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भारत सरकार GOVERNMENT OF INDIA
रेल मंत्रालय MINISTRY OF RAILWAYS



VANDE BHARAT EXPRESS TRAINSET (V2.0) MAINTENANCE MANUAL

Volume 3 – Part III
Furnishing Items & Passenger Amenities`

IRCAMTECH/GWL/2022-23/T-18/MM/2.0
SEPTEMBER, 2022



Indian Railways
Centre for Advanced Maintenance Technology

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Amendment and Revisions

The correction slips to be issued in future for this report will be numbered as follows:

IRCAMTECH/GWL/2022-23/T-18/MM/2.0# XX date

Where “XX” is the serial number of the concerned correction slip (starting from 01 onwards).

Version	Date	Corrections	Remarks
1.0	AUGUST 2020	First Release	For first and second rake of the VBE trainset manufactured by ICF.
2.0	SEPTEMBER 2022	Second Release	For 44 rakes of VBE trainset (Third rake onwards).



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All technical information and guidelines are latest at the time of publishing and are subjected to change due to technology updates and requirements.

Introduction

This volume of the maintenance manual contains maintenance/ operational/ installation related document from various OEM associated with different system and components of Trainset. For ease of understanding and for simplification the document, this volume has been divided into 5 parts to divide the large document for ease of download and navigation. These are:

PART - 1

- Bogie
- Couplers

PART - 2

- Electro-Pneumatic Brakes and Air Supply

PART - 3

- Furnishing Items
- Passenger Amenities

PART - 4

- Propulsion System

PART - 5

- Train Lighting & Air-conditioning

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Technical Description

ICF

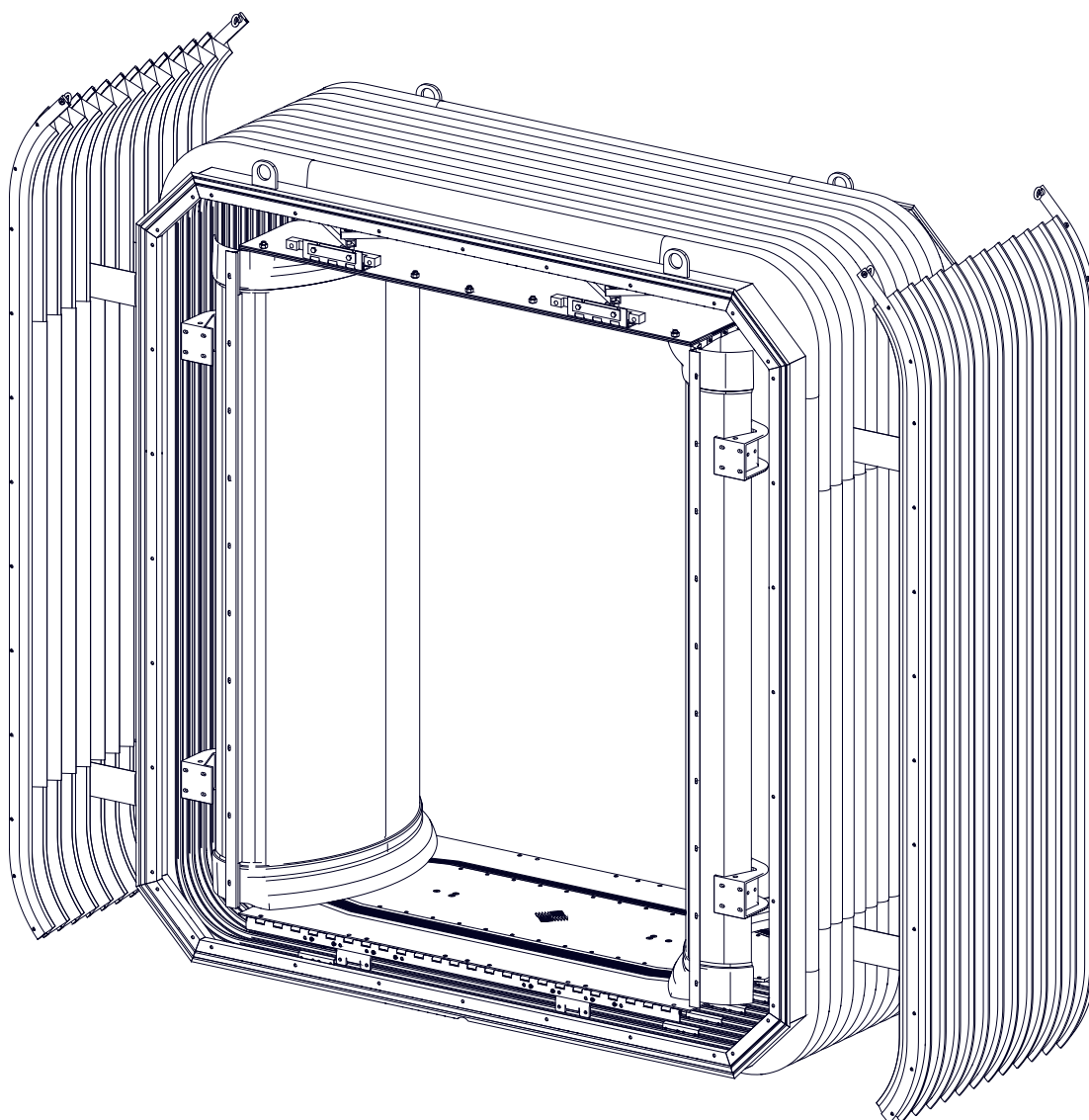
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Gangway, assy. mounting

041448517

ICF / Train 18



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Document revision	-	Company / Department
Datum	2018-05-14	HÜBNER GmbH & Co. KG / SC KE
		Name
Prepared		<i>H. Fuhrmann</i>
Checked / Approved		<i>S. Tatzel</i>

0 List of revisions


Revision	Date	Name	Modifications	Page(s)
-	2018-05-14	Frm-Tat	First issue	all
A				
B				

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1 Safety

1.1 General

Attentively read the Technical Description prior to taking the gangway into operation and/or proceeding with maintenance tasks in order to avoid accidents or damage.
Note the safety information within the separate chapters!

Endangering passengers, train staff and operating personnel has to be avoided by appropriate hazard avoiding measures by the operator.

1.2 Safety information

This Technical Description contains the following safety information:



CAUTION / ATTENTION

Information about a risk which, when not being obeyed, can lead to bodily injury and/or extensive material damage.



NOTICE

Important information, which has to be additionally noted.

1.3 Usage as directed

The gangway is designed by the manufacturer to exclusively meet the requirements of the operating conditions. The manufacturer cannot be held liable if operating conditions are changed without prior notice to the manufacturer.

The operating conditions for usage as directed include:

- Maintaining the standard according to the technical data
- Movements and operating conditions permitted by the manufacturer
- Environment (temperature, humidity, pressure, dust)
- Usage of original accessories (components)
- Observance of this Technical Description



CAUTION


Danger of falling.
Injury and material damage possible.
➤ Do not step onto and/or walk on the roof area respectively inside of the bellows.



CAUTION / ATTENTION

Danger of damage.
Injury and material damage possible.
➤ Movements with max. height misalignment which might occur e.g. in failure cases do require an unmounting of the linking ceiling and side walls.

Usage beyond and exceeding these limits is considered inappropriate. The manufacturer will not be liable for such claims.

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2 Introduction

The gangway is the flexible part of the train, allowing the relative movements between the wagons and offering passengers a secure and comfortable passageway.

3 Product Description

3.1 Product breakdown structure

The main assembly groups/components of the gangway are shown in Illustration 1:

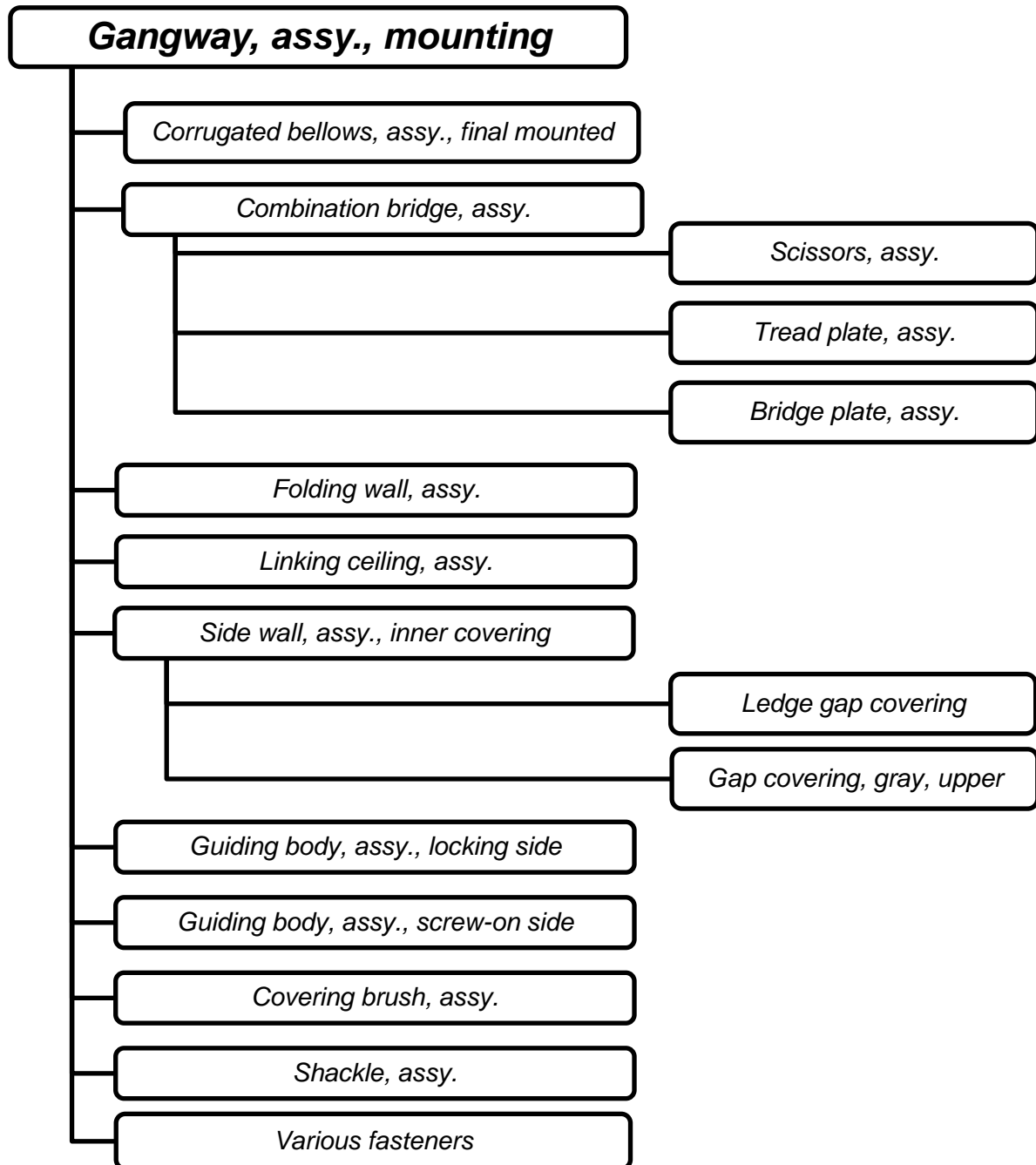
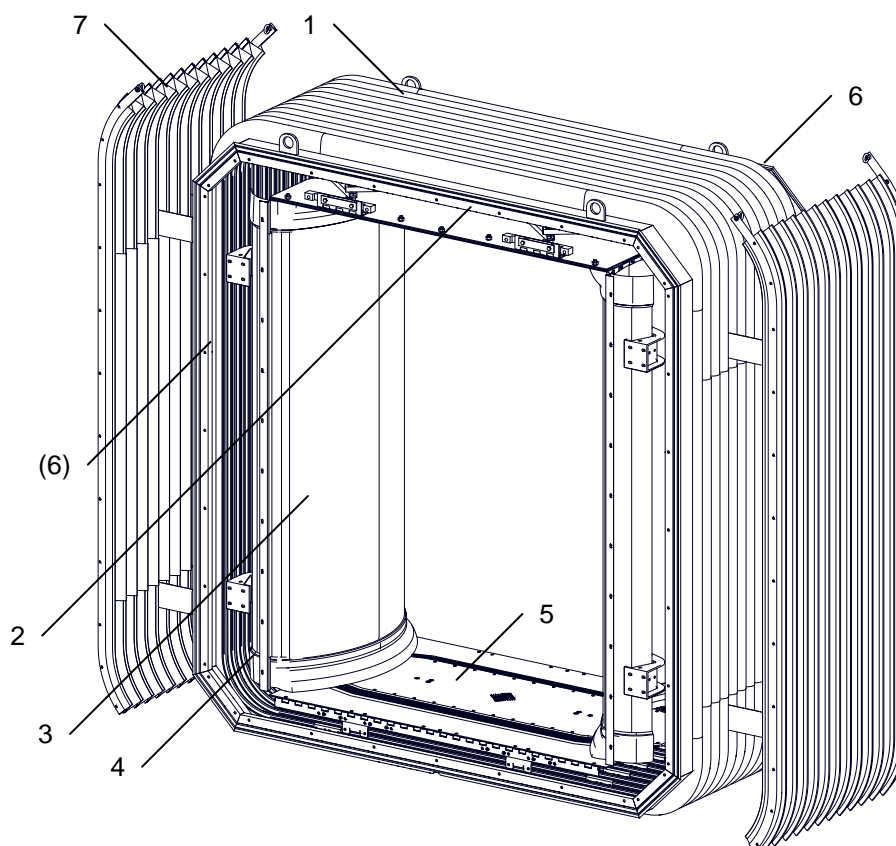


Illustration 1: Main assembly groups/components

The following illustrations show the above mentioned assembly groups, sub-assembly groups and components:

3.2 Graphical representation



1	<i>Corrugated bellows, assy., mounted</i>	2	<i>Linking ceiling, assy.</i>
3	<i>Side wall, assy. inner covering</i>	4	<i>Covering brush, assy.</i>
5	<i>Combination bridge, assy.:</i>	6	<i>Screw-on frame</i>
7	<i>Folding wall, assy.</i>		

Illustration 2: Gangway, assy. mounting

3.3 Detailed description

3.3.1 Gangway, assy. mounting

The Gangway, assy. mounting comprises the Corrugated bellows, assy. final mounted, the combination bridge, assy., the folding wall, the Linking ceiling, assy., two Side walls, assy. inner covering, four covering brushes, assy., two guiding body, assy., locking side, two guiding body, assy., screw-on side, four shackles, assy. and fasteners.

3.3.1.1 Corrugated bellows, assy. final mounted

The corrugated bellows, assy. final mounted comprises the corrugated bellows, assy., the Screw-on frames, the Sealing profiles as well as fasteners.

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Corrugated bellows

The corrugated bellows is comprising flexible material corrugations which are open towards the inside. The material corrugations, made out of a special material, are connected to each other on the inner side with crimped-on aluminum frames.

Screw-on frame

Each screw-on frame consists of welded aluminum profiles. The screw-on frame ensures the frictional connection of the corrugated bellows to the wagon-interface.

3.3.1.2 Combination bridge, assy.

The combination bridge consists of the scissors system, the bridge plates (wagon sided) and the tread plate (middle).

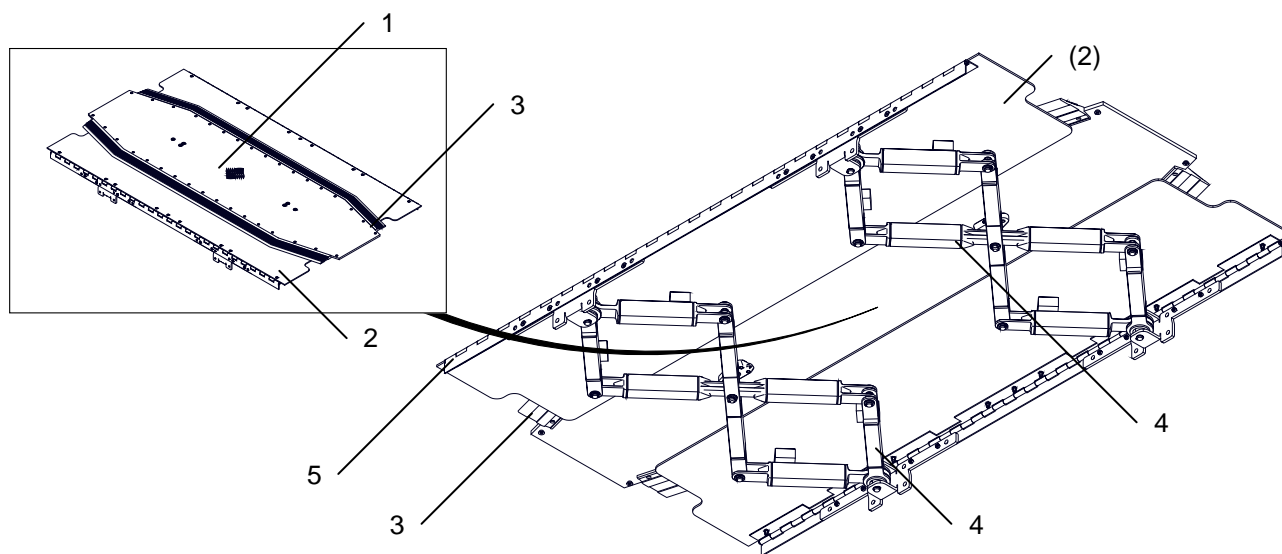
The combination bridge when mounted between the carbodies is self-supporting and does not require a coupler support or any other support.

Specific provisions at the carbody interfaces like boxes to support the bridge are not required.

The scissors system supports both screw-on frames sided bridge plates. It ensures a consistent level of the bridge plates independently of the particular movement situation. On the top of the scissors system sliding ledges are mounted on which the bridge plates rest during operation.

The scissors system is mounted on both sides to the wagon-interfaces. The flexible mounting of the scissors system allows compensating the various relative movements.

The connection of the tread plate to the scissors ensures that there are no gaps during all relative movements including roll.



1	<i>Tread plate</i>	2	<i>Bridge plate</i>
3	<i>Sliding ledge</i>	4	<i>Scissors system</i>
5	<i>Hinge</i>		

Illustration 3: Combination bridge, assy., view from underside

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3.3.1.3 Folding wall, assy.

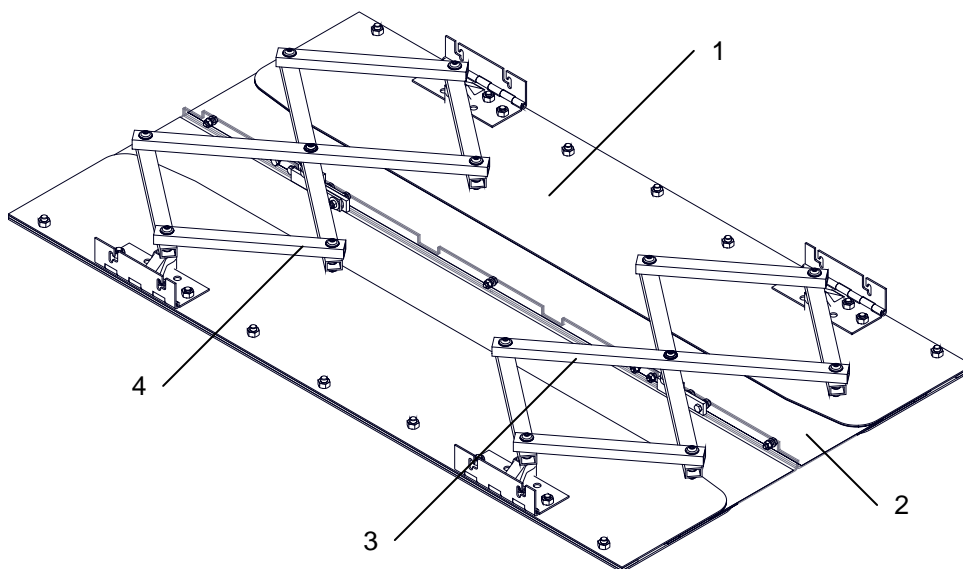
The folding wall, assy., closes the lateral gap between the two end walls of the wagon. It protects the bellows behind it from vandalism and improved the aerodynamic performance of the train.

3.3.1.4 Linking ceiling, assy.

The linking ceiling comprises one simple and two slotted ceiling plates. Their shape suits the relative movements of the wagons to each other. A scissors suspension ensures that the simple ceiling plate is properly positioned and guided inside the slotted ceiling plates.

The linking ceiling is by means of hinges and shackles attached to the wagon-interfaces. The advantage of attaching the ceiling to the wagon-interfaces is that it can be easily mounted and unmounted.

The specially designed linking ceiling parts allow all relative movements between the wagons. All mounting and bearing parts of the linking ceiling are not visible to the passenger.



1	<i>Lamella, assy. screw-on side</i>	2	<i>Lamella, assy. center part</i>
3	<i>Tube, long</i>	4	<i>Tube, short</i>

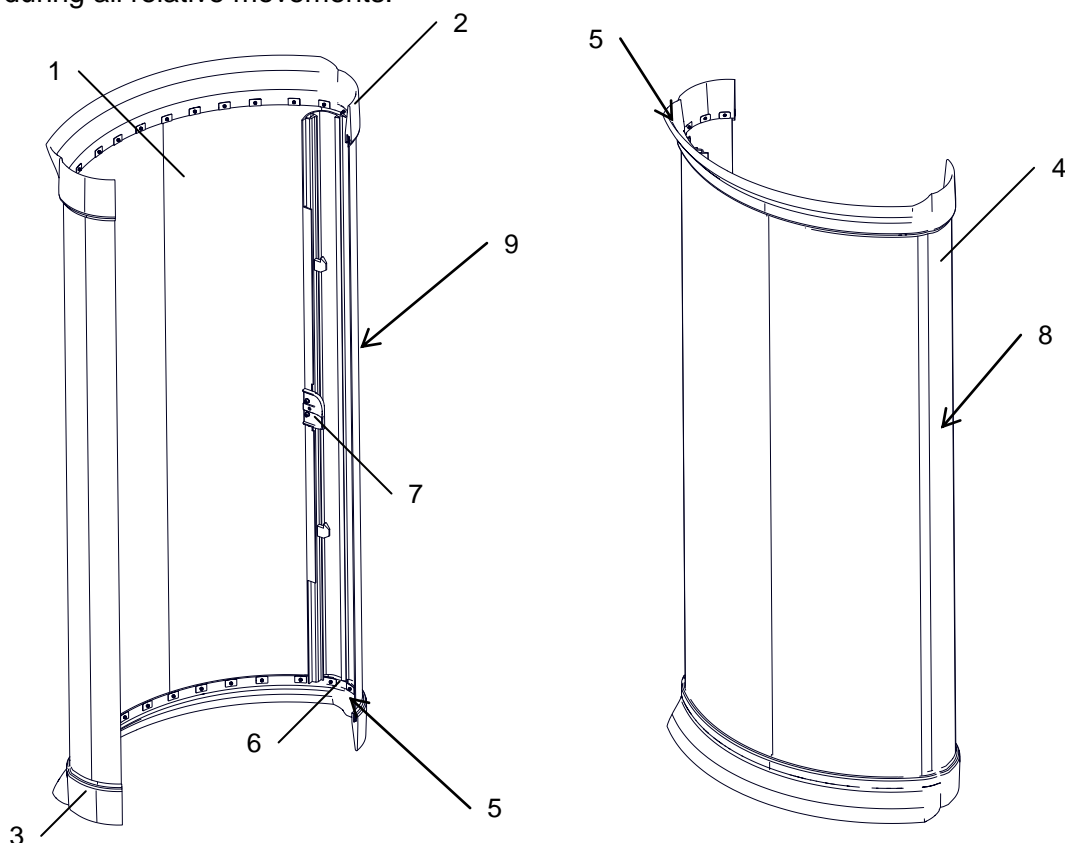
Illustration 4: Linking ceiling, assy.

3.3.1.5 Side wall, assy.

The side wall is made of two roll bodies rotating around vertical axes. The roll bodies are connected to each other through a vaulted flexible side part. The roll bodies of the side wall are bolted resp. locked to the guiding bodies. The specially designed side parts allow all relative movements between the wagons.

The side parts are vaulted towards the passageway by a special pre-tension.

Its one piece design with a decorative surface ensures that there are no gaps and no moving edges during all relative movements.



1	Side panel, assy.	2	Gap covering, upper
3	Gap covering, lower	4	Roll body
5	Short screws	6	Locking hook (of side wall)
7	Lead-in latch	8	Side wall, screw-on side
9	Side wall, locking side		

Illustration 5: Side wall, assy. (front and rear view)

Pinching protection

One piece gap coverings without any seam are used to cover the gaps between the side walls and the bridge plates, as well as the gaps between the side walls and the linking ceiling.

The for passengers invisible locking/unlocking mechanism of the side wall behind this gap covering avoids unallowed access and opening through unauthorized passengers

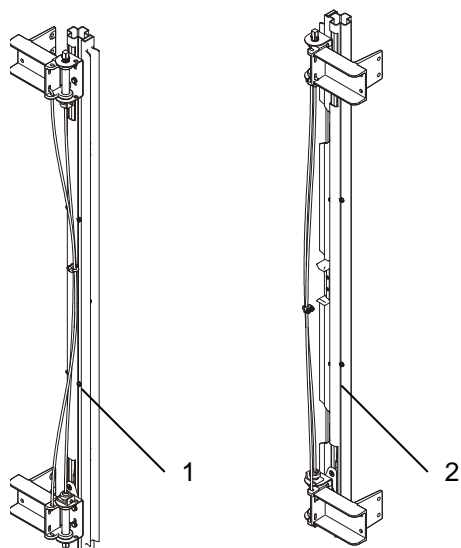
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3.3.1.6 Guiding body, assy. screw-on side and locking side

The guiding bodies, which include also the holders receiving the side walls, are bolted to the wagon-interfaces.

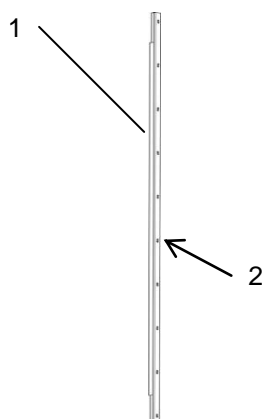


1	<i>Guiding body, assy., screw-on side</i>	2	<i>Guiding body, assy., locking side</i>
---	---	---	--

Illustration 6: Guiding body, assy., screw-on side and locking side (schematic)

3.3.1.7 Covering brush, assy.

Vertical brushes are attached to both wagon-interfaces (left and right hand side) in order to cover the small gap between the roll bodies and the carbody interface.



1	<i>Bristles (brush)</i>	2	<i>Attachment to wagon-interface</i>
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Illustration 7: Covering brush, assy. (schematic)

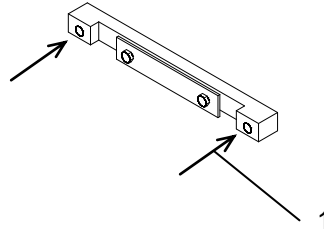
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3.3.1.8 Shackle, assy.

The shackles are made of stainless steel and are mounted to the wagon-interfaces (2 per wagon-interface) in order to receive the linking ceiling.



1	Attachment to wagon-interface	
---	-------------------------------	--

Illustration 8: Shackle, assy. (schematic)

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4 Technical data

4.1 Main dimensions

Distance between wagon-interfaces:	900 mm
Clear passage height:	1953,5 ±5 mm
Clear passage width (at half height):	approx. 1150 mm
Max. speed:	160 km/h
Max. bridge system load:	435 kg (6 pers/m ² with 70 kg/pers)

4.2 Weight

Gangway, assy. mounting	394 kg ±10 %
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4.3 Materials

• Corrugated bellows, assy.	
• Corrugated bellows	Bellows fabric with proven service life of more than 12 years, Aluminium profiles
• Screw-on	Aluminium profiles
• Side walls	GRP, Aluminium, Rubber, Stainless Steel
• Linking ceiling	Aluminium, Stainless Steel
• Guiding bodies	Aluminium profile
• Combination bridge	Aluminium plates, Stainless Steel, Sliding material

4.4 Fire behaviour

The non-metallic materials used for the gangway meet the fire requirements according to the following standard:

- EN 45545 HL2

4.5 Sound insulation

Due to experiences in laboratories with similar gangways a sound insulation of the mounted bellows of $R_w = 27$ dB can be expected.

4.6 Operating temperature

The operating temperature is approx. -30 °C to +80 °C in case of normal environmental influences.

4.7 Service life

The gangway system can achieve a life time of up to 12 years under normal conditions of use and performed maintenance as specified. This is a non-binding forecast based on experience and does not constitute any guarantee or warranty claims.

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5 Transport and Storage

5.1 Transport



ATTENTION

Material damage possible.

Obey the instructions on the transport-packaging regarding the removal of the gangway(s) respectively the assembly groups/components!



ATTENTION

Material damage possible.

For transport or shunting movements secure or support one-sided mounted gangways resp. bellows, with appropriate means to avoid damage.

Generally the following specifications and instructions for the transportation of the gangways resp. the sub-components/sub-assembly groups have to be obeyed:
The gangways resp. the sub-components/sub-assembly groups are suitably packaged and are delivered with elements for stabilization if applicable.

5.2 Storage



ATTENTION

Material damage possible.

If applicable obey the instructions on the wooden crates regarding the removal out of the packaging of the gangways resp. the sub-components/sub-assembly groups!

The gangways resp. the sub-components/sub-assembly groups can be stored on a wooden support standing upright. The room for storage has to be dry and well ventilated.



CAUTION

Unsecured or tipping over components.

Risk of injury and material damage possible.

- Secure the gangways resp. the sub-assembly groups/components against tipping over.

The wooden crate containing the remaining assembly groups/components has to be stored as well in a dry and well ventilated room.

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6 Mounting

6.1 Personnel qualification

Mounting and commissioning of a passenger gangway can only be executed by authorized technical personnel or by authorized personnel with comparable mechanical knowledge.

6.2 General information



ATTENTION

For mounting procedure in any case use besides the mounting instruction also the corresponding HÜBNER-drawings.



ATTENTION

Note the accident prevention and safety regulations as well as the industrial safety regulations.



WARNING

Danger of injury or running over.
Severe injury or death possible.

- Prior to mounting works secure the wagons against rolling away.



CAUTION

Danger of falling.
Injury and material damage possible.

- Do not step onto and/or walk on the roof area of the bellows.



ATTENTION

Material damage possible.

- Secure or support one-sided mounted gangways/bellows with appropriate means to avoid damage.



NOTICE

Apply suitable thread locking fluid (e.g. "Loctite 243") to all screw connections during mounting. Exception microcapsulated screws!



NOTICE

Fasteners for attachment of the gangway/bellows are not in the scope of supply of HÜBNER.
This excludes also the specification of tightening torques for the assembly of these components.

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6.3 Special tools and aid

6.3.1 Tools

- Overhead crane with a capacity of at least 600 kg
(ensure to maintain the normal position as described)
- Fork lift
- Ropes for mounting purposes (carrying ropes)
- Standard-Work shop equipment and tools
- Hollow square spanner (9 mm)

6.3.2 Special tools

None.

6.4 Mounting preparation

The following components have to be available (acc. to BOM 04144851700):

Item 1:	1 pc.	Corrugated bellows, assy. final mounted
Item 2:	1 pc.	Folding wall, assy.
Item 3:	1 pc.	Combination bridge, assy.
Item 4:	1 pc.	Linking ceiling, assy.
Item 5:	2 pc.	Side wall, assy. inner covering
Item 6:	2 pc.	Guiding body, assy. locking side
Item 7:	2 pc.	Guiding body, assy. screw-on side
Item 8:	4 pc.	Covering brush, assy.
Item 9:	4 pc.	Shackle, assy.
Item 12:	4 pc.	Socket cap screw DIN 6912-M8x30-A2
Item 13:	4 pc.	Washer DIN 433-8.4-140 HV-A2
Item 15:	24 pc.	Socket cap screw DIN 912-M6x12-A2-70
Item 16:	48 pc.	Washer DIN 9021-6,4-140 HV-A2P
Item 17:	24 pc.	Cap nut DIN 1587-M6-A2-70

The fasteners required to mount items 1– 3 and 6 – 9 to the wagon end wall have to be supplied by the customer.



ATTENTION

Material damage possible.

- The gangway system shall not stay only mounted to one wagon interface. Always mount the gangway system to both wagon interfaces



NOTICE

Ensure that prior to mounting the gangway system the first time, the stabilization elements and their fasteners which were attached for transportation purpose are removed.

Wagon-interfaces – Hole patterns:



NOTICE

The hole patterns of the wagon-interfaces of the vehicles receiving the screw-on frames and guiding bodies have to exist (performed by customer). Maintain the true positions of the holes!

Wagon-interfaces – Flatness:

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NOTICE

Ensure that the wagon-interface(s) have a surface flatness of ± 1.5 mm/500 mm.
No steps allowed!

Wagon-interfaces – Cleanliness:



NOTICE

Ensure the cleanliness of the mounting surfaces at the wagon-interfaces and the gangway (both screw-on frames) prior to mounting!

Verification of condition of rubber seals:



NOTICE

Ensure that the rubber seals of the screw-on frames are not damaged (e.g. torn, brittle) and there is no rippling!

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6.5 Tightening torques

None of the fasteners to attach the gangway system to the wagon-interfaces are included in the scope of supply of HÜBNER GmbH & Co. KG. The tightening moment (depending on the grade and type of fasteners coming to application) are given for reference and maintenance purpose.

Source: DIN 25201-2: 2015-12 Design guide for railway vehicles and their components – Bolted joints – Part 2: Design – Mechanical applications

Thread	Strength Class	F_M in N for μ_G							M_A in Nm for μ_K						
		0,08	0,09	0,1	0,12	0,14	0,16	0,20	0,08	0,09	0,1	0,12	0,14	0,16	0,20
M4	8.8	4,6	4,6	4,5	4,4	4,3	4,2	3,9	2,3	2,4	2,6	3,0	3,3	3,6	4,1
	10.9	6,8	6,7	6,7	6,5	6,3	6,1	5,7	3,3	3,6	3,9	4,6	4,8	5,3	6,0
	A2-70	3,3	3,2	3,2	3,1	3,0	2,9	2,8	1,6	1,7	1,8	2,1	2,3	2,5	2,9
	A4-80	4,4	4,3	4,3	4,1	4,0	3,9	3,7	2,1	2,3	2,5	2,8	3,1	3,4	3,8
M5	8.8	7,6	7,5	7,4	7,2	7,0	6,8	6,4	4,4	4,8	5,2	5,9	6,5	7,1	8,1
	10.9	11,1	11,0	10,8	10,6	10,3	10,0	9,4	6,5	7,0	7,6	8,6	9,5	10,4	11,9
	A2-70	5,3	5,3	5,2	5,1	4,9	4,8	4,5	3,1	3,4	3,6	4,1	4,6	5,0	5,7
	A4-80	7,1	7,0	6,9	6,8	6,6	6,4	6,0	4,1	4,5	4,8	5,5	6,1	6,6	7,6
M6	8.8	10,7	10,6	10,4	10,2	9,9	9,6	9,0	7,7	8,3	9,0	10,1	11,3	12,3	14,1
	10.9	15,7	15,5	15,3	14,9	14,5	14,1	13,2	11,3	12,2	13,2	14,9	16,5	18,0	20,7
	A2-70	7,5	7,4	7,3	7,2	7,0	6,8	6,4	5,4	5,8	6,3	7,1	7,9	8,6	9,9
	A4-80	10,0	9,9	9,8	9,5	9,3	9,0	8,5	7,2	7,8	8,4	9,5	10,5	11,5	13,2
M8	8.8	19,5	19,3	19,1	18,6	18,1	17,6	16,5	18,5	20,1	21,6	24,6	27,3	29,8	34,3
	10.9	28,7	28,4	28,0	27,3	26,6	25,8	24,4	27,2	29,5	31,8	36,1	40,1	43,8	50,3
	A2-70	13,7	13,6	13,4	13,1	12,7	12,4	11,7	13,0	14,1	15,2	17,3	19,2	21,0	24,1
	A4-80	18,3	18,1	17,9	17,5	17,0	16,5	15,6	17,3	18,8	20,3	23,0	25,6	28,0	32,1
M10	8.8	31,0	30,7	30,3	29,6	28,8	27,9	26,3	36	40	43	48	54	59	68
	10.9	45,6	45,1	44,5	43,4	42,2	41,0	38,6	53	58	63	71	79	87	100
	A2-70	21,8	21,6	21,3	20,8	20,3	19,7	18,6	26	28	30	34	38	41	48
	A4-80	29,1	28,8	28,5	27,8	27,0	26,3	24,8	34	37	40	45	51	55	64
M12	8.8	45,2	44,7	44,1	43,0	41,9	40,7	38,3	63	68	73	84	93	102	117
	10.9	66,3	65,7	64,8	63,2	61,5	59,8	56,3	92	100	108	123	137	149	172
	A2-70	31,8	31,4	31,1	30,3	29,5	28,7	27,1	44	48	52	59	65	72	82
	A4-80	42,4	41,9	41,4	40,4	39,4	38,3	36,1	59	64	69	78	87	95	110
(M14)	8.8	62,0	61,1	60,6	59,1	57,5	55,9	52,6	100	108	117	133	148	162	187
	10.9	91,0	89,7	88,9	86,5	84,4	82,1	77,2	146	159	172	195	218	238	274
	A2-70	43,4	43,0	42,5	41,4	40,3	39,2	37,0	70	76	82	94	104	114	131
	A4-80	57,9	57,3	56,6	55,2	53,8	52,3	49,3	93	102	110	125	139	152	175
M16	8.8	84,7	84,0	82,9	80,9	78,8	76,6	72,2	153	167	180	206	230	252	291
	10.9	124,4	123,4	121,7	118,8	115,7	112,6	106,1	224	245	264	302	338	370	428
	A2-70	59,7	59,1	58,4	57,1	55,6	54,1	51,1	108	117	127	145	162	178	206
	A4-80	79,6	78,8	77,9	76,1	74,1	72,2	68,1	143	157	169	193	216	237	274
M20	8.8	136	135	134	130	127	123	116	308	336	363	415	464	509	588
	10.9	194	193	190	186	181	176	166	438	479	517	592	661	725	838
	A2-70	93	92	91	89	87	84	80	210	229	248	284	317	347	402
	A4-80	124	123	122	119	116	113	106	280	306	331	378	422	463	536
M24	8.8	196	195	192	188	183	178	168	529	579	625	714	798	875	1011
	10.9	280	277	274	267	260	253	239	754	825	890	1017	1136	1246	1440
	A2-70	134	133	131	128	125	122	115	362	395	427	488	545	598	691
	A2-50	63	62	61	60	58	57	54	169	184	199	228	254	279	322

Table 1: Tightening torques

6.6 Mounting the components/assembly groups

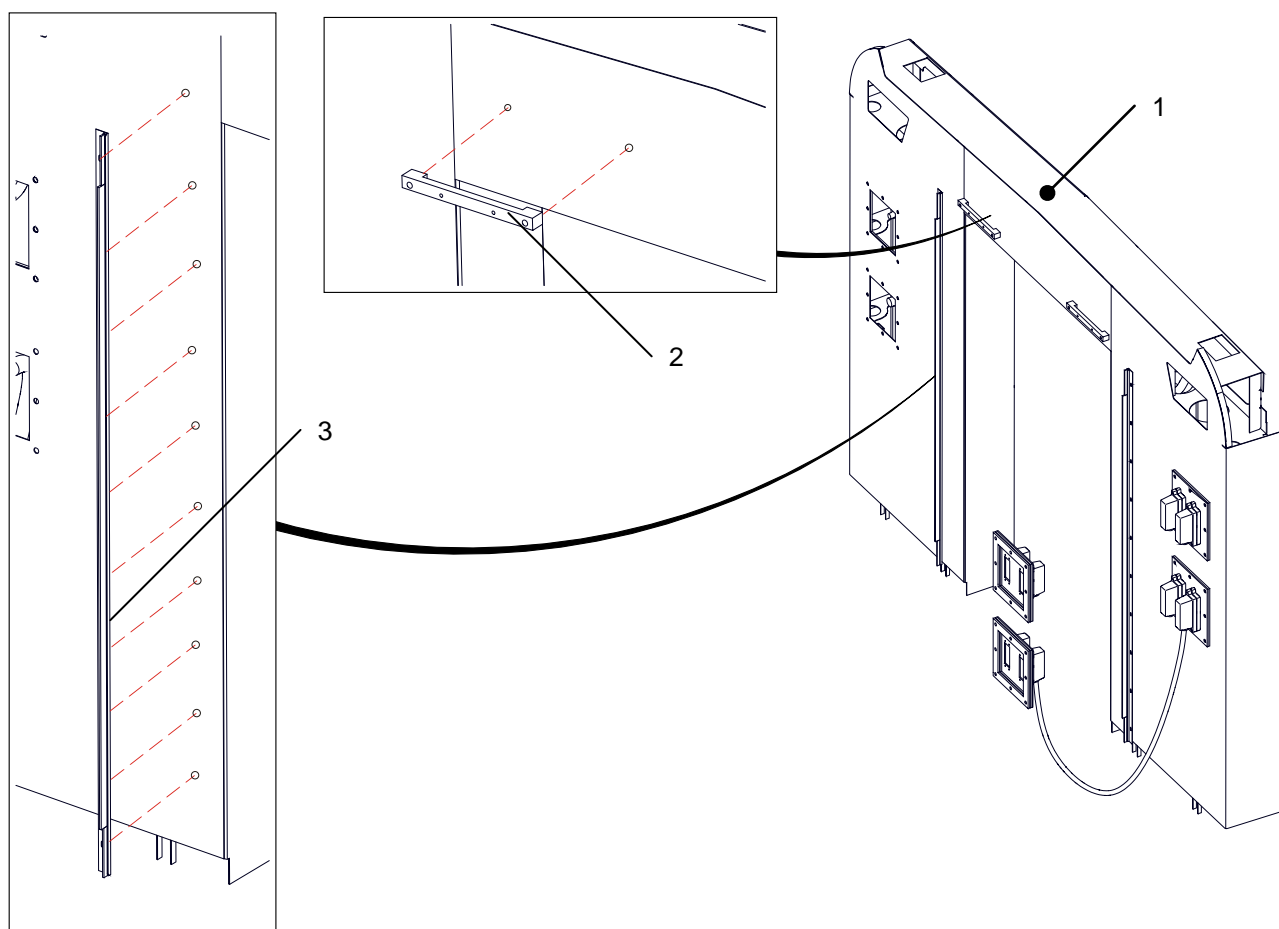
6.6.1 Mounting the loose parts - Overview

Both wagon-interfaces have to have the hole pattern to receive:

- the screw-on frames of the "corrugated bellows, assy. final mounted"
- the folding wall
- the combination bridge,
- the covering brushes,
- the guiding bodies and
- the shackles.

Mount the following components to each wagon-interfaces acc. to drawing 01448517:

- 4 pc. Covering brush, assy.
- 4 pc. Shackle, assy.



1	Wagon-interface	2	Shackle
3	Covering brush		

Illustration 9: Mounting parts – Wagon-interface No. 1 and No. 2 (No. 2 = opposite side)

6.6.1.1 The covering brushes to the wagon-interfaces

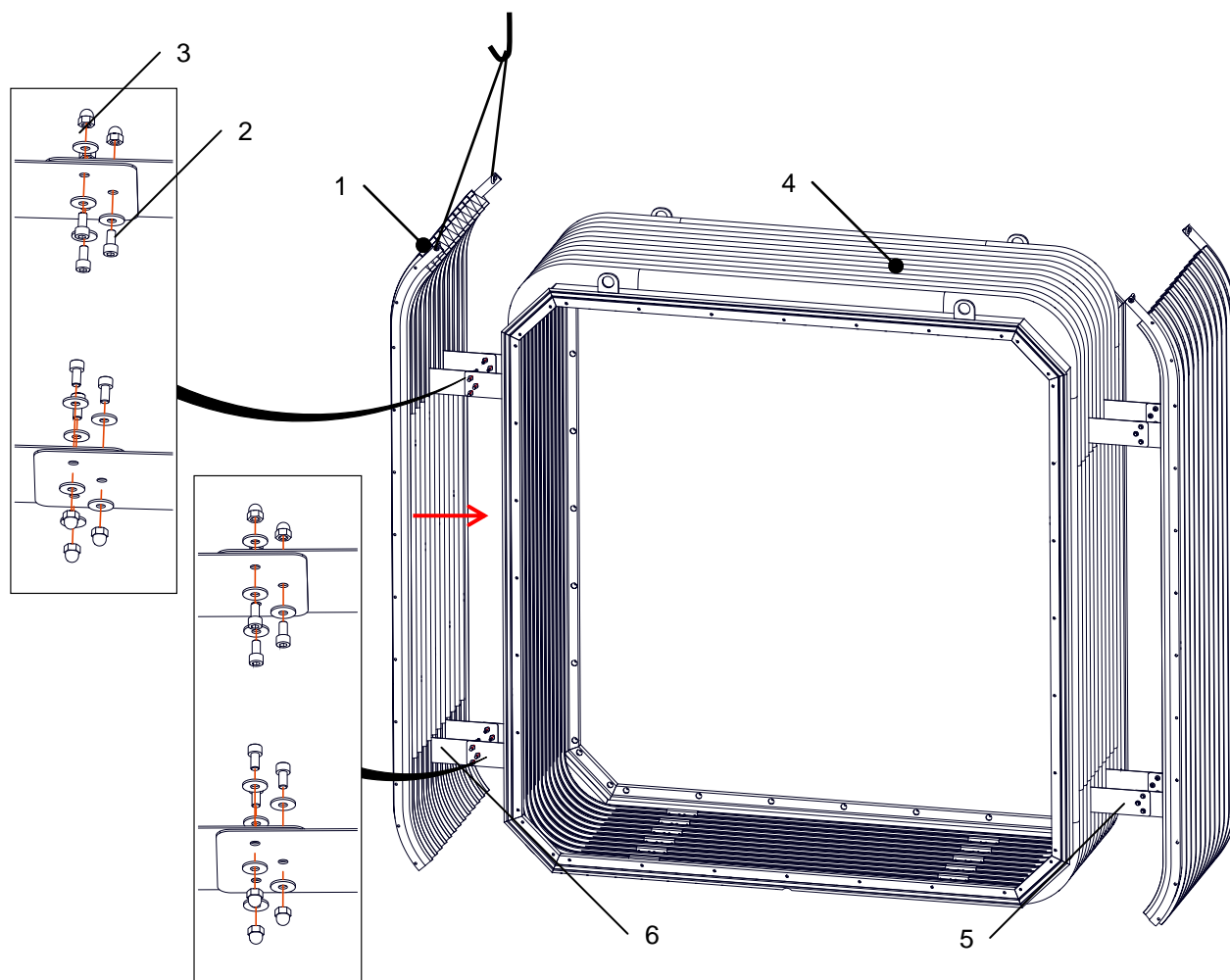
- Bolt the covering brushes to the wagon-interfaces (each 10x M6). Refer to Illustration 9.

6.6.1.2 The shackles to the wagon-interfaces

- Bolt two shackles (receiving later-on the linking ceiling) to each wagon-interface. Each 2x M10 – refer to Illustration 9.


6.6.2 The folding wall, assy. to the corrugated bellows

1. Lift the folding walls by means of a crane and bring it into approximate mounting position.
2. Bolt with screws, washers and nuts the connecting plates of the folding wall with the connecting plates of the corrugated bellows.
3. Perform the same procedure for the other folding wall.



1	<i>Folding wall, assy.</i>	2	<i>Screw and washer</i>
3	<i>Nut and washer</i>	4	<i>Corrugated bellows, assy., final mounted</i>
5	<i>Connecting plate (bellows)</i>	6	<i>Connecting plate (folding wall)</i>

Illustration 10: Mounting folding wall, assy. on corrugated bellows

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6.6.3 The corrugated bellows, final mounted to wagon interfaces



ATTENTION

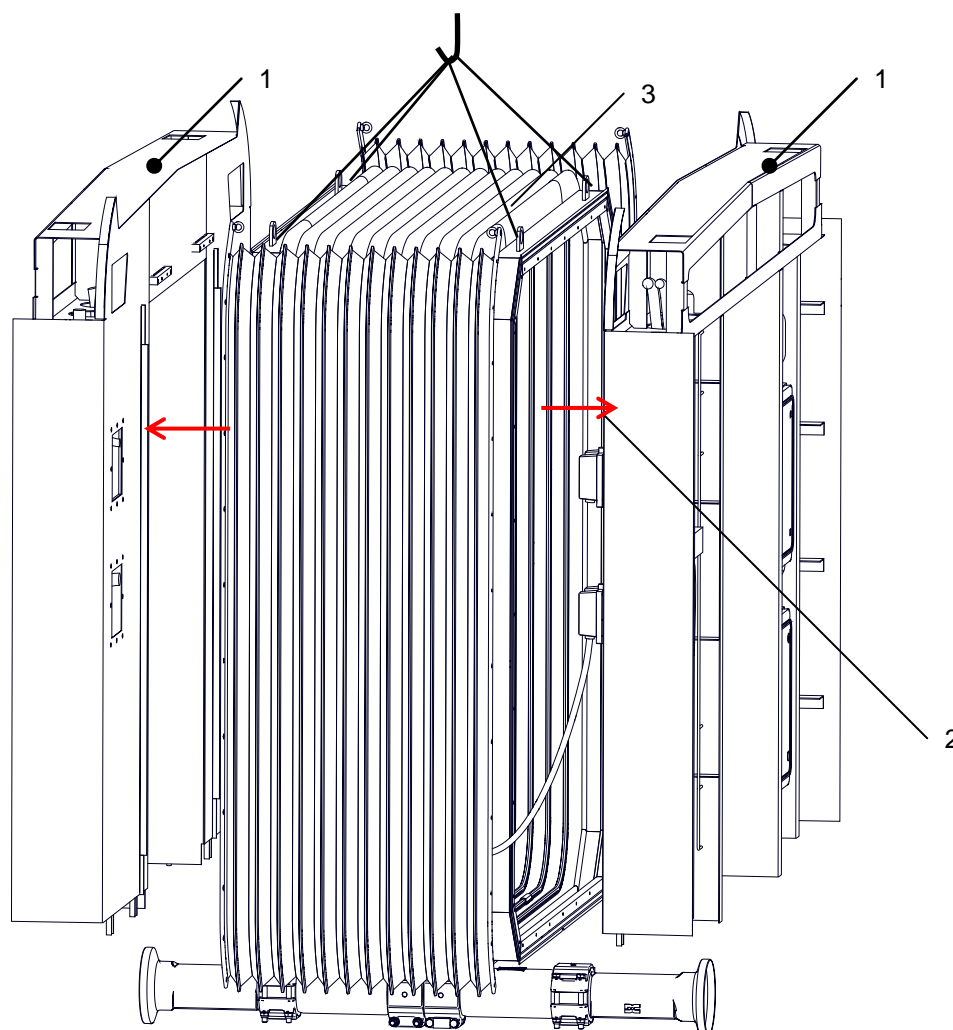
Material damage possible.

- Ensure that for lifting the corrugated bellows, always all four crane lugs are used and that the load is distributed equally to all of them. Please also refer to the illustration below.

1. Couple the wagon coupling of the cars.
2. Lift the corrugated bellows by means of a crane and bring it into approximate mounting position between the wagons.
3. Align the hole pattern of the wagon-interface and the screw-on frame. Screw the screw-on frame of the corrugated bellows to the wagon- interface.
4. Repeat the previous step at the other wagon-interface.
5. Bolt on the screw-on frames of the folding walls to the wagon interfaces.

After mounting the “Corrugated bellows, assy. final mounted” mount the following components to the wagon-interfaces acc. to drawing 041448517:

- 1 pc. Combination bridge, assy. (refer to Chap. 6.6.4)
- 1 pc. Linking ceiling, assy. (refer to Chap.6.6.5)
- 2 pc. Guiding body, assy. screw-on frame side (refer to Chap. 6.6.7)
- 2 pc. Guiding body, assy. locking side (refer to Chap. 6.6.7)
- 2 pc. Side wall, assy. (refer to Chap. 0)

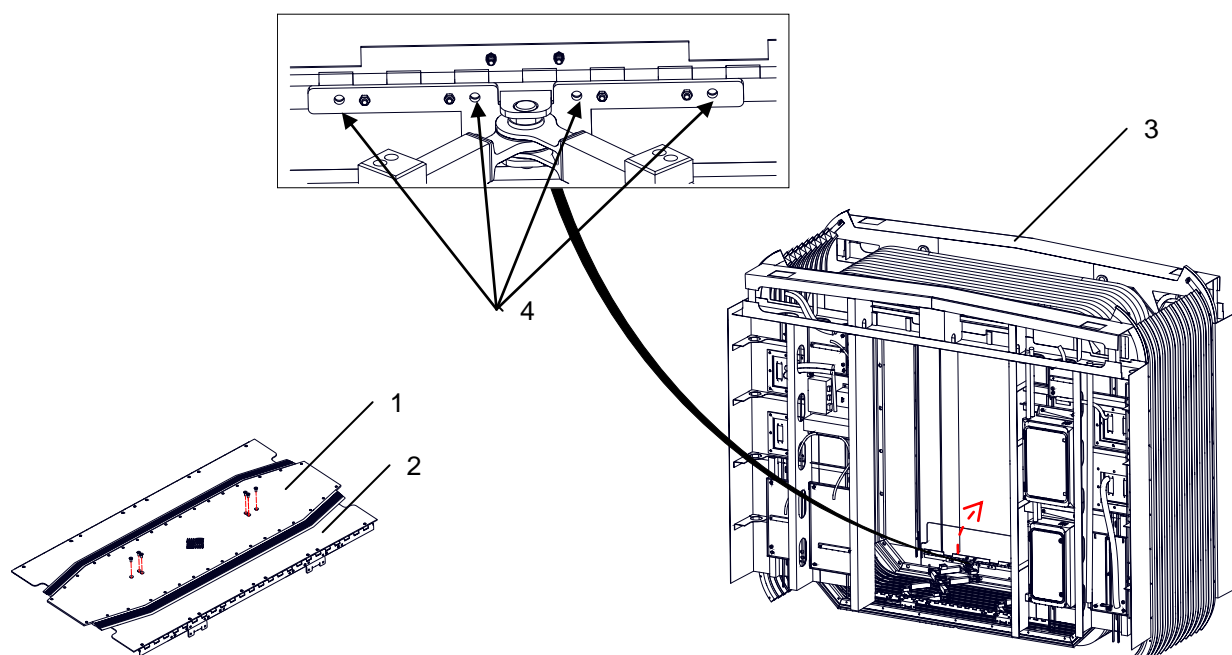


1	<i>Wagon-interface</i>	2	<i>Bolt Bellows to hole pattern of wagon-interface all around contour</i>
3	<i>Corrugated bellows, assy., final mounted</i>		

Illustration 11: Mounting corrugated bellows on vehicle interfaces

6.6.4 The combination bridge, assy.

1. Before installing the combination bridge, assy. between the wagon interfaces. Unscrew the six screw of the tread plate and remove the tread plate. (see Illustration 12)
2. Insert the combination bridge into the corrugated bellows.
3. Flip up the wagon sided bridge plates of the combination bridge.
4. Screw the combination bridge to the vehicle interface near the scissors by using appropriated screws.
5. Bolt the combination bridge to the vehicle interface on the other side near the scissors using screws.
6. Flip down the bridge plates.
7. Put in the tread plate and bolt it on with the six screws.



1	Tread plate, assy.	2	Bridge plate, assy.
3	Wagon interface	4	Holes for screws

Illustration 12: Mounting combination bridge, assy.

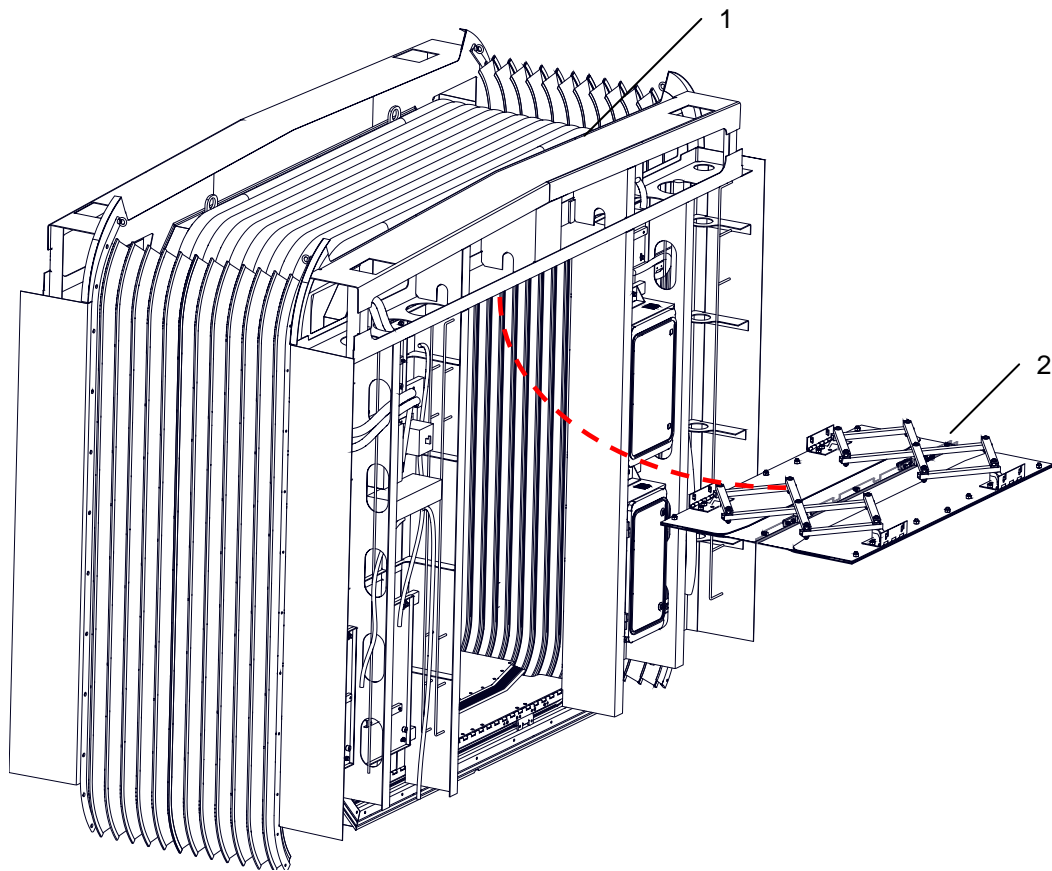
6.6.5 The linking ceiling

Mounting of the linking ceiling requires two persons.

1. Compress the unmounted linking ceiling by pushing the outer ceiling plates onto the middle (simple) ceiling plate.
2. Bring the linking ceiling into mounting position into the gangway area.
3. Bolt the hinges (per hinge 2x M8) of the linking ceiling to the already mounted shackles of the screw-on frame side No. 1 by sliding the hinges of the linking ceiling **in-between** the plate of the shackle and the shackle body - refer also to Illustration 14.
Note: The attachment drillings of the rod hinges are slots (refer to Illustration 14) in order to be able to align the height of the linking ceiling with the interior lining in the respective area. Place (hang) the hinges onto the screws before used to bolt the shackles to the wagon-interfaces.
4. Tighten the attachment screws of the linking ceiling (per hinge 2x) by reaching into the gap between wagon-interface and linking ceiling using a flat open-end spanner (Size 13).
5. Repeat on 2nd wagon-interface.

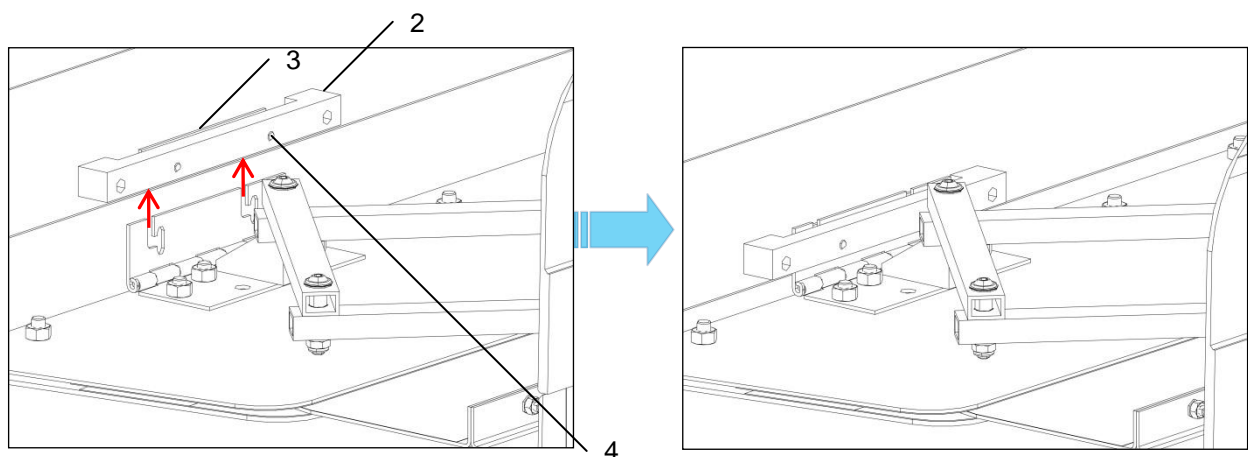
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1	Wagon-interface	2	Linking ceiling
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Illustration 13: Mounting the linking ceiling to the shackles already mounted to the wagon-interfaces



1	Wagon-interface	2	Shackle
3	Plate	4	Screw

Illustration 14: Mounting the linking ceiling to the shackles already mounted to the wagon-interfaces (schematic)

6.6.6 Handling – Height adjustment of linking ceiling

1. The attachment screws of the linking ceiling can be loosened through the horizontal gaps between wagon-interface and linking ceiling element using a flat open end spanner size 13.
2. Adjust the height of the linking ceiling successively on each side is up to ± 5 mm possible to meet the interior lining. After height adjustment retighten the attachment screws at the required height.

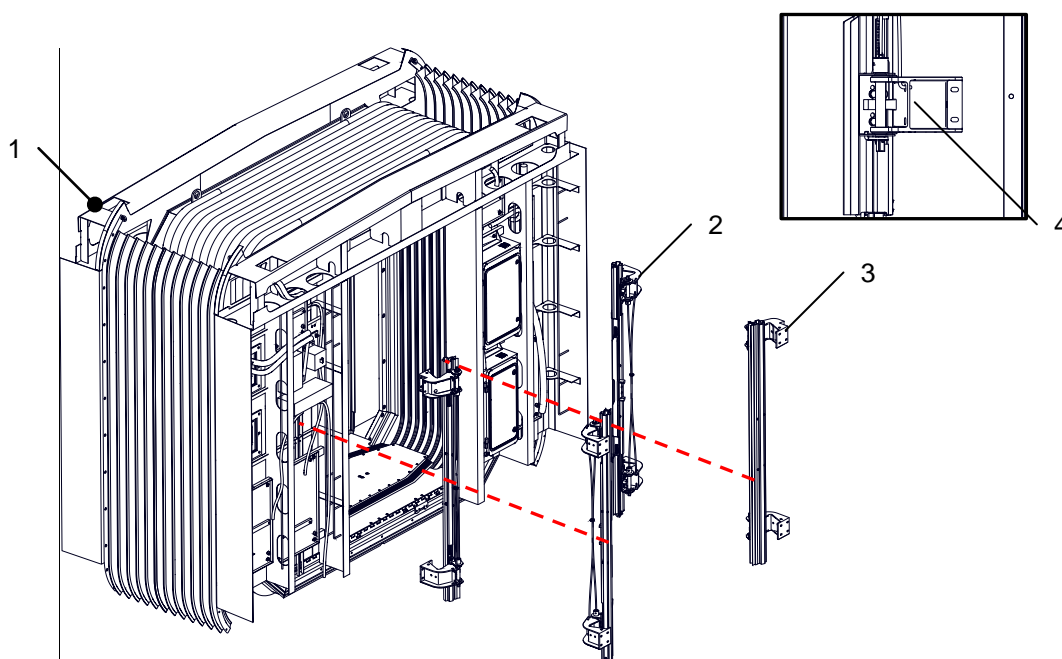
6.6.7 Mounting the guiding bodies to the wagon-interfaces



NOTICE

The linking ceiling is already mounted! Proceed with care when mounting the guiding bodies to avoid damage (e.g. scratches) to the linking ceiling!

1. Bring the guiding body into mounting position into the gangway area.
2. To each wagon-interface one “screw-on side” and one “locking side” guiding body is mounted. For details regarding the upper and lower sides of the guiding bodies refer to the attached drawing 041448517.
3. Align the hole pattern and bolt the cast holders to the wagon-interface (4x M10).
4. Repeat for other guiding bodies.



1	Wagon-interface	2	Guiding body, locking side
3	Guiding body, screw-on side	4	Holder side wall

Illustration 15: Mounting the guiding bodies to the wagon-interfaces

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6.6.8 Mounting the side walls

Mounting of the side wall requires two persons.

Pre-condition

- The bellows is mounted
 - The combination bridge is mounted
 - The linking ceiling is mounted
 - The guiding bodies are mounted to the wagon-interfaces.
1. At the guiding body screw-on side (right hand side; looking orthogonal to the longitudinal axis of the wagons) pull the guiding body downwards.
 2. Place a spacer (Size: approx. 100 mm x 50 mm x 20 mm) in the upper opening at the guiding body – refer to Illustration 16. (The spacer will pre-tension the spring. It is suggested to secure the spacer with a tape to prevent it from falling into the inside of the gangway).
 3. Insert the pin of the side wall into the hole of the guiding body screw-on side.
 4. Bolt (2x M8x30) the screw-on side of the side wall to the guiding body (screw-on side) which is already mounted to the wagon-interface (refer to Illustration 17).
 5. Repeat for opposite side wall.
 6. Remove the spacer out of the opening (guiding body).
 7. Refer to Chap. 7.1 for locking the side walls.

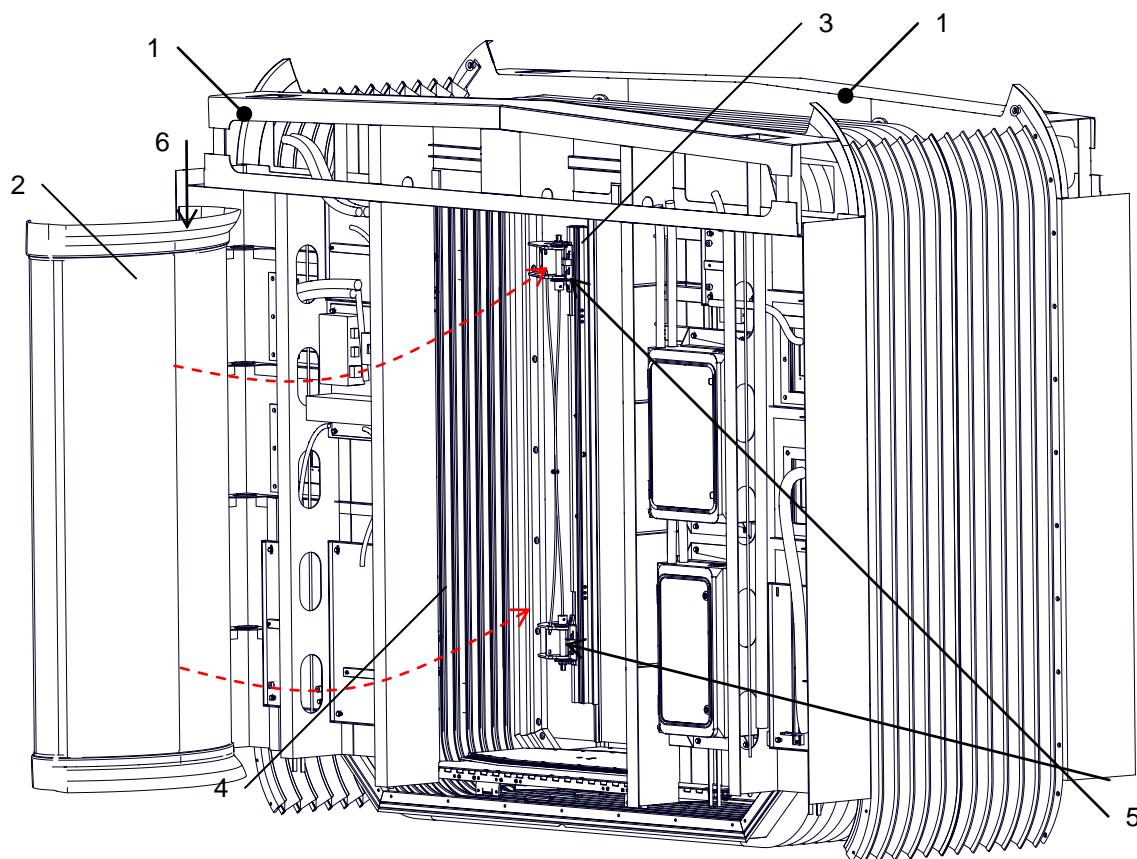


NOTICE

If a spacer was used to mount the side wall(s) ensure that the spacer is removed prior to proceed with locking the side wall(s).



Illustration 16: Guiding body without (left) and with spacer (right) as mounting aid



1	<i>Wagon-interface</i>	2	<i>Side wall</i>
3	<i>Guiding body – screw-on side</i>	4	<i>Guiding body, locking side</i>
5	<i>Attachment points of side wall at guiding body, screw-on side</i>	6	<i>Screw-on side of side wall</i>

Illustration 17: Mounting the side wall to the guiding bodies, screw-on side

6.6.9 Locking the side walls after mounting to the wagon-interfaces

For closing and locking the side walls refer to Chapter 7.1.

7 Locking/Unlocking the side wall(s)

7.1 Locking the side wall(s)

Pre-condition:

- The vehicles must be in normal position on straight track.

Procedure:

- Prior to locking the side wall ensure that the curve shaft and the locking bar of the guiding body are in locked position (Illustration 18b)). For this the curve shaft is turned clockwise to the right until the stop is reached. The locking bar should now be in the lower position (Illustration 18b)). This position of the locking rod is required to make the locking of the side wall possible.
- To lock the side walls they have to be turned and guided between brush ledge and guiding body until locked with the locking bar of the guiding body.
- Repeat procedure for second side wall.

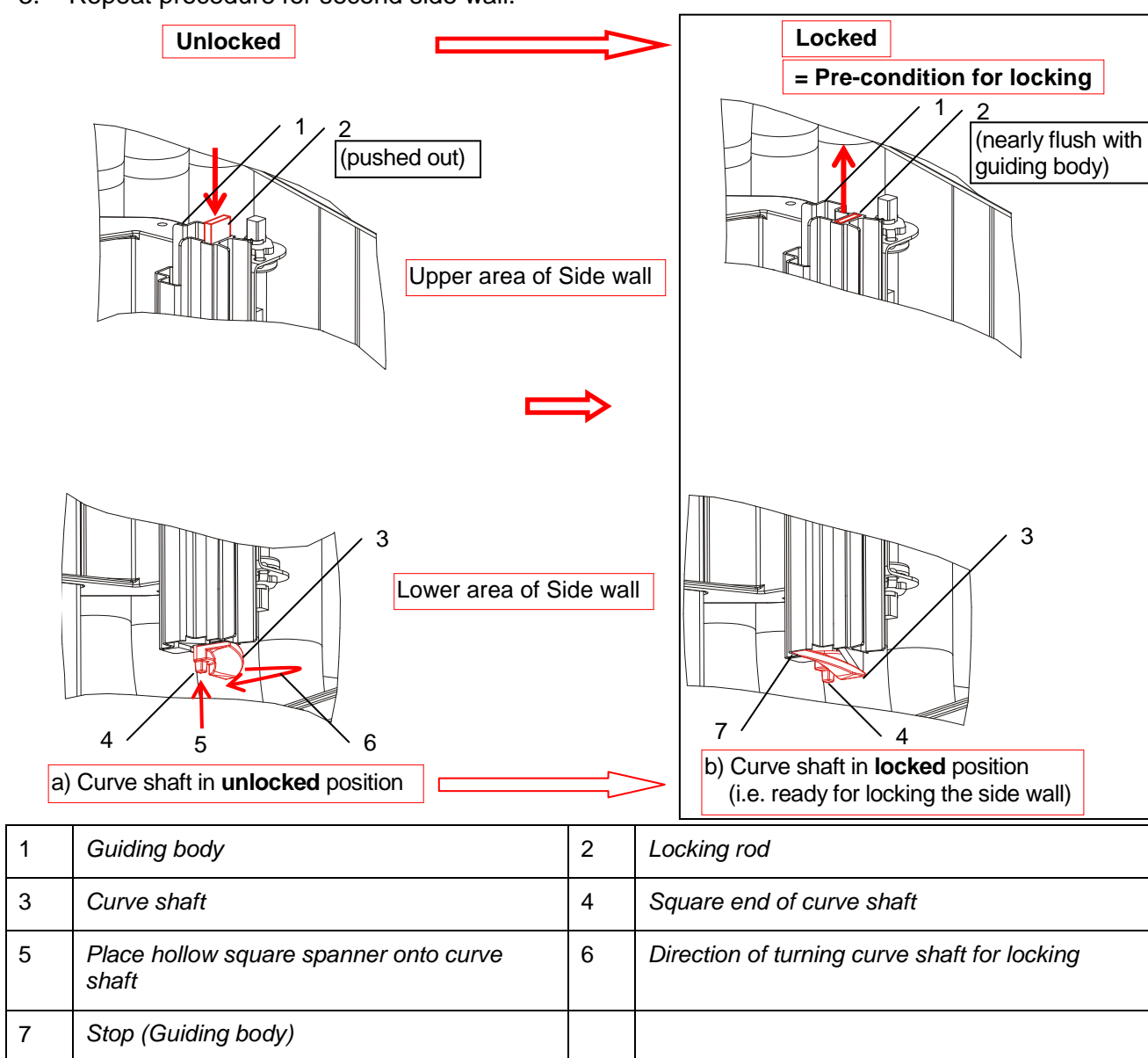


Illustration 18: Locking the Side wall(s) (schematic)

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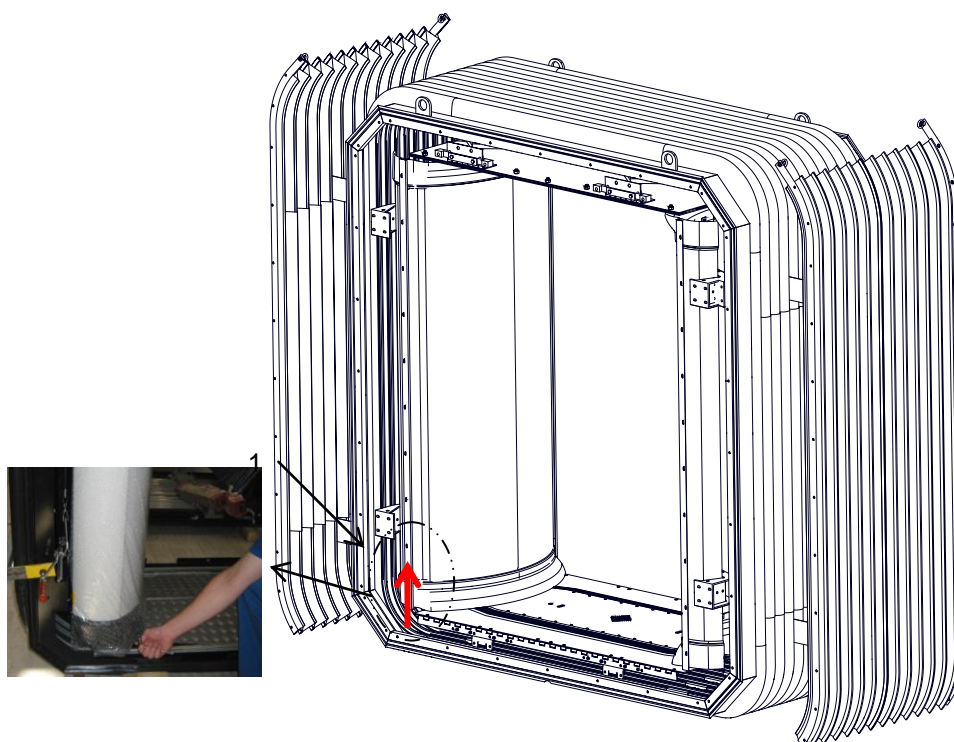
1	<i>Hollow square spanner</i>		
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Illustration 19: Hollow square spanner - Aid

7.2 Unlocking the side wall(s)

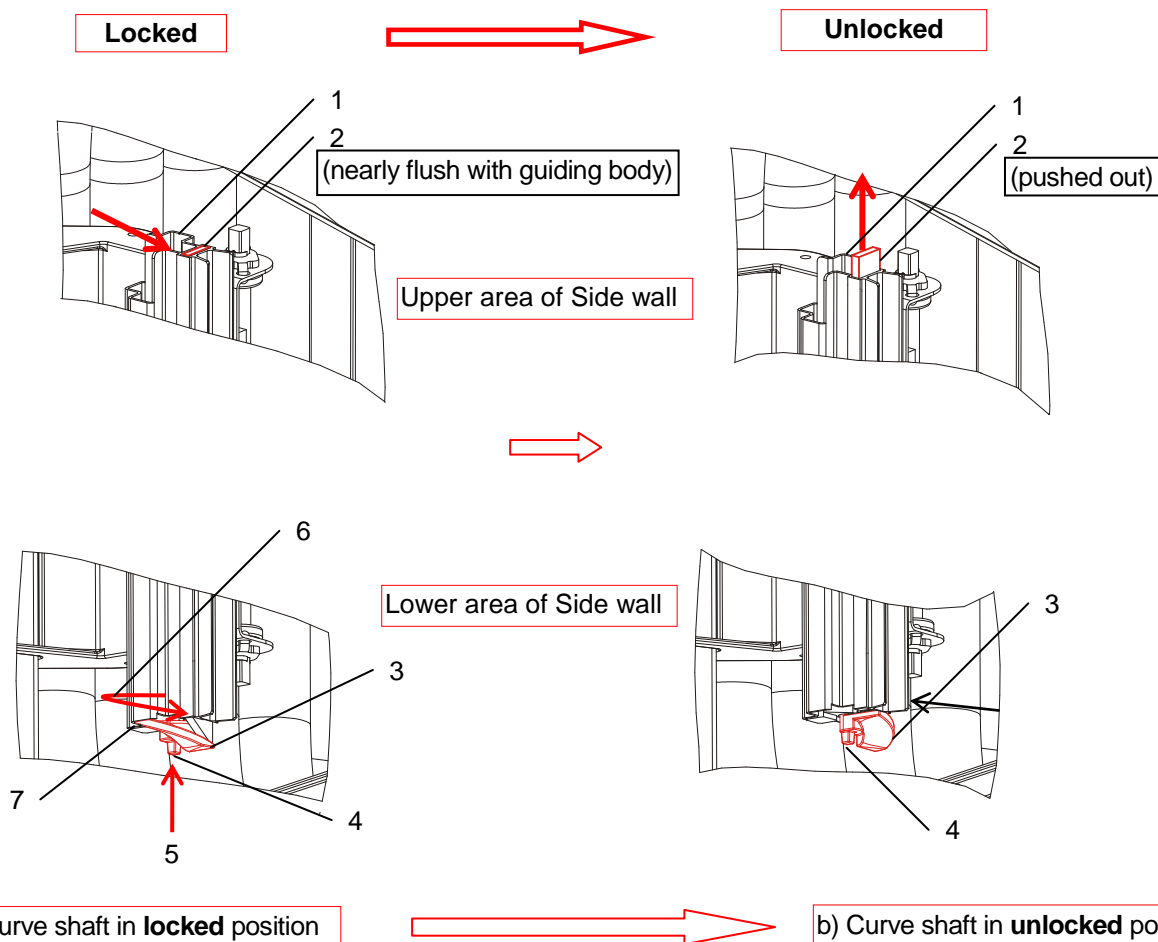
The side walls have to be unlocked and opened prior to proceeding with unmounting maintenance tasks.

1. Unlocking of the side walls occurs at the lower left hand side of the side wall behind the folds of the gap covering by means of a 9 mm square spanner.
2. Correct unlocking of the side wall through turning the curve shaft is achieved if the locking rod at the upper end of the guiding body is pushed out by approx. 30 mm (Illustration 21).



1	<i>Lower left hand side of side wall</i>		
---	--	--	--

Illustration 20: Unlocking the Side wall(s)



1	Guiding body	2	Locking rod
3	Curve shaft	4	Square end of curve shaft
5	Place hollow square spanner onto curve shaft	6	Direction of turning curve shaft for <u>unlocking</u>
7	Stop (Guiding body)		

Illustration 21: Unlocking the Side wall(s) (schematic)

8 Commissioning

8.1 Inspections prior to starting operation

Prior to starting operation the inspections listed in Table 2 have to be executed:

Component/Assembly group	Function to be checked	Inspection methods
Linking ceiling	Free movement of the linking ceiling elements	Check for correctly mounted shackles and linking ceiling
Side walls	Firm fit of the side walls	Pull and move the side walls
Combination bridge	Free movement	Check easy running
Screw-on frames	Gap free fit of the screw-on frames (corrugated bellows and folding walls)	External inspection
Folding walls	Connection between folding walls and corrugated bellows	External inspection

Table 2: Inspections prior to starting operation

8.2 Starting operation

If no faults have been located according to Table 2 the gangway is ready for operation.

9 Maintenance, cleaning and repair instructions

9.1 Maintenance

The following inspections listed in Table 3 should be carried out when inspecting the wagons:

No.	Component	Task description / Possible failure	Interval			Action / Remedy
			1 Month	1 Year	12 Years ¹	
01	Bellows and folding wall	Visual inspection:	X	X		Repair according to Chap. 9.3.4
		➤ Tears or holes in bellows fabric				Repair according to Chap. 9.3.2
		➤ Broken aluminum profiles				Repair according to Chap. 9.3.3
		➤ Fabric torn out of bellows frames				Replace sealing(s)
		➤ Sealing of screw-on frames worn/damaged				Fasten/attach screw-on frame as required
		➤ No gap-free fit of screw-on frames at wagon-interfaces				Fasten/attach connection
		Visual inspection / Cleaning:				Cleaning as required. Use industrial vacuum cleaner, if necessary.
02	Combination bridge	Visual/functional inspection:	X	X		Replace
		➤ Damage				Replace sliding ledges as required, chap. 10.4
	➤ Sliding ledges worn/damaged					
03	Linking ceiling	Visual inspection:	X	X		Replace linking ceiling, chap. 6.6.5
		➤ Linking ceiling damaged				
04	Side wall	Visual/functional inspection:	X	X		Replace gap covering – refer to Chap. 10.2
		➤ Tears in gap covering				Tighten attachment screws
	➤ Firm fit					
05	Bellows – Cleaning the floor area of the bellows	Visual/functional inspection:		X		Clean if necessary using the industrial vacuum cleaner
		➤ Dirt and rubbish on the bellows floor area (visual inspection through flipping-up the floor flaps of the bridge plates)				
06	Gangway system	Overhaul / Replacement:			X	Replace gangway system
		➤ Replacement at end of lifetime				

Table 3: Preventive maintenance instructions

¹ On request Hübner offers at the end of the lifetime a condition assessment to evaluate the possibility of an extended usage of the gangway system.

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9.2 Cleaning



ATTENTION

- Limited resistance of bellows fabric and aluminum profiles against cleaning devices.
Material damage possible.
- Avoid material damage to the bellows fabric.
 - Use of high-pressure cleaners or steam cleaners is not allowed.



ATTENTION

- Draining suds through the bellows can lead to irreparable damage at the bellows.
Material damage possible.
- Do not spill under any circumstances any liquids, which are used for cleaning the interior of the vehicle, in the bellows.
 - Draining suds through the bellows can lead to irreparable damage at the bellows!



ATTENTION

- Material damage possible.
- To clean the gangway system it not allowed using any other cleaning agent than the once mentioned in this chapter. The usage of other cleaning agent might lead to irreparable damages in particular of the bellows fabric.

9.2.1 Cleaners



ATTENTION

- Check cleaner before using:
- Cleaners may only be applied on non-disturbed surfaces without scratches.
 - Longer reaction time of the cleaners is to be avoided. Application shall be done by using a soft rag.
 - Before applying and using the cleaner, apply the chosen cleaner in an inconspicuous place and check for any changing of surface conditions!



CAUTION

- Harmful substances.
Hazardous to health.
- Note the safety data sheets and manufacturer remarks of the used cleaners.

The following cleaners can be used to clean the bellows fabric and the linking ceiling:

- a) For slight soiling:
 - pH neutral industrial cleaners (pH6 - pH8)
- b) For strong soiling or Graffiti - soiling the following cleaning agents on the basis of citric or orange acid can be used:
 - DERCAM ® GRAFFORANGE BIO
 - Comorcap LP
 - NOVO PEN-OFF

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The coating of the interior lining (powder coating and lacquer of side wall) are chosen in a way that graffiti can be removed by using the following product:

- a) For slight soiling:
 - NOVO PEN-OFF
- b) For strong soiling or Graffiti:
 - DERCAM® GRAFFORANGE BIO
from MC2 Chimie, 77 rue Albert GARRY, 94450 LIMEIL BREVANNES

9.2.2 Cleaning the bridge plates (passage area of gangway)



ATTENTION

- Do not spill any kind of liquid in the bridge plate area of the gangway when cleaning!

1. In order to remove dirt use an industrial vacuum cleaner or a broom.
2. Only for very hard to remove soiling use a damp cleaning method.

9.2.3 Cleaning the bellows floor area (underneath bridge plates)

1. In order to remove dirt and/or rubbish accumulated over time, cleaning the area of the bellows underneath the bridge plates has to occur if necessary, but at least once a year, using an industrial vacuum cleaner.

Proceed as follows:



WARNING - DANGER OF INJURY

- Proceed with care when working at the bridge plates!

1. Unlock, open and dismount the side walls.
2. Dismount the middle tread plate of the combination bridge.
3. Flip up the wagon sided bridge plates.
4. Insert the nozzle of the industrial vacuum cleaner into the opening and remove the dirt/garbage accumulated in the lower area of the bellows.



ATTENTION

- No suds or any kind of liquid to remain in the bottom area of the bellows after any kind of cleaning!

9.2.4 Cleaning the bellows fabric, the linking ceiling and the side walls

- Thoroughly clean the soiled fabric of the bellows using the above mentioned cleaners (refer to Chap. 9.2.1). Use a soft rag.
- Thoroughly clean the soiled surface and the gap coverings of the side wall using the above mentioned cleaners (refer to Chap. 9.2.1). Use a soft rag.

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9.3 Repair

9.3.1 General

The required spare parts can be ordered from HÜBNER GmbH & Co. KG. The order can be made with the list of spare parts according to the HÜBNER-article number.

All repair instructions, special tools, materials and repair patches required for repair purposes are included in the HÜBNER-Repair-Set.



CAUTION

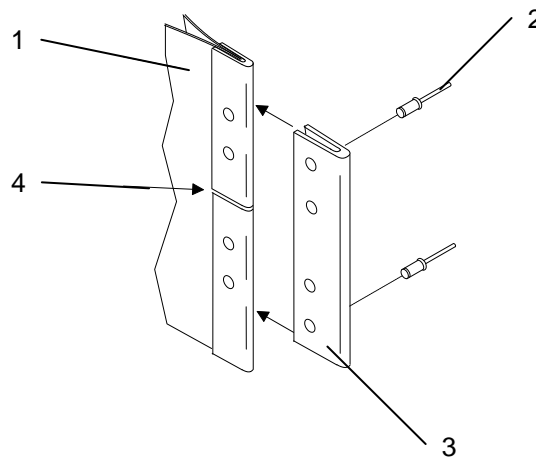
Harmful substances.
Hazardous to health.

- Note the safety data sheets and manufacturer remarks of the used cleaners.

Note: A detailed repair instruction is included in the HÜBNER-Repair-Set.

9.3.2 Repair of broken aluminum bellows profiles

1. Set the repair-set enclosed aluminum cross profile onto the broken profile.
2. Knock the profile into shape using the enclosed PVC hammer.
3. Drill at four suitable places holes (e.g. Ø 4.2 mm – diameter depending on profile size – refer to repair instructions of HÜBNER-Repair-Set), two holes to each side of the broken profile.
4. Secure with the enclosed blind rivets.
5. Should profiles be broken in the corner area it is possible to order respective repair corners according to the article number.



1	Bellows fabric	2	Rivet
3	Cross profile	4	Broken bellows frame

Illustration 22: Repair of broken bellows frames

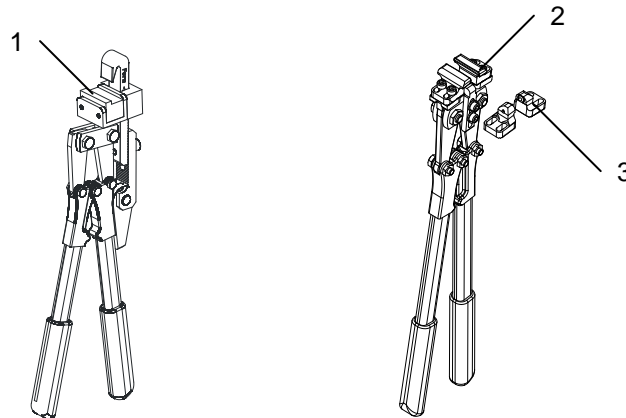
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9.3.3 Repair of torn out bellows fabric

1. Slightly open the aluminium profile in the repair area using the enclosed opener pliers.
2. Re-position the bellows' fabric by hand into the aluminium profile.
3. Pre-clamp the repair area every 5 cm using the enclosed crimping pliers. Pre-clamping in corner areas every 3 cm.
4. Close the entire repair area using the special hand-closure pliers.



1	<i>Opener pliers</i>	2	<i>Multipurpose pliers (as closure pliers)</i>
3	<i>Multipurpose pliers (as crimping pliers)</i>		

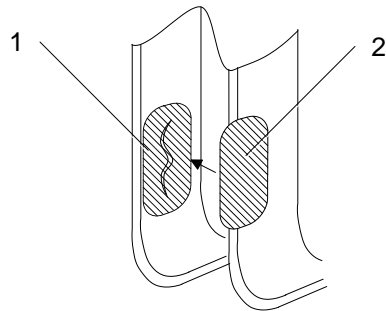
Illustration 23: Special pliers

9.3.4 Repair of damaged bellows fabric (cuts, tears etc.)

1. Clean the affected area of the bellows fabric with the repair-set provided cleaning agent on the side onto which the patch will be attached.
2. Cut patches of fabric according to the size of the damaged area. Patch has to exceed size of damaged area by approximately 10 mm. Round off the edges.
3. Apply "Elastosil E 43" evenly onto the patch using a brush (approximately 2–3 mm thick).
4. Place patch onto damaged area and firmly press the patch to the bellows fabric using the enclosed cellular rubber roller. Support area from the inside with a suitable hard item (e.g. board). Avoid air bubbles. Note: "Elastosil E 43" has to come out all around the patch edges.
5. Press the patch with a suitable helping device (e.g. wooden clamps, screw clamp etc.), possibly covering the entire repair area to the bellows fabric until the "Elastosil E 43" has hardened.
6. After hardening the glued section can be subject to strain. Note: The repaired area is after six hours firm to contact and after five days ready to be subject to strains.
7. In the roof, floor and corner area the patches should additionally be secured with the hollow rivets contained in the repair set. All patches exceeding the size of 3 x 5 cm have to be secured with hollow rivets. The riveting has to occur prior to hardening of the adhesive.
 - a. Let the applied adhesive dry for approximately one hour.
 - b. Drill out or punch holes in the bellows fabric and the patch at suitable places and according to the patch size (at a size of 3 x 5 cm use 3 hollow rivets) using a drill (\varnothing 4.2 mm), a hollow punch or another suitable tool.
 - c. Insert hollow rivets (NK 10 and NN 7). Support one side of the hollow rivet with a hard object and rivet using the PVC hammer.

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1	Damaged bellows fabric	2	Patch
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Illustration 24: Repair of damaged bellows fabric

9.3.5 Repair of small damage of bellows fabric (e.g. detachments of silicone coating)

Small detachments of the silicone coating (maximum size: 5 mm) caused by normal operation, can be repaired according to the following repair instruction:

1. Clean the affected area of the bellows fabric with the repair-set provided cleaning agent (note the safety data sheet and manufacturer remarks of the cleaner) with the aim to completely remove dirtying by oil, grease or dust.
2. Caulk the respective area by squirting "Elastosil E 43" (note the safety data sheet) onto the affected area. If needed, the silicone can be smoothed by use of soapy water (curd soap etc.) and a plastic spatula.
3. At a relative air humidity of 50 % and a temperature of 23 °C, the silicone is hardened after 24 hours and ready to be subject to normal strains, if a layer thickness of max. 2 mm was maintained. A layer thickness larger than 2 mm requires a longer hardening time, generally the hardening time can be shortened by higher temperature and/or air humidity.

9.3.6 Repair of small holes of bellows fabric

Small holes (diameter 2–3 mm) of bellows fabric, caused by normal operation, can be repaired according to the following repair instruction:

1. Clean the punched area inside and outside of the bellows fabric with the repair-set provided cleaning agent (note the safety data sheet and manufacturer remarks of the cleaner) with the aim to completely remove dirtying by oil, grease or dust.
2. Caulk the hole by squirting "Elastosil E 43" (note the safety data sheet) onto the affected area so that the "Elastosil E 43" comes out on the other side of the bellows fabric. If needed, the silicone can be smoothed by use of soapy water (curd soap etc.) and a plastic spatula.
3. At a relative air humidity of 50 % and a temperature of 23 °C, the silicone is hardened after 24 hours and ready to be subject to normal strains, if a layer thickness of max. 2 mm was maintained. A layer thickness larger than 2 mm requires a longer hardening time, generally the hardening time can be shortened by higher temperature and/or air humidity.

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10 Replacement of components/assembly groups

10.1 Replacing the side wall

10.1.1 Unmounting the side wall

Refer to Chap. 6.6.8 and 7.2.

The unmounting of the side wall requires two persons.

1. Unlock the side wall (see Chap. 7.2).
2. Open side wall and hold in opened position.
3. Remove the lower and the upper screw (M8) of the roll body using an Allen key (size 6).



ATTENTION

- Do **not** remove the screw at half height. This screw is used for attaching the centering bolt. The centering bolt will drop into the inner body of the guiding body when this screw is removed.

4. Remove the roll body of the side wall out of the guiding body profile (two persons).



ATTENTION

- The pressure of the springs is released and pushes the guiding body upwards!

5. For a replacement of the gap coverings bring the side wall into horizontal position.



ATTENTION

- Do **not** store the side wall resting on the gap coverings!

10.1.2 Mounting the side wall



NOTICE

Apply suitable thread locking fluid (e.g. "Loctite 243") to all screw connections during mounting. Exception microcapsulated screws!

1. At the guiding body screw-on side (right hand side) – pull the guiding body downwards.
2. Place a spacer (Size: approx. 100 mm x 50 mm x 20 mm) in the opening at the guiding body – refer to Illustration 16 (The spacer will pre-tension the spring. It is suggested to secure the spacer with a tape to prevent it from falling into the inside of the gangway).
3. Place the roll body of the side wall onto the guiding body profile and insert the guiding bolt into the hole.
4. At the right hand side: Bolt the roll body of the side wall with two screws and washers to the guiding body.
5. Remove spacer.
6. Lock the side wall (see Chapter 7.1).

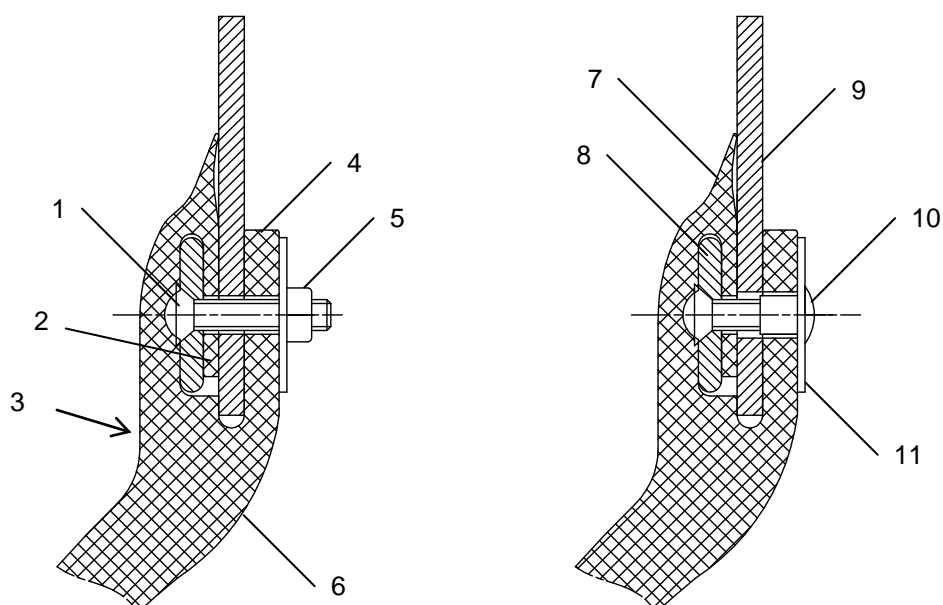
10.2 Replacement of the gap covering

Damaged or torn gap coverings of the side walls have to be replaced. For this procedure the side wall has to be unmounted (see Chapter 10.1.1) and brought into horizontal position.

10.2.1 Unmounting the gap covering

At surface facing during operation the inner gangway – front surface:

1. Cut the rubber lip of the damaged gap covering at height of screws.
2. Secure the heads of the screws using an Allen key (2.5 mm) against turning.
3. Remove hexagon nut at the rear side of the gap covering using a spanner (Size 7).
4. Remove hexagon head screw and washer.
5. Remove rubber lip from the side wall (removes also gap covering and plastic ledge).
6. Remove plastic ledge out of the gap covering and set aside for re-usage.



	<i>Hexagon socket screw Size 2.5 mm</i>	3	<i>Inner rubber lip</i>
4	<i>Front side (of Gap covering)</i>	5	<i>Outer rubber lip</i>
6	<i>Hexagon nut Size 7 mm</i>	7	<i>Gap covering</i>
8	<i>Rubber lip</i>	9	<i>Plastic ledge</i>
10	<i>Side wall</i>	11	<i>Sleeve nut</i>
12	<i>Packing piece</i>		

Illustration 25: Gap covering of the Side wall

10.2.2 Mounting the gap covering



NOTICE

Apply suitable thread locking fluid (e.g. "Loctite 243") to all screw connections during mounting. Exception microcapsulated screws!

1. Transfer the hole pattern of the side wall onto the gap covering.
2. Drill the holes into the gap covering acc. to Illustration 26. Maintain the following sequence:
 - 1) Transfer the hole pattern to the outer rubber lip.
 - 2) Punch out the holes (\varnothing 4.5 mm) at the rubber lip.
 - 3) Transfer the hole pattern to the inner rubber lip.
 - 4) Punch out the holes (\varnothing 4.5 mm) at the inner rubber lip (height difference is required to achieve a tight fit of the rubber lip at the side wall).
3. Screws which became loose during unmounting have to be glued back into the plastic ledge using a suitable thread locking fluid (e.g. Loctite 243).
4. Insert the existing plastic ledge with the glued in screws behind the inner lip of the gap covering.
5. **Note:** The short screws have to be located at the roll body of the locking side.
6. Insert the screws into the holes of the side wall and the roll body.
7. Place the outer lip of the gap covering over the screws.
8. Place the packing parts and nuts onto the screws and tighten nuts until the rubber lip is slightly pressed out of the packing parts (use sleeved nuts for the short screws at the locking side).
9. Secure the nuts with suitable thread locking fluid (e.g. Loctite 243).
10. Adjust the length of the gap covering (cut gap coverings flush with roll bodies using a knife).
11. Mount the side wall (refer to Chapter 10.1.2).

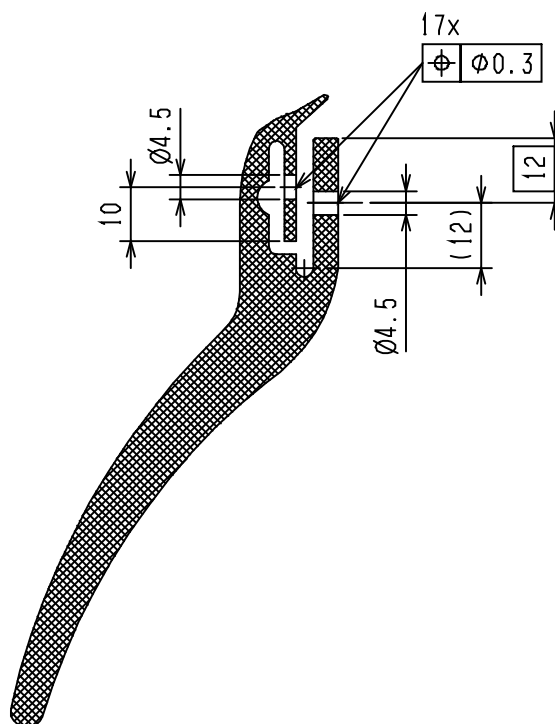


Illustration 26: Attachment of Gap coverings

10.3 Replacing the linking ceiling

Replacement of the linking ceiling requires two persons.

10.3.1 Unmounting the linking ceiling

Proceed in the following sequence for replacing the linking ceiling:

1. Loosen the attachment screws of the linking ceiling by reaching into the gap between wagon-interface and linking ceiling using a flat open-end spanner (Size 13).
2. The attachment holes of the rod hinges are slots (Illustration 14). Therefore after loosening the screws slightly lift the linking ceiling up, move it slightly to the side and then remove it from the shackles against the resistance of the elastic gap coverings.
3. Push the outer ceiling plates onto the middle (simple) ceiling plate.
4. Rotate the linking ceiling by approx. 90° and remove it out of the gangway area.

10.3.2 Mounting the linking ceiling



NOTICE

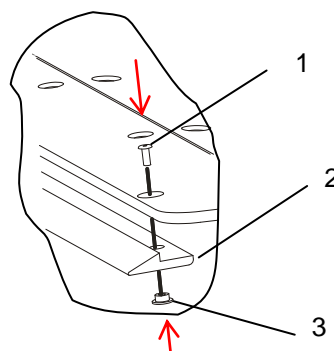
Apply suitable thread locking fluid (e.g. "Loctite 243") to all screw connections during mounting. Exception microcapsulated screws!

- Mounting of the linking ceiling occurs acc. Chap.6.6.5.

10.4 Replacing the sliding ledges and parts

Replacement of the sliding ledges has to occur when they are heavily worn (e.g. when the heads of the rivets of the sliding ledge(s) are rubbing on the bridge plates they are resting on).

1. Drill-out the rivets of the sliding ledge (drill \varnothing 4 mm) of the respective floor flap segment (from the top).
2. Remove the bushings and set aside for re-usage.
3. Remove the sliding ledge.
4. Clean. Ensure to remove all chips. No burrs allowed.
5. Place new sliding ledge onto the floor flap segment, insert the bushings and rivet (blind rivets \varnothing 4.2 mm).



1	Rivet	2	Sliding ledge
3	Bushing		

Illustration 27: Replacement of the sliding ledges

10.4.1 Tread plate

To change the sliding ledges on the tread plate, it must be removed.

- 1 Loosening the six screws of the tread plate and remove the tread plate
- 2 Change the sliding ledges see chapter 10.4
- 3 Built the tread plate in and screw it on.

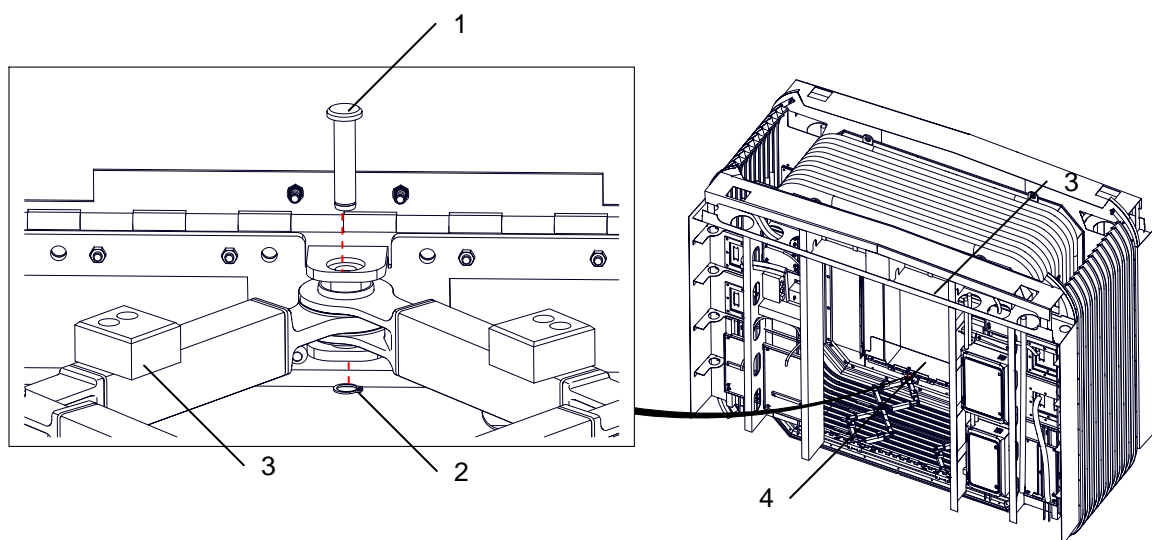
10.4.2 Scissors

For changing the sliding elements

- 1 Open the side walls on left and right side.
- 2 Loosening the six screws of the tread plate and remove the tread plate.
- 3 Flip up the both bridge plates.
- 4 Loosening the two screws of sliding element and remove it, see Illustration 28.
- 5 Built in a new sliding element and screw it on
- 6 Built the tread plate in and screw it on.
- 7 Close the side walls
- 8 For changing the others elements do step 4 and 5 again.

For changing other wear parts of the scissors.

- 1 Do step 1-3 for changing sliding elements
- 2 Loosening the circlip and remove the pin. On both sides, see Illustration 28
- 3 Remove the scissors.
- 4 Loosening the other circlips and change the collar bushes and sealing washers.
- 5 Built the scissors together and built it in the vehicle interface.
- 6 Put in the pin and save it with the circlip.
- 7 Flip down the bridge plates.
- 8 Do step 6 and 7 from changing sliding elements.



1	<i>Pin</i>	2	<i>Circlip</i>
3	<i>Sliding element</i>	4	<i>Bridge plate</i>

Illustration 28: Replace wear parts of combination bridge

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11 Appendix

11.1 Gangway, assy., mounting 041448517



1001513679_000_04
1448517_-_Uebergar

11.2 Corrugated bellows, assy., final mounted 041448515



1001592710_000_04
1448515_-_Wellenba

11.3 Folding wall, assy. 041448420



1001594236_000_04
1448420_-_Faltenwa

11.4 Combination bridge, assy. 041445191



1001587194_000_04
1445191_-_Kombinat

11.5 Linking ceiling, assy. 041448481



1001503738_000_04
1448481_-_Gliederde

11.6 Side wall, assy., inner covering 041445174



1001587942_000_04
1445174_-_Seitenwa

11.7 Guiding body, assy., locking side 041448060 and Guiding body, assy., screw-on side 041448066



1001515673_000_04
1448060_-_Fuehrung



1001515555_000_04
1448066_-_Fuehrung

11.8 Covering brush, assy. 041448476

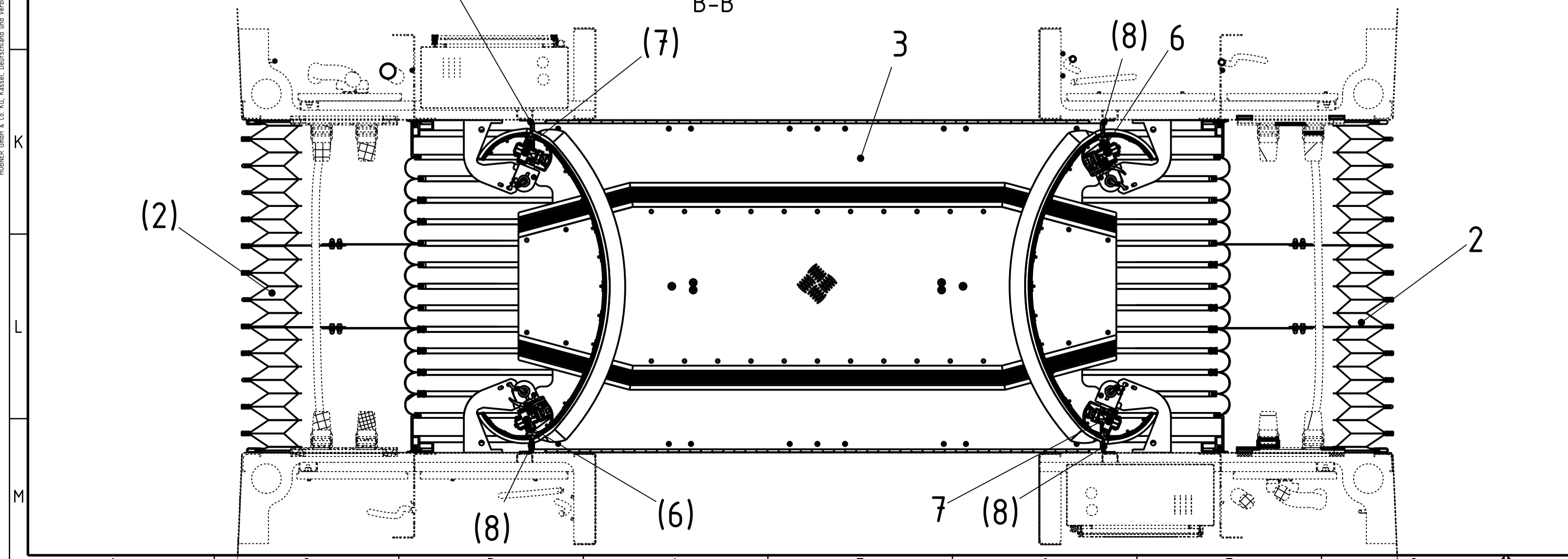
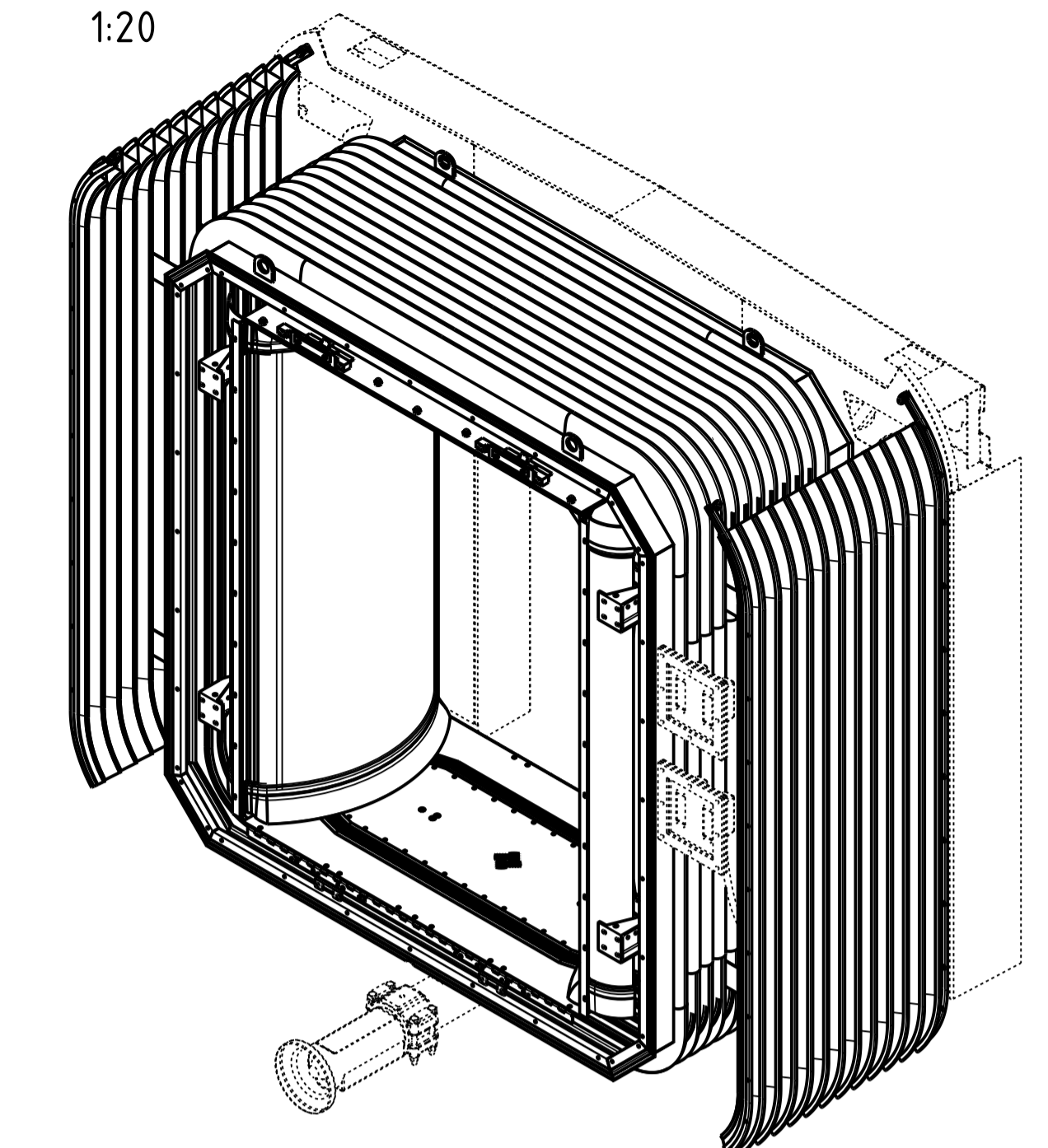
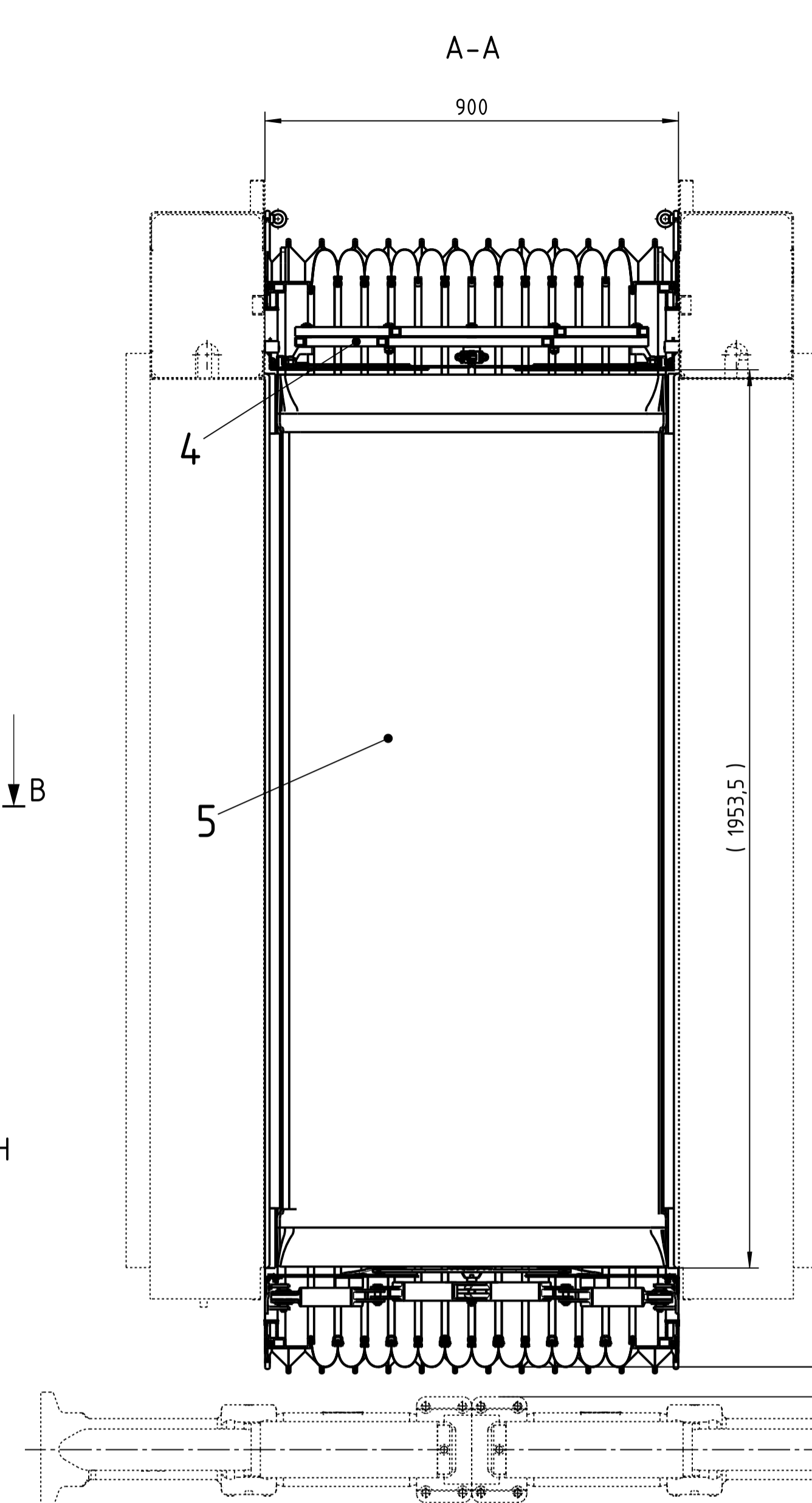
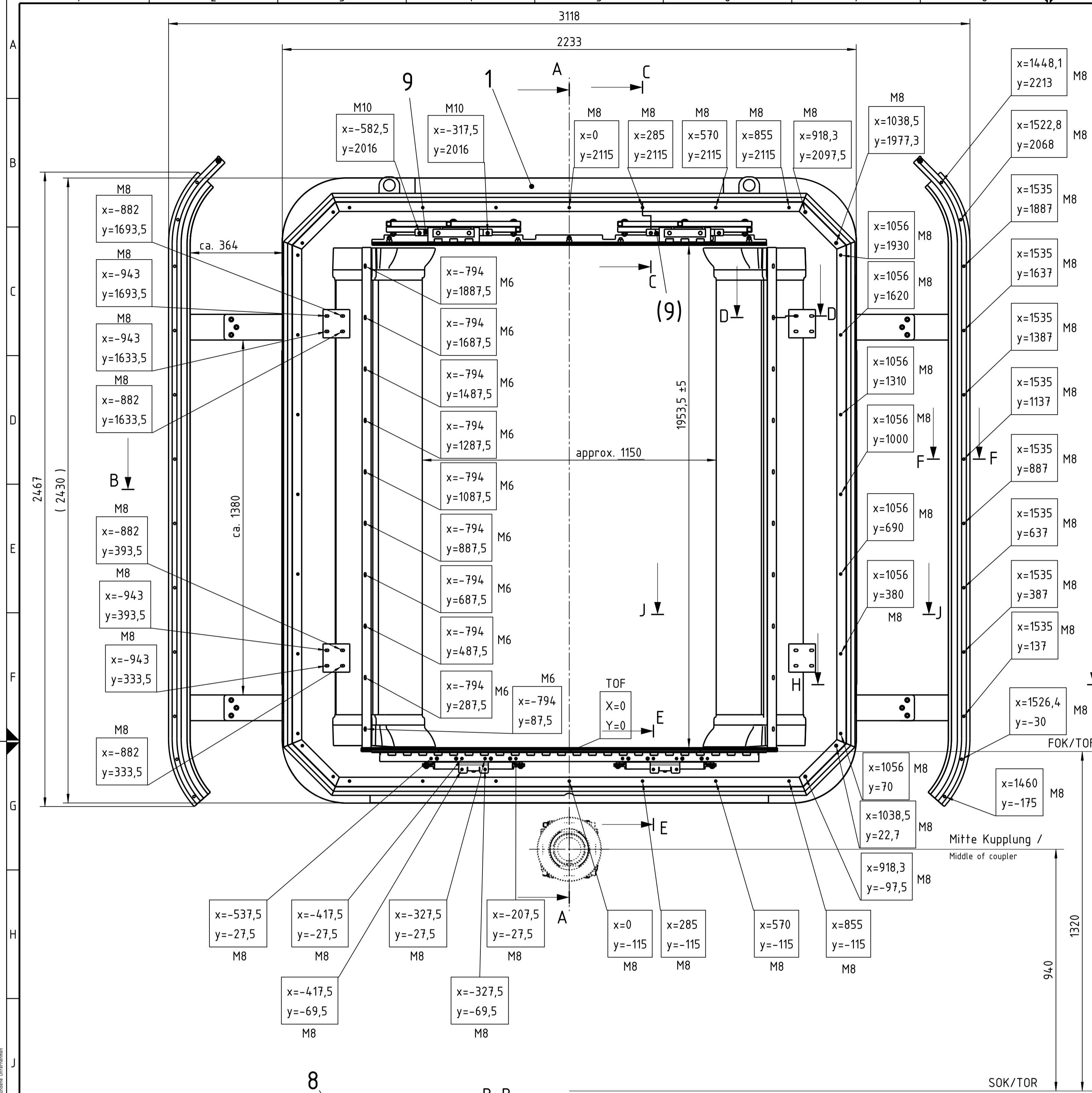


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1448476_-_Abdeckbu

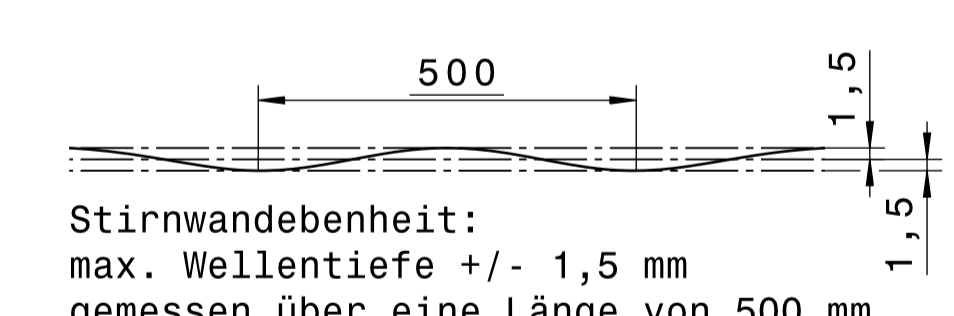
11.9 Shackle, assy. 041292226



041292226#-#1#Haltebuegel_vollst.#.tif

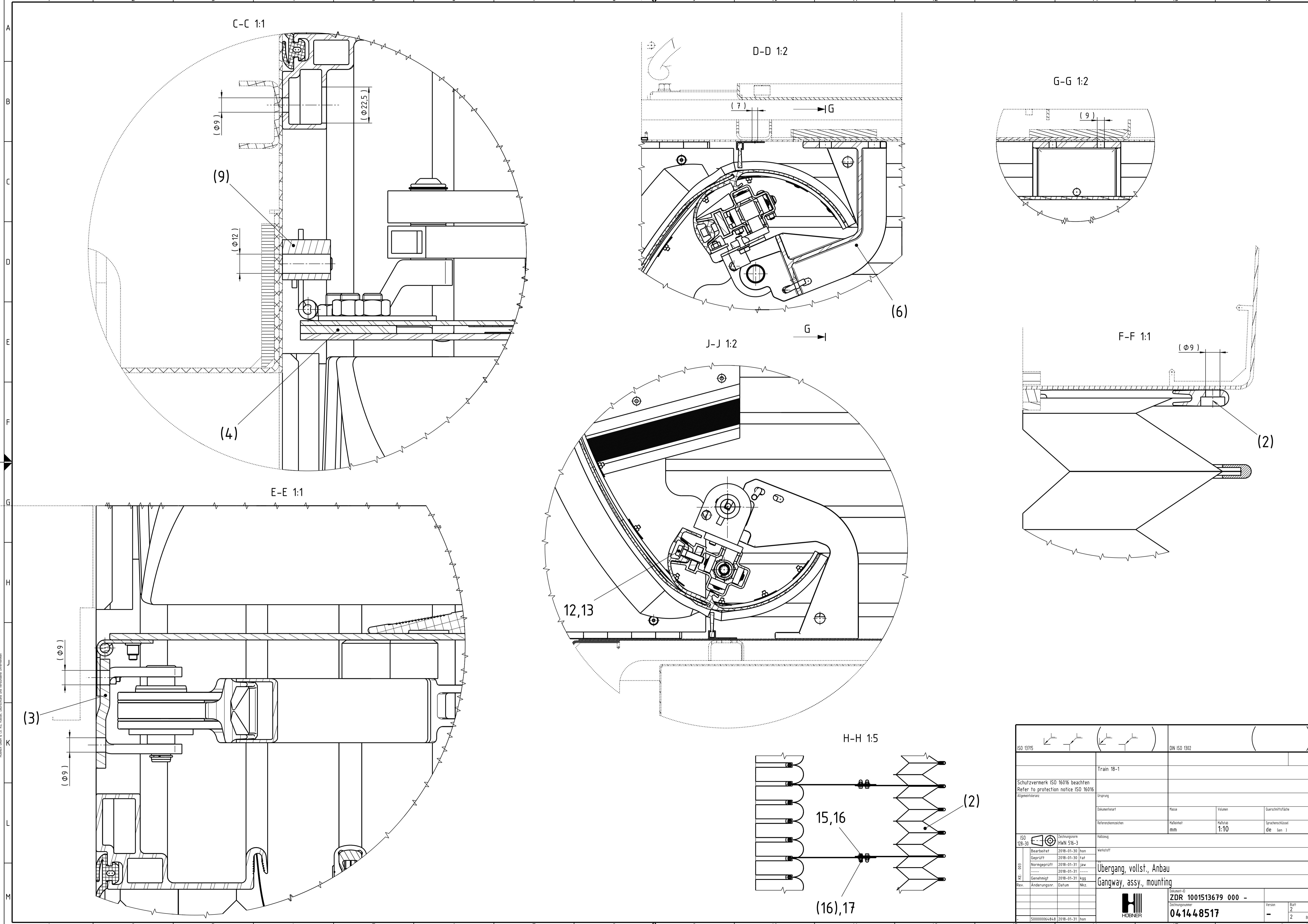


Fuer alle Bohrungen und Gewinde gilt folgende Toleranz: $\pm \Phi 0,4$
 For all holes and threads the following tolerance:



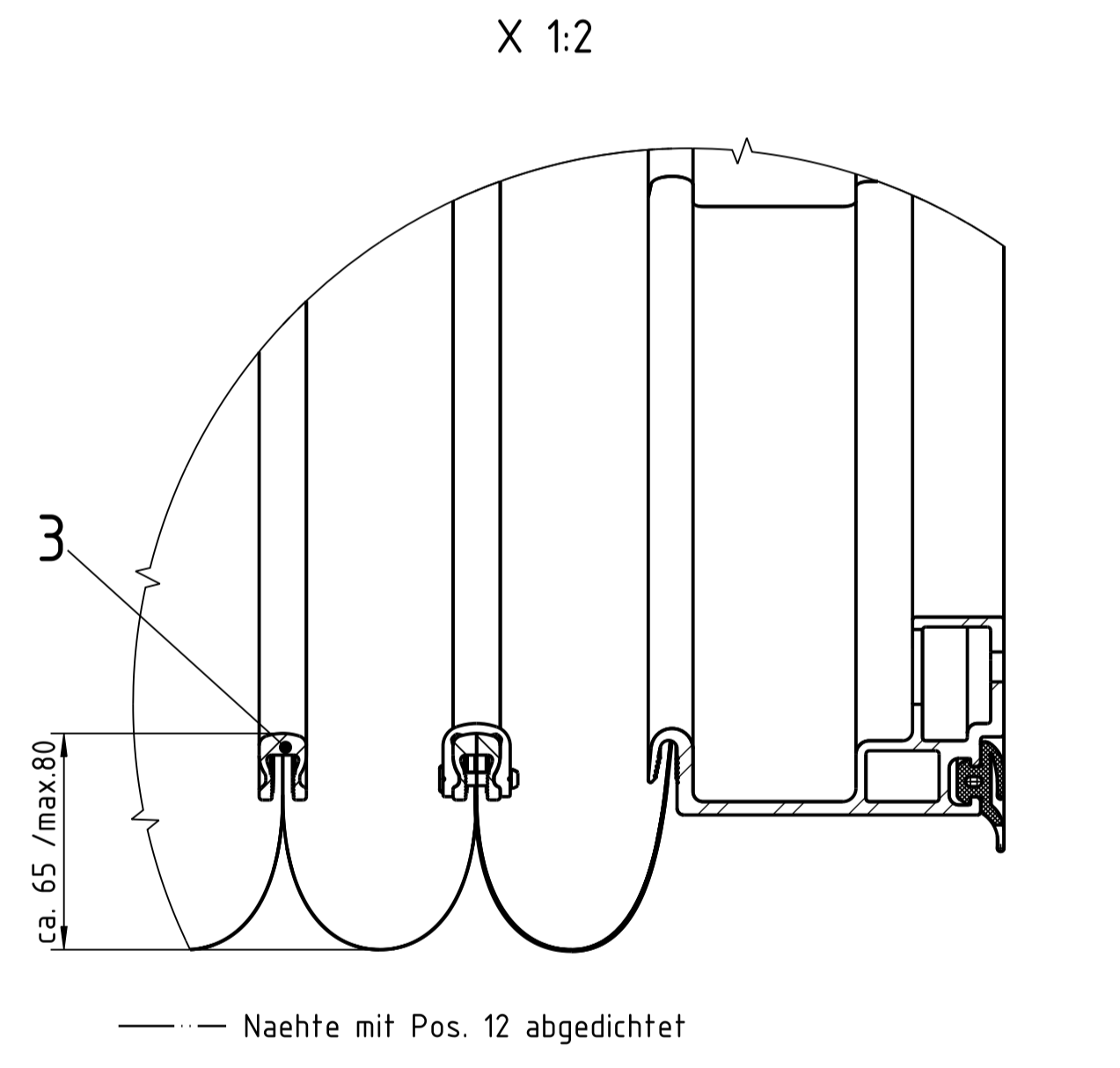
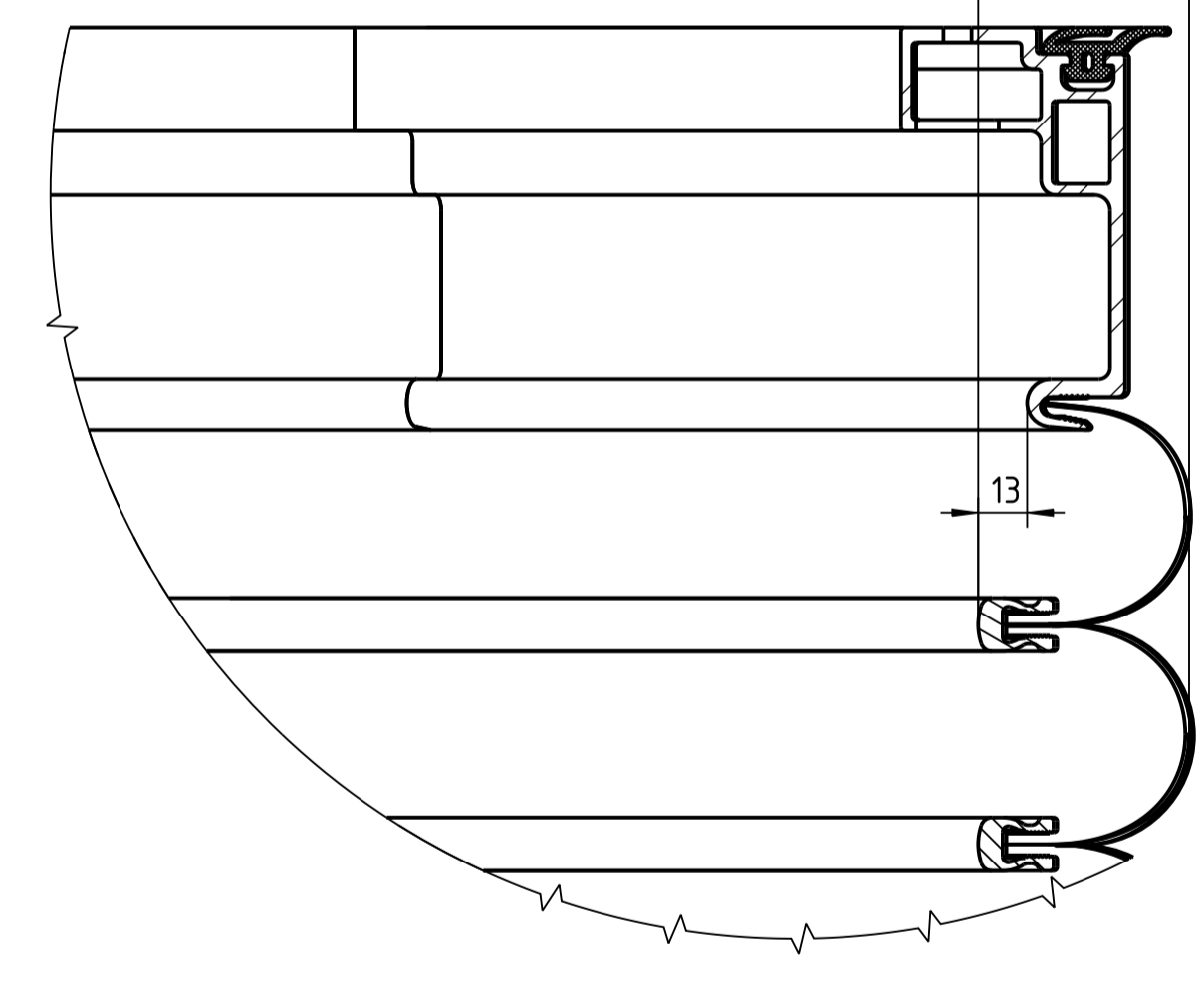
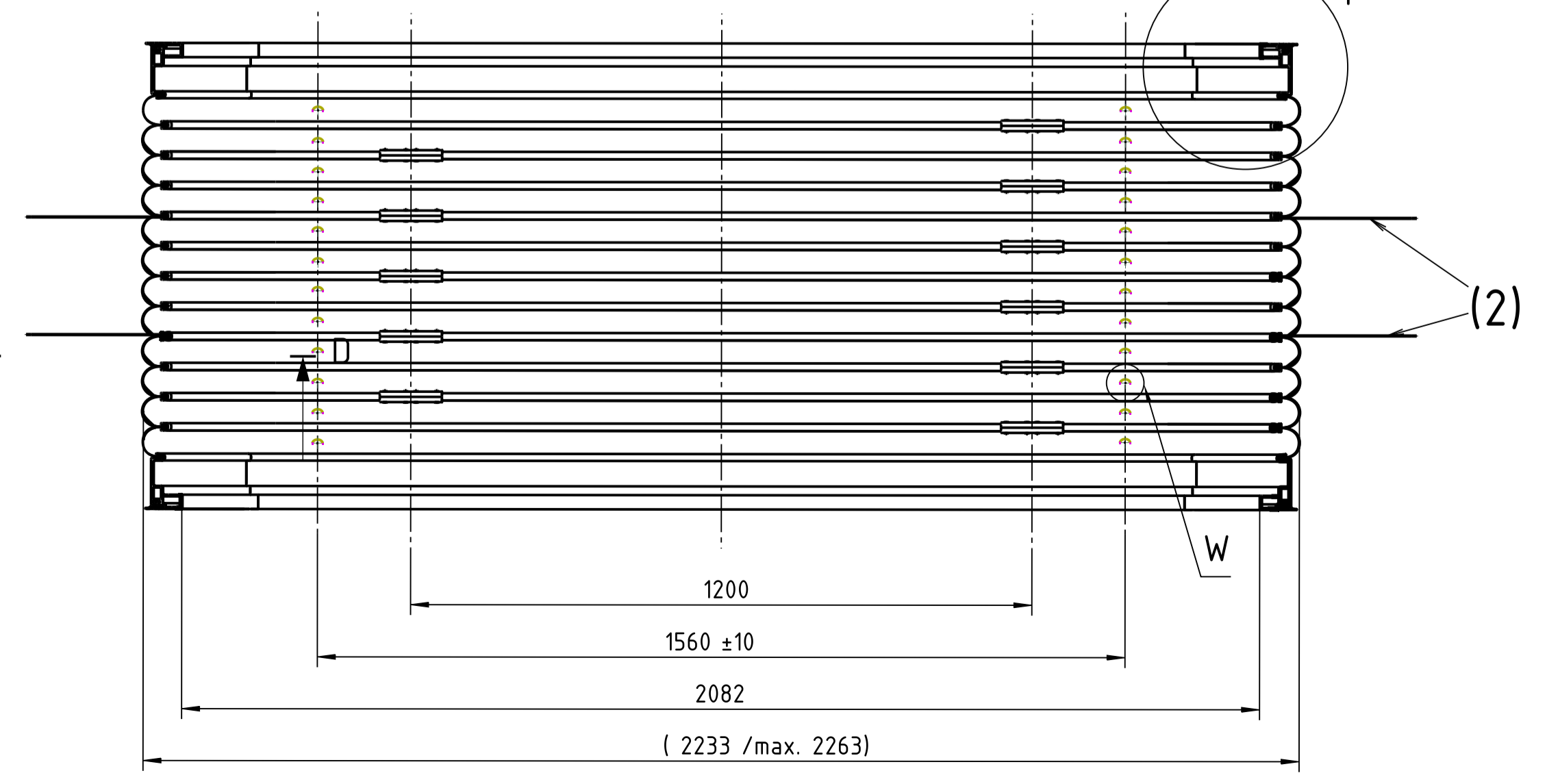
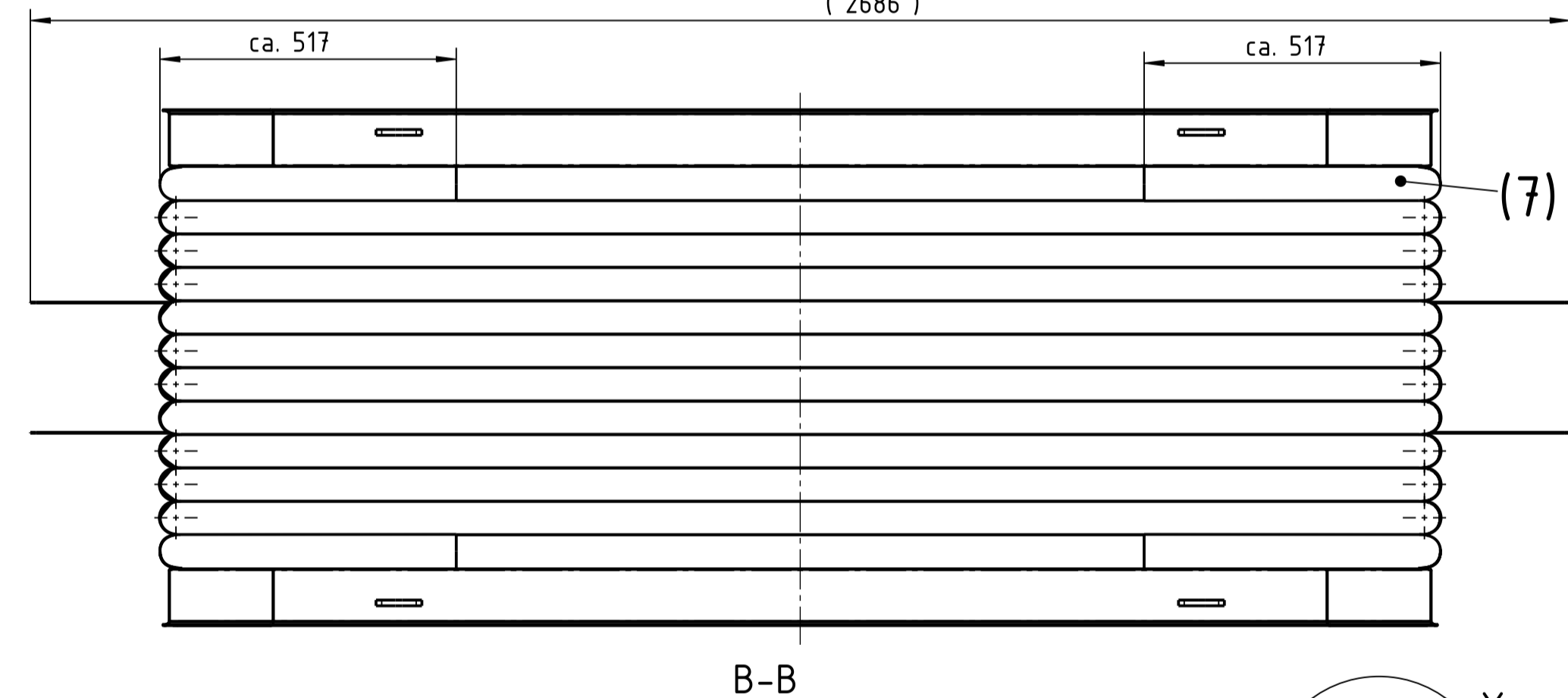
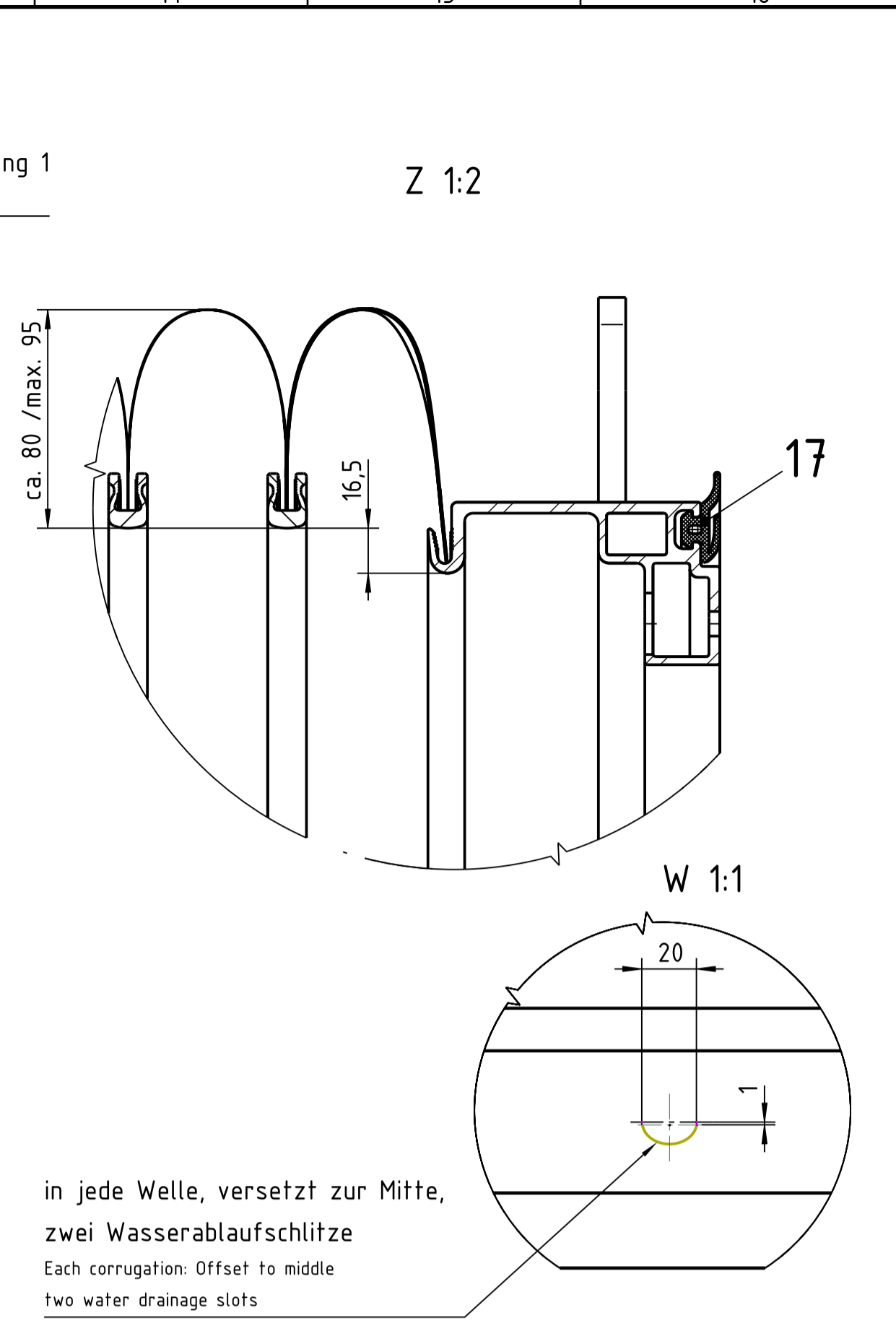
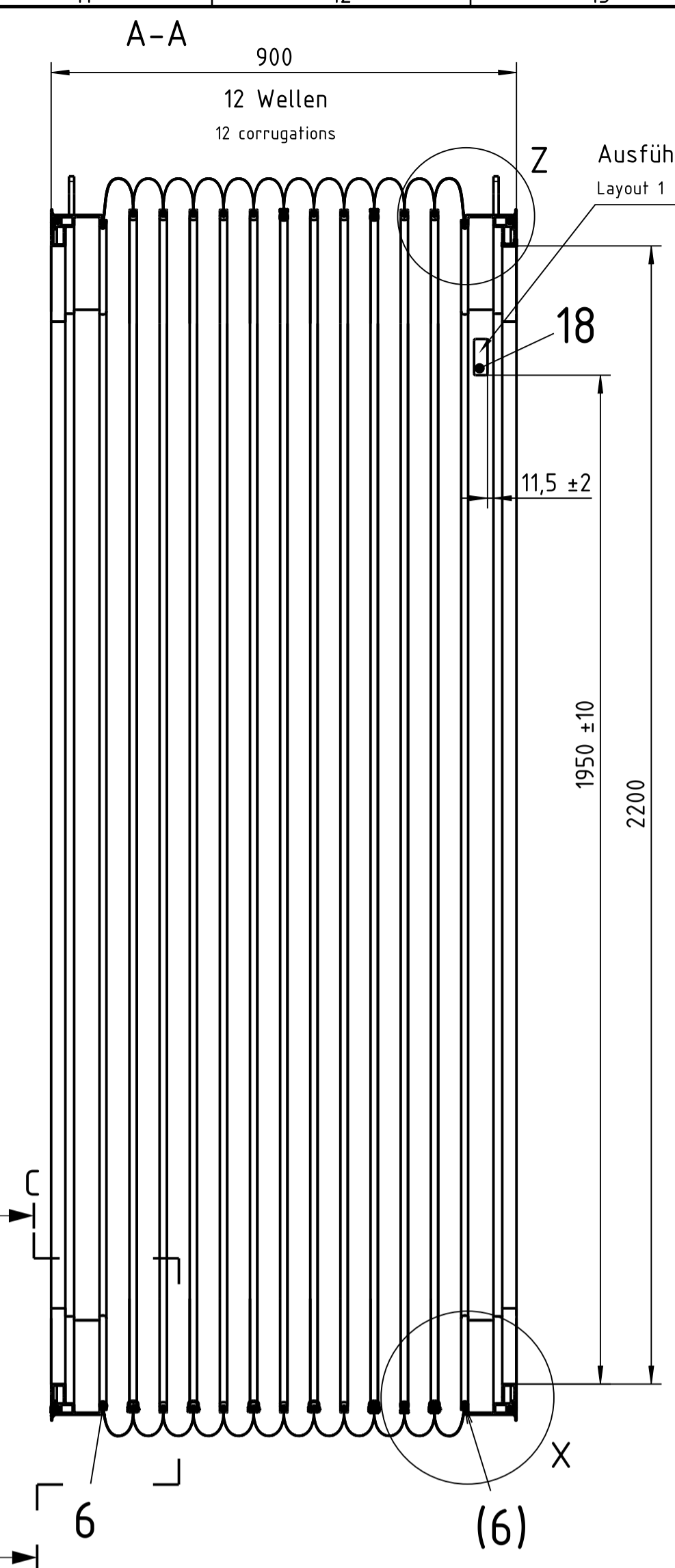
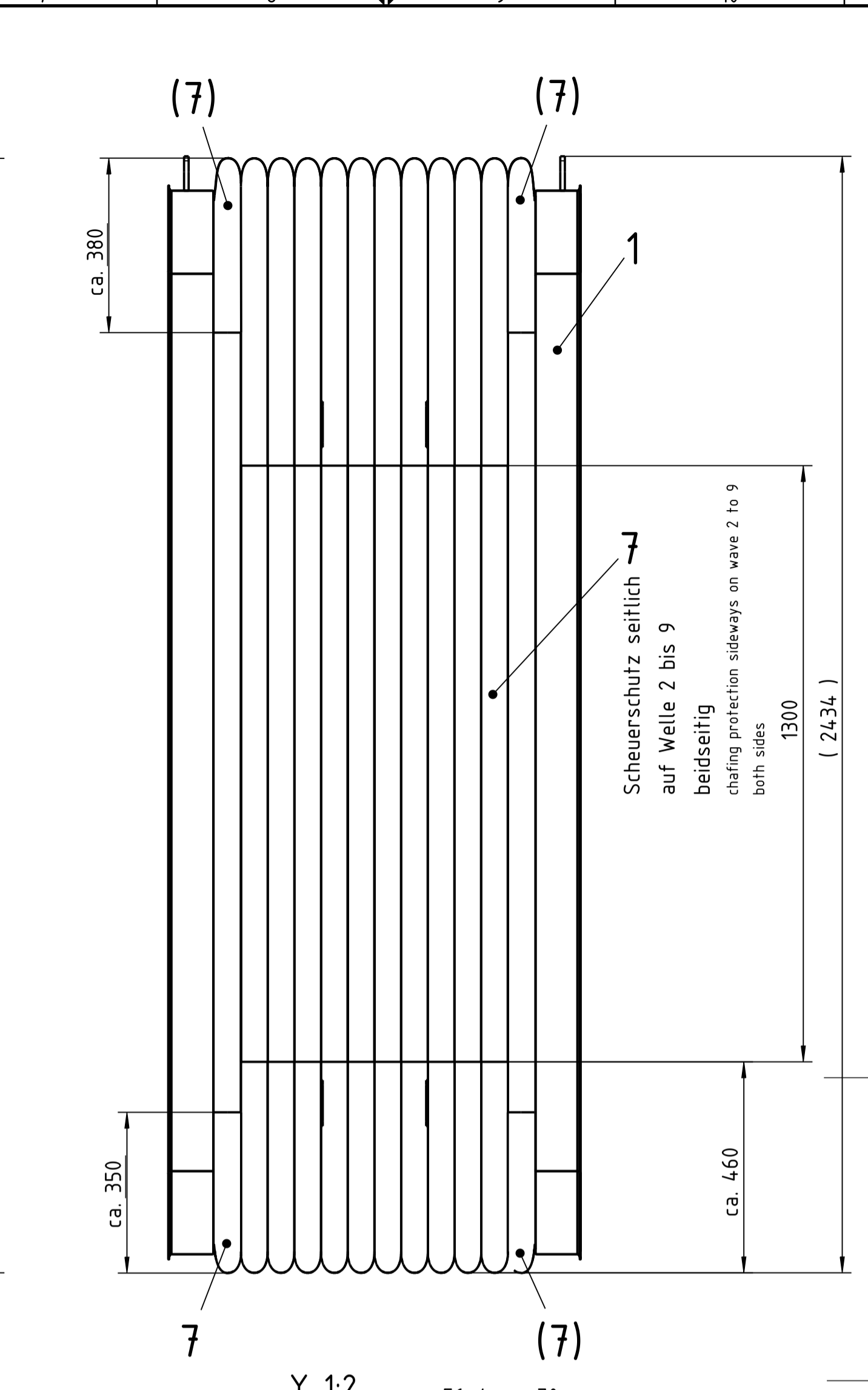
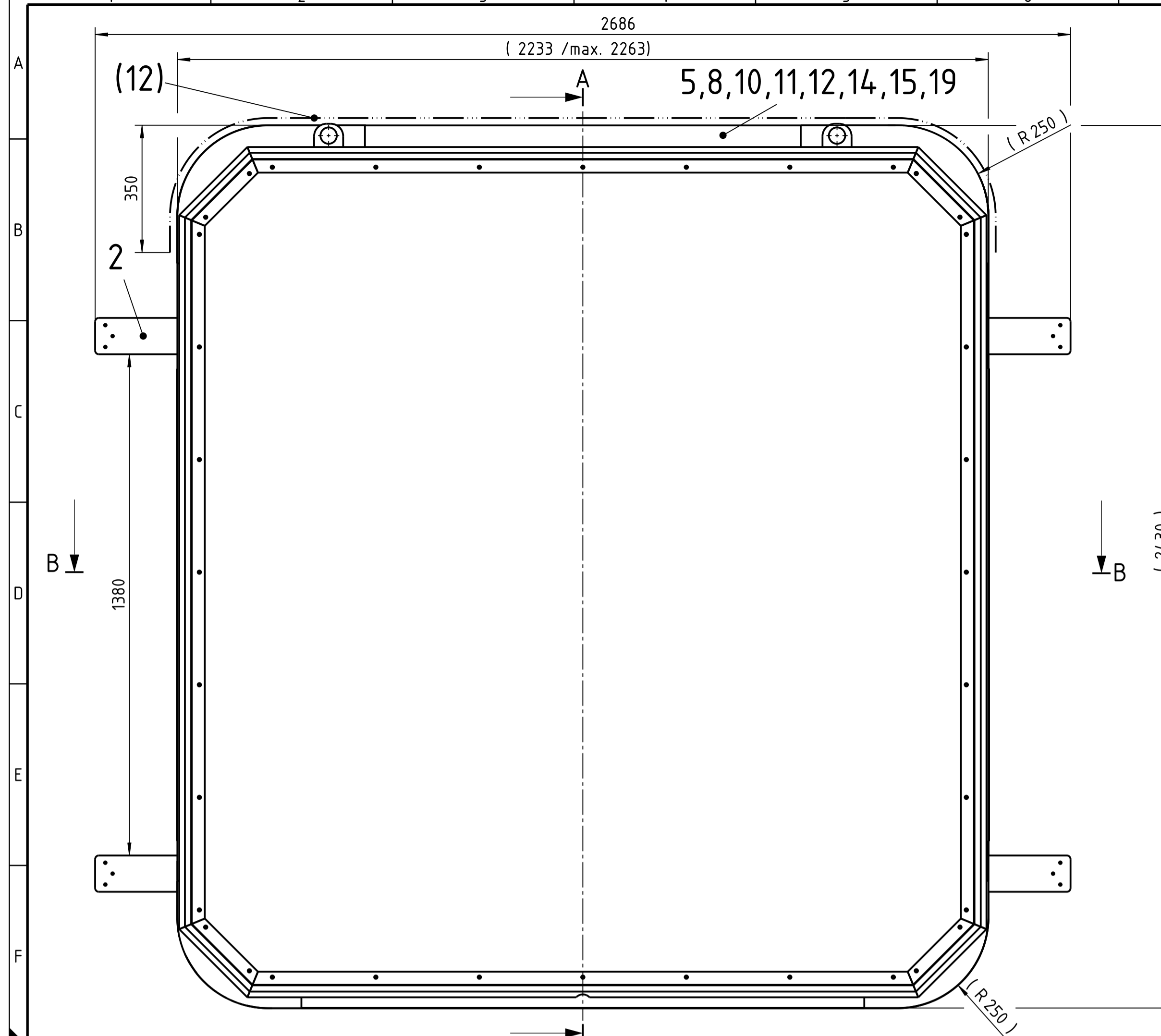
Toleranz fuer Faltenbalgabmessungen				
Tolerance for dimensions of folding bellows				
1	20	200	1000	>2500
Nennmassbereich	bis 20	bis 200	bis 1000	bis 2500
Nominal size				
Grenzabmasse	+/- 5	+/- 6	+/- 10	+/- 15
Tolerance				
-Linienform der Balgrahmen umlaufend (konvex)				
-Line shape of bellows frames all around contour				
-von Balgrahmen zu Balgrahmen ist ein Versatz von +/- 4 mm zulässig				
-Allowable offset of adjacent bellows frames: +/- 4 mm				
-Versatz ueber alle Balgrahmen von 10 mm zulässig				
-Allowable offset over all bellows frames: 10 mm				
-zulässiger Durchhang im Boden: 2 mm pro Falte				
-Allowable sag in floor area per fold: 2 mm				
-Stoffbezogene Masse sind zirka (ca.) Masse				
-Fabric relating dimensions are approximate dimensions				
Toleranz fuer Wellenbalgabmessungen mit positiver Welle				
Tolerance for dimensions of corrugated bellows with positive corrugations				
1	20	200	1000	>2500
Nennmassbereich	bis 20	bis 200	bis 1000	bis 2500
Nominal size				
Grenzabmasse	+/- 5	+/- 6	+/- 10	+/- 15
Tolerance				
-Linienform der Balgrahmen umlaufend (konkav)				
-Line shape of bellows frames all around contour				
-von Balgrahmen zu Balgrahmen ist ein Versatz von +/- 6 mm zulässig				
-Allowable offset of adjacent bellows frames: +/- 6 mm				
-Versatz ueber alle Balgrahmen von 20 mm zulässig				
-Allowable offset over all bellows frames: 20 mm				
-zulässiger Durchhang im Boden: 2,5 mm pro Welle				
-Allowable sag in floor area per corrugation: 2,5 mm				
-Stoffbezogene Masse sind zirka (ca.) Masse				
-Fabric relating dimensions are approximate dimensions				

ISO 13715	DIN ISO 1302	Train 18-1	ISO 128-30	Technisprachnorm DIN EN 516-3	ISO 10000	1:10	Übergang, vollst., Anbau Gangway, assy., mounting
Bearbeitet	2018-01-30	han	Geprüft	2018-01-30	hat	Werkstoff	
Normgeprüft	2018-01-31	jaw	Genehmigt	2018-01-31	kgg		
Rev.	Änderungsstr.	Datum	Nr.				
							ZDR 1001513679 000 - Zeichnungsnummer 041448517
150000064848 2018-01-31 han							Version 1 Blatt 2 8



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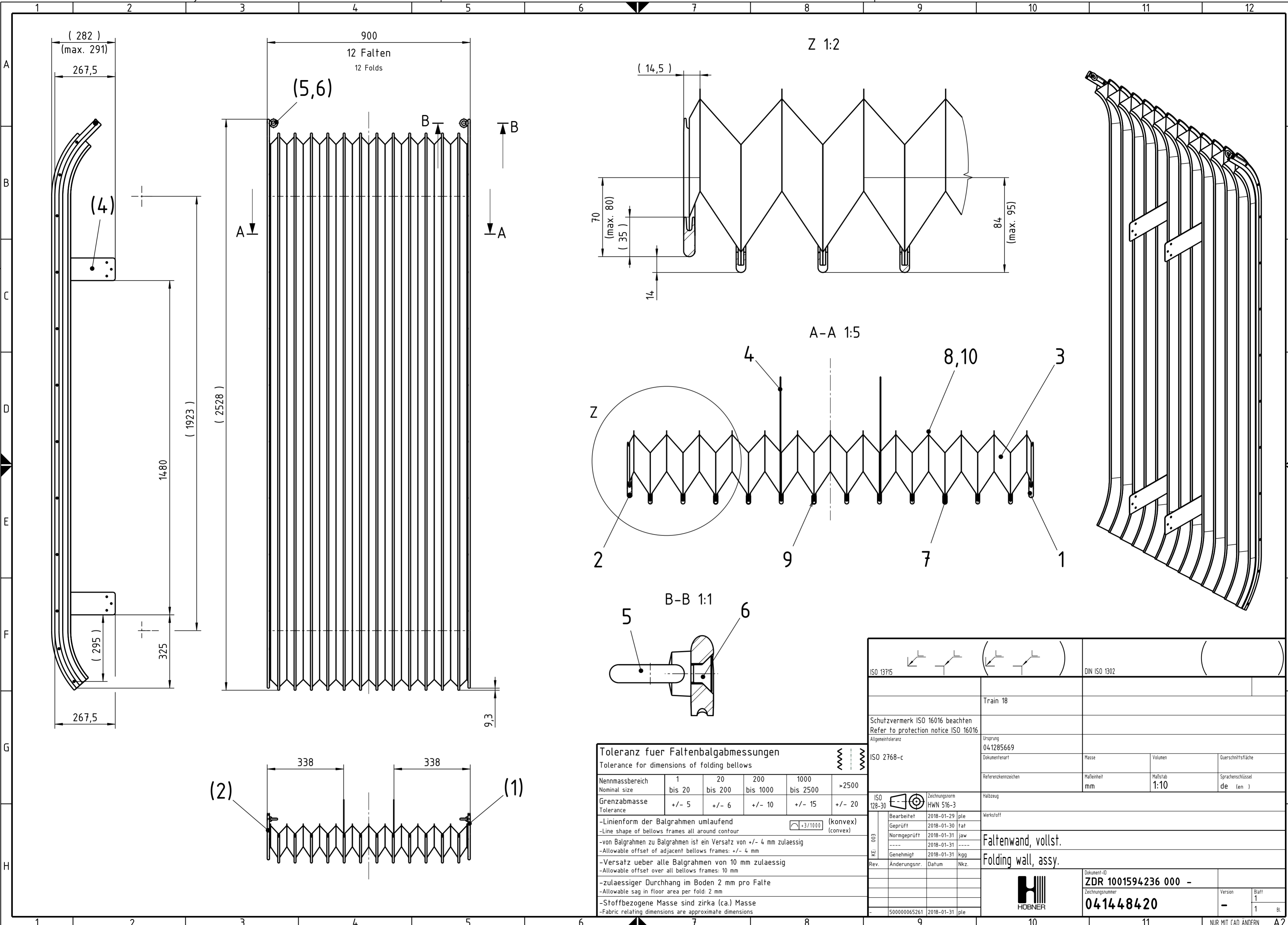
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Train 18-1			
Schutzvermerk ISO 16016 beachten Refer to protection notice ISO 16016			
Allgemeintoleranz		Ursprung	
Dokumentenart	Phase	Maßstab	Querschnittfläche
Referenzzeichnungen	Mittelmaß	1:10	de (en)
ISO 128-30	Zeichnungsform	Halbzug	
	HWN 516-3		
Bearbeitet	2018-01-30	hon	Werkstoff
Geprüft	2018-01-30	fat	
Normgeprüft	2018-01-31	jav	
-----	2018-01-31	----	
Genehmigt	2018-01-31	kgg	
Rev.	Änderungsnr.	Datum	Nkz.
		Übergang, vollst., Anbau	
		Gangway, assy., mounting	
		Dateien-ID	
		ZDR 1001513679 000 -	
		Zeichnungsnummer	
		041448517	
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Toleranz fuer Wellenbalgabmessungen mit positiver Welle				
Tolerance for dimensions of corrugated bellows with positive corrugations				
mm	µm			
1	20	200	1000	2500
Nennmassbereich	bis 20	bis 200	bis 1000	bis 2500
Nominal size				
Grenzabmasse	+/- 5	+/- 6	+/- 10	+/- 15
Tolerance				

ISO 13715	DIN ISO 1302		
Train 18			
Schutzvermerk ISO 16016 beachten Refer to protection notice ISO 16016			
Allgemeintoleranz ISO 2768-cK			
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Normgeprüft	2018-01-31	jav	
-----	2018-01-31	-----	
Genehmigt	2018-01-31	kgg	
Rev.	Änderungsnr.	Datum	Nkz.
Wellenbalg, vollst., endmontiert Corrugated bellows, assy, final mounted			
ZDR 1001592710 000 -		Version	
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Toleranz fuer Faltenbalgabmessungen
 Tolerance for dimensions of folding bellows

Nennmassbereich Nominal size	1 bis 20	20 bis 200	200 bis 1000	1000 bis 2500	>2500
Grenzabmasse Tolerance	+/- 5	+/- 6	+/- 10	+/- 15	+/- 20

-Linienform der Balgrahmen umlaufend
 -Line shape of bellows frames all around contour $\nabla_{+3/1000}$ (konvex)

-von Balgrahmen zu Balgrahmen ist ein Versatz von +/- 4 mm zulassig
 -Allowable offset of adjacent bellows frames: +/- 4 mm

-Versatz ueber alle Balgrahmen von 10 mm zulassig
 -Allowable offset over all bellows frames: 10 mm

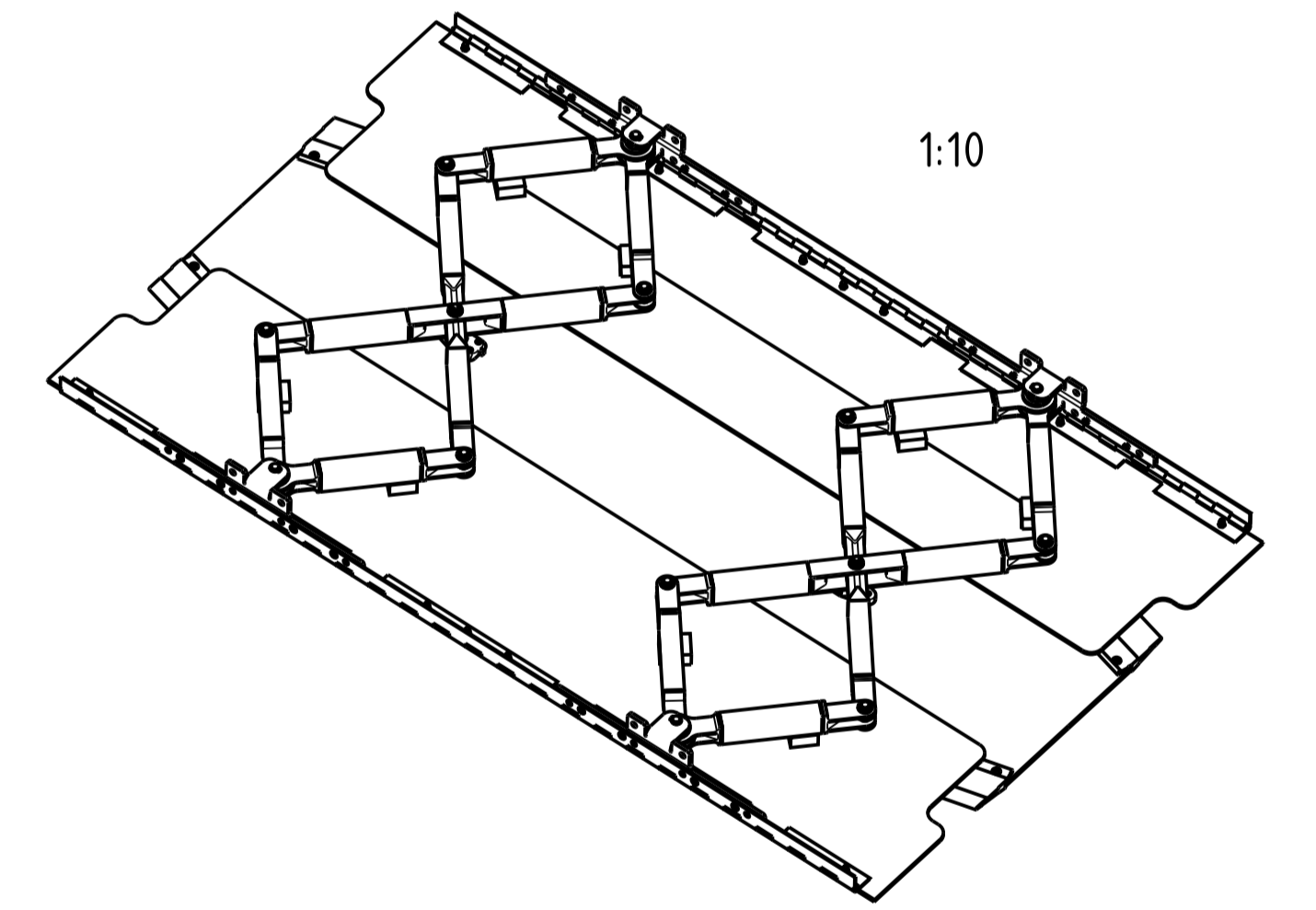
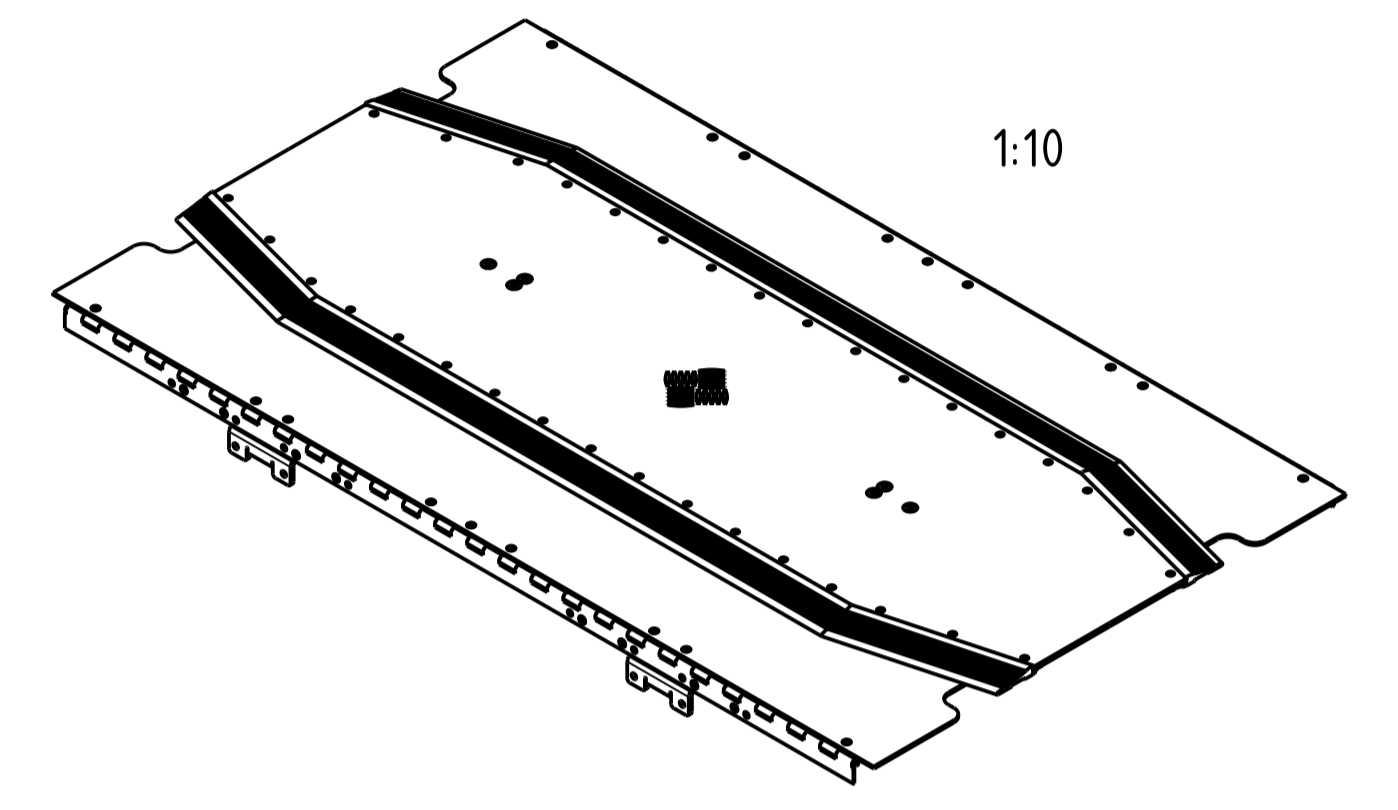
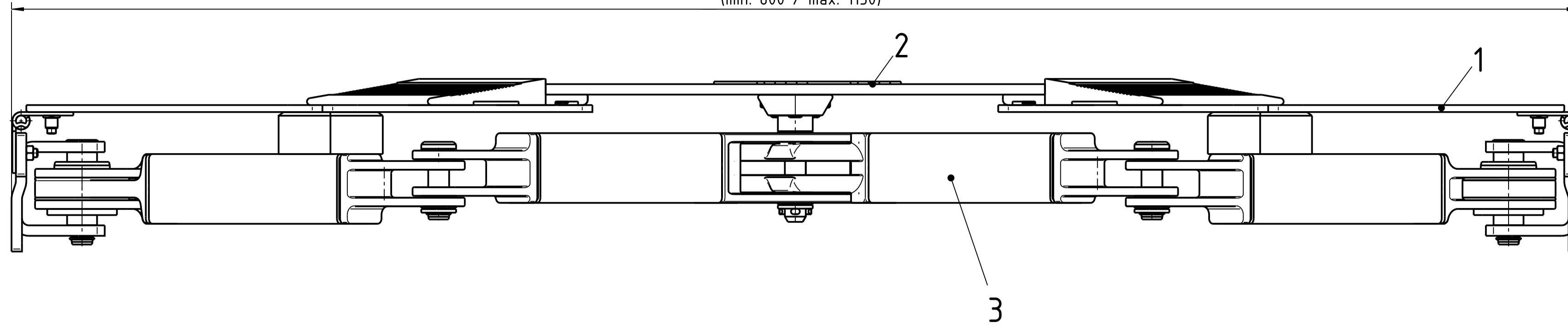
-zulassiger Durchhang im Boden 2 mm pro Falte
 -Allowable sag in floor area per fold: 2 mm

-Stoffbezogene Masse sind zirka (ca.) Masse
 -Fabric relating dimensions are approximate dimensions

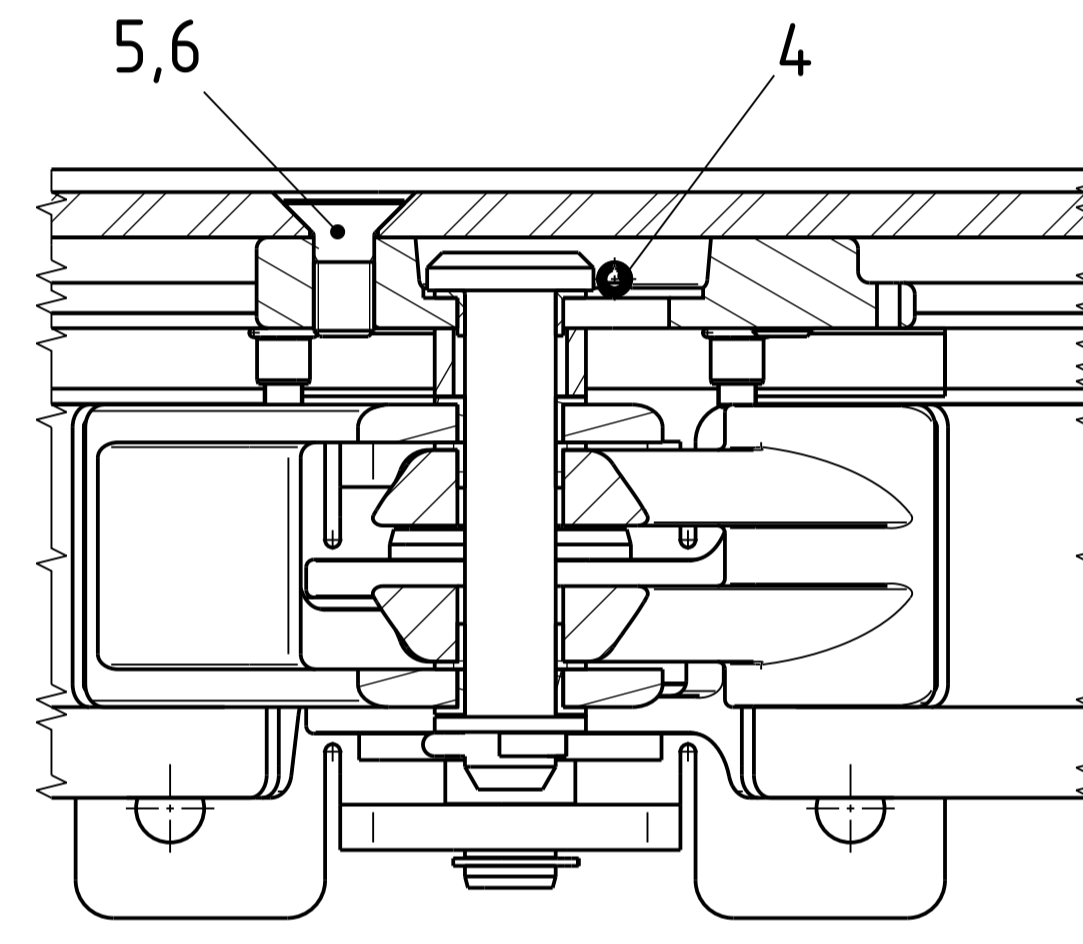
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Geprüft 2018-01-30 tat	Werkstoff		
Normgeprüft 2018-01-31 jaw	Faltenwand, vollst.		
Genehmigt 2018-01-31 kgg	Folding wall, assy.		
Rev.	Änderungsnr.	Datum	Nkz.
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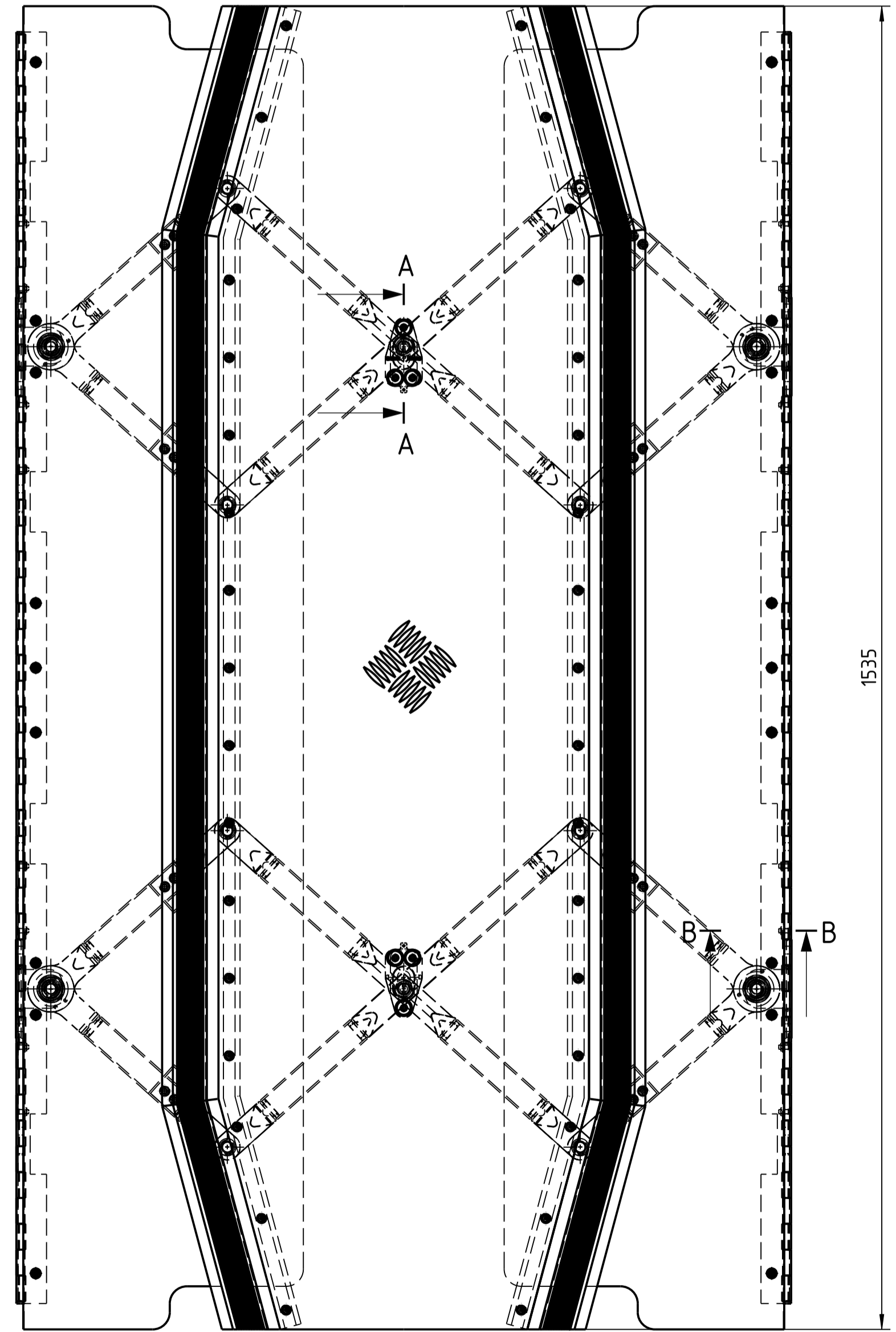
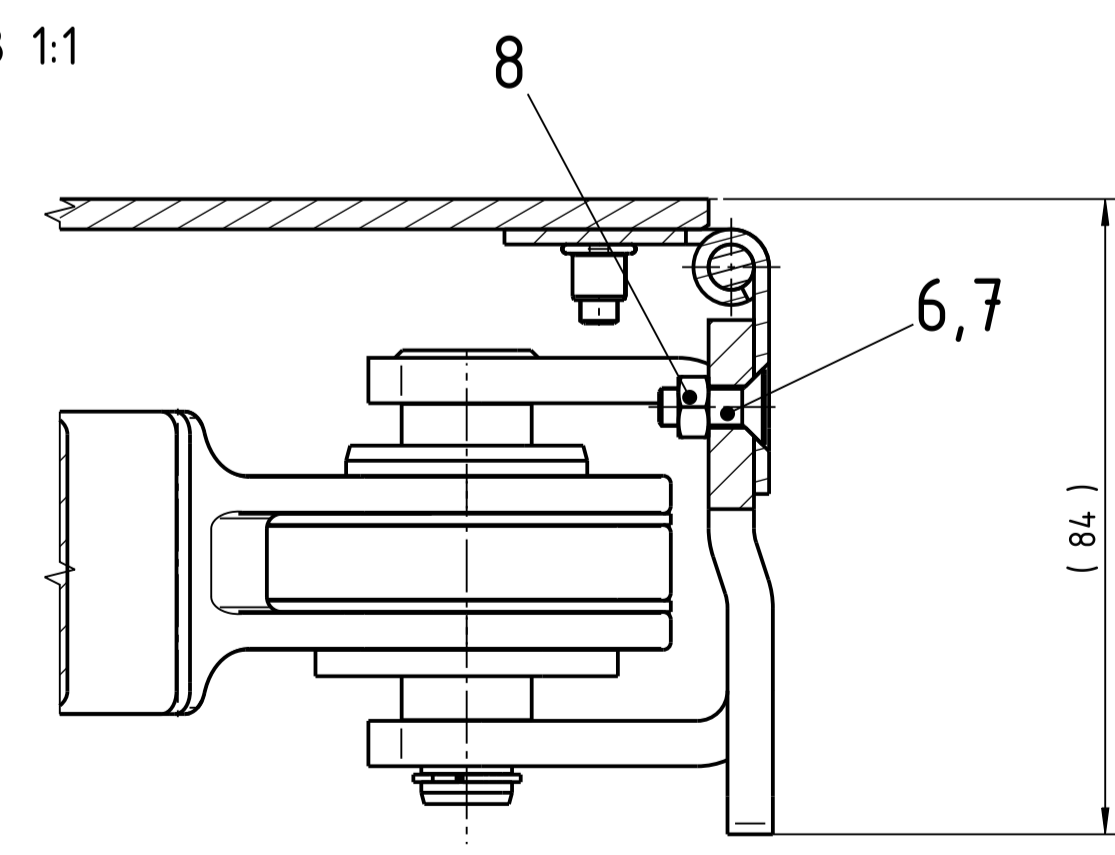
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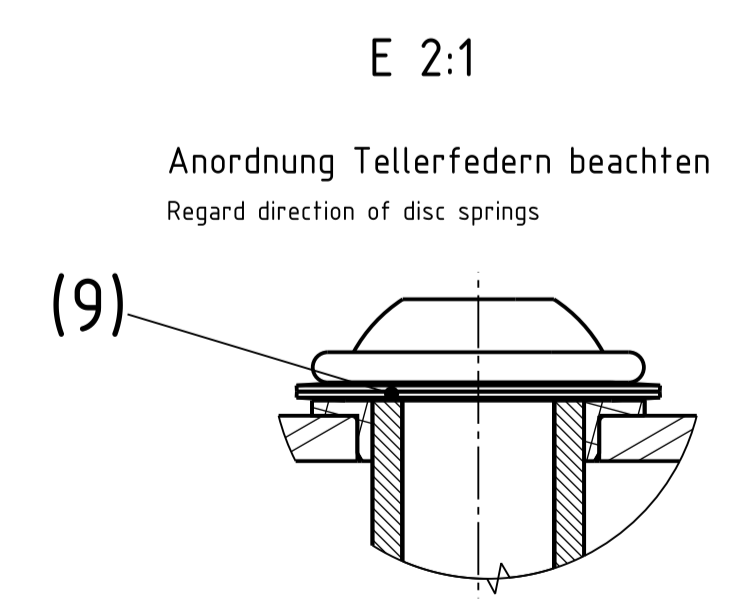
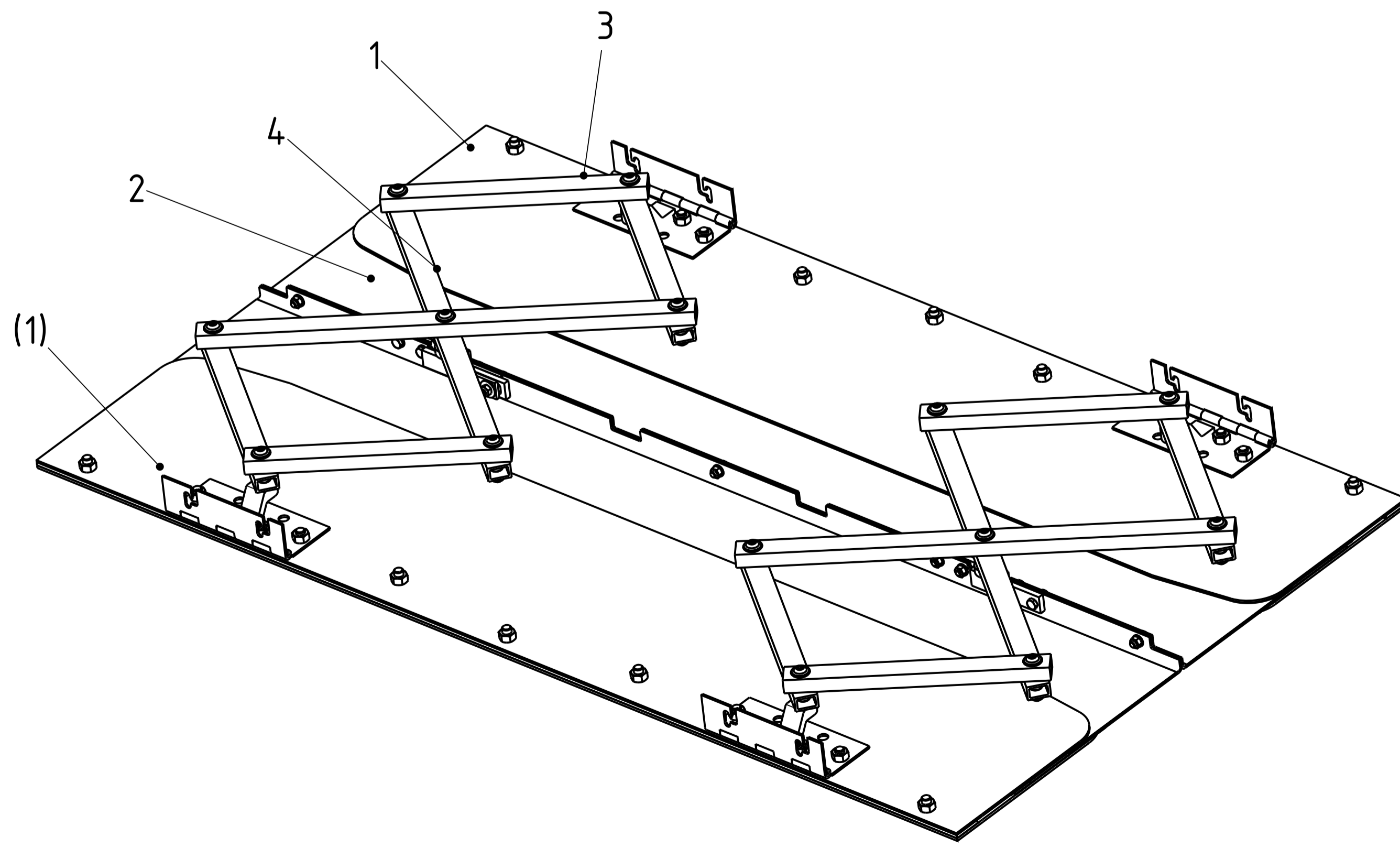
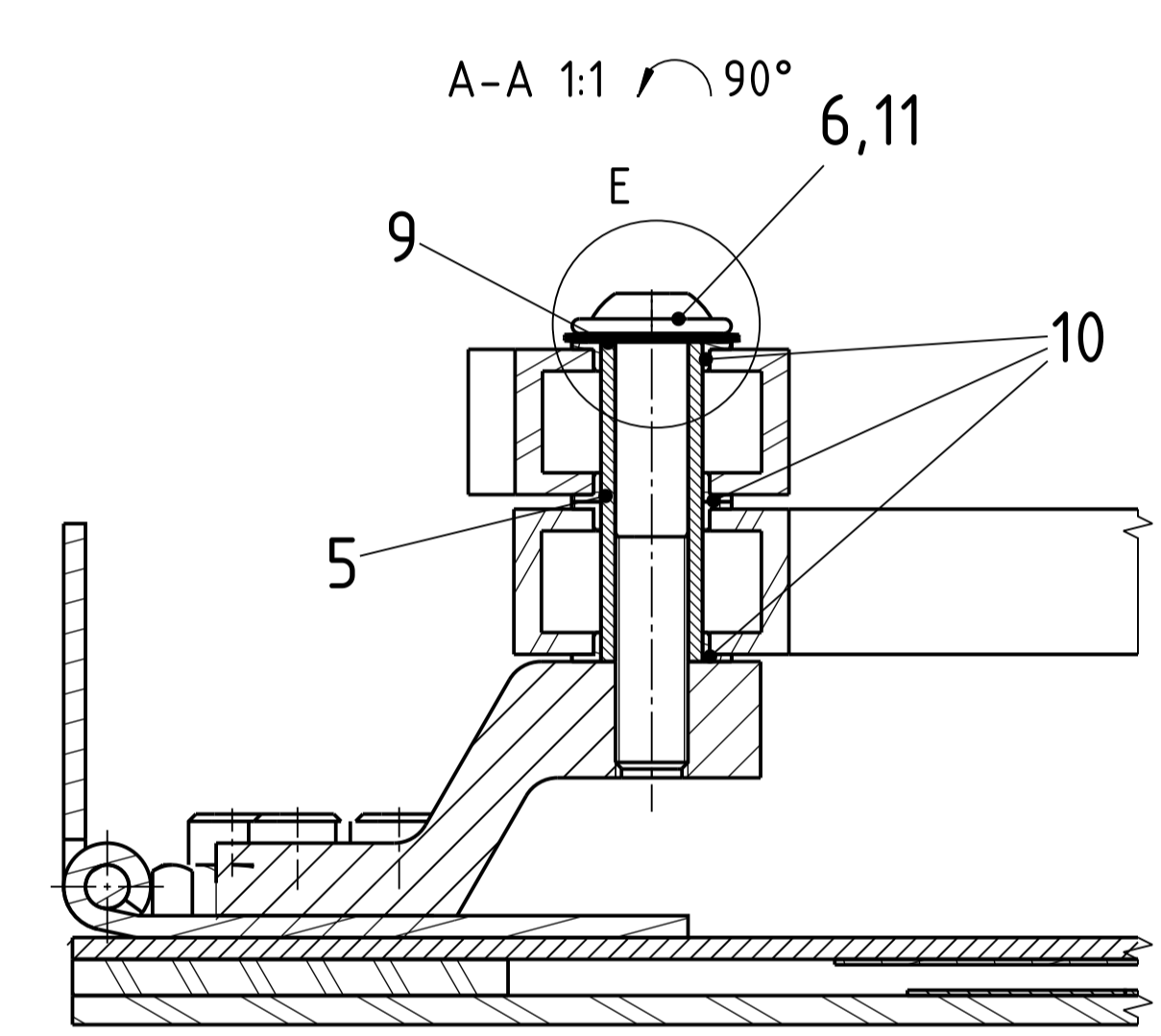
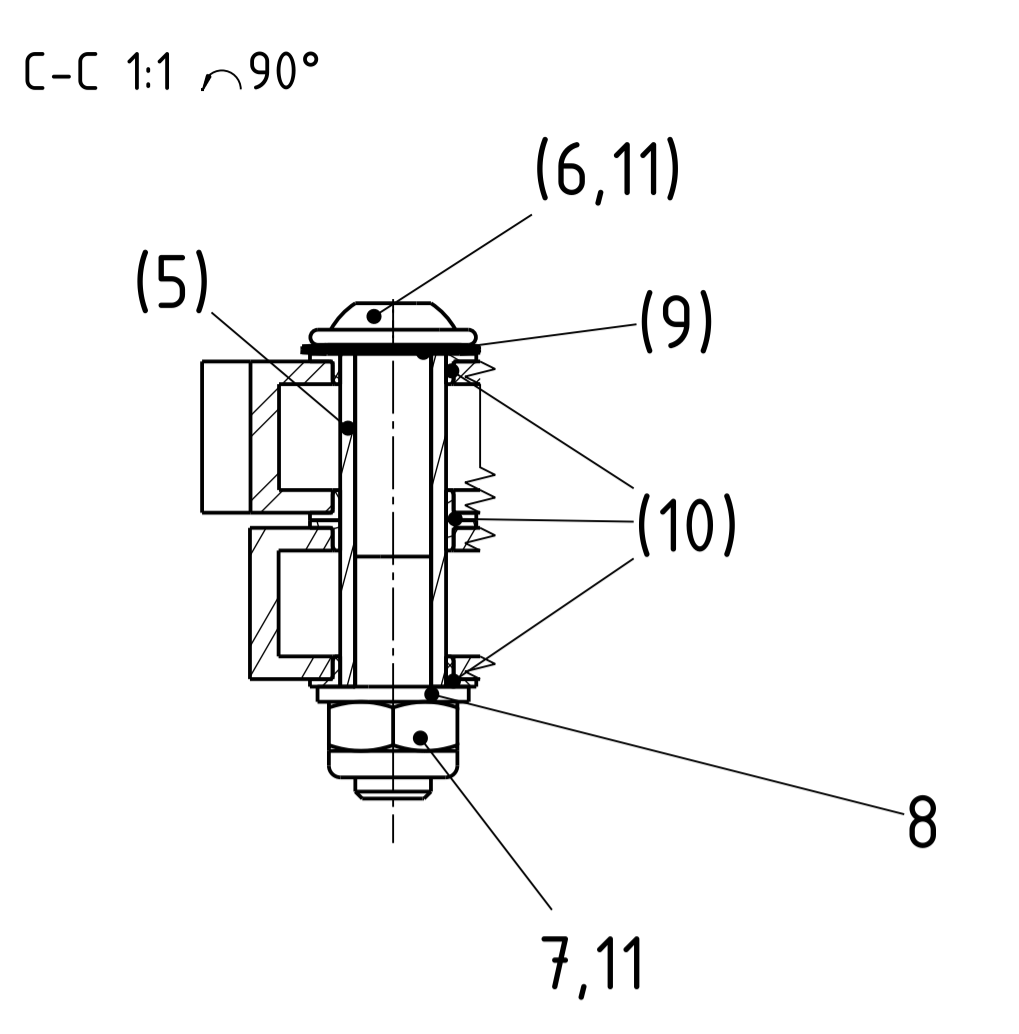
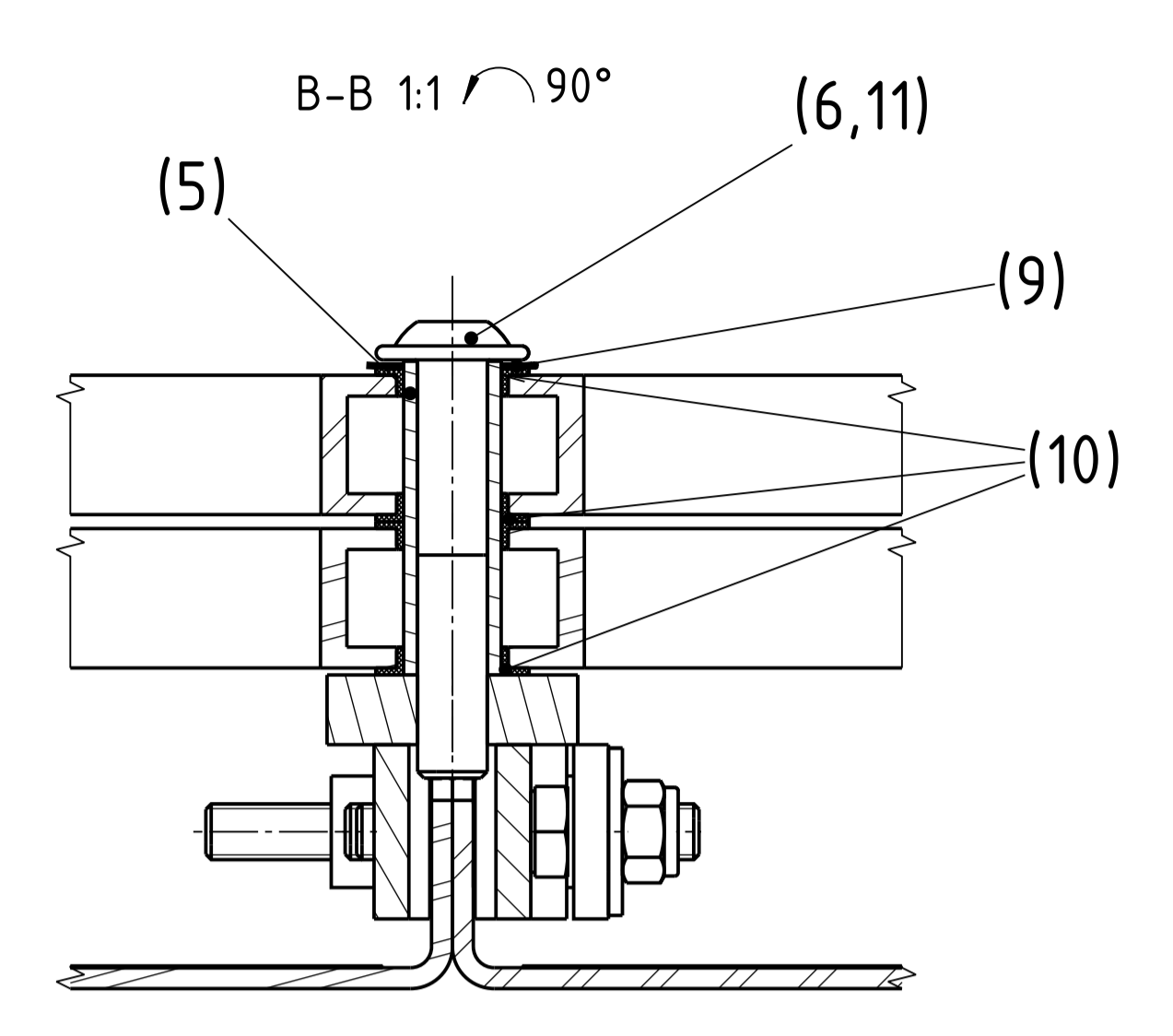
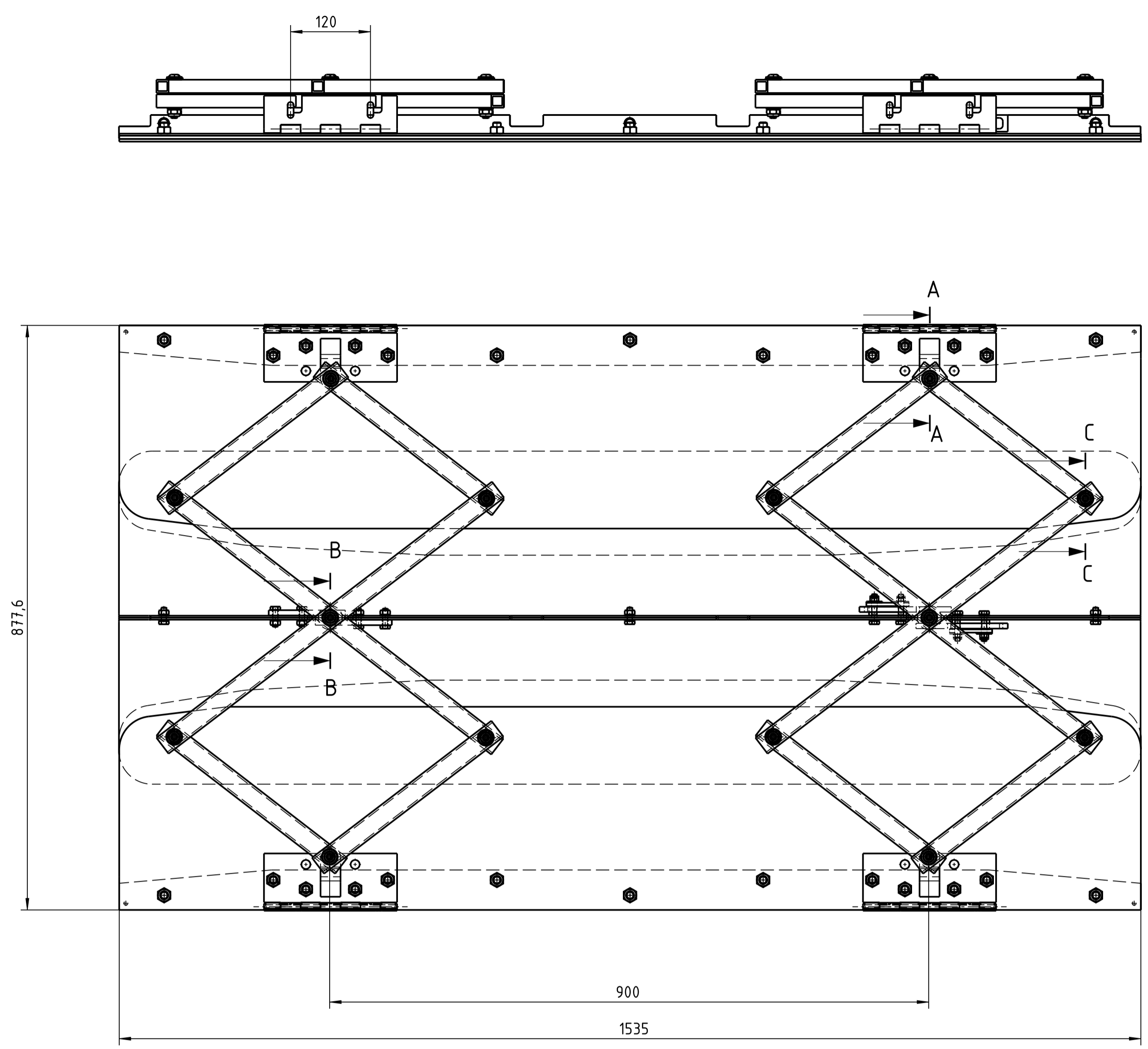
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B-B 1:1

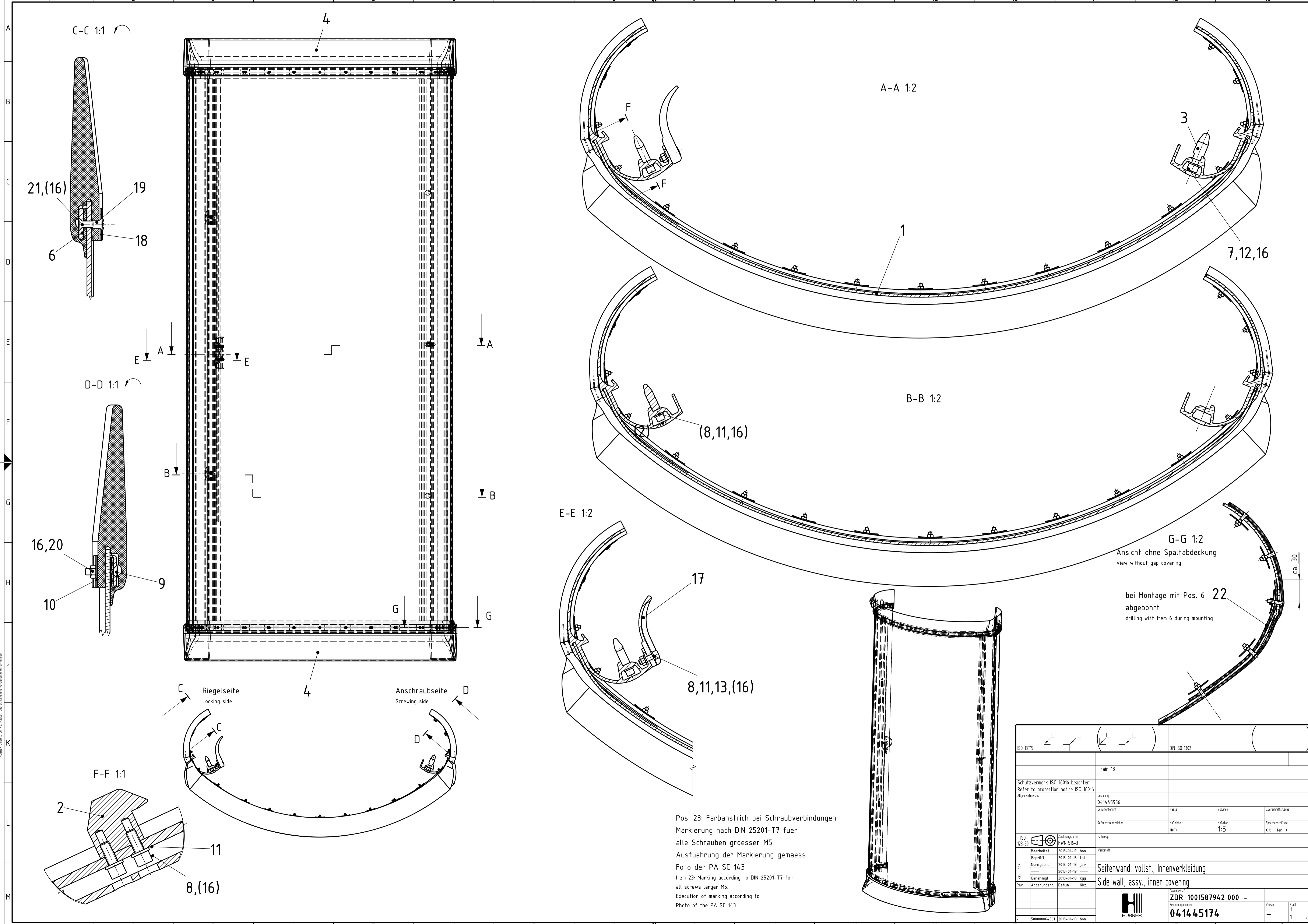


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Normgeprüft	2018-01-23	jav	
-----	2018-01-23	----	
Genehmigt	2018-01-23	kgg	
Rev.	Anderungsnr.	Datum	Nr.z.
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		Combination bridge, assy.	
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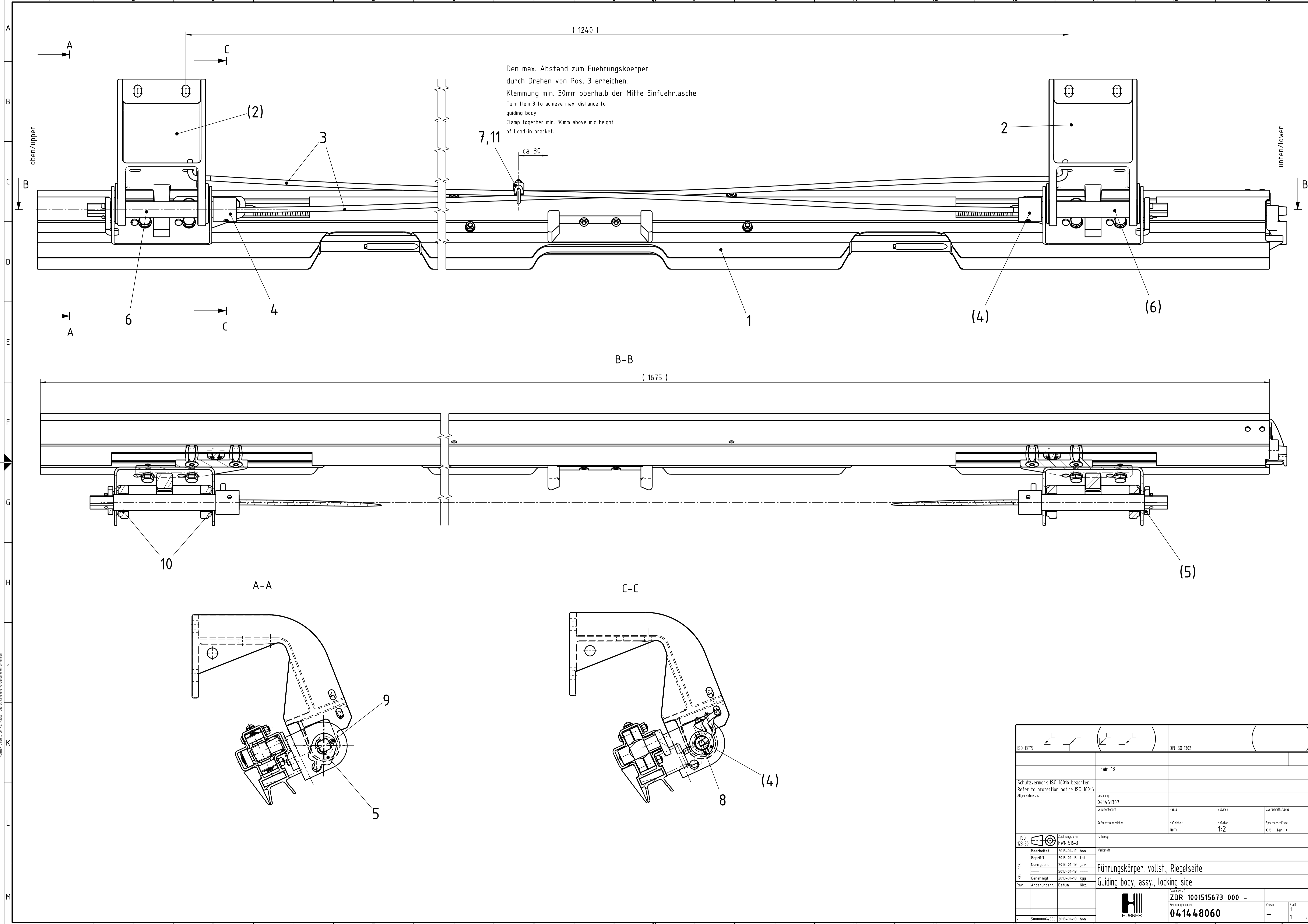
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Geprüft 2018-01-23		fat		
Normgeprüft 2018-01-23		jaw		
Genehmigt 2018-01-23		kgg	Gliederdecke, vollst.	
Rev. Änderungsnr.		Datum	Nkz.	Linking ceiling, assy.
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		Datenfeld-ID ZDR 1001503738 000 -		Version 1
		Zeilungnummer 04.14.48481		Blatt 1
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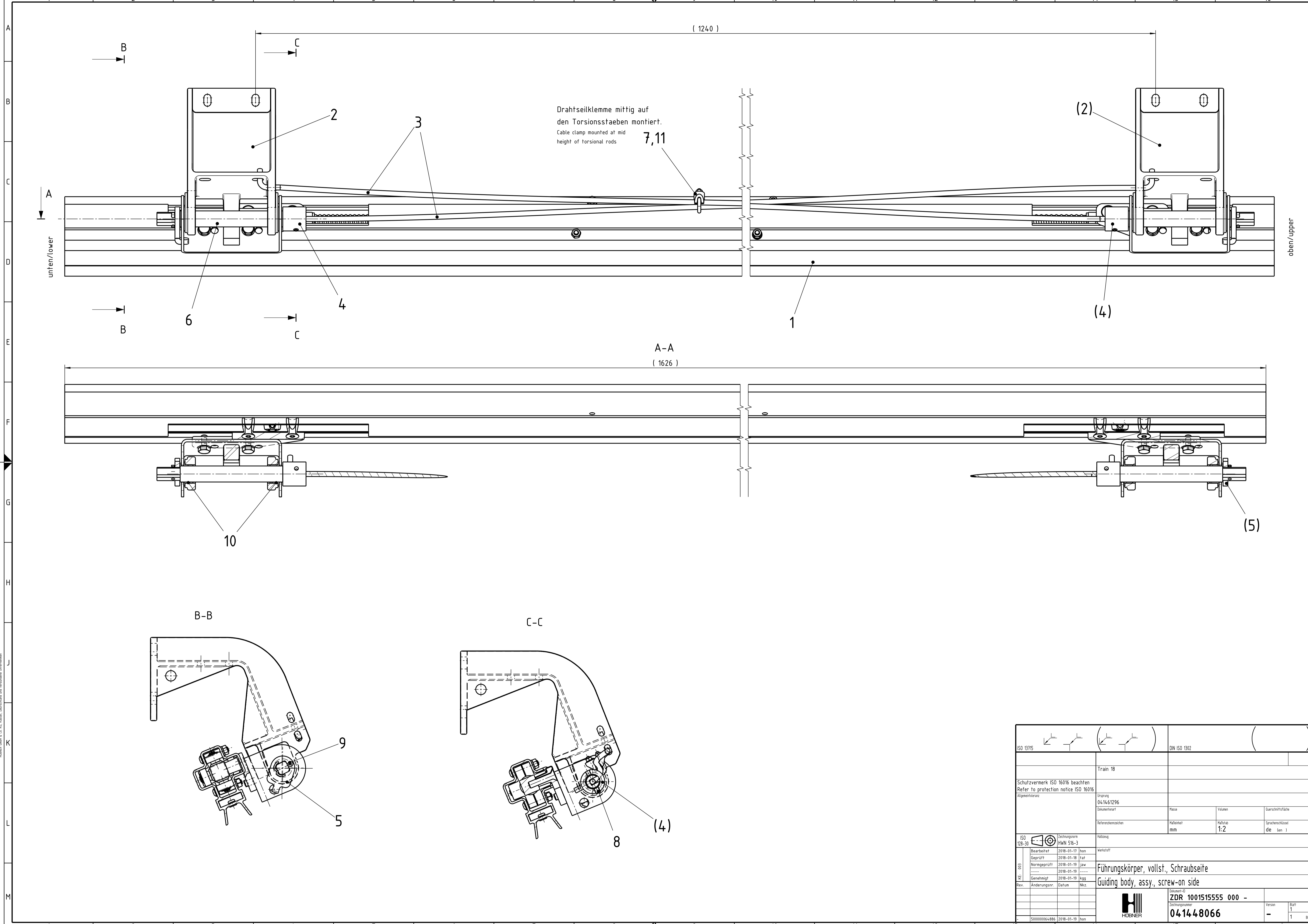


Pos. 23: Farbanstrich bei Schraubverbindungen:
 Markierung nach DIN 25201-T7 fuer
 alle Schrauben grosser M5.
 Ausfuehrung der Markierung gemaess
 Foto der PA SC 143
 Item 23: Marking according to DIN 25201-T7 for
 all screws larger M5.
 Execution of marking according to
 Photo of the PA SC 143

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Normgepueft	2018-01-19	jav	
Genehmigt	2018-01-19	kgg	
Rev.	Änderungsnr.	Datum	Nkz.
Seitenwand, vollst., Innenverkleidung Side wall, assy., inner covering			
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Drahtseilklemme mittig auf den Torsionsstäben montiert.
Cable clamp mounted at mid height of torsional rods

7,11

A-A

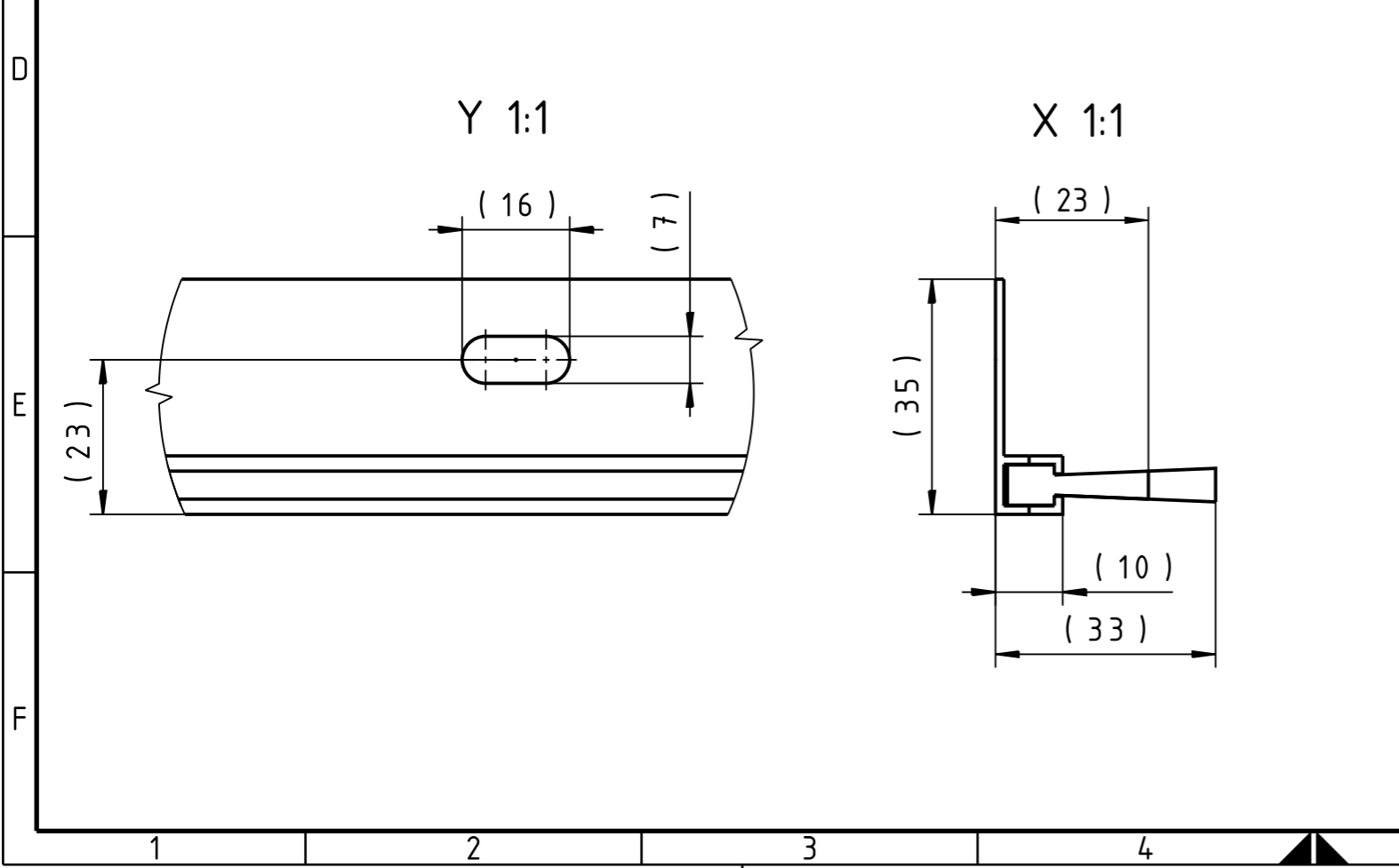
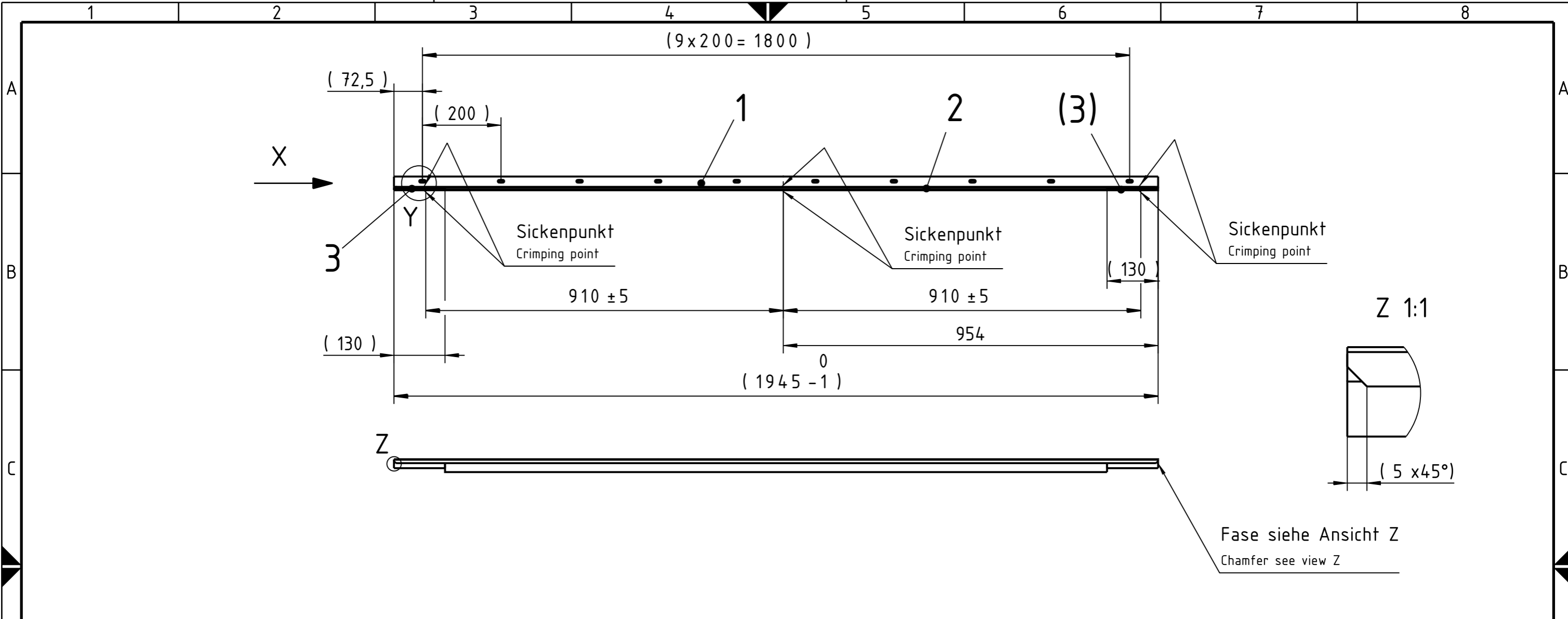
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B-B

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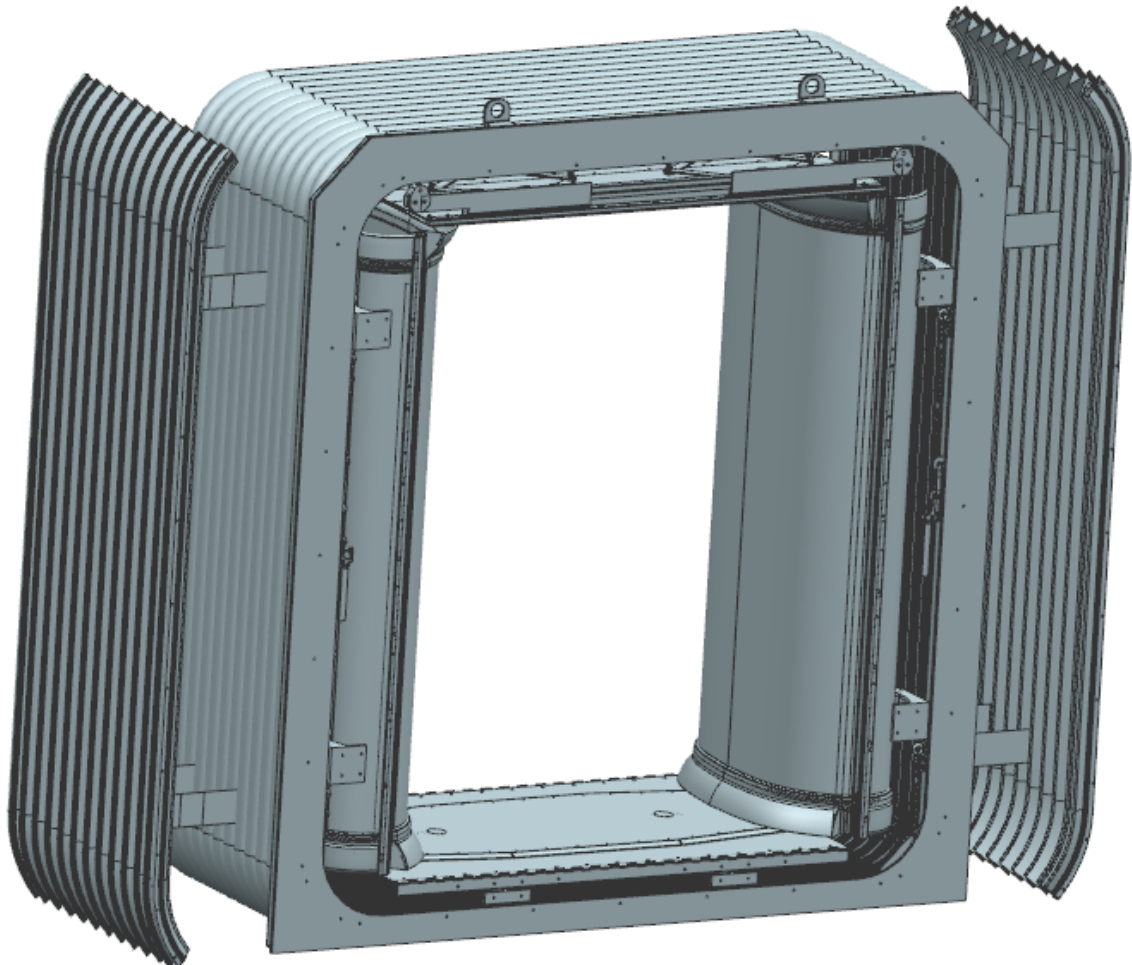
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Normgeprüft	2018-01-19	jav	
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HUBNER		Version	Blatt
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	-----	2018-01-23	----
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Operation & Maintenance Manual of Indian Train 18 Gangway



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1. OVERVIEW

The gangway for Train 18 EMU has the advantages of safety, comfort, low noise, leak-proof, dust-proof, strong weather resistance and long service life.

This type of gangway can ensure the safety of passengers when pass through the connecting area between coaches, and protect the bellow from damage. It also has good decorative properties.. In an emergency, the side protecting plate can be opened to uncouple the gangway to evacuate passengers and crew.

1.1. Sketch of Gangway Location

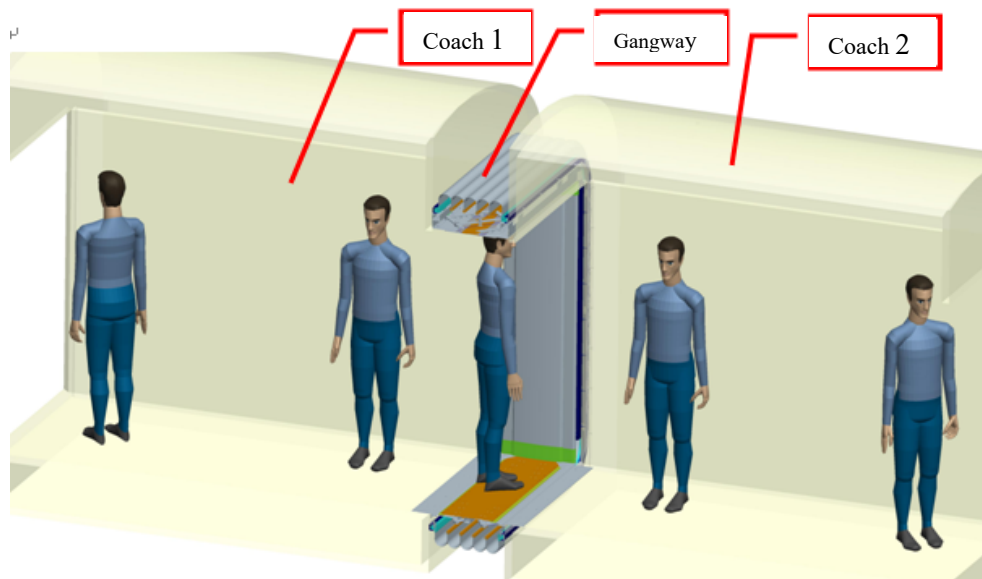


Fig 1 Sketch of Gangway Installation Location

The installation of gangway locates between two coaches.

1.2. Introduction of Function and Principle

The gangway is a safety passage between two adjacent coaches. The main functions are as follows:

- 1) Provide safe standing and passing space for passengers between two adjacent coaches.
- 2) It can reduce external noise and heat transfer, and act as a seal.
- 3) As a deformable area in the whole train, it provides recoverable deformation ability when the train passes through the curve.

This gangway is mainly divided into the following major components: internal bellow assembly, external bellow assembly, step plate assembly, bridge plate assembly, side protecting plate assembly, hairbrush assembly and coupler wearing plate.

The gangway adopts a modular structure. All the gangway components were integrated into each functional module as much as possible, which facilitates the maintenance, assembly and removal of maintenance personnel at site, and simplifies & facilitates the on-site installation and operation.

1.3. System Composition

The main components of the gangway are shown in Fig 2 as follows:

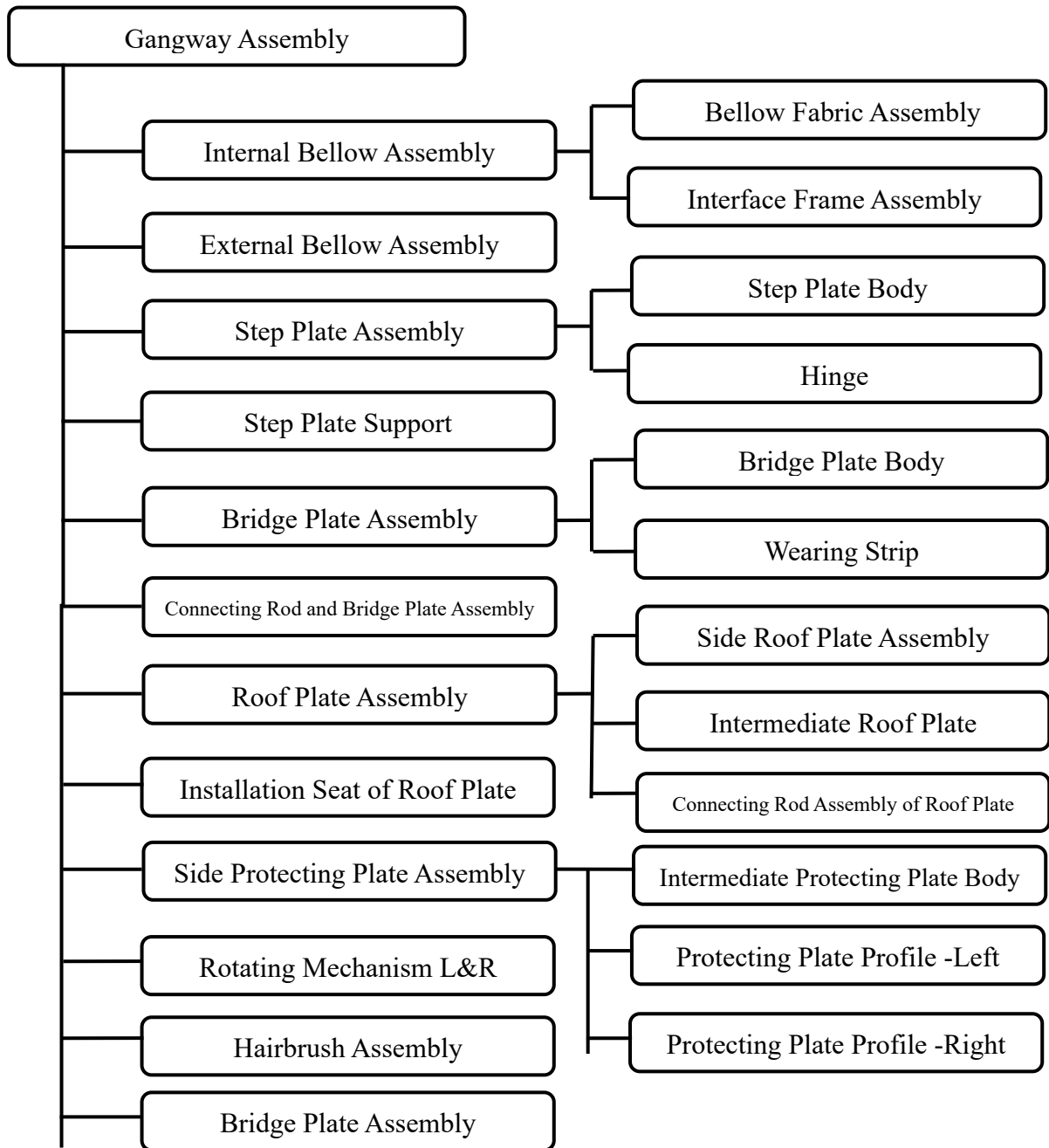


Fig 2 Main Components of Gangway

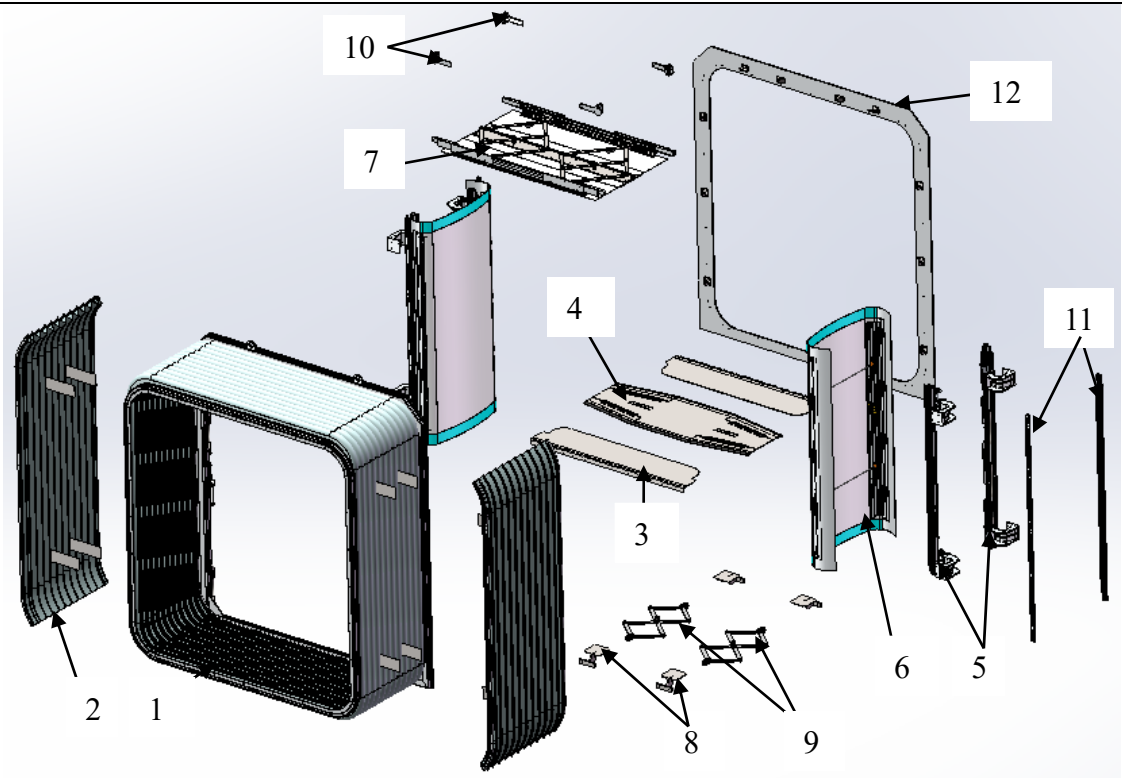


Fig 3 Gangway Exploded Views

S.N	Items	Type	Material Code	Qty.	Installation Position	Remark
1	Internal bellow assembly	Assembly	FD6501000000	1	Carbody end wall	
2	External bellow assembly	Assembly	FD6502000000	1	Carbody end wall	
3	Step assembly plate	Assembly	FD6503000000	2	Carbody end wall	
4	Bridge assembly plate	Assembly	FD6504000000	1	Connecting rod and bridge plate assembly	
5	Rotating Mechanism 1&2	Assembly	FD6505000000, FD6506000000	4	Carbody end wall	
6	Side protecting plate assembly	Assembly	FD6507000000	2	Rotating Mechanism 1&2	
7	Roof assembly plate	Assembly	FD6508000000	1	Roof installation seat-Left & Right	
8	Step support plate	Assembly	FD6509000000	4	Carbody end wall	
9	Connecting rod and bridge plate assembly	Assembly	FD6510000000	2	Carbody end wall	

10	Roof installation seat-Left & Right	Assembly	FD6511000000, FD6512000000	4	Carbody end wall	
11	Hairbrush assembly	Assembly	FD6513000000	4	Carbody end wall	
12	Transition plate assembly	Assembly	FD6516000000	1	Carbody end wall	

1.4. Description of Components

1.4.1. Internal Bellow Assembly

The internal bellow can conform to the movement of the car body and form a sealed space. The interface frame can be quickly uncoupled after being connected, and used as an emergency channel to evacuate passengers.

The bellow assembly mainly consists of bellow fabric assembly, interface frame assembly, carbody frame, sealing strips and fasteners, etc., as shown in Figure 4.

The bellow fabric assembly consists of bellow, intermediate frame, side frame, connecting plate, etc., as shown in Figure 5.

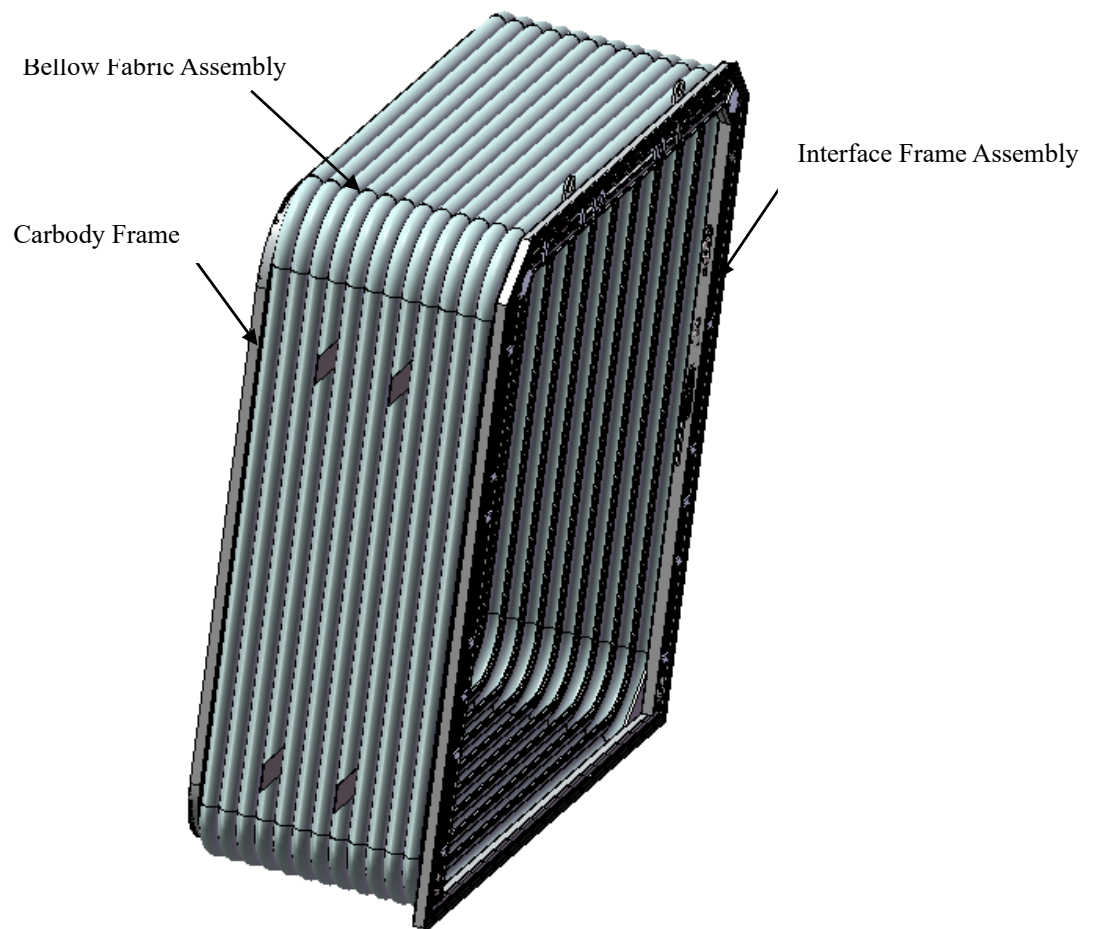


Fig 4 Internal Bellow Assembly

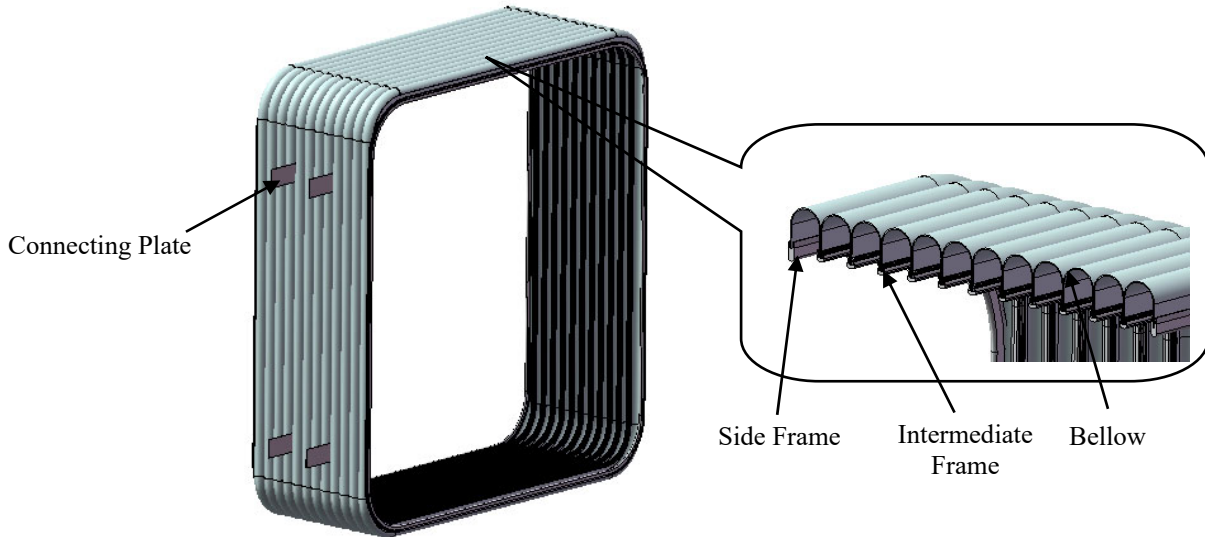


Fig 5 Bellow Fabric Assembly

The bellow fabric assembly is sewn from 12-fold ring bellows. The bellow fabric is made of high-strength, flame-retardant and environmentally friendly silicone fabric, which has good sound insulation, heat insulation, waterproof, fireproof, environmental protection, anti-aging and other characteristics. In order to ensure the support strength and appearance of the entire bellow, the intermediate frame made of aluminum profile is used at the joint of each two folds, and the end of the bellow close to the car body is pressed in car body frame. The car body frame is connected with the both car body end through screws. Each fold of bellow can stretched and compressed to meet the requirements of train passing through the line curve.

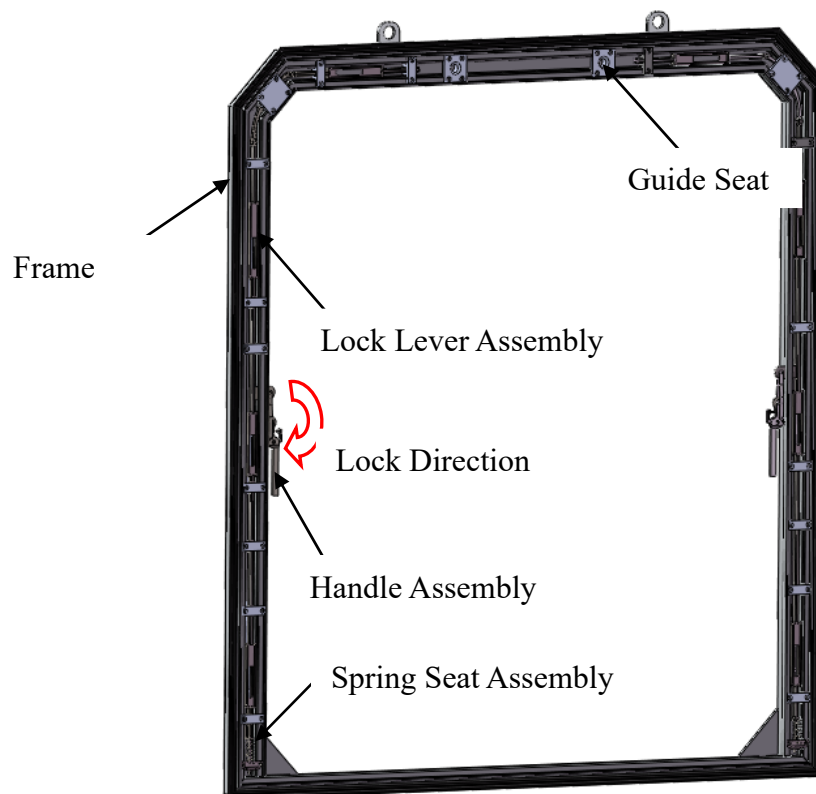


Fig 6 Interface Frame Assembly

The interface frame assembly consists of frame, handle assembly, lock lever assembly, guide seat, spring seat assembly, etc. Details are shown in Fig 6. The interface frame assembly is the key component for quick release of gangway. By operating the handle assembly, the internal mechanism will drive the lock lever assembly to realize the release and lock of two interface frames. The guide seat plays a guiding and positioning role in the process of coupling.

1.4.2. External Bellow Assembly

The external bellows are connected with internal bellow through connecting plates. It consists of side frame, intermediate frame, bellow and connecting plates. The side frame is fitted on the car body end wall through hexagon socket screws, as shown in Fig.7.

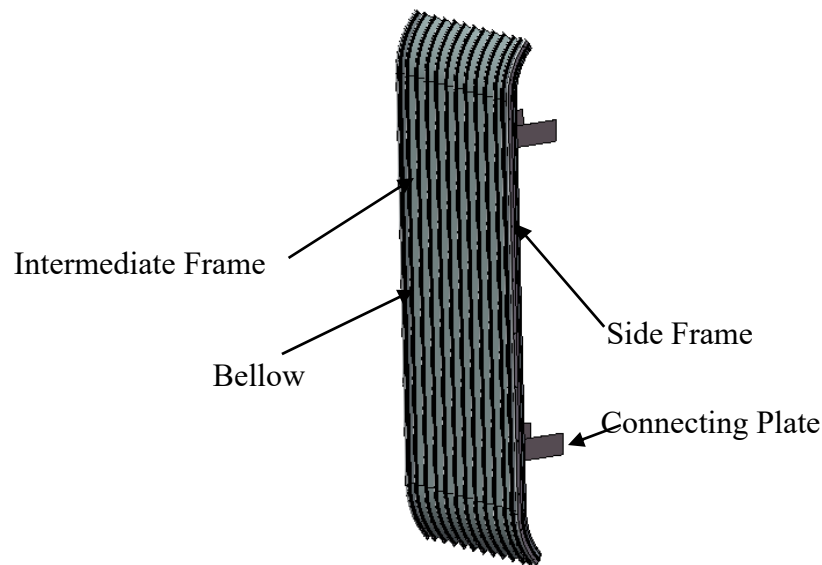


Fig 7 External Bellow Assembly

1.4.3. Step Plate Assembly

The step plate assembly is connected to the car end. When relative displacement happened between two coaches, there can be relative displacement between bridge plate assembly and step plate assembly to ensure that there is no gap on the floor surface of gangway, so as to ensure the safety of passengers.

The step plate assembly mainly consists of step plate, hinge and fasteners. The hinges are installed on the end wall of car body through hexagon head bolts, and the step plate is lapped on the step plate supports. The step plate assembly provides support for the bridge, which forms a tread surface in combination with the bridge plate assembly for passengers to pass through. When required, the step plate can be lifted for inspection and maintenance. The structure is shown in Fig.8

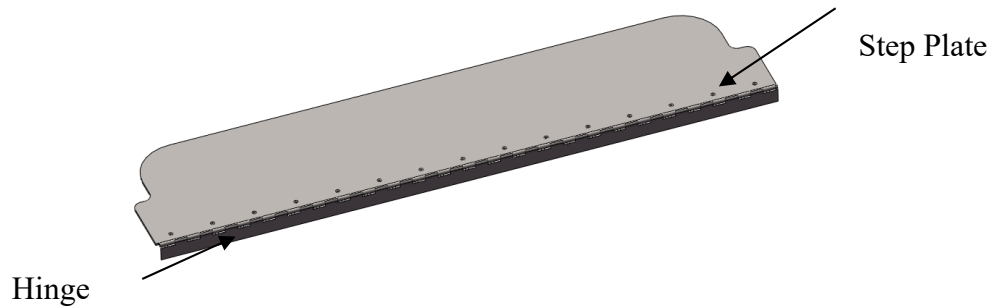


Fig 8 Step Plate Assembly

1.4.4. Bridge Plate Assembly

The bridge plate assembly is connected with the connecting rod of the bridge plate and moves with it. When relative displacement happened between two coaches, there can be relative displacement between bridge plate assembly and step plate assembly to ensure that there is no gap on the floor surface of gangway, so as to ensure the safety of passengers.

The bridge plate assembly mainly consists of bridge plate body, locking mechanism, wearing strip and fasteners. The bridge plate body is made of stainless steel checkered plate with anti-skid effect, and lapped on step plate assembly. The wearing strip is made of non-metal wear-resistant material, which can avoid the metal friction between the lap plate and the step plate. The locking mechanism locks the bridge plate assembly and its connecting rod together. As shown in Fig. 9.

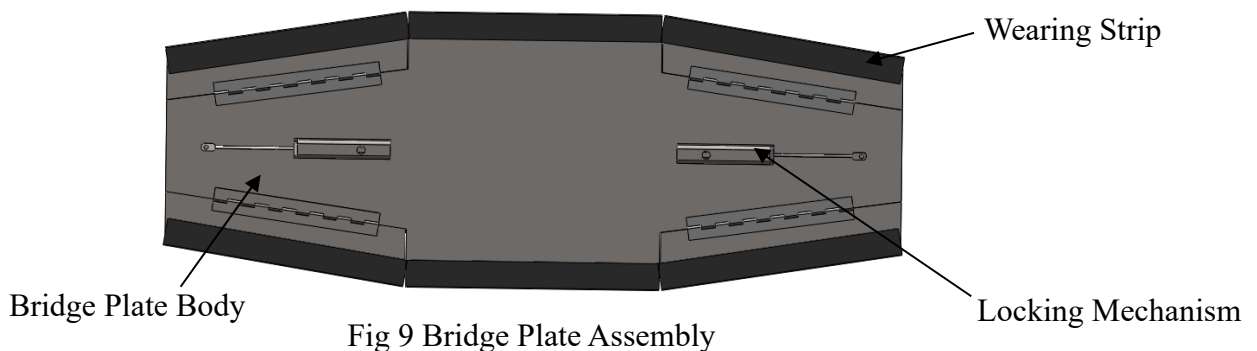


Fig 9 Bridge Plate Assembly

1.4.5. Rotating Mechanism 1 & 2

The rotating mechanism-left mainly consists of the left side of the profile beam assembly-left, spring rod composition, installation seat, etc. The rotating mechanism -right mainly consists of profile beam assembly-right, spring rod composition, installation seat, release mechanism, etc. As shown in Fig.10, when the rotary switch rotates to the limit position in the direction of the arrow, the locking lever moves up to the position shown in the figure, and the rotating mechanism is unlocked at this time. The rotating mechanism left/right are installed on the end wall of the car body through the installation seat.

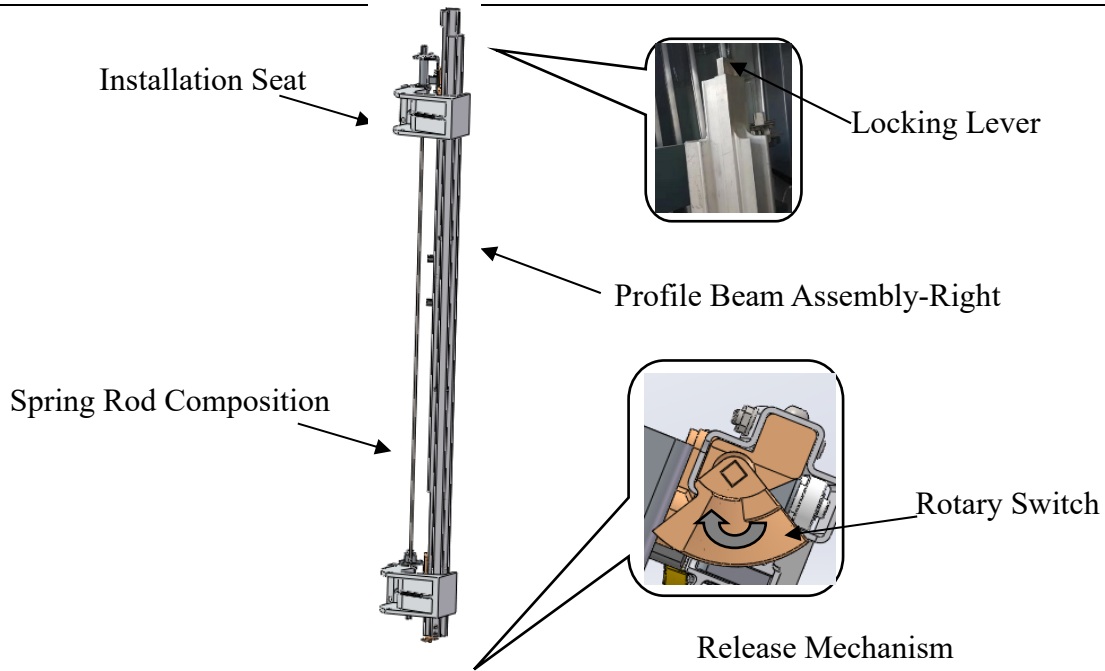


Fig. 10 Release Mechanism-Right

1.4.6. Roof Plate Assembly

The roof plate assembly is installed on the roof plate fitment seat, which can realize quick removal and assembly. The roof plate assembly consists of side roof plate assembly, intermediate roof plate assembly, connecting rod assembly of roof plate, etc., as shown in Fig7. The roof plate assembly is composed of a double-layer board structure. The intermediate roof plate is inserted into double-layer board, and slides in it. The inner side of the double-layer board is pasted with a noise-reducing cloth to reduce the noise caused by friction. The upper and lower surfaces of the intermediate roof plate are filmed to reduce friction and make it easier to slide.

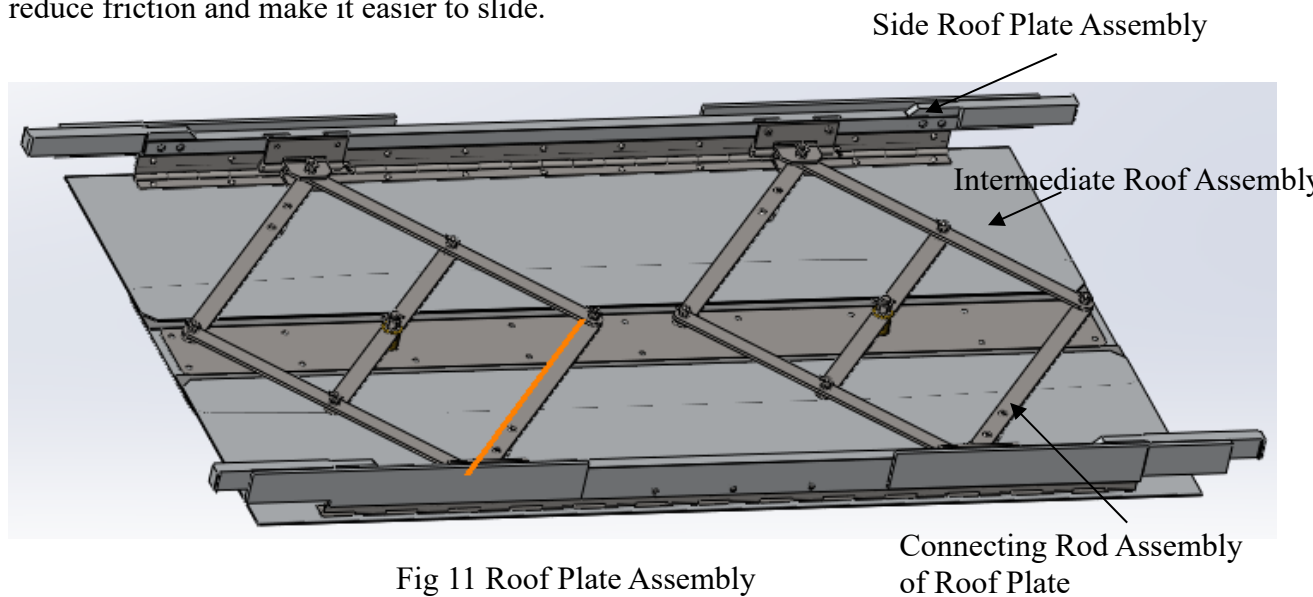


Fig 11 Roof Plate Assembly

1.4.7. Step Plate Support

The foot plate support assembly is made of stainless steel welded parts, which are installed

on the end face of the coach at the lower part of the floor by screws. It plays the role of supporting the step plate of the step plate assembly, and used to connect the connecting rod assembly and bridge plate. As shown in Fig.12.

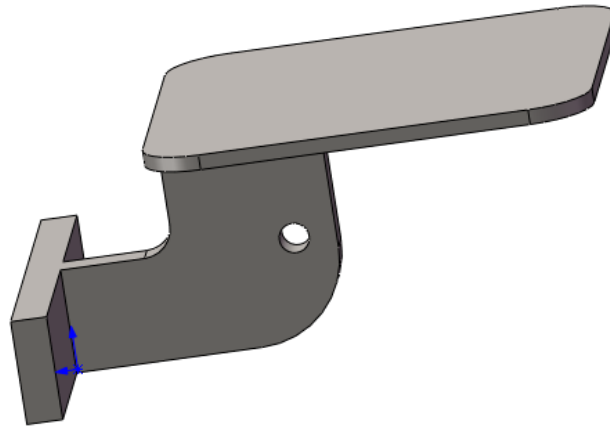


Fig. 12 Step Plate Support

1.4.8. Connecting Rod and Bridge Plate Assembly

The connecting rod and bridge plate assembly consists of intermediate connecting rod, side connecting rod, connecting seat, intermediate shaft, etc. The both ends are installed on the step plate support, and the intermediate shaft is used to connect bridge plate assembly. When displacement of the coach end changes, the connecting rod and bridge plate assembly produces corresponding movements such as stretching, compression, and rotation, and drives the bridge plate to follow the movement. As shown in Fig. 12.

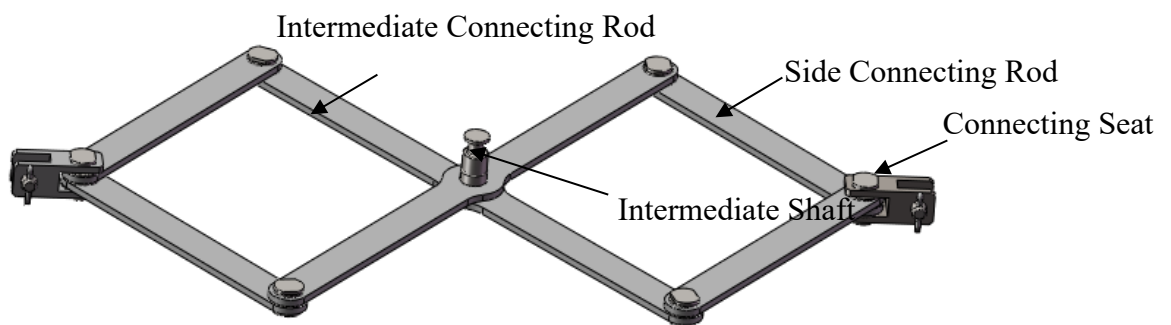


Fig 12 Connecting Rod and Bridge Plate Assembly

1.4.9. Side Protecting Plate Assembly

The intermediate protecting plate body of side protecting plate assembly is made of flexible material, which can adapt to the relative movement between coaches. The side protecting plate assembly can prevent passengers from contacting the interior of the bellows and the handle assembly, and plays a role in safety. In addition, the side protecting plate assembly and roof plate assembly jointly form the decorative surface of the passenger passage, which is in harmony with the interior of the coach body to provide an aesthetic feeling.

The side protecting plate mainly consists guard profiles, protecting plate profile assembly-left, protecting plate profile assembly-right, intermediately protecting plate body, and the skirt, etc. The intermediately protecting plate body is made of flexible material and connected with protecting plate profile assembly-left & right together. After the completion of the side protecting plate assembly installation, the intermediately protecting plate is

usually in a tensioned state under the action of the rotating mechanisms-left & right. And the protecting plate can be stretched and compressed through the rotation of the rotating mechanisms to adapt to the train movement. After the completion of the side protecting plate installation, it can be quickly released. Release can be realized through rotation of the rotary switch at the bottom right of rotating mechanism in case of need. As shown in Fig. 11.

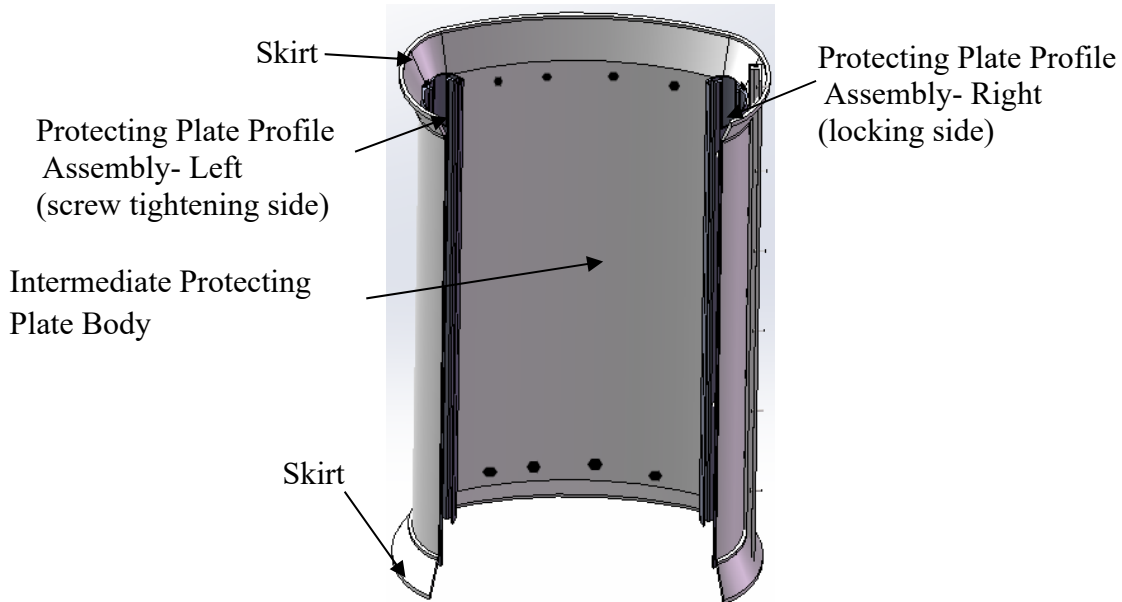


Fig 11 Side Protecting Plate Assembly

1.4.10. Installation Seat of Roof Plate-Left & Right

The installation seat of roof plate is used for installation of roof plate assembly, which consists of the fixing plate, installation seat, rotating plate, etc. Under normal circumstances, the rotating plate must be turned to the closed position, and the locking screw must be tightened. When the roof plate assembly needs to be installed or removed, rotate the rotating plate to open position to install or remove the roof plate. As shown in Fig.12.

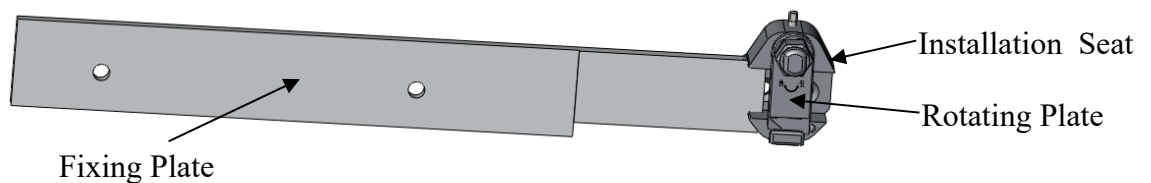


Fig 12 Installation Seat of Roof Plate

1.4.11. Hairbrush Assembly

The hairbrush assembly is used to fill the gap between the side protecting plate assembly and the coach body.

The hairbrush assembly is mainly composed of a brush plate, hairbrush, rubber rib, hairbrush depression bar, etc. It is mainly used to fill the gap between the side protecting plate assembly and the coach body. As shown in Fig.13.

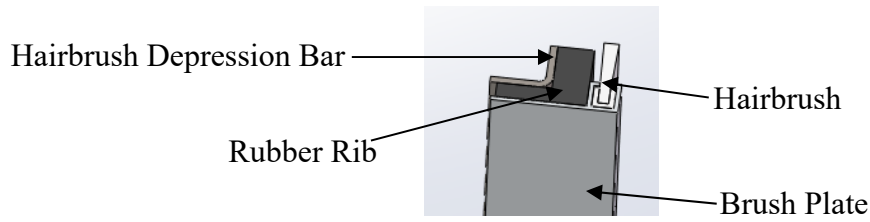


Fig 13 Hairbrush Assembly

1.4.12. Transition Plate Assembly

The transition plate assembly is matched with the interface frame to realize the quick coupling and release of gangway. The transition plate consists of transition plate, guide pin, latch hook, etc. As shown in Fig. 14.

The transition plate is installed on the end wall of the coach body through countersunk screws. When the gangway is coupled, the guide pin is inserted into the guide seat to operate the handle assembly, then the lock lever moves and locks together with the latch hook.

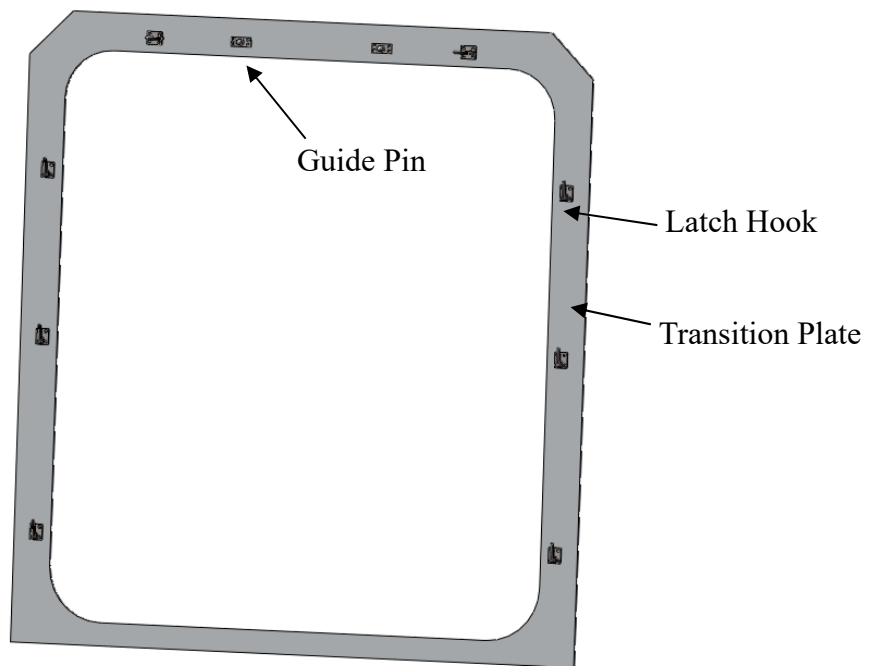


Fig 14 Transition Plate Assembly

1.5. Fasteners

S. N	Material Code		Name	Type/Size	Torque	Model of thread anti-loose agent/ anti-seize agent	Quantity of thread anti-loose agent/ anti-seize agent	Remarks
	ZELC	Hunan Lince						
1		1303004005	Hexagon head bolt M8x30	GB/T 5781	15 Nm	Loctite 243	Appropriate amount	
2		1306003258	Plain washer 8	GB/T 95	/	/	/	




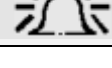
3		1306000375	Spring washer 8	GB/T 93	/	/	/	
4		1303001286	Hexagon head bolt M8x35	GB/T 5781	15 Nm	Loctite 243	Appropriate amount	
5		1303001290	Hexagon head bolt M8x20	GB/T 5781	15 Nm	Loctite 243	Appropriate amount	
6		1307004495	Hexagon head screw M10x25	GB/T 70.3	24 Nm	Loctite 243	Appropriate amount	
7		1307008074	Hexagon socket cap head screw M6x25	GB/T 70.1	5.4 Nm	Loctite 243	Appropriate amount	
8		1303004018	Hexagon head bolt M8x25	GB/T 5781	15 Nm	Loctite 243	Appropriate amount	
9		1307005079	Hexagon socket head cap screw M8x20	DIN 7984	15 Nm	Loctite 243	Appropriate amount	
10		1309000165	Type B pin shaft 12x35					
		1309000120	Cotter pin 4x24					
11		1307001150	Hexagon socket head cap screw M6x16	GB/T 70.1	5.4 Nm	Loctite 243	Appropriate amount	
12		1306003257	Plain washer 6	GB/T 95	/	/	/	
13		1306000374	Spring washer 6	GB/T 93	/	/	/	
14		1301000006	Hex Nut M6	GB/T 6170				
15		1301000006	Hexagon countersunk head screw M8x35	GB/T 70.3	15 Nm	Loctite 243	Appropriate amount	
16		1307008074	Hexagon socket head cap screw M8x25	GB/T 70.1	15 Nm	Loctite 243	Appropriate amount	



2. EQUIPMENT INSTALLATION AND REMOVAL

2.1. Installation

2.1.1. Safety Instructions

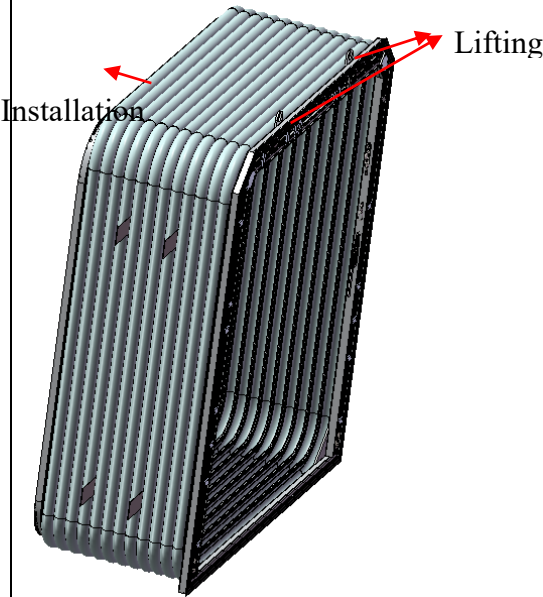
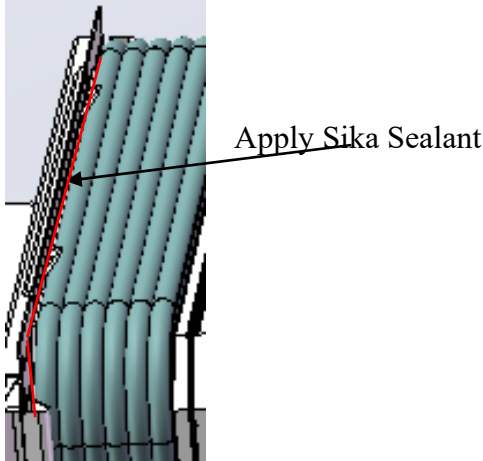
Installation, use and maintenance must be operated by qualified personnel (competent and trained personnel) and in accordance with these instructions!

Caution 	Handle with care! Avoid damaging part surfaces!
Warning 	Be careful when coupling and uncoupling the bellows to prevent personal injury from falling!
Caution 	Handle with care! Keep the bellows away from sharp objects!
Caution 	Don't step or walk on the bellow roof area. It may cause material damage or destruction of the overall structure!

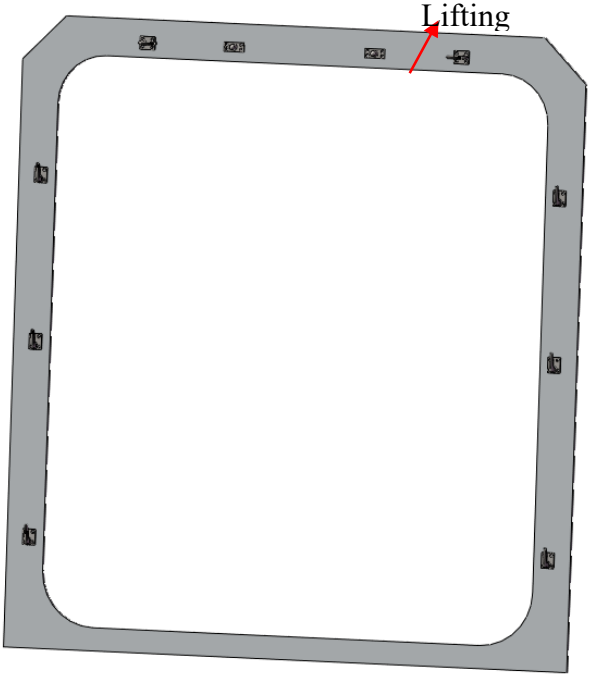
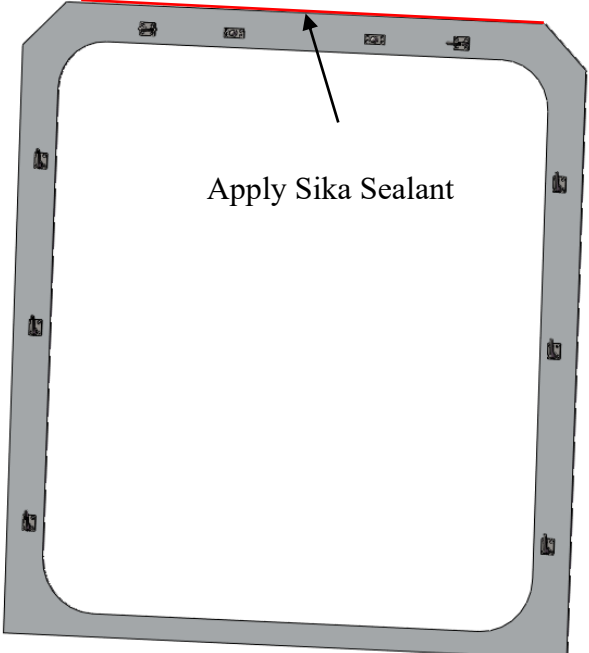
Caution 	Caution! Be careful when lifting!
Caution 	Handle with care! Avoid damaging part surfaces!

2.1.2. Work Content and Steps

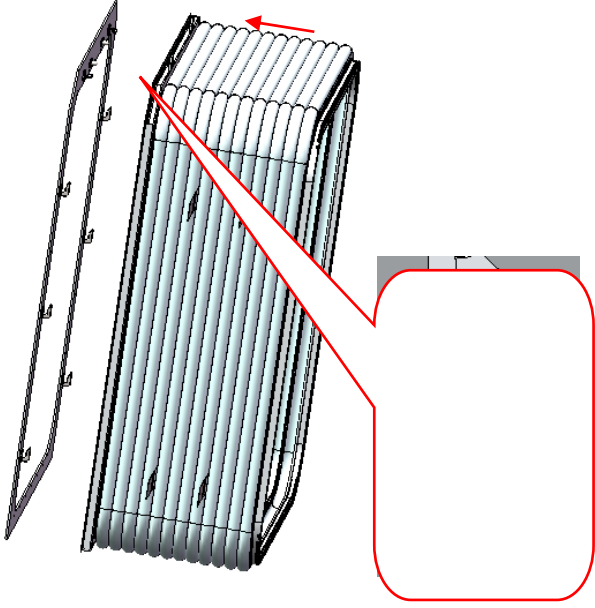
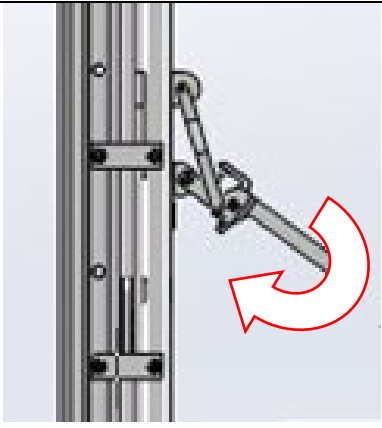
2.1.2.1. Installation of Internal Bellow Assembly

Fig	Item	Steps	Tools
	1. Install the fastening screws	<p>Let a sling pass through the internal bellow to form the lifting lug, hook the sling by an overhead crane to assist the installation. And install the internal bellow on the coach body end wall with hexagon head bolts $M8 \times 30$.</p> <p>Note: The screws should be crossed, symmetrically and evenly tightened. The pre-tightening force shall be 15Nm.</p> <p>Safety rope should be hung to prevent deformation of the bellows assembly.</p>	Overhead crane, hexagon torque wrench (M12, 0-60Nm)
	2. Apply Sika sealant	Apply Sika sealant around the carbody frame for sealing	Sika sealant

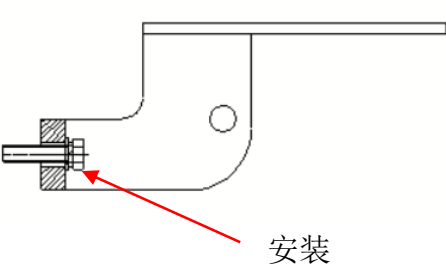
2.1.2.2. Installation of Transition Plate Assembly

Fig	Item	Steps	Tools
	<p>1. Install the fastening screws</p>	<p>Let a sling pass through the transition plate assembly. Hook the sling by an overhead crane to assist the installation. Install the transition plate on the other coach body end wall with hexagon countersunk head bolts M8×35.</p> <p>Note: The screws should be crossed, symmetrically and evenly tightened. The pre-tightening force shall be 15Nm.</p>	<p>Overhead crane, hexagon torque wrench (M12, 0-60Nm)</p>
	<p>3. Apply Sika sealant</p>	<p>Apply Sika sealant around the transition plate for sealing</p>	<p>Sika sealant</p>

2.1.2.3 Coupling of Bellow

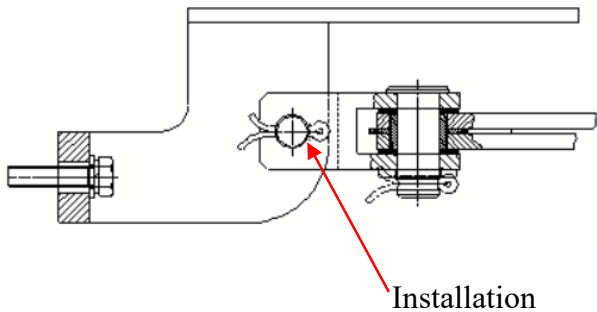
Fig	Item	Steps	Tools
	1. Coupling	Pull the two handle assemblies up to the limit position, push the interface frame assembly, and insert the guide pins on the transition plate into the guide seat on interface frame.	/
	2. Locking	Press down the two handle assemblies at the same time to the locked position to complete the coupling of the bellow.	

2.1.2.4 Installation of Step Plate Support

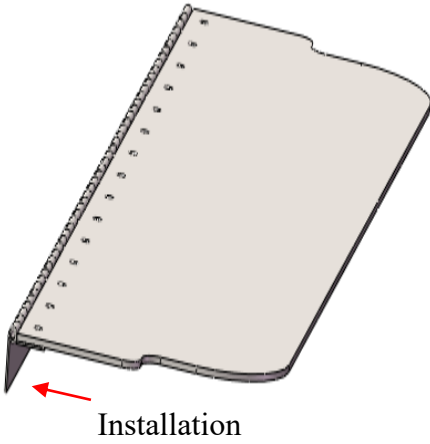
Fig	Item	Steps	Tools
	1. Install the fastening screws	Install the step plate support on the coach body end wall with hexagon head bolts M8×35. The pre-tightening	Hexagon Torque Wrench (M8,0-60Nm)

		<p>force shall be 15Nm.</p> <p>Total 4nos. to be installed.</p>	
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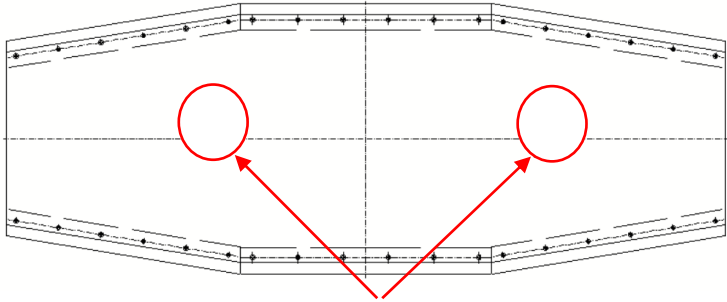
2.1.2.5 Installation of Connecting Rod and Bridge Plate Assembly

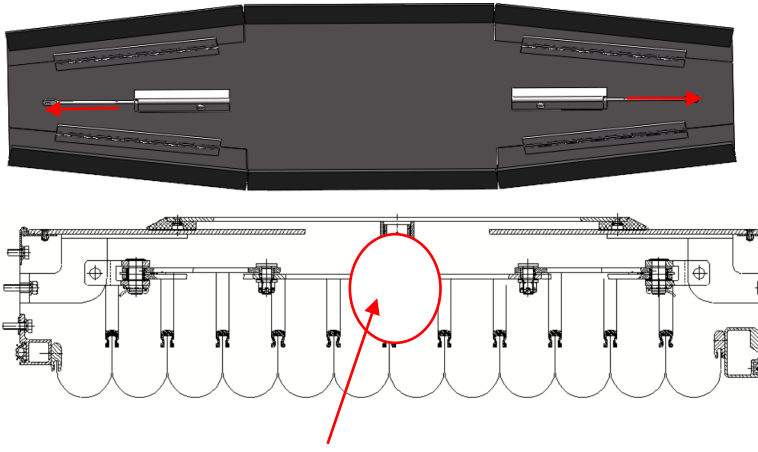
Fig	Item	Steps	Tools
	<p>1. Install shaft plug and cotter pin</p>	<p>Connect the two ends of the connecting rod and bridge plate assembly to the step plate support respectively through the shaft plug B type 12 × 35, and install the cotter pin. Totally two sets of connecting rod and bridge plate assembly need to be installed.</p>	<p>Needle nose plier</p>

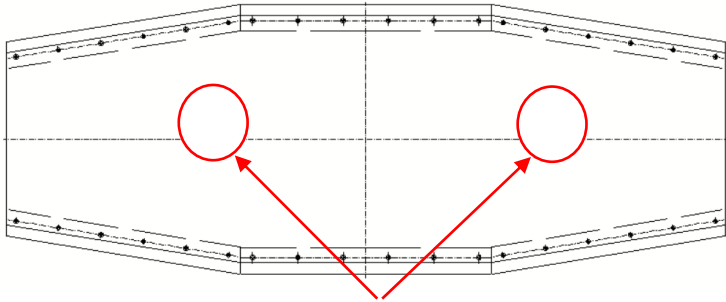
2.1.2.6 Installation of Step Plate Assembly

Fig	Item	Steps	Tools
 <p style="text-align: center;">Installation</p>	1. Install hinge fastening screw	Install the step plate assembly on the end wall of the coach body through hexagon head bolts $M8 \times 20$, with pre-tightening torque 15Nm. Totally 2 pieces are required to be installed.	Hexagon Torque Wrench ($M8, 0-60Nm$)

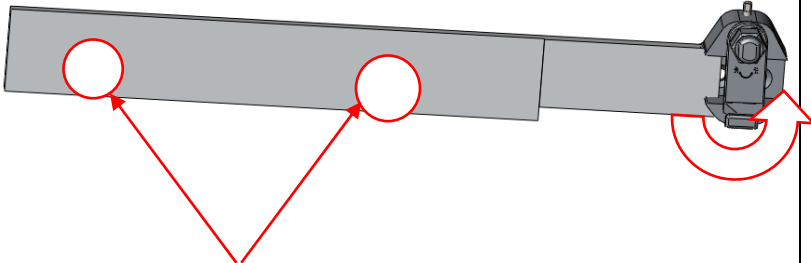
2.1.2.7 Installation of Bridge Plate Assembly

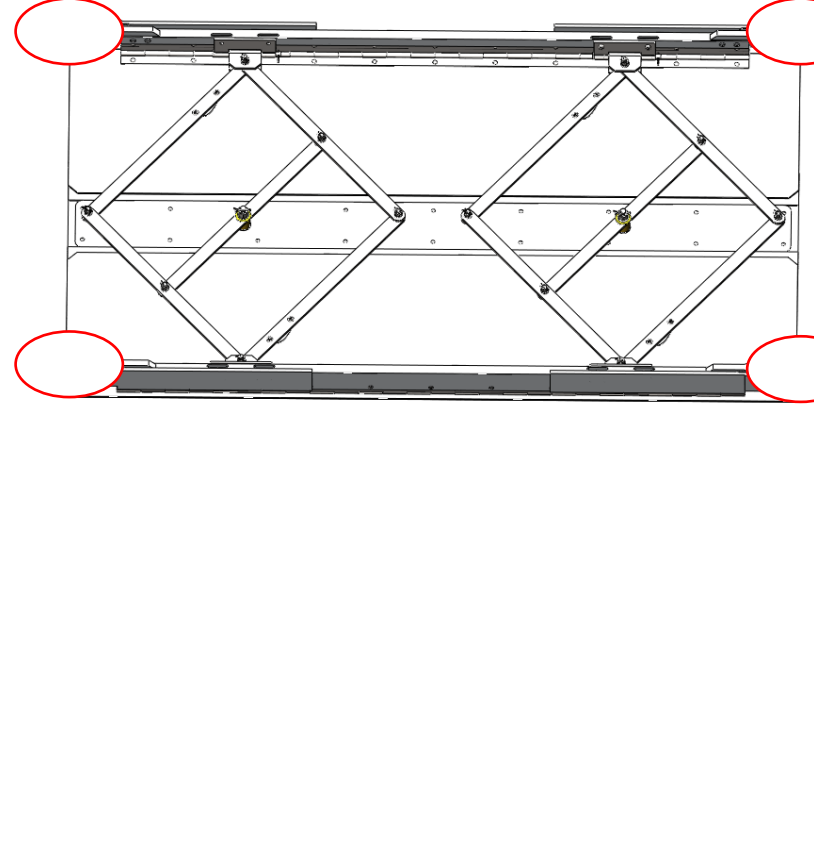
Fig	Item	Steps	Tools
 <p style="text-align: center;">Remove the observation board</p>	1. Remove the screw of observation board	Remove the cross recessed countersunk head screws $M4 \times 12$ of observation board of bridge plate assembly.	Phillips screwdriver

 <p style="text-align: center;">Installation Location</p>	<p>2. Remove the screw of observation board</p>	<p>Pull out the pulling rods at both ends of the bottom of the board, and insert the intermediate shaft of the connecting rod and the bridge plate assembly into the mounting seat on the bridge plate assembly, then release the rod to lock bridge plate assembly on the connecting rod.</p>	<p>/</p>
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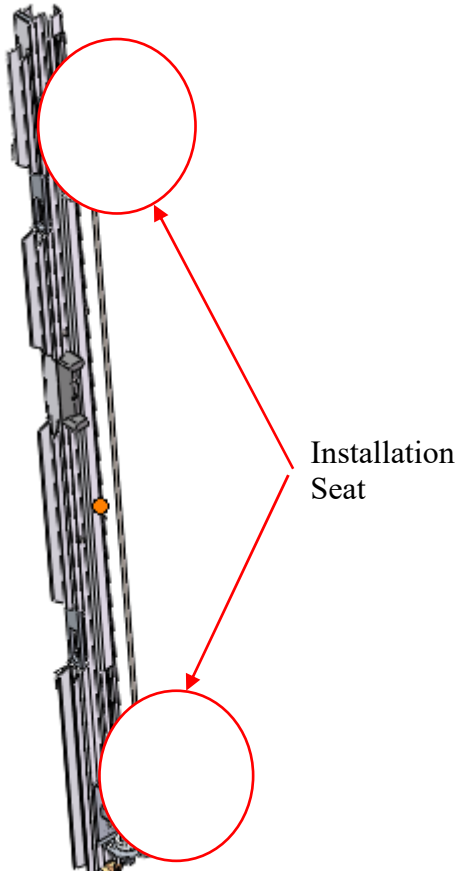
 <p style="text-align: center;">Install the observation board</p>	3. Install the screws of observation board	Fix the observation board on the bridge plate assembly with cross recessed countersunk head screws M4 × 12.	Phillips screwdriver
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2.1.2.8 Installation of Roof Plate Assembly

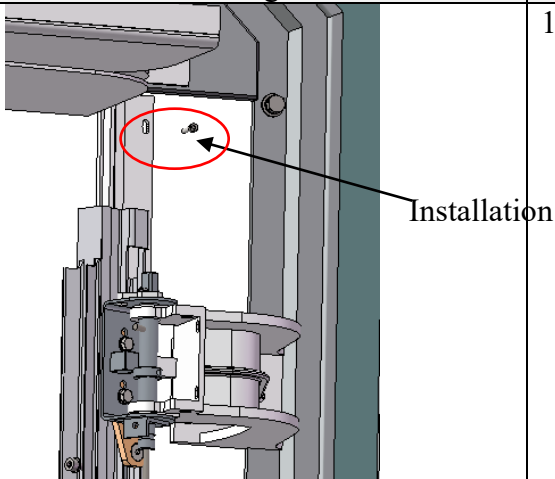
Fig	Item	Steps	Tools
 <p style="text-align: center;">Mounting Holes</p>	1. Install the fastening screws of roof plate installation seat	Install the roof plate installation seat left/right on the coach body end wall with M10 × 25 socket head countersunk head screws, and turn the turning plate on the installation seat to the "OPEN" position.	Allen Torque Wrench M10

	<p>Install roof plate assembly</p>	<p>Install the four mounting beams of the roof plate into the top plate mounting seat respectively, and turn the rotating plate on the installation seat to the "CLOSE" position.</p>	<p>Hexagon Torque Wrench</p>
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2.1.2.9 Installation of Rotating Mechanism Left & Right

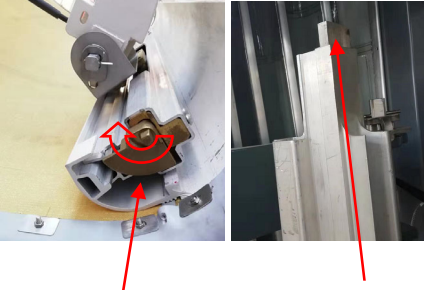
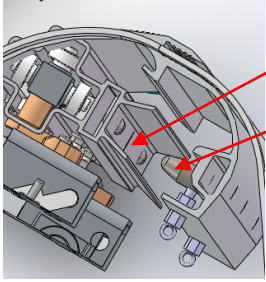

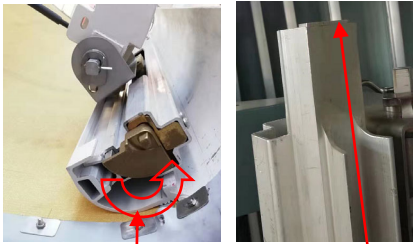
Fig	Item	Steps	Tools
	<p>1. Install the fastening screws of rotating mechanisms</p>	<p>Install the rotating mechanism left & right with M8 × 25 hexagon head bolts. The pre-load torque is 15Nm Nm.</p>	<p>Hexagon Torque Wrench M8</p>

2.1.2.10 Installation of Hairbrush Assembly

Fig	Item	Steps	Tools
	<p>1. Install the fastening screws of hairbrush assembly</p>	<p>1. Align the mounting holes on the brush assembly with the mounting holes on the coach body.</p> <p>2. Fix the brush assembly on the end wall of the coach body by with hexagon socket head cap screws M5 × 25 with a pre-tighten torque of 4Nm.</p>	<p>Allen Torque Wrench (M5, 0-60 Nm)</p>

2.1.2.11 Installation of Side Protecting Plate Assembly

Fig	Item	Steps	Tools
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 <p>Release Direction Release Position</p>	<p>1. Release rotating mechanism</p>	<p>1. Find out the rotary switch at the bottom right of the rotating mechanism.</p> <p>2. Rotate the rotary switch to the release state in the direction as shown in the figure. At this time, the lock lever is raised up and out of the profile beam.</p>	
 <p>Locating Hole Locating Pin</p>	<p>2. Install the fastening screws</p>	<p>1. Insert the locating pin on the side guard plate into the locating hole on the left profile beam of the rotating mechanism.</p> <p>2. Tighten the socket head cap screws $M8 \times 25$ with an Allen wrench (M8) with a pre-tightening torque of 15Nm.</p>	<p>Allen Torque Wrench (M8 , 0-60 Nm)</p>
 <p>Slot Locating Plate</p>  <p>Lock Direction Lock Position</p>	<p>3. Lock the side protecting plate assembly</p>	<p>1. Put the locating plate at the locking side of the side protecting assembly into the slot on the upper right of the rotating mechanism</p> <p>2. Turn the rotary switch to the limit position in the direction shown in the figure, and the locking lever should be in the state shown in the figure, which means that the side protecting plate assembly is locked.</p>	

2.2 Removal

2.2.2 Safety Instructions

Please follow the Safety Instructions for Installation as per Clause 2.1.

2.2.3 Safety Instructions

The gangway can be removed in the reverse direction of the installation steps in Clause 2.1.



3. REMOVAL AND INSTALLATION OF SUB COMPONENTS

3.1 Wearing Strips

3.1.1 Removal

3.1.1.3 Safety Instructions

Installation, use and maintenance must be operated by qualified personnel (competent and trained personnel) and in accordance with these instructions!

Caution 	Handle with care! Avoid damaging part surfaces!
Caution 	Handle with care! Avoid pinching your fingers!

3.1.1.4 Preparation

Tool Preparation: electric hand drill, wooden square, 7×7 square hole key, Allen key (M8).

3.1.1.5 Work Content and Steps

Fig	Items	Steps	Tools
	1. Remove side protecting plate assembly	1. Remove the side protecting plate assembly with reverse direction of Clause 2.1.2.11	Allen key (M8)
	2. Remove bridge plate assembly	1. Remove the bridge plate assembly with reverse direction of Clause 2.1.2.7.	
	3. Remove rivets	Lift up the bridge plate assembly and place a wooden square under it.	Electric Hand Drill, Wooden Square

		Drill the rivets of wear strip one by one with a hand electric drill and remove the wear strip.	
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3.1.2 Installation

3.1.2.1 Safety Instructions

Installation, use and maintenance must be operated by qualified personnel (competent and trained personnel) and in accordance with these instructions!

Caution 	Handle with care! Avoid damaging part surfaces!
Caution 	Handle with care! Avoid pinching your fingers!

3.1.2.2 Preparation

It must be done while train stop. Tools preparation: riveting gun, wooden square.

3.1.2.3 Working Content and Steps

Fig	Items	Steps	Tools				
	3.1.2.1 Assemble rivets	Lift up the bridge plate assembly, put a wooden square under it, and align the wear strip with the mounting hole of the bridge plate. Assemble the bushing on the wearing strip, assemble the rivets with a rivet gun, and tight the wearing strip and lap plate.	Riveting Gun, Wooden Square				
S.N of Process	Material Code	Material Name	Qty.	S.N of Process	Material Code	Material Name	Qty.

3.1.2.1	1302000030	Blind rivet 4× 10	16				
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3.1.2.4 Completion

After the completion of installation, the wearing strip and the lap plate should fit well without warping.

3.1.2.5 Transportation And Storage




The goods should be packed and stored in a dry, cool and dust-free area, the warehouse should be properly ventilated. Collisions should be avoided during transportation, and special attention should be paid to protecting the surface of the product.

3.2 Carbody Frame Sealing Strip

3.2.1 Removal

3.2.1.1 Safety Instructions

Installation, use and maintenance must be operated by qualified personnel (competent and trained personnel) and in accordance with these instructions!

Caution 	Handle with care! Avoid damaging part surfaces!
Warning 	Be careful when uncoupling the bellows to prevent personal injury from falling!
Caution 	Caution! Be careful when lifting!

3.2.1.2 Preparation

Tools Preparation: 7×7 square hole key, Allen key (M5, M6, M8), external hexagon wrench (M12), overhead crane (load capacity more than 800kg), sling (10m), flat-blade screwdriver.

3.2.1.3 Working Content and Steps

Fig	Items	Steps	Tools
	3.2.1.1 Remove the bellow	See Clause 2.6.1	7 × 7 square hole key, Allen key (M5, M6, M8), external hexagon wrench (M12),

								overhead crane (load capacity more than 800kg), sling (10m).	
				3.2.1.2	Remove Carbody frame sealing strip			Pull the carbody frame sealing strip firmly, and use a flat-blade screwdriver to pry out it if necessary	flat-blade screwdriver
S.N of Process	Material Code	Material Name	Qty.	S.N of Process	Material Code	Material Name	Qty.		
3.2.1.1	1307008074	Hexagon socket head cap screws M8×25	4	3.2.1.1	1303020256	Hexagon head bolts M12×30	6		
3.2.1.1	1307001133	Hexagon socket head cap screw M5×25	7	3.2.1.1	1303020256	Hexagon head bolts M12×30	22		
3.2.1.1	1307004472	Hexagon countersunk head screw M8×16	6						
3.2.1.1	1307004453	Hexagon countersunk head screw M6×25	6						

3.2.2 Installation

3.2.2.1 Safety Instruction

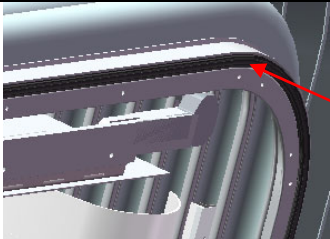
Installation, use and maintenance must be operated by qualified personnel (competent and trained personnel) and in accordance with these instructions!

Caution 	Handle with care! Avoid smashing your fingers!
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3.2.2.2 Preparation

Tools Preparation: rubber hammer.

3.2.2.3 Working Content and Steps

Fig			Items	Steps	Tools		
			3.2.2.1 Assemble the carbody frame sealing strip	Expand the sealing strip according to the shape of the carbody frame, and align the installation part of the sealing strip with the profile slot.	rubber hammer		
				Knock the sealing strip with a rubber hammer along the profile of the carbody frame to make it snap into the slot of the profile. The sealing strip can be water lubricated and the four corners are installed first.			
S.N of Process	Material Code	Material Name	Qty.	S.N of Process	Material Code	Material Name	Qty.
/	/	/	/	/	/	/	/

3.2.2.4 Completion

After completion of installation, the carbody frame sealing strip should be well fit with the carbody frame profile slot without warping.

3.2.3 Transportation and Storage


The goods should be packed and stored in a dry, cool and dust-free area, the warehouse should be properly ventilated. Collisions should be avoided during transportation, and special attention should be paid to protecting the surface of the product.

3.3 Interface Frame and Sealing Strip

3.3.1 Removal

3.3.1.1 Safety Instructions

Installation, use and maintenance must be operated by qualified personnel (competent and trained personnel) and in accordance with these instructions!

Caution 	Handle with care! Avoid damaging part surfaces!
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3.3.1.2 Preparation

Tools Preparation: 7×7 square hole key, Allen key (M8), flat-blade screwdriver.

3.3.1.3 Work Content and Steps

Fig	Items	Steps	Tools
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<p>Decoupling position of handle assembly</p>				3.3.1.1 Remove the side protecting plate assembly, please see Clause 2.1.1 Pull the handle assembly to the position shown in the figure, and separate the two interface frame assemblies.		7 × 7 square hole key, Allen key (M8)	
<p>Pull or pry out the sealing strip of interface frame</p>				3.3.1.2 Remove the sealing strip of interface frame Pull the sealing strip of the interface frame firmly, and use a flat-blade screwdriver to pry it out if necessary.		Flat-blade screwdriver	
S.N of Process	Material Code	Material Name	Qty.	S.N of Process	Material Code	Material Name	Qty.
3.3.1.1	1307008074	Hexagon socket head cap screw M8×25	4				

3.3.2 Installation

3.3.2.1 Safety Instructions

Installation, use and maintenance must be operated by qualified personnel (competent and trained personnel) and in accordance with these instructions!

Caution 	Handle with care! Avoid smashing your fingers!
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3.3.2.2 Preparation

Tools Preparation: rubber hammer.

3.3.2.3 Work Content and Steps

Fig	Items	Steps	Tools
<p>Knock</p>	3.3.2.1 Fit carbody frame sealing	Expand the sealing strip according to the shape of the interface frame, and align the installation part of the sealing strip with the profile slot.	Rubber hammer

				strip	Knock the sealing strip with a rubber hammer to make it snap into the slot of the profile. The sealing strip can be water lubricated, and the four corners are installed first.		
S.N of Process	Material Code	Material Name	Qty.	S.N of Process	Material Code	Material Name	Qty.
/	/	/	/	/	/	/	/

3.3.2.4 Completion

After completion of installation, the carbody frame sealing strip should be well fit with the carbody frame profile slot without warping.

3.3.3 Transportation and Storage



The goods should be packed and stored in a dry, cool and dust-free area, the warehouse should be properly ventilated. Collisions should be avoided during transportation, and special attention should be paid to protecting the surface of the product.

3.4 Roof Plate Assembly

3.4.1 Removal

3.4.1.1 Safety Instructions

Installation, use and maintenance must be operated by qualified personnel (competent and trained personnel) and in accordance with these instructions!

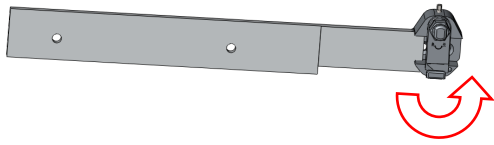
Caution 	Handle with care! Avoid damaging part surfaces!
Caution 	Handle with care! Avoid getting hurt!

3.4.1.2 Preparation

Tools Preparation: 7×7 square hole key, open-end wrench.

3.4.1.3 Work Content and Steps




Fig	Items	Steps	Tools
	3.4.1.1 Remove the side protecting plate assembly	As per Clause 2.1.1	7 × 7 square hole key, Allen key (M8)

				3.4.1.2 Unlock the roof plate fitment seat	Turn the turning plate on the fitment seat to the "OPEN" position with an open-end wrench.	Open-end wrench			
				3.4.1.3 Remove roof plate assembly	Remove the four roof plate mounting beams from the roof plate fitment seat, and turn the turning plate on the seat to the "CLOSE" position.				
S.N Process	of	Material Code	Material Name	Qty.	S.N Process	of	Material Code	Material Name	Qty.

3.4.2 Installation

3.4.2.1 Safety Instruction

Installation, use and maintenance must be operated by qualified personnel (competent and trained personnel) and in accordance with these instructions!

Caution 	Handle with care! Avoid damaging part surfaces!
Notice 	All connecting screws must be coated with thread locker (eg. "Loctite 243")!
Caution 	Handle with care! Avoid getting hurt!

3.4.2.2 Preparation

It must be done while train stop. Tools Preparation: riveting gun, wooden square.

3.4.2.3 Work Content and Steps

Fig	Items	Steps	Tools
	3.4.2.1 Install roof plate assembly	As per Clause 2.1.2.8	

S.N of Process	Material Code	Material Name	Qty.	S.N of Process	Material Code	Material Name	Qty.

3.4.2.4 Completion

After completion of the installation, all fasteners should be well fitted, and roof plate assembly should be on the proper position.

3.4.2.5 Transportation and Storage

The goods should be packed and stored in a dry, cool and dust-free area, the warehouse should be properly ventilated. Collisions should be avoided during transportation, and special attention should be paid to protecting the surface of the product.

4. Commissioning & Testing

Not applicable. No special commissioning & testing required for gangway installation and removal. It can be conducted along with the whole train.

4.1 Test 1

4.1.1 Test requirement

Not applicable.

4.1.2 Preparation before Test

Not applicable.

4.1.3 Test Steps

Not applicable.

5. Maintenance

5.1 Instructions of Daily Maintenance

5.1.1 Cleaning

5.1.1.1 Cleaning agents

The following cleaning products can be used for cleaning:

Minor contamination: pH neutral industrial cleaner (pH6-pH8)

Heavy soiling or scribbling : clean with citric acid based cleaners as Grafforange, Comorcap LP.

5.1.1.2 Cleaning of Bellow Bottom

To remove the long-term accumulated dirt or litter, clean the bottom of the bellows if necessary with an industrial vacuum cleaner, but at least once a year.

Cleaning should be done with following method:

- 1) Remove the side protecting plate and lift the step plate till the vertical position.
- 2) Place the nozzle of the vacuum cleaner on the bottom area of the bellow to remove dirt and garbage.

5.1.1.3 Cleaning of Bellow Fabric and Side Wall

Fully clean the stained bellow fabric with listed cleaning agent and soft cloth.

Fully clean the smudge on the side protecting plate assembly and skirt with listed cleaning agent and soft cloth.

5.1.2 Lubricating

5.1.2.1 Lubricant

Ordinary lubricating oil such as: lithium base grease RL3, 150# lubricating oil.

5.1.2.2 Lubricate the Hinges and Rotating Mechanisms

If necessary, the following bearing points must be lubricated with lubricant (such as 150# lubricating oil mist) when they make creaking noises:

Step plate hinges, bridge plate hinges, roof plate hinges and rotating mechanisms (all should be carried out with side protecting plate removed).

Check interval: two years.

Lubricating method: If necessary, spray a little lubricating oil between the rotating shaft and the rotating sleeve of the above components.

5.2 Maintenance Instructions for Long-Term Standby

The goods should be packed in a box and stored in a dry and cool place, and special attention should be paid to prevent the product from being bumped or scratched.

6. PREVENTIVE MAINTENANCE








6.1 Maintenance Plan



This section supplements the maintenance plan for equipment or system. It requires a maintenance plan for three-level components, and gives specific maintenance or replacement standards/period to guide subsequent equipment maintenance.

Maintenance Level	Period	Maintenance Scope
In and out of warehouse	Every in & out of warehouse of the train.	Check the integrity of the bellow fabric Clean
Monthly Check	1 Month	Check the roof plate assembly Check the side protecting plate assembly Check step plate assembly Check the bridge plate assembly
Half-Year Check	6 Months	Check the fasteners of each component Check the flexibility of hinges of each component Check the bellow fabric (inside) to see if any damage and cracks
Yearly Check	1 Year	Check the wearing strips of the bridge plate assembly Check moving parts of rotating mechanisms Check the wearing plate of coupler Clean the bottom of the bellows

Maintenance Level	Period	Maintenance Scope
Three-Year Check	3 Years	Lubricate the hinges of roof plate assembly Lubricate the hinges of step plate assembly Lubricate the hinges of bridge plate assembly Lubricate the rotating shaft and rotating sleeve of the rotating mechanisms
Un-wheel Repair	6 Years	Replace the wearing strips of bridge plate assembly Replace the skirt of side protecting plate assembly Replace the sealing strips Replace the wearing plate of coupler
Overhaul	12 Years	Replace bellow assemblies Replace side protecting plate assembly

6.2 Safety Instructions

Danger 	Parts should be checked and replaced under stop state of the train. The strengthen of lift tool and slings must be sufficient.
Warning 	Be careful when uncoupling the bellows to prevent personal injury from falling!
Warning 	Make sure that the handle assembly is on lock position after completion of bellow coupling!
Warning 	Make sure that the rotary switch is on lock position after completion of side protecting plate locking!
Caution 	Caution! Be careful when lifting!
Caution 	Handle with care! Avoid damaging part surfaces!
Caution 	Handle with care! Avoid pinching your fingers when operating the step plate assembly and bridge plate assembly!

Caution 	Handle with care! Avoid smashing your fingers when installing the sealing strips!
Notice 	All connecting screws must be coated with thread locker (eg. "Loctite 243")!

6.3 Maintenance Interval0-Train Check


This section supplements the list of all maintenance content within this maintenance interval.

Maintenance Level	Period	Maintenance Scope
In and out of warehouse	Every in & out of warehouse of the train	Check the integrity of the bellow fabric Clean

6.3.1 Preparation

Tools Preparation: electric torch, cleaning agent and soft cloth.

6.3.2 Maintenance Steps

Fig	Items	Steps	Tools				
	6.3.1 Check the integrity of the bellow fabric	Illuminate with an electric torch to visually check whether the surface of the bellow fabric is scratched, cracked or come off from the profile frame.	Electric torch				
	6.3.2 Clean	If necessary, clean the bellow fabric as per 5.1.1.	Cleaning agent and soft cloth.				
S.N of Process	Material Code	Material Name	Qty.	S.N of Process	Material Code	Material Name	Qty.
6.3.1	/	/	/	6.3.2	/	/	/

6.3.3 Completion

The bellow surface and its sealing performance should be good. No obvious dirt on the surface of the bellows.

6.4 Maintenance Interval I1-1 Monthly

Maintenance Level	Period	Maintenance Scope
Monthly Check	1Month	Check the roof plate assembly Check the side protecting plate assembly Check step plate assembly Check the bridge plate assembly

6.4.1 Preparation

Tools Preparation: electric torch

6.4.2 Maintenance Steps

Fig	Items	Steps	Tools				
	6.4.1 Check the roof plate assembly	Check if the roof plate assembly is in the normal position.	Electric torch				
		Stand in the center position of the gangway and check whether any abnormal knocking is produced from the roof plate assembly.					
	6.4.2 Check the side protecting plate assembly	Check the installation position and movement of the side protecting plate assembly.	Electric torch				
		Check the wearing status of the skirt of side protecting plate assembly.					
	6.4.3 Check the step plate assembly	Check if the step plate assembly is in the normal position.	Electric torch				
		Stand in the center position of the gangway and check whether any abnormal knocking is produced from the step plate assembly.					
	6.4.4 Check the bridge plate assembly	Check if the bridge plate assembly is in the normal position.	Electric torch				
		Stand in the center position of the gangway and check whether any abnormal knocking is produced from the bridge plate assembly.					
S.N of Process	Material Code	Material Name	Qty.	S.N of Process	Material Code	Material Name	Qty.
6.4.1	/	/	/	6.4.3	/	/	/
6.4.2	/	/	/	6.4.4	/	/	/

6.4.3 Completion

The roof plate assembly, side protecting plate assembly, step plate assembly, bridge plate

assembly should be in normal position, and no abnormal knocking during operation.

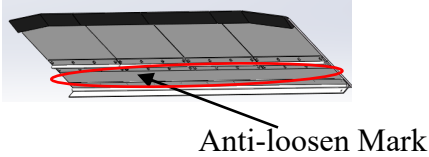
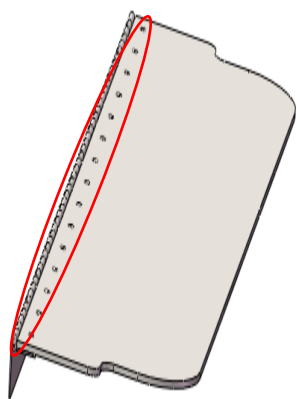
6.5 Maintenance Interval I2-Half-Year Check (6 Months)

Maintenance Level	Period	Maintenance Scope
Half a Year	6 Months	Check the fasteners of each component Check the flexibility of hinges of each component Check the bellow fabric (inside) to see if any damage and cracks

6.5.1 Preparation

Tools Preparation: Electric torch

6.5.2 Maintenance Steps

Fig	Items	Steps	Tools
	6.5.1 Check the fasteners of each component	Remove the side protecting plate assembly as per 2.1.1, lift up bridge plate assembly and step plate assembly. Check whether anti-loosen marks and the fasteners themselves are complete or not.	Electric torch
	6.5.2 Check the flexibility of hinges of each component	Check the flexibility of hinges of roof plate assembly, step plate assembly, bridge plate assembly. If the flexibility is not good, please lubricate it as per 5.1.2.	Electric torch
	6.5.3 Check the bellow fabric (inside) to see if any damage and cracks	Visually check whether the inside surface of the bellow fabric cracked or come off from the profile frame.	Electric torch
	6.5.4 Install side protecting plate assembly	As per 2.1.2	7 × 7 square hole key, Allen key (M8)

S.N of Process	Material Code	Material Name	Qty.	S.N of Process	Material Code	Material Name	Qty.
6.5.1	1307008074	Hexagon socket head cap screwM8x25	4	6.5.4	1307008074	Hexagon socket head cap screwM8x25	4

6.5.3 Completion

There is no abnormality in the fasteners of each component. The hinges work flexibly, and the inside bellow fabric is not broken without come off from the profile frame.

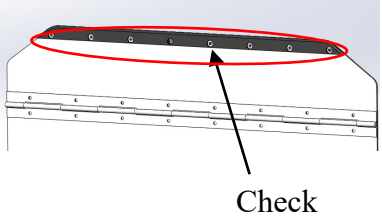
6.6 Maintenance Interval M01-Yearly Check (Every 1 Year)

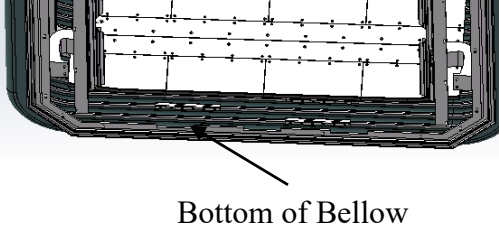
Maintenance Level	Period	Maintenance Scope
Yearly Check	1 Year	Check the wearing strips of the bridge plate assembly Check the moving parts of rotating mechanisms Check the wearing plate of the coupler Clean the bottom of the bellows

6.6.1 Preparation

Tools Preparation: electric torch, industrial vacuum cleaner, 7×7 square hole key, Allen key (M8), Allen torque wrench (M8, 0-60Nm)

6.6.2 Maintenance Steps

Fig	Items	Steps	Tools
	6.6.1 Check the wearing strips of bridge plate assembly.	Remove the side protecting plate assembly, and lift up the bridge plate assembly as per 2.1.1. Check whether the wearing strips are damaged and the distance between the worn position of the wearing strip and the rivet is less than 0.5mm or not. If the above occurs, replace it according to 3.1	Electric torch, 7×7 square hole key, Allen key (M8)
	6.6.2 Check the moving parts of rotating mechanisms	Rotate the rotating mechanisms firmly and check the condition of each moving part	Electric torch
	6.6.3 Check the	Remove bellow assemblies as per 2.5.1.2	Electric torch,

			wearing plate of the coupler	Firmly push the interface frame assembly to coach body side, and check the state of wearing plate of coupler.	7×7 square hole key		
			6.6.4 Clean the bottom of the bellows	As per 5.1.1.2	Industrial vacuum cleaner		
			6.6.5 Install side protecting plate assembly	As per 2.1.2	7×7 square hole key, Allen Torque Wrench (M8, 0-60Nm)		
S.N of Process	Material Code	Material Name	Qty.	S.N of Processes	Material Code	Material Name	Qty.
6.6.1	1302000030	Blind rivet 4x10	16	6.6.5	1307008074	Hexagon socket head cap screwM8x25	4
6.6.1	1307008074	Hexagon socket head cap screwM8x25	4				

6.6.3 Completion

No damage to the wearing strips. The distance between the worn position of the wearing strip and the rivet is no less than 0.5mm. Moving parts of the rotating mechanism are normal. No damage to the wearing plate of coupler. And no obvious dirt on the bottom of the bellows.

6.7 Maintenance IntervalM02-3-Year Check (Every 3 Years)

Maintenance Level	Period	Maintenance Scope
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Maintenance Level	Period	Maintenance Scope
3-Year Check	3 Years	Lubricate the hinge of roof plate assembly Lubricate the hinge of step plate assembly Lubricate the hinge of bridge plate assembly Lubricate the rotating shaft and rotating sleeve of the rotating mechanisms.

6.7.1 Preparation

Tools Preparation: Electric torch, Lubricating oil (such as 150# lubricating oil mist), 7×7 square hole key, Allen key(M8), Allen Torque Wrench(M8,0-60Nm).

6.7.2 Maintenance Steps

Fig	Items	Steps	Tools				
	6.7.1 Remove the side protecting plate assembly	As per 2.1.1	7×7 square hole key, Allen key (M8)				
	6.7.2 Lubricate the rotating shaft and rotating sleeve of the rotating mechanisms.	As per 5.1.1.2	Electric torch, lubricating oil				
	6.7.3 Lubricate the hinge of roof plate assembly	As per 5.1.1.2	Electric torch, lubricating oil				
	6.7.4 Lubricate the bridge plate assembly and hinge of step plate.	Lift up the bridge plate assembly and step plate assembly as per 5.1.1.2	Electric torch, lubricating oil				
	6.7.5 Install side protecting plate assembly	As per 2.1.2	7×7 square hole key, Allen Torque Wrench (M8, 0-60Nm)				
S.N of Proces	Material Code	Material Name	Qty.	S.N of Proces	Material Code	Material Name	Qty.

s				s			
6.7.1	130700807 4	Hexagon socket head cap screwM8x2 5	4	6.7.4	/	/	/
6.7.2	/	/	/	6.7.5	130700807 4	Hexagon socket head cap screwM8x2 5	4
6.7.3	/	/	/				

6.7.3 Completion

The support points of the above components can move flexibly without abnormal knocking.

6.8 Maintenance Interval M03-Unwheeling Repair (6 Year)

Maintenance Level	Period	Maintenance Scope
Unwheeling repair	6 Years	Replace the wearing strips of bridge plate assembly Replace the skirt of bridge plate assembly Replace sealing strips Replace the wearing plate of coupler

6.8.1 Preparation

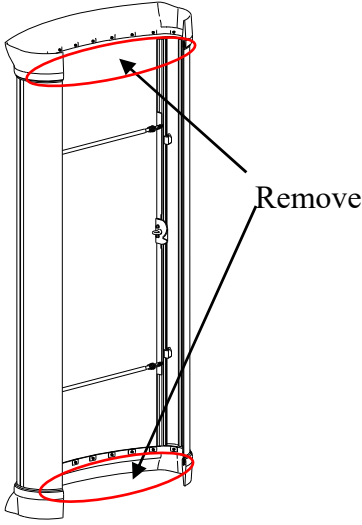
Tools Preparation: Hand drill, wooden square, torque wrench (0-60Nm), 7×7 square hole key, Allen key (M5, M6, M8), external hexagon wrench(M4, M12), overhead crane (load capacity more than 800kg), sling (10m), Flat-blade screwdriver, rubber hammer, Sika sealant (such as Sikaflex-221R, etc).

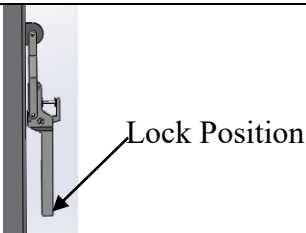
Special tool: 7×7 square hole key

Special material: nil.

6.8.2 Maintenance Steps

Fig	Items	Steps	Tools
	6.8.1 Replace the wearing strips of bridge plate assembly (It can be done in the train).	As per 3.1	Hand drill, wooden square, 7×7 square hole key, Allen key (M8)

	(It can be done in the train).		
	6.8.2 Replace the skirt of bridge plate assembly (It can be done in the train).	Remove the fastening screws of skirt, and take the skirt out.	Torque wrench (0-60Nm), external hexagon wrench (M4)
		Replace the skirt with a new one. Fasten the screws with torque 2Nm.	
	6.8.3 Replace sealing strips (It is applicable for operation in workshop)	Replace the sealing strips of carbody frame and interface frame as per 3.2 and 3.3	Overhead crane (load capacity more than 800kg), sling (10m), Flat-blade screwdriver, rubber hammer
	6.8.4 Replace the wearing plate of coupler	As per 2.6	Allen key (M8), torque wrench (0-60Nm)
	6.8.5 Install the bellow assembly	As per 2.5.2	Overhead crane (load capacity more than 800kg), sling (10m), torque wrench (0-60Nm), external hexagon wrench (M12),

							Sika sealant	
				6.8.6 Couple up bellows	Align the guide pins on the two interface frames with the guide seats and then close them together (match them with overhead crane if necessary), and rotate the handle assembly to the position shown in the figure.			overhead crane (load capacity more than 800kg) , sling (10m) ,
				6.8.7 Install side protecting plate assembly	As per 2.1.2			7×7 square hole key, Allen Torque Wrench (M8 , 0-60Nm)
S.N of Processes	Material Code	Material Name	Qty.	S.N of Processes	Material Code	Material Name	Qty.	
6.8.1	1307008074	Hexagon socket head cap screwM8x25	4	6.8.3	1307004472	Hexagon countersunk head screw M8x16	12	
6.8.1	1302000030	Blind rivet 4x10	32	6.8.4	1307005079	Hexagon socket head low cylinder head screw M8x20	12	
6.8.2	1307004416	Hexagon socket head cap screwM4x20	60	6.8.5	1303020256	Hexagon head bolts M12x30	6	
6.8.3	1307001133	Hexagon socket head cap screwM5x25	14	6.8.5	1303020256	Hexagon head bolts M12x30	22	

6.8.3	130700447 2	Hexagon countersunk head screw M8x16	12	6.8.7	130700807 4	Hexagon socket head cap screwM8x2 5	4
6.8.3	130700445 3	Hexagon countersunk head screw M6x25	18				

6.8.3 Completion

The wear strip and the lap plate fit well. The wear strip has no loose. The skirt and the protecting plate body fit well. The sealing strip fits well with the profile slot without warping. Each fastener should be marked with anti-loosen line. Each component works without abnormal knocking and interference.

6.9 Maintenance IntervalM03-Overhaul (12 Years)

Maintenance Level	Period	Maintenance Scope
Overhaul	12 Years	Replace bellow assembly Replace side protecting plate assembly

6.9.1 Preparation

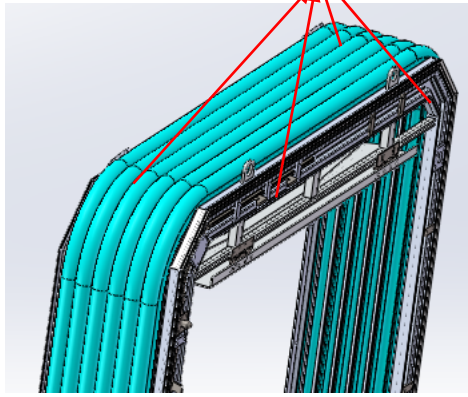
Tools Preparation: torque wrench(0-60Nm), 7×7 square hole key, Allen key(M5, M6, M8), external hexagon wrench(M12), overhead crane (load capacity more than 800kg), sling (10m), Sika sealant (such as Sikaflex-221R, etc.)

Special tools: 7×7 square hole key

Special materials: Nil.

6.9.2 Maintenance Steps

Fig	Items	Steps	Tools
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<p style="text-align: center;">Lifting Position</p> 				6.9.1 Replace the bellow assemblies (Replacement applicable in workshop)		Remove and install bellow assemblies as per 2.5		torque wrench (0-60Nm), 7×7 square hole key, Allen key (M5, M6, M8) , external hexagon wrench (M12) , overhead crane (load capacity more than 800kg) , sling (10m) , Sika sealant
				6.9.2 Replace side protecting plate assembly (It can be done in the train).		Remove and install side protecting plate assembly as per 2.1		torque wrench (0-60Nm), 7×7 square hole key, Allen key (M8)
S.N of Process	Material Code	Material Name	Qty.	S.N of Processes	Material Code	Material Name	Qty.	
6.9.1	1307008074	Hexagon socket head cap screw M8x25	4	6.9.1	1307004472	Hexagon countersunk head screw M8x16	12	

6.9.1	1307004416	Hexagon socket head cap screw M4x20	60	6.9.1	130302025 6	Hexagon head bolts M12x30	6
6.9.1	1307001133	Hexagon socket head cap screw M5x25	14	6.9.1	130302025 6	Hexagon head bolts M12x30	22
6.9.1	1307004472	Hexagon countersunk head screw M8x16	12	6.9.2	130700807 4	Hexagon socket head cap screw M8x25	4
6.9.1	1307004453	Hexagon countersunk head screw M6x25	18				


6.9.3 Completion

After completion of the installation of bellow assemblies, the carbody frame sealing strip should be well fit with the installation surface of the coach body without obvious abnormal knocking or interference during operation. And the side protecting frame assembly works without obvious abnormal knocking and interference.

7. Repair

Here means corrective maintenance, and how to recover the damaged equipment.

7.1 Safety Instructions

Danger 	Parts should be checked and replaced under stop state of the train. The strengthen of lift tool and slings must be sufficient.
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<p>Warning</p>	<p>Be careful when uncoupling the bellows to prevent personal injury from falling!</p>
<p>Warning</p>	<p>Make sure that the handle assembly is on lock position after completion of bellow coupling!</p>
<p>Warning</p>	<p>Make sure that the rotary switch is on lock position after completion of side protecting plate locking!</p>
<p>Caution</p>	<p>Caution! Be careful when lifting!</p>
<p>Caution</p>	<p>Handle with care! Avoid pinching fingers when operate the step plate and bridge plate assembly!</p>
<p>Caution</p>	<p>Handle with care! Avoid smashing your fingers when installing the sealing strips!</p>
<p>Notice</p>	<p>All connecting screws must be coated with thread locker (such as “Loctite 243”)!</p>

7.2 Preparation

Tools Preparation: external hexagon wrench or Allen key, torque wrench, marker, thread locker (such as Loctite 243), bending plier, clamping plier, locking plier (provided by the gangway manufacturer if necessary), sand paper, knife, brush, roller (provided by the gangway manufacturer if necessary), hand drill, wooden square, 7×7 square hole key, and Allen key (M8).

7.3 Maintenance Steps

Fig	Items	Steps	Tools
<p>Mark anti-loosen line</p>	<p>7.1 Replace fasteners</p>	<p>All replaced fasteners must be torqued according to regulations, applied with thread locker and marked</p>	<p>External hexagon wrench or Allen key, torque wrench,</p>

		with anti-loosen line.	marker, thread locker
	7.2 Repair of damaged aluminum profile	Prepare the connecting aluminum profile and place it at the broken position, and drill holes for connection. Generally four holes should be used for connection. Fix with rivets. If the profile at the corner is broken, the connecting aluminum profile needs to be customized.	
	7.3 Recovery of bellow fabric come off	Gently open the aluminum profile within the area to be repaired with bending plier. Put the bellow fabric back to aluminium profile by hand. Clamp at the place to be repaired every 5 cm and every 3cm at the corner with clamping piler. Close the entire repaired area with locking piler.	Bending plier, clamping plier, locking plier (provided by the gangway manufacturer if necessary)
	7.4 Recovery of damaged bellow fabric	Clean around the damaged bellow fabric, grind it with sand cloth for patching. Cut the patch according to the size of the damaged area, and make the edge as smooth as possible, and then grind it with sand cloth. Common damaged areas should be repaired with T5 fabric. Those areas that are often touched should be patched with T3	Sand cloth, knife, brush, roller (provided by the gangway manufacturer if necessary)

				fabric. Apply a thin layer of adhesive to places where have been grinded and cleaned on the bellow and patch. the Use a brush to apply a thin layer of adhesive to the sanded and cleaned areas of the patch and bellows.		Sand cloth, knife, brush, roller (provided by the gangway manufacturer if necessary)	
				Apply the patch to the broken position and press it tightly against the bellow with a roller. At the same time, put a hard object (such as a wooden board) inside as a support to prevent air bubbles from being generated.			
				After hardening of the glued area, it can adapt to the stretching. Note: Maximum use value (for vigorous movement) is reached after 24 hours, and average use value (for normal movement) after approximately 4 hours.			
				Patches at the roof, bottom and corners require special re-fixing with the repair tool-hollow rivet. If the patch size is more than 3×5cm, all patches needs to be fixed with hollow rivet before the glue hardening.			
				7.5 Replace wearing strips	Refer to 3.1		Hand drill, wooden square, 7×7 square hole key, Allen key (M8)
				7.6 Replace skirt	Refer to 6.8.2		external hexagon wrench (M4)
S.N of Process	Material Code	Material Name	Qty.	S.N of Process	Material Code	Material Name	Qty.

7.5	1307008074	Hexagon socket head cap screwM8x25	4	7.6	1307004416	Hexagon socket head cap screwM4x20	60
7.5	1302000030	Blind rivet 4x10	32				

7.4 Repair Completion

The pre-tightening torque of the fasteners should meets the relevant requirements, and mark the anti-loosening line. The bellow fabric should have good sealing performance to meet the tensile requirements. The wearing strip should be well fit with the lap plate. No obvious abnormal knocking and no interference during operation.

8. Special Tools and Materials

This section supplements the list of special tools and maintenance requirements for this system and equipment

This section supplements the list of spare parts and consumables for this system and equipment (here only refers to the spare parts and consumables mentioned in this part to be replaced)

8.1 Special Tools

8.1.1 List of Special Tools

Table A List of Special Tools

Process No.	Name	Type	Remark
2.1.1	Square hole key	7×7	

8.1.2 Maintenance for Special Tools

Place in a cool and dry place. If the movement is inflexible, please coat lubricating oil

8.2 Materials

Table B List of Materials (Including Consumables)

Process No.	Material Code	Part Name	Type	Qty.	Manufacturer	Remark
6.8.1	FD6504000002/ FD6504000004/ FD6504000006	Wearing strip 1/2/3	POM	2/2/2	Zhuzhou Gofront Brake Equipment Co., Ltd.	
6.8.3	FD5501000002	Carbody sealing strip	EPDM	2	Zhuzhou Gofront Brake Equipment Co., Ltd.	
6.8.3	FD6501000001	Interface fame sealing	EPDM	2	Zhuzhou Gofront	

		strip			Brake Equipment Co., Ltd.	
6.8.2	FD0304040800	Skirt	Assembly	4	Zhuzhou Gofront Brake Equipment Co., Ltd.	
7.1	/	Thread locker	Loctite 243	/	/	
6.9.1	/	Sika sealant	Sikaflex-221R	/	/	
6.3.2	/	pH Neutral industrial cleaner	pH6-pH8	/	/	
6.3.2	/	Citric acid cleaner	Grafforange, Comorcap LP	/	/	
6.7.2-6.7.4	/	Ordinary lubricating oil	Lithium grease RL3, 150#Lubricating oil)	/	/	

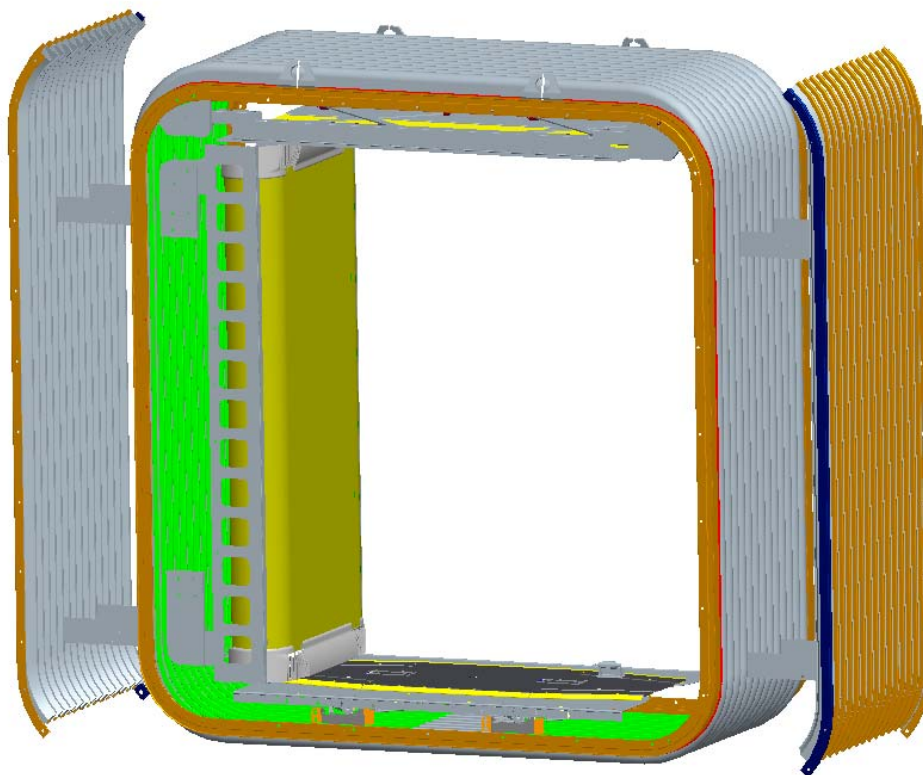
9. Disposal of Waste

Table C Disposal of Waste

S.N	Part Name	Raw Material	Size	Method of Disposal
1	Frame sealing strip	EPDM	/	Landfill as industrial waste
2	Skirt	EPDM	/	Landfill as industrial waste
3	Wearing Strip	Engineering plastics	/	Landfill as industrial waste
4	Bellow	Fabric	/	Landfill as industrial waste
5	Others	Metal	/	Recyclable

10. Others

Project Name	T18 Gangway T18 风挡
Product / System	Bellow Gangway 折棚风挡
Document Title	Mounting, Application and Maintenance Manual 安装、使用及维护手册
Identification No.	Q-1810418x001-DD-0013
Customer Specification No.	



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1. Introduction 概述

The structure and major technical parameters for T18 gangway are based on Technical Specification «INTERAL COACH FACTORY CHENNAI-600 038». It is capable of guaranteeing the safety of the passengers when passing through the car body connecting area. Furthermore, the gangway offers the car body connection area an aesthetic looking and can protect the bellows from being damaged.

青岛欧特美交通装备有限公司生产的 T18 折棚风挡是依据《金奈整车车厂-600 038》CF/MD/SPEC-324 REV00 设计而成。该型风挡能确保旅客通过连接区域的安全性，使连接区域具有良好的装饰性，并保护折棚使其免受损坏。

2. Structure principle 结构原理

2.1. Gangway components 风挡的部件名称

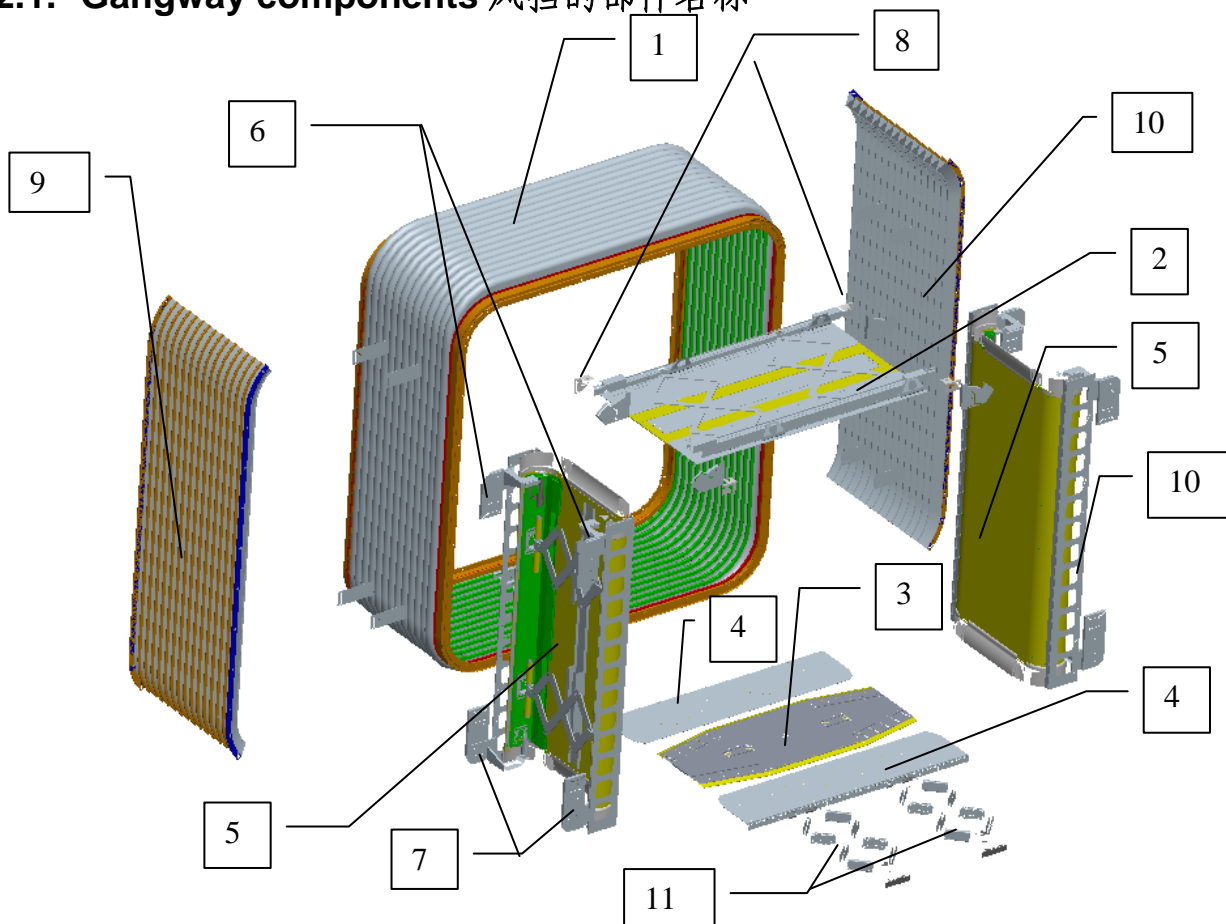


Figure 1 Gangway Structure Decomposition 图 1 风挡结构分解

1 Bellow assy. 折棚组成 2 Ceiling panel assy. 顶板组成 3 Bridge plate assy. 渡板组成 4 Step plate assy. 踏板组成 5 Side panel assy. 侧护板组成 6 Upper panel bracket assy. 上护板安装座组成
7 Lower panel bracket assy. 下护板安装座组成 8 Ceiling panel bracket assy. 顶板安装座组成 9 ICB assy. 外护屏组成 10 Brush assy. 毛刷组成
11 Bridge plate scissor system 渡板连杆组成

This type of gangway bellow is mainly composed of bellow assy., side panel assy., ceiling panel assy., bridge plate assy., upper and lower side panel bracket assy., step plate assy., ICB (inter-car barrier) assy. and scissor system.

该折棚风挡主要由折棚组成、侧护板组成、顶护板组成、渡板组成、护板上下安装座组成、踏板组成、外护屏和渡板连杆等组成。

2.2. Bellow assy. and ICB assy. 折棚组成及外护屏组成

Bellow assy. comprises fabric, VMP frame and clamp frame.

折棚组成包括棚布组成、车体框组成、面料框。

Each bellow assy. comprises 13 corrugated loops made by special material with high fire resistant, high intensity and anti-aging performance. The loop edge is clamped with aluminum frame. The end loop is connected with VMP frame.

每个折棚组成由 13 折环状折棚构成，折棚由特制材料制成，具有防火性、高强度、防老化等特性。

每折棚布缝制边缘用铝型材制成的中间框压夹，折棚端部与连接框和端框相连。

End frame is made by aluminum profile welding with surface powder coated. The end frame is connected to car end through bolt.

端框由铝型材焊接而成，表面喷塑处理，通过安装螺栓与车端相连。

ICB assy. is also made by fabric and clamping frame, which can adapt curve movements and provide protection.

外护屏组成也是通过金属框夹持柔性面料组合而成，满足曲线运动和保护功能。

2.3. Side panel assy.侧护板组成

One-piece side panel assy. comprises panel, rolling device, scissor system. Above and below panel is mounted rubber skirt. Scissor system connects two rollers that curl side panel on its two edges near car end meanwhile provides support to panel center for passenger leaning on. The upper and lower brackets are mounted to mounting brackets on car body so that side panel assy. connects to car body. The structure of side panel enables it to adapt all movements (lateral, longitudinal movements or vertical rolls)in train operation.

一片式侧护板由面板、卷筒及卷曲装置、连杆机构组成。面板的上下安装有橡胶裙边，面板在靠近车辆两侧由卷筒及卷曲装置卷曲，连杆机构将两卷筒连接在一起，同时对面板中部起到支承作用，使面板有足够强度，满足乘客的倚靠要求，侧护板由设置在卷筒的上下各安装座与车辆端部安装架进行连接。通过以上这种侧护板结构设计，能够保证侧护板适应车辆行驶中的各种状况，即车厢水平摆动、垂向摆动（侧滚运动）、上下垂向运动、俯仰运动。

2.4. Ceiling panel assy.顶护板组成

Each bellow assy. is equipped with a set of ceiling panel assy. to provide complete ceiling decoration. 每个折棚组成配有一套顶护板组成，具有完整的顶装饰面。

Ceiling panel assy. comprises edge beam, edge plate, center plate and scissor system. Scissor system connects center panel and edge plate and edge plates as well as fixes edge plates to edge beams. The articulated scissor system enables it to adapt all movements in vehicle operation.

顶护板组成由边梁、边护板、中间护板及连杆机构等组成，中间护板通过连杆机构将边护板连接在边梁上。由于连杆机构为铰接式，可适应车辆运行中车端的各种变化。

2.5. Bridge plate assembly and step plate assembly 渡板和踏板组成

Bridge plate assembly is composed of main piece of bridge plate and wearing strips. Bridge plate is made of checker aluminum panel. Step plate body is made of stainless steel plate with anti-skid surface treatment. Step plate flap is made by stainless steel panel.

渡板组成由渡板体及磨损条等组成，渡板体采用花纹铝板，踏板体由不锈钢板制成，有防滑性能。踏板页由光面不锈钢板制成。

2.6. Upper and lower bracket assy.上、下护板安装座组成

The upper and lower brackets are mounted on car body side wall to work with side panel. Releasing the bracket via keys can achieve quick mounting and demounting of side panel.

上下护板安装座安装在车墙上，和侧护板配合，通过钥匙解锁，能够实现侧护板组成的快速拆卸和安装。

2.7. Bridge plate scissor system 渡板连杆组成

Below bridge plate mounts bridge plate scissor system, which flexes along the movements of vehicle to enable the safe movements of bridge plate and transfer loading on bridge plate to car body.

渡板安装在渡板连杆上，渡板连杆能够随着车辆的运动，实现拉伸压缩，确保渡板能够安全的运动，将渡板承受的重量安全的传递到车体上。

2.8. Ceiling panel bracket assy.顶板安装座组成

The bracket of ceiling panel is installed on VMP frame to provide the origin of force for ceiling panel and prevent it from dropping off.

顶板安装座安装在风挡的车体框上，可以为顶板提供着力点，使顶板在满足曲线运动的同时，无脱落的风险。

2.9. Brush assy.毛刷组成

Brush assy. is the accessory of side panel assy., which on the one hand provides safe space between side panel and side wall and on the other hand prevent foreign articles as well as clean the side panel.

毛刷组成是配合侧护板组成的组件，一方面为侧护板和车墙的间隙提供安全空间，防止异物夹入，另一方面还能起到清洁面板的作用，在面板曲面经过毛刷时，可以清洁表面。

3. Installation 安装

3.1. Standard tools 标准工具

- Outer Hex. wrench (1 set) 外六角扳手一套
- Inner Hex. wrench (1 set) 内六角扳手一套
- Cross head wrench (1 set) 十字头扳手一套

3.2. Special Tools 特殊工具

- Proper lifting devices 合适的吊装设备

3.3. Consumables 消耗品

Thread locker:Loctite243 螺纹锁固胶: 乐泰 243

3.4. Preparatory work 准备工作

Tap and drill on the interface of car body end before assembling the gangway and other accessories. Drilling jig must be used for the assembling accuracy.

安装前，应在车尾端的连接平面上钻孔、攻丝，安装风挡及附件，为保证安装精度，应使用钻孔样板。

Check following locations and interface dimensions before installation:

安装前检查如下安装点位置及尺寸：

The dimensions of the mounting hole on the VMP

车体框组成安装孔尺寸。

Mounting position of side panel bracket

护板安装座组成安装位置。

Check the depth of the screw hole and relevant position.

检查螺孔深度、相对位置尺寸是否符合实际安装要求。

3.5. Procedure 安装步骤

Install the gangway as follows 安装步骤如下：

3.5.1. Installation of upper and lower brackets 侧护板上、下安装座组成的安装

Firstly, mount the upper side panel bracket on pre-checked thread holes of side wall with four inner hexagon countersunk screws M8X40, seeing picture below. Notice the upper side panel bracket has opposite part.

第一步，将“侧护板上安装座组成”用 4 个内六角沉头螺钉 M8X40 安装于车墙已经检查无误的螺纹孔上，如下图所示。注意“侧护板上安装座组成”分左右件。

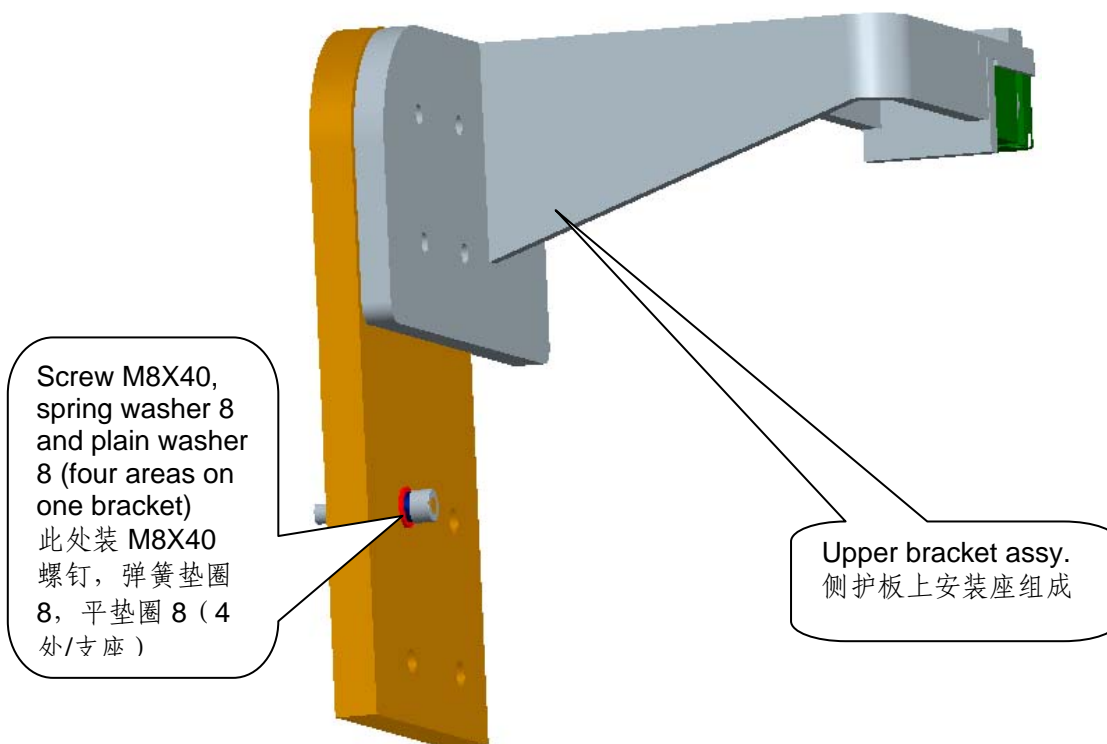


Figure 2 Installation of upper side panel bracket

图 2 侧护板上支座组成的安装

Secondly, mount the lower side panel bracket on pre-checked thread holes of side wall with four inner hexagon countersunk screws M8X40, seeing picture below. Notice the lower side panel bracket has opposite part.

第二步，将“侧护板下安装座组成”用 4 个内六角沉头螺钉 M8X40 安装于车墙已经检查无误的螺纹孔上，如下图所示。注意“侧护板下安装座组成”分左右件。

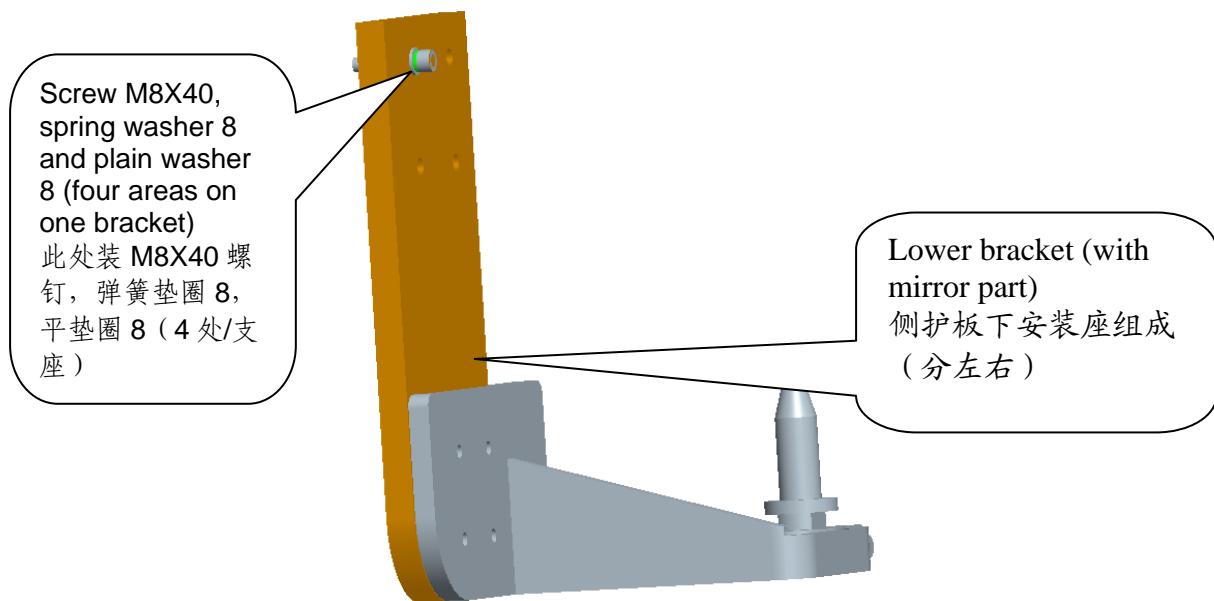


Figure 3 installation of lower bracket

图 3 侧护板下支座组成的安装

3.5.2. Installation of bellow and ICB 风挡组成（折棚和外护屏）的安装

The bellow assy. actually includes bellow and ICB. First lift the bellow with appropriate device to level of car end and then fix bellow to car end wall with hexagon screw M8X40, plain washer and spring washer (48 pcs for each fastener) via MVP frames. Apply Loctite 243 on each screw, seeing figure below:

风挡组成分两部分，折棚组成和外护屏先将折棚组成用适当的吊装设备吊起，吊起到车端对应位置，用六角头螺钉 M8X40 及平垫圈和弹簧垫圈（各 48 件）将折棚通过车体框和两侧车体端墙相连接，拧紧螺钉时使用螺纹锁固胶乐泰 243，如下图：

First step: installation of bellow assy.

第一步，安装折棚组成

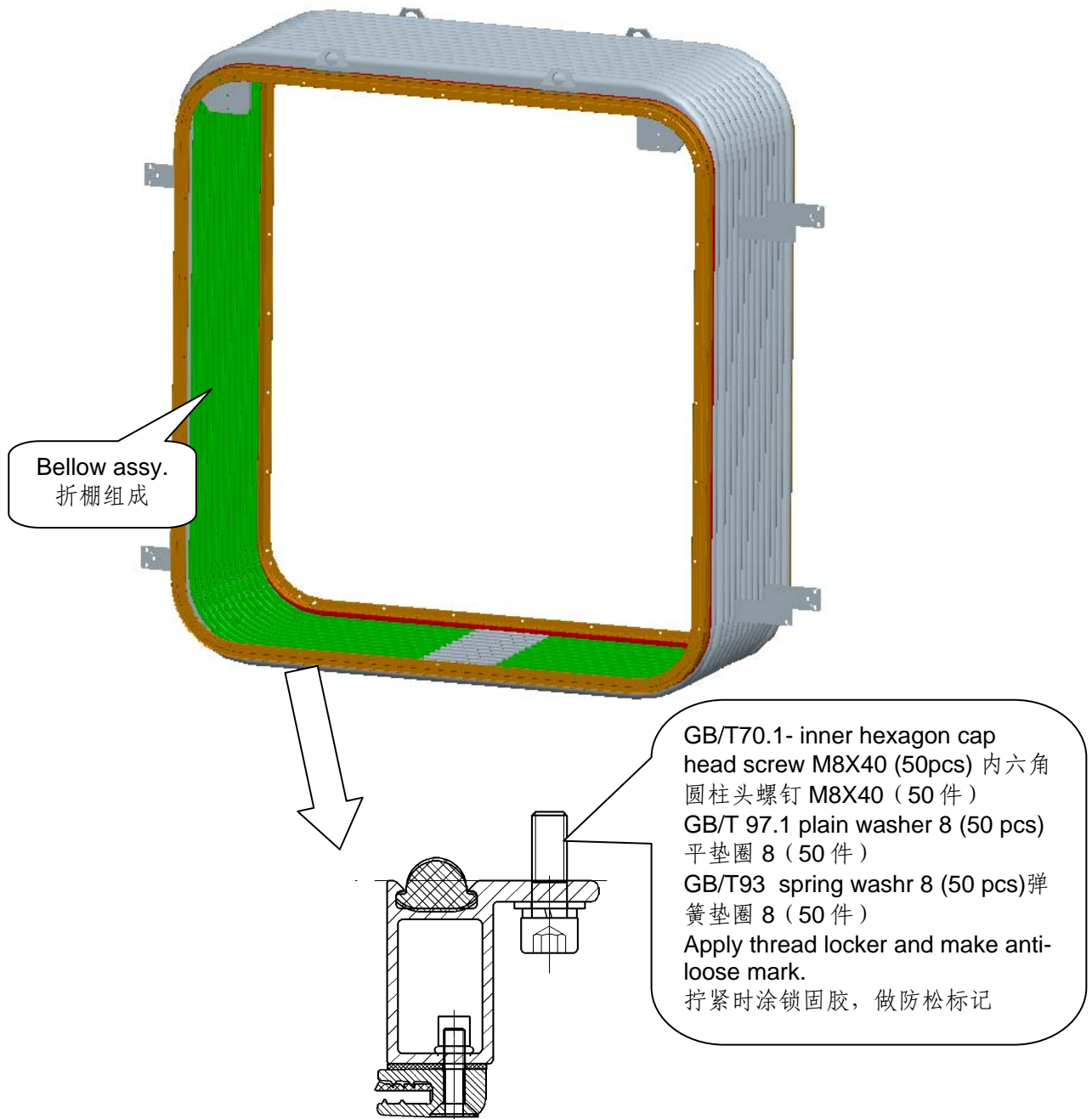


Figure 4 installation of bellow

图 4 折棚的安装

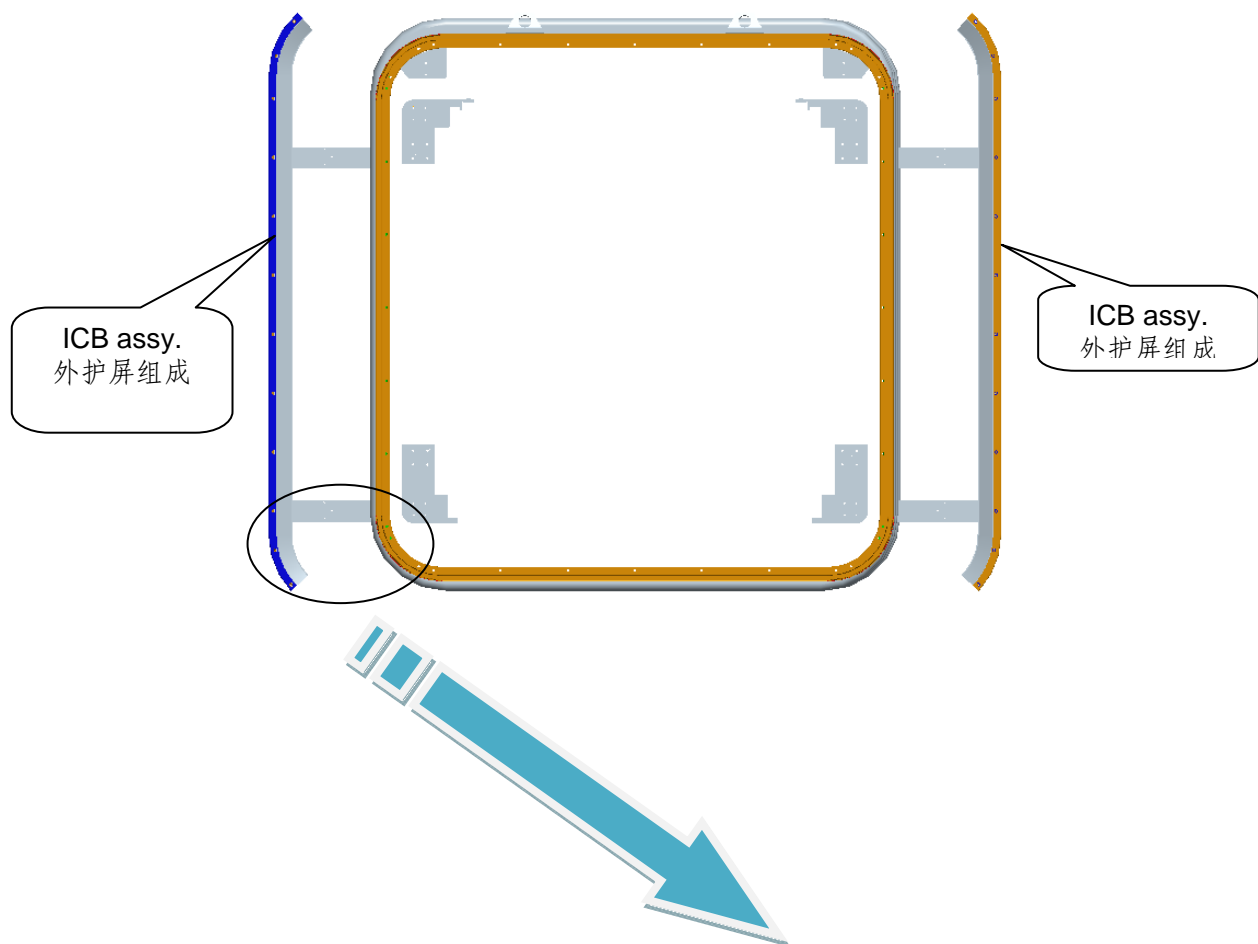
Second step: installation of ICB

第二步，安装外护屏组成

There are two parts of ICB assy. respectively locating at two sides of bellow, which connect to bellow via ICB connection plate and bellow connection plate with GB5783-M6x10 outer hexagon bolt,

GB6170-M6 nut, GB93-6 spring washer, GB97.1-6 plain washer (24 pcs per car, which already fixed on gangway) and connect to car end wall with GB/T70.3-M8X40 inner hexagon countersunk screw (24pcs per ICB, 48 pcs per car), seeing figure below:

外护屏位于折棚两侧，通过 GB5783-M6x10 外六角螺栓、GB6170-M6 螺母、GB93-6 弹簧垫圈、GB97.1-6 平垫圈（24 件/辆车，已经装在风挡上）将连接板和折棚连接板连接在一起。然后，通过 GB/T70.3-M8X40 内六角沉头螺钉（24 件/外护屏，共 48 件/辆车）与车体端墙连接，如下图所示：



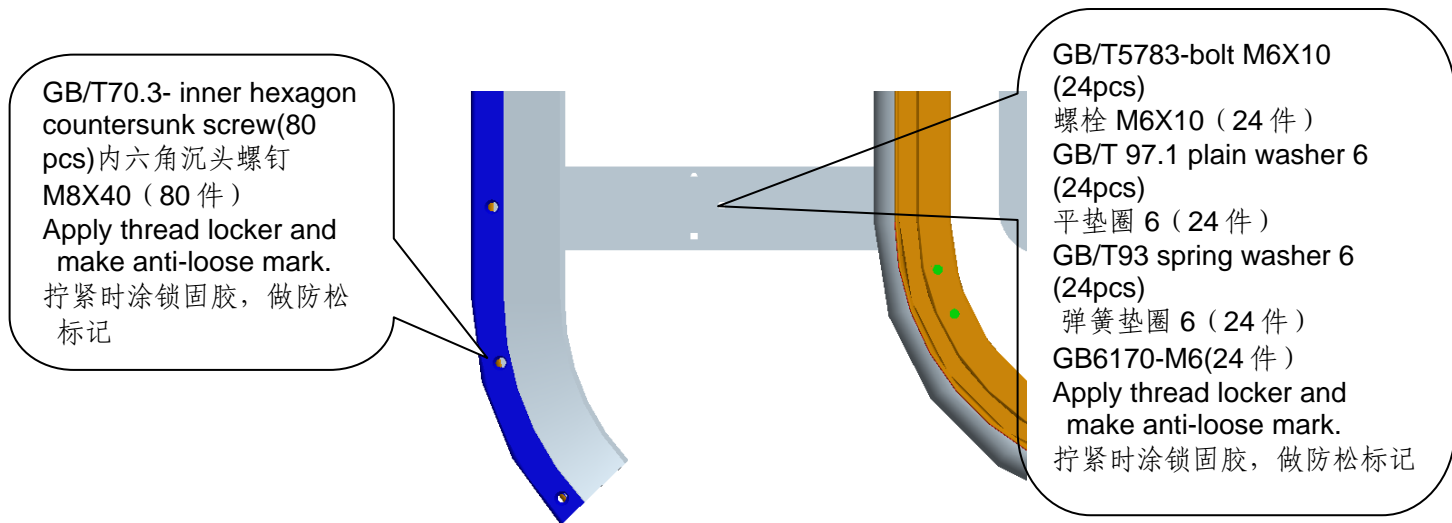


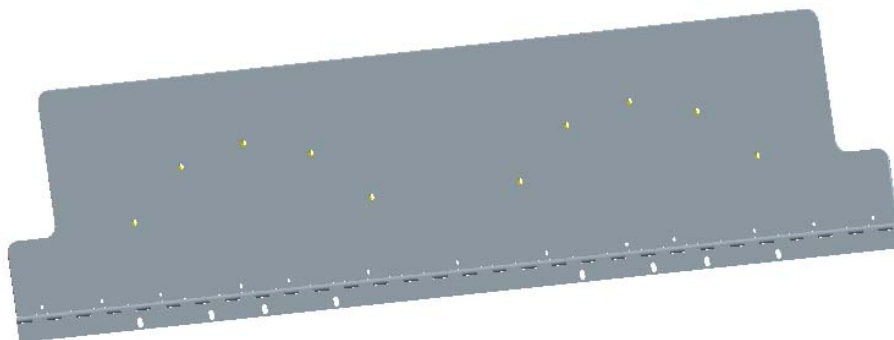
Figure 5 installation of ICB assy.

图 5 安装外护屏

3.5.3. Installation of step plate 踏板组成的安装

Unpack and take out step plate assy. first mount the flap of step plate to car body via four holes with inner hexagon cap head screw M8X40, plain washer GB97.1-8 and spring washer GB93-8 for positioning, all screws unfastened. Tighten all screws (16 pcs for two step plate assy.) after mounting the bridge plate scissor system and apply thread locker and anti-loose mark.

打开包装, 取出踏板组成, 先用内六角圆柱头螺钉M8X40、平垫圈GB97.1-8、弹簧垫圈GB93-8将折页两端的四个孔与车体连接, 将踏板定位, 不要完全紧固, 待装完渡板连杆组成后一起将8个螺钉(两件踏板组成共16个螺钉)与安装渡板连杆的螺钉打锁固胶并划防松标记。



Step plate assy. 踏板 组成

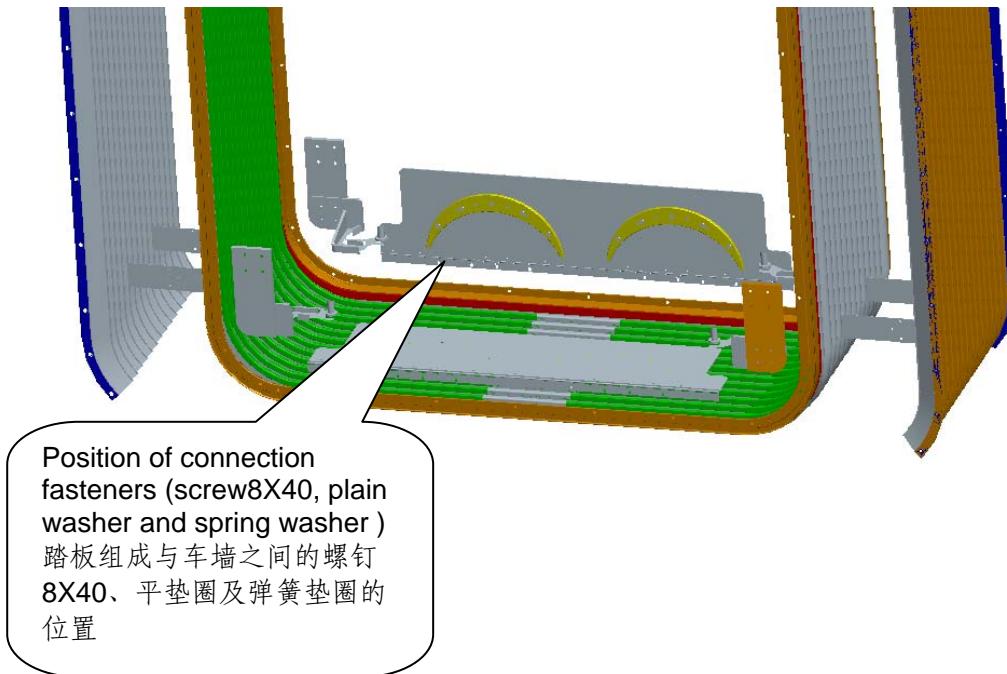


Figure 6 installation of step plate

图 6 踏板组成的安装

3.5.4. Installation of bridge plate scissor system 渡板连杆组成的安装

Unpack and take out bridge plate scissor system. Lift the step plate to vertical state and then mount the bridge plate scissor system with inner hexagon cap head screw M8X40, plain washer GB97.1-8 and spring washer GB93-8 to car end. The step plate assy. that shares same holes and screws shall be fixed together.

打开包装，取出渡板连杆组成。将踏板掀起至竖直状态，然后将渡板连杆组成用内六角圆柱头螺钉 M8X40、平垫圈 GB97.1-8、弹簧垫圈 GB93-8 安装到车端面，和先前已经定位的踏板组成有共用孔和螺钉的一并安装。

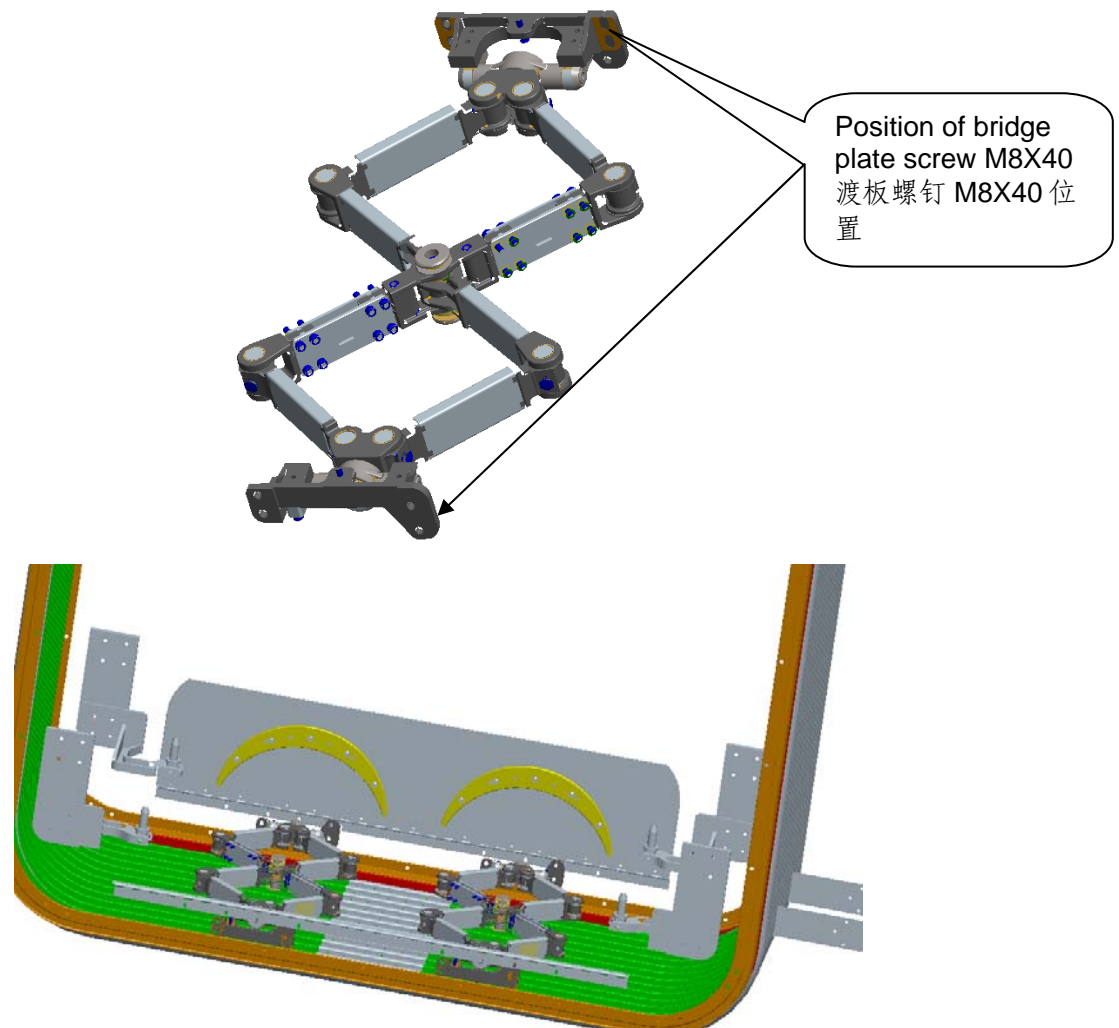


Figure 7 installation of bridge plate scissor system

图 7 渡板连杆组成的安装

Fix all screws that connect two sets of bridge plate scissor systems and two sets of step plate assy. Notice the mounting hole on step plate flap is a slot, so the step plate and bridge plate scissor system shall be adjusted to proper position, which means all screws shall be tightened until upper surface of step plate in alignment with upper surface of vehicle floor. Apply thread locker and make anti-loose mark. Flatten the step as shown in figure below:

将两组渡板连杆组成和两组踏板组成的连接螺钉全部安装，因折页是长圆孔，需将踏板和渡板连杆调整到合适位置，即踏板上表面和车辆底板上平面平齐时，将所有螺钉紧固（涂螺纹锁固胶，并划防松标记），将踏板放平，状态如下：

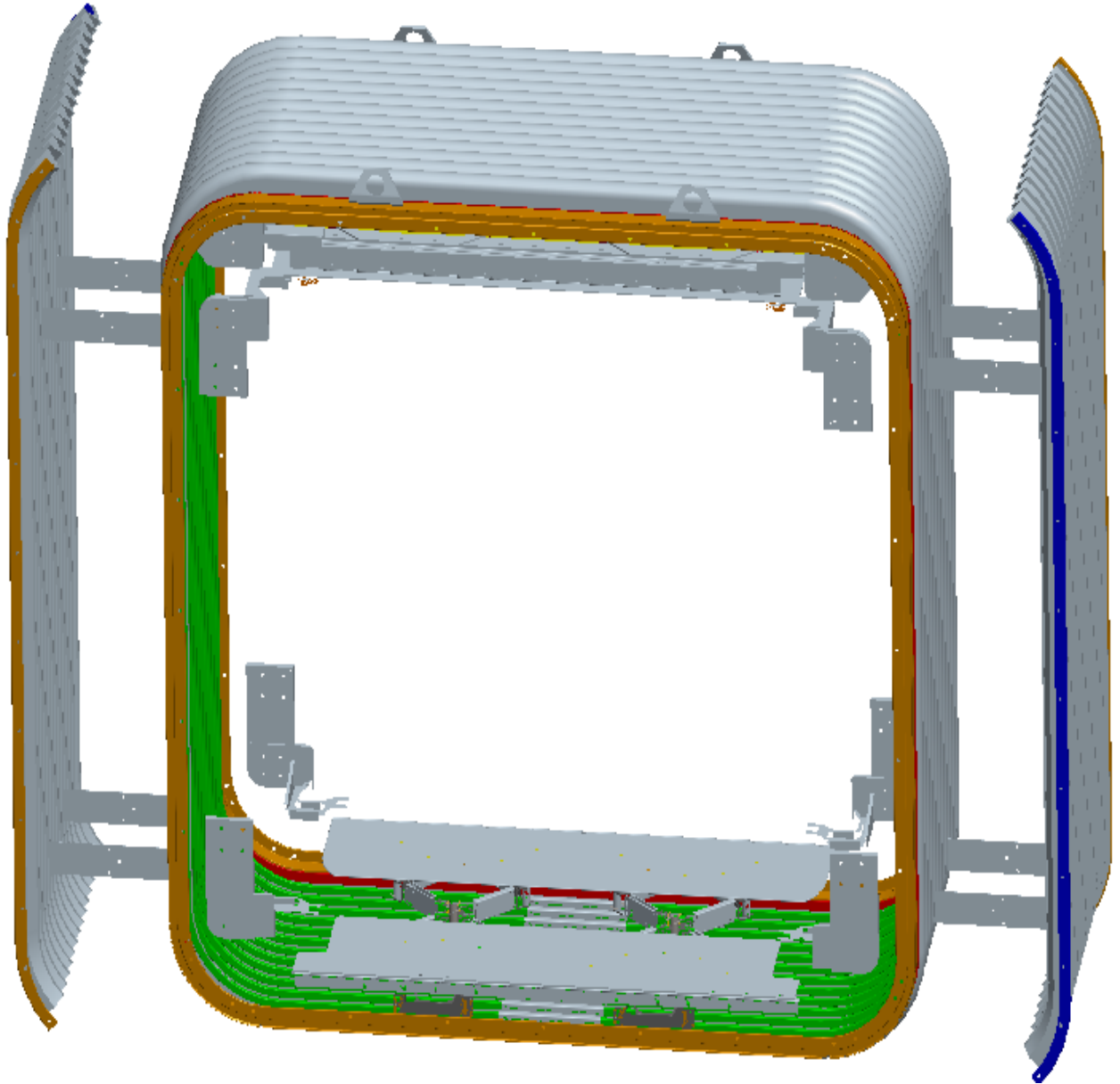


Figure 8 state of bellow after installing step plate and bridge plate scissor system

图 8 风挡安装完踏板组成和渡板连杆组成后的状态

3.5.5. Installation of bridge plate assy. 渡板组成的安装

Unpack and take put bridge plate assy. loosen 8 inner hexagon lobular screws M8X20; lift two litter covers as seen below

打开包装，取出渡板组成。旋开8个内六角花型螺钉M8X20，打开两个顶部小盖板，如下图所示。

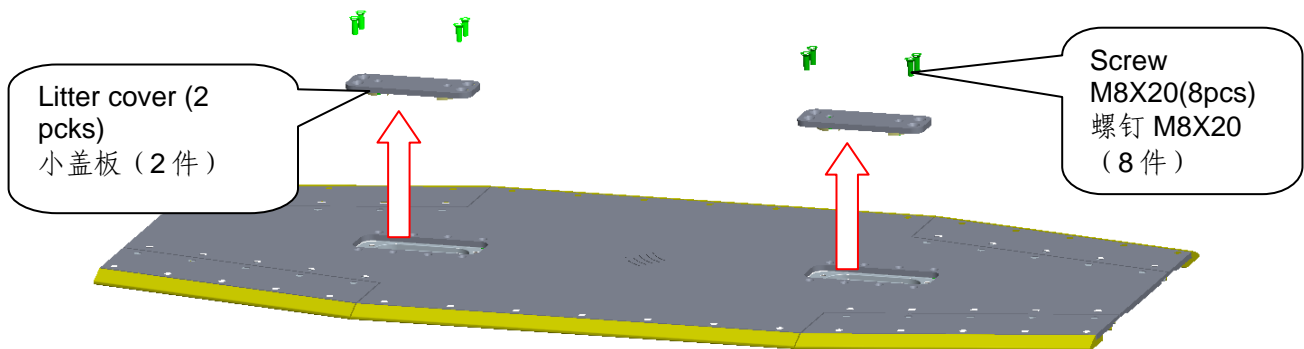


Figure 9 Remove bridge plate assy.; disassembly as per figure instruction

图 9 去除渡板组成，按图示拆卸

Then put bridge plate on scissor system, enabling the pin on top of scissor plug in bridge plate holes as shown in figure below:

然后将渡板放在渡板连杆上面，使连杆顶部的一侧销轴插入渡板预留的圆孔中，如下图所示：

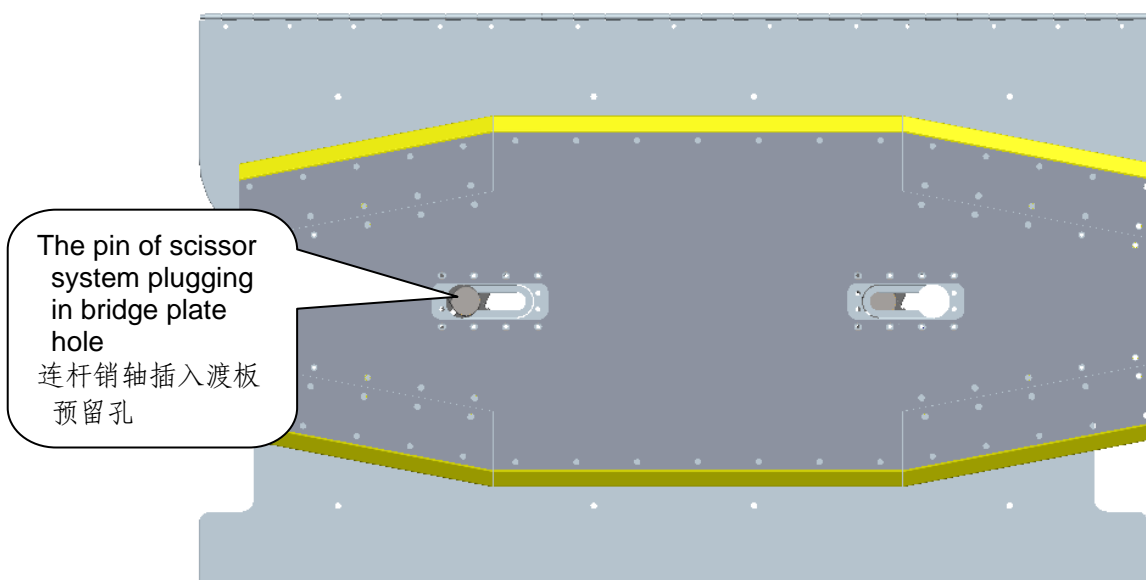


Figure 10 Mount bridge plate body as per figure and description

图 10 按图示和文字说明安装渡板体

Transversely move the bridge plate to enable the pin on another scissor rod plug into another hole, then adjust the bridge plate to make it center with gangway as seen below.

然后将渡板横向偏移，使另一连杆的销轴插入渡板另一侧的圆孔，将渡板再横向偏移，使渡板与风挡居中。如下图所示：

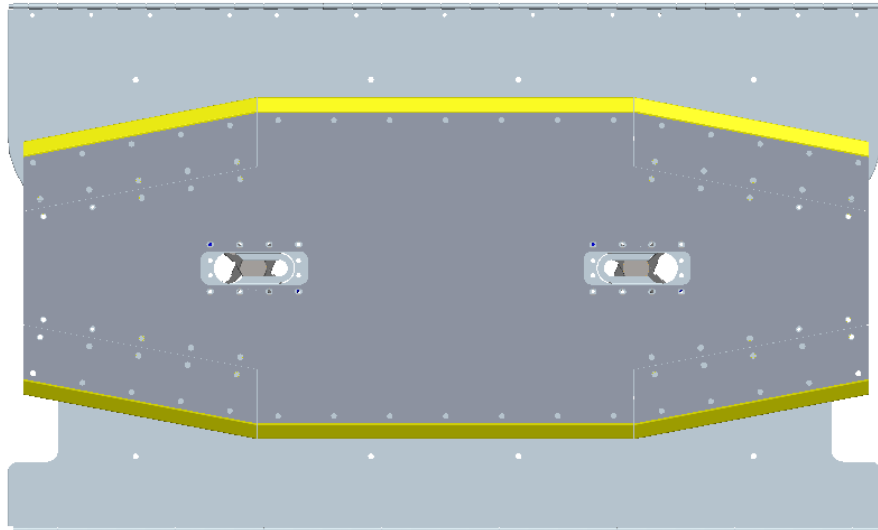


Figure 11 reset cover plate

图 11 复原盖板

Reset the little covers with M8X20 inner hexagon lobular screw and the installation of bridge plate is finished, seeing figure below:

再将小盖板通过M8X20的内六角花型螺钉复位，渡板安装完毕，如下图所示：

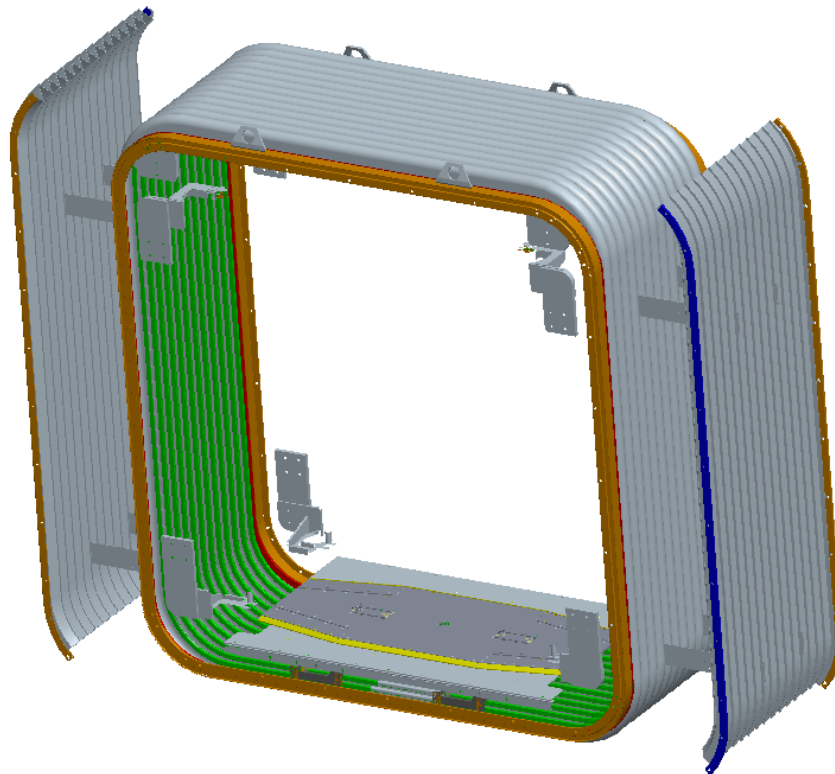


Figure 12 Complete installation of bridge plate

图 12 渡板安装完毕

3.5.6. Installation of ceiling panel bracket 顶板安装座组成安装

Unpack and take out ceiling panel bracket and shims (with thickness of 1mm and 2 mm). Choose shim of proper thickness according to flatness of side wall to ensure parallel mounting surfaces of four ceiling panel brackets and keep standard car end distance of 900mm, seeing figure below:

打开包装，取出顶板安装座组成及垫片，垫片厚度有 2mm 和 1mm 两种，安装时根据车墙的平面度状况合理选用，以保证四个顶板安装座的安装平面平行和正常车端距 900mm 为准，如下图所示：

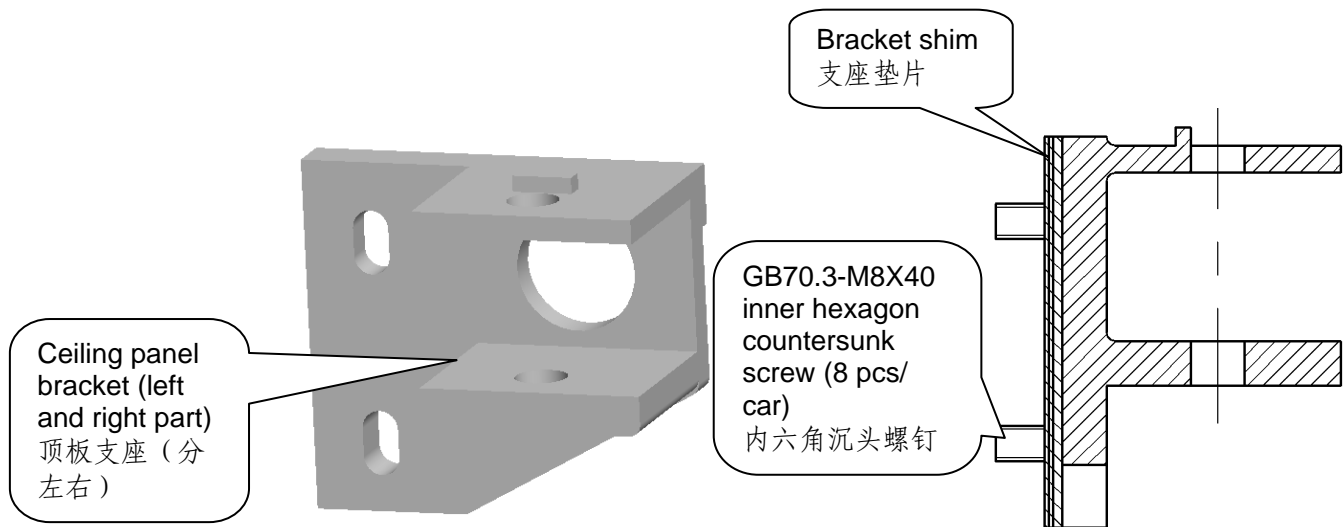


Figure 13 installation of ceiling bracket

图 13 顶板支座的安装

Fix the bracket shim and bracket to side wall through screw M8x40. Adjust the brackets to make sure four brackets at same height. The slot is used to adjust the height of ceiling panel.

将支撑座垫片和支座通过 M8x40 的螺钉连接在车墙上，通过调整支座的高度，确保四个座安装高度相同。长圆孔是用来根据实际情况调整顶板高度的，以便使顶板处于合适位置，确保通过高度满足要求。

3.5.7. Installation of ceiling panel 顶板组成安装

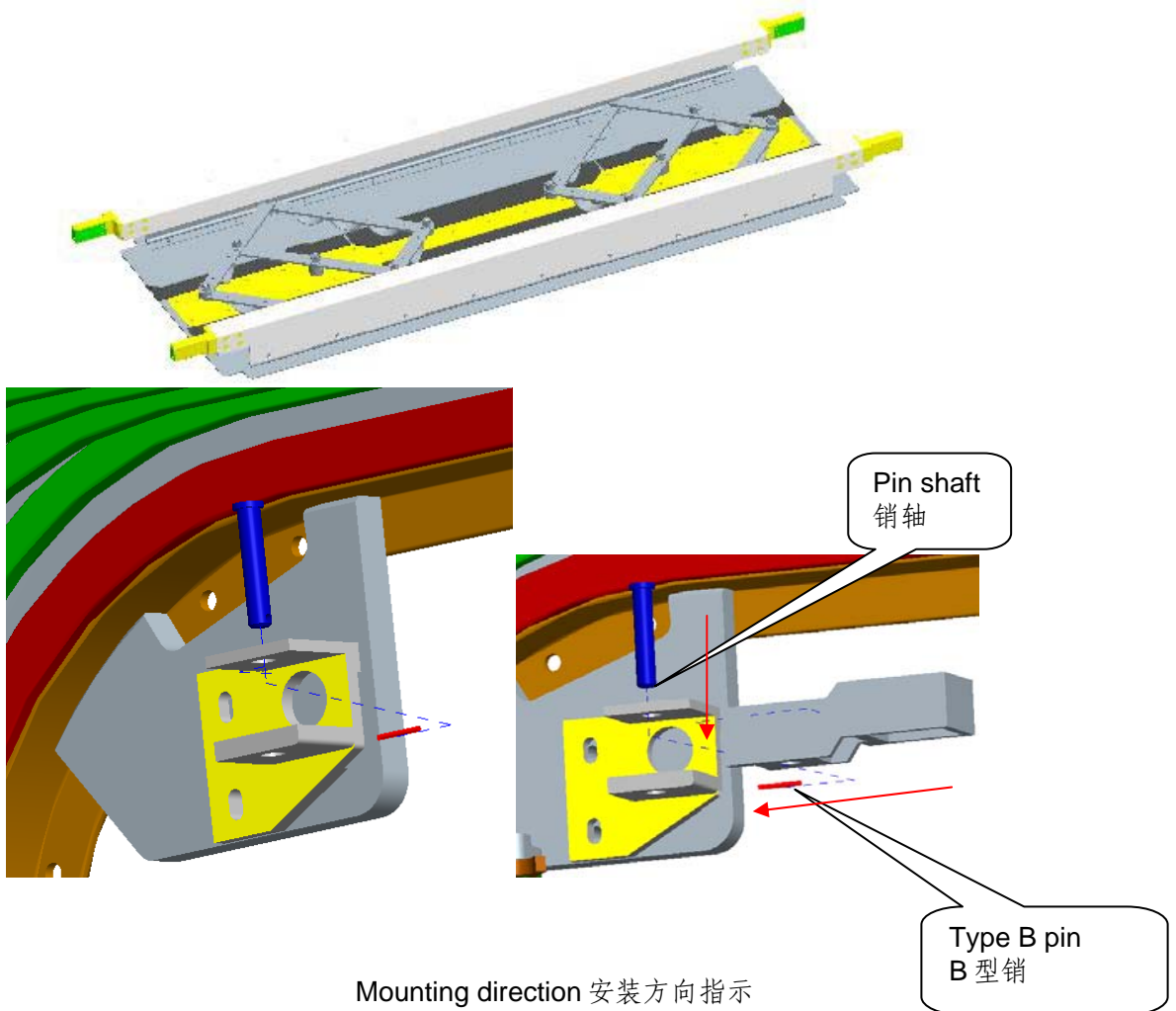


Figure 14 installation of ceiling panel

图 14 顶板组成的安装

First put four joints on edge plate of ceiling panel in slot of bracket and plug pin shaft in, then insert Type B pin in shaft. The completed ceiling panel is shown below:

首先将边顶板四个接头全部放入安装座的槽内，再将销轴插入，最后将 B 型销嵌入销轴内即可。如图所示，顶板组成安装完成。顶板安装完毕后如下图所示：

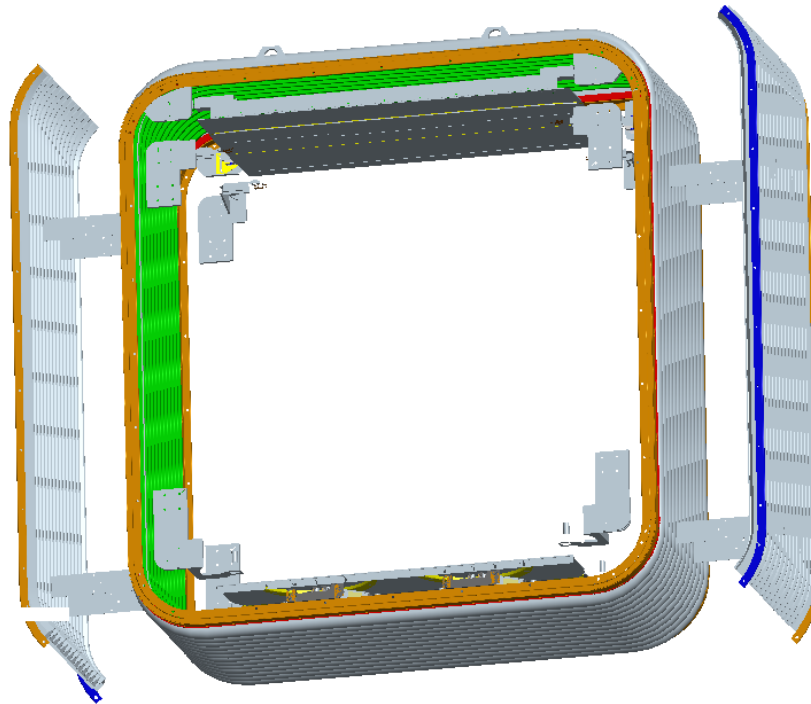


Figure 15 completion of ceiling panel assy.

图 15 顶板组成安装完毕的状态

3.5.8. Installation of side panel assy. 侧护板组成安装

Unpack the side panel and rotate outwards the mounting pin shaft on lower bracket. Unlatch the upper bracket, plug lower part of side panel into lower bracket and slowly erect the side panel assy. then lock the pin on upper bracket. Repeat the procedure to mount another side panel. See operation in figure below:

打开侧护板的包装，并将护板下安装座的安装销轴旋转朝向外侧，将上安装座用风挡钥匙打开至开锁状态。后将侧护板下端斜插入护板下安装座，然后将侧护板组成慢慢竖起，把护板推入上安装座的销孔内锁紧，侧护板安装完成。用同样的方法再安装另一侧。操作见下示意图：

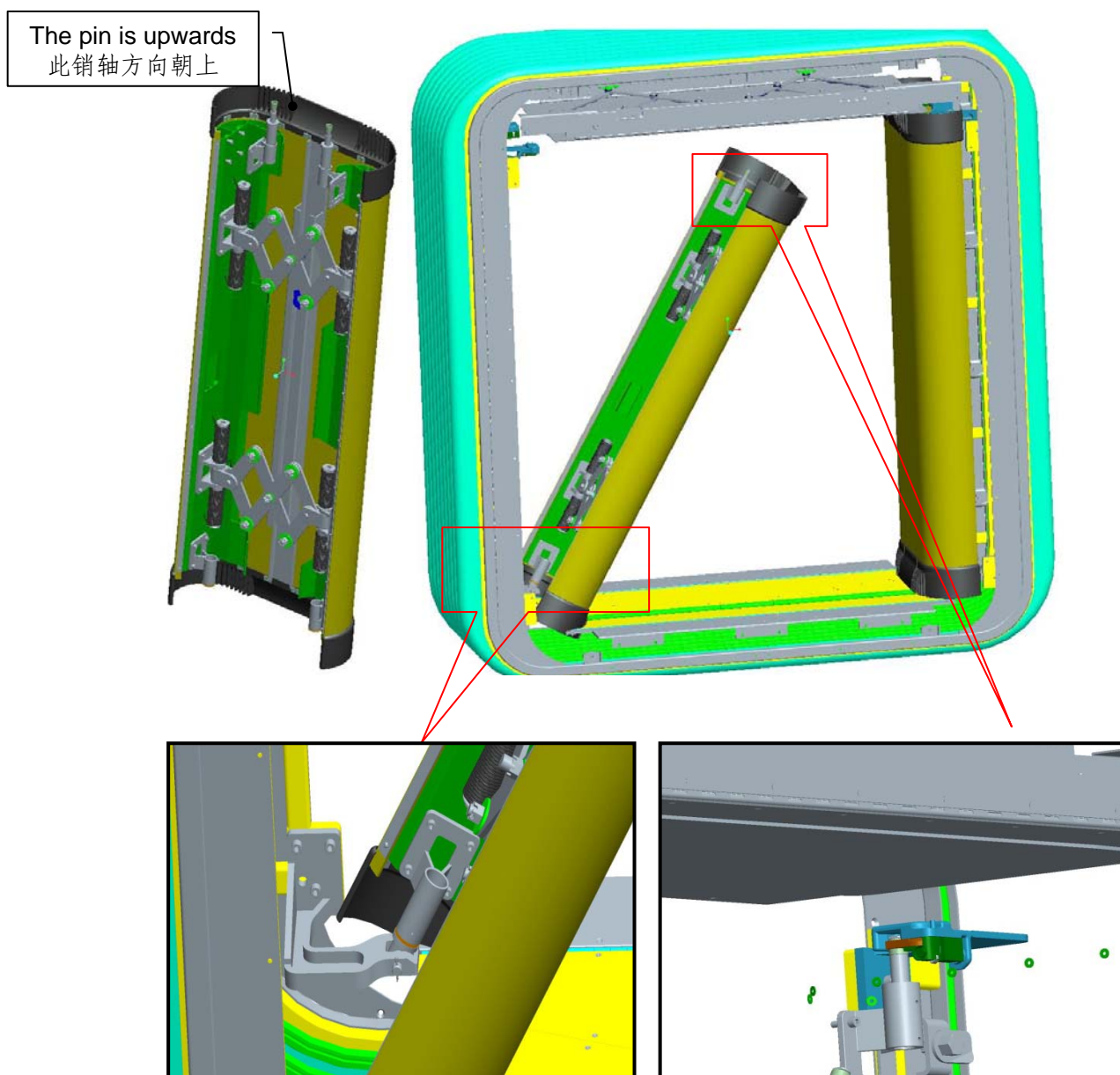


Figure 16 installation of side panel assy.

图 16 安装侧护板组成

The assembly of gangway is completed till now.

至此，风挡安装完成。

4. Gangway disassembly 风挡拆卸

4.1. Standard tools 标准工具

- Outer Hex. wrench (1 set) 外六角扳手一套
- Inner Hex. wrench (1 set) 内六角扳手一套
- Cross head wrench (1 set) 十字头扳手一套

4.2. Special Tools 特殊工具

- Suitable lifting device 吊装设备

4.3. Preparatory Work 准备工作

Before dismounting the gangway from the car end, the vehicle should be stopped at normal position.
在准备拆卸风挡之前，先将车辆调整到正常位置。

4.4. Gangway demounting procedure 风挡拆卸步骤

4.4.1. Demounting of side panel assy. 侧护板组成的拆卸

Demounting of side panel assy.: plug the gangway key into lock shaft of upper side panel bracket and rotate it, the bracket will be unlocked and side panel will flick out. Operator shall support the side panel with hand and move the panel to gangway aisle in a certain angle; then demount the pin shaft on lower bracket of side panel.

侧护板组成拆除：将风挡钥匙插入上护板支座的锁轴并旋转，使护板旋转轴与护板支座处于未锁闭状态，这时侧护板将被弹开，注意操作人员需用手扶住侧护板，将侧护板向折棚风挡过道中间旋转至一定角度，后将侧护板从下安装座的销轴上拆下。

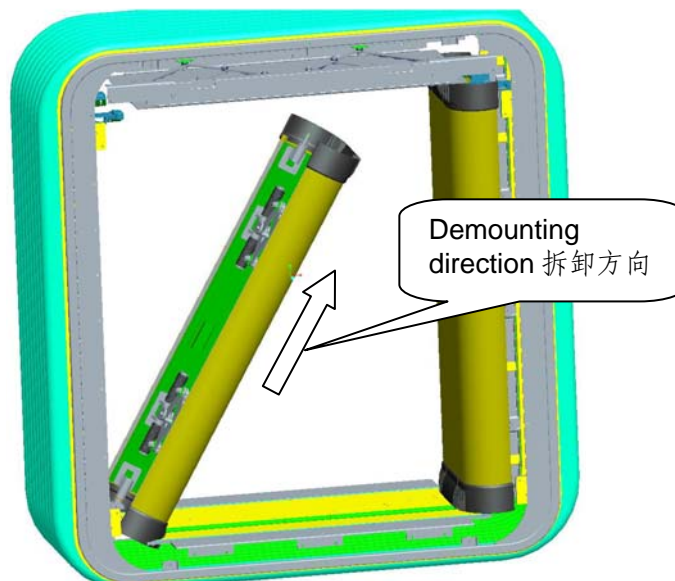


Figure 17 demounting of side panel assy.

图 17 拆卸侧护板组成

4.4.2. Demounting of ceiling panel assy. 拆卸顶护板组成

Draw out the Type B pin in direction shown below and draw out the pin shaft and push forward the ceiling panel to make “joint of edge ceiling panel” separate from mounting bracket. The ceiling panel assy. can be demounted.

按照下图指示方向先将 B 型销抽出，再将销轴向上拉出，然后向前推顶板，使“边顶板接头”脱离安装座，顶护板组成即可拆卸下来。

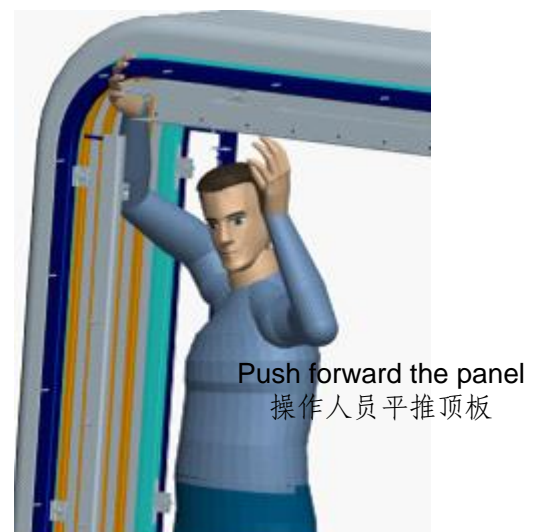
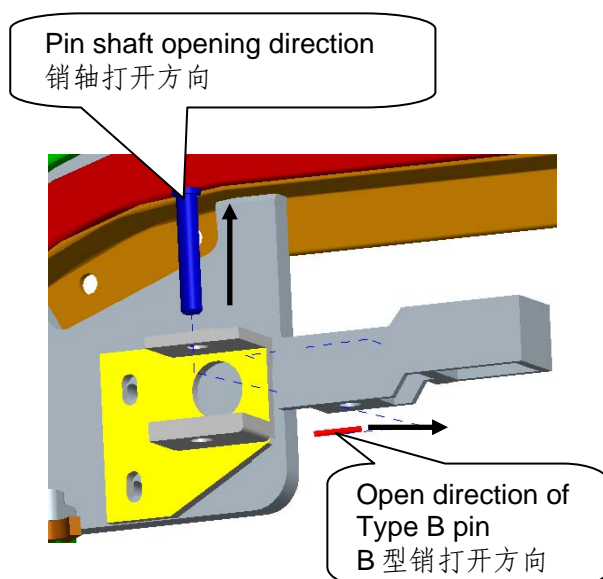


Figure 18 demounting of ceiling panel assy.

图 18 拆卸顶板组成

4.4.3. Demounting of bridge plate assy. and bridge plate scissor system 渡板组成和渡板连杆组成和踏板组成的拆卸

Unscrew the inner lobular screw M8X20 with inner hexagon wrench to lift two litter covers as shown below:

用内六角扳手螺开旋开8个内六角花型螺钉M8X20，打开两个顶部小盖板，如下图所示。

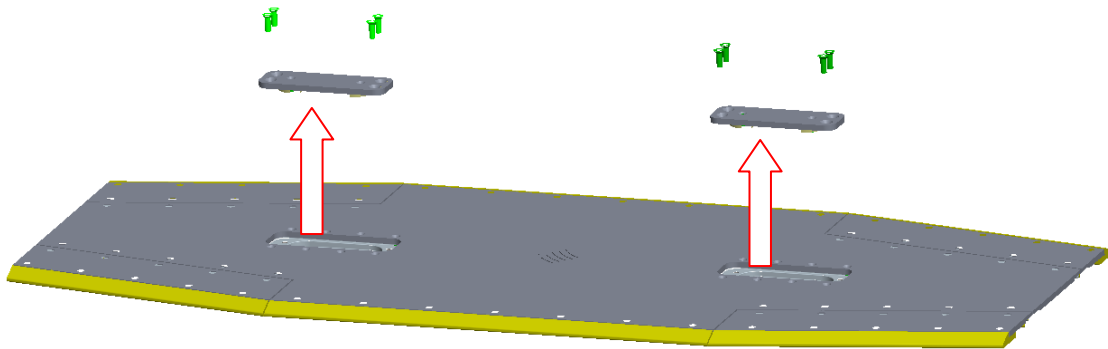


Figure 19 demounting of bridge plate assy. (1)

图 19 拆卸渡板组成 (1)

Transversely move the bridge plate to enable the pin on one scissor rod plug into the hole; then transversely move the plate and lift it to enable another pin plug into the hole at the other side.

The bridge plate can be demounted then. The operation is shown below:

然后将渡板横向偏移，使一侧连杆的销轴插入渡板的圆孔中，将渡板再横向偏移，并将渡板向上提起，使渡板连杆另一侧的销轴插入渡板圆孔时，将整个渡板提起拆下即可。如下图所示：

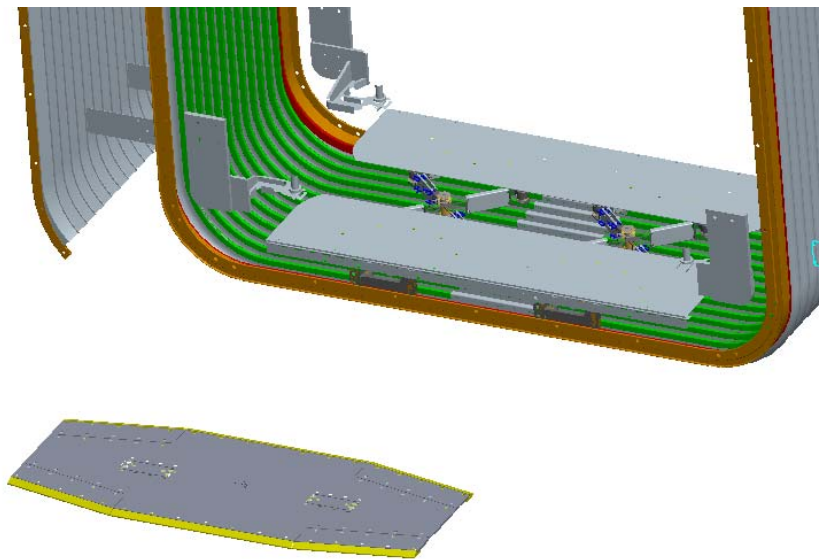


Figure 20 demounting of bridge plate assy. (2)

图 20 拆卸渡板组成 (2)

Later, lift the step plate and demount bridge plate scissor system and screws on car body to remove the bridge plate assy. as shown below:

然后将踏板掀起，拆下连接渡板连杆和车体的螺钉，然后即可将渡板组成拆下：如下图所示：

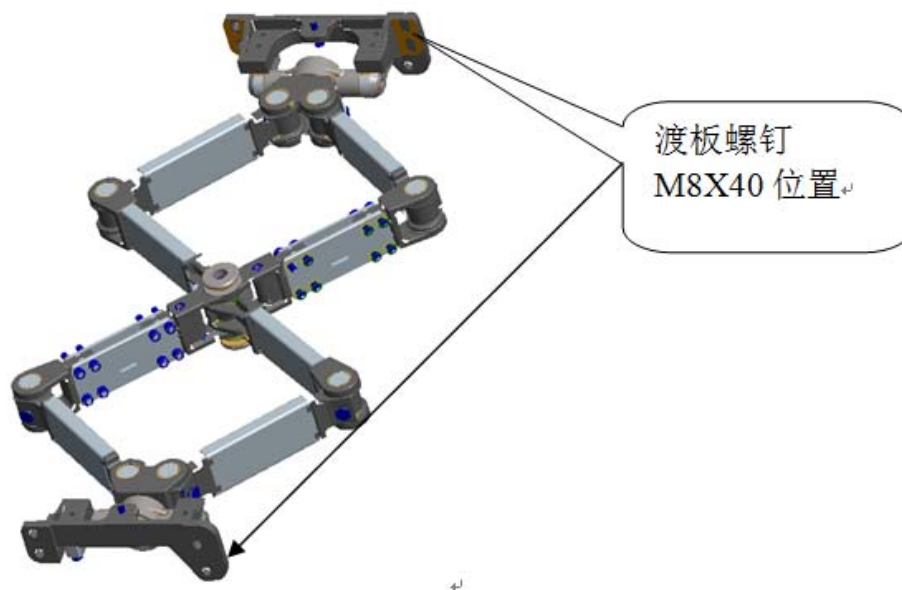


Figure 21 demounting of bridge plate scissor system

图 21 拆卸渡板连杆组成

Lift the step plate and unscrew the inner hexagon cap head screws M8X40 which connect hinge and side wall.

将踏板掀起，旋开折页和车墙连接的M8X40的内六角圆柱头螺钉

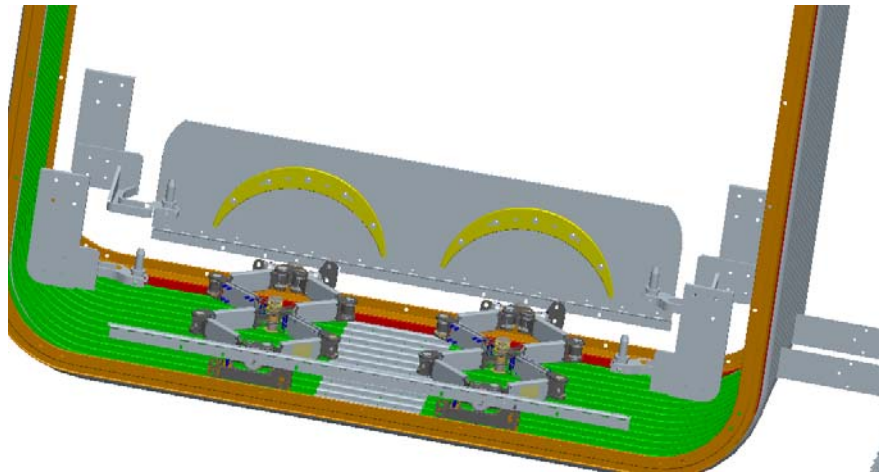


Figure 22 demounting of step plate assy.

图 22 拆卸踏板组成

Follow the above procedure to demount and remove the step plate assy.

即可将踏板组成拆下，移走即可。

4.4.4. Demounting of upper and lower bracket 护板上、下安装座的拆卸

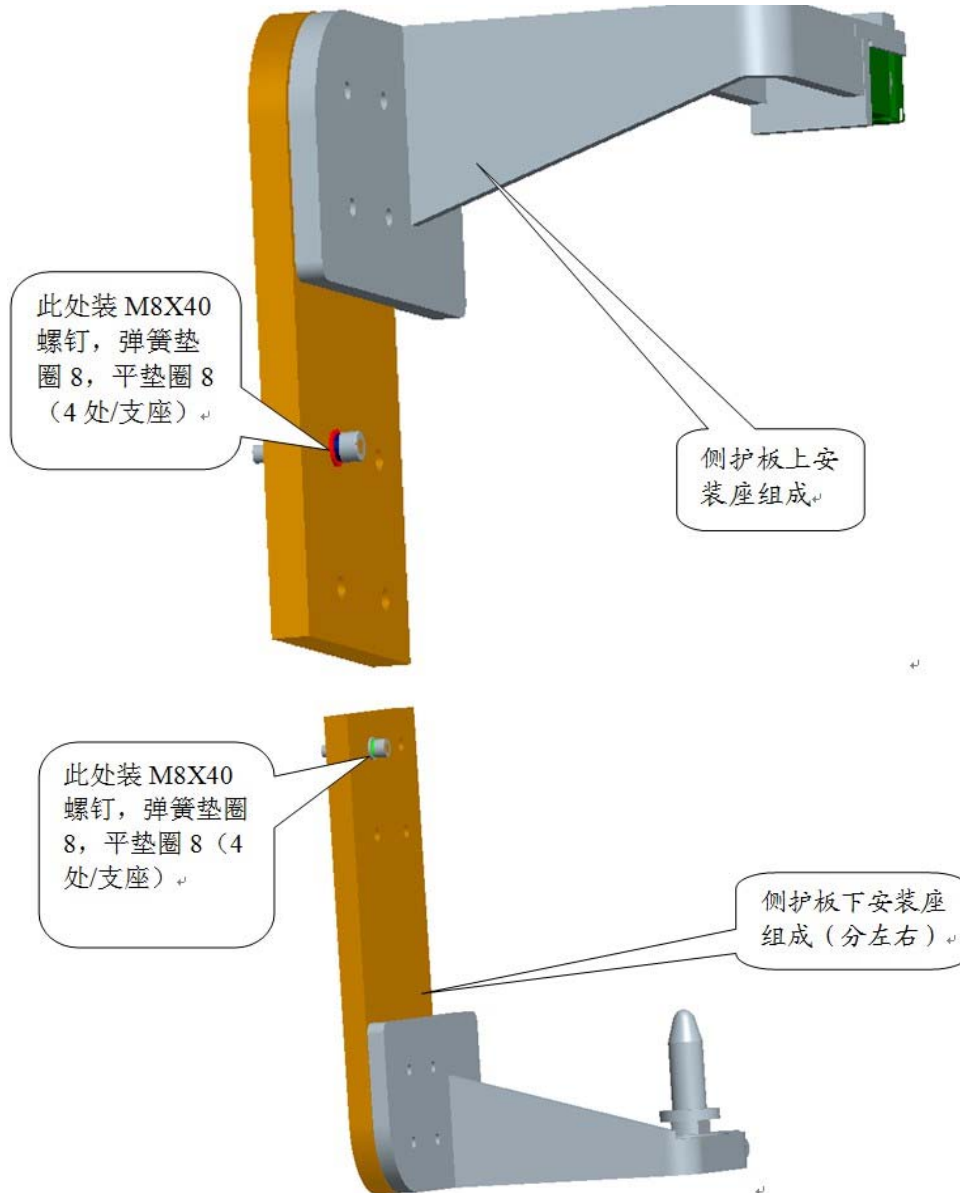


Figure 23 demounting of upper and lower panel bracket

图 23 拆卸上、下护板支座

The demounting of upper and lower brackets of side panel follows opposite procedure as installation. The brackets can be removed by unscrewing the screw M8x40.

侧护板上下安装座的拆卸是上下安装座安装的逆过程，将 M8x40 的螺钉旋开即可取下安装座。

Before demounting the gangway assy., first unscrew the connection between ICB and main bellow and then unscrew all screws used for ICB mounting and remove the ICB. Lift the gangway assy. by tying four lifting lugs to remove all screws of gangway around car body.

拆卸风挡组成前，先将外护屏和主折棚之间的连接板连接螺钉打开，然后将安装外护屏的螺钉拆掉，将两侧外护屏移走。然后再用吊装带将风挡组成的四个吊耳栓住，并稍微向上用力吊起。这时再将风挡组成车体框周围的螺钉拆除，即可将风挡组成拆卸下来。

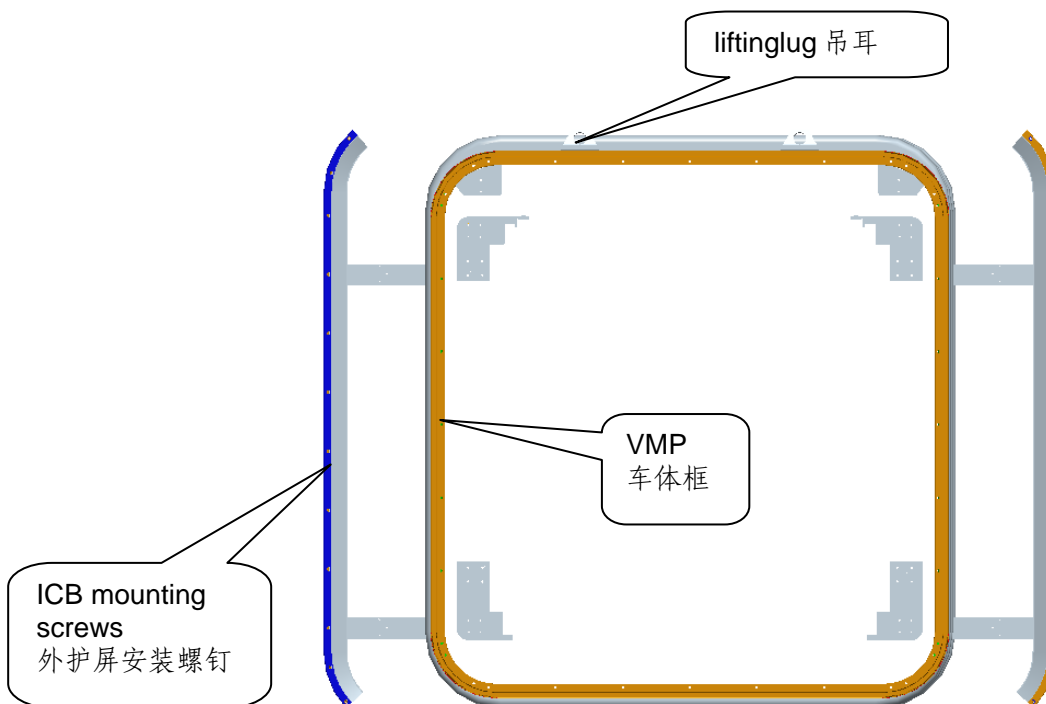


Figure 24 demounting of ICB and bellow assy.

图 24 拆卸外护屏和折棚组成

Other parts of gangway assy. that are independently installed on car end and cannot affect coupling and uncoupling of gangway will not be demounted.

因其余未拆除的部件分别独立安装于车辆两端的车端面上，所以这时若不拆卸这些部件并不影响折棚风挡的解编和组编。

5. Commissioning instruction 试车说明

NOTE



Locking condition must be inspected after assembly.

组装完成后，必须检查锁闭情况。

Before commissioning, inspect according to following items.

试运行前，应根据下列条件检查风挡情况。

During and after assembly, verify, among other things, that:

组装过程中和完成后，应验证并检查下列事项：

All fastening screws and connecting elements of connections are tightened with the specified torque and are locked by thread locker.

所有紧固件及连接件应按规定扭矩预紧，并使用螺纹锁固胶。

Bridge plate assy., ceiling panel assy. and side panel assy. are all at correct position.

渡板组成、顶护板组成和侧护板组成均处于正确的位置。

No damage appears on bellow fabric. 折棚组成的棚布无破坏。

The gangway bellow can be put into operation until all above are confirmed.

上述事项确认无误后，折棚风挡可投入试运行。

6. Maintenance and overhaul 维护及高级修

6.1. Maintenance and Overhaul Task List (time or mile which comes first) 维护及高级修任务清单（时间和里程以先到为准）



Maintain and Overhaul code 维护及大修等级	Kilometric performance 走行公里	Interval (time) 间隔时间	Maintenance Task 维护内容	Section Reference 参考章节
Train inspection 列检	Unspecified 未规定	Daily 每天	Inspection of bellow completeness 检查棚布的完整性 Inspection of top protection panels 检查顶护板组成 Inspection of side cladding panel assy. 检查侧护板组成 Inspection of bridge plate 检查渡板组成 Inspection of step plate assy. 检查踏板组成 Cleaning 清洁	6.3.4
Weekly inspection 周检	5000	15 days 15 天	Inspection of flexibility of bridge plate hinge 检查渡板组成折页的灵活性	6.4.4
Monthly inspection 月检	30 000	3 months 3 月	Inspection of fasteners on each parts 检查各部件紧固件 Inspection of any damages and crack of bellow fabric(inside) 检查棚布（内侧）是否有破损及裂纹 Inspection of joint bearing on ceiling panel 检查顶板关节轴承是否异常	6.5.4



<p>Third level repairing 三级修</p>	<p>1 200 000</p>	<p>3 years 3 年</p>	<p>Replacement of bridge plate wearing strip 更换渡板组成磨损条</p> <p>Replacement of skirt 更换裙边</p> <p>Replacement of sealing rubber 更换密封胶条</p> <p>Replacement of side panel brush 更换侧护板毛刷</p> <p>Replacement of joint bearing of ceiling panel 更换顶板关节轴承</p>	<p>6.6.4</p>
<p>Forth level repairing 四级修</p>	<p>2 400 000</p>	<p>6 years 6 年</p>	<p>Replacement of bridge plate assy. 更换渡板组成</p> <p>Replacement of step plate assy. 更换踏板组成</p>	<p>6.7.4</p>
<p>Fifth level repairing 五级修</p>	<p>4 800 000</p>	<p>12 years 12 年</p>	<p>Replacement of gangway assy. 更换风挡组成</p> <p>Replacement of side panel assy. 更换侧护板组成</p> <p>Replacement of ceiling panel assy. 更换顶板组成</p>	<p>6.8.4</p>

6.2. Safety instructions 安全说明

DANGER Before checking and replacing parts, vehicles must be in stopped conditions.



检查和更换零部件时，必须停车。

If parts or components are re-installed back to the vehicle, all mounting bolts and screws must be discarded and replaced with new set of fasteners.

所有更换件中拆下的螺栓，再次安装时必须更换，并加螺纹锁固胶。

Capacity of lifting device and their lifting wires must be enough for bearing gangway load and other auxiliary equipment.

吊装时吊具和绳锁应具有足够的强度。

WARNING Spare parts of gangway must be well stored.



风挡备件必须妥善储存。

Do not fit the damaged parts or components to gangway or vehicle.

已破坏的零部件不允许安装在风挡或车体上。

CAUTION During mounting process, protect bellow fabric and other interior coverings including painting surface of skirt, side panel and ceiling panel from sharp things.



组装过程中，避免锋利物体接触棚布及其它内饰件，如裙边、侧护板、顶板的喷漆表面。

NOTE



Before vehicles re-operation, inspect the gangways according to commissioning instructions (see chapter 5).

车再次运行前，按试运行条款（第5章）进行检查。

6.3. Maintenance interval Train inspection 维护等级 列检

6.3.1. Special tools 特殊工具

Not required 不需要

6.3.2. Consumables and Spare parts 消耗品及备品备件

Consumables: Light-coloured soft fabric& cleaner 消耗品：浅色软布及清洁剂

Spare parts: not required 备品备件：不需要

6.3.3. Preparatory Work 准备工作

Not required.不需要

6.3.4. Maintenance Procedure 维护程序

<p>Train inspection 列检</p>	<p>Unspecified 未规定</p>	<p>Daily 每天</p>	<p>Inspection of bellow completeness 检查棚布的完整性</p> <p>Inspection of top protection panels 检查顶护板组成</p> <p>Inspection of side cladding panel assy. 检查侧护板组成</p> <p>Inspection of bridge plate 检查渡板组成</p> <p>Inspection of step plate assy. 检查踏板组成</p>
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			Cleaning 清洁
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1) Inspection of bellow completeness 检查棚布的完整性

Visually inspect the surface of bellow fabric, and its sealing.

目测检查棚布表面及其密封性。

If there is any tear of fabric, repair according to chapter 7.3.2.

若棚布撕裂，按 7.3.2 条程序修理。

2) Inspection of ceiling panel assy. 检查顶护板组成

Inspect the position of ceiling panel 检查顶护板组成是否处于正常位置

Inspect the movement of ceiling panel,检查正常运行时顶护板组成的运动情况

Inspect the abnormal noise of ceiling panel assy.

检查顶护板组成是否产生异常噪音。

3) Inspection of side ceiling panel assy. 检查侧护板组成

Inspect mounting position and movement of side panel assy. and wearing status of skirt.

检查侧护板组成的安装位置和运动情况及裙边的磨损情况

4) Inspection of bridge plate assy. 检查渡板组成

Inspect the status of bridge plate assy.检查渡板组成是否处于正常状态

Inspect movement of bridge plate flap 检查正常运行时渡板页的活动情况

Inspect abnormal noise of bridge plate assy. 检查渡板组成是否产生异常噪音。

5) Cleaning 清洁

Immerse the cotton cloth in cleaner and use it to wipe surface to erase dirt or smears. Soft brush can be used for hard-erasing area. Finally wipe the surface with clean water and dry it.

Notice not to use strong solvent or abrasive which may damage surface gloss to make harder cleaning in future.

用事先浸泡好的棉布蘸清洁剂和温水擦拭表面，去除污迹。若污迹不易用抹布擦拭，用软毛刷擦洗。最后用干净的水清洗擦拭面直至变干。

注意：不要使用强烈的溶剂或者研磨剂，强烈的溶剂或研磨剂的使用可能会去掉外层光泽面，使得将来的清洗更困难。

6.4. Maintenance interval Weekly inspection 维护等级 周检

6.4.1. Special tools 特殊工具

Not required 不需要

6.4.2. Consumables and Spare parts 消耗品及备品备件

Consumables: not required 消耗品：不需要

Spare parts: not required 备品备件：不需要

6.4.3. Preparatory Work 准备工作

Not required 不需要

6.4.4. Maintenance Procedure 维护程序

Weekly inspection 周检	5000	15 days 15 天	Inspect the flexibility of bridge plate flap. 检查渡板组成折页的灵活性
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Inspect the flexibility of bridge plate flap 检查渡板组成折页的灵活性

Lift upwards the bridge plate flap and inspect the flexibility. If necessary, open side panel and take full inspection.

向上抬起渡板页，检查渡板各折页的灵活程度，必要时打开侧护板，进行全部折页的检查

6.5. Maintenance Interval Monthly Interval 维护等级 月检

6.5.1. Special tools 特殊工具

Not required 不需要

6.5.2. Consumables and spare parts 消耗品及备品备件

Consumables: lithium-lubricant 消耗品: 锂基润滑脂

Spare parts: not required 备品备件: 不需要

6.5.3. Preparatory work 准备工作

The gangway bellow shall stop in correct position before inspection.

检查前, 将折棚风挡停止在正常位置。

6.5.4. Maintenance procedure 维护程序

Monthly inspection 月检	30 000	3 months 3 月	Inspect all fasteners; Inspect damage or crack on bellow fabric (inside) 检查各部件紧固件 检查棚布 (内侧) 是否有破损及裂纹
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1 Open side panel assy. 打开侧护板组成;

Inspect and maintain the fasteners on side panel mounting base.

检查并维护侧护板安装座组成的紧固件;

Open ceiling panel assy. 打开顶板组成;

Inspect and maintain the fasteners on ceiling panel brackets

检查并维护顶护板安装座组成的紧固件;

Open bridge plate assy. 打开渡板组成;

Inspect and maintain fasteners on step plate 检查并维护踏板组成的紧固件;

2) Inspect bellow fabric 检查棚布

Open side panel assy. and remove it. 打开侧护板组成并移开;

Open the ceiling panel bracket and remove ceiling panel assy. to check upper bellow fabric.

打开顶护板组成安装座, 取下顶板组成, 观察上部棚布;

Open bridge plate flap and check lower bellow fabric.

向上打开渡板组成的渡板页，观察下部棚布；

Check the connection of fabric. 检查棚布的连接情况。

Repair as per procedure 7.3.2 if bellow fabric tears off.

若棚布撕裂，按 7.3.2 条程序修理。

6.6. Maintenance interval Third level repairing – 1200,000 miles/3 years (according to which comes first)维护等级 三级修 120 万公里 /3 年（先到为准）

6.6.1. Special tools 特殊工具

- Proper lifting devices 适当的吊装设备

6.6.2. Consumables and Spare parts 消耗品及备品备件

Consumables: thread locker loctite 243 消耗品： 螺纹锁固胶 乐泰 243

Spare part 备品备件：

Bridge plate wearing strip 渡板磨损条

Side panel skirt 侧护板裙边

Sealing rubber of VMP frame 车体框的密封胶条

6.6.3. Preparatory Work 准备工作

Make sure the gangway is in correct position before inspection and prepare general and special tools and materials for maintenance.

检查前，将风挡停在正常位置，并准备通用和特殊工具及材料以备维修。

6.6.4. Inspection procedure (1200,000 miles/3 years taking which comes first)大修程序(120 万公里/3 年 先到为准)

Third level repairing 三级修	1200,000 miles 120 万公里	3 years 3 年	Replacement of bridge plate wearing strip 更换渡板组成磨耗条 Replacement of skirt 更换裙边 Replacement of sealing rubber 更换密封胶条 Replacement of side panel brush 更换侧护板毛刷 Replacement of joint bearing of ceiling panel 更换顶板关节轴承
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1) Replacement of wearing plate of bridge plate 更换渡板组成的磨耗条

Lift bridge plate flap and check wearing strip and replace as per 7.3.3.

提起渡板页检查磨耗条，按 7.3.3 条更换。

2) Replacement of skirt 更换裙边

Visually inspect the wearing status of skirt. It's not necessary to replace the skirt if appearance not bad.

目测裙边磨损情况，若不影响外观，则不更换。

Replace the skirt as per 7.3.4 if wearing is severe.

若磨损严重，则按第 7.3.4 条进行更换。

3) Replacement of sealing rubber 更换密封胶条

Demount side panel, ceiling panel, bridge plate, step plate, step plate support and bellow assy. in order and replace the rubber which belongs to bellow assy.

依次拆除侧护板，顶板，渡板，踏板，踏板支撑，风挡组成后进行更换，密封胶条属于风挡组成中的零件。

4) Replacement of side panel brush 更换侧护板毛刷

First demount side panel, then remove the old brush and replace with new one.

首先拆除侧护板，再取下毛刷组成后进行更换。

5) Replacement of joint bearing of ceiling panel 更换顶板关节轴承

First demount ceiling panel; then demount scissor system to replace the part.

首先拆除顶板，再取下连杆组成后进行更换。

6.7. Maintenance interval fourth level repairing –2400,000miles/6 years (taking which comes first)维护等级 四级修 240 万公里/6 年 (先到为准)

6.7.1. Special tools 特殊工具

- Proper lifting device 适当的吊装设备

6.7.2. Consumables and Spare parts 消耗品及备品备件

Consumables: thread locker Loctite 243 消耗品: 螺纹锁固胶 乐泰 243

Spare parts:备品备件:

Bridge plate assy. 渡板组成

Step plate assy. 踏板组成

6.7.3. Preparatory Work 准备工作

Make sure the gangway is in correct position before inspection and prepare general and special tools and materials for maintenance.

检查前，将风挡停在正常位置，并准备通用和特殊工具及材料以备维修。

6.7.4. Maintenance Procedure of fourth level 四级修程序

Fourth level repairing 四级修	2400,000 miles 240 万 km	6 years 6 年	Replacement of bridge plate assy. 更换渡板组成 Replacement of step plate assy. 更换踏板组成
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1) Replacement of bridge plate assy. 更换渡板组成

Replace bridge plate assy. after removing side panel.

拆除侧护板后，更换渡板组成。

2) Replacement of step plate assy 更换踏板组成

Replace step plate assy. after demounting side panel and bridge plate assy.

拆除侧护板和渡板组成后，更换踏板组成。

6.8. Maintenance interval fifth level repairing- 4800,000miles/12 years (taking which comes first)维护等级 五级修 480 万公里/12 年（先到 为准）

6.8.1. Special tools 特殊工具

- Proper lifting devices 适当的吊装设备

6.8.2. Consumables and Spare parts 消耗品及备品备件

Consumables: thread locker Loctite 243 消耗品： 螺纹锁固胶 乐泰 243

Spare part: bellow assy. 备品备件： 折棚组成

Side panel assy. 侧护板组成

Ceiling panel assy. 顶板组成

6.8.3. Preparatory work 准备工作

Make sure the gangway is in correct position before inspection and prepare general and special tools and materials for maintenance.

检查前，将风挡停在正常位置，并准备通用和特殊工具及材料以备维修。

6.8.4. Maintenance procedure 五级修程序

Fifth level repairing 五级修	4800,000km 480 万 km	12 years 12 年	Replacement of gangway assy. 更换风挡组成 Replacement of side panel assy. 更换侧护板组成 Replacement of ceiling panel assy. 更换顶板组成
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1) Replacement of gangway assy. 更换风挡组成

Replace gangway assy. after demounting side panel, ceiling panel, bridge plate and step plate. 拆除侧护板、顶板、渡板、踏板后，更换风挡组成。

2) Replacement of side panel assy. 更换侧护板组成

The side panel can be replaced directly without demounting other parts.

更换侧护板组成前不需拆卸其它部分，直接更换即可。

3) Replacement of ceiling panel assy. 更换顶板组成

Replace ceiling panel assy. after demounting side panel. 拆除侧护板后，更换顶板组成。

6.9. Failure isolation 故障隔离

Failure 故障	Cause 产生原因	Corrective measure 纠正措施
Bad sealing performance 风挡密封性遭破坏	Bellow fabric damage 棚布破损 Sealing rubber damage 密封胶条损坏	Inspection of bellow completeness 检查棚布完整性 Repairing of bellow fabric 修补棚布 Inspection of sealing rubber 检查密封胶条 Replacement of sealing rubber 更换密封胶条
Abnormal noise	The wearing strip wore up	Inspection of bridge plate wearing



Failure 故障	Cause 产生原因	Corrective measure 纠正措施
产生异常噪音	渡板组成磨损条磨光 Interference between movement parts of side panel or ceiling panel 侧护板组成或顶护板组成运动部件干涉	strip 检查渡板组成磨损条 Replacement of bridge plate wearing strip 更换渡板组成磨损条 Inspection of movement parts of side panel assy. 检查侧护板组成运动部件 Replacement of movement parts of side panel assy. 更换侧护板组成运动部件 Inspection of movement parts of ceiling panel assy. 检查顶护板组成运动部件 Replacement of movement parts of ceiling panel assy. 更换顶护板组成运动部件

7. Repair 修理

7.1. Safety instructions 安全说明

DANGER



Before checking and replacing parts, vehicles must be in stopped conditions.

检查或更换零件时，必须停车。

If parts or components are re-installed back to the vehicle, all mounting bolts and screws must be discarded and replaced with new set of fasteners.

所有更换件中拆下的螺栓，再次安装时必须更换，并加锁固胶。

Capacity of lifting device and their lifting wires must be enough for bearing gangway load and other auxiliary equipment.

吊装时吊具和绳锁应有足够的强度。

WARNING



Thread locker must be used for fasteners when assembling.

组装时，紧固件一定要使用螺纹锁固胶。

After re-installed, inspection must be done according to chapter 5.

重新安装后，必须按第 5 部分的要求进行检查

CAUTION



Before installation, gangways must be well stored. Be care of gangway being lifted from packing case.

组装前，风挡应正确储存。风挡吊离包装箱时应注意。

During mounting process, protect bellow fabric and other interior coverings including painting surface of skirt, side panel and ceiling panel from sharp things.

组装中，避免锋利物体接触棚布和内饰材料，如铝面板、裙边及顶板等表面。

NOTE

Bracket assembly comprises upper bracket and lower bracket(LH and RH)

护板安装座组成包含两种型式，即有左右之分



7.2. Preparatory work 准备工作

When failure detected, isolate the gangway immediately. While repairing, stop the gangway in its normal position, and prepare common & special tools and materials for repair.

发现故障时，立即隔离风挡。更换部件时，将风挡停在正常位置，并准备常规工具、特殊工具及材料。

7.3. Repair procedure 修理程序

7.3.1. Replace fastener 更换紧固件

If parts or components are re-installed back to the vehicle, all mounting bolts and screws must be discarded and replaced with new set of fasteners.

所有更换件中拆下的螺栓，再次安装时必须更换，并加锁固胶。

7.3.2. Repair bellow fabric 修补棚布

Below described repairing procedures 修补程序如下：

- 1)、 Clean the damaged position by cleanser, remove burrs evenly by sand cloth after drying(surrounding 15-18mm), repair damaged burrs to round edges. Polish the edges to shape a chamfer.
将棚布损坏部位用清洗剂清洗干净，干燥后用砂布均匀地将粘合面（周边 15-18mm 范围）打毛，修整损坏的毛边成圆弧过渡，打磨边缘（非结合面侧）形成一个倒角。
- 2)、 Prepare two pieces of new fabric(similar material of similar colour to the original fabric) which its surrounding is larger than damaged by 20mm, clean the new fabric by cleanser, remove burrs evenly by sand cloth and cut the surrounding of new fabric by 5mm.
准备两块比损坏处周边各大 20mm 左右的(与原棚布的材质、颜色相近)新布料
用清洗剂清洗用于修补风挡的新布料，用砂布均匀地将粘合面（周边 20mm 范围）打毛，将打毛后的修补布料四周切下 5mm。
- 3)、 Spread the bonding agent evenly and fully by brush

用刷子将粘合剂均匀地涂在粘合面,粘合剂要涂的充分。

- 4)、Dry the bonding agent for about 2-3 min, then press the two parts together by roller, ensure no air hole.

让粘合剂干燥大约 2-3 分钟, 然后使用滚子将两部分压在一起, 不要有气眼。

- 5)、The area spread with bonding agent could be normally used after 24 hours.

大约 24 小时后, 涂有粘合剂的区域就可以正常使用

7.3.3. Replace nylon wearing strip between bridge plate and step plate 更换渡板与踏板之间的尼龙磨耗条

7.3.4.1 Special Tools 特殊工具

- Not required 不需要

7.3.4.2 Consumables and Spare part 消耗品及备品备件

Consumables 消耗品: Thread locker Loctite 243 螺纹锁固胶 乐泰 243

Spare part: wearing strip 备品备件: 磨耗条

Open side panel assy. and remove it. 打开侧护板组成, 并将其移开。

Demount the bridge plate assy. from scissor system and remove old rivet.

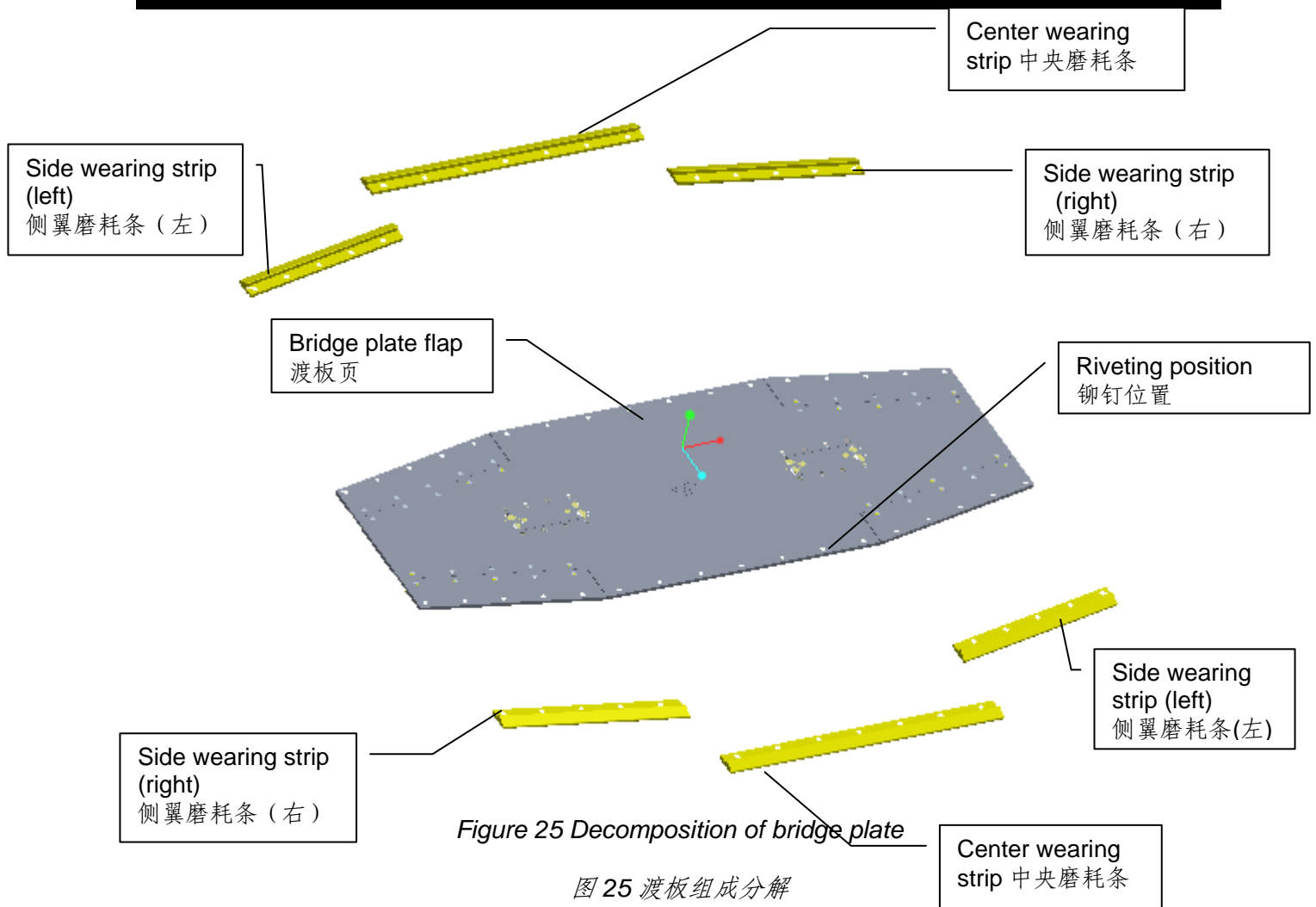
将渡板组成从连杆上卸下, 把磨耗条固定铆钉钻掉。

Put new wearing strip at mounting position and apply new countersunk blind rivet (GB/T 12617-5x12)

将新的磨耗条放在安装位置上, 重新打铆钉 (GB/T 12617-5x12) 开口型沉头抽芯铆钉固定。

Reset the bridge plate assy.

再恢复渡板组成在风挡上的位置即可。



7.3.4. Replacement of skirt 更换裙边

7.3.8.1 Special tools 特殊工具

Not required 不需要

7.3.8.2 Consumables and Spare parts 消耗品及备品备件

Consumables 消耗品: Thread locker Loctite 243 螺纹锁固胶 乐泰 243

Spare part: skirt 备品备件: 裙边

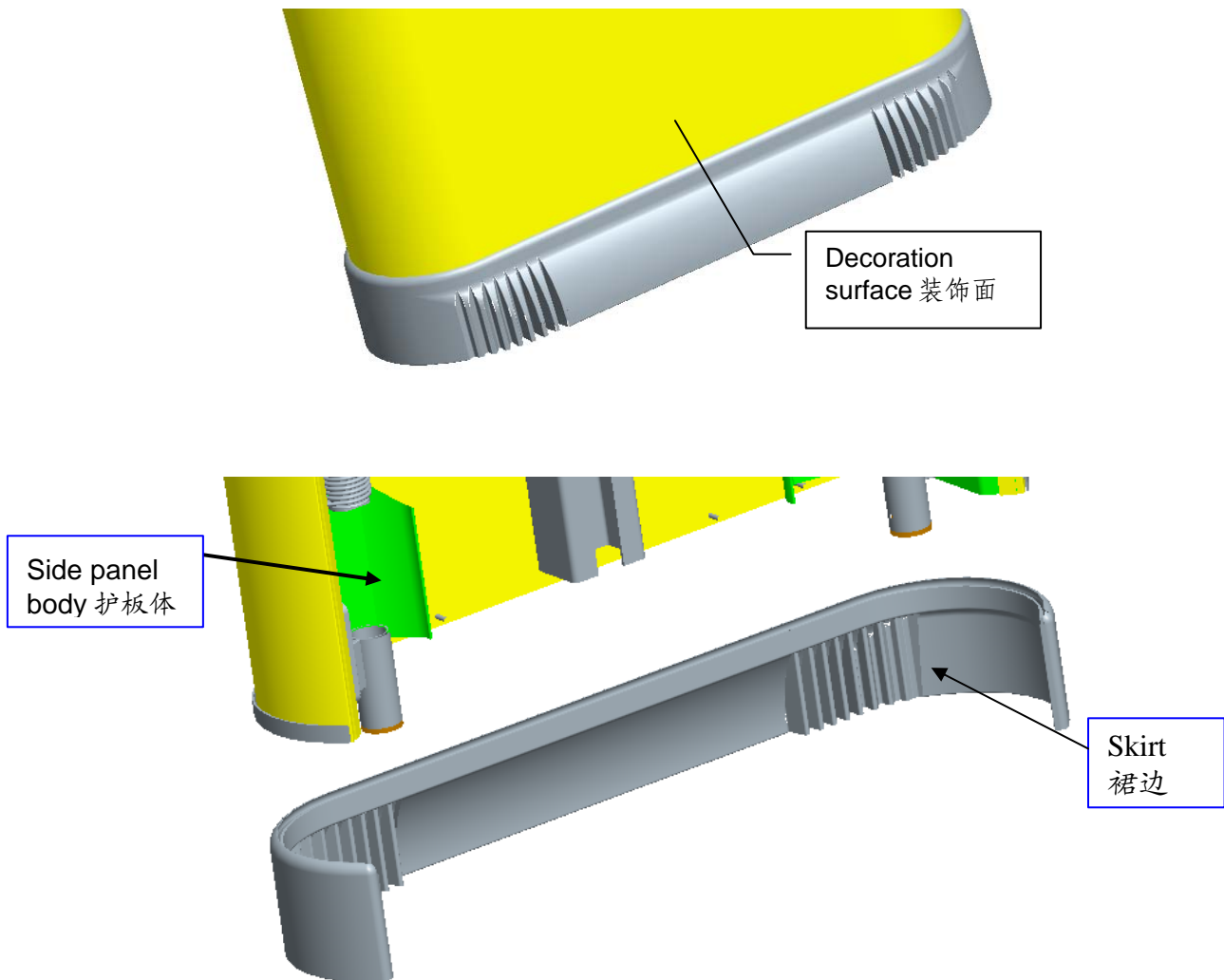


Figure 26 side panel skirt

图 26 侧护板裙边

Open side panel assy. with gangway key and move it out with decoration surface downwards. Notice to protect each decoration surface. Put the side panel horizontally on operation bench and loose bolts, pressing plate and mounting plate for skirt fixation and remove the skirt from side panel. Fix new skirt on mounting position and remount all accessories.

用风挡钥匙打开侧护板组成，将其移出，装饰面朝下（注意保护好各装饰面）平放到操作台上；松开固定裙边的固定螺栓及压板、裙边安装板，将裙边从侧护板组成上拆下。将新裙边固定在安装位置，并将裙边压板、安装板重新装回。

8. Special tools and materials 特殊工具及材料

Special tools 特殊工具			
Item 序号	Description 说明	Parameter 规格型号	Manufacturer 制造商
1	Proper lifting device 适当的吊装设备	--	-
Consumable 消耗品			
Item 序号	Description 说明	Parameter 规格型号	Manufacturer 制造商
1	Thread locker 螺纹锁固胶	Loctite243	-
2	Lithium-lubricant 锂基润滑脂	RL3	-
Spare part 备件			
1	Center wearing strip 中央磨耗条	UFD275-03-00-02	Ultimate
	Side wearing strip (left and right) 侧翼磨耗条(分左右)	UFD275-03-00-03L/R	
2	Side panel skirt 侧护板裙边	UFD275-05-01-01	Ultimate
3	Side panel assy. 侧护板组成	UFD275-05-00-00	Ultimate
4	Ceiling panel assy. 顶护板组成	UFD275-04-00-00	Ultimate
5	Bridge plate assy. 渡板组成	UFD275-03-00-00	Ultimate
6	Step plate assy. 踏板组成	UFD275-02-00-00	Ultimate



7	Side panel upper bracket 侧护板上安装座组成	UFD275-08-00-00	Ultimate
	Side panel lower bracket 侧护板下安装座组成	UFD275-07-00-00	
8	Gangway assy. 风挡组成	UFD275-01-00-00	Ultimate
9	Ceiling panel bracket (left and right) 顶板安装座组成(分左右)	UFD154-04-00-00L/R	Ultimate
10	Side panel brush 侧护板毛刷	UFD275-06-00-00	Ultimate
11	VMP sealing rubber 车体框密封胶条	UFD275-01-00-01	Ultimate
Standard parts/标准件			
Item 序号	Standard 标准	Name and type 名称及规格	Materials 材质
1	GB/T97.1	Plain washer 8 平垫圈 8	A4
2	GB/T93	Spring washer 8 弹簧垫圈 8	A4
3	GB/T70.1	Inner hexagon cap head screw M6x16 内六角圆柱头螺钉 M6x16	A4-70
4	GB/T97.1	Plain washer 6 平垫圈 6	A4
5	GB/T93	Spring washer 6 弹簧垫圈 6	A4
6	GB70.3	Inner hexagon countersunk screw M8X40 内六角沉头螺钉 M8X40	A4-70

7	GB/T70.1	Inner hexagon cap head screw M8X40 内六角圆柱头螺钉 M8X40	A4-70
8	GB6170-2000	Hexagon head nut M6 六角头螺母 M6	A4-70
9	GB5783	Hexagon nut M6X10 六角头螺钉 M6X10	A4-70
10	GB70.3	Inner hexagon countersunk screw M6X25 内六角沉头螺钉 M6X25	A4-70

9.Torque list 扭矩表

See minimum torque reference in table below:

本文中所涉及安装螺钉的最小扭矩请参考下表:

Item 序号	Type 规格	Material 材料	Torque(N.M) 扭矩
1	M5	A4-70	4
2	M6	A4-70	5.4
3	M8	A4-70	15
4	M10	A4-70	28
5	M12	A4-70	48

6
MAINTENANCE MANUAL FOR TRAIN18 IC DOOR
AS PER SPECIFICATION ICF/MD/SPEC-363
ISSUE DATE:01, REV:00 DATE 25/04/2019,
AS PER CLAUSE 12.0 PARA 12.3, 12.3.1, 12.3.2
AND 12.4

Recommended Maintenance Schedule and operational manual of Train -18 IC Door

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For PRAG POLYMERS


Authorised Signatory


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We are proud that you have selected our "Internal Sliding Door" and you as our customer; we will strive to provide you with our best services.

This operation and maintenance manual has been prepared by considering needs of the most of the users starting from the Rack level examination right up to the maintenance schedules, it is mandatory to study the manual carefully before operating the unit.

We are sure this "Internal Sliding Door" will serve you well for years as you continue to maintain the door assembly as per guidelines of this manual.

For PRAG POLYMERS

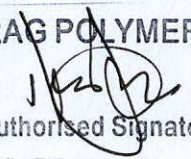

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CONTENT

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2.	Main Parts of IC Door and its details	5
3.	Operational Details	5
4.	Trouble Shooting at crew level	7
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1. TECHNICAL SPECIFICATION

Actuation(Move Mechanism)	Electrical
Internal passing (width)	805 +0/-5mm
Internal passing (height)	1960 +0/-5 mm
Distance between door posts	900 +3/-0 mm
Opening time of the door leaf	3-5s
Weight of the door leaf	30kg (max)
Weight of the carrier mechanism	20kg (max)
Door Thickness	40mm(max)
Nominal voltage	110 V DC -30 % to +30 %
Nominal current	0.5 A, max. 2 A
Lifetime:	30 years / 1 000 000 cycles(min)

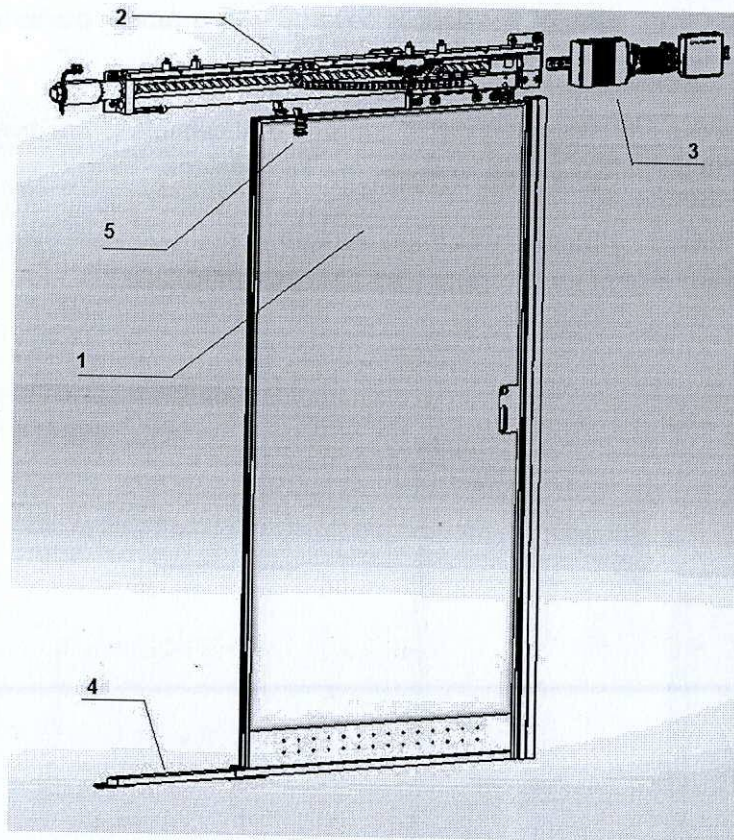
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2. MAIN PART OF IC DOOR AND ITS DETAILS

1. Door leaf
2. Drive and carrier mechanism
3. Electrical Control unit



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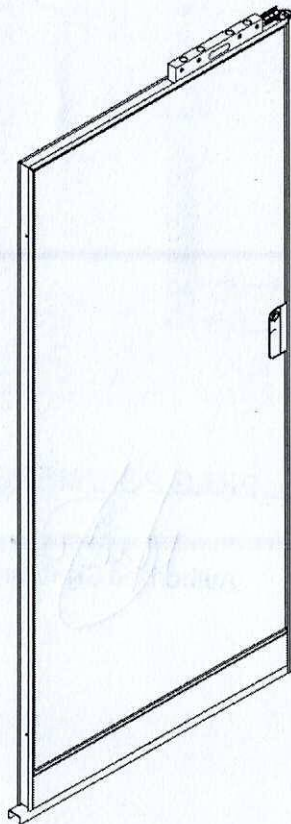
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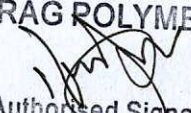
2.1 Door leaf details

The door leaf is designed as a welded Al profile frame. This frame is then sealed with 4 mm thick safety glass with printing. An integrated handle for manual door control is a part of the frame. The front edge of the door is covered with a rubber profile with a contact strip installed.

At the top, the doors are connected via an adjustable Al console to the drive mechanism. At the bottom, the doors are guided by a pair of sliding guides.

The door is controlled by buttons which are the part of the door leaf - one back-lit button is installed on each side of the door.



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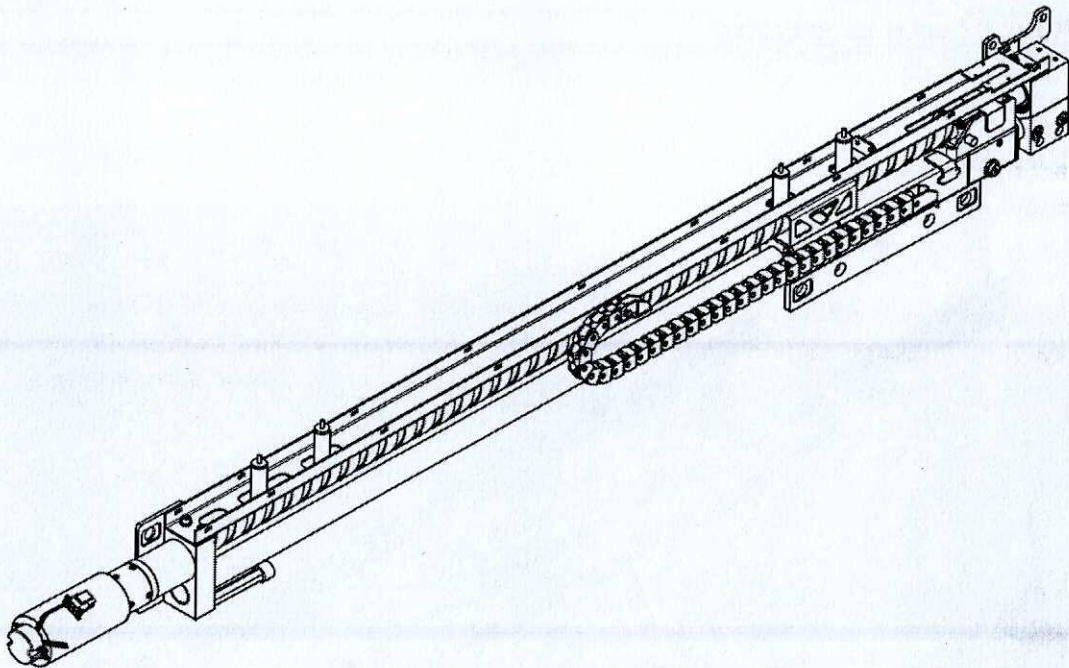
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2.2 Drive and carrier mechanism details


The drive mechanism is designed to drive and carry the door leaf. During the operation cycle, the door moves between the end positions. The door leaf runs on the ball bushing on the cut steel rod.

The mechanism is driven by a DC electric motor that moves the door leaf through the planetary gear and the motion screw. End positions of the mechanism are equipped with stops.

Closing the doors in the closed position is secured by software. If the door detects an undesirable shift from the closed position (loss of a signal on the sensor), the motor closes the door again.



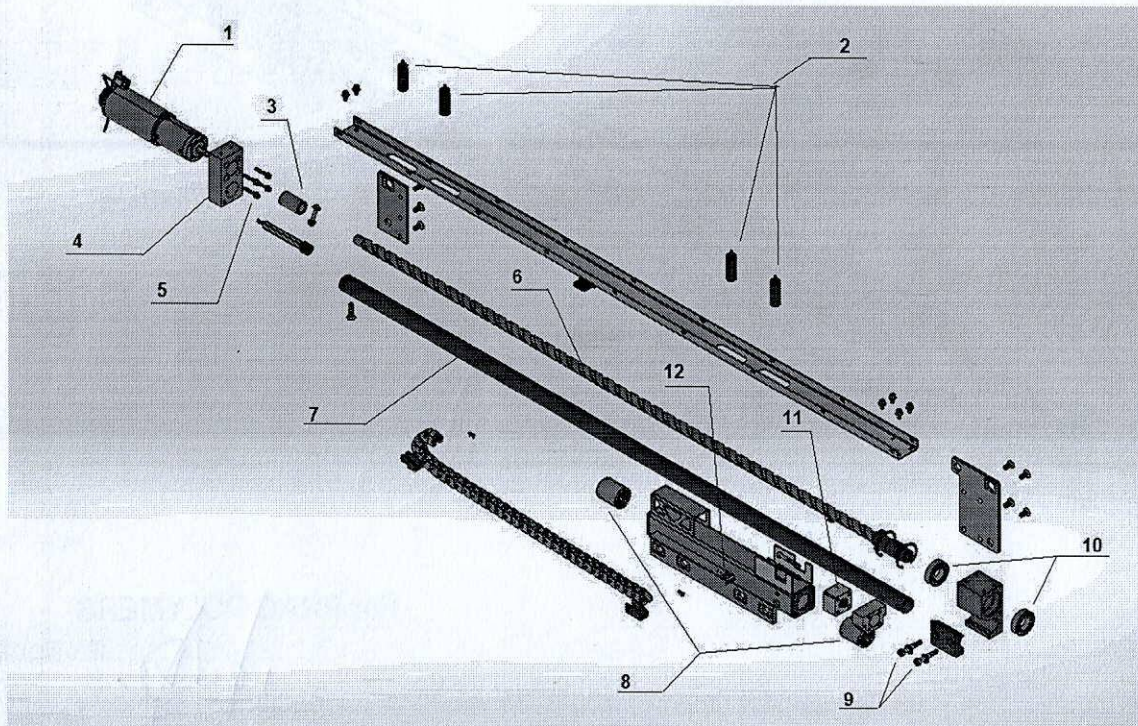
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Details illustration of component of door mechanism

S.No.	Name of Component
1	Motor
2	Proximity Sensor
3	Coupling
4	Motor console
5	Allen bolt
6	Ball Screw
7	Guide rod
8	Linear Bearing
9	Allen bolt
10	Ball Bearing
11	Square Nut
12	Leaf Holding Bracket



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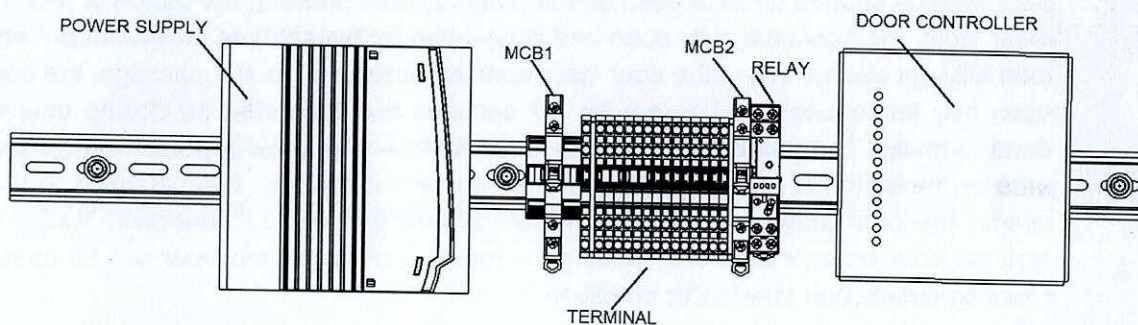
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2.2 Electrical system

The electrical system of doors operates with 24V DC. Due to 110V DC power supply, a transducer is included in the system.

The electrical system consists of a control unit, a terminal block with switches, a transducer and a cable harness. The switch can either disconnect the entire system or just the radar system - the door responds to the push of a button only then.

Two emergency pushbutton disconnecting switches located near the door are a part of the system. When pressing, the door is disconnected from the power supply and can be moved freely.



3. OPERATIONAL DETAILS

The interior doors shall be controlled either by a radar signal when the passenger approaches or by pressing a button on the door. Both control modes shall be equivalent. The system shall not distinguish difference between the button & the radar and between the outer and inner side of the door. In case of power failure, the doors shall be free to move.

MODE OF OPERATION

Internal partition doors works in three mode of operation

1. **Rader sensing mode** – Door opens and closes automatically when a person comes/ disappears in the range of radar. Two radar are fitted on the top of the door frame at both side i.e. entrance and exit.
2. **Pushbutton mode** – There is a lit pushbutton provided on the door leaf, door opens when lit button is pressed and closes automatically after 5-7 second.

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3. **Emergency mode** –There is red mushroom type press button provided on both side i.e. entrance and exit side of the door. Door comes in manual mode when this button is pressed.

CLOSING / OPENING:

Door shall be opened through push button or radar. After pressing the button or receiving the radar input, the door shall fully open and stays open for the set time interval of 5-7 seconds, then fully get closed. When the door leaf meets an obstruction in the passage, the door shall open fully immediately and pause for 5-7 seconds and then start its closing operation as done normally. The number of attempts is not limited .No matter a person enters the radar area or the button is pressed, the door shall behave identically. If a person is in the radar space, the door stays opened. One MCB2 is provided nearby controller. Radar can be isolated from the door control by putting the switch in off condition. Door can be opened and close by pushbutton only in this condition.

Once closing starts, it should complete its closing stroke in normal operation. After the closing stroke is completed, door should remain in the closed position, unless opening action is initiated. Opening and closing of doors shall be automatic and time for each opening and closing stroke shall be between 3 to 5 sec. Door should remain in closed condition during normal train running and shall not move /open up owing to centrifugal force experienced on curvature or under normal vibrations

EMERGENCY MODE OF OPERATION

The following provision kept for the emergency purpose.

- After pressing the emergency control (a red switch near the door) the door is disconnected from the power supply and is freely movable manually. In order to return the door back to the initial state, the emergency switch has to be unlocked by turning/pulling. The door is then fully closed and operates normally.
- If the door is required to remain open for a longer duration, especially at en route stations where large nos. of passenger's board or get down, it should be possible to keep the door open by pressing emergency push button.
- In case of failure of electrical supply in the coach operation control will automatically switchover in manual closing mode. The door shall work as manual opening & manual closing door.

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4. TROUBLESHOOTING AT CREW LEVEL

Problem : When door in not opening automatically on Automatic mode (Rader/Spot Scan sensing mode) –

Step to be taken by crew-

Push lit button provided on door leaf – Door will open and close automatically after pressing the pushbutton

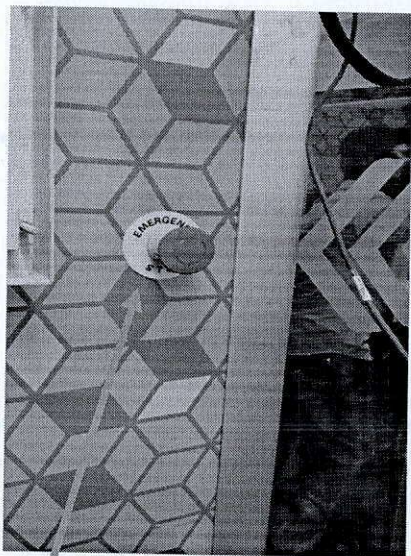
- Check the MCB2 , it should be ON state in case radar is working in auto mode.

Step to be taken by crew- When radar sensing mode and green lit pushbutton mode both are not working

Following steps is recommended for crew to perform to make the doors operational.

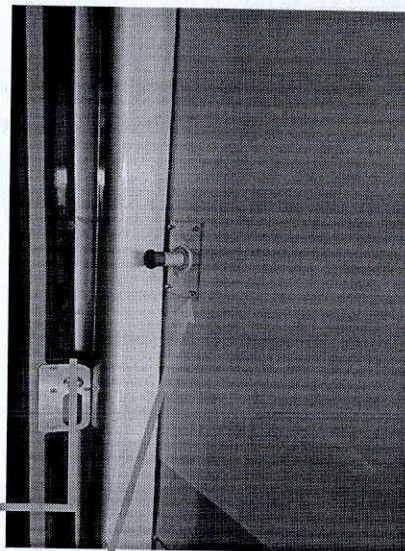
Step -1

Press the red colour mushroom type emergency pushbutton located on side panel of door. The door mechanism will switch over on manual mode after pressing the emergency pushbutton.



Emergency Push Button at Passenger side Entry Side

Figure 2



Emergency Push Button at

Figure 3

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Step -2 (For opening of the door)

Pull the door leaf manually with the help of **sunk in handle** provided on door lead frame on the direction of opening the door.

Step – 3 (For closing of the door)

Pull the door leaf manually with the help of **sunk in handle** provided on door lead frame on the direction of closing the door.

5. SCHEDULED MAINTENANCE PLAN OF IC DOOR

Periodic Maintenance Schedule:-


- Schedule D1 : Trip/Weekly
- Schedule D2 : Monthly
- Schedule D3 : Half yearly
- Schedule : 9-Month
- Shop Schedule (SS-1) : 18-Month
- Shop Schedule (SS-2) : 36-Month
- Shop Schedule : 72-Month

Maintenance Activity and Plan

Maintenance Activity according to Climate clause no 6 of CAMTECH, maintenance manual of Vande Bharat Express (T-18) (18 Month Schedule) Ref: IRCAMTECH/GWL/2020-21/T-18 /SS-1/1.0	T1 (D1)	Monthly (D2)	HY (D3)	9 Monthly	18 Monthly	36 Monthly	72 Monthly
	Check the log sheet maintained in driver cabin and attained the defect recorded by the escorting staff.	✓	✓	✓	✓	✓	✓

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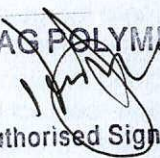
Clean the dust by compressed air of IC door and tighten the cable terminals, if found loose.	✓	✓	✓	✓	✓	✓	✓
Checking the fluent opening & Closing of the door, noise, jerking motion and knocking & rectify the observed defect.	✓	✓	✓	✓	✓	✓	✓
Check the mechanical movement of door after pressing emergency pushbutton switch, i.e Manual operation and rectify the issue if noticed any.	✓	✓	✓	✓	✓	✓	✓
Check the function of Radar for proper working and replace if defective.	✓	✓	✓	✓	✓	✓	✓
Check the door leaf and Glass for any damage or crack and replace the glass if crack or broken.	✓	✓	✓	✓	✓	✓	✓
Checking completeness of the mechanism, screwing up, binding cables, loose connections etc. Visually, Adjust the mechanism for smooth operation.	✓	✓	✓	✓	✓	✓	✓
Check the condition of silent block, replace if required	--	✓	✓	✓	To be replaced	To be replaced	To be replaced
Lubricate the guide rod with THK Synthetic grease.	--	✓	✓	✓	✓	✓	✓
Checking the door protection function- contact bar in the door leaf and over current protection, change the contact bar if door is not returning back by pressing the contact bat manually.	--	✓	✓	✓	✓	✓	To be replaced
Check the condition of Emergency Push button, Tightened if loosen and replace if damage/required.	-	✓	✓	✓	✓	✓	Replaced NC Contact block
Check the drive screw system-replacing the plastic nut if required.	--	✓	✓	✓	✓	To be replaced	To be replaced
Check the working of door leaf push button and its illuminated light, replaced if required.	--	-	✓	✓	✓	✓	To be replaced
Checking end position sensors of the doors-functionality and its proper switching, adjust or replace if required	--	--	✓	✓	✓	✓	✓
Check the bottom guide rail replaces the plastic slider if required.	--	--	✓	✓	✓	✓	✓

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Lubricate travel bearing bushing with THK Synthetic grease.	--	--	✓	✓	✓	✓	✓
Checking the rubber sealing (Male and Female rubber)-replacing if necessary.	--	--	✓	✓	✓	To be replaced	To be replaced
Lubricate the motion screw with Spray (Berucoat AF-438)	--	--	--	✓	✓	✓	To be replaced
Check the bearing (rear side of motor) for bubbling and zurk of screw, Replaced if required	--	--	--	✓	✓	To be replaced	To be replaced
Check the linear bearing (inside screw block) for bubbling and zurk of screw, Replaced if required.	--	--	--	✓	✓	To be replaced	To be replaced
Check the Cable Drag Chain for any damage, Replaced if required.	✓	✓	✓	✓	✓	✓	To be replaced
Check the the function of Relay , Replaced if required	✓	✓	✓	✓	✓	✓	To be replaced
Check motor for any abnormal noise, Replace if required.				✓	✓	✓	Replaced if required

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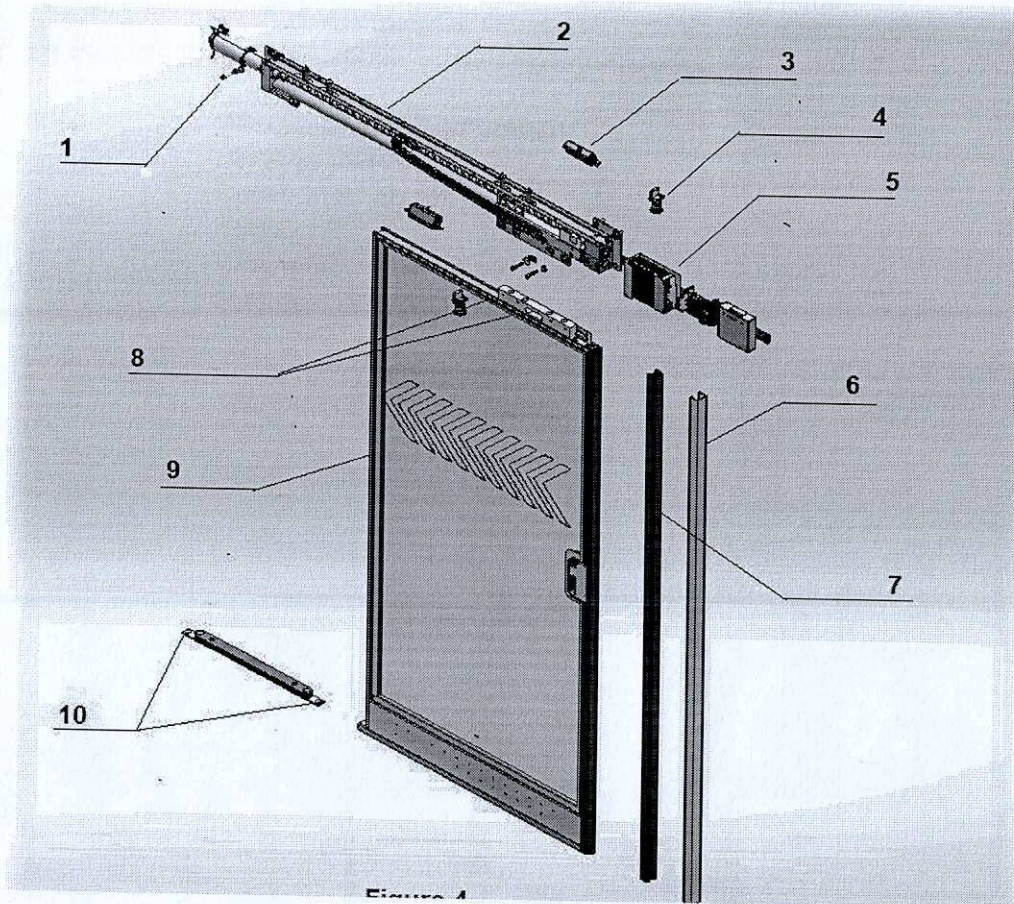
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6. DISMANTLING INSTRUCTION

The below figure shows the main parts of the door and their disassembling illustration to show separate components.

6.1 Dismantling instruction & illustration of Sliding door

S.No	Description of Component
1	Eccentric washer
2	Derive Mechanism
3.	Radar
4	Emergency Push button switch
5	Electrical control unit
6	C-Channel
7	Rubber Profile (Female)
8	Allen Bolt ,Eccentric washer
9	Door leaf
10	Bottom guide



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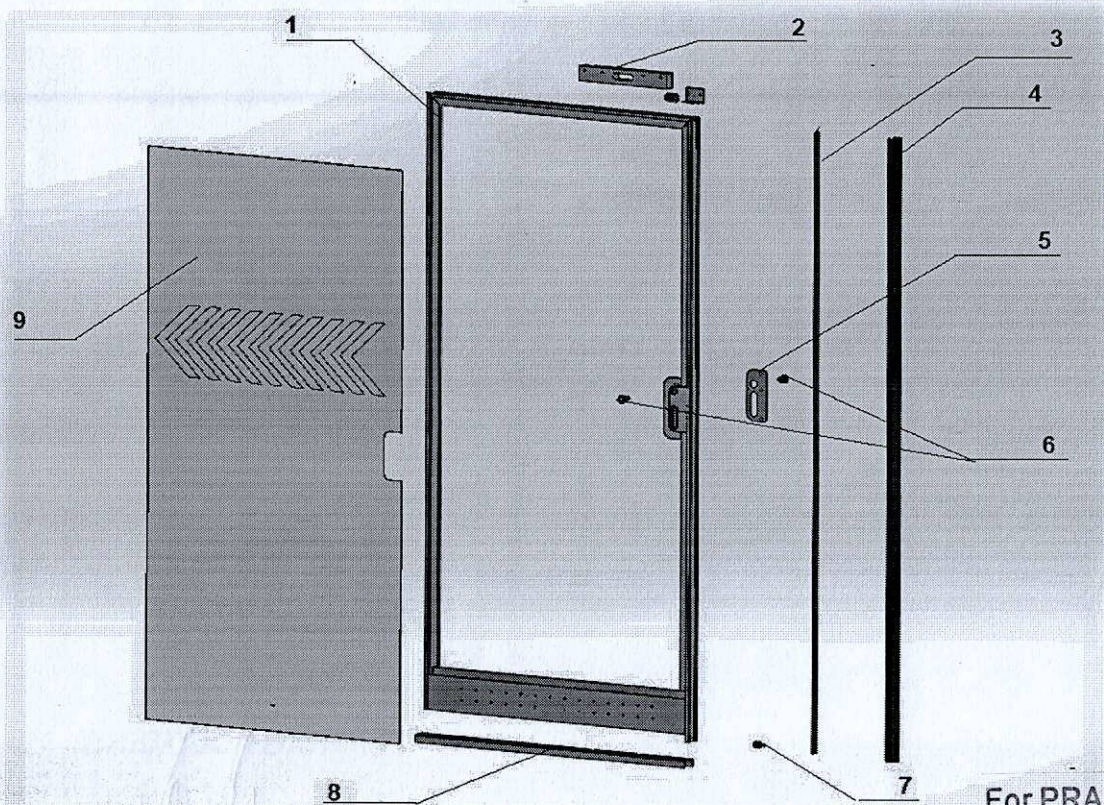
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- Dismantling of door leaf from mechanism-
 - To remove door leaf form mechanism, Open Allen bolt (Location 8 on Figure 4) (M8x35 and M8x30) form door leaf holding bracket. Eccentric washer is used to miner adjustment of height of door leaf from bottom.

6.2 Dismantling instruction & illustration of door leaf assembly

S.No	Name of Component
1	Aluminium Frame
2	Door Holding bracket
3	Contact Strip
4	Rubber Profile-Male
5	Pushbutton Plate
6	Pushbutton
7	Silent block
8	Bottom Rail
9	Glass 4mm



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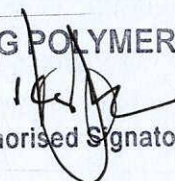
Figure 5

- Dismantle of leaf holding bracket from Leaf- (item no 2 of Figure 5)
 - Leaf holding bracket is fixed with Aluminium frame by 4 No. Allen Bolt M8x30 (4 No.), Replacement of door leaf holding bracket or leaf can be done by unscrewing Allen bolt.
- Dismantling of Contact Strip and re-fixing. (item no 5 of Figure 5)
 - Contact strip is placed inside male rubber profile of door leaf, In case of condition of replacement of contact strip, open electrical connection from terminal 25 and 26 and pull to remove contact strip from male rubber profile and fix another one/new in reverse order.
- Dismantling of Pushbutton and from door leaf and door leaf push button plate. (item no 6 of Figure 5)
 - There are two pushbutton which placed both face of door leaf (in shunk handle). For replacement of pushbutton remove pushbutton plate by unscrewing CSK M5x15 (4 No) and electrical connection and for re-fix adopt this procedure in reverse order.
- Dismantling of Bottom rail (item no 8 of Figure 5)
 - Bottom rail are placed at bottom of door leaf. For dismantle of bottom rail from door leaf by unscrewing CSK M6x16 (06 No.) and for re-fix in reverse order.

6.3 Dismantling instruction & illustration door mechanism

S.No.	Name of Component
1	Motor
2	Proximity Sensor
3	Coupling
4	Motor console
5	Allen bolt
6	Ball Screw
7	Guide rod
8	Linear Bearing
9	Allen bolt
10	Ball Bearing
11	Square Nut
12	Leaf Holding Bracket

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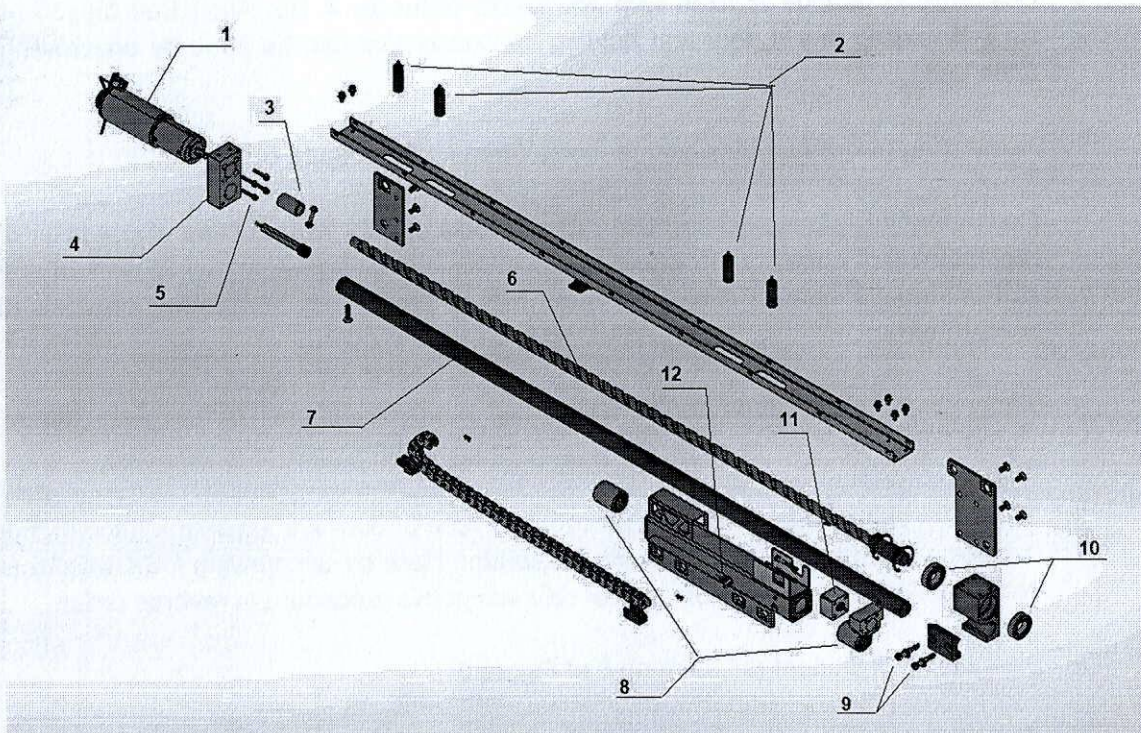


Figure 6

- Dismantling of Motor: (item no 1 of Figure 6)
 - Unscrew Allen bolt (item -5 on Figure 6) form motor console (item -4 on Figure 6) to dismantle motor.
- Dismantling of Ball Screw: (item no 6 of Figure 6)
 - After removing motor unscrew Allen bolt M6x30 from coupling (Location-3 on figure) after unscrew Allen bolt , Pull the ball screw toward motor side.
- Dismantling of Guide rod: (item no 7 of Figure 6)
 - Remove Allen bolt M8x40 (Location -9 of Figure) form console
 - Pull Guide rod and remove from motor console.
- Dismantling of Leaf holding bracket and Linear Bearing. (item no 12 of Figure 6)
 - After removal of guide rod remove leaf holding bracket for guide rod and there after remove linear bearing from both end of leaf holding bracket.

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7. Any Special tool requirement

No any Special tool required for maintenance of IC door

-----End of Manual-----..

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Door Guiding Internal Door Single leaf

Revision: 1.0

Date: 22.12.2020

First Edition: 1.0

Date: 23.12.2020

Document – No.:

SPC/191506/Doc

List of Modifications

Revision	Date	Modification Description	Page(s)
1.00	22.12.2020	New document	All

Release History

	Name	Department	Date	Signature
Prepared by:	Nitin Chauhan	Norgren-Engineering	22.12.2020	
Checked by:	Ajay Gupta	Norgren-Engineering	23.12.2020	
Released by:	Dhirendra Singh	Norgren-Engineering	23.12.2020	

0 SAFETY INSTRUCTIONS

0.1 Notes and Information

It is a prerequisite, that only qualified personnel may operate, maintain, troubleshoot and repair the existing subsystems and equipment.

Damages resulting from disregarding this prerequisite are not covered by the guarantee regulations.

Qualified Personnel are persons who, because of their training, experience and the instructions they have received, as well as their knowledge of pertinent standards, regulations, accident prevention rules and working conditions, are authorized by the person responsible for the safety of the component/system to carry out the respectively necessary activities while recognizing the possible dangers and how they are to be prevented.

Moreover, first aid skills and knowledge of local rescue services are required.




0.2 Safety Relevant Terms

Important notes regarding technical safety as well as operation and radiation protection are highlighted as follows in the individual documents:

- bold print and

with notices **CAUTION**, **ATTENTION** and **NOTE**

The safety-relevant terms have the following meaning:

	CAUTION	is placed in front of working and operating processes that have to be exactly observed in order to rule out danger to persons. This also includes warnings of special dangers during works on the subsystems and equipment!
	ATTENTION	is placed in front of working and operating processes that have to be exactly observed in order to prevent damage to or destruction of subsystems and equipment. This is valid for regular work as well as work that have to be done according to special demands or under unusual effects of the weather and operating methods!
	NOTE	is used for technical requirements which have to be taken into account by the user of the subsystems or equipment.

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1 GENERAL DESCRIPTION

This document states the intervals required for maintenance and repair of the door guiding and explains the required work steps. It also contains information on mounting and setup of the door guiding as well as information on spare parts.

The illustrations in this document may differ from the original part in detail.

1.1 Internal Door, arrangement

The train consists of several vehicles at whose passage internal doors are mounted.

The complete door system consists of:

- 1 door drive/guiding system
- 1 floor guiding
- 1 door leaf
- 2 Push Button
- 3 Human Sensor

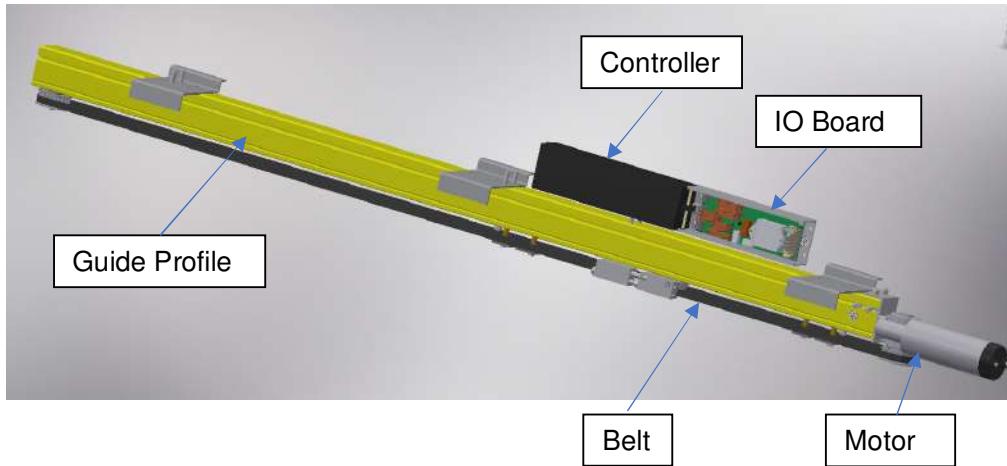
The following components are Norgren's scope of supply:

Designation	Norgren type
Door guiding, electric (stroke 750 mm)	SPC/191506
Door Leaf & Floor Guiding	SPIN/0159/019
Human Sensor	IB9EE-000155
Push Button	IB9EE-000281

The above-mentioned delivered parts are illustrated in the following drawings of the manufacturer:

Designation	Norgren drawing no.	Manufacturer
Door guiding, electric (stroke 750 mm)	SPC/191506	Norgren
Door Leaf & Floor Guiding	SPIN/0159/019	Norgren
Human Sensor	IB9EE-000155	Norgren
Push Button	IB9EE-000281	Norgren

Figure 1: Door guiding SPC/191506



1.2 Operation Conditions and Technical Data

Operation Conditions:

Passage width	mm	800
Passage height	mm	1830
External power supply to drive	V DC	24

1.3 Technical Description

1.3.1 Guiding system

The door guiding consists of a bending-resistant, torsion-stiff extruded aluminum profile 60 x 70 mm, which is the guiding of the carriage and on which the Motor and other components are installed. The carriage is equipped with a total of 12 plastic-covered rollers - 4 of which are engaged on the upper running surface by means of eccentric axes. The door suspension, in which the door leaf can be aligned and fastened, is the lower part of the carriage. The stroke of the door is limited by two end stops in the track. This end stop is adjusted ex-factory to the stroke of the door. The end stop has a rubber shock absorber in order to prevent the carriage from being stopped abruptly in end position. In "closed position", the stroke of the door is limited by the closing end profile of the door leaf. Therefore, the carriage moves a bit towards the closing end if the door leaf is disengaged.

1.3.2 Actuator concept

The door actuator is driven by an electric motor. The actuator unit consists of two separated carriages and a speed-controlled DC motor with gears which are not self-locking. The power of the actuator unit is form fittedly transmitted to one of the carriages by means of a toothed belt. The door leaf is fastened to the other carriage. During an opening process, the belt driven carriage is pushing the carriage with the attached door leaf. Before reaching end position, the door leaf is slowed down by the motor. If there is an obstacle during door movement in opening direction, the door reverses direction automatically.

At the end of an adjustable opening time, the door closes automatically. During the closing process the belt driven carriage is moving in closing direction.

In case of an obstacle during the door movement in closing direction, both carriages will be separated and a switch which is controlling the position of the carriages will be activated and gives an opening signal to the controller. Hereupon the door will be opened again.

If the door guiding system is not connected to the power supply, the door can be opened manually.

1.3.3 Control concept

The comfort control SLIDING DOOR SPIN/0159/ATD-400T for trains is an “intelligent” door control by means of which inner and connecting doors with adjustable speeds and accelerations can be controlled.



NOTE The operating manual of the control unit SPIN/0159/ATD400T and the online system guide contains all details with regard to the control unit.

Reversing device

The door system has obstacle detection in opening direction which reverses the door.

There is no direct obstacle detection in closing direction. If the door is blocked by an obstacle, the door-guiding carriage is stopped and a switch on the carriage is actuated. A new opening signal is then sent to the door controller and the door opens again.



NOTE The operating manual of the control unit SPIN/0159/ATD400T and the online system guide contains all details regarding the control unit.

Signal transmission

The I/O board, which is fastened to the door guiding, serves as central element of signal transmission. It contains connector positions for all arriving and outgoing signals. Only the actuator with rotary encoder is directly connected to the control unit. The I/O board also contains the plug-in connection of the interface for the car (power supply / signal transmission).

The I/O board (Figure 3) consists of a printed circuit board, connecting the different sockets via lines. Thus, the signals reach the different positions via the door control and the main plug.

A temperature fuse interrupts the power supply of the car in case of a fire. If an ambient temperature of 120C° is exceeded, the fuse melts and interrupts the power supply (same function as emergency pushbutton).

The green “Power” LED on the I/O board shows if the external 24V DC power supply is available.

The red “relay state1” LED on the I/O board indicates that the system is working correctly. Pin 2 and 3 on relay X12 at the SPIN/0159/ATD400T controller are connected. If an error message is issued by the controller, the display goes out.



NOTE The online system guide contains all details with regard to the error messages.

The red “relay state 2” LED on the I/O board shows if the K2 P and S relay contact are connected.

Figure 3 shows the I/O board completely mounted with fitting panel and mains filter. On the board the positions of the different sockets (pin strips) as well as the most important components can be seen.

Signal transmission and LED status is shown in table 1.

Following table shows the signal transmission and LED state for the different conditions:

	Signal K4 (X12)	Signal K2	LED's		
	State 1	State 2	Power	State 1	State 2
Drive system in normal service	1	1	1	1	1
Error message from ATD400T (relay contact X12 pin 2 and 3 connected)	0	1	1	0	1
Emergency button activated	0		1	0	0
Power failure, plug X20 not connected			0	0	0

Table 1

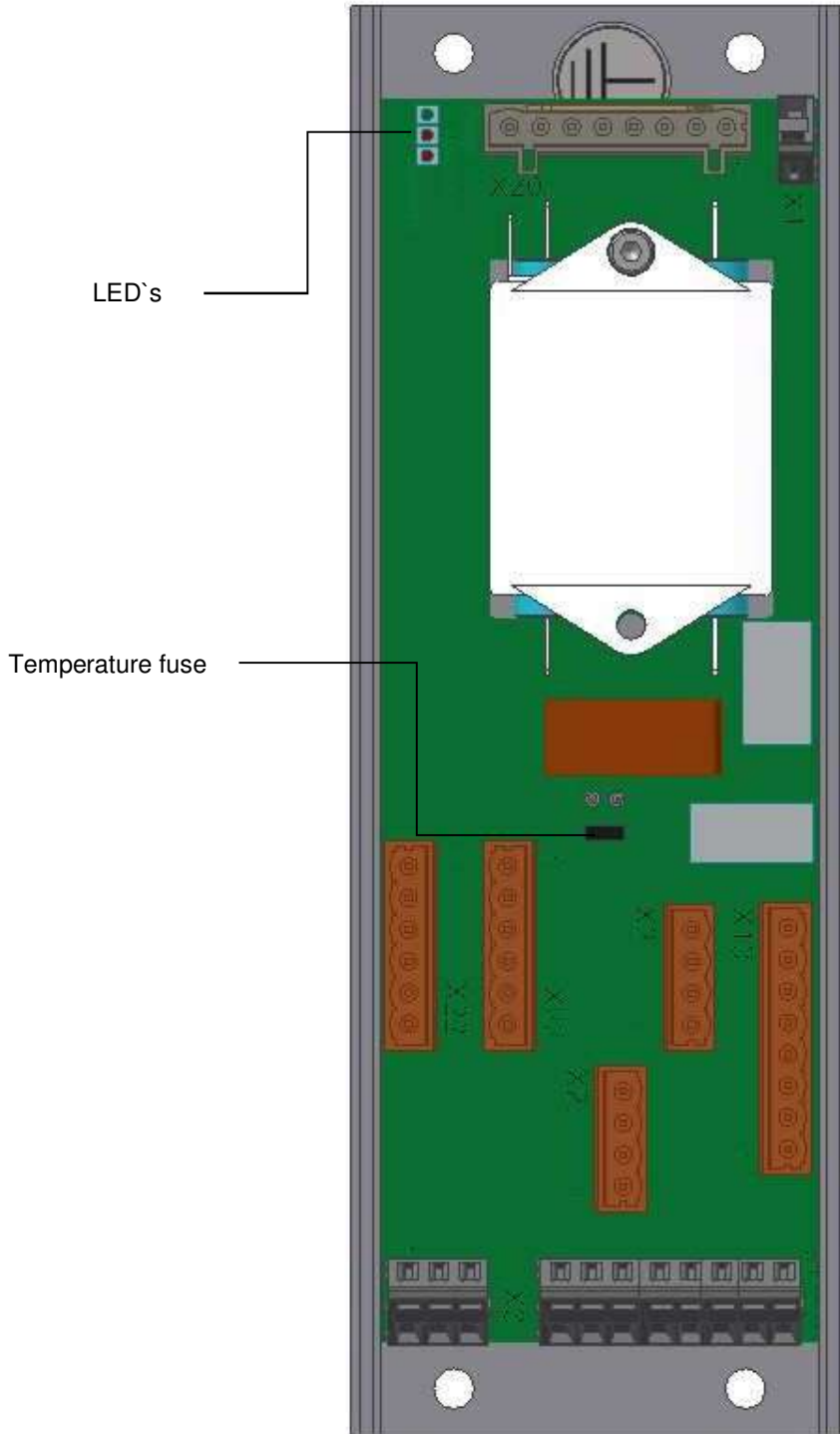
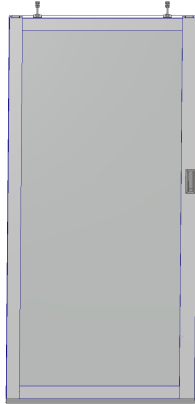


Figure 3: I/O board

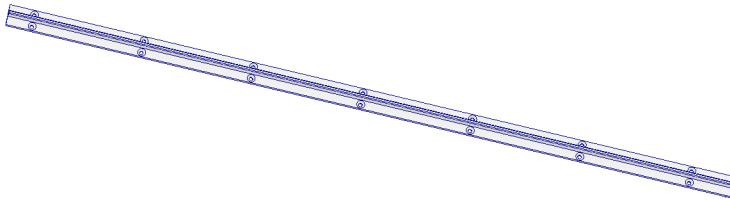
1.3.4 Door leaf

It is a metal glass sandwich profile is held in place with the help of rubber. Thickness of door is 40mm, Glass thickness 5mm.



1.3.5 Floor guiding

Floor guiding is an aluminum profile which guides the door at bottom.



1.3.6 Electric wiring

All operations of the sliding door are controlled by the control unit and the I/O board (Figure 3)

In the following figure (Figure 4), the wiring diagram of the door system with all connections and connected control units is shown.

To ensure better viewing, the wiring plan is again shown in a larger format and in detail in the following pictures (Figure 5 to Figure 6).

Installation and Maintenance Instruction

Door System SPC/191506

The circuit diagram also indicates the pin assignment with the corresponding conductor coloring.

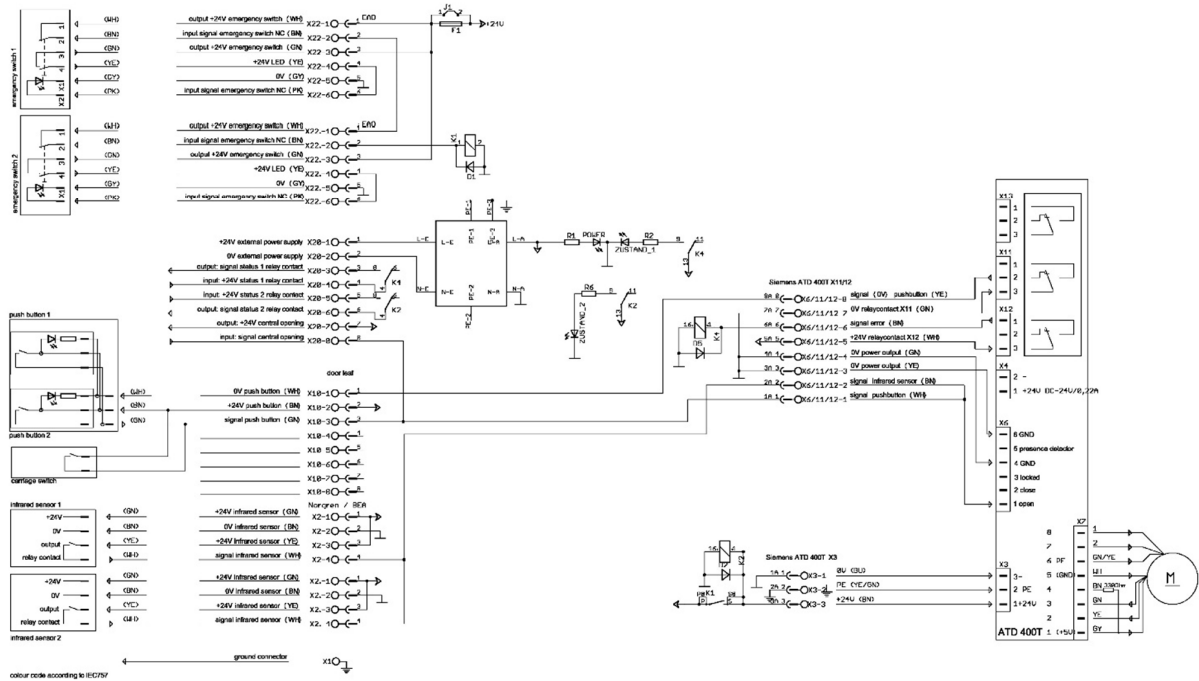


Figure 4: Complete wiring diagram

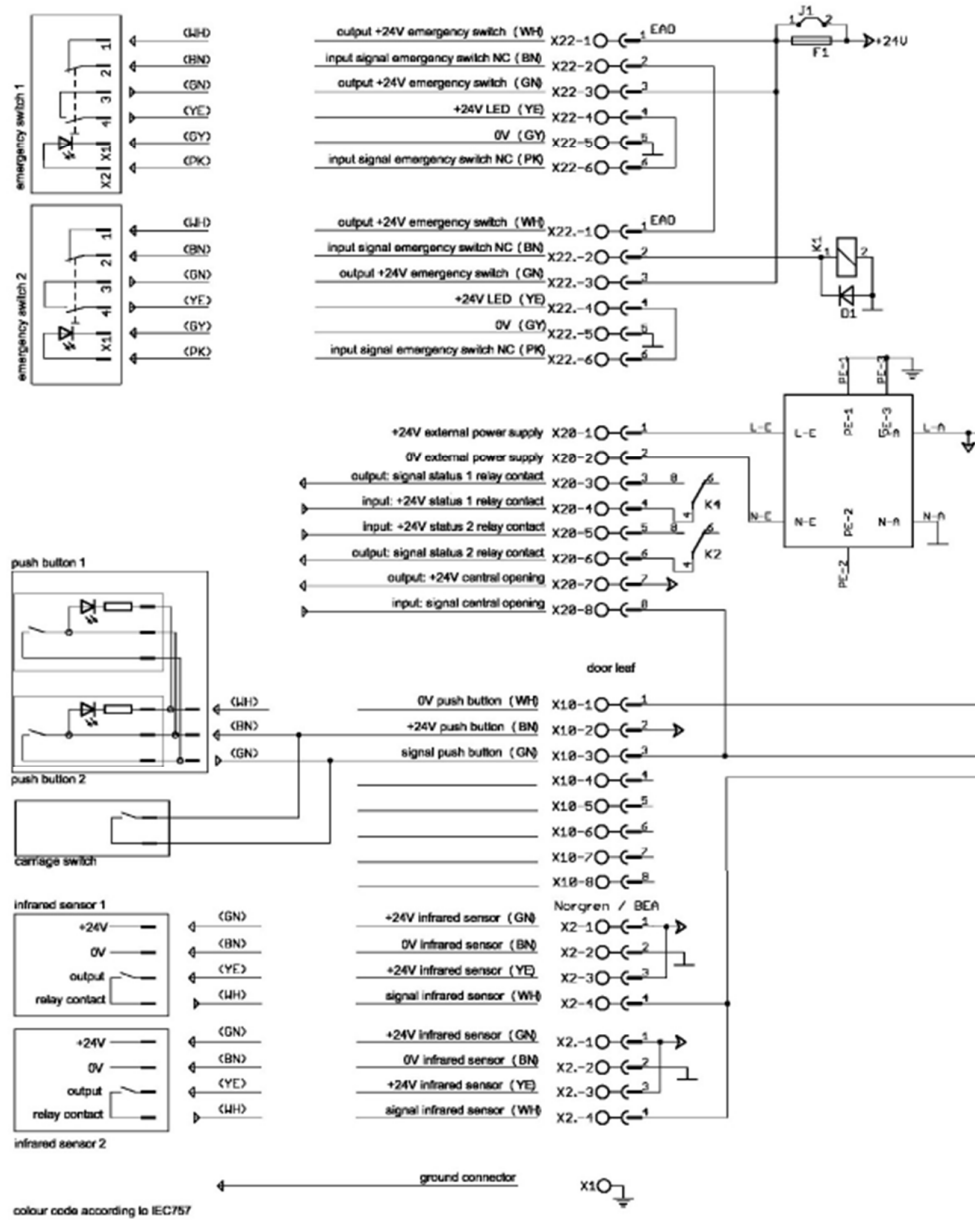


Figure 5: Wiring diagram part 1

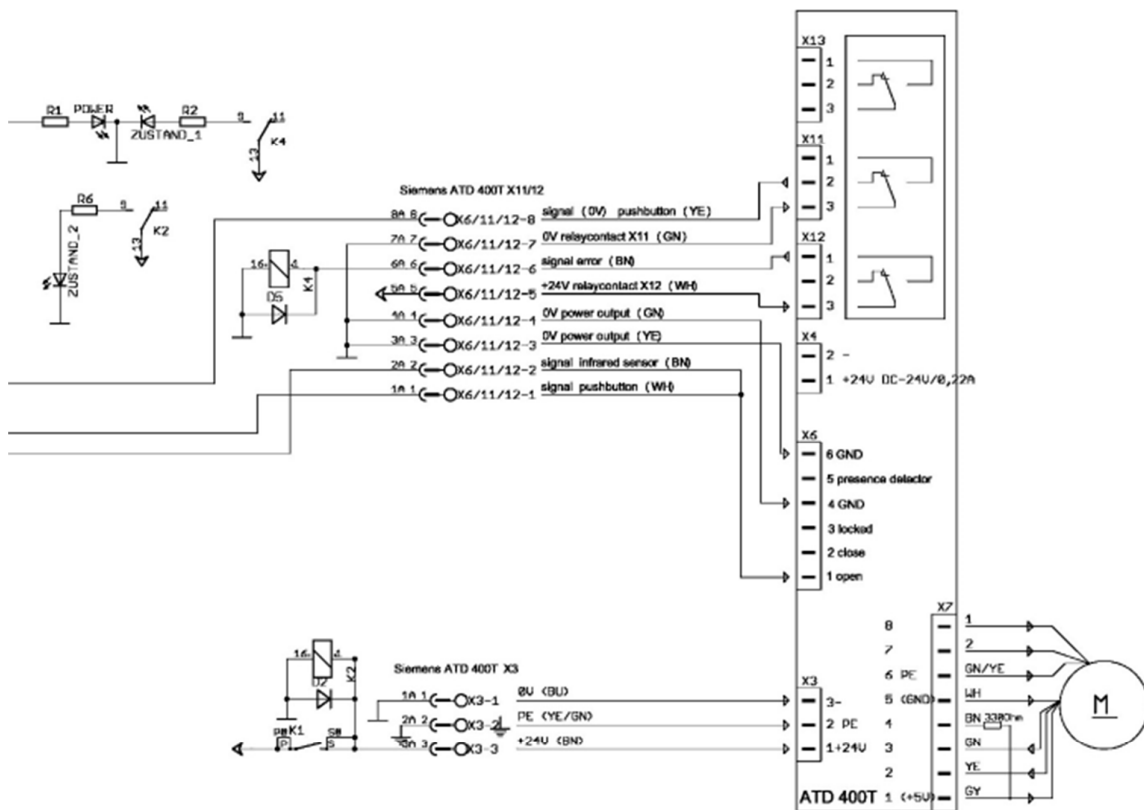


Figure 6: Wiring diagram part 2

1.3.7 Plug-in connector

All plugs and sockets can only establish the corresponding connection; therefore, it is impossible to connect them incorrectly.

In case of same pin number and different function, the sockets are equipped with a coding element so that only correct coded plugs can be connected.

All pins are numbered, starting with 1, from left to right seen from the coding side. This guarantees correct connection. The example of a pin numbering for an 8-pole plug (female multipoint connector) can be seen in Figure 7:

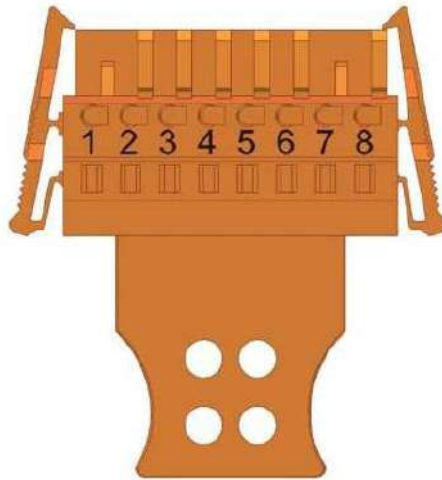


Figure 7: Plug-in-connector

2 TRANSPORT, DISPATCH, STORAGE AND CONSERVATION



ATTENTION Correct transportation, storage, set-up and assembly of this device as well as careful operation and maintenance are important conditions for the correct and safe operation of it.

2.1 Transport and Dispatch

Basically, the manufacturer's regulations apply for transport and storage. Appropriate loading and transportation devices have to be used in order to avoid damages and or other impacts on the quality of the product.

All units shall be protected against mechanical damage, humidity as well as chemical influences

For protective reasons, the door guiding is covered with a plastic foil ex- factory.

Shipment is done in a wooden box. Until definitely installing of the actuators in the car, they should remain in the boxes or in the plastic foils in order to avoid soiling.

2.2 Storage

The used material shall be stored under dry conditions. Furthermore, it shall be protected against mechanical damage, humidity as well as all chemical and thermal influences.

2.3 Conservation

Not applicable.

3 INSTALLATION AND CHECKS PRIOR TO INITIAL OPERATION

Please observe the following prior to commissioning

Read the present manual carefully. It contains important information regarding installation, use and safety of the actuator system.



CAUTION

Only *qualified personnel* are allowed to operate the device and to work in its environment. The personnel must read all warnings and notes and be familiar with all functions of the door system according to this manual.

Qualified personnel in the sense of this instruction manual and the warnings are persons who are familiar with installation, assembly, start-up and operation of the product and who have the necessary qualifications for their work such as:

- Training and authorization regarding connecting and disconnecting electric circuits and devices/ systems according to the safety standards.
- Training on how to care and use the appropriate safety equipment in accordance with the safety standards.
- First aid training.

Correct transportation, storage, set-up and assembly of this device as well as careful operation and maintenance are important conditions for the correct and safe operation of it.

Before activating the system, check if all electrical connections are safely connected.

When working on the door actuator, interrupt the power supply by pulling the X20 plug.

3.1 Installation

During the installation, first the door guiding, and the floor guiding are mounted and aligned to each other. Then, the door leaf is installed and adjusted. Finally, the electric connections are established.



ATTENTION

Do not pull electric cables, guiding rods, spiral cables, and toothed belts! Do not soil the actuator with wooden or steel swarf!

3.1.1 Installation of door guiding and floor guiding

The door guiding is mounted using a total of 12 M8 screws (Norgren's scope of supply) at three consoles of the car.



NOTE Nuts and safety washers for fastening are not included in the delivery of the door guiding (to be provided by customer). The torque for fastening has to be 14Nm.

The floor guiding (not included in the delivery) must be fixed to the car body.

Please observe the following during installation:

- Horizontal alignment of the door guiding:
max. allowable deviation **1 mm/m**
- Vertical alignment of the door guiding:
max. allowable deviation **1 mm/m**
- Horizontal alignment of the door guiding to the floor guiding:
max. allowable deviation **1 mm/m**
- Vertical alignment of the door guiding to the floor guiding:
max. allowable deviation **1 mm/m**
- Offset of the door guiding center line to the floor guiding center line (top view):
max. allowable deviation $\pm 1 \text{ mm}$



NOTE The door system may only be installed when the vehicle is aligned in horizontal and vertical position.

3.1.2 Installation of the door leaf

Before installing the door leaf, the rubber profiles and guide strips must be visually checked regarding damages and correct seat.

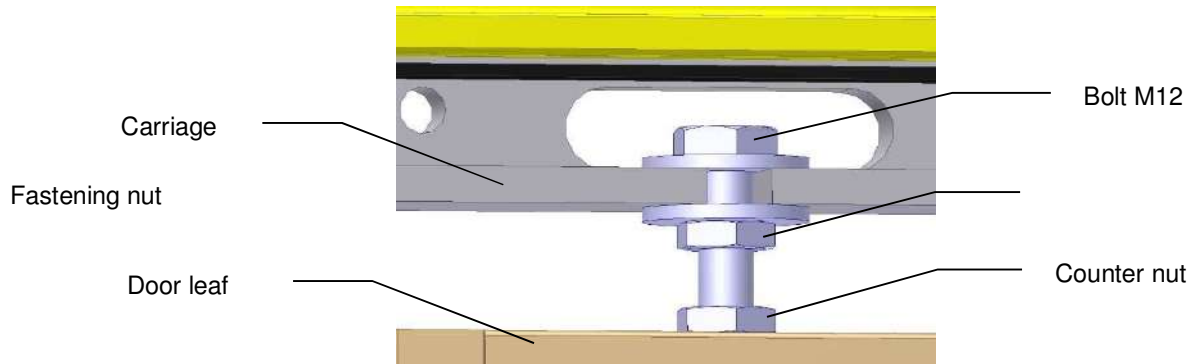
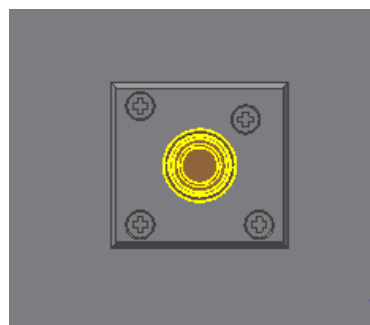


Figure 8: Installation of the door leaf

During installation, proceed as described below:

- Insert the door leaf into the floor guiding (use mounting aids to guarantee the necessary air gap) and lean it with the two bolts M12 against the gaps into the carriage (if you notice that the inserting depth within the door leaf connection is not sufficient for mounting, the whole actuator must be lowered at the fastening points of the car).
- Lock the two M12 bolts, without lifting the leaf.
- Lock the counter nuts by holding the bolts
- Lock the fastening nuts at the bottom of the carriage
- Remove the mounting aids and move the door leaf by hand; you should be able to move the door leaf lightly and evenly over the entire stroke.
- Check if the closing edge is parallel to the cabin frame in the "closed position" in manual mode; realign, if necessary.
- For a successful set-up run connect both carriages with a link so that the carriages cannot be separated. The link must be removed after the door system has conducted the first training and testrun.

Push Button Connection- IO X10 Port



3.1.3 Electrical connection

- Connect the earth cable from the car body to the door guiding (Figure 1). **Torque for fastening: 4 Nm**
- Establish the cable connection to the push buttons in the door leaf (X0)

Do **not connect** the X20 plug of the car until first operation

3.1.4 Installation documentation

The installation has to be documented for each door system The following items have to be documented:

- Norgren material no. and serial no. of the electric door guiding
- Vehicle no.
- Installation position in the vehicle
- Installation date
- Change of profile parameters

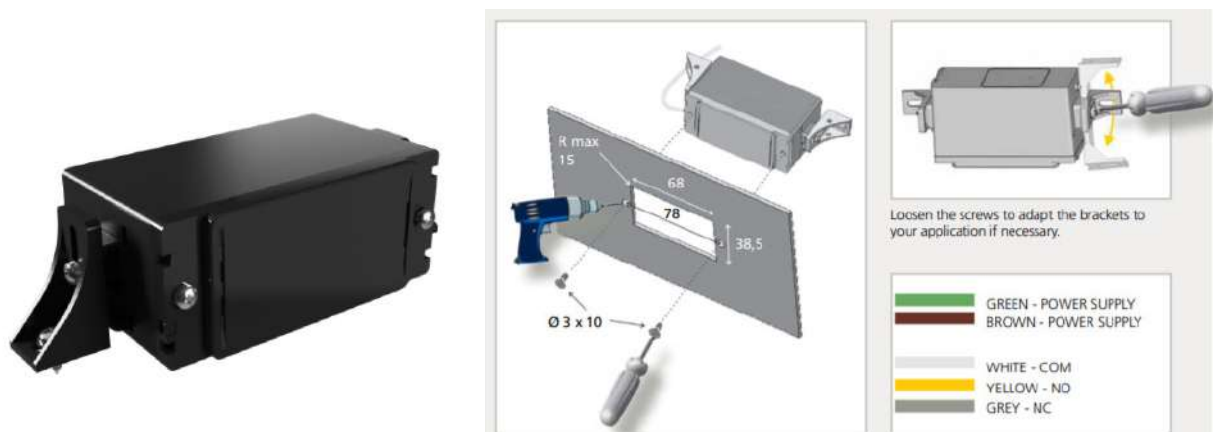
3.2 Checks Prior to Initial Operation

3.2.1 General checks

Please observe the following steps before first operation:

- System de-energized: X20 plug **not** connected
- It has to be made sure that door leaf can be manually moved into end position

5.2.1.2 Human Sensor Connection- IO X2 Port



4 INITIAL START- UP



CAUTION

During the operation of electrical equipment, certain parts of these devices are inevitably laden with dangerous voltage.

Non-adherence to the operating instructions may therefore lead to serious bodily harm or damage to property.

It is therefore imperative that the warnings are heeded.

During the activation of the controller (in particular during automatic parameter verification) the door movements cannot always be influenced externally.

Therefore, an authorized person, who is positioned at the door, should make sure that no other person come close to the door during start-up.

The permissible forces and energy sources on the total system (vehicle) should be checked by the service personnel after activation of the door.



NOTE

At the parameter training run the motor temperature may not be lower than 0°C, because otherwise the door mass will be determined incorrectly, causing the closing speed to be in an unacceptable range.

4.1 Startup procedure

1. Push the door into the "CLOSED" position.
2. Open the housing cover.
3. The motor plug must be connected to X7.
4. The input plug must be connected to X3.
5. Connect I/O circuit board to the power supply. The fuse/circuit breaker on the vehicle (lift) side may only be a maximum of 10A.
6. Press and hold the blue "DOOR PARAM" (S5000) button.
7. The door immediately starts the training run, where after the S5000 button may be released. The 7-segment display (H5000) indicates "H".

The training run includes an approximately 10cm-wide opening and closing once or twice.

Then, for the verification of the friction/traction of the door system, it opens and closes over 25cm once or twice in creep motion.

Afterwards the door opens and closes at reduced speed (full run). During the opening cycle, after a run of approximately 10 cm, a short acceleration ramp is performed to determine the mass of the door.

The door parameters and the calculated door width are saved in the "CLOSED" position.

The 7-segment display (H5000) indicates "u".

8. The door can now be opened with the "OPEN" (S5001) button. The 7-segment display (H5000) indicates "o" while the door is opening.
9. Switch off controls by disconnecting the mains connection.
10. Control signals from the I/O circuit board (see attachment) must be connected via plug with X4 and X6.



NOTE

The controller is ready for use the next time it is switched on. At an incoming opening signal the door travels in the opening direction, otherwise in the closing direction.

11. Connect I/O circuit board to the power supply. The four LEDs next to plug terminal X3 indicate which control signal is currently active. At an incoming "OPEN" control signal or identified blockage in the "CLOSED" direction, the

- door travels in the "OPEN" position at initial speed.
12. If the controller identified the "OPEN" and "CLOSED" door end positions, the following opening and closing cycles are carried out at normal speed.



NOTE The activation for the door movement in the "OPEN" direction can also be undertaken with the service button *S5001 (OPEN)*.
The door opens as long as the service button (*OPEN*) is activated.
When using the user terminal or the Frontend PC the external input signals are blocked in some menus.
Saving the parameters determined during the training run is always done in the "CLOSED" position.

13. For special applications the drive characteristics can be individually adapted to the door. To do this, the terminal module (optional) must be installed or the user terminal HT18 connected.
Instead of the user terminal, a PC can also be connected via the USB adapter that is available as a special accessory, on which the operating program (Frontend PC) has been started.
The operation is described in the procedures in the attachment.

4.2 Check of software parameters after start-up

To ensure a safe and proper functionality of the door drive it is necessary to check if the saved parameters in the control unit are in accordance with the parameters in table 2.

Parameter list

Function	Adjustment range	Adjustment value	Profile parameter
Slow end distance open	0 – 100 mm	10 mm	
Slow start distance open	0 – 100 mm	0 mm	
Slow start distance close	0 – 100 mm	0 mm	
Slow end distance close	0 – 100 mm	100 mm	
Maximum speed open	100 – 650 mm/s	270 mm/s	
Slow end speed open	30 – 90 mm/s	30 mm/s	
Slow start speed open	30 – 90 mm/s	90 mm/s	
Slow initial speed open	30 – 90 mm/s	90 mm/s	
Maximum speed close	100 – 500 mm/s	220 mm/s	
Slow start speed close	30 – 90 mm/s	90 mm/s	
Slow end speed close	30 – 90 mm/s	30 mm/s	
Slow initial speed close	30 – 90 mm/s	90 mm/s	
Nudging speed	50 – 250 mm/s	150 mm/s	
Acceleration ramp open	300 – 1400 mm/s ²	1400 mm/s ²	
Deceleration ramp open	300 – 1400 mm/s ²	850 mm/s ²	
Reversal ramp op>cl	300 – 1400 mm/s ²	1400 mm/s ²	
Acceleration ramp close	300 – 1400 mm/s ²	1400 mm/s ²	
Deceleration ramp close	300 – 1400 mm/s ²	850 mm/s ²	
Reversal ramp cl>op	300 – 1400 mm/s ²	1400 mm/s ²	
Idle torque open	0 – 3000 mA	1500 mA	
Idle torque close	0 - 2500 mA	700 mA	
Peak torque close	0 – 1000 mA	700 mA	
Limit force open	70 – 300 N	180 N	
Limit force close	0 – 230 N	100 N	
Limit force end close	0 – 230 N	100 N	
Limit force close nudging(not applicable)	0 – 230 N	50 N	
Reversal distance close	6 – 50mm	7mm	

Function	Adjustment range	Adjustment value	
Hold- open time after open command	0 – 60 sec	4 s	Time parameter
Hold- open time after motion detector	0 – 60 sec	4 s	
Hold- open time after blockage	0 – 20 sec	4 s	
Delay time in wait mode close	0 – 600 sec	60 s	
Delay time in wait mode open	0 – 600 sec	30 s	
Number of blockages before wait mode close	0 - 20	5	
Number of blockages before wait mode open	0 – 20	5	
Limited time motion detector	0 – 60 min	15 min	
Time delay before movement	0 – 5000 ms	0 ms	
X 11 Mode (under Menu entry Service Special)	IR- Sensor Push button	Push button Human Sensor	

Table 2



NOTE The parameters in bold print are divergent to the pre-set values of the control unit



The strict adherence to the parameters stipulated in above chart is precondition for the safety and functionality of the door actuator. Therefore, any modification is interdicted. If you consider any modification or adaptation of the parameter, please be so kind and name these and represent the reasons thereto in originally signed written letter or by fax in advance. For the case being that such modification or adaptation may not impair safety or essential functionality, we will adjust the chart accordingly.

If modifications or adaptations are conducted without our consent thereto, we herewith explicitly reserve the right to evaluate any legal action in relation thereto.

5 OPERATION AND OPERATION MONITORING

5.1 Operation

The door starts opening when one of two push buttons, which are installed on both sides of the passage way is activated. Alternatively, an infrared sensor which is installed at the ceiling in front of each door side can be activated.

At the end of an adjustable opening time, the door closes automatically.

If there is an obstacle during door movement (open / close), the door moves back automatically.

5.2 Operation Monitoring

The 7-segment display (H401) on the controller shows following status and error displays.

Display	Meaning	Significance	Measures	Error Message Relay x12
1	RAM-, EEPROM- or CPU error (system error)	Motor torque-free. New start after threefold correct additional test	If necessary replace controller	yes
3	Error in second switch-off stroke	Motor torque- free: New start after 5 seconds	If necessary replace controller	yes
4	Extend hold-open time at increased motor switch-on duration	Hold-open time extended by minimum 2s to maximum 4s	Motor needs longer rest phases	no
5	Motor undefined	Motor torque-free. New start after 30 seconds	Check wiring, if necessary replace controller or motor	yes
6	Motor blocked in closing direction	Door stops and reverses	Check if an obstacle is in the door	no
7	Error pulse generator	Motor torque- free: New start after 5 seconds	Check wiring, if necessary replace controller or motor	yes
8	Minimal editor is started (service button Open and Closed activated at the same time)	Motor is torque free	Door must be taken into operation by re-applying operating power	no
9	Motor overcurrent	Motor torque-free. New start after 30 seconds	Check wiring, if necessary replace controller or motor	yes
A	Minimal editor (power adjustment) active	Motor is torque free	Door must be taken into operation by re-applying operating power	no
c	Blockage at opening	Door stops and reverses	Check if an obstacle is in the door	no

C	Minimal editor (profile adjustment) active	Motor is torque free	Door must be taken into operation by re-applying operating power	no
d	Door does not move during initializing run (no	Door has stopped	Check if an obstacle is in the door	no

	OPEN or CLOSED signal)			
E	Motor overcurrent- Motor torque-free.	New start after 30 seconds	Check input voltage from vehicle, if necessary replace controller	yes
F	Motor low voltage	Door system is slower	Check input voltage from vehicle	no
H	Parameter verification (training run)	The door travels automatically in both directions until the training run has been finished.	Wait for end of training run	no
L	Current measurement error	Motor torque- free: New start after 5 seconds	If necessary replace controller	yes
o	Function OK.	The door is outside the "Closed" position	None	no
P	Parameter error (error in the training run)	Motor is stopped. No new automatic start	Check the door at first activation (service). If necessary replace controller	yes
u	Door is closed	The door is in the "CLOSED" position	None	no
U	Max. door mass exceeded	Immediate new start. Can only be quit via a training run with standard parameter set	Check the door at first activation (service). If necessary replace controller	yes
-	Door does not move during the initializing run and has no valid parameters	no	Perform training run for parameter verification	no

Table 3

6 MAINTENANCE



ATTENTION Correct transportation, storage, set-up and assembly of this device as well as careful operation and maintenance are important conditions for the correct and safe operation of it.



NOTE After a breakdown of the power supply the end positions of the door have to be re-determined. Therefore, the door moves with reduced speed (initial speed) until both end positions “open” and “closed” are detected by the control unit. Afterwards the door moves with normal speed.



NOTE Preventive maintenance is used for keeping the door system operative.
Maintenance work on parts of the door system which belongs not to IMI Precision Engineering scope of supply but which has an influence on the correct performance of the drive is marked below in red.



NOTE Perform a teach-in and test run after having changed mechanical parameters such as stroke/friction.

The operating manual of the control unit SPIN/0159/ATD400T contains all details with regard to teach-in/test runs

6.1 Maintenance Intervals

Following maintenance intervals have to be considered:

Service work every 3 Months

Service work every 6 Months

Service work every 12 Months

Service work every 72 Months

6.1.1 Service work every 3 Months

Functional check

Reverse movement (see chapter 6.2.1)

Cleaning

Floor guiding (see chapter 6.2.2)

6.1.2 Service work every 6 Months

Functional check

Reverse movement (see chapter 6.2.1)

Cleaning

Parallel contact between door leaf and closing edge (see chapter 6.2.3)

Floor guiding (see chapter 6.2.2)

6.1.3 Service work every 12 Months

Functional check

Reverse movement (see chapter 6.2.1)

Floor guiding (see chapter 6.2.2)

Check

Parallel contact between door leaf and closing edge (see chapter 6.2.3)

Belt tension (see chapter 6.2.4)

Bearing play on the carriage (see chapter 6.2.6)

Tight seat of all components

Tight fitting of all plug-in connections at the I/O-board

6.1.4 Service work every 72 Months

See chapter 8 Overhaul

6.2 Maintenance Instructions

6.2.1 Functional check: Reverse movement

The door moves back when closing if the door leaf meets an obstacle at any position (minimum distance 25 mm before being closed).

The door moves back when opening if the door leaf is detained in any position.



NOTE The operating manual of the control unit SPIN/0159/ATD400T contains all details with regard to detecting obstacles and error display.

6.2.2 Cleaning of the floor guiding

Clean the floor guiding using a lint-free cloth and a cleaning agent suitable for sensitive surfaces.

6.2.3 Check the parallel contact between the door leaf and closing edge

If the door is closed and power moment free, the rubber profile on the front edge of the door has to be in parallel contact with the opposite counter rail or represent a Concave-shaped gap (max. 4 mm).

If there is an A-shaped gap, readjust the door leaf on the carriage (see chapter 3.1.2).

6.2.4 Check the belt tension

The belt tension can be checked using a belt tension measuring device (SM4 (Rothermundt)). The measurement has to be made on the left strand (if seen from the front) with closed door. The belt frequency has to be between 31 and 33 Hz.

Readjust the belt tension on the tensioning device (**Figure 10**), if different. First loosen the counter nut. Then readjust the adjusting screw until obtaining the requested belt tension. Then retighten the counter nut (Torque = 10 Nm).

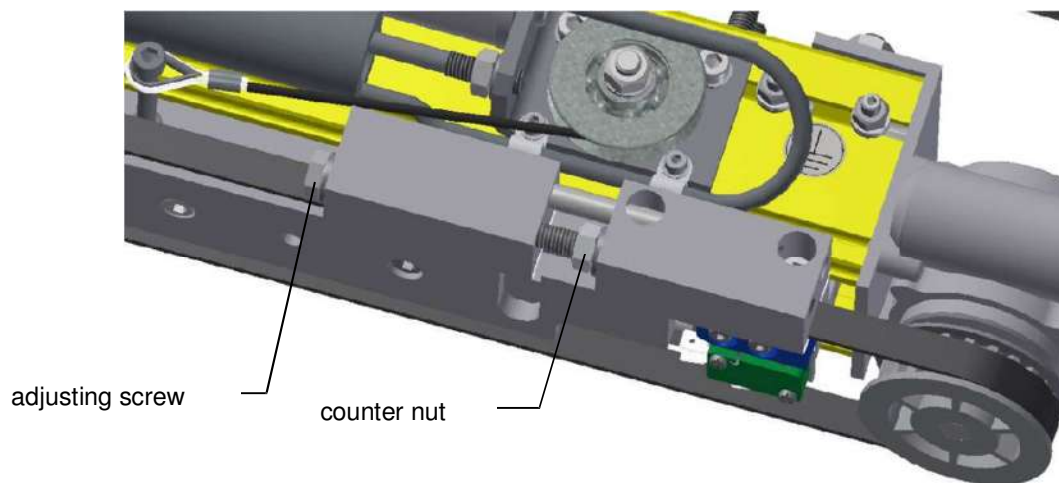


Figure 10: Belt tensioning device

6.2.5 Check the bearing play on the carriage

This maintenance measure is required if the engaged door leaf swings when reaching the open position or if there is so much bearing play that the door leaf can be moved more than 20 mm in moving direction on the lower door guiding.

Remedies:

- Loosen the counter- screw on eccentric bolt with help of an Allen Key. both ends of the carriage
- Turn around the eccentric bolt, reachable via a hole in the extrusion (remove cover and move door leaf by hand into position) with the help of a screwdriver, until it becomes tight.
- Glue counter screw with thread locking adhesive (Loctite 242 or equivalent) and lock the eccentric bolt.



NOTE In order to prevent oblique positions of the carriage readjust always both eccentric axes as described simultaneously.

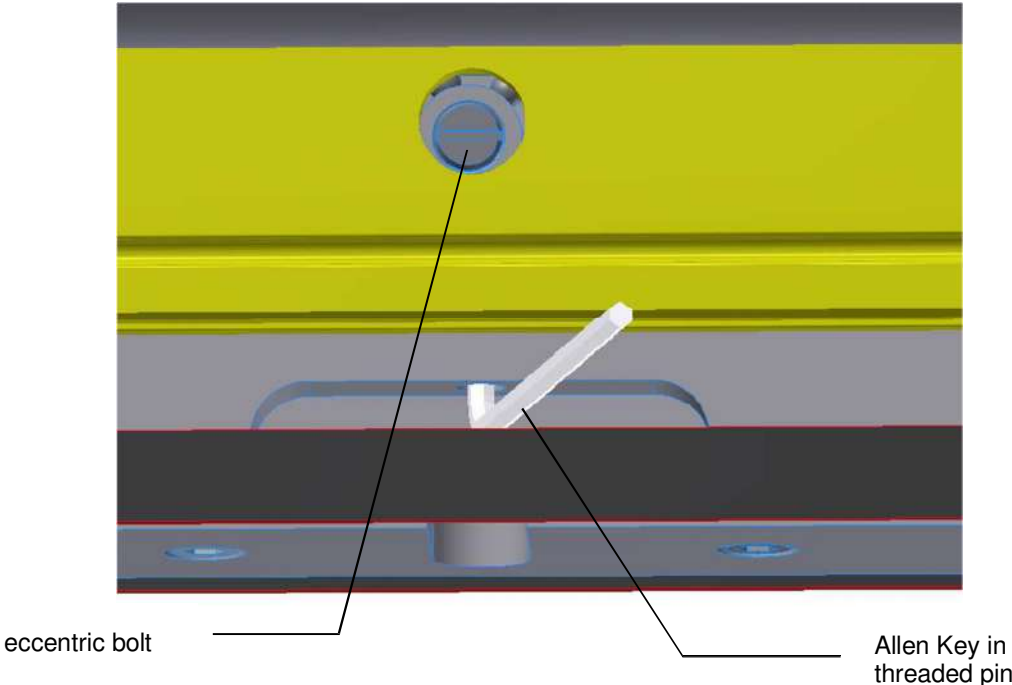


Figure 11: Threaded pin and eccentric axis

7 CORRECTIVE MAINTAINANCE

If necessary (and if defective), assembly groups can be replaced without need of dismounting the door actuator.



CAUTION

When operating electric appliances, you may come into contact with parts which carry dangerous voltage.
Risk of serious injuries or material damage if the operating instructions are not observed.

It is necessary to observe the warnings.
Door movements cannot always be influenced externally when commissioning the control unit (in particular during the automatic determination of parameters). Therefore, an authorized person standing on the door must make sure that there is not any other person nearby when starting up.
After starting up the door, the service personnel have to check the admissible forces and energies in the entire system (vehicle).



ATTENTION Interrupt the power supply to the actuator before carrying out repair work (pull out the X20 plug from the control unit).

Test: By interrupting the power supply, the illumination of the pushbuttons in the door leaf is switched off and the "Power" diode of the board is not longer illuminated.



NOTE

In some cases, different parts have to be removed before replacing the defect assembly group. It is assumed, that assemblers do this independently referring to the respective chapter for disassembly and assembly.

7.1 Replacement of actuator

Smallest replaceable unit:	Actuator complete
Norgren type:	SPC/Q121515/2

Disassembly

- 1) Open the control unit and remove the motor connector X7 (Figure 23)
- 2) Loosen the belt tension on the carriage until the toothed belt can be removed from the motor (Figure 10)
- 3) Unscrew the motor on the guide tube (2 Nuts M8) (Figure 12)

Installation

- Assembly takes place in reverse order, cutting the motor cable to the required length. Place sleeves on the cable ends and fasten the cable to the motor using cable ties.
- Readjust the belt tension after mounting (see chapter 6.2.4) and perform a functional test.

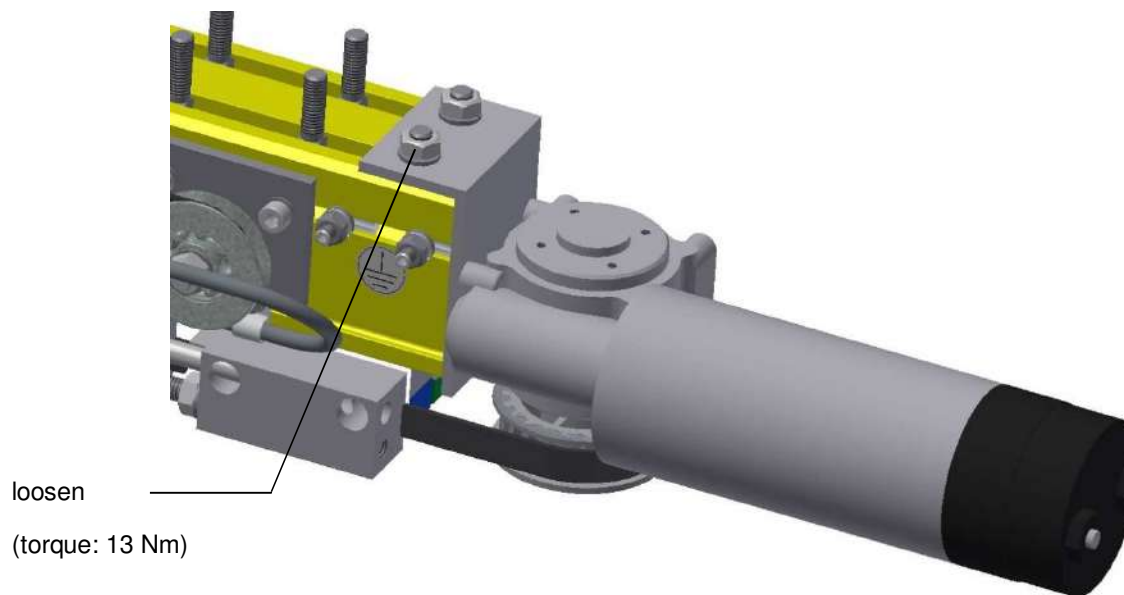


Figure 12: Actuator

7.2 Replacement of carriage 1

Smallest replaceable unit: Carrier assy.
Norgren type: SPC/Q121515/3/4



NOTE The carriage can only be replaced if the door leaf is disengaged. The end stop in door-opened position has to be disassembled (Figure 19).

Disassembly

- 1) Loosen the belt tension (Figure 10)
- 2) Unscrew the end stop of the guiding profile (Figure 13)
- 3) Unscrew the T-profile of the right and left basis (Figure 14)
- 4) Move the carriers (Figure 15) to the free end of the guide tube and remove it through the opening of the profile.

Installation

- Assembly takes place in reverse order.



NOTE Observe the following items:
1.) Put down the eccentric axis
2.) Adjust the bearing play as described in chapter 6.2.6

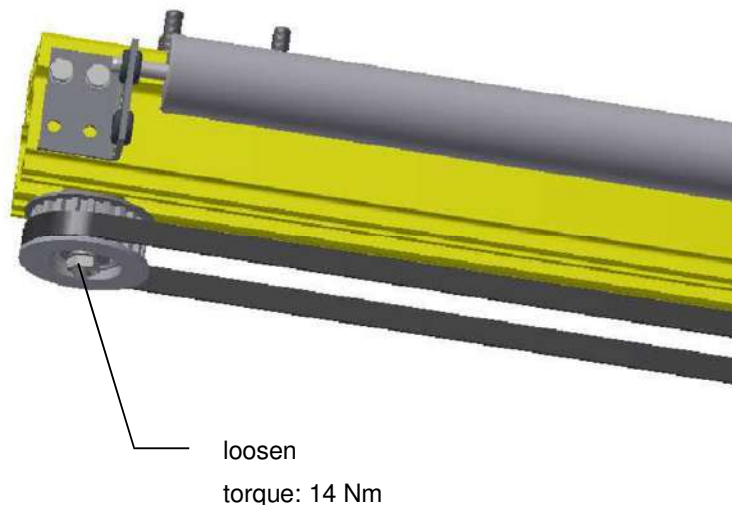


Figure 13: End Stop

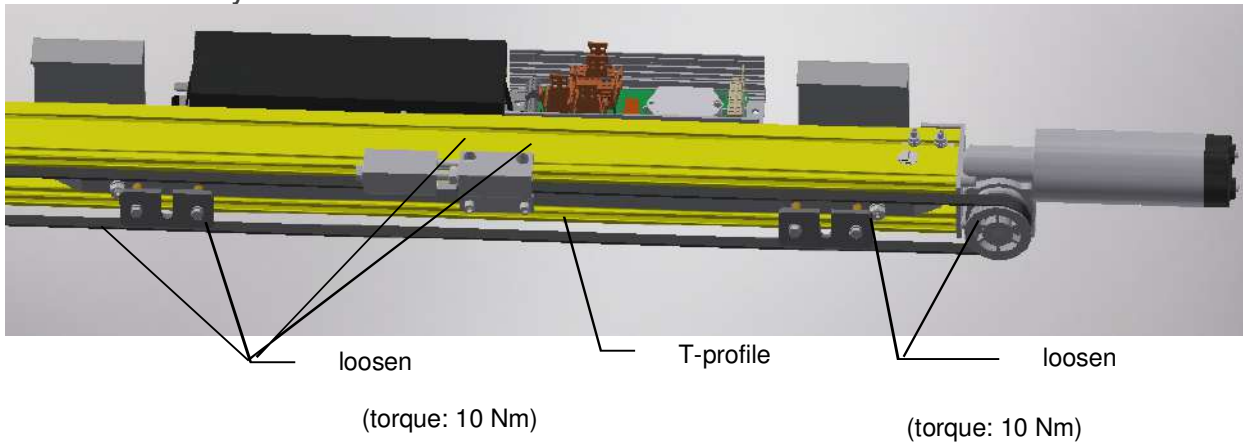


Figure 14: T-profile

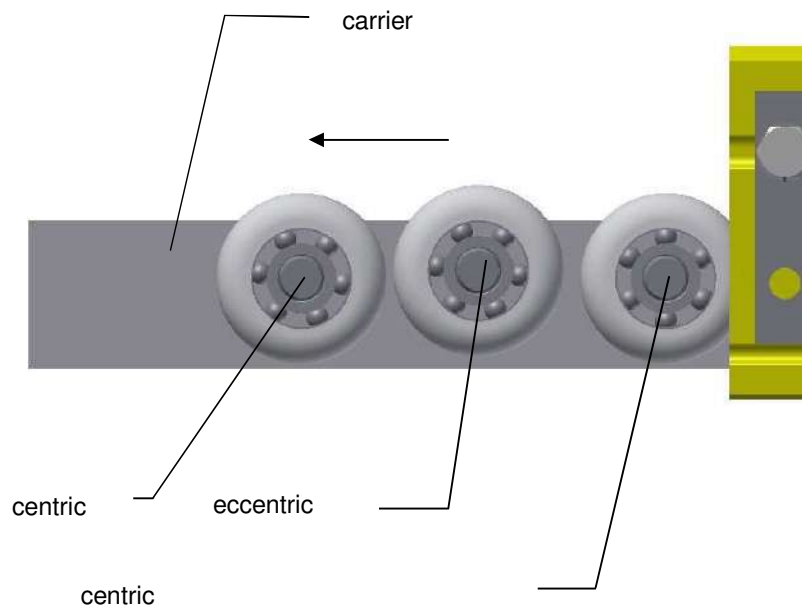


Figure 15: Carrier assy.

7.3 Replacement of carriage 2

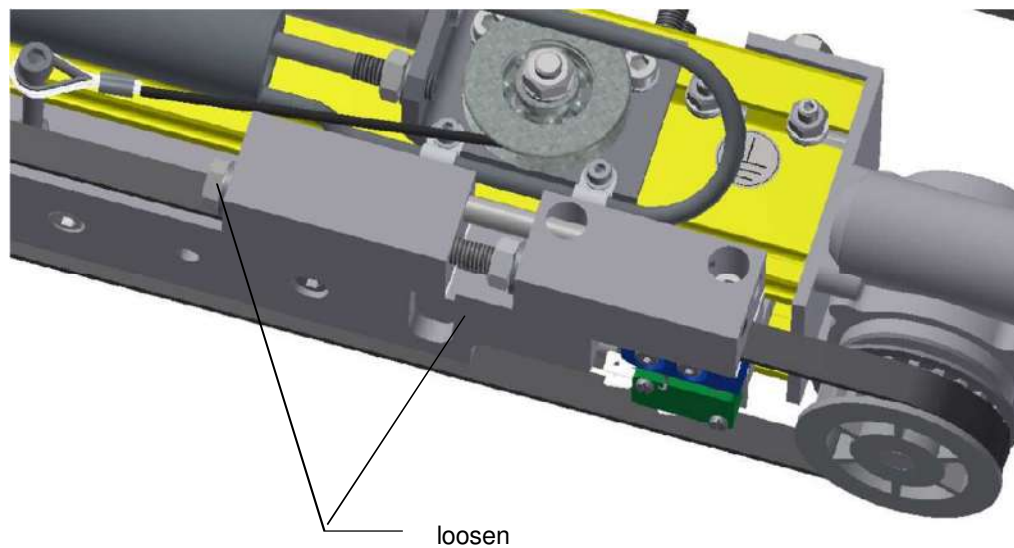
Smallest replaceable unit: carrier assy.
Norgren type: SPC/Q121515/4

Disassembly

- 1) Loosen the belt tension (Figure 17)
- 2) Unscrew the actuator of the guiding profile (Figure 12)
- 3) Move the carrier (Figure 18) to the free end of the guide tube and remove it through the opening of the profile.

Installation

- Assembly takes place in reverse order.



(torque: 14 Nm)

Figure 17: Tensioning device

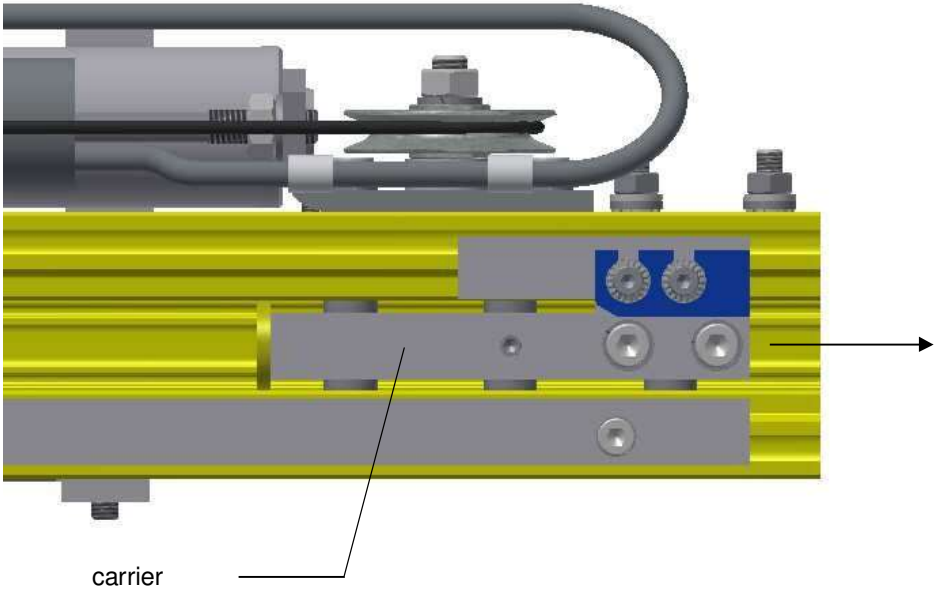


Figure 18: Basis of carriage 1

7.4 Replacement of end stop

Smallest replaceable unit:	End stop assembly
Norgren type:	SPC/Q101529/5
Rawag material no.:	

Disassembly

- 1) Mark the position of the end stop on the guide tube (Figure 19)
- 2) Loosen the belt tension (Figure 10) until the belt has loose contact to the pulley
- 3) Loosen the M8 nut at the end stop until the end stop can be moved (Figure 19)
- 4) Remove the toothed belt slightly moving the end stop
- 5) Remove the end stop completely from the guide tube in axial direction

Installation

- Assembly takes place in reverse order. Then readjust the correct belt tension (see chapter 6.2.4) and perform a functional test.

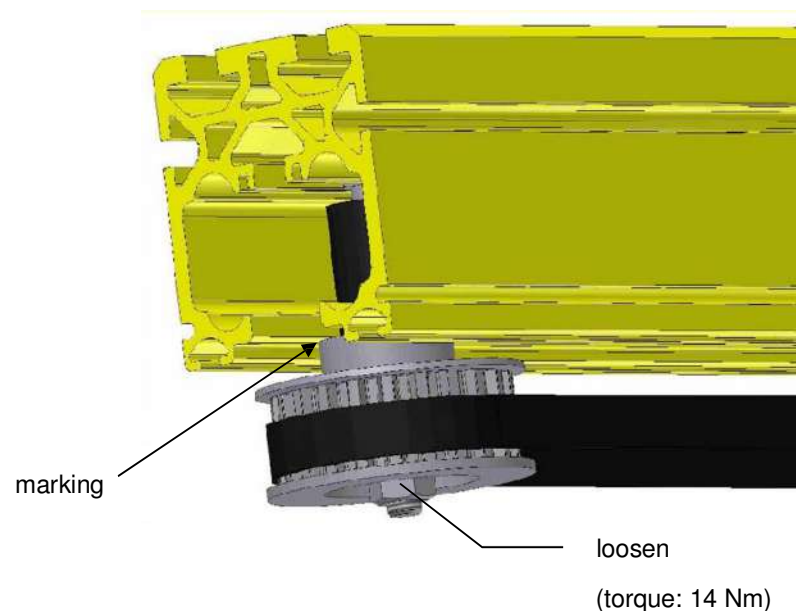


Figure 19: End stop

7.5 Replacement of tensioning device

Smallest replaceable unit:	Tensioning device
Norgren type:	SPC/Q121515/6

Disassembly

- 1) Loosen the counter nut on the tensioning device (Figure 20)
- 2) Unscrew the tensioning screw and pull out the movable belt holder from the tensioning device (Figure 21 and Figure 22)
- 3) Loosen the clamping screws until the toothed belt can be removed (Figure 22)
- 4) Loosen the fix belt holder until the belt can be removed (Figure 20)

Installation

Assembly takes place in reverse order. Then readjust the correct belt tension (see chapter 6.2.4) and perform a functioning test.

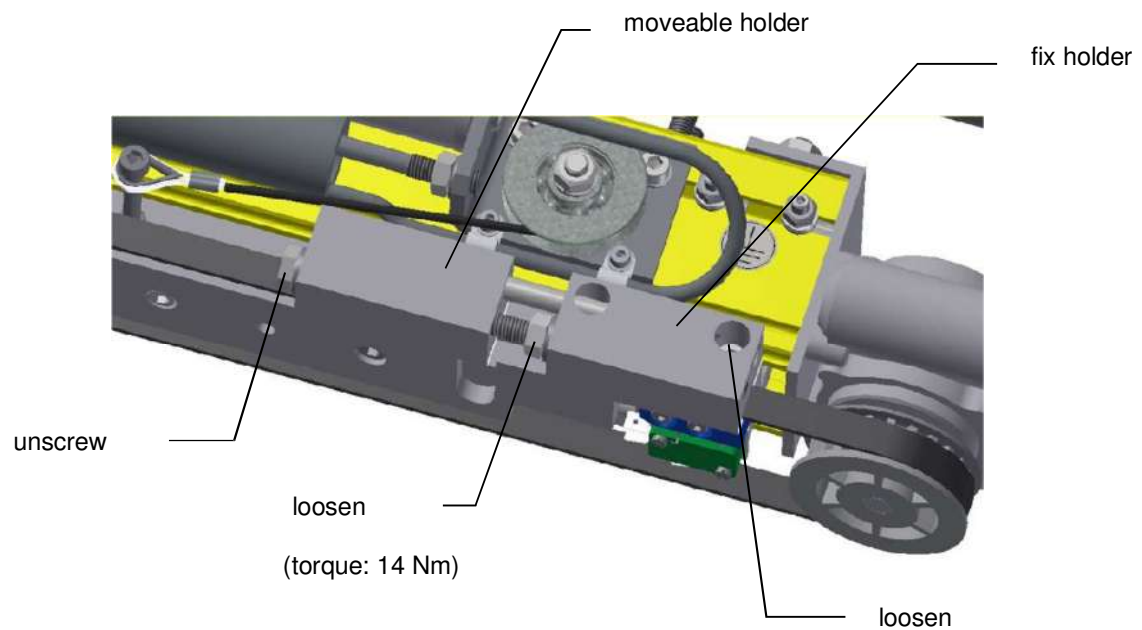


Figure 20: Tensioning device

7.6 Replacement of toothed belt

Smallest replaceable unit: Toothed belt L = 3328 mm
Norgren type: SPC/991500/10/3328



NOTE **The toothed belt is slightly longer than required and must be shortened after mounting. It makes sense to let the belt slightly overlap on the belt clamping during mounting to allow corrections.**

Disassembly

- 1) Loosen the counter nut on the tensioning device (Figure 22)
- 2) Unscrew the tensioning screw and pull out the movable belt holder from the tensioning device (Figure 21 and Figure 22)
- 3) Loosen the clamping screws until the toothed belt can be removed (Figure 22)
- 4) Loosen the fixing screws at the fix belt holder on the carriage until the belt can be removed (Figure 22)
- 5) Remove the belt

Installation

- 1) Mount the fix belt holder to one end of the belt (Figure 21)
- 2) Place the belt holder onto the carriage and screw it on.
- 3) Guide the belt around the deflection pulleys (Figure 19) and the motor deflection (Figure 12), insert it into the moveable belt holder and fix it with the clamping screws (Figure 22).
- 4) Fasten the moveable holder to the fix holder with the tensioning screw (Figure 22 ; pretension the belt as much as possible).
- 5) Pretension the belt using the tensioning device
- 6) Adjust the correct belt tension (see chapter 6.2.4) and secure the tensioning device using the counter nut (Figure 22)
- 7) Cut overlapping ends leaving one tooth
- 8) Functional check



NOTE **The position of the deflection pulleys remains unchanged when replacing the belt.**

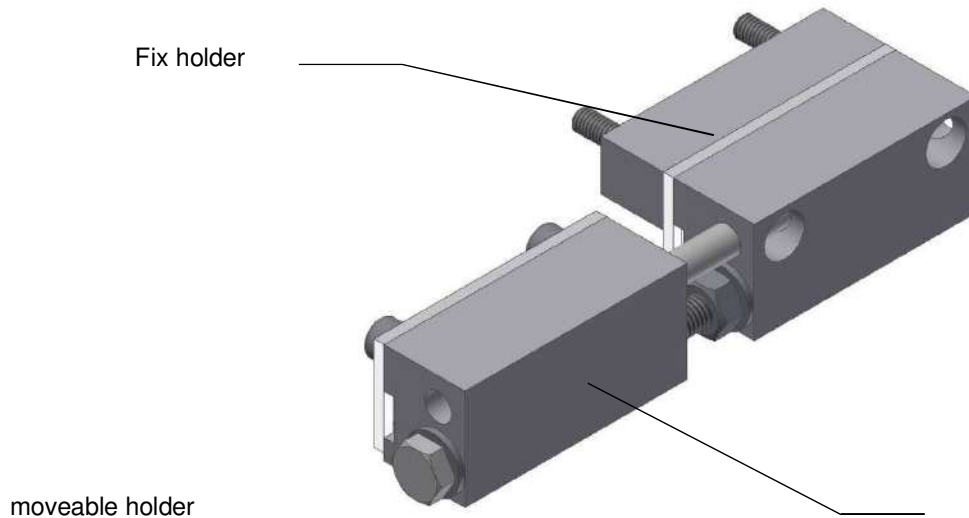


Figure 21: Tensioning device (front view)

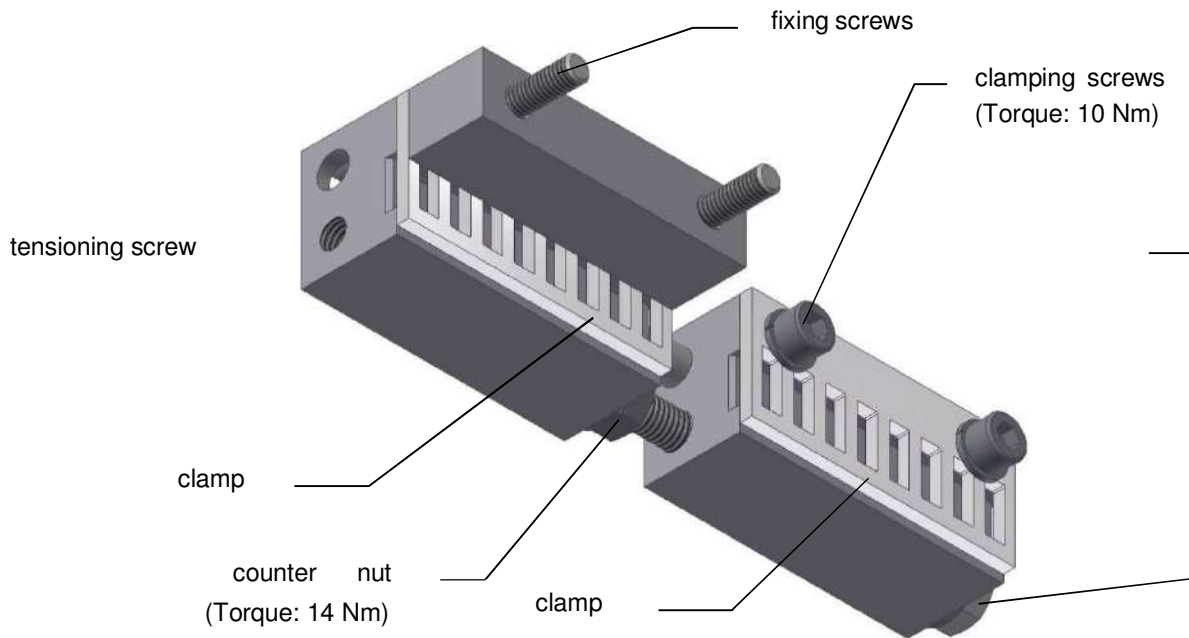


Figure 22: Tensioning device (back view)

7.7 Replacement of control unit SPIN/0159/ATD400T

Smallest replaceable unit: Control unit SPIN/0159/ATD400T
Norgren type: SPC/Q121515/17

Disassembly

- 1) Unplug the connector X20 on the I/O board
- 2) Remove the cover from the control unit.
- 3) Remove the plastic cover from the relay module, loosen all cable ties and pull out all connectors from the control unit (Figure 23)
- 4) Unscrew the control unit on both holders (4 screws).

Installation

- 1) Assembly takes place in reverse order.
- 2) Activate the power supply and start first operation (3.2 Safety Instructions)



NOTE Cable ties for fastening the cables are not included in the delivery of the control unit ATD400T (to be provided by customer).

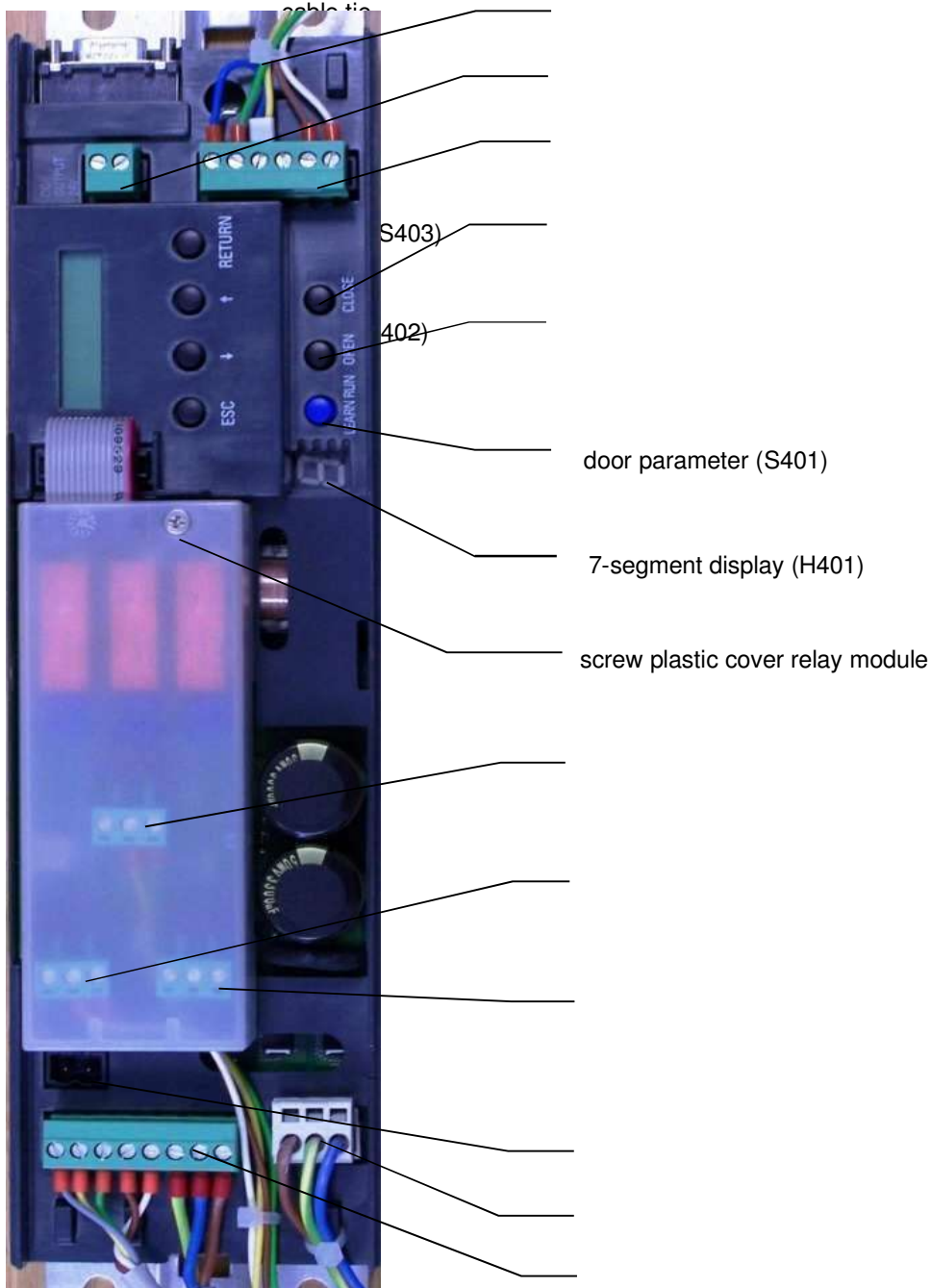


Figure 23: Control unit ATD400T

7.8 Replacement of I/O board

Smallest replaceable unit: I/O board
Norgren type: SPC/Q121515/18
Rawag material no.:

Disassembly

- 1) Unplug the connector X20 on the I/O board
- 2) Remove the cover from the control unit.
- 3) Remove the plastic cover from the relay module, and loosen all cable ties
- 4) Unplug all connectors (X2, X10 and X22) on the board (Figure 24).
- 5) Loosen the earthing cable
- 6) Unplug the connectors X4, X6, X11 and X12 on the control unit ATD400T (Figure 23).
- 7) Unscrew the board from the two holders (4 screws; Figure 24).

Installation

- Assembly takes place in reverse order.



NOTE Connectors have numbers! Connectors must engage!

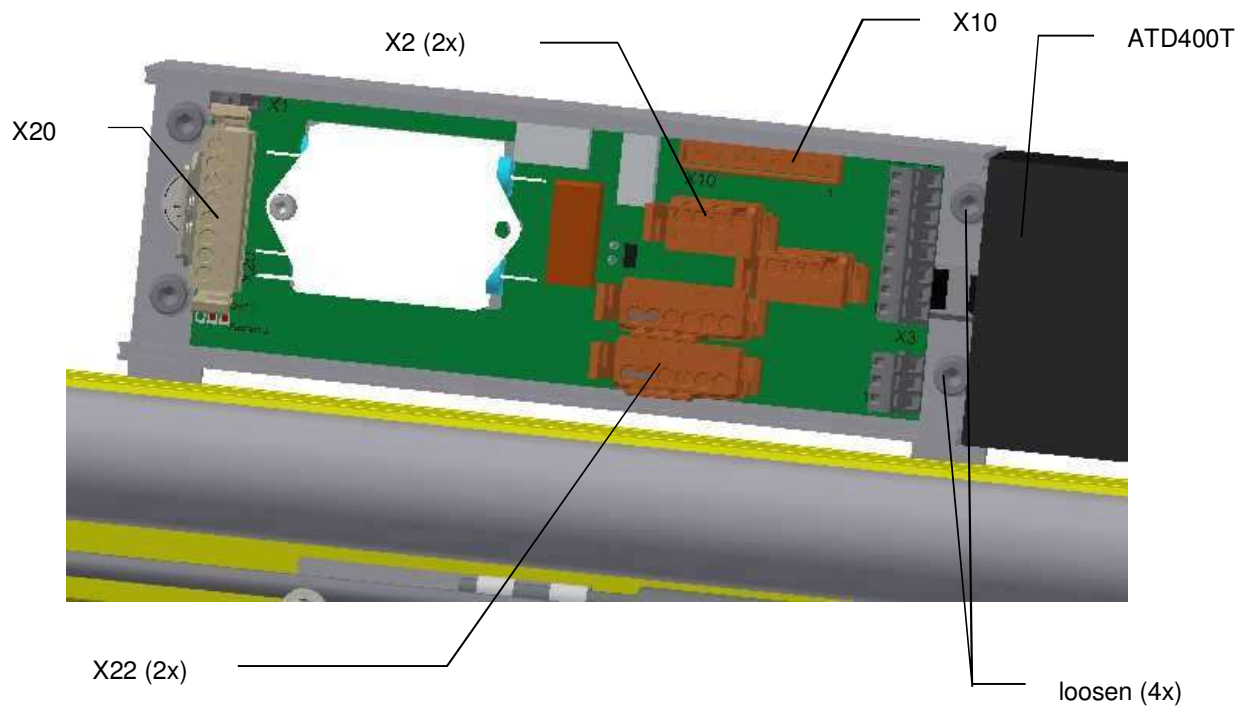


Figure 24: I/O board and connectors

7.9 Replacement of cables

The cables delivered are already prepared and configured with connectors and can only be inserted into the adequate female connectors.

Pin assignment and cable colour correspond to the wiring diagram (see Figure 4).

Perform the following work before and after replacing the cables:

Before

- Loosen the fastening (cable ties) of the cable bundle
- Remove the protective tube from the cable bundle if required

After

- Activate the power supply and perform a functional test
- Place the protective tube around the cable bundle
- Fasten the cable bundle to the defined locations using cable ties



NOTE Cable ties are not included in the delivery of spare parts and must be provided by the customer!

7.10 Setting Data and Tolerances

See chapter 3.1 Installation.

7.11 Resumption of Operation and Function Test

See chapter 4 & 5

8 OVERHAUL

Overhaul is required every 72 months or after having opened the door 1 million times.

During overhaul, replace also the assembly groups or components as described in section 7 depending on their wear.

8.1 Replacement of carriage 1

Please refer to chapter 7.2

8.2 Replacement of carriage 2

Please refer to chapter 7.4

8.3 Replacement of toothed belt

Please refer to chapter 7.7

8.4 Replacement of relay module

The operating manual of the control unit SPIN/0159/ATD400T contains all details with regard to replacement of the relay module, see chapter Expansion modules.

9 SPARE PARTS CATALOGUE

9.1 Illustration Section

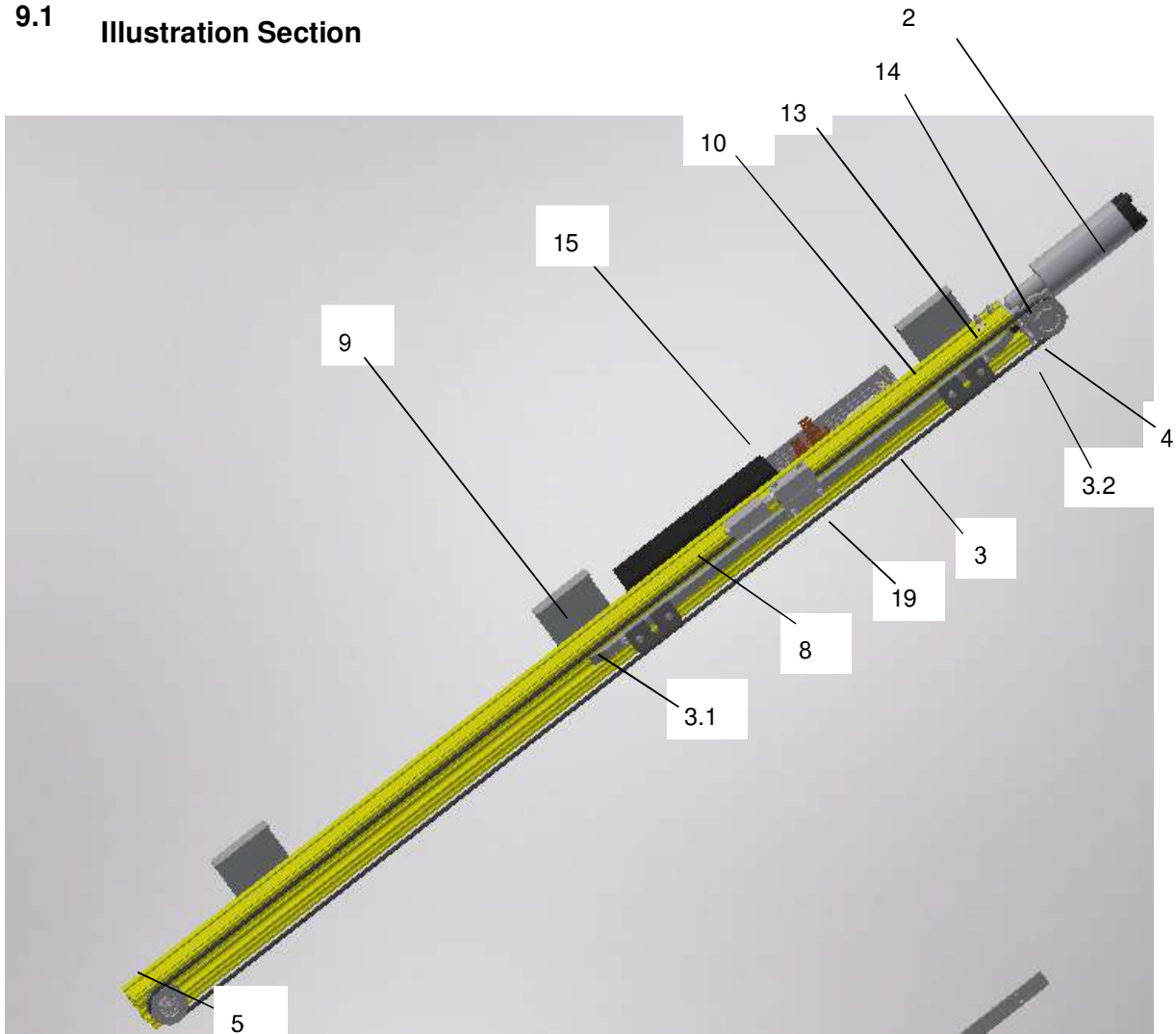


Figure 25: Door guiding SPC/171534 (1)

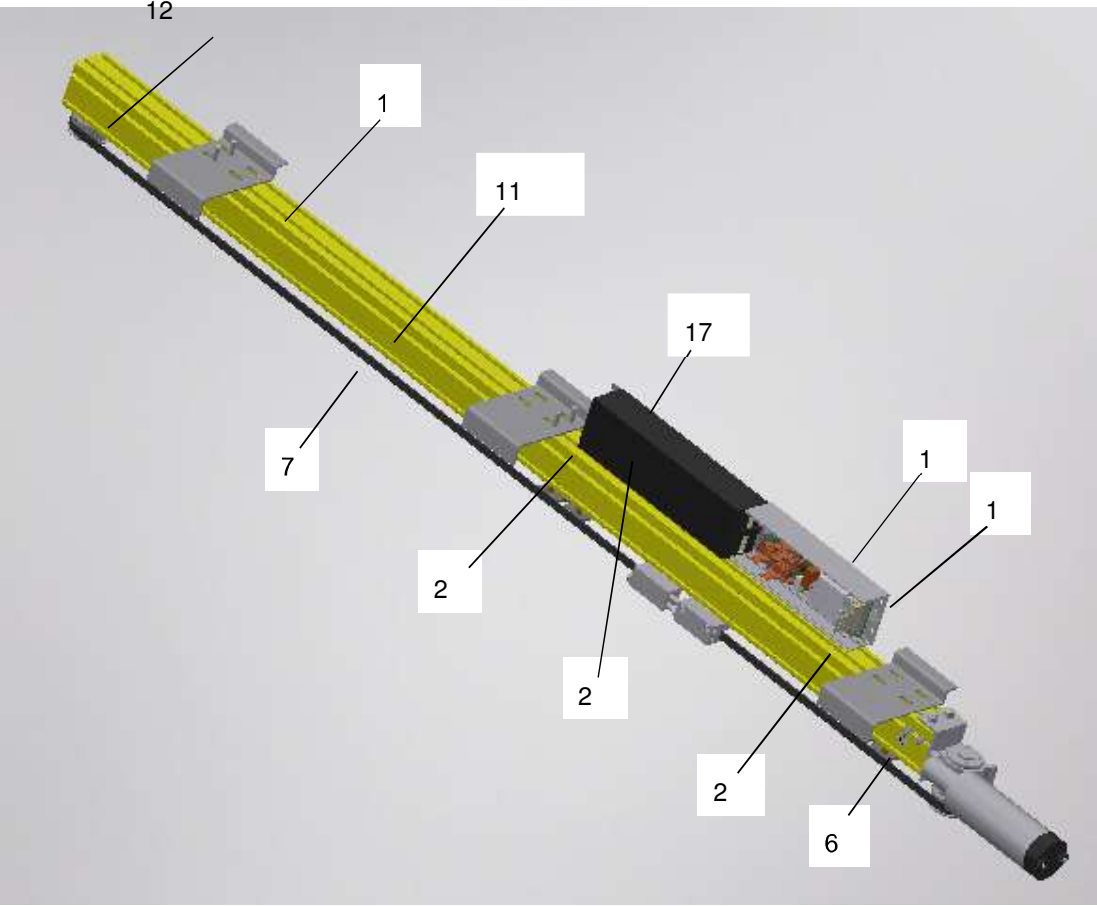


Figure 26: Door guiding SPC/171534 (2)

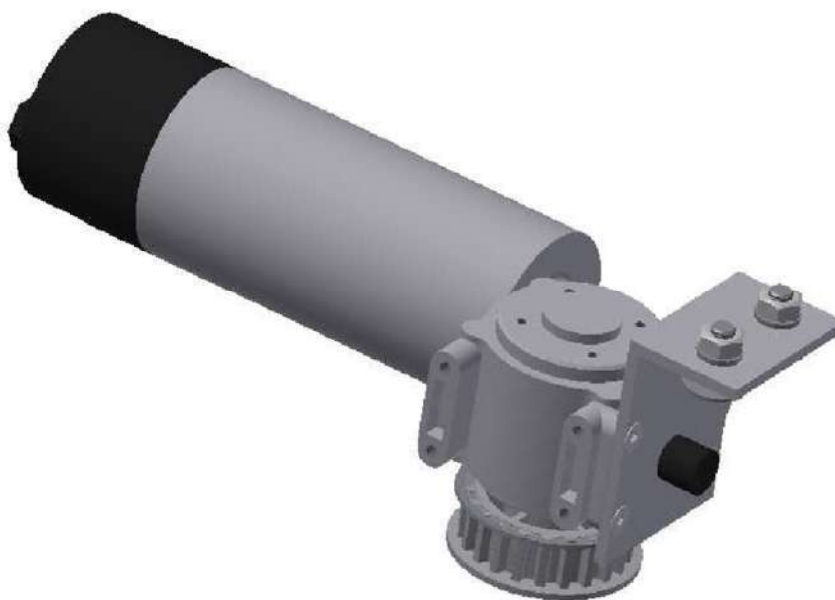


Figure 27: Actuator (2)



Figure 28: Carriage 1 (3)

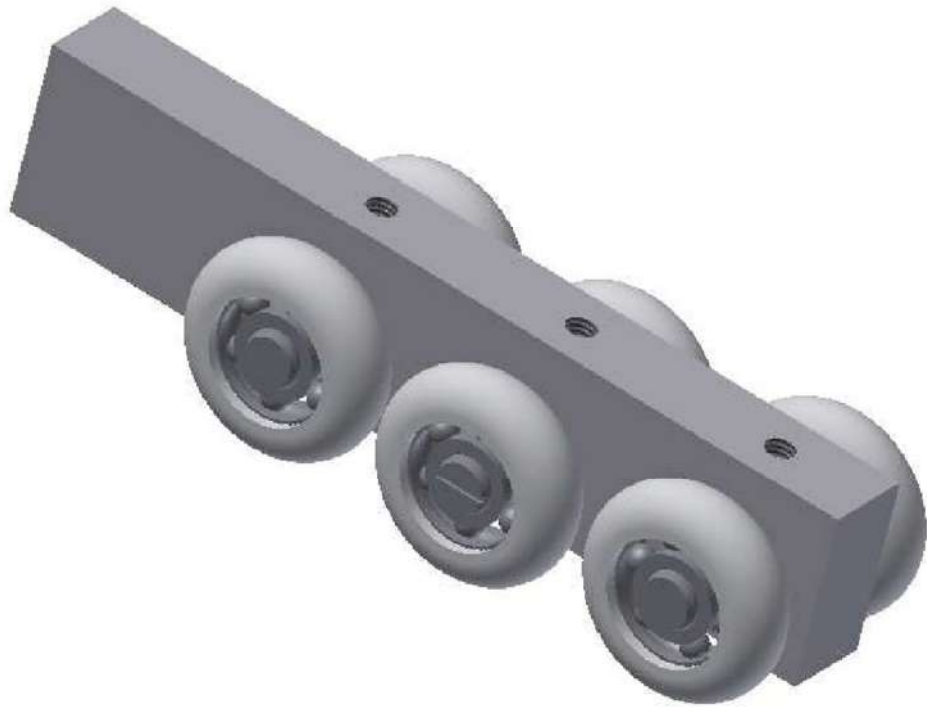


Figure 29: Carrier assy (3.1)

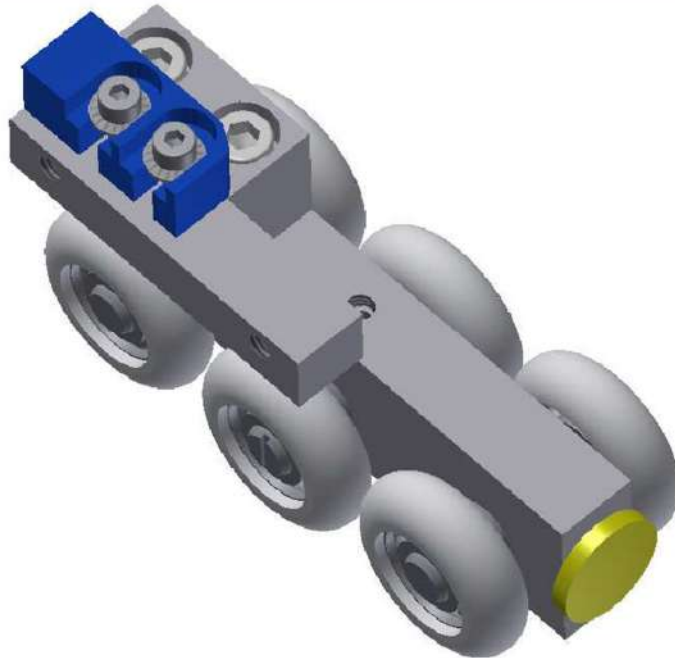


Figure 31: Carriage 2 (4)

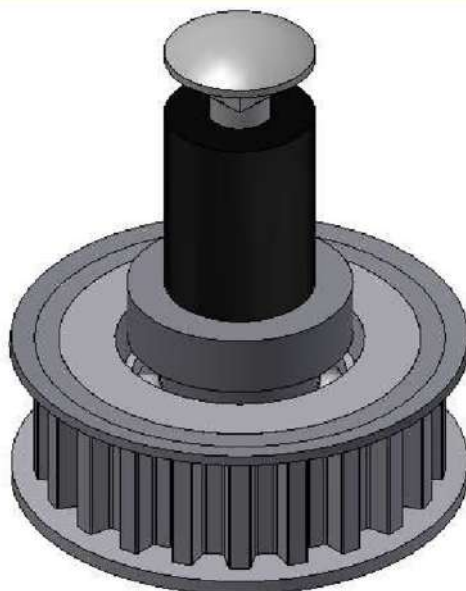


Figure 32: End stop (5)

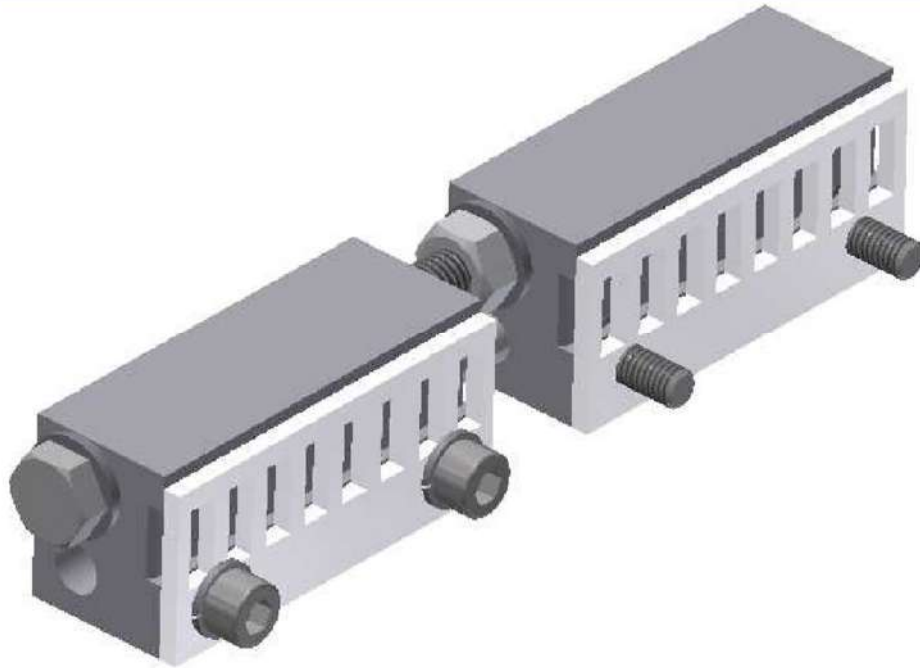


Figure 33: Tensioning device (6)

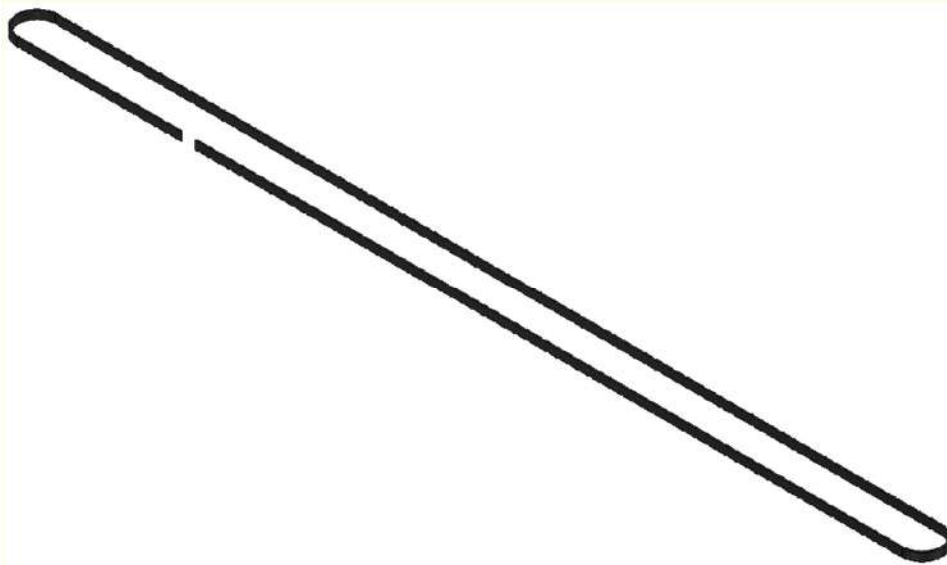


Figure 34: Toothed belt (7)

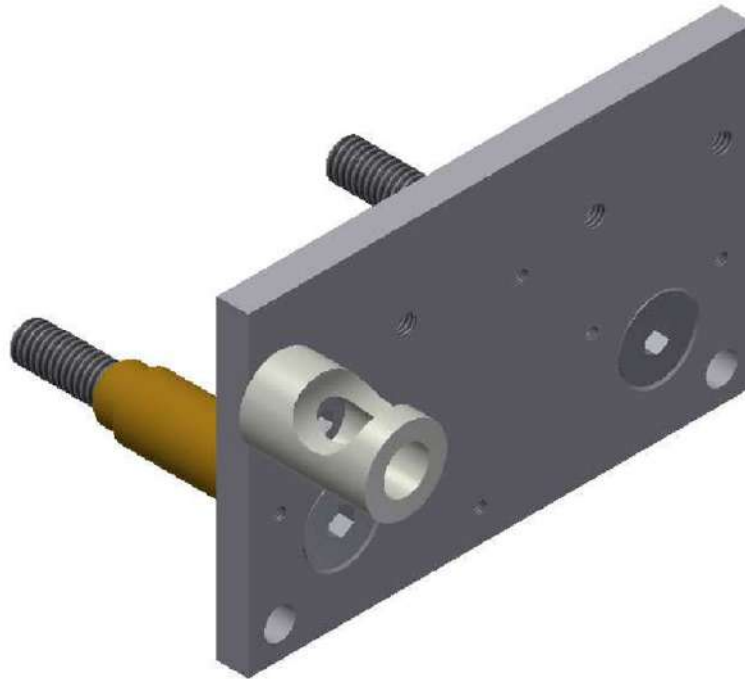


Figure 35: Carrier Plate cpl. (8)



Figure 36: Holder cpl. (12)



Figure 37: Pulley cpl. (13)

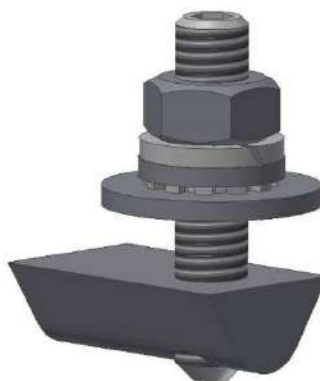


Figure 38: Earthing (14)

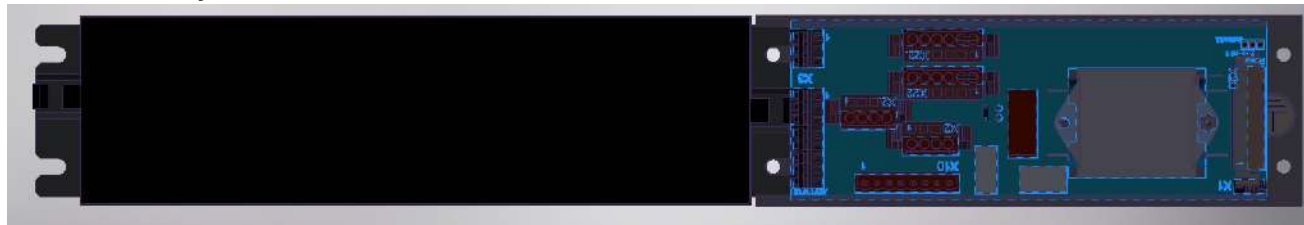


Figure 39: Controller cpl. (16)

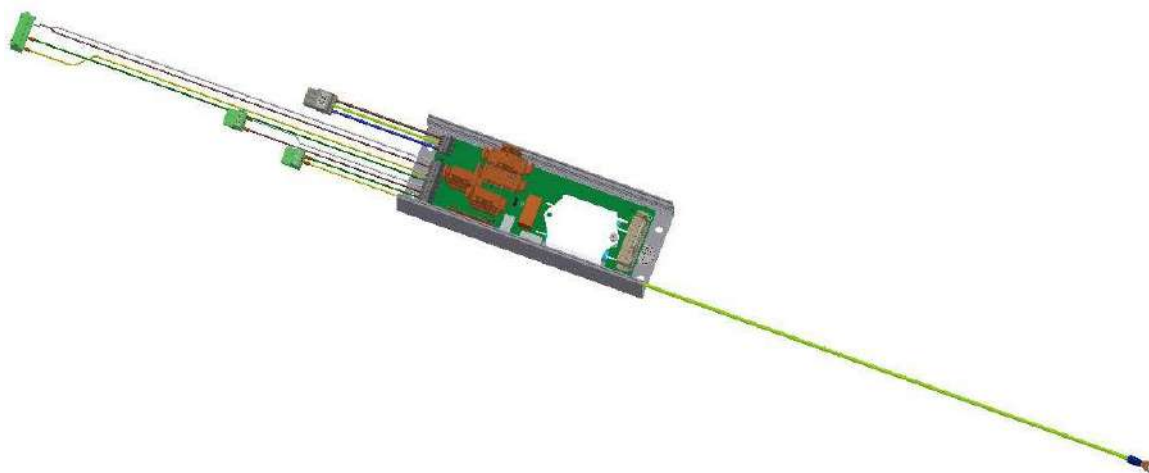


Figure 40: I/O board (17)

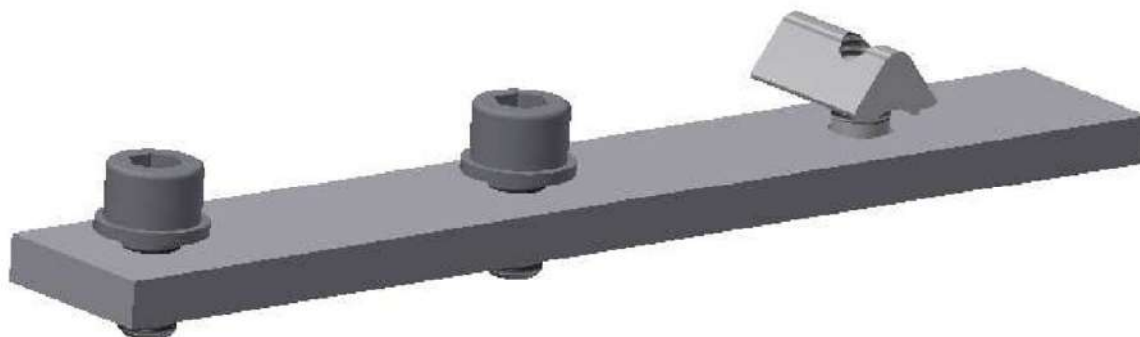


Figure 41: Holder cpl. (18)



Figure 42: Locking cam cpl. (19)

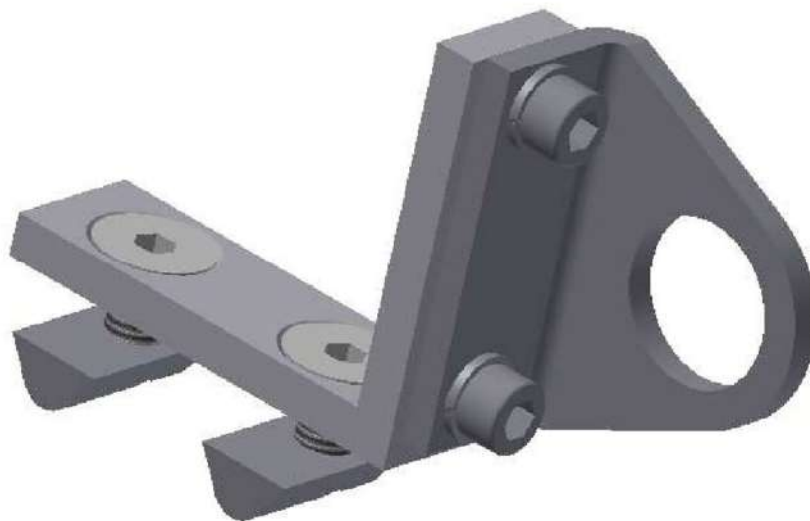


Figure 43: Holder cpl. (20)

9.2 List Section

	Name	Norgren- Type
1	Door Guiding complete	SPC/171534
2	Actuator	SPC/Q121515/2
3	Carriage 1	SPC/Q171534/3
3.1	Carrier assy.	SPC/Q121515/3/4
4	Carrier 2	SPC/Q121515/4
5	End Stop	SPC/Q101529/5
6	Tensioning device	SPC/Q121515/6
7	Toothed belt	SPC/991500/10/3328
8	Carrier plate cpl.	SPC/Q091533/9
9	Rod cpl.	SPC/Q101568/10
12	Holder cpl.	SPC/Q091528/13
13	Pulley cpl.	SPC/Q121515/14
14	Earthing	SPC/Q091528/15
16	Control unit	SPC/Q121515/17
17	I/O board	SPC/Q121515/18
18	Holder cpl.	SPC/Q101568/19
19	Locking cam cpl.	SPC/Q121515/20
20	Holder cpl.	SPC/Q171534/22
21	Holder cpl.	SPC/Q171534/23
22	Plate cpl.	SPC/Q171534/24

Table 4

10 APPENDIX

LIST OF ABBREVIATIONS

ATD400T	Control unit
FW version	Firmware version
SPC.....	Special Product Cylinder

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Installation and Maintenance Instruction
Door System SPC/191506



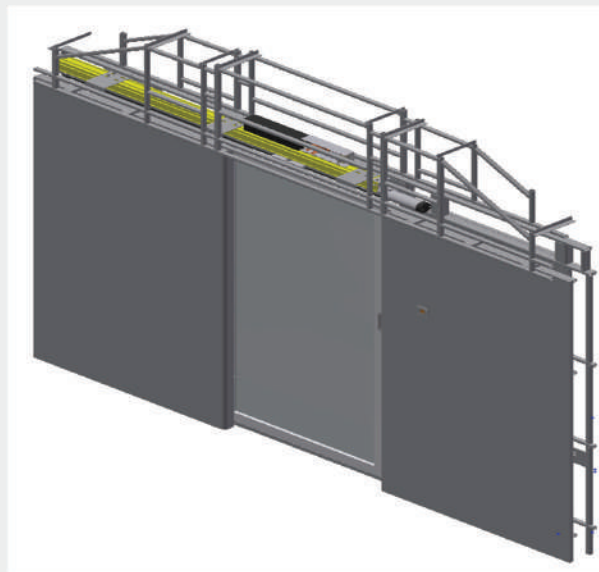
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Location	India-Noida

Operating Instructions
SPIN/0159 AUTOMATIC INTERNAL DOOR

Operating Instruction Manual



Operating Instructions for Automatic Internal Door

The door can be operated using following 3 methods :

1. Manual Press of Button
2. Human Detection Sensor
3. Manual opening/absence of Power

Pre Requisite parameters for operation of Door

1. Ensure 110 VDC supply is connected with door.
2. Check LED light on push button is glowing.
3. Check the doorway area is clean.
4. Check the door movement is smooth, without power-up condition.

Operation of Door Using Manual Button

1. Identify the button as per fig. 1 mounted near to the door, inside and outside of passenger cabin. The light should be illuminating around the button.
2. To open the door, first Press the button

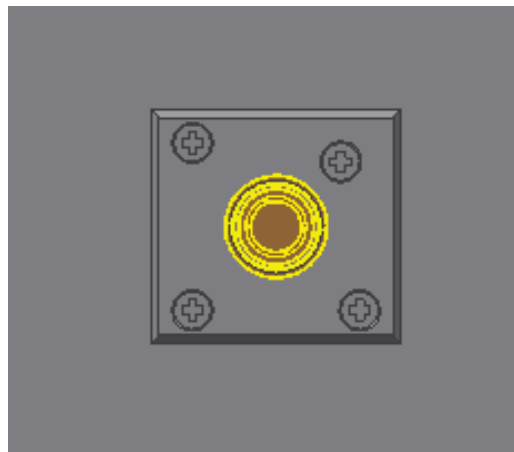


Fig.1 Illuminated push Button

3. The door will open as required.

Operation of Door Using Human Detection Sensor

1. As soon as a person/moving item is detected in the sensing range of sensor. A red light will glow up inside the sensor.

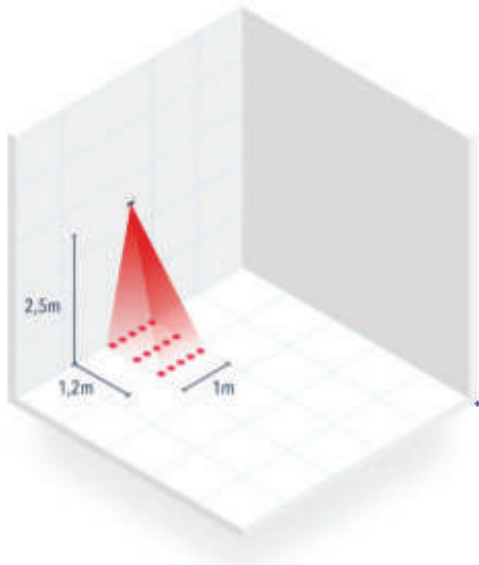


Fig. 2 Sensing range of human detection Sensor

2. The sensor can detect moving items/Human body only.
3. The door will open automatically.

Operation of Door in absence of Power

1. Incase there is no power and the door can be opened using manual force.

Prepared by: Nitin Chauhan

Checked by: Ajay Gupta

Approved by: Dharendra Singh



Project: Automatic Internal Door

Stroke: 750mm

Input: Push Button/Human Sensor

Watt Consumption per Coach

Input Voltage: 24VDC

Sr. No.	Load Description	Consumption[W]	Qty./Door	Total Consumpton [W]
1	Door guiding, electric (stroke 750 mm)	110	1	110
2	Illuminated Push Button	2	2	4
3	Human Detection sensor	3	2	6

Max. Total Consumption is 120 W

Prepared by: Nitin Chauhan

Checked by: Ajay Gupta

Approved by: Dhirendra Singh

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DDSTE11071E00

Rev. 00 - en
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Instruction Manual

Instruction Manual

TRAIN 18 EMU ICF

Project-No. 66408U1A

Customer INDIAN RAILWAY

Project-Part Single leaf Plug Sliding Door

System SST-e1

Created: 2018.04.26
Date

Checked: _____
Date

Kumar, Rajneesh
Name

Name

TAO-
R/DOOERA
Department

Signature

Department

Signature

Released: _____
Date

Translated: _____
Date

Name

Name

Department

Signature

Department

Signature

Contact Address

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Revision History

Version	Date	Creator	Inspector
00	2018.04.26	Kumar, Rajneesh	

Section	Revision
All	First edition.

The original document was issued in English language.

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1 Summary

This section of the instruction manual contains a list of all required specifications and provides a superior index.



NOTE

IFE advises that in order to protect against danger, the installation of or the operation of our products or components is only to be undertaken by authorized personnel in accordance with appropriate technical instructions.



NOTE

IFE accepts no liability under the product liability laws for direct or consequential damage, arising from incorrect operation, incorrect installation or incorrect handling of products or components supplied by us.

2 Referenced Documents

Table 2-1: Reference Documents

Doc. No.	Title
66408U1AR11	SoS Entrance Door
66408U1AR11	Assembly Drawing PD
66408U1AR21	SoS Access Support Device
T003450R47_C01	Assembly Drawing ASD
ED91041R02_C01	Wiring Diagram

3 Definitions

3.1 Terms

Table 3-1: Terms

Term	Description

3.2 Abbreviations

Table 3-2: Abbreviations

Abbreviations	Description
SoS	Scope of Supply
PD	Passenger Door

4 Instruction Manuals

4.1 Contents list

Table 4-1: Instruction Manual – Table of content

Content	Doc. No.	Revision
Introduction and General Information	DDSTE11071E01	00
Door Function Description	DDSTE11071E03	00
Assembly and Adjustment Instruction	DDSTE11071E04	00
Lubrication Instruction	DDSTE11071E05	00
Adjustment Checklist	DDSTE11071E06	00
Set-Up Instruction	DDSTE11071E07	00
Maintenance Plan	DDSTE11071E09	00
Door Diagnostic Description	DDSTE11071E13	00
Spare Part Catalogue	DDSTE11071E20	00
Safety Checklist	DDSTE11071E36	00

DDSTE11071E01

Rev. 00 - en

Instruction Manual

Introduction and General Information

TRAIN 18 EMU ICF

Project-No. 66408U1A

Customer INDIAN RAILWAY

Project-Part Single Leaf plug Sliding Door

System SST-e1

Created: 2018.04.30
Date

Checked: _____
Date

Kumar, Rajneesh
Name

Name

TAO-
R/DOOERA
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Date

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1 Required Documents

Document-No. / Drawing-No.	Description
66408U1AR11	Assembly drawing door
66408U1AR11	Scope of supply
ED91041R02_C01	Wiring Diagram
N401275R81	Repair instruction
T901247	Painting instruction
DDSTE11071E06	Adjustment Checklist

2 General warnings & devices

This manual includes the following warnings categorized in different hazard classes:



DANGER

The non-observance of these instructions will lead to irreversible personal injury or death.



WARNING

The non-observance of these instructions may lead to serious personal injury or death.



CAUTION

The non-observance of these instructions may lead to personal injury as well as to damage to the equipment and/or the environment.

Explanation of the structure of warnings (for example DANGER):



DANGER

Cause of danger
Consequence of danger
Remedial measures

Advices do not obtain security relevant content. They are listed here for sake of completeness.



NOTE

Notes provide helpful tips and additional information about the equipment.

Depending to special employments the warnings in other chapters of this manual point out the particular hazards. Generally the warnings and advices are prefixed to the concerning procedure.

3 Using the documentation

3.1 Breakdown of documentation

The technical documentation is divided into the following sections:

3.1.1 Technical Documentation E00

Contains a list of all the necessary descriptions

3.1.2 Introduction and General Instructions E01

Explains how to use the documentation gives indications of dangers and contains regulations for IFE-components and IFE-documentation.

3.1.3 Door Function Description E03

Explains how the door control system works.

3.1.4 Mounting and Adjustment Instructions E04

Explains how to install/adjust the door system, with all mechanical and electrical components where these are present.

3.1.5 Lubrication Instruction E05

Contains the necessary lubrication work and the lubricants prescribed for such work.

3.1.6 Adjustment Checklist E06

Serves the verification of the door system after the mounting, adjustment or maintenance of the system.

3.1.7 Set-up Instruction E07

Describes the adjustment of all electrical elements and putting the door system into electrical service.

3.1.8 Maintenance Plan E09

Specifies the intervals of time at which maintenance activities should be carried out.

3.1.9 Door Diagnostic Description E13

Explains all failures, which will be collected and saved from the door control unit.

3.1.10 Spare Part Catalogue E20

The Spare part catalogue is an effective aid for finding the needed part numbers of components making up the complete door entry system.

3.1.11 Safety - Checklist E36

Used for checking all safety functions of the door system.



NOTE

The documentation sections listed above contain components of the IFE only.

3.2 Descriptions used

Only the descriptions given in the overall Table of Contents and contractually agreed shall be used. If the technical documentation is dispatched in electronic form, files in the PDF format are thus considered as original documents and as legal basis.

If documents have been translated in accordance to the contract, then in case of discrepancies the original German or English version applies.

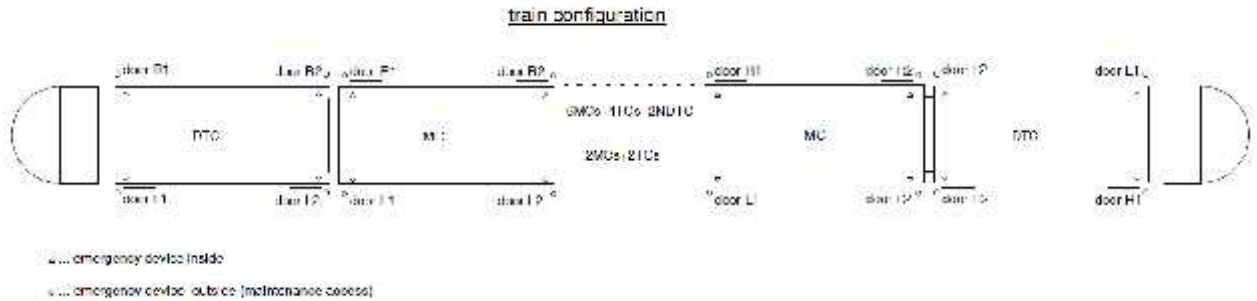
3.3 Amendments

In order to ensure that no confusion can be caused if the documentation is amended, any description that has been amended is given an amendment number.

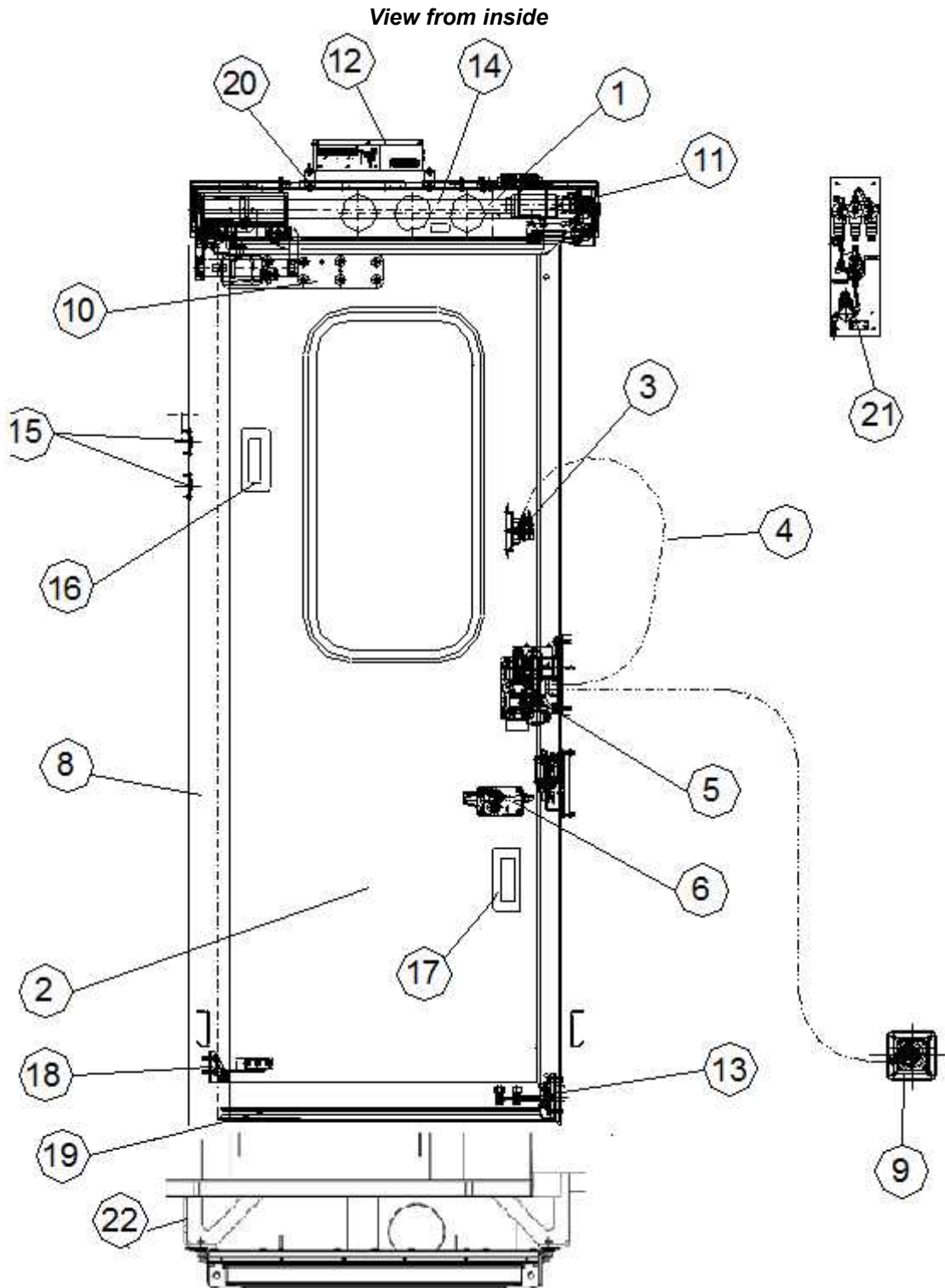
This amendment number must then be entered on the corresponding description in the footer under "Issue No" and in the overall Table of Contents.

If amendments are made to descriptions, the corresponding correction will be distributed afresh in the form of replacement descriptions.

4 Coach lay-out



4.1 General view



These Pos. numbers do NOT refer to IFE's scope of supply list.

Pos.	Designation	Pos.	Designation
1	Drive unit	2	Door leaf
3	Emergency egress device	4	Bowden cable
5	Lock housing mechanism	6	Bolt box
18	Portal frame	9	Emergency access device
10	Door leaf carrier	11	Drive motor (M1)
12	Door control unit	13	Roller swing arm bracket
14	Spindle	15	Push Button
16	Handle recess inside	17	Handle recess outside
18	Holding bracket	19	Bottom guide rail
20	Warning buzzer (H1)	21	Pneumatic controlling board
22	Foot Step		

5 Tightening torques of fastening elements

5.1 General Information

The tightening torques is calculated according to VDI 2230 with assumed friction coefficients. The achieved values are reduced by 7% tool variation and so the reduced tightening torques $M_{A, red}$ are obtained.

Unless stated otherwise on the drawing, the bolted connections have to be tightened with the following tightening torques.

Preconditions:

- tightening of the screw in accordance with class B, DIN 25201-2 Tab. 3
- the required length of engagement is compiled (DIN 25201-2 cap. 7.2.2 respective DIN 25201-6 Tab.1 and 2)
- the design principle has been followed (the screw must be the weakest component, on overload, failure is only to occur in the breaking of the freely loaded part of the thread)
- the surface pressure does not exceed the limiting surface pressure
- the hole of the clamped parts meets class "medium" according to DIN EN 20273

The torque values are not valid for impact wrench or tightening spindle.

The values are settings for torque wrenches.

Table 1: Approximate values for coefficients of friction

Type	Coefficients of friction (min. values)	Bolt		Nut		Lubricant / Adhesive
		Material	Surface	Material	Surface	
A	$\mu_G=0.12$ $\mu_K=0.12$	Steel	yellow galvanized Geomet 500A	Steel Cast iron Aluminum	yellow galvanized nitrocarburized bright	Loctite or none
			Geomet 500A	Helicoil – thread insert	Bright	Optimol Paste White T
B	$\mu_G=0.12$ $\mu_K=0.12$	A2, A4	Bright	A2, A4 Nut A2, A4 Stainless steel (1.4301,...) Helicoil – thread insert	Bright	Thread and Head: Optimol Paste White T
C	$\mu_G=0.13$ $\mu_K=0.20$	A2, A4	Bright	A2, A4 Nut A2, A4 Steel Cast iron Aluminum	yellow galvanized nitrocarburized bright	Loctite

5.2 Metric standard thread and normal head dimension

The values in the following table are for bolts with metric standard thread and head dimensions of hexagon head bolts according to ISO 4014 (DIN 931) and ISO 4017 (DIN 933) or cylindrical bolts according to ISO 4762 (DIN 912) or cup head square neck bolts according to DIN 603.

Table 2: Tightening torque – Metric standard thread and normal head dimension

Tightening torque for bolts with metric standard thread							
Thread	Strength grade	Tightening torque $M_{A\ red}$ in Nm (wrench setting) for					
		$\mu_G=0.12$	$\mu_K=0.12$	$\mu_G=0.12$	$\mu_K=0.12$	$\mu_G=0.13$	$\mu_K=0.20$
		Type A		Type B		Type C	
M4	8.8	2.8					
	10.9	4.1					
	A2-70			2.0		2.6	
M5	8.8	5.5					
	10.9	8.0					
	A2-70			3.8		5.1	
M6	8.8	9.5					
	10.9	14.0					
	A2-70			6.7		8.8	
M8	8.8	23.0					
	10.9	33.8					
	A2-70			16.2		21.4	
M10	8.8	45					
	10.9	67					
	A2-70			32		42	
M12	8.8	78					
	10.9	115					
	A2-70			55		73	
(M14)	8.8	126					
	10.9	185					
	A2-70			89		118	
M16	8.8	192					
	10.9	282					
	A2-70			135		179	
(M18)	8.8	275					
	10.9	392					
	A2-70			188		249	
M20	8.8	388					
	10.9	553					
	A2-70			265		352	
(M22)	8.8	522					
	10.9	743					
	A2-70			356		474	
M24	8.8	668					
	10.9	951					
	A2-70			455		606	

5.3 Metric standard thread and low head dimension

Bolts according to the following standards have a reduced minimum breaking force of 80% compared to bolts with normal head. The tightening torque was reduced accordingly.

The values in the following table are for bolts with metric standard thread and head dimensions of hexagon socket head cap screws with low head according to DIN 6912 or DIN 7984.

Table 3: Tightening torque – Metric standard thread and low head dimension

Tightening torque for bolts with metric standard thread and low head				
Thread	Strength grade	Tightening torque $M_{A, red}$ in Nm (wrench setting) for		
		$\mu_G=0.12$ $\mu_K=0.12$	$\mu_G=0.12$ $\mu_K=0.12$	$\mu_G=0.13$ $\mu_K=0.20$
		Type A	Type B	Type C
M4	8.8	2.2		
	10.9	3.3		
	A2-70		1.6	2.1
M5	8.8	4.4		
	10.9	6.4		
	A2-70		3.1	4.1
M6	8.8	7.6		
	10.9	11.2		
	A2-70		5.3	7.1
M8	8.8	18.4		
	10.9	27.0		
	A2-70		12.9	17.2
M10	8.8	36		
	10.9	53		
	A2-70		25	34
M12	8.8	63		
	10.9	92		
	A2-70		44	58
(M14)	8.8	101		
	10.9	148		
	A2-70		71	94
M16	8.8	153		
	10.9	225		
	A2-70		108	143

5.4 Metric standard thread and nuts with grip

By use of wire thread inserts with grip according to DIN 8140 – B (Helicoil Midgrip) or prevailing torque nuts according to ISO 2330 (self-locking nuts) the overbolting moment has to be added to the tightening torque (VDI 2230 – 5.4.3).

The maximum overbolting moments for the first fastening are given in ISO 2320 (for wire thread inserts DIN 8140-B or prevailing torque nuts).

The values in the following table are for bolts with metric standard thread and head dimensions of hexagon head bolts according to ISO 4014 (DIN 931) and ISO 4017 (DIN 933) or cylindrical bolts according to ISO 4762 (DIN 912).

Table 4: Tightening torque – Metric standard thread and nut with grip


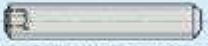

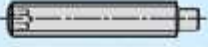

Tightening torque for bolts with metric standard thread and nuts with grip							
Thread	Strength grade	Tightening torque $M_{A\ red}$ in Nm (wrench setting) for					
		$\mu_G=0.12$	$\mu_K=0.12$	$\mu_G=0.12$	$\mu_K=0.12$	$\mu_G=0.13$	$\mu_K=0.20$
		Type A		Type B		Type C	
M4	8.8	3.1					
	10.9	4.4					
	A2-70		2.3		2.9		
M5	8.8	6.0					
	10.9	8.6					
	A2-70		4.4		5.6		
M6	8.8	10.5					
	10.9	15.0					
	A2-70		7.7		9.8		
M8	8.8	25.0					
	10.9	35.8					
	A2-70		18.2		23.4		
M10	8.8	49					
	10.9	70					
	A2-70		35		46		
M12	8.8	83					
	10.9	120					
	A2-70		60		78		
(M14)	8.8	134					
	10.9	193					
	A2-70		97		126		
M16	8.8	202					
	10.9	292					
	A2-70		146		190		

5.5 Countersunk head screws and set screws

For the tightening of countersunk head screws ISO 10642 (DIN 7991) and for set screws the tightening torque is limited by the hexagon socket respectively by the hexalobular socket and the recommendations published by Bossard company are adopted. For countersunk head screws ISO 10642 strength grade 8.8 the values for countersunk head screws ISO 14581 shall be taken.

Source: www.bossard.com / Engineering/ Technical Section.

Table 5: Approximate tightening torque – Countersunk head screws and set screws

Approximate tightening torque $M_{A\ red}$ in Nm				
Tightening torque for countersunk head screws and set screws				
Thread	Class	Strength grade	Tightening torque $M_{A\ red}$ in Nm (wrench setting) for	
			ISO 10642 (DIN 7991)	ISO / DIN
				 ISO 4026/DIN 913  ISO 4027/DIN 914  ISO 4028/DIN 915  ISO 4029/DIN 916
			Type d	Type e
M3	3I	8.8 / 45H	0,6	0,5
	3II	10.9	0,8	
	3III	A2-70 / 21H	0,4	0,2
M4	4I	8.8 / 45H	1,3	1,5
	4II	10.9	2,0	
	4III	A2-70 / 21H	0,9	0,7
M5	5I	8.8 / 45H	2,6	3
	5II	10.9	3,8	
	5III	A2-70 / 21H	1,8	1,5
M6	6I	8.8 / 45H	4,5	5
	6II	10.9	6,6	
	6III	A2-70 / 21H	3,1	2,5
M8	8I	8.8 / 45H	11	12
	8II	10.9	16	
	8III	A2-70 / 21H	7,6	6
M10	10I	8.8 / 45H	21	24
	10II	10.9	31	
	10III	A2-70 / 21H	15	12
M12	12I	8.8 / 45H	36	40
	12II	10.9	54	
	12III	A2-70 / 21H	25	20
M16	16I	8.8 / 45H	90	100
	16II	10.9	132	
	16III	A2-70 / 21H	63	50

5.6 Validity restriction

The tightening torques stated before are not valid for:

- Self-tapping screw joints
- Shims with serrated bearing face (detent edge disk, Nordlock-washer)
- Hexagon head bolts with flange
- Serrated bearing face bolts
- Bolts with hole
- Hexagon thin nuts
- Bolted joints for electrical applications – see DIN 25201-3.

5.7 Screw marking of fastening elements

Required material	
IFE-part number	Designation
-	-
Required additional material/ auxiliary supplies	
IFE-part number	Designation
3TD02727R01	Sealing wax blue

Table 6: Screw marking of fastening elements

5.7.1 Area of Application

- Drive assembly, door leaf assembly, interface screw connection to customer components, maintenance of IFE components.
- All components adjusted and fixed during assembling.

All screwed joints which have to be tightened during assembly with a certain torque indicated on the drawing.

6 Hazard Information

Each single hazard information is noted in the appropriate documentation section.

6.1 Safety Notes

When using lubricants, adhesives, sealant or other materials listed in below sections observe and follow the manufacturer's safety instructions to preclude damages to or impairment of health. Observing the manufacturer's instructions for use also ensures compatibility with other materials or manufacturing equipment.

6.2 Personal protection

The personnel must wear appropriate protective clothing when working on the door system.

7 Unpacking instructions

7.1 Contents of pack units

A package list is enclosed with each delivery slip. Each package (pack unit) is marked with a series number (e.g. Pack 1).

This pack unit contains all the components that are listed on the corresponding package list, and a computer printout is attached to each individual component group giving the following information:

- part number
- part designation
- item number on the delivery list
- number of items

7.2 Damage

IFE carries guarantee out for the stipulated condition of the commodity/documentation, in accordance with conditions regulated under chapter 9. The commodity/documentation is to be examined with assumption for lack.

Lack is to be communicated within three calendar dates in writing with use of RMA warranty claim form stated under chapter 9.4. In the case by absence hurrying additionally the delivery note number and the date are to be indicated.

Transport damages are to be noted on the delivery note of the delivering enterprise and be given as above aforementioned at IFE well-known.

The assumption generally takes place in accordance with Incoterm.

8 Storage Instruction

8.1 Storage of pack units (preliminary storage for Installation in batches)

The pack units must be stored in a dry, non-dusty, well-ventilated room. Care should be taken to ensure that the boxes are not stored on their sides or upside down. The surrounding temperature of storage should be between 0° C and +25°C.

Goods, which packed up in steel frames (i.e. door leaves) or packed up in wood boxes (i.e. drive units) should not be stored in this way for more than six months. Goods, which packed up in cardboard boxes (i.e. additional parts) should not be stored in this way for more than one month (First In – First Out).

8.2 Storage of separate components (e.g. consignment store for spare parts)

8.2.1 Storage of mechanical parts

Mechanical parts should be stored in a dry room, packed in cases and protected against damage to the paintwork.

Bearings (ball bearings, joint bearings) and guide bars and parts with untreated surfaces must be stored in a dry place, protected against corrosion.

Telescopic rails with removed covers should be kept or stored such, that the ball and ball cages are protected against dirt, such as dust and shavings.

8.2.2 Storage of rubber sections

Storage room:

The storeroom should be cool, dry, non-dusty and well ventilated.

Temperature:

Rubber sections should not be stored at temperatures of less than -10° C and or greater than +25°C.

Lighting:

Rubber sections must be protected against sunlight and strong artificial light containing a high proportion of ultraviolet light.

The storage of the rubbers must keep them straight; never store rubber sections in rolled form.

8.2.3 Storage of pneumatic components:

Storage room:

Pneumatic components (valves, cylinder...) should be kept or stored well-packed, in dry, non-dusty and well ventilated places.

Pneumatic joints must be kept closed with these components (stoppers, adhesive tape).

Temperature:

Pneumatic components should not be stored at temperatures of less than -10° C and or greater than +35°C.

Humidity:

Be aware not to get condensing. The relative humidity must not greater than 50 %.

Maintenance and servicing:

To be accomplished at expiration of a storage time of 2 years (manufacture date at type label is crucial) the standard initial lubrication is a functional test (e.g. leak test) to be renewed and. At expiration of a storage time by 5 years additionally an exchange of the seal elements (so far as possible) is to be made.

8.2.4 Storage of electrical components:

Electrical components (switches, electrical controls) should be kept or stored well-packed, in a dry, non-dusty place, at a temperature between 0° and +40°C.

9 Warranty

9.1 Warranty

See main contract.

9.2 Exception of warranty

With the exception of following items in the warranty period:

- a) Wearing parts (sealing, bearings, rollers, bushes...)
- b) Corrosion, due to the fact of improper use and damages
- c) Damages caused by third parties

9.3 Loss of Guarantee

The period of warranty agreed according to the main contract expires due to improper use, improper installation or improper handling or operation contrary to chapter 15 (ratings) of the products and components supplied by us.

We do not assume liability for damages or consequential damages arising there form.

9.3.1 Signed fastening elements

Signed fastening screws (e.g. adjusting screws on limit switches, break, and so on) may only be opened upon prior consultation with the IFE customer service and upon subsequent confirmation in writing by the latter. The opening of such screws without prior consultation and confirmation in writing will cause the loss of warranty claims. Furthermore, we will not be able to warranty for the proper

function of the door system and we decline all responsibility in the case of injury to persons or material damages.

9.3.2 Guarantee sealing on door control unit

The guarantee sealing on the door control unit must not be damaged or removed. If guarantee seal is damaged, IFE will not be able to warranty-/guarantee for the proper function of the door system and we decline all responsibility in the case of injury to persons or material damages.

Maintenance – or repair work on the door control unit carried out by IFE only. The exchange of NO-VRAM by customer takes place on own risk.

9.4 Warranty Claim form

In case of a warranty claim and to guarantee a correct and short-term warranty claim process, please fill out the required * fields of the IFE RMA-claim form (form see following page) and send them to IFE.





NOTE

If components without any serial number then the upstream serial numbers have to be advised (i.e.: door push button → serial number of door leaf; drive motor → serial number of drive unit)

After receiving the IFE RMA-claim form information at IFE you will get an internal IFE-claim number, which is used to mark the claimed goods, and just then the goods are sent to IFE.

9.4.1 RMA- Claim form / RMA

Figure 9-1: RMA-claim form / RMA

 IFE Innovations For Entrance Systems 33.a Straße 1 3331 Kematen / Ybbs Tel.: +43 7448 9000 www.ife-doors.com 	
Ihre Lieferanschrift / your delivery address.* Reklamationsdatum/claim date*	
Fehler wurde erkannt/claim noticed* <input type="checkbox"/> bei Montage (if assembly) <input type="checkbox"/> im Betrieb (during operation)	
Ihre Adresse (Rechnungsanschrift) / Your address (invoice address)* Kontaktperson / responsible person* Telefon / phone.* Fax: email:	Serienr./serial no.*# Stk. /pcs.* Projekt Nr./project no.:
Bezeichnung /part-description* IFE Teilnr./part no.* Fehlerbeschreibung description of failure.*	Identnummer Kunde/your part no.: Fzg.-Nr./Car no.: Tür-Nr./door-no.: Kunden RMA Nr./customer claim no.* IFE RMA-Nr./claim no.:
Bezeichnung /part-description* IFE Teilnr./part no.* Fehlerbeschreibung description of failure.*	Identnummer Kunde/your part no.: Fzg.-Nr./Car no.: Tür-Nr./door-no.: Kunden RMA Nr./customer claim no.* IFE RMA-Nr./claim no.:
Bezeichnung /part-description* IFE Teilnr./part no.* Fehlerbeschreibung description of failure.*	Identnummer Kunde/your part no.: Fzg.-Nr./Car no.: Tür-Nr./door-no.: Kunden RMA Nr./customer claim no.* IFE RMA-Nr./claim no.:
INFO: Reklamierte Waren/claimed goods Wir weisen darauf hin, daß eine Behandlung der Reklamation nur bei vollständig ausgefülltem Formular erfolgen kann (Pflichtfelder sind mit * gekennzeichnet) We herewith inform you, that we can't process claims with this form partially filled in. (*required fields)	
<small>* - Weist detaillierte Komponente keine Seriennummer auf, dann Seriennummer der übergeordneten Baugruppe verwenden/* - If there is no serial number at the stated part fill in serial number of next higher assembly group!</small>	

9.4.2 RMA- Claim form for DCU / DCU

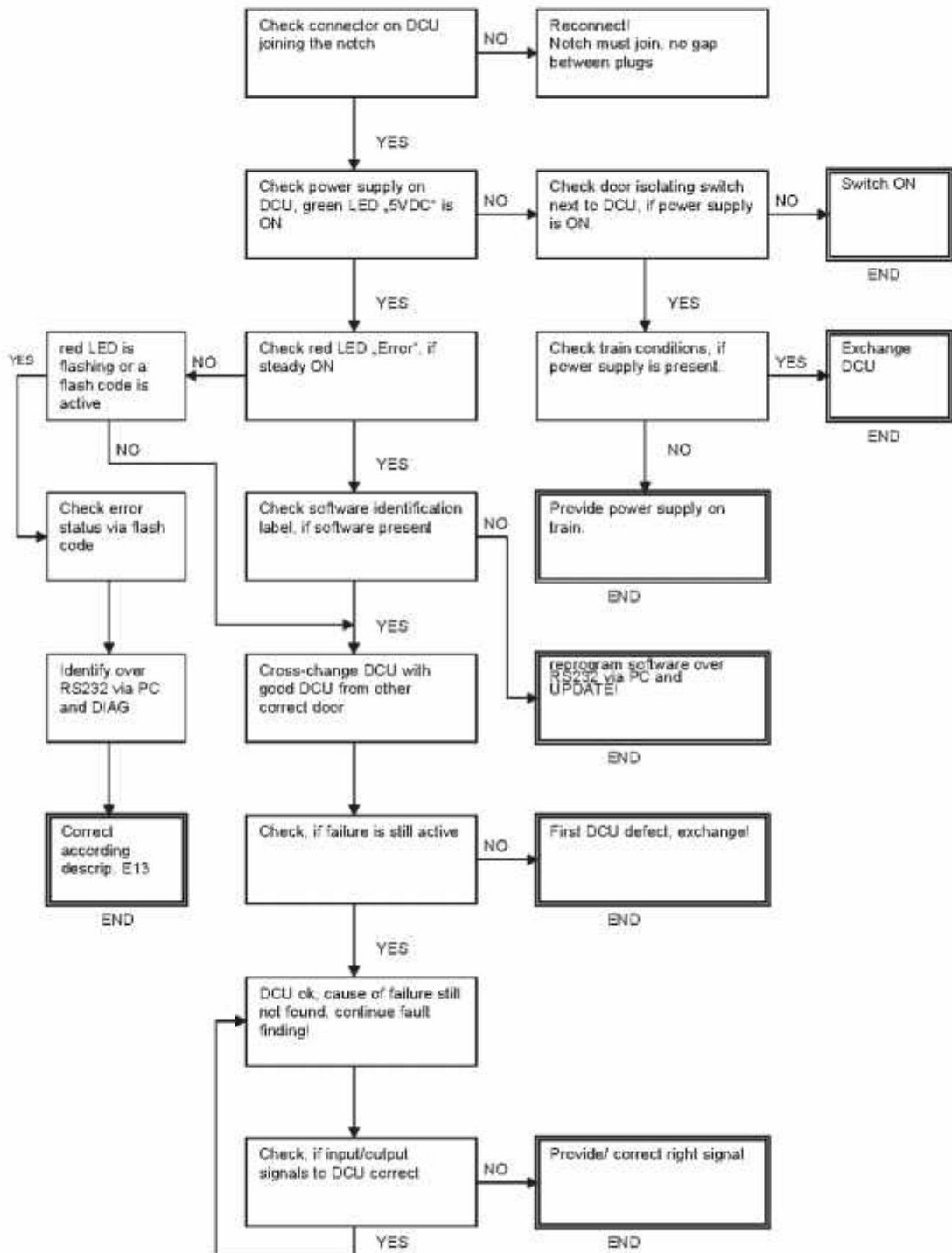
Figure 9-2: RMA-claim form for DCU / DCU

RMA Claim Form for door control unit only

S-No.* <small>(examples: 31.1563-06/A7-001; 701690/079/0203; 0041591A-01/01-Z453)</small> P-No.* <small>(examples: E202200R13; 3ED00821R90)</small> Type: <small>(examples: PMC-24; T2G 24; MDC-240MV8-10)</small>		 IFE Innovations For Entrance Systems 33.a Straße 1 3331 Kematen / Ybbs Tel.: +43 7448 9000 www.ife-doors.com KNORR-BREMSE	claim date*																		
responsible person* phone.* Fax: email	failure noticed* <input type="checkbox"/> at assembly <input type="checkbox"/> during operation																				
Type of malfunction / Failure description: <i>(choose the main fault group)</i> <div style="display: flex; flex-direction: column;"> <div style="margin-bottom: 10px;"> DOOR <input type="checkbox"/> no door movement - door does not open after opening command <input type="checkbox"/> no door movement - door does not close after closing command <input type="checkbox"/> door movement interrupted - door not being in fully end position <input type="checkbox"/> faulty signal - no / wrong signals between train and door control unit (DCU) </div> <div style="margin-bottom: 10px;"> STEP <input type="checkbox"/> no step movement - step does not open after opening command <input type="checkbox"/> no step movement - step does not close after closing command <input type="checkbox"/> step movement interrupted - step not being in fully end position </div> <div> OTHER FAILURE <input type="checkbox"/> faulty on auxiliary - no / wrong function <input type="checkbox"/> faulty communication - no / wrong BUS communication system <input type="checkbox"/> software problem - malfunction with service software UPDATE, DIAG <input type="checkbox"/> _____ </div> </div>																					
Trouble shooting: <i>(proceed as following - for details see also diagram at next page!)</i> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%; padding: 5px;">A) visual check for mechanical damages of DCU housing <small>comments: _____</small></td> <td style="width: 20%; text-align: right; padding: 5px;"><input type="checkbox"/> checked</td> </tr> <tr> <td style="padding: 5px;">B) check, if smoke or bad smell comes from DCU <small>comments: _____</small></td> <td style="text-align: right; padding: 5px;"><input type="checkbox"/> checked</td> </tr> <tr> <td style="padding: 5px;">1) check connectors on DCU joining the notch, no gap between plugs <small>comments: _____</small></td> <td style="text-align: right; padding: 5px;"><input type="checkbox"/> checked</td> </tr> <tr> <td style="padding: 5px;">2) check power supply on DCU - "SVDC" LED is green illuminated <small>comments: _____</small></td> <td style="text-align: right; padding: 5px;"><input type="checkbox"/> checked</td> </tr> <tr> <td style="padding: 5px;">3) check "Error" LED, if steady red illuminated or flashing <small>comments: _____</small></td> <td style="text-align: right; padding: 5px;"><input type="checkbox"/> checked</td> </tr> <tr> <td style="padding: 5px;">4) check software on identification sticker and via UPDATE and personal computer <small>comments: _____</small></td> <td style="text-align: right; padding: 5px;"><input type="checkbox"/> checked</td> </tr> <tr> <td style="padding: 5px;">5) cross-change of DCU with good one from other correct door <small>comments: _____</small></td> <td style="text-align: right; padding: 5px;"><input type="checkbox"/> checked</td> </tr> <tr> <td style="padding: 5px;">6) check diagnostic codes via DIAG and personal computer <small>comments: _____</small></td> <td style="text-align: right; padding: 5px;"><input type="checkbox"/> checked</td> </tr> <tr> <td style="padding: 5px;">7) check input/output signals via personal computer <small>comments: _____</small></td> <td style="text-align: right; padding: 5px;"><input type="checkbox"/> checked</td> </tr> </table>				A) visual check for mechanical damages of DCU housing <small>comments: _____</small>	<input type="checkbox"/> checked	B) check, if smoke or bad smell comes from DCU <small>comments: _____</small>	<input type="checkbox"/> checked	1) check connectors on DCU joining the notch, no gap between plugs <small>comments: _____</small>	<input type="checkbox"/> checked	2) check power supply on DCU - "SVDC" LED is green illuminated <small>comments: _____</small>	<input type="checkbox"/> checked	3) check "Error" LED, if steady red illuminated or flashing <small>comments: _____</small>	<input type="checkbox"/> checked	4) check software on identification sticker and via UPDATE and personal computer <small>comments: _____</small>	<input type="checkbox"/> checked	5) cross-change of DCU with good one from other correct door <small>comments: _____</small>	<input type="checkbox"/> checked	6) check diagnostic codes via DIAG and personal computer <small>comments: _____</small>	<input type="checkbox"/> checked	7) check input/output signals via personal computer <small>comments: _____</small>	<input type="checkbox"/> checked
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B) check, if smoke or bad smell comes from DCU <small>comments: _____</small>	<input type="checkbox"/> checked																				
1) check connectors on DCU joining the notch, no gap between plugs <small>comments: _____</small>	<input type="checkbox"/> checked																				
2) check power supply on DCU - "SVDC" LED is green illuminated <small>comments: _____</small>	<input type="checkbox"/> checked																				
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4) check software on identification sticker and via UPDATE and personal computer <small>comments: _____</small>	<input type="checkbox"/> checked																				
5) cross-change of DCU with good one from other correct door <small>comments: _____</small>	<input type="checkbox"/> checked																				
6) check diagnostic codes via DIAG and personal computer <small>comments: _____</small>	<input type="checkbox"/> checked																				
7) check input/output signals via personal computer <small>comments: _____</small>	<input type="checkbox"/> checked																				
INFO: claimed goods We herewith inform you, that we can't process claims with this form partially filled in. (*=required fields)																					

RMA Claim Form for door control unit only

Trouble shooting diagram for door control unit



10 Over-sea packaging

If over-sea packaging is agreed and required, then usually a drying agent will be added at IFE for a maximum transportation period of 6 months. If the maximum transportation period will extend then prior consultation and agreement with IFE is required.

11 General IFE-instructions for inspection the painting surface

11.1 Inspection carried out by the customer

For correct inspection of the painting it is necessary to use a service book.

Following inspections are required by the customer:

- a) Visual check for mechanical damages
- b) Correction of the mechanical damages according to the painting structure (Cleaning the corrosion area, and re-painting in accordance with repair instruction N401275R83 and painting instruction no. T901247)
- c) Note the damage in the service book
- d) After each fourth cleaning (ph-value of cleaners should be between 5 and 7) of the inner and outer parts a preservation of the parts is recommended in accordance with the manufacturer's user guide (paint).
- e) If during the visual check, corrosion is detected, which is not due to mechanical damages, and then IFE must be informed immediately.
- f) If faults have to be repaired due to mechanical damages or corrosion in which corrosion on the ground is visible, IFE need to be contacted in order to obtain the correct information for the repair of this damage.

11.2 Assumptions for warranty (paint)

- a) The coating / painting will be checked or repaired in accordance with IFE instructions.
- b) All cleaners, which will be used by the Customer, have to be confirmed by IFE or the manufacturer (paint).
- c) Differences in matches or brilliance due to ultra violet light or cleaners will be not accepted as warranty claim.

12 Repairs on the wagon or the vehicle



CAUTION

Owing to the torsion of the vehicle body, the adjustment of the door system will have to be checked according to Checklist DDG10203R06 after the lifting of the vehicle (e.g.: Repair or replacement of the pivoted bogies ...)

13 Exchange of electrical components



DANGER

The exchange of electric components (limit switch, door control unit...) must be carried out with an electrically cut out condition. Therefore the respective door area must be electrically taken out of service. We will not be able to guarantee for the proper function of electric components and we decline all responsibility in the case of material damages.

14 Accessibility of components of IFE Door System

IFE components should be able to be reached easily for maintenance, overhaul and repair works within 10 minutes. These have to be guaranteed by the coach builder through using practical and quick removable covers.

Should these not be reached by the coach builder due to design reasons, IFE will be not liable for additional expenses to remove covers or after costs.

15 General technical requirements

- temperature range: 5° C to +70 ° C
- voltage range: 110VDC +25/-30 %
- humidity: up to 100 %
- Max. vehicle speed: 200 km/h
- Max. passing vehicle speed 200 km/h
- air supply: 6-9 bar



CAUTION

No additives (e.g. glycol, antifreeze, dirt,) in the air supply for the IFE pneumatic system are allowed



NOTE

Door control and wiring correspond to protection class IP 20 according to EN 60529.

16 Technical customer service

If you have any questions, our Customer Support would be pleased to help you.

Please contact the following address /

IFE-Victall Railway Vehicle Door Systems (Qingdao) Co., Ltd.
Huanhai Economical and Technical Development Zone
Chengyang District
Xinghaizhi Road No.2
266108 Qingdao
P.R. China

Phone: +86 0532 8793 8567

Fax / : +86 0532 8493 1003

17 Issue Remark

Issue	Date	Prepared	checked/released
00	2018.04.30	Kumar, Rajneesh	
	item	modification	
		First edition /	

Door function description

Single leaf sliding plug door with step
(66408U1AR11/R12/R21)

TRAIN 18 Coaches_MEDHA

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<i>Issue No.:</i> 00	<i>prepared/modified</i> 27.07.2018 Yutao	<i>checked/released</i> 27.07.2018 PengJ	<i>Total pages</i> 23	<i>Page No.</i> 1
IFE-VICTALL No.2 XingHan Branch Road ; Huanhai Economic and Technical Developing Zone Chengyang District, QingDao 266108			Documentation-No.: DDSTE11071E03	

Take notice - Take notice - Take notice - Take notice - Take notice

We advise that in order to protect against danger, the installation of or the operation of our products or components is only to be undertaken by authorised personnel in accordance with appropriate technical instructions.

We accept no liability under the product liability laws for direct or consequential damage, arising from incorrect operation, incorrect installation or incorrect handling of products or components supplied by us.

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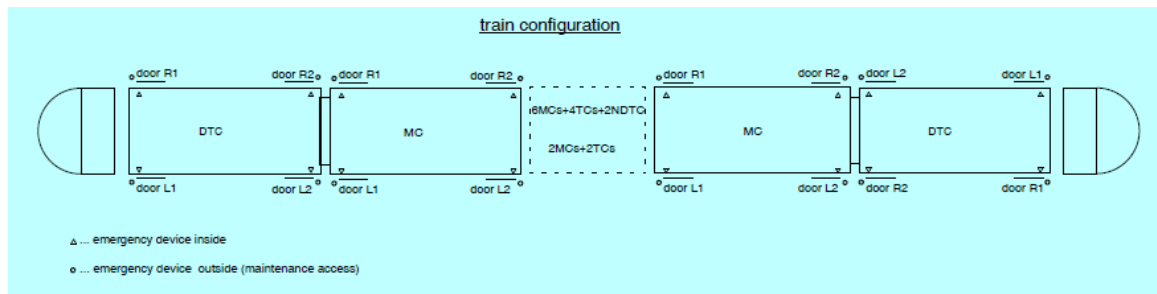
1 Required Documents

Document-No/ Drawing-No	Description
ED91041R02_C01	Wiring diagram
ED99002R15_C01	Pneumatic diagram
DDSTE11071E13	Door Diagnostic Description
66408U1AR11/R12/R21	Assembly drawing

2 General

2.1 System description

Door arrangement



Each car is equipped with 4 electrical single leaf sliding plug doors whereas every door is controlled by the IFE door control unit MDC2-110-I-RS4.

The door control unit MDC2-110-I-RS4 controls the door and step motors in open and close position, in accordance with local door control commands (e.g. push button ...), train control signals (e.g. $v > 5\text{kph}$, central close ...).

The door control unit consists a programmable logic module, a power module, a input extension module, a second motor module and RS485 bus module.

The door control unit is programmable and incorporates

- 42 input signals (E1 ...E18, E19... E34, E35...E42) and
- 10 output signals (A1 A8, A17...A18)

which are governed by the software contained in the system memory.

Accordingly, different control requirements or customers preferences can be accommodated merely by changing the software. The software can be downloaded on the RS232 service interface using a laptop and the download software "UPDATE" from IFE.

The door diagnostic system is explained in the document door diagnostic description.

The diagnostic memory of the DCU can be read out via the RS232 service interface using a PC (laptop) and the diagnostic software DIAG from IFE.

2.2 Marking of the software version:

The software version of the DCU contained in the flash EPROM can be shown by using the IFE software "UPDATE".

Additionally there is a sticker on the housing of the DCU. On this sticker you can find numbers from "01" up to "20", which means the last two numbers of the software number, i.e. for the software number E406255P01 the number "01" on the sticker has to be marked.

If it is necessary to change the software once, the last two numbers of the software number will be increased (e.g. "02" for software number E406255P02).

Are there marked more than one number, the highest number is the current version.

2.3 Technical data of the door control unit MDC2-110-I-RS4

- Voltage supply: 110VDC +25/-30%
- Internal power consumption: < 25 W
- Maximum motor current: 10A; short-circuit proof
- Digital inputs:
 - 1 input (E1), positive switched
input current 30mA at 110VDC
 - 29 inputs (E2 – E14, E23-E30, E35-E42) positive switched
(input current 5mA at 110VDC)

- 4 inputs (E17/ E18, E33/E34) for door position sensor
- 4 inputs (E19-E22) potential free inputs
- 4 inputs (E15/ E16, E31/E32) two-wire input for sensitive edge
- Digital outputs: 7 outputs. (A1-A4, A6-A8,A17) positive switching (short circuit proof, max. 21W lamp load)
2 outputs. (A5/A18); positive switching (short circuit proof, output load 65W)
- “safety relays”, “internal power supply (5VDC)”, “error” and “status info” are indicated with LED’s
- temperature range : -40°C +70°C
- tested according to:
 - EN 50155 (rules for electronic equipment used on rail vehicles)
 - EN 50121-3-2 (electromagnetic compatibility part 3-2 – rolling stock – apparatus)
 - IEC 571 (electronic equipment used on rail vehicles)
- software number E406255
- weight: 3.7 Kg

2.4 System data

- Voltage supply: 110VDC +25/-30%
- Pressure supply: 6 – 9bar (IFE pressure regulator is pre-set at 6bar)
- Door opening time 4 ± 1 seconds
- Door closing time 4 ± 1 seconds
- Step opening time 2 ± 1 seconds
- Step closing time 2 ± 1 seconds
-
- Average power consumption of the door 140 W (opening and closing sequence)
- Maximum power consumption of the door 500 W (for a time of 500 ms) (locking, unlocking, reopening)
- Free opening width door 800 +5/-0 mm
- Free opening width step 150 +5/-0 mm
- Squeezing force (according to EN 14752)
 - < 150 N_{effective} for the first closing sequence
 - < 200 N_{effective} for the following closing sequences
 - < 300 N_{peak}
 - Measuring method according EN 14752
- Test bar for obstruction detection 30 x 60 mm
(= the smallest detectable piece which provides a reliable responding of the obstruction detection during the closing sequence) Testing according to EN14752

3 Door control and signal elements

3.1 Control elements related to a door

Element 元件	Number 编号	Location 位置	Supply 供货
Door control unit	A1	Door drive unit	IFE
Circuit breaker	F1	Vehicle	Customer
Warning buzzer	H1	Door drive unit	IFE
Warning lamp inside	H3	Vehicle	Customer
Warning lamp outside	H4	Vehicle	Customer
Door motor	M1	Door drive unit	IFE
Step motor	M2	Step	IFE
Limit switch – door closed and locked	S1	Main lock	IFE
Limit switch – emergency device inside	S3-1	emergency device inside	IFE
Limit switch – emergency device inside	S3-2	emergency device inside	IFE
Limit switch – emergency device outside	S4-1	emergency device outside	IFE
Limit switch – emergency device outside	S4-2	emergency device outside	IFE
Limit switch – door out of service	S5	Isolation device	IFE
Switch – service toggle switch	S7	Door drive unit	IFE
Limit switch – door 98% closed	S8	Main lock	IFE
Pressure switch	S15	Pneumatic panel	IFE
Limit switch – step closed	S16	Step	IFE
Limit switch – step emergency operation	S17-1	Step	IFE
Limit switch – step emergency operation	S17-2	Step	IFE
Switch – step electrical isolation	S19	Door drive unit	IFE
Push button open	S21	Door leaf outside	IFE
Push button open	S22	Vehicle	IFE
Different connectors	X..	See wiring diagram	IFE
Solenoid valve – open	Y1	Pneumatic panel	IFE
Solenoid valve – close	Y2	Pneumatic panel	IFE
Solenoid valve – blocking at $v > 5$ kph	Y3	Pneumatic panel	IFE
Brake step	Y4	Step	IFE

3.2 Elements located at the door control unit (DCU)

3.2.1 At the front side of the DCU following elements are located:

- LED's:

5 VDC (green)	internal power supply is available
ERROR (red)	failure DCU (see diagnostic description)
STATUS INFO (yellow)	without any function
STATUS INFO 2 (yellow)	without any function
SAFTEY RELAY OFF (green)	safety relay status
SAFTEY RELAY 2 OFF (green)	safety relay status
- BUTTON: The service button has 2 functionalities:

1) Initialisation of nominal motor current curves:

Initialisation of the nominal motor current curve and learning of the typical motor current curve for this door:

The voltage supply is switched off. Then the button should be pressed and held, until the red LED extinguish while the voltage supply is switched back on.

Then the door learns the required typical motor current during the next opening and closing sequence.

During these sequences, there must not be any obstructions to door motion or other door problems, because the door control unit would learn these sections and include them in the door motor current curve.

The initialisation can be started if the door is open or closed.

2) Closing of a non closed door (operating time < 3 s)

A non closed door can be closed by operation this button (See chapter 5.5.5)

- RS232 interface :Service interface with one 9 pole SUB – D male connector (X8)
 - For software upload on each door control unit with the IFE – software UPDATE
 - For diagnostic issues (PC software DIAG)
- CAN interface: Internal door bus system with one 9 pole SUB – D male (X7) and one 9 pole SUB – D female (X6) connector
- DIP – switch: The four DIP switches are pre-adjusted and have to be in position OFF. The DIP switches are not used for this project.

3.2.2 At the right side of the DCU following elements are located:

- X1 connector for logic module
- X2 connector for power module
- X3 connector for input extension module
- X4 connector for second motor module

3.2.3 At the left side of the DCU following elements are located:

- X9/X10 connector for RS485 module

3.3 DCU input and output signals

DCU logic module	X1.1	E1	No motion	"1" = no motion
	X1.2	E2	Pushbutton open inside	"1" = operated
	X1.3	E3	Central open	"1" = open
	X1.4	E4	v>5kph	"1" = v>5kph
	X1.5	E5	Pushbutton open outside	"1" = operated
	X1.6	E6	Central close	"1" = close
	X1.7	E7	Spare	
	X1.8	E8	Limit switch – door closed & locked	"0" = door closed& locked
	X1.9	E9	Limit switch – door 98% closed	"0" = door 98% closed
	X1.10	E10	Limit switch – door emergency device outside	"1" = emergency operated
	X1.11	E11	Limit switch – door out of service	"0" = out of service
	X1.12	E12	Limit switch – door emergency device inside	"1" = emergency operated
	X1.13	E13	Closure warning	"1" = active
	X1.14	E14	Not used	
	X1.15	KI(-)	Not used	
	X1.16	E15	Not used	
	X1.17	KI(-)	Not used	
	X1.18	E16	Not used	
	X1.19	E17	Door position sensor (direction)	"0" = pulse
	X1.20	E18	Door position sensor (pulse)	"0" = pulse
	X1.21	G+	Power supply position sensor (12VDC)	
X1.22	G-	Power supply position sensor(0VDC)		

DCU input extension module	X3.1	E19(+)	Door coding bit 0	"1" = active
	X3.2	E19(-)	Door coding bit 0	
	X3.3	E20(+)	Door coding bit 1	"1" = active
	X3.4	E20(-)	Door coding bit 1	
	X3.5	E21(+)	Door coding bit 2	"1" = active
	X3.6	E21(-)	Door coding bit 2	
	X3.7	E22	Door coding bit 3(spare)	"1" = active
	X3.8	E22	Door coding bit 3	
	X3.9	E23	Pressure switch	"1" = p>4,5bar
	X3.10	E24	spare	
	X3.11	E25	spare	
	X3.12	E26	Not used	
	X3.13	E27	Not used	
	X3.14	E28	Not used	
	X3.15	E29	Not used	

	X3.16	E30	Not used	
	X3.17	KI(-)	Not used	
	X3.18	E31	Not used	
	X3.19	KI(-)	Not used	
	X3.20	E32	Not used	
	X3.21	E33	Not used	
	X3.22	E34	Not used	

DCU power module	X2.1	A8	Warning buzzer	"1" = active
	X2.2	A7	Warning lamp inside(max 21W lamp load)	"1" = active
	X2.3	A6	Warning lamp outside(max 21W lamp load)	"1" = active
	X2.4	A5	Solenoid valve Y1 (open)	"1" = active
	X2.5	A4	Illumination push button open	"1" = active
	X2.6	A3	Solenoid valve Y2 (close)	"1" = active
	X2.7	A2	Power supply of doorleaf	"1" = active
	X2.8	A1	Spare	
	X2.9	P+	Power supply DCU (110VDC)	
	X2.10	P+	Power supply DCU (110VDC)	
	X2.11	P-	Power supply DCU (0VDC)	
	X2.12	P-	Power supply DCU (0VDC)	
	X2.13	M-	Not used	
	X2.14	M-	Motor control	"-" = open
	X2.15	M+	Not used	
	X2.16	M+	Motor control	"+" = open
	X2.17	SI	Potential free contact of safety relay	"0" = active
X2.18	SI	Potential free contact of safety relay	"0" = active	

DCU second motor module	X4.1	G-	Power supply position sensor(0VDC)	
	X4.2	G+	Power supply position sensor (12VDC)	
	X4.3	E42	Door position sensor (pulse)	"0" = pulse
	X4.4	E41	Door position sensor (direction)	"0" = pulse
	X4.5	E40	Limit switch step closed	"0" = closed
	X4.6	E39	Limit switch emergency device step	"1" = emergency operated
	X4.7	E38	Not used	
	X4.8	E37	Not used	
	X4.9	E36	Electrical isolation	"1" = electrical isolation
	X4.10	E35	No motion	"1" = motion
	X4.11	A18	Brake step	"1" = active
	X4.12	A17	Spare	
	X4.13	P+	Power supply DCU (110VDC)	
	X4.14	P+	Power supply DCU (110VDC)	
	X4.15	P-	Power supply DCU (0VDC)	
	X4.16	P-	Power supply DCU (0VDC)	
	X4.17	M-	Motor control	"-" = open
X4.18	M+	Motor control	"+" = open	
X4.19	SI	Potential free contact of safety relay	"0" = active	
X4.20	SI	Potential free contact of safety relay	"0" = active	

4 Signals between train control system and door control unit (DCU)

4.1 Hardwired signals from the train control system to the DCU

No.	X11	Signal	signal level	Type
1	2	Train line no motion	"1" = no motion	Permanent
2	3	Train line v>5kph	"1" = v>5kph	Permanent
3	4	Train line central open	"1" = open	Pulse
4	5	Train line central close	"1" = close	Pulse
5	6	Train line closure warning	"1" = active	Permanent

4.2 Hardwired signals from the DCU to the train control system

No.	X11	Signal	signal level	Type
1	19	Warning lamp inside(max 21W lamp load)	"1" = active	Permanent
2	22	Warning lamp outside(max 21W lamp load)	"1" = active	Permanent

4.3 Hardwired signals from the door system to the train control system

No.	X11	Signal	signal level	Type
1	11/12	Door safety loop	<p>Closed if :</p> <ul style="list-style-type: none"> - door closed and locked AND - safety relay at POM deactivated AND - door 98% closed AND - door not emergency operated(inside and outside) <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> - door mechanically isolated <p>AND</p> <ul style="list-style-type: none"> - step closed AND - step not emergency operated AND - safety relay at SMM2 deactivated <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> - step electrically isolated 	Potential free contact

To accelerate the vehicle, the door & step closed and locked loop has to be closed. In case of interruption of the loop during the train is moving, an emergency brake is caused.

4.4 No motion

DCU will get speed signal from both network and hardwire. And it will be considered as "no motion" only if the following requirements are met, otherwise it will be considered non-no motion.

TCMS communication in normal operation:

Hardwire signal "no motion" is active(E1=1 & E35=1) And
 Hardwire signal "v>5kph" is inactive(E4=0) And
 Network signal "zero speed" indicates zero speed signal enable(refer to ICD, chapter 6.1)

TCMS communication fails:

Hardwire signal "no motion" is active(E1=1 & E35=1) And
 Hardwire signal "v>5kph" is inactive(E4=0)

4.5 Door status via RS485

Signal	Function	Description
Door closed	"1" = door closed	Steady signal as long as the door & step is closed
Door fully open	"1" = door fully open	Steady signal as the door & step is fully open (this position can only be detected by the door position sensor)
Door emergency device activated	"1" = door emergency device activated	Steady signal as long as one of the door & step emergency device is activated

Door out of service	"1" = door out of service	Steady signal as long as the door is out of service mechanically.
Step out of service	"1" = step out of service	Steady signal as long as the step is out of service electrically.
Door obstruction detected	"1" = door obstruction detected	•) Pulse signal of 1sec when an obstacle is detected acc.5.7 •) Steady signal if the number of obstacle detections are reached acc. 5.7, until door is reactivated and closed again
Failure priority A active	"1" = Failure priority A active	Steady signal as long as the DCU detects a priority A failure
Failure priority B active	"1" = Failure priority B active	Steady signal as long as the DCU detects a priority B failure

5 Door control operations

5.1 Activation of the door control unit

The door control unit will be activated by switching the power supply on.

Following functions will be performed:

- Door and step are closed and locked:
The door and step stays in the closed and locked position
- Door not closed and locked:
The door will be closed automatically independent on the train line status.
The door control unit cannot monitor the position of the door when the door is not closed.
Therefore the closing sequence will be done with constant speed until the closed and locked position reached for the first time.

The same procedure is implemented also for step. The door closes first and only if the door is closed the step will close.

The warning buzzer (see chapter 5.8), warning lamp inside and outside(see chapter 5.9), and the obstacle detection (see chapter 5.7) are active during this closing sequence.

5.2 Safety concept

5.2.1 General issues

Each door entrance is equipped with a solenoid valve Y3 (blocking at $v > 5\text{kph}$), which ensures that the unlocking cylinder will not be supplied with pressure supply if $v > 5\text{kph} = "1"$ (see also pneumatic diagram). In this case the door can not be unlocked and opened electrically.

Additionally each DCU consists two safety relays (one at POM module and one at SMM2 module) that can only be activated by hardwired signal "no motion".

The NC contacts of the two safety relays is integrated in the safety loop, which has the consequence that in case of an activated safety relay (NC contact opened) the safety loop is interrupted.

The NO contact of safety relay at POM module is connected in series in the circuit of door opening, which means door can only be opened when safety relay at POM module is activated. Controlling the door motor in closing direction is always possible.

The NO contact of safety relay at SMM2 module is connected in series in the circuit of step brake activation, which means step can only be moved when safety relay at SMM2 module is activated.

5.2.2 Activation of the DCU safety relay

The two safety relays (one at POM and one at SMM2) are activated and deactivated as below.

Following conditions must be fulfilled to energize the safety relay:

hardwired no motion active (E1&E35="1") AND
 hardwired signal $v > 5\text{km/h}$ inactive (E4 = "0")

Additionally internal release for activation by software must be available.

This release will be done if:

valid open command	OR
door is not closed & locked	OR
door is emergency operated	OR
step is not closed	OR
step is emergency operated	

And if TCMS works, the network “zero speed signal” will also need to be considered for internal release, which means safety relay can only be activated when network “zero speed signal” enable.

Safety relay will be self-latched after it is activated, then unlocking device can be activated to unlock the door.

5.2.3 Deactivation of the DCU safety relay

Following conditions must be fulfilled to switch off the latching functionality of the safety relay at POM by software:

- door closed and locked **AND**
- door 98% closed **AND**
- door is not emergency operated **AND**
- step closed **AND**
- step is not emergency operated **AND**
- no diagnostic code of priority A is active

OR

- door is out of service

Following conditions must be fulfilled to switch off the latching functionality of the safety relay at SMM2 by software:

- door closed and locked **AND**
- door 98% closed **AND**
- door is not emergency operated **AND**
- step closed **AND**
- step is not emergency operated **AND**
- no diagnostic code of priority A is active

OR

- door is out of service

OR

- step is out of service(electrically)

5.3 mode of operations

5.3.1 Normal mode

DCU should consider this mode of operation when communication is fine with TCMS and Bit [7,6] of byte 6 of TCMS to DCU packet=01 or 10. This has more priority than RDM mode. In normal mode command shall always be accepted from RS485 in place of train line commands.

TCMS(MCU/PCU) will be connected with DCU through RS485 channel. In this mode, MCU/PCU will send Door Open, Door Close, Train Speed, Door Isolation and Door Warning Bell signal to DCU. MCU/PCU will receive status and faults from various DCU in reply. Details is defined in the chapter 6.1 of the file Protocol Document of TCMS - DCU for MAE675U from Medha.

5.3.2 RDM mode

DCU shall consider this mode when communication is failed with TCMS or Bit [7: 6] of Byte 6 of TCMS to DCU packet= 00 or 11.

In this mode, DCU shall work purely on train line command. If RS485 status is healthy, DCU shall send status to TCMS.

5.3.3 Local mode of operation

Door shall open based on input received locally (pushbutton inside and outside) for each door. This mode of operation has highest priority.

5.4 Opening the doors

5.4.1 Opening sequence

Door & step can only be opened at no motion acc. chapter 4.4

During opening sequence, obstacle detection will be activated acc.5.7. The warning buzzer is activated acc.5.8 and warning lamp is activated acc.5.9.

The opening sequence of the door & step after a valid opening command will be done as followed:

- The brake of step Y4 is activated and step is energized to open direction until fully opened position.
- The solenoid valve “close” Y2 will be switched off
- The solenoid valve “open” Y1 will be switched on, whereby the unlocking cylinder will be supplied with compressed air
- The door motor will be switched on, to control the door in open direction.
- the door starts opening, and the limit switch “door closed & locked” is actuated.
- shortly after the door has left the closed position, the limit switch “door 98% closed” is no longer actuated.
- the door moves to open end position.
- The solenoid valve “open” Y1 is switched on until:
 - a closing order is given OR
 - the door emergency device inside or outside is activated at no motion OR
 - the isolating lock mechanism is activated OR
 - the step emergency device is activated at no motion

5.4.2 Opening in normal mode

DCU shall open Door, based on Door Open command received from TCMS through RS485.

TCMS will give Door open command to DCU for minimum 1 cycle to maximum 5 cycles, if Door open switch(by driver) is pressed minimum of 1 second and maximum of 10seconds and both rising & falling edge is detected. Then valid command will be given to left or right door based on command received from Driver. In normal scenario, TCMS will give command to either left 2 doors or right 2 doors of all coaches based on command received from switch.

Similarly command for individual door open can also be issued by TCMS, if command originate from DDU. In this case TCMS will issue door open command to only that particular door of selected coach.

Pls. refer to chapter 6.1 of the file Protocol Document of TCMS - DCU for MAE675U from Medha.

After receiving valid opening command, the door & step will be opened acc. 5.4.1

5.4.3 Opening in RDM mode

In this mode, door shall be opened based on hardwire train line connected directly to DCU.

Both rising edge and falling edge (Pulse) is detected on Door Open Right or Door Open Left Train line AND pulse width is minimum of 1 second and maximum of 10seconds, then it will be considered as a valid opening command.

After receiving valid opening command, the door & step will be opened acc. 5.4.1

If RS485 communication is healthy, it shall communicate status of door to TCMS.

In this mode individual door open command from DDU can't be issued.

5.4.4 Opening in local mode

Each door is equipped with one pushbutton open inside S22(located on carbody) and one pushbutton open outside S21(located on door leaf), which are used to open the door.

In this mode, Door shall be opened, based on locally connected hardwired door open input directly to DCU(pushbutton inside and outside). The door will be opened only at no motion acc. chapter 4.4..The power supply of pushbutton open inside(DCU output A4) and pushbutton open outside(DCU output A2) will be ON at no motion.

Both rising edge and falling edge (Pulse) is detected on Door Open Local input AND pulse width is minimum of 1 second and maximum of 10seconds, then it will be considered as a valid opening command.

After receiving valid opening command, the door & step will be opened acc. 5.4.1

5.5 Closing the doors

5.5.1 Closing sequence

During closing sequence, obstacle detection will be activated acc.5.7. The warning buzzer is activated acc.5.8 and warning lamp is activated acc.5.9.

The closing sequence of the door & step after a valid closing command will be done as followed:

- The solenoid valve “open” will be switched off, whereby the unlocking cylinder will be vented
- The solenoid valve “close” will be switched on
- The door motor will be switched on, to control the door in close direction
- before the door reaches the closed and locked position the limit switch “door 98% closed” will be operated
- If the door reaches the closed and locked position, the door motor will be switched off.
- After the door reaches the closed position, the step will start to close until closed position, then step drive motor is switched off.
- The solenoid valve “close” is switched on until:

▪ an opening order (see chapter 5.4) is given	OR
▪ the emergency device inside or outside is activated at no motion.	OR
▪ the isolating lock mechanism is activated	OR
▪ the step emergency device is activated at no motion	
- If the limit switch “door closed and locked” is activated (E8= “0”) and the limit switch “door 98% closed”(E9=“1”) acquaints an opened door following procedure will be done:
 - The solenoid valve “open” will be switched on as long as the limit switch “door closed and locked” is no longer operated
 - If the door is after a time of 1 second not unlocked, the door will be controlled for 200mm in open position.
 - By reaching this position the door will be controlled immediately in closed and locked position.
 - Thereby the solenoid valve “open” will be switched off and the solenoid valve “close” will be switched on.

5.5.2 Closing in normal mode

DCU shall close Door, based on door close command received from TCMS through RS485. TCMS will give Door close command to DCU for minimum 1 cycle to maximum 5 cycles, which means DCU will be considered close command valid if it last for minimum 1 cycle to maximum 5 cycles. In normal scenario, TCMS will give command to all 4 doors of all the coaches if command received from switch. Similarly command for individual door closure can also be issued by TCMS, if command originates from DDU. In this case TCMS will issue door closure command to only that particular door of selected coach.

TCMS will also inform Door Warning Bell status to DCU through RS485. DCU shall do following after receiving of Door Warning Bell:

- a) DCU shall start flashing internal and external door indicator.
 - b) Parallely PIS will start buzzing the buzzer. The Following Sequence Will be taken Care by DCU in case of Closing the door.
 - c) Both rising edge and falling edge (Pulse) is detected for Door Warning bell AND pulse width is minimum of 3 seconds (Software configurable). AND
 - d) Within 20 second of detection of Door warning bell, both rising edge and falling edge (Pulse) is detected for Door close Train line AND pulse width is minimum of 1 second and maximum of 10 seconds (Software configurable).
 - e) If Door close command is not detected within 20 second of activation of Door warning Bell, Door close command is repeated only when step (a) and (b) is repeated.
- In Turn DCU will indicate status of door to TCMS.

5.5.3 Closing in RDM mode

In this mode, Door shall be closed based on Hardwired train line connected directly to DCU. Following shall be considered for closing the door:

- a) Both rising edge and falling edge (Pulse) is detected for door warning bell and pulse width is minimum of 3 seconds, then door warning bell is considered valid. AND
- b) Within 20 second of detection of Door warning bell, both rising edge and falling edge (Pulse) is detected for Door close Train line(E6) AND pulse width is minimum of 1 seconds and Maximum of 10seconds, then closed command will be considered valid.
- c) If Door close command is not detected within 20 second of activation of door warning bell, door close command is repeated only when step (a) and (b) is repeated.

If RS485 communication fails, the hardwire signal "closure warning" will be evaluated instead of "door warning bell".

- If RS485 communication is healthy, it shall communicate status of door to TCMS.
- In this case individual door close command from RS485 can't be issued.

5.5.4 Closing the doors by speed signal

An opened door will be closed immediately when no motion signal (refer to chapter 4.4) is not active. This operation will be done with highest priority.

if the door get any opening command during the closing sequence, the door would continual the closing sequence.

5.5.5 Closing by activation the service push button on the DCU

It is possible to close a door with service button, the closing movement of the door will immediately be done without any pre-warning sequence.

The obstacle detection system is active acc. chapter 5.7.

5.6 Door emergency device

5.6.1 Door emergency device inside (egress)

5.6.1.1 General

For purposes of opening the door in case of emergency, an emergency device inside is at each door available.

This emergency egress device consists of:

- a rotary handle 2 positions: 0° [not operated]./ 90° [operated] **OR**
- a square key: 2 positions: 0° [not operated]./ 90° [operated]

Further the limit switch S3-1/S3-2 "door emergency device inside" is located on the emergency egress device

To reset the emergency egress device, the rotary handle or the square key has to be put back in not operated position (0°)

5.6.1.2 Activation of the emergency egress device at no motion or at non-no motion:

An operation of the rotary handle or square key at no motion(chapter 4.4) effects:

- the limit switch "emergency device inside" S3-1/S3-2 will be operated
- the warning buzzer will be switched on acc. chapter 5.8
- the warning lamp inside and outside will be switched on acc. chapter 5.9.
- the solenoid valve "close" will be switched off
- the solenoid valve "open" will be switched off
- the door will be unlocked via bowden cable and can be opened manually

An operation of the rotary handle or square key at non-no motion (chapter 4.4)effects:

- the limit switch "emergency device inside" will be operated
- the warning buzzer will be switched on acc. chapter 5.8.
- the warning lamp inside and outside will be switched on acc. chapter 5.9.
- the solenoid valve "close" will be switched on
- by receiving the emergency signal the door control unit activates the door drive motor in closing until no motion gets active but max. for 3 min. (thermic reasons).

A reset of the emergency device effects:

- the limit switch "emergency device inside" will no longer be operated
- the warning buzzer and warning lamp will be switched off.
- the door would stay at its current position and the further door movement depends on the train line signal

5.6.2 Door emergency device outside (access)

5.6.2.1 General

Each door system is also equipped with an emergency access device outside.

This emergency egress device consists of:

- a rotary handle 2 positions: 0° [not operated]./ 90° [operated] **OR**
- a square key: 2 positions: 0° [not operated]./ 90° [operated]

Further the limit switch S4-1/S4-2 "door emergency device outside" is located on the emergency access device

To reset the emergency egress device, the rotary handle or the square key has to be put back in not operated position (0°)

5.6.2.2 Activation of the emergency access device at no motion or at non-no motion :

An operation of the rotary handle or square key at no motion(chapter 4.4) effects:

- the limit switch "emergency device outside" S4-1/S4-2 will be operated.
- the warning buzzer will be switched on acc. chapter 5.8
- the warning lamp inside and outside will be switched on acc. chapter 5.9.
- the solenoid valve "close" will be switched off

- the solenoid valve “open” will be switched off
- the door will be unlocked via bowden cable and can be opened manually

An operation of the rotary handle or square key at non-no motion (chapter 4.4)effects:

- the limit switch “emergency device outside” will be operated
- the warning buzzer will be switched on acc. chapter 5.8.
- the warning lamp inside and outside will be switched on acc. chapter 5.9.
- the solenoid valve “close” will be switched on
- by receiving the emergency signal the door control unit activates the door drive motor in closing direction until no motion gets active but max. for 3 min. (thermic reasons).

A reset of the emergency device effects:

- the limit switch “emergency device outside” will no longer be operated
- the warning buzzer and warning lamp will be switched off.
- the door would stay at its current position and the further door movement depends on the train line signal

5.6.3 step emergency device

Each movable step is equipped with a manual release device. An operation of the manual release device via rotary triangular key will release the step brake thus makes it possible to move the sliding step by hand in open or close direction.

An emergency operation of step effects:

- the limit switch “emergency device step” will be operated
- the warning buzzer will be switched on acc. chapter 5.8.
- the warning lamp inside and outside will be switched on acc. chapter 5.9.
- the step will be unlocked and can be opened manually.
- The functions of door & step are cut off

A reset of the emergency device effects:

- the limit switch “emergency device step” will no longer be operated
- the warning buzzer and warning lamp will be switched off.
- the warning lamp inside and outside will be switched off.
- If the door or step was closed before emergency operation→the door and step will close again..
- If the door or step was fully or partly open before emergency operation→the door and step will open again...

5.7 Door obstacle detection

5.7.1 Obstacle detection for doors

5.7.1.1 Obstacle detection during the closing sequence

During closing sequence trapped obstacles are monitored by following systems:

- a) Motor current monitoring
The curve of the normal motor current during closing sequence is stored and automatically adjusted on each closing sequence (self-learning system).

If the actual value of the motor current exceeds the nominal value, the obstacle detection gets active.

The maximum current is not steady but depends on the door position and also on the current consumption of earlier closing sequences (self learning maximum current curve).

The value of the maximum current stays saved even when the supply voltage of the DCU is switched off.

If the DCU is exchanged to any other door a new initialisation is necessary (see chapter 3.2.1/ service button)

b) Way/time monitoring:

The door position sensor allows dividing the door movement into small distances.

If the distances are not passed within a fixed time, the obstacle detection gets active.

Following cases must be distinguished:

- Obstacle detection gets active at no motion(chapter 4.4)

If the obstacle detection gets active the door will be controlled move back for about 200mm(if the width between the door actual position and the fully opened position is less than 200mm, the door moves to the fully opened position) and then stops

During the opening sequence the warning buzzer is switched on (see chapter 5.8).

During the opening sequence the warning lamp inside and outside are switched on (see chapter 5.9).

The door stays in that position for 2 seconds.

Afterwards the door will be closed automatically.

During the closing sequence until the door is in closed and locked position the warning buzzer and warning lamp inside and outside are also switched on(see chapter 5.8 and chapter 5.9)...

If the obstacle detection gets active (due to the motor current monitoring or the way/time monitoring) after 5 closing attempts, the door will be controlled in open end position.

The door stays in the open end position until a reactivation will be made (see diagnostic description).

- Obstacle detection gets active at non-no motion(chapter 4.4)

If the obstacle detection gets active the door continues closing movement for max. 3 min. with following sequence:

→ I_{max} (maximum motor current) for 1sec.

→ $0,8 \times I_n$ ($0,8 \times$ nominal motor current) for 10sec.

During this closing sequence the warning buzzer is still switched on (see chapter 5.8)..

During this closing sequence the warning lamp inside and outside still switched on(see chapter 5.9).

After max. 3 min. the motor will be switched off, whereby the door can be opened manually (in case the door is not closed and locked).

5.7.1.2 Door way monitoring during an opening sequence

During an opening sequence the motor current monitoring and way/time monitoring are used for door way monitoring.

If the door way monitoring is activated the door movement will stop for 2 seconds.

Afterwards a new opening attempt will be done.

If the door way monitoring gets active after 3 successive opening sequences, the opening sequence will be stopped and this position will be accepted as maximum reachable open position.

During the opening sequence until the door is opened position the warning buzzer and warning lamp inside and outside are also switched on(see chapter 5.8 and chapter 5.9).

5.7.2 Obstacle detection for steps

5.7.2.1 Door way monitoring during an opening sequence

a) Motor current monitoring

The door control unit measures the automatic step motor current during the closing and opening sequence of the step. If the actual current is higher than the nominal current then the door control unit detects an obstruction in the free movement of the step (caused by passenger, luggage ...).

The door control unit monitors the current at each closing and opening sequence of the step and, if necessary, makes corrections to the stored nominal current.

The learned nominal current will be kept stored in the door control unit even when the voltage supply of the door control unit is switched off. Therefore, if the door control unit is changed to any other door, it is necessary to make a new initialisation.

b) Way/time monitoring

The step position sensor allows the door control unit to divide the step movement into small distances. If the closing/opening step does not pass the appropriate distance point within a fixed time, the obstruction detection subroutine is activated.

If an obstruction on step opening sequence is detected, the step will reclose for 30mm(If current opening stroke is less than 30mm, the step will be fully closed) , wait for 2 seconds and starts to open again. After 3 opening attempts the automatic footboard back to fully closed position and a failure code in the door control unit is generated.

If an obstruction on step closing sequence is detected , the automatic footboard reopens for 30mm (if current closing stroke is less than 30mm, the step will be fully opened) wait for 2 seconds and starts to close again. After 3 closing attempts automatic footboard is fully opened until the next close command is given.

Also a failure code in the door control unit is generated.

If at non-no motion (chapter 4.4) the obstruction detection system is not active.

5.8 Acoustic warning device (warning buzzer)

The warning buzzer will be switched on under following conditions:

:

- on each opening sequence with a frequency of 2 Hz
The warning buzzer is switched on at the same time as the opening sequence starts (without a warning delay time) until the open end position will be reached or failure code of obstacle detection generated.
- on each closing sequence with a frequency of 6 Hz
The warning buzzer is switched on 2 seconds (warning delay time) before the closing sequence starts until the closed and locked position will be reached or failure code of obstacle detection generated (no delay time by deactivating no motion).
- by operating emergency device of door or step (see chapter 5.6) with a constant signal

5.9 Visible warning device (warning lamp inside(H3) and warning lamp outside(H4))

The warning lamp inside and outside will be switched on under following conditions:

- on each opening sequence with a frequency of 2 Hz
The warning lamp inside and outside is switched on at the same time as the opening sequence starts (without a warning delay time) until the open end position will be reached or failure code of obstacle detection generated.

- on each closing sequence with a frequency of 6 Hz
The warning lamp inside and outside is switched on 2 seconds (warning delay time) before the closing sequence starts until the closed and locked position will be reached or failure code of obstacle detection generated.
(no delay time by deactivating no motion).
- by operating emergency device of door or step (see chapter 5.6) with a constant signal
- by receiving " Door Warning Bell" in normal mode (see chapter 5.5.2) with a constant signal

5.10 Door isolation (mechanically)

A door can be taken out of service by a mechanical isolating lock mechanism which contains a square key. This isolating lock mechanism is located in the door leaf.

To take a door out of service the door has to be taken first in the closed and locked position.

If the door is out of service, the limit switch "door out of service" is operated.

Therefore the "door safety loop" is by passed.

The step & door function will cut off if door isolated.

5.11 Step isolation (electrically)

As there is no function of step mechanical isolation, a step can be taken out of service electrically by a toggle switch S19 on drive unit.

If the step is out of service electrically, the step closed loop will be by-passed, and the function of step will cut off.

The step must be at fully closed position before electrical isolation, and function of door will not be affected, which means door can be opened/closed without movement of step.

5.12 Loss of pressure supply

The pressure supply is monitored by a pressure switch.

A pressure supply of lower than 4,5 bar (E23 = "0") effects:

- an opened door stays in open position
- a closed and locked door stays in closed and locked position
- opening and closing electrically are not possible
- the solenoid valves "open" and "close" are switched off
- the doors can be opened only by operating of an emergency device (see chapter 5.6)

If the pressure supply gets higher than 4,5 bar following sequences must be distinguished:

- train at no motion acc. chapter 4.4
→ Door stay in this current position
→ Then door will perform acc. further operation.
- train not at no motion acc. chapter 4.4
→ Door will close immediately acc.5.5.4

5.13 Loss of voltage supply

A loss of the voltage supply effects:

- the door control unit is without any function
- an opened door stays in open position

- a closed and locked door stays in closed and locked position
- the open push buttons are without any function
- the solenoid valves “open” and “close” are switched off
- the doors can be opened only by operating of an emergency device (see chapter 5.6)

If the voltage supply is switched on again the door control unit will be activated according chapter 5.1.

6 Issue Remark

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00	27.07.2018	Yutao	PengJ

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Instruction Manual

Assembly and Adjustment Instruction

TRAIN 18 EMU ICF

Project-No. 66408U1A

Customer INDIAN RAILWAY

Project-Part Single Leaf-Plug Sliding Door

System SST-e1

Created: 2018.05.01
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1 Required Documents

Document-No. / Drawing-No.	Description
66408U1AR11	Assembly drawing door
66408U1AR11	Scope of supply
DDSTE11071E00	Instruction Manual
DDSTE11071E01	Introduction and General Information
DDSTE11071E03	Door Function Description
DDSTE11071E05	Lubrication Instruction
DDSTE11071E06	Adjustment Checklist
DDSTE11071E07	Set up Instruction
DDSTE11071E36	Safety Checklist
ED91041R02_C01	Wiring diagram

2 General warnings & devices

This manual includes the following warnings categorized in different hazard classes:



DANGER

The non-observance of these instructions will lead to irreversible personal injury or death.



WARNING

The non-observance of these instructions may lead to serious personal injury or death.



CAUTION

The non-observance of these instructions may lead to personal injury as well as to damage to the equipment and/or the environment.

Explanation of the structure of warnings (for example DANGER):



DANGER

Cause of danger
Consequence of danger
Remedial measures

Advices do not obtain security relevant content. They are listed here for sake of completeness.

**NOTE**

Notes provide helpful tips and additional information about the equipment.

Depending to special employments the warnings in other chapters of this manual point out the particular hazards. Generally the warnings and advices are prefixed to the concerning procedure.

3 General

The following instructions in combination with the assembly drawing 66408U1AR11 serve as the "Assembly and Adjustment Instruction" for the electrically operated and pneumatically supported single leaf sliding plug (SST-E1) from **IFE** Door System.

Only commercially used tools and the following materials are required for the assembly:

- Loctite 243 N401289R47 (to secure screws)
- Opimol Paste white T will be screwed 0VN401289R47 (to grease fasteners, which into threaded holes with HELICOILS in the door leaf.)
- SIKAFLEX 252 shell) **SoS-Customer** (sealing portal profile to the body)
- Klüber Isoflex LDS 18 Spezial A N300130R08 (lubricating grease)
- witness painting TD02927R01 (sealing of fastening screws)

The following devices are required for adjusting the doors electrically and pneumatically:

- Power supply unit 110VDC (+25% / -30%)
- Adjusting device
- Wire loom
- Pressure supply 6-9 bar

All components mentioned in this manual only refer to **IFE's** scope of supply.

SoS-Customer means: Not included in the supply list of **IFE**.

**NOTE**

After completion of the adjustment all fastening screws of the main components (drive unit, holding bracket, roller swing arm bracket, ...) must be tightened with the nominal torque, secured with Loctite 243 and marked with a witness painting (serve for the check of screw tightness).

**CAUTION**

DO NOT lock mounting screws of door leaf carrier (connecting drive unit and door leaf) by using Loctite 243.



NOTE

The documentation shows the position numbers of both the right-hand and the left-hand door system. Therefore always be sure to use the correct piece in each phase of the mounting process. Left and right hand are referred to as viewed from the inside of the coach.

After locking, tighten all mounting screws applying the torque required, which is shown in the assembly drawing 66408U1AR11 or the applicable standard sheets (see also chapter 3.3).

3.1 Notes



WARNING

When using above materials observe the manufacturer's safety instructions to preclude damages to or impairment of health.



WARNING

Observing the manufacturer's instructions for use also ensures compatibility with other materials or manufacturing Equipment.



NOTE

The illustrations shown in this manual are not always detailed views but are intended to provide the minimum information required.

3.2 Safety notes



WARNING

Adjustments with temporary power supply ⇒ During door leaf adjustments with temporary power supply, jam protection is not active.



DANGER OF SQUEEZING!

⇒ during adjustment work on components never perform such adjustment when door leaves move

3.3 Torque setting



NOTE

All fastening elements have to be tightened with the nominal tightening torques indicated.

If no other tightening torque is indicated, use the tightening torques listed in document „Introduction and General Information DDSTE11071E01“.



NOTE

After occurred setting, all fastening screws of the attachment parts (Drive unit, Roller lever, emergency device, etc.) are to be secured with Loctite 243 to tighten with the indicated tightening torque and to mark with sealing wax – Exception HELICOIL- thread.



NOTE

Never secure screw connections in HELICOIL- thread with Loctite 243, grease it with Optimol White T.

4 Check of portal dimensions and Assembly bores

4.1 Check of portal dimensions



NOTE

The reference levels for all fastening part dimensions are:

- The leading portal edge,
- The upper portal edge and
- The outer coach surface,

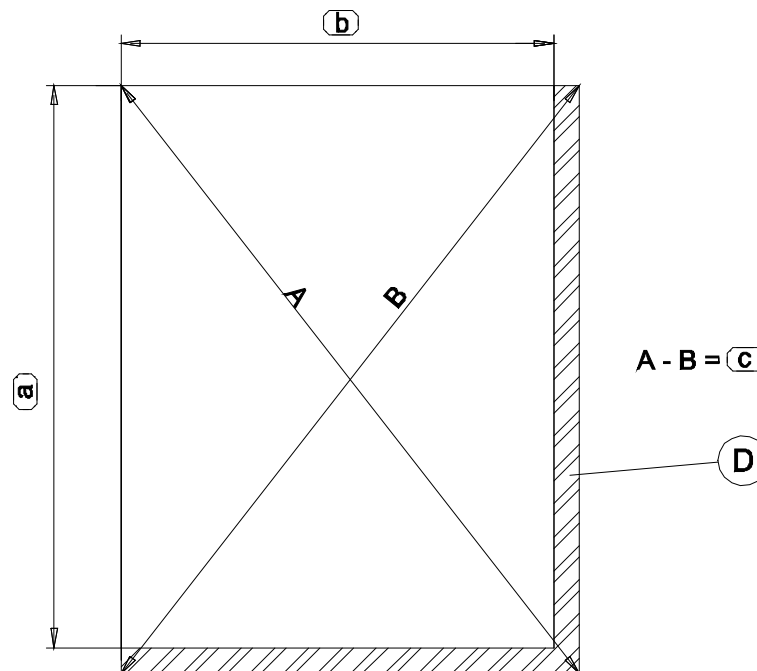
See also assembly drawing 6640481GR01.



NOTE

Refer to the assembly drawing 6640481GR01 for information about shape and positional tolerances.

Drawing 4-1 – Check of portal dimension



a	2276 ^{+4/-2} mm	b	1010 ^{+3/-2} mm
c	0 ^{+/-4} mm	D	Tolerance area
A	Diagonal measurement	B	Diagonal measurement

4.2 Reference levels

The reference levels for all fastening part dimensions are portal width centre line, upper portal edge and outer coach surface.

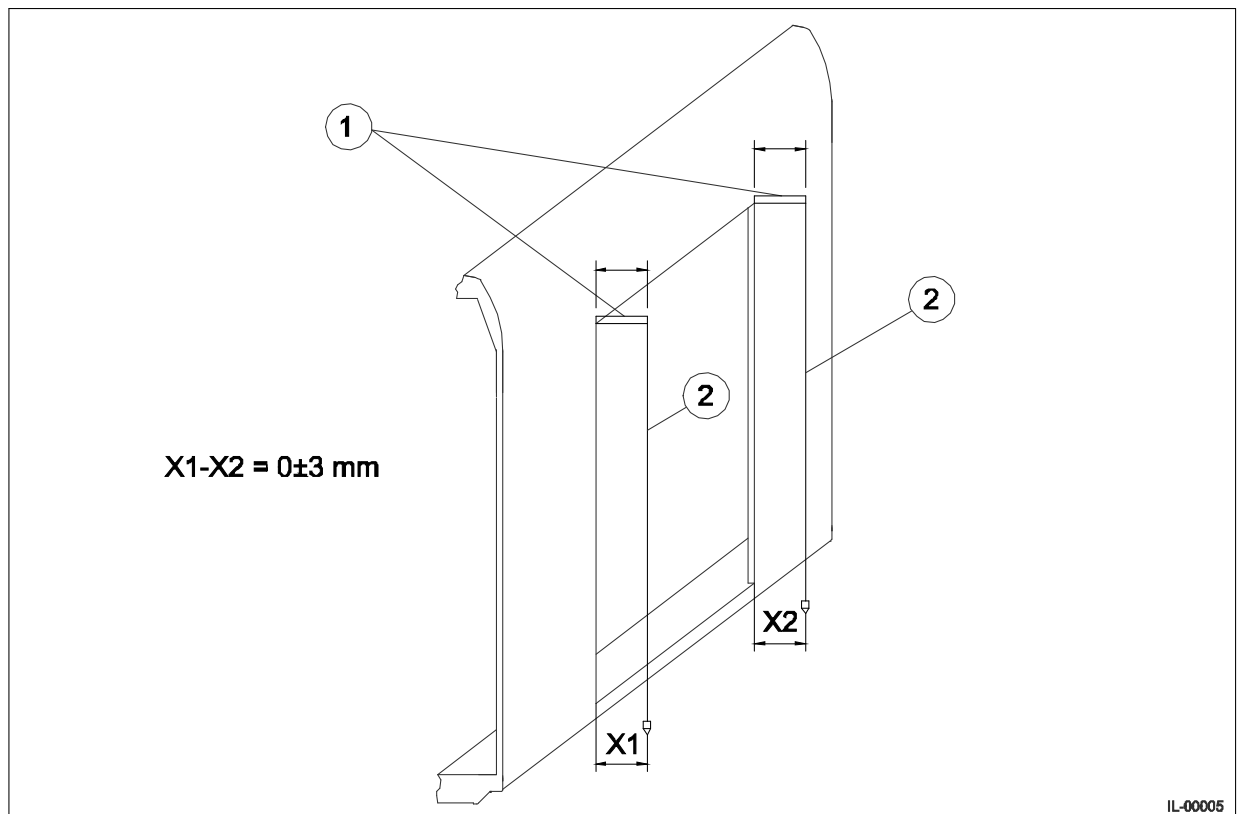
4.3 Checking mounting bore holes

● drive unit (item 01)	● isolating lock (item 04)
● roller swing arm bracket (item 05)	● pneumatic control board (item 34)
● lock housing mechanism (item 03)	● holding bracket (item 09)
● portal profile (item 07)	

4.4 Check the parallelism of the portal frame seal area

The measurement X1 at the frame seal area must be equal than measurement X2 on the frame seal area, allowed tolerance of the difference between right and left hand side is max. 3 mm to each side (see Drawing 4-2).

Drawing 4-2 – portal deviation vertical

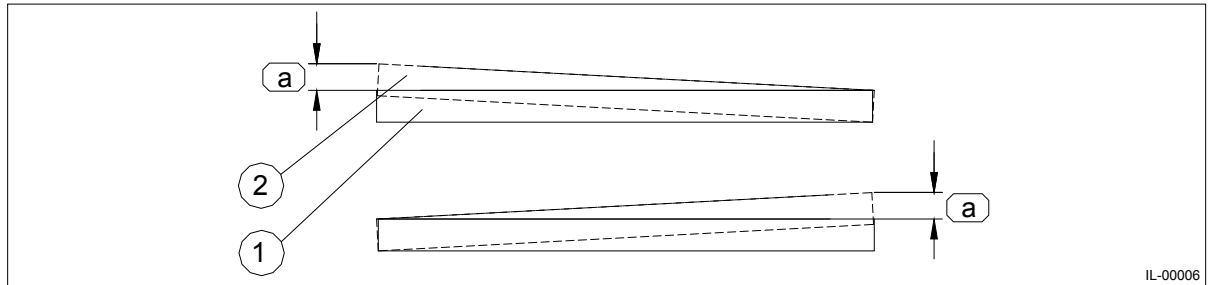


1	fix distance	2	plump line
---	--------------	---	------------

The two horizontal portal levels (portal top and bottom) must be parallel to each other. Any difference may be compensated by means of the bottom threshold (customer's scope of supply). Ensure parallelism using plumb bob. Maximum admissible variation is 3 mm (see

Drawing 4-3).

Drawing 4-3 – portal deviation horizontal



1	horizontal portal level (top)	2	Threshold (bottom)
a	3 mm		

5 Check the portal profile and portal seal rubber



NOTE

In case that the portal pillars are distorted, the door protrudes from the outer coach surface or the finger protection rubber and portal seal rubber are offset. In such cases a correction is not possible



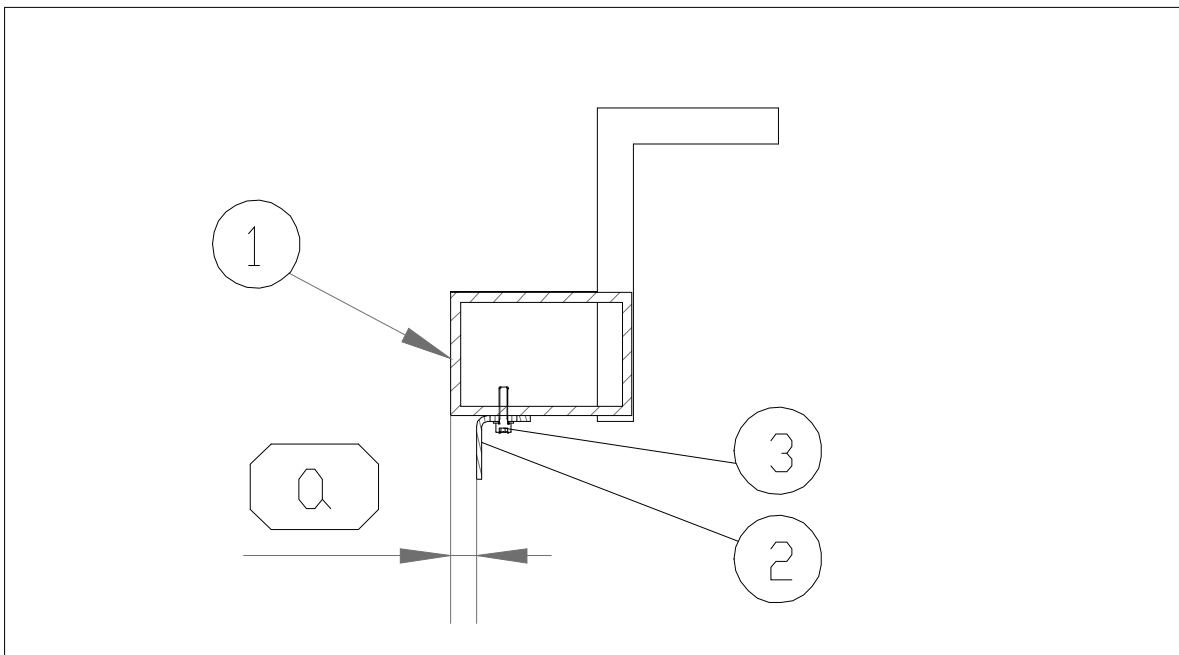
NOTE

Following measurements refer to a portal distortion of maximum 3 mm!

Check the mounting of portal profiles and portal seal rubber in accordance with the assembly drawing 66408U1AR11.

5.1 Top sealing angle

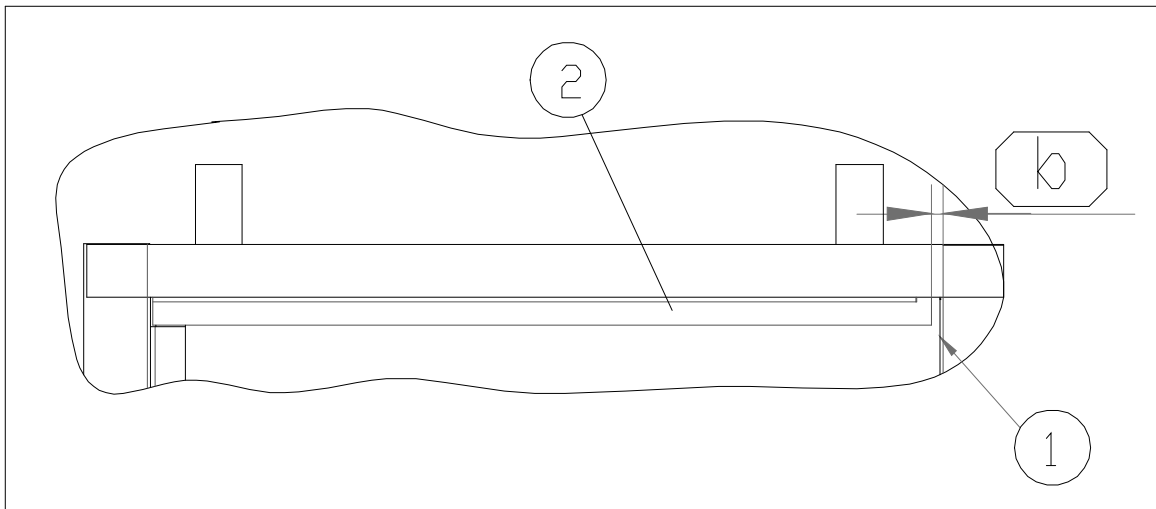
Drawing 5-1 – top sealing angle



Pos.	Designation
1	Car body
2	Top sealing angle (SoS customer).
3	Machine screw and washer (SoS customer).
a	14 ^{+3/0} mm

Check dimension (a) in the whole length of top sealing angle to location top sealing angle.

Drawing 5-2 – top sealing angle



Pos.	Designation
1	Car body(front side)
2	Top sealing angle (SoS customer).
b	11 \pm 1 mm

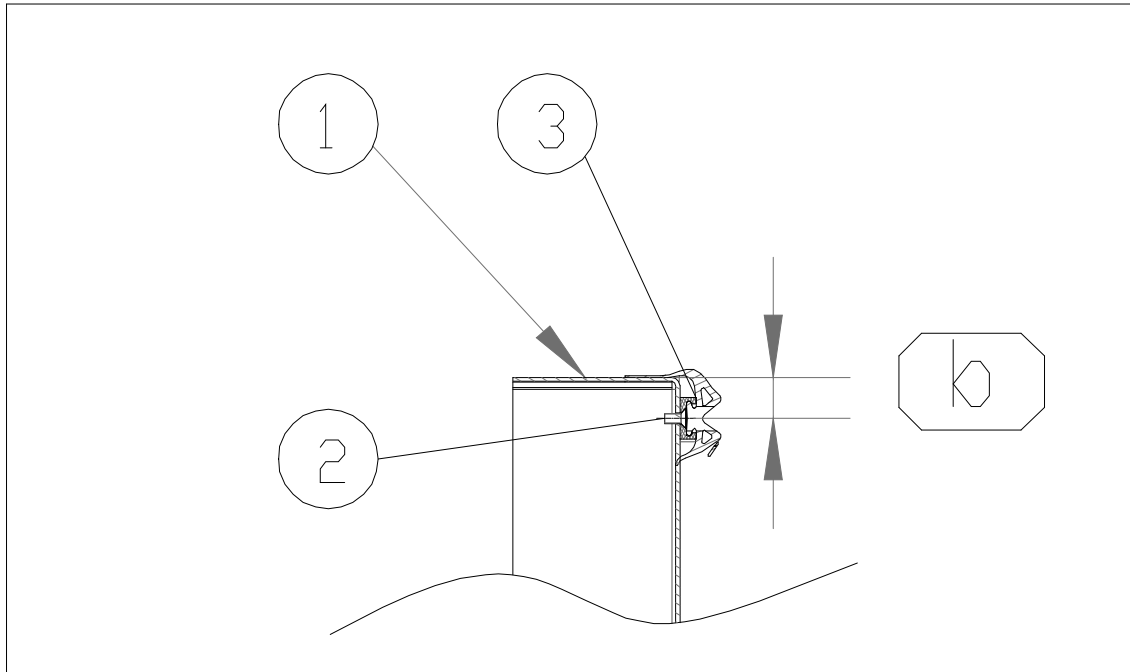
Check dimension (b) (view from outside of car) to position top sealing angle in horizontal direction.

Use machine screw and washer (SoS customer) to install top sealing angle to car body.

Secure the machine screw with customer specified torque setting and Loctite 243, marked with sealing wax.

5.2 Sealing strip

Drawing 5-3 – sealing strip



Pos.	Designation
1	Car body(front side)
2	Countersunk screw(SoS customer)
3	Sealing strip
b	20 ^{±1} mm

Put the sealing strip with (3) its top touching the ceiling of the portal (permissioned gap less than 2 mm), and drill holes for assembly of the sealing strip (3) according to the position of the sealing strip (3) and dimension (b) in the whole length of sealing strip.

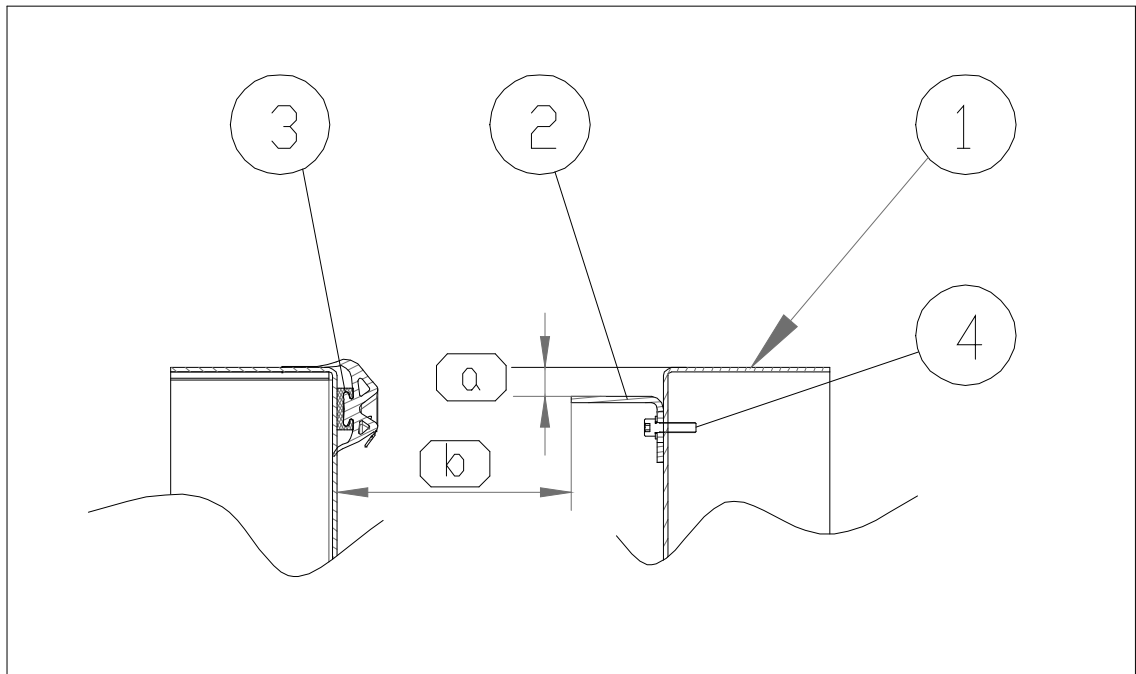
Assemble the sealing strip (3) to the holes drilled with countersunk screws (2) (SoS customer).

Make sure the rubber seal from sealing strip (3) is tightly against car body.

Fasten the countersunk screw (2) with customer specified torque setting and Loctite 243, and marked with sealing wax.

5.3 Vertical sealing angle

Drawing 5-4 – sealing strip



Pos.	Designation
1	Car body(front side)
2	Vertical sealing angle(SoS customer)
3	Sealing strip
4	Machine screw and washer(SoS customer)
a	14 ^{+3/0} mm
b	965 ^{±1.5} mm

Put the vertical sealing angle (2) with its top touching the top sealing angle (permitted gap less than 2 mm), and drill holes for assembly of the vertical sealing angle (2) according to the position of the vertical sealing angle (2) and dimension (a) in the whole length of vertical sealing.

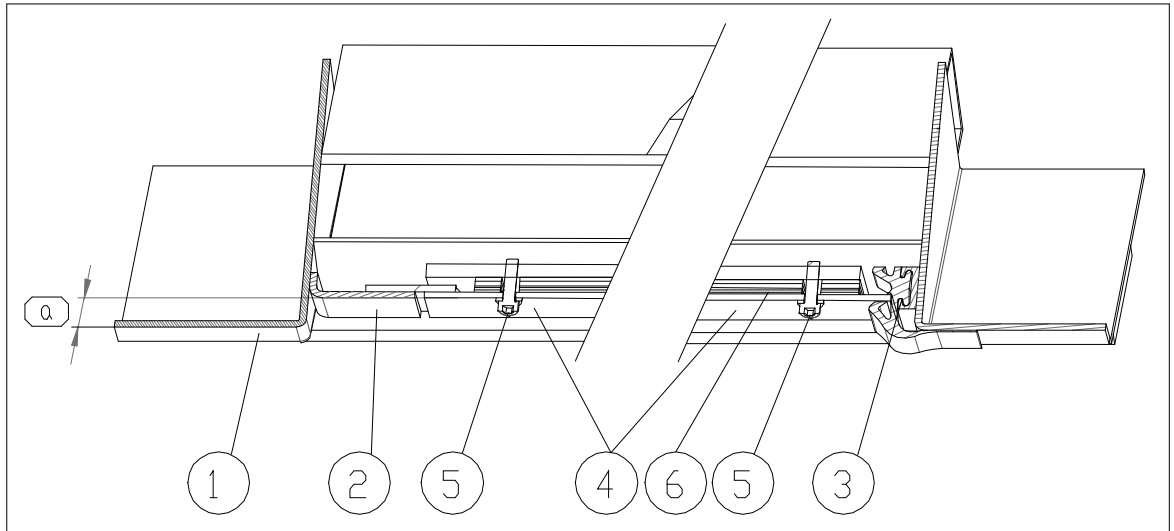
Assemble the vertical sealing angle (2) to the holes drilled with machine screws and washer (4) (SoS customer).

Check dimension (b) in the whole length of vertical sealing angle and add shims at back of vertical sealing angle (2).

Fasten the machine screw (4) with customer specified torque setting and Loctite 243, and marked with sealing wax.

5.4 Bottom sealing angle

Drawing 5-5 – bottom sealing angle



Pos.	Designation
1	Car body
2	Vertical sealing angle(SoS customer)
3	Sealing strip
4	Bottom sealing angle(SoS customer)
5	Machine screw and washer(SoS customer)
6	Shim (SoS customer).
a	14 ^{+3/0} mm

Insert the bottom sealing angle (4) to strip sealing (3) and keep the bottom sealing angle (4) align with vertical sealing angle (2).

Fix the bottom sealing angle (4) to car body with machine screw and washer (5) (SoS customer).

Check the dimension (a) over the whole length of bottom sealing angle (4), if required, add or move shims (6) (SoS customer) at back.

Fasten the machine screw (5) with customer specified torque setting and Loctite 243, and marked with sealing wax.

After installation, apply sealing agent to gaps between sealing angles and gaps between sealing angle to car body.

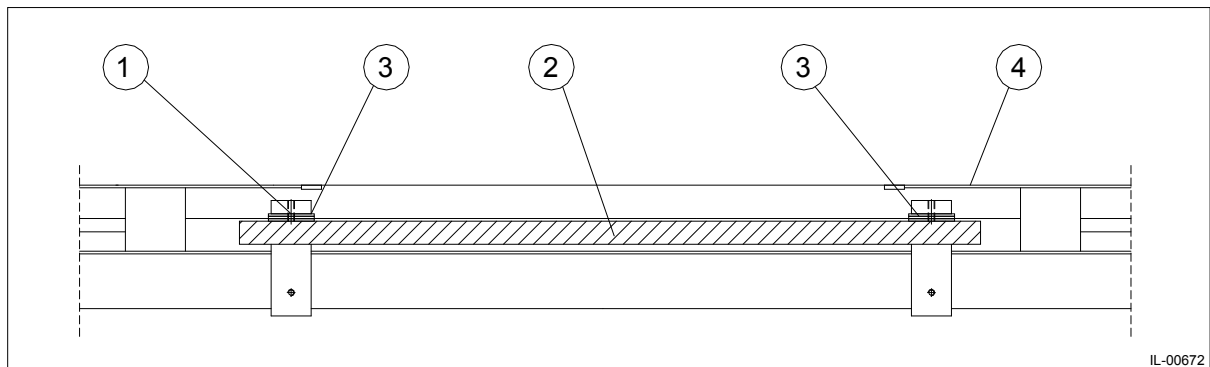
Check all the portal profiles and portal seal rubber are sealed to car body.

6 Mounting the drive unit (item 01)

6.1 Preparation for mounting the drive unit

Prior to drive unit mounting, check the mounting surfaces in accordance with the assembly drawing 66408U1AR11. Make sure mounting surfaces are level with each other (see Drawing 6-1).

Drawing 6-1 – drive unit mounting surface

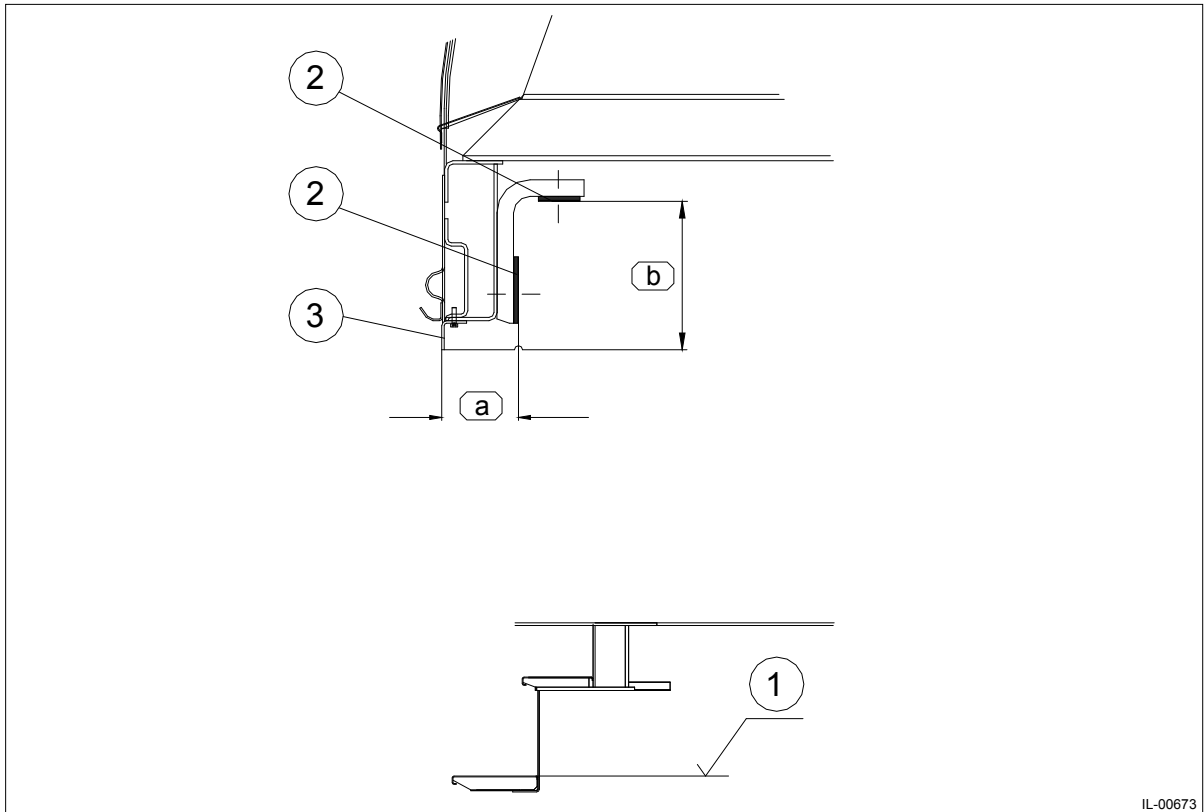


Pos.	Designation
1	Mounting surface
2	Ruler
3	Shims
4	Portal

Prepare shims (items 14, 15) and pre-assemble shims by means of e.g. a twin-adhesive tape at each fastening point. Nominal 6 mm shims are required at each fastening point.

Afterwards check the horizontal measurement of (a) and vertical measurement of (b) (Drawing 6-2).

Drawing 6-2 – vertical/ horizontal drive unit shim position



IL-00673

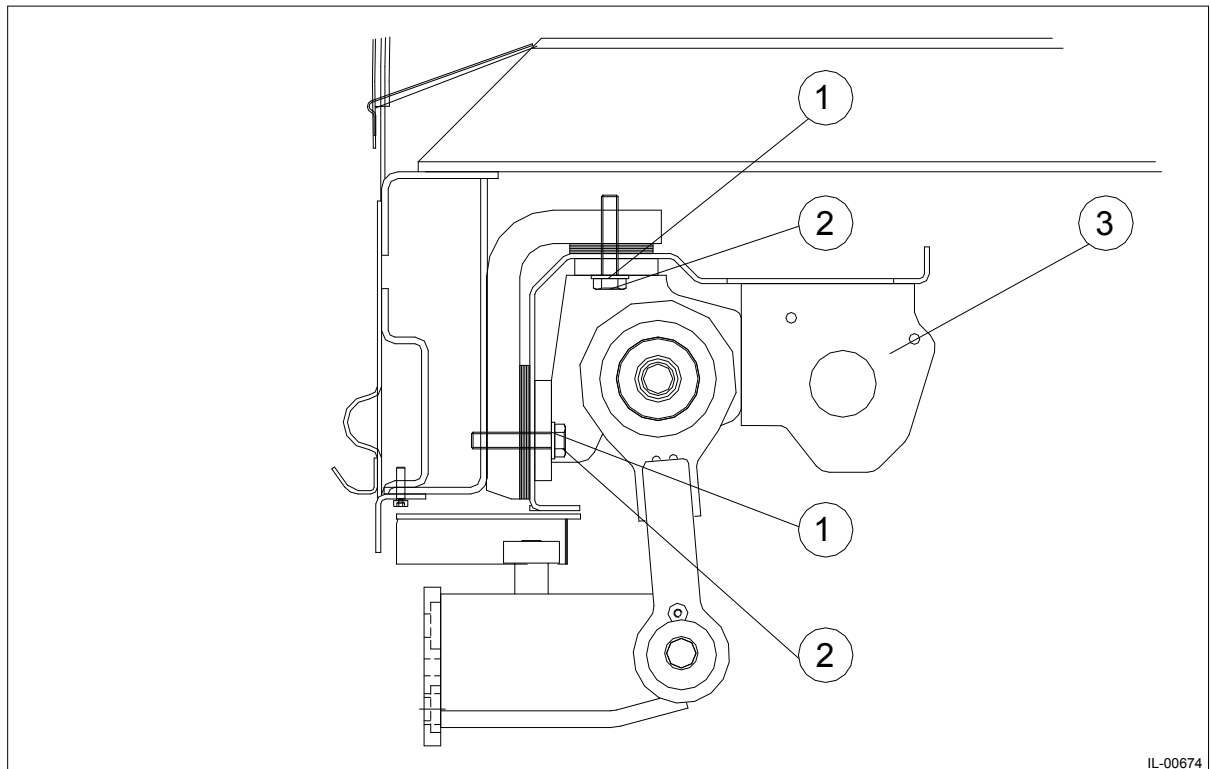
Pos.	Designation
1	1100 mm ARL
2	Shims - 6 mm nominal
3	Portal sealing angle
a	93 ^{±1} mm
b	179 ^{±1} mm

Remove or add shims (item 14, 15) depending on the actual dimensions as shown in Drawing 6-2.

6.2 Mounting the drive unit

Lift the drive unit (item 01) into position and tighten using Hex-head screws and washers at the mounting points (see Drawing 6-3).

Drawing 6-3 – mounting drive unit



IL-00674

Pos.	Designation
1	Washer(SoS customer)
2	Hex-head screw (SoS customer)
3	Drive unit



CAUTION

Make sure not to warp the drive unit during the adjustment and fastening!

Indication of tightening torques

Item	Description/Dimension	Tightening torque	Loctite 243	Optimol Paste	Sealing wax
4	Hex-head screw M10×45	45 Nm	Yes	No	Yes

6.3 Checking the drive unit position

6.3.1 Horizontal drive unit adjustment

Check measure (a) using a plumb bob. The measurement is taken from the upper horizontal sealing angle to the guide rod (\varnothing 50 mm, see Drawing 6-4).



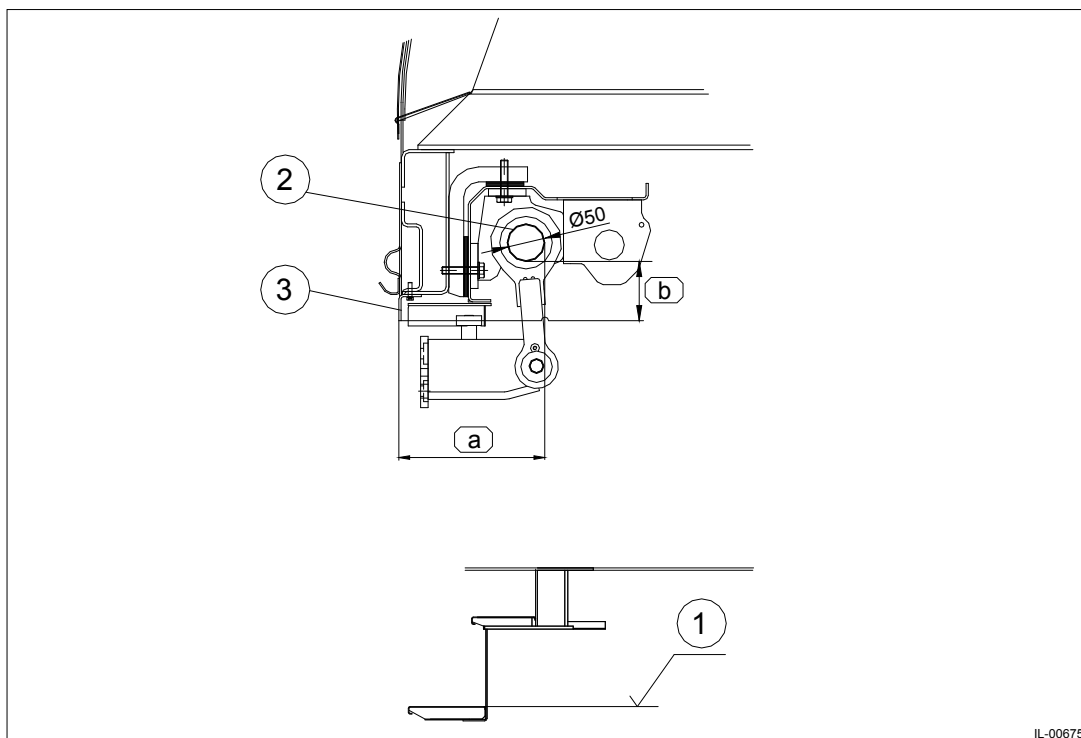
CAUTION

Caution: Check measure (a) along entire length of guide rod.

If adjustment is required, proceed by adding or removing shims in accordance with chapter 6.1. For this the respective fastening screw has to be loosened. After completed adjustment tighten the fastening screw again.

6.3.2 Vertical drive unit adjustment

Drawing 6-4 – horizontal/ vertical drive unit position



Pos.	Designation
1	1100 mm ARL
2	Guide rod
3	Portal sealing angle
a	$201^{\pm 1}$ mm
b	$79^{\pm 1}$ mm

After adjusting the horizontal position, check vertical measure of (b) by using e.g. a water level. The measurement is also taken from upper horizontal sealing angle to the guide rod (\varnothing 50 mm, see Drawing 6-4).

**CAUTION**

Caution: Check measure (b) along entire length of guide rod.

If adjustment is required, proceed by adding or removing shims in accordance with chapter 6.1. For this the respective fastening screw has to be loosened. After completed adjustment tighten the fastening screw again.

**DANGER**

During adjustment and fastening with screws ensure strain free mounting of the drive unit!

6.4 Fastening the drive unit

When horizontally and vertically the drive unit adjustments are complete, just hands tighten the fastening screws. **DO NOT SECURE** the screws with Loctite 243, because the drive unit still could be adjusted when adjusting the door leaf in height.

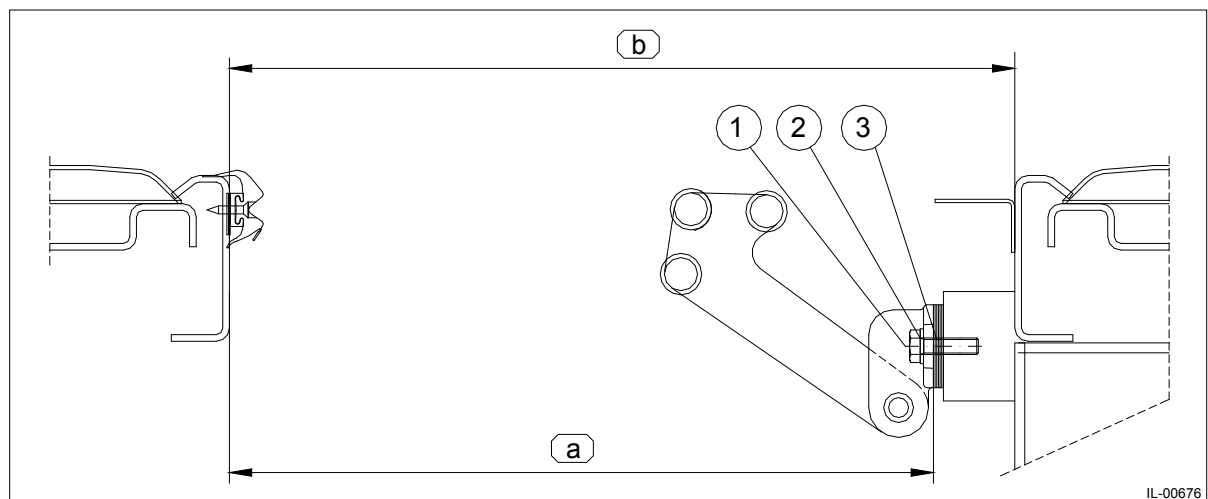
7 Mounting the roller swing arm bracket (item 05)

Prior to mounting the roller swing arm bracket, check the provided bore holes on portal and portal width measurement of (b) in accordance with assembly drawing 66408U1AR11.

Check measurement of (a) between roller swing arm bracket and portal. For adjustment this measurement nominal 5 mm shims (item 24 25 26) are provided.

Fit the roller swing arm bracket (item 05) and fasten it onto mounting bores by using hex-head screws and washers (see Drawing 7-1).

Drawing 7-1 – assembling roller swing arm



Pos.	Designation
1	Hex-dead screw (SoS customer)
2	Spring washer (SoS customer)
3	Shims (item 24 25 26) – nominal 5 mm
a	961 ^{±2} mm
b	1010 ^{+3/-2} mm

Indication of tightening torques

Item	Description/Dimension	Tightening torque	Loctite 243	Optimol Paste	Sealing wax
1	Machine screw – M10x35	45 Nm	Yes	No	Yes

8 Mounting the door leaf (item 02)



WARNING

Hazard risk while removing cable ties of the door leaf carrier - carrier swings towards the inside of the coach! - Danger of injuries!

8.1 Preparing the door leaf prior to mounting

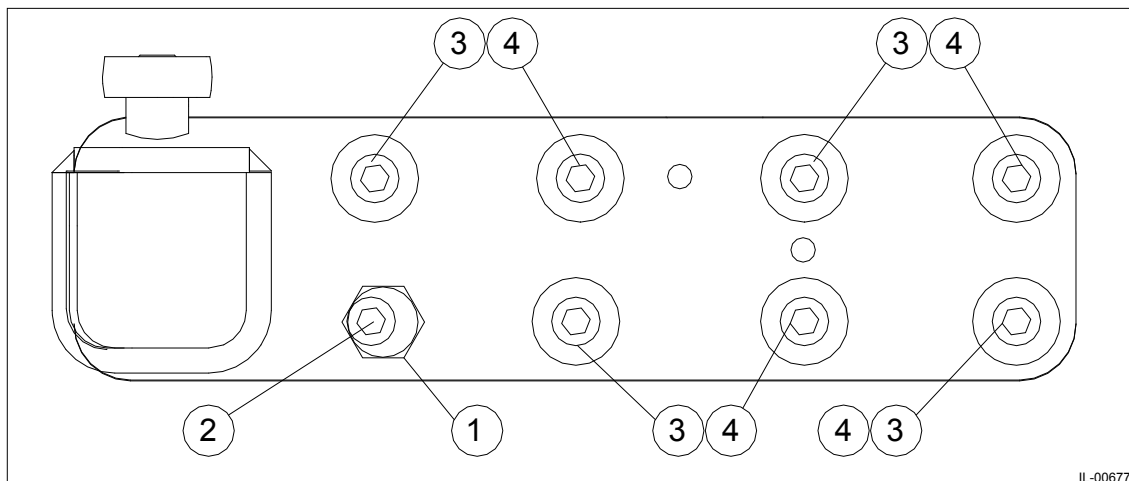


NOTE

Loosen the fastening screws of the bottom guide rail to ensure that the door leaf is not retained by the roller swing arm bracket during the following required adjustments.

Prepare machine screws (item 12) and washers (item 13) as well as eccentric (item 10) and countersunk screws (item 11) prior to mounting the door leaf (see Drawing 8-1).

Drawing 8-1 – preparing door leaf



IL-00677

Pos.	Designation
1	Eccentric (item 10)
2	Countersunk screw (item 11)
3	Machine screw (item 12)
4	Washer (item 13)

Indication of tightening torques

Item	Description/Dimension	Tightening torque	Loctite 243	Optimol Paste	Sealing wax
2	Countersunk screw M10×35	25 Nm	No	Yes	Yes
3	Machine screw M10×30	40 Nm	No	Yes	Yes



WARNING

Do NOT lock fastening screws with Loctite 243!



NOTE

Before mounting the door leaf, grease the fastening screws M10 (items 11, 12) with Optimol Paste to preclude seizing of the screws.

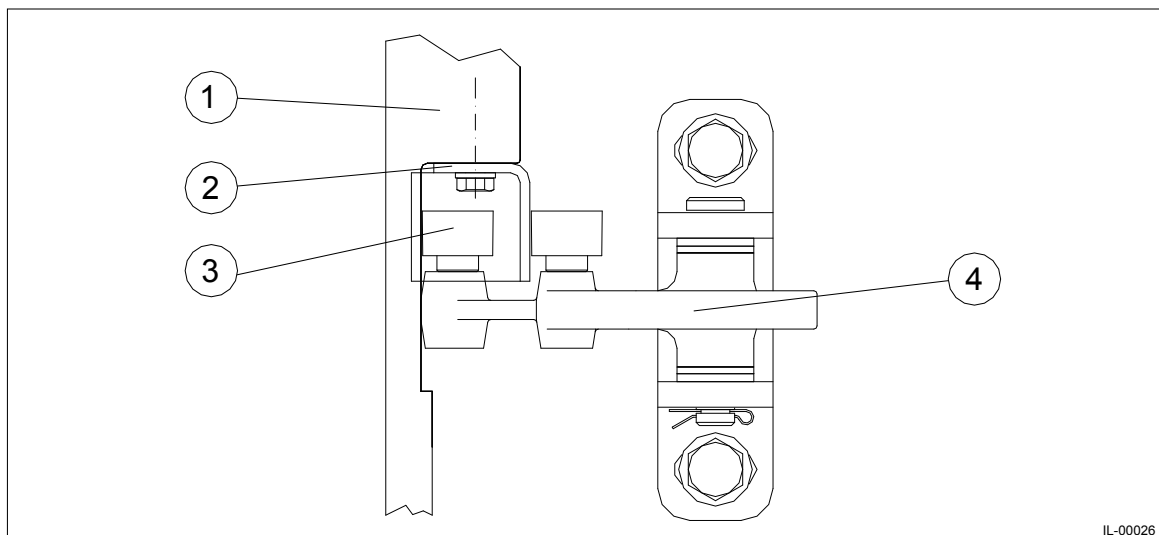


NOTE

Helicoils inside the door leaves are "Mid grip" types! Re-cutting the threads of helicoils is improper. Installation and will cause loss of guarantee!

8.2 Mounting the door leaf

Drawing 8-2 – bottom door leaf support



Pos.	Designation
1	Door leaf
2	Bottom guide rail
3	Roller
4	Roller swing arm

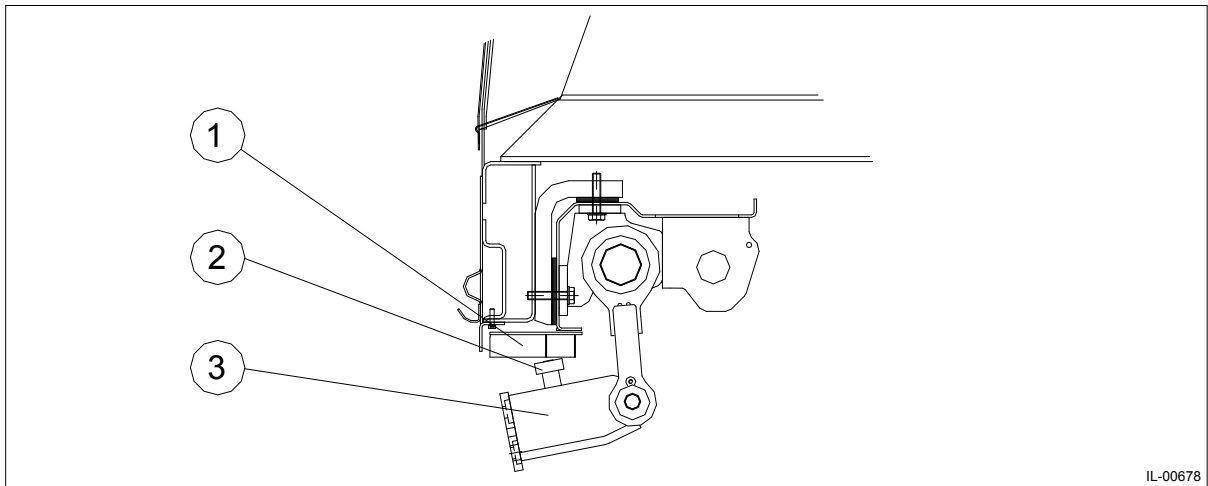


NOTE

Make sure that the door leaf carrier base plate does not get jammed with door leaf to preclude damages to the painting surface.

Lift the door leaf and insert the roller of the roller swing arm (item 05) into the bottom guide rail of the door leaf (see Drawing 8-2).

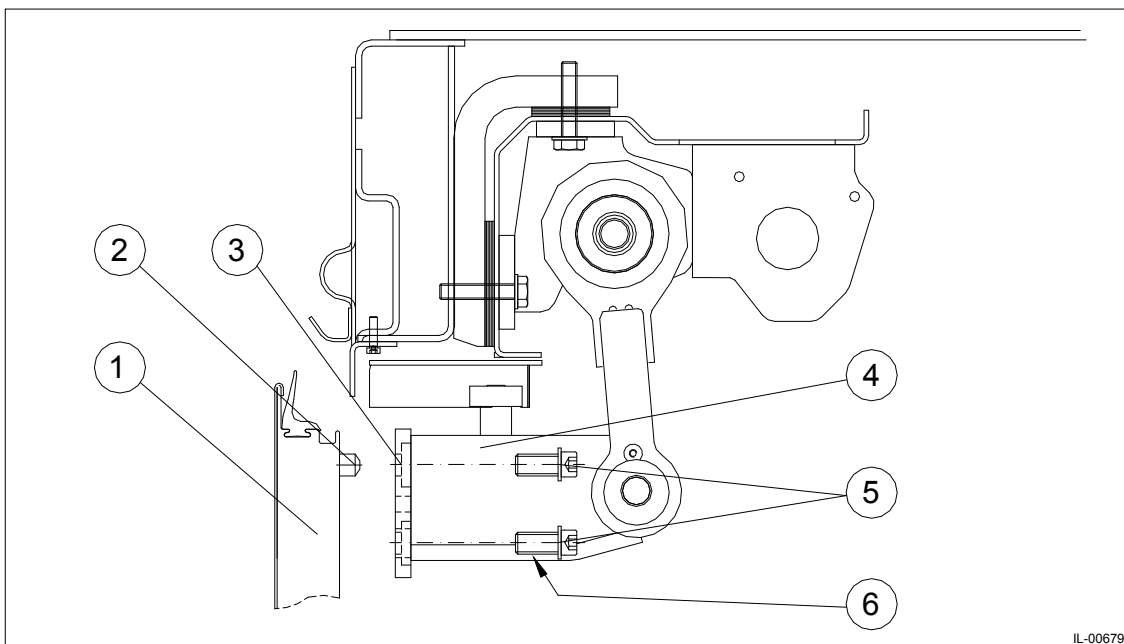
Drawing 8-3 – upper door leaf support



Pos.	Designation
1	Top guide rail
2	Guide roller
3	Door leaf carrier

Lift the door leaf carrier into position and insert the guide roller into the top guide rail (see Drawing 8-3).

Drawing 8-4 – assembling door leaf

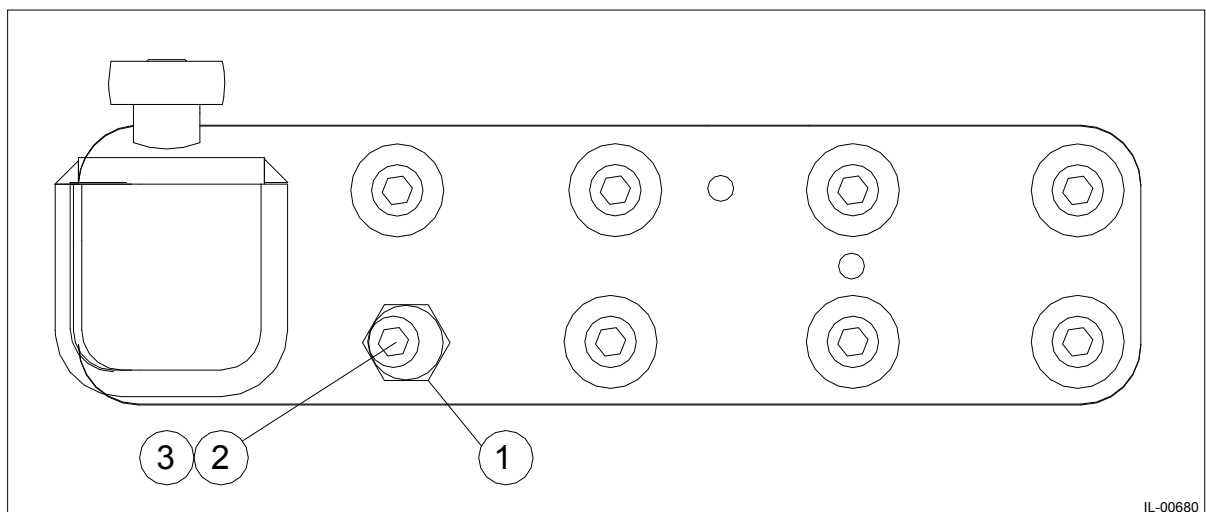


Pos.	Designation
1	Door leaf (item 02)
2	Cylinder pin
3	Bore hole
4	Door leaf carrier
5	Screws, washers
6	Optimol Paste

Lift the door leaf (item 02), make the cylinder pin on the door leaf cover the bore on the door leaf carrier. Knock the door leaf carrier with a plastic tip hammer onto the door leaf (see Drawing 8-4), taking care not to chock the base plate of the door leaf carrier on the door leaf and not to damage the painting.

Fix the door leaf carrier to the door leaf by means of the fastening screws and washers. Apply Optimol Paste onto screw before mounting.

Drawing 8-5 – assembling eccentrics



IL-00680

Pos.	Designation
1	Eccentric
2	Fastening screw
3	Optimol Paste

Insert eccentrics into longitudinal slots at door leaf carriers and fasten them with screws (see Drawing 8-5). Apply Optimol Paste onto screw before mounting.

9 Adjusting the door leaf (Item 02)



WARNING

Ensure that the fastening screws of the bottom guide rail are released to prevent friction of the roller lever during adjustment.

9.1 Adjusting the door leaf parallelism

The door leaf carrier support on the sensitive-edge-side is provided with an eccentric.

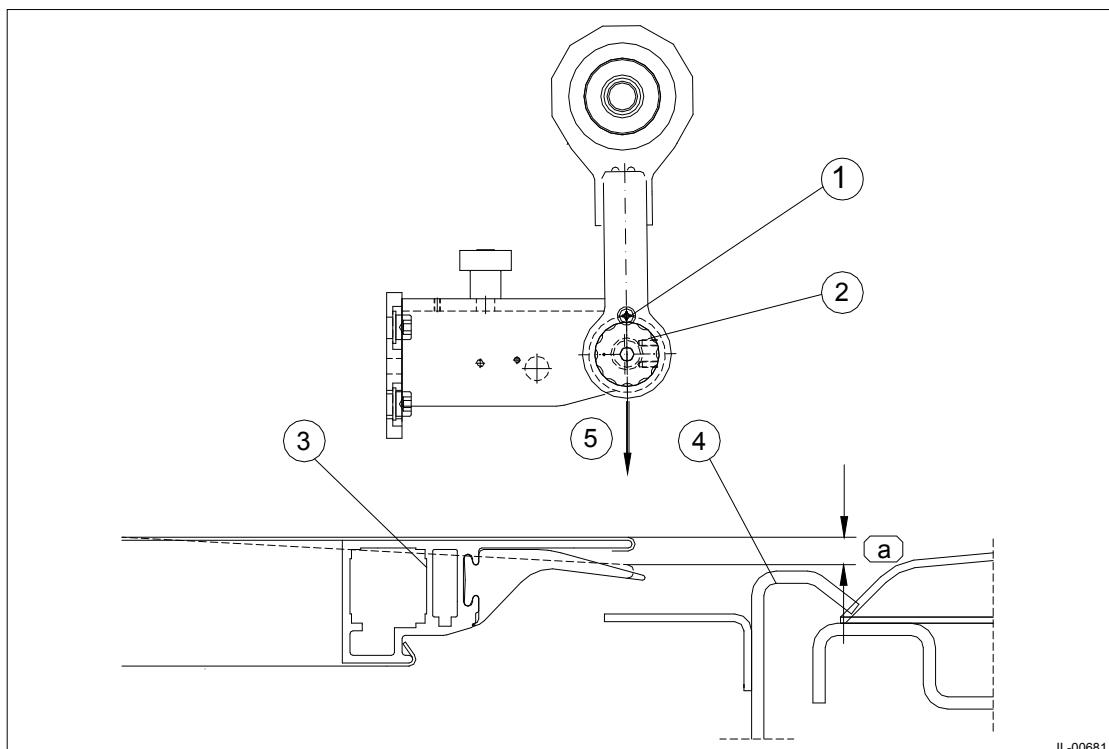
Basically the door leaf carrier is pre-adjusted to be parallel to the guide rod.

First re-check the horizontal drive unit adjustment (see section 0).

In case they are not parallel proceed as follows:

- Loosen the screw by using a cross recessed screw driver
- By using an Allen key rotate eccentric so that the door leaf outside is parallel with the seal surface (see Drawing 9-1).
- Re-tighten the screw.

Drawing 9-1 – door leaf parallelism; vertical position

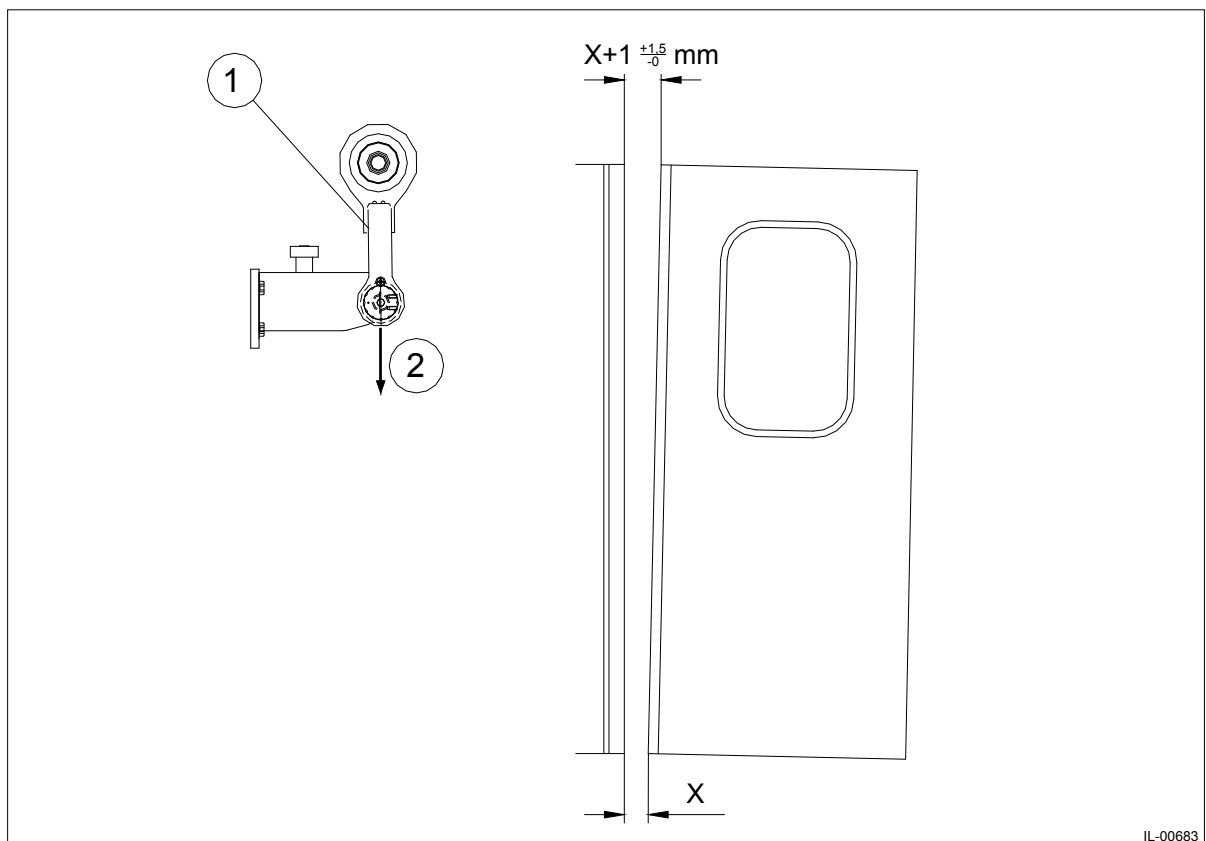


Pos.	Designation
1	Cross recessed screw
2	Eccentric
3	Door leaf
4	Portal
5	Vertically!!
a	$0^{+0/-2}$ mm

9.2 Adjusting the door leaf pre-load

Following vertical adjustment, the pre load at the top of door leaf should be between 1 and 2,5 mm. For this bring the door leaf in such a position, that the door leaf carriers supports are in a vertical position (see Drawing 9-2 and Drawing 9-3).

Drawing 9-2 – door leaf preload



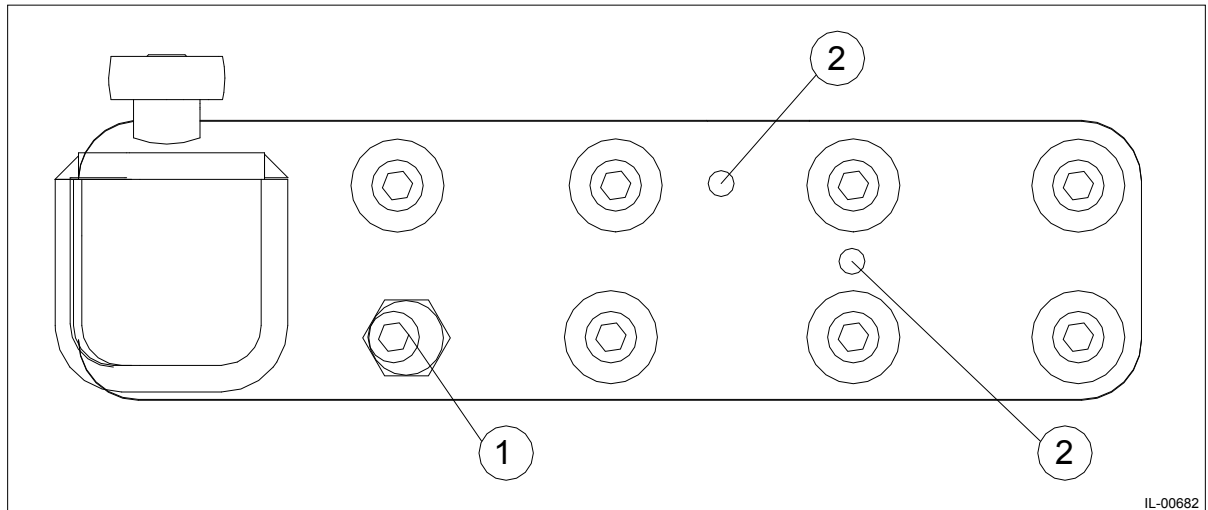
Pos.	Designation
1	Door leaf carrier support
2	Vertical

The adjustment is done by turning the eccentric of door leaf carrier (see Drawing 9-3).

How to adjust vertical position:

- Release fastening screws (see Drawing 8-1)
- Move door leaf around parallel pin by means of eccentric (see Drawing 9-3)

Drawing 9-3 – adjustment of eccentric

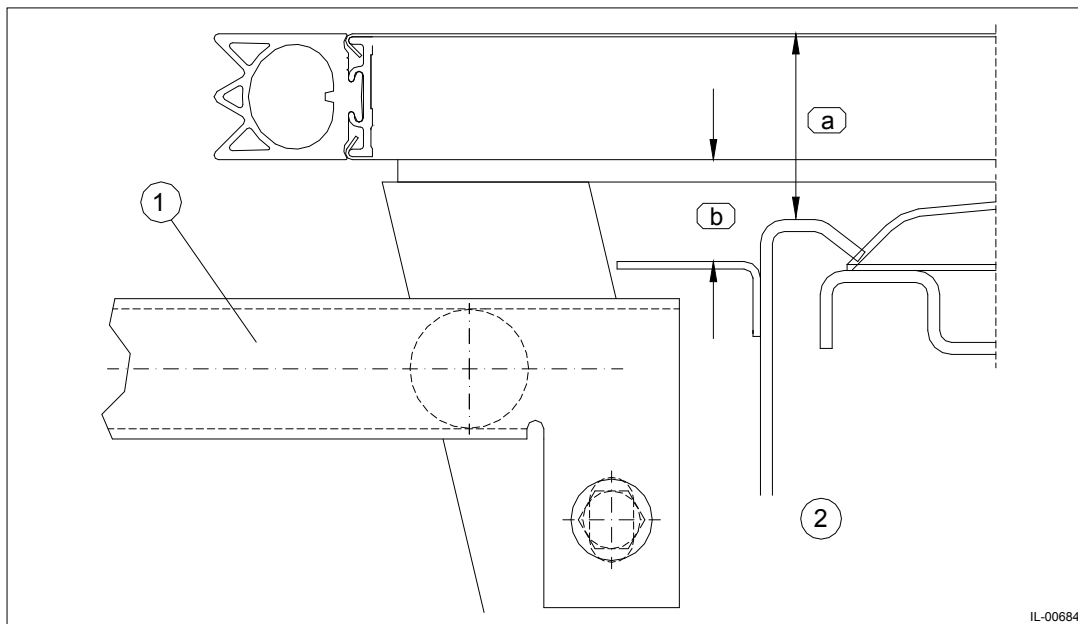


Pos.	Designation
1	Eccentric
2	Parallel pin

9.3 Adjusting the upper swing-out movement

Move the door leaf into open-position. Adjust the measurement of (a) (to sealing angle reference – measure dimension (b)) using the trailing elongated slots of top guide rail (mounted at drive unit – see Drawing 9-4).

Drawing 9-4 – adjusting upper swing-out movement



Pos.	Designation
1	guide rail
2	Adjust at guide rail!
a	62 ⁺⁴ mm
b	(34 mm)

Tighten the trailing fastening screws to guide rails.

Indication of tightening torques

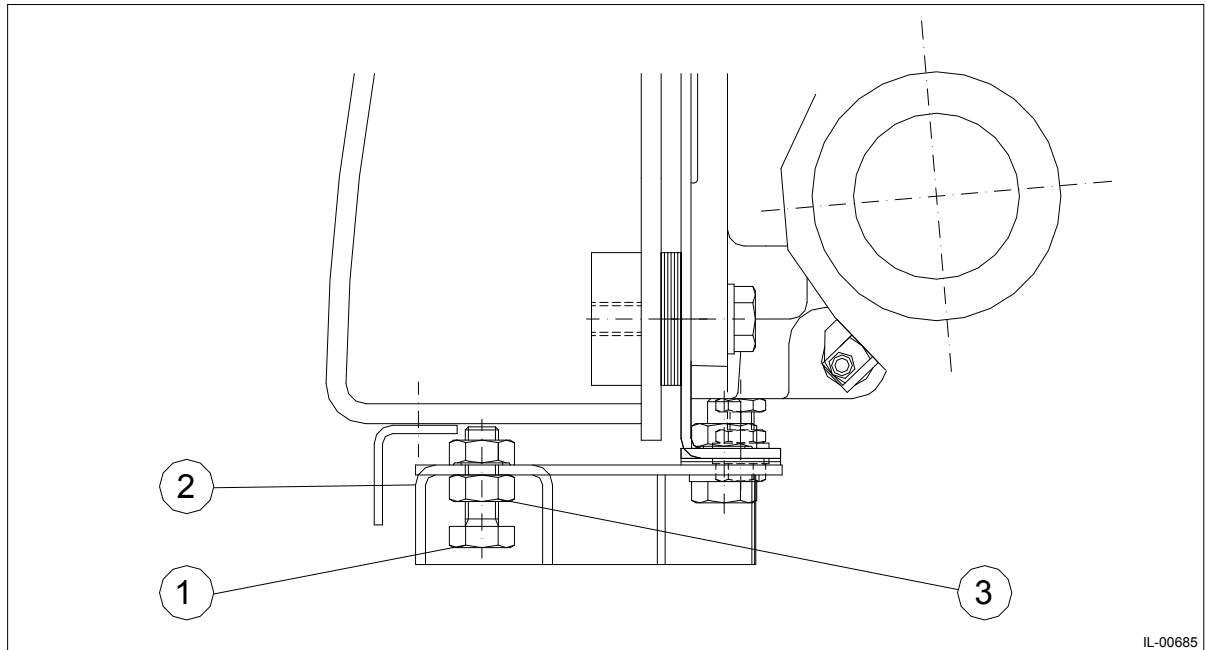
Item	Description/Dimension	Tightening torque	Loctite 243	Optimol Paste	Sealing wax
	Screw of the guide rail M10x25	45 Nm	Yes	No	Yes

9.4 Check of additional support screw of upper guide rail

For additional support and stiffness of the upper guide rail check the support screw, if the screw contacts the portal surface.

If required, loosen counter nut and screw in until the screw contacts the portal surface (see Drawing 9-5 – support screw at guide rail). Afterwards counter with nut.

Drawing 9-5 – support screw at guide rail



Pos.	Designation
1	Support screw
2	Upper guide rail
3	Counter nut

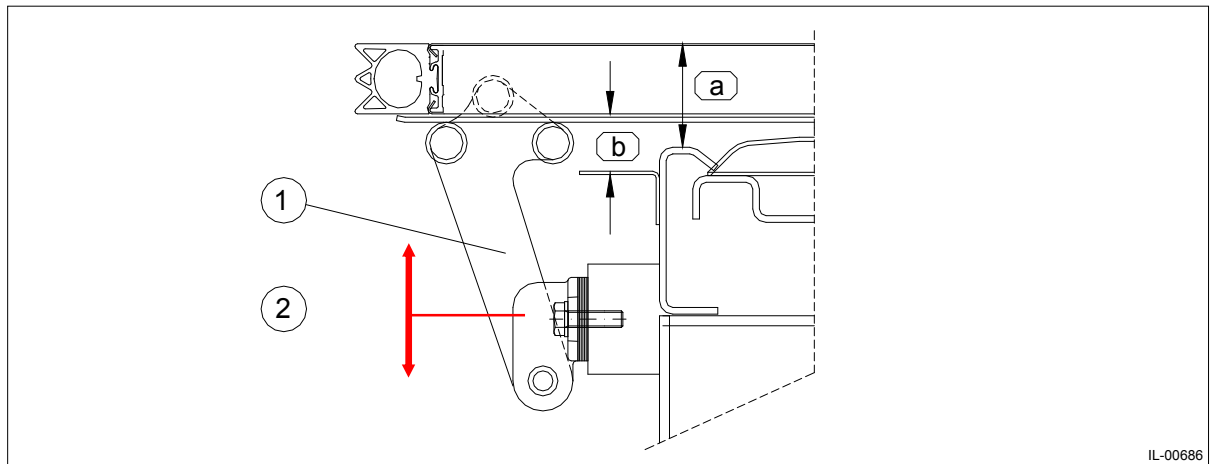
Indication of tightening torques

Item	Description/Dimension	Tightening torque	Loctite 243	Optimol Paste	Sealing wax
1	Nut M10	45 Nm	Yes	No	Yes

9.5 Adjusting the lower swing-out movement

Adjust the roller swing arm using the elongated holes such that the door leaf swings out (a) (reference to sealing angle – measure (b)) measured at the bottom door leaf edge (see Drawing 9-6) the same as upper swing out.

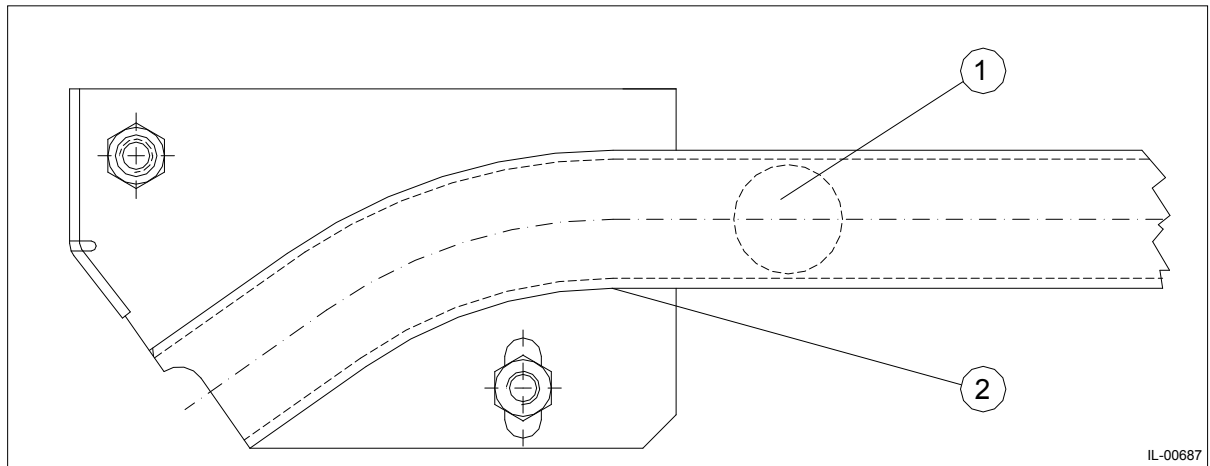
Drawing 9-6 – adjusting lower swing out movement



Pos.	Designation
1	Roller swing arm
2	Adjust at roller swing arm bracket!
a	62 ⁺⁴ mm, (measured to bottom door leaf edge)
b	(34 mm)

Therefore ensure, that the roller is not in the curved area of the upper guide rail (see also drawing 9-7).

Drawing 9-7 – checking guide roller in upper guide rail



Pos.	Designation
1	Roller
2	Upper guide rail

When adjustment is complete, tighten fastening screws.

Indication of tightening torques

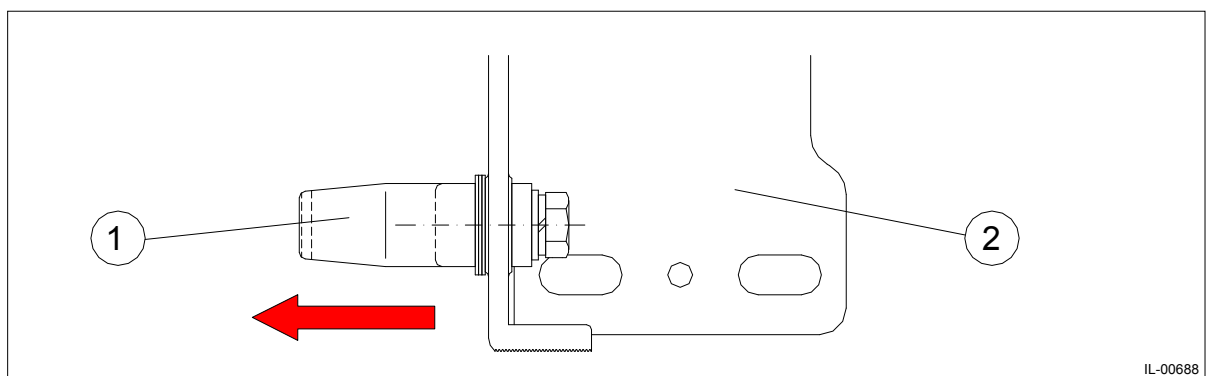
Item	Description/Dimension	Tightening torque	Loctite 243	Optimol Paste	Sealing wax
1	Machine screw – M10x35	45 Nm	Yes	No	Yes

10 Mounting and adjustment of the lock housing mechanism (item 03)

10.1 Preparation of the lock housing mechanism

Prior to mounting the lock housing mechanism the catch hook have to be dismantled, to prevent damages on the door leaf which can occur during the assembly and adjustment procedure of the lock housing mechanism (see Drawing 10-1).

Drawing 10-1 – preparation catch hook



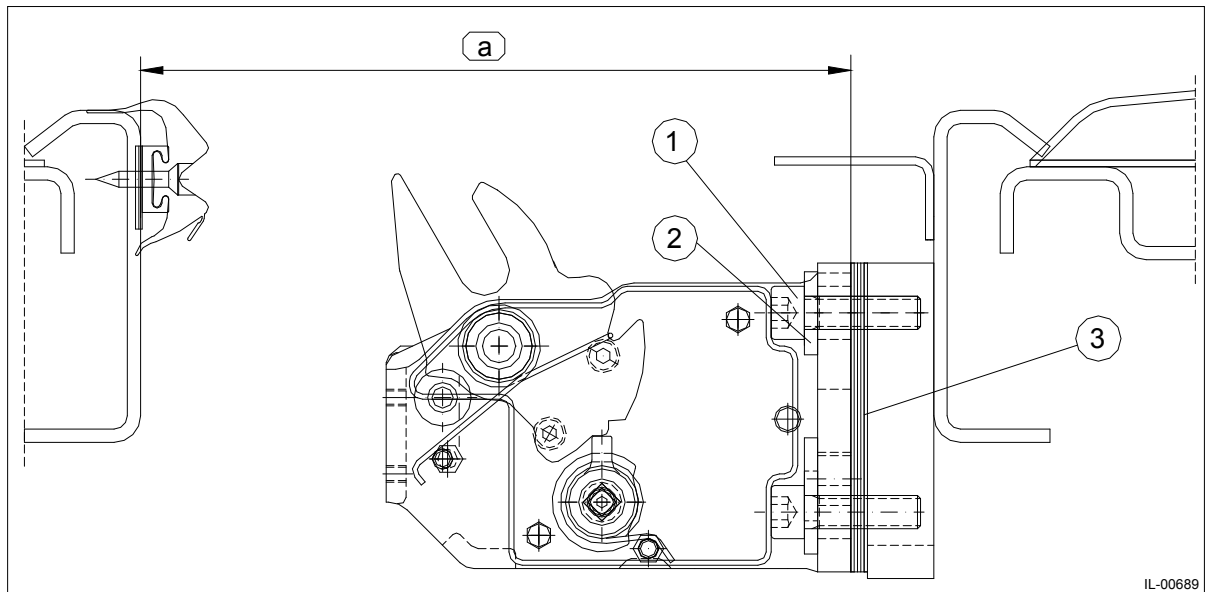
Pos.	Designation
1	Catch hook
2	Lock housing mechanism

10.2 Mounting the lock housing mechanism

Prior to mounting the lock housing mechanism, check provided bore holes in accordance with assembly drawing 66408U1AR11. The measurement of (a) between the portal edge and the lock housing mechanism mounting surface should be guaranteed. Nominal 5 mm shims from the mounting surface are provided (see Drawing 10-2).

Position the lock housing mechanism and fasten it onto mounting bores provided by using hex-head screws and washers.

Drawing 10-2 – mounting the hock housing mechanism



Pos.	Designation
a	985 ± 2 mm
1	Hex-head screw (SoS customer)
2	Washer (SoS customer)
3	Shims (nominal 5 mm)

Indication of tightening torques

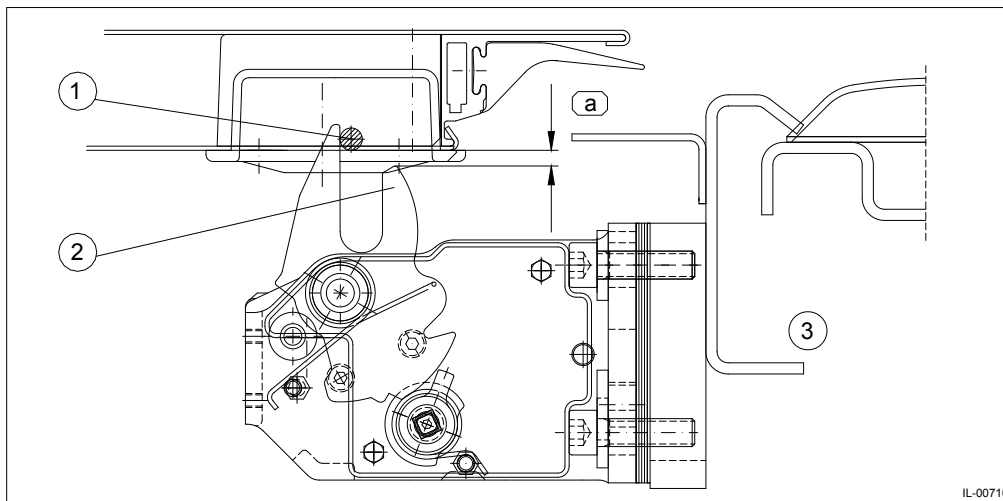
Item	Description/Dimension	Tightening torque	Loctite 243	Optimol Paste	Sealing wax
1	Hex-head screw M10×35	45 Nm	Yes	No	Yes

10.3 Adjust the distance between the latch and the roller

The door leaf must be moved into the closed position by hand, such that the roller inside the door leaf touches the latch of the lock housing mechanism.

In that position a distance of (a) must exist. The lock housing mechanism must be adjusted through sideways moving via the elongated holes (see Drawing 10-3)

Drawing 10-3 – adjusting the lock housing mechanism

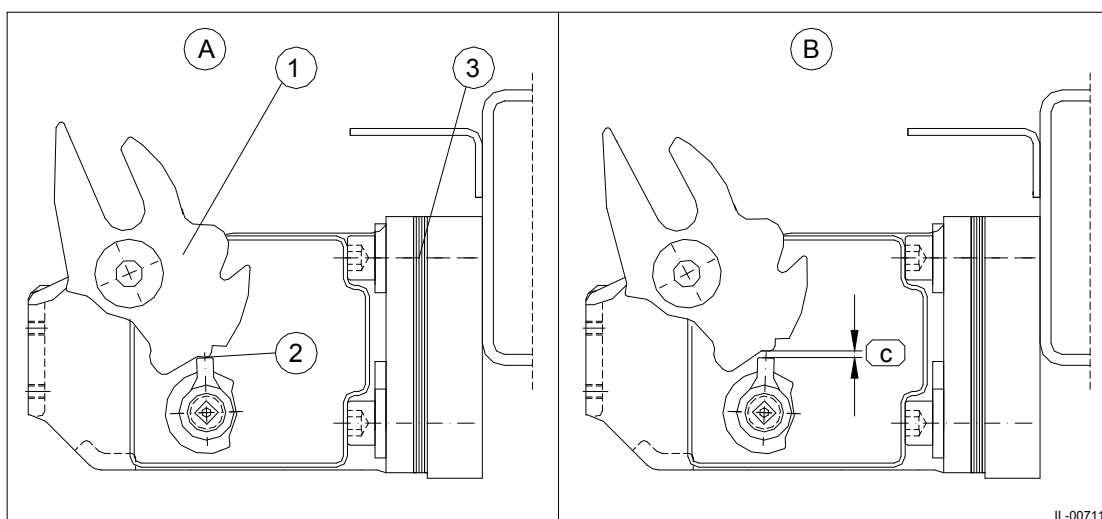


Pos.	Designation
a	1 – 3 mm
1	Roller at door leaf
2	Latch at lock housing mechanism
3	Adjust in the elongated holes!

10.4 Closing of the door leaf with electrical supply

Bring the door leaf in fully closed position with electrical supply and check that the latch is in the second stage engagement and does overdrive (c) (see Drawing 10-4).

Drawing 10-4 – adjusting the overdrive of latch

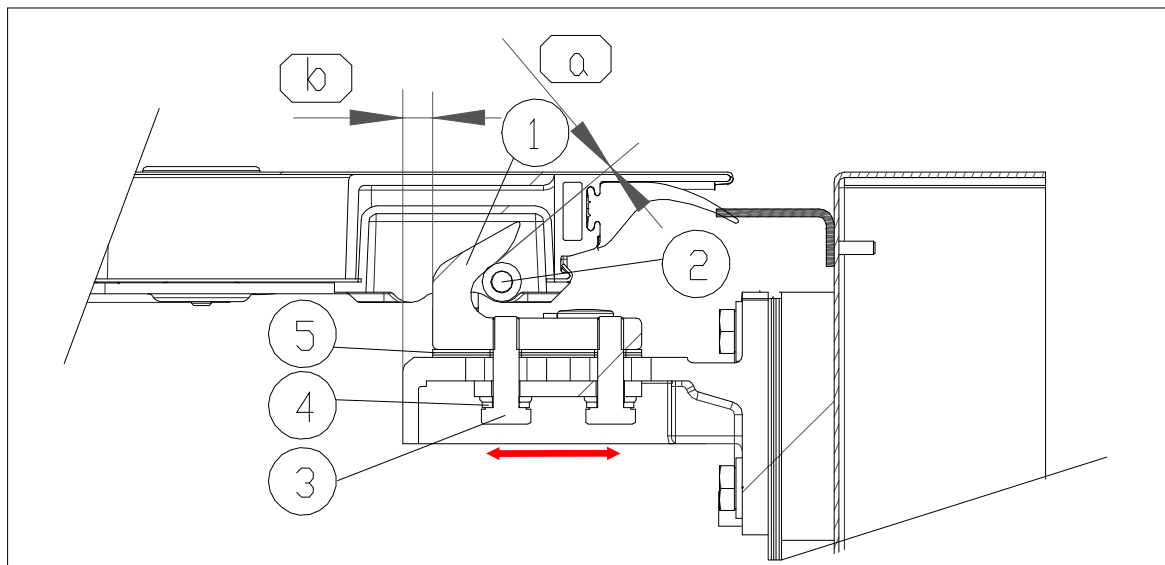


Pos.	Designation
1	Latch at lock housing mechanism
2	Second engagement
3	Shims
A	Closed and locked without electrical supply
B	Closed and locked with electrical supply
c	1 – 2 mm

By adding or taking out shims (3) between the lock housing mechanism and the portal the overdrive can be adjusted as following (see Drawing 10-4).

In fully electrical closed position remount the catch hook on the lock housing mechanism so that there is no gap between the roller of the door leaf and the catch hook (see Drawing 10-5).

Drawing 10-5 – mounting the catch hook



Pos.	Designation
1	Catch hook
2	Roller
3	Hex-head screws
4	Washer
5	Shims (if necessary)
a	0 mm

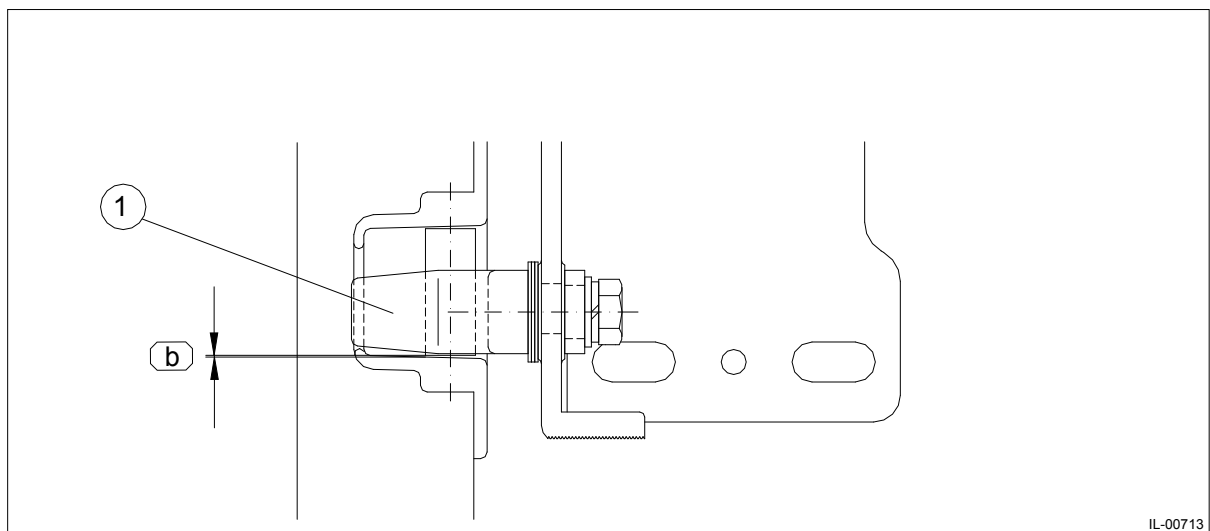
b	11.5 ^{±2} mm
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After tightening the catch hook, open the door and close again with electrical supply. Check that the door reaches the second stage engagement (see Drawing 10-4).

If door leaf does not reach the second stage engagement, then the catch hook presses the door too much to the outside. Readjustment of the catch hooks due to shifting entire the elongated holes and/ or adding/ removing of shims; see Drawing 10-5).

The height position of the catch hook must be adjusted according to Drawing 10-6.

Drawing 10-6 – height position of catch hook



IL-00713

Pos.	Designation
1	Catch hook
b	1 - 3mm

When adjustment is complete apply Loctite 243 on the fastenings screws (see Drawing 10-5) and tighten them.

Indication of tightening torques

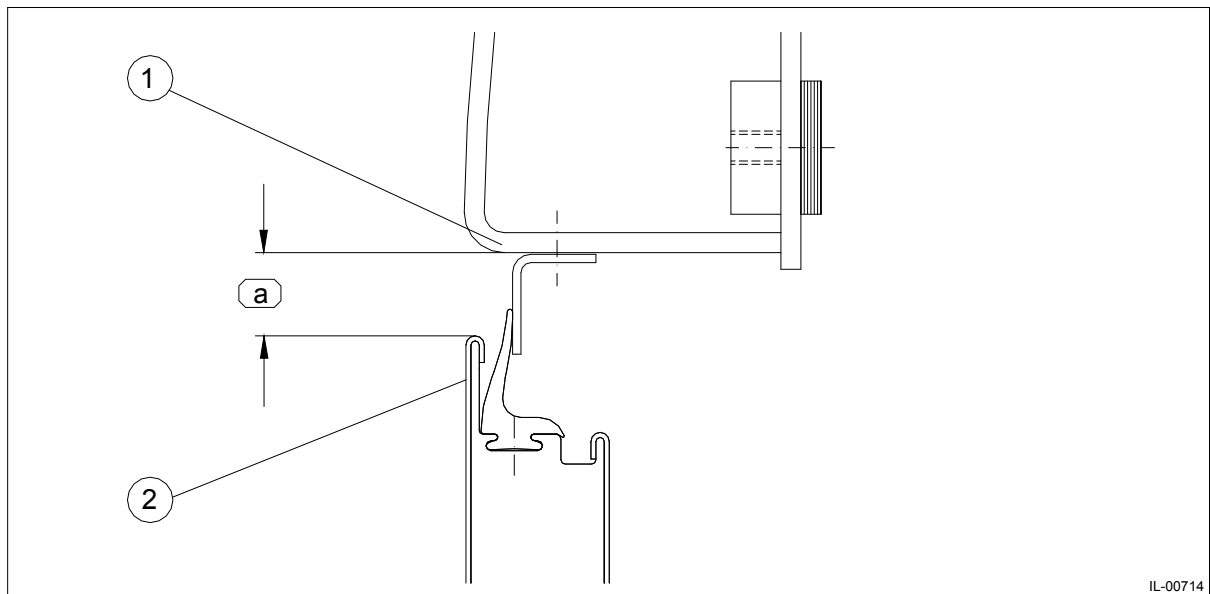
Item	Description/Dimension	Tightening torque	Loctite 243	Optimol Paste	Sealing wax
1	Hex-head bolt M10×35	45Nm	Yes	No	Yes

11 Final Door leaf adjustments

11.1 Door leaf height position check

In door closed position, check the measurement of (a) from the upper edge of the door leaf to the portal structure (see Drawing 11-1).

Drawing 11-1 – door leaf height position

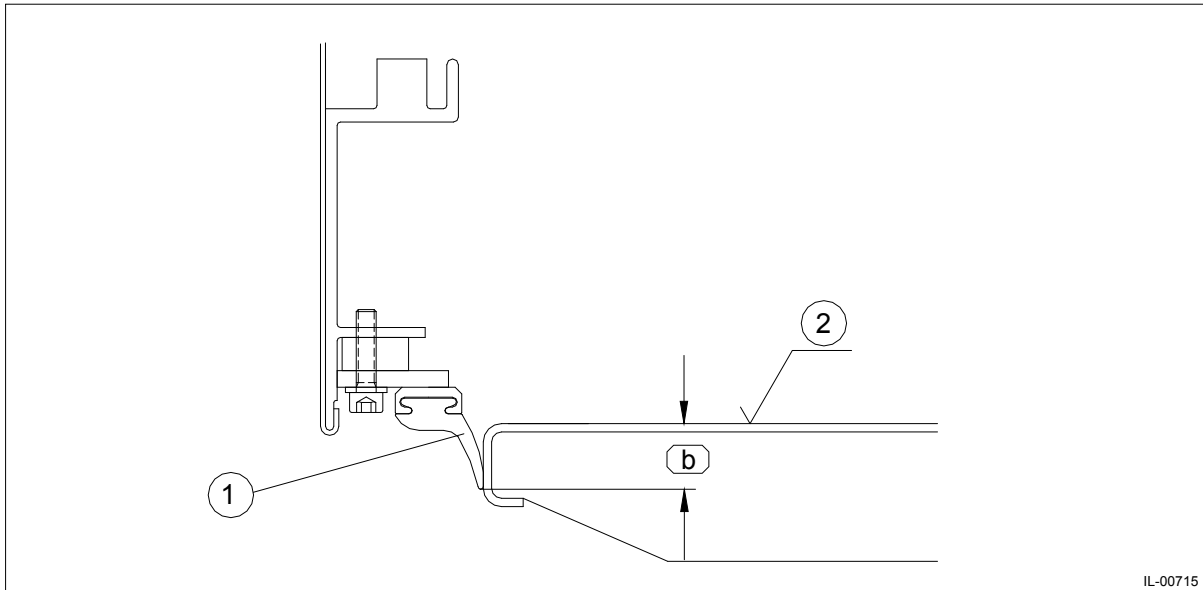


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Pos.	Designation
1	Portal structure
2	Door leaf
a	24 \pm 2 mm

Therefore as a reference serve the bottom overlap measurement of (b) of bottom door seal rubber to (2) (see Drawing 11-2).

Drawing 11-2 – door seal rubber overlap



Pos.	Designation
1	Door seal rubber
2	1100 mm ARL (above rail level)
b	(9 mm)

A correction adjustment of the top measurement of (a) carried out by removing or adding of shims located behind drive unit in accordance with chapter 6.1.



NOTE

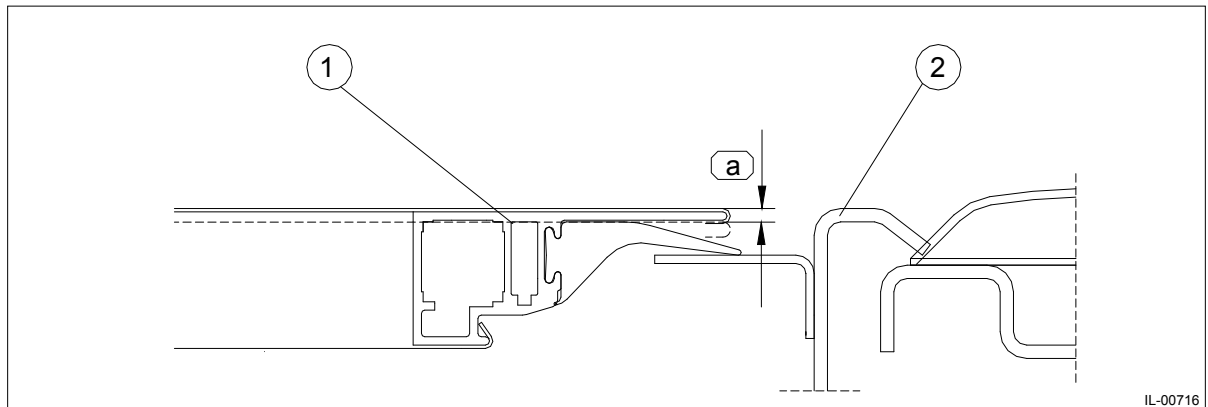
If a correction of the drive unit in height is carried out, then the support screw has to be readjusted and countered with counter nut as already described under chapter 9.4.

When adjustment is complete remove the drive unit fastening screws one at a time, apply Loctite 243 and tighten with correct torque.

11.2 Adjustment of the tightness at upper area

Perform visual check on the door leaf side, between portal panel and door leaf edge. Further check that outer door leaf surface at upper area is flush with the portal surface (a). (See Drawing 11-3)

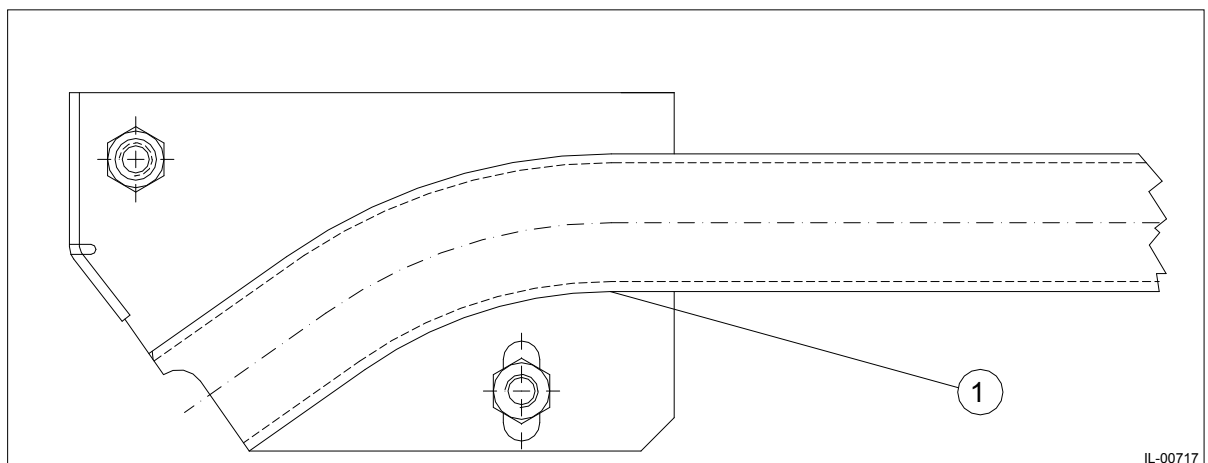
Drawing 11-3 – tightness at upper area



Pos.	Designation
1	Door leaf
2	Portal surface
a	0 ^{+0/-3} mm

The adjustment carried out by sliding the upper guide rail along elongated slots (see Drawing 11-4).

Drawing 11-4 – adjusting tightness at upper area



Pos.	Designation
1	Guide rail

The variation of the clearance between portal and door leaf arises from the admissible variation of the portal.



NOTE

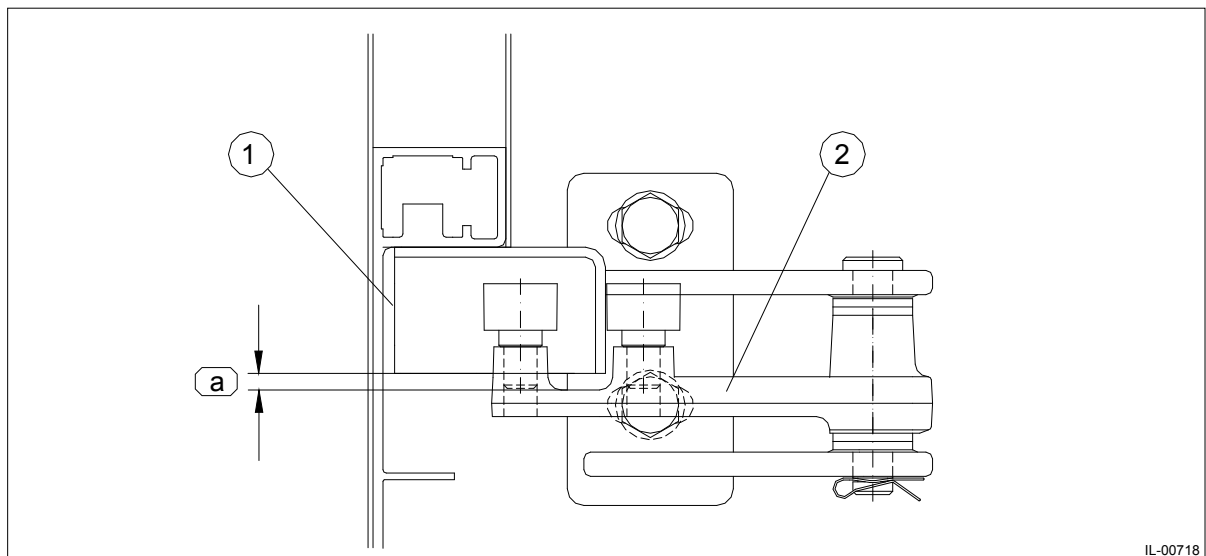
In case that the portal pillars are distorted, the door protrudes from the outer coach surface or door rubber to portal rubber is offset. In such cases a correction is not possible.

11.3 Adjusting the roller swing arm bracket

For elevation adjustment of the rollers with respect to the bottom guide rail checks again that:

- In door closed-position, the roller swing arm does not brush against the guide rail. The minimum distance of (a) between lower guide rail edge and top of the roller swing arm should be achieved (see Drawing 11-5).

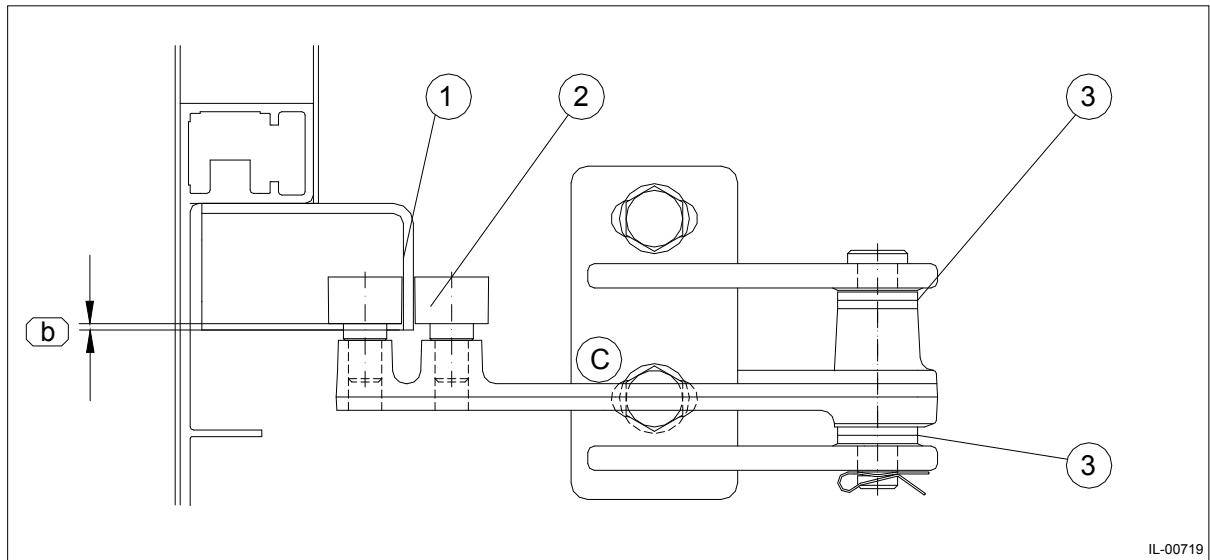
Drawing 11-5 – roller swing arm in closed position



Pos.	Designation
1	Guide rail
2	Roller swing arm
a	5.5 – 7.5 mm

- In door open-position, the bottom edge of the rollers must not be lower than the guide rail (b) (see Drawing 11-6).

Drawing 11-6 – roller swing arm in open position



Pos.	Designation
1	Guide rail
2	Roller of roller swing arm
3	Shims
b	≥0 mm
C	Horizontally!

To adjust rollers in height, remove shims from top of roller swing arm and add to bottom or vice-versa (see Drawing 11-6).



WARNING

Ensure the roller swing arm is mounted horizontally!

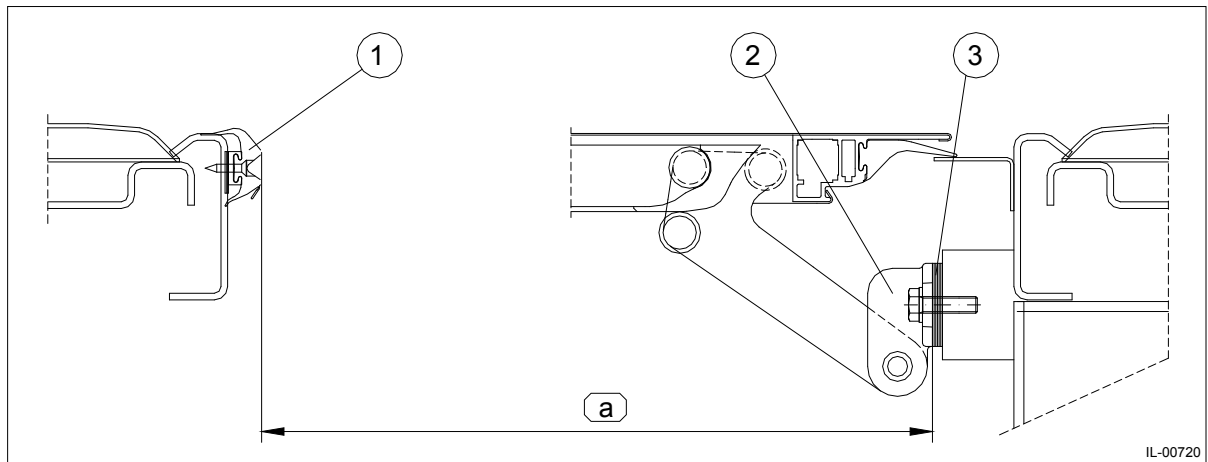


WARNING

Open and close the door by hand 3-5 times and check whether the roller on top and bottom does move free and will not become jammed in the guide rails.

The measurement (a) from the portal rubber leading edge referring to the roller swing arm bracket must be already ensured whilst mounting of the portal profile (see earlier chapter7) (see Drawing 11-7).

Drawing 11-7 – measurement roller swing arm to portal rubber



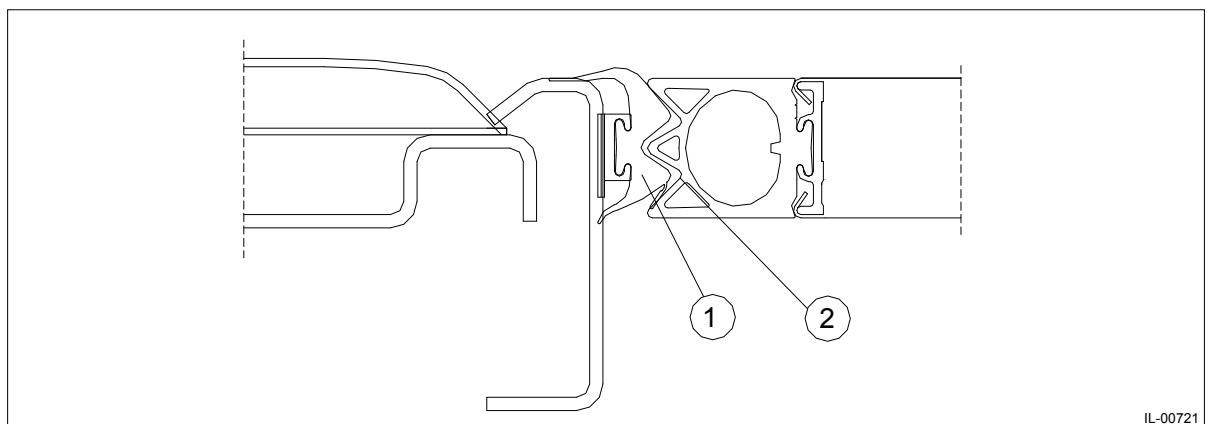
Pos.	Designation
1	Portal rubber
2	roller swing arm bracket
3	Shims (item 24 25 26) – nominal 5 mm
a	961 \pm 2 mm

11.4 Adjustment of the door closed position on TOP and BOTTOM

Move the door leaf into the fully closed position by hand.

By moving the guide rails (top and bottom) in the slotted holes the door leaf will be adjusted such that the leading door leaf rubber and the portal rubber comes together in the correct position (see Drawing 11-8).

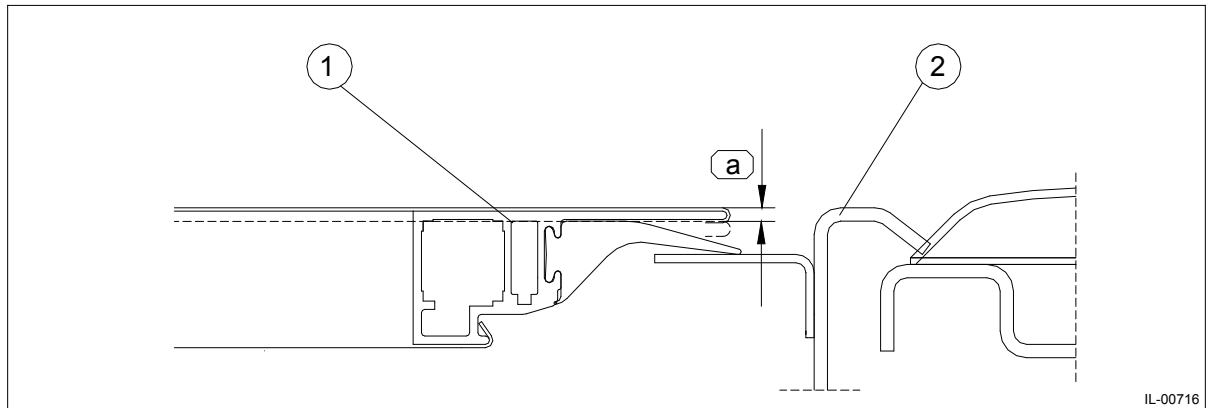
Drawing 11-8 – adjusting door closed position



Pos.	Designation
1	Portal rubber
2	Leading door leaf rubber

Check that outer door leaf surface at bottom area is flush to the portal surface or minus 3mm as maximum (Drawing 11-9).

Drawing 11-9 – tightness at bottom area



Pos.	Designation
1	Door leaf
2	Portal surface
a	0 ^{+0/-3} mm

Then tighten all fastening screws of the bottom guide rail.

Indication of tightening torques /

Item	Description/Dimension	Tightening torque	Loctite 243	Optimol Paste	Sealing wax
	Machine screw M6×16	8.8 Nm	Yes	No	Yes

12 Mounting and adjustment of the bottom holding bracket (item 09)

12.1 Mounting of the holding bracket

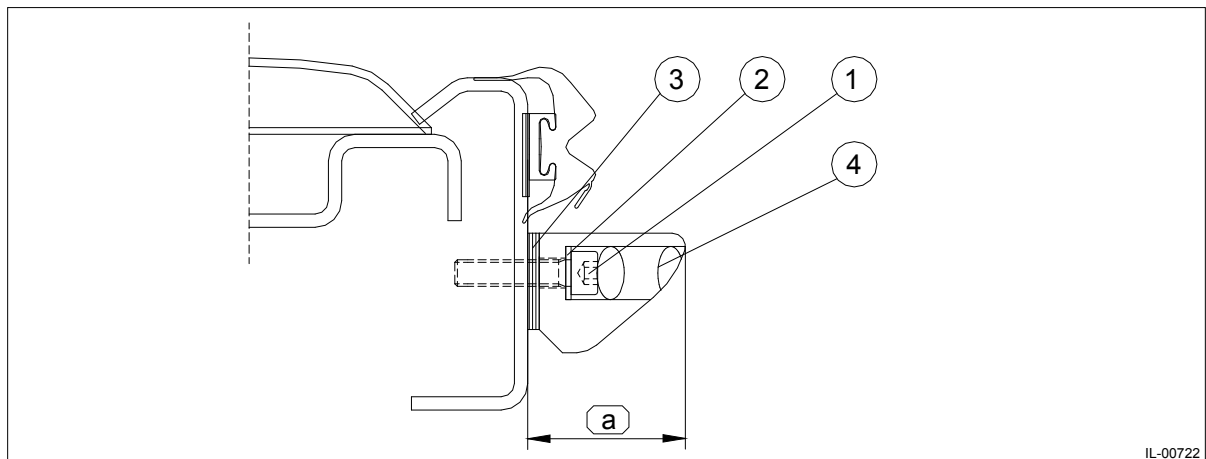
Open the doors manually.

Check bore hole measurements on the portal in accordance with assembly drawing 66408U1AR11.

Mount the bracket by fixing with machine screws, spring washers and shims (see Drawing 12-1).

By adding or removing of shims adjust the bracket to a measurement of (a) from portal edge to the edge of the bracket as advised in Drawing 12-1.

Drawing 12-1 – mounting the holding bracket



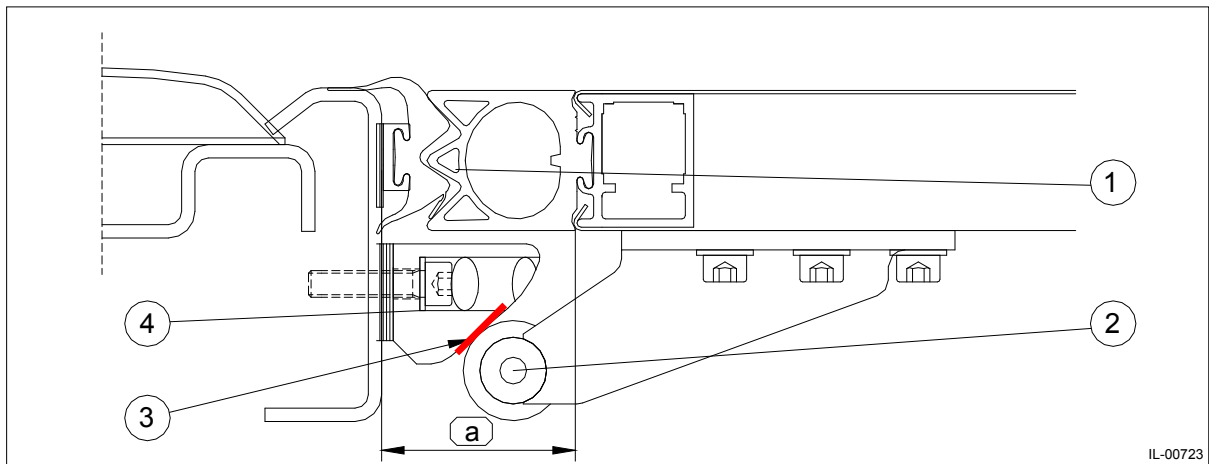
Pos.	Designation
1	Machine screw (SoS customer)
2	Spring Washer (SoS customer)
3	Shims (nominal 5 mm)
4	Holding bracket (item 9)
a	49 \pm 1 mm

Indication of tightening torques

Item	Description/Dimension	Tightening torque	Loctite 243	Optimol Paste	Sealing wax
1	Machine screw M10x30	21 Nm	Yes	No	Yes

Bring door in closed position and check if the roller on the door leaf comes into the straight line area of the bracket and the compression of door leaf rubber to portal rubber result in a dimension of (a) (see Drawing 12-2).

Drawing 12-2 – adjusting the holding bracket



Pos.	Designation
1	Door leaf rubber
2	Roller
3	Straight line area!
4	Holding bracket
a	(54-55 mm)

When adjustment is complete apply Loctite 243 on the machine screws (see Drawing 12-1) and tighten them.

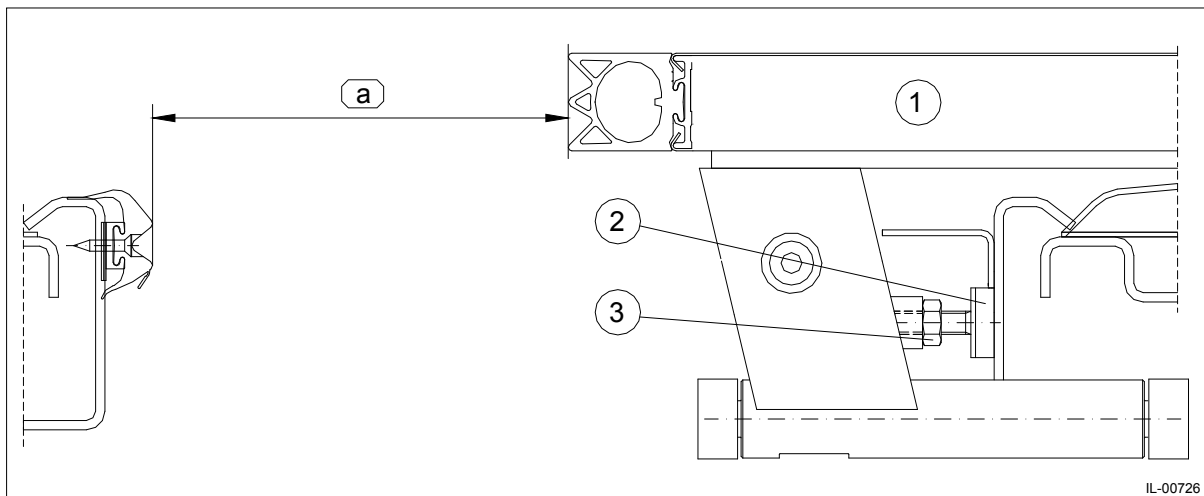
13 Adjustment of the door opening width

The door opening width must be adjusted via the rubber bump stop on the door leaf carrier.

Door opening Width (a) (see
Drawing 13-1).

After adjustment the rubber bump stop must be secured with the counter nut.

Drawing 13-1 – adjusting door opening width



IL-00726

Pos.	Designation
1	Door leaf
2	Rubber bump stop
3	Counter nut
a	Clearance 800 ⁺⁵ mm

14 Mounting and adjustment of the isolating lock mechanism (Item 04)

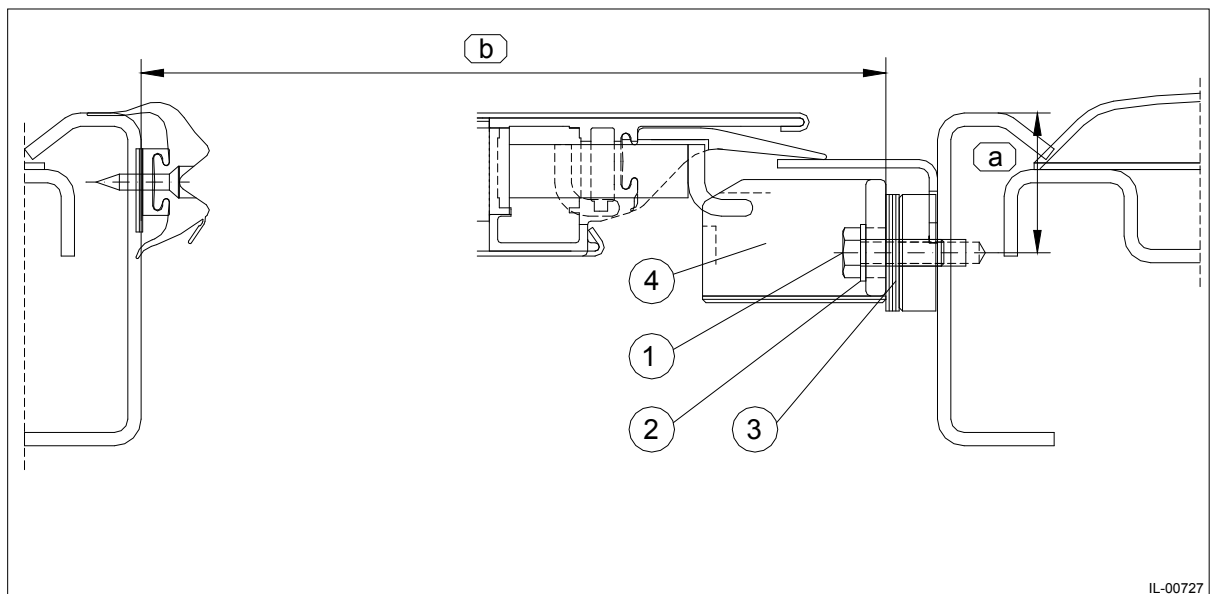
14.1 Mounting the isolating lock mechanism

Prior to mounting the isolating lock mechanism, check provided bore holes in accordance with assembly drawing 66408U1AR11. Nominal 5 mm shims from the mounting surface are provided (see Drawing 14-1).

Position the isolating lock mechanism (items 04) and fasten it onto mounting bores provided by using fastening screws (item 19) and washers (item 20) (see Drawing 14-1).

By adding or removing of shims adjust to a measurement of (b) from portal edge to the bracket as advised in Drawing 14-1.

Drawing 14-1 - mounting the isolating lock mechanism



Pos.	Designation
1	Hex-head screw (SoS customer)
2	Washer(SoS customer)
3	Shims (nominal 5 mm)
4	Isolating lock mechanism (item 04)
a	42 ± 1 mm
b	995 ± 2 mm

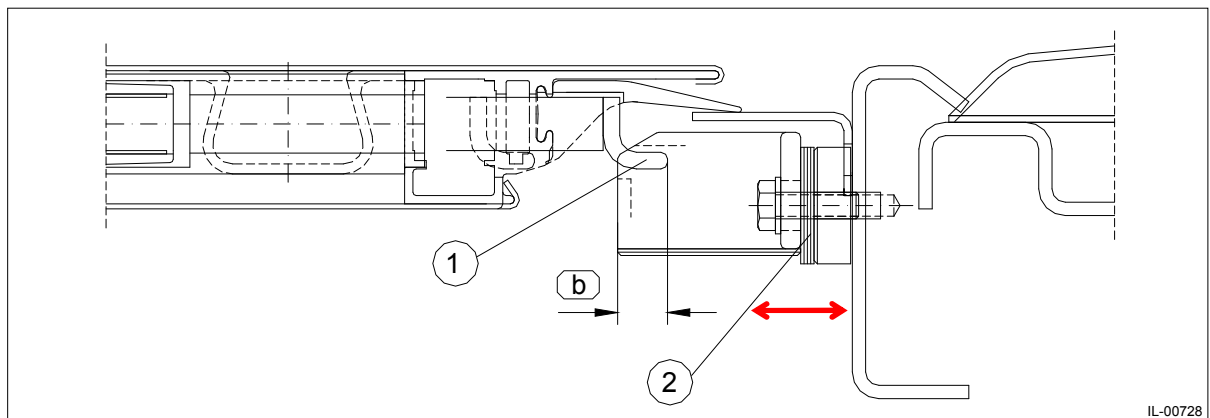
Indication of tightening torques

Item	Description/Dimension	Tightening torque	Loctite 243	Optimol Paste	Sealing wax
1	Hex-head screw M8 x 30	23 Nm	Yes	No	Yes

14.2 Adjustment of the isolating lock mechanism

By longitudinally (compared with car) displacing and by adding and removing shims, the door isolating lock is adjusted such as that when locking the door out of use, the door lock lever penetrates (b) into the isolating lock mechanism (see Drawing 14-2).

Drawing 14-2 – adjusting the isolating lock mechanism



Pos.	Designation
1	Lock lever
2	Shims (nominal 5 mm)
b	Min. 10 mm – max. 16 mm

14.3 Adjustment check

When lock the door, check the following

- The door being locked out of use, the limit switch (located inside the isolating lock mechanism) must be actuated.
- The door lock lever must not slip off the actuating lever.

If the limit switch is not pressed (actuated), then readjustment by adding shims is required.

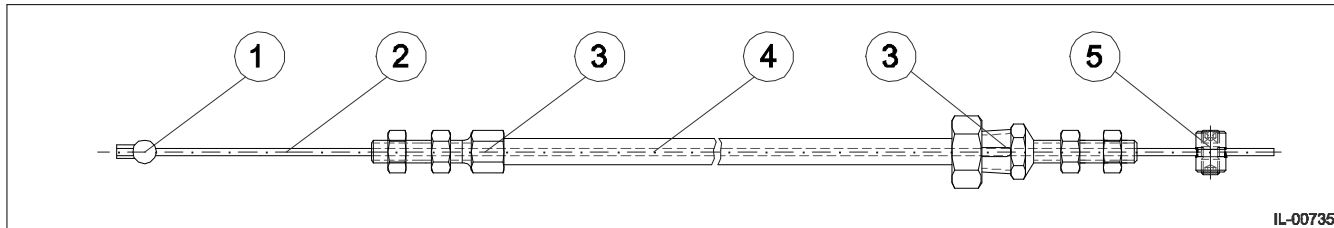
When adjustment is complete apply Loctite 243 on the hex-head screws (see Drawing 14-1) and tighten them.

15 Mounting and adjusting the emergency device

15.1 Preparation the Bowden cable

Remove round clamping nipple, cable and the two tail pieces from the Bowden sleeve (see Drawing 15-1 – preparation Bowden cable).

Drawing 15-1 – preparation Bowden cable



IL-00735

Pos.	Designation
1	round clamping nipple
2	Cable
3	Tail piece
4	Bowden sleeve
5	Nipple



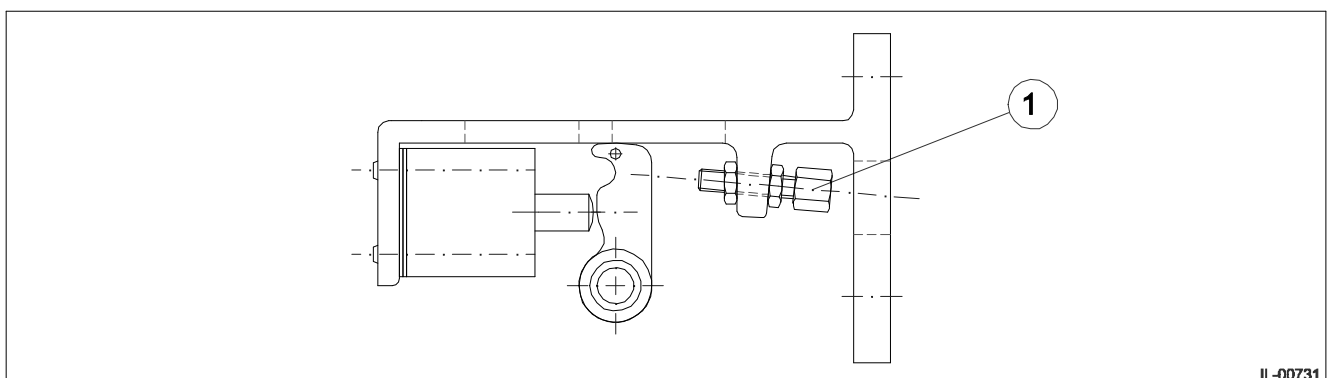
NOTE

If component parts of the Bowden cable are lost, only the complete Bowden cable is available as spare part liable to cost. Component parts cannot be supplied.

15.2 Mounting

Screw one tail piece into emergency device (see Drawing 15-3) and the second tail piece into respective mounting located at lock housing mechanism side (see Drawing 15-2).

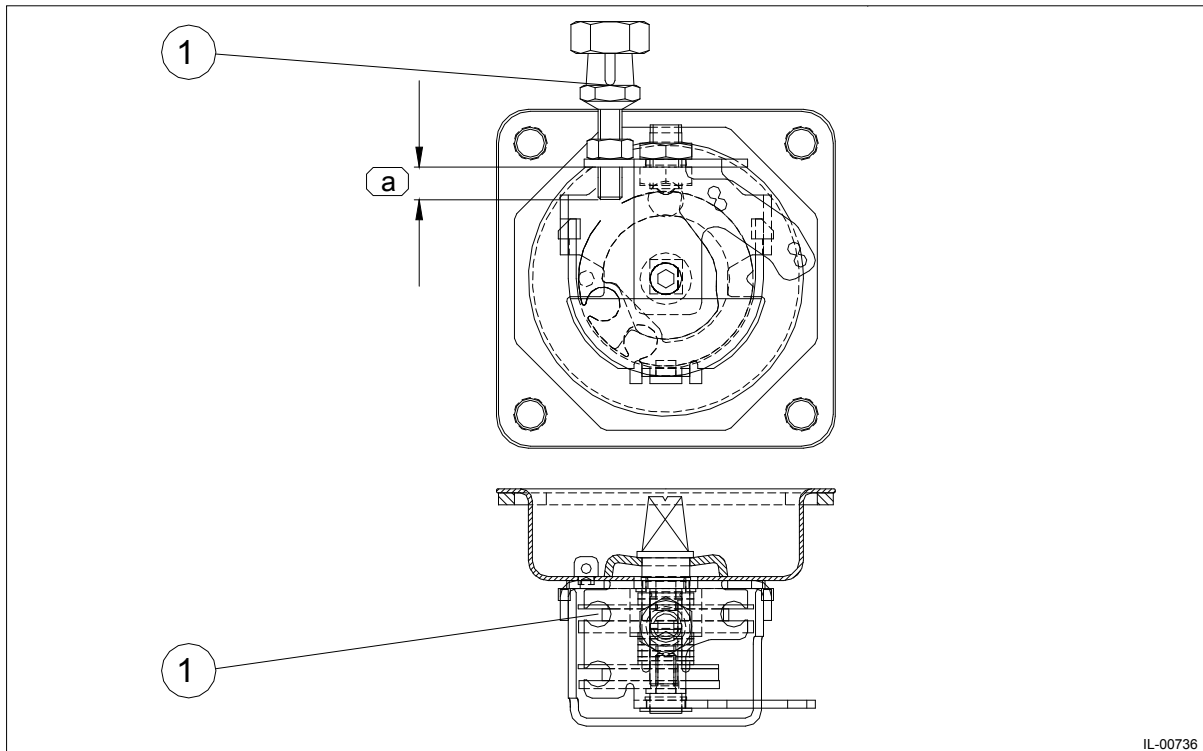
Drawing 15-2 – tail piece on lock housing mechanism



IL-00731

Pos.	Designation
1	Tail piece

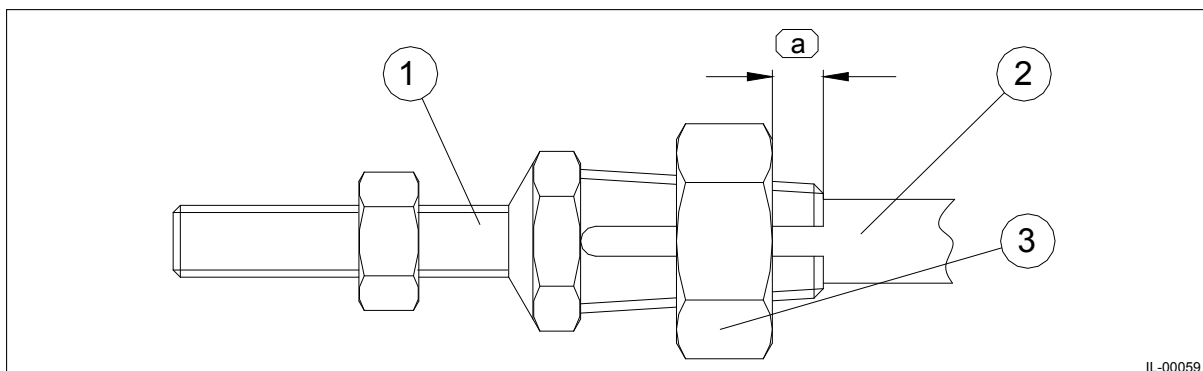
Drawing 15-3 – tail piece on emergency device



Pos.	Designation
1	tail piece
a	maximum 5 mm

Install the Bowden sleeve to the lock housing mechanism (radius minimum 200 mm). If the installation carried out in too small radii, the force of friction will become more and therefore the emergency device activation will be more as well.

Drawing 15-4 – Bowden sleeve fixing



Pos.	Designation
1	Tail piece
2	Bowden sleeve
3	Tightening nut
a	Maximum 5 mm

The Bowden sleeve will be pushed into the adjuster with the black surrounding and fastened with the tightening nut onto emergency device and lock housing mechanism (see Drawing 15-4).

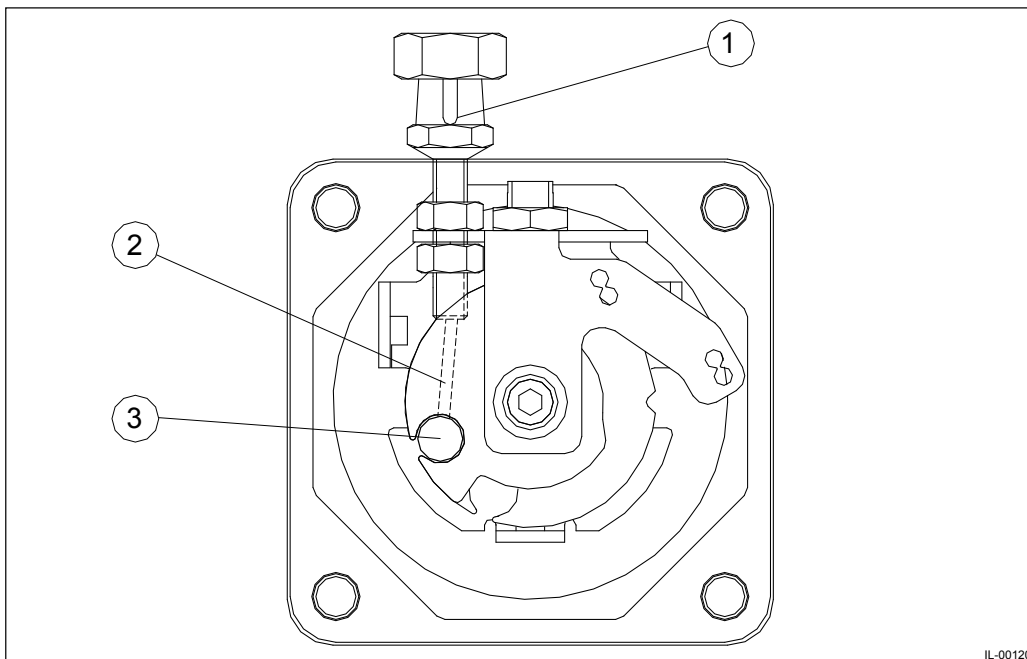


NOTE

Screw the tightening nut max. 5 mm to prevent a damage of the tail piece.

Push the cable from the lock housing mechanism side into the tail piece and the bowden sleeve and put the square clamping nipple into the recess at the emergency egress device (see Drawing 15-5).

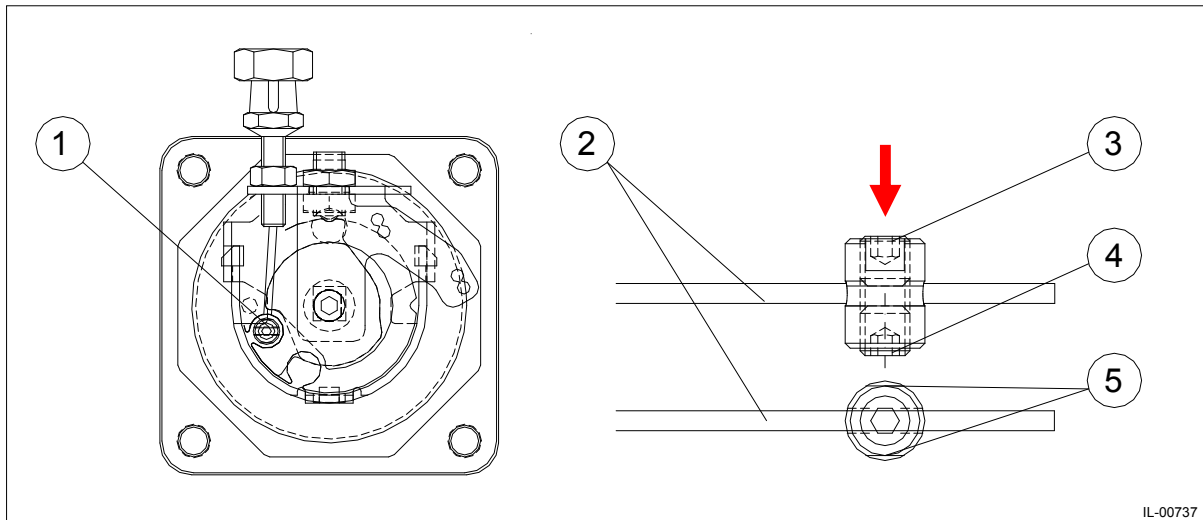
Drawing 15-5– installing cable on emergency device



Pos.	Designation
1	Tail piece
2	Cable
3	Round nipple

Tighten the round clamping nipple using the fastening screw M5. For countering use the width across flat (see Drawing 15-6).

Drawing 15-6 – tightening of round clamping nipple

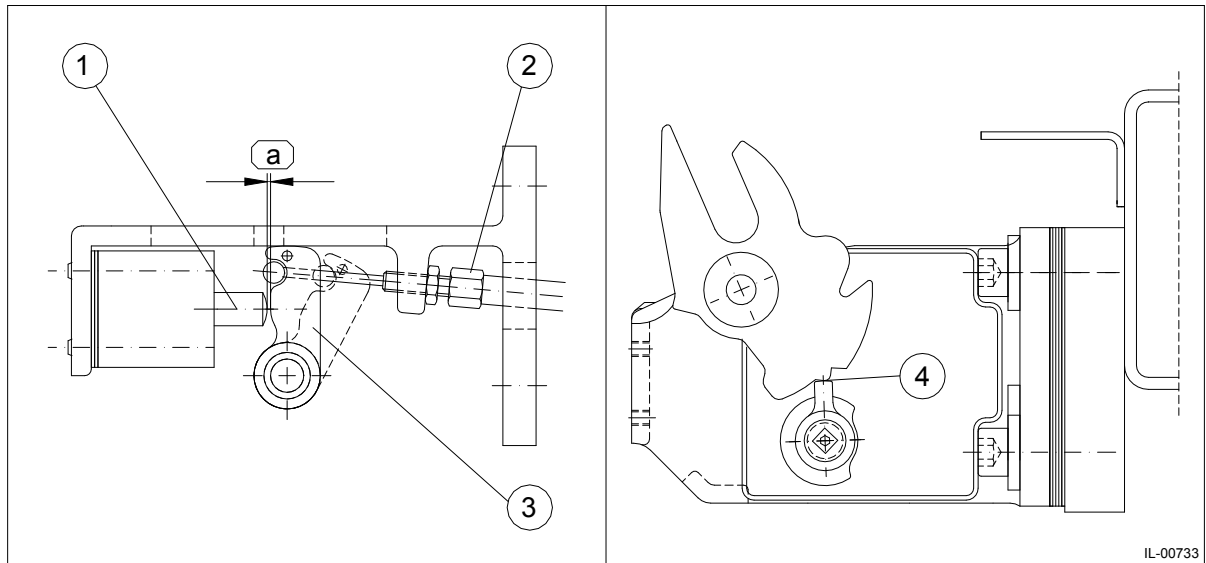


Pos.	Designation
1	Round clamping nipple
2	Cable
3	Fixed Screw – Do NOT USE!!!
4	Screw to be tightened with 3 Nm!!!!
5	Width across flats – SW 7

15.3 Adjusting the emergency device

Ensure that in the main catch position a gap of 1-2 mm between cylinder piston rod and catch lever is available (see Drawing 15-7). Further ensure, that the ball has a gap of 2-3mm to the release lever (see Drawing 15-8). When operating the emergency device, the release lever in the lock housing mechanism will be activated (see Drawing 15-7).

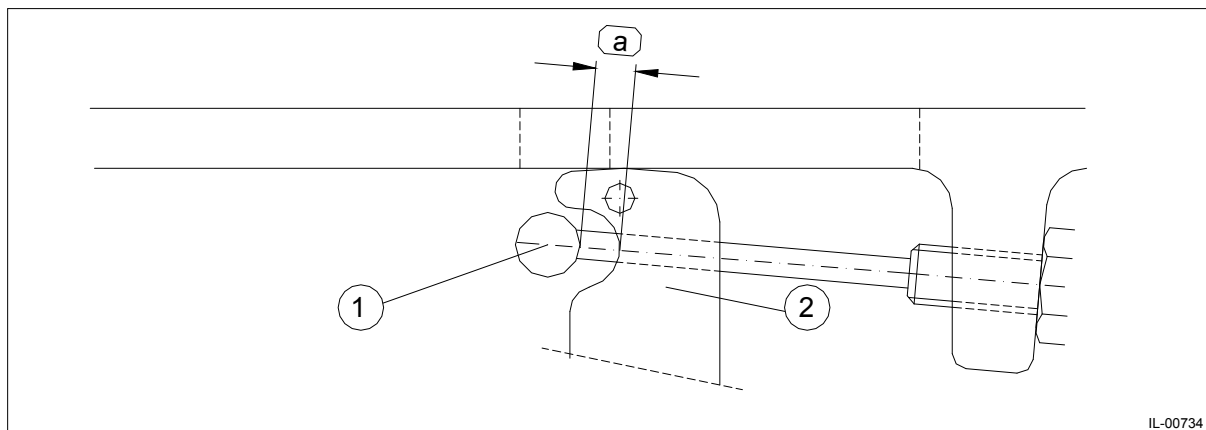
Drawing 15-7– main catch position of catch lever



IL-00733

Pos.	Designation
1	Cylinder position
2	Tail piece
3	Release lever
4	Main catch position
a	1-2 mm

Drawing 15-8– gap release lever in lock housing mechanism



IL-00734

Pos.	Designation
1	Ball
2	Release lever
a	2-3 mm

Operate the emergency device several times and check the unlocking function of the door. If necessary, tension the Bowden cable via the round clamping nipple on the emergency device again (permanent set of the cable).

When adjustment is complete, then mount the emergency egress device inside the provided recess and fastening by using the four countersunk screws M5, apply Loctite 243 onto screws and tighten.

If an adjustment is required follow earlier chapters.

15.4 Shortening the Bowden cable

In case the Bowden cable needs to be shortened, protect cut-off end against fining out using a shrink sleeve.

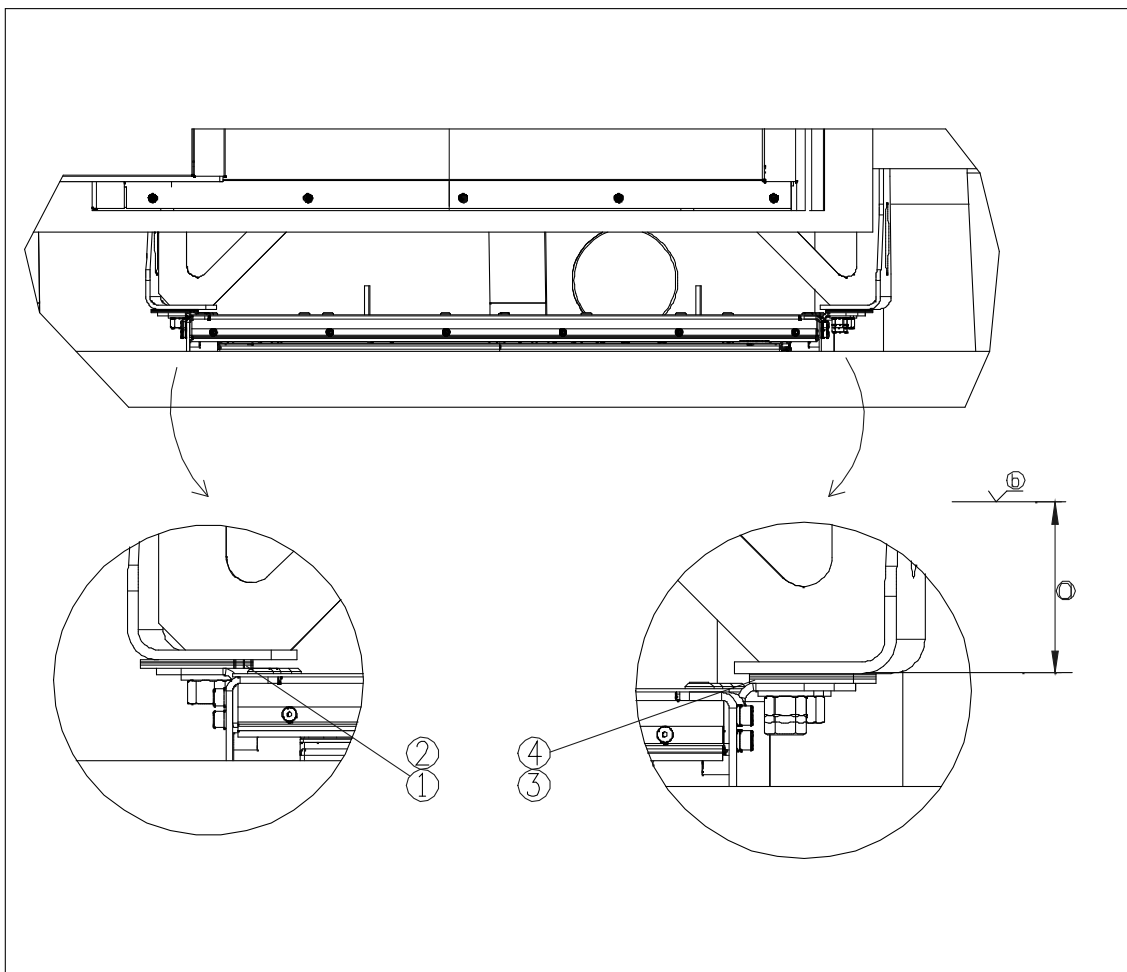
16 Mounting Sliding foot step

Following mentioned items are part of scope of supply 66408U1AR21.

16.1 Preparation for the sliding step assembly

- Check evenness of mounting surface using ruler before assembly of sliding step.
- Compensate deviation with shims, described in the following.

Drawing 16-1– Preparation of sliding step assembly

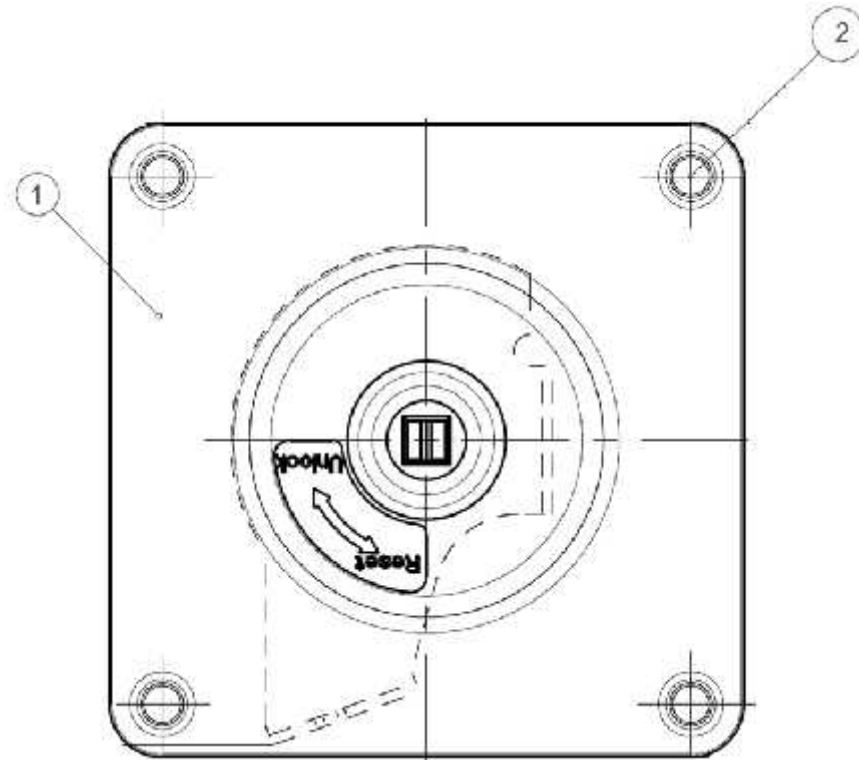


1	Shim (2mm)	2	Shim (1mm)
3	Shim (2mm)	4	Shim (1mm)
a	420.8 ± 1 mm	b	Floor = TOR 1320 mm

- Before mounting sliding step it's necessary to determine shims at mounting surface. Nominal 5 mm shims are used.
- Check measurement (a) for each mounting surface.

16.2 Preparation for emergency device assembly

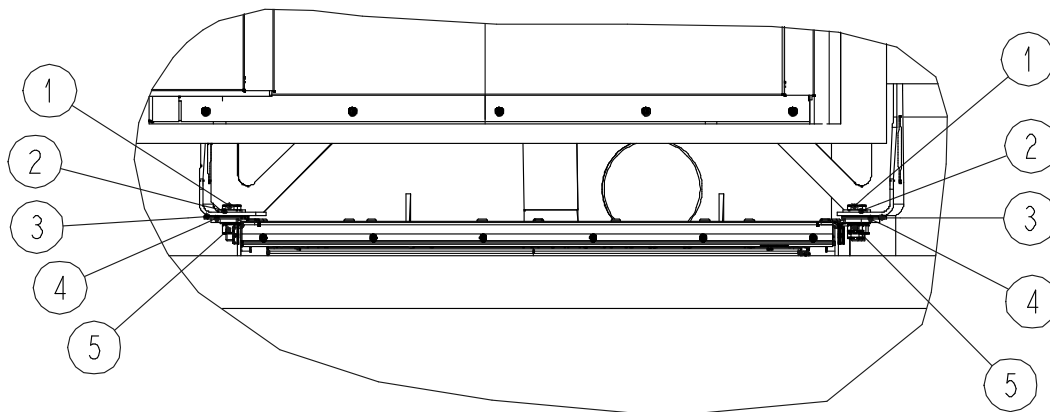
Drawing 16-2– Preparation of emergency device assembly



1	<i>Emergency Device</i>	2	<i>Countersunk screw M5 (4 no's)</i>
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16.3 Mounting of sliding step

Drawing 16-3– Mounting of sliding step



1	<i>Hexagon head screw (SoS- customer)</i>	2	<i>Washer (SoS- customer)</i>
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3	Washer (SoS- customer)	4	Shims
5	Hexagon Nut		

Indication of tightening torques

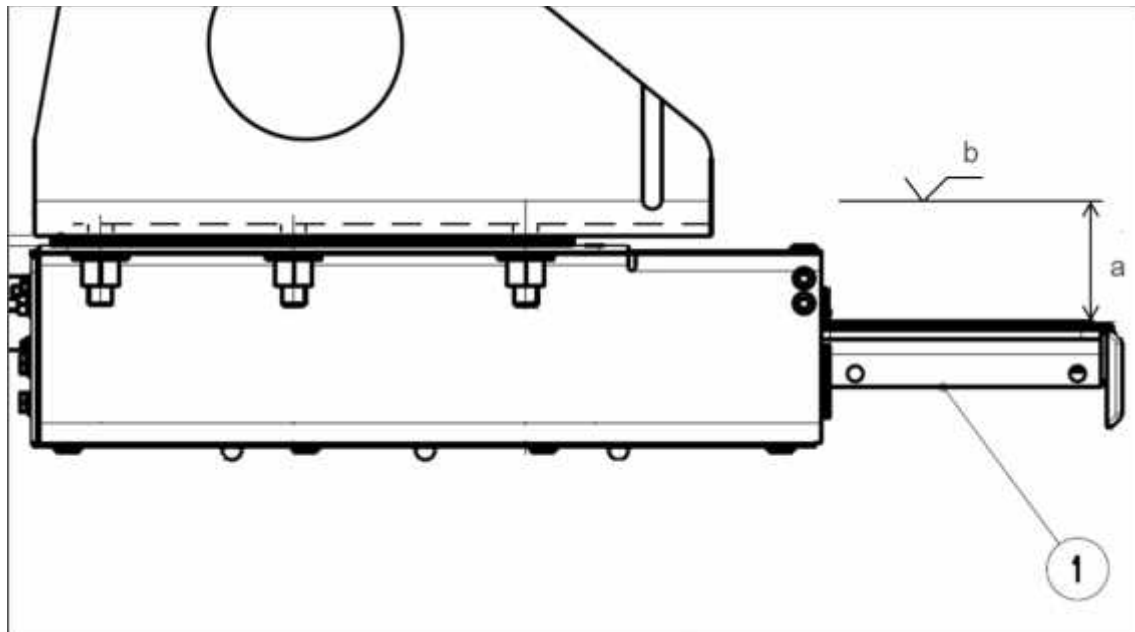
Item	Description/Dimension	Tightening torque	Loctite 243	Optimol	Sealing wax
1	Hexagon head screw M12	73Nm	Yes	No	Yes

- Fasten sliding step with before determined shims (3, 4), hexagon head screws (1) and washers (2) at the portal.
- Tighten hexagon head screws (1) slightly.

16.4 Check the sliding step position

16.4.1 Check height position

Drawing 16-4– Checking height of sliding step

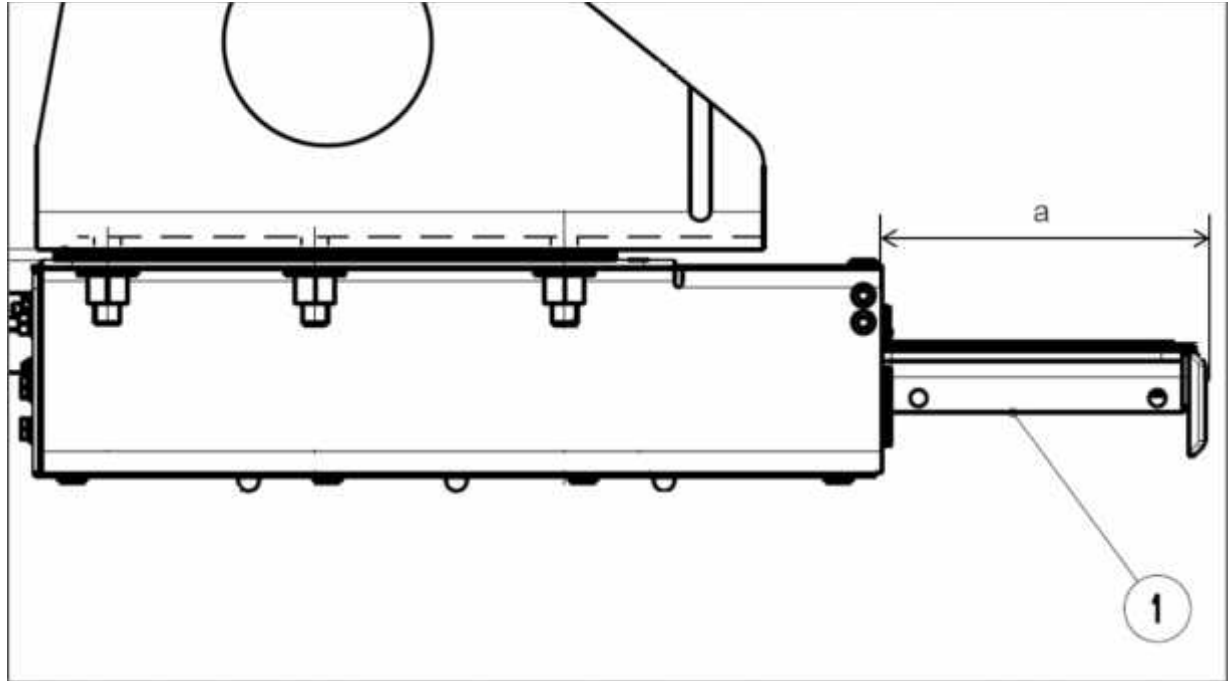


1	Sliding step		
a	467 mm	b	Floor = TOR 1320 mm

- Move sliding step (1) manually in open position.
- Check measurement (a) between floor (b) and sliding step over the full length.
- If necessary, readjust shims according chapter 16.1

16.4.2 Check the spiding step stroke

Drawing 16-5– Checking stroke of sliding step



1	<i>Sliding step</i>	a	$150 \pm 1mm$
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17 Tightness Check

For testing the water tightness ensure that door is electrically driven and pressurised and locked in the main catch position (see

Drawing 10-4) otherwise leaky areas can occur.

- Check whether all components around the door are tight.
- If not, use SIKAFLEX 252 to seal open areas.
- Leaky areas will cause strong impurities of the components which may shorten the life time.

18 Installation of the electrical components



NOTE

The installation and connecting of the connectors and the wiring for electrical and pneumatic components only to be undertaken by authorized personnel in accordance with wiring scheme ED91041R02_C01

18.1 Installation of the door cable

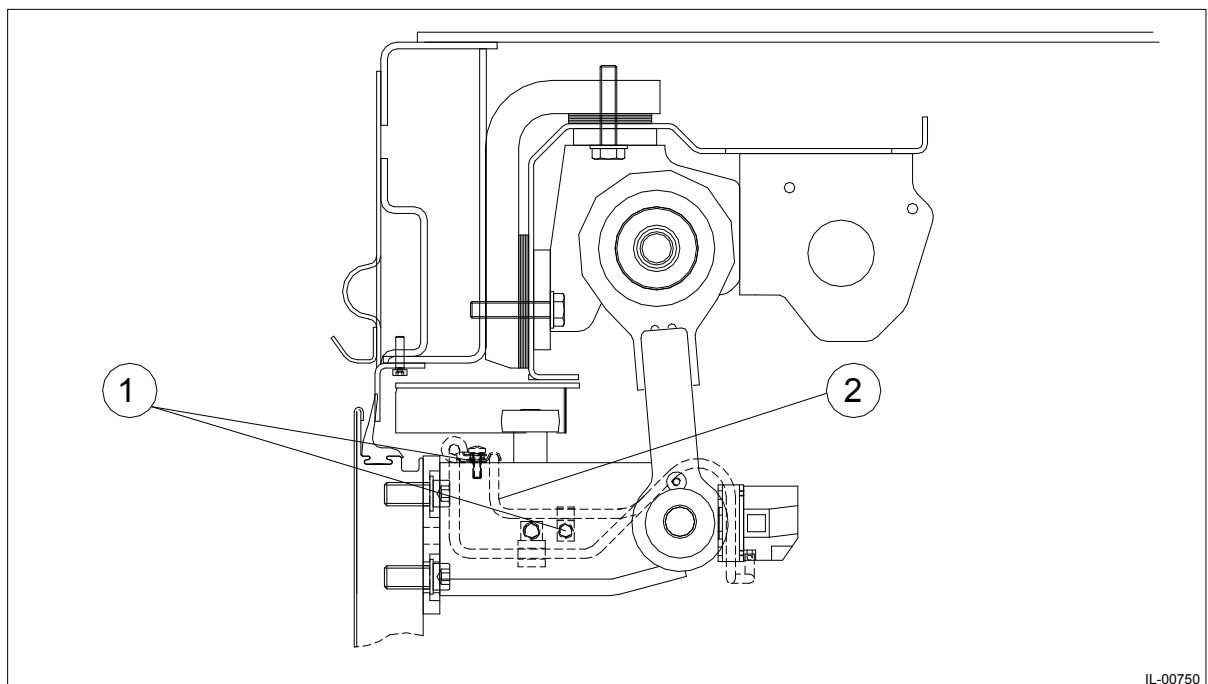
Plug in the connector X19 from drive unit area and coupler from door push button at left hand door leaf carrier and screw down cables using pertaining clips (see Drawing 18-1).



NOTE

When laying door cable, make sure that no parts may touch or squeeze the cable during movement.

Drawing 18-1 – installation the door cable



IL-00750

Pos.	Designation
1	Pertaining clips
2	Door cable

19 Installation of the pneumatic components



NOTE

The installation and tubing of the pneumatic components only to be undertaken by authorised personnel in accordance with pneumatic diagram ED90201R06_C01.

19.1 Install the pneumatic control board

Install the pneumatic control board to the provided mounting bore holes in accordance with assembly drawing 66408U1AR01 sheet 01 and fasten it using screws M6.

Indication of tightening torques

Item	Description/Dimension	Tightening torque	Loctite 243	Optimol Paste	Sealing wax
	Machine screw M6×30	11.2 Nm	YES	No	Yes

19.2 Tubing of the door-system according to pneumatic diagram

Tube the pneumatic components such as drive cylinder, roller lever valve and lock housing mechanism and pneumatic control board in accordance with pneumatic diagram ED90201R06_C01 using tubing of 8 x 1 and 6 x 1.

Take care for correct installation (the out-streaming air will be regulated!).

20 Mounting Instructions for Coverings in Door Area



NOTE

With door electrically closed, the lateral door post coverings as well as the drive unit covering must not press against the door leaf.

In case the covering presses against the door leaf, this may cause malfunctions.

21 Initial Lubrication in accordance with Lubrication Instructions DDSTE11071E05

22 Checking Mechanical Adjustments in accordance with Checklist DDSTE11071E06

23 Electrical Commissioning in accordance with Set-up Instruction DDSTE11071E07

24 Issue Remark

Issue	Date	Prepared	checked/released
00	2018.05.02	Kumar, Rajneesh	Lynette Li

.....
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DDSTE11071E05

Rev. 00 - en
.....

.....
Instruction Manual

Lubrication Instruction

TRAIN 18 EMU ICF

Project-No. 66408U1A

Customer INDIAN RAILWAY

Project-Part Single Leaf-Plug Sliding Door

System SST-e1

Created: 2018.05.03
Date

Checked: _____
Date

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Revision History

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00	2018.05.03	Kumar, Rajneesh	Lynette Li

Section	Revision
All	First edition.

The original document was issued in English language.

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1 Required Documents

Document-No. / Drawing-No.	Description
66408U1AR01	Assembly drawing
66408U1AR01	Scope of supply
DDSTE11071E00	Instruction Manual
DDSTE11071E01	Introduction and General Information
DDSTE11071E03	Door Function Description
DDSTE11071E04	Assembly and Adjustment Instruction
DDSTE11071E07	Set-Up Instruction
DDSTE11071E09	Maintenance plan
DDSTE11071E36	Safety Checklist
ED90201R06_C01	Pneumatic Diagram

2 Introduction

The lubrication instruction is an aid for the lubrication of the IFE-door system for first lubrication before setting system in use and for lubrication after setting system in use according to the service intervals.

- For service intervals see maintenance and overhaul plan DDSTE11071E09.
- Before starting the lubrication tasks all mechanical and electrical actions must be finished.
- The lubricants are not in IFE's scope of supply and must be bought from the customer on the market or can be ordered by IFE with the below mentioned part No. (See item 2.1).
-
- If the lubrications tasks are not undertaken in accordance to our maintenance plan and lubricating instruction, IFE is not liable for unusual wear out.

2.1 Specified Grease Type

KLUEBER ISOFLEX LDS 18 SPECIAL A

IFE -Part No. N300160R08

*KLUEBER LUBRICATION AUSTRIA GesmbH
Franz-W.-Segererstr.32
A-5028 SALZBURG-KASERN*

Klueber Barrierta L 25 DL – free of silicone

IFE -Part No. N300160R19

*KLUEBER LUBRICATION AUSTRIA GesmbH
Franz-W.-Segererstr.32
A-5028 SALZBURG-KASERN*

2.2 Safety Instruction



CAUTION

When using above materials observe the manufacturer's safety instructions to preclude damages to or impairment of health.



CAUTION

Observing the manufacturer's instructions for use also ensures compatibility with other materials or manufacturing equipment.



CAUTION

During lubrication work in the area of the drive there is squeezing danger!!! The concerning door area must be electrical disconnected and therefore taken out of service.



NOTE

Clean the whole door area from dust, swarf, etc. before starting lubrication!

3 Initial lubrication before set-up of the vehicle

3.1 Header gear area



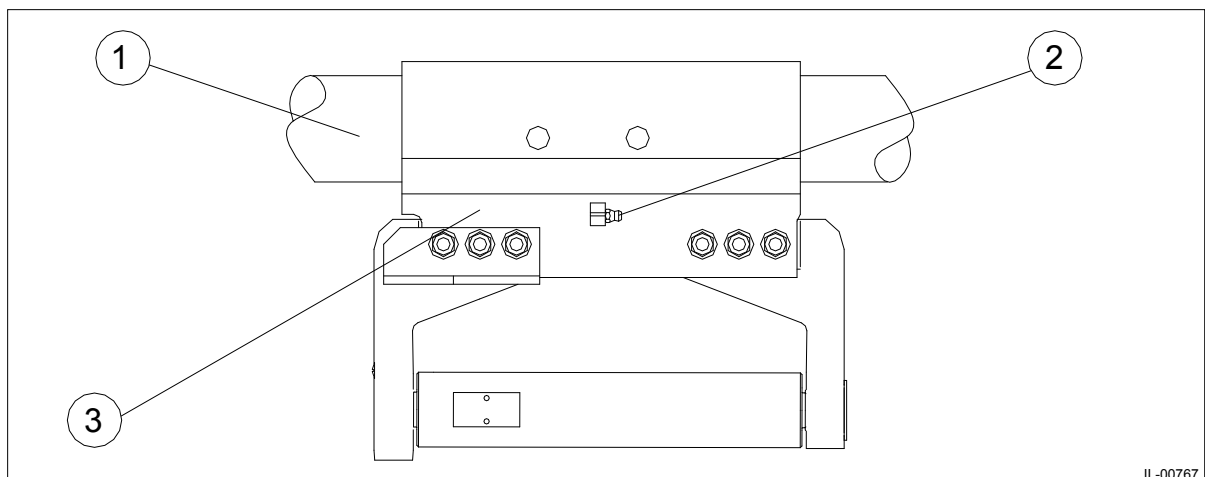
WARNING
Switch off power supply of the door system!

Use grease type KLÜBER ISOFLEX LDS 18 Special A.

3.1.1 Guide rod (round)

The guide rod have to be lubricated through the grease nipple located on the trolley with KLÜBER ISOFLEX LDS 18 Special A (see **Drawing 3-1 – grease nipple at trolley**).

Drawing 3-1 – grease nipple at trolley



Grease amount: 4 to 6 gram grease

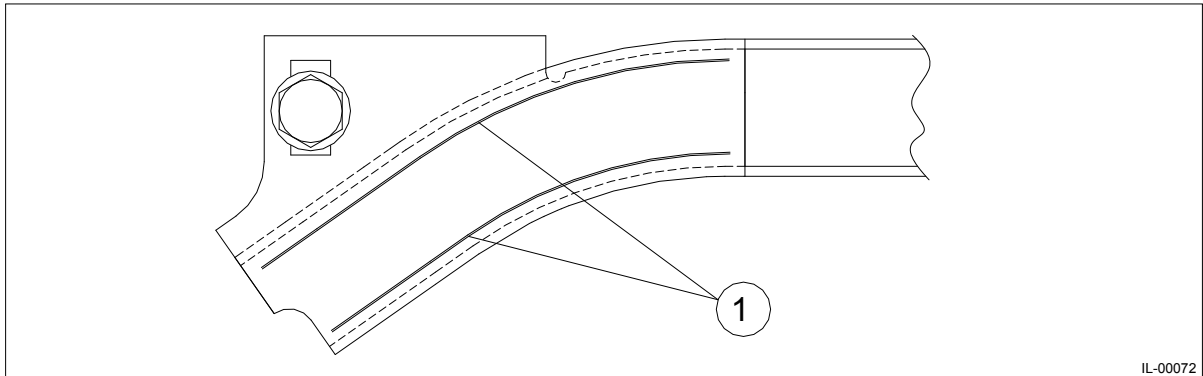


WARNING
DO NOT use hydraulic grease pistol, use hand grease pistol for greasing the ball bearing!!

3.1.2 Guide rail

The guide rail at the top have to be lightly lubricated in the swing area with KLÜBER ISOFLEX LDS 18 Special A (see **Drawing 3-2 – guide rail**).

Drawing 3-2 – guide rail

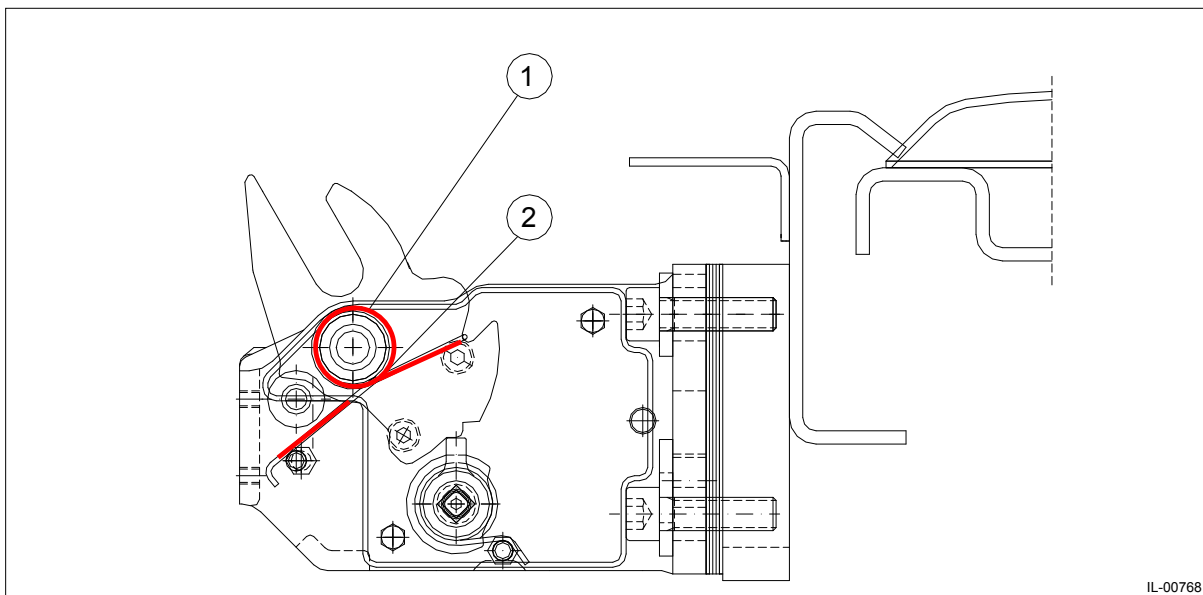


Pos.	Designation
1	Grease with Klüber Isoflex LDS 18 Special A, only in the swing area!

3.2 Lock Housing Mechanism

Following parts of the lock housing mechanism have to be lubricated with KLÜBER ISOFLEX LDS 18 Special A:

Drawing 3-3 – spring in lock housing mechanism

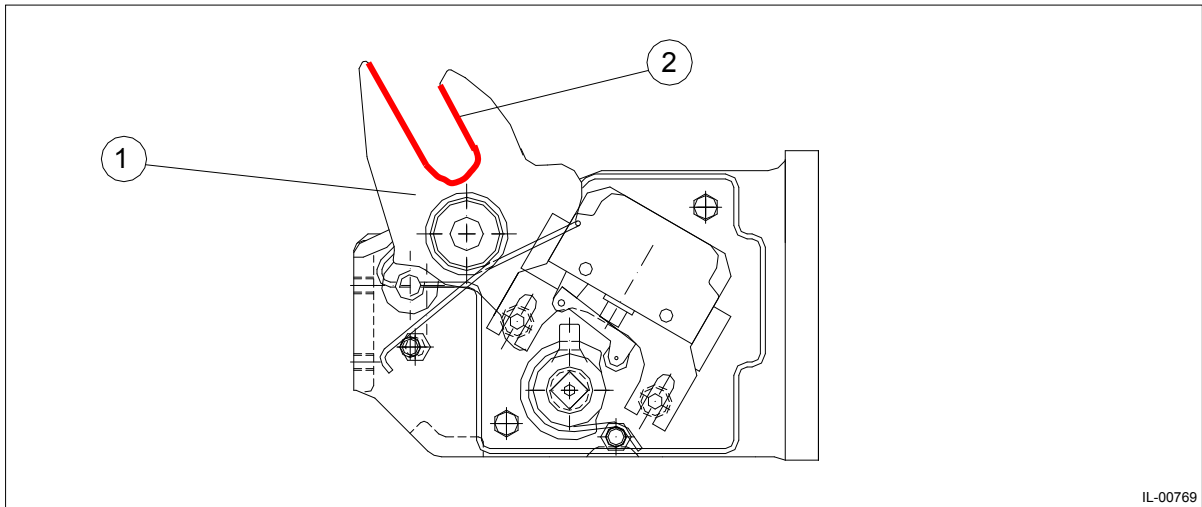


Pos.	Designation
1	Torsion spring
2	KLÜBER ISOFLEX LDS 18 Special A

All springs located in the lock housing mechanism (see

- Drawing 3-3 – spring in lock housing mechanism).

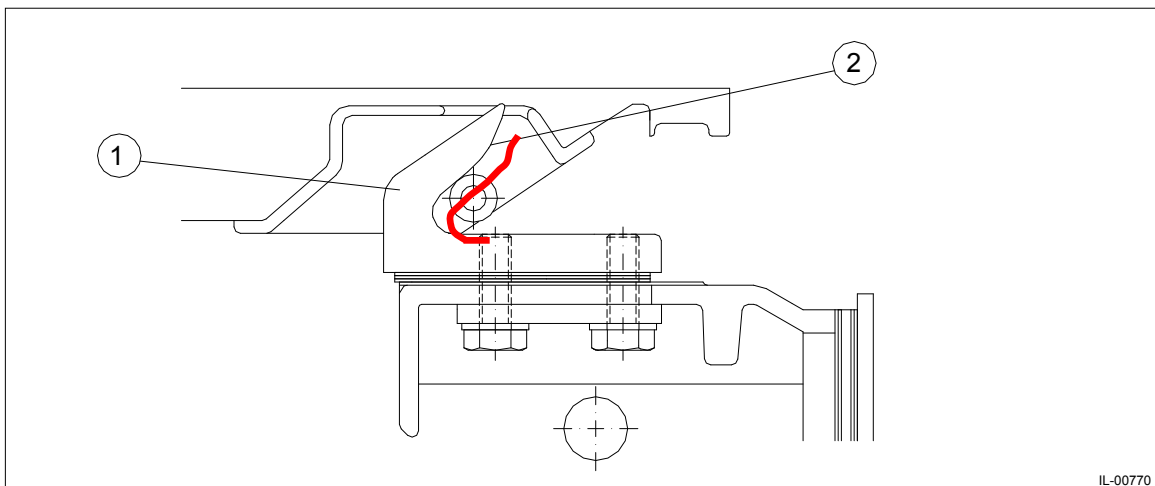
Drawing 3-4 – latch in lock housing mechanism



Pos.	Designation
1	Latch
2	KLÜBER ISOFLEX LDS 18 Special A

- Latch in the lock housing mechanism (see Drawing 3-4 – latch in lock housing mechanism).

Drawing 3-5 – catch hook in lock housing mechanism



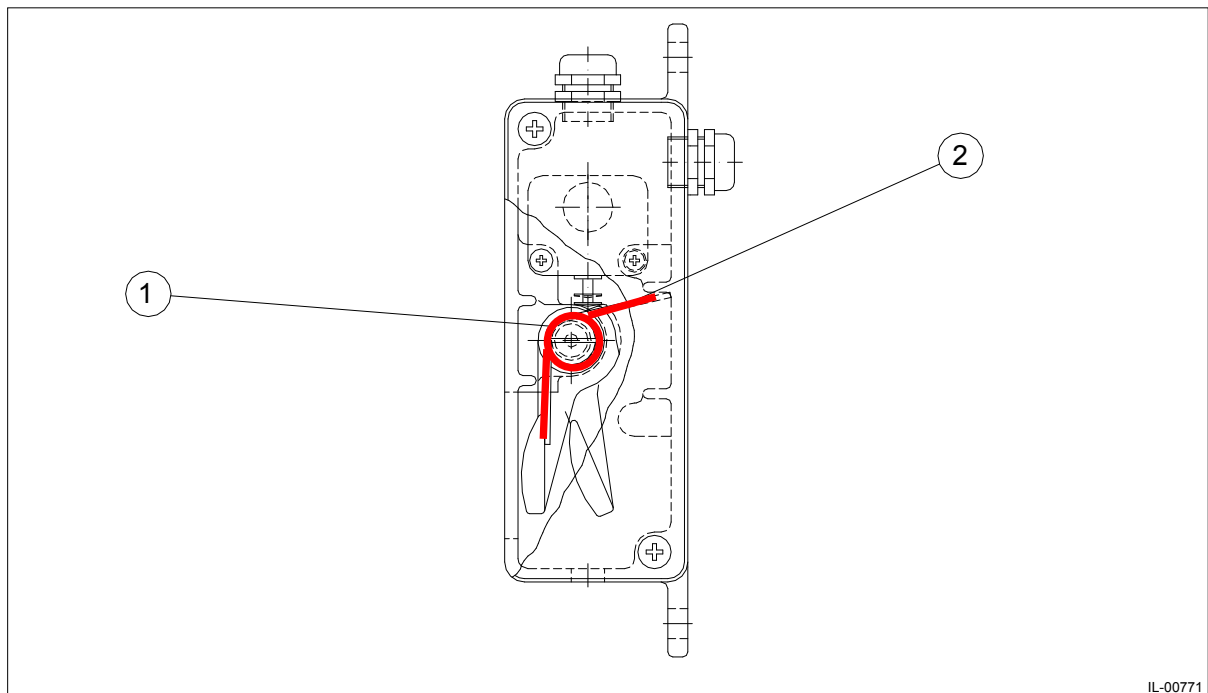
Pos.	Designation
1	Catch hook
2	KLÜBER ISOFLEX LDS 18 Special A

- Catch hook in the lock housing mechanism (see **Drawing 3-5 – catch hook in lock housing mechanism**).

3.3 Isolating lock Mechanism for door lock

Following parts of the isolating lock mechanism have to be lubricated with KLÜBER ISOFLEX LDS 18 Special A:

Drawing 3-6 – torsion spring in isolating lock

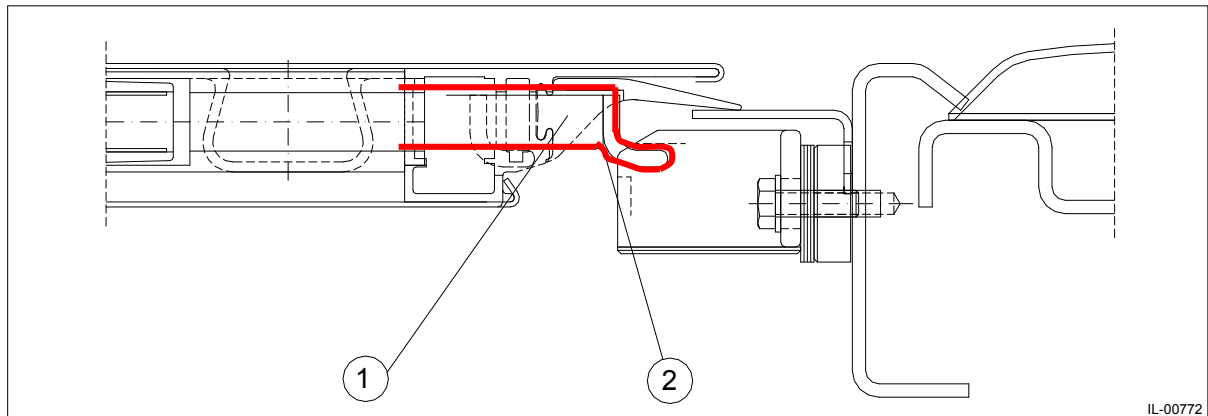


IL-00771

Pos.	Designation
1	Torsion spring
2	KLÜBER ISOFLEX LDS 18 Special A

- All springs in the isolating lock mechanism (see **Drawing 3-6 – torsion spring in isolating lock**).

Drawing 3-7 – lock lever in isolating lock



Pos.	Designation
1	Lock lever
2	KLÜBER ISOFLEX LDS 18 Special A

- Lock lever located in the door lock (see **Drawing 3-7 – lock lever in isolating lock**).

3.4 Door seals

All surrounding door seals, the finger protection rubber and the portal rubber must be lubricated with Klueber Barrierta L 25 DL – free of silicone.

After the finger protection rubber and the portal rubber have been greased, they need to be dried with a clean piece of cloth.

3.5 Foot step

3.5.1 Foot step Seals

- All surrounding seals of the front cover must be lubricated with Klüber Barrierta L 25 DL.

4 Lubrication after the set-up of the vehicle



WARNING
Remove old grease and dirt before applying any new lubricant.



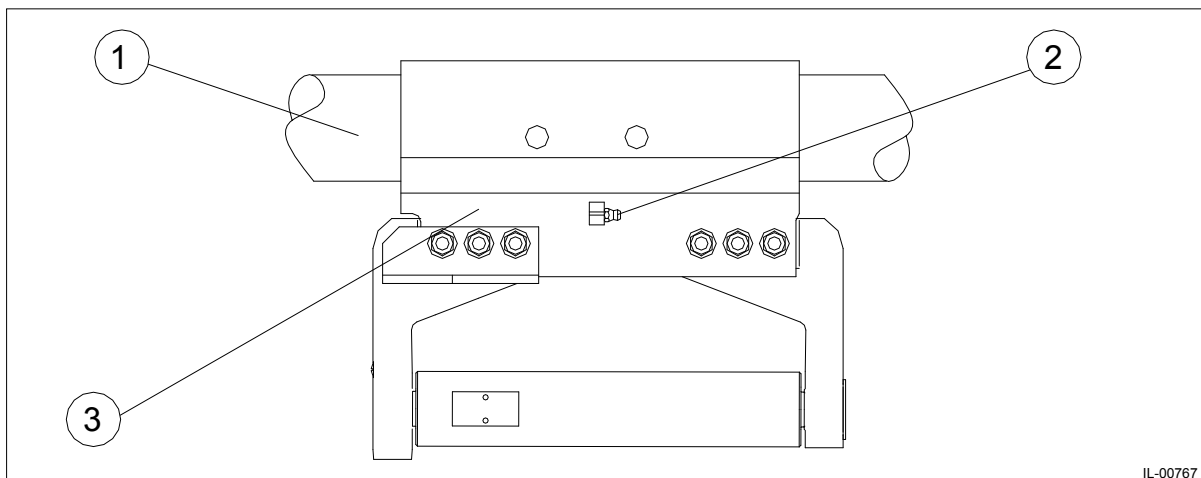
WARNING
Remove old grease and dirt before applying any new lubricant.

4.1 Header gear area

4.1.1 Guide rod (Round)

The guide rod have to be lubricated through the grease nipple located on the trolley with KLÜBER ISOFLEX LDS 18 Special A (see **Drawing 4-1 – grease nipple at trolley**).

Drawing 4-1 – grease nipple at trolley



IL-00767

Pos.	Designation
1	Guide rod
2	Grease nipple
3	Trolley

Grease amount: 4 to 6 gram grease

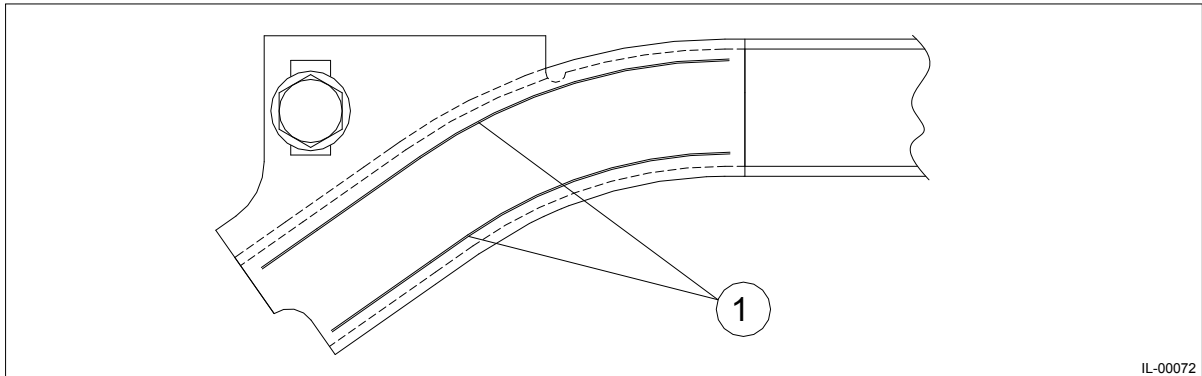


WARNING
DO NOT use hydraulic grease pistol, use hand grease pistol for greasing the ball bearing!!

4.1.2 Guide rail

The guide rail at the top have to be lightly lubricated in the swing area with KLÜBER ISOFLEX LDS 18 Special A (see **Drawing 4-2 – guide rail**).

Drawing 4-2 – guide rail

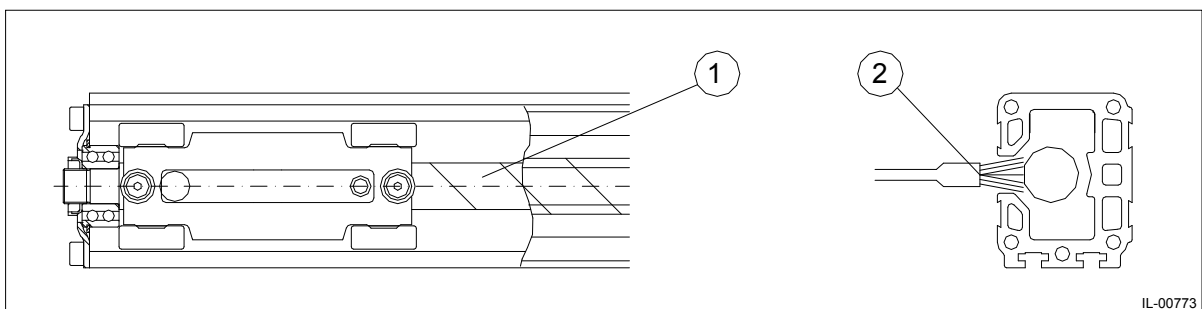


Pos.	Designation
1	Grease with Klüber Isoflex LDS 18 Special A, only in the swing area!

4.1.3 Drive spindle

Lubricate the drive spindle over the whole length with Klüber Isoflex LDS 18 Special A via a small brush (see Drawing 4-3 – drive spindle).

Drawing 4-3 – drive spindle



Pos.	Designation
1	Drive spindle
2	Grease with a brush



NOTE

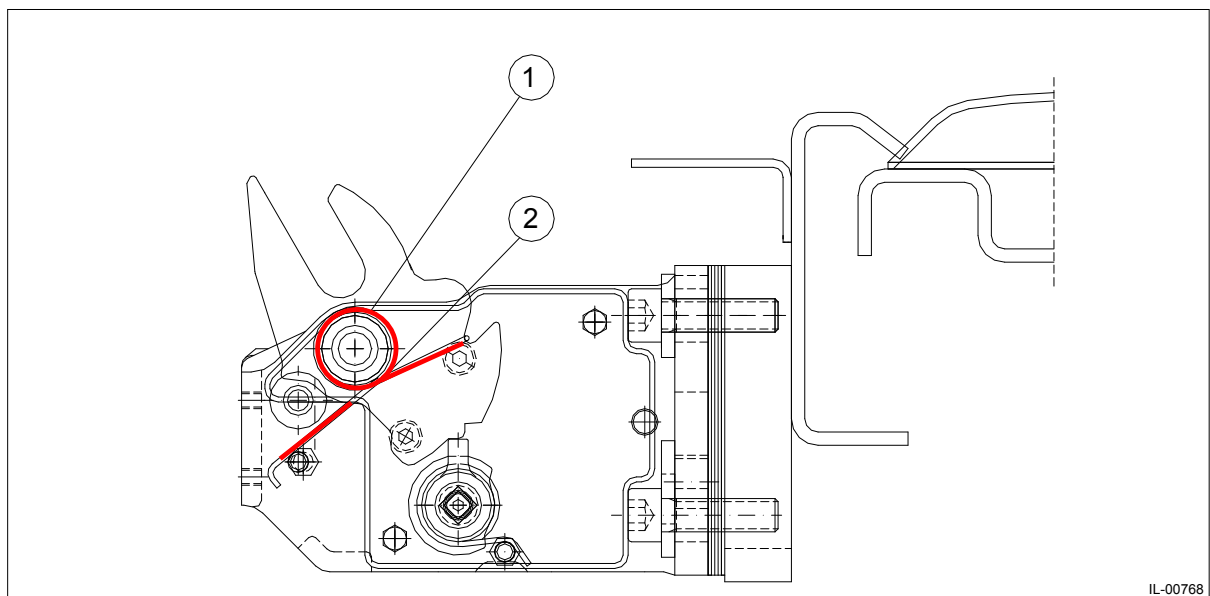
After the lubrication, close and open the door approximately 3 times.

4.2 Lock Housing Mechanism

Following parts of the lock housing mechanism have to be lubricated with KLÜBER ISOFLEX LDS 18 Special A:

- All springs located in the lock housing mechanism (see **Drawing 4-4 – spring in lock housing mechanism**).

Drawing 4-4 – spring in lock housing mechanism

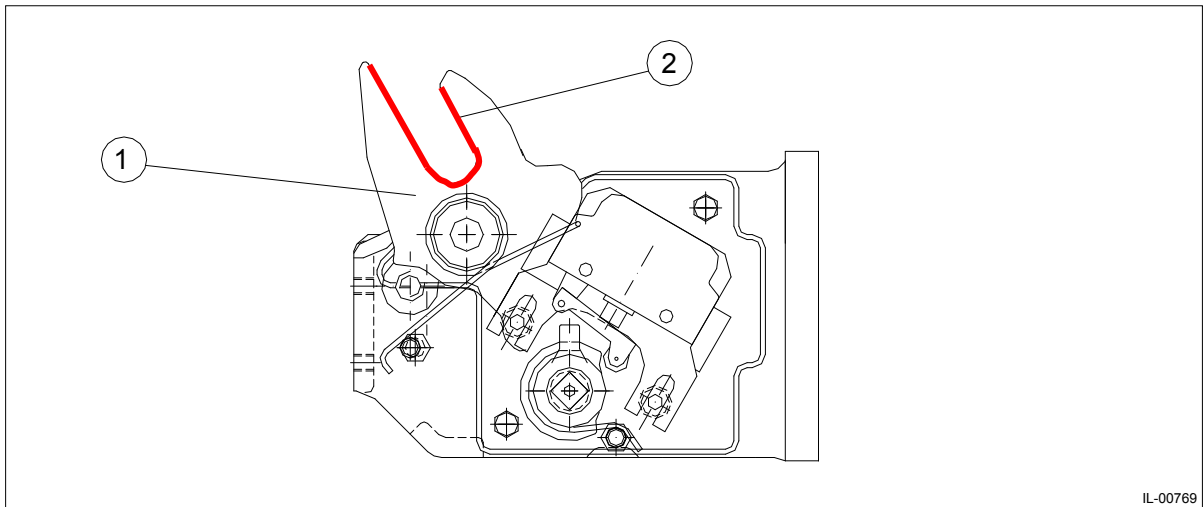


IL-00768

Pos.	Designation
1	Torsion spring
2	KLÜBER ISOFLEX LDS 18 Special A

- Latch in the lock housing mechanism (see **Drawing 4-5 – latch in lock housing mechanism**).

Drawing 4-5 – latch in lock housing mechanism

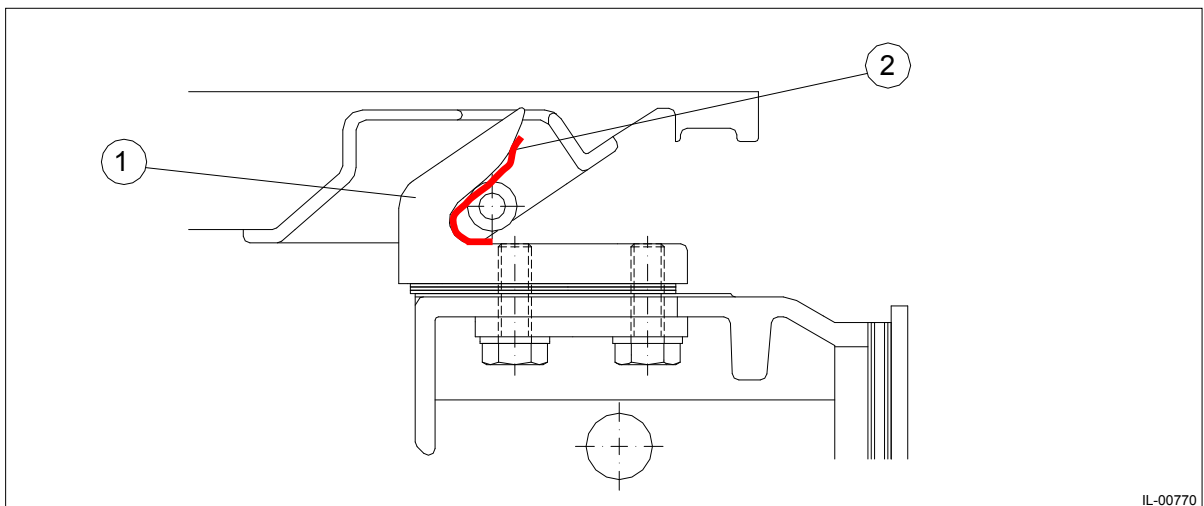


IL-00769

Pos.	Designation
1	Latch
2	KLÜBER ISOFLEX LDS 18 Special A

- Catch hook in the lock housing mechanism (see **Drawing 4-6 – catch hook in lock housing mechanism**).

Drawing 4-6 – catch hook in lock housing mechanism



IL-00770

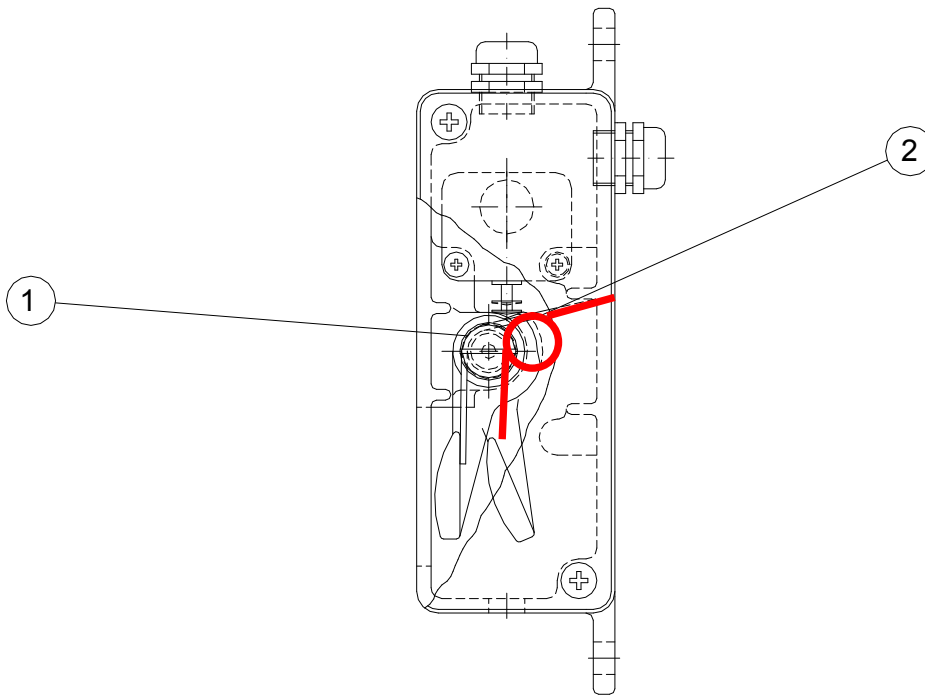
Pos.	Designation
1	Catch hook
2	KLÜBER ISOFLEX LDS 18 Special A

4.3 Isolating lock Mechanism for door lock

Following parts of the isolating lock mechanism have to be lubricated with KLÜBER ISOFLEX LDS 18 Special A:

- All springs in the isolating lock mechanism (see **Drawing 4-7 – torsion spring in isolating lock**).

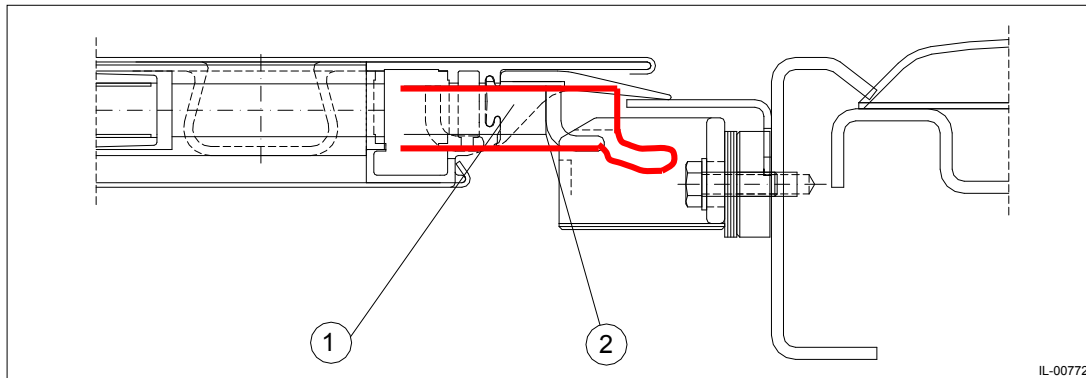
Drawing 4-7 – torsion spring in isolating lock



Pos.	Designation
1	Torsion spring
2	KLÜBER ISOFLEX LDS 18 special A

- Lock lever located in the door lock (see **Drawing 4-8 – lock lever in isolating lock**).

Drawing 4-8 – lock lever in isolating lock



Pos.	Designation
1	Lock lever
2	KLÜBER ISOFLEX LDS 18 special A

4.4 Door Seals

All surrounding door seals, the finger protection rubber and the portal rubber must be lubricated with Klueber Barrierta L 25 DL – free of silicone.

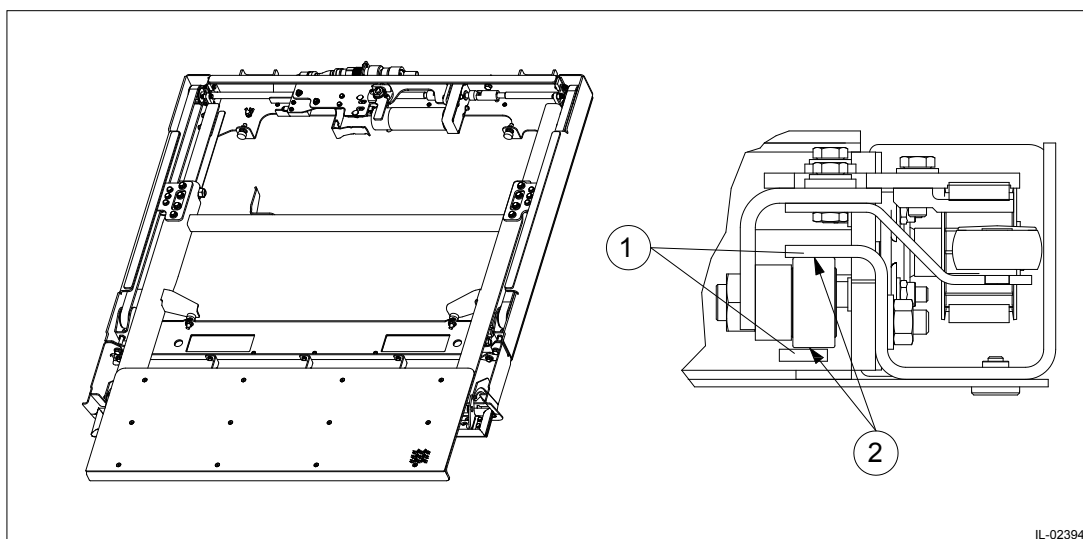
After the finger protection rubber and the portal rubber have been greased, they need to be dried with a clean piece of cloth.

4.5 Foot step

4.5.1 Foot step seals

- All surrounding seals of the front cover must be lubricated with Klüber Barrierta L 25 DL.
- Klüber Barrierta L 25 DL

4.5.2 Running surface



1	<i>Running surface 踏面</i>	2	<i>Grease with Klüber Isoflex LDS 18 Special A Klüber Isoflex LDS 18 Special A</i>
----------	---------------------------	----------	--

Figure 4-1 Sliding step – running surface 5.1

(see Figure 4-1)

- The running surfaces have to be lubricated with Klüber Isoflex LDS 18 Special A (2).
Klüber Isoflex LDS 18 Special A (2)

5 Issue Remark

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00	2018.05.03	Kumar Rajneesh	Lynette Li
	item	modification	
		First edition	

DDSTE11071E06

Rev. 00 - en

Instruction Manual

Adjustment Checklist

TRAIN 18 ICF EMU

Project-No. 66408U1A

Customer INDIAN RAILWAY

Project-Part Single Leaf Plug Sliding Door

System SST-e1

Created: 2018.05.04
Date

Checked: _____
Date

Kumar, Rajneesh
Name

Name

TAO-
R/DOOERA
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Released: _____
Date

Translated: _____
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1 Required Documents

Doc. No.	Title
66408U1AR11	SoS Entrance Door
66408U1AR11	Assembly Drawing PD
66408U1AR21	SoS Access Support Device
T003450R47_C01	Assembly Drawing ASD
ED91041R02_C01	Wiring Diagram

2 Introduction

2.1 General Instruction

- This manual is used for checking the mechanical and electrical adjustment of the IFE door system.
- This Adjustment Checklist is relating ones to the assembly and adjustment instruction DDSTE11071E04 and to the set-up instruction DDSTE11071E07.
- In order to make a correct checking, it is required to connect the door system with correct electric supply 110 VDC ^{+25/-30%}
- This Adjustment Checklist is made for checking after putting the door system into electrical service and is not used for an acceptance test.



NOTE

It is mandatory to keep filled-up Adjustment Checklists in evidence. Each Adjustment Checklist per car must be sent to IFE if requested!



NOTE

When checking the components fill in serial numbers of main components in accordance with appendix A (see chapter **Error! Reference source not found.**).



NOTE

If any readjustments are required, refer to the assembly and adjustment instruction DDSTE11071E04 or set-up instruction DDSTE11071E07.

2.2 Safety notes



WARNING

Adjustments with temporary power supply ⇒ During door leaf adjustments with temporary power supply, jam protection is not active.



DANGER

Danger of squeezing!

⇒ during adjustment work on components never perform such adjustment when door leaves move

3 Adjustment Checklist

3.1 Fill in aid

When filling in the Adjustment Checklist, please proceed as follows:

E.g. portal width

- Portal width → 1010 ^{+3/-2} mm

Car no →

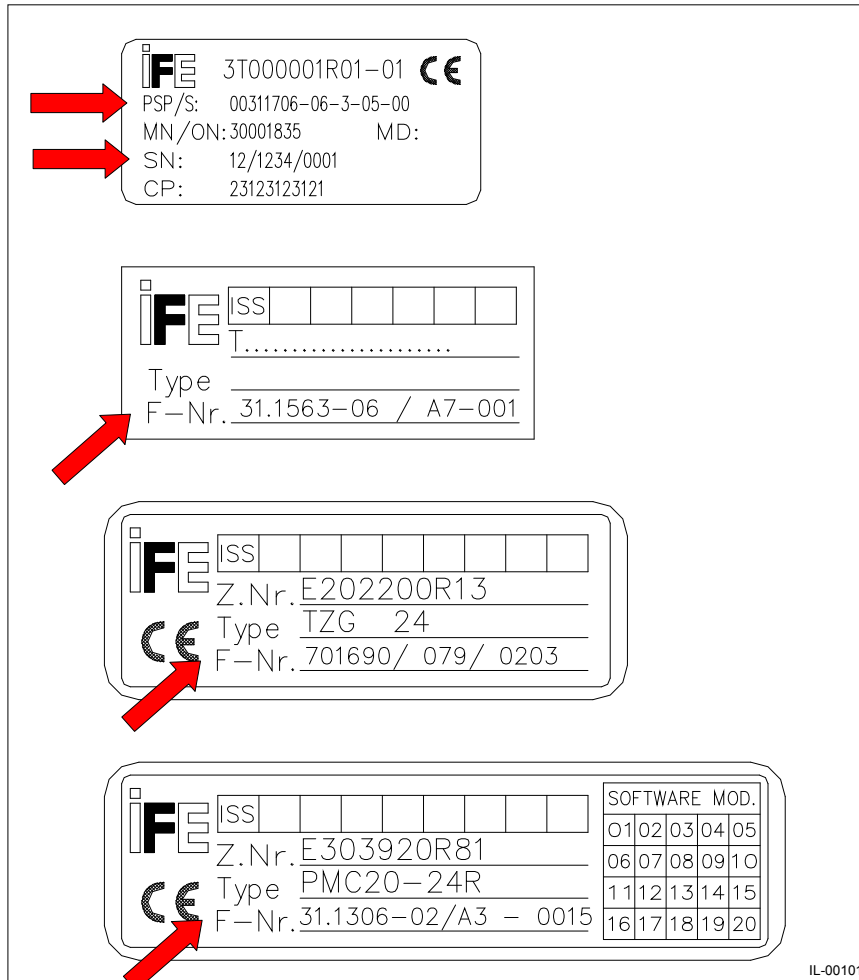
Door no:

actual dimension top
actual dimension centre
actual dimension bottom
checked and correct

	01	02	03	04
	1013	1014	1013	1007
	1010	1012	1012	1010
	1012	1009	1010	1012
	Yes	Yes	Yes	Yes

Referring to the fill-out procedure of the serial numbers of the main components see following examples (see **Drawing 3-1 – examples – serial numbers**).

Drawing 3-1 – examples – serial numbers



Adjustment Checklist for Single leaf sliding plug door SST – E1

TRAIN 18

Coach-No. _____

Checked by: _____

Date: _____

Time: _____

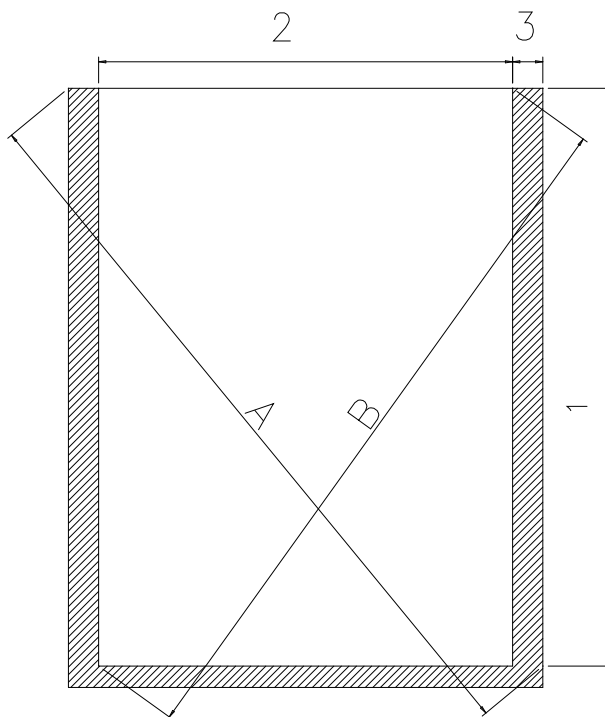


4 Portal dimensions before assembly

4.1 Check Portal Dimension

(See Drawing 4-1 – diagonal deviation for portal)

Drawing 4-1 – diagonal deviation for portal



Pos.	Designation
1	Portal height 2276 ^{+4/-2} mm
2	Portal width 1010 ^{+3/-2} mm
3	Admissible variation $ A-B \leq 2$ mm

- Portal width → 1010 ^{+3/-2} mm

Car no →	Door no:	01	02	03	04
actual dimension top					
actual dimension center					
actual dimension bottom					
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

- * Portal height → 2276 ^{+4/-2} mm

Car no →	Door no:	01	02	03	04
actual dimension left					
actual dimension center					
actual dimension right					
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

- * Angular misalignment → Diagonal A-B = 0 ^{±2} mm
- *

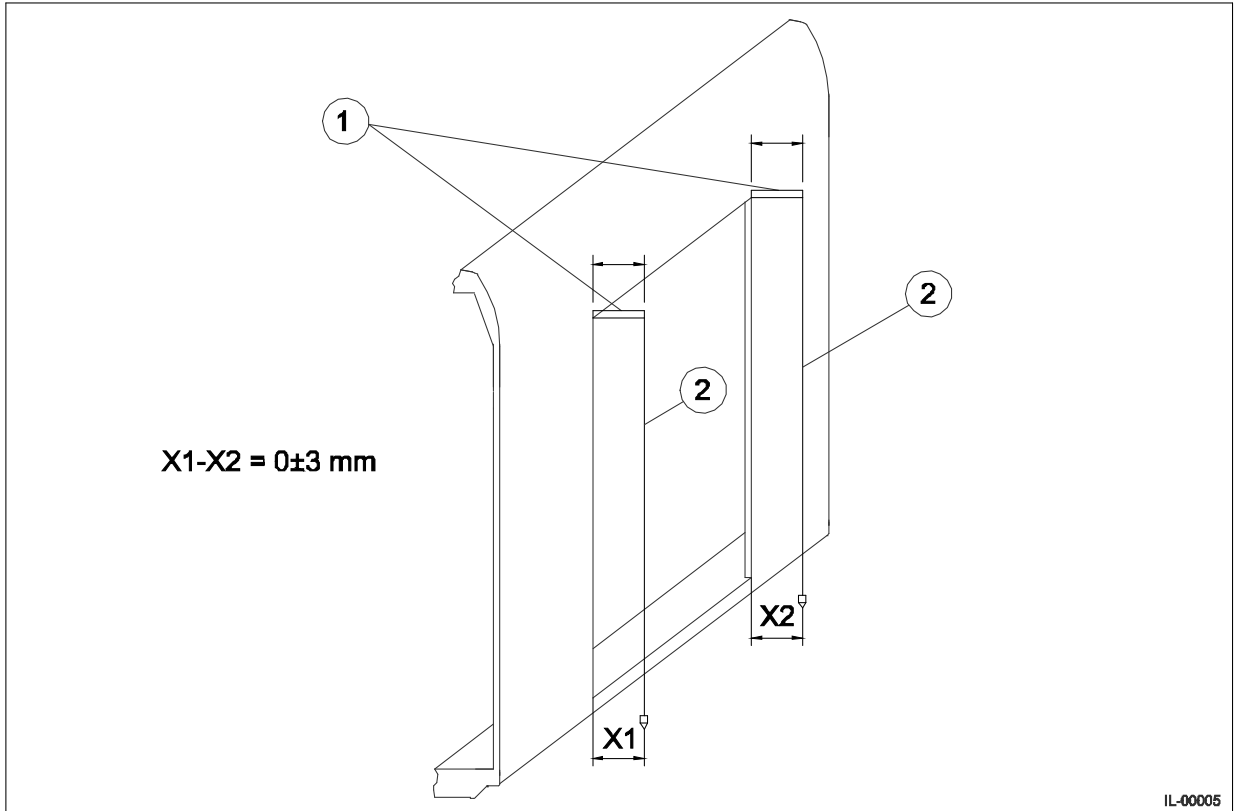
Car no →	Door no:	01	02	03	04
actual dimension					
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

4.2 Check parallelism of the portal frame seal area

- Measurement X1 and X2 → allowed tolerance max. ± 3 mm (see Drawing 4-2 – portal deviation vertical)

Car no →	Door no:	01	02	03	04
actual dimension					
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

Drawing 4-2 – portal deviation vertical



Pos.	Designation
1	fix distance
2	plump line

5 Seal angles and portal profile before assembly

5.1 Check seal angle

- Measurement of (a) over the whole length of the seal angle (see 4.2)

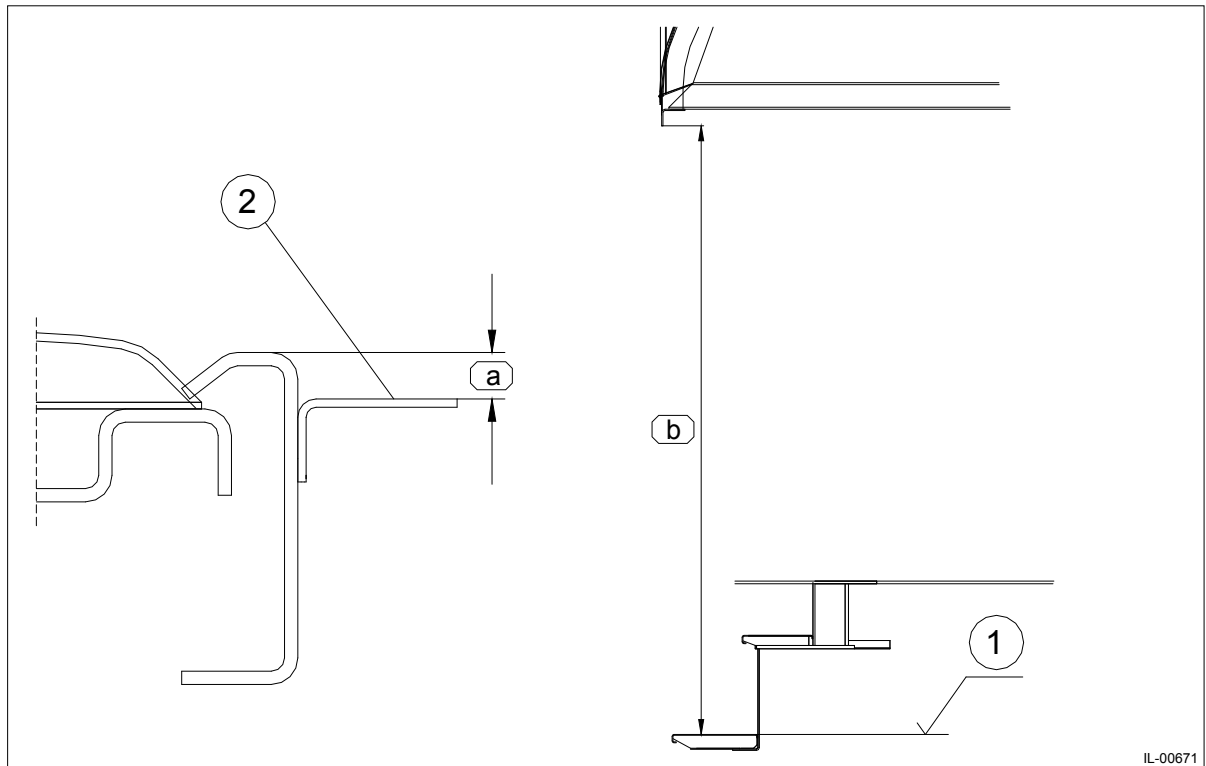
Car no →	Door no:	01	02	03	04
actual dimension left on top					
actual dimension right on top					
actual dimension vertical area					
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

* Measurement of (b) over the whole length of the seal angle to (1) Above Rail Level (ARL) (see 4.2).

*

Car no →	Door no:	01	02	03	04
actual dimension left					
actual dimension right					
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

Drawing 5-1 – mounting seal angles



IL-00671

Pos.	Designation
1	1100 mm ARL
2	seal angle
a	14 ⁺³ mm
b	1971 ^{±1} mm

5.2 Check the portal profile (item 11)

- Measurement of (a) over the whole length of portal profile (see Drawing 5-2 – mounting portal profile).

Car no →

Door no:

01	02	03	04
----	----	----	----

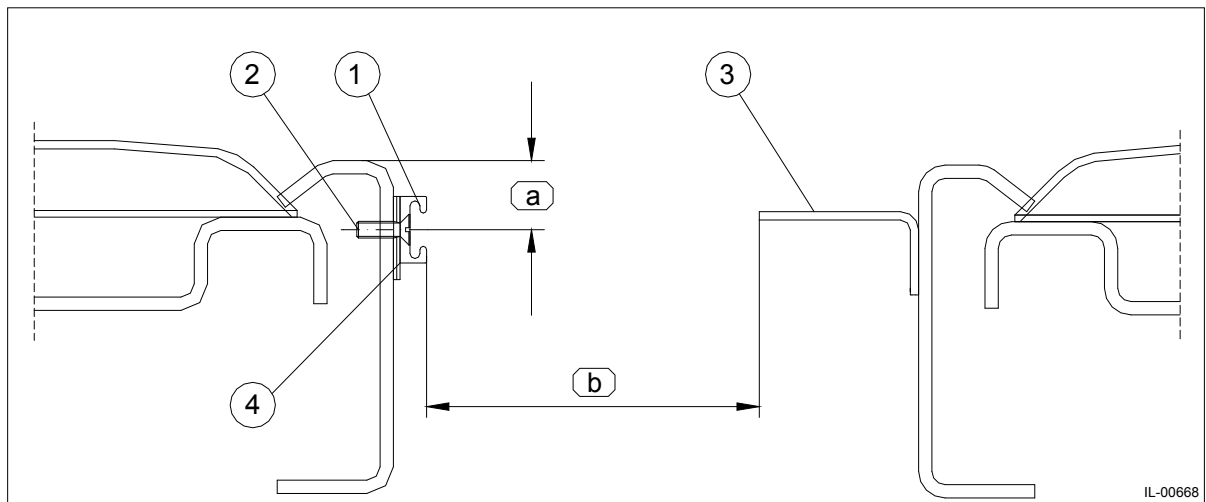
actual dimension top
actual dimension center
actual dimension bottom
checked and correct

Yes	Yes	Yes	Yes
No	No	No	No

- Measurement of (b) to the vertical seal angle (See Drawing 5-2 – mounting portal profile).

Car no →	Door no:	01	02	03	04
actual dimension top					
actual dimension center					
actual dimension bottom					
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

Drawing 5-2 – mounting portal profile



Pos.	Designation
1	Portal profile
2	Fastening screw
3	Vertical seal angle
4	Shims (item 25)
a	20 ^{±0,5} mm
b	957 ^{±1,5} mm

6 Drive Unit

6.1 Check Position of Drive unit



CAUTION

Caution: Check measure (a) and (b) along entire length of guide rod.

- Depth measurement → (a) (see Drawing 6-1 – horizontal/ vertical Drive unit position).

Car no →

Door no:

01	02	03	04
----	----	----	----

actual dimension

checked and correct

Yes	Yes	Yes	Yes
No	No	No	No

- Height measurement → (b) (see Drawing 6-1 – horizontal/ vertical Drive unit position).

Car no →

Door no:

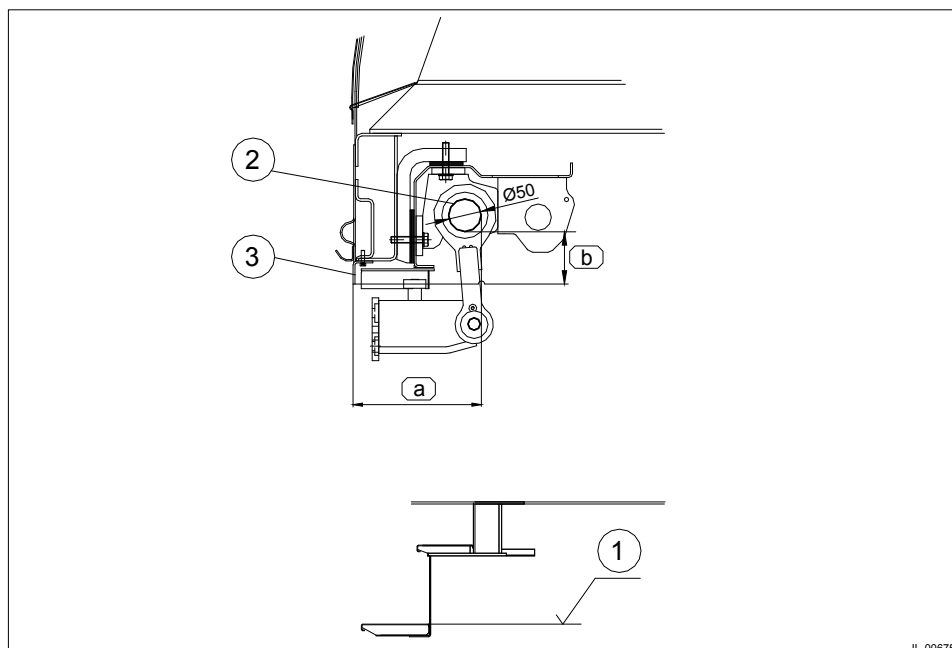
01	02	03	04
----	----	----	----

actual dimension

checked and correct

Yes	Yes	Yes	Yes
No	No	No	No

Drawing 6-1 – horizontal/ vertical Drive unit position



IL-00675

Pos.	Designation	Pos.	Designation
1	ARL above rail level (1100 mm)	a	201 ^{±1} mm
2	Guide rod	b	79 ^{±1} mm
3	Portal sealing angle		

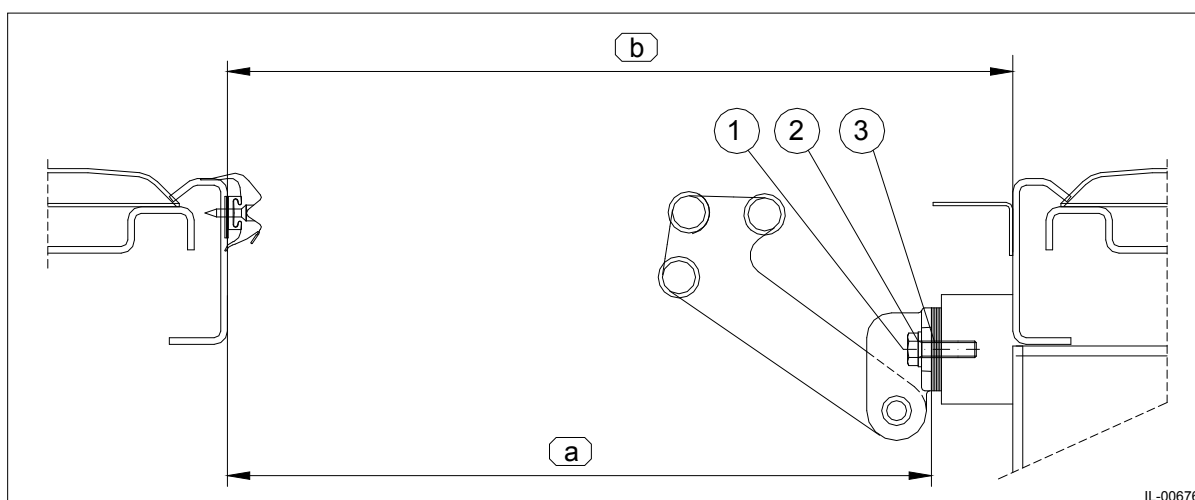
7 Roller swing arm (item 05)

7.1 Check Adjustment

- Check measurement \Rightarrow (a) between roller swing arm bracket and portal (see Drawing 7-1 – assembling roller swing arm).

Car no \rightarrow	Door no:	01	02	03	04
actual dimension					
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

Drawing 7-1 – assembling roller swing arm



Pos.	Designation
1	Fastening screw (item 16)
2	Washer D10 (item 13)
3	Shims (item 24) – nominal 6 mm
a	961 ± 2 mm
b	1010 $^{+3/-2}$ mm

8 Door Leaf

8.1 Check parallelism of the door leaf

- Parallel – deviation measurement is (a) in vertical position of the door leaf carrier support (see Drawing 8-1 – door leaf parallelism; vertical position).

Car no →

Door no:

01

02

03

04

actual dimension on top
checked and correct

Yes

Yes

Yes

Yes

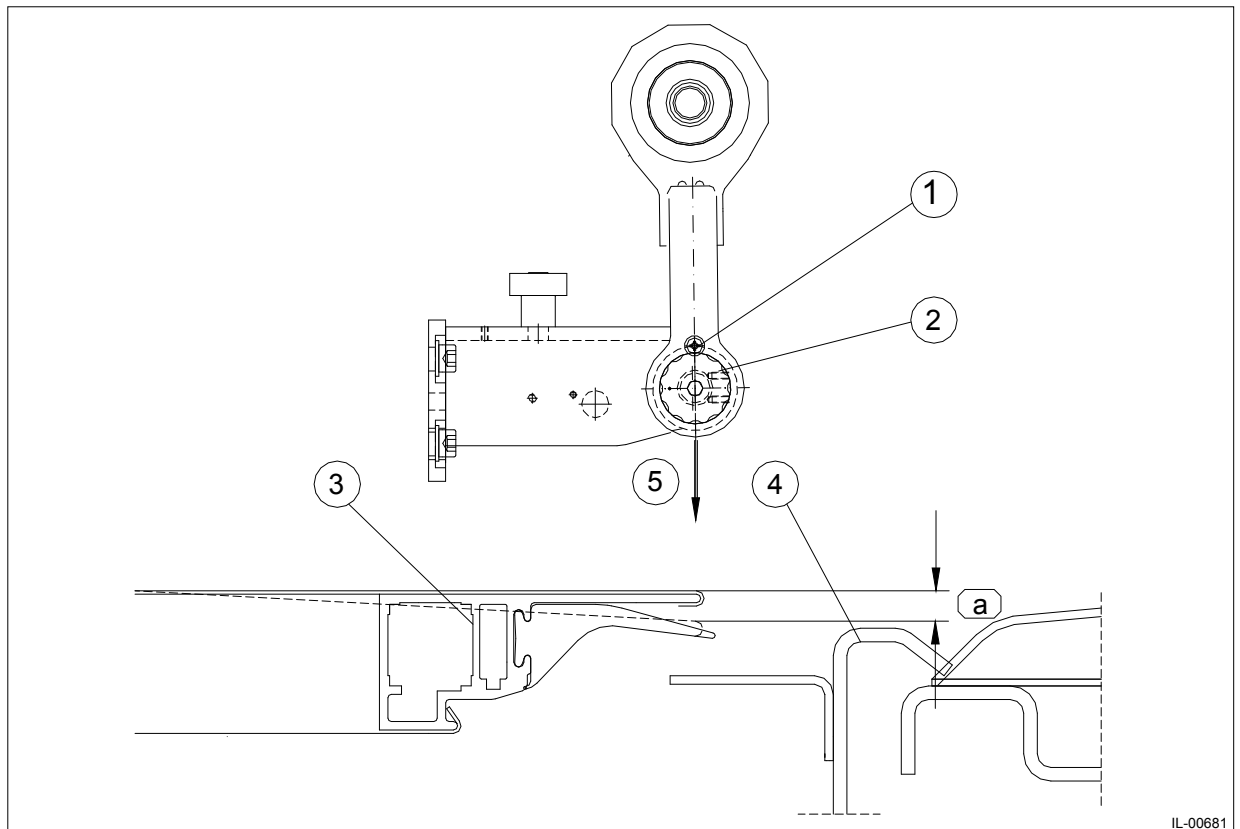
No

No

No

No

Drawing 8-1 – door leaf parallelism; vertical position



IL-00681

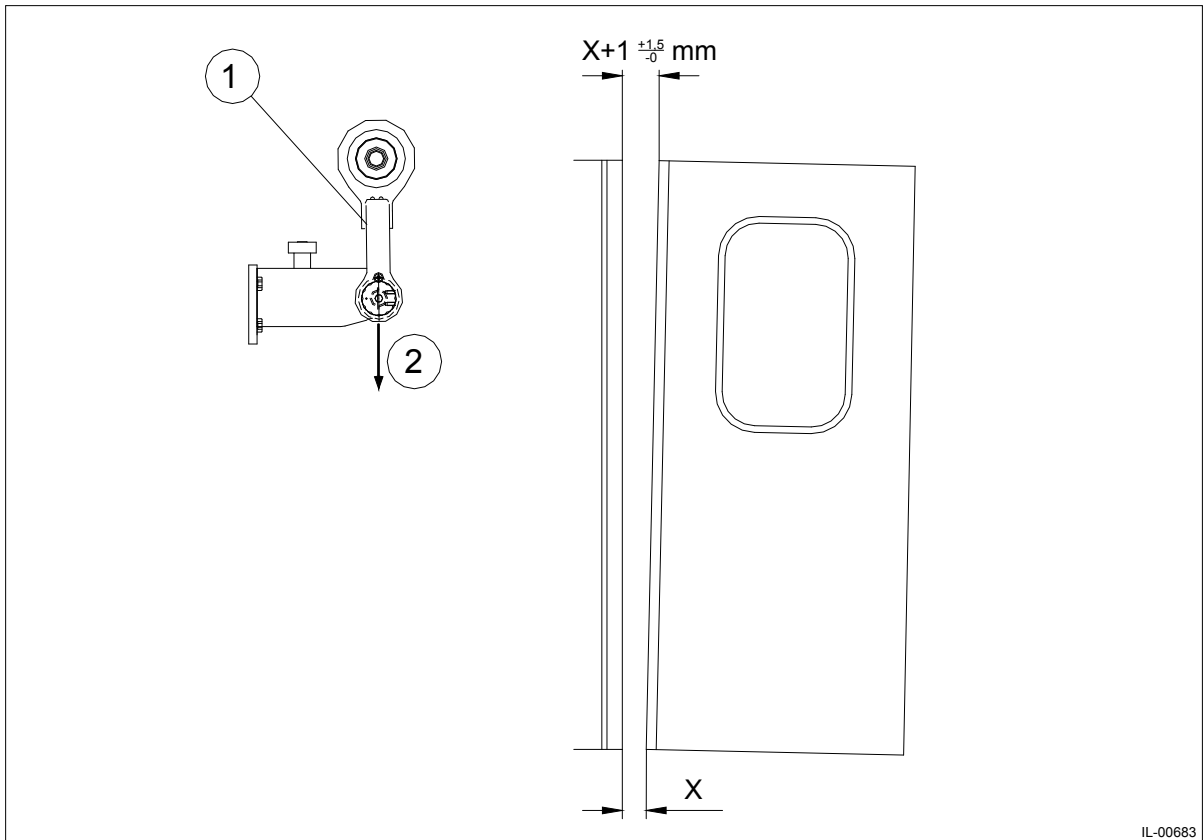
Pos.	Designation
1	Cross recessed screw
2	Eccentric
3	Door leaf
4	Portal
5	Vertically!!
a	0 ^{+0/-2} mm

8.2 Check pre load Position

* Check the pre load of the door leaves (in vertical position of the door leaf carrier support):
measurement → $X + 1^{+1,5/-0}$ mm (see Drawing 8-2 – door leaf preload).

Car no →	Door no:	01	02	03	04
actual dimension					
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

Drawing 8-2 – door leaf preload



IL-00683

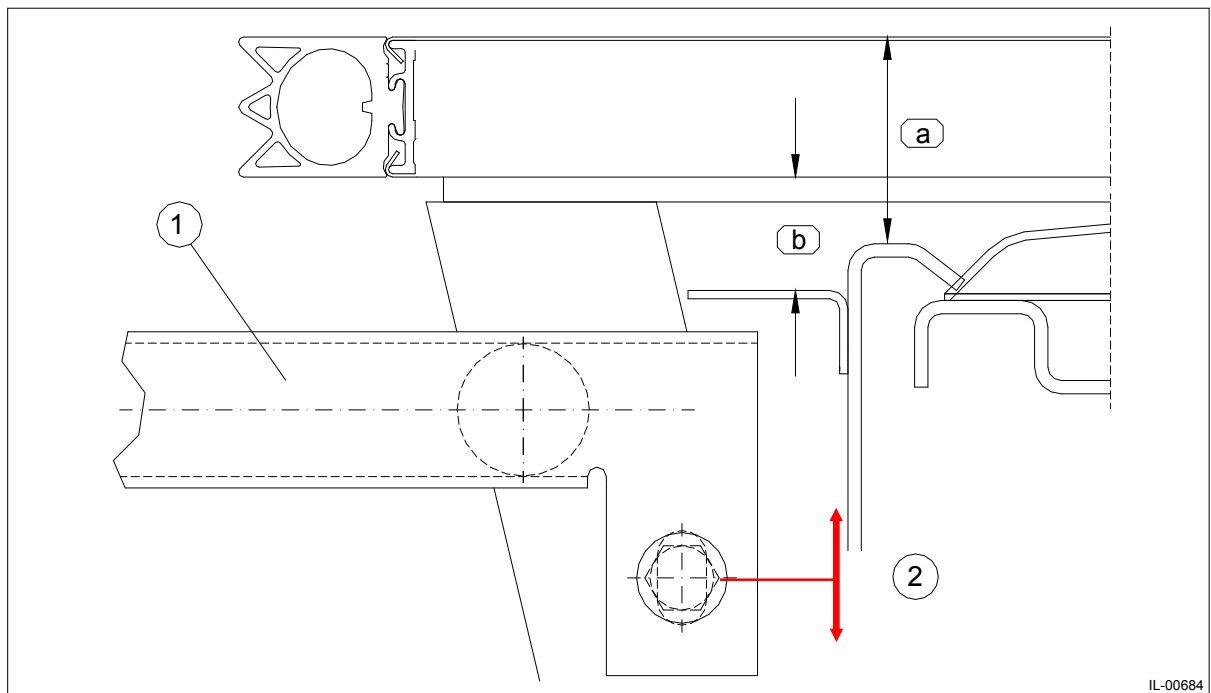
Pos.	Designation
1	Door leaf carrier support
2	Vertical!!

8.3 Swing-out movement

- Top → (a) (see Drawing 8-3 – adjusting upper swing-out movement).

Car no →	Door no:	01	02	03	04
actual dimension on bottom					
checked and correct		Yes / 是	Yes / 是	Yes / 是	Yes / 是
		No / 否	No / 否	No / 否	No / 否

Drawing 8-3 – adjusting upper swing-out movement

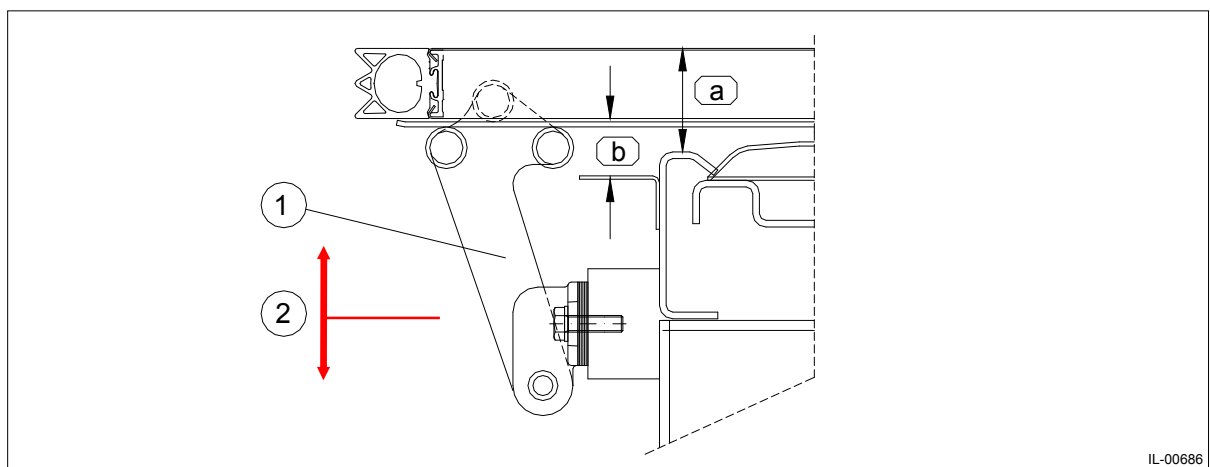


Pos.	Designation
1	guide rail
2	Adjust at guide rail!
a	62 ⁺⁴ mm
b	(34 mm)

- Bottom → (a) (see Drawing 8-4 – adjusting lower swing out movement).

Car no →	Door no:	01	02	03	04
actual dimension					
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

Drawing 8-4 – adjusting lower swing out movement



IL-00686

Pos.	Designation
1	Roller swing arm
2	Adjust at roller swing arm bracket!
a	62 ⁺⁴ mm, (measured to bottom door leaf edge)
b	(34 mm)

8.4 Check door leaf height

- In door closed position, check the measurement of (a) from the upper edge of the door leaf to the portal structure (see Drawing 8-5 – door leaf height position)

Car no →

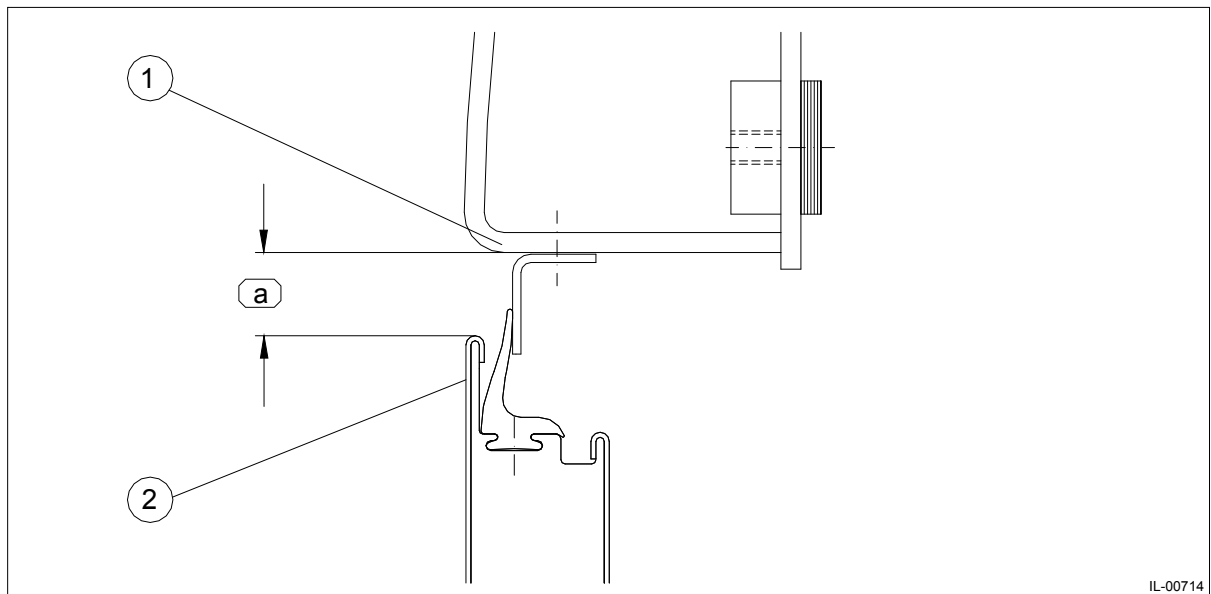
Door no:

01	02	03	04
----	----	----	----

actual dimension left side
actual dimension right side
checked and correct

Yes	Yes	Yes	Yes
No	No	No	No

Drawing 8-5 – door leaf height position

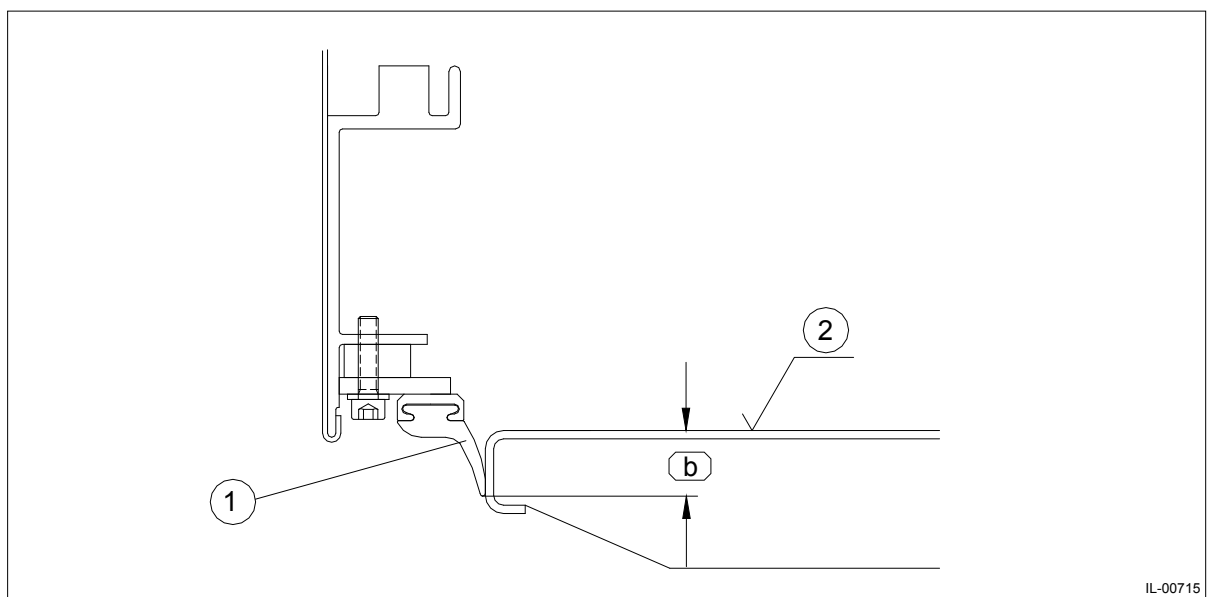


Pos.	Designation
1	Portal structure
2	Door leaf
a	24 ±2 mm

- Bottom overlap measurement of (b) of bottom door seal rubber to (2) ARL (Above Rail Level) (see Drawing 8-6 – door seal rubber overlap).

Car no →	Door no:	01	02	03	04
actual dimension left side					
actual dimension right side					
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

Drawing 8-6 – door seal rubber overlap



Pos.	Designation
1	Door seal rubber
2	1100mm ARL
b	(9 mm)

8.5 Check roller swing arms

8.5.1 Closed Position

- In door closed-position, the roller swing arm does not brush against the guide rail → minimum distance of (a) between lower guide rail edge and top of the roller swing arm (see Drawing 8-7 – roller swing arm in closed position).

Car no →

Door no:

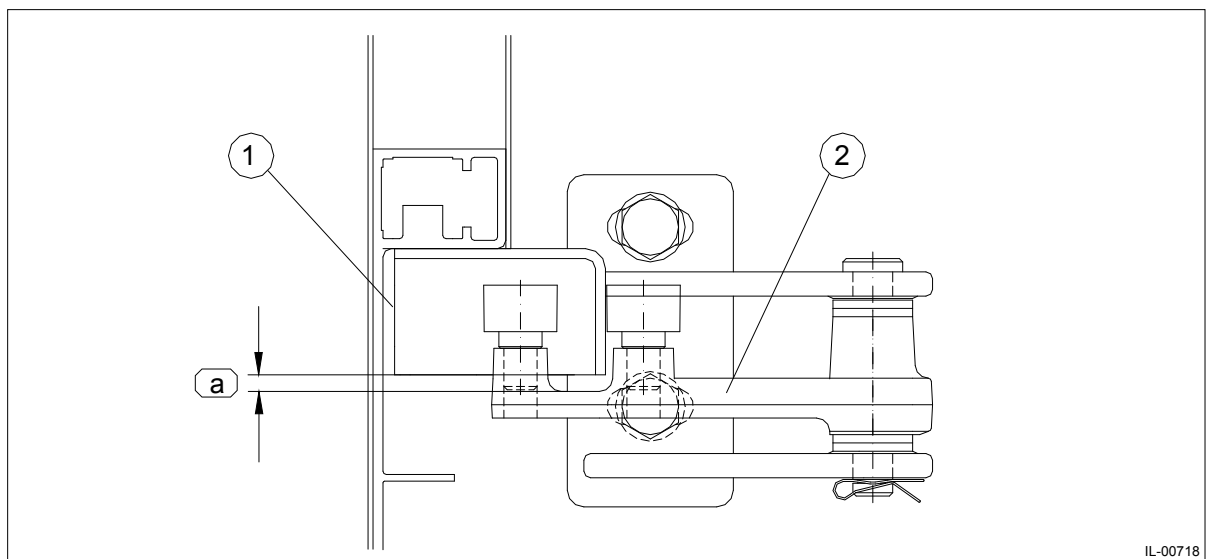
01	02	03	04
----	----	----	----

actual dimension

checked and correct

Yes	Yes	Yes	Yes
No	No	No	No

Drawing 8-7 – roller swing arm in closed position



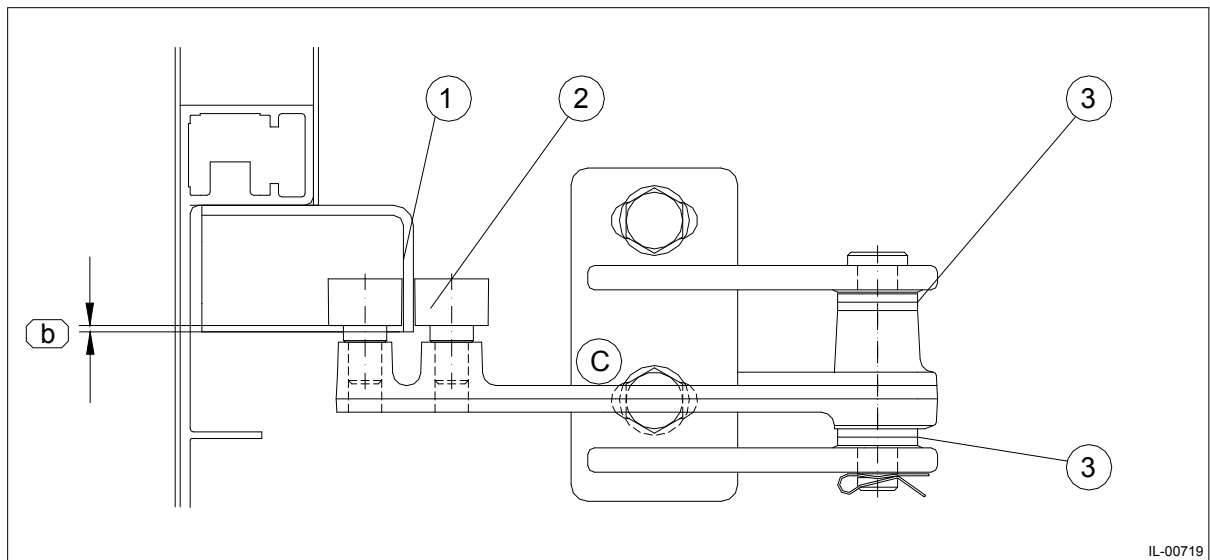
Pos.	Designation
1	Guide rail
2	Roller swing arm
a	5.5 – 7.5 mm

8.5.2 Opened Position

- In door open-position, the bottom edge of the rollers must not be lower than the guide railing (see Drawing 8-8 – roller swing arm in open position).

Car no →	Door no:	01	02	03	04
actual dimension					
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

Drawing 8-8 – roller swing arm in open position



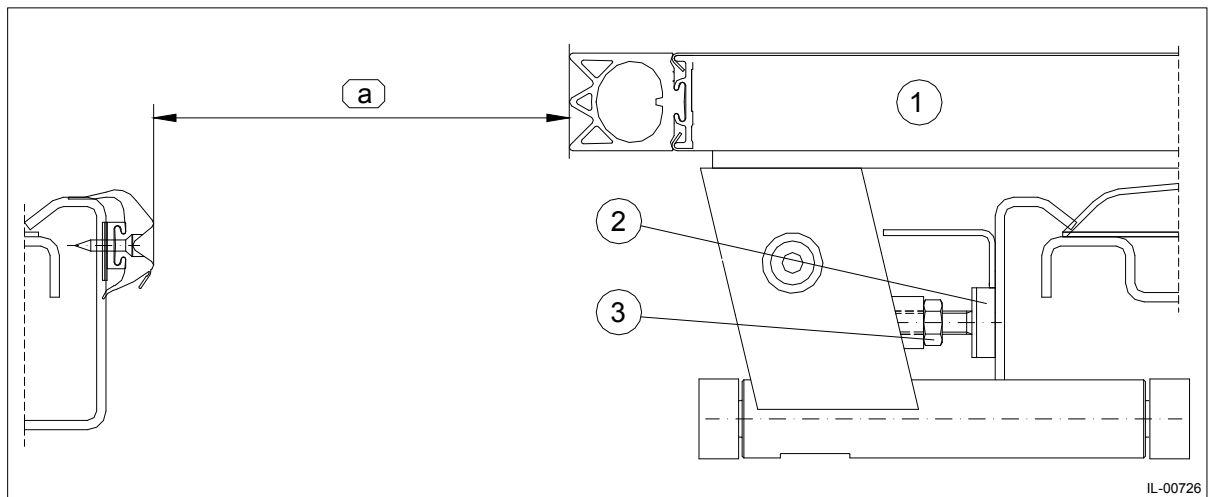
Pos.	Designation
1	Guide rail
2	Roller of roller swing arm
3	Shims
b	0 mm as minimum (roller inside of guide rail)
C	Horizontally!

8.6 Door opening width

- Opening width → (a) (see Drawing 8-9 – adjusting door opening width).

Car no →	Door no:	01	02	03	04
actual dimension					
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

Drawing 8-9 – adjusting door opening width



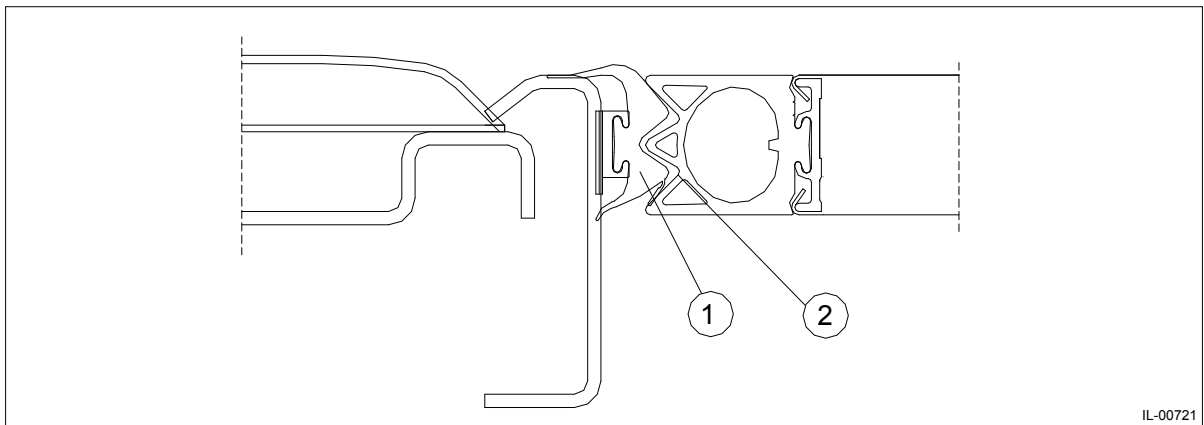
Pos.	Designation
1	Door leaf
2	Rubber bump stop
3	Counter nut
a	Clearance / 间距 800 ^{+5/-0} mm

8.7 Check of door Closed Position

- In door closed position leading door leaf rubber and the portal rubber comes together in the correct position (see Drawing 8-10 – adjusting door closed position).

Car no →	Door no:	01	02	03	04	
		checked and correct	Yes	Yes	Yes	Yes
			No	No	No	No

Drawing 8-10 – adjusting door closed position

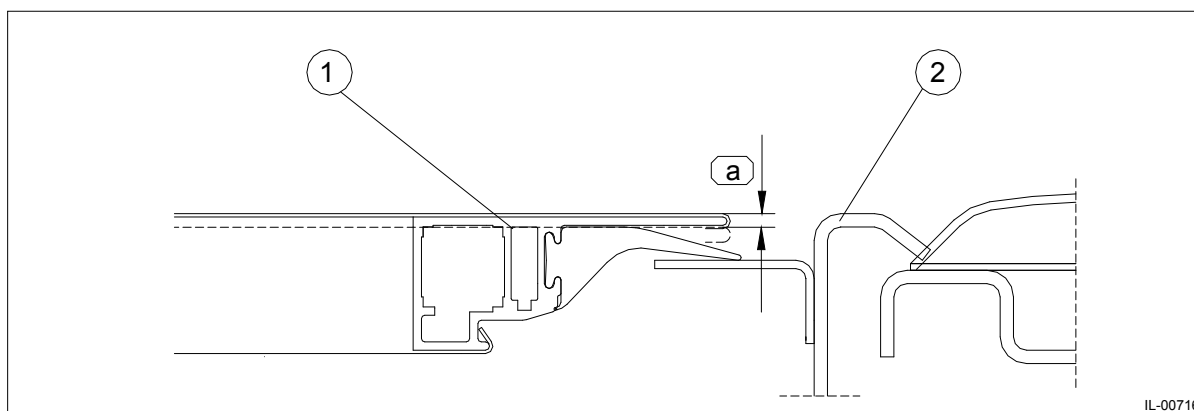


Pos.	Designation
1	Portal rubber
2	Leading door leaf rubber

- Outer door leaf surface at bottom area is flush to the portal surface or minus 3mm as maximum (see Drawing 8-11 – tightness at bottom area).

Car no →	Door no:	01	02	03	04	
		actual dimension on bottom				
		checked and correct	Yes	Yes	Yes	Yes
		No	No	No	No	

Drawing 8-11 – tightness at bottom area



IL-00716

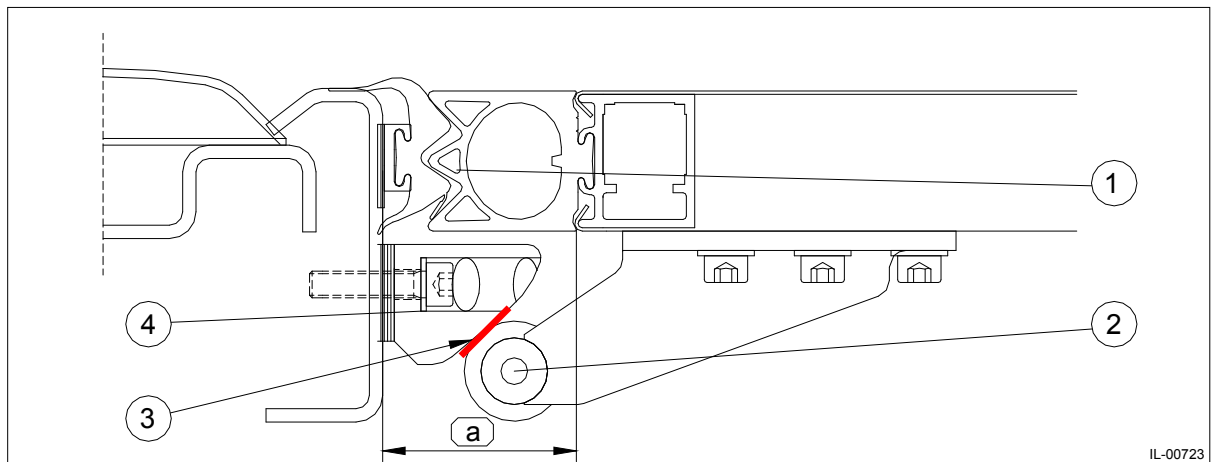
Pos.	Designation
1	Door leaf
2	Portal surface
a	0 ^{+0/-3} mm

9 Bottom holding bracket

- In closed position the roller on the door leaf comes into the straight line area of the bracket and the compression of door leaf rubber to portal rubber result in a dimension of (a) (see Drawing 9-1 – adjusting the holding bracket).

Car no →	Door no:	01	02	03	04
actual dimension					
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

Drawing 9-1 – adjusting the holding bracket



Pos.	Designation
1	Door leaf rubber
2	Roller
3	Straight line area!
4	Holding bracket
a	(54-55 mm)

10 Lock Housing Mechanism (Item 03)

10.1 Distance between latch and roller

- Roller inside the door leaf touches the latch → distance of (a) (see Drawing 10-1 – adjusting the lock housing mechanism).
-

Car no →

Door no:

01

02

03

04

actual dimension

checked and correct

Yes

Yes

Yes

Yes

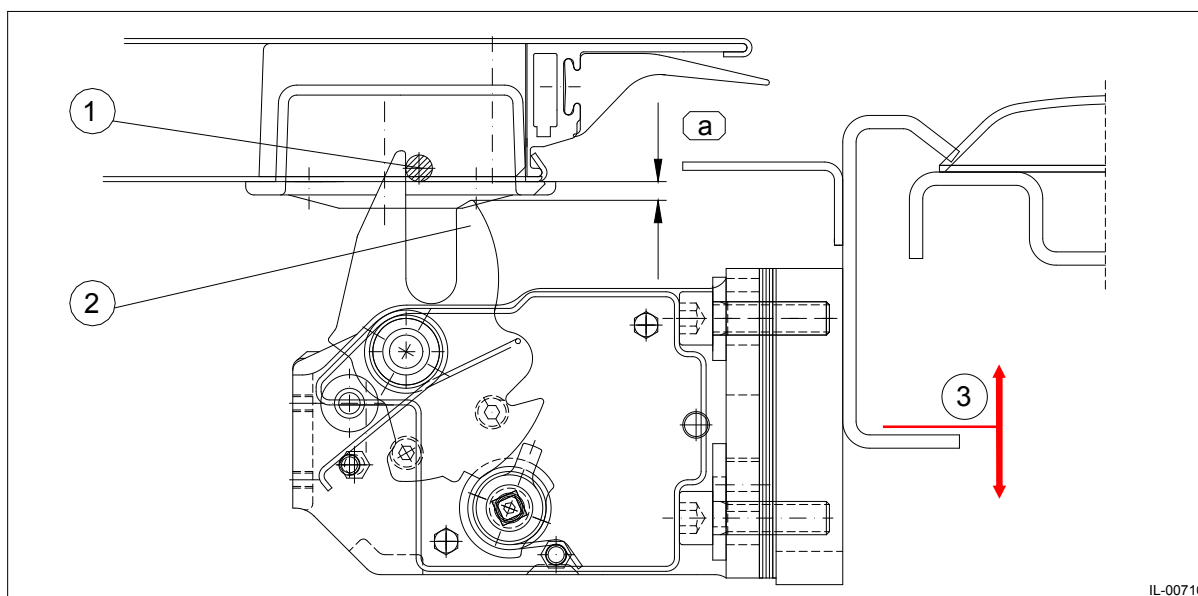
No

No

No

No

Drawing 10-1 – adjusting the lock housing mechanism



Pos.	Designation
a	1 – 3 mm
1	Roller at door leaf
2	Latch at lock housing mechanism
3	Adjust in the elongated holes!

10.2 Electrically closing position of latch

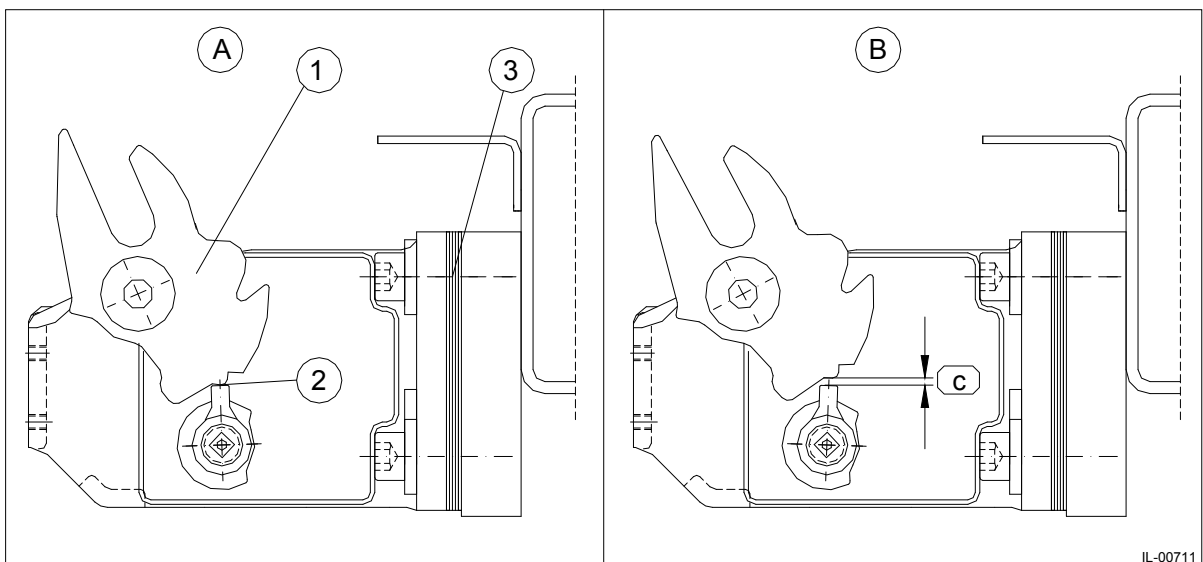
- In fully closed position the latch is in the second stage engagement (see Drawing 10-2 – adjusting the overdrive of latch).

Car no →	Door no:	01	02	03	04
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

- With electrically closed door position the latch is in the second stage engagement and does overdrive (c) (see Drawing 10-2 – adjusting the overdrive of latch).

Car no →	Door no:	01	02	03	04
actual dimension closed position					
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

Drawing 10-2 – adjusting the overdrive of latch

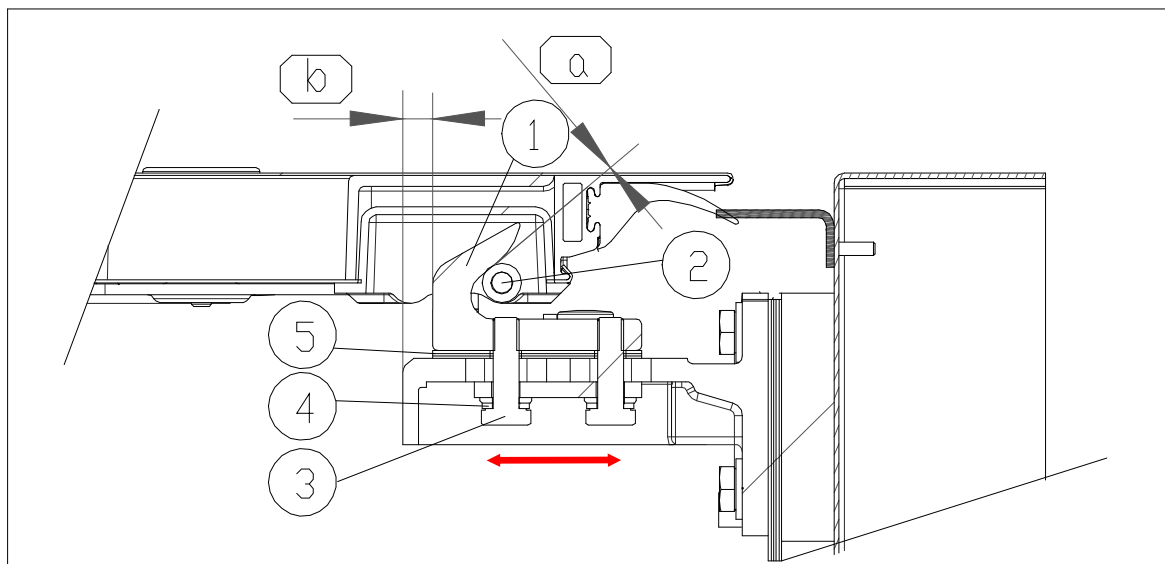


Pos.	Designation
1	Latch at lock housing mechanism
2	Second engagement
3	Shims
A	Closed and locked without electrical supply
B	Closed and locked with electrical supply
c	1 – 2 mm

- In fully electrical closed position → no gap between the roller of the door leaf and the catch hook (see Drawing 10-3 – mounting the catch hook).

Car no →	Door no:	01	02	03	04
actual gap checked and correct					
	Yes	Yes	Yes	Yes	
	No	No	No	No	

Drawing 10-3 – mounting the catch hook

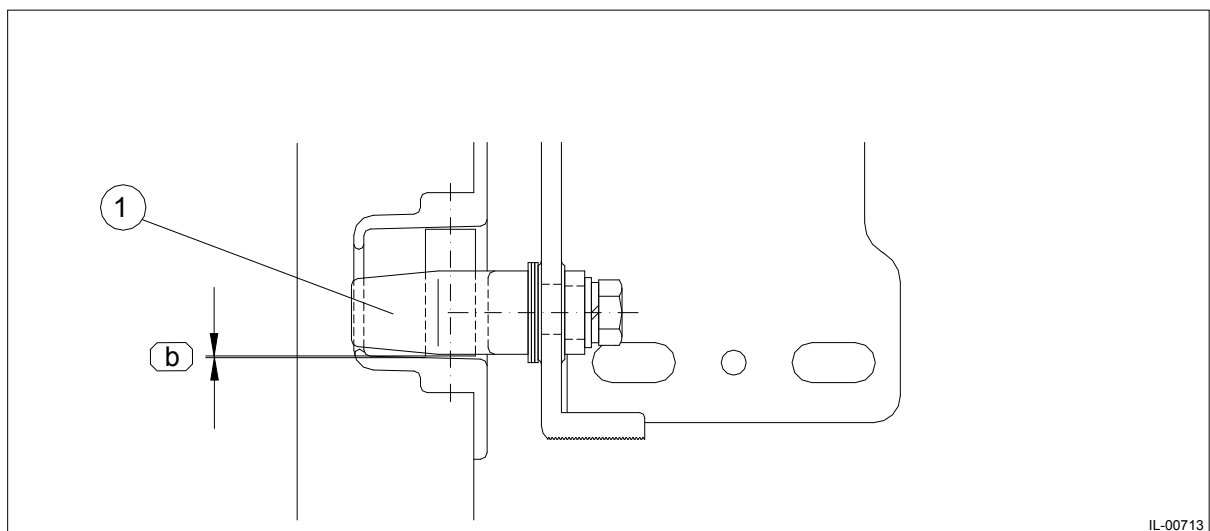


Pos.	Designation
1	Catch hook
2	Roller
3	Fastening screws
4	Washer
5	Shims (if necessary)
a	0 mm
b	11.5 ⁺² mm

The height position of the catch hook must be checked according to Drawing 10-4

Car no →	Door no:	01	02	03	04
actual gap checked and correct					
	Yes	Yes	Yes	Yes	
	No	No	No	No	

Drawing 10-4 – height position of catch hook



IL-00713

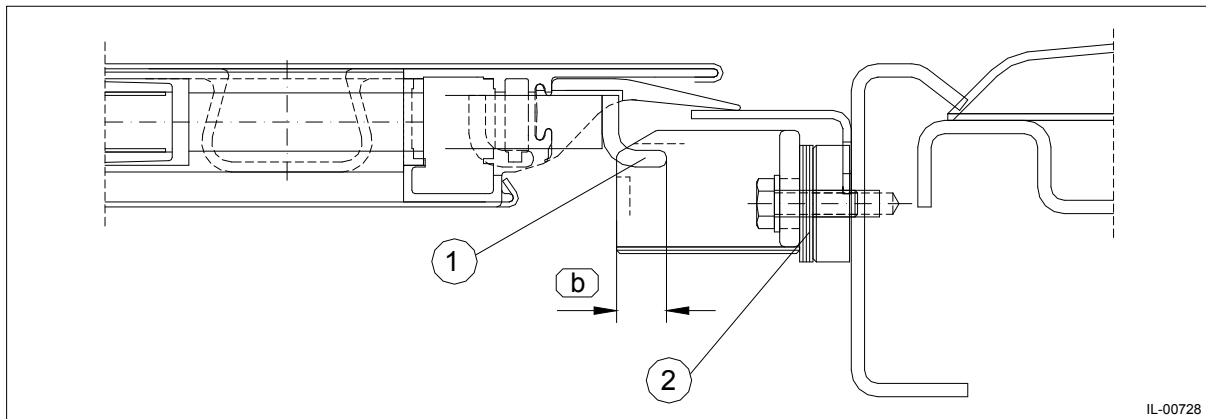
Pos.	Designation
1	Catch hook
b	1 - 3mm

11 Isolating lock mechanism (Item 04)

- Door lock lever penetrates min. 10 to max. 16 mm into the isolating lock mechanism (see Drawing 11-1 – adjusting the isolating lock mechanism)

Car no →	Door no:	01	02	03	04
actual dimension					
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

Drawing 11-1 – adjusting the isolating lock mechanism



Pos.	Designation
1	Lock lever
2	Shims
b	Min. 10 mm – max. 16 mm

- When the door is locked, the door being locked out of use, the limit switch (S4, located inside the isolating lock mechanism) is actuated, and the door lock lever does not slip off the actuating lever.

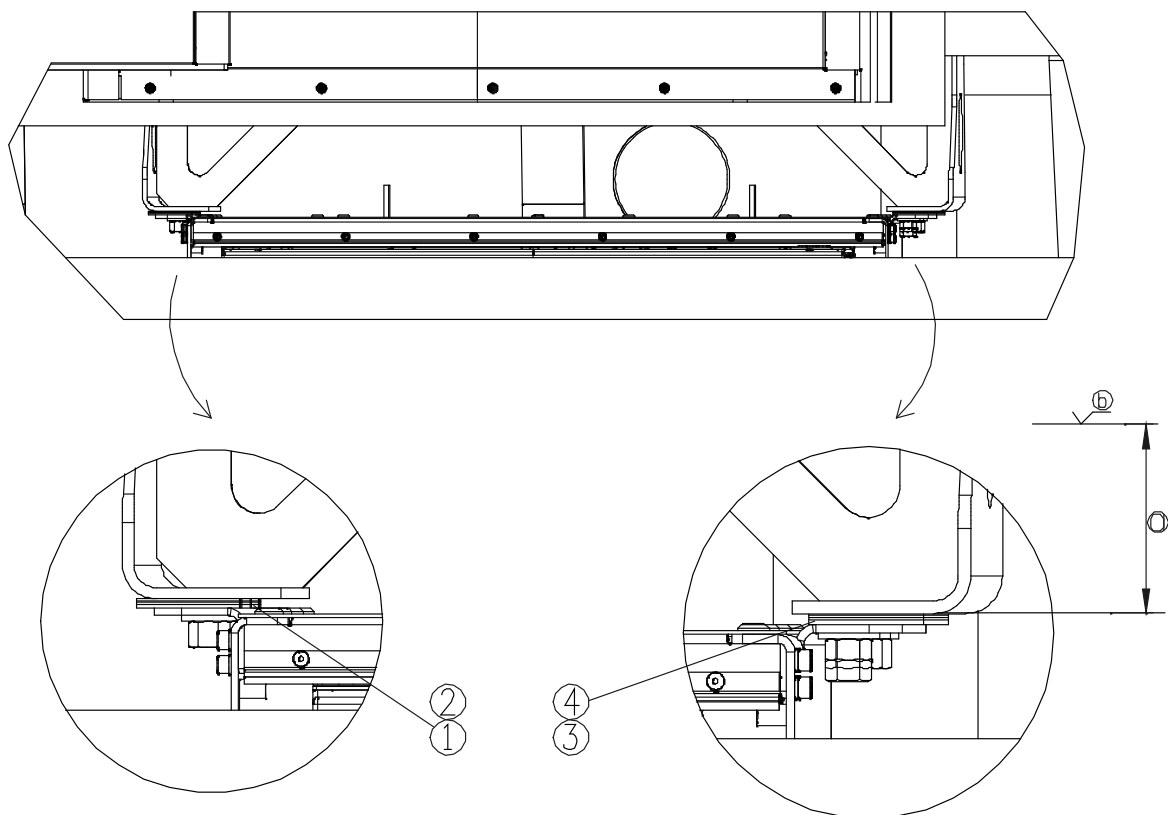
Car no →	Door no:	01	02	03	04
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

12 Access Support Device

12.1 Preparation of sliding step assembly

- Check evenness of mounting surface using ruler before assembly of sliding step.
- Compensate deviation with shims, described in the following.

Drawing 12-1 – Preparation of Sliding Step Assembly

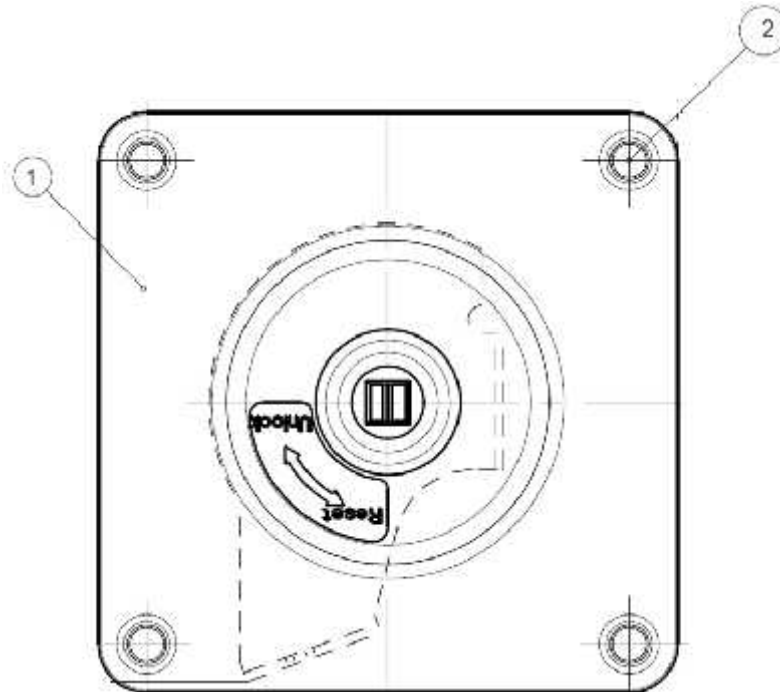


1	Shim (2mm)	2	Shim (1mm)
3	Shim (2mm)	4	Shim (1mm)
a	420.8 ± 1 mm	b	Floor = TOR 1320 mm

- Before mounting sliding step it's necessary to determine shims at mounting surface. Nominal 5 mm shims are used.
- Check measurement (a) for each mounting surface.

12.2 Preparation of emergency device assembly

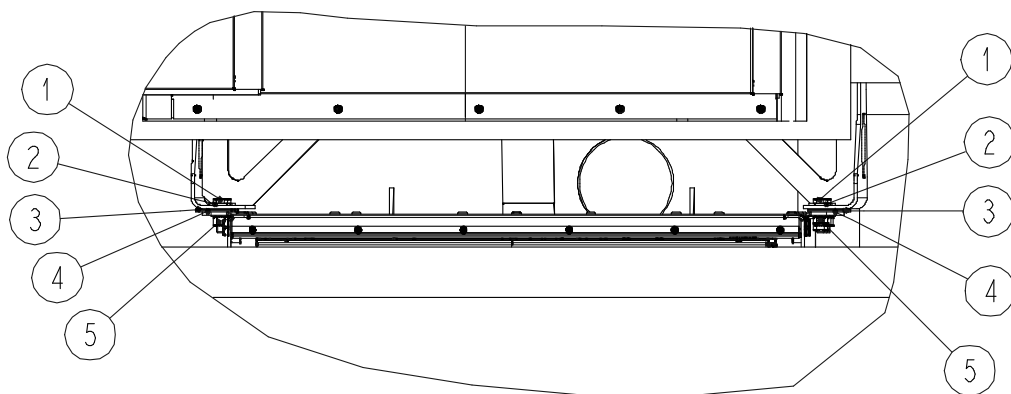
Drawing 12-2 – Preparation of emergency device assembly



1	<i>Emergency Device</i>	2	<i>Countersunk screw M5 (4 no's)</i>
----------	-------------------------	----------	--------------------------------------

12.3 Mounting of sliding step

Drawing 12-3 – Mounting of sliding step



1	<i>Hexagon head screw (SoS- customer)</i>	2	<i>Washer (SoS- customer)</i>
3	<i>Washer (SoS- customer)</i>	4	<i>Shims</i>
5	<i>Hexagon Nut</i>		

Indication of tightening torques

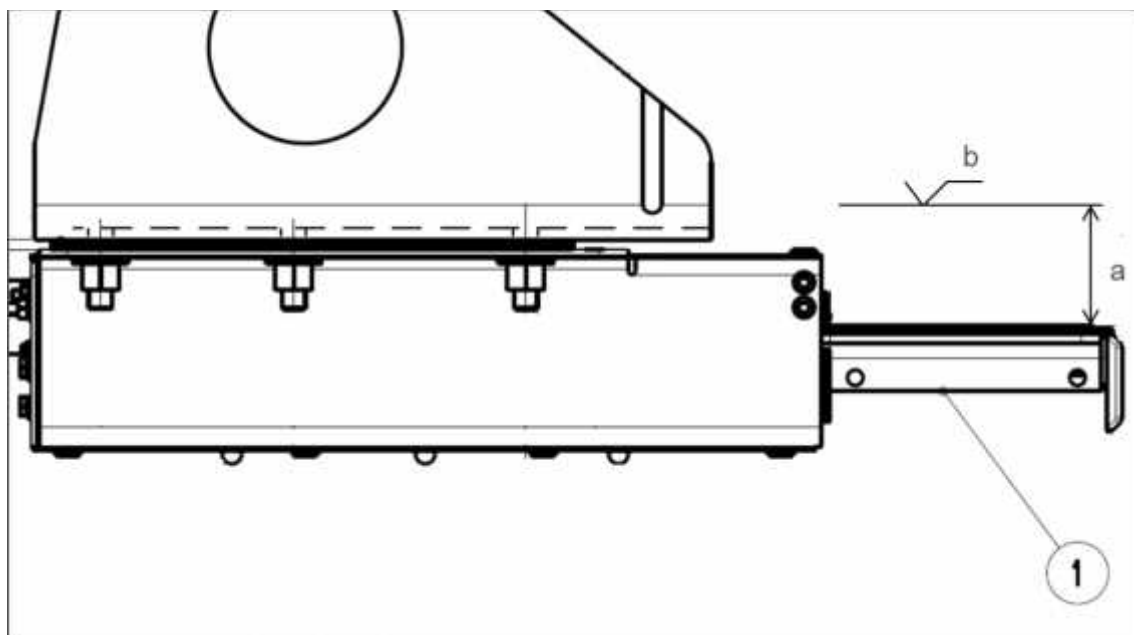
Item	Description/Dimension	Tightening torque	Loctite 243	Optimol	Sealing wax
1	Hexagon head screw M12	73Nm	Yes	No	Yes

- Fasten sliding step with before determined shims (3, 4), hexagon head screws (1) and washers (2) at the portal.
- Tighten hexagon head screws (1) slightly.

12.4 Check the sliding step position

12.4.1 Check height position

Drawing 12-4– Checking height of sliding step

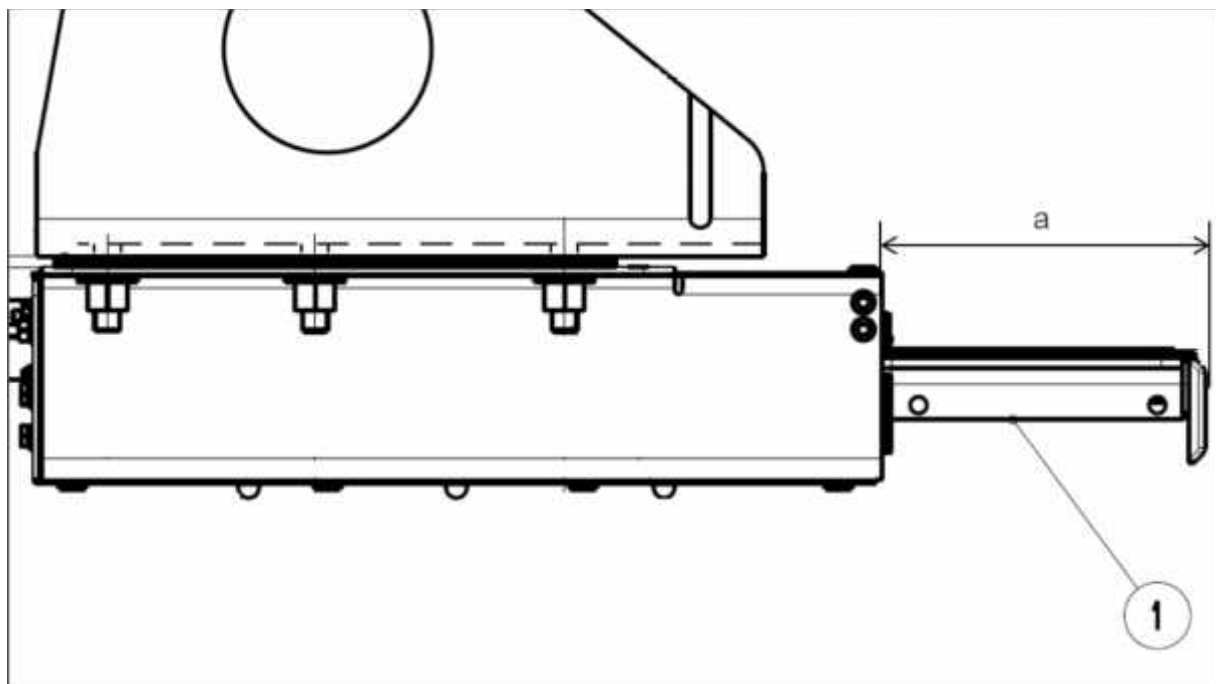


1	<i>Sliding step</i>		
a	<i>467 mm</i>	b	<i>Floor = TOR 1320 mm</i>

- Move sliding step (1) manually in open position.
- Check measurement (a) between floor (b) and sliding step over the full length.
- If necessary, readjust shims according chapter 12.1

12.4.2 Check the sliding step stroke

Drawing 12-5– Checking stroke of sliding step



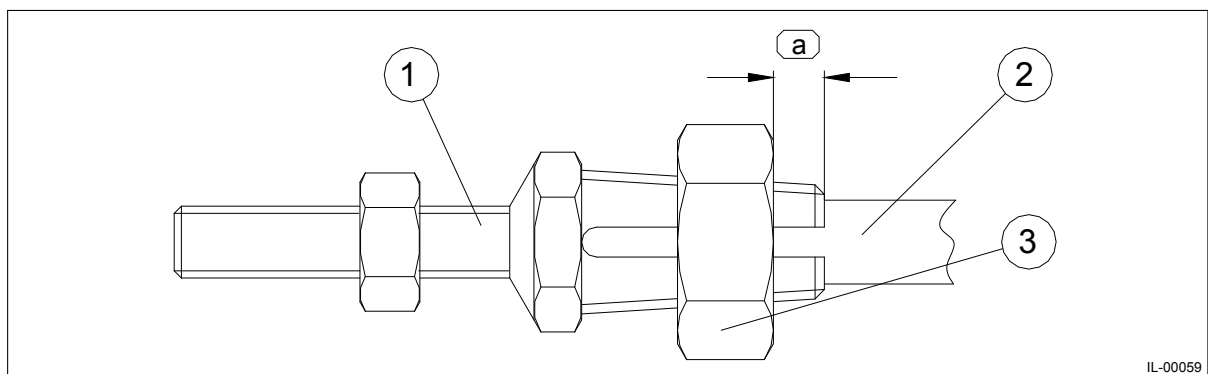
1	<i>Sliding step</i>	a	$150 \pm 1\text{mm}$
----------	---------------------	----------	----------------------

13 Emergency Egress Device

13.1 Check Bowden cable Fixing

- The tightening nut is screwed for max. 5 mm on the tail piece (see Drawing 13-1 – Bowden sleeve fixing).

Drawing 13-1 – Bowden sleeve fixing



Pos.	Designation
1	Tail piece
2	Bowden sleeve
3	Tightening nut
a	Maximum 5 mm

13.2 Check function of emergency egress device

- Catch hook is in main catch position → gap of 1-2 mm between cylinder piston rod and catch lever (see Drawing 13-2 – main catch position of catch lever).

Car no →

Door no:

01	02	03	04
----	----	----	----

actual dimension

checked and correct

Yes	Yes	Yes	Yes

No	No	No	No
-----------	-----------	-----------	-----------

- The ball has a gap of 2-3mm to the release lever (see Drawing 13-3 – gap release lever in lock housing mechanism).

• **Car no →**

Door no:

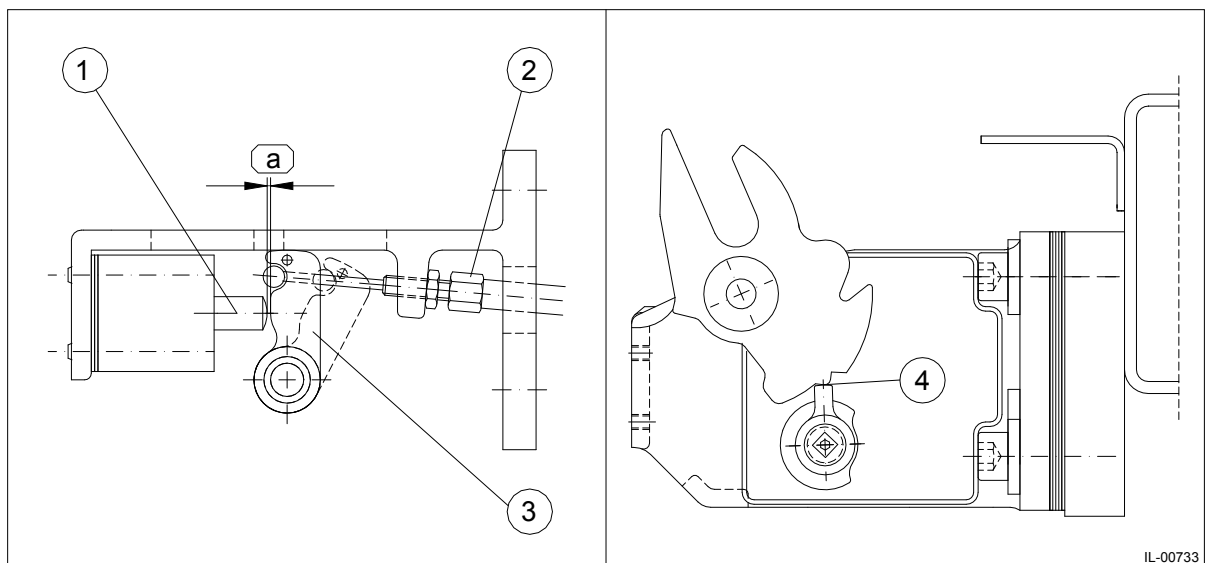
01	02	03	04
----	----	----	----

actual dimension

checked and correct

Yes	Yes	Yes	Yes
No	No	No	No

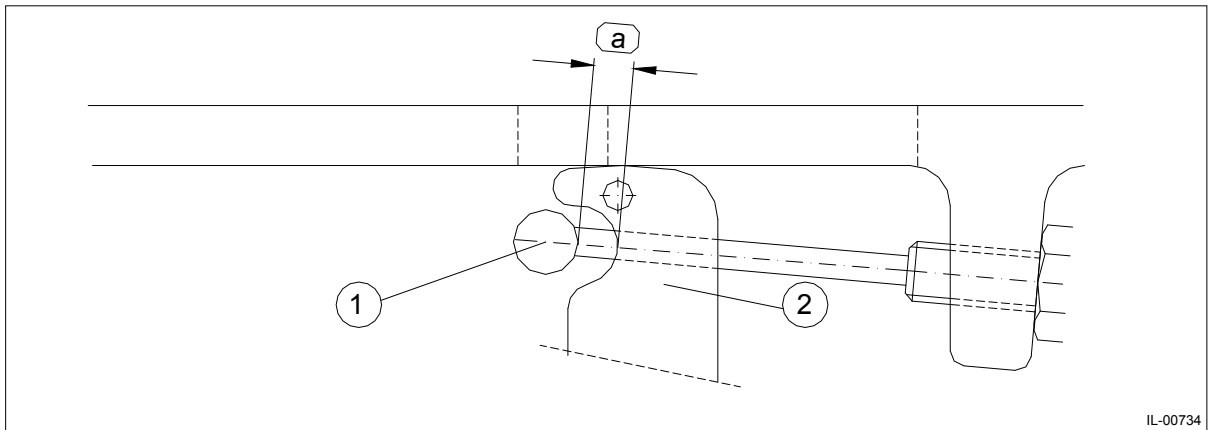
Drawing 13-2 – main catch position of catch lever



IL-00733

Pos.	Designation
1	Cylinder piston
2	Tail piece
3	Release lever
4	Main catch position
a	1-2 mm

Drawing 13-3 – gap release lever in lock housing mechanism



Pos.	Designation
1	Ball
2	Release lever
a	2-3 mm

- The installation of the Bowden sleeve is done with big radius (minimum 200 mm).

Car no →

Door no:

01	02	03	04
----	----	----	----

checked and correct

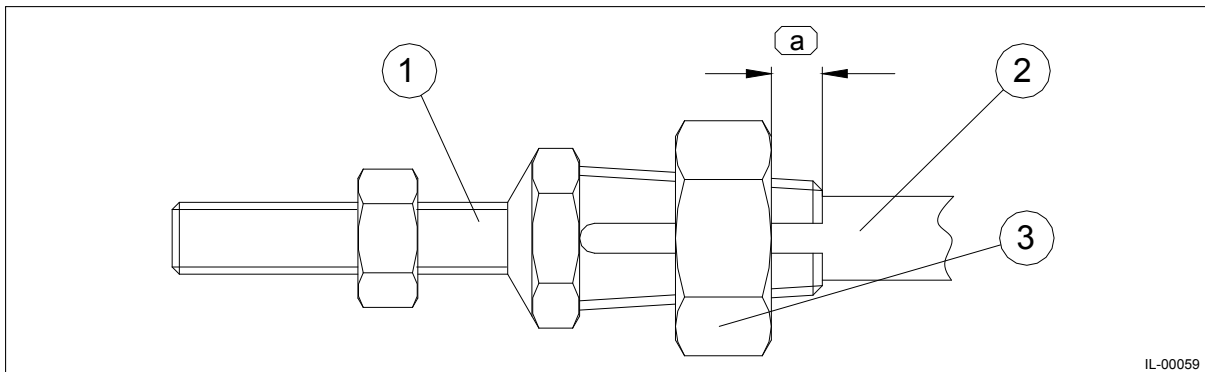
Yes	Yes	Yes	Yes
No	No	No	No

14 Emergency Access Device

14.1 Check Bowden cable fixing

- The tightening nut is screwed for max. 5 mm on the tail piece (see Drawing 14-1 – Bowden sleeve fixing).

Drawing 14-1 – Bowden sleeve fixing



Pos.	Designation
1	Tail piece
2	Bowden sleeve
3	Tightening nut
a	Maximum 5 mm

14.2 Check function of Emergency Access Device

Catch hook is in main catch position → gap of 1-2 mm between cylinder piston rod and catch lever (see Drawing 14-2 – main catch position of catch lever).

Car no →

Door no:

01	02	03	04
----	----	----	----

actual dimension

checked and correct

Yes	Yes	Yes	Yes
No	No	No	No

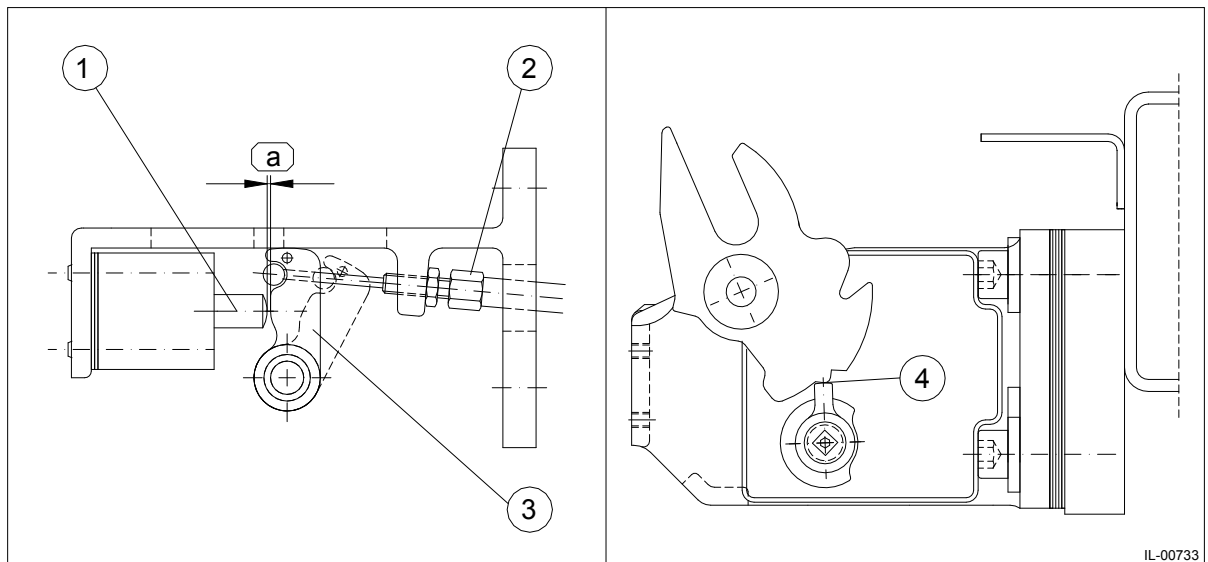
- The ball has a gap of 2-3mm to the release lever (see Drawing 14-3).

Car no →	Door no:	01	02	03	04
actual dimension					
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

- When operating the emergency device, the release lever in the lock housing mechanism will be activated (see Drawing 14-2 – main catch position of catch lever).

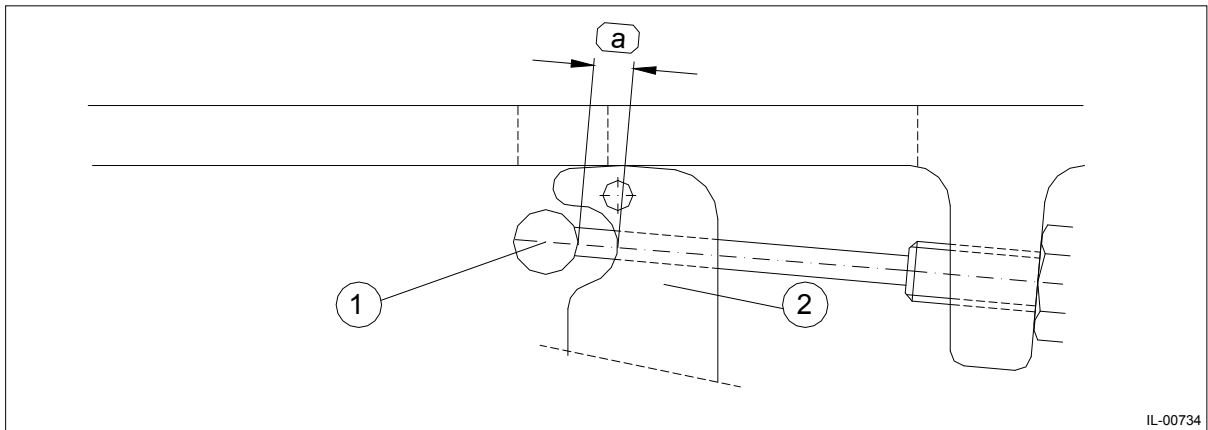
Car no →	Door no:	01	02	03	04
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

Drawing 14-2 – main catch position of catch lever



Pos.	Designation
1	Cylinder piston
2	Tail piece
3	Release lever
4	Main catch position
a	1-2 mm

Drawing 14-3 – gap release lever in lock housing mechanism



Pos.	Designation
1	Ball
2	Release lever
a	2-3 mm

- The installation of the Bowden sleeve is done with big radius (minimum 200 mm).

Car no →

Door no:

01	02	03	04
----	----	----	----

checked and correct

Yes	Yes	Yes	Yes
No	No	No	No

15 Check of fastening elements

- All fastenings screws are secured with the proper retention and tighten with the torque setting in accordance with assembly and adjustment instruction DDSTE11071E04.
- All fastening screws are marked with witness painting.

Car no →	Door no:	01	02	03	04
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

16 Lubrication Check



NOTE

Clean the whole door area from dust, swarf, etc. before starting lubrication!

- Check lubrication in accordance with Lubrication Instruction DDSTE11071E05.

Car no →	Door no:	01	02	03	04
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

17 Electrical Part

17.1 Limit switch „door Closed and locked“ (S1)

Check the function of the “door closed & locked” limit switch (S1) in accordance with DDSTE11071E07.

Car no →	Door no:	01	02	03	04
checked and correct		Yes	Yes	Yes	Yes
		No	No	No	No

17.2 Limit switch „emergency device outside“(S3)

Check the function of the “emergency device outside” limit switch (S3) in accordance with DDSTE11071E07.

Car no → checked and correct	Door no:	01	02	03	04
		Yes	Yes	Yes	Yes
		No	No	No	No

17.3 Limit switch „emergency device Inside“(S4)

Check the function of the “emergency device inside” limit switch (S4) in accordance with DDSTE11071E07.

Car no → checked and correct	Door no:	01	02	03	04
		Yes	Yes	Yes	Yes
		No	No	No	No

17.4 Limit switch „door out of Service“ (S5)

Check the function of the “door out of service” limit switch (S4) in accordance with DDSTE11071E07.

Car no → checked and correct	Door no:	01	02	03	04
		Yes	Yes	Yes	Yes
		No	No	No	No

17.5 Limit switch „door 98% Closed“ (S8)

Check the function of the “door 98% closed” limit switch (S7) in accordance with DDSTE11071E07 chapter 3.5.

Car no → checked and correct	Door no:	01	02	03	04
		Yes	Yes	Yes	Yes
		No	No	No	No

17.6 Obstruction detection

Check with rectangular piece 30 x 60 mm

- Close the door and hold a rectangular piece 30 x 60 mm between the doors during the closing movement. Door must re-open.
- If the test object will be held between the finger protection rubber and portal rubber, a door closed signal must not be present.

Car no →	Door no:	01	02	03	04	
		checked and correct	Yes	Yes	Yes	Yes
			No	No	No	No

17.7 Function check of the complete door area

- Check the function of the doors in accordance with "Door function description DDSTE11071E03" and "Door diagnostic description DDSTE11071E13".

Car no →	Door no:	01	02	03	04	
		All functions are checked and correct	Yes	Yes	Yes	Yes
			No	No	No	No

18 Pneumatic Part

- All pneumatic components such as drive cylinder lock housing mechanism and pneumatic control board are connected in accordance with pneumatic diagram ED90201R06_C01 using tubing of 8 x 1 and 6 x 1.

Car no →	Door no:	01	02	03	04	
		checked and correct	Yes	Yes	Yes	Yes
			No	No	No	No

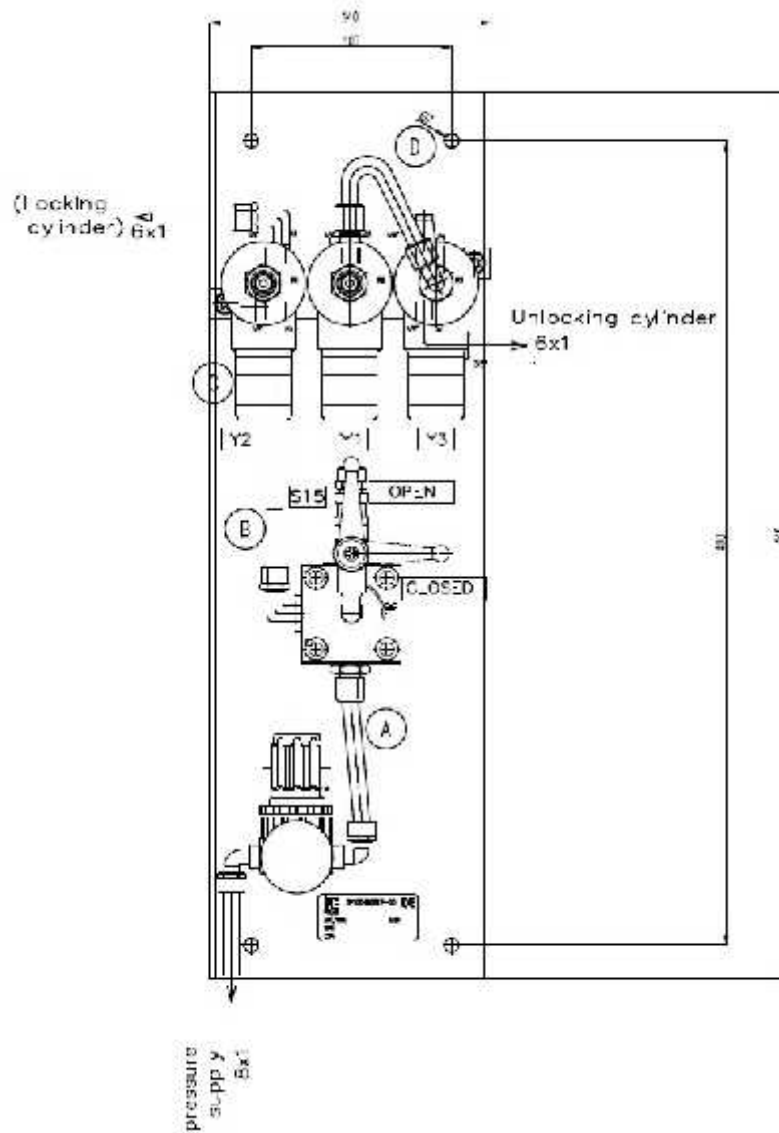
- check pressure supply :
 - dried (dew point is 10 °C below working temperature,
 - And filtered (<30µm)
 - 6-9 bar

Car no →	Door no:	01	02	03	04	
		checked and correct	Yes	Yes	Yes	Yes
			No	No	No	No

- Check if the pressure supply is present (open position at pressure supply switch S15 and connected to DCU (see Drawing 18-1).

Car no →	Door no:	01	02	03	04	
		checked and correct	Yes	Yes	Yes	Yes
			No	No	No	No

Drawing 18-1 – pneumatic control board



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00	2018.05.04	Kumar, Rajneesh	Lynette Li
	item	modification	
		First edition	

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DDSTE11071E07

Rev. 00 - en
.....

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Instruction Manual

Set-up Instruction

TRAIN 18 EMU ICF

Project-No. 66408U1A

Customer INDIAN RAILWAY

Project-Part Single Leaf-Plug Sliding Door

System SST-e1

Created: 2018.05.03
Date

Checked: _____
Date

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Released: _____
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1 Required Documents

Document-No. / Drawing-No.	Description
66408U1AR11	Assembly drawing door
66408U1AR11	Scope of supply
DDSTE11071E01	Introduction and General Information
DDSTE11071E03	Door Function Description
DDSTE11071E04	Assembly and Adjustment Instruction
ED91041R02_C01	Wiring diagram
ED90201R06_C01	Pneumatic diagram

2 Introduction

The set-up of the IFE-Door System can only be carried out by trained and authorized personnel.

Before the electrical set-up, the assembly and adjustment has to be completed according to the instruction DDSTE11071E04.

Basically the signaling elements of the drive are **pre-adjusted**.

A check of the adjustments and the adaptations to the vehicle circumstances (tolerances) are necessary for the operation without a malfunction of the system.

If readjustments or changes on signaling elements are imperative, the respective procedure must be carried out as mentioned and advised in the instruction DDSTE11071E01.

Before the door control electronic is taken into service, the complete electrical wiring must be installed and checked. Damages of electrical or electronic components caused by improper wiring cannot be accepted as warranty claims.

Damages caused by wrong or not checked wiring cannot be accepted as warranty claims.

For the electrical set-up 110VDC ^{+25/-30%} (min. 77 VDC ... max. 137.5 VDC) is necessary.

For the pneumatic set-up pressure supply with 5-10 bar (condition of pressure supply see below)



NOTE

Only dried (dew point 10°K below working temperature) and filtered (< 30 µm) air pressure is necessary !No glycol or other alcoholic additions , No synthetic or part synthetic compressor oil

For set up the following materials are required:

- Loctite 243 N401289R47 (screw locker)
- Witness painting TD02927R01 (sealing of fastening screws)

2.1 Safety Instruction



WARNING

Adjustments with temporary power supply ⇒ During door leaf adjustments with temporary power supply, jam protection is not active.



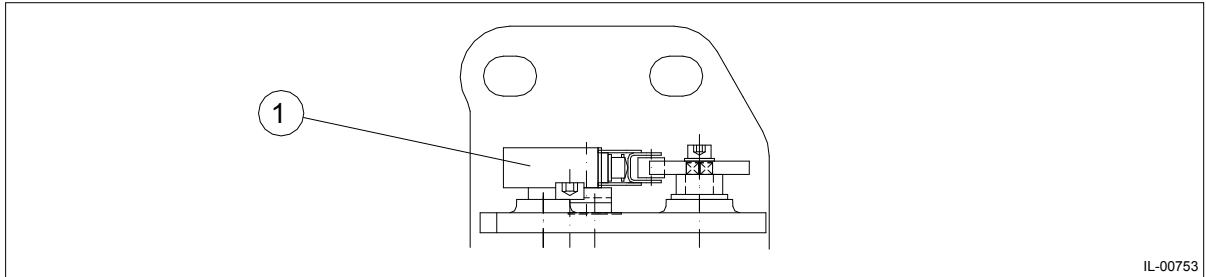
DANGER

Danger of squeezing!
⇒ during adjustment work on components never perform such adjustment when door leaves move

3 Adjustment of electrical components

3.1 Adjustment of the Limit switch "Door closed & locked" S1

Drawing 3-1 – door closed and locked limit switch



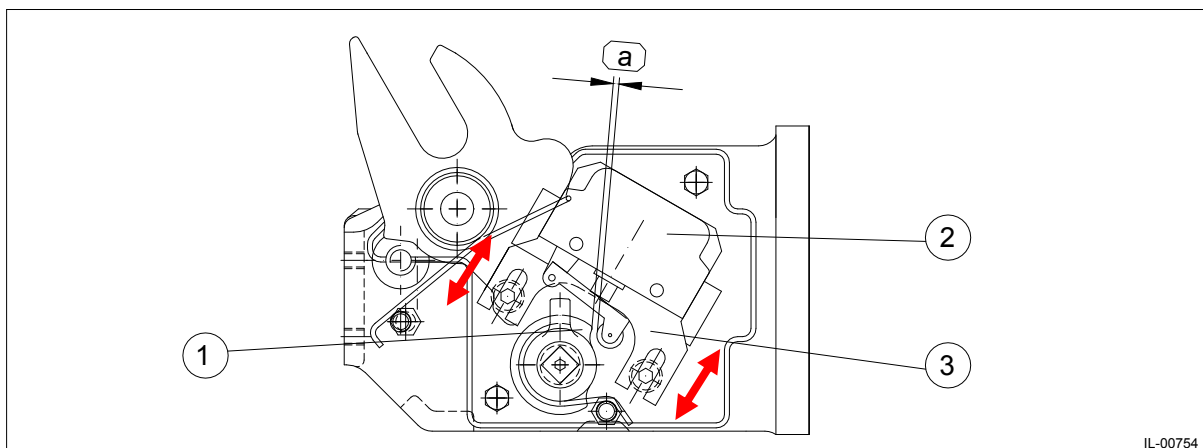
Pos.	Designation
1	Door closed and locked limit switch S1

Bring the door leaf pneumatically in closed position and check, if the limit switch is not activated, when the door is in closed and locked position.

Check that the roller lever of the limit switch is released and there is a gap of 1 mm between the roller and the switch cam.

If necessary readjust the switch by loosening the fastening screws and moving the switch bracket in the longitudinal slots (see **Drawing 3-2 – adjustment of door closed and locked limit switch**).

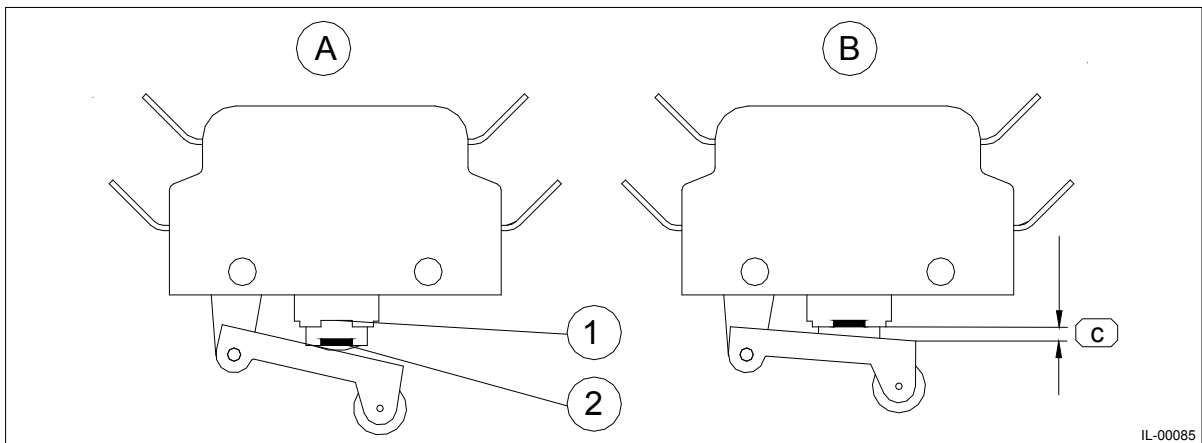
Drawing 3-2 – adjustment of door closed and locked limit switch



Pos.	Designation
1	Switch cam
2	Limit switch S1
3	Limit switch bracket
a	1 mm

During the adjustment take care not to destroy the roller lever with too much pressing force on the roller lever itself (see Drawing 3-3 – limit switch activation – rest stroke).

Drawing 3-3 – limit switch activation – rest stroke



Pos.	Designation
A	Not activated state
B	Activated state
1	Cut out
2	Indicator
c	Rest stroke - at least 1 mm

To check the adjustment uses the white indicator on the limit switch.

To ensure the correct activation, the indicator must reach into the recess on the housing of the limit switch and must be still visible (see Drawing 3-3 – limit switch activation – rest stroke).

When the switch is activated a reserve stroke of at least 1 mm must be left over between the roller lever and the switch housing (see Drawing 3-3 – limit switch activation – rest stroke).

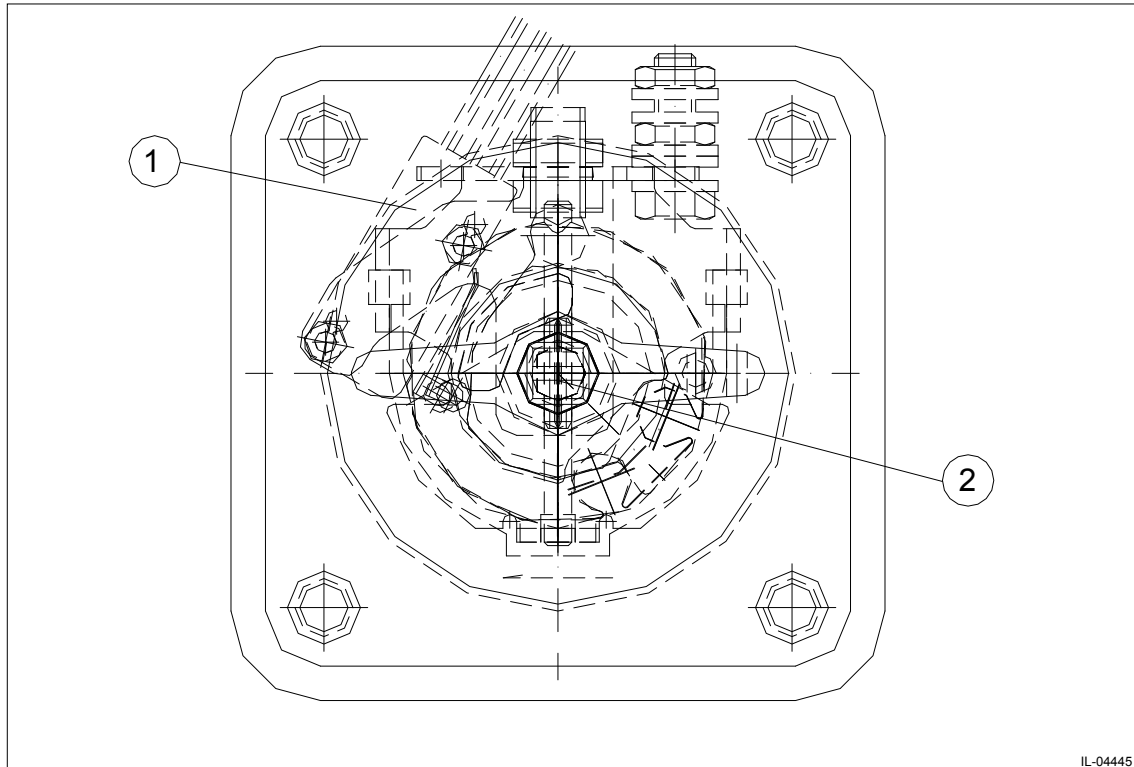
After adjustment fasten the fastening screws of the limit switch bracket, secure them with Loctite 243 and seal them with witness painting.

3.2 Adjustment of the “emergency device inside” limit switch S4

The limit switch „emergency device inside “is located at the emergency device and pre-adjusted by IFE.

Check the limit switch for being activated when the emergency egress device is operated (rotate clockwise) by means of a square key (see Drawing 3-4 – emergency device inside limit switch).

Drawing 3-4 – emergency device inside limit switch



Pos.	Designation
1	Limit switch S4, activated
2	Square key

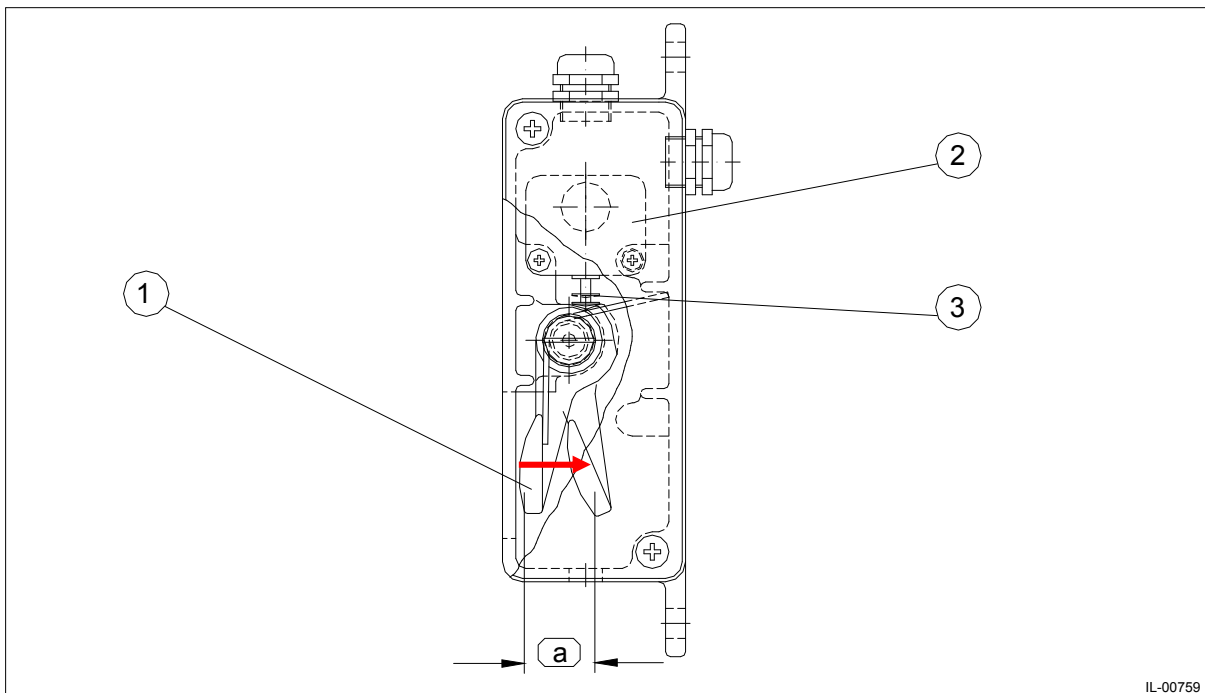
3.3 Adjustment of the „out of Service“ Limit Switch S5

The limit switch „out of service “is located in the center of the isolating lock mechanism and is pre-adjusted by IFE.

Check the limit switch for being activated by means of the lock lever in the door locked position (see **Drawing 3-5 – adjustment of out of service limit switch**).

Switch point of the lock lever is minimum 12 mm up to max. 18 mm.

Drawing 3-5 – adjustment of out of service limit switch



Pos.	Designation
1	Release lever
2	Limit switch “out of service” S5
3	Activated position
a	Switch point: min. 12 up to max. 18 mm

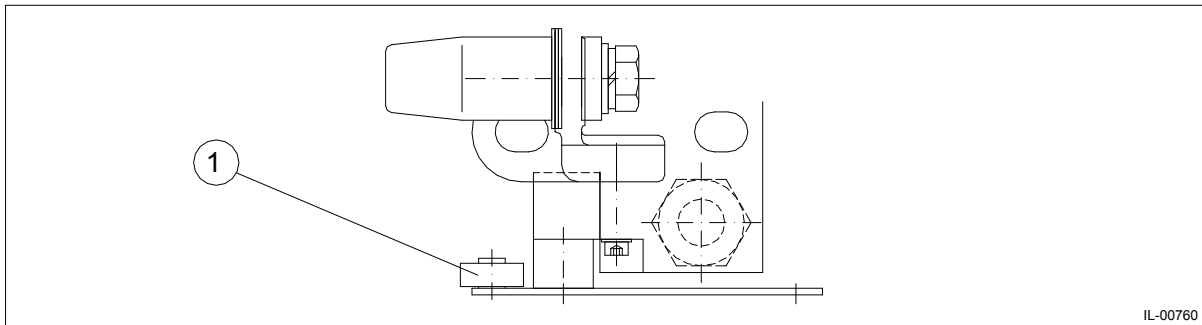
An required adjustment carried out by laterally adding or removing of shims behind the isolating lock mechanism itself.

Therefor see also the adjustment procedure for the isolating lock mechanism, advised in the Assembly and Adjustment Instruction DDSTE11071E04.

3.4 Adjustment of the „door leaf 98% closed“ limit switch S8

The switch is mounted at the bottom of the lock housing mechanism (see **Drawing 3-6 – limit switch “door 98% closed”**).

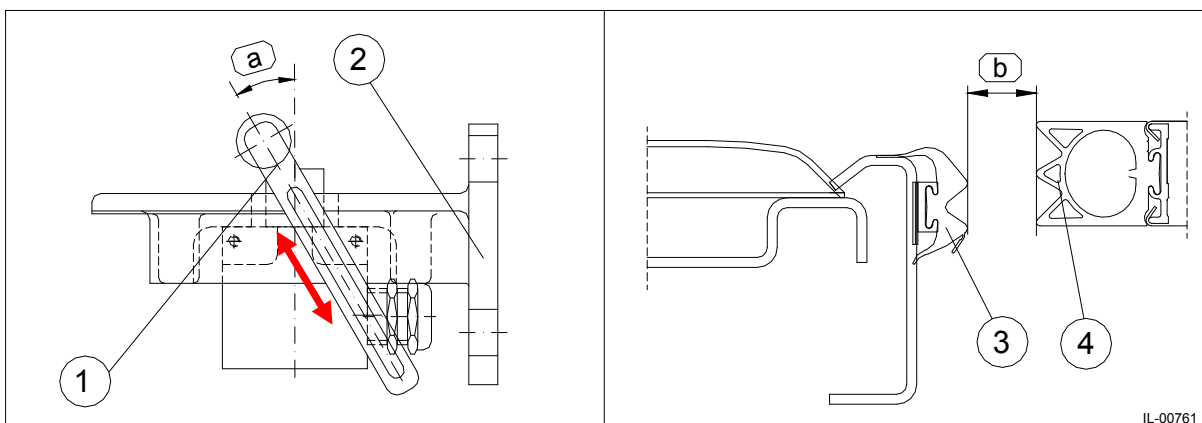
Drawing 3-6 – limit switch “door 98% closed”



Pos.	Designation
1	Door leaf 98% closed limit switch S8

The limit switch must be adjusted through the elongated holes at the roller arm so, that the switch will be activated 16 mm (which is 2 % of door width 800 mm) before the closed end position is reached (see **Drawing 3-7 – adjustment of limit switch „door 98% closed“**).

Drawing 3-7 – adjustment of limit switch „door 98% closed“



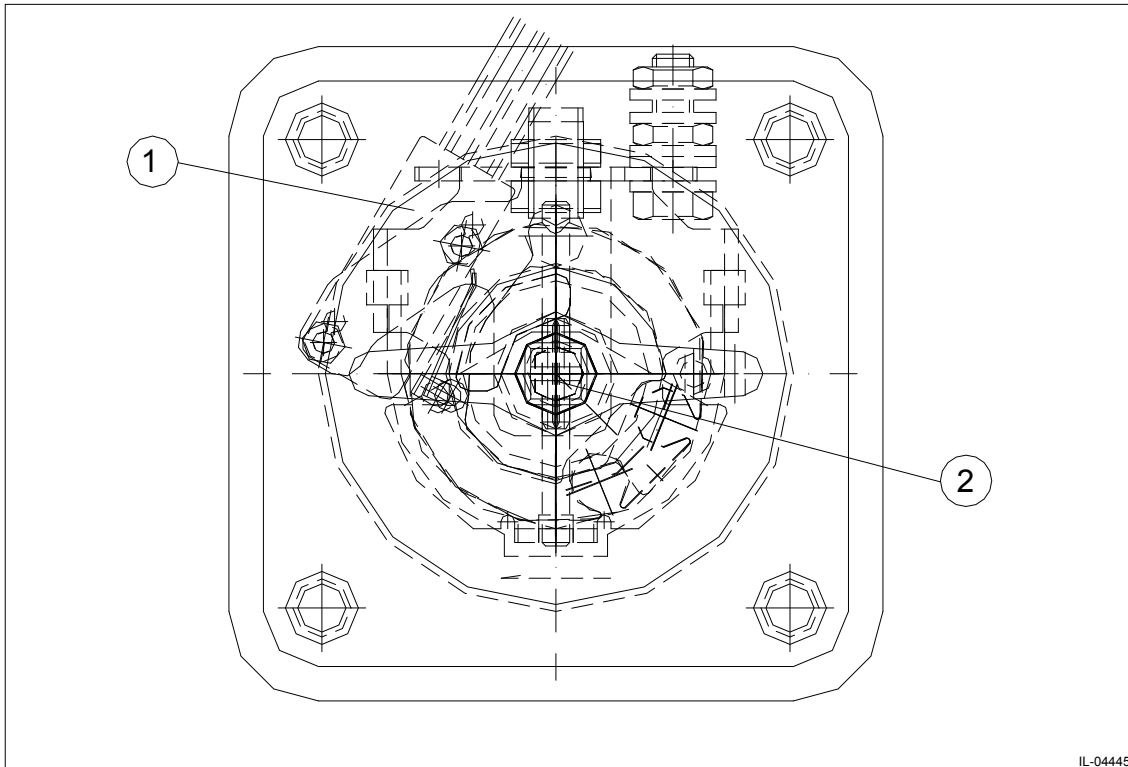
Pos.	Designation
1	Roller arm
2	Lock housing mechanism
3	Portal rubber
4	Leading door leaf rubber
a	30°
b	16 mm

3.5 Adjustment of the „emergency device outside“ limit switch S3

This limit switch is located onto emergency access device and is pre-adjusted by **IFE**.

Check the limit switch for being activated when the emergency access device is operated (rotate clockwise) by means of a square key (see **Drawing 3-8 – emergency device outside limit switch**).

Drawing 3-8 – emergency device outside limit switch



Pos.	Designation
1	Limit switch S3, activated
2	Square key

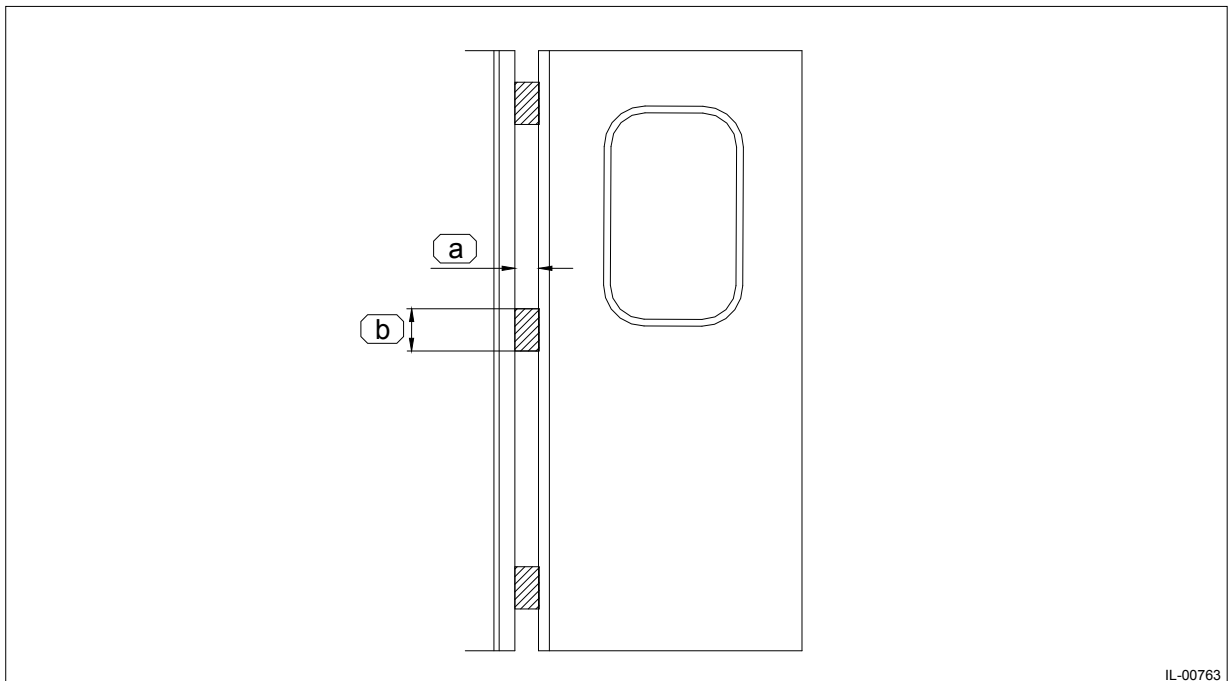
3.6 Check function of obstruction detection system

For controlling the obstruction detection system following process should be carried out:

⇒ With test object 30 x 60 mm, (60 mm perpendicular, at the top, center and bottom area; see Drawing 3-9 – test objects between **rubbers**).

- The door must reopen
- If the test object will be held between the door and portal rubbers, a door closed signal must not be present.

Drawing 3-9 – test objects between rubbers



IL-00763

Pos.	Designation
a	30 mm
b	60 mm

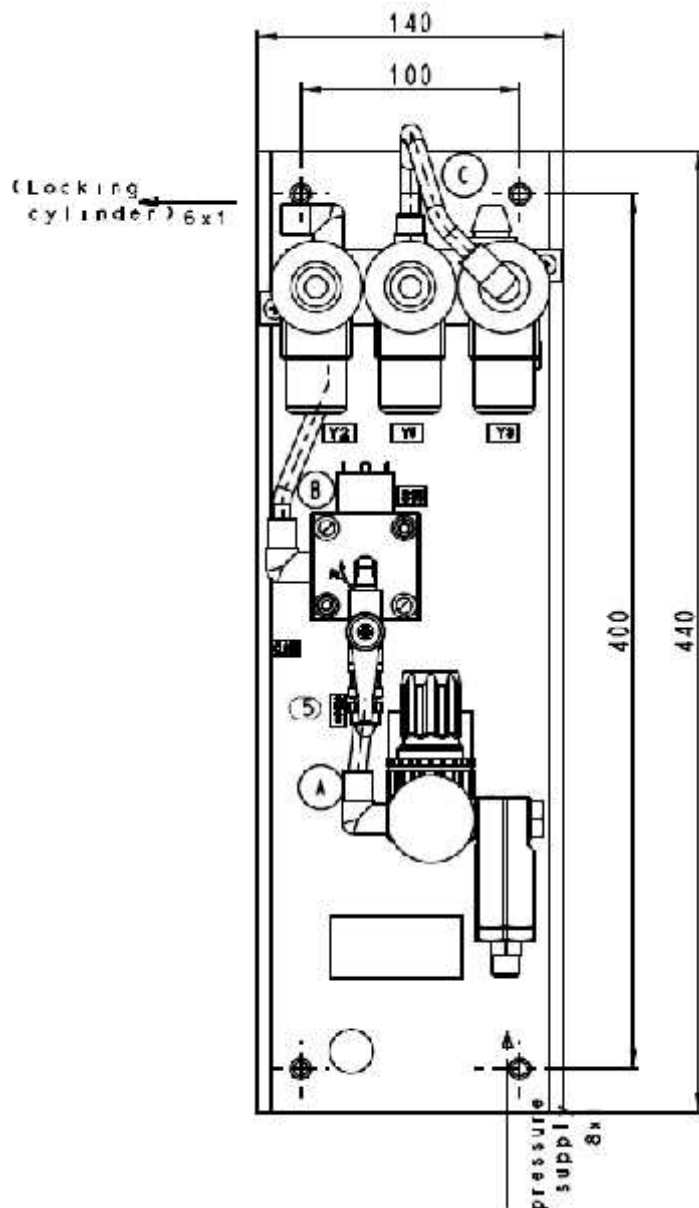
4 Adjustment of pneumatic components

4.1 Adjustment of the pressure supply by pressure switch S15

The pressure supply is monitored by the pressure switch S15 located at the pneumatic control board.

Check if the pressure switch can be switched into open and closed position and is connected to door control unit (DCU) (see **Drawing 4-1 – pneumatic control board**).

Drawing 4-1 – pneumatic control board



5 Set-up of the door control electronic MDC-110



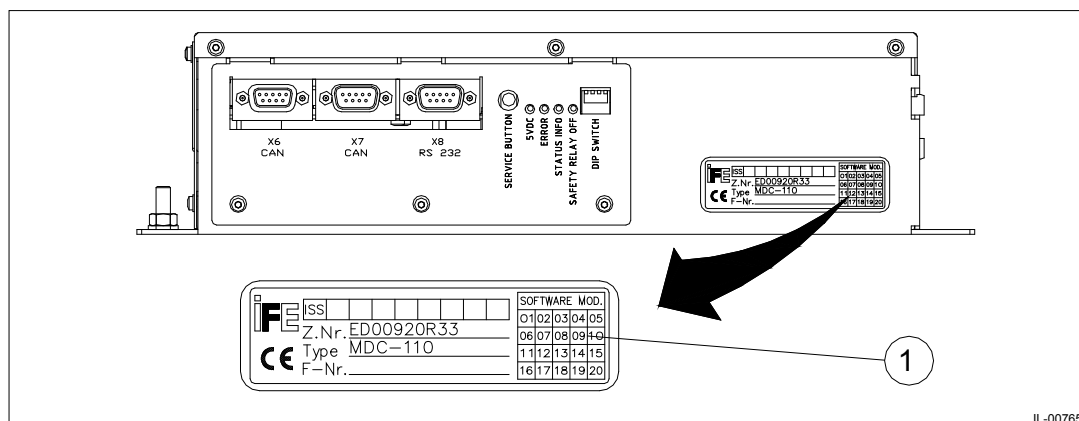
WARNING

Do NOT unplug the connection plugs of the Door control unit whilst electric voltage is switched on.

5.1 Preparation for the set-up

- ⇒ Voltage of 110 ^{+25/-30%} (min. 77 VDC ... max. 137.5 VDC) has to be supplied.
- ⇒ The electrical wiring (IFE scope of supply) has been fitted and tested before delivery according to the wiring diagram ED00344R11 before the door control unit can be activated.
- ⇒ The pneumatic elements have to be tubed according to pneumatic diagram ED90201R06_C01.
- ⇒ Correct vehicle wiring and correct IFE wiring should be guaranteed.
- ⇒ Pressure supply must be
 - ⇒ dried (dew point 10°C below working temperature) and filtered (<30 µm)
 - ⇒ no glycol or other alcoholic additions
 - ⇒ no synthetic or part synthetic compressor oil
- ⇒ The software no. is E406119Pxx .The last two numbers (xx = 01, 02 ...) represent the current version of the program. The current version will be marked after a software change with a cross at the software modification sticker on the cover of the door control unit (see Drawing 5-1).

Drawing 5-1 – software sticker at DCU



Pos.	Designation
1	Software modification sticker



WARNING

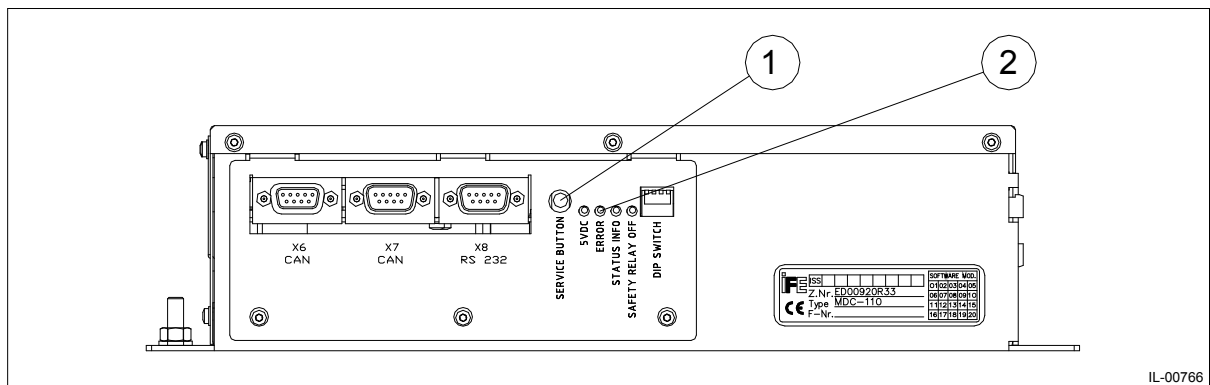
Damages of electrical or electronic components caused by improper or wrong wiring cannot be accepted as warranty claims.

5.2 Initialization of the mechanical open position

The current curve and the mechanical open position have to be stored by the door control unit. Therefore both the current curve and the mechanical open position have to be learnt by initialization.

If the power supply is switched off, the test push button has to be pressed and held (see a) Drawing 5-2 – test push button at DCU).

Drawing 5-2 – test push button at DCU



Pos.	Designation
1	Test push button
2	Red LED

With the push button pressed, switch ON the power supply and keep the push button pressed as long as the red error LED (see

- b) Drawing 5-2 – test push button at DCU) switches off.
- c) Open and close the door leaves completely minimum five times. Make sure that, the full mechanical open position is reached. (rubber bump stop on pull arm contacts the hard point). With the door movements the open position is learnt by the door control unit. The door control unit tries to reach this learnt open position at every subsequent door open-cycle
- d) If the open position was not learnt correctly the procedures a) to c) have to be repeated.

6 Measuring of the squeezing force

6.1 Environmental requirements

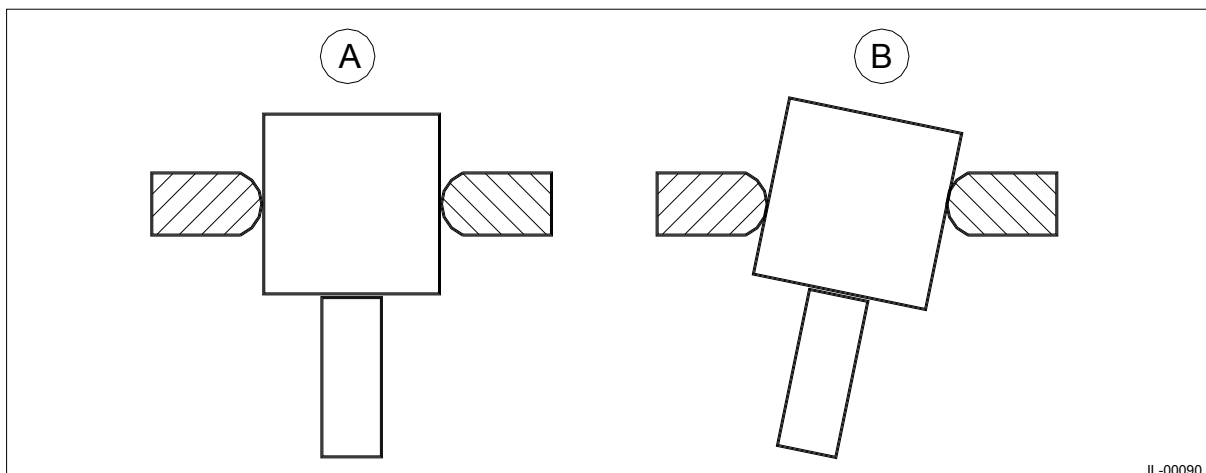
- a) The permissible variation of the temperature of the device is between + 10 °C - + 30 °C.
- b) The vehicle has to be in a horizontal position.
- c) After each measuring the door have to reach the closed position at least 1 time without any reversing of the door.
- d) The measuring is done at the upper, central and lower area of the door leaves.
Decisive for the evaluation of the measuring is the average of all three measuring.
- e) A tolerance of ± 10 N is taken into consideration for error of measurement.

6.2 Handling of the instrument

For measuring put the instrument between the closing edges. Be careful to contact the initiation area in parallelism to the closing edges. When testing doors with two moving wings, you are recommended to press the static part of the instrument to one wing and follow the moving door until the other wing contacts the moveable part of the instrument.

Be careful not to tilt the instrument. Try to prevent any force to the handle; it would distort the measure (see **Drawing 6-1 – handling of squeezing force instrument**).

Drawing 6-1 – handling of squeezing force instrument



IL-00090

Pos.	Designation
A	Correct position
B	Wrong position

Measuring device group I: it is possible to measure and to document the peak force and the effective force

Measuring device group II: only the peak force can be measured

The values required for squeezing force are mentioned in the “door function description DDSTE11071E03”.

7 Issue Remark

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	item	modification	
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DDSTE11071E09

Rev. 00 - en
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Instruction Manual

Maintenance Plan

TRAIN 18 EMU ICF

Project-No. 66408U1A

Customer INDIAN RAILWAY

Project-Part Single Leaf Plug Sliding Door

System SST-e1

Created: 2018.05.03
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Date

Kumar, Rajneesh
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1 Required Documents

Document-No. / Drawing-No.	Description
66408U1AR11	Assembly drawing
66408U1AR11	Scope of supply
DDSTE11071E03	Door Function Description
DDSTE11071E05	Lubrication Instruction
DDSTE11071E36	Safety-Checklist

2 Introduction

- The information given in the following chapters provides assistance for the maintenance and overhaul of the door system during a period of up to 30 years from the start-up.
- The general view of the assembly groups given in chapter 3 allows the operator to localize the component that needs to be overhauled. The item numbers used in the general view of the assembly groups are also given as reference numbers in the Maintenance and Overhaul Schedule.
- The information given in the following chapters only refers to the parts supplied by IFE.
- No special tools and appliances are required for maintenance and overhaul (Only commercial tools will be used).
- The following parameters are the basis for the maintenance and overhaul intervals given below:
 - Life time 30 years
 - door cycle/year 15.000 cycles
 - kilometer of the wagon/year : 120.000 km
 - Operating days per year ___ days
 - Operating hours per day ___ hours

2.1 Maintenance Intervals

Time	Distance
Every 3 month	75.000 km
Annually	300.000 km
Every 3 years	900.000 km
Every 5 years	1.500.000 km
Every 10 years	3.000.000 km

2.2 Safety Instructions



WARNING

- Maintenance operations may be carried out by trained personnel only.
- Prior to any operation, the corresponding working area must be secured in order to prevent danger of injury.
- Make sure to keep to all safety instructions given by the required descriptions (e.g. Lubrication Instruction).



WARNING

- **When working in the area of the door leaf there is squeezing danger!!!**
- **The concerning door area must be electrical disconnected and therefore taken out of service**

3 Maintenance and Overhaul Plan

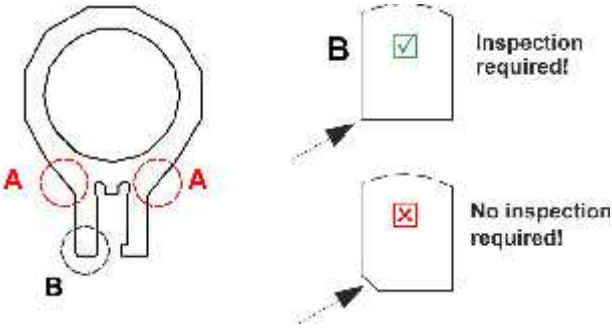


NOTE

after 2 weeks:

Check screws of assembly parts to find out if they are loose. (Check witness painting, if broken). In case they are loose, screws have to be removed, cleaned, applied with LOCTITE 243 and secured again with required torque setting.

Maintenance activities	every 3 months				
	Annually				
	Every				
	3	5	10	Years	
Safety-Check in accordance with Safety-Checklist DDSTE11071E36.	*				
Check painting in accordance with chapter 7 of Introduction and General Information DDSTE11071E01.		*			
Visually check for flats at rollers of roller swing arm, roller on the door leaf carrier, and roller from roller bracket on the bottom door leaf area. Exchange defective component if required.		*			
Clean door seals and re-grease in accordance with Lubrication instruction DDSTE11071E05.		*			
Clean and re-grease guide rod in accordance with Lubrication instruction DDSTE11071E05.			*		
Clean top guide rail and re-grease in accordance with Lubrication instruction DDSTE11071E05.			*		

Maintenance activities	every 3 months				
	Annually				
	Every				
	3	5	10	Years	
<p>Visual inspection for cracks in the radius area (A) on the right and left trolley on drive unit ^{2.)} and replace if necessary.</p> <p>1.) Initial inspection is required after 3 years,</p> <p>2.) inspection is only required for trolleys without bevel on the trolley profile(B)</p> 			*	1.)	
Clean drive spindle (item 14) and re-grease in accordance with Lubrication instruction DDSTE11071E05.			*		
Grease the components in the lock housing mechanism (item 5) in accordance with Lubrication instruction DDSTE11071E05.			*		
Grease the components in the isolating lock (item 6) in accordance with Lubrication instruction DDSTE11071E05.			*		
Refurbishment of solenoid valve Y1, Y2, Y3, mounted on pneumatic control board using repair kit.				*	
Exchange cylinder in the lock housing mechanism (item 5)				*	
Exchange of solenoid valve Y1, Y2, Y3, mounted on pneumatic control board using repair kit.					*
Exchange of pressure switch S15, mounted on pneumatic control board					*

Maintenance activities	every 3 months				
	Annually				
	Every				
	3	5	10	Years	
Exchange rollers of roller swing arm (item 13), roller on the door leaf carrier (item 10) and roller at the holding bracket (item 18) on the door leaf.					*
Exchange toothed belt onto linear spindle drive unit					*
Exchange drive motor (M1) (item 11)					*
Exchange spindle (item 14) in spindle drive unit					*
Exchange of 98% door closed limit switch S7 at lock housing mechanism.					*
Exchange door closed and locked limit switch S1 at isolating lock mechanism.					*
New programming of EPROMS of electronic door control unit (item 12)					*
Exchange of the NOVRAM of the door control unit (item 12)					*
Exchange torsion spring of the lock housing mechanism (item 5)					*
Exchange spring of the isolating lock mechanism (item 6).					*
Exchange buzzer H1 (item 20) on top of the header gear.					*
Exchange limit switch "emergency device inside" S3 at emergency egress device (item 3).					*
Exchange Magnet onto emergency egress device (item 07)					*
Exchange limit switch "emergency device outside" S8 at emergency access device (item 9).					*

Maintenance activities	every 3 months				
	Annually				
	Every				
	3	5	10	Years	
Exchange all door seals					*
Exchange portal seal					*
Exchange rubber bump stop at door leaf carrier					*
Exchange interior and exterior Bowden cables (item 04)					*
Check corrosion protection for mechanical damage. Correct locally if required.		*			
Visual check brush for wear out.		*			
Check visually the anti-slip coating.		*			
Check rubber bump stop Step open/ closed for wear and tear.				*	
Check guide blocks.					*
Check the bearings and the torsion spring at locking unit and locking bracket.		*			
Check visually the seals at maintenance cover at step, exchange if necessary.		*			
Check function of locking device of step.	*				
Check tension of toothed belt.		*			

4 Issue Remark

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Door Diagnostic Description

Single leaf sliding plug door
(66408U1AR11/R12/R21)
TRAIN 18 Coaches_MEDHA

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Take notice - Take notice - Take notice - Take notice - Take notice

We advise that in order to protect against danger, the installation of or the operation of our products or components is only to be undertaken by authorised personnel in accordance with appropriate technical instructions.

We accept no liability under the product liability laws for direct or consequential damage, arising from incorrect operation, incorrect installation or incorrect handling of products or components supplied by us.

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1 Required Documents

Document-No/ Drawing-No	Description
ED91041R02_C01	Wiring diagram
ED99002R15_C01	Pneumatic diagram
DDSTE11071E03	Door Diagnostic Description
66408U1AR11/R12/R21	Assembly drawing

2 General

The purpose of the diagnostic system is to monitor the door operation according the specifications, to find automatically fail functions and to indicate them to operation personnel (to set the door out of service) or to service people (to locate and repair the failure).

For diagnostic purposes the door control unit provides :

- A diagnostic software module monitoring the door functions continuously to find abnormal conditions by plausibility checks.

If a diagnostic code occurs, it is indicated on the red LED "Error" on the DCU by a flash code.

- A failure in the hardware of the DCU or a missing software in the system memory is indicated by a steady illuminated red LED "Error".
- With the use of a laptop computer and the diagnostic software DIAG the diagnostic data of the DCU can be read out and memorized.
- The diagnostic data will be additionally transmitted to the central control unit via the door bus system.

3 Indication - LED's

The LED's on the front panel of the door control unit allow an easy check of the door system without any need of additional measuring equipment.

Following conditions are indicated on the door control unit LED's:

Name of LED	Color	Function
5VDC	Green	internal voltage supply available
ERROR	Red	Failure door control unit
STATUS INFO	Yellow	Without any function
SAFETY RELAY OFF	Green	is used for monitoring the position of the internal security relay

Pin assignment of input and output signals:

DCU logic module	X1.1	E1	No motion	"1" = no motion
	X1.2	E2	Pushbutton open inside	"1" = operated
	X1.3	E3	Central open	"1" = open
	X1.4	E4	v>5kph	"1" = v>5kph
	X1.5	E5	Pushbutton open outside	"1" = operated
	X1.6	E6	Central close	"1" = close
	X1.7	E7	Spare	
	X1.8	E8	Limit switch – door closed & locked	"0" = door closed& locked
	X1.9	E9	Limit switch – door 98% closed	"0" = door 98% closed
	X1.10	E10	Limit switch – door emergency device outside	"1" = emergency operated
	X1.11	E11	Limit switch – door out of service	"0" = out of service
	X1.12	E12	Limit switch – door emergency device inside	"1" = emergency operated
	X1.13	E13	Closure warning	"1" = active
	X1.14	E14	Not used	
	X1.15	KI(-)	Not used	
	X1.16	E15	Not used	
	X1.17	KI(-)	Not used	
	X1.18	E16	Not used	
	X1.19	E17	Door position sensor (direction)	"0" = pulse
	X1.20	E18	Door position sensor (pulse)	"0" = pulse
	X1.21	G+	Power supply position sensor (12VDC)	
X1.22	G-	Power supply position sensor(0VDC)		

DCU input extension module	X3.1	E19(+)	Door coding bit 0	"1" = active
	X3.2	E19(-)	Door coding bit 0	
	X3.3	E20(+)	Door coding bit 1	"1" = active
	X3.4	E20(-)	Door coding bit 1	
	X3.5	E21(+)	Door coding bit 2	"1" = active
	X3.6	E21(-)	Door coding bit 2	
	X3.7	E22	Door coding bit 3(spare)	"1" = active
	X3.8	E22	Door coding bit 3	
	X3.9	E23	Pressure switch	"1" = p>4,5bar
	X3.10	E24	spare	
	X3.11	E25	spare	
	X3.12	E26	Not used	
	X3.13	E27	Not used	
	X3.14	E28	Not used	
	X3.15	E29	Not used	
	X3.16	E30	Not used	
	X3.17	KI(-)	Not used	
	X3.18	E31	Not used	
	X3.19	KI(-)	Not used	
	X3.20	E32	Not used	
	X3.21	E33	Not used	
	X3.22	E34	Not used	

DCU power module	X2.1	A8	Warning buzzer	"1" = active
	X2.2	A7	Warning lamp inside(max 21W lamp load)	"1" = active
	X2.3	A6	Warning lamp outside(max 21W lamp load)	"1" = active
	X2.4	A5	Solenoid valve Y1 (open)	"1" = active
	X2.5	A4	Illumination push button open	"1" = active
	X2.6	A3	Solenoid valve Y2 (close)	"1" = active
	X2.7	A2	Power supply of doorleaf	"1" = active
	X2.8	A1	Spare	
	X2.9	P+	Power supply DCU (110VDC)	
	X2.10	P+	Power supply DCU (110VDC)	
	X2.11	P-	Power supply DCU (0VDC)	
	X2.12	P-	Power supply DCU (0VDC)	
	X2.13	M-	Not used	
	X2.14	M-	Motor control	"-" = open

	X2.15	M+	Not used	
	X2.16	M+	Motor control	"+" = open
	X2.17	SI	Potential free contact of safety relay	"0" = active
	X2.18	SI	Potential free contact of safety relay	"0" = active
DCU second motor module	X4.1	G-	Power supply position sensor(0VDC)	
	X4.2	G+	Power supply position sensor (12VDC)	
	X4.3	E42	Door position sensor (pulse)	"0" = pulse
	X4.4	E41	Door position sensor (direction)	"0" = pulse
	X4.5	E40	Limit switch step closed	"0" = closed
	X4.6	E39	Limit switch emergency device step	"1" = emergency operated
	X4.7	E38	Not used	
	X4.8	E37	Not used	
	X4.9	E36	Electrical isolation	"1" = electrical isolation
	X4.10	E35	No motion	"1" = motion
	X4.11	A18	Brake step	"1" = active
	X4.12	A17	Spare	
	X4.13	P+	Power supply DCU (110VDC)	
	X4.14	P+	Power supply DCU (110VDC)	
	X4.15	P-	Power supply DCU (0VDC)	
	X4.16	P-	Power supply DCU (0VDC)	
X4.17	M-	Motor control	"-" = open	
X4.18	M+	Motor control	"+" = open	
X4.19	SI	Potential free contact of safety relay	"0" = active	
X4.20	SI	Potential free contact of safety relay	"0" = active	

The above mentioned logical levels are corresponding to the levels of the signals at the inputs and outputs of the DCU

4 Function of the diagnostic software module

The door and the door control unit are continuously checked to following conditions:

a) Internal checks (hardware) of the door control unit:

- EPROM (CRC checksum)
- RAM
- NOVRAM
- Runtime Watchdog
- Oscillator Watchdog

b) Plausibility checks:

The movement of the door and the corresponding input signals coming from limit switches or push buttons etc. are checked continuously against required and known operating conditions, time outs or failure conditions.

c) Monitoring of the output current:

- * the motor output is monitored for broken wires
- * all other outputs are monitored to short circuits

If a door is isolated, the logging of diagnostic data of the door is immediately switched off.

All already recorded diagnostic data stays memorized.

4.1 Structure of the diagnostic memory

4.1.1 Quantitative diagnostic system (QDS):

The diagnostic memory is subdivided into

- foreground memory (current fail conditions)
- background memory (temporary fail conditions)

The foreground memory contains current diagnostic data, i.e. diagnostic data which is existent at the time of the inquiry.

The background memory contains temporary diagnostic data, i.e. diagnostic data that were previously observed by the DCU, but are not active at the moment of data transmission from DCU to PC or have been changed into temporary diagnostic data by any circumstances (i.e. by itself or an action of train personnel).

Current diagnostic data become temporary diagnostic data:

- automatically, if a previous faulty state clears and the door works again correctly
- if the reason for the diagnostic code is repaired by the train personnel (however not by isolating the door)

A change of current diagnostic data to temporary diagnostic data is done in order to preserve this diagnostic information for the workshop.

4.1.2 Historical diagnostic system(HDS):

The historical diagnostic system stores every change of diagnostic condition with date and time stamp.

Every time a diagnostic condition gets active (current fail condition) or a diagnostic condition gets inactive (temporary fail condition) the diagnostic condition is stored with current time and date of occurrence.

Because of the circumstance that there is no internal real time clock(RTC) available in the DCU, it is necessary to get the date and time information from the train communication system via bus interface. But for this project train system can not provide the data and time information, so the start time and date is 00000000:00:00 when software is uploaded into DCU. When DCU is powered off the current time and date information will be stored in DCU and stop to increase. When DCU is powered on again, the time and date information will continue with the increment from the stored time and date

If any software is re-uploaded to DCU, the time and data information will restart from 00000000:00:00.

The different diagnostic conditions will be memorized in a ring memory (max. number of conditions – see later on), so therefore it is necessary to limit the number of entries in the diagnostic memory, depending on the size of the used non volatile memory. If the limitation is exceeded, the oldest entry will be overwritten by the new one.

The door control unit MDC with integrated 128k-NOVRAM can memorize the following number of historical diagnostic conditions:

- Historical diagnostic system (HDS) in the own door control unit MDC, controlling only 1 door system and storing only own HDS-Data:
- Without environment data: max. 500 entries

4.1.3 Parameter on each diagnostic code:

Each diagnostic code is described by the following parameters:

- Internal diagnostic code number: 1...999
- Customer diagnostic code number: 1...99
- Diagnostic code counter¹: 1...99
- Customer specific flash code: 1...30x flashing / 閃
- Priority: A,B
- Function: a, b, c, d

4.2 Diagnostic code priority

The diagnostic codes are split into priority A and B

- Priority A high priority; the safety of the passengers or the operation of the door can be influenced; the train personnel has to take measures against it, e.g. to isolate the door.
- Priority B low priority; the safety of the passengers or the operation of the door is not influenced; the problem can be checked or repaired at home depot.

4.3 Door functions to corresponding diagnostic codes

Diagnostic codes of function “a” or “b” with the numbers according to the table at chapter 4.7) will cause an immediately stop of the door movement. In that case the door will be set free (the short circuit of the door drive motor is interrupted), so that the door can be closed/locked manually.

Due to one of the listed actions below, on diagnostic codes of function “b” the DCU tries to continue the door movement (without any actions from the train personnel as e.g. repair or door isolating):

- Operating a push button open inside(E2)
- Operating a push button open outside(E5)
- Activation of trainline central open (E3)
- Activation of trainline central close (E6)
- Activation or deactivation of trainline "no motion"(E1&E35)

All other diagnostic codes will only cause a diagnostic code, but the door functions will not be influenced.

4.4 Read out the diagnostic memory

4.4.1 Indication at the red LED “ERROR”

Each active diagnostic code will be indicated at the DCU with a flash code.

Following conditions are possible

- The red LED is not illuminated, if no diagnostic code is active.
- The red LED is steady illuminated, if there is a failure in the hardware of the DCU or if the software in the system memory is missing (see chapter 2).
- The red LED is flashing, if an active diagnostic code is present (see chapter 5).

¹ will be incremented if a diagnostic code occurs or change from the background to the foreground memory;

The flash code always shows the diagnostic code with lowest number, i.e. if there is e.g. the code “broken wire to the door drive motor” and the “Internal security relay of the DCU fails” active, the flash code “1 flash” is activated. If the code with the lowest number is no more active (reason for diagnostic code no more existent), the flash code with the next higher number (e.g. 4 flashes) will be activated.

The flashing is done in the following sequence:

- 300ms ON
- 300ms OFF
- 2.5 sec. break until the next flash sequence is started.

4.4.2 Read out via RS 232 interface:

With the use of a laptop computer and the diagnostic software DIAG the diagnostic data can be read out and stored. The data can be managed with the use of a database.

For detailed information please refer to the DIAG users manual (see chapter 1).

4.5 Clear the diagnostic memory

- Current diagnostic codes will be automatically cleared and become temporary diagnostic data (background memory), if a previous faulty state clears and the door works again correctly or if the reason for the diagnostic code is repaired by the train personnel (however not by isolating the door).
- The whole diagnostic memory can be deleted with the IFE diagnostic software DIAG. For detailed information please refer to the DIAG users manual (see chapter 1).

An active diagnostic code stays saved even if the supply voltage of the DCU is switched off.

4.6 Door cycle counter

The door control unit includes a internal counter to show the number of opening cycles.

This counter is a 6-digit counter, i.e. if the counter reading is higher than 999.999 so it will start at 0 again.

The door cycle counter is automatically transmitted during read out of the diagnostic memory (see chapter 4.4.2)

4.7 Summary of flash codes, diagnostic codes and priority/

Flash-Code	Priority	Function	Name	Customer diagnostic code No.	Internal diagnostic code No.	Comment for operation
1	A	b	Broken wire in the circuit of the door drive motor	1	1	
2	A	a	Limit switch "door closed/locked" fails	2	2	
2	A	d	Door leaves the closed/locked position without permission	44	44	Door will be activated in closing direction
2	A	b	Limit switch "door 98% closed" fails	90	71	time duration = 2 sec.
2	A	b	Pressure supply missing	50	124	time duration = 10 sec.
2	A	b	Door out of service device fails	66	226	limit switch "door out of service" (S5) time duration = 2s
3	A	b	Door does not unlock within 3 seconds	4	4	limit switch "door closed & locked" (S1)
4	A	b	Door position sensor fails	5	5	number of door movements = 2
5	A	b	Obstruction detection at closing sequence was activated on a fixed number of successive closing sequences	6	6	number of closing sequences = 5
6	B	d	Motor current monitoring at opening sequence was activated on a fixed number of successive opening attempts	7	7	number of opening attempts = 3 the actual position will be used as substitute for the open position
7	A	b	Internal security relay of the DCU fails	8	8	Safety relay at POM module ;not testable
7	A	b	Internal security relay of the DCU fails	51	8	Safety relay at SMM module;not testable
8	B	d	Short circuit at the output A1 of the DCU	13	13	spare
8	A	b	Short circuit at the output A2 of the DCU	14	14	Power supply of door leaf
8	A	b	Short circuit at the output A3 of the DCU	15	15	Solenoid valve Y2 (close)
8	B	d	Short circuit at the output A4 of the DCU	16	16	Illumination – push button open
8	A	b	Short circuit at the output A5 of the DCU	17	17	Solenoid valve Y1 (open)
8	B	d	Short circuit at the output A6 of the DCU	19	19	Warning lamp outside
8	B	d	Short circuit at the output A7 of the DCU	20	20	Warning lamp inside
8	B	d	Short circuit at the output A8 of the DCU	21	21	Warning buzzer
8	B	d	Short circuit at the output A17 of the DCU	57	206	spare
8	B	d	Short circuit at the output A18 of the DCU	58	207	Brake step
11	A	b	Signal from the vehicle control unit is different	49	252	No motion signal, input E1 and E35 have a different status Time duration=10s
12	A	b	Broken wire in the circuit of the step drive motor	81	110	
12	A	d	Step leaves the closed position without permission	83	222	Step will be activated in closing direction
12	A	a	Limit switch "step closed" fails	82	111	
12	A	b	Armature stop brake step fails	80	229	

13	A	b	Step does not unlock within 3 seconds	84	113	
14	A	b	Obstruction detection at step closing sequence was activated on a fixed number of successive closing sequences	86	173	number of closing sequences = 3
14	A	b	Obstruction detection at step opening sequence was activated on a fixed number of successive opening attempts	87	174	number of opening attempts = 3
14	B	c	Data bus communication fails	42	42	signals and functions respectively via bus are no longer available
14	B	d	Speed signals from the VCU are faulty	91	225	<i>compared are the signals:</i> "no motion" (input E1) and "v>5kph "(input E4) time duration = 5s
14	A	a	Door coding faulty	48	138	-
21	B	c	Door open push button outside fails	32	48	Open push button on doorleaf or on vehicle; time duration = 1 min.
22	B	c	Door open push button inside fails	37	34	Close push button on vehicle; time duration = 1 min.
23	B	c	Service push button on the DCU fails	34	246	time duration = 1 min.
24	B	d	Battery backup of the diagnostic memory fails	22	22	not testable

- a).....Stop of the door movement. Reactivation only possible by switching the supply voltage of the DCU OFF and ON again. A closed/locked door or step can only be opened by the emergency device.
- b).....Stop of the door movement and reactivation as described in chapter 4.3.
- c).....No stop of the door movement. For further door functions the component will not be used anymore.
- d).....No stop of the door movement and no change for further door functions.

5 Diagnostic code description

All following diagnostic data will be detected by the door diagnostic system.

All diagnostic codes will be indicated on the red LED "ERROR" at the DCU by a flash code and can be read out (see chapter 4.4).

Diagnostic Code:	1
Statement:	Broken wire in the circuit of the door drive motor
Prerequisite:	Door drive motor activated (open or close direction)
Diagnostic criterion:	The door drive motor is activated, but no current is measured
Diagnostic deletion:	If the door drive motor is activated again and a current is measured
Possible remedy:	Motor circuit, wiring, output circuit of the DCU and motor to be checked

Diagnostic Code:	2
Statement:	Limit switch "door closed/locked" fails
Prerequisite:	Door drive motor activated (open or close direction) and the limit switch "door closed/locked" indicates a closed/locked door
Diagnostic criterion:	When the door drive motor is activated and the door position sensor detects a door movement
Diagnostic deletion:	If the limit switch "door closed/locked" indicates a not closed/locked door
Possible remedy:	Adjustment and wiring of the limit switch "door closed/locked" and input circuit of the DCU to be checked

Diagnostic Code:	4
Statement:	Door does not unlock within 3 seconds
Prerequisite:	Door drive motor activated (open or close direction) and the limit switch "door closed/locked" indicates a closed/locked door
Diagnostic criterion:	The door drive motor is activated to open direction, but after 3 seconds the limit switch "door closed/locked" still indicates a closed/locked door and the door position sensor detects no door movement
Diagnostic deletion:	If the limit switch "door closed/locked" indicates a not closed/locked door
Possible remedy:	Free movement of the door drive mechanism, adjustment of the door, function of the security relay and input circuit of the DCU to be checked

Diagnostic Code:	5
Statement:	Door position sensor fails
Prerequisite:	Door drive motor activated (open or close direction)
Diagnostic criterion:	On a fixed number of successive door movements no pulses from the door position sensor are counted
Diagnostic deletion:	If again at least 1 pulse from the door position sensor is counted
Possible remedy:	Door position sensor and input circuit of the DCU to be checked

Diagnostic Code:	6
Statement:	Obstruction detection at closing sequence was activated on a fixed number of successive closing sequences
Prerequisite:	Door drive motor activated (close direction) and the limit switch "door closed/locked" indicates a not closed/locked door
Diagnostic criterion:	The motor current or way-/time monitoring was activated on a fixed number of successive closing sequences, and the door did not reach the closed/locked position meanwhile
Diagnostic deletion:	If the limit switch "door closed/locked" indicates a closed/locked door
Possible remedy:	Door drive mechanism, movement of the door, adjustment of the door, adjustment and wiring of the limit switch "door closed/locked" and input circuit of the DCU to be checked

Diagnostic Code: 7
Statement: Motor current monitoring at opening sequence was activated on a fixed number of successive opening attempts
Prerequisite: Door drive motor activated (open direction) and the limit switch "door closed/locked" indicates a not closed/locked door
Diagnostic criterion: The motor current or way-/time monitoring was activated on a fixed number of successive opening attempts
Diagnostic deletion: If an open command is given (at a closed/locked door) and the door reaches the fully open position without interruption of the opening sequence
Possible remedy: Signal input of the door position sensor at the DCU, door drive mechanism, door movement, adjustment of the door, adjustment and wiring of the limit switch "door closed/locked" and input circuit of the DCU to be checked

Diagnostic Code: 8
Statement: Internal security relay of the DCU fails
Prerequisite: None
Diagnostic criterion: The state of the security relay (checked by the signal "observation security relay", which is internally hardwired to the .µP) do not correspond to the activating signals of the relay
Diagnostic deletion: If the logical state of the security relay corresponds to the activating signals
Possible remedy: The activation of the security relay according to the block diagram of the DCU and according to the wiring diagram has to be checked, otherwise the DCU has to be replaced

Diagnostic Code: 13
Statement: Short circuit at the output A1 of the DCU
Prerequisite: Output A1 is activated
Diagnostic criterion: The output A1 is activated and the current exceeds the nominal value or a short circuit is detected by the DCU
Diagnostic deletion: If the output A1 is activated and the current does not exceed the nominal current and there is no short circuit detected by the DCU
Possible remedy: Component connected to output A1, wiring and output of the DCU to be checked

Diagnostic Code: 14
Statement: Short circuit at the output A2 of the DCU
Prerequisite: Output A2 is activated
Diagnostic criterion: The output A2 is activated and the current exceeds the nominal value or a short circuit is detected by the DCU
Diagnostic deletion: If the output A2 is activated and the current does not exceed the nominal current and there is no short circuit detected by the DCU
Possible remedy: Component connected to output A2, wiring and output of the DCU to be checked

Diagnostic Code: 15
Statement: Short circuit at the output A3 of the DCU
Prerequisite: Output A3 is activated
Diagnostic criterion: The output A3 is activated and the current exceeds the nominal value or a short circuit is detected by the DCU
Diagnostic deletion: If the output A3 is activated and the current does not exceed the nominal current and there is no short circuit detected by the DCU
Possible remedy: Component connected to output A3, wiring and output of the DCU to be checked

Diagnostic Code: 16
 Statement: Short circuit at the output A4 of the DCU
 Prerequisite: Output A4 is activated
 Diagnostic criterion: The output A4 is activated and the current exceeds the nominal value or a short circuit is detected by the DCU
 Diagnostic deletion: If the output A4 is activated and the current does not exceed the nominal current and there is no short circuit detected by the DCU
 Possible remedy: Component connected to output A4, wiring and output of the DCU to be checked

Diagnostic Code: 17
 Statement: Short circuit at the output A5 of the DCU
 Prerequisite: Output A5 is activated
 Diagnostic criterion: The output A5 is activated and the current exceeds the nominal value or a short circuit is detected by the DCU
 Diagnostic deletion: If the output A5 is activated and the current does not exceed the nominal current and there is no short circuit detected by the DCU
 Possible remedy: Component connected to output A5, wiring and output of the DCU to be checked

Diagnostic Code: 19
 Statement: Short circuit at the output A6 of the DCU
 Prerequisite: Output A6 is activated
 Diagnostic criterion: The output A6 is activated and the current exceeds the nominal value or a short circuit is detected by the DCU
 Diagnostic deletion: If the output A6 is activated and the current does not exceed the nominal current and there is no short circuit detected by the DCU
 Possible remedy: Component connected to output A6, wiring and output of the DCU to be checked

Diagnostic Code: 20
 Statement: Short circuit at the output A7 of the DCU
 Prerequisite: Output A7 is activated
 Diagnostic criterion: The output A7 is activated and the current exceeds the nominal value or a short circuit is detected by the DCU
 Diagnostic deletion: If the output A7 is activated and the current does not exceed the nominal current and there is no short circuit detected by the DCU
 Possible remedy: Component connected to output A7, wiring and output of the DCU to be checked

Diagnostic Code: 21
 Statement: Short circuit at the output A8 of the DCU
 Prerequisite: Output A8 is activated
 Diagnostic criterion: The output A8 is activated and the current exceeds the nominal value or a short circuit is detected by the DCU
 Diagnostic deletion: If the output A8 is activated and the current does not exceed the nominal current and there is no short circuit detected by the DCU
 Possible remedy: Component connected to output A8, wiring and output of the DCU to be checked

Diagnostic Code: 22
 Statement: Battery backup of the diagnostic memory fails
 Prerequisite: Switch on the supply voltage for the DCU
 Diagnostic criterion: At deactivated supply voltage of the DCU the battery backup of the NOVRAM is not in function
 Diagnostic deletion: If the battery backup is in function again when the supply voltage is activated
 Possible remedy: Change the NOVRAM mounted in the DCU

Diagnostic Code: 34
 Statement: Door open push button inside fails
 Prerequisite: Door open push button released to open the door
 Diagnostic criterion: The input signal at the DCU is longer activated than a fixed time duration
 Diagnostic deletion: If the DCU detects no activation of the door open push button anymore
 Possible remedy: door open push button, input circuit of the DCU and wiring to be checked

Diagnostic Code: 42
 Statement: Data bus communication fails
 Prerequisite: Bus online
 Diagnostic criterion: The connection to the door data bus is interrupted
 Diagnostic deletion: If the connection to the data bus works again
 Possible remedy: Door data bus cable, connectors and bus interface to be checked

Diagnostic Code: 44
 Statement: Door leaves the closed/locked position without permission
 Prerequisite: Door has closed/locked faultless and no open command is active
 Diagnostic criterion: The limit switch "door closed/locked" indicates a not closed/locked door
 Diagnostic deletion: If the limit switch "door closed/locked" indicates a closed/locked door again
 Possible remedy: Mechanical adjustment of the emergency release device, adjustment of the limit switch of the emergency release device, door locking mechanism, door drive mechanism, adjustment and wiring of the limit switch "door closed/locked" and input circuit of the DCU

Diagnostic Code: 48
 Statement: Door open push button outside fails
 Prerequisite: Door open push button(s) released to open the door
 Diagnostic criterion: The input signal at the DCU is longer activated than a fixed time duration
 Diagnostic deletion: If the DCU detects no activation of the door open push button(s) anymore
 Possible remedy: Door open push button(s), input circuit of the DCU and wiring to be checked

Diagnostic Code: 71
 Statement: Limit switch "door 98% closed" fails
 Prerequisite: None
 Diagnostic criterion: The door is activated in open direction and the limit switch "door closed" indicates an open door, but after a fixed time duration the limit switch "door 98% closed" still indicates a closed door
 or the door is activated in close direction and the limit switch "door closed" indicates a closed door, but the limit switch "door 98% closed" still indicates an open door
 Diagnostic deletion: If the limit switch "door 98% closed" indicates a not closed door respectively a closed door
 Possible remedy: Adjustment and wiring of the limit switch "door 98% closed" and input circuit of the DCU to be checked

Diagnostic Code: 124
Statement: Pressure supply missing
Prerequisite: None
Diagnostic criterion: The pressure switch indicates low pressure for a fixed time duration
Diagnostic deletion: If the pressure switch detects high pressure anymore
Possible remedy: Pressure switch, input circuit of the DCU and wiring to be checked

Diagnostic Code: 134
Statement: Signals from the VCU are faulty
Prerequisite: none
Diagnostic criterion: The enable signal is active, but after a fixed time duration the train is not standstill(E2: $v \leq 5\text{kph} = "0"$ or E4: $v > 5\text{kph} = "1"$)
Diagnostic deletion: If the DCU detects an active enable signal during the train is standstill(E2: $v \leq 5\text{kph} = "1"$ and E4: $v > 5\text{kph} = "0"$)
Possible remedy: Signals from the VCU, wiring, connectors and input circuit of DCU to be checked

Diagnostic Code: 138
Statement: Door coding faulty
Prerequisite: none
Diagnostic criterion: The used door coding is not correct
Diagnostic deletion: If the used door coding is correct again
Possible remedy: Coding of the DCU has to be checked

Diagnostic Code: 225
Statement: Speed signals from the VCU are faulty
Prerequisite: None
Diagnostic criterion: The logical state of the speed signals do not correspond during a fixed time duration
Diagnostic deletion: If the logical state of the speed signals do correspond again
Possible remedy: Speed signals from the VCU, wiring, connectors and input circuit of DCU to be checked

Diagnostic Code: 226
Statement: Door out of service device fails
Prerequisite: Door is not closed & locked
Diagnostic criterion: The input signal at the DCU indicates a door locked out of service for a defined time
Diagnostic deletion: If the input signal at the DCU indicates no longer a door locked out of service during the door is not closed & locked
Possible remedy: Door out of service mechanism, input circuit of the DCU and wiring to be checked

Diagnostic Code: 246
Statement: Service push button on the DCU fails
Prerequisite: None
Diagnostic criterion: The input signal at the DCU is longer activated than a fixed time duration
Diagnostic deletion: If the DCU detects no activation of the Service push button anymore
Possible remedy: Service push button of the DCU to be checked

Diagnostic Code: 252
Statement: Signal from the vehicle control unit is different
Prerequisite: None

Diagnostic criterion: The status of the redundant input signal is not equal
Diagnostic deletion: If both signals are the same again
Possible remedy: Signals from the vehicle control unit, wiring, connectors and input circuit of DCU to be checked

6 Issue Remark

Issue	Date	Prepared	checked/released
00	19.01.2016	Wayde Zhang	YangJ
	Item	Modification	
		First issue	

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Instruction Manual

Spare Part Catalogue

TRAIN 18 ICF EMU

Project-No. 66408U1A

Customer INDIAN RAILWAY

Project-Part Single Leaf Sliding Plug Door

System SST-e1

Created: 2018.05.04
Date

Checked: _____
Date

Kumar, Rajneesh
Name

Name

TAO-
R/DOOERA
Department Signature

Department Signature

Released: _____
Date

Translated: _____
Date

Name

Name

Department Signature

Department Signature

Notice



NOTE

IFE advises that in order to protect against danger, the installation of or the operation of our products or components is only to be undertaken by authorized personnel in accordance with appropriate technical instructions.



NOTE

IFE accepts no liability under the product liability laws for direct or consequential damage, arising from incorrect operation, incorrect installation or incorrect handling of products or components supplied by us.

Revision History

Version	Date	Creator	Inspector
00	2018.05.04	Kumar, Rajneesh	

Section	Revision
All	Initial edition.

Contact Address

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Technical Changes

KNORR-BREMSE Division IFE Automatic Door System reserves the right to change products or this document at any time without giving special notice.

In the case of changes to product, this spare parts catalogue is no longer valid.

Ordering spare

It is necessary to use the latest spare parts catalogue when ordering spare parts.

If you discover that products need to be renewed, only **KNORR-BREMSE original parts** are to be used.

General Information

The Spare part catalogue – a compilation of drawing and parts lists – is an effective aid for finding the needed part numbers of components making up the complete door entry system.

How the IFE part number is made up (Part Number column) / IFE

The part number is made up of the following:

- a) Drawing number e.g. T002541
- b) Heading number e.g. R97

When ordering, it is important that you note the complete part number, made up of part number and heading number, on your order form.

Hints on finding the required components

The table of contents lists all explosion drawings groups with the corresponding page number. To find the part number of the corresponding parts, you even have to turn to the given page and find the part number under the relevant item number.

The assemblies which are dismantled in separate steps are indicated on the drawing by the item numbers in the circles. If you look under the "Page" column of the tables for these items, you will see the number of the page where you can find the individual parts of these assemblies.

Classification of the door components

In the Spare part catalogue, the column „Spare Part Type“ gives a classification of the individual components that is broken down as follows:

WEC	Definition
A	Parts subject to wear
B	Spare parts that we recommend you keep in stock
C	Structural and standard parts that are not subject to ware

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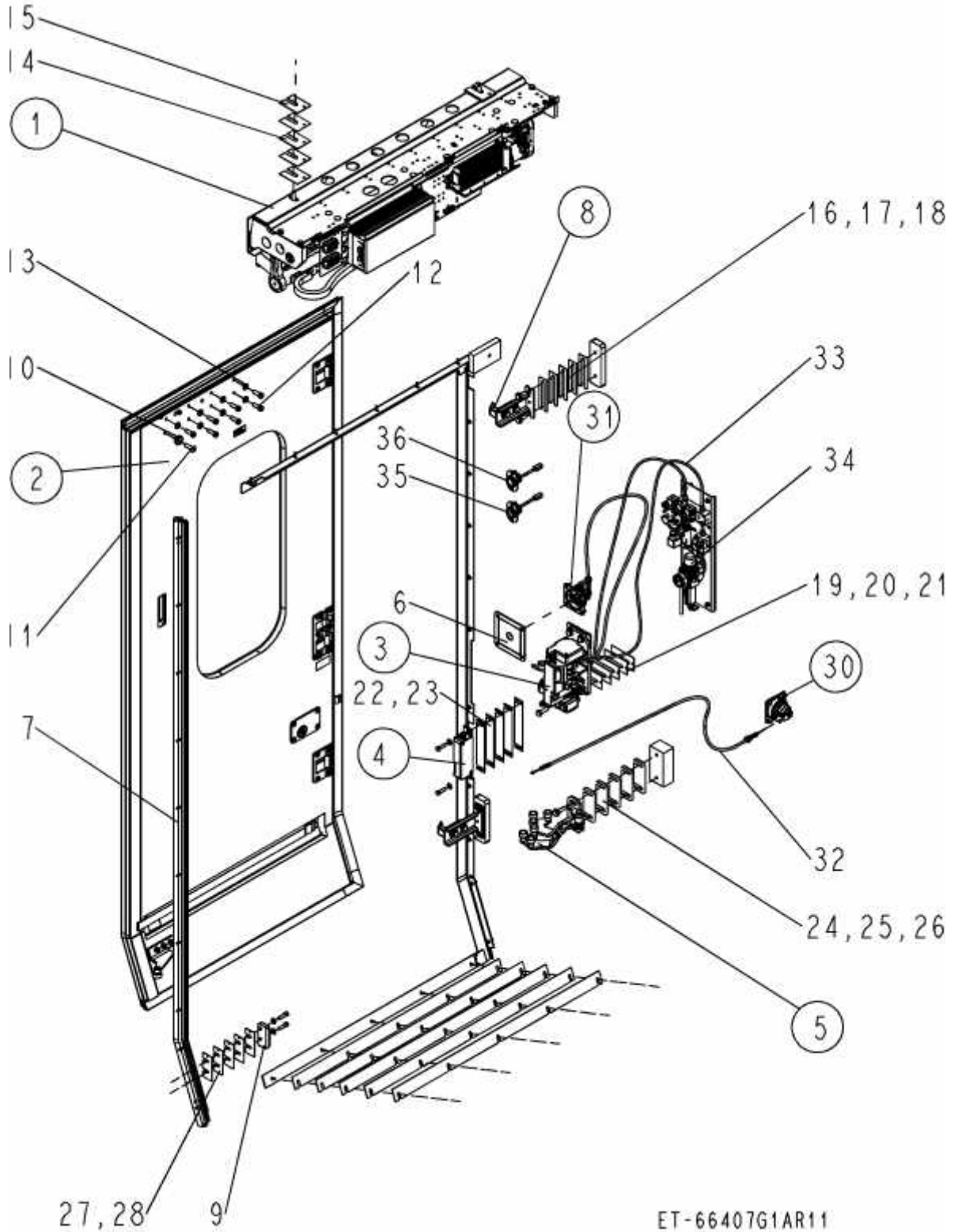
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T0 Scope of supply

T0:	Ordering information:						
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page

	DDSTE11071E20				SCOPE OF SUPPLY		
1	66408U1AR11			Pce	SCOPE OF SUPPLY	C	7
2	66408U1AR12			Pce	SCOPE OF SUPPLY	C	
3	66408U1AR21			Pce	SCOPE OF SUPPLY	C	

T1 Scope of supply



ET-66407G1AR11

T1: Ordering information:

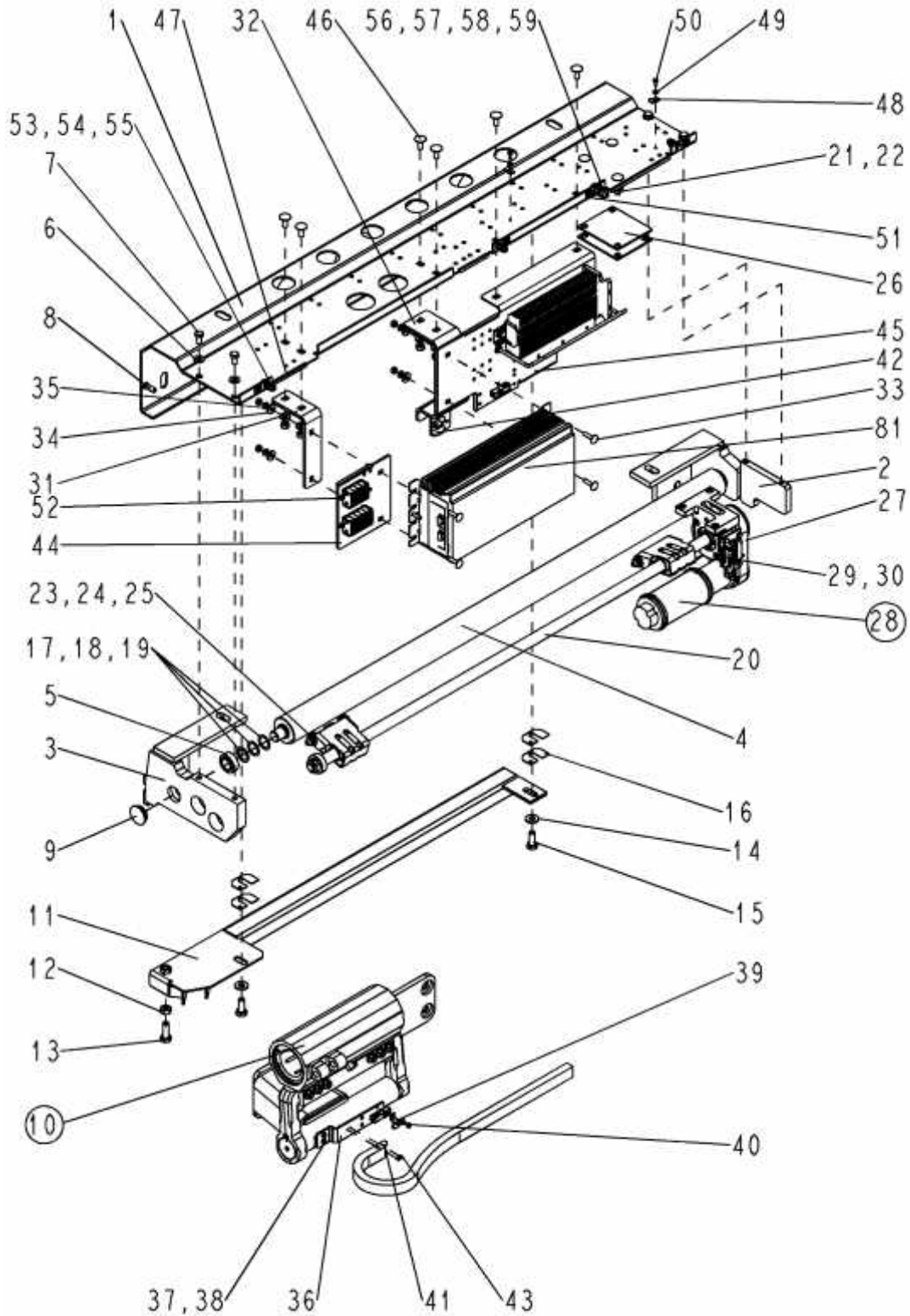
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
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2015.9.25

	66408U1AR11				SCOPE OF SUPPLY		
01	3TD08370R09		1	Pce	Drive	C	10
02	3T003958R19		1	Pce	Door Leaf Complete	C	26
03	3T103520R53		1	Pce	Main Lock	C	32
04	3T201883R21		1	Pce	Bolt Box	C	37
05	3TD90530R03		1	Pce	Rolling Arm	C	39
06	3TD90527R01		1	Pce	Plastic Panel	C	
07	3TD90515R29		1	Pce	Sealing Strip	B	
08	3T404165R26		2	Pce	Catch Hook	C	41
09	3KT202251R05		1	Pce	Arrester Block	C	
10	3KT408879R02		1	Pce	Eccentric	C	
11	477990		1	Pce	Countersunk Screw	C	
12	7B1401107		7	Pce	Machine Screw	C	
13	3TD81440R16		7	Pce	Washer	C	
14	3T304858R31		20	Pce	Shim	C	
15	3T304858R32		12	Pce	Shim	C	
16	3TD90423R10		6	Pce	Shim	C	
17	3TD90423R38		4	Pce	Shim	C	
18	3TD90423R39		2	Pce	Shim	C	
19	3TD90423R45		6	Pce	Shim	C	
20	3TD90423R46		4	Pce	Shim	C	

T1: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
21	3TD90423R47		2	Pce	Shim	C	
22	3TD90516R102		5	Pce	Shim	C	
23	3TD90516R101		1	Pce	Shim	C	
24	3TD90423R09		3	Pce	Shim	C	
25	3TD90423R40		2	Pce	Shim	C	
26	3TD90423R41		1	Pce	Shim	C	
27	3TD90423R43		4	Pce	Shim	C	
28	3TD90423R44		2	Pce	Shim	C	
29	3TD90516R10		34	Pce	Shim	C	
30	3TD90524R19		1	Pce	Emergency Device	C	43
31	3TD90524R20		1	Pce	Emergency Device	C	49
32	3TD90537R37		2	Pce	Bowden Cable	B	
33	OSN400222P04		6	m	Pipe	C	
34	3ED90201R03_C01		1	Pce	Pneum.Control Unit	C	
35	3ED99061R33_C01		1	Pce	Button	B	
36	3ED99061R34_C01		1	Pce	Button	B	
37	3ED90002R75_C01		1	Pce	E-Loose Part	C	53

T2 Drive Unit



ET-3TD08370R09

T2: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
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2015.10.19

	3TD08370R11				Drive unit		
01	3TD08371R03		1	Pce	Support Bracket	C	
02	3T202745R63		1	Pce	Bearing Bracket	C	
03	3T202745R29		1	Pce	Bearing Bracket	C	
04	3TD08375R01_C01		1	Pce	Guide Rod	C	
05	3D0006000		2	Pce	Swivel Bearing	C	
06	7M6108857		13	Pce	Spring Washer	C	
07	7A0602307		4	Pce	Hex-Head Bolt	C	
08	478035		2	Pce	Countersunk Screw	C	
09	0VN401666R02		2	Pce	Protective Plug	C	
10	3T102292R39		1	Pce	Roller Rocker Guide	B	15
11	3TD08376R01_C01		1	Pce	Guide Rail	C	
12	7L5202107		1	Pce	Hexagon Nut	C	
13	7A0603707		1	Pce	Hex-Head Bolt	C	
14	7M6108867		2	Pce	Spring Washer	C	
15	7A0603607		2	Pce	Hex-Head Bolt	C	
16	3KT403595R72		4	Pce	Washer	C	
17	7U9251150		2	Pce	Shim	C	
18	7U9251160		2	Pce	Shim	C	
19	7U9251170		2	Pce	Shim	C	
20	3T003399R83		1	Pce	Linear Actuator	C	

T2: Ordering information:

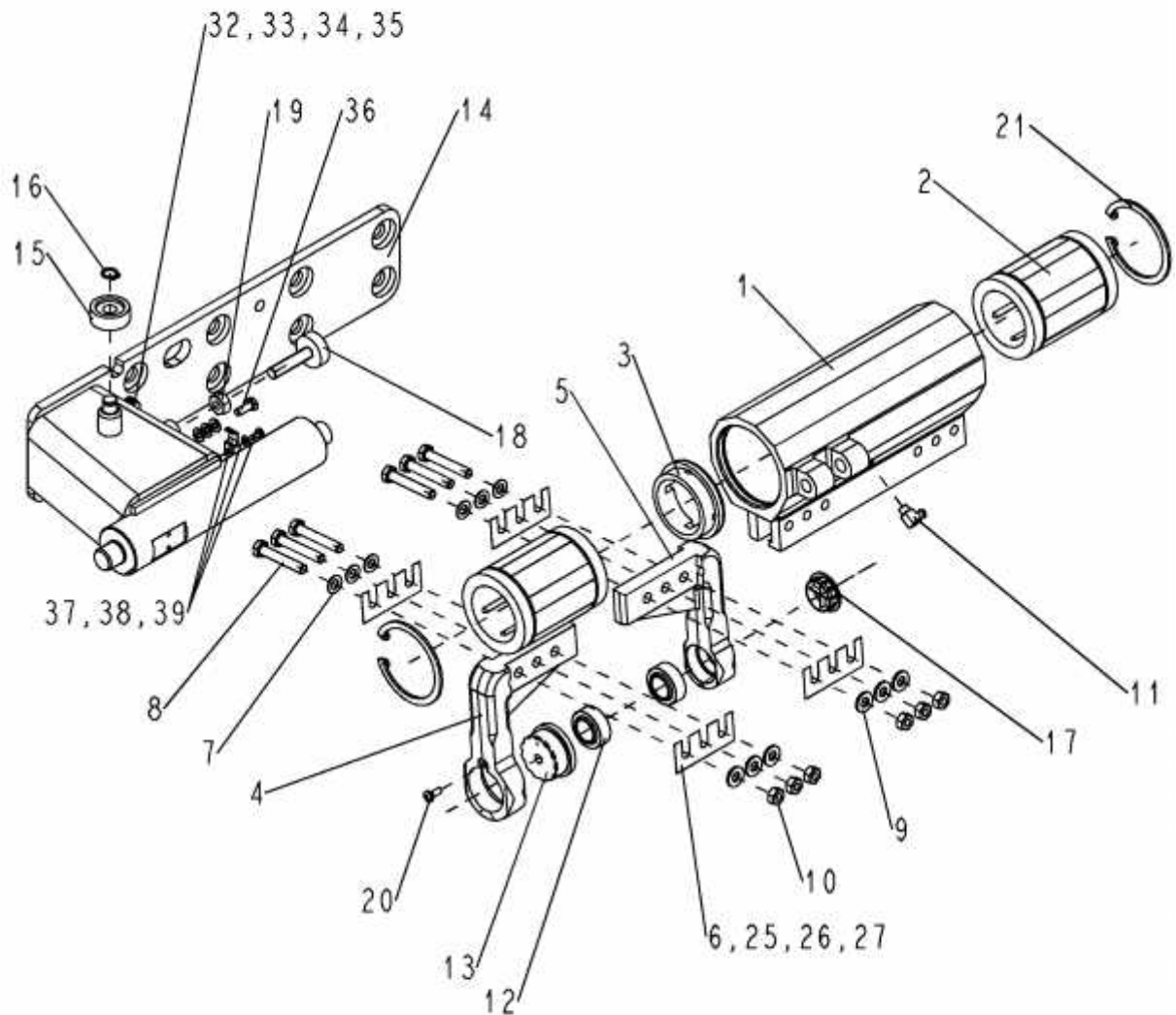
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.10.19							
21	7C1702207		3	Pce	Coach Bolt	C	
22	7L5201707		11	Pce	Hexagon Nut	C	
23	3T406422R28		1	Pce	Pin	C	
24	3TD00658R21		1	Pce	Washer	C	
25	EAU17DA		1	Pce	Hexagon Nut	C	
26	3TD90037R01		2	Pce	Plate	C	
27	3KN401349R31		1	Pce	Htd-Toothed Belt	B	
28	3T203272R29		1	Pce	Motor Assembly	B	18
29	8101280254		3	Pce	Machine Screw	C	
30	7L5201407		13	Pce	Hexagon Nut	C	
31	3TD90541R31		1	Pce	Dcu Bracket	C	
32	3TD90541R33		1	Pce	Dcu Bracket	C	
33	475238		4	Pce	Coach Bolt	C	
34	7M6108997		4	Pce	Washer	C	
35	450488		10	Pce	Washer	C	
36	3TD12848R01		1	Pce	Bracket	C	
37	468811		3	Pce	Washer	C	
38	7A0600350		2	Pce	Hex-Head Bolt	C	
39	3T411409R12		1	Pce	Bracket	C	
40	T1481053		1	Pce	Pan-Head Screw	C	
41	8DN300340R11		1	Pce	Chain Connector	C	

T2: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.10.19							
42	8DN300340R12		1	Pce	Chain Connector	C	
43	7D2602200		4	Pce	Countersunk Screw	C	
44	3TD90520R97		1	Pce	Electronic Bracket	C	
45	3TD90541R29		1	Pce	Terminal Board	C	
46	7C1702017		6	Pce	Coach Bolt	C	
47	8TN401944R05		0.6	m	Edge Guard	C	
48	3N401249R51		2	Pce	Clamp	B	
49	7M6108821		2	Pce	Spring Washer	C	
50	7D2203307		2	Pce	Pan-Head Screw	C	
51	7UN401337R11		6	Pce	Label	C	
52	T1481030		4	Pce	Pan-Head Screw	C	
53	7A0601757		3	Pce	Hex-Head Bolt	C	
54	470360		6	Pce	Spring Washer	C	
55	469639		3	Pce	Spring Washer	C	
56	7A0602627		1	Pce	Hex-Head Bolt	C	
57	470361		2	Pce	Spring Washer	C	
58	7M5803807		2	Pce	Washer	C	
59	469640		1	Pce	Spring Washer	C	
60	3N401099R10		1	Pce	Adhesive Label	C	
61	8EN401218R03		40	Pce	Cable Tie	C	
62	7UN402019R01		18	Pce	Adhesive Label	C	

T2: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.10.19							
63	3ED90071R37_C01		1	Pce	Cabling	C	20
-							
80	3ED90161R03_C01		1	Pce	Cabling	C	22
81	3ED01921R52		1	Pce	Door Control Unit	B	

T3 Roller Rocker Guide



ET-3T102292R39

T3: Ordering information:

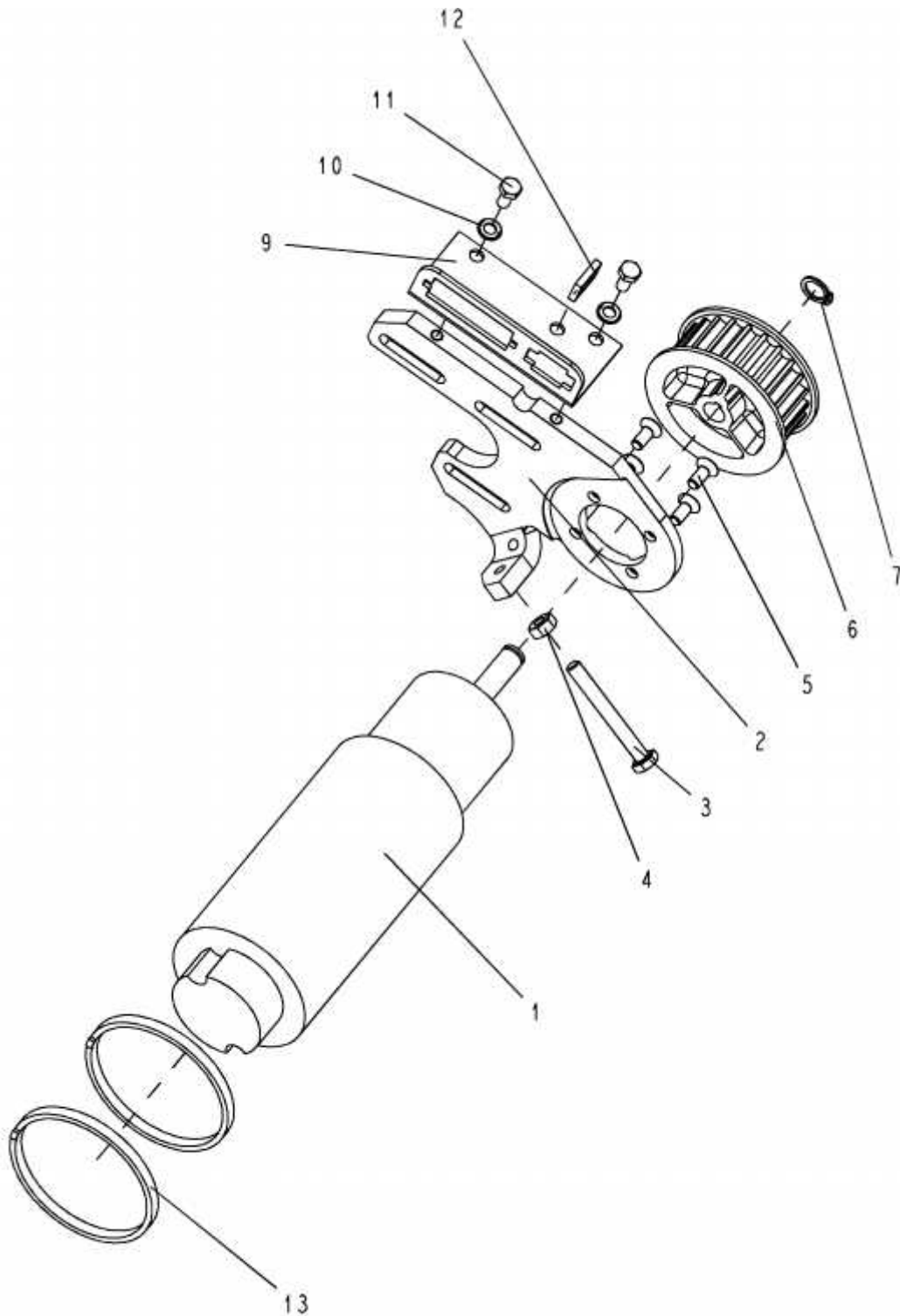
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
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2015.9.1

	3T102292R39				Roller Rocker Guid		
01	3T202384R51		1	Pce	Trolley Carrier	C	
02	3N300466R06		2	Pce	Spherical Liner	C	
03	3WT405094R03		1	Pce	Lubricating Ring	C	
04	3KT305107R13		1	Pce	Doorleaf Carrier S	C	
05	3KT305097R13		1	Pce	Doorleaf Carrier S	C	
06	3KT403595R75		4	Pce	Washer	C	
07	7M5803807		6	Pce	Washer	C	
08	451759		6	Pce	Hex-Head Bolt	C	
09	7M6108857		6	Pce	Spring Washer	C	
10	7L5201707		6	Pce	Hexagon Nut	C	
11	7U9701507		1	Pce	Grease Nipple	C	
12	3D0006000		2	Pce	Swivel Bearing	C	
13	3KT408657R01		1	Pce	Eccentric	C	
14	3T102036R35		1	Pce	Door Leaf Carrier	C	
15	3NT400985R01		1	Pce	Roller	B	
16	7S8300700		1	Pce	Retaining Ring	C	
17	0VN401666R02		1	Pce	Protective Plug	C	
18	3DN400826R24		1	Pce	Rubber Buffer	B	
19	7L5202107		1	Pce	Hexagon Nut	C	
20	7D2204301		1	Pce	Oval-Head Screw	C	

T3: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.1							
21	7S8404200		2	Pce	Retaining Ring	C	
22	7U9251150		1	Pce	Shim	C	
23	7U9251160		1	Pce	Shim	C	
24	7U9251170		1	Pce	Shim	C	
25	3KT403595R92		2	Pce	Washer	C	
26	3TD90519R29		2	Pce	Shim	C	
27	3TD90519R30		6	Pce	Shim	C	
31	0VN401284R01		2	Pce	Taper Plug	C	
32	7A0601307		1	Pce	Hex-Head Bolt	C	
33	469639		2	Pce	Spring Washer	C	
34	7M5803309		2	Pce	Washer	C	
35	470360		2	Pce	Spring Washer	C	
36	7A0601457		1	Pce	Hex-Head Bolt	C	
37	3N401249R14		2	Pce	Clamp	B	
38	7D2203200		2	Pce	Oval-Head Screw	C	
39	468811		2	Pce	Washer	C	

T4 Motor Assembly



ET-3T203272R29

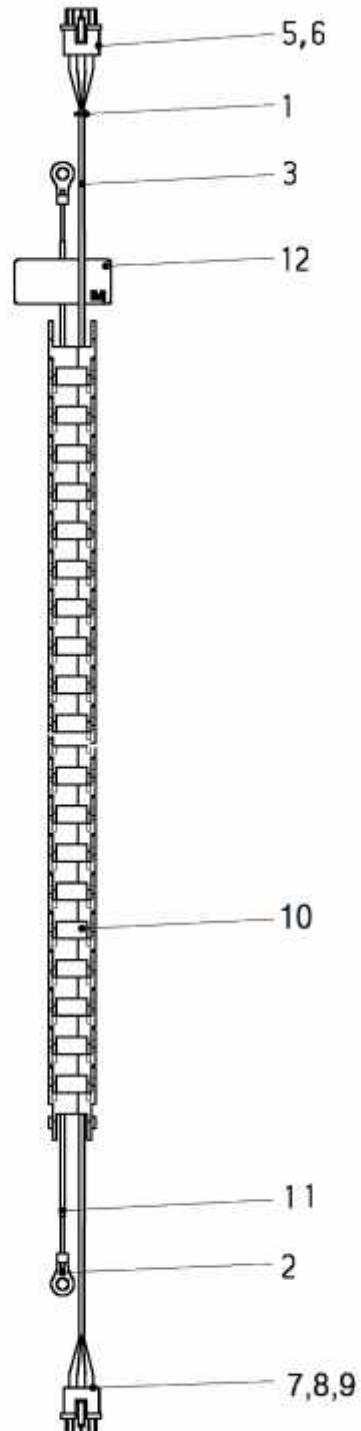
T4: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
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2012.11.14

	3T203272R29				Motor Assembly		
01	3KN300406R96		1	Pce	Geared Motor	B	
02	3T307437R05		1	Pce	Motor Bracket	C	
03	7A0601907		1	Pce	Hex-Head Bolt	C	
04	7L5201407		1	Pce	Hexagon Nu	C	
05	475096		4	Pce	Countersunk Screw	C	
06	3KT408221R07		1	Pce	Toothed Washer Hdt	C	
07	7S8300507		1	Pce	Retaining Ring	C	
09	3T307228R05		1	Pce	Bracket	C	
10	474771		2	Pce	Washer	C	
11	7A0600450		2	Pce	Hex-Head Bolt	C	
12	8EN401218R03		1	Pce	Cable Tie	C	
13	8EN401218R01		2	Pce	Cable Tie	C	

T5 Cabling



ET-3ED90071R37_C01

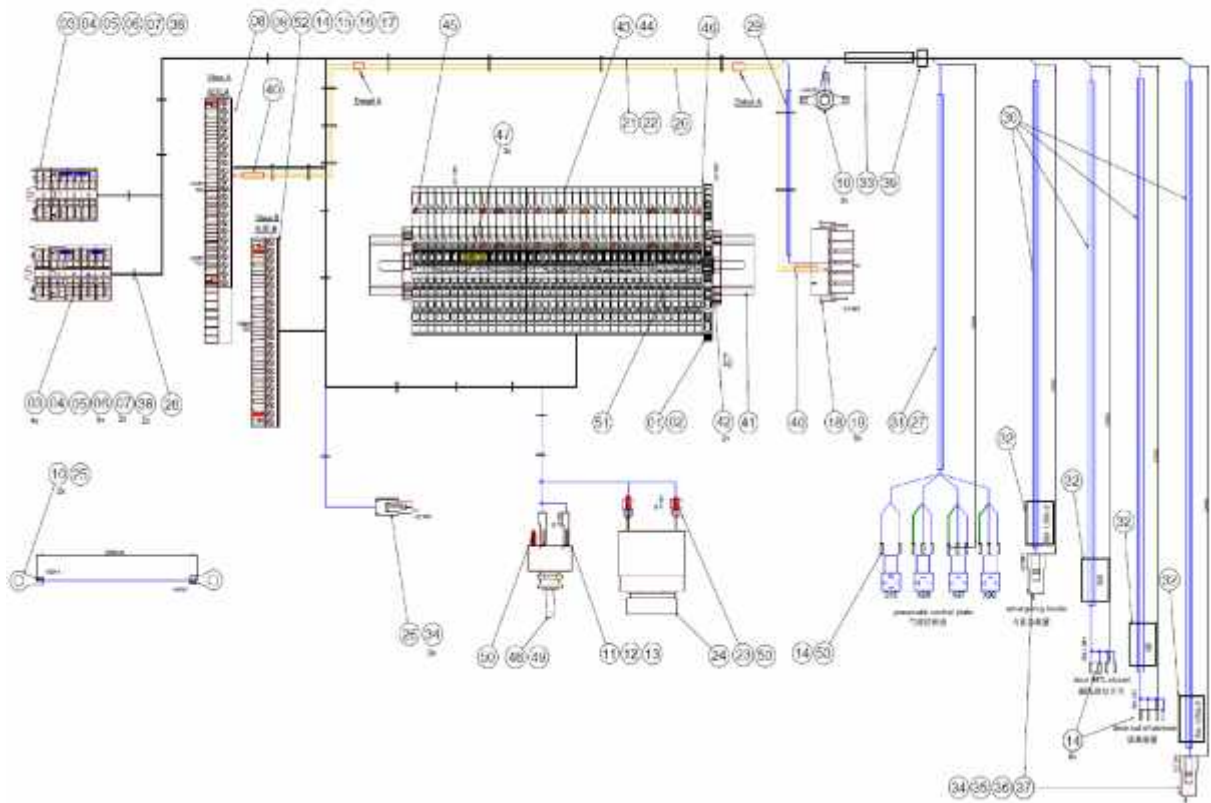
T5 : Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
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2015.9.22

	3ED90071R37_C01				Cabling		
01	7UN401099R12		2	Pce	Ife Name Plate IFE	C	
02	8E1202200		4	Pce	Ring Cable Terminal	C	
03	3ED01101R01		1.5	m	Cable	C	
-							
05	8FN401891R03		1	Pce	Plug	C	
06	8FN401893R12		4	Pce	Pin	C	
07	3ED00054R12		1	Pce	Connector Mmnl S	C	
08	3ED00056R21		4	Pce	Connector Mmnl S	C	
09	3ED00056R12		4	Pce	Bush	C	
10	8DN300340R02		0.66	m	Energy Chain	C	
11	8CN401644R01		1.5	m	Cable	C	
12	8D1003000		0.07	m	Shrinkable Tubing	C	
13	8AN400509P26		0.15	m	Lead	C	

T6 Cabling



ET-3ED90161R03_C01

T6: Ordering information:

Pos.	1	Cust. Number	Quantity	Unit	Name	WEC	Page
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2016.1.08

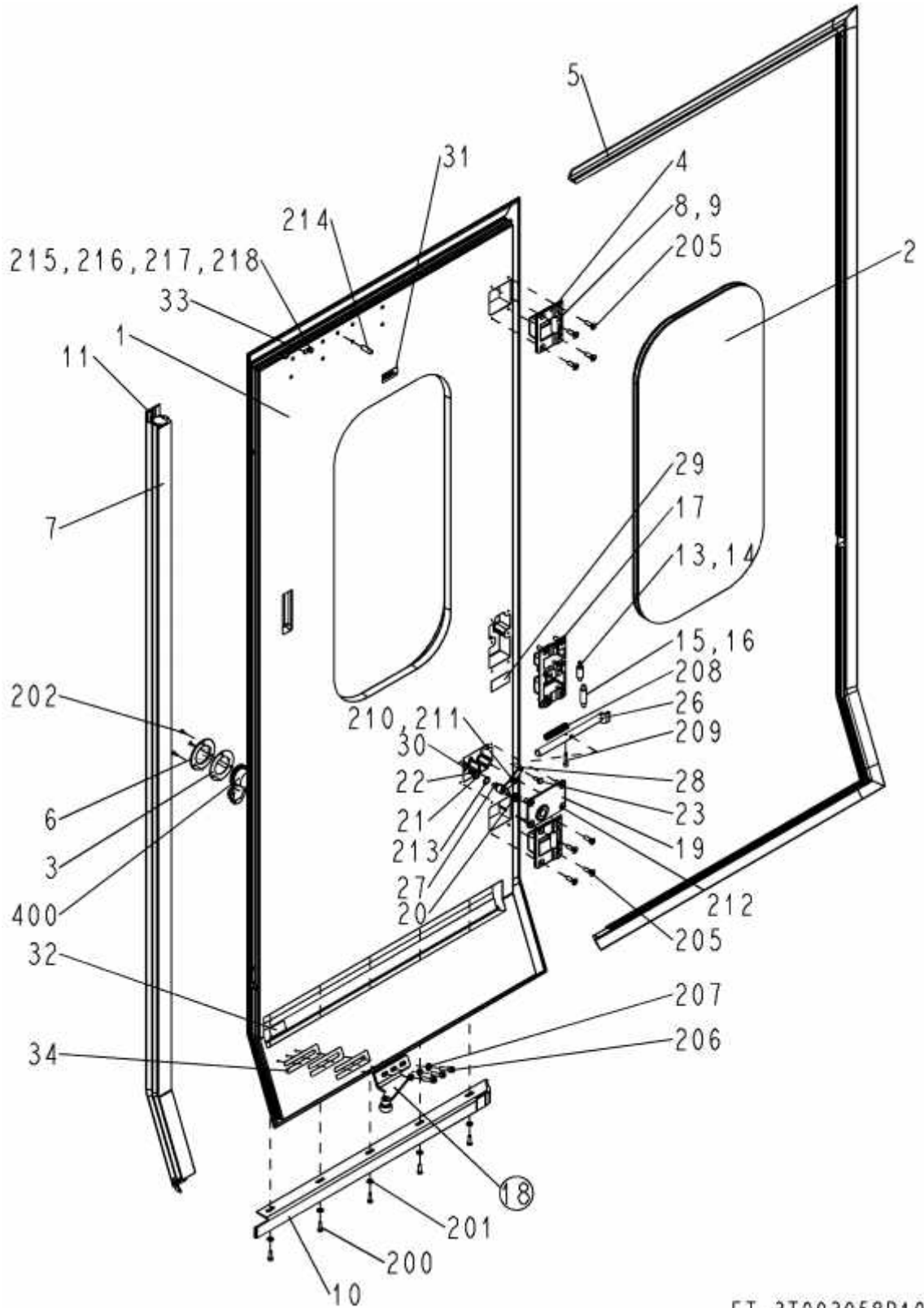
	3ED90151R03_C01				Cabling		
01	3ED00321R02		1	Pce	Optocoupler	C	
02	3ED00321R03		1	Pce	Optocoupler	C	
03	8FN300370R02		7	Pce	Terminal Block	C	
04	8FN300370R11		2	Pce	Terminal Block	C	
05	8FN300370R04		2	Pce	Terminal Block	C	
06	8FN300370R31		9	Pce	Terminal Block	C	
07	8FN300370R12		4	Pce	Terminal Block	C	
08	8FN401266R11		1	Pce	Connector Combicon	C	
09	3ED00231R03		1	Pce	Connector Combicon	C	
10	8E1202200		5	Pce	Ring Cable Terminal	C	
11	8EN400261P12		2	Pce	Insulating Sleeve	C	
12	8EN402079R02		1	Pce	Receptacle	C	
13	8EN402079R09		1	Pce	Receptacle	C	
14	8E1205200		64	Pce	Wire End Sleeve	C	
15	8E1205300		3	Pce	Wire End Sleeve	C	
16	8FN402237R05		3	Pce	Wire End Sleeve	C	
17	8FN402237R04		4	Pce	Wire End Sleeve	C	
18	8FN401229R03		1	Pce	Connector Mnl	C	
19	8FN401044R05		6	Pce	Connector Mnl	C	
20	3ED99001R81_C01		3	m	Cable	C	

T6: Ordering information:

Pos.	1	Cust. Number	Quantity	Unit	Name	WEC	Page
2016.1.08							
21	3ED99001R23_C01		80	m	Lead	C	
22	3ED99001R24_C01		30	m	Lead	C	
23	8E1200500		2	Pce	Ring Cable Terminal	C	
24	3ED99051R05_C01		1	Pce	Warning Device	C	
25	8AN402249R03		0.7	m	Lead	C	
26	8FN401892R03		1	Pce	Plug	C	
27	8DN401172R04		2	m	Braided Hose	C	
28	8EN401218R03		54	Pce	Cable Tie	C	
29	8D1001600		0.21	m	Tube	C	
30	8DN401172R02		19.2	m	Braided Hose	C	
31	8AN402080R02		16.22	m	Line	C	
32	7UN300409R97		4	Pce	Identification Sleeve	C	
33	8DN401367R20		0.66	m	Tube	C	
34	8FN401893R09		11	Pce	Bush	C	
35	3ED00054R13		2	Pce	Connector Mmnl S	C	
36	3ED00056R21		8	Pce	Connector Mmnl S	C	
37	3ED00054R31		2	Pce	Connector Mmnl S	C	
38	7D2202200		4	Pce	Oval-Head Screw	C	
39	7UN401099R12		2	Pce	lfe Name Plate IFE	C	
40	8D1003000		0.08	m	Shrinkable Tubing	C	
41	3ED00230R07		1	Pce	Support Rail	C	

T6: Ordering information:							
Pos.	1	Cust. Number	Quantity	Unit	Name	WEC	Page
2016.1.08							
42	8FN401189R03		2	Pce	Terminal Block	C	
43	3ED00015R01		38	Pce	Terminal Block	C	
44	8FN300370R31		38	Pce	Terminal Block	C	
45	3ED00015R15		20	Pce	Terminal Block	C	
46	3ED00015R03		1	Pce	Terminal Block	C	
47	8FN300179R12		3	Pce	Terminal Block	C	
48	8HN401198R02		1	Pce	Switch	B	
49	8HN401514R04		1	Pce	Label	C	
50	8D1003100		0.12	m	Shrinkable Tubing	C	
51	3ED00376R12		1	Pce	Zener Diode	B	
52	8FN401266R12		1	Pce	Connector Combicon	C	
53	8E1205400		3	Pce	Wire End Sleeve	C	
54	3ED90201R04_C01		3	Pce	Pneumatic control unit	C	

T7 Door Leaf



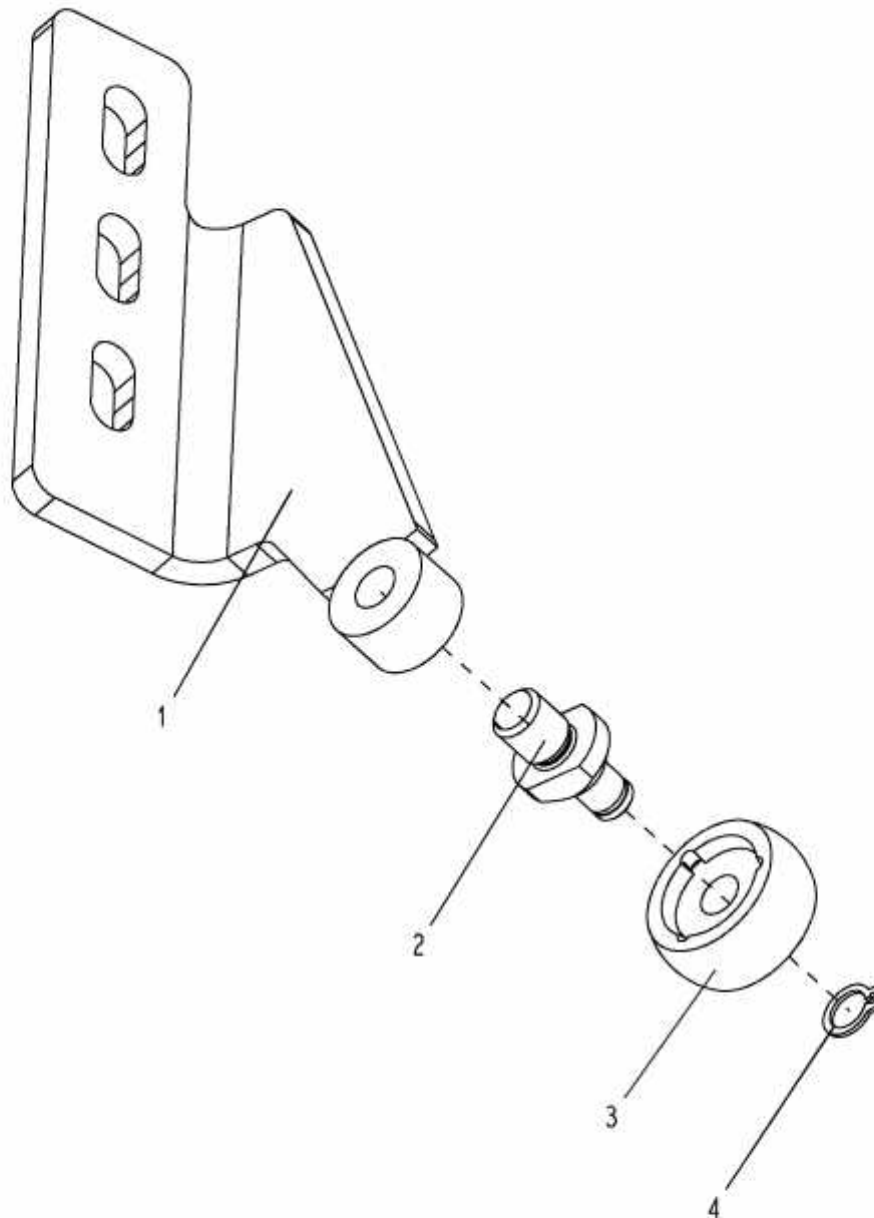
ET-3T003958R19

T7: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
	3T003958R19				Door Leaf		
001	3TD04339R11		1	Pce	Raw Doorleaf Panel	C	
002	3TD04235R03		1	Pce	Window Pane	C	
003	3T400825R05		1	Pce	Sealing Disc	C	
004	3TD15671R02		2	Pce	Roller Bracket	C	
005	3TD15653R03		1	Pce	Sealing Frame	C	
006	3TD04549R05		1	Pce	Cover Ring	C	
007	3TD04333R11		1	Pce	Finger Prot Rubber	B	
008	3KT403095R05		2	Pce	Roller	B	
009	3T403668R10		2	Pce	Roller Pin	C	
010	3TD04356R04		1	Pce	Guide Rail	C	
011	3TD14379R08		2	Pce	Cellular Rubber	B	
-							
013	3KT403095R06		1	Pce	Roller	B	
014	3T403668R11		1	Pce	Roller Pin	C	
015	3KT403095R07		1	Pce	Roller	B	
016	3T403668R12		1	Pce	Roller Pin	C	
017	3TD08418R07		1	Pce	Roller Bracket	C	
018	3TD04373R39		1	Pce	Roller Bracket	C	30
019	3TD08417R07		1	Pce	Cover	C	

T7: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
020	3JT402864R01		1	Pce	Bush	C	
021	3JT402864R02		1	Pce	Bush	C	
022	3JN400373P35		1	Pce	O-Ring	C	
023	3JT402779R01		1	Pce	Threaded Rod	C	
024	7UN400584P25		1	Pce	Bearing	C	
025	7UN400584P26		1	Pce	Bearing	C	
026	3T302108R40		1	Pce	Bolt	C	
027	3PT402866R11		1	Pce	Locking Pin	C	
028	3JT402782R02		1	Pce	Lever	C	
029	3KT411415R01		1	Pce	Sheet Metal	C	
030	3T409359R07		1	Pce	Collar	C	
031	7UN400999R05		1	Pce	Plate	C	
032	7UN401099R03		1	Pce	IFE Name Plate IFE	C	
033	7UN401337R11		1	Pce	Label	C	
034	3TD90423R32		3	Pce	Shim	C	
-							
200	7A0601400		6	Pce	Hex-Head Bolt	C	
201	3KN460000R65		6	Pce	Lock Washer	C	
202	3ED00328R24		3	Pce	Countersunk Screw	C	
-							
205	478010		14	Pce	Countersunk Screw	C	

T7: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
206	7B1203300		3	Pce	Machine Screw	C	
207	467765		3	Pce	Washer	C	
208	3J0041630		1	Pce	Tension Spring	B	
209	3JT402810R01		1	Pce	Pin	C	
210	7L5201407		1	Pce	Hexagon Nut	C	
211	476443		1	Pce	Washer	C	
212	469533		4	Pce	Countersunk Screw	C	
213	7U9245200		2	Pce	Shim	C	
214	7Q7605660		1	Pce	Straight Pin	C	
215	7M5803309		1	Pce	Washer	C	
216	477965		1	Pce	Spring Washer	C	
217	7A0601457		1	Pce	Hex-Head Bolt	C	
218	475976		1	Pce	Spring Washer	C	
-							
400	3ED00615R01		1	Pce	Button	B	
401	3ED90051R26_C01		1	Pce	Wiring Harness	C	

T8 Roller Bracket Assembly



ET-3TD04373R39

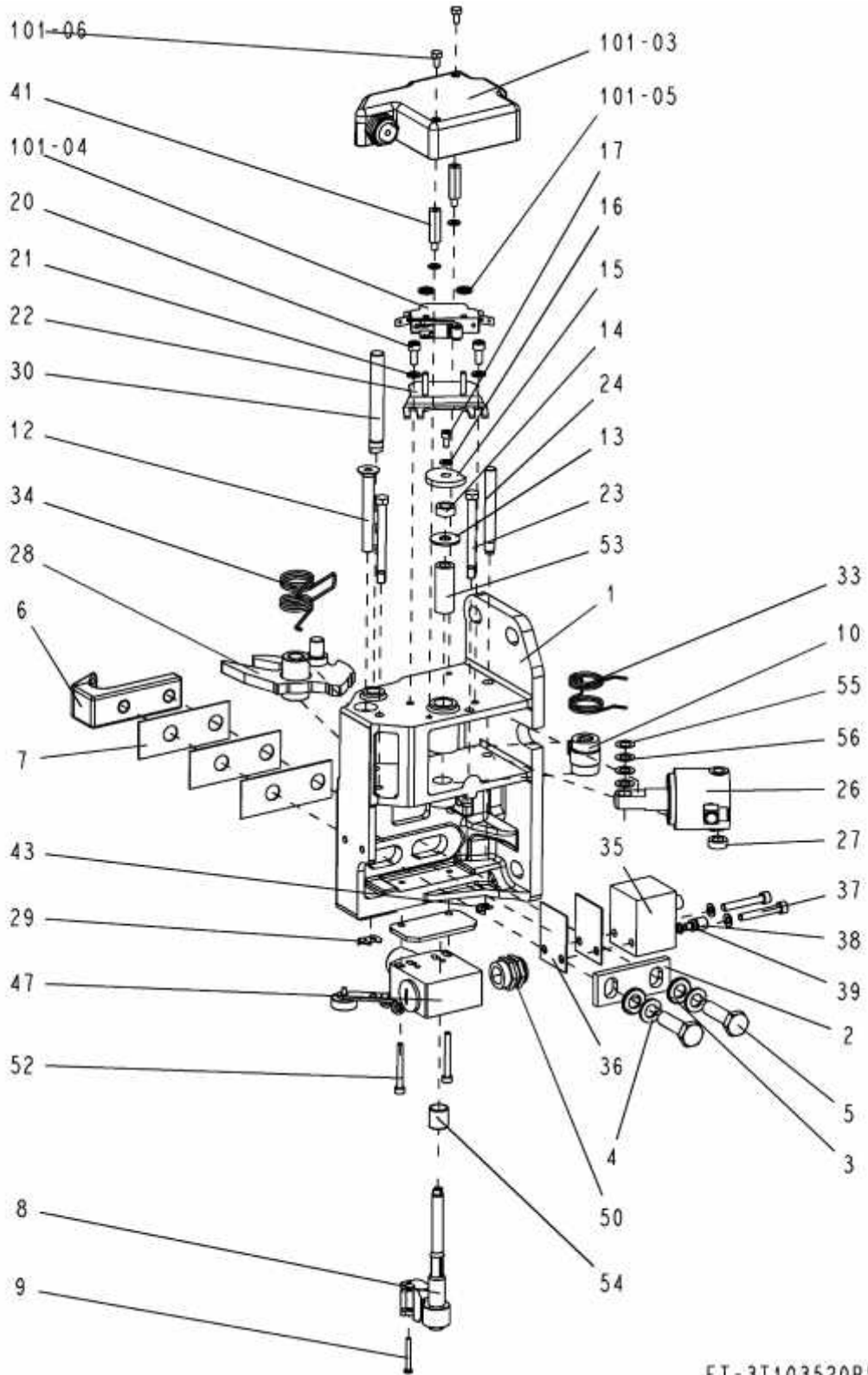
T8: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
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2015.8.27

	3TD04373R39				Roller Bracket Assembly		
001	3TD04374R15		1	Pce	Roller Bracket	C	
002	3WT407666R01		1	Pce	Pin	C	
003	3ET401232R01		1	Pce	Roller	B	
004	7S8300400		1	Pce	Retaining Ring	C	

T9 Main lock Assembly



ET-3T103520R53

T9: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
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2015.9.25

	3T103520R53				Main Lock		
01	3JT101521R91_C01		1	Pce	Lock Mounting Frame	C	
02	3T404166R15		1	Pce	Washer	C	
03	450671		2	Pce	Washer	C	
04	7N6501607		2	Pce	Lock Washer	C	
05	7A0603857		2	Pce	Hex-Head Bolt	C	
06	3T404165R17		1	Pce	Catch Hook	C	
07	3JT404166R01		3	Pce	Washer	C	
08	3RT302923R31		1	Pce	Check Bolt Pawl	C	
09	7A0307000		1	Pce	Hex-Head Bolt	C	
10	3JT404167R13		1	Pce	Locking Pawl	C	
-							
12	478017		1	Pce	Countersunk Screw	C	
13	3JT404168R01		1	Pce	Washer	C	
14	3JT404499R01		1	Pce	Sleeve	C	
15	3CT403086R03		1	Pce	Switch Cam	B	
16	7M5802600		5	Pce	Washer	C	
17	7B1200200		1	Pce	Machine Screw	C	
20	7B1201210		2	Pce	Machine Screw	C	
21	450659		4	Pce	Washer	C	
22	3RT404340R03		1	Pce	Holder	C	

T9: Ordering information:

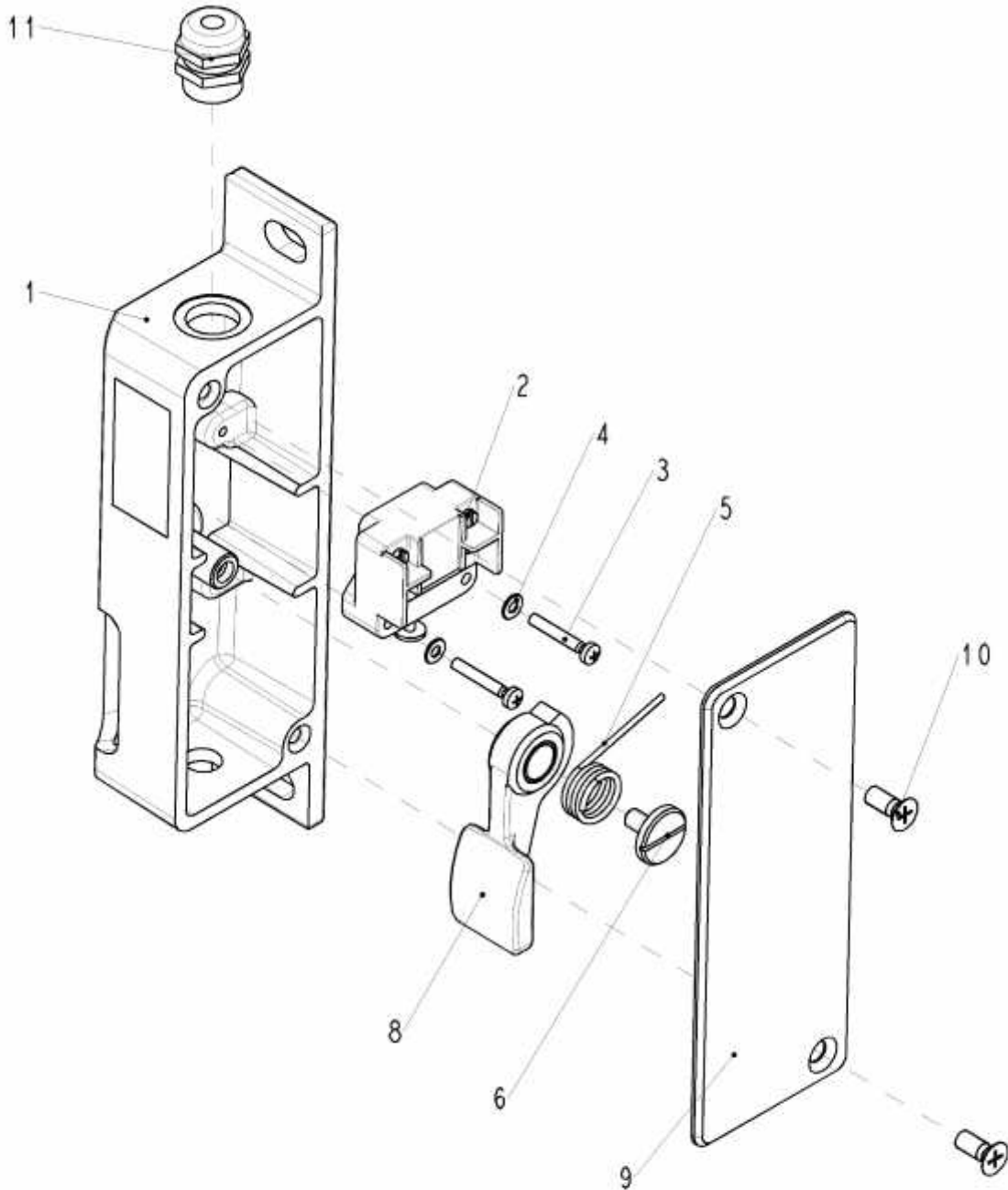
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
23	478316		2	Pce	Pin	C	
24	3RT403910R02		1	Pce	Pin	C	
-							
26	3VT404900R01		1	Pce	Cylinder	B	
27	3RT404169R02		1	Pce	Washer	C	
28	3T302921R23		1	Pce	Pawl	C	
29	7UN401031R06		1	Pce	Clip	B	
30	3T403906R07		1	Pce	Pin	C	
-							
33	3JN401022R01		1	Pce	Torsion Spring	B	
34	3JN401023R01		1	Pce	Torsion Spring	B	
35	3VT404173R03		1	Pce	Cylinder	B	
36	3JT404170R01		2	Pce	Washer	C	
37	7B1201500		2	Pce	Machine Screw	C	
38	7RN400243P01		1	Pce	Sealing Ring	C	
39	7WN400218R02		1	Pce	Fitting	C	
-							
41	7GN300136R34		2	Pce	Spacing Pin	C	
-							
43	7UN401031R54		1	Pce	KI-Clip	B	
-							
47	8HN300159R22		1	Pce	Limit Switch	B	
-							

T9: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
50	3ED00101R03		1	Pce	Screw Fitting	C	
-							
52	7B1200600		2	Pce	Machine Screw	C	
53	7UN400242P18		1	Pce	Bearing	C	
54	7UN400584P15		1	Pce	Bearing	C	
55	7U9244500		1	Pce	Shim	C	
56	7U9244550		1	Pce	Shim	C	
-							
101	3ED90101R26_C01		1	Pce	Cabling	C	

T10 Cabling

T10: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.22							
	3ED90101R26_C01				Cabling		
01	8E1302200		1	Pce	Nut	C	
02	8E1301050		1	Pce	Fitting	C	
03	3RT303026R07		1	Pce	Cover	C	
04	8HN300431R11		1	Pce	Limit Switch	B	
05	7UN400588P03		2	Pce	Securing Clip	B	
06	7A0600390		2	Pce	Hex-Head Bolt	C	
07	8DN401172R02		1.8	m	Braided Hose	C	
08	7UN401099R12		2	Pce	Ife Name Plate IFE	C	

T11 Bolt Box



ET-3T201883R21

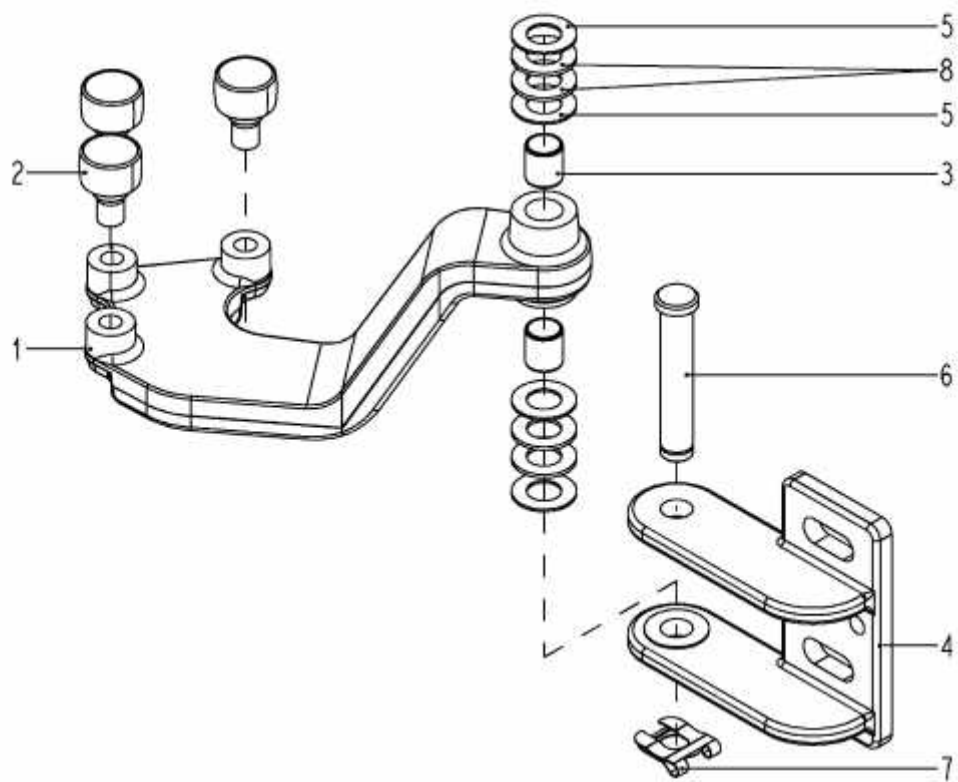
T11: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
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2012.11.14

	3T201883R21				Bolt Box		
01	3T202050R11		1	Pce	Housing	C	
02	8HN401253R01		1	Pce	Limit Switch	B	
03	7D2202600		2	Pce	Pan-Head Screw	C	
04	474785		2	Pce	Washer	C	
05	3JN401252R01		1	Pce	Spring Clip	B	
06	7E4400007		1	Pce	Pan-Head Screw	C	
-							
08	3WT405877R02		1	Pce	Cam	C	
09	3KT405866R03		1	Pce	Cover	C	
10	7D2605100		2	Pce	Countersunk Screw	C	
11	8E1301000		1	Pce	Screw Fitting	C	

T12 Roller swing arm



ET-3TD90530R03

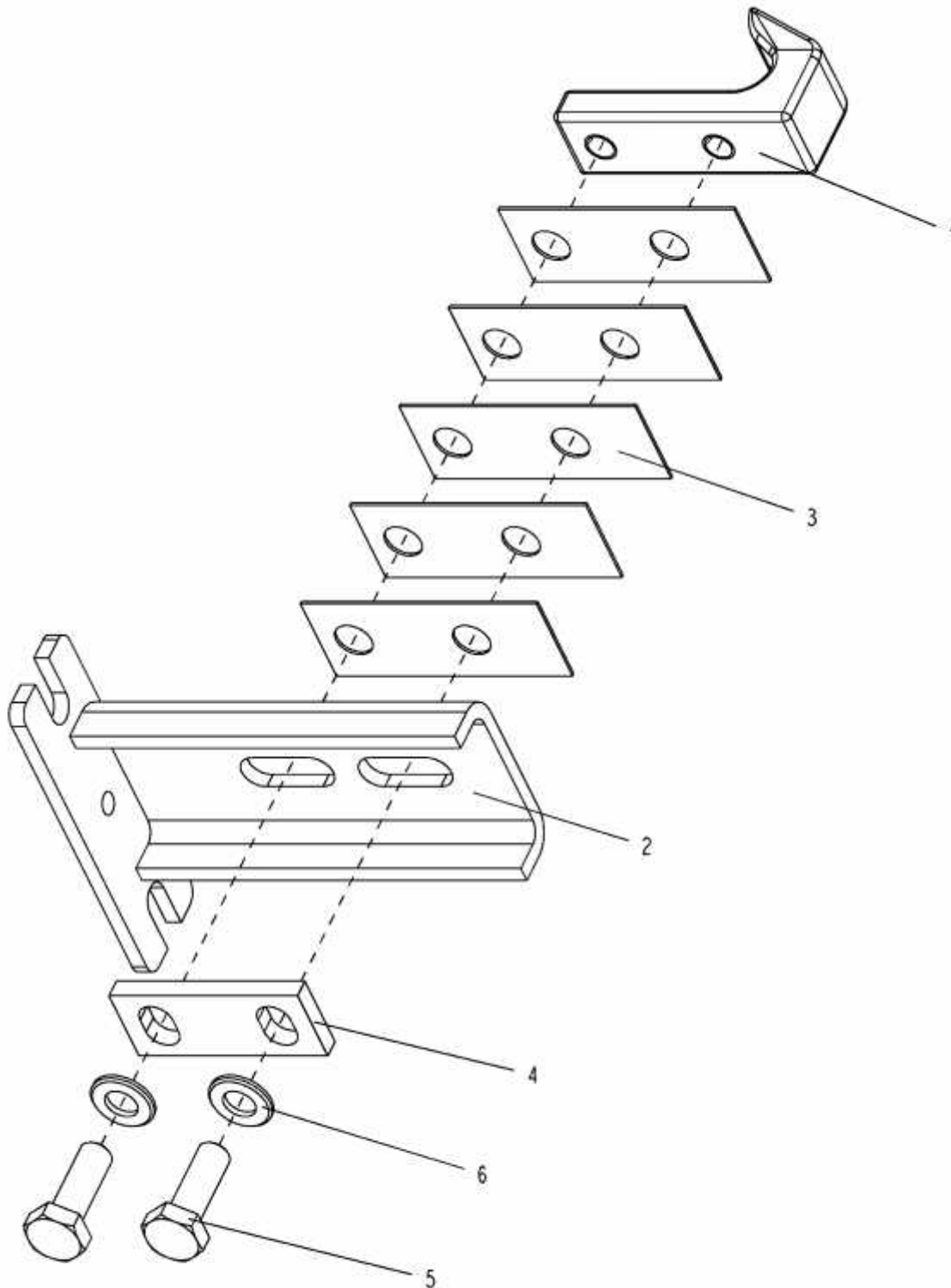
T12: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
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2012.10.29

	3TD90530R03				Roller swing arm		
01	3TD90539R05		1	Pce	Rocker Arm	C	
02	3K89993089		3	Pce	Cam Roller	B	
03	7UN300503P25		2	Pce	Bearing	C	
04	3TD92670R01		1	Pce	Support Frame	C	
05	3WT400215R48		4	Pce	Washer	C	
06	3VT403450R06		1	Pce	Bearing Pin	C	
07	7UN400244P56		1	Pce	Securing Clip	B	
08	3WT400215R49		4	Pce	Washer	C	
-							
44	3N401099R10		1	Pce	Adhesive Label	C	

T13 Catch hook



ET-3T404165R26

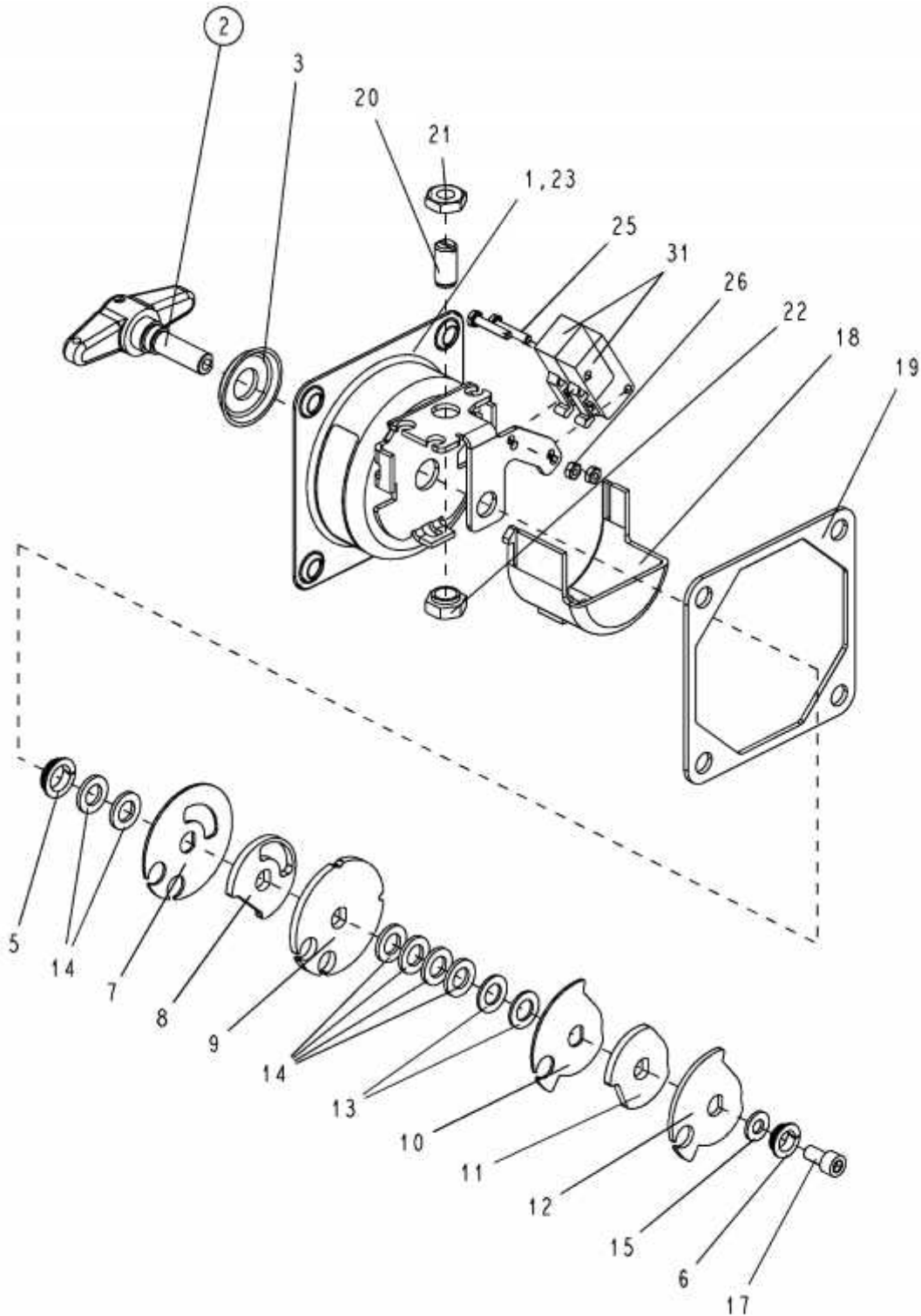
T13: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
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2015.8.28

	3T404165R26				Catch hook		
01	3T404165R17		1	Pce	Catch Hook	C	
02	3TD90423R12		1	Pce	Bracket	C	
03	3JT404166R01		5	Pce	Washer	C	
04	3JT404166R02		1	Pce	Washer	C	
05	7A0603707		2	Pce	Hex-Head Bolt	C	
06	7M6108867		2	Pce	Spring Washer	C	

T14 Emergency device



ET-3TD90524R19

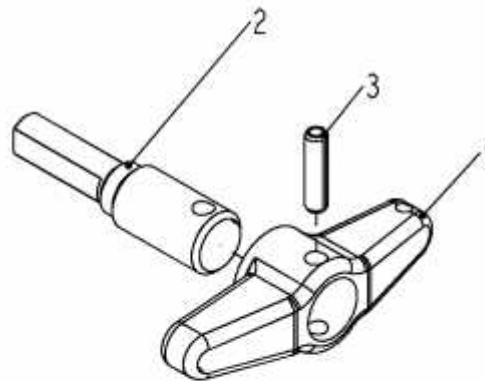
T14: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page

2015.9.25

	3TD90524R19				Emergency device		
01	3TD90525R33		1	Pce	Finger grip	C	
02	3T302735R52		1	Pce	Operating Lever	C	46
03	3WN300444R44		1	Pce	Cup Packing	C	
05	3N300504R07		1	Pce	Bearing	C	
06	3N300504R05		1	Pce	Bearing	C	
07	3T407784R09		1	Pce	Drum	C	
08	3T407784R11		1	Pce	Drum	C	
09	3T407784R14		1	Pce	Drum	C	
10	3T407784R10		1	Pce	Drum	C	
11	3T407784R12		3	Pce	Drum	C	
12	3T407784R15		1	Pce	Drum	C	
13	7U9244600		5	Pce	Shim	C	
14	470035		7	Pce	Shim	C	
15	7M6108830		1	Pce	Spring Washer	C	
17	3T411479R01		1	Pce	Screw	C	
-							
19	3T409379R07		1	Pce	Gasket	C	
20	7UN401240R35		1	Pce	Thrust Member	C	
21	463626		1	Pce	Hexagon Nut	C	

T14: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
-							
23	7UN402019R04		1	Pce	Adhesive Label	C	
-							
25	470959		2	Pce	Hex-Head Bolt	C	
26	7L5200750		2	Pce	Hexagon Nut	C	
-							
31	3ED90101R28_C01		1	Pce	Cabling	C	48

T15 Operating lever



ET-3T302735R52

T15: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
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2015.8.28

	3T302735R52				Operating lever		
01	3N401158R13		1	Pce	Operating Lever	C	
02	3T404246R87		1	Pce	Pin	C	
03	7Q8001550		1	Pce	Clamping Pin	B	

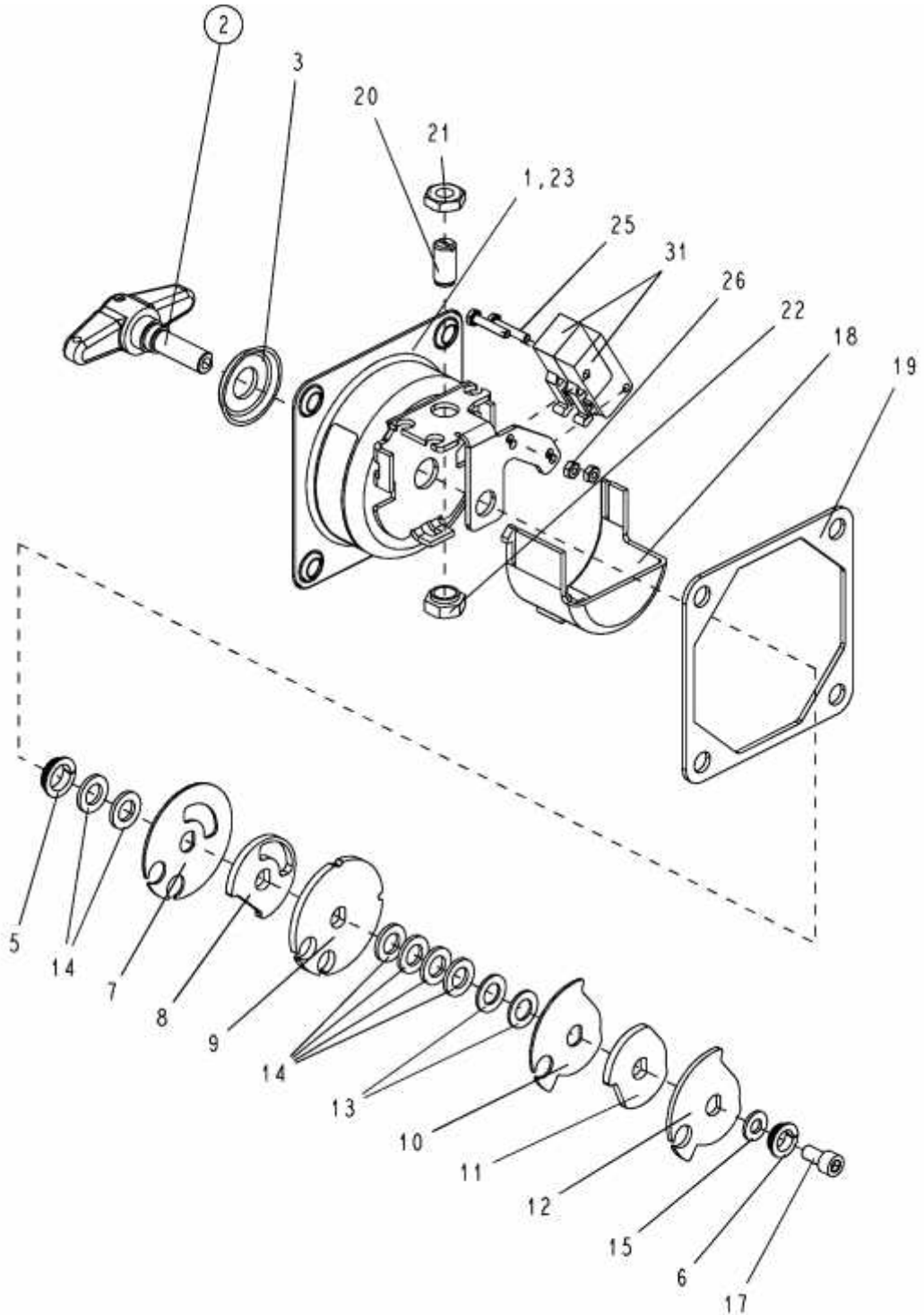
T16 Cabling

T16: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page

2015.9.22

	3ED90101R28_C01				Cabling		
01	3ED00054R03		1	Pce	Connector Mmnl S	C	
02	8FN401893R19		6	Pce	Pin	C	
03	3ED00056R21		6	Pce	Connector Mmnl S	C	
04	3ED00054R23		1	Pce	Connector Mmnl S	C	
05	8HN300290R04		2	Pce	Button	B	
06	8D1001750		1	Pce	Tube L =0.25 m	C	

T17 Emergency device



ET-3TD90524R20

T17: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
	3TD90524R20				Emergency device		
01	3TD90525R33		1	Pce	Finger grip	C	
02	3T302735R52		1	Pce	Operating Lever	C	46
03	3WN300444R44		1	Pce	Cup Packing	C	
-							
05	3N300504R07		1	Pce	Bearing	C	
06	3N300504R05		1	Pce	Bearing	C	
07	3T407784R09		1	Pce	Drum	C	
08	3T407784R11		1	Pce	Drum	C	
09	3T407784R14		1	Pce	Drum	C	
10	3T407784R10		1	Pce	Drum	C	
11	3T407784R12		3	Pce	Drum	C	
12	3T407784R15		1	Pce	Drum	C	
13	7U9244600		5	Pce	Shim	C	
14	470035		7	Pce	Shim	C	
15	7M6108830		1	Pce	Spring Washer	C	
-							
17	3T411479R01		1	Pce	Screw	C	
19	3T409379R07		1	Pce	Gasket	C	
20	7UN401240R35		1	Pce	Thrust Member	C	
21	463626		1	Pce	Hexagon Nut	C	

T17: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
-							
23	7UN402019R04		1	Pce	Adhesive Label	C	
-							
25	470959		2	Pce	Hex-Head Bolt	C	
26	7L5200750		2	Pce	Hexagon Nut	C	
-							
31	3ED90101R29_C01		1	Pce	Cabling	C	52

T18 Cabling

T18: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page

2015.9.22

	3ED90101R29_C01				Cabling		
01	3ED00054R03		1	Pce	Connector Mmnl S	C	
02	8FN401893R19		6	Pce	Pin	C	
03	3ED00056R21		6	Pce	Connector Mmnl S	C	
04	3ED00054R23		1	Pce	Connector Mmnl S	C	
05	8HN300290R04		2	Pce	Button	B	
06	8D1001750		1	Pce	Tube L =0.25 m	C	

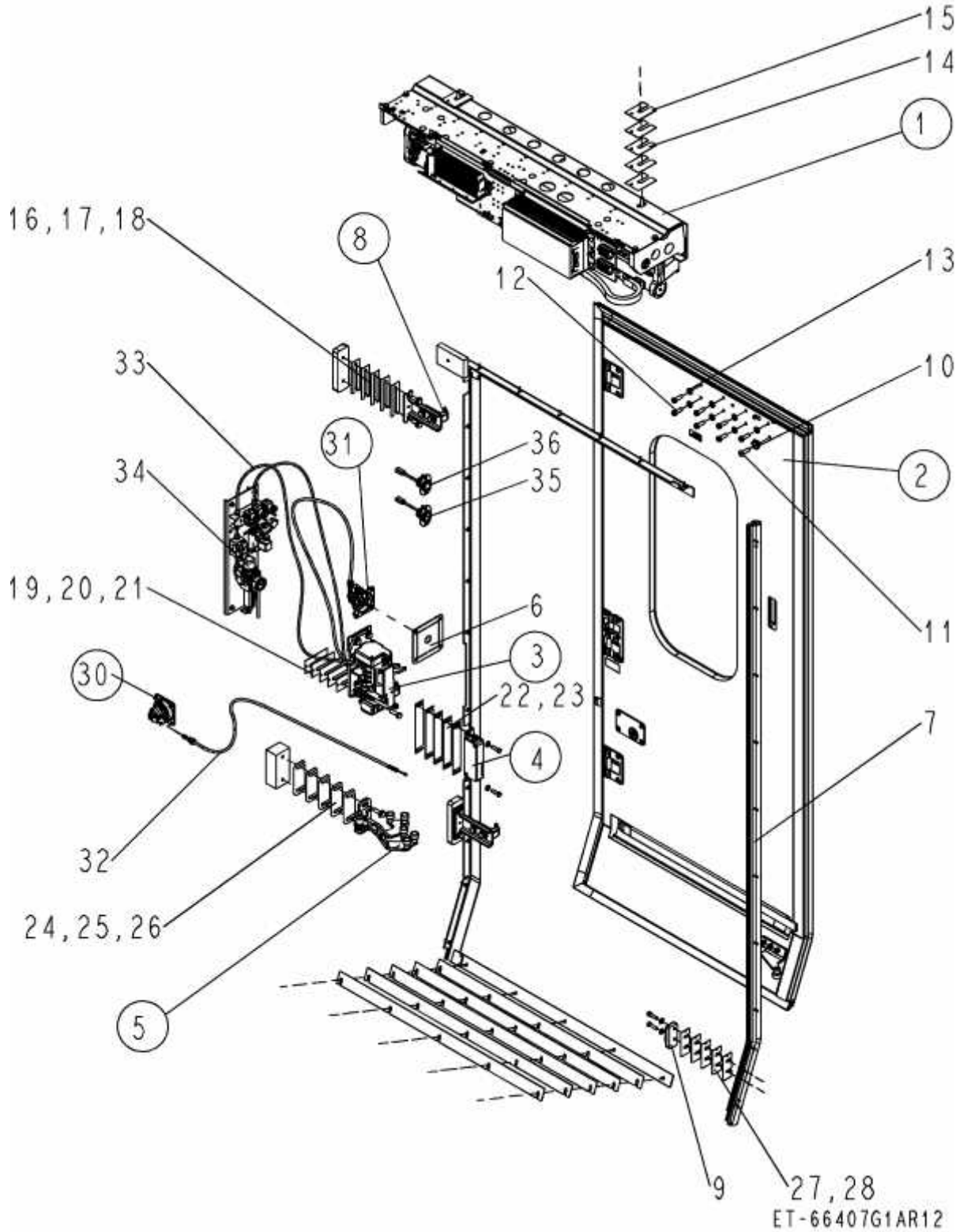
T19 E. Parts Loose

T19: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page

2015.9.22

	3ED90002R75_C01				E. Parts Loose		
01	3ED00016R40		1	Pce	Terminal Block	C	
02	3ED00016R38		1	Pce	Terminal Block	C	
03	3ED00016R37		1	Pce	Terminal Block	C	
04	3ED00016R34		1	Pce	Terminal Block	C	
05	3ED00016R33		1	Pce	Terminal Block	C	
06	3ED00016R32		3	Pce	Terminal Block	C	
07	3ED00016R19		8	Pce	Terminal Block	C	
08	8FN300370R31		38	Pce	Terminal Block	C	

T20 Scope of supply



T20: Ordering information:

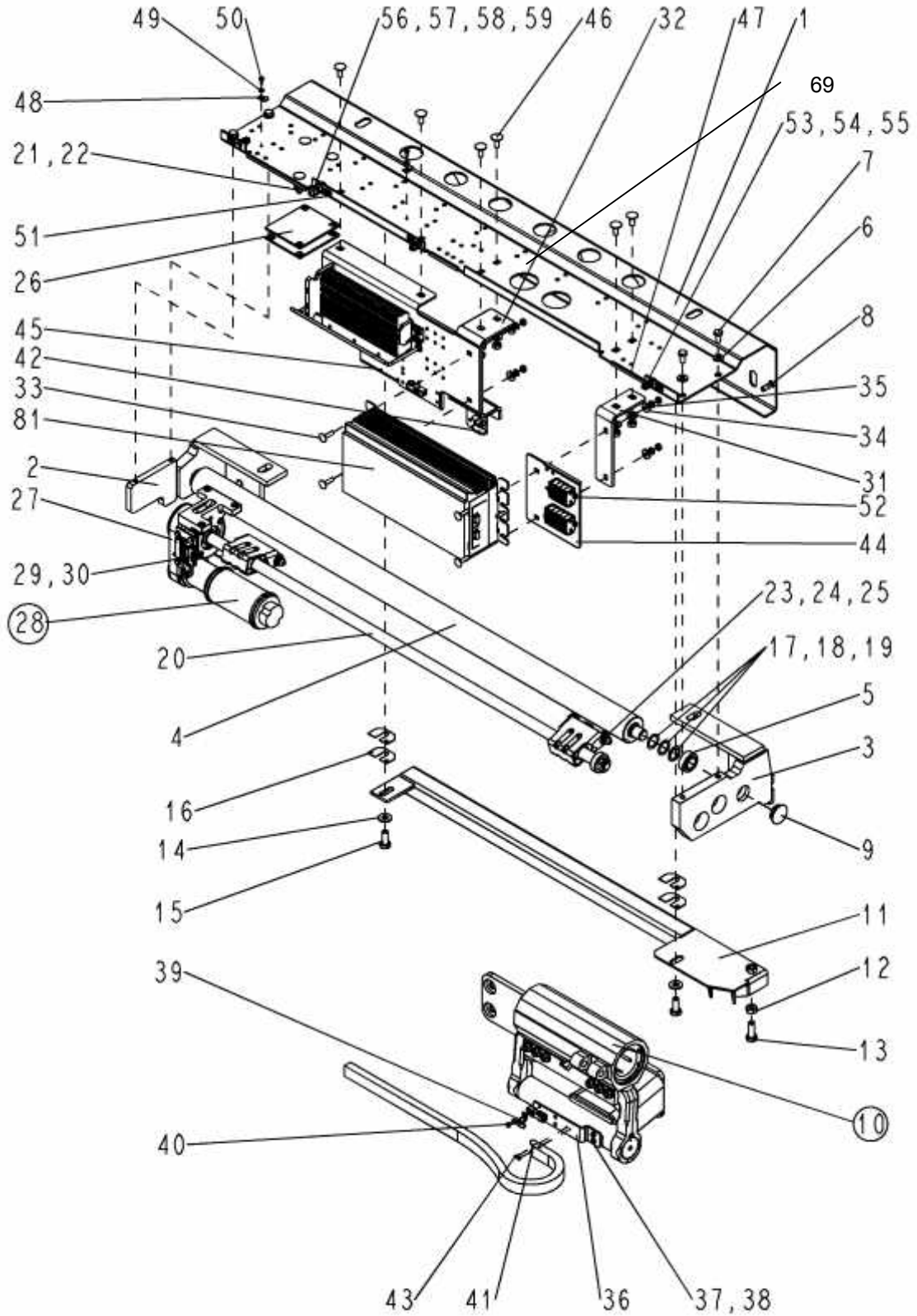
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
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2015.9.25

	66407G1AR12				SCOPE OF SUPPLY		
01	3TD08370R10		1	Pce	Drive	C	57
02	3T003958R20		1	Pce	Door Leaf Complete	C	71
03	3T103520R54		1	Pce	Main Lock	C	77
04	3T201883R22		1	Pce	Bolt Box	C	81
05	3TD90530R04		1	Pce	Rolling Arm	C	83
06	3TD90527R01		1	Pce	Plastic Panel	C	
07	3TD90515R30		1	Pce	Sealing Strip	B	
08	3T404165R26		2	Pce	Catch Hook	C	41
09	3KT202251R06		1	Pce	Arrester Block	C	
10	3KT408879R02		1	Pce	Eccentric	C	
11	477990		1	Pce	Countersunk Screw	C	
12	7B1401107		7	Pce	Machine Screw	C	
13	3TD81440R16		7	Pce	Washer	C	
14	3T304858R31		20	Pce	Shim	C	
15	3T304858R32		12	Pce	Shim	C	
16	3TD90423R10		6	Pce	Shim	C	
17	3TD90423R38		4	Pce	Shim	C	
18	3TD90423R39		2	Pce	Shim	C	
19	3TD90423R45		6	Pce	Shim	C	
20	3TD90423R46		4	Pce	Shim	C	

T20: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
21	3TD90423R47		2	Pce	Shim	C	
22	3TD90516R102		5	Pce	Shim	C	
23	3TD90516R101		1	Pce	Shim	C	
24	3TD90423R09		3	Pce	Shim	C	
25	3TD90423R40		2	Pce	Shim	C	
26	3TD90423R41		1	Pce	Shim	C	
27	3TD90423R43		4	Pce	Shim	C	
28	3TD90423R44		2	Pce	Shim	C	
29	3TD90516R10		34	Pce	Shim	C	
30	3TD90524R19		1	Pce	Emergency Device	C	43
31	3TD90524R20		1	Pce	Emergency Device	C	49
32	3TD90537R37		2	Pce	Bowden Cable	B	
33	0SN400222P04		6	m	Pipe	C	
34	3ED90201R03_C01		1	Pce	Pneum.Control Unit	C	
35	3ED99061R33_C01		1	Pce	Button	B	
36	3ED99061R34_C01		1	Pce	Button	B	
37	3ED90002R75_C01		1	Pce	E-Loose Part	C	53

T21 Drive Unit



ET-3TD08370R10

T21: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.10.19							
	3TD08370R10				Drive unit		
01	3TD08371R04		1	Pce	Support Bracket	C	
02	3T202745R64		1	Pce	Bearing Bracket	C	
03	3T202745R30		1	Pce	Bearing Bracket	C	
04	3TD08375R01_C01		1	Pce	Guide Rod	C	
05	3D0006000		2	Pce	Swivel Bearing	C	
06	7M6108857		13	Pce	Spring Washer	C	
07	7A0602307		4	Pce	Hex-Head Bolt	C	
08	478035		2	Pce	Countersunk Screw	C	
09	0VN401666R02		2	Pce	Protective Plug	C	
10	3T102292R40		1	Pce	Roller Rocker Guide	B	62
11	3TD08376R02_C01		1	Pce	Guide Rail	C	
12	7L5202107		1	Pce	Hexagon Nut	C	
13	7A0603707		1	Pce	Hex-Head Bolt	C	
14	7M6108867		2	Pce	Spring Washer	C	
15	7A0603607		2	Pce	Hex-Head Bolt	C	
16	3KT403595R72		4	Pce	Washer	C	
17	7U9251150		2	Pce	Shim	C	
18	7U9251160		2	Pce	Shim	C	
19	7U9251170		2	Pce	Shim	C	

T21: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.10.19							
20	3T003399R84		1	Pce	Linear Actuator	C	
21	7C1702207		3	Pce	Coach Bolt	C	
22	7L5201707		11	Pce	Hexagon Nut	C	
23	3T406422R28		1	Pce	Pin	C	
24	3TD00658R21		1	Pce	Washer	C	
25	EAU17DA		1	Pce	Hexagon Nut	C	
26	3TD90037R01		2	Pce	Plate	C	
27	3KN401349R31		1	Pce	Htd-Toothed Belt	B	
28	3T203272R30		1	Pce	Motor Assembly	B	65
29	8101280254		3	Pce	Machine Screw	C	
30	7L5201407		13	Pce	Hexagon Nut	C	
31	3TD90541R32		1	Pce	Dcu Bracket	C	
32	3TD90541R34		1	Pce	Dcu Bracket	C	
33	475238		4	Pce	Coach Bolt	C	
34	7M6108997		4	Pce	Washer	C	
35	450488		10	Pce	Washer	C	
36	3TD12848R01		1	Pce	Bracket	C	
37	468811		3	Pce	Washer	C	
38	7A0600350		2	Pce	Hex-Head Bolt	C	
39	3T411409R12		1	Pce	Bracket	C	
40	T1481053		1	Pce	Pan-Head Screw	C	

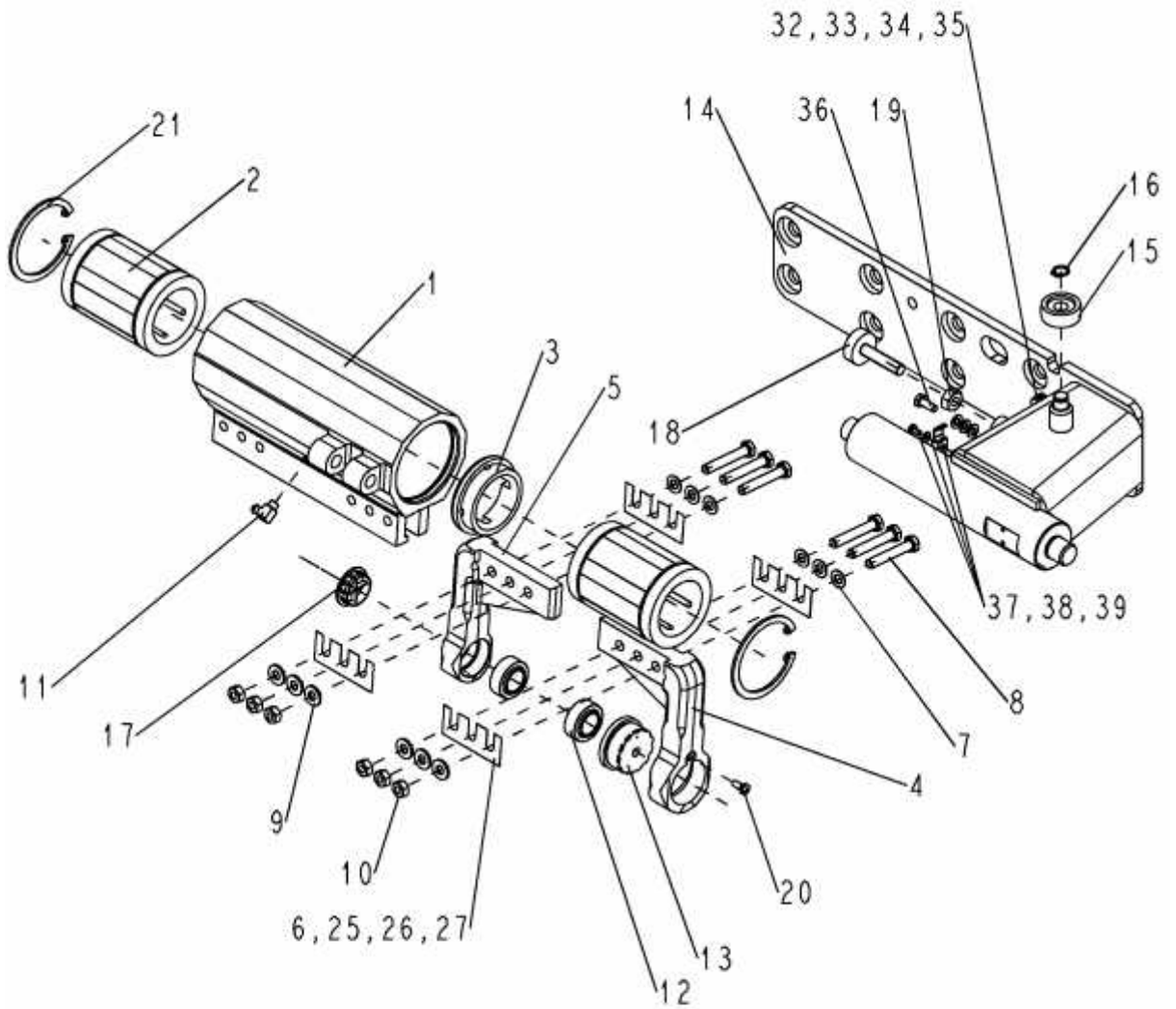
T21: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.10.19							
41	8DN300340R11		1	Pce	Chain Connector	C	
42	8DN300340R12		1	Pce	Chain Connector	C	
43	7D2602200		4	Pce	Countersunk Screw	C	
44	3TD90520R37		1	Pce	Electronic Bracket	C	
45	3TD90541R30		1	Pce	Terminal Board	C	
46	7C1702017		6	Pce	Coach Bolt	C	
47	8TN401944R05		0.6	m	Edge Guard	C	
48	3N401249R51		2	Pce	Clamp	B	
49	7M6108821		2	Pce	Spring Washer	C	
50	7D2203307		2	Pce	Pan-Head Screw	C	
51	7UN401337R11		6	Pce	Label	C	
52	T1481030		4	Pce	Pan-Head Screw	C	
53	7A0601757		3	Pce	Hex-Head Bolt	C	
54	470360		6	Pce	Spring Washer	C	
55	469639		3	Pce	Spring Washer	C	
56	7A0602627		1	Pce	Hex-Head Bolt	C	
57	470361		2	Pce	Spring Washer	C	
58	7M5803807		2	Pce	Washer	C	
59	469640		1	Pce	Spring Washer	C	
60	3N401099R10		1	Pce	Adhesive Label	C	
61	8EN401218R03		40	Pce	Cable Tie	C	

T21: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.10.19							
62	7UN402019R01		18	Pce	Adhesive Label	C	
63	3ED90071R37_C01		1	Pce	Cabling	C	20
-							
80	3ED90161R04_C01		1	Pce	Cabling	C	67
81	3ED01921R52		1	Pce	Door Control Unit	B	

T22 Roller Rocker Guide



ET-3T102292R40

T22: Ordering information:

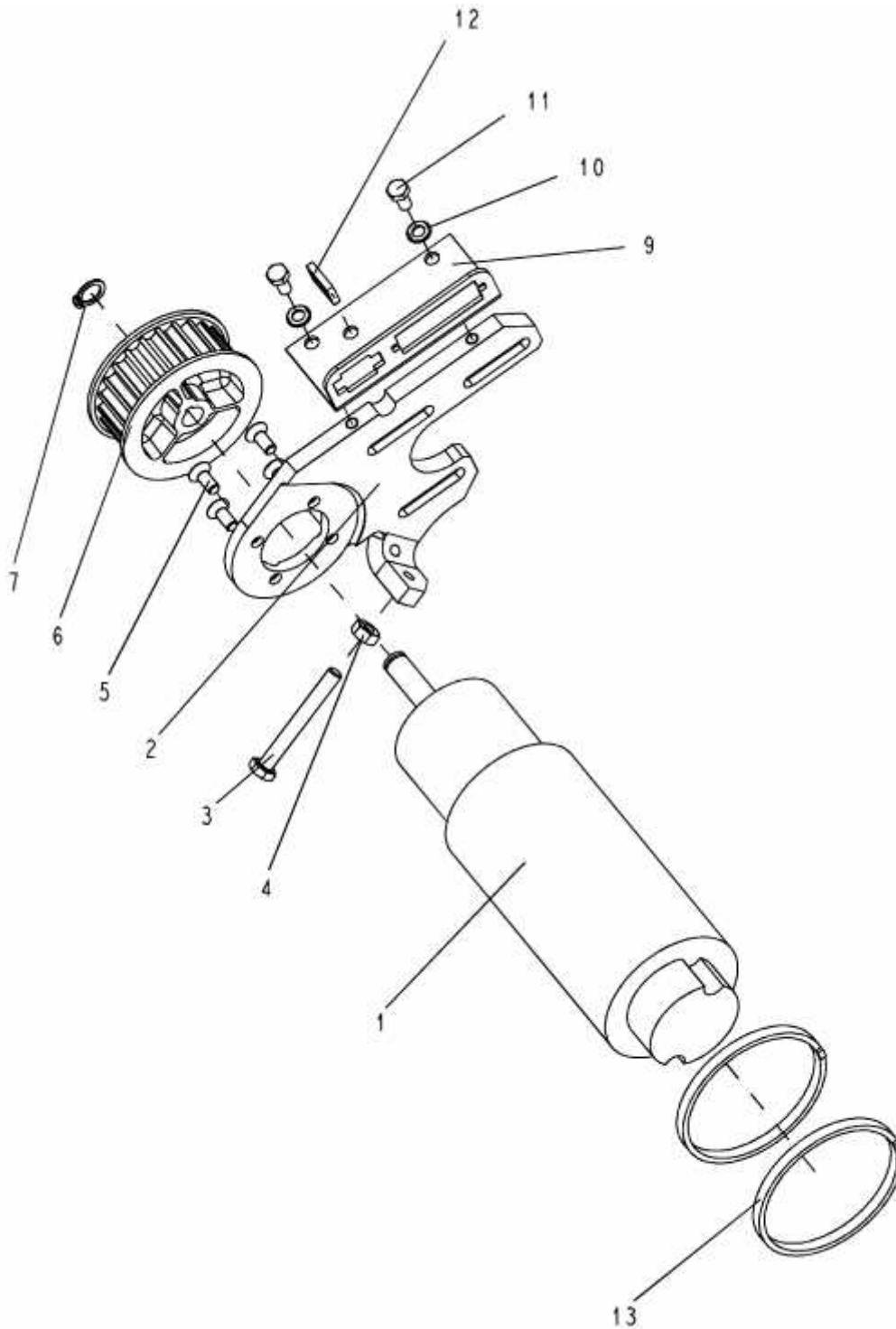
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
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2015.12.14

	3T102292R40				Roller Rocker Guid		
01	3T202384R52		1	Pce	Trolley Carrier	C	
02	3N300466R06		2	Pce	Spherical Liner	C	
03	3WT405094R03		1	Pce	Lubricating Ring	C	
04	3KT305107R14		1	Pce	Doorleaf Carrier S	C	
05	3KT305097R14		1	Pce	Doorleaf Carrier S	C	
06	3KT403595R75		4	Pce	Washer	C	
07	7M5803807		6	Pce	Washer	C	
08	451759		6	Pce	Hex-Head Bolt	C	
09	7M6108857		6	Pce	Spring Washer	C	
10	7L5201707		6	Pce	Hexagon Nut	C	
11	7U9701507		1	Pce	Grease Nipple	C	
12	3D0006000		2	Pce	Swivel Bearing	C	
13	3KT408657R01		1	Pce	Eccentric	C	
14	3T102036R36		1	Pce	Door Leaf Carrier	C	
15	3NT400985R01		1	Pce	Roller	B	
16	7S8300700		1	Pce	Retaining Ring	C	
17	0VN401666R02		1	Pce	Protective Plug	C	
18	3DN400826R24		1	Pce	Rubber Buffer	B	
19	7L5202107		1	Pce	Hexagon Nut	C	
20	7D2204301		1	Pce	Oval-Head Screw	C	

T22: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.12.14							
21	7S8404200		2	Pce	Retaining Ring	C	
22	7U9251150		1	Pce	Shim	C	
23	7U9251160		1	Pce	Shim	C	
24	7U9251170		1	Pce	Shim	C	
25	3KT403595R92		2	Pce	Washer	C	
26	3TD90519R29		2	Pce	Shim	C	
27	3TD90519R30		6	Pce	Shim	C	
31	0VN401284R01		2	Pce	Taper Plug	C	
32	7A0601307		1	Pce	Hex-Head Bolt	C	
33	469639		2	Pce	Spring Washer	C	
34	7M5803309		2	Pce	Washer	C	
35	470360		2	Pce	Spring Washer	C	
36	7A0601457		1	Pce	Hex-Head Bolt	C	
37	3N401249R14		2	Pce	Clamp	B	
38	7D2203200		2	Pce	Oval-Head Screw	C	
39	468811		2	Pce	Washer	C	

T23 Motor Assembly



ET-3T203272R30

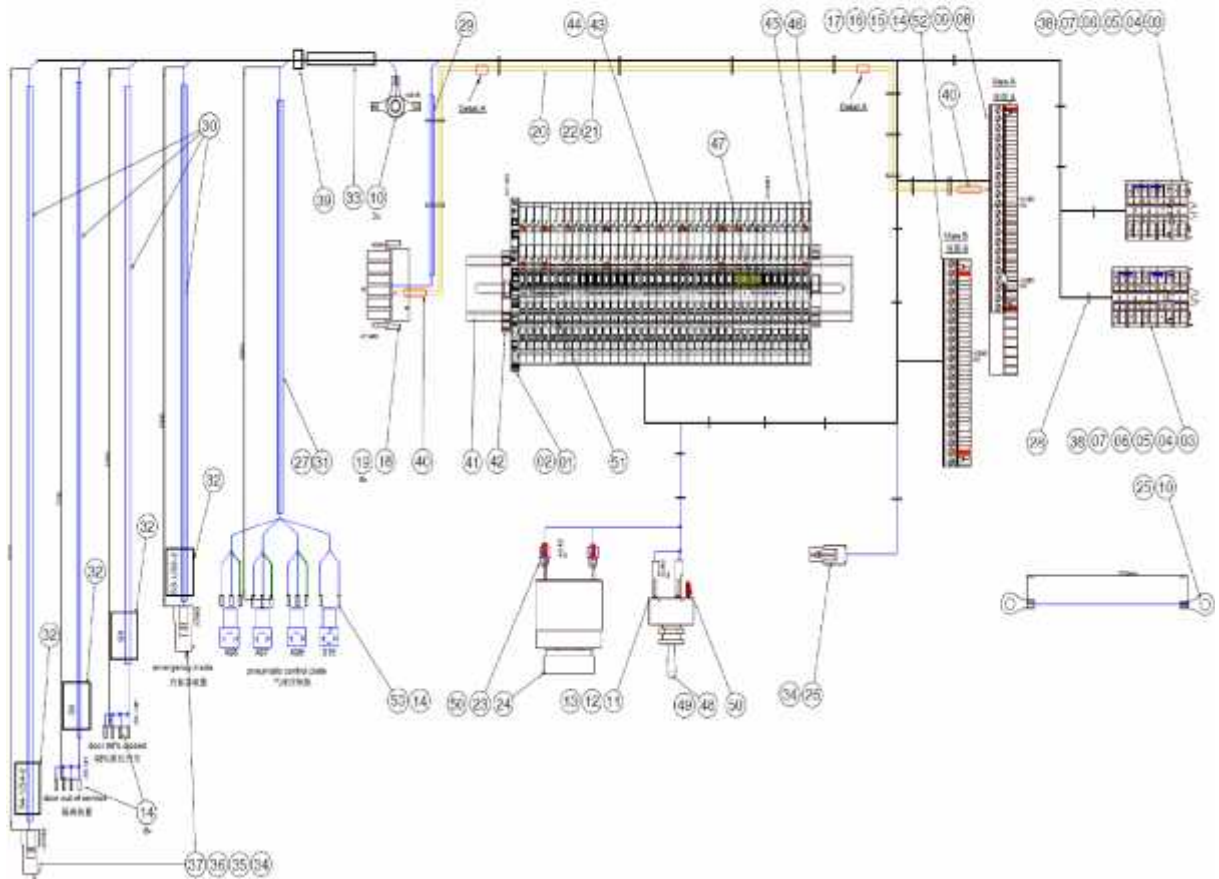
T23: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
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2012.11.14

	3T203272R30				Motor Assembly		
01	3KN300406R96		1	Pce	Geared Motor	B	
02	3T307437R06		1	Pce	Motor Bracket	C	
03	7A0601907		1	Pce	Hex-Head Bolt	C	
04	7L5201407		1	Pce	Hexagon Nut	C	
05	475096		4	Pce	Countersunk Screw	C	
06	3KT408221R07		1	Pce	Toothed Washer Hdt	C	
07	7S8300507		1	Pce	Retaining Ring	C	
09	3T307228R05		1	Pce	Bracket	C	
10	474771		2	Pce	Washer	C	
11	7A0600450		2	Pce	Hex-Head Bolt	C	
12	8EN401218R03		1	Pce	Cable Tie	C	
13	8EN401218R01		2	Pce	Cable Tie	C	

T24 Cabling



ET-3ED90161R04_C01

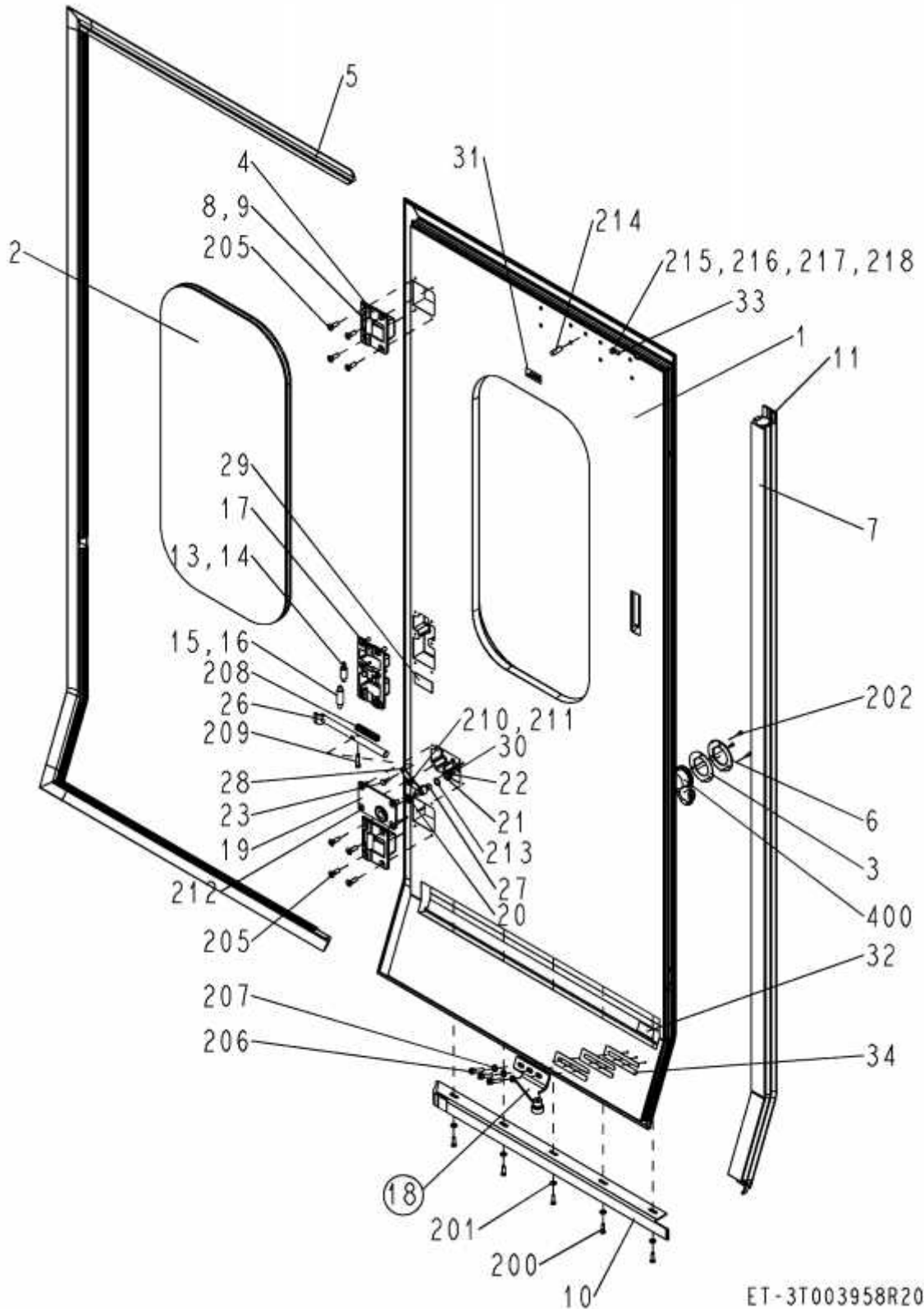
T24: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2016.1.8							
	3ED90161R04_C01				Cabling		
01	3ED00321R02		1	Pce	Optocoupler	C	
02	3ED00321R03		1	Pce	Optocoupler	C	
03	8FN300370R02		7	Pce	Terminal Block	C	
04	8FN300370R11		2	Pce	Terminal Block	C	
05	8FN300370R04		2	Pce	Terminal Block	C	
06	8FN300370R31		9	Pce	Terminal Block	C	
07	8FN300370R12		4	Pce	Terminal Block	C	
08	8FN401266R11		1	Pce	Connector Combicon	C	
09	3ED00231R03		1	Pce	Connector Combicon	C	
10	8E1202200		5	Pce	Ring Cable Terminal	C	
11	8EN400261P12		2	Pce	Insulating Sleeve	C	
12	8EN402079R02		1	Pce	Receptacle	C	
13	8EN402079R09		1	Pce	Receptacle	C	
14	8E1205200		64	Pce	Wire End Sleeve	C	
15	8E1205300		3	Pce	Wire End Sleeve	C	
16	8FN402237R05		3	Pce	Wire End Sleeve	C	
17	8FN402237R04		4	Pce	Wire End Sleeve	C	
18	8FN401229R03		1	Pce	Connector Mnl	C	
19	8FN401044R05		6	Pce	Connector Mnl	C	

T24: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2016.1.8							
20	3ED99001R81_C01		3	m	Cable	C	
21	3ED99001R23_C01		80	m	Lead	C	
22	3ED99001R24_C01		30	m	Lead	C	
23	8E1200500		2	Pce	Ring Cable Terminal	C	
24	3ED99051R05_C01		1	Pce	Warning Device	C	
25	8AN402249R03		0.7	m	Lead	C	
26	8FN401892R03		1	Pce	Plug	C	
27	8DN401172R04		2	m	Braided Hose	C	
28	8EN401218R03		54	Pce	Cable Tie	C	
29	8D1001600		0.21	m	Tube	C	
30	8DN401172R02		19.2	m	Braided Hose	C	
31	8AN402080R02		16.22	m	Line	C	
32	7UN300409R97		4	Pce	Identification Sleeve	C	
33	8DN401367R20		0.66	m	Tube	C	
34	8FN401893R09		11	Pce	Bush	C	
35	3ED00054R13		2	Pce	Connector Mmnl S	C	
36	3ED00056R21		8	Pce	Connector Mmnl S	C	
37	3ED00054R31		2	Pce	Connector Mmnl S	C	
38	7D2202200		4	Pce	Oval-Head Screw	C	
39	7UN401099R12		2	Pce	Ife Name Plate	C	
40	8D1003000		0.08	m	Shrinkable Tubing	C	

T24: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2016.1.8							
41	3ED00230R07		1	Pce	Support Rail	C	
42	8FN401189R03		2	Pce	Terminal Block	C	
43	3ED00015R01		38	Pce	Terminal Block	C	
44	8FN300370R31		38	Pce	Terminal Block	C	
45	3ED00015R15		20	Pce	Terminal Block	C	
46	3ED00015R03		1	Pce	Terminal Block	C	
47	8FN300179R12		3	Pce	Terminal Block	C	
48	8HN401198R02		1	Pce	Switch	B	
49	8HN401514R04		1	Pce	Label	C	
50	8D1003100		0.12	m	Shrinkable Tubing	C	
51	3ED00376R12		1	Pce	Zener Diode	B	
52	8FN401266R12		1	Pce	Connector Combicon	C	
53	8E1205400		3	Pce	Wire End Sleeve	C	
54	3ED90201R04_C01		3	Pce	Pneumatic control unit	C	

T25 Door Leaf



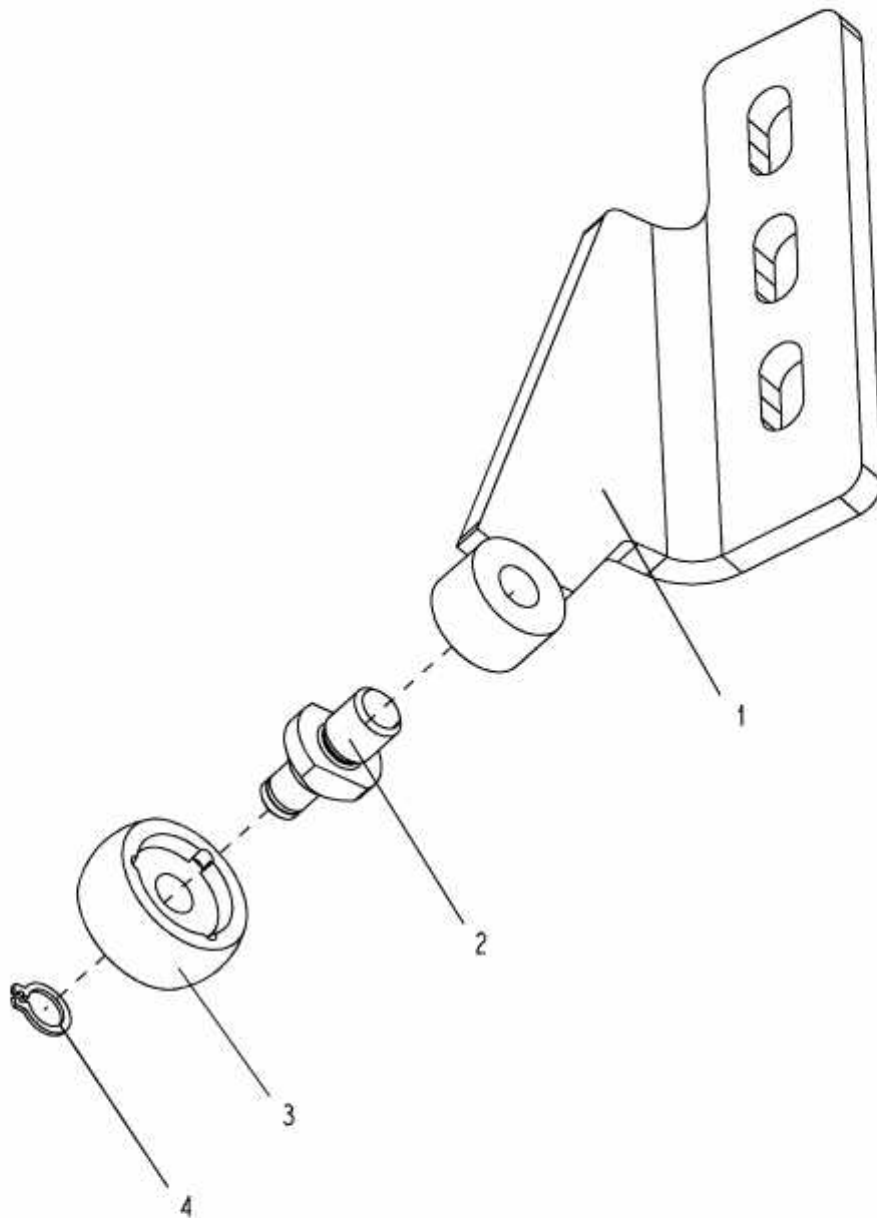
ET-3T003958R20

T25: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.12.02							
	3T003958R20				Door Leaf		
001	3TD04339R12		1	Pce	Raw Doorleaf Panel	C	
002	3TD04235R03		1	Pce	Window Pane	C	
003	3T400825R05		1	Pce	Sealing Disc	C	
004	3TD15671R02		2	Pce	Roller Bracket	C	
005	3TD15653R04		1	Pce	Sealing Frame	C	
006	3TD04549R05		1	Pce	Cover Ring	C	
007	3TD04333R12		1	Pce	Finger Prot Rubber	B	
008	3KT403095R05		2	Pce	Roller	B	
009	3T403668R10		2	Pce	Roller Pin	C	
010	3TD04356R05		1	Pce	Guide Rail	C	
011	3TD14379R08		2	Pce	Cellular Rubber	B	
-							
013	3KT403095R06		1	Pce	Roller	B	
014	3T403668R11		1	Pce	Roller Pin	C	
015	3KT403095R07		1	Pce	Roller	B	
016	3T403668R12		1	Pce	Roller Pin	C	
017	3TD08418R08		1	Pce	Roller Bracket	C	
018	3TD04373R40		1	Pce	Roller Bracket	C	75
019	3TD08417R08		1	Pce	Cover	C	
020	3JT402864R01		1	Pce	Bush	C	

T25: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.12.02							
021	3JT402864R02		1	Pce	Bush	C	
022	3JN400373P35		1	Pce	O-Ring	C	
023	3JT402779R01		1	Pce	Threaded Rod	C	
024	7UN400584P25		1	Pce	Bearing	C	
025	7UN400584P26		1	Pce	Bearing	C	
026	3T302108R40		1	Pce	Bolt	C	
027	3PT402866R12		1	Pce	Locking Pin	C	
028	3JT402782R02		1	Pce	Lever	C	
029	3KT411415R01		1	Pce	Sheet Metal	C	
030	3T409359R07		1	Pce	Collar	C	
031	7UN400999R05		1	Pce	Plate	C	
032	7UN401099R03		1	Pce	lfe Name Plate	C	
033	7UN401337R11		1	Pce	Label	C	
034	3TD90423R32		3	Pce	Shim	C	
-							
200	7A0601400		6	Pce	Hex-Head Bolt	C	
201	3KN460000R65		6	Pce	Lock Washer	C	
202	3ED00328R24		3	Pce	Countersunk Screw	C	
-							
205	478010		14	Pce	Countersunk Screw	C	
206	7B1203300		3	Pce	Machine Screw	C	

T25: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.12.02							
207	467765		3	Pce	Washer	C	
208	3J0041630		1	Pce	Tension Spring	B	
209	3JT402810R01		1	Pce	Pin	C	
210	7L5201407		1	Pce	Hexagon Nut	C	
211	476443		1	Pce	Washer	C	
212	469533		4	Pce	Countersunk Screw	C	
213	7U9245200		2	Pce	Shim	C	
214	7Q7605660		1	Pce	Straight Pin	C	
215	7M5803309		1	Pce	Washer	C	
216	477965		1	Pce	Spring Washer	C	
217	7A0601457		1	Pce	Hex-Head Bolt	C	
218	475976		1	Pce	Spring Washer	C	
-							
400	3ED00615R01		1	Pce	Button	B	
401	3ED90051R26_C01		1	Pce	Wiring Harness	C	

T26 Roller Bracket Assembly



ET-3TD04373R40

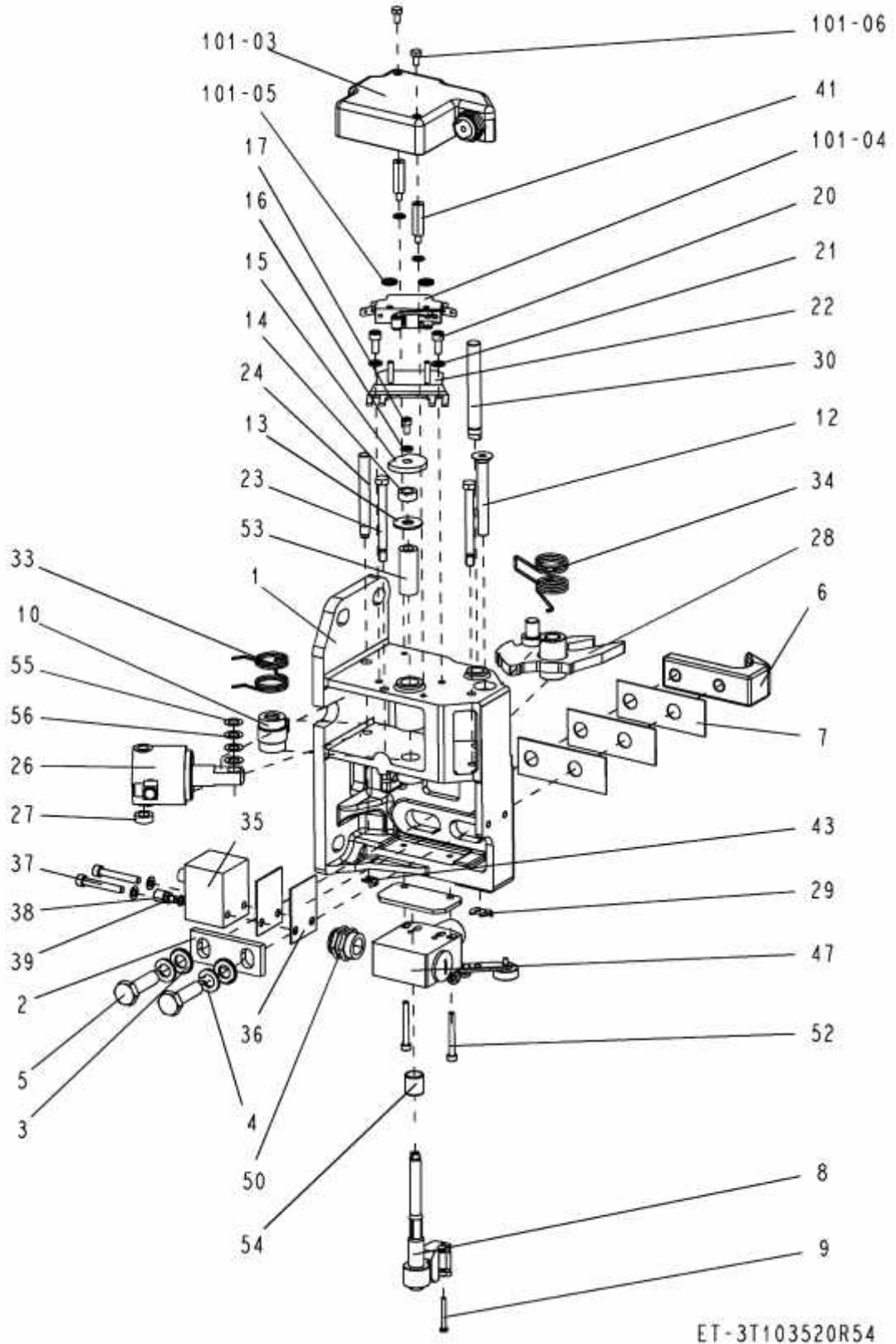
T26: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
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2015.8.27

	3TD04373R40				Roller Bracket Assembly		
001	3TD04374R16		1	Pce	Roller Bracket	C	
002	3WT407666R01		1	Pce	Pin	C	
003	3ET401232R01		1	Pce	Roller	B	
004	7S8300400		1	Pce	Retaining Ring	C	

T27 Main lock Assembly



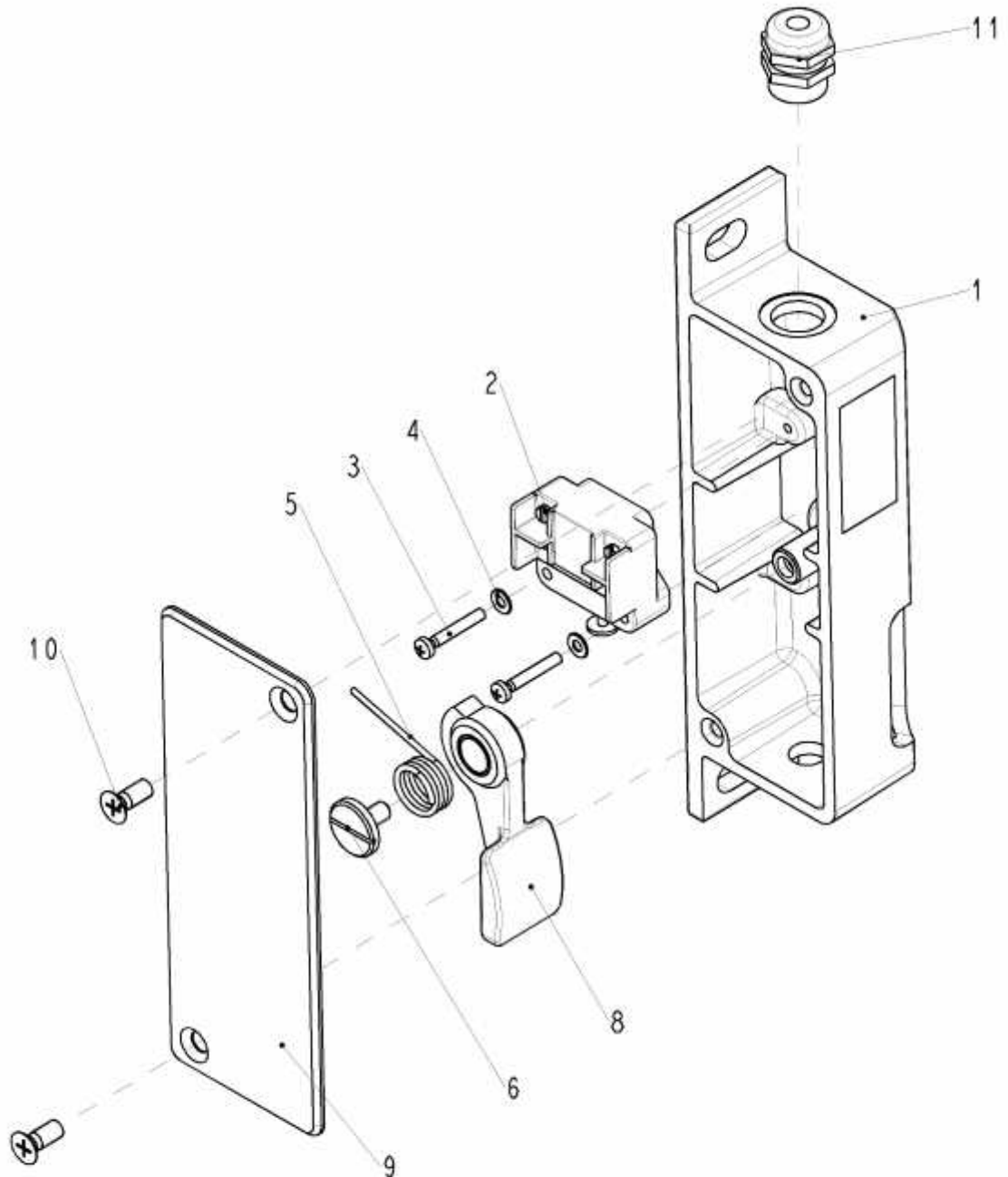
T27: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
	3T103520R54				Main Lock Assembly		
01	3JT101521R92_C01		1	Pce	Lock Mounting Frame	C	
02	3T404166R15		1	Pce	Washer	C	
03	450671		2	Pce	Washer	C	
04	7N6501607		2	Pce	Lock Washer	C	
05	7A0603857		2	Pce	Hex-Head Bolt	C	
06	3T404165R17		1	Pce	Catch Hook	C	
07	3JT404166R01		3	Pce	Washer	C	
08	3RT302923R32		1	Pce	Check Bolt Pawl	C	
09	7A0307000		1	Pce	Hex-Head Bolt	C	
10	3JT404167R13		1	Pce	Locking Pawl	C	
-							
12	478017		1	Pce	Countersunk Screw	C	
13	3JT404168R01		1	Pce	Washer	C	
14	3JT404499R01		1	Pce	Sleeve	C	
15	3CT403086R03		1	Pce	Switch Cam	B	
16	7M5802600		5	Pce	Washer	C	
17	7B1200200		1	Pce	Machine Screw	C	
20	7B1201210		2	Pce	Machine Screw	C	
21	450659		4	Pce	Washer	C	

T27: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
22	3RT404340R03		1	Pce	Holder	C	
23	478316		2	Pce	Pin	C	
24	3RT403910R02		1	Pce	Pin	C	
-							
26	3VT404900R01		1	Pce	Cylinder	B	
27	3RT404169R02		1	Pce	Washer	C	
28	3T302921R24		1	Pce	Pawl	C	
29	7UN401031R06		1	Pce	Clip	B	
30	3T403906R07		1	Pce	Pin	C	
-							
33	3JN401022R01		1	Pce	Torsion Spring	B	
34	3JN401023R01		1	Pce	Torsion Spring	B	
35	3VT404173R03		1	Pce	Cylinder	B	
36	3JT404170R01		2	Pce	Washer	C	
37	7B1201500		2	Pce	Machine Screw	C	
38	7RN400243P01		1	Pce	Sealing Ring	C	
39	7WN400218R02		1	Pce	Fitting	C	
-							
41	7GN300136R34		2	Pce	Spacing Pin	C	
-							
43	7UN401031R54		1	Pce	KI-Clip	B	
-							
47	8HN300159R22		1	Pce	Limit Switch	B	

T27: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
-							
50	3ED00101R03		1	Pce	Screw Fitting	C	
-							
52	7B1200600		2	Pce	Machine Screw	C	
53	7UN400242P18		1	Pce	Bearing	C	
54	7UN400584P15		1	Pce	Bearing	C	
55	7U9244500		1	Pce	Shim	C	
56	7U9244550		1	Pce	Shim	C	
-							
101	3ED90101R27_C01		1	Pce	Cabling	C	

T28 Bolt Box



ET-3T201883R22

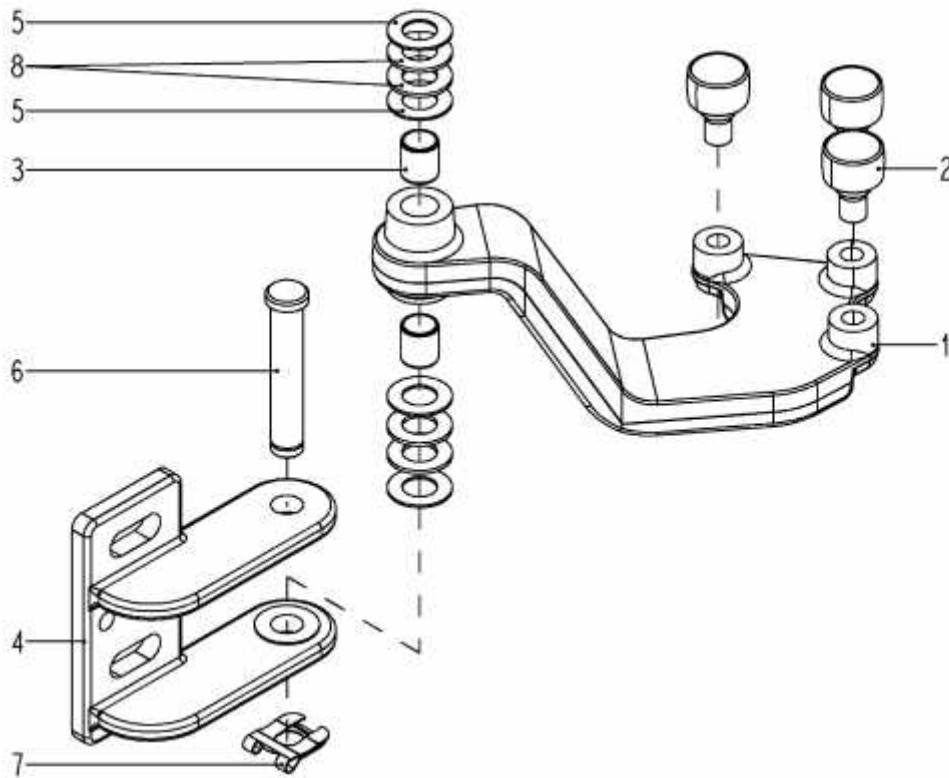
T28: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
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2012.11.14

	3T201883R22				Bolt Box		
01	3T202050R12		1	Pce	Housing	C	
02	8HN401253R01		1	Pce	Limit Switch	B	
03	7D2202607		2	Pce	Pan-Head Screw	C	
04	7M5802207		2	Pce	Washer	C	
05	3JN401252R01		1	Pce	Spring Clip	B	
06	7E4400007		1	Pce	Pan-Head Screw	C	
-							
08	3WT405877R02		1	Pce	Cam	C	
09	3KT405866R03		1	Pce	Cover	C	
10	7D2605007		2	Pce	Countersunk Screw	C	
11	8E1301000		1	Pce	Screw Fitting	C	

T29 Roller swing arm



ET-3TD90530R04

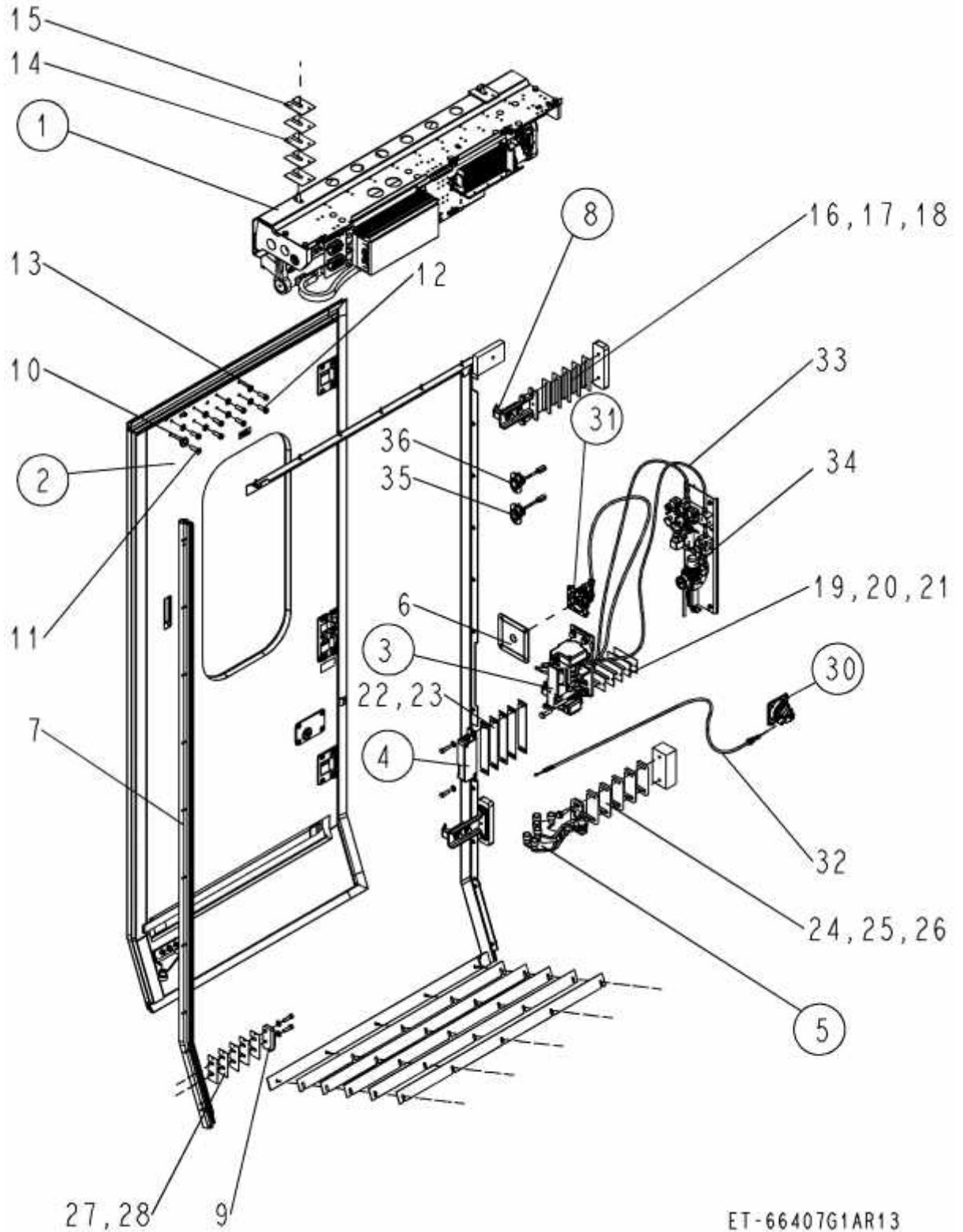
T29: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
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2012.10.29

	3TD90530R04				Roller swing arm		
01	3TD90539R06		1	Pce	Rocker Arm	C	
02	3K89993089		3	Pce	Cam Roller	B	
03	7UN300503P25		2	Pce	Bearing	C	
04	3TD92670R01		1	Pce	Support Frame	C	
05	3WT400215R48		4	Pce	Washer	C	
06	3VT403450R06		1	Pce	Bearing Pin	C	
07	7UN400244P56		1	Pce	Securing Clip	B	
08	3WT400215R49		4	Pce	Washer	C	
-							
44	3N401099R10		1	Pce	Adhesive Label	C	

T30 Scope of supply

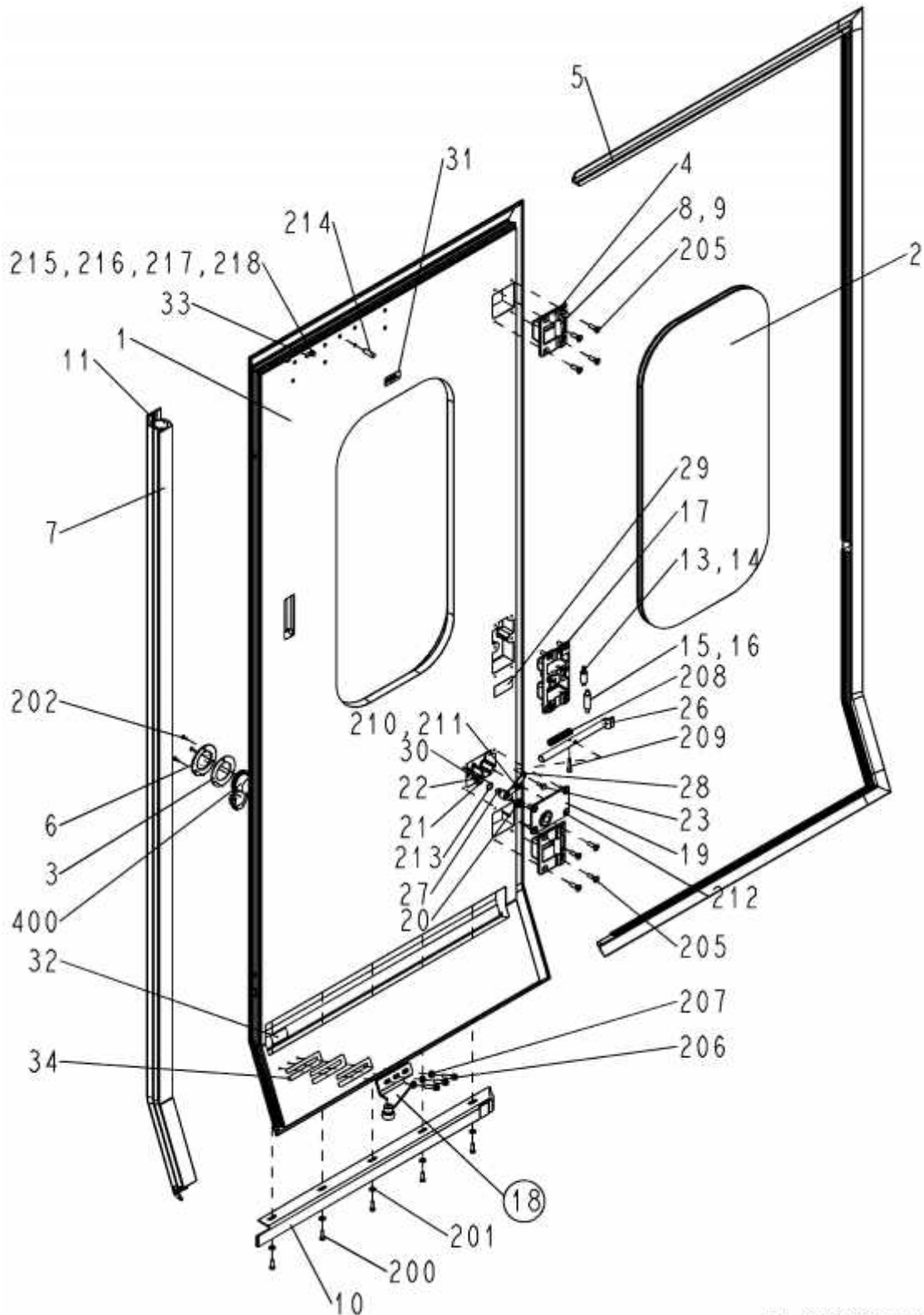


ET-66407G1AR13

T30: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
	66407G1AR13				SCOPE OF SUPPLY		
01	3TD08370R09		1	Pce	Drive	C	10
02	3T003958R21		1	Pce	Door Leaf Complete	C	88
03	3T103520R53		1	Pce	Main Lock	C	32
04	3T201883R21		1	Pce	Bolt Box	C	37
05	3TD90530R03		1	Pce	Rolling Arm	C	39
06	3TD90527R01		1	Pce	Plastic Panel	C	
07	3TD90515R29		1	Pce	Sealing Strip	B	
08	3T404165R26		2	Pce	Catch Hook	C	41
09	3KT202251R05		1	Pce	Arrester Block	C	
10	3KT408879R02		1	Pce	Eccentric	C	
11	477990		1	Pce	Countersunk Screw	C	
12	7B1401107		7	Pce	Machine Screw	C	
13	3TD81440R16		7	Pce	Washer	C	
14	3T304858R31		20	Pce	Shim	C	
15	3T304858R32		12	Pce	Shim	C	
16	3TD90423R10		6	Pce	Shim	C	
17	3TD90423R38		4	Pce	Shim	C	
18	3TD90423R39		2	Pce	Shim	C	
19	3TD90423R45		6	Pce	Shim	C	

T30: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
20	3TD90423R46		4	Pce	Shim	C	
21	3TD90423R47		2	Pce	Shim	C	
22	3TD90516R102		5	Pce	Shim	C	
23	3TD90516R101		1	Pce	Shim	C	
24	3TD90423R09		3	Pce	Shim	C	
25	3TD90423R40		2	Pce	Shim	C	
26	3TD90423R41		1	Pce	Shim	C	
27	3TD90423R43		4	Pce	Shim	C	
28	3TD90423R44		2	Pce	Shim	C	
29	3TD90516R10		34	Pce	Shim	C	
30	3TD90524R19		1	Pce	Emergency Device	C	43
31	3TD90524R20		1	Pce	Emergency Device	C	49
32	3TD90537R37		2	Pce	Bowden Cable	B	
33	0SN400222P04		6	m	Pipe	C	
34	3ED90201R03_C01		1	Pce	Pneum.Control Unit	C	
35	3ED99061R33_C01		1	Pce	Button	B	
36	3ED99061R34_C01		1	Pce	Button	B	
37	3ED90002R75_C01		1	Pce	E-Loose Part	C	53

T31 Door Leaf



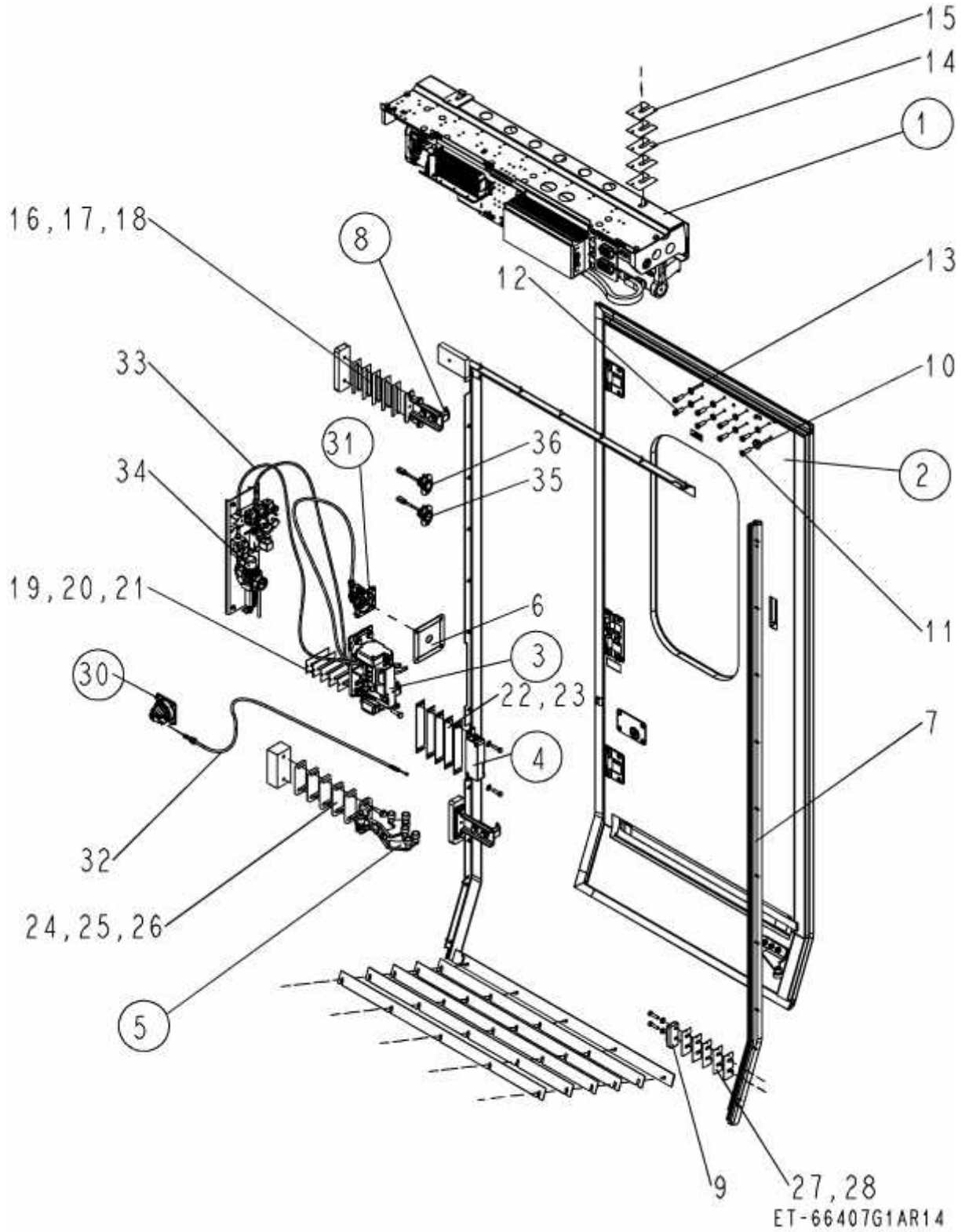
ET-3T003958R21

T31: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
	3T003958R21				Door Leaf		
001	3TD04339R13		1	Pce	Raw Doorleaf Panel	C	
002	3TD04235R03		1	Pce	Window Pane	C	
003	3T400825R05		1	Pce	Sealing Disc	C	
004	3TD15671R03		2	Pce	Roller Bracket	C	
005	3TD15653R03		1	Pce	Sealing Frame	C	
006	3TD04549R05		1	Pce	Cover Ring	C	
007	3TD04333R11		1	Pce	Finger Prot Rubber	B	
008	3KT403095R05		2	Pce	Roller	B	
009	3T403668R10		2	Pce	Roller Pin	C	
010	3TD04356R04		1	Pce	Guide Rail	C	
011	3TD14379R08		2	Pce	Cellular Rubber	B	
-							
013	3KT403095R06		1	Pce	Roller	B	
014	3T403668R11		1	Pce	Roller Pin	C	
015	3KT403095R07		1	Pce	Roller	B	
016	3T403668R12		1	Pce	Roller Pin	C	
017	3TD08418R09		1	Pce	Roller Bracket	C	
018	3TD04373R41		1	Pce	Roller Bracket	C	30
019	3TD08417R09		1	Pce	Cover	C	

T31: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
020	3JT402864R01		1	Pce	Bush	C	
021	3JT402864R02		1	Pce	Bush	C	
022	3JN400373P35		1	Pce	O-Ring	C	
023	3JT402779R01		1	Pce	Threaded Rod	C	
024	7UN400584P25		1	Pce	Bearing	C	
025	7UN400584P26		1	Pce	Bearing	C	
026	3T302108R40		1	Pce	Bolt	C	
027	3PT402866R11		1	Pce	Locking Pin	C	
028	3JT402782R02		1	Pce	Lever	C	
029	3KT411415R01		1	Pce	Sheet Metal	C	
030	3T409359R07		1	Pce	Collar	C	
031	7UN400999R05		1	Pce	Plate	C	
032	7UN401099R03		1	Pce	lfe Name Plate	C	
033	7UN401337R11		1	Pce	Label	C	
034	3TD90423R32		3	Pce	Shim	C	
-							
200	7A0601400		6	Pce	Hex-Head Bolt	C	
201	3KN460000R65		6	Pce	Lock Washer	C	
202	3ED00328R24		3	Pce	Countersunk Screw	C	
-							
205	478010		14	Pce	Countersunk Screw	C	

T31: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
206	7B1203300		3	Pce	Machine Screw	C	
207	467765		3	Pce	Washer	C	
208	3J0041630		1	Pce	Tension Spring	B	
209	3JT402810R01		1	Pce	Pin	C	
210	7L5201407		1	Pce	Hexagon Nut	C	
211	476443		1	Pce	Washer	C	
212	469533		4	Pce	Countersunk Screw	C	
213	7U9245200		2	Pce	Shim	C	
214	7Q7605660		1	Pce	Straight Pin	C	
215	7M5803309		1	Pce	Washer	C	
216	477965		1	Pce	Spring Washer	C	
217	7A0601457		1	Pce	Hex-Head Bolt	C	
218	475976		1	Pce	Spring Washer	C	
-							
400	3ED00615R01		1	Pce	Button	B	
401	3ED90051R26_C01		1	Pce	Wiring Harness	C	

T32 Scope of supply



T32: Ordering information:

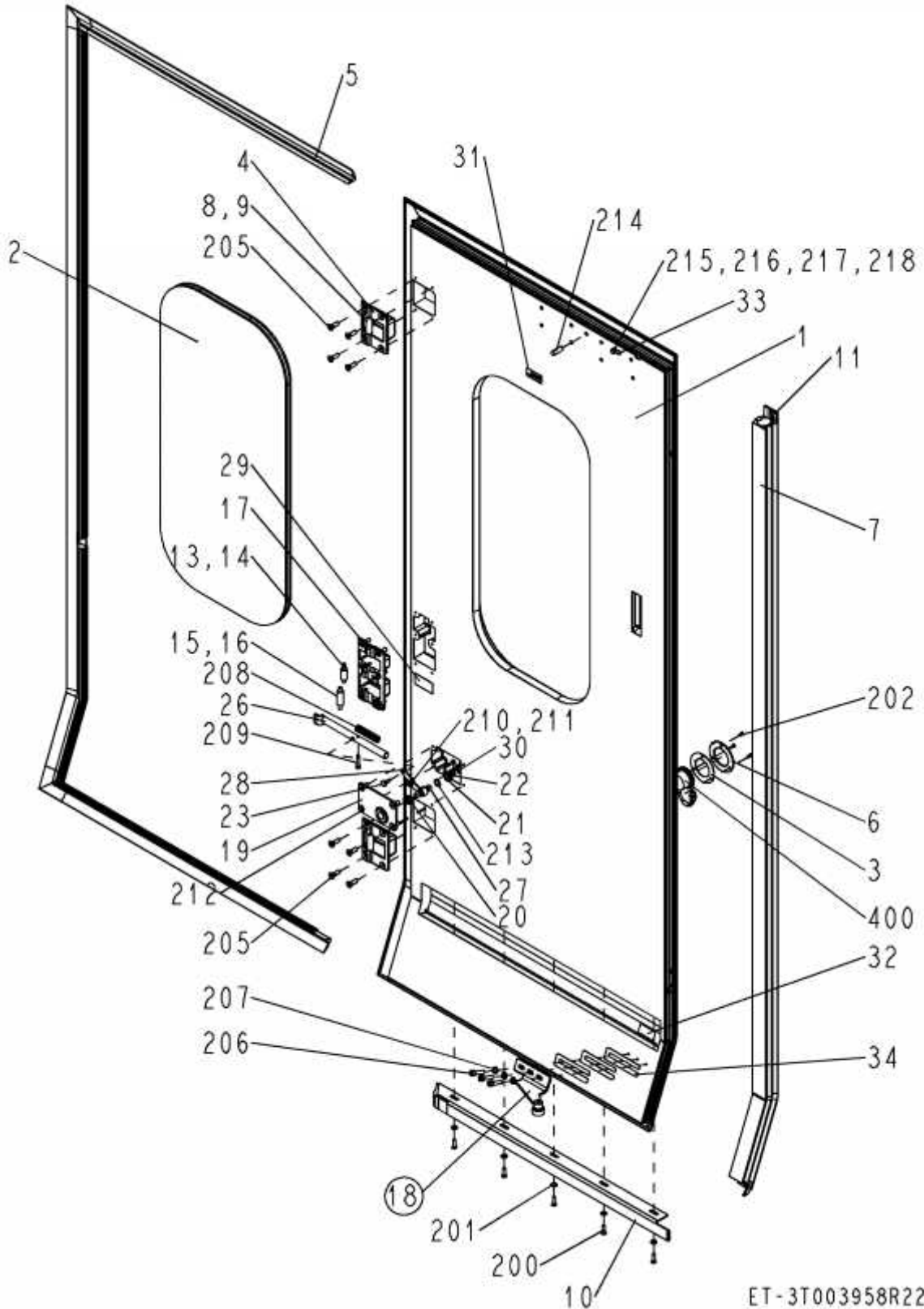
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
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2015.9.25

	66407G1AR14				SCOPE OF SUPPLY		
01	3TD08370R10		1	Pce	Drive	C	57
02	3T003958R22		1	Pce	Door Leaf Complete	C	95
03	3T103520R54		1	Pce	Main Lock	C	77
04	3T201883R22		1	Pce	Bolt Box	C	81
05	3TD90530R04		1	Pce	Rolling Arm	C	83
06	3TD90527R01		1	Pce	Plastic Panel	C	
07	3TD90515R30		1	Pce	Sealing Strip	B	
08	3T404165R26		2	Pce	Catch Hook	C	41
09	3KT202251R06		1	Pce	Arrester Block	C	
10	3KT408879R02		1	Pce	Eccentric	C	
11	477990		1	Pce	Countersunk Screw	C	
12	7B1401107		7	Pce	Machine Screw	C	
13	3TD81440R16		7	Pce	Washer	C	
14	3T304858R31		20	Pce	Shim	C	
15	3T304858R32		12	Pce	Shim	C	
16	3TD90423R10		6	Pce	Shim	C	
17	3TD90423R38		4	Pce	Shim	C	
18	3TD90423R39		2	Pce	Shim	C	
19	3TD90423R45		6	Pce	Shim	C	
20	3TD90423R46		4	Pce	Shim	C	

T32: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.9.25							
21	3TD90423R47		2	Pce	Shim	C	
22	3TD90516R102		5	Pce	Shim	C	
23	3TD90516R101		1	Pce	Shim	C	
24	3TD90423R09		3	Pce	Shim	C	
25	3TD90423R40		2	Pce	Shim	C	
26	3TD90423R41		1	Pce	Shim	C	
27	3TD90423R43		4	Pce	Shim	C	
28	3TD90423R44		2	Pce	Shim	C	
29	3TD90516R10		34	Pce	Shim	C	
30	3TD90524R19		1	Pce	Emergency Device	C	43
31	3TD90524R20		1	Pce	Emergency Device	C	49
32	3TD90537R37		2	Pce	Bowden Cable	B	
33	OSN400222P04		6	m	Pipe	C	
34	3ED90201R03_C01		1	Pce	Pneum.Control Unit	C	
35	3ED99061R33_C01		1	Pce	Button	B	
36	3ED99061R34_C01		1	Pce	Button	B	
37	3ED90002R75_C01		1	Pce	E-Loose Part	C	53

T33 Door Leaf



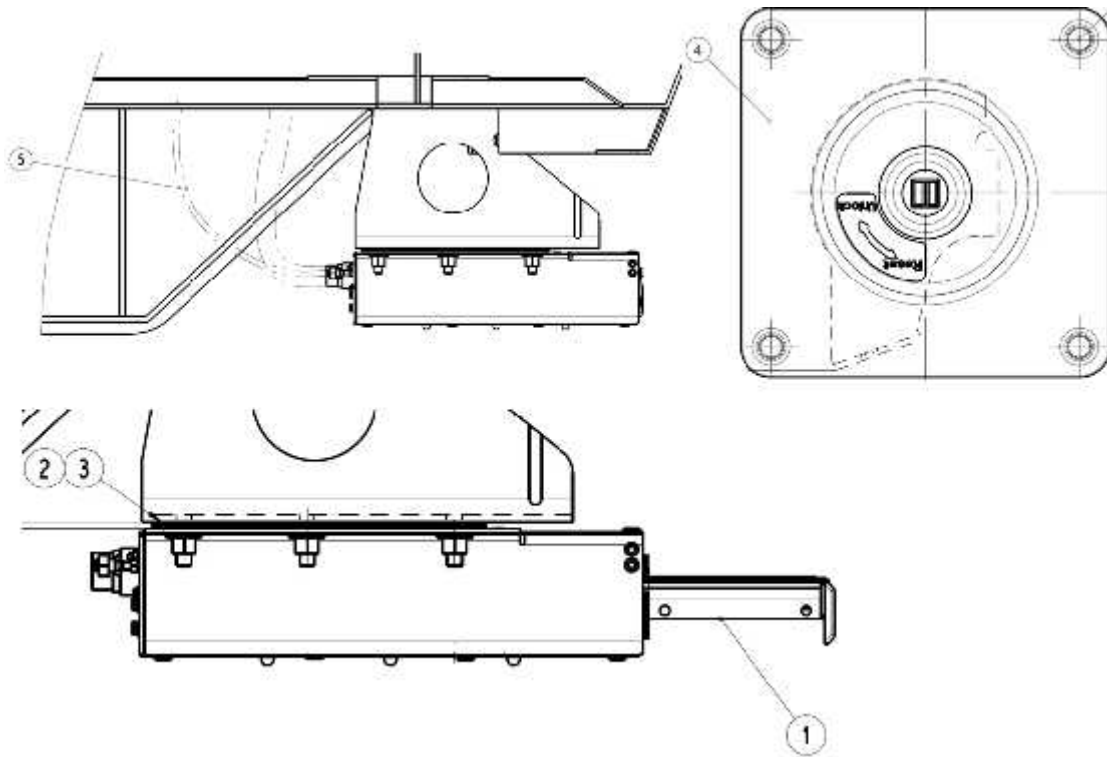
ET-3T003958R22

T33: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.12.2							
	3T003958R22				Door Leaf		
001	3TD04339R14		1	Pce	Raw Doorleaf Panel	C	
002	3TD04235R03		1	Pce	Window Pane	C	
003	3T400825R05		1	Pce	Sealing Disc	C	
004	3TD15671R03		2	Pce	Roller Bracket	C	
005	3TD15653R04		1	Pce	Sealing Frame	C	
006	3TD04549R05		1	Pce	Cover Ring	C	
007	3TD04333R12		1	Pce	Finger Prot Rubber	B	
008	3KT403095R05		2	Pce	Roller	B	
009	3T403668R10		2	Pce	Roller Pin	C	
010	3TD04356R05		1	Pce	Guide Rail	C	
011	3TD14379R08		2	Pce	Cellular Rubber	B	
-							
013	3KT403095R06		1	Pce	Roller	B	
014	3T403668R11		1	Pce	Roller Pin	C	
015	3KT403095R07		1	Pce	Roller	B	
016	3T403668R12		1	Pce	Roller Pin	C	
017	3TD08418R10		1	Pce	Roller Bracket	C	
018	3TD04373R42		1	Pce	Roller Bracket	C	30
019	3TD08417R10		1	Pce	Cover	C	

T33: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.12.2							
020	3JT402864R01		1	Pce	Bush	C	
021	3JT402864R02		1	Pce	Bush	C	
022	3JN400373P35		1	Pce	O-Ring	C	
023	3JT402779R01		1	Pce	Threaded Rod	C	
024	7UN400584P25		1	Pce	Bearing	C	
025	7UN400584P26		1	Pce	Bearing	C	
026	3T302108R40		1	Pce	Bolt	C	
027	3PT402866R12		1	Pce	Locking Pin	C	
028	3JT402782R02		1	Pce	Lever	C	
029	3KT411415R01		1	Pce	Sheet Metal	C	
030	3T409359R07		1	Pce	Collar	C	
031	7UN400999R05		1	Pce	Plate	C	
032	7UN401099R03		1	Pce	lfe Name Plate	C	
033	7UN401337R11		1	Pce	Label	C	
034	3TD90423R32		3	Pce	Shim	C	
-							
200	7A0601400		6	Pce	Hex-Head Bolt	C	
201	3KN460000R65		6	Pce	Lock Washer	C	
202	3ED00328R24		3	Pce	Countersunk Screw	C	
-							
205	478010		14	Pce	Countersunk Screw	C	

T33: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
2015.12.2							
206	7B1203300		3	Pce	Machine Screw	C	
207	467765		3	Pce	Washer	C	
208	3J0041630		1	Pce	Tension Spring	B	
209	3JT402810R01		1	Pce	Pin	C	
210	7L5201407		1	Pce	Hexagon Nut	C	
211	476443		1	Pce	Washer	C	
212	469533		4	Pce	Countersunk Screw	C	
213	7U9245200		2	Pce	Shim	C	
214	7Q7605660		1	Pce	Straight Pin	C	
215	7M5803309		1	Pce	Washer	C	
216	477965		1	Pce	Spring Washer	C	
217	7A0601457		1	Pce	Hex-Head Bolt	C	
218	475976		1	Pce	Spring Washer	C	
-							
400	3ED00615R01		1	Pce	Button	B	
401	3ED90051R26_C01		1	Pce	Wiring Harness	C	

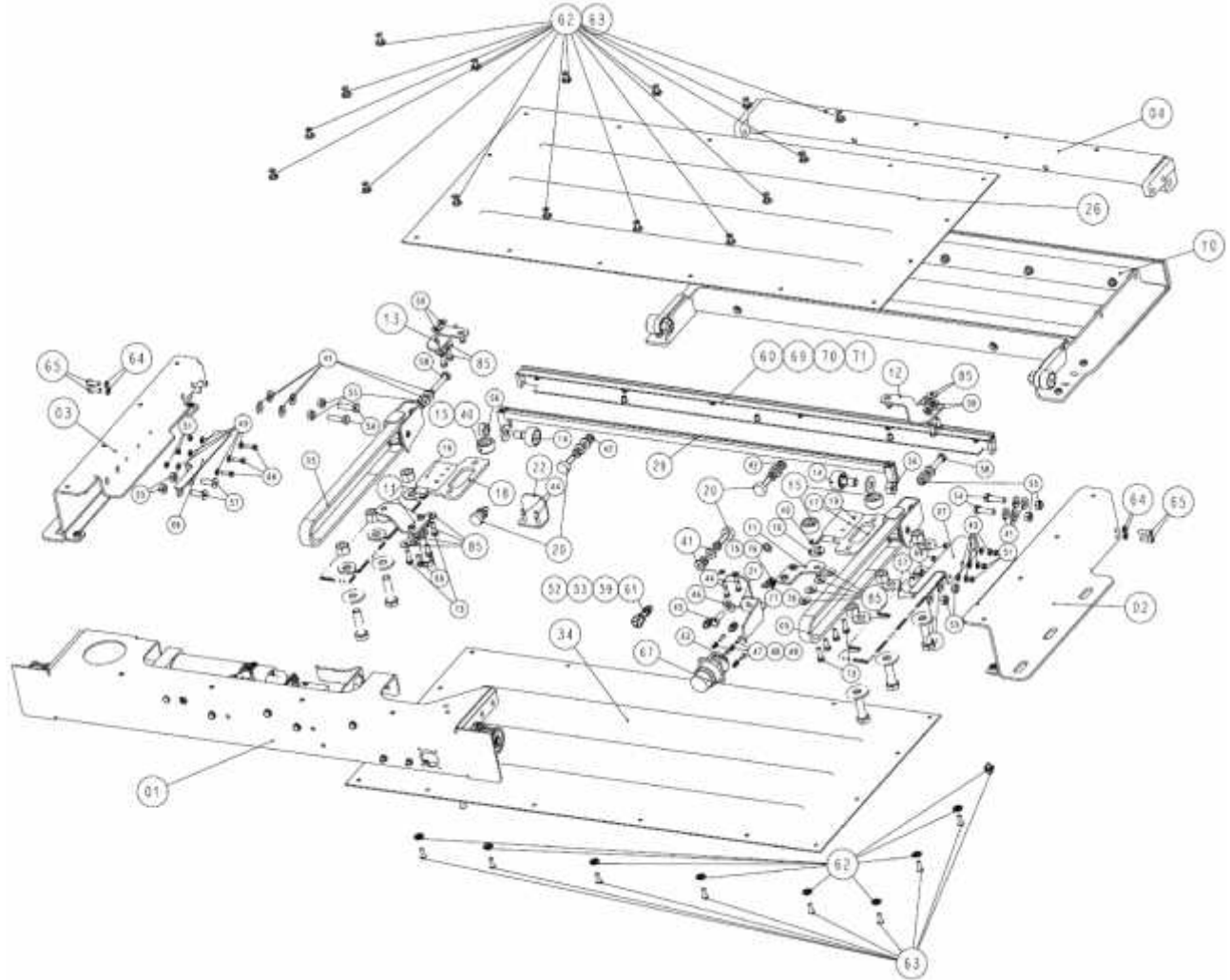
T34 Scope of Supply



T34: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page

	DDSTE11071E20				SCOPE OF SUPPLY		
1	3T003450R47_C01		1	Pce	ACCESS SUPPORT DEV		
2	3TD90423R96		2	Pce	SHIM		
3	3TD90423R97		2	Pce	SHIM		
4	3T203732R131		1	Pce	EMERGENCY DEVICE		
5	3TD90537R87		1	Pce	BOWDEN CABLE		

T35 Access Support Device



T35: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page

	3T003450R47_C01				Access Support Device		
001	3T102776R43_C01		1	Pce	Drive Unit	C	
002	3TD01749R75		1	Pce	Side Plate	C	
003	3TD01749R74		1	Pce	Side Plate	C	
004	3TD01694R67		1	Pce	Crossmember	C	
005	3T102777R47		2	Pce	Belt Unit	B	
006	3TD01205R03		1	kg	Guide Rail	C	

T35: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page

007	3TD01205R04		1	kg	Guide Rail	C	
-							
010	3TD01822R65		1	Pce	Foot Step	C	
011	3TD01996R11		2	Pce	Adjusting Bracket	C	
012	3TD01996R12		1	Pce	Adjusting Bracket	C	
013	3TD01996R13		1	Pce	Adjusting Bracket	C	
014	3T410657R07		2	Pce	Roller	B	
015	3ET401232R01		4	Pce	Roller	B	
016	0VN401666R03		4	Pce	Protective Plug	C	
017	3TD01904R03		1	Pce	Tie Arm	C	
018	3TD01904R04		1	Pce	Tie Arm	C	
019	3T410616R03		2	Pce	Clamping Plate	C	
020	3DN400826R13		4	Pce	Rubber Buffer	B	
021	3TD03280R02		1	Pce	Switch Ang. Brack.	B	
022	3TD03280R04		1	Pce	Angle	C	
-							
026	3TD01987R79		1	Pce	Cover	C	
-							
029	3HT490410R01		0.8	m	Rubber Profile	B	
-							
033	3ED90041R21_C01		1	Pce	Cabling	C	
034	3TD01987R78		1	Pce	Cover	C	
-							
040	7S8300400		4	Pce	Retaining Ring	C	
041	7M6108860		24	Pce	Spring Washer	C	
042	477913		7	Pce	Hexagon Nut	C	
043	7M6108830		20	Pce	Spring Washer	C	
044	7A0600710		4	Pce	Hex-Head Bolt	C	
045	7A0602460		1	Pce	Hex-Head Bolt	C	
046	467765		1	Pce	Washer	C	
047	476463		4	Pce	Machine Screw	C	
048	474766		4	Pce	Spring Washer	C	
049	7L5200750		4	Pce	Hexagon Nut	C	
050	7M6108840		12	Pce	Spring Washer	C	
051	7L5201200		8	Pce	Hexagon Nut	C	
052	7M5803300		2	Pce	Washer	C	
053	7L5201300		2	Pce	Hexagon Nut	C	
054	7A0602620		4	Pce	Hex-Head Bolt	C	

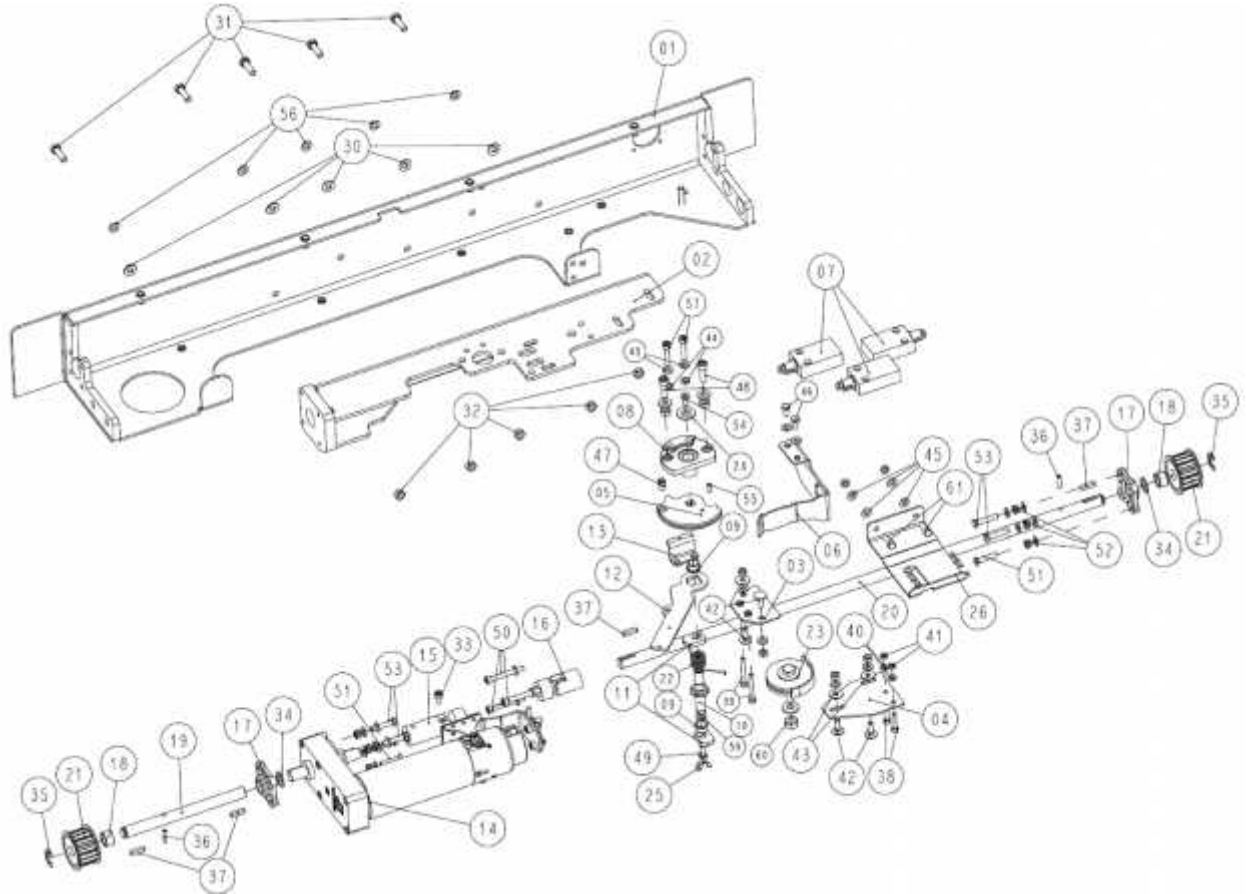
T35: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
055	7L5201700		10	Pce	Hexagon Nut	C	
056	476200		2	Pce	Hexagon Nut	C	
057	474208		4	Pce	Countersunk Screw	C	
058	7A0602860		2	Pce	Hex-Head Bolt	C	
059	3T402795R09		1	Pce	End Fastening	C	
060	477179		6	Pce	Countersunk Screw	C	
061	7L5202110		1	Pce	Hexagon Nut	C	
062	7MN400628P06		31	Pce	Washer	C	
063	477305		31	Pce	Countersunk Screw	C	
064	475966		4	Pce	Washer	C	
065	7B1202200		4	Pce	Machine Screw	C	
066	7A0601457		8	Pce	Hex-Head Bolt	C	
067	3ED01070R16		1	Pce	(Rundstecker Schwer)	C	
-							
069	469642		2	Pce	Spring Washer	C	
070	3TD01749R76		1	Pce	Front Plate	C	
071	7A0600600		8	Pce	Hex-Head Bolt	C	
-							
073	7A0601607		4	Pce	Hex-Head Bolt	C	
-							
075	477965		1	Pce	Spring Washer	C	
076	476443		1	Pce	Washer	C	
077	475976		1	Pce	Spring Washer	C	
078	7L5201407		1	Pce	Hexagon Nut	C	
-							
080	8EN401218R03		15	Pce	Cable Tie	C	
081	7UN401337R01		3	Pce	Adhesive Label	C	
082	7UN402019R01		6	Pce	Adhesive Label	C	
-							
085	7M6301020		12	Pce	Washer	C	
-							
090	0UN300160R20		0.001	kg	(Molykote 1000)	C	
091	0VN401289R47		0.001	Pce	Loctite 243	C	
092	0UN300160R08		0.001	kg	Bearing Grease Iso	C	
093	0UN401080P02		0.001	Pce	(Sikaflex 252)	C	
094	0VN401517R01		0.001	kg	Grease	C	
095	0VN401670R01		0.001	Pce	(Optimol Paste)	C	
-							

T35: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page

100	3N401989R04		0.001	Pce	Anticorrosive	C	
101	3N401989R08		0.001	Pce	(Rustoff (Dinitrol))	C	
102	3N401989R06	0.001	Pce	(Dinitrol 77B)	C		

T36 Drive Unit



T36: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page

	3T102776R43_C01				Drive Unit		
01	3TD01694R65		1	Pce	Cross Member Back	C	
02	3T203767R29		1	Pce	Motor Bracket	C	
03	3T402275R112		1	Pce	Ls-Holder	C	
04	3T402283R53		1	Pce	Limit Switch Metal	B	
05	3T203732R129		1	Pce	Emergency Device	C	
06	3TD04064R04		1	Pce	Supporting Plate C	C	
07	3ED00170R01		3	Pce	Limit Switch	B	
08	3TD01031R11		1	Pce	Bearing Bracket	C	
09	3N300521R11		2	Pce	Plain Bearing	C	
10	3TD01030R46		1	Pce	(Dreikant)	C	

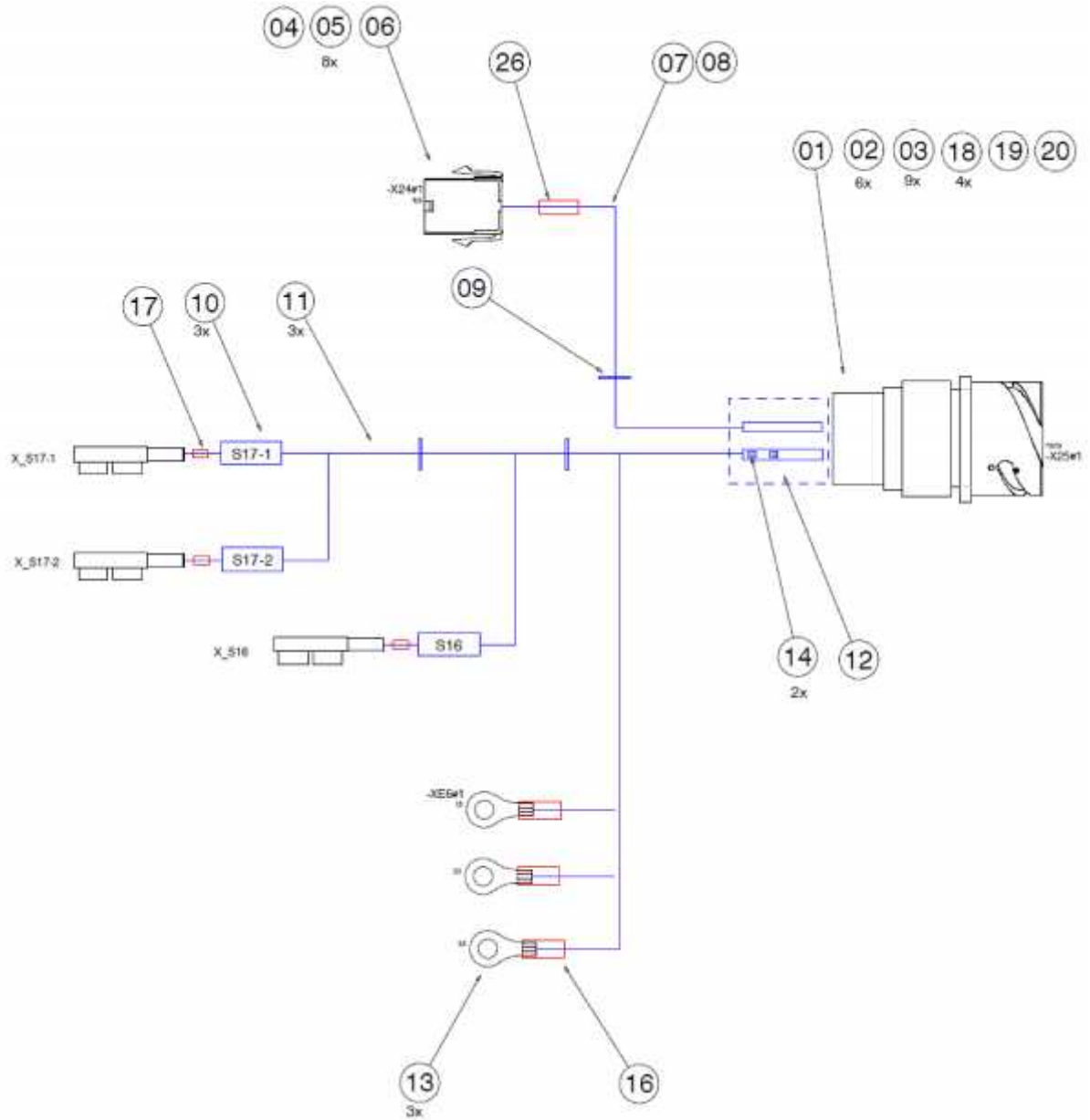
T36: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page

11	3T410512R11		1	Pce	Eccentric	C	
12	3T307312R11		1	Pce	Lever	C	
13	3TD03280R36		1	Pce	Switch Ang. Brack.	B	
14	3ED01379R22		1	Pce	(Mortor Assembly)	C	
15	3T410802R03		1	Pce	Cardan Joint	C	
16	3KT410802R01		1	Pce	Cardan Joint	C	
17	3TD01614R05		2	Pce	Flange Bearing	C	
18	3T410621R07		2	Pce	(Distanzstück)	C	
19	3T410506R17		1	Pce	Shaft	C	
20	3T410507R15		1	Pce	Shaft	C	
21	3TT411500R01		2	Pce	Toothed Belt Disc	B	
22	3N401025R14		1	Pce	Torsion Spring	B	
23	3TD90345R03		1	Pce	Deflection Pulley	C	
24	3TD18936R01		1	Pce	Shim	C	
25	7N6850150		1	Pce	Lock Washer	C	
26	3TD01205R40		1	Pce	Guide Rail	C	
-							
30	7M6108840		8	Pce	Spring Washer	C	
31	7A0601500		6	Pce	Hex-Head Bolt	C	
32	7L5201300		8	Pce	Hexagon Nut	C	
33	7B1201000		1	Pce	Machine Screw	C	
34	7U9244910		2	Pce	Shim	C	
35	7N6850300		2	Pce	Lock Washer	C	
36	7Q8001550		2	Pce	Clamping Pin	C	
37	7U9200140		4	Pce	Feather Key	C	
38	7B1200361		2	Pce	Machine Screw	C	
39	7B1200600		2	Pce	Machine Screw	C	
40	7M6108821		2	Pce	Spring Washer	C	
41	7L5200900		2	Pce	Hexagon Nut	C	
42	470059		4	Pce	Coach Bolt	C	
43	7M6301010		4	Pce	Washer	C	
44	7L5201200		8	Pce	Hexagon Nut	C	
45	7M6108830		31	Pce	Spring Washer	C	
46	7A0600450		2	Pce	Hex-Head Bolt	C	
47	3T405759R05		1	Pce	Wire Rope Grip	C	
48	7B1202320		2	Pce	Machine Screw	C	
49	7A0600510		1	Pce	Hex-Head Bolt	C	
50	7B1201700		4	Pce	Machine Screw	C	

T36: Ordering information:

Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page
51	477978		2	Pce	Countersunk Screw	C	
52	7L5400700		8	Pce	Hexagon Nut	C	
53	7A0600730		6	Pce	Hex-Head Bolt	C	
54	475096		1	Pce	Countersunk Screw	C	
55	456788		1	Pce	Clamping Pin	C	
56	7M5803300		6	Pce	Washer	C	
57	7B1201430		2	Pce	Machine Screw	C	
58	7B1201400		2	Pce	Machine Screw	C	
59	7M6108857		1	Pce	Spring Washer	C	
60	475948		1	Pce	Hexagon Nut	C	
61	468101		2	Pce	Hex-Head Bolt	C	
-							
90	0VN401289R47		0.001	Pce	Loctite 243	C	
91	0VN401670R01		0.001	Pce	(Optimol Paste)	C	
92	3N401989R06		0.001	Pce	(Dinitrol 77B)	C	

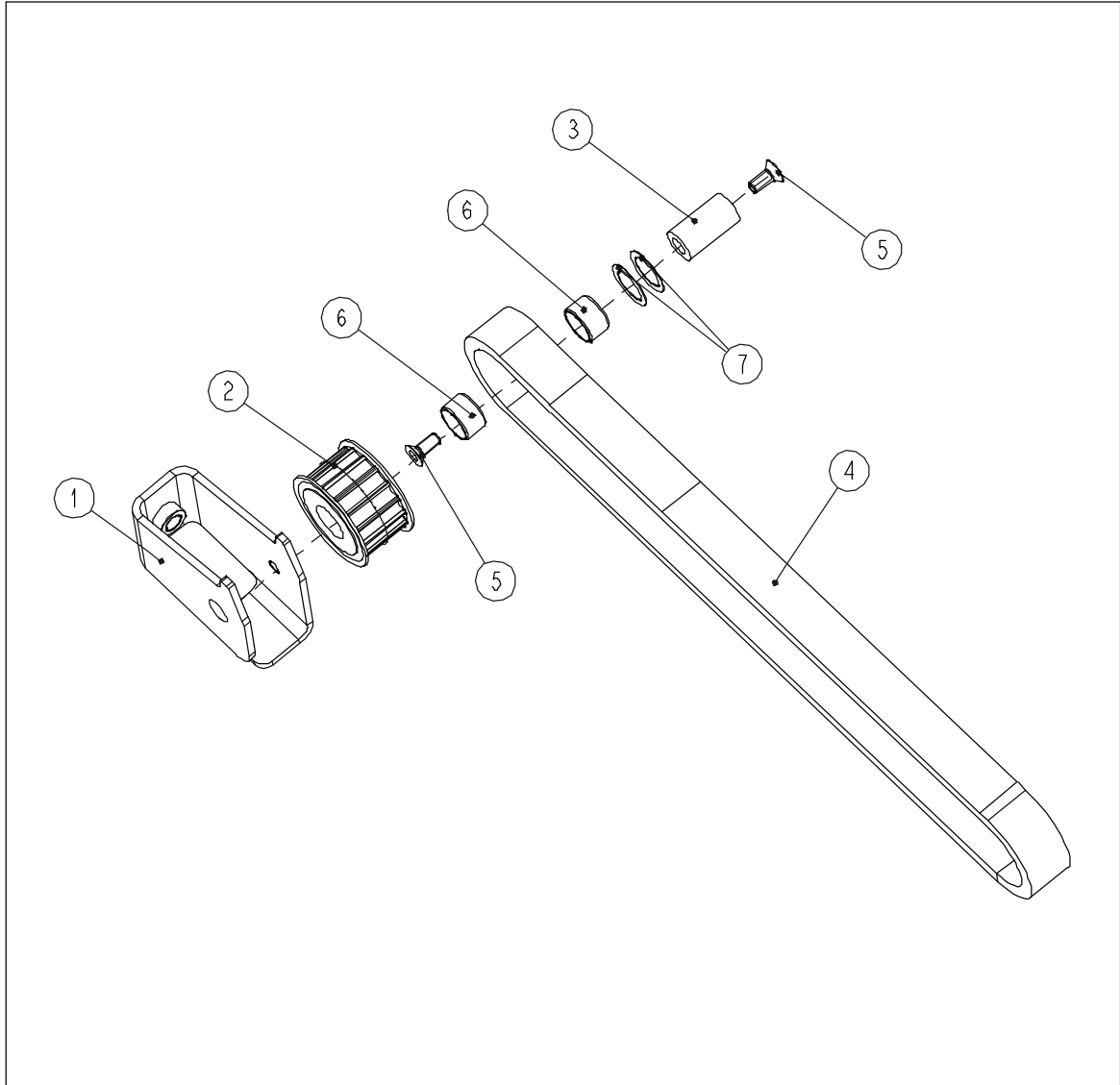
T37 Cabling



T37: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page

	3ED90041R21_C01				Cabling		
01	3ED01070R16		1	Pce	(Rundstecker Schwer)	C	
02	3ED01070R57		6	Pce	Round Connector He	C	
03	3ED01070R58		9	Pce	Round Connector He	C	
04	8FN300395R04		1	Pce	Plug	C	
05	8FN401941R06		8	Pce	Socket Contact	C	
06	8FN300395R14		1	Pce	Wedge	C	
07	3ED99001R83_C01		3	m	Lead	C	
08	3ED99001R84_C01		1.5	m	Lead	C	
09	8EN401218R03		6	Pce	Cable Tie	C	
10	7UN300409R97		3	Pce	Identification Sle	C	
11	3ED00170R53		3	Pce	Connection Line	C	
12	8D1001750		0.9	m	Tube	C	
13	8E1202100		3	Pce	Ring Cable Termina	C	
14	3ED00061R03		2	Pce	Butt Joint	C	
-							
16	3ED00034R82		0.1	m	Shrinkable Tubing	C	
17	8DN300235R02		0.3	m	Shrinkable Tubing	C	
18	3ED01070R60		4	Pce	(Rundstecker Schwer)	C	
19	3ED00722R03		1	Pce	Strain Rel.	C	
20	3ED00722R13		1	Pce	Cable Grommet	C	
-							
26	8DN300235R08		0.15	m	Shrinkable Tubing	C	

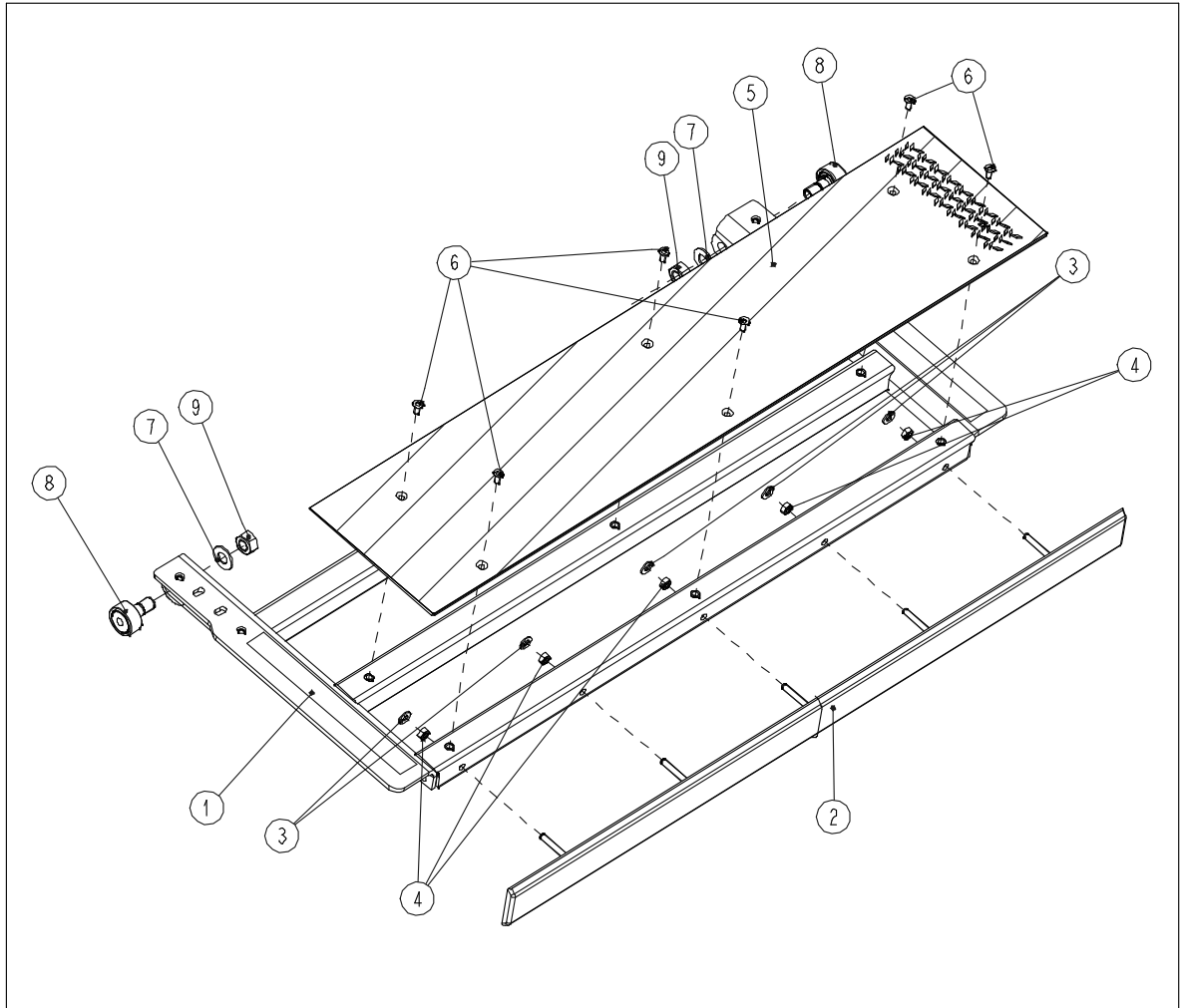
T38 Belt Drive Unit



T38: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page

	3T102777R47				Belt Drive Unit		
01	3TD01265R24		1	Pce	Clamping Fixture	C	
02	3TT411500R02		1	Pce	Toothed Belt Disc	B	
03	3PT410618R02		1	Pce	Bearing Pin	C	
04	3T411514R23		1	Pce	Toothed Belt	B	
05	475096		2	Pce	Countersunk Screw	C	
06	7UN300103P10		2	Pce	Bearing	C	
07	7U9245400		2	Pce	Shim	C	
-							
10	0VN401289R47		0.001	Pce	Loctite 243	C	
11	0V5605200		0.001	Pce	Loctite 2701	C	

T39 Foot Step Assembly



T38: Ordering information:							
Pos.	Item number	Cust. Number	Quantity	Unit	Name	WEC	Page

	3TD01822R65				Foot Step Assembly		
01	3TD01156R53		1	Pce	Foot Step	C	
02	3TD01624R98		1	Pce	Rubber Buffer	B	
03	7M6108847		5	Pce	Spring Washer	C	
04	7L5201407		5	Pce	Hexagon Nut	C	
05	3TD01190R68		1	Pce	Step	C	
06	475096		6	Pce	Countersunk Screw	C	
07	469642		2	Pce	Spring Washer	C	
08	3T410657R07		2	Pce	Roller	B	
09	476200		2	Pce	Hexagon Nut	C	
-							
20	0VN401289R47		0.001	Pce	Loctite 243	C	
21	0VN401670R01		0.001	Pce	(Optimol Paste)	C	

DDSTE11071E36

Rev. 00 - en

Instruction Manual

Safety Checklist

TRAIN 18 ICF EMU

Project-No. 66408U1A

Customer INDIAN RAILWAY

Project-Part Single Leaf-Plug Sliding Door

System SST-e1

Created: 2018.05.04
Date

Checked: _____
Date

Kumar, Rajneesh
Name

Name

TAO-
R/DOOERA
Department Signature

Department Signature

Released: _____
Date

Translated: _____
Date

Name

Name

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Revision History

Version	Date	Creator	Inspector
00	2018.05.04	Kumar, Rajneesh	

Section	Revision
All	First edition.

The original document was issued in English language.



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1 Required Documents

Doc. No.	Title
66408U1AR11	SoS Entrance Door
66408U1AR11	Assembly Drawing PD
66408U1AR21	SoS Access Support Device
T003450R47_C01	Assembly Drawing ASD
ED91041R02_C01	Wiring Diagram

2 Introduction

2.1 General Instruction

- This manual is used for checking the safety functions of the IFE door system.
- This safety checklist is relating ones to the assembly and adjustment instruction DDSTE11071E04, set-up instruction DDSTE11071E07 and to maintenance plan DDSTE11071E09.
- In order to make a correct checking, it is required to connect the door system with correct electric supply 110 VDC ^{+25/-30%}
- This safety checklist is made for checking the safety functions according to the maintenance and overhaul plan DDSTE11071E09.



NOTE

It is mandatory to keep filled-up Adjustment Checklists in evidence. Each Adjustment Checklist per car must be sent to IFE if requested!

2.2 Safety Instruction



DANGER

Danger of squeezing

⇒ during adjustment work on components never perform such adjustment when door leaves move

Safety - Checklist for Single leaf sliding plug door SST – E1

Train 18

Coach-No. _____

Checked by: _____

Date: _____

Time: _____



3 Mechanical Part

3.1 Check the correct fitting of the clips on the lock housing mechanism

(See Drawing 3-1 – clips at roller swing arm/ limit switch)

Roller swing arm; limit switch at lock housing mechanism

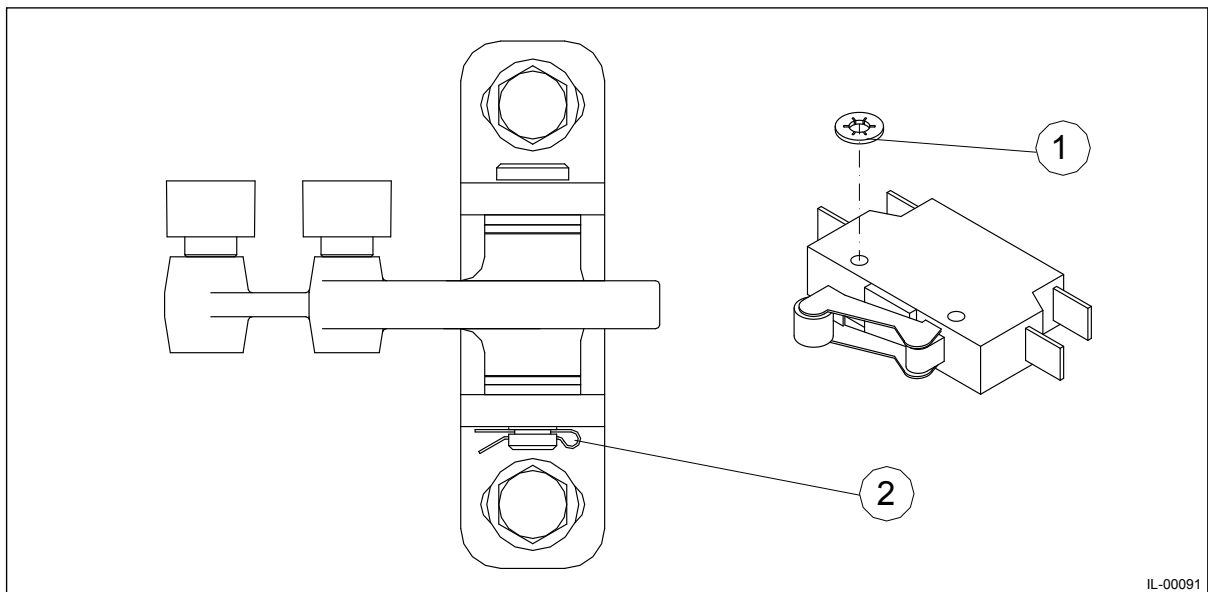
Car no -

Door No. -

Checked and Correct

01	02	03	04
Yes	Yes	Yes	Yes
No	No	No	No

Drawing 3-1 – clips at roller swing arm/ limit switch



Pos.	Designation
1	SI-clips / SI
2	SL-clips / SL

3.2 Check the fastening screws

- Check screws of assembly parts to find out if they are loose. (Check witness painting, if broken). In case they are loose, screws have to be removed, cleaned, applied with LOCTITE 243 and secured again with required torque according assembly and adjustment instruction DDSTE10788E04.

Car no -

Door No. -

Checked and Correct

01	02	03	04
Yes	Yes	Yes	Yes
No	No	No	No

3.3 Check the function of the emergency egress device

When operating the emergency device, the release lever in the lock housing mechanism will be activated (see Drawing 3-2 – main catch position of catch lever).

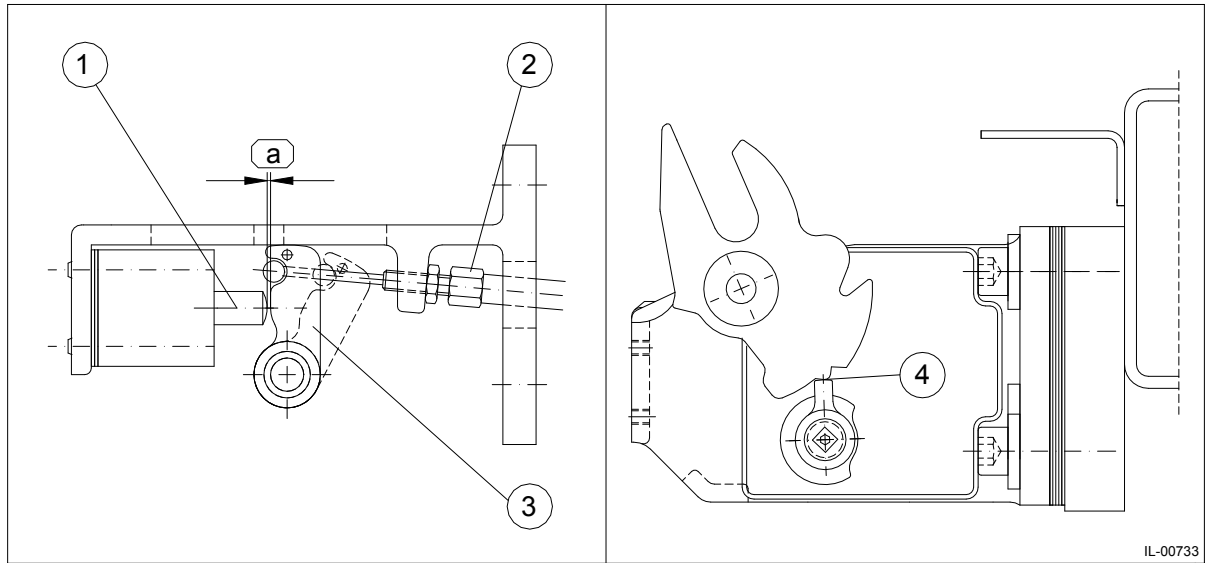
Car no -

Door No. -

Checked and Correct

01	02	03	04
Yes	Yes	Yes	Yes
No	No	No	No

Drawing 3-2 – main catch position of catch lever



Pos.	Designation
1	Cylinder piston
2	Tail piece
3	Release lever
4	Main catch position
a	1-2 mm

3.4 Check function of emergency Access device

- When operating the emergency device, the release lever in the lock housing mechanism will be activated (see Drawing 3-3 – main catch position of catch lever).

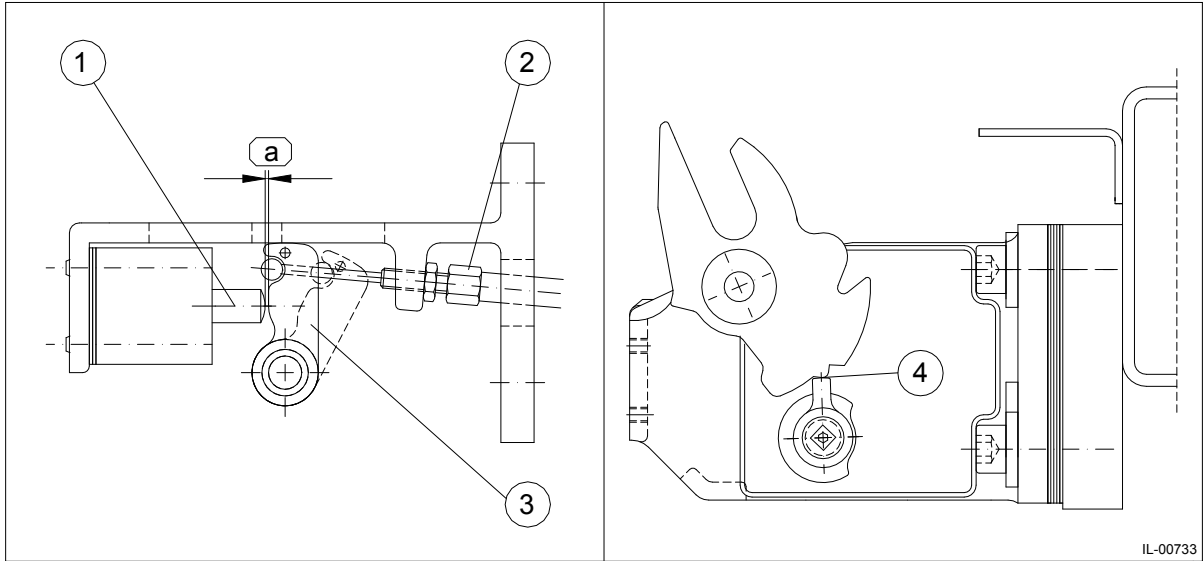
Car no -

Door No. -

Checked and Correct

01	02	03	04
Yes	Yes	Yes	Yes
No	No	No	No

Drawing 3-3 – main catch position of catch lever



IL-00733

Pos.	Designation
1	Cylinder piston
2	Tail piece
3	Release lever
4	Main catch position
a	1-2 mm

3.5 Check the function – taken door out of service

- In door closed and locked position, by using a square key the door can be taken out of service at the isolating lock mechanism. If the door is out of service, the limit switch “door out of service” is operated.

Car no -

Door No. -

Checked and Correct

01	02	03	04
Yes	Yes	Yes	Yes
No	No	No	No

4 Electrical Part

4.1 Obstruction detection

Check with test object 30 x 60 mm / 30 x 60 mm

- Close the door and hold a test object 30 x 60 mm between the portal and door rubbers during the closing movement. Door must re-open.
- If the test object will be held between the rubbers, a door closed signal must not be present.

Car no -

Door No. -

Checked and Correct

01	02	03	04
Yes	Yes	Yes	Yes
No	No	No	No

5 Pneumatic Part

5.1 Check the pressure supply switch S15

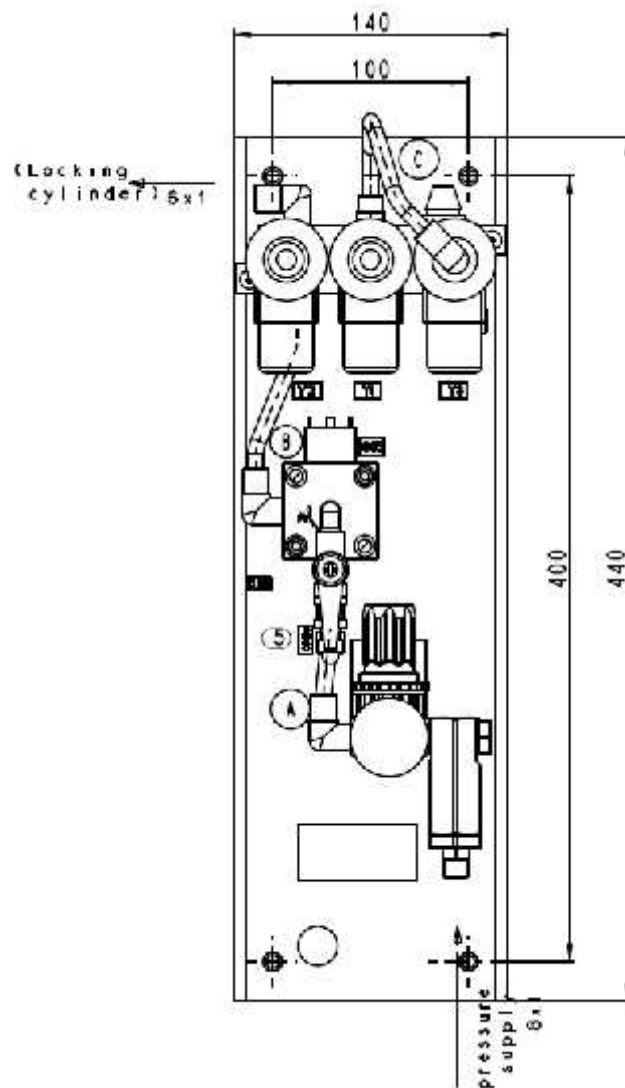
Car no -

Door No. -

Checked and Correct

01	02	03	04
Yes	Yes	Yes	Yes
No	No	No	No

Drawing 5-1 – pneumatic control board



6 Issue Remark

Issue	Date	Prepared	checked/released
00	2018.05.04	Kumar, Rajneesh	Lynette Li



Maintenance Manual

Vacuum Toilet System

Squatting System India

Part-No. 85516

Rev.: 01 – 2018-08

1. SAFETY ADVICE

Read this manual carefully!
Keep this manual for future reference!
The vacuum toilet assembly is designed to transport human waste from the toilet bowl to a waste tank or sewage pipe!



DANGER

**Risk of electric shock on control board!
Shut down the power supply!**



WARNING

**Risk of fecal infection!
Refer to Safety at Work!**

Safety at work

During work on toilets and sanitary systems note the national employment protection provisions (in Germany Biostoffverordnung, BGR 145)!

Wear protective clothing, do not eat, drink or smoke!

Immediately change and disinfect contaminated clothing!

Thoroughly clean yourself with soap and water after working in a sewage handling area or coming in contact with sewage handling equipment. This precaution is an absolute requirement before eating, drinking, smoking or performing any hand-to-mouth functions!

Skin abrasions, punctures or any other wounds require immediate and appropriate medical attention!

After coming in contact with sewage, do not handle potable water hoses or work on potable water systems until thoroughly washed!

Sewage spills are to be cleaned up immediately, before they dry. Rinse the contaminated area with water and non-scented disinfectant!

Maintenance work

Only trained personnel knowing the contents of this manual may perform maintenance work on this toilet assembly!

Never clean or operate this vacuum toilet assembly with aggressive acids or cleaning agents which contain chlorine!

Avoid injury: Make sure that exit valves are not operated manually at the same time during maintenance work!

Repair work

Disconnect system from all supplies!

Components which are part of the safety or control system (i.e. pressure switch, safety valve) should not be repaired - this may lead to serious malfunction - they must be replaced with new components!

Breakdown

Disconnect system - main switch OFF - in case of excessive heat or fire!

Switch off and lock toilet system!

Danger of frost

Empty fresh and waste water tank!

Fresh water tank refilling

Do not refill in case of frost or frost danger!

Pipes must not be blocked or frozen!

Waste water tank emptying

Empty in case of frost or frost danger!

Empty if tank is full!

NOTICE

Unexpected escape of fluids from the system!

Property damage to the rail car:

- ▶ The rail car manufacturer has to take appropriate measures to prevent possible damage due to escaping fluids.
- ▶ Rubber elbows and elastic adapters have to be secured against sliding off in axial direction. The piping is subjected to severe pressure surges during evacuation of the intermediate tank.
- ▶ Compressed air, exhaust air, fresh and waste water piping has to be laid with an even slope!
- ▶ Bends and curves in the piping have to be avoided, accumulated water or fecal matter could block and damage piping during frost!

2. PUBLISHING INFORMATION

2.1 Producer and Publisher

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GERMANY

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Fax: +49 4103 9168 90
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www.evac-train.com

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Only staff trained by Evac service is permitted to perform any kind of maintenance on the Evac vacuum toilet system.

We recommend to have Evac service perform any kind of maintenance work.

2.2 Record of Revisions

Issue	Description	Date	Pages
01	First issue	03-08-2018	All

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3.3 List of Abbreviations

Abbreviation	Denotation
HT	Squatting Toilet
RS-Box	Backflush Unit
STC	Standard Toilet Controller
FD	Freeze Drain
FWT	Fresh Water Tank
WWT	Waste Water Tank

Table 1: List of abbreviations

4. GENERAL SAFETY ADVICE

4.1 About this Manual

Please keep this manual for future reference.

Please read the instructions in this manual carefully before installing and operating this assembly.

Safety precautions should always be made according to the general safety advice in this manual, chapter General safety advice.

All personnel working on this assembly should be adequately vaccinated to minimize risk of infection.

4.2 Safety Symbols – User Guide

The following signifies property damage:

NOTICE

The following signifies severe property damage:

CAUTION

The following signifies minor injuries:

▲ CAUTION

The following signifies possible serious injury or death:

▲ WARNING

The following signifies serious injury or death:

▲ DANGER

The following signifies important information:

 **Important information**

The following signifies extra information:

 **Extra information**

5. INTRODUCTION

5.1 Intended Use

NOTICE

Vacuum toilet assembly is designed to transport human waste from the toilet bowl to a waste tank or sewage pipe!

Any other use of the toilet system does not comply with the intended design.

Resulting damage is the sole responsibility of the operator.

5.2 Transport and Storage Information

EVAC components shall transported be in accordance with the GGVSEB (Gefahrgutverordnung Straße, Eisenbahn und Binnenschifffahrt) ordinance on the national and international carriage of dangerous goods by road, rail, and inland waterways or an equivalent guideline consistent with local regulations.

6. SYSTEM DIAGRAM

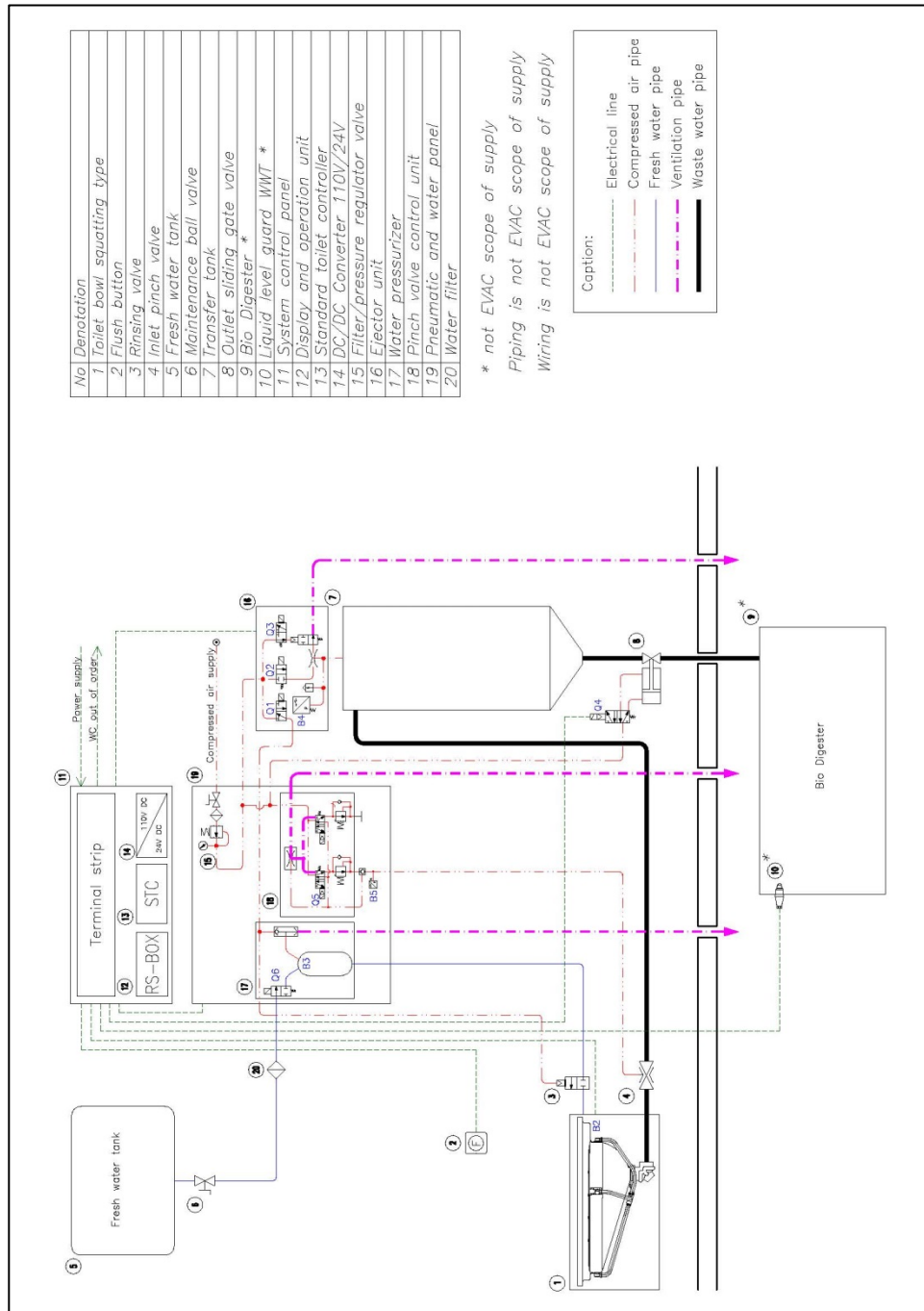


Figure 1: System Diagram – Squatting System (for reference only)

7. SCOPE OF SUPPLY

Pos.	Description	Quantity
01	Squatting Toilet	1
02	Base Unit	1
03	Water System Panel	1
04	Pneumatic Panel	1
05	Control Board	1
06	Connection Set	1
07	Cable Set	1

Table 2: Scope of Supply – Squatting System

7.1 Required Tools

Evac recommended for professional maintenance and repair the use of commercial tools like screwdrivers, torque spanner etc.

7.1.1 List of Special Tools

Evac propose the use of the following special tools for maintenance or repair:

- 10531 Service terminal HT-793-English HT793E

or

- 69833 Service terminal PC version
- 23474 Tool for pan head screw
- 79017 Cleaning tool for EVAC flush nozzles

7.2 List of Consumables

- Metallic threads locked with article no: 11161 Thread locking AN302-43.
- Metal threads with non-metallic threads locked with article no: 17271 Thread seal Loctite 5331.
- Non-metallic threads locked with article no: 17271 Thread seal Loctite 5331.
- Metallic and non-metallic threads that may undergo small readjustments before use locked with article no: 39399 Thread sealing tape - Loctite 55
- For WC-seat greasing article no: 21446 Grease - Aerosol 400ml

7.3 Approved Cleaner



Do not use cleaner which contains chlorine, particles or other abrasives! Follow the instructions of the manufacturer data sheet!

- Neutral cleaning agent and warm water
- Cleaner approved for rolling stock with following composition:
 - Citric acid <15% weight/volume
 - Amidosulfuric acid <15% weight/volume
 - Phosphoric acid < 5% weight/volume

Example:

- Into-Top from Henkel
- Neporin from Saniclean
- Retirol from Deutsche Hahnerol

Before using a differed cleaner please contact Evac.

7.4 Approved Disinfectant



Follow the instructions of the manufacturer data sheet!

The following disinfectants show no incompatibility to the materials up to the specific concentration limit stated below:

- Hydrogen peroxide 5% ready to use solution
- Chlorine dioxide 5% ready to use solution

Example:

- Herlisil (hydrogen peroxide, commercially available concentration 50%) from Herlisil GmbH
- Duozone (chloroxide, commercially available concentration (finished product) 0.3%)

Before using a differed disinfectant please contact Evac.

7.5 Approved Decalcifier



Follow the instructions of the manufacturer data sheet!

- Decalcifier approved for rolling stock with following composition:
 - Citric acid <4% weight/volume

8. INTERFACE – SQUATTING TOILET



Only qualified personnel is permitted to carry out the installation!



*For additional information:
Appendix Manuals - Squatting System India
EVAC-TRAIN_General-integration-guideline_Rev1*

NOTICE

Unexpected escape of fluids from the system.

Potential risk of damage to the rail car:

- ▶ The rail car manufacturer has to take appropriate measures to prevent possible damage due to escaping fluids.
- ▶ Rubber elbows and elastic adapters have to be secured against sliding off in axial direction. The piping is subjected to severe pressure surges during evacuation of the intermediate tank.
- ▶ Compressed air, exhaust air, fresh and waste water piping has to be laid with an even slope!
- ▶ Bends and curves in the piping have to be avoided, accumulated water or fecal matter could block and damage piping during frost!

8.1 Fixing Points

The vacuum toilet is installed to the frame with two screws to the frame or shroud):

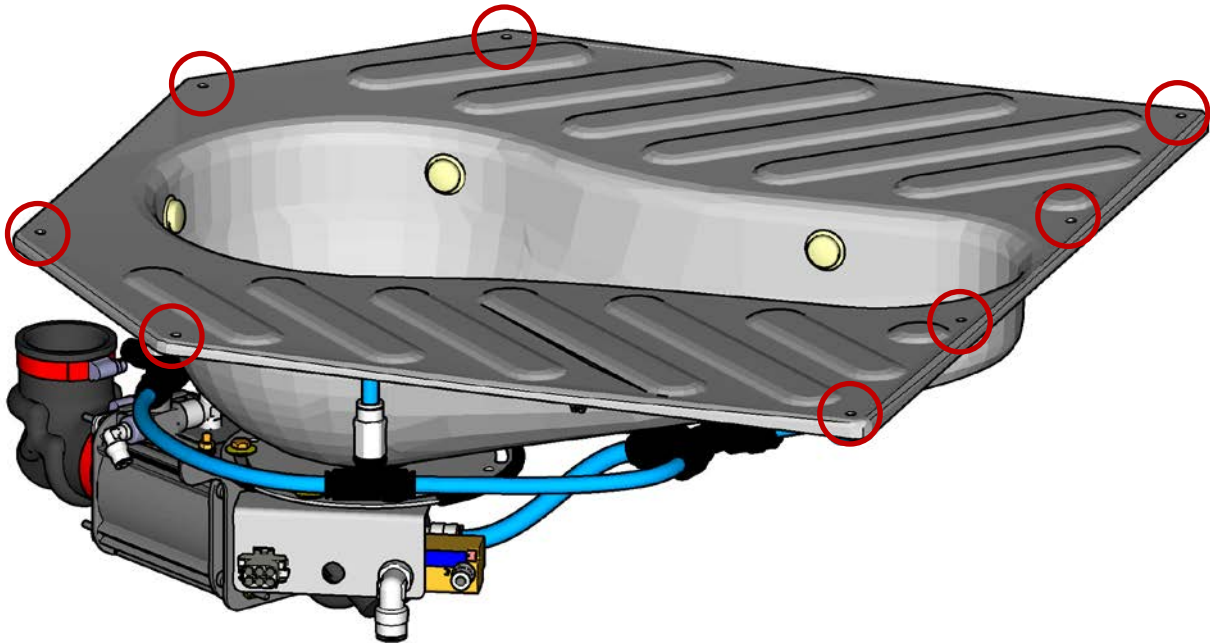
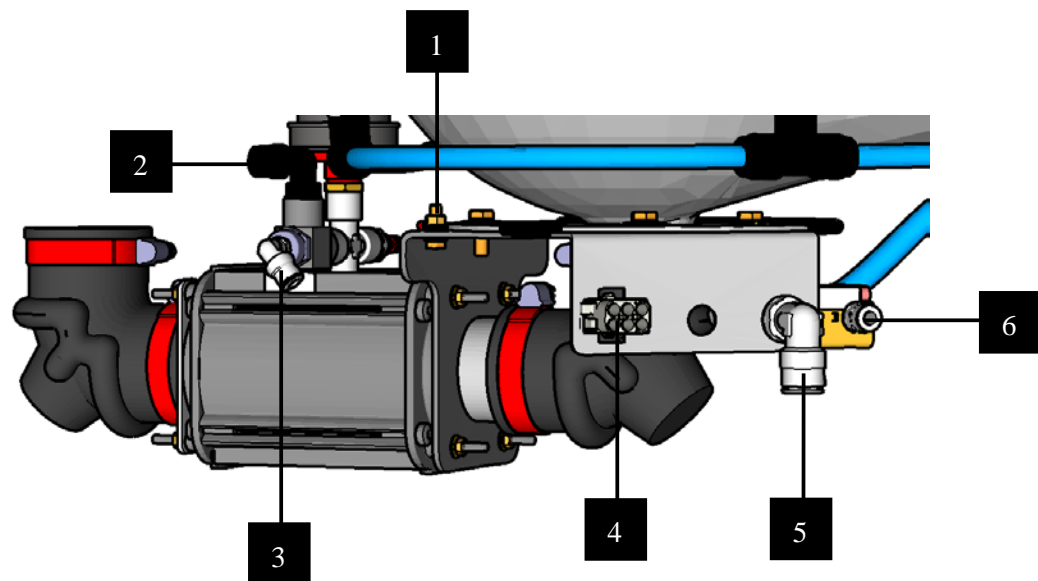


Figure 2: Fixing points – Squatting toilet (for reference only)

8.2 Interfaces – Cabling, Water and Compressed Air



1	Grounding Connection M5	2	Pinch Valve to Ejector Ø 8 mm
3	Pressure Switch to Ejector Ø 6 mm	4	Mini Mate-N-Lok, 4 pol
5	Water Inlet Ø 12 mm	6	Compressed Air Inlet Ø 6 mm

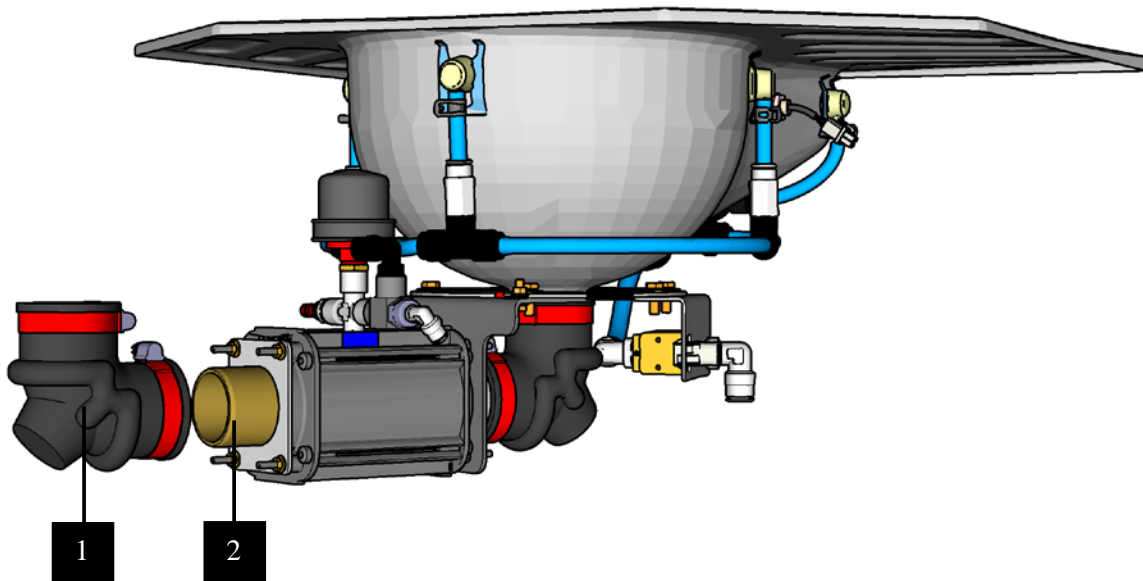
Figure 3: Interfaces – Squatting Toilet (for reference only)

8.3 Interface – Outlet

▲ WARNING *Risk of infection!*

Refer to safety at work:

- ▶ Use personal protective equipment
- ▶ Do not eat, drink or smoke



1	Rubber Elbow Ø 50 mm, 90°	2	Outlet Nozzle Ø 48 mm, l= 54 mm
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Figure 4: Interface – Toilet Outlet (for reference only)

9. CLEANING, DISINFECTION AND DECALCIFYING

 **CAUTION** *Health hazard!*

Citric acid:

- ▶ Use personal protective equipment

 **WARNING** *Risk of infection!*

Refer to safety at work

- ▶ Use personal protective equipment
- ▶ Do not eat, drink or smoke

NOTICE *Damage to the system!*

Aggressive acids, cleaning agents containing chlorine:

- ▶ Clean according to instructions



Only qualified personnel is permitted to carry out the installation!



The time intervals mentioned in the following chapter are only recommendations, the intervals could vary due to water quality and the system operator has to take the necessary adaptations.

NOTICE: *The cleaning, disinfection and descaling agents listed in the manuals are only tested for the Evac scope of supply!*

9.1 Intervals

Level	Interval
A	Monthly
B	Annually
C	As required (minimum 1x annually)

Table 3: Intervals – Cleaning, disinfection and decalcification



Lower levels are included in all higher levels! The cleaning intervals are depending on the water quality. The intervals are recommendations!

Work to be performed	A	B	C
Cleaning vacuum toilet	X		
Cleaning spray nozzle	X		
Cleaning liquid level guard, opt.	X		
Cleaning filter pressure regulator		X	

Table 4: Overview – Cleaning

Work to be performed	A	B	C
Disinfection vacuum toilet		X	

Table 5: Overview – Disinfection



**The buildup of deposits in the system cause by the precipitation of lime is depending strongly from the water hardness of the used fresh water.
The timely decalcification of the system is the sole responsibility of the system operator.**

Work to be performed	A	B	C
Decalcification vacuum toilet			X

Table 6: Overview – Decalcification

9.2 Cleaning – Squatting Toilet



Do not use cleaner which contains chlorine, particles or other abrasives! Follow the instructions of the manufacturer data sheet!

NOTICE: Avoid scratches on the surface of the liquid level guard!

- Neutral cleaning agent and warm water
- Cleaner approved for rolling stock with following composition:
 - Citric acid <15% weight/volume
 - Amidosulfuric acid <15% weight/volume
 - Phosphoric acid < 5% weight/volume

Example:

- Into-Top from Henkel
- Neporin from Saniclean
- Retirol from Deutsche Hahnerol

Before using a differed cleaner please contact Evac.

9.3 Cleaning – Spray Nozzles



Do not use cleaner which contains chlorine, particles or other abrasives! Follow the instructions of the manufacturer data sheet!

Clean the spray nozzles opening carefully with a small metal sheet.

- For plastic spray nozzle sheet thickness < 0.65 mm.

or

- Cleaning tool for EVAC flush nozzles (art.-no: 79017)

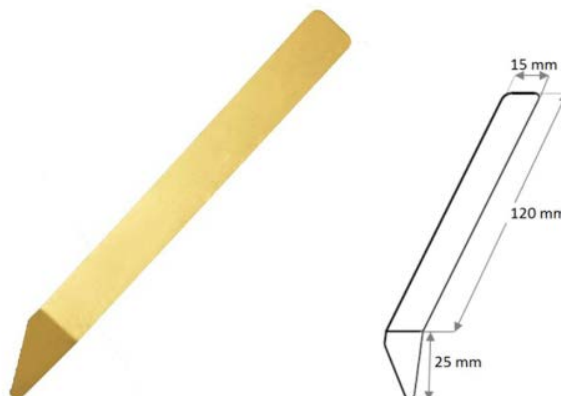


Figure 5: Cleaning tool – flush nozzles (for reference only)

9.4 Cleaning – Liquid Level Guard, optical



Do not use cleaner which contains chlorine, particles or other abrasives! Follow the instructions of the manufacturer data sheet!

NOTICE: *Avoid scratches on the surface of the liquid level guard!*

- Clean optical liquid level guard carefully with water and a soft cloth.

9.5 Cleaning – Filter Pressure Regulator



Switch off power, water and air supply. Do not use cleaner which contains chlorine, particles or other abrasives! Use warm water!

- Remove container from filter pressure regulator.
- Clean container.
- Remove filter element.
- Blow out with compressed air (max. 6 bar).
- Install filter element.
- Install container.
- Switch **ON** all supplies.

9.6 Disinfection – Squatting Toilet



Follow the instructions of the manufacturer data sheet!

Use for disinfection of the squatting toilet the following agents:

Disinfectant approved for rolling stock with following composition:

- Hydrogen peroxide 5% ready to use solution
- Chlorine dioxide 5% ready to use solution

Example:

- Herlisil from Herlisil GmbH
- Durozon

Before using a differed disinfectant please contact Evac.

9.7 Decalcification – Squatting Toilet



Follow the instructions of the manufacturer data sheet!

Use for decalcification of the vacuum toilet the following agents:

- Decalcifier approved for rolling stock with following composition:
 - Citric acid <4% weight/volume

Routine:

- Switch off power supply.
- Fill bowl with 4% citric acid (the bowl liquid level guard should be also wetted).
- Max residence time: 24 hours.
- Clean with toilet brush if necessary.
- Switch on power supply
- Flush toilet once.

10. PREVENTIVE MAINTENANCE

10.1 Preventive Maintenance Table

Maintenance level	Maintenance interval
A	annually
B	Every 3 years
C	Every 6 years
D	Every 12 years
E	Every 15 years

Table 7: Maintenance intervals



Lower preventive maintenance levels are included in all higher maintenance levels!

Maintenance task	A	B	C	D	E
Visual check	X				
Refurbishment pinch valve		X			
Replacement pinch valve				X	
Replacement water inlet valve		X			
Replacement pressure guard module		X			

Table 8: Preventive Maintenance – Squatting Toilet

Maintenance task	A	B	C	D	E
Visual check	X				
Replacement sliding gate valve		X			
Replacement vacuum pump		X			

Table 9: Preventive Maintenance – Base Unit

Maintenance task	A	B	C	D	E
Visual check	X				
Replacement water inlet valve		X			
Replacement quick exhaust valve		X			
Replacement flush water tank					X

Table 10: Preventive Maintenance – Water System Panel

Maintenance task	A	B	C	D	E
Visual check	X				
Replacement pressure guard		X			
Replacement ejector			X		

Table 11: Preventive Maintenance – Pneumatic Panel

11. VISUAL CHECK



Only qualified personnel is permitted to carry out the installation!



WARNING

Risk of infection!

Refer to safety at work

- ▶ Use personal protective equipment
- ▶ Do not eat, drink or smoke

11.1 Visual Check – Squatting Toilet

- Shut off power supply of squatting toilet.
- Shut off fresh water and compressed air supply.
- Open revision hatch to get access to the squatting toilet.

Check and record the following:

- Piping not damaged or bent?
- Electrical connections tightly mounted?
- Cable harness undamaged?
- All components tightly mounted and undamaged?
- Water connection tightly mounted, no leakage visible?
- Compressed air hoses mounted correctly?
- Gaskets, sealing muffs or rubber elbows (e.g. at the bowl connection) not porous, damaged or leaky?
- Pinch valve not contaminated on the outside (if yes, might indicate leakages)?

Switch on all supplies; the toilet will perform a self-test cycle, see **chapter 16 Initialization, page 73**.

11.2 Visual Check – Base Unit

- Shut off power supply of base unit.
- Shut off fresh water and compressed air supply.
- Open revision hatch to get access to the base unit.

Check and record the following:

- Piping not damaged or bent?
- Electrical connections tightly mounted?
- Cable harness undamaged?
- All components tightly mounted and undamaged?
- Compressed air hoses mounted correctly?
- Gaskets, sealing muffs or rubber elbows (e.g. at the bowl connection) not porous, damaged or leaky?
- Sliding gate valve not contaminated (if yes, might indicate leakages)?
- Exhaust pipe of the vacuum pump clean?

Switch on all supplies; the toilet will perform a self-test cycle, see **chapter 16 Initialization, page 73**.

11.3 Visual Check – Water System Panel

- Shut off power supply of water system panel.
- Shut off fresh water and compressed air supply.
- Open revision hatch to get access to the water system panel.

Check and record the following:

- Piping not damaged or bent?
- Electrical connections tightly mounted?
- Cable harness undamaged?
- All components tightly mounted and undamaged?
- Compressed air hoses mounted correctly?

Switch on all supplies; the toilet will perform a self-test cycle, see **chapter 16 Initialization, page 73**.

11.4 Visual Check – Pneumatic Panel

- Shut off power supply of pneumatic panel.
- Shut off compressed air supply.
- Open revision hatch to get access to the pneumatic panel.

Check and record the following:

- Piping not damaged or bent?
- Electrical connections tightly mounted?
- Cable harness undamaged?
- All components tightly mounted and undamaged?
- Compressed air hoses mounted correctly?

Switch on all supplies; the toilet will perform a self-test cycle, see **chapter 16 Initialization, page 73**.

12. MAINTENANCE DESCRIPTION – SQUATTING TOILET



Only qualified personnel is permitted to carry out the installation!



WARNING

Risk of infection!

Refer to safety at work:

- ▶ Use personal protective equipment
- ▶ Do not eat, drink or smoke



The vacuum toilet must be completely emptied before any maintenance activities could be started.

NOTICE

Unexpected escape of fluids from the system!

Potential risk of damage to the rail car:

- ▶ The rail car manufacturer has to take appropriate measures to prevent possible damage due to escaping fluids.
- ▶ Rubber elbows and elastic adapters have to be secured against sliding off in axial direction. The piping is subjected to severe pressure surges during evacuation of the intermediate tank.
- ▶ Compressed air, fresh and waste water piping has to be laid with an even slope!
- ▶ Bends and curves in the piping have to be avoided, accumulated water or fecal matter could block and damage piping during frost!

12.1 Preparation – Squatting Toilet

For maintenance tasks it is necessary to separate the squatting toilet from the fresh water tank and to empty it completely.

- Close maintenance ball valve.
- Activate the «**Service flush**» via RS-box button until the squatting toilet is emptied.
- Switch off power supply for squatting toilet system.
- Switch off air and water supply squatting toilet system.

12.2 Removal – Squatting Toilet



Only qualified personnel is permitted to carry out the installation!

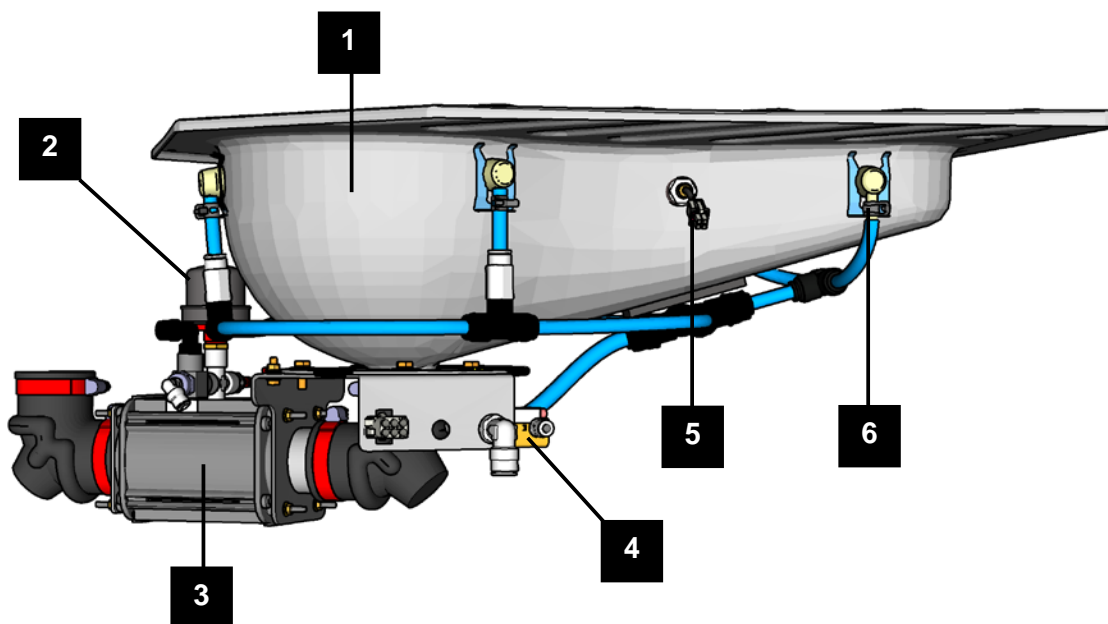


The squatting toilet must be completely emptied before any maintenance activities could be started.

Dismount squatting toilet from cabin floor as follows:

- Disconnect power supply.
- Disconnect fresh water and compressed air supply.
- Disconnect squatting toilet from sewage piping.
- Remove supply connections, see **Figure 3: Interfaces – Squatting Toilet (for reference only)** and **Figure 4: Interface – Toilet Outlet (for reference only)**.
- Unscrew fixing screws (not Evac scope) from bowl, see **Figure 2: Fixing points – Squatting toilet (for reference only)**.
- Lift out squatting toilet.

12.3 Component Overview – Squatting Toilet



1	Bowl Unit	2	Pressure Guard
3	Pinch Valve	4	Water Inlet Valve
5	Liquid Level Guard	6	Flush Nozzle (5x)

Figure 6: Squatting Toilet (for reference only)

12.4 Refurbishment and Replacement – Pinch Valve



Only qualified personnel is permitted to carry out the installation!

Dismount squatting toilet as follows:

See *chapter 12.2 Removal – Squatting Toilet, page 28.*

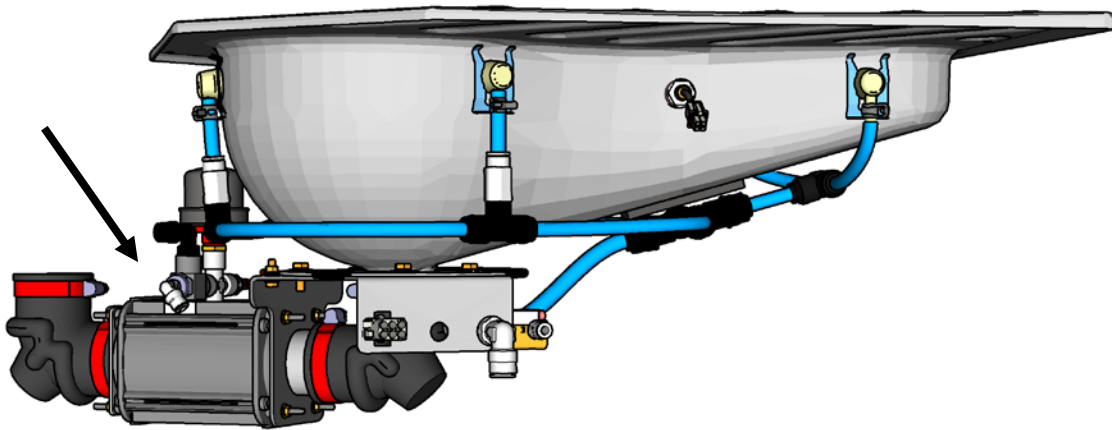


Figure 7: Refurbishment and Replacement – Pinch Valve (for reference only)

Maintenance Description – Squatting Toilet

- Loosen hose clamps from rubber elbow (2x).
- Remove rubber elbow.

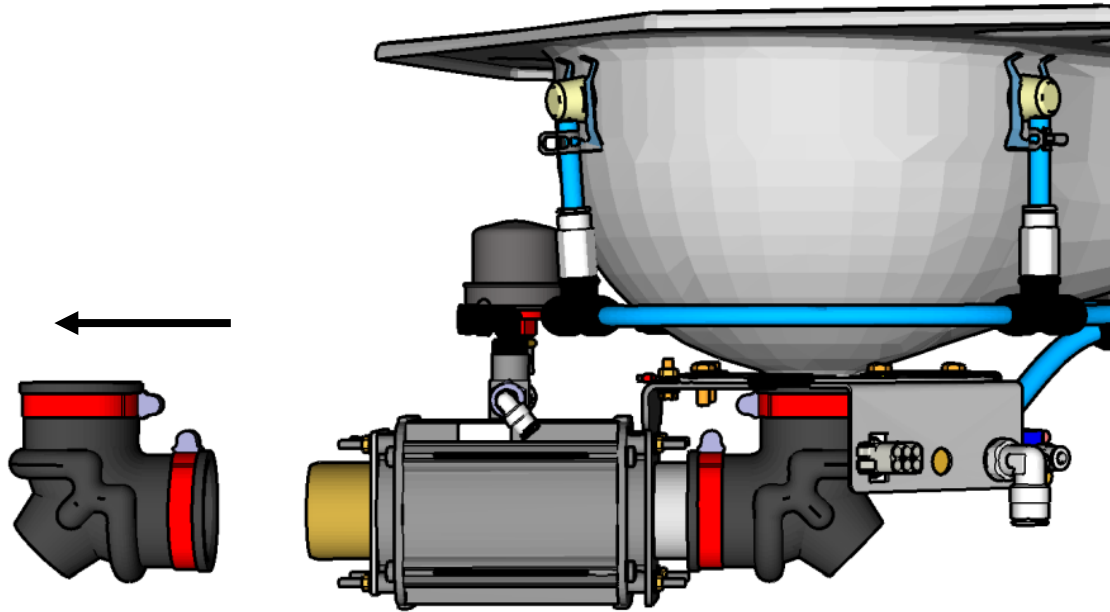


Figure 8: Removal – Rubber Elbow (for reference only)

- Disconnect pneumatic connections.
- Remove cap from pressure guard.
- Disconnect electrical plug connection to pressure guard.
- Loosen hexagon nut M4 (4x) and detent edge washers (4x).
- Remove pinch valve from squatting toilet.

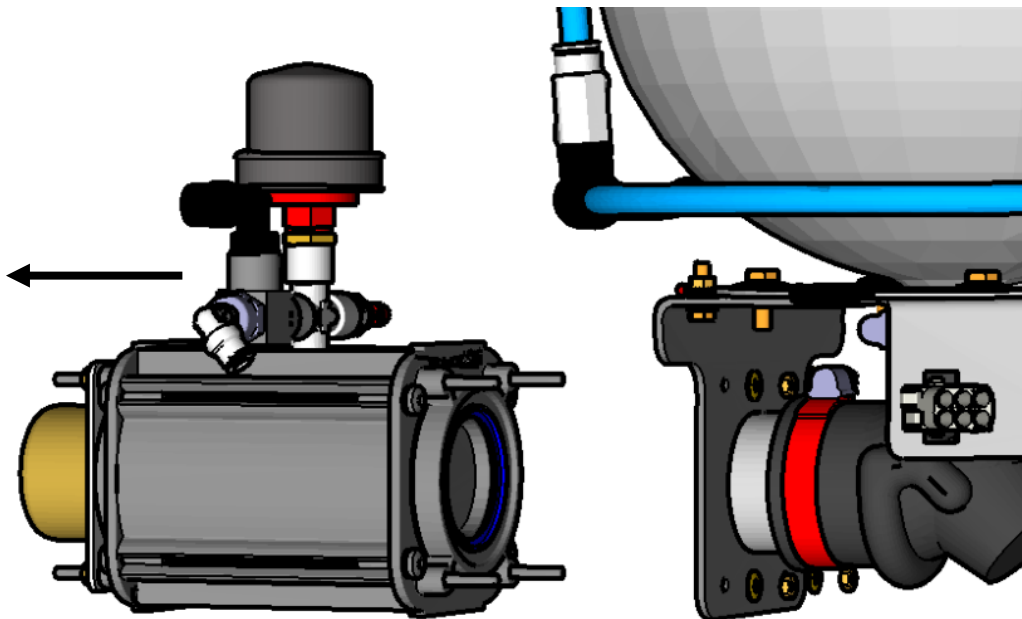
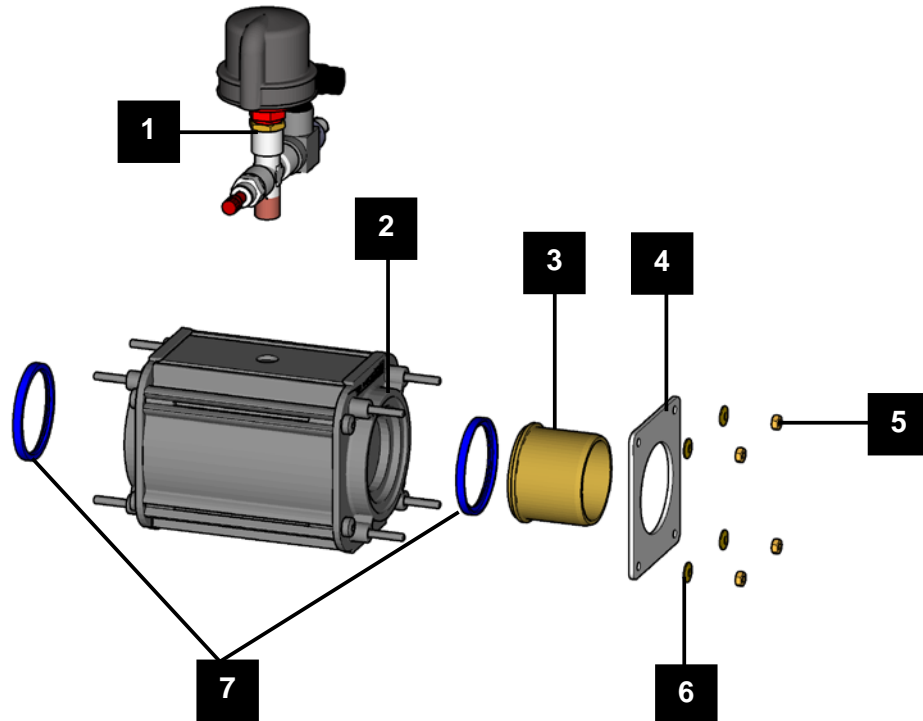


Figure 9: Removal – Pinch Valve (for reference only)

- Unscrew pressure guard module.
- Unscrew outlet nozzle Ø 48 mm and other mounting parts.



1	Pressure Guard Module	2	Pinch Valve
3	Outlet Nozzle Ø 48 mm	4	Connection Plate
5	Hexagon Nut M4 (4x)	6	Detent Edge Washer Ø 4 mm (4x)
7	Gaskets (2x)		

Figure 10: Disassembly – Pinch Valve (for reference only)

The old pinch valve is now removed!

12.4.1 Disassembly – Pinch Valve



*Required material please find also in the spare part catalog:
66529 Maintenance set for Pinch valve - Maintenance set for 53915*

Required tools:

Torx T25

Channel locks or engineer pliers

Abor press

Torque spanner

69656 Test pin hose valve DN 40

Required consumable:

Water-dishwashing detergent mixture (mixing ratio 1:1)

Notice: *Alternative you can send the pinch valve to the Evac workshop for refurbishment. Address see chapter 15.*

- Loosen self-tapping lens head screws (8x) and detent edge washers (8x).



Figure 11: Disassembling – Pinch Valve (for reference only)

- Remove both flanges from the pinch valve.

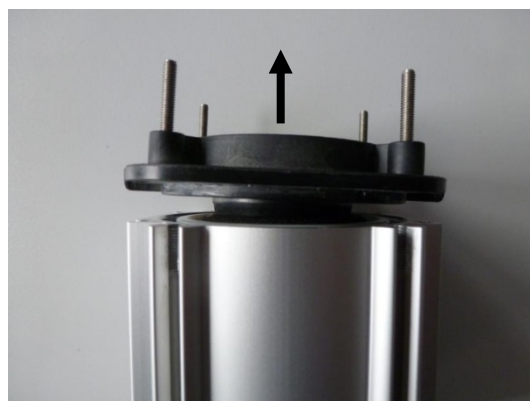


Figure 12: Disassembling – Flange (for reference only)

- Remove the hose from the clamp ring with the help of a channel locks.



Figure 13: Disassembling – Hose (for reference only)



Take care the sealing surface of the aluminum housing will not be damaged! This could cause leakages!

- Remove the O-rings with the help of a screw driver.



Figure 14: Disassembling – O-rings (for reference only)

Maintenance Description – Squatting Toilet

- Remove the clamp rings from the housing.



Figure 15: Disassembly – Clamp rings (for reference only)

The following components must be replaced:

- Detent edge washers (8x)
- Self-tapping lens head screws (8x)
- O-rings (2x)
- Hose
- Clamp rings (2x)
- Gasket (2x)

12.4.2 Assembly – Pinch Valve



Use 66529 Maintenance set for Pinch valve - Maintenance set for 53915

NOTICE: The clamp ring must flush with the housing!

- Install first clamp ring into the housing.



Figure 16: Installation – First Clamp Ring (for reference only)

NOTICE

Don't use Teflon grease for installation!

- Press the hose carefully into the clamp ring of the housing.

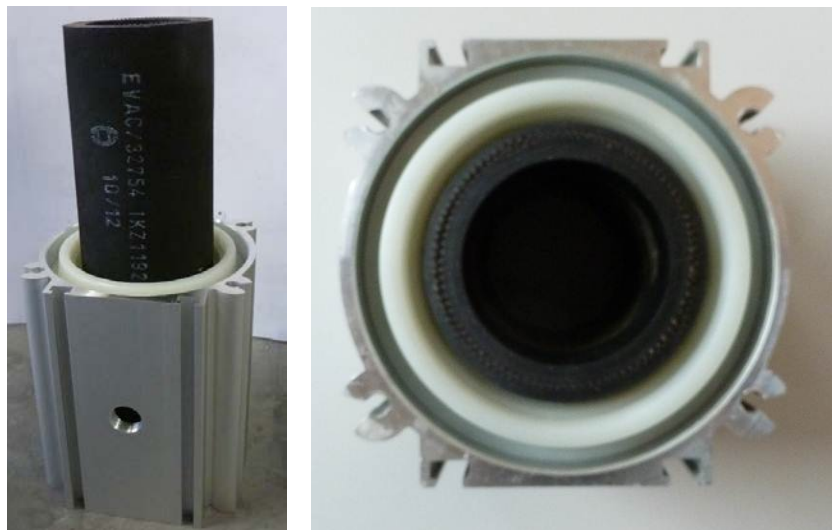


Figure 17: Installation – Hose (for reference only)

Maintenance Description – Squatting Toilet

- Press the second clamp ring into the other housing side until it flushed with the housing.



Figure 18: Installation – Second Clamp Ring (for reference only)

- Install the O-rings into the groove between clamp ring and housing.
- The O-rings must be flushed with the housing.

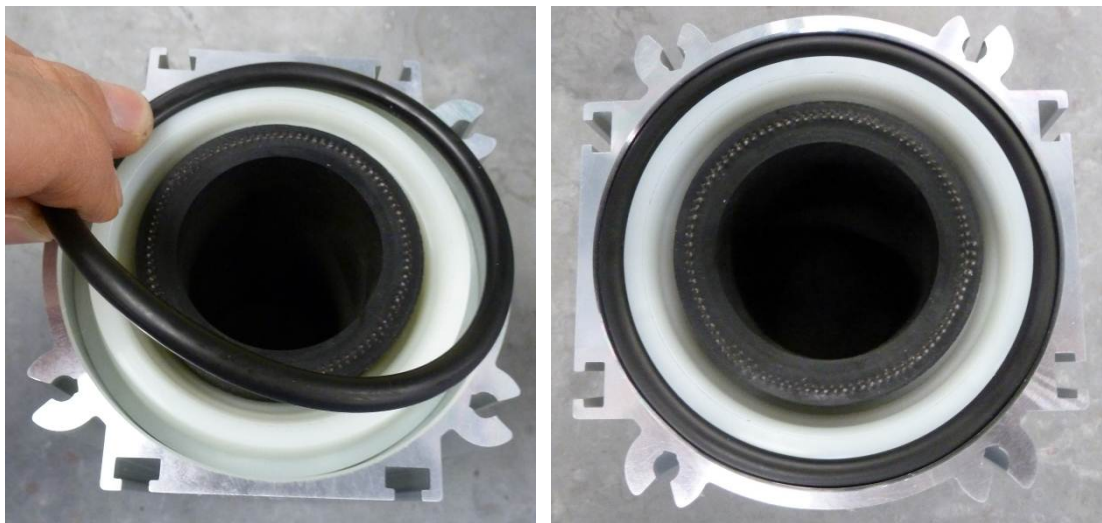


Figure 19: Installation - O-rings (for reference only)

- Coat the inner border (approx. 20 mm to 30 mm) of the hose on both sides with the water-dishwashing detergent mixture (mixing ratio 1:1).

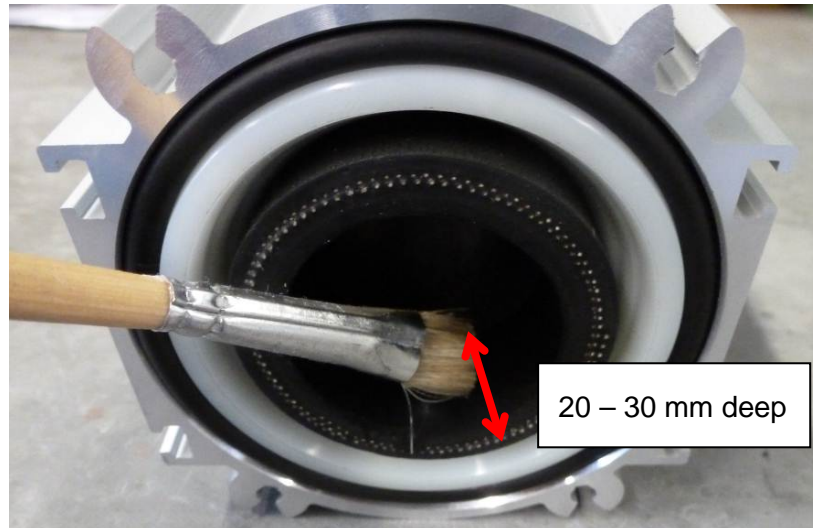


Figure 20: Detail – Hose (for reference only)

NOTICE: The label *Evac Train* shall be aligned to the connection thread!

- Press flanges on both housing sides into the hose, so the flange will be guided over the hose ends.



Figure 21: Installation – Flange (for reference only)

Maintenance Description – Squatting Toilet

- Install pinch valve to the abor press and take care of the axial alignment between housing and flange.



Figure 22: Detail – Pinch Valve (for reference only)

Must be aligned axial



Figure 23: Abor Press – Alignment Pinch Valve (for reference only)

- Press pinch valve together until the lower side of the flange flushed with the upper housing edge.
- Arrest the abor press in this position.



Figure 24: Assembly – Pinch Valve (for reference only)

- Fix upper flange with self-tapping lens head screws (4x) and detent edge washers (4x) crosswise, tightening torque 500 Ncm (5 Nm).



Figure 25: Installation – Fixing Screws (for reference only)

Maintenance Description – Squatting Toilet

NOTICE: *The pinch valve can be rotate in compressed conditions, this will simplify the tightening of the self-tapping lens head screws!*

- Loosen abor press.
- Rotate the pinch valve and repeat the above described steps.

12.4.3 Visual Inspection



The hose must be positioned correctly to the flange and may not show any kind of deformations!

- Perform visual inspection.



Figure 26: Hose OK (for reference only)

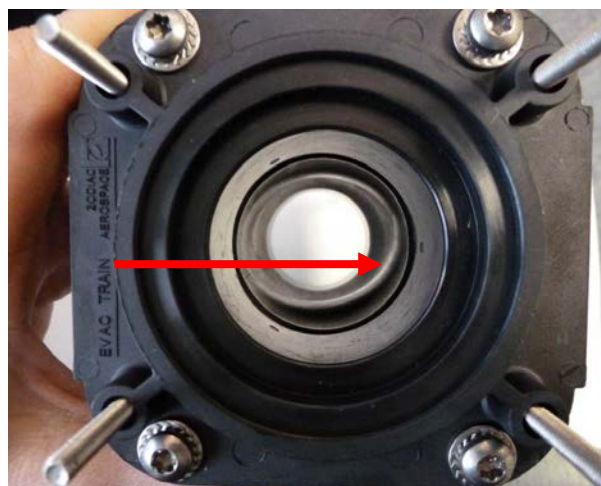


Figure 27: Hose deformed (for reference only)

Now the position of the hose must be checked with test pin:

- Insert test pin into the test opening of the flange until it hit the hose.
- Is the green area of the pin still visual the hose is positioned correctly.
- Is the green area of the pin not visual anymore the hose is not positioned correctly and the pinch valve must be disassembled again.

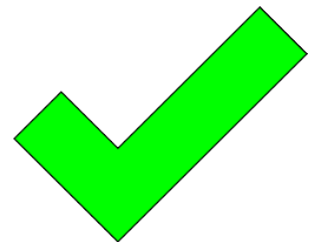


Figure 28: Hose Position ok (for reference only)



Figure 29: Hose Position not ok (for reference only)

12.4.4 Installation – Pinch Valve



Replace pinch valve after 12 years!
Spare part catalog - Squatting System India

- Install pressure guard module with liquid sealing to the refurbished or new pinch valve.



The gaskets must not get out of place! If the gaskets are out of place fluids could leak out!

- Install outlet nozzle through the connection plate and align them to pinch valve.
- Install new gaskets (2x).
- Screw in hexagon nut M4 (4x) and detent edge washers (4x) with liquid sealing in a crosswise sequence, tightening torque 300 Ncm.

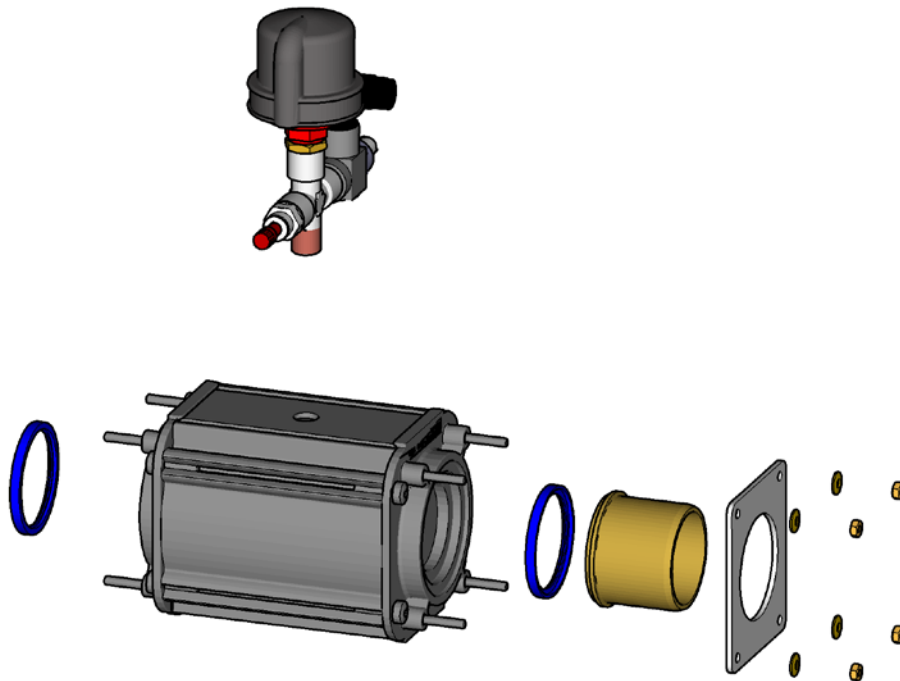


Figure 30: Assembly – Pinch Valve (for reference only)

- Align pinch valve to the interface on the squatting.

- Fix hexagon nut M4 (4x) and detent edge washers (4x) with liquid sealing in a crosswise sequence, tightening torque 300 Ncm.

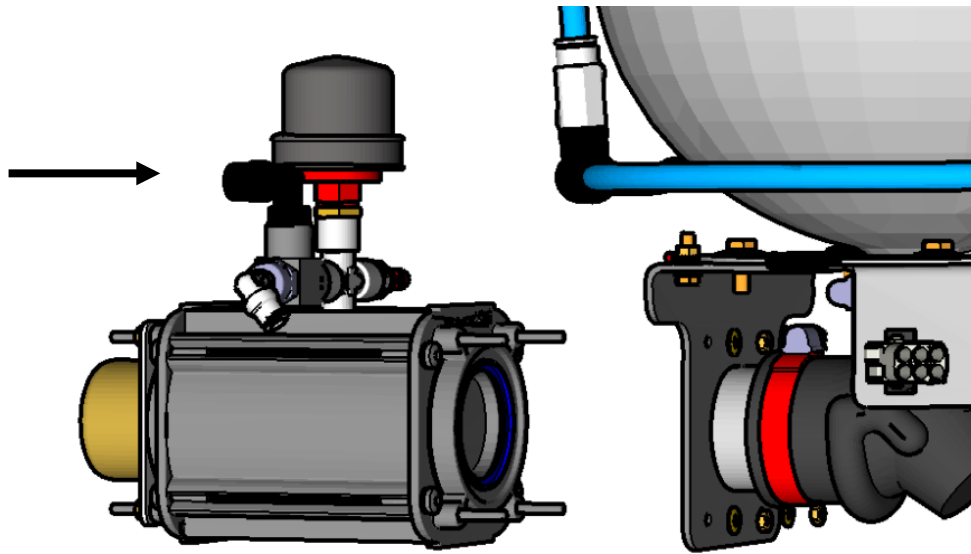


Figure 31: Installation – Pinch Valve (for reference only)



Observe fitting position of the pinch valve! Cables or pneumatic pipes must not get pinched or kinked!

- Reconnect pneumatic piping.
- Reconnect electrical plug connections.
- Fix hose clamps rubber elbow (2x), tightening torque 280 Ncm.

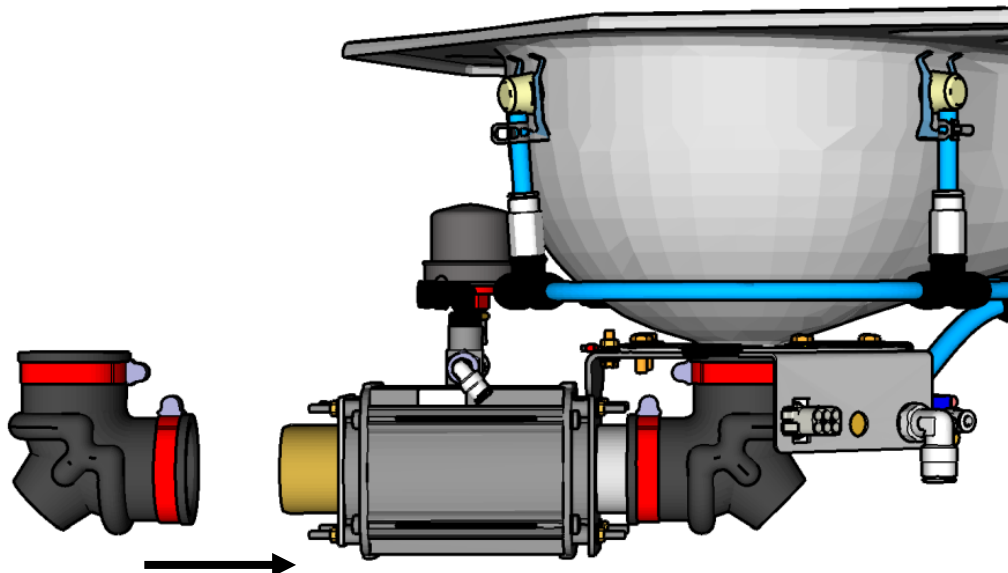


Figure 32: Installation – Rubber Elbow (for reference only)

The new pinch valve is now installed!

12.5 Replacement – Water Inlet Valve

 **Only qualified personnel is permitted to carry out the installation!**

Dismount squatting toilet as follows:

See *chapter 12.2 Removal – Squatting Toilet, page 28.*

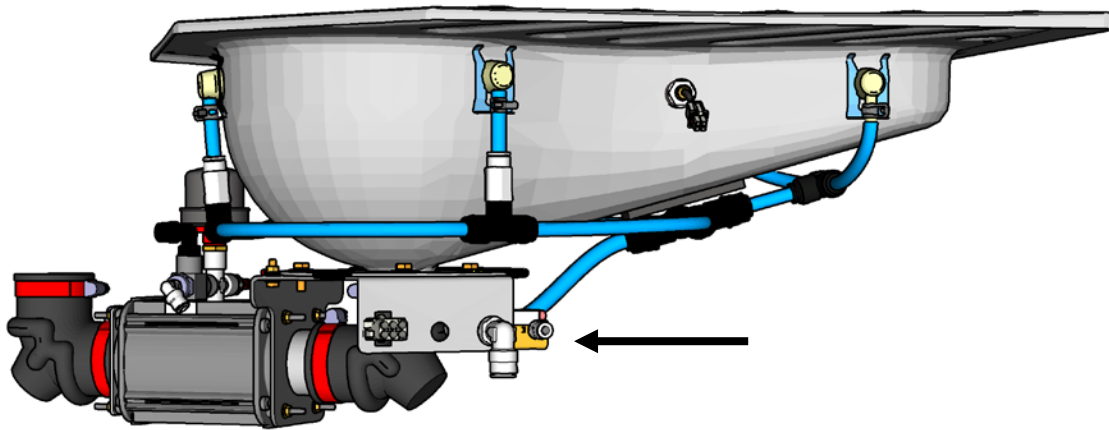
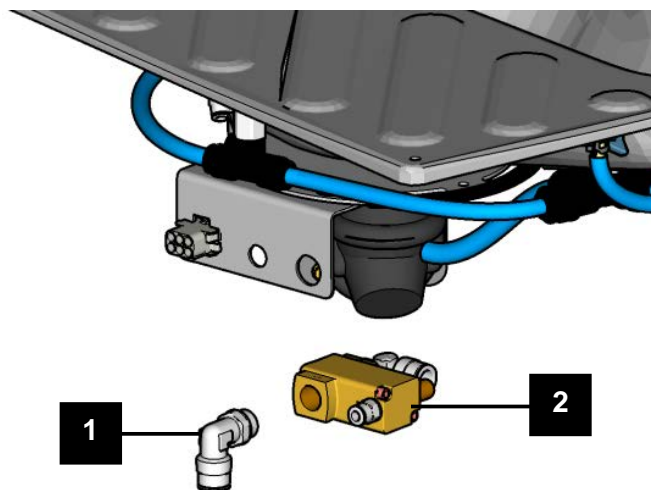


Figure 33: Replacement – Water Inlet Valve (for reference only)

- Disconnect water connection.
- Unscrew male elbow Ø 12 mm.



1	Male Elbow Ø 12 mm	2	Water Inlet Valve
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Figure 34: Detail – Water Inlet Valve (for reference only)

The old water inlet valve is now removed!



***Replace water inlet valve:
Spare part catalog - Squatting System India***

- Replace water inlet valve.
- Align to squatting toilet.
- Fix it with male elbow Ø 12 mm and liquid sealing.
- Reconnect water connection.

The new water inlet valve is now installed!

12.6 Replacement – Pressure Guard Module

 **Only qualified personnel is permitted to carry out the installation!**

Dismount squatting toilet as follows:

See *chapter 12.2 Removal – Squatting Toilet, page 28.*

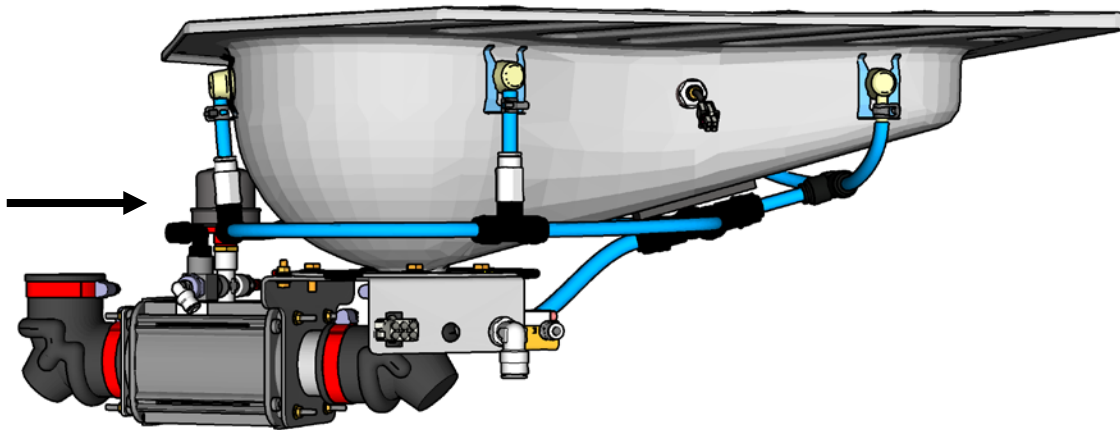


Figure 35: Replacement – Pressure Guard Module (for reference only)

- Remove pinch valve, follow the instruction under *chapter 12.4 Refurbishment and Replacement – Pinch Valve, page 29.*
- Unscrew pressure guard module.

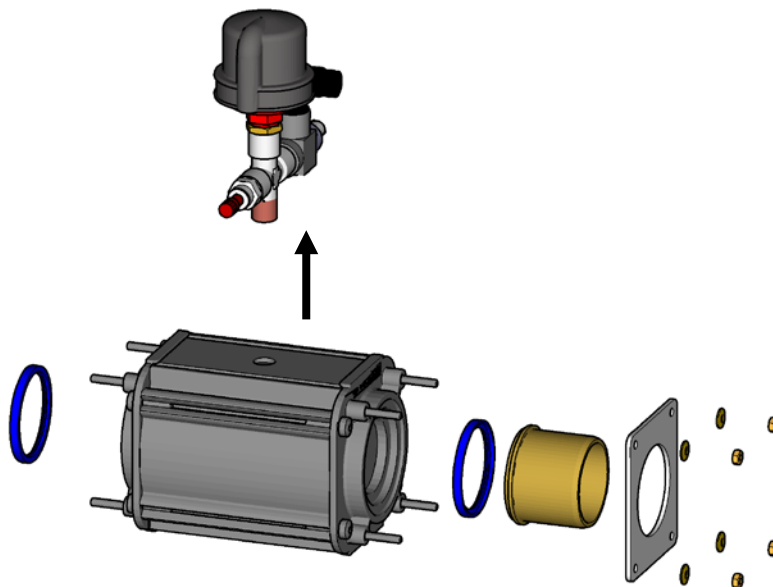


Figure 36: Removal – Pressure Guard Module (for reference only)

The old pressure guard is now removed!

The new water inlet valve is now installed!



***Replace pressure guard module:
Spare part catalog - Squatting System India***

- Replace pressure guard module.
- Align to pinch valve.
- Install pressure guard module with liquid sealing to the refurbished or new pinch valve.
- Install pinch valve to squatting, follow the instruction under ***chapter 12.4 Refurbishment and Replacement – Pinch Valve, page 29.***

The new pressure guard is now installed!

13. MAINTENANCE DESCRIPTION – BASE UNIT



Only qualified personnel is permitted to carry out the installation!



WARNING

Risk of infection!

Refer to safety at work:

- ▶ Use personal protective equipment
- ▶ Do not eat, drink or smoke



The base unit must be completely emptied before any maintenance activities could be started.

NOTICE

Unexpected escape of fluids from the system!

Potential risk of damage to the rail car:

- ▶ The rail car manufacturer has to take appropriate measures to prevent possible damage due to escaping fluids.
- ▶ Rubber elbows and elastic adapters have to be secured against sliding off in axial direction. The piping is subjected to severe pressure surges during evacuation of the intermediate tank.
- ▶ Compressed air, fresh and waste water piping has to be laid with an even slope!
- ▶ Bends and curves in the piping have to be avoided, accumulated water or fecal matter could block and damage piping during frost!

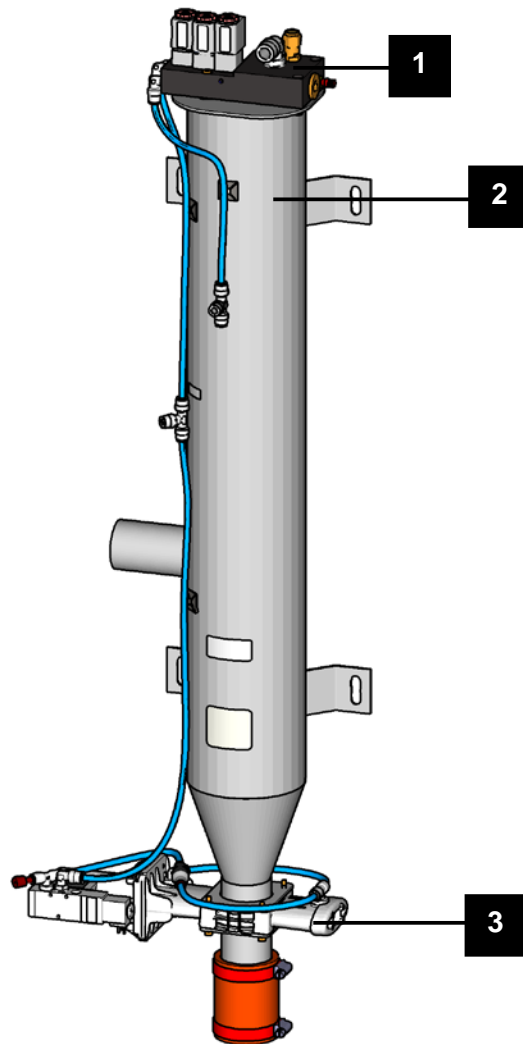
13.1 Preparation – Base Unit

NOTICE: *Normally a dismantling of the base unit for maintenance shall not be necessary!*

For maintenance tasks it is necessary to separate the squatting toilet system from the fresh water tank and to empty it completely.

- Close maintenance ball valve.
- Activate the «**Service flush**» via RS-box button until the squatting toilet system is emptied.
- Switch off power supply for squatting toilet system.
- Switch off air and water supply squatting toilet system.

13.2 Component Overview – Base Unit



1	Vacuum Pump	2	Base unit
3	Sliding gate Valve		

Figure 37: Base unit (for reference only)

13.3 Replacement – Vacuum Pump

 *Only qualified personnel is permitted to carry out the installation!*

Dismount vacuum pump as follows:

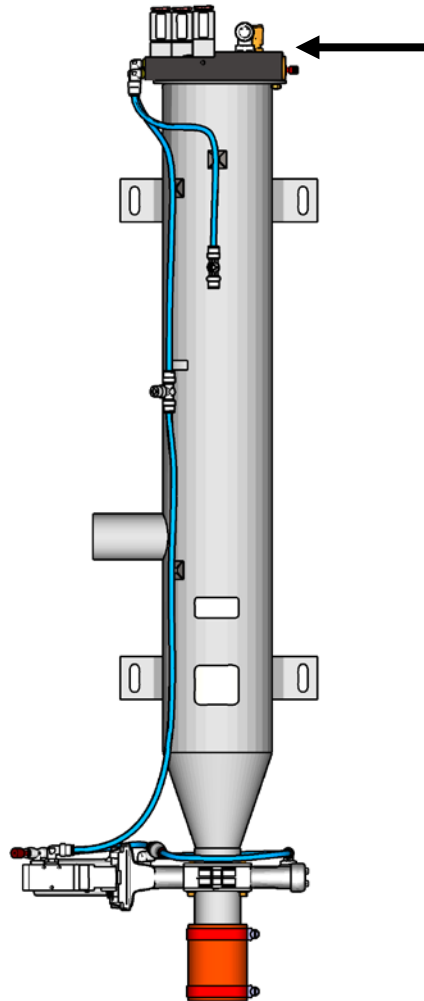
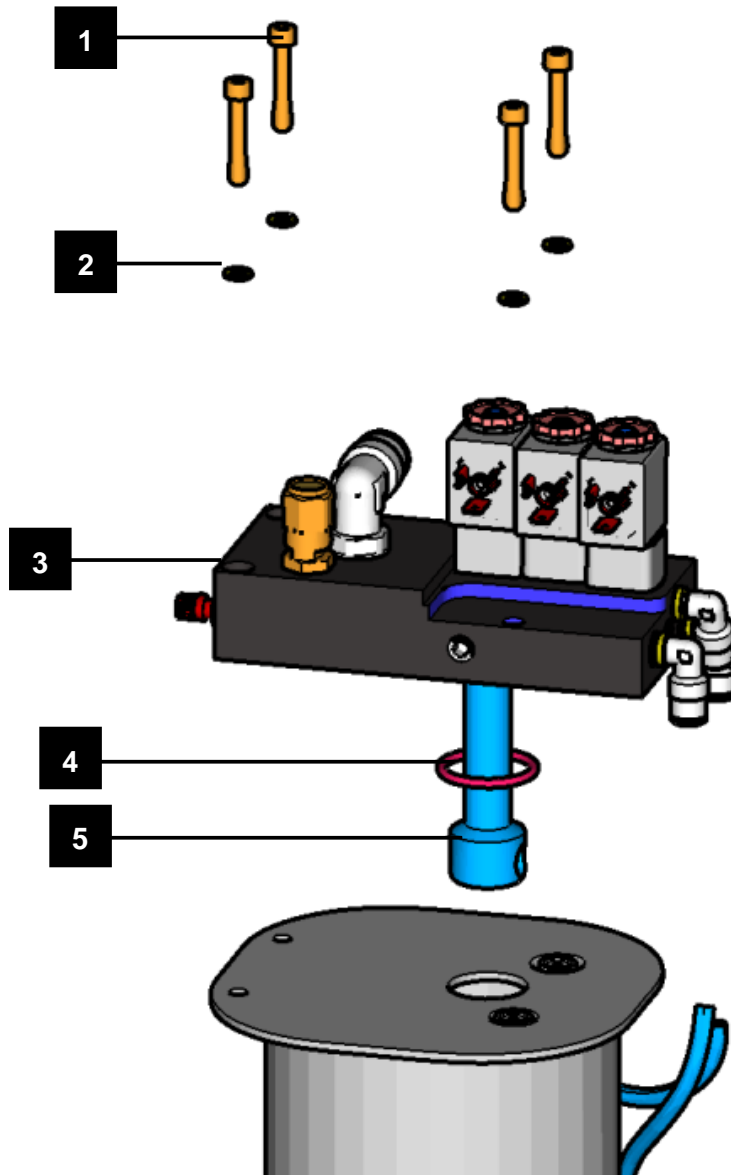


Figure 38: Replacement – Vacuum Pump (for reference only)

- Mark electrical plug connection.
- Disconnect electrical plug connection.
- Mark pneumatic piping.
- Disconnect pneumatic piping.
- Unscrew hexagon socket head cap screws M5 x 30 mm (4x) and washers (4x).
- Remove vacuum pump and other components from base unit.



1	Hexagon socket head cap screws M5 x 30 mm (4x)	2	Washer (4x)
3	Vacuum pump	4	O-Ring
5	Tube		

Figure 39: Details – Vacuum Pump (for reference only)

The old vacuum pump is now removed!

Maintenance Description – Base Unit



Replace vacuum pump, fixing material and gasket!
Spare part catalog - Squatting System India

- Replace vacuum pump.
- Install new O-Ring to the tube.

NOTICE: Take care of the alignment of the tube!

- Install new tube with liquid sealing to the vacuum pump.
- Align new vacuum pump to base unit.
- Fix vacuum pump with hexagon socket head cap screw M5 x 30 mm (4x) and washers (4x) with liquid sealing; tightening torque 250 Ncm.
- Reconnect electrical connections.
- Reconnect pneumatic piping.

The new vacuum pump is now installed.

13.4 Replacement – Sliding Gate Valve



Only qualified personnel is permitted to carry out the installation!



Observe fitting position of the sliding gate valve!

Dismount sliding gate valve as follows:

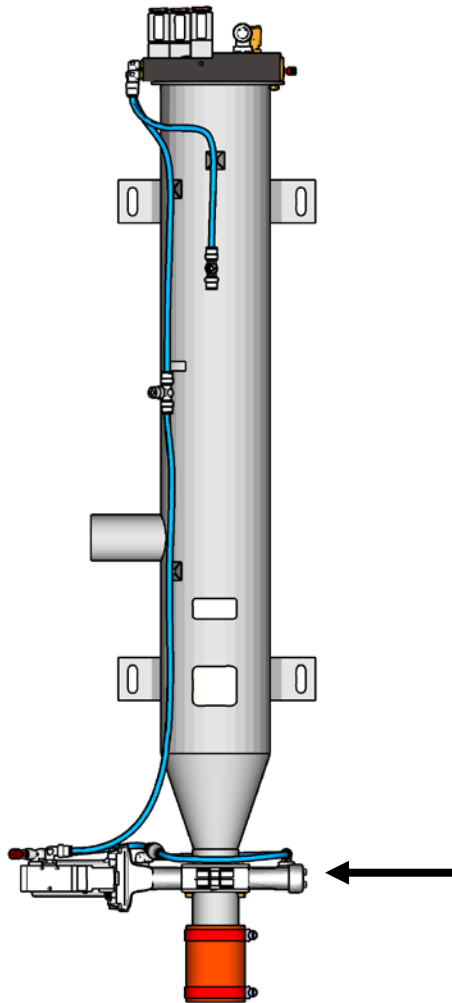


Figure 40: Replacement – Sliding Gate Valve (for reference only)

Maintenance Description – Base Unit

- Loosen sealing muff.

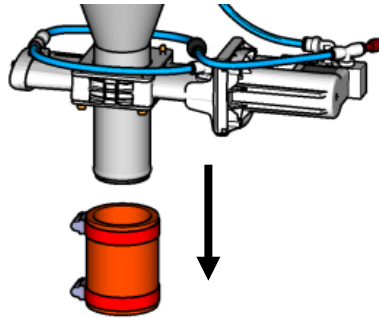
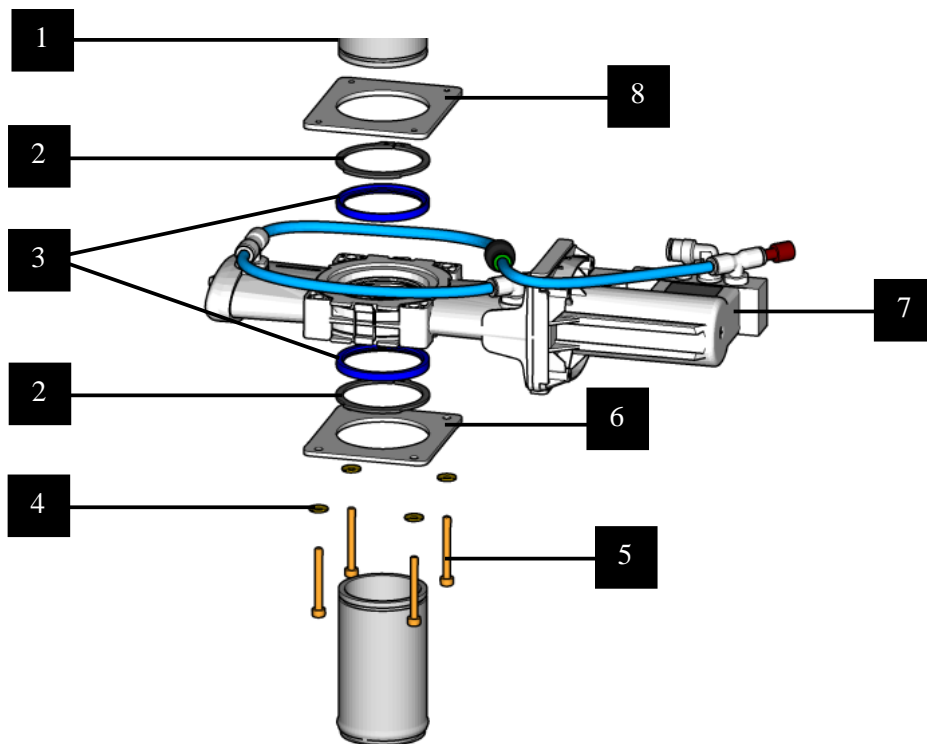


Figure 41: Removal – Sealing Muff (for reference only)

- Disconnect pneumatic connections.
- Disconnect electrical plug connection.
- Loosen hexagon socket head cap screw M4 x 35 mm (4x) and detent edge washers (4x) from the sliding gate valve.
- Remove sliding gate valve and other components from base unit.



1	Interface Base Unit	2	Retaining Ring (2x)
3	Gasket (2x)	4	Detent Edge Washer (4x)
5	Hexagon Socket Head Cap Screw M4 x 35 mm (4x)	6	Connection Plate C06
7	Sliding Gate Valve	8	Connection Plate C04

Figure 42: Details – Sliding Gate Valve (for reference only)

The old sliding gate valve is removed!



Replace sliding gate valve, gaskets and fixing material!
Spare part catalog - Squatting System India

- Replace sliding gate valve.
- Install connection plate C04 to interface intermediate tank.
- Fix it with retaining ring.



The gaskets must not get out of place! If the gaskets are out of place fluids could leak out!

- Align gaskets (2x) to the new sliding gate valve.



Observe fitting position of the sliding gate valve!

- Adjust new sliding gate valve on interface intermediate tank.
- Install connection plate C06 to the gate valve.
- Install hexagon socket head cap screw M4 x 35 mm (4x) and detent edge washers (4x); tightening torque 300 Ncm.
- Reconnect pneumatic piping.
- Reconnect electrical plug connection.
- Install sealing muff with hose clamps (2x), tightening torque 280 Ncm.



Check if the plug-in nozzle (white) is installed to the T-pieces of the gate valve!

The new sliding gate valve is now installed!

14. MAINTENANCE DESCRIPTION – WATER SYSTEM PANEL



Only qualified personnel is permitted to carry out the installation!



WARNING

Risk of infection!

Refer to safety at work:

- ▶ Use personal protective equipment
- ▶ Do not eat, drink or smoke



The base unit must be completely emptied before any maintenance activities could be started.

NOTICE

Unexpected escape of fluids from the system!

Potential risk of damage to the rail car:

- ▶ The rail car manufacturer has to take appropriate measures to prevent possible damage due to escaping fluids.
- ▶ Rubber elbows and elastic adapters have to be secured against sliding off in axial direction. The piping is subjected to severe pressure surges during evacuation of the intermediate tank.
- ▶ Compressed air, fresh and waste water piping has to be laid with an even slope!
- ▶ Bends and curves in the piping have to be avoided, accumulated water or fecal matter could block and damage piping during frost!

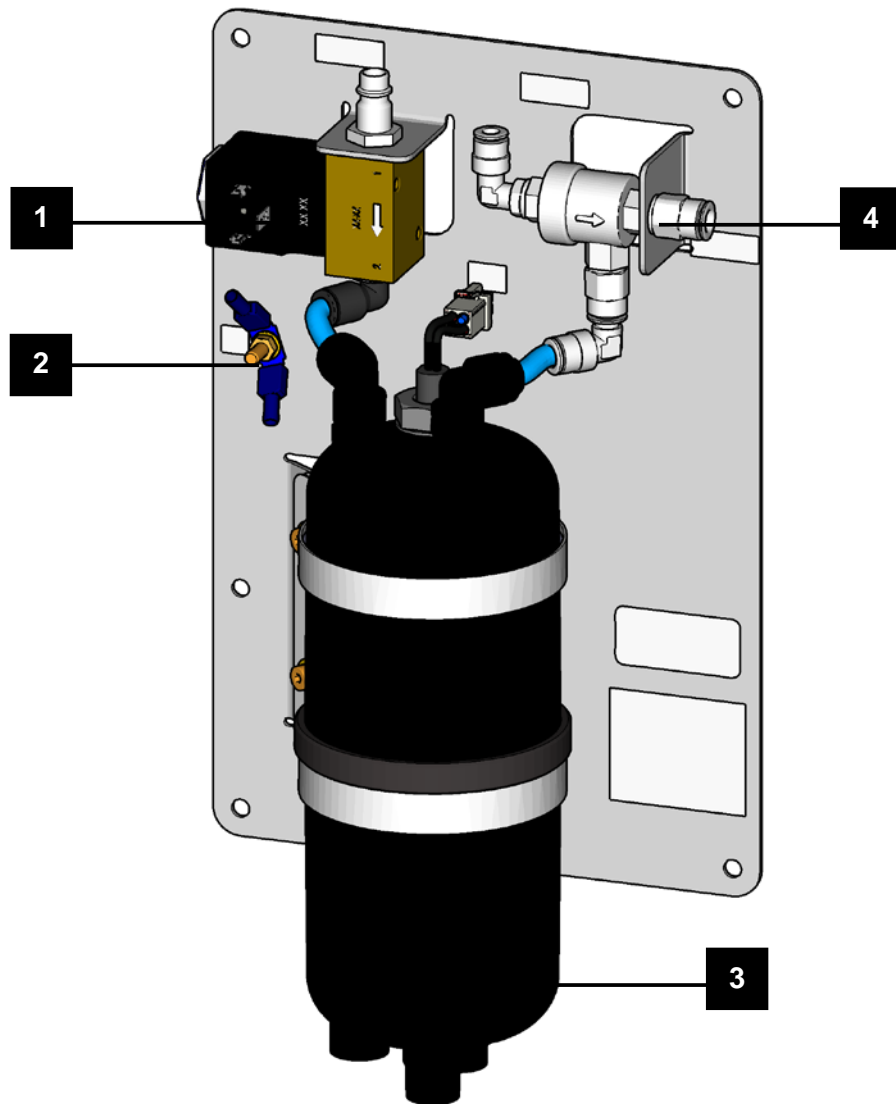
14.1 Preparation – Water System Panel

NOTICE: *Normally a dismantling of the water system panel for maintenance shall not be necessary!*

For maintenance tasks it is necessary to separate the squatting toilet system from the fresh water tank and to empty it completely.

- Close maintenance ball valve.
- Activate the «**Service flush**» via RS-box button until the squatting toilet system is emptied.
- Switch off power supply for squatting toilet system.
- Switch off air and water supply squatting toilet system.

14.2 Component Description – Water System Panel



1	Water Inlet Valve	2	Grounding M5
3	Flush Water Tank	4	Quick Exhaust Valve

Figure 43: Water System Panel (for reference only)

14.3 Replacement – Water Inlet Valve



Only qualified personnel is permitted to carry out the installation!

Dismount water inlet valve as follows:

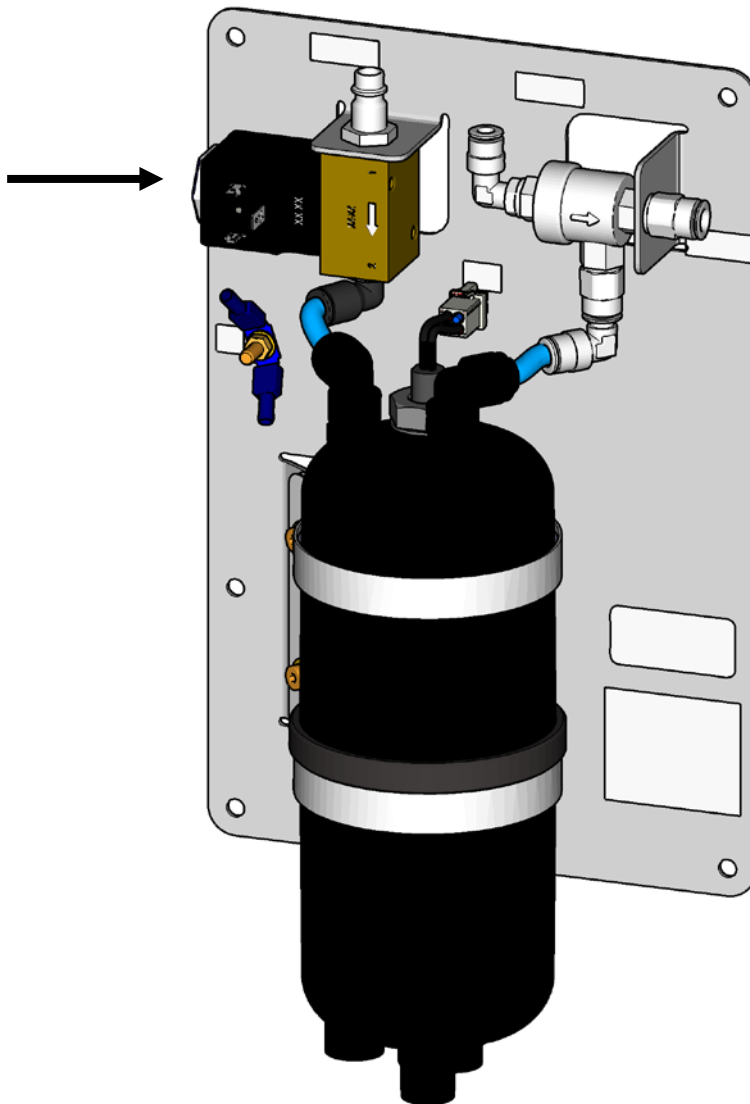
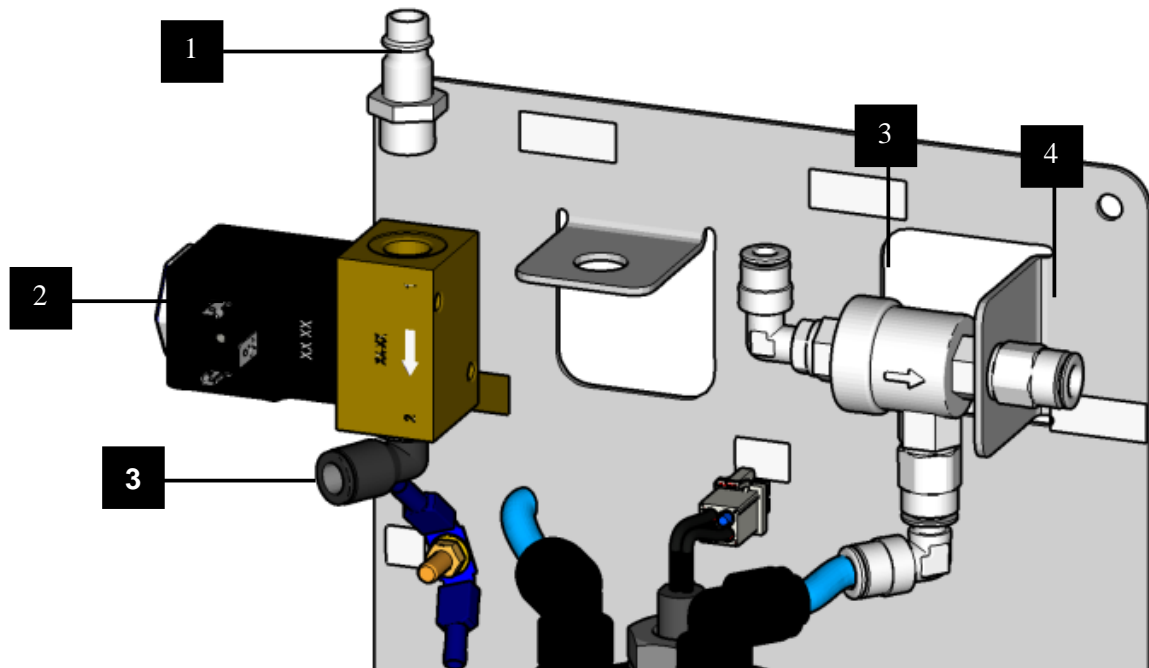


Figure 44: Replacement – Water Inlet Valve (for reference only)

- Disconnect water piping from water inlet valve.
- Disconnect electrical plug connection.
- Loosen male coupling DN7.2.
- Remove water inlet valve.



1	Male coupling DN7.2	2	Water inlet valve
3	Male elbow Ø 8 mm		

Figure 45: Details – Water Inlet Valve (for reference only)

The old water inlet valve is now removed.

! **Replace solenoid valve and connectors!**
Spare part catalog - Squatting System India

- Replace water inlet valve.
- Install male elbow with liquid sealing.
- Align water inlet valve to water system panel.
- Fix male coupling with liquid sealing into the water inlet valve.
- Reconnect water piping.
- Reconnect electrical plug connect.

The new water inlet valve is now installed.

14.4 Replacement – Quick Exhaust Valve



Only qualified personnel is permitted to carry out the installation!

Dismount quick exhaust valve as follows:

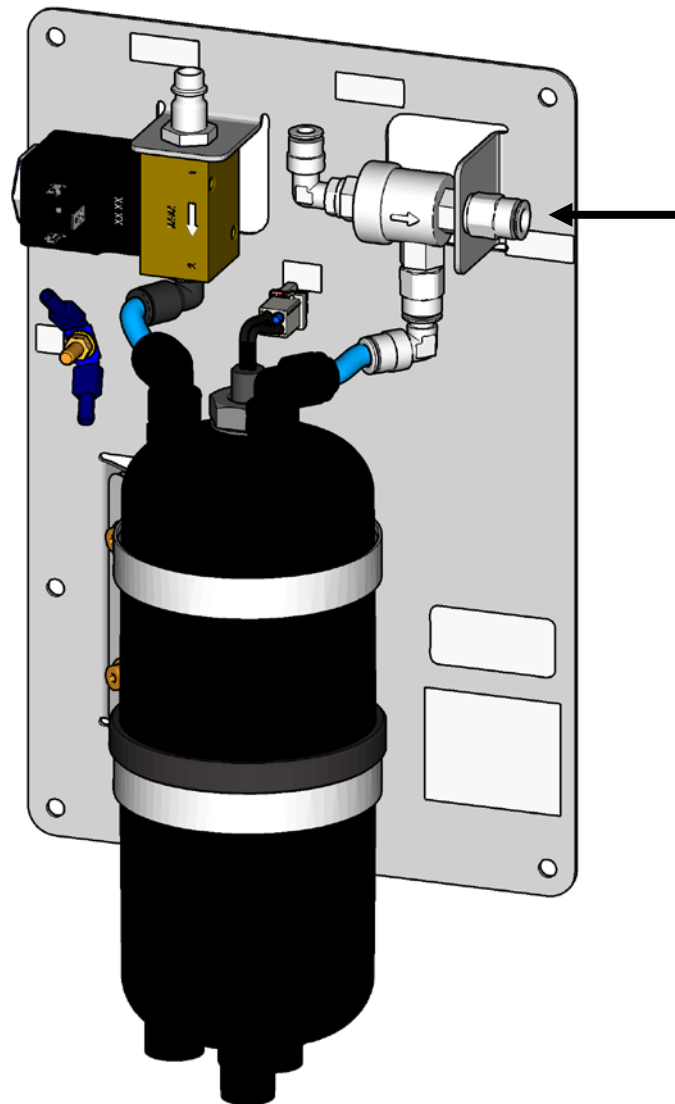
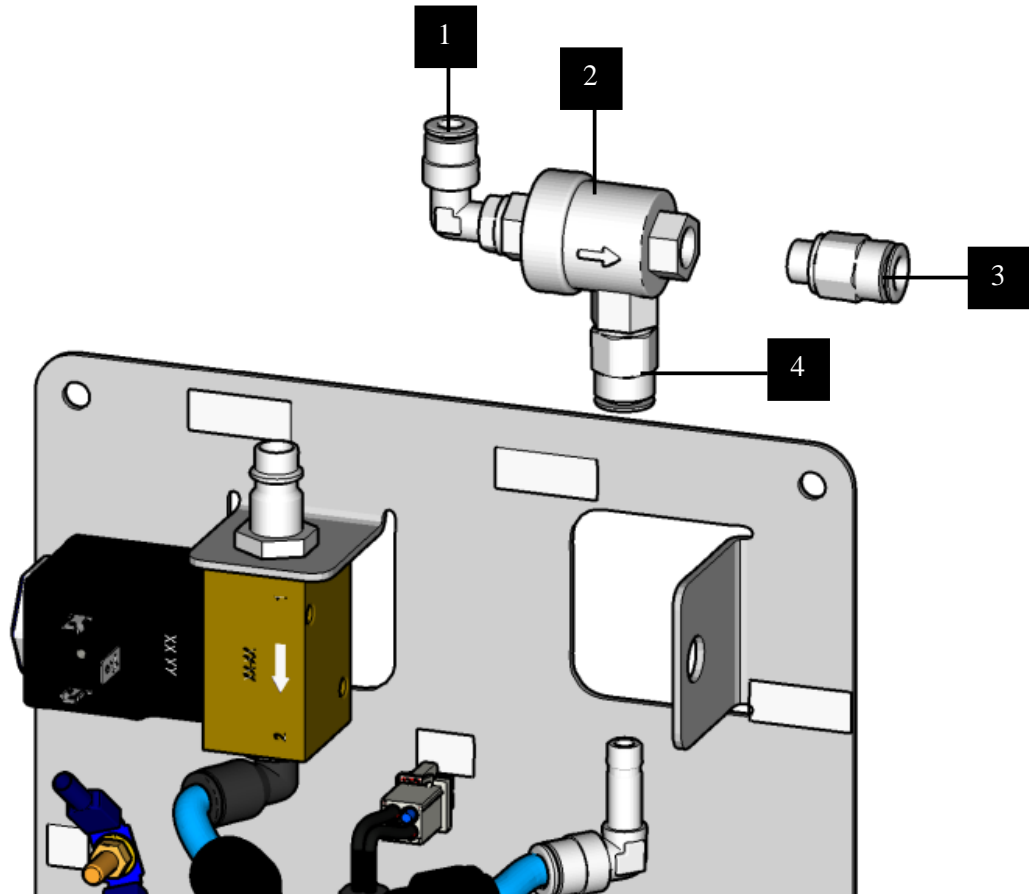


Figure 46: Replacement – Quick Exhaust Valve (for reference only)

- Mark pneumatic piping.
- Disconnect pneumatic piping.
- Loosen male connectors.
- Remove the quick exhaust valve.



1	Mal Elbow Ø 6 mm to Vacuum Pump	2	Quick Exhaust Valve
3	Connector Ø 8 mm Air Outlet	4	Connector Ø 8 mm to Flush Water Tank

Figure 47: Details – Quick Exhaust Valve (for reference only)

The old quick exhaust valve is now removed.



**Replace quick exhaust valve and connectors!
Spare part catalog - Squatting System India**

- Replace quick exhaust valve.
- Screw in the male elbow (Pos. 1) and connector (Pos. 4) with liquid sealing to the quick exhaust valve.
- Align quick exhaust valve to water system panel.
- Screw in connector (Pos. 3) with liquid sealing to the quick exhaust valve.
- Reconnect the pneumatic piping.

The new quick exhaust valve is now installed.

14.5 Replacement – Flush Water Tank



Only qualified personnel is permitted to carry out the installation!

Dismount flush water tank as follows:

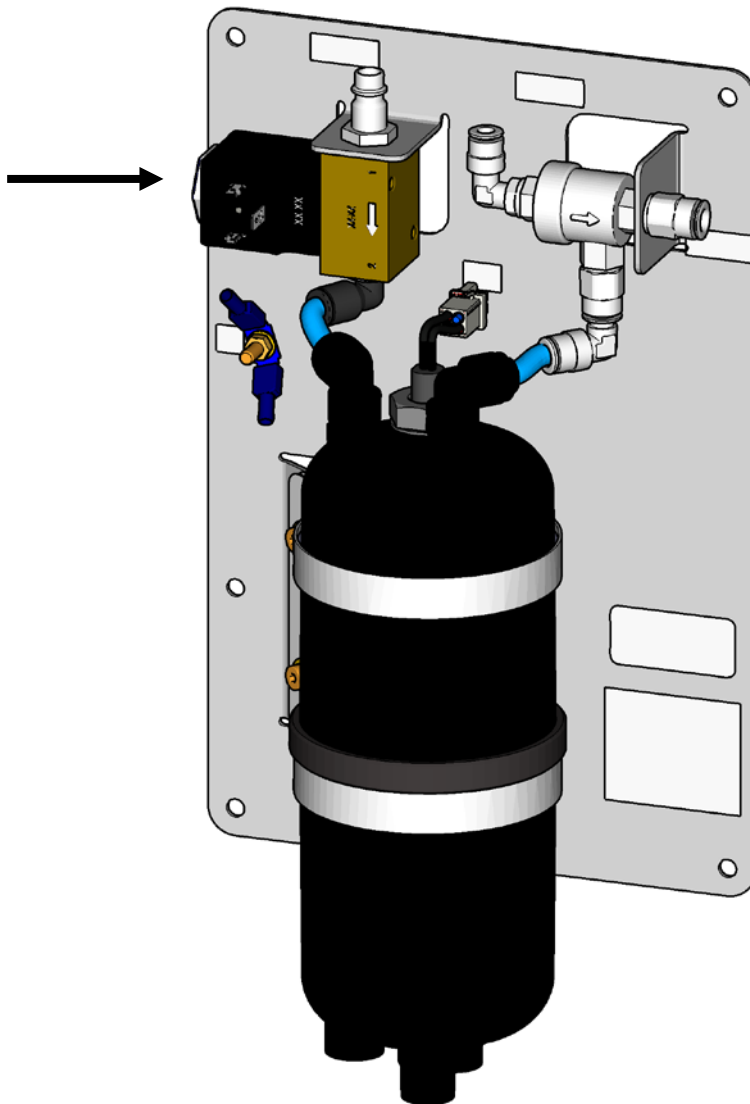
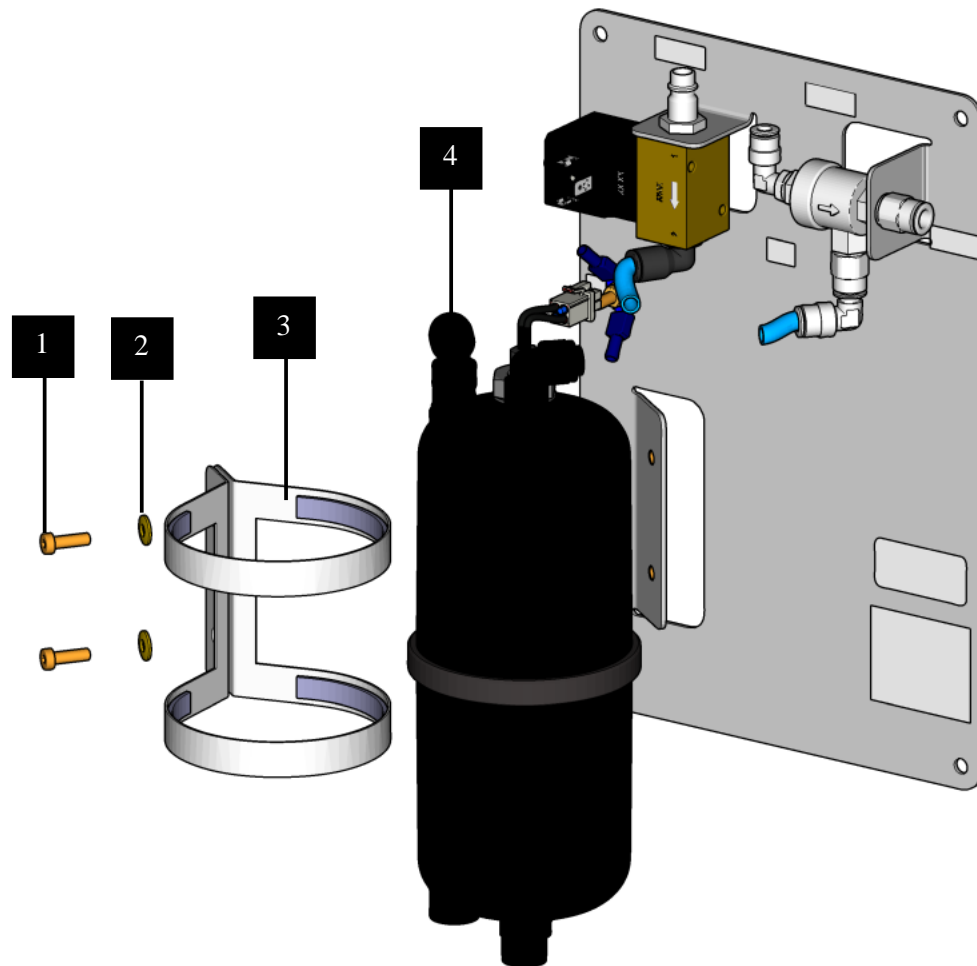


Figure 48: Replacement – Flush Water Tank (for reference only)

- Mark pneumatic piping.
- Disconnect pneumatic piping.
- Disconnect electrical connector.
- Unscrew hexagon socket cap screws M5 x 16 mm (2x) and detent edge washer (2x).
- Remove flush water tank and holder.



1	Hexagon Socket Cap Screw M5 x 16 mm (2x)	2	Detent Edge Washer
3	Holder	4	Flush Water Tank

Figure 49: Details – Flush Water Tank (for reference only)

The old flush water tank is now removed.



Replace flush water tank!
Spare part catalog - Squatting System India

- Replace water tank.
- Align new water tank into holder.

Maintenance Description – Water System Panel

- Reconnect pneumatic piping.
- Reconnect electrical connector.
- Install hexagon socket cap screws M5 x 16 mm (2x) and detent edge washers (2x) with liquid sealing; tightening torque 250 Ncm.

The new water tank is now installed!

15. MAINTENANCE DESCRIPTION – PNEUMATIC PANEL



Only qualified personnel is permitted to carry out the installation!



WARNING

Risk of infection!

Refer to safety at work:

- ▶ Use personal protective equipment
- ▶ Do not eat, drink or smoke



The base unit must be completely emptied before any maintenance activities could be started.

NOTICE

Unexpected escape of fluids from the system!

Potential risk of damage to the rail car:

- ▶ The rail car manufacturer has to take appropriate measures to prevent possible damage due to escaping fluids.
- ▶ Rubber elbows and elastic adapters have to be secured against sliding off in axial direction. The piping is subjected to severe pressure surges during evacuation of the intermediate tank.
- ▶ Compressed air, fresh and waste water piping has to be laid with an even slope!
- ▶ Bends and curves in the piping have to be avoided, accumulated water or fecal matter could block and damage piping during frost!

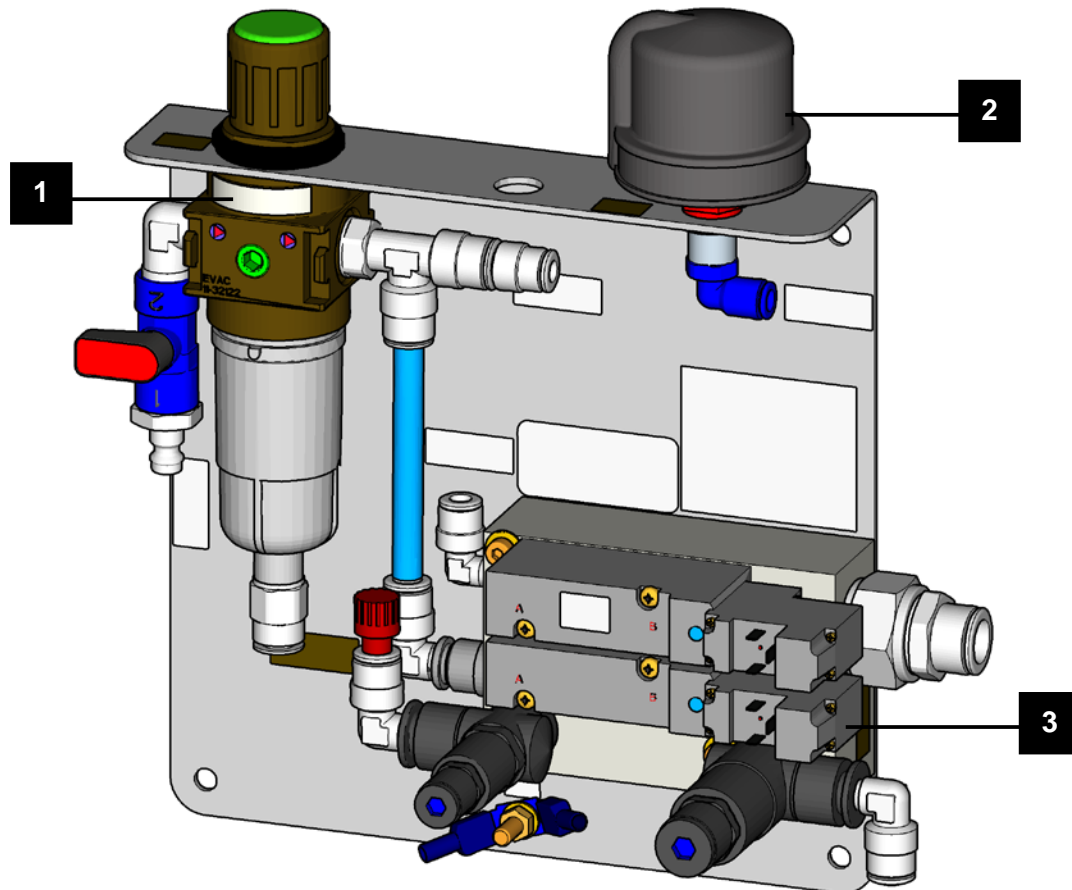
15.1 Preparation – Pneumatic Panel

NOTICE: *Normally a dismantling of the pneumatic panel for maintenance shall not be necessary!*

For maintenance tasks it is necessary to separate the squatting toilet system from the fresh water tank:

- Close maintenance ball valve.
- Switch off power supply for squatting toilet system.
- Switch off air and water supply squatting toilet system.

15.2 Component Description – Pneumatic Panel



1	Filter Pressure Regulator	2	Pressure Guard
3	Ejector	4	

Figure 50: Pneumatic Panel (for reference only)

15.3 Replacement – Pressure Guard

 **Only qualified personnel is permitted to carry out the installation!**

Dismount pressure guard as follows:

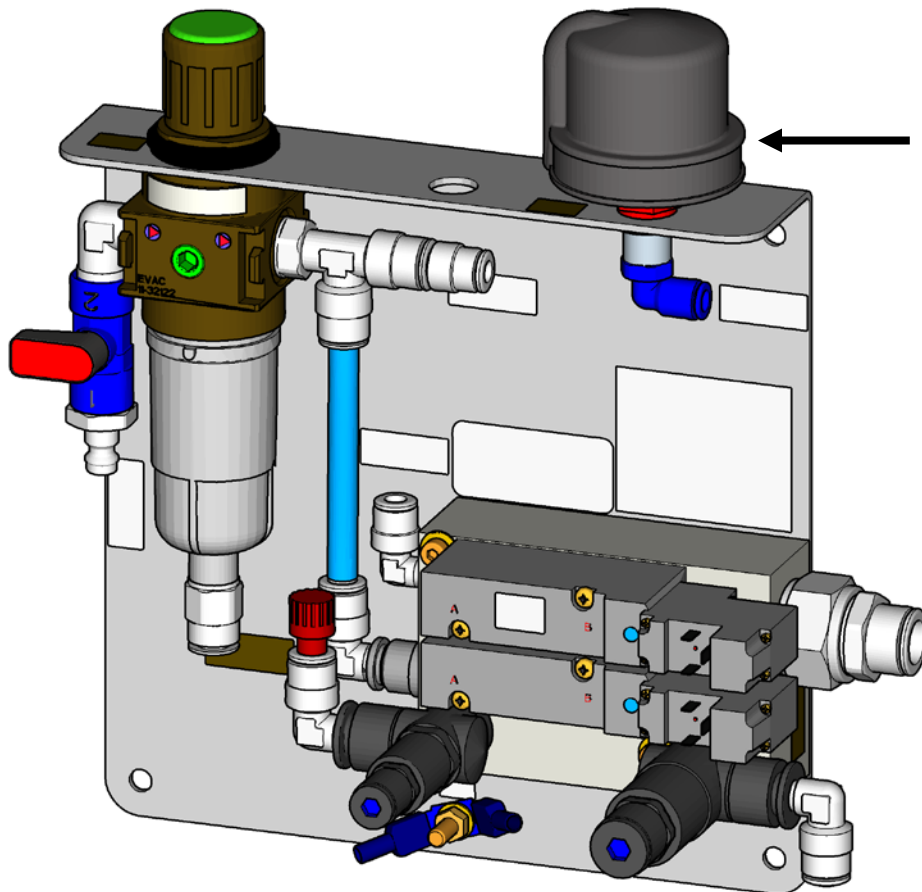


Figure 51: Replacement – Pressure Guard (for reference only)

Maintenance Description – Pneumatic Panel

- Remove cap from pressure guard.

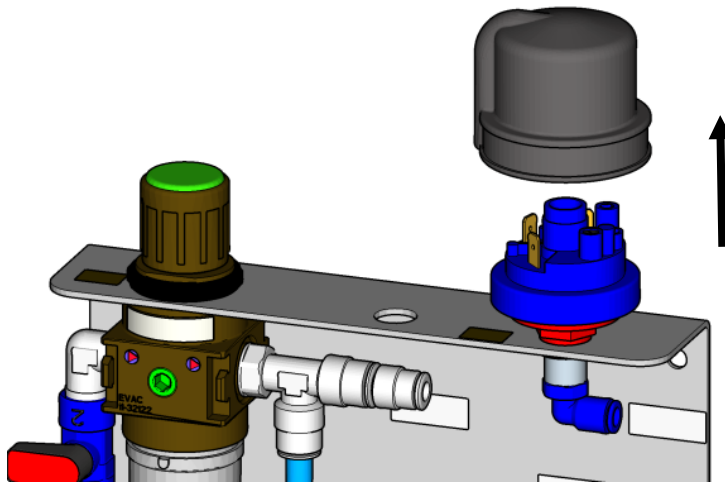
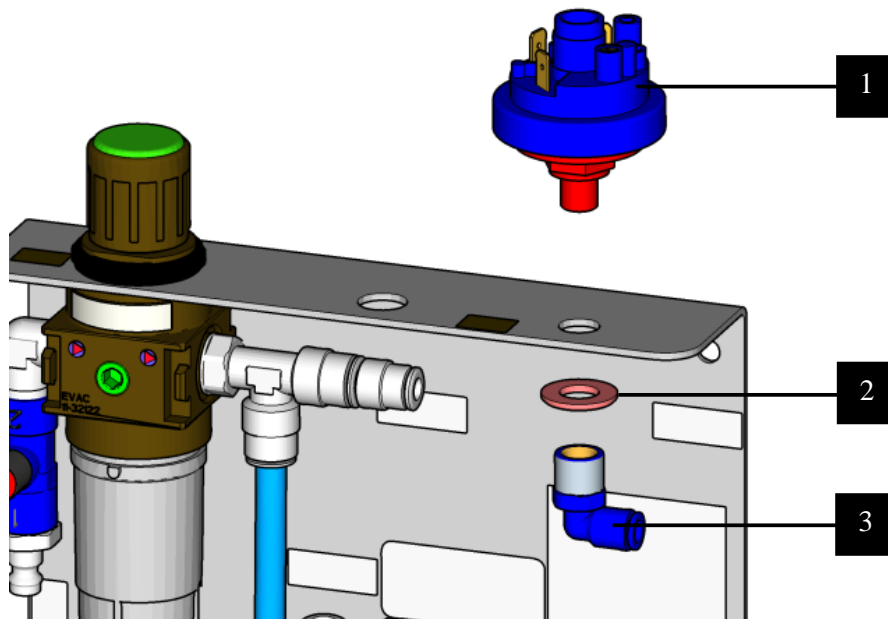


Figure 52: Removal – Cap (for reference only)

- Disconnect electrical plug connection to pressure guard.
- Disconnect pneumatic piping.
- Unscrew male elbow Ø 6 mm.
- Remove pressure guard.



1	Pressure Guard	2	Plain Washer
3	Mal elbow Ø 6 mm		

Figure 53: Details – Pressure Guard (for reference only)

The old pressure guard is now removed.



***Replace pressure guard, washer and connector!
Spare part catalog - Squatting System India***

- Replace pressure guard.
- Adjust new pressure guard to the bracket.
- Install male elbow and washer with liquid sealing into the pressure guard.
- Reconnect electrical connections.
- Reconnect pneumatic piping.
- Install cap.

The new pressure guard is now installed.

15.4 Replacement – Ejector

 **Only qualified personnel is permitted to carry out the installation!**

Dismount ejector as follows:

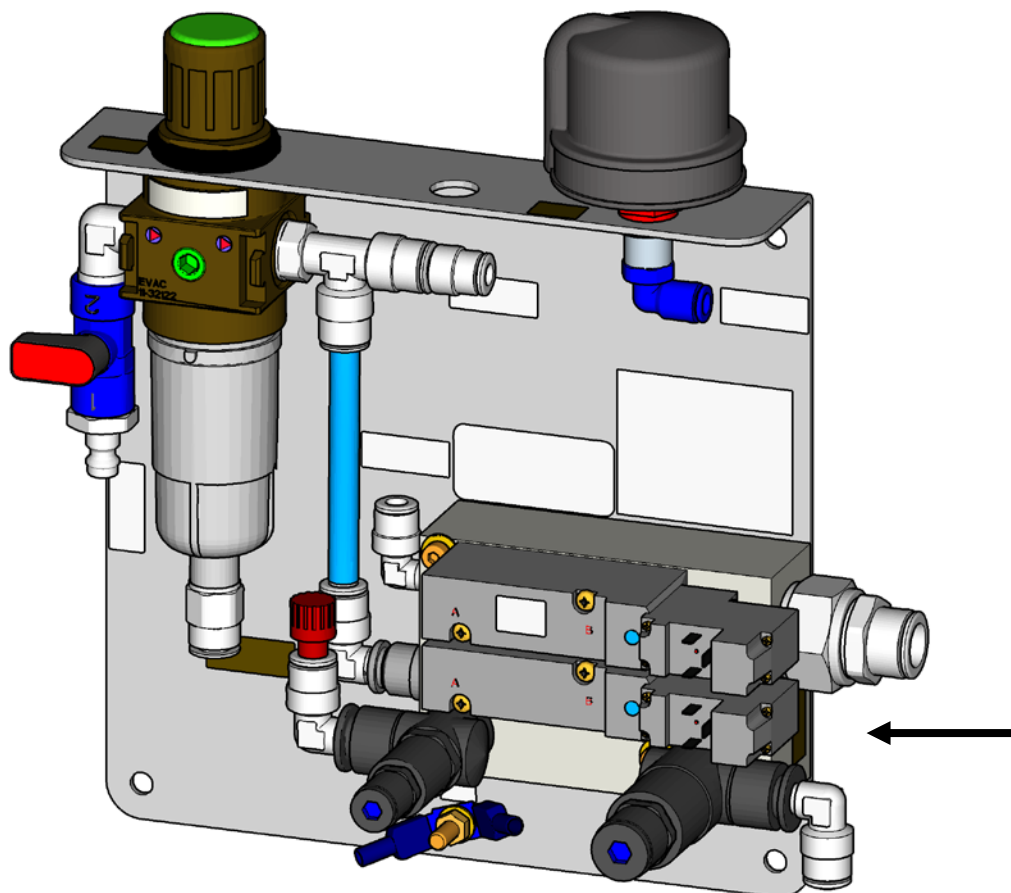
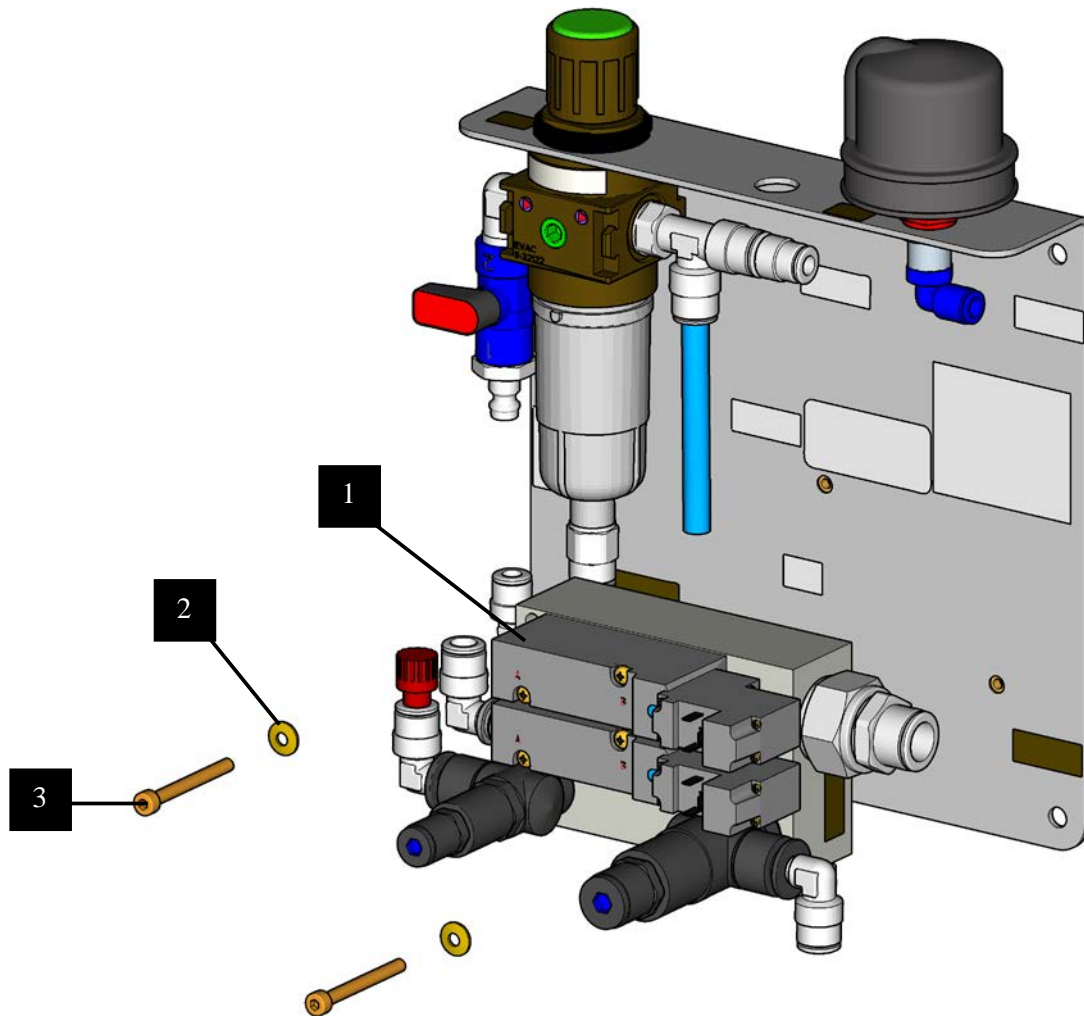


Figure 54: Replacement – Ejector (for reference only)

- Mark electrical plug connection
- Disconnect electrical plug connection.
- Mark pneumatic piping.
- Disconnect pneumatic piping.
- Unscrew hexagon socket head cap screw - M4 x 40 mm (2x) and detent edge washer (2x).
- Remove ejector.



1	Ejector	2	Detent Edge Washer (2x)
3	Hexagon Socket Head Cap Screw - M4 x 40 mm (2x)		

Figure 55: Details – Ejector (for reference only)

The old ejector is now removed.

Maintenance Description – Pneumatic Panel



Replace ejector and fixing material!
Spare part catalog - Squatting System India

- Replace ejector.
- Adjust new ejector to the bracket.
- Reconnect electrical connections.
- Reconnect pneumatic piping.

The new ejector is now installed.

16. INITIALIZATION

16.1 Initial Start-Up



***Make sure all connections are correct and tight!
Fresh water tank must be filled up, water inflow pipe (water filter) should be neither leaking nor clogged or frozen up.***

The squatting toilet will run a self-test cycle every time the squatting toilet is supplied with power.

The self-test cycle consists of one complete flush cycle.

Procedure:

- Switch **OFF** the power supply.
- Switch **ON** the power supply.
- RS-Box display 00 and the squatting toilet start a self-test cycle.

Check:

- Has the flush cycle been proceeded completely without problems?
- Is water pressed through the flush nozzles strongly and evenly?

After the self-test cycle is completed, press the flush button and check the flush cycle again.



Check for leakages!

17. ADDITIONAL INFORMATION

17.1 Taking Out of Service


 **WARNING** *Fecal matter!*

Risk of infection:

- ▶ Only sufficiently immunized personnel
- ▶ Do not eat, drink or smoke.
- ▶ Wear PPE

 *Only qualified personnel is permitted to carry out the installation!*

 *Disconnect supply cables and air pipes and electrical cabling!*

 *Make sure the system is emptied completely:
No fecal matter or water should remain!*

17.2 Recycling and Disposal

Defect components send back to:

EVAC GmbH
Servicewerkstatt
Feldstr. 124
22880 WEDEL
GERMANY

Phone: 04103 9168 28
Fax: 04103 9168-8533 or -57

evac-train@zodiacaerospace.com



Operation Manual

Vacuum Toilet System

Squatting System India

Part-No. 85516

Rev.: 01 – 2018-08

1. SAFETY ADVICE

Read this manual carefully!
Keep this manual for future reference!
The vacuum toilet assembly is designed to transport human waste from the toilet bowl to a waste tank or sewage pipe!



DANGER

**Risk of electric shock on control board!
Shut down the power supply!**



WARNING

**Risk of fecal infection!
Refer to Safety at Work!**

Safety at work

During work on toilets and sanitary systems note the national employment protection provisions (in Germany Biostoffverordnung, BGR 145)!

Wear protective clothing, do not eat, drink or smoke!

Immediately change and disinfect contaminated clothing!

Thoroughly clean yourself with soap and water after working in a sewage handling area or coming in contact with sewage handling equipment. This precaution is an absolute requirement before eating, drinking, smoking or performing any hand-to-mouth functions!

Skin abrasions, punctures or any other wounds require immediate and appropriate medical attention!

After coming in contact with sewage, do not handle potable water hoses or work on potable water systems until thoroughly washed!

Sewage spills are to be cleaned up immediately, before they dry. Rinse the contaminated area with water and non-scented disinfectant!

Maintenance work

Only trained personnel knowing the contents of this manual may perform maintenance work on this toilet assembly!

Never clean or operate this vacuum toilet assembly with aggressive acids or cleaning agents which contain chlorine!

Avoid injury: Make sure that exit valves are not operated manually at the same time during maintenance work!

Repair work

Disconnect system from all supplies!

Components which are part of the safety or control system (i.e. pressure switch, safety valve) should not be repaired - this may lead to serious malfunction - they must be replaced with new components!

Breakdown

Disconnect system - main switch OFF - in case of excessive heat or fire!

Switch off and lock toilet system!

Danger of frost

Empty fresh and waste water tank!

Fresh water tank refilling

Do not refill in case of frost or frost danger!

Pipes must not be blocked or frozen!

Waste water tank emptying

Empty in case of frost or frost danger!

Empty if tank is full!

NOTICE

Unexpected escape of fluids from the system!

Property damage to the rail car:

- ▶ The rail car manufacturer has to take appropriate measures to prevent possible damage due to escaping fluids.
- ▶ Rubber elbows and elastic adapters have to be secured against sliding off in axial direction. The piping is subjected to severe pressure surges during evacuation of the intermediate tank.
- ▶ Compressed air, exhaust air, fresh and waste water piping has to be laid with an even slope!
- ▶ Bends and curves in the piping have to be avoided, accumulated water or fecal matter could block and damage piping during frost!

2. PUBLISHING INFORMATION

2.1 Producer and Publisher

© EVAC GmbH
Feldstr. 124
22880 WEDEL
GERMANY

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Fax: +49 4103 9168 90
evac-train@zodiacaerospace.com
www.evac-train.com

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Only staff trained by Evac service is permitted to perform any kind of maintenance on the Evac vacuum toilet system.

We recommend to have Evac service perform any kind of maintenance work.

2.2 Record of Revisions

Issue	Description	Date	Pages
01	First issue	2018-08	All

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3.3 List of Abbreviations

Abbreviation	Denotation
HT	Squatting Toilet
RS-Box	Backflush Unit
STC	Standard Toilet Controller
FD	Freeze Drain
FWT	Fresh Water Tank
WWT	Waste Water Tank

Table 1: List of abbreviations

4. GENERAL SAFETY ADVICE

4.1 About this Manual

Please keep this manual for future reference.

Please read the instructions in this manual carefully before installing and operating this assembly.

Safety precautions should always be made according to the general safety advice in this manual, chapter General safety advice.

All personnel working on this assembly should be adequately vaccinated to minimize risk of infection.

4.2 Safety Symbols – User Guide

The following signifies property damage:

NOTICE

The following signifies severe property damage:

CAUTION

The following signifies minor injuries:

▲ CAUTION

The following signifies possible serious injury or death:

▲ WARNING

The following signifies serious injury or death:

▲ DANGER

The following signifies important information:

 **Important information**

The following signifies extra information:

 **Extra information**

5. INTRODUCTION

5.1 Intended Use

NOTICE

Vacuum toilet assembly is designed to transport human waste from the toilet bowl to a waste tank or sewage pipe!

Any other use of the toilet system does not comply with the intended design.

Resulting damage is the sole responsibility of the operator.

5.2 Transport and Storage Information

EVAC components shall transported be in accordance with the GGVSEB (Gefahrgutverordnung Straße, Eisenbahn und Binnenschifffahrt) ordinance on the national and international carriage of dangerous goods by road, rail, and inland waterways or an equivalent guideline consistent with local regulations.

6. SYSTEM DIAGRAM

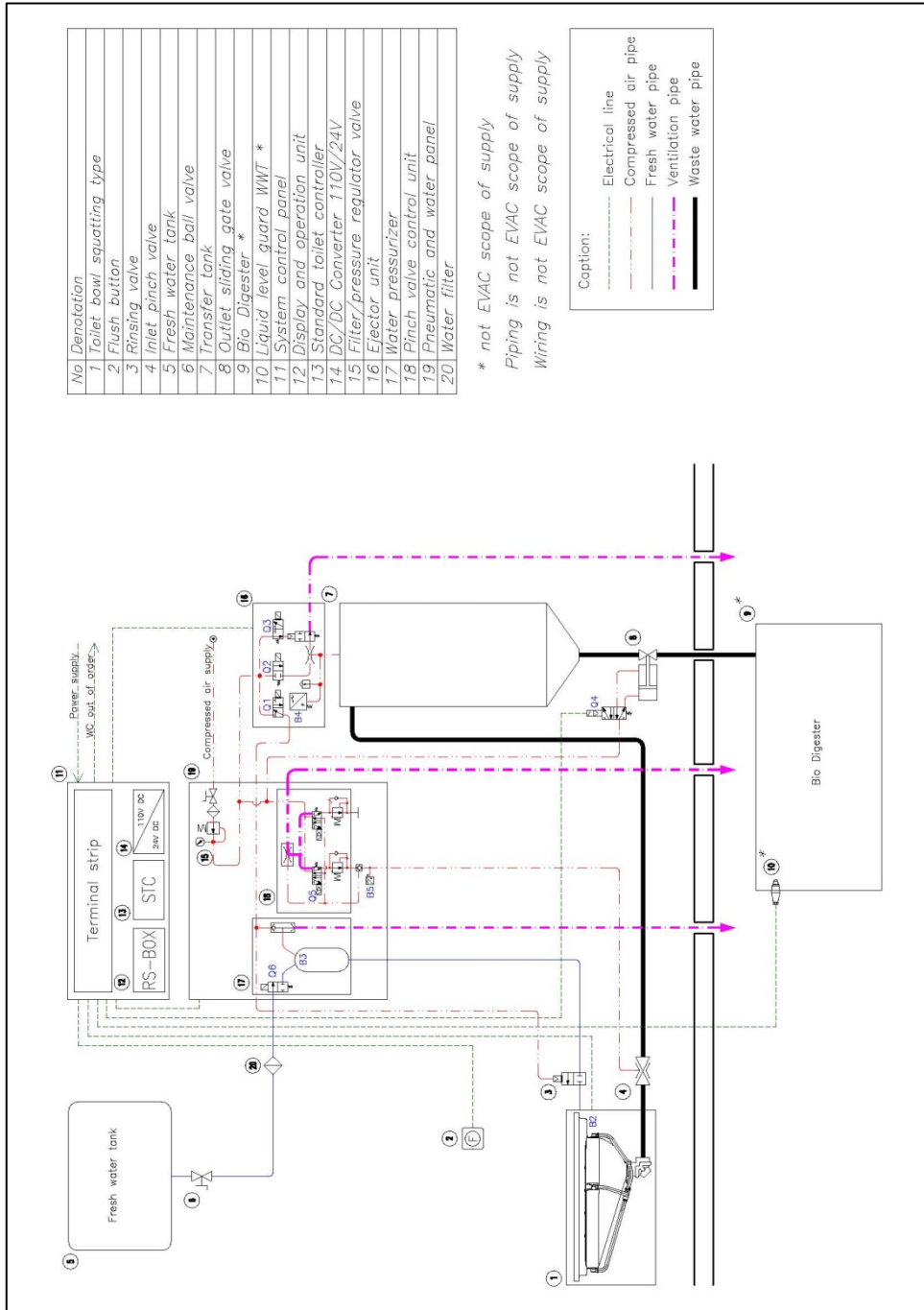


Figure 1: System Diagram – Squatting System (for reference only)

7. SCOPE OF SUPPLY

Pos.	Description	Quantity
01	Squatting Toilet	1
02	Base Unit	1
03	Water System Panel	1
04	Pneumatic Panel	1
05	Control Board	1
06	Connection Set	1
07	Cable Set	1

Table 2: Scope of Supply – Squatting System

7.1 Required Tools

Evac recommended for professional maintenance and repair the use of commercial tools like screwdrivers, torque spanner etc.

7.1.1 List of Special Tools

Evac propose the use of the following special tools for maintenance or repair:

- 10531 Service terminal HT-793-English HT793E

or

- 69833 Serviceterminal PC version
- 23474 Tool for pan head screw
- 79017 Cleaning tool for EVAC flush nozzles

7.2 List of Consumables

- Metallic threads locked with article no: 11161 Thread locking AN302-43.
- Metal threads with non-metallic threads locked with article no: 17271 Thread seal Loctite 5331.
- Non-metallic threads locked with article no: 17271 Thread seal Loctite 5331.
- Metallic and non-metallic threads that may undergo small readjustments before use locked with article no: 39399 Thread sealing tape - Loctite 55
- For WC-seat greasing article no: 21446 Grease - Aerosol 400ml

7.3 Approved Cleaner



Do not use cleaner which contains chlorine, particles or other abrasives! Follow the instructions of the manufacturer data sheet!

- Neutral cleaning agent and warm water
- Cleaner approved for rolling stock with following composition:
 - Citric acid <15% weight/volume
 - Amidosulfuric acid <15% weight/volume
 - Phosphoric acid < 5% weight/volume

Example:

- Into-Top from Henkel
- Neporin from Saniclean
- Retirol from Deutsche Hahnerol

Before using a differed cleaner please contact Evac.

7.4 Approved Disinfectant



Follow the instructions of the manufacturer data sheet!

The following disinfectants show no incompatibility to the materials up to the specific concentration limit stated below:

- Hydrogen peroxide 5% ready to use solution
- Chlorine dioxide 5% ready to use solution

Example:

- Herlisil (hydrogen peroxide, commercially available concentration 50%) from Herlisil GmbH
- Duozone (chloroxide, commercially available concentration (finished product) 0.3%)

Before using a differed disinfectant please contact Evac.

7.5 Approved Decalcifier



Follow the instructions of the manufacturer data sheet!

- Decalcifier approved for rolling stock with following composition:
 - Citric acid <4% weight/volume

8. COMPONENT DESCRIPTION – SQUATTING SYSTEM INDIA



*Part list and drawings see
Appendix Manuals - Squatting System India*

The Evac toilet system consists of:

- vacuum toilet (squatting or western type) equipped with a pinch valve
- base unit equipped with an sliding gate valve
- water system
- pneumatic panel
- connection set
- cable set

The system is fed with water from the Fresh water tank (not Evac supply) via gravity.

The waste water flows into a Bio-digester (not Evac scope) which is located in the car body.

The function of the vacuum toilet are controlled and monitored by a STC (Standard Toilet controller).

8.1 Squatting Toilet

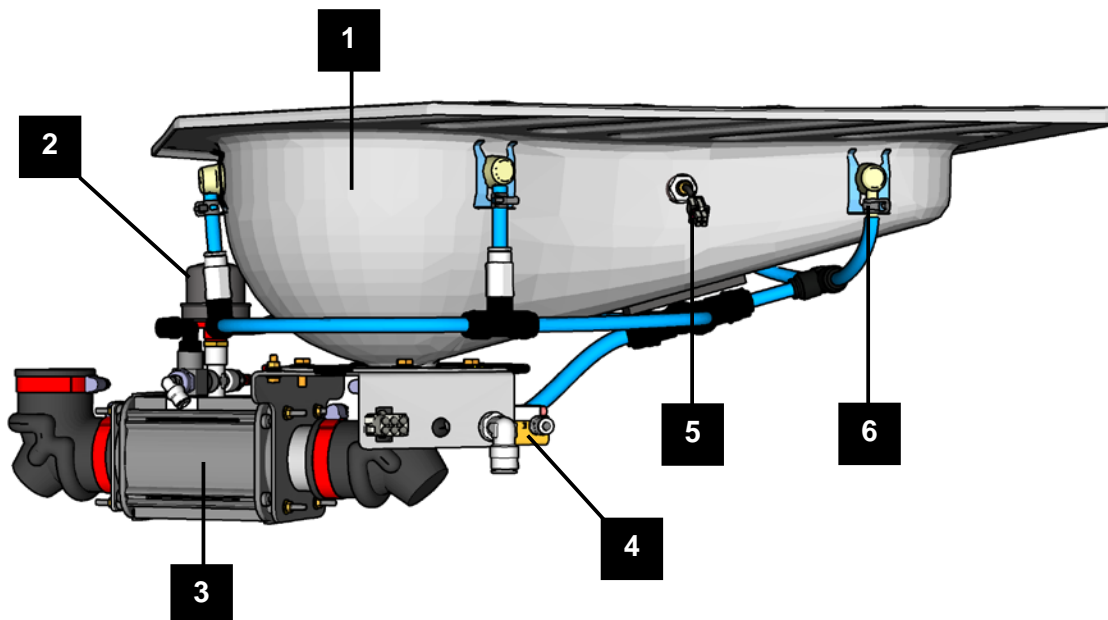


**Part list and drawings see
Appendix Manuals - Squatting System India**

The squatting toilet combines the following main features:

- Compact and space saving design.
- Quick and easy installation.
- Excellent up-time record.
- Sets highest standards in hygiene.
- 0.5-0.7 liters of water per flush. The bowl is efficiently flushed with high pressure water.
- Sturdy pinch gate valve which opens the whole diameter. No restriction, even bulky waste us passed.
- The system is micro-processor controlled. Fault detection and error correction is integrated.

The squatting toilet is made of stainless and consists of the following main components:



1	Bowl Unit	2	Pressure Guard
3	Pinch Valve	4	Water Inlet Valve
5	Liquid Level Guard	6	Flush Nozzle (5x)

Figure 2: Squatting Toilet (for reference only)

8.1.1 Technical Data – Squatting Toilet

Materials		
	Bowl	Stainless steel
Weight		
		approx. 12.5 kg
Supplies		
	Compressed air	6.2 (4 bar to 10 bar), Filter 5 µm max. grain size
	Water	Pressure: 0.2 bar to 1.5 bar Filter: 250 µm max. grain size Minimum flow rate: 2 l/min
	Electrical	24 V DC
External connections		
	Mechanical	Mounting holes Ø 6.5 mm (8x)
	Compressed air	Ø 6 mm
	Water	Ø 12 mm
	Outlet	Ø 48 mm
	Electrical connections	Mini Mate-N-Lok, 4 pol
Certificates		
		CE certificate
Production standard		
		ISO 9000 ff

Table 3: Technical Data – Squatting Toilet

8.1.2 Interfaces

NOTICE

Unexpected escape of fluids from the system.

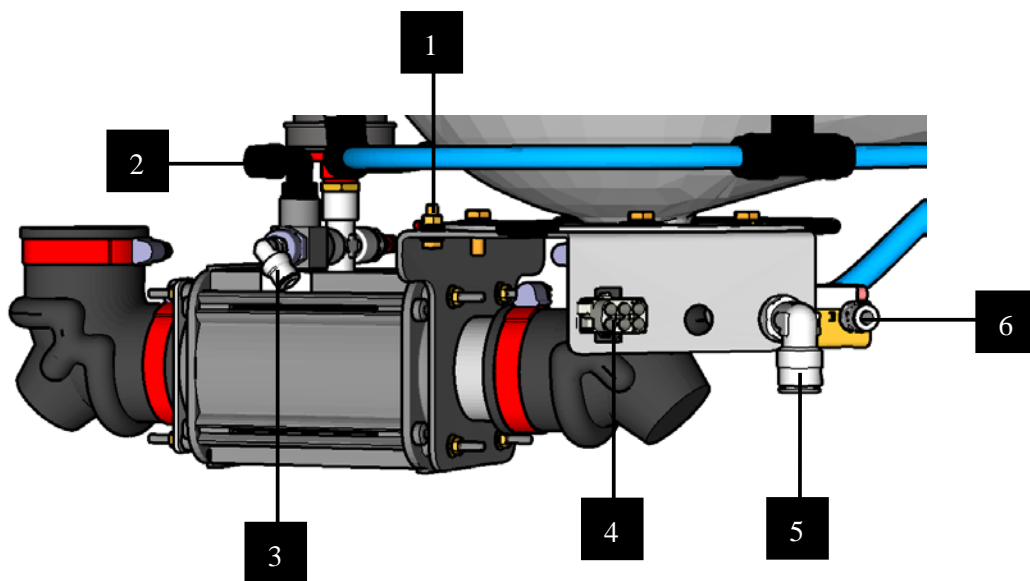
Potential risk of damage to the rail car:

- ▶ The rail car manufacturer has to take appropriate measures to prevent possible damage due to escaping fluids.
- ▶ Rubber elbows and elastic adapters have to be secured against sliding off in axial direction. The piping is subjected to severe pressure surges during evacuation of the intermediate tank.
- ▶ Compressed air, fresh and waste water piping has to be laid with an even slope!
- ▶ Bends and curves in the piping have to be avoided, accumulated water or fecal matter could block and damage piping during frost!



Part list and drawings see Appendix Manuals - Squatting System India

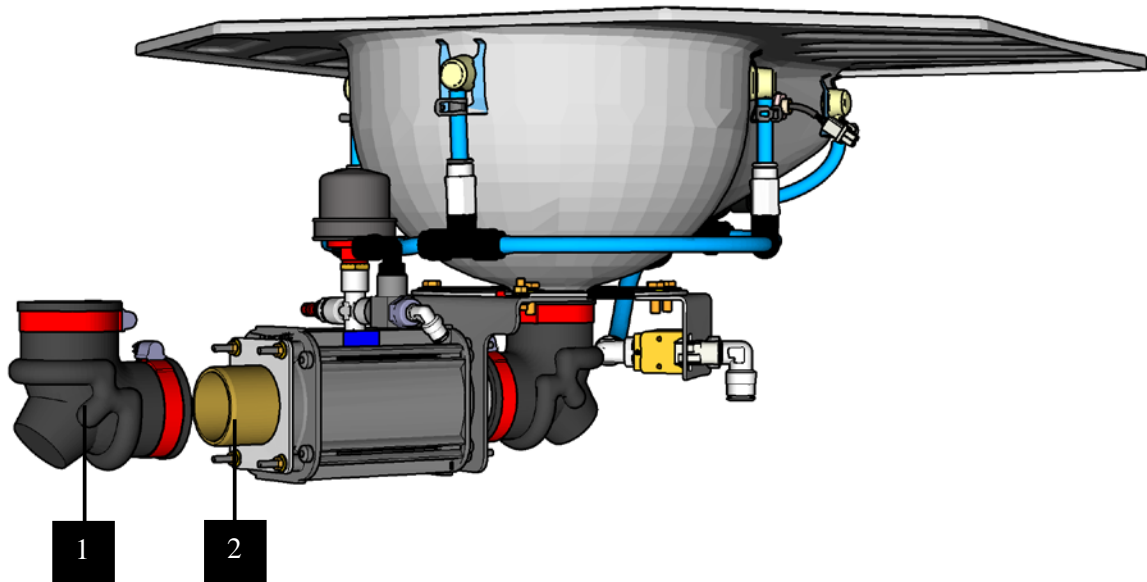
8.1.2.1. Interfaces – Voltage, Air and Water



1	Grounding Connection M5	2	Pinch Valve to Ejector Ø 8 mm
3	Pressure Switch to Ejector Ø 6 mm	4	Mini Mate-N-Lok, 4 pol
5	Water Inlet Ø 12 mm	6	Compressed Air Inlet Ø 6 mm

Figure 3: Interfaces – Squatting Toilet (for reference only)

8.1.2.2. Interface – Outlet



1	Rubber Elbow Ø 50 mm, 90°	2	Outlet Nozzle Ø 48 mm, l= 54 mm
---	---------------------------	---	---------------------------------

Figure 4: Interface – Toilet Outlet (for reference only)

8.1.3 Flush Nozzle

The bowl is equipped with five plastic flush nozzles that will flush the bowl efficiently. Due to the design and placement of the flush nozzles the water consumption of the squatting is low, just approx. 0.5-0.7 l.

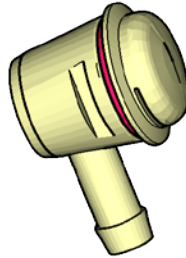


Figure 5: Flush Nozzle (for reference only)

8.1.4 Liquid Level Guard opt.

The optical liquid level guard ensures that the bowl will not overflow. The sensor is activated with a delay to avoid accidental activation during the flush cycle or while cleaning.

The liquid level guard is maintenance-free.

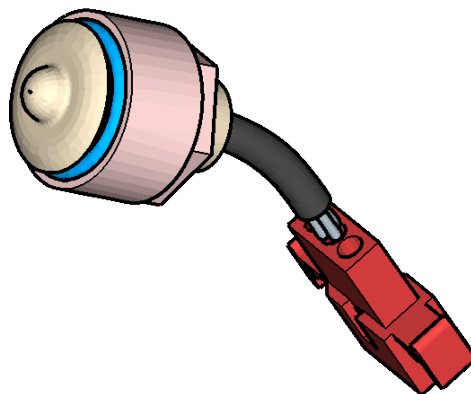


Figure 6: Liquid Level Guard (for reference only)

8.1.5 Pinch Valve

One pinch valve DN40 is installed into the piping between squatting pan and base unit.

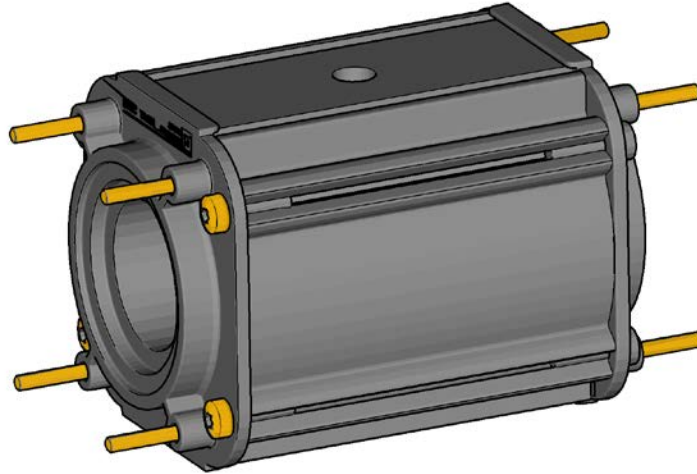


Figure 7: Pinch Valve (for reference only)

8.1.6 Pressure Guard

The preset pressure guard controls the compressed air supply of the pinch valve:

- Switching point 300/250 kPa.

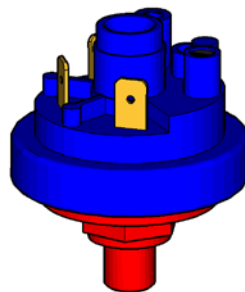


Figure 8: Pressure Guard (for reference only)

8.2 Base Unit

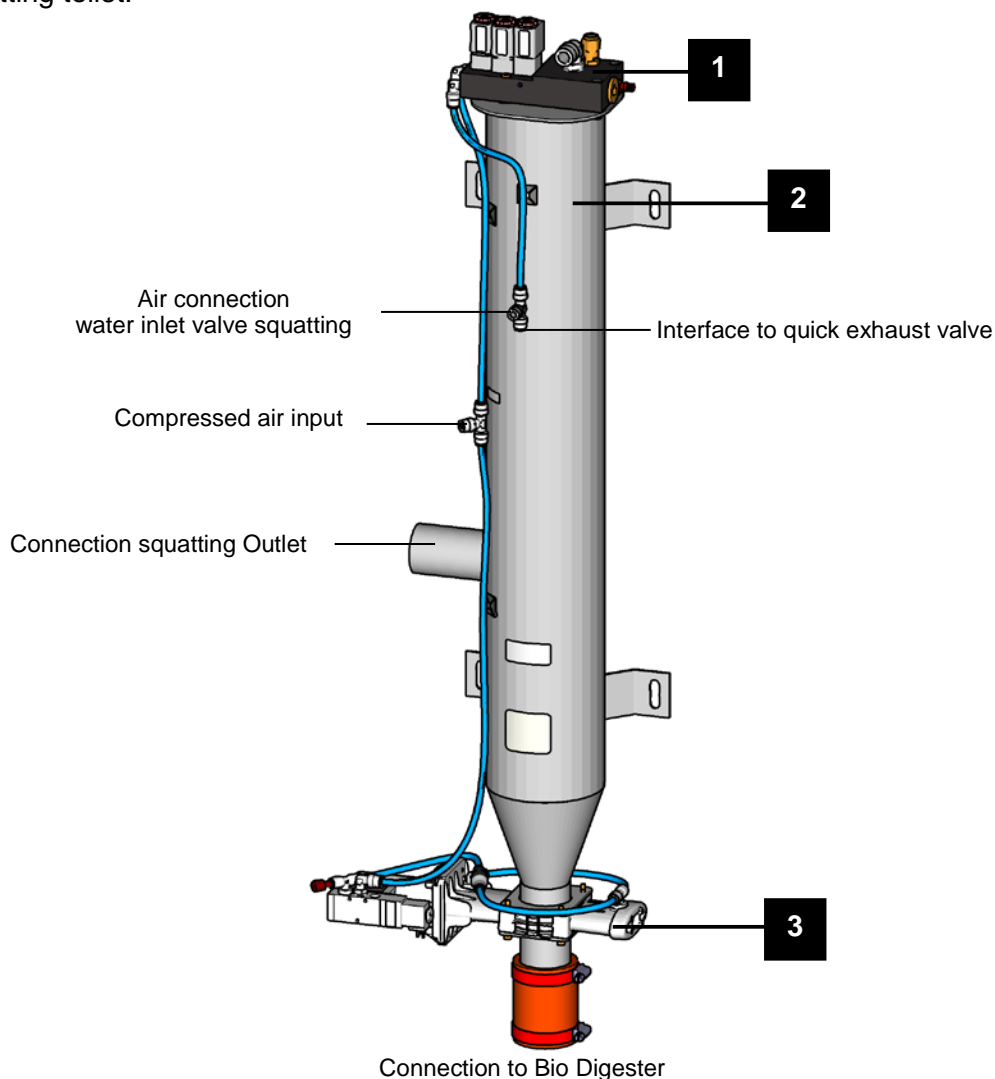


Part list and drawings see Appendix Manuals - Squatting System India

The base unit has a volume of approx. 7 l and is made of stainless steel. It is equipped with a vacuum pump and a sliding gate valve.

The flush sequence will start after pushing the flush button. After a defined vacuum level is reached the pinch valve of the squatting toilet opens and the content of the bowl is sucked into the base unit. The pinch valve is closed. Now compressed air is blown into the base unit until a defined pressure level is reached. The sliding gate valve shortly opens the piping to the Bio Digester. The pressure surge empties the contents of the base unit into the Bio Digester.

To ensure the proper function of the system the base unit must be positioned as near as possible to the squatting toilet.

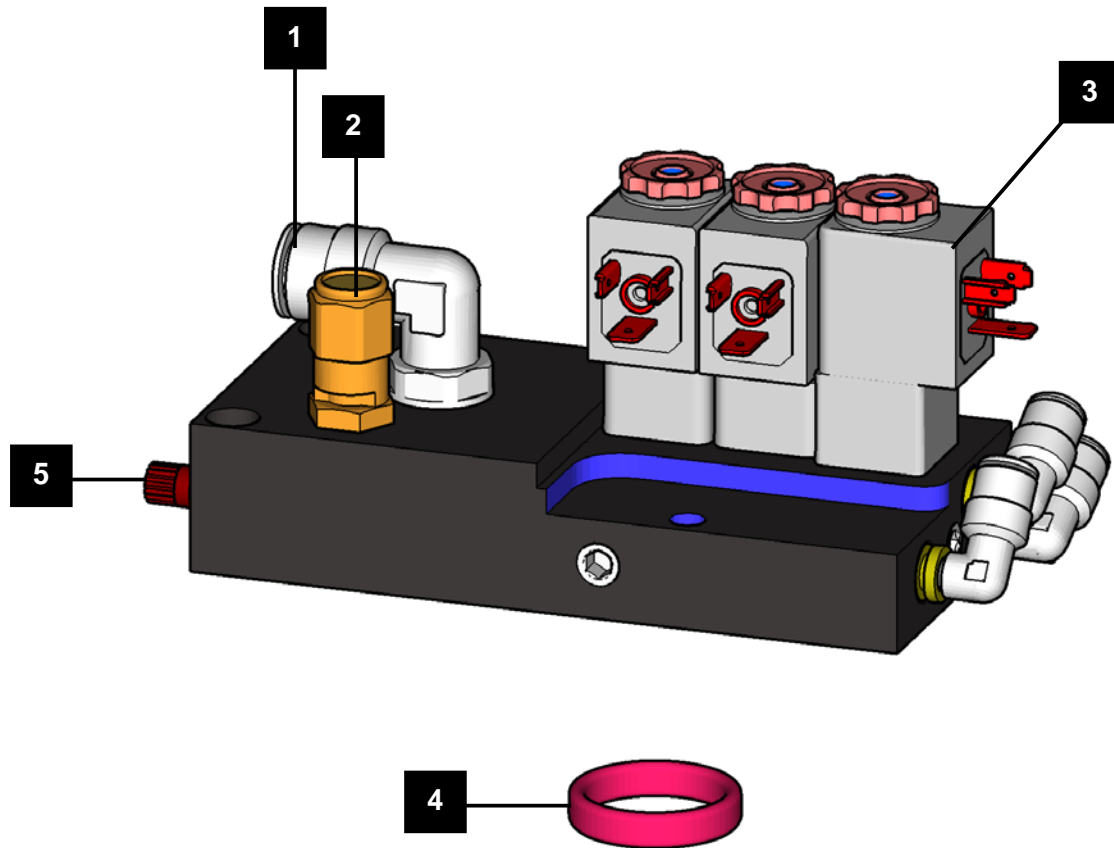


1	Vacuum Pump	2	Base unit
3	Sliding gate Valve		

Figure 9: Base unit (for reference only)

8.2.1 Vacuum Pump

The vacuum pump charges the base unit with pressure and vacuum:

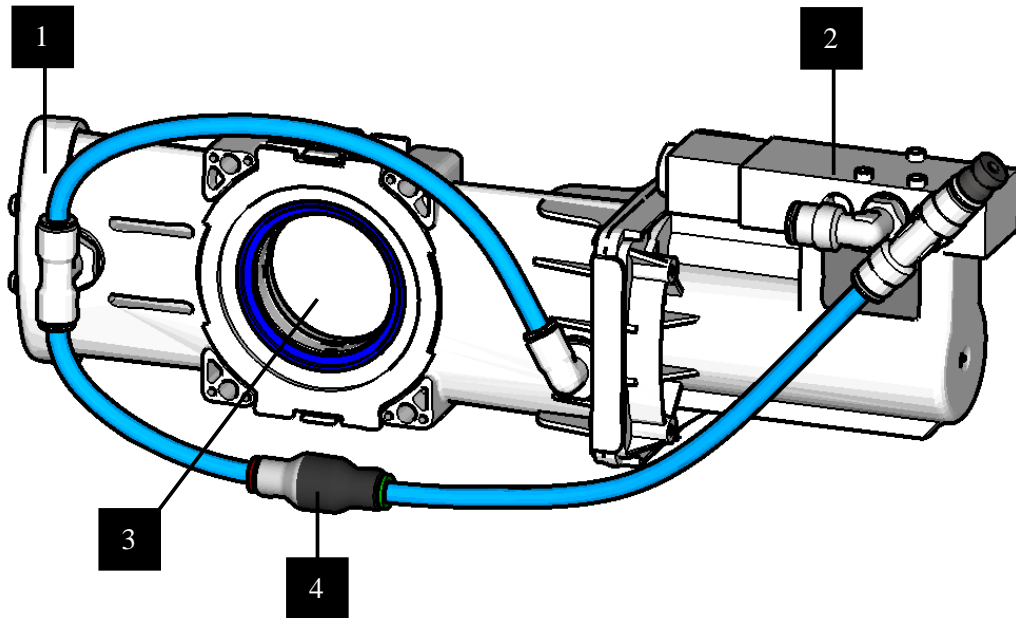


1	Compressed Air Output Ø 12 mm	2	Safety Valve
3	Solenoid Valves (3x)	4	Gasket
5	Test Connection Ø 6 mm		

Figure 10: Vacuum Pump (for reference only)

8.2.2 Sliding Gate Valve

The sliding gate valve opens and closes the connection between the base unit and the Bio digester tank. The sliding gate valve is equipped with a self-cleaning device:



1	Sliding Gate Valve	2	5/2 Solenoid Valve
3	Sliding Gate	4	Self-Cleaning Device

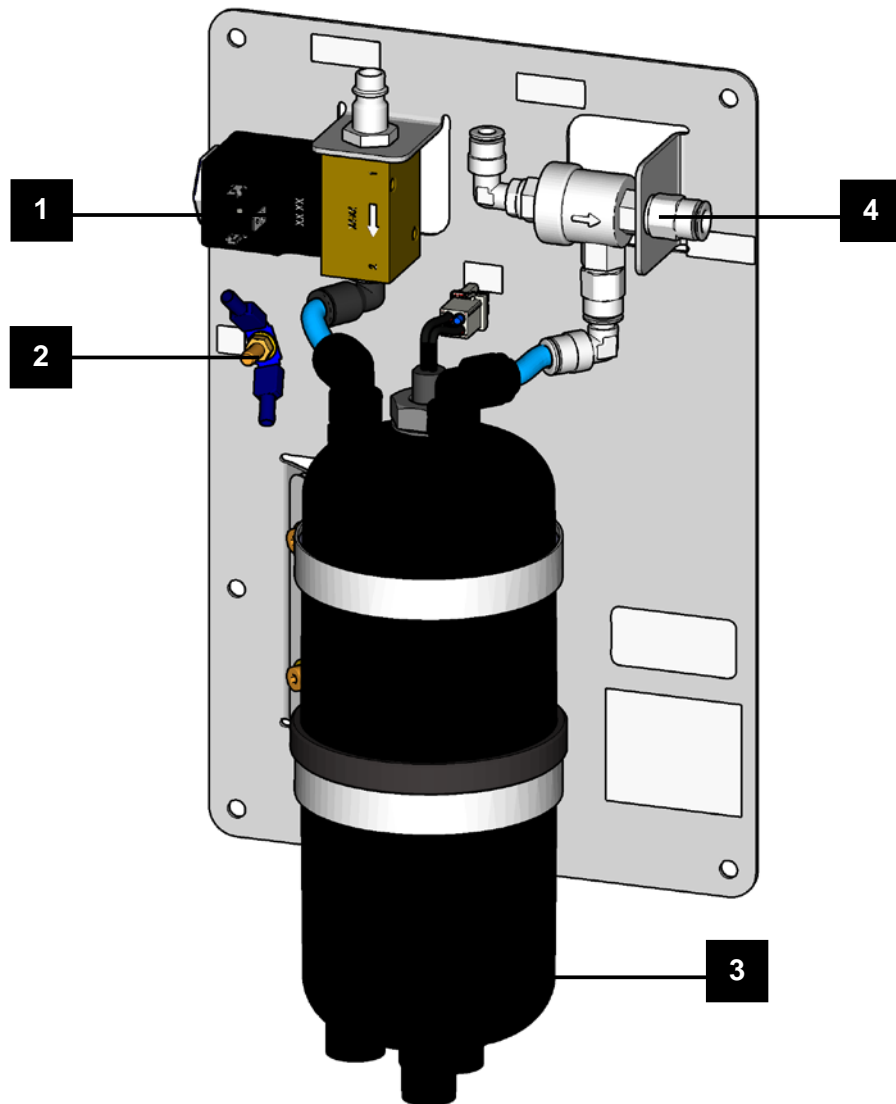
Figure 11: Sliding Gate Valve – sr (for reference only)

8.3 Water System Panel



Part list and drawings see Appendix Manuals - Squatting System India

The water system panel consists of a water inlet valve, a flush water tank and a quick exhaust valve. The flush water tank feeds the squatting toilet with pressurized water for flushing:



1	Water Inlet Valve	2	Grounding M5
3	Flush Water Tank	4	Quick Exhaust Valve

Figure 12: Water System Panel (for reference only)

8.3.1 Water Inlet Valve

Normally closed 2/2 way valve:

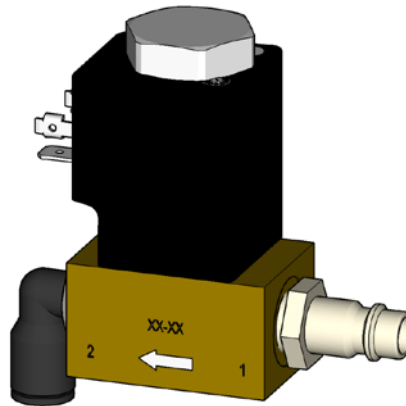


Figure 13: Water Inlet Valve (for reference only)

Technical data	
Supply voltage	24 Volt +/- 30%
Medium	Water/Air
Flow rate	0.4 m ³ /h
Pressure range	0-3 bar
Weight	0.43 kg
Medium Temperature	to +70 °C

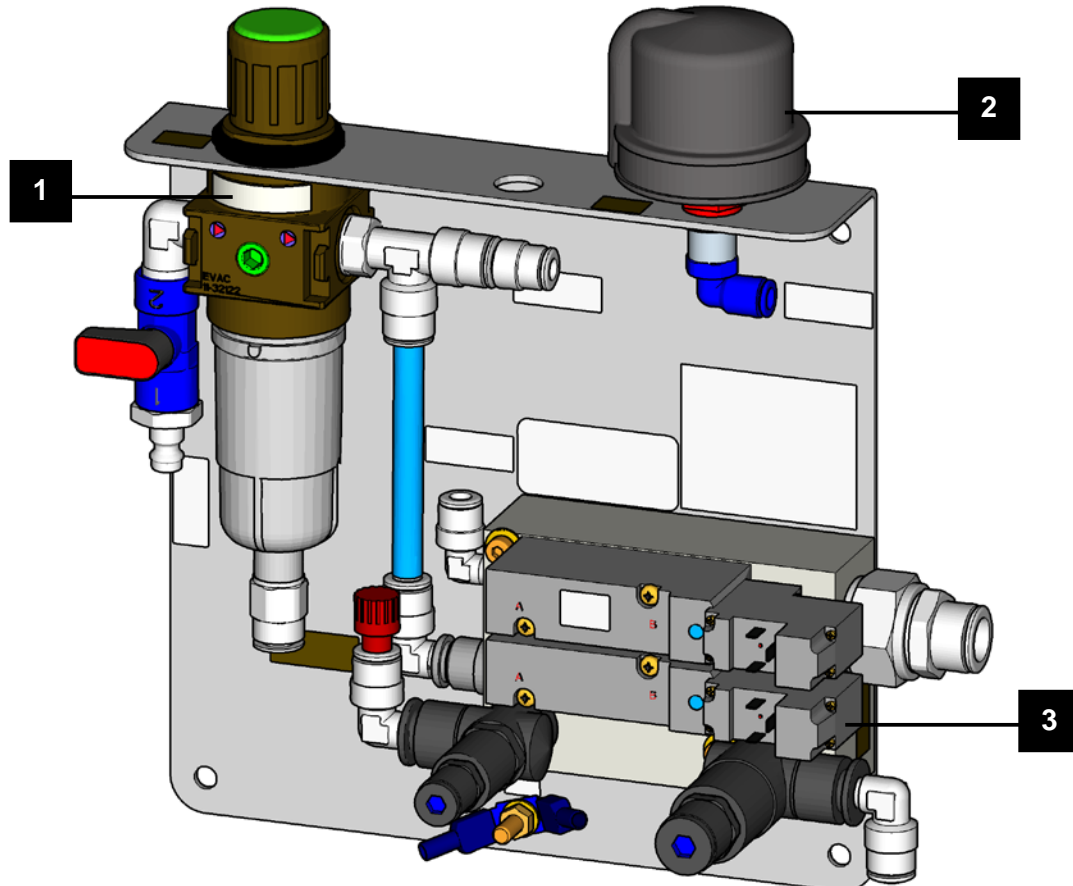
Table 4: Technical Data – Water Inlet Valve (for reference only)

8.4 Pneumatic Panel



Part list and drawings see
Appendix Manuals - Squatting System India

The pneumatic control consists of a filter pressure regulator, a pressure guard and an ejector:



1	Filter Pressure Regulator	2	Pressure Guard
3	Ejector		

Figure 14: Pneumatic Panel (for reference only)

8.4.1 Filter Pressure Regulator

The preset filter pressure regulator regulates the compressed air and reduces the incoming pressure down to the required value. It is equipped with a manually ball valve:

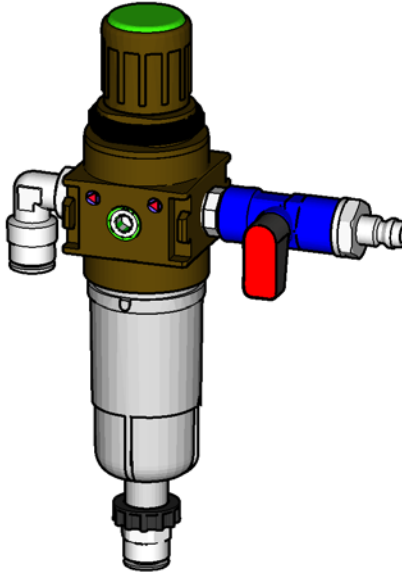


Figure 15: Filter Pressure Regulator (for reference only)

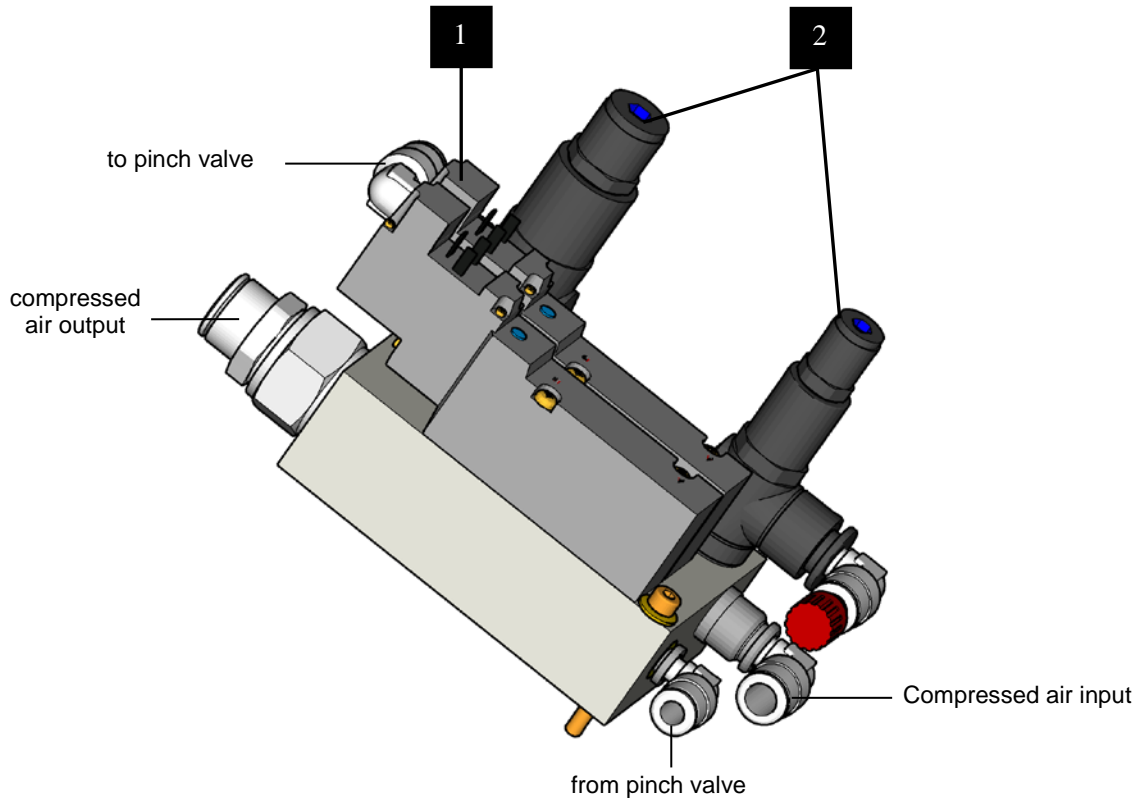
8.4.2 Pressure Guard

The preset pressure guard monitors the pressure ratio in the base unit:

- Switch point 20/17 kPa.

8.4.3 Ejector

The ejector controls the pinch valve function:



1	Solenoid Valve (2x)	2	Pressure Control Valve (2x)
---	---------------------	---	-----------------------------

Figure 16: Ejector (for reference only)

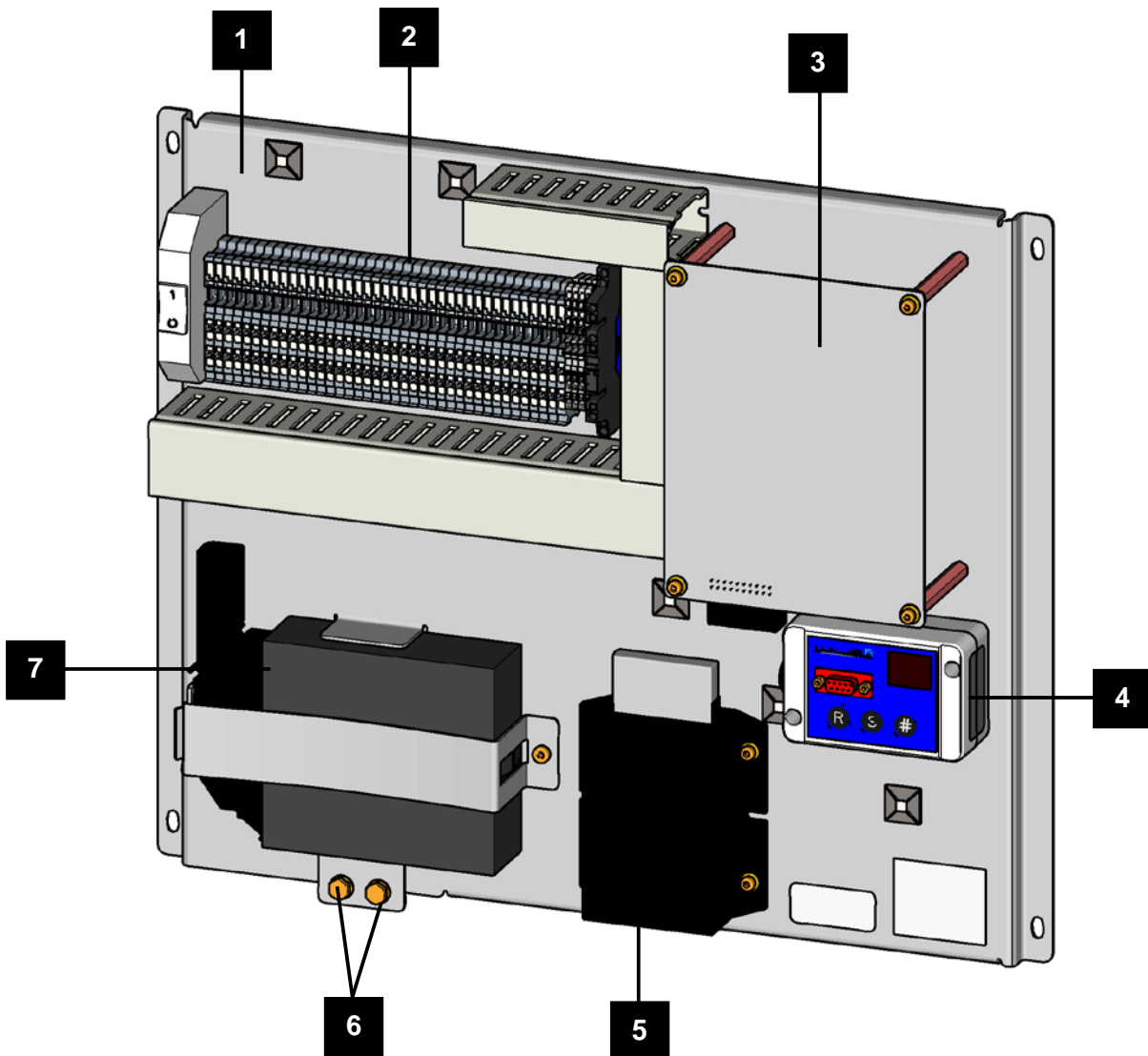
8.5 Control Board



Part list and drawings see
Appendix Manuals - Squatting System India

NOTICE: Inputs & outputs will be indicated via LEDs!

The control board controls and monitors the functionality of the compact toilet system and consists of a RS-Box, a DC/DC converter, the control unit (STC), an LED board and a terminal strip:



1	Terminal strip	2	Terminal Strip
3	LED Board	4	RS-Box
5	DC/DC Converter	6	Grounding (2x)
7	Standard Toilet Controller		

Figure 17: Control Board (for reference only)

8.5.1 RS-Box



If the Evac service terminal or service terminal on PC is connected the functionalities of the RS-Box are unavailable.

The service interface unit provides an immediate status of system working conditions. The status is displayed on a double-digit 7-segment display.

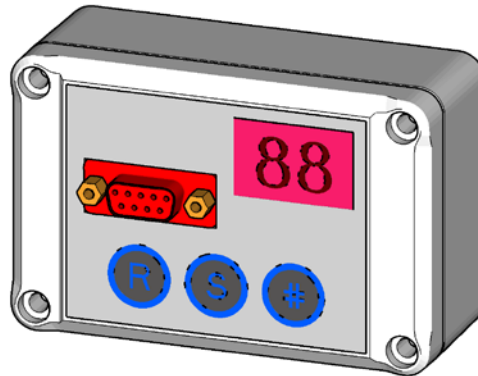


Figure 18: RS-Box (for reference only)

Technical data	
Supply voltage	24 Volt +/- 30%
Current consumption	approx. 65 mA at 24V, all LEDs on
Serial Interface	RS232, compliant to vacuum unit protocol
Dimension	(98 x 64 x 45) mm ³
Weight	approx. 0.16 kg
Temperature Range	-40 to +70 °C
Protection grade	IP 54 (all connector positions plugged)

Table 5: Technical Data – RS-Box (for reference only)

The RS-box has the following features:

- System status report.
- Button **R** (backflush)
- Service-flush button **S** (Flush without water).
- Button **#** (communication mode or error quit).
- Sub-D connector (9-pole) for service terminal or service terminal on PC to monitor:

Component Description – Squatting System India



After the recognition of an error (except: Waste tank full) the control unit will initiate applicable error correction routines. During the correction routines the respective code is shown as continuous light. At the same time the external 'WC-out of service' light of the coach is not illuminated. If the error cannot be corrected automatically the control unit switches of the vacuum toilet.

The code indication on the RS-box and the 'WC-out of service' display starts blinking. After pushing the error quit button “#” the 'WC-out of service' display switches from blinking light to continuous light. The blinking light of the RS-Box code indication will not be affected and it is still blinking.

Freeze drain is no error and will not be indicated by the 'WC-out of service' display.

Code	Description	Display
00	System ready	continuous light
01	Waste tank full	blinking light
02	Pressure rise	continuous light → blinking light
03	Pressure Vacuum	continuous light → B blinking light
04	Pressure detected	continuous light → blinking light
05	Bowl full	continuous light → blinking light
06	No water	continuous light → blinking light
09	Pinch valve closed	continuous light → blinking light
10	Pinch valve open	continuous light → blinking light
20	Flush button error	continuous light → blinking light
88	Initialization	LED check - all segments illuminated for 5 seconds

Table 6: Code Overview

8.5.1.1. To connect a PC with service terminal software



If the EVAC service terminal or service terminal on PC is connected the functionalities of the RS-Box are unavailable.

NOTICE: Refer to manual for detailed installation instructions.

- Connect the USB-Stick with the software to a free USB-Port.
- Open the USB-Stick in Windows-Explorer.
- Double-click on **Service terminal - PC Version v1.2.8 Setup.exe** to start the installation.
- Follow the instructions of the installer.
- Connect the adapter cable to the free USB-port of the PC.
- Connect the adapter cable to the RS232 interface.
- Start the Service terminal – PC Version.
- Choose the USB-Serial Port in the settings.

CAUTION: Make yourself familiar with operating the Service terminal – PC Version before using it! Read the manual carefully and keep it for future reference!

- The Service terminal – PC Version is now ready to use.
- Push «#» (min. 0,7 s) → **00** blinking light → push «#» → **90** blinking light for 5 s → **90** continuous-light (if you push during **90** blinking light «#» you go back to **00**)
- Use service terminal on PC like described in the technical manual.
- Terminate: Push «#» (min. 0.7 s) → **90** blinking light → push «#» → **00** blinking light for 5 s → **00** continuous-light

8.5.1.2. To connect the service terminal HT793 (Hardware)



If the EVAC service terminal or service terminal on PC is connected the functionalities of the RS-Box are unavailable.

There are 24 V operating voltage from the toilet 24V on the RS-232- Interface! Don't connect a PC!

- Connect service terminal at the RS-Box (RS-232-interface).
- Push «**S**» (service flush) for 10 seconds → **92** continuous-light.
- The service terminal will be active.
- Terminate: Push «**S**» for 10 seconds → **00** continuous-light.

8.5.2 DC/DC Converter

The DC/DC converter converts the power supply 110 V DC of the train to 24 V DC:

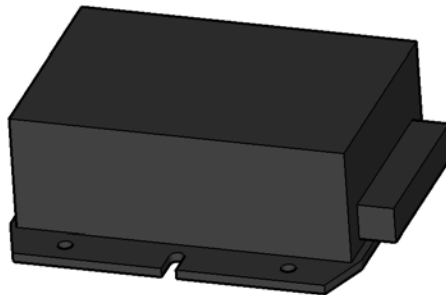


Figure 19: DC/DC Converter (for reference only)

Technical data	
Input voltage	50.4-154 V
Output voltage	24 V DC ($\pm 2\%$)
Power	max. 80 W
Dimensions	119 mm x 100 mm x 40 mm
Ambient temperature	-40° C ...+70° C
Storage temperature	-88° C ...+85° C
Operation area	Railway applications

Table 7: Technical Data – DC/DC Converter (for reference only)

8.6 Connection Set



*Part list and drawings see
Appendix Manuals - Squatting System India*

The connection set includes incidentals for pneumatic connection of the system components:

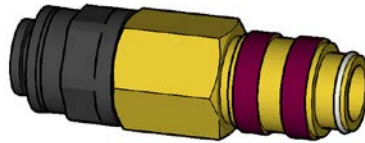


Figure 20: Compressed Air Supply – DN5 - 8 mm (for reference only)

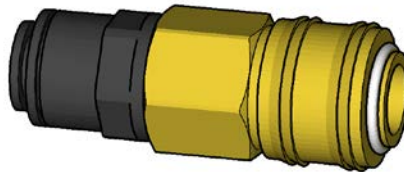


Figure 21: Water Supply – DN7.2 - 8 mm (for reference only)

Figure 22: Pneumatic hoses (for reference only)

8.7 Cable Set



*Part list and drawings see
Appendix Manuals - Squatting System India*

The cable set includes the connection cable for:

- Squatting Toilet
- Base Unit
- Water System Panel
- Pneumatic Panel

9. OPERATING DESCRIPTION

Squatting toilet assembly is designed to transport human waste from the toilet bowl to a waste tank or sewage pipe!

Any other use of the toilet system does not comply with the intended design.

During normal operation the squatting toilet will be in standby mode until a flush cycle is initiated. The squatting toilet will perform a flush cycle and revert to standby mode afterwards.

9.1 Initial Start-Up



***Make sure all connections are correct and tight!
Fresh water tank must be filled up, water inflow pipe (water filter) should be neither leaking nor clogged or frozen up.***

The squatting toilet will run a self-test cycle every time the squatting toilet is supplied with power.

The self-test cycle consists of one complete flush cycle.

Procedure:

- Switch **OFF** the power supply.
- Switch **ON** the power supply.
- RS-Box display 00 and the squatting toilet start a self-test cycle.

Check:

- Has the flush cycle been proceeded completely without problems?
- Is water pressed through the flush nozzles strongly and evenly?

After the self-test cycle is completed, press the flush button and check the flush cycle again.

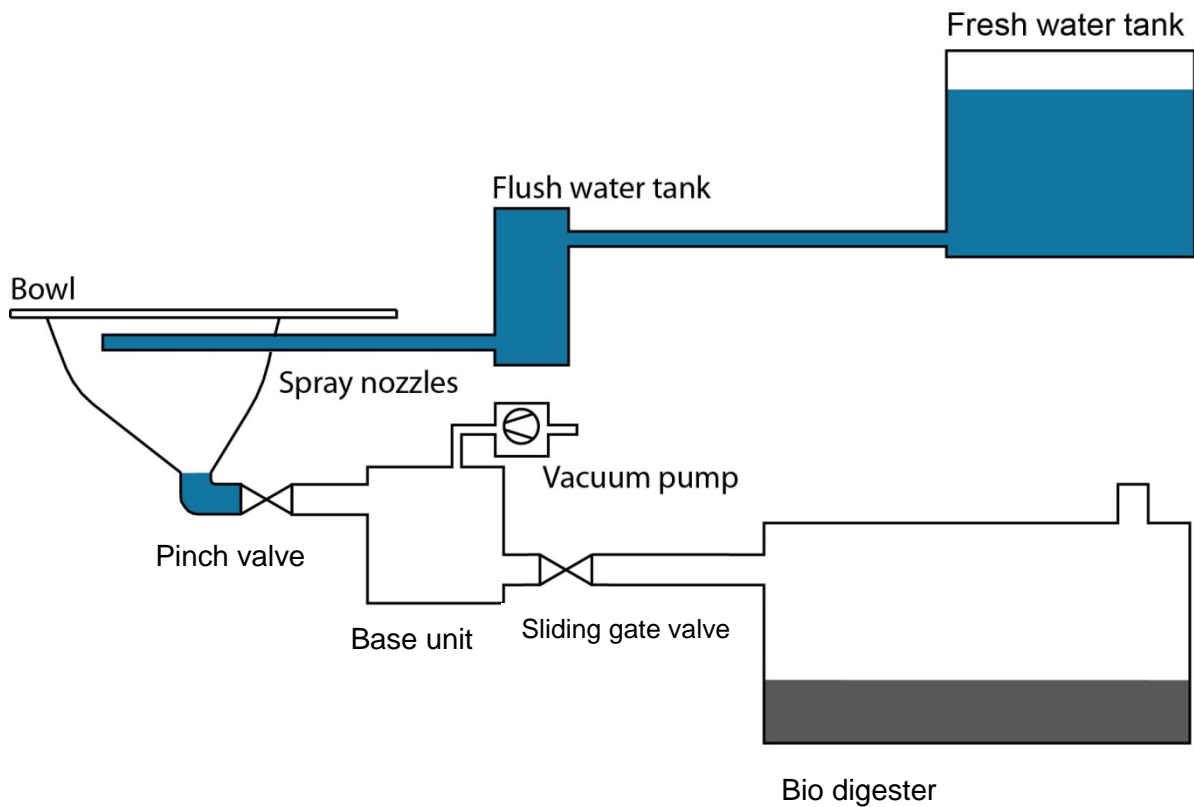


Check for leakages!

9.2 Stand-By

In stand-by the squatting bowl is filled with an initial water supply, the flush water tank on the water system panel is filled up and the base unit is empty.

Pinch valve and sliding gate valve are closed and the LED on the flush button illuminates permanently.



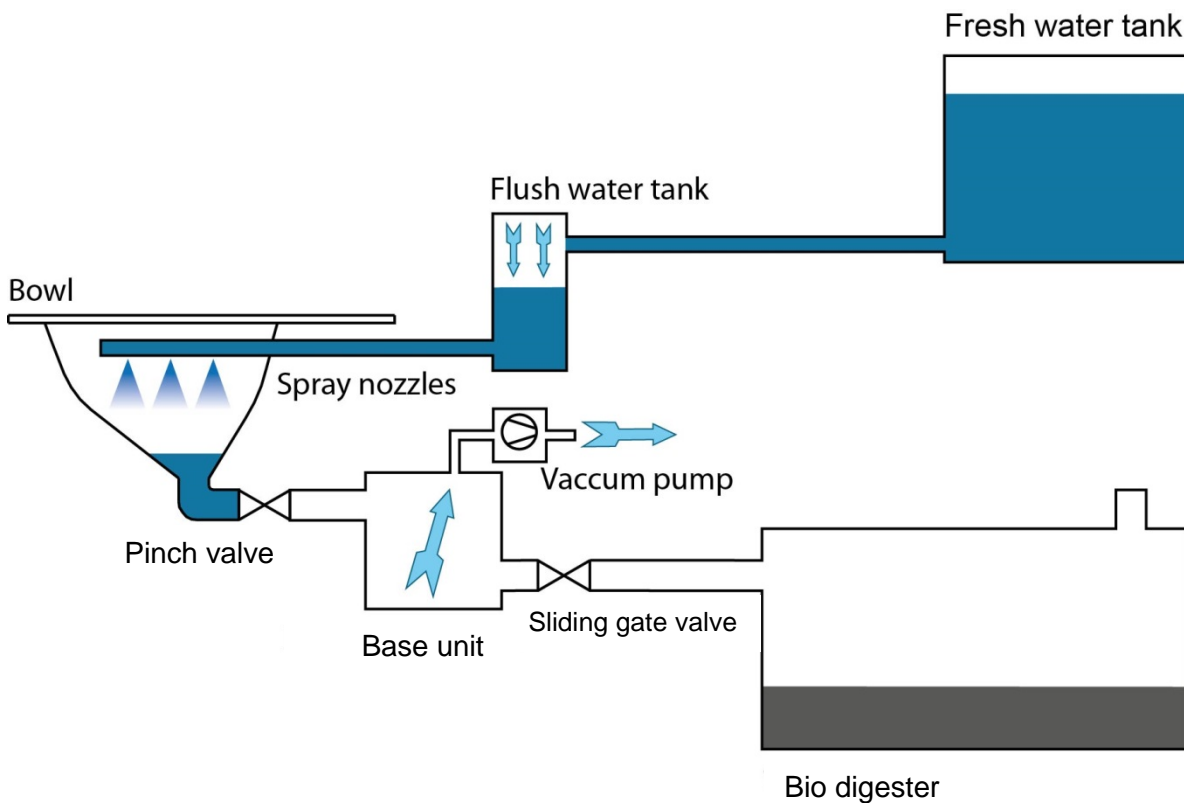
9.3 Flushing the Toilet Bowl and Evacuating the Base Unit

The flush button is pressed, the LED on the flush button begins to flash and the squatting toilet starts the flush cycle. The complete cycle takes approx. 25 seconds.

Compressed air is pressed into the flush water tank, positioned on the water system panel.

Flush water is pressed through the spray nozzles by the pressurized flush water tank. The squatting bowl is flushed with high efficiency.

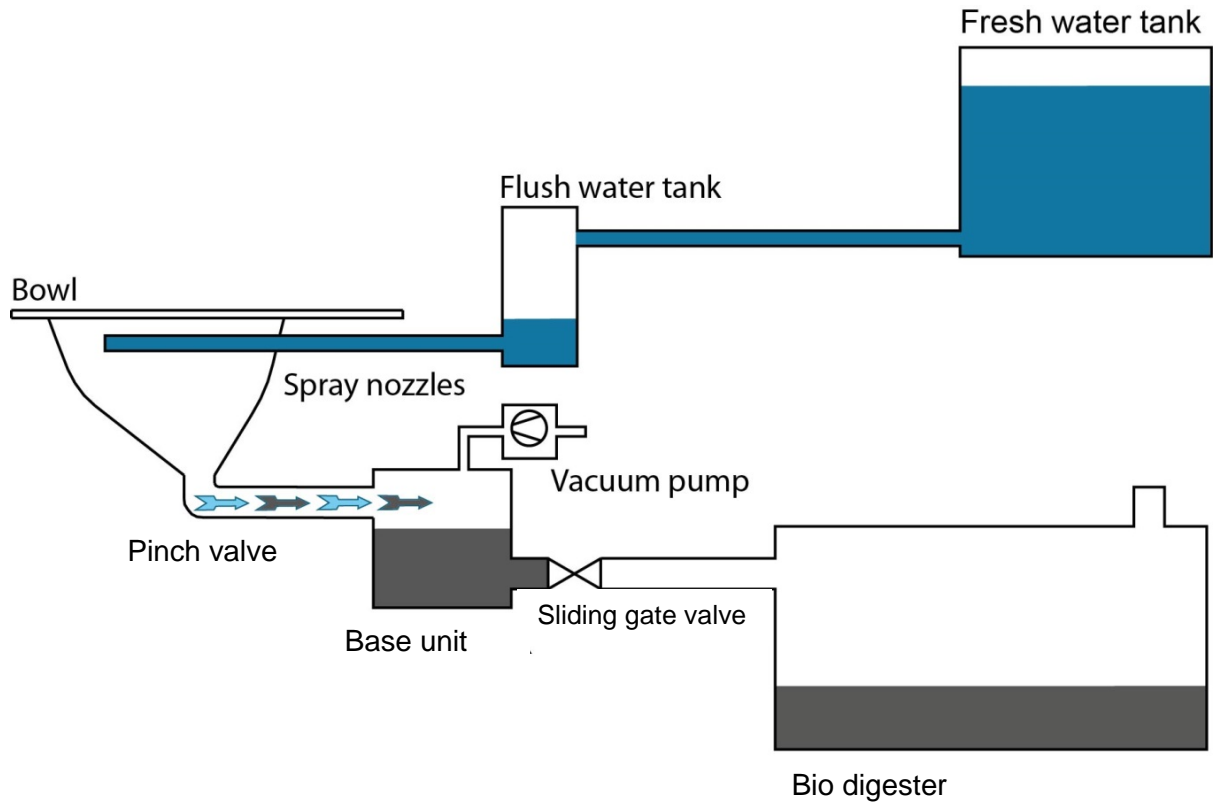
At the same time the vacuum pump evacuates the base unit until the necessary vacuum level - 0.05 to -0.5 bar is reached.



9.4 Emptying the Bowl

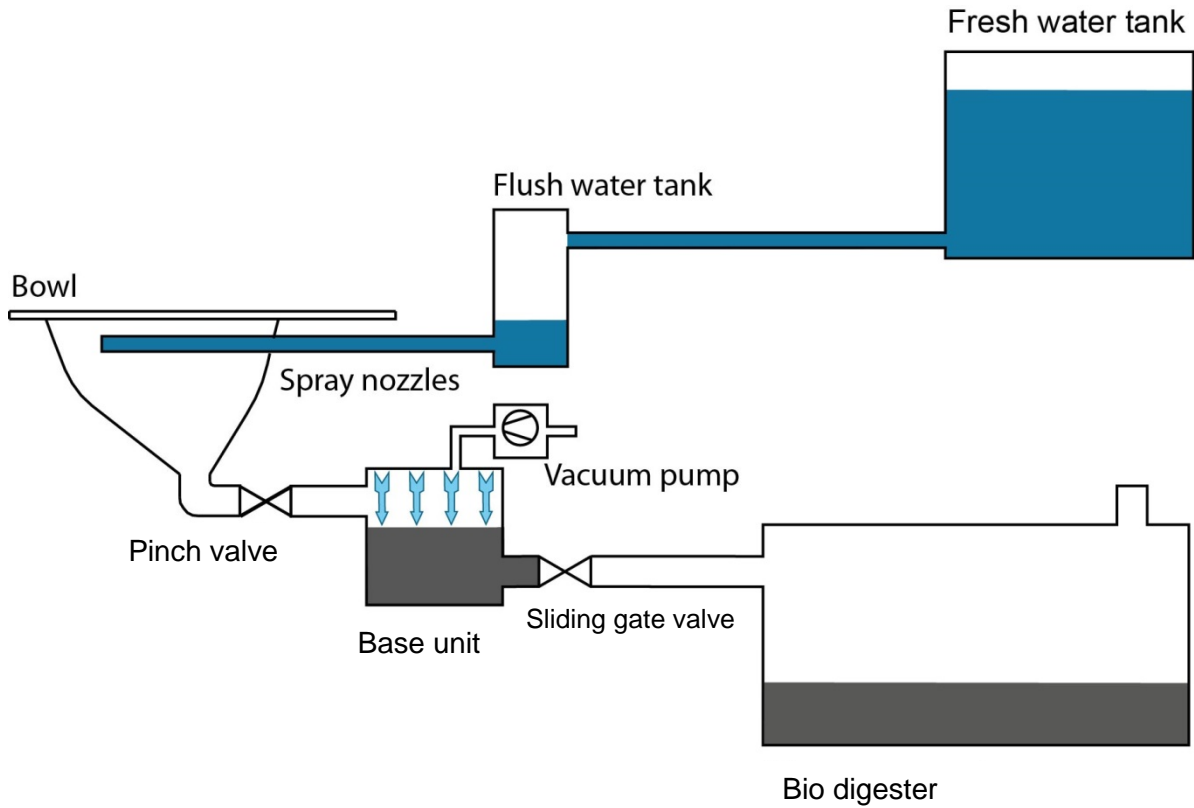
As soon as the required vacuum level is reached the pinch valve between squatting bowl and base unit is opened for a short time.

The vacuum inside the base unit sucks the contents of the bowl into the base unit.



9.5 Pressure Built-Up Intermediate Tank

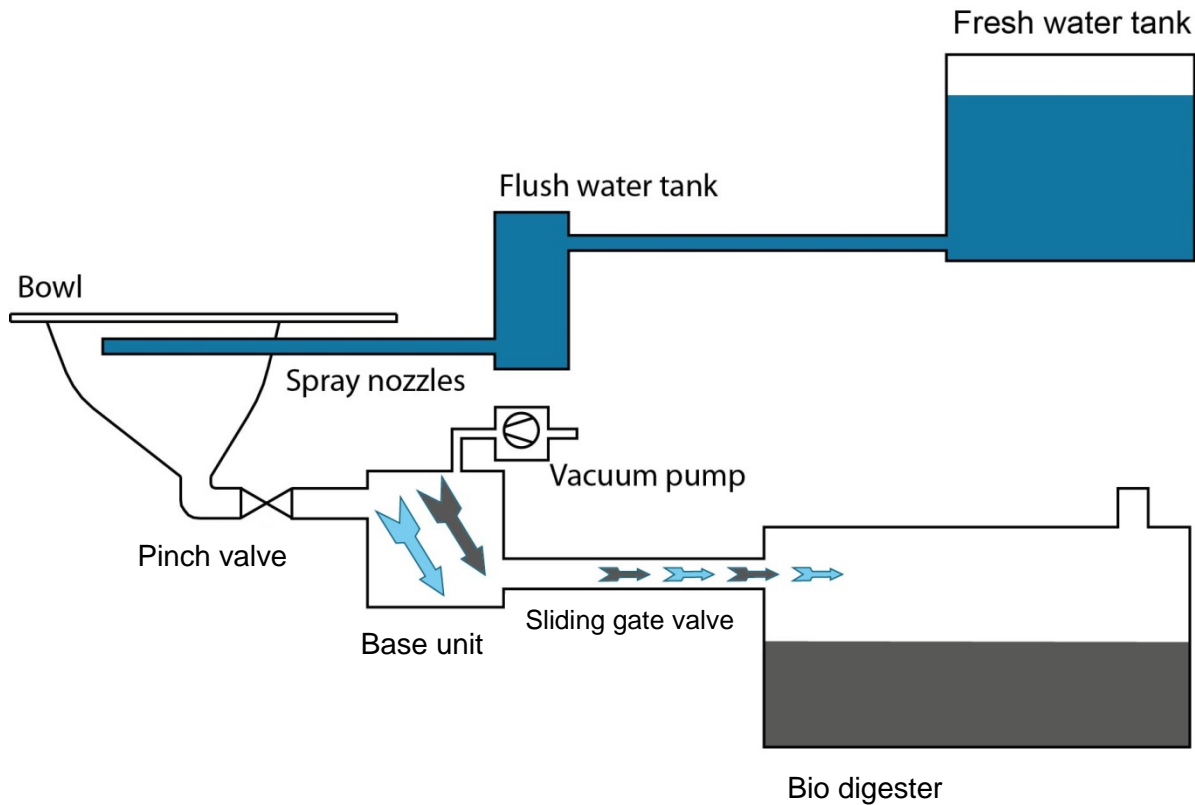
The pinch valve is closed and now compressed air is blown into the base unit until a pressure of approx. +0.6 bar is reached.



9.6 Emptying the Base Unit

The sliding gate valve shortly opens the piping to the Bio digester. Two pressure surges emptied the contents of the base unit into the Bio digester.

At the same time the water inlet valve positioned on the water system panel opens and the flush water tank is refilled.

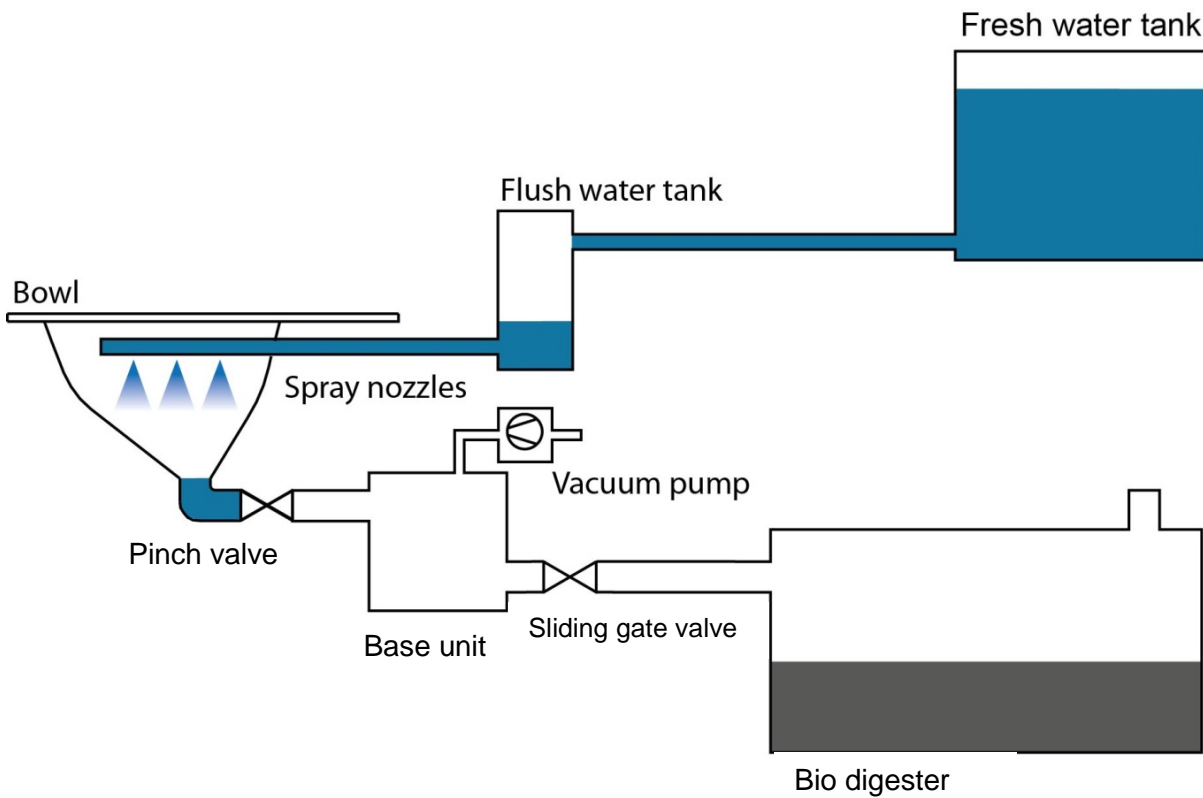


9.7 Initial Water Supply

Compressed air is pressed into the flush water tank and presses water through the spray nozzles and in the toilet bowl again.

The bowl is flushed efficiently and an initial water supply is build up.

The system switches to stand-by mode.



9.8 System Function other Components

9.8.1 Fresh Water Tank

The fresh water tank (not Evac scope) is equipped with a ball valve (not Evac scope) to separate the fresh water supply to the squatting toilet system.

9.8.2 Bio-Digester

The Bio-Digester (not Evac scope) is equipped with a liquid level guard to monitor the 95% level.

95% active

- If the 95% signal is more than 5 minutes active the squatting toilet switches to the «Pre-WWT full» status. One more flush cycle is possible before the system switches to «Out of Order».
- After this last flush cycle the system switches to «WWT full» and the flush button LED will be deactivated.
- If the 95% liquid level guard is not activated no more the system switches after 1 minute waiting time to stand-by mode.

10. TROUBLE SHOOTING

10.1 General Information

⚠ WARNING *Risk of infection!*

Refer to safety at work:

- ▶ Do not eat, drink or smoke.
- ▶ Wear PPE

This chapter described diagnostics and actions for different error scenarios. Qualified personnel is able to recognize the error causes and start the needful actions.

Detailed maintenance description see:

- Maintenance Manuel – Squatting System India

10.2 Error Recovery Routines

After detecting error conditions (except: waste tank full) the control unit (STC) initiates an error correction routine.

Should the error correction routine be unsuccessful, the control unit (STC) will switch off the vacuum toilet.

The error detection of the vacuum toilet will be carried out by the following sensors:

- Pressure guard base unit (pneumatic panel)
- Bowl liquid level guard (squatting toilet)
- Liquid level guard inside flush water tank (water system panel)

10.3 Troubleshooting during Commissioning

NOTICE

If water flows continuously into the toilet bowl, interrupt fresh water supply immediately to prevent damage.

- It is mandatory to install a manometer to the test conduit of the vacuum pump to avoid accidental back flushes before it is allowed to open the pinch valve or sliding gate valve manually.

10.4 Troubleshooting in the Cabin

If no service terminal is available the following first checks should be done:

Flush button is pushed but toilet does not flush

Cause	Action
No power	Supply power
No fresh water	Check water supply
Bio-digester full	Empty Bio-digester
No compressed air	Provide compressed air
Flush button defective	Check cable, check flush button, replace if necessary

Water flows into toilet bowl

Cause	Action
Water Inlet valve clogged	Remove blockage
Pinch valve defective	Replace pinch valve
Quick exhaust valve blocked due to frost	Defrost quick exhaust valve
Quick exhaust valve blocked due to pollution	Clean quick exhaust valve
Water filter clogged	Clean filter
Liquid level guard in flush water tank defective	Contact Evac service Remove flush water tank

Toilet bowl is not flushed sufficiently

Cause	Action
Flush nozzles polluted	Clean flush nozzles
Flush nozzles calcified	Decalcify flush nozzles
Flush nozzles swiveled out of optimal position	Adjust flush nozzles

10.5 Description Error Routine



After the recognition of an error (except: Waste tank 95% full) the control unit will initiate applicable error correction routines. During the correction routines the respective code is displayed as continuous light. If the error cannot be corrected automatically the control unit switches off the toilet.

The code indication on the RS-Box display starts blinking.

Code 01: WWT (Bio-digester) full	
Possible cause	Action
WWT (Bio-digester) full	Empty WWT (Bio-digester)
Liquid level guard clogged	Clean component
Liquid level guard defect	Replace component

The vacuum toilet could not generate pressure inside the base unit after bowl emptying and starts the failure correction routine:

Code 02: Pressure rise	
Possible cause	Action
No compressed air available	Check compressed air supply
Test conduit not tight	Check test conduit, must be closed with a blind plug.
Pinch or sliding gate valve not tight	Check component, remove blockage and replace component if defect.
Pinch valve does not open	Check component (also electrical connections) and replace component if defect.
Pressure guard defect	Check component (also electrical connections) and replace component if defect.

The vacuum toilet measures pressure instead of vacuum inside the base unit and starts the failure correction routine:

Code 03: Pressure Vacuum	
Possible cause	Action
Vacuum pump clogged or defect	Check component (also electrical connections), clean if possible and replace component if defect.
Exhaust piping clogged or bend	Clean if possible and replace component if defect.

The pressure guard of the base unit measures overpressure after the first emptying pressure shock or after the start of a new flush cycle and the vacuum toilet starts the failure correction routine:

Code 04: Pressure detected	
Possible cause	Action
Sliding gate valve does not open	Connect service terminal and activate maintenance mode: manually control outlet gate valve. Replace if defect. <div style="background-color: yellow; text-align: center; padding: 2px;">▲ WARNING</div> <i>In no case open the pinch valve!</i>
Blockage in the waste pipe or tank.	Remove blockage in the waste water piping
Vacuum pump or tube clogged	Clean if possible and replace component if defect.

The optical bowl liquid level guard is active and the vacuum toilet starts the failure correction routine. The vacuum toilet starts some flush cycles without adding water to empty the bowl:

Code 05: Bowl full	
Possible cause	Action
Bowl level too high, liquid level guard not active	Activate service flush to empty the bowl, check component (also electrical connections) and replace if defect.
Bowl empty, liquid level guard active	Check component (also electrical connections) and replace if defect.
Pinch valve does not open	Connect service terminal and activate maintenance mode: manually control inlet gate valves. Replace if defect.
Water inlet valve does not close	<i>If water flows continuously into the toilet bowl, interrupt fresh water supply immediately to prevent damage.</i> Check component (also electrical connections) and replace if defect.

Trouble Shooting

The liquid level guard inside the flush water tank measures no water and the vacuum toilet starts the failure correction routine:

Code 06: no water	
Possible cause	Action
FWT empty	Refill FWT
Water filter clogged	Clean component.
Fresh water piping clogged or bend	Clean piping if possible and replace component if defect.
Water inlet valve (water system panel) defect	Check component (also electrical connections) and replace if defect.
Liquid level guard defect	Check component (also electrical connections) and replace if defect.

The pinch valve cannot be opened and the error correction routine is running.

Code 09: Inlet can't close	
Possible cause	Action
Pinch valve clogged/defect	Check/Clean valve; replace if necessary.

The pinch valve cannot be opened and the error correction routine is running.

Code 10: Inlet can't open	
Possible cause	Action
Interrupted air supply to valve	Check pipe for blockages Check if pipe is connected right

The flush button is pressed but the vacuum toilet didn't start a flush cycle.

Code 20: Flush Button Error	
Possible cause	Action
Flush Button defect	Check component and cabling, replace if necessary.

10.6 Service Flush Function



The buttons must be pressed for at least 0.7 seconds.

After pushing the push button «**S**» the vacuum toilet system performs a service flush cycle without adding fresh water.

If the disturbance could be cleared the toilet is automatically ready for operation and can be newly started by pushing the flush button. In case the service-flush could not clear the disturbance the control unit of the toilet switches back to the error.

The green LED of the flush button is blinking during the service flush function!

10.7 Back-Flush Function



Empty the bowl as far as possible.

Cover the squatting bowl as good as possible!

Blockages are pushed out of bowl by compressed air

«R» must be pressed for at least 0.7 sec.

4 Pressure levels:

- *pressure VERY WEAK*
 - *pressure WEAK*
 - *pressure MODERATE*
 - *pressure HIGH*
- Blockages are pushed out of bowl by compressed air.
 - The moderate reverse flush may be incrementally increased in intensity by repeated pressing of «**R**» button.
 - An intense reverse flush may be activated by pressing both «**R**» and «**S**» simultaneously.

10.7.1 Reverse flush

 **WARNING** *Fecal matter!*

Risk of infection:

- ▶ Use personal protective equipment
- ▶ Do not eat, drink or smoke
- ▶ Refer to safety at work



*Empty the bowl as far as possible.
Cover the squatting bowl as good as possible!
Blockages are pushed out of bowl by compressed air.
Button «R» must be pressed for at least 0.7 seconds.*

First pushing → shock pressure (**very weak pressure**).

Press the «R» button for 0.7 seconds.

- Automatic valve actuation.
- The pressure in the intermediate tank is scanned. If excess pressure is detected, the sequence will be interrupted.
- 1. shock pressure (**very weak pressure**).

If the back flush button was pressed during the RS-box indicates an error code the program returns to this error code indication.

When the blockage is loosened it should be removed. The toilet is now operational and the flush button could be pressed.

Second push → shock pressure (**weak pressure**)

Unit still blocked press the «R» button within 2 minutes a **second time**.

- Automatic valve function.
- Pressure release as described above.
- 2. shock pressure (**weak pressure**)

When the blockage is loosened it should be removed. The toilet is now operational and the flush button could be pressed.

Third push → shock pressure (**moderate pressure**).

Unit still blocked press the «R» button within 2 minutes a **third time**.

- Automatic valve function.
- Pressure release as described above.
- 3. shock pressure (**moderate pressure**).

When the blockage is loosened it should be removed. The toilet is now operational and the flush button could be pressed.

Fourth push → shock pressure (**pressure high**).

Unit still blocked press the «R» button within 2 minutes a **fourth time**.

- Automatic valve function.
- Pressure release as described above.
- 4. shock pressure (**pressure high**).

When the blockage is loosened it should be removed. The toilet is now operational and the flush button could be pressed.



If within 2 minutes no button was press the back flush function starts after new activation with the very weak pressure step.

10.7.2 Hard Reverse Flush

▲ WARNING

Fecal matter!

Risk of infection:

- ▶ Use personal protective equipment
- ▶ Do not eat, drink or smoke
- ▶ Refer to safety at work



Empty the bowl as far as possible.

Cover the squatting bowl as good as possible!

Hard reverse flush only possible with simultaneous pressing of «R» and «S»

«R» and «S» must be pressed for at least 0.7 second

Blockages are pushed out of bowl by compressed air

Press the «R» and «S» buttons for 0.7 seconds. The following program ensues:

- Automatic valve function.
- Pressure release as described above.
- Hard reverse flush (**high pressure**).

When the blockage is loosened it shall be removed. The toilet is now operational. Press flush push button.




If you press the «R» and «S» buttons again a harder reverse flush at high pressure will ensure.

11. CLEANING AND DECALCIFYING

 **CAUTION** *Health hazard!*

Citric acid:

- ▶ Use personal protective equipment

 **WARNING** *Risk of infection!*

Refer to safety at work:

- ▶ Use personal protective equipment
- ▶ Do not eat, drink or smoke

NOTICE *Damage to the system!*

Aggressive acids, cleaning agents containing chlorine:

- ▶ Clean according to instructions



Only qualified personnel is permitted to carry out the installation!

11.1 Squatting Toilet



Do not use cleaner which contains chlorine, particles or other abrasives! Follow the instructions of the manufacturer data sheet!

NOTICE: *Avoid scratches on the surface of the liquid level guard!*

- Neutral cleaning agent and warm water
- Cleaner approved for rolling stock with following composition:
 - Citric acid <15% weight/volume
 - Amidosulfuric acid <15% weight/volume
 - Phosphoric acid < 5% weight/volume

Example:

- Into-Top from Henkel
- Neporin from Saniclean
- Retirol from Deutsche Hahnerol

Before using a differed cleaner please contact Evac.

12. ADDITIONAL INFORMATION

12.1 Taking Out of Service


 **WARNING** *Fecal matter!*

Risk of infection:

- ▶ Only sufficiently immunized personnel
- ▶ Do not eat, drink or smoke.
- ▶ Wear PPE

 *Only qualified personnel is permitted to carry out the installation!*

 *Disconnect supply cables and air pipes and electrical cabling!*

 *Make sure the system is emptied completely:
No fecal matter or water should remain!*

12.2 Recycling and Disposal

Defect components send back to:

EVAC GmbH
Servicewerkstatt
Feldstr. 124
22880 WEDEL
GERMANY

Phone: 04103 9168 28
Fax: 04103 9168-8533 or -57

evac-train@zodiacaerospace.com



FISA Fabbrica Italiana Sedili Autoferroviari Srl
Via Giovanni De Simon, 6 - 33010 Rivoli di Osoppo (UD) Italy
Tel. +39 0432 986 071 - Fax +39 0432 986 086
info@fisaitaly.com - www.fisaitaly.com

SLIM 450M User Manual

Locomotive Driver Seat SLIM 450M Series
FISA Item Nr. 1S450Mxxx Series



Revision 00
Date 27/02/2015
Name FISA Srl/LG


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IMPORTANT REMARK

Pictures and diagrams contained in this document are for indication purposes only.
The contents of this document are not referred to a specific product p/n but to a driver seat series.

GENERAL INSTRUCTIONS

- The operating instructions must be read in full before use.
- The operating instructions must be kept in the vehicle and always be at hand.
- The driver's seat may only be fitted, serviced and repaired by specialist personnel, in accordance with national regulations and the vehicle manufacturer's fitting instructions.
The national fitting regulations can be obtained from **F.I.S.A. SRL** or from agencies of the company, or from the vehicle manufacturer.
- A correctly functioning and individually adjusted driver's seat is essential to your health. Take adequate care of your seat and have it serviced regularly to ensure that it functions correctly.
 The functional checks are to be carried out at least as regularly as vehicle services (see maintenance plan for vehicle).
- These operating instructions should always be kept with the driver's seat. If the seat is passed on to a third party, it must be accompanied by the relevant operating instructions.



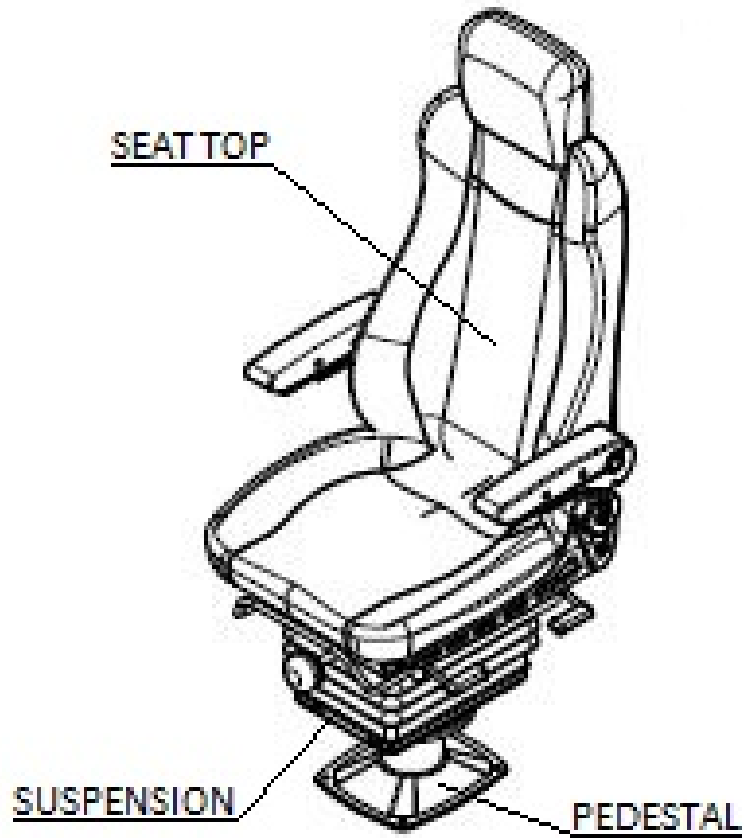
SAFETY INSTRUCTIONS

- Driver's seats that have been adjusted incorrectly have a smaller moving area. To prevent damage to the driver's back and to the seat, the driver's seat must be adjusted for the driver's weight **before use** and **before every change of driver**.
- To prevent injury, **no objects should be placed within the moving area** of the driver's seat.
- **Before commissioning** of the driver's seat, possible **packaging material** has to be removed from the seat cushion and the backrest upholstery.
- To eliminate any risk of accident, the settings must be checked to ensure they are correctly engaged **before the vehicle is driven**.
- Adjustments must **not** be made **while driving**.
- The backrest frame must be hold, (for example with one hand at the upper part), before the backrest adjuster is operated, when the seat is not occupied. If you fail to do so, there is a danger that the backrest may jerk forward and **cause injury**.
- **Any changes to the series standard of the seat** (for example fitting parts which are not original **F.I.S.A. SRL** parts) may impair the safety standard to which it has been tested. **Functions may be impaired**, threatening your **safety**. For this reason, **any change in design of the seat** must be approved by **F.I.S.A. SRL**.
- During the removal and installation of the driver's seat, the corresponding instructions by the specific vehicle manufacturer must be strictly observed!
- Do not hold onto the covers for lifting the driver's seats. If you do so anyway, there is an **increased risk of injury due to loosening or breaking covers**.
- Fasteners must be **checked regularly for tight seat**. If the seat wobbles, there may be loose bolts or other faults. Check regularly the fixing points of the seat.
- If you notice that the seat does not function correctly (for example a defective seat suspension; improper curvature of the lumbar support or damaged bellows), **contact a specialist workshop immediately** to arrange for repairs to be carried out.
If you fail to do so, your health may be affected and the **risk of accident increased**.
- Do not indent the bellows while there is load on the driver's seat. **RISK OF CRUSHING**.
- Make sure that the **interior of the driver's seat** remains free of **foreign particles** or **liquids**.
- The driver's seat is **not watertight** and must be protected against splashes of water!
- Any conversion or refitting work on a **F.I.S.A. SRL** driver's seat must be performed exclusively in **authorized workshops** by **trained or suitably qualified personnel** and in adherence with the applicable operating, maintenance and installation instructions and in compliance with all relevant national regulations.
- **Improper installation and assembly** bear the risk of **bodily injury** or **property damage** and the proper function of the driver's seat or mounted parts can no longer be guaranteed.

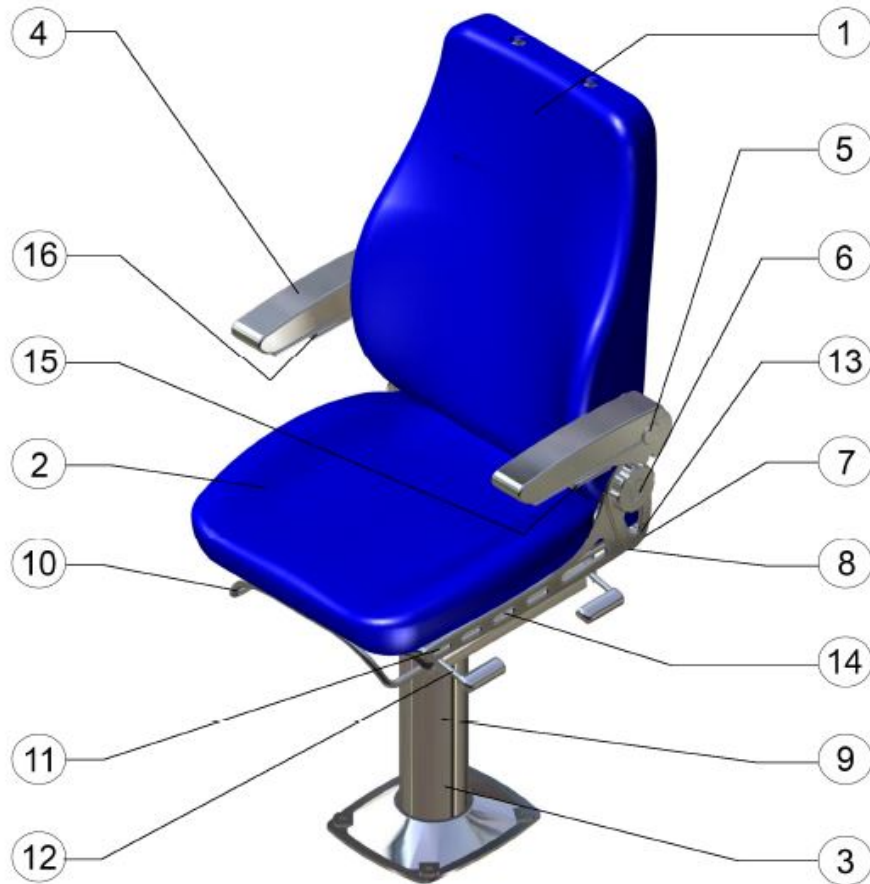
GUARANTEE

- **F.I.S.A. SRL** can provide no guarantee for damage resulting from incorrect assembly, use or repair of the driver's seats.
- The guarantee on the products granted by **F.I.S.A.** is 12 months, unless differently specified in the contract.

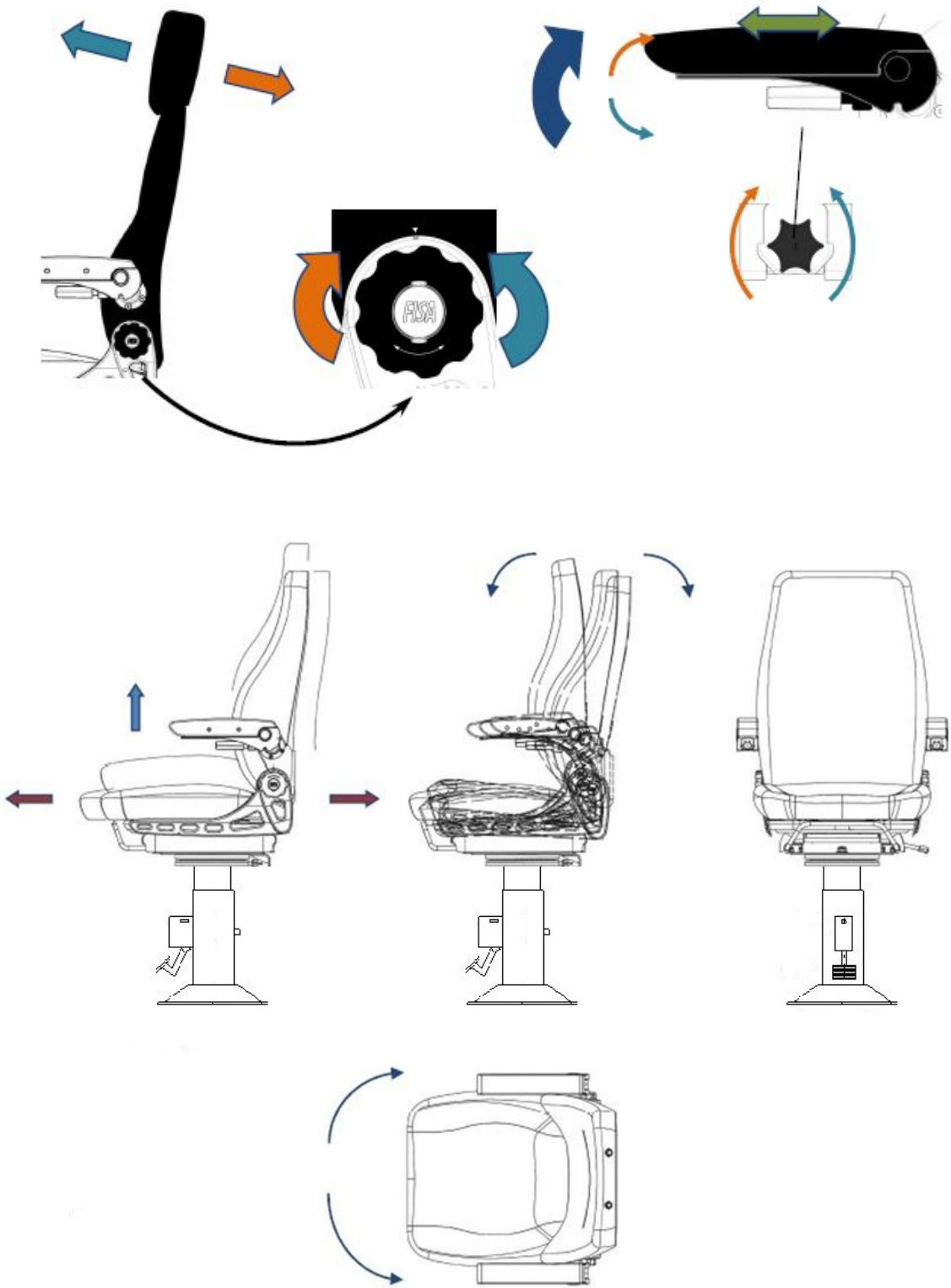
SEAT MAIN ASSEMBLIES



SEAT FUNCTIONS AND MAIN REGULATIONS



POS.	DESCRIPTION
1	BACKREST UNIT
2	CUSHION UNIT
3	PEDESTAL UNIT (FOR SOME VERSION WITH HEIGHT ADJUSTMENT AND/OR MECHANICAL SUSPENSION)
4	RH ARMREST
5	LH ARMREST
6	BACKREST ANGLE ADJUSTMENT
7	TURNTABLE
8	ROTATION MECHANISM
9	COLUMN PEDESTAL WITH HEIGHT ADJUSTMENT (WHERE REQUIRED)
10	SLIDING GUIDES AND LEVER
11	COMPLETE HEIGHT/TILT ADJUSTER
12	HEIGHT/TILT ADJUSTER LEVERS
13	CUSHION FRAME
14	HEIGHT/TILT ADJUSTER CARTERS
15	LH ARMREST ADJUSTMENT
16	RH ARMREST ADJUSTMENT



Mechanical suspension and weight adjustment (if included as optional)

The mechanical suspension has a regulation range of 50-130 Kg.

It can be adjusted by rotating the clear plastic knob positioned in the frontward or lateral side of the suspension. The setting value of the knob with regards to the graduated scale should be the same as the value of the driver's weight.



Warning! Risk of accident!

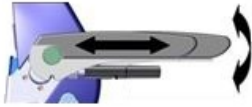
Do not operate the Mechanical suspension and weight adjustment while driving.

Armrests

The armrests can be folded up if required.

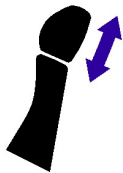
The inclination of the armrests can be modified by turning the adjustment knob.

When turning the knob to the outside the front part of the armrest will be lifted; when turning the knob to inside it will be lowered.



Headrest

The headrest can be individually adjusted for height by pulling it upwards or pushing it downwards over the various locking increments up to the end stop.



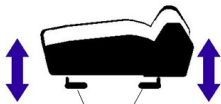
Backrest adjustment

The backrest can be adjusted forward or backward simply by turning the adjustment knobs on the sides of the seat clockwise or counterclockwise (see picture at page 6).

Height and pan angle adjustment (backwards and forwards)

To adjust the height and the angle of the back of the seat, pull the lever upwards. By simultaneously exerting pressure on or off the front part of the seat pan, the back part of the seat can be moved upwards or downwards.

To adjust the height and the angle of the front of the seat, pull the lever upwards. By simultaneously exerting pressure on and off the front part of the seat pan, the front part of the seat can be moved upwards or downwards.



Swivel and height adjustment (if included as optional)

The seat pedestal (the part fixed to the vehicle's floor) allows an angle rotation and a height adjustment too.

The height adjustment travel has a series of fixed positions, it can be actuated by pressing the pedal.

The seat swivel can be adjusted by using the lever placed on the right side of the cushion, or with a pressure device without lever, depending from the seat version.

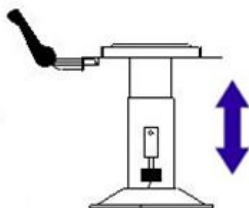
It allows for a free pivoting of the seat until it comes to an end stop towards the right or the left.

The locking is always effected in the driving direction.



Warning! Risk of accident!

Do not operate the swivel while driving.



Fore/aft adjustment

The fore/aft adjustment can be adjusted by pulling the locking lever and by simultaneously sliding the seat forwards or backwards.

The seat must lock into place with an audible click when the lever is released.



Warning! Risk of accident!
Do not operate the locking lever while driving.

Lumbar support (curvature and height) (if included as optional)

By turning the right knob for the lumbar support the curvature of the backrest can be adjusted individually.

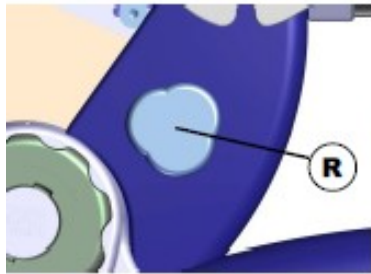
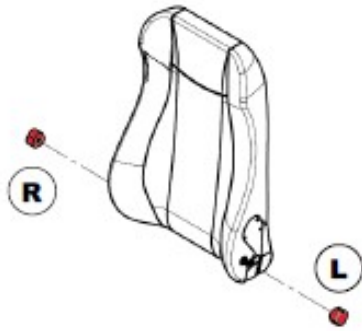
Turning in forward direction: Curvature becomes more inwardly bowed.

Turning in backward direction: Curvature becomes less inwardly bowed.

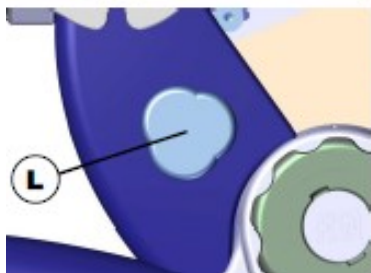
By turning the left knob for the lumbar support the height of the curvature of the backrest can be adjusted individually.

Turning in forward direction: curvature down.

Turning in backward direction: curvature up.



With the handle on the right side (R) adjust the thickness of the support



With the handle on the left side (L) shift the lumbar support vertically

SEAT MAINTENANCE

The following maintenance procedures are recommended to make sure that the seat works properly at all times.

FREQUENCY	OPERATION
Every 6 months	Check that all adjustment mechanisms and suspensions work properly
Every 12 months	Clean the seat and grease all moving parts

NOTES ON CLEANING THE SEAT COVERS

General cleaning instructions

Regularly remove the dust by means of an industrial-type vacuum cleaner. Do the same prior to removing the single stain.

Stain Removal

The wet stains should be removed with a damp cloth.

- Dilute a soft cleansing agent following the respective instructions for use.
- Moisten a synthetic sponge with this cleansing agent and dab the stain (do not rub in).
- Then, remove the cleansing agent by means of an absorbent, clean and white cloth or paper.

Note:

Use cleaning agents with a neutral pH value (pH7), because acidic or alkaline products reduce the product lifetime.

Ber, wine, fruit juice, coke, chocolate, sauce	Lukewarm mild detergent solution	Apply with a white cloth and dab off.
Blood, egg yolk, egg white	1. Cold water 2. Warm mild detergent solution	1. Dab on and soak. 2. Apply with a white cloth.
Color	1. Turpentine 2. Benzine	1. Soak a white cloth and rub the color off. 2. Further treatment
Grease	Purified benzine	Soak a white cloth and rub the grease off.
Coffee, tea	1. Benzine soap 2. Water	1. Soak a white cloth and rub the dirt off. 2. Further treatment
Chewing gum	Coolant spray	Spray, then carefully scrape off.
Ball-point pen	Benzine	Soak an absorbent cloth/paper, then carefully dab off.
Lipstick, shoe polish, soup	1. Petroleum ether 2. Mild detergent	1. Soak a cloth and rub the dirt off. 2. Further treatment
Urine	1. Soda 2. Water	1. Dissolve in lukewarm water, soak a cloth and rub the dirt off. 2. Further treatment
Pressure marks, basic cleaning	Without chemical agents, if possible	Spray extraction device

IDENTIFICATION OF SEAT AND COMPONENTS

An adhesive label is applied on each driver seat (dimensions approx 70x35mm) with informations as per example here below represented:



A list of the seat components is shown in the driver seat spare parts drawing and list. Please refer to these documents when requiring to identify the components of the seat.



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Project:	Train 18	Language	English

Maintenance Manual

Passenger seats

Train 18

Approved by				
Name	Function	Date		Pages
Project Manager Rail	Romain Faivre	2022-08-03		43
Engineer Rail	MikołajMichnik	2022-08-03		

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1 ABOUT THIS MANUAL

This manual aims at giving operating personal on the train basic knowledge of safe usage and operation of the product.

DISCLAIMER: Any interference to construction of the seats and adaptation is forbidden, which include also unscrewing of any parts other than that required in this manual. Such case of quality deviation must be reported immediately for servicing.

Any misuse or modification of the seat cancels the warranty.

2 SAFETY





DISCLAIMER:The product is designed so that passenger can safely use it on a daily basis. However, assembling and disassembling seat fixations and upholstery parts should be done only by personal trained.




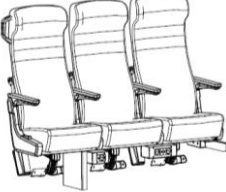

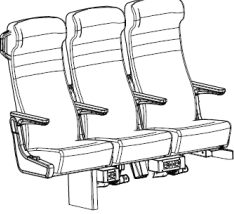
CAUTION:During assembly/disassembly or cleaning, the personnel shall manipulate all parts with care to avoid damage, scratch, or dirt.



3 DESCRIPTION OF THE SEATS

The scope of delivery encompasses the supply of Passenger seats for Train 18. The different seat configurations are described in Table 1, and layout given in section 13. Each seat is designed to allow fast exchange, as described in section 8.

Table 1: List of seat configurations

No	Drawing number	Description*	Illustration	Qty per rake
1	11143-0001-00-00-01	Executive class – 2 seater L		26
2	11143-0002-00-00-01	Executive class - 2 seater R		26
3	11144-0010-00-00-01	Class II - 1-seater L no table		2
4	11144-0008-00-00-01	Class II - 2-seater R no tables		28

No	Drawing number	Description*	Illustration	Qty per rake
5	11144-0001-00-00-01	Class II - 2-seater R 2 tables		92
6	11144-0009-00-00-01	Class II - 2-seater L no table		26
7	11144-0002-00-00-01	Class II - 2-seater L 2 tables		92
8	11144-0003-00-00-01	Class II - 3-seater R 3 tables		78
9	11144-0004-00-00-01	Class II - 3-seater L 3 tables		76
10	11144-0006-00-00-01	Class II - 3-seater R 2 tables		14

No	Drawing number	Description*	Illustration	Qty per rake
11	11144-0005-00-00-01	Class II - 3-seater L 2 tables		12
12	11144-0007-00-00-01	Class II - 3-seater L 1 tables		2

*R = right, L = left

4 TRANSPORT AND STORAGE OF THE SEATS

DISCLAIMER:Do not store other objects (including other seats) on the soft parts of the upholstery.Loading, even short-term, can cause irreversible deformation of the foam.The manufacturer of the seats is not responsible for any damage resulting from such action.

Seats are heavy and require special device such as forklift for transportation.

Executive class seat + fixation = 76 kg

Second class single + fixations = 30 kg

Second class double with fixations = 55kg

Second class triple with fixation = 73kg

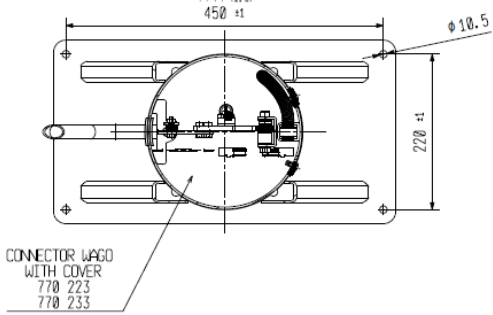
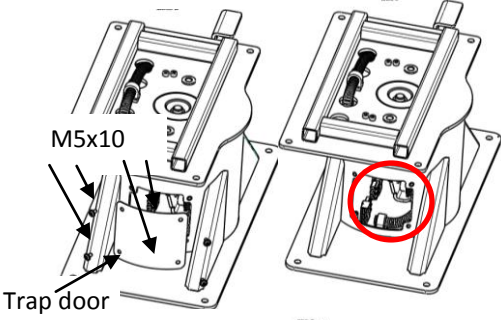
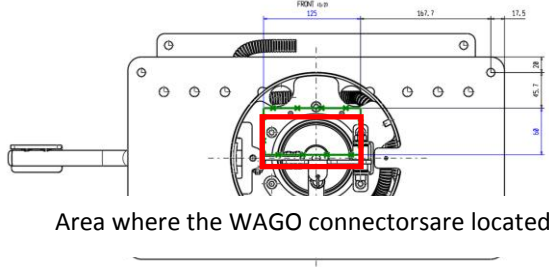
The seat and its equipment should be stored in a dry, clean place, protected from dust and dirt. During storage

CAUTION: During transport, pay attention to the movable elements of the seat's equipment.Armrests are accessories that can unfold, creating a risk of hitting possible obstacles.Holding the seat by the arm of the movable armrest may cause it to move, slip out of your hand, and resulting in the product dropping on the floor.

5 INSTALLATION OF THE SEATS

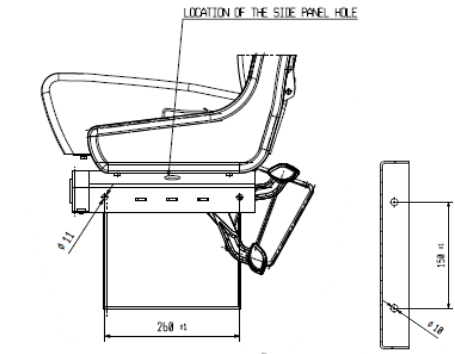

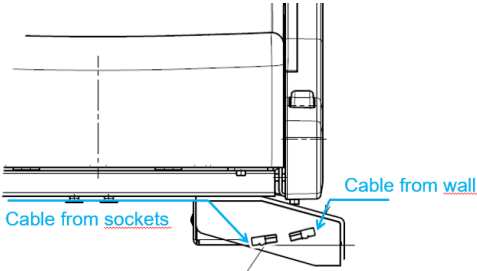
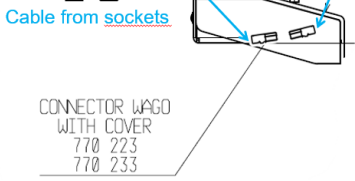
5.1 Assembly of Executive class seat

CAUTION: Screw type, torque, and use of medium strength thread locker for the fixation of the seat to the train structure must be defined by the train manufacturer

1	Position the seat carrier onto the vehicle floor with electric connection in the centre of the rotation mechanism.	
2	Fasten the four mounting screws (M10)	
3	Open the trap door on the rotation mechanism (4 x M5x10 A2 70- ISO 7380-2) and remove the trap door	 <p>Trap door</p>
4	Connect the electricity connector (one from the rotation mechanism, one coming from the ground) - WAGO 770-223 (socket) + 770-233 (plug) – red circle and red square	
5	Close trap door and tighten the screws (4 x M5x10, adding medium strength thread locker on the tip of each screw)	
		 <p>Area where the WAGO connectors are located</p>

5.2 Assembly of Second class seats

CAUTION: Screw type, torque, and use of medium strength thread locker for the fixation of the carrier to the tram structure must be defined by the vehicle manufacturer

<p>1</p>	<p>Position the leg and the wall connector.</p>	
<p>2</p>	<p>Tighten the fixation screws (leg and wall) with M10 screws</p>	
<p>3</p>	<p>Pull electrical cable coming from wall into hole in the wall connector.</p>	
<p>4</p>	<p>Connect the two WAGO connectors under the wall connector - WAGO 770-223 (socket) + 770-233 (plug)</p>	

6 COMMISSIONING OF THE SEAT

The first time the seat is used, remove packaging and install it according to the instructions in chapter 5. No special commissioning check is necessary. Just ensure that the seat is not damaged and clean.

7 OPERATION OF THE SEATS

All seats are intended to provide support for passenger in seating position, with possibility to adjust backrest angle for improved comfort.

Each individual seat is equipped with USB socket (1500mA) and Electric outlet (110V)

7.1 Executive class seat

1	Reclinable backrest
2	Foldable armrest
3	180 degree rotation
4	Foldable snack table into central armrest console
5	Footrest

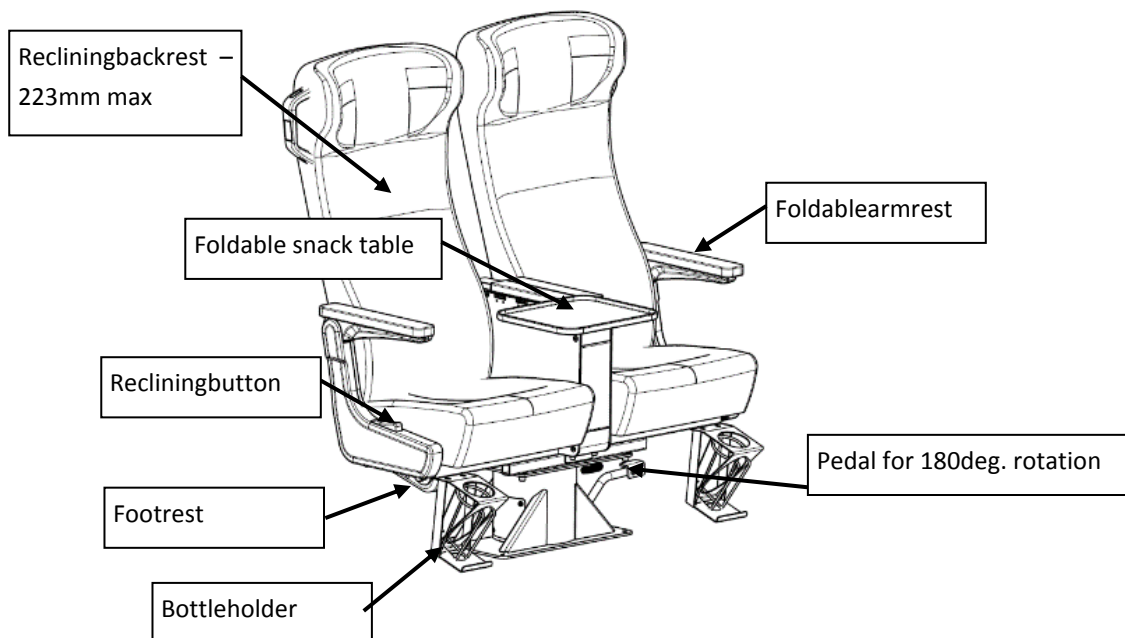
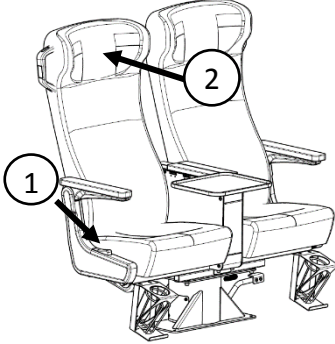



Figure 1: Functions of Executive class seat

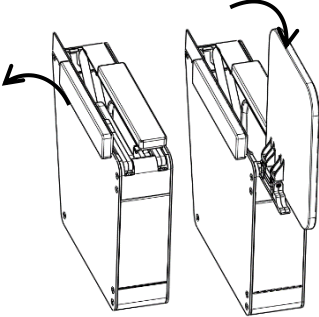
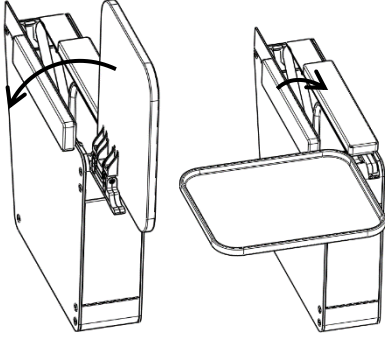
7.1.1 Reclining the seat

<p>1</p>	<p>Push the button (1) and recline the backrest to the desired position (2)</p>	
<p>2</p>	<p>To decline the backrest, push the button (1) without applying pressure on the backrest. The backrest will return in neutral position automatically.</p>	

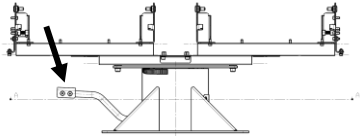
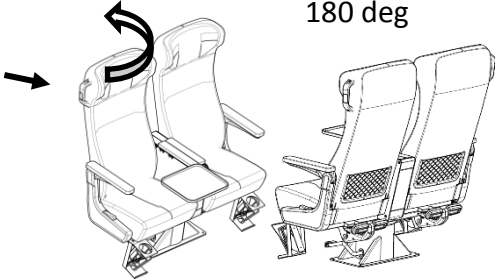
7.1.2 Armrests

<p>1</p>	<p>Lift the armrest</p>	
<p>2</p>	<p>For second class, armrests on the gangway side are fixed and can't be lifted.</p>	

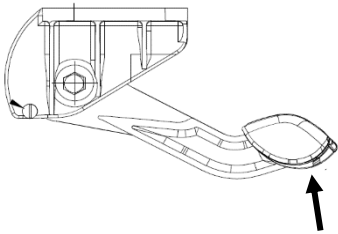
7.1.3 *Snack table (Central console)*

<p>1</p>	<p>Open the armrest</p>	
<p>2</p>	<p>Pull the table and rotate until blocked in longitudinal direction</p>	
<p>3</p>	<p>Rotate the table in lateral direction</p>	
<p>4</p>	<p>Close the armrest</p>	

7.1.4 Rotating the seat (180 degree)

<p>1</p>	<p>Push the pedal down</p>	
<p>2</p>	<p>Start rotating the seat (around 15 degrees). By pushing or pulling the handle. CAUTION: The rotation is possible only in one direction. If the seat blocks when rotating, then try the other direction.</p>	
<p>3</p>	<p>Release the pedal</p>	
<p>4</p>	<p>Rotate the seat to 180 degrees until the mechanism locks itself</p>	

7.1.5 Footrest

<p>1</p>	<p>To release the footrest, lift it.</p>	
<p>2</p>	<p>Then lift it up to the desired position. Three lock position are available</p>	

7.2 Second class seat

1	Reclinable backrest
2	Foldable armrest
3	Foldable snack table into central armrest console
4	Footrest

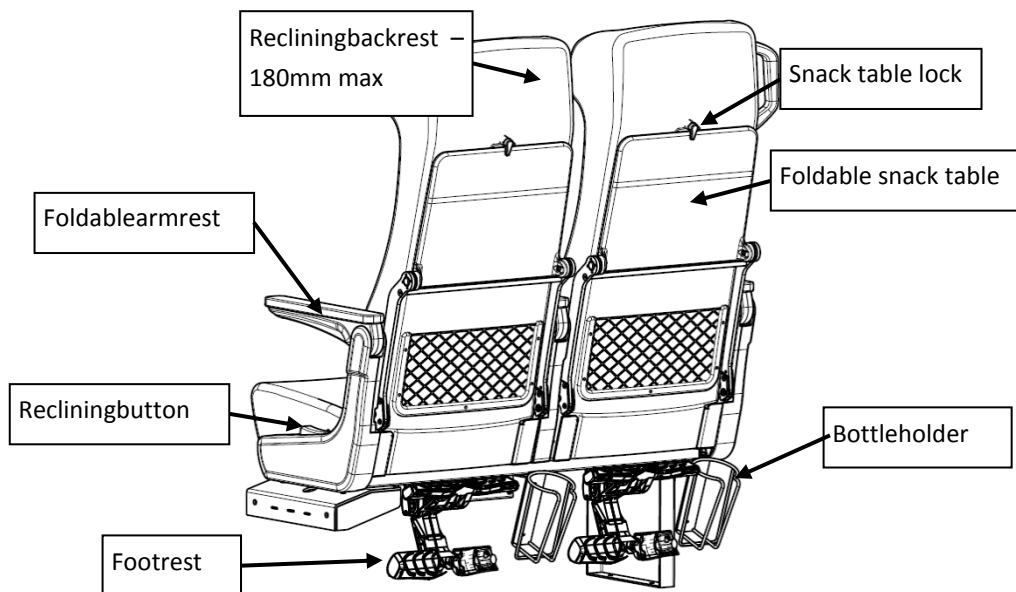


Figure 2: Functions of Executive class seat

7.2.1 Reclining the seat


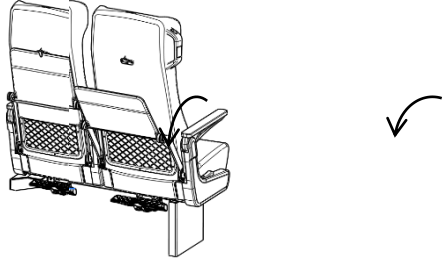
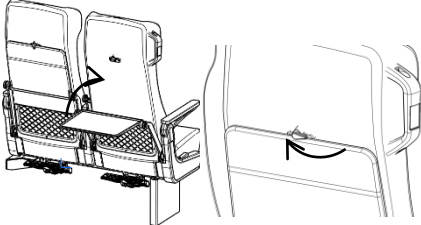
See paragraph 7.1.1

7.2.2 Armrests

CAUTION: Armrests on the aisle side are blocked.

For operation of the foldable armrests, see paragraph 7.2.2.

7.2.3 *Snack table*

1	Release the table lock	
2	Gently open the arms of the table	
3	Open the snack tray	
4	To close the table, lift it until it is fully folded	
5	Secure the lock	

7.2.4 *Footrest*

See paragraph 7.1.5

8 PREVENTIVE AND CORRECTIVE MAINTENANCE OF SEAT

Location of parts are shown in Figure 3 and Figure 4

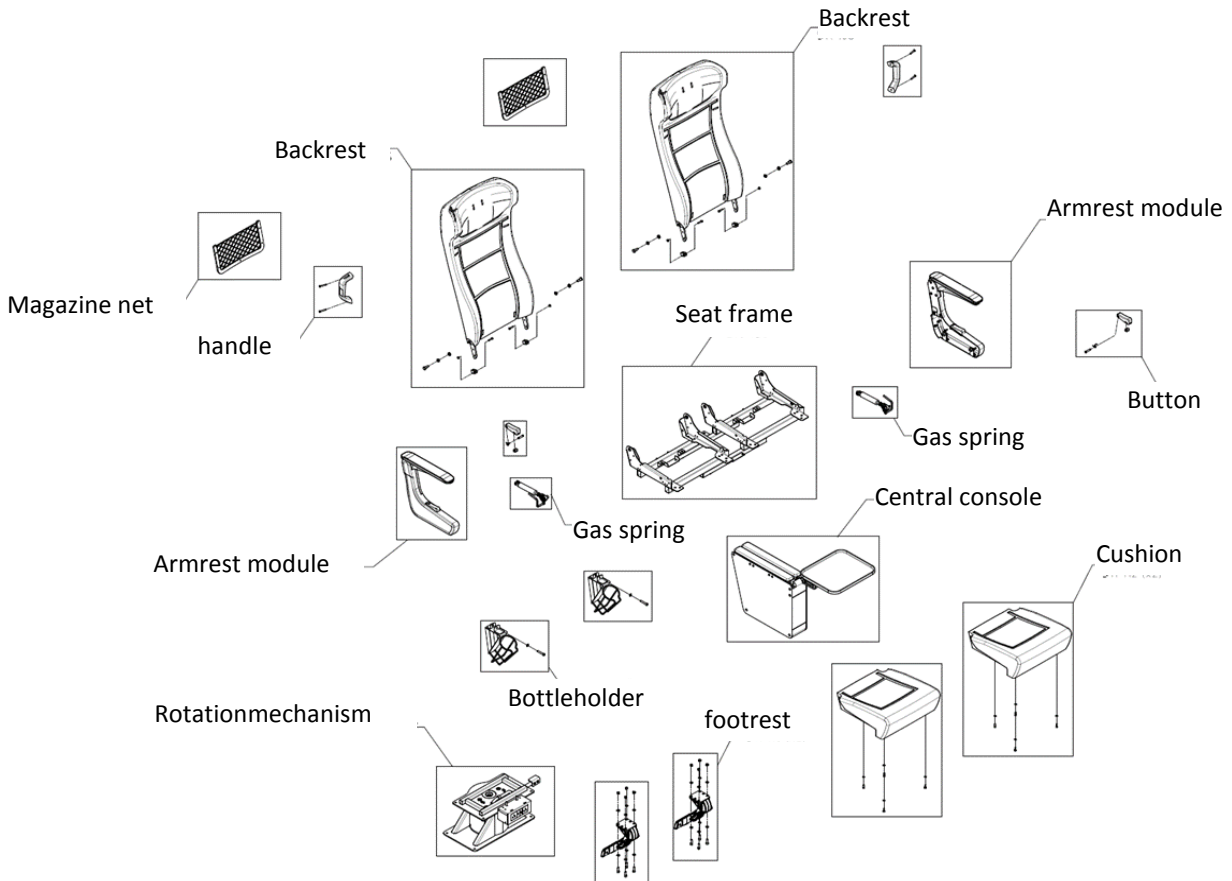


Figure 3: Components Executive class seat

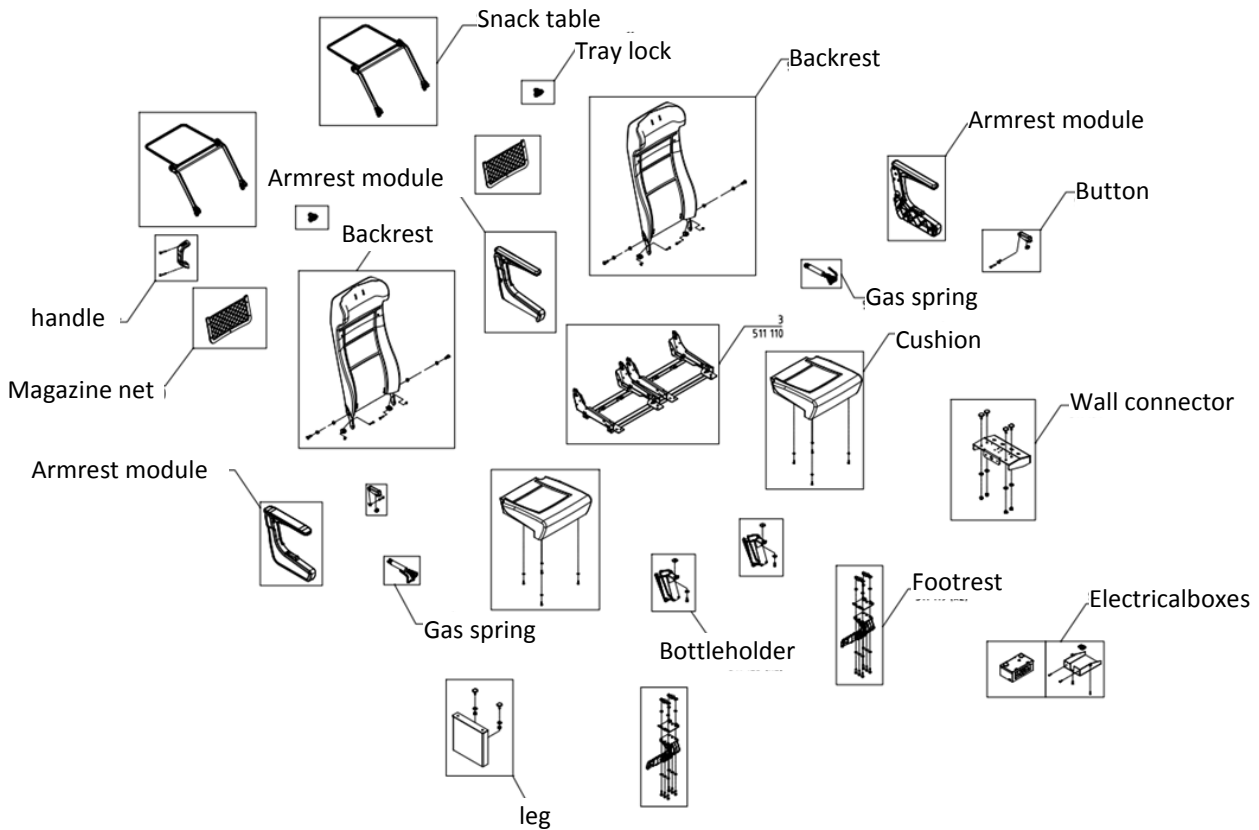


Figure 4: Components 2nd class seat

Preventive maintenance involves visual inspection, and cleaning according to situation (Table 2).

Table 2: List of maintenance actions and associated times for seats

Action	Section	Maintenance interval	Time*	Workforce (person)
Inspection of equipment	8.1	Each month	10s	1
Cleaning of equipment	8.2	Each month	30s	1

*time is given for trained person with proper tool, and do not include preparation time

A list of recommended products is given in 8.2.5.

In case non-acceptable damage is observed, the damaged part should be exchanged according to Table 3.

Table 3: List of corrective actions in case of detected damage for seats

Action	Section	Maintenance interval	Time*	Workforce (person)
Exchange of the cushion	8.3	When necessary	4 min	1
Exchange of the backrest	8.4	When necessary	6 min	1
Exchanging the handle	8.5	When necessary	45sec	1
Exchange of the armrest pad	8.6	When necessary	1 min	1
Exchange of the gas spring (reclining button)	8.7	When necessary	7 min	1
Exchange of armrest panel	8.8	When necessary	6 min	1
Exchange of central armrest pad (Executive)	8.9	When necessary	45 sec	1
Exchange of snack table (2 nd class)	8.10	When necessary	45 sec	1
Exchange of footrest	8.11	When necessary	1 min	1
Exchange of magazine net	8.12	When necessary	1 min	1

*Time is given for trained person with proper tool, and do not include preparation time

8.1 Seat inspection

Inspection typically consists in examination of the state of the upholstery and painted parts.

The seat inspection is negative if:

For upholstered area, operator identifies unacceptable visible degradation of the fabric such as:

- Fabric wear is not acceptable on a visual point of view
- Act of vandalism cut through the fabric
- Foam is visible under the fabric

For painted area, operator identifies structural damages or deep scratches that:

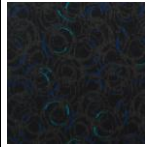
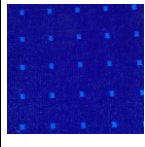
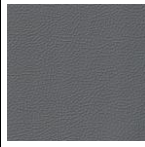

- Scratches is not acceptable on a visual point of view
- Metal structure damaged

For more information, please refer to section 12 of this manual.

8.2 Equipment Cleaning

Always follow the manufacturer's guideline for cleaning surface finish.

Table 4: Visible materials in the seat

Type	Part concerned	Producer	Colour
Metal	- Snack table 2 nd - Seat frames - Handle 2 nd class - Rotation mechanism - Armrests frames	Powder painting	RAL 9006
	- Handle Executive class	Powder painting	RAL 5012
Plastics	- Footrest - Magazine net	PA6 GF10 V0	RAL 7037
Fabric	Executive class - Seat upholstery	Epengle MOQ WM6 DFR 8565 3231	
	2 nd class - Seat upholstery	Epengle WAR 125 125 R/1	
Artificial Leather (Skai)	Executive class: - Headrest - Armrest squab	UEG Polisoft RW 73136 GREY	
	2 nd class - Headrest - Armrest squab	UEG Polisoft RW 73135 MAVI	

8.2.1 Plastic

The shell and backrest have to be cleaned with products recommended for plastic. Other products

and solvents with aggressive reaction are not allowed. It is recommended to test a new cleaning product in its concentrated form on a non-visible surface. In case of observing surface failure, stop the cleaning. In case of doubt, please consult the producer's manual.

8.2.2 *Metal*

Metal parts has to be cleaned with products recommended for powder painting. Other products and solvents with aggressive reaction are not allowed. It is recommended to test a new cleaning product in its concentrated form on a non-visible surface. In case of observing surface failure, stop the cleaning. In case of doubt, please consult the producer's manual.

8.2.3 *Fabric*

We recommend the following procedure:

The dust must be removed regularly every month with a good industrial vacuum cleaner (avoid rubber feet), but also before each treatment of stain, graffiti, tags and general each freshening up.







Stains that are the result of a liquid must also be wiped out with a liquid. Use a soft standard washing detergent according to the notice. Soak a synthetic sponge and apply the solution on the stain but do not rub. Then sponge up with a piece of white and clean cotton cloth.




To take off chewing gum, use a freezer spray or cool down with ice cubes, wrapped in a plastic bag. Scrap off carefully.

Do not:

- Do not use rubber feet for vacuum cleaning
- Do not rub the textile
- Do not use acid or alkaline cleaning products
- Do not separate textile from the foam if water is used for cleaning
- Do not add water for dry cleaning
- Do not wash the entire cover

8.2.4 Artificial leather

ARTIFICIAL LEATHER TERMS OF USE SUNİ DERİ KULLANMA TALİMATI		
		
Do not clean with bleach and detergents which contain bleach.	Do not interfere the surface with sharp and cutting tools.	Do not clean with chemicals which contain solvent and
<i>Ağartıcı ve ağartıcı içeren deterjanlarla temizlemeyiniz.</i>	<i>Sivri uçlu ve keskin aletlerle yüzeye müdahale etmeyiniz</i>	<i>Çözücü ve alkol içeren kimyasallarla temizlemeyiniz.</i>
		
Secure the surface of artificial leather against heavy impacts.	Do not leave instruments with high surface temperature in contact.	Do not leave in direct sunlight for long period.
<i>Suni deri yüzeyini sert darbelerden koruyunuz.</i>	<i>Yüzey sıcaklığı yüksek aletlerle temas halinde bırakmayınız.</i>	<i>Uzun süre direkt gün ışığına maruz bırakmayınız.</i>

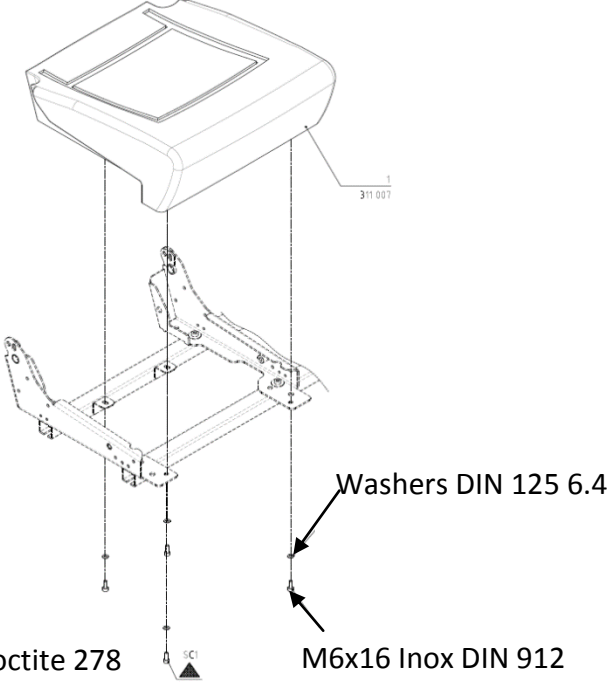
CLEANING ADVISE - TEMİZLEME ÖNERİLERİ	
	If the product is exposed to dusty environments, take out the dust on the product by vacuum and then wipe it with damp cloth. <i>Çok tozlu ortamlara maruz kalan ürünün yüzeyindeki tozları vakum kullanarak temizleyip, daha sonra nemli bir bezle silebilirsiniz.</i>
	In the case of liquid spills like coffee, tea, wine etc.; use a highly absorbent cloth .Make sure the stain is absorbed by the cloth. Wipe the remaining stains with a damp absorbent cloth by gentle circular motion. <i>Kahve, çay, şarap vb sıvı dökülmeleri durumunda; emiciliği yüksek olarak bir bez kullanınız. Lekenin bez tarafından emildiğinden emin olunuz. Kalan lekeyi nemli emici bir bez ile nazik dairesel hareketlerle silerek temizleyiniz.</i>
	In case of spilling oil, wipe the surface with a soapy and cotton cloth. Then gently wipe with a clean-damp cloth in circular motion. <i>Yağ ile lekelenme durumlarında yüzeyi sabunlu ve pamuklu bir bezle silin. Daha sonra temiz ve nemli bir bez ile dairesel hareketlerle hafifçe siliniz.</i>

8.2.5 *Recommended cleaning products*

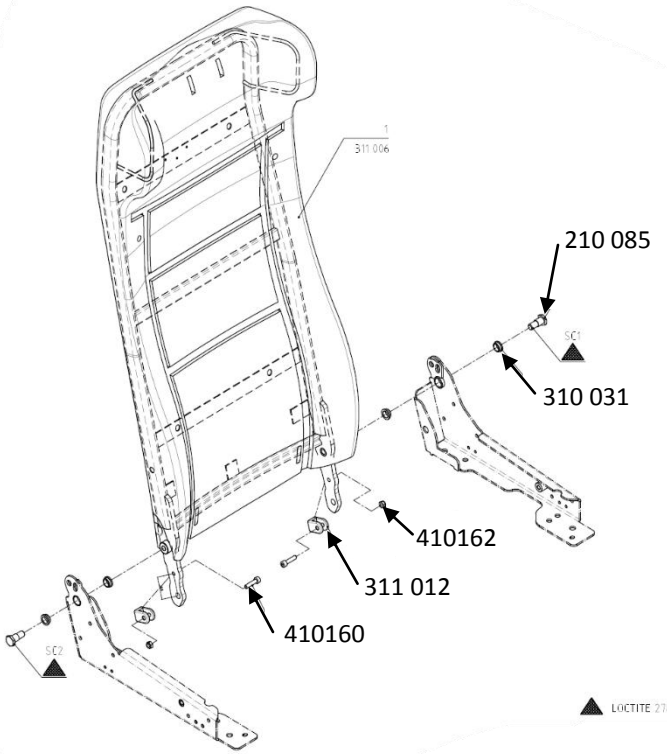
Table 5: Recommended cleaning products

Surface	Description	Product
Paint	Universal cleaning product:	<i>PE 9206</i> (spray) from Henkel AG
Paint	Graffiti removers:	<i>Socostrip T4210P</i> (Socomore) or <i>Magnus 1302</i> (Henkel AG)
Fabric	Dry steam or injection/extraction:	<i>P3-NEXO VS</i> (Henkel) – to be confirmed by the producer of cleaning system

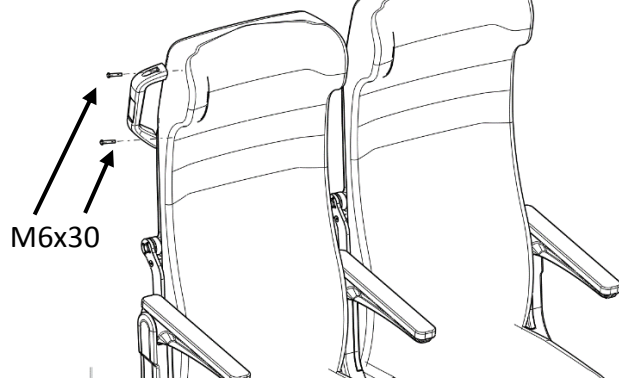
8.3 Exchange of seat cushion

1	Unscrew the four screws M6x16	
2	Remove cushion	
3	Place the new cushion back	
4	Put thread locker on the tip of the screws (Loctite 278)	
5	Place the four washers DIN 125 A6.4 Inox and tighten the four screw M6x16 Inox – DIN 912 to a torque of 10N.m	

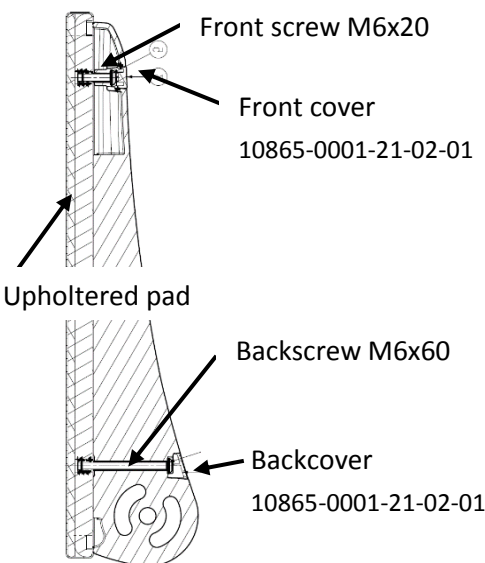
8.4 Exchange of the seat backrest

1	Remove the cushion according to paragraph 8.3	
2	Remove the gas spring according to paragraph 8.7	
3	Untighten the bolt No 218 085 and disassemble the fasteners	
4	Remove backrest and replace it with the new one	
5	Place the backrest according to illustration using spare parts set: 218 085, 310 031, 410 162, 311 012, 410 160	
6	Add thread locker (Loctite 278) on the tip of the screw and tighten to torque 45N	

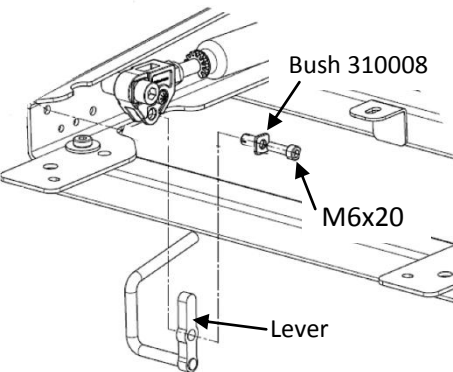
8.5 Exchange of the handle

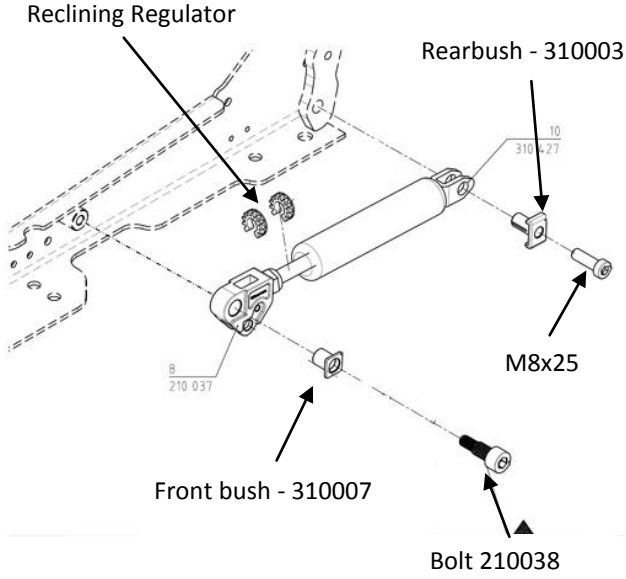
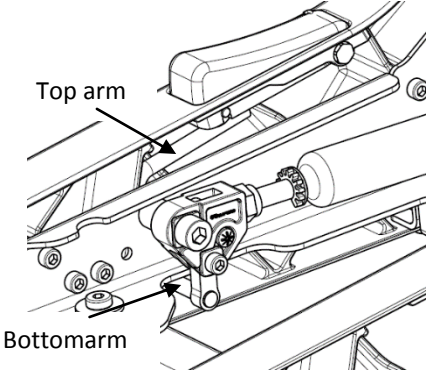
1	Remove two screws M6x30 8.8 A2J - ISO 7380	
2	Replace handle	
3	Add medium thread locker on tip of screws	
4	Tighten the screws M6x30 8.8 A2J - ISO 7380 to 11Nm.	

8.6 Exchange of armrest pads

1	Fold up the armrest to have access to screws	
2	Remove front (10865-0001-21-02-01) and back (10865-0001-21-03-01) screw covers	
3	Remove front screw M6x20 10.9 A2J ISO 7380 and back screw M6x60 10.9 A2J ISO 7380	
4	Remove and replace upholstered pad	
5	Add medium thread locker on tip of screws	
6	Fasten the two M6 front and back screws	
7	Add the front and back screw covers	

8.7 Exchange of the gas spring

1	Remove cushion according to section 8.3.	
2	Remove the bolt M6x20 8.8 DIN 912 and gas spring fixation bush 310008	
3	Remove the gas spring lever	

<p>4</p>	<p>Remove bolt M8x25 8.8 DIN 7984 and rear fixation bush 310003</p>	
<p>5</p>	<p>Remove gas spring assembly bolt 210038 and front fixation bush 310007</p>	
<p>6</p>	<p>Replace gas spring</p>	
<p>7</p>	<p>Use medium strength thread lock Loctite 278 on bolt 210038 and fasten M8x25 and 210038</p>	
<p>8</p>	<p>NOTE: 2nd class gas spring have two reclining regulators, whereas the executive class has one</p>	
<p>9</p>	<p>Reassemble the Lever (see point 2)</p>	
<p>10</p>	<p>Ensure that the top arm of the lever is under the button, and that the bottom arm is inside the side armrest panel</p>	

8.8 Exchange of armrest module

8.8.1 Map of armrests for each seat configuration

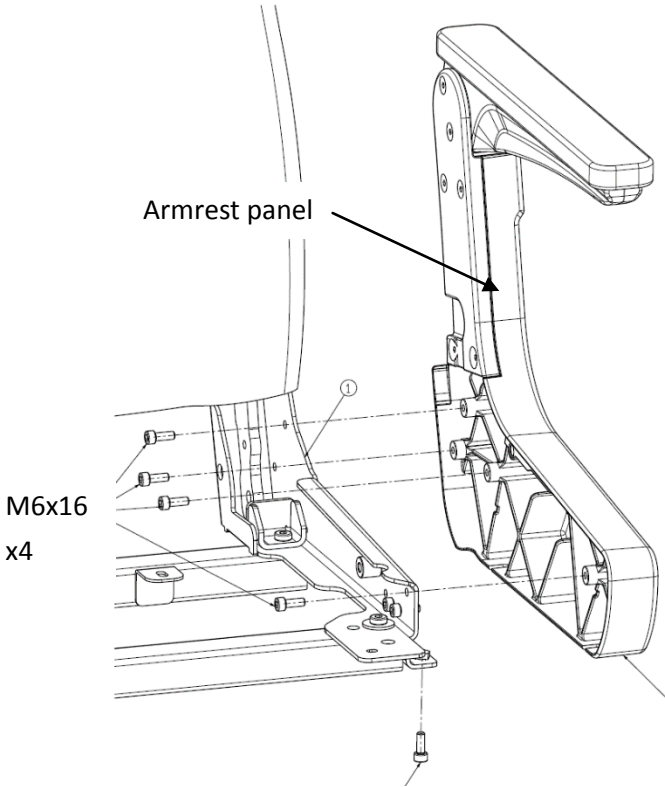
Table 6: Type of arrest for each configuration

No	Configuration	Armrest 2nd class R	Armrest 2nd class R, button, blocked	Armrest 2nd class R, button	Armrest 2nd class, middle R	Armrest 2nd class, middle R, button	Armrest 2nd class middle R, hole	Armrest 2nd class middle R, hole, button	Armrest 2nd class L	Armrest 2nd class L, button	Armrest 2nd class L, button, blocked	Armrest 2nd class middle L	Armrest 2nd class middle L, button	Armrest 2nd class middle L, hole	Armrest 2nd class middle L, hole, button	Armrest 1st class R, button	Armrest 1st class L, button
1	Executive class – 2 seater L 11143-0001-00-00-01															1	1
2	Executive class - 2 seater R 11143-0002-00-00-01															1	1
3	Class II - 1-seater L no table 11144-0010-00-00-01	1									1						
4	Class II - 2-seater R no tables 11144-0008-00-00-01		1		1					1							
5	Class II - 2-seater R 2 tables 11144-0001-00-00-01		1				1			1							
6	Class II - 2-seater L no table 11144-0009-00-00-01			1							1	1					
7	Class II - 2-seater L 2 tables 11144-0002-00-00-01			1							1			1			
8	Class II - 3-seater R 3 tables 11144-0003-00-00-01		1					2	1								
9	Class II - 3-seater L 3 tables 11144-0004-00-00-01	1									1				2		
10	Class II - 3-seater R 2 tables 11144-0006-00-00-01		1			1		1	1								
11	Class II - 3-seater L 2 tables 11144-0005-00-00-01	1									1		1		1		
12	Class II - 3- seater L 1 tables 11144-0007-00-00-01	1									1		2				

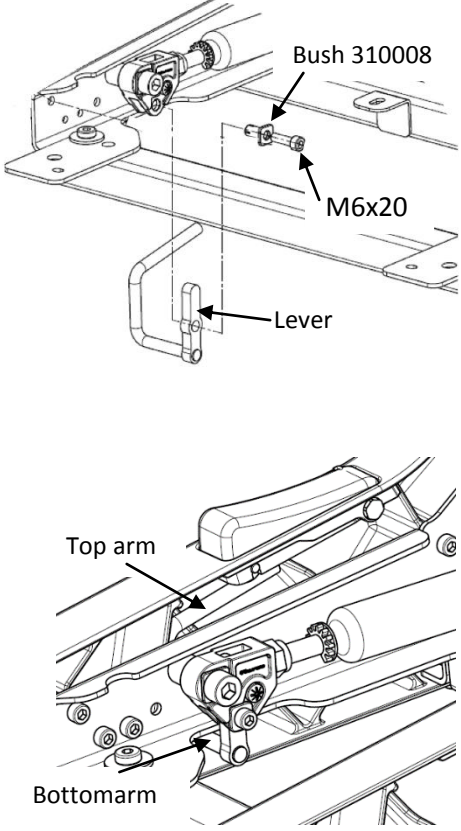
Table 7: List of the different armrests modules

No	Type of armrest	Drawing number
1	Armrest 2nd class R	11144-0004-21-00-01
2	Armrest 2nd class R, button, blocked	11144-0001-29-00-01
3	Armrest 2nd class R, button	11144-0001-21-00-01
4	Armrest 2nd class, middle R	11144-0008-21-00-01
5	Armrest 2nd class, middle R, button	11144-0006-21-00-01
6	Armrest 2nd class middle R, hole	11144-0001-22-00-01
7	Armrest 2nd class middle R, hole, button	11144-0003-20-00-01
8	Armrest 2nd class L	11144-0003-21-00-01
9	Armrest 2nd class L, button	11144-0001-23-00-01
10	Armrest 2nd class L, button, blocked	11144-0002-20-00-01
11	Armrest 2nd class middle L	11144-0009-21-00-01
12	Armrest 2nd class middle L, button	11144-0005-20-00-01
13	Armrest 2nd class middle L, hole	11144-0002-21-00-01
14	Armrest 2nd class middle L, hole, button	11144-0004-20-00-01
15	Armrest 1st class R, button	11143-0001-31-00-01
16	Armrest 1st class L, button	11143-0001-33-00-01

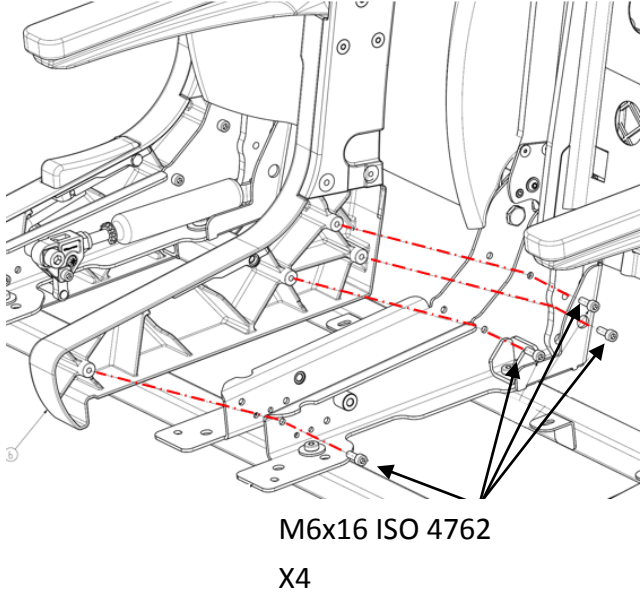
8.8.2 Side armrest module without button

1	Remove cushion according to section 8.3.	 <p>Armrest panel</p> <p>M6x16 x4</p> <p>M6x16 x1</p>
2	Decline the seat backrest to neutral position	
3	Remove the bolts M6x16 8.8 A2J ISO 4762 (4 on the side, and one at the bottom)	
4	Replace the armrest panel	
5	Ensure that the part number is the correct one (guide in section 8.8.1.)	
6	Use medium thread locker on the tip of each bolt thread	
7	Tighten the five bolts bolt M6x16 8.8 A2J ISO 4762 to 11 Nm	

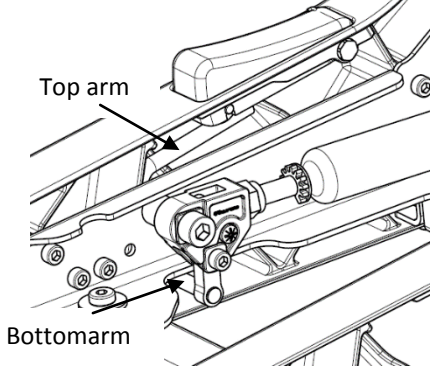
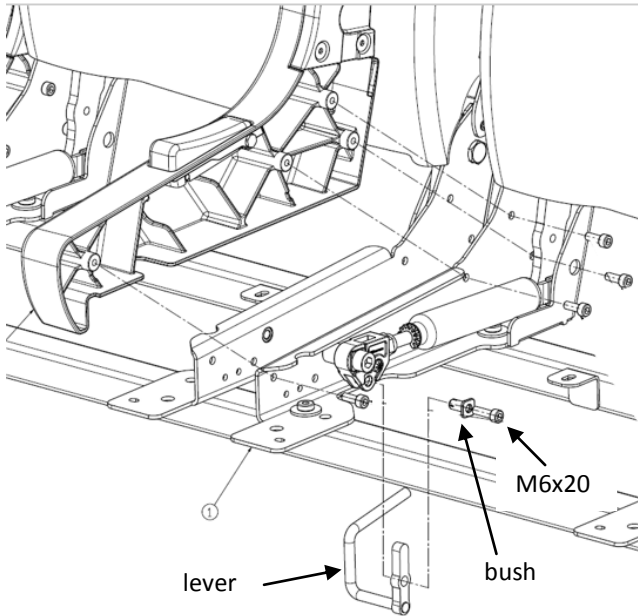
8.8.3 Side armrest module with button

<p>1</p>	<p>Remove first the gas spring lever as indicated in 8.7 (Remove bolt M6x20 8.8 DIN 912 and the sleeve and then remove the lever).</p>	
<p>2</p>	<p>Replace the armrest panel according to section 8.8.2 Ensure that the part number is the correct one (guide in section 8.8.1.)</p>	
<p>3</p>	<p>Position the lever so that the long arm is in contact with the roll under the button and the shorter arm is inside the armrest (4)</p>	
<p>4</p>	<p>Place the bush and tighten the gas spring lever bolt M6x20 8.8 DIN 912</p>	

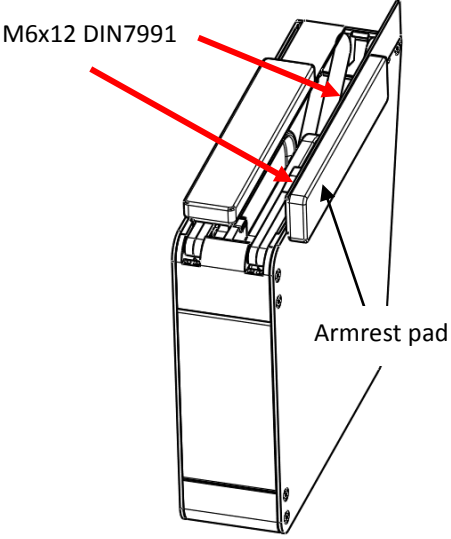
8.8.4 Middle armrest module without button

1	Remove cushion according to section 8.3.	 <p>M6x16 ISO 4762 X4</p>
2	Decline the seat backrest to neutral position	
3	Remove four bolts bolt M6x16 8.8 A2J ISO 4762	
4	Remove the armrest	
5	Place the new armrest. Ensure that the part number is the correct one. Use guide in section 8.8.1.	
6	Use medium thread locker on the tip of each bolt thread	
7	Tighten the four bolts bolt M6x16 8.8 A2J ISO 4762 to 11 Nm	

8.8.5 Middle armrest module with button

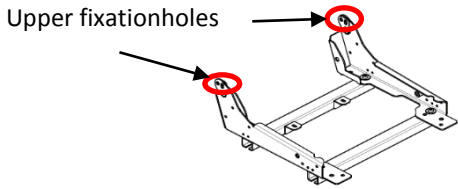
<p>8</p>	<p>Remove first the gas spring lever as indicated in 8.7 (Remove bolt M6x20 8.8 DIN 912 and the sleeve and then remove the lever).</p>	
<p>9</p>	<p>Replace the armrest panel according to section 8.8.4 Ensure that the part number is the correct one (guide in section 8.8.1.)</p>	
<p>13</p>	<p>Position the lever so that the top arm is in contact with the roll under the button and the bottom arm is inside the panel.</p>	
<p>15</p>	<p>Place the sleeve and tighten the gas spring lever bolt (M6x20 8.8 DIN912) to the gas spring head</p>	

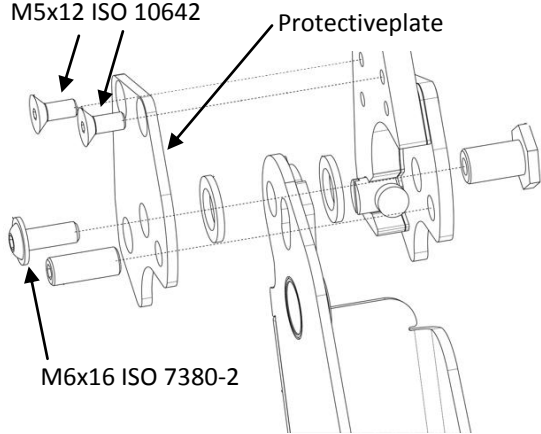
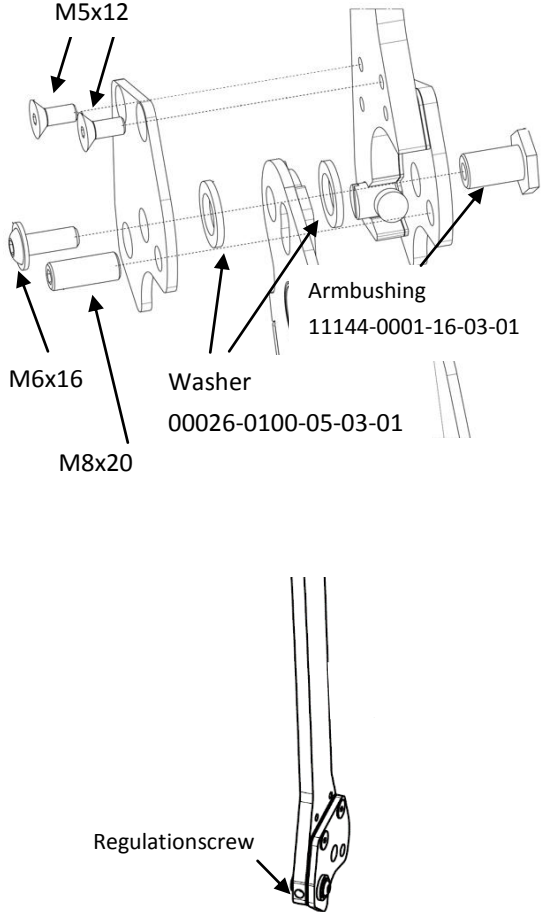
8.9 Exchange of the central console armrest pad

1	Open the armrest on the central console	
2	Remove the 2 screws M6x12 10,9 DIN7991	
3	Exchange the insert	
4	Add medium thread locker on tip of screws	
5	Tighten the screws M6x12	

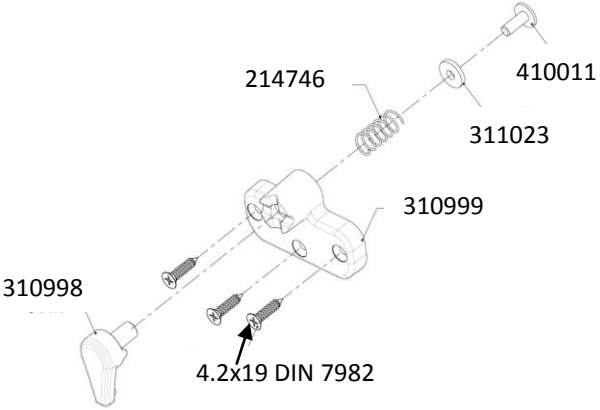
8.10 Exchange of table (2nd class)

8.10.1 Table assembly

1	Remove backrest as described in point 8.4	
2	Table is attached on the upper fixation holes of the seat frame	

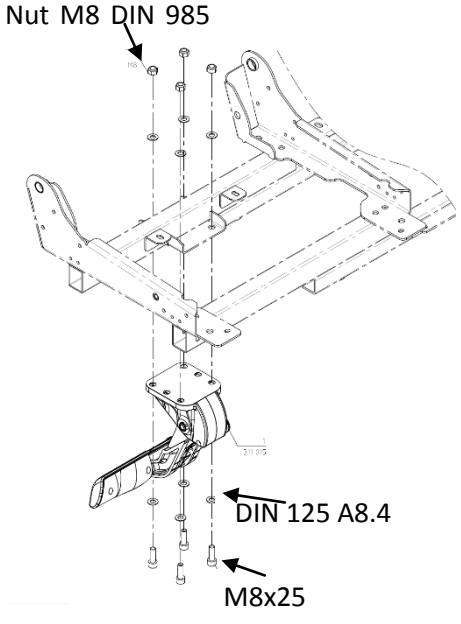
<p>3</p>	<p>Unfasten the 2 x screws M5x12 8.8 ISO 10642</p>	
<p>4</p>	<p>Unfasten the screw M6x16 10.9 ISO 7380-2</p>	
<p>5</p>	<p>Remove the protective plate</p>	
<p>6</p>	<p>Exchange the table and position each arms back in front of the respective holes on the frame (see step 2)</p>	
<p>7</p>	<p>Add the 2x washers 00026-0100-05-03-01</p>	
<p>8</p>	<p>Place the protective plate</p>	
<p>9</p>	<p>For each thread connection, use medium thread lock (Loctite 242) on the tip of the screw.</p>	
<p>10</p>	<p>Tighten the set screw M8x20 45H ISO 4026</p>	
<p>11</p>	<p>Tighten the screw M6x16 10.9 ISO 7380-2 with the arm bushing 11144-0001-16-03-01 (torque 16.5Nm)</p>	
<p>12</p>	<p>Tighten the 2 x screws M5x12 8.8 ISO 10642 (6.5 Nm)</p>	
<p>13</p>	<p>Repeat the steps 7 to 12 for the second arm of the table</p>	
<p>14</p>	<p>Adjust the regulation screw to make the table horizontal. It is recommended to use a level to find the appropriate position.</p>	

8.10.2 Tray lock

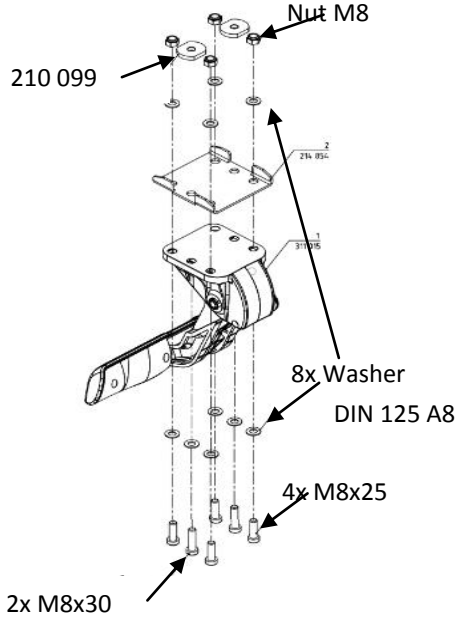
<p>1</p>	<p>Remove the 3 screws screw 4.2x19 Inox DIN 7982</p>	
<p>2</p>	<p>Remove old lock</p>	
<p>3</p>	<p>Assemble the lock together: 310998 (rotating lock), 310999 (lock body), 214746 (spring), 311023 (washer) and 410011 (screw)</p>	
<p>4</p>	<p>Position the lock onto the back of the seat</p>	
<p>5</p>	<p>Tighten the 3 screws 4.2x19 Inox DIN 7982</p>	

8.11 Exchange of the footrest

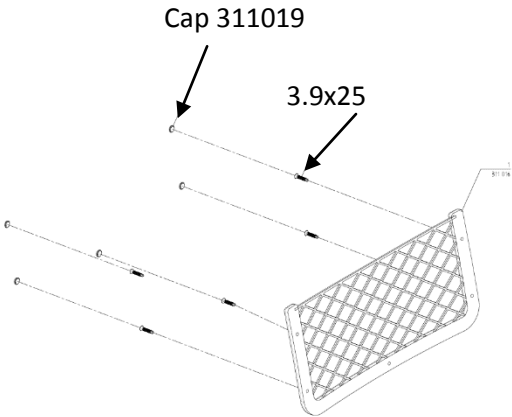
8.11.1 Footrest executive class

1	Remove bolts M8x25 DIN 7984	
2	Exchange footrest	
3	Add medium thread locker on tip of screws	
4	Tighten the 4 screws M8x25 DIN 7984 with washer DIN 125 and nut M8 DIN 985	

8.11.2 Footrest 2nd class

1	Remove 4x bolts M8x25 and 2x bolts M8x30 DIN 7984	
2	Exchange footrest	
3	Add medium thread locker on tip of screws	
4	Tighten the 4boltsM8x25 DIN 7984 and 2 bolts M8x30 DIN 7984 with washer DIN 125 and nut M8 DIN 985 (torque 25 Nm)	

8.12 Exchange of the magazine net

1	Remove 5 screw covers 311019	
2	Remove screw 5 screws 3.9x25 DIN 7504P	
3	Replace the net and replace it with new one	
4	Tighten the 5 screws 3.9x25 DIN 7504P	
5	Place the 5 caps 311019 on the screws	

9 DECOMMISSIONING OF THE SEATS

Each piece of equipment should be disassembled according to procedures section 8.

The seat can be stored with or without assembled inserts, but each element must be stored separately in a cool, dry place, and they must be protected against dirt and dust, as well as very low temperatures.

10 DISMANTLING OF THE SEATS

Each piece of equipment should be disassembled according to procedures section 8.

More importantly, all upholstered elements, as well as components in plastic must be disassembled before discarding. Each removed part can be then disposed of, reused or recycled according to chapter 11.

11 DISPOSAL OF THE SEAT

Table 8 summarizes the mass of constitutive materials. Each material can be recycled or reused according to local regulations. European waste codes are given as example in Table 9 (European Commission decision 2000/532/EC amended 30.12.2014).

Priority should be given to reuse and recycling. Disposal can be considered only when other solutions are not possible. Waste should be handled by certified bodies to conduct the transport, recovery or disposal of such materials.

Table 8: Constituting component of Passenger seats for Train 18

No.	Drawing number	Components	Steel	Aluminium	Plastics (V0)	Non-woven fabric	PUR	FR Plywood
1.	11143-0001-00-00-01	Executive class - 2 seater L	X	X	X	X	X	X
	11143-0002-00-00-01	Executive class - 2 seater R	X	X	X	X	X	X
	11144-0010-00-00-01	Class II - 1-seater L no table	X	X	X	X	X	X
2.	11144-0008-00-00-01	Class II - 2-seater R no tables	X	X	X	X	X	X
3.	11144-0001-00-00-01	Class II - 2-seater R 2 tables	X	X	X	X	X	X
4.	11144-0009-00-00-01	Class II - 2-seater L no table	X	X	X	X	X	X
5.	11144-0002-00-00-01	Class II - 2-seater L 2 tables	X	X	X	X	X	X
6.	11144-0003-00-00-01	Class II - 3-seater R 3 tables	X	X	X	X	X	X
7.	11144-0004-00-00-01	Class II - 3-seater L 3 tables	X	X	X	X	X	X
8.	11144-0006-00-00-01	Class II - 3-seater R 2 tables	X	X	X	X	X	X
9	11144-0005-00-00-01	Class II - 3-seater L 2 tables	X	X	X	X	X	X
	11144-0007-00-00-01	Class II - 3-seater Left 1 tables	X	X	X	X	X	X

Table 9 Waste classification list

No.	Material	European waste code	Recycling	Secondary market
1.	Fabric	04 02 09	X	X
2.	Steel	12 01 01	X	X
3.	Aluminium	12 01 03	X	X
4.	Plastics and PUR	07 02 13		X
5.	FR Plywood	15 01 10		X

12 ERROR IDENTIFICATION

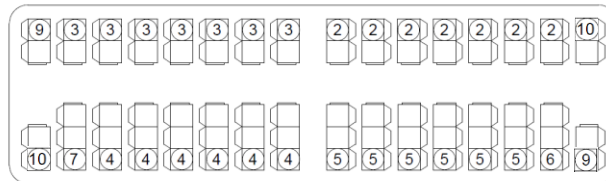
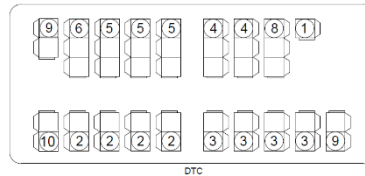
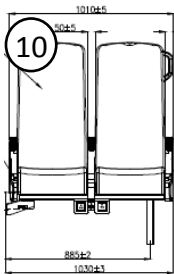
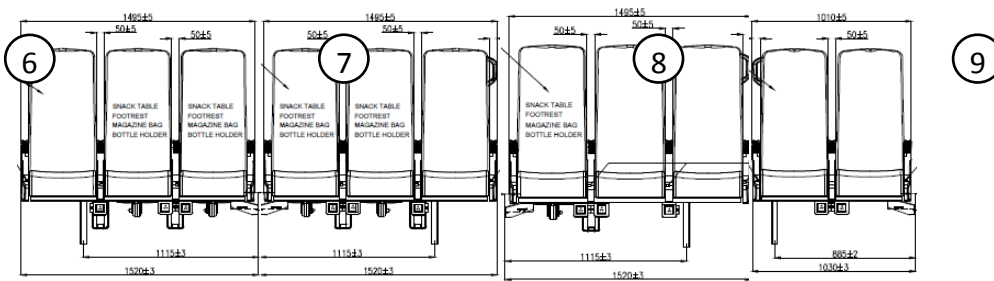
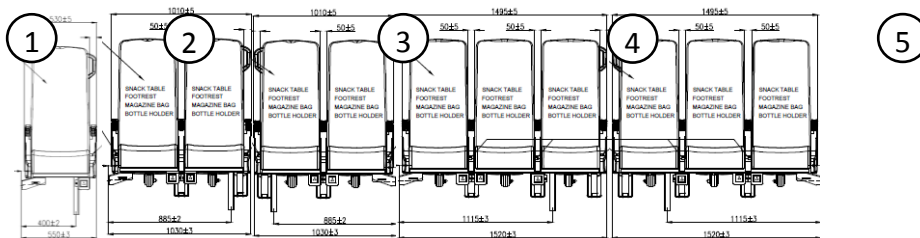
Table 10 summarizes common failure identified, and associated repair.

Table 10: Common failure and remediation associated with the seats

No	Description	Quick response	Further Action
1	Upholstery damaged due to wear of fabric, or due to vandalism	Train can continue operation without correction	Damaged upholstery should be replaced as soon as possible according to section 8.3 and 8.4
2	Parts are scratched, burned, deformed, broken due to vandalism	Train can continue operation without correction. If structural damage is suspected, the parts shall not be used or operated by anyone	If after cleaning, the considered area still shows structural damage (and/or aesthetically unacceptable traces), then replace the part according to section 8
3	2nd class snack table is not levelled	Train can continue operation without correction.	Adjust the level by following procedure in 8.9 step 4.
4	Armrest doesn't lift or lower	Train can continue operation without correction. Make sure you follow the instruction in paragraph 7.1.2	If the armrest still can't be operated, Refer to STER service ASAP. Eventually exchange the armrest following procedure
5	Executive class seat doesn't rotate	Train can continue operation without correction. Make sure you follow the instruction in paragraph 7.1.4	Contact STER service or exchange the corresponding part
6	Executive class seat central console table can't be opened	Train can continue operation without correction. Make sure you follow the instruction in paragraph 7.1.3	Contact STER service or exchange the corresponding part

13 APPENDIX

13.1 Layout (2nd class)



No	Description	Drawing number	Qty DTC	Qty TC, MC MC2
1	Class II - 1-seater L no table	11144-0010-00-00-01	1	
2	Class II - 2-seater L 2 tables	11144-0002-00-00-01	4	7
3	Class II - 2-seater R 2 tables	11144-0001-00-00-01	4	7
4	Class II - 3-seater L 3 tables	11144-0004-00-00-01	2	6
5	Class II - 3-seater R 3 tables	11144-0003-00-00-01	3	6
6	Class II - 3-seater R 2 tables	11144-0006-00-00-01	1	1
7	Class II - 3-seater L 2 tables	11144-0005-00-00-01		1
8	Class II - 3-seater L 1 tables	11144-0007-00-00-01	1	
9	Class II - 2-seater R no tables	11144-0008-00-00-01	2	2
10	Class II - 2-seater L no table	11144-0009-00-00-01	1	2



14 SUBJECT INDEX

N/A

15 CHANGE INDEX

Index	Date	Description	Author	Validated by	
				Project Manager	Engineering Leader
1	03/08/22	Initial Version	R. Faivre	R. Faivre	M. Michnik

Should you require any assistance regarding seat maintenance, please contact directly the seat producer Ster:

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