

## CONTACTORS

**Contactor:** It is an electromagnetic device used in various types of ( High current rating ) electrical circuits to make and break the circuits. In this, there are two types of contactors.

1. Electromagnetic contactors.
2. Electromagnetic & pneumatic contactors.

**ELECTROMAGNETIC CONTACTORS:** When coil of these contactors are energized, the core gets magnetized and movable tip moves on fixed tip. When the current is with drawn to the coil, the core is de-magnetized and movable contact opens from fixed contact due to spring action.

**1. Fuel pump contactor (FPC) :** It is located in Front Panel. Whenever MFPB<sub>1</sub> & MFPB<sub>2</sub> switched 'ON' FPC will close.

**Purpose:** To energize many control circuits especially engine starting and running circuits.

**If Fails :** During starting if it is not closed engine will not crank. During running, if it fails engine will come to shut down.

On emergency FPC can be packed and work onwards.

**2. Cranking contactors : (CK<sub>1</sub> & CK<sub>2</sub>) :** It is located in Front Panel. Whenever start button is pressed these contactors will close.

**Purpose :** If CK<sub>1</sub> closes positive (+ve) supply goes to main generator and if CK<sub>2</sub> closes negative (-ve) supply goes to main generator. It is having interlocks for controlling some other control circuits.

**If Fails :** If contactors defective engine will not crank & interlocks defective, mainly GF contactor will not close.

**3. Generator Field Contactors (GFC) :** It is located in Front Panel. Whenever both GFCO switched 'ON' from both control stands GF contactor will close.

**Purpose :** To connect exciter generator supply to main generator field for field excitation.

**If Fails :** Load meter will drop to zero (or) Load meter will not respond.

On emergency GFC can be packed and work onwards

**4. Radiator fan Contactors : (R1 & R2) :** These are located on Back Panel. Whenever engine cooling water temperature raises (68 & 74 degrees), TS.1 & TS.2 will close. If TS.1 closes R1 contactor and if TS.2 closes R2 contactor will be closed.

**Purpose :** To give auxiliary generator supply to eddy current clutch for rotating radiator fan.

**If Fails :** If there is no supply to ECC, Radiator fan will not work. Engine water temperature will raise to 90°C and engine temperature switch (ETS) will pick up. Hot engine indication and alarm will come, no change in the engine speed. Then put ON ERF breaker.

**5. Field Shunting Contactors (F.S.C) :** These are located in back Panel. During 1<sup>st</sup> and 3<sup>rd</sup> transition field shunting relay will energize and makes six (6) F.S. contactors (FS 21 to 26) to close.

**Purpose :** To divert traction motor field current (or) weakening traction motor field current and to get acceleration in Traction Motor.

**If Fails :**

- a) During first transition if any FS contactor is not closing (picking up) and another five contactors closes continuously wheel slip relay will operate.  
To work further, Apply manual II nd transition all FS contactors will drop. Again, at III rd transition, same problem will arise. To work further remove 210 - 3 card III rd transition will not pickup.
- b) While starting the Loco if any FS contactor is welded continuously wheel slip relay will operate.  
To work further; Start the Loco with direct I st transition remaining five FS contactors will also close. Again at II nd transition, same problem will arise. To work further apply manual III rd transition remaining five contactors will also close.

**ELECTROMAGNETIC & PNEUMATIC CONTACTORS:**  
(The required control air pressure is 5 kg/cm<sup>2</sup>).

When operating coil of these contactors are energized, it opens the passage for control air. This control air pressure forces movable tip on to fixed tip. When the coil is de-energized exhaust port opens and movable tip comes to original position with the help of spring.

**1. Series Parallel Contactors : (S<sub>1</sub>, S<sub>21</sub>, S<sub>31</sub>) :**

These are located in Front Panel. During locomotive movement these contactors will close.

**Purpose:** To make the six traction motors in series parallel combination (1 & 4 TMs in S<sub>1</sub>, 2 & 5 TMs in S<sub>31</sub> & 3 and 6 TMs in S<sub>21</sub>).

**If Fails:** Load meter will not indicate (if S<sub>1</sub> not picking up) and hauling power is effected, (if S<sub>21</sub> or S<sub>31</sub> not picking up) only Hauling power is effected.

**2. Parallel Contactors: (P<sub>1</sub>, P<sub>21</sub>, P<sub>31</sub>, P<sub>2</sub>, P<sub>22</sub>, P<sub>32</sub>):** These are located in Front Panel. During second transition, transition relay will pickup and makes to energize all parallel power contactors.

**Purpose:** To make all six traction motors in parallel to main generator (parallel combination).

**If Fails:**

1. During second transition load meter will not respond if P<sub>32</sub> not picking up.
2. Hauling power is effected if any one power contactor is not picking up.
3. Load meter will not indicate if P<sub>2</sub> not picking up.

**3. Braking Switches (BKT<sub>1</sub>, BKT<sub>2</sub>):** These are located in Front Panel. Operation like power contactors.

**Purpose:** The power break switch changes the connections of the armature and fields of the traction motor suitably for motoring and dynamic braking. It is also off load operated power switch. It will decide locomotive to work for motoring or braking. It is under the control of selector handle.

**BKT 1** Controls traction motor Nos 1, 4, 3 & 6

**BKT2** controls traction motor Nos 2 & 5

and in **single BKT** locos it will control all six traction motors.

**If Fails:** During motoring load meter will not respond and during braking dynamic brake will not work.

**4. Reverser Switch (REV<sub>1</sub>, REV<sub>2</sub>):** It is located in Front Panel. Operation same as BKT's.

**Purpose:** The Reverser is remotely controlled off load operated power switch used for reversing the direction of rotation of traction motor. It is under the control of reverser handle.

**REV 1** controls traction motor Nos 1, 4, 3, 6 and **REV 2** controls traction motors 2 & 5 and in single reverser locos it will control all six traction motors.

**If Fails:** In one direction load meter will not respond.

In double BKT locomotives in dynamic brake except P<sub>2</sub>, P<sub>22</sub> remaining power contactors S<sub>1</sub>, S<sub>21</sub>, S<sub>31</sub>, P<sub>1</sub>, P<sub>21</sub>, P<sub>31</sub>, P<sub>32</sub> will pick up and also only one BKR relay is going to operate.

In single BKT locomotives during dynamic brake except P<sub>2</sub>, P<sub>22</sub>, S<sub>21</sub> & S<sub>31</sub> remaining power contactors S<sub>1</sub>, P<sub>1</sub>, P<sub>21</sub>, P<sub>31</sub>, P<sub>32</sub> will energize and also BKR<sub>1</sub>, BKR<sub>2</sub> & BKR<sub>3</sub> will operate.