

SET OF PANELS FOR LHB EOG NON AC COACHES

SPEC:EDTS-355 REV-01

User Manual



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INTRODUCTION



INTRODUCTION

Before using this product, be sure to read this chapter carefully.

It's not a secret - electricity can be dangerous and when things go wrong lives can be at stake!

Electrical engineers are Industrial safety doctors, so it's our duty to keep employee's health and maintain a quality of life that we all deserve by providing safe work practices to avoid electrical accidents.

How much electricity is dangerous?????

CURRENT	EFFECT
0.5 - 3mA	Tingling sensations
3 - 10mA	Muscle contractions (painful)
10 - 40mA	"can't let go" phenomena
40 - 75mA	Respiratory paralysis (possibly fatal)
75 - 200mA	Ventricular fibrillation (likely fatal)
200 - 500mA	Heart clamps tight
>1.5A	Tissue and organs began to burn

Fact: A 15 amp circuit breaker was designed to protect equipment - not people!



HEALTH AND SAFETY

It deals with the handling of panel in proper way. An individual to be considered as 'qualified' with regard to certain equipment in the workplace, but 'unqualified' as to other equipment. "An employee, who is undergoing on the job training and who, in the course of such training, has demonstrated the ability to perform duties safely at his or her level of training and who is under the direct supervision of a qualified person also considered to be a qualified person for the performance of those duties".

The following requirements must be met, in the order given, before circuits or equipment's are re-arranged, even temporarily.

1. People handling the equipment should be aware about the panel safety handset.
2. Ensure that the product is in the off condition before working on the conducting or terminal side
3. A qualified person must conduct tests and visual inspection, as necessary, to verify that tools electrical jumpers, short, ground and other such devices have been removed, so that the circuits and equipment can be safely re-energized.
4. Employees exposed to the hazards associated with re-energizing the circuit or equipment must be warned to stay clear of the circuits and equipment.
5. Each lock and tag must be removed by the employee who applied it or someone else under that employee's direct supervision.
6. A visual determination that all employees are clear of the circuits and equipment's must be made.

For any queries related to panels, feel free to contact ALIND



NON-AC DESCRIPTION



NON-AC DESCRIPTION

The set of panels comprises of the various cubicles consisting of power and control switch gear consisting of following.

I.	HV CUBICLE	LS71103	2000(L)x550(D)x525(H)
II.	LOW VOLTAGE PANEL INCLUDING CABLE COVER FOR TOP AND BOTTOM	CC72081	500(W)x130(D)x1000(H)

The cubicles indicated as item I is of welded stainless-steel construction; it is made of stainless-steel grade S2 to IS: 6911. Thickness of the sheet is 2mm.

The on-board cabinet conform to CRCA sheet of thickness 2mm conforming to IS:513 and it is powder coated to Siemens gray shade no.6102/08038 after the proper surface treatment.

HIGH VOLTAGE CUBICLE

A disconnecting and earthing device along with high voltage fuses shall be located in the drawing. The main function of this device is to separate the two feeders (input supply) and simultaneously earthing 750volts AC network of the coach. The connection to the device shall be made by removing the top cover on the front of the device. The panel consist of switchgear for main contactors, measuring and monitoring relays, contactors for pump control, MPCB, mounting for pump controller and cage clamp terminal.

ON BOARD SWITCH PANEL

The on-board panel shall house the rotary switch panel as used in conventional coaches for distribution of light and fan as per the schematic and wiring diagram. The rotary switch for the feeder selection shall be provided on the panel to select the feeder as provided in the under slung hv cubicle. It may be noted that the control for the feeder selection contactors shall be on 110V DC only.

The connectors for the mobile charging sockets shall be provided in the panel as indicated in the drawing.



CIRCUIT DESCRIPTION



CIRCUIT DESCRIPTION

The HV cubicle which is installed under slung of the LHB coach which is given by main feeder lines of 750V AC 3 ϕ . The two lines are connected directly to disconnecting and earthing device. Then the line passes through the main fuses of 25A and measuring and monitoring relays. These relays are designed to detect overloads, temperature, liquid and other potentially damaging fluctuations. After the main fuses, lines are fed to the main contactors K01 & K02.

When MMR relays are ok and no tripping conditions occur, by the selection of either one of the NET supplies one of the contactors pass this supply. It may be noted that two contactors never work on the same time. For this operation sufficient interlocking is made in the HV panel.

Then the 750 V 3 ϕ Supply is fed to the 15/9 KVA Transformer 750/415 & 190V star -star connected transformers. and after step down the supply given back to the HV cubicle.

415V 3 ϕ supply is given to water pump control and to the battery charger. from battery charger 110 v dc is return back and this supply is needed for the Anti-skid device and on-board LV panel, on board LV panel consist of fuses, rotary switches, MPCB, RCBO and terminal blocks.

190V 3 ϕ supply is needed for the exhaust fan controls and mobile and laptop charging.



COMPONENT DESCRIPTION



MMR

S1K03 & S1K04

It operates with a rated control supply voltage / three-phase measuring voltage of 530-820 V AC 50/60 Hz and has a 2 c/o (SPDT) output with contacts rated at 250 V / 4 A. This relay monitors all phase parameters such as over/under voltage, phase unbalance and phase failure. The corresponding threshold values are adjustable.

MPCB

MPCBs are used to manually turn on and off electric motors and at the same time protect them from different types of faults occurring in motors. It can protect motors against overload, short circuits, phase loss and under-voltage faults. MPCBs are specially designed for motor protection. Maximum load current can be set based on the full load current of the motor and are selected based on the full load current of motors and maximum possible short circuit current. It can withstand the starting currents without interrupting the circuit.

MPCBs have an adjustable bimetallic strip for overload protection. This strip can be adjusted between two set values. Overload relay is not required for motor circuits with MPCB backup. An MPCB can protect a motor against overload and short circuit. A Motor can be directly turned ON and OFF manually using an MPCB, a contactor is optional.

RCBO

RCBO stands for 'Residual Current Breaker with Over-Current'. As the name suggests it protects against two types of fault and in essence combines the functionality of an MCB and RCD.

Let us first remind ourselves of those two faults:

1. Residual Current, or Earth Leakage - Occurs when there is an accidental break in a circuit through poor electrical wiring or DIY accidents such as drilling through a cable when mounting a picture hook or cutting through a cable with the lawn mower. In this instance the electricity must go somewhere and choosing the easiest route travels through the lawnmower or drill to the human causing electric shock.



2. Over-Current takes two forms:

1. Overload - Occurs when too many devices are in use on the circuit, drawing an amount of power which exceeds the capacity of the cable.
2. Short Circuit - Occurs when there is a direct connection between the live and neutral conductors. Without the resistance provided by the normal circuit integrity, electrical current rushes around the circuit in a loop and multiplies the amperage by many thousand times in just milliseconds and is considerably more dangerous than Overload.

Whereas an RCD is designed solely to protect against earth leakage and an MCB protects only against over-current, an RCBO protects against both types of faults.

ROTARY SWITCHES

RSW1: Rotary switch 3 pole 2way

RSW2: Rotary switch 3 pole 2way

RSW3: Power supply on / off

RSW4: Rotary switch with marking I-O-II, NET-1 -OFF NET-2(Change over switch with 0-position 3 pole)

These are placed on the on-board LV PANEL.

DROP OUT DELAY TIME RELAY

S1K05

It is a single-function electronic time relay. It provides an OFF-delay (true delay on break) function without auxiliary voltage and with 10-time ranges from 0.05 s to 300 h. This time relay operates with a rated control supply voltage of 24 - 240 V AC / DC and has a 1 c/o (SPDT) output rated at 250 V / 4 A

CONTACTORS

S1K01 & S1K02

4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e., resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC.

DISCONNECTING AND EARTHING DEVICE

Disconnecting and Earthing Devices provide easy **disconnecting** high voltage equipment from a high voltage bus bar and connect these parts to ground potential to take away all electric energy, which might rest in capacitors and other components



HIGH VOLTAGE AND LOW VOLTAGE FUSES

HIGH VOLTAGE FUSES:

S1F50, S1F51, S1F52, S1F53, S1F54, S1F55

LOW VOLTAGE FUSES:

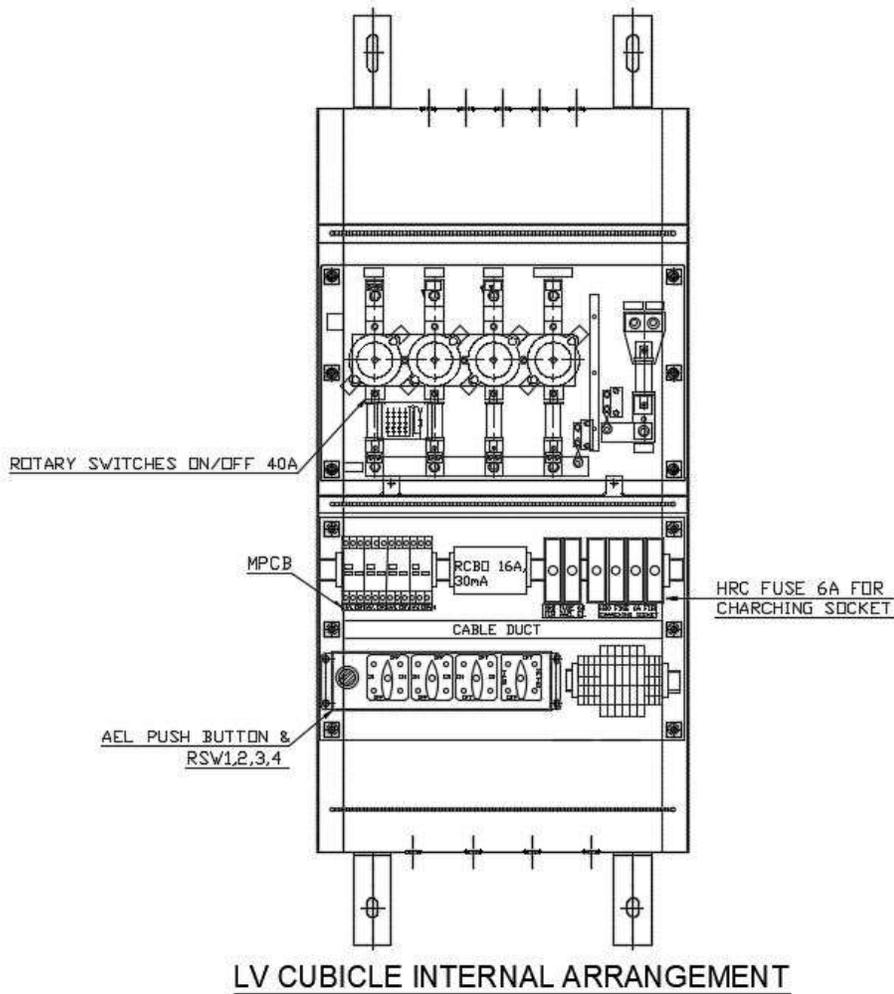
S1F44, S1F45, S1F46, S1F47, S1F48, S1F49

High Voltage (HV) AC Fuses are used for **voltages** above 1000V and **Low Voltage (LV) AC Fuses** are used for **voltages** less than 1000V.



INTERNAL ARRANGEMENT

b.LV Cubicle internal arrangement.





TROUBLESHOOTING



Sl. No.	FAULTS	CHECKS
1.	Main contactor off	1. Check the incoming supply. 2. Check the high voltage fuses. 3. Check the condition of MMR relay; is it in trip condition or not. 4. Check the interlocking contacts like disconnecting device NC contact, Contactor NC contact. 5. Check the on-board LV panel rotary switches, power supply on and feeder selection.
2.	415V & 190V supply fail	1. Check the 15/9 KVA transformer output. 2. Check the low voltage fuses.
3.	LV panel dc fail (110V DC)	1. Check the 110V DC from battery charger. 2. Check the incoming fuses.
4.	HV cubicle dc fail.	1. Check the fuses S1F63 & S1F65 2. Check the incoming supply.



COMMISSIONING



COMMISSIONING

1. Unpack the panels and check for any physical damage. In case of damage inform concerned authority
2. Mount the HV Panel, LV Panel in proper place in the LHB Coach panel cubicle and Battery Charger are of under slung type in the LHB coach while the LV cubicle is on the on-board type LHB Coach.
3. Pass the cables through the proper glands and terminate proper feeder lines on the Earthing and Disconnecting device. Proper cables of suitable sizes to be terminate on the HV cubicle, LV cubicle and RBC cubicle. Incoming and outgoing cables to the 15/9 KVA transformer to be wired in the terminals of hv cubicle. Proper earthing to be given for the panels.
4. Connect all wires to the anti-skid device from anti-skid terminals in the HV cubicle. Remaining wires from the HV cubicle also terminate to the anti-skid device.
5. Connect all wires to the Pump controller from the panels.
6. After all the connections feeder lines are active and switch on the Earthing and Disconnecting device. Then power supply on /off switch in the LV panel to be ON. After select the feeder lines through the rotary switches in the LV panel.
7. Check the contactor KO1 or KO2 is ON.
8. Check the low voltage sections 415V 3 ϕ & 190V 3 ϕ supplies.
9. Check the 110 VDC supply from battery charger.
10. Check the on-board LV panel rotary switch operations and output and also need to check the MPCB output.
11. Panel is now ready for on line operations.



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