

## FUSE AUTO CHANGE OVER SYSTEM

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### *Operating & Maintenance Instructions*

*Manufactured by -*

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## GENERAL

**SCOPE:** This manual provides operating & maintenance instructions for FUSE AUTO CHANGEOVER SYSTEM. This system is Designed & Manufactured by KDP MICRO POINT PVT LTD, KOLKATA.

**DESCRIPTION:** The FUSE AUTO CHANGEOVER SYSTEM can be broadly divided into

- a) Fuse voltage sensing cables
- b) Auto change over type fuse alarm panel,

### **Types of FACS**

Type I – Module Consist of 32 fuses

Type II – Module Consist of 24 fuses

Fuse Auto Changeover System is designed for mounting on standards relay racks for railway use. Please see fig. The cabinet is upright with removable back cover suitable for external wiring. Each panel consists of 8 control cards (Type I) & 6 control cards (Type II). Each card individually contains a microcontroller-based circuit for failure detection & change over for 4 individual fuses. All control cards are easily detachable (Euro Connector type) for easy maintenance. Power supply for the system can be derived from 90V AC/DC to 120V AC/DC.

**INSTALLATION:** Installation consists of wiring from relay rack fuses to terminals mounted on back of Fuse alarm system. The terminals are marked as F1, F2, F3, F4 & so on and are to be connected to the output of fuses to be monitored. +V & -V of the supply is to be connected to the terminals marked +V / -V of respective card. Any one card can be used for same type of supply. Individual card can detect four different fuses connected to same type of supply having one common phase & neutral. For example, one card cannot be used for detecting 24V DC or 110 V AC at a time.

If any circuit is unused or used as a spare circuit, terminal marked as +V should be looped with respective terminals (1,2,3,4) and supply should be connected across +V & -V terminals.



## PRINCIPLE OF OPERATION

Four LED indications- 2 green and 2 red- are provided for each fuse. Two green LEDs show the health of respective main fuse and the corresponding spare (stand by) fuse. When any of the fuses blows, Red LED glows and related green LED turns off.

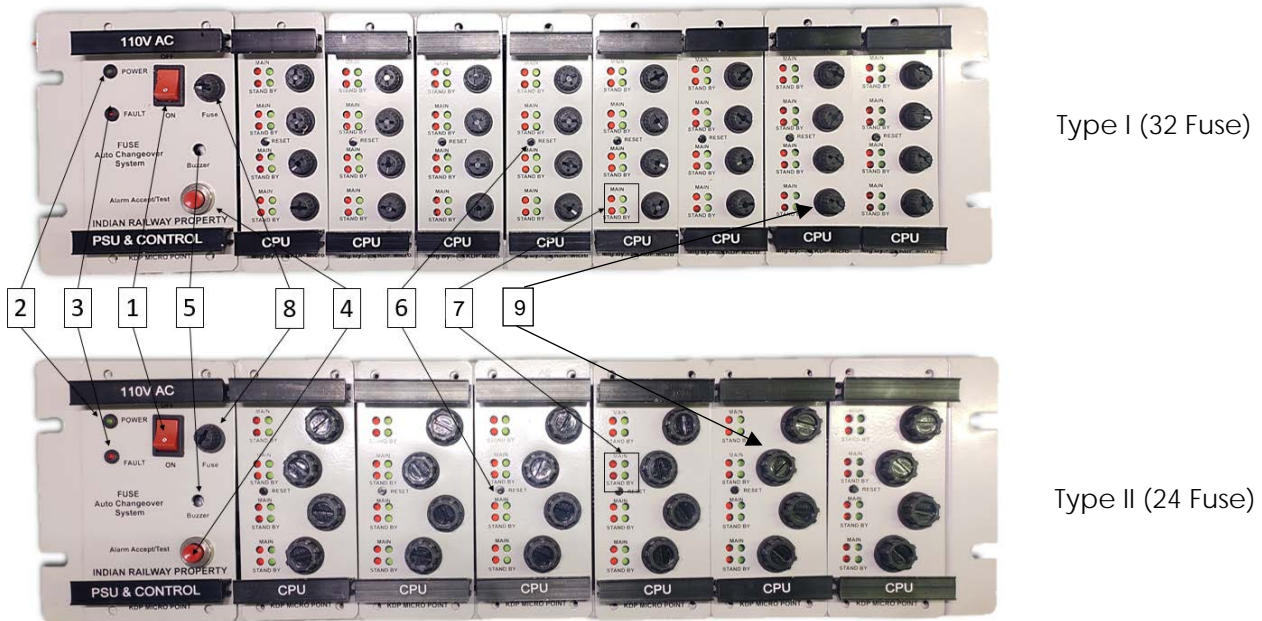
Voltages at the output of both the external fuse and the standby fuse - even if load is not connected to the standby- are sensed through opto-isolated inputs by the microcontroller. Upon blowing of any fuse, alarm is generated. Moreover, when the external fuse blows, the microcontroller instantly actuates a relay which connects the load to the standby fuse, thus maintaining the load without interruption. Corresponding LED states are established. When the standby fuse is detected as blown, only alarm and indicators are set, while the load is still supplied from the external fuse. Audio alarm continues till 'Alarm accept' switch is pressed. However, fresh audio alarm will start if any other fuse blows. The 'FAULT' LED will continuously blink till the fault is rectified. For total restoration, the blown fuse has to be replaced and the corresponding 'RESET' switch has to be pressed.

When all the fuses are intact, 'TEST/ALARM ACCEPT' switch performs system self-test. In self-test, buzzer sounds all LED's blink to indicate proper system operation.

**POWER SUPPLY:** SMPS type 12 V DC & 5 V DC regulated power supplies are generated for the operation of the control circuit, relays, LED indications and audible alarm.

**CONTROL CARD:** Each control card consists of Microcontroller based 4 Nos. of fuse failure detection circuits corresponding to 32 X 4 LEDS (Type I) & 24 X 4 LEDS (Type II). The panel can have up to 8 control cards. Each panel can thus monitor up to 32 fuses (Type I) or 24 Fuses (Type II).

## OPERATING CONTROLS & INDICATORS:



1. **Power On /Off Switch:** Front side left panel provides means to switch OFF & ON power to the indicator.
2. **Power on LED:** Indicates that the indicator panel is energized & ready to indicate failure of fuse.
3. **Fault LED:** Common flashing 10mm red LED indicates failure of fuse.
4. **Alarm Accept/Test Push Button:** It provides means to reset only audible alarm. When 'Alarm Accept/Test' button is pressed on normal working condition LEDs light & audible alarm sounds
5. **Buzzer:** It sounds to indicate fuse failure.
6. **Reset Switch:** In case of main fuse failure standby fuse will be in circuit. When main fuse is replaced press 'RESET' button to reset main fuse in circuit.
7. **LEDs:** Red glow only when fuse failure occurs, or 'Alarm Accept/Test' push button is pressed. For healthy fuse, corresponding green LEDs glow.
8. **Power Fuse.**
9. **Standby Fuse.**

## OPERATING INSTRUCTION

- A) Always put Power – ON switch in 'ON' position.
- B) Once in a day check the working of the system using Test push button

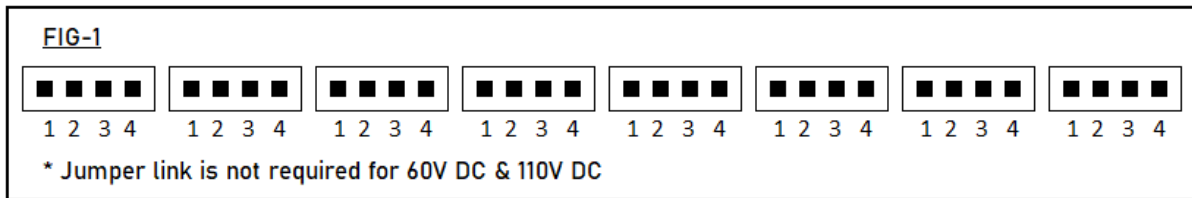
## CAUTION

**CONTROL CARD REPLACEMENT:** Control card Replacement must be made only with the type specified. Any substitution without manufacturer's consent may blow up main fuse in racks or destroy control card & void the warranty.

**IMPORTANT NOTE:**

Depending on the fuse supply voltage the jumper settings is as below

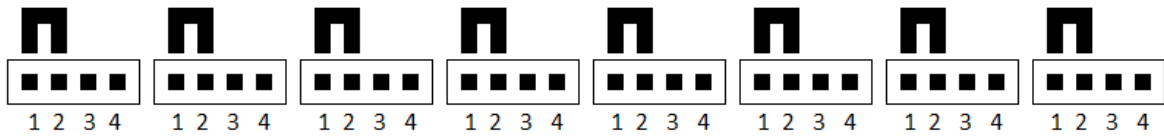
- If fuse supply voltage is 60V DC and 110V DC then configure the burg strips as per FIG-1.
- If fuse supply voltage is 110V AC then configure the burg strips as per FIG-2.
- If fuse supply voltage is 12V DC and 24V DC then configure the burg strips as per FIG-3.



60V DC & 110V DC



FIG-2



\* Jumper link is required for 110V AC

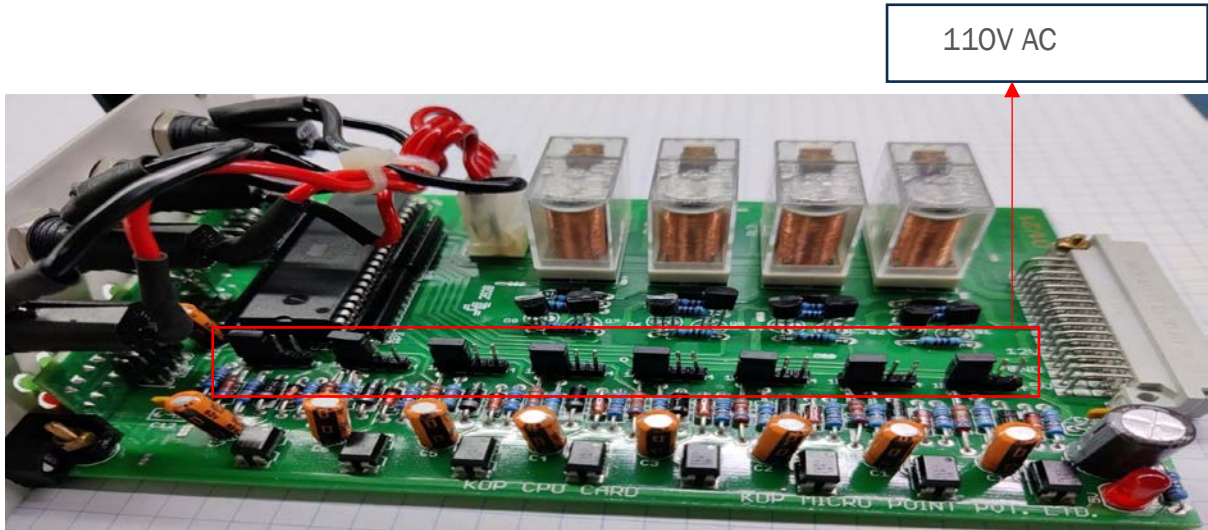
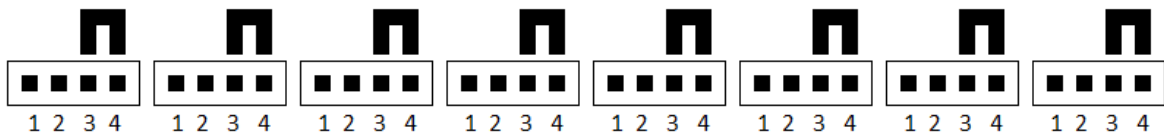
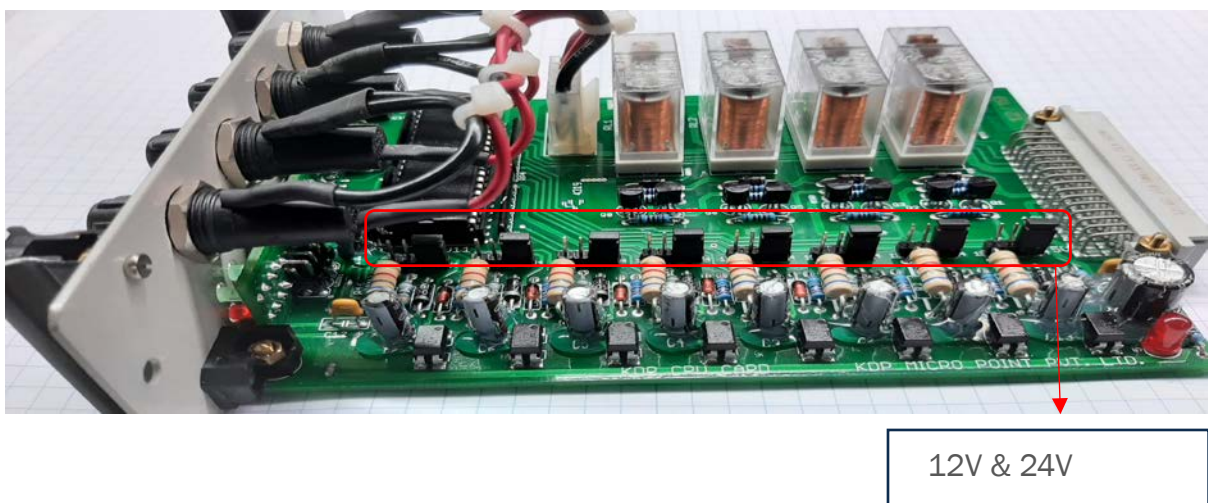


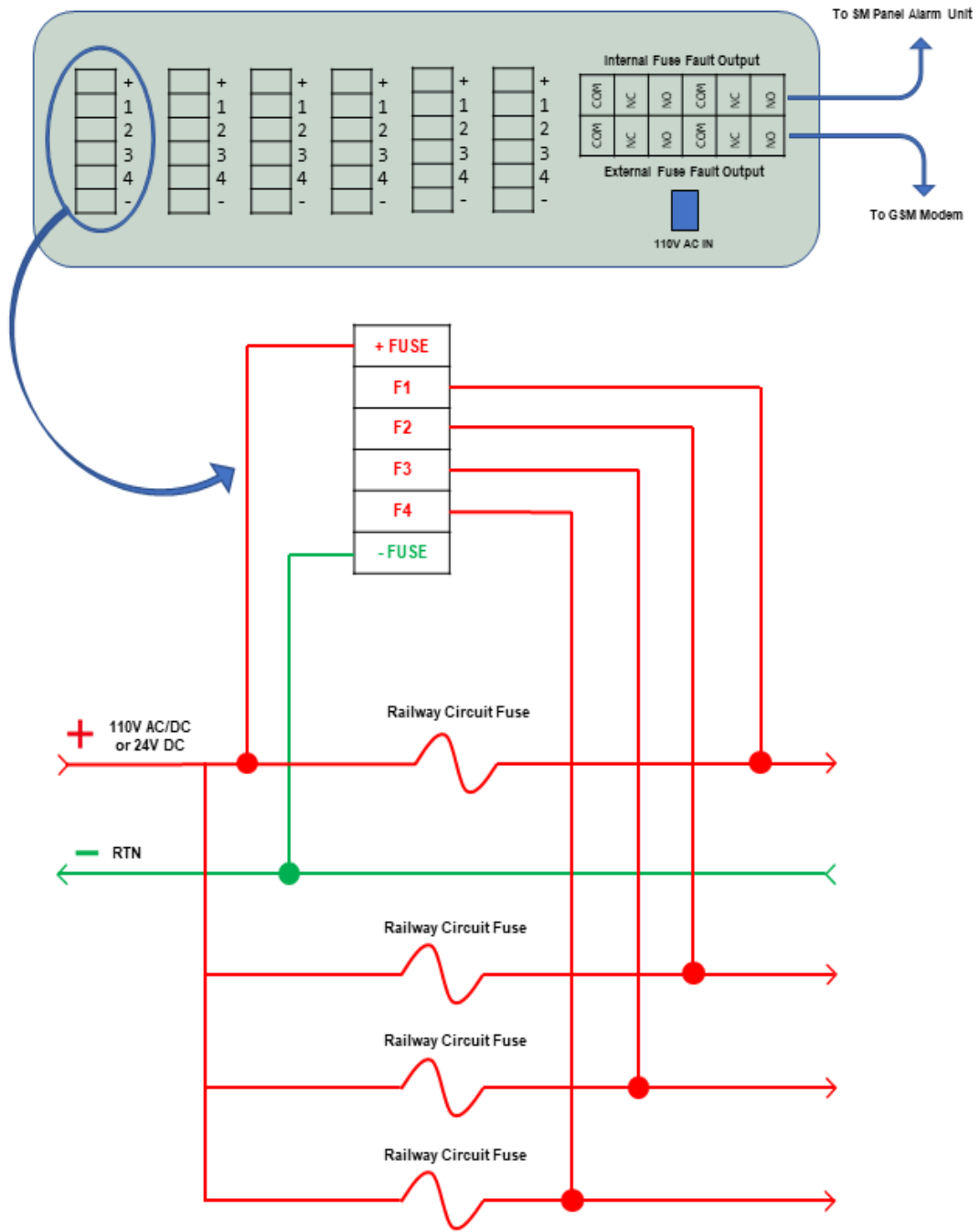
FIG-3



\* Jumper link is required for 12V DC & 24V DC



# FACS Connection Diagram



By  KDP Micro Point Pvt. Ltd.

## REPAIRS & REPLACEMENT:

Do not try to repair control card in actual system. Repair the card in laboratory by simulating actual conditions. While replacing the components, observe the following.

- 1 When soldering avoid excessive heat which may damage components.
- 2 Be careful while making all soldered joints as a poorly soldered joint can cause further trouble and is one of the most difficult faults to locate.
- 3 Do not damage lead of other components by pushing or pulling them Aside.
- 4 Maintain a log of all repairs and adjustments. Comprehensive notes and an accurate log make it possible to manage subsequent maintenance actions.

## MAINTENANCE

**GENERAL:** The FUSE ALARM SYSTEM has been designed for continuous reliable operation. However, following steps for periodic inspection are recommended: Press 'TEST' of each sub-rack one at a time. All LEDs should blink and the buzzer will sound. It shows that all Indicators, the buzzer and associated circuit are working OK. At a suitable interval, say once in a month, test the system by removing actual fuses one by one.

## TROUBLE SHOOTING

In case there is any fault in the FUSE ALARM SYSTEM it is preferable to test the system step by step as given below. It is desirable that basic principle of operation of the system should be kept in mind before doing any trouble shooting. A brief trouble shooting chart is given below.

Fault	Reason	Solution
Red LED corresponding to a fuse glowing.	1. Input wire to the card may be open	Check input connection
	2. Sensing voltage may not be proper	Check voltages
Led indicator not blinking during system test.	LED faulty or card faulty	Change LED card
Supply LED indicator not glowing	Supply connection bad or fuse blown	Check supply connection and fuse.



## COMMON AUDIO-VISUAL ALARM UNIT (OPTIONAL ITEM)

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The Common AUDIO-VISUAL Alarm Unit for FACS is made for ASM's Room or any other convenient place and it have the following features:

1. Yellow indication (5mm LED) for indication Power Supply OK
2. Common failure LED indication (RED) in case of any main fuse getting blown out at the station.
3. Another LED indication (RED) if any of the standby fuse also is blown along with its Main fuse.  
Both LED will lit in case of both Main and Standby getting blown.
4. Piezoelectric buzzer to give audio alarm for failure conditions.
5. A non-locking type Push Button for acknowledgment of Audio Alarm.

## GSM MODEM (OPTIONAL ITEM) \*\*

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GSM modem is small unit with AC power supply adapter also operate from 12-24V AC/DC, it can be connected very easily with FACS unit. This system(s) is fully automated and very simple way to configure for station code it sends SMSs on GSM network up to 5 preselected GSM mobile numbers in case of any of the fuse blowing within 30 seconds. The mobile number is easily configurable. Also, it generates SMSs when a fuse is replaced.

It is compatible to Tri-band GSM 850, 900, 1800 and 1900 MHz and supports GPRS class 10 and works on 110V AC with suitable power supply adapter.

EVENT	SMS
Main fuse blown, standby operative	ATTENTION: FUSE BLOWN AT STATION XXXXX STANDBY OPERATIVE
Standby Fuse blown, Main operative	ATTENTION: FUSE BLOWN AT STATION XXXXX MAIN OPERATIVE
Main and Standby both fuses blown	ATTENTION: BOTH FUSES BLOWN AT STATION XXXXX
Fuse Restored (either main or standby or both)	FUSE REPLACED AT STATION XXXXX

**\*\*The SIM required for the GSM Modem shall be provided by the purchaser.**

## OPERATING CONTROLS & INDICATORS:



## CONFIGURATION SETTING MESSAGE

FOR SETTING → 5 MOBILE NO FOR RECEIVING SMS & STATION CODE PLEASE SEND THE FOLLOWING SETTINGS SMS

CONFIG <MOBILE1> <MOBILE2> <MOBILE3> <MOBILE4> <MOBILE5> <STATION CODE>

N.B.: MOBILE NO = 10 DIGIT & STATION CODE = 5 DIGIT

**EXAMPLE:** For Setting of following numbers i.e 9007282980 9007282981 9007282982 9007282983 9007282984 as SMS receivers for station code BELUR send the following SMS shown below to the installed SIM number.

0	1	2	3	4	5	6	7	8	9	1	1	1	1	1	1	1	1	1	1
C	O	N	F	I	G		9	0	0	7	2	8	2	9	8	0		9	0
2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3
0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
0	7	2	8	2	9	8	1		9	0	0	7	2	8	2	9	8	2	
4	4	4	4	4	4	4	4	4	4	5	5	5	5	5	5	5	5	5	5
0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
9	0	0	7	2	8	2	9	8	3		9	0	0	7	2	8	2	9	8
6	6	6	6	6	6	6													
0	1	2	3	4	5	6													
4		B	E	L	U	R													

## SIM INSTALLATION/ REPLACEMENT

Insert the SIM into the slot by removing the cover of GSM Modem Unit. Power on the unit and press the Delete Configuration Button wait for a beep to delete previous configuration data. By this process modem is reset to its factory setting and now it can configure by sending Configuration Setting Message from any mobile to the SIM number installed in the unit. Restart the unit and wait for one long beep and three short beeps for final confirmation, now the system is ready to use.