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OPERATION AND MAINTAINANCE MANUAL

FOR

FIRE DETECTOR EQUIPMENT

AS PER

CLW SPECIFICATION : CLW/ ES/3/0057

FOR

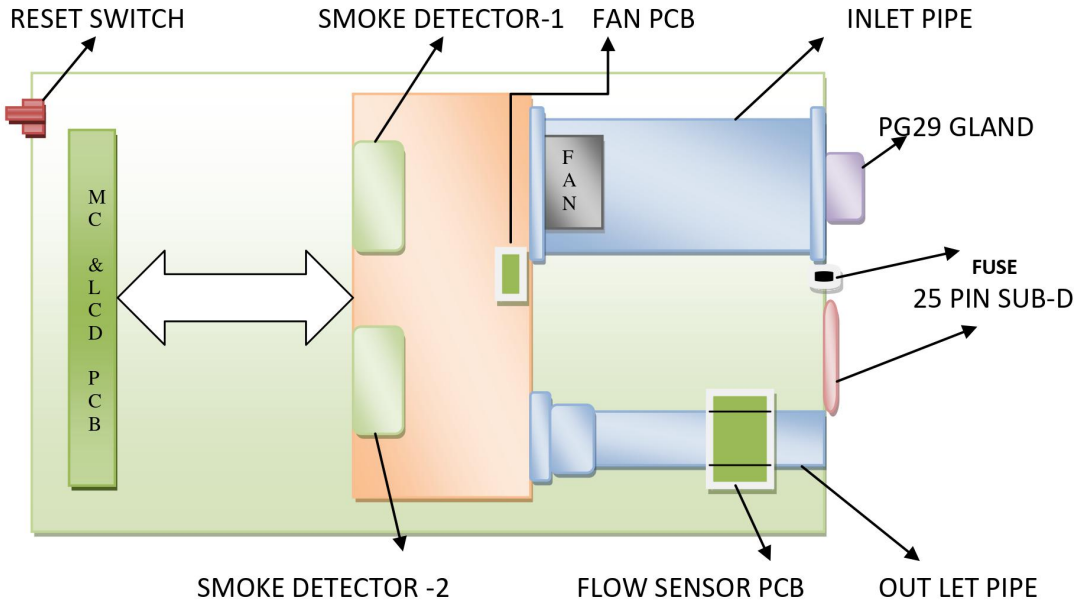
Electric Locomotives

CONTENTS:

Introduction:

Saitronix has designed the new system "AIR SAMPLING SMOKE/FIRE DETECTION UNIT" which provides the early warning by detecting the presence of smoldering fires through its opto electronic smoke detectors 1 & 2 which is controlled by Programmed advanced Micro Controller with visual indicators and messages display on LCD .

Block Diagram of FDE:



Principal

CONCEPT

Saitronix SFDE-63 Air Sampling Fire Detector (ASFD) is intelligent & self-calibration device comprised of the Micro Controller which controls the function of the following major parts:

- Two optical electronic smoke detectors.
- Airflow sensor for air flow monitoring through out let pipe.
- Visual indicators in the front panel of the unit for In Operation, Fault,
- Alarm Smoke Detector 1&2.

- Reset button to reset the unit to the normal condition after taking necessary action if smoke is detected.
- LCD Module to display various status and conditions of the SFDE-63

The primary purpose of this unit is to detect smoke generated by smoldering fires and flaming fires produced in the area around the suction pipe.

The ASFD is coupled to the suction pipe (25mm OD) through a PG29 gland entry. Air samples are drawn through the opening on the suction pipe which has up to 20 distributed smoke entries.

Special Features of Saitronix SFDE Automatic Fire Detection System : -

- **Self Calibration system based on airflow. Now manual calibration is required**
- **Capable to detect – pipe rupture , pipe blockage , fan problems intelligently.**
- **Self Diagnostic mode**
- **Exhaust mode to eliminate erroneous smoke detection.**
- **Unique flow sensor design to eliminate blockage of flow sensors due to dust particles**
- **Low maintenance**

The ASFD can be broadly divided into two parts namely:

Smoke detector system.

Air flow monitoring system

- If the smoke detector detects fire aerosols in the air sample a visual alarm indication is displayed i.e. SD1 & SD2 glows which are available in the front panel of the FDU message will be passed to the VCU of the locomotive.
- The Saitronix Fire Detection Unit is designed to provide the Output in three different stages with the variation in its output Air flow to the unit through the out let pipe.
- The three stages of Indications are “Normal Condition, Rupture Condition & Blockage Condition.
    - If the Air flow is moderate then the Unit will be in the Normal Condition air flow within range of 2.75m^3/h to 5.00m^3/h.

- If the unit senses the inadequate flow /Blockage in the hole of the suction pipe then Fault Indication LED will glow & air flow within range of <0.75m³/h.

- Similarly, if the unit senses overflow of the air / if the air flow is too high pipe break in the suction pipe then also Fault Indication LED will glow & air flow within range of >5.0m³/h

FUNCTIONAL DESCRIPTION

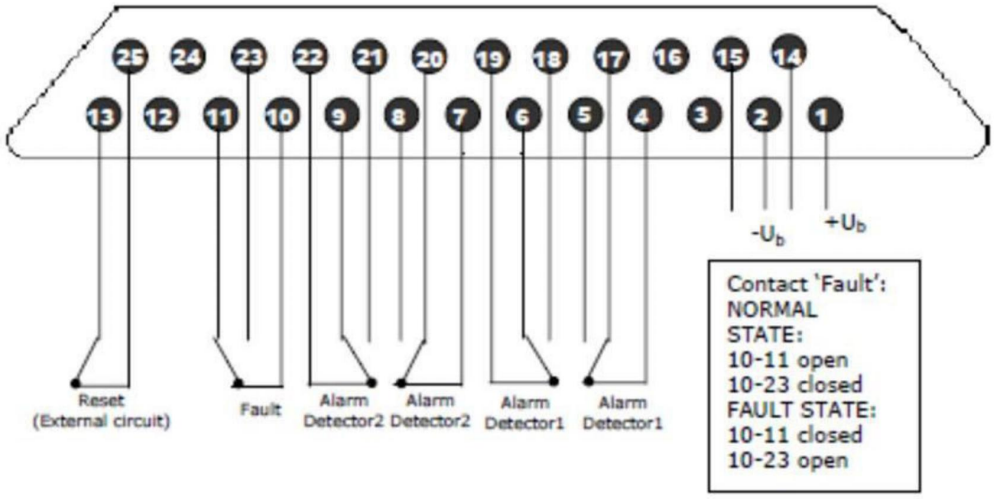
SL.NO.	FUNCTION	EXPLNATION
1	Reset	Reset Push button
2	Calibration	Internal Calibration with Micro controller
3	Operation LED	Unit is in Operation
4	Fault LED	There is an Airflow fault or detector is missing
5	Alarm smoke detector LED 1 & 2	When smoke detected
6	LCD Display	To display messages corresponding the function of SFDE.

A) Electrical Parameters	Voltage	Supply Voltage	20-30 V DC
	Current	Power consumption normal State (24V)	250mA ± 20%
		Power consumption alarm (24v)	280mA ±20%
	Contact	Contact rating (Alarm and fault)	30V DC/ 8A (Max.Allowable voltage 300V @ 0.2A
	Connection	Electric Connection	25 Way Sub-d connector
B) Dimensions	-	Lenth	350 mm
	-	Width	252 mm
	-	Height	143 mm
		Length Including PG Gland Connection	376mm
C) Weight			7.68 Kgs
Case		Material	CRCA Sheet
Temperature		Range, Operation	-25°C to + 70°C

		Colour of Case& panel	RAL 9018 Grey
Fan		Service Life L10 (40°C)	60000Hrs.
Led Indicator		Operation	Green LED
		Fault	Yellow LED
LCD Display		Display	16x2 Alphanumeric
Smoke Detectors		Alarm Smoke Detector 1	RED LED
		Alarm Smoke Detector 2	RED LED
Suction		Pipe Connection	PG 29 Gland

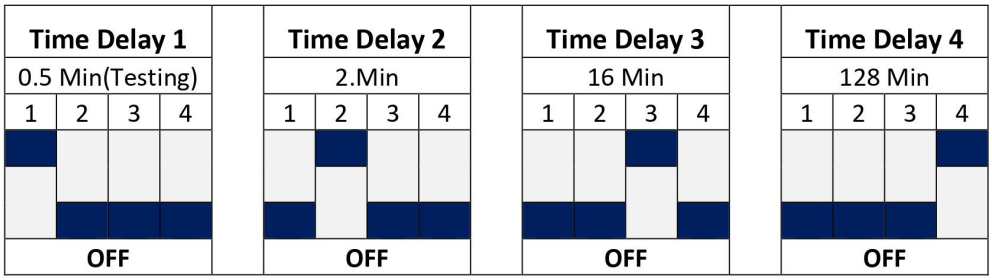
Connection:

The SFDE-63 unit is connected through a 25-way Sub-D socket connector for the external electrical connections. The diagram showing pin assignments for the Sub-d connector is givenas below.



The above contact are shown in the Fault state

Setting the time delay for fault messages:



The Saitronix FDU is set for default delay time for 2 minutes.

To change the delay time switch contact (1,2,3&4) arrangement must be changed by opening the top cover of the unit and there by access the switch mounted on the control PCB.

Mounting of the fire detector unit :

- Mount the FDU using the 4 free holes provided in the rear side of the Unit sing M6 hex head screw.
- Rubber vibration absorbers should be used while mounting.
- Ensure proper Positioning of the FDU so that the operator can easily access it.
- Also Ensure that Air outlet vent is clear without obstructions.

Suction Unit :

- The suction system i.e. the suction pipe must be installed in such a way that pipe should not sag nor be able to shift.
- The pipes should be fixed using clamps.
- No. of pipe clamping and the spacings should be such that the pipe should not sag and it should firmly be held at a place.
- The pipe should be routed in such a way that it should not obstruct to access the other equipment and during normal operation the pipe should not be damaged.
- A flexible link between the fire detector and the suction system must be installed since the fire detector may move slightly up/down if it is mounted on the vibration absorbers during the vibration/running condition.
- Pipes should be routed in such a way to avoid length and bending, as minimum as possible and the bending should be preferably 90 degree angle.
- Connect the Suction pipe to the FDU through PG 29 gland.
- Unscrew the PG union nut and then slide it over the suction pipe, which is to be connected. Insert the pipe into the union piece till the adapter (about 4cm) and then tighten the union nut by hand.

Checking of Air flow monitoring:

1	**Test Condition : Normal Operation**				
	Inlet pipe holes ID			**Air Flow Range in m3/h**	**LED & LCD status on display panel**
	NR1 Closed	NR2 Open	NR3 Open	2.75 - 5	Green LED ON and Air Flow & Fan RPM messages display on LCD
2	**Test Condition : Fault Operation-Blockage**				
	Inlet pipe holes ID			**Air Flow Range in m3/h**	**LED & LCD status on display panel**
	NR1 Closed	NR2 closed	NR3 Open	<0.75	Yellow LED ON and Air flow Blocked and Air Flow,Fan RPM messages display on LCD
3	**Test Condition : Fault Operation-Open/Rupture**				
	Inlet pipe holes ID			**Air Flow Range in m3/h**	**LED & LCD status on display panel**
	NR1 Open	NR2 Open	NR3 Open	>5	Yellow LED ON and Pipe Open/Rupt and Air flow,Fan RPM messages display on LCD
4	**Test Condition : Smoke Detection Operation** ***(Simulation of smoke by burning cotton waste near the test pipe)***				
	Inlet pipe holes ID			**Air Flow Range in m3/h**	**LED & LCD status on display panel**
	NR1 Closed	NR2 Open	NR3 Open	2.75 - 5	a. Alarm detector-1&2 RED LED ON and Fire Detected,CLR Fire faut &Press RST SWT messages display on LCD
5	**Smoke Detectors Reset operation : Test conditions (press reset button RST PB)**				
	Inlet pipe holes ID			**Air Flow Range in m3/h**	**LED & LCD status on display panel**
	NR1 Closed	NR2 Open	NR3 Open	2.75 - 5	a. Alarm detector-1&2 RED LED OFF and smoke Evac is ON ,Fan RPM,Air Flow messages display on LCD