TRANSPORTATION
INTERIORS - SEATS &
ELECTRONIC SYSTEMS

Saira Electronics Srl

FIRE DETECTION AND EXTINGUISHMENT SYSTEM

Commissioning Instructions

User's Manual

Writer: A.Macchioni	*Alessandro Macchioni*
Verifier: G.Bissoli	*Giuseppe Bissoli*
Approver: L.Nani	*Leonardo Nani*

File: 000187-UMN001-000.3.C1

Ref. No.: (000187-UMN001-000.3.C1.doc)

Distribution Level: Confidential

TABLE of CONTENTS

I. HISTORY OF REVISION

Revision	Date	Author	Description of Revision
0.1.A	22/05/2015	D. Gozzi	Draft version
0.2.B	21/07/2015	A. Macchioni	Update test verifications Add PIN out Aerosol
0.3.C	21/09/2015	A.Macchioni	Update manual Switch NC connections

II. GLOSSARY OF TERMS

III. ACRONYMS

IV. REFERENCE DOCUMENTS

IV.1 NORMATIVE REFERENCE DOCUMENTS

IV.2 NON-NORMATIVE REFERENCE DOCUMENTS

Mod.: Mu_EN_02.dot

© Copyright 2015 Saira Electronics Srl   4/33

This document contains reserved information and it must not be reproduced without written consent.

1. INDEX OF TABLES

2. INDEX OF FIGURES

Mod.: Mu_EN_02.dot

© Copyright 2015 Saira Electronics Srl   5/33

This document contains reserved information and it must not be reproduced without written consent.

3.   SCOPE

This is the user's installation and maintenance manual for integrators, programmers and maintenance personnel of systems based on the fire detection systems using two LHC cables and able to drive up to four aerosol cartridges.
It contains general information, electrical safety instructions, assembly and installation instructions, specifications and maintenance instructions concerning the fire and extinguishment system.

4.   NOTES AND WARNINGS IN THIS MANUAL

4.1   Intended Audience

This manual is written for the original equipment manufacturer (OEM) who plans to use it in his system. The installation, configuration, commissioning and maintenance of the fire and extinguishment system must be performed by qualified and trained only.

4.2   How to use this Manual

This manual should be carefully and entirely read and later the user should store it in a safe place for future reference.
The user must employ the fire and extinguishment system only as specified in this manual.
Saira Electronics cannot be held responsible for damages to any person or property, or for any resulting financial loss or cost caused by inappropriate product use or failure to observe this manual.

4.3   Typographical Conventions

A signal name ending with "*" (asterisk) is to be intended as active logical low.

This symbol, if present, means an information or a warning that the reader of this manual must respect carefully.

4.4   Electrical Safety Instructions

Read these instructions carefully. Save these instructions for future reference.
Follow all warnings and instructions marked on the product.

WARNING: ELECTRICAL SHOCK HAZARD

- To prevent ELECTRICAL shock, do not open the enclosure. No user-serviceable parts inside. This unit contains HAZARDOUS VOLTAGES and should only be opened by a trained and qualified technician.
- To avoid the possibility of ELECTRICAL SHOCK, disconnect electrical power from the product before connecting or disconnecting the cables. Warranties are void if seals are broken.
- To allow grounding the Enclosure Frame is plated with electrical conductive material, to avoid the possibility of ELECTRICAL SHOCK do not apply any dangerous voltage.
- It is the user's responsibility to ensure that installation, wiring and protection of installation are in accordance with the relevant standards.

5. SYSTEM OVERVIEW

A multifunction unit that can be equipped in different manner composes the Fire Protection System here described. Normally, the multifunction unit is composed by a smoke, temperature sensor and additional LHC cables (up to 2) connected to it. Since this application is designed for engine compartment, then the multifunction unit device is not equipped with "smoke" and the "temperature" sensors. Therefore, for this application the multifunction unit is able to detect an over temperature or a fire by monitoring the LHC cable status. In the following **Errore. L'origine riferimento non è stata trovata.** are shown the two multifunction units available for fire detection applications.

#	Saira Code	Model	ID	Detection	Extinguishment
1	80002701	MMF024-MF-E	MF-E	2 LHC cables	4 Aerosol
2	8000xxxx	MMF024-RFMF-E	RFMF-E	• Smoke sensor • Temperature sensor • 2LHC cables	4 Aerosol

Table 1 – Multifunction unit configurations

The following Figure 1**Errore. L'origine riferimento non è stata trovata.**, shown a typical block diagram of this "FIRE DETECTION AND EXTINGUISHMENT SYSTEM" based on the multifunction unit #1.

The main scope for this document is to provide the information for the right system installation, mainly relating the LHC cable handling and fixing constraints. Starting from the equipment listed in Table 2, it possible to see the system composition. Three devices, MF-E unit, HMI and aerosol dispenser plus four kits relating LHC cables and connectors composing the system.

All the cables adopted for the connections (except for the LHC cables) shall be conform the EN50200 standard reference. The section of the wire shall be adopted to match the contacts connector used (HAN Q); typically 1mm^2. This kind of cable is not in the scope of the supply.
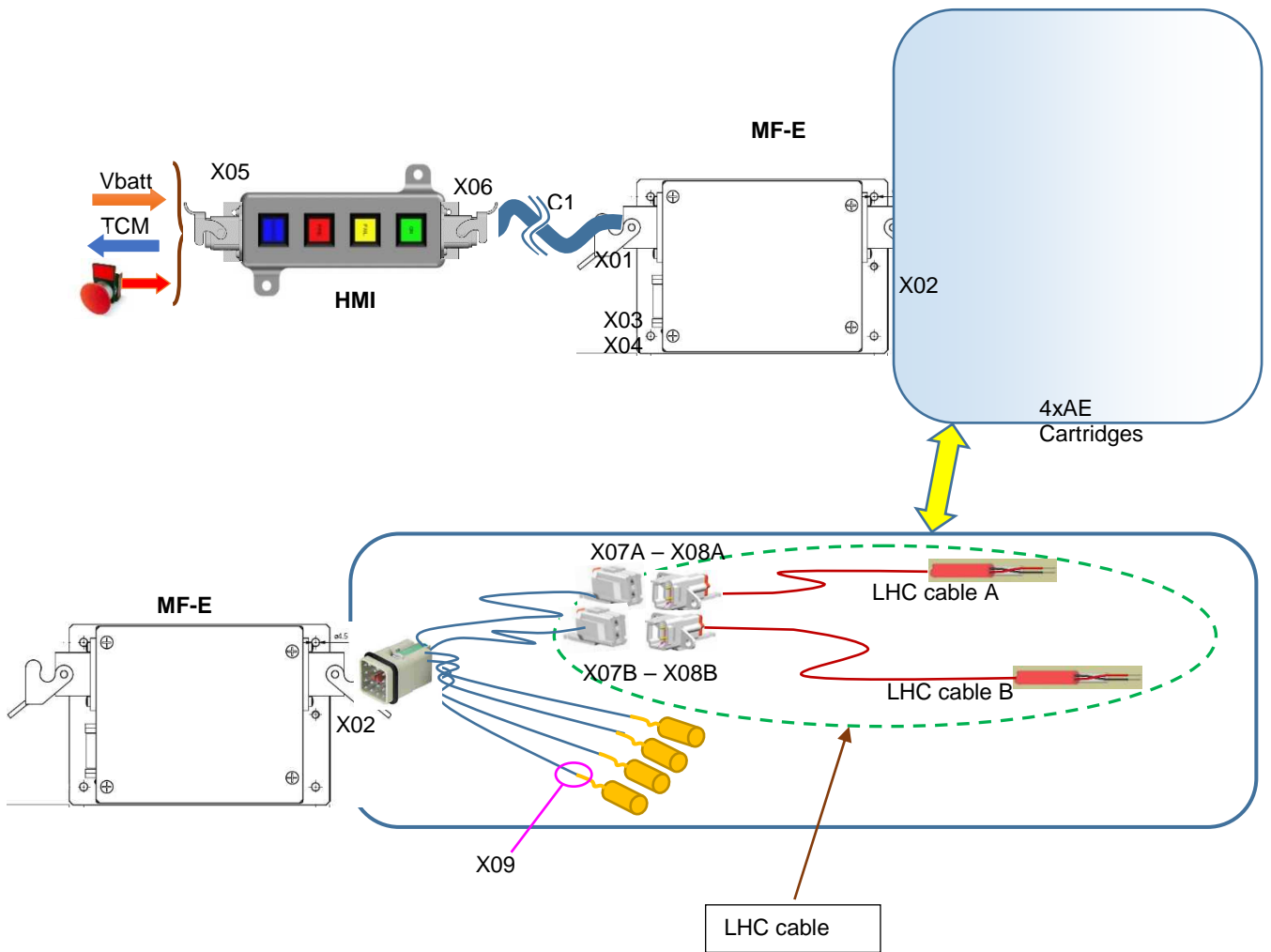
Figure 1 – Block diagram overview

Mod.: Mu_EN_02.dot

© Copyright   2015 Saira Electronics Srl   8/33

This document contains reserved information and it must not be reproduced without written consent.

6. INSTALLATION KIT

The installation kit is uniquely identified by the SairaElectronics codes and shall consist of the following items:

ITEM	COD. SAIRAELECTRONICS	Description	Q.TY
1	80002701	DEVICE MMF024-MF-E ANTINCENDIO WP000187	1
2	20515158	L04-I HMI INTERFACE BOX WITH TCMS CONN	1
3	89000086	FIRECOM ARE700-R 700GR CON DISSIPATORE	4
4	80002707	KITCVMMF024-MF-E, X01 and X02 mating connectors	1
5	80002708	KITCVHMI-L04-I PER HMI WP000187	1
6	80002709	KITLHC_CABLE WP000187	1
7	80002710	KITCV_AEROSOL WP000187	4

Table 2 – Installation KIT

6.1   MMF024-MF-E Device

This device is indicated in the following Figure 2 as MF-E and it is the "multifunction unit" of the FPS system. It corresponds to the model #1 of theTable 1. For the installation of the MF-E shall be respect the following constraints:

1. MF-E shall be fixed outside the engine compartment
2. The MF-E shall be fixed on a plane surface (vertical or horizontal) by means four M4 screws.
3. The position of the MF-E box shall be chosen in order to permit an easily connection-disconnection of the cables located on the X01 and X02 HAN Q mating connectors.
4. If a CAN bus connection is not required, the X03 and X04 connector shall be protected with the plastic cap.

X01 mating connector connects the C1 cable to the MF-E device. The other end of C1 cable shall be connected to the HMI X06 mating connector, see §.9.1. In the following Figure 2 are shown the MF-E mechanical dimensions.
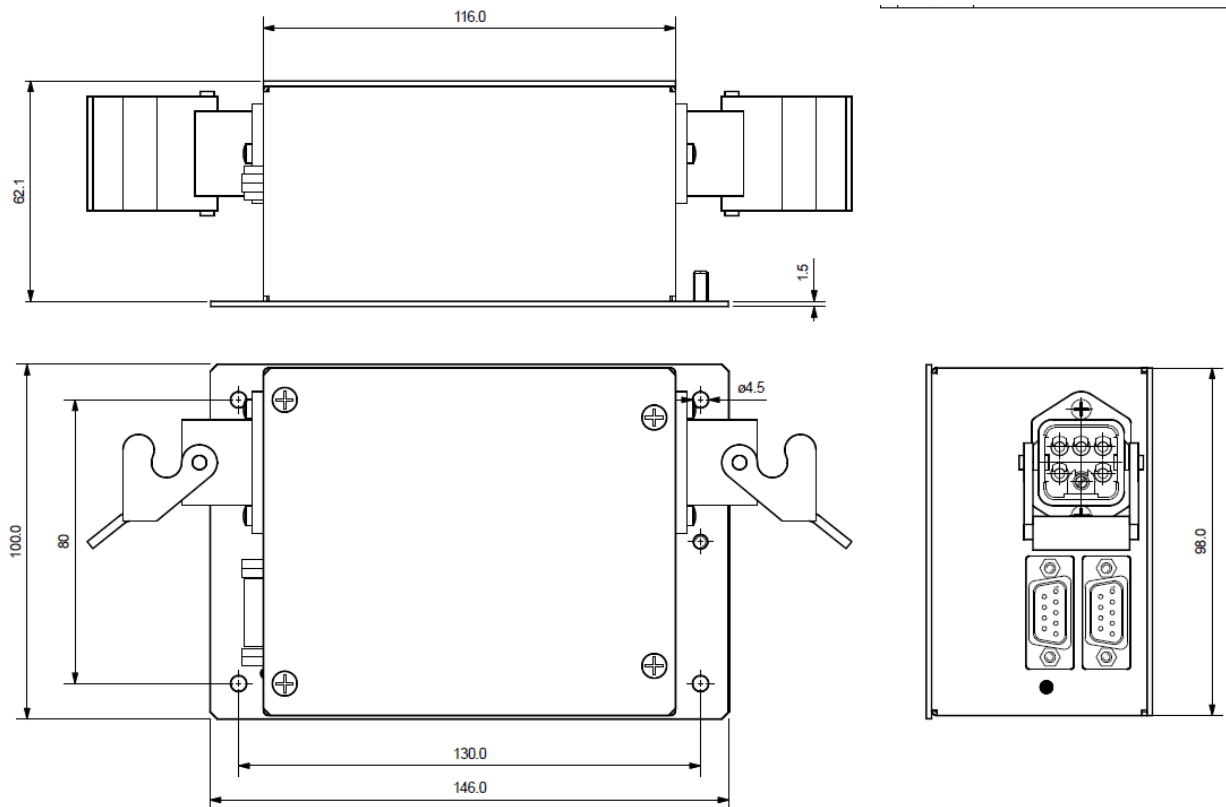
Figure 2 – MF-E mechanical dimension

6.2   HMI Device

This device permit to monitor the FPS status by driving the led light on its front panel. This HMI (see Figure 3**Errore. L'origine riferimento non è stata trovata.**) shall be installed on the driver desk in a position to be continuously visible by the train staff in each moment during the train running. For the installation of the HMI shall be respect the following constraints:

1. HMI shall be fixed on the driver desk in order to be visible by the train conductor
2. HMI shall be fixed by means four M5 screws
3. The HMI shall be fixed on a plane in manner to be easily connected to C1 cable at X06 connector side.
4. The HMI shall be fixed in manner to be easily connected to the Vbatt and push button (if any) cable at X05 connector side.
5. The C1 cable length shall not be more than 20 meters.
6. If a push button is installed, it shall be protected against accidental pressure (hardware/mechanical protection).

Mod.: Mu_EN_02.dot

© Copyright   2015 Saira Electronics Srl   10/33

This document contains reserved information and it must not be reproduced without written consent.
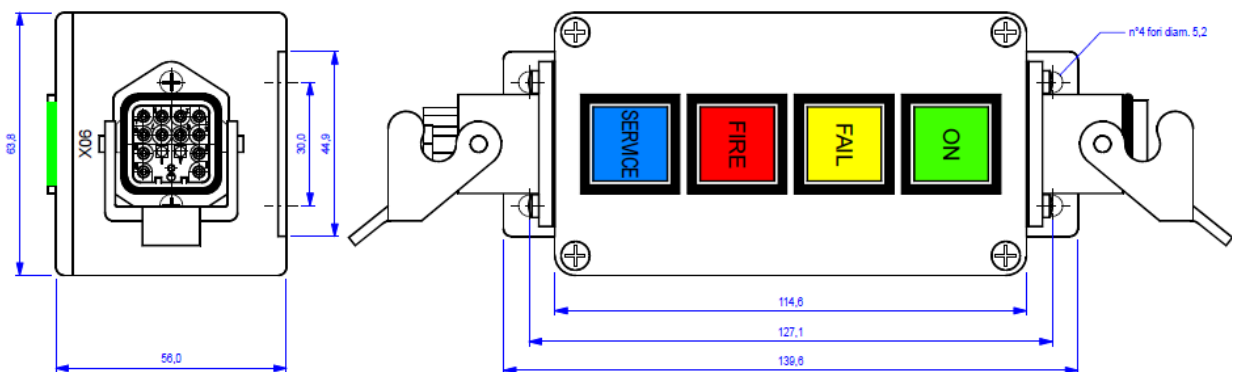
Figure 3 – HMI mechanical dimensions

6.3   Aerosol Generator

The aerosol dispenser is the device performing the extinguish action. It is a stainless steel casing containing 700gr of compound. This device shall be placed in proximity of the location where could being a combustion. This kind of dispenser is able to cover around 8m^3 of volume at maximum. It is a non-pressurized devices which, when activated, generates aerosol. In the Figure 4 it is shown the ARE700-R model.
The requirements for the installation of this device are the following:

1.   The air space around the device shall be 10cm at least.
2.   It shall be fixed by bracket with M6 screws in vertical position
3.   If more than one of this device shall be installed in the same compartment, the position shall be chosen in order to guarantee the whole volume coverage.
4.   The length of the cable between the MF-E and Aerosol shall not be more than 20 meters
5.   The Aerosol installation shall be done in manner to be easily its substitution when occurs.

Figure 4 – ARE700-R aerosol Generator

In the following Figure 5, it is shown the label attached under the aerosol casing.

Figure 5 – Aerosol Label

6.4   KITCVMMF024-MF-E

All the connectors used for the MF-E integration in the system compose this kit. The connectors involved are X01, X02, X03 and X04. Hereafter is a list of these with the details.

ITEM	DESCRIPTION	SAIRA PART NUMBER	SUPPLIER Part Number	Q.ty
KITCVMMF024-MF-E	X01 and X02 mating connectors	80002707		1
X01- Mating	Han Q 12/0 Female insert	14028187DM0	09 12 012 3101	1
Contacts	Crimp contact F Ag AWG18	14040114DM0	09 15 000 6202	12
Hood	Hood, top entry grey	14080088DM0	19 20 003 0420	1
X02 - Mating	Han Q 12/0 Male insert	14028188DM0	09 12 012 3001	1
Contacts	Crimp contact M Ag AWG18	14040109	09 15 000 6102	12
Hood	Hood, top entry grey	14080088DM0	19 20 003 0420	1
FCI 70518CLF CAP MALE DSUB 9P	Plastic Cap for Male connector	14415008	FCI 70518CLF	1
FCI 70523CLF CAPP FEMALE DSUB 9P	Plastic Cap for Female connector	14415011	FCI 70523CLF	1

Table 3 – BOM of KITCVMMF024-MF-E

The requirements for the usage of the connectors are the following:

1. The cable usage for the connection to the Aerosol, and to HMI, shall be conform the EN50200 standard reference specification.
2. The wire section to match the contacts used for HAN Q series connectors (X01 and X02) shall be 1mm^2.
3. The crimp tool to be used could be the following :

HARTING	09990000021

For the X03 and X04 connectors, in this application where CAN bus connection is not used, it has been foreseen a plastic cap.

Mod.: Mu_EN_02.dot

6.5   KITCVHMI-L04-I

This kit is composed by two HAN Q mating connector, X05 and X06. In the following Table 4 are listed the parts composing KIT.

ITEM	DESCRIPTION	SAIRA PART NUMBER	SUPPLIER Part Number	Q.ty
KITCVHMI-L04-I	X05 and X06 mating connectors	80002708		1
X05 - Mating	Han Q 12/0 Female insert	14028187DM0	09 12 012 3101	1
Contacts	Crimp contact F Ag AWG18	14040114DM0	09 15 000 6202	12
Hood	Hood, top entry grey	14080088DM0	19 20 003 0420	1
X06 - Mating	Han Q 12/0 Male insert	14028188DM0	09 12 012 3001	1
Contacts	Crimp contact M Ag AWG18	14040109	09 15 000 6102	12
Hood	Hood, top entry grey	14080088DM0	19 20 003 0420	1

Table 4 – BOM of KITCVHMI-L04-I

The requirements for the usage of the connectors are the following:

1. The C1 cable usage for the connection to the MF-E device and to cable used for TCMS connection shall be conform the EN50200 standard reference specification.
2. The wire section to match the contacts used for HAN Q series connectors (X05 and X06) shall be 1mm^2.
3. The crimp tool to be used could be the following :

HARTING	09990000021

6.6   KITLHC_CABLE

This kit contains the LHC cables to use for the installation in the engine compartment and the intermediate connectors (X07 and X08). All the cables connected to the X02 mating connector shall be conform the EN50200 standard reference specification.

ITEM	DESCRIPTION	SAIRA PART NUMBER	SUPPLIER Part Number	Q.ty
KITLHC_CABLE	LHC cable terminated	80002709		1
LHC cable 12m	LHD PSHC-XCR 280F 138C	14269001	XCR280	1
Termination Resistor	MRS25 1 kohm Tol. 1% 0,6W @ 70^C 50ppm	P10120428	MRS25000C1001FCT00	2
Coupling crimp	Drawing TB50431	P25555155		2
heat shrink tubing HT	Drawing TB50431	P25555300		2
Black heat shrink tubing	Drawing TB50431	P25550058		2
Wire straps	Drawing TB50431	16516048KR0		4
Male Connector Hypertac REP202	Male Connector, X08	P26112400	REP202	2
HYPERTAC 0151071-20-OG	Pin contact, X08	14040103NK0	0151071-20-OG	4
Female Connector Hypertac REP102	Female Connector, X07	P26112411	REP102	2
HYPERTAC 0151832-20-N1	Socket Contact, X07	14040102NK0	0151832-20-N1	4

Table 5 – BOM of KITLHC_CABLE

The requirements for the usage of the connectors are the following:

1. The cable used for the connection to the Aerosol device and to the connectors X07 shall be conform the EN50200 standard reference specification.
2. The wire section to match the contacts used for Aerosol and X07 connectors shall be 1mm^2.
3. The LHC cable shall be crimped on the X08 connectors
4. The connector X07 and X08 shall be positioned outside the engine compartment
5. The crimp tool to be used for X07 and X08 pin/socket contacts could be the following :

Crimp Tool	Position & wire section	Extraction Tool
Astro-tool TGV 101 or Daniels FT8	5 - 0.50 mm2 to 1 mm2 (18AWG)	SD-0150000012

6.6.1 LHC cable installation constraints

The LHC cable is a distributed temperature sensor composed by two steel wire insulated by a temperature sensible polymer. Due to the twisted condition of the steel wires, there is the necessary mechanical strength to trigger immediately short circuit conditions, when the temperature reaches the "alarm temperature". This detector is specifically designed for use in applications where extreme environmental and product performance criteria must be met. In any case, due to its nature, some constraints shall be respect during its installation.

Connectors *(ref. to*Figure 6):

1. Insert dedicated sleeve braid in one of the two cable to connect (3)
2. To connect X07 connector to X08 connectors
3. Move the sleeve (3) to cover the connectors
4. With the wire straps to fix the sleeve at both end of connector (1)
5. With another wire strap fix the connectors to the bracket (2)
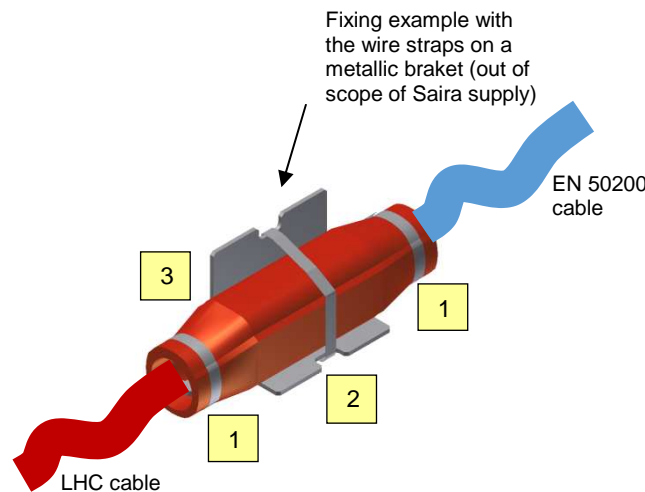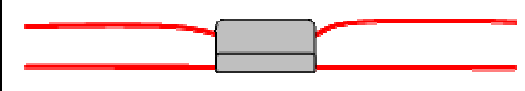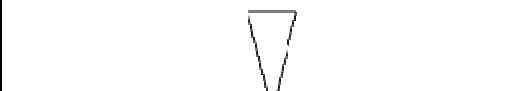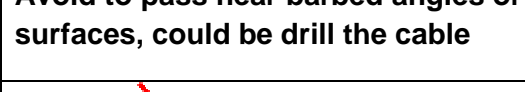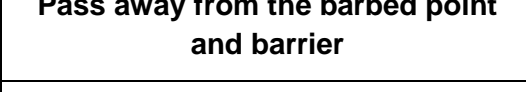
Figure 6 – LHC (X08) and EN50200 (X07) cables interconnection

The sleeve braid could be a "Braided fibreglass sleeving" diameter 12mm. The corresponding RS code is the following or similar.

RS code	668-1251
P55031700	INSUFLEX PJA-10 FIRE SLEEVE ø 5/8 inch (16mm)

Mod.: Mu_EN_02.dot

© Copyright   2015 Saira Electronics Srl   14/33

This document contains reserved information and it must not be reproduced without written consent.

LHC Cable:

1. The LHC cable shall be positioned where it is established to pass and fixed
2. Where possible use WAW clip instead of wire strap, in order to avoid to stress the cable
3. Please to be sure that the cable distance from the surfaces at high temperature is enough to avoid inappropriate trigger event (to be check the minimum distance)
4. Insert the cable ties and fix it to the structure
5. Storage and shipping: This wire is sensitive to heat and must be stored in areas where the temperature will not exceed the maximum ambient temperature rating of the detector. Since this cable is a heat-activated device, it is possible that if proper precautions are not taken to avoid high ambient temperatures during shipment or storage, the wire could be activated before it is installed.
6. Installation Warnings:
    a. DO NOT leave it on the floor and walk on it or set ladders on it during installation
    b. DO NOT install it with commercial fasteners unless specially approved by the cable provider
    c. DO NOT place it where it could be subject to mechanical damage by equipment processes
    d. DO NOT over tighten the fasteners as this may breach the outer jacket or crush the inner insulation causing "false alarm". All fasteners must allow the wire to expand and contact with temperature changes
    e. Take into account the following suggestion:

Wrong	Right
Too much pressure by the tie could damage the cable itself	
Avoid to pass near barbed angles or surfaces, could be drill the cable	**Pass away from the barbed point and barrier**
Do not bend excessively the cable. During the assembling, do not pull the cable, but help it to shift throught the ties using both the hands.	Minimum R 6,4 cm.

**Warning:** the surfaces around the cable could be hot. Even if the distance between these surfaces and the cable during installation is respected, in some circumstances the cable could touch these

surfaces. It is recommended to wait that the surfaces becomes cold before to install the cable, in order to avoid cable damages.

6.7   KITCV_AEROSOL

The connector used for aerosol connection to the MF-E device composes by this kit.

ITEM	DESCRIPTION	SAIRA PART NUMBER	SUPPLIER Part Number	Q.ty
KITCV_AEROSOL	Dispenser connector KIT	80002710		4
Hoods	R 15 Hood Metal PG 11 (Harting)	14093010	09 15 000 0421	1
Socket Contact Gender	CIRCULAR INSERT, SOCKET, 7+PE POS	14093008	09 15 007 3121	1
Female Contacts	Han D F Crimp Contact Ag AWG 18	14040114DM0	09 15 000 6202	4

Table 6 – BOM of KITCV_AEROSOL

Hereafter the main constraints for the aerosol connector installation.

1. The cable usage for the connection to the Aerosol shall be conform the EN50200 standard reference specification.
2. The wire section to match the contacts used for Harting series connectors shall be 1mm^2.
3. The crimp tool to be used could be the following :

HARTING	09990000021

In the following Figure 7, shown the connector and all its parts.
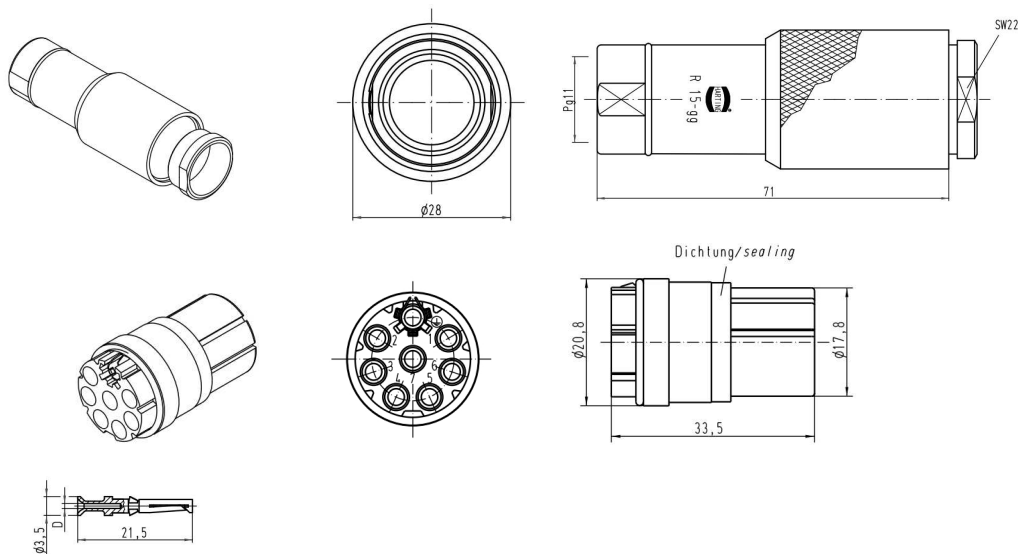
Figure 7 – Mating Aerosol connector

Aerosol connector		
Pin	**Signal name**	**Function**
5	Aero+	Aerosol +
3	Aero-	Aerosol -
GND	Aero GND	Aerosol GND

Tabella 6-1 – Aerosol connection

6.8   GROUND CONNECTION

On the MF-E device, there is a dedicated screw for the ground connection. As shown in the following Figure 8 there is an M4 prisoner with a bolt where connect the ring terminal crimping with the ground cable connection.
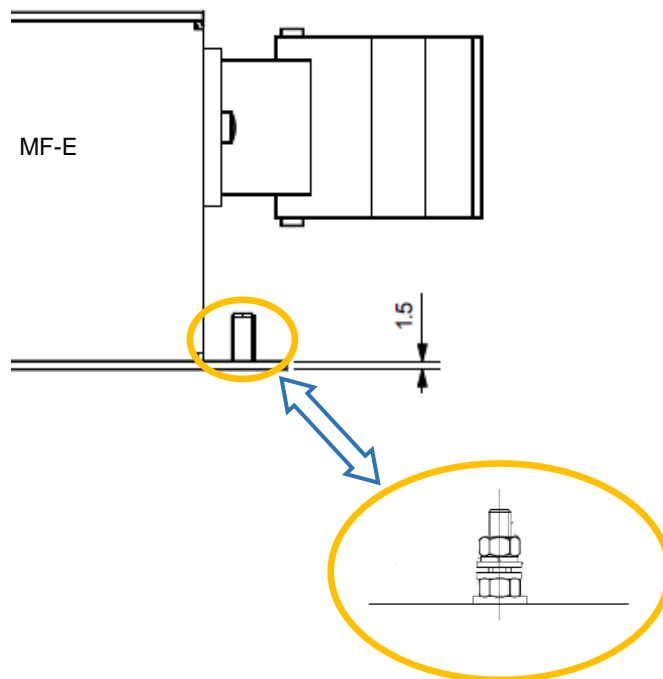
Figure 8 – MF-E ground screw

7.   POST INSTALLATION CHECK

In this paragraph are described the actions to do in order to check if the FPS system has been correctly installed.

7.1   CONSTRAINTS

To perform the check, it is necessary to have the train in depot with the supply battery voltage available.

7.2   TOOLS

A MF-E device (multifunction unit), an HMI, aerosol device and the cables compose this system.
For a check after installation should be useful the following tools:

- Multimeter
- 4 Aerosol Check Tool to simulate the 4 aerosols
- 2 LHC Check Tool to simulate the 2 LHC cable

7.3   TEST LIST

7.3.1   Visual check

Check if all the device are correctly installed precisely the item to check are the following:

- MF-E device
- HMI device
- Aerosol casing
- LHC cables
- Push button
- All other cables (TCMS, aerosol etc.)

The tests to be done are the following:

1. Right installation position
2. Right device fixing
3. Right cabling devices
4. Right ground fixing

7.3.2   Power ON check

7.3.2.1   Start conditions

1. The train (Loco) shall be in a depot
2. Battery voltage (+24Vdc) available
3. Main system (Automatic Circuit Breaker) disabled

7.3.2.2   System switch on

Step 1: Connect MF-E Check Tool
Disconnect the Aerosol 1 from the MF-E cable 1 and connect to the cable 1 the "Aerosol Check Tool" device
Disconnect the Aerosol 2 from the MF-E cable 2 and connect to the cable 2 the "Aerosol Check Tool" device
Disconnect the Aerosol 3 from the MF-E cable 3 and connect to the cable 3 the "Aerosol Check Tool" device
Disconnect the Aerosol 4 from the MF-E cable 4 and connect to the cable 4 the "Aerosol Check Tool" device
Disconnect the LHC cable from the connector X7A and replace with "LHC Check Tool"
Disconnect the LHC cable from the connector X7B and replace with "LHC Check Tool"

This tools permit to emulate the aerosol load (from electric point of view) in order to check the right cabling and operating of the system, without causing a real aerosol activation.

Step2: Stotz Activation
To activate the system stotz, in order to provide the supply battery voltage to the system

Step3: Check HMI status
Check the led status on the HMI control panel, it shall be conform the following after 2 minutes from the switched on.

Indication	Line Status	LED	Function
ON	Active	ON	• Power supply is properly working • All CPU functions are active • No watchdog events occurs
FAIL	No Active	OFF	None failure events occurs
FIRE	No Active	OFF	None fire event occurs
SERVICE	No Active	OFF	None service event occurs

Table 7 – LED status if system in its normal operation mode

Step4: LHC input function

Step4.a: Disconnect LHC cables:

Connector involved	Function	Effect	Note
X07A and X08A X07B and X08B	Open the line cable A from MF-E by simulator	• SERVICE led on HMI switches ON	A LHC cable disconnection/broken is emulated,
	Close the line cable A from MF-E by simulator	• SERVICE led on HMI switches OFF	A LHC cable return Ok.
	Open the line cable B from MF-E by simulator	• SERVICE led on HMI switches ON	A LHC cable disconnection/broken is emulated,
	Close the line cable B from MF-E by simulator	• SERVICE led on HMI switches OFF	A LHC cable return Ok.
	Open the line cable A from MF-E by simulator	• SERVICE led on HMI switches ON	A LHC cable disconnection/broken is emulated,
	Open the line cable B from MF-E by simulator	• FAIL led on HMI switches ON • OK led on HMI switches OFF	Double fault happens
	Close the line cable A & B from MF-E by simulator	• FAIL led on HMI switches OFF • OK led on HMI switches ON	

Table 8 – LHC failure check

Step4.b: Activations by LHC cables with Line A out of order:

Connector involved	Function	Effect	Note
X07A and X08A X07B and X08B	Open the line cable A from MF-E X07A pin1-2 by simulator	• SERVICE led on HMI switches ON	A LHC cable disconnection/broken is emulated,
	Short the line cable B from MF-E X07B pin1-2 by simulator	• FIRE led on HMI remains ON until MF-E is reset (restart)	A fire event occurs and the Aerosol sequence activation is running.
	Close the line cable A & B from MF-E by simulator		Switch off and on the system to return on normal conditions

Table 9 – LHC Activation with line A failure

Step4.c: Activations by LHC cables with Line B out of order:

Connector involved	Function	Effect	Note
X07A and X08A X07B and X08B	Open the line cable B from MF-E X07B pin1-2 by simulator	• SERVICE led on HMI switches ON	A LHC cable disconnection/broken is emulated,
	Short the line cable A from MF-E X07A pin1-2 by simulator	• FIRE led on HMI remains ON until MF-E is reset (restart)	A fire event occurs and the Aerosol sequence activation is running.
	Close the line cable A & B from MF-E by simulator	•	Switch off and on the system to return on normal conditions

Table 10 – LHC Activation with line B failure

Step4,d: Activations by LHC cables with both cables:

Connector involved	Function	Effect	Note
X07A and X08A X07B and X08B	Short the line cable B from MF-E X07B pin1-2 by simulator	• No effect until 1 minute an perform the next step	A LHC cable disconnection/broken is emulated,
	Short the line cable A from MF-E X07A pin1-2 by simulator	• FIRE led on HMI remains ON until MF-E is reset (restart)	A fire event occurs and the Aerosol sequence activation is running.
	Close the line cable A & B from MF-E by simulator		Switch off and on the system to return on normal conditions

Table 11 – LHC Activation with both LHC

Step5: PSB function

Push button action:

PSB	Function	Effect	Note
ON	Press push button for 2 seconds at least	• FIRE led on HMI switches ON • Red led on "MF-E Check Tool" is switched ON	A fire event occurs and the Aerosol sequence activation is running.
OFF	Release the PSB	• FIRE led on HMI remains ON until MF-E is reset (restart)	Switch OFF the system to re-establish the initial conditions

Table 12 – PSB function check

Step6: Aerosol surveillance test

On nominal configuration, perform this action to verify the Aerosol surveillances:

Connector involved	Function	Effect	Note
Aerosol 1 connector	Disconnect the Aerosol1	• FAIL led on HMI switch ON	The MF-E detect the aerosol missing
	Reconnect the Aerosol1	• FAIL led on HMI switch OFF	
Aerosol 2 connector	Disconnect the Aerosol2	• FAIL led on HMI switch ON	The MF-E detect the aerosol missing
	Reconnect the Aerosol2	• FAIL led on HMI switch OFF	
Aerosol 3 connector	Disconnect the Aerosol3	• FAIL led on HMI switch ON	The MF-E detect the aerosol missing
	Reconnect the Aerosol3	• FAIL led on HMI switch OFF	
Aerosol 4 connector	Disconnect the Aerosol4	• FAIL led on HMI switch ON	The MF-E detect the aerosol missing
	Reconnect the Aerosol4	• FAIL led on HMI switch OFF	

Table 13 – Aerosols surveillance check

8.   CONNECTORS PIN-OUT

In the following tables are shown the connectors pinout. In the first table is listed the entire set of connector provided for this system.

#	Connector	Typology	Gender	Manufacturer	KIT	Note
1	X01	HAN Q	F	Harting	KITCVMMF024-MF-E	Train Interfaces
2	X02	HAN Q	M	Harting		Fire component interfaces
3	X03	DB-9	M	FCI		SLB Interfaces
4	X04	DB-9	F	FCI		SLB Interfaces
5	X05	HAN Q	F	Harting	KITCVHMI-L04-I	
6	X06	HAN Q	M	Harting		
7	X07	REP102	F	Hypertac	KITLHC_CABLE	Thermal Cable connection
8	X08	REP202	M	Hypertac		Thermal Cable connection
9	X09	HAN D	F	Harting	KITCV_AEROSOL	Aerosol Connection

Table 14 – System connectors list

8.1   MF-E device

In the following table are listed the pin out signals of the MF-E connectors, X01, X02, X03 and X04.

8.1.1   X01 connector

X01 Power supply and signalling		
Pin	**Signal name**	**Function**
1	Adr0	Address coding input [1]
2	Adr1	Address coding input [2]
3	Adr_Ref	Address reference
4	LED_On	LED Green, system ok
5	LED_Fail	LED Yellow, system fail
6	LED_Fire	LED Red, fire alarm
7	LED_Service	LED Blue, system degraded
8	LED_Ref	LEDs Reference
9	Aux_A	Manual extinguishing input A NC
10	Aux_B	Manual extinguishing input B NC
11	0Vbat	Battery supply, 0V
12	+Vbat	Battery supply, +24V nominal

Table 15 – X01 connector pin out

Mod.: Mu_EN_02.dot

© Copyright   2015 Saira Electronics Srl   22/33

This document contains reserved information and it must not be reproduced without written consent.

8.1.2 X02 connector

X02 Aerosol and LHD		
Pin	**Signal name**	**Function**
1	LHD1+	Linear Heat Detector 1, high side
2	LHD1-	Linear Heat Detector 1, low side
3	LHD2+	Linear Heat Detector 2, high side
4	LHD2-	Linear Heat Detector 2, low side
5	PowerOut_1+	Aerosol 1 squib drive, high side
6	PowerOut_1-	Aerosol 1 squib drive, low side
7	PowerOut_2+	Aerosol 2 squib drive, high side
8	PowerOut_2-	Aerosol 2 squib drive, low side
9	PowerOut_3+	Aerosol 3 squib drive, high side
10	PowerOut_3-	Aerosol 3 squib drive, low side
11	PowerOut_4+	Aerosol 4 squib drive, high side
12	PowerOut_4-	Aerosol 4 squib drive, low side

Table 16 – X02 connector pin out

X03 and X04 is not used in this application therefore they are protected by a plastic cap.

8.1.3   X03 connector

Local Safety Bus X03 Male		
Pin	**Signal name**	**Function**
1	LSB-H	LSB high signal
2	LSB-L	LSB low signal
3	NC	not connected
4	LSB-0V	LSB reference
5	NC	not connected
6	Rline+	R 120 Ohm – pin 1
7	Rline-	R 120 Ohm – pin 2
8	NC	not connected
9	NC	not connected

Table 17 – X03 connector pin out

8.1.4   X04 connector

Local Safety Bus X04 Female		
Pin	**Signal name**	**Function**
1	LSB-H	LSB high signal
2	LSB-L	LSB low signal
3	NC	not connected
4	0VCAN1	CAN1 reference
5	NC	not connected
6	Rline+	R 120 Ohm – pin 1
7	Rline-	R 120 Ohm – pin 2
8	NC	not connected
9	NC	not connected

Table 18 – X04 connector pin out

Mod.: Mu_EN_02.dot

© Copyright   2015 Saira Electronics Srl   24/33

This document contains reserved information and it must not be reproduced without written consent.

8.2   L04-I device (HMI)

In the following table are listed the pin out signals of the HMI connectors, X05 and X06.

8.2.1   X05 connector

X05 Power supply and signalling (TCMS side)		
Pin	**Signal name**	**Function**
1	NC	Reserved
2	NC	Reserved
3	NC	Reserved
4	On	Output, system ok [3]
5	Fail	Output, system fail [3]
6	Fire	Output, fire alarm [3]
7	Service	Output, system depredated [3]
8	Fire	Output, No Fire [3]
9	Aux_A	Manual extinguishing input A NC
10	Aux_B	Manual extinguishing input B NC
11	0Vbat	Battery supply, 0V
12	+Vbat	Battery supply, +24V nominal

Table 19 – X05 connector pin out

8.2.2   X06 connector

X06 Power supply and signalling (MMF side)		
Pin	**Signal name**	**Function**
1	NC	Reserved
2	NC	Reserved
3	NC	Reserved
4	LED_On	LED Green, system ok
5	LED_Fail	LED Yellow, system fail
6	LED_Fire	LED Red, fire alarm
7	LED_Service	LED Blue, system depredated
8	LED_Ref	LEDs Reference
9	Aux_A	Manual extinguishing input A NC
10	Aux_B	Manual extinguishing input B NC
11	0Vbat	Battery supply, 0V
12	+Vbat	Battery supply, +24V nominal

Table 20 – X06 connector pin out

Hereafter the "note" explanation.

Mod.: Mu_EN_02.dot

© Copyright 2015 Saira Electronics Srl   25/33

This document contains reserved information and it must not be reproduced without written consent.

Note	Meaning
1	closed to Adr_Ref = address 0
2	closed to Adr_Ref = address 1
	If none closed to Adr_Ref = error
3	Battery supply, +24V nominal

8.3 LHC intermediate connector (X07, X08)

In this table, it is shown the X07 and X08 connector pin out

8.3.1 X07 and X08 connectors

X07A, X07B - EN50200 cable			
connector	**Pin**	**Signal name**	**Function**
X07A	1	LHD1+	Linear Heat Detector 1, high side
	2	LHD1-	Linear Heat Detector 1, low side
X07B	1	LHD2+	Linear Heat Detector 2, high side
	2	LHD2-	Linear Heat Detector 2, low side
X08A, X08B - LHC cable			
connector	**Pin**	**Signal name**	**Function**
X08A	1	LHD1+	Linear Heat Detector 1, high side
	2	LHD1-	Linear Heat Detector 1, low side
X08B	1	LHD2+	Linear Heat Detector 2, high side
	2	LHD2-	Linear Heat Detector 2, low side

Table 21 – X07 and X08 connector pin out

8.4 Aerosol connector

8.4.1 X09 connectors

Aerosol connector		
Pin	**Signal name**	**Function**
5	Aero+	Aerosol +
3	Aero-	Aerosol -
GND	Aero GND	Aerosol GND

Table 22 – X09 connector pin out

Mod.: Mu_EN_02.dot

© Copyright 2015 Saira Electronics Srl   26/33

This document contains reserved information and it must not be reproduced without written consent.

9.   CABLE DEFINITION

In this paragraph will be specified the cable to use for the MF-E, HMI and Aerosol connection and integration on board train.
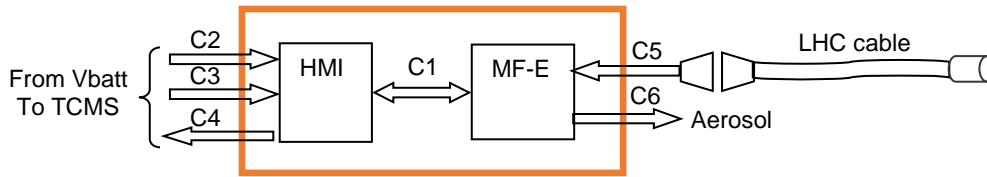

Figure 9 – System Cable overview

Cable	Side A		Side B		Length max	Section		Typology	Note
	Device	Con.	Device	Con.	(m)	AWG	(mm^2)		
C1	HMI	X06	MF-E	X01	20	18	1	EN50200	Interconnection cable
C2	Train Battery		HMI	X05	20	18	1	EN50200	Power supply cable
C3	Push button		HMI	X05	5	18	1	EN50200	Push button cable connection
C4	TCMS		HMI	X05	20	18	1	EN50200	MF-E signalling status
C5	MF-E	X02	LHC cable	X07	5	18	1	EN50200	Interconnection cable between Fire detection unit (MF-E) and LHC cable
C6	MF-E	X02	Aerosol	X09	20	18	1	EN50200	Cable for aerosol connection

Table 23 – Cable definition

Mod.: Mu_EN_02.dot

© Copyright   2015 Saira Electronics Srl   27/33

This document contains reserved information and it must not be reproduced without written consent.

9.1 C1 cable pin out

| X06	Power supply and signalling (HMI side)		Power supply and signalling (MMF side)		X01
Pin	Signal name	Function	Function	Signal name	Pin
1	NC	Reserved	Address coding input[1]	Adr0	1
2	NC	Reserved	Address coding input[2]	Adr1	2
3	NC	Reserved	Address reference	Adr_Ref	3
4	LED_On	LED Green, system ok	LED Green, system ok	LED_On	4
5	LED_Fail	LED Yellow, system fail	LED Yellow, system fail	LED_Fail	5
6	LED_Fire	LED Red, fire alarm	LED Red, fire alarm	LED_Fire	6
7	LED_Service	LED Blue, system depredated	LED Blue, system degraded	LED_Service	7
8	LED_No Fire	LED No Fire	LED No Fire	LED No Fire	8
9	Aux_A	Manual extinguishing input A NC	Manual extinguishing input A NC	Aux_A	9
10	Aux_B	Manual extinguishing input B NC	Manual extinguishing input B NC	Aux_B	10
11	0Vbat	Battery supply, 0V	Battery supply, 0V	0Vbat	11
12	+Vbat	Battery supply, +24V nominal	Battery supply, +24V nominal	+Vbat	12

Table 24 – C1 pin out
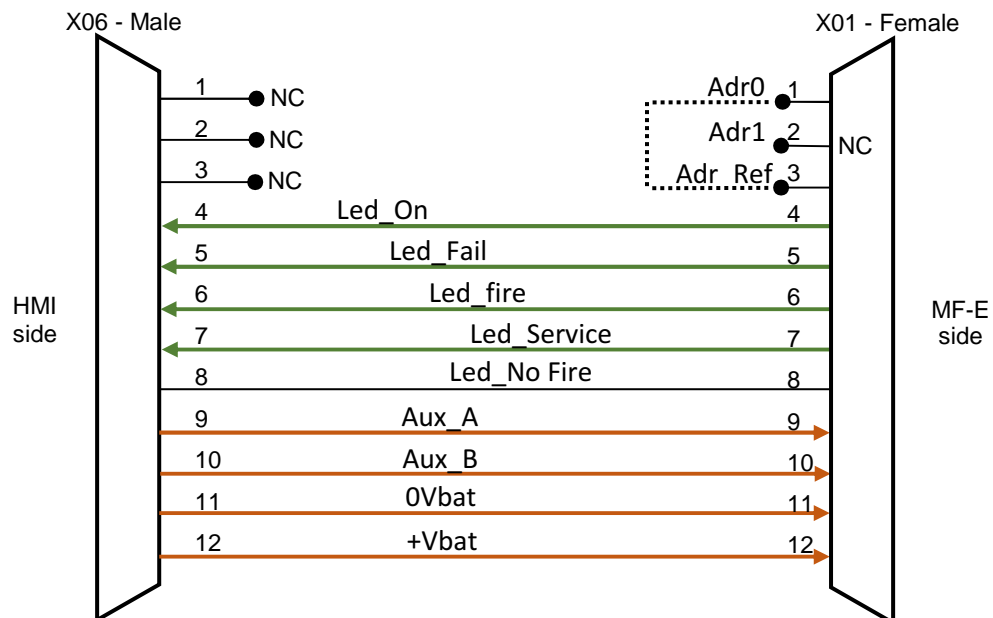
Figure 10 – C1 cable layout

9.1.1   MF-E coding

Before to complete the MF-E installation, it is necessary to configure it by two pins of the X01 connector. As shown in the previous **Errore. L'origine riferimento non è stata trovata.** it shall be perform the configuration as follow:

Adr0	Adr1	Result	PIN config. X01	Note
0	0	Prohibited	-	
0	1	MF-E address =0	1 – 3	[1] Adr0 closed to Adr_Ref = address 0
1	0	MF-E address =1	2 – 3	[2] Adr1 closed to Adr_Ref = address 1
1	1	Error	Open	If none closed to Adr_Ref = error

Table 25 – MF-E coding

9.2   MF-E CHECK TOOL

This device is a simple device composed by X09 mating connector on which is fitted a resistor and a led light to emulate the aerosol load. This device substitutes the aerosol device and shall be demonstrate the right "aerosol" activation, i.e. the cabling is correct. This device is closed in a box where is fixed the mating connector specified below and a red led.
The led switches on indicating the right aerosol activation.
The X09 mating connector is the following:

Harting code	Saira Electronics code	Description	Quantity
09150000121	14093009	Panel mounting body	1
09150073021	14093007	Male insert	1
09150006102	14040109	Male Crimp contact 1mmq	3

Table 26 – X09 specification

The pin out of this connector shall be conform those specified in the §. **Errore. L'origine riferimento non è stata trovata.**.
In the following table is listed the BOM of this tool:

| ITEM	DESCRIPTION	SAIRA PART NUMBER	SUPPLIER Part Number	Q.ty
MF-E check Tool	Aerosol Emulator	8000xxxx		1
X09 - Mating	Panel mounting body	14093009	09150000121	1
Insert	Male insert	14093007	09150073021	1
Pin	Male Crimp contact 1mmq	14040109	09150006102	3
LED	Red led 3mm 5mA			1
Resistor	R led 270 Ohm 1/4W			1
Braided fibreglass sleeving	RS Code		668-1251	1
Wire straps	To fix the braided fibreglass sleeving	16516048KR0		2
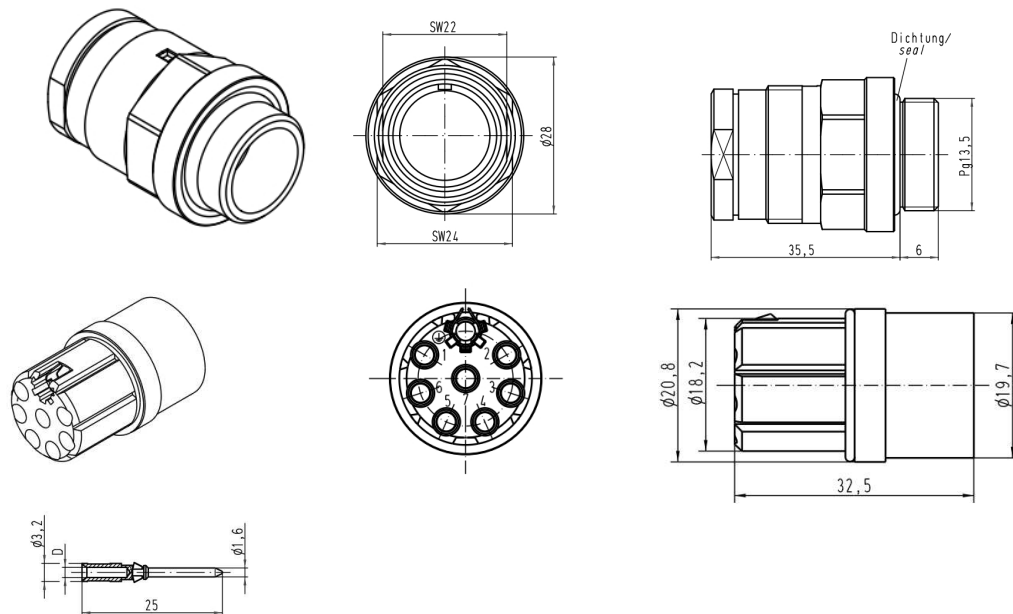
Figure 11 – X09 Aerosol connector

10.   TROUBLESHOOTING

- FAIL led on HMI is ON
  - o   Verify the aerosols connections/impedance
  - o   Verify the push button conditions (if is ON during wakeup made fail conditions)
  - o   Verify both LHC cable integrity
  - o   MF-E Watch-dog is expired
  - o   MF-E internal problems

- SERVICE led on HMI is ON
  - o   Verify a single LHC cable integrity

11.   WARRANTIES AND ASSISTANCE

11.1   Limited Warranty

Unless otherwise agreed in the contract between Saira Electronics Srl and purchaser, Saira Electronics Srl hereby warrants that this product shall be free from defects in materials and workmanship for a period of twenty-five (25) months from the date of shipment to purchaser. Saira Electronics Srl sole responsibility with respect to this warranty shall be to repair or to replace any product or any part, at Saira Electronics Srl discretion, thereof determined by Saira Electronics Srl to be defective in workmanship or material.

Saira Electronics Srl expressly disclaims all warranties, expressed or implied, including but not limited to merchantability and fitness, for a particular purpose except as specifically set forth herein.

11.2   Limitation of Liability

Saira Electronics Srl liability, if any, for damages relating to this product, regardless of the nature of the action brought, is limited to the actual price paid by purchaser for this product, and will be in no event included consequential, incidental, indirect, special or other damages of any kind.

To obtain authorized service:

1. Note the serial number or the license number.
2. Complete Problem Report.
3. Call Saira Electronics Srl between 9:00 hrs. and 13:00 hrs. or 14:00 hrs. and 17:00 hrs. (Central Europe Time) at:

    +39 045 630 4558

    or fax to:

    +39 045 790 3371

    Monday through Friday.
4. Explain your problem to one of our technicians.

11.2.1   Technical Support

5. To contact technical support you can phone from 9:00 hrs to 13:00 hrs and from 14:00 hrs to 18:00 hrs (Central Europe Time) at:

    +39 045 630 4558

    or fax to:

    +39 045 790 3371

    or send message to:

    E-mail: saira@sairaelectronics.com

When you call you should have the appropriate product documentation at hand. For an explicit request to after-sale department, be prepared to give the following information:

• Version number and serial number of the Saira Electronics product you are using;
• The type of Saira Electronics-supplied hardware you are using, if any;
• The PC configuration on which you have installed the Saira Electronics-supplied hardware, if any;
• The exact wording of any message that appeared on your screen, if any;
• What happened and what you were doing when the problem occurred;
• How you tried to solve the problem.

When sending your E-mail the above referred information should be reported in it.

Saira Electronics' technical support services are subject to Saira Electronics Srl conditions, prices and terms in force at the time of service's request.

12.   DISCLAIMER

12.1   Warning

The information contained in this document is subject to change without notice.

No part of this document may be reproduced or transmitted in any form or by any means, without the express written permission of Saira Electronics S.r.l.

This document is subject to Copyright law and has to be considered confidential.

Electronic and informatics concepts, principles and products described in this document are intellectual and industrial exclusive property of Saira Electronics S.r.l., except the case of contractually written agreements between Saira Electronics S.r.l. and the Customer.

Saira Electronics S.r.l. declares and advises that part of the product (products) herein described might contain information property of or under licence of a third part, even if not explicitly declared.

13.   TRADE MARK CLAIMS

SAIRA is a registered trade mark, covered by copyright, property of Saira Electronics S.r.l. – Via Fornaci, 35 - 38068 Rovereto (TN) - ITALY.

is the registered logo of Saira Electronics S.r.l.. - Via Fornaci, 35 -38068 Rovereto (TN) - ITALY.