

# USER MANUAL



## μ-FEP

### FIRE DETECTION & EXTINGUISHING CONTROL PANEL WITH AN INTEGRATED UPS



FC CE

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## 1 DOCUMENT REVISION DETAILS

Issue	Modification Detail	Author	Date
1	1 <sup>st</sup> publishing document	CvT	19 / 12 / 2019
2	IP rating adjust to IP 66	CvT	25 / 02 / 2020
3	Text correction page 6, appendix 3 becomes chapter 22	CvT	26 / 02 / 2020
4	Resistor change chapter 18 linear heat cable	CvT	17 / 04 / 2020
5	Ambient Temperature Range -10 to 50° Celsius	CvT	20 / 04 / 2020
6	Text adaptation chapters 8, 10, 12 and 14	CvT	08 / 06 / 2020
7	Add Carbon Monoxide/Heat detector chapter 15	CvT	09 / 06 / 2020
8	Text adaptation chapters 7.2, 7.3, 9.2.2, 9.3, 12, 13.1	CvT	01 / 09 / 2020
9	New graphics in chapter 12 and several text improvements	CvT	01 / 01 / 2021
9	Text improvement/addition chapter 7.2 / 9.1.1 / 15.2	CvT	01 / 01 / 2021
10	Text adaptation chapter 14	CvT	01 / 02 / 2021
11	Text adaptation chapter 7.2 – 22 page 23	CvT	28 / 04 / 2022
12	Event log expand	CvT	01 / 07 / 2024
13	Modbus register expand	CvT	01 / 08 / 2024
14	Acoustic signaling hold function adjusted	CvT	20 / 01 / 2025

## 2 SOFTWARE UPGRADE DETAILS

Ver.	Modification Detail	Author	Date
05	1 <sup>st</sup> release approval BRL 21045 Kiwa	CvT	19 / 12 / 2019
06	Write protection USB port adjusted + Modbus activation	CvT	01 / 07 / 2020
07	Ventilation off with 2 <sup>e</sup> fire alarm or start extinguishing delay	CvT	23 / 07 / 2020
08	Sounder relay also active with manual extinguishing release	CvT	05 / 08 / 2020
08	General fire leds also on with manual extinguishing release	CvT	05 / 08 / 2020
09	Additional surge protection on alarm inputs	CvT	01 / 01 / 2021
10	Voltage Modbus off in emergency power state chapter 7.2	CvT	01 / 02 / 2021
10	Voltage fire alarm zone increased to 15,1 Vdc	CvT	01 / 02 / 2021
2.0	Event log expand	CvT	01 / 07 / 2024
2.1	Modbus register expand	CvT	01 / 08 / 2024
2.3	Acoustic signaling hold function adjusted	CvT	20 / 01 / 2025

### 3 IMPORTANT NOTES

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This manual should be thoroughly read and understood before installation and/or commissioning of the system is undertaken. The  $\mu$ -FEP system is not to be regarded as properly used when it is used without regard to any relevant information or advice relating to its use that has been made available by the supplier. The  $\mu$ -FEP system and the associated connections must be installed, commissioned, and maintained by a skilled, knowledgeable, and competent person or organization that is qualified to perform this work and is familiar with the objective of the equipment and the associated technical terminology. This equipment is not guaranteed unless the complete installation is installed and commissioned in accordance with the laid down local and/or national standards.

Electrostatic Discharge (ESD) precautions when opening the  $\mu$ -FEP. Always wear a properly grounded anti-static wrist strap. Avoid direct contact with any of the components on the printed circuit board. Never let the electronics come in contact with clothing. The ground strap cannot dissipate static charges from fabrics. Failure to follow accepted ESD handling practices could cause damage to the  $\mu$ -FEP. The warranty may be void if the equipment is damaged by ESD.

The  $\mu$ -FEP has successfully passed CE and FCC compliance testing for EMC according to EN 50130, EN 61000, EN 55016, EN 55022, 47 CFR 15, ANSI 63.4, ICES-003 and a Kiwa BRL 23003/02-2019-par 5 attests. This is a type test approval for the activation of a modular electrically activated extinguishing system.

### 4 WARRANTY

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K&G Groep BV represents the  $\mu$ -FEP system and is free from material defects in materials and workmanship. Our warranty does not cover a  $\mu$ -FEP system which is damaged, misused, and/or used contrary to the supplied operating manuals or which has been repaired or altered by others. The liability of K&G Groep BV is at all times limited to repair or, at K&G Groep BV's discretion, replacement of the  $\mu$ -FEP system. K&G Groep BV shall not under any circumstances be liable for any indirect, special or consequential damages such as, but not limited to, damage or loss of property or equipment, cost of de-installation or reinstallation, cost of transport or storage, loss of profits or revenue, cost of capital, cost of purchased or replacement goods, or any claims by customers of the original purchaser or third parties or any other similar loss or damage, whether incurred directly or indirectly. Remedies set forth herein to the original purchaser and all others shall not exceed the price of the  $\mu$ -FEP system supplied. This warranty is exclusive and expressly in lieu of all other warranties, whether expressed or implied, including, without limitation, any warranties of merchantability or fitness for a particular purpose.

#### Reservations

The diagrams of operating principles of the  $\mu$ -FEP fire-/extinguisher system, included in this manual, are intended to support this manual and are therefore not intended and suitable for technical implementation or realization. No part of this manual may be reproduced, stored in an automated database, or made public in any form or by any means either electronically, mechanically or by photocopying, recording, or in any other way, without prior written permission from K&G Groep BV. The policy of the K&G Groep BV is one of continuous improvement and as such we reserve the right to make changes to product specifications at any time and without prior notice.

Errors and omissions excepted.



## 5 INTRODUCTION

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The  $\mu$ -FEP is designed to be a stand-alone fire detection-extinguishant release panel used in systems for e.g. electrical cabinets, CNC machines, engine rooms, small area's or other equipment in which the user should be able to extinguish a fire rapidly and effective.

This is done by pressing two buttons, external release button or using fire sensor inputs. The  $\mu$ -FEP continuously senses its inputs and, in the event of a fire, gives the correct output to enable a product specific fire extinguishing.

The  $\mu$ -FEP control panel is designed to meet the requirements of the European standard EN54-2 Fire Detection and Fire Alarm systems - Control and Indicating Equipment, and the EN12094-1 for Fixed firefighting systems Part 1: Requirements and test methods for electrical automatic control and the NEN-EN 15276-2 for aerosol fire extinguishing systems. The  $\mu$ -FEP is a versatile fire alarm / extinguishing system with a high-performance level intended for small/compact firefighting systems.

The  $\mu$ -FEP is a combined fire alarm control panel and extinguishing release system and has two detection zones, any, or all of which can contribute to the extinguishant release decision. The  $\mu$ -FEP extinguishant release panel offers outstanding value and performance for all small, fixed firefighting installations.

## 6 KEY PROPERTIES

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- Able to set to manual, single stage or double stage detection, alarm, and extinguishing
- Outputs for fire, fault, extinguishing released, ventilation off and visual & acoustic alarm device
- A full monitored output for the aerosol fire extinguishing generators
- Two full monitored fire alarm input groups (zones) for linear heat and / or point detectors
- Two full monitored alarm input groups for external extinguishing release and hold function
- Double extinguisher release buttons to prevent unwanted releases
- Extinguishers hold release button to postpone releases
- Extinguisher release delay to prevent unwanted releases
- A test mode that allows to test the detection, signalling and controls without a release
- Watchdog timer will for additional safety
- Fault monitoring and fault identifying
- Fault monitoring extinguishing output
- Fault monitoring fire detection input
- Additional option to override the release extinguishing delay after manual release
- Additional functionality regarding separated external hold-off functions
- Additional functionality regarding separated external release extinguishing functions
- Historic event log memory readable from a mini USB port
- The  $\mu$ -FEP works on input voltage 6 to 28 Volt DC
- Modbus RS485 communication port
- The unit is waterproof IP66 and surge, transient, ESD and EMC protected
- CE and FCC mark

# 7 FEATURES

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## 7.1 ACOUSTIC ALARM

The  $\mu$ -FEP has an internal attention signal. Malfunctions are standard signaled with a continuous tone signal, alarms with a pulsating tone signal. Deviating tone signalling takes place with extinguishing activation and operation of the hold (extinguishing delay) function. The voltage of the monitored output to drive an additional sounder/beacon is controlled by the  $\mu$ -FEP and is independent of the main power supply voltage. In case emergency power status, the sounder output voltage reduces to 9 VDC what might affect the sound pressure level.

## 7.2 EMERGENCY POWER

The  $\mu$ -FEP is equipped with an emergency power supply of approximately 3,5 hours in the event of a main power failure. To reach the maximum time of emergency power, it is important that the power consumption during the emergency power status is as low as possible. Only the primary functions such as fire detection, extinguishing release and fault messages are maintained. The other VFC relays are disabled. When using the MODBUS communication system, the emergency power capacity will be reduced with 30 minutes. To prevent unnecessary use of emergency power capacity, the Modbus communication will be disabled if there is NO communication for 5 minutes. Replacing the LIR2477 battery every 3 years will prevent shortening the standby time and prevent power down in case of increased power consumption during alarm state.

## 7.3 COMMUNICATION

The  $\mu$ -FEP has a Modbus network connection. Modbus enables communication among devices connected to the same network. A Modbus network consists 1 master and a maximum of 247 slave units, each with a unique address. For more information, see the MODBUS user manual.

## 7.4 EXTINGUISHERS TERMINAL BOARD ( $\mu$ -ETB)

The  $\mu$ -FEP has as an extra option a special for aerosol extinguishers developed junction box. See chapter 18 for more details.

## 7.5 HISTORIC EVENT LOG

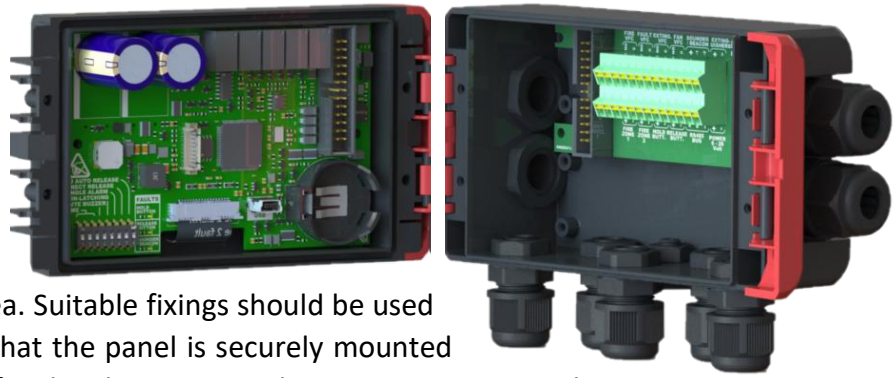
The  $\mu$ -FEP has an historic event log memory of 10000 events readable from a USB port. Connect an USB cable between the Mini-B USB port and your computer. The device will act as an USB stick. Your operating system will create a new disk station. The files on the disk station are text files with logged event. Each time the  $\mu$ -FEP reboots, a new file is created with a new batch number in the filename. Buttons press events, detailed fault indication and relay switching events are logged in the text files.





## 8 ENCLOSURE & INSTALLATION

The  $\mu$ -FEP control panel should be mounted on a dry, flat surface, at eye height to the signaling and operating panel, in a horizontal position so that the enclosure cannot be deformed. The  $\mu$ -FEP should



be installed in an accessible area. Suitable fixings should be used at all  $\mu$ -FEP fixing points such that the panel is securely mounted and is not liable to move once fixed. Take into consideration environmental factors such as high temperatures and/or magnetic fields, the  $\mu$ -FEP control panel can be installed in another enclosure. A disadvantage can be the inability to witness alarms and / or fault messages on the spot. The enclosure is provided of 9 predrilled holes meant for cable glands. To ensure IP rating the cables must be brought in using the provided cable glands.

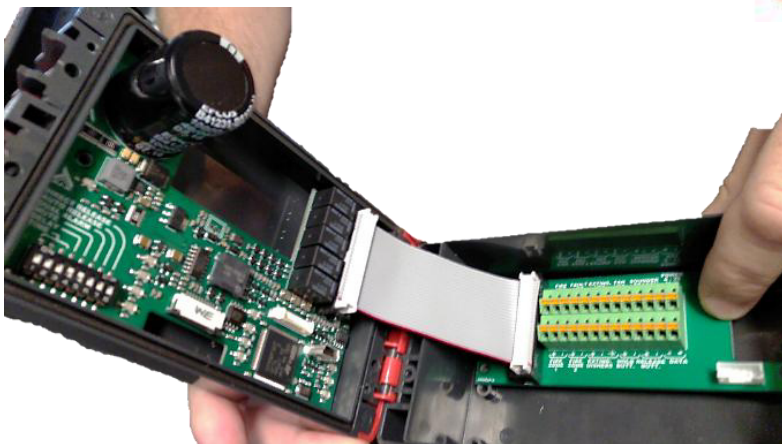


The FEP housing consists of two parts, so it can easily be mounted by hand. The rear part with the terminal block in it and the front part with the panel electronics. The two parts are connected to each other by a flat cable.

Before installing the panel, it is advisable to start separating the rear part (backbox) from the front part of the panel. Open the enclosure by means of a screwdriver (size 3).

Mount the rear part (backbox) at the desired location. The hinged catch of this enclosure conceals the installation screws.

Connect the required cables with sufficient length and connect them to the terminal block according to the connection requirements.



After the cable glands have been tightened, the front part with the electronics must be re-installed and the flat cable must be re-connected.

## 9 IN- & OUTPUTS

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### 9.1 MONITORED INPUTS

The  $\mu$ -FEP is equipped with two detection zones and two external button inputs (Extinguishing Release & Hold). These inputs are continuously scanned for alarm or fault detection. All inputs are monitored and require a 10 k $\Omega$  end of line resistor, even if the input is not used. The button inputs must have a trigger resistor between 470 and 1000  $\Omega$ .

#### 9.1.1 Detection zones

The  $\mu$ -FEP is equipped with two detection zone inputs. The loop inputs are continuously scanned for fire or fault detection.

The loops are set to the following values:

- RESISTANCE of less than 100  $\Omega$ : FAULT
- RESISTANCE of more than 100  $\Omega$  and less than 1,5 k $\Omega$ : FIRE
- RESISTANCE of more than 1,5 k $\Omega$  and less than 8 k $\Omega$ : FAULT
- RESISTANCE of more than 8 k $\Omega$  and less than 12 k $\Omega$ : NORMAL
- RESISTANCE of more than 12 k $\Omega$ : FAULT

#### **Note:**

When a low resistance (less than 450  $\Omega$ ) linear heat cable is used, a 470  $\Omega$  resistor must be installed in series at the begin of the loop on one of the wires. Otherwise, the wires of the linear heat cable which will give a fault instead of a fire alarm. Contrary to the linear heat cable, when using Fenwal thermal heat detector, a resistor of 470  $\Omega$  must be placed in series with the alarm contact, an end of line resistor 10 k $\Omega$  in parallel over the alarm contact and 470  $\Omega$  resistor. The commissioner should ensure to be using detectors with corresponding specifications and the correct input voltage and alarm resistance of the used detector for the  $\mu$ -FEP. The maximum number of detectors in one zone is 4. Devices advised for the  $\mu$ -FEP are described in the manual. All monitored inputs are short circuit protected. The voltage of all monitored detection inputs is controlled by the  $\mu$ -FEP and is independent of the main power supply voltage. The  $\mu$ -FEP alarm zones 1 and 2 operate in the quiescent state with a voltage of 15 VDC. Each input zone needs an EOL resistor of 10 k $\Omega$ , even if the fire zone is not used.

#### 9.1.2 External release input

The  $\mu$ -FEP has a separate input for an external release extinguishing button. The external release extinguishing button has the same function as the dual release extinguishing buttons (fire buttons) on the front of the panel. By pressing the external release extinguishing button, the fire extinguisher(s) will be released. Depending on the dipswitch (time) settings it is possible the release is delayed. The delayed can be set from 0 to 30 seconds in steps of 5 seconds. These loop inputs are continuously scanned for alarm or fault conditions.

#### 9.1.3 External hold input

The  $\mu$ -FEP has a separate input for an external hold-off button. The external hold-off button has the same function as the internal hold-off button. When an alarm is active and this button is pressed, the extinguisher release is delayed. When the button is released, the system will wait the configured time delay (see DIP switches). Release of the Hold input shall re-start the countdown release timer from maximum.



## 9.2 MONITORED OUTPUTS

The  $\mu$ -FEP is equipped with six outputs, two monitored and four potential free. The monitored outputs are continuously scanned for open and short circuit fault conditions. The potential free outputs have a contact load of 30 VDC /1A. The monitored outputs are the extinguishing output (extinguishing release) for a maximum of 5 extinguishing units and the sounder output for a two-tone alarm signal generator.

### 9.2.1 Monitored extinguishing output

In combination with the  $\mu$ -ETB the extinguishing output of the  $\mu$ -FEP is reverse polarity protected. Without the use of an  $\mu$ -ETB, the extinguishing output is **NOT** reverse polarity protected. In that case a diode acts as the end of line monitoring device (see specification chapter for more details) with the anode on the + line and cathode on the – line. A maximum of five aerosol generator ignitors can be wired in series.

### 9.2.2 Monitored sounder/beacon output

Sounder circuits are monitored for open and short circuit faults by placing a 10 k $\Omega$  end of line monitoring resistor across the two-tone alarm sounder/beacon. The monitoring resistor must be connected on the + VDC and first stage – VDC. At a first stage fire alarm, the optical and acoustic alarm device will be activated. Upon receipt of a second fire alarm (main fire alarm) and/or operation of the front panel mounted manual release buttons, or external manual release buttons connected on the monitored manual release input, the optical and acoustic alarm device will be activated with a different alarm tone. This alarm will also be activated immediately in case of extinguishing delay.

## 9.3 VOLT FREE CONTACT RELAY OUTPUT

Contact load relays 30 VDC 1A.

- **1 relay output general fire alarm.**

The general fire relay will energize upon activation of a fire condition on any of the fire zones or by pressing of the in or external extinguishing release buttons.

- **1 relay output extinguishing released.**

The extinguishing release relay will be energized when an extinguishing activation has taken place.

- **1 relay output general fault message.**

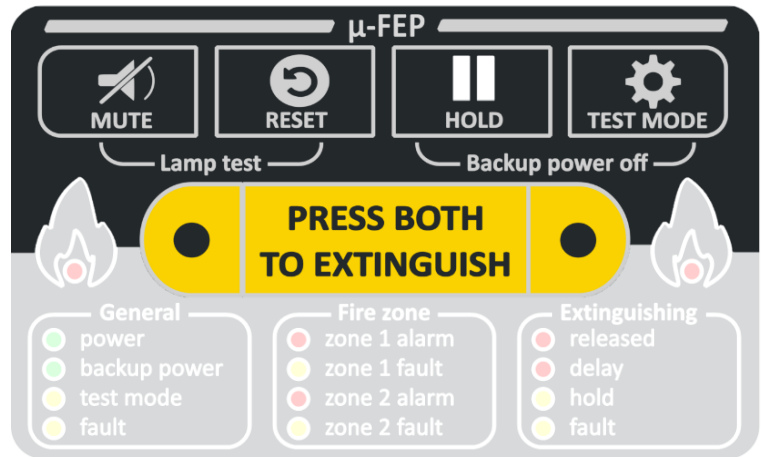
The fault relay is normally energized and will de-energize upon any fault condition including total loss of power.

- **1 relay output switch off the ventilation/air-co from the protected area.**

The ventilation stop relay will be energized upon receipt of a second stage fire alarm and/or operation of the front panel release buttons or external mounted extinguishing release button.

# 10 CONTROL BUTTONS

The  $\mu$ -FEP has a clear and orderly front panel with which the system status of the  $\mu$ -FEP can be determined rapidly. The figure shows the controls and indications. The  $\mu$ -FEP facia consists of a special foil with embedded the control buttons and LED indicators.



## 10.1 MUTE

The buzzer can be silenced at any time by pressing the Mute button. To silence the external sounder, press the Mute button twice. In case of a second alarm the sounder and buzzer will be activated again.

## 10.2 RESET

After the cause of the alarm has been determined the  $\mu$ -FEP can be reset by pressing the Reset button. Manual Call Points, if triggered, must first be reset locally. The  $\mu$ -FEP will reset any latched devices.

## 10.3 LAMP TEST

All indicators and buzzer can be test at any time by pressing the **Mute and Reset** simultaneously.

## 10.4 HOLD EXTINGUISHING RELEASE

By pressing the hold button at the panel or external hold button will, as long this button is pressed, the extinguishing release sequence will be halted and cause the yellow hold activated indicator flash, and the buzzer to sound pulsating. When the control panel is in the 2nd stage alarm condition and the hold function is activated, the extinguishing release sequence will be halted, the 2nd stage sound shall change to 1st stage sound. Release the Hold button shall re-start the countdown release timer from maximum.

## 10.5 TEST MODE

Fire alarm systems must be tested regularly to ensure that they are functioning correctly. The system can be tested by using the test mode. In test mode you can test the alarm and fault circuits without activating the extinguishers. Activating the test mode is signalled, the general fault relay is enabled. Press the test mode button for 3 seconds to enable the test mode. It activates the general fault relay and the yellow test mode indicator flash. Press test mode button again for 3 seconds to bring the system back to normal status and the yellow test mode indicator tuns off.

## 10.6 BACKUP POWER OFF

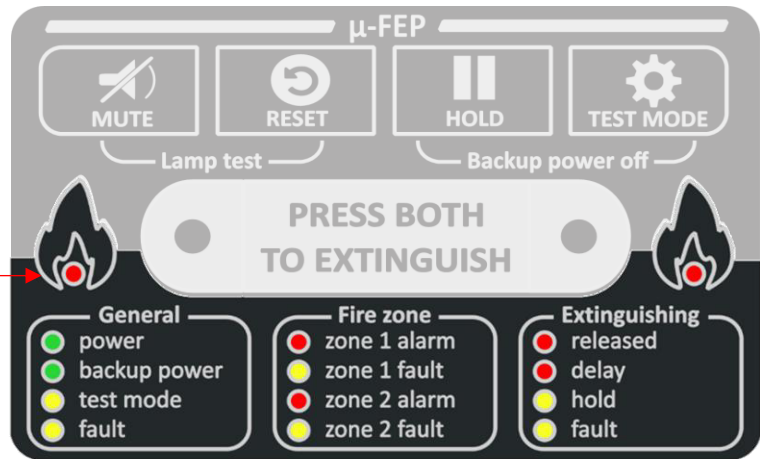
Press the Hold and Test button simultaneously and the emergency power supply is turned off. In the case of service, wiring or maintenance work, it is important that not only the primary power, but also the secondary (emergency) power must be disabled.

## 10.7 EXTINGUISHING RELEASE

When a fire emerges, press both front extinguishing release buttons, this will trigger an alarm. The fire extinguishers will be released, depending on the dip switch (time) settings.

# 11 LED INDICATORS

The front of the  $\mu$ -FEP has 2 common fire 3 internal fault, and 12 individual LED indicators on the front divided in three sections to indicate general functions, fire detection and the extinguishing status, with separate LED indicators.



## 11.1 GENERAL FIRE ALARM

Upon receipt of a fire condition on any of the fire zones or by pressing of the internal or external extinguishing release buttons the two red general fire indicators lights continuously.

## 11.2 POWER

This green power indicator confirms the power status of the  $\mu$ -FEP, which can have different states. In normal condition this indicator lights continuously, in emergency power status this indicator turns off. When starting the  $\mu$ -FEP after a power failure or after an extinguishers activation, the green power indicator flashes for maximal 1 minute until the system is ready for use again. The system is ready for use when the green power indicator lights continuously.

## 11.3 BACKUP POWER

This green LED indicates the emergency power status of the  $\mu$ -FEP. When active the indicator will light continuously. In emergency power state, the system will go into a kind of survival mode. Only the primary functions remain in operation such as fire /fault detection, fault output, and a one-time activation of the extinguishers.

## 11.4 TEST MODE

The yellow test indicator lights continuously indicating the system is in test mode.

## 11.5 GENERAL FAULT

General fault indicator lights and specific fault indicators flash. This yellow fault indicator will light continuously at any fault condition, the test mode and emergency power status.

## 11.6 FIRE ZONE ALARM

Upon receipt a fire alarm condition caused by the activation of a fire detector, the red alarm indicator of the relevant fire alarm zone will flash. The general fire indicators will always accompany this, and the internal buzzer sounds pulsating.

## 11.7 FIRE ZONE FAULT

When the  $\mu$ -FEP has detected an error in one of the critical fire detection paths of the system, the specific yellow zone fault indicator flash and the general fault indicator lights up. The internal buzzer sounds pulsating.

### 11.8 EXTINGUISHING RELEASED

The red extinguishing release indicator lights continuously when the extinguishers are activated. This red extinguishing release indicator lights up after ending of the configured extinguishing delay time, or when the two extinguishing release buttons on the front are pressed or the external release button is activated. A tone sounds when the extinguishing has released.

### 11.9 EXTINGUISHING DELAY

The red extinguishing delay indicator indicates that the extinguishing release delay is active. This indicator flash when the delay time is running. This indicator will light continuously when pressing the hold button. When the hold button is released, the indicator shall flash again and re-start the countdown release timer from maximum. This indicator turns off when the delay time has elapsed, and the extinguishing release has taken place.

### 11.10 EXTINGUISHING RELEASE HOLD

The yellow hold indicator flash and a different tone sounds as long the hold button on the panel front, or the external hold button is pressed. This yellow hold indicator is turns off when the hold button is released.

### 11.11 EXTINGUISHING FAULT

This yellow indicator lights up continuously when a critical fault is detected (open or short circuit) in the extinguishing output line. This yellow indicator turns off when the cause of the fault has vanished.

### 11.12 INTERNAL FAULT INDICATORS

There are three extra yellow fault indicators on the internal electronic PCB, meant for 2nd priority fault messages and these indicators will flash.

- LED 1 signals a fault in the extinguishing delay hold input (MI 4)
- LED 2 signals a fault in the external extinguishing release input (MI 3)
- LED 3 signals a fault in the monitored sounder/beacon line (MO 2)



# 12 DIP SWITCHES

## 12.1 STANDARD SETTING

The most common setting of the  $\mu$ -FEP is based on user experience. In this standard setting all switches are in OFF position. Under normal circumstances only  $\mu$ -FEP green Power LED is On.

### Standard setup is:

- The extinguishing delay time is 0
- The internal buzzer is not muted
- The fire detection zones operate in the latching mode
- Dual zone alarm for automatic extinguishing release. (Co-occurrence)
- When release delay is programmed, manual release is also delayed
- The use of automatic fire detectors as the initiators of an extinguishing action is the standard

## 12.2 EXTINGUISHING DELAY TIMER

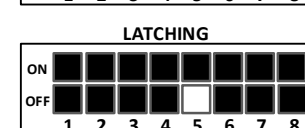
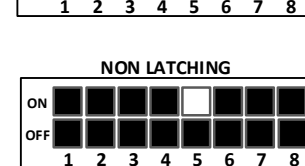
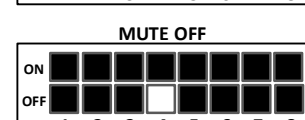
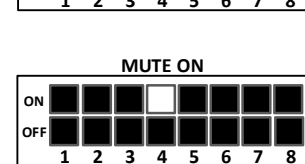
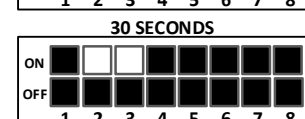
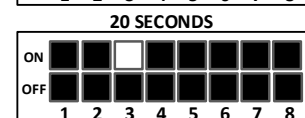
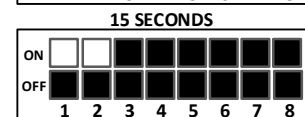
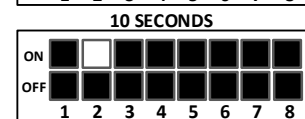
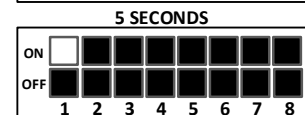
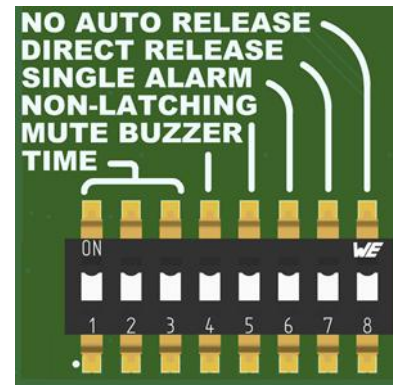
Extinguishing delay is only useful in normally occupied spaces. For the delay timer settings, there are 3 dipswitches, which can be set between 0 and 30 seconds, with steps of 5 seconds. The count-down timer is used to wait a certain amount of time before extinguisher is activated. This timer can be set with the use of the TIME-SWITCH dipswitches 1,2 and 3. The timer is changeable between 0 and 30 seconds, with steps of 5 seconds.

## 12.3 MUTE BUZZER

The acoustic attention signal of the  $\mu$ -FEP is activated with every action or reaction on the panel. When testing or programming the panel, this acoustic attention signal can be disrupting for persons present in the environment or room where this panel is installed. The acoustic signal can be temporarily switched off with the dip switch 4. The deactivation of the acoustic warning is not signalled on the LED panel, but the general fault relay has been activated. The reason for this is that it must remain possible to see the optical fault messages during technical and/or maintenance activities.

## 12.4 LATCHING/NON-LATCHING

Normally the fire alarm, from a fire detector, will remain activated on the panel until the panel has been reset. That is the latching status. In the non-latching status, the fire alarm zone is self-resetting and will reset the alarm. In other words, the fire detector/zone reset itself when the reason for the fire alarm has vanished. In the non-latching position, two zones must, both and at the same time, have a fire alarm and stay in alarm to decide positive over an extinguishing release.



### When non-latching.

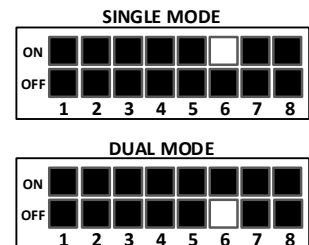
It is possible that a short increase of humidity, dust or rise in temperature, nearby the detector occurs. This can result in a fire alarm that only disappears when the reset button on the panel is physically pressed. Normally somebody will go to the fire panel and press the reset button and with that restore the false alarm. But not in all the cases is that easy and handy. Then the use of the non-latching feature can be a solution. Be careful with using and applying the non-latching solution.

### WARNING

**Non-latching feature is ONLY applicable at the Fenwal heat detectors, some cable heat detection systems, and the Apollo optical smoke detector type ORB-OP-02032-APO.**

## 12.5 SINGLE OR DUAL FIRE ALARM

Normally we work in dual fire zone mode. In some cases, a single mode status can be handy. A single or dual fire alarm triggers the fire relay, LEDs, and fire-extinguisher. Single or dual mode is configurable with one dipswitch. Any detection zone alarm will operate audible and visual indications as follow.



In dual (standard) mode the extinguisher(s) will be released after both detection zones will have a fire alarm condition and cause an internal pulsing alarm sound. The fire relay and extinguisher are activated according to the dip-switch settings. In single mode the extinguisher(s) will be released when one detection zone is in fire alarm condition and cause an internal pulsing alarm sound. The fire relay and extinguisher are activated according to the dip-switch settings.

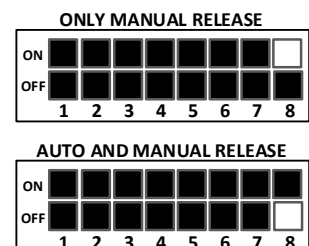
## 12.6 DIRECT RELEASE

When the timer settings are set to a delay (between 10 – 30 seconds), the direct extinguish dipswitch gives the choose to override the delay in case of a fire event. If a fire alarm is detected, by the automatic fire detectors of the  $\mu$ -FEP and the count-down timer is started, you can override the timer. By pressing the dual release extinguishing buttons on the front of the panel or the external release extinguishing button, the extinguishing releasing process starts without delay immediately.



## 12.7 NO AUTOMATIC RELEASE

In this state, only pressing the extinguishing release buttons on the device or the external release button can (immediately) release the fire-extinguisher. In this case, FIRE alarms from the detector zones will only trigger the FIRE indications and fire output relays (and not release the fire-extinguishers). The TIME-SWITCH dipswitches can also be used to set the device in No-AUTO release state. In this state, only pressing the fire-buttons on the device or the external extinguishing release button can (immediately) release the fire-extinguisher. In this case the fire alarm from the detector zones will only trigger the fire alarm leds and relays (but will not activate the fire-extinguishers).



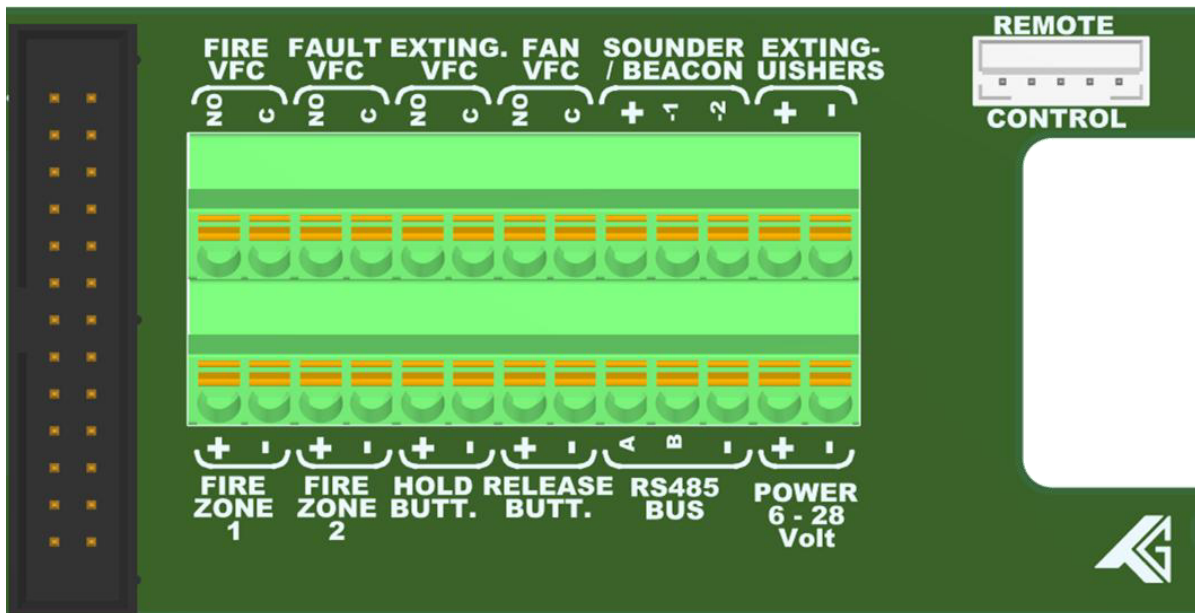


# 13 CONNECTION & CABLE AND WIRING SPECIFICATIONS

The  $\mu$ -FEP has the connections inside back box of the control panel enclosure.

## WIRING & CABLE SPECIFICATIONS:

- Use a pair of twisted cable, this strength the protection against electrical or magnetic field influences on the cable.
- Minimal solid copper core diameter, extinguisher line 1,0mm<sup>2</sup> (AWG 17)
- Minimal solid copper core diameter, other cables 0,5mm<sup>2</sup> (AWG 20)
- Maximum solid copper core diameter other cables 1,5mm<sup>2</sup> (AWG 16)
- Maximum wire resistance 3,5  $\Omega$ .
- Maximum cable length of the fire zone and the extinguisher cables is 100 meters
- Maximum cable length other cables maximum 30 meter
- General fire, fault, extinguishing release, and ventilation relay are normally open contacts
- Sounder beacon -1 is stage one and -2 is stage two alarm
- For remote control panel use the special connector with RS485 data line and + and - voltage.



# 14 TECHNICAL SPECIFICATION

## Environment

Ambient Temperature Range	-10 to 50 degrees Celsius
Dust and water rating	IP66

## Power related specification

Input voltage	6 to 28 VDC
Maximum power usage	5 Watt
Maximum voltage VFC	30 VDC
Maximum current VFC	1 A
Backup power duration	Typically, 3 hours in idle state
Voltage fire zone	15 Vdc
Limited alarm current fire detectors	60 mA
Sounder / beacon voltage main powered mode	20 – 22 VDC
Sounder / beacon alarm maximum current	50 mA / 100 mw
Sounder / beacon voltage battery powered mode	9 – 11 VDC
Sounder / beacon alarm maximum current	50 mA / 50 mw
Voltage in battery powered mode or when sounder / beacon is off	9 – 11 VDC
Voltage in main powered mode and when sounder / beacon is on	20 – 22 VDC

## Connector and cable specification

Conductor cross section solid (Cross Sectional Area mm <sup>2</sup> )	0.5 mm <sup>2</sup> ... 1.5 mm <sup>2</sup>
Conductor cross section flexible (Cross Sectional Area mm <sup>2</sup> )	0.5 mm <sup>2</sup> ... 1.5 mm <sup>2</sup>
Conductor cross section AWG	20 ... 16
Stripping length	8 mm
Maximum cable length of extinguish and fire zone connections	100 m
Maximum cable length of all other connections	30 m

## Extinguisher output specification

End of line component	Diode with anode connected to + connection
Advised diode	1N5400, RL201, SF21
Maximum extinguisher count	5 connected in series
Extinguisher release current	Between 1,3 and 1,6 A
Extinguisher release pulse length	Between 50 and 55 ms

## Detection zone, hold and extinguishing release inputs

Normal state	> 8 kΩ < 12 kΩ
Alarm load	< 100 Ω >1.2 kΩ
Zone fault threshold 1	< 100 Ω
Zone fault threshold 2	> 1.2 kΩ < 8 kΩ
Zone fault threshold 3	> 12 kΩ
Alarm resistant	470 Ω
End of line resistant	10 kΩ

# 15 DEVICES SUPPORTED BY THE $\mu$ -FEP

## 15.1 DETECTION DEVICE SUPPORT

The detector types below have been tested on the $\mu$ -FEP and are approved for such		
Part no	Type	Brand
ORB-OP-42001-MAR <sup>1</sup>	smoke	Apollo
ORB-OH-43001-MAR <sup>1</sup>	smoke/heat	Apollo
ORB-HT-41002-MAR <sup>1</sup>	heat 61°C	Apollo
ORB-HT-41004-MAR <sup>1</sup>	heat 73°C	Apollo
ORB-HT-41006-MAR <sup>1</sup>	heat 90°C	Apollo
ORB-MB-00001-MAR	standard detector base	Apollo
ORB-OP-02032-APO	optical (non-latching)	Apollo
KG/601CH <sup>1</sup>	CO/HT Carbon Monoxide/Heat	FireClass
KG/4B	standard detector base snap-fit to ceiling	FireClass
KG/4B-EM	European mounting box for detector base	FireClass
KG/BU	extinguishing hold button (blue)	K&G
KG/BA	extinguishing release button (yellow)	K&G

## 15.2 SOUNDER / BEACON DEVICE SUPPORT

Part no	Type	Brand
VTB-32EM-DB-RB/RL VTB <sup>2</sup>	sounder beacon	Cranford

Note:

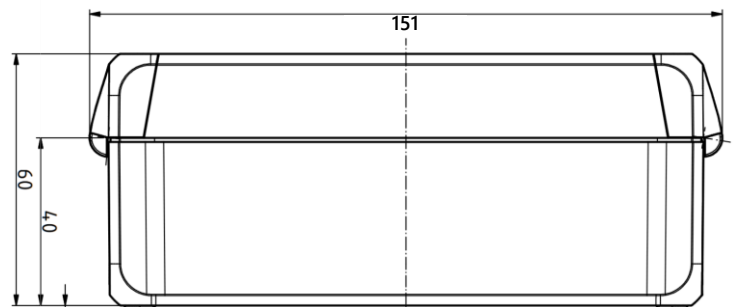
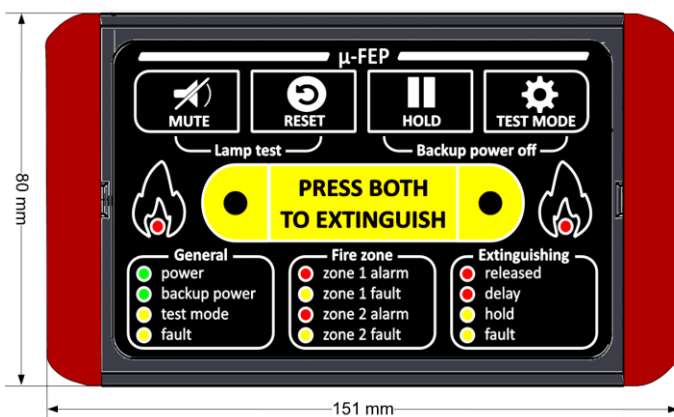
<sup>1</sup> Device input voltage 9 – 22 VDC

<sup>2</sup> Device input voltage 18 – 22 VDC

Always check the specification of the devices before installing them on the  $\mu$ -FEP.

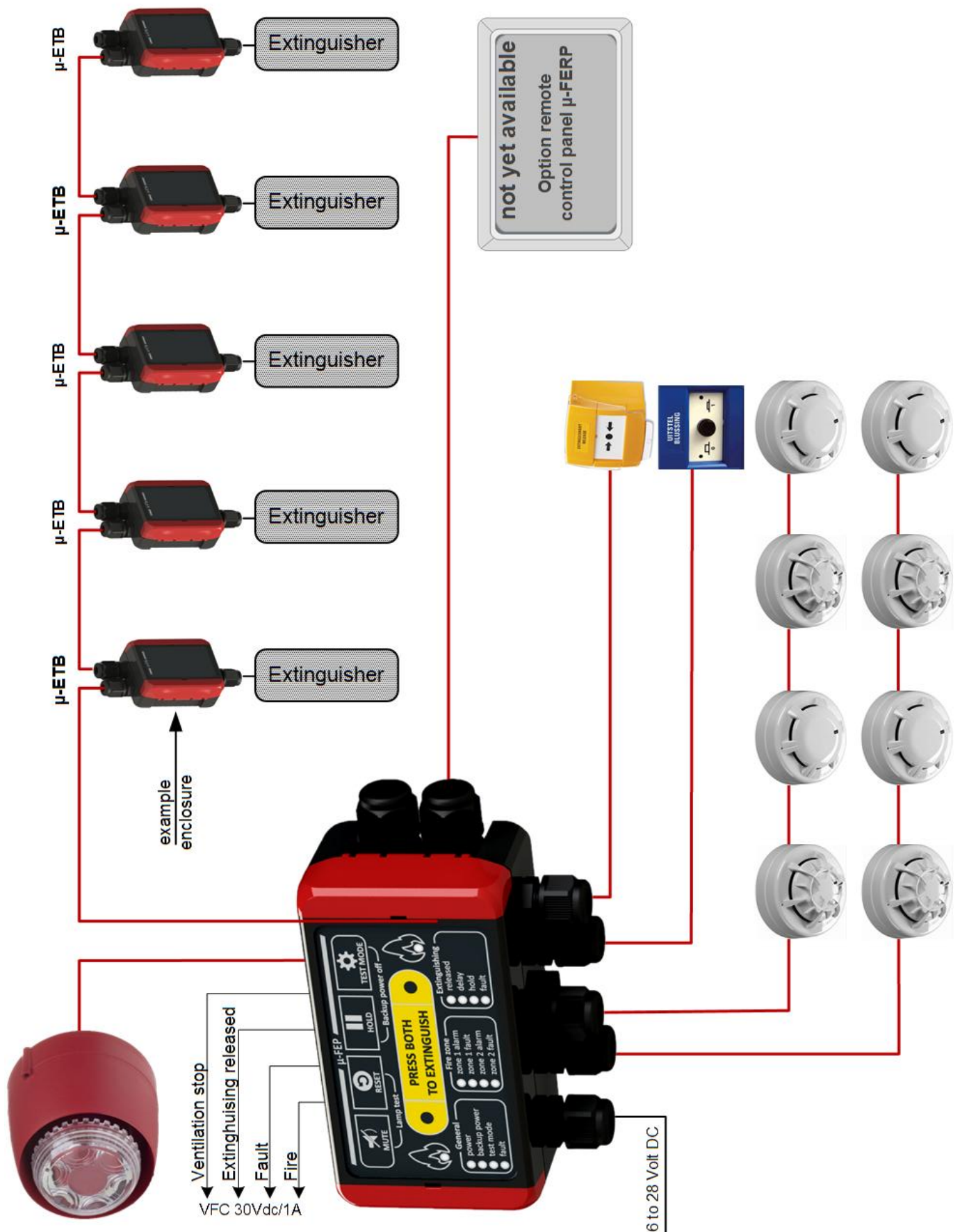
# 16 ENCLOSURE SPECIFICATIONS

- outside enclosure : 151 x 80 x 60 mm w x h x d
- protection class : IP 66, 68 - 1,2m (2 hours)
- colour of enclosure : graphite grey RAL 7024
- enclosure material : ABS suitable for outdoor use
- cable gland holes : 9 predrilled holes



# 17 μ-FEP MAIN WIRING DIAGRAM

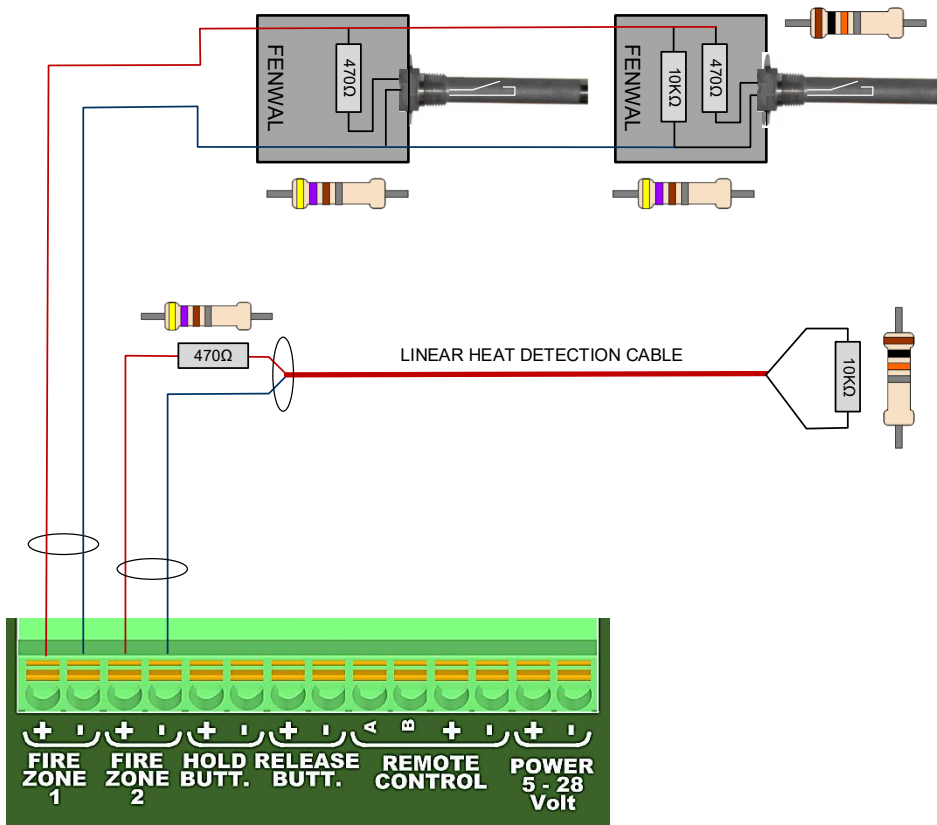
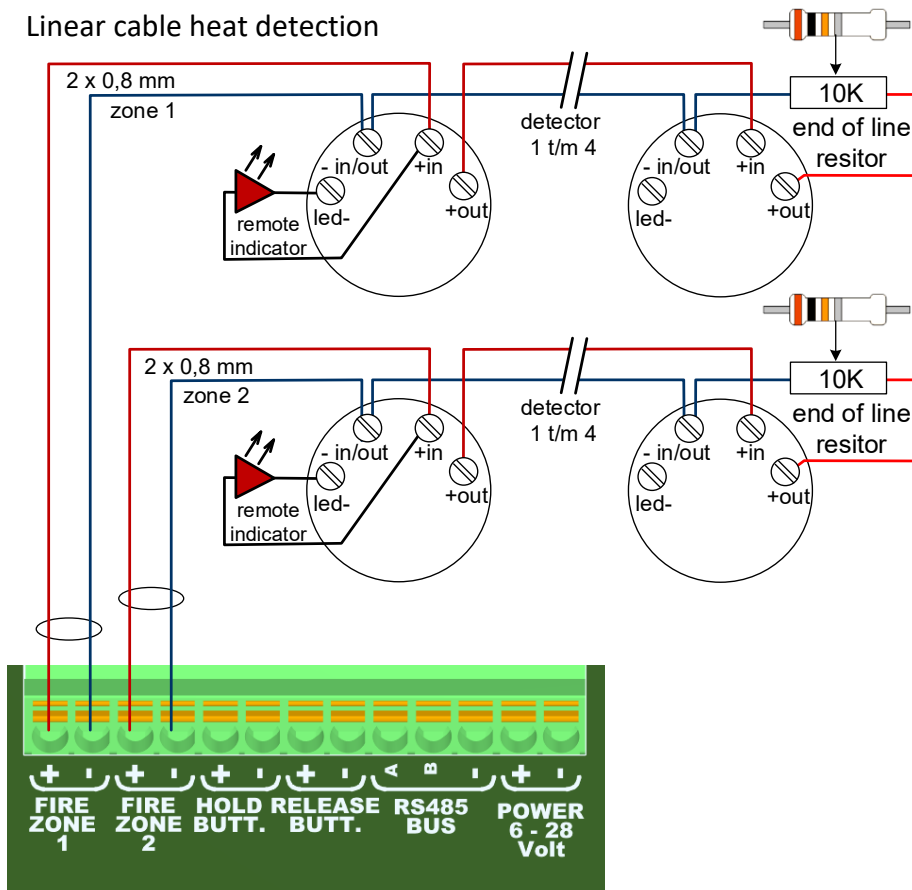
The diagram below shows the μ-FEP connections options



# 18 $\mu$ -FEP FIRE DETECTOR AND WIRING OPTIONS

There are three options for connecting fire detectors to the  $\mu$ -FEP.

- Conventional Apollo Orbis fire detectors
- Fenwal heat detectors
- Linear cable heat detection



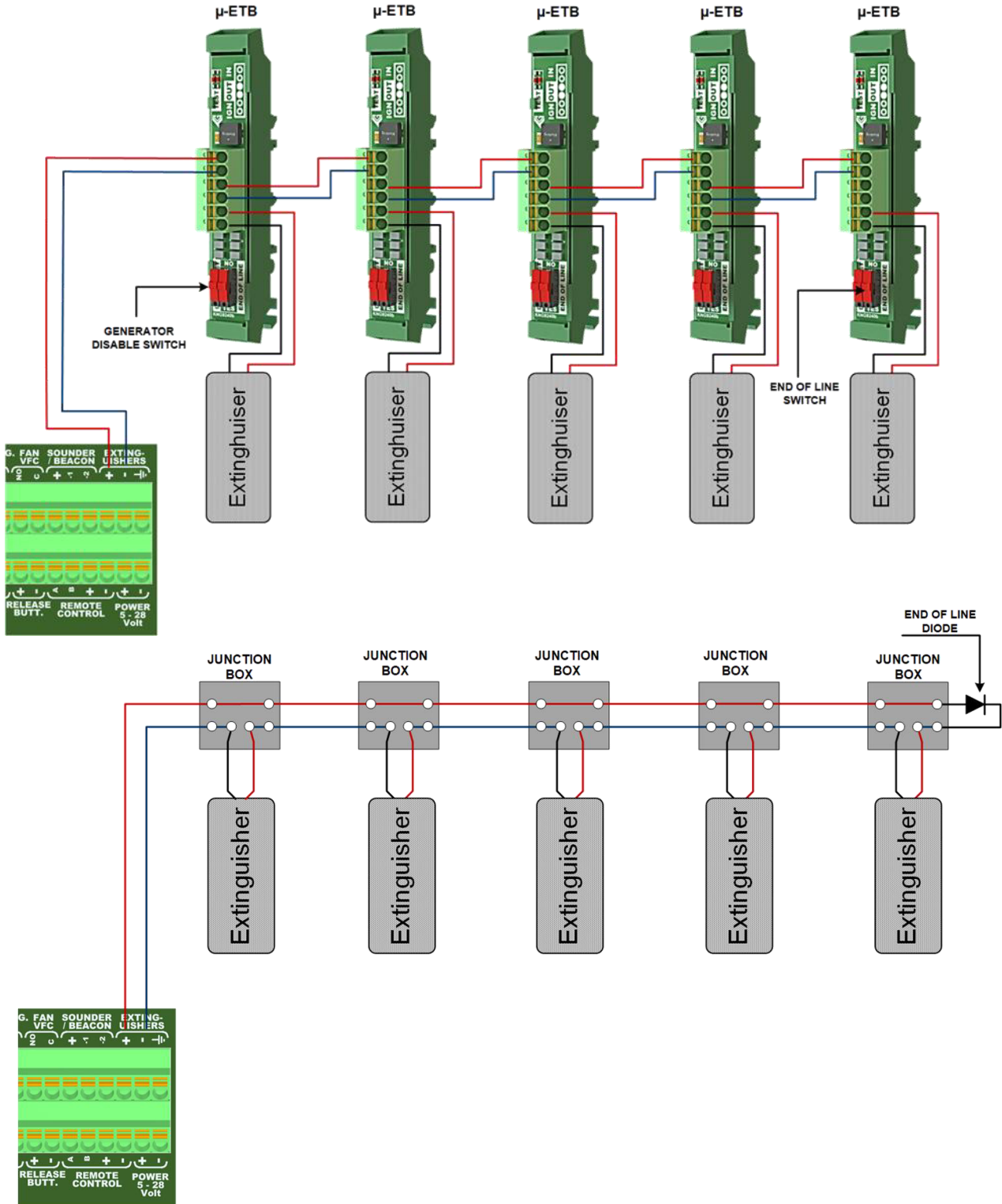




# 21 μ-FEP FIRE EXTINGUISHERS WIRING OPTIONS

There are two ways to connect the aerosol generator to the system.

- The μ-ETB/DIN terminal board
- IP-protected junction box



### WARNING

CONNECTION IN ACCORDANCE WITH THE JUNCTION BOX SITUATION AS SHOWN ABOVE IS TECHNICALLY POSSIBLE, BUT THIS IS NOT COVERED BY THE MANUFACTURER'S WARRANTY. THE MANUFACTURER GUARANTEES THE PROPER FUNCTIONING OF THE μ-FEP ONLY AND EXCLUSIVELY IN COMBINATION WITH THE μ-ETB

## 22 μ-ETB CONNECTION DEVICE

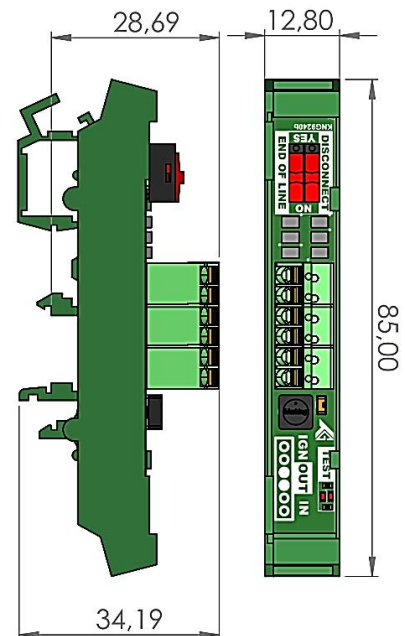
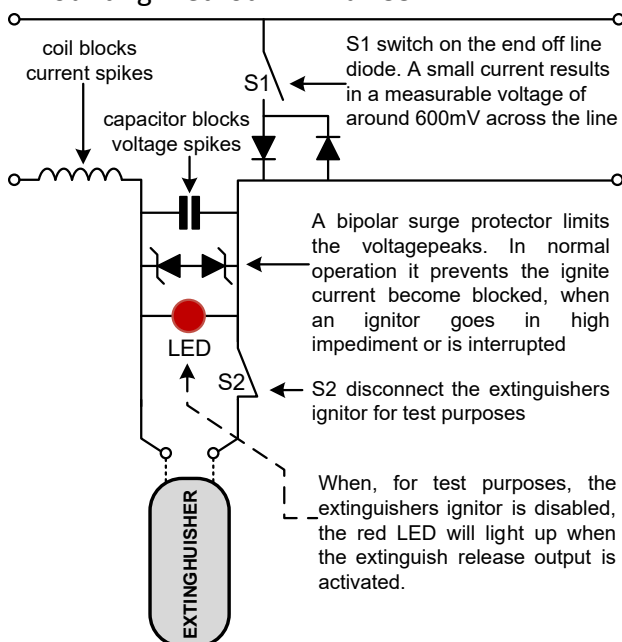
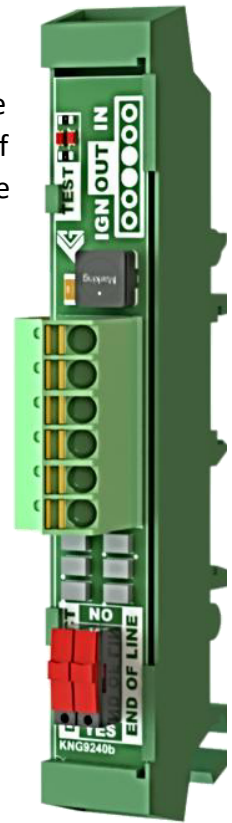
The μ-ETB is specially developed for the μ-FEP and aerosol extinguishers. This terminal connection board is equipped with built-in security electronics, which ensures that all igniters of the extinguishing units are activated. Together with an end line switch, this option turns the μ-FEP system into a complete and reliable fire detection and extinguishing system.

### WARNING

Incorrect placement of the end line switch makes it possible to disable a part of the extinguisher's activation circuit. Therefore, a visual inspection is an essential part of the commissioning and maintenance engineers' work. This visual inspection must be a standard provision in the commissioning regulation.

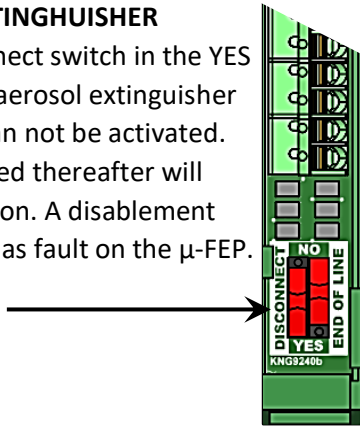
### The most important characteristics of the μ-ETB are:

- simple push-in connection technology
- minimum core diameter 0.5 mm<sup>2</sup> (AWG 20)
- maximum core diameter 1.5 mm<sup>2</sup> (AWG 16)
- a bridging protection ensures that the ignition current flows through ALL electrical activators for at least 50 ms, also when one of the ignitors is malfunctioning or behaving differently than others (eg. Ignite sooner and going in high impedance before other igniters have been ignited)
- the μ-ETB is equipped with a switch that activates the end-line monitoring diode on the last extinguishing generator
- a second switch is intended to disconnect the electrical activator from the extinguishing line for the purpose of testing the extinguishing line without activating the extinguishing generators
- there is a red LED that shows that an activation current is actually being initiated during the installation test
- the μ-ETB is equipped with reverse polarity protection, thereby avoiding connection errors
- the μ-ETB is equipped with surge protection, which reduces the risk of activation of a fire generator near a lightning strike
- mounting method: DIN rail 35 mm



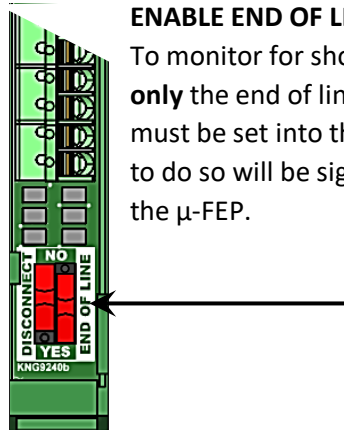
### DISCONNECT EXTINGUISHER

Move the disconnect switch in the YES position and the aerosol extinguisher is disabled and can not be activated. All ETB's connected thereafter will remain in operation. A disablement will be signaled as fault on the  $\mu$ -FEP.



### ENABLE END OF LINE DIODE

To monitor for short circuit or wire break, **only** the end of line switch on the **last** ETB must be set into the YES position. A failure to do so will be signaled as a fault on the  $\mu$ -FEP.



## 23 OTHER MANUALS

Other manuals associated with the  $\mu$ -FEP system are:

- K&G  $\mu$ -FEP Concise User Manual
- K&G  $\mu$ -FEP Owners manual
- K&G  $\mu$ -FEP Modbus User Manual
- K&G  $\mu$ -FTM Test panel User manual
- K&G  $\mu$ -FEP Compatible Devices Manual

Outdated or replaced computers and electronics are valuable sources for secondary raw materials, if recycled. Dealers of the  $\mu$ -FEP system must comply with local regulations for waste separation applicable in the country where the supplier is located.



Questions concerning the information presented in this manual may be addressed to your dealer. For technical questions or support contact your dealer or further assistance.

