Version 5.1 July 13, 2026

Installation and Service Manual

Firetrace CoolGen Max®
1 gen. / 2 gen. / 3 gen.

Contents

LIST OF ABBREVIATIONS

In this manual, several abbreviations are used. They are listed in the table below.

CGG	CoolGen Generator
ft^3	Cubic feet
m^3	Cubic meter
MAB	Manual Activation Button
DSW	Door Switch
MSB	Most significant bit
LSB	Least significant bit
NO	Normally open
NC	Normally closed

1 Introduction

The FIRETRACE® CoolGen Max 1gen./2gen./3gen is an extinguishing unit that detects and extinguishes fires in unoccupied spaces, such as server racks and electrical cabinets.

Upon detection of a fire, nitrogen gas is released from the unit. The nitrogen gas dilutes the oxygen level within the enclosure, and consequently suppresses the fire. The CoolGen Max version of the systems can be connected to enlarge the protected volume.

1.1 About this manual

This document is the Installation and Service Manual for the FIRETRACE® CoolGen Max 1gen./2gen./3gen

This manual is aimed at CoolGen Max devices which;

- Run firmware version 2.3.0

This manual contains all the information necessary to install, operate and service the FIRETRACE® CoolGen Max 1gen./2gen./3gen for all phases of its product lifecycle, see Figure 1.

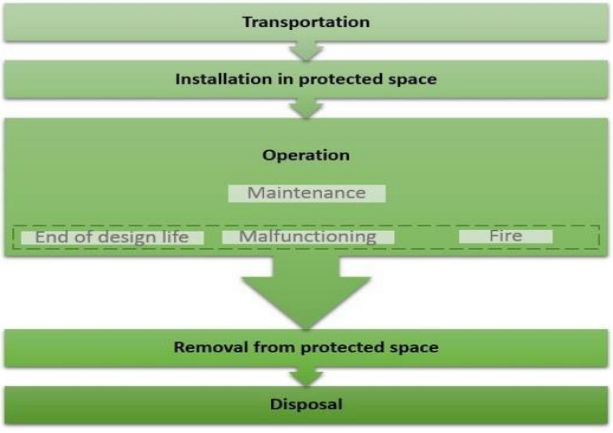


Figure 1: Product life cycle

This manual concerns the original instructions in UK English. Keep it in a safe location! Ensure access to this manual at all times.

This manual includes notes and warnings on safe installation and operation of the equipment. These notes and warnings are accompanied by the following icons. Read them attentively!

⚠WARNING	Warning indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠CAUTION	Caution indications a hazardous situation which, if not avoided, could result in minor or moderate injury or property/product damage.
NOTICE	Notice indicates information considered important, but not hazard-related.

1.2 Intended use

Safe operation of the FIRETRACE® CoolGen Max 1gen./2gen./3gen. is only guaranteed if used as specified in this manual. Other forms of use can put persons at risk as well as the surroundings and the environment.

During all phases of the lifecycle of the FIRETRACE® CoolGen Max 1gen./2gen./3gen. (e.g. transport, deployment, etc.), standard Health, Safety and Environmental (HSE) procedures and regulations as set forth by the product owner or local authorities must be adhered to, in addition to the specific instructions in this document.

⚠CAUTION	Misuse will occur when the FIRETRACE® CoolGen Max 1gen./2gen./3gen. is used beyond its operational boundaries. Operational boundaries are described in Chapter 2 and must never be exceeded.

1.3 Disclaimer

It is the responsibility of the installer to ensure that the user is aware of the relevant contents of this document and the documents listed herein. To ensure full system capabilities it is important to check the following elements before installing the FIRETRACE systems:

1. Air tightness /leakage of the protected volume (e.g. cabinet). Gaseous fire protection works only if the extinguishing gas can be kept inside the protected volume as long as possible to prevent reignition
2. If in doubt the following precautions can be made; Close off all openings visible (cable entries, ventilation etc.) with fire retardant material

2 Product Description

2.1 FIRETRACE® CoolGen Max 1gen./2gen./3gen.

The FIRETRACE® CoolGen Max 1gen./2gen./3gen. is a unit that is used to detect and extinguish fires in unoccupied spaces , such as server racks and electrical cabinets. The FIRETRACE® CoolGen Max 1gen./2gen./3gen. is equipped with:

- One, Two or Three CoolGen Generators (CGG) to release nitrogen gas
- Air inlet fan and filter
- Three optical sensors to detect smoke
- Software to ensure robust decision making
- Electronics for configuration settings and status outputs
- Power supply unit with back-up battery
- Input terminals for Manual Activation Button and Door switch
- RS485 communication bus to connect up to 8 systems to work as one system to protect larger volumes up to 36 m3
- User Interface with status LEDs, numerical display, push buttons and a key switch

Upon detection of a fire event, nitrogen gas is released from a CoolGen Generator (CGG). The nitrogen gas dilutes the oxygen level within the protected space, and consequently suppresses the fire. This is in line with common practice using compressed inert Nitrogen, or other clean agents in Higher Hazard Class A fires at 20˚C. If Normal Class A fires are taken into consideration the systems can protect a larger volume (see for instance NFPA 2001 for the exact calculation)

Table 1: Gas mass versus protected space (in normal conditions temperature and pressure)

		CoolGen Max 1 gen.	CoolGen Max 2 gen.	CoolGen Max 3 gen.
		1 generator	2 generators	3 generators
Gas mass	kg	0,9	1.8	2.7
	L	750	1500	2250
Protection	m^3	1.5	3	4.5
	ft^3	53	106	159

The FIRETRACE® CoolGen Max 1gen./2gen./3gen. is housed in a metal casing.

Here the FIRETRACE CoolGen Max 2 gen. is described.

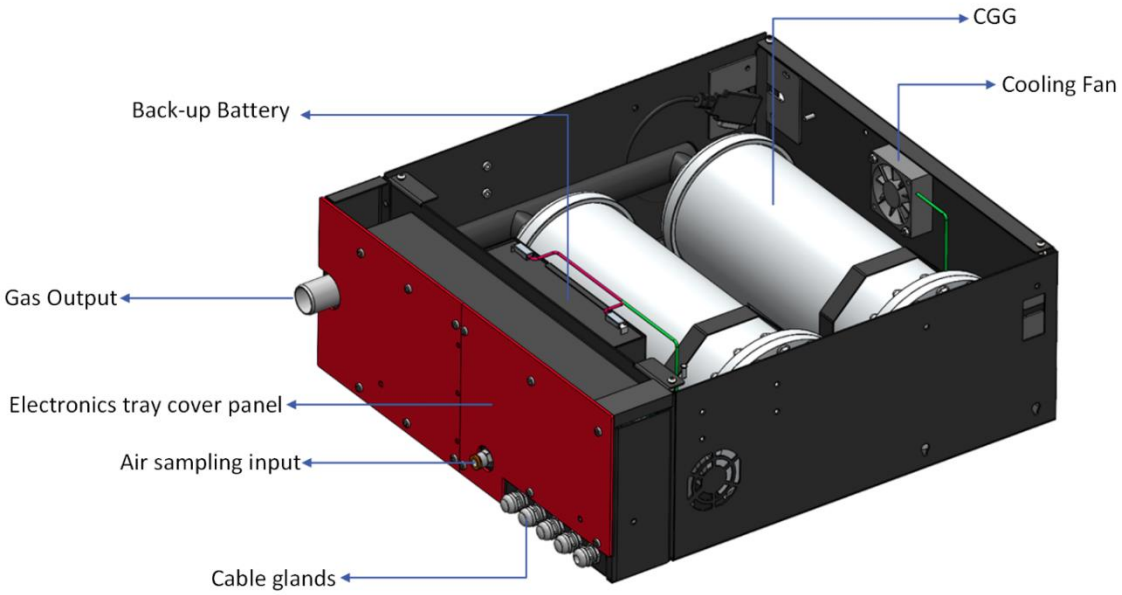


Figure 2 FIRETRACE CoolGen Max 2 gen. in/exterior

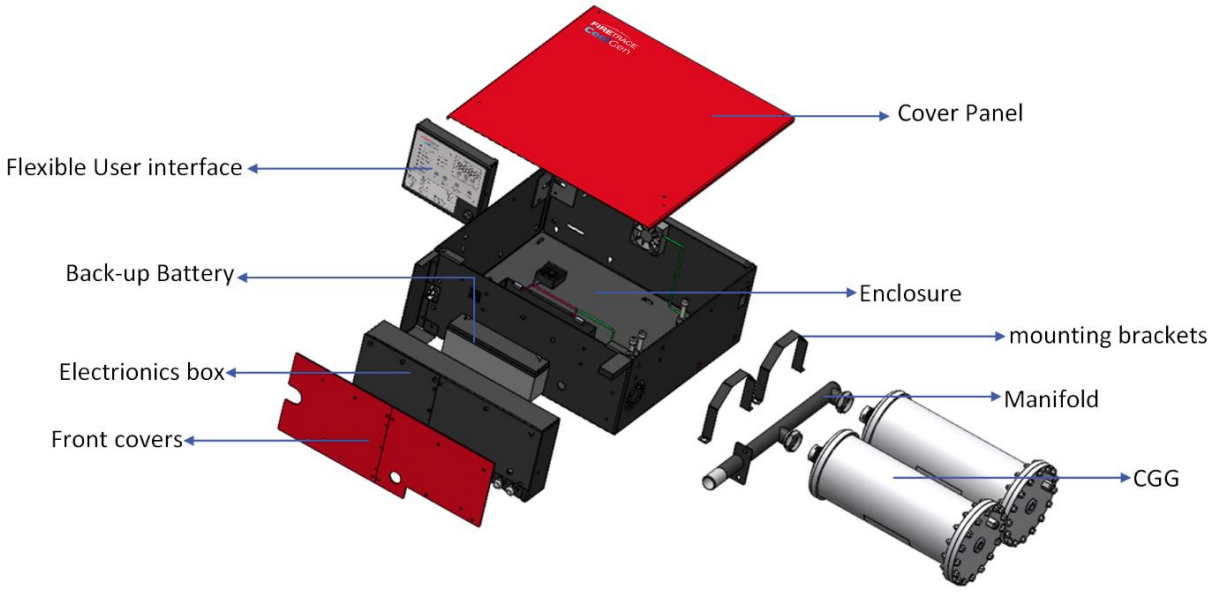


Figure 3 Exploded view

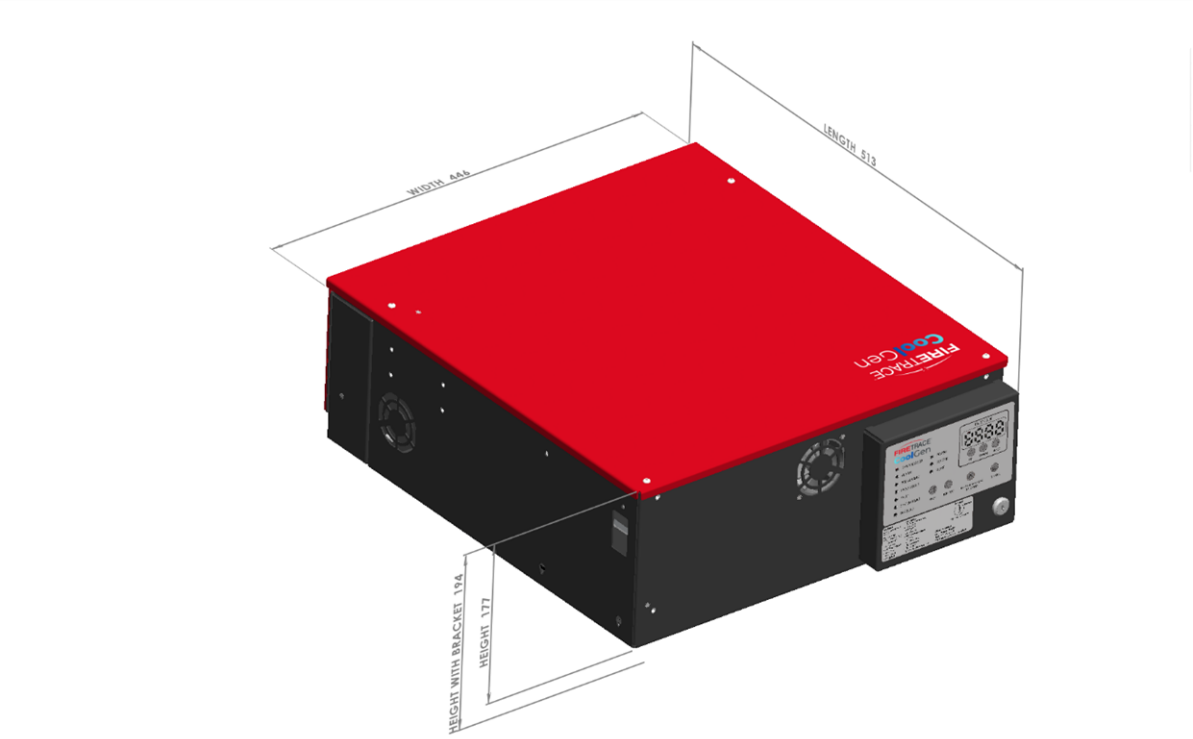


Figure 4 FIRETRACE CoolGen Max 2 gen. in/exterior (system with flexible User Interface mounted at front side)

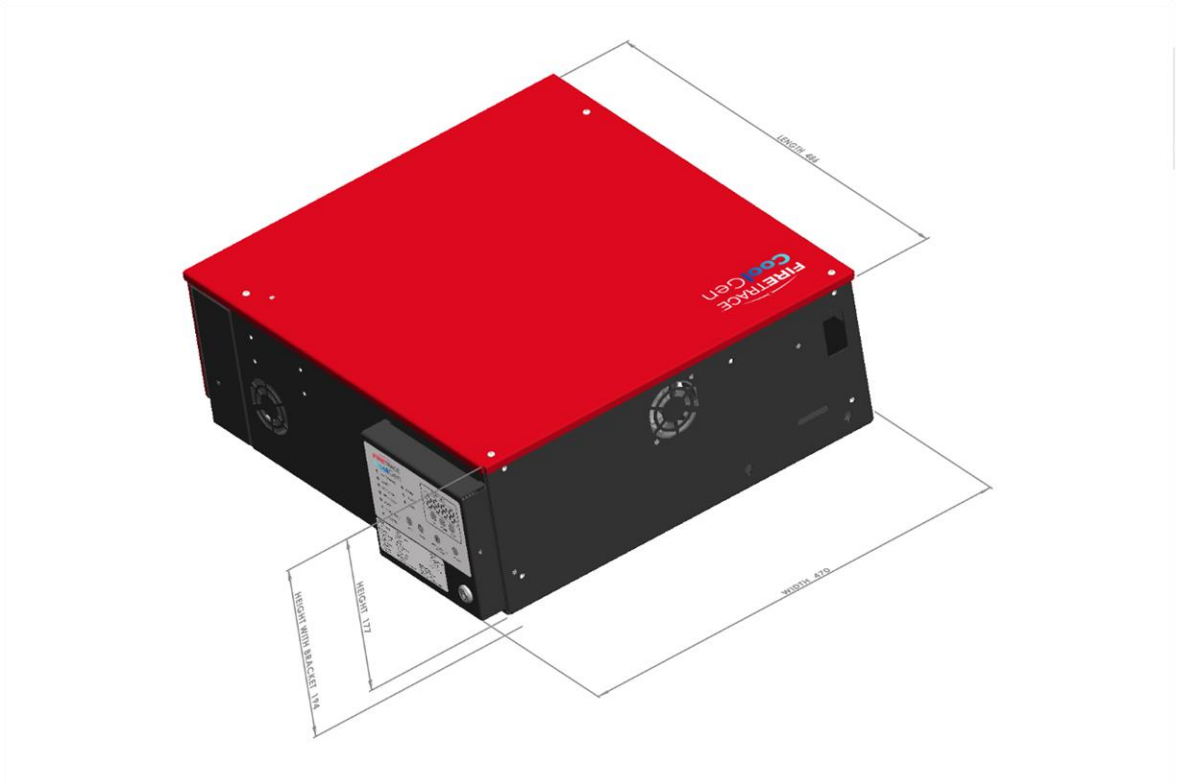


Figure 5 FIRETRACE CoolGen 2 gen. in/exterior (system with flexible User Interface mounted at left side panel)

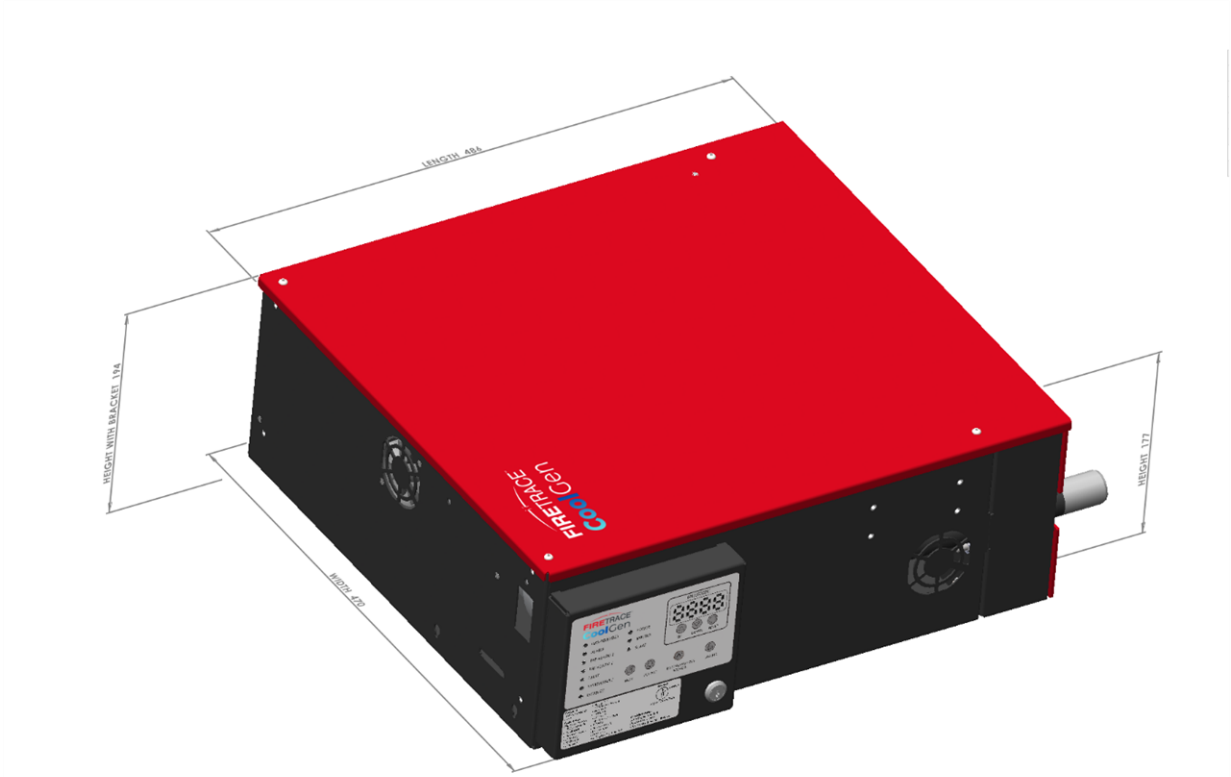


Figure 6 FIRETRACE CoolGen Max 2 gen. in/exterior (system with flexible User Interface mounted at right side panel)

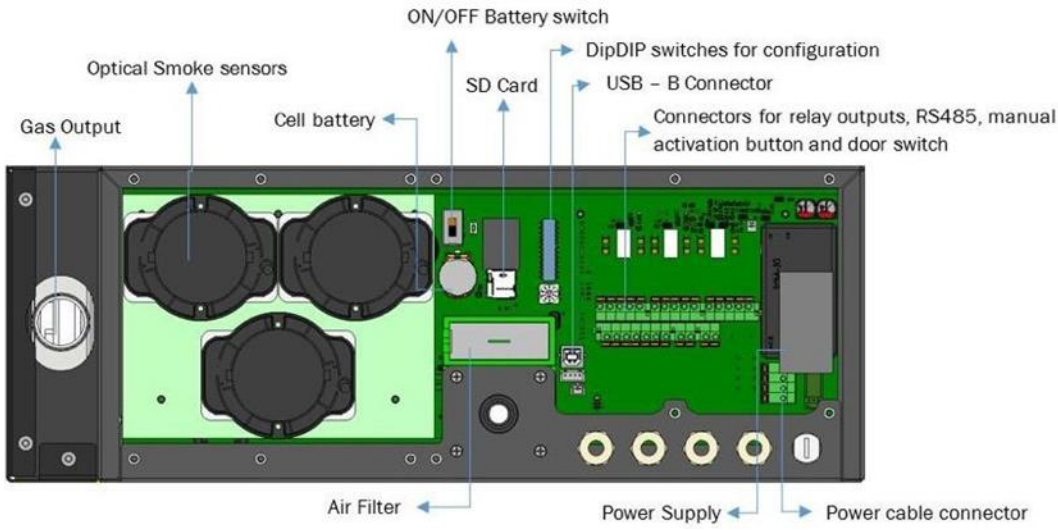


Figure 7 Interior electronics box

Table 2 Product dimensions and weight for systems with flexible User Interface

		UI on front side	UI on one of the side panels
FIRETRACE® CoolGen Max 1 gen.	Length x Width x Height	367x446x177	340x470x177
	Weight	20.5 kg	20.5 kg
FIRETRACE® CoolGen Max 2 gen.	Length x Width x Height	513x446x177	486x470x177
	Weight	30.5 kg	30.5 kg
FIRETRACE® CoolGen Max 3 gen.	Length x Width x Height	685x446x177	657x470x177
	Weight	41.5 kg	41.5 kg

Note that the hight of the system will be 194 mm when using the mounting brackets,

2.2 Compatibility

The FIRETRACE CoolGen Max systems can be a substitute for the FIRETRACE® CoolGen Max 1gen./2gen./3gen. The top mounting kits are equal for all FIRETRACE aspirating smoke detection systems, where the rack mounting kits for the FIRETRACE CoolGen Max system contains additional brackets as compared to the rack mounting kits for the FIRETRACE® CoolGen Max 1gen./2gen./3gen.

2.3 About CoolGen Generators

The CGG's supply the nitrogen gas to dilute the oxygen level within the protected space, and consequently suppress the fire.

The CGG stores the gas as a chemical solid. The gas is bound up in a molecule which naturally forms a solid at room temperature and is released when a chain reaction is started within the canister. This controlled decomposition of the solid 'grain' reaches high temperatures as it breaks down, before passing through a cleansing and heat absorbing filter.

Finally, the cooled nitrogen gas is passed through a very fine filter to remove further impurities before being released into the protected space.

The base material for the gas production is sodium azide. This is mixed with a number of other modifying chemicals to make the grain perform with the desired characteristics. The encapsulated product is generally safe to handle.
When the CGG is deployed to protect against a fire, the core grain material (sodium azide) changes state as it is decomposed to produce nitrogen gas, and a sodium 'slag' is formed. As sodium can exhibit energetic reactions in certain conditions, it is imperative that care is taken to follow the basic installation and handling guidelines.

With appropriate handling, the CGG will remain in a safe and stable configuration throughout its lifecycle, allowing it to be transported, stored, used, and recycled in line with local legislation. As with many high-tech chemical products mistreating the CGG could lead to potentially dangerous exposure of energetic chemicals.

For a more detailed description of the generator, consult the CGG DIOM.

2.4 Aspirating smoke detection system

The system continually monitors the status within the protected space by taking air samples and testing it for smoke. Air is drawn into the FIRETRACE® CoolGen Max 1gen./2gen./3gen. using a centrifugal fan.

The air is filtered through a high-grade filter, which allows the broad range of smoke particles to pass freely through, while preventing harmful dust ingress. This minimizes the chance of false alarms caused due to solid particulates and insects, while maintaining a high throughput.

The carefully filtered air is then passed into the detection chamber, where three high-sensitivity optical smoke detectors are exposed to the same sample. Each of the three calibrated detectors can build up a reliable histogram of smoke obscuration data, and thus provide a reliable output in its own right. This temporal reliability is then fortified by redundancy, by using the three detectors to vote simultaneously. This provides an exceptionally reliable means to detect a fire, which reduces false alarms, and avoids dropping the gas unnecessarily.

Air flow is monitored in accordance to EN54-20 (aspirating smoke detectors) to ensure that the inlet is not blocked or broken, or that the filter is blocked. Either case will result in a fault status. Air flow is monitored after the detection chamber, where it is then ejected through vents in the case – sampled air is not returned to the protected space.

2.5 Software for decision making

The three smoke detectors are used to build up a picture of the current status of air in the protected space. Three thresholds are defined in the software. As the smoke level rises above each threshold, actions are taken accordingly. The thresholds and related actions are outlined in the following table:

Table 3 Smoke Thresholds and effects

Threshold	Action	Notes
Pre-Alarm 1	Close Pre-alarm relay, Pre-alarm 1 LED on, Emit sound signal	First indication that smoke level is above normal, this is a positive acknowledgement that smoke has been detected
Pre-Alarm 2	Pre-alarm 2 LED on, Emit sound signal	Second indication that smoke level is above normal.
Alarm	Close Alarm relay, Fire Alarm LED on. Emit sound signal, Release gas	Positive identification of a fire event – normally connected to a central fire panel Gas is released after this threshold is exceeded, after a delay which can be programmed by the installer depending on the application – it may be desirable to allow the air conditioning fan to stop before ejecting gas for example.

The system also has an input for a Manual Activation Button (MAB). When this MAB is activated this will also generate an Alarm, resulting in closing the ALARM relay, turning on the Alarm LED and releasing the gas, just as when the smoke level surpasses the threshold value for Alarm.

Electronics

Relay outputs

Status outputs from the system are established by relay contacts.

Relay contacts are rated to 2 A at 28 Vdc. This supports connection to most alarm panels, building control systems and direct connection to DIN rail mounted relays for supplementary shut-down etc.

Table 4 Fault and Alarm relays

Relay	Primary Contacts	Fault/Alarm is active when
Fault	Normally Closed (passive state)	Contact is closed
Pre-Alarm	Normally Open (passive state)	Contact is closed
Alarm	Normally Open (passive state)	Contact is closed

All relays are dual pole, dual throw, thus providing the installer with a flexible range of options for a wide variety of applications. All outputs are duplicated, and isolated, and can be configured either as NO or NC. The output channels for the Pre-Alarm and Alarm relays are offered as both a changeover contact (Side A) and a Normally Open contact (Side B). The output channel for the Fault relay is offered as both a changeover contact (Side A) and a Normally Closed contact (Side B). The Side B contacts will be sufficient for most typical installations.

For example, the Side B contacts would typically be connected to the fire panel to indicate a fire status. The Changeover contacts on Side A may be connected to a separate building management system without any connectivity issues.

Wired Inputs

The following wired inputs are made available to the installer in this product:

- Power Cable to connect to mains power (100-240 VAC)
- Manual Activation Button to allow connection of a MAB to generate an Alarm and subsequent gas release when the operator activates the MAB
- Door switch to allow connection of a door switch (to signal an opened cabinet door and to inhibit gas release when the door of the cabinet is open) or a manual override switch (to inhibit gas release when this switch is activated by an operator)
- Two RS485 bus interfaces to allow connection to other FIRETRACE® CoolGen Max 1gen./2gen./3gen. systems; a maximum of 8 systems can be connected in a daisy-chain configuration.

Configuration settings

The system has an array of DIP switches and a rotary switch for installer level configuration settings for the following functions:

- Smoke sensitivity setting
- Extinguishing gas delay (time delay between Alarm and release of the gas)
- Time delay between gas release of multiple generators (only applicable for FIRETRACE® CoolGen Max 1gen./2gen./3gen.)
- Flow monitoring sensitivity
- Configuration of Manual Activation Button
- Configuration of Door Switch
- Configuration of connected systems

The configuration settings are described in detail in Chapter 5.

2.6 Power Supply and battery back-up

The FIRETRACE® CoolGen Max 1gen./2gen./3gen. series are equipped with an internal power supply unit and battery back-up that complies to EN54-4. The system can be powered by mains power 100/240 Vac. The battery back-up function allows continuation of system operation for 12 hours in case of mains power interruption (based on fully charged battery).
Availability of mains power and battery status and health are monitored, and fault status is activated in case of power interruption or battery problems.

2.7 Connection of multiple systems

An FIRETRACE® CoolGen Max 1gen./2gen./3gen. system can operate as a standalone system to protect volumes up to 1.5/3.0/4.5m3.To allow protection of larger volumes, the FIRETRACE® CoolGen Max 1gen./2gen./3gen. series are designed to enable connection of multiple systems (with a maximum of 8) to protect volume up to 36 m3 for 8 connected FIRETRACE® CoolGen Max 3 gen. systems.

Connected systems will functionally behave as one system: fire detection, gas release and system alarm and fault status are synchronized for all connected systems. Each of the connected systems is equipped with a smoke aspiration system, allowing multiple smoke detection points in the protected volume. In case one of the connected systems generates an Alarm, all systems will deploy their gas simultaneously. A common system status (fault, pre-alarm and alarm status) is available on the relay outputs, so that only one of the systems (the Master system) needs to be wired to a fire alarm panel.

A RS485 communication bus is used to connect systems into a Master-Slave configuration, with one Master system and up to 7 Slave systems. The systems are physically connected by a shielded fire alarm cable. One of the connected systems will be configured as Master System and the others as Slave Systems. A number of DIP switches and a Rotary Switch are provided for Access level 3 configuration settings.

The settings are described in Chapter 5.

2.8 User Interface panel

Each system has a User Interface panel as shown in Figure 8.

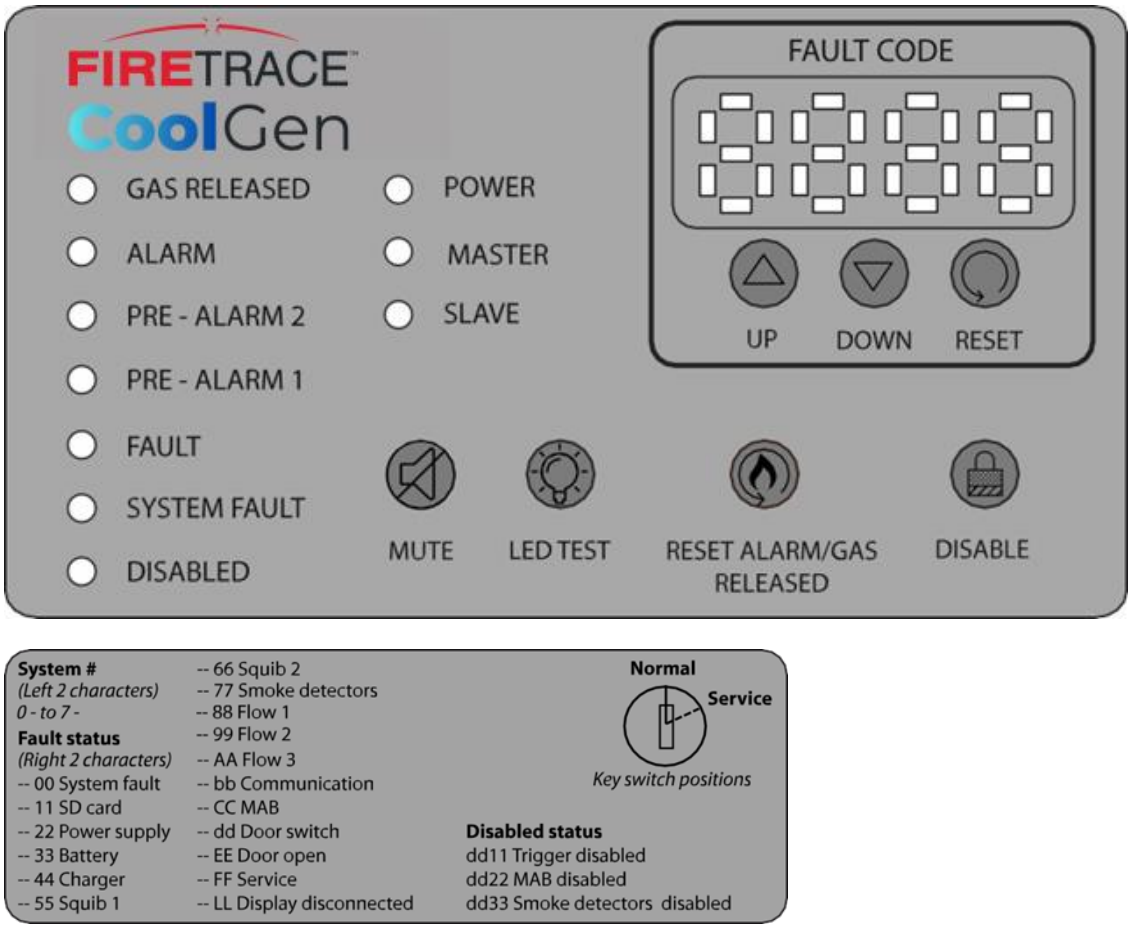


Figure 8 User interface panel

The user interface panel has a number of LEDs to indicate system statuses, a number of push buttons to interact with the system and a 7-segment display to display detailed status information.

In addition to this a key switch is available to switch between normal operation mode and service mode. In service mode a number of operations are allowed which are not available in normal operational mode (e.g. disable the system or reset the Alarm status).

See Chapter 7 for a detailed description of the User Interface and all functions related to it.

2.9 Technical data

Table 5 Technical data

	FIRETRACE CoolGen Max 1 gen.	FIRETRACE CoolGen Max 2 gen.	FIRETRACE CoolGen Max 3 gen.	
L x W x H	See Table 2	See Table 2	See Table 2	
Weight	See Table 2	See Table 2	See Table 2	
Gas mass	0.9	1.8	2.7	kg
	750	1500	2250	L
Protection*	1.5	3	4.5	m^3
	53	106	159	ft^3
Rating	IP30	IP30	IP30	Class
Voltage (mains)	97/253	97/253	97/253	Vac
Internal power supply voltage	15	15	15	Vdc
Max power	22.5	22.5	22.5	W
Power supply Imax.a	1.0	1.0	1.0	A
Power supply Imax.b	1.5	1.5	1.5	A
Backup battery capacity	4.5	4.5	4.5	Ah
Battery back-up duration	>12	>12	>12	Hours
Battery internal resistance (incl. cable)	max. 3	max. 3	max. 3	Ω
Battery fault signal when	<11.5V	<11.5V	<11.5V	V
Battery switch off voltage	10.9±0.1	10.9±0.1	10.9±0.1	V
Battery Lifetime @20˚C	4	4	4	Years
Sensor Lifetime	10	10	10	Years

Relay cable length	100	100	100	Meters
MAB & DSW cable length	5	5	5	Meters
RS485 interface cable length (system to system)	5	5	5	Meters
Temperature	-0 to 50	-0 to 50	-0 to 50	°C
Generators	1	2	3	pcs
Cable shield	On RS485 and Relay**	On RS485 and Relay**	On RS485 and Relay**	
Max thickness cable core	1.5	1.5	1.5	mm^2
Min thickness cable core	0.6	0.6	0.6	mm^2
Max voltage relay contact	28	28	28	Vdc
Number of cores for Relay, MAB and DSW	2	2	2	#
Number of cores for RS485 interface	3	3	3	#
Example Relay, MAB and DSW cable	Keram JE-H(St)H Bd FE180 E30 Light 1x2x0.8			
Example RS485 cable	Keram JE-H(St)H Bd FE180 E30 Light 2x2x0.8			
Temperature sampling airflow	Same as system temperature	Same as system temperature	Same as system temperature	°C

n* NFPA2001 Design concentration Class A = 40.3%

**Relay shield need to be connected on the source

Table 6 Length and sizes of inserts for sampling tubes

Length sampling tube (meter)	Insert diameter (millimetre)
0,5	3,5
1,0	4,0
1,5	4,0
2,5	5,0

2.10 List with Optional and Additional functions

Requirement	Description	O*	A*	Manual Section
5.4.1.b-a and 5.4.6.a	Delay of extinction signal	v		5.2
5.4.1.b-e and 5.4.6.e	Transmission of control signal to equipment forming part of the system: RS485 bus for connected systems (Master-Slave configuration)	v		0
5.4.1.b-f and 5.4.6.f	Transmission of signals to equipment located outside the extinguishing system (relay outputs for ventilation stop, energy shutdown, indication of pre-alarm)	v		2.6
n.a.	Door Switch input		v	7.5
	SD card for data logging		v	7.15
	DIP switches for configuration settings		v	5
	Pre-alarm relay output		v	4.5.4
	Connection of multiple systems		v	4.5.3
	Gas-released indicator		v	7.1
	Pre-alarm1 and pre-alarm 2 indicators		v	7.1
	Indicators for Master and Slave systems		v	7.1
	Commissioning of flow monitoring function		v	6.1

	Service intervals		v	7.13

* Optional
** Additional

2.11 Identification plate

For systems with a flexible User Interface the identification plate is located on the side, as illustrated in Figure 9 and Figure 10.

Figure 9 Location of the identification plate (for systems with a flexible User Interface

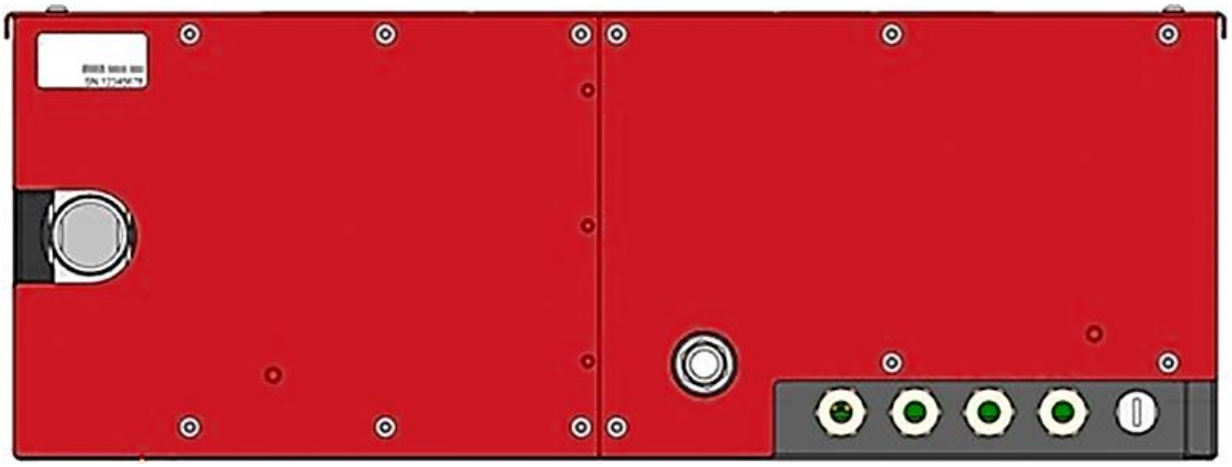


Figure 10 Location of the identification plate (for systems with a flexible User Interface) and two examples (below)

The following details are displayed on the identification plate:

- System type
- Barcode
- Serial number

2.12 Design Life

The Product design life is defined in terms of time only. The design life (or technical life span) of the Product is stated below:

- CGG Design life (after production): See label on CGG
- Sensors and electronics Design life: 10 years
- Battery design life is 4 years @ 20˚C
- Filter Design life: 1 year (in normal circumstances)

3 Safety

3.1 General

The FIRETRACE® CoolGen Max 1gen./2gen./3gen. contains pyrotechnic and chemical components that are hermetically sealed off from the environment. These cannot be released under normal or reasonably foreseeable conditions of use including proper disposal.

FIRETRACE products should only be handled by trained professionals. FIRETRACE provides specialist training to all professional handlers through its distributors. The distributors are responsible for providing the right training and correct information about the installation, handling and removal of the product.

The FIRETRACE products are dependent on chemical technology from the Space Industry. This technology necessitates special knowledge of the product to ensure a robust, safe, and functional manufacturing

Handling of the FIRETRACE® CoolGen Max 1gen./2gen./3gen. must only be done by qualified and trained personnel familiar with the product and its documentation (product datasheet, operating manual). Incorrect handling or use of the product can cause serious damage and lead to serious injuries and fatalities.

These guidelines with respect to the constituent materials apply to the FIRETRACE® CoolGen Max 1gen./2gen./3gen.. The Safety Data Sheet (SDS) of the generators are delivered with the CGG.

It is recommended that this source is checked at least once a year.

⚠WARNING

- Do not handle the unit until all safety precautions have been read and understood
- Do not expose devices to temperatures above 85℃,
- Avoid all possible contact with grain inside device.
- Make sure that the unit is only handled in well-ventilated areas.
- To prevent unnecessary initiation, keep the unit away from heat/sparks/open flames/hot surfaces. Also, do not smoke in the enclosure where the unit is placed.
- Do not open, drill, incinerate, crush, immerse or expose to temperatures above range reported for products.
- Avoid all contact with grain inside the unit.
- Do not bring the unit in contact with water, because of violent reaction and possible

flash fire (only applicable after usage).

- In case of fire: Use dry powder or sand for extinction.
- Avoid release to the environment
- Do not store together with combustible or oxidizing substances or mixtures.
- Dispose of the contents/container of the unit at an approved waste disposal plant

⚠CAUTION

- Do not use the product beyond its design life in duration

3.2 Personal protective equipment

The personal protective equipment mentioned in this section must be used in the event of a hazardous situation. In normal circumstances, only safety shoes are required.

Respiratory protection: In case of contact with grain inside CGG

Symbol	Prescribed personal protective equipment
	▪ Where risk assessment shows air-purifying respirators are appropriate, use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. ▪ If the respirator is the only means of protection, use a full-face supplied air respirator. ▪ Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
	▪ Hand protection, in case of contact with grain inside CGG. ▪ The selected protective gloves should satisfy the specifications of EU Directive EU 2016/425 and the standard EN 374 derived from it.
	▪ Eye protection, in case of contact with grain inside CGG: ▪ Safety glasses with side-shields conforming to EN-ISO-16321-1 and EN-ISO-16321-3
	▪ Skin and body protection, in case of contact with grain inside CGG: ▪ Choose body protection according to the amount and concentration of the dangerous substance at the workplace.

3.3 Hygiene measures (apply in any case)

- Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of the workday.
- Do not inhale released gas

3.4 Installation

NOTICE

- Install the FIRETRACE® CoolGen Max 1gen./2gen./3gen. with one or two people.
- Do not install the unit outside. The unit can only be used to protect uninhabited small enclosures such as server racks and cabinets.

In normal circumstances, the chemical agents within the CGG are safely contained within the unit. During normal installation and maintenance, it is unlikely that the CGG housing could become damaged, as it is protected by the aluminium casing.

As with any electrical device, care should be taken to avoid exposure to live electrical parts. The device operates from a main power supply and contains a battery. .

The connection of the system must be in compliance with general and specific rules defined in the installation place as defined for example in IEC 60364-1 :2005 (breaker).

⚠WARNING

- Only a trained installer / engineer should remove any cover from the device.
- The unit should be powered off before any cover is removed from the device to avoid exposure to high-voltage areas.
- The key switch does not cut off mains power, unplug from the main power and switch the Battery switch to OFF inside the electronics tray.
- Power should not be restored until all covers are safely back in place.

3.5 Configuration

- It should be noted that extending the time delay beyond the factory set 10s may compromise local regulations in some areas.

3.6 What to do when the unit is activated

The installer must inform the owner on what to do when the unit is activated, and gas is released.

During activation, nitrogen 99 mass% and trace gases 1% (e.g. CO, CO2, NOx….) are released, so there is risk of asphyxia due to the lack of oxygen and potential respiratory tract exposure when somebody is inside the protected volume (e.g. inside the cabinet when the FIRETRACE system is activated).

Consequently, **at all times, the following applies when the system is ACTIVATED:**

- Immediately evacuate all people from the room in which the small enclosure is located
- Always ensure a good ventilation of room in which the small enclosure is located before resuming operational functions.
- If needed wear self-contained breathing apparatus for firefighting when opening the small enclosure.
- Leave the system ON for at least 4 hours after gas deployment for the cooling fan inside the system to actively cool down the CGG's

In case someone accidently inhales the gas released from the CGG:

1. Bring the victim to a well-ventilated area.
2. In case of difficult breathing, give the victim extra oxygen
3. Consult a physician.

NOTICE

Check the Installation Manual for the CoolGen Generator and the SDS.

3.7 Storage

- Conditions for safe storage**:** store in a dry, clean area, below 40 ℃.

NOTICE

Check the Installation Manual for the CoolGen Generator.

4 Installation

- During installation local health, safety and environmental requirements and regulations must be respected and shall be conformed to by the installer (e.g. work at height, electrical work, etc.)
- The installer must have authorization/training for electrical work and for working at height.

⚠WARNING

- The device should only be installed by a trained professional, with reference to the latest installation guidelines.

4.1 Firetrace system contents

The FIRETRACE® CoolGen Max 1gen./2gen./3gen. is delivered in boxes containing the following items.

- FIRETRACE® CoolGen Max 1gen./2gen./3gen. unit (one box)
  - Firetrace system
  - Instruction card
  - Door sticker

4.2 Mounting

The FIRETRACE® CoolGen Max 1gen./2gen./3gen. is suited for:

- Outside the protected enclosure mounting - On top of the protected space, e.g. a cabinet
- Inside the protected enclosure mounting - Within the mounting rails of a 19” rack (See internal mounting manual)

Use the supplied manual for the used mounting kit.

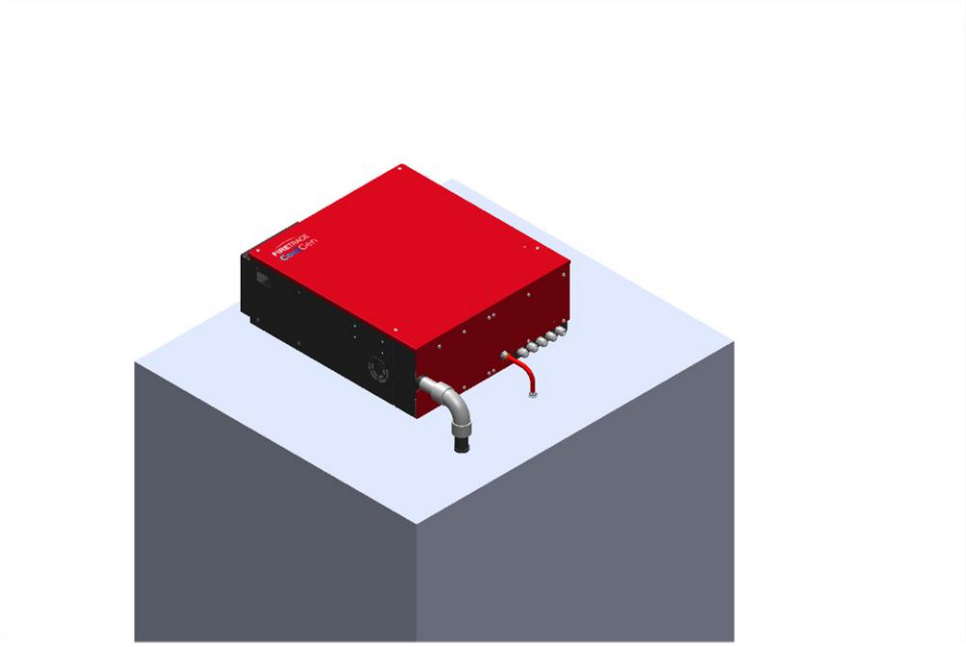


Figure 11 CoolGen Max system mounted on a cabinet

4.3 Electrical connections

Information and warnings

⚠WARNING

- The unit must be disconnected from mains power before opening the cover. The system will not switch off by turning the power off, since it will continue operating on the back-up battery.

NOTICE

- Access to connection terminals is made via the rear access panel (right-side panel at the rear side), which can be removed by unscrewing the 6 screws, and lifting out the aluminium cover (see Figure 12 below).
- Turn the battery switch on the PCB OFF. As a result the system will switch off. After completion of the electrical installation this switch must be put in the ON position again.
- Connection is made through one of four cable glands. Each cable gland can accept a multicore cable up to 8mm in diameter. The cables are connected to push-in connectors. The push-in contacts for the power cable can accept wires up to 2.5mm^{2}.The contacts for the relays, RS485 interfaces, Manual Activation Button and Door Switch can accept wires up to 1.5mm^{2} in each connection point.

NOTICE

Cables used for connecting multiple systems using the RS485 interface must be screened; the screens should be appropriately connected (**at one side of the cable only!**!) to the shield pin of the RS485 connector of the FIRETRACE system in order to ensure EMC compliance. The connector for the RS485 interfaces has a contact for connecting the screen of the cables used for

the RS485 connection. Section 4.3 23describes how to connect systems to one another, this section also gives instructions on how to shield the RS485 cables.

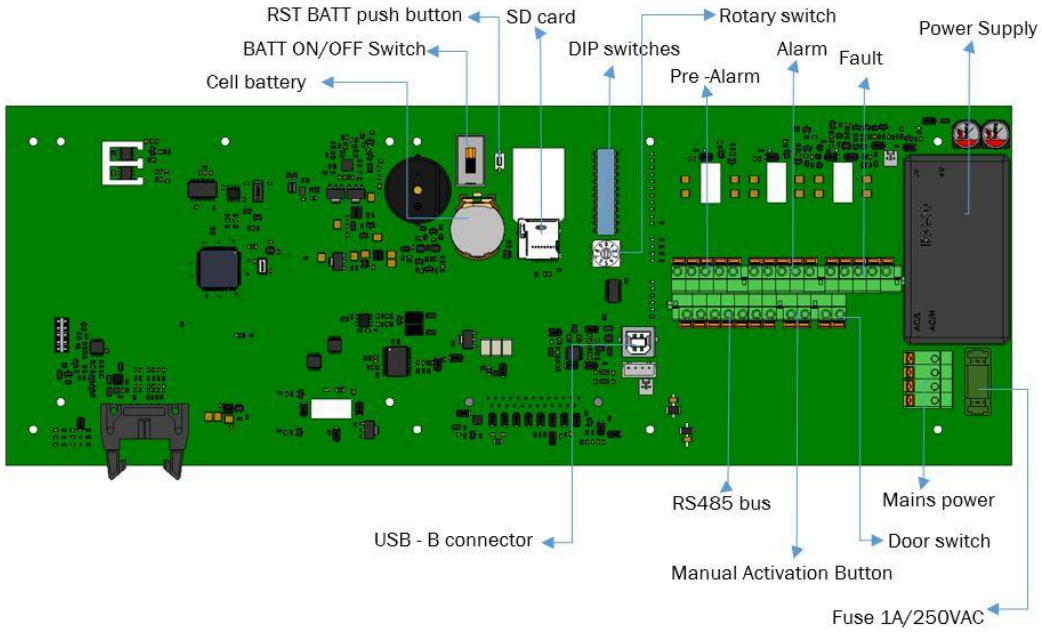


Figure 12 Main board of the FIRETRACE® CoolGen Max 1gen./2gen./3gen.

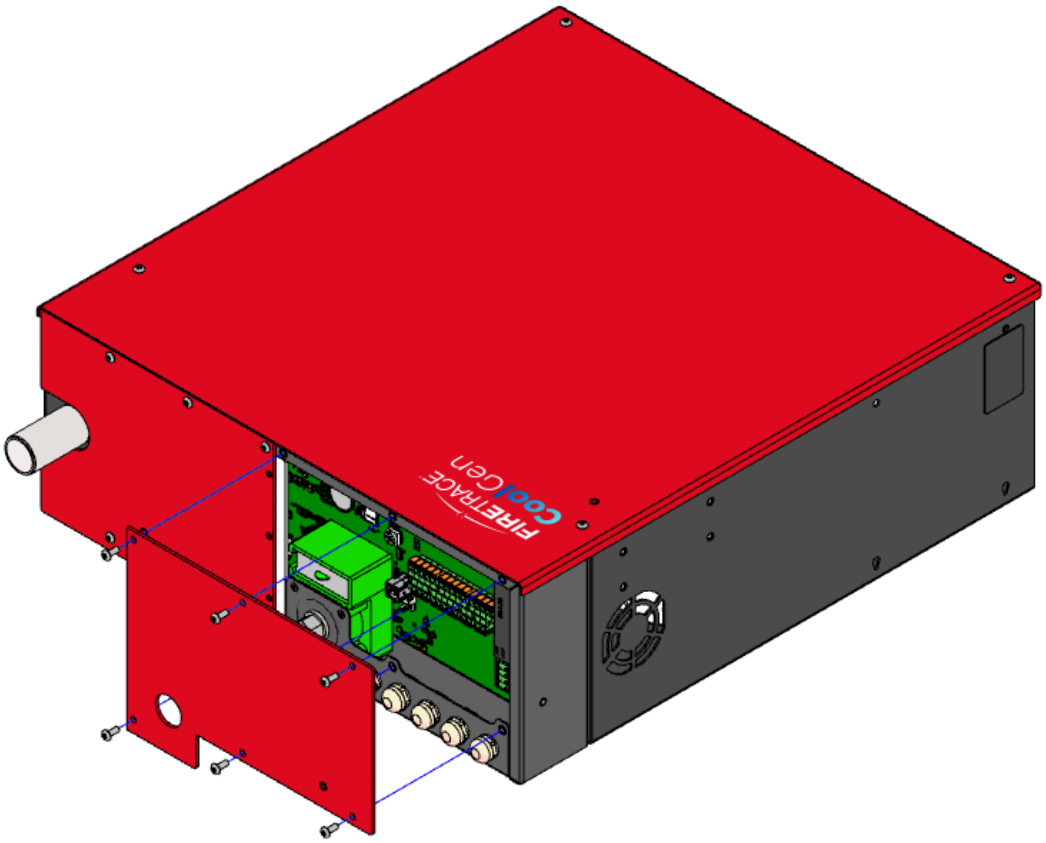


Figure 13 Remove electronics cover panel

Install mains power cable

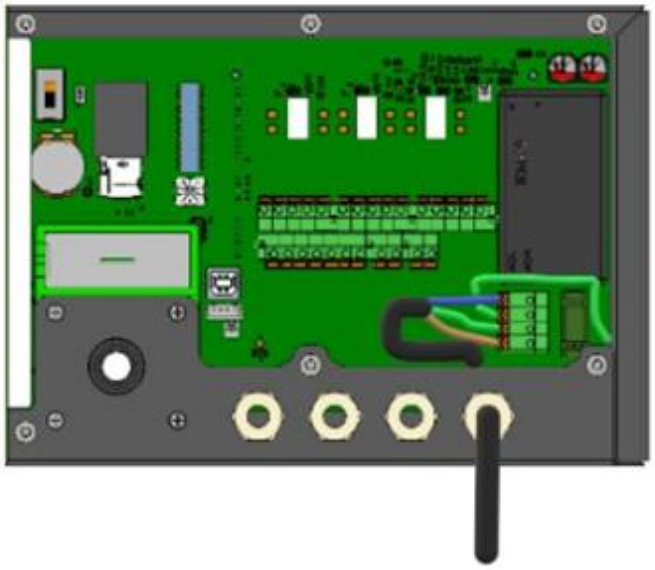


Figure 14 Mains power wiring

The device is powered by 100/240 Vac mains. The rightmost cable gland is used to bring mains power into the enclosure.

Ensure that the mains cable is disconnected from the power source before connecting to the system.

Strip an appropriate amount of the outer sheath away and strip the conductors before inserting into the cable gland. Ensure that the gland seals tightly against the outer sheathing, providing both physical support for the cable, and an airtight seal. Failure to do this will result in increased false alarms since the sampled air flow rate will be less stable.

Keep any excess cable inside the box to a minimum. Excessive looping of “spare” cable will compromise EMC tolerance, and could lead to increased false alarms.
Connect the earth, neutral, and live conductors to the green push-in connector as shown in the picture above.

A fuse holder for the mains power connection is located at the right side of the mains power connector. The fuse type to be used is a slow acting fuse, rated at 1A and 250VAC.

Install the wiring for Connecting Systems

In case of a standalone system this section is not applicable, and you can continue to page 30 to install the pre-alarm, alarm and fault outputs.

The system provides a communication bus to connect up to 8 systems. The connectors for this bus are labelled RS485. Systems can be connected typically using a screened, fire-resistant, 4 core cable, of which three cores will be used for the bus connection.
Two sets of contacts are provided:

- The first set (left side) consists of three contacts: RS485 A, RS485 B and GND
- The second set (right side) consists of four contacts: RS485 A, RS485 B, GND and SHIELD
-

In a configuration where two systems are connected one cable must be used to connect contacts RS485 A, RS485 B and GND on both systems. The shielding of the cable must be connected to one of the two systems only, using the shield contacts. Figure 15 shows an example of an RS485 connection including the SHIELD connection and shows an example of an RS485 connection without the SHIELD connection.

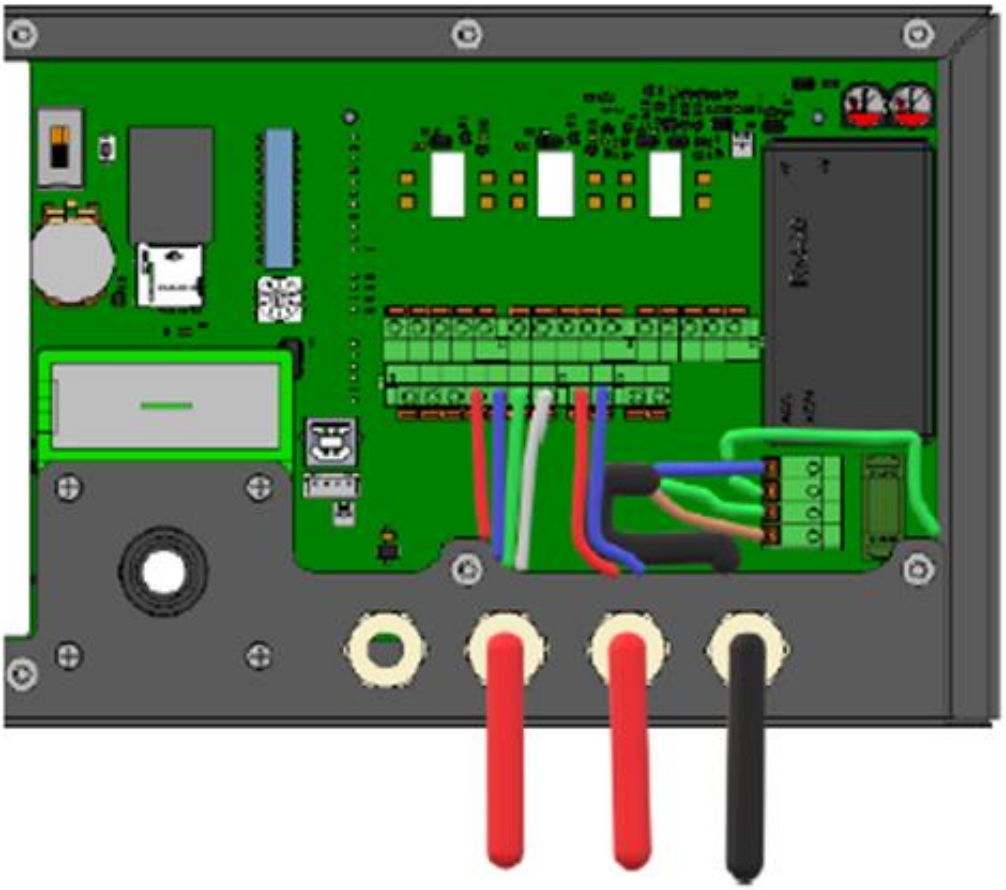


Figure 15 Wiring for connecting a system to an adjacent system using the RS485 connector including SHIELD connection

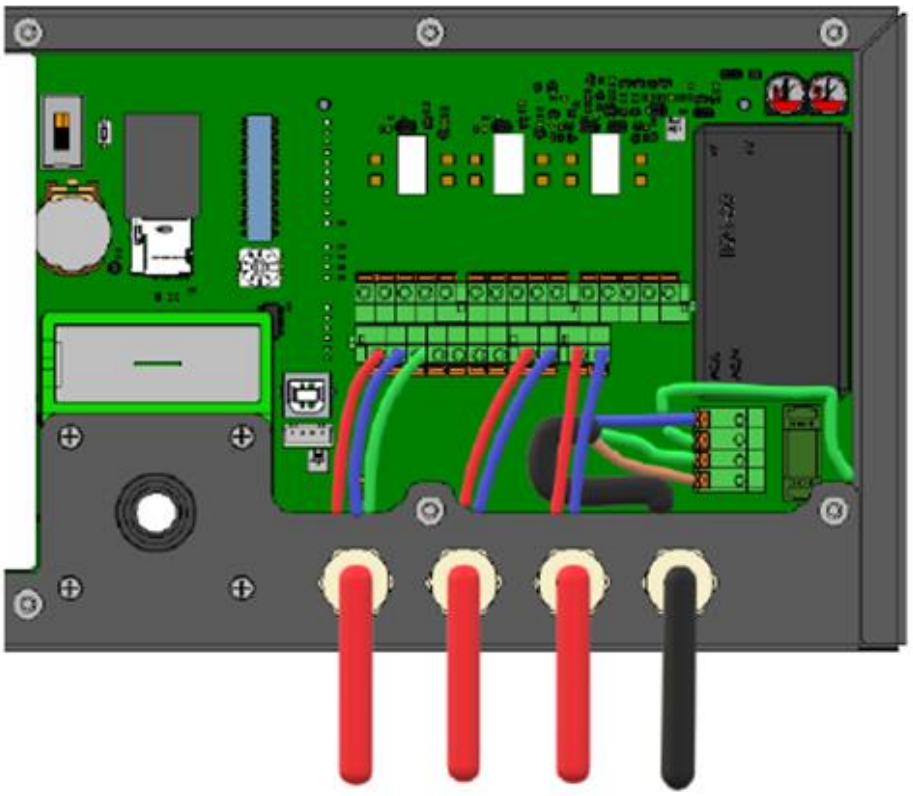


Figure 16 Wiring for connecting a system to one adjacent system without SHIELD connection

In a configuration where more than two systems are connected multiple cables must be used to create a daisy chain connection of the systems. Each cable will connect two systems, whereby each cable connects contacts RS485 A, RS485 B and GND of two systems and the shielding of each cable is connected to the SHIELD contact at one system only. Figure 17 shows an example of an RS485 connection of a system in the middle of a daisy chain configuration; this system has two cables connected to its RS485 connectors and one of the cables has its shielding connected to the SHIELD contact. The RS485 connection of the system at the left outer side of the daisy chain will typically look like Figure 15, having one cable to connect the RS485 bus to the adjacent system, whereby the shielding of the cable is connected to the SHIELD contact. The system at the other outer side of the daisy chain will look like Figure 16; in this system the shielding of the cable will not be connected to the SHIELD contact.

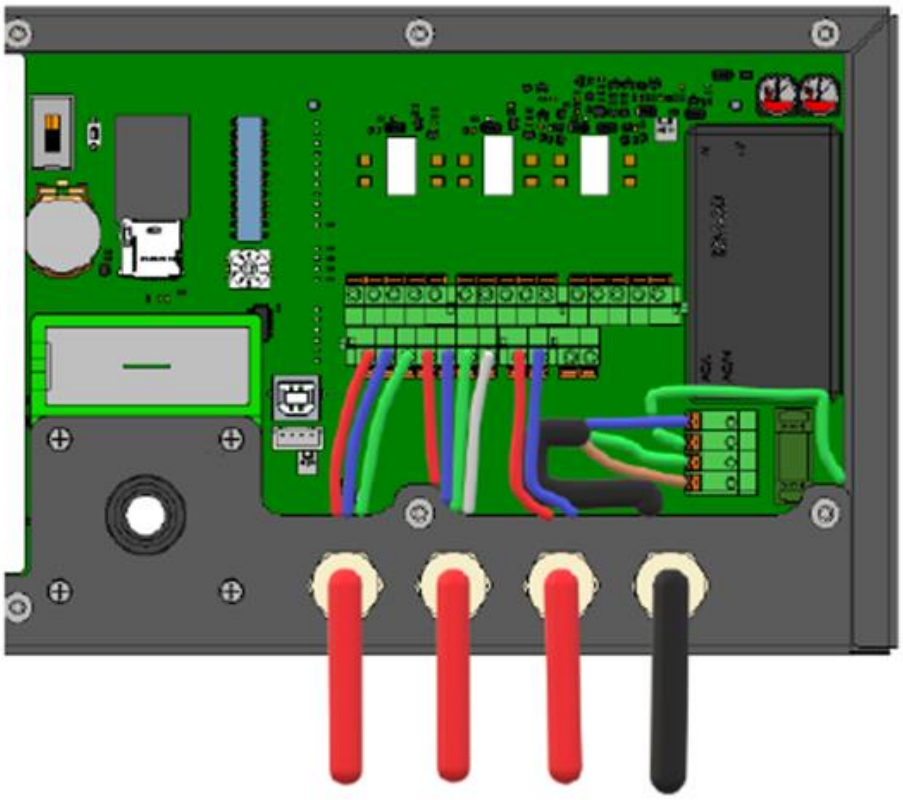


Figure 17 wiring for connecting a system to two adjacent systems

The cables for the RS485 connections must be terminated at the outer two systems of the daisy chain configuration only. This can be done using the DIP switch “T”, as explained in Chapter 5.

Choose the most appropriate cable glands for the RS485 cable(s) to be used.

Strip an appropriate amount of the outer sheath away and strip the conductors before inserting into the cable gland. Ensure that the gland seals tightly against the outer sheathing, providing both physical support for the cable, and an airtight seal. Failure to do this will result in increased false alarms since the sampled air flow rate will be less stable.

Keep any excess cable inside the box to a minimum. Excessive looping of “spare” cable will compromise EMC tolerance, and could lead to increased false alarms.

Push the cables into the terminal block which is labelled RS485, as described above.

If any cable glands remain unused, they must be fitted with the blanking plugs provided. Failure to do this can result in increased fault indications since the sampled air flow rate will be less stable.

Once all connections have been made and the configuration settings have been changed (settings for Master and Slave systems, see Chapter 5), the rear cover must be refitted, with all screws to provide a good seal against air leakage, light leakage, and EMC.

NB: Please take care that the earth cable to the cover panel does not get stuck in between the cover panel and the system, since this will cause air leakage.

Please take the following into account:

- Always place the Master system at the outside of the daisy chain, so that the Master system only needs 1 cable gland for the RS485 cable
- Connections to the Alarm and Fault relays must always be made to the Master system
- In case one or more Manual Activation buttons are used it is recommended to connect them to the two outermost systems, i.e. the Master system and the Slave system at the other end of the daisy chain
- Door Switches can be connected to any system; in case no more cable glands are available at the Master system the connection of the Door Switches should be made to one of the Slave systems.

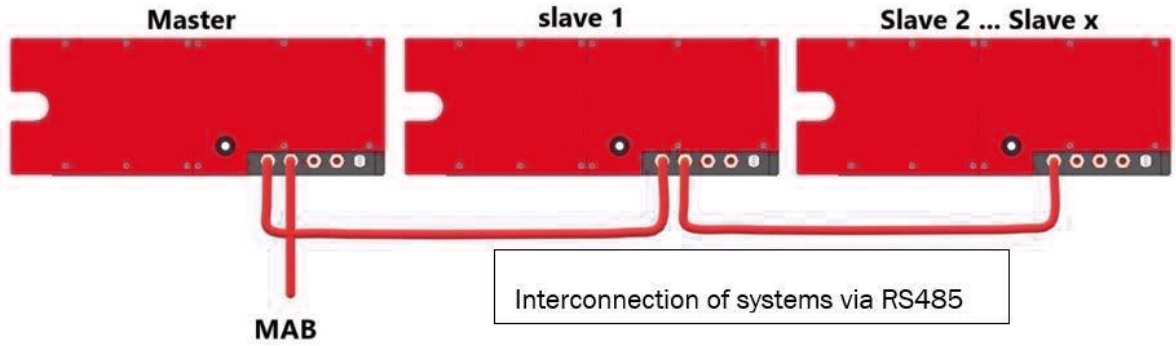


Figure 18 Example of three connected systems with MAB connected to the master system

Install the cable for Pre-alarm, Alarm and Fault outputs

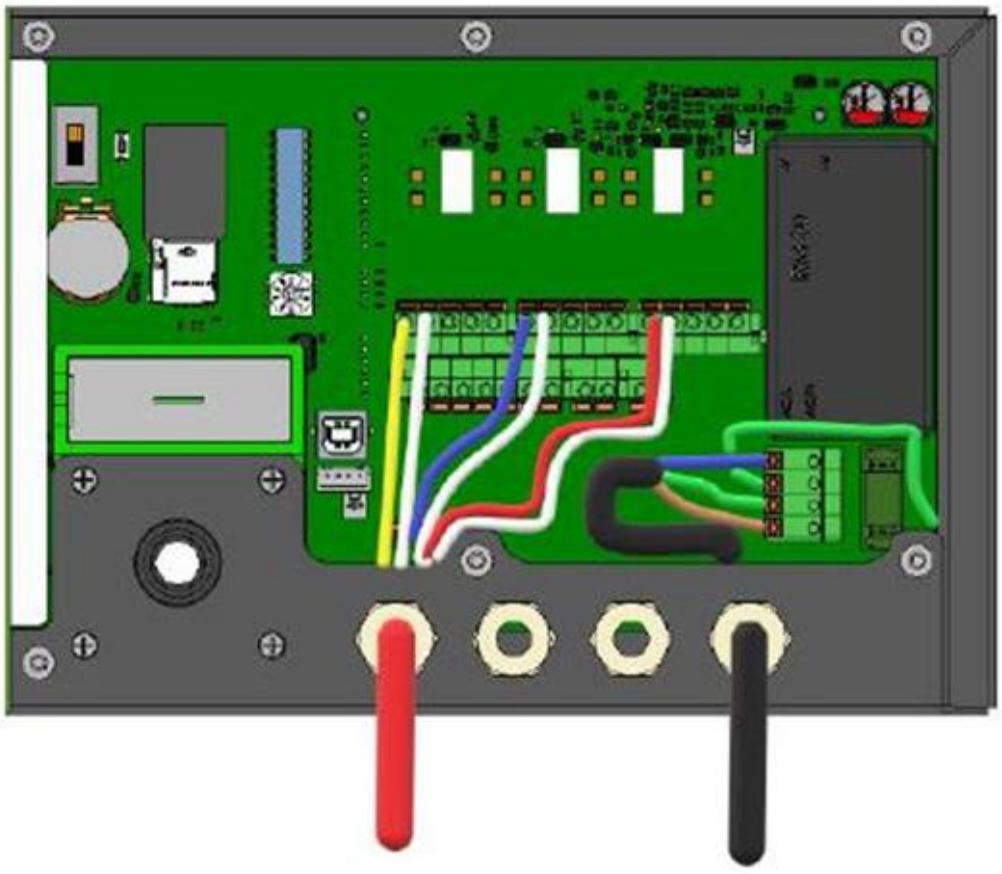


Figure 19 Wiring for Pre-Alarm, Alarm and Fault outputs (Only for standalone or master systems)

Three pairs of relay contacts are provided for simple connection to a panel, or other apparatus as needed. These may be used to signal a fire or fault, or they may be configured to shut-down power to a cabinet by connection to an auxiliary relay for example, typically using a screened, fire-resistant, two core cable.

Choose the most appropriate cable gland for the relay contacts to be used; for a standalone system the left cable gland is recommended. In case of connected systems (see section Install the wiring for Connecting Systems) the connection to the relays must be made to the Master system; in that case the most left cable gland is used for the cable to connect the systems, so one of the other cable glands must be used to connect to the relay outputs.

Strip an appropriate amount of the outer sheath away and strip the conductors before inserting into the cable gland. Ensure that the gland seals tightly against the outer sheathing, providing both physical support for the cable, and an airtight seal. Failure to do this will result in increased false alarms since the sampled air flow rate will be less stable.

Keep any excess cable inside the box to a minimum. Excessive looping of “spare” cable will compromise EMC tolerance, and could lead to increased false alarms.

Push the cables into the terminal blocks.

Before powering up the unit, perform a continuity test along the cable to ensure the correct connection has been made. Note – the (Normally Closed) Fault relay will be CLOSED while the unit is powered off. This relay will only be activated to the open state once the unit is powered and fully operational without any faults. All other relays will remain in their dormant state until activated by a fire event.

If any cable glands remain unused, they must be fitted with the blanking plugs provided. Failure to do this will result in increased fault indications since the sampled air flow rate will be less stable.

Once all connections have been made, the rear cover must be refitted, with all screws to provide a good seal against air leakage, light leakage, and EMC.

NB: Please take care that the earth cable to the cover panel does not get stuck in between the cover panel and the system, since this will cause air leakage.

Install wiring for Manual Activation Button input

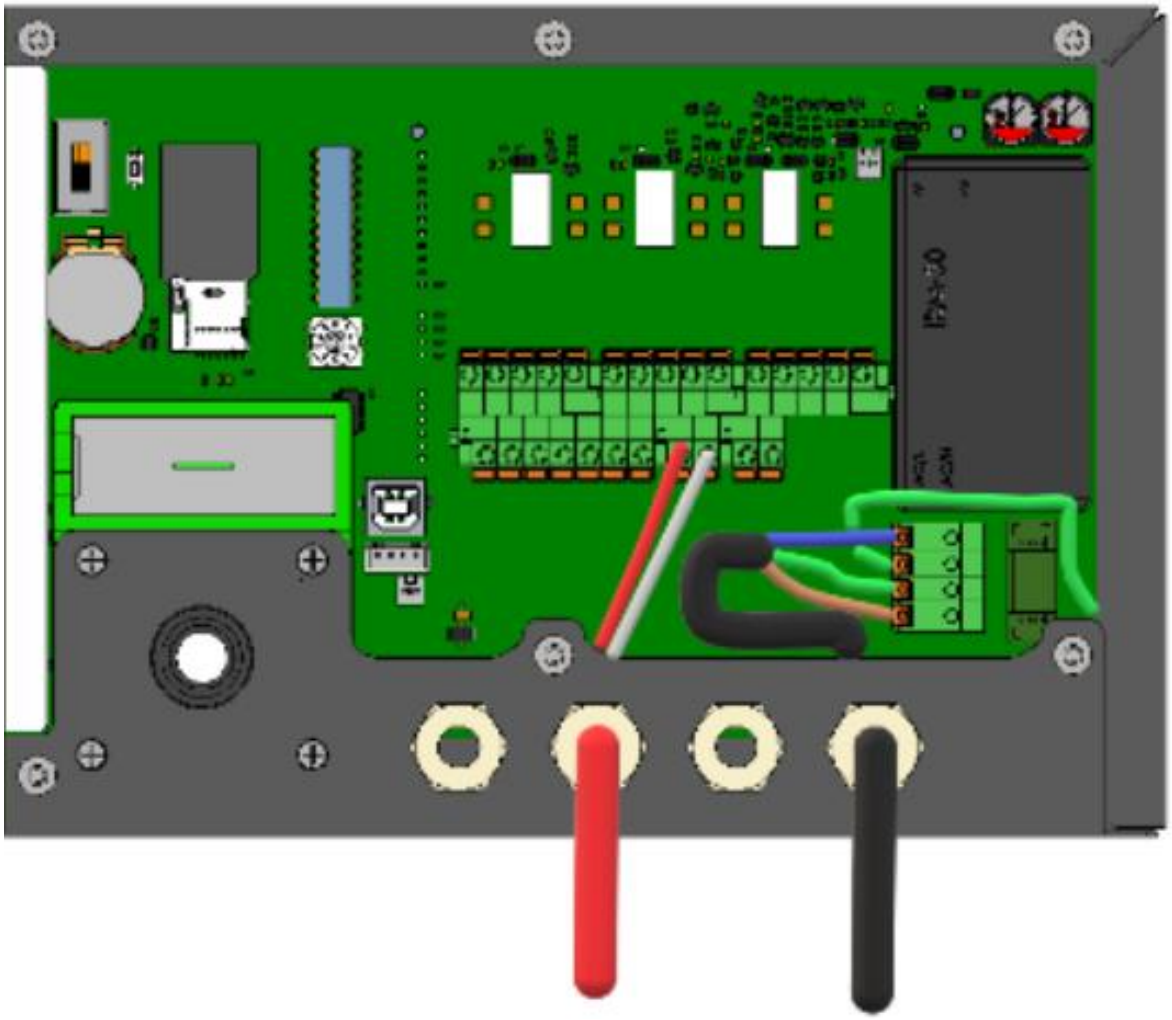


Figure 20 Wiring for Manual Activation input

One contact is provided to connect a Manual Activation Button (MAB), typically using a screened, fire-resistant, two core cable.

The type of MAB to be used is a conventional type of MAB with a normally open contact in series with a 470 Ohm resistor, e.g. the DM1103-L Code A5Q00017630 (see Figure 21).

The cable to the MAB must be terminated with a 1k Ohm resistor at the MAB side of the cable.

Choose the most appropriate cable gland for the MAB contact to be used.

Strip an appropriate amount of the outer sheath away and strip the conductors before inserting into the cable gland. Ensure that the gland seals tightly against the outer sheathing, providing both physical support for the cable, and an airtight seal. Failure to do this will result in increased fault indications since the sampled air flow rate will be less stable.

Keep any excess cable inside the box to a minimum. Excessive looping of “spare” cable will compromise EMC tolerance, and could lead to increased false alarms.

Push the cables into the terminal block which is labelled MAB.

If any cable glands remain unused, they must be fitted with the blanking plugs provided. Failure to do this can result in increased false alarms since the sampled air flow rate will be less stable.

Once all connections have been made and the configuration settings have been changed (set DIP switch for MAB, see Chapter 5), the rear cover must be refitted, with all screws to provide a good seal against air leakage, light leakage, and EMC.

NB: Please take care that the earth cable to the cover panel does not get stuck in between the cover panel and the system, since this will cause air leakage.

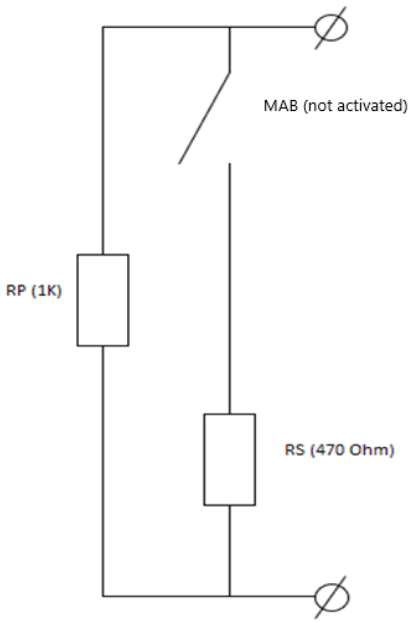


Figure 21 Wiring for Manual activation button

Install wiring for door switch input

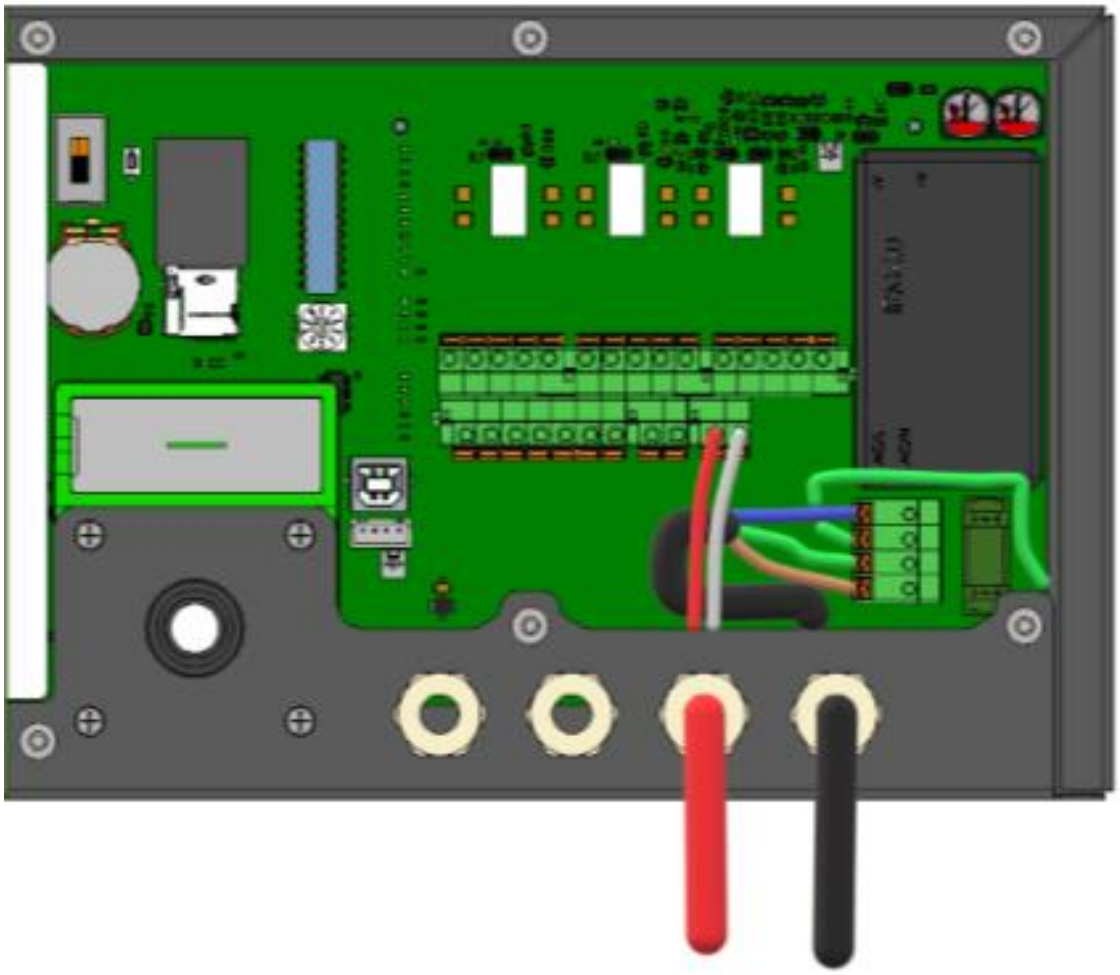


Figure 22 Wiring for Door switch input

One contact is provided to connect a Door Switch, typically using a screened, fire-resistant, two core cable.

The type of Door Switch to be used is a switch that is closed when the door is closed and open when the door is open. A 470 Ohm resistor should be placed in series with the door switch.
The cable to the Door Switch must be terminated with a 1k Ohm resistor at the Door Switch side of the cable.

In case multiple Door Switches must be connected to the FIRETRACE system, these switches should be put in series as shown in Figure 23 and Figure 24.

Choose the most appropriate cable gland for the Door Switch contact to be used.

Strip an appropriate amount of the outer sheath away and strip the conductors before inserting into the cable gland. Ensure that the gland seals tightly against the outer sheathing, providing both physical support for the cable, and an airtight seal. Failure to do this will result in increased false alarms since the sampled air flow rate will be less stable.

Keep any excess cable inside the box to a minimum. Excessive looping of “spare” cable will compromise EMC tolerance, and could lead to increased false alarms.

Push the cables into the terminal block which is labelled Door SW.

If any cable glands remain unused, they must be fitted with the blanking plugs provided. Failure to do this can result in increased fault indications since the sampled air flow rate will be less stable.

Once all connections have been made and the configuration settings have been changed (set DIP switch for Door Switch, see Chapter 5), the rear cover must be refitted, with all screws to provide a good seal against air leakage, light leakage, and EMC.
NB: Please take care that the earth cable to the cover panel does not get stuck in between the cover panel and the system, since this will cause air leakage.

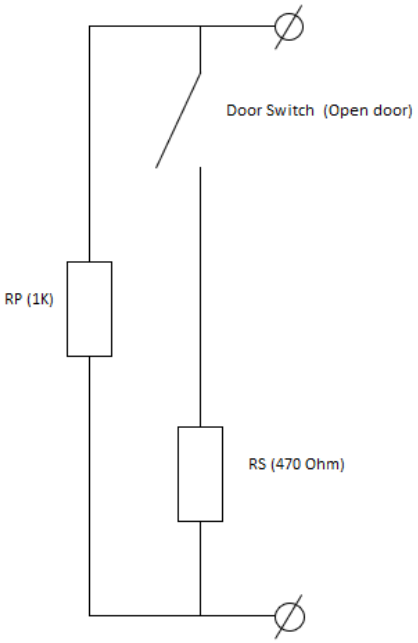


Figure 23 Wiring for single Door switch input

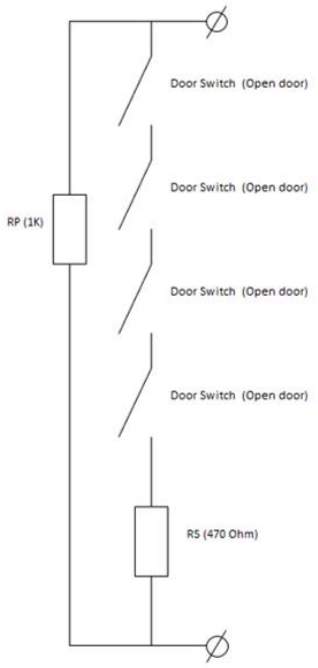


Figure 24 Wiring for Serial contact (multiple) Door switches

Connecting the Battery

In case no battery is installed in the system yet, the battery can now be connected to the unit. Lift the top cover after releasing the screws. Remove the plastic transport covers from the battery terminals and discard.

Connect the red cable to the red terminal, and the black cable to the black terminal. Incorrect connection will cause the safety fuse to blow. This must only ever be replaced by a fuse of the same value.
Once the connections are made correctly, the top cover must be refitted, being careful not to trap or disturb any internal wiring.

Verify that the power ON/OFF switch (see Figure 12) is in the ON position to connect the battery to the main board.

Pushing the Battery push button (located at the right next to the power ON/OFF switch) will start up the system, even when mains power has not been connected to the system. The system can be switched off by switching the power switch in the OFF position. Note: in this case there will still be mains power connected to the system!

NOTE: do not switch the system on before configuring the system as described below. System configuration will be determined at system start-up and changes in DIP switch settings will not be recorded after system start-up!

4.4 Placement UI box

These are the steps for place the UI box on a different side:

1. Disconnect the 15-pin D-sub connector from the electronics box shown in blue, remember to remove the screws before taking it out.

Figure 25 remove connector

2. Take the cable out of cable clips and remove the cable ties

3. Remove the screws that fasten the UI box to the base enclosure. Lift the UI box so that the lower locking screw are relived from the key holes

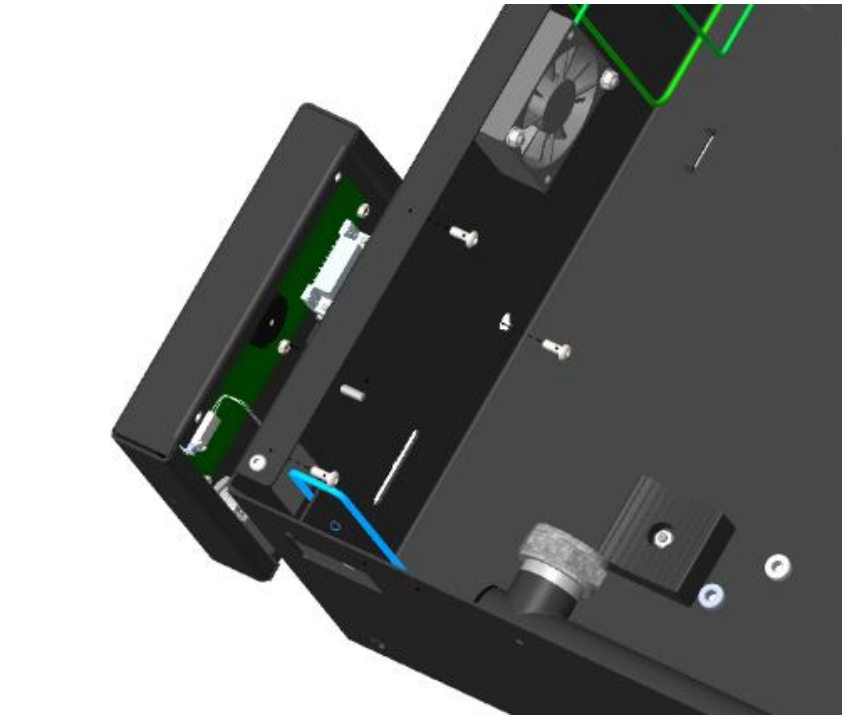


Figure 26 remove UI box

4. Guide the cable through the rectangular hole in the base enclosure, shown by the red circle below.

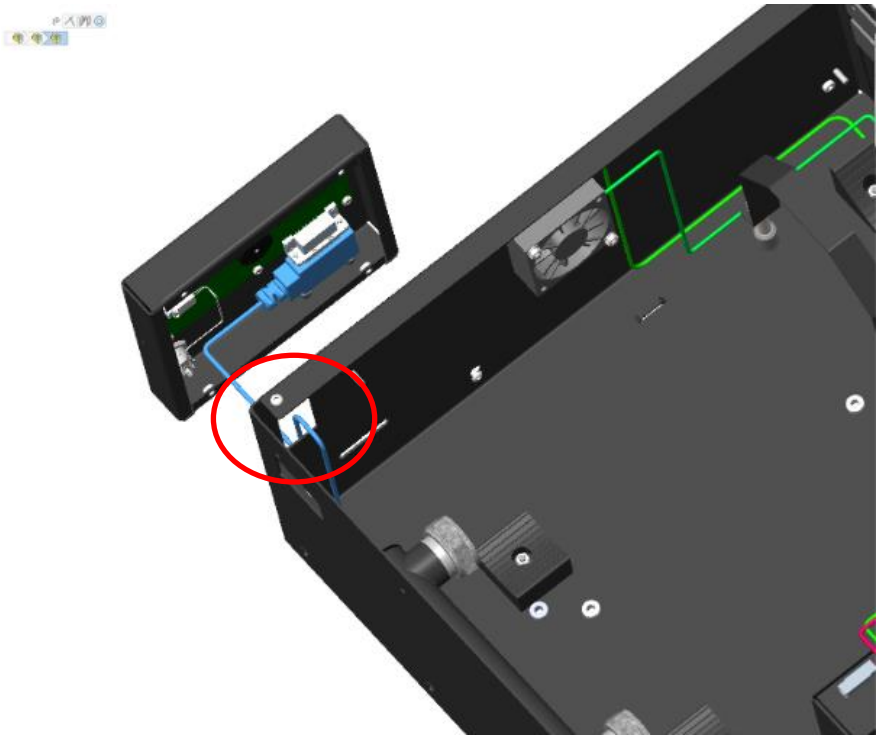


Figure 27 rectangular hole

5. Guide the cable into the rectangular hole at the new position for the UI box

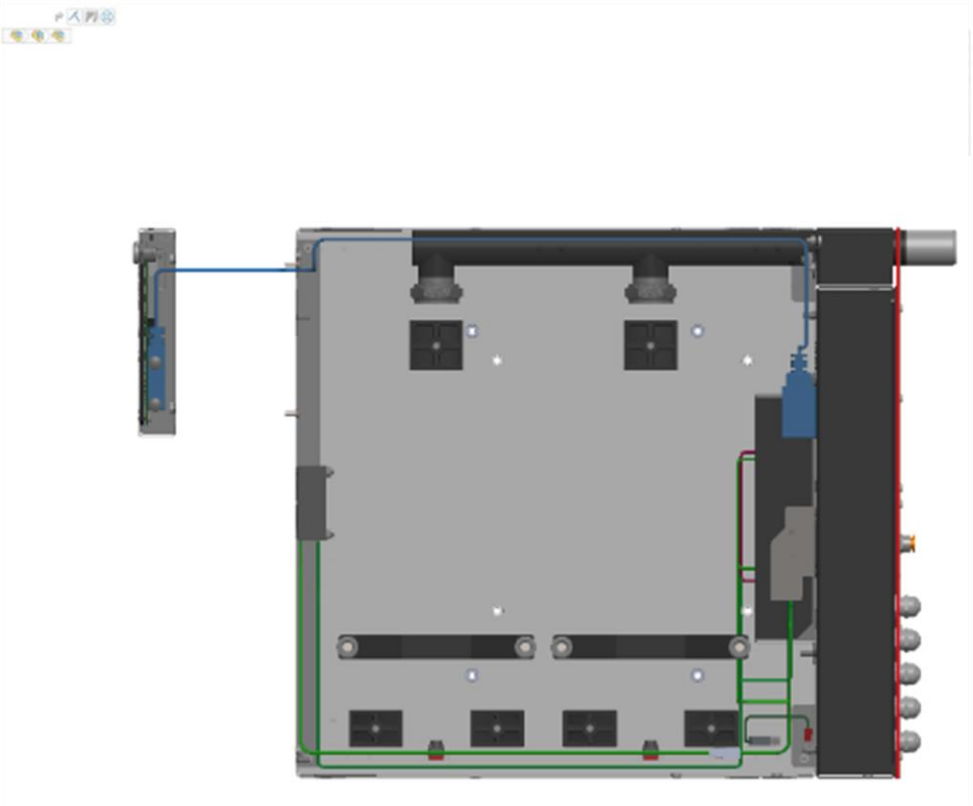


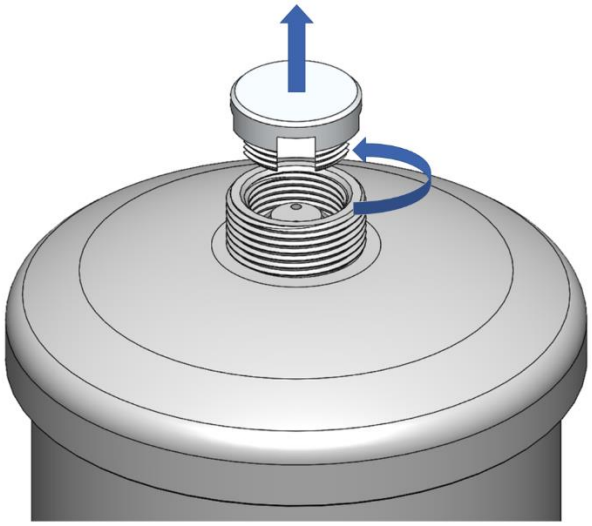
Figure 28 placing the UI

6. Fasten the UI box with the screws.
7. Fasten the cable into the cable clips and reconnect the 15-pin D-sub connector to the electronic box, remember to screw in the connector using the two screws on the connector.
8. Wind up the excess cable and tie it up with a cable tie

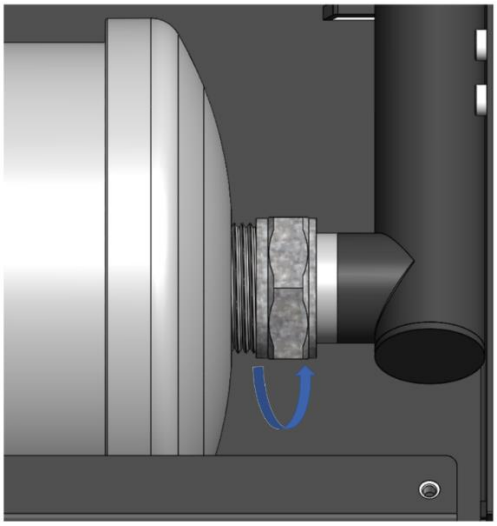
4.5 Installation of the CGG

The CoolGen Generator (CGG) is now installed by following the steps shown below.

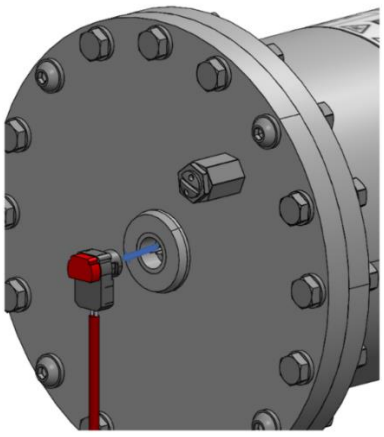
1. Remove the anti-thrust nozzle from the CGG.

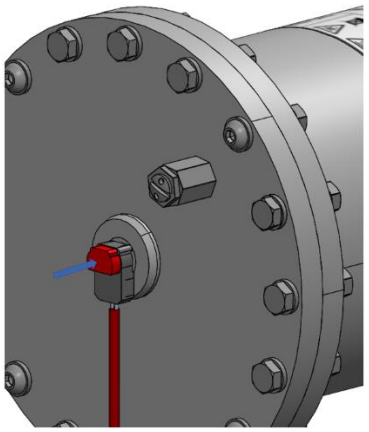


2. Connect the CGG to the manifold by tightening the nut using the 36 mm wrench.

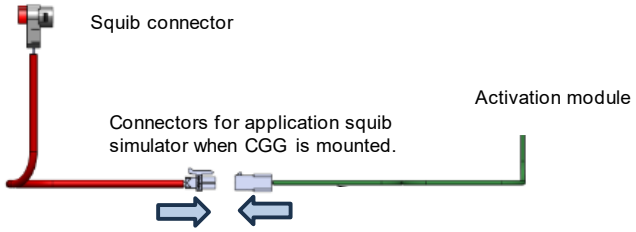


3. After the installation and commissioning (squib simulator) connect the squib cable to the squib and press the button to finalize the connection.





4. Connect the squib cable connected to the CGG (red) to the squib cable connected to the PCB (green).



5. Secure the CGG with the clamp in the system using the bolts that are incorporated, remove the spacers beforehand.

5 Configuration

Several DIP switches are provided for installer level configuration settings. The switches can be found directly above the air filter behind the rear right access panel. The switches are clearly numbered 1-10 + M and T and can be set to ‘OFF" or ‘ON’ or 0 or 1.

Also one rotary Switch, labelled “S”, is provided. This switch can be set to a value of 0 to 10.

Note 1: Switch settings will not take effect unless the system is restarted.

Note 2: DIP switches 2, 3, 4, 5, 6 and 7 need to be set on the Master system only. These configuration settings will be sent by the Master system to all connected Slave systems as part of system initialization and the Slave systems will copy these settings from the Master system.

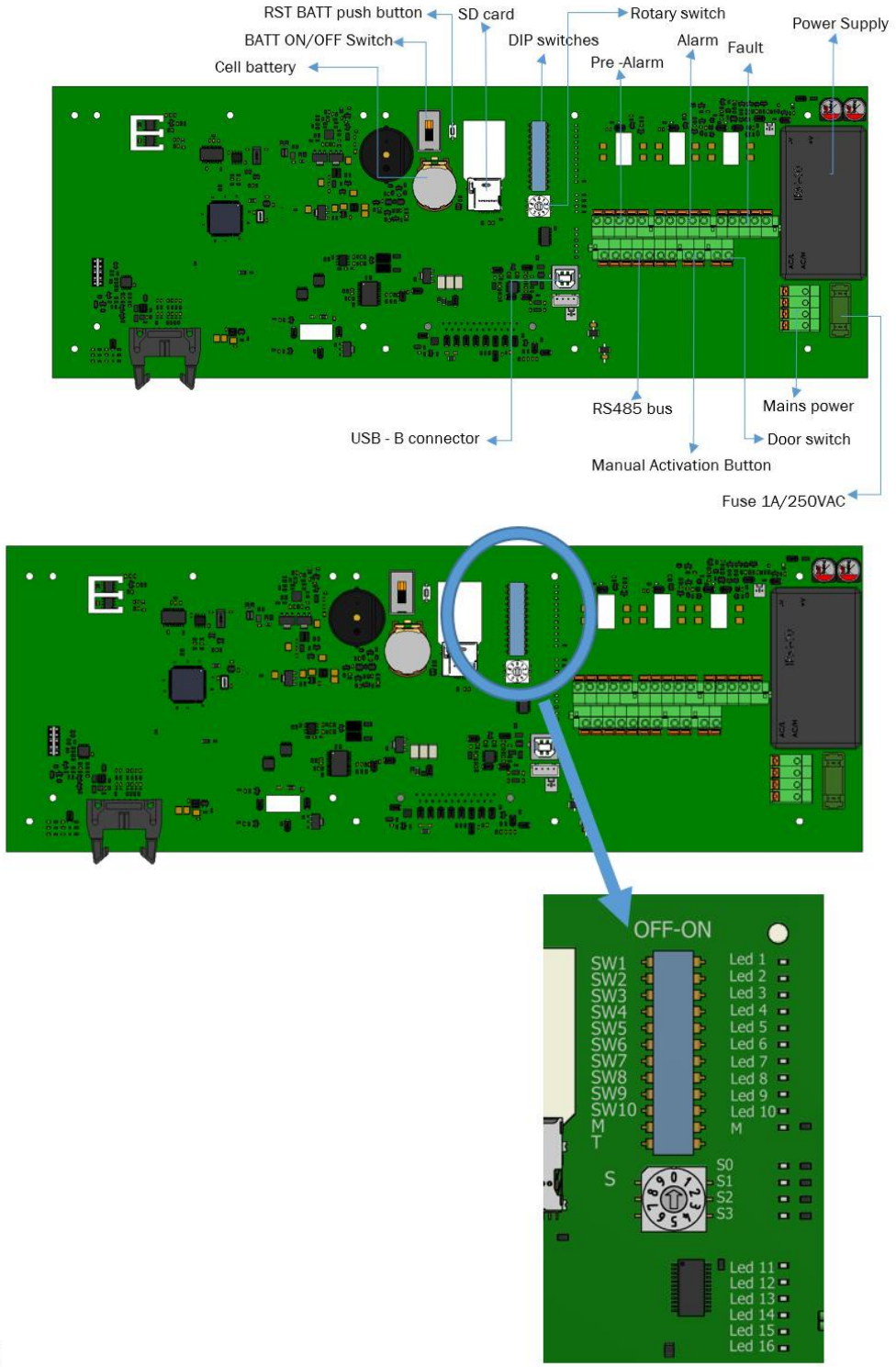


Figure 29 Location of dip switches

The functions and settings for each switch are outlined in Table 7. The switches can easily be set or reset by sliding them to the desired location using a small insulated screwdriver.

DIP Switch	Function
SW1	Reserved (always set to 0)
SW2	Pre-Alarm, Alarm and Fire threshold
SW3	Pre-Alarm, Alarm and Fire threshold
SW4	Gas Release Delay Time
SW5	Gas Release Delay Time
SW6	Sequential/Parallel Gas Release
SW7	Flow Sensitivity Normal/Low
SW8	Reserved (always set to 0)
SW9	MAB
SW10	Door switch
M	Master system (1) or Slave system (0)
T	Terminating resistor RS485 bus (1=connected / 0= not connected)
S	Number of Slave systems/Slave address

Table 7 Configuration switches

5.1 Smoke Sensitivity

Switches 2 and 3 are used to set the smoke sensitivity level. The default setting (low sensitivity) is in line with the nominal value applied to the Apollo XP95 optical detectors which are set at an appropriate detection threshold to meet EN54-7. Higher sensitivity should only be selected for much cleaner applications. Selection of a higher sensitivity threshold could cause a higher rate of false alarms and should be avoided unless the environment is known to be reliably clean throughout the year.

NOTICE Note that changing flow sensitivity from the factory pre-set may compromise local regulations in some areas

Switch 2	Switch 3	Sensitivity
0	0	Low
0	1	Normal
1	0	Enhanced (adv.)
1	1	Clean room

Table 8 Smoke Sensitivity

5.2 Extinguishing Gas Delay

When a fire event is registered, the Alarm status is set and the Alarm relay is closed. After the relay has closed, there is a delay before the first gas generator is initiated. This delay can be set **using DIP switches 4 and 5.**

The delay needs to be optimized to allow time for ventilation fans or air conditioning to reach a standstill; thus, maximizing the effectiveness of nitrogen flooding (by avoiding further introduction of fresh oxygen-rich air).

NOTICE	Note that changing flow sensitivity from the factory pre-set may compromise local regulations in some areas

Switch 4	Switch 5	Total Delay
0	0	Factory 0 s
0	1	5 s
1	0	10 s
1	1	15 s

Table 9 Gas Delay times

NOTICE	Extending the time delay beyond the factory set 10 s may compromise local regulations in some areas.

5.3 Simultaneous Gas Release

The FIRETRACE® CoolGen Max 1gen./2gen./3gen. contains one, two or three CoolGen Generators (CGG's) respectively.

When a CGG is initiated, depending on the ambient temperature it discharges its nitrogen gas in around 10 to 20 seconds.

The CGG's in the FIRETRACE® CoolGen Max 1gen./2gen./3gen. can be initiated simultaneously or sequentially. This provides some flexibility and benefits for several applications, with stringent restrictions on pressure or flow rates.

If simultaneous gas release is selected, all gas is released from the unit as quickly as possible, however, a minimum delay of 10 seconds is always applied between adjacent CGG's to avoid a pressure peak. If sequential gas release is selected, then each CGG is initiated with a 30-s delay between each one. All this can be configured **using DIP switch 6.**

NOTICE	Note that changing flow sensitivity from the factory pre-set may compromise local regulations in some areas

Model	Switch 6	Time delay between 1st to 2nd to 3rd	Comments
CoolGen Max 1 gen.	0 or 1	NA	only 1 CGG
CoolGen Max 2 gen.	0	10 s	Simultaneous
	1	30 s	Sequential
CoolGen Max 3 gen.	0	10 s + 10 s	Simultaneous
	1	30 s + 30 s	Sequential

Table 10 Discharge times

5.4 Flow monitoring sensitivity

The air flow sensor detects changes in air flow, which in turn reflects the status of the sampling pipe, and filter. If the filter or sample pipe is blocked, then the air flow will drop. If the filter is damaged, or the pipe is broken, then the air flow will increase.

In some applications, air flow may be heavily influenced by air conditioning or cooling fans. In this case, it may be attractive to reduce the sensitivity of the flow sensor in order to reduce the frequency of fault events in the system, **using DIP switch 7.**

NB See Note 2 in section 5

Switch 7	Flow Change Sensitivity	Comments
0	High sensitivity	Factory Pre-set
1	Low sensivity	Reduced Sensitivity

Table 11 Flow monitoring sensitivity

NOTICE Note that changing flow sensitivity from the factory pre-set may compromise local regulations in some areas

5.5 Manual Activation Button and Door Switch

A Manual Activation Button (MAB) can be connected to a system to generate an Alarm and subsequent gas release when the operator activates the MAB. The presence of a MAB must be configured, **using DIP switch 9.**

Switch 9	MAB configuration
0	MAB not connected
1	MAB connected

Table 12 Manual Activation Button

A Door Switch (DS), or multiple Door Switches in series, can be connected to a system to prevent a gas release from happening in case one or more of the doors to which the switches are connected are open. The presence of a Door Switch must be configured **using DIP switch 10.**

Switch 10	Door Switch configuration
0	Door Switch not connected
1	Door Switch connected

Table 13 Door switch

Connected Systems in a Master-Slave configuration
The system can be used as a standalone system or can be connected to a number of other FIRETRACE® CoolGen Max systems. In case of connected systems, the systems will behave as one system, whereby each system will perform its smoke detection function and in case one of the systems generates an Alarm all systems will fire their gas generators simultaneously. Also, activation by a Manual Activation Button at one of the connected systems will cause all systems to fire.

In case of connected systems one system must be configured as the Master system and the other systems must be configured as Slave systems, using DIP switch M and rotary switch S. DIP switch T is used to configure terminating resistors on the cable(s) to connect the systems.

In case of a standalone system the following switch settings need to be set: M=1, T=0 and S=0.

(A standalone system is configured as a Master system with no Slave systems. No terminating resistor is connected to the communication bus.)

In case of a configuration where multiple systems are connected the switch settings are explained below.

DIP switch M is used to configure a system as Master system (M=1), or Slave system (M=0). Only one of the connected systems should be configured as Master system and all the others as Slave systems.

Switch M	Master/Slave configuration
0	Slave System
1	Master system (default)

Table 14 Switch M to select Master or Slave system

The meaning of the Rotary switch setting depends on the setting of DIP switch M:

- In case DIP switch M is set to 1, the system is configured as a Master system and the meaning of the value set by the Rotary switch is the amount of Slave systems connected to the Master system. Up to 7 slave systems can be connected to a Master.

  Example: if the Rotary switch is set to 3, the total system configuration consists of 4 systems: 1 Master system and 3 Slave systems.
- In case DIP switch M is set to 0, the system is configured as a Slave system and the meaning of the value set by the Rotary switch is the address of the Slave system. Each Slave system must have a unique slave address.

  Example: if the Master system is configured to have 3 slave systems, three slave systems must be connected to the Master system (in a daisy chain configuration), whereby the three slave systems must be configured to have three different slave addresses, i.e. 1, 2 and 3.

Switch S	Slave address or number of Slaves	Comments
0	0	Factory Pre-set
1	1	
2	2	
3	3	
4	4	
5	5	
6	6	
7	7	
8	Reserved	Do not use
9	Reserved	Do not use

Table 15 Rotary switch S

DIP switch T is used to configure the terminating resistors on the cable(s) to connect the systems:

- In case of a standalone system, T should be set to 0
- In case of connected systems, T should be set to 1, for the first system and the last system in the daisy chain.
- In case of connected systems, T should be set to 0, for the systems between the first and the last system of the daisy chain.

This will result in a daisy chain configuration where the communication bus is terminated at both ends of the daisy chain.

Switch T	Comments
0	Terminating resistor not connected (default)
1	Terminating resistor connected

Table 16 Switch T to select terminating resistor on RS485 bus

6 Commissioning

Once the unit has been correctly and safely fitted to the target application, all electrical and mechanical connections have been made, all checks for safety have been performed, all configuration settings have been made, and all covers have been fitted in place, then the unit can be commissioned.

Before the unit is fully commissioned and activated the installer must instruct the owner on:

1. How to operate the unit, see Chapter 7.
2. What to do when someone is exposed to chemical contents, see the COOLGEN DIOM
3. How to clean spilt material, see the COOLGEN DIOM
4. Fire fighter instructions, see the COOLGEN DIOM
5. When to contact the distributor:
    - A defective unit
    - The unit has released the gas
    - End of life of the system. The
    - End of life of a CGG. See CGG DIOM.

Use the supplied User Instruction Card during the instruction of the owner.

6.1 Commissioning of the flow monitoring system

Commissioning of the flow monitoring system takes 30 hours and during these 30 hours the system will learn its environment, especially the changes in flow rate of the aspiration system during operation. Based on the values measured during the commissioning period the FIRETRACE system will set the limit values for the flow rate of the aspiration system. After completion of the commissioning period the FIRETRACE system will generate a flow fault in case these limit values are exceeded.

A new system will automatically start a commissioning cycle when it is switched on.

The system will show that it is in commissioning mode by blinking the white Master LED (for a system configured as Master system) or Slave LED (for a system configured as Slave system) on the UI panel. This blinking will stop when the commissioning has been completed. The system stores the data collected during the Commissioning cycle and uses this data when it is restarted.

During the commissioning period the system is fully functional, except for the flow monitoring function.

If a system is turned off before completion of the Commissioning cycle it will automatically start a new Commissioning cycle when it is switched on again.

If the flow rate gets too low during the Commissioning cycle the system will generate a Fault condition and show fault code 99 (see Section 7.1 and Table 18). The Commissioning cycle will be stopped but the system will stay fully functional, except for the flow monitoring function. See Section 7.9 for further information in this situation.

If a system is switched on when it has stored data of a completed Commissioning cycle, it will use these data after a warm-up period of 1 hour. During this first hour it will not generate flow faults if the flow limits for the aspiration system are exceeded but will only start doing so after 1 hour of operation.

After a successful commissioning cycle, the system will set the service date for the air filter to one year after the date the commissioning cycle was completed.

Start a new Commissioning cycle

In certain cases, it might be desirable to re-commission a system, e.g. when the environment of the FIRETRACE system has changed and this might influence the air flow of the aspiration system.

1. In order to start a new Commissioning cycle, follow the following procedure: Put the key switch in the SERVICE position (see Section 7.1)
2. Restart the FIRETRACE system (see Section 7.2) and press and hold the RESET ALARM/GAS RELEASED button on the front of the unit during start up and continue to hold the button down until the white Master LED goes on.

If the unit has successfully entered Commissioning mode it will show this by blinking the white Master LED (for a system configured as Master system) or Slave LED (for a system configured as Slave system) on the display.

Note: in case of connected systems the procedure to start a new commissioning cycle can only be done at the Master system. The Master system will then send the commissioning command to all connected Slave systems, so that all connected systems will perform a new commissioning cycle.

7 Operation

The FIRETRACE® CoolGen Max 1gen./2gen./3gen. systems perform the following functions during operation:

- Displaying the system status on the User interface and handling user inputs (see section 7.1)
- Smoke detection and raising an Alarm in case the smoke level exceeds the threshold values related to the selected sensitivity level (see Chapter 7.3)
- Monitoring of the Manual Activation Button (MAB) input and raising an Alarm in case the MAB is activated or raising a Fault condition in case the MAB input shows unexpected values (see section 7.4)
- Monitoring of the Door Switch (DSW) input and inhibiting fire extinguishing in case the DSW inputs indicates an open door or raising a Fault condition in case the MAB input shows unexpected values (see section 7.5)
- Fire extinguishing in case of an Alarm by releasing the nitrogen gas from the CoolGen Generators (CGG's) (in case gas release is not inhibited, e.g. by an open door) (see section 7.7)
- Flow monitoring for the aspiration system and raising a fault condition in case the flow limit levels are exceeded; the flow limit values are determined during the Commissioning procedure, typically performed during system installation (see section 7.9)
- Monitoring of power supply and battery backup system and raising a fault condition in case of loss of mains power or any problem with the power supply or battery (see section 7.10)
- Monitoring of the electrical connection to the CGG's and raising a fault condition in case the electrical connection to the CGG's does not show the right value (see section 7.11)
- Monitoring of the communication between connected systems in case multiple systems are connected via the RS485 bus and raising a fault condition in case of a communication problem over the RS485 bus (see section 7.12)
- Monitoring of service intervals and raising a fault condition in case the system needs servicing (see section 7.13)
- Monitor code execution on the microcontroller, the system fault status LED and fault code displays a problem with code execution (see section 7.14)
- Logging of data to an SD card (see section 7.15)

7.1 User Interface and key switch

The User Interface of an FIRETRACE® CoolGen Max 1gen./2gen./3gen. system consists of a UI control and indicating panel (UI panel) and a 2-position key switch.

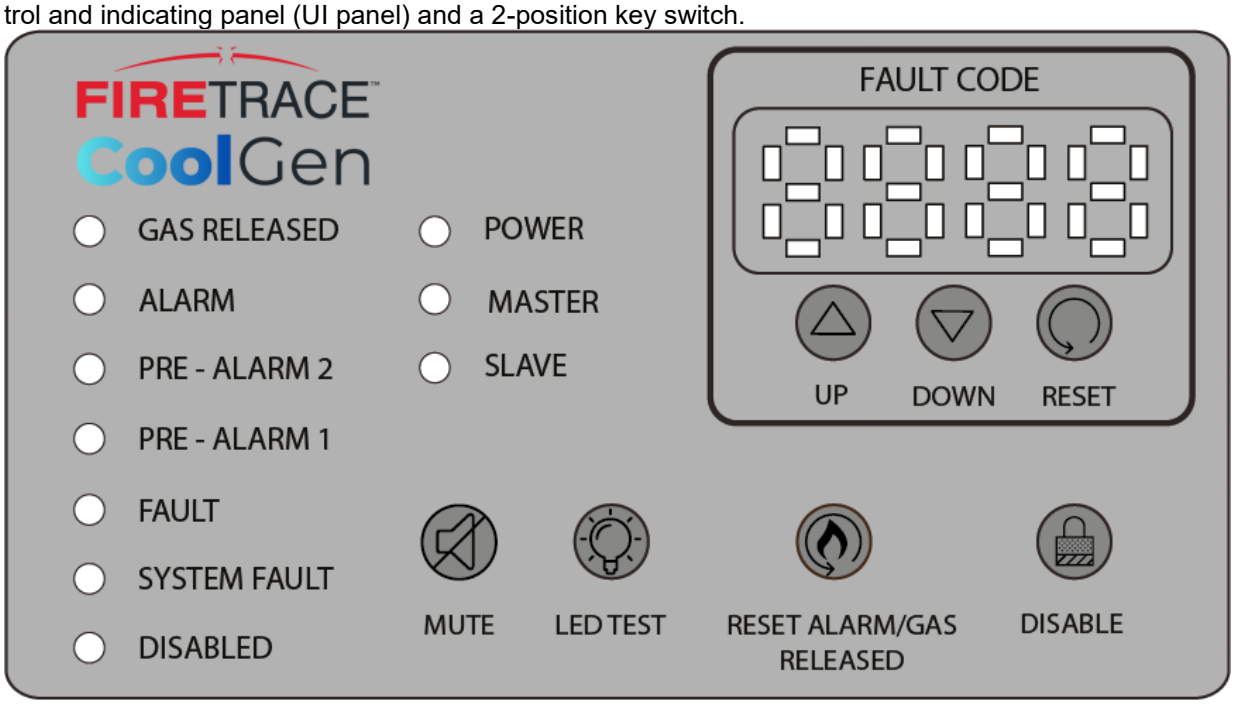


Figure 30 User Interface

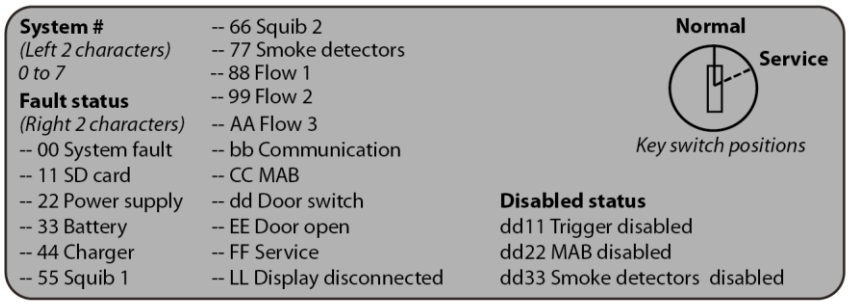


Figure 31 Fault codes

The key switch has two positions:

1. Normal operation (key can be removed in this position)

   This is the standard situation for the key switch and the key should be removed from the key switch. In this position the system will have all functionality for normal operation (access level 1).

2. Service Mode (key cannot be removed in this position)

With the key in this position the system will have a number of additional functionalities which are reserved for access level 2:

- The system can be reboot by simultaneously pressing buttons UP, DOWN and for a number of seconds.
- The system can be put in one of the DISABLED modes by pressing one of the supported DISABLE button combinations; this will switch the DISABLED LED on; The DISABLED mode can be ended by pressing the same DISABLE button combination again. See section 7.6 for more information on the DISABLED mode.
- An Alarm can be reset by pressing the RESET ALARM/GAS RELEASED button. See section for more information on the RESET ALARM/GAS RELEASED operation.
- Certain Fault conditions can be reset by pressing the RESET button under the 4-digit fault code. The following faults (see Table 18) can be reset:
    - Fault code 99 (flow fault 2); see Section 7.9 for further information
    - Fault code AA (flow fault 3); see Section 7.9 for further information
    - Fault code FF (service interval fault); see Section 7.13 for further information
- A new Commissioning cycle can be started by keeping button RESET ALARM/GAS RELEASED pressed for some seconds during system start-up (see Chapter 6)
- The service interval for the system can be set to one year from now by pressing the DISABLE button for some seconds during system start-up (see section 7.13)
- Communication through the USB-B connector on the main board is enabled (access level 3 only). Special software is required to interface to the system via this USB connector.

On the UI panel 10 LEDS are used to indicate the overall system status and a 4-digit alphanumeric display is used to show detailed fault information. A number of push buttons is available to control the system. The functions of the LEDs and push buttons are described in the following table.

Light indicator	**Meaning**	**Sound**
POWER	Green LED is ON when system is powered by Power Supply and/or Battery	
MASTER	White LED is ON when system is configured as Master system in a connected installation or as stand-alone system	
SLAVE	White LED is ON when system is configured as Slave system in a connected installation	
DISABLED	Yellow LED is on when gas release of the system is disabled (switching between DISABLED and NORMAL mode is only possible when Key Switch is in SERVICE position by pushing the DISABLE button (combination))	
SYSTEM FAULT	Yellow LED is ON when main functions of embedded software are no longer executed properly	Intermittent beep (can be muted)
FAULT	Yellow LED is ON when one or more fault conditions are active. See for an overview of all the FAULT CODES and possible fault conditions Table 19	Intermittent beep (can be muted)
PRE-ALARM 1	Red LED is ON when the obscuration level has reached the first threshold value	Continuous beep (can be muted)
PRE-ALARM 2	Red LED is ON when the obscuration level has reached the second threshold value	Continuous beep (can be muted)

ALARM	Red LED is ON when the obscuration level has reached the third threshold value	Continuous beep (can be muted)
GAS RELEASED	Red LED starts blinking as soon as the system starts the initiation of the gas generators and will turn on continuously after gas has been released	Continuous beep
Push Button	**Function**	
UP	Scrolling UP through fault codes if multiple fault conditions occur	
DOWN	Scrolling DOWN through fault codes if multiple fault conditions occur	
RESET	Button is disabled when Key Switch is in NORMAL position. When Key Switch is in SERVICE position a fault code can be reset, if possible for that fault code, by pressing the RESET button	
MUTE	By pressing this button, the buzzer can be silenced	
LED TEST	General test of all LED indicators and buzzer	
RESET ALARM/GAS RELEASED	Only active when the Key Switch is in SERVICE position. This button can reset the Alarm condition and restore the detection capabilities. This function is disabled until 10 minutes after the first generator has been fired. In case the smoke levels remain above Alarm threshold value or a MAB is still activated, the Alarm condition will not be reset when this button is pressed.	
DISABLE	Only active when the Key Switch is in SERVICE position. By pushing this button, the system will disable the gas release (DISABLED LED will turn ON and code dd11 will be shown indicating that gas release is disabled). By pushing the DISABLE button again the gas release capability will be enabled again, and the dd11 code will disappear.	
DISABLE + UP	Only active when the Key Switch is in SERVICE position. By pushing this button combination, the system will disable the Manual Activation Button (DISABLED LED will turn ON and code dd22 will be shown indicating that the MAB is disabled). By pushing the DISABLE button + UP button combination again the Manual Activation Button will be enabled again, and the dd22 code will disappear.	
DISABLE + DOWN	Only active when the Key Switch is in SERVICE position. By pushing this button combination, the system will disable the smoke sensors (DISABLED LED will turn ON and code dd33 will be shown indicating that the smoke sensors are disabled). By pushing the DISABLE button + DOWN button combination again the smoke sensors will be enabled again, and the dd33 code will disappear.	

Table 17 light indicators and push buttons of the User Interface panel

The 4-digit display on the UI panel is used to indicate detailed fault information in case the general FAULT LED is on. The 4-digit display will start blinking when multiple faults are present. When scrolling through the faults, it will stop blinking until 30s achter the last button press.

In case of a standalone system the first two digits of the display are not used and the fault code is displayed as a 2 digit code (XX) only. The disabled codes will stay the same, regardless of standalone or connected (ddXX).
In case of connected systems the fault code is shown as a 4 digit code (N-XX), where

- N = the system number (0 to 7; 0 for Master system, 1-7 for Slave system)
- - = dash sign (-)
- XX = a 2-digit fault code as described in Table 19

In case of a disablement function the following codes can be shown:

- **dd01 = Gas release disabled**
- **dd02 = Manual Activation Button (MAB) disabled**
- **dd03 = Smoke sensors disabled**

The Master system shows all fault codes of all connected systems. A Slave system shows the fault codes of that slave system only.

Examples:

1. For a standalone system that has a mains power fault the UI panel will look like this:

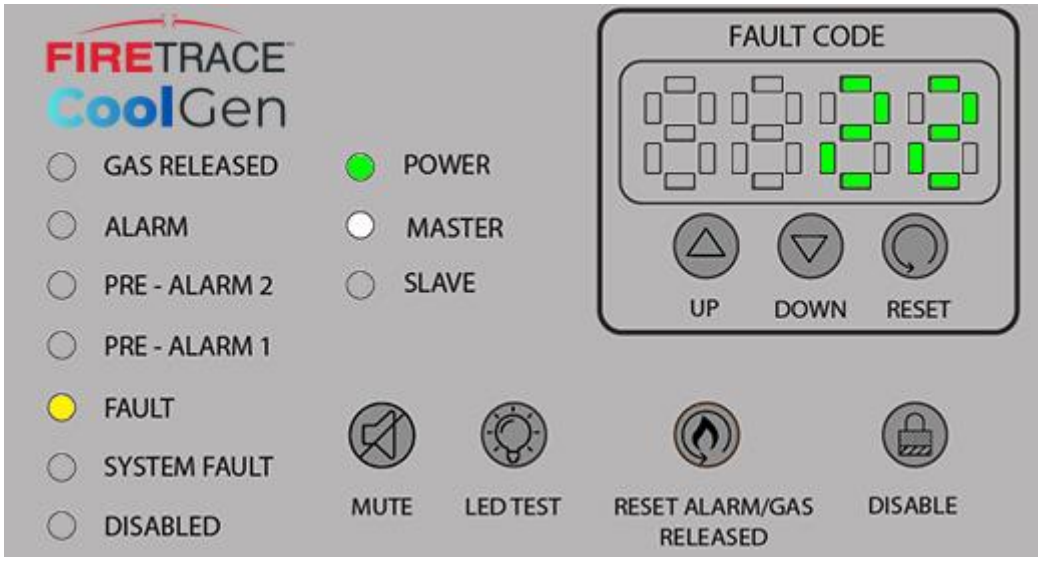


Figure 32 Mains fault on UI

2. For a Master system (connected to Slave system(s)) that has a battery fault, the UI panel will look like this:

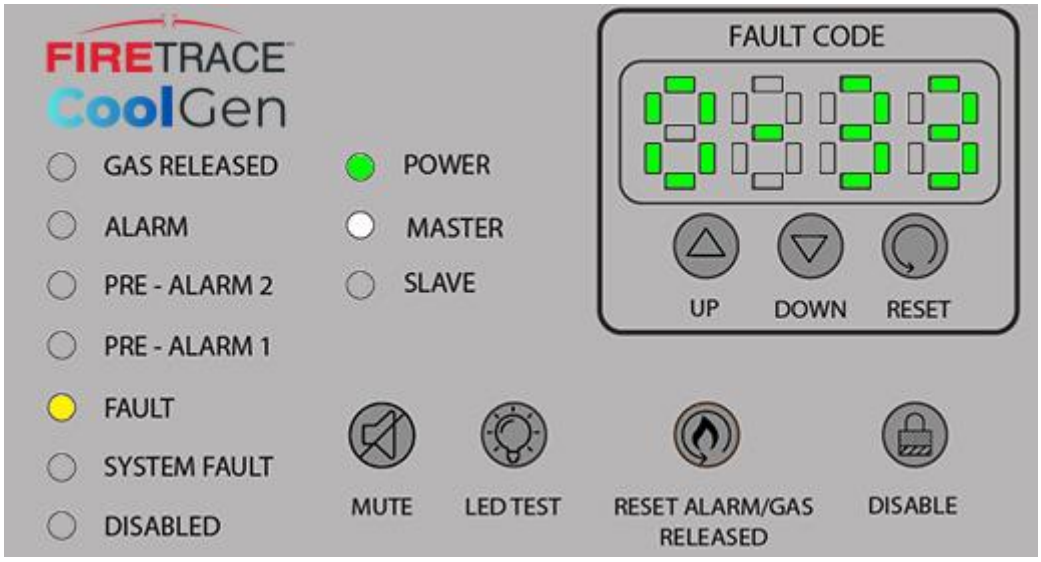


Figure 33 UI Battery fault master

3. For slave system #2 that has a Door Open fault, UI panel will look like Figure 34 (this same fault code will also be show on the display of the master system)

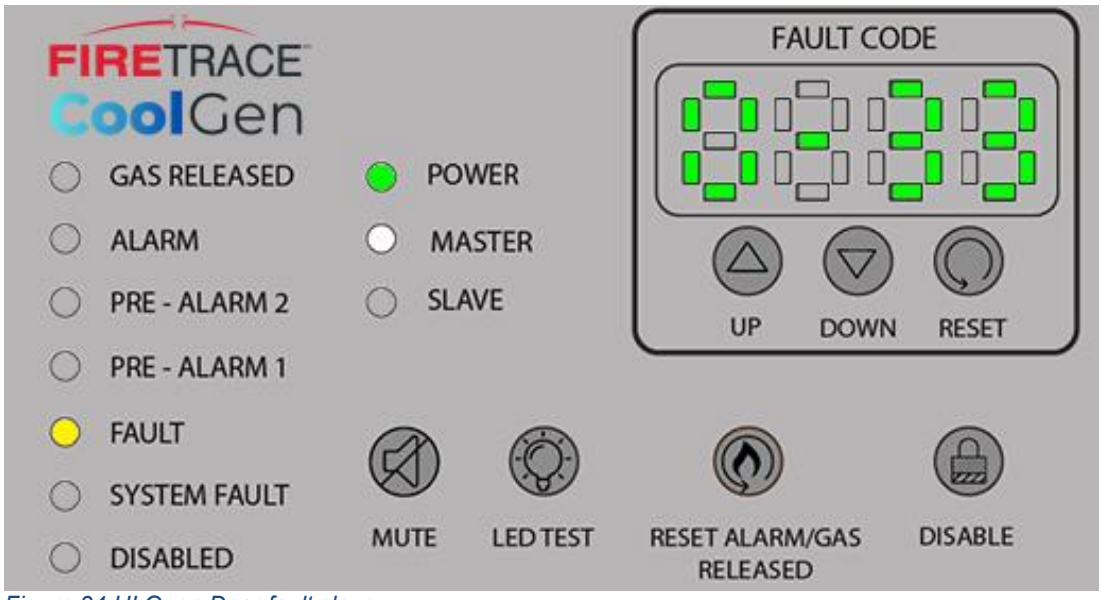


Figure 34 UI Open Door fault slave

In case multiple fault conditions are active, only the most recent one will be shown on the display. The display will start blinking to indicate the presence of multiple faults. The UP and DOWN push buttons can then be used to scroll through the fault codes.

Fault conditions	Fault code displayed on 7-segment display
System fault	00
SD card fault	11
Mains Power fault, system continues normal operation on battery (check mains connection)	22
Battery fault	33
Charger fault	44
Squib fault 1, One or more squibs don't have the correct resistance value **before** firing	55
Squib fault 2, One or more squibs don't have the correct resistance value **after firing**	66
Smoke detector fault	77
Flow fault 1, air flow exceeds upper or lower level threshold value (check air filter, air sampling tube)	88
Flow fault 2, air flow value too low during commissioning	99
Flow fault 3, flow sensor doesn't reach required temperature difference	AA
Communication fault, communication error between Master-Slave systems	bb
Manual Activation Button fault	CC
Door switch fault	dd
Door Open	EE
Service interval notification	FF
Disconnected display	LL

Table 18 Fault codes

Disabled codes	Disabled code displayed on 7-segment display
Trigger disabled	dd11
MAB disabled	dd22
Smoke sensor disabled	dd33

Table 19 Fault codes

Main board LEDs

The main board contains 16 status LEDS which correspond to the fault codes that are displayed on the 7-segment display of the User Interface (see Figure 29 or the location of these LEDS near the DIP switches).

Fault description	Colour	NEXT to DIP switches
SD card fault	Red	Led 1
Mains Power fault	Red	Led 2
Battery fault	Red	Led 3
Battery charger fault	Red	Led 4
Squib fault before firing	Red	Led 5
Squib fault after firing	Red	Led 6
Smoke detector fault	Red	Led 7
Flow exceeding threshold fault	Red	Led 8
Flow too low during commissioning	Red	Led 9
Flow fault 3	Red	Led 10
RS485 communication fault	Red	Led 11
Manual Activation Button fault	Red	Led 12
Door switch fault	Red	Led 13
Door Open fault	Red	Led 14
Service interval notification	Red	Led 15
Commissioning mode	Red	Led 16

Table 20 Led fault descriptions

7.2 Turning system ON and OFF and Resetting the system

A system can be turned ON by:

1. Make sure that the power ON/OFF switch (Figure 12) is in its ON position (Factory setting)
2. Connect the system to mains power and switch mains power on. The system will start up.
3. If the system is not connected to mains power it can still be started up from battery power by pushing the RST BATT push button next to the power ON/OFF switch.

A system can be turned OFF by the ON/OFF switch on the main board. Note that in that case mains power will still be connected to the system.

There are three ways to reset an FIRETRACE® CoolGen Max 1gen./2gen./3gen. system:

1. A hard system reset by switching off power from the system and then power the system back up again (only accessible at access level 3 for Installers).
    a. The system can be switched off by just switching off the PSU and battery power with the ON/OFF switch on the main board. Note that in that case mains power will still be connected to the system. Switching the system back on can be done by putting the ON/OFF switch back in its ON position; if mains power is connected to the system the system will then start up; if mains power is not connected to the system the system can be started from battery power by pushing the battery push button next to the ON/OFF switch (See Figure 12).
2. By putting the key switch in Service position and then pressing the buttons UP, DOWN and RESET on the UI panel simultaneously for three to five seconds (accessible at access level 2; this requires ownership of the key for the key switch)
    a. This will cause a warm reboot of the system
3. Slave systems will also restart when the Master system they are connected to is restarted.
    a. This means that all systems that are connected can be restarted by resetting the Master system. The Master system will send reset commands to all connected Slave systems, causing a warm reboot of the Slave systems.

If an FIRETRACE system is reset it will read its DIP switch settings and configure itself. Changed DIP switch settings will only take effect after a restart/reboot of the system.

7.3 Smoke detection and Alarm

The system continually monitors the status within the protected space by taking air samples and testing it for smoke. Air is drawn into the FIRETRACE® CoolGen Max 1gen./2gen./3gen. using a centrifugal fan.

The air is filtered through a high-grade filter, which allows the broad range of smoke particles to pass freely through, while preventing harmful dust ingress. This minimizes the chance of false alarms caused due to solid particulates and insects, while maintaining a high throughput.

The carefully filtered air is then passed into the detection chamber, where three high-sensitivity optical smoke detectors are exposed to the same sample. Each of the three calibrated detectors can build up a reliable histogram of smoke obscuration data, and thus provide a reliable output in its own right. This temporal reliability is then fortified by redundancy, by using the three detectors to vote simultaneously. This provides an exceptionally reliable means to detect a fire, which reduces false alarms, and avoids dropping the gas unnecessarily.

The sensitivity level of the smoke detection system can be configured as described in Section 5.1. Factory settings are set at the lowest of four sensitivity level.

Each sensitivity level has 3 threshold values: for Pre-alarm 1, Pre-alarm 2 and Alarm.

When the threshold value for Pre-alarm 1 is exceeded the PRE-ALARM 1 LED on the UI panel will go ON, the buzzer will go on (continuous sound) and the Pre-alarm relay will be activated, resulting in the NO contacts to close. The buzzer can be muted by pressing the MUTE button on the UI panel.

In case the smoke concentration drops below the Pre-alarm 1 threshold value the PRE-ALARM 1 LED on the UI panel will be switched OFF, the buzzer will be switched off and the Pre-alarm relay will be deactivated, resulting in the NO contacts to open.

When the threshold value for Pre-alarm 2 is exceeded the PRE-ALARM 2 LED on the UI panel will go ON and the buzzer will go on (continuous sound). This is an extra indication on the UI panel that the smoke concentration in the protected volume is increasing. The buzzer can be muted by pressing the MUTE button on the UI panel.

In case the smoke concentration drops below the Pre-alarm 2 threshold value the PRE-ALARM 2 LED on the UI panel will be switched OFF.

When the threshold value for Alarm is exceeded the ALARM LED on the UI panel will go ON and the Alarm relay will be activated, resulting in the NO contacts of this relay to close. The buzzer will go on (continuous sound). This is a countdown to the start of fire extinguishment. The duration of this count down is dependent on the configuration setting for Extinguishing Gas Delay (see Section 5.2) and has a minimum duration of 0 seconds and a maximum duration of 15 seconds.

At the end of the countdown fire extinguishing will start, indicated by a continuous sound. This process is described in Section 7.7.

The Alarm state will remain active even when the smoke concentration drops below the threshold value for Alarm. The Alarm state can only be reset by the RESET ALARM/GAS RELEASED procedure described in Section 7.2.

7.4 Manual Activation Button

When a Manual Activation Button (MAB) is connected to a system the configuration settings for this system must be set accordingly (see Section 5.5).

In case of connected systems this configuration setting must be made on the system to which the MAB is connected. Example: in a configuration with 2 connected systems and a MAB connected to the Slave system only, the configuration setting on the Slave system should be set for MAB connected and the configuration setting on the Master system should be set for MAB not connected.

In case configuration is set to no MAB connected nothing should be connected to the MAB input of the FIRETRACE system so that the system sees open circuit on this input.

In case the MAB connection and MAB configuration settings do not match during system start-up or when the MAB is in activated state during system start-up the system will show an MAB fault (code CC on the 4-digit display of the UI panel). Make sure that MAB installation and configuration settings match and reset the MAB before starting up the system.

When the system is in operation and the MAB is activated the ALARM LED on the UI panel will go ON and the Alarm relay will be activated, resulting in the NO contacts of this relay to close. The buzzer will go on (continuous sound). This is a countdown to the start of fire extinguishment. The duration of this count down is dependent on the configuration setting for Extinguishing Gas Delay (see section 5.2) and has a minimum duration of 0 seconds and a maximum duration of 15 seconds.

At the end of the countdown fire extinguishing will start, indicated by a continuous sound. This process is described in Section 7.7.

The Alarm state will remain active even when the MAB is reset. The Alarm state can only be reset by the procedure described in Section 7.8.

Note: The PRE-ALARM 1 and PRE-ALARM 2 LEDs will not be switched on and the Pre-Alarm relay will not be activated when the MAB is activated.

7.5 Door Switch

When a Door Switch (DSW) is connected to a system the configuration settings for this system must be set accordingly (see Section 5.5).

In case of connected systems this configuration setting must be made on the system to which the DSW is connected. Example: in a configuration with 2 connected systems and a DSW connected to the Slave system only, the configuration setting on the Slave system should be set for DSW connected and the configuration setting on the Master system should be set for DSW not connected.

In case the DSW configuration is set to “no DSW connected” nothing should be connected to the DSW input of the FIRETRACE system so that the system sees open circuit on this input.

In case the DSW connection and DSW configuration settings do not match during system start-up the system will show a DSW fault (code dd on the 4-digit display of the UI panel). When the DSW is in open state during system start-up the system will show a Door Open fault (code EE on the 4-digit display of the UI panel). Make sure that DSW installation and configuration settings match and close the DSW (by closing the corresponding door(s) before starting up the system.

When the system is in operation and the DSW is opened the Fault state is entered and the FAULT LED on the UI panel will go ON, the Door Open fault code (EE) will be shown on the 4-digit display of the UI panel and the Fault relay will be activated, resulting in the NC contacts of this relay to close. The buzzer will go on (intermittent sound signal). The buzzer can be muted by pressing the MUTE button on the UI panel.

The effect of the Open Door fault status is that fire suppression will be blocked: in case of an Alarm condition the system will not release its gas; instead, the system will remain in an endless countdown, indicated by a continuous beep and the ALARM LED on; at the same time the Door Open Fault condition remains active (FAULT LED on and Fault code EE displayed).

This condition can be ended in different ways:

1. By closing the door(s) so that the DSW is closed: if the Alarm condition is still active, this will start the fire extinguishing (see section 7.7)
2. By resetting the Alarm condition (see Section 7.8); this will only be successful when the smoke level has dropped below the Alarm level and/or the MAB has been reset. After the Alarm condition has been reset, the door can be closed; there will be no fire extinguishing.
3. By first putting the system in TRIGGER DISABLED (see section 7.6) and then closing the door(s) so that the DSW is closed: in this case the system will stay in Alarm condition but the gas will not be released as long as the fire extinguishing is disabled. A RESET ALARM/GAS RELEASED procedure (see Section 7.8) can then be performed in order to reset the Alarm condition.

7.6 DISABLE Fire Extinguishing

The FIRETRACE® CoolGen Max 1gen./2gen./3gen. systems provide three different disable functions:

TRIGGER DISABLE operation:

1. Put the key switch in SERVICE position
2. Press the DISABLE button on the UI panel
3. The DISABLED LED on the UI panel will switch ON and display dd11 on the alpha numeric display to indicate that the system is in TRIGGER DISABLED mode; fire extinguishing is disabled in this mode, but all other functions will work normally:
    a. The smoke detection function will continue working in TRIGGER DISABLED mode, allowing activating the Alarm condition; however, the system will not release the gas.
    b. Activating the MAB will activate the Alarm condition; however, the system will not release the gas.
    c. The relay outputs Alarm and Fault will function normally in TRIGGER DISABLED mode.

DISABLE Manual Activation Button (MAB):

1. Put the key switch in SERVICE position
2. Press the DISABLE button + UP on the UI panel
3. The DISABLED LED on the UI panel will switch ON and display dd22 on the alpha numeric display to indicate that the system is in MAB DISABLED mode; the manual activation button is disabled in this mode, but all other functions will work normally:
    a. The smoke detection function will continue working in MAB DISABLED mode, allowing activating the Alarm condition. The system will release gas normally
    b. Activating the MAB will not trigger an alarm condition
    c. The relay outputs Alarm and Fault will function normally in MAB DISABLED mode.

DISABLE smoke sensors:

4. Put the key switch in SERVICE position
5. Press the DISABLE button + DOWN on the UI panel
6. The DISABLED LED on the UI panel will switch ON and display dd33 on the alpha numeric display to indicate that the system is in SMOKE SENSOR DISABLED mode; the smoke sensors are disabled in this mode, but all other functions will work normally:
    d. The smoke detection will be disabled in SMOKE DISABLED mode and will not trigger an alarm condition.
    e. Activating the MAB will activate the Alarm condition; the system will release the gas normally.
    f. The relay outputs Alarm and Fault will function normally in TRIGGER DISABLED mode.

The system can be put back in normal mode (ENABLED) by performing the following operation:

ENABLE operation (all disablement codes):

1. Put the key switch in SERVICE position
2. In case TRIGGER is disabled: Pressing the DISABLE button again will reset the Trigger DISABLED mode and code dd11 will disappear
3. In case the Manual Activation Button is disabled: Pressing the DISABLE button + UP button again will reset the MAB DISABLED mode and code dd22 will disappear
4. In case the Smoke sensors are disabled: Pressing the DISABLE button + DOWN button again will reset the SMOKE SENSOR DISABLED mode and code dd33 will disappear
5. The DISABLED LED on the UI panel will switch OFF in case all three disable modes are switched off

Notes:

1. The DISABLE button is disabled when the key switch is in Normal operation position
2. **When the system is switched from TRIGGER DISABLED mode back to ENABLED mode while the Alarm condition is still active and the system has not released its gas yet, the system will start a fire extinguishing sequence and release its gas (unless the DSW indicates an open door)!**

7.7 Fire Extinguishing

In order to start fire extinguishing the following conditions must be met:

1. An Alarm condition must be set either by the smoke detection system or by activation of the Manual Activation Button (MAB)
2. Fire extinguishing must not be blocked by an Open Door Switch (see Section 7.5)
3. The system must not be in TRIGGER DISABLED mode (see Section 7.6)
4. The countdown period after start of the Alarm condition has passed (see Sections 7.3 and 7.4)

If all these conditions are met the system will start extinguishing the fire by releasing the nitrogen gas:

1. During the gas release there will be a continuous beep that can be muted by pressing the MUTE button on the UI panel and the GAS RELEASED LED will be blinking
2. There will be a delay between firing adjacent gas generators dependent on the chosen release mode (see Section 5.3)
3. After all generators have been fired the GAS RELEASED LED will be switched ON continuously; the continuous beep will still be on and can be muted by pressing the MUTE button on the UI panel.
4. The aspiration fan will be stopped in order to increase the HOLD time of the system, i.e. the time that the oxygen level stays below a defined threshold value.
5. The cooling fan(s) of the system will be switched on in order to cool the gas generators as they will get hot after gas release. The cooling fans will be switched off after 4 hours.

After the system has deployed its gas the system will show the following status:

1. The ALARM and GAS RELEASED LEDS are ON
2. In case the Alarm condition was set by the smoke detection system also the PRE-ALARM 1 and PRE-ALARM 2 LEDS are ON; in case the Alarm was activated by the MAB these two PRE-ALARM LEDS will be OFF
3. The buzzer will be on (continuous beep) and can be muted
4. The cooling fan(s) will be on

Keep the system powered if possible and call your installer/distributor.

7.8 Reset Alarm/Gas Released

When an FIRETRACE® CoolGen Max 1gen./2gen./3gen. system shows the Alarm condition it will remain doing so even when the smoke level drops to normal values or when the MAB has been reset.

The Alarm condition can only be reset by a RESET ALARM/GAS RELEASED operation. Please not that during a RESET ALARM/GAS RELEASED operation, the TRIGGER ENABLE cannot be manipulated

RESET ALARM/GAS RELEASED operation:

1. Put the key switch in SERVICE position
2. Press the RESET ALARM/GAS RELEASED button on the UI panel
3. The system will restore the functional conditions as follows:
    a. During the Reset ALARM/GAS RELEASED operation the ALARM LED will blink; in case the GAS RELEASED LED and PRE-ALARM LEDs were on before the RESET ALARM/GAS RELEASED operation, these LEDs will blink as well
    b. In case the system has released the gas, the aspiration fan will be switched on again and the system will resume its smoke detection function
    c. The Alarm condition (No Alarm, PRE-ALARM 1, PRE-ALARM 2, ALARM) will be restored after 20 seconds, based on actual smoke level and Manual Activation Button status. The PRE-ALARM 1, PRE-ALARM 2 and ALARM LEDs, the Pre-Alarm and Alarm relays and the buzzer will be set according to the actual Alarm condition.

Notes:

1. The RESET ALARM/GAS RELEASED button is disabled when the key switch is in Normal operation position
2. The RESET ALARM/GAS RELEASED button is disabled during gas release and the first 10 minutes after initiation of the gas release (Hold time)
3. In case a Manual Activation Button was activated the Alarm condition cannot be reset until the MAB has been reset
4. During a RESET ALARM/GAS RELEASED operation, the Trigger DISABLED mode cannot be changed.

7.9 Flow monitoring

The air flow of the smoke aspiration system is monitored in accordance to EN54-20.

During commissioning of the flow monitoring system (see Section 6.1) flow variations during normal operation are measured and at the end of commissioning threshold values are set relative to the minimum and maximum flow values measured during the commissioning period.

The sensitivity of the flow monitoring function can be set to normal or low, as described in Section 5.4. Factory settings are set to normal sensitivity.

Once the air flow monitoring system has been commissioned the system will monitor air flow and generate a Fault condition if the flow gets out of boundaries.

The air flow monitoring system can generate three types of faults:

1. Flow fault 1 (fault code 88): this fault indicates the flow has exceeded the limit values as determined during the commissioning period. The following actions can be taken:
    a. Check integrity of the sampling pipe, nozzle and nozzle insert (if placed)
    b. Check the air filter
    c. Check leakage of the right cover panel
    d. Perform a new commissioning cycle of the flow monitoring system (see Section 6.1)
    e. Set the sensitivity of the flow monitoring system to low (see Section 5.4)
2. Flow fault 2 (fault code 99): this fault indicates that the flow level got too low during the Commissioning of the flow monitoring system. The system requires a minimum level of flow during the Commissioning cycle so that a sufficient flow rate is guaranteed during normal operation of the system, even when the flow drops to just above the minimum flow level before the system goes into fault. The following corrective actions can be taken in case of a flow fault 2:
    a. Check that the right cover panel of the system is correctly put in place and there is no leakage (e.g. check that the earth cable of the right cover panel is not trapped between the system and the cover panel)
    b. Check that the red air tube and the sampling nozzle are not blocked
    c. Reduce the length of the red air tube
    d. Increase the diameter of the insert of the sampling nozzle

    After taking corrective actions the commissioning cycle of the flow monitoring system can be restarted by resetting flow fault 2 in the following manner:

        i. Put the key switch in SERVICE position
        ii. Press the UP or DOWN button on the UI panel until fault code 99 is shown
        iii. Then press the RESET button until the fault code 99 disappears

            Note: in case of connected systems this operation must be performed on the Master system!
        iv. Put the key switch back in NORMAL position and remove the key

3. Flow fault 3 (fault code AA): this fault indicates a problem with the flow sensor was detected. This could happen in case of sudden changes in air flow or fast temperature changes of the air flow.

This fault should disappear automatically. In case the fault does not disappear automatically try the following actions:

a. Reset the fault:
    i. Put the key switch in SERVICE position
    ii. Press the UP or DOWN button on the UI panel until fault code AA is shown
    iii. Then press the RESET button until the fault code AA disappears
    iv. Put the key switch back in NORMAL position and remove the key
b. Reset the system (see Section 7.2)

If the fault reappears after trying both options, please contact your installer or distributor.

7.10 Power Supply System including battery backup

The FIRETRACE® CoolGen Max 1gen./2gen./3gen. system has an internal power supply system including battery backup. The backup battery will be charged when mains power is connected to the system. The backup time is more than 12 hours on a full battery.

The system regularly monitors health of the power supply and battery and generates a fault condition in case anything is wrong. The following fault conditions can occur:

1. Mains power disconnected from the system (fault condition generated after 5 minutes)
2. Battery fault: in case battery not connected, battery voltage drops below 11.5V or when the internal resistance value of the battery exceeds the upper limit (3 ohm)
3. Battery charger problem

The system will automatically switch off if running on battery power and the battery voltage drops below 10.9±0,1V.

7.11 Monitoring Cool Gas Generator status

During normal operation the system will constantly check if the squib cables are connected properly to the cool gas generators and if it reads correct squib values, indicating unfired generators.
In case the system does not read the correct values on the squib cables a fault condition is generated and fault code 55 is shown on the 4-digit display of the UI panel. Corrective action that should be taken in this case is:

- check if the squib cable are properly connected to the generators and that the orange mechanical locks of the squib connectors are fully pressed down.

Note: fault 55 will also be activated after reset of the alarm.

7.12 Operation of connected systems

When multiple system are connected in order to protect a larger volume, the systems must be installed as described in Section 234.3.

Each system must be configured as described in Chapter 5. Note that DIP switches 2 to 7 only need to be set on the Master system. Even if these DIP switches are set on a Slave system, these settings will be overridden by the settings of the Master system. All other DIP switches and the rotary switch must be must set on both the Master system and on all Slave systems.

During operation the Master system will collect status data from all Slave systems and determine the overall system status and communicate this status back to all Slave systems. The FAULT, PRE-ALARM 1 and 2, ALARM and GAS RELEASED status LEDs on all systems will show the overall system status and the relay outputs of all systems will also reflect this overall system status.

Detailed fault information for all systems will be shown on the 4-digit display of the Master system, where a Slave system will only show the detailed fault information of that particular Slave system.

Note:

- As a result a Slave system can show the general fault status (FAULT LED is ON), but no fault code on its 4-digit display (this means that one of the other systems generated the fault condition and the fault code will be visible on the 4-digit display of the system that generated the fault and on the Master system)

If one of the systems generates an Alarm the Alarm status will be activated on all connected systems and all systems will fire their generators and release the gas simultaneously (unless fire extinguishing is blocked by an open Door Switch or DISABLED mode).

Muting of buzzers on all systems can be done by pressing the MUTE button on the UI panel of any system.

A number of functions are only available at the Master system, but will have effect on all connected systems:

- DISABLING the system (see Section 7.6)
- Resetting an Alarm (see Section 7.8)
- Starting a new commissioning cycle (see Section 6.1)
- Resetting flow faults 2 and 3 (see Section 7.9)

Lost RS485 connection:
The RS485 bus that connects the systems is constantly monitored. In case connection between systems is lost, this will be detected by each of the systems and will result in the fault status to be raised and signalled on the UI panel and communicated through the fault relay outputs of the systems. The 4-digit display on the system will indicate fault code “bb” (communication fault).

Systems will continue to operate standalone in case of a communication issue. This could mean that not enough gas will be released in the protected volume in case not all systems release their gas.

7.13 Service intervals

The FIRETRACE® CoolGen Max 1gen./2gen./3gen. system has the capability to set service interval for maintenance (e.g. replacement of the air filter) and generate a notification condition when the service interval expires. The default service interval is 1 year.

When the service interval expires the system will show fault code FF in the 4-digit display. Please note that this does **not** trigger the fault relay. Call your installer/distributor to have the system serviced.

The fault can be temporarily suppressed by following the following procedure:

- Put the key switch in SERVICE position
- Press the UP or DOWN button on the UI panel until fault code FF is shown
- push the RESET button

The fault will then disappear and a new fault will be generated after one month time, unless the system has been serviced in the meantime and the service interval has been updated.

When the system is serviced the service interval can be set to one year from now by following the following procedure:

- Put the key switch in SERVICE position
- Reset the system (see section 7.2)
- Keep the DISABLE button pressed for some seconds during system start-up
- The system will acknowledge setting of the service interval by blinking **all** red LEDs (pre alarm 1, pre alarm 2, alarm and gas released) on the UI panel.

This procedure must be done on each system in case of connected systems.

7.14 System Fault

The FIRETRACE® CoolGen Max 1gen./2gen./3gen. system has integrated code execution monitoring

When a code execution fault is detected, the system will reset and show fault code 00 in the 4-digit display, as well as turn on the system fault LED.

The system fault can be reset by the following procedure (this can only be done on the master):

- Put the key switch in SERVICE position
- Press the UP or DOWN button on the UI panel until fault code 00 shown
- push the RESET button

The fault will disappear on the 4-digit display and the system fault LED will be turned off.

7.15 Data logging

The FIRETRACE® CoolGen Max 1gen./2gen./3gen. system logs data onto an onboard SD card to allow a service engineer to analyse system performance. The SD card can hold data for 10+ years of operation.

In case the SD card is missing or the system cannot access the SD card it will generate a Fault condition and show fault code 11 on the 4-digit display of the UI panel.

7.16 Disconnected display

The FIRETRACE® CoolGen Max 1gen./2gen./3gen. system detects when a display is not connected. When the system detects this it will go in the fault state and try to display fault code LL. Since there is no display available on the system itself, the system cannot display the fault code. However, if the system is connected using the RS-485 interface, the other systems in the network will display this fault.

If this fault appears, check the display cable on both sides of the connection, meaning in the user interface box itself and the cable that is connected in the system to the electronics box. Be sure to fasten the two screws on the connector!

If this does not resolve the issue, please contact Firetrace.

8 Removal of CGG's

Handling of the FIRETRACE® CoolGen Max 1gen./2gen./3gen. must only be done by qualified and trained personnel, familiar with the product and its documentation (product datasheet, operating manual).

Remove the COOLGEN according to the DIOM Chapters 7 and 8. Also use the MSDS for the generator to ensure safe handling of the product.

9 Storage conditions

⚠CAUTION

Conditions for safe storage of FIRETRACE® CoolGen Max 1gen./2gen./3gen.

- Store in a clean and dry area, below 40℃.
- Well ventilated
- Keep in own system packaging

Conditions for safe storage of used/end of life FIRETRACE® CoolGen Max 1gen./2gen./3gen.

- Store in a clean and dry area, below 40℃.
- Well ventilated
- Keep in own system packaging
- Upon request - Send back for inspection to FIRETRACE without the used CGG's (applicable for first series of products)

Consult the DIOM for the storage conditions of the COOLGEN.

10 Troubleshooting

⚠WARNING

- **No fire suppression or incomplete fire suppression**: see the COOLGEN DIOM for fire-fighting measures.

NOTICE

- And in the case of **all other problems** which may occur: contact FIRETRACE

11 Inspection and Maintenance

This section gives requirements for inspection and maintenance of the product.

Table 21 shows the maintenance schedule for the product.

Task	Usage	Frequency
Replace filter	Normal	Once a year
Replace battery	Normal	Once in 4 years
Replace generators	Normal	See the COOLGEN DIOM
Replace filter	Dusty environment	Twice a year
Clean aspiration tube	Dusty environment	Once a year

Table 21 Maintenance schedule

11.1 Spare parts

The following spare parts are available through the distributor:

Spare parts:

Description	**order number**
Service-Fan-Assy	909600
Service-Airfilter	909601
Service-Battery	909605
Service-Sensorboard-Assy	909607
Service-UI-Assy	
Service-EL-box	

Accessories:

Description	**order number**
Squib-Simulator -NXG	909567
COOLGEN Dual Sampling & Suppression - Mounting Kit	909517
COOLGEN Rack mount - Mounting Kit	909516
COOLGEN Top/Wall mount COOLGEN - Mounting Kit	909515

11.2 Replace filter

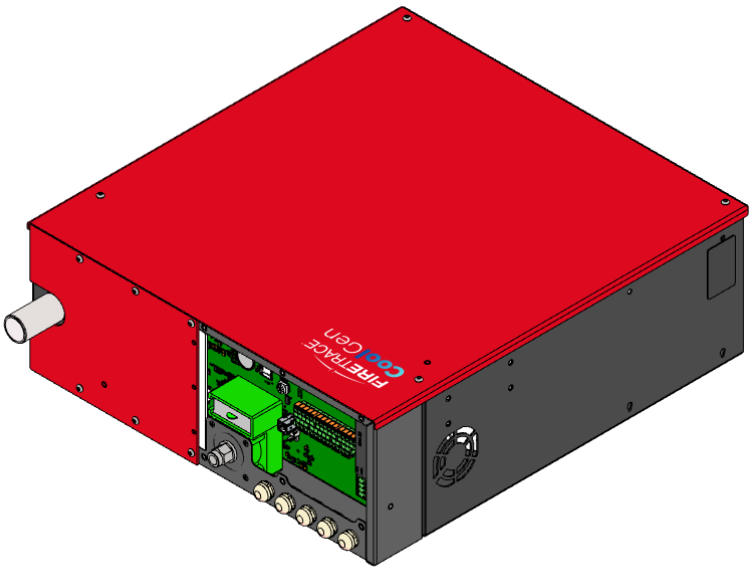


Figure 35 Open the electronics box

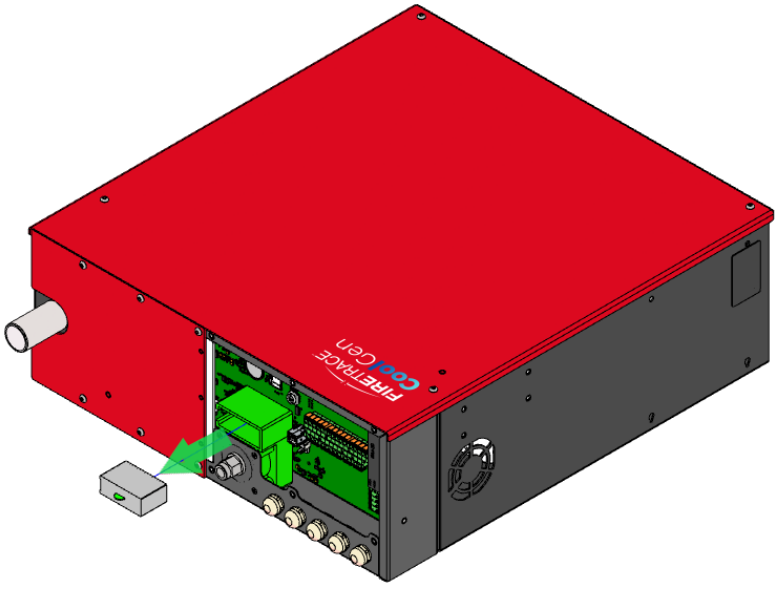


Figure 36 Replace the air-filter

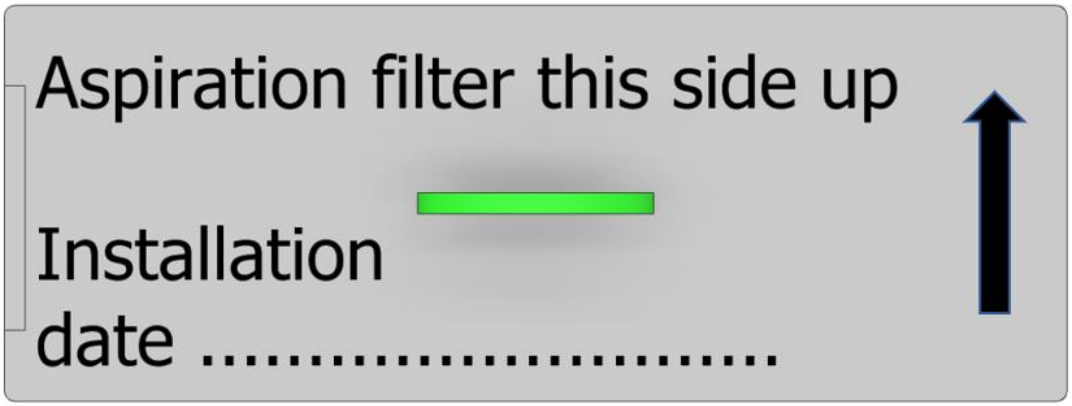
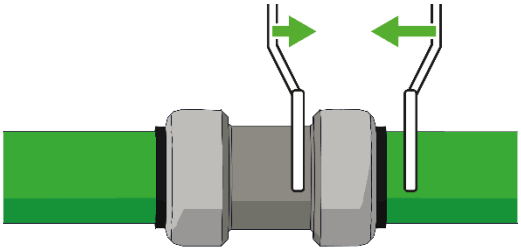


Figure 37 Write down the installation date

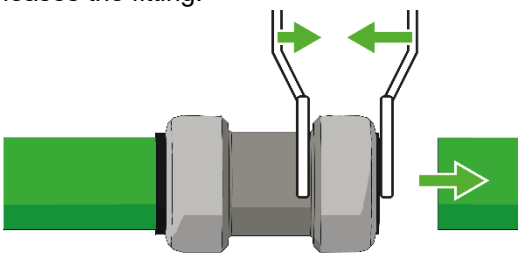
12 Decommissioning

Decommissioning of the system without it being used.

- De install the system and put it in its original packaging and return it to the Distributor of your catchment area/country/region
- Use the pipe fitting disconnecting tool from the mounting kit to disassemble the pipe connections:
    1. Place the tool arms against the sides of a coupling.



    2. Squeeze the tool and disassemble. The arms will move a plastic ring inward that releases the fitting.



- The distributor will organize the collection of the used generators in the respective catchment area/region/country and takes care of the chemical waste disposal process on behalf of FIRETRACE.

13 Disposal

⚠WARNING

For the COOLGEN disposal, always consult the most recent version of the COOLGEN DIOM.

13.1 Disposal at end of life product

⚠WARNING

After removal from the protected space:

- Handling of the FIRETRACE® CoolGen Max 1gen./2gen./3gen. must only be done by qualified and trained personnel, familiar with the product and its documentation (product datasheet, operating manual). Incorrect handling or use of the product can cause serious damage and unsafe situations (serious injuries and possible fatalities).
- The distributor will organize the collection of the used system in the respective catchment area/region/country and takes care of the chemical waste disposal process on behalf of FIRETRACE.

14 Environment

NOTICE

Consult the relevant (Material) safety data sheets for further information.

15 Relevant documents

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NOTICE

The documents mentioned in Table 22 are available.

Document	Version
MSDS COOLGEN unused	24-07-2025
MSDS COOLGEN used	24-07-2025
DIOM COOLGEN	1.5
COOLGEN-NXT 750, 1500 and 2250 EU Declaration of conformity	02-09-2020
COOLGEN *EU-type examination certificate - module B*	03-10-2024
COOLGEN EU Declaration of conformity	Available upon request Firetrace stating serial number CGG.
Datasheet battery	

Table 22 Relevant documents