Spark Extinguishing System

Installation and operating instructions

5014033 Installationsmanual -- UK --

Masthead

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Conventions

Service contract

Safe-Vent recommends that spark extinguishing systems be maintained regularly by a recognised supplier. Safe-Vent is a recognised supplier of spark extinguishing systems. We recommend that you form a service contract with Safe-Vent to ensure reliable and due maintenance of any major assignments.

For further details please contact Safe-Vent at +45 8863 8900 or mail kd@safevent.dk

Technical issues and ordering of spare parts

When ordering spare parts and in case of technical problems, please do not hesitate to call our Customer Service Dept.

Telephone Customer Service Dept. +45 8863 8900 or mail kd@safevent.dk

CE conformity

CE Safe-Vent products are CE marked and meet the specifications of the following EU directives:

- EU Directive 2014/30/EU "Electro Magnetic Compatibility Directive"
- EC Directive 73/23/EEC "Low Voltage Directive"
  as amended by CE Marking Directive (93/68/EEC)

The harmonised standards are listed in the CE Declaration of Conformity.

The power supply has to meet the demands of having less then a 5% harmonic disturbance level and have no transients or be protected against transients.

ATEX conformity

Safe-Vent spark extinguishing systems are certified to ATEX 2014/34/EU and meet the standards of the following EU directives:

- DS/EN 60079-0:2012 Electrical equipment for explosive atmospheres. General measures.
- DS/EN 50281-1-1:2001, Electrical equipment for use in combustible dust locations. Electrical equipment protected by enclosures. Design and testing.
- DS/EN 50281-1-2:2001, Electrical equipment for use in combustible dust locations. Electrical equipment protected by enclosures. Selection, installation and maintenance.)

Name plate

Name plate DC1 central (example and for your own markups of serial number)

10 -18 017			

Name plate SDD detector (example and for your own markups of serial number)

12-18 1550			

Name plate SDN detector (example and for your own markups of serial number)

01-18 2663			

About these instructions

These instructions apply to Safe-Vent spark extinguishing systems.
We recommend that you study the product documentation literature for all units/items of the entire system.

These instructions are targeted against persons who install, maintain and service the product.

Installation and maintenance work must be performed by Safe-Vent personnel or by personnel duly instructed by Safe-Vent personnel.
Operating personnel must also be duly instructed by Safe-Vent personnel.

All personnel must read these instructions. Depending on the task to be solved, we recommend you to study the relevant chapters in more detail. Our recommendations are given in the below table.

Chapter	Task		
	Installation	**Maintenance/ Adjustment**	**Operating the system**
Conventions	**X**	**X**	**X**
Safety	**X**	**X**	**X**
Description	**X**	**X**	**X**
Opening and closing of station	**X**	**X**	
Installation	**X**	**X***	
Electrical installation	**X**	**X**	
Commissioning	**X**	**X**	
Fault diagram and operating instructions	**X**	**X**	**X**
Service and maintenance		**X**	**X**

*: Only the section on connection of back-up batteries.

Safety

Safety instructions

This Safe-Vent spark extinguishing system complies with the technical standards, and it is built in accordance with recognised technical rules and it is safe for operation. To protect you and your product from harm and damage, certain safety instructions must be observed while performing any tasks on the system.

Please read these safety instructions and guidelines carefully.

Warning plate

Station DC1 is fitted with a warning plate on the front and on the battery holder. The warning plate on the front is to draw attention to the fact that the station must not be opened unless the relevant instructions have been studied carefully. The relevant instructions are part of the chapter *Opening and closing of station* from page 25. The warning plate on the battery holder advises you on how to connect the back-up batteries in series. Please refer to the section *Connecting back-up batteries on page* 31, particularly Figure 13.

Protective earth (PE)

The protective earth symbol is shown here. In this documentation, protective earth is referred to as PE. All components feature a PE connection which must be connected.

Proper usage

Do not make any unauthorised changes or modifications to the system yourself. Otherwise, the manufacturer is not liable for any consequential damage or reduced functioning of the system.

The devices described in these instructions should only be used in connection with a Safe-Vent spark extinguishing system.

Proper usage also involves complying with these operating instructions.

Applications beyond those described in these instructions are considered improper usage.

Improper usage may result in reduced functioning.

Basic rules for safety-conscious operation

Documentation

Always keep the documentation near the system in an easily accessible location which is generally known to your staff.

Operating the system

The system must only be operated by persons duly instructed and trained.

Production stoppage

Only perform installation, service and replacement of components after the production system has been disengaged and the mains voltage switched off.

Safety at work

Any persons working on ladders and/or working platforms while performing the required work functions should be duly protected against falls.

Safety measures

Qualified personnel

Only qualified and trained personnel may perform installation, service and maintenance work.

Commissioning

Commissioning must only be performed by a Safe-Vent employee or a skilled person authorised by Safe-Vent.

Maintenance of the system

Only operate the system if it is in good condition technically. Ensure that the specified service intervals are observed and that maintenance and inspection work on the system is performed regularly. Remedy any faults or defects as soon as they occur.

If you cannot yourself remedy any faults in the system, please contact Safe-Vent at:
phone +45 98 58 19 43 or mail kd@safevent.dk

Selecting the installation site

Considering the technical specifications, installation sites must be selected so they are easily accessible for service and maintenance work.

Description

Functional description

Your Safe-Vent spark extinguishing system monitors industrial systems to prevent fire and dust explosions. Monitoring is done by means of spark detectors. If any sparks are detected, this is reported to the system control unit, Station DC1, which will activate the countermeasures connected. Such measures may include extinguishing with water or shut off using a guillotine damper. In case of massive occurrence of sparks Station DC1 can also cut off the conveyor system thus preventing a further spread of sparks.
Whenever sparks are detected, operating staff is alerted by alarm flashes and horn.
Figure 1 shows a functional diagram for the spark extinguishing system

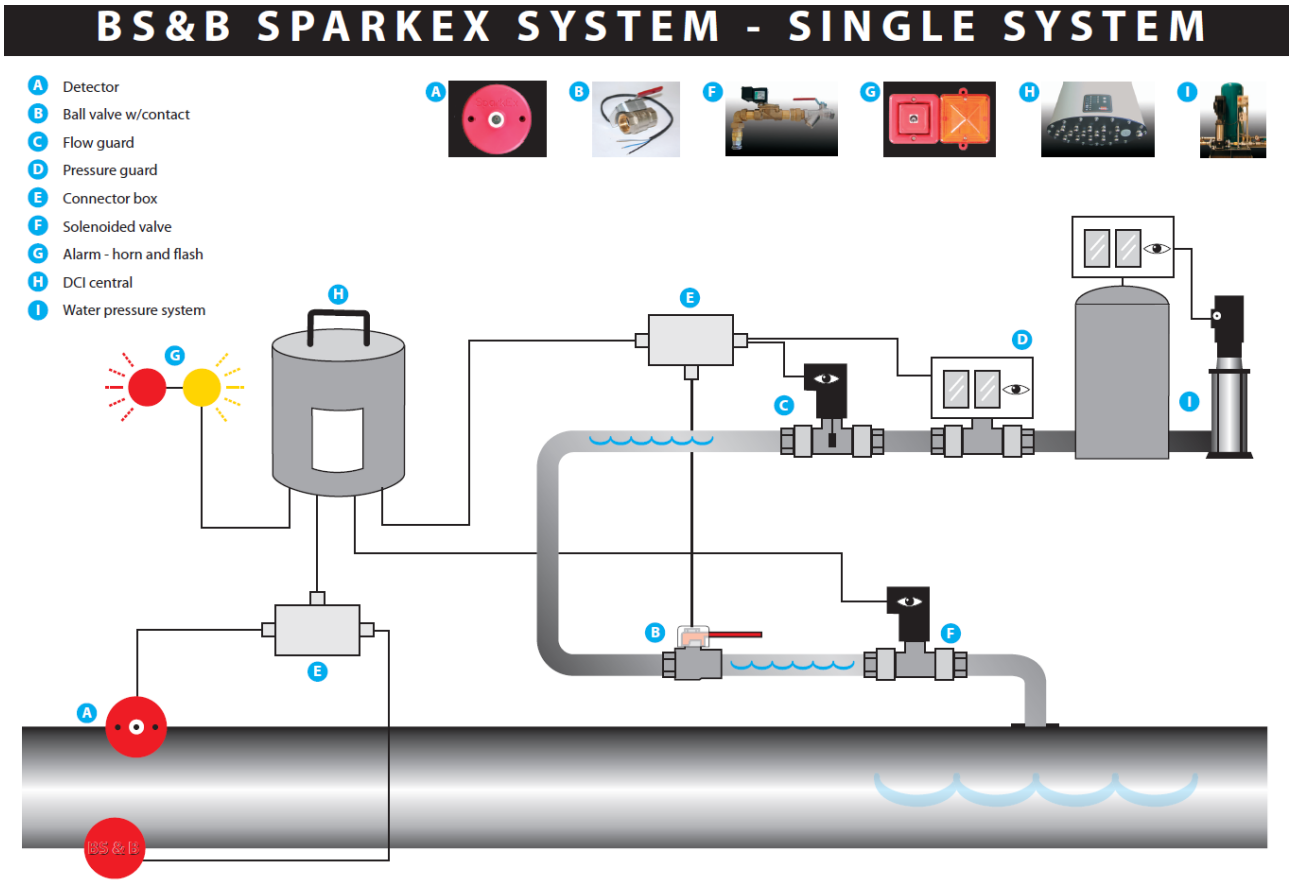


Figure 1: Functional diagram for Station DC1

If several spark extinguishing systems have been installed, the individual DC1 stations can be connected to one central control panel via a CAN-bus system, see Figure 2. Such a system can incorporate up to 1024 DC1 station units.

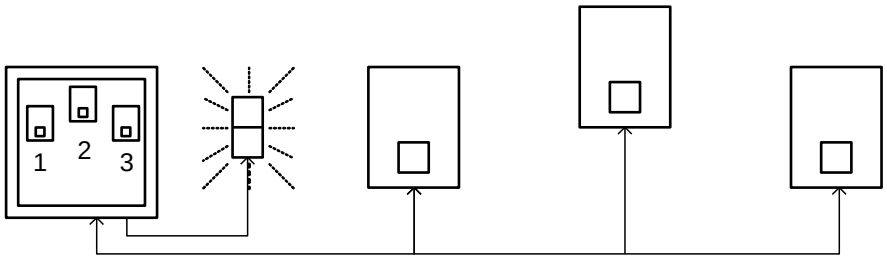


Figure 2: Spark extinguishing system incorporated in CAN-bus system

System monitoring

The following measures ensure full functioning of the system:

Automatic testing
The DC1 station automatically tests according to a pre-set cycle:

- Spark detector function
- Battery voltage of back-up batteries
- Heating belt (frost protection)

Manual testing
Via a touch of the operator keypad you can perform a test which makes the same checks as in the automatic test. The system is also checked for extinguishing water. This test is also used upon start-up of the system, meaning that any faults during commissioning are detected immediately.

Alerting the operating staff

Alerts are made by means of alarm flashes and horn signal. All alarms must be cancelled manually at the station to ensure that all incidents are attended to by staff.

The spark extinguishing system operates with the following three states:

- **Alarm stage 1:** Normal extinguishing of sparks. Alarm horn and flash will continue until the alarm is cancelled manually. Normal function will continue.
- **Alarm stage 2:** The production plant closes down and extinguishing continues as long as sparks are registered. Alarm horn and flash will continue until the alarm is cancelled manually.
- **Fault alarm:** The plant continues as normal; however, the alarm will flash and the current fault will be reported on the keypad.

Alarm stage 2

Activation of alarm stage 2 can be based on the following criteria:

- The moment sparks are detected alarm stage 2 will instantly be activated
- If sparks are detected within a defined period, alarm stage 2 will be activated
- Alarm stage 2 is never activated

Data memory

If a control panel is connected to the DC1 station, the latest 1024 fault and alarm alerts will be saved in an internal memory.

These alerts can then be read in the control panel.

Components

The following components may be used with a Safe-Vent spark extinguishing system.

Component	Item no.
DC1 station	101101
Spark detector (daylight) SDD	101801
Spark detector (darkness) SDN	101802
Extinguishing automatics (SA1 – SA4)	10190**1**0, 10190**2**0, 10190**3**0, 10190**4**0
Guillotine damper	Please contact Safe-Vent for further information.
Bypass flap	Please contact Safe-Vent for further information.
Alarm flash and horn	101401
Control panel CP1 [Item no. (display dimension)]	Please contact Safe-Vent for further information.
Unions [Item no. (diameter)]	101190 (16mm), 101192 (20mm)
Blanking plugs [Item no. (diameter)]	101194 (16mm)
Connecting links for cable extension	101807 (std.), 101805 (ATEX)
Cable for spark Detector 100 m	101700
Heating cable 1 m	101602
Cable for extinguisher (flap/damper/valve) 50 m	101702
BUS cable	101004
Booster system [Item no. (capacity)]	101201 (150L), 101202 (300L), 101203 (500L), 101205 (1000L)

All components can be supplied by Safe-Vent.

Station DC1 design

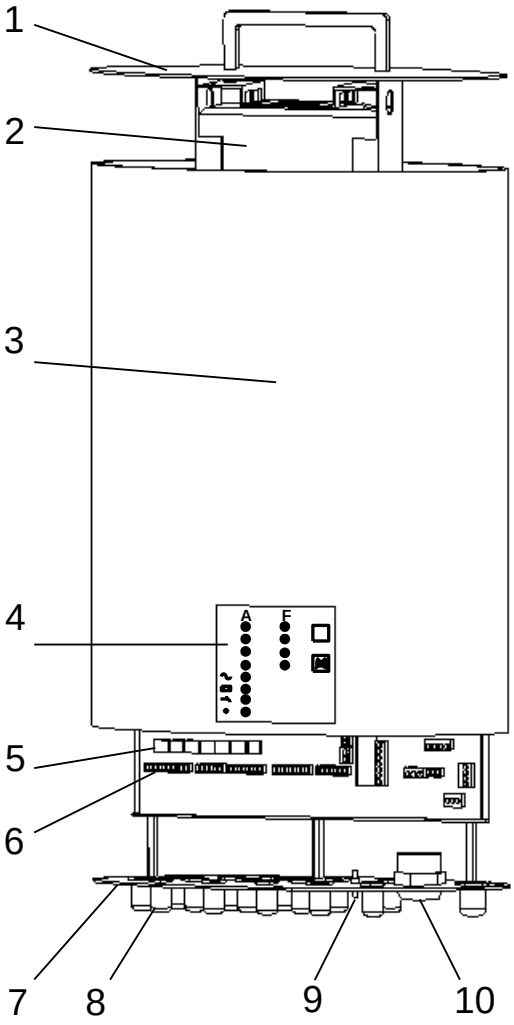


Figure 3: Station DC1 and the most important elements

1. Battery-holder endplate with gasket
2. Battery-holder for back-up batteries
3. Station
4. Keypad and status LEDs
5. DIP-switches
6. Connecting terminals
7. PC-board holder endplate with gasket
8. Unions for wires
9. External PE
10. Internal acoustic generator

Keypad

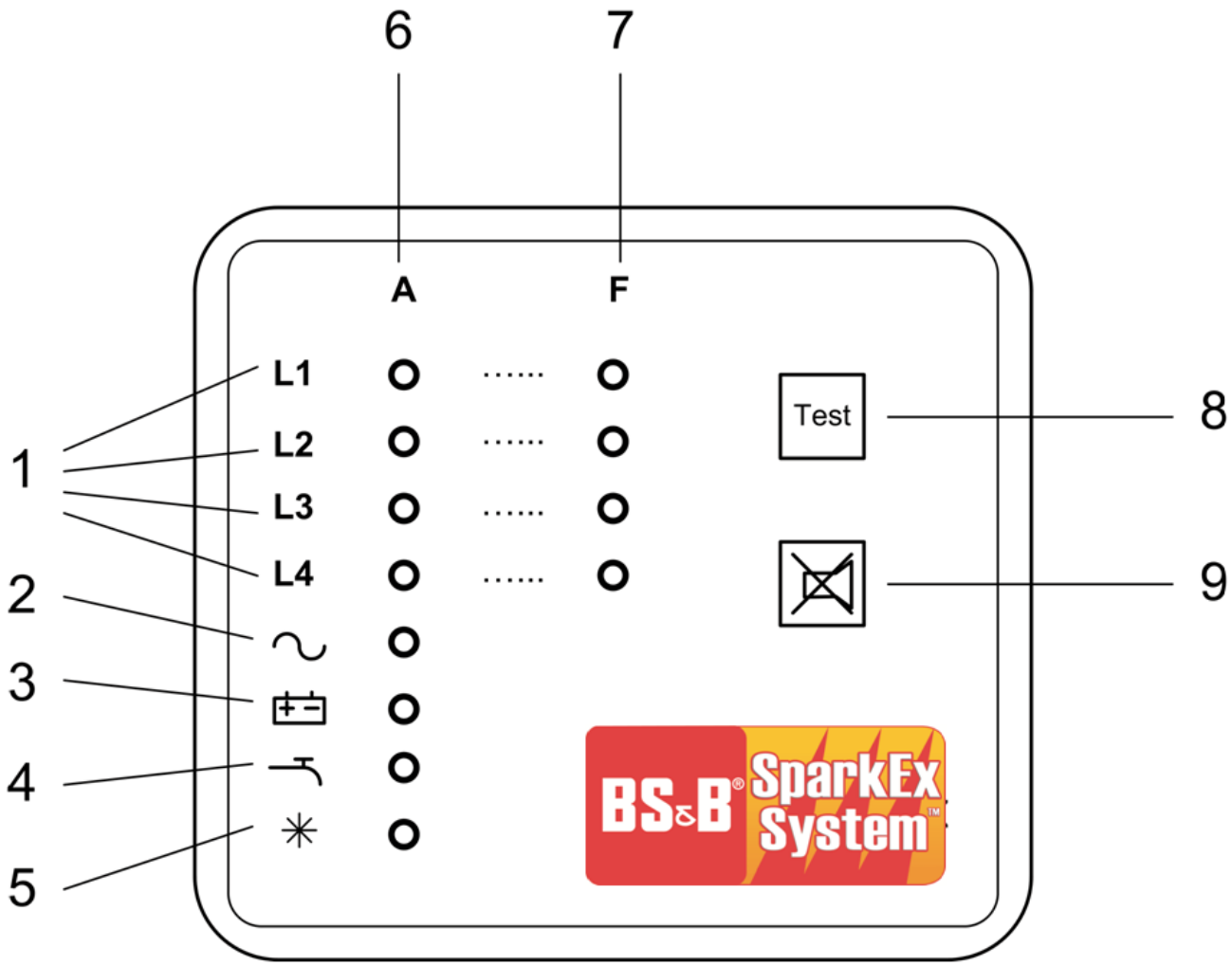


Figure 4: Keypad

1. Spark detectors 1 - 4
2. Mains voltage
3. Battery voltage
4. Flow sensor
5. Heating belt
6. Alarm LEDs
7. Fault LEDs
8. Test button
9. Alarm flash and horn switch

Dimensions and technical data

DC1 Station

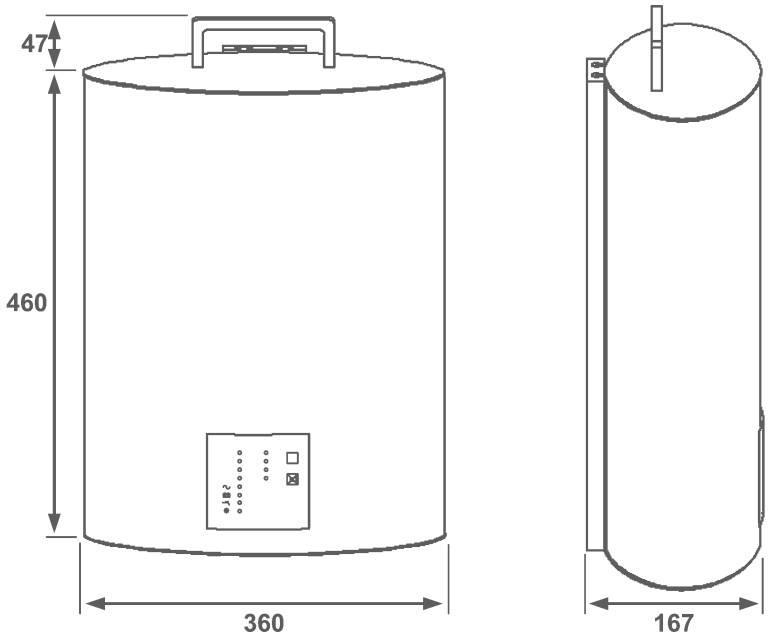


Figure 5: DC1 station dimensions

Mains connection	230 VAC ± 10 %, 50Hz, power: 70 W
Pre-fuse	10A
Equalising connection	PE
Weight (incl. batteries)	16.5 kg
Operating temperature	-15° C to +50° C
Storage and carriage temperatures	-25° C to +80° C (battery only -15° C to +50° C)
Max. height above sea level	2,000 m
ATEX zone	21
Enclosure class	IP65

For indoor installation only.

Back-up batteries (Panasonic LC-R127R2PGI)

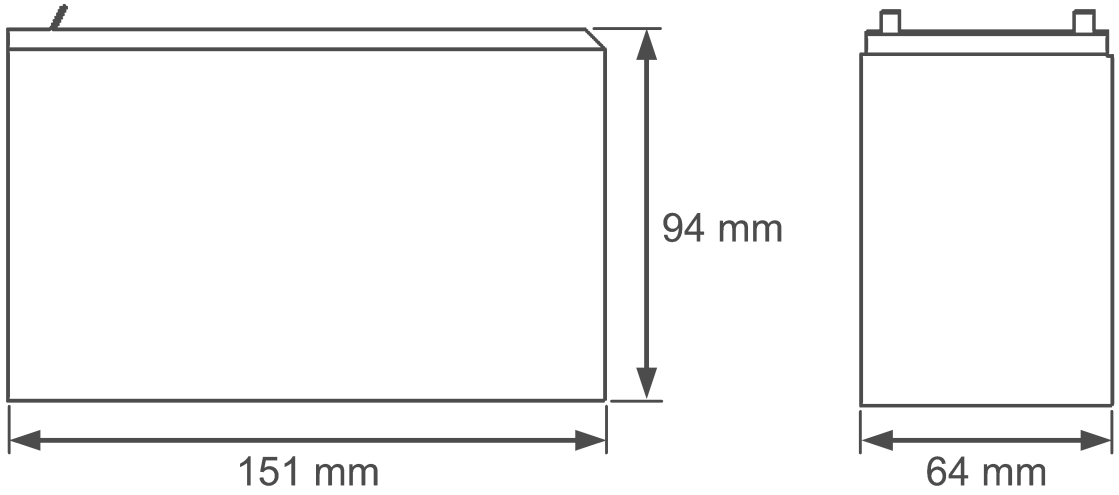


Figure 6: Back-up battery dimensions

Type: Panasonic LC-R127R2PGI

The back-up batteries for the DC1 station must be Panasonic LC-R127R2PGI supplied by Safe-Vent. To ensure leak-free batteries make sure to observe the instructions given in the enclosed battery documentation:

Quantity	2
Rated voltage	12 VDC
Capacity	7.2 Ah
Charging detector voltage	13.6 V – 13.8 V
Charging current	max. 2.88 A
Weight	2.6 kg
Operating temperature	-15° C to +50° C
Storage and carriage temperatures	-15° C to +50° C

Alarm flash and horn

Operating voltage	24 VDC
Rated current	25 mA

If more spark extinguishing systems are connected via CAN-bus, use only one alarm flash/horn for each control panel instead of one for each DC1 station.

Central monitor control panel

101060 Central overvågning. Integr. Canbus (101001)

Figure 7: Central monitor Control panel

Spark detector

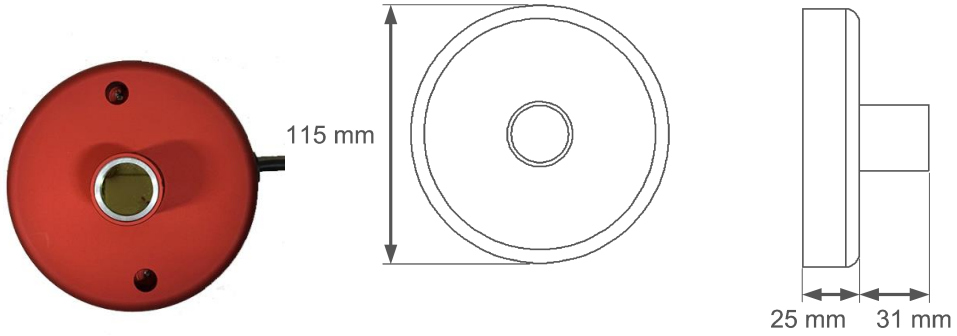


Figure 8: Spark detector dimensions

Voltage	+ 20 VDC ± 10%
Current	10 mA ± 10%
Operating temperature	-40° C to +70° C

Available in two variants. For use in day light SDD (101801) or darkness SDN (101802).

If further documentation is required, data sheets are available from Safe-Vent.

Extinguishing automatics

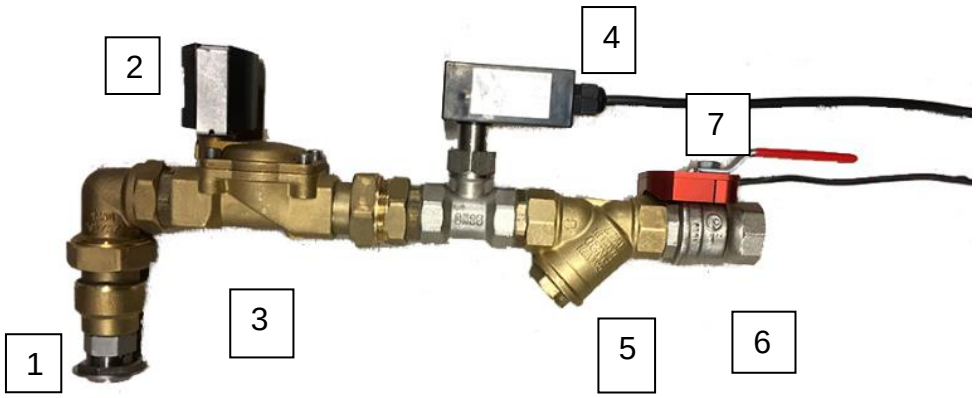


Figure 9: Extinguishing automatics – dimensions and components

1. Nozzle
2. Valve coil
3. Valve
4. Flow guard
5. Strainer
6. Ball valve
7. Contact switch for ball valve

Supply voltage (coil)	+24 VDC ± 10%
Max. operating pressure	16 bar
Weight (incl. one nozzle)	3.15 kg

Opening and closing of station

Opening of DC1 Station

This chapter describes the correct procedure for opening the DC1 station. If you follow this procedure, the station will be opened correctly safety-wise and the enclosure remain undamaged.

Accessing the pc-board

To change the setting of the DC1 station or to connect/disconnect any components you must access the pc-board. Before doing so the following conditions must be met:

1. The room must be dust-free This means that the presence of explosive atmosphere due to dust in the air is not allowed. If you are in doubt, please see the definition in article 1 of ATEX directive 94/9/EC or contact Safe-Vent.
2. The mains voltage must be switched off.

If the above conditions have been met, you can loosen the Allen screws and open to the pc-board.

Accessing the battery

1. Unscrew the battery holder and remove.

The back-up batteries can now be exchanged as described on page 31.

Closing the DC1 Station

This chapter describes the correct procedure for closing the DC1 station. Follow the below procedure to ensure the enclosure remains undamaged:

Closing off the pc-board

Check the following:

1. All unions must fit tight around wires
2. All non-used unions must be replaced by blanking plugs
3. The gasket must be unbroken and cover the entire perimeter of the endplate
4. Do not allow any wires to get jammed between the endplate and the extruded section

If the above is in order, proceed as follows:

1. Push the pc-board into place in the station.
2. Torque each Allen screw (16 pcs.) to 8 Nm.
3. Switch on the mains voltage.

To activate the DC1 station push the test button. The test procedure is described on page 56.

Closing off the battery

1. Check that the endplate gasket is unbroken and covers the entire edge.
2. Place the battery holder in the station.
3. Torque each Allen screw (16 pcs.) of the battery holder to 8 Nm.

Installation

Wall mounting of DC1 Station

Mount the DC1 station on the wall-mounting rail as shown in Figure 10. The battery holder may be removed before mounting.
Fix the wall-mounting rail to the wall duly observing the dimensions specified in Figure 11. The holes must be Ø6 – 8 mm. Use expansion bolts or screws, 4.5 x 40 mm – 6.5 x 40 mm and Rawlplugs.
When selecting a location, we recommend that you select a location where the keypad can be operated without obstructions.

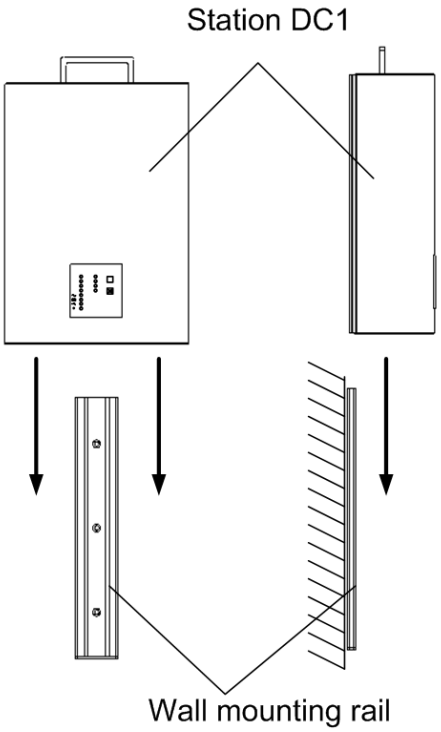


Figure 10: Wall-mounting of DC1 station

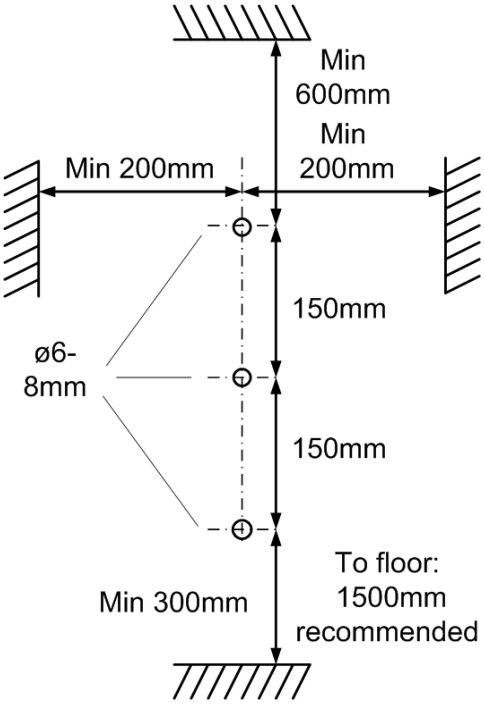


Figure 11: Installation dimensions and minimum distance to other objects.

Connection of back-up batteries

The back-up batteries must be Panasonic LC-R127R2PGI batteries.
Place the batteries in the battery holder as shown in Figure 12.

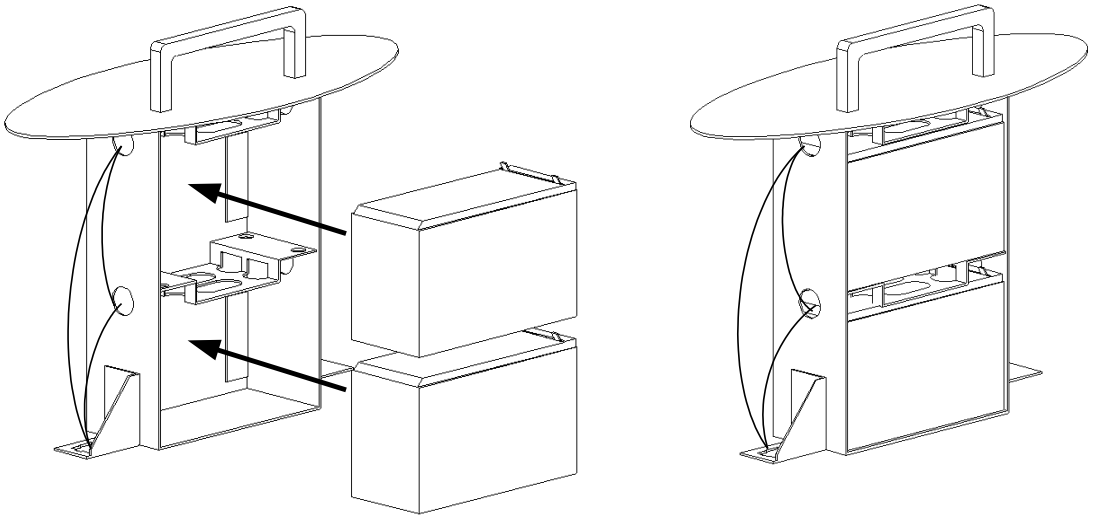


Figure 12: Batteries in battery holder

Connect the back-up batteries in series as shown in Figure 13.

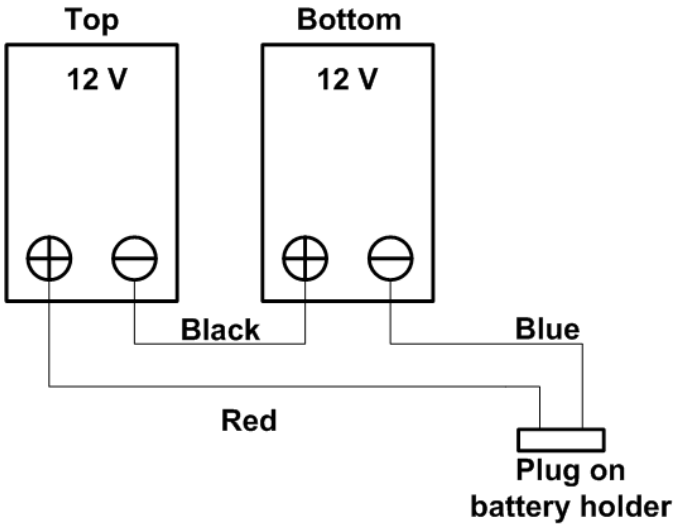


Figure 13: Series-connected back-up batteries.

The battery holder can now be placed and fixed to the station. Proceed as follows.

1. Check that the endplate gasket is unbroken and covers the entire edge.
2. Place the battery holder in the station as shown in Figure 14.
3. Torque each Allen screw (16 pcs.) of the battery holder to 8 Nm.

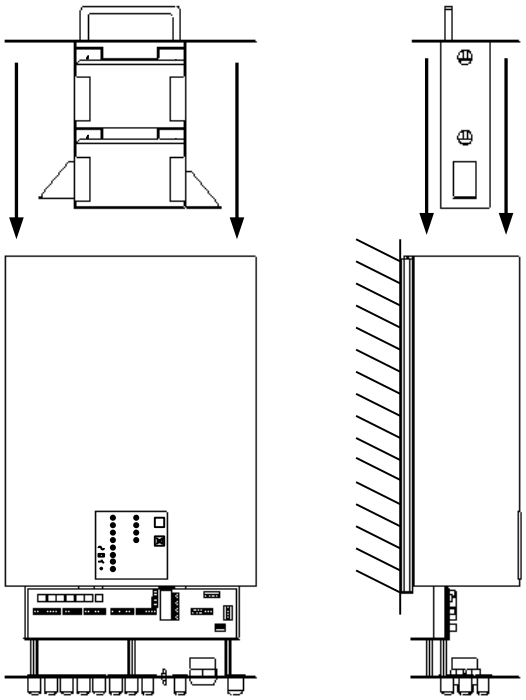


Figure 14: Alignment of battery holder

Connecting the mains voltage

Connect mains voltage (230 VAC, 50 Hz, 70 W) to the relevant terminal on the pc-board as shown in Figure 15. The wires to the mains voltage must be protected up to 10 A.

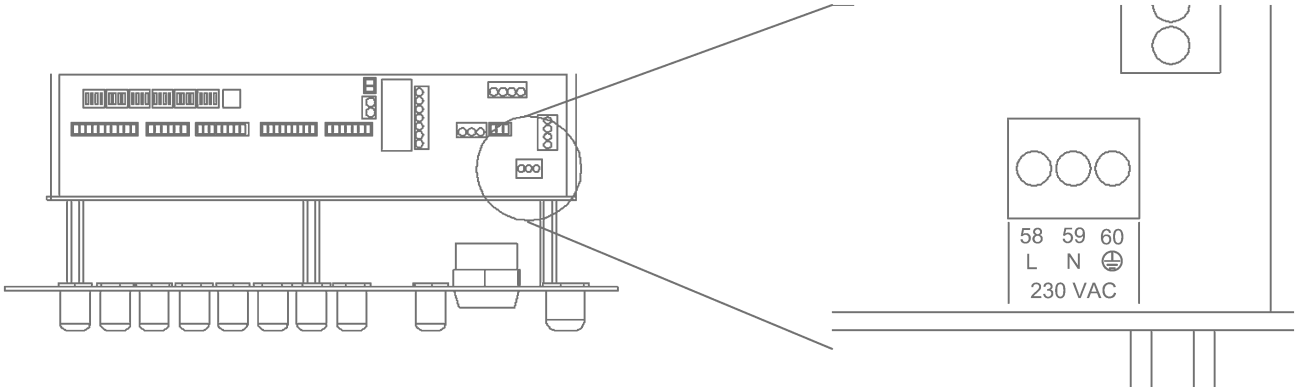


Figure 15: Connecting the mains voltage

Terminal no.:	Connection
58	L (phase) 230 VAC, 50 Hz
59	N (neutral) 230 VAC, 50 Hz
60	PE (earth)

Please note: The mains voltage must be switched off until all mounting, electrical installation and commissioning work has been completed and the station closed off.

Switch

The system must be fitted with an external switch which must be labelled uniquely as the switch for this system. This switch must be placed in a central panel and protected by its own sensitive current circuit breaker. The panel must be located in the same building as the extinguishing system.

We recommend that you place the switch close to the system where it is easy to operate.

The switch should have a maximum load of 10 A and should be lockable when servicing the station of the system.

Installation of alarm flash/horn

Install the combined alarm flash/horn so your staff can always hear and see it in case of an alarm. Inside the alarm flash and horn the connection terminals are clearly marked with + and -. Connect the mains supply (+ 24 VDC) and chassis from the DC1 station to these terminals. If you require further information, please ask for the relevant data sheet from Safe-Vent.

Mounting of control panel

The control panel is mounted on two Ø5 screws placed in wall as specified on Figure 16.

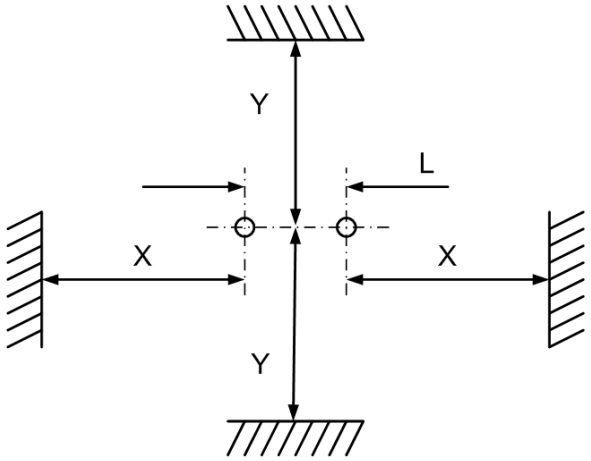


Figure 16: Installation dimensions for control panel

	Large/Medium	Small
X	Min 100 mm	min 100 mm
Y	Min 160 mm (To floor: 1600mm recommended)	min 100 mm (To floor: 1600mm recommended)
L	188 mm	38 mm

After mounting the control panel on the screws, the supply and communication can be connected. This is done to the plugs on the bottom of the control panel. The precise placing of the plugs can be seen on Figure 17.

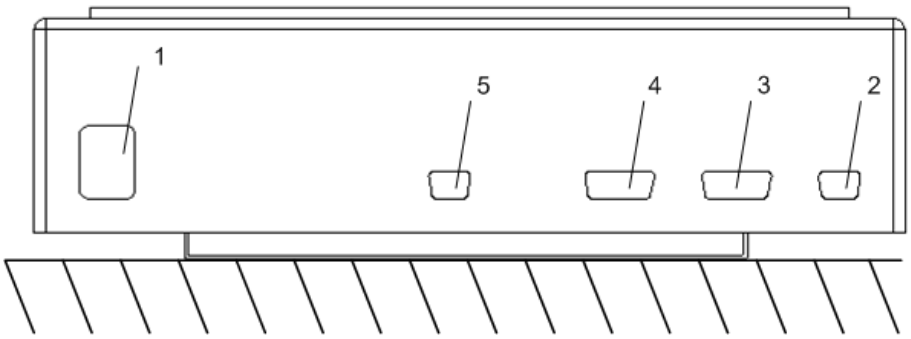


Figure 17: Control panel mounted on wall, seen from below

Where the numbers are explained in the following table

1	230 V supply
2	Canbus communication
3	Programming interface for panel
4 (only large and medium panels)	I/O interface
5 (only large and medium panels)	Programming interface for modem

Installation of spark detectors

Refer to Figure 18 for installation of the spark detector.

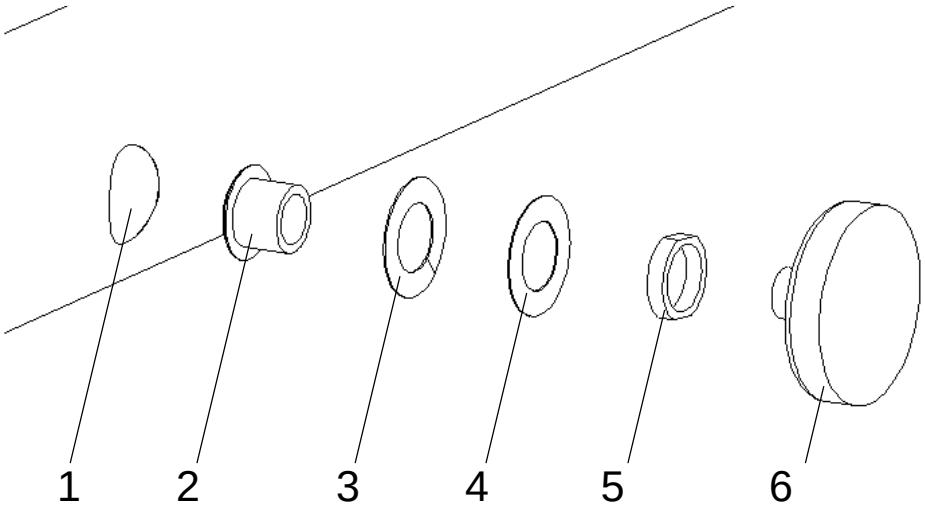


Figure 18: Installation of spark detector

Proceed as follows:

1. Bore a Ø57 mm hole in the pipe
2. Use a special-purpose tool, see Figure 19, and place the adapter in the hole, glass inwards.
3. Turn the split disc to the inside of the pipe.
4. Place the outer disc on the outside of the pipe.
5. Fasten the adapter using a nut, and remove the special-purpose tool.
6. Place the spark detector in the adapter and press to bottom.

Use the special-purpose tool to protect against losing any parts in the pipe.

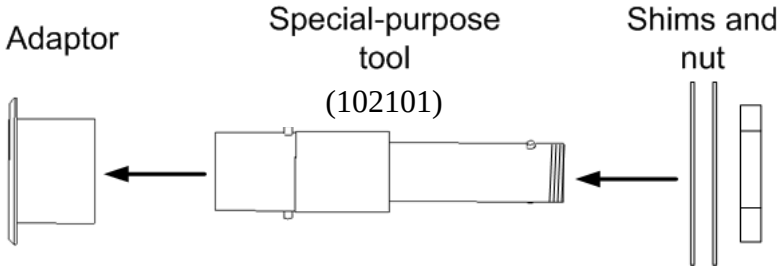


Figure 19: Adapter and special-purpose tool

The finished installation can be seen on Figure 20.

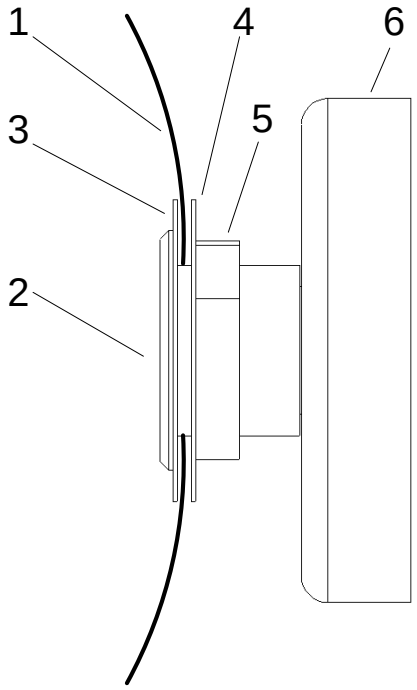


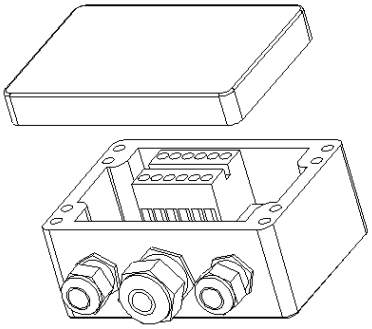
Figure 20: Finished installation of spark detector

1. Pipe
2. Adapter
3. Split ring
4. Outer ring
5. Nut
6. Spark detector

If the spark detectors are installed so the wires cannot reach the station, extend the wires using the enclosed connecting links. The maximum overall wire length between the spark detectors and the station is 100 m.

Mounting of connecting links

Use the connecting links to extend the wires between the spark detectors and the station and to join the wires from two spark detectors to one shielded 5-core wire. Figure 21 shows the connecting link.



101807 (std.)
101805 (ATEX)

Figure 21: Connecting links

Pass the wire from the spark detectors through the two unions on the side and connect as illustrated in Figure 22.

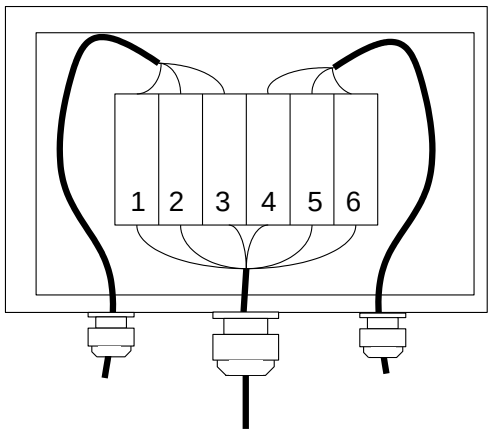


Figure 22: Connecting box and connections

The below table specifies how to connect the wires in the junction box. Spark detectors 1 and 2 do not refer to the numbering in relation to the station, but only internally in the connecting link.

Connecting link terminal no.	Spark detector wires	Shielded 5-core
1	Spark detector 1: + 20 VDC	1 (if numbered)
2	Spark detector 1: Test	2 (if numbered)
3	Spark detector 1: Chassis	3 (if numbered)
4	Spark detector 2: + 20 VDC	4 (if numbered)
5	Spark detector 2: Test	5 (if numbered)
6	Spark detector 2: Chassis	Shield

Spacing of spark detectors and extinguishing devices

To ensure that the extinguishing system has time to activate the extinguishing devices a certain minimum spacing must be kept, L in Figure 23, between the observation point of the spark detector and selected extinguishing devices.

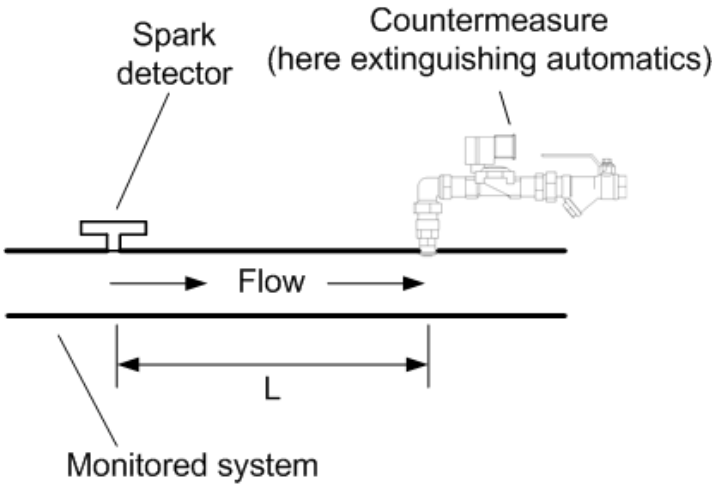


Figure 23: Spacing of spark detector and extinguishing device.

This spacing, which is given in the below table, depends on the ventilation speed of the system being monitored:

Ventilation speed [m/s]	< 15	< 20	< 25	< 30	< 35	35 <
Minimum distance between spark detector and automatic extinguishing device [m]	3.75	5	6.25	7.5	8.75	10

If these distances are not observed, sparks will have time to move past the extinguishing devices and in the worst case start a fire.

Wall mounting of spark detectors and fibre

When monitoring a production plant where the exterior temperature of the system exceeds the max. operating temperature of the spark detector, 70° C, the spark detector must be mounted on the flange supplied and it must be connected to the pipe using an optical glass fibre, see Figure 24.

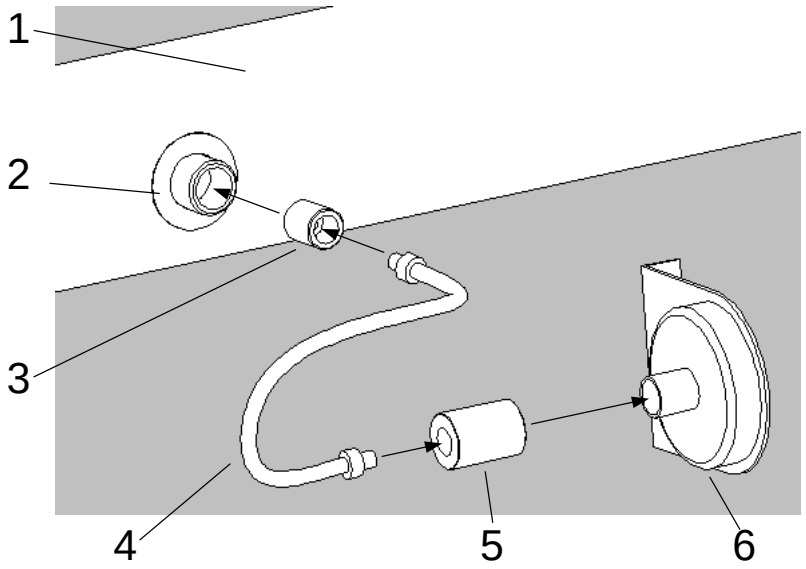


Figure 24: Spark detector mounted away from the system being monitored.

The numbers in the figure are as follows:

1. Pipe monitored
2. Pipe adapter
3. Fibre adapter 2*
4. Optical glass fibre* } 101501 Optical glass fibre w/adapter 1 m (Mod. 2011)
5. Fibre adapter 1*
6. Spark detector mounted on wall mounting flange (0370-04)

Proceed as follows when mounting:

1. Mount the pipe adapter on the pipe as described under mounting of spark detector, page 35 items 1 – 5.
2. Fix the mounting flange to the wall. Make sure that the temperature of the mounting site will always be under 70°C and that the optical glass fibre is longer than the distance between the pipe adapter and the spark detector. (The optical fibre is available in 1 m lenght).
3. Mount the spark detector on the mounting flange.
4. Install fibre adapter 1 on the spark detector and install fibre adapter 2 in the pipe adapter.

Installation of automatic extinguishing devices

Figure 25 shows the components required to install the automatic extinguishing devices

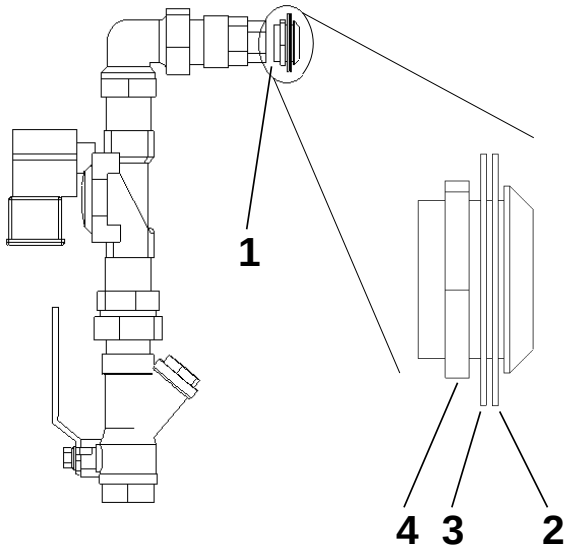


Figure 25: Fixing components for automatic extinguishing devices

1. Nozzle head
2. Split ring
3. Outer ring
4. Nut

Proceed as follows to install the automatic extinguishing devices:

1. Drill a Ø32 mm hole in the pipe
2. Remove the nozzle head from the automatics
3. Use a special-purpose tool, see Figure 26 and place the nozzle head in the Ø32 mm hole
4. Install the split ring in the pipe, cf. Installation of spark detector
5. Fasten the nozzle head using the nut; the nozzle head will now be positioned on the pipe as shown in Figure 27, where 1 is the pipe, 2 is the split ring on the inside of the pipe and 3 is the outer ring
6. Remove the special-purpose tool and mount the rest of the components.

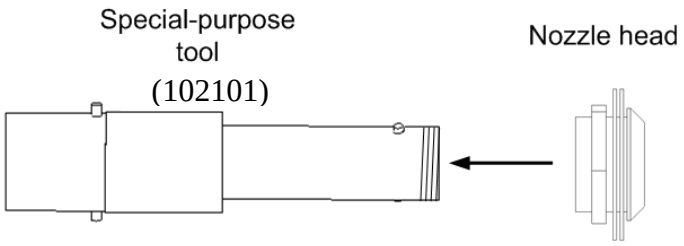


Figure 26: Nozzle head and special-purpose tool

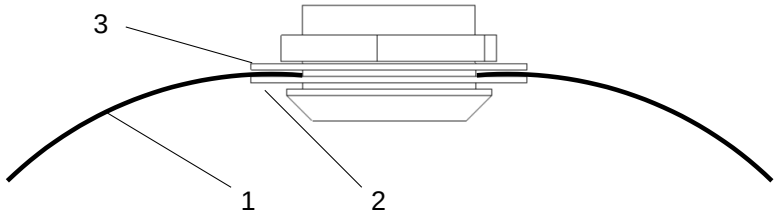


Figure 27: Finished mounting of nozzle head

To protect the extinguishing automatics against the surroundings it should finally be shrouded in the fabric bag provided.

Installation of flow switch

The flow switch has been installed in the booster system upon delivery.
Couple the flow switch to the DC1 station via a 4-pole plug. Use 1, 2 and ⏚ and connect to the station as shown on page 49.

Installing the flow switch without the use of CAN-bus

The following applies to the location of the flow switch on the pipe system in cases where there are several centrals that are not connected with a CAN-bus.
Figure 33 shows a pipe system with three extinguishers devices (1-3) where a is connected to the water supply (pressure booster unit), and b and c are pipe branches.

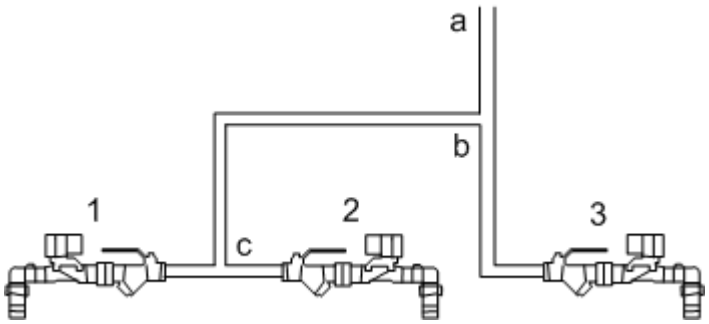


Figure 33: Pipe system with three extinguishers

One of the three following situations can arise:

1. All three extinguishing devices are controlled by the same central. A flow switch must be used and installed centrally next to the pressure booster unit.

2. 1 and 2 are controlled by one central, and 3 by another. Two flow switches must be used, one of which must be installed between b and c, and other between b and 3.
3. All three extinguishing devices are controlled by separate centrals. Three flow switches must be used and installed between 1 and c, between c and 2, and between b and 3 respectively.

It is not possible to create flow control without CAN-bus communication if one central controls 1, and another central controls 2 and 3.

Installation of heating belt

Full documentation on how to install the heating belt is available from Safe-Vent. Do not start any installation work until you have studied the documentation carefully.
Protect the water supply to the automatic extinguishing devices against frost by means of heating belts installed on the pipes. Generally, the heating belts should be installed on the underside of the pipes, as shown in Figure 28, and on the outer side of pipe bends before lining with insulation material.

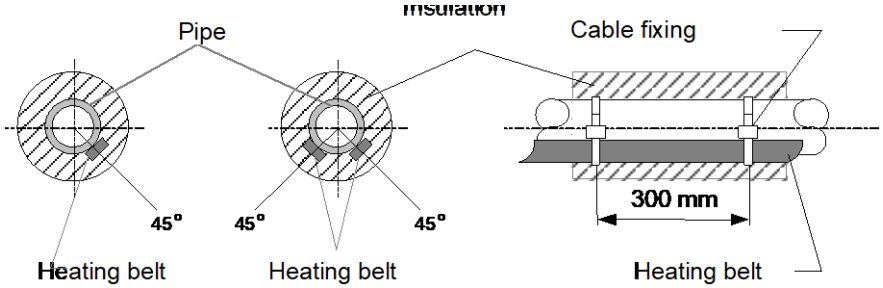


Figure 28: Installation of heating belt [Thermon]

Heat belt is plugged directly into the terminal block in the center as shown in the diagram in Figure , where **a** is the isolated piece.

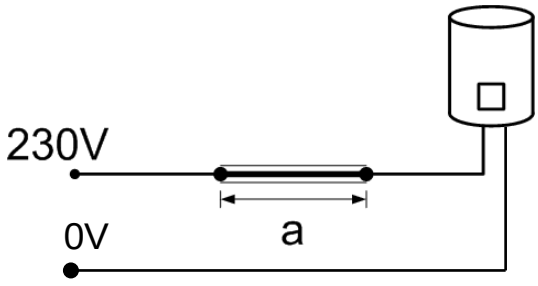


Figure 29: Schematic diagram of heating belt connection

If more than one heating strip is monitored by the same key, they must be connected in series as shown in Figure 2, where a and b are separate pieces.

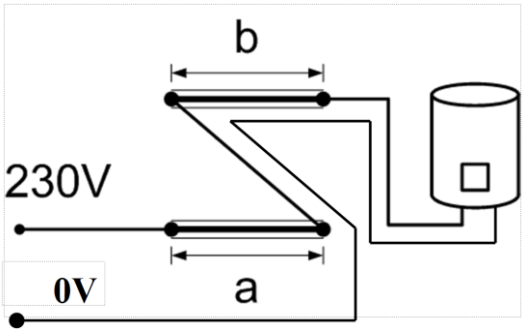


Figure 30: Principskitse af seriel varmebåndstilkobling

Dismounting the DC1 station

Proceed as follows when dismounting the DC1 station:

1. The room must be dustfree
2. Switch off mains voltage
3. Open to the pc-board (bottom of DC1 station)
4. Dismount all external wires.
5. Remove the battery holder
6. Close to the pc-board
7. Lift the DC1 station off the wall-mounting rail
8. Dismount the wall-mounting rail.

Electrical installation on the DC1 station

Connecting terminals on the DC1 station

Components are connected to the DC1 station using the connecting terminals. The connecting terminals are located on plugs on the pc-board. See their position on the pc-board in Figure 31.

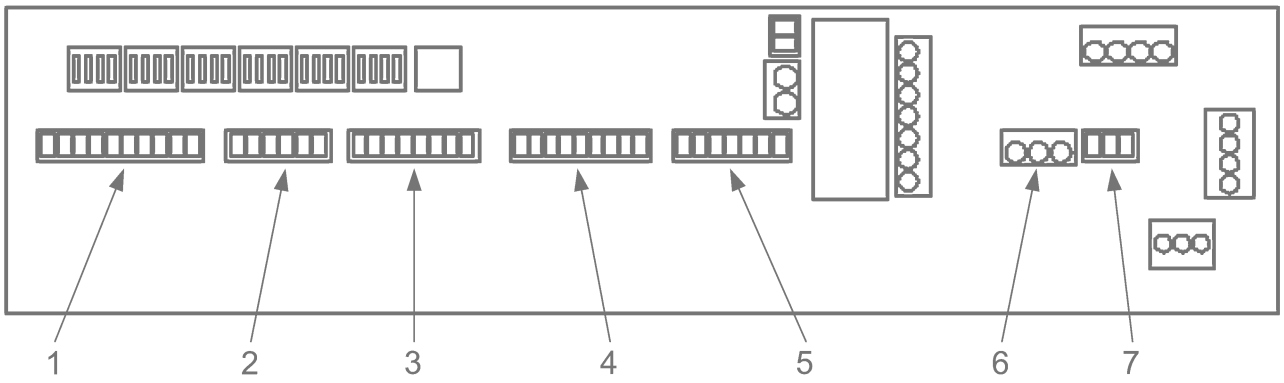


Figure 31: Position of the connecting terminals

Pass all the wires through the unions in the bottom plate.

See the below table to establish which components are to be mounted on which plugs. The table also specifies on which page you can find more details about the mounting.

Plug no.	Components	Page
1	CAN-bus 1 and 2	47
2	Spark detectors 1 and 2	47
3	Spark detectors 3 and 4	47
4	Outputs for solenoid valves or damper/flap, alarm stage 2	48, 48
5	Alarm flash and horn	48
6	Heating belt	49
7	Flow input	49

For spark detectors, solenoid valve/damper/flap and flow input the relevant wire nos. are specified. These numbers are marked on the wires from the said components.

CAN-bus

CAN-bus 1
Plug no. 1

Terminal no.:	Connection
1	CAN-Hi
2	CAN-Lo
3	CAN-Shield/GND Ext.

CAN-bus 2

Plug no. 1

Terminal no.:	Connection
5	CAN-Hi
6	CAN-Lo
7	CAN-Shield/GND Ext.

Spark detectors

Spark detector 1

Plug no. 2

Terminal no.:	Connection	Wire no.
11	+ 20 VDC	1 (red)
12	Test	2 (black)
13	Chassis	Shield (black with text)

Spark detector 2

Plug no. 2

Terminal no.:	Connection	Wire no.
14	+ 20 VDC	1 (red)
15	Test	2 (black)
16	Chassis	Shield (black with text)

Spark detector 3

Plug no. 3

Terminal no.:	Connection	Wire no.
17	+ 20 VDC	1 (red)
18	Test	2 (black)
19	Chassis	Shield (black with text)

Spark detector 4

Plug no. 3

Terminal no.:	Connection	Wire no.
20	+ 20 VDC	1 (red)
21	Test	2 (black)
22	Chassis	Shield (black with text)

Solenoid valve/damper/flap

Output 1
Plug no. 4

Terminal no.:	Connection	Wire no.
25	+24 VDC	1
26	Chassis	2
27	PE	3

Output 2
Plug no. 4

Terminal no.:	Connection	Wire no.
28	+24 VDC	1
29	Chassis	2
30	PE	3

Alarm stage 2

Plug no. 4

Terminal no.:	Connection
31	+24 VDC
32	Chassis
33	PE

Alarm flash - horn

Alarm flash
Plug no. 5

Terminal no.:	Connection
35	+24 VDC
36	Chassis
37	PE

Alarm horn
Plug no. 5

Terminal no.:	Connection
38	+24 VDC
39	Chassis
40	PE

Heating belt – only surveillance

Plug no. 6

Terminal no.:	Connection
52	L (phase) 230 VAC, 50 Hz
53	N (neutral) 230 VAC, 50 Hz
54	PE

Flow input and pressur surveillance

Plug no. 7

Terminal no.:	Connection	Wire no.
55	Switch input	1
56	Switch input (chassis)	2
57	PE	⏚

The wire numbers for flow input refer to the designations specified on the plug for the Honsberg flow switch normally applied.

Installation: Flow guard and Pressostat shall be connected parallel into terminal no. 55 and 56.

Commissioning

Setting up the DIP-switches

The individual spark extinguishing systems can be configured via the DIP-switches of the DC1 station. The individual DIP-switches and their position on the pc-board can be seen in Figure 32.

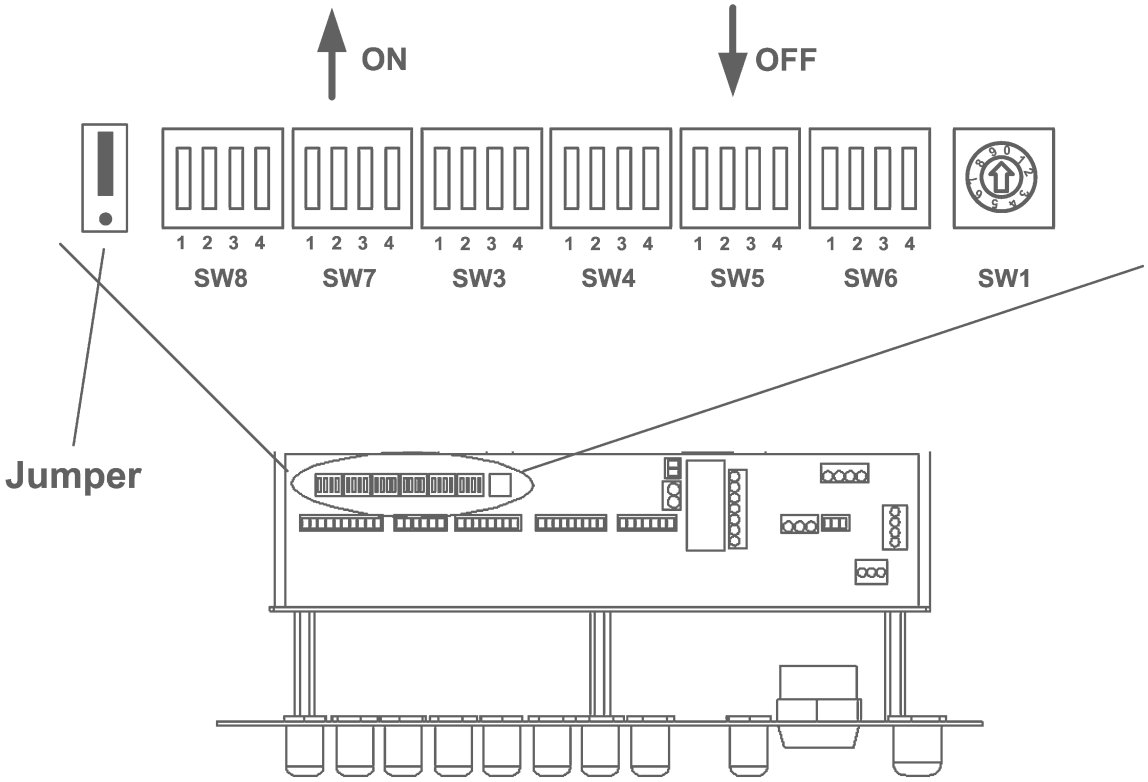


Figure 32: DIP-switches and CAN-bus jumper

The jumper shown in the figure functions as an end resistor in the CAN-bus network. For more details about CAN-bus, see page 55.
Each DIP-switch features four contacts numbered 1 to 4, left to right. Below is a description of their functions.

PLEASE NOTE – a contact is ON, when it is up and OFF, when it is down, see Figure 32.

The below tables describe the ON/OFF functions of the contacts. In the cases not described the OFF function will disengage the component or function to which the ON function is connected.

Spark detectors (SW3)

SW3 determines which spark detectors are connected to the station.

Contact no.	Function
1	**ON**: Spark detector 1 is connected
2	**ON**: Spark detector 2 is connected
3	**ON**: Spark detector 3 is connected
4	**ON**: Spark detector 4 is connected

Immediate activation of alarm stage 2, independently of SW1 (SW4)

SW4 determines whether alarm stage 2 is to be activated immediately if sparks are detected on spark detector 3 or 4.

Contact no.	Function
1	**ON**: Spark detector 3 immediately activates alarm stage 2. **OFF**: Spark detector 3 activates alarm stage 2 independently of the turn encoder.
2	**ON**: Spark detector 4 immediately activates alarm stage 2. **OFF**: Spark detector 4 activates alarm stage 2 independently of the turn encoder.
3	No function
4	No function

Activating and selecting the extinguishing method (SW5)

SW5 determines the setting up of the 24 VDC outputs.

Contact no.	Function
1	**ON**: Output 1 is connected. The DC1 station will start up the selected extinguishing method at output 1. Output 1 can only be activated by spark detectors 1 and 2. **OFF**: DC1 station will not start up any extinguishing method.
2	**ON**: Output 2 is connected. The DC1 station will start up the selected extinguishing method at output 2. Output 2 can only be activated by spark detectors 3 and 4. **OFF**: DC1 station will not start up any extinguishing method.
3	**ON**: Solenoid valve (extinguishing automatics) is activated by output 1. **OFF**: Damper/flap or other extinguishing automatics is activated by output 1.
4	**ON**: Solenoid valve (sprinkler) is activated by output 2. **OFF**: Damper/flap or other extinguishing automatics is activated by output 2.

Connecting the flow and heating belt controls (SW6)

SW6 determines whether flow measurement is to be done via the activation of solenoid valves and whether heating belts have been connected.

Contact no.	Function
1	No function.
2	No function.
3	**ON**: Heating belt connected.
4	**ON**: Flow is measured when the solenoid valves are activated. If dampers/flaps or any other extinguishing automatics are used, this contact should be OFF.

Setting of period before activation of alarm stage 2 (SW1/turn encoder)

Use the turn encoder to set the period during which continuous detection of sparks is to be ON prior to activating alarm stage 2.
This setting applies to all spark detectors connected, however, not 3 and 4 if they have been set to use SW5 to report alarm stage 2 immediately.
The positions of the encoder and their relevant times can be read in the below table:

Position:	Function:	Comment:
0	0 seconds	Alarm stage 2 is activated immediately.
1	5 seconds	Alarm stage 2 is activated if sparks have been detected for 5 secs.
2	10 seconds	Alarm stage 2 is activated if sparks have been detected for 10 secs.
3	20 seconds	Alarm stage 2 is activated if sparks have been detected for 20 secs.
4	30 seconds	Alarm stage 2 is activated if sparks have been detected for 30 secs.
5	40 seconds	Alarm stage 2 is activated if sparks have been detected for 40 secs.
6	60 seconds	Alarm stage 2 is activated if sparks have been detected for 60 secs.
7	Never	Alarm stage 2 is never activated.
8	Never	Alarm stage 2 is never activated.
9	Never	Alarm stage 2 is never activated.

The individual user selects his own setting. Generally, Safe-Vent recommends you to apply position 3.

Setting up CAN-bus

Setting up of jumper

The jumper functions as the end resistor in a CAN-bus system. Resistance is 120 Ohm

The jumper is located on the pc-board immediately to the left of the DIP-switches, see Figure 32.

The jumper consists of 3 pins, see Figure 33, and it can have two settings: ON (pins 2 and 3 are connected) and OFF (pins 1 and 2 are connected).

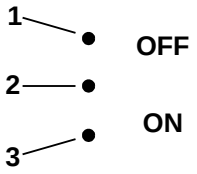


Figure 33: Jumper pins

The jumper should be ON if:

- The station is the final element in a CAN-bus system.

The jumper should be OFF in all other situations.

Position of the station in a CAN-bus network (SW7 and 8)

SW7 and 8 are used to indicate the position of the individual DC1 stations in a CAN-bus system. The eight contacts of the two switches form an eight-digit binary number, where **ON** is 1 and **OFF** is 0. The value of each contact appears from the below table, where the top row shows which contact to use (8.2 is contact 2 on switch 8 etc.).

If the station is not networking, all contacts must be **OFF.**

Please note: contact 7.4 is the least significant bit (LSB), whereas contact 8.1 is the most significant bit (MSB).

Contact	8.1	8.2	8.3	8.4	7.1	7.2	7.3	7.4	Total value
Value	128	64	32	16	8	4	2	1	255

The total value is the sum total of the contacts that are **ON.** Max. value is 255.

A control panel can handle four groups with up to 255 stations in each, sum total: 1020.

Example:

If you want value 53, set the contacts as described in the below table:

Contact	8.1	8.2	8.3	8.4	7.1	7.2	7.3	7.4	Total value
ON			X	X		X		X	53
OFF	X	X			X		X		

SW8.3 + SW8.4 + SW7.2 + SW7.4 = 32 + 16 + 4 + 1 = 53

Start-up and initial test

Follow the following procedure for start-up:

1. Check that all wires are correctly connected.
2. Check that the DIP-switches are set as required
3. Close off the station, see section *Closing off the DC1 station* on page 26.
4. Switch on mains voltage.

Following start-up all LEDs in the display will light red and you can perform the initial test by pushing the test button. The test proceeds as follows:

1. All LEDs light green for 3 secs.
2. All LEDs light red for 3 secs., lamps then light as usual.
3. The test signal is sent to spark detector 1 if it has been registered as connected.
4. Check the return signal from spark detector 1.
5. Repeat 3 and 4 above for all spark detectors.
6. If water is used for extinguishing, activate the nozzles alternately, and check that there is a flow in the pipe.
7. Deactivate the battery charging circuit and check the battery voltage
8. Activate the alarm flash for 3 seconds
9. Activate the horn for 5 seconds
10. End the test, the DC1 Station will start up normal operation

During the test procedure check that the nozzles are activated, thus filling the system with water (about 8 litres).

Please note: If any faults are detected during the initial test, the system will not start up normal operation. Any faults should be remedied and the test performed without faults before commissioning has been duly completed.

Operating instructions and fault diagram

Operating instructions and fault diagrams for stand-alone spark extinguishing system.

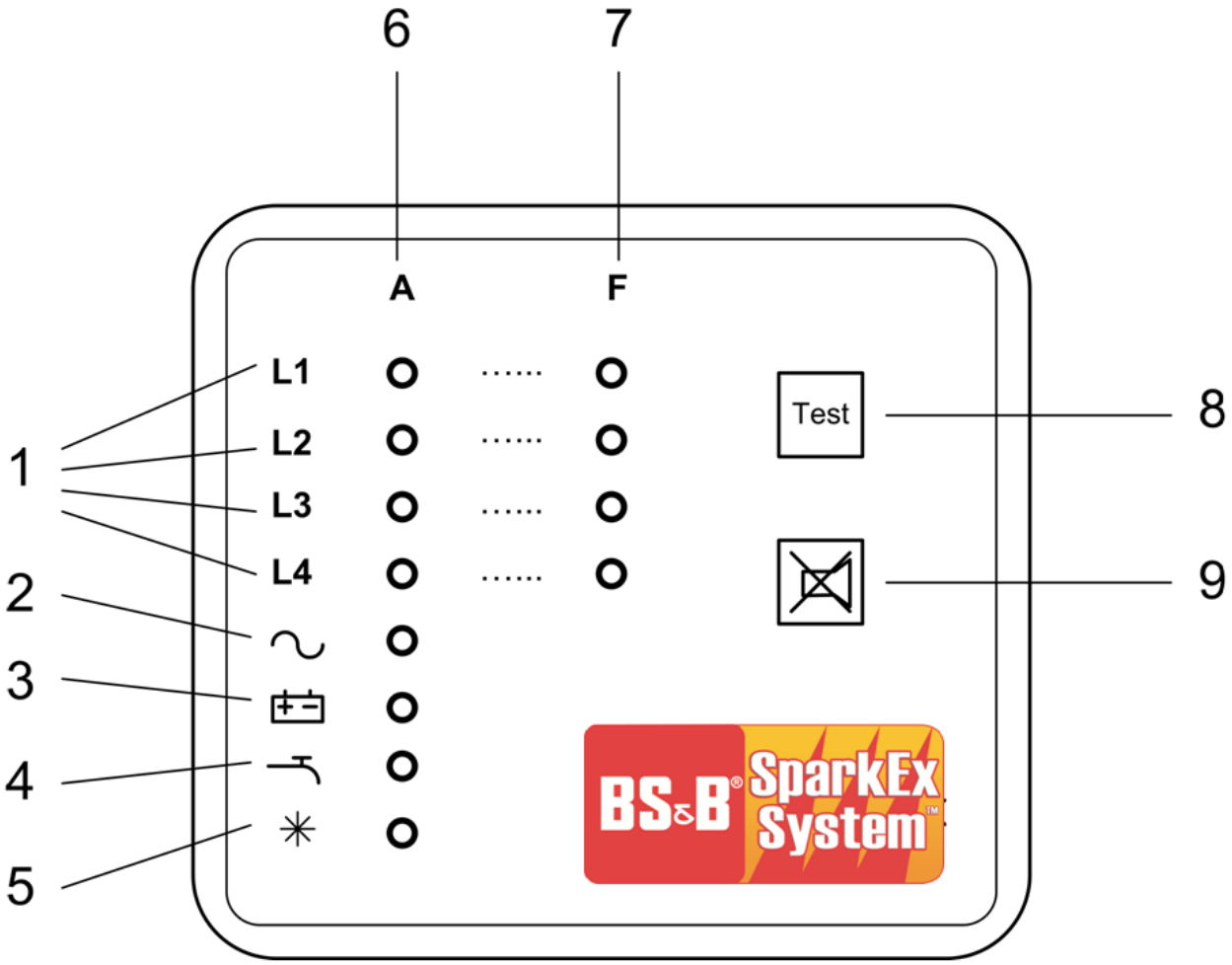


Figure 34: Keypad

1. Spark detectors 1 - 4
2. Mains voltage
3. Battery voltage
4. Flow sensor
5. Heating belt
6. Alarm LEDs
7. Fault LEDs
8. Test button
9. Alarm switch.

Button operation

The buttons on the keypad (Test and ☒ in Figure 34) have the following functions:

Test:

- At start up the equipment this button is used Test to activate the first test, which is the last point before operation start.
- During operation, the test button Test activates the test as needed, whereby the equipment components and thereby the overall function is tested. *Note: Test may lead to short-term activation of the relay output I and II.*
- Created and repaired errors during operation use the test button Test to check if the repair is done correctly.
- Reset function - Pressing the button Test for more than 15 seconds, the panel will reset. When the button is released, the center stands as it does immediately after connection of the power voltage. Pressing the button Test again, the first test will start.

Reset the alarm stage 1: (short duration spark detection)

- This alarm button ☒ is used to disconnect the alarm light and horn after registration of sparks.
- Bypass function – If the alarm button ☒ is activated for more than 15 seconds, the DC 1 Station will switch onto bypass condition, whereby either sparks are registered or extinguishing is being carried out. 1 single activation of the alarm button ☒ will switch the DC1 Station back into normal condition. This function .....

Reset the alarm stage 2 (continuous spark detection as well as by functional failures of the equipment, view LED explanation):
This mode is a security feature and is in SW version >= 120426, 1 timer seen directly on the keyboard as all 4 Fault LED (7 on keyboard) are flashing. *The reason for activating the alarm stage 2 must be found before the reset of the device is made.* ⚠

- This alarm button ☒ is used to disconnect the alarm light and horn.
- Then use the test button Test to reset the equipment, including alarm stage II output.

All alarms are indicated by alarm horn and light.

All errors are indicated **only** by light.

All alarms are indicated by alarm horn and light.

LED Explanation

All errors are indicated **only** by light.

Spark detectors (L1…L4)

Colour		Reason	Solution
Alarm LED	Error LED		

Green	Off	That spark detector is connected and works normally.	
Red (flashing)	Off	ALARM. Spark detector detects sparks.	Wait for the LED lights steady red, then press the alarm switch (9 on the keypad)
Red (constantly)	Off	ALARM. The spark detector has detected sparks.	Press the alarm switch (9 on the keypad)
Red (constantly)	Red (constantly)	FEJL. The central has detected an error in the spark detector.	Press the test button (8 on the keyboard). By continuing error - check that the connection is correct.
Off	Off	The spark detector is not switched on	Switch on the spark detector to the relevant dipswitch.

Power voltage (~)

Colour	Reason	Solution
Green	Power voltage is connected.	
Red (flashing)	There is no power voltage. The central is driven by the backup batteries.	Check – power voltage is connected correct – if the fuses are blown – if HPFI relay is switched on – if there is a cable breakage.
Off	The central is off.	Connect power voltage.

Backup batteries (⊞)

Colour	Reason	Solution
Green	The batteries are fully functional.	
Red (flashing)	Battery voltage is between 21 and 24,5 volt	Change the batteries as soon as possible.
Red (constantly)	Battery voltage is less 21 volt	Change the batteries immediately.
Off	The central is off	Connect power voltage

Water (⌐)

Colour	Reason	Solution
Green	Flow guard, Pressure switch, works	
Red (flashing)	Detected flow without the valve is opened or detected no flow though the valve is opened.	Check - pipes for leaks - connection. See also Table error in documentation of booster system.
Red (constantly)	The flow guard fails during testing	Check connections and cables.

Heat cable (✳)

This requires that the heat cable is connected - if not the diode will be turned off.

Colour	Reason	Solution
Green	Heat cable works	
Red	Failure on heat cable.	Check – heat cable is connected correctly

		– if the fuses are blown – if HPFI relay is switched on – if there is a cable breakage.

Test button:

- When starting up the system, this button is used to initiate the first test, which is the final commissioning operation.
- During operation the button can initiate the manual test as required, by which all system components and functions are tested.
- If faults occur and are remedied during operation, the test is used to check whether the repair has been carried out correctly.

Alarm switch:

- This button is used to switch off alarm flashes and horn after detection of sparks. This ensures that operating personnel acknowledges all alarms.

The diagrams overleaf describe the possible states of the LEDs on the keypad and what action the operating personnel must take in the different situations.

Spark detectors

The following diagram is based on the condition that the relevant spark detector has been installed and connected.

Colour		Cause	Action
Alarm LED	FAULT LED		
Green	Switched off	The spark detector concerned is connected and functions normally.	None
Red (flashing)	Switched off	ALARM. The spark detector detects sparks.	Wait for the LED to light a constant red, then push the Alarm switch (9 in Figure 34)
Red (constant)	Switched off	ALARM. The spark detector has detected sparks.	Push the Alarm switch (9 in Figure 34).
Red (constant)	Red (constant)	FAULT. The station has detected a fault in the spark detector.	Push the test button (8 in Figure 34). If the fault is not cancelled – check that the connection is correct.
Switched off	Switched off	The spark detector has not been connected.	Connect spark detector to relevant DIP-switch.

Mains voltage

Colour	Cause	Action
Green	Mains voltage switched on	None
Red (flashing)	No mains voltage. The station is operated by back-up batteries	Check the following: that mains voltage is correctly connected, whether fuses have

		blown, that the sensitive earth fault circuit breaker has been connected, whether there are any cable fractures.
Switched off	Station switched off	Switch on mains voltage

Back-up batteries

Colour	Cause	Action
Green	Batteries are fully functional.	None
Red (flashing)	Battery voltage between 21 and 24.5 volts	Replace batteries as soon as possible
Red (constant)	Battery voltage below 21 volts	Replace batteries immediately
Switched off	Station switched off	Switch on mains voltage

Flow sensor

This is based on the condition that the flow sensor has been connected - if not, the LED will be switched off.

Colour	Cause	Action
Green	Flow sensor works	None
Red (flashing)	A flow is detected without the valve being opened *or* no flow is detected even though the valve has been opened.	Check pipes for leakage and check connection. See also fault diagram in pressure booster system documentation.
Red (constant)	Flow sensor fails during testing.	Check connection and cables.

Heating belt

This is based on the condition that the heating belt has been connected - if not, the LED will be switched off.

Colour	Cause	Action
Green	Heating belt works	None
Red	Heating belt failure.	Check the following: that heating belt is correctly connected, whether fuses have blown, that earth fault circuit breaker has been connected, whether there are any cable fractures.

Service and maintenance

Maintenance procedures

Maintenance procedures may vary and depend on your production. Safe-Vent recommends the following:

Maintenance interval: Weekly

To be done by operating staff.

- Cleaning
  - Wipe off any dust from station exterior.
  - Clean the display.
- Visual inspection, specifically:
  - Is the display lit.
  - Is the station damaged.

Maintenance interval: Every six months

To be performed by Safe-Vent or by a technician approved by Safe-Vent.

- Service overhaul by Safe-Vent:
  - Opening of station, ref. page 25.
  - Remove battery holder and inspect back-up batteries
  - Function control of all components and connections

Maintenance interval: Every other year

To be performed by Safe-Vent or by a technician approved by Safe-Vent.

- Replace back-up batteries.