FS10

Control and Monitoring system for

Fixed Aerosol Fire Extinguishing Systems

Installation and Service Manual

Release 3

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2 Preface

This document serves as the service manual for the FS10 Control and Monitoring System designed for Fixed Aerosol Fire Extinguishing Systems.

Please observe local regulations and classification society requirements.

2.1 Purpose

This document outlines the installation, servicing, and troubleshooting procedures for the FS10 system.

It's important to note that this manual focuses solely on the FS10 system itself. Details regarding the placement of aerosol generators, cables, etc., are not included, as these aspects are typically customized for each installation.

For information on the day-to-day operation of the FS10 system, please refer to the FS10 User Manual.

2.2 Abbreviations

HMI	Human Machine Interface
IMO	International Maritime Organization
NC	Normally Closed
NO	Normally Open
PCB	Printed Circuit Board

3 General description

3.1 System Description

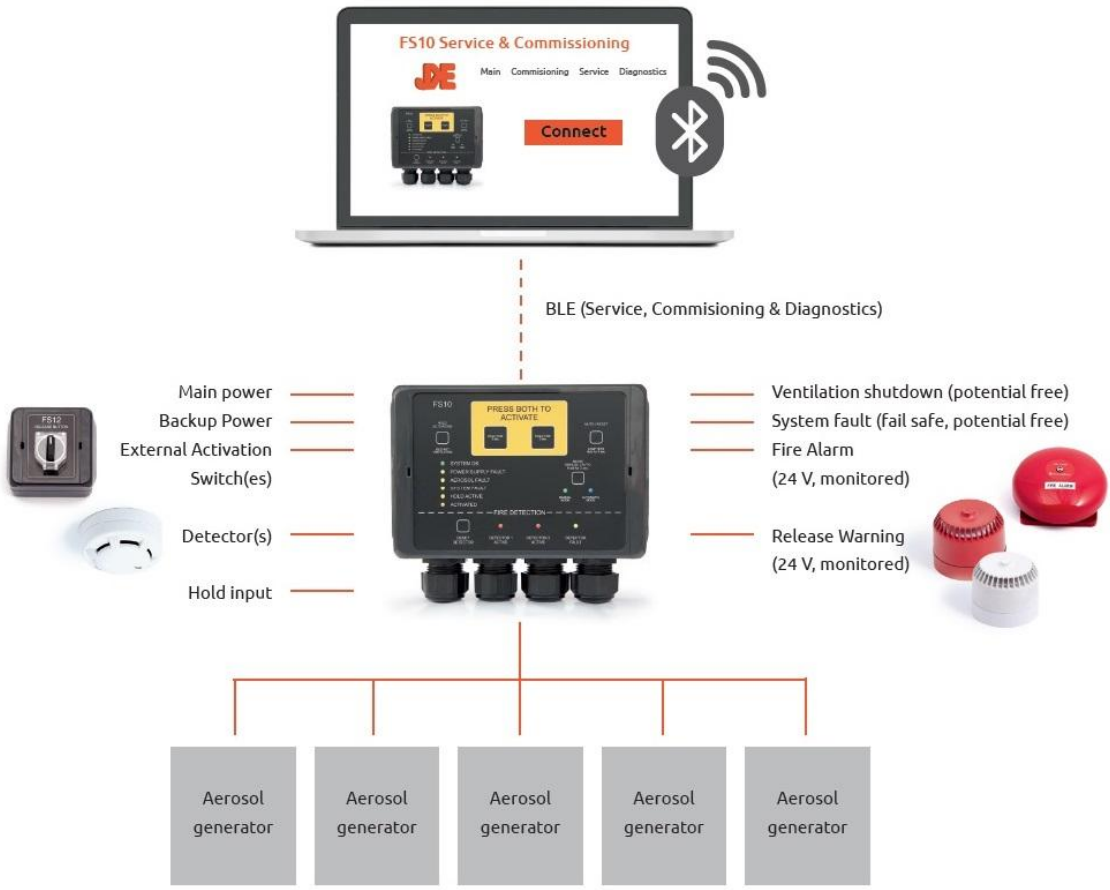
The FS10 system serves to oversee and regulate a series of aerosol generators installed on a vessel as part of its fire suppression setup.

Its primary function is to trigger the aerosol generators in case of a fire emergency.

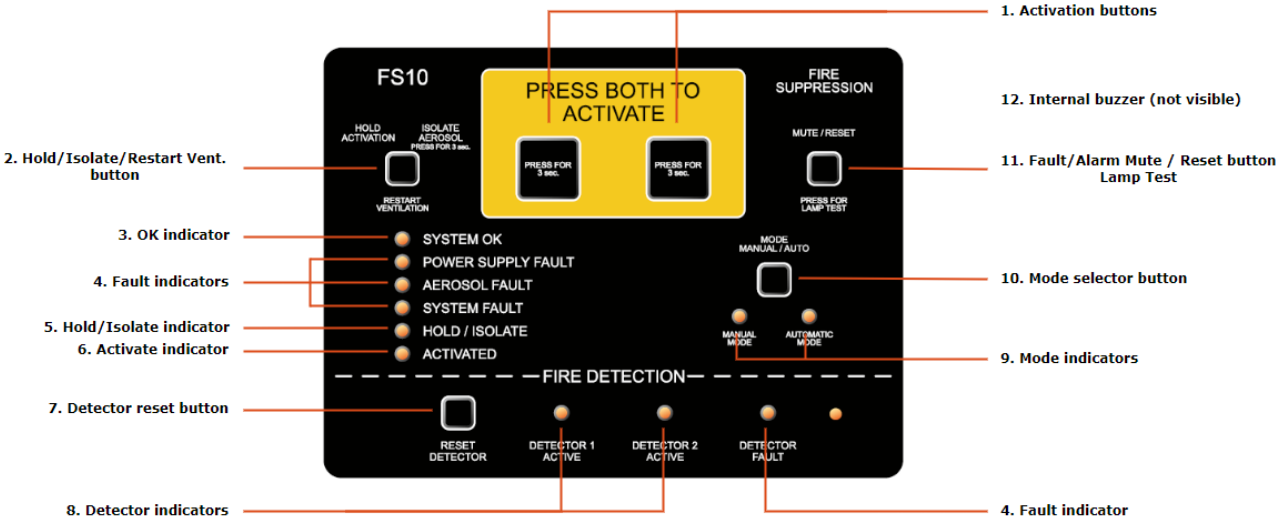
Additionally, the FS10 system is designed to monitor its own functionality, including power sources, aerosol connections, cables, and various system components, issuing an alert if any faults are detected.

Moreover, it features two inputs for smoke detectors. During setup, the system can be programmed to automatically engage the aerosol generators if one or both detector inputs are activated.

3.2 Overview



4 Buttons and indicators



4.1 Descriptions of Indicators and Buttons

Detailed descriptions of the indicators and buttons on the FS10 panel are provided, including activation buttons, ventilation control, fault indicators, mode selectors, and more.

4.1.1 Activation Buttons

Press both buttons for at least 3 seconds to manually activate the aerosol generators in case of fire.
The activation delay initiates the process. Refer to section 4 for more details.

The default setting for the activation delay is 20 seconds.

4.1.2 Hold / Isolate / Restart Ventilation Button

There are 3 functions in this button:

1. Hold
   a. When the Aerosol generators are activated, this is to delay/hold the activation of Aerosol generators after activation, manual or automatic.
   b. Note: If you press the button for more than 20 seconds activation is cancelled.
      Activate indicator (6) stops blinking.
2. Isolate
   a. To ensure aerosol generators cannot be activated, e.g. when working in the protected area.
   b. To enter Isolate mode, press the button for 3 seconds.
      - Hold / Isolate indicator (5) is turned on.

c. To exit Isolate mode, press the button for 3 seconds.
   - Hold / Isolate indicator (5) is turned off.

3. Restart Ventilation
   a. When connected to the FS10 unit, the ventilation system in the protected area will be shut off if aerosol generators are activated.
      By pressing the Restart Ventilation button, the ventilation system can be restarted after fire extinction.

4.1.3 OK Indicator

The OK indicator (green) illuminates during normal operation.

Ensure at least one indicator on the FS10 panel always remains lit (If no indicators are lit, the FS10 panel is not powered).

4.1.4 Fault Indicators

If the FS10 system detects a fault, the corresponding yellow fault indicator lights up.

4.1.5 Hold / Isolate Indicator

The hold / isolate indicator illuminates when the hold or isolate function is active, triggered by pressing the Hold/Isolate/Restart Vent. button (2) or by activating the external isolate switch, see Hold / Isolate input terminal, page 12.

4.1.6 Activate Indicator

The Activate indicator (orange) blinks during the activation delay and remains lit once the aerosol generators are activated (1).

4.1.7 Detector Reset Button

Use the Detector Reset button to reset detectors in alarm state.

4.1.8 Detector Indicators

The relevant detector indicator(s) remains permanently lit if a Manual Call Point is in alarm state or blink if an automatic detector is in alarm state.

4.1.9 Mode Indicators

Mode indicators display whether the FS10 panel is in automatic or manual mode. In manual mode, activation occurs only via the Activation buttons (1) or an external activation switch. In automatic mode, activation can be initiated by 1 or 2 active detector inputs, or manually as in manual mode.

4.1.10 Mode Selector Button

Hold the Mode Selector button for at least 3 seconds to switch between automatic and manual modes.

- Automatic mode: The system will automatically activate Aerosol generator(s) when detectors (heat, smoke etc.) are active, it is also possible to activate manually.

- Manual mode: The system can only be activated by pressing the Activations buttons (1) or an external activation switch.
- Note: This feature must be configured via setup site.

4.1.11 Fault/Alarm Mute / Reset / Lamp Test Button

There are 3 functions in this button:

1. Mute
    a. When a fault is detected, the corresponding indicator illuminates, and both the internal buzzer and the fault output are activated.
    b. Pressing the "MUTE" button silences the internal buzzer. The buzzer will remain silent until a new fault occurs.
2. Reset
    a. Once the fault condition is remedied, both the fault indicator and external fault warning device can be deactivated by pressing the "RESET" button. If the fault is permanent, the relevant fault indicator will remain lit
3. Lamp Test
    a. Press for 3 seconds to do a Lamp Test.

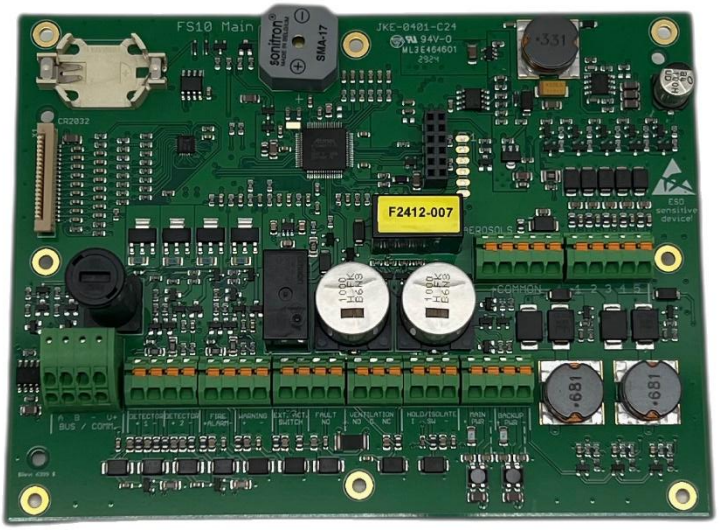
Similarly, if a fire alarm is triggered, the relevant detector indicator(s) illuminates, and both the internal buzzer and external fire alarm device are activated. Pressing the button silences the internal buzzer and fire alarm device. When the detector inputs return to a non-alarm state, pressing the button for a slightly longer duration (> 0.5 second) cancels the fire alarm.

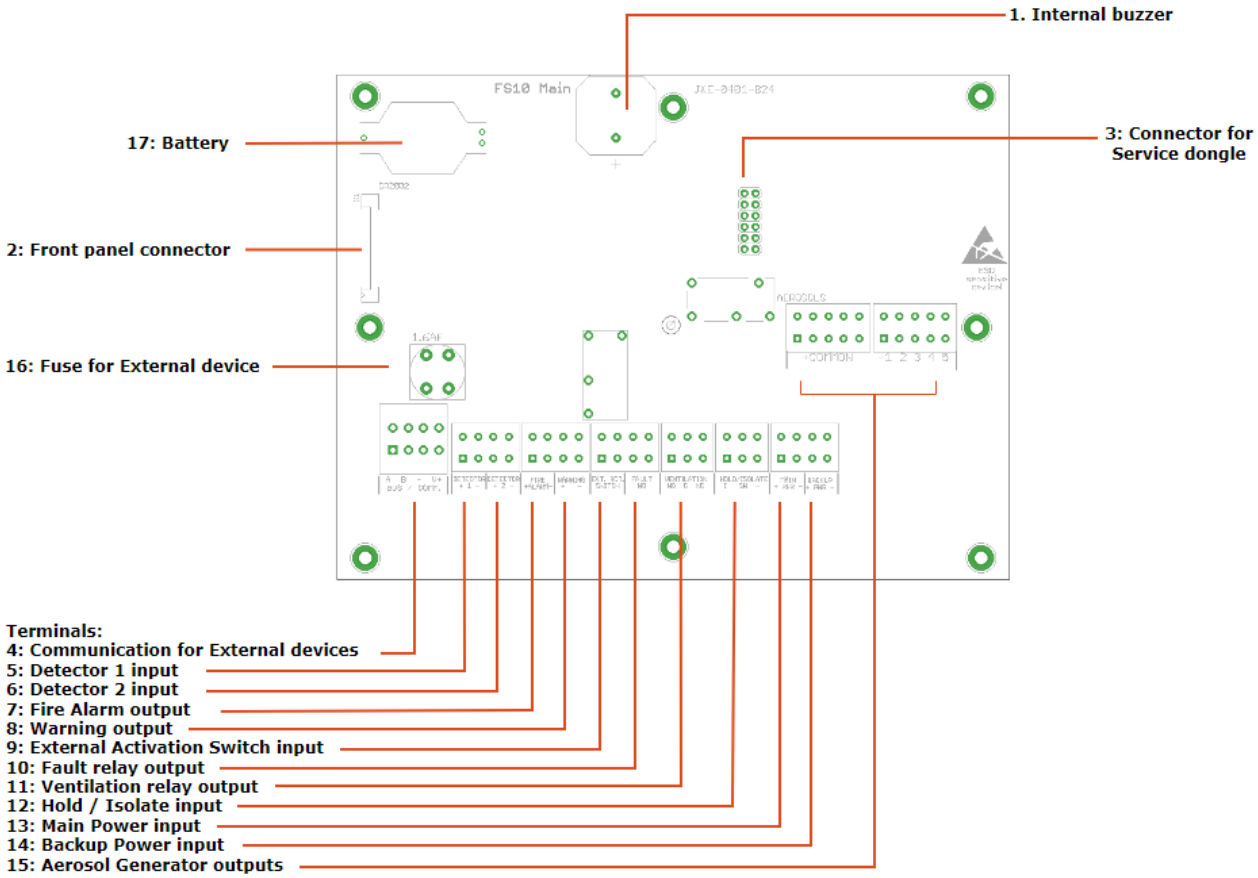
4.1.12 Internal Buzzer

The internal buzzer activates when a fault or alarm state is detected, including activation of aerosol generators. It continues to beep until the fault condition is cleared, and the fault is acknowledged. The internal buzzer can be silenced by “MUTE” button (11.1).

5 PCB

Refer to Section Description of PCB for details on the indicators and buttons featured on the FS10 panel.





5.1 Description of PCB

Detailed description of the PCB for the FS10 panel:

1. Internal buzzer

The internal buzzer serves as an additional component to the external alarm and warning systems. It activates when a fault is detected, when a detector input triggers an alarm or fire, or when the aerosol generators are activated.

2. Front panel connector

Internal connector for the front panel.

3. Connector for service dongle

Connector for service dongle, needed for configuration and service.

See Service Dongle, page 30.

4. Bus / Communication terminal

Power and Communications for other future FS10 units e.g., HMI and/or slave panel.

5. Detector 1 input terminal

You can connect up to three detector devices in parallel to each detector input. See Detectors, page 14, for details on detector characteristics. The detectors receive unregulated power from the active power input via the terminals. Ensure that the detector cable is terminated by an EOL resistor at the last detector.
The detector input must be configured, see FS10 Configuration, page 18.

6. Detector 2 input terminal

You can connect up to three detector devices in parallel to each detector input.
See Detectors, page 14, for details on detector characteristics.

The detectors receive unregulated power from the active power input via the terminals.
Ensure that the detector cable is terminated by an EOL resistor at the last detector.
The detector input must be configured, see FS10 Configuration, page 18.

7. Fire Alarm output terminal

Output for external fire alarm sirens and/or beacons.

The Fire alarm output must be configured, see FS10 Configuration, page 18.

8. Warning output terminal

The warning output is active in the delay period before activation of the aerosol generators.

Warning devices must be mounted in the protected area.

The Warning output must be configured, see FS10 Configuration, page 18.

9. External Activation Switch input terminal

Connect external activation switch(es) to this terminal. A Maximum of 5 External Activation Switches can be connected.

Settings for External Activation Switches must be configured, see FS10 Configuration, page 18. and FS10 External Activation Switch, page 29.

10. Fault relay output terminal

This relay NO output is used for fault warning devices (e.g., monitoring systems or warning devices). It operates on a fail-safe basis, meaning the relay contacts are shorted when the system is in a non-fault condition. The contacts will be open if the system is unpowered or if a fault condition is detected.

11. Ventilation relay output terminal

This potential free relay output is designated for the ventilation system. In the protected area, the ventilation system should be able to be interrupted by the FS10 system to enable automatic shutdown in case the aerosol generators are activated.
The NC (Normally Closed) and NO (Normally Open) designations apply when the system is not powered and during normal operation.
Thus, during normal operation, the NC contact set will be closed. When the activation procedure is initiated, the NO contact set will be closed until either "Restart Ventilation" is pressed or power is cut from the system.

12. Hold / Isolate input terminal

You can connect an external hold/isolate switch to this terminal.
The hold/isolate input serves two functions: hold functionality, which temporarily delays the activation of the aerosols after the activation procedure has started, and isolate functionality, which permanently disables the activation of aerosols while work is being carried out in the protected area.

Hold / Isolate must be configured, see FS10 Configuration, page 18 and FS10 External Isolation Switch, page 29.

13. Main power input terminal

Connect Main power, nominal 12VDC or 24VDC
The Power input voltage must be configured, see FS10 Configuration, page 18.

Note: If both Main and Backup power supplies are missing, the system is off. There will be no light on the FS10, and the fault relay output will be in fault position (open).

---

14. Backup power input terminal

Connect Backup power, nominal 12VDC or 24VDC

The Power input voltage must be configured, see FS10 Configuration, page 18.

Note: If both Main power and Power supply are missing, the system is off. There will be no light on the FS10, and the fault relay output will be in fault position (open).

---

15. Aerosol Generator output terminals

Connect up to 5 aerosol generators to these terminals.

16. Fuse for External device

The fuse protects against damage in case of short circuits in an external device or in the wiring. Replace with a fuse of type F 1,6A 5x20mm if needed.

17. Coin cell

The coin cell keeps the internal clock running when external power is unavailable. The internal clock is used for timestamps in the logs.

Coin cell type: CR2032.

6 Technical Details

6.1 Power supply

The FS10 system must be powered by two independent 12V or 24V power supplies. The system is designed to work with voltages within these ranges:

- 12V nominal: 9.0V – 15.6V
- 24V nominal: 18V – 31.2V

6.2 Current consumption

- Idle, OK state: < 50mA
- During activation: < 500mA

6.3 Environmental

- Temperature: -25° to +70°
- IP rating: IP65

6.4 Physical dimensions

- WxHxD: 190x125x60 mm
- Weight: 0.4kg

6.5 Aerosol Generators

The FS10 supports up to 5 aerosol generators.
Aerosol Generators must be configured, see FS10 Configuration, page 18.

The total resistance of the electrical activation unit in the aerosol generator and cabling must be 0.5Ω – 4.0Ω. Recommended maximum cable length when using 0.75 mm2 cables is 30 meters. In this case the resistance of the electrical activation unit must be below 2.5Ω.

When using more than 3 aerosol generators, it is recommended to use the FS10 Connection box and split out to each aerosol generator from there.

See FS10 Connection Box, page 30.

6.6 Detectors

The FS10 system supports smoke, fire, flame detectors, and other devices with the following characteristics:

- Alarm resistance (Manual call points): 330 - 390Ω
- Alarm resistance (Automatic detectors): 470 - 1000Ω
- No-alarm current: Less than 100µA per detector.

When a detector indicates an alarm condition, the corresponding Detector Active indicator will flash intermittently.

Conversely, when an MCP device indicates an alarm condition, the corresponding Detector Active indicator will remain illuminated steadily.

This feature aids in distinguishing between Manual Call Points (MCPs) and automatic detectors.
For example, a 330Ω series resistor is suitable for MCPs, while a 600Ω resistor is recommended for automatic detectors.

Each detector input on the FS10 system can accommodate up to 3 detector devices. A 10kΩ resistor must be used as an EOL device on each input.

The detectors must be configured, and can be configured for automatic release, see FS10 Configuration, page 18.

6.7 External Activation Switch Input

The FS10 system can handle up to 5 external activation switches and must be configured before use, see FS10 Configuration, page 18.

6.8 Hold / Isolate Input

The Hold/Isolate input is used for connecting an external “HOLD / ISOLATE” switch, to be mounted outside the protected aera. It must be configured before use, see FS10 Configuration, page 18.
JKE Isolate switches are prepared with yellow and green LEDs for showing status for the switch.
See FS10 External Isolation Switch, page 29.

There are 2 functions in this button:

1. Hold
    a. Hold functionality, which, when the Aerosol Generators are activated, temporarily delays the activation of the Aerosols Generators after the activation procedure has started.
    b. Press and hold the Hold button to hold/delay the activation of the aerosol generators after being manually or automatically activated.
    Hold indicator (5) is turned on, and Activation indicator (6) will continue to blink.

Note: Pressing the button for at least 20 seconds will cancel the activation (Activate indicator (6) will then stop flashing and turn off!)

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2. Isolate
    a. Isolate functionality, which permanently disables activation of Aerosol Generators, e.g. while work is being carried out in the protected area.
    b. By pressing the button, the FS10 will isolate the aerosol generator.
    Hold indicator (5) is turned on.

c. To return to normal state press the button again and the Aerosol Generators will be online again, and the Hold indicator (5) is turned off.

6.9 Fire Alarm Output

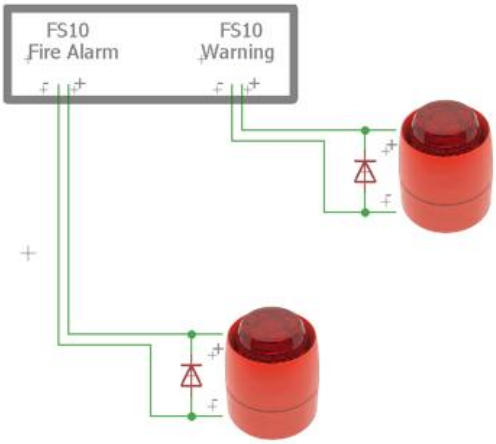
The fire alarm output is an active (“wet”) output capable of delivering up to 150 mA. Optional cable monitoring is provided using reverse polarity. Therefore, a diode must be fitted on the last alarm device connected to the output.
Fire monitoring must be configured before use, see FS10 Configuration, page 18.

6.10 Warning Output

The Warning Output is an active (“wet”) output capable of delivering up to 150 mA. Optional cable monitoring is provided using reverse polarity. Therefore, a diode must be fitted on the last alarm device connected to the output.
The monitoring must be configured before use, see FS10 Configuration, page 18.

6.11 Monitoring “Warning” and “Fire Alarm” devices

If monitoring is chosen in the configuration, you must mount a reverse diode (1N4007 at the Warning and Fire Alarm devices, see picture.)



6.12 Fault Relay Output - NO

Potential free relay NO for fault warning devices (e.g. monitoring system or warning device).

When the system is running and everything is ok, the contact set is NC (normal close)
If a fault condition occurs on the FS10 system, the contact set will be NO.

The fault relay can be reset by pressing the “MUTE / RESET” button after its OK again.

- Potential-free (“dry”) relay output.
- Max. voltage: 36VDC
- Max. current: 2A

6.13 Ventilation Relay Output NO/NC

Is a NO/NC relay for shutting down the ventilation in the protected area, if a fire occurs. It can be restarted again by pressing “RESTART VENTILATION” on the front, after the fire is shot down.

- Potential-free (“dry”) relay output.
- Max. voltage: 36VDC
- Max. current: 2A

7 FS10 Configuration

When you receive FS10, the FS10 is installed with a default configuration. You see the default configuration below.

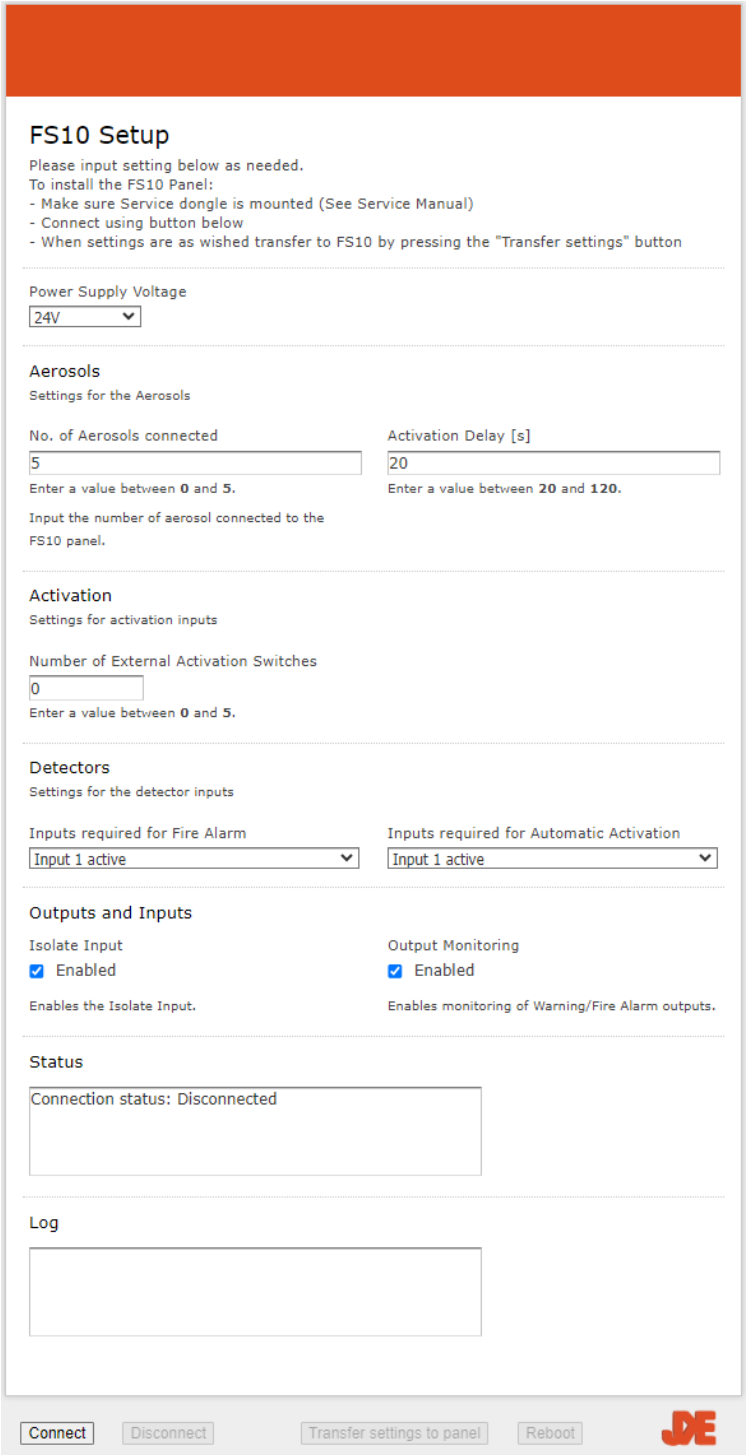
If you need to change the configuration it must be done using the FS10 Configuration Site at this link: https://jke-solutions.dk/fs10/setup/. You will need a Service Dongle and a pc with BLE interface and Chrome browser installed to be able to connect to the FS10.

7.1 Default Configuration

FS10 Configuration

Configuration sheet, FS10	
Date of configuration:	**2024-04-15**
FS10, S/N:	**2404xxxx**
Power supply voltage:	**24V**
Settings for Areosols	
Numbers of Areosols connected:	**5**
Activation	
Activation delay (range 20-120 seconds):	**20 seconds**
Numbers of External Activation switches:	**1**
Detectors	
Inputs required for Firealarm:	**1 OR 2 active**
Inputs required for automatic activation:	**Disabled**
Outputs and inputs	
Isolate Input	☒
Output monitoring	☒

7.2 FS10 Setup page



7.3 FS10 Setup page – step by step

1. Turn off the power to the FS10 and mount the FS10 Service Dongle. See page 30.
2. Open setup site: https://jke-solutions.dk/fs10/setup/
3. Turn on the power to the FS10 panel.
4. Press "Connect" on the screen. The FS10 serial number will emerge on your screen (e.g. F2402-001) mark it and press "Start Parring"
   In the "Status" window you will see that its connected, software version and time stamp.
   You might be asked to update the firmware of the FS10. In this case follow the instructions given.
   In the "Log" window you will find info about the system.
   The internal setting from the FS10 panel will appear on the screen, now you can change the settings for your projects.
5. Choose between 12Vdc or 24Vdc system.
6. Choose the number of aerosols needed for your projects, 1-5 aerosols.
7. Change the activation delay between 20-120 seconds.
8. Add external activation switches, 0-5 units.
9. Settings for detector:
   a. Input 1 active: If only detector 1 is required for activation of the Fire Alarm.
   b. Input 1 AND 2 active: Both detectors must be active for activation of the Fire Alarm.
   c. Input 1 OR 2 active: Only detector 1 or detector 2 must be active for activation of the Fire Alarm.
   d. Disabled: If no detectors are to be used for Fire Alarm.
10. Settings for Automatic Activation:
    a. Input 1 active: If only detector 1 is required for automatic activation.
    b. Input 1 AND 2 active: Both detectors must be active for automatic activation.
    c. Input 1 OR 2 active: Only detector 1 or detector 2 must be active for automatic activation.
    d. Disabled: If Automatic Activation is to be disabled / not allowed.
11. Add an external "HOLD / ISOLATION SWITCH".
12. Enable Output Monitoring.
    a. "FIRE ALARM" device will be checked with a reverse mounted diode.
       See page 16
    b. "WARNING" device will be checked with a reverse mounted diode. See page16
13. When alterations have been done, install the new configuration into the FS10 by pressing" Transfer settings to panel", and the FS10 will be programmed with the new configuration. When the FS10 has received the new settings, it will sign with a beep.
14. To finish the setup, you must press "Reboot" to power cycle the FS10 system.

Remember, remove Service Dongle after finishing your Configuration !!

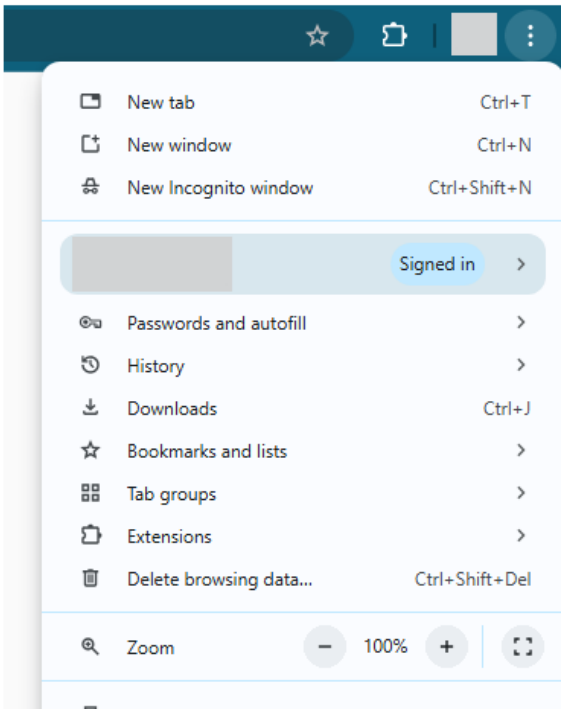
15. Now the FS10 unit is ready to be mounted with your new configuration.

7.4 FS10 Setup page – trouble shooting

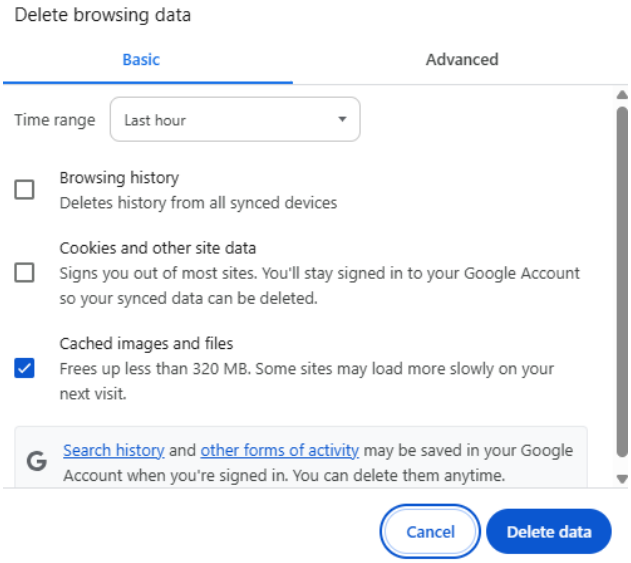
If you are experiencing problems communicating with the FS10 via the service dongle, please try the following remedies:

1. Clear browsing data:

   In **Chrome** click ⋮ in the upper right corner:



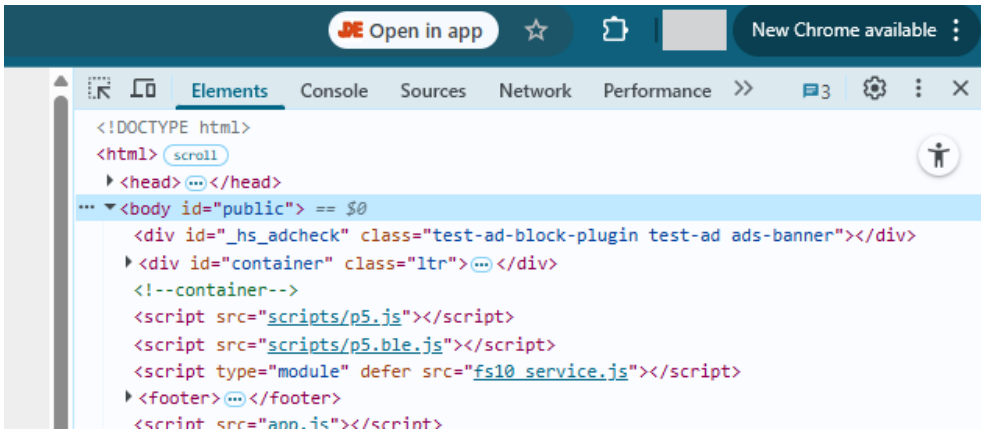
   Click “Delete browsing data...” and you should see this dialog:



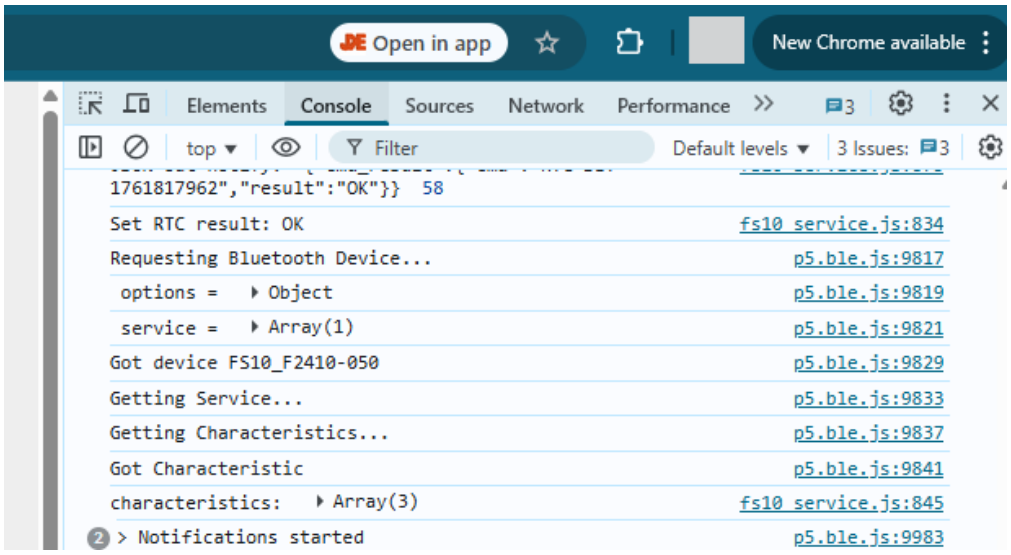
   Select “Cached images and files” and press “Delete data”
2. Reboot your PC.
3. Go to https://jke-solutions.dk/fs10/setup/
4. Retry connect to FS10

If none of the above helps, please information about the problem to support@jke-solutions.dk, at least including the following information:

1. The serial number of the FS10.
2. Browser console log. The browser console is obtained in this way in **Chrome**:
   a. In the browser, press F12
   b. You should see the debug window



   c. Select “Console”



   d. Right click and select “Save as...”
   e. Save the file and attach it to the e-mail.
   f. Send the e-mail to us.

8 Installation

The FS10 system is preconfigured from factory, see Default Configuration, page. 18

To change the settings, you need a laptop with Microsoft Windows 10 or newer, Bluetooth, Chrome browser and the Service Dongle, see Service Dongle, page 30.

There are two ways to install the FS10 system for your project.

1. WE RECOMMEND that you mount FS10 on the ship and change the settings after it is mounted. Then you will see that everything is ok with a green led on the front.
2. Alternatively, you can do all settings at your workshop, before mounting it on the ship. In this case you might encounter faulty conditions because external devices are not connected.

Cable type: It is recommended to use fireproof cable according to IEC60331 and minimum 0.75mm2 (~ AWG18). Local regulations or classification society requirements may also apply.

If more than 3 aerosol generators are to be connected, we recommend using an FS10 Connection Box, see page 30. A multi conductor cable (Number of conductors = Number of aerosols +2) must be used between the FS10 panel and the splitter box and individual cables between the splitter box and each aerosol generator.

The following outlines a standard installation procedure. Specific systems may have variations. Equipment should align with construction drawings.

Simple Installation:

1. Mount the FS10 unit outside the protected area.
2. Mount aerosol generators in the protected area, if necessary, also the FS10 connection box.
   a. ***Don't connect the Aerosol generators yet.***
3. Mount FS tester instead of each aerosol generator, or 2.2 Ω resistors.
4. Mount extra FS10 activation switch(es) if applicable.
5. Mount external Hold / Isolation switch if applicable.
6. Mount alarm / warning devices.
7. Connect the FS10 to the ventilation system if chosen.
8. Mount detector devices if applicable.
9. Test the FS10 system without aerosol generators connected.

8.1 Testing the installation

When all cables are connected, **except aerosol generators**, you are ready to test the FS10 system to verify that activation of aerosol generators is possible and check all other functionality on the FS10 system.

The aerosol generators will not actually be activated, but the installation's ability to do so will be verified by the FS test device. If FS test devices are not available 2.2 Ω resistors can be connected to simulate the aerosol generators.

Remember to check that all the aerosol generators are disconnected before performing an installation test!

1. Turn on both power supplies.

2. Check FS10 is working, no faults are present:
   2.1. Verify “SYSTEM OK” is indicated.
   2.2. Press and hold “MUTE / RESET” for 3 seconds to do Lamp Test.
      2.2.1. Verify all indicators on FS10 are on briefly.
      2.2.2. Verify internal buzzer is on briefly (The internal buzzer will also be active in most steps below).

3. Check Power supply connections:
   3.1. Turn off the main power.
      3.1.1. Verify “POWER SUPPLY FAULT” is indicated.
   3.2. Turn on the main power.
   3.3. Press “MUTE / RESET”.
      3.3.1. Verify “SYSTEM OK” is indicated.
   3.4. Repeat steps 3.1 to 3.3 with backup power.

4. Check Aerosol connections:
   4.1. Verify that all FS test devices are blinking at “TESTING OK”.
   4.2. Dismount a FS test device.
      4.2.1. Verify “AEROSOL FAULT” is indicated.
   4.3. Mount the FS test device again.
   4.4. Press “MUTE / RESET”.
      4.4.1. Verify “SYSTEM OK” is indicated.
   4.5. Repeat 4.2 to 4.6 for each mounted FS test device (configured number of aerosol generators).

5. Check Detector / Fire Alarm connections:
   5.1. If detector 1 input is in use:
      5.1.1. Activate first detector connected to input by test smoke or other means.
         5.1.1.1. Verify "DETECTOR 1 ACTIVE" is indicated (It may be blinking or steadily on, please refer to section Detectors, 6.6 for further details.
         Verify Fire Alarm device is on
      5.1.2. Reset Detector by pressing "RESET DETECTOR".
         5.1.2.1. Verify "SYSTEM OK" is indicated.
      5.1.3. Repeat steps 5.1.1 and 5.1.2 for all detectors connected to input 1.
   5.2. If detector 2 input is in use:
      5.2.1. Repeat steps 5.1.1 and 5.1.2 for all detectors connected to input 2.

6. Check Fire Alarm connections:
   6.1. If "Output Monitoring" is enabled:
      6.1.1. Disconnect Fire Alarm device.
         6.1.1.1. Verify "SYSTEM FAULT" is indicated.
      6.1.2. Reconnect Fire Alarm device.
      6.1.3. Press "MUTE / RESET".
         6.1.3.1. Verify "SYSTEM OK" is indicated.

7. Check Warning connections:
   7.1. Activate aerosol release by holding both Activate buttons for 3 seconds (**Make sure aerosol generators are not connected!)**
      7.1.1. Verify Warning device is on.
   7.2. Cancel aerosol release by holding Hold/Isolate button for 20 seconds.
      7.2.1. Verify "SYSTEM OK" is indicated.
   7.3. If "Output Monitoring" is enabled:
      7.3.1. Disconnect Warning device.
         7.3.1.1. Verify "SYSTEM FAULT" is indicated.
      7.3.2. Reconnect Warning device.
      7.3.3. Press "MUTE / RESET".
         7.3.3.1. Verify "SYSTEM OK" is indicated.

8. Check External Activation Switch connections:
   8.1. If External Activation Switch(es) is/are connected:
      8.1.1. **Make sure aerosol generators are not connected!**
      8.1.2. Press and hold 1st activation switch for 3 seconds.
         8.1.2.1. Verify "ACTIVATED" Indicator is blinking.
      8.1.3. Cancel aerosol release by holding Hold/Isolate button for 20 seconds.
         8.1.3.1. Verify "SYSTEM OK" is indicated.
      8.1.4. Repeated steps 8.1.1 to 8.1.3.1 for other External Activation Switches connected.

9. Check Fault output connections:
   9.1. If an external device or monitoring system is connected to the Fault Relay output:
      9.1.1. Create a fault condition, e.g. by disconnecting the backup power supply.
         9.1.1.1. Verify “POWER SUPPLY FAULT” or another fault is indicated.
         9.1.1.2. Verify “fault” is indicated by external device or monitoring system.
      9.1.2. Reconnect backup power supply or remedy other faults created.
      9.1.3. Press “MUTE / RESET”.
         9.1.3.1. Verify “SYSTEM OK” is indicated.
         9.1.3.2. Verify “no fault” is indicated by external device or monitoring system.

10. Check Ventilation connections:
   10.1. If a ventilation system is mounted in the protected space:
      10.1.1. With the FS10 system in OK state (“SYSTEM OK” is indicated).
         10.1.1.1. Verify that the ventilation system is running / can be started.
      10.1.2. Activate aerosol release by holding both Activate buttons for 3 seconds. (**Make sure aerosol generators are not connected!)**
         10.1.2.1. Verify that the ventilation system is stopped / cannot be started.
      10.1.3. Cancel aerosol release by holding Hold/Isolate button for 20 seconds.
         10.1.3.1. Verify “SYSTEM OK” is indicated.

11. Check internal Isolation Switch
   11.1. With the FS10 system in OK state (“SYSTEM OK” is indicated).
   11.2. Press and hold “ISOLATE AEROSOL” for 3 seconds
   11.3. Verify “HOLD/ISOLATE” yellow led on front is ON.
   11.4. Press and hold “ISOLATE AEROSOL” for 3 seconds for getting to normal mode
   11.5. Verify that “HOLD/ISOLATE” yellow led is OFF again.

12. Check External Isolate Switch connections:
   12.1. If External Isolate Switch is connected:
      12.1.1. With the FS10 system in OK state (“SYSTEM OK” is indicated).
         12.1.1.1. Verify that the green LED on the External Isolate Switch is on.
      12.1.2. Push External Isolate Switch to activate Isolate mode.
         12.1.2.1. Verify that the green LED on the External Isolate Switch is off.
         12.1.2.2. Verify that the yellow LED on the External Isolate Switch is ON.
   12.2. Verify “HOLD/ISOLATE” yellow led on front of the FS10 is ON.
      12.2.1. Push Isolate Switch to de-activate Isolate mode.
      12.2.2. Verify normal mode again (green LED on the External Isolate Switch)

13. Check Manual activation (**Make sure aerosol generators are not connected!)**:
    - 13.1. Activate aerosol release by holding both Activate buttons for 3 seconds.
      - 13.1.1. “ACTIVATED” indicator is blinking.
    - 13.2. Push and hold “HOLD ACTIVATION”
    - 13.3. Verify that delay time is on “HOLD
    - 13.4. Release the “HOLD ACTIVATION”
    - 13.5. Verify that the activation time is active again.
    - 13.6. Wait for the configured activation delay.
      - 13.6.1. Verify “ACTIVATED” indicator is permanently on.
      - 13.6.2. Verify “RELEASED” is indicated on FS test devices.
14. Check Automatic activation, if configured.
    (**Make sure aerosol generators are not connected!)**:
    - 14.1. Activate aerosol according to configuration by “Automatic Activation”.
      - 14.1.1. “ACTIVATED” indicator is blinking.
    - 14.2. Wait for the configured activation delay.
      - 14.2.1. Verify “ACTIVATED” indicator is permanently on.
      - 14.2.2. Verify “RELEASED” is indicated on FS test devices.

15. Finalize installation with real Aerosol generators.
    - 15.1. Turn off both power supplies.
    - 15.2. Disconnect all FS testers.
    - 15.3. Connect all Aerosol generators
    - 15.4. Turn on both power supplies.
    - 15.5. Verify that “System OK” is indicated and no fault on front.

9 Checklist

Checklist for FS10		
#	Action	✓
A	Before Installation, make sure you have relevant equipment	
	- Cable: fireproof cable according to IEC60331, minimum 0.75mm2 (~ AWG18)	☐
	- FS10 Main Unit	☐
	- FS10 External Activation Switch (optional)	☐
	- FS10 External Isolation Switch (optional)	☐
	- FS10 Connection Box (optional)	☐
	- Service Dongle (optional)	☐
	- FS tester (optional)	☐
	- Relevant Warning Devices	☐
	- Relevant Detectors	☐
	- Relevant Aerosol Generators	☐
	- Make sure Aerosol Generators are NOT connected to the system	☐
1	Turn on both power supplies	☐
2	Check FS10 is working, and no faults are present	☐
3	Check Power supply connections	☐
4	Check Aerosol connections	☐
5	Check Detector / Fire Alarm connections, if configured	☐
6	Check Fire Alarm connections, if configured	☐
7	Check Warning connections, if configured	☐
8	Check External Activation Switch connections, if configured	☐
9	Check Fault output connections	☐
10	Check Ventilation connections	☐
11	Check internal Isolation Switch	☐
12	Check External Isolation Switch connections, if configured	☐
13	Check Manuel activation (Make sure aerosol generators are not connected!)	☐
14	Check Automatic Activation, if configured	☐
15	Finalize installation with real Aerosol generators	☐

For more details see Testing the installation, page 24.

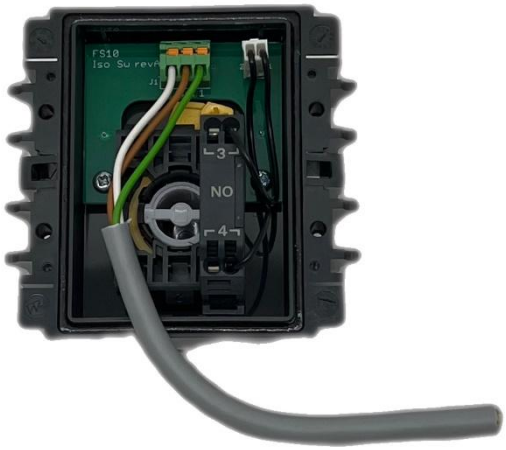
10 Accessories

10.1 FS10 External Activation Switch

FS10 External Activation Switch makes it possible to activate the Aerosol Generators without having direct access to the FS10 panel. For example, it can be placed just outside the protected area where it must be possible to activate the Aerosol Generators. Download datasheet at https://jke-solutions.dk/downloads/

10.2 FS10 External Isolation Switch

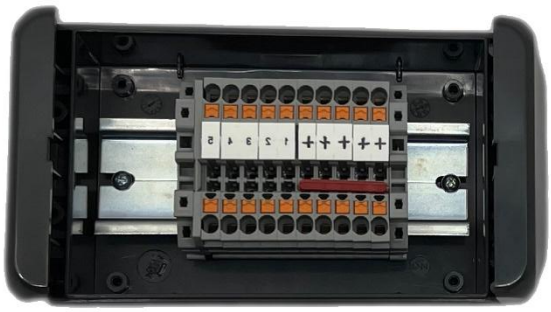
FS10 External Isolation Switch makes it possible to activate “ISOLATE” or “HOLD” mode without having direct access to the FS10. For example, it can be placed just outside the protected area. Download datasheet at https://jke-solutions.dk/downloads/



10.3 FS10 Connection Box

FS10 Connection Box makes sense when you have multiple Aerosol Generators attached to the FS10.

In this way you can save the use of cable, and it makes the mounting in the FS10 easier. Download datasheet at https://jke-solutions.dk/downloads/



10.4 Service Dongle

The Service Dongle is needed for wireless communication with the FS10 when doing setup and service.

When mounted in the FS10, the Service Dongle provides a BLE (Bluetooth Low Energy) interface that can be accessed by most newer pc's.

For further detail see FS10 Configuration, page 18.

The FS10 unit must be opened, and the Service Dongle physically inserted.

1. Turn off the power on FS10.
2. Open your FS10 unit by carefully inserting and turning a screwdriver on the right side. See pictures.

Mount the Bluetooth dongle as shown in the picture below.
Note: The yellow mark must be on the left side.

3. Turn ON the power for the FS10
4. Do your update or configuration, see FS10 setup page 19
5. Before removing the Service Dongle, turn OFF power on FS10.
6. Remove Service Dongle carefully.
7. Close your FS10 firmly by pressing on the right side. See Picture
8. Keep your Service Dongle in a safe place.
9. Restart your FS10 – and you are ready for operation.

REMEMBER: to remove Service Dongle after configuration!

10.5 Warning Devices

- MED Approved Sounder/Beacon
- 21-28Vdc
- -20° to +70°
- IP65
- Ø93mm

Beacon/flasher for 12VDC on request

10. Smoke Detector

- MED Approved Optical Smoke Detector
- 8,5-33Vdc
- -40° to +70°
- IP23D
- Ø97mm

11 Part list

FS10, Aerosol Control and Monitoring System and related materials	
Part#	**Article description**
0301	FS10 Main unit
0310	FS10 Service Dongle
0209	FS Test Device
0311	FS10 External Activation Switch
0312	FS10 External Isolation Switch
0313	FS10 Connection box
Misc.	
0230	Sounder/Beacon, combined red
0231	Automatic smoke detector
0232	Automatic heat detector
0234	Automatic smoke detector, ext. temp.
0350	FS10, demo system in suitcase, 1xFS10, 1xDongle, 1xTest Device, etc.

12 Fault scenarios

By pressing the “LAMP TEST” button for 3 seconds on the front of the FS10, it is easy to see what causes the fault.

Showing on FS10 front	**Press ”LAMP TEST” for 3 seconds**	**Fault**
POWER SUPPLY FAULT	1 x flash	Check Main Power. See page 14
	2 x flash	Check Backup Power. See page 14
AEROSOL FAULT	1 x flash	Check Aerosol 1. See page 14
	2 x flash	Check Aerosol 2. See page 14
	3 x flash	Check Aerosol 3. See page 14
	4 x flash	Check Aerosol 4. see page 14
	5 x flash	Check Aerosol 5. See page 14
SYSTEM FAULT	1 x flash	Check Ext. Act Switch See page 15
	2 x flash	Check Ext. Iso. Switch See page 15
	3 x flash	Check Monitoring See page 16
	4 x flash	Internal fault, please contact support
DETECTOR FAULT	1 x flash	Check detector 1. See page 14
	2 x flash	Check Detector 2. See page 14

13 Safety Considerations

1. Upon hearing the fire alarm in the engine room, crew members should immediately evacuate the area to prevent being in the same room as the aerosol generators when they are activated or are about to be activated. This precautionary measure reduces the risk of exposure to potentially harmful release of aerosols generators and ensures the safety of personnel during firefighting operations.
2. Safety Protocols: Implement strict safety protocols that prohibit entry into the engine room when the aerosol generator is activated. Ensure crew members are trained to follow these protocols without exception to prevent accidents or injuries.
3. Remote Monitoring: Utilize remote monitoring systems to assess the situation in the engine room from a safe location. This allows crew members to make informed decisions and coordinate firefighting efforts without risking exposure to hazardous conditions.
4. Emergency Communication: Establish clear communication channels for reporting fires and other emergencies. Ensure all crew members are aware of emergency procedures and know how to communicate effectively during high-stress situations.
5. Fire Suppression Systems: Equip the engine room with effective fire suppression systems, including aerosol generators, fire extinguishers, and automatic sprinkler systems. Regularly inspect and maintain these systems to ensure they function properly in the event of a fire.
6. Evacuation Plans: Develop comprehensive evacuation plans that outline escape routes and assembly points in the event of a fire. Conduct regular drills to familiarize crew members with evacuation procedures and ensure they can evacuate safely in an emergency.

14 Third-party Software

The FS10 firmware includes the following third-party software components:

1. Component name: CMSIS
    a. Version: V1.0.1
    b. License: Apache 2.0
    c. Description: ARM MicroController API
    d. Source: Downloaded by Microchip MPLAB-X[1]

2. Component name: FreeRTOS
    a. Version: V10.4.6
    b. License: MIT
    c. Description: Real Time Operating System
    d. Source: Downloaded by Microchip MPLAB-X[2]

3. Component name: ArduinoJSON
    a. Version: V7.0.3
    b. License: MIT
    c. Description: JSON library for embedded C++
    d. Source: https://github.com/bblanchon/ArduinoJson/releases/download/v7.0.3/ArduinoJson-v7.0.3.h

The FS10 setup web page includes the following third-party software components:

1. Component name: P5 BLE
    a. Version: V0.0.7
    b. License: MIT
    c. Description: Javascript library for BLE communication
    d. Source: https://github.com/ITPNYU/p5.ble.js

2. Component name: intel-hex.ja
    a. Version: V0.2.0
    b. License: MIT
    c. Description: Javascript parser/writer for Intel HEX file format.
    d. Source: https://github.com/bminer/intel-hex.js/tree/master

[1] https://ww1.microchip.com/downloads/aemDocuments/documents/DEV/ProductDocuments/SoftwareTools/MPLABX-v6.20-windows-installer.exe

[2] https://ww1.microchip.com/downloads/aemDocuments/documents/DEV/ProductDocuments/SoftwareTools/MPLABX-v6.20-windows-installer.exe

14.1 License Information

The following licenses apply to the respective third-party software used in this product:

- **MIT License**
  https://opensource.org/license/MIT
- **Apache License 2.0**
  https://www.apache.org/licenses/LICENSE-2.0

15 Contact

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