



# S•Line

ALARM CONTROL UNITS FOR  
TOXIC & FLAMMABLE GASES

## INSTRUCTIONS MANUAL





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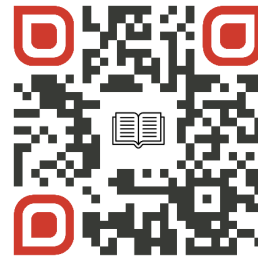
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# 1 INTRODUCTION

Welcome to the world of advanced gas detection technology with the S•Line Gas Detection Control Units. This manual is designed to provide you with comprehensive instructions on the proper use and installation of both S•Lx and S•Vx Control Units, that comprise the S•Line range. Before proceeding, please ensure that you have read and understood this manual in its entirety.

For more information about our product, feel free to check the following links.



Please contact your local distributor. In case of doubt, contact the manufacturer:

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## 1.1 Revision Record

Version	Description	Date	Author
V1R0	First Release (technical handbook)	02/06/2025	PWA, NMA, JDE
V1R1	<ul style="list-style-type: none"><li>Moved maintenance related content to a separate document</li><li>Change of doc structure</li><li>Change of style and theme</li><li>Change of external alarm content</li><li>Added analogue output diagrams</li><li>Instructions about SD card datalogging</li><li>Ethernet wiring</li></ul>	16/06/2026	PWA, EKO, NMA, LSE, NBE

## 1.2 Disclaimer

The installer is required to respect CE standards and installation instructions.

The installation should ONLY be carried out by qualified personnel.

Commissioning and maintenance must be carried out by qualified personnel approved by DALEMANS sa/nv.

This document must be read carefully by anyone who is or will be responsible for the installation, use and/or maintenance of this equipment. The warranty offered by DALEMANS sa/nv will be null and void if this equipment is not installed, used and maintained in compliance with these instructions, warnings and limitations of use.

By following these instructions, proper functioning of the equipment is guaranteed. Please contact DALEMANS sa/nv for any information about the use or maintenance of this product.

ONLY use original DALEMANS sa/nv parts when performing maintenance on the equipment, as described in this document. In the opposite case, the equipment's performance can seriously be altered.

Any repair or maintenance performed without respecting the procedures described in this document or without intervention from our after-sales service, may prevent the equipment from performing correctly and, as a result, prevent guaranteeing both the safety of the building's occupants and of installations.

This equipment must be installed in accordance to the instructions of this document. Please do not hesitate to contact DALEMANS sa/nv for any additional information regarding the use and/or the maintenance of this product.

DALEMANS sa/nv cannot be held responsible for any direct or indirect material/structural damage as well as any direct and indirect financial damages resulting from failure to comply with these guidelines.




DALEMANS sa/nv guarantees that this product is free from manufacturing defects and agrees, at its sole discretion, to repair or replace any component which is defective or likely to become so, in the context of normal use during the warranty period specified in the general terms of sale.

This warranty does not cover elements such as batteries, fuses or any other component provided by a third party.

Claims concerning the DALEMANS sa/nv product warranty must be made within the warranty period specified above and within 5 calendar days of the discovery of the problem. Please contact your DALEMANS sa/nv after-sales service to register your claim.

For any additional information, please refer to DALEMANS sa/nv general conditions available upon request.

## 1.3 Safety Markings

Symbol	Description
	Protective Earth terminal
	Warning: risk of electric shock
	Warning: refer to Instruction's Manual

Installation and commissioning must be performed by qualified personnel only, trained and accredited by DALEMANS sa/nv. During installation, please refer to applicable standards.

### 1.3.1 Safety Warnings

Modification, disassembling and total or partial destruction of this equipment may invalidate the essential safety requirements of the whole plant.

#### Batteries handling:



- Batteries used with S•Line range to provide backup power are of the type VRLA (lead-acid) 12V.
- To guarantee normal operation of the equipment, it is recommended to replace the backup batteries every 4 years maximum. The S•Line Control Units count and warn when this interval has elapsed.

#### Risk of **electrical** shock:



- The equipment contains live hazardous voltage that may be harmful if safety precautions are not strictly followed.
- The S•Line Control Units must be electrically isolated in the event of an intervention (protected by circuit breaker or bipolar switch)

- Do not open the equipment without disconnecting the mains power supply first.

Mechanical hazard:

- The weight of the equipment is sufficient to cause harm if not properly handled during transport and installation.

- The installer undertakes to comply with the relevant **CE** standards and installation instructions.
- Installation must be carried out **ONLY** by qualified personnel.
- Commissioning and maintenance must be carried out by qualified personnel approved by DALEMANS sa/nv.
- All our equipment is tested and inspected in our workshops prior to dispatch.

## 1.4 Environmental Awareness



The presence of the crossed-out wheeled bin logo on this product, indicates that the end user is responsible for complying with current regulations on collection and recycling of waste of electrical and electronic equipment.

The aim of these regulations is to preserve the natural resources used to manufacture this product, and to prevent the dispersion of substances potentially harmful for the environment and human health.

Once this product has reached the end of its useful life, it **MUST** be disposed of by handing it over to an approved collection centre for the recycling of electrical and electronic equipment.

For more information about collection and recycling centres in your area, please contact your local or regional authorities.

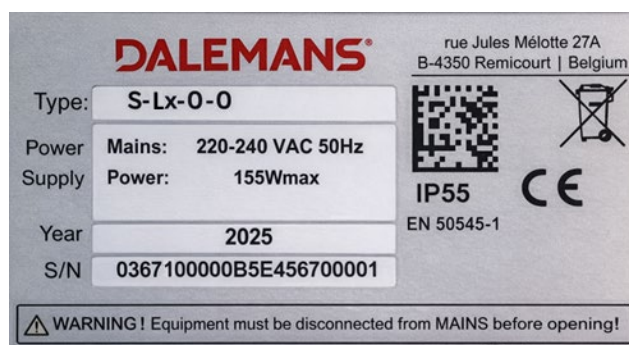
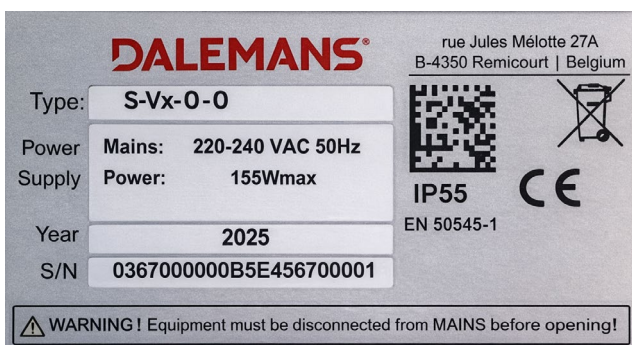


- Compatible batteries, sold separately, may be included as standard with the device. Please contact your DALEMANS representative to order the right model of batteries.
- The S•Line Control Units have a rating of IP55. This means that the equipment is protected against limited dust ingress (sufficient to prevent dust to interfere with normal device operation) and can withstand water jets from any direction. Ingress protection is achieved only if the installation instructions are strictly followed.

## 1.5 Marking Label

The marking label below, is affixed to the right-hand side on the top corner of the Control Unit's casing and enables identification of:

- the device model (hardware and software versions)
- the device's serial number
- the year of manufacture
- the operating supply voltage range and frequency
- the maximum power consumption
- the CE marking
- the WEEE (crossed wheely bin) marking
- Certified standard references



### 1.5.1 Model Identification

The model's name on the control unit's CE label, contains the exact hardware configuration of the device. The below table indicates all the possibilities for control units provided without batteries.

Item #	Model reference	Base	Enclosure Colour	LED Strip indicator	2xCAN interface boards	4x420 detector input boards	8x420 detector input boards	6x relays output boards
03685	S•Vx-0-R6	S•Vx	Dark Grey	-	-	-	-	-
03686	S•Vx-0-R12	S•Vx	Dark Grey	-	-	-	-	1
03687	S•Vx-0-R18	S•Vx	Dark Grey	-	-	-	-	2

Item #	Model reference	Base	Enclosure Colour	LED Strip indicator	2xCAN interface boards	4x420 detector input boards	8x420 detector input boards	6x relays output boards
03688	S•Vx-B2-R6	S•Vx	Dark Grey	–	1	–	–	–
03689	S•Vx-B2-R12	S•Vx	Dark Grey	–	1	–	–	1
03690	S•Vx-B2-R18	S•Vx	Dark Grey	–	1	–	–	2
03691	S•Vx-CL8-R6	S•Vx	Dark Grey	–	–	–	1	–
03692	S•Vx-CL8-R12	S•Vx	Dark Grey	–	–	–	1	1
03693	S•Vx-CL8-R18	S•Vx	Dark Grey	–	–	–	1	2
03694	S•Vx-CL16-R6	S•Vx	Dark Grey	–	–	–	2	–
03695	S•Vx-CL16-R12	S•Vx	Dark Grey	–	–	–	2	1
03696	S•Vx-CL16-R18	S•Vx	Dark Grey	–	–	–	2	2
03697	S•Lx-0-R6	S•Lx	White	1	–	–	–	–
03698	S•Lx-0-R12	S•Lx	White	1	–	–	–	1
03699	S•Lx-0-R18	S•Lx	White	1	–	–	–	2
03700	S•Lx-B2-R6	S•Lx	White	1	1	–	–	–
03701	S•Lx-B2-R12	S•Lx	White	1	1	–	–	1
03702	S•Lx-B2-R18	S•Lx	White	1	1	–	–	2
03703	S•Lx-CL8-R6	S•Lx	White	1	–	–	1	–
03704	S•Lx-CL8-R12	S•Lx	White	1	–	–	1	1
03705	S•Lx-CL8-R18	S•Lx	White	1	–	–	1	2
03706	S•Lx-CL16-R6	S•Lx	White	1	–	–	2	–
03707	S•Lx-CL16-R12	S•Lx	White	1	–	–	2	1
03708	S•Lx-CL16-R18	S•Lx	White	1	–	–	2	2

Item #	Model reference	Base	Enclosure Colour	LED Strip indicator	2xCAN interface boards	4x420 detector input boards	8x420 detector input boards	6x relays output boards
03866	S•Lx-CL4-R6	S•Lx	White	1	–	1	–	–
03867	S•Lx-CL4-R12	S•Lx	White	1	–	1	–	1

## 1.5.2 Devices Covered

This document has been written specifically for the version of the S•Line gas detection system described in the table below.

Device	Device version	Firmware version
S•Lx Control Unit	V1R0	v 1.3
S•Vx Control Unit	V1R0	v 1.3

# 2 OVERVIEW

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## 2.1 Intended Use

The S•Line Control Units allow the monitoring of gas concentrations of many potentially harmful gases, in order to act immediately before a danger has emerged.

They are designed to operate within commercial, industrial or laboratory buildings, such as underground car parks requiring the presence of numerous detectors.

In its **simplest variant**, the S•Line range features:

- One field bus interface (CAN bus) to interconnect the remote gas sensors
- One togglable input
- A large 7" capacitive touchscreen to visualize and operate the device
- LED indicators (S•Lx only)
- One mechanical button to acknowledge and reset alarms
- One output relay specific for system faults indications,
- Six programmable alarm output relays

**Fully configurable**, the S•Line can also be fitted with:

- Up to 16 extra gas alarm relays
- Up to 16 analogue detector inputs (4-20mA current loops)
- Up to 3 field bus interfaces
- Up to 2 analogue outputs for ventilation control (0-10V or 0-20mA or 4-20mA)
- Each field bus interface can be connected to up to 126 nodes (detectors or peripherals), depending on the electrical installation and configuration. The total is capped to 240 nodes.

Combined with D•CAN, D•420, D•TEX 420, DAX•420 or DAT•420 detectors, the S•Line alarm Control Units can easily monitor gas concentrations in very complex installations.

The backlit touchscreen display allows to visualize the configuration, the gas measurements, a journal of past and current events, displaying immediately and very clearly a warning in case of an alarm condition or of any other system anomaly.

Up to four gas alarm conditions may be configured for each detector, and compound alarm conditions may be configured with a list of logical functions.



The S•Line also features internal fault management. Once detected, any abnormal operation of the control unit or of a sensor is signalled by an action on a relay indicating the technical fault. This function ensures the reliability of the whole gas detection system.

Finally, all or part of the alarms can be linked to external equipment, such as a centralised technical management system, by means of an additional alarm relay.

At any time, the status of the Control Unit as well as the activation of each of the functions presented, can be visually observed through the following features on its front panel:

- A display whose backlighting varies according to:
  - The status of the Control Unit
  - The supply of an explanatory message of the above status.
- A set of 5 coloured LEDs.

An audible buzzer, resettable, which accompanies the alarm triggering or the error functions.

## 2.2 Limitations

The S•Line Control Units:

- must be connected to one or more remote gas sensors to operate. A remote gas sensor is a device that measures gas concentration in its direct vicinity and transmits the acquired measure using a digital or analogue electrical signal.
- are compatible with DALEMANS sa/nv gas detectors, as well as gas detectors with current loop outputs complying with Namur NE43 – any other gas detector tested and approved by DALEMANS sa/nv, provided that the power supply limitations are respected.
- are destined to be used indoors, with a pollution degree 2, overvoltage category II.
- are manufactured for industrial environments and have been tested as such (e.g. for industrial electromagnetic environments). They are not destined to be used in domestic premises.
- are a **class I** electrical devices that require to be connected to earth through their protective earth terminal.
- must be powered from a **European 220-240V AC 50Hz** mains power supply.
- are only destined to the European market and comply with all applicable European Directives. They have been affixed with the CE marking.

## 2.3 Housing

The S•Line's housing is made of metal and is extremely robust, specially designed to combine style, fit and functionality.

- It offers an IP55 rating (dust and water jets protection)
- The underside features innovative, discreet rubber grommets allowing signal and power cables to pass through, thereby ensuring IP55 compliance
- The door is hinged to facilitate access during maintenance
- The rear panel is fitted with grooves for vertical cabling

The following table provides an overview of the enclosure components.

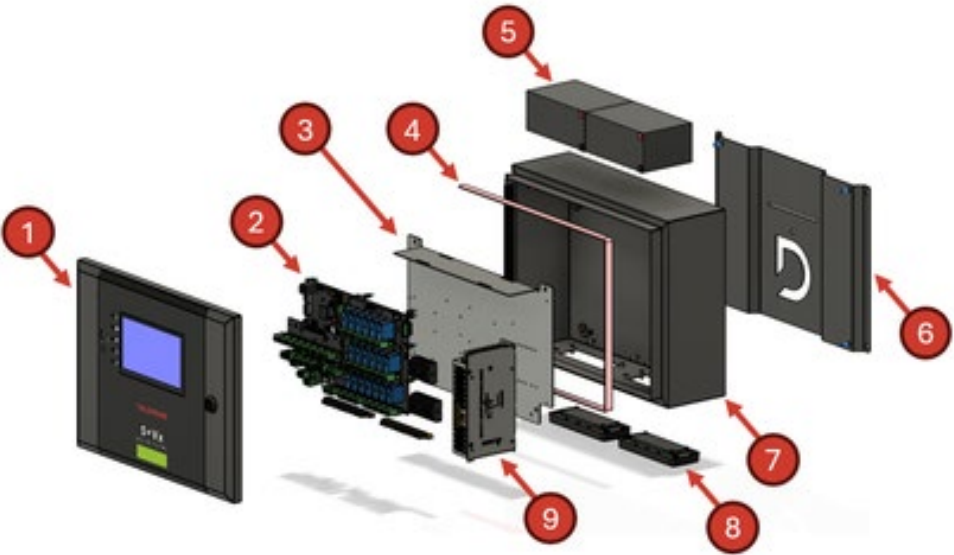
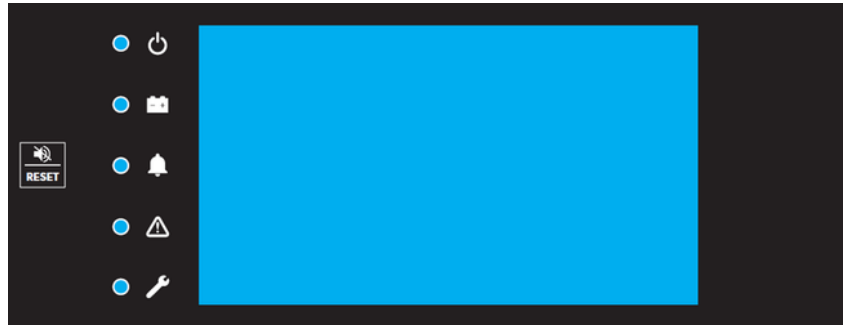
Housing Components (exploded view)	Description
	1. Enclosure door with touchscreen
	2. Motherboard & Modules
	3. Internal mounting plate
	4. LED Strip (S•Lx only)
	5. Backup Batteries
	6. Mural mounting plate
	7. Enclosure
	8. Cable entries
	9. Power supply

Figure 2 – Schematic Representation of the S•Line's enclosure components (S•Vx's door shown, LED strip in S•Lx only – batteries not aligned with their location, shown for clarity purposes)






## 2.4 Front Panel



The S•Line has a human-machine interface (HMI) with several components:

- A capacitive touchscreen
- 5 Discrete LED indicators
- 1 mechanical “MUTE and RESET” button
- 1 alarm buzzer
- 1 multicolour light ring (S•Lx variants only)

## 2.5 LED Indicators

Name	Symbol	Colour	Explanation
Power		Green	ON: the equipment is properly powered from MAINS Blinking: the equipment is powered from the Backup battery
Battery		Green	ON: battery present and available Blinking: battery low in charge OFF: battery either not present or configured
Alarm		Red	ON: at least one gas alarm has been triggered
Fault		Yellow	ON: at least one component of the equipment is failing
Maintenance mode		Yellow	ON: the system is in maintenance mode: it may behave differently than in operating (normal) mode Blinking: the maintenance interval has been exceeded. The system should be controlled by a professional

## 2.6 LED Status Ring (S•Lx only)

Light ring colour & pattern	Explanation
OFF	The control unit may be inactive The light ring may be absent from the configuration The light ring may be disabled
Green	The control unit is operating normally
Red	The system is in alarm mode
Yellow	The system is in fault mode
Blinking yellow	The system is in maintenance mode, or the maintenance interval has been exceeded.

## 2.7 External Dimensions

The external dimensions of the S•Line range are the same on both models (S•Lx & S•Vx).

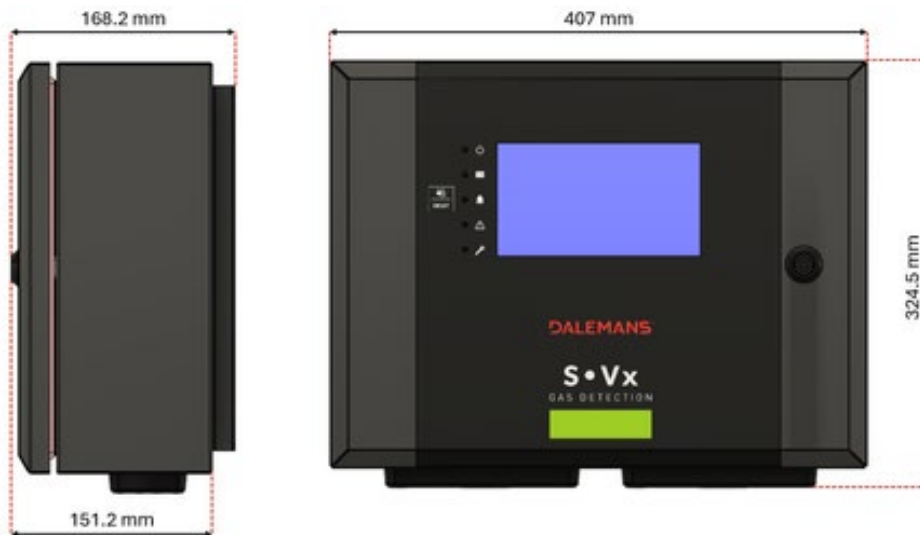


Figure 3 – External Dimensions of the S•Line range (S•Lx & S•Vx – S•Vx shown)

# 3 USER INTERFACE

## 3.1 Home Screen

The home screen is the first screen the user sees when approaching the control unit. It shows the most important information regarding the system state, and possibly events information if appropriate.

### 3.1.1 Home Screen in Normal State



Figure 4 – Home screen in Normal state

1	<b>Status bar</b>	Shows the customizable control unit name, the date & time, and the button to enter the main menu
2	<b>Current events area</b>	Either displays “No gas alarm” if the system is in normal state, or shows a list of current events: gas alarms, errors, power failures, ...
3	<b>Maintenance area</b>	Displays the date before which a new maintenance must be performed. If the date is passed, the area is coloured yellow and shows a warning message.

It is possible from the home screen to go:

- to the main menu by touching the menu icon
- directly to the events journal by touching the events area
- directly to the maintenance menu by touching the maintenance area

### 3.1.2 Home Screen in Alarm State

In case of alarm, the current events area will show a list. Each line in the list represents the highest alarm level of each detector. E.g. if a detector has alarm level 3 active, alarm levels 1 and 2 will not be shown.

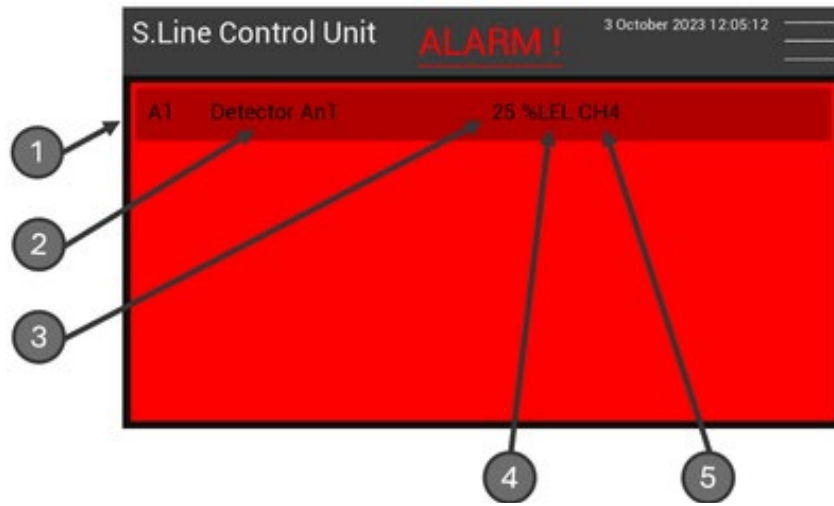


Figure 5 – Home screen in Alarm state

1	Highest active alarm level (A1, A2, A3 or A4)
2	Detector's custom name
3	Current gas concentration measurement
4	Gas concentration unit
5	Target gas

The list is ordered in alarm activation date and time, chronological order.

### 3.2 Main Menu

When entering the main menu, the top status bar changes, a new vertical navigation bar appears, and the rest of the display shows more information on the system.

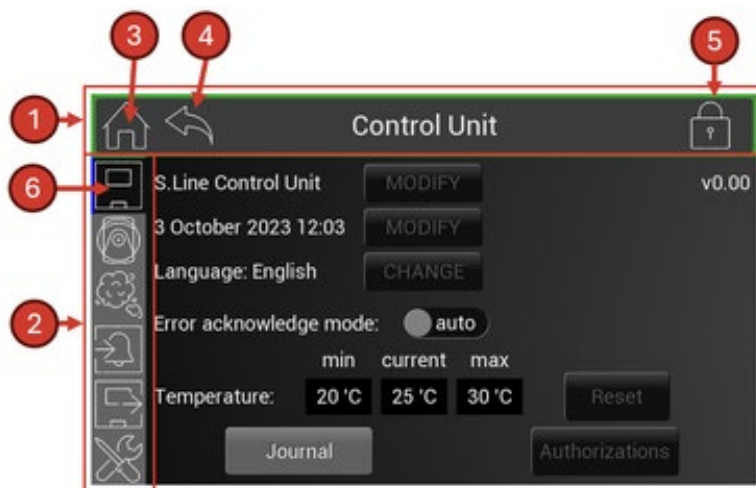


Figure 6 – Main menu navigation

1	<b>Status bar</b>	The outline is coloured green, yellow or red, depending on the operating state.
2	<b>Navigation bar</b>	It is possible to scroll up and down to find more icons that point to other menus.
3	<b>Home button</b>	Returns to the home screen
4	<b>Back button</b>	Returns to the previous screen
5	<b>Access button</b>	Shows the current access level and allows to unlock higher access levels
6	<b>System menu button</b>	Shows the general parameters of the Control Unit

### 3.3 User Access Levels

The Control Unit supports three types of user profiles: Regular user, Super user and Maintenance user.

- **Regular user** is the usual access level to operate the control unit daily.
- **Super user** access level allows to edit some parameters that are directly relevant for the users, such as the date and time or the network settings.
- **Maintenance user** access level is dedicated to any qualified person in charge of commissioning and maintaining the system.

Depending on the active profile, the icon on the top right of the screen will be displayed accordingly:



Regular user profile



Super user profile




Maintenance user profile






The default active profile is the Regular User profile.




**Super user** and **Maintenance user** profiles are password protected.

User may change the active profile by clicking on the  icon on the top right of the display and enter the appropriate password.

The password of the super user profile is

The following table shows the access level depending on the user profile.

Description	Event	Regular user 	Super user 	Maintenance user 
System Information	Date/time	View only	Edit	Edit
	Event journal	View only	View only	Edit (clear)
	Data logging settings	View only	Edit	Edit
	Manual/automatic fault acknowledge	View only	View only	Edit
	Change Maintenance password	Not allowed	Not allowed	Allowed
	Update configuration file	Not allowed	Not allowed	Allowed
	microSD Card Removal	Allowed	Allowed	Allowed
Detectors	Deadband status	View only	View only	Edit
	Out of order status	View only	Edit	Edit
	Enable/disable status	View only	View only	Edit
	Calibration	View only	View only	Edit
	CAN ID Assignment	View only	View only	Edit
Network	IP / Gateway address	View only	Edit	Edit
	Mask	View only	Edit	Edit
Tests	Front panel LED	Allowed	Allowed	Allowed
	Buzzer	Allowed	Allowed	Allowed
	Display	Allowed	Allowed	Allowed
	Output relays	Not allowed	Allowed	Allowed

Description	Event	Regular user 	Super user 	Maintenance user 
	Fault relay	Not allowed	Allowed	Allowed
Maintenance	Battery age	View only	View only	Reset
	Battery Replacement	Not allowed	Not allowed	Allowed

### 3.4 System Menu

The system menu shows the system-wide parameters:

- Control unit name (can be customised)
- Date and time
- Display language
- Error acknowledge: defines if an action on the reset button is required (manual) or not required (automatic) in case of a fault/error that is no longer present.
- Deadband activation/deactivation (for all detectors)

Depending on the obtained access level, some modifications may or may not be allowed.

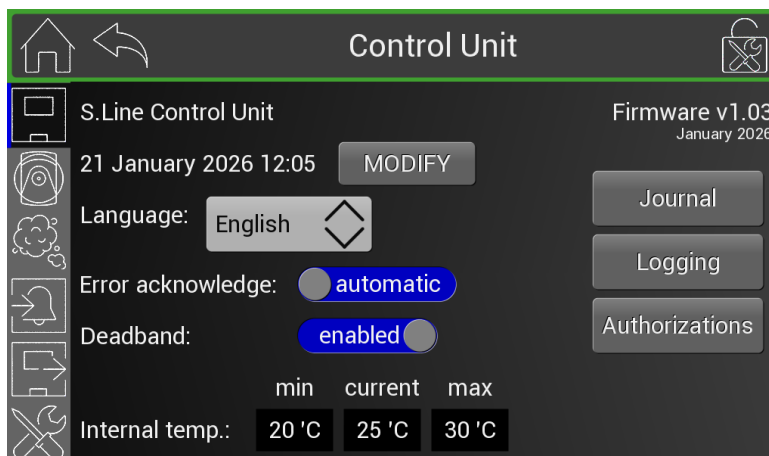


Figure 7 – System menu

The event journal button provides access to the journal where the list of any event is queued.

The logging button provides access to the settings of the logging of data/events on the SD card (optional)

The Authorization button provides access to the screen where the password of the maintenance user profile might be changed/recovered.

### 3.5 Detector's Menu

At any time, it is possible to visualise a list of all the detectors with their statuses, the last measurement, and any detector related information. To do so, from the home screen go into the main menu and touch the detector icon in the navigation bar.

The list below is displayed:

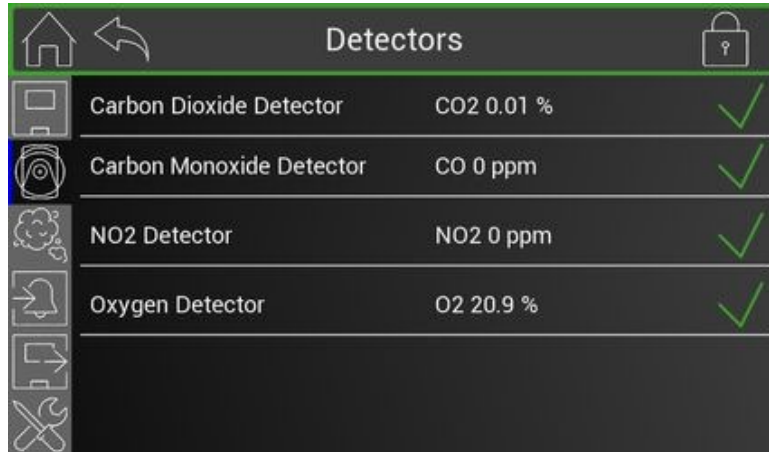


Figure 8 – Detectors list screen

By touching any line in the list, more details on one single detector can be shown:

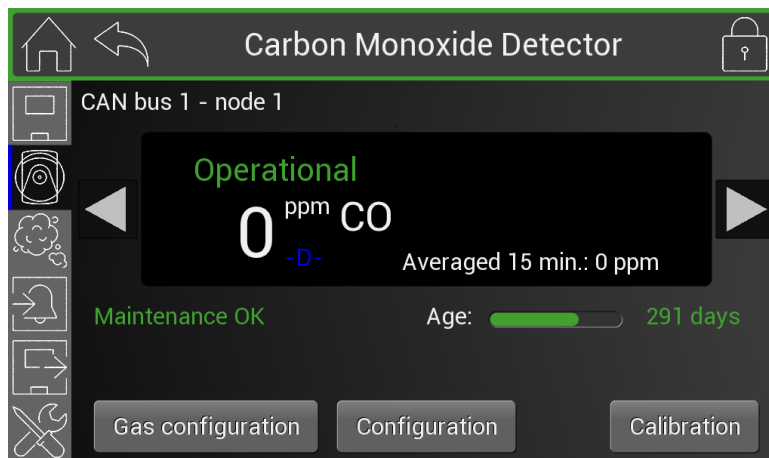


Figure 9 – Single detector screen

Detectors information can be browsed with the left and right arrows.

When the selected detector has at least one alarm condition, the alarm level is also indicated:

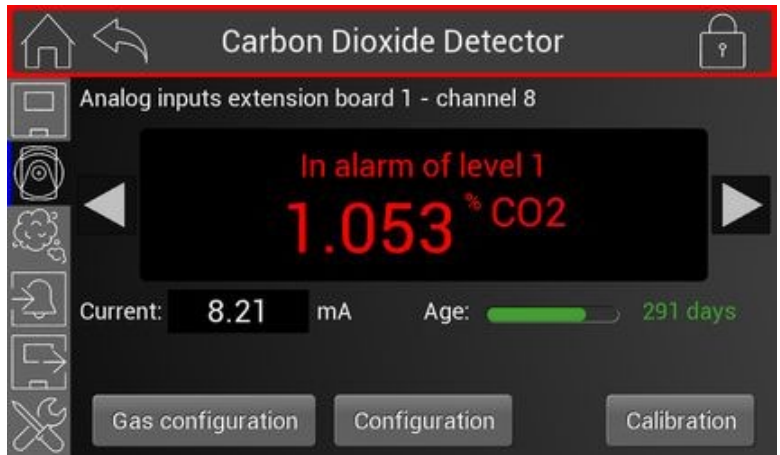


Figure 10 – Single detector in Alarm state

If the selected detector encountered an error, or the control unit cannot receive correct data from it, the display will indicate it:

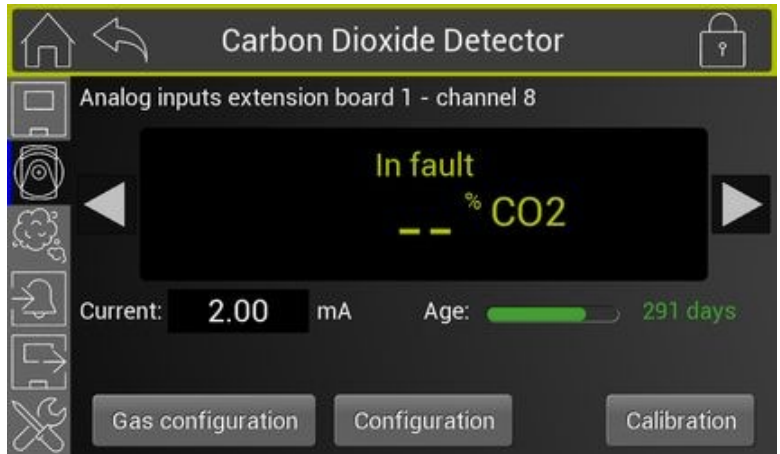


Figure 11 – Single detector in fault state



If the detector possesses at least one alarm condition using the “time weighted average” alarm type, the averaged measurement will be displayed accordingly.

### 3.6 External Alarm Input Menu

The external alarm menu parameters may be visualized using the fourth menu button.

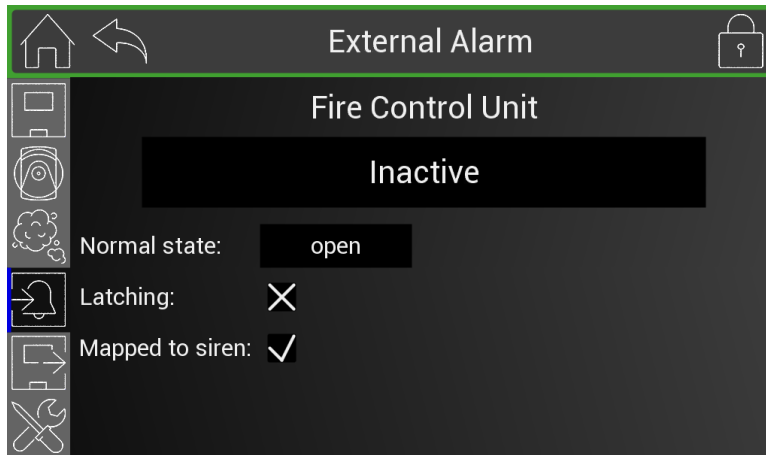


Figure 12 – External alarm input screen

In the screen shot above, the external alarm has been given a custom name “Fire control unit”, is currently inactive (no alarm), is set as non-latching and will trigger the siren in case of activation.

Since it is currently inactive and the normal state is “open (circuit)”, we can deduce that the contact is open.

### 3.7 Events Journal (History)

The event log allows users to view the history of alerts, faults, and other recorded events. Accessing the Event Log can be done as follows:

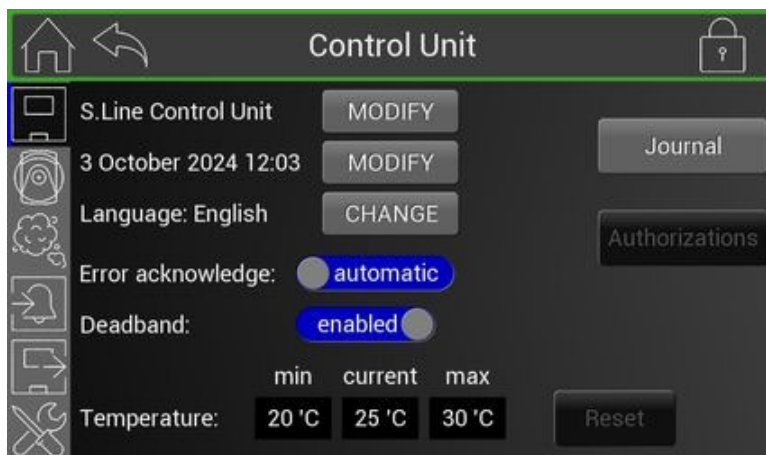



Figure 13 – System menu

- Go to the system menu
- Open the Event Log
- Press the "Journal" button to display the list of recorded events.
- Filter Events
-  To display only faults, press the yellow filter icon.

-  To display only alarms, press the red filter icon.

### 3.8 Output Menu

The output menu allows to visualise the list of all outputs: fault relay, alarm relays, siren output, and analogue outputs. It is also the place where each output behaviour can be viewed.



Figure 14 – Relay output

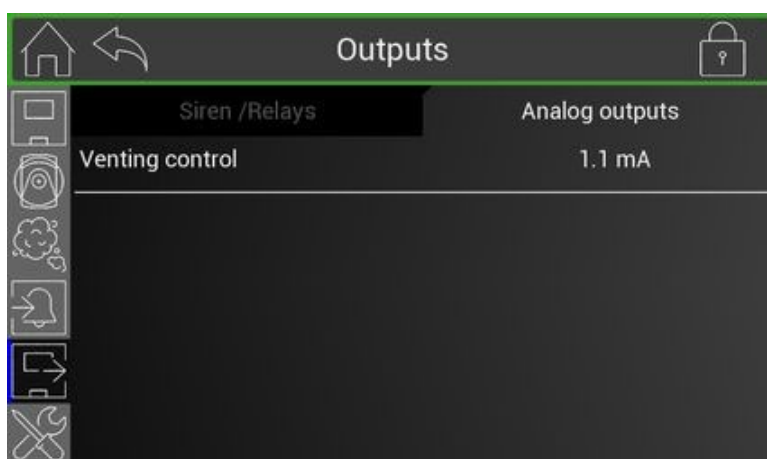


Figure 15 – Analog output

### 3.9 Communication Menu

The communication menu allows to visualise and configure the communication interfaces of the control unit.

The Modbus tab targets the Modbus TCP protocol configuration. This protocol uses Ethernet as a network, data and physical layers. IP address is fixed and entirely configurable through the Super User profile. The last byte of the gateway address and the MAC address are also configurable.

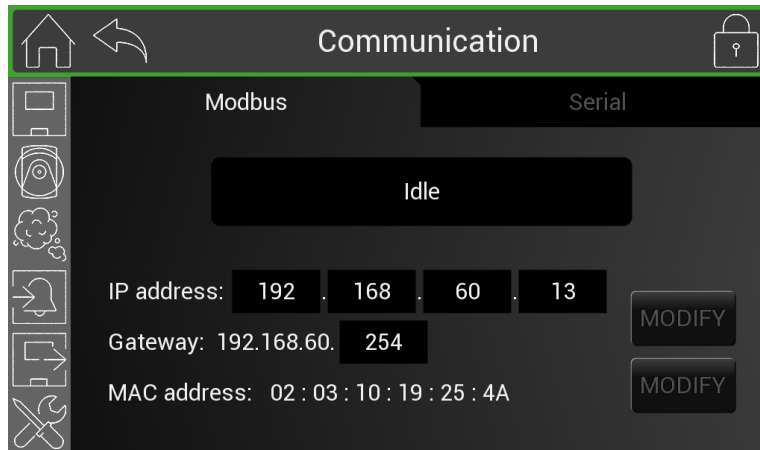


Figure 16 – Communication menu with Modbus parameters



The second tab, Serial, shows information about the serial interface, which is the service port of the device for maintenance and configuration purposes.

# 4 OPERATION

## 4.1 First Start-Up



For the equipment to be effective, it must be appropriately configured, with wisely selected sensors and adequate positioning.

### 4.1.1 Verification Sequence

1. Before switching on the Control Unit, please ensure that the terminals are tight and that the supplied voltage is within the Unit's operating voltage range.
2. When the unit is switched on, the LEDs on the front panel should all light up for a brief moment, and the internal alarm buzzer should sound. It is important to check that they do. The front panel's LEDs should reflect the operating state of the control unit, and the display should show the main screen.



For commissioning, please contact either DALEMANS sa/nv or an approved partner to arrange for an appointment.

### 4.1.2 Relay Tests

Verifies the activation and deactivation of relays according to configured parameters.

Prior to execute the test sequence, it is possible to adjust the settings of the sequence, such as delaying the activation of the relay and/or the duration of the activation.



Before commissioning or after maintenance, it is recommended to perform tests to ensure the system is functioning correctly.



Figure 17 – Output display

### 4.1.3 Power & Battery Check

The power supply and battery status can be monitored through the appropriate menu.

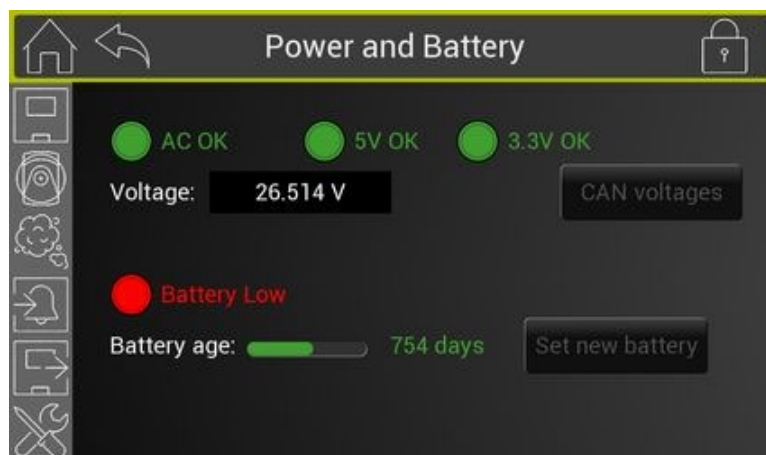


Figure 18 – Power and battery screen

## 4.2 Operational States

This section is an overview of the different modes of operation of the Control Unit.

### 4.2.1 Normal State

In normal state:

- The system is actively monitoring the gas sensor measurements
- No alarm conditions have been met
- No internal event or sensor event have triggered a transition to a special state



In this mode the user can consider the area covered by the system as safe against hazardous gas presence.

Normal mode is the only operation mode in which the display of the control unit may turn off, to extend the display's expected life.

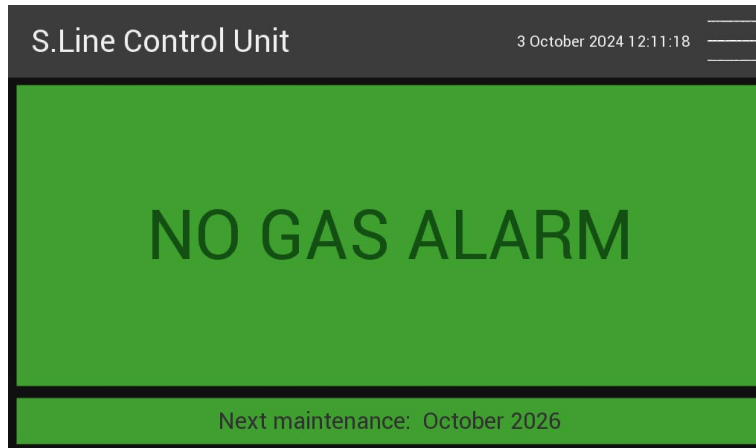


Figure 19 – Home screen in Normal state

## 4.2.2 Alarm State

The unit enters in alarm mode when one or more alarm conditions have been met. The display (and, in case of S•Lx, the LED ring) turns RED, indicating information about the nature of the triggered alarm conditions.

**The alarm state has priority over any other state:** if a fault condition is active, but the system is still able to measure a gas presence that activates an alarm condition, the alarm mode will take precedence.

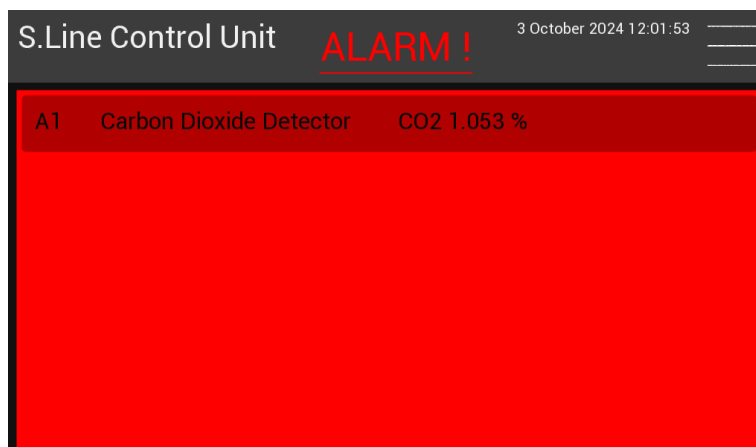


Figure 20 – Home screen in Alarm state

## 4.2.3 Special States

Special states are specific conditions in which the system is not operating normally. The display (and the LED Ring in S•Lx) will show a dominance of YELLOW and provide more information.

### 4.2.3.1 Fault State

A fault state indicates that at least one internal event is active and is qualified as an error.

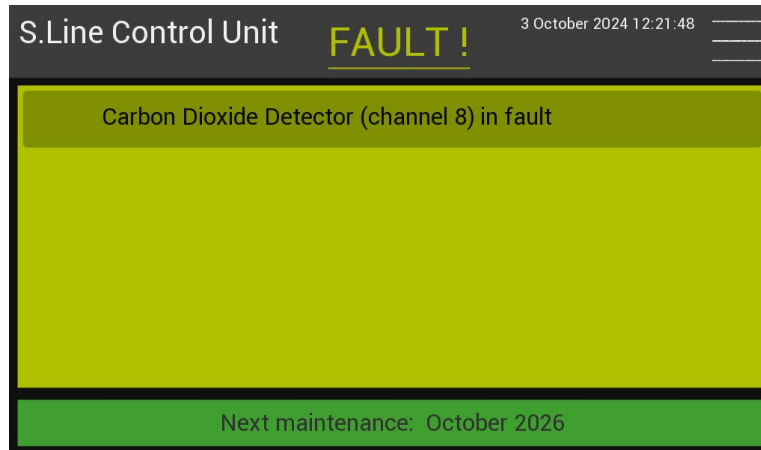


Figure 21 – Home screen in Special state (Fault)

### 4.2.3.2 Maintenance State

The maintenance special state allows the qualified personnel to operate on the system without causing actions on the control unit outputs.

This state is only accessible via a maintenance password and is automatically activated during calibration operations.



**After 15 minutes of idle time**, this state is automatically ended. Performing any action on the control unit or on a CAN bus detector resets the idle time to zero.

### 4.2.3.3 Warm-Up State

A warm-up is a state that applies to each sensor individually, not on the whole gas detection system. This state is a temporary one that occurs during power-up, after the initialization and self-tests phase. A warm-up state indicates that the associated sensor still needs time to stabilise, and the measurements are ignored.

## 4.3 Gases & Gas Concentration

Gas concentrations are expressed in different units, depending on the target gas.

- Flammable gases are expressed in %LEL, which is a relative percentage of the lower explosivity limit. The LEL itself is expressed in % of volume and depends on the target gas and the technical standard used as reference.
- Toxic gases are mostly expressed in ppm (part per million) of volume. It is shortened as ppm. Some very toxic gases are expressed in ppb (part per billion).
- Other gases such as CO<sub>2</sub> and O<sub>2</sub> are directly expressed as a %vol. or %V/V, a percentage of volume.

All these units are configurable within the Control Unit.

## 4.4 Gas Alarms

The S•Line Control Units use input gas concentration measurements to trigger alarms (which can be of different types), when going over a defined concentration level called a **threshold**.

The following are the available alarm types:

Alarm type	Behaviour	Parameters
Instantaneous	If one measurement is above/below the set threshold, the alarm is triggered	Threshold, direction
Time weighted average	Measurements from the detector are accumulated over a certain period.	Threshold, direction, averaging period
Qualifying timer	If one measurement is above/below the set threshold, a countdown is started. If all subsequent measurements are still above/below the threshold at the end of the countdown, the alarm is triggered	Threshold, direction, countdown period



Averaging period may be set from 30s to 8 hours

Each detector may be associated with up to four alarms, and each alarm must have one alarm type with configured parameters.

Besides the alarm type, each alarm must be configured as “**latching**” or “**non-latching**”.

- A **non-latching** alarm will immediately deactivate if its alarm condition is no longer satisfied.

- A **latching** alarm will stay active, even if the alarm condition is no longer satisfied, until the alarm is manually “reset”. The reset operation is performed by pressing twice on the mute/reset button, on the front panel.



Latching alarms are usually recommended when the underlying hazard is critical, e.g. a high concentration of flammable gas that may lead to an explosion.

## 4.5 Front Panel – System Mute/Reset

The front panel’s “Reset” button can be used in 2 distinct ways: “mute” and/or “reset”.

**One click** leads to “Mute”, while **two clicks** lead to “Reset”.

Their differences are explained in conjunction with the alarm types (“**latching**” or “**non-latching**”) as previously explained (see § [4.4 Gas Alarms](#) )

### 4.5.1 Mute

To perform a “Mute” action, **1 click** is required.

“Mute” can be useful in the following situations:

- Buzzer stop;
- Siren stop;
- Relay deactivation (if the targeted relays are configured to act as a siren output);

### 4.5.2 Reset

To perform a “Reset” action, **2 clicks** are required.

“Reset” can be useful in the following situation:

- Reset the alarm/error if the alarm/error conditions no longer apply (*nb.* the alarm is set to “latching” mode and/or the “error acknowledge mode” is set to “manual”)

## 4.6 Maintenance Considerations



- “Mute” silences the audible outputs momentarily – it will return if any other alarm/error appears.
- “Reset” Deactivates the alarm or an error for which the conditions no longer apply

It is important to know that most gas detectors use sensors that wear out over time – the signal may drift, or the sensitivity may decrease. In normal conditions the effects may be limited but, in some cases, environmental factors may drastically reduce the performance of the gas detectors.

Moreover, electrical installations are always subject to external influences and perturbations, may it be electromagnetic, mechanical shocks and vibrations, dust and water, heat...



A catalytic sensor, used widely for flammable gas detection, can stop working in a few days if it is exposed to high concentrations of gas or vapours containing silicone, lead or sulphur. In lower concentrations, the effect may take weeks or months to appear.

Some types of sensors may fail if exposed to a high concentration of the gas itself they are developed to detect.

### Détecteur

These are the reasons necessitating gas detectors to be regularly controlled, maintained and recalibrated.

To do so, the S•Line Control Units and their associated detectors implement the following features:

- A maintenance alert can be set to remind the user to perform the maintenance operation. The maintenance interval is set depending on the application by the qualified personnel.
- Each detector is associated with an “age” timer that will trigger the maintenance alert if required
- The backup batteries are also associated with an age counter. Outdated batteries trigger the maintenance alert and must be replaced.
- If a detector fails, it can be temporarily disabled (“**out of order**” mode) to let the rest of the system operate normally until a maintenance is done. **This action activates the fault relay.**
- Detector’s re-calibration routine is supervised and controlled from the touchscreen of the control unit

- A series of automated tests can be run from the control unit; this is in addition to the self-tests performed continuously from the control unit.

## 4.7 Using the External Alarm Input

The external alarm input is an ON/OFF type input based on a dry contact (relay). It allows an alarm to be activated by an external device and used within the internal logic of the control unit to act on the outputs.

External alarm may be provided with a custom name, so in case of an alarm activation, the custom name may be displayed on the home screen.

Same as with other alarms, the external alarm input may be configured as latching or non-latching.

The external alarm may be mapped to any alarm relay using the same configuration logic as the other alarms.

It is possible to map the external alarm to the siren output.

The **normal state** of the external alarm input is configurable according to the relay contact type: the **closing of the contact** may be considered as an alarm and the **opening** as “not an alarm”, or inversely, depending on whether a NO (Normally Open) or NC (Normally Closed) contact is used.

No external voltage is required on the external alarm input.

## 4.8 Using the Relay Output

A relay output is basically a binary output. One advantage of a relay over other type of signal outputs is that it creates a galvanic isolation between the coil and the contacts. Another advantage is that it can be used in a specific manner called a failsafe mode.

In **failsafe** mode, a relay will be energised permanently if the desired logic signal is “OFF” or “0”, and that the device has electrical power. If the power fails, or if the mapped alarms are activated, the relay will de-energise.

In **non-failsafe** mode, a relay will be de-energised permanently if the desired logic signal is “OFF” or “0”. If the mapped alarms are activated, the relay will energize.



The Fault relay is always using a failsafe behaviour.

Each programmable alarm relay may be set individually in failsafe or non-failsafe mode. Their default behaviour is non-failsafe.

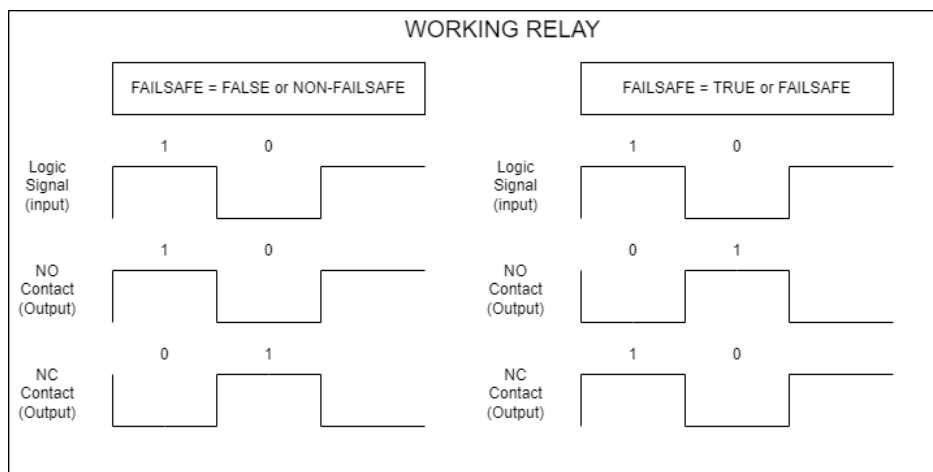


Figure 22 – Schematic representation of Failsafe and Non-Failsafe relays

Relay outputs of the S•Line Control Units may be given a custom name for a clearer electrical installation.

## 4.9 Modbus TCP via Ethernet

The S•Line Control Units can connect to the Ethernet network and implement the Modbus TCP communication protocol. This feature allows interoperability with remote equipment, such as a PC, a remote screen or a programmable logic controller (PLC). The control unit must be connected using the RJ45 connector located on the bottom edge of the mainboard.

Consequently, it is possible to remotely exchange data with the control unit, such as:

- System information
- Measurements
- Alarm & fault statuses
- System configuration
- Events journal

The control unit has one Ethernet interface on which a MODBUS TCP server is running.



Please note that most RJ45 connectors are too big to pass through the rubber cable entry panel. It is recommended to use a single ended cable or to crimp the connector after passing the cable through the cable entry panel.

The default network settings are as follows:

**IP Address:** 192.168.10.100

**Mask:** 255.255.255.0

**Gateway:** 192.168.10.1

A unique MAC address is assigned to each control unit.

The network settings can also be properly reconfigured (according to the building's IT network) to operate.

IP address may only be manually assigned.

The TCP server, supporting the MODBUS protocol, can accept up to 4 simultaneous connections.

The remote device required to exchange data with the control unit must initiate the connection and send queries, regarding:

- alarms, faults, and maintenance status of the control unit
- The status of every measurement channel as well as the status of their alarm levels
- The external alarm status
- The relay state



Enabling the Ethernet connection requires the intervention of a Dalemans sa/nv approved technician.

## 4.9.1 Modbus Implementation

The features of the implementation of the Modbus TCP protocol in the S•Line control units are :

- Communication port: default port of the Modbus TCP protocol (502)
- Maximum number of simultaneous clients: 4
- Read-only data access
- Supported functions:
  - Read Coils (0x01)
  - Read Discrete Inputs (0x02)

- Read Holding Registers (0x03)
- Read Input Registers (0x04)

In general,

- The **configuration information** (static data) of the control unit is available through the functions 1 (“Read Coils”) et 3 (“Read Holding Registers”). After commissioning, (when the control unit configuration is no more modified), the connected application should read that information only once as it is not supposed to change over time.
- **Dynamic information** of the control unit is available through the functions 2 (“Read Discrete Inputs”) et 4 (“Read Input Registers”). Those are refreshed every second and should then be acquired periodically.

Please note that more detailed information can be found at the **S•Line Modbus Interface Manual**.

## 4.10 Data Logging

Data Logging is achieved via a preformatted microSD card (**optional**), and the function needs to be enabled in the configuration menu (it must be launched from the control panel screen of the Control Unit).

To extract the data, the SD card must be physically removed from the Control Unit and be inserted into a pc to see the logged events information.

The sampling period in Data Logging can be set from 5s onwards, however, it should be done in increments of 5min and more ideally, so as not to saturate the card with impractical information.

The microSD card must be **separately ordered** from Dalemans na/sv – please DO NOT USE any other card, as data logging may be compromised.

### 4.10.1 µSD Memory Card Removal

To remove the card (for either data logging acquisition or for card replacement), please follow the instructions below:

1. **Act:** Click on the front panel button “Remove SD card” from the User Menu (mandatory to prevent data corruption).



In case an extension board is installed, the Card holder can be somewhat hidden from view – however, access from top of the extension boards can be achieved

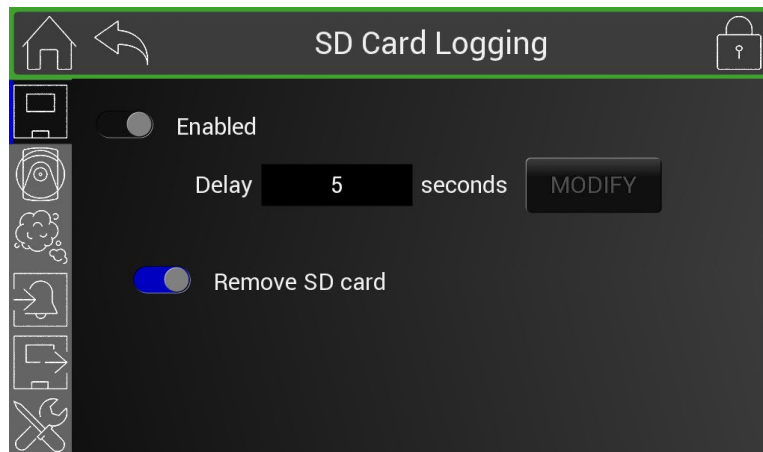


Figure 23 – SD card Info on the display

2. **Locate:** Locate SD Card on the motherboard (see [Figure 24 – Motherboard](#))

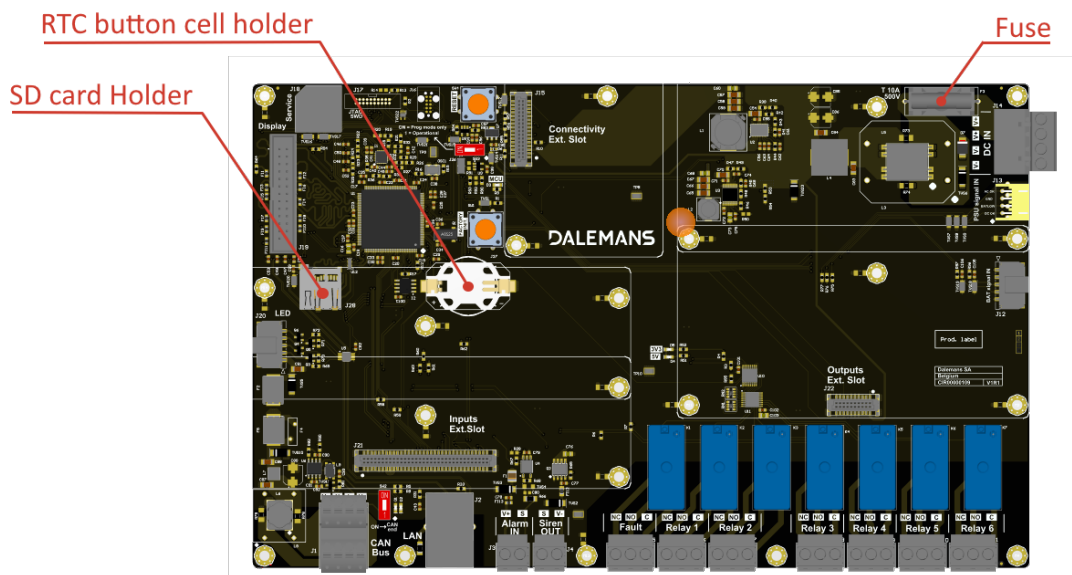
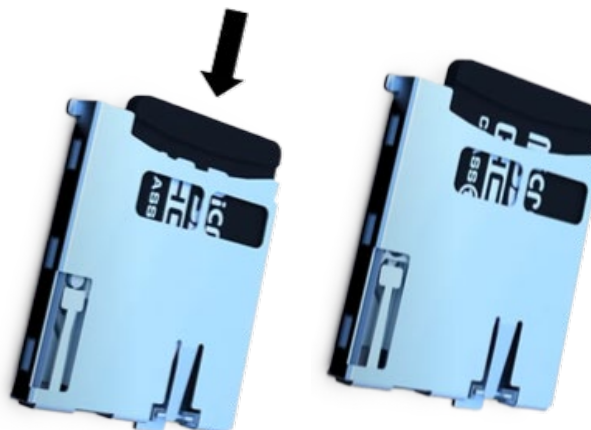


Figure 24 – Motherboard locations

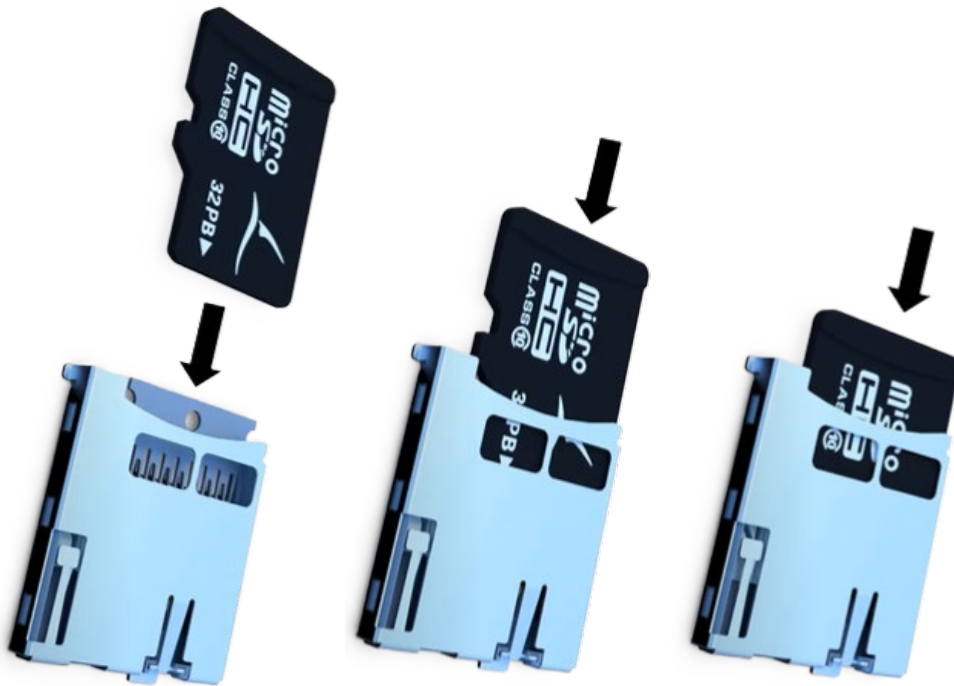
3. **Eject** SD Card: Press the SD card in the push-push socket until it clicks and ejects.



4. **Verify:** Front Panel of the Control Unit shows on log data: "SD card Removed"

## 4.10.2 $\mu$ SD Memory Card Insertion

1. **Insert** New SD Card: Align the new SD card with the socket and press it in until it locks in place.



2. **Verify & Select:** SD Card is present



3. **Verify:** Front Panel shows on log data: "SD card Inserted"
4. **Select:** choose the delay in data logging

## 4.11 Analogue Output

The control unit may have up to two analogue outputs that allow the user to output a continuous signal, proportional to the maximum value of the measurements taken at time "t" for one or more detectors connected to the unit.

The user can choose one of the following for this output signal:

- A 4-20 mA industrial current loop
- A 0-20mA current loop
- A 0-10V electrical voltage

The user can switch the analogue output from current mode to voltage mode by using the switch on the electronic board, next to the wire terminals.

Furthermore, it is possible to select a split ratio for this measurement, to adapt the output signal to the various devices.



- By default, all detectors input channels are integrated into the calculation of the maximum value.
- If only one channel is integrated into the calculation, the analogue output acts directly on the measurement taken at time “t” for this channel.

# 5 INSTALLATION

## 5.1 Safety Precautions

The Control Unit housing can only be wired with electrical cables from the bottom side of the enclosure, to ensure ingress protection against water and dust. This ingress protection is only reached if all instructions in this manual are followed.



### Electrical hazard:

- The equipment must be disconnected from mains and batteries during installation.
- The AC line voltage selector switch on the SMPS must be on the correct voltage position before turning on the device.

### Explosion hazard:

- the S•Line Control Unit must be situated in a room with non-explosive atmosphere and must be easily accessible.

## 5.2 Wall Mounting

The S•Line Control Units must be mounted on a flat, smooth surface. One mounting plate is supplied along with a quick installation guide. Alternatively, it is possible to mount the control unit directly on the wall surface to reduce the overall height of the enclosure.



Figure 25 – Control Unit mounted on a wall

The equipment is designed to be mounted on a vertical wall. Ensure the selected surface is smooth and flat.



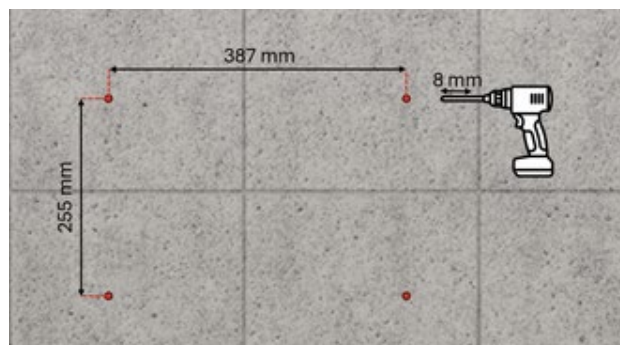
Wall installation requires power tools that may damage the equipment (especially the display) directly, or indirectly from debris. Please keep the equipment away during drilling/fitting operations.



- The control unit has a lid with hinges that must be opened during maintenance or inspection. The unit should be fixed on the wall in such a way that there is a **± 20cm clearance** to the left side.
- The ideal height for the display is 165cm from the ground, so it sits at the average eye level for a standing person in Europe. To facilitate height adjustment, the mounting plate has two horizontal slits that mark the exact display horizontal centreline, once mounted.

## 5.3 Step-by-Step Instructions

1. If the wall is made of bricks or concrete, drill four 8mm holes in the wall, following the drilling plan, and place four 8mm wall plugs in the drilled holes.



Mount the steel backplate on the wall using the provided 8mm screws

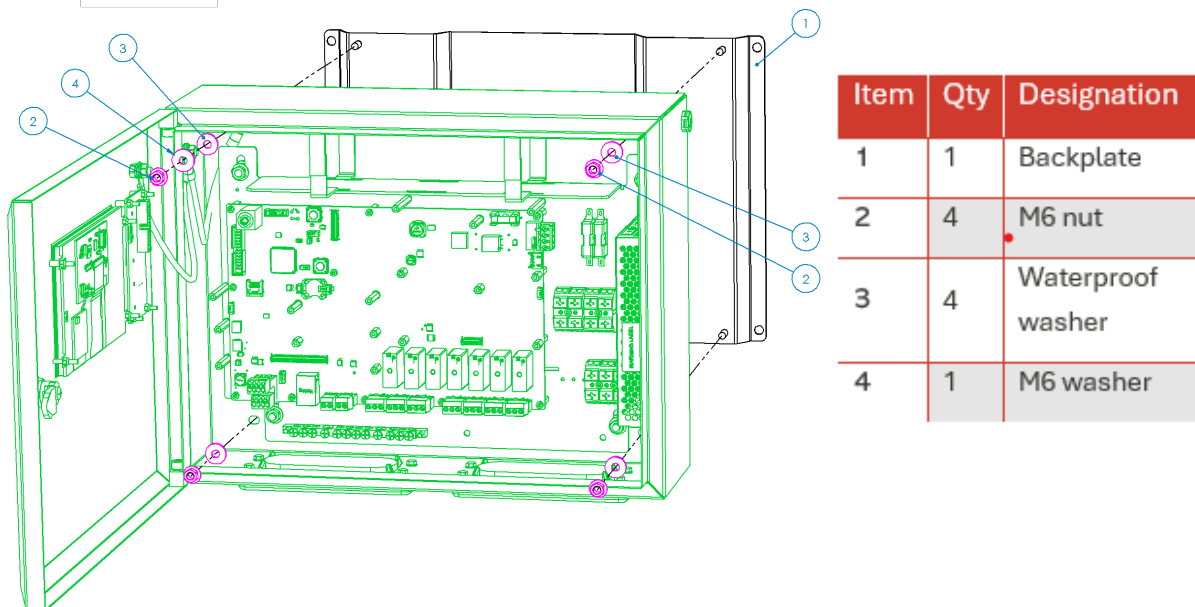


Figure 26 – Control Unit mounting on the backplate

2. With the control unit's lid open, place the enclosure on the 4 threaded rods of the backplate.
3. Place the 4 waterproof washers on the threaded rods. Then place the earthing ring terminal on the top left threaded rod to ensure that the wall mounting plate is properly earthed.
4. Fasten the control unit from the inside of the enclosure, using the provided M6 nuts. The tightening torque shall be minimum 2,8 Nm.
5. Close the lid so the internal components are protected.

# 6 WIRING

## 6.1 General Cabling Rules

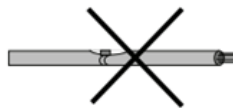
- Do not damage the cables during storage.
- Carefully unwind the cable, taking care not to damage it.



- Avoid right angles. The bending radius must be at least 8 x the cable's diameter.



- Do not crush the cable's insulation by tightening it (clamps, pliers) or by walking on it. If the sheath is damaged, the cable must be replaced.



- Avoid using the same cable trays as the 220-240 VAC power supply. Maintain between signal and power cables a minimum distance of 30cm.



## 6.2 Wiring - General Remarks/Overview

- Installation and electrical connections must be carried out by qualified personnel in accordance to the diagram on the back of the S•Line Control Unit's cover, as well as to the specifications defined by Dalemans sa/nv.
- All installations must comply with local applicable standards and regulations, including cable type and wire cross-section to be used.
-

- When making electrical connections to the terminals, ensure that the wires are securely fastened to the connectors.
- The outer diameter of the cable must be compatible with the acceptable diameter ranges on the rubber cable feedthrough, located at the bottom side of the enclosure.
- Conductors must be stripped and inserted so that the insulation is not more than 1 mm from the metal edge of the terminal.
- Use a maximum tightening torque of 0.60 Nm.
- To ensure electrical safety, wires running from the housing cable feedthrough (bottom side of the enclosure) to the board terminal blocks must not be longer than 70mm.
- Always use wires with crimp ferrules to avoid any risk of poor electrical contact.

Never place a sensor cable next to a coaxial cable or next to a power cable, and certainly not in the same sheath or cable tray. Distance between sensor cables and EMI-prone cables shall be at least 30cm.

If the control unit is installed in an environment that contains sources of strong electromagnetic interference (transmitters, welding stations, switching relays, HF transmitters, cable runs or computer networks, etc.), shielded cables shall be used to connect the sensors.

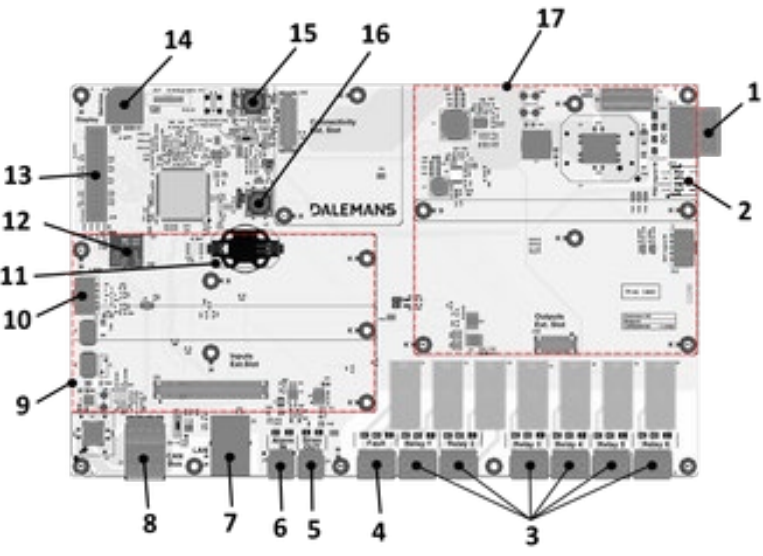
For optimal performance, detectors cable shields must be earthed at the earthing terminal block located inside the control unit enclosure.

Never use two or more wires to increase the wire cross-section. The cable must be of a single length (without splices) and correctly attached to the appropriate terminal blocks. Use a maximum tightening torque of 0.60 Nm.



## 6.3 Motherboard Overview

The motherboard manages the power supplies of the extension modules and of the detectors directly or indirectly connected to it.

Motherboard	Locations
	1. Motherboard DC power supply connection
	2. AC/DC power supply signal connection
	3. Configurable alarm relays connection
	4. Fault relay connection
	5. Siren output connection
	6. External alarm input connection
	7. Ethernet connection
	8. Native CAN bus connection
	9. CAN extension slot 1 or 4-20mA extension slot 1 to slot 2
	10. Strip LED connection (S•Lx only)
	11. Button battery holder
	12. µSD card connector
	13. Connection to the front panel
	14. Maintenance connection
	15. Reset button
	16. Factory init. button
	17. Relay extension slot 1 to slot 2



Replacing the RTC Coin Cell as well as the Fuse, requires Maintenance rights from Dalemans sa/nv qualified personnel/technicians – please refer to Maintenance Manual.

## 6.4 Power Supply Wiring

The S•Line Control Units are **Class I** devices. It must be always connected to a proper protective earth circuit using a yellow/green wire connected to ground, and this wire must be connected first. Always refer to local electrical installation's legislation.



Figure 27 – Cable entry (left) and schematic wiring diagram of power supply (right)



A circuit breaker (2-pole, 6A, 250V (AC), Class C) must be placed on the phase and neutral. See wiring example below.

The S•Line Control Units must be electrically isolated in the event of an intervention (protected by a circuit breaker or bipolar switch). **It is recommended to place the circuit breaker close to the equipment.**

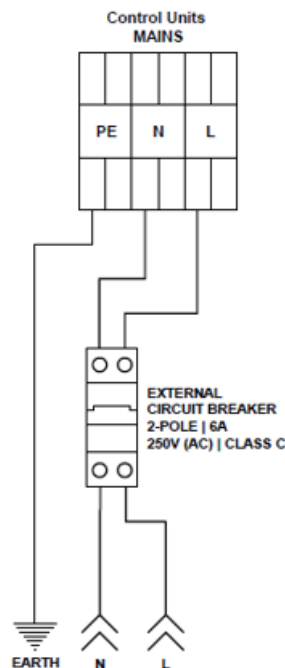


Figure 28 – S•Line Circuit breaker circuit

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The power supplies for the S•Line range and all other electrically connected devices must be connected to the same line-neutral circuit. Ensure that power supply conductors are always fixed together and separate from low-voltage conductors.

Power cables for the mains voltages section must have a minimum cross-section of 1.5 mm<sup>2</sup>.

## 6.4.1 Step-by-Step Instructions

- 1. Ground Connection:** Connect the protective earth (PE) wire to the PE terminal of the Mains input connector. This terminal is directly wired to the internal power supply, ensuring that the chassis is properly grounded.
- 2. Mains Power Connection:** Connect the line (L1) wire to the terminal labelled "L1". Connect the neutral (N) wire to the terminal labelled "N".
- 3. Cable Management:**
  - Route the power cables through the appropriate entry points in the enclosure.
  - Use the designated cable entries using the appropriate holes (depending on the cable's outer diameter), ensuring that there is no movement and that the cables are protected from sharp edges.
- 4. Separation of Conductors:** Ensure that the power conductors are kept separate from any low-voltage conductors (such as control signals or data lines).
- 5. Final Inspection:**
  - Double-check all connections to ensure they are secure.
  - Verify that all power cables are properly insulated and that there are no exposed wires.
  - Ensure that the protective earth connection is firmly attached.
- 6. Cable Routing Inside the Enclosure:**
  - Guide the cables neatly through the interior of the enclosure, ensuring that the cables are organised and do not cross or entangle with each other.
  - Use cable ties or clips to secure the cables along the routing path, preventing any movement or strain on the connections.
- 7. Closing the Enclosure:**
  - After all connections are made and verified, close the enclosure securely, ensuring that all seals and covers are properly in place to protect the internal components from dust, moisture, or other environmental factors.
- 8. Power-On Check:**

- Once everything is securely in place, perform a final inspection before powering on the unit. Verify that all connections are correct, and that there are no loose or exposed wires. Then, turn on the power and observe the unit for any irregularities during startup.

This process ensures that the S•Line Control Units are installed safely and in compliance with electrical safety standards, providing reliable operation in their intended environment.

## 6.5 Battery Wiring

Incorporating batteries will allow the system to keep operating for a limited period of time, should the mains power supply fail. Please note that battery autonomy depends on the power consumption of the specific installation.

The control unit contains a dedicated space for backup batteries. The space is meant for 2x VRLA, 12V 7Ah batteries connected in series.



Only batteries specified and supplied by DALEMANS sa/nv or approved partner are suitable.

It is also possible to connect larger batteries for a longer power autonomy, provided the batteries are placed in a dedicated separate housing. The batteries must be 2x VRLA, 12V batteries connected in series. The maximum capacity is 2x12Ah.

The control unit contains an **external fuse** to protect the battery connection. The recommended fuse is a **10A 250V type T** 20mm cartridge.

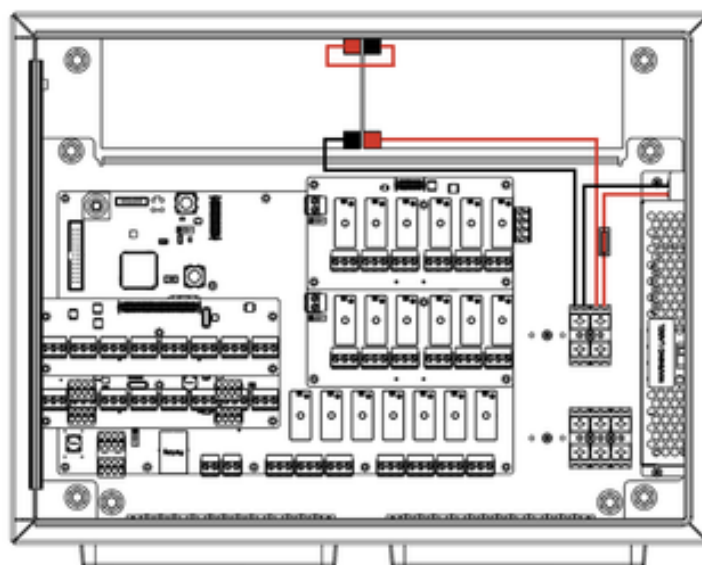


Figure 29 – S•Line Battery connection circuit

## 6.5.1 Step-by-Step Instructions

1. Ensure that the control unit is powered OFF before starting the installation procedure.
2. Open the lid using the maintenance key.
3. Place the batteries in the housing, on top of the metallic L-shape angle provided for this purpose.
4. Secure the batteries using hose clamps.
5. Connect the battery in series, respecting the polarity:

**red wire → positive (+)**

**black wire → negative (-)**

6. Check the power supply visually.
7. If a **RED LED is on**, it means that the polarity is wrong. In that case, **DO NOT TURN THE MAINS POWER BACK ON.**
8. If the power supply LED does not turn on, the polarity is right.
9. Turn the power mains back on. The control unit should start normally.

## 6.6 Detector's Wiring

### 6.6.1 Current Loop Detectors

The maximum cable length between the control unit and the sensor depends on the supply voltage, the wire resistance, the minimum operating voltage of the detector/instrument, and the maximum signal wire resistance of the detector/instrument.

Regarding the signal input terminal, the S•Line Control Unit's current loop inputs have **225 ± 31 Ω input resistance**. Ensure that the detector or other instrument is able to drive that load, wire resistance included.

Concerning the power supply output terminal, the nominal voltage is 27.6V and it can decrease to as low as 22.5V, voltage at which the "Battery Low" message is shown. Ensure that the connected detector/instrument receives enough voltage despite the voltage drop due to cable resistance.

The formulas used in the calculations for maximum cable length are:

**2-wire** loop:

$$\ell_{max} = \frac{1}{2 \cdot \rho_{wire} \cdot I_{DD}} (V_{CC} - R_{PTC} I_{DD} - V_{DD} - R_{in} I_{DD})$$

### 3-wire loop:

$$\ell_{max} = \frac{1}{2 \cdot \rho_{wire} \cdot I_{DD}} (V_{CC} - R_{PTC} I_{DD} - V_{DD})$$

Where:

$\ell_{max}$  : maximum wire length (in m)

$\rho_{wire}$  : wire resistivity (in  $\Omega/\text{km}$ )

$I_{DD}$  : current at detector's end (in mA)

$V_{CC}$  : voltage at Control Unit's end (in V)

$R_{PTC}$  : Circuit protection resistance (in  $\Omega$ )

$V_{DD}$  : Voltage at detector's end (in V)

$R_{in}$  : Shunt resistance (in  $\Omega$ )

For symbol explanations, please see [Figure 30 – Schematic wiring diagram of a 2-wire current loop](#) and [Figure 31 – Schematic wiring diagram of a 3-wire current loop](#).

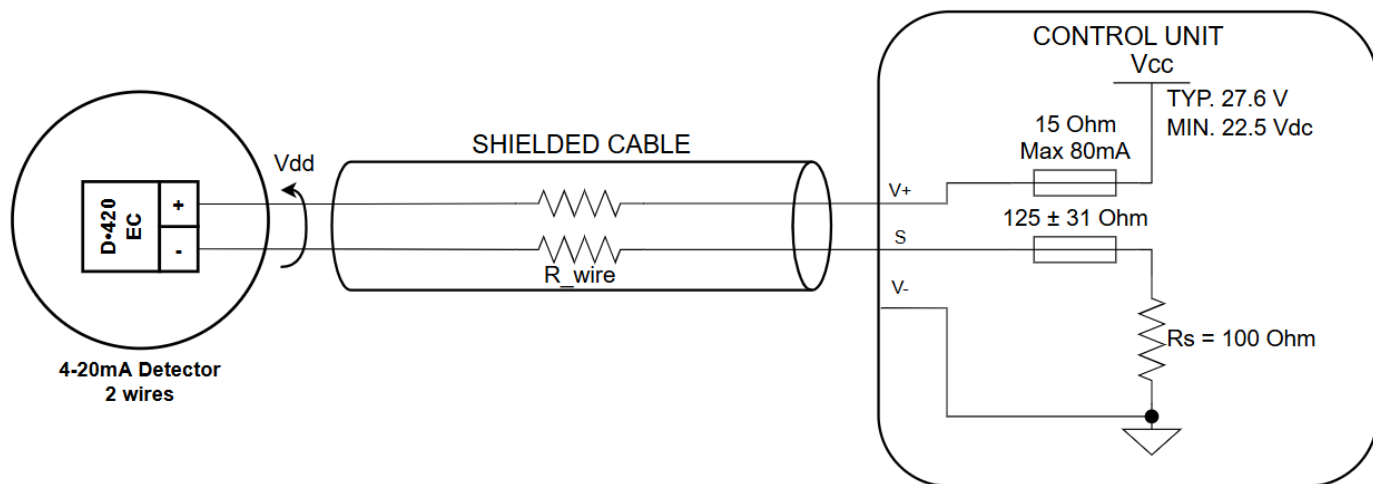


Figure 30 – Schematic wiring diagram of a 2-wire current loop

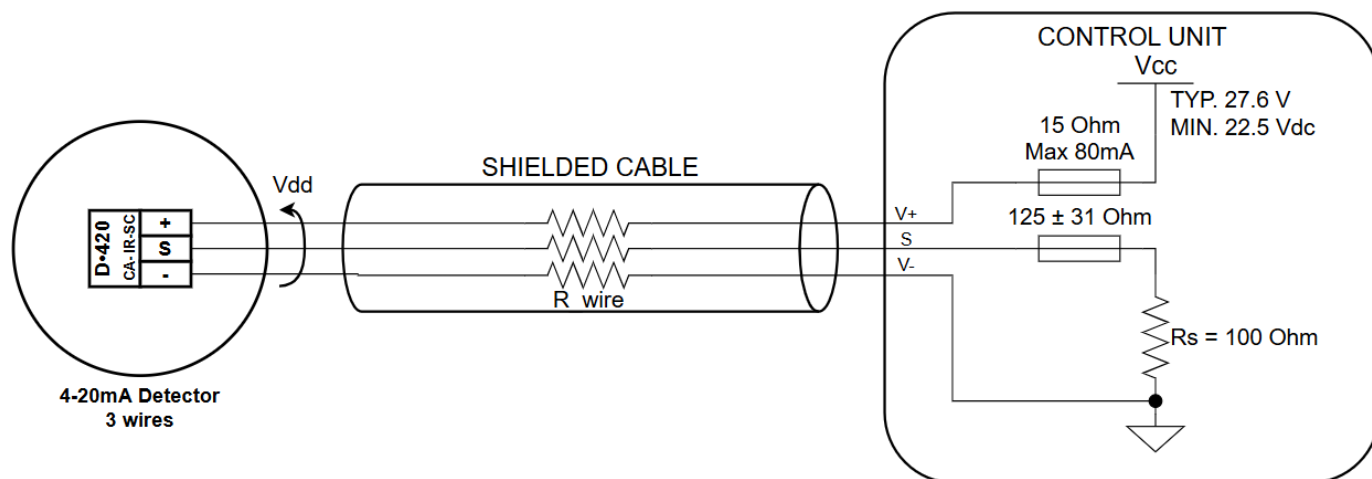


Figure 31 – Schematic wiring diagram of a 3-wire current loop

An overview of maximum cable length is given on the following table.

Cable Length (m)								
$\rho$ ( $\Omega/\text{km}$ )	D.420 EC (2-wire)	DAT420 EC (2-wire)	D.420 CA (3-wire)	D.420 IR (3-wire)	D.420 SC (3-wire)	DAX420 IR HC (3-wire)	DAX420 IR CO <sub>2</sub> (3-wire)	DAX420 CA (3-wire)
35 (0,75mm <sup>2</sup> aluminium)	1000	1000	1000	1000	1000	314	285	200
23 (0,75mm <sup>2</sup> annealed copper)	1000	1000	1000	1000	1000	478	434	304
18 (1,5mm <sup>2</sup> aluminium)	1000	1000	1000	1000	1000	611	555	388
11 (1,5mm <sup>2</sup> annealed copper)	1000	1000	1000	1000	1000	1000	909	636

### 6.6.1.1 Current Loop Input Terminals

The S•Line Control Units may be equipped with internal extension boards that allow to interface up to 16 current loop sensors (8 inputs for each board, maximum 2 boards).

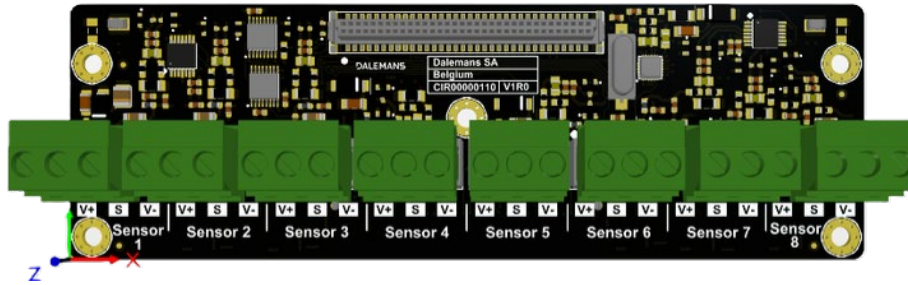


Figure 32 – Extension board with 8 current loop inputs

For each sensor input, 3 terminals are available. Depending on the type of sensors, a 2-wire or 3-wire connection must be made.

Terminal Name	2-wire connection	3-wire connection
V+	Sensor positive terminal	Sensor positive terminal
S	Sensor return terminal	Sensor signal terminal
V-	[Not connected]	Sensor negative terminal

### 6.6.1.2 Current Loop Cable Characteristics

Minimum wire diameter	0.75mm <sup>2</sup> or AWG 18
Maximum wire diameter	1.5mm <sup>2</sup> or AWG 16
Cable type	Shielded

## 6.6.2 Wiring CAN bus Detectors & CAN Devices

The maximum size and performance of a CAN bus network cannot be defined by a single parameter. Even when the wiring topology is correct and the termination resistors are properly installed, every installation behaves differently depending on several factors.

### 6.6.2.1 CAN Bus Limitations & Installation Constraints

The following parameters influence the reliability and communication quality of the CAN bus:

- Total cable length.
- Length of individual cable segments.

- Number of connected devices.
- Type of connected devices and their electrical characteristics.
- Position of devices along the bus.
- Cable type and quality.
- Electromagnetic environment.
- Presence of CAN repeaters.
- Position of CAN repeaters on the network.
- Presence of additional power distribution lines and associated ground potential differences.

Consequently, two installations with the same number of detectors may exhibit completely different communication margins and reliability levels.

Depending on the network configuration, one or more of the following physical limitations may be reached:

- Severe bus load caused by the large number of connected devices.
- Excessive total cable length.
- Big attenuation of the CAN differential signal.
- Extreme common-mode voltage caused by ground potential differences between distant nodes.
- Disproportionate propagation delay, due to cable length and network topology.
- Intense capacitive load of the bus.
- Large number of nodes connected to the same CAN segment.

Some limitations are relatively easy to identify, such as excessive cable length or large node count. Others are more difficult to predict, especially when using cable types that do not comply with the recommended CAN bus specifications.

For example, the use of a non-recommended cable may affect:

- Signal attenuation.
- Characteristic impedance matching.
- Propagation delay.
- Susceptibility to electromagnetic disturbances.
- Common-mode noise immunity.

These effects may lead to intermittent communication errors that cannot always be predicted during the design phase.

When a physical limitation is reached, it may be possible to extend the network by using one or more CAN repeaters. A CAN repeater electrically isolates bus segments and reconstructs the differential CAN signal, allowing longer cable distances, higher node counts, or improved robustness in electrically noisy environments.

However, the use of repeaters does not eliminate all limitations and must be considered as part of the overall network design.



Compliance with the recommended cable type, topology, and termination rules does not guarantee successful operation for all network sizes. Final network performance depends on the combined effect of cable characteristics, node distribution, environmental conditions, and installation practices. Validation of communication quality under real operating conditions is therefore strongly recommended for large or complex installations.

### 6.6.2.2 CAN Interface Terminals



When calculating the permissible cable lengths and dimensioning the connection parameters, please consult DALEMANS sa/nv.

The S•Line Control Units have one CAN interface by default and may be equipped with an internal extension board that adds 2 CAN interfaces.

Terminal Name	Description
V+	Positive terminal (22 - 28 V DC)
H	“CAN High” terminal
L	“CAN Low” terminal
V-	Ground terminal (GND)

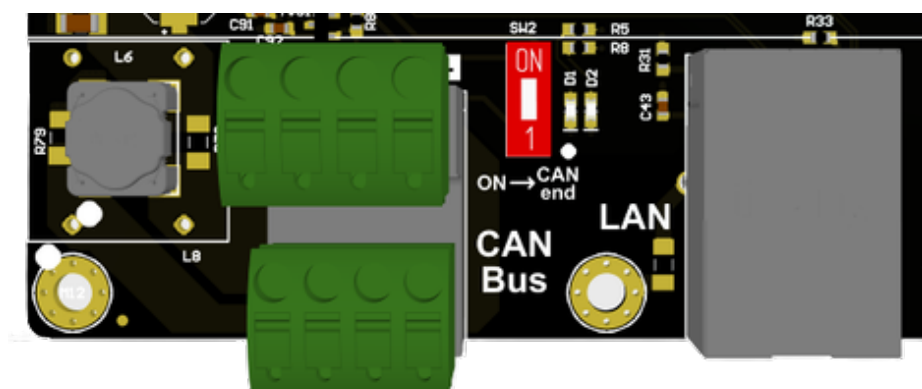


Figure 33 – Native CAN interface

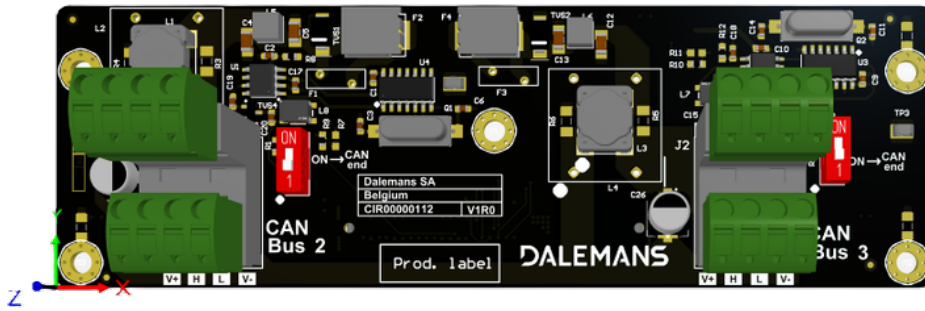


Figure 34 – Extension board with 2 extra CAN interfaces

### 6.6.2.3 Ground Potential Differences & Power Distribution Considerations

The D•CAN Gen2 network uses the same cable infrastructure for both power distribution and CAN communication. As a result, the CAN transceivers reference their communication signals to the local supply ground ("V-") present at each detector.

As the total bus current increases, the resistance of the power conductors causes a voltage drop along the cable. This creates a difference in ground potential between the control unit and remote detectors.

Although CAN communication is based on a differential signal (CAN\_H and CAN\_L), CAN transceivers can only tolerate a limited common-mode voltage range. Excessive ground potential differences may shift the CAN common-mode voltage outside the allowable operating range of the transceiver.

When this limit is exceeded, communication quality may deteriorate, resulting in:

- Increased communication errors.
- Intermittent loss of communication.
- Bus-off conditions.
- Complete communication loss with one or more detectors.

The maximum acceptable network size therefore depends not only on the CAN communication characteristics, but also on the power distribution characteristics of the installation, including:

- Total current consumption of all connected devices.
- Cable conductor cross-section.
- Total cable length.
- Distribution of detectors along the bus.
- Presence of additional power injection points.

For installations with significant total current consumption, long cable lengths, or a large number of detectors, the voltage drop and ground potential differences must be evaluated during the design phase.



Dalemans sa/nv recommends consulting the technical support team to validate the proposed network architecture and ensure reliable operation under all operating conditions



A CAN bus may comply with all wiring, topology and termination requirements and still experience communication failures if excessive voltage drop causes the ground potential difference between devices to exceed the CAN transceiver operating limits

#### 6.6.2.4 CAN Bus Cable Characteristics

CAN bus requires a “daisy-chain” topology: all devices on the bus must be chained from one to another, without creating any “stubs” or “branches”. The S•Line Control Units may be placed in any position on the chain, provided the termination resistors are set correctly.

Cable selection is critical for reliable operation. The standard CAN bus cable shall be shielded, have CAN High and CAN Low wires as a twisted pair with a **characteristic impedance of 120 Ω**. Degraded cable may work but can be less reliable depending on both the external environment and the path the cable takes within the installation.

The following parameters have an influence on the system operability: cable length, wire resistance, cable length between each node, type of detectors used, number of detectors.



The recommended cables should be STRANDED and not rigid, to ensure proper door closing, smooth cabling passage through the cable entries as well as effortless connections at the terminals.

Dalemans sa/nv suggests two cable types for optimal performance:

#### **Cable suggestion #1: 2x2x0.75mm<sup>2</sup> shielded twisted pairs, stranded wires**

DALEMANS sa/nv recommends using LiHCH shielded twisted pairs 2x2x0.75mm<sup>2</sup> cables for short to medium length busses. Please see [Figure 35 – LiHCH cable wiring example](#) for wiring details.

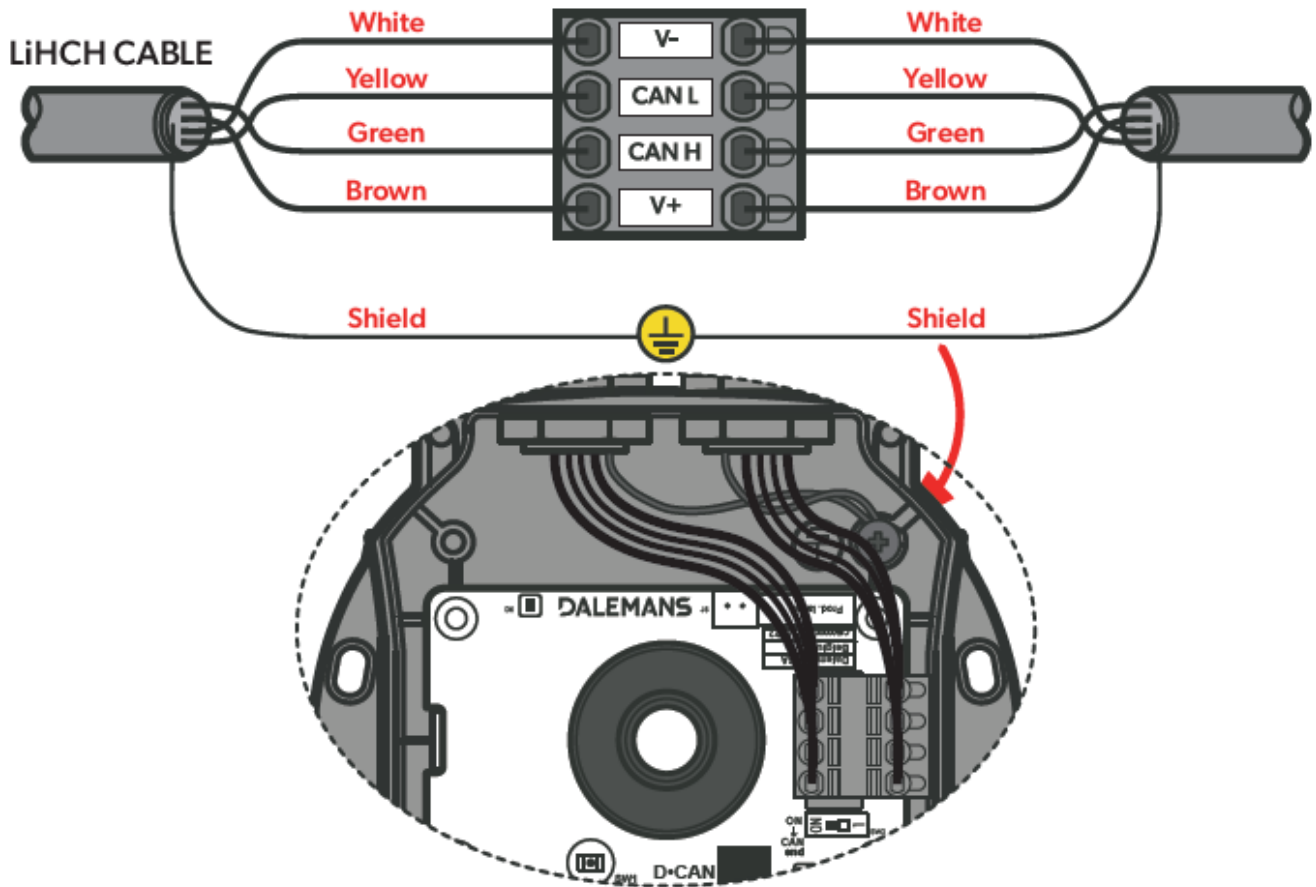


Figure 35 – LiHCH cable wiring example

### Cable suggestion #2: Ethernet S/FTP, stranded wires

Ethernet S/FTP cables can also be used for short to medium length busses. In this case, some data wire may be combined to carry the detectors DC power. This method is cost effective and yet allows to limit the voltage drop in the DC power wires, while providing a good performance on the data lines. Please see [Figure 36 – FTP cable wiring example](#) for wiring details.

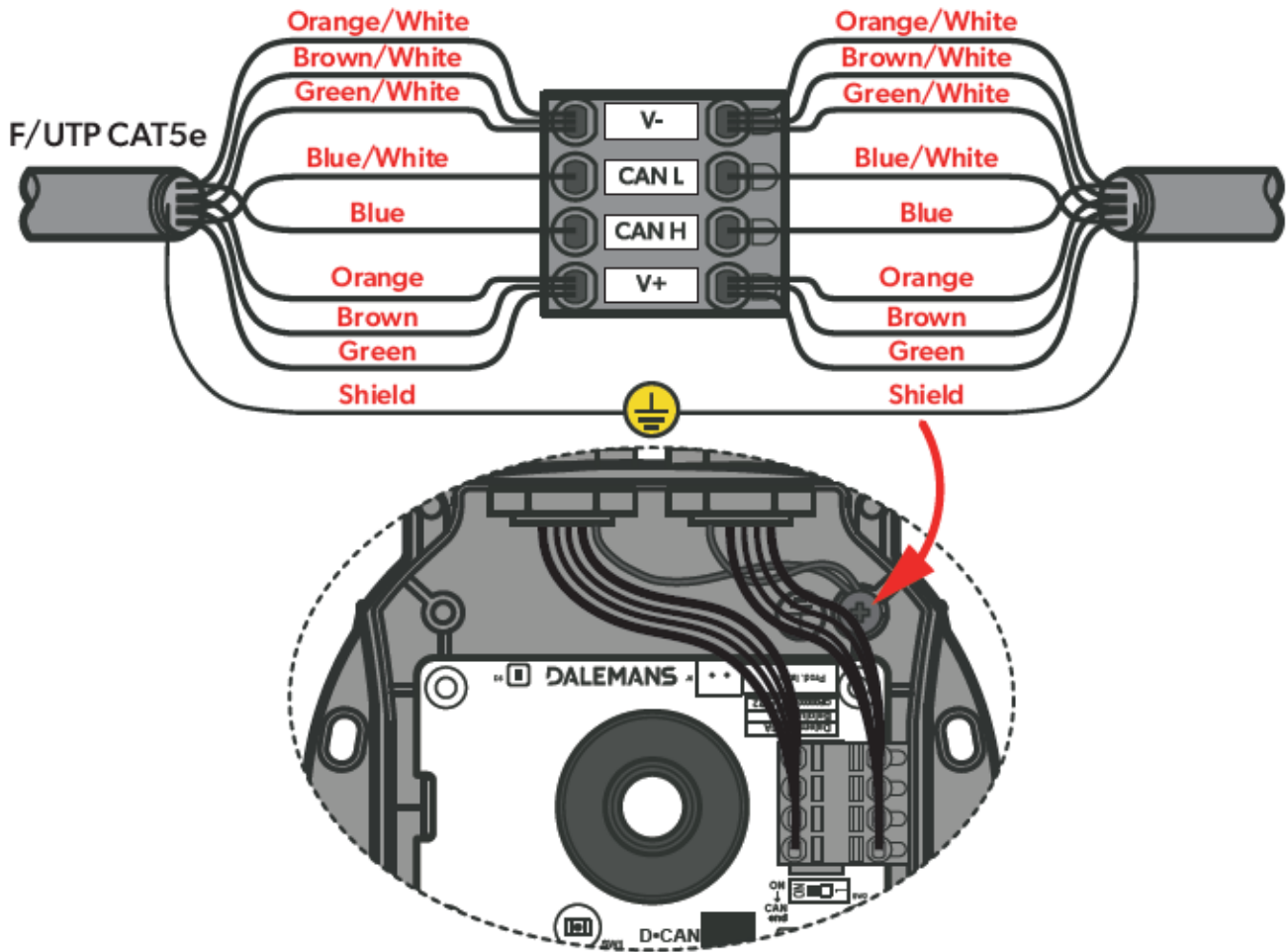
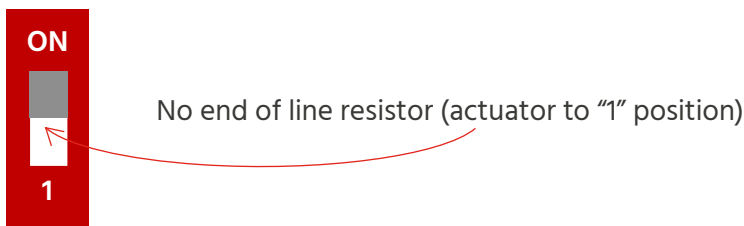
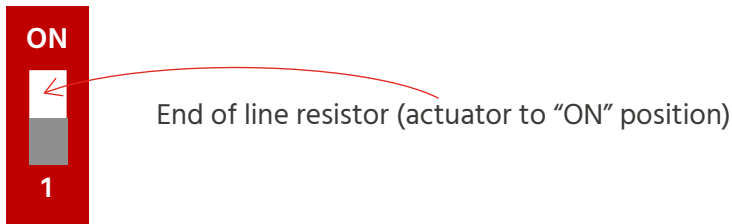


Figure 36 – FTP cable wiring example

Detailed information regarding 4 different cable characteristics can be found at the below table:

Cable Characteristics	Cable 1	Cable 2	Cable 3	Cable 4
Conductor Resistance ( $\Omega$ /Km)	82	39	26	36
Cable alim. Resistance ( $\Omega$ /Km)	27.33	39.00	26.00	36.00
Designation	CAT5E S/FTP AWG24	LiHCH (2x2x0.5)	LiHCH (2x2x0.75)	J-H(ST)H (2x2x0.8)
CAN Repeaters Interval (m)	<b>450</b>	<b>600</b>	<b>800</b>	<b>600</b>
Wire section (mm <sup>2</sup> )	4x2x0.205	2x2x0.5	2x2x0.75	2x2x0.5
n° of twisted pair dedicated to bus power supply	3	1	1	1
n° of twisted pair dedicated to bus communication	1	1	1	1

CAN bus requires to be terminated with a resistance of 120 Ω. It means the first and the last node on the bus must connect “CAN High” and “CAN Low” lines through a 120 Ω resistance. On the S•Line Control Units, it is achieved using a hardware DIP switch located next to the CAN bus connector.



The bus **WILL NOT OPERATE CORRECTLY** if any of the nodes on the bus adds an extra resistance between CAN High and CAN Low. This includes the S•Line Control Units.

Please verify both visually and by using an ohmmeter before commissioning the installation! The measured resistance between CAN\_H and CAN\_L should be **close to 60 Ω**.

### 6.6.2.5 CAN Bus Wiring Checklist – Verification

#### Objective:

- To verify the integrity of field wiring between gas detectors and the control unit using resistance measurements.



**Important note:** Ensure the system is completely powered OFF before performing any measurements.

#### Required tool:

- Digital multimeter (set to resistance / Ohms mode)

#### Procedure (per incoming CAN bus segment):

- Perform the following checks on each bus connected to the control panel:

Check	Action	Expected Result
CAN Bus Resistance	Measure resistance between: <b>CAN_High</b> and <b>CAN_Low</b>	<b>Approximately 60 Ω</b> (Typical value for a properly terminated CAN bus network)
Power Supply Line Check	Measure resistance between: <b>V+</b> and <b>V-</b>	<b>No short circuit</b> (Resistance should be high)
V+ to Communication Lines	Measure resistance between: <ul style="list-style-type: none"> <li>V+ and CAN High</li> <li>V+ and CAN Low</li> </ul>	<b>No short circuit</b> (Resistance should be high)
V- to Communication Lines	Measure resistance between: <ul style="list-style-type: none"> <li>V- and CAN High</li> <li>V- and CAN Low</li> </ul>	<b>No short circuit</b> (Resistance should be high)
Shield to Power Line	Measure resistance between: <b>Cable Shield (Drain Wire)</b> and <b>V+</b>	<b>No short circuit</b> (Resistance should be high)
Shield to Communication Line	Measure resistance between: <ul style="list-style-type: none"> <li>Shield and CAN High</li> <li>Shield and CAN Low</li> </ul>	<b>No short circuit</b> (Resistance should be high)



- Wires going to the extension boards should be securely fastened using the provided wire clamps
- The cable shield must be connected to earth (ground) at the control unit side.
- Any low resistance detected where a “no short circuit” condition is expected indicates a potential wiring fault (short circuit, insulation damage, or misconnection).
- If the CAN bus resistance deviates significantly from 60 Ω, check termination resistors and network topology. (If the value is around 120Ω or higher, a termination resistor is missing. If the value is below 50Ω, more than 2 termination resistors are active).

## 6.7 Relay Output Wiring

Each relay output has 3 terminals available. A choice must be made on how to use them depending on the desired circuitry:

Terminal name	Function
C	<b>Common:</b> this terminal is always used and always connected to the switching contact.
NC	<b>Normally Closed:</b> when the relay is not energised, this terminal is connected to C terminal.
NO	<b>Normally Open:</b> when the relay is not energised, this terminal is not connected to the C terminal.

Since each alarm relay may be configured with either a failsafe or a non-failsafe behaviour, care must be taken to choose the appropriate wiring



The operation of the current-loop mode might be impaired if the load of the connected equipment has an input impedance of between 100Ω and 500Ω.

The operation of the voltage mode might be impaired if the piece of equipment connected has a low input impedance (less than 10kΩ)

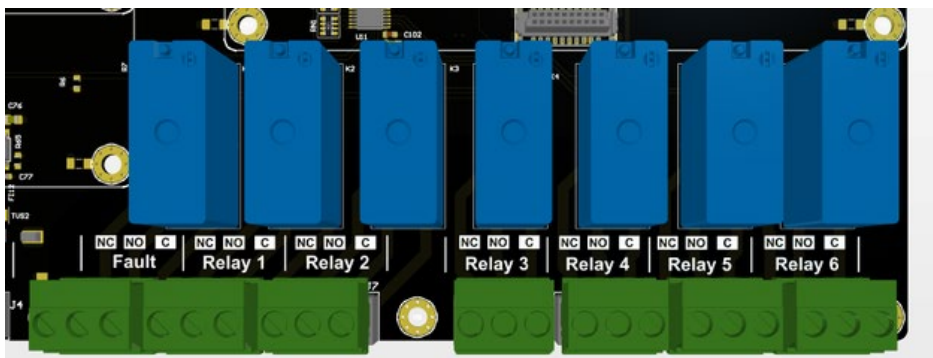


Figure 37 – Native output relays

## 6.8 Analogue Output Wiring



Analogue outputs are only available on relay expansion boards.

There is one analogue output per expansion board, with up to two (2x) outputs.

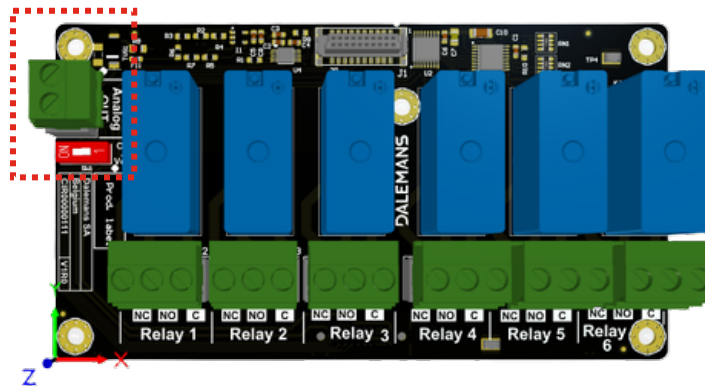


Figure 38 – Extension board with 6 extra relays and one analogue output

Connect the S and V- terminals on the analogue output to close the circuit. In current loop mode, the current leaves via terminal S and returns via terminal V-.

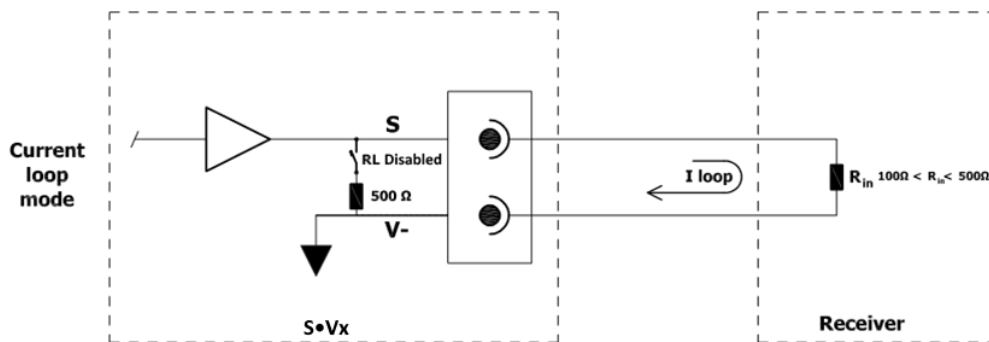


Figure 39 – Schematic wiring diagram of Current Loop Mode

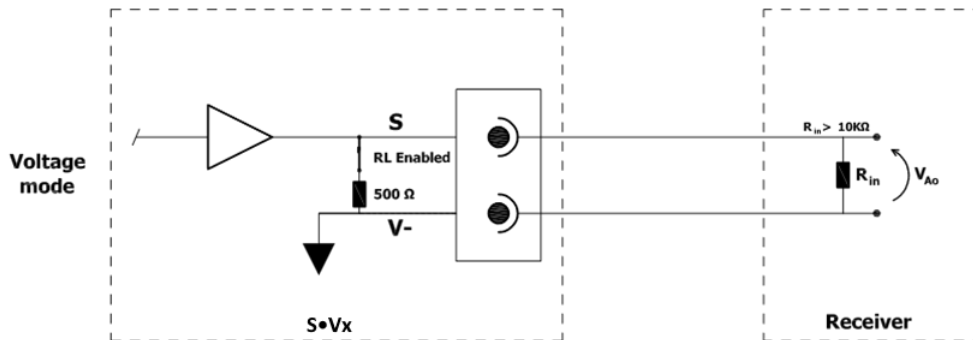


Figure 40 – Schematic wiring diagram of Voltage Mode

The analogue output is configured as follows before leaving the factory:

- In 4-20 mA current-loop mode
- The output signal corresponds to the maximum value of the 6 input channels
- The output gain ratio is 1:1 of the sensors' measurement range. A full-scale measurement of the sensor is shown as 20 mA on the analogue output signal

The user can change the unit from a current-loop signal mode to a voltage-signal mode by toggling the RL Enable switch:

- The ON position of the RL Enable switch, transforms the output signal to a voltage signal, by adding a 500Ω shunt resistor.
- The other position (OFF) of the RL Enable load-resistor switch, leaves the analogue output in current-loop mode.

## 6.9 Wiring the Siren Output

The external siren should have electrical characteristics of 22-28 VDC, 200mA max.

Connect the siren terminals S and V- of the S•Line Control Units to the positive and negative terminals of the siren.

The siren connection cables must meet the same requirements as those of the detectors. The cable need not be shielded.



Observe polarity to avoid damaging the siren.

For siren connection and tone setting, refer to the siren's operating instructions.

## 6.10 Wiring the External Alarm Input

To connect an external alarm equipped with a dry contact (relay output) to an S•Line Control Unit, connect the two terminals of the relay contact (NO or NC, according to the desired logic) to the terminals S and V+ of the Control Unit.



The total current of interfaces must consider the power available to the unit. When calculating the remaining power for external use, please consult a DALEMANS sa/nv approved technician.

Since the alarm input is connected via a dry contact, no polarity needs to be observed, and no external voltage must be applied to the terminals.

The external alarm connection cables should meet the same specifications as those used for detectors, although shielding is not required.

For further details on external alarm settings, refer to the alarm's operating instructions.

## 6.11 Wiring the Ethernet Connection (Modbus TCP)

A standard RJ45 Cable CAT5e or superior may be used. Be advised that the S.Lx variants of the control unit are equipped with splittable cable glands, while S.Vx variants are not. In the latter case, RJ45 connector must be crimped during installation.

## 6.12 Wiring the External DC Load

Depending on system configuration, it is possible to use part of the power to supply an external DC load. A DC output terminal is installed with the positive terminal protected by a replaceable cartridge fuse (1.5A 250V T).

A fuse holder is available on the mounting plate to protect the external DC output. The fuse cartridge must be adapted based on the power sizing of the system.

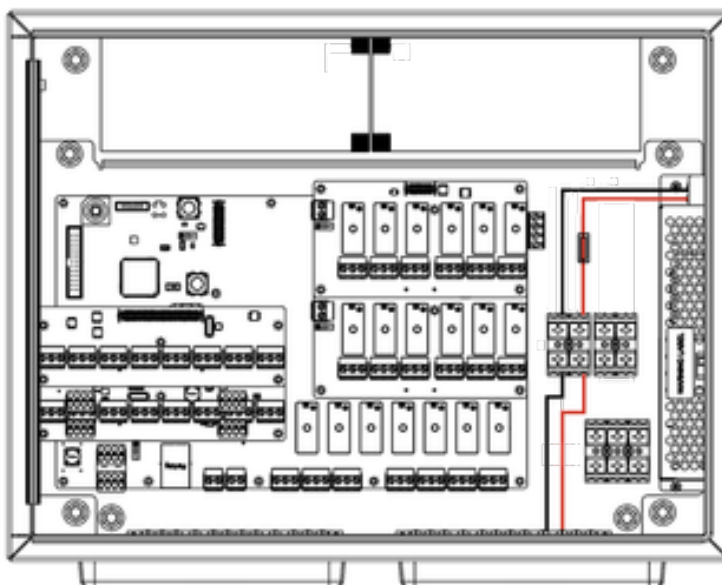


Figure 41 – DC output wiring scheme

# 7 CONFIGURATION

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Configuring the S•Line Control Units, suggests setting parameters defining the way the system operates.

The configuration includes the following settings:

- System configuration: control unit name, optional extension boards, optional battery, optional network settings, optional SD card logging
- Gas detectors configuration
- Target gas configuration and alarm conditions
- Output relays
- External alarm input
- Current loop channels activation
- Setting up the programmable logic

Two different types of external software (for Configuration and Communication) are required for the successful configuration of the S•Line Units (provided only to approved/qualified technicians from Dalemans sa/nv).

On the field, some limited settings might be modified depending on the user profile as described in [§ 3.3 User Access Levels](#)

Preparing a gas alarm controller's configuration must be done by qualified personnel only, trained and accredited by DALEMANS sa/nv.

## 8 ACCESSORY PARTS

A list of available accessory parts, with their corresponding reference number, is presented below:

Designation	Characteristics	Reference
Backup battery for S.Line	VRLA, 12V, 7Ah, High Temperature Rated <b>x2 wired in series are required</b>	03915
CAN Extension kit	2x CAN busses with 2x4 terminals and 22-28 VDC supply /!\ ESD sensitive PCB	03729
420 Extension kit	8x 4..20mA 3wires with 22-28 VDC supply /!\ ESD sensitive PCB	03730
Relays Extension kit	6x programmable changeover relays 3-poles NC-NO-C, max. 230V/3A 1x Analog output 4-20mA/0-20mA/0-10V /!\ ESD sensitive PCB	03731
S.Line Datalogger	Adds datalogging capability to the controller, including an industrial 32GB SD card.	03869
S.Line Ethernet Activation	Adds Modbus TCP connectivity	03931
S.Line extra terminal block	Adds a 2-poles, 4-connections terminal block max 2.5mm <sup>2</sup> , max 250V, push-in type	03714
S.Line Cable Entry plugs kit	4x 6mm plugs, 4x 10mm plugs	03910
Extra Door key	(One is already included with the control unit)	03796

## 9 SPECIFICATIONS

Category	Characteristic	Value
Power Supply	Mains voltage & frequency	220–240 VAC 50Hz
	Input current	1.5A @ 230 VAC
	Available power per unit	40 W for batteries charging 110 W for detectors and internal parts 155 W maximum combined power
	Batteries	2x 12V VLRA 7Ah (optional) Higher capacities available in a separate battery pack
	DC Output	Max current 1.5A (Fuse 1.5A 250V T) Voltage 22–28 VDC
Enclosure	Material	Powder coated steel enclosure UV resistant PET front panel Polyamide 6.6 UL94 V-0 Cable entries
	External dimensions (W x D x H)	407 x 168 x 325 mm
	Weight	8.6 kg (without batteries) 13.5 kg (with 2x12V 7Ah VRLA batteries & mounting plate)
	Ingress protection	IP55 (dust and water jets protected)
	Wall mounting with separate backplate	YES
	Hinged door for easy maintenance	YES
Connection	Cable entries	5x 3.2-6.3 mm ext. diameter 16x 4-7.5 mm ext. diameter 5x 5.5-10.5 mm ext. diameter 12x 8-12.5 mm ext. diameter
	Wire terminals (excepted CAN and Ethernet)	0.75 mm <sup>2</sup> - 2.5 mm <sup>2</sup> wires
Inputs	Digital detectors (CAN bus)	Up to 126x per CAN interface Maximum 240x per system
	Digital detector Interfaces (CAN bus)	1x (base), or 3x (optional) <b>[SEE § 6.6.2.1]</b>
	Supply output per interface (CAN bus)	Voltage 22–28 VDC Maximum 1.6A (@ 40°C) to 1.8A (@ 20°C <b>[SEE § 6.6.2.1]</b> )
	Current loop detectors	0 (base), 8x or 16x (optional) <b>[SEE § 6.6.2.1]</b> 2-wires or 3-wires 4..20mA
	Supply output per current loop detectors	Voltage 22–28 VDC Maximum 80mA (@ 40°C) to 100mA (@ 20°C) <b>[SEE § 6.6.2.1]</b>

Category	Characteristic	Value
	Cabling length	Up to 1000 m CAN bus (CAN bus protocol limit [SEE § 6.6.1]) Up to 1000 m for each current loop
	Cable type	CAN: 2x2x0.75 mm <sup>2</sup> shielded or Ethernet S/FTP 0.25 mm <sup>2</sup> Current loops: minimum 0.75 mm <sup>2</sup> shielded
	External alarm input	1x input, ON/OFF 24 VDC, configurable behaviour
Outputs	Alarms: programmable changeover relays	6x (base), 12x, or 18x (optional) 3 poles NC-NO-C, max. 230V / 3A
	Fault: changeover relay	1x, failsafe mode, 3 poles NC-NO-C 3 poles NC-NO-C, max. 230V / 3A
	Analog outputs	0 (base), 1x or 2x (optional) 4..20mA/0..20mA/0..10V
	Siren output	1x, with active output 22-28 VDC 200mA max
	Digital communication	1x Ethernet RJ45 with MODBUS TCP protocol 1x Internal connectivity board slot for co-engineered connectivity solutions
Interface	Display	7" capacitive TFT touchscreen with bright colours
	LED indicators	5x: Power, Battery, Alarm, Fault, Maintenance
	Mute/Reset button	Available on the front panel
	Service port	1x jack 3.5 mm with serial to USB PC connector
	LED Status Ring	1x (S•Lx ONLY)
Main Functions	Configurable alarm levels	Up to 4x for each detector Alarm types: Instantaneous, average, and qualifying timer
	I/O mapping	Configurable logic between inputs (e.g. alarms & faults) and outputs (e.g. relays) Easy zone creation using the configuration software
	Maintenance alert	Configurable interval, with clear reminders on the display
	Display of events and statuses	Internal event journal with filters Clear main screen with event information
	Measurements display	Clear measurements visualization
	Datalogging	Yes (optional), measurements and events, using a high-capacity SD card with CSV files
	Customizable labels	Detector locations, control unit name, ext. alarm names, relays names
	Reliability	Self-tests at power on and continuously Continuous data integrity checks Continuous voltage monitoring Continuous program sequence monitoring

Category	Characteristic	Value
Operating Conditions	Temperature	-10 °C to 40 °C
	Humidity	10% to 90% RH (non-condensing)
	Pressure	90 to 110 kPa
	Altitude	Maximum 2000 m
	Pollution degree	2
	Overvoltage category	II
Storage Conditions	Temperature	-10 °C to 40 °C
	Humidity	10% to 90% RH (non-condensing)
Certifications	Electromagnetic compatibility (EMC)	EN 50270 (type 2)
	Low-voltage safety	EN 61010-1
	Construction & performance of Gas detection in car parks & tunnels	EN 50545-1
	Functional safety of digital components	EN 50271
	Marking	CE, RoHS, WEEE, IP55

## A. Continuous Improvement (Kaizen)

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Please do not hesitate to inform us on the completeness, accuracy, organisation, useability and readability of this manual. Your feedback can be sent to [sales@dalemans.com](mailto:sales@dalemans.com), listing the page and paragraph of any errors or misinterpretations you may find.

We also welcome your suggestions for any possible improvements we can apply to the next revision of this manual.

Thank you in advance for your cooperation!



# S•Line

ALARM CONTROL UNITS FOR  
TOXIC & FLAMMABLE GASES

## INSTRUCTIONS MANUAL

**DALEMANS<sup>®</sup>**

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