PHILAE

FIRE ALARM SYSTEM

CONVENTIONAL

INSTALLATION MANUAL

1 SUMMARY

PHILAE_INSTALLATION_MANUAL_EN_REV2.docx				
Version	**Date**	**Description**	**Author**	**Approved by**
0.0	27/10/2020	Preliminary version	MH	JMA
1.0	17/02/2021	First official version	MH	JMA
2.0	28/09/2022	Diagram modification §4.3.1 and §4.3.7	BS	JMA

2 INTRODUCTION

You have acquired a conventional fire detection **PHILAE** system and we thank you for the trust you place in MARINELEC TECHNOLOGIES.
This product has been developed and approved for a marine and fluvial use. Below you can find all necessary information for its installation and commissioning.

2.1 Standards & Approvals

PHILAE system has been developed in conformity with:

- Rule EN54-2 (12/97) + A1(01/06) "Fire detection and fire alarm systems – Control and indicating equipment"
- Directive 2014/90/EU of the European Parliament and of the Council of 23 July 2014 as transposed in the French Regulations and Commission Implementing Regulation (EU) 2019/1397 of 06 Aug. 2019 – Item A.1/ *3.51*

2.1.1 EN54-2 application

Mandatory functions of the EN54-2 standard applied

- FIRE ALARM
- FAULT ALARM
- ZONE DISABLEMENT
- ZONE ACTIVATION
- VISUAL AND AUDIBLE INDICATORS TEST

Additional functions not required by EN54-2 standard

- COMMUNICATION PORT MODBUS SLAVE
- COMMUNICATION PORT "V.D.R." [Marine application – Voyage Data Recorder]
- « GENERAL ALARM » AUDIBLE SIGNALISATION [Marine application – Vessel evacuation signal]
- « NOT ACKNOWLEDGED FIRE ALARM 2 MINUTES » OUTPUT [Marine application – Requirement for alarm forwarding off the navigation bridge]

Optional function with requirement of EN54-2

- OUTPUTS TO FIRE ALARM DEVICES (SIREN output)

Optional function with requirement of EN54-2 not implemented

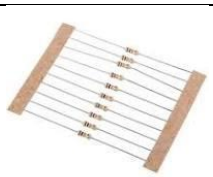
- OUTPUTS TO FIRE ALARM ROUTING EQUIPMENT
- OUTPUTS TO AUTOMATIC FIRE PROTECTION EQUIPMENT
- DELAY OF THE ACTIONING OF OUTPUTS
- COINCIDENCE DETECTION
- RECORDING OF THE NUMBERS OF ENTRIES INTO FIRE ALARM CONDITION
- FAULT SIGNALS FROM POINTS
- OUTPUTS TO FAULT WARNING ROUNTING EQUIPMENT
- DISABLEMENT OF EACH ADDRESS POINT
- TEST CONDITION
- STANDARDIZED INPUT/OUTPUT INTERFACE
- TOTAL LOSS OF POWER SUPPLY

2.2 Provided documents

Document	Description
PHILAE_USER_MANUAL_EN_REVx	User manual of the PHILAE product
PHILAE_DIAGRAM_REVx	Wiring and mechanical diagram of the PHILAE product

PHILAE_ MODBUS_RTU_TABLE_REVx	MODBUS table of the PHILAE product
PHILAE_VDR_PROTOCOL_EN_REVx	VDR information of the PHILAE product

2.3 Supplied accessories

	End of Line resistors (4.7Kohm) for the zone monitoring and siren output monitoring
	BUS PHILAE cable (30cm) for the communication between PHILAE and PHILAE_EM module
	SPARE fuses for PHILAE (5A): x2

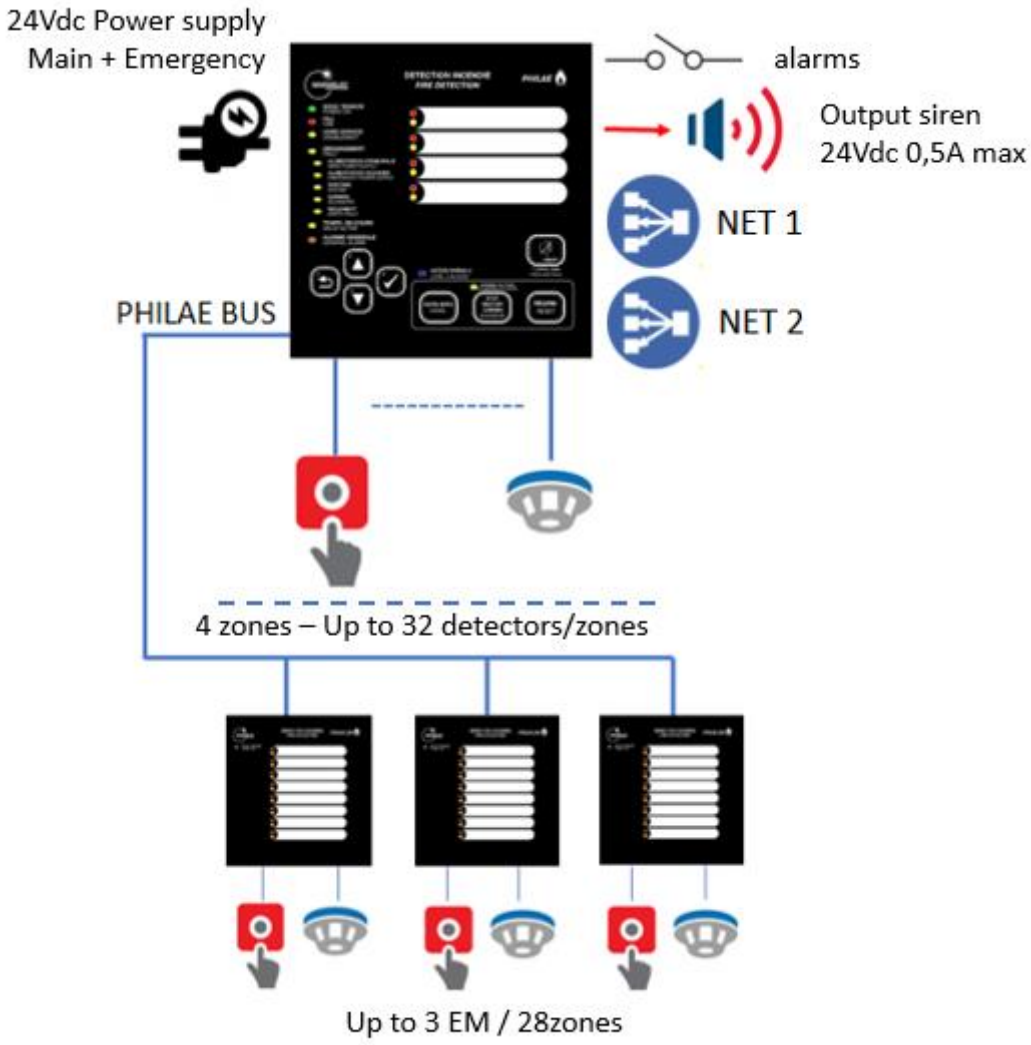
3 PRODUCT PRESENTATION

3.1 Overview

PHILAE is a conventional fire alarm system and his capacity is defined **from 4 to 28 zones**. It is composed of one panel with 4 zones, and it's possible to add up to **3 optional expansion modules** PHILAE_EM (with 8 zones each). It's possible to connect 32 devices (manual call points and optical/heat/flame detector) per zone. It's forbidden to connect more than 512 detectors on your installation.

MARINELEC supplies some approved detectors with the best adaptation of the need: Optical smoke, heat, multi-sensor, flame, manual call point. These detectors are available in the Intrinsically safe or ex-proof version for installation in areas with explosion risk.

PHILAE product is designed for a simple and intuitive utilization.



3.2 Mechanical characteristics

3.2.1 PHILAE

Parameter	Value
Dimensions	Front panel: 178 x 176 x 17 mm
	Enclosure: 142 x 135 x 44 mm
Material	PE (flexible membrane keyboard: polyethylene terephthalate)
Weight	0.5Kg
Fixing method	4 x M4 screws
Protection class	IP32 front panel
Operating temperature	+5°C to +70°C
Storage temperature	-10°C to +70°C
Connectors	X1 : Plug-in connector 10 channels, 5.08mm pitch, cable cross-section up to 2.5mm² max
	X2 : Plug-in connector 8 channels, 5.08mm pitch, cable cross-section up to 2.5mm² max
	X3 : Plug-in connector 14 channels, 3.80mm pitch, cable cross-section up to 1mm² max

3.2.2 PHILAE_EM

Parameter	Value
Dimensions	Front panel: 178 x 176 x 17 mm
	Enclosure: 142 x 135 x 44 mm
Material	PE (flexible membrane keyboard: polyethylene terephthalate)
Weight	0.6Kg
Fixation	4 M4 countersunk screws for the front panel (30mm minimum)
Protection class	IP32 front panel
Operating temperature	+5°C to +70°C
Storage temperature	-10°C to +70°C
Connectors	X1 : Plug-in connector 8 channels, 5.08mm pitch, cable cross-section up to 2.5mm² max
	X2 : Plug-in connector 8 channels, 5.08mm pitch, cable cross-section up to 2.5mm² max
	X3 : Plug-in connector 6 channels, 5.08mm pitch, cable cross-section up to 2.5mm² max

3.3 Electrical characteristics of the inputs/outputs

3.3.1 PHILAE

	Parameter	Details
Main power supply input	Voltage	18 to 32VDC (24VDC -25% / +30%)
	Protection	Reverse voltage protected
		Automotive fuse 5A
	Cable	0,75 to 2,5 mm² not shielded
Emergency power supply input	Voltage	18Vdc to 32Vdc (24Vdc -25% / +30%)
	Protection	Reverse voltage protected
		Automotive fuse 5A
	Cable	0,75 à 2,5 mm² not shielded
Power supply output "24VDC_EM"	Voltage	18Vdc to 32Vdc (24Vdc -25% / +30%)
	Cable	0,75 à 2,5 mm² not shielded

PHILAE consumption	Nominal current (standby)	4 zones	12 zones	20 zones	28 zones
		150mA	275mA	400mA	525mA
	Max. current	4 zones	12 zones	20 zones	28 zones
		1.5A	3A	4.5A	6A
« Earth » input	Threshold with 24VDC	Insulation resistance fault < 10Kohms between input and 24VDC			
	Threshold with 0VDC	Insulation resistance fault < 10Kohms between input and 0VDC			
	Cable	1.5 to 2,5 mm² not shielded			
Zones	Voltage	18VDC			
	Current threshold	Open line: 0 to 3,4mA			
		Standby: 3,4 to 26mA			
		Fire alarm: 26mA to 120mA			
		Short circuit: above 120mA			
		Max : 120mA			
	End of Line resistor	4,7Kohms +- 5%			
	Maximum number of detectors	Max. 32 detectors or manual call point per zone			
	Maximum line resistor	20 ohms			
	Protection	Automatic shutdown (120mA per zone)			
	Cable	0.75 to 2,5 mm² not shielded			
SIREN output	Output type	Polarized			
	Voltage	18 to 32VDC			
	Current	500mA protected by resettable fuse			
	Cable	0.75 to 2,5 mm² not shielded			
FIRE output	Contact type	N.O. contact			
	Breaking capacity	1A max @ 24VDC			
	Cable	0.75 to 1mm² not shielded			
FAULT output	Contact type	N.C. contact			
	Breaking capacity	1A max sous 24VDC			
	Cable	0.75 to 1mm² not shielded			
FIRE NACK 2 MINUTES output	Contact type	N.O. contact			
	Breaking capacity	1A max @ 24VDC			
	Cable	0.75 to 1mm² not shielded			
General alarm input	Input type	N.O. contact			
	Cable	0.75 to 1mm² not shielded			
NET 1 - VDR	Type of link	RS485, differential			
	Max. output voltage	-7 to +12VDC			
	Min. output voltage	-1.5 to +1.5VDC			
	Cable	0.34 to 1mm² shielded twisted pair			
NET 2 - MODBUS	Type of link	RS485, differential			
	Max. output voltage	-7 to +12VDC			
	Min. output voltage	-1.5 to +1.5VDC			
	Cable	0.34 to 1mm² shielded twisted pair			

PHILAE_BUS	Type	BUS link (I2C)
	Voltage level	0 to 3,3VDC
	Cable (supplied with PHILAE_EM)	0,34 to 1mm² twisted shielded. Max length 0.3m

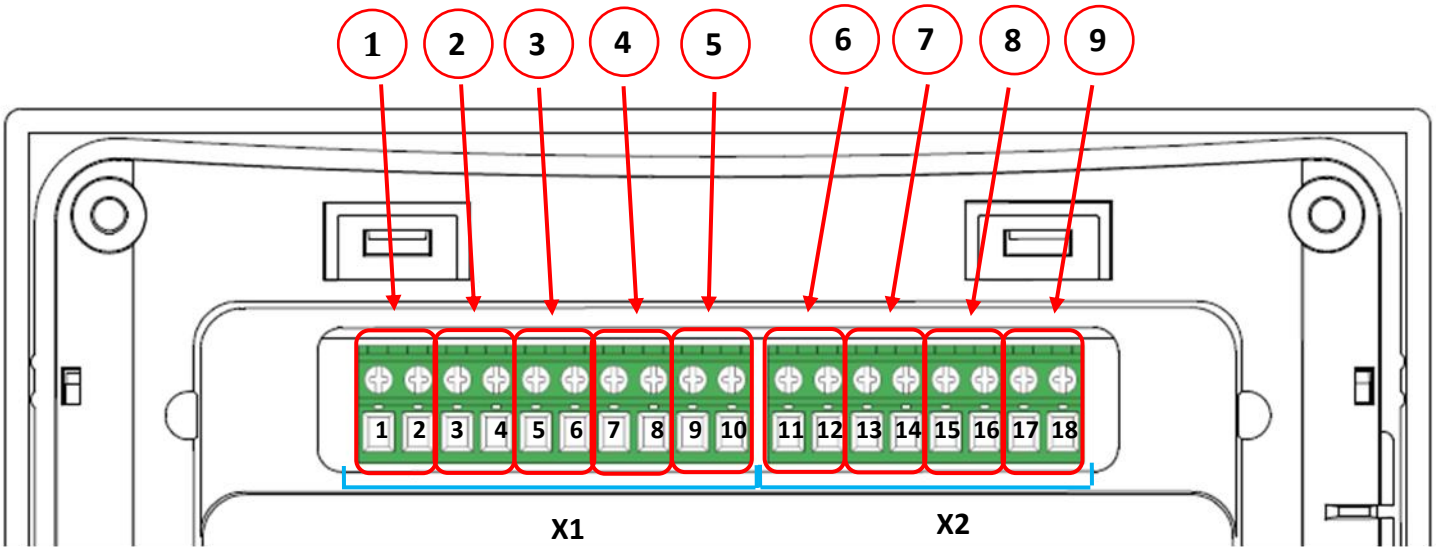
3.3.2 PHILAE_EM

	Parameter	**Details**
Power supply input "24VDC_EM"	Voltage	18 to 32VDC (24VDC -25% / +30%)
	Protection	Reverse voltage protected
		Resettable fuse 1.5A
	Cable	0,75 to 2,5 mm² not shielded
PHILAE_EM consumption	Nominal current	125mA
	Max. current	Holding current 1.5A protected by resettable fuse tripping at 3A
Zones	Voltage	18VDC
	Current threshold	Open line: 0 to 3,4mA
		Standby: 3,4 to 26mA
		Fire alarm: 26mA to 120mA
		Short circuit: above 120mA
		Max : 120mA
	End of Line resistor	4,7Kohms +- 5%
	Maximum number of detectors	32 detectors or manual call points per zone
	Maximum line resistance	20 ohms
	Protection	Automatic shutdown (120mA per zone)
	Cable	0.75 to 2,5 mm² not shielded
« Earth » input	Cable	1,5 to 2,5 mm² not shielded
BUS_PHILAE	Type	BUS link (I2C)
	Voltage level	0 to 3,3VDC
	Cable (supplied)	0,34 to 1mm² twisted shielded. Max length 0.3m

3.4 Inputs/Outputs identification

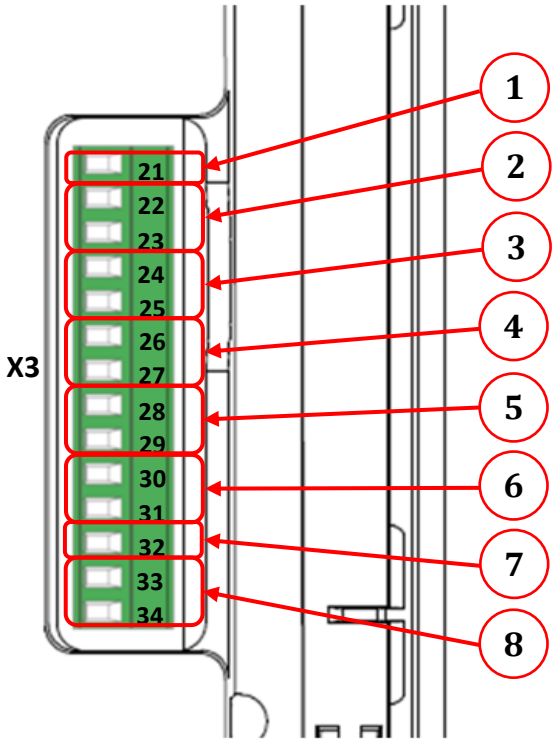
3.4.1 PHILAE

X1 and X2 connectors have a 5.08mm pitch, and maximum cable cross-section up to 2.5mm²



Number	Connector marking	Description
1	X1 - 1, 2	Main power supply input
2	X1 - 3, 4	Emergency power supply input
3	X1 - 5, 6	24Vdc commuted output (for PHILAE_EM)
4	X1 - 7, 8	Siren output 24Vdc 0,5A.
5	X1 - 9, 10	Earth
6	X2- 11, 12	Zone 1
7	X2 - 13, 14	Zone 2
8	X2 - 15, 16	Zone 3
9	X2 - 17, 18	Zone 4

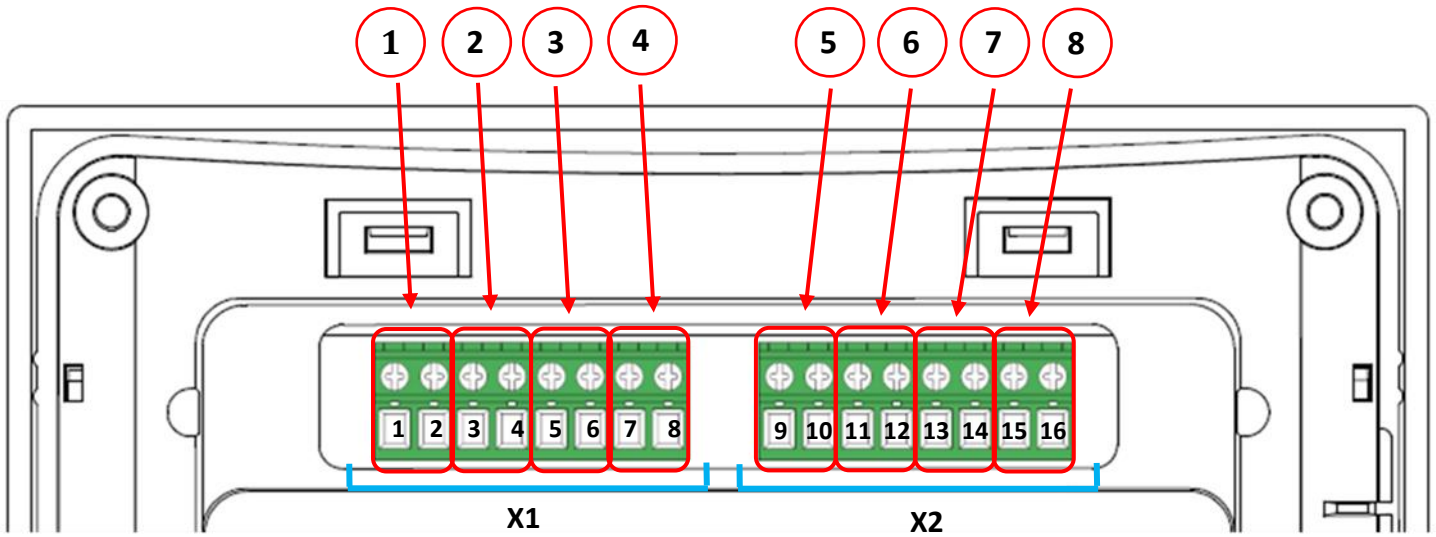
X3 connector has a 3.81mm pitch, and maximum cable cross-section up to 1mm²



Number	Connector marking	Description
1	X3 - 21	General Alarm input
2	X3 - 22, 23	FIRE alarm output
3	X3 - 24, 25	FAULT output
4	X3 - 26, 27	FIRE NACK 2 MINUTES output
5	X3 - 28, 29	NET 1 – VDR
6	X3 - 30, 31	NET 2 – MODBUS SLAVE
7	X3 - 32	GND PHILAE_BUS
8	X3 - 33, 34	PHILAE_BUS

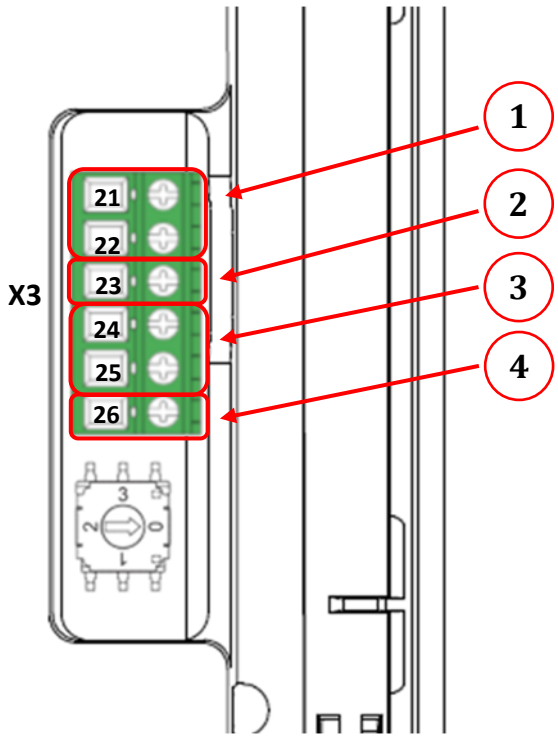
3.4.2 PHILAE_EM

X1 and X2 connectors have a 5.08mm pitch, and maximum cable cross-section up to 2.5mm²



Number	Connector marking	Description
1	X1 - 1, 2	Zone 1
2	X1 - 3, 4	Zone 2
3	X1 - 5, 6	Zone 3
4	X1 - 7, 8	Zone 4
5	X2 - 9, 10	Zone 5
6	X2 - 11, 12	Zone 6
7	X2 - 13, 14	Zone 7
8	X2 - 15, 16	Zone 8

X3 connector has a 5.08mm pitch, and the maximum cable cross-section up to 2.5mm²



Number	Connector marking	Description
1	X3 - 21, 22	24Vdc power supply
2	X3 - 23	EARTH
3	X3 - 24, 25	PHILAE_BUS
4	X3 - 26	GND PHILAE_BUS

3.5 Acces levels

Three access levels are defined on the PHILAE panel, as defined by the EN54-2 standard and allow to limit the use of particular functionalities according responsibilities.

Access level	Protection	Authorized functionalities
1	No protection	Alarm acknowledgement
		Audible and visual test
2	Level 2 access code required	Stop/Start of the siren output
		Reset
		Disablement
3	Product disassembly	Number of PHILAE_EM modules adjustment
		Delay application adjustment for « FIRE NACK 2 MINUTES » output (Zones 11 and 12 only)
		Siren output operation settings
		PHILAE_EM address settings
4	Product disassembly + programming tools	Only for repair (MARINELEC access)

The code for accessing level 2 mode is 2132, and shall only be communicated to authorized crew members.

4 INSTALLATION

During the commissioning, we recommend to follow these step by step procedure:

- Mechanical installation + product settings
- Electrical wiring
- Electrical checking
- Power up
- Functional test
- Zone labeling

4.1 Security

All documents concerning the installation and use provided by MARINELEC should imperatively be taken into account by the fitter and the users.
PHILAE system should be installed and commissioned by qualified person only.
Make sure that you comply with the regulations and directives in force concerning the commissioning of the fire alarm system.
Do not unplug connectors when PHILAE is powered.
Electrostatic discharges can damage the electronic components present on the electronic card, make sure you take all the necessary precautions if you have to manipulate the electronic card (antistatic bracelet, …).

4.2 Panel installation

4.2.1 Location

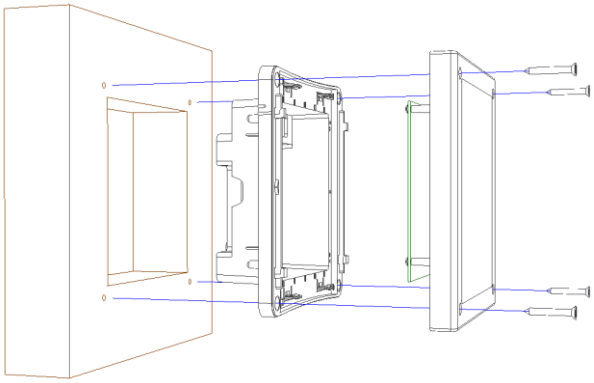
location must be meticulously chosen according applicable regulations and regarding easiness of use and repair actions. Recommendations regarding location of the panel:

- On the bridge, away from any risk of exposure to humidity
- Built-in on a console or electrical cabinet
- At eye level
- Far from sources of important electromagnetic radiations (BLU, VHF, WIFI etc.)
- Avoid direct exposure to: sun, high light or heat source
- Avoid direct exposure to mechanical impacts
- Avoid direct exposure to projections of liquid, fuel, steam, water, coffee

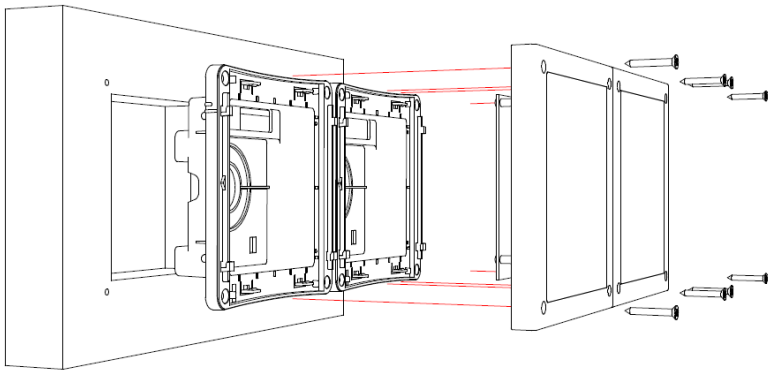
Note: it's necessary to address PHILAE_EM module before its installation (refer chapter 5)

4.2.2 Console/cabinet mounting

PHILAE product and the expansion modules (PHILAE_EM) should be mounted in the console and fixed with self-drilling countersunk screws of Ø 4mm diameter.
Mechanical drawing is available in "***PHILAE_DIAGRAM_REVx***" document.



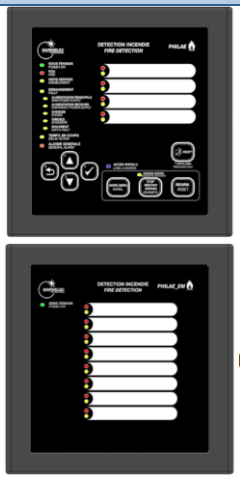
Console mounting details - PHILAE



Console mounting details – PHILAE + PHILAE_EM

4.2.3 Organisation of the installation

If one or more expansion modules are used, it's possible to place them as shown below:

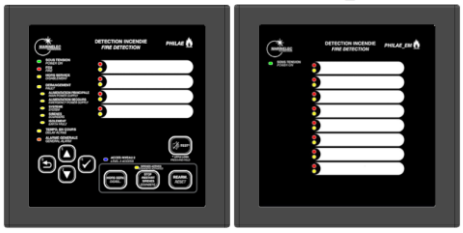
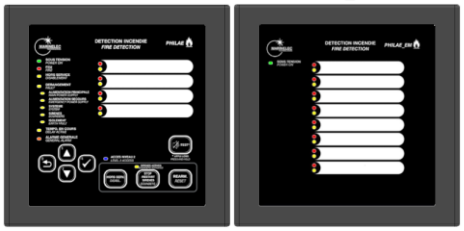
Number of PHILAE EM	Possible arrangements	
1	 PHILAE PHILAE_EM n°1	 PHILAE PHILAE_EM n°1
2	 PHILAE PHILAE_EM n°1 PHILAE_EM n°2	 PHILAE PHILAE_EM n°1 PHILAE_EM n°2

<table>
<tr><td>2 (cont.)</td><td> 
PHILAE PHILAE_EM n°1 PHILAE_EM n°2</td></tr>
<tr><td>3</td><td>

PHILAE

PHILAE_EM n°1

PHILAE_EM n°2

PHILAE_EM n°3
PHILAE PHILAE_EM n°1

PHILAE_EM n°3 PHILAE_EM n°2
PHILAE PHILAE_EM n°1

PHILAE_EM n°2

PHILAE_EM n°3


PHILAE PHILAE_EM n°1 PHILAE_EM n°2 PHILAE_EM n°3
</td></tr>
</table>

It's necessary to install the PHILAE and PHILAE_EM closed to each other, in the same console (or cabinet) and to respect the maximum bus communication length of 30cm.

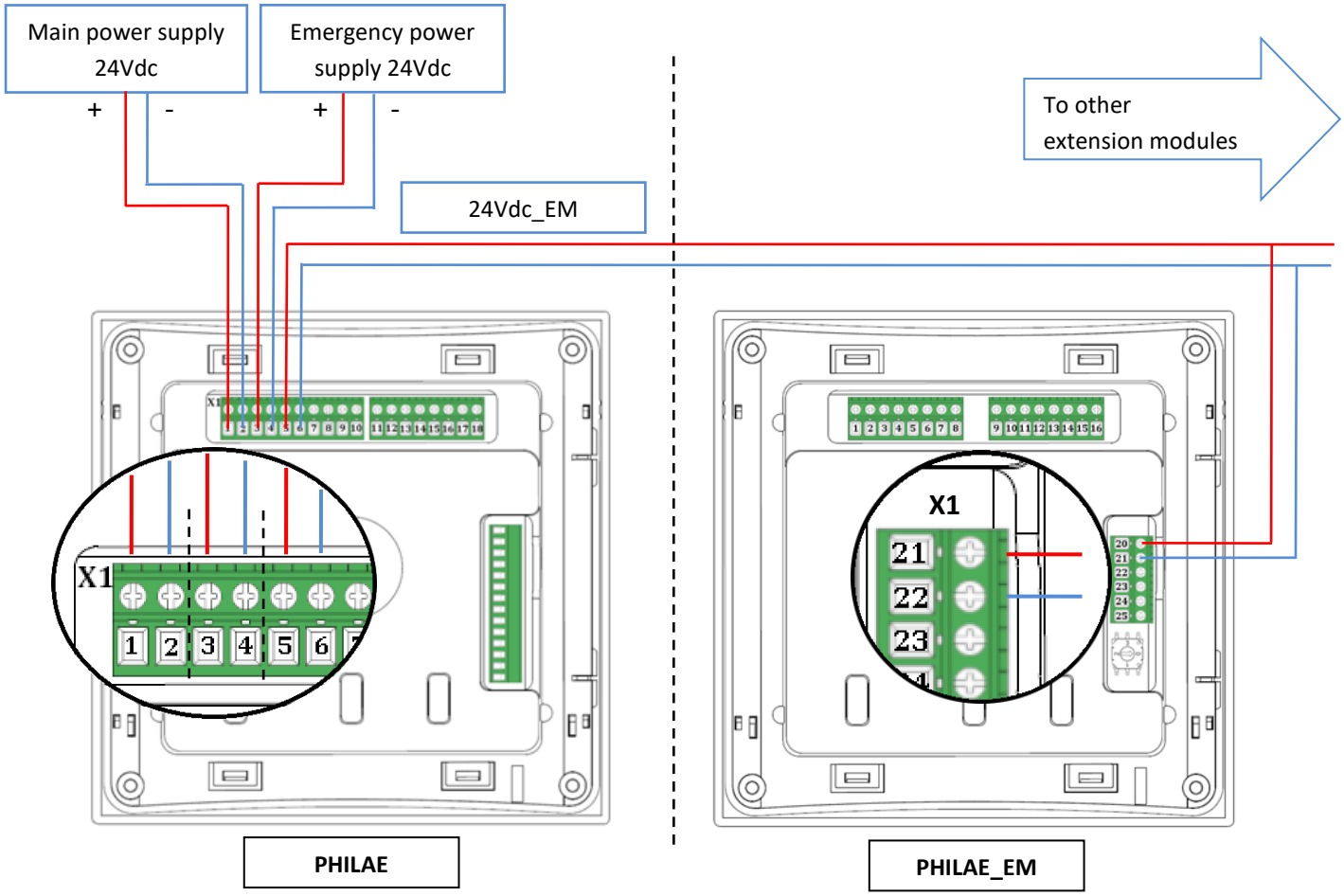
4.2.4 Zones labelling

Specific areas are available on PHILAE and PHILAE_EM products to allow you adding a text label for each zone. It's necessary to use a simple language with no ambiguity for an easy and quick understanding. Labels' height is 10mm and compatible with 9mm standard labels.

4.3 Wiring

4.3.1 Power supply of PHILAE and PHILAE_EM

The expansion modules (PHILAE_EM) are powered by "24Vdc_EM" output of the PHILAE. Automatic switch between the main power supply and the emergency power supply is ensured by the PHILAE.
Fuses are placed on the main power supply and the emergency power supply (5A).

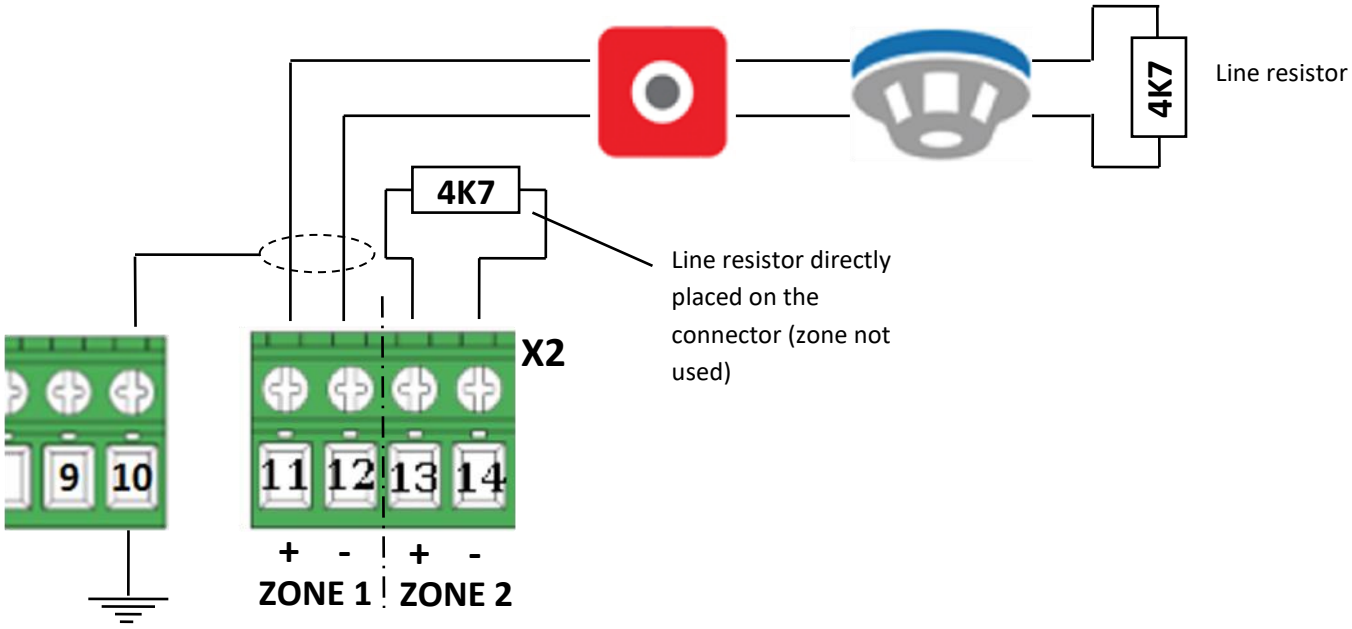


4.3.2 Zones

It's necessary to connect detectors according the wiring diagram provided by MARINELEC to ensure correct operation of the system and respect applicable regulations.

Each zone has to be fitted with one End of Line resistor (4K7, 0.5W) at the end of the zone, even when it is not used.
Resistors are delivered with the panel.

Be sure to connect the cable shielding of the zone on the earth (terminals 9 and 10) to check the isolation fault.



The wiring diagram of the detectors and the manual call points are provided in this document : "**PHILAE_DIAGRAM_REVx".**

Important recommendations regarding zone cables:

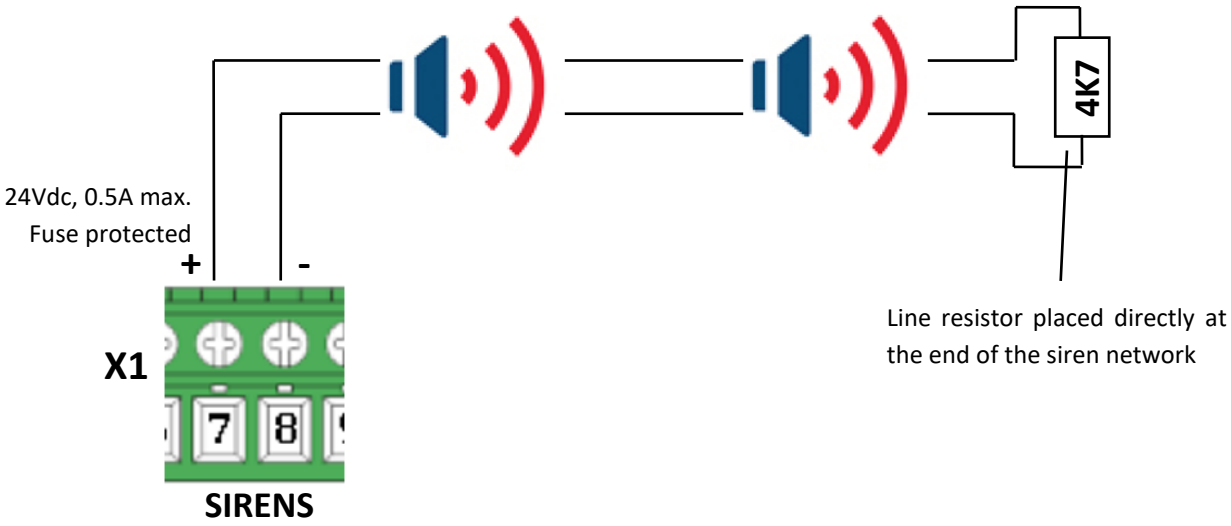
- Must be routed away and separated from high power cables
- Away from any source of high electromagnetic radiations (DC/DC converters, AC/DC converters, rotating machines, frequency inverters, power cabinets, radio transmitters, VHF, …)

4.3.3 Siren output

Sirens are to be connected on PHILAE terminals X1-7 & X1-8. Take into account the maximum current for this output: **0.5A**.
If the current is greater than 0.5A, an internal resettable fuse will trigger and cause troubles of the system until acceptable current condition is restored.

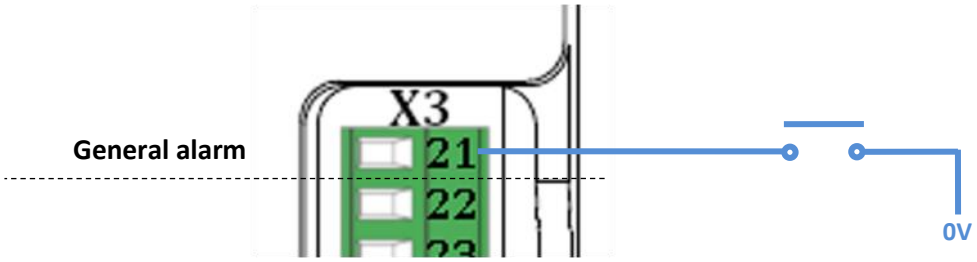
The siren output is polarized and monitored with an end of line resistor (4K7, 0.5W). This line resistor must be connected on the connector of the last siren of the siren network. If short circuit or open line is present on the siren network, an alarm is raised on the panel.

Star topology connection of multiple sirens is not acceptable because not compatible with line monitoring feature.
Even though siren output is not used, it's necessary to connect the end of line resistor (directly on the X1).



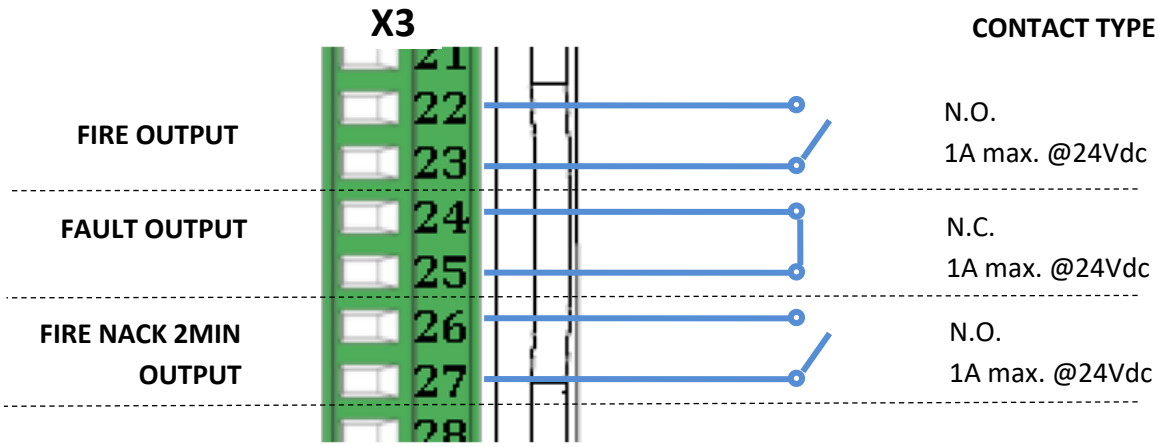
4.3.4 General Alarm input

This input allows to launch general alarm sequence when the corresponding input is active. The general alarm indicator lit when this sequence is launched (7 short / 1 long blast). If fire alarm is present at the same time, General Alarm sequence has priority.



4.3.5 Relay outputs

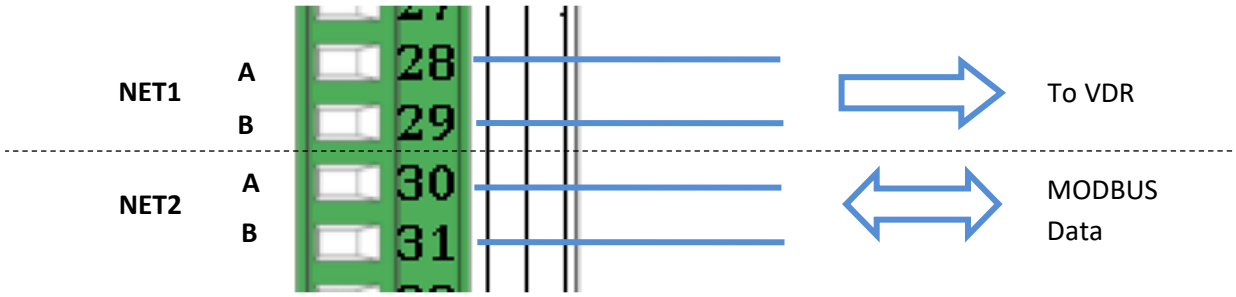
The relay outputs allow transfer of fire alarm, fault and fire alarm not acknowledged (2 minutes) to other equipment.



4.3.6 NET1 and NET2 communication port

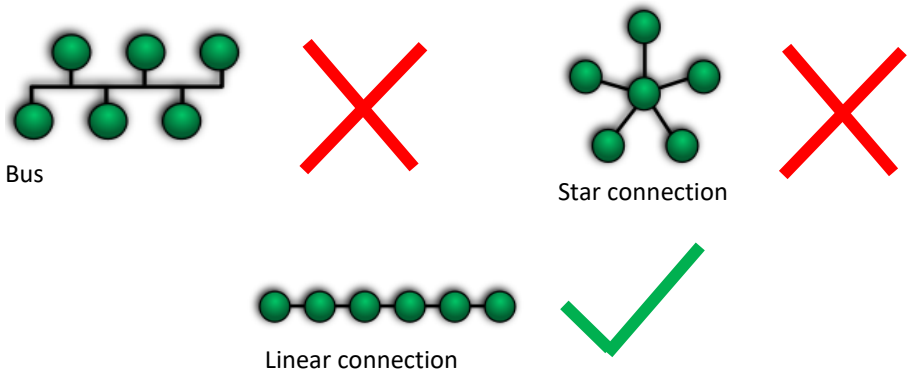
Two communication ports are available on the PHILAE product, based on RS485 standard.

Port	Description
NET1	VDR output to transmit frames to Voyage Data Recorder. Refer to **"PHILAE_VDR_PROTOCOL_EN_REVx"** for more information
NET2	Communication port for MODBUS communication with remote alarm panel or Alarm & Monitoring System). PHILAE is programmed as a Modbus Slave. Refer to **"PHILAE_MODBUS_TABLE_REVx"** for more information

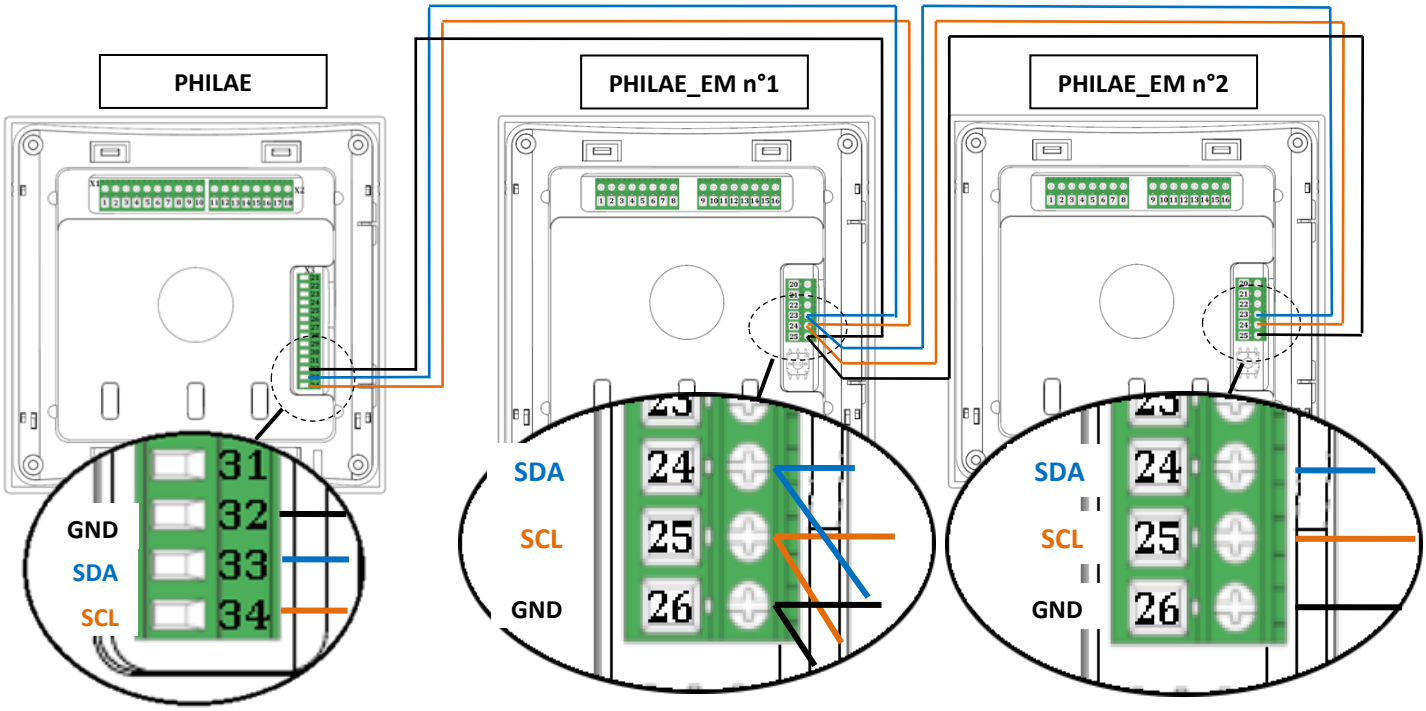


4.3.7 PHILAE_BUS

PHILAE product and PHILAE_EM product, must be connected using PHILAE_BUS provided by MARINELEC. The length of the PHILAE_BUS is defined to **30cm**. It's important to respect a linear connection (as below). Star connection is forbidden.



Wiring diagram between two PHILAE_EM with PHILAE_BUS:

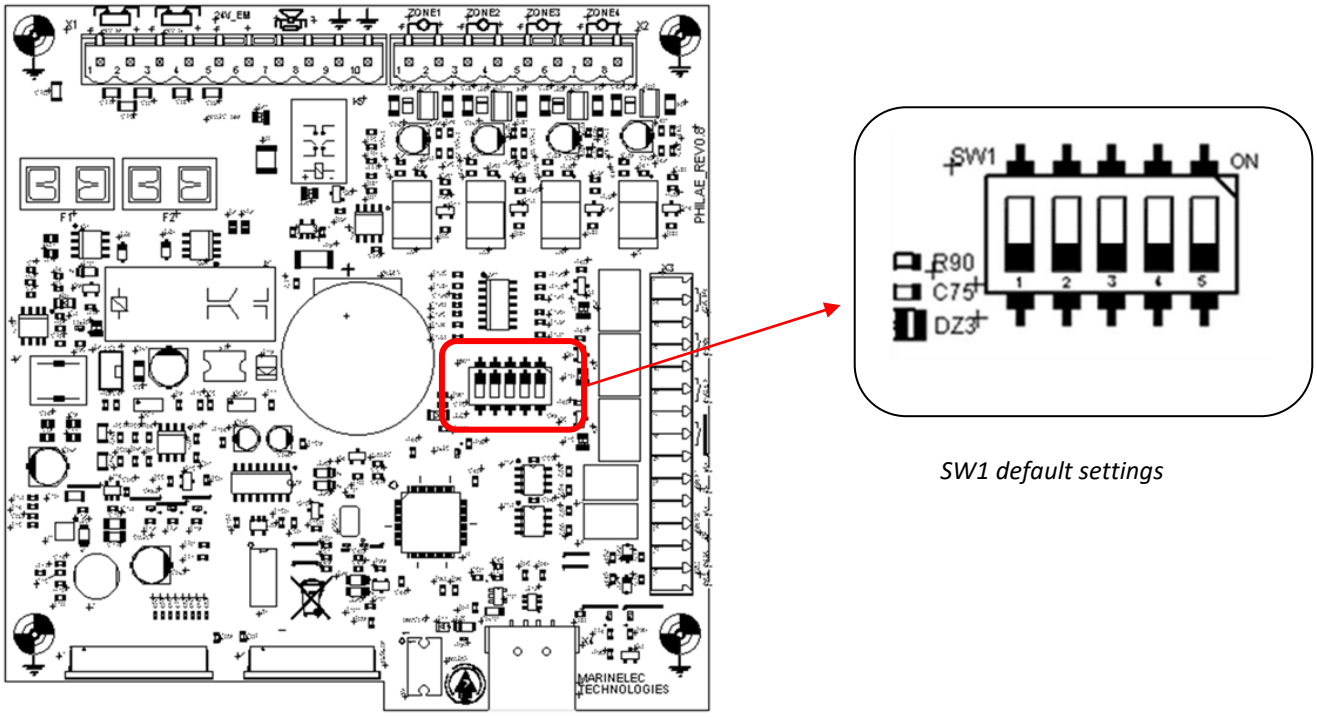


5 SETTINGS [LEVEL 3]

Before the commissioning, it's necessary to set parameters of the PHILAE and PHILAE_EM from the micro-switches on the electronic card. The front panel should be removed to access configuration micro-switches. Only qualified technicians are allowed to set these parameters.

5.1 PHILAE

The location of the micro-switch block (SW1) is shown below:



SW1 default settings

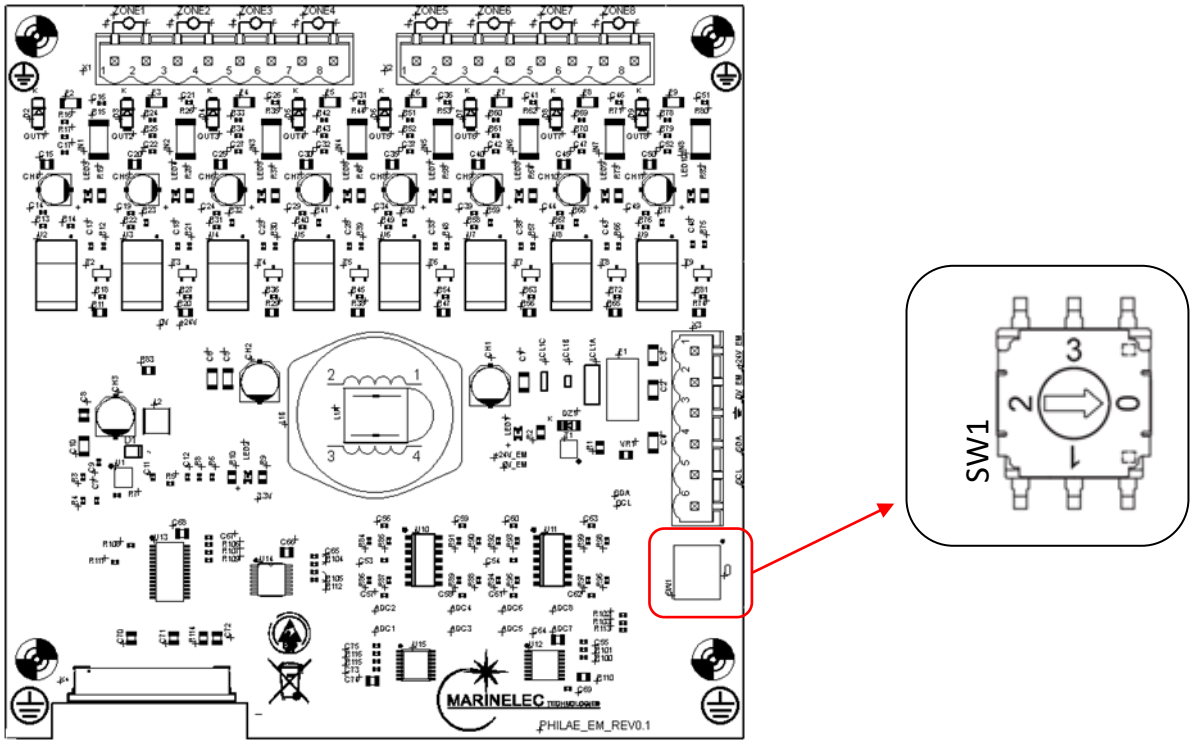
PHILAE µSwitches SW1		
Function	**SW1 ID**	**Details**
Number of extension modules	SW1.1	**OFF**, **OFF**: no extension module. **OFF**, **ON**: 1 extension module. **ON**, **OFF**: 2 extension modules. **ON**, **ON**: 3 extension modules.
	SW1.2	
Delay cancellation for "FIRE NACK 2 MINUTES" output on zones 11 and 12	SW1.3	**OFF**: no delay cancellation for zones 11 and 12. **ON**: delay cancellation for zones 11 and 12.
Sounders activation on each zone	SW1.4	**OFF**: sounders will be activated only on the first fire alarm condition. **ON**: sounders will be activated on each new zone in fire alarm condition.
Sounders muting from ACK button	SW1.5	**OFF**: no sounders muting from the acknowledgement button. **ON**: sounders muting from the acknowledgement button **(*)**.

Note: *All µSwitches are set to off by default*

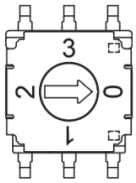
(*): Operation with SW1.5 set to "ON" doesn't comply with EN54-2 standard requirements!

5.2 PHILAE_EM

Each PHILAE_EM has a rotary switch (SW1) allowing to set the unique address of the module:



It's necessary to use a screw to modify the address. The default position is 1.



Position	Description
0	*Address is not set on the expansion module – should not be used -*
1	Expansion n°1.
2	Expansion n°2.
3	Expansion n°3.

6 TROUBLESHOOTING

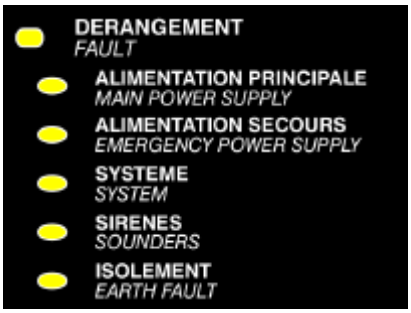
6.1 Front panel warning lights

Warning lights on the PHILAE and PHILAE_EM inform about alarms detected by the system.

6.1.1 Power ON

Lit when the system is powered.
If not lit, check power supply source voltage (main & emergency), then F1 and F2 fuses.

6.1.2 Electical faults



Indicator	Description
MAIN POWER SUPPLY	Indicates a Main power supply failure *Check supply voltage (19-32V)*
EMERGENCY POWER SUPPLY	Indicates an Emergency power supply failure *Check supply voltage (18-32V)*
SYSTEM	Steady on: internal processor failure, it's necessary to restart the system
	Flashing: address or communication failure between PHILAE and PHILAE_EM *Check the PHILAE_BUS and the PHILAE_EM settings*
SOUNDERS	SIREN output failure *Check the siren output wiring (short-circuit, open line, presence of EOL resistor*
EARTH FAULT	Insulation fault detected between "EARTH" and 0V or +24VDC (Z<10Kohm). *Check all cables and connections to the panel*

6.1.3 Zone faults

Each zone has one fault indicator (also used for disablement indications). Fault alarm on zone appears in these cases:

- Missing End Of Line resistor
- Open line
- Line short-circuited or over current situation detected (>150mA)

6.2 "Test" button

A long press (>3 seconds) on the “acknowledgement” bouton allows to launch an audible and visual test:

- A few seconds sequence is launched to check all warning light of the panel, including PHILAE_EM expansion modules
- Two beeps are played on internal buzzer

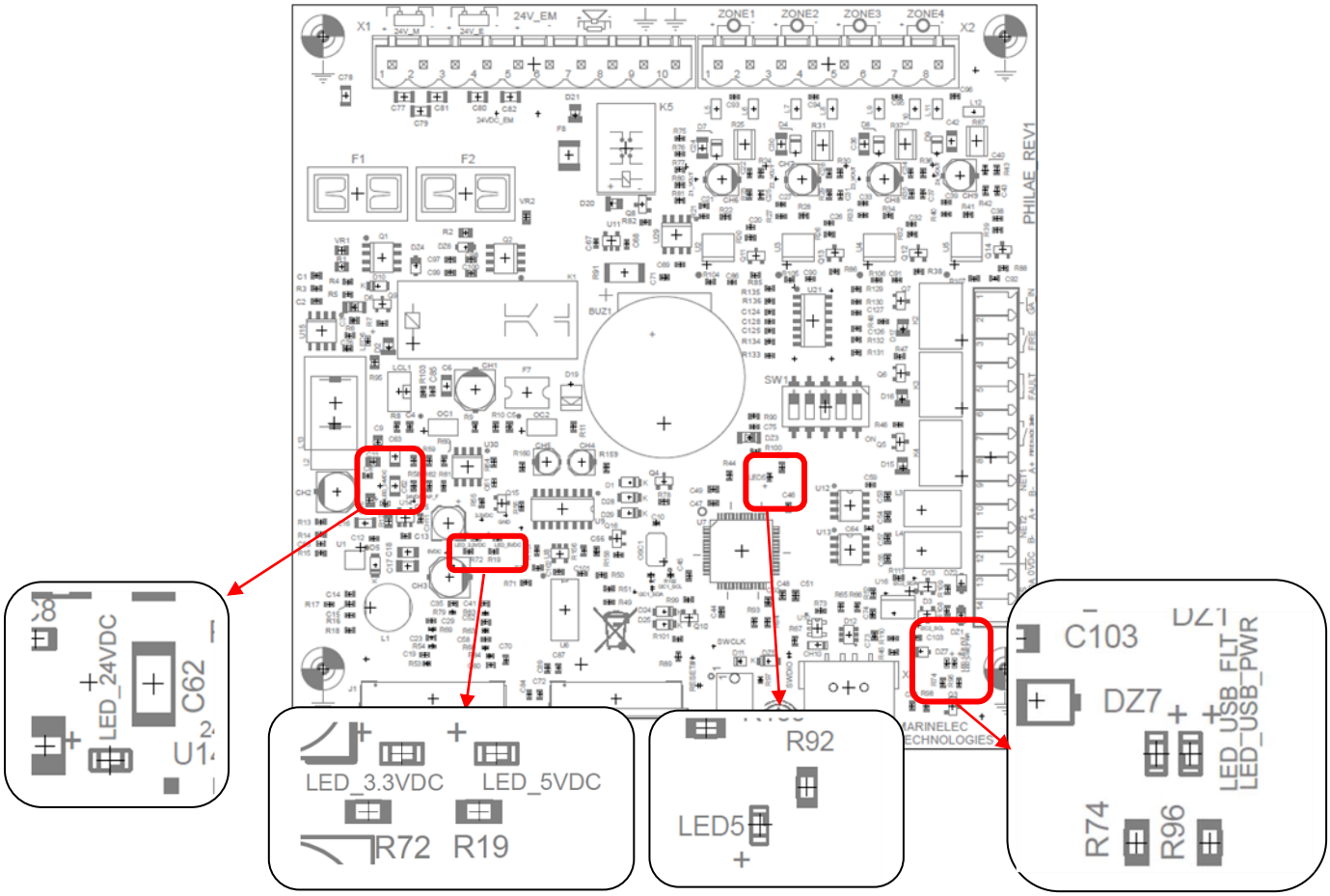
This test allows to check these points:

One or more indicators are not operational	Front panel film and/or LED drivers failure
The internal buzzer does not operate	Internal buzzer failure .
One or more warning lights are not functional on the expansion module (PHILAE_EM)	Power supply problem on the expansion module or incorrect address settings

6.3 Electronic card signalling lights

Some indicators are placed on the electronic card of the PHILAE and the PHILAE_EM to allow quick diagnosis.

6.3.1 PHILAE

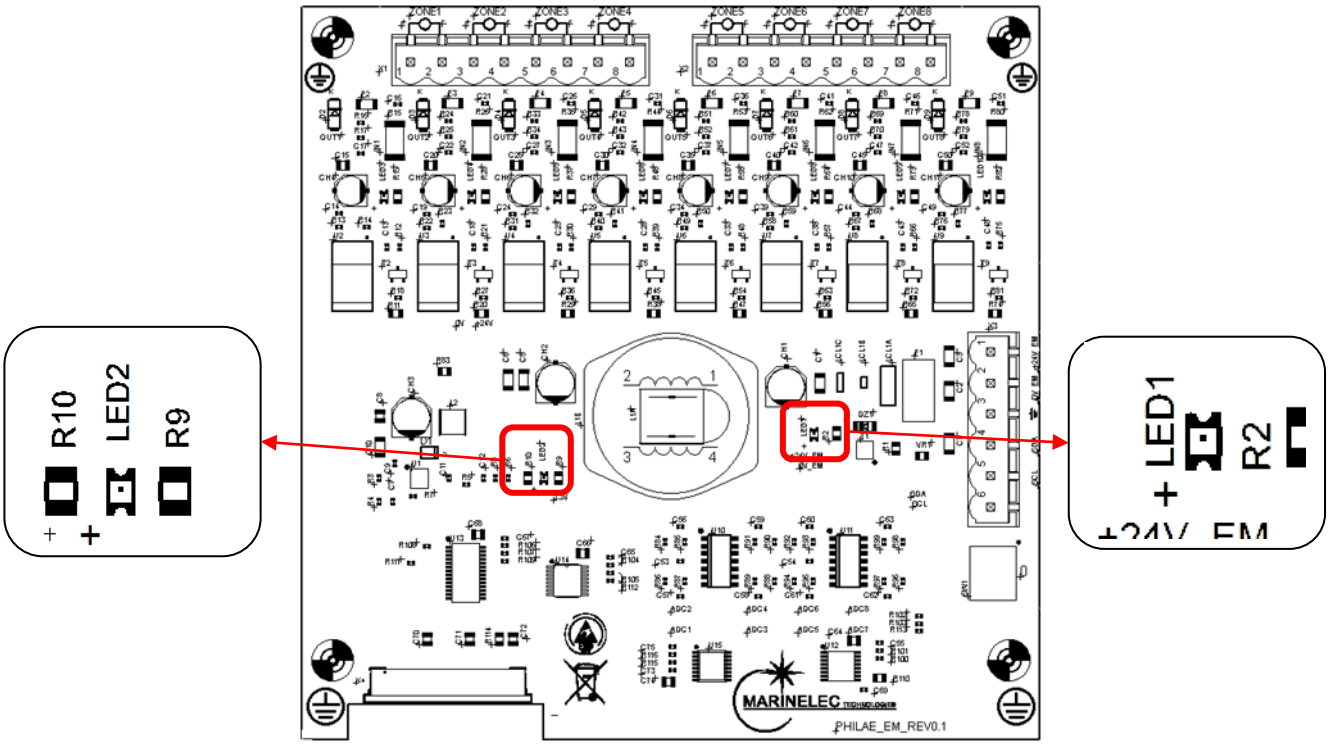


Designation	Description	Normal state
LED_24VDC	Indicator for the 24Vdc on the electronic card	Green light ON (steady)
LED_5VDC	Indicator for the 5Vdc on the electronic card	Green light ON (steady)
LED_3.3VDC	Indicator for the 3.3Vdc on the electronic card	Green light ON (steady)

LED5	Alive LED indicator	Red, flashing
LED_USB_FLT	Fault indicator for USB power	OFF
LED_USB_PWR	USB power indicator	Green, steady

If one indicator is not in his normal state (as above), it's necessary to contact MARINELEC TECHNOLOGIES.

6.3.2 PHILAE_EM

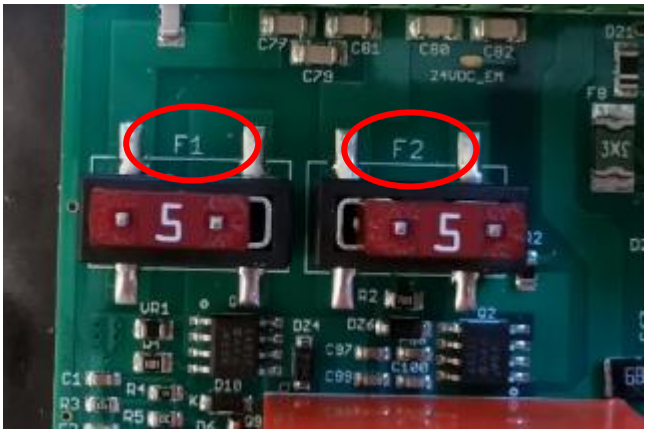


Designation	Description	Normal state
LED1	Indicator for the 24Vdc on the electronic card	Green light ON (steady)
LED2	Indicator for the 3.3Vdc on the electronic card	Green light ON (steady)

If one indicator is not in his normal state (as above), it's necessary to contact MARINELEC TECHNOLOGIES.

6.4 Fuses

Two fuses are placed on the PHILAE electronic card, in order to protect main emergency power supply inputs.
It's necessary to power off and disassemble the PHILAE to perform fuse replacement. Fuse value is defined at 5A.



Please use an appropriate tool to remove fuses.

6.5 After sale service contact

- After sales service remains available for any technical information:
    - Tel : +33 7 64 57 55 20
    - Mail : aftersales@marinelec.com

7 CONTACT

MARINELEC TECHNOLOGIES 13 rue Alfred Le Bars - 29000
Quimper - FRANCE
+33 (0)2 98 52 16 44 - Fax: +33 (0)2 98 64 74 05
marinelec@marinelec.com

MARINELEC
TECHNOLOGIES

Marinelec Head Office
13 rue Alfred Le Bars - 29000 Quimper - FRANCE
Tél : +33 (0)2 98 52 16 44

www.marinelec.com