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SHIELD
TRUSTED WORLDWIDE

PROGRAMMABLE SI-90 SYSTEM

INSTALLATION & OPERATION MANUAL

TECHNICAL SPECIFICATION
SH-048-EN-V4R7

Important Notes

The objective of the company ***Shield Fire, Safety and Security Ltd.*** is the continuous improvement of the features of its products. Therefore, this manual may be subject to changes without any notice. All technical information and data provided herein have been carefully checked. This cannot guarantee that the manual does not include any defects or typos. ***Shield Fire, Safety and Security Ltd*** accepts no legal responsibility for the possible consequences of errors or changes of this manual.

Property rights

List of revisions

List of Revisions	Short Content Description	Release Date
Rev. 0	Preliminary version	11-02-2016
Rev. 1	Revision for certification - Added SI-2403 Card - Added SI-2602 Card - Added SI-2401 Card in compliance with standard EN54-2 - Added SI-3807 Card - Added SI-2708, SI-2709, SI-2710 Cards - Added addressable device POM, SOM, FB-1 on SI-2702-1 card - Adhesive Label modification for CPR. - Added application notes for ATEX panels - Safety Bus Card SI-2711-1 with modules added - Versions SI-90/L and SI-90/M added - Addition of SI-3804-1 card Keypad option for explosion proof housing - Added EN 54-13 and EN 54-21 compliance - Added power supply unit SI-PU-0004-x - Added SI-1102-1 and SI-1106-2 cards - Added variable output V11 on SI-2601-1 card - Added remote displays SI-R0001-x and SI-R0001-x - Added I/O bus SI-2201-1 - Added surge protection termination modules - Added remote I/O device SI-LEU - Added new Shield devices - Added mention of Annex A regarding the EN54-13 standard - Reduced the maximum number of zones from 300 to 250 - Added communication network redundancy - Correct indication of devices disabling led - Added mentions of Annex B of this manual, regarding the GOST 53325-2012 standard	02-07-2020

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Notes on the use of this manual

Carefully read this manual before carrying out any operations on SI-90 systems. All assembly and maintenance operations described in this manual must be carried out by skilled staff. The SI-90 systems must be used only in the applications for which they have been designed and must operate under the operating conditions set out in chapter 1. Moreover, the field devices connected to the system must be compatible with and approved for being operated with SI-90 systems. The misuse of this equipment, the failure to comply with the instructions herein or any interventions by non-skilled staff may cause serious injuries to people and damages to objects. ***Shield Fire Safety & Security Ltd*** assumes no responsibilities for these damages.

This manual is divided into the following chapters:

Chapter 1 **General description**
It provides a general description of the SI-90 panel, listing system main technical features and the operative conditions.

Chapter 2 **Parts of the SI-90 system**
It provides a detailed description of the parts making up SI-90 control panel.

Chapter 3 **Installation Instructions**
It provides the required information for product proper installation.

Chapter 4 **Start-Up and fault management**
It describes the various stages relating to system start-up and lists the operations to be carried out for restoring system faults.

Chapter 5 **Maintenance**
It describes the main maintenance operations to be carried out on the system on a regular basis.

Chapter 6 **Application notes**
This chapter provides useful information relating to reference standards.

Chapter 7 **Operator Instructions**
This chapter provides useful information about how to operate in the operator cycle menus.

Appendix A. **Part list**
It provides the complete list of all the parts making up SI-90 system.

Appendix B. **Compatible devices**
The list of SI-90 compatible devices.

Appendix C. **Power supply unit dimensioning**
It provides the required information on the size of the power supply unit and of the batteries.

Appendix D. **Adhesive label**
Adhesive label with identification data of the product.

All information reported in this manual is valid for the following firmware versions:
Card SI-1102-1 ≥V2.4.2
Card SI-1102-2 ≥V3.0.0

- For control units conforming to the UL 864 standard, refer to the appropriate manual ST-058-EN
- For control units conforming to the GOST 53325-2012 standard, refer to Annex B of this manual

Abbreviations

CPU	Central processing unit
EMC	Electromagnetic compatibility
I/O	Input/output
PSU	Power supply unit
TCP/IP	Network protocol
START-UP	System start-up
c.c.s.	Monitoring & signaling system
d.e.c.	Monitoring & automatic delay electronic device
a.d.a.	Power supply equipment

Glossary

Safety rating — This term is used in connection with systems performing functions intended to ensure that risk is kept at an acceptable level. These functions are called "safety functions".

Hot Plug — Hot plug is a card that can be replaced when the system is started.

Availability — The availability of a card is the percentage of time during which it is operating. Generally this value is a percentage and is obtained by applying the formula below:

$$A = \frac{MTBF}{MTBF + MTTR}$$

MTBF — Mean time before failure, is the time estimated by the manufacturer before a failure occurs to the card.

MTTR — Mean time to repair, is the mean time required for repairing a broken card. In SI-90 systems, repair means the replacement of the broken card, which is generally estimated to take 8 hours.

SELV — Safety Extra Low Voltage

ATEX — Consists of two EU directives for environments with an explosive atmosphere:

the ATEX 95 equipment directive ***2014349/EU***, dedicated to manufacturers, for Equipment and protective systems intended for use in potentially explosive atmospheres;

the ATEX 137 workplace directive ***99/92/EC***, dedicated to users, covers Minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres.

Reference documents

For further details and additional information on the SI-90 system, please refer to the following documents:

Document number	Name
ST-048-EN	Installation and user manual (EN54 edition. This manual)
ST-071-EN	Safety Manual
ED-Cxxxxx-Fyy-Rz	Wiring diagram (specific to each control panel)
ST-015-EN	Programming software PRO-S81
ST-021-EN	Graphic supervisory program IRIDE
ST-057-EN	Scame OPC Server
ST-007-EN	Modbus RTU protocol
ST-166-EN	Safety Bus Installation and user manual
ST-188-EN	Remote Displays Installation and user manual
ST-058-EN	Installation and Operation Manual (UL 864 edition)
ST-048-EN-ANNEX-A	List of compatible devices according to EN 54-13 standard
ST-048-EN-ANNEX-B	Panels conforming to GOST 53325-2012 standard

1 GENERAL DESCRIPTION

This chapter provides a general description of the SI-90 control panel, listing system main technical features.

1.1 Architecture of the system

The SI-90 control panel is a high technology product created for controlling safety-related systems and equipment. It is characterized by easy configuration and programming, combined with excellent reliability and system diagnosis. SI-90 is similar to a "safety PLC" and can be configured and programmed for carrying out, in compliance with applicable standards, integrated safety functions such as:

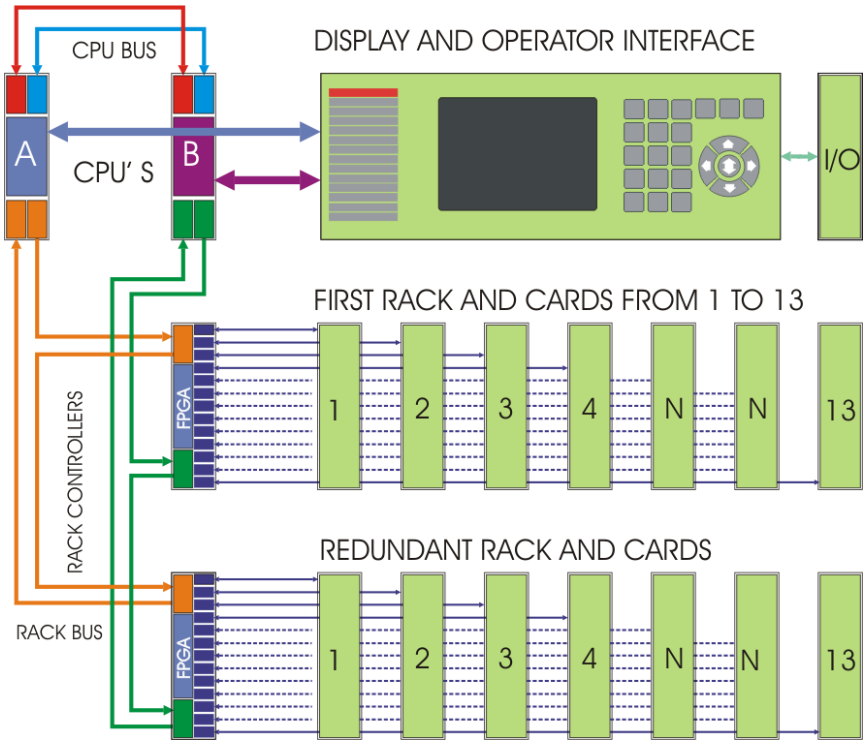
- fire detection
- gas detection,
- burglar alarm
- technological control.

The SI-90 can also interact with other control panels of the same type and with supervisory systems via both standard and proprietary protocols such as TCP/IP Ethernet, Modbus RTU, or OPC Server.

Each system includes a power supply unit, a processing unit -which is also the user interface- and the I/O cards controlling field devices. Both the processing unit and the I/O cards are located on 19 inch racks. There are two ways of connecting cards and field devices:

- The first solution, available in the versions SI-90 /L & SI-90 /M, uses 8 terminal blocks, with 18 screw terminals each, to directly connect cables from field devices.
- The second solution, available in all other versions, consists in the use of multipolar cables directly connected to bus back through a DIN41618 connector. This solution allows for a redundant card termination.

The SI-90 system has a modular structure. The processing rack includes two CPUs and an operator interface panel. Each processing unit can be connected to a maximum of 10 racks, including 13 I/O cards each, for a total amount of 130 cards. I/O cards can be fitted the racks without any limitations, according to the requirements of the specific system under consideration.



Architecture of the system

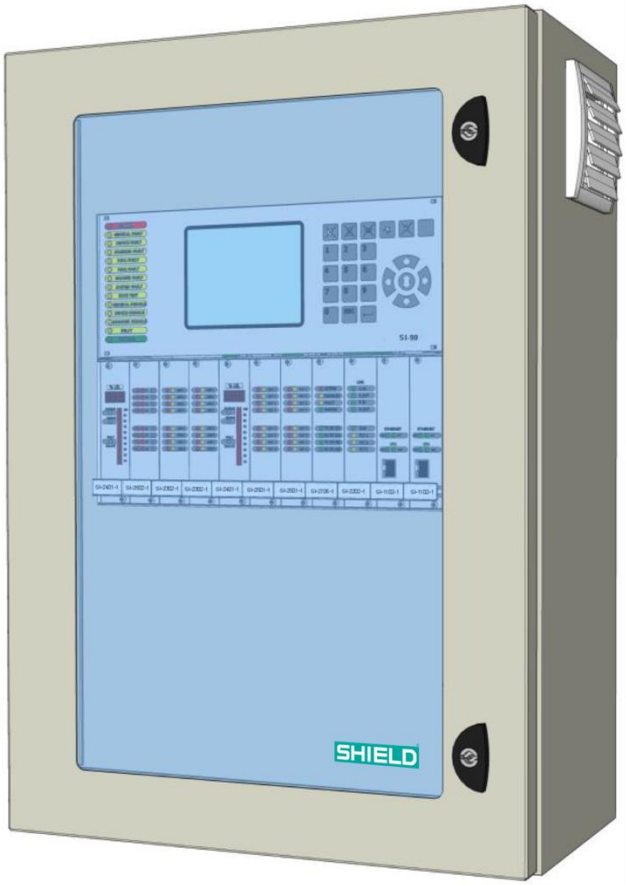
1.2 Mechanical structure

All models are installed in a steel cabinet with double door:

- SI-90/L Base + 8 I/O cards in a wall mount cabinet
- SI-90/MB Base + 8 I/O cards in a wall mount cabinet
- SI-90/M Base + 8 I/O cards in a wall mount cabinet
- SI-901R Base rack + 1 rack with 13 slots for I/O cards in a wall mount cabinet
- SI-90/2R Base rack + 2 racks with 13 slots, each, for I/O cards in a wall mount cabinet
- SI-90/10R Base rack + up to 10 racks with 13 slots, each, for I/O cards in a free standing cabinet
- SI-90/U Base rack + up to 6 racks with 13 slots, each, for I/O cards in a free standing cabinet

1.2.1 SI-90/L

The SI-90 /L model is a modular unit consisting of one display and a 3-unit high anodized aluminum rack for installing two CPUs, one rack controller and 8 slots for I/O cards. Cards and power supply units are installed inside a steel cabinet with double door. The 8 slots allow for installation of I/O cards as selected to match the requirement of the installation. Each I/O card is connected to field devices through a 18 terminals block.



SI-90 ***/L***

1.2.2 SI-90/M

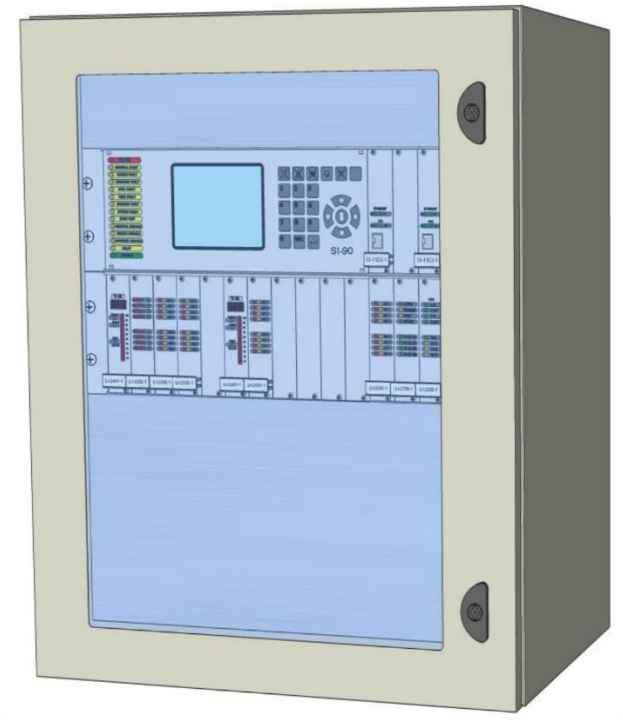
The SI-90/M model is identical to SI-90 /L, but uses a different power supply unit and is certified for marine application.

1.2.3 SI-90/MB

The SI-90/MB model is identical to SI-90/L, and is UL 864 certified.

1.2.4 SI-90 /1R

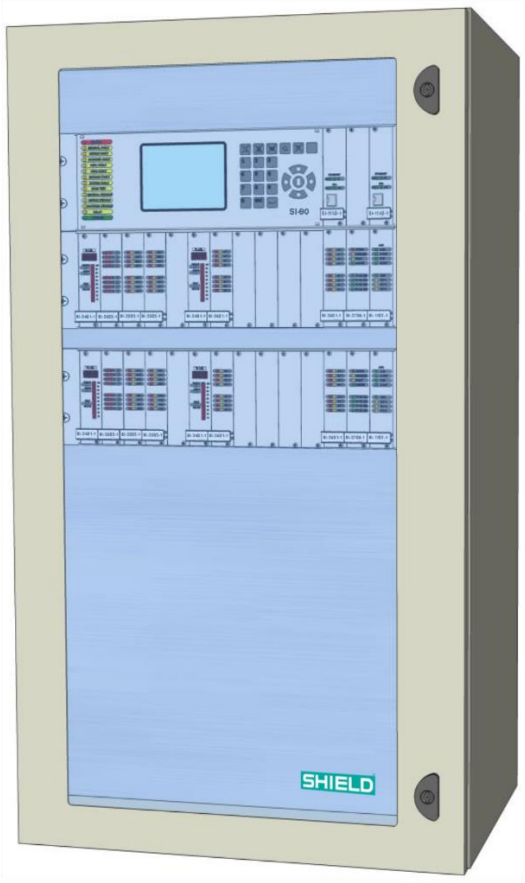
The SI-90/1R model is a modular unit consisting of two 19” 3-unit high anodized aluminum racks; they will be installed in a steel cabinet with revolving rack and acrylic glass door. The first rack includes the Base with one or two CPUs, the operator interface display and the keyboard. The second rack is composed by one rack controller and 13 slots for installation of I/O cards. They will be arranged by type and number according to the requirements of the system to be protected. Each card is connected to field devices by pre-wired connectors connected to electromechanical terminal blocks.



SI-90***/1R***

1.2.5 SI-90/2R

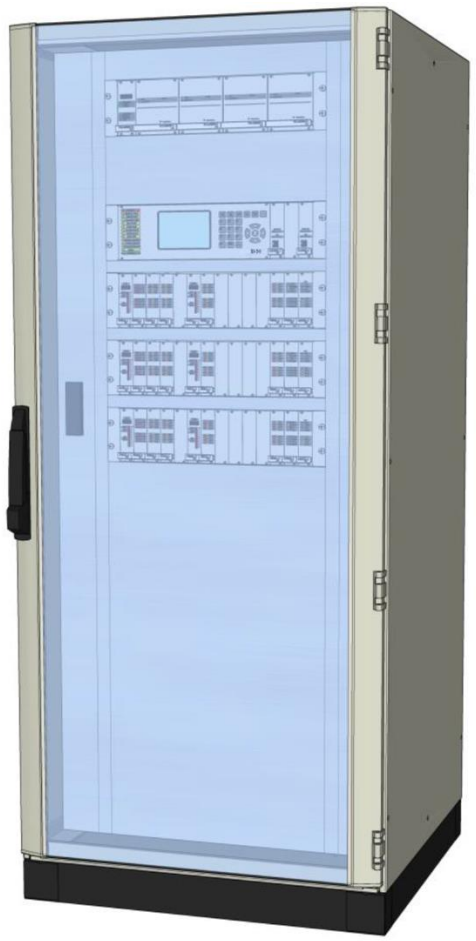
The SI-90/R model is a modular unit consisting of three 19” 3-unit high anodized aluminum racks; they will be installed in a steel cabinet with revolving rack and acrylic glass door. The first rack includes the Base with one or two CPUs, the operator interface display and the keyboard. The other two racks are composed by one rack controller and 13 slots for installation of I/O cards. They will be arranged by type and number according to the requirements of the system to be protected. Each card is connected to field devices by pre-wired connectors connected to electromechanical terminal blocks.



SI-90/2R

1.2.6 SI-90/1-10R

The SI-90/1-10R model is a modular unit to install up to 11 19” 3-unit high anodized aluminum racks; they will be installed in a steel cabinet with revolving rack and acrylic glass door. The first rack includes the Base with one or two CPUs, the operator interface display and the keyboard. The other racks are composed by one rack controller and 13 slots for installation of I/O cards. They will be arranged by type and number according to the requirements of the system to be protected. Each card is connected to field devices by pre-wired connectors connected to electromechanical terminal blocks. This panel is also available in a UL Listed version.



SI-90/1-10R

1.2.7 SI-90/U

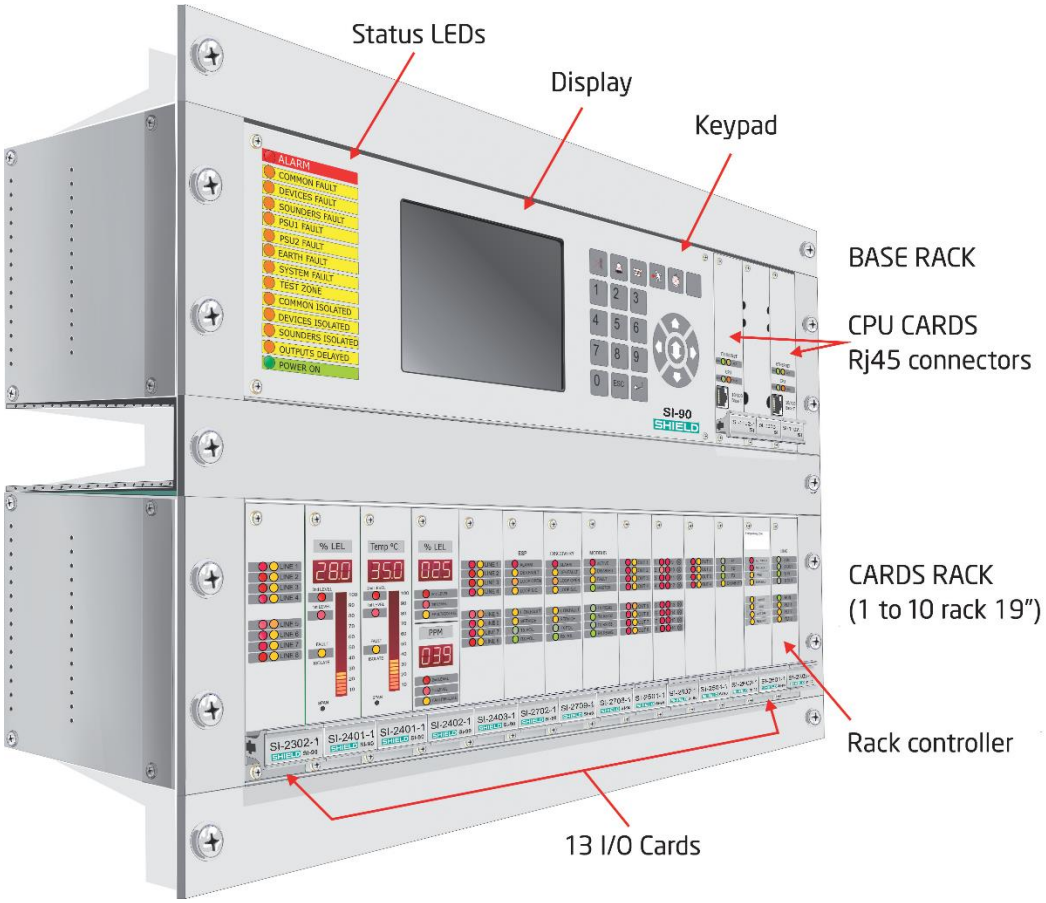
The SI-90/U model is identical to SI-90/1÷10, but allows for installation of maximum 6 I/O racks.

For this version of the panel refer to the latest ST-058-EN-SI-90 Installation and Operation Manual.

The following table summarizes the main characteristics of each model.

	SI-90/M	*SI-90/MB*	*SI-90/L*	*SI-90/1R*	*SI-90/2R*	*SI-90/1÷10R*	*SI-90/U*
Width	500mm	500mm	500mm	600mm	600mm	800mm	800mm
Height	700mm	700mm	700mm	700mm	1100mm	2100mm	2100mm
Depth	250mm	250mm	250mm	400mm	400mm	800mm	800mm
I/O Rack	1	1	1	1	2	1÷10	1÷6
Max. I/O Card	8	8	8	13	26	130	78
I/O card redundancy	No (note-A)	No (note-A)	No (note-A)	No (note-A)	Yes	Yes	No
Certifications	RINA/MED EN 54-2 EN 54-4 EN 54-13 EN 54-21 EN 12094-1 IEC 61508/2010 IEC60079-29-3 IEC60079-29-1	UL 864 IEC 61508/2010 IEC60079-29-3 IEC60079-29-1	EN 54-2 EN 54-4 EN 54-13 EN 54-21 EN 12094-1 IEC 61508/2010 IEC60079-29-3 IEC60079-29-1 GOST	EN 54-2 EN 54-4 EN 54-13 EN 54-21 EN 12094-1 IEC 61508/2010 IEC60079-29-3 IEC60079-29-1 GOST	EN 54-2 EN 54-4 EN 54-13 EN 54-21 EN 12094-1 IEC 61508/2010 IEC60079-29-3 IEC60079-29-1 GOST	EN 54-2 EN 54-4 EN 54-13 EN 54-21 EN 12094-1 IEC 61508/2010 IEC60079-29-3 IEC60079-29-1 GOST	UL 864 IEC 61508/2010 IEC60079-29-3 IEC60079-29-1
Usable power supply units	S81-PU003-1	S81-PU003-1 S81-PU003-2	S81-PU001-1 S81-PU001-2	S81-PU001-1	S81-PU001-1 S81-PU001-2 S81-PU001-4 S81-PU004-2 S81-PU004-3	S81-PU001-1 S81-PU001-2 S81-PU001-4 SI-5000-2 SI-5000-4 S81-PU004-2 S81-PU004-3 S81-PU004-4	S81-PU001-2 S81-PU001-4
Maximum battery capacity	18Ah	65Ah, (18Ah max. inside panel)	18Ah	26Ah	40Ah	120Ah	120Ah

(Note-A) It is possible to install two SI-2711-1 cards without redundancy of rack and rack controller.



1.3 General features

Serial communication interface	2 x RS232
Ethernet communication interface	10/100BaseT with RJ45 connector
Maximum number of programmable zones	250 fire alarm zones + 250 burglar alarm zones
Maximum number of programmable points per zone	99 inputs 99 outputs 99 links
Exportable local variables via network	Max. 250
Importable remote variables via network	Max. 999
System variables (Local)	64
Maximum number I/O of cards (SI-90/L)	8
Maximum number I/O of cards (SI-90/M)	8
Maximum number I/O of cards (SI-90/MB)	8
Maximum number I/O of cards (SI-90/2R)	26
Maximum number I/O of cards (SI-90/1-10R)	130
Maximum number I/O of cards (SI-90/U)	78
Time slots with holiday management	10 (with 10 intervals each)
CPU redundancy	Standard
I/O bus redundancy	Optional (only in 2R, 1-10 and 1-6R versions)
Card redundancy	Optional (only in 2R, 1-10 and 1-6R versions)
Hot swap capability	Available for all cards
Centralization between control panels	Via LAN network with RCP protocol
Supervisory system	Max. two supervisors per panel
Management of time slots	10 categories with management of holidays
Default outputs	16 SPDT contacts
Default inputs	10 opto isolated inputs
Available protocols	MODBUS RTU

In order to comply with the requirements of EN54-2 standard, a maximum of 32 detectors and/or fire alarm buttons can be configured in each zone of the area-1.

1.3.1 Mechanical properties

SI-90/L, SI-90/M, SI-90/MB

Cabinet type	Metal, with transparent door and revolving inner door
Color	RAL 7035 (Other colors available on request)
Protection degree	IP54
Type of installation	Wall mounted
Dimensions	H=700mm L=500mm P=250mm

SI-90/1R

Cabinet type	Metal, with 19 "revolving rack frame and transparent door
Color	RAL 7035 (Other colors available on request)
Protection degree	IP55
Type of installation	Wall mounted
Dimensions	H=700mm W=600mm D=400mm

SI-90/2R

Cabinet type	Metal, with 19 "revolving rack frame and transparent door
Color	RAL 7035 (Other colors available on request)
Protection degree	IP55
Type of installation	Wall mounted
Dimensions	H=1100mm W=600mm D=400mm

SI-90/1-10R, SI-90/1-6R SI-90/U

Cabinet type	Metal, with 19 "revolving rack frame and transparent door
Color	RAL 7032 (Other colors available on request)
Protection degree	IP54
Type of installation	Free standing installation
Dimensions	H=2100mm W=800mm D=800mm

1.3.2 Electrical characteristics

Supply voltage	110÷240 V~ (-15% + 10%)
Nominal frequency of the power supply	50÷60Hz
Power supply unit output voltage	25VDC ±2%

1.3.3 Reference standards

The SI-90 system was developed complying with the requirements of the following International Standards:

Reference standard	Description
EN-54-2:1997+A1:2006	Fire detection and fire alarm systems Part 2: Control and indicating equipment
EN-54-4: 1997+A1:2002+A2:2006	Fire detection and fire alarm systems Part 4: Power supply equipment
EN 54-13:2017	Fire detection and fire alarm systems Part 13: Compatibility assessment of system components
EN 54-21:2006	Fire detection and fire alarm systems Part 21: Alarm transmission and fault warning routing equipment
EN-12094-1:2004	Fixed firefighting systems. Components for gas extinguishing systems. Requirements and test methods for electrical automatic control and delay devices
EN-60950-1:2001	Information technology equipment – Safety - part 1: General requirements
EN 60079-0:2018	Explosive atmospheres. Equipment. General requirements
EN 60079-29-1:2016	Gas detectors - Performance requirements of detectors for flammable gases
CEI 79-2:1998 + Ab2000	Italian standard. Impianti antieffrazione, antintrusione, antifurto e antiaggressione. Norme particolari per le apparecchiature.
IEC-61508 Part 1÷7:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems
IEC60079-29-3:2014	Explosive atmospheres - Part 29-3: Gas detectors Guidance on functional safety of fixed gas detection systems
EN 60079-29-1:2007	Gas detectors - Performance requirements of detectors for flammable gases
IEC-61508 Edition 2.0	Functional safety of electrical/electronic/programmable electronic safety-related systems –
ATEX 2014/34/EU Gudelines	Equipment and protective systems intended for use in potentially explosive atmospheres (ATEX)
Directive 99/92/CE	Minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres
Solas 74 as amended: Reg. II-2 /7, Reg. X/3, 2000HSC Code 7, FSS code 9 and IMO MSC.1 / Circ. 1242	RINA Rules for the certification of marine equipment in accordance with European directive 96/98/EC and subsequent amendments.
UL 864	Standard for Control Units and Accessories for Fire Alarm Systems
UL 2017	General-Purpose Signaling Devices and Systems
GOST 53325-2012	Fire techniques. Means of fire automatics. The general technical requirements. Test methods

1.3.4 Climatic conditions

The table below summarizes the climatic conditions for SI-90 system operation and storage. The climatic conditions refer to the whole system.

Parameter	Allowed range	Notes
Operating temperature	-5÷+50°C	
Storage temperature	-40÷+85°C	
Operating Humidity	5÷95% RH	Non condensing
Storage humidity	5÷95% RH	Non condensing

Please note that the operating temperature inside an electronic device significantly affects the duration of its useful life. High operating temperatures and sharp temperature increases will significantly reduce electronic device life. Therefore, it is extremely important that the environmental operating conditions are within the allowed ranges.

Should storage temperature be lower than -30°C or exceed +60°C, remove the lithium battery on central units (SI-1102-x cards).

1.3.5 Mechanical conditions

The table below summarizes the type of mechanical tests undergone by the SI-90 system.

Standard	Test	Test levels
IEC 68-2-6	Vibration sinusoidal test (endurance)	Frequency range: 10÷150Hz Acceleration amplitude: 0.5g Number of axis: 3 Number of sweep cycles: 20 per axis
IEC 817	Impact test	Impact energy: 0.5J number of impact per point: 3

1.3.6 Electromagnetic compatibility (EMC)

The SI-90 system has been designed and tested for resisting to standard levels of radiated and conducted electromagnetic interference, and electrostatic discharges. The table below lists the types and levels of the tests undergone by the SI-90 system.

Basic Standard	Date	Title	Noise Immunity Tests
EN 61000-4-2	2009	Electrostatic discharge immunity test	6 kV contact discharge 8 kV air discharge
EN 61000-4-3 A1 A2	2006 2008 2010	Radiated, radio-frequency, electromagnetic field immunity test	10 V/m 80 MHz÷2 GHz, 80 % AM
EN 61000-4-4 A1	2004 2010	Electrical fast transients/bursts immunity test	2 kV power supply 1 kV signal lines
EN 61000-4-5	2006	Surge immunity test	2 kV common mode 1 kV differential mode
EN 61000-4-6	2009	Conducted disturbances induced by radio-frequency fields immunity test	10 V, 150 kHz÷80 MHz, AM
EN 1000-4-11	2004	Voltage dips, short interruptions and voltage variations immunity test	60% 200ms 100% 100ms
EN 61000-6-4	2007	Emission standard for industrial environment	*

Electrical disturbances vary significantly according to the type of installation, wiring and to the distance from other devices. Therefore, it is important to make sure that the electromagnetic interference levels do not exceed the values reported in the table.

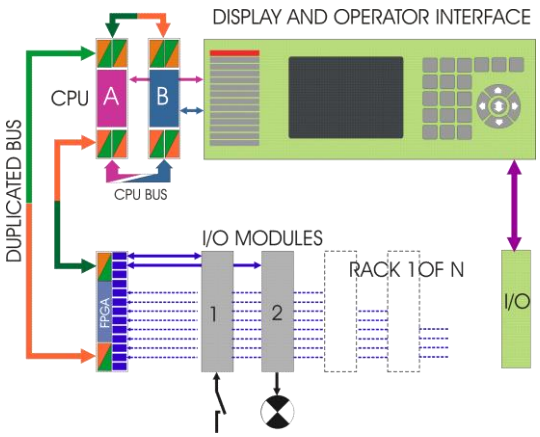
Based on EN 61000-6-4 compliance, this product may only be installed in industrial environments.

1.4 Safety and availability of the SI-90 system

The SI-90 system is intended for use in applications requiring a high safety level, together with high system availability. According to the required safety and availability levels, different SI-90 system configurations can be provided.

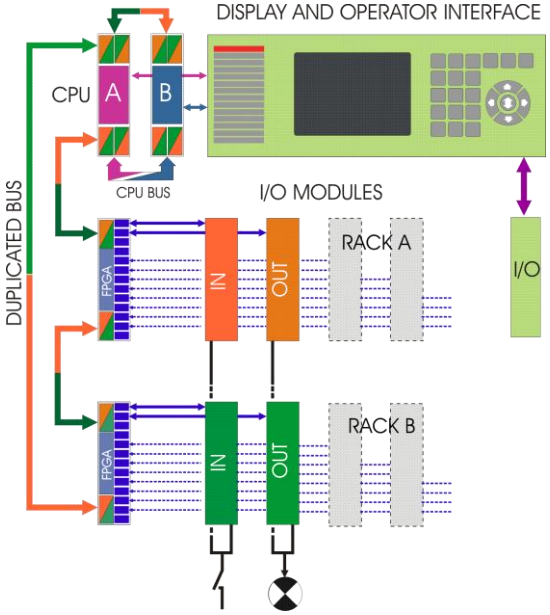
1.4.1 Possible configurations of the SI-90 system

"Mono" Configuration
This solution includes the redundant central unit and the I/O cards in single configuration.



"Mono" configuration

"Duplex" configuration
This solution is characterized by a redundant configuration for both the central unit and the I/O cards. Card redundancy increases system availability. In case of error or failure of a card in "duplex" configuration, the broken card is automatically put in safety condition (OFF) whereas the redundant one keeps operating. I/O card redundancy is possible only with safety related cards.



"Duplex" configuration

1.5 Safety-related cards in the SI-90 system

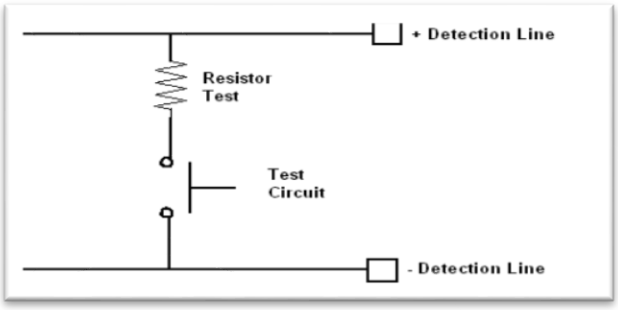
This paragraph describes the measures undertaken by safety related cards in order to guarantee the required reliability of the various applications.

1.5.1 Central unit

The CPU features an external watchdog circuit that activates in case of failure. In standard operating conditions, the CPU cyclically tests the memory, internal voltage values and the status of RAM lithium batteries. Should it detect any faults, the card would set in safety condition. If there is a redundant CPU, the new CPU will carry out the monitoring functions without any interruptions. The broken CPU can be replaced without the need of switching off the system.

1.5.2 Digital input cards

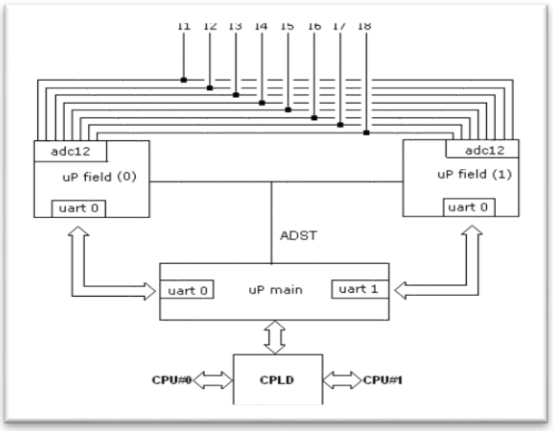
Safety related digital input cards feature a circuit allowing to simulate the opening and closing of each channel. During operation, channels are cyclically tested. It a redundant card exists, the control panel keeps operating and gathering data from this card, guaranteeing maximum system availability. The broken card can be replaced without the need of switching off the system.



Digital input test

1.5.3 4-20mA input cards

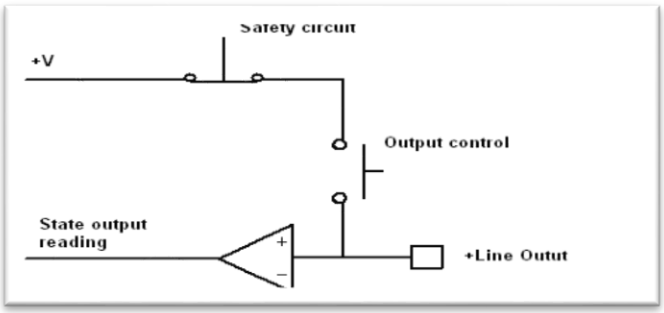
4-20mA safety related input cards feature two separated measuring circuits per input channel. The two measured current values are, hence, compared between them and in case of difference between the two values the channel is set in failure condition. It a redundant card exists, the control panel keeps operating and gathering data from this card, guaranteeing maximum system availability. The broken card can be replaced without the need of switching off the system.



Analog input test

1.5.4 Output cards

Safety related output cards feature two control drivers connected in series. During operation, the output channels are cyclically tested by reversal of output status for some hundreds of microseconds. In case of difference between the channel status set and the read one, the whole card is excluded from operation and its outputs are put in safety condition. (Shut-down) If a redundant card exists, the control panel keeps operating and gathering data from this card, guaranteeing maximum system availability. The broken card can be replaced without the need of switching off the system.



Digital output test

1.5.5 Loop cards

The Safety Bus control card SI-2711-1 is based on a microprocessor certified for safety application up to SIL3, equipped with a safety architecture using the “safe island” philosophy. The basic concept involves a balance between application of hardware diagnostics and software diagnostics to manage functional safety while balancing cost concerns. In the “safe island” approach, a core set of elements are used as continuous operation hardware safety mechanisms. These elements – including CPU, flash memory, SRAM and associated interconnect structures – are needed to guarantee the correct execution of software. Once the correct execution of software is ensured, software-based diagnostics can be applied to check other device elements, such as peripherals.

1.5.6 Central unit safety switch-off

During operation, central units cyclically test the main 25V and local 3.3V power supply voltage values. If one of these values is not within the allowed range, a safety switch-off sequence is carried out in order to put the whole system in safety condition. During this sequence, the following operations are carried out:

- Activation of the main FAULT and SYSTEM FAULT outputs.
- Deactivation of the main RUN output.
- Deactivation of the RUN LED on the CPU.
- PANEL SHUT-OFF indication on the display

In this condition, output status is frozen. Restart the system to clear this condition.

Allowed 25V voltage range: 18.5 -32VDC (Note-A)
Allowed 3.3V local voltage range: 3.15-3.6VDC (Note-B)

(Note-A) with voltage values of 25V <22.5 V and >29.5 a warning condition is reported.
(Note-B) with voltage values of 3.3V >3.15 V this function is carried out by an external reset circuit.

In the configurations with redundant CPU, if the sequence is carried out only by the primary CPU, the secondary one signals primary CPU failure and starts controlling the system without any interruption of system operation. If, instead, the sequence is carried out only by the secondary CPU, the primary one signals secondary CPU failure and keeps carrying out its functions.

1.5.7 Central unit safety shut-down

In case of critical failures during operation, the central unit will carry out a safety shut-down sequence in order to put the whole system in safety condition. The following failures will cause a safety shut-down:

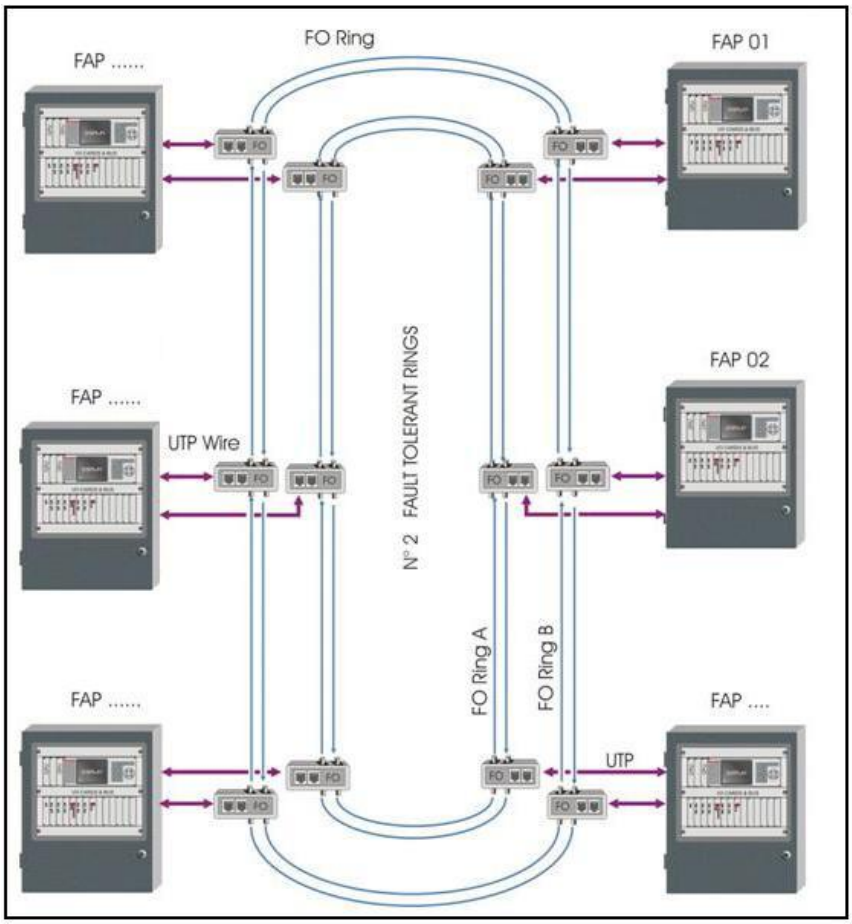
- Error in checking memory content (Flash/Ram).
- Internal hardware failure

Restart the system to clear this condition.

In the configurations with redundant CPU, if the sequence is carried out only by the primary CPU, the secondary one signals primary CPU failure and starts controlling the system without any interruption of system operation. If, instead, the sequence is carried out only by the secondary CPU, the primary one signals secondary CPU failure and keeps carrying out its functions.

1.6 Communication network between control panels

By using CPU Ethernet interface, the logic status of the rules (Checked/Not checked) can be exchanged between several control panels. Control panels are divided into two categories: Master and Slave. Each control panel in the network can be indifferently slave only, master only or master and slave. The Master panels periodically require the status of remote rules at Slave panels. For every panel can be imported up to 999 remote rules and can be exported up to 250 local rule. A maximum of 32 control panels can be connected to each other in a network. During operation, the Master panels cyclically tests the efficiency of the connection to Slave panels, and, in case of disconnection, signals it on the display. Signal propagation time between the various control panels may vary according to network traffic. However, in case of dedicated networks it will not exceed two seconds. Control panel network can be made of copper or optical fiber by using the proper converters allowing a redundant loop connection able to support a possible failure or fiber break. The connection between the fire alarm panel can be single (only the main CPU manages the communication with the slave control units), or redundant (both CPUs manage communication with the slave control units).



Communication network between control panels

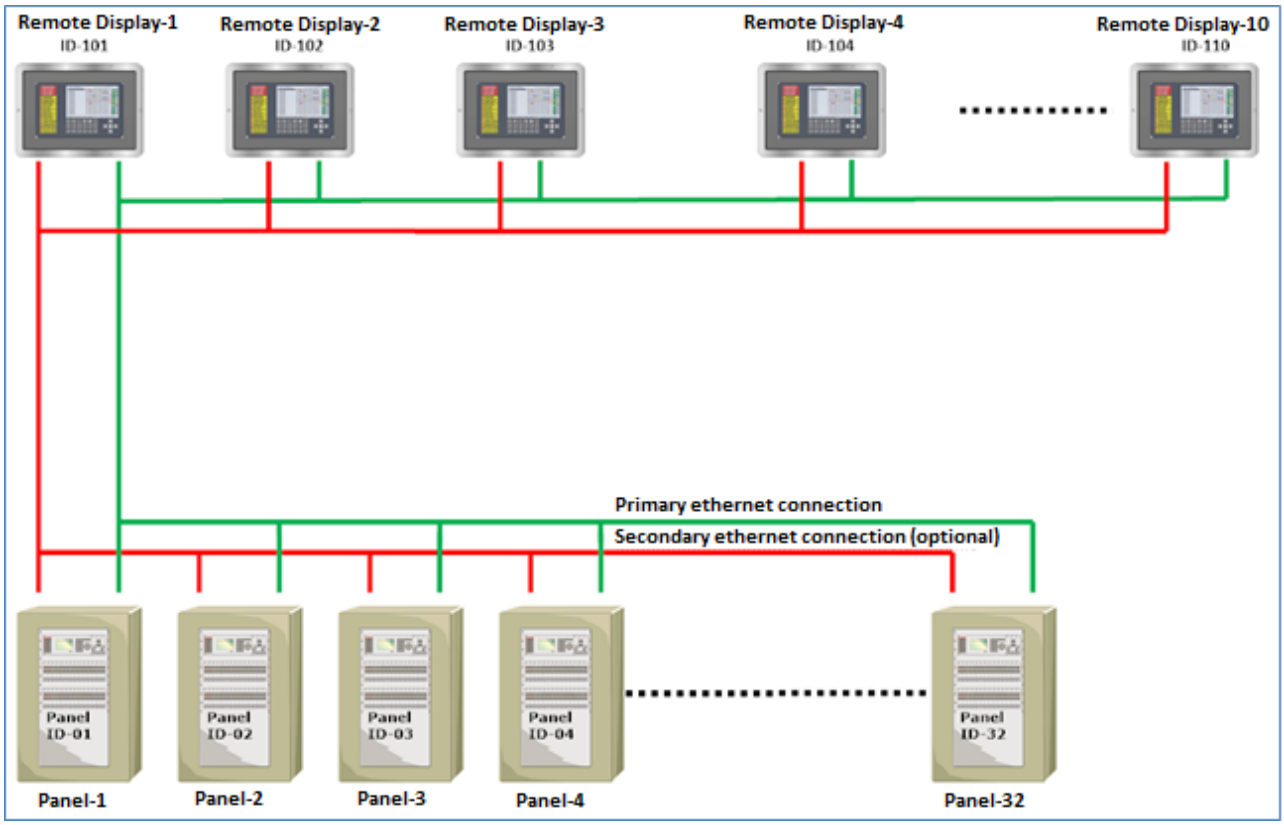
Error messages of the communication network:
The following error messages concerning communication networks can be shown on control panel displays:

Message Type	*Panel*	*Error*
Panel xxx Communication Fault 100 of CPU 0	Master	The master panel cannot communicate with the slave panel
Panel xxx Communication Fault 101 of CPU 0	Master	Slave ID different than IP address configured
Panel xxx Communication Fault 102 of CPU 0	Master	Slave and Master panels have the same ID
Panel xxx Communication Fault 100 of CPU 1	Master	The master cannot communicate with the slave
Panel xxx Communication Fault 101 of CPU 1	Master	Slave ID different than IP address configured
Panel xxx Communication Fault 102 of CPU 1	Master	Slave and Master panels have the same ID

1.7 Remote Display Network

Panels equipped with SI-1106-2 display card can be remotely controlled via one or more remote display. Connections are made via LAN or WAN Ethernet network and can be either single or redundant. Each remote display can individually control up to 32 panels. Up to 10 remote displays can be connected to a network. To avoid conflicts on operations performed simultaneously from different locations, the following rules are adopted:

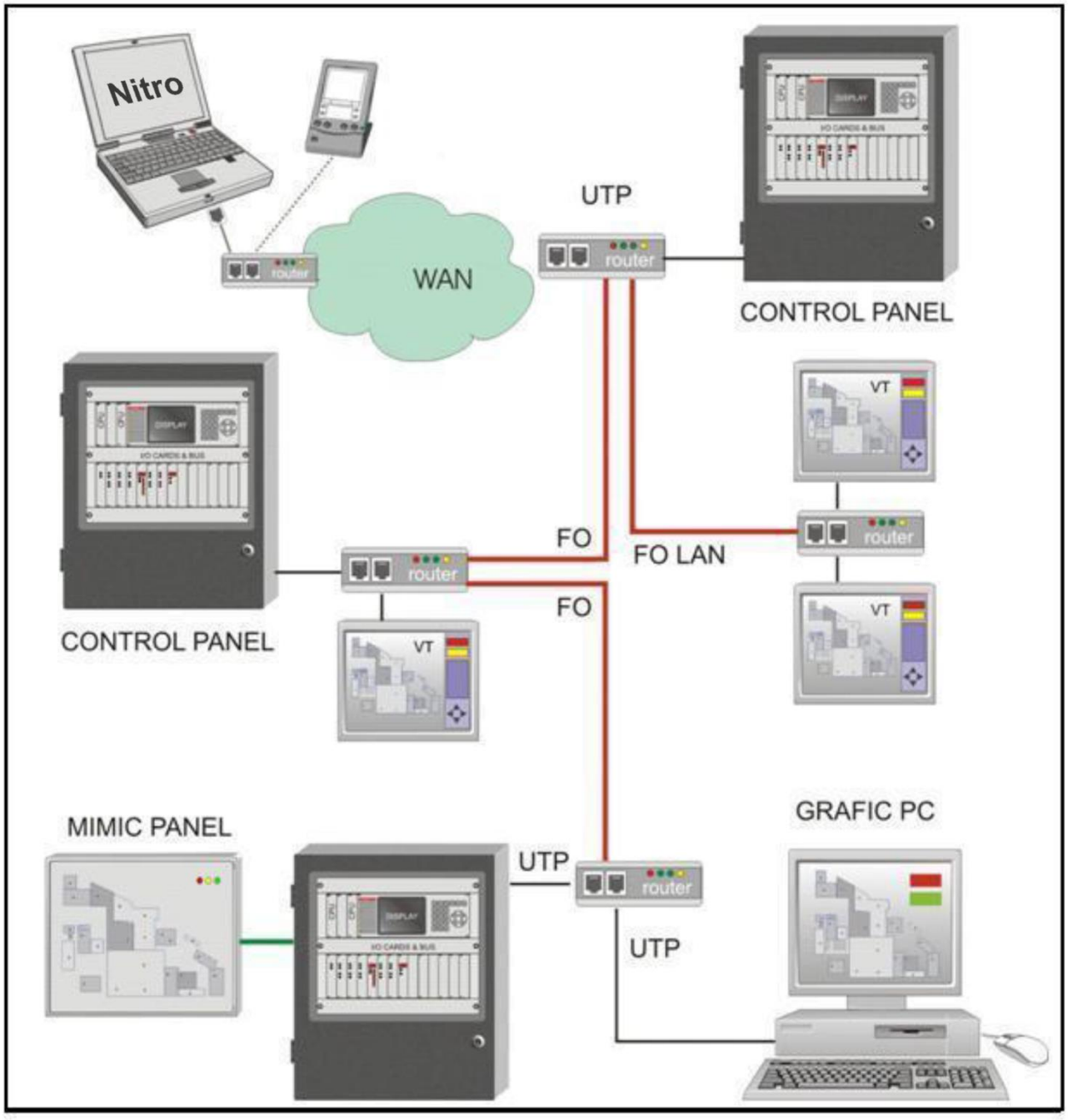
- Each display can replicate only one control panel at a time.
- Only one remote display at a time can operate on a single central unit.
- By setting the priority to the local display, pressing any key will cause immediate disconnection with the connected remote display.
- Configuring the priority to the remote display all the local display keys are disabled until the connection ends.



Remote Display Architecture

1.8 Communication protocol for supervisory systems

SI-90 systems can be connected to IRIDE supervisory system via LAN network or point-to-point serial connection. A maximum of 2 supervisors per control panel can be configured on the LAN network, and one on Host serial port. In both cases, a dedicated protocol is used. The connection between control panels and supervisors can be made of copper, optical fiber or copper/fiber (mixed), for meeting different needs. For using IRIDE supervisory program, please refer to the specific manual **ST-021-IT.**

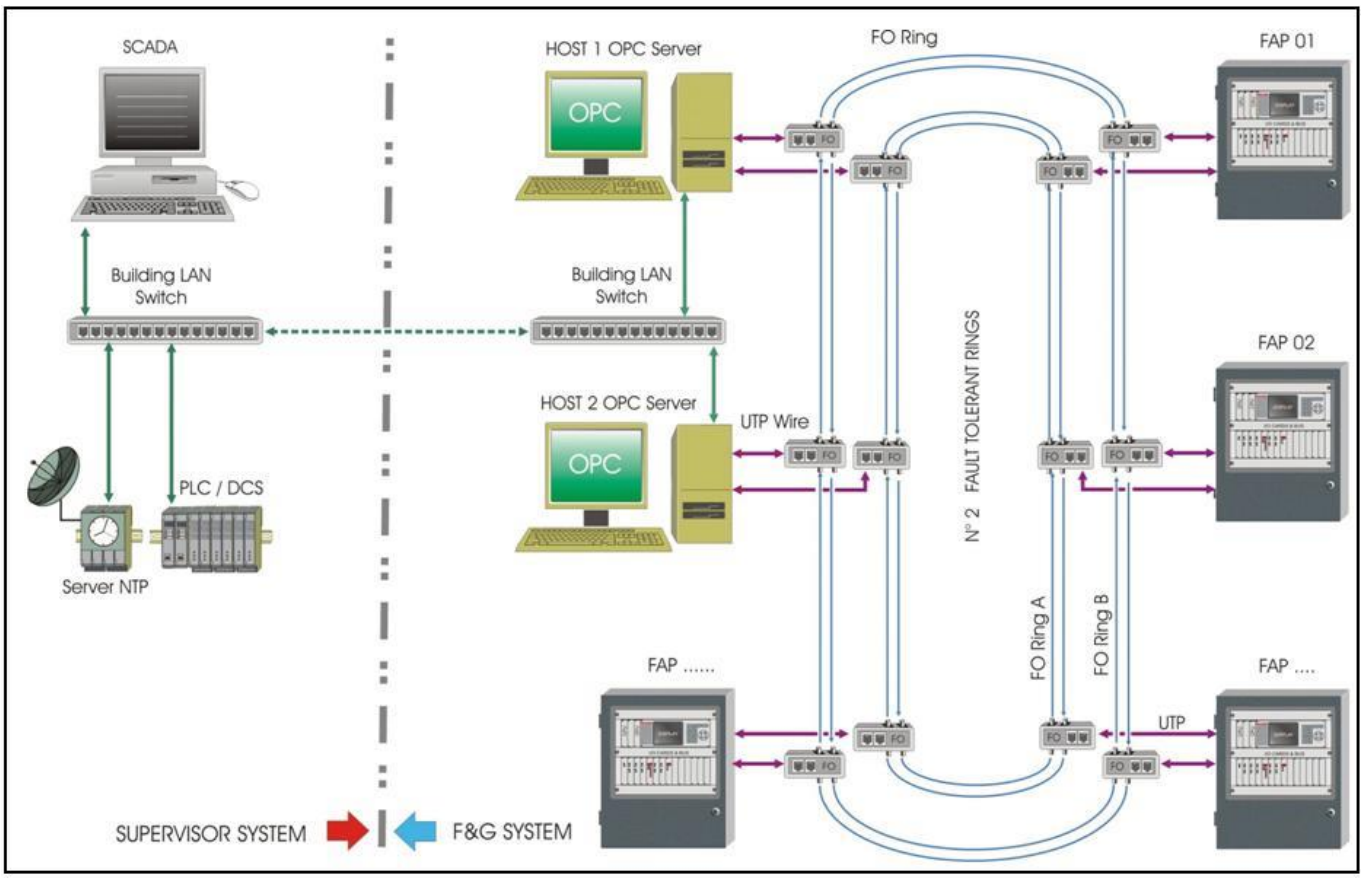


Control panel remote monitoring

1.9 OPC Server

Thanks to the program Shield OPC Server, any Windows OPC Client applications (Scada/DCS, supervisors, control or other applications) can communicate to SI-90 series control panels featuring V2.0.0 or higher software version. The OPC Client application can interact with all variables made available by the control panel following the modes defined by the OPC standard. By using the program Shield OPC Server, clients can access the following data:

- Alarms
- Analog value measurements
- Device status indications
- Control panel status indications
- Communication status indications



Example of connection with OPC Server

For using the program ***SHIELD OPC Server***, please refer to the specific manual **ST-057-EN.**

1.10 Programming

SI-90 system programming is carried out through a personal computer in OFF-LINE mode by means of a specific configuration program. After completing the configuration and checking that the entered data are correct, data can be transferred to the central unit. Once they have been transferred, the central unit replaces the old configuration with the new one and re-initializes the system. If there are two CPUs, the configuration is transferred to both at the same time. For using the configuration program Pro-S81, please refer to the specific manual **ST-015-IT.**

N.	Nome Sensore	Scheda	Rack	Pos	Tipo	Canale	Punto	Logica	Modo	Sen	Range	Pre/Zp	Al/Fs	Corto	Rit.Al	Segn	AR	Modb	Export
1	Automatic Discharge	SI-2302-1	2	1	*	1	1	R-NA	AD	*	10-250 Bit	25	40	F	0	I	N	N	N
2	Manual Discharge	SI-2302-1	2	1	*	2	1	R-NA	AD	*	10-250 Bit	25	40	F	0	I	N	N	N
3	Hold	SI-2302-1	2	1	*	3	1	N-NA	AD	*	10-250 Bit	25	40	F	0	B	N	N	N
4	Inhibit	SI-2302-1	2	1	*	4	1	N-NA	AD	*	10-250 Bit	25	40	F	0	B	N	N	N
5	Automatic-Off	SI-2302-1	2	1	*	5	1	N-NA	AD	*	10-250 Bit	25	40	F	0	H	N	N	N
6	Reserve Battery	SI-2302-1	2	1	*	6	1	N-NA	AD	*	10-250 Bit	25	40	F	0	H	N	N	N
7	Secondary Discharge	SI-2302-1	2	1	*	7	1	R-NA	AD	*	10-250 Bit	25	40	F	0	H	N	N	N
8	PSH	SI-2302-1	2	1	*	8	1	R-NA	AD	*	10-250 Bit	25	40	F	0	B	N	N	N
9	Active	SI-2601-1	2	2	V-IN	1	1	N-NA	*	*	*	0	0	*	0	I	N	N	N
10	EV1-Main	SI-2601-1	2	2	V-IN	1	2	N-NA	*	*	*	0	0	*	0	H	N	N	N
11	EV1-Reserve	SI-2601-1	2	2	V-IN	1	3	N-NA	*	*	*	0	0	*	0	H	N	N	N
12	EV2-Main	SI-2601-1	2	2	V-IN	1	4	N-NA	*	*	*	0	0	*	0	H	N	N	N
13	EV2-Reserve	SI-2601-1	2	2	V-IN	1	5	N-NA	*	*	*	0	0	*	0	H	N	N	N
14	TO/A Fixed	SI-2601-1	2	2	V-IN	1	6	N-NA	*	*	*	0	0	*	0	H	N	N	N
15	TO/A Periodic	SI-2601-1	2	2	V-IN	1	7	N-NA	*	*	*	0	0	*	0	H	N	N	N
16																			
17																			
18																			
19																			
20																			
21																			
22																			
23																			

Configuration program

2 COMPONENTS OF THE SI-90 SYSTEM

This chapter provides a detailed description of all the parts making up the SI-90 system.

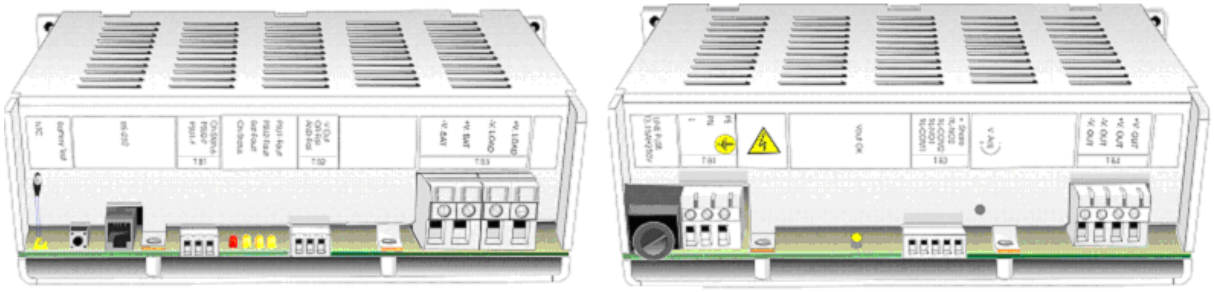
2.1 Power supply units

The SI-90 control panel can be equipped with the following power supply units:

S81-PU001-x power supply unit for base plate installation.
SI-5000-x power supply unit for rack installation.
S81-PU003-x power supply unit for SI-90/M and S81-HC/C version.
S81-PU004-x power supply unit for internal plate installation.

2.1.1 Power Supply Unit S81-PU001-x

This is a power supply unit to be fitted on a base plate. It consists of a maximum of 4 x 25 Watt power supply units, SI-5005-1 model, plus one SI-5004-1 battery charger unit able to supply a 2 or 4A adjustable battery charge current. Power supply units are connected in parallel, up to a maximum of four units amounting to a total of 16A. Under normal operating conditions, a simplified test is carried out every 30 seconds in order to check the proper presence of the batteries. A full test, instead, is carried out every hour in order to check electrical connections and battery efficiency. During battery trickle charge, battery voltage is compensated automatically according to the temperature. In case of mains voltage failure, batteries are automatically switched to the load without any interruptions. Should the full charge stage exceed 24 hours, the power supply unit will signal a battery fault. In case of primary power supply failure, the system will shut batteries down when the on-load voltage is lower than 18VDC in order to avoid damaging the batteries. The unit features three open collector outputs for replicating the various types of faults to the alarm control panel, along with a RS232 port for the connection to a supervisory system.



S81-PU001 power supply unit

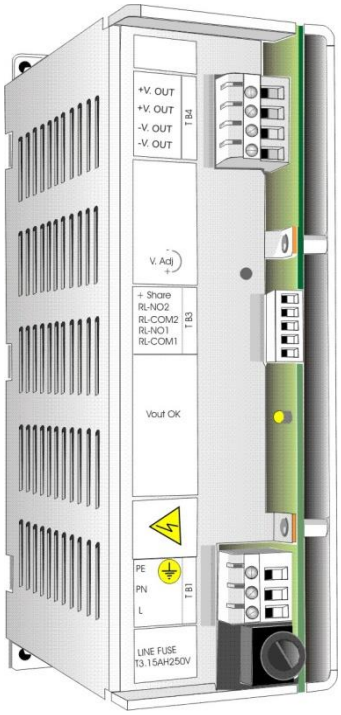
Technical features of the S81-PU001-x power supply unit according to the different configurations

Features	S81-PU001-1	S81-PU001-2	S81-PU001-4
Number of SI-5005-1 power supply units	1	2	4
Power supply voltage	110÷240V~		
Rated frequency	50÷60Hz		
Max. input current at 110V~	1.6A	3.3A	6.4A
Nominal output voltage	25VDC ±2%		
Max. residual ripple	266mV	704mV	704mV
Minimum output voltage (Note-A)	18.9VDC		
HFT0 Max. output current (Note-B)	2A	6A	12A
HFT1 Max. output current (Note-B)	N.A.	2A	8A
HFT2 Max. output current (Note-B)	N.A.	NA	4A
Maximum battery resistance (Note-C)	1.5 Ω		
Max. current for battery charger	2,5A	2,5A	4,5A
Max. current for battery charging	2A	2A	4A
Maximum battery capacity	26Ah	40Ah	65Ah

Note-A: Full load output voltage with low batteries in case of mains voltage failure
Note-B: Maximum current for the external loads plus the current required by the panel. The HFT value defines the maximum number of PU-0005-1 modules that can be broken without degradation of the maximum output current.
Note-C: Internal resistance of the batteries and of the relevant circuits (Cables, terminals, fuses, etc.)

2.1.1.1 Power supply module SI-5005-1

It is a universal switching power supply able to provide a maximum current of 4A at 25VDC. It is used in combination with the SI-5004-1 battery charger in compliance with EN54-4 standard provisions. The power supply unit features a circuit for load distribution which allows the parallel connection of multiple power supply units, up to a maximum of four units.



SI-5005-1

Technical features

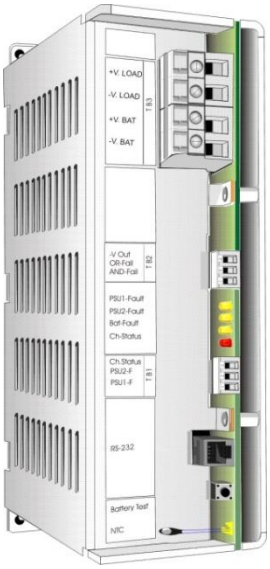
Input voltage	110÷240V~ (-15% ÷ +10%)
Max. input current at 110V~	1.6A
Max. input current at 240V~	0.79A
Free-air operating temperature	-5 °C ÷ 50 °C
Relative humidity	93% non-condensing
Frequency	50÷60 Hz
Power factor (W/VA)	0.6 Typical
Efficiency	> 80%
Protection degree	IP20
Dimensions	200mm x 110mm x 60mm
Insulation between input and output	>2 Mohm (500VDC)
Insulation between input and ground	>2 Mohm (500VDC)
Dielectric strength between input and output	3000 Vac for 1 minute
Dielectric strength between input and ground	1500 Vac for 1 minute
Output voltage	25VDC
Max. output current	4A
Ripple	<266mV
Protections	Line Fuse, overcurrent, short circuit

Connections

AC INPUT CONNECTION			
Tag.	**Terminal**	**Name**	**Function**
TB1	**M1**	L input	Phase (protected by internal fuse)
	M2	N input	Neutral
	M3	PE	Earth
CURRENT SHARE AND STATUS REPLICATION CONNECTIONS			
Tag.	**Terminal**	**Name**	**Function**
TB2	**M1**	RL-COM1	Status relay-1 DC-OK
	M2	RL-NO1	Status relay-1 DC-OK
	M3	RL-COM2	Status relay-2 DC-OK
	M4	RL-NO2	Status relay-2 DC-OK
	M5	SHARE (+)	Signal for load distribution
DC OUTPUT CONNECTIONS			
Tag.	**Terminal**	**Name**	**Function**
TB3	**M1**	- V. OUT	Output voltage negative
	M2	- V. OUT	Output voltage negative
	M3	+V. OUT	Output voltage positive
	M4	+V. OUT	Output voltage positive

This unit includes circuits with voltage and current values potentially dangerous for people

2.1.1.2 Battery charger module SI-5004-1



SI-5004-1

This is a UPS able to control and charge two 12 Volt batteries with a maximum capacity of 65Ah. Battery maximum charge current can be set through a dip-switch on the unit. Under normal operating conditions, a simplified test is carried out every 30 seconds in order to check the proper presence of the batteries. A full test, instead, is carried out every hour in order to check electrical connections and battery efficiency. During battery trickle charge, battery voltage is compensated automatically according to the temperature. In case of mains voltage failure, batteries are automatically switched to the load without any interruptions. Should the full charge stage exceed 24 hours, the power supply unit will signal a battery fault. In case of primary power supply failure, the system will shut batteries down when the on-load voltage is lower than 18VDC in order to avoid damaging the batteries. The module features three open collector outputs for replicating the faults to the alarm control panel, two inputs for monitoring the power supply units and one RS232 port for the connection to a supervisory system. It can be used together with one or more SI-5005-1 power supply units. In this case, the resulting power supply unit will be fully compliant with the EN54-4:1997/A2:2006 standard.

Technical features

Input voltage	22÷28 VDC
Free-air operating temperature	-5 °C ÷ 50 °C
Relative humidity	93% non-condensing
Efficiency	> 83%
Protection degree	IP20
Dimensions	200mm x 110mm x 60mm
Flammability	UL94V2
Battery voltage	26.2 to 28.7 VDC, compensated automatically
Battery current	(1/2/4A) Adjustable through dip switch
VBAT Ripple	< 100mV pK-pK at maximum current
Resistance to mains voltage dips	>=20mS at maximum current (with SI-5005)
Maximum battery circuit resistance	1.5 ohm
Maximum battery capacity	65 Ah
Maximum current to batteries	limited automatically
Current to the load	protected by 20A internal fuse

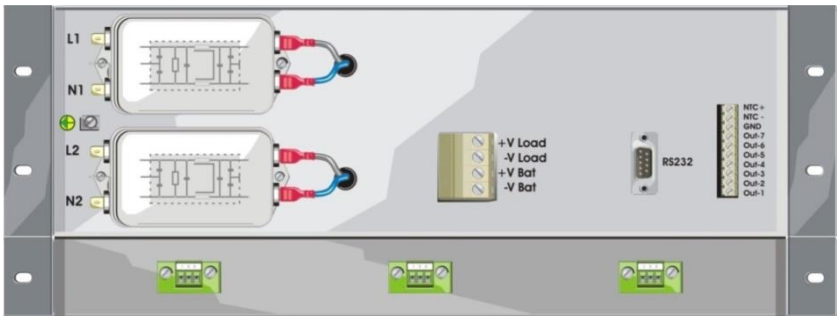
Connections

CONNECTION OF STATUS OPEN COLLECTOR OUTPUTS			
Terminal block	**Terminal**	**Name**	**Function**
TB1	**M1**	PSU1 Fault	Open collector output - power supply unit section fault
	M2	PSU2 Fault	Open collector output - battery charger section fault
	M3	Charge Status	Battery charge status output (energized during the full charge stage).
CONNECTION OF POWER SUPPLY UNIT STATUS INDICATION			
Terminal block	**Terminal**	**Name**	**Function**
TB2	**M1**	AND-Failure	All power supply modules failure input
	M2	OR-Failure	One power supply module failure input
	M3	-Vout	M1 and M2 input common
CONNECTIONS TO THE BATTERIES AND TO THE LOAD			
Terminal block	**Terminal**	**Name**	**Function**
TB3	**M1**	- V. Bat	Battery negative
	M2	+V. Bat	Battery positive
	M3	- V. Load	Negative of power supply to the Load
	M4	+V. Load	Positive of power supply to the Load

2.1.2 Power Supply Unit SI-5000-x

This power supply unit is able to supply a maximum current of 32A, redundant to the load, and to control and charge two 12 Volt batteries with maximum capacity of 120Ah. Battery maximum charge current is 6A. Under normal operating conditions, a simplified test is carried out every 30 seconds in order to check the proper presence of the batteries. A full test, instead, is carried out every hour in order to check electrical connections and battery efficiency. During battery trickle charge, battery voltage is compensated automatically according to the temperature. In case of mains voltage failure, batteries are automatically switched to the load without any interruptions. Should the full charge stage exceed 24 hours, the power supply unit will signal a battery fault. In case of primary power supply failure, the system will shut batteries down when the on-load voltage is lower than 18VDC in order to avoid damaging the batteries. The unit features seven open collector outputs for replicating the various types of faults to the alarm control panel, along with a RS232 port for the connection to the configuration program ***Test-PUA009***. Hot swapping is possible for both the 4 AC/DC converters and the battery charger (Hot Plug).

SI-5000 power supply unit - front view



S81- PU002 power supply unit - rear view

Technical features of the SI-5000-x power supply unit according to the different configurations

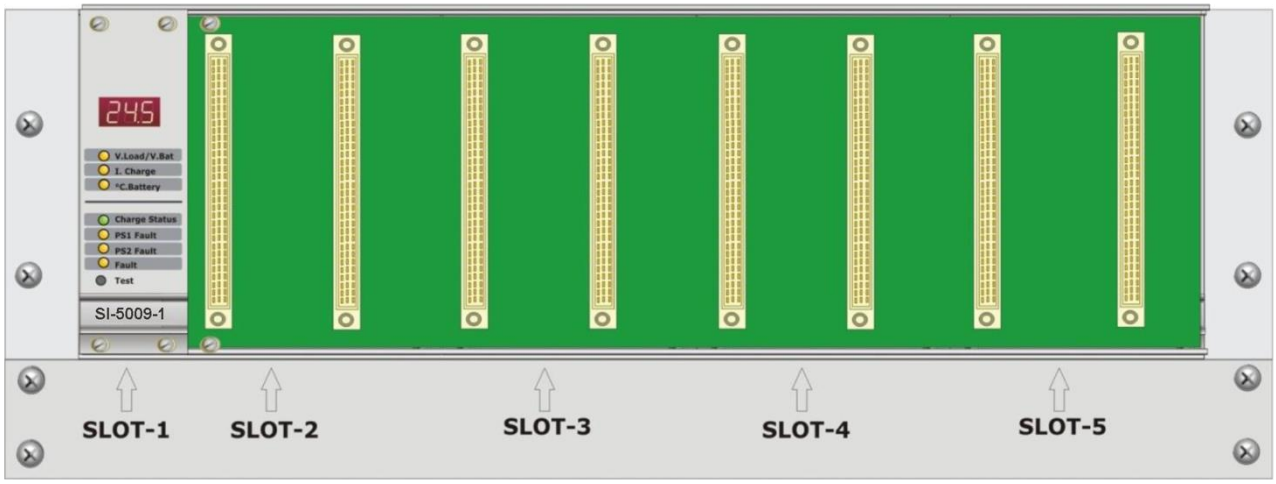
Features	SI-5000-2	SI-5000-4
Number of SI-5008-1 power supply units	2	4
Power supply voltage	110÷240V~	
Rated frequency	50÷60Hz	
Max. input current at 110V~	6A	12A
Nominal output voltage	25VDC ±2%	
Max. residual ripple	<115mV	
Minimum output voltage (Note A)	18.9VDC	
Min. output current (Note B)	8A	20A
HFT0 Max. output current (Note-C)	32A	72A
HFT1 Max. output current (Note-C)	12A	52A
HFT2 Max. output current (Note-B)	N.A.	32A
Maximum battery resistance (Note D)	0.1 Ω	0.05 Ω
Max. current for battery charger	8A	
Max. current for battery charging	6A	
Maximum battery capacity	120Ah	

Note A: Full load output voltage with low batteries in case of mains voltage failure.
Note B: Minimum output current for proper battery testing.
Note C: Max. current for the external loads plus the current required by the panel. The HFT value defines the max. number of PU-0008-1 modules that can be broken without degradation of the maximum output current.
Note D: Internal resistance of the batteries and of the relevant circuits. (Cables, terminals, fuses, etc.)

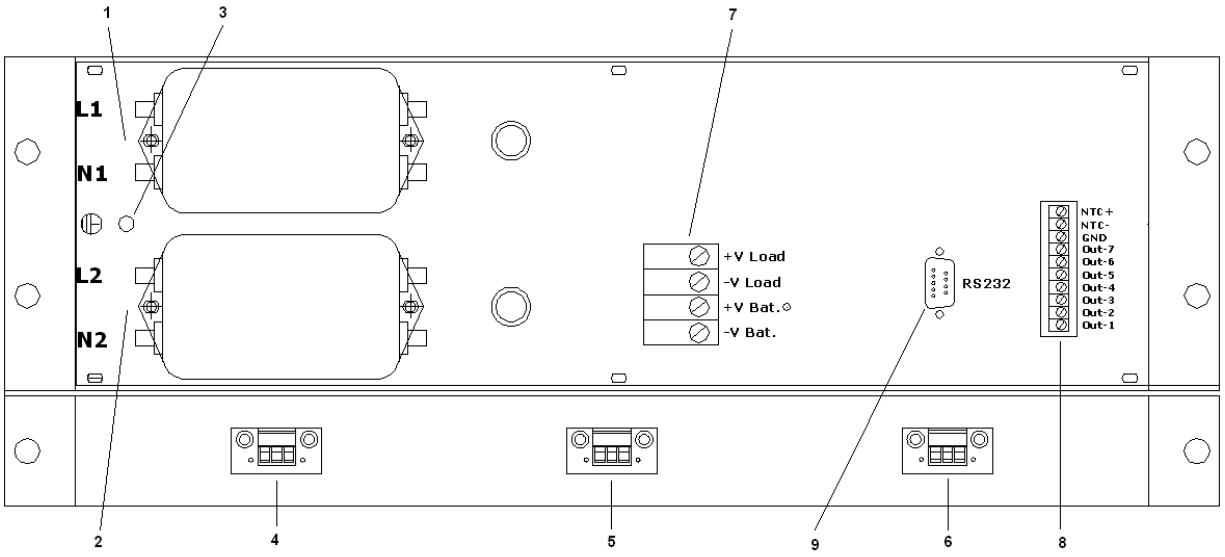
2.1.2.1 Rack SI-5007-1

Description

It is a 19 inch rack that can contain a SI-5009-1 battery charger and up to four SI-5008-1 power supply units. It features ventilation, consisting in three fans with a diameter of 120 mm. The terminal blocks for power supply and status replication connection are located on slot back.



SI-5000 power supply unit slot



SI-5000 power supply unit connections

Connections

Line- 1 input voltage

Tag	Terminal	Name	Function
1	F1	L1	Primary power supply 1 phase
	F2	N1	Primary power supply 1 neutral
	F3	PE1	Primary power supply 1 earth

Line- 2 input voltage

Tag	Terminal	Name	Function
2	F1	L2	Primary power supply 2 phase
	F2	N2	Primary power supply 2 neutral
	F3	PE2	Primary power supply 2 earth

The SI-5008-1 units installed in slot 2 and 3 are connected to line 1 network input.
The SI-5008-1 units installed in slot 4 and 5 are connected to line 2 network input.

Main earth

Tag	Screw	Name	Function
3	V1	PE	Rack earthing

Cooling fans

Tag	Terminal	Name	Function
4-5-6	M1	S	Fan speedometer signal
	M2	-V	Fan power supply negative
	M3	+V	Fan power supply positive

Output voltage

Tag	Terminal	Name	Function
7	M1	+VLOAD	Supply voltage positive
	M2	-VLOAD	Supply voltage negative
	M3	+VBAT	Battery positive
	M4	-VBAT	Battery negative

Open collector replications

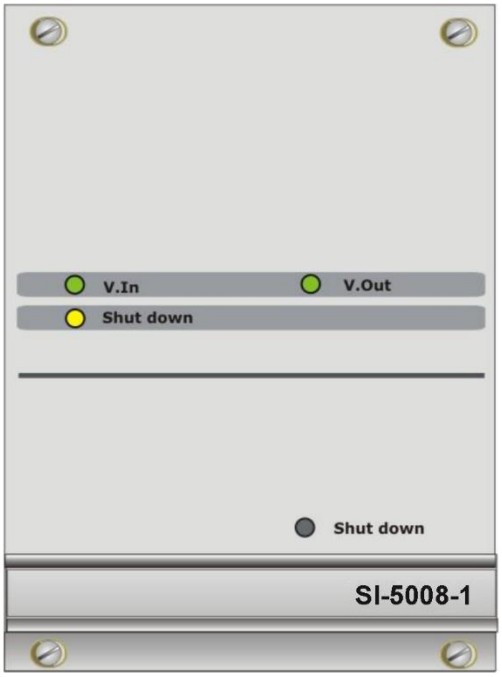
Tag	Terminal	Name	Function
8	M1	PSU1-Fault	Primary power supply failure
	M2	PSU2-Fault	Secondary power supply failure
	M3	Fault	Internal failure
	M4	Battery status	Battery status (charge/supply)
	M5	Charge Status	Battery charge status (full charge/trickle charge)
	M6	Rip.1	Programmable output
	M7	Rip.2	Programmable output
	M8	GND	Common
	M9	+S	External temperature probe positive
	M10	-S	External temperature probe negative

RS 232

Tag	Pin	Name	Function
9	1	N.C.	Not used
	2	Txd	RS232 data transmission
	3	Rxd	RS232 data reception
	4	N.C.	Not used
	5	GND	RS232 common
	6	N.C.	Not used
	7	N.C.	Not used
	8	N.C.	Not used
	9	N.C.	Not used

2.1.2.2 Power supply module SI-5008-1

Description



It is a switching power supply unit with universal input able to provide a maximum current of 20A at 25VDC. It is placed in a 19 inch rack slot and used in combination with the SI-5009-1 battery charger in compliance with EN54-4 standard. The power supply unit features a circuit for load distribution which allows the parallel connection of multiple power supply units, up to a maximum of four units. Unit hot swapping is allowed (Hot Plug). On the front panel there are: two green LEDs signaling the proper presence of input and output voltage; a yellow LED that lights up in case of failure; and a button for shutting the unit down before hot swapping.

SI-5008-1

Visual indications

Led V. In (green)
When lit, it indicates the presence of alternating input voltage.
Led V. Out (green)
When lit, it indicates the presence of DC output voltage.
Led Shut down (yellow)
It comes on in case of module failure or if the button bearing the same name is pressed.

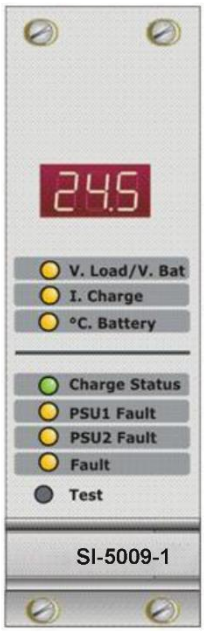
Shut down Button

Press this button to shut down the AC/DC converter module.

This unit includes circuits with voltage and current values potentially dangerous for people

2.1.2.3 Battery charger module SI-5009-1

Description



This is a UPS able to control and charge two 12 Volt batteries with a maximum capacity of 120Ah. Battery maximum charge current can be set through a dip-switch on the unit. Under normal operating conditions, a simplified test is carried out every 30 seconds in order to check the proper presence of the batteries. A full test, instead, is carried out every hour in order to check electrical connections and battery efficiency. During battery trickle charge, battery voltage is compensated automatically according to the measured temperature. During the full charge stage, instead, it is kept at 27.6VDC In case of mains voltage failure, batteries are automatically switched to the load without any interruptions. Should the full charge stage last more than 24 hours, the battery charger will signal a battery fault. In case of primary power supply failure, the system will shut batteries down when the on-load voltage is lower than 18VDC in order to avoid damaging the batteries. The module features seven open collector outputs for replicating the various types of faults, several inputs for monitoring power supply units and cooling fan status, and one RS232 port for the connection to a supervisory system. It is used together with one or more SI-5008-1 power supply units. In this case, the resulting power supply unit is fully compliant with the EN54-4:1997/A2:2006 standard.

SI-5009-1

Visual indications

Led V. Load/V. Bat (yellow)
When lit, it indicates that the value in the three-figure display refers to Vload voltage or Vbat voltage.
Led I. Charge (yellow)
When lit, it indicates that the value in the three-figure display refers to the battery charge current.
Led °C Battery (yellow)
When lit, it indicates that the value in the three-figure display refers to temperature taken by the external probe.
Led Charge Status (yellow)
It is steadily lit during full charging; it blinks during trickle charging; it is off during delivery from the batteries.
Led PSU1-Fault (yellow)
It is off in normal operating conditions. It is steadily lit in case of primary power supply fault.
Led PSU2-Fault (yellow)
It is off in normal operating conditions. It is steadily lit in case of secondary power supply fault.
Led Fault (yellow)
It is off in normal operating conditions. It is steadily lit if a fault condition occurs. Fault type details are given in the three-figure display.

Three-Figure Alpha-Numeric Display
The display is turned off in normal operating conditions. Should a fault condition occur, the fault type is displayed according to the following table:

Digit 1	Digit 2	Digit 3	Fault Type	Led PSU1 Fault	Led PSU2 Fault	Led Fault	OUT PSU1 Fault	OUT PSU2 Fault	OUT PSU Fault
F	0	1	Cooling fan fault -1			x			x
F	0	2	Cooling fan fault -2			x			x
F	0	3	Cooling fan fault -3			x			x
F	0	4	Memory data/osc. CRC error ***			x			x
F	0	5	Vcbat<23VDC Vcbat>29.5VDC **		x	x		x	
F	0	6	Tbat<-2°C Tbat>+52°C			x			x
F	0	7	Battery reduced test failed		x	x		x	
F	0	8	Battery full test failed		x	x		x	
F	0	9	Battery full charging time T>Tmax		x	x		x	
F	0	A	Vload<23VDC Vload>29.5VDC	x		x	x		
F	1	E	Module 1 Acfail input on	x		x	x		
F	1	F	Module 1 Dcfail input on	x		x	x		
F	2	E	Module 2 Acfail input on	x		x	x		
F	2	F	Module 2 Dcfail input on	x		x	x		
F	3	E	Module 3 Acfail input on	x		x	x		
F	3	F	Module 3 Dcfail input on	x		x	x		
F	4	E	Module 4 Acfail input on	x		x	x		
F	4	F	Module 4 Dcfail input on	x		x	x		

Trouble code

** Vcbat voltage is tested during trickle charging only.
*** In these conditions, the battery charger is placed under safety conditions.

Test Button
Press this button and the following parameters will be displayed one after the other:

V. Load Voltage at distribution terminals.
I. Charge Battery charge current.
°C Battery Temperature taken by the external probe.
V. Bat Voltage measured at battery terminals.

During battery full testing, battery voltage value ***Vbat*** is displayed.
During battery trickle charging, unloaded battery value is displayed.
During battery full charging, the battery charge voltage value is displayed.

Hold down the button for 3 seconds to run a battery full test.

Reduced Battery Test
This test is performed automatically every 30 seconds during trickle charging. This test is used to confirm that batteries are present, and not their efficiency. During the test, charge voltage is switched off, and then voltage is measured at battery terminals. If voltage is lower than the value of **V. Bat min**, a fault condition is signaled.

Full Battery Test
In normal conditions, this test is performed automatically at the preset frequency or manually using the special button. This test is used to confirm the efficiency of batteries and connections. During the test, the battery charger is switched off and voltage from AC/DC converters is lowered to 23 VDC. In these conditions, the load is powered by the batteries. During the test, both battery current and voltage are monitored. A battery fault is signaled if voltage rapidly decreases towards the Vbat min value.

During full test, voltage from AC/DC converters is not switched off but it is brought down to approximately 23 VDC to guarantee uninterrupted current supply to the load even in the case of inefficient batteries.

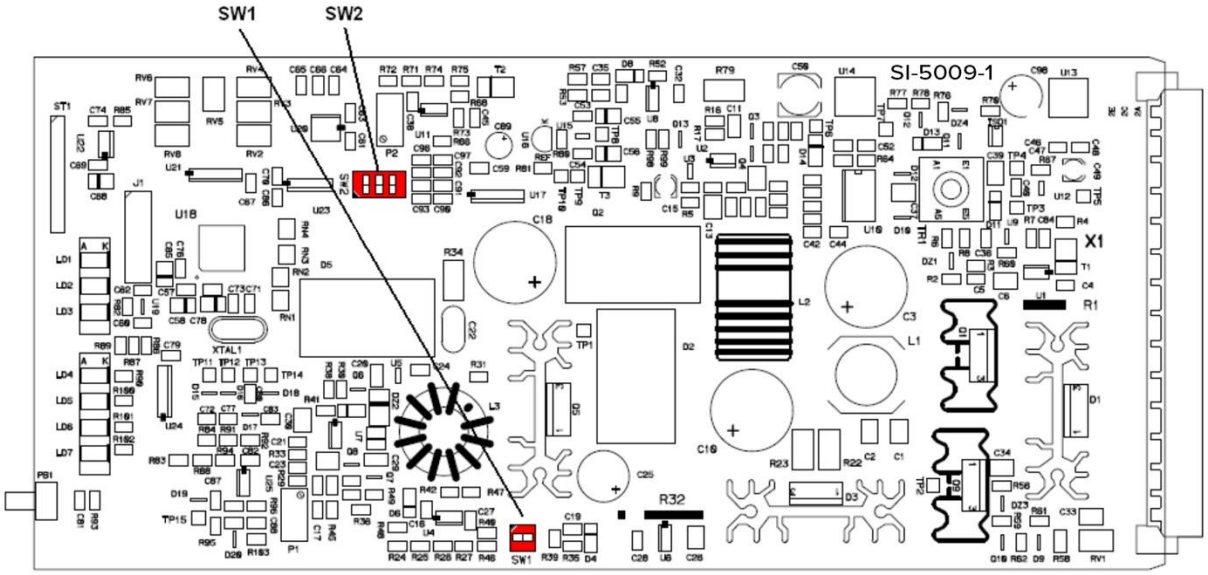
Minimum voltage and duration of the test can be set using the appropriate program.
Battery Charge Voltage Compensation

During trickle charging, battery charge voltage Vbat is compensated depending on the temperature taken by the external probe. The factory-set compensation factor is 48 mV/°C. This value will result in the following charge voltages:

Temperature	Vbat Voltage
50°C	26.16 VDC
25°C	27.36 VDC
0°C	28.56 VDC

During full charging, Vbat voltage is kept at 27.6 VDC. If batteries are not fully charged within the preset time, a battery fault warning is triggered. If battery temperature is above 52°C or below -2°C, battery charge is inhibited and a temperature fault warning is triggered.

Configuration



SI-5009-1 Configuration

Two dip-switches are installed on the board. They are used to set max battery current and the number of AC/DC converter modules in use.

SW1 Setting Max Battery Charge Current

SW1-1	Max Battery Charge Current
OFF	4 Amp
ON	6 Amp (factory-setting)

If small-capacity batteries are used, set current at 4 Amp to avoid damaging the batteries during full charging.

If small-capacity batteries are used, set current at 4 Amp to avoid damaging the batteries during full charging.

Configuring SI-5008-1 AC/DC Converter Modules

SW 2-1	**OFF**	AC/DC converter module 2 not fitted
	ON	AC/DC converter module 2 fitted
SW 2-2	**OFF**	AC/DC converter module 3 not fitted
	ON	AC/DC converter module 3 fitted
SW 2-3	**OFF**	AC/DC converter module 4 not fitted
	ON	AC/DC converter module 4 fitted

The AC/DC converter module 1 (slot-2) must always be fitted.

Using the configuration program and a pc with a serial port, you can set some operating parameters. The table below lists the parameters that can be changed:

Parameter	Function	Permissible Values	Factory Setting
Battery check	Battery control	Enabled/Disabled	Enabled
Battery Capacity	Available battery capacity A/h	25-40-65-120A/h	120A/h
Vbat min.	Minimum Vbat voltage during full testing	22 to 27 VDC	24 VDC
T-Test	Duration of battery full test	1 to 30 seconds	5 seconds
F-Test	Frequency of battery full test	0 to 240 minutes	60 minutes
Δ T	Vbat mv/°c compensation	20 to 60 mV/°C	48 mV/°c
Tmax	Max battery charging time	24/48 hours	24 hours
RPM	Number of revolutions of the cooling fans	1000-2000 RPM	1500 RPM
Out-1	Programming of configurable output 1	See Tab. 7	PSU1-Fault
Out-2	Programming of configurable output 2	See Tab. 7	PSU2-Fault

To ensure compliance with the EN-54-4 standard, Battery check shall always be enabled.

The table below shows the statuses that can be associated to the two configurable outputs. Only one of the available statuses can be associated to each output.

Configurable Status	Fault/Status Types	Output Status
Fault PSU1	F0A-F1E-F2E-F3E-F4E-F1F-F2F-F3F-F4F	Off in fault condition
Fault PSU2	F07-F08-F09	Off in fault condition
Battery charger module fault	F04-F5	Off in fault condition
Cooling fan fault	F01-F02-F03	Off in fault condition
Battery temperature fault	F06	Off in fault condition
Battery reduced test fault	F07	Off in fault condition
Battery full test fault	F08	Off in fault condition
Battery charging time fault	F09	Off in fault condition
Battery status	Charge/Delivery	On with batteries delivering
Battery charge status	Trickle/Full	On with batteries being fully charged
Full battery test	On/Off	On during battery full test

2.1.3 Power Supply Unit S81-PU003-x

This power supply unit can only be installed in the SI-90/M or SI-90/MB version. It's fitted on the base plate. It consists of one or two 240 watt AC/DC power supply, model SDR-240-24 plus one SI-5004-1 battery charger able to supply 2A battery charging current. In the model with two power supply module (S81-PU003-2), the DR-RDN20 redundancy module is used.

Power Unit S81-PU003-x

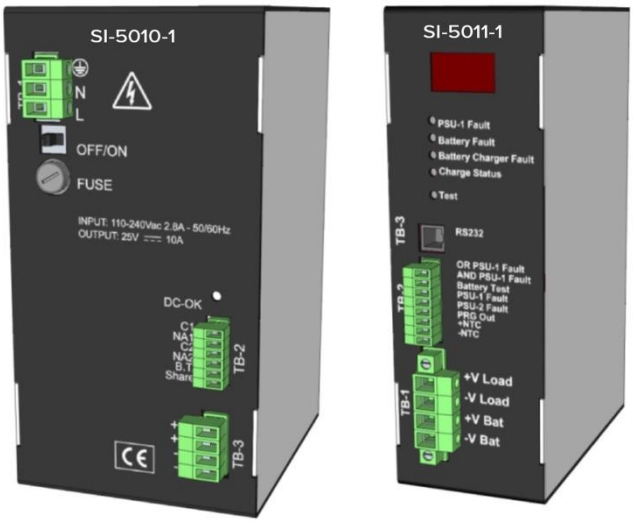
Technical features of the S81-PU003-x power supply unit according to the different configurations

Features	S81-PU003-1	S81-PU003-2
Number of SDR-240-24	1	2
Power supply voltage	110÷240V~	
Rated frequency	50÷60Hz	
Max. input current at 115V~	2,6A	5,2A
Nominal output voltage	25VDC ±1%	
Max. residual ripple	100mVp-p	
Minimum output voltage (Note A)	18,9VDC	
HFT0 Max. output current (Note-B)	8A	18A
HFT1 Max. output current (Note-B)	N.A.	8A
Maximum battery resistance (Note C)	1,5 Ω	
Max. battery current	2A	
Maximum battery capacity	18Ah	

Note A: Full load output voltage with low batteries in case of mains voltage failure
Note B: Maximum current for the external loads plus the current required by the panel. The HFT value defines the maximum number of SDR-240-24 modules that can be broken without degradation of the maximum output current.
Note C: Internal resistance of the batteries and of the relevant circuits. (Cables, terminals, fuses, etc.)

2.1.4 Power Supply Unit S81-PU004-x

This power supply unit can only be installed in the SI-90/M or SI-90/MB version. SI-90/1-10R. It's fitted on the base plate. It consists of one or two, three, or four 250 watt AC/DC power supply, model SI-5010-1 plus one SI-5011-1 battery charger able to supply up 6A battery charging current. Under normal operating conditions, a simplified test is carried out every 30 seconds in order to check the proper presence of the batteries. A full test, instead, is carried out every hour in order to check electrical connections and battery efficiency. Battery charge voltage is compensated automatically according to the temperature. In case of mains voltage failure, batteries are automatically switched to the load without any interruptions. Should the full charge stage exceed 24 hours, the power supply unit will signal a battery fault. In case of primary power supply failure, the system will shut batteries down when the on-load voltage is lower than 18VDC in order to avoid damaging the batteries. The unit features three open collector outputs for replicating the various types of faults to the panel, and one RS232 port for the connection to the configuration program through which you can set some parameters such as charging current and battery capacity.



Power Unit S81-PU004-x

Technical features of the S81-PU004-x power supply unit according to the different configurations

Features	S81-PU004-2	S81-PU004-3	S81-PU004-4
Number of SI-5008-1 power supply units	2	3	4
Power supply voltage	110÷240V~		
Rated frequency	50÷60Hz		
Max. input current at 110V~	2,8A	5,6A	8,4A
Nominal output voltage	25VDC ±2%		
Max. residual ripple	100mV		
Minimum output voltage (Note A)	18,9VDC		
Min. output current (Note B)	2A		
HFT0 Max. output current (Note-C)	16A	22A	N.A.
HFT1 Max. output current (Note-C)	6A	15A	22A
HFT2 Max. output current (Note-B)	N.A.	5A	12A
Maximum battery resistance (Note D)	0,2 Ω		
Max. current for battery charger	4A	5A	8A
Max. current for battery charging	3A	4A	6A
Maximum battery capacity	40Ah	64Ah	120Ah

Note A: Full load output voltage with low batteries in case of mains voltage failure.
Note B: Minimum output current for proper battery testing.
Note C: Maximum current for the external loads plus the current required by the panel. The HFT value defines the maximum number of PU-0008-1 modules that can be broken without degradation of the maximum output current.
Note D: Internal resistance of the batteries and of the relevant circuits. (Cables, terminals, fuses, etc.)

2.1.4.1 Power supply module SI-5010-1

SI-5010-1

It is a universal switching power supply able to provide a maximum current of 10A at 25VDC. It is used in combination with the SI-5011-1 battery charger in compliance with EN54-4 standard provisions. The power supply unit features a circuit for load distribution which allows the parallel connection of multiple power supply units, up to a maximum of four units

Visual indications

Led DC-OK (green)

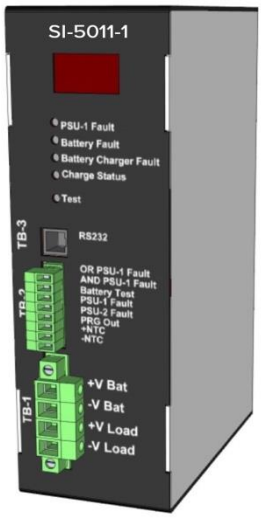
When lit, it indicates the presence of DC output voltage.

Connections

AC INPUT CONNECTION			
Tag.	**Terminal**	**Name**	**Function**
TB1	**M1**	PE	Earth
	M2	N input	Neutral
	M3	L input	Phase (protected by internal fuse)
CURRENT SHARE AND INPUT/OUTPUT CONNECTIONS			
Tag.	**Terminal**	**Name**	**Function**
TB2	**M1**	SHARE (+)	Signal for load distribution
	M2	B.T.	Test Battery Input
	M3	RL-NO2	NA relay-1 DC-OK
	M4	RL-COM2	C relay-1 DC-OK
	M5	RL-NO1	NA relay-2 DC-OK
	M6	RL-COM1	C relay-2 DC-OK
DC OUTPUT CONNECTIONS			
Tag.	**Terminal**	**Name**	**Function**
TB3	**M1**	- V.	VLOAD Output voltage negative
	M2	- V.	VLOAD Output voltage negative
	M3	+V.	VLOAD Output voltage positive
	M4	+V	VLOAD Output voltage positive

This unit includes circuits with voltage and current values potentially dangerous for people

2.1.4.2 Battery charge module SI-5011-1



This is a UPS able to control and charge two 12 Volt batteries with a maximum capacity of 120Ah. Battery maximum charge current can be set between 1 and 6A through a special program by connecting to a PC to the RS232 port. Under normal operating conditions, a simplified test is carried out every 30 seconds in order to check the proper presence of the batteries. A full test, instead, is carried out every hour in order to check electrical connections and battery efficiency. Battery voltage is compensated automatically according to the measured temperature. In case of mains voltage failure, batteries are automatically switched to the load without any interruptions. Should the full charge stage last more than 24 hours, the battery charger will signal a battery fault. In case of primary power supply failure, the system will shut batteries down when the battery voltage is lower than 18VDC in order to avoid damaging the batteries. It is used together with two or more SI-5010-1 power supply units. In this case, the resulting power supply unit is fully compliant with the EN54-4:1997/A2:2006 standard.

.

Visual indications

On the front of the box there are 4 LEDs and a 3-digit alphanumeric display.

The 4 LEDs are activated in the following ways:

Tag.	*Name*	*Color*	*Mode*	*Condition*
LD1	PSU-1 Fault	Yellow	Off	AC voltage OK
			Steady On	AC voltage failure
LD2	Battery Fault	Yellow	Off	Battery status OK
			Steady On	Battery disconnected or faulty
LD3	Battery Charger Fault	Yellow	Off	Normal condition
			Steady On	Internal failure
LD4	Charge Status	Green	Off	Batteries switched to the load
			Flashing	Battery trickle charge status
			Steady On	Battery full charge status

After a short press of the **Test** button, the 4 LEDs are lit up in sequence for 2 seconds to indicate the type of measurement displayed in the following order:

LD1 Load voltage
LD2 Battery voltage
LD3 Battery, Which depends on the battery status (charging / discharging)
LD4 External probe temperature

Alpha-Numeric Display

The display is turned off in normal operating conditions. Should a fault condition occur, the fault type is displayed according to the following table:

Digit 1	Digit 2	Digit3	Fault Condition	LD1	LD2	LD3	Output PS1-Fault	Output PS2-Fault
F	0	1	PSU-1 Fault (OR/AND)	x			x	
F	0	2	Vload<22VDC Vload>29.5VDC	x			x	
F	0	3	Battery reduced test failed		x			x
F	0	4	Battery full test failed		x			x
F	0	5	Battery full charging time T>Tmax		x			x
F	0	6	Tbat<-10°C Tbat>+65°C		x			x
F	0	7	Vbat<Vbatmin		x			x
F	0	8	Battery switched without PSU-1 fault (VLOAD<23VDC)	x			x	
E	0	1	Internal +3.3V Voltage <3.0V / >3.6V ***(a)***			x		x
E	0	2	Internal +5V voltage <4.8V / >5.2V ***(a)***			x		x
E	0	3	CPU temperature <-40°C/>+90°C ***(a)***			x		x
E	0	4	CPU oscillator failure ***(a)***			x		x
E	0	5	Flash CRC error ***(a)***			x		x
E	0	6	Eeprom CRC error ***(a)***			x		x
E	0	7	Watchdog timer expiration ***(a)***			x		x
E	0	8	ADC failure ***(a)***			x		x
E	0	9	Vcbat<23VDC Vcbat>29.5VDC ***(b)***			x		x
E	0	A	Vloadfail not triggered during battery full test			x		x
E	0	B	Discharge current IBAT> / to the measured value during the battery full test			x		x
U	0	1	Full battery test with discharge current < Imin ***(c)***					
U	0	2	It is impossible to run the battery full test ***(d)***					
U	0	3	VBAT voltage < 3V ***(e)***					

(a) Under these conditions, the battery charger goes in a safe condition.
(b) Vcbat voltage control is only done during the trickle charge condition.
(c) Under these conditions, the battery full test result may not be guaranteed.
(d) This warning appears for 2 seconds if manual battery full test is not possible.
(e) Indicates a possible short on the VBAT + / VBAT- terminals or the presence of a fully discharged battery. In this condition, the charge current is lowered to 0.5A to avoid excessive dissipation of the battery control mosfet. As soon as the VBAT voltage returns ≥ 3V, the charge current is returned to the previous value.

Test Button

The test button is used to display the battery charger parameters or to manually perform the full battery test.

Battery Charger Parameters Visualization

By briefly pressing the Test button, the display shows in succession the current values as indicated on the previous page. At the end, all LEDs and display segments are briefly switched on to ensure that read values are correct.

Battery Full Test

Pressing the Test button for 4 seconds will perform a battery full test. The full test is performed only during the maintenance charge phase and in the absence of the PSU1 Fault failure.

Connections

BATTERY/LOAD CONNECTIONS			
Tag.	**Terminal**	**Name**	**Function**
TB1	**M1**	+V. Bat	+ Battery
	M2	-V. Bat	- Battery
	M3	+ V. Load	+ LOAD
	M4	- V. Load	- LOAD
INPUT/OUTPUT CONNECTIONS			
Tag.	**Terminal**	**Name**	**Function**
TB2	**M1**	OR-PSU1 Failure	All power supply modules failure input
	M2	AND-Failure	One power supply module failure input
	M3	Battery Test	Battery full test output
	M4	PSU1 Fault	Open collector output - power supply unit section fault
	M5	PSU2 Fault	Open collector output - battery charger section fault
	M6	PRG-Out	Programmable output
	M7	+NTC	External temperature probe positive
	M8	-NTC	External temperature probe negative

2.2 Central unit rack

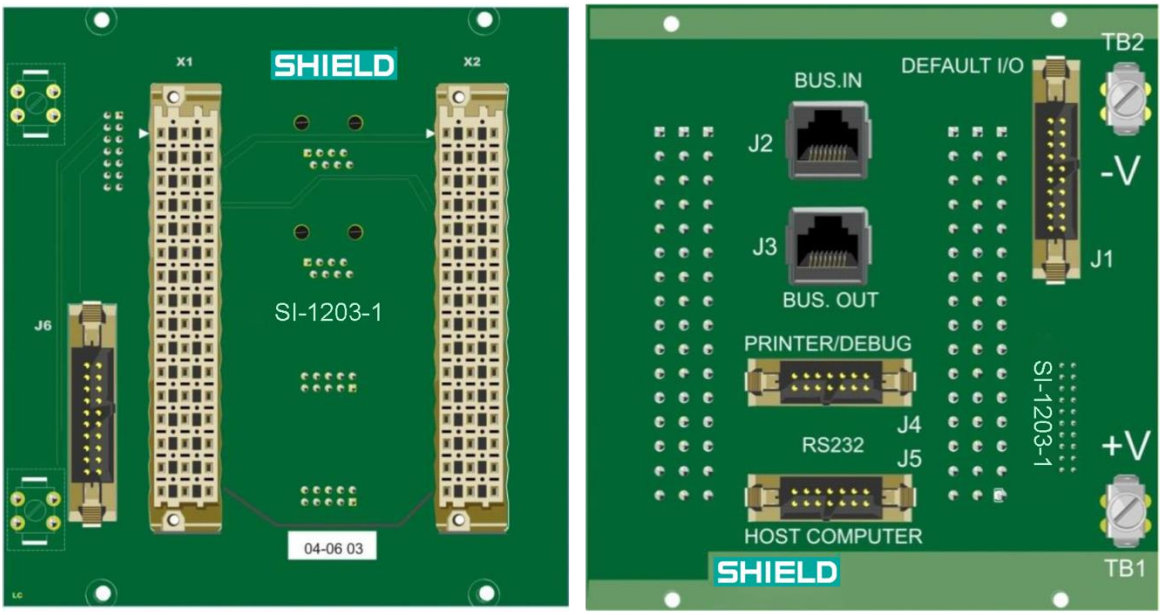
The central unit includes a central processing unit (CPU) with the relevant bus, the display card and the default I/O control termination board. It has the function of processing the data received from the cards and controlling the operator interface and the communication with supervisory systems.

Central unit rack

2.2.1 SI-2203-1

Description

It is the interface between the two CPUs and the other peripheral devices making up the system.



SI-2203-1 bus

Technical features

Operating temperature:	-5 / +50 °C
Storage temperature:	-30 / +80 °C
Maximum humidity:	95% (RH) non-condensing

Connections

TB1-TB2 +V/-V

These two Faston terminals are used for supply voltage connection

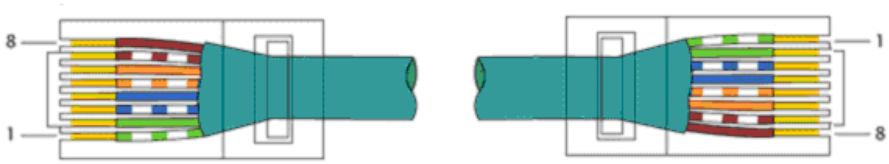
TAG	Function	Cable color
TB1	25VDC power supply positive	Red
TB2	25VDC power supply negative	Black

J1 Default I/O

It is a connector for a 14-pole flat cable allowing the connection to the termination board SI-3804-1 (default I/O).

J2-J3 LVDS bus loop link

They are 2 RJ45 connectors for category 5 cable allowing to connect the CPU to the two I/O cards. This is a closed loop connection, thus allowing to increase system reliability. The J2 connector (Bus-IN) must be connected to the BUS-OUT terminal of the last rack, whereas the J3 connector (Bus-OUT) must be connected to the BUS-IN terminal of the first rack.

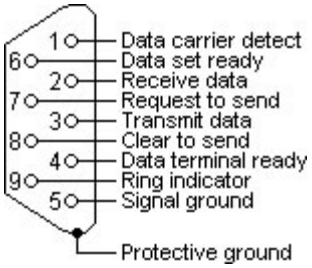


RJ45 UTP connection cable

J4-J5 Printer/Debug / Host Computer

Two connectors for 10-pole flat cable, allowing the connection of a 40 or 80 column serial printer and of a PC for configuration data transfer. Use the S81-CFT10/2 cable for connecting to the PC.

J4 Connector		Direction	DB9 Female	
Pin	Signal		Signal	Pin
1	DTR	→	DCD	1
3	TXD	→	RXD	2
5	RXD	←	TXD	3
7	DCD	←	DTR	4
9	GND	←→	GND	5
2	DTR	→	DSR	6
4	CTS	←	RTS	7
6	RTS	→	CTS	8
8			RI	9
10	NU			

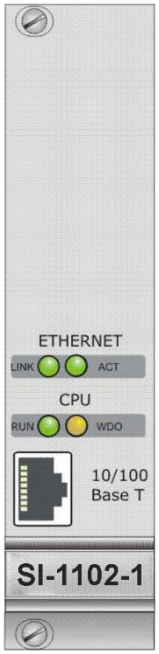


RS232 connections

J6 Display

A connector for 20-pole flat cable, allowing the connection to the SI-1106 display card.

2.2.2 SI-1102-1



Description

This card is system central unit. Besides the microcontroller, the card includes the following elements: Flash memory, buffered static Ram, watchdog circuit and Ethernet controller. The CPU card can be used in both single and redundant configuration. In this last case, two CPUs operating in parallel are used. Both CPUs process the information received from the I/O cards, but only one of the two CPUs runs the commands. In case of failure of the primary CPU, the other one keeps on carrying out all the tasks without any interruption of the machine cycle.

Technical features

- Safety rating: applicable up to SIL3
- Microcontroller: Renesas H8-2318 at 25Mhz
- RAM memory: 4 Mbits, lithium battery buffered
- FLASH memory: 2 Mbits
- Ethernet Output: 10/100BaseT with RJ45 connector
- Watchdog: external
- Redundancy YES
- Supply voltage: 22-29VDC
- Quiescent current: 70mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing

Visual indications

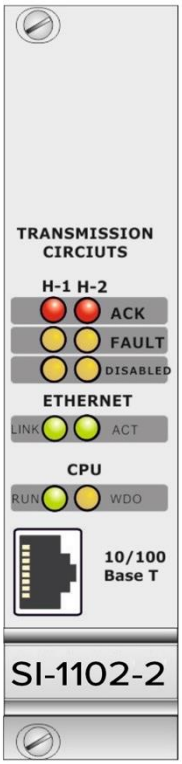
The card front panel includes four LEDs indicating the following conditions:

Tag.	Condition
LINK	It lights in the presence of an Ethernet connection link
ACT	It lights in the presence of an Ethernet activity
RUN	It lights up following an activity on the Ethernet
WDO	It lights up following a CPU error (CPU blocked)

Connections

On card front panel there is an 8-pole RJ45 connector, enabling connection to the Ethernet network. Through this port, connections with maximum length of 100 m can be carried out using category 5 cables.

2.2.3 SI-1102-2



Description

This card is identical to the SI-1102-1, but with more information on the status of the two connections in accordance with EN 54-21.

Technical features

- Safety rating: applicable up to SIL3
- Microcontroller: Renesas H8-2318 at 25Mhz
- RAM memory: 4 Mbits, lithium battery buffered
- FLASH memory: 2 Mbits
- Ethernet Output: 10/100BaseT with RJ45 connector
- Watchdog: external
- Redundancy YES
- Supply voltage: 22-29VDC
- Quiescent current: 70mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing

Visual indications

The card front panel includes ten LEDs indicating the following conditions:

Tag.	Condition
ACK-H1	It lights on every message transmission to Host-1 It shuts off after receiving the ACK message
ACK-H2	It lights on every message transmission to Host-2 It shuts off after receiving the ACK message
FAULT-H1	It lights up following a Host-1 connection failure
FAULT-H2	It lights up following a Host-2 connection failure
DISABLED-H1	It lights up following a Host-1 connection disabling
DISABLED-H2	It lights up following a Host-2 connection disabling
LINK	It lights in the presence of an Ethernet connection link
ACT	It lights in the presence of an Ethernet activity
RUN	It lights up following an activity on the Ethernet
WDO	It lights up following a CPU error (CPU blocked)

Connections

On card front panel there is an 8-pole RJ45 connector, enabling connection to the Ethernet network. Through this port, connections with maximum length of 100 m can be carried out using category 5 cables.

CPUs used on a system must be of the same type and must have the same firmware version

2.2.4 SI-1106-1

Description

The display card is the interface between the control panel and the operator. It includes a LED-backlit graphic display with 30 lines of 52 characters each, 19 LEDs, 23 buttons and one buzzer.

SI-1106-1

Technical features

- Supply voltage: 22-29VDC
- Quiescent current: 70mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing
- LCD resolution: 320 x 128 pixels
- Backlighting: LED

Visual indications

The front panel includes 14 LEDs with the following functions:

Tag.	Condition
Alarm	Alarm condition
Common Fault	Common Fault condition
Device Fault	Sensors/actuators Fault
Sounder Fault	Sounder Fault
PSU1 Fault	Primary power supply Fault
PSU2 Fault	Secondary power supply Fault
Earth Fault	Earth leakage
System Fault	System Fault
Test Zone	Test Zone
Common Disabled	Common disable condition
Sensors Disabled	Sensors disabled
Sounders Disabled	Sounder disabled
Outputs Delayed	Delay timer in progress
Power On	Primary voltage detection

Rear panel includes 5 LEDs with the following functions:

LED	Indication
LD15	Communication network failure
LD16	Currently not used
CPU-A Link	CPU-A Link is present
CPU-B Link	CPU-B Link is present

SI-3804-1 Link	81-T8004-1 Link is present

Keys

Button	Description of buttons	Level	Description of the function
	Local Buzzer Silencing	1-2-3	Deactivates the local buzzer
	System sounder silencing	2-3	Silencing of system fire alarm sounders
	Control panel reset	2-3	Resets the control panel
	Evacuation command	2-3	Activates system fire alarm sounders
	Delay time reset	1-2-3	Cancels output delay timer
ESC	Selection cancel	1-2-3	To cancel an operation or to go back to the previous page
	Enter key	1-2-3	Confirms a selection made when navigating through operator cycle menus
	Arrows for selecting menu direction	2-3	They enable the navigation through operator cycle menus
0-9	0-9 key numbers	1-2-3	They are used for entering parameters and access passwords
	Scroll	1-2-3	It allows to view the complete list in operator cycle menu
F1	F1 key	1-2-3	It allows to access directly the main page of the active access level

Key functions

Connections

BR1-BR2 +V/-V

These two Faston terminals are used for supply voltage connection

TAG	Function	Cable Color
BR1	25VDC power supply positive	Red
BR2	25VDC power supply negative	Black

J2 A connector for 20-pole flat cable, allowing the connection to SI-2203-1 Bus.
J3 A 4-pole connector supplying power to the LEDs for display backlighting.
J5 A 10-pole connector connecting the membrane keyboard to the display.

2.2.5 SI-1106-2

Description

This card performs the same functions as the SI-1106-1 card, adding that it can be connected to remote displays to remotely control the panel. It comes with a 7-inch color display with 800x480 resolution that can display informations in different fonts and languages.

SI-1106-2

Technical features

- Supply voltage: 22-29VDC
- Quiescent current: 300mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing
- LCD resolution: 800 x 480 pixels
- Backlighting: LED

Visual indications

The front panel includes 14 LEDs with the following functions:

LED	Indication
Alarm	Alarm condition
Common Fault	Common Fault condition
Device Fault	Sensors/actuators Fault
Sounder Fault	Sounder Fault
PSU1 Fault	Primary power supply Fault
PSU2 Fault	Secondary power supply Fault
Earth Fault	Earth leakage
System Fault	System Fault
Test Zone	Test Zone
Common Disabled	Common disable condition
Sensors Disabled	Sensors disabled
Sounders Disabled	Sounder disabled
Outputs Delayed	Delay timer in progress
Power On	Primary voltage detection

Rear panel includes 9 LEDs with the following functions:

Led	Function
LD1	It lights up when there is a USB memory attached to the card
LD16	Communication network failure
LD17	Currently not used
LD18	CPU-A Link failure
LD19	CPU-B Link failure
LD20	SI-3804-1 Link failure
LD21	Remote Display main communication Link failure
LD22	Remote Display reserve communication Link failure
LD23	Currently not used

Keys

Button	Description of buttons	Level	Description of the function
	Local Buzzer Silencing	1-2-3	Deactivates the local buzzer
	System sounder silencing	2-3	Silencing of system fire alarm sounders
	Control panel reset	2-3	Resets the control panel
	Evacuation command	2-3	Activates system fire alarm sounders
	Delay time reset	1-2-3	Cancels output delay timer
	Selection cancel	1-2-3	To cancel an operation or to go back to the previous page
	Enter key	1-2-3	Confirms a selection made when navigating through operator cycle menus
	Arrows for selecting menu direction	2-3	They enable the navigation through operator cycle menus
	0-9 key numbers	1-2-3	They are used for entering parameters and access passwords
	Scroll	1-2-3	It allows to view the complete list in operator cycle menu
	F1 key	1-2-3	It allows to access directly the main page of the active access level

Key functions

Configuring the priority to the local display, pressing any key will cause immediate disconnection with the connected remote display, while configuring priority to remote displays all the local display keys will be disabled when connecting to remote displays

Connections

The board is equipped with the following connectors:

Tag.	Type	Function	Note
CN1	2-pole terminal clamp	Card power supply	
CN2	USB type-A connector	USB Host port	For firmware update
CN4	RJ45 female connector	Ethernet main communication Link	
CN5	RJ45 female connector	Ethernet reserve communication Link	
CN11	Strip 20P MV	Connection with SI-2203-1 bus card	

Termination Connector List

Terminal Block CN1
This is a two-pole terminal block for connecting the power supply voltage.

Terminal Block CN2
This is a Type-A type USB connector that allows connection to a USB memory stick for firmware update.

Terminal Block CN4
This is an 8-pin RJ45 connector that allows connection with the main communication network.

Terminal Block CN5
This is an 8-pin RJ45 connector that allows connection with the reserve communication network.

Terminal Block CN11
This is a 20-pin flat cable connector that allows connection with the SI-2203-1 Bus card.

For additional details on the use of this product, please refer to the specific document ST-188-EN “Remote Displays – Installation and user manual”.

2.3 I/O rack

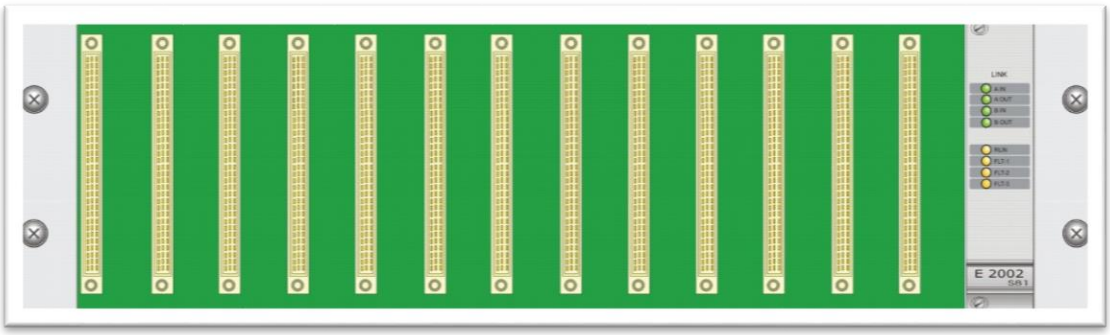
All SI-90 models contain at least one of the following racks:

- SI-2201-2 rack with 13 slots for installation of SI-90 I/O cards and 1 slot for installation of rack controller SI-2202-1 with DIN41618 type connector.
- SI-2201-3 rack with 13 slots for installation of SI-90 I/O cards and 1 slot for installation of rack controller SI-2202-1 with DIN41612 type connector.
- SI-2204-1 rack with 8 slots for installation of SI-90 I/O cards, 1 slot for installation of rack controller SI-2202-1 and 2 slots for installation of CPUs SI-1102-1

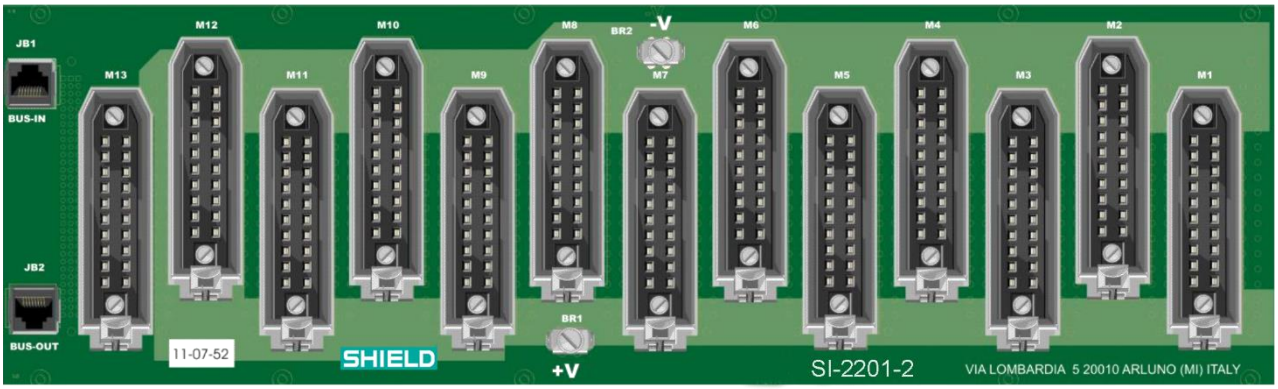
2.3.1 SI-2201-2

Description

This unit includes the thirteen cards and the rack controller. Card-field device connections are carried out by using 5-metre long prewired cables with DIN41618 Type connectors. Systems with redundant I/O cards are possible.



SI-2201-2 - front view



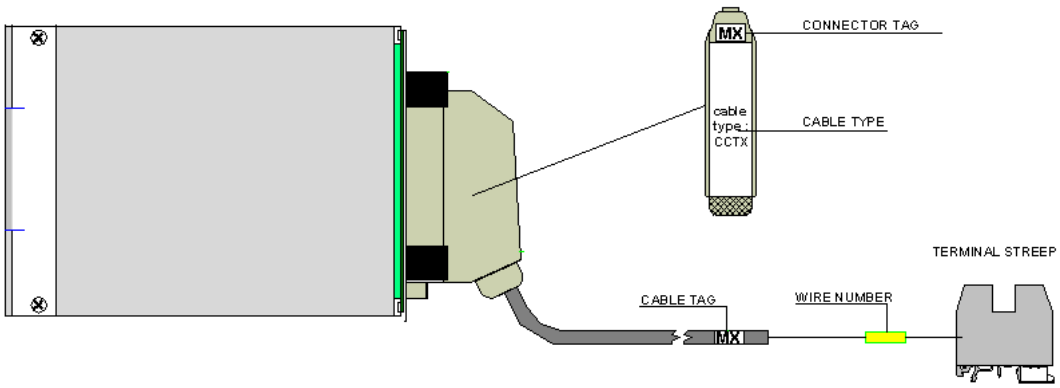
SI-2201-2 - rear view

Technical features

- Supply voltage: 22-29VDC
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing
- Maximum number of I/O cards: 13
- Field connections: Multi cables with DIN41618 Type connectors

Connections

Prewired cables are used in this case to connect the rack to the terminal block. The cable type and the relevant connections depend on the type of card to be terminated.

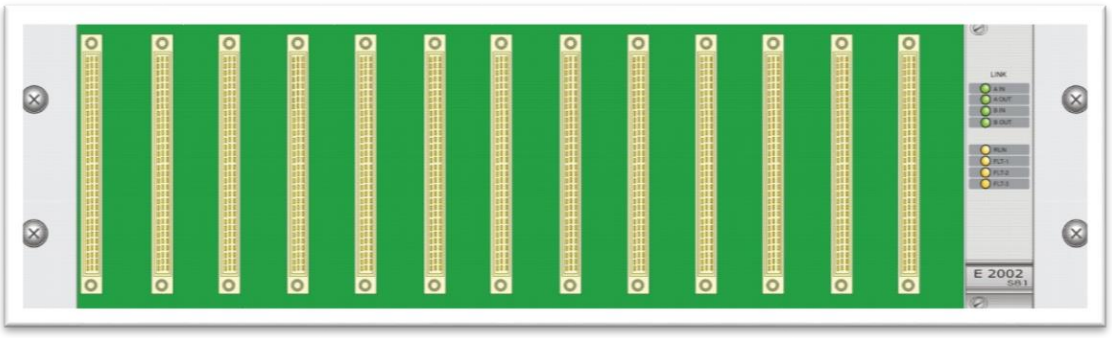


SI-2201-2 cable connections

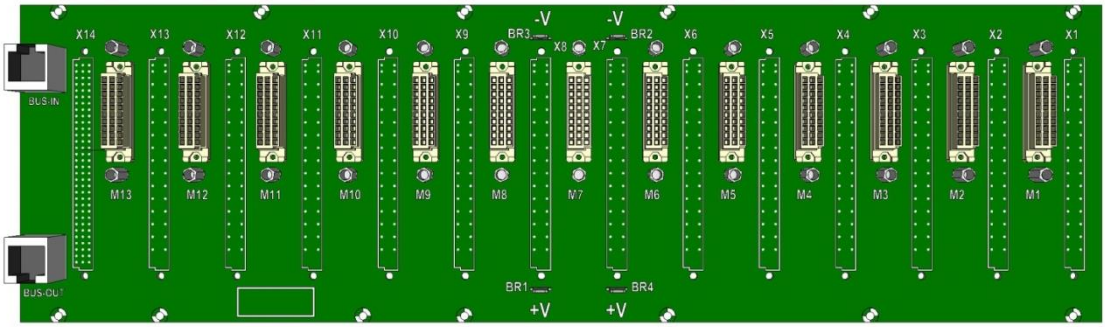
2.3.2 SI-2201-3

Description

This unit includes the thirteen cards and the rack controller. Card-field device connections are carried out by using 5-metre long prewired cables with DIN41612 Type connectors. Systems with redundant I/O cards are possible.



SI-2201-3 - front view



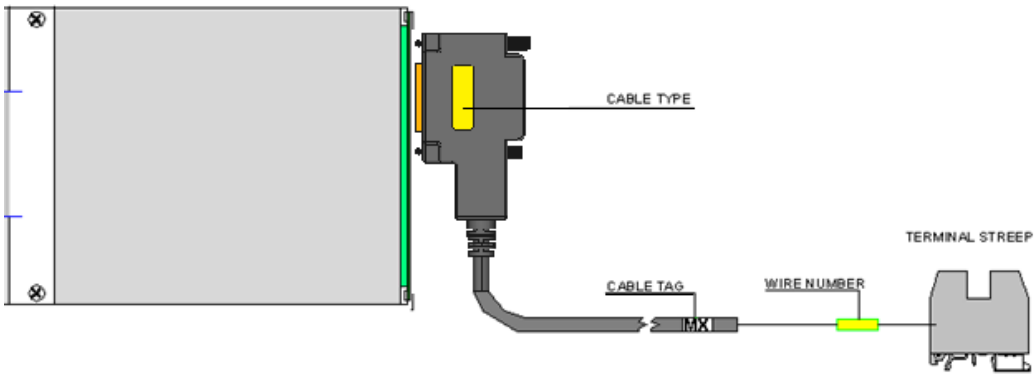
SI-2201-3 - rear view

Technical features

- Supply voltage: 22-29VDC
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing
- Maximum number of I/O cards: 13
- Field connections: Multi cables with DIN41618 Type connectors

Connections

Prewired cables are used in this case to connect the rack to the terminal block. The cable type and the relevant connections depend on the type of card to be terminated.



SI-2201-3 cable connections

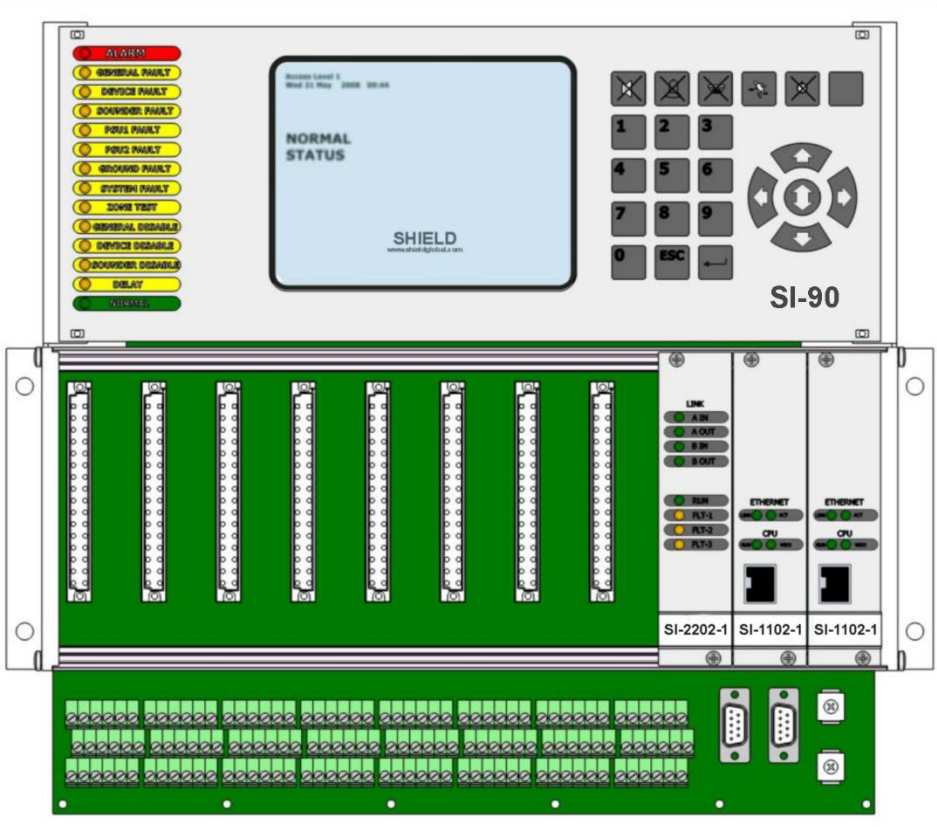
2.3.3 SI-2204-1

Description

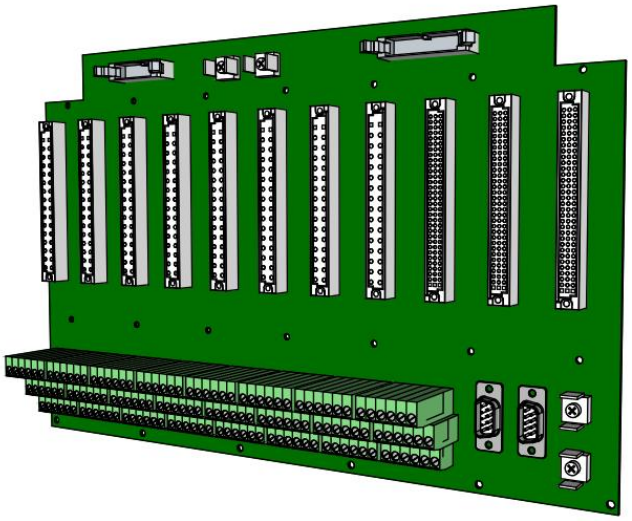
One SI-2204-1 rack can be installed in one SI-90/M or SI-90/L panel. The rack includes:

- 8 slots for I/O cards
- 1 slot for SI-2202-1 rack controller
- 2 slots for SI-1102-1 CPUs
- The upper part of the rack allows installation of SI-1106-1 main display.

Connections between I/O cards and field devices is achieved with screw terminals mounted on the PCB.



I/O rack SI-2204-1 assembly- front view with dual CPU rack controller and display



I/O rack SI-2204-1 PCB view

Technical features

- Supply voltage: 22-29VDC
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing
- Maximum number of I/O cards: 8
- Field connections: 8 terminal blocks with 18 screw terminals each
- Maximum current on terminals BR1..BR8 500mA protected with resettable fuse

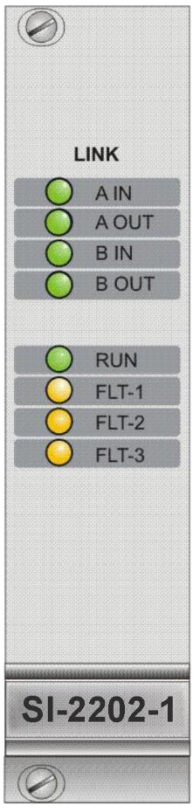
Internal connections

This bus uses 8 terminal blocks, with 18 screw terminals each, to directly connect cables from field devices. The table below shows connections on screw terminals for each type of I/O card.

Screw Terminal BR1÷BR8	*F3002*	*F4001*	*F4002*	*F4003*	*F5001*	*F5002*	*F5003*	*F5004*	*F6001*	*F7002, F7007, F7009, F7010*	*F7006 F7008*	*F7011*
M1	+L1-in	+L1-in	+L1-in	+L1-in	+L1-Out	+L1-Out	+L1-in	+L1-Out	-	+Loop Out	232-TX	+Link-1
M4	-L1-in	+L1-in	+L1-in	+L1-in	+L1-Out	+L2-Out	+L1-in	+L1-Out	-	+Loop Out	232-TX	+Link-1
M7	+L2-in	GND	GND	+L2-in	+L2-Out	+L3-Out	+L2-in	+L2-Out	-	-Loop Out	232-RX	-Link-1
M10	-L2-in	GND	GND	+L2-in	+L2-Out	+L4-Out	-L2-in	+L2-Out	-	-Loop Out	232-RX	-Link-1
M13	+L3-in	-	+L2-in	+L3-in	+L3-Out	+L5-Out	+L3-in	+L3-Out	-	+Loop In	GND	Sch Link-1
M16	-L3-in	-	+L2-in	+L3-in	+L3-Out	+L6-Out	-L3-in	+L3-Out	-	+Loop In	GND	Sch Link-1
M2	+L4-in	-	GND	+L4-in	+L4-Out	+L7-Out	+L4-in	+L4-Out	-	-Loop In	+RS485	-
M5	-L4-in	-	GND	+L4-in	+L4-Out	+L8-Out	-L4-in	+L4-Out	-	-Loop In	+RS485	-
M8	+L5-in	+L1-Out	+L1-Out	+L5-in	+L5-Out	+L9-Out	+L5-in	-	-	-	-RS485	+Link-2
M11	-L5-in	+L1-Out	+L1-Out	+L5-in	+L5-Out	+L10-Out	-L5-in	-	-	-	-RS485	+Link-2
M14	+L6-in	GND	GND	+L6-in	+L6-Out	+L11-Out	+L6-in	-	-	-	GND	-Link-2
M17	-L6-in	GND	GND	+L6-in	+L6-Out	+L12-Out	-L6-in	-	-	-	GND	-Link-2
M3	+L7-in	-	+L2-Out	+L7-in	+L7-Out	+L13-Out	+L7-in	-	-	-	-	Sch Link-2
M6	-L7-in	-	+L2-Out	+L7-in	+L7-Out	+L14-Out	-L7-in	-	-	-	-	Sch Link-2
M9	+L8-in	-	GND	+L8-in	+L8-Out	+L15-Out	+L8-in	-	-	-	-	-
M12	-L8-in	-	GND	+L8-in	+L8-Out	+L16-Out	-L8-in	-	-	-	-	-
M15	+25V	+25V	+25V	+25V	+25V	+25V	+25V	+25V	+25V	+25V	+25V	+25V
M18	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND

Field connection on SI-2204-1

2.3.4 SI-2202-1



Description

This card is the rack controller. It allows the information exchange between CPUs and I/O cards. It controls 13 point-to-point links to rack cards and two closed loop links for the communication to the two CPUs.

Technical features

- Safety rating: applicable up to SIL3
- Supply voltage: 22-29VDC
- Quiescent current: 20mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing

Status Indications

Card front panel includes eight LEDs with the following functions:

Tag.	Indication
A-IN Link	Steady on when CPU-0 loop input link is present
A-OUT Link	Steady on when CPU-0 loop output link is present
B-IN Link	Steady on when CPU-1 loop input link is present
B-OUT Link	Steady on when CPU-1 loop output link is present
Run	Flashes during operation
FLT1	Steady on in case of local interrupt
FLT2	Steady on in case of CPU-A loop interrupt
FLT3	Steady on in case of CPU-B loop interrupt

Configuration

Cards are configured by means of a 4-way dip switch used to set the number of racks from 1 to 10, according to the table below:

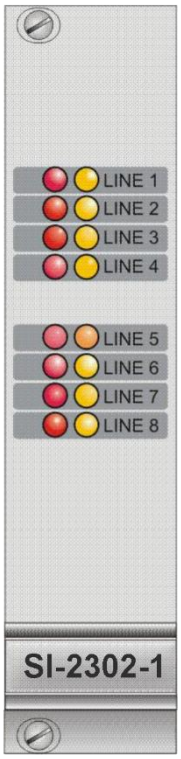
SW1-1	SW1-2	SW1-3	SW1-4	Rack No.
OFF	OFF	OFF	OFF	1
ON	OFF	OFF	OFF	2
OFF	ON	OFF	OFF	3
ON	ON	OFF	OFF	4
OFF	OFF	ON	OFF	5
ON	OFF	ON	OFF	6
OFF	ON	ON	OFF	7
ON	ON	ON	OFF	8
OFF	OFF	OFF	ON	9
ON	OFF	OFF	ON	10

2.4 I/O cards

The following I/O card types are available:

Part Number	Description	Notes
SI-2302-1	8 monitored input card for conventional detectors	Redundancy not possible
SI-2302-2	8 monitored input card for conventional detectors	Redundancy possible
SI-2401-1	Card with 1 x 4-20mA analog input	Redundancy not possible
SI-2401-2	Card with 1 x 4-20mA analog input	Redundancy possible
SI-2402-1	Card with 2 4-20mA analog inputs	Redundancy not possible
SI-2402-2	Card with 2 4-20mA analog inputs	Redundancy possible
SI-2403-1	Card with 8 x 4-20mA analog inputs	Redundancy not possible
SI-2403-2	Card with 8 x 4-20mA analog inputs	Redundancy possible
SI-2501-1	Card with 8 x 500mA monitored outputs for solenoids	Redundancy not possible
SI-2501-2	Card with 8 x 500mA monitored outputs for solenoids	Redundancy possible
SI-2502-1	Card with 16 x 250mA non monitored outputs	Redundancy not possible
SI-2503-1	Card with 8 x 250mA monitored outputs for sounders	Redundancy not possible
SI-2504-1	Card with 4 x 2A monitored outputs for solenoids	Redundancy not possible
SI-2504-2	Card with 4 x 2A monitored outputs for solenoids	Redundancy possible
SI-2601-1	Card for fire extinguishing system control	Redundancy not possible
SI-2602-1	Logic card	Redundancy not possible
SI-2702-1	Loop control card with ESP protocol	Redundancy not possible
SI-2706-1	Modbus RTU Master/Slave card	Redundancy not possible
SI-2707-1	Loop control card with SSP protocol	Redundancy not possible
SI-2708-1	Control card for weighing modules	Redundancy not possible
SI-2709-1	Loop control card with Shield Devices	Redundancy not possible
SI-2710-1	Loop control card with System Sensor protocol	Redundancy not possible
SI-2711-1	Loop control card with Safety Bus protocol	Redundancy possible

2.4.1 SI-2302-1 / SI-2302-2



Description

Eight balanced input card for conventional safety related sensors. All channels can be reset individually and are tested every 30 seconds during operation. This card is suitable for controlling detection systems with conventional lines and can be used in systems with already existing detection lines for controlling automatic fire extinguishing systems with double enable logic or intrinsically safe systems. It is also used for controlling all the devices typical of fire extinguishing systems (pressure switches, discharge buttons, etc.). This card can be duplicated in fault tolerant systems; in this case, the two cards shall be placed on adjacent racks in the same position. In this configuration, the eight detection lines are connected to both cards.

Technical features

- Safety rating: applicable up to SIL3
- Redundancy: SI-2302-2 model
- Alarm threshold: 2 programmable thresholds on 255 levels
- Line short circuit current >115mA
- Channel test: every 30 seconds
- Intrinsic Safety Barriers allowed: Galvanic separation barriers
- Supply voltage: 22-29VDC
- Quiescent current: 14mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing

Status Indications

For each one of the eight channels, on the front panel, there are two status LEDs providing the following information:

Tag.	Indication
LINE 1…LINE 8	Flashing if channel is in pre alarm condition Steady on if channel is in alarm/active condition
LINE 1…LINE 8	Flashing if channel is in fault condition Steady on if channel is disabled

Configuration

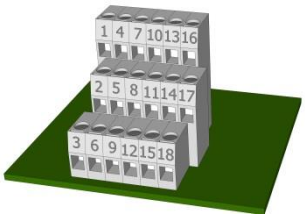
By using the configuration program ProS81, the following parameters can be set for each input channel:

Function	Allowed values in SAFETY mode	Allowed values in SECURITY mode
Operating mode:	Latching-NO, Latching-NC, Non-Latching-NO, Non-Latching-NC,	Latching-NC
Alarm verification function	Yes/No	Disabled
Pre-alarm threshold	10÷250	Fixed threshold
Alarm threshold	10÷250	Fixed threshold
Channel status with line short circuit	Fault / Alarm	Tampering
Type of indication	Fire, Supervisory, Gas, Fault, Hidden, Buzzer Only	Burglar Alarm, Hidden
Automatic alarm reset	Yes/No	N0
Enable/Disable channel status export to Hosts	No, TCP1, TCP2, RS232	No, TCP1, TCP2, RS232
Enable/Disable commands from Hosts	No, TCP1, TCP2, RS232	No, TCP1, TCP2, RS232

Field connection

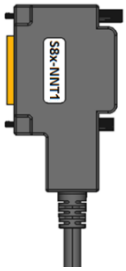
The connection between this card and field devices depends on the type of bus used.

With bus SI-2204-1 the I/O card is internally connected to one of the 8 terminal blocks with 18 screw terminals mounted on the PCB.

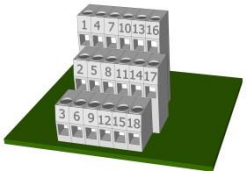


With bus SI-2201-2 the card is connected to the field terminal block by the S81-CCT1 16-conductor multipolar cable. For SI-2302-2 card redundant connection, use the S81-CCT1R cable.

With bus SI-2201-3 the card is connected to the field terminal block by the S81-NNT1 16-conductor multipolar cable. For SI-2302-2 card redundant connection, use the S81-NNT1R cable.



Connections

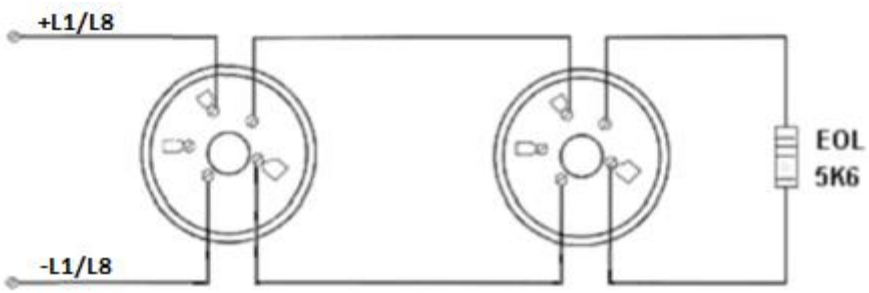
Function		*SI-2204-1 Bus Termination*		*SI-2201-2 / SI-2201-3 Bus Termination*		
detection line 1	**+L1**	**1**		**1**	White	
	-L1	**4**		**2**	Brown	
detection line 2	**+L2**	**7**		**3**	Green	
	-L2	**10**		**4**	Yellow	
detection line 3	**+L3**	**13**		**5**	Grey	
	-L3	**16**		**6**	Pink	
detection line 4	**+L4**	**2**		**7**	Blue	
	-L4	**5**		**8**	Red	
detection line 5	**+L5**	**8**		**9**	Black	
	-L5	**11**		**10**	Violet	
detection line 6	**+L6**	**14**		**11**	Grey/pink	
	-L6	**17**		**12**	Red/blue	
detection line 7	**+L7**	**3**		**13**	White/green	
	-L7	**6**		**14**	Brown/green	
detection line 8	**+L8**	**9**		**15**	White/yellow	
	-L8	**12**		**16**	Yellow/brown	
+25V (500mA max.)	**+25V**	**15**				
0V	**0V**	**18**				

SI-2204-1

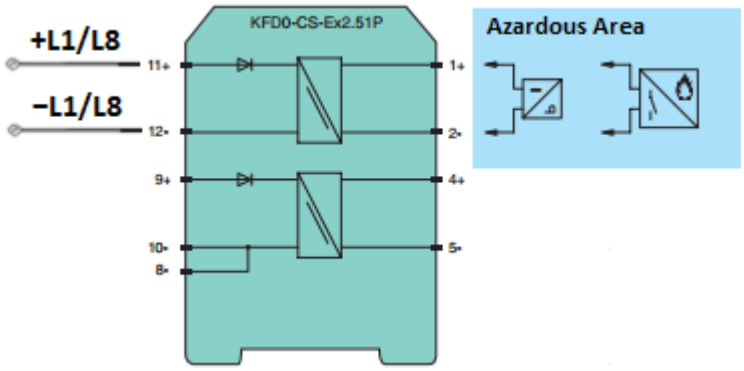
Field connections

Standard connection diagrams

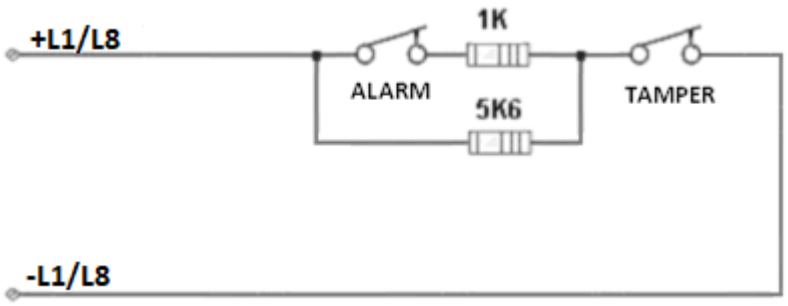
Standard connection diagram of NO/NC contacts



Standard connection diagram of conventional detectors



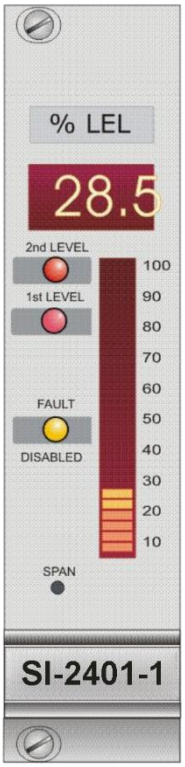
Standard connection diagram of the intrinsic safety barrier



Standard connection diagram for burglar alarm

Up to 32 detectors and / or alarm buttons can be connected on each conventional type of line (SI-2302 card)

2.4.2 SI-2401-1 / SI-2401-2



Description

Safety related card with 1 x 4-20mA analog input and two programmable thresholds. It can control the following transducer types: explosion sensors, air quality sensors, oxygen sensors, temperature sensors, 4-20mA general sensors. The channel is continuously tested during operation. The card features a 4-20mA output that provides the current value measured on the input. This analog value can be transferred to a DCS by means of the SI-2706-1 Modbus RTU card. This card can be duplicated in fault tolerant systems; in this case, the two cards shall be placed on two adjacent racks in the same position. In this configuration, the detection lines is connected to both cards.

Technical features

- Safety rating: applicable up to SIL3
- Redundancy: SI-2401-2 model
- Alarm threshold: 2 programmable thresholds
- Channel test: continuously tested
- Measuring range 0-24mA
- Line short circuit condition: with current >23.5mA
- Supply voltage: 22-29VDC
- Quiescent current:: 35mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing

Status Indications

Card front panel includes three LEDs, a graphic LED bar and a three-digit display.

LEDs

Tag.	Indication
1st Level	Steady on if channel is in pre alarm condition
2nd Level	Steady on if channel is in alarm condition
Fault/Disabled	Flashing if channel is in fault condition Steady on if channel is disabled

LED Bar

It indicates the 0-100% percentage of the measured value.

Three-digit display

The three-digit display generally shows the measured value in the programmed format. Moreover, it shows some fault codes according to the following table.

Code	Channel Status
---	Initialization stage
F00	Card/channel not configured
F01	Line opening (current <1mA)
F02	Over current (current >23.5mA)
F03	Internal test failed
Fx.x	Device Fault (Note-A)
E00	Memory data error CRC
+/-999	Measured value

Note-A: For current values lower than the set Fault threshold and exceeding 1mA, the display will show the value of the measured current in mA preceded by letter F. Please refer to the manual of the connected device for identifying the type of anomaly.

The 3-digit display on card front panel does not provide the operator with fundamental information for the operator according to the standard EN-54-2.

Configuration

By using the configuration program ProS81, the following parameters can be set for each input channel:

Function	Allowed values
Operating mode	Latching/Non latching, UP/Down, NM Range
Mode of analog value transfer to Hosts	Upon request/Automatic in case of change
Unit of measure of the channel	Ppm, %LEL, %O2, mA, °C, RH, V, bar, db, rpm and others
Zero Point of the measuring range	-999÷+999
End of scale of the measuring range	-999÷+999
Pre-alarm threshold	-999÷+999
Alarm threshold	-999÷+999
Lower Fault threshold	1,0÷3,8mA
Alarm delay	0÷255 seconds
Type of indication	Fire, Supervisory, Gas, Fault, Hidden, Buzzer Only
Automatic alarm reset	Yes/No
Enable/Disable status export via ModBus	Yes/No
Enable/Disable channel status export to Hosts	No, TCP1, TCP2, RS232
Enable/Disable commands from Hosts	No, TCP1, TCP2, RS232
Defines the format of the analog value sent via ModBus, and automatically via Host	mA, mA tenth, VI, VI, tenth of converter points

Threshold setting

The following parameters can be set for each card through the configuration program or directly on the control panel in the operator cycle, access level 3:
- Pre-alarm threshold.
- Alarm threshold.
- Current value below which a Fault condition is signaled.
- Calibration mixture concentration value for end of scale calibration.

Zero point calibration

Calibrate the zero point as reported below:
- Disable the channel of the card to be calibrated from the operator cycle.
- Enter the diagnosis cycle of the card to be calibrated.
- Make sure that no gas is present near the sensor to be calibrated.
- Press the “1” key to calibrate the zero point.
- The new zero value is stored in the memory of the card.
- Press “0” to cancel the operation.
- Exit the card diagnosis cycle and enable the channel.

The zero point can be calibrated only with zero values ranging between 3 and 5mA.

End of scale calibration

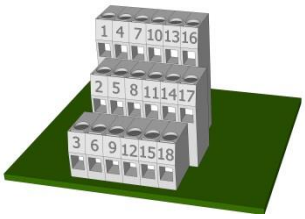
Calibrate the end of scale as follows:
- Disable the channel of the card to be calibrated from the operator cycle.
- Enter the diagnosis cycle of the card to be calibrated.
- Apply gas to the sensor according to the percentage set during configuration.
- Wait for the gas value measured by the card to stabilize.
- Press the key “3” to calibrate the end of scale.
- The new value is stored in the memory of the card.
- Press “2” to cancel the operation.
- Exit the card diagnosis cycle and enable the channel.

The end of scale can be calibrated only if the current value measured by the card is ±3mA than the set calibration value.

Field connections

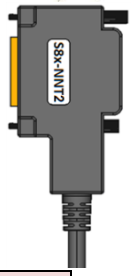
The connection between this card and field devices depends on the type of bus used.

With bus SI-2204-1 the I/O card is internally connected to one of the 8 terminal blocks with 18 screw terminals mounted on the PCB.

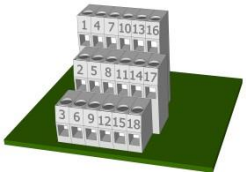


With bus SI-2201-2 The card is connected to the field terminal block by the S81-CCT2 2-conductor multipolar cable. For card redundant connection, use the S81-CCT2R cable.

With bus SI-2201-3 The card is connected to the field terminal block by the S81-NNT2 2-conductor multipolar cable. For card redundant connection, use the S81-NNT2R cable.



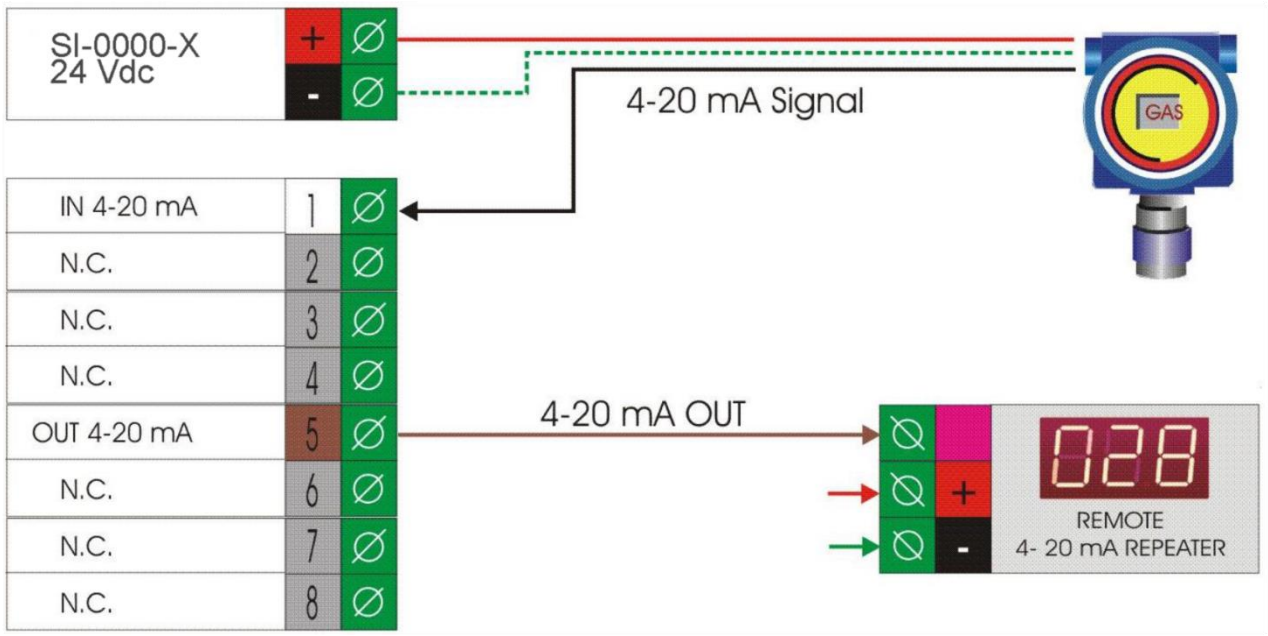
Connections

Function		*SI-2204-1 Bus Termination*		*SI-2201-2 / SI-2201-3 Bus Termination*		
+ Input signal 1	**+L1-In**	**1**		**1**	White	
		4				
		7				
		10				
		13				
		16				
		2				
		5				
+ output signal 1	**+L1-Out**	**8**		**2**	Brown	
		11				
		14				
		17				
		3				
		6				
		9				
		12				
+25V (500mA max.)	**+25V**	**15**				
0V	**0V**	**18**				

SI-2204-1

Field connections

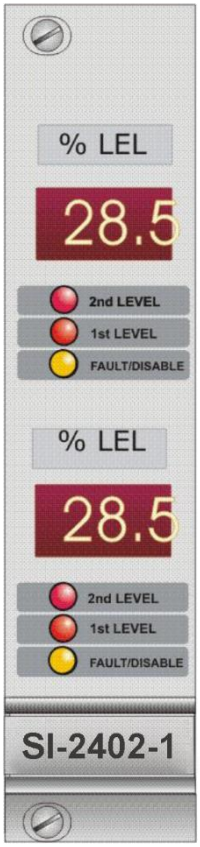
Standard connection diagrams



Standard connection diagram

Gas detection is not covered by the standards EN 54-2, EN-54-4 and EN 12094-1.

2.4.3 SI-2402-1 / SI-2402-2



Description

Safety related card with 2 x 4-20mA analog inputs and two thresholds to be programmed on the card through the operator cycle. The following transducer types can be connected to this card: Explosion Sensors, Air Quality Sensors, Oxygen Sensors, Temperature Sensors, 4-20mA General Sensors. The channel is continuously tested during operation. The card features 4-20mA outputs that provide the current value measured on the input. The analog value of each channel can be transferred to a DCS by means of the SI-2706-1 Modbus RTU card. This card can be duplicated for fault tolerant systems; in this case, the two cards shall be placed on two adjacent racks in the same position. In this configuration, the two detection lines are connected to both cards.

Technical features

- Safety rating: applicable up to SIL3
- Redundancy: SI-2402-2 model
- Alarm threshold: 2 programmable
- Channel test: continuously tested
- Measuring range 0-24mA
- Line short circuit condition: with current >23.5mA
- Supply voltage: 22-29VDC
- Quiescent current: 60mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing

Status Indications

Card front panel includes three LEDs and a three-digit display for each channel.

LEDs

Tag.	Indication
1st Level	Steady on if channel is in pre alarm condition
2nd Level	Steady on if channel is in alarm condition
Fault/Disabled	Flashing if channel is in fault condition Steady on if channel is disabled

Three-digit display

The three-digit display generally shows the measured value in the programmed format. Moreover, it shows some fault codes according to the following table.

Code	Channel Status
---	Initialization stage
F00	Card/channel not configured
F01	Line opening (current <1mA)
F02	Over current (current >23.5mA)
F03	Internal test failed
Fx.x	Device Fault (Note-A)
E00	Memory data error CRC
+/-999	Measured value

Note-A: For current values lower than the set Fault threshold and exceeding 1mA, the display will show the value of the measured current in mA preceded by letter F. Please refer to the manual of the connected device for identifying the type of anomaly.

The 3-digit display on card front panel does not provide the operator with fundamental information for the operator according to the standard EN-54-2.

Configuration

By using the configuration program ProS81, the following parameters can be set for each input channel:

Function	Allowed values
Operating mode	Latching/Non latching, UP/Down, NM Range
Mode of analog value transfer to Hosts	Upon request/Automatic in case of change
Unit of measure of the channel	Ppm, %LEL, %O2, mA, °C, RH, V, bar, db, rpm and others
Zero Point of the measuring range	-999÷+999
End of scale of the measuring range	-999÷+999
Pre-alarm threshold	-999÷+999
Alarm threshold	-999÷+999
Lower Fault threshold	1.0÷3.8mA
Alarm delay	0÷255 seconds
Type of indication	Fire, Supervisory, Gas, Fault, Hidden, Buzzer Only
Automatic alarm reset	Yes/No
Enable/Disable status export via ModBus	Yes/No
Enable/Disable channel status export to Hosts	No, TCP1, TCP2, RS232
Enable/Disable commands from Hosts	No, TCP1, TCP2, RS232
Defines the format of the analog value sent via ModBus, and automatically via Host	mA, mA tenth, VI, VI, tenth of converter points

Threshold setting

The following parameters can be set for each card through the configuration program or directly on the control panel in the operator cycle, access level 3:
- Pre-alarm threshold.
- Alarm threshold.
- Current value below which a Fault condition is signaled.
- Calibration mixture concentration value for end of scale calibration.

Zero point calibration

Calibrate the zero point as reported below:
- Disable the channel of the card to be calibrated from the operator cycle.
- Enter the diagnosis cycle of the card to be calibrated.
- Make sure that no gas is present near the sensor to be calibrated.
- Press the “1” key to calibrate the zero point of the channel 1.
- Press “0” to cancel the operation for the channel 1.
- Press the “5” key to calibrate the zero point of the channel 2.
- Press the “4” key to cancel the operation for the channel 2.
- Exit the card diagnosis cycle and enable the channel.

The zero point can be calibrated only with zero values ranging between 3 and 5mA.

End of scale calibration

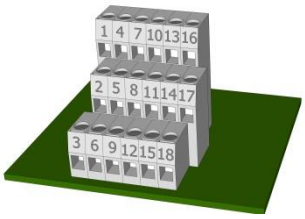
Calibrate the end of scale as follows:
- Disable the channel of the card to be calibrated from the operator cycle.
- Enter the diagnosis cycle of the card to be calibrated.
- Apply gas to the sensor according to the percentage set during configuration.
- Wait for the gas value measured by the card to stabilize.
- Press the key "3" to calibrate the end of scale for channel 1.
- Press "2" to cancel the operation for channel 1.
- Press the key "7" to calibrate the end of scale for channel 2.
- Press "6" to cancel the operation for channel 2.
- Exit the card diagnosis cycle and enable the channel.

The end of scale can be calibrated only if the current value measured by the card is ±3mA than the set calibration value.

Field connections

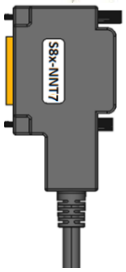
The connection between this card and field devices depends on the type of bus used.

With bus SI-2204-1 the I/O card is internally connected to one of the 8 terminal blocks with 18 screw terminals mounted on the PCB.

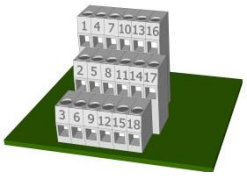


With bus SI-2201-2 The card is connected to the field terminal block by the S81-CCT7 4-conductor multipolar cable. For card redundant connection, use the S81-CCT7R cable.

With bus SI-2201-3 The card is connected to the field terminal block by the S81-NNT7 4-conductor multipolar cable. For card redundant connection, use the S81-NNT7R cable.



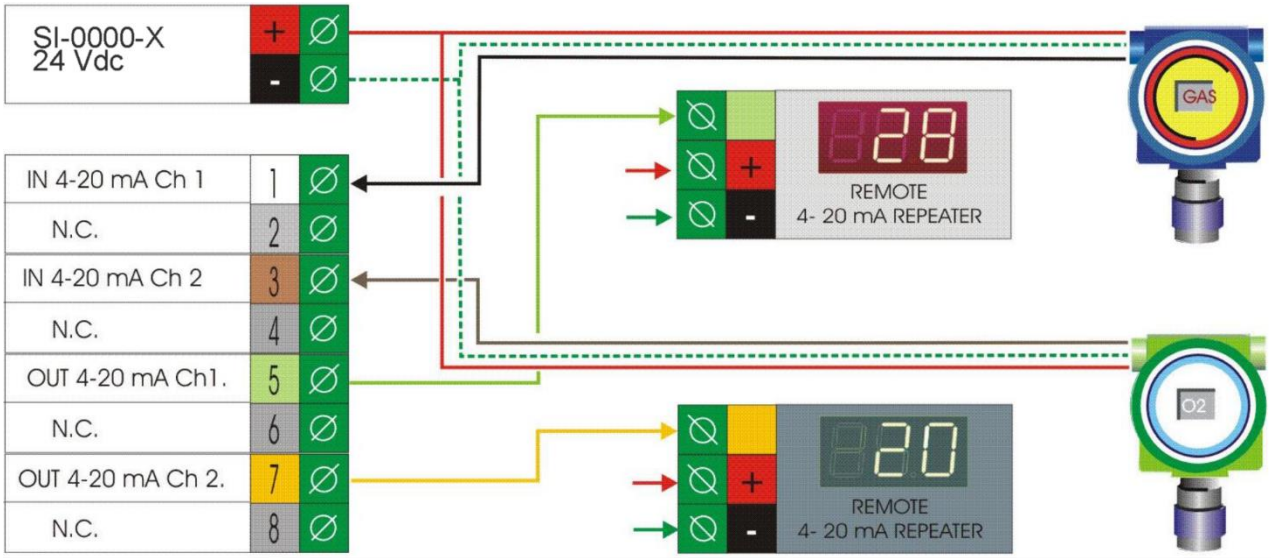
Connections

Function		*SI-2204-1 Bus Termination*		*SI-2201-2 / SI-2201-3 Bus Termination*		
+ Input signal 1	**+L1-In**	**1**		**1**	White	
		4				
		7				
		10				
+ Input signal 2	**+L2-In**	**13**		**2**	Brown	
		16				
		2				
		5				
+ output signal 1	**+L1-Out**	**8**		**3**	Green	
		11				
		14				
		17				
+ output signal 2	**+L2-Out**	**3**		**4**	Yellow	
		6				
		9				
		12				
+25V (500mA max.)	**+25V**	**15**				
0V	**0V**	**18**				

SI-2204-1

Field connections

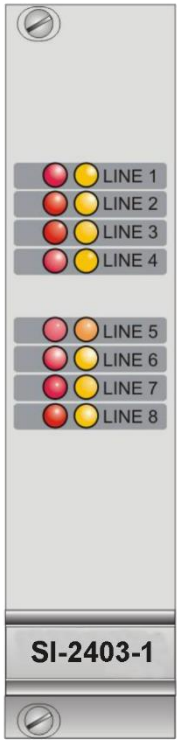
Standard connection diagrams



Standard connection diagram

Gas detection is not covered by the standards EN 54-2, EN-54-4 and EN 12094-1.

2.4.4 SI-2403-1 / SI-2403-2



Description

Safety related card with 8 x 4-20mA analog inputs and two thresholds to be programmed on the card through the operator cycle. The following transducer types can be connected to this card: Explosion Sensors, Air Quality Sensors, Oxygen Sensors, Temperature Sensors, 4-20mA General Sensors. The channels are continuously tested during operation. The analog value of each channel can be transferred to a DCS by means of the SI-2706-1 Modbus RTU card. This card can be duplicated in fault tolerant systems; in this case, the two cards shall be placed on two adjacent racks in the same position. In this configuration, the eight detection lines are connected to both cards.

Technical features

- Safety rating: applicable up to SIL3
- Redundancy: SI-2403-2 model
- Alarm threshold: 2 programmable thresholds for each channel
- Channel test: continuously
- Measuring range 0-24mA
- Line short circuit condition: with current >23.5mA
- Supply voltage: 22-29VDC
- Quiescent current: 13mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing

Status Indications

For each one of the eight channels, on the front panel, there are two status LEDs providing the following information:

Tag.	Indication
LINE 1…LINE 8	Flashing if channel is in pre alarm condition Steady on if channel is in alarm/active condition
LINE 1…LINE 8	Flashing if channel is in fault condition Steady on if channel is disabled

Configuration

By using the configuration program ProS81, the following parameters can be set for each input channel:

Function	Allowed values
Operating mode	Latching/Non latching, UP/Down, NM Range
Mode of analog value transfer to Hosts	Upon request/Automatic in case of change
Unit of measure of the channel	Ppm, %LEL, %O2, mA, °C, RH, V, bar, db, rpm
Zero Point of the measuring range	-999÷+999
End of scale of the measuring range	-999÷+999
Pre-alarm threshold	-999÷+999
Alarm threshold	-999÷+999
Lower Fault threshold	1.0÷3.8mA
Alarm delay	0÷255 seconds
Type of indication	Fire, Supervisory, Gas, Fault, Hidden, Buzzer Only
Automatic alarm reset	Yes/No
Enable/Disable status export via ModBus	Yes/No
Enable/Disable status export to Hosts	No, TCP1, TCP2, RS232
Enable/Disable commands from Hosts	No, TCP1, TCP2, RS232
Defines the format of the analog value sent via ModBus, and automatically via Host	mA, mA tenth, VI, VI, tenth of converter points

Threshold setting

The following parameters can be set for each card through the configuration program or directly on the control panel in the operator cycle, access level 3:
- Pre-alarm threshold.
- Alarm threshold.
- Current value below which a Fault condition is signaled.
- Calibration mixture concentration value for end of scale calibration.

Zero point calibration

Calibrate the zero point as reported below:
- Disable the channel of the card to be calibrated from the operator cycle.
- Enter the diagnosis cycle of the card to be calibrated.
- Disconnect the channel to be calibrated (1-8)
- Make sure that no gas is present near the sensor to be calibrated.
- Press the “1” key to calibrate the zero point of the channel.
- The new zero value is stored in the memory of the card.
- Press “0” to cancel the operation for the channel.
- Exit the card diagnosis cycle and enable the channel.

The zero point can be calibrated only with zero values ranging between 3 and 5mA.

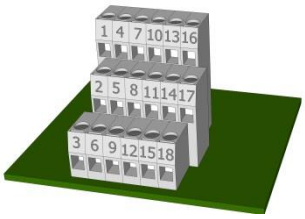
End of scale calibration

Calibrate the end of scale as follows:
- Disable the channel of the card to be calibrated from the operator cycle.
- Enter the diagnosis cycle of the card to be calibrated.
- Disconnect the channel to be calibrated (1-8)
- Apply gas to the sensor according to the percentage set during configuration.
- Wait for the gas value measured by the card to stabilize.
- Press the key “3” to calibrate the end of scale for the channel.
- Press “2” to cancel the operation for the channel.
- Exit the card diagnosis cycle and enable the channel.

The end of scale can be calibrated only if the current value measured by the card is ±3mA than the set calibration value.

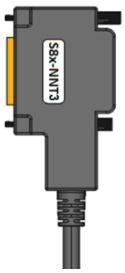
Field connections

The connection between this card and field devices depends on the type of bus used.



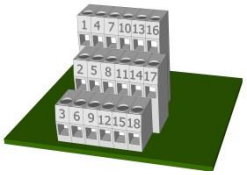
With bus SI-2204-1 the I/O card is internally connected to one of the 8 terminal blocks with 18 screw terminals mounted on the PCB.

With bus SI-2201-2 The card is connected to the field terminal block by the S81-CCT3 8-conductor multipolar cable. For card redundant connection, use the S81-CCT3R1 cable.



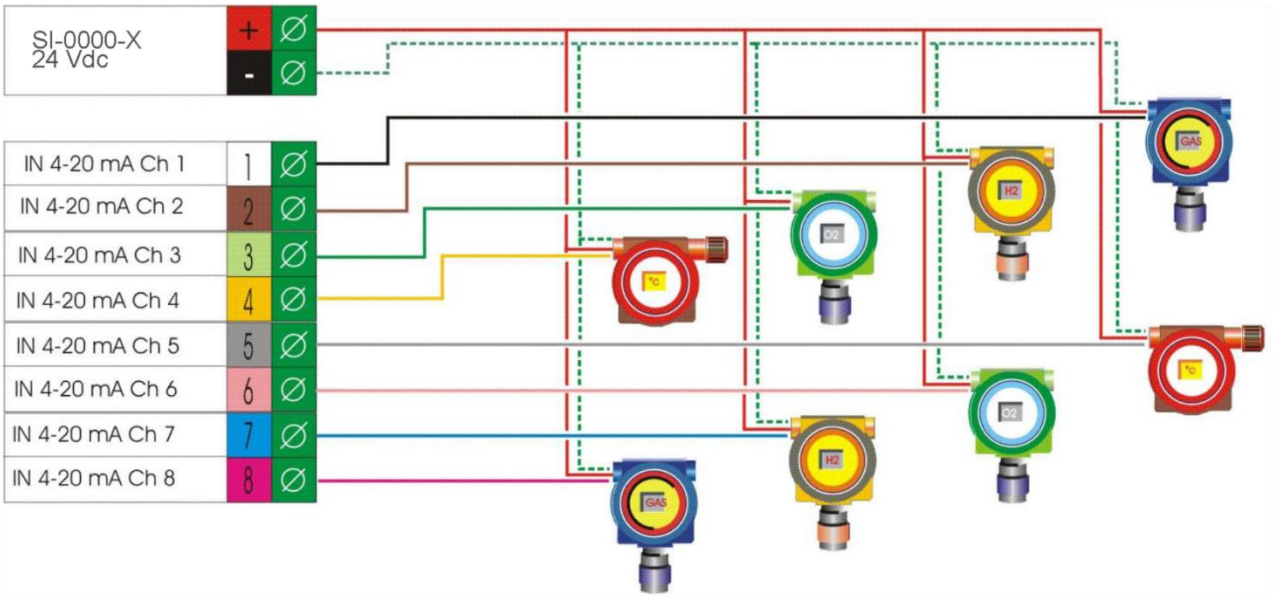
With bus SI-2201-3 The card is connected to the field terminal block by the S81-NNT3 8-conductor multipolar cable. For card redundant connection, use the S81-NNT3R1 cable.

Connections

Function		*SI-2204-1 Bus Termination*		*SI-2201-2 / SI-2201-3 Bus Termination*		
+ input signal 1	**+L1-In**	**1**	 **SI-2204-1**	**1**	White	
		4				
+ input signal 2	**+L2-In**	**7**		**2**	Brown	
		10				
+ input signal 3	**+L3-In**	**13**		**3**	Green	
		16				
+ input signal 4	**+L4-In**	**2**		**4**	Yellow	
		5				
+ input signal 5	**+L5-In**	**8**		**5**	Grey	
		11				
+ input signal 6	**+L6-In**	**14**		**6**	Pink	
		17				
+ input signal 7	**+L7-In**	**3**		**7**	Blue	
		6				
+ input signal 8	**+L8-In**	**9**		**8**	red	
		12				
+25V (500mA max.)	**+25V**	**15**				
0V	**0V**	**18**				

Field connections

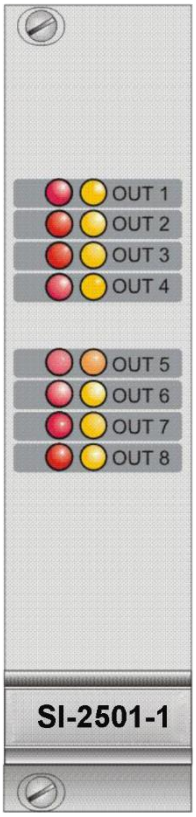
Standard connection diagrams



Standard connection diagram

Gas detection is not covered by the standards EN 54-2, EN-54-4 and EN 12094-1.

2.4.5 SI-2501-1 / SI-2501-2



Description

8 x 500 mA monitored control channels card. This is especially suited to control automatic fire extinguishing systems, and can be used both for controlling directional and releasing solenoid valves and evacuation visual and audible alarm devices. During operation, each channel is cyclically tested by the card through reversal of output signal for approximately 200 hundreds of microseconds. In case of difference between the set signal and the read one, the control panel promptly signals a fault. Several channels can be connected in parallel in order to increase the output current. This card can be duplicated in fault tolerant systems; in this case, the two cards shall be placed on adjacent racks in the same position. In this configuration, the eight output lines are connected to both cards.

Technical features

- Safety rating: applicable up to SIL3
- Redundancy: SI-2501-2 model
- Channel test: every 2 seconds
- Max. output current: 500mA
- Automatic output protection: Yes
- Supply voltage: 22-29VDC
- Quiescent current: 35mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing

Status Indications

For each one of the eight channels, on the front panel, there are two status LEDs providing the following information:

Tag.	Indication
OUT 1…OUT 8	Steady on if channel is in active condition
OUT 1…OUT 8	Flashing if channel is in fault condition Steady on if channel is disabled

Configuration

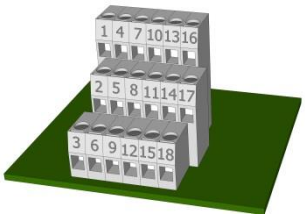
By using the configuration program ProS81, the following parameters can be set for each output channel:

Function	Mode
Operating mode	Continuous-Normally Energized, Continuous-Normally de-energized, Intermittent, Pulsing-1, Pulsing-2, ISA-1A Alarm Sequence, Delayed on activation, Delayed on enabling, Delayed on deactivation
Timing	1 to 255 seconds/minutes (only for pulsing and intermittent modes)
Output type	Normal / Sounder
Output status in case of CPU fault	Frozen in the last status / Off
Enable/Disable status export to Hosts	No, TCP1, TCP2, RS232
Enable/Disable commands from Hosts	No, TCP1, TCP2, RS232

Field connections

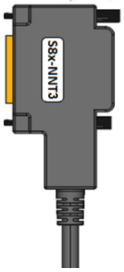
The connection between this card and field devices depends on the type of bus used.

With bus SI-2204-1 the I/O card is internally connected to one of the 8 terminal blocks with 18 screw terminals mounted on the PCB.

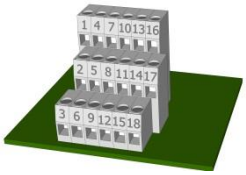


With bus SI-2201-2 The card is connected to the field terminal block by the S81-CCT3 8-conductor multipolar cable. For card redundant connection, use the S81-CCT3R cable.

With bus SI-2201-3 The card is connected to the field terminal block by the S81-NNT3 8-conductor multipolar cable. For card redundant connection, use the S81-NNT3R cable.



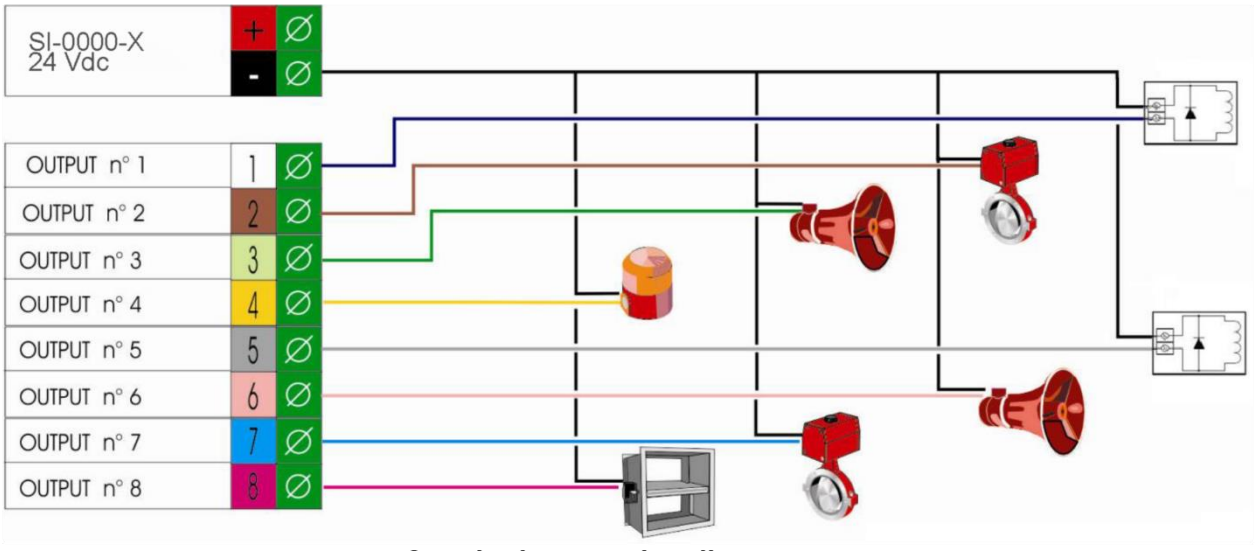
Connections

Function		*SI-2204-1 Bus Termination*		*SI-2201-2 / SI-2201-3 Bus Termination*		
+ Output 1	**+L1**	**1**	 **SI-2204-1**	**1**	White	
		4				
+ Output 2	**+L2**	**7**		**2**	Brown	
		10				
+ Output 3	**+L3**	**13**		**3**	Green	
		16				
+ Output 4	**+L4**	**2**		**4**	Yellow	
		5				
+ Output 5	**+L5**	**8**		**5**	Grey	
		11				
+ Output 6	**+L6**	**14**		**6**	Pink	
		17				
+ Output 7	**+L7**	**3**		**7**	Blue	
		6				
+ Output 8	**+L8**	**9**		**8**	Red	
		12				
+25V (500mA max.)	**+25V**	**15**				
0V	**0V**	**18**				

Field connections

To avoid excessive voltage drops it is recommended to connect outputs bridging two terminals on bus SI-2204-1. (1-4, 7-10, 13-16 etc.)

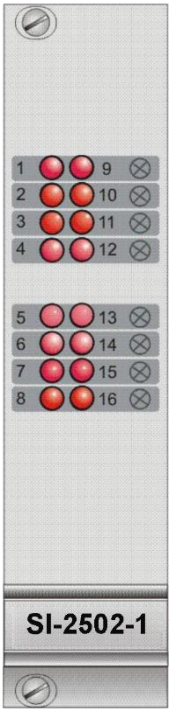
Standard connection diagrams



Standard connection diagram

The card can control resistive or inductive loads with a maximum current of 500mA. Should the card be used for controlling filament lamps, the maximum load power shall not exceed 4W.

2.4.6 SI-2502-1



Description

Card with sixteen non monitored 250mA open collector outputs. It is also used together with the SI-3807-2 16-relay termination board.

Technical features

- Redundancy: No
- Channel test: No
- Max. output current 250mA
- Automatic output protection No
- Supply voltage: 22-29VDC
- Quiescent current: 10mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing

Status Indications

For each one of the sixteen channels, on the front panel, there is one status LEDs providing the following information:

Tag.	Indication
1…16	Steady on if channel is in active condition

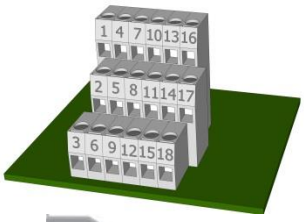
Configuration

By using the configuration program ProS81, the following parameters can be set for each output channel:

Function	Mode
Operating mode	Continuous-Normally Energized, Continuous-Normally de-energized, Intermittent, Pulsing-1, Pulsing-2, ISA-1A Alarm Sequence, Delayed on activation, Delayed on enabling, Delayed on deactivation
Timing	1 to 255 seconds/minutes (only for pulsing and intermittent modes)
Output type	Normal / Sounder
Output status in case of CPU fault	Frozen in the last status / Off
Enable/Disable status export to Hosts	No, TCP1, TCP2, RS232
Enable/Disable commands from Hosts	No, TCP1, TCP2, RS232

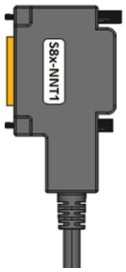
Field connections

The connection between this card and field devices depends on the type of bus used.

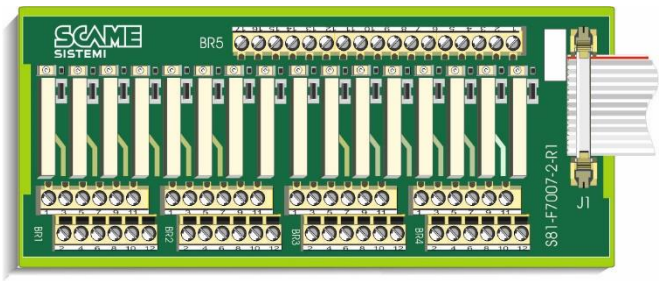


With bus SI-2204-1 the I/O card is internally connected to one of the 8 terminal blocks with 18 screw terminals mounted on the PCB.

With bus SI-2201-2 The card is connected to the field terminal block by the S81-CCT1 16-conductor multipolar cable.



With bus SI-2201-3 The card is connected to the field terminal block by the S81-NNT1 16-conductor multipolar cable.



In both cases the card can be connected to the SI-3807-2 16 relay termination board.

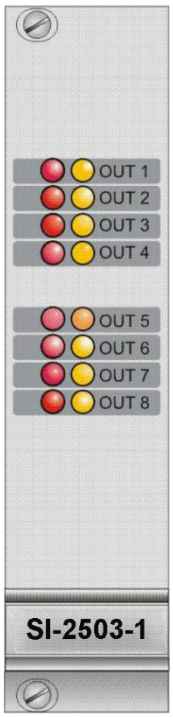
Connections

Function		*SI-2204-1 Bus Termination*		*SI-2201-2 / SI-2201-3 Bus Termination*			*SI-3807-2 Bus Termination*	
- Output 1	**-L1**	**1**		**1**	White		**1**	K1 relay
- Output 2	**-L2**	**4**		**2**	Brown		**2**	K2 relay
- Output 3	**-L3**	**7**		**3**	Green		**3**	K3 relay
- Output 4	**-L4**	**10**		**4**	Yellow		**4**	K4 relay
- Output 5	**-L5**	**13**		**5**	Grey		**5**	K5 relay
- Output 6	**-L6**	**16**		**6**	Pink		**6**	K6 relay
- Output 7	**-L7**	**2**		**7**	Blue		**7**	K7 relay
- Output 8	**-L8**	**5**		**8**	Red		**8**	K8 relay
- Output 9	**-L9**	**8**		**9**	Black		**9**	K9 relay
- Output 10	**-L10**	**11**		**10**	Violet		**10**	K10 relay
- Output 11	**-L11**	**14**		**11**	Grey/pink		**11**	K11 relay
- Output 12	**-L12**	**17**		**12**	Red/Blue		**12**	K12 relay
- Output 13	**-L13**	**3**	**SI-2204-1**	**13**	White/Green		**13**	K13 relay
- Output 14	**-L14**	**6**		**14**	Brown/ Green		**14**	K14 relay
- Output 15	**-L15**	**9**		**15**	White/ Yellow		**15**	K15 relay
- Output 16	**-L16**	**12**		**16**	Yellow/ Brown		**16**	K16 relay
+25V (500mA max.)	**+25V**	**15**		**17**	White / Grey		**17**	+25V (*)
0V	**0V**	**18**						

Field connections

(*) Only S81-CCT1 cables

2.4.7 SI-2503-1



Description

Card with 8 x 250 mA monitored output channels for sounder control. Outputs are controlled by two virtual channels for allowing both continuous and intermittent output control. Line is monitored by polarity reversal.

Technical features

- Redundancy: No
- Channel test: No
- Max. output current 250mA
- Automatic output protection Yes
- Supply voltage: 22-29VDC
- Quiescent current: 38mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing

Status Indications

For each one of the eight channels, on the front panel, there are two status LEDs providing the following information:

Tag.	Indication
OUT 1…OUT 8	Steady on if channel is in active condition
OUT 1…OUT 8	Flashing if channel is in fault condition Steady on if channel is disabled

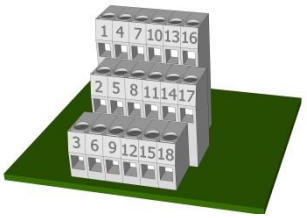
Configuration

By using the configuration program ProS81, the following parameters can be set for each output channel:

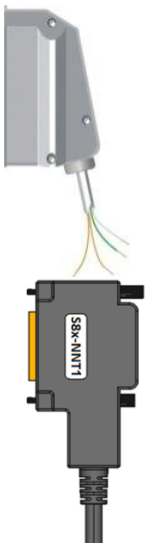
Function	Mode
Operating mode	Continuous-Normally Energized, Continuous-Normally de-energized, Intermittent, Pulsing-1, Pulsing-2, ISA-1A Alarm Sequence, Delayed on activation, Delayed on enabling, Delayed on deactivation , ANSI-S3.41, March
Timing	1 to 255 seconds
Output type	Normal / Sounder
Output status in case of CPU fault	Frozen in the last status / Off
Enable/Disable status export to Hosts	No, TCP1, TCP2, RS232
Enable/Disable commands from Hosts	No, TCP1, TCP2, RS232

Field connections

The connection between this card and field devices depends on the type of bus used.

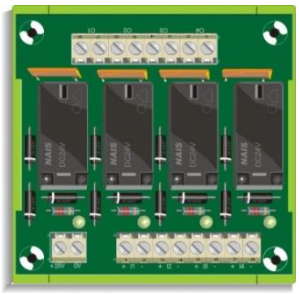


With bus SI-2204-1 the I/O card is internally connected to one of the 8 terminal blocks with 18 screw terminals mounted on the PCB.



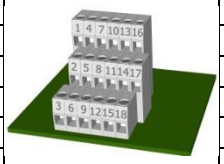
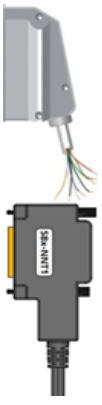
With bus SI-2201-2 The card is connected to the field terminal block by the S81-CCT1 16-conductor multipolar cable.

With bus SI-2201-3 The card is connected to the field terminal block by the S81-NNT1 16-conductor multipolar cable.



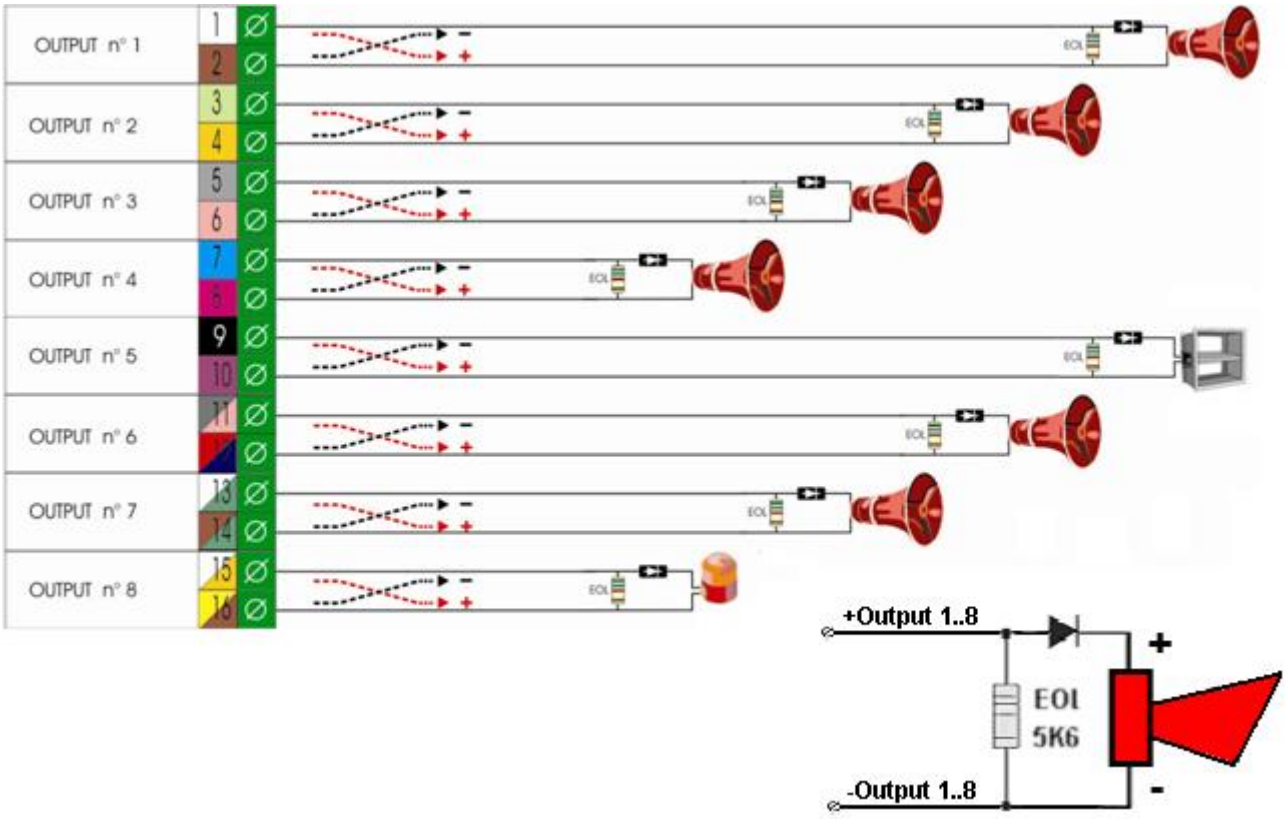
Should 250 mA per line not be enough, it will be possible to connect the optional termination board SI-3808-1 to card SI-2503-1. The former will add 4 x 2A at 24 VDC polarity reversal outputs.

Connections

Function		*SI-2204-1 Bus Termination*		*SI-2201-2 / SI-2201-3 Bus Termination*			*SI-3808-1 Bus Termination*	
Output 1	**+L1**	**1**		**1**	White		**+I1**	K1 relay Control
	-L1	**4**		**2**	Brown		**-I1**	
Output 2	**+L2**	**7**		**3**	Green		**+I2**	K2 relay Control
	-L2	**10**		**4**	Yellow		**-I2**	
Output 3	**+L3**	**13**		**5**	Grey		**+I3**	K3 relay Control
	-L3	**16**		**6**	Pink		**-I3**	
Output 4	**+L4**	**2**		**7**	Blue		**+I4**	K4 relay Control
	-L4	**5**		**8**	Red		**-I4**	
Output 5	**+L5**	**8**		**9**	Black			
	-L5	**11**	**SI-2204-1**	**10**	Violet			
Output 6	**+L6**	**14**		**11**	Grey/pink			
	-L6	**17**		**12**	Red/Blue			
Output 7	**+L7**	**3**		**13**	White/Green			
	-L7	**6**		**14**	Brown/ Green			
Output 8	**+L8**	**9**		**15**	White/ Yellow			
	-L8	**12**		**16**	Yellow/ Brown			
+25V (500mA max.)	**+25V**	**15**					**+25V**	+25V
0V	**0V**	**18**					**0V**	0V

Field connections

Standard connection diagrams



Standard connection diagram

2.4.8 SI-2504-1 / SI-2504-2

Description

4 x 2A monitored control channel card. This is especially suited to control automatic fire extinguishing systems, and can be used both for controlling directional and releasing solenoid valves and evacuation visual and audible alarm devices. During operation, each channel is cyclically tested by the card through reversal of output signal for approximately 200 hundreds of microseconds. In case of difference between the set signal and the read one, the control panel promptly signals a fault. Several channels can be connected in parallel in order to increase the output current. This card can be duplicated in fault tolerant systems; in this case, the two cards shall be placed on adjacent racks in the same position. In this configuration, the eight output lines are connected to both cards.

Technical features

- Safety rating: applicable up to SIL3
- Redundancy: SI-2504-2 model
- Channel test: every 2 seconds
- Max. output current 2A
- Automatic output protection Yes
- Supply voltage: 22-29VDC
- Quiescent current: 20mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing

Status Indications

For each one of the four channels, on the front panel, there are two status LEDs providing the following information:

Tag.	Indication
OUT 1…OUT 4	Steady on if channel is in active condition
OUT 1…OUT 4	Flashing if channel is in fault condition Steady on if channel is disabled

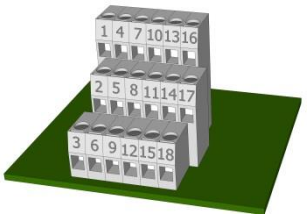
Configurations

By using the configuration program ProS81, the following parameters can be set for each output channel:

Function	Mode
Operating mode	Continuous-Normally Energized, Continuous-Normally de-energized, Intermittent, Pulsing-1, Pulsing-2, ISA-1A Alarm Sequence, Delayed on activation, Delayed on enabling, Delayed on deactivation
Timing	1 to 255 seconds/minutes (only for pulsing and intermittent modes)
Output type	Normal / Sounder
Output status in case of CPU fault	Frozen in the last status / Off
Enable/Disable status export to Hosts	No, TCP1, TCP2, RS232
Enable/Disable commands from Hosts	No, TCP1, TCP2, RS232

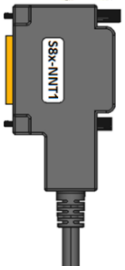
Field connections

The connection between this card and field devices depends on the type of bus used.



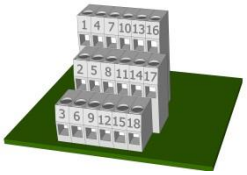
With bus SI-2204-1 the I/O card is internally connected to one of the 8 terminal blocks with 18 screw terminals mounted on the PCB.

With bus SI-2201-3 the card is connected to the field terminal block by the S81-NNT4 4-conductor multipolar cable. For card redundant connection, use the S81-NNT4R cable.



With bus SI-2201-3 the card is connected to the field terminal block by the S81-NNT4 4-conductor multipolar cable. For card redundant connection, use the S81-NNT4R cable.

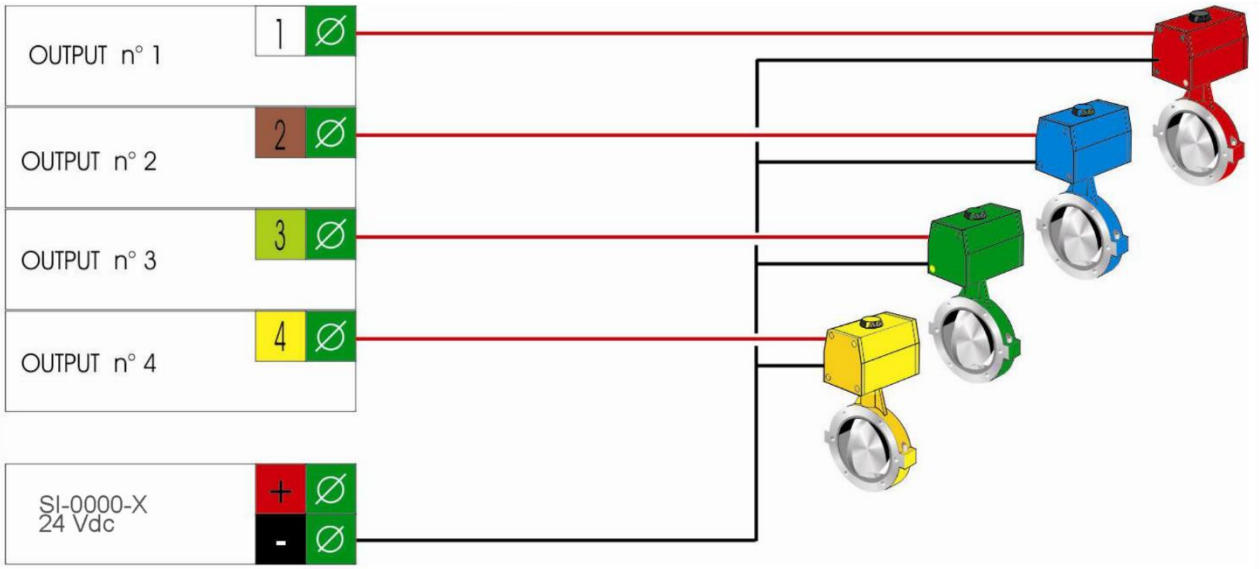
Connections

Function		*SI-2204-1 Bus Termination*		*SI-2201-2 / SI-2201-3 Bus Termination*		
+ Output 1	**+L1**	**1**		**1**	White	
		4				
+ Output 2	**+L2**	**7**		**2**	Brown	
		10				
+ Output 3	**+L3**	**13**		**3**	Green	
		16				
+ Output 4	**+L4**	**2**		**4**	Yellow	
		5				
		8				
		11				
		14				
		17				
		3	**SI-2204-1**			
		6				
		9				
		12				
+25V (500mA max.)	**+25V**	**15**				
0V	**0V**	**18**				

Field connections

To avoid excessive voltage drops it is recommended to connect outputs bridging two terminals on bus SI-2204-1. (1-4, 7-10, 13-16 etc.)

Standard connection diagrams



Standard connection diagram

The card can control resistive or inductive loads with a maximum current of 2A. Should the card be used for controlling filament lamps, the maximum load power shall not exceed 10W.

2.4.9 SI-2601-1

Description

This card is used for controlling the logic and indications of a certain fire extinguishing zone in compliance with the requirements of the EN12094-1 standard. It controls eleven output variables and seven input variables. It controls some fire extinguishing system typical logics, such as discharge delay and reset inhibit time. This card checks the status of the inputs and outputs physically located on other cards by using virtual channels.

Technical features

- Safety rating: applicable up to SIL3
- Redundancy: Yes
- Max. output current 250mA
- Automatic output protection No
- Supply voltage: 22-29VDC
- Quiescent current: 10mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing

Status Indications

The front panel includes 8 status LEDs with the following functions:

Tag.	Indication
Activated	Flashing in pre-activated condition Steady on under "activated" condition. It goes out in case of reset.
Released	Steady on under "released" condition. It goes out in case of reset.
Fault	Flashing in case of Fault in the fire extinguishing zone.
Disabled	Steady on if a fire extinguishing zone is disabled
Inhibit	Steady on under "inhibit" condition.
Hold	Steady on under "Hold" condition.
Aut. Off	Steady on under "Automatic exclusion" condition
Res. Bank	Steady on when the reserve bank is selected

Virtual channels

The card controls the following variables:

Variable	Type	Description	Type	Description
V1	In	"Activated" condition	Out	Manual activation
V2	In	Main primary discharge	Out	Automatic activation
V3	In	Reserve primary discharge	Out	Automatic exclusion
V4	In	Main secondary discharge	Out	Emergency hold
V5	In	Reserve secondary discharge	Out	Release inhibition
V6	In	Continuous audible indications	Out	Reserve bank
V7	In	Intermittent audible indications	Out	Secondary discharge
V8	In		Out	Triggered system
V9	In		Out	General Fault
V10	In		Out	General disable
V11	In		Out	“Pre-activated” condition

Configuration

By using the ProS81 configuration program, the following parameters can be set for each virtual channel:

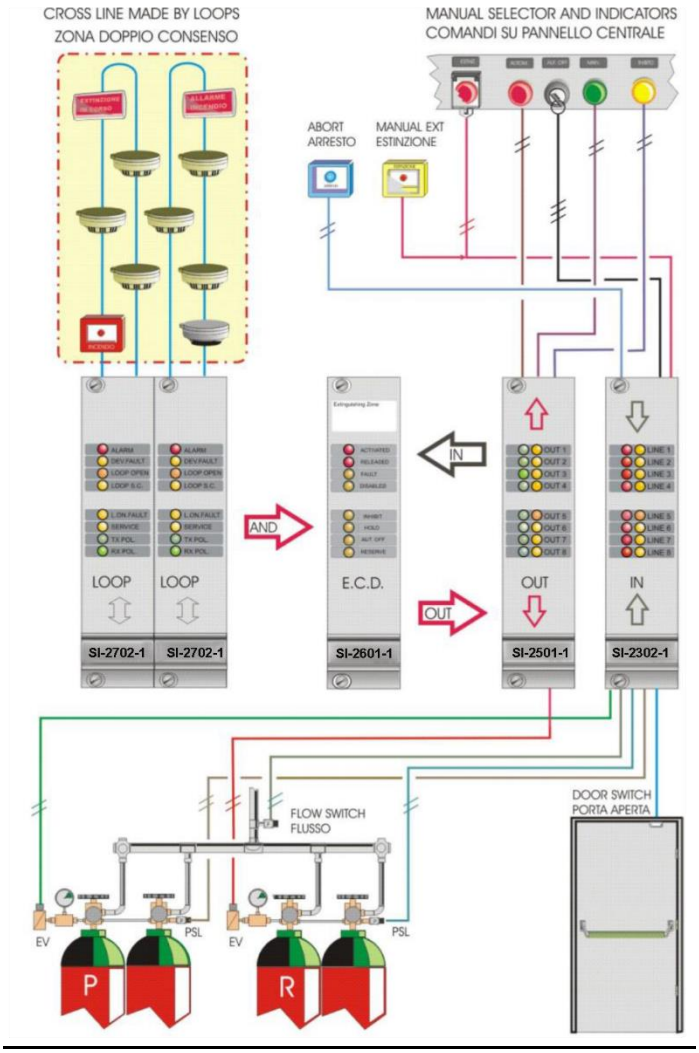
Function	Type	Mode
Operating mode	Sensors	NO
Activates/alarmed condition	Sensors	Non Latching
Type of indication	Sensors	Fire, Supervisory, Gas, Fault, Hidden, Buzzer Only
Operating mode	Actuators	Continuous-Normally De-energized
Output type	Actuators	Normal
Enable/Disable status export to Hosts	Sensors/Actuators	No, TCP1, TCP2, RS232
Enable/Disable commands from Hosts	Sensors/Actuators	No, TCP1, TCP2, RS232

The following parameters can be set for each card through the configuration program or directly on the control panel in the operator cycle, access level 3:

Parameter	Mode
Release delay time	0-60 seconds
Reset inhibit time	1-30 minutes
Hold operating mode	Mode-A / Mode-B / Modo C (UL)

Field connections

This card does not feature any field connections, and therefore requires no terminations.



Fire extinguishing system

2.4.10 SI-2602-1

Description

Logic card able to control 100 S-R flip flops, 100 toggles and 100 timers. Timers can be configured for two operating modes (Mode-A and Mode-B)

Technical features

- Redundancy: Yes
- Maximum number of S-R flip flops 100
- Maximum number of logic Toggles 100
- Maximum number of Timers 100
- Timer range 0-255 seconds
- Supply voltage: 22-29VDC
- Quiescent current: 9mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing

Status Indications

The front panel includes four LEDs with the following functions:

Tag.	Indication
F1	Steady on if a logic function input variable is active
F2	Steady on if a logic function output variable is active
F3	Flashing during Timer count.
Disabled	Steady on if an input or output variable is disabled

Configuration

By using the ProS81 configuration program, the following parameters can be set for each virtual channel:

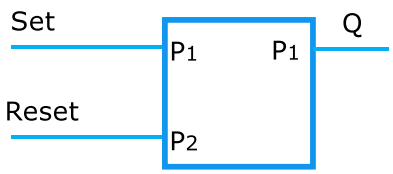
Parameter	Type	Mode
Type	Sensors	Flip Flop / Toggle / Timer
Mode	Sensors	A / B (Only for Timer types)
Alarm delay	Sensors	0-255 seconds (Only for Flip Flop and Timer types)
Type of indication	Sensors	Fire, Supervisory, Gas, Fault, Hidden, Buzzer Only
Enable/Disable status export to Hosts	Sensors/Actuators	No, TCP1, TCP2, RS232
Enable/Disable commands from Hosts	Sensors/Actuators	No, TCP1, TCP2, RS232

Logic function virtual inputs are set in zone outputs, whereas logic function virtual outputs are set in zone sensors.

Logic Functions

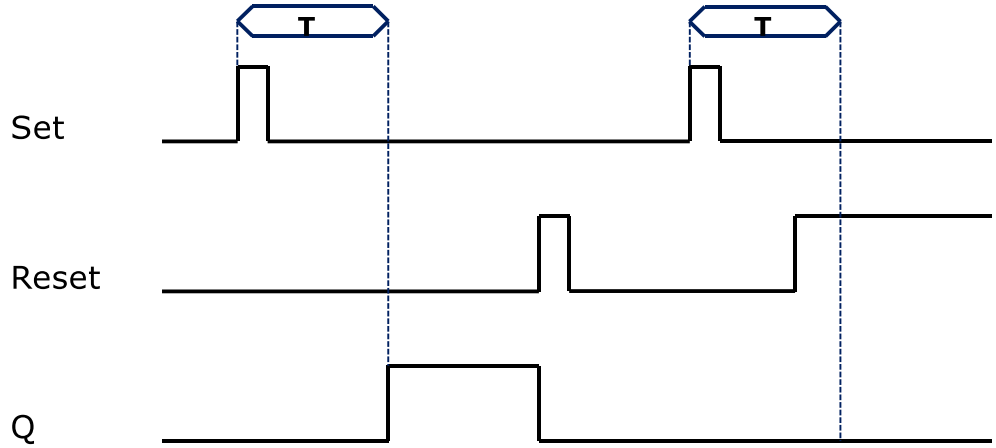
The following time diagrams describe in detail the operation of the various logic functions of the card.

S-R Flip Flop Function

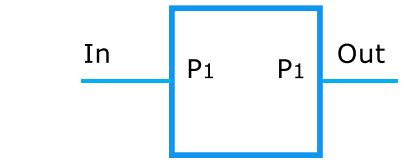


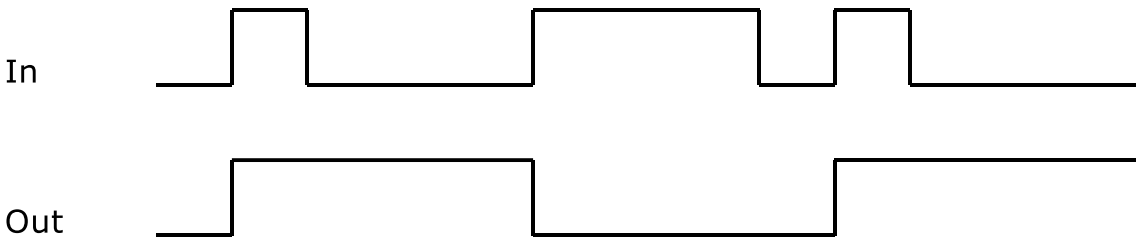
Set	Reset	Q
0	0	0
1	0	1*
0	1	0
1	1	0

*** After T period**

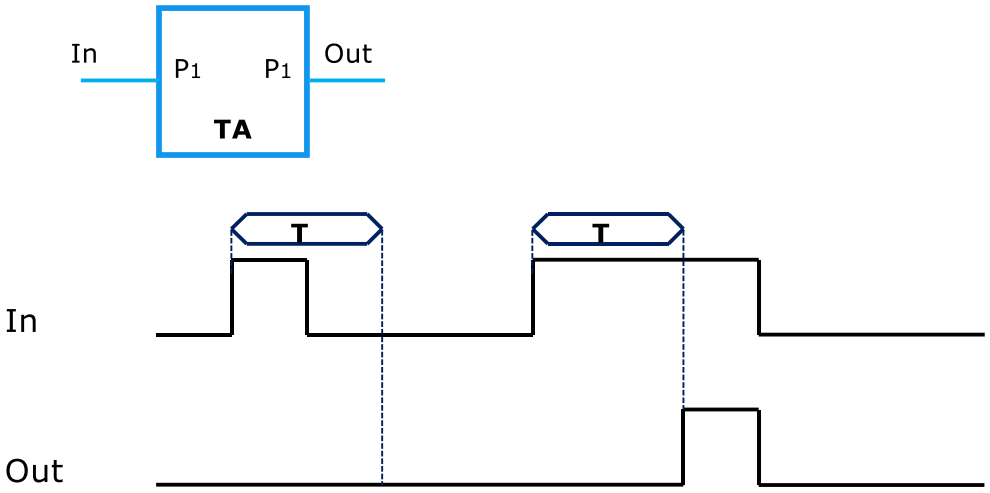


Toggle Function

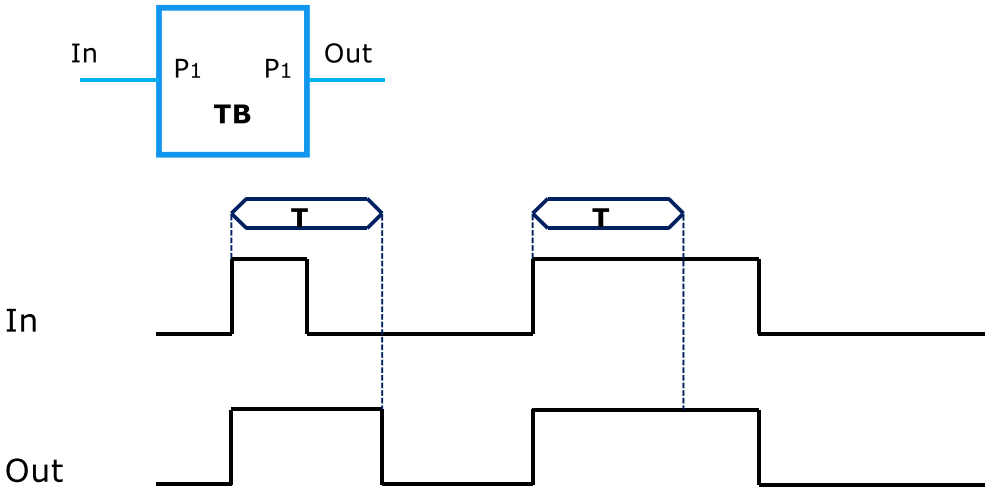




Timer Function (Mode-A)



Timer Function (Mode-B)



Field connections

This card does not feature any field connections, and therefore requires no terminations.

2.4.11 SI-2702-1

Description

Control card for addressable devices using Hochiki ESP protocol. This card can control up to a maximum of 127 fire detection addressable devices including: smoke, heat, combined detectors, alarm buttons, control modules, visual and audible alarm devices.

Technical features

- Redundancy: No
- Maximum number of devices per loop 127
- Loop maximum current 400mA
- Supply voltage: 22-29VDC
- Quiescent current: 90mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing

Status Indications

The front panel includes 8 LEDs with the following functions:

Tag.	Indication
Active	Steady on if an input is under alarmed/activated condition
Disabled	Steady on if an input or an output is disabled
Fault	Flashing in case of Fault condition
Loop Fault	Flashing in case of loop short circuit or open loop
Log on Fault	Flashing in case of difference between the detected devices and the programmed ones.
Service	Flashing in case of in case of smoke detectors with dirty lenses
TX Pol.	It lights up every time data are transmitted from the card to loop devices.
RX Pol.	It lights up every time data from loop devices are received

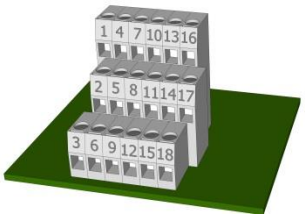
Configuration

By using the configuration program ProS81, the following parameters can be set for each point of the single devices, according to the relevant type:

Parameter	Type	Mode
Operating mode	Sensors	Latching-NO, Latching-NC, Non-Latching-NO, Non-Latching-NC
Sensitivity	Sensors	3 sensitivity levels to be selected
Measuring range	Sensors	See table
Pre-alarm threshold	Sensors	According to the selected measuring range
Alarm threshold	Sensors	According to the selected measuring range
Type of indication	Sensors	Fire, Supervisory, Gas, Fault, Hidden, Buzzer Only
Automatic alarm reset	Sensors	Yes/No
Operating mode	Actuators	Continuous-Normally Energized, Continuous-Normally De-energized, Intermittent, Pulsing
Timing	Actuators	1 to 15 seconds (only for pulsing and intermittent modes)
Output type	Actuators	Normal / Sounder
Sounder tone	Actuators	7 selectable tones
Sounder volume	Actuators	50,55,60,70,78,80,85,88,90,93,94,95,98 decibels
Enable/Disable status export to Hosts	Sensors/Actuators	No, TCP1, TCP2, RS232
Enable/Disable commands from Hosts	Sensors/Actuators	No, TCP1, TCP2, RS232

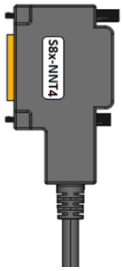
Field connections

The connection between this card and field devices depends on the type of bus used.



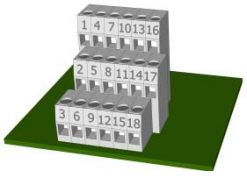
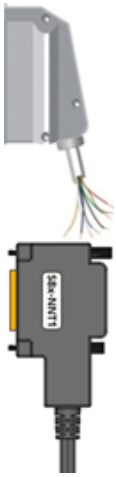
With bus SI-2204-1 the I/O card is internally connected to one of the 8 terminal blocks with 18 screw terminals mounted on the PCB.

With bus SI-2201-3 the card is connected to the field terminal block by the S81-NNT4 4-conductor multipolar cable.



With bus SI-2201-3 the card is connected to the field terminal block by the S81-CCT4 4-conductor multipolar cable.

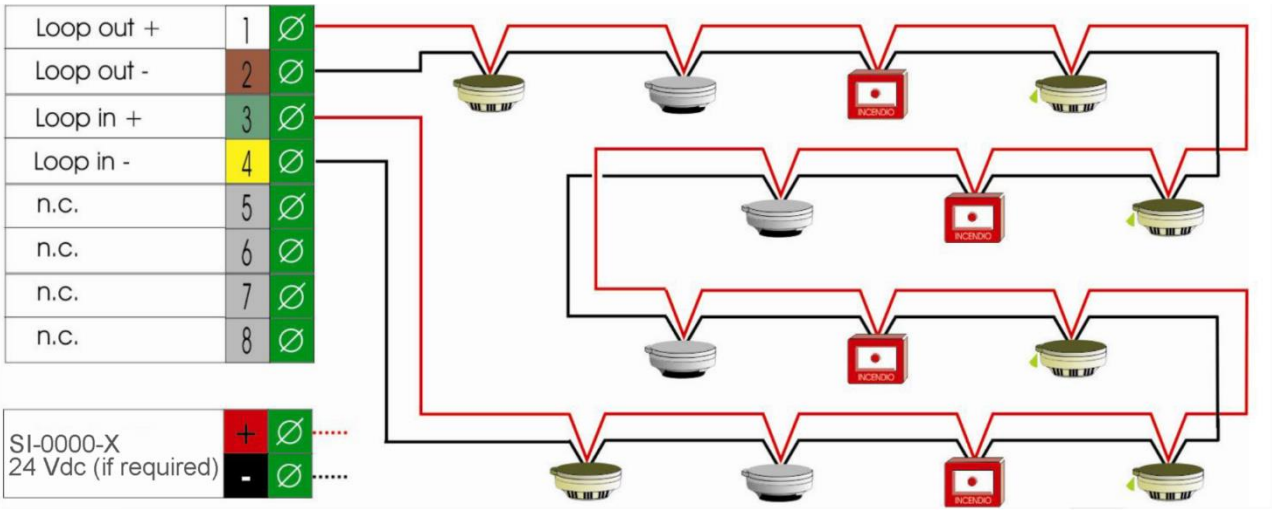
Connections

Function		*SI-2204-1 Bus Termination*		*SI-2201-2 / SI-2201-3 Bus Termination*		
+ Loop Out	**+Lout**	**1**		**1**	White	
		4				
- Loop Out	**-Lout**	**7**		**2**	Brown	
		10				
+ Loop In	**+Lin**	**13**		**3**	Green	
		16				
- Loop In	**-Lin**	**2**		**4**	Yellow	
		5				
		8				
		11				
		14				
		17				
		3	**SI-2204-1**			
		6				
		9				
		12				
+25V (500mA max.)	**+25V**	**15**				
0V	**0V**	**18**				

Field connections

To avoid excessive voltage drops it is recommended to connect outputs bridging two terminals on bus SI-2204-1. (1-4, 7-10, 13-16 etc.)

Standard connection diagrams



Loop standard connection diagram

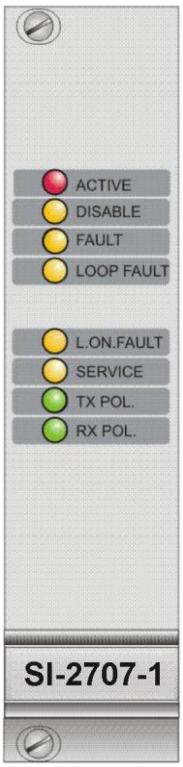
For compliance to EN-54-2 at least one short circuit isolator shall be installed every 32 devices and/or manual call points.

To avoid potential issues it is recommended to install short circuit isolators at the field terminals inside the panel enclosure on both branches of the loop (Loop in and Loop out). If it is not possible due to space constraints, install the SCIs at the nearest available point, ensuring that the cables from the panel to the SCIs are protected as to avoid any mechanical damage or external inference potentially causing short or partial short circuits

Supported devices

For the list of devices supported by this card, refer to Appendix B.2

2.4.12 SI-2707-1



Description

Control card for addressable devices using SSP protocol. The card is able to control up to 127 addressable devices and is mainly used for controlling technological signals. This type of card shall not be used to connect fire detection devices.

Technical features

- Redundancy: No
- Number of devices per loop 127
- Loop maximum current 250mA
- Supply voltage: 22-29VDC
- Quiescent current: 70mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing

Status Indications

The front panel includes 8 LEDs with the following functions:

Tag.	Indication
Active	Steady on if an input is under alarmed/activated condition
Disabled	Steady on if an input or an output is disabled
Fault	Flashing in case of Fault condition
Loop Fault	Flashing in case of loop short circuit or open loop
Log on Fault	Flashing in case of difference between the detected devices and the programmed ones.
Service	Flashing in case of in case of smoke detectors with dirty lenses
TX Pol.	It lights up every time data are transmitted from the card to loop devices.
RX Pol.	It lights up every time data from loop devices are received

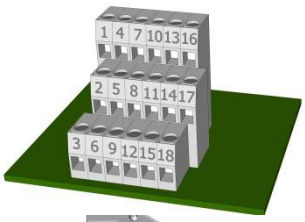
Configuration

By using the configuration program ProS81, the following parameters can be set for each point of the single devices, according to the relevant type:

Parameter	Type	Mode
Operating mode	Sensors	Latching-NO, Latching-NC, Non-Latching-NO, Non-Latching-NC
Measuring range	Sensors	See table
Pre-alarm threshold	Sensors	According to the selected measuring range
Alarm threshold	Sensors	According to the selected measuring range
Type of indication	Sensors	Fire, Supervisory, Gas, Fault, Hidden, Buzzer Only
Automatic alarm reset	Sensors	Yes/No
Operating mode	Actuators	Continuous-Normally Energized, Continuous-Normally De-energized, Intermittent, Pulsing
Timing	Actuators	1 to 255 seconds (only for pulsing and intermittent modes)
Enable/Disable status export to Hosts	Sensors/Actuators	No, TCP1, TCP2, RS232
Enable/Disable commands from Hosts	Sensors/Actuators	No, TCP1, TCP2, RS232

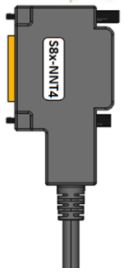
Field connections

The connection between this card and field devices depends on the type of bus used.



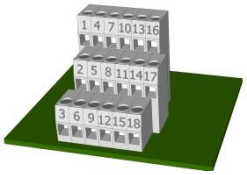
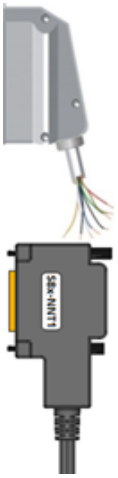
With bus SI-2204-1 the I/O card is internally connected to one of the 8 terminal blocks with 18 screw terminals mounted on the PCB.

With bus SI-2201-2 the card is connected to the field terminal block by the S81-CCT4 4-conductor multipolar cable.



With bus SI-2201-3 the card is connected to the field terminal block by the S81-NNT4 4-conductor multipolar cable.

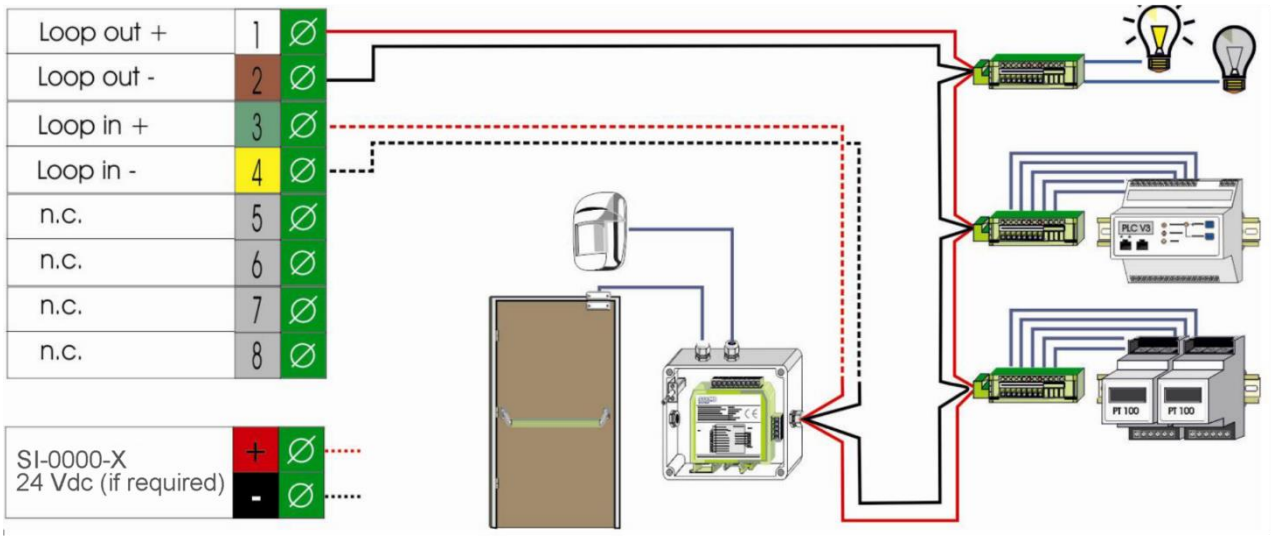
Connections

Function		*SI-2204-1 Bus Termination*		*SI-2201-2 / SI-2201-3 Bus Termination*		
+ Loop Out	**+Lout**	**1**		**1**	White	
		4				
- Loop Out	**-Lout**	**7**		**2**	Brown	
		10				
+ Loop In	**+Lin**	**13**		**3**	Green	
		16				
- Loop In	**-Lin**	**2**		**4**	Yellow	
		5				
		8				
		11				
		14				
		17				
		3	**SI-2204-1**			
		6				
		9				
		12				
+25V (500mA max.)	**+25V**	**15**				
0V	**0V**	**18**				

Field connections

To avoid excessive voltage drops it is recommended to connect outputs bridging two terminals on bus SI-2204-1. (1-4, 7-10, 13-16 etc.)

Standard connection diagrams

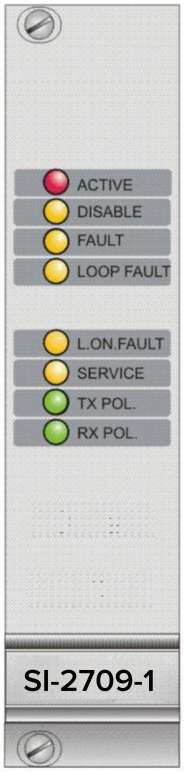


Standard connection diagram of technological controls

Supported devices

For the list of devices supported by this card, refer to Appendix B.3

2.4.13 SI-2709-1



Description

Control card for SHIELD addressable devices. This card can control up to a maximum of 126 fire detection devices including: smoke, heat, combined detectors, alarm buttons, control modules, visual and audible alarm devices.

Technical features

- Redundancy: No
- Number of devices per loop 126
- Loop maximum current 400mA
- Supply voltage: 22-29VDC
- Quiescent current: 90mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing

Status Indications

The front panel includes 8 LEDs with the following functions:

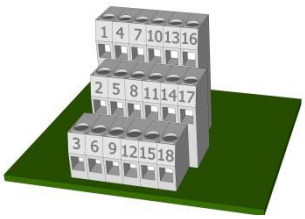
Tag.	Indication
Active	Steady on if an input is under alarmed/activated condition
Disabled	Steady on if an input or an output is disabled
Fault	Flashing in case of Fault condition
Loop Fault	Flashing in case of loop short circuit or open loop
Log on Fault	Flashing in case of difference between the detected devices and the programmed ones.
Service	Flashing in case of in case of smoke detectors with dirty lenses
TX Pol.	It lights up every time data are transmitted from the card to loop devices.
RX Pol.	It lights up every time data from loop devices are received

Configuration

By using the configuration program ProS81, the following parameters can be set for each point of the single devices, according to the relevant type:

Parameter	Type	Mode
Operating mode	Sensors	Latching-NO, Latching-NC, Non-Latching-NO, Non-Latching-NC
Sensitivity	Sensors	5 sensitivity levels to be selected
Type of indication	Sensors	Fire, Supervisory, Gas, Fault, Hidden, Buzzer Only
Automatic alarm reset	Sensors	Yes/No
Operating mode	Actuators	Continuous-Normally Energized, Continuous-Normally De-energized, Intermittent, Pulsing
Timing	Actuators	1 to 15 seconds (only for pulsing and intermittent modes)
Output type	Actuators	Normal / Sounder
Sounder tone	Actuators	15 selectable tones
Sounder volume	Actuators	7 selectable volume levels
Polling LED	Sensors/Actuators	Enable/Disable LED lighting up during polling
Enable/Disable status export to Hosts	Sensors/Actuators	No, TCP1, TCP2, RS232
Enable/Disable commands from Hosts	Sensors/Actuators	No, TCP1, TCP2, RS232

Field connections

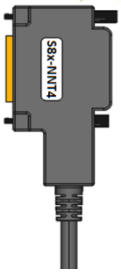


The connection between this card and field devices depends on the type of bus used.

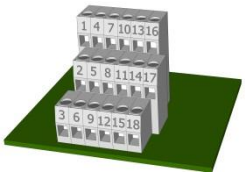
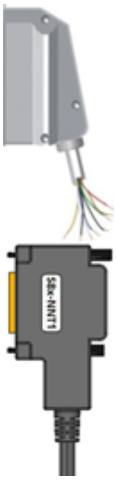
With bus SI-2204-1 the I/O card is internally connected to one of the 8 terminal blocks with 18 screw terminals mounted on the PCB.

With bus SI-2201-2 the card is connected to the field terminal block by the S81-CCT4 4-conductor multipolar cable.

With bus SI-2201-3 the card is connected to the field terminal block by the S81-NNT4 4-conductor multipolar cable



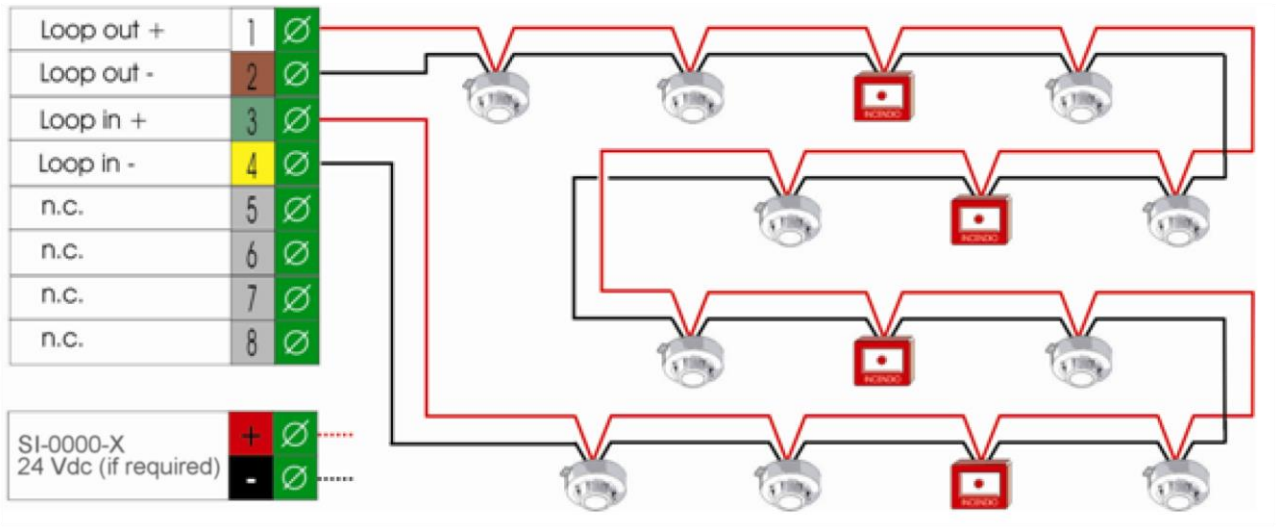
Connections

Function		*SI-2204-1 Bus Termination*		*SI-2201-2 / SI-2201-3 Bus Termination*		
+ Loop Out	**+Lout**	**1**	 **SI-2204-1**	**1**	White	
		4				
- Loop Out	**-Lout**	**7**		**2**	Brown	
		10				
+ Loop In	**+Lin**	**13**		**3**	Green	
		16				
- Loop In	**-Lin**	**2**		**4**	Yellow	
		5				
		8				
		11				
		14				
		17				
		3				
		6				
		9				
		12				
+25V (500mA max.)	**+25V**	**15**				
0V	**0V**	**18**				

Field connections

To avoid excessive voltage drops it is recommended to connect outputs bridging two terminals on bus SI-2204-1. (1-4, 7-10, 13-16 etc.)

Standard connection diagrams



Loop standard connection diagram

For compliance to EN-54-2 at least one short circuit isolator shall be installed every 32 devices and/or manual call points.

To avoid potential issues it is recommended to install short circuit isolators at the field terminals inside the panel enclosure on both branches of the loop (Loop in and Loop out). If it is not possible due to space constraints, install the SCIs at the nearest available point, ensuring that the cables from the panel to the SCIs are protected as to avoid any mechanical damage or external inference potentially causing short or partial short circuits

Supported devices

For the list of devices supported by this card, refer to Appendix B.5

2.4.14 SI-2710-1

Description

Control card for addressable devices using System Sensor protocol. This card can control up to a maximum of 188 fire detection devices including: smoke, heat, combined detectors, alarm buttons, control modules, visual and audible alarm devices.

Technical features

- Redundancy: No
- Operating modes: Configuration via software.
- Number of devices per loop 99 modules + 99 sensors
- Loop maximum current 500mA
- Supply voltage: 22-29VDC
- Quiescent current: 39mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing
- Hot swap capability: yes

Status Indications

The front panel includes 8 LEDs with the following functions:

Tag.	Indication
Active	Steady on if an input is under alarmed/activated condition
Disabled	Steady on if an input or an output is disabled
Fault	Flashing in case of Fault condition
Loop Fault	Flashing in case of loop short circuit or open loop
Log on Fault	Flashing in case of difference between the detected devices and the programmed ones.
Service	Flashing in case of in case of smoke detectors with dirty lenses
TX Pol.	It lights up every time data are transmitted from the card to loop devices.
RX Pol.	It lights up every time data from loop devices are received

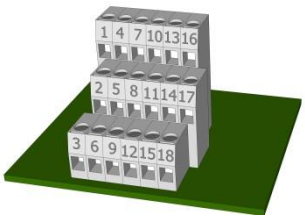
Configuration

By using the configuration program ProS81, the following parameters can be set for each point of the single devices, according to the relevant type:

Parameter	Type	Mode
Operating mode	Sensors	Latching-NO, Latching-NC, Non-Latching-NO, Non-Latching-NC
Sensitivity	Sensors	5 or 9 sensitivity levels to be selected
Polling priority for call points	Sensors	Normal, High
Unit of measure of the channel	Sensors	Ppm, %LEL, %O2, mA, °C, RH, V, bar, db, rpm
Zero Point	Sensors	-500÷+500
End of scale	Sensors	-500÷+500
Pre-alarm threshold	Sensors	-500÷+500
Alarm threshold	Sensors	-500÷+500
Lower Fault threshold	Sensors	1.0÷3.8mA
Type of indication	Sensors	Fire, Supervisory, Gas, Fault, Hidden, Buzzer Only
Automatic alarm reset	Sensors	Yes/No
Operating mode	Actuators	Continuous-Normally Energized, Continuous-Normally De-energized, Intermittent, Pulsing
Timing	Actuators	1 to 15 seconds (only for pulsing and intermittent modes)
Output type	Actuators	Normal / Sounder
Polling LED	Sensors/Actuators	Enable/Disable LED lighting up during polling

Enable/Disable status export to Hosts	Sensors/Actuators	No, TCP1, TCP2, RS232
Enable/Disable commands from Hosts	Sensors/Actuators	No, TCP1, TCP2, RS232

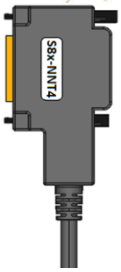
Field connections



The connection between this card and field devices depends on the type of bus used.

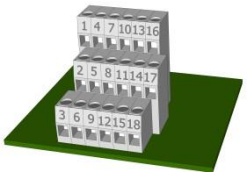
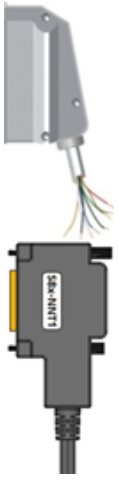
With bus SI-2204-1 the I/O card is internally connected to one of the 8 terminal blocks with 18 screw terminals mounted on the PCB.

With bus SI-2201-2 the card is connected to the field terminal block by the S81-CCT4 4-conductor multipolar cable.



With bus SI-2201-3 the card is connected to the field terminal block by the S81-NNT4 4-conductor multipolar cable.

Connections

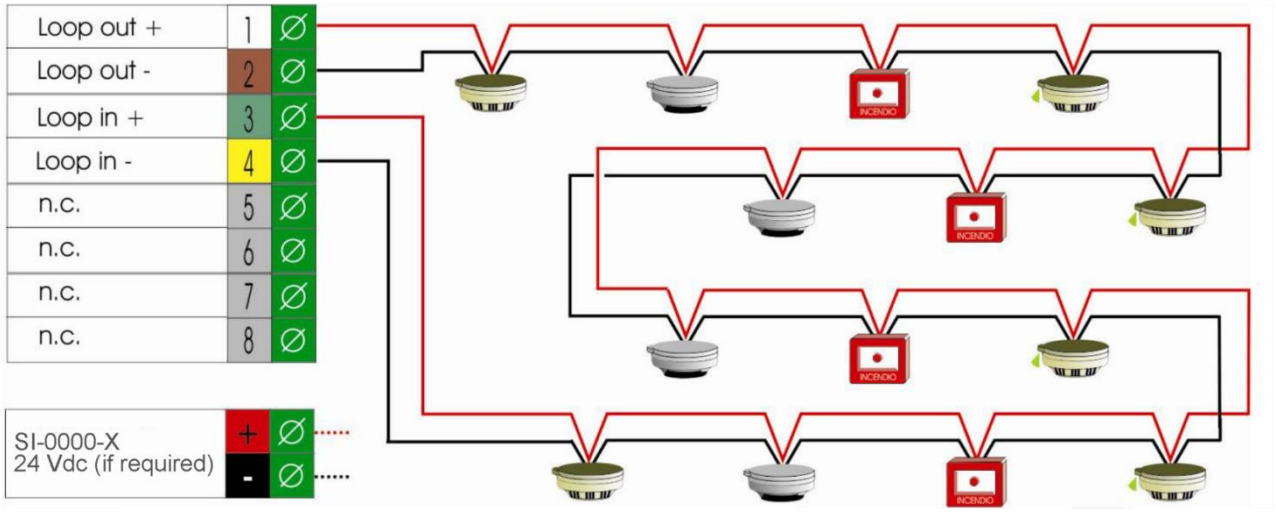
Function		*SI-2204-1 Bus Termination*		*SI-2201-2 / SI-2201-3 Bus Termination*		
+ Loop Out	**+Lout**	**1**		**1**	White	
		4				
- Loop Out	**-Lout**	**7**		**2**	Brown	
		10				
+ Loop In	**+Lin**	**13**		**3**	Green	
		16				
- Loop In	**-Lin**	**2**		**4**	Yellow	
		5				
		8				
		11				
		14				
		17				
		3				
		6				
		9				
		12				
+25V (500mA max.)	**+25V**	**15**				
0V	**0V**	**18**				

SI-2204-1

Field connections

To avoid excessive voltage drops it is recommended to connect outputs bridging two terminals on bus SI-2204-1. (1-4, 7-10, 13-16 etc.)

Standard connection diagrams



Loop standard connection diagram

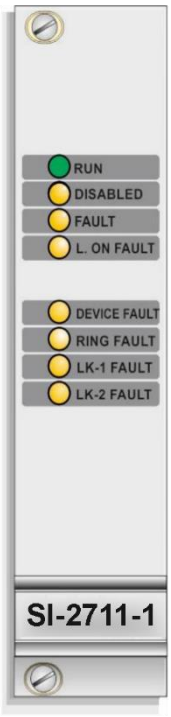
For compliance to EN-54-2 at least one short circuit isolator shall be installed every 32 devices and/or manual call points.

To avoid potential issues it is recommended to install short circuit isolators at the field terminals inside the panel enclosure on both branches of the loop (Loop in and Loop out). If it is not possible due to space constraints, install the SCIs at the nearest available point, ensuring that the cables from the panel to the SCIs are protected as to avoid any mechanical damage or external inference potentially causing short or partial short circuits

Supported devices

For the list of devices supported by this card, refer to Appendix B.6

2.4.15 SI-2711-1



Description

Control card for addressable devices (remote I/O) using Safety Bus based on CAN communication ring. The card can control up to 64 detection and control modules.

Technical features

- Redundancy: yes
- Operating modes: Configuration via software.
- Number of devices per loop 64
- Supply voltage: 22-29VDC
- Quiescent current: 70mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing
- Hot swap capability: yes

Status Indications

The front panel includes 8 LEDs with the following functions

Tag.	Mode	Indication
Run	Off	Out of service
	Blinking	Slave mode
	Steady on	Master Mode
Disabled	Steady on	At least one channel/point disabled
Fault	Blinking	Fault in the devices line
Log. On Fault	Blinking	Discrepancy between configured and installed devices
Device Fault	Blinking	At least one device fault
Ring Fault	Blinking	Communication ring open
Link-1 Fault	Blinking	Communication fault on link-1
Link-2 Fault	Blinking	Communication fault link-2

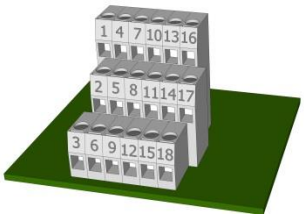
Configuration

By using the configuration program ProS81, the following parameters can be set for each point of the single devices, according to the relevant type:

Parameter	Type	Mode
Operating mode	Sensors	Latching-NO, Latching-NC, Non-Latching-NO, Non-Latching-NC
Alarm verification function	Sensors	Enabled/Disabled
Unit of measure of the channel	Sensors 4-20mA	Ppm, %LEL, %O2, mA, °C, RH, V, bar, db, rpm
Zero Point	Sensors 4-20mA	-1000÷+1000
End of scale	Sensors 4-20mA	-1000÷+1000
Pre-alarm threshold	Sensors 4-20mA	-1000÷+1000
Alarm threshold	Sensors 4-20mA	-1000÷+1000
Lower Fault threshold	Sensors 4-20mA	1,0÷3,8mA
Higher Fault threshold		4÷131mA
Type of indication	Sensors	Fire, Supervisory, Gas, Fault, Hidden, Buzzer Only
Automatic alarm reset	Sensors	Yes/No
Operating mode	Sensors	Continuous-Normally Energized, Continuous-Normally de-energized, Intermittent, Pulsing-1, Pulsing-2, ISA-1A Alarm Sequence, Delayed on activation, Delayed on enabling, Delayed on deactivation, S341, March
Timing	Actuators	1 to 255 minutes/seconds (only for pulsing and intermittent modes)
Output type	Actuators	Normal / Sounder
Fail safe status	Actuators	Off, Freeze
Enable/Disable status export to Hosts	Actuators	No, TCP1, TCP2, RS232
Enable/Disable commands from Hosts	Sensors/Actuators	No, TCP1, TCP2, RS232

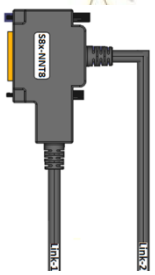
Field connections

The connection between this card and field devices depends on the type of bus used.



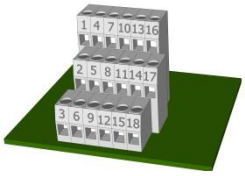
With bus SI-2204-1 the I/O card is internally connected to one of the 8 terminal blocks with 18 screw terminals mounted on the PCB.

With bus SI-2201-2 the card is connected to the field terminal block by the S81-CCT8 3-conductor multipolar cable. For card redundant connection, use the S81-CCT8R cable.



With bus SI-2201-3 the card is connected to the field terminal block by the S81-NNT8 3-conductor multipolar cable. For card redundant connection, use the S81-NNT8R cable.

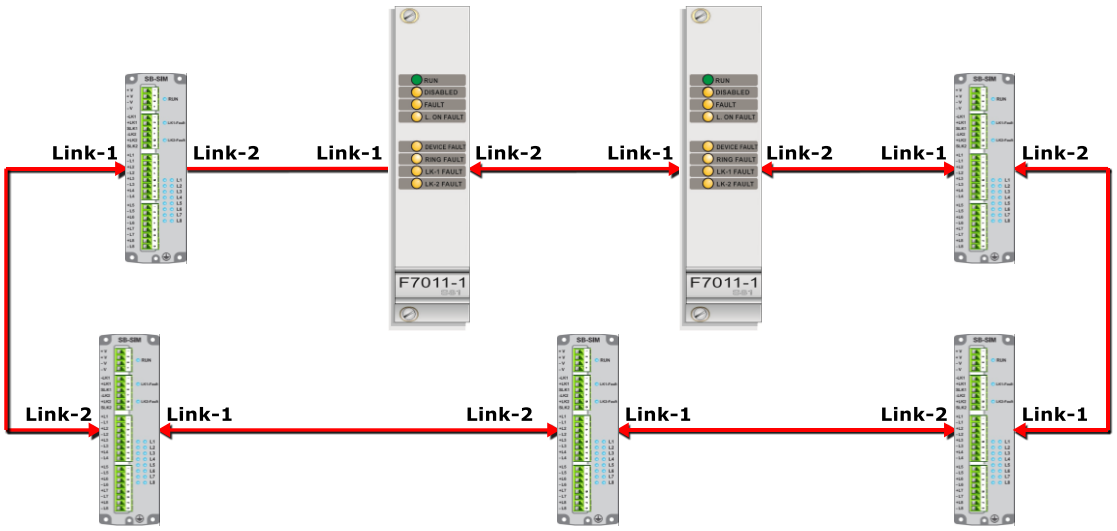
Connections

Function		*SI-2204-1 Bus Termination*		*SI-2201-2 / SI-2201-3 Bus Termination*		
+ Link 1	**+Lk1**	**1**	 **SI-2204-1**	**1**	White	
		4				
- Link 1	**-Lk1**	**7**		**2**	Blue	
		10				
Shield Link 1	**Sch-Lk1**	**13**		**3**	Shield	
		16				
		2				
		5				
+ Link 2	**+Lk1**	**8**		**1**	White	
		11				
- Link 2	**-Lk1**	**14**		**2**	Blue	
		17				
Shield Link 2	**Sch-Lk1**	**3**		**3**	Shield	
		6				
		9				
		12				
+25V (500mA max.)	**+25V**	**15**				
0V	**0V**	**18**				

Field connections

System Architecture

System is composed by one (or two in redundancy) control card and a maximum of 64 addressable I/O modules. Connection between modules is single fault (short circuit or open circuit) tolerant closed loop.

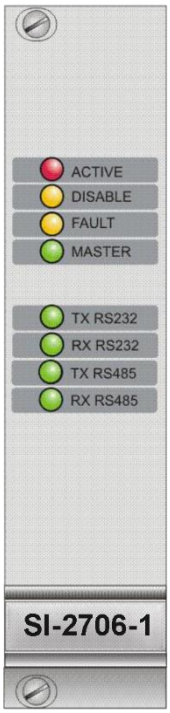


System Architecture

Supported devices

For the list of devices supported by this card, refer to Appendix B.4

2.4.16 SI-2706-1



Description

Communication card with Modbus RTU Master/slave protocol. It features two outputs providing independent connections: a RS485 Half Duplex connection, and a RS232 connection. It controls the following modbus variables:
512 Boolean input variables (32 16-bit words)
512 Boolean output variables (32 16-bit words)
1024 16-bit analog variables.
Analog variables report the analogue values of the SI-2401, SI-2402, SI-2403 cards and the SB-AN module.

Technical features

- Redundancy: No
- Operating modes: Master/Slave.
- Interface : N°1 RS232 + N°1 RS485
- Supply voltage: 22-29VDC
- Quiescent current: 14mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing

Status Indications

The front panel includes 8 LEDs with the following functions:

Tag.	Indication
ACTIVE	Steady on if an input variable is active
DISABLED	Steady on if an input or output variable is disabled
FAULT	Flashing in case of communication fault. (Master mode only)
MASTER	Steady on in Master operating mode.
TX RS232	It lights up every time data are transmitted on the RS232 port
RX RS232	It lights up every time data are received on the RS232 port
TX RS485	It lights up every time data are transmitted on the RS45 port.
RX RS485	It lights up every time data are received on the RS45 port.

Configuration

By using the ProS81 configuration program, the following parameters can be set for each virtual channel:

Parameter	Type	Mode
Operating mode	Sensors	Latching-NO, Latching-NC, Non-Latching-NO, Non-Latching-NC
Type of indication	Sensors	Fire, Supervisory, Gas, Fault, Hidden, Buzzer Only
Operating mode	Actuator	Continuous-Normally Energized, Continuous-Normally De-energized, Intermittent, Pulsing
Timing	Actuator	1 to 15 seconds (only for pulsing and intermittent modes)
Output type	Actuators	Normal / Sounder
Enable/Disable status export to Hosts	Sensors/Actuators	No, TCP1, TCP2, RS232
Enable/Disable commands from Hosts	Sensors/Actuators	No, TCP1, TCP2, RS232

The card includes 2 x 8-way dip switches required for setting the communication parameters.

SW1 Modbus address configuration

SW1 dip switch configures card modbus address in the 1-255 range. In Slave mode, it defines card modbus address, whereas in master mode it defines the address of the Slave peripheral devices to which commands are to be sent. The address 00 is not allowed.

SW1-1	Modbus address Weight 1 (on=Active)
SW1-2	Modbus address Weight 2 (on=Active)
SW1-3	Modbus address Weight 4 (on=Active)
SW1-4	Modbus address Weight 8 (on=Active)
SW1-5	Modbus address Weight 16 (on=Active)
SW1-6	Modbus address Weight 32 (on=Active)
SW1-7	Modbus address Weight 64 (on=Active)
SW1-8	Modbus address Weight 128 (on=Active)

SW2 Modbus parameter configuration

The 1-2-3 dips of SW2 switch configure the Baud rate according to the table below:

SW2-1	SW2-2	SW2-3	Baud Rate
Off	Off	Off	1200
On	Off	Off	2400
Off	On	Off	4800
On	On	Off	9600
Off	Off	On	19200
On	Off	On	38400
Off	On	On	57600
On	On	On	115200

The 4-5-3 dips of the SW2 switch configure parity and stop bit number

SW2-4	SW2-5	Parity
Off	Off	No parity
On	Off	Even
Off	On	Odd
On	On	Not allowed

The 6-7-8 dips of the SW2 switch configure the following options:

SW2-6	**On**	2 stop bits
	Off	1 stop bit
SW2-7	**On**	Card in Master mode
	Off	Card in Slave mode
SW2-8	**On**	Freezes the last acquired status in case of Slave disconnection (*)
	Off	Puts all entities in communication fault condition in case of Slave disconnection (*)

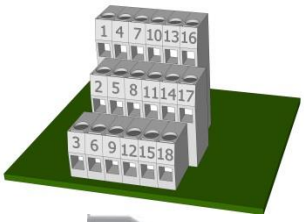
(*) only for Master mode

Moreover, the card includes a Jumper for allowing the 120 ohm termination resistor on the RS485 line.

JP1	**On**	RS485 primary line termination added
	Off	RS485 primary line termination removed

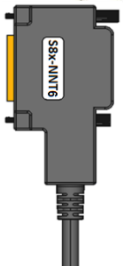
Field connections

The connection between this module and field devices depends on the type of bus used.



With bus SI-2204-1 the I/O card is internally connected to one of the 8 terminal blocks with 18 screw terminals mounted on the PCB.

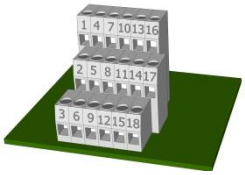
With bus SI-2201-2 the card is connected to the field terminal block by the S81-CCT6 6-conductor multipolar cable.



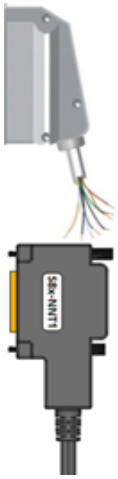
With bus SI-2201-3 the card is connected to the field terminal block by the S81-NNT6 6-conductor multipolar cable.

Connections

Function		*SI-2204-1 Bus Termination*		*SI-2201-2 / SI-2201-3 Bus Termination*		
RS232 TX Data	**232-TX**	**1**		**1**	White	
		4				
RS232 RX Data	**232-RX**	**7**		**2**	Brown	
		10				
RS232 GND	**GND**	**13**		**3**	Green	
		16				
RS485 +	**+RS485**	**2**		**4**	Yellow	
		5				
RS485 -	**-RS485**	**8**		**5**	Grey	
		11				
RS485 GND	**GND**	**14**		**6**	Pink	
		17				
		3				
		6				
		9				
		12				
+25V (500mA max.)	**+25V**	**15**				
0V	**0V**	**18**				

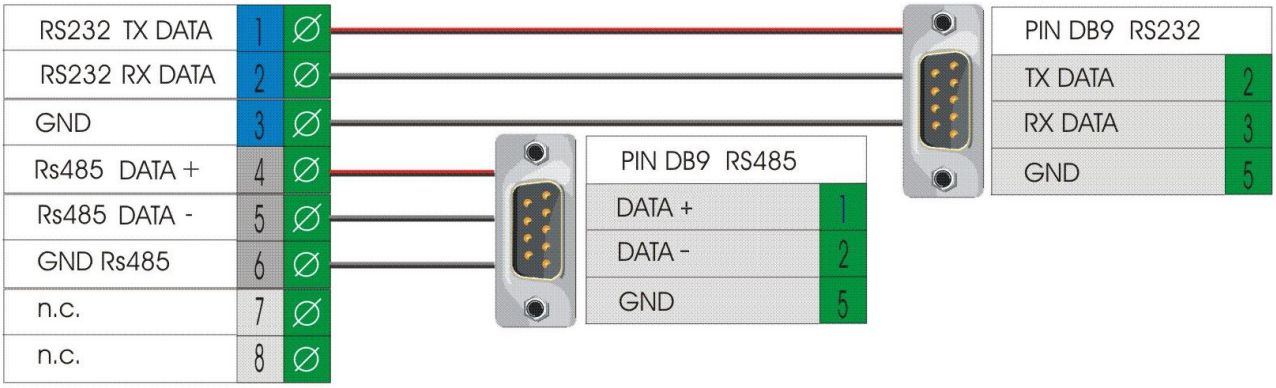


SI-2204-1



Field connections

Standard connection diagrams



RS232/RS485 standard connection diagram

For additional details on the use of this card, please refer to the specific document ST-007-EN RTU Modbus Protocol.

2.4.17 SI-2708-1

Description

This card, used together with S81-MOD-BIL cylinder weighing modules, allows to monitor cylinder load status and to signal even the slightest extinguishing gas leakage without delay.

Technical features

- Redundancy: No
- Operating modes: Master/Slave.
- Interface to field devices: RS485
- Load cells on bus: 32
- Supply voltage: 22-29VDC
- Quiescent current: 14mA
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing
- Hot swap capability: yes

Status Indications

The front panel includes 8 LEDs with the following functions:

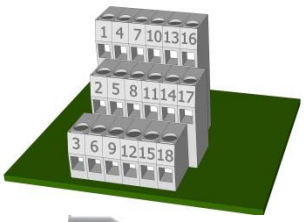
Tag.	Indication
ACTIVE	Flashing in case of pre-alarm. Steady on in case of load cell alarm.
DISABLED	Steady on if a load cell is disabled.
FAULT	Flashing in case of load cell Fault
MASTER	Not used (steady light)
TX RS232	Not used (off)
RX RS232	Not used (off)
TX RS485	It lights up every time data are transmitted on the RS45 port.
RX RS485	It lights up every time data are received on the RS45 port.

Configuration

Thanks to the configuration program ProS81, the following parameters can be set for each load cell:

Parameter	Type	Mode
Operating mode	Sensors	Latching-NO, Latching-NC, Non-Latching-NO, Non-Latching-NC
Pre-alarm threshold	Sensors	1÷3000 hg
Alarm threshold	Sensors	1÷3000 hg
Alarm indication mode	Sensors	Fire, Supervisory, Gas, Fault, Hidden, Buzzer Only
Enable/Disable status export to Hosts	Sensors	No, TCP1, TCP2, RS232
Enable/Disable commands from Hosts	Sensors	No, TCP1, TCP2, RS232

Field connections



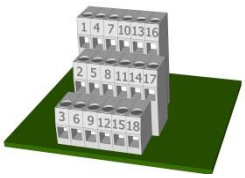
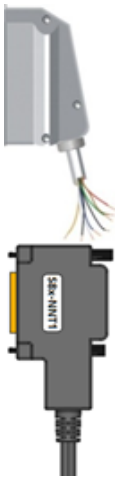
The connection between this card and field devices depends on the type of bus used.

With bus SI-2204-1 the I/O card is internally connected to one of the 8 terminal blocks with 18 screw terminals mounted on the PCB.

With bus SI-2201-2 the card is connected to the field terminal block by the S81-CCT6 6-conductor multipolar cable.

With bus SI-2201-3 the card is connected to the field terminal block by the S81-NNT6 6-conductor multipolar cable.

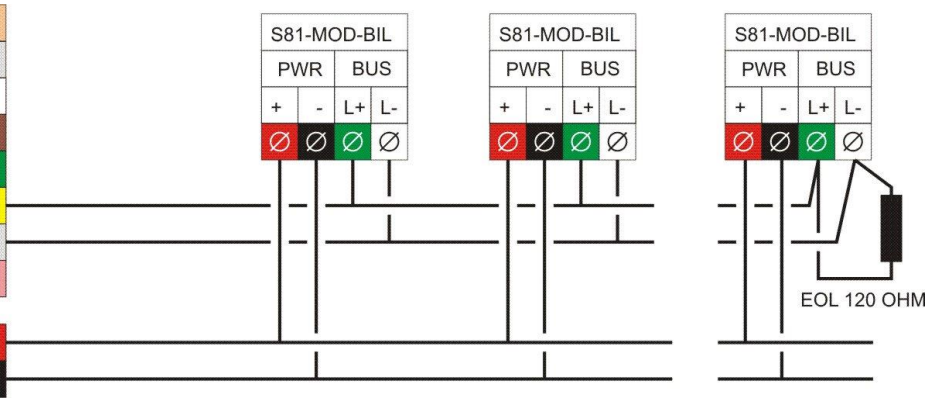
Connections

Function		*SI-2204-1 Bus Termination*		*SI-2201-2 / SI-2201-3 Bus Termination*		
		1				
		4				
		7				
		10				
		13				
		16				
RS485 +	**+RS485**	**2**		**1**	Yellow	
		5				
RS485 -	**-RS485**	**8**		**2**	Grey	
		11				
RS485 GND	**GND**	**14**		**3**	Pink	
		17				
		3	**SI-2204-1**			
		6				
		9				
		12				
+25V (500mA max.)	**+25V**	**15**				
0V	**0V**	**18**				

Field connections

Standard connection diagrams

S81-CCT6 CABLE PLUG		
Function	Wire colour	
Rs232 TX	White	1
Rs232 RX	Brown	2
GND	Green	3
Rs485 L+	Yellow	4
Rs485 L-	Grey	5
GND	Pink	6
PANEL POWER	+ 24 Vdc	∅
	GND	∅

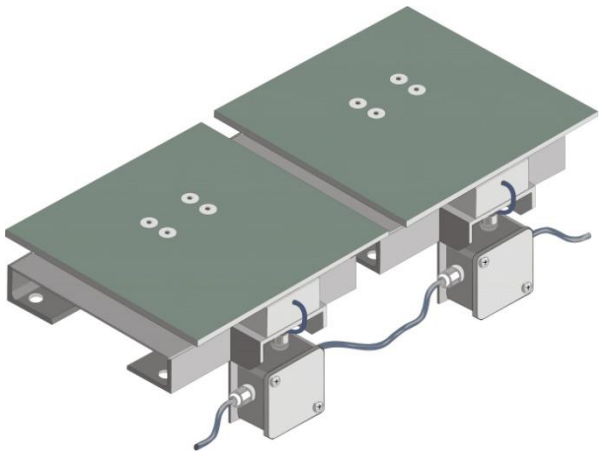


RS485 standard connection diagram

Connect a 120 Ohms ¼ watt resistor between L+ and L- terminals on the weighing end module to balance the RS485 bus.

S81-MOD-BIL weighing module

The S81-MOD-BIL module, together with the SI-2708-1 module, allows to monitor cylinder load status and to signal even the slightest extinguishing gas leakage without delay. The weighing module communicates with the control module through the RS485 bus that accepts up to 32 modules. Two thresholds - pre-alarm and alarm - can be set for each weighing module when programming.



Weighing module

Technical features

Support Material	Steel
Supply voltage	22-28VDC
Typical absorption	36mA typical
Protection degree	IP 30
Operating temperature	-5 +50°C
Measuring range	0÷3000 hg
Maximum load	300 Kg
Compatible control cards	SI-2708-1
RS485 bus maximum length	1000 meters

Assembly

Install the weighing module to the floor with the relevant base by using the four fixing holes on the lower section of the support. Before tightening the fixing nuts, make sure that cylinder base plate is perfectly levelled. Do not install the module outdoor.

Programming weighing module address

In order to program the address of weighing modules follow the procedure below:

- Enter module diagnosis cycle
- Select the ***Program Device Address*** menu
- Set the desired address using the keys ↑ and ↓
- Press ***Enter***

NB: during this stage only the weighing module to which address has to be assigned must be connected to the bus.

Weighing module reset

In order to reset the weighing modules, follow the procedure below:

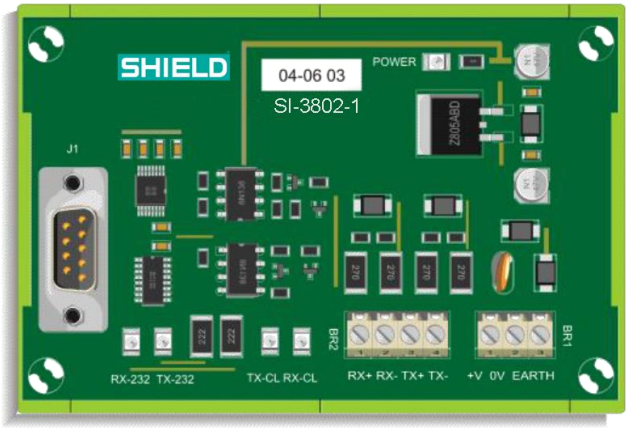
- Enter module diagnosis cycle
- Select the ***Devices*** menu
- Go to the weighing module to be reset using the arrows.
- Press ***Enter***

2.5 Termination Boards

The following terminal board are available:

Part Number	Description	Connected Cards
S81-T8002-1	RS232 / Current loop Converter	SI-2203-1
SI-3804-1	Default I/O card	SI-2203-1
SI-3807-2	16 relays card	SI-2502-1, SI-3804-1
SI-3808-1	4relays card	SI-2503-1
SI-3901-1	8 channels cards surge protection	SI-2302-x, SI-2501-x, SI-2503-1
SI-3902-1	4 channels cards surge protection	SI-2504-x
SI-3903-1	Loop cards surge protection	SI-2702-1, SI-2709-1, SI-2707-1, SI-2710-1
SI-3904-1	8 channels analog card surge protection	SI-2403-x
SI-3905-1	1/2 channels analog card surge protection	SI-2401-x, SI-2402-x

2.5.1 S81-T8002-1



Description

This termination board transforms the remote Host serial output signal from RS232 to current loop with galvanic insulation. It work in passive mode and therefore needs an actively operating converter on the other end. With this termination board it is possible to connect a remote Host computer to a maximum distance of 2,000 meters.

Technical features

- Supply voltage: 22-29VDC
- Quiescent current: 30mA
- Current loop maximum distance: 2,000 meters at 9,600 bps
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing
- Dimensions: W 57 x H 50 x D 77 mm

Status Indications

On the PCB there are 5 LEDs with the following functions:

Tag.	Indication
Power	Steady on when supply voltage is detected
RX-232	On when data are received on the RS232 port
TX-232	On when data are transmitted on the RS232 port
RX-CL	On when data are received on the current loop
TX-CL	On when data are transmitted on the current loop

Internal connections

J1 RS232

RS232 connection. Connect to the J5 connector of card SI-2203-1 using the S81-C232/2 cable.

BR1 Power Supply

These 3 terminals connect supply voltage (+25VDC) and earth.

Tag.		Function	Cable Color
∅	M1	25VDC power supply positive	Red
∅	M2	25VDC power supply negative	Black
∅	M3	Earth	Yellow/Green

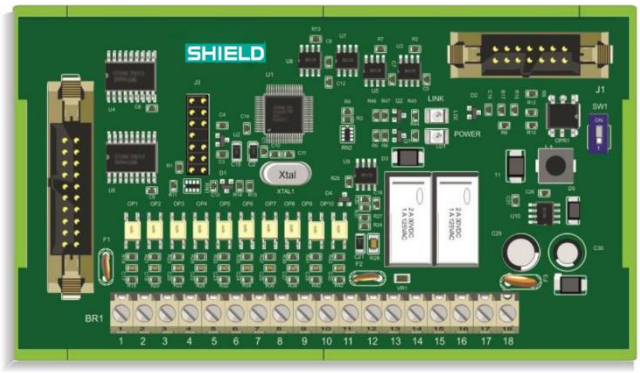
Field connections

BR2 Current loop

These 4 terminals

Tag.		Function	Cable Color
∅	M1	RX data input positive	White
∅	M2	RX data input negative	Brown
∅	M3	TX data output positive	Green
∅	M4	TX data output negative	Yellow

2.5.2 SI-3804-1



Description

This termination board controls 10 digital inputs, 16 open collector outputs, one SPDT relay contact for fault indication, and a local sounder 250mA monitored output for Fire alarm functions. Moreover, it checks the primary power supply voltage for any earth leakage. It can be combined with the termination board SI-3807-2 to get 16 x SPDT contacts.

Technical features

- Supply voltage: 22-29VDC
- Quiescent current: 100mA
- Max. current of open collector outputs 250mA, not protected
- Max. current of local sounder output 250mA, protected electronically
- Fault indication relay Max current 2A 30VDC
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing
- Earth leakage threshold level: ±25%
- Dimensions: W 135 x H 50 x D 77 mm

Status Indications

On the PCB there are two green LEDs with the following functions:

Tag.	Indication
Power	Steady on when supply voltage is detected
Link	Steady on when the link for communication with card SI-1106 is present

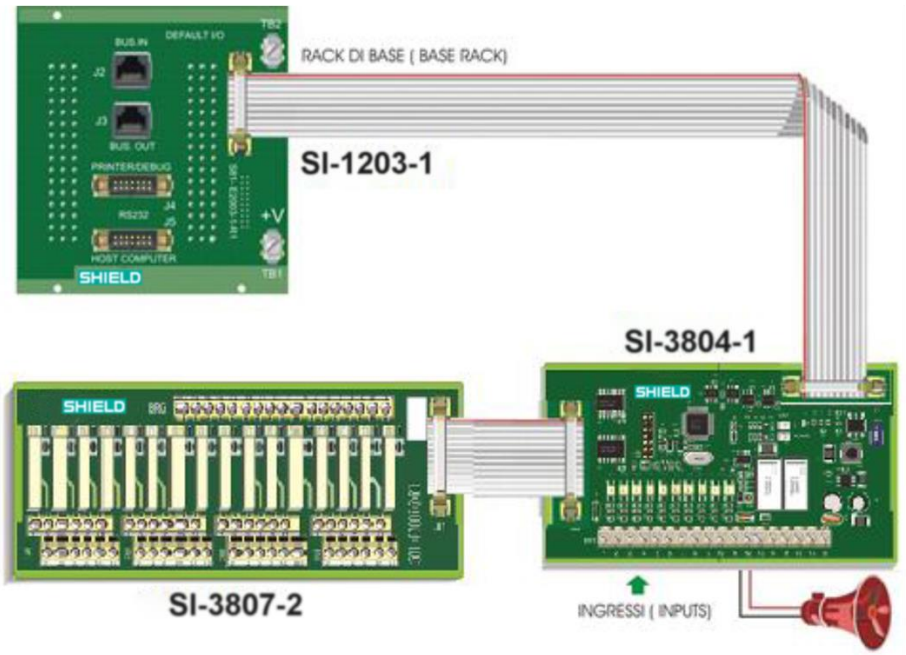
Configuration

On the PCB there is a 1-way dip-switch used to enable the earth leakage check on the supply voltage.

SW1	Description
On	Supply voltage earth leakage check enabled
Off	Supply voltage earth leakage check disabled

Warning: The supply voltage of the SI-90 control panel is not referenced to earth. In some devices, such as personal computers, the power supply negative is earthed for safety reasons. When these devices are connected to the control panel, an earth leakage is signaled. To prevent this, move the SW1 dip-switch to the OFF position.

Internal connections



SI-3804-1 Interconnections

J1 -> J1 SI-2203-1
It is a connector for 14-pole flat cable, allowing connection to the SI-2203-1 Bus card. Connect using S81-CFT14/2 cable.

J2 -> J1 SI-3807-2
It is a connector for 20-pole flat cable, allowing connection to the SI-3807-2 (16-relay termination board). Connect using S81-CFT20/05 cable.

SI-3807-2 Relay		Function with EN54, L864 option	Function with GOST option	Type	Notes
∅	K1	Supervisory	Supervisory	Safety	Normally de-energized
∅	K2	Fire Alarm	Fire 1 Alarm		Normally de-energized
∅	K3	General Fault	General Fault		Normally energized
∅	K4	Disabling	Disabling		Normally de-energized
∅	K5	External buzzer	External buzzer		Normally de-energized
∅	K6	Gas Alarm	Gas Alarm		Normally de-energized
∅	K7	Alarm	Alarm	Security	Normally energized
∅	K8	Tampering	Tampering		Normally energized
∅	K9	Fault	Fault		Normally energized
∅	K10	External sounder	External sounder		Normally energized
∅	K11	Currently not used	Fire 2 Alarm	Safety	Normally de-energized
∅	K12	Running System	Running System	System	Normally energized
∅	K13	System fault	System fault		Normally energized
∅	K14	Power supply fault	Power supply fault		Normally energized
∅	K15	CPU fault	CPU fault		Normally energized
∅	K16	Control panel reset	Control panel reset		Pulsing on reset

Field connections

BR1 Terminal Block

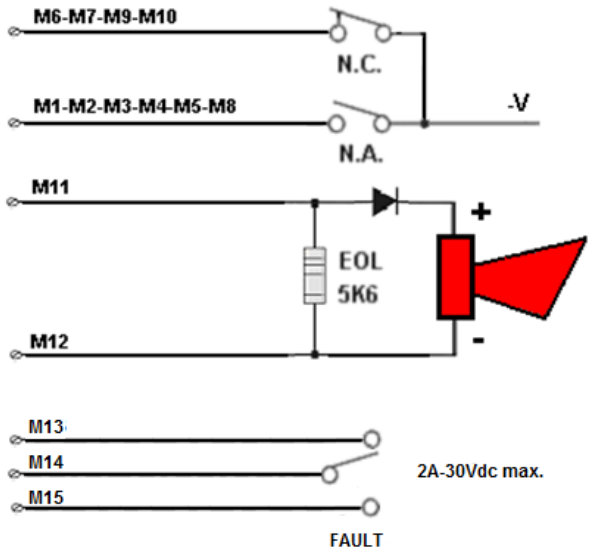
It is a 12-way terminal block to connect the ten default inputs and the local fire alarm sounder.

BR1		Function	Type	Notes
∅	M1	Remote buzzer silencing input	Safety	N.O.
∅	M2	Remote sounder silencing input	Safety	N.O.
∅	M3	Remote control panel reset input	Safety	N.O.
∅	M4	Remote evacuation control input	Safety	N.O.
∅	M5	Battery status input (supply/charge) ***Note-a***	System/System	0V during charge
∅	M6	PSU1 primary power supply Fault input	System	N.C.
∅	M7	PSU2 secondary power supply Fault input	System	N.C.
∅	M8	Battery charge status (Full charge/Trickle) ***Note-a***	System	0V full charge
∅	M9	External Fault Input ***Note-a***	Safety/System	N.C
∅	M10	Revolving door tamper input ***Note-a***	Security/System	N.C
∅	M11	Local sounder/buzzer output +	Safety	max. 250mA
∅	M12	Local sounder/buzzer output -	Safety	max. 250mA
∅	M13	NC Fault contact	System	2A 30VDC max.
∅	M14	C Fault contact	System	2A 30VDC max.
∅	M15	NO Fault contact	Safety	2A 30VDC max.
∅	M16	+ Power supply to card	*	+25VDC
∅	M17	- Power supply to card	*	0VDC
∅	M18	Ground	*	For ground leakage detection

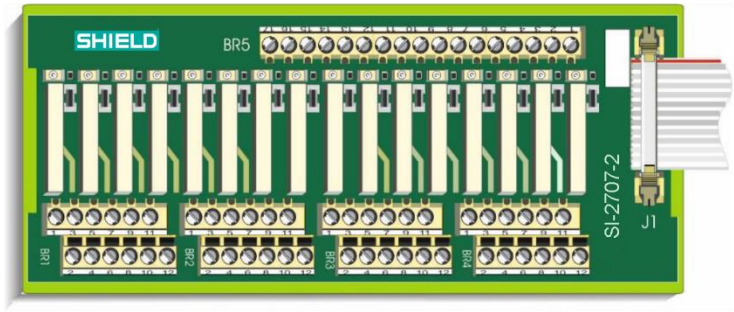
Note-a: If in the Standard Features configuration the option “External Keypad” is enabled, these inputs perform the following functions:
M5 ***“Enter”*** Key
M8 ***“Escape”*** Key
M9 ***“Up”*** Key
M10 ***“Down”*** Key
The External Keypad option can be used when the system resides in an explosion proof housing to enable zone status visualization without opening the housing.

The REMOTE EVACUATION CONTROL and REMOTE CONTROL PANEL RESET inputs must not be actuated directly through external manual buttons since they are not monitored. This guarantees compliance with standard EN-54-2.

Standard connection diagrams



2.5.3 SI-3807-2



Description

It is used with SI-2201-2 type bus to terminate SI-2502-1 cards. It features 16 x 4A 30VDC SPDT output contacts to be used for the connection of SELV circuits only. It is also used together with the SI-3804-1 termination board.

Technical features

- Supply voltage: 22-29VDC
- Quiescent current: 0mA
- Contact type: SPDT
- Contact capacity: 4 A 30VDC
- Assembly: on DIN bar
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing
- Dimensions: W 170 x H 50 x D 77 mm

Status Indications

On the PCB there are 16 green LEDs for relay status indication:

Tag.	Indication
LD1..LD16	It lights up when relay coil is active

Field connections

SPDT contacts

NC = Normally closed
NO = Normally open
COM = Common

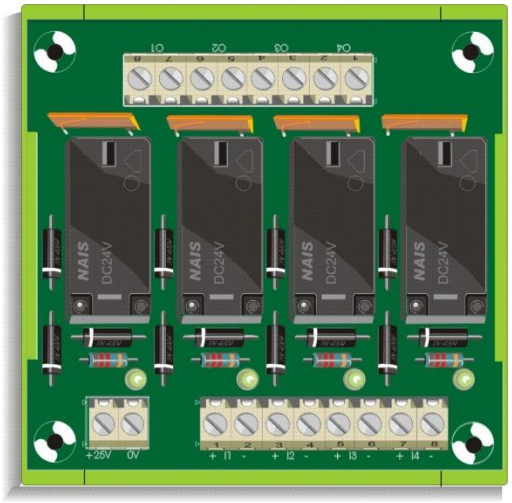
	K1			K2			K3			K4			K5			K6			K7			K8		
	NC	NO	COM	NC	NO	COM	NC	NO	COM	NC	NO	COM	NC	NO	COM	NC	NO	COM	NC	NO	COM	NC	NO	COM
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
	BR1												***BR2***											
	K9			K10			K11			K12			K13			K14			K15			K16		
	NC	NO	COM	NC	NO	COM	NC	NO	COM	NC	NO	COM	NC	NO	COM	NC	NO	COM	NC	NO	COM	NC	NO	COM
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12

	BR3	***BR4***

Relay	K1	K2	K3	K4	K5	K6	K7	K8	K9	K10	K11	K12	K13	K14	K15	K16	C
Terminals	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Activation input	***BR5***																

The outputs above are not C-, E- or J-type outputs (EN 54-1), therefore they must not be used to control fire alarm devices or alarm, fire alarm or fault alarm transmission devices. This guarantees compliance with standard EN-54-2.

2.5.4 SI-3808-1



Description

This termination board is used together with card SI-2503-1 and allows to control up to 4 sounders with a maximum absorption of 2A each.

Technical features

- Supply voltage: 22-29VDC
- Quiescent current: 0mA
- Max. output current 2A - current protected
- Assembly: on DIN bar
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% (RH) non condensing
- Dimensions: W 78 x H 50 x D 77 mm

Status Indications

It includes 4 green LEDs for output status indication:

Tag.	Indication
LD1..LD16	It lights up when outputs are active

Internal connections

BR1 Terminal Block
2-way terminal block for power supply connection.

Tag.		Function	Notes
∅	M1	25VDC power supply positive	Red
∅	M2	25VDC power supply negative	Black

BR2 Terminal block
8-way terminal block for the connection of cables coming from card SI-2503-1.

Tag.		Function	Notes
∅	M1	+ Input 1	From SI-2503-1 card Output +
∅	M2	- Input 1	From SI-2503-1 card Output -
∅	M3	+ Input 2	From SI-2503-1 card Output +
∅	M4	- Input 2	From SI-2503-1 card Output -
∅	M1	+ Input 3	From SI-2503-1 card Output +
∅	M2	- Input 3	From SI-2503-1 card Output -
∅	M3	+ Input 4	From SI-2503-1 card Output +
∅	M4	- Input 4	From SI-2503-1 card Output -

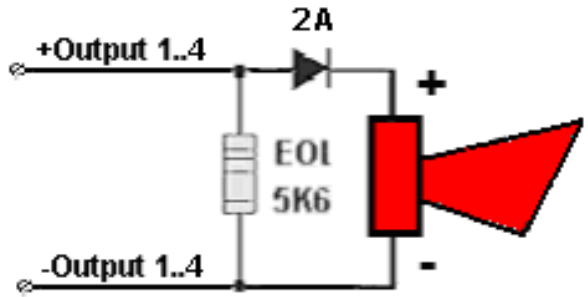
Field connections

BR3 Terminal block

8-way terminal block for output connection to field devices.

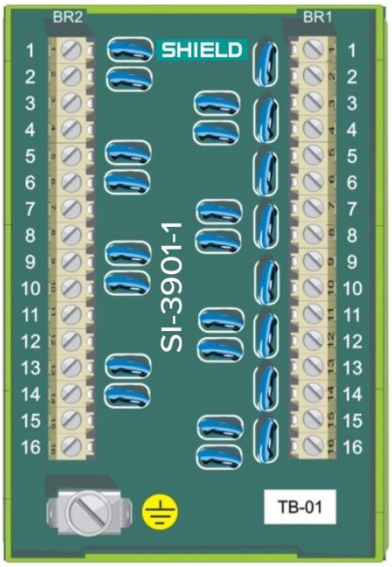
TAG		Function	Notes
∅	M1	+ Output 1	*Maximum current 2A*
∅	M2	- Output 1	
∅	M3	+ Output 2	
∅	M4	- Output 2	
∅	M1	+ Output 3	
∅	M2	- Output 3	
∅	M3	+ Output 4	
∅	M4	- Output 4	

Standard connection diagrams



Sounder standard connection diagram

2.5.5 SI-3901-1



Description

Is used to connect SI-2302, SI-2501 and SI-2503 cards to improve immunity to electromagnetic disturbances which may be induced in power and signal cables from lightning strikes or by switching in the power distribution system.

Technical Data

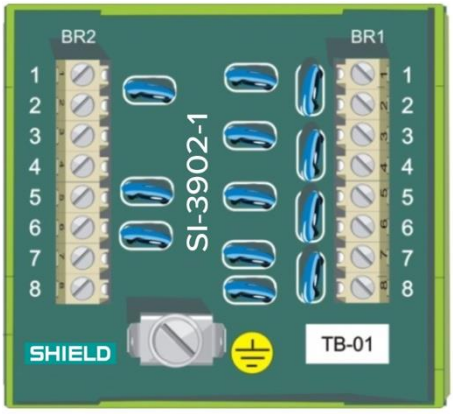
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% RH non-condensing
- Dimensions: W 78 x H 50 x D 77 mm

Connections

BR2		Card Side		BR1		Field Side	
∅	M1	+	Circuit-1	∅	M1	+	Circuit-1
∅	M2	-		∅	M2	-	
∅	M3	+	Circuit-2	∅	M3	+	Circuit-2
∅	M4	-		∅	M4	-	
∅	M5	+	Circuit-3	∅	M5	+	Circuit-3
∅	M6	-		∅	M6	-	
∅	M7	+	Circuit-4	∅	M7	+	Circuit-4
∅	M8	-		∅	M8	-	
∅	M9	+	Circuit-5	∅	M9	+	Circuit-5
∅	M10	-		∅	M10	-	
∅	M11	+	Circuit-6	∅	M11	+	Circuit-6
∅	M12	-		∅	M12	-	
∅	M13	+	Circuit-7	∅	M13	+	Circuit-7
∅	M14	-		∅	M14	-	
∅	M15	+	Circuit-8	∅	M15	+	Circuit-8
∅	M16	-		∅	M16	-	
TB1		Earth Ground					

SI-3901-1 Connections

2.5.6 SI-3902-1



Description

Is used to connect SI-2504 cards to improve immunity to electromagnetic disturbances which may be induced in power and signal cables from lightning strikes or by switching in the power distribution system.

Technical Data

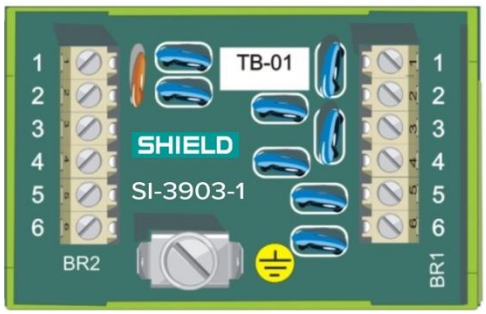
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% RH non-condensing
- Dimensions: L 56 x H 44 x P 77 mm

Connections

BR2		Card Side		BR1		Field Side	
∅	M1	+	Circuit-1	∅	M1	+	Circuit-1
∅	M2	-		∅	M2	-	
∅	M3	+	Circuit-2	∅	M3	+	Circuit-2
∅	M4	-		∅	M4	-	
∅	M5	+	Circuit-3	∅	M5	+	Circuit-3
∅	M6	-		∅	M6	-	
∅	M7	+	Circuit-4	∅	M7	+	Circuit-4
∅	M8	-		∅	M8	-	
TB1		Earth Ground					

SI-3902-1 Connections

2.5.7 SI-3903-1



Description

Is used to connect SI-2701, SI-2711 and SI-2712 cards to improve immunity to electromagnetic disturbances which may be induced in power and signal cables from lightning strikes or by switching in the power distribution system.

Technical Data

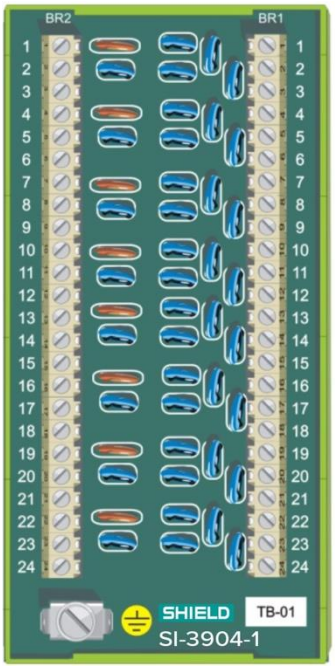
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% RH non-condensing
- Auxiliary output current: 500 mA
- Dimension: L 45 x H 44 x P 77 mm

Connections

BR2		Card Side		BR1		Field Side	
∅	M1	+	25VDC Aux.	∅	M1	+	25VDC Aux.
∅	M2	-		∅	M2	-	
∅	M3	+	Loop Out	∅	M3	+	Loop Out
∅	M4	-		∅	M4	-	
∅	M5	+	Loop In	∅	M5	+	Loop In
∅	M6	-		∅	M6	-	
TB1		Earth Ground					

SI-3903-1 Connections

2.5.8 SI-3904-1



Description

Is used to connect SI-2403 cards to improve immunity to electromagnetic disturbances which may be induced in power and signal cables from lightning strikes or by switching in the power distribution system.

Technical Data

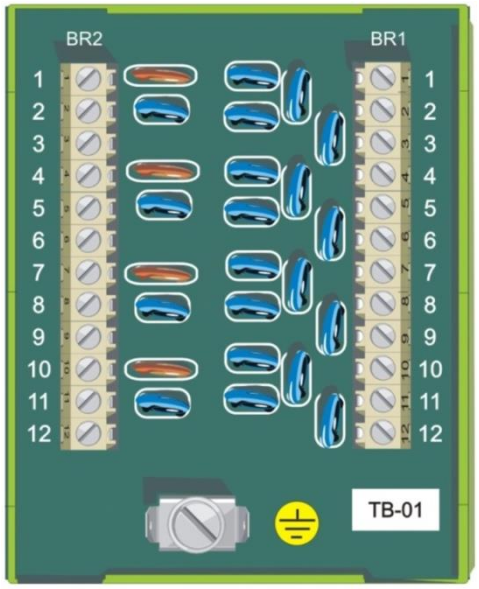
- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% RH non-condensing
- Auxiliary output current: 500 mA
- Dimension: L 146 x H 40 x P 77 mm

Connections

BR2		Card Side		BR1		Field Side	
∅	M1	+	Circuit-1	∅	M1	+	Circuit-1
∅	M2	-	25VDC Aux.	∅	M2	-	25VDC Aux.
∅	M3	+	Circuit-1 Signal	∅	M3	+	Circuit-1 Signal
∅	M4	+	Circuit-2	∅	M4	+	Circuit-2
∅	M5	-	25VDC Aux.	∅	M5	-	25VDC Aux.
∅	M6	+	Circuit-2 Signal	∅	M6	+	Circuit-2 Signal
∅	M7	+	Circuit-3	∅	M7	+	Circuit-3
∅	M8	-	25VDC Aux.	∅	M8	-	25VDC Aux.
∅	M9	+	Circuit-3 Signal	∅	M9	+	Circuit-3 Signal
∅	M10	+	Circuit-4	∅	M10	+	Circuit-4
∅	M11	-	25VDC Aux.	∅	M11	-	25VDC Aux.
∅	M12	+	Circuit-4 Signal	∅	M12	+	Circuit-4 Signal
∅	M13	+	Circuit-5	∅	M13	+	Circuit-5
∅	M14	-	25VDC Aux.	∅	M14	-	25VDC Aux.
∅	M15	+	Circuit-5 Signal	∅	M15	+	Circuit-5 Signal
∅	M16	+	Circuit-6	∅	M16	+	Circuit-6
∅	M17	-	25VDC Aux.	∅	M17	-	25VDC Aux.
∅	M18	+	Circuit-6 Signal	∅	M18	+	Circuit-6 Signal
∅	M19	+	Circuit-7	∅	M19	+	Circuit-7
∅	M20	-	25VDC Aux.	∅	M20	-	25VDC Aux.
∅	M21	+	Circuit-7 Signal	∅	M21	+	Circuit-7 Signal
∅	M22	+	Circuit-8	∅	M22	+	Circuit-8
∅	M23	-	25VDC Aux.	∅	M23	-	25VDC Aux.
∅	M24	+	Circuit-8 Signal	∅	M24	+	Circuit-8 Signal
TB1		Earth Ground					

SI-3904-1 Connections

2.5.9 SI-3905-1



Description

Is used to connect SI-2401 and SI-2402 cards to improve immunity to electromagnetic disturbances which may be induced in power and signal cables from lightning strikes or by switching in the power distribution system.

Technical Data

- Operating temperature: -5 / +50 °C
- Storage temperature: -30 / +80 °C
- Maximum humidity: 95% RH non-condensing
- Auxiliary output current: 500 mA
- Dimension: L 146 x H 40 x P 77 mm

Connections

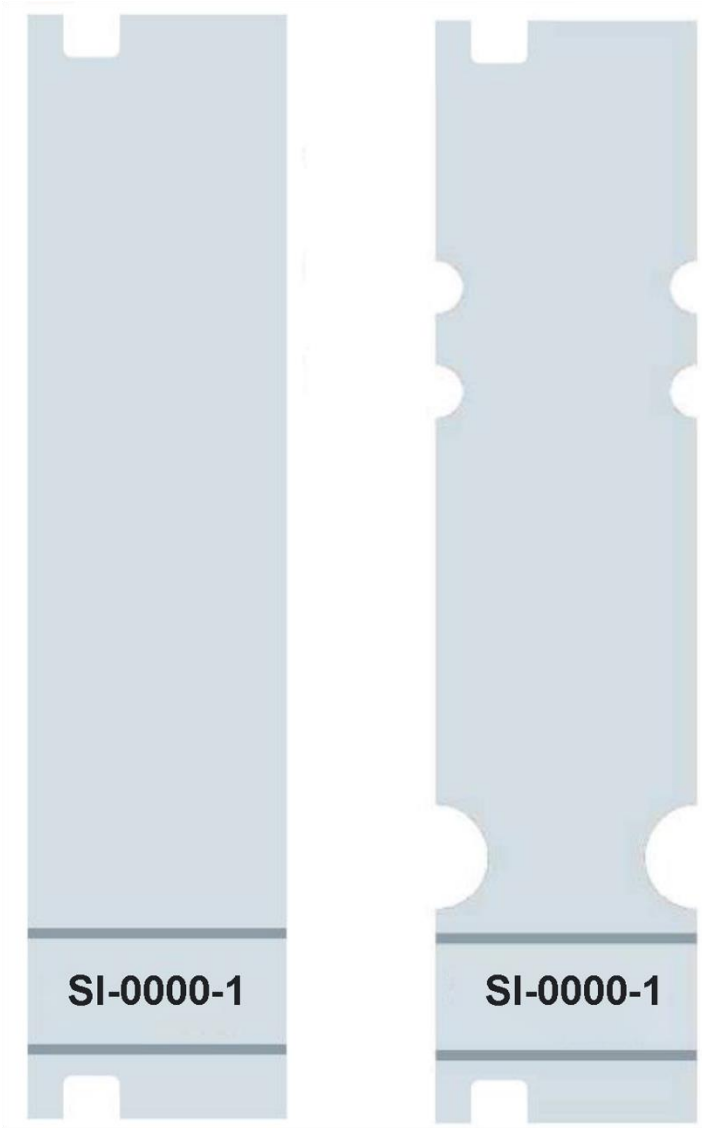
BR2		Card Side		BR1		Field Side	
∅	M1	+	Circuit-1	∅	M1	+	Circuit-1
∅	M2	-	25VDC Aux.	∅	M2	-	25VDC Aux.
∅	M3	+	Circuit-1 Signal	∅	M3	+	Circuit-1 Signal
∅	M4	+	Circuit-2	∅	M4	+	Circuit-2
∅	M5	-	25VDC Aux.	∅	M5	-	25VDC Aux.
∅	M6	+	Circuit-2 Signal	∅	M6	+	Circuit-2 Signal
∅	M7	+	Circuit-3	∅	M7	+	Circuit-3
∅	M8	-	25VDC Aux.	∅	M8	-	25VDC Aux.
∅	M9	+	Circuit-3 Signal	∅	M9	+	Circuit-3 Signal
∅	M10	+	Circuit-4	∅	M10	+	Circuit-4
∅	M11	-	25VDC Aux.	∅	M11	-	25VDC Aux.
∅	M12	+	Circuit-4 Signal	∅	M12	+	Circuit-4 Signal
TB1		Earth Ground					

SI-3905-1 Connections

2.6 Blank panels

They close empty card slots in the rack.

DESCRIPTION
This is a series of front panels used to close empty card slots on I/O racks and on the central unit rack.



Blank panels

2.7 Cables

Possible connections according to card type:

Card PN	Description	Termination Cable usable with SI-2201-2 bus	Termination Cable usable with SI-2201-3 bus
SI-2302-1	Card with 8 x 22VDC monitored inputs	S81-CCT1	S81-NNT1
SI-2302-2	Card with 8 x 22VDC monitored inputs	S81-CCT1R	S81-NNT1R
SI-2302-3	Card with 8 x 12VDC monitored inputs	S81-CCT1	S81-NNT1
SI-2401-1	Card with 1 x 4-20mA analog input	S81-CCT2	S81-NNT2
SI-2401-2	Card with 1 x 4-20mA analog input	S81-CCT2R	S81-NNT2R
SI-2402-1	Card with 2 x 4-20mA analog inputs	S81-CCT7	S81-NNT7
SI-2402-2	Card with 2 x 4-20mA analog inputs	S81-CCT7R	S81-NNT7R
SI-2403-1	Card with 8 x 4-20mA analog inputs	S81-CCT3	S81-NNT3
SI-2403-2	Card with 8 x 4-20mA analog inputs	S81-CCT3R1	S81-NNT3R1
SI-2501-1	Card with 8 x 500mA monitored outputs	S81-CCT3	S81-NNT3
SI-2501-2	Card with 8 x 500mA monitored outputs	S81-CCT3R	S81-NNT3R
SI-2502-1	Card with 16 x 250mA open collector outputs	S81-CCT1	S81-NNT1
SI-2503-1	Card with 8 x 500mA monitored outputs for sounders	S81-CCT1	S81-NNT1
SI-2504-1	Card with 4 x 2A monitored outputs	S81-CCT4	S81-NNT4
SI-2504-2	Card with 4 x 2A monitored outputs	S81-CCT4R	S81-NNT4R
SI-2601-1	Card for fire extinguishing systems EN-12094-1	Not available	Not available
SI-2602-1	Logic card	Not available	Not available
SI-2702-1	Loop card with ESP protocol	S81-CCT4	S81-NNT4
SI-2706-1	Modbus RTU Master/Slave card	S81-CCT6	S81-NNT6
SI-2707-1	Loop card with SSP protocol	S81-CCT4	S81-NNT4
SI-2708-1	Control card for scales	S81-CCT6	S81-NNT6
SI-2709-1	Loop card with Shield addressable devices	S81-CCT4	S81-NNT4
SI-2710-1	Loop card with System Sensor protocol	S81-CCT4	S81-NNT4
SI-2711-1	Loop card with Safety Bus single mode	S81-CCT8	S81-NNT8
	Loop card with Safety Bus redundant mode	S81-CCT8R	S81-NNT8R

3 INSTALLATION INSTRUCTIONS

This chapter provides all the necessary information for proper product installation.

All operations described in this chapter must be carried out by skilled staff.

3.1 Positioning of the control panel

Before positioning the SI-90 control panel, please refer to the environmental specifications for proper product operation described in chapter 1.3. The control panel must be located in a properly monitored area and in a place granting easy access to the staff.

All the parts used in SI-90 systems are selected depending on the relevant intended use and are suitable for operating in compliance with the technical specifications and the relevant environmental conditions therein specified.

3.2 Measures for installation in compliance with the EC standard

For proper system installation on the cabinet, undertake the following measures:

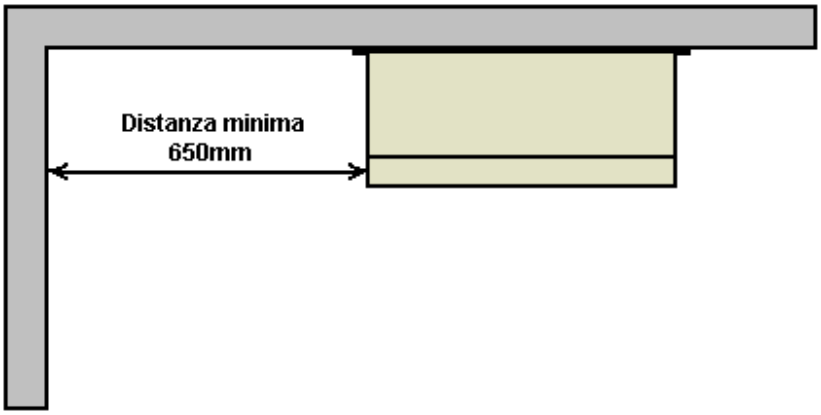
- Use only power supply unit certified for the product.
- Lay power cables and terminating cables of field devices on two separate paths.
- Use shielded cables to connect field devices and I/O cards.
- Follow all the instructions provided for system earthing.
- In case of permanent installation, the electrical system of the building must be provided with a (magneto thermal/differential) disconnect device, easy to be accessed and with the following features:

Power supply unit	Type of protection	Electrical characteristics
S81-PU001-1	Magneto thermal differential switch	6A-400Vac
S81-PU001-2		10A-400Vac
S81-PU001-4		12A-400Vac
SI-5000-2		12A-400Vac
SI-5000-4		20A-400Vac
S81-PU003-1		6A-230Vac
S81-PU003-2		12A-230Vac
S81-PU004-1		12A-230Vac
S81-PU004-2		12A-230Vac
S81-PU004-3		20A-230Vac
S81-PU004-4		20A-230Vac

3.3 Instructions for fixing SI-90-1R, SI-90-2R, SI-90-L, S81HS/M panels

The control panel must be located in an easily accessible place, well signaled and protected against fire. To fix the cabinet to the wall (SI-90-1R, SI-90-2R) use the four tabs provided.

Wall fixing

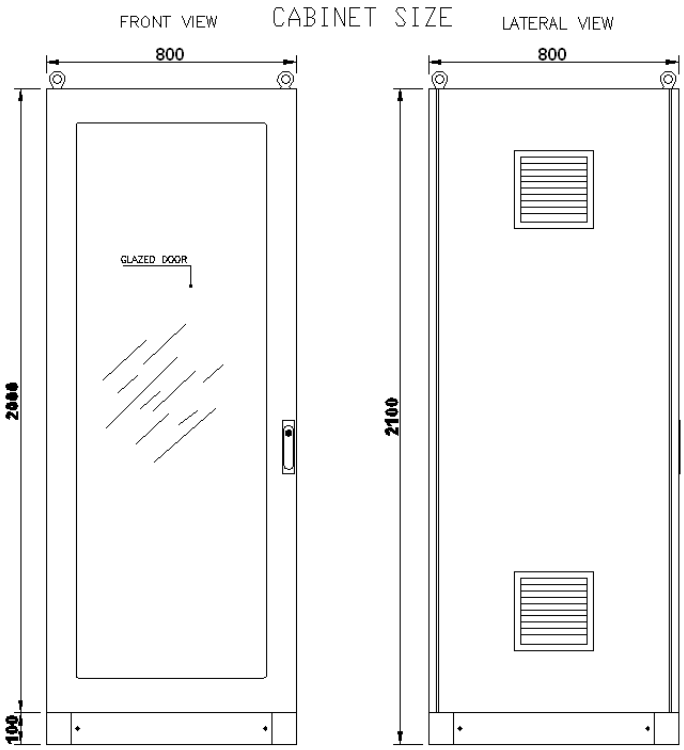


Furthermore, should the cabinet be fixed next to a corner wall, the minimum distance from the latter must be 650 mm, so to allow for front panel opening. Moreover, the installation height must guarantee display clear visibility and easy access by operators.

Position of Cabinet

3.4 Instructions for positioning the SI-90-1/10R, SI-90-1/U panel

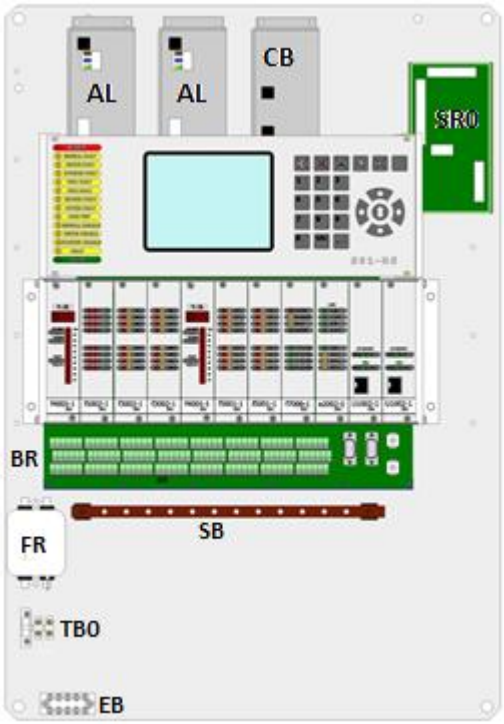
The panel must be located in an easily accessible place, well signaled and protected against fire. Place the cabinet on a dead level floor.



Free Standing cabinet example

3.5 Layout of SI-90/L internal parts

The picture below shows the typical layout of the parts located on the base plate of SI-90/L type control panels. In this specific configuration, main Ac input is connected to TB0 terminal, field device cables are connected to eight terminal blocks BR1÷BR8.

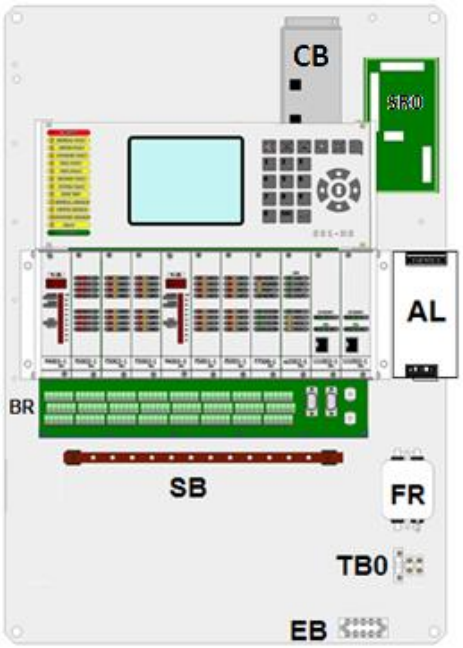


SI-90/L Internal plate

AL SI-5005-1 Power supply unit
CB SI-5004-1 Battery charger
SR0 SI-3804-1 Default I/O
BR Filed terminal blocks
TB0 Main AC input
FR AC filter
EB Safety earth bar
SB Earth bar of shields

3.6 Layout of SI-90/M internal parts

The picture below shows the typical layout of the parts located on the base plate of SI-90/M type control panels. In this specific configuration, main AC input is connected to TB0 terminal, field device cables are connected to eight terminal blocks BR1÷BR8.

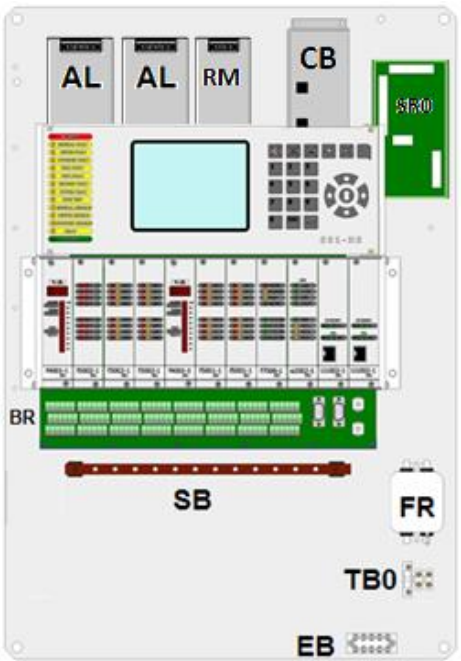


SI-90/M Internal plate

AL SDR-240-24 Power supply unit
CB SI-5004-1 Battery charger
SR0 SI-3804-1 Default I/O
BR Filed terminal blocks
TB0 Main AC input
FR AC filter
EB Safety earth bar
SB Earth bar of shields

3.7 Layout of SI-90/MB internal parts

The picture below shows the typical layout of the parts located on the base plate of SI-90/M type control panels. This version differs from M and L version because it must have the S81-T900x surge suppression terminal boards and must only use S81-PU003-x power supply.

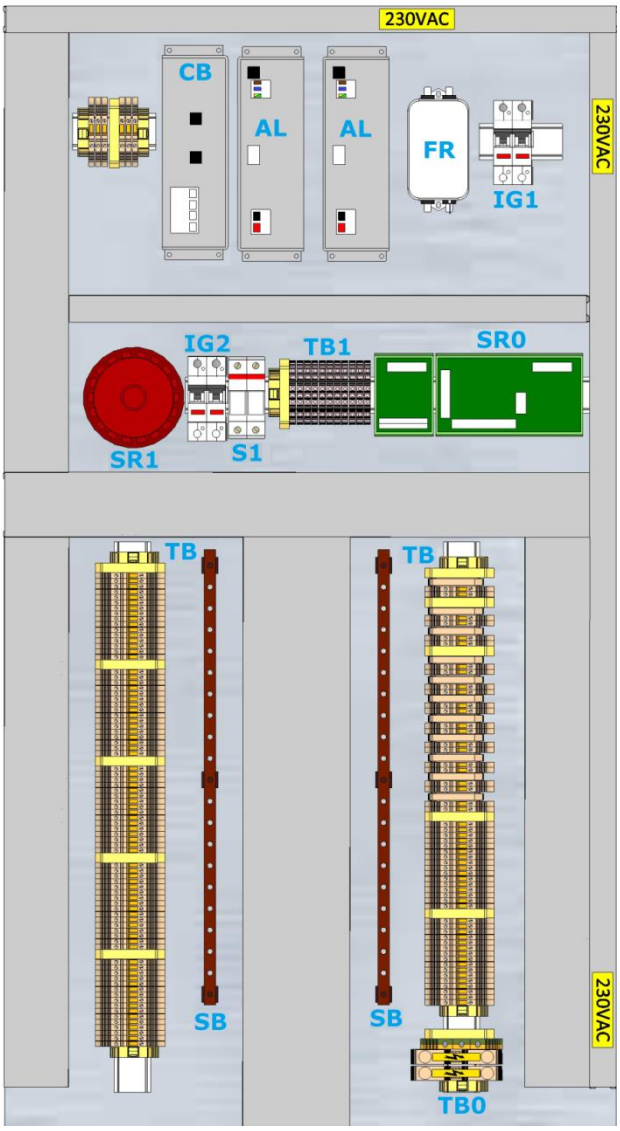


SI-90/MB Internal Plate

AL SDR-240-24 Power supply unit
RM Redundancy Module DR-RDN20
CB SI-5004-1 Battery charger
SR0 SI-3804-1 Default I/O
BR Filed terminal blocks
TB0 Main AC input
FR AC filter
EB Safety earth bar
SB Earth bar of shields

3.8 Layout of S81-/2R internal parts

The picture below shows the typical layout of the parts located on the base plate of SI-90/1R/2R type control panels. In these two versions main AC input is connected to terminal TB0, field device cables are connected to I/O cards on TB terminals. Cable trays identified as 230VAC are used only for AC main supply.

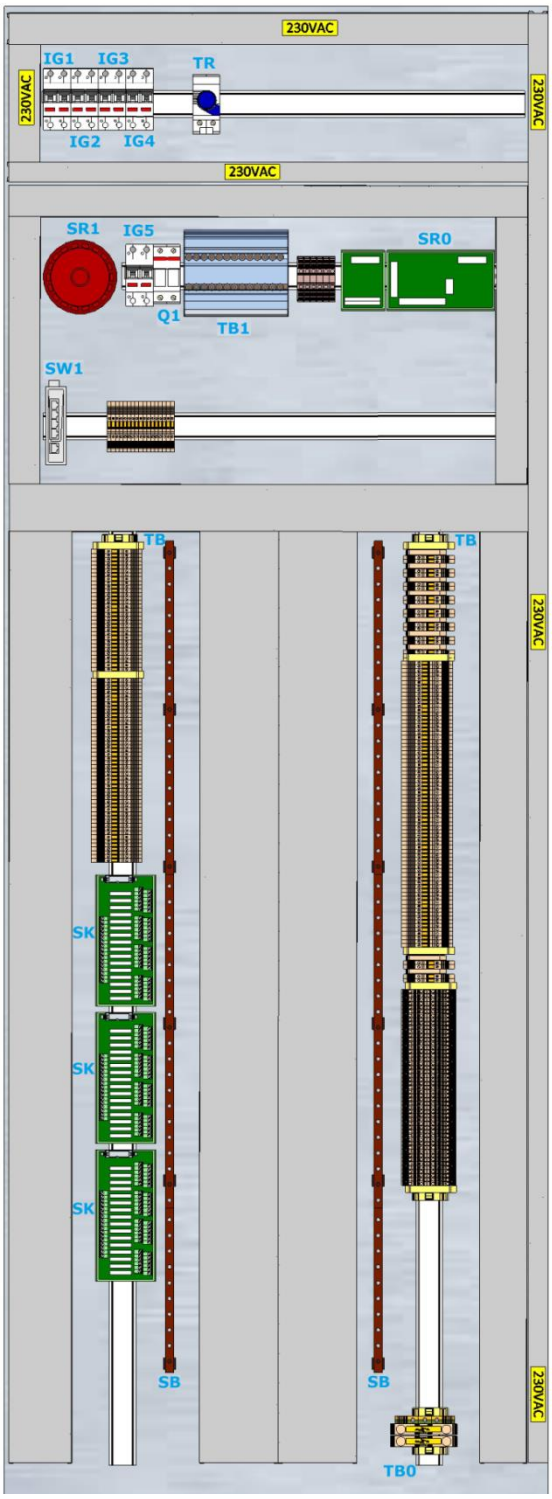


CB SI-5004-1 or SI-5011-1 Battery charger
AL SI-5005-1 or SI-5010-1 Power supply unit
FR AC filter
IG1 AC Main switch
SR1 Internal Sounder (optional)
IG2 DC Main switch
S1 Battery disconnect switch
TB1 25VDC distribution
SR0 SI-3804-1 Default I/O
TB Field Terminals
TB0 AC main terminals
SB Earth bar of shields

SI-90/1R-SI-90/2R Internal plate

3.9 Layout of SI-90/1-10R internal parts

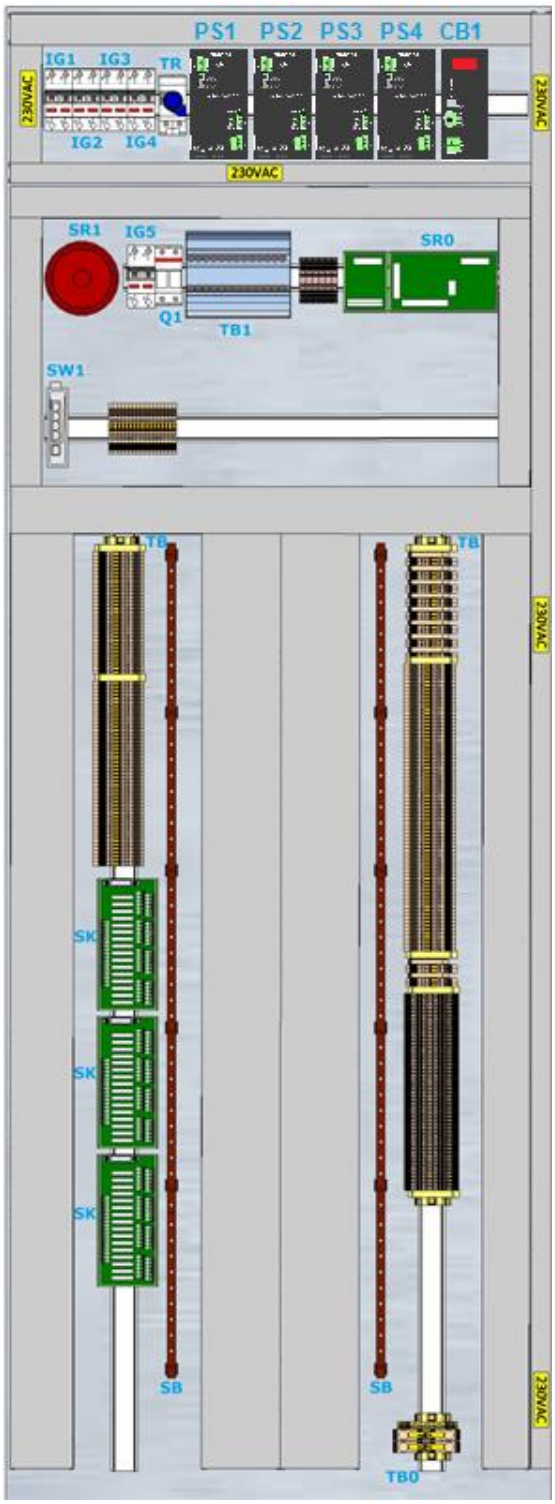
The picture below shows the typical layout of the parts located on the base plate of the SI-90/1-10R type control panels using rack power supply unit. In this version main AC input is connected to terminal TB0, field device cables are connected to I/O cards on TB terminals. Cable trays identified as 230VAC are used only for AC main supply.



SI-90/1-10R internal plate

IG1 Main AC switch-1
IG2 Main AC switch -2
IG3 Internal light switch
IG4 Aspirating fans switch
IG5 Main DC switch
TR Aspirating fan Thermostat
SR1 Internal sounder (option)
Q1 Battery disconnect switch
TB1 25VDC distribution
SR0 SI-3804-1 Default I/O
SW1 Ethernet Switch
TB Field terminals
TB0 AC Main terminals
SB Earth bar of shields

The picture below shows the typical layout of the parts located on the base plate of the SI-90/1-10R type control panels using DIN rail power supply unit.



Piastra interna SI-90/1-10R

IG1	Main AC switch-1
IG2	Main AC switch -2
IG3	Internal light switch
IG4	Aspirating fans switch
IG5	Main DC switch
TR	Aspirating fan Thermostat
PSx	SI-5005-1 or SI-5010-1 Power supply unit
CB1	SI-5004-1 or SI-5011-1 Battery charger
SR1	Internal sounder (option)
Q1	Battery disconnect switch
TB1	25VDC distribution
SR0	SI-3804-1 Default I/O
SW1	Ethernet Switch
TB	Field terminals
TB0	AC Main terminals
SB	Earth bar of shields

3.10 Cable entry

For cable entry use the proper plates located on the top or bottom of the cabinet. For the entry of the AC mains supply cable, use a cable entry physically separated by the signal cables.

Use only cable glands with V1 or higher flammability rating.

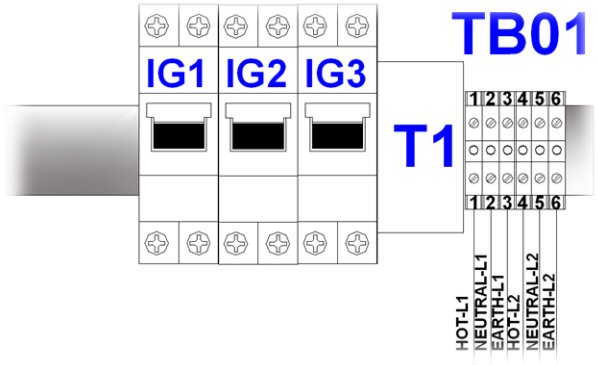
3.11 Earthing instructions

To improve the electromagnetic compatibility, SI-90 systems are equipped with two separate earth connection types. The earth bar marked with **PE** or **BT** is for earthling cabinet, racks and power supply unit. It must be connected to PE. The earth bars marked with **IE** or **BS** are for earthing the shields of the cables from field devices and must be connected to IE.

If the system has no IE connection, **BS** earth bars must be connected to the earth bar **BT.**

3.12 Connection to the mains

The mains supply cable must preferably pass through the relevant cable tray. Use a three-conductor cable (phase – neutral – earth) for mains connection.



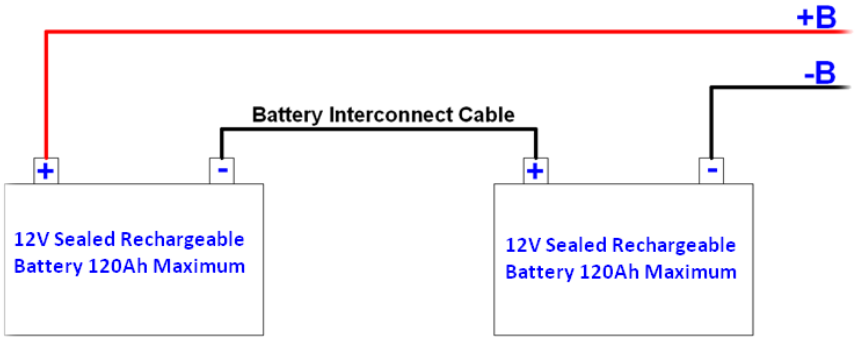
Supply mains terminal block

Before connecting the control panel to the power supply, place all the AC switches in the OFF position. After the AC mains connection, be sure to reassemble the removed AC caps before turn on the panel.

The connection to the mains shall be carried out in full compliance with the national regulations in force.

3.13 Battery connection

There must be a secondary power source (battery) to power the system in case of primary mains supply failure. The SI-90 control panel can charge two 12V sealed lead batteries connected together in series, with maximum capacity determined by the type of battery charger used. Refer to the spreadsheet of the paragraph to calculate the proper capacity of the batteries to be used. Open the battery disconnect switch (if it is present), connect the red cable marked with ***+B*** to the positive pole of the batteries and the black cable marked with ***–B*** to the negative pole of the batteries; then close battery disconnect switch.



Internal batteries

- The two batteries shall have the same Ah capacity.
- Do not connect the batteries in parallel to obtain higher capacity.
- Fix the batteries properly

3.13.1 Replacement of battery fuses

To replace the battery protection fuses (if present) open the battery disconnector switch, remove the fuses and replace them with two of the same type or equivalent and then close the battery disconnector switch.

Batteries can power the control panel only after the primary mains voltage is supplied.

3.14 Instructions for the connection of field devices

All the interconnecting cables of field devices must be duly identified and terminated with suitable end ferrules. During wiring, make sure to keep the cables of field devices (Inputs/Outputs) and the power cables separate.

3.14.1 Balanced input cables

For this type of signal we recommend using shielded twisted cables **CEI EN 50200** 2 x 1 mm².

3.14.2 4-20 mA analog input cables

For this type of signal we recommend using shielded twisted cables **CEI EN 50200** with 3 wires for active transmitters or 2 wires for passive transmitters with a minimum cross section of 1.5 mm². In this case, please take utmost care when selecting the conductors to avoid that the voltage drop along the cable may prevent the connected devices from operating.

3.14.3 Addressable loop cables

For these types of signal we recommend using shielded twisted pair cables **CEI EN 50200** 2 x 1 mm². Cable section depends on the length, and on the number and type of installed devices. However, total cable resistance must not exceed 40 Ohms, cable capacity must be below 1 µF and inductance below 1 mH. The table below shows the minimum cable section required according to loop length. It is however advisable to check sections and lengths of the loop configuration with appropriate calculation programs.

Loop length	Type of cable	AWG	Type
≤ 1000 meters	2 x 1 mm²	16AWG	Belden 9575
≤ 1500 meters	2 x 1.5 mm²	16AWG	Belden 9575
≤ 2000 meters	2 x 2.5 mm²	14AWG	Belden 9581
≤ 3000 meters	2 x 4 mm²	12AWG	Belden 9583

In case of closed loops, cable length is the overall length from starting to end point. Multicore cables cannot be used for loop connection.

3.14.4 25 VDC power cables

For control panel to field device power supply, we recommend using shielded twisted pair cables **CEI EN 50200**. Please take utmost care when selecting the conductors to avoid that the voltage drop along the cable may prevent the connected devices from operating.

3.14.5 Output cables

For the connection between control panel and outputs (sounders, solenoid valves, panels) we recommend using flame-resistant, shielded twisted pair cables **CEI EN 50200**. Also in this case, check the voltage drop on the cable and increase its section, if necessary.

Use the relay contacts on SI-3806 and SI-3807 relay termination boards only with Safety Extra Low Voltages.

4 START UP AND FAULT MANAGEMENT

This section describes the different stages of system start up and explains the operation to be carried out to reset the various system faults.

All operations described in this chapter must be carried out by skilled staff, adopting all suitable protective measures against Electro Static Discharges.

4.1 Start-Up

This paragraph describes the operations to be carried out upon first system startup.

4.1.1 Required materials

To carry out all the startup stages properly, the equipment below is required:

- Digital multimeter
- 1 x 0-20 mA current generator to simulate analog sensors

4.1.2 Preliminary checks

- Make sure that the earth connections are made properly. Check also that system earth resistance does not exceed 20 Ohms.
- Carry out a visual inspection of the connections on the terminal block inside the switchboard; in particular, check the polarity of battery and power cables.
- Make sure that all the cards are properly installed into the racks with their fixing screws tightened.

4.1.3 Checks on cables from field devices

Before carrying out these checks, disconnect the cables by opening the terminal blades to avoid damaging I/O cards.

Balanced input cables (SI-2302 Cards)

- Make sure that both conductors (+L/-L) are insulated from the earth.
- Disconnect the shield from the shield bar and make sure it is insulated from the earth.
- Make sure that the resistance between the positive and negative of the line is of approximately 5600 Ohms.

Analog input cables (SI-2401, SI-2402, SI-2403 Cards)

- Make sure that the conductor (+L/-L) is insulated from the earth.
- Make sure that the positive and negative (+25V -25V) of the power supply are insulated from the earth.
- Disconnect the shield from the shield bar and make sure it is insulated from the earth.

Addressable loop cables (SI-2702, SI-2707, SI-2709, SI-2710 Cards)

- Make sure that the 4 conductors (+Lout/-Lout and +Lin/-Lin) are insulated from the earth.
- Disconnect the shield from the shield bar and make sure it is insulated from the earth.
- Make sure that there is no short circuit between terminals +Lout and -Lout.
- Make sure that there is no short circuit between terminals +Lin and -Lin.

Audible alarm device control cables (SI-2503 Cards)

- Make sure that both conductors (+L/+L) are insulated from the earth.
- Make sure that the resistance between the positive and negative of the line is of approximately 5600 Ohms.

Solenoid control cables (SI-2501, SI-2504 Cards)

- Make sure that both conductors (+L/-L) are insulated from the earth.
- Make sure that the resistance between terminals +Lout and +Lin exceeds 40 Ohms.

25 VDC power cables

- Make sure that both conductors (+L/-L) are insulated from the earth.

4.1.4 Power On

- Make sure that the disconnect switch supplying 25 VDC voltage to the system and field devices is in off position.
- Close the battery disconnector switch.
- Activate the AC main switch powering the power supply unit.
- Use a voltmeter to measure the voltage on the power supply unit outputs and check that it is 25VDC.
- Use a voltmeter to measure the voltage on battery terminals and check that it is about 27VDC.
- Activate the disconnect switch supplying field devices and the system and wait for initialization cycle conclusion.
- During this stage, possible faults, if any, will be shown on the central unit display.
- Cut power to power supply unit. Make sure that central unit display shows the message: **"Primary voltage fault"**.
- Use a voltmeter to measure the voltage on the power supply unit outputs and check that it is >25VDC.
- Restore power to power supply unit. Fault condition must be restored.
- Disconnect battery positive terminal. Make sure that the central unit display shows the message: **"Secondary voltage fault"** within 30 seconds.
- Connect battery positive terminal again. Fault condition must be restored.

4.1.5 Functional Tests

Functional tests aim to check all system features and its compliance with customer requirements. Utmost care must be taken in checking the logics of the extinguishing zones to make sure that the system carries out the required operations in case of fire alarm.

Before carrying out any functional test, disconnect all the solenoids controlling the extinguishing systems. If necessary, replace the solenoids with a 25 VDC 2Watt bulb to check the proper implementation of the logics.

The functional test of a safety system is deemed to be 100% valid if the following points are complied with:

- All inputs are tested in all of their possible operating statuses.
- All outputs are tested in all of the statuses defined by the application program.
- All program logical paths are tested.
- All preset delays are checked.
- All combinations of digital signal permutations are checked - fault conditions included.

4.2 Faults management

This paragraph describes the behavior of system SI-90 when the various faults occur.

4.2.1 Power supply unit fault

The fault of the power supply unit is detected by the central unit during operation. Fault type and details are shown on the display. Before replacing a module of the power supply unit, carefully read the instructions of paragraphs 5.5.1, 5.5.2 and 0.

4.2.2 Central unit fault

In case of fault of one of the two CPUs, the system will keep operating without any interruptions. The faulty CPU is indicated on the display. To this end, please note that "***CPU-0***" on the display indicates the CPU in the left slot and "***CPU-1***" the right one. The faulty CPU can be replaced during system operation following the instructions of paragraph 5.5.5.

4.2.3 I/O card fault

The fault of one I/O card is detected by the central unit during operation. The position of the faulty card and the relevant fault type are shown on the display. The faulty I/O card can be replaced during system operation following the instructions of paragraph 5.5.6.

5 MAINTENANCE

System and equipment maintenance must be carried out by skilled staff at regular intervals.

5.1 Cabinet

The cabinet of the SI-90 control panel does not require special maintenance. However, we recommend cleaning and/or replacing the air intake filters located on the cabinet side walls at regular intervals and, moreover, periodically checking that the terminals connecting the cables from field devices are properly tightened.

5.2 Batteries

The cabinet contains two dry batteries to power the system in case of primary power supply fault. The lifetime of these batteries depends on the type and the correct use. We recommend checking them every six months according to the manufacturer's instructions in order to assess their operating capacity.

5.3 Field devices

For the maintenance of field devices (gas, flame or smoke detectors, etc.) please refer to the relevant product manuals.

5.4 Functional tests

Carry out the following operations in the following order:

- Make sure that the green LED ***"Voltage detection"*** on the Display card is steady on and all other LEDs are off
- Run the "Control Panel Test" procedure in the operator cycle and check that the control panel carries out all the operations shown on the display correctly (LED switching on, buzzer activation, etc.)
- Cut the mains power from the control panel and check the following conditions:
  - The "***Primary Voltage Fault***" message is shown on the display
  - The yellow LED "***General fault***" flashes
  - The yellow LED "***PSU1 fault***" flashes
  - The ***Buzzer*** operates intermittently
  - The relay "***General fault***" (K3) is deactivated
  - The relay "***Power supply fault***" (K14) is deactivated
- Use a voltmeter to measure the voltage at battery ends and check that it does not go below 25VDC. Otherwise, replace the batteries
- Connect the mains power to the control panel and check the following conditions:
  - The "***Primary Voltage Fault***" message on the display resets.
  - The yellow LED "***General fault***" resets
  - The yellow LED "***PSU1 fault***" resets
  - The ***Buzzer*** switches off
  - The relay "***General fault***" (K3) is deactivated
  - The relay "***Power supply fault***" (K14) is deactivated
- Activate the alarm of a device controlling only visual/audible alarm devices and check what follows:
  - The alarm message is shown on the display
  - The red LED "***Alarm***" flashes
  - The ***Buzzer*** operates steadily
  - The relay "***General fault***" (K2) is activated
  - Activation of field sounders connected to the alarm
- Press the "***Buzzer silencing***" button and check the following conditions:
  - The red LED "***Alarm***" is steady on
  - The ***Buzzer*** switches off
- Enter level 2 password, press the "***Sounder silencing***" button and check what follows:
  - Field sounders connected to the alarm deactivate

- Press the "***Reset***" button and check what follows:
  - The alarm message shown on the display resets
  - The red LED "***Alarm***" resets
  - The relay "***General fault***" (K2) is deactivated

Functional tests must be carried out by a skilled technician, undertaking the proper safety measures so to avoid accidental discharges of the extinguishing agent or the activation of outputs that may be harmful to the environment or people.

5.5 Faulty Component Replacement

This chapter provides useful information for replacing faulty components.

5.5.1 Replacing one module of the S81-PU001-x/S81-PU003-x power supply unit

Before replacing a module of the S81-PU001-x or S81-PU003-x power supply unit, the system must be powered down. This is why this operation requires complete system shutdown.

To replace one module, operate as follows:

- Open the disconnect switch that connects the batteries to the power supply unit (if present).
- Deactivate the main switch powering the control panel.
- Deactivate the external and internal disconnect switches supplying the primary power supply.
- Use a voltmeter to make sure that no voltage is present on the input terminals.
- Disconnect the wires connected to the faulty module.
- Remove the 4 fixing screws securing the module to the base plate.
- Remove the faulty module and mount the new one by tightening the 4 screws.
- Make the connections following the instructions of the wiring diagram.
- Activate the disconnect switches that supply the primary power supply, inside and outside the switchboard.
- Use a voltmeter to measure the voltage on the power supply unit outputs and check that it is 25VDC.
- Activate the disconnect switch that connects the batteries to the power supply unit.
- Activate the main switch supplying power to the control panel.

5.5.2 Replacing one module of the S81-PU004-x power supply unit

The replacement of the modules composing the S81-PU004-x power supply unit can be made during operation and does not require system shutdown.

To replace the **SI-5011-1** battery charger module operate as follows:

- Open the disconnect switch that connects the batteries to the power supply unit.
- Remove the two terminal blocks TB1 and TB2.
- Remove the module from DIN rail support.
- Reinstall the new module on the DIN rail support.
- Re-apply the two terminal blocks TB1 and TB2.
- Use a voltmeter to measure the voltage at **Vbat** terminal and check it is 27VDC approximately.
- Activate the disconnect switch that connects the batteries to the power supply unit.

To replace one **SI-5010-1** power supply module operate as follows:

- Put the ON/OFF switch in OFF position.
- Remove the three terminal blocks TB1, TB2 and TB2.
- Remove the module from DIN rail support.
- Reinstall the new module on the DIN rail support.
- Re-apply the three terminal blocks TB1, TB2 and TB3.
- Put the ON/OFF switch in ON position.
- Use a voltmeter to measure the voltage at **Vload** terminal and check it is 25VDC.

5.5.3 Replacing one module of the SI-5000 power supply unit

The replacement of the modules composing the SI-5000 power supply unit can be made during operation and does not require system shutdown.

To replace the **SI-5009-1** battery charger module operate as follows:

- Open the disconnect switch that connects the batteries to the power supply unit.
- Unscrew the four screws on the front panel.
- Remove the module from the rack using the handle on the front panel.
- Set the two dip-switches on the new module in exactly the same way as those on the faulty one.
- Insert the new module in the rack and tighten the 4 fixing screws on the front panel.
- Use a voltmeter to measure the voltage **Vbat** terminal and check that it is 27VDC approximately.
- Activate the disconnect switch that connects the batteries to the power supply unit.

To replace one **SI-5008-1** power supply module operate as follows:

- Press the shutdown button on the front of the module to be replaced using the tip of a screwdriver.
- Unscrew the four screws on the front panel.
- Remove the module from the rack using the handle on the front panel.
- Insert the new module in the rack and tighten the 4 fixing screws on the front panel.

Avoid any contact with the tracks and internal parts of the removed module since the energy stored in electrolytic capacitors can cause serious injury to people.

5.5.4 Battery Replacement

To replace lead batteries, proceed as follows:

- Open the isolator that connects the batteries to the power supply unit (if present).
- Disconnect the + B and -B cables from the battery terminals.
- Replace the batteries with two identical and same models.
- Connect the + B and -B cables to the battery terminals, taking care not to reverse the polarity.
- Close the battery disconnector

5.5.5 CPU card Replacement

The replacement of one of the CPUs can be made during operation and does not require system shutdown. To replace the **SI-1102-x** central unit operate as follows:

- Fully unscrew the two screws on the front panel making sure that they are completely free.
- Remove the faulty card using the handle on the front panel.
- Remove the new card from the package taking care not to touch the electronic components.
- Insert the new card and tighten the two fixing screws on the front panel.
- Synchronization of the new card will start automatically and may take from few seconds to few minutes depending on the panel size and type of I/O cards installed. When the automatic synchronization finishes the CPU fault clears. During synchronization time:
    - all new events/alarms are collected and stored, ready to be processed.
    - all events/alarms happening in the field are promptly reported on the front panel of the respective I/O card.

All actions related to events happened during the synchronization are processed by the control panel as soon as the synchronization finishes.

5.5.6 I/O card replacement

The replacement of I/O cards can be made during operation and does not require system shutdown. To replace one I/O card operate as follows:

- Fully unscrew the two screws on the front panel making sure that they are completely free.
- Remove the faulty card using the handle on card front panel.
- Remove the new card from the package taking care not to touch the electronic components.
- Insert the new card and tighten the two fixing screws on the front panel.
- Wait for some seconds until the fault indication disappears from the display.

5.5.7 Fuses Replacement

Fuses must be replaced exclusively with fuses of the same type and value. See the table below for fuse types.

Location	Type	Value
Fuse for SI-5005-1 power supply module	5x20 ultra-fast glass fuse	T6,3A H250V
Fuse for SI-5008-1 power supply module	5x20 ultra-fast glass fuse	T10A H250V
Fuse for SI-5010-1 power supply module	5x20 ultra-fast glass fuse	T8A H250V
Battery fuse disconnect switch for S81-PU001/S81-PU003	10x38 fuse link	20A-G
Battery fuse disconnect switch for S81-PU-002/S81-PU004	10x38 fuse link	50A-G
Power supply fuse SI-90/MB panel	5x20 ultra-fast glass fuse	T6,3A H250V

5.5.8 Repair of a faulty card

The repair of a faulty card must be carried out by the manufacturer only. Send faulty cards to ***SHIELD FIRE SAFETY & SECURITY LTD*** for repair, together with a brief description of the type of fault using the appropriate repair form.

5.5.9 Customer service and training

The customer service of ***SHIELD FIRE SAFETY & SECURITY LTD***. can support the final user during design, development and testing of SI-90-type systems. Furthermore, specific training courses on this product can be organized on request at our premises. For any technical information, please use the following contacts:

SHIELD FIRE SAFETY & SECURITY LTD
Ph: +39-02-90379410
Fax: +39-02-90378574
E-mail: info@shieldglobal.com

6 APPLICATION NOTES

This chapter contains some instructions to be followed for the development of systems that comply with the requirements of European standards.

6.1 Notes for the development of systems in compliance with EN54-2 / EN54-4 standard.

EN 54-2 standard compliant fire detection systems must comply with the following provisions:

- Use only power supply units certified and approved for this type of equipment.
- No more than 32 detectors and/or alarm buttons must be configured per zone.
- Each conventional detection line (SI-2302 cards) can be connected to max 32 detectors and/or alarm buttons.
- Each 4-20mA detection line (SI-2401, SI-2402, SI-2403 cards) can be connected to one fire detector only.
- The 7-segment display on SI-2401 and SI-2402 cards does not provide the operator with fundamental information according to the standard EN-54-2.
- Each loop line (SI-2702 cards) can be connected to max 512 detectors and/or alarm buttons.
- One short circuit isolator must be installed every 32 detectors and/or alarm buttons on loop lines (SI-2702-1, SI-2709-1, SI-2710-1).
- Systems with more than 512 detectors and/or alarm buttons must have redundant CPUs.
- The maximum number of cards for addressable devices in the different configurations must not exceed the values shown in the table below:

Configuration	Max Number of loop cards
SI-90/L/M/C	8
SI-90/1R	13
SI-90/2R	26
SI-90/1-10R	64

6.2 Notes for the development of systems in compliance with EN12094-1 standard.

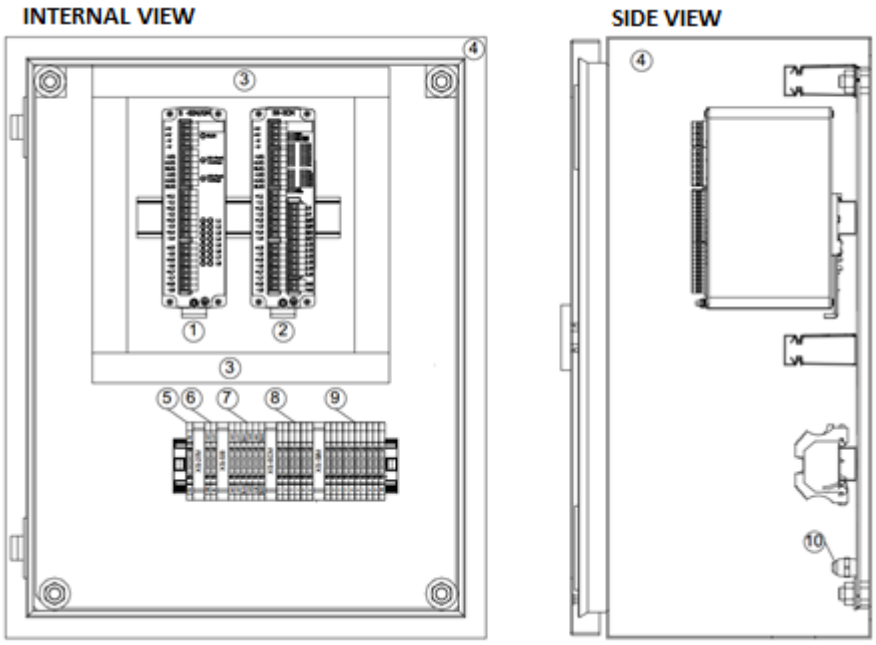
The inputs and outputs of fire extinguishing systems must be always monitored by the following types of cards:
SI-23028 monitored input card for monitoring buttons, pressure valves, selectors, etc.
SI-24011 x 4-20mA input card for monitoring flame, heat detectors, etc.
SI-24022 x 4-20mA input card for monitoring flame, heat detectors, etc.
SI-24038 x 4-20mA input card for monitoring flame, heat detectors, etc.
SI-25018 monitored output card for solenoid control and monitoring.
SI-25044 monitored output card for solenoid control and monitoring.
SI-25038 output card for visual and audible alarm device control and monitoring
SI-250216-relay output card for controlling blockages, replications, etc.
S81-LEU Remote I/O device (can handle an extinguishing zone)
SI-2601 Card gathering the visual signals of one extinguishing zone

The SI-2302, SI-2401, SI-2402, SI-2403, SI-2501, SI-2504 and SI-2711 cards can be used in redundant configuration to increase system availability. The maximum number of fire extinguishing cards in the various configurations must not exceed the values shown in the table below:

Configuration	Max Number of extinguishing cards SI-2601-1	Max Number of remote I/O device S81-LEU
SI-90/L/M/C	2	2
SI-90/1R	6	6
SI-90/2R	12	12
SI-90/1-10R	64	64

6.2.1 Remote I/O device S81-LEU

The SB-ECM extinguishing modules must be plugged into an appropriate enclosure (S81-LEU) also containing a SB-SIM-GM module to send the local power supply faults to the central unit. The casing should be positioned less than 10cm from the local PSU-001-x power supply and the connections between the two devices must be made using a steel tube. For this scope only use a power supply unit PSU-001-x. Finally, a SI-2601-1 card must be provided in the central unit to report all the required signaling from the extinguishing zone.



Item	Description
1	8 inputs module SB-SIM-GM
2	Extinguishing module SB-ECM
3	Cable try 25x80
4	Housing L400 H500 P250
5	Earth terminal
6	+25V terminals

7	Safety Bus terminal
8	SB-ECM terminal
9	SB-SIM-GM terminal
10	Shields earth bar

Remote I/O device S81-LEU

6.2.2 Processing of signals and indicators

The SI-90 system receives and shows the signals relating to the different extinguishing zones. The central unit processes the logics. The information is sent to the display unit. Both compulsory and optional functions are carried out by the cards as described in paragraphs 5.2.2 and 5.2.3.

6.2.3 Mandatory functions

The SI-90 system can carry out the following mandatory functions:

- Receiving and processing the Sequence Start signal from the detection card.
- Monitoring of one monitored input line for manually operated equipment.
- Monitoring and control of output lines for solenoid control.
- Monitoring and control of output lines for visual/audible alarm devices.
- Unequivocal visual indication of the various statuses.
- Control of a fault open collector output.
- Control of an open collector output and visual indication of the released status.

6.2.4 Optional functions

The SI-90 system can carry out the following optional functions:

- Control of release delay.
- Signal representing extinguishing agent flow
- Emergency hold
- Activation of a secondary flooding sequence
- Manual only mode (Aut-Off)
- Actuation commands to equipment inside the system
- Release signals to reserve cylinders
- Actuation commands to equipment outside the system
- Emergency shutdown
- Activation of alarm devices with different signals

6.2.5 Light indicators

Each extinguishing zone shall be provided with a SI-2601-1 card that gathers all the main indications relating to a single extinguishing zone. The front panel of said card shall include eight LED indicators signaling the following statues:

Function	Color	Label	Mode	Notes
"Pre-Activated" condition	Red	Activated	Flashing	Mandatory
"Activated" condition	Red	Activated	Fixed	Mandatory
"Released" condition	Red	Released	Fixed	Mandatory
Fault condition	Yellow	Fault	Fixed	Mandatory
Out of service condition	Yellow	Disabled	Fixed	Mandatory
Emergency shutdown	Yellow	Inhibit	Fixed	Mandatory
Emergency hold	Yellow	Hold	Fixed	Mandatory
Only manual mode	Yellow	Automatic-Off	Fixed	Mandatory
Reserve bank selection	Yellow	Reserve bank	Fixed	Mandatory

Detailed information concerning alarm, Fault and out of service conditions are shown on the control panel display.

6.2.6 Monitored inputs

Use SI-2302 cards or the remote I/O device S81/LEU for controlling the following devices:

- Inputs for manual actuation devices. (Manual discharge buttons)
- Inputs for devices indicating extinguishing agent flow, such as pressure switches or flow switches. (PSH)
- Inputs for devices monitoring part status. (Valve position or weight monitoring devices)
- Inputs for discharge sequence extension. (HOLD)
- Inputs for devices allowing to switch from Manual/Automatic to Manual only operation.
- Inputs for devices allowing to select MAIN/RESERVE

A maximum of 5 manual discharge buttons and a maximum of 5 Emergency Hold devices can be connected per fire extinguishing zone.

6.2.7 Monitored outputs

Use SI-2501, SI-2504 cards or the remote I/O device S81/LEU for monitoring and controlling the following devices:

- Releasing device control outputs. (Solenoids, Deluge valves, etc.)
- Outputs for controlling equipment inside the system (Pilot cylinders, etc.)

Use SI-2503 cards for monitoring and controlling the following devices:

- Outputs for visual and audible alarm device control. (TOA)

6.2.8 Non monitored outputs

SI-2502 type cards, combined with the termination board SI-3807, can monitor the outputs controlling equipment external to the system (door release, ventilation stop, etc.)

6.2.9 Receiving and processing inbound actuation signals

The system is able to receive an automatic actuation signal from the detection cards and a manual actuation signal from the manual actuation devices connected to SI-2302 type cards or to the remote I/O device S81/LEU.

After receiving the actuation signal ("Activated" Condition) no disabling operation can be carried out in the relevant fire suppression zone.

6.2.10 Transmission of the release signal

After receiving the actuation signal, the system transmits the signal to releasing devices (Solenoids). Signal transmission (actuation) only affects the selected bank (Main/Reserve)

6.2.11 Actuation of alarm devices

After receiving the actuation signal, the system transmits the signal to Alarm devices.

Alarm devices can be silenced at access level 2 (Sounder silencing) only after the "released" condition has activated.

6.2.12 Mains voltage detection signal

The mains voltage detection signal relates to the whole system (Power-ON LED on the display).

6.2.13 “Pre-Activated” condition

If appropriately configured, the system enters the Pre-Activation condition within one second of receiving the first trigger signal inputs. The Pre-Activated condition is reported by:
- flashing the Activated zone LED on the SI-2601 card

6.2.14 "Activated" condition

The system enters in Activated mode within one second of the trigger signal reception. After setting the "Activated" condition, the d.e.c. always activates alarm devices within one second. The "Activated" condition is signaled by:
- Activation of local audible indication
- Activation of the "Activated" zone steady light indicator on card SI-2601
- Intermittent activation of alarm device control output. (TOA)

6.2.15 "Released" condition

The "released" condition is activated when the signal relating to extinguishing agent flow (PSH) is received or when releasing devices (EV) output is activated. When programming, the user can decide how to set the "released" condition. The "Released" condition is signaled by:
- Activation of the "Released" zone steady light indicator on card SI-2601
- Activation of the output for "Released" condition replication.
- Continuous activation of alarm device control output. (TOA)

If the "released" condition is activated further to the receipt of the signal relating to extinguishing agent flow without the d.e.c. being in the "Activated" condition (Manual release by mechanical command) the local sounder is also activated.

6.2.16 Resetting the "Activated" and "Released" conditions

The "Activated" and "Released" conditions are reset by means of the manual Reset command at access level 2. (Reset Panel)

The reset of the "Activated" and "Released" conditions can be inhibited for a certain time, adjustable from 1 to 30 minutes. This time is set for each fire extinguishing zone in the operator cycle at access level 3 or by Pro-S81 configuration program.

6.2.17 Fault condition

The system can recognize and signal the following fault conditions:
- Interruption of the automatic actuation signal from the central unit (Alarm Card Fault).
- Interruption or short circuit of all monitored input and output lines.
- Internal power supply faults.
- System faults
- Wrong program running and/or corrupted memory.

Faults are signaled as explained below:
- Activation of local audible indication
- Activation of the "Fault" steady light indicator on control panel display.
- Detailed information on the fault type and total number of faults on control panel display.
- Activation of the output for Fault condition replication.

6.2.18 Out of service condition

All inputs and outputs relating to the fire extinguishing zones can be enabled/disabled individually or altogether at access level 2. Any disabling will not be affected by the reset command (Reset).
The "Released" condition is not activated when in "out of order" condition, unless the signal of extinguishing agent flow is received (PSH). The condition of "out of order" is indicated at access level 1 on the SI-2601 cards by cumulative visual alarm device. The details of all exclusions are visible at access level 1 on control panel display.

If the discharging actuators are enabled when an alarm is active, the extinguishing agent will be discharged only after the set discharge delay time has elapsed.

6.2.19 Release signal delay

The system can delay the release command for a variable time of 0 to 60 seconds. This time is set for each fire extinguishing zone in the operator cycle at access level 3 or by Pro-S81 configuration program.

6.2.20 Signal representing extinguishing agent flow

The system features inputs for receiving the signal that represents extinguishing agent flow (PSH).
If this signal is received without the "Activated" condition, the "Released" condition activates. Therefore, all relevant outputs will be activated.

6.2.21 Emergency hold

The system features inputs for receiving the emergency hold signal. (Hold). Two possible modes exist for this function:

Mode-A
Release control outputs are not activated until the emergency hold device is active. When the emergency hold device deactivates, after the release delay time, the release control outputs activate immediately. (EV)

Mode-B
Release control outputs are not activated until the emergency hold device is active. The release delay time is reset every time the emergency hold device is released. After the emergency hold input is activated, the system carries out the following operations:
- Activation of local audible indication. (If previously silenced)
- Activation of the HOLD steady light indicator on card SI-2601.
- Activation of the output for emergency hold replication.

Mode-C (UL 864)
Extinction command outputs are not activated until the emergency extension device is active. The extinction delay time continues to be decremented but is stopped at 10 seconds from the term. Following the release of the emergency extension device, the timer resumes counting for 10 seconds.

The fault condition of the emergency hold input line will inhibit the activation of releasing control outputs.

6.2.22 Activation of a secondary release sequence

The system can control a secondary release sequence. This sequence is activated by manual device. The secondary flooding sequence is activated only in the following cases:
- Primary release sequence is over ("Released" condition)
- Sounders have not been silenced
- System has not been reset
- Secondary sequence manual actuation input is active.

The secondary releasing control output is activated immediately after the activation of the manual actuation input without any delay.

6.2.23 Manual only mode (Aut-Off)

The system features inputs for receiving the signal switching the operating mode from manual only to automatic/manual and vice versa. After this input is activated, the system carries out the following operations:
- Activation of the Aut-Off steady light indicator on card SI-2601.
- Activation of the output for Manual only operation replication. (Aut-Off)

During the manual only operation, a fire extinguishing zone can be activated only by means of the manual actuation device. (PB)

6.2.24 Actuation commands for system internal equipment

The system can control equipment located inside the fire extinguishing zone. E.g. Pilot cylinders, visual alarm devices, etc. The cards to be used for these purposes are:
- SI-2503, S81-LEU for controlling visual and audible alarm devices
- SI-2501, SI-2504, S81-LEU for controlling solenoids, valves, etc.

6.2.25 Releasing signals to the reserve cylinders

The system features inputs for receiving the signal that switches the releasing command from the main bank to the reserve one and vice versa. After these inputs are activated, the system carries out the following operations:
- Activation of the "Reserve Banks" steady light indicator on card SI-2601
- Activation of the output for Reserve Bank replication.

6.2.26 Actuation commands to equipment outside the system

The system can control equipment located outside the fire extinguishing zone. E.g. Door closing, ventilation stop, etc. The cards to be used for these purposes are SI-2502 combined with the termination board SI-3807.

6.2.27 Emergency shutdown devices

The system features inputs for receiving the signal from emergency shutdown devices. If these devices are actuated under standby and "activated" conditions, the release control signal will be inhibited until this condition is active and until the "activated" condition is reset. The fault condition of the emergency shutdown input line will inhibit the activation of fire suppression control outputs.

6.2.28 Activation of alarm devices with different signals

The d.e.c. can control the output of alarm devices by means of two different signals: This is why the control output of alarm devices is activated intermittently during the warning time (pre-discharge) and continuously during the "released" or emergency hold conditions.

6.3 Notes for the development of systems in compliance with ATEX directive.

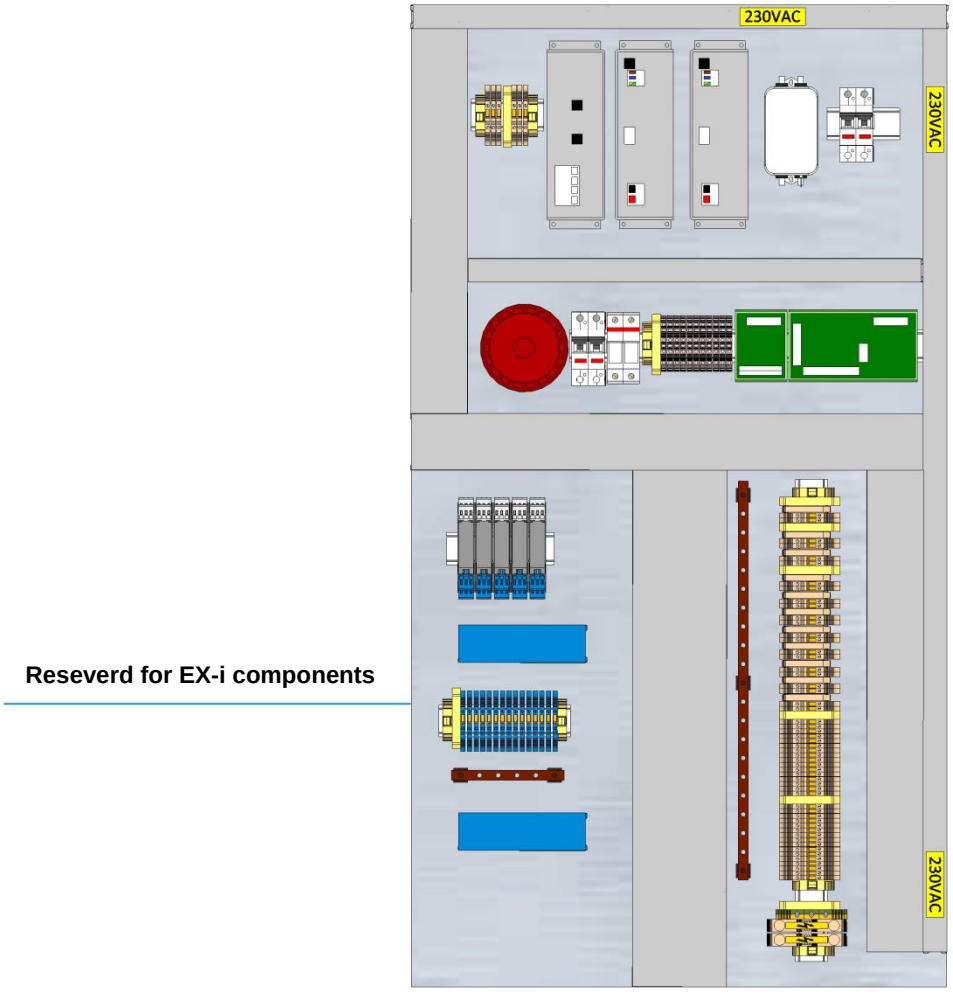
For systems in compliance with ATEX directive connected to intrinsic Safety devices (Ex-I) the following prescription shall be followed:

Input cables
Input cables for Ex-i circuits shall be identified with a plate or by coloring the surroundings with RAL-5015 color. Ex-i inputs shall be clearly identified.

Internal cables
Connection of internal cables to intrinsic safety barriers is executed in compliance with the standard EN60079-11, with one side dedicate to Ex-I circuit only and the other side for non Ex-i connections. Connection of Ex-I circuit shall be done with isolated cables and only single cable terminal is permitted. Ex-I cables cannot be grouped or routed with non Ex-I cables, and Ex-I and non-Ex-I cables shall be separated. Minimum distance between two conductors shall be 8mm. Minimum isolation grade shall be higher than 1.5kV for non Ex-I cables and higher than 0,5kV fro Ex-I cables.

Internal connections
Trays for Ex-I circuits shall be identified with one of the following methods:

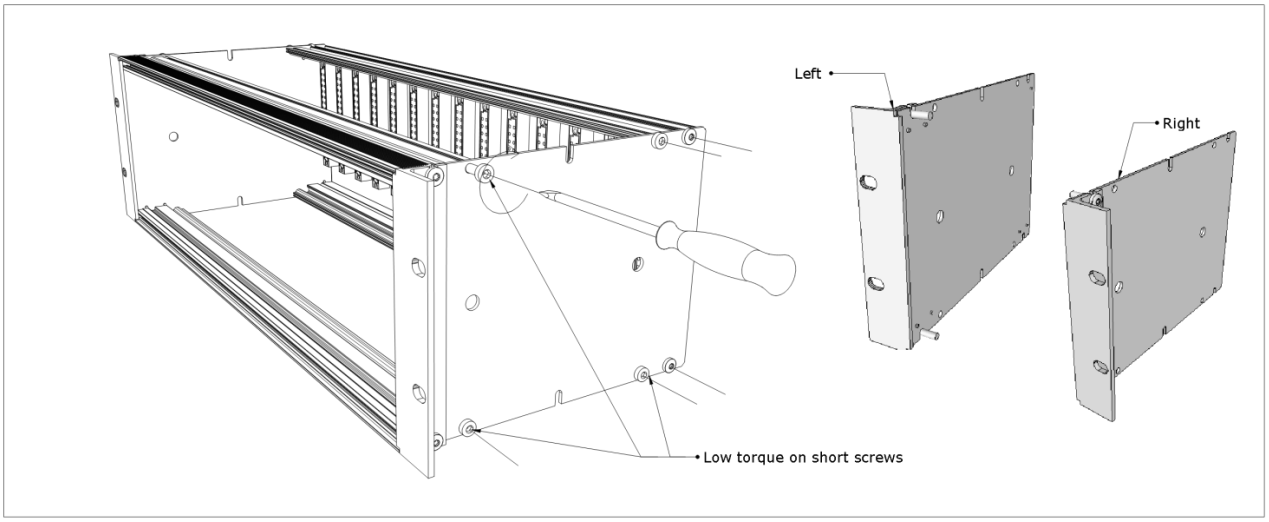
- Cables with blue color insulation (if there aren't other cables of this color in the cabinet)
- Blue color for Cable trays used for Ex-I cables
- Grouping or bundling of Ex-I cable with cable ties identified with blue color plate
- Section for power circuit cables shall be minimum 1.5 mm².
- Minimum distance between Ex-I circuits and non Ex-i circuits shall be 50mm.
- Ground connection shall be in compliance with EN60079-14.



SI-90-1R/2R ATEX Internal Plate

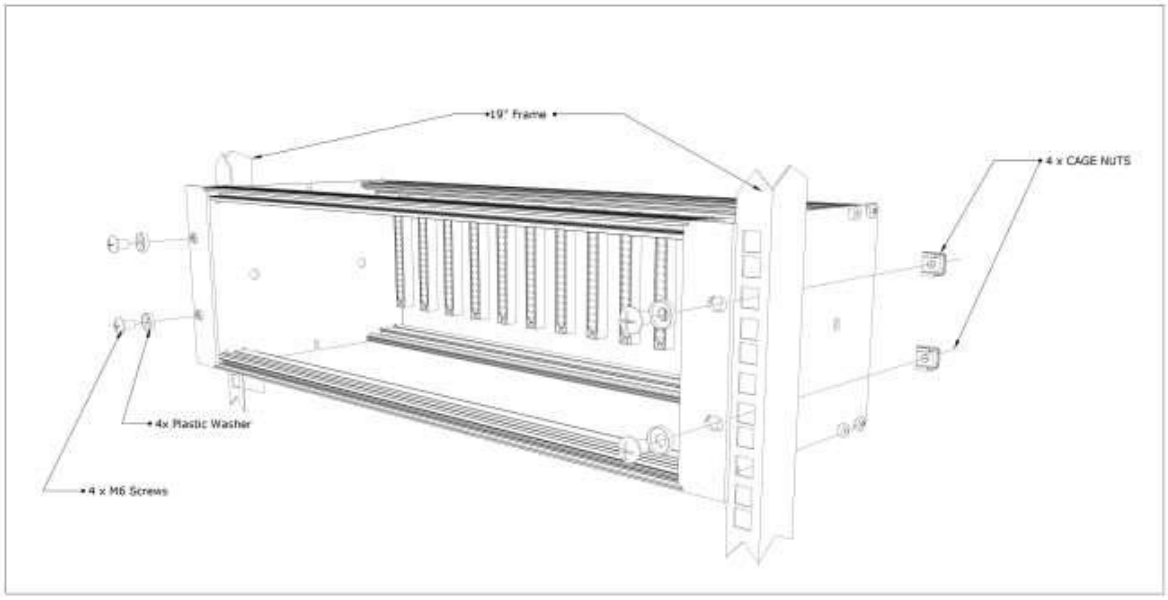
13 Slots I/O rack SI-2201-2/SI-2201-3 assembly

Up to ten expansion racks can be installed in one SI-90 panel. Each rack can include up to thirteen I/O cards. Position 14 is reserved to the SI-2202-1 rack controller. Module-field device connections are carried out by using prewired cables. Using this bus, systems with redundant I/O cards are possible. 13 I/O slots SI-2201-2 and SI-2201-3 rack is mounted using aluminum side panels provided with the product and fixed using six screws per panel provided. The rack is normally supplied already assembled with side panels.



Assembling of side panels - 13 slots

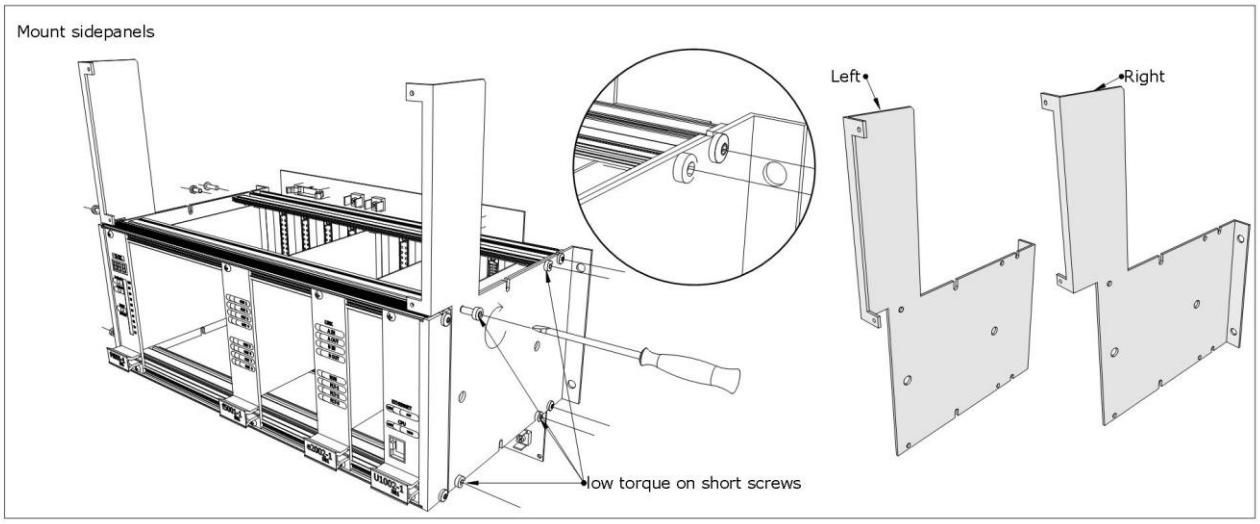
The rack assembly with side panels is fixed onto a standard 19” frame four using nut cages and M6 screws



Fixing of assembly onto a standard 19” frame

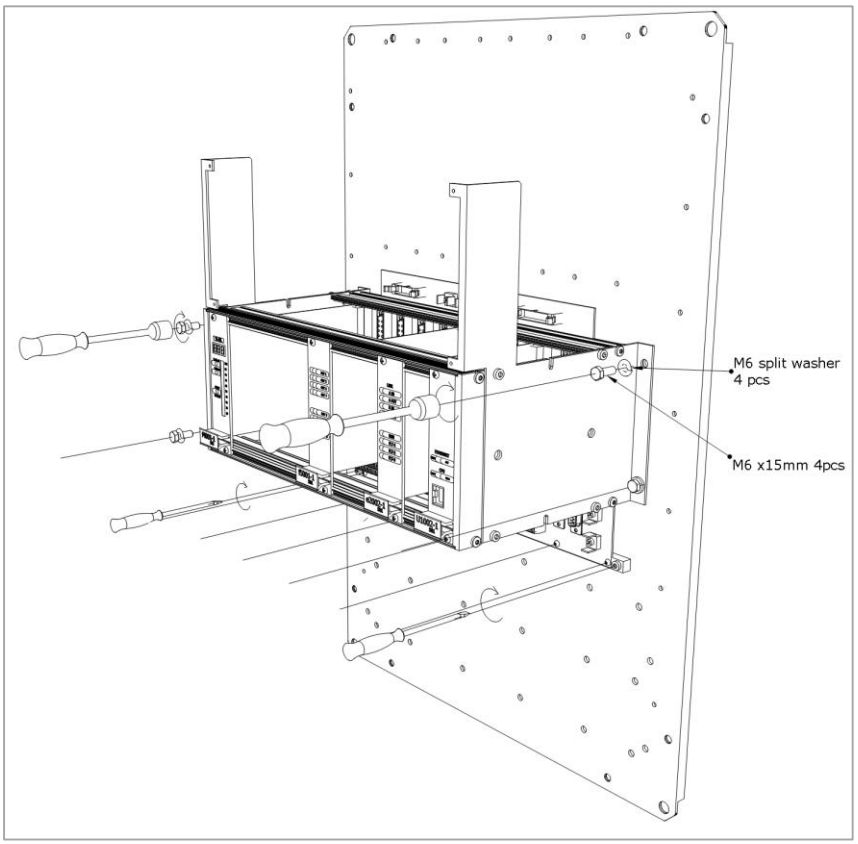
8 Slots I/O rack SI-2204-1 assembly

8 I/O slots SI-2204-1 rack is mounted using aluminum or steel side panels provided with the product and fixed using six screws per panel provided.



Assembling of side panels - 8 slots

The rack assembly with side panels is fixed on a metallic plate, using four M6 screws.



Fixing of assembly onto metallic plate

Racks Ratings

V in	22-29VDC
I in	40A max
Inputs	Minimum 1 with one SI-2401 installed in the rack Maximum 104, with thirteen SI-2403 cards installed in the rack
Outputs	Minimum 4 supervised, with one SI-2504 installed in the rack, 24VDC, 4A each Maximum 104 supervised, with thirteen SI-2501 cards installed in the rack, 24VDC, 0.5A each, or 208 unsupervised outputs with thirteen SI-2502 cards installed in the rack, open collector
Alarm thresholds	2 programmable channel by channel
Warm-up time	<120sec
Operating temp.	5 / +50 °C
Degree of protection	NA

Recommendations

SI-2201-2, SI-2201-3 and SI-2204-1 racks are foreseen to be installed in locations with environmental conditions specified above and as clearly specified at clause 1, par. 2 of EN 60079-0.

The above referred equipment shall be installed in an enclosure with minimum degree of protection IP30.

Devices installed in zone that have been classified and connected to SI-2201-2, SI-2201-3 or SI-2204-1 racks shall be protected with one of the types of protection listed in EN 60079-0, corresponding to their own category.

6.4 Notes for the installation of systems in compliance with CEI 79-2 standard.

Should the system be required to carry out burglar alarm functions, too, please consider what follows:

- The cabinet shall be equipped with a micro switch placed on the revolving door connected to the 24h surveillance opening of the termination board SI-3804-1.
- The clamping screws of the cable entry plate must be tamper proof.
- S81-Mod-AIT input modules shall be installed in a tamper proof housing with protection rating IP30 or higher.
- In order to guarantee the safety systems IMQ certification, the functions NON LATCHING and NORMALLY OPEN must not be enabled for the SI-2707-1 card.

6.5 Notes on I/O card redundancy

Safety related cards can be duplicated, in order to increase system availability. In this case, the two cards must be positioned on different racks and their channels must be configured in the same way. In case of redundant card, the channels of both cards are seen by the control panel independently for the purposes of logic processes and diagnosis. The card redundancy of SI-90 systems is based on the following principles:

- An I/O card is considered as faulty by the central unit if it does not respond to bus LVDS polling or further to three consecutive failed tests on at least one of the channels.
- If one of the two cards is faulty, the other one will become effective for logic processing. Therefore, logics on redundant channels shall always be OR, and never AND.

SI-2711-1 card can be redundant without the need of configuring the field devices twice.

6.5.1 I/O card redundancy

I/O card redundancy means the possibility to connect a field user to two cards at the same time. Therefore, redundancy in this document refers to I/O cards only, and not to field devices. With respect to this, we would remind that complete redundancy (cards + field devices) is possible for all I/O cards without restrictions. The I/O cards of the SI-90 system can be divided into three categories:

- Redundancy not possible
- Redundancy possible, with restrictions
- Redundancy without restrictions

6.5.2 I/O cards for which redundancy is not possible

Redundancy is not possible for these cards:

SI-2502-1	Card with 16 non monitored outputs
SI-2503-1	Card with 8 monitored outputs with polarity reversal for audible alarm devices
SI-2601-1	Control card for fire extinguishing systems
SI-2602-1	Logic card
SI-2702-1	ESP protocol control card
SI-2706-1	Modbus RTU Master/Slave card (*)
SI-2707-1	SSP protocol control card
SI-2708-1	Control card for scales
SI-2709-1	Shield addressable devices control card
SI-2710-1	System Sensor protocol control card

(*) The card SI-2706 cannot be duplicated, but features two independent communication lines, one RS485 and one RS232; therefore, the communication to the DCS can be considered redundant.

6.5.3 I/O cards for which redundancy is possible with restrictions

Redundancy is possible for the cards below, with some restrictions or precautions:

SI-2302-2 Card with 8 safety related monitored inputs
These cards can be redundant, even though with the following restrictions:
- To isolate an input channel, both channels connected to the two cards shall be isolated.
- In the supervisory system, each channel shall be represented by two different items.
- Cards shall be placed on adjacent racks and in the same position.
- Duplicated channels shall be configured in the same way.

SI-2401-2, SI-2402-2, SI-2403-2 (4-20mA safety related cards)
These cards can be redundant, even though with the following restrictions:
- To isolate an input channel, both channels connected to the two cards shall be isolated.
- In the supervisory system, each channel shall be represented by two different items.
- Cards shall be placed on adjacent racks and in the same position.
- Duplicated channels shall be configured in the same way.

SI-2501-2, SI-2504-2 (Safety related output cards)
These cards can be redundant, even though with the following restrictions:
- To isolate an output channel, both channels connected to the two cards shall be isolated.
- In the supervisory system, each channel shall be represented by two different items.
- Cards shall be placed on adjacent racks and in the same position.
- Duplicated channels shall be configured in the same way.

SI-2601-1, SI-2602-1,l SI-2706-1 (Special cards)
These cards can be redundant, even though with the following restrictions:
- To isolate an output channel, both channels to the two cards shall be isolated.
- In the supervisory system, each channel shall be represented by two different items.
- Cards shall be placed on adjacent racks and in the same position.
- Duplicated channels shall be configured in the same way.

6.5.4 I/O cards for which redundancy is possible without restrictions

Redundancy is possible for the cards below, without any restriction or limitation:

SI-2711-1 Loop control card with Safety Bus protocol for safety related addressable module.

7 INSTRUCTIONS FOR OPERATORS

This chapter provides all the information necessary for the operator to carry out main operations on the SI-90 control panels conforming to the EN 54-4 standard, for control panels conforming to the UL864 standard refer to the ST-058-EN documents, while for control panels conforming to the GOST standard refer to the annex B of this manual. This section includes some basic operations, such as:

- Silencing the control panel
- Silencing the sounders
- Resetting the control panel
- Displaying multiple events
- Enabling/disabling a system section
- Viewing the zone and device statuses
- Testing the control panel or the zones.
- Setting date and time
- Configuring control panel parameters

7.1 Operator interface

The operator interface of the SI-90 control panel includes: a graphic display, 14 indicator LEDs and a 23-key keyboard.

Operator interface

7.1.1 Visual indicators

ALARM LED (fire alarm function)
It flashes when an alarm status is received from one input defined as fire when programming. It is steady on if Control panel silencing is commanded. It goes out in case of reset.

GENERAL FAULT LED (burglar/fire alarm function)
It flashes in case of any Faults. It becomes steady-on after pressing Local Buzzer Silencing. It goes out when the cause of the problem is solved or further to the reset command if the cause has ceased to exist.

DEVICE FAULT LED (fire alarm function)
It flashes in case of sensor or actuator (other than sounders) Faults. It becomes steady-on after pressing Local Buzzer Silencing. It goes out when the cause of the problem is solved or further to the reset command if the cause has ceased to exist.

SOUNDER FAULT LED (fire alarm function)
It flashes in case of Faults of actuators defined as sounders. It becomes steady-on after pressing Local Buzzer Silencing. It goes out when the cause of the problem is solved or further to the reset command if the cause has ceased to exist.

PSU1 FAULT LED (burglar/fire alarm function)
It flashes in case of primary power supply fault. It becomes steady-on after pressing Local Buzzer Silencing. It goes out automatically when the cause is solved.

PSU2 FAULT LED (burglar/fire alarm function)
It flashes in case of secondary power supply fault. It becomes steady-on after pressing Local Buzzer Silencing. It goes out automatically when the cause is solved.

LEAKAGE FAULT LED (burglar/fire alarm function)
It flashes in case of voltage leakage to ground. It becomes steady-on after pressing Local Buzzer Silencing. It goes out automatically when the cause is solved.

SYSTEM FAULT LED (burglar/fire alarm function)
It flashes in case of system fault. It becomes steady-on after pressing Local Buzzer Silencing. It goes out automatically when the cause is solved.

ONGOING ZONE TEST LED (fire alarm function)
It flashes when a zone is set to test mode. It goes out automatically when the test is completed.

GENERAL DISABLE LED (fire alarm function)
It is steady on in case of any disable relating to area 1 (Safety).

SENSORS DISABLE LED (fire alarm function)
It is steady on in case of a sensor disable in area 1.

SOUNDER DISABLE LED (fire alarm function)
It is steady on in case of disable of an actuator defined as sounder in area 1.

OUTPUT DELAY LED (fire alarm function)
It flashes during the delay time count for the activation of one area 1 actuator. It goes out automatically when this count is over or when the delay override button is pressed.

VOLTAGE DETECTION LED (burglar/fire alarm function)
It is steady on when primary supply voltage is detected (PSU1). It goes out in case of primary supply voltage failure.

The back of the card includes three LEDs with the following functions:
Green LED: CPU-A Link
Steady on in presence of communication link to CPU-0.
Green LED: CPU-B Link
Steady on in presence of communication link to CPU-1.
Green LED: T8004-1 Link
Steady on in presence of communication link to default I/O termination board.

7.1.2 Buttons

 **Local Buzzer Silencing (fire alarm function)**
It operates at access level 1 or higher, and switches off only the local buzzer relating to fire alarm functions. The display shows a message informing that the buzzer has been silenced, which is stored in the event history and sent to any peripheral devices (host/printer).

 **Control panel reset (fire alarm function)**
At access level 2 or higher, it resets all currently active control panel alarms or Faults in area 1. The display shows a message informing that reset has been completed, which is stored in the event history and sent to any peripheral devices (host/printer). This function can be activated only after silencing local buzzer and sounders.

 **Scroll (fire/burglar alarm function)**
It operates at access level 1 or higher, and allows to scroll all currently active alarms or Faults of the selected zone of area 1 in chronological order, viewing the details of each event. It also operates in the history submenus of both area 1 and 2.

Sounder Silencing (fire alarm function)

It operates at access level 2 or higher, and deactivates the default sounder monitored output and all the outputs defined as sounder when configuring the system. The display shows a message informing that sounders have been silenced, which is stored in the event history and sent to any peripheral devices (host/printer). This function can be activated only after silencing the local buzzer.

Delay override (fire alarm function)

It operates at access level 1 or higher, and cancels the activation delay time of the actuators of configured area 1, where a delay time count is active at that moment.

Evacuation (fire alarm function)

At access level 2 or higher, it immediately activates the default sounder monitored output and all the outputs defined as sounder in system configuration. The display shows a message informing that evacuation has been completed, which is stored in the event history and sent to any peripheral devices (host/printer).

Esc (fire/burglar alarm function)

It operates in the various operator menus, and cancels the digital keys or selected menus on the display. It routes back to the previous menu.

Enter (fire/burglar alarm function)

It operates in the various operator menus, and confirms the digital keys or selected menus on the display.

Up arrow (fire/burglar alarm function)

It is used to select vertically the menu options or to scroll upward.

Down arrow (fire/burglar alarm function)

It is used to select vertically the menu options or to scroll downward.

Right arrow (fire/burglar alarm function)

It is used to select menu options horizontally.

Left arrow (fire/burglar alarm function)

It is used to select menu options horizontally.

Function (fire/burglar alarm function)

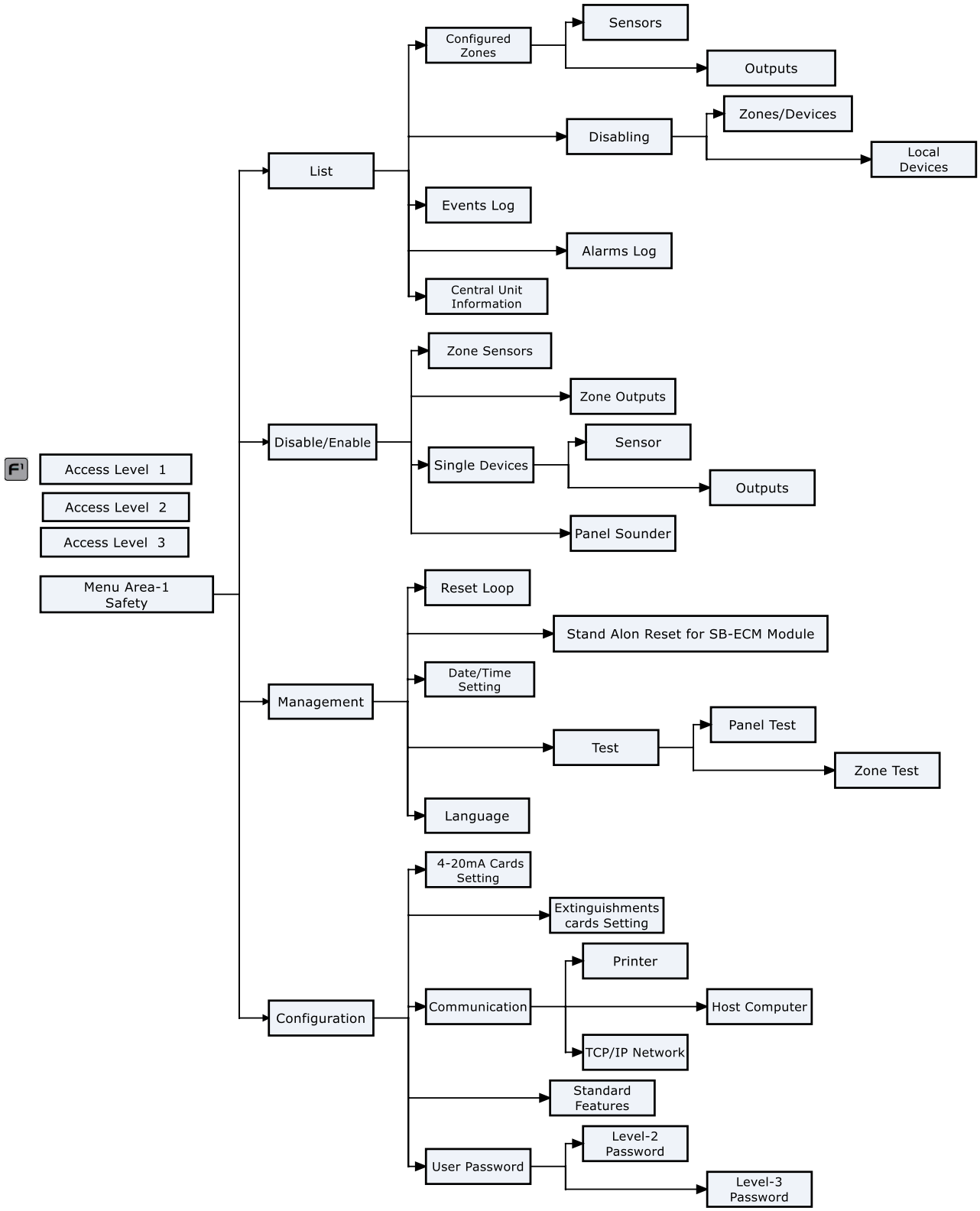
It allows to access directly the menu of the access level active when it is pressed

1/9 number keys (fire/burglar alarm function)

They are used to select password digits and to enter new data in the menus of the operator cycle

7.2 Fire alarm section menu (Safety)

The following picture represents the tree diagram of the menus available in the fire alarm section.



Structure of the fire alarm section menu

7.3 Access to functions

There are four different access levels for the fire alarm section.

- Level 1: accessible to the PUBLIC
- Level 2: accessible to the USER
- Level 3: accessible to the MAINTENANCE PERSON
- Level 4: for the MANUFACTURER only

Level 1 does not require any password and is accessed by pressing F1; Level 2 or 3 require the relevant passwords. Control panels are supplied with the following default passwords that can be changed in the operator cycle:

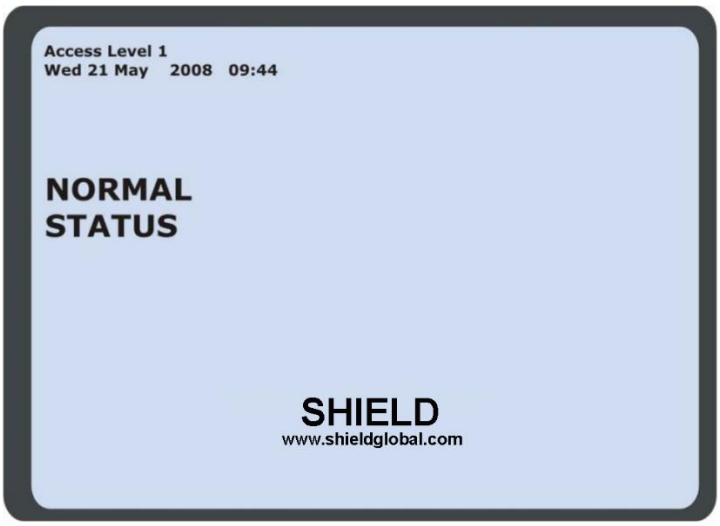
Access level	Password
Area 1 Level 2 (safety)	**151729**
Area 1 Level 3 (safety)	**161841**

The following table shows the required access levels for carrying out the main functions of the fire alarm section.

OPERATOR ACTIVITIES	Level 1	Level 2	Level 3
Local Buzzer Silencing	√	√	√
Ongoing timer override	√	√	√
Alarm, Fault and fault viewing	√	√	√
Sounder silencing		√	√
Alarm/Fault reset		√	√
Sounder activation (evacuation)		√	√
Access to View menu	√	√	√
Access to Enable/Disable menu		√	√
Access to Management menu		√	√
Access to Configuration menu			√

7.4 Operations at access level 1

After the initialization cycle, when the system is in standby mode, the display shows the status of the control panel, as show in the following picture.



Standby mode

7.4.1 Local Buzzer Silencing

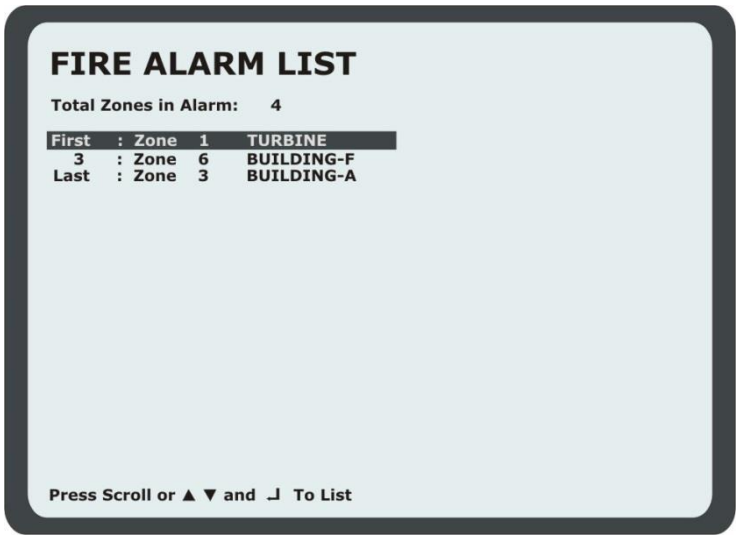
Press the button ***Local Buzzer Silencing***. The last line of the display will show a confirmation message for two seconds.

7.4.2 Delay Override

Press the button ***Delay override***. This operation is allowed only if the ***Delayed Output*** LED is on, and cancels any ongoing activation delay.

7.4.3 Overview of zones with ongoing fire alarm

In case of active alarms, a page is displayed as shown in the picture below.



List of zones with active fire alarms

This page allows to view:

- The total number of zones with active fire alarms
- The name and number of the first zone with active fire alarm
- The name and number of any other zone with active fire alarm
- The name and number of the last zone with active fire alarm.

Go to the central line using the arrow buttons and use the ***Scroll*** to view the chronological sequence of the alarmed zones.

For viewing the list of alarmed devices, go to the relevant zone and press ***Enter.***

Details of zones with active fire alarms

This page shows:

- The total number of alarmed zones
- The name and number of the first alarmed zone
- The name and number of the first sensor of the alarmed zone.
- The current number and the total number of alarmed zone sensors.

The complete list of alarmed sensors can be viewed by using the ***Scroll.***

7.4.4 Overview of zones with active fire pre-alarms

The overview of zones with active fire pre-alarm is the same as that of the zones with active fire alarms.

7.4.5 Overview of zones under supervisory condition

The overview of the zones under "supervisory" condition is the same as that of the zones with active fire alarms.

7.4.6 Overview of zones with active gas alarm

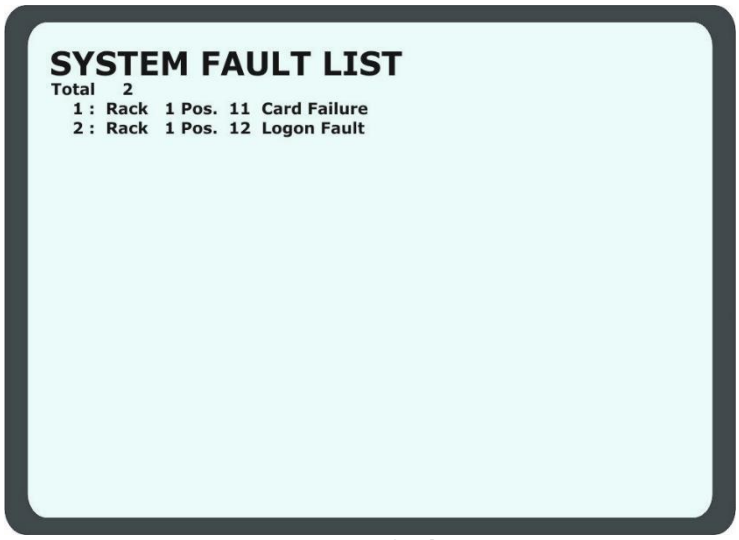
The overview of the zones with active gas alarms is the same as that of the zones with active fire alarms.

7.4.7 Overview of Fault zones

The overview of the Fault zones is the same as that of the zones with active fire alarms.

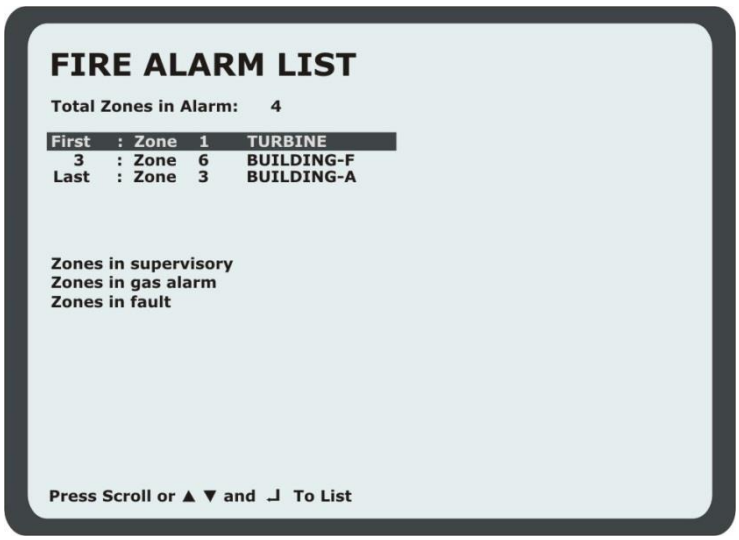
7.4.8 Overview of system faults

In case of one or more system faults, the following page will be displayed.



System faults

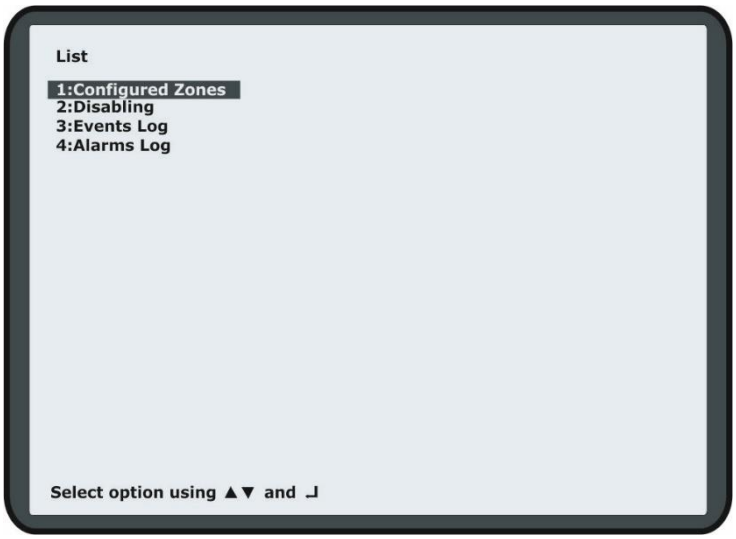
In case of several different events, the sequence of all event pages can be seen by pressing Esc. In all cases, after one minute of idle time, the system will display the page with the alarms with higher priority. During this stage, any new events having higher priority will be immediately shown on the display. The presence of events with lower priority will be signaled as shown in the picture below.



Events with lower priority

7.5 List

By pressing ***F1*** at access level 1, the overview page will be displayed as shown in the picture below.



Main menu at access level 1

7.5.1 Configured zones

To view the complete list of the programmed zone in area 1. The complete list of sensors and actuators can be viewed for each zone.

7.5.2 Disabling

To view the list of disabled zones and devices.

7.5.3 Event Log

To view the history of the last 250 events. The following information is shown for each event:

- Progressive number
- Date and time of occurrence
- The name and number of the zone to which it is related
- The type of device to which it is related
- The type of event.

User can move through the history following the chronological order using the ***Arrow*** keys.

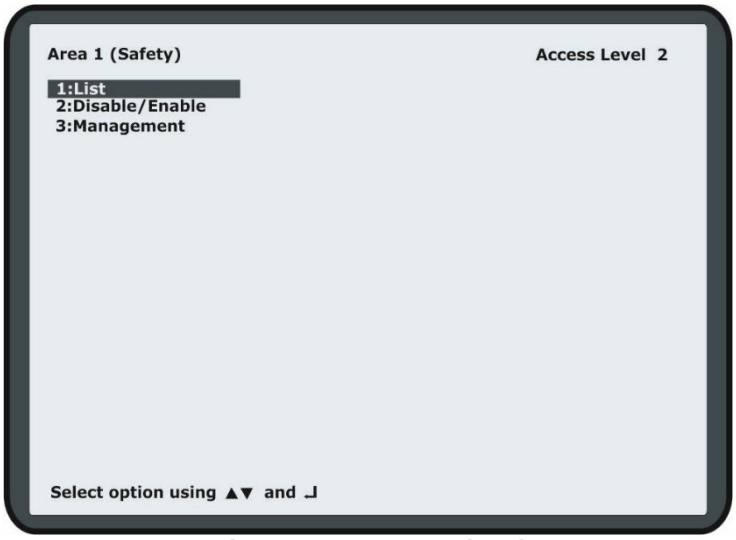
Event history

7.5.4 Alarm Log

To view the history of the last 100 fire, gas and supervisory alarms. The overview is the same as the event history.

7.6 Operations at access level 2

By entering level 2 password, preceded by the prefix 1, the main menu shown below is accessed.



Main menu at access level 2

The control panel will automatically exit the selected access level after an idle time of one minute. The following operations are allowed at access level 2:

7.6.1 Sounder silencing

The actuation of the Sounder silencing button will cause all actuators defined as sounders to deactivate. This button can be used only in case of alarm, after silencing the local buzzer.

7.6.2 Control panel reset

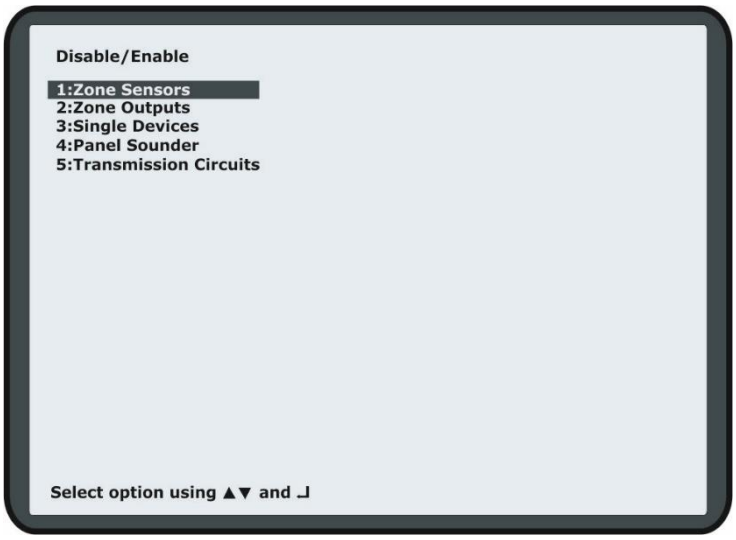
Acting on the ***Reset*** button, the alarm condition of latching sensors will reset, as well as the Faults of those types requiring a reset. This function can be activated only after silencing local buzzers and sounders.

7.6.3 Evacuation

The actuation of the Evacuation button will cause all actuators configured as sounders to activate immediately.

7.7 Disable/Enable

By selecting this option in the main menu, the disable/enable stage is accessed, as shown in the picture below.



Disable/Enable

7.7.1 Whole Sensor Zone

Select this option to enable/disable all the sensors of one zone

7.7.2 Whole Actuator Zone

Select this option to enable/disable all the actuators of one zone

7.7.3 Individual Devices

Select this option to enable/disable a single sensor or actuator.

7.7.4 Local Sounder

Select this option to enable/disable the local sounder

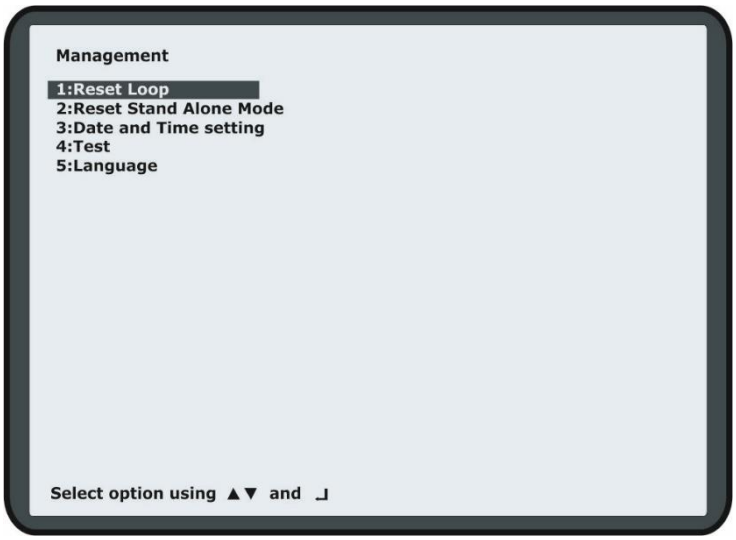
NB: In compliance with the EN12094-1 standard, no disabling is possible in fire extinguishing zones during the discharge activation sequence.

7.7.5 Transmission circuits

Select this option to disable / enable the alarm / fault transmission circuits individually.

7.8 Management

By selecting this option from the main menu, the "management" stage is accessed, as shown in the picture below.



Management menu

7.8.1 Loop Reset

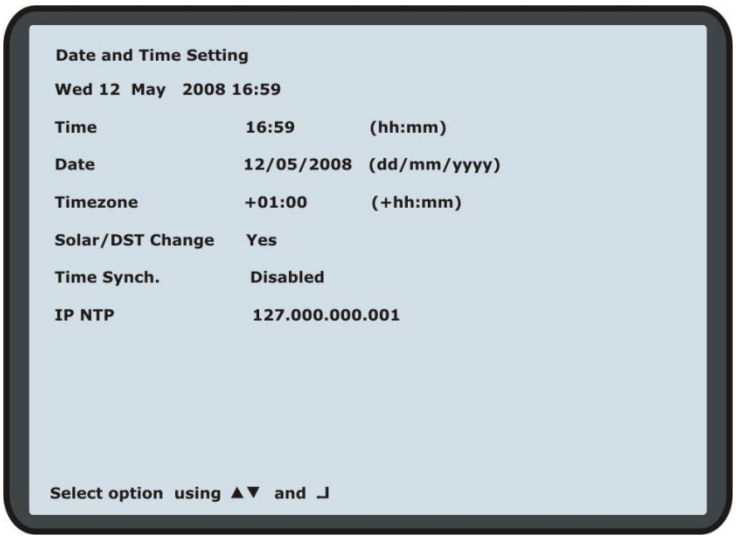
Select this option to reset the loop for SI-2702, SI-2707, SI-2709, SI-2710, SI-2711 type cards. If the card does not exist, or is of a different type, an error message is displayed. Loop reset is required to reset a short circuit condition or to temporarily remove the Logon Fault signal.

7.8.2 Reset Stand Alone Mode

Select this option to reset the Stand Alone Mode of SB-ECM modules after restoring bus connection.

7.8.3 Date and Time changing

By selecting this option, the system date/time setting page is displayed, as shown in the picture below. This step allows to change the various parameters. If the entered value is not allowed, an error message is displayed.



Date/Time changing

Time
It allows to set the time of control panel clock in the hour/minute format

Date
It allows to set control panel date in the day/month/year format.

Time Zone
It allows to set the difference from the reference time zone in the +/- hours/minutes format.

Solar/DST Change
It allows to set the automatic switching between solar time and DTS at 2 a.m. on the last Sunday of March, and from DST to solar time at 2 a.m. on the last Sunday of October.

Time Synch.
It allows to synchronize system clock. The following options are available:

Disabled	No synchronization of system clock
NTP Server	Synchronization via NTP Server
TCP-1 Host	Synchronization via Host-1 with supervisory protocol
TCP-2 Host	Synchronization via Host-2 with supervisory protocol
SERIAL Host	Synchronization via serial Host with supervisory protocol

IP NTP
This parameter sets the IP address of the NTP server. If the NTP server is external to the local network, the gateway has to be configured in the ***Communications – TCP/IP*** menu. SI-90 panel support NTP Protocol V4 specification RFC2030.

7.8.4 Test

Select this option to access the Test Menu. In this stage, it is possible to test a zone or the control panel.

Control Panel Test
If this option is selected, the control panel will carry out the following operations:

- LCD display test.
- Front panel LEDs lighting up.
- Local buzzer activation for 2 seconds
- All card LEDs lighting up.
- Keyboard test.

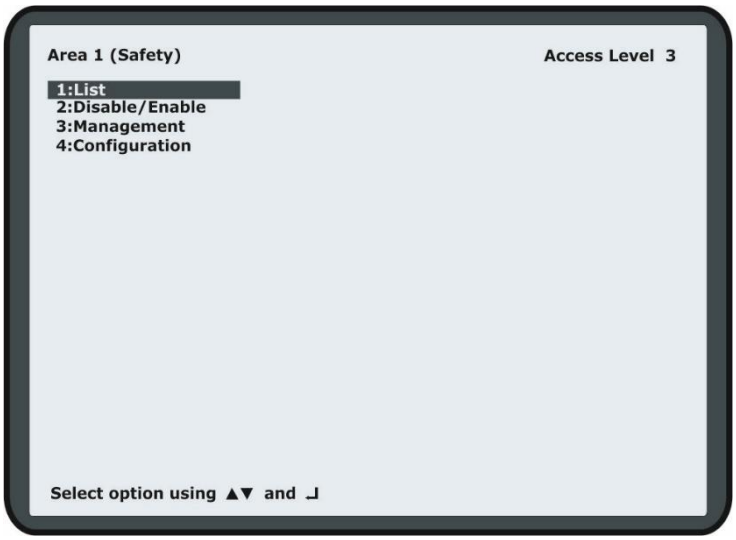
Zone Test
This option allows to test one zone. To test one zone, first of all select the desired zone from the list. Only one zone at a time can be tested. When a zone is being tested, the relevant LED lights up on the front panel. A zone cannot be tested if it is in the isolated alarm, pre alarm or Fault status. When a zone is in test mode, the control panel automatically resets alarmed sensors after 5 seconds and does not activate the outputs. The zone test mode is automatically exited after 2 hours, or by manually disabling the zone test from the same menu. During the test, the main page displays the remaining time.

7.8.5 Language

In this option it is possible to change in sequence the three installed languages by pressing Enter. The three languages shall be downloaded to the panel using ProS81 programming software.

7.9 Operations at access level 3

By entering level 3 password, preceded by the prefix 1, the main menu shown below is accessed.

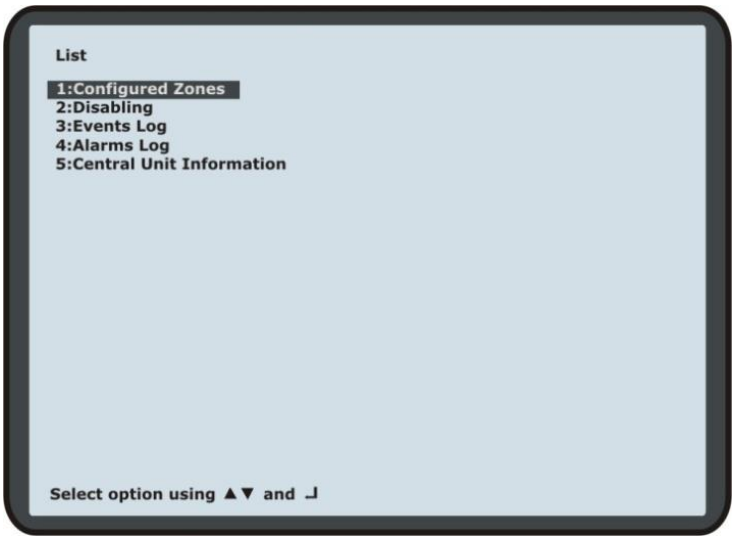


Main menu at access level 3

In this stage, in addition to same options of access level 2, also ***Configuration*** menu options are possible.

7.10 List Menu (Access Level 3)

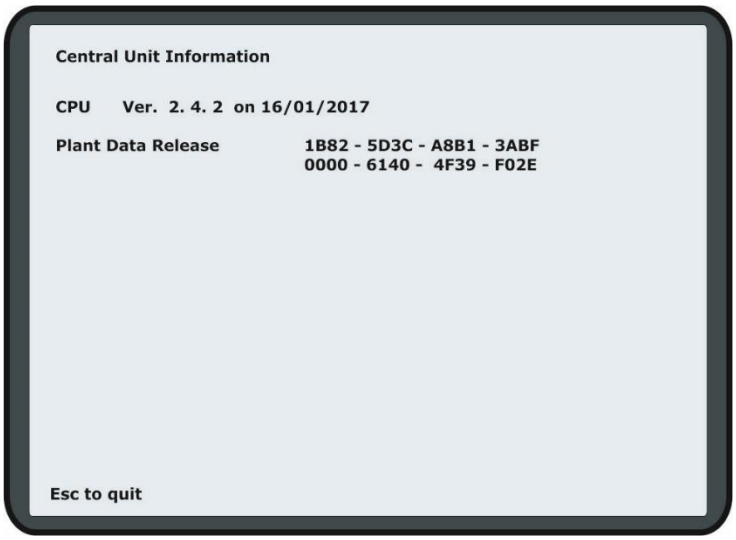
The options in this menu are the same as those at access level 2, plus the option “Central Unit Information”.



List Menu at access level 3

7.10.1 Central Unit Information

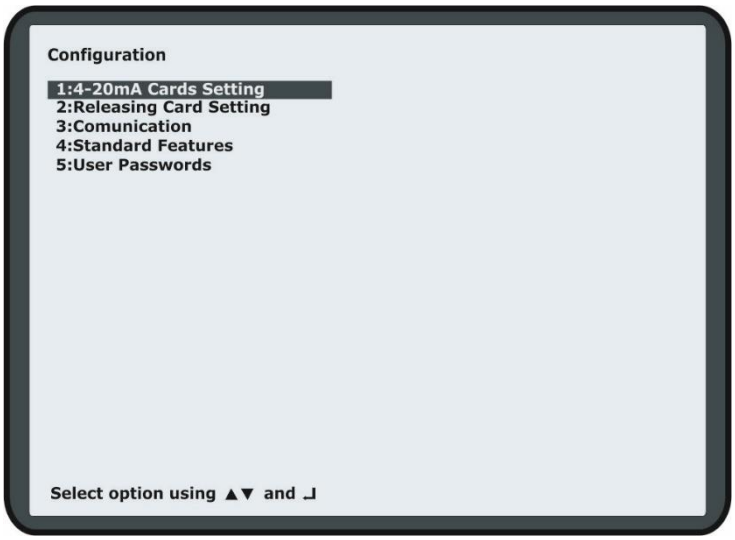
By selecting this option from the List menu, you access information on CPU software release and panel configuration release, as shown by the figure here below.



Central Unit Information

7.11 Configuration

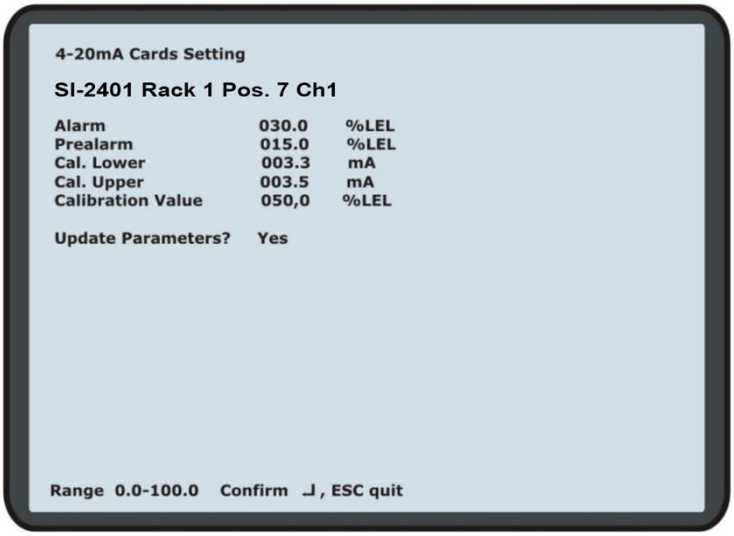
By selecting this option from the main menu, the configuration stage is accessed, as shown in the picture below.



Configuration

7.11.1 4-20mA Cards Setting

By selecting this option, the thresholds of ***SI-2401***, ***SI-2402*** and ***SI-2403*** type cards can be changed. First of all, enter the rack number and the position of the card whose thresholds are to be changed. If the card does not exist, or is of a different type, an error message is displayed. In case of ***SI-2402*** or ***SI-2403*** type cards, first of all enter the number of the channel whose thresholds are to be changed. Then, the screen below will be displayed:

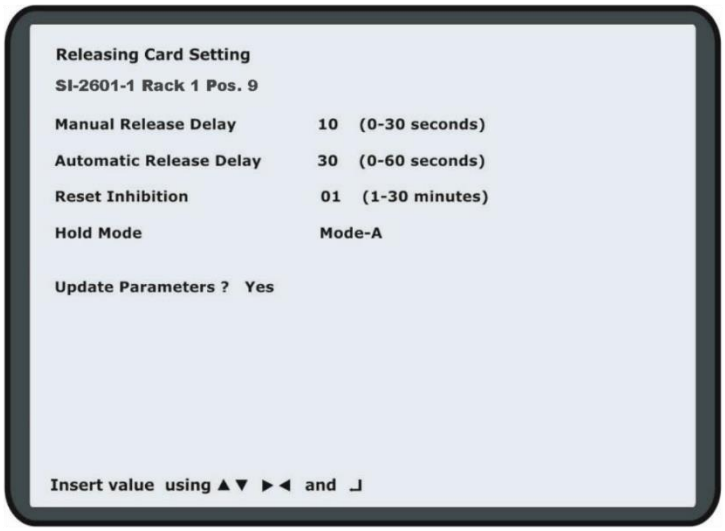


4-20mA Cards

The first line shows card type and position and channel number. The second line shows the pre alarm threshold, with the unit of measure. The third line shows the alarm threshold, with the unit of measure. The fourth line shows the lower Fault threshold in milliamperes. The fifth line shows the gas percentage of the calibration mixture. On the bottom of the screen, the allowed range for each one of the 4 adjustable parameters is displayed. After changing the values, go to the field Update Parameters and press ***Enter*** for sending the new parameters to the card.

7.11.2 Releasing Cards Setting

Selecting this option, the stage of fire extinguishing zone parameter adjustment for ***SI-2601*** type cards will be accessed. First of all, enter the rack number and the position of the card whose parameters are to be changed. If the card does not exist, or is of a different type, an error message is displayed. If the entered card exists and the relevant type is correct, the screen below will be displayed.



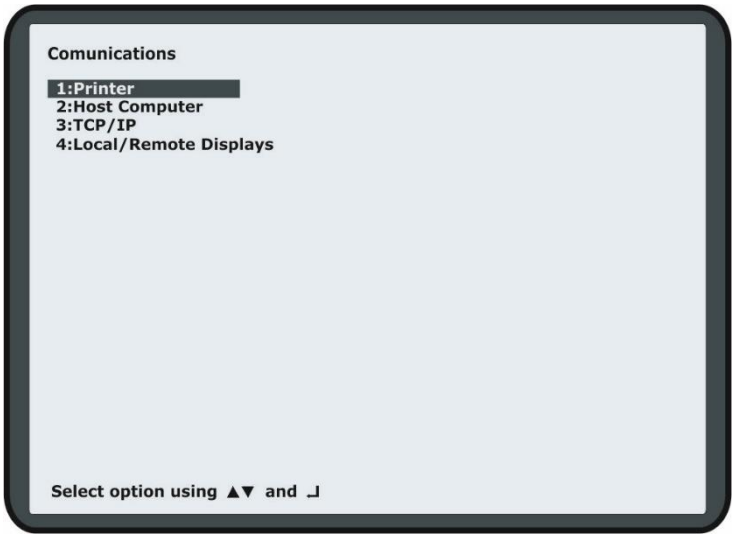
Fire extinguishing zones

The first adjustable parameter is the release delay. A value range of 0 to 60 can be set. The second parameter is the inhibit time of release activation and sequence start conditions reset. A value range of 1 to 30 can be set. The third parameter is the operating mode of the Hold function. In mode A, the Hold condition does not interrupt the discharge delay time count; in mode B the Hold condition resets the discharge delay time; in mode C, the Hold condition interrupts the discharge delay time count 10 seconds before it is over. Parameters can be changed by using the arrow buttons as follows:

- The ***Up arrow*** increases the set value by one point.
- The ***Down arrow*** decreases the set value by one point.
- The ***Right arrow*** increases the set value by five points.
- The ***Left arrow*** decreases the set value by five points.

7.11.3 Communications

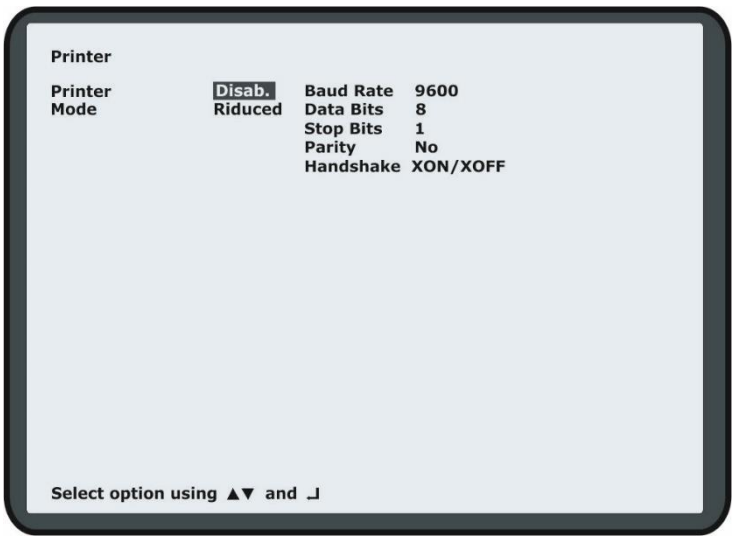
By selecting this option, the user will access the communication peripheral device configuration stage, as shown in the picture below:



Communications

7.11.3.1 Printer

By selecting this option, a submenu will be accessed where the printer can be configured, as shown in the picture below:



Printer

In order to change the parameters use the ***Up/Down*** buttons. Press ***Esc*** to exit and go back to the previous menu. Below are the allowed field values and their meaning:

Printer Selection of printer type
Disab. Serial printer disabled.
40 col. Serial printer enabled for 40 column printing.
80 col. Serial printer enabled for 80 column printing.

Mode To configure the printing mode in the operating cycle.
Reduced Only alarmed/activated events and fault conditions are printed;
Complete All events are printed.

Baud Rate To configure the bit rate of the serial port. (Allowed values: 1200, 2400, 4800, 9600, 19200).

Data Bits To configure the data bit number of the serial communication. Allowed values are: 7 and 8.

Stop Bits To configure the stop bit number of the serial communication. Allowed values are: 1 and 2.

Parity To configure the parity control of the serial communication. Allowed values are: No (no parity), Odd (off parity) and Even (even parity).

Handshake To configure the handshake type of the serial communication. Allowed values are: Xon/Xoff, Rts/Cts and None.

7.11.3.2 Host Computer

By selecting this option, a submenu will be accessed where the communication parameters of the Host computer peripheral device can be configured, as shown in the picture below:

Host Computer

In order to change the parameters use the ***Up/Down*** buttons. Press ***Esc*** to exit and go back to the previous menu. Below are the allowed field values and their meaning:

Host
Disab.: Host computer peripheral device with serial protocol disabled.
Enabl.: Host computer peripheral device with serial protocol enabled.

ID Identification of control panel number if several systems are to be centralized. It must be a progressive number from 1 to 999. This parameter is used by both the serial communication protocol and by the TCP/IP communication protocol.

Baud Rate To configure the bit rate of the serial port. (Allowed values: 1200, 2400, 4800, 9600, 19200).

Data Bits To configure the data bit number of the serial communication. Allowed values are: 7 and 8.

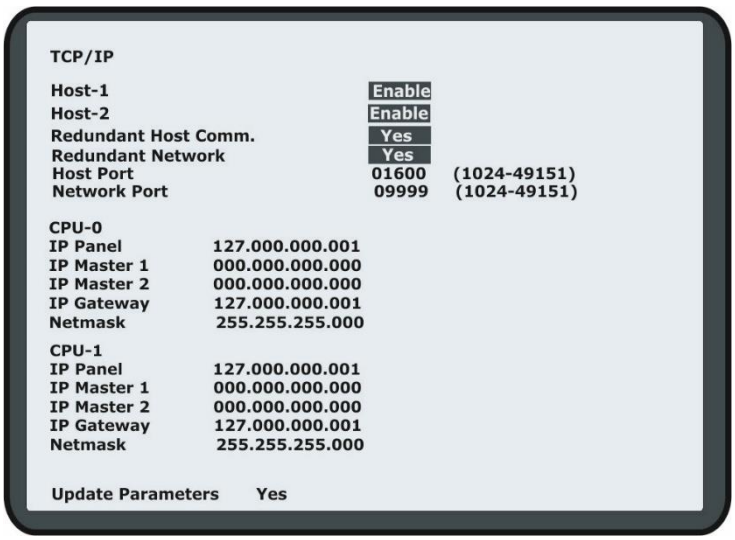
Stop Bits To configure the stop bit number of the serial communication. Allowed values are: 1 and 2.

Parity To configure the parity control of the serial communication. Allowed values are: No (no parity), Odd (off parity) and Even (even parity).

Handshake To configure the handshake type of the serial communication. Allowed values are: Xon/Xoff, Rts/Cts and None.

7.11.3.3 TCP-IP

By selecting this option, a submenu will be accessed where the communication parameters of the TCP/IP protocol can be configured, as shown in the picture below:



TCP/IP

In order to change the parameters use the ***Arrow*** and ***Number*** keys and confirm pressing **Enter.** Press ***Esc*** to exit and go back to the previous menu. Below are the allowed field values and their meaning:

Host-1 To enable/disable TCP/IP Host-1 protocol.

Host-2 To enable/disable TCP/IP Host-2 protocol.

Redundant Host Com. To define if the TCP/IP Host connection is redundant or not.

Redundant Network To define if the TCP/IP Network connection is redundant or not. ***(Note-A)***

Host Port To define the communication port used by the TCP/IP Host protocol.

Network Port To define the communication port used by the TCP/IP Network protocol.

Panel IP To identify panel IP address.

CPU-0
IP Panel To identify CPU-0 IP address. ***(Note-A)***
IP Master 1 To identify Host-1 IP address.
IP Master 2 To identify Host-2 IP address.
IP Gateway To identify the IP address of the access point to geographical networks (VAN).
Netmask To define the range of a host in an IP network in order to reduce network traffic and simplify the research of a certain IP address.

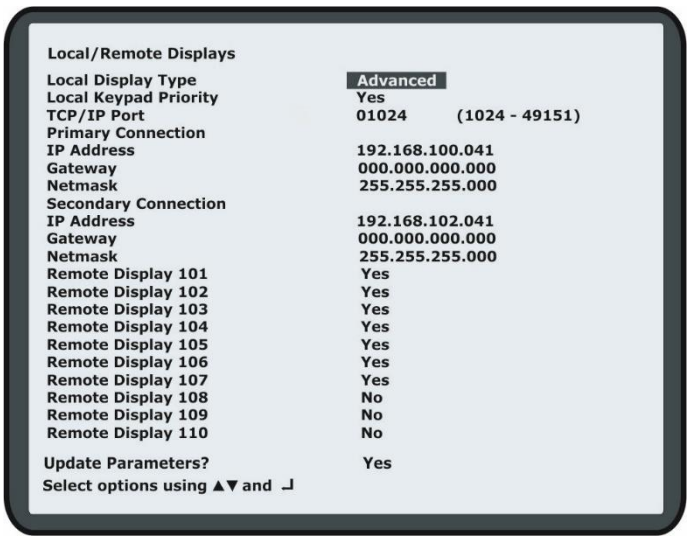
CPU-1
IP Panel To identify CPU-0 IP address. ***(Note-A)***
IP Master 1 To identify Host-1 IP address.
IP Master 2 To identify Host-2 IP address.
IP Gateway To identify the IP address of the access point to geographical networks (VAN).
Netmask To define the range of a host in an IP network in order to reduce network traffic and simplify the research of a certain IP address.

Note-A: In redundant communication, the IP addresses of the two CPUs must belong to different subnets.
Note-B: Selecting the redundant network connection, the host communication will also be set redundant.

NB: Values 127.000.000.001 and 000.000.000.000 mean that the relevant function is disabled.

7.11.3.4 Local/Remote Displays

By selecting this option, a submenu will be accessed where the communication parameters of the Local/Remote Displays can be configured, as shown in the picture below:



Local/Remote Displays Configuration

In order to change the parameters use the ***Arrow*** and ***Number*** keys and confirm pressing **Enter.** Press ***Esc*** to exit and go back to the previous menu. Below are the allowed field values and their meaning:

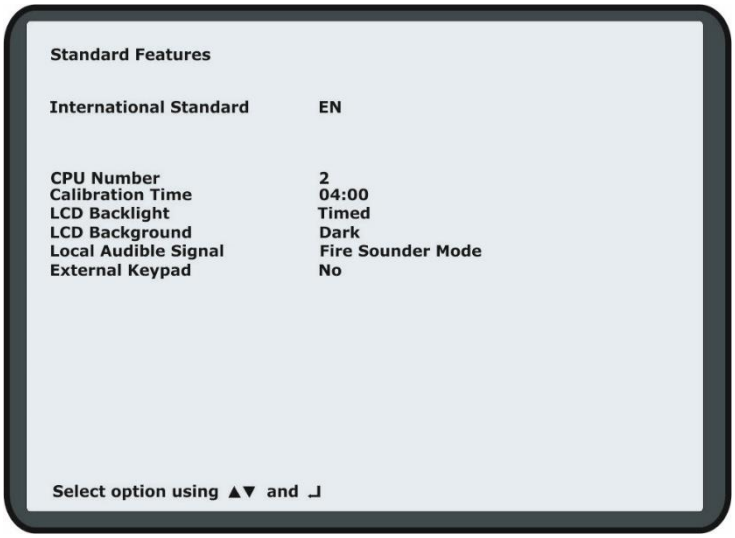
Local Display Type	Defines the Local Display Type (U1006-1: Standard, U1006-2 Advanced)
Local Keypad Priority	Defines if the local display keyboard has priority over remote display keyboards.
TCP/IP Port	To define the communication port used by the TCP/IP display protocol.
Primary Connection	
IP Address	To define the primary connection IP address of the local display.
Gateway	To define the IP address of the access point to geographical networks (VAN).
Netmask	To define the range of a host in an IP network in order to reduce network traffic and simplify the research of a certain IP address
Secondary Connection	
IP Address	To define the secondary connection IP address of the local display.
Gateway	To define the IP address of the access point to geographical networks (VAN).
Netmask	To define the range of a host in an IP network in order to reduce network traffic and simplify the research of a certain IP address
Remote Display 101	To define if the remote display 101 is present on the network
Remote Display 102	To define if the remote display 102 is present on the network
Remote Display 103	To define if the remote display 103 is present on the network
Remote Display 104	To define if the remote display 104 is present on the network
Remote Display 105	To define if the remote display 105 is present on the network
Remote Display 106	To define if the remote display 106 is present on the network
Remote Display 107	To define if the remote display 107 is present on the network
Remote Display 108	To define if the remote display 108 is present on the network
Remote Display 109	To define if the remote display 109 is present on the network
Remote Display 110	To define if the remote display 110 is present on the network

NB: Values 127.000.000.001 and 000.000.000.000 mean that the relevant function is disabled.

Selecting Standard type all the other fields are no editable and the relate values are not relevant.

7.11.4 Standard Features

This option allows to display standard configuration parameters as shown in the picture below. In order to change the parameters use the ***Arrow*** and ***Number*** keys and confirm by pressing ***Enter***. Press ***Esc*** to exit and go back to the previous menu.



Standard Options

International Standard
This parameter can be changed from the operator cycle and indicates the international standard used by the control panel. It can be: **EN** for control panels intended for the European market, or **UL864** for the control panels for the US market.

Number of CPUs
It defines the number of CPUs installed in the control panel (1-2)

Calibration time
This parameter sets the calibration time of analog smoke detectors. The default setting is 4.00 am.

LCD backlight
This parameter sets the operating mode of display backlighting.
Possible choices are:
On: Display backlight always on;
Off: Display backlight always off;
Timed: Display backlight switches off automatically after an idle time of one minute (default setting).

LCD Background
This parameters defines behavior of the LCD background.
The options are :
Dark: Text is dark on a light grey background;
Dark: Text is light grey on a dark background;

Audible indication
It defines the operating mode of the internal sounder. By selecting the **Fire Sounder Mode** the internal sounder is activated in case of fire alarm or further to the evacuation command. By selecting the ***Buzzer Mode*** the sounder is activated simultaneously to the local Buzzer.

External Keypad
It defines the operating mode of the inputs 5, 8, 9 and 10 of the I/O default card SI-3804-1.
No: Keys 5, 8, 9 and 10 perform standard functions
Yes: Keys 5, 8, 9 and 10 perform the external keypad function

The External Keypad option can be used when the system resides in an explosion proof housing to enable zone status visualization without opening the housing.

Input	Standard Function	External Keypad Function
M5	Battery status input (supply/charge)	"Enter" Key
M8	Battery charge status (Full charge/Trickle)	"Esc" Key
M9	External Fault Input	"Up" Key
M10	Revolving door tamper input	"Down" Key

Sequence pressing of keys **Enter+Escape+Up+Down** enables access level 2.

7.11.5 Change Password

This option allows to change user passwords. First of all, select the access level for password changing. After selecting the desired level, the screen shown in the following picture will be displayed:

Change Password

In this stage, the new password has to be entered twice. It shall include 5 numbers followed by ***Enter***. For safety reasons, entered numbers will be shown as #.

7.12 Event displaying

Below you will find the description of how events are displayed during the various operating stages of the control panel.

Initialization cycle
It is run upon system start and after Area/Zone transfer through the program Pro-S81.
The initialization cycle includes the following stages:

Hardware verification
The main CPU checks secondary CPU and Display card operation.

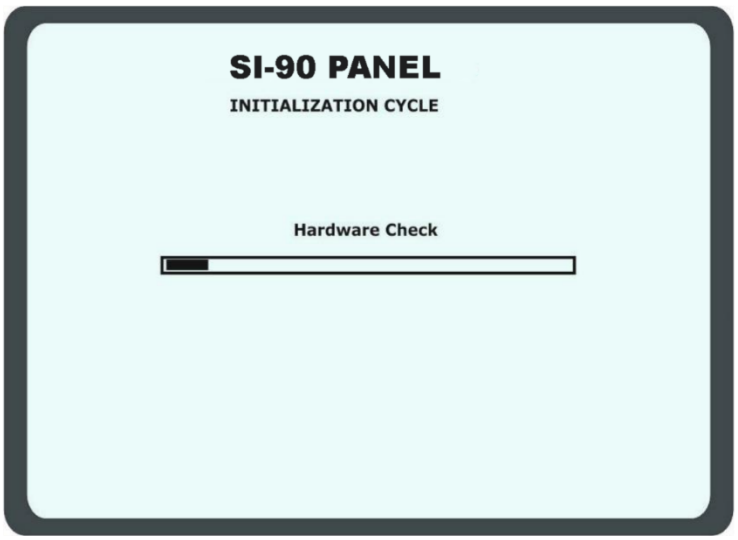
Card verification
The main CPU checks that bus cards operate properly and are correct.

Card software version verification
The main CPU checks the compatibility between software version and configured cards.

Card initialization
The main CPU sends the configuration parameters of all programmed devices to each card.

Card enable
The main CPU enables card operation.

Clock synchronization
The main CPU synchronizes system clock to check time slot status.



Initialization

If during initialization a system fault is detected -e.g. a faulty card- the ***local buzzer*** will be activated intermittently, whereas the display will show the type of fault as shown in the following picture.

System fault

By pressing ***Enter***, the control panel will carry out the following operations:

- The “General Fault” LED flashes.
- “System Fault” LED flashes.
- The relays General and System Fault are deactivated.

By selecting not to continue by using the arrows, the control panel will stop and remain stopped until it is started again.

7.12.1 Disabled condition

When a device is disabled, the control panel carries out the following operations:

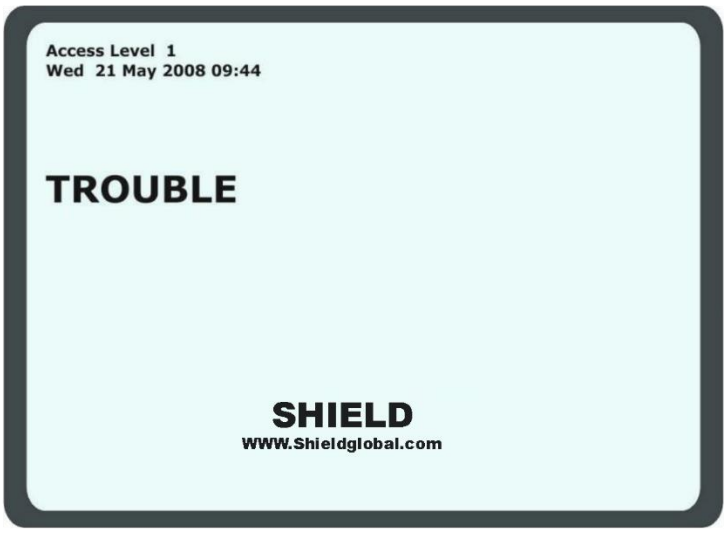
- The ***General Disable*** LED lights up steadily.
- The ***Device Disable*** LED lights up steadily.
- The ***Sounder Disable*** LED lights up steadily. (Only if the output type is Sounder)
- The ***General Disable*** relay activates.

Disable condition

7.12.2 Fault condition

When a Fault condition is detected, the control panel carries out the following operations:

- The intermittent ***local buzzer*** activates.
- The ***General Fault*** LED flashes.
- The ***Device Fault*** LED flashes (only if the Fault affects a device).
- The ***System Fault*** LED flashes (only if the Fault affects the system).
- The ***Sounder Fault*** LED flashes (only if the Fault affects a Sounder type output).
- The ***General Fault*** and/or ***System Fault*** relays deactivate, according to the type of Fault.



Fault condition

Press ***Esc*** to view the Fault details.

7.12.3 Fire pre-alarm condition

In case of fire pre alarm condition, the control panel carries out the following operations:

- The intermittent ***local buzzer*** activates.

Fire pre alarm condition

Press ***Esc*** to view the details of the fire pre alarm.

7.12.4 Fire alarm condition

In case of fire alarm condition, the control panel carries out the following operations:

- The continuous ***local buzzer*** activates.
- The ***local sounder*** activates.
- The ***Alarm*** LED flashes.
- The **Fire Alarm *relay activates.***

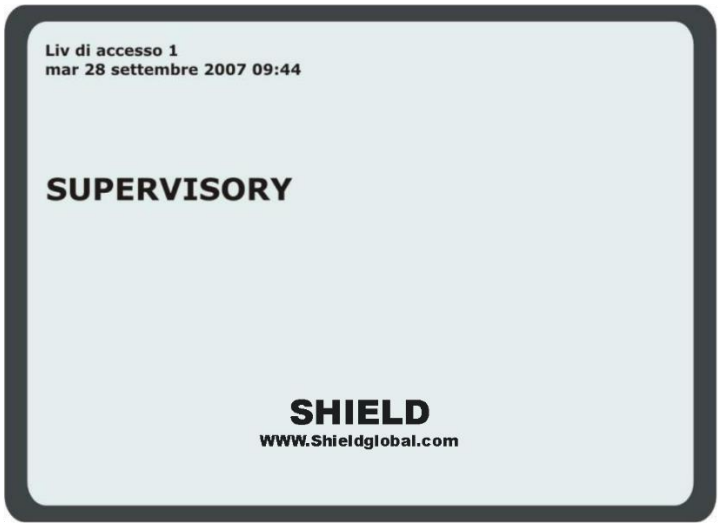
Fire alarm condition

Press ***Esc*** to view the details of the fire alarm.

7.12.5 Supervisory condition

When a supervisory condition is detected, the control panel carries out the following operations:

- The intermittent ***local buzzer*** activates.
- The **Supervisory *relay activates.***



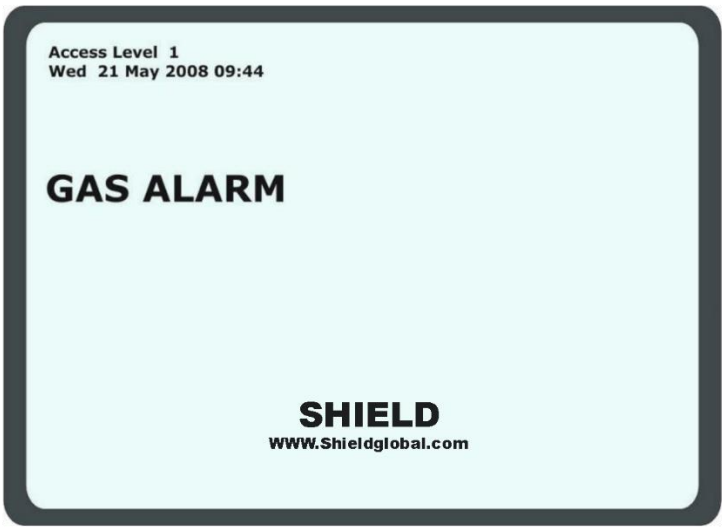
Supervisory condition

Press ***Esc*** to view the details of the supervisory.

7.12.6 Gas alarm condition

In case of gas alarm condition, the control panel carries out the following operations:

- The intermittent ***local buzzer*** activates.
- The ***Gas Alarm*** relay activates***.***

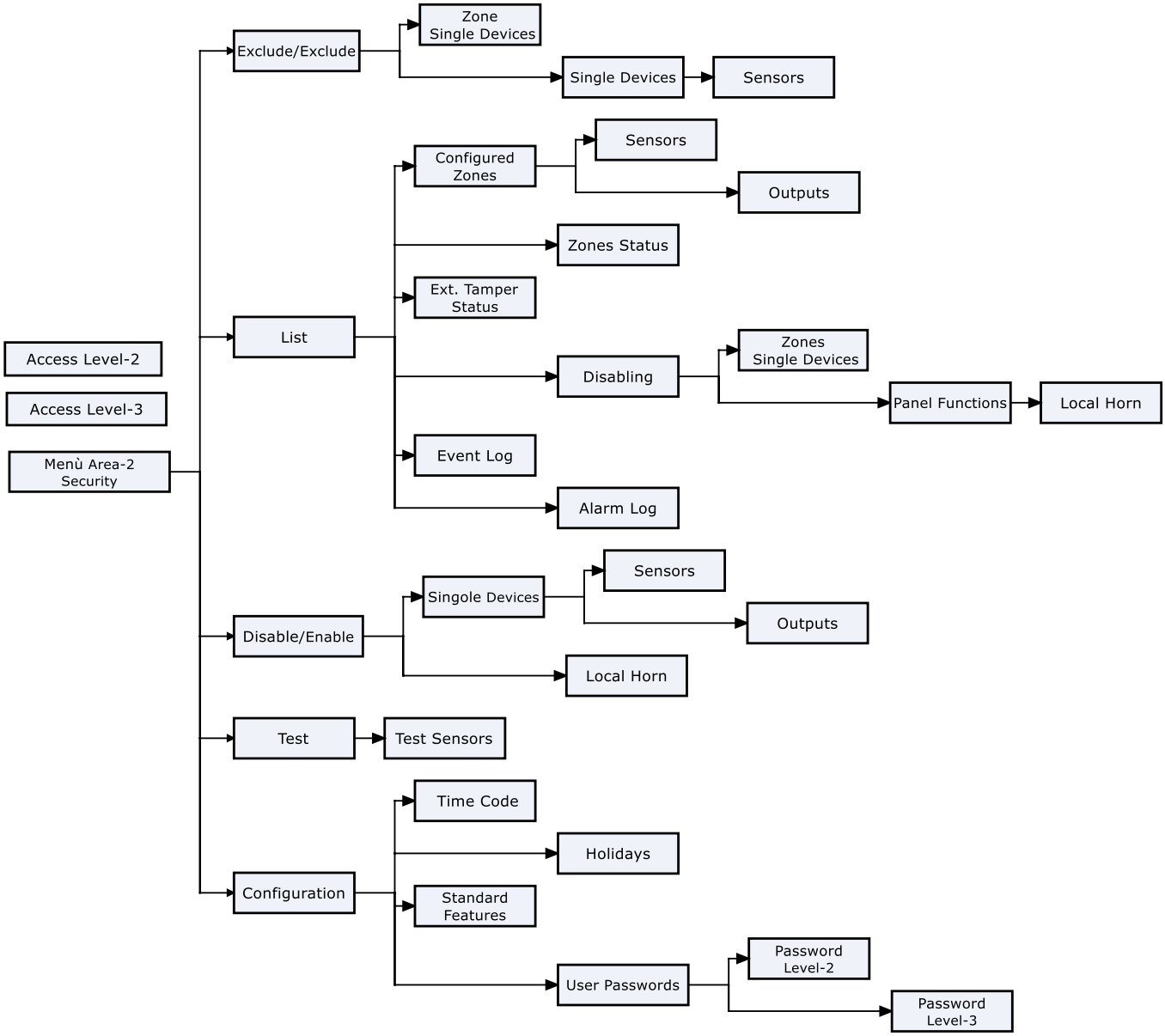


Gas alarm condition

Press ***Esc*** to view the details of the gas alarm.

7.13 BURGLAR ALARM SECTION (Security)

The following picture represents the tree diagram of the menus available in the burglar alarm section.



Structure of the burglar alarm section menu

7.14 Access to operator functions

There are three different access levels for the burglar alarm section. Level 1 access does not require any password; Level 2 or 3 require the relevant passwords. Control panels are supplied with the following default passwords that can be changed in the operator cycle:

Access level	Password
Burglar alarm Level 2 (Area-2)	**222213**
Burglar alarm Level 3 (Area-2)	**274512**

The following table shows the required access levels for carrying out the main functions of the fire alarm section.

OPERATOR ACTIVITIES	Level 1	Level 2	Level 3
Access to Inclusion/Exclusion menu		√	√
Access to View menu		√	√
Access to Enable/Disable menu			√
Access to Test menu			√
Access to Configuration menu			√

The burglar alarm section of the S-81-HS control panel complies with IMQ first level. The functions for viewing and controlling this section do not interfere with those of the fire alarm section, which have higher priority.

7.15 Operations at access level 1

At access level 1, no operations are allowed in the burglar alarm section.

7.16 Operations at access level 2

By entering level 2 password, preceded by the prefix 2, the main menu shown below is accessed:

Main menu at access level 2

7.17 Exclusion/Inclusion

By selecting this option from the main menu, the exclusion/inclusion stage is accessed.

Exclusion/Inclusion

7.17.1 Zone

Select this option to exclude/include all the sensor of one zone at level 2.

7.17.2 Individual devices

Select this option to exclude/include single sensors at level 2.

7.18 List

Select this option to access the overview functions of the operator cycle. The items of the submenu can be selected using the ***Up/Down*** arrows followed by ***Enter*** or by pressing the number key of the desired operation.

View

7.18.1 Configured zones

For viewing the complete list of the programmed zone in area 2. The complete list of sensors and actuators can be viewed for each selected zone.

7.18.2 Zone status

To view zone status. The list of alarm, tamper and Fault zones can be shown, with the relevant details. In this page, the overview modes are the same of area 1, with the additional feature that zone statuses are displayed under normal conditions. If there is at least one included zone, the **Included Zones** message is displayed. Otherwise, the **Excluded Zones** message is shown.

7.18.3 Control panel tamper status

To view the ***control panel tamper*** status. It can be Normal, Active or Disabled. If it is disabled, the remaining time before automatic enabling is shown. In this page, control panel tamper reset is possible.

7.18.4 Disabling

To view the list of disabled zones and devices. Disabling overview is the same of that of area 1.

7.18.5 Event history

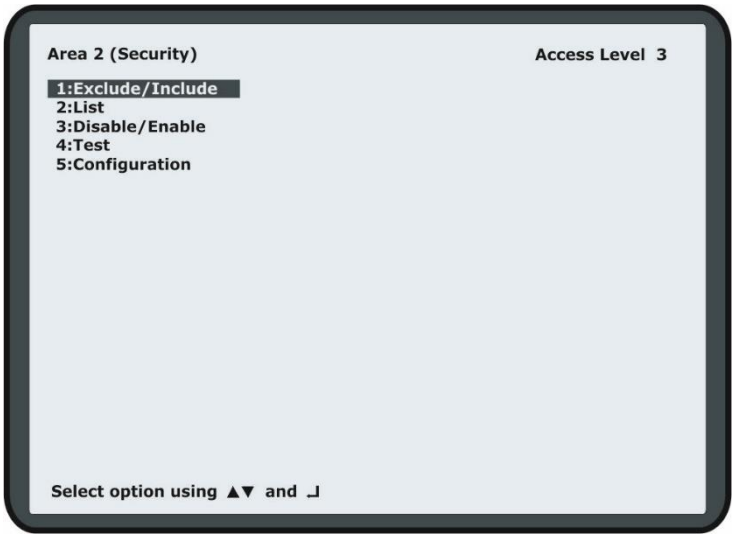
To view the history of the last 250 events.

7.18.6 Alarm history

To view the history of the last 100 alarms. History overview is the same of that of area 1.

7.19 Operations at access level 3

By entering level 3 password, preceded by the prefix 2, the main menu shown below is accessed.

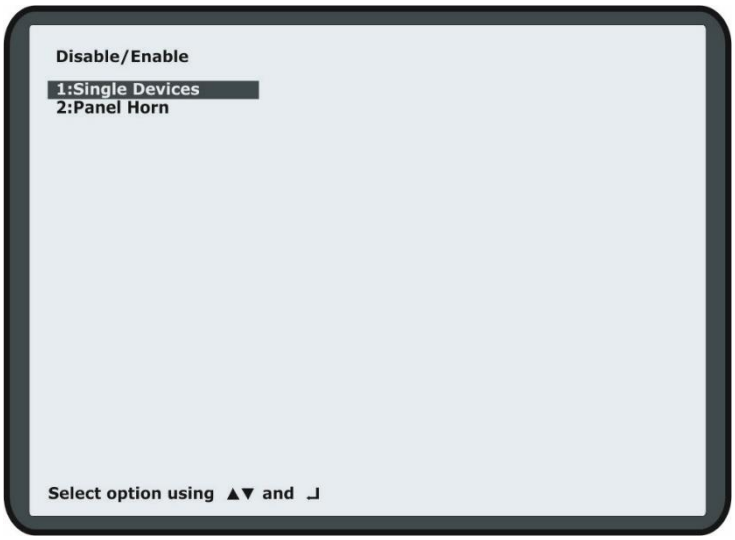


View

The **Exclusion/Inclusion** and **View** options are the same as those of level 2.

7.20 Disable/Enable

By selecting this option from the main menu, the enable/disable stage is accessed.



Disable/Enable

7.20.1 Individual devices

Select this option to enable/disable a single sensor or actuator.

7.20.2 Local sounder

Select this option to enable/disable the local sounder

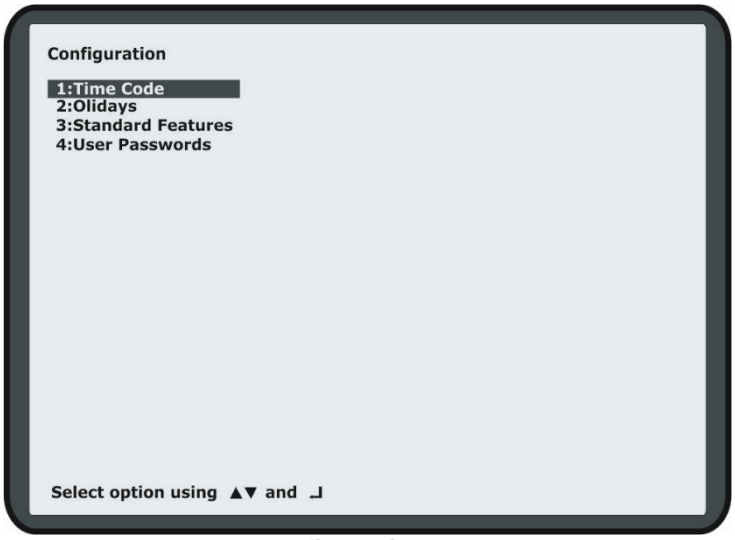
7.21 Test

This option allows to test one or more sensors. To test a sensor, first select the desired zone from the list. When a device is being tested, the relevant alarm/tamper/Fault events will be recorded and sent to the peripheral devices, but will cause no activation in control panel logics. This function is used, for instance, for monitoring a sensor.

Only 10 devices can be tested at the same time. The test mode can be manually removed from the same menu.

7.22 Configuration

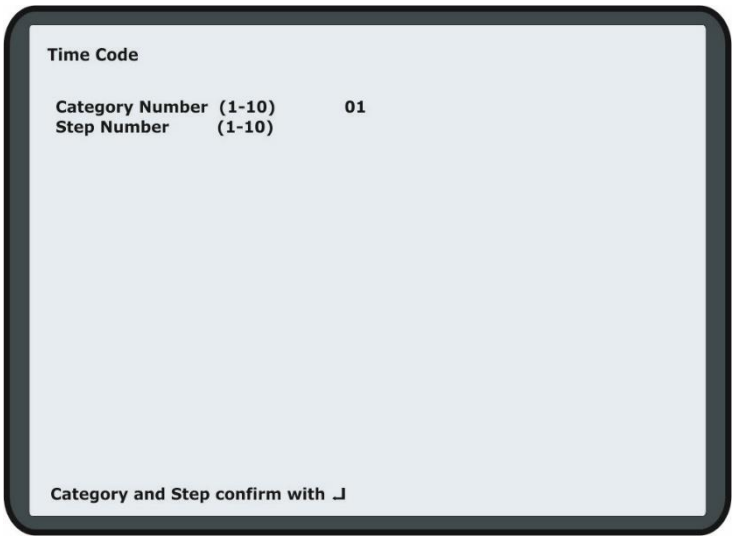
By selecting this option from the main menu, the configuration menu is accessed.



Configuration

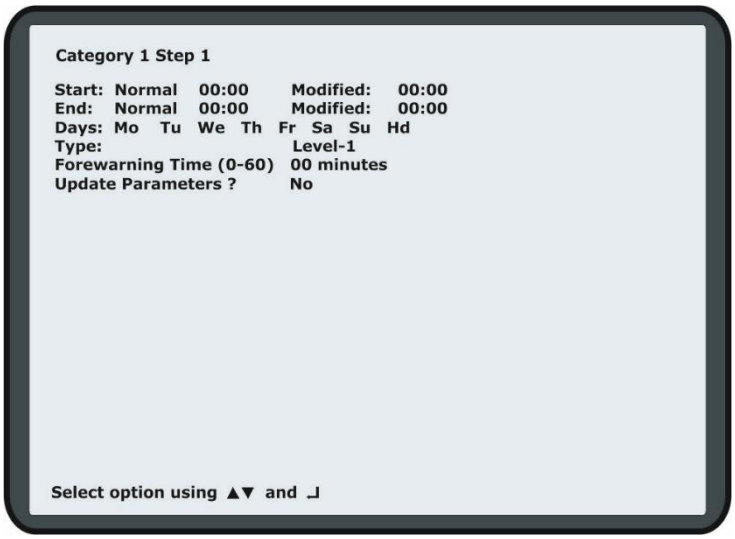
7.22.1 Time Code

This options sets the validity periods for 10 intervals of the 10 time slot categories. First of all, select the category number and desired interval:



Time slots

Values not allowed are signalled by an error message. By entering correct values, the overview page of the selected interval is displayed:

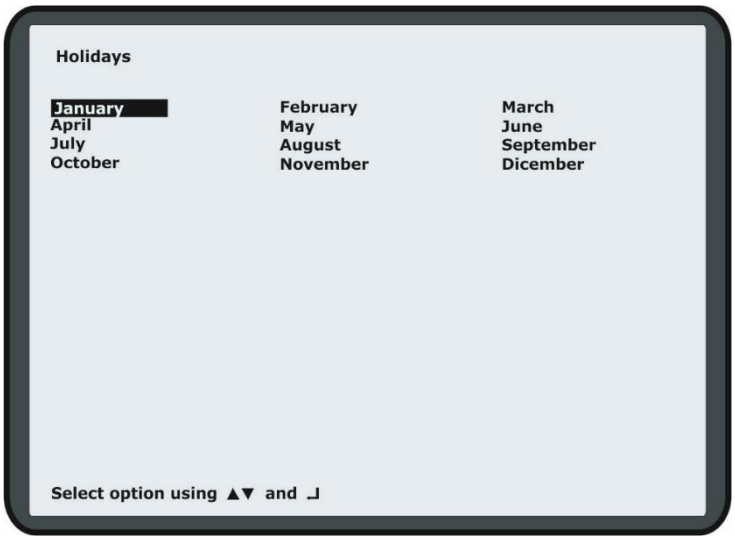


Time slots

In this stage, use the number keys followed by ***Enter*** for changing the data of the various fields. The entered values not included in the allowed range will be rejected and the cursor will place again in the same field. Lines are structured as follows: The first line shows the standard and temporary start time of the interval. The second line shows the standard and temporary end time of the interval. The third line shows the validity period of the interval. The fourth line is the type of activity carried out in the interval. The fifth line is the entering warning time in minutes. If it is zero, no warning will be sent to the control panel. After entering all the parameters, go to ***Update parameters?*** and confirm using ***Enter***.

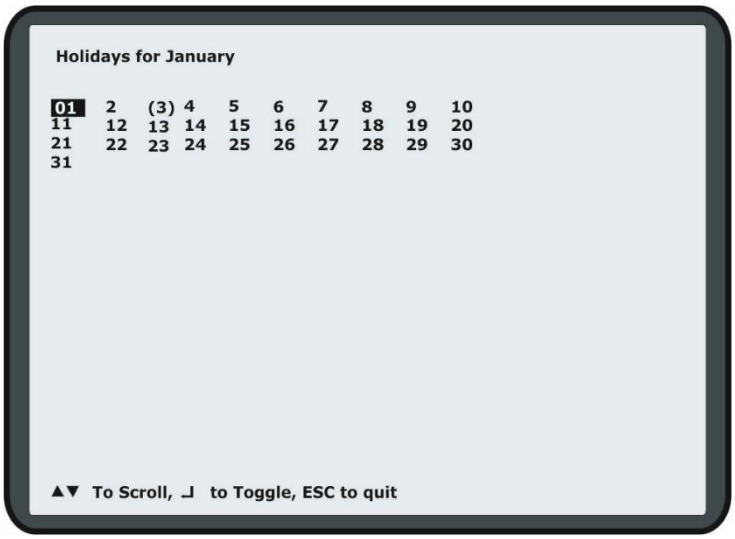
7.22.2 Holidays

This options sets the holiday periods valid for 10 intervals of the 10 time slot categories. First of all, select the month where to add or remove a holiday:



Holidays

After selecting the month, by using the ***up/down*** buttons, and confirming with the Confirm button, the display will show a window with the days of the selected month:



Holidays

select the day using the up/down buttons and confirm with the Confirm button. The days defined as holidays will be shown in brackets.

7.22.3 Standard options

This option allows to display standard configuration parameters relating to the burglar alarm section. In order to change the parameters use the ***Arrow*** and ***Number*** keys and confirm by pressing ***Enter***. Press ***Esc*** to exit and go back to the previous menu.

Standard options

Event printing
This parameter enables/disables the printout of the events relating to the Burglar alarm section.

Ent. time
This parameter sets zone entering time. Value ranging between 0 and 10 minutes.

Output reset time
This parameter sets the reset time of the default outputs of the burglar alarm section. Value ranging between 1 and 10 minutes.

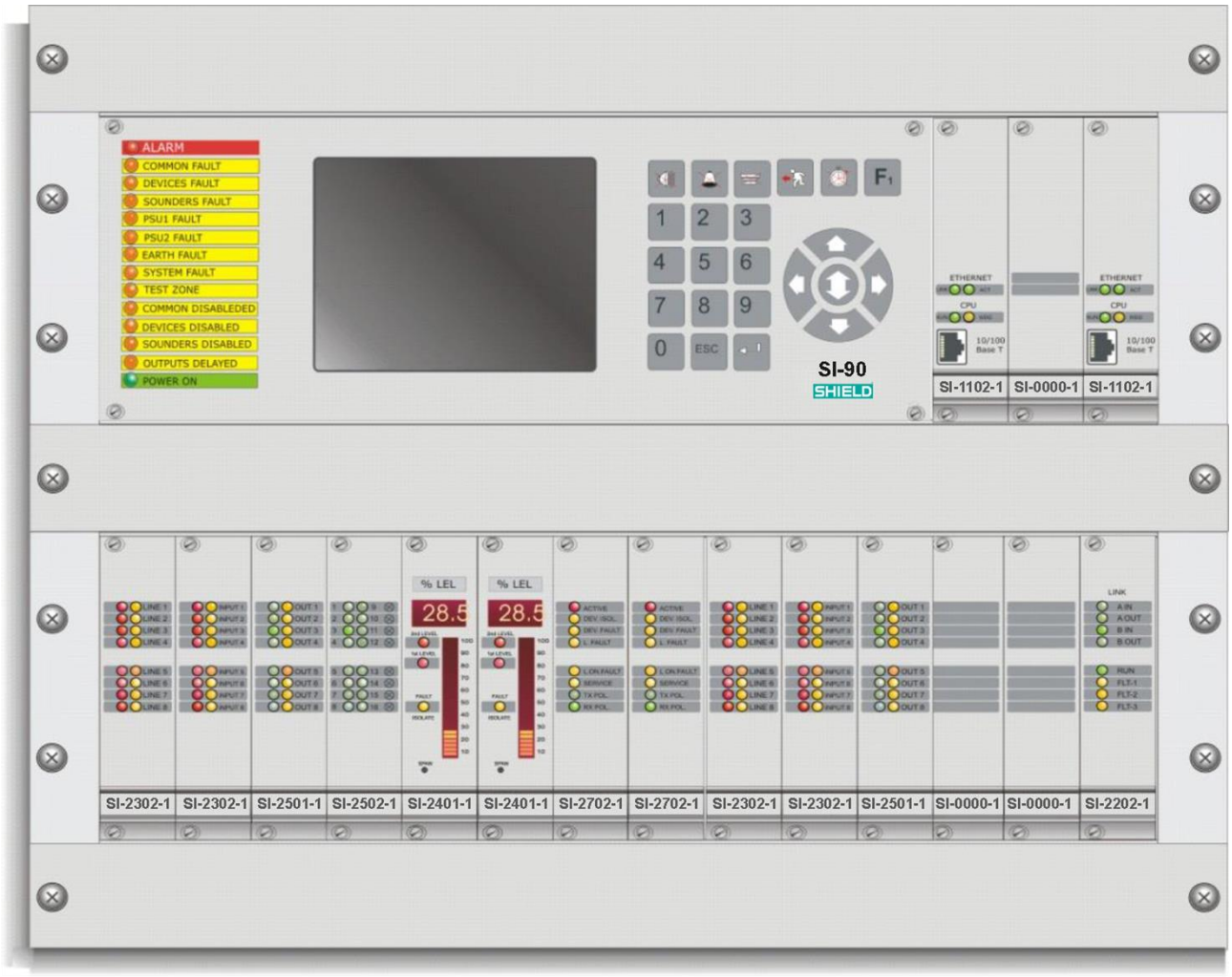
NB: This time must be kept >/ 3 minutes in order to comply with IMQ level 2.

7.22.4 Change Password

The password changing mode for level 2 and 3 passwords of the burglar alarm section is the same as that of the fire alarm section.

7.23 NOTES ON CPU REDUNDANCY

The left CPU card (CPU-0) is the primary one (steady green LED "Run" on) whereas the right one (CPU-1) is secondary (green LED "Run" flashing). Each operation carried out by the primary CPU is carried out in parallel also by the secondary CPU. In this way, in case of fault of one of the two CPUs, the other one will keep operating without any interruptions. The faulty CPU is indicated on the display of system fault list. CPU hot swapping is allowed (hot plug).



CPU redundancy

APPENDIX A. - PART LIST

The tables below list the components making up the SI-90 system, sorted by product type.

A.1 Cabinet

Part Number	Description	Notes
S81-CB000	Cabinet for SI-90/L/M/C panels (wall mount)	H750mm, L500mm, P250mm
S81-CB001	Cabinet for SI-90/1R panel (wall mount)	H700mm, W600mm, D400mm
S81-CB002	Cabinet for SI-90/2R panel (wall mount)	H1100mm, W600mm, D400mm
S81-CB003	Cabinet for SI-90/1-10R panel (Free Standing)	H2100mm, W800mm, D800mm

A.2 Power supply units

Part Number	Description	Notes
S81-PU001-1	Power supply unit with one SI-5005-1 and one SI-5004-1	
S81-PU001-2	Power supply unit with two SI-5005-1 and one SI-5004-1	
S81-PU001-4	Power supply unit with four SI-5005-1 and one SI-5004-1	
SI-5000-2	Power supply unit with two SI-5008-1 and one SI-5009-1	
SI-5000-4	Power supply unit with four SI-5008-1 and one SI-5009-1	
S81-PU003-1	Power supply unit with one SDR-240-24 and one SI-5004-1	
S81-PU003-1	Power supply unit with two SDR-240-24 and one SI-5004-1	With redundant module DR-RDN20
S81-PU004-1	Power supply unit with one SI-5010-1 and one SI-5011-1	
S81-PU004-2	Power supply unit with two SI-5010-1 and one SI-5011-1	
S81-PU004-3	Power supply unit with three SI-5010-1 and one SI-5011-1	
S81-PU004-4	Power supply unit with four SI-5010-1 and one SI-5011-1	
SI-5005-1	125Watt Power supply module for S81-PU001-x power supply unit	
SI-5008-1	500Watt Power supply module for SI-5000-x power supply unit	
SDR-240-24	Power supply module 240Watt for S81-PU003-x power supply unit	
SI-5010-1	250Watt Power supply module for S81-PU004-x power supply unit	
DR-RDN20	Redundant module for S81-PU003-2 power supply unit	
SI-5004-1	Battery charger for S81-PU001-x/S81-PU003-x power supply unit	Max. battery charger current : 4A
SI-5009-1	Battery charger for SI-5000-x power supply unit	Max. battery charger current: 6A
SI-5011-1	Battery charger for S81-PU004-x power supply unit	Max. battery charger current: 6A
SI-5007-1	Slot with cooling unit for SI-5000-x power supply unit	
FN2090-16-06	AC filter 115/250Vac 16A 50/60Hz	For SI-90/1R/2R/1-10R
FN2090-4-06	AC filter 115/250Vac 6A 50/60Hz	For SI-90/L/M and C panels
B84115-E-B110	115/250Vac 10A 50/60Hz line trap	
LS502	Disconnect switch with fuses for batteries	
FS20	10x38 20A fuse	For battery disconnect switch
FS50	10x38 50° fuse	For battery disconnect switch
F6.3	Fuse 5x20 T6,3A H250V Littelfuse PN:021606.3P	For SI-5005-1 and SDR-240-24
F10	Fuse 5x20 T10A H250V Littelfuse PN:0216010.MXP	For SI-5008-1
SK12-18	12V 18Ah batteries	
SK12-26	12V 26Ah batteries	
SK12-65	12V 65Ah batteries	
SK12-120	12V 120Ah batteries	

A.3 Central unit rack

Part Number	Description	Notes
S81-CU001-1	Central unit	with 19 inch 3 unit aluminum slot
SI-1102-1	Central processing unit	
SI-1102-2	Central processing unit	EN54-21 compliant
SI-2203-1	Two slot bus for central unit	
SI-1106-1	Operator interface unit	
SI-1106-2	Operator interface unit for remote display networking	
SI-3804-1	Default I/O termination board	
SI-0000-1	Blank panel for central unit	
S81-CFT20/05	Flat cable for termination board SI-3807-2	5 centimeter long
S81-CFT10/2	Flat cable for serial connection	2 meter long
S81-CFT14/2	Flat cable for SI-3804-1 connection	2 meter long
SI-0000-1	Blank panel with holes for Ethernet cables	Takes the place of one card

A.4 I/O Rack

Part Number	Description	Notes
S81/S CP-1	I/O Expansion rack with DIN41618 type connectors with SI-2202-1 card	19 inch 3 unit aluminum 13 slot
S81/S CP-2	I/O Expansion rack with DIN41612 type connectors with SI-2202-1 card	19 inch 3 unit aluminum 13 slot
SI-2201-2	13 slot bus for multi conductor cable with DIN41618 connector	I/O card redundancy allowed
SI-2201-3	13 slot bus for multi conductor cable with DIN41612 connector	I/O card redundancy allowed
SI-2204-1	8 slot bus for SI-90/L/M and C panels	
SI-2202-1	Controller rack card	
SI-0000-2	Blank panel	Takes the place of one card

A.5 I/O cards

Part Number	Description	Notes
SI-2302-1	8 monitored input card	Redundancy not possible
SI-2302-2	8 monitored input card	Redundancy possible
SI-2401-1	Card with 1 x 4-20mA analog input	Redundancy not possible
SI-2401-2	Card with 1 x 4-20mA analog input	Redundancy possible
SI-2402-1	Card with 2 x 4-20mA analog input	Redundancy not possible
SI-2402-2	Card with 2 x 4-20mA analog input	Redundancy possible
SI-2403-1	Card with 8 x 4-20mA analog input	Redundancy not possible
SI-2403-2	Card with 8 x 4-20mA analog input	Redundancy possible
SI-2501-1	Card with 8 x 500mA monitored outputs	Redundancy not possible
SI-2501-2	Card with 8 x 500mA monitored outputs	Redundancy possible
SI-2502-1	Card with 16 x 250mA non monitored outputs	Redundancy not possible
SI-2503-1	Card with 8 x 250mA monitored	Redundancy not possible
SI-2504-1	Card with 4 x 2A monitored outputs for solenoids	Redundancy not possible
SI-2504-2	Card with 4 x 2A monitored outputs for solenoids	Redundancy possible
SI-2601-1	Fire extinguishing card	Redundancy possible
SI-2602-1	Logic card	Redundancy possible
SI-2702-1	Loop control card for ESP addressable devices	Redundancy not possible
SI-2706-1	Modbus RTU Master/Slave card	Redundancy not possible
SI-2707-1	Control card for Scame Sistemi bus	Redundancy not possible
SI-2708-1	Control card for scales	Redundancy not possible
SI-2709-1	Control card for Shield addressable devices	Redundancy not possible
SI-2710-1	Control card for System Sensor bus	Redundancy not possible
SI-2711-1	Loop control card with Safety Bus protocol	Redundancy possible

A.6 Termination boards

Part Number	Description	Notes
S81-T8002-1	Passive current loop/RS232/converter termination board	DIN bar installation
SI-3804-1	Default I/O module termination board	DIN bar installation
SI-3807-2	Termination board with 16 x 4A 30 VDC relays for S81-CCT1 cable	DIN bar installation
SI-3808-1	Termination board with 4 x 2A 30 VDC relays for sounder control	DIN bar installation

A.7 SI-2201-2 Bus Termination Cables

Part Number	Description	Notes
S81-CTT1	16x0.22 cable for non-redundant cards	5 meters length
S81-CTT1R	16x0.22 cable for redundant cards	5 meters length
S81-CTT2	2x0.5 cable for non-redundant cards	5 meters length
S81-CTT2R	2x0.5 cable for redundant cards	5 meters length
S81-CTT3	8x0.5 cable for non-redundant cards	5 meters length
S81-CTT3R	8x0.5 cable for redundant cards	5 meters length
S81-CTT3R1	8x0.5 cable for redundant cards	5 meters length
S81-CTT4	4x0.5 cable for non-redundant cards	5 meters length
S81-CTT4R	4x0.5 cable for redundant cards	5 meters length
S81-CTT6	6x0.5 cable for non-redundant cards	5 meters length
S81-CTT7	4x0.5 cable for non-redundant cards	5 meters length
S81-CTT7R	4x0.5 cable for redundant cards	5 meters length
S81-CTT8	3x0.5 shielded cable for non-redundant cards	5 meters length
S81-CTT8R	3x0.5 shielded cable for redundant cards	5 meters length

A.8 SI-2201-3 Bus Termination Cables

Part Number	Description	Notes
S81-NNT1	16x0.22 cable for non-redundant cards	5 meters length
S81-NNT1-R	16x0.22 cable for redundant cards	5 meters length
S81-NNT2	2x0.5 cable for non-redundant cards	5 meters length
S81-NNT2-R	2x0.5 cable for redundant cards	5 meters length
S81-NNT3	8x0.5 cable for non-redundant cards	5 meters length
S81-NNT3-R	8x0.5 cable for redundant cards	5 meters length
S81-NNT3-R1	8x0.5 cable for redundant cards	5 meters length
S81-NNT4	4x0.5 cable for non-redundant cards	5 meters length
S81-NNT4-R	4x0.5 cable for redundant cards	5 meters length
S81-NNT6	6x0.5 cable for non-redundant cards	5 meters length
S81-NNT7	4x0.5 cable for non-redundant cards	5 meters length
S81-NNT7-R	4x0.5 cable for redundant cards	5 meters length
S81-NNT8	3x0.5 shielded cable for non-redundant cards	5 meters length
S81-NNT8-R	3x0.5 shielded cable for redundant cards	5 meters length

A.9 Interconnection Cables

Part Number	Description	Notes
S81-CFT10/2	10-way flat cable for Host connection	2.5 meters length
S81-CFT14/2	14-way flat cable	2.5 meters length
S81-CFT20/05	20-way flat cable	17 centimeters length
S81-CFT20/2	20-way flat cable	2 meters length
S81-CVSC5	8-way RJ cable	36 centimeters length
S81-CVSC12	8-way RJ cable	60 centimeters length
S81-CVSC14	8-way RJ cable	120 centimeters length
S81-CVSC17	8-way RJ cable	170 centimeters length

A.10 Remote Display

Part Number	Description	Notes
S81-RD001-1	10“ touch remote display 25VDC flush mounting enclosures	L315 P110 H235mm
S81-RD001-2	10“ touch remote display 25VDC wall mounting enclosures	L310 P110 H225mm
S81-RD001-3	10“ touch remote display 110÷220VAC wall mounting enclosures	L430 P145 H330mm
S81-RD002-1	7“ remote display 25VDC flush mounting enclosures	L315 P110 H235mm
S81-RD002-2	7“ remote display 25VDC wall mounting enclosures	L350 P105 H225mm
S81-RD002-3	7“ remote display 110÷220VAC wall mounting enclosures	L430 P145 H330mm

APPENDIX B.- COMPATIBLE DEVICES

The tables below list the field devices compatible with SI-90 control panel, sorted by product type, for the complete list refer to **ST-048-EN-ANNEX-A** document.

B.1 Hochiki conventional detectors

Part Number	Description	Notes
SLR-E3N	Smoke detector	to be used with SI-2302 cards
DCD-AE3	60° combined heat detector	to be used with SI-2302 cards
DFJ-AE3	60°C fixed temperature heat detector	to be used with SI-2302 cards
DFJ-CE3	90°C fixed temperature heat detector	to be used with SI-2302 cards
DRD-E	IR flame detector	to be used with SI-2302 cards

B.2 Hochiki addressable devices

Part Number	Description	*Out*	*In*	*Pro-S81 Type*
ALG-E, ALG-EN, ALN-E	Photoelectric Smoke Sensor	*	1	ALG-E
ATG-E	Heat Sensor	*	1	ATG-E
ACB-E, ATJ-EN	Multi Heat Sensor	*	1	ACB-E
AIE-E	Ionization Smoke Sensor	*	1	AIE-E
ACA-E, ACC-E	Smoke/Heat Multi Sensor	*	1	ACA-E
CHQ-CP, CHQ-CP2, MCP-E, HCP-E	Manual Call Point	*	1	CHQ-CP
YCA-RL/3H2	Addressable Base	*	1	RL/3H2
YCA-RL/5H2	Addressable Master Base	*	1	RL/3H2
CHQ-MZ, CHQ-SZM	Single Zone Module	*	1	CHQ-MZ
CHQ-Z, CHQ-DZM	Dual Zone Module	1	2	CHQ-Z
CHQ-SIM	Single Input Module	*	1	CHQ-SIM
CHQ-POM	Powered Output Module	1	2	CHQ-POM
CHQ-SOM	Single Output Module	1	*	CHQ-SOM
FB-1	Fire Beam Detector	*	1	FB-1
CHQ-S, CHQ-DIM, CHQ-DIM-2	Dual Input Module	*	2	CHQ-S
CHQ-R, CHQ-DRC, CHQ-DRC2	Dual Relay Controller	2	1	CHQ-R
CHQ-B, CHQ-DSC	Dual Sounder Controller	2	1	CHQ-B
CHQ-PCM	Plant Control Module	4	4	CHQ-PCM
YBO-BS	Base Sounder	1	*	YBO-BS
CHQ-BS	Base Sounder	1	*	CHQ-BS
CHQ-WS2	Wall Sounder	1	*	CHQ-WS2
YBO-BSB, YBO-BSB2	Base Sounder Beacon	2	*	YBO-BSB
CHQ-WSB, CHQ-WSB2	Wall Sounder Beacon	2	*	CHQ-WSB
CHQ-AB	Addressable Beacon	1	*	CHQ-AB
CHQ-CB	Addressable Ceiling Beacon	1	*	CHQ-CB
CHQ-WB	Addressable Wall Beacon	1	*	CHQ-WB
CHQ-ARI	Remote Indicator	1	*	CHQ-ARI
CHQ-MRC2	Mains Relay Controller	1	1	CHQ-MRC
CHQ-FTM	4-20mA Module	*	2	CHQ-FTM

B.3 Scame Sistemi addressable devices

Part Number	Description	*Out*	*In*	*Pro-S81 Type*	Notes
S81-Mod-DI	Module with 8 non monitored inputs	*	8	DI	Requires external power supply
S81-Mod-AIT	Module with 4 monitored inputs (Note-A)	*	4	AIT	Requires external power supply
S81-Mod-AI020	Module with 1 x 4-20mA analog input	*	1	AI020	Requires external power supply
S81-Mod-AV010	Module with 1 x 0-10V analog input	*	1	AV010	Requires external power supply
S81-Mod-DO	Module with 8 open collector outputs	8	*	DO	Requires external power supply
SI-6001-1	255 programmable message display	*	*	DISP	Requires external power supply
S81-Mod-PRG	Programmer for addressable modules	*	8	DI	Requires external power supply (*)

(*) Up to 64 modules of this type can be mounted on one loop.

- The S81-Mod-AIT module can only be used in anti-intrusion applications.
- All modules listed in this table do not comply with EN 54-17 and EN 54-18 standards. For this reason they can not be used in fire alarm and signaling applications.

B.4 Safety Bus addressable devices

Part Number	Description	*Out*	*In*	*Pro-S81 Type*	Notes
SB-SIM	8 supervised input module	*	8	SIM	Safety Related
SB-SIM-GM	8 supervised input module with ground leakage detection	*	8	SIM/GM	Safety Related
SB-AIM	8 4-20mA input module	*	8	AIM	Safety Related
SB-SCM	8 supervised output module for solenoids	8	*	SCM	Safety Related
SB-NCM	8 supervised output module for sounder control	8	*	NCM	
SB-ECM	8 supervised input and 8 supervised output for extinguishing system	8	6	ECM	Safety Related
SB-PRG	Hand held Programmer for SB modules	*	*	*	

B.4 Shield addressable devices

Part Number	Type	Description
SEN-A4011	Addressable Detectors & Base	Analogue Addressable Optical Smoke Detector
SEN-A4013		Analogue Addressable Class A2S Heat Detector (50deg C)
SEN-A4015		Analogue Addressable Multisensory Detector
TEN-A8011		Photo-Electric Smoke Detector with isolator
TEN-A8012		Heat Detector with Isolator
TEN-A8013		Multisensory Detector with isolator
TEN-A8030		Standard Mounting Base for Detector
SIL-A8011		SIL I.S Optical Detector
SIL-A8012		SIL I.S Heat Detector
SIL-A8021		SIL Optical Detector with Isolator
SIL-A8022		SIL Heat Detector with Isolator
SIL-A8023		SIL Multisensory Detector with Isolator
SEN-A4021	Notification Devices	Intelligent Open Area Sounder (Red)
SEN-A4022		Intelligent Open Area Sounder Beacon (Red)
SEN-A4025		Deep isolating base
SEN-A4026		Addressable Sounder base
SEN-A4047	Interface Modules	Analogue Addressable Sounder Controller with Isolator
TEN-A6061		Intelligent Switch Monitor
TEN-A6062		Intelligent Input / Output Unit
TEN-A6063		Intelligent Mains Switching Input / Output Unit
TEN-A6064		Intelligent Twin Input / Output Unit
TEN-A6065		Intelligent DIN-Rail Switch Monitor
TEN-A6066		Intelligent DIN-Rail Input / Output Unit
TEN-A6067		Intelligent Twin Input / Output Unit
SIL-A6061		SIL Input Output Unit with Isolator
SIL-A6062		SIL Output Unit with Isolator
SEN-A4061	Manual Call Points	Intelligent Manual call point
SIL-A7011		SIL Manual Call Point with Isolator
SIL-A7023		SIL Waterproof Manual Call Point with Isolator
SIL-A7033		SIL I.S Manual Call Point (Red without Flap)

B.5 System Sensor addressable devices

Part Number	*Description*	*Used Addresses*	*Pro-S81 Type*
CMA1-I	Module with 1 output with isolator	1	CON/FORC
M701E	Module with 1 output with isolator	1	CON/FORC
MMA1-I	Module with 1 input with isolator	1	MON3
M710E	Module with 1 input with isolator	1	MON3
M720E	Module with 2 inputs with isolator	2	MON3
CMA11	Module with 1 input + 1 output	2	MON3/CON/FORC
M721E	Module with 2 inputs + 1 output	3	MON3/FORC
CMA22	Module with 2 inputs + 2 outputs	4	MON3/CON/FORC
MCX-55M	Module with 5 inputs + 5 outputs	10	MON3/FORC
MMX-10M	Module with 10 inputs	10	MON3
CMX-10RM	Module with 10 relay outputs	10	FORC
M710ECZ	Module with 1 input for conventional detectors	1	SCON
M710ECZR	Module with 1 input for conventional EExd detectors	1	SCON
MMT	Module for 4-20mA analog interface with 1 channel	1	TEC2
IIG4N	Module for 4-20mA analog interface with 4 channels	4	TEC2
M700KW	Outdoor red alarm button with isolator	1	PULL
M700KI	Red alarm button with isolator	1	PULL
M700KACI-FG-B	Blue alarm button with isolator	1	PULL
M700KACI-FG-B	Yellow alarm button with isolator	1	PULL
ABS32/PW-I	Addressable sounder base with isolator	1	HORN
ABSB32/PW/RD-I	Addressable sounder base + beacon with isolator	1	HORN
AWB/RD-I	Addressable beacon	1	HORN
AWS32/R/RD-I	Electronic sounder with beacon with isolator	1	HORN
AWS32/R-I	Electronic sounder with isolator	1	HORN
NFXI-SS-W	Addressable sounder base with isolator	1	HORN
NFXI-BSF-WC	Addressable sounder base + beacon with isolator	1	HORN
NFXI-WF-RR	Addressable beacon	1	HORN
NFXI-WS-R	Electronic sounder with isolator	1	HORN
NFXI-WSF-RR	Electronic sounder + beacon with isolator	1	HORN
NFXI-OPT	Optical smoke sensor with isolator	1	PHOT
NFXI-TDIFF	Rate of rise + fixed 58°C temperature heat detector with isolator	1	TH58
NFXI-TFIX58	58℃ heat sensor with isolator	1	TH58
NFXI-TFIX78	78℃ heat sensor with isolator	1	TH78
NFXI-SMT2	Optical/rate of rise heat detector with isolator	1	OMNI
NFXI-SMT3	Optical smoke, heat and flame IR detector with isolator	1	OMNI
SDX-751CTEM	Optical smoke, heat, CO and flame IR detector with isolator	1	OMNI
7251 PINNACLE	Laser smoke detector	1	PINN
SDX-751ME	Optical smoke sensor	1	PHOT
FDX551REM	Rate of rise heat detector	1	TH58
FDX-551HTE	78℃ heat sensor	1	TH78
FDX-751TEM	Optical/rate of rise heat detector	1	OMNI
IDX751AE	Intrinsically safe optical sensor	1	PHOT
WL-NTM	Radio translator	*	WTR
WL-CM SERIE	Wireless output modules with one non monitored contact	1	WFORC
WL-MM SERIE	Wireless input modules	1	WMON3
WL-MCP	Wireless alarm button	1	WPULL
WL-D100	Wireless optical smoke sensor	1	WPHOT
WL-D200	Wireless optical/rate of rise heat detector	1	WTH58
WL-D350	Wireless 58° C heat sensor	1	WTH58
WL-SDN	Wireless electronic sounder	1	WHORN

B.6 Visual and audible alarm devices

Part Number	Manufacturer	Description	Notes
5965-CSA	CSA-COOPER	Combined Beacon/Sounder	To be used with SI-2503-1 cards
SOLEX 11	FULLEON	10 cdn beacon	
SOLEX 15	FULLEON	15 cnd beacon	
FLASHNI(FL/SV)	COOPER/FULLEON	Combined Beacon/Sounder	
EVA 50	KROMA-MEC	EX-d Beacon	
ETH 20 MD	KROMA-MEC	EX-d Sounder	
XB-11	MEDC	EX-d Beacon	
XB-12	MEDC	EX-d Beacon	

APPENDIX C. - POWER SUPPLY UNITI DIMENSIONING

Use the tables below for checking the size of the power supply unit and of the batteries.

C.1 SI-90 panel power consumption

Part Number	Description	Qty.	Quiescent current	Total quiescent current	Alarm current	Total alarm current
PU-0001-x	Power supply unit	1	4A (*)	4A	4A (*)	4A
PU-0002-x	Power supply unit	1	8A (*)	8A	8A (*)	8A
PU-0003-x	Power supply unit	1	4A (*)	4A	4A (*)	4A
PU-0004-x	Power supply unit	1	8A (*)	8A	8A (*)	8A
SI-90 Base	Central unit rack with SI-1106-1 + SI-3804-1	1	0,300A	0,300A	0,330A	0,330A
SI-90 Base	Central unit rack with SI-1106-2 + SI-3804-1	1	0,600A	0,600A	0,630A	0,630A
S81-RD001-1/2	Remote Display (panel powered)		0,500A	0,500A	0,530A	0,530A
S81-RD002-1/2	Remote Display (panel powered)		0,600A	0,600A	0,630A	0,630A
SI-90 I/O	I/O rack + rack controller		0,050A		0,050A	
SI-2302	8 monitored input module		0,018A		0,048A	
SI-2401	Module with 1 x 4-20mA input		0,035A		0,055A	
SI-2402	Module with 2 x 4-20mA input		0,060A		0,080A	
SI-2403	Module with 8 x 4-20mA input		0,020A		0,030A	
SI-2501	Module with 8 x 500mA monitored outputs		0,035A		0,038A	
SI-2502	Module with 16 x 250mA non monitored outputs		0,012A		0,015A	
SI-2503	Module with 8 monitored outputs for sounders		0,035A		0,038A	
SI-2504	Module with 4 x 2A monitored outputs		0,025A		0,028A	
SI-2601	Fire extinguishing module		0,012A		0,015A	
SI-2602	Logic module		0,009A		0,012A	
SI-2702	Control module for ESP bus		0,068A		0,070A	
SI-2706	Modbus RTU Master/Slave module		0,014A		0,017A	
SI-2707	Control module for Scame Sistemi bus		0,065A		0,068A	
SI-2708	Control module for scales		0,014A		0,017A	
SI-2709	Control module for Shield addressable devices		0,090A		0,094A	
SI-2710	Control module for System Sensor bus		0,039A		0,042A	
SI-2711	Loop control module with Safety Bus protocol		0,080A		0,080A	
			Total quiescent current	**(A1)**	**Total alarm current**	**(B1)**

(*) Power supply unit quiescent current and current with alarmed control panel is considered with the battery charger at maximum current supply condition (low batteries).

C.2 Power consumption of Hochiki conventional detectors

Part Number	Description	Qty.	Quiescent current	Total quiescent current	Alarm current	Total alarm current
SLR-E3N	Smoke detector		0.00004A		0.04000A	
DCD-AE3	60°C combined heat detector		0.00004A		0.04000A	
DFJ-AE3	60°C fixed temperature heat detector		0.00004A		0.04000A	
DFJ-CE3	90°C fixed temperature heat detector		0.00004A		0.04000A	
DRD-E	IR flame detector		0.00007A		0.04000A	
NO contact	Normally open contact		0.00400A		0.02600A	
NC contact	Normally closed contact		0.02600A		0.00400A	
			Total quiescent current	**(A2)**	**Total alarm current**	**(B2)**

C.3 Power consumption of Hochiki addressable devices

Part Number	Description	Qty.	Quiescent current	Total quiescent current	Alarm current	Total alarm current
ALG-E, ALG-EN, ALN-E	Photoelectric Smoke Sensor		400µA		9100µA (a)	
ATG-E	Heat Sensor		360µA		9100µA (a)	
ACB-E, ATJ-EN	Multi Heat Sensor		350µA		9100µA (a)	
AIE-E	Ionization Smoke Sensor		350µA		9100µA (a)	
ACA-E, ACC-E	Smoke/Heat Multi Sensor		400µA		9100µA (a)	
CHQ-CP, MCP-E, HCP-E	Manual Call Point		250µA		5000µA	
YCA-RL/3H2	Addressable Base		245µA		245µA	
YCA-RL/5H2	Addressable Master Base		300µA		300µA	
CHQ-MZ ,CHQ-SZM	Single Zone Module		260µA		260µA	
CHQ-Z, CHQ-DZM	Dual Zone Module		330µA		330µA	
CHQ-SIM	Single Input Module		150µA		150µA	
CHQ-POM	Powered Output Module		200µA		32300µA	
CHQ-SOM	Single Output Module		150µA		150µA	
FB-1	Fire Beam Detector		3000µA		3000µA	
CHQ-S, CHQ-DIM, CHQ-DIM-2	Dual Input Module		280µA		280µA	
CHQ-R, CHQ-DRC, CHQ-DRC2	Dual Relay Controller		300µA		300µA	
CHQ-B, CHQ-DSC	Dual Sounder Controller		340µA		340µA	
CHQ-PCM	Plant Control Module		300µA		300µA	
YBO-BS	Base Sounder		150µA		16000µA (b)	
CHQ-BS	Base Sounder		200µA		200µA	
CHQ-WS2	Wall Sounder		200µA		8000µA (b)	
YBO-BSB, YBO-BSB2	Base Sounder Beacon		250µA		16000µA(b/c)	
CHQ-WSB, CHQ-WSB2	Wall Sounder Beacon		200µA		8000µA (b/c)	
CHQ-AB	Addressable Beacon		240µA		4300µA	
CHQ-CB	Addressable Ceiling Beacon		250µA		38000µA (d)	
CHQ-WB	Addressable Wall Beacon		250µA		38000µA (d)	
CHQ-ARI	Remote Indicator		280µA		4500µA	
CHQ-MRC2	Mains Relay Controller		300µA		300µA	
			Total quiescent current	**(A3)**	**Total alarm current**	**(B3)**

(a) Optical indicator exluded
(b) 90÷102 dB @ 1m
(c) Add 7000µA with optical indicator active
(d) at maximum brightness

C.4 Power consumption of Scame Sistemi addressable devices

Part Number	Description	Qty.	Quiescent current	Total quiescent current	Alarm current	Total alarm current
S81-Mod-DI	Module with 8 non monitored inputs		0.00025A		0.01000A	
S81-Mod-AIT	Module with 4 monitored inputs		0.00025A		0.01000A	
S81-Mod-AI020	Module with 1 x 4-20 mA input		0.00025A		0.01600A	
S81-Mod-AV010	Module with 1 x 0-10V input		0.00025A		0.01000A	
S81-Mod-DO	Module with 8 open collector outputs		0.00025A		0.01000A	
SI-6001-1	255 message display module		0.03000A		0.05000A	
			Total quiescent current	**(A4)**	**Total alarm current**	**(B4)**

C.5 Power consumption of Safety Bus addressable devices

Part Number	Description	Qty.	Quiescent current	Total quiescent current	Alarm Current	Total alarm current
SB-SIM	8 supervised input module		0.115A			
SB-SIM-GM	8 supervised input module with ground leakage detection		0.115A			
SB-AIM	8 4-20mA input module		0.105A			
SB-SCM	8 supervised output module for solenoids control		0.095A			
SB-NCM	8 supervised output module for sounder control		0.085A			
SB-ECM	8 supervised input and 8 supervised output for extinguishing system		0.135A			
HD67181FSX	Can to fiber converter		0.140A			
			Total quiescent current	**(A5)**	**Total alarm current**	**(B5)**

C.7 Power consumption of System Sensor addressable devices

Part Number	Description	Qty.	Quiescent current	Total quiescent current	Alarm Current	Total alarm current
CMA1-I	Module with 1 output		410µA		580µA	
M701E	Module with 1 output		310µA		510µA	
MMA1-I	Module with 1 input		400µA		510µA	
M710E	Module with 1 input		288µA		500µA	
M720E	Module with 2 inputs		340µA		600µA	
CMA11	Module with 1 input + 1 output		500µA		750µA	
M721E	Module with 2 inputs + 1 output		340µA		600µA	
CMA22	Module with 2 inputs + 2 outputs		620µA		860µA	
MCX-55M	Module with 5 inputs + 5 outputs		4000µA(a)		5000µA	
MMX-10M	Module with 10 inputs		4000µA(a)		5000µA	
CMX-10RM	Module with 10 relay outputs		4000µA(a)		5000µA	
M710ECZ	Module with 1 input for conv. detectors		500µA		2200µA	
M710ECZR	Module with 1 input for conv. detectors EExd		500µA		2200µA	
MMT	1 channel 4-20mA analog module		10000µA(b)			
IIG4N	4 channel 4-20mA analog module		22000µA(b)			
M700KW	Red alarm button for outdoor installation		200µA		5000µA	
M700KI	Red alarm button		200µA		5000µA	
M700KACI-FG-B	Blue alarm button		200µA		5000µA	
M700KACI-FG-B	Yellow alarm button		200µA		5000µA	
ABS32/PW-I	Addressable sounder base		220µA		6500µA	
ABSB32/PW/RD-I	Addressable sounder base + beacon		220µA		9800µA	
AWB/RD-I	Addressable beacon		220µA		2200µA	
AWS32/R/RD-I	Electronic sounder with beacon		220µA		9800µA	
AWS32/R-I	Electronic sounder		220µA		6500µA	
NFXI-SS-W	Addressable sounder base		225µa		10500µa	
NFXI-BSF-WC	Addressable sounder base + beacon		225µA		14000µA	
NFXI-WF-RR	Addressable beacon		225µA		3500µA	
NFXI-WS-R	Electronic sounder		225µA		14500µA	
NFXI-WSF-RR	Electronic sounder + beacon		225µA		14700µA	
NFXI-OPT	Optical smoke sensor		300µA		7000µA	
NFXI-TDIFF	Rate of rise + fixed 58°C temp. heat detector		300µA		3500µA	
NFXI-TFIX58	58° heat sensor with isolator		300µA		3500µA	
NFXI-TFIX78	78° heat sensor with isolator		300µA		3500µA	
NFXI-SMT2	Optical/rate of rise heat detector		300µA		3500µA	
NFXI-SMT3	Optical smoke/ heat/flame IR detector		300µA		3500µA	
SDX-751CTEM	Optical smoke/ heat/CO/flame IR detector		220µA		7000µA	
7251 PINNACLE	Laser smoke detector		230µA		330µA	
SDX-751ME	Optical smoke sensor		330µA		6500µA	
FDX551REM	Rate of rise heat detector		150µA		5000µA	
FDX-551HTE	78° heat sensor		150µA		5000µA	
FDX-751-TEM	Optical/heat detector		300µA		7000µA	
IDX751AE	Intrinsically safe optical sensor		330µA		2500µA	
			Total quiescent current	**(A7)**	**Total alarm current**	**(B7)**

(a) With blinking LED

C.8 External load Power consumption

Part Number	Description	Qty.	Quiescent current	Total quiescent current	Alarm Current	Total alarm current
	Visual and audible alarm devices					
	Solenoids					
	Magnets					
	Gas detectors					
	Flame detectors					
	Replication relays					
	Other loads					
			Total quiescent current	**(A8)**	**Total alarm current**	**(B8)**

(*) For quiescent and alarm current values please refer to manufacturer's data sheets

C.9 Calculation of total system Power consumption

Description	Total quiescent current		Total current with alarmed control panel
SI-90 control panel absorption	**(A1)**		**(B1)**
Max. sensor absorption	**(A2)**		**(B2)**
Absorption of Addressable Devices	**(A3+A4+A5+A6+A7)**		**(B3+B4+B5+B6+B7)**
Absorption of External Loads	**(A8)**		**(B8)**
Total quiescent current	**(A9)**	**Total alarm current**	**(B9)**

The table below indicates the power supply units that can be used according to the total alarmed system current calculated.

Use the suitable power supply unit according to the total current calculated with alarmed system.

C.10 Calculation of battery capacity

According to the European and US standards, the operating time of SI-90 control panel with primary voltage failure is:

– Standby 24 h
– Alarm 5 minutes = 0.083 h

Use the following table to calculate the capacity of the batteries to be used.

- Calculate battery capacity in standby A9[Ah]=(A8) x 24 [Hours].
- Calculate battery capacity in alarm condition B9[Ah]=(B8) x 0.083 [Hours].
- Calculate battery maximum capacity [Ah]=A9+B9
- Multiply the total capacity by a safety factor of 1,2. The result of the multiplication will be the minimum required battery capacity.
- Select a battery type with capacity equal or higher that the calculated one, referring to the table at the bottom of the page

Total System Standby Current=	**(A8)**	**A**
x Standby Time	**24**	**Hours**
Standby Battery Capacity=	**(A9)**	**Ah**
Total Alarm Current=	**(B8)**	**A**
x Alarm Time	**0.083**	**Hours**
Alarm Battery Capacity=	**(B9)**	**Ah**
Total Calculated Battery Capacity=	**A9+B9**	**Ah**
x Derating Factor=	**1.2**	
Battery Size Needed=	**C**	**Ah**

The table below shows the lead battery type to be used according to the calculated capacity

Part Number	*Description*
6FM40-X	12 V - 40 Ah batteries
6FM65-X	12 V - 65 Ah batteries
6FM120-X	12 V - 120 Ah batteries

APPENDIX D. - ADHESIVE LABELS

D.1 CPR Adhesive label

SHIELD

Redburn House, 2A Tonbridge Road,
Romford, Essex - RM3 8QE, United Kingdom

CE

15
0051-CPR-0466 0051

EN 54-2:1997 + A1:2006
EN 54-4:1997 + A1:2002 + A2:2006

FIRE DETECTION AND FIRE ALARM SYSTEMS
CONTROL AND INDICATING EQUIPMENT MODEL:

☐ SI-90/L	Loop card (s): 1-8
☐ SI-90/1R	Loop card (s): 1-6
☐ SI-90/2R	Loop card (s): 1-26
☐ SI-90/1-10R	Loop card (s): 1-64

Provided options:
- Output to fire alarm devices
- Delay to outputs
- Co-incidence detection
- Fault signal from points
- Disablement of addressable points
- Test condition

EN 12094-1:2003

ELECTRICAL AUTOMATIC CONTROL AND DELAY

☐ Equipped with extinguishing card (s) SI-2601-1

SI-90/L	Flooding zone (s): 1-2
SI-90/1R	Flooding zone (s): 1-6
SI-90/2R	Flooding zone (s): 1-12
SI-90/1-10R	Flooding zone (s): 1-64

Environmental Class: A
H/L Pressure CO_2, Inert Gas, Halogenated Hydrocarbon Systems

Provided options:
- Delay of extinguishing signal
- Signal representing the flow of the extinguishing agent
- Emergency hold device
- Initiation of secondary flooding
- Manual mode only
- Triggering signal to equipment within the system
- Triggering signal to equipment outside the system
- Extinguishing signal to spare cylinders
- Emergency abort device
- Activation of alarm devices with different signals

Maximum response delay to activated condition: 1 sec.
Maximum response delay to triggering of outputs: 1 sec.

Install in accordance with installation manual SI90-013

CPR Label

D.2 Panel Rating Adhesive Label

Panel rating Label

According to 051-CPR-0423 protection degree is IP-30.

D.3 ATEX Adhesive label

SI-2204-1, SI-2201-2 and SI-2201-3 racks are CE marked to indicate conformity with the essential requirements of the ATEX 2014/34/UE Guidelines:

CE 0051

The number after the CE mark is the number of the Notified Body involved the production control phase.
The racks also carry the following marking in accordance with the directive:

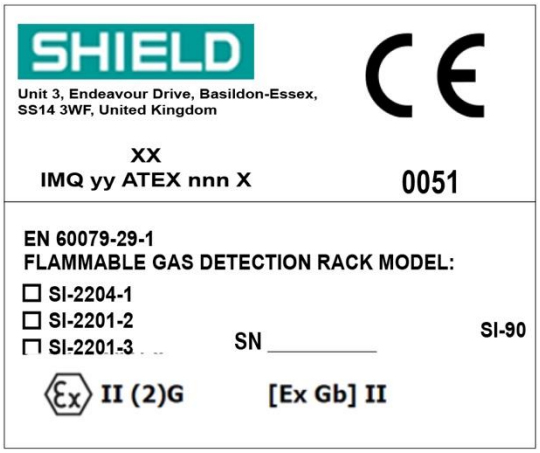
This marking means that the racks are suitable for use in non-hazardous areas, in non-mining Category 2 applications for the detection of flammable gases.

THIS MARKING DOES NOT MEAN THAT THE RACKS ARE “EXPLOSION PROOF”. SI-2204-1, SI-2201-2 and SI-2201-3 racks cannot be used in areas subject to explosion hazards (“hazardous areas”) without suitable additional protection.

The certification code corresponds with the ATEX EC-type-examination certificate:

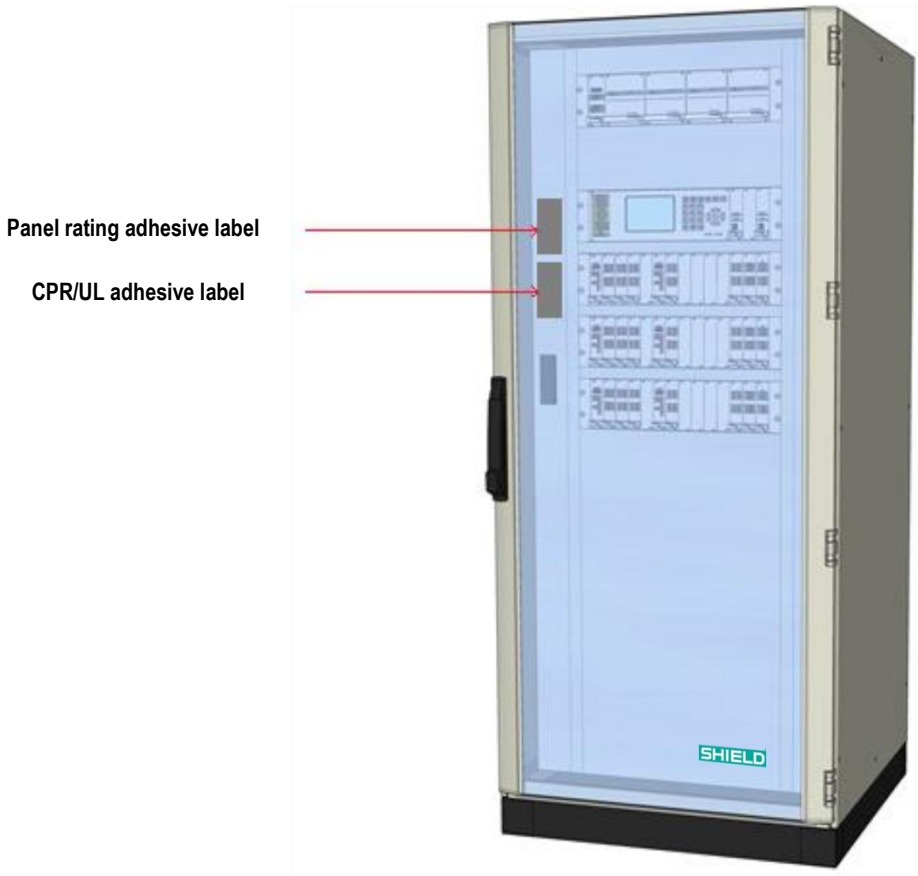
IMQ yy ATEX nnn X

The year of construction of the rack can be derived from the card's serial number

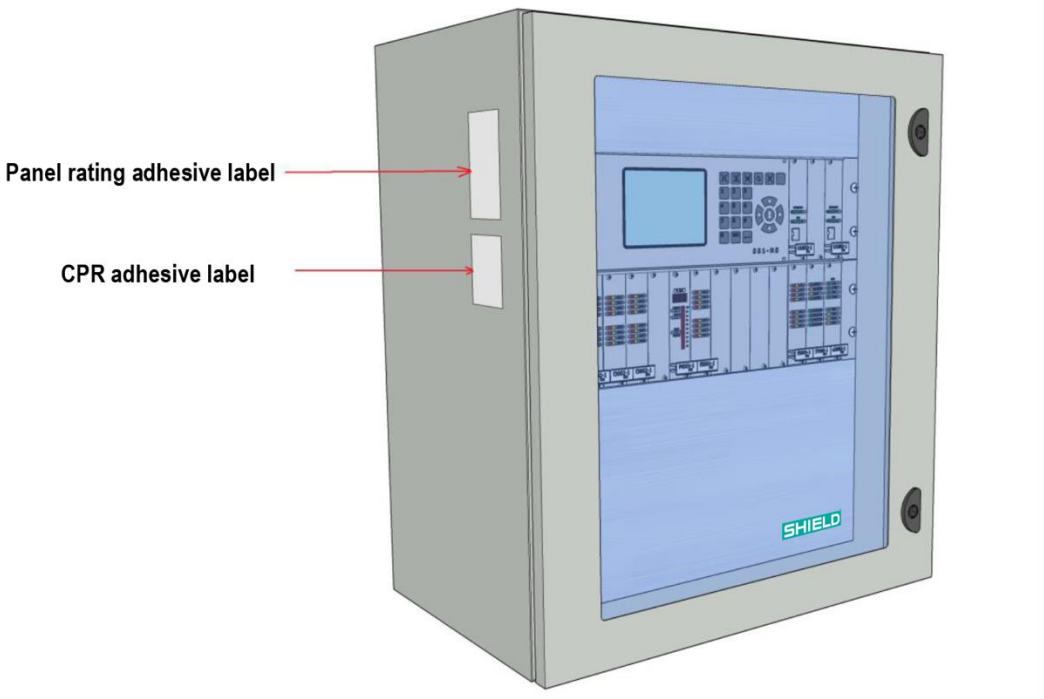


ATEX Label

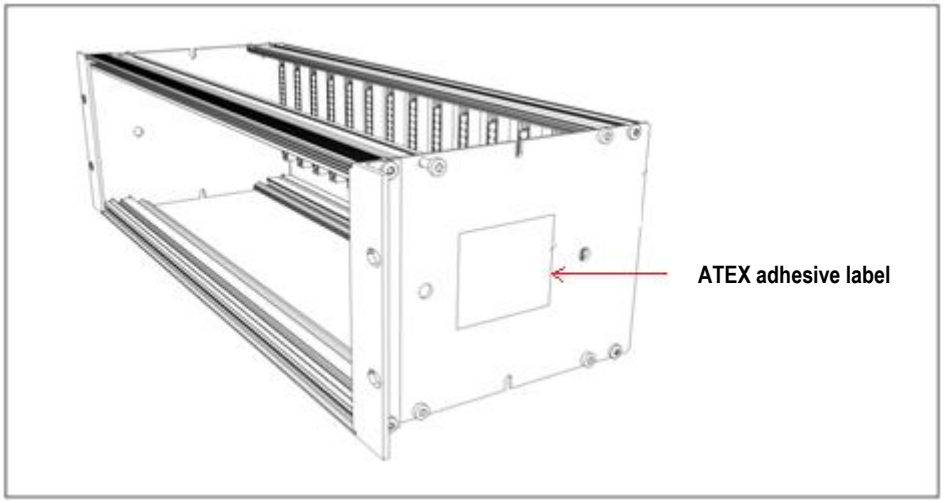
D.4 Adhesive labels location



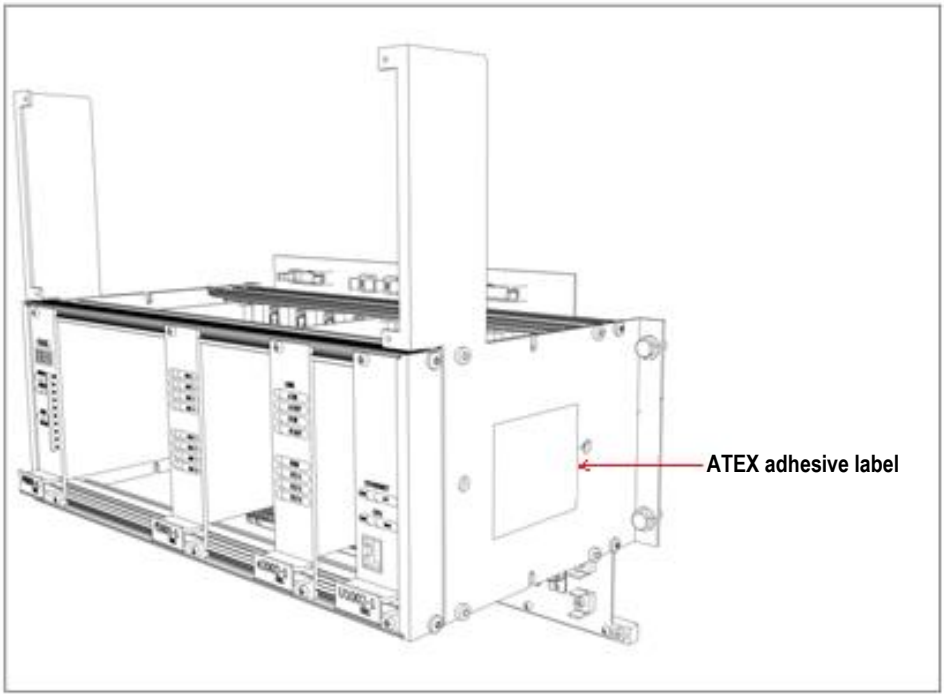
SI-90-1/10R Panel Rating and CPR adhesive label location



SI-90-1R/2R/L/M Panel Rating and CPR adhesive label location



SI-90-1R/2R/1-10R ATEX adhesive label location



SI-90-L/M ATEX adhesive label location