SI-90

MULTIFUNCTIONAL INTELLIGENT SYSTEM
FIRE/GAS/EXTINGUISHING

SHIELD®
TRUSTED WORLDWIDE

SIL2 SIL3 SIGNALING UL LISTED TŪV AUSTRIA

About Shield

Competence and innovation driven by consistent market development and customer requirements have shaped the successful development of the SHIELD Brand. The extensive product range of the market leader in the field of fire detection technology contains single, individually integrable system performances. In this way, a customized overall fire protection concept can be planned and realized for every need with optimally synchronized products.

Performance is in international demand, SHIELD is among the highly accredited fire alarm companies that meet rigorous British and American standards for all projects from small conventional system to multi-site networks. Certifications such as UL and FM approvals have earned SHIELD a world-renowned reputation with quality products and powerful solutions.

A strong brand is generally known to be a secure basis for close and lasting customer relationships. In accordance with this, SHIELD uses available potential in order to keep on growing in a dynamic competitive environment. And at the same time, SHIELD stands for innovative and high quality fire alarm and evacuation systems.

We invite you to explore and visit our new website www.shieldglobal.com. You can also send us your feedback and inquiry through our user-friendly online forms.

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Multifunctional Intelligent Control Panel
SI-90

Overview

The SHIELD SI-90 panel is intended for the protection, in complete safety, of high technologic and economic content plants and equipment. It is designed to meet the heaviest functional reliability and availability requirements, particularly of the companies that operate in the field of energy production and transformation, where it shows excellent resistance to electromagnetic disturbances. Though the panel looks like a safety PLC but, differently from this, it is certified, by European laboratories, to perform the envisaged protection functions in compliance with the applicable regulations.

The panel is composed of specialised cards, installed in 19" racks, whose type and quantity depends on specific application requirements, i.e. on the plant/equipment to be protected. The cards, which have their own "intelligence", are programmed for active/passive fire protection, gas detection, intruder alarm and technologic control management.

Moreover, the SHIELD SI-90 can interact with other panels of the same type, as well as with supervisory and SCADA systems, through both proprietary and standard protocols, such as Ethernet TCP/IP and Modbus.

Why SIL ?

• Redundant CPU, I/0 cards and Power Supply available on the panel to ensure the continuous operation in case of one or more failures.

• Hot-swap: CPU, I/O cards and Power Supply can be replaced without switching off the panel, thus maintaining system and safety functionality.

• Extreme reduction of false below acceptable levels out of 100 signals there is a possibility for only one fault.

• High level of Reliability, Availability and Maintainability (RAM) for the software and hardware of the system.

• High tolerance and stability over electromagnetic noise.

Multifunctional Intelligent Control Panel
SI-90

■ Redundancy

With the intention of increasing the functional reliability in the hardware, the system is built with two CPU, Power Supply & I/0 Cards. Ensuring the performance of the system to stay high and uninterrupted in case of any failure.

■ Reliability

The SI-90 system has been designed to meet the heaviest functional reliability and availability requirements, particularly of the companies that operate in the field of energy production and transformation, where it shows excellent resistance to electromagnetic disturbance and a continuous operability in difficult environmental conditions.

■ Flexibility

The SI-90 system is extremely flexible to all project requirements making it suitable for addressable & conventional Fire Detection, Gas Detection & Fire Extinguishant applications. The maximum number of devices for each control panel ranges from 9,828 to 16,380 field devices. Integration with Access Control, CCTV & BMS systems are also possible.

■ Modular

Shield SI-90 stands versatile with modular design approach. System composes of several individual components that could be group together to perform specific function.Adding or replacing any component will be much easier without effecting rest of the system.

■ Hot-Swap

The system is engineered to meet the safety integrity level standards. The CPU, I/O card and power supply can be replaced without switch off the panel.

■ Networkable

Control panels are divided into two categories: Master (receiving) and Slave (transmitting). Each control panel in the network can be indifferently slave only, master only or slave/master. A maximum of 99 control panels can be connected to each other in a network.

SIL2 SIL3

Multifunctional Intelligent Control Panel
SI-90

TECHNICAL DATA

Supply voltage	110 to 240 V AC (-15% + 10%)
Nominal frequency of the power supply	50 to 60Hz
Power supply set output voltage	25Vdc ±2%
Serial communication interface	2 x RS232
Ethernet communication interface	10/100BaseT with RJ45 connector
Maximum number of programmable zones	300 fire alarm zones + 300 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
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 TCP protocol
Supervisory system	Max. three supervisors per control 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

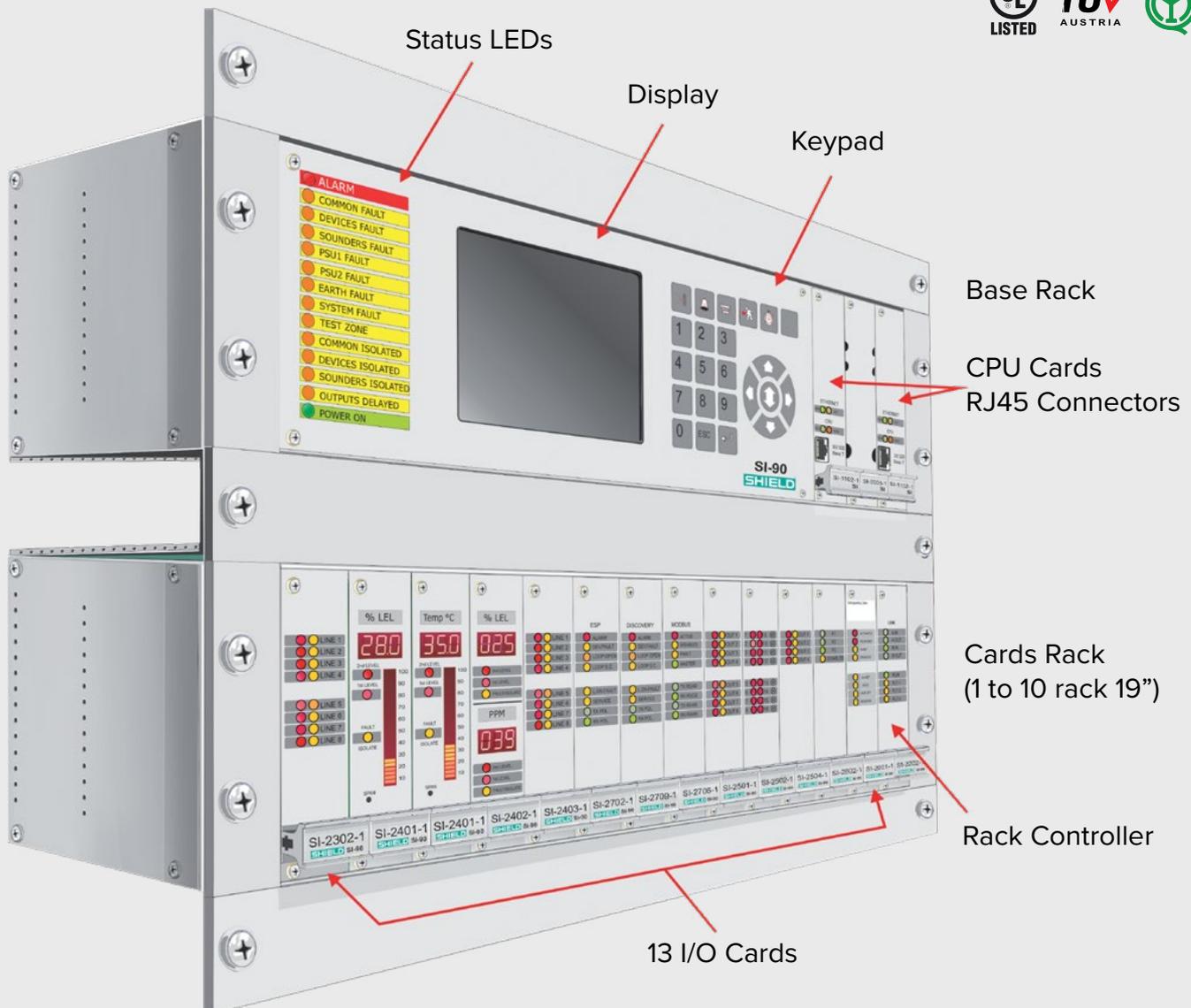| STANDARDS	DESCRIPTION
EN-54-2:1997+A1:2006	Fire detection and fire alarm systems Part 2: Control and indicating equipment
EN-54-4: 1997+A1:2002+A2:2006	Fire detection and fire alarm systems Part 4: Power supply equipment
EN-12094-1:2004	Fixed firefighting systems. Components for gas extinguishing systems. 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	Part 0: Explosive atmospheres. Equipment. General requirements
EN 60079-29-1	Part 29-1: 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 Edition 2.0	Functional safety of electrical/electronic/programmable electronic safety-related systems
UL 864 9th Edition	Standard for Control Units and Accessories for Fire Alarm Systems
UL 2017	General-Purpose Signaling Devices and Systems

Multifunctional Intelligent Control Panel
SI-90

Status LEDs

Display

Keypad

Base Rack

CPU Cards
RJ45 Connectors

Cards Rack
(1 to 10 rack 19")

Rack Controller

13 I/O Cards

ORDERING INFORMATION

UL RANGE SI-90 SYSTEM

|	
SI-90/MB	Base + 8 I/O cards in a wall mount cabinet
SI-90/U	Base rack + 6 racks with 13 slots, each, for I/O cards in a wall mount cabinet

EN RANGE SI-90 SYSTEM

SI-90/L	Base + 8 I/O cards in a wall mount cabinet
SI-90/1R	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-90/1-10R	Base rack + up to 10 racks with 13 slots, each, for I/Ocards in a free standing cabinet
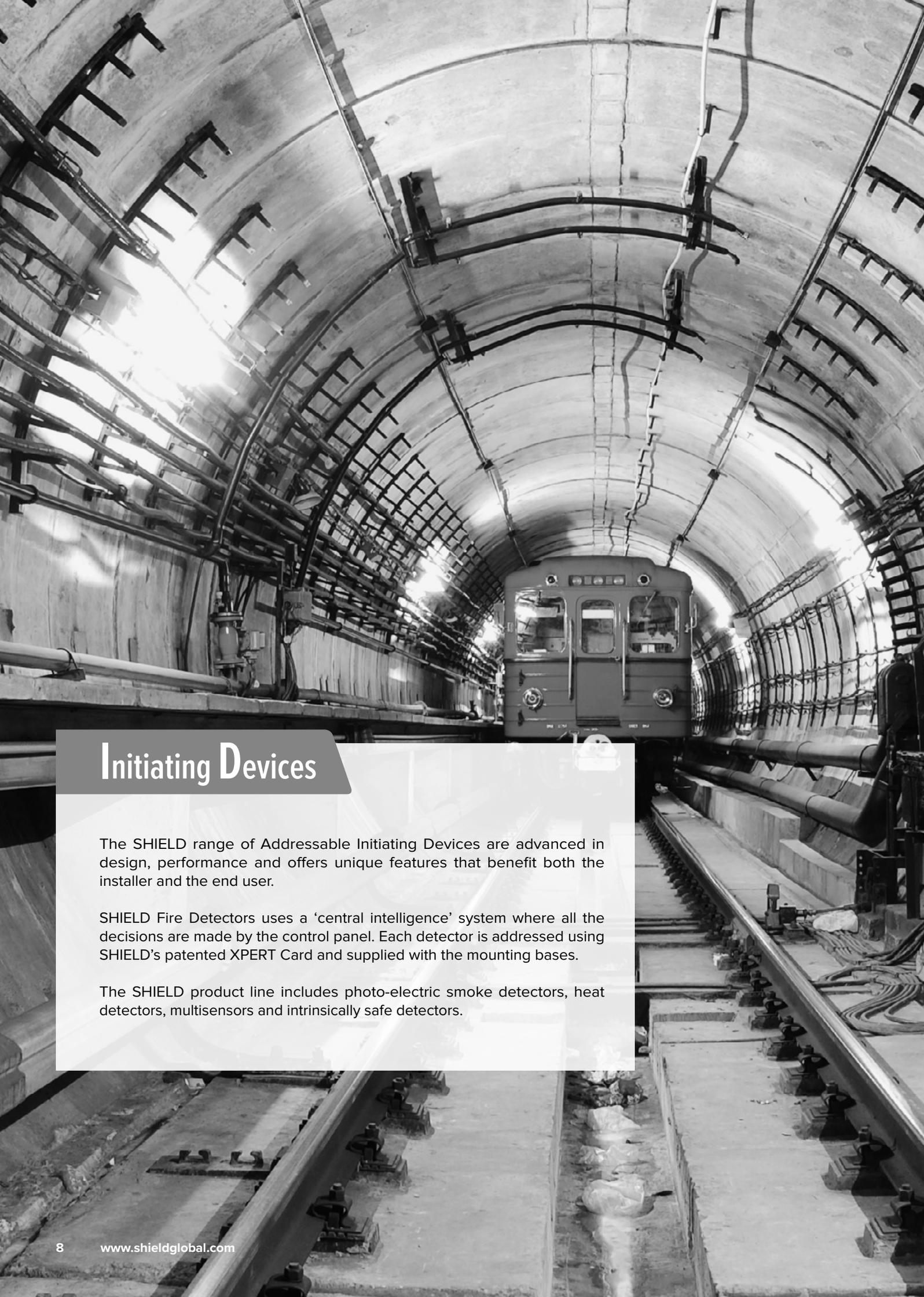
Initiating Devices

The SHIELD range of Addressable Initiating Devices are advanced in design, performance and offers unique features that benefit both the installer and the end user.

SHIELD Fire Detectors uses a 'central intelligence' system where all the decisions are made by the control panel. Each detector is addressed using SHIELD's patented XPERT Card and supplied with the mounting bases.

The SHIELD product line includes photo-electric smoke detectors, heat detectors, multisensors and intrinsically safe detectors.

Initiating Devices
Detectors

PRODUCT		TECHNICAL DATA	
SIL-A8021	SIL② SIL③ LPCB Cert/LPCB ref. 010q/03	Description	Optical Smoke Detector
		Detection principle	Photo-electric detection of light scattered in a forward direction by smoke particles
		Sensor	Silicon PIN photo-diode
		Operating temperature	-40 ºC to +70 ºC
		Operating voltage	17-28 V DC
		Quiescent current	300 µA
		Alarm current, LED illuminated	3.5 mA
		IP Rating	IP44
		Standards & approvals	EN 54-7, LPCB & SIL
		Dimensions (D x H)	100 mm x 42 mm (50 mm height with Mounting Base)

PRODUCT		TECHNICAL DATA	
SIL-A8022	SIL② SIL③ LPCB Cert/LPCB ref. 010p/03	Description	Heat Detector
		Detection principle	Heat sensitive resistance
		Storage temperature	-40 ºC to +80 ºC
		Operating voltage	17-28 V DC
		Quiescent current	400 µA
		Alarm current, LED illuminated	3.5 mA
		IP Rating	IP54
		Standards & approvals	EN 54-5, LPCB & SIL
		Dimensions (D x H)	100 mm x 42 mm (50 mm height with Mounting Base)
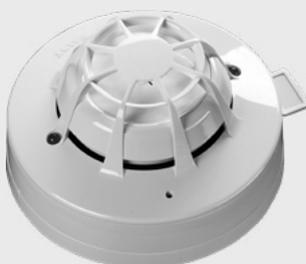
PRODUCT		TECHNICAL DATA	
SIL-A8023	SIL② SIL③ LPCB Cert/LPCB ref. 010h/03	Description	Multisensor Detector
		Detection principle	Smoke: Photo-electric detection of light scattered by smoke particles Heat: Temperture-dependent resistance
		Operating temperature	-40 ºC to +70 ºC
		Operating voltage	17-28 V DC
		Quiescent current	400 µA
		Alarm current, LED illuminated	3.5 mA
		IP Rating	IP44
		Standards & approvals	EN 54-5, EN 54-7, LPCB & SIL
		Dimensions (D x H)	100 mm x 42 mm (50 mm height with Mounting Base)

Initiating Devices
Detectors

PRODUCT	TECHNICAL DATA	
	Description	Intrinsically Safe Optical Smoke Detector
	Detection principle	Photo-electric detection of light scattered in a forward direction by smoke particles
	Sensor	Silicon PIN photo-diode
	Operating temperature	-20 °C to +40 °C (T5) -20 °C to + 60 °C (T4)
	Operating voltage	14-22 V DC
	Quiescent current	340 µA
	Alarm current, LED illuminated	4 mA
SIL-A8011	IP Rating	IP23D
	Standards & approvals	EN 54, IEC61508-1, BS EN60079-11, LPCB & SIL
	Dimensions (D x H)	100 mm x 42 mm (50 mm height with Mounting Base)

PRODUCT	TECHNICAL DATA	
	Description	Intrinsically Safe Heat Detector
	Detection principle	Linear approximation over temperature range 25 °C to 90 °C
	Sensor	Single NTC thermistor
	Operating temperature	-20 °C to +40 °C (T5) -20 °C to + 60 °C (T4)
	Operating voltage	14-22 V DC
	Quiescent current	300 µA
	Alarm current, LED illuminated	2 mA
SIL-A8012	IP Rating	IP53
	Standards & approvals	EN54, IEC61508-1, 2, LPCB & SIL
	Dimensions (D x H)	100 mm x 42 mm (50 mm height with Mounting Base)

PRODUCT	TECHNICAL DATA	
	Description	Standard and Intrinsically Safe Detector Base
	Operating temperature	-20 °C to +60 °C
	Humidity (no condensation or icing)	0% to 95% RH
	Dimensions (D x H)	100 mm x 20 mm
	Weight	63g
SEN-A4001	Materials	Base: White flame-retardant polycarbonate Terminals: Nickel plated stainless steel

LPCB
Cert/LPCB ref. 010p-(C1-5)

Manual Call Points

PRODUCT

SIL-A7011

Cert/LPCB ref. 010w/01

TECHNICAL DATA

Description	Manual Call Point
Operating voltage	17-28 V DC
Communication protocol	5-9 V peak to peak
Quiescent current	100 μA
Alarm current (LED On)	4 mA
Operating temperature (ambient)	-20 ºC to 60 ºC
IP rating	IP45
Standards & approvals	EN 54-11, EN 54-17, LPCB & SIL
Dimensions (H x W x D)	93 mm x 89 mm x 59.5 mm

Interfacing Modules

The shield interface modules are intended for use with the intelligent addressable fire detection system, where each module is individually addressed by the built-in DIP switches.

These includes the interfaces with other services or an existing system which is otherwise incompatible to allow fire signal to be passed in both directions.

Interfacing Modules
Modules & Accessories

PRODUCT	TECHNICAL DATA	
	Description	Input / Output Unit - with Isolator
SIL-A6061	**Minimum loop operating voltage in normal conditions**	17 V DC
	Maximum loop operating voltage	28 V DC
	Switch input monitoring voltage	9-11 V DC (open-circuit condition)
	Maximum cable resistance	50 Ω
	Contact rating (inductive or resistive)	1 A at 30 V AC or DC
	Wetting current	10 µA at 10 m V DC
	On resistance	0.2 Ω
	Maximum continuous current	1 A
	Maximum switching current	3 A
	Operating temperature (ambient)	-20 ºC to 70 ºC
	IP rating	IP54
	Standards and approvals	EN54-17, EN54-18, IEC61508-1, LPCB & SIL
	Dimensions (H x W x D)	90 mm x 150 mm x 48 mm

SIL2
SIL3

LPCB
Cert/LPCB ref. 010ah/06

PRODUCT	TECHNICAL DATA	
	Description	Intrinsically Safe Protocol Translator Single Channel
SIL-A9099	**Supply voltage**	19-28 V DC
	Modulation voltage at translator	5 to 9 Volts peak to peak
	Input current (no load condition)	1.0 mA max - Single Channel 2.0 mA max - Dual Channel
	Output voltage (to barrier)	16.5 V to 19 V
	Operating temperature	-20 ºC to +60 ºC
	Standards & approvals	LPCB & SIL
	Dimensions (H x W x D)	110 mm x 92.5 mm x 20 mm

SIL2
SIL3

CE

LPCB
Cert/LPCB ref. 010ag/14

Notification Appliances

Shield provides a wide range of audible/visual indication loop powered devices which serves the requirement for both the indoor/outdoor application as per the EN 54-3 standards. These Includes;

▶ Open Area Sounder.
▶ Open Area Sounder Beacon.
▶ Open Area Beacon.

Notification Appliances
Sounders & Beacons

PRODUCT	TECHNICAL DATA		
	Description	Open Area Sounder	
	Operating voltage	17-28 V DC (polarity sensitive)	
	Protocol pulses	5-9 V	
	Current consumption at 24V	switch-on surge	1.2 mA for <1 sec
		quiescent	333 µA
		alarm, sounder 92/100dB(A)	5 mA
		alarm, sounder beacon	8 mA
		alarm, beacon	3.1 mA
SEN-A4021	Operating temperature	-10 °C to 55 °C	
	Maximum sound output	100 dB(A)	
	IP Rating	IP65	
	Dimensions (D x H)	104 mm x 97.5 mm	

SIL2 SIL3

LPCB
Cert/LPCB ref. 010ak/01

PRODUCT	TECHNICAL DATA		
	Description	Open Area Sounder Beacon	
	Operating voltage	17-28 V DC (polarity sensitive)	
	Current consumption at 24V	switch-on surge	1.2 mA for <1 sec
		quiescent	333 µA
		alarm, sounder 92/100dB(A)	5 mA
		alarm, sounder beacon	8 mA
		alarm, beacon	3.1 mA
SEN-A4022	Operating temperature	-10 °C to 55 °C	
	Maximum sound output	100 dB(A)	
	IP Rating	IP65	
	Dimensions (D x H)	104 mm x 97.5 mm	

SIL2 SIL3

LPCB
Cert/LPCB ref. 010ak/03
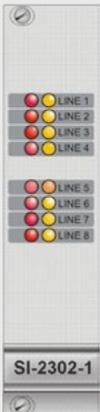
Input / Output Cards

The SI-90/1-10R model is a modular unit to install up to 11 19" 3-unit high anodized aluminium racks; they will be installed in a steel cabinet with revolving rack and acrylic glass door.
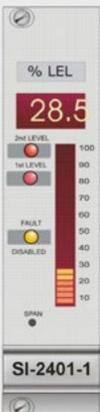
The first rack includes the Base with one or two CPUs, the operator interface display and the keyboard. The other racks are composed by one rack controller and 13 slots for installation of I/O cards.

These I/O cards 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 a flat cable and an electronic terminal block fitted on a DIN bar at the bottom of the switchboard; alternatively, cards can be connected to field devices by pre-wired connectors connected to electromechanical terminal blocks.

Input / Output Cards

PRODUCT

SI-2709-1

TECHNICAL DATA

Description	Addressable Loop Control Card
Application	Suitable for addressable fire detection devices
Redundancy	No
Number of devices per loop	127
Loop maximum current	400 mA
Supply voltage	22 to 29 V DC
Quiescent current	90mA
Operating temperature	-5 to +50 °C
Storage temperature	-30 to +80 °C
Maximum humidity	95% (RH) non condensing
Hot swap capability	yes

PRODUCT

SI-2302-1

TECHNICAL DATA

Description	8 Channel Monitored Input Card
Application	Suitable for fire extinguishing systems (pressure switches, discharge buttons, etc...)
Safety rating	applicable up to SIL3
Redundancy	SI-2302-2 model
Line short circuit current	>115 mA
Channel test	every 30 seconds
Intrinsic Safety Barriers allowed	uZ680
Supply voltage	22-29 V DC
Quiescent current	14 mA
Operating temperature	-5 to +50 °C
Storage temperature	-30 to +80 °C
Maximum humidity	95% (RH) non condensing
Hot swap capability	yes

PRODUCT

SI-2401-1

TECHNICAL DATA

Description	Single Channel 4-20 mA Analog Input Card
Application	Suitable for transducer control (explosion, air quality, gas, temperature, 4-20 mA general sensors)
Safety rating	applicable up to SIL3
Redundancy	SI-2401-2 model
Channel test	continuously tested
Measuring range	0-24 mA
Line short circuit condition	with current >23.5mA
Supply voltage	22-29 V DC
Quiescent current	35 mA
Operating temperature	-5 to +50 °C
Storage temperature	-30 to +80 °C
Maximum humidity	95% (RH) non condensing
Hot swap capability	yes

Input / Output Cards

PRODUCT

SI-2402-1

TECHNICAL DATA

|	
Description	Dual Channel 4-20 mA Analog Input Card
Application	Suitable for transducer control (explosion, air quality, gas, temperature, 4-20 mA general sensors)
Safety rating	applicable up to SIL3
Redundancy	SI-2402-2 model
Channel test	continuously tested
Measuring range	0-24 mA
Line short circuit condition	with current >23.5 mA
Supply voltage	22-29 V DC
Quiescent current	60mA
Operating temperature	-5 to +50 °C
Storage temperature	-30 to +80 °C
Maximum humidity	95% (RH) non condensing
Hot swap capability	yes

PRODUCT

SI-2403-1

TECHNICAL DATA

Description	8 Channel 4-20 mA Analog Input Card
Application	Suitable for transducer control (explosion, air quality, gas, temperature, 4-20 mA general sensors)
Safety rating	applicable up to SIL3
Redundancy	SI-2403-2 model
Channel test	continuously tested
Measuring range	0-24 mA
Line short circuit condition	with current >23.5mA
Supply voltage	22-29 V DC
Quiescent current	13 mA
Operating temperature	-5 to +50 °C
Storage temperature	-30 to +80 °C
Maximum humidity	95% (RH) non condensing
Hot swap capability	yes

PRODUCT
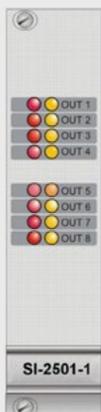
SI-2501-1

TECHNICAL DATA

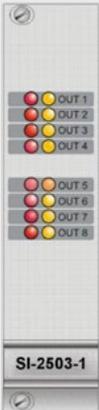|	
Description	8 Channel 500 mA Monitored Output Card
Application	Suitable for controling directional & releasing solenoid valves, audible/visual alarm devices
Safety rating	applicable up to SIL3
Redundancy	SI-2501-2 model
Channel test	every 2 seconds
Max. output current	500 mA
Automatic output protection	Yes
Supply voltage	22-29 V DC
Quiescent current	35 mA
Operating temperature	-5 to +50 °C
Storage temperature	-30 to +80 °C
Maximum humidity	95% (RH) non condensing
Hot swap capability	yes

Input / Output Cards

PRODUCT		TECHNICAL DATA	
SI-2502-1		Description	16 Channel 250 mA Non-Monitored Output Card
		Application	Suitable for non-monitored open collector outputs
		Redundancy	No
		Channel test	No
		Max. output current	250 mA
		Automatic output protection	No
		Supply voltage	22-29 V DC
		Quiescent current	10 mA
		Operating temperature	-5 to +50 °C
		Storage temperature	-30 to +80 °C
		Maximum humidity	95% (RH) non condensing
		Hot swap capability	yes

PRODUCT		TECHNICAL DATA	
SI-2503-1		Description	8 Channel 250mA Monitored Outputs Card
		Application	Suitable for sounder controls
		Redundancy	No
		Channel test	No
		Max. output current	250 mA
		Automatic output protection	Yes
		Supply voltage	22-29 V DC
		Quiescent current	38 mA
		Operating temperature	-5 to +50 °C
		Storage temperature	-30 to +80 °C
		Maximum humidity	95% (RH) non condensing
		Hot swap capability	yes

PRODUCT		TECHNICAL DATA	
SI-2504-1		Description	4 Channel 2 A Monitored Output Card
		Application	Suitable to control automatic fire extinguishing systems
		Safety rating	applicable up to SIL3
		Redundancy	SI-2504-2 model
		Channel test	every 2 seconds
		Max. output current	2 A
		Supply voltage	22-29 V DC
		Quiescent current	20 mA
		Operating temperature	-5 to +50 °C
		Storage temperature	-30 to +80 °C
		Maximum humidity	95% (RH) non condensing
		Hot swap capability	yes

Input / Output Cards

PRODUCT

SI-2601-1

TECHNICAL DATA

|	
Description	8 Channel Outputs Control Card
Application	Used to control fire extinguishing systems typical logics, such as discahrge relay & reset inhibit time
Safety rating	applicable up to SIL3
Redundancy	Yes
Max. output current	250 mA
Automatic output protection	No
Supply voltage	22-29 V DC
Quiescent current	10 mA
Operating temperature	-5 to +50 °C
Storage temperature	-30 to +80 °C
Maximum humidity	95% (RH) non condensing
Hot swap capability	yes

PRODUCT

SI-2602-1

TECHNICAL DATA

Description	Logic Card
Application	To control 100 S-R flip flops, toggles & timers
Redundancy	Yes
Maximum number of S-R flip flops	100
Maximum number of logic Toggles	100
Maximum number of Timers	100
Timer range	0 to 255 seconds
Supply voltage	22-29 V DC
Quiescent current	9 mA
Operating temperature	-5 to +50 °C
Storage temperature	-30 to +80 °C
Maximum humidity	95% (RH) non condensing
Hot swap capability	yes

System Architecture

The SI-90 control panel is a high technology product created for controlling safety-related systems and equipment. It is characterised 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.
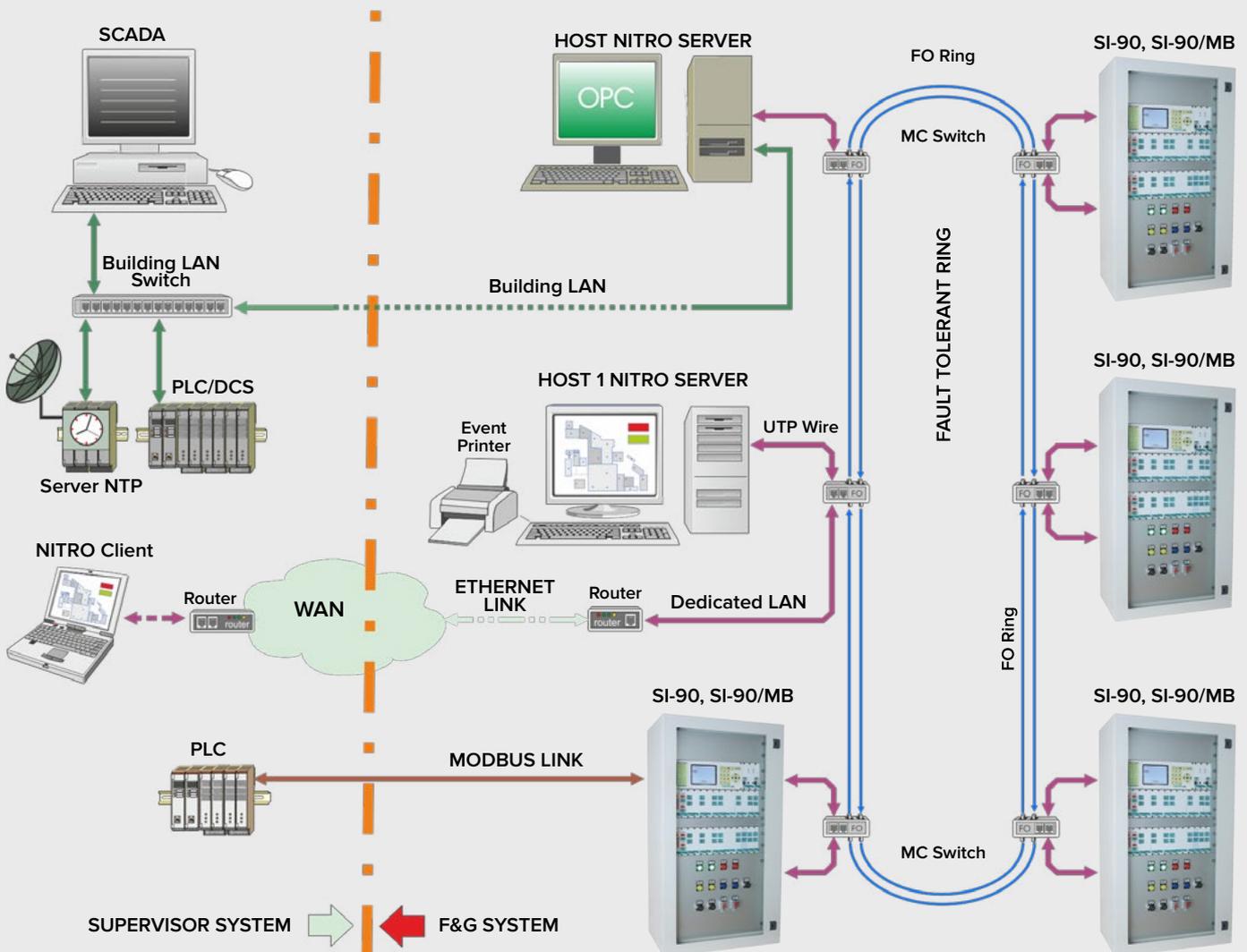
Graphic Supervision Program

Nitro

Nitro is a supervision program that allows a computer-based event management of fire and crime squad systems through animation and graphic pages. Basically Nitro allows to manage the activity of the installation without physically moving to it. Nitro program can be installed on one or more PCs that will connect to the control panel with a LAN Ethernet or serial line.

Nitro has an easy configuration in order to adapt to the fire and gas installation requirements. From the main panel, the administrator can modify the graphic pages and the fire plant features on the map.

Moreover, the administrator can decide all possible actions for each level of access and the graphic pages visible on each PC. In addition to the basic functions, the program NITRO can also have some on-demand options such as NITRO VIDEO or be customized according to the client's needs.

Features

- PC installed (MS Windows).
- Compatible with both SI-90 and SI-90/MB control panels.
- Access and configuration with USB protection device.
- Connection to the plants though LAN Ethernet or serial line.
- Choose of language – Italian, English, French and on request.
- Import zone names and entities from panels.
- Maps in bitmap format (bmp, jpg, etc.).
- Past events with filter to see and export data.
- On line manual.

Notes

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