



EN 54-4



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0051-CPR-0433
0051-CPR-0434



SmartLevel
SPS24060S
SPS24160S
Power supply station
Installation manual



GameOver



ISO 9001 Quality Management
certified by BSI with certificate number FM530352

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European directive compliance

This power station has been designed and developed to the highest standards of quality and performance implemented by INIM Electronics.

This power station must be installed in accordance with the instructions described in this manual and in compliance with the laws in force.

All power stations from the SmartLevel series are **EN54-4** compliant.

All power stations from the SmartLevel series, and all accessory items and special functions have IMQ Sistemi di Sicurezza certification, unless otherwise stated.

Declarations of performance, declarations of compliance and certificates relating to the products mentioned in this manual can be downloaded from the following website:

www.inim.biz/certifications

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Overview

Note: *The power supply stations described in this manual have been designed and developed to the highest standards of quality, reliability and performance. The components selected for this product will operate properly within their specifications when the environmental conditions outside the product enclosure comply with Class 3k5 (EN 60721-3-3).*

1.1 Application and use

The SmartLevel unit is a constituent part of your fire detection system and is capable of supplying power to the remote loads of the system. It supplies power to remote loads such as: fire-door magnets, sounders, emergency signs, linear smoke detectors.

Note: *The SmartLevel power supply station is EN54-4 compliant and specifically the amendment EN 54-4:1997 A2 which includes a test regarding the internal resistance of the batteries.*

Main features:

- front panel with signalling LEDs
- 1 24V output
- 2 fault relays
- loop connection

The SmartLevel can operate in stand-alone mode using the fault signaling output and on-board data, or combined mode using the loop of an INIM Electronics fire detection system (refer to *Chapter 4 - Technical description*).

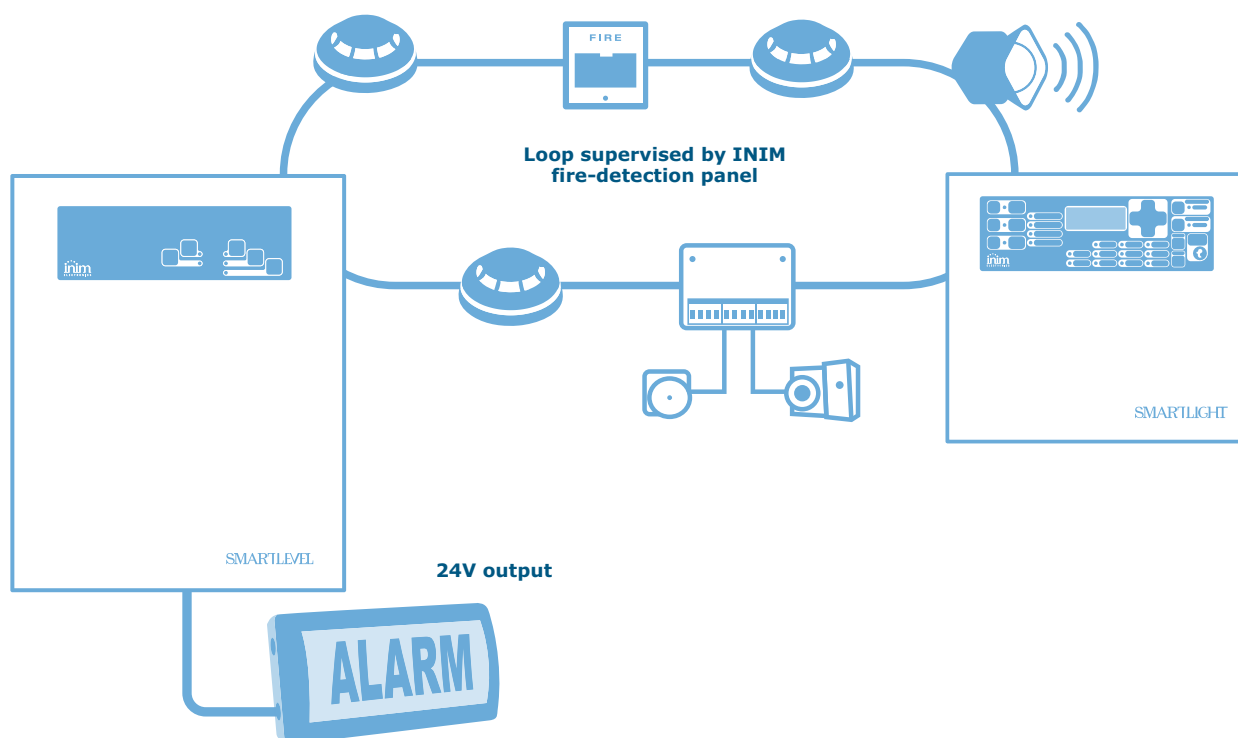


Figure 1 - Example of a typical application

Note: *Do not use this station to supply power to a fire-detection control panel.*

1.2 The system parts and definitions

Switching power supply: this unit, starting from the mains power supply (230V~) it connects to, supplies the board with a 24V (27,6V $\overline{=}$) stabilized current capable of feeding the control panel and recharging the batteries. The power-supply module is located below the mother board and is EN54-4 compliant. the mains power supply (230V~) the primary power source of the system. Refer to *paragraph 4.2 Internal devices*.

Batteries: the secondary power source of the system. The power supply station enclosure houses two lead batteries @ 12V 7Ah (depending on the model) connected in series. The system monitors the battery status (efficiency and charge). In the event of inefficient or low battery conditions, the system will signal fault (A2 amendment). In the event of primary power failure (230V~), the batteries will take over automatically. If the problem persists for a long period thus causing the battery charge to drop below the minimum value required, they will be shutdown automatically in order to avoid damage. Refer to *paragraph 5.3 Connecting the batteries*.

Thermal probe: an accessory tool connected to the panel and attached to the battery pack. This device monitors the temperature of the battery pack and regulates the battery charge accordingly. Refer to *paragraph 5.4 Thermal probe*.

Loop: all the peripheral devices of the system must be connected in parallel to the loop circuit (2 pole shielded cable). The circuit is considered a "loop" because the wiring path starts at the loop-out terminals, passes through all the protected areas, connects all the system devices in parallel and returns to the loop-in terminals. The panel controls and communicates with the loop devices via digital protocol. The loop utilizes the same two poles for the power supply to the system devices and the two-way communication channel.

1.3 How to use the power supply station

The power station supplies 24V $\overline{=}$ by means of the "OUTPUT" terminals.

To signal faults are available:

- the "FAULT" relay, which is activated together with the corresponding LED on the panel when the station detects at least one fault.
- the "MAINS" relay, which is activated together with the corresponding LED on the panel when there is at least one mains fault.

The loop connection allows the power station to be supervised by the control panel and to report the loop activity by the LEDs on the front panel.

For details, please refer to and to *paragraph 4.2 Internal devices* and to *paragraph 4.3 Signalling LEDs*.

1.4 The SmartLevel power supply stations

Product models:

- SPS24060S - power-supply unit with internal 60W @ 27.6V $\overline{=}$ switching power-supply module and housing for 7Ah, 12V batteries
- SPS24160S - power-supply unit with internal 160W @ 27.6V $\overline{=}$ switching power-supply module and housing for 17Ah, 12V batteries

General information

2.1 Supplied documentation

The power supply station comes with a combined installation manual (this document). For further copies of the installation manual, please contact INIM Electronics offices quoting the order number shown in *Appendix A Order codes*.

2.2 Manual details

- Title: SPS24060S and SPS24160S installation manual
- Version: 1.00
- Installation manual code: DCMIINIESPS24S
- Addresses: installer, technicians

2.3 Intellectual property rights

The information contained in this document is private property. All rights reserved.

This document must not be reproduced, either totally or in part, without the prior written consent of INIM Electronics, and refers to the devices specified in *paragraph 2.11 CE Mark*.

2.4 Disclaimer

INIM Electronics s.r.l. shall not be responsible for damage arising from improper application or use.

Only qualified personnel (refer to Terminology) should touch this device. Installation must be carried out strictly in accordance with the instructions described herein, and in compliance with the local fire code in force.

2.5 Recommendations

INIM Electronics recommends that the entire system be checked completely at regular intervals (refer to *paragraph 2.6 System test*).

2.6 System test

This system has been designed to provide the highest standards of reliability and performance. Malfunction of any of the system devices may cause the system to be incapable of reaching the intended levels of performance. Most problems which prevent the system from operating as intended can be found by regular testing and maintenance of the system devices (refer to *Chapter 7 - Maintenance*).

2.7 Note to the installer

In order to provide adequate protection and instructions for correct use of the apparatus, you (the installer) must be fully aware of the regulations and operating procedures of firefighting. As the only individual in contact with system users, it is your responsibility to instruct them on how to use this device properly.

2.8 Technical support

Our professional engineers are readily available to assist you. If you require help, call us and you will be put through to a person capable of answering your questions and providing you with the service you need.

2.9 Conventions

2.9.1 Terminology

- **Power supply unit:** refers to the device defined in *paragraph 2.11 CE Mark*.
- **Left, right, behind, above, below:** refer to the directions as seen by the operator in front of the mounted device.
- **Qualified personnel:** those persons whose training, expertise and knowledge of the laws and bylaws regarding service conditions and the prevention of accidents, are able to identify and avoid all possible situations of danger.

2.9.2 Graphic conventions

Following are the graphic conventions used in the text. For a description of the graphic conventions relating to the interface, refer to *paragraph 4.3 Signalling LEDs*.

Conventions	Example	Description
<i>Text in Italics</i>	Refer to <i>paragraph 2.9.2 Graphic conventions</i>	Text in italics: indicates the title of a chapter, section, paragraph, table or figure in this manual or other published reference.
[uppercase letter]	[A]	Representation of a part of the system or video object.
BUTTON	Ok/ Esc	computer or control panel keys.

Note: *The detached notes contain important information about the text.*

Attention: **The attention prompts indicate that total or partial disregard of the procedure could damage the connected devices.**

Danger: **The danger warnings indicate that total or partial disregard of the procedure could injure the operator or persons in the vicinity.**

2.10 Manufacturer's name and address

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2.11 CE Mark

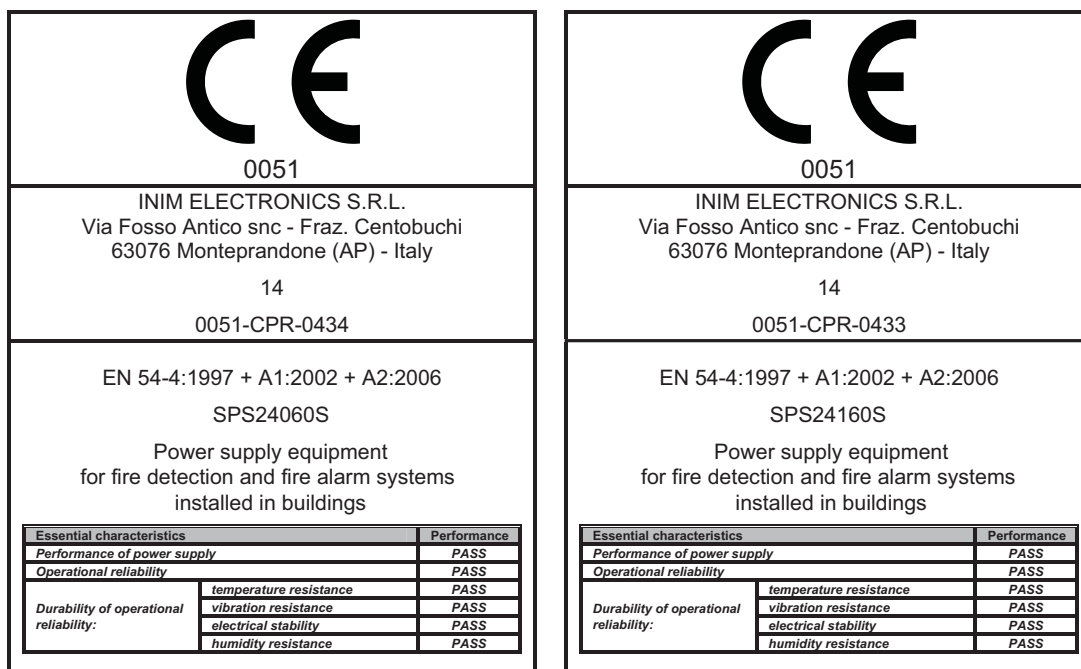


Figure 2 - Certifications for SmartLevel power stations

Declarations of performance, declarations of compliance and certificates relating to the products mentioned in this manual can be downloaded from the following website:

www.inim.biz/certifications

2.12 Warranty

INIM Electronics s.r.l. warrants that for a period of 24 months from the date of commissioning, the product shall be free of defects in materials and workmanship. The warranty applies only to defects in parts and workmanship relating to normal use. It does not cover:

- Improper use or negligence
- Damage caused by fire, flood, wind or lightning
- Vandalism
- Fair wear and tear

INIM Electronics s.r.l. shall, at its option, repair or replace any defective products. Improper use, that is, use for purposes other than those mentioned in this manual will void the warranty. For the full details and conditions regarding the warranty, refer to the purchase order.

2.13 Safety laws

The aim of the instructions in this section is to ensure that the device is installed and handled properly. It is assumed that anyone who handles this apparatus is familiar with the contents of this chapter.

2.13.1 Compliancy

The SmartLevel power supply station has been especially designed and manufactured to comply with EN 54-4 *Fire detection and signaling systems - Power supply devices* and the amendment *EN54-4:1997/A2:2006*.

2.13.2 Managing electronic devices

The normal motions of any person may generate electrostatic potential of thousands of volts. Discharge of this current through semiconductor devices during handling may cause serious damage which although may not be immediately evident may reduce the reliability of the circuits.

If located in their housings, the electronic circuits of INIM Electronics products are highly immune to electrostatic discharge.

- Do not expose the circuits to damage by removing the modules unnecessarily from their housings.
- When removing or handling the boards, hold the board edges only.
- Do not touch the electronic components, the printed circuits or the metal parts of the connectors.
- Do not hand the board to another person without first ensuring that both of you have the same electrostatic potential. This can be achieved by simply shaking hands.
- Place the board on an anti-static surface or a conductor surface with the same potential.

Further information regarding procedures relating to safety when working with electronic devices can be found in EN 61340-5-1 e CLC/TR 61340-5-2.

2.13.3 Setting up the system

In order to provide adequate protection and instructions for proper use, security professionals (Installers and maintenance technicians) must be familiar with the operating procedure of this device.

Please read the instructions carefully before installing and setting up this product.

Before first power-up, be sure that the earth connection has been completed properly on the respective terminal.

The recommended minimum wire cross section for the earth connection is 2.5 mm², unless otherwise stated in accessory documentation.

2.13.4 Replacement and disposal of used devices

Replacement

When replacing obsolete devices, disconnect the devices concerned then complete the connections of the new devices in compliance with the instructions printed on the respective leaflets.

In order to avoid short-circuits, take all the necessary precautions when removing used batteries.

Disposal

Do not burn used electronic devices, or allow them to pollute the environment (countryside, rivers, etc.). Electronic devices must be disposed of in a safe environment-friendly way.

When disposing used devices or batteries, contact your local municipal offices for information regarding their disposal.

Device management

3.1 Product handling and storage

This device is safely packed inside a cardboard box, however, care must be taken to avoid accidental damage during handling. Cartons/boxes should be placed in such a way as to avoid knocks and falls, and special care must be taken to protect the devices from extreme heat and/or cold.

3.2 Environmental conditions

Temperature limits:

- -10° / +55°C for transport and storage
- -5° / +40°C operating temperature

3.3 Unpacking the device

On receipt the goods must be unpacked with care. All waste packaging materials must be disposed of in compliance with the local laws and bylaws in force.

The metal enclosure of the device is packed carefully inside the cardboard box.

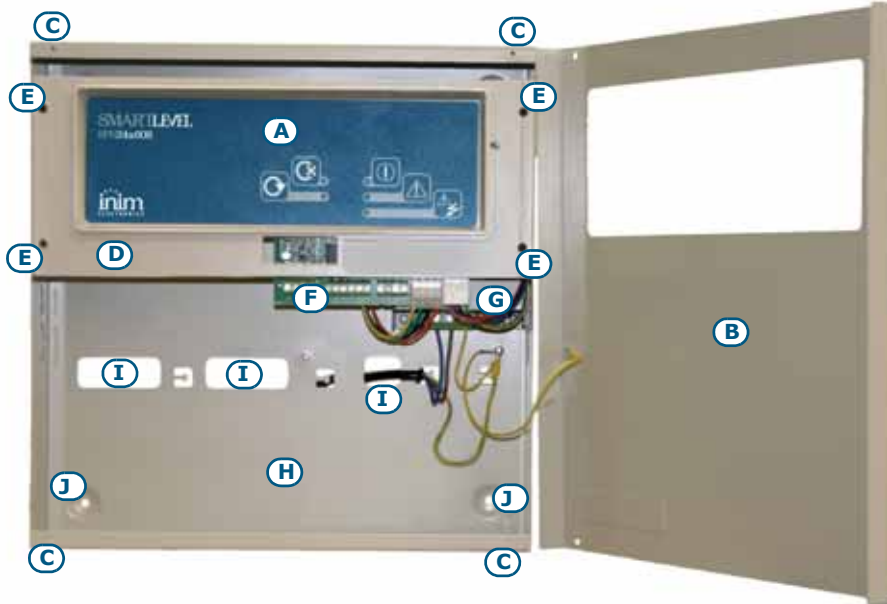
Note: *The lead batteries are not included. Be sure you have the batteries on hand before starting.*

When you remove the four screws and metal-frontplate, you will find:

- The SmartLevel motherboard, mounted on a plastic support which bridges the two sides of the metal enclosure.
- Power supply module located under the plastic support. The power-supply module is already connected to the SmartLevel motherboard.
- Thermal probe connected to the power-supply module, for battery-charge optimization.
- A plastic bag containing the battery and earth connection wires.

Technical description

4.1 Station



[A]	Front panel with signaling LEDs
[B]	Front cover
[C]	Securing screw location for the front cover
[D]	Plastic support for front panel and motherboard mounting
[E]	Plastic support anchor screw
[F]	About the motherboard
[G]	Power supply module
[H]	Backup battery housing
[I]	Cable entry
[J]	Anchor screw hole

Figure 3 - Inside SPS24060S

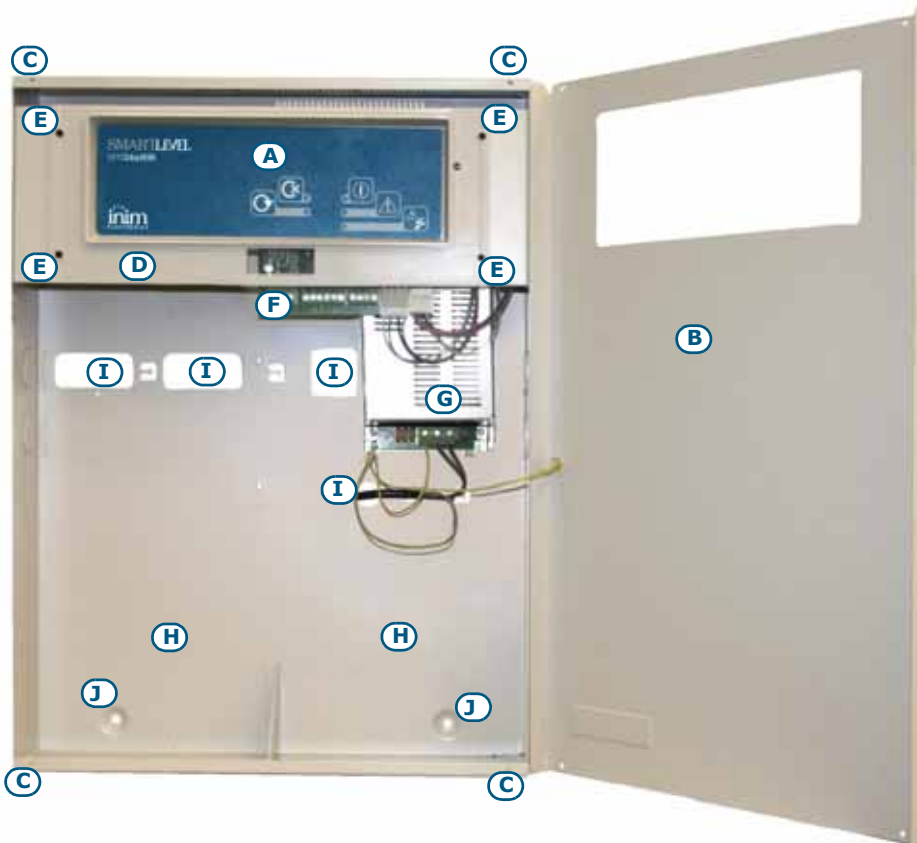


Figure 4 - Inside SPS24160S

4.2 Internal devices

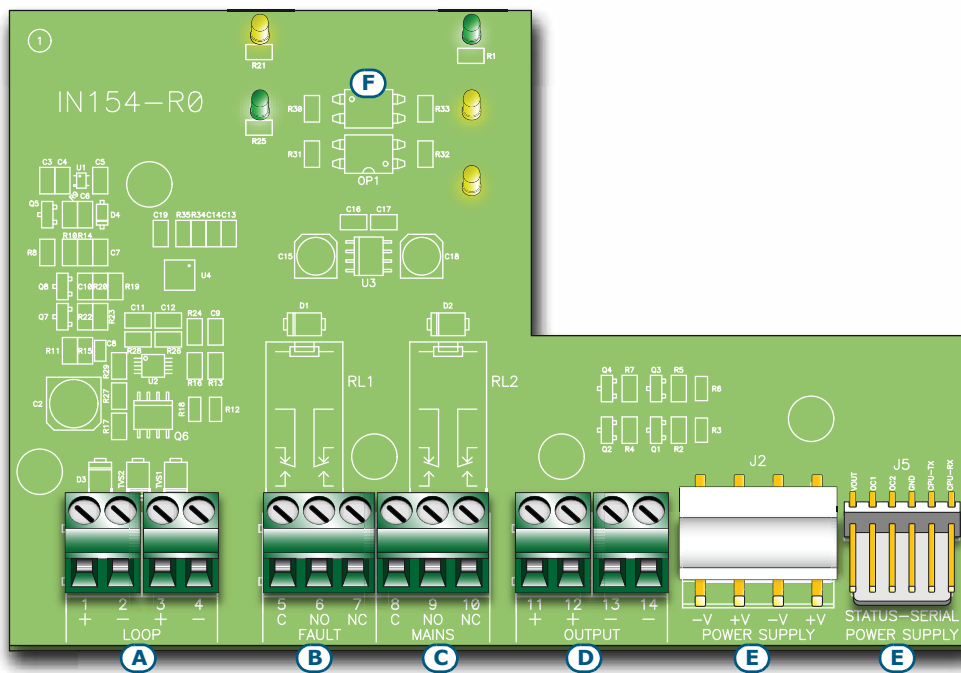


Figure 5 - The SmartLevel motherboard

Main components

[A]	LOOP	Loop connection terminals
[B]	FAULT	Voltage free fault relay contacts
[C]	MAINS	Voltage free mains fault relay contacts
[D]	OUTPUT	Output channel terminals (2 "+" terminals and 2 "-" terminals in parallel)
[E]	Power-supply module connectors DO NOT USE	
[F]	Front panel signaling LEDs	

Note: *The relay contacts on the electronic are suitable for SELV circuitry only.*

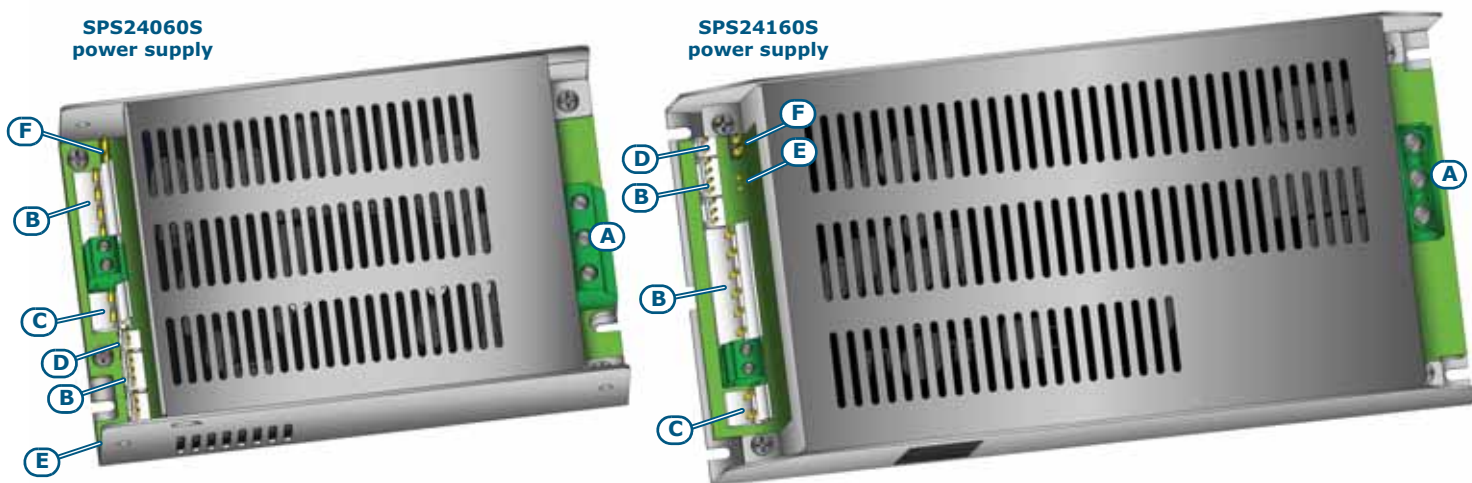
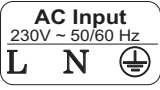
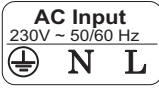


Figure 6 - Switching power supply

The switching power supply is attached to the backplate of the metal enclosure. The power supply type depends on the station model.

	SPS24060S	SPS24160S
	Mains input terminal board	
[A]		
[B]	SmartLevel mother board connector	
[C]	Battery connector	
[D]	Thermal probe connector	
[E]	Signaling LEDs	
[F]	Ground fault signaling jumper input (if the jumper is removed, earth faults will not be signaled)	

Note: *INIM s.r.l. reserves the right to change, replace, in part or entirely, the components not strictly relating to the installation procedure described in Chapter 5 - Installation instructions.*

4.3 Signalling LEDs

The user can access the SmartLevel stations through the two relay outputs available on the motherboard and the LEDs on the front panel and on the switching power supply:



Figure 7 - Front panel

LED	Colour	Signalling	Note
[A]	green	Indicates the power station is working.	This LED will go Off in the event of joint primary (230V~) and secondary (batteries) power failure.
[B]	yellow	Indicates an active fault condition.	This condition activates the "FAULT" relay. For further details, see the LED activation on the power-supply unit.
[C]	yellow	Indicates an active mains fault condition.	This condition activates the "MAINS" relay. For further details, see the LED activation on the power-supply unit.
[D]	yellow	Indicates an active fault condition or a short-circuit in the loop.	For further details, see the fire-detection control panel that supervises the loop.
[E]	green	Indicates active communication through the loop.	

LED		Colour	Signalling	Note
DL1	Power supply module	green	Indicates that the power-supply unit is operating (On).	In case of fast blinking the LED indicates an overheat condition of the power-supply unit. In case of slow blinking the LED indicates an overload of the outputs.
DL2		yellow	Indicates an active mains fault condition.	In case of slow blinking the LED indicates an active earth fault condition.
DL3		yellow	Indicates an active battery fault condition.	

4.4 Technical specifications

Specification	SPS24060S	SPS24160S
AC power	230 V \sim (-15% / 10%) 50/60 Hz	
Maximum current draw 230V	0.5 A	1.1 A
Nominal output voltage	27.6 V ---	
Maximum output current	2.1 A	5.2 A
$I_{\text{max. a}}$	1.5 A	4 A
$I_{\text{max. b}}$	1.5 A	4 A
Maximum battery current emission during primary power failure	1.5 A	4 A
Maximum current for external loads and accessory devices	1.47 A	3.97 A
Maximum battery-charge current	0.6 A	1.2 A
Minimum current (I_{min})	30 mA	
Battery specifications	2 x 12V, 7 Ah	2 x 12V, 17 Ah
	2 x 12 V/7 Ah YUASA NP-12 FR or similar with case flame class UL94-V2 or higher	
Maximum internal resistance of the batteries ($R_{i \text{ max}}$)	2.7 Ohm	1 Ohm
Output voltage	from 18 to 27.6V ---	
Battery shutdown tension	19V ---	
Internal fuse of switching power supply module	T 3.15A 250V	
Maximum output current ripple	1%	
Operating temperature	from -5°C to 40°C	
Isolation class	I	
Enclosure protection class (EN 60529)	IP30	
Dimensions	325 x 325 x 80 mm	497 x 380 x 87 mm
Weight	2.8 Kg	6 Kg

Chapter 5

Installation instructions

5.1 Wall mounting

1. Pull the wires through the wire entry and ensure they do not get in way of operations.
2. Prepare the wall for the four 8mm anchor screws (stop screws) which must be positioned in correspondence with the holes on the backplate of the metal enclosure (*paragraph 4.1 - [J]*).

Danger: **Care must be taken not to drill in the vicinity of electrical wiring, heating ducts and plumbing.**

Note: *Choose anchor screws which are capable of supporting 20kg and which are suitable for the characteristics of the wall.
Ask for professional advice with regard to the best type of anchor screw for the wall concerned.*

3. Using the 4 anchor screws, attach the enclosure securely to the wall.

5.2 Connecting the mains power source

The power system of the SmartLevel stations is EN54-4 compliant.

Danger: **DO NOT power up the system with a non-compliant voltage.**

1. Connect the mains power supply to the terminals on the power-supply module (*Figure 6 - Switching power supply, [A]* and *Figure 8 - Earthing system, [A]*).
For a safety standards compliant system, the Line must be connected to terminal "L", the Neutral conductor to terminal "N".

This station must be connected to a separate line on the Electrical Switchboard (Mains power supply). The line must be protected by a sectioning device which complies with local safety regulations, fire codes, laws and bylaws in force.

Note: *As a further safety measure, the electrical system of the building must be protected against overload and short-circuit.*

Note: *The ends of wires must not be soft soldered in points where they are subject to clamping.*

- Primary power source: 230 V \sim (-15%/+ 10%) 50/60 Hz.
 - SPS24060S station current draw: 0.5 A (max.)
 - SPS24160S station current draw: 1.1 A (max.)
2. Crimp the earth line wire to the eyelet terminal [B] (included in the package).
 3. Attach the wire with the eyelet to the control panel using the ground connection screw [C].
 4. Ensure that the terminal "⊕" of the power supply module [D] and the frontplate [E] of the enclosure are connected to earthing system.

Danger: **The protective earthing system must be compliant with the local safety regulations, fire codes, laws and bylaws in force.**

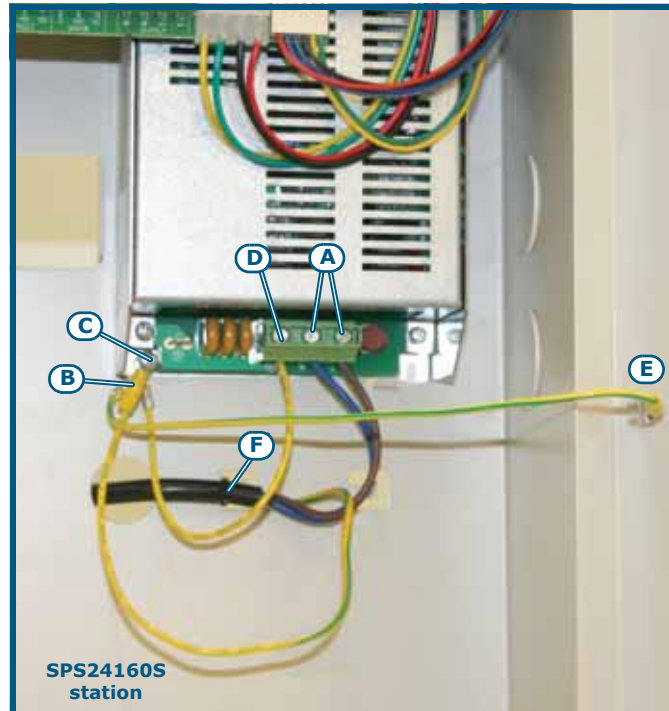
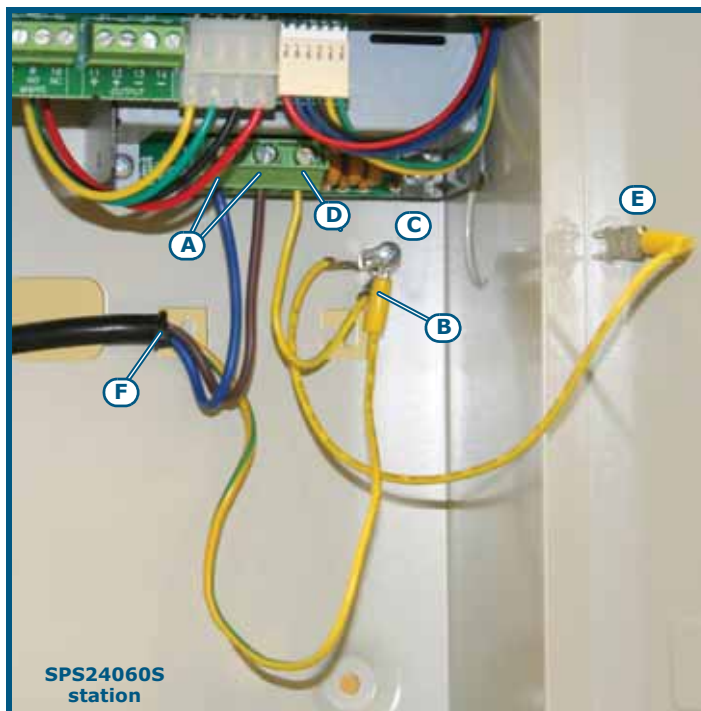


Figure 8 - Earthing system

Note: *A protective earth connection ensures that all exposed conductive surfaces are at the same electrical potential as the earth surface, in order to avoid the risk of electrical shock if a person touches a device in which an insulation fault has occurred. In the event of an insulation fault, a protective earth connection will generate a high fault current which in turn will trigger an overcurrent protection device (fuse) and disconnect the power supply.*

- Ensure that low-current safety or signal lines DO NOT come into contact with points with potentially dangerous currents.
Using a plastic cable tie, bunch the wires together and secure them to one of the wire hooks on the backplate of the enclosure [F].

Note: *The connection wires (to the mains supply and also any other wires inside the SmartLoop enclosure) must be secured to the cable hooks on the backplate by means of plastic cable ties. Use cable with double isolation for the connection to the electrical mains.*

- Insert the two 12V batteries and connect them to the power supply module (*Figure 6 - Switching power supply, [C]*).

5.3 Connecting the batteries

The enclosure provides housing for two 12V lead batteries: 7 Ah for the SPS24060S model and 17 Ah for the SPS24160S model. The two batteries must be connected in series, in such way as to provide a 24V $\overline{=}$ current.

Using the battery connection wire, connect the two batteries together then connect the batteries to the power-supply module using the respective wire (included).

- Connect the connection wire [A] to the two batteries.
- Connect the wire [B] to the batteries.

Attention: **Be sure that cable polarity is correct.**

- Connect the terminal [C] of the battery wire to the proper connector of the power-supply unit (*Figure 6 - Switching power supply, [C]*).

Attention: **Be sure that connector polarity is correct.**

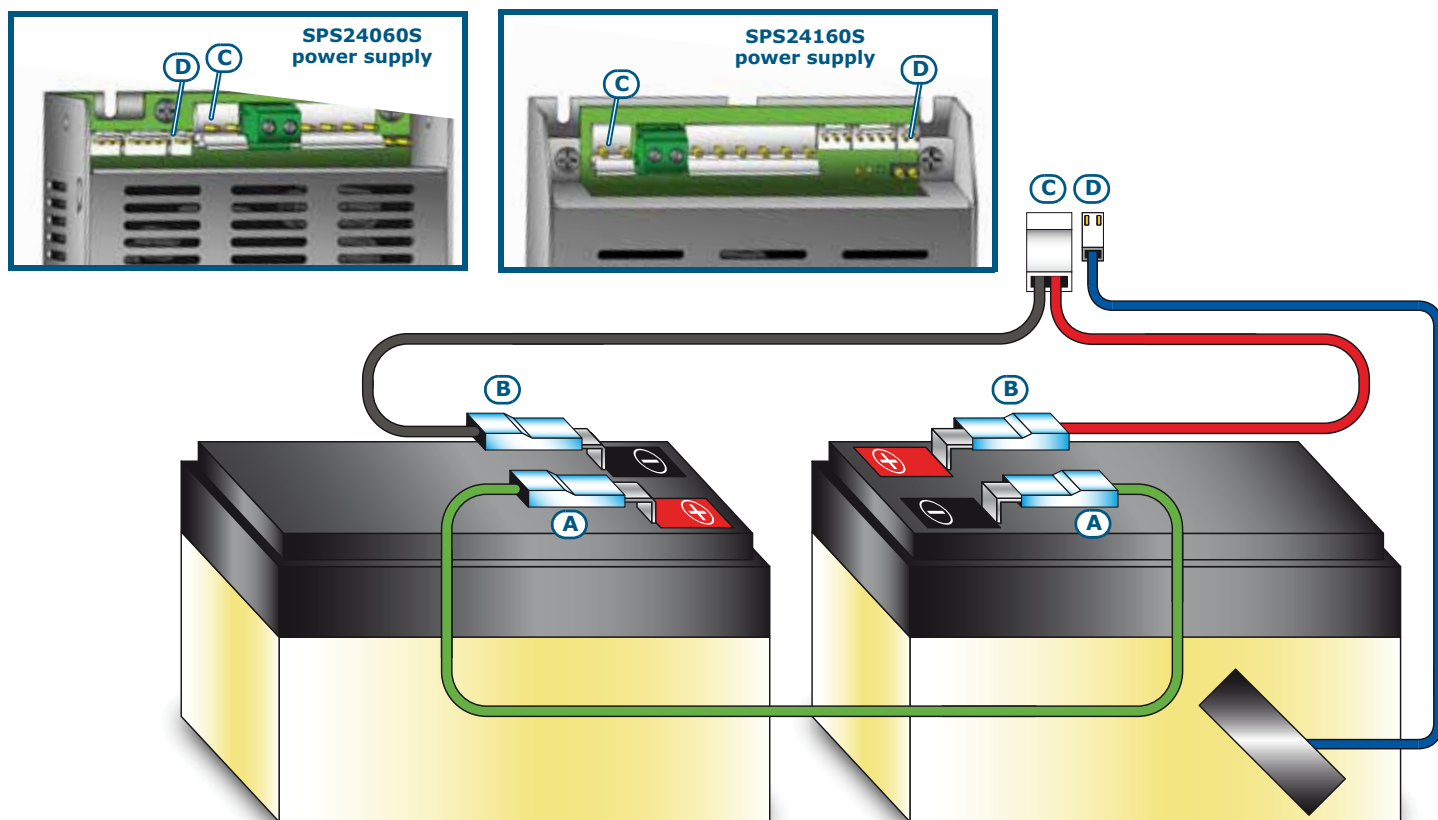


Figure 9 - Connecting the batteries

The batteries are the secondary power supply of the system. The power supply station monitors the battery status (efficiency and charge). The battery-test circuit of the power supply station operates as follows:

- Efficiency test
The station tests the battery efficiency every 10 minutes. If their internal resistance is over the allowed limit, the event will be signaled, according to the amendment EN54-4:1997/A2.
- Battery level test
The battery-test circuit monitors the battery status (efficiency and charge) continuously. In the event of mains failure, the power supply station will still monitor the battery voltage continuously. If the voltage drops below 22.8V, the power supply station will signal the fault. Fault condition will be reset when the voltage restores to 24.6V.
- Deep discharge shutdown
If a mains failure event lasts for a long period, causing the battery voltage to drop below 18V, the power supply station will shutdown the batteries in order to avoid permanent damage.

5.4 Thermal probe

Attention: In order to validate the IMQ-SISTEMI DI SICUREZZA certification and comply with EN 54-4 requirements, installation of a thermal probe is essential.

The thermal probe regulates the charging process in accordance with the battery temperature. The thermal probe protects against battery overheating and consequent permanent damage.

5.4.1 Connecting the thermal probe

Connect the thermal probe to the proper connector of the power-supply module (*Figure 6 - Switching power supply, [D]* and *Figure 9 - Connecting the batteries, [D]*).

Using adhesive-insulating tape, attach the thermal probe to one of the batteries, in order to provide optimized heat-transfer measurements.

Diagnostics and fault solutions

6.1 Battery disconnected or inefficient

The battery is not connected or has failed the battery efficiency test (EN 54-4:1997 A2 amendment).

1. Allow the batteries to charge for several hours.
2. If the fault signal persists, disconnect the batteries from the station and test them separately.
3. If only one of the batteries has a voltage below 12.5 - 13 V:
 - Replace the faulty battery only.
 - Allow the batteries to charge for several hours.
 - Check that the fault has cleared.
4. If both batteries have a voltage of 12.5 - 13 V, it means they are both inefficient (even though the voltage without load is correct).
 - Replace both batteries.
 - Allow them to charge for several hours.
 - Check that the fault has cleared.

6.2 Low Battery

The batteries are running low.

This signal should be present only during primary power source failure (Mains 230V~). Mains power must be restored in order to charge the batteries.

6.3 Loop faults and testing

The station shows the status of the loop and the presence of any fault or short-circuit on it via the LEDs on the front panel (*Figure 7 - Front panel, [D] and [E]*).

For further details, see the analog control panel that supervises the loop.

6.4 Earth fault

In the case of voltage dispersion to earth, this fault is indicated by the LED on the front panel (*Figure 7 - Front panel, [C]*) and by a flashing of the "DL2" yellow LED on the power-supply unit (*Figure 6 - Switching power supply, [E]*).

This fault signal can be disabled by disconnecting the respective jumper (*Figure 6 - Switching power supply, [F]*).

Maintenance

The following operations must be carried out regularly.

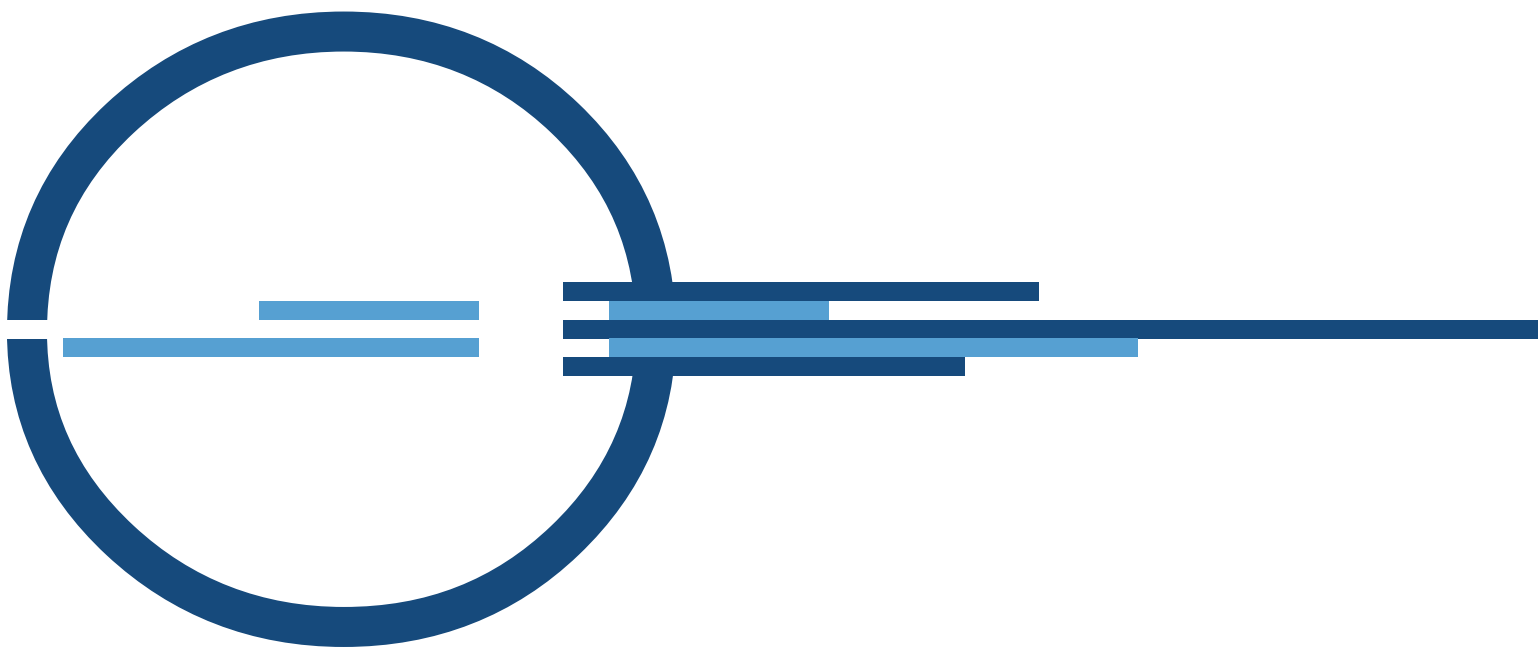
1. Using a damp lint-free cloth, remove any dust that may have gathered on the control panel (do not use any kind of cleaning product or solvent!).
2. Check the functioning of the LEDs.
3. Check the battery efficiency and change them if necessary.
4. Check the integrity of all wires and connections.
5. Ensure that there are no extraneous objects inside the control panel.

Note: *Points 1 and 2 can be carried out by authorized persons, whereas all other points must be carried out by qualified technicians.*

Order codes

Following are the order codes of INIM Electronics s.r.l. products:

Code	Description
DCMIINIESPS24S	Installation manual for SPS24060S and SPS24160S power-supply stations
IPS24060G	60W - 27.6V Switching power-supply module
IPS24160G	160W - 27.6V Switching power-supply module
ProbeTH	Thermal probe for battery charge optimization
SPS24060G	60W @ 27.6V SmartLevel power supply station in metal enclosure with 3 controlled outputs, fault relay and connection to RS485 BUS
SPS24060S	60W @ 27.6V SmartLevel power supply station in metal enclosure with 1 controlled output, 2 fault relays and connection to the loop
SPS24160G	160W @ 27.6V SmartLevel power supply station in metal enclosure with 3 controlled outputs, fault relay and connection to RS485 BUS
SPS24160S	160W @ 27.6V SmartLevel power supply station in metal enclosure with 1 controlled output, 2 fault relays and connection to the loop



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