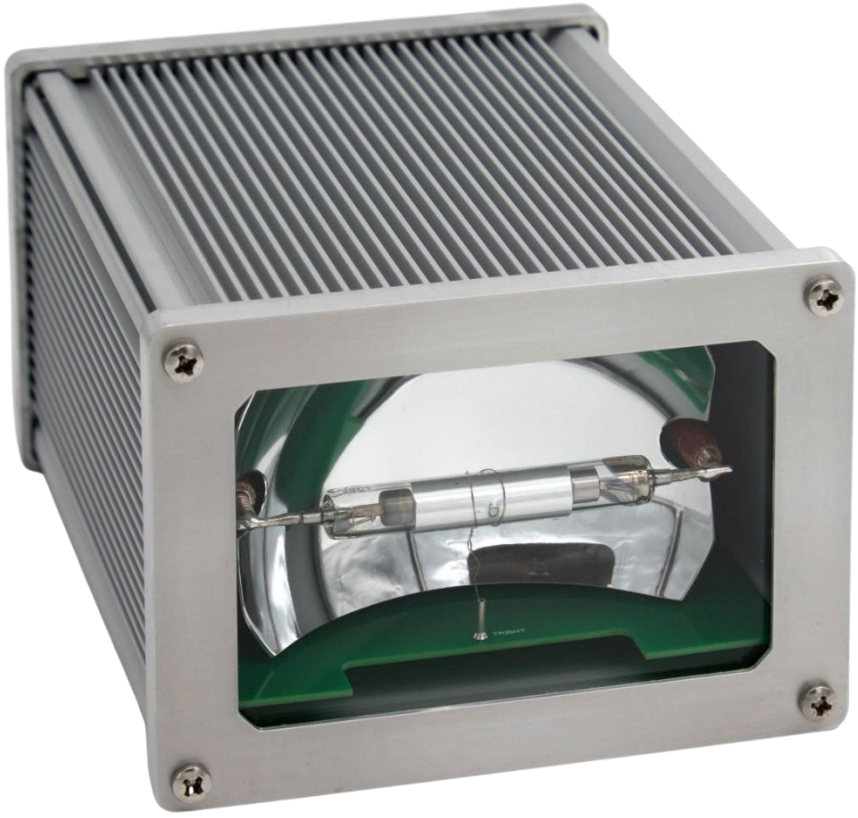
Sx-IP

IP67 versatile Xenon Flash

USER GUIDE

Hardware revisions C00 to C03



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2 SAFETY INSTRUCTIONS

2.1 SAFETY WARING

2.1.1 ELECTRICAL SHOCKS

Sx-IP device stores up to 400J of energy in high voltage capacitors charged at almost 300 V. **Sx-IP housing integrity must be preserved**. If the housing is damaged (cracked or broken glass, infiltration of water…) the device must be disconnected from supply and removed from the system.

Opening the housing is reserved to qualified and trained staff and shall be done accordingly to maintenance instructions.

2.1.2 LIGHT

Due to the extreme high power of light emission, operators and people in sight of the flash must be protected against direct impact of the light output

Any other utilization of the Sx-IP that is not described in the following document can lead to a dangerous situation

In case of unexpected behavior of the product, the power supply must be cut off by removing the connector

2.2 SAFETY ICONS

	**Disposal of Electrical and Electronic Equipment in Private Households In the European Union, Norway, Iceland and Liechtenstein:** This symbol on the product indicates that this product shall not be treated as household waste. Instead, it should be taken to an applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences to the environment and human health, which could otherwise be caused by inappropriate waste handling of this product.
	**Continuous Current:** This symbol on the product indicates that this product shall be powered with continuous current.
	**Risk of Electrical Shock:** This symbol on the product indicates that dangerous voltages are generated by the product and can be dangerous for human without precaution.
	**Warning:** This symbol on the product or the manual indicates that particular attention must be taken.
	**Read the Manual** This symbol on the product indicates that the manual shall be read before any operation.

3 MAIN CHARACTERISTICS

3.1 IP RATING

Sx-IP has an **IP67** rating.

Sx-IP is totally protected from dust.

Sx-IP is protected from powerful water jets.

Sx-IP support immersion at 1m for 30min

3.2 POWER SUPPLY REQUIREMENTS

Sx-IP can operate from **10.2Vdc to 28.8Vdc**. Input current can be up to **6A**.

Sx-IP is protected against over-voltages and reverse voltages up to +/-36Vdc.

Care must be taken to keep cables' voltage drop small enough not to cause undervoltage detection.

Small input voltages reduce recharge performances.

3.3 MAXIMUM POWER

3.3.1 PEAK CHARGE POWER

Sx-IP can operate up to:

- **40W at 12Vdc** input voltage
- **50W at 24Vdc** input voltage

3.3.2 CONTINUOUS AVERAGE POWER

Sx-IP has been designed to operate continuously at **30W average power in all conditions**.

Effective maximum average power is limited by **internal temperature protection** that is triggered when the internal temperature reaches **80°C**.

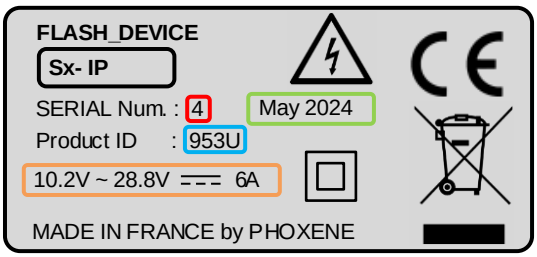
In facts, maximum average power is limited by the ability of the case to dissipate power, so maximum average power is mainly affected by:

- Ambient temperature
- Air flow around the case
- Direct solar energy input

Sx-IP has **half an hour thermal inertia.**

4 PRODUCT IDENTIFICATION

Sx-IP are identified thanks to a sticker on its rear side.



It includes following information:

- **Serial number**
- **Manufacturing date**
- **Product ID.:**
  - Product ID identify main characteristics of the product
  - Detailed characteristics are stored in a database with the serial number as reference
- **Power supply requirements**

5 QUICK START

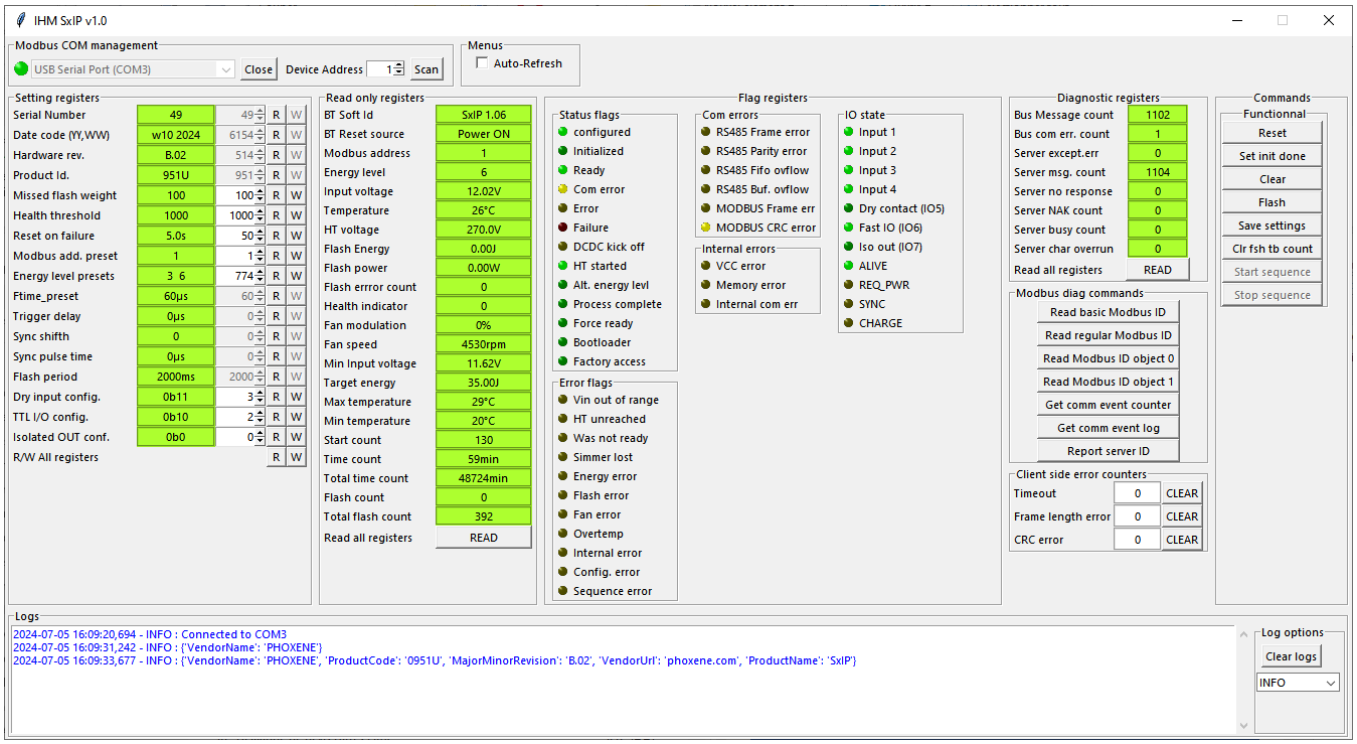
Phoxene can provides means for a rapid set-up of Sx-IP devices.

5.1 SERVICE CABLE AND POWER SUPPLY

The service cable includes power supply terminals, Modbus link on USB and triggers inputs on a Dsub9 connector. This cable allows very quick bring-up for R&D, evaluation or servicing. It has no IP grade.

5.2 SERVICE SOFTWARE

A service software is available for window platforms and Linux platforms on request. It allows configuration, monitoring, test and firmware update of Sx-IP devices.



5.1 MODBUS MANUAL

All information needed to go on with Sx-IP configuration and supervision through the Modbus communication link can be found in the Sx-IP Modbus Manual.

5.2 PYTHON LIBRARY

Phoxene provide a python driver that can be used to manage PHOXENE's flash devices.

Python driver download link

6 MECANICAL

6.1 DIMENSSIONS

Sx-IP dimensions are 180 x 142 x 100mm (excluding screws and connector)

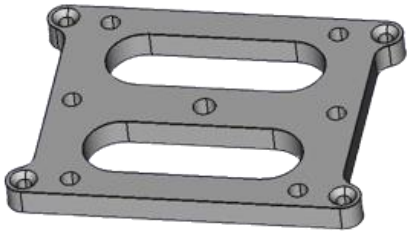
Weight is between 1600g and 2000g according to the configuration.

6.2 HOLDING THE BOX:

It is possible to attach Sx-IP devices on any face by using stainless M3 stainless screws directly between the case's grooves. It will auto-tap in aluminum.

6.2.1 UNIVERSAL MOUNT

Phoxene can supply standard mount that provide six M5 threads and one standard ¼" camera thread.

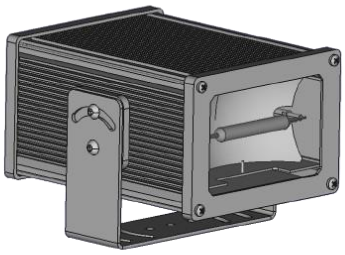


6.2.2 CUSTOM MOUNTS

Phoxene can design, manufacture and assemble custom mounts to provide mounting points that fit your needs.

6.2.3 2 AXES ORIENTABLE MOUNT

Phoxene can supply 2 axes orientable mounts that provide +/-22° horizontal and +/-45° vertical tilt adjustment.



7 HARDWARE INTERFACE

7.1 DSUB15 INTERFACE (OPTION)

As an option, Sx-IP is available with a single Female DA-15 (Dsub) interface.

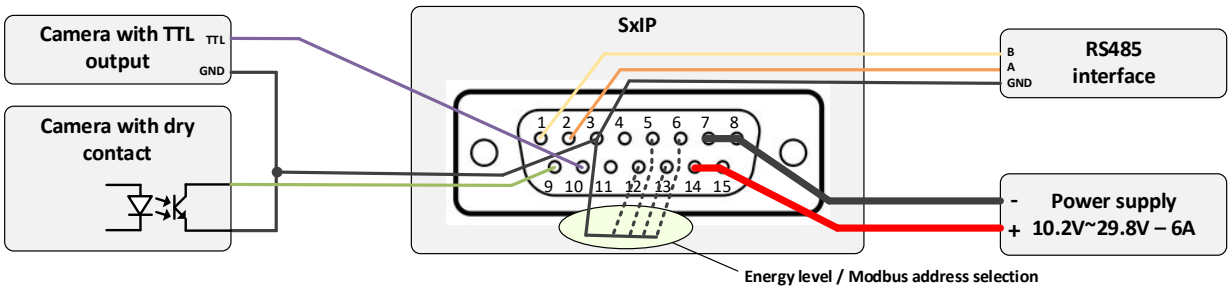


Figure 1 – Dsub15 version basic connections

7.1.1 DA-15 INTERFACE PINOUT

DA-15 connector pinout is as defined in Table 1.

Pin	Signal	Pin	Signal
1	RS485_B	9	IN5 (dry input)
2	RS485_A	10	IO6 (TTL IO)
3	0V	11	Isolated output reference (COM)
4	IO7 (Isolated output)	12	IN4 (configuration input)
5	IN3 (configuration input)	13	IN2 (configuration input)
6	IN1 (configuration input)	14	10.2V to 28.8V dc supply input
7	0V supply input	15	10.2V to 28.8V dc supply input
8	0V supply input		

Table 1 – DA-15 connector pinout

7.1.2 MATCHING CONNECTOR

Matching connector could be any DA-15 male connector.

If a protection is required, we recommend to use following covers:

- Amphenol CONEC 165X14829XE
- NORCOMP 967-015-010R011 (7.62mm max cable diameter)

7.1.3 CABLES GAUGES AND LENGTH

Power supply cable shall be sized to handle the device maximum current with a limited voltage drop.

- **1mm²** wire gauge is acceptable for up to **6m**.
- **1.5mm²** wire gauge allows up to **10m**.

7.2 RS485 INTERFACE

RS485 interface is a 1/8 load standard RS485 interface. Up to 256 devices can be connected to a standard 32 unit load RS485 bus.

RS485 signals are referenced to 0V, supporting up to +12V/-7V common mode voltage.

Design notes:

For high bus lengths and/or high device count, please comply with RS485 state of the art design rules:

- *Three wires bus (A, B and voltage reference (0V))*
- *Line bus topology with 1000m maximum length*
- *120Ω termination resistors at both ends*

7.3 INPUT 5 (DRY CONTACT)

The dry contact input is intended to be driven from a dry contact or an open drain output.

The dry contact input is referenced to 0V.

The dry contact has internal 2K61 pull-up to the 12V power.

The dry contact input shall be pull to 0V with at least 5mA drive current.

Symbol	Characteristics	Value	Unit	Conditions
VIL_{max}	Maximum input low voltage	2.0	V	Schmitt trigger buffer
		1.6	V	5V compatible buffer
VIH_{min}	Minimum input high voltage	8.0	V	Schmitt trigger buffer
		4.0	V	5V compatible buffer
	Minimum required drive current	5	mA	
TLH_{max}	Maximum low to high transition delay	2	µs	
THL_{max}	Maximum high to low transition delay	2	µs	

Table 2 – Dry input electrical characteristics

Design notes:

When using mechanical switch, be careful with bounces that may cause multiple edges that may be interpreted as multiple flash request.

When using non-isolated open-drain input, be careful with common mode voltage.

When using phototransistors, make sure that the driver can deliver 5mA drive in any case.

7.4 INPUT 6 (TTL I/O)

The TTL I/O pin can be configured either as TTL input or TTL output signal.

The TTL I/O is referenced to 0V.

7.4.1 USED AS INPUT

In input configuration, TTL I/O is intended to be driven by a 5V or 3.3V push-pull output.

It has an internal weak pull-up to 5V.

Mains characteristics are:

Symbol	Characteristics	Value	Unit	Conditions
VIL_{max}	Maximum input low voltage	1.0	V	Schmitt trigger buffer
		0.8	V	TTL buffer
VIH_{min}	Minimum input high voltage	4.0	V	Schmitt trigger buffer
		2.0	V	TTL buffer
TLH_{max}	Maximum low to high transition delay	1	µs	
THL_{max}	Maximum high to low transition delay	1	µs	
Ipu_{max}	Maximum pull-up current	200	mA	
Ipu_{min}	Minimum pull-up current	80	mA	

Table 3 – TTL input electrical characteristics

7.4.2 USED AS OUTPUT

In output mode, TTL I/O provide 0V and 5V levels with 660Ω serial impedance.

Mains characteristics are:

Symbol	Characteristics	Value	Unit	Conditions
$Iout_{max}$	Maximum output current	1	mA	
VOL_{max}	Maximum output low voltage	0.9	V	1mA sourced to the IO
VOH_{min}	Minimum output high voltage	4.0	V	1mA sink from the IO
TLH_{max}	Maximum low to high transition delay	1	µs	
THL_{max}	Maximum high to low transition delay	1	µs	

Table 4 – TTL output electrical characteristics

7.5 ISOLATED OUTPUT

The isolated output is an open drain output. it supports up to 28V and can drive up to 10mA.

Reverse voltages are short-circuited by a diode.

Symbol	Characteristics	Value	Unit	Conditions
VO_{max}	Maximum bias voltage	28	V	
VOL_{max}	Maximum output low voltage	0.4	V	10mA sink to 0V
VOL_{max}	Maximum sink current	10	mA	
TLH_{max}	Maximum low to high transition delay	20	µs	
THL_{max}	Maximum high to low transition delay	4	µs	

Table 5 – Isolated outputs electrical characteristics

Design notes:

Isolated output is not protected from over-current. Care must be taken to limit the current flowing through it.

7.6 CONFIGURATION INPUTS

Configuration inputs (IN1 to IN4) are intended to be left open or short-circuited to 0V.

Alternatively, configuration inputs can be driven by push-pull or open-drain interfaces.

Configuration inputs are referenced to 0V.

Configuration inputs have internal 2K7 pull-ups to the internal 5V.

Mains characteristics are:

Symbol	Characteristics	Value	Unit	Conditions
VIL_{max}	Maximum input low voltage	1.0	V	Schmitt trigger buffer
		0.8	V	TTL buffer
VIH_{min}	Minimum input high voltage	4.0	V	Schmitt trigger buffer
		2.0	V	TTL buffer
TLH_{max}	Maximum low to high transition delay	20	µs	
THL_{max}	Maximum high to low transition delay	20	µs	

Table 6 – Configuration inputs electrical characteristics

8 CONFIGURATION

Sx-IP is a very versatile device, many parameters can be adjusted using the Modbus communication link.

For information about how to configure the device through using the RS485 Modbus link, refers to the Sx-IP Modbus Manual.

According to the software configuration, some settings can be done through hardware.

Design notes:

Sx-IP devices are factory configured with the parameters you requested or with those we believe to be most appropriate for your application.

8.1 HARDWARE SETTINGS

8.1.1 ENERGY LEVEL / MODBUS ADDRESS SELECTION

Discrete inputs IN1 to IN4 can be used to select the Modbus address or one of the energy levels.

If the *ENERGY_LEVEL_PRESET* register is 0, energy level is selected using discrete inputss.

If the *MODBUS_ADDRESS_PRESET* register is 0, Modbus address is selected using discrete inputs.

Values are is according to Table 7.

IN1	IN2	IN3	IN4	Selected value
Open	Open	Open	Open	1
0V	Open	Open	Open	2
Open	0V	Open	Open	3
0V	0V	Open	Open	4
Open	Open	0V	Open	5
0V	Open	0V	Open	6
Open	0V	0V	Open	7
0V	0V	0V	Open	8
Open	Open	Open	0V	9
0V	Open	Open	0V	10
Open	0V	Open	0V	11
0V	0V	Open	0V	12
Open	Open	0V	0V	13
0V	Open	0V	0V	14
Open	0V	0V	0V	15
0V	0V	0V	0V	16

Table 7 – Energy level or Modbus address selection using configuration inputs

8.1.2 ALTERNATE ENERGY LEVEL SELECTION (DAY / NIGHT)

IN5 and IO6 can be configured for alternate energy selection. It allows to switch between two pre-configured energy levels using a discrete input (without use of Modbus communication). It is mainly used to adapt the flash energy to lighting conditions (day/night, sunny/cloudy…)

Design notes:

Switching between regular and alternate energy level can take up to 105ms.

9 MAINTENANCE INSTRUCTIONS

All following instructions must be carried out by High Voltage qualified and trained staff only

9.1 FLASH TUBE REPLACEMENT

Before opening the housing, disconnect the Sx-IP then wait at least 30minutes.

Always wear qualified for protection glasses.

Until that capacitors' voltages have been verified to be lower than 12V, use 1000V rated Personal Protective Equipment

When the 30 minutes are elapsed:

- Remove the 4 screws on the front side of the product (flash tube side).
- Remove the front panel

Using a VAT, check that there is not voltage (less than 12V) between the following points:

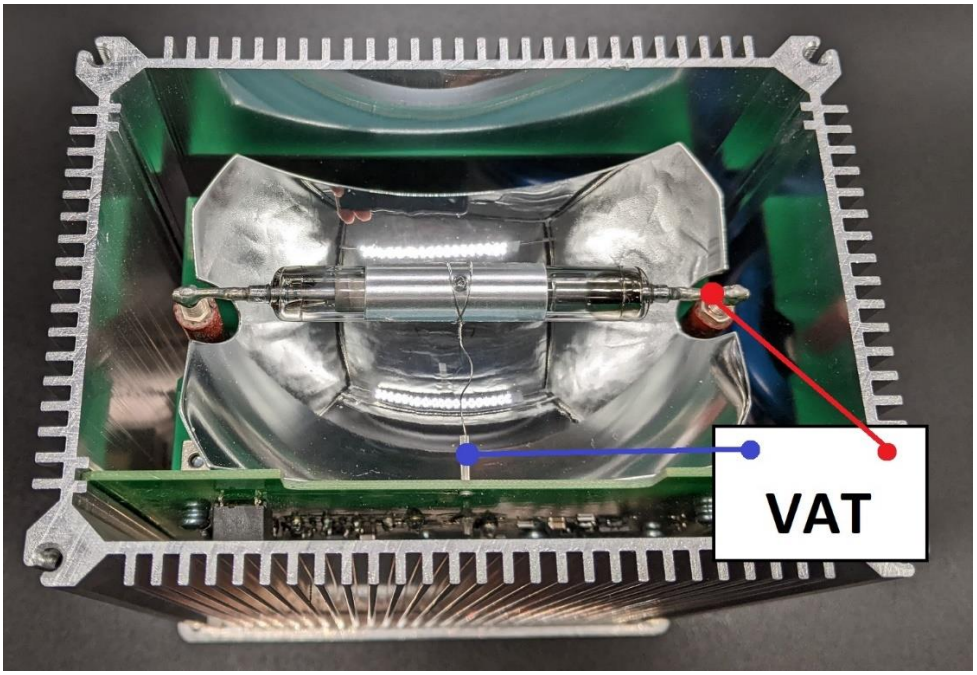


Figure 2 – VAT points

When all the safety measures are met:

- Remove the old flash tube by pulling it by both ends.
- Insert the new flash tube, then insert the trigger wire in the dedicated receptacle.
- The trigger wire is just placed in the tube. It is intended to transmit the high voltage trigger impulse (10 kV) that doesn't require a full electrical contact.

When the new flash tube is in place:

- Check that glass is in good condition
- Check that the seal is in good condition
- Put back the front panel
- Tighten the four screws (1.5N.m)

9.2 FUSES REPLACEMENT:

This product is equipped with several fuses; **their replacement must be done by Phoxene at warehouse**.