Sx-LED-M

USER GUIDE

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2 MAIN CHARACTERISTICS

2.1 IP RATING

Sx-LED-M has an **IP67** rating.

Sx-LED-M is totally protected from dust.

Sx-LED-M is protected from powerful water jets.

Sx-LED-M support immersion at 1m for 30min

2.2 POWER SUPPLY REQUIREMENTS

Sx-LED-M can operate from **10.0Vdc to 30.3Vdc**. Input current can be up to **5A**.

Sx-LED-M is protected against over-voltages and reverse voltages up to +/-35Vdc.

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

Small input voltages reduce recharge performances.

2.3 MAXIMUM POWER

2.3.1 PEAK CHARGE POWER

Sx-LED-M can operate up to 55W

2.3.2 CONTINUOUS AVERAGE POWER

Sx-LED-M 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**.

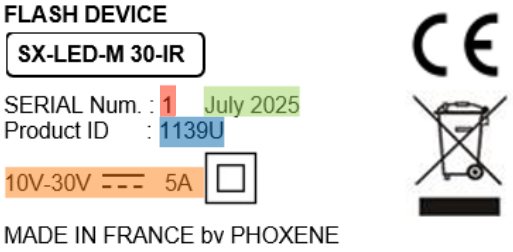
In facts, maximum average power is limited by the ability of the case to dissipate power, so maximum average power is mainly affected by:

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

Sx-LED-M has **half an hour thermal inertia.**

3 PRODUCT IDENTIFICATION

Sx-LED-M 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**

4 QUICK START

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

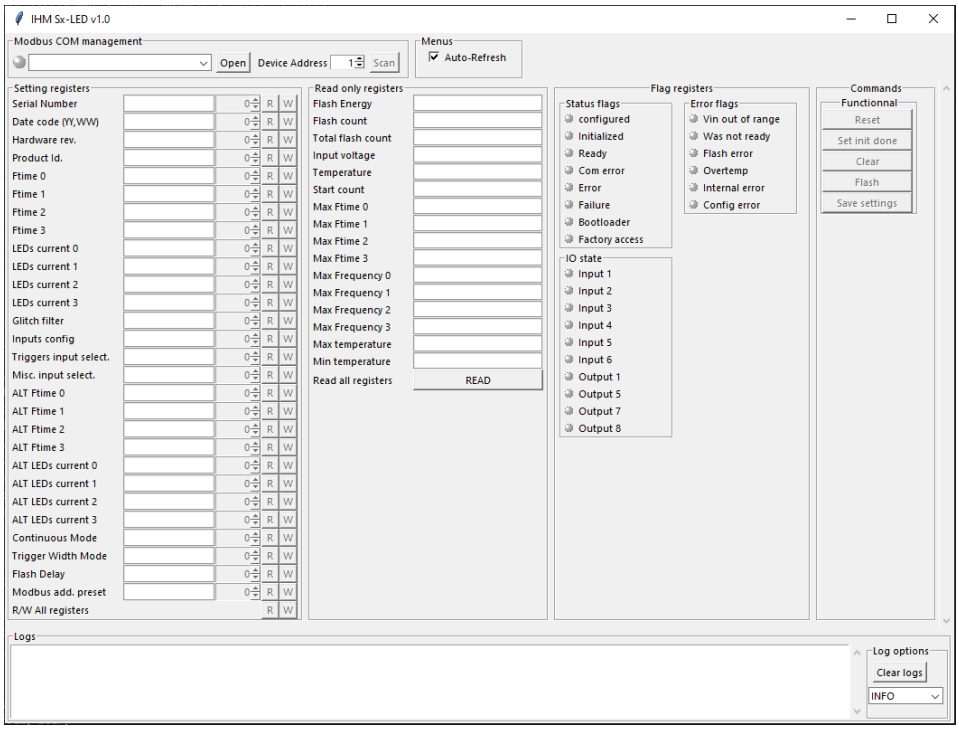
4.1 SERVICE CABLES AND POWER SUPPLY

The service cable is a M12 RS485 Modbus interface to USB adapter. It allows to connect a Sx-LED-M to a computer for configuration or maintenance.

The power supply allows to power a Sx-LED-M from a standard power socket.

4.2 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-LED-M devices.



4.1 MODBUS MANUAL

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

4.2 PYTHON LIBRARY

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

Python driver download link

5 MECANICAL

5.1 DIMENSSIONS

Sx-LED-M dimensions are 95 x 136 x 116mm (excluding connector)

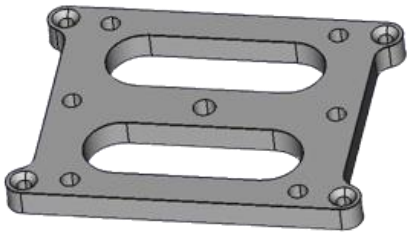
Weight is 1400g.

5.2 HOLDING THE BOX:

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

5.2.1 UNIVERSAL MOUNT

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



5.2.2 2 AXES ORIENTABLE MOUNT

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

5.2.3 CUSTOM MOUNTS

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

6 HARDWARE INTERFACE

6.1 BASIC CONNECTIONS

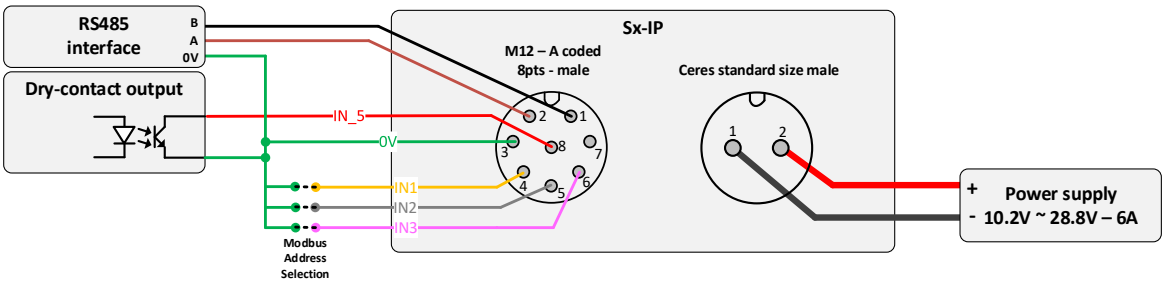


Figure 1 – Basic connections

6.2 POWER SUPPLY

Power supply input is through an **Amphenol Ceres** standard size 2pts male receptacle with male contacts.

Signal	Description	Wire color	Pinout
0V	Input supply return	Black	1
Vin	Input supply	Red	2

Table 1 – Ceres connector pinout

6.2.1 MATTING CONNECTORS

Field installable connectors and over-molded cables are available from PHOXENE.

6.2.2 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**.

6.3 SIGNALS CONNECTOR

Signals are available through an M12 A code male/male connector. Three versions are available:

- **M12-8pts (standard).**
- M12-12pts that provide an additional 5V input and two isolated outputs (option).
- M12-5pts that reduce wiring cost and allows serial connection (option).

6.3.1 M12 CONNECTORS PINOUT

M12 connectors pinout are as follows:

Signal	Description	M12-5pts	M12-8pts	M12-12pts
RS485A	RS485 A	1	1	1
RS485B	RS485 B	3	2	2
0V	Reference	5	3	3
IO1	5V input / output	2	4	4
IN2	5V input	4	5	5
IN3	5V input		6	6
IN4	5V input			7
IO5	12V input / output	2	8	8
IN6	12V input	4	7	9
OUT7	Isolated output			10
OUT8	Isolated output			11
COM	Isolated common			12

Table 2 – M12 connectors pinout and wire color

Design notes:

Presented wires' colors are according to M12 usual conventions. Please note that M12 cables can comes with other color coding. Always refers to cable datasheet and respect to pinout.

6.3.2 MATTING CONNECTORS

Compatible field installable (screws) connectors from TE Connectivity:

- T4110001081-000 (Field installable M12-8pts female/female straight connector with PG7 gland)
- T4112012081-000 (Field installable M12-8pts female/female shieled right-angled connector with PG9 gland)

Straight or right angle M12 matting connectors over-molded on 5m wire ended cables are available from PHOXENE.

6.3.3 SHIELDING

M12 connector is shielded at SxIP side. Shielded M12 connector and cables are not mandatory but can be used to ensure good performances with high cable lengths or in harsh environment.

6.4 ADDRESS / LEVEL HARDWARE SELECTOR (OPTION)

Sx-LED-M devices can be fitted with a hardware selector accessible on the back panel.

Hardware selector allows easy and direct configuration of the Modbus device address or of the energy level.

Hardware selector is protected by a M16 IP67 plug.

6.5 USING M12-5PTS CONNECTORS FOR DAISY CHAINNING SX-LED-M DEVICES

By using M12-5pts connectors and some standard M12 splitters, it is possible to daisy chain Sx-LED-M devices.

Using some splitters providing asymmetric routing (IN4 -> OUTA4 and IN2 -> OUTB4), it is possible to have separated hardware triggers on a single daisy chain.

Asymmetric splitter example:

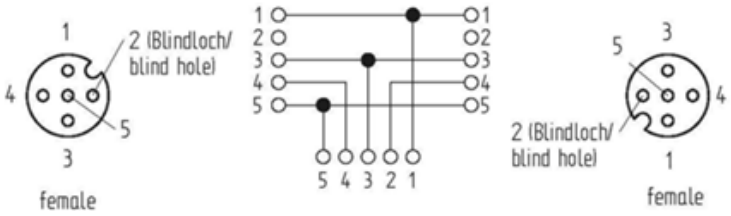


Figure 2 – M12 5pts splitter illustration

6.6 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*

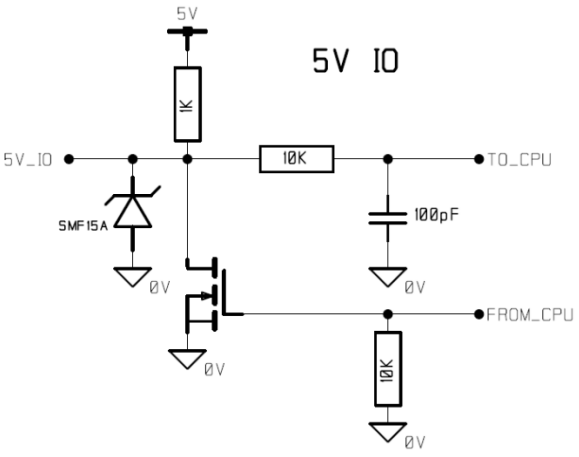
6.7 DISCRETE IOS

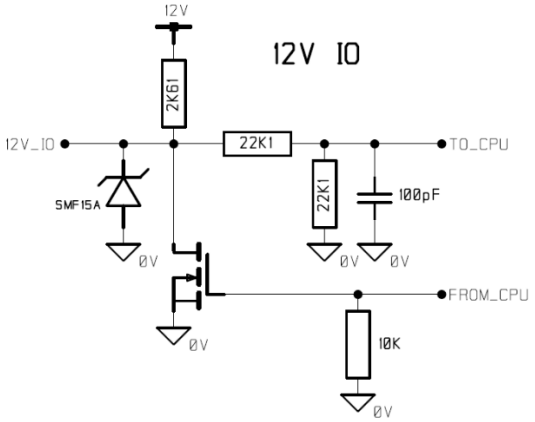
Sx-LED-M provide up to eight discrete IOs:

5V input / output	IO1
5V inputs	IN2, IN3, IN4
12V input / output	IO5
12V input	IN6
Open drain isolated outputs (up to 24V)	OUT7 and OUT8

Optionally, IN2 and IN3 are available as isolated inputs. In that case the M12 connector will come with a custom pinout.

6.7.1 SCHEMATIC DIAGRAMS OF IOS





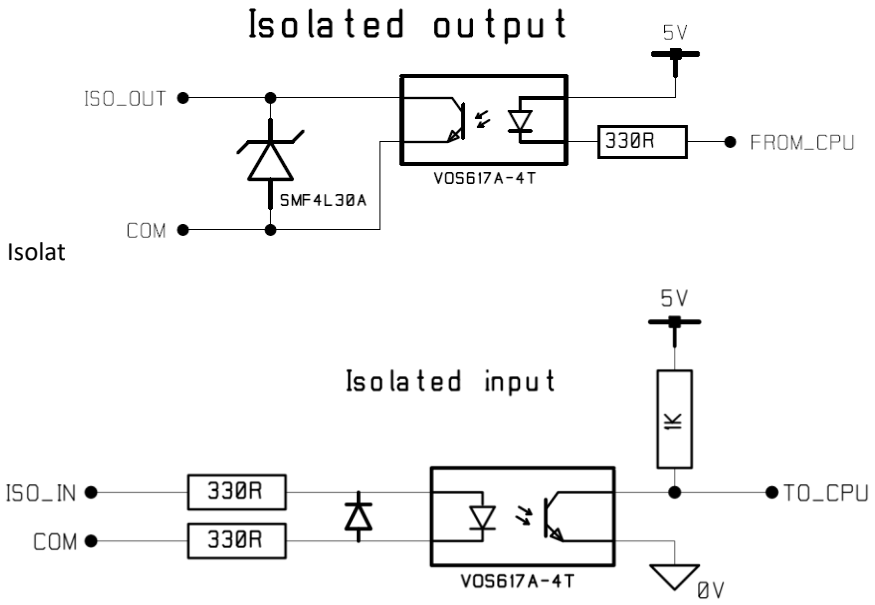


Figure 3 – Sx-LED-M Ios schematic diagram

6.7.2 5V INPUTS (IO1, IN2, IN3, IN4)

5V inputs are intended to be driven from a dry contact, open drain output or 5V push-pull outputs.

However, it is also possible to drive it from 3.3V push-pull outputs.

5V input are referenced to 0V.

5V input has internal 1kΩ pull-ups to the internal 5V rail.

5V inputs shall be pull to 0V with at least 5mA drive current.

Symbol	Characteristics	Value	Unit	Conditions
VIL_{max}	Maximum input low voltage	1.0	V	Schmitt trigger buffer(1)
		0.8	V	TTL buffer(1)(2)
VIH_{min}	Minimum input high voltage	4.0	V	Schmitt trigger buffer(1)
		2.0	V	TTL buffer(1)(2)
IL_{min}	Minimum required drive current	5	mA	
TLH_{max}	Maximum low to high transition delay	1	µs	
THL_{max}	Maximum high to low transition delay	1	µs	

Table 3 – 5V inputs 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 it can sink 5mA in any case.

(1) Input buffer software selectable. TTL buffer can be selected to reduce the input voltage thresholds allowing compatibility with 3.3V outputs.

(2) TTL buffer is not windowed, it has lower immunity to perturbation than Schmitt trigger buffer.

6.7.3 5V OUTPUT (IO1)

IO1 can be configured as a 5V output (open drain with 1kΩ to 5V internal rail).

Symbol	Characteristics	Value	Unit	Conditions
VOH_{min}	Minimum output high voltage	4.0	V	1mA sourced from internal 5V
VOL_{max}	Maximum output low voltage	0.4	V	50mA sink to 0V
VOL_{max}	Maximum sink current	50	mA	
TLH_{max}	Maximum low to high transition delay	1	µs	
THL_{max}	Maximum high to low transition delay	1	µs	

Table 4 – 5V output electrical characteristics

Design notes:

5V output is not protected from over-current. Care must be taken to limit the current flowing through it.

6.7.4 12V INPUTS (IO5 AND IN6)

12V inputs are intended to be driven from a dry contact, open drain output or 12V push-pull outputs.

However, it is also possible to drive it from 5V push-pull outputs.

12V input are referenced to 0V.

12V input has internal 2.61kΩ pull-ups to the internal 12V rail.

12V inputs 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)
		1.6	V	TTL buffer(1)(2)
VIH_{min}	Minimum input high voltage	8.0	V	Schmitt trigger buffer(1)
		4.0	V	TTL buffer(1)(2)
IL_{min}	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 5 – 12V inputs 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 it can sink 5mA in any case.

(1) Input buffer software selectable. TTL buffer can be selected to reduce the input voltage thresholds allowing compatibility with 5V outputs.

(2) TTL buffer is not windowed, it has lower immunity to perturbations than Schmitt trigger buffer.

6.7.5 12V OUTPUT (IO5)

IO5 can be configured as a 12V output (open drain with 2.61kΩ to 12V internal rail).

Symbol	Characteristics	Value	Unit	Conditions
VOH_{min}	Minimum output high voltage	9.0	V	1mA sourced from internal 5V
VOL_{max}	Maximum output low voltage	0.4	V	50mA sink to 0V
VOL_{max}	Maximum sink current	50	mA	
TLH_{max}	Maximum low to high transition delay	1	µs	
THL_{max}	Maximum high to low transition delay	1	µs	

Table 6 – 12V output electrical characteristics

Design notes:

12V output is not protected from over-current. Care must be taken to limit the current flowing through it.

6.7.6 ISOLATED OUTPUTS (OUT7 AND OUT8)

OUT7 and OUT8 are isolated open drain outputs. They support 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 7 – Isolated outputs electrical characteristics

Design notes:

Isolated outputs are not protected from over-current. Care must be taken to limit the current flowing through them.

6.7.7 ISOLATED INPUTS (OPTIONS FOR IN2 AND/OR IN3)

Isolated inputs are intended to be driven by a 5V or a 12V dc voltage.

Symbol	Characteristics	Value	Unit	Conditions
VIH_{max}	Maximum input high voltage	13	V	
VIL_{max}	Minimum input high voltage	4.5	V	
VIL_{max}	Maximum input low voltage	0.5	V	
VIL_{min}	Minimum input low voltage	-0.5	V	
IH_{typ}	Typical input current	5	mA	at 5V drive voltage
		16	mA	at 12V drive voltage
IH_{min}	Minimum required drive current	4	mA	
TLH_{max}	Maximum low to high transition delay	4	µs	
THL_{max}	Maximum high to low transition delay	20	µs	

Table 8 – Isolated inputs electrical characteristics

Design notes:

Isolated inputs are only available as an option. Please contact Phoxene for details.

7 CONFIGURATION

Sx-LED-M 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-LED-M Modbus Manual.

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

For example, it is possible to set one of the eight energy levels

Design notes:

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

7.1 HARDWARE SETTINGS

7.1.1 HARDWARE MODBUS ADDRESS SELECTION

The Modbus address of the device can be set accordingly to a combination of software values and discrete inputs.

A basic usage is to set part or all of the Modbus address (1 to 247) by hardware configuration (some of the discrete inputs shorted to 0V). An optional back-side selector can also be used to set the Modbus address.

7.1.2 ALTERNATE ENERGY LEVEL SELECTION (DAY / NIGHT)

One of the inputs 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 100ms.

8 MAINTENANCE INSTRUCTIONS

8.1 FUSES REPLACEMENT:

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