

# LPPHOTS - Transmitter with RS485 MODBUS output for photometric sensors



Member of GHM GROUP

The LPPHOTS transmitter converts the mV analog signal generated by the illuminance probe in a digital signal suitable to be transmitted over a RS485 serial line with MODBUS RTU protocol. The connections are made via the screw terminals accessible by unscrewing the top cover of the transmitter. The casing is designed for wall mounting.

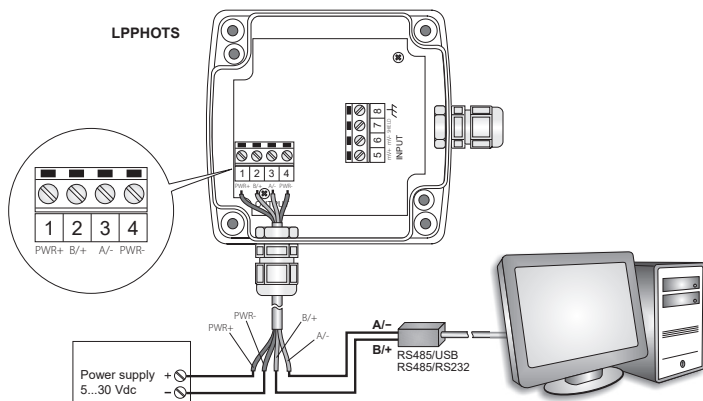
## Technical specifications

Measuring range with LPPHOT... probes	0...150.000 lux
Resolution	10 lux
Output	RS485 (not isolated) with MODBUS RTU protocol
Power supply	5...30 Vdc
Housing dimensions	80 x 84 x 44 mm
Protection degree	IP 66
Working Temperature / %RH	-30...+70 °C / 0...90% R.H. not condensing
Storage temperature	-40...+80 °C

## Setting the RS485 communication parameters of the transmitter

Before connecting the transmitter to the RS485 network, an address must be assigned and the communication parameters be set, if different from the factory preset.

The parameters setting is performed by connecting the transmitter to the PC by using the optional RS48 cable, with built in RS485/USB converter. To use the cable, it is necessary to install the related USB drivers in the PC. Alternatively, a generic RS485/RS232 or RS485/USB converter can be used instead of the RS48 cable.



Command	Response	Description
CMA <sub>nnn</sub>	&	Set RS485 address to nnn Ranging from 1 to 247 Preset on 1
CMB <sub>n</sub>	&	Set RS485 Baud Rate n=0 ⇒ 9600 n=1 ⇒ 19200 Preset on 1 ⇒ 19200
CMP <sub>n</sub>	&	Set RS485 transmission mode n=0 ⇒ 8-N-1 (8 data bit, no parity, 1 stop bit) n=1 ⇒ 8-N-2 (8 data bit, no parity, 2 stop bit) n=2 ⇒ 8-E-1 (8 data bit, even parity, 1 stop bit) n=3 ⇒ 8-E-2 (8 data bit, even parity, 2 stop bit) n=4 ⇒ 8-O-1 (8 data bit, odd parity, 1 stop bit) n=5 ⇒ 8-O-2 (8 data bit, odd parity, 2 stop bit) Preset on 2 ⇒ 8-E-1
CMW <sub>n</sub>	&	Set receiving mode after RS485 transmission n=0 ⇒ Violate protocol and go in Rx mode right after Tx n=1 ⇒ Respect protocol and wait 3.5 characters after Tx Preset on 1 ⇒ Respect the protocol

6. You can check the parameters setting by sending the following serial commands:

Command	Response	Description
RMA	Address	Read the RS485 address
RMB	Baud Rate (0,1)	Read RS485 Baud Rate 0 ⇒ 9600 1 ⇒ 19200
RMP	Tx Mode (0,1,2,3,4,5)	Read RS485 transmission mode 0 ⇒ 8-N-1 1 ⇒ 8-N-2 2 ⇒ 8-E-1 3 ⇒ 8-E-2 4 ⇒ 8-O-1 5 ⇒ 8-O-2
RMW	Rx Mode (0,1)	Read receiving mode after RS485 transmission 0 ⇒ Violate protocol and go in Rx mode right after Tx 1 ⇒ Respect protocol and wait 3.5 characters after Tx

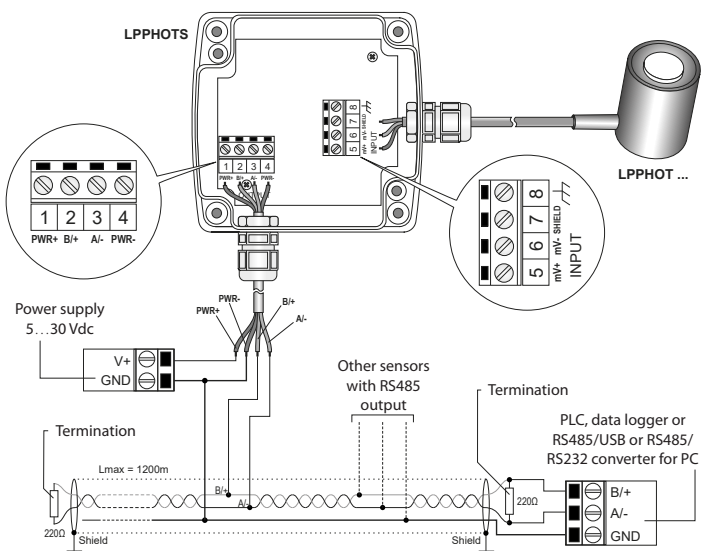
## Operating mode connection


### Procedure for setting the parameters

1. Start with the transmitter not powered
2. Start a standard serial communication program, such as Hyperterminal. Set the COM port number to which the transmitter will be connected, set the Baud Rate to 57600 and the communication parameters as follows:  
Data bits: 8      Parity: None      Stop bits: 2
3. Switch the transmitter on and wait to receive the & character, then send (within 10 s from power on) the @ command and press Enter.

*Note:* if the transmitter does not receive the @ command within 10 seconds from power on, the RS485 MODBUS mode is automatically activated. In such a case, it is necessary to switch off and on again the transmitter.

4. Send the command **CAL USER ON**.  
*Note:* The command CAL USER ON turns off after 5 minutes of inactivity.
5. Send the serial commands in the following table to set the RS485 MODBUS parameters:



Terminal	Symbol	Function
1	PWR+	Power supply positive
2	B/+	RS485 B/+
3	A/-	RS485 A/-
4	PWR-	Power supply negative
5	mV+	mV input signal positive
6	mV-	mV input signal negative
7	SHIELD	Shield of the probe cable
8		Earth connection

For best accuracy, it is advisable not to extend the length of the shielded cable supplied with the LPPHOT01 probe. It is also recommended not to pass wiring near power cables (electric motors, induction furnaces, inverters, etc.).

In the RS485 connection, the instruments are connected through a twisted-pair shielded cable for signals and a third wire for ground. Line terminations should be placed at the two ends of the network.

The maximum number of devices that can be connected to the RS485 line (Bus) depends on the load characteristics of the devices to be connected. The RS485 standard requires that the total load does not exceed 32 unit loads. The load of an LP PHOT S transmitter is equal to 1 unit load. If the total load is greater than 32 unit loads, divide the network into segments and add a signal repeater between a segment and the successive one. Line termination should be applied at both ends of each segment.

## Operating mode

The transmitter enters RS485 MODBUS RTU mode after 10 seconds from power on. In the first 10 seconds from power on the transmitter does not reply to requests from the MODBUS master unit. After 10 seconds, it is possible to send MODBUS requests to the transmitter.

## Reading of the measure with the MODBUS-RTU protocol

In MODBUS mode, you can read the values measured by the instrument through the function code 04h (Read Input Registers). The following table lists the information available with the appropriate register address:

Address	Quantity	Format
2	Illuminance in lux/10	16 Integer
3	Status register bit 0 = 1 ⇒ illuminance measurement error bit 2 = 1 ⇒ configuration data error bit 3 = 1 ⇒ program memory error	16 Integer
4	Average illuminance in lux/10 The average refer to the last 4 measures	16 Integer
5	Input signal value in $\mu\text{V}$	16 Integer

## Setting the probe sensitivity

The setting of the probe sensitivity is required when replacing the probe connected to the transmitter with a new probe having different sensitivity.

To set the probe sensitivity, proceed as follows:

1. Start with the transmitter not powered.
2. Connect the transmitter to the PC by using the optional RS48 cable.
3. Start a standard serial communication program, such as Hyperterminal. Set the COM port number to which the transmitter will be connected, set the Baud Rate to 57600 and the communication parameters as follows:

Data Bits: 8  
Parity: None  
Stop bit: 2

4. Switch the transmitter on and wait to receive the **&** character, then send (within 10 s from power on) the **@** command and press **Enter**.

*Note:* if the transmitter does not receive the **@** command within 10 seconds from power on, the RS485 MODBUS mode is automatically activated. In such a case, it is necessary to switch off and on again the transmitter.

5. Send the command **CAL START**.

*Note:* The command **CAL START** turns off after 5 minutes of inactivity.

6. Send the following serial commands:

Command	Response	Description
CLSnnn	&	Set the probe sensitivity to the value nnn in $\mu\text{V}/\text{klux}$ <i>nnn indicates a 3 or 4-digit integer number between 500 and 2500</i>

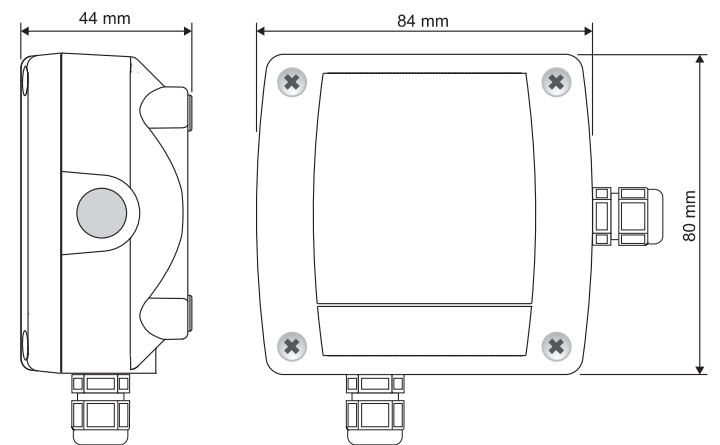
7. You can check the probe sensitivity setting by sending the following serial command:

Command	Response	Description
RLS	& nnn	Read the set sensitivity in $\mu\text{V}/\text{klux}$

*Note:* it is not required to send the **CAL START** command to read the setting with the **RLS** command.

When the setting is completed, switch the transmitter off and then back on to activate the RS485 MODBUS RTU operating mode.

## Dimensions



## ORDERING CODES

**LPPHOTS:** Transmitter with RS485 MODBUS RTU output for the LPPHOT... illuminance probes. Measuring range 0...150,000 lux. Resolution 10 lux. Connections via screw terminals. Wall mount casing. Power supply 5...30 Vdc. To combine with LPPHOT01, LPPHOT02 and LPPHOT03 probes.

**RS48:** PC connection cable for the configuration of the MODBUS parameters. With built in RS485/USB converter. Open wires on the instrument side and USB A type connector on the PC side.