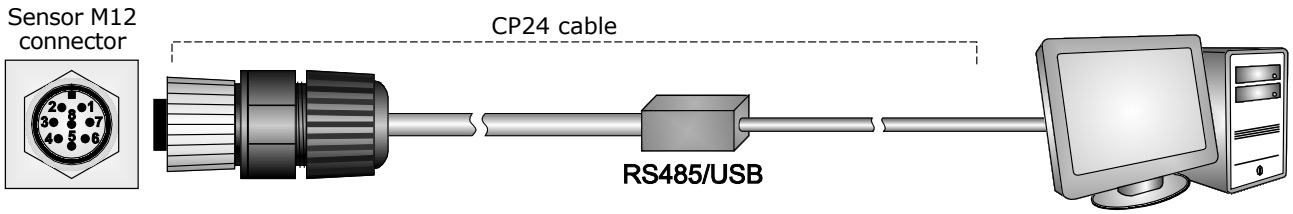
SETTING THE PARAMETERS OF THE PHOTOMETRIC AND RADIOMETRIC SENSORS WITH RS485 MODBUS-RTU OUTPUT BY USING A STANDARD COMMUNICATION PROGRAM.

RS485 COMMUNICATION PARAMETERS:

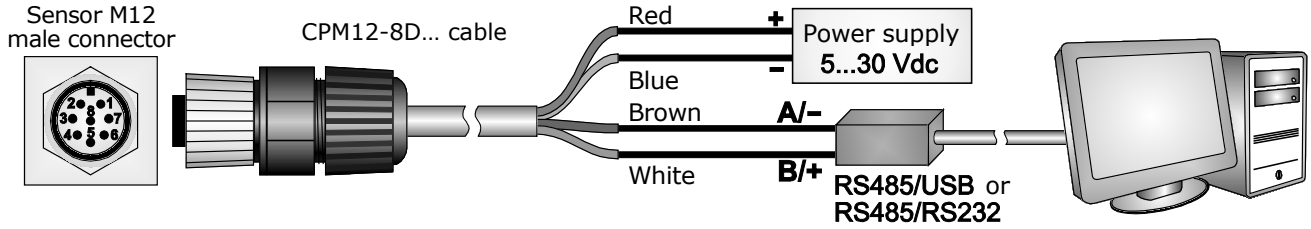
Before connecting the sensor to the RS485 network, an address must be assigned and the communication parameters must be set, if different from the factory preset.

The setting of the parameters is performed by connecting the sensor to the PC in one of the following two ways:

A. By using the optional **CP24** cable, with built-in RS485/USB converter. In this connection mode, the sensor is powered by the PC USB port. To use the cable, it is necessary to install the related USB drivers in the PC.



B. By using the supplied 8-pole M12 female connector or the optional **CPM12-8D...** cable and a generic RS485/USB or RS485/RS232 converter. In this connection mode, it is necessary to power the sensor separately. If a RS485/USB converter is used, it is necessary to install the related USB drivers in the PC.



NOTES ON THE INSTALLATION OF UNSIGNED USB DRIVER: before installing unsigned USB driver into operating systems starting from Windows 7, it is necessary to restart the PC by disabling the driver signing request. If the operating system is 64-bit, even after installation the request of driver signing have to be disabled each time the PC is restarted.

Procedure for setting the communication parameters:

1. Start with the sensor not powered (if the CP24 cable is used, disconnect one end of the cable).
2. Start a communication program, such as Hyperterminal. Set the Baud Rate to 57600 and set the communication parameters as follows (the sensor is connected to a COM type port):

   Data Bits: 8
   Parity: None
   Stop Bits: 2

   In the program, set the COM port number to which the sensor will be connected.

3. Switch the sensor on (if the CP24 cable is used, connect both ends of the cable).

4. Within 10 seconds from the sensor power on, send the **@** command and press **Enter**.

Note: if the sensor 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 sensor.

5. Send the command **CAL USER ON**.

Note: the command CAL USER ON is disabled after 5 minutes of inactivity.

6. Send the serial commands given in the following table to set the RS485 MODBUS parameters:

Command	Response	Description
CMAnnn	&|	Set RS485 address to nnn Ranging from 1 to 247 Preset on 1
CMBn	&|	Set RS485 Baud Rate n=0 ⇒ 9600 n=1 ⇒ 19200 n=2 ⇒ 38400 n=3 ⇒ 57600 n=4 ⇒ 115200 Preset on 1 ⇒ 19200
CMPn	&|	Set RS485 transmission mode n=0 ⇒ 8-N-1 (8 data bits, no parity, 1 stop bit) n=1 ⇒ 8-N-2 (8 data bits, no parity, 2 stop bits) n=2 ⇒ 8-E-1 (8 data bits, even parity, 1 stop bit) n=3 ⇒ 8-E-2 (8 data bits, even parity, 2 stop bits) n=4 ⇒ 8-O-1 (8 data bits, odd parity, 1 stop bit) n=5 ⇒ 8-O-2 (8 data bits, odd parity, 2 stop bits) Preset on 2 ⇒ 8-E-1
CMWn	&|	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

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

Command	Response	Description
RMA	*Address*	Read RS485 address
RMB	*Baud Rate* (0,1)	Read RS485 Baud Rate 0 ⇒ 9600 1 ⇒ 19200 2 ⇒ 38400 3 ⇒ 57600 4 ⇒ 115200
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

Note: it is not required to send the CAL USER ON command to read the settings.

SETTING THE RANGE IN THE LPPHOT03BLS PROBE:

The LPPHOT03BLS probe has two measuring ranges: 0…20,000 lux (low range) with 1 lux resolution and 0…200,000 lux (high range, default) with 10 lux resolution.

In order to change the range, proceed as for setting the communication parameters, up to step 4 included, then send the command **CAL START** (instead of the command CAL USER ON) and the serial commands given in the following table:

Command	Response	Description
O2E	&|	Set low range (0…20,000 lux, 1 lux resolution)
O2D	&|	Set high range (0…200,000 lux, 10 lux resolution)
RO	hh|	Read the configuration byte bit 2 = 0 ⇒ high range (0…200,000 lux, 10 lux resolution) bit 2 = 1 ⇒ low range (0…20,000 lux, 1 lux resolution) *The bit 2 is the third bit from the right of the configuration byte*

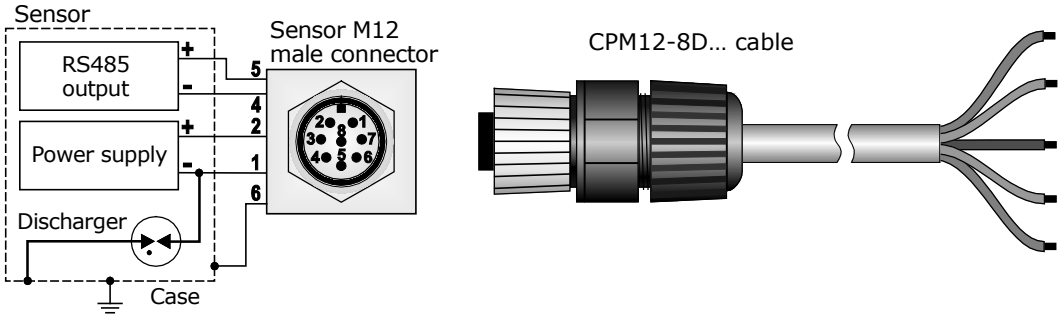
READING OF THE MEASURES WITH THE MODBUS-RTU PROTOCOL

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

Address	Quantity	Format
0	Internal temperature in °C (x10)	16-bit Integer
1	Internal temperature in °F (x10)	16-bit Integer
2	Measurement: **LPPHOT03 low range** (20,000 lux): illuminance in lux **LPPHOT03 high range** (200,000 lux): illuminance in lux/10 [e.g.: 3278 means 32780 lux, the resolution is 10 lux] **LPPAR03**: photon flow in µmol m^{-2} s^{-1} **LPUVA03**: UVA irradiance in W/m^2 x 10 [e.g.: 425 means 42.5 W/m^2, the resolution is 0.1 W/m^2]	16-bit Integer
3	Status register: bit0=1 ⇒ measurement error bit2=1 ⇒ configuration data error bit3=1 ⇒ program memory error	16-bit Integer
4	Average values of the last 4 measurements	16-bit Integer
5	Signal generated by the sensor: **LPPHOT03 low range** (20,000 lux): µV **LPPHOT03 high range** (200,000 lux): µV/10 [e.g.: 3278 means 32780 µV, the resolution is 10 µV] **LPPAR03**: µV **LPUVA03**: µV	16-bit Integer

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

CONNECTION:

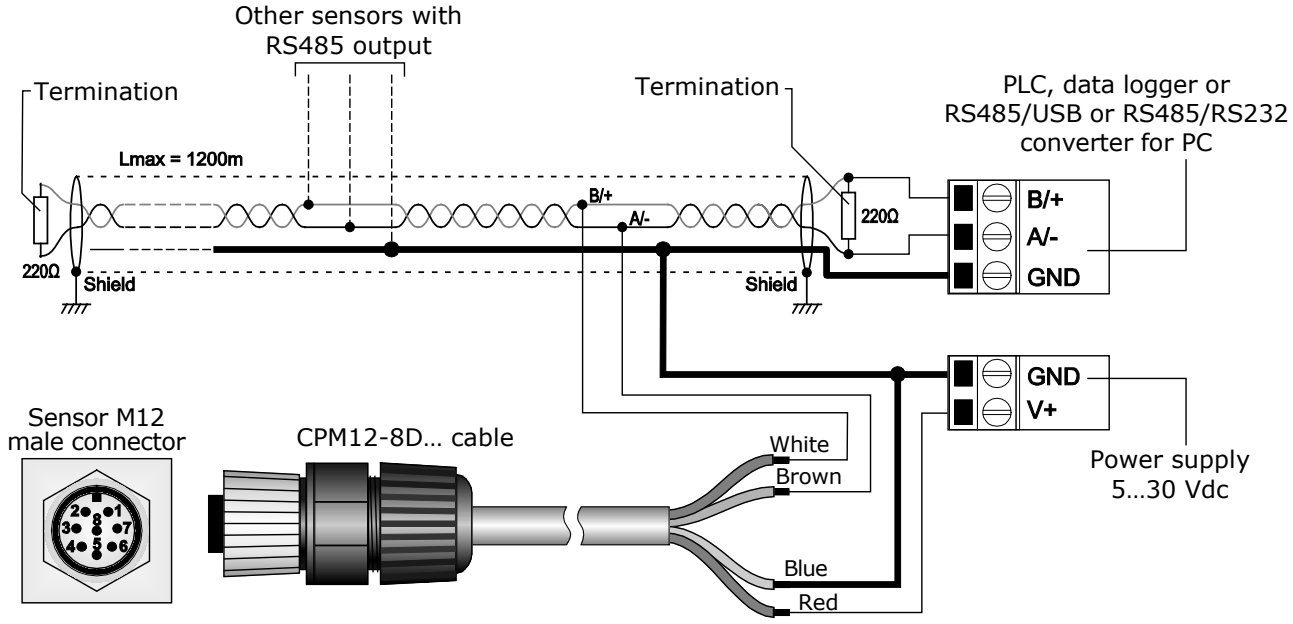


Connector	Function	Color
1	Power supply negative	Blue
2	Power supply positive	Red
3	Not connected	
4	RS485 A/-	Brown
5	RS485 B/+	White
6	Case	Shield (Black)
7	Not connected	
8	Not connected	

The RS485 output is not isolated.

⚠ **The metallic case of the sensor should preferably be grounded (⏚) locally. In this case, do not connect the shield of the CPM12-8D… cable to prevent ground loops.**

⚠ **Only if it is not possible to ground locally the metallic case of the sensor, connect the shield of the CPM12-8D… cable to ground (⏚).**



Connection of RS485 output

CABLES:

CP24 PC connecting cable for the MODBUS parameters configuration. With built-in RS485/USB converter. 8-pole M12 connector on sensor side and A-type USB connector on PC side.

CPM12-8D.2 Cable with 8-pole M12 connector on one end, open wires on the other side. Length 2 m.

CPM12-8D.5 Cable with 8-pole M12 connector on one end, open wires on the other side. Length 5 m.

CPM12-8D.10 Cable with 8-pole M12 connector on one end, open wires on the other side. Length 10 m.