USER MANUAL

Longo Modbus Products
LMP-1.OC3 Occupancy ToF sensor

Version 1

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Written by SMARTEH d.o.o.
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User manual

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STANDARDS AND PROVISIONS: Standards, recommendations, regulations and provisions of the country in which the devices will operate, must be considered while planning and setting up electrical devices. Work on 230 V AC network is allowed for authorized personnel only.

DANGER WARNINGS: Devices or modules must be protected from moisture, dirt and damage during transport, storing and operation.

WARRANTY CONDITIONS: For all products LMP-1 - if no modifications are performed upon and are correctly connected by authorized personnel – in consideration of maximum allowed connecting power, we offer warranty for 24 months from date of sale to end buyer. In case of claims within warranty time, which are based on material malfunctions the producer offers free replacement. The method of return of malfunctioned module, together with description, can be arranged with our authorized representative. Warranty does not include damage due to transport or because of unconsidered corresponding regulations of the country, where the module is installed.



This device must be connected properly by the provided connection scheme in this manual. Misconnections may result in device damage, fire or personal injury.



Hazardous voltage in the device can cause electric shock and may result in personal injury or death.

NEVER SERVICE THIS PRODUCT YOURSELF!



This device must not be installed in the systems critical for life (e.g. medical devices, aircrafts, etc.).

If the device is used in a manner not specified by the manufacturer, the degree of protection provided by the equipment may be impaired.



Waste electrical and electronic equipment (WEEE) must be collected separately!

LMP-1 complies to the following standards:

- EN 55032:2015
- EN 55035:2017
- EN 61000-3-2:2014
- EN 61000-3-3:2013

Smarteh d.o.o. operates a policy of continuous development. Therefore, we reserve the right to make changes and improvements to any of the products described in this manual without any prior notice.

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1 ABBREVIATIONS

ToF	Time-of-Flight
DC	Direct Current
PS	Power Supply
LED	Light Emitting Diode
Rx	Receive
Tx	Transmit
FoV	Field of View
DIP	Dual in-line Package Switch
RTU	Remote Terminal Unit
AP	Access Point
IAQ	Indoor Air Quality
NVS	Non-Volatile Storage
LSB	Least Significant Bit
MSB	Most Significant Bit
NO	Normally open
NC	Normally closed
CO	Common contact

2 DESCRIPTION

The LMP-1.OC3 occupancy sensor is designed to operate as a Modbus RTU Slave within the Smarteh LMP-1 systems, as well as other compatible systems. It monitors the area below and in front of the sensor and reports the presence of people and an estimated people count to the Modbus RTU Master device.

The sensor is powered by an external 8 .. 30 V DC power supply and consumes 1 W. Its compact circular housing is intended for wall or ceiling mounting. Three status LEDs inside the housing provide visual indication of the power supply status and Modbus RTU communication activity.

Occupancy is measured by three Time-of-Flight sensors. Each sensor projects a 45° × 45° square field of view (65° diagonal) and returns a matrix of 8 × 8 individual distance readings with a range of up to 4 m. All 64 distance values of every sensor are available to the Modbus RTU Master device as input registers, together with the derived presence flag and people count.

3 FEATURES

Figure 1 : LMP-1.OC3 module

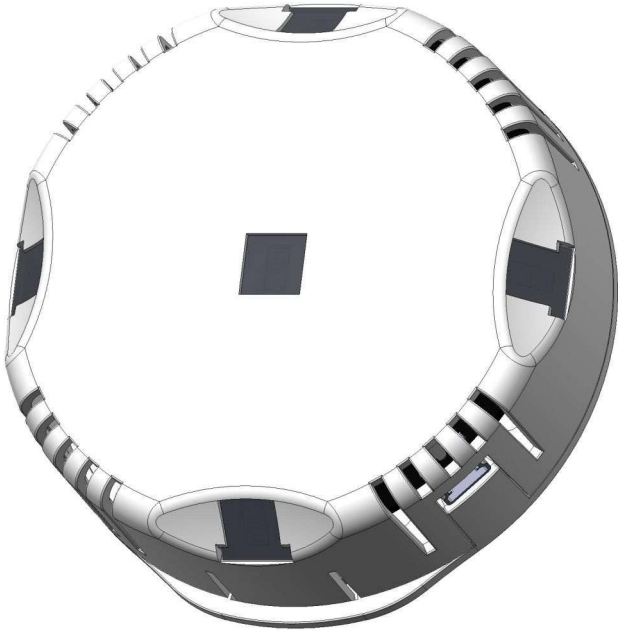


Table 1: Features

8 .. 30 V DC power supply, 1 W
Three VL53L8CX Time-of-Flight sensors, 8 × 8 zones, range up to 4 m
RS-485 half duplex serial port for Modbus RTU Slave communication
Modbus RTU Slave address selectable by 6-pole DIP switch
Signal relay output, NO / NC
USB service connector
Three diagnose LEDs
Wall or ceiling mounting, circular housing ⌀80 mm

4 INSTALLATION

4.1 Connection

Figure 2 : LMP-1.OC3 module

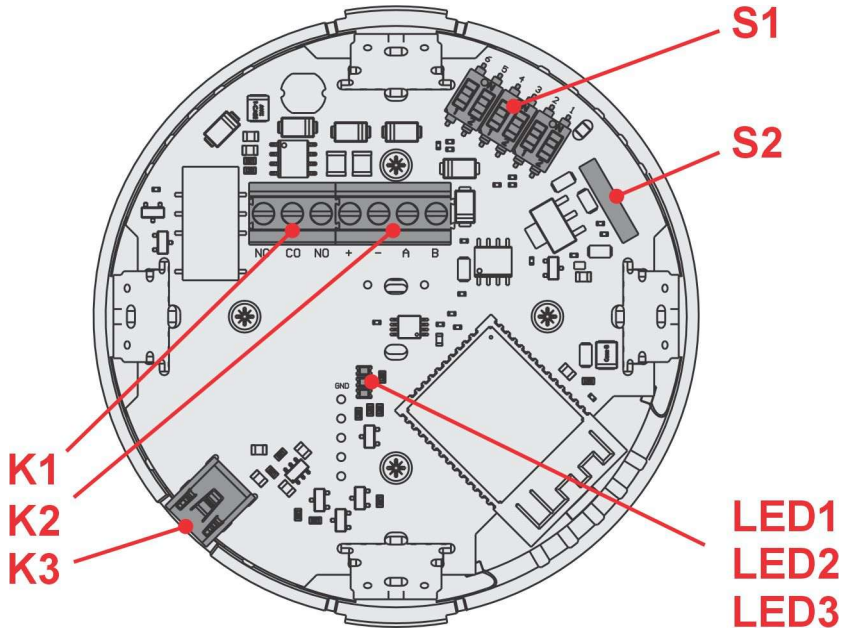
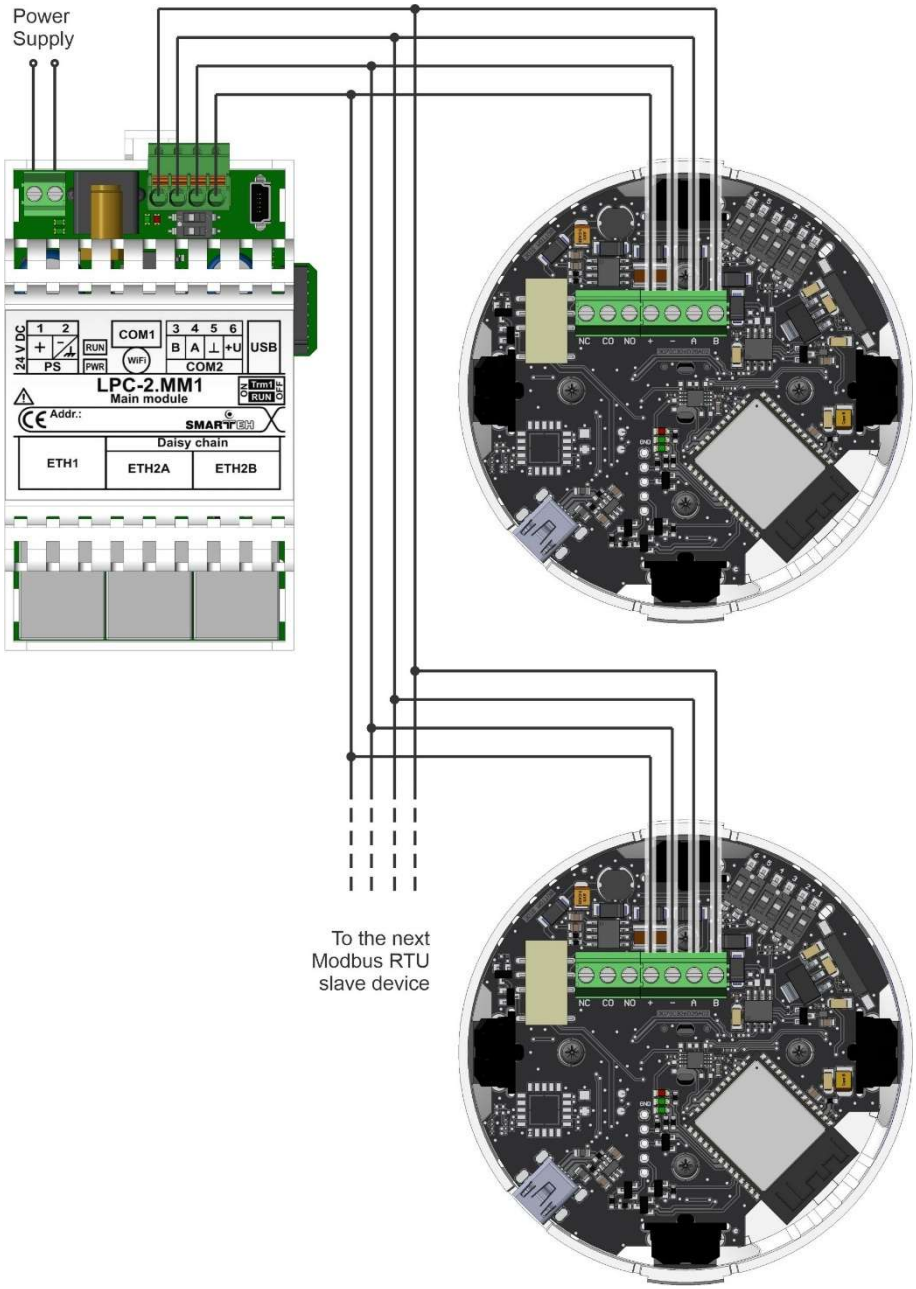


Table 2: Connectors

K1.1	Normally closed relay output (NC)	Voltage free contacts Max. switching current: 2 A DC, resistive load Max. switching voltage: 30V DC
K1.2	Relay common contact (CO)	
K1.3	Normally open relay output (NO)	
K2.1	+	Power supply, 8 .. 30 V DC
K2.2	⊥	GND
K2.3	RS-485 (A) Modbus RTU	3.3 V / 5V
K2.4	RS-485 (B) Modbus RTU	3.3 V / 5V
K3	USB Mini	mini-B type, device mode
S1	Modbus RTU address setting	000000 → default Modbus RTU settings, Slave ID: 234 000001 .. 111111 → 1 .. 63 Slave ID S1.1: LSB, S1.6: MSB
S2	Reed contact	Digital input

Table 3: LEDs		
LED1 (red)	Rx, RS-485 Rx status	Blink: OK Off: no communication from Master On: A and/or B line in shortcut
LED2 (green)	Tx, RS-485 Tx status	Blink: OK Off: no communication from Master On: A and/or B line in shortcut
LED3 (green)	Status LED	Programmable LED

Figure 3 : Connection scheme example



4.2 Mounting instructions

Figure 4 : Housing dimensions

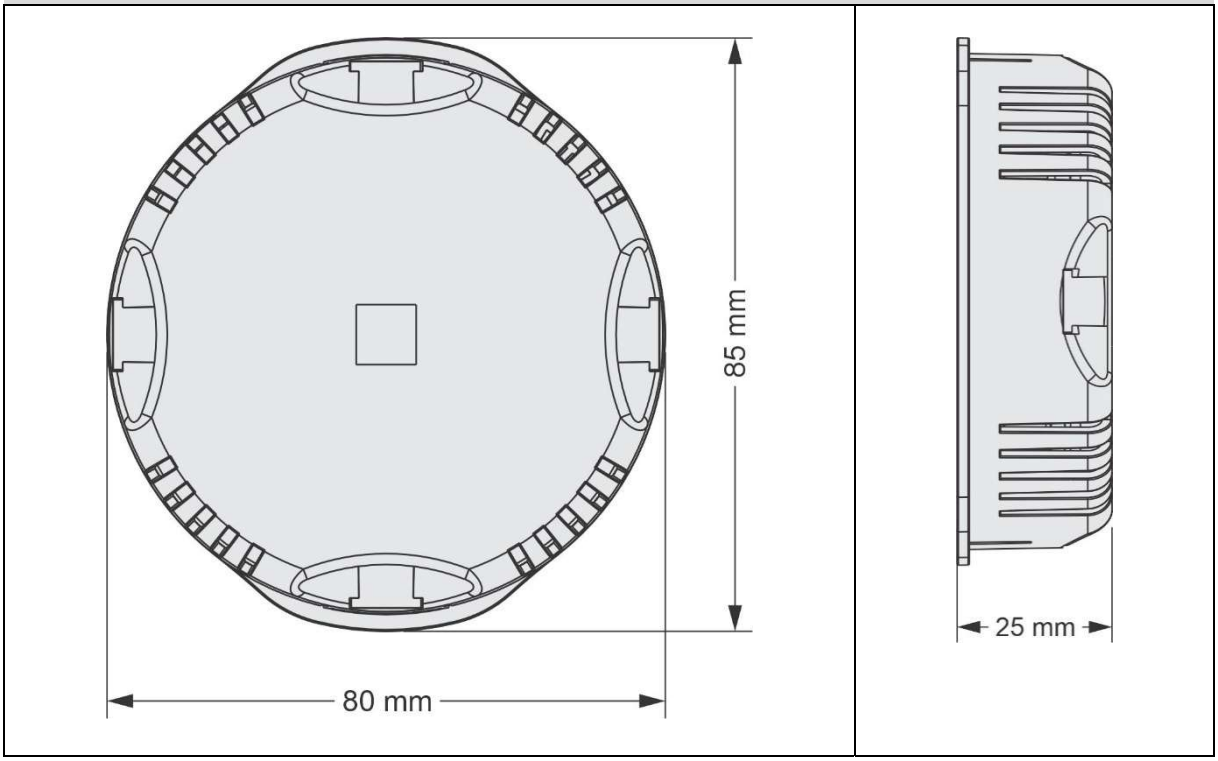
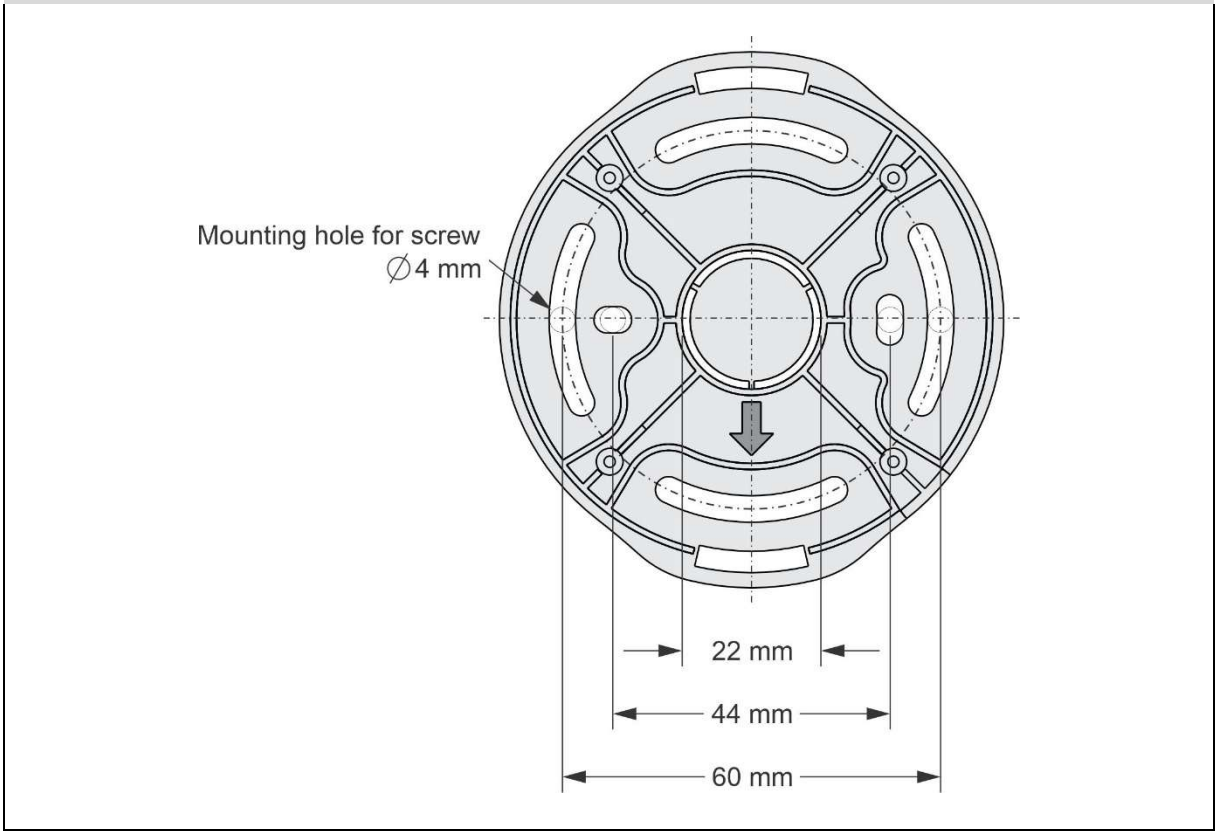


Figure 5 : Mounting holes



EXTERNAL SWITCH OR CIRCUIT-BREAKER AND EXTERNAL OVERCURRENT PROTECTION: The unit is allowed to be connected to installation with over current protection that has nominal value of 6 A or less.



All connections, PLC attachments and assembling must be done while LMP-1.OC3 is not connected to the main power supply. Module should be positioned in the wall inside of the room. Avoid direct sunlight, positioning near heating/cooling source object or under high luminance lights for best performance of the on-board sensors. Junction box and tubes in the wall must be sealed to prevent airflow. Displayed temperature is adequate to temperature approx. 10 cm below module and 1 cm off the wall. Recommended installation height is 1.5 m above floor level. Portrait orientation of the module may produce slight errors in temperature measurements.

Wires connected to the PLC must have cross sectional area at least 0.75 mm^2. Minimum temperature rating of wire insulation must be 85 °C.

Mounting instructions:

1 Switch OFF the power supply.

2 Remove the cover from the base plate.

3 Fix the base plate to the wall or ceiling with two screws through the ⌀4 mm mounting slots and lead the cable through the ⌀22 mm cable hole, see Figure 5 : Mounting holes.

4 Connect the power supply and RS-485 wires to the 4-pin terminal block according to *Table 2: Connectors*.

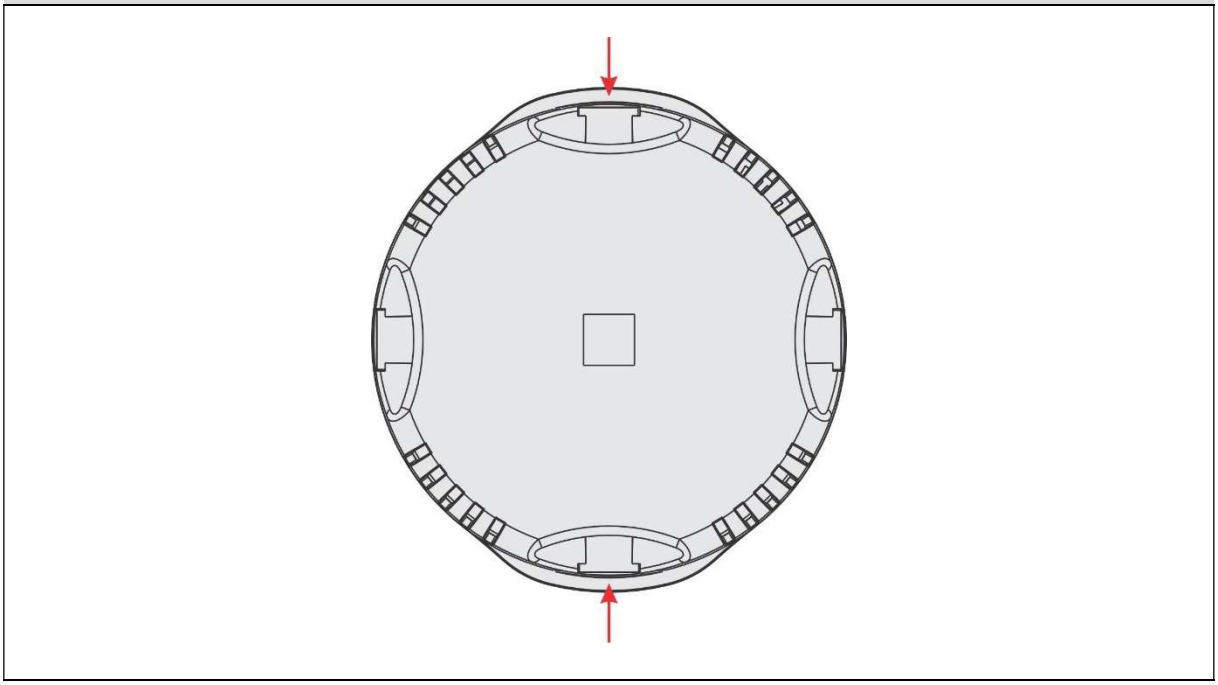
5 Set the Modbus RTU slave address with the DIP switch, see *Table 2: Connectors*.

6 Close the cover and make sure that both locking clips engage, see *Figure 6 : Position of locking clips*.

7 Switch ON the power supply. The status LED should switch on, see Table 3: LEDs.

8 Perform the empty-room learning procedure described in chapter *5.1.1 Empty room learning*.

Figure 6 : Position of locking clips



The field of view of the sensor must not be obstructed by luminaires, ducts, beams or other objects.

NOTE:

Signal wires must be installed separately from power and high voltage wires in accordance with general industry electrical installation standard.

Mount the sensor so that the monitored area lies within the field of view of the three Time-of-Flight sensors. See Chapter 4.1 for coverage examples.

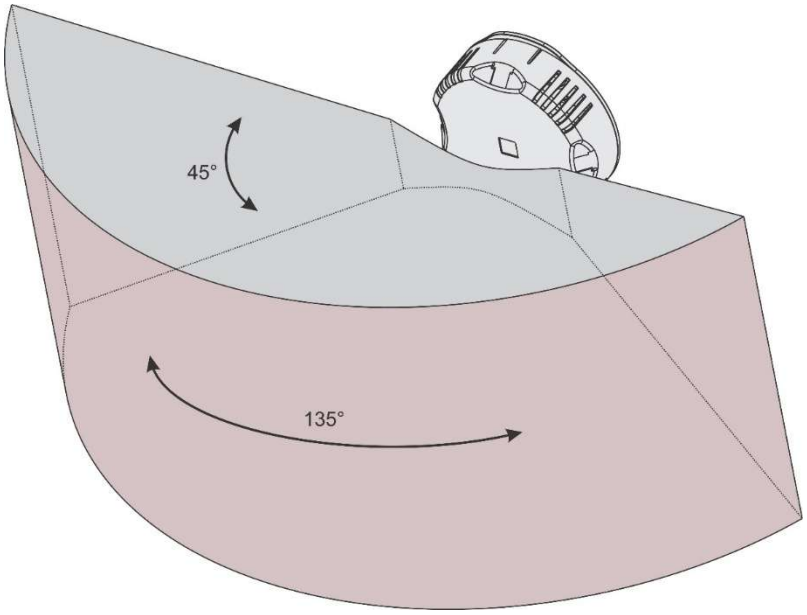
5 OPERATION AND FUNCTIONALITY

The LMP-1.OC3 is monitored and controlled entirely through Modbus RTU registers: input registers (3xxxx) are read by the Modbus master, holding registers (4xxxx) are written to configure and control the terminal. The terminal offers the following functions, each explained briefly below. The full register lists are given in section Modbus RTU registers.

5.1 ToF sensors

The Time-of-Flight sensors measure distance across an 8 x 8 grid of zones. The LMP-1.OC3 module features three horizontally aligned sensors, providing a total Field of View (FOV) of 135° horizontally by 45° vertically, with a maximum measuring range of up to 4 meters.

Figure 7 : ToF sensors FOV



5.1.1 Empty room learning

Before the first use the empty-room reference must be learned. With no people present in the monitored area, write the value 1 or the password 9066 to Holding Register 907. Reading register 907 returns the number of learning frames left; input registers 340 and 346 return 0 while learning is in progress.

For further support, contact Smarteh technical support at: support@smarteh.si

5.2 Modbus management

The module is a Modbus RTU slave on the RS-485 interface. The master device reads the measured distances, the presence flag and the people count, and configures the module through Modbus registers. After power-up it communicates with the default parameters for 10 seconds. If no valid

request is received in that time, it switches to the user-defined parameters, which can be changed in Modbus RTU registers. See section *6.1 Modbus RTU*.

5.3 Voltage free digital output

The module features a built-in relay with changeover (CO), normally closed (NC), and normally open (NO) output contacts. It supports two operating modes: automatic and manual. In the automatic mode, the relay activates when the sensor detects the presence of people in the room, serving as a digital signal output for direct switching applications based on occupancy detection.

6 PROGRAMMING GUIDE

6.1 Modbus RTU variables

The LMP-1.OC3 module communicates with Modbus RTU Master device using the Modbus RTU protocol over an RS-485 connection.

By default, after power-up, the LMP-1.OC3 module communicates with the following parameters for the first 10 seconds:

- Slave ID: 234
- Baud rate: 115200 bps
- Data bits: 8
- Parity: None
- Stop bits: 1

If no valid Modbus request is received within 10 seconds after power-up, the module switches to the user-defined communication parameters.

The factory-set user-defined parameters are:

- Slave ID: 1
- Baud rate: 115200 bps
- Data bits: 8
- Parity: None
- Stop bits: 1

The communication parameters can be changed by writing new values to the corresponding Modbus holding registers. The updated parameters can be stored in the module's non-volatile memory (EEPROM) using a password-protected command. Once the Modbus RTU settings have been saved, the device must be power-cycled (turned OFF and back ON) for them to take effect.

Important:

It is recommended not to use polling intervals shorter than 200 ms to ensure reliable communication.

6.2 Modbus RTU registers

The module provides access to the following Modbus register types:

- Input Registers: Used for reading real-time data from the connected I/O modules.
- Holding Registers: Used for controlling outputs and configuration parameters.

Some configuration parameters are defined as Retain parameters or Modbus settings. These parameters are saved to the module's non-volatile memory (EEPROM) only when the corresponding save command is executed.

- To save Retain parameters permanently, write the password 9055 to Holding Register 905.
- To save Modbus communication settings, write the password 9088 to Holding Register 908.

If the parameters are not saved using this procedure, they won't come in to affect and will be lost after the next power cycle. When writing password to save Modbus or Retain parameters, new values of all Retain or Modbus parameters are saved at once.

Before the first use the empty-room reference must be learned. With no people present in the monitored area, write the value 1 or the password 9066 to Holding Register 907. Reading register 907 returns the number of learning frames left; input registers 340 and 346 return 0 while learning is in progress.

For further support, contact Smarteh technical support at: support@smarteh.si

Table 4: 3xxxx, Input registers, Runtime

Reg.	Name	Description	Raw → Engineering data
1	FWver	Firmware version	0 .. 65535 → 0 .. 65535
75	Sensor1_Z0	Sensor slot 1, zones 0 .. 63: distance measured by the 8 x 8 matrix of the ToF sensor	0 .. 40000 → 0.0 .. 4000.0 mm 40000 = no target, masked or > 4 m
…	…		
138	Sensor1_Z63	Sensor slot 1, zones 0 .. 63: distance measured by the 8 x 8 matrix of the ToF sensor	0 .. 40000 → 0.0 .. 4000.0 mm 40000 = no target, masked or > 4 m
139	Sensor 2_Z0	Sensor slot 2, zones 0 .. 63: distance measured by the 8 x 8 matrix of the ToF sensor	0 .. 40000 → 0.0 .. 4000.0 mm 40000 = no target, masked or > 4 m
…	…		
202	Sensor2_Z63	Sensor slot 2, zones 0 .. 63: distance measured by the 8 x 8 matrix of the ToF sensor	0 .. 40000 → 0.0 .. 4000.0 mm 40000 = no target, masked or > 4 m
203	Sensor3_Z0	Sensor slot 3, zones 0 .. 63: distance measured by the 8 x 8 matrix of the ToF sensor	0 .. 40000 → 0.0 .. 4000.0 mm 40000 = no target, masked or > 4 m
…	…		
266	Sensor3_Z63	Sensor slot 3, zones 0 .. 63: distance measured by the 8 x 8 matrix of the ToF sensor	0 .. 40000 → 0.0 .. 4000.0 mm 40000 = no target, masked or > 4 m
340	Presence	Presence detection. Set to 1 when *People_count* is greater than 0	0 → Presence detected 1 → No presence
346	People_count	Estimated number of people in the monitored area	0 .. 3 → 0 .. 3 people
400	Magnet	Reed contact input, active high	0 → Contact OFF 1 → Contact ON
401	DIP_mask	State of the DIP switch read at power-up	000000 → Slave ID: 234 000001 .. 111111 → 1 .. 63 Slave ID

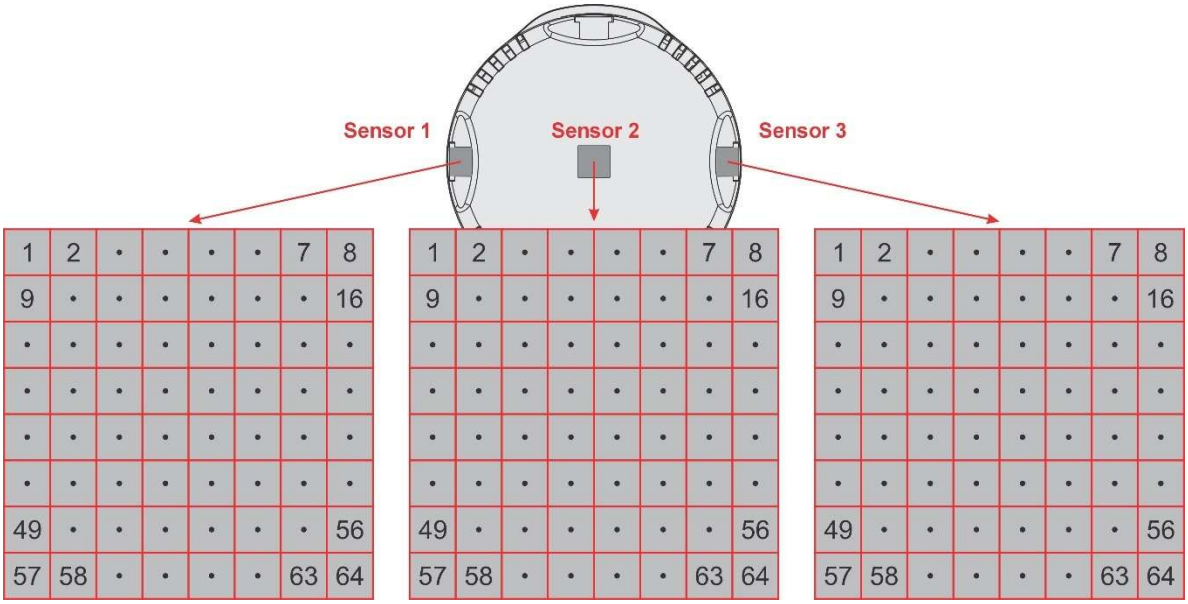
Table 5: 4xxxx, Holding registers, Runtime			
Reg.	**Name**	**Description**	**Raw → Engineering data**
20	LedFunction **R parameter**	LED function mode. Determines whether the LEDs are in automatic mode, controlled by the module, or are controlled manually.	0 → automatic 1 → manual control
21	LedCmd **R parameter**	LED command bit mask, valid when *LedFunction* is in manual control.	bit 0 = status LED bit 1 = Rx LED bit 2 = Tx LED 0 → OFF 1 → ON
22	Relay **R parameter**	Relay output command	0 → OFF 1 → ON
23	RelayFunction **R parameter**	Relay function mode. Determines whether the relay is in automatic mode, activated if presence is detected, or it is controlled manually with *Relay* register.	0 → automatic 1 → manual control

Table 6: 4xxxx, Holding registers, Modbus RTU settings			
Reg.	**Name**	**Description**	**Raw → Engineering data**
801	SlaveID	Slave address for Modbus RTU communication. Feedback on the DIP switch settings.	1 .. 247 → SlaveID 1 .. SlaveID 247
802	Baudrate	Baudrate for Modbus RTU communication	0 → 115k2 (default) 1 → 4k8 2 → 9k6 3 → 14k4 4 → 19k2 5 → 38k4 6 → 56k0 7 → 57k6 8 → 115k2
803	Parity	Parity for Modbus RTU communication	0 → None (default) 1 → Even 2 → Odd
804	Stop Bit	Stop Bits for Modbus RTU communication	1 → 1 Stop bit (default) 2 → 2 Stop bits

Table 7: 4xxxx, Holding registers, Save parameters			
Reg.	**Name**	**Description**	**Raw → Engineering data**
905	SaveRParameters	On rising-edge of password 9055, R settings are written to EEPROM, which are used after power-up.	9055

907	Occ_Learn	Empty-room learning. Write 1 or password 9077 to start; reading returns the number of learning frames left. Registers 340 and 346 are forced to 0 while learning.	1 or 9077
908	SaveModbusSettings	On rising-edge of password 9088, Modbus settings are written to EEPROM, which are used after power-up.	9088

Figure 8 : ToF sensors and zones numbering



7 TECHNICAL SPECIFICATIONS

Table 8: Technical specifications	
Power supply	8 .. 30 V DC
Inrush current	max. 1 A
Power consumption	Max. 1 W
Connection type for K1 and K2	screw type connectors for stranded wire 0.75 to 1.5 mm^2
RS-485 port	non isolated, 2 wire
USB port	mini B type, device mode
Time-Of-Flight sensors array size	24 x 8 pixels
Occupancy detection sensor range	Up to 400 cm
Occupancy detection sensor FOV	135°x 45°
Relay max. switching current	2 A DC, resistive load
Relay max. switching voltage	30 V DC, resistive load
Dimensions (L x W x H)	80 x 85 x 25 mm
Weight	60 g
Ambient temperature	0 to 50°C
Ambient humidity	max. 95 %, no condensation
Maximum altitude	2000 m
Mounting position	Vertical, marked with arrow
Transport and storage temperature	-20 to 60 °C
Pollution degree	2
Over-voltage category	II
Electrical equipment	class II (double insulation)
Protection class	IP30

8 MODULE LABELING

Figure 9: Label

Label (sample):

XXX-N.ZZZ
P/N: AAABBBCCDDDEEE
S/N: SSS-RR-YYXXXXXXXXX
D/C: WW/YY

Label description:

1. XXX-N.ZZZ - full product name.
    - XXX-N - Product family
    - ZZZ – product
2. P/N: AAABBBCCDDDEEE - part number.
    - AAA - general code for product family,
    - BBB - short product name,
    - CCDDD - sequence code,
    - CC - year of code opening,
    - DDD - derivation code,
    - EEE – version code (reserved for future HW and/or SW firmware upgrades).
3. S/N: SSS-RR-YYXXXXXXXXX - serial number.
    - SSS – short product name,
    - RR – user code (test procedure, e.g. Smarteh person xxx),
    - YY – year,
    - XXXXXXXXX– current stack number.
4. D/C: WW/YY - date code.
    - WW – week and
    - YY – year of production.

Optional

1. MAC
2. Symbols
3. WAMP
4. Other

9 SPARE PARTS

For ordering spare parts following Part Numbers should be used:

LMP-1.OC3 Occupancy ToF sensor	
LMP-1.OC3 Occupancy ToF sensor	220OC325003001

10 CHANGES

The following table describes all the changes to the document.

Date	V.	Description
10.11.2026	1	The initial version, issues as *LMP-1.OC3 UserManual*.

11 NOTES