USER MANUAL

Longo Modbus Products
LMP-1.MP2BH
Modbus RTU Temperature
Humidity Control panel

Version 1

SMARTEH d.o.o. / Poljubinj 114 / 5220 Tolmin / Slovenia / Tel.: +386(0)5 388 44 00 / e-mail: info@smarteh.si / www.smarteh.si

Written by SMARTEH d.o.o.

User Manual

Document Version: 1
December, 2020

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 LONGO LMP – 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!

LONGO LMP-1 complies to the following standards:

- EMC:EN 61000-6-2 (EN 50082), EN 61000-6-4 (EN 50081)
- LVD: IEC 61131-2
- Vibrations and climatic-mechanical: EN 60068-2-6, EN 60068-2-27, EN 60068-2-29

MANUFACTURER:

SMARTEH d.o.o.
Poljubinj 114
5220 Tolmin
Slovenia

Index

Longo Modbus Products LMP-1.MP2BH

1 ABBREVIATIONS

Sorted by order of appearance in document:

SP	Set point
CP	Control Panel
PB	Push Button
LCD	Liquid crystal display

2 DESCRIPTION

LMP-1.MP2BH Modbus RTU Slave compatible control panel (CP) is used for room temperature and humidity regulation as radiators, chilled beams, floor heating, etc.

Panel is equipped with temperature, humidity and light intensity sensor and four push buttons (PB). To increase, decrease temperature set point *warmer*, *cooler* PB should be pressed respectively. Temperature SP is represented with right LCD bar-graph. While CP is in heating mode (temperature SP is higher than actual room temperature), LCD SP bar is red and while in cooling mode (temperature SP is lower than actual room temperature), LCD SP bar is blue. If actual temperature is in SP +/- Dead band range, LCD SP bar is white.

PB on the left side has the same function as on the right (*warmer*, *cooler* PB).

With ECO (economy), OFF and ERR (error) signs on LCD, CP status is represented.

Color back ground LCD picture is possible to customize by using Smarteh LCD Composer software. Light intensity sensor controls LCD intensity.

It is possible to display actual temperature value (0.5 °C resolution), temperature set point and actual humidity (1 % resolution). The real time clock (HH:MM) can also be displayed.

All parameters are accessible on panel's communication port. When panel is connected to Modbus RTU Master equipment, parameters can be viewed and modified.

LMP-1.MP2BH parameters and functions allows adaptation to desired system and regulation diagram.

Panel is able to regulate 2 or 4-pipe systems, depending on 4/2 *pipe* parameter.

3 FEATURES

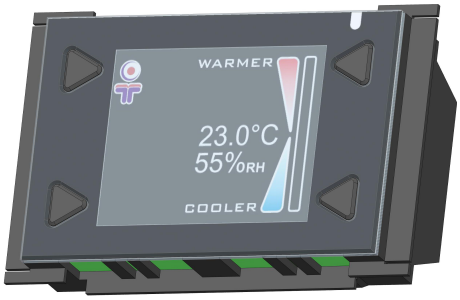


Figure 1: LMP-1.MP2BH module

Table 1: Features
Room temperature and humidity measurement
2 + 2 Push buttons for temperature set point
10 position LCD bar-graph for temperature set point
Light intensity measurement
LCD intensity control
Economic function
2/4 pipe heating cooling system supported
Balcony door/window function
Frost protection function
Color LCD display with background picture customization possibility[1]

1 For LCD background picture replacement, **please refer** to LCD Composer → Help.

4 OPERATION

Basic settings can be entered with panel push buttons (PB).
Modes of operation and parameters can be set from any Modbus RTU Master.

It is advised to press push buttons respectively with finger not faster than 1 press per second.

4.1 Operational modes

LCD Display "stand-by mode"

The display is normally in this mode, if no PB is pressed in last ~5 seconds.

LED intensity is in correlation with Light intensity measurement (more light - brighter, less light - darker).

Actual room temperature (0.5 °C resolution) is shown on the screen if enabled.

LCD Display "SET mode"

First press on any PB will activate the display to "set mode" and LCD intensity will be put to maximum. No action regarding the pressed PB is done. Further pressings on any PB will make the change (bar-graphs) regarding the pressed PB.

Actual temperature set-point (regarding the right bar-graph) is shown on the screen if enabled.

Display will return to "stand-by mode" if push buttons are not pressed for a while (~5 seconds).

Changing operation modes
Request for switching between CP *normal* and *economic* operating mode is done with lower left and right PB pressed simultaneously : switch to *economic* mode

Request for switching between CP *on* and *off* operating mode is done with upper left and right PB pressed simultaneously : CP switched *off*

Confirmation of above requested modes is done by Modbus RTU Master equipment by changing the appropriate command bit (normal/economic, system on/off).

Normal
This is default mode for MP2 module. The control algorithm is executing regarding the parameters.

Economy
If set, controller will start cooling when room temperature will raise above max. temperature set-point (SP) and stop when temperature will drop 1 °C below max. temp. SP. On the other hand, when room temperature fall's below min. temp. SP controller will start heating and stop when temperature will raise 1 °C above min. temp. SP.
In economic mode "ECO" sign appear on LCD.

Off
In this mode panel sends command to switch off all devices: hot valve and cold valve. Temperature LCD bar becomes white and "OFF" sign appear on LCD.
CP can be turned off using *System On/Off* command. In this case cool, heat commands are switched off. Cool and heat commands are also switched off when temperature measured by the panel is inside temperature dead band values (default dead band is 0.5 °C).

Error
In case of CP internal or communication fault, "ERR" sign appear on LCD.

Set
When any of four buttons is pressed more than certain time, “SET” sign appear on LCD and buttons functioning is enabled. After “SET” sign is off, push buttons functions are disabled.

4.2 Functions

PI controller
Output variable range is 0 to 10000 (0 .. 100 %) in heating and/or cooling mode respectively .

Values are used for the output for the heat/cool actuator (0-100% / On-Off valve).
The dynamics of PI calculation is defined by P& I parameters.

Example:

If proportional – P parameter (default = 25) is set to 1 and difference between measured temperature and temperature set point is changed to +1 °C, the PI output value will change from example 5000 to 5100. On the other hand if the difference is changed to -1 °C, PI output value will change from example 5000 to 4900.
If integral – I parameter (default = 5) is set to 1 and difference between measured temperature and temperature set point is +1 °C, the PI output value will increase every second by 1. On the other hand if the difference is -1 °C, the PI output value will decrease every second by 1.

2/4 pipe system selection
While 4-pipe (factory default) system active, controller will activate hot water actuator when heating is required and cool water actuator when cooling is required.
In case 2-pipe system is active, hot water actuator will be operated regardless whether heating or cooling is needed. Mode of operation (closing, opening) is dependent on *Winter/Summer* parameter.
Example:
System selected is 2-pipe , summer mode active and SP is lower than room temperature. CP will start cooling with activating heat valve. In 2-pipe system cool valve is always inactive.

Frost protection
Function activates heat command when room temperature measured by the panel drops below 7 °C. This function has priority over all control panel integrated functions.

Window open
Panel will operate in special mode if opened window and opened balcony door are detected. This function is enabled by enabling parameters *Balcony door En.* or *Window En.* When this function is active and one of parameters *Window* or *Balcony Door* commands is active, valves for heating and cooling will close (delay of 1 minute is add with Balcony door command).

4.3 Parameters

If parameter is set to logical “1”, is considered to be active, enabled or set. If parameter has logical value “0” is considered to be inactive, disabled, or cleared.

Parameter can be status or command or both. When parameter is marked as status this means that module is sending information to controller. On the other hand command represents request from module to Modbus RTU Master equipment.

Communication: Normal state is “1”. If off, there is communication error or no communication established.

Normal/Economic: When set Economic mode is enabled. Default value is “0” therefore normal mode is selected.

Local/Remote: When “0”, Local mode is selected. In this mode CP uses set point set by PB. In remote mode, “1”, CP uses set point received from other devices (HMI, Touch Panel, OT1, ...) through communication channel.

Heat valve: When valve is opened “1” is reported, while “0” stands for closed valve

Cool valve: When valve is opened “1” is reported, while “0” stands for closed valve

System On/Off: If parameter is set to “0” CP functions are executing in normal mode. If set to “1” all valves are OFF (closed).

Winter/Summer: Used only for t*wo-pipe system* to change calculation for Hot valve; Winter – heating (“0”) to Summer – cooling (“1”)

4/2 pipe: Four-pipe system manages hot and cold water pipes simultaneously. Two-pipe system manages only one pair of pipes (one valve, pump). Operation in two-pipe system is therefore dependent on *Winter/Summer (Change-over)* parameter.
“0” = Four pipe system
“1” = Two pipe system

Balcony door En.: When switch for detecting opened balcony door is connected to the system, this function should be enabled (“1”).

Balcony door switch: Parameter reports whether door are closed or opened
“1”: closed
“0”: opened

Window En.: When switch for detecting opened window is connected to the system, this function should be enabled (“1”).

Window switch: Parameter reports whether window is closed or opened
“1”: closed
“0”: opened

Max. temp.: denotes max. SP temp. which is scaled to top of LCD temperature bar

Min. temp.: denotes min. SP temp. which is scaled to bottom of LCD temperature bar

P regulation par.: Proportional parameter for PI calculation algorithm on CP

I regulation par.: Integral parameter for PI calculation algorithm on CP

PI Dead band: Value of change for PI loop output.

Temp. SP: This value is taken into PI calculation algorithm

Room temp.: Room temperature measured by CP panel.

Auxiliary room temp.: Room temperature value from other sensor is taken into PI calculation as

room temperature instead of temp. value measured by CP panel.

Absolute PI out: Result of PI calculation algorithm used for valve opening

Light intensity: Actual light intensity measured by sensor on CP

Min. light intensity: When *Light intensity* is lower than this parameter, LCD bar graph on CP turns off

Remote temp. SP: When *Local/Remote* parameter is active this parameter is taken into PI calculation algorithm as SP.

SP up: When this command changes to active, CP will increment SP for 1/10 of scale. It acts like pressing on *Warmer* PB on CP.

SP down: When this command changes to active, CP will decrement SP for 1/10 of SP range. It acts like pressing on *Cooler* PB on CP.

Real Time clock: Real time clock (HH:MM) value by Modbus RTU Master equipment for display on CP panel. Displaying is enabled with *RTC Enable* command bit.

Temp. display Enable: If this command is active, displaying of actual Room temperature on the CP panel is enabled.

PB pressed: This parameter indicates that any of PB is pressed.

4.4 Modbus RTU variables memory

Table 2: 0xxxx, Coils		
Reg.	**Description**	**Raw → Engineering data**
2	Normal/economy command	0 → Normal 1 → Economy
3	Local/remote command	0 → Local 1 → Remote
4	Set point DOWN command	0 → OFF 1 → DOWN
5	Set point UP command	0 → OFF 1 → UP
6	System ON/OFF command	0 → ON 1 → OFF
7	Winter/summer command	0 → Winter 1 → Summer
8	4/2 pipe system command	0 → 4 pipe 1 → 2 pipe
9	Temperature display number enable	0 → Disable 1 → Enable
10	RTC display number enable	0 → Disable 1 → Enable
13	Balcony door status	0 → Open 1 → Closed
14	Window switch status	0 → Open 1 → Closed
15	Enable balcony door command	0 → Disable 1 → Enable
16	Enable window command	0 → Disable 1 → Enable

Table 3: 4xxxx, Holding Registers		
Reg.	**Description**	**Raw → Engineering data**
1	Max. temperature set point parameter	0 .. 10000 → 0.00 .. 100.00 °C
2	Min. temperature set point parameter	0 .. 10000 → 0.00 .. 100.00 °C
3	P regulation parameter	0 .. 100 → 0 .. 100
4	I regulation parameter	0 .. 100 → 0 .. 100
5	PI deadband parameter	0 .. 10000 → 0.00 .. 100.00 °C
6	Min. light intensity parameter	0 .. 100 → 0 .. 100 %
7	Remote temperature set point	0 .. 10000 → 0.00 .. 100.00 °C
9	Real time clock set value	0 .. 23:0 .. 59 → 0 .. 23:0 .. 59

Table 3: 4xxxx, Holding Registers		
10	Remote temperature	0 .. 10000 → 0.00 .. 100.00 °C

Table 4: 1xxxx, Digital Inputs		
Reg.	**Description**	**Raw → Engineering data**
1	Communication status	0 → Error 1 → OK
2	Normal/economy status	0 → Normal 1 → Economy
3	Local/remote status	0 → Local 1 → Remote
4	Heat valve status	0 → Closed 1 → Open
5	Cool valve status	0 → Closed 1 → Open
6	System ON/OFF status	0 → ON 1 → OFF
7	Winter/summer status	0 → Winter 1 → Summer
8	4/2 pipe system status	0 → 4 pipes 1 → 2 pipes
14	Push button pressed status	0 → OFF 1 → ON
15	Balcony door status enable	0 → Disable 1 → Enable
16	Window status enable	0 → Disable 1 → Enable

Table 5: 3xxxx, Input Registers		
Reg.	**Description**	**Raw → Engineering data**
1	Max. temperature set point value	0 .. 10000 → 0.00 .. 100.00°C
2	Min. temperature set point value	0 .. 10000 → 0.00 .. 100.00°C
3	P regulation parameter status	0 .. 100 → 0 .. 100
4	I regulation parameter status	0 .. 100 → 0 .. 100
5	PI deadband parameter	0 .. 10000 → 0.00 .. 100.00 °C
7	Temperature set point	0 .. 10000 → 0.00 .. 100.00 °C
8	Actual room temperature	0 .. 10000 → 0.00 .. 100.00 °C
9	Actual room relative humidity	0 .. 100 → 0 .. 100 %
10	Actual light intensity	0 .. 100 → 0 .. 100 %

4.5 Modbus RTU settings memory

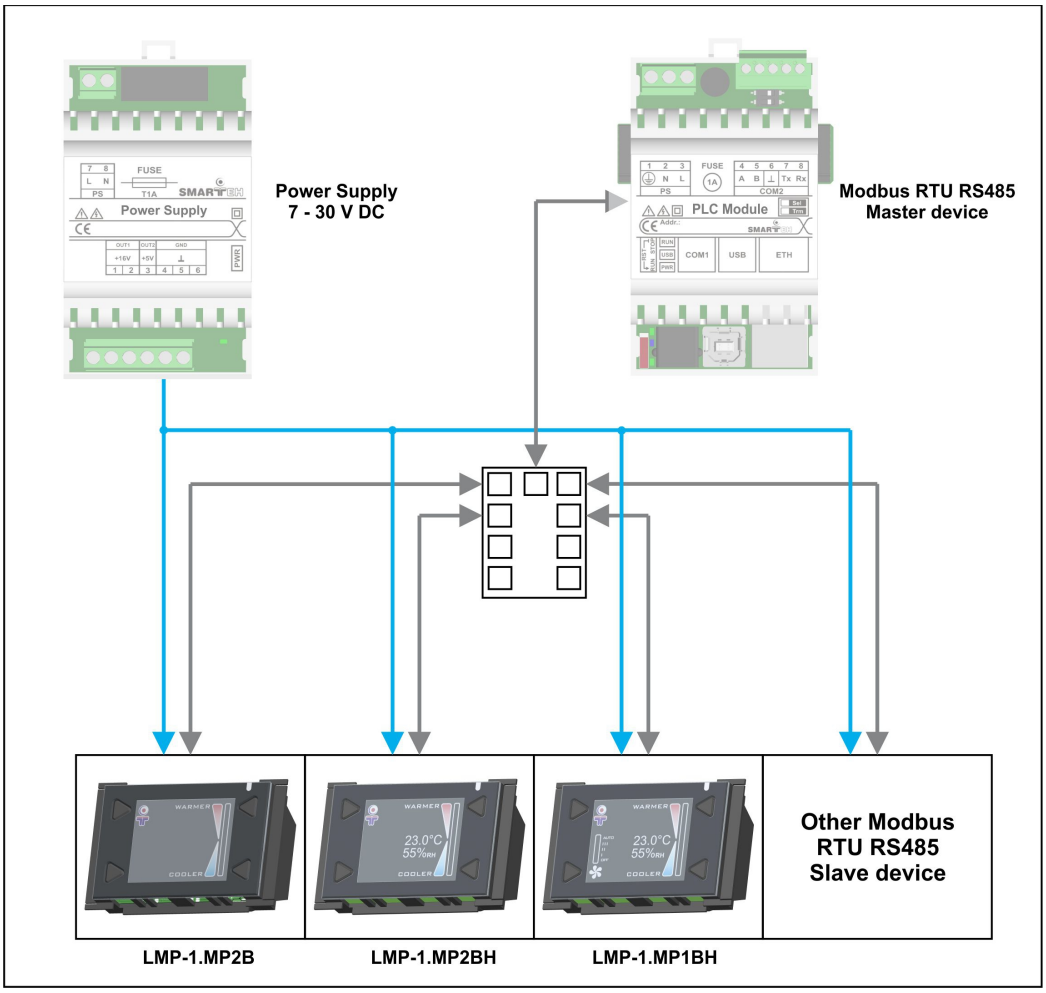
Table 6: 4xxxx, Holding Registers		
Reg.	**Description**	**Raw → Engineering data**
90	EEPROM write command [2]	On rising edge from 0 to 12345 the Modbus RTU settings are updated
95	Temperature offset	-1000 .. +1000 → -10.00 .. +10.00 °C
98	Modbus RTU slave address	0 .. 10000 → 0.00 .. 100.00 °C
99	Modbus RTU baud rate NOTE: polling cycle faster than 500 msec can cause occasionally timeout warnings.	0 → 19200 bps (default) 1 → 600 bps 2 → 1200 bps 3 → 2400 bps 4 → 4800 bps 5 → 9600 bps 6 → 14400 bps 7 → 19200 bps Other → 19200 bps
100	Modbus RTU Parity	1 → Even (default) 2 → Odd Other → Even

2 On change from 0 to 12345 the RTU settings memory (40091..40100) will be updated into the module Eeprom.

5 INSTALLATION

5.1 Connection scheme

Figure 2: Connection scheme



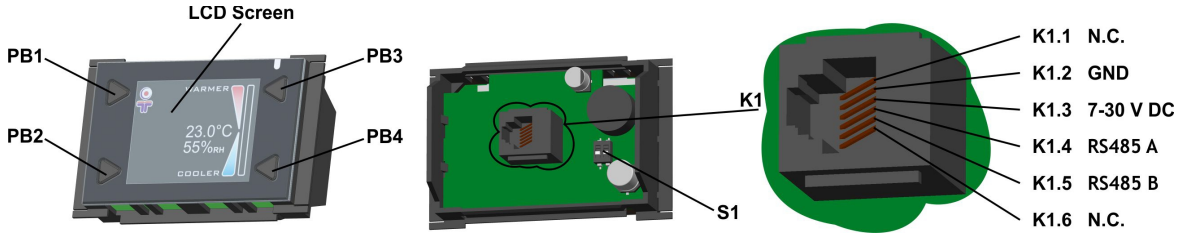


Table 7: K1		
K1.1	N.C.	Not connected
K1.2	GND	Ground
K1.3	7 .. 30 V DC	Power supply input
K1.4	Standard RS-485 A	Data receive/send line A
K1.5	Standard RS-485 B	Data receive/send line B
K1.6	N.C.	Not connected

Table 8: LCD bars & Buttons		
Bar 1 LCD	Temp. SP	Active LCD bar presents actual set point relative to range *Min. temp.* (bottom LCD bar) and *Max. temp.* (top LCD bar)
PB1/PB3 (Up-left/Up-right)	Temp. SP Up	Increase by one step, step = (*Max. temp* - *Min. temp*) * 1/10
PB2/PB4 (Down-left/Down-right)	Temp. SP Down	Decrease by one step, step = (*Max. temp* - *Min. temp*) * 1/10

Table 9: S1[3]		
SELECTOR	**Switch 1**	**Switch 2**
User settings, from Modbus RTU registers	OFF	OFF
Mode for download LCD background picture	OFF	ON
Not used	ON	OFF
Default factory settings active, 19200 bps/8 data bits/1 stop bit/EVEN	ON	ON

3 Reset LMP-1 module after switch S1 changed, to activate new settings.

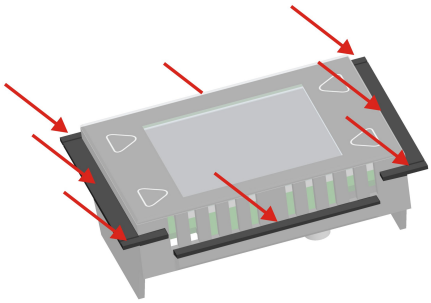
5.2 Mounting frame selection

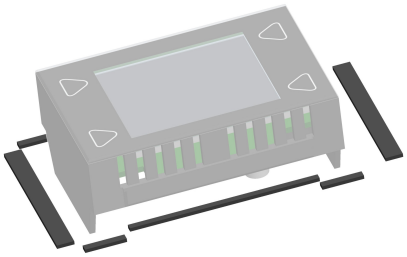
Smarteh has verified following lines to be compatible with LMP-1.MP2BH module:

- Bticino – Living, Light
- Gewiss – Playbus, System
- Vimar – Plana, Idea
- Tem – Modul Soft, Modul Line
- Master

Frames of other vendors most probably suits as well, but they were not verified by Smarteh. Before installation verify compatibility of non listed frames.

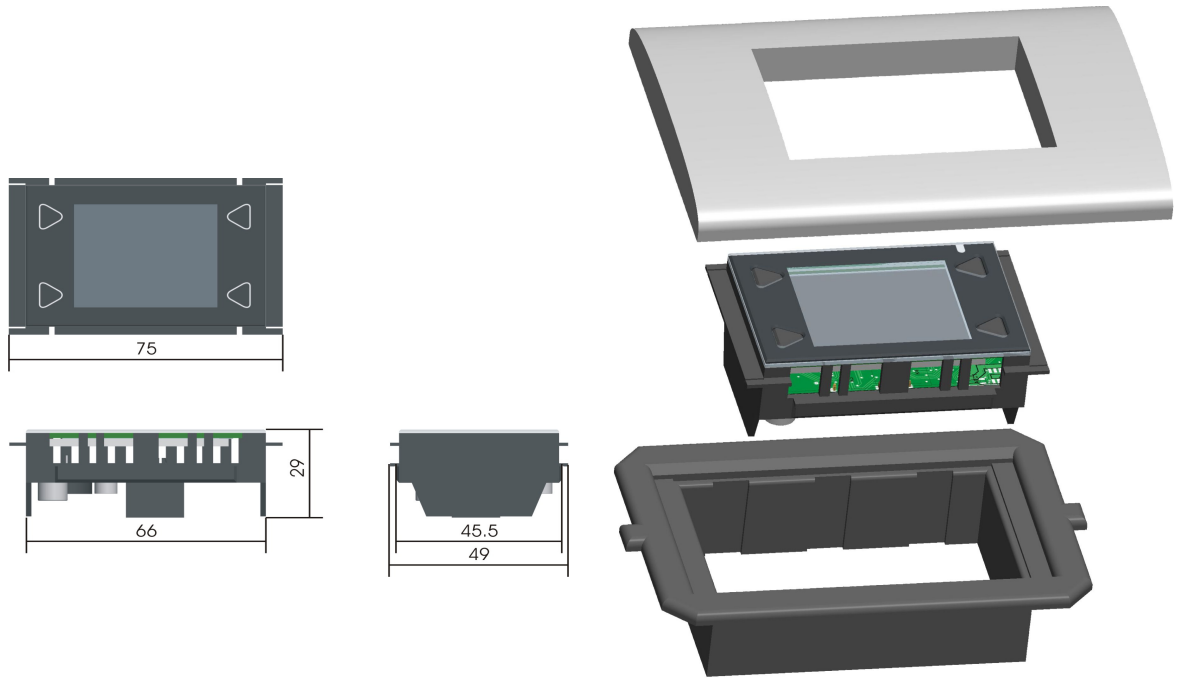
Module housing has a fin on each side, which can be easily removed with knife cutter or pliers. This adaptation enables housing to be build in various frame formats with two different depths. With regard to frame used you may remove fin for housing to fit in.





5.3 Mounting instructions

Figure 3: Housing dimensions



Dimensions in milimeters.

All connections, module attachments and assembling must be done while module is not connected to the main power supply.

Module should be positioned in the wall inside of the room. Avoid direct sunlight or positioning near heating/cooling source object.

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.

1. Set the correct LMP-1.MP2BH settings (refer to Table 6 and Table 9).
2. Connect LMP-1.MP2BH with appropriate cable to the connector K1, Modbus RTU Master equipment and power supply source (refer to Table 7). Max. allowed tensile force is 30 N.
3. Put the LMP-1.MP2BH in mounting frame
4. Cover LMP-1.MP2BH with cover plate

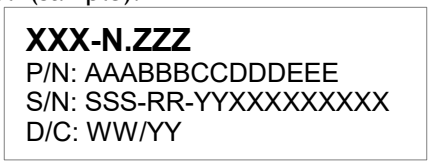
Modbus RTU settings source is set with DIP switch on the back of the LMP-1.MP2BH module (Table 9).

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

5.4 Module labeling

Figure 4: Label

Label (sample):



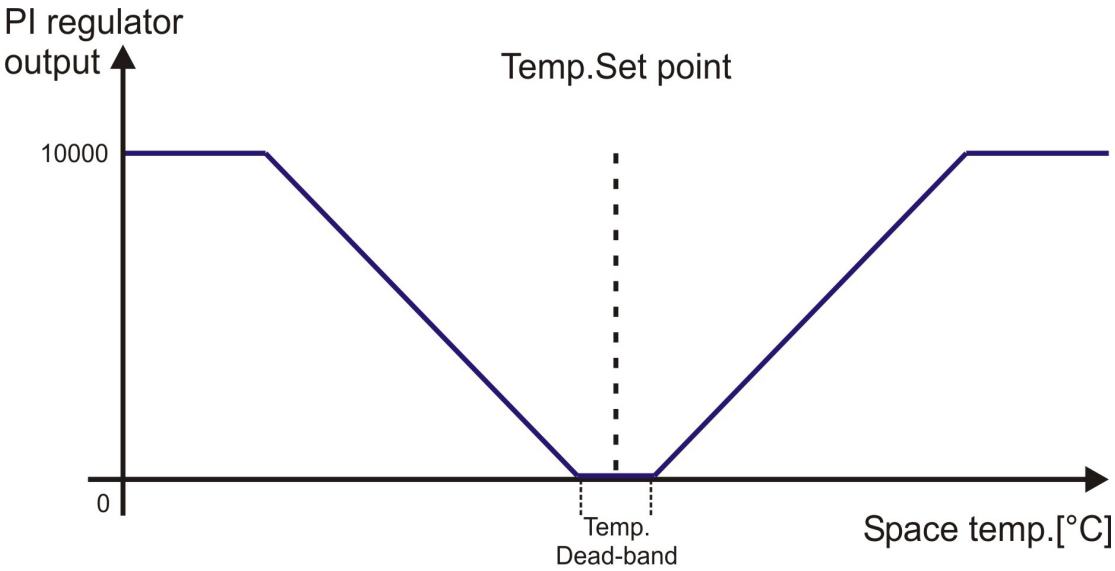
Label description:

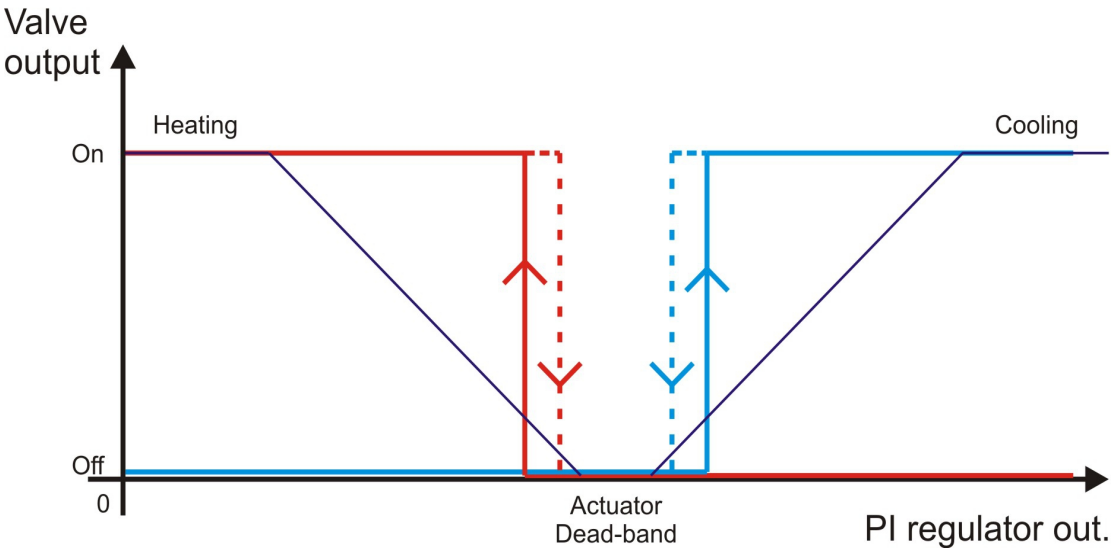
1. **XXX-N.ZZZ** - full product name.
   - **XXX-N** - Product family
   - **ZZZ** - product
2. **P/N: AAABBBCCDDDEEE -** part number.
   - **AAA** - general code for product family,
   - **BBB** - short product name,
   - **CCDDD** - sequence code,
     - **CC** - year of code opening,
     - **DDD** - 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***

6 REGULATION DIAGRAM





7 TECHNICAL SPECIFICATIONS

Table 10: Technical specifications	
Power supply	7 .. 30 V DC from an external source
Interconnection connector type	RJ-12 6/6
Power consumption	1 W
Dimensions (W x H x D)	75 x 49 x 29 mm
Weight	50 g
Maximum altitude	2000 m
Mounting position	horizontal
Ambient temperature	0 to 50 °C
Ambient humidity	max. 95 %, no condensation
Transport and storage temperature	-20 to 60 °C
Protection class	IP 20

8 CHANGES

The following table describes all the changes to the document.

Date	V.	Description
20/1/21	1	*The initial version, issued as LMP-1.MP2BH module UserManual.*

9 NOTES