USER MANUAL

Longo modbus product
LMP-1.MP1BH
Modbus RTU Temperature
Humidity Control panel

Version 1

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 product LMP-1.MP1BH

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.MP1BH Modbus RTU Slave compatible control panel (CP) is used for room temperature and humidity regulation using fan-coil or other heating/cooling devices.

Panel is equipped with temperature 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.

With *fan PB* speed I, speed II, speed III, AUTO or OFF modes of operation can be selected. Fan mode is represented with left blue LCD bar-graph.

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 humidity (1 % resolution). The real time clock (HH:MM) can also be displayed. Enabling can be done by MCU enable commands.

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.MP1BH parameters and functions allows adaptation to desired system and regulation diagram.

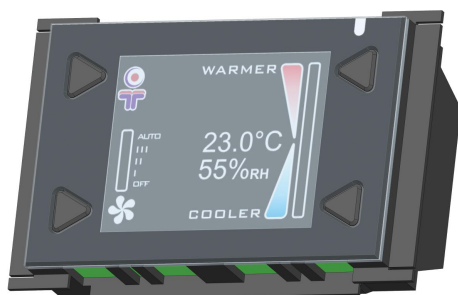Panel is able to regulate 2 or 4-pipe systems, depending on 4/2 *pipe* parameter.

3 FEATURES

Figure 1: LMP-1.MP1BH module.

Table 1: Technical data
Room temperature and humidity measurement
2 push buttons for temperature set point
2 push buttons for manual fan speed, auto and controller off
10 position LCD bar-graph for temperature set point
4 position LCD bar-graph for manual fan speed, auto and controller off
Light intensity measurement
LCD intensity control
Step-less or 3 step fan motor controlling
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 equipment.

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) and humidity (1 % 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 MP1BH 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, cold valve, fan. Temperature LCD bar becomes white and "OFF" sign appear on LCD.
CP can be turned off using *fan* PB or *System On/Off* command. In this case cool, heat and fan 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 analog/digital (0 .. 100 % / I.,II.,III. speed) output reference for the fan speed and/or 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, fan will stop and 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" Fan speed and all valves are OFF (closed).

Winter/Summer: Used only for *two-pipe system* to change calculation for Hot valve and Fan speed; 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

Fan speed I.: When this parameter is "1", actual fan speed is I.

Fan speed II.: When this parameter is "1", actual fan speed is II.

Fan speed III.: When this parameter is "1", actual fan speed is III.

Fan speed mode : This parameter determines fan speed adjustment mode:
"0": Manual
"1": Auto

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.

Fan reference: denotes fan speed value requested by panel

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 fan speed and 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.

Fan mode set: Fan mode on CP panel can be remotely changed by Modbus RTU Master equipment. [0,1,2,3,4=Off,I.,II.,III.,auto]. The change is made by setting the *Fan Remote Cmd.* command bit.

Remote Fan mode inc: When this command changes to active, Fan mode on CP panel will be changed in increment-rotate way [->Off,I.,II.,III.,auto,->].

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.

Fan DB Off: If this command is active, the Fan speed inside dead-band goes to Off. Otherwise it remains in low speed.

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
1	Fan in deadband OFF command	0 → Fan ON 1 → Fan OFF
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
11	Fan mode increment command	0 → 0 1 → Led Up
12	Fan local/remote command	0 → Local 1 → Remote
13	Balcony door status	0 → Open 1 → Closed
14	Set point display only enable	0 → Disable 1 → Enable
15	Balcony door command enable	0 → Disable 1 → Enable
16	Temperature unit	0 → °C 1 → °F

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

Table 3: 4xxxx, Holding Registers

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
8	Fan mode set	0 → OFF 1 → I 2 → II 3 → III 4 → Auto
9	Real time clock set value	0 .. 23:0 .. 59 → 0 .. 23:0 .. 59
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
9	Fan speed I status	0 → 0 1 → Speed I
10	Fan speed II status	0 → 0 1 → Speed II
11	Fan speed III status	0 → 0 1 → Speed III
12	Fan local/remote status	0 → Local 1 → Remote
13	Fan mode manual/auto	0 → Manual 1 → Auto

Table 4: 1xxxx, Digital Inputs

14	Push button pressed status	0 → OFF 1 → ON
15	Enable balcony door status	0 → Disable 1 → Enable
16	Enable window status	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
6	Fan reference	0 .. 10000 → 0.00 .. 100.00 %
7	Temperature set point	0 .. 10000 → 0.00 .. 100.00 °C
8	Actual room temperature	0 .. 10000 → 0.00 .. 100.00 °C
9	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 ms 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
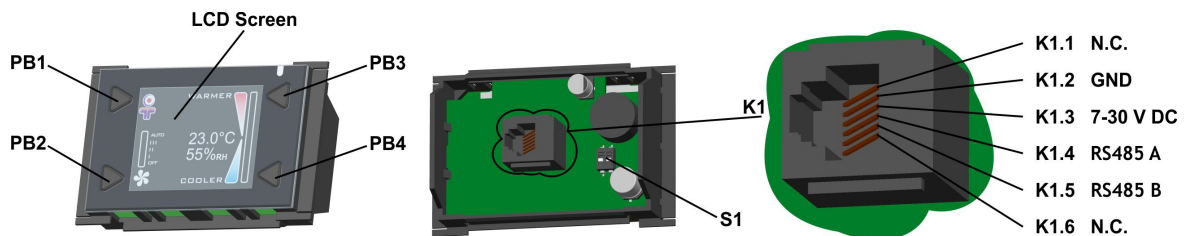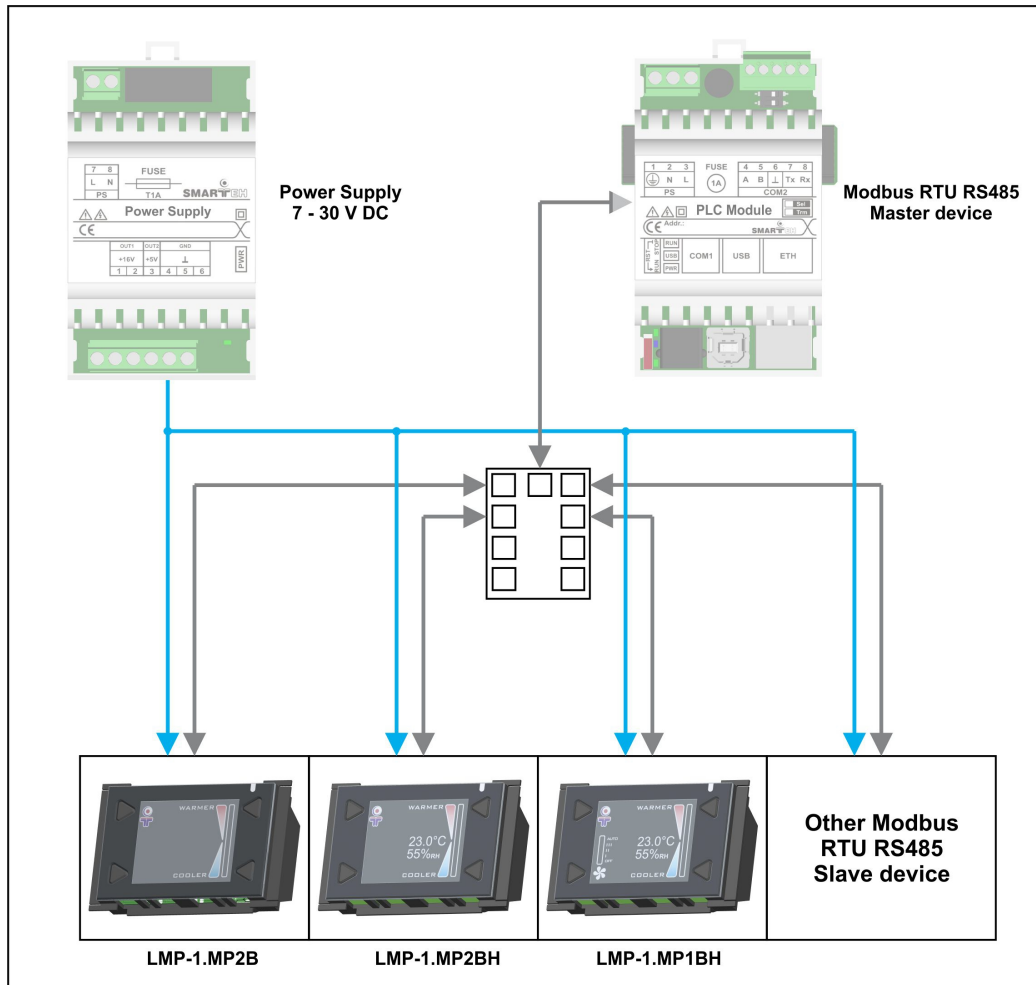
Table 7: K1

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)
Bar 2 LCD	Fan mode	I: minimum speed selected II: middle speed selected III: maximum speed selected AUTO: auto speed selection OFF: module functions switched-off
PB1 (Up-left)	Fan mode	Increase Mode & speed selection
PB2 (Down-left)	Fan mode	Decrease Mode & speed selection
PB3 (Up-right)	Temp. SP Up	Increase by one step, step = (*Max. temp* - *Min. temp*) * 1/10
PB4 (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.MP1BH 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 4: Housing dimensions
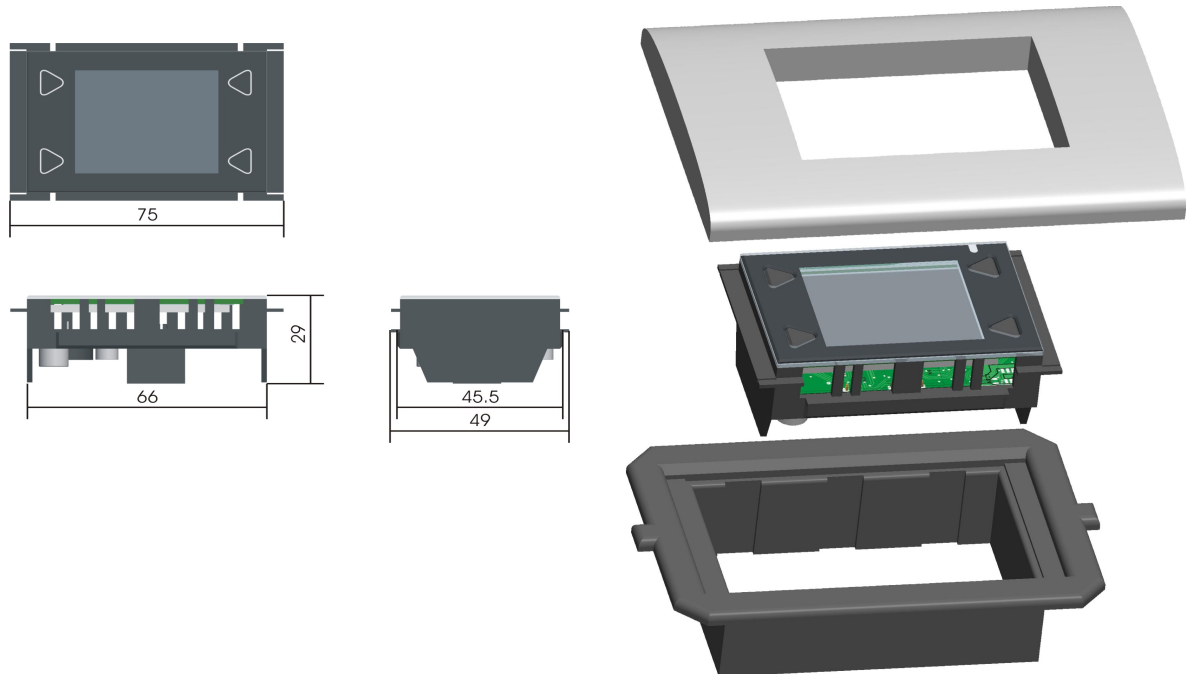
Dimensions in milimeters.

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.MP1BH settings (refer to Table 6 and Table 9).
2. Connect LMP-1.MP1BH 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.MP1BH in mounting frame
4. Cover LMP-1.MP1BH with cover plate

Modbus RTU settings source is set with DIP switch on the back of the LMP-1.MP1BH 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):

> **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,
   - **XXXXXXXX**– 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
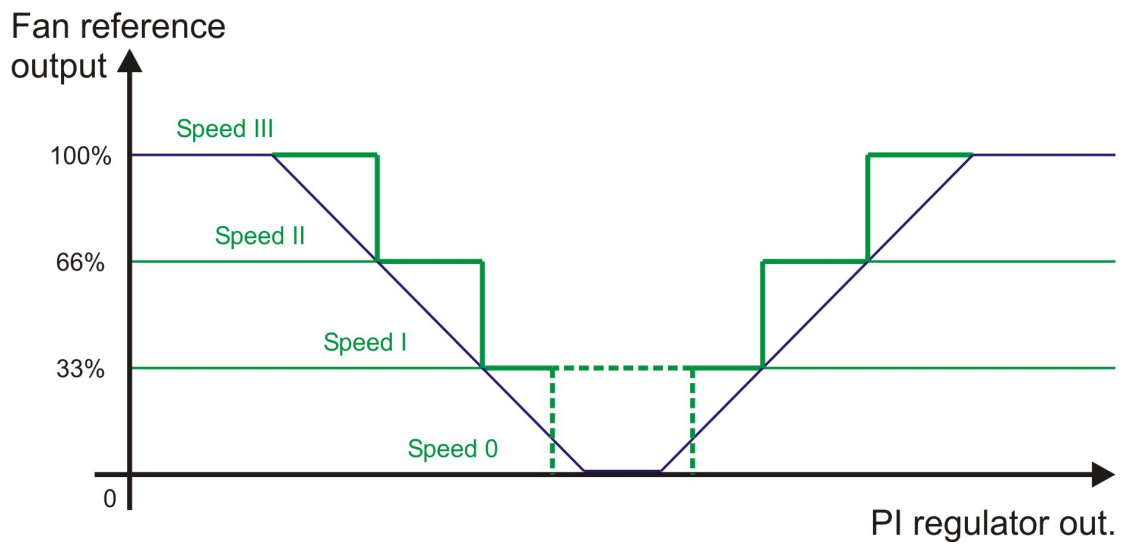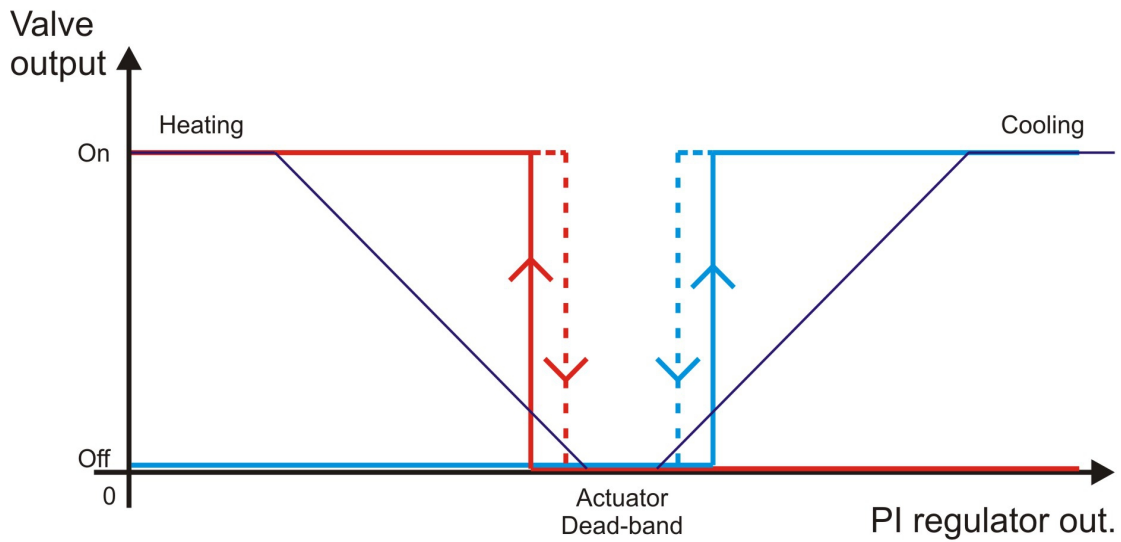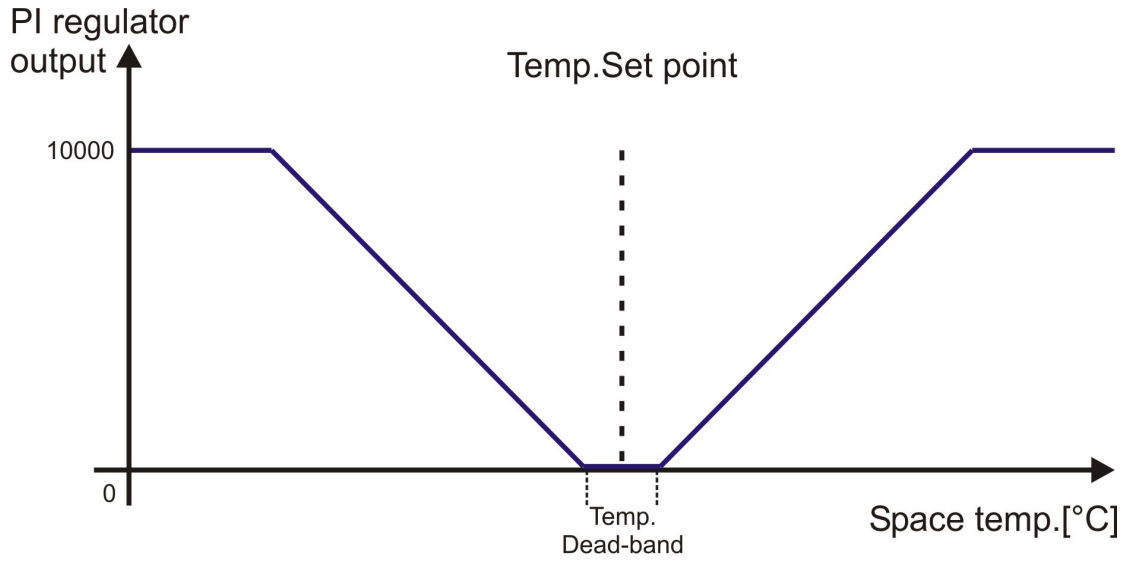
7 TECHNICAL SPECIFICATIONS

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
23/12/20	1	The initial version, issued as *LMP-1.MP1BH module UserManual*.

9 NOTES