# USER MANUAL

Longo programmable controller
LPC-2.P01V
Temperature Control panel

**Version 2**

*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

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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 100 .. 240 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 modules LONGO LPC-2 – if no modifications are performed upon and are correctly connected by authorized personnel – in consideration of maximum allowed connecting power, warranty of 24 months is valid from the date of sale to the end buyer, but not more than 36 months after delivery from Smarteh. 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 LPC-2 complies to the following standards:

- EMC: EN 61000-6-3:2007 + A1:2011, EN 61000-6-1:2007, EN 61000-3-2:2006 + A1:2009 + A2: 2009, EN 61000-3-3:2013
- LVD: IEC 61010-1:2010 (3rd Ed.), IEC 61010-2-201:2013 (1st Ed.)

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.

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

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## Longo programmable controller LPC-2.P01V

# 1 ABBREVIATIONS

| | |
|---|---|
| SP | Set-point |
| CP | Control panel |
| PB | Push button |
| LED | Light emitting diode |

# 2 DESCRIPTION

LPC-2.P01V control panel (CP) is used for room temperature regulation.

Panel is equipped with temperature and light intensity sensor and three push buttons (PB). To increase, decrease temperature set point *warmer*, *cooler* PB should be pressed respectively. With *fan PB* speed I, speed II, speed III, AUTO or OFF modes of operation can be selected. Temperature SP, fan mode and panel switched off mode are represented with two LED bar-graphs. Light intensity sensor controls LED bar-graph intensity.

All parameters are accessible on panel's communication port. When panel is connected to the LPC-2 main module parameters can be viewed and modified with Smarteh IDE application.

LPC-2.P01V parameters and functions allows adaptation to desired system and regulation diagram.

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

LPC-2.P01V is controlled and powered from the main module (e.g., LPC-2.MC9) via Smarteh bus.

# 3 FEATURES


Figure 1: LPC-2.P01V module

| Table 1: Features |
|---|
| Room temperature measurement |
| 2 push buttons for temperature set point |
| 1 push button for manual fan speed, auto and controller off |
| 10 LED bar-graph for temperature set point |
| 4 LED bar-graph for manual/auto fan speed setting |
| Light intensity measurement |
| LED intensity control |
| Step-less or 3 step fan motor controlling |
| Economic function |
| 2/4 pipe heating cooling system supported |
| Balcony door and window function |
| Frost protection function |
| Power LED |
| Internal fault LED |

# 4 OPERATION

Basic setting can be entered with panel Push Buttons (PB).
Modes of operation and parameters can be set via Smarteh IDE software, some of them can be also activated through special sequence PB pressing.

## 4.1 Operational modes

**Changing operation modes**
Switching between modes is done with PB1 (SP Up):
pressed 5 s - switch to *economic* mode
pressed 10s - switch to *Off* mode
Exit to normal mode is executed with a short press on a PB1 (SP Up).

**Normal**
This is default mode for P01V module.

**Economic**
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 setpoint LED in barLED1 is blinking.

**Off**
In this mode panel sends command to switch off all devices: hot valve, cold valve, fan, LED's. 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 deadband values (default = 0.5 °C).

## 4.2 Functions

**PI controller**
Output variable range is 0 to 10000. Values from 0 to 4999 represents cooling and values from 5000 up to 10000 represents heating.
Example: If proportional – P parameter (default = 25) is set to 1 and difference between measured temperature and temperature set point is +1 °C, the PI output value will be 5100. On the other hand if the difference is -1 °C, the control panel regulator output value will be 4900.
If integral – I parameter (default = 5) is set to 1 and difference between measured temperature and temperature set point is +1 °C, the control panel regulator output will increase every second by 100. On the other hand if the difference is -1 °C, the control panel regulator output will decrease every second by 100.

**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 5 °C. This function has priority over all control panel integrated functions.

**Open window**
Panel will operate in special mode if open 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 go to the first (I.) speed and valves for heating and cooling will be closed.

## 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 main module.

*Communication*: Normal state is "0". If set, 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 setpoint set by pushbuttons. In remote mode, "1", CP uses setpoint 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 "1" CP functions are executing in normal mode. If set to "0" Fan speed and all valves are OFF (closed).

*Winter/Summer:* Used only for t*wo-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 *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

"0": closed
"1": 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
"0": closed
"1": opened

*Max. temp.*: denotes max. SP temp. which is scaled to top of barLED1

*Min. temp.*: denotes min. SP temp. which is scaled to bottom of barLED1

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

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

*PI Deadband*: 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

*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, LED bargraph on CP turns off

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

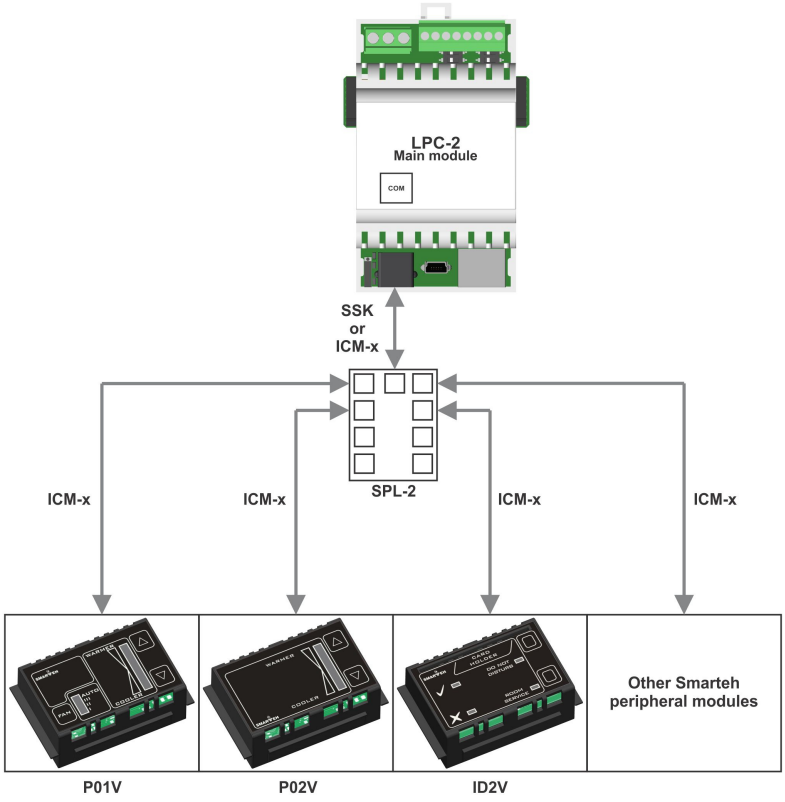
*SP up:* When *Local/Remote* parameter is active and this command changes to active, CP will increment SP for 1/10 of scale. It acts like one press on *Up* PB1 on CP.

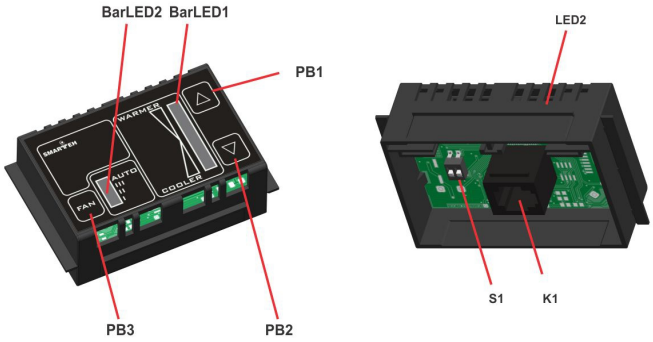
*SP down:* When *Local/Remote* parameter is active and this command changes to active, CP will decrement SP for 1/10 of SP range. It acts like one press on *Down* PB2 on CP.

# 5 INSTALLATION

## 5.1 Connection scheme

**Figure 2: Connection scheme**



| Table 2: K1 | | |
|---|---|---|
| K1.1 | GND | Ground |
| K1.2 | 7 .. 30 V DC | Power supply input |
| K1.3 | Standard RS-485 A | Data receive/send line A |
| K1.4 | Standard RS-485 B | Data receive/send line B |

| Table 3: LEDs & Buttons | | |
|---|---|---|
| LED2: red | Communication | ON: RS-485 communication fault<br>OFF: RS-485 communication OK |
| BarLED1 | Temp. SP | lit LED presents actual set point relative to range<br>*Min. temp.* (bottom barLED) - *Max. temp.* (top barLED) |
| BarLED2 | Fan mode | I: minimum speed selected<br>II: middle speed selected<br>III: maximum speed selected<br>AUTO: auto speed selection<br>no LED lit: functions switched-off |
| PB1 | Temp. SP | Increase by one step, step = (*Max. temp - Min. temp*) * 1/10 |
| PB2 | Temp. SP | Decrease by one step, step = (*Max. temp - Min. temp*) * 1/10 |
| PB3 | Fan speed | Mode & speed selection |

| Table 4: S1 | | |
|---|---|---|
| **RS-485 ADDRESS** | **Switch 1** | **Switch 2** |
| 0 | OFF | OFF |
| 1 | OFF | ON |
| 2 | ON | OFF |
| 3 | ON | ON |

## 5.2 Mounting frame selection

Smarteh has verified following lines to be compatible with LPC-2.P01V module:

- Bticino – Living, Light
- Gewiss – Playbus, System
- Vimar – Plana, Idea
- Tem
- 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 regard to frame used you may remove fin for housing to fit in.

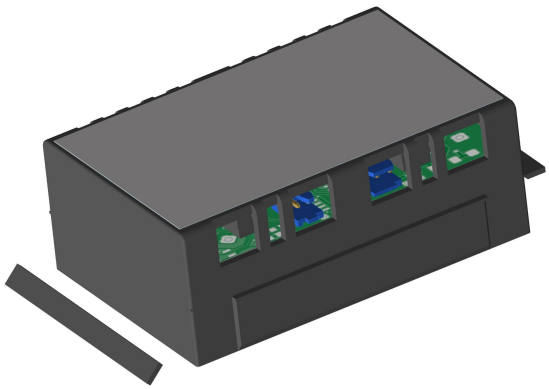
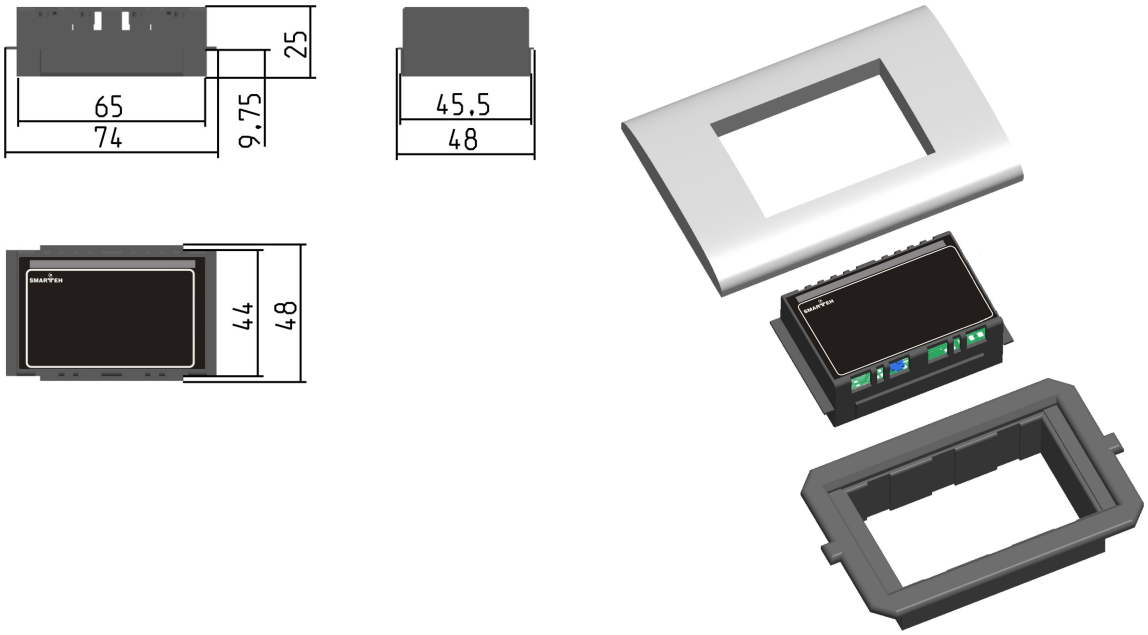


Figure 1: Module with removable fin

## 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.

**Mounting instructions:**

1. Set the correct RS-485 address (S1 switch) for LPC-2.P01V (refer to the Table 4).
2. Connect interconnection cable to the connector K1. Max. allowed tractive force is 30 N.
3. Put the LPC-2.P01V in mounting frames.
4. Cover LPC-2.P01V with cover plate.

LPC-2.P01V is connected to the main module with interconnection cable (e.g. SSK, ICM-7) which must be ordered together with LPC-2.P01V module. When more modules are connected to the main module, splitter (e.g. SPL-2) is also required (Figure 2). Signal wires must be installed separately from power and high voltage wires in accordance with general industry electrical installation standard.

**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 5: Labels**

Label 1 (sample):

**LPC-2.P01V**
P/N:225P0108V01001
D/C: 40/08

Label 2 (sample):

S/N: P01V-S9-0800000003

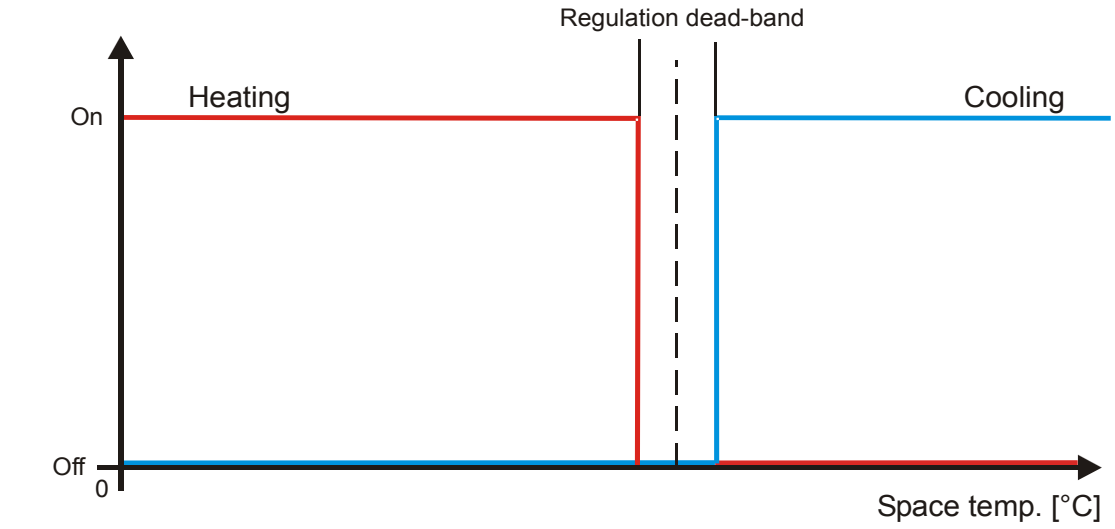
***Label 1 description:***

- **LPC-2.P01V** is the full product name.
- P/N: 225P0108V01001 is the part number.
  - 225 – general code for LPC-2 product family,
  - P01 – short product name,
  - 08 – year of code opening,
  - V - denotes flush frame mounting module,
  - 01 – derivation code,
  - 001 – version code (reserved for future HW and/or SW firmware upgrades).
- D/C: 40/08 is the date code.
  - 40 – week and
  - 08 – year of production.

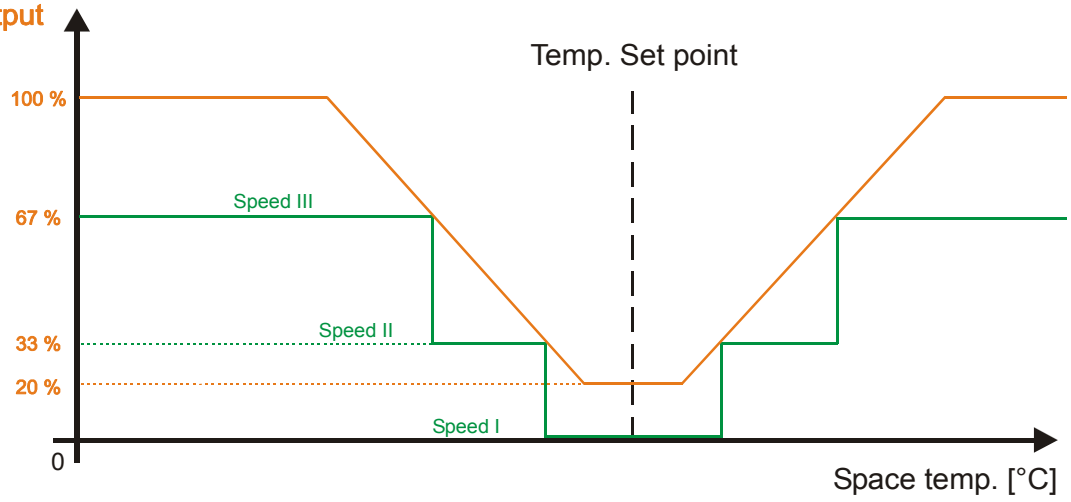
***Label 2 description:***

- S/N: P01V-S9-0800000003 is the serial number.
  - P01V – short product name,
  - S9 – user code (test procedure, e.g. Smarteh person xxx),
  - 08 – year (last two cyphers),
  - 00000003 – current stack number; previous module would have the stack number 00000002 and the next one 00000004.

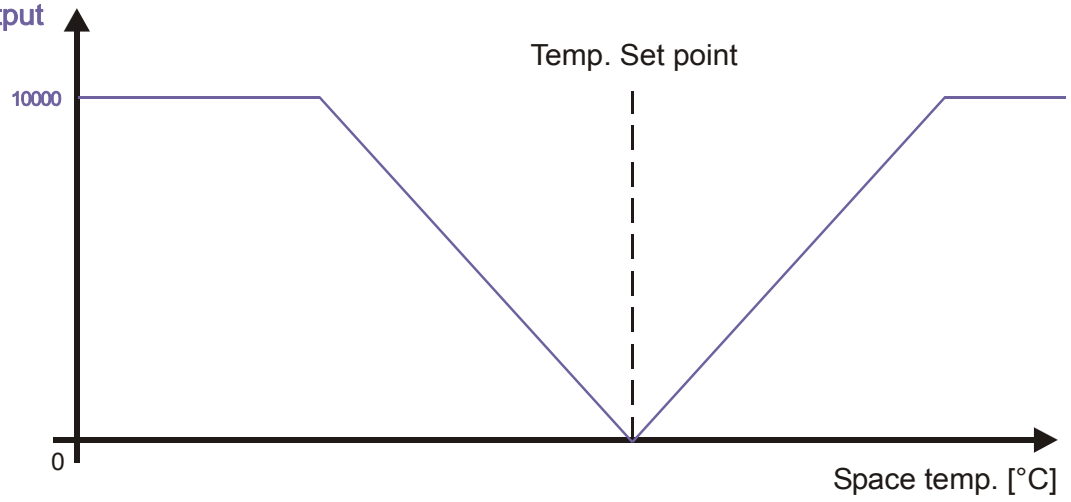
# 6 REGULATION DIAGRAM




Fan reference output




PI regulator output



# 7 TECHNICAL SPECIFICATIONS

| Table 5: Technical specifications | |
|---|---|
| Power supply | from main module |
| Interconnection connector type | RJ-12 6/6 |
| Power consumption | 0.5 W |
| Dimensions (W x H x D) | 65 x 47 x 25 mm |
| Weight | 35 g |
| Maximum altitude | 2000 m |
| Mounting position | all directions |
| 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 SPARE PARTS

For ordering spare parts following Part Numbers should be used:

| LPC-2.P01V temperature control panel, black | |
|---|---|
| LPC-2.P01V | P/N: 225P0108V02002 |

| LPC-2.P01V temperature control panel, white | |
|---|---|
| LPC-2.P01V | P/N: 225P0108V01002 |

| Interconnection cable | |
|---|---|
| ICM-x | P/N: 203ICMxxxxxxxx |

| Interconnection cable | |
|---|---|
| SSK | P/N: 203SSK05001001 |

| Splitter | |
|---|---|
| SPL-2 (1/8) | P/N: 206SPL04002001 |

# 9 CHANGES

The following table describes all the changes to the document.

| Date | V. | Description |
|---|---|---|
| 15.03.17 | 2 | General update. |
| 28.02.09 | 1 | The initial version, issued as *LPC-2.P01V module UserManual*. |

# 10 NOTES