USER MANUAL

Longo programmable controller
LPC-2.IR2V
Multisensor

Version 7

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 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.

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Longo programmable controller LPC-2.IR2V

1 ABBREVIATIONS

Sorted by order of appearance in document:

IR	Infrared
LED	Light emitting diode
PWR	Power
ERR	Error
DIP	Dual in-line package
SEL	Selector

2 DESCRIPTION

The LPC-2.IR2V is a sensor which consists of the lux sensor for light intensity measurements, temperature sensor, relative humidity sensor and IR receive/transmit for IR communication.

Measuring light intensity, temperature and relative humidity provides the information needed for achieving good work conditions. IR transmit feature can be used for remote controller substitution, for example air conditioning can be controlled from Smarteh main module via LPC-2.IR2V in parallel with remote controller. On the other hand, IR receive feature can be used for receiving commands to the main module from Smarteh remote controller, smartphone or other remote controller.

LPC-2.IR2V is controlled and powered from the main module (e.g., LPC-2.MC8, LPC-2.MC9) via Smarteh bus.

3 FEATURES

Figure 1: LPC-2.IR2V sensor

Table 1: Features
Room temperature and relative humidity measurement
Lux sensor for light intensity measurement
IR receive/transmit
Programmable IR transceiver
RC-5 IR protocol receiver
Daikin, Toshiba, Hitachi, Panasonic, Mitsubishi, LG IR protocol transmitter
2 diagnose LED
Modular frame mounting

NOTE: In case of usage Daikin, Toshiba, Hitachi, Panasonic, Mitsubishi or LG IR protocol transmitter, due to various sub protocols, consult with Smarteh.

4 OPERATION

LPC-2.IR2V can be in one of two operational modes - normal or error. When LPC-2.IR2V is in normal mode, module parameters can be read or written via Smarteh IDE software.

4.1 Operational modes

Normal
Communication with the main module is working. Only green "PWR" LED2 is turned on.

Error
In case of communication fault, red "ERR" LED1 will turn on.

4.2 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 a command or feedback. When parameter is marked as feedback it means that LPC-2.IR2V is sending information to the main module. On the other hand, command represents request from the main module to the LPC-2.IR2V.

Command:

> **IR command number selection for transmit [oIrCmdSendNum]:** This parameter is used to select the IR learned command which will be used for transmit.
> Type: WORD
> Raw to engineering data: 1 .. 15 → IR transmit command 1 .. IR transmit command 15

> **IR command transmit control bit [oIrCmdSend]:** When this bit goes to "1", corresponding command is transmitted. When protocol selector is set to 0, IR learned command is set by *oIrCmdSendNum*. When protocol selector is set to 2 .. 8, all corresponding commands are transmitted (*oIrOffOn, oIrTSet, oIrFanSet, oIrModeSet*).
> Type: BOOL
> Raw to engineering data: "0" → No transmit
>   "1" → Transmit selected IR command

> **IR protocol selector [oIrProtocolSel]:** Selector for IR protocol.
> Type: WORD
> Raw to engineering data: 0 → Learned IR commands (Receive and transmit)
>   1 → RC-5 IR protocol (Receive only)
>   2 → Daikin (Transmit only)
>   3 → Toshiba (Transmit only)
>   4 → Hitachi (Transmit only)
>   5 → Panasonic (Transmit only)
>   6 → Mitsubishi (Transmit only)
>   7 → LG - Type 1 (Transmit only)
>   8 → LG - Type 2 (Transmit only)

> **IR Off/On command [oIrOffOn]:** IR command for Off or On is transmitted when *oIrCmdSend* is set. Applicable only when protocol selector is set to 2 .. 8.
> Type: BOOL
> Raw to engineering data: "0" → IR set Off command
>   "1" → IR set On command

IR set temp. setpoint *[oIrTSet]*: IR command for temperature setpoint. Applicable only when protocol selector is set to 2 .. 8.
Type: WORD
Raw to engineering data: 10 .. 32 → 10°C .. 32°C

IR set fan speed *[oIrFanSet]*: IR command for fan speed. Applicable only when protocol selector is set to 2 .. 8.
Type: WORD
Raw to engineering data: 0 .. 65535 → Fan speed 0 .. Fan speed 65535[1]

IR set mode *[oIrModeSet]*: IR command for air-conditioning mode. Applicable only when protocol selector is set to 2 .. 8.
Type: WORD
Raw to engineering data: 0 .. 65535 → Mode 0 .. Mode 65535[1]

LED Off/On *[oLed]*: Command to set LED3 Off or On.
Type: BOOL
Raw to engineering data: "0" → LED3 Off
                                  "1" → LED3 On

Feedback:

Actual light intensity value *[iLight]*: Actual measured light intensity value.
Type: WORD
Raw to engineering data: 0 .. 2990 → 0 .. 2990 lux

Act. Room temp. *[iTAct]*: Actual room temperature measured by panel.
Type: WORD
Raw to engineering data: 0 .. 5000 → 0.00°C .. 50.00°C

Act. Room RH *[iRhAct]*: Room humidity measured by panel.
Type: WORD
Raw to engineering data: 0 .. 10000 → 0 .. 100.00 %

Toggle communication bit *[iComm]*: At each valid Rx packet from main module, this bit is toggled.
Type: BOOL

IR command number received value *[iIrCmdRecNum]*: This parameter depends on the *oIrProtocolSel* parameter. Latency between touched button on the remote controller and reception on the main module is max. 1 s.
Type: WORD

If *oIrProtocolSel*
is "0":
　　　　When LPC-2.IR2V receives an IR command, value of *iIrCmdRecNum* corresponds to the number of the IR learned command. Value is set back to 0 after next communication cycle with main module or after approximately two seconds regardless communication.

Raw to engineering data: 1 .. 15 → IR receive learned command 1 .. IR receive learned command 15
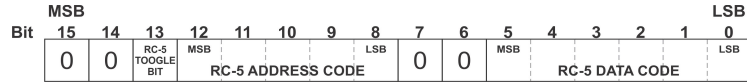
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1   Range depends on the air-conditioner.

is "1":

> When LPC-2.IR2V receives an IR command, value of *iIrCmdRecNum* corresponds to the number described below in binary code which includes toggle bit, address code and data code of the RC-5 protocol. When button is released, value gets to 0 after next communication cycle with main module or after approximately two seconds regardless communication.

Raw to engineering data:

	MSB															LSB
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	0	RC-5 TOOGLE BIT	MSB RC-5 ADDRESS CODE				LSB	0	0	MSB RC-5 DATA CODE					LSB

In case that *oIrProtocolSel* is set to 2 .. 8, variable *iIrCmdRecNum* is not applicable, because protocols are transmit only.

4.3 IR learn, receive and transmit

LPC-2.IR2V module can be learned to recognize 15 different IR commands. Module enters IR learning mode as soon as the left pair of DIP switches (S1) are not in position for "No learning - receive only" – see table 4.

IR learn is demonstrated on the example on how to learn LPC-2.IR2V the IR command "power ON" from third-party IR remote controller for air conditioning and store it under command 15 in the LPC-2.IR2V internal memory. IR receive and transmit is demonstrated on the example how to verify stored IR commands.

IR learn

Set the S1 DIP switches to the setting than corresponds to the number under which IR command will be stored. In this example, switches must be set to setting "learning mode for command 15". Once this is done, LPC-2.IR2V is ready to receive the IR command from the remote controller and store it to internal memory under command 15.

Press the button on the IR remote controller which you want it to be stored under command that is set with DIP switches on LPC-2.IR2V. In this example, press "power ON" button on the IR remote controller. Once the button has been pressed, the LPC-2.IR2V stores the IR command to internal memory, in this example under command 15. LPC-2.IR2V will not store any other command under command 15, unless S1 DIP switches has been changed to other setting and back to the setting "learning mode for command 15".

IR receive

Which protocol should be used for IR receive, user can select with *IrProtocolSel* parameter. To check if the IR command has been learned and stored correctly *IrProtocolSel* parameter must be "0".

Set the DIP switches to the setting "No learning - receive only" and than press button "power ON" on the IR remote controller. If the received IR command corresponds to any of the IR commands stored in the LPC-2.IR2V internal memory, the command number under which the received IR command has been stored will be shown in the feedback parameter *iIrCmdRecNum*. In this example, number 15 should be shown.

If *IrProtocolSel* is set to "0" and DIP switches to the setting "No learning - receive only" than LPC-2.IR2V will receive learned IR commands only.
If *IrProtocolSel* is set to "1" and DIP switches to the setting "No learning - receive only" than LPC-2.IR2V will receive RC-5 IR protocol only.

Be advised that during IR transmit, IR receive is blocked.

IR transmit

In order to check if the IR command that was stored can also be transmitted correctly, the LPC-2.IR2V should be used as a substitution of the IR remote controller. On the main module, number 15 should be written to the LPC-2.IR2V command *oIrCmdSendNum*. This command selects IR command which is stored under number 15 for transmit. IR transmit is executed once *oIrCmdSend* is set to logical "1". In this example, air conditioning should be turned ON.

Procedure for IR learn can be repeated for 15 different IR commands. DIP switch setting corresponds to learning mode for one of 15 commands and IR receive only mode – see table 4.
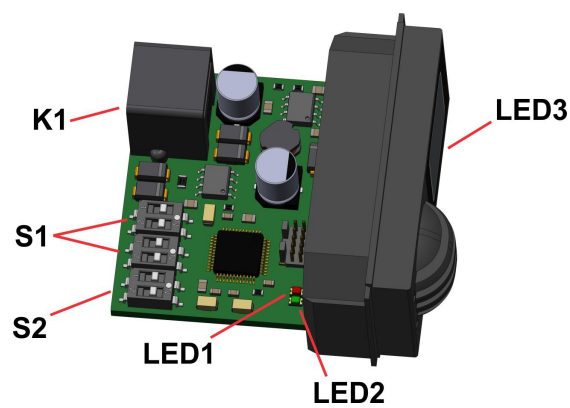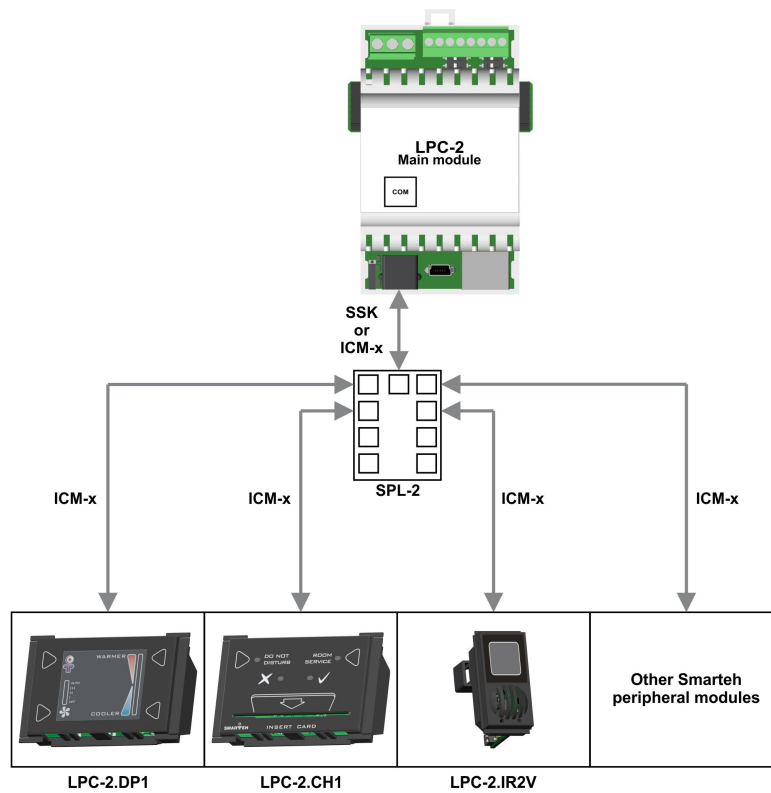
The IR commands may also be learned during manufacturing process - consult with Smarteh.

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

LED1: red	Communication	ON: RS-485 communication fault OFF: RS-485 communication OK
LED2: green	Power supply	ON: power supply OK OFF: power supply missing or power off
LED3: orange	Signalization	Programmable

Table 4: S1

SEL for IR	Switch 1	Switch 2	Switch 3	Switch 4
No learning - IR receive only	OFF	OFF	OFF	OFF
Learning mode for command 1	OFF	OFF	OFF	ON
..	..	..	..	..
..	..	..	..	..
Learning mode for command 14	ON	ON	ON	OFF
Learning mode for command 15	ON	ON	ON	ON

Table 5: S2

RS-485 ADDRESS	Switch 1	Switch 2
0	OFF	OFF
1	OFF	ON
2	ON	OFF
3	ON	ON

5.2 Mounting frame selection

Frame, suitable for IR2V module insertion, should be modular one at least 1 gang wide. Be careful to have corresponding flush-mounting box provided on the place where module will be positioned.

Smarteh has verified following lines to be compatible with LPC-2.IR2V 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.
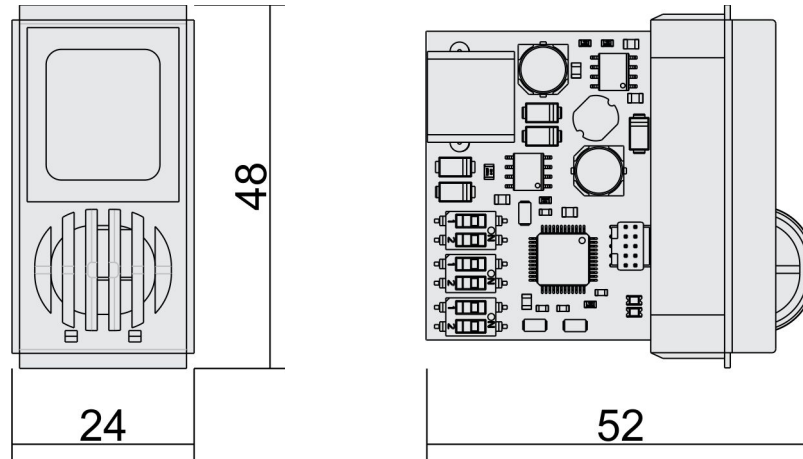
Module housing has a fin on each side, which can be easily removed with knife cutter or pliers. This adaptation enables housing to be inserted in various frame formats. With regard to frame used you may remove fin for housing to fit in.

Figure 3: Fin removing

5.3 Mounting instructions

Figure 4: Housing dimensions

48

24

52

Dimensions in millimetres.

⚠️ 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, 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.

Mounting instructions:

1. Set the correct RS-485 address (S2 switch) for LPC-2.IR2V (table 5).
2. Connect interconnection cable to the connector K1. Max. allowed tensile force is 30 N.
3. Put the LPC-2.IR2V in mounting frames, with ventilation slots positioning downwards.
4. Cover LPC-2.IR2V with cover plate.

LPC-2.IR2V is connected to main module with interconnection cable (e.g. SSK, ICM-7) which must be ordered together with LPC-2.IR2V. When more modules (e.g. LPC-2.CR1, LPC-2. CH1, LPC-2.DP1,..) are connected to main module, splitter (e.g. SPL-2) is required (figure figure 2).

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.IR2V**
> P/N:225IR218V01002
> D/C: 01/19

Label 2 (sample):

> S/N: IR2V-S9-1900000003

Label 1 descriptions:

1. **LPC-2.IR2V** is the full product name.
2. **P/N: 225IR218V01002** is the part number.

   - **225** – general code for product family,

   - **IR2V** – short product name,

   - **18V01** – sequence code,

     - 18 – year of code opening,

     - V01 – derivation code,

   - **002** – version code (reserved for future HW and/or SW firmware upgrades).

3. **D/C: 01/19** is the date code.

   - **01** – week and

   - **19** – year of production.

Label 2 descriptions:

1. **S/N: IR2V-S9-1900000003** is the serial number.

   - **IR2V** – short product name,

   - **S9** – user code (test procedure, e.g. Smarteh person xxx),

   - **1900000003** – year and current stack code,

     - 19 – year (last two cyphers),

     - 00000003 – current stack number; previous module would have the stack number 00000002 and the next one 00000004.

6 TECHNICAL SPECIFICATIONS

Table 6: Technical specifications	
Power supply	from main module
Interconnection connector type	RJ-12 6/6
Power consumption	0.5 W
Light intensity measurement range	0 .. 2990 lux[2]
IR frequency carrier	38 kHz
IR max. pulse length in protocol used for learning	16 ms
IR min. pulse length in protocol used for learning	250 us
IR max. number of pulses for learning single IR command	550
Dimensions (W x H x D)	24 x 48 x 52 mm
Weight	20 g
Maximum altitude	2000 m
Mounting position	any
Ambient temperature	0 to 50 °C
Ambient humidity	max. 95 %, no condensation
Transport and storage temperature	-20 to 60 °C
Protection class	IP 20

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2   Due to various spectral sensitivity of the various lux sensors on the market, the actual light intensity may vary.
    If LED3 is turned on, it may influence light intensity measurement.

7 SPARE PARTS

For ordering spare parts following Part Numbers should be used:

LPC-2.IR2V Infrared transceiver and light sensor	
LPC-2.IR2V	P/N: 225IR218V01002

LPC-2.RC1S remote control	
LPC-2.RC1S	P/N: 225RC116001001

Interconnection cable	
ICM-x	P/N: 203ICMxxxxxxxx

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

8 CHANGES

The following table describes all the changes to the document.

Date	V.	Description
03.02.20	7	Parameters description update.
31.07.19	6	Protocols added.
12.04.19	5	Technical update.
29.03.19	4	Technical update.
18.01.17	3	Technical update.
16.11.16	2	Added IR data.
30.10.16	1	The initial version, issued as *LPC-2.IR2V User Manual*.

9 NOTES