# USER MANUAL

Longo programmable controller
LPC-3.GOT.131
Graphical Operation Terminal

**Version 9**

*SMARTEH d.o.o. / Poljubinj 114 / 5220 Tolmin / Slovenia / Tel.: +386(0) 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 .. 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 modules LONGO LPC-3 – 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-3 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

# Index

## Longo programmable controller LPC-3.GOT.131

# 1 ABBREVIATIONS

| | |
|---|---|
| PLC | Programmable logic controller |
| GUI | Graphical user interface |
| TCP | Transmission control protocol |
| RTU | Remote terminal unit |
| RTC | Real time clock |
| IDE | Integrated development environment |
| FBD | Function block diagram |
| LD | Ladder diagram |
| SFC | Sequential function chart |
| ST | Structured text |
| IL | Instruction list |
| CAN | Controller area network |
| COM | Communication |
| SD | Secure digital |
| LED | Light emitting diode |
| NDEF | NFC data exchange format |
| UID | Unique identifier |
| RAM | Random access memory |
| NV | Non volatile |
| PS | Power supply |

# 2 DESCRIPTION

Smarteh LPC-3.GOT.131 graphical operation terminal is designed and developed as ideal solution for building automation as a supplement to LPC-2 modules. It is PLC based product with software tools allowing users to design GUI. Different communication protocols offers various connectivity opportunities. Frameless glass screen offers an intuitive, clear and flexible interface between the user and the building.

LPC-3.GOT.131 is equipped with Ethernet connection and can be used as a Modbus TCP/IP Master and/or Slave device or BACnet IP (B-ASC). USB port is used for local programming and debugging. Over TCP/IP, programming and debugging is possible via LAN (inside building) or even via WAN network (remotely over internet).

LPC-3.GOT.131 also includes two CAN bus for CANopen protocol and RS-485 bus for Modbus RTU master protocol, used e.g. for local or remote connection to other LPC PLCs. Integrated "Setting Storage FLASH", "RTC" and "NV RAM", does not need the battery for it is functioning. There is also a built-in buzzer which can be controlled through PLC program.

LPC-3.GOT.131 has on-board peripherals, such as RFID reader/writer, temperature measurement and ambient light measurement, which gives this terminal extra value and possibilities of use.

Smarteh IDE (Integrated Development Environment) software tool is used with all the PLCs from the LPC family and it supports all five standard PLC programmable languages (FBD, LD, SFC, ST, IL). It also supports "off line", "on line" debugging and local/remote program transferring. Distributed processing is supported which makes it possible to handle fast operations. GUI design tool supports large set of dynamic controls from buttons to indicators and enables connectivity between PLC programs and user interface.

LPC-3.GOT.131 is an innovative and an attractive solution for a competitive price.

LPC-3.GOT.131 is powered from external DC power supply.

# 3 FEATURES

Figure 1: LPC-3.GOT.131, card holder or card access.

| Table 1: Features |
|---|
| Frameless glass screen with 4.3” LCD display with capacitive touch screen - landscape or portrait orientation |
| Graphical interface is freely designed by the user with GUI editor in SmartehIDE |
| Integrated ISO/IEC 14443 A/MIFARE RFID UID reader |
| Mifare Classic 1K, 2K, 4K NDEF reader and writter |
| Integrated temperature and light sensor |
| Possibility to use as card access or card holder - supplied with two different plastic covers for RFID slot |
| Ethernet connectivity with Modbus TCP/IP Slave (server) and/or Master (client) functionality, BACnet IP (B-ASC), web server and SSL |
| Modbus RTU Master or Slave |
| USB port for Debugging and application transfer |
| Remote access and application transfer |
| Two CAN ports - one for master, one for slave |
| RTC and 512 kB NV RAM with super capacitor for needed energy storage |
| Built-in buzzer controlled from PLC program |
| Display brightness level controlled from PLC program |
| Disconnectable connectors |
| 3 status LEDs |
| Flush mount in various flush mounting boxes or screw mount |
| Quality design |

# 4 OPERATION

Module parameters can be read or written via Smarteh IDE software.

## 4.1 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.

Parameters can be from Write channel group or Read channel group. Parameters from Write channel group are send to On-Board peripherals, where parameters from Read channel are received from the On-Board peripherals.

Write channel:

**New ID confirmation *[oIDNewConfirm]*:** When this bit goes to "1", *iIDNew* gets reset.
Type: BOOL
Raw to engineering data: “0” → New ID not confirmed
“1” → New ID confirmed - reset *iIDNew*

**LED for occupancy switch and card holder illumination *[oHolderLEDoff]*:** When this bit goes to "1", card holder LED goes off.
Type: BOOL
Raw to engineering data: “0” → LED ON
“1” → LED OFF

**Disable RFID functionality *[oRFIDdisable]*:** When this bit goes to "1", RFID functionality gets disabled.
Type: BOOL
Raw to engineering data: “0” → RFID enabled
“1” → RFID disabled

**Card Data Function Select *[oSelDataFcn]*:** Selector between read UID, read data from RFID Mifare Classic card or write data to RFID Mifare Classic card. Whenever *oSelDataFcn* goes from 1 or 2 to 0, it resets *iDataReadOK* and *iDataWriteOK*.
Type: WORD
Raw to engineering data: 0 → Read UID
1 → Read from *oMemStart* location
2 → Write to *oMemStart* location

**Memory Start Location *[oMemStart]*:** Memory start location for read from or write data to RFID Mifare Classic card. Mapping between terminology used in *"AN1304 NFC Type MIFARE Classic Tag Operation"* and *oMemStart* is the following: SECTOR × 4 + BLOCK = oMemStart. For example, if user wants to read from location SECTOR 14-BLOCK 1, write 57 (14 × 4 + 1 = 57) to *oMemStart*, 1 to *oSelDataFcn* and the belonging Key to *oKeyW1* .. *oKeyW3*.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID Key write Word1 *[oKeyW1]*:** Byte 0 and byte 1 of Key A. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*. Default key is 65535.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID Key write Word2 *[oKeyW2]*:** Byte 2 and byte 3 of Key A. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*. Default key is 65535.

Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID Key write Word3 *[oKeyW3]*:** Byte 4 and byte 5 of Key A. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*. Default key is 65535.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID Data write Word1 *[oDataW1]*:** Byte 0 and byte 1 within a BLOCK. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID Data write Word2 *[oDataW2]*:** Byte 2 and byte 3 within a BLOCK. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID Data write Word3 *[oDataW3]*:** Byte 4 and byte 5 within a BLOCK. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID Data write Word4 *[oDataW4]*:** Byte 6 and byte 7 within a BLOCK. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID Data write Word5 *[oDataW5]*:** Byte 8 and byte 9 within a BLOCK. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID Data write Word6 *[oDataW6]*:** Byte 10 and byte 11 within a BLOCK. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID Data write Word7 *[oDataW7]*:** Byte 12 and byte 13 within a BLOCK. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID Data write Word8 *[oDataW8]*:** Byte 14 and byte 15 within a BLOCK. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

Read channel:

**New ID detected *[iIDNew]*:** This bit goes to "1" when new ID is detected.
Type: BOOL
Raw to engineering data: “0” → No new ID
“1” → New ID

**Read from RFID card successful *[iDataReadOK]*:** This bit goes to "1" when data read from memory of the MIFARE Classic card has been successful.
Type: BOOL

Raw to engineering data: “0” → Read not successful or read hasn't been performed
“1” → Read successful

**Write to RFID card successful *[iDataWriteOK]*:** This bit goes to "1" when write data to memory of the MIFARE Classic card has been successful.
Type: BOOL
Raw to engineering data: “0” → Write not successful or write hasn't been performed
“1” → Write successful

**MIFARE card presence *[iCardPresent]*:** This bit is "1" for as long as ISO/IEC 14443 A/MIFARE card is present at RFID reader.
Type: BOOL
Raw to engineering data: “0” → MIFARE card is not present
“1” → MIFARE card is present

**Occupancy switch *[iOccup]*:** This bit is "1" for as long as any type of card is present in card holder. It's functionality is based on interruption of blue light curtain so it is essential that holder LED is ON.
Type: BOOL
Raw to engineering data: “0” → Card is not present in card holder
“1” → Card is present in card holder

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

**Actual Light intensity *[iLight]*:** Ambient light sensitivity
Type: WORD
Raw to engineering data: 0 .. 10000 → 0 .. 10000 %

**Type of MIFARE card *[iCardType]*:** This parameter has the information of the card type of which UID has been read lastly. E.g Desfire, Classic, Ultralight - see AN10833 MIFARE Type Identification Procedure. Data resets when RFID card is not present at RFID Mifare reader any more.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**Length of ID code *[iIDLength]*:** This parameter has the information of the length of the cards UID code which has been read lastly. Data resets when RFID Mifare card is not present at RFID reader any more.
Type: WORD
Raw to engineering data: 1 .. 10 → 1 .. 10 bytes

**RFID ID received Word1 *[iIDW1]*:** Byte 0 and byte 1 of UID. UID resets when RFID card is not present at RFID reader any more.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID ID received Word2 *[iIDW2]*:** Byte 2 and byte 3 of UID. UID resets when RFID card is not present at RFID reader any more.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID ID received Word3 *[iIDW3]*:** Byte 4 and byte 5 of UID. Byte 8 and byte 9 of UID. UID resets when RFID card is not present at RFID reader any more.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID ID received Word4 *[iIDW4]*:** Byte 6 and byte 7 of UID. Byte 8 and byte 9 of UID. UID resets when RFID card is not present at RFID reader any more.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID ID received Word5 *[iIDW5]*:** Byte 8 and byte 9 of UID. UID resets when RFID card is not present at RFID reader any more.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID Data received Word1 *[iDataW1]*:** Byte 0 and byte 1 within a BLOCK. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID Data received Word2 *[iDataW2]*:** Byte 2 and byte 3 within a BLOCK. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID Data received Word3 *[iDataW3]*:** Byte 4 and byte 5 within a BLOCK. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID Data received Word4 *[iDataW4]*:** Byte 6 and byte 7 within a BLOCK. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID Data received Word5 *[iDataW5]*:** Byte 8 and byte 9 within a BLOCK. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID Data received Word6 *[iDataW6]*:** Byte 10 and byte 11 within a BLOCK. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

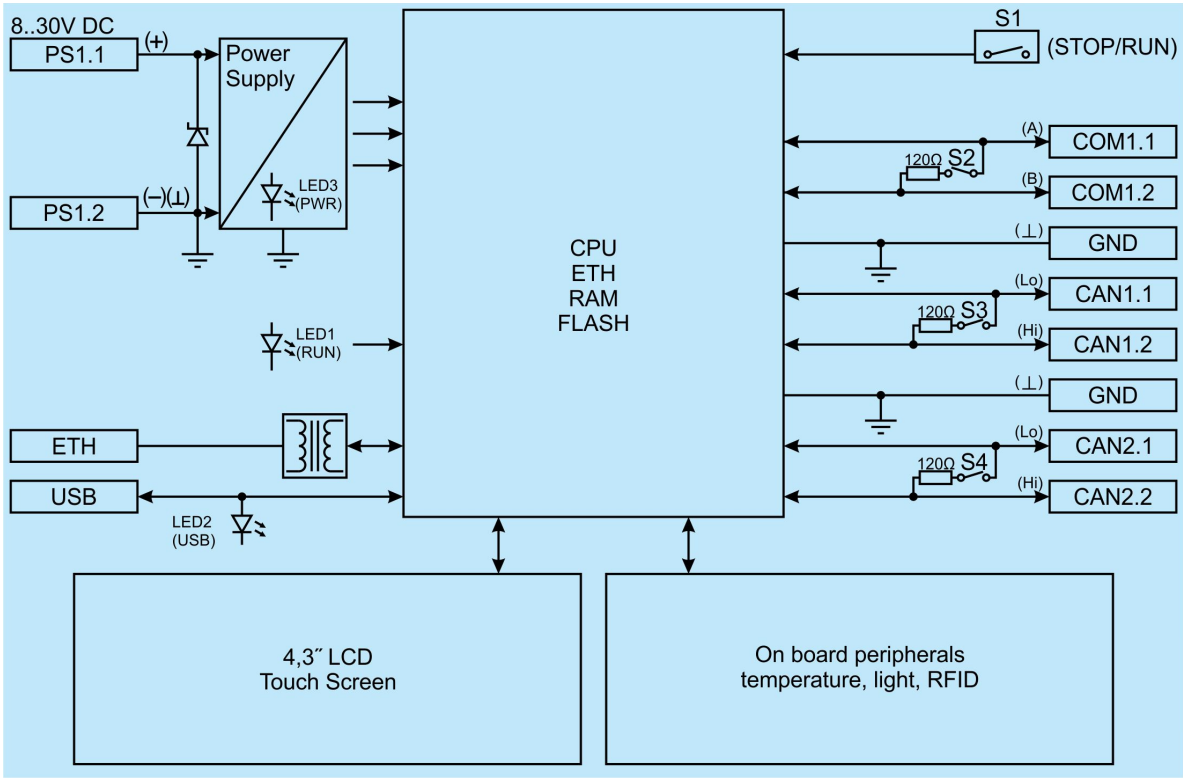
**RFID Data received Word7 *[iDataW7]*:** Byte 12 and byte 13 within a BLOCK. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

**RFID Data received Word8 *[iDataW8]*:** Byte 14 and byte 15 within a BLOCK. See *"AN1304 NFC Type MIFARE Classic Tag Operation"*.
Type: WORD
Raw to engineering data: 0 .. 65535 → 0 .. 65535

# 5 INSTALLATION

## 5.1 Block diagram

**Figure 2: Block diagram**[1]




1 **Coloured areas** represents different voltage domains - galvanic isolated areas. **Please refer** to General technical specifications in TECHNICAL SPECIFICATION for details.

## 5.2 Input & output connection interfaces

**Figure 3: Connection scheme**

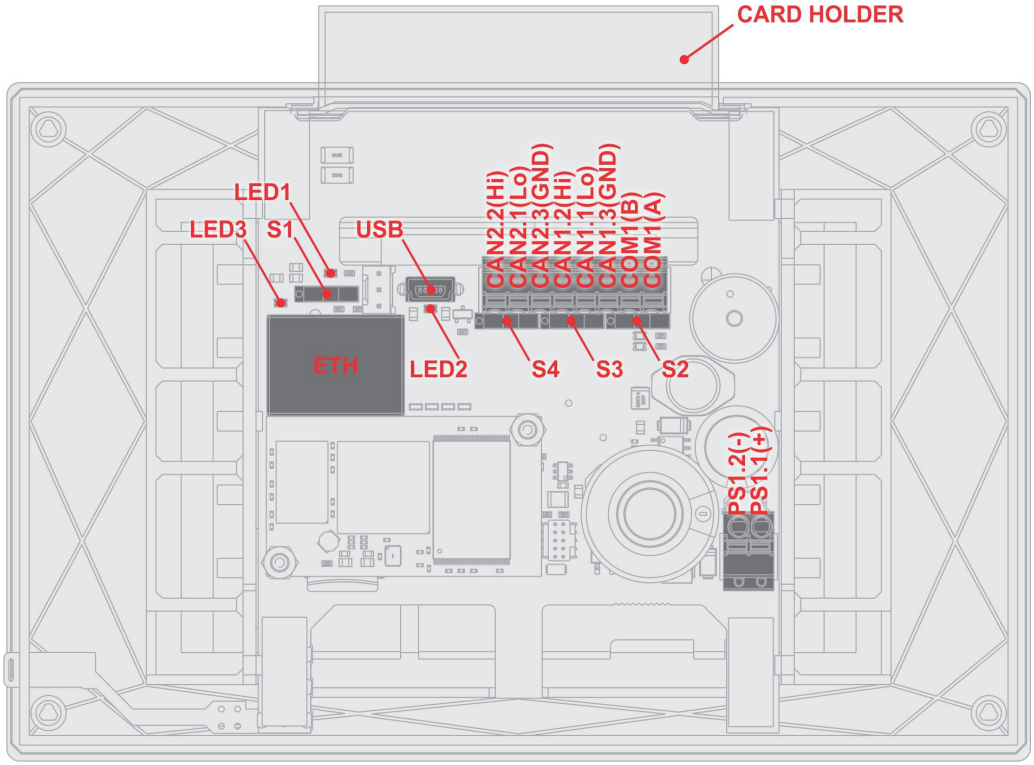



**Table 2: Power supply**[2]

| | | |
|---|---|---|
| PS1.1 (+) | PLC power supply | 8 .. 30 V DC, 2 A |
| PS1.2 (-) | ⊥ | GND |

**Table 3: Switches**

| | | |
|---|---|---|
| S1 | Operation mode (RUN/STOP) | RUN: PLC normal operational mode<br>STOP: application not running |
| S2 | COM1 RS-485 termination (Trm1) | ON: corresponding channel is internally terminated with 120 Ω<br>OFF: no internal termination present |
| S3 | CAN1 bus termination (Trm2) | ON: corresponding channel is internally terminated with 120 Ω<br>OFF: no internal termination present |
| S4 | CAN2 bus termination (Trm3) | ON: corresponding channel is internally terminated with 120 Ω<br>OFF: no internal termination present |

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

| Table 4: CAN1 & CAN2[3] | | |
|---|---|---|
| CAN1.1 | CAN1 Low (Lo) (Master) | 0 .. 5 V |
| CAN1.2 | CAN1 High (Hi) (Master) | |
| GND | ⊥ | GND |
| CAN2.1 | CAN2 Low (Lo) (Slave) | 0 .. 5 V |
| CAN2.2 | CAN2 High (Hi) (Slave) | |

| Table 5: COM1 RS-485[4] | | |
|---|---|---|
| COM1(A) | RS-485 (A) | 0 .. 5 V |
| COM1(B) | RS-485 (B) | |
| GND | ⊥ | GND |

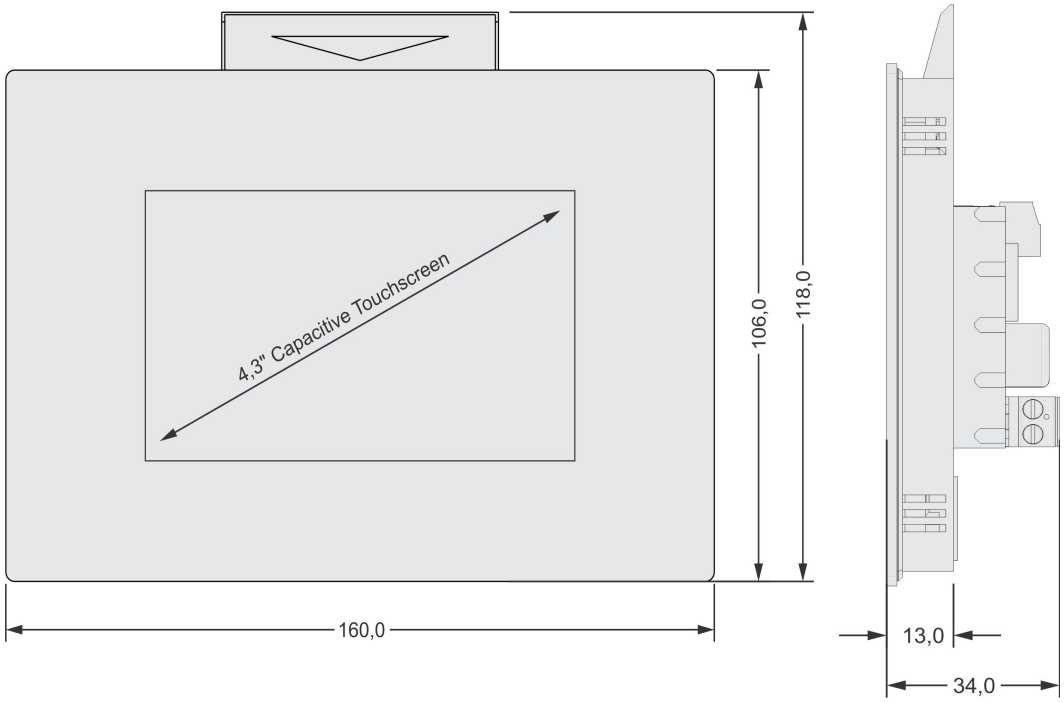
| Table 6: LEDs | | |
|---|---|---|
| LED1: green | Application running (RUN) | ON: application is running<br>OFF: application is stopped or PLC in boot mode |
| LED2: blue | Additional LED | Not used |
| LED3: green | Power (PWR) | ON: PLC is powered on<br>OFF: PLC has no power supply |

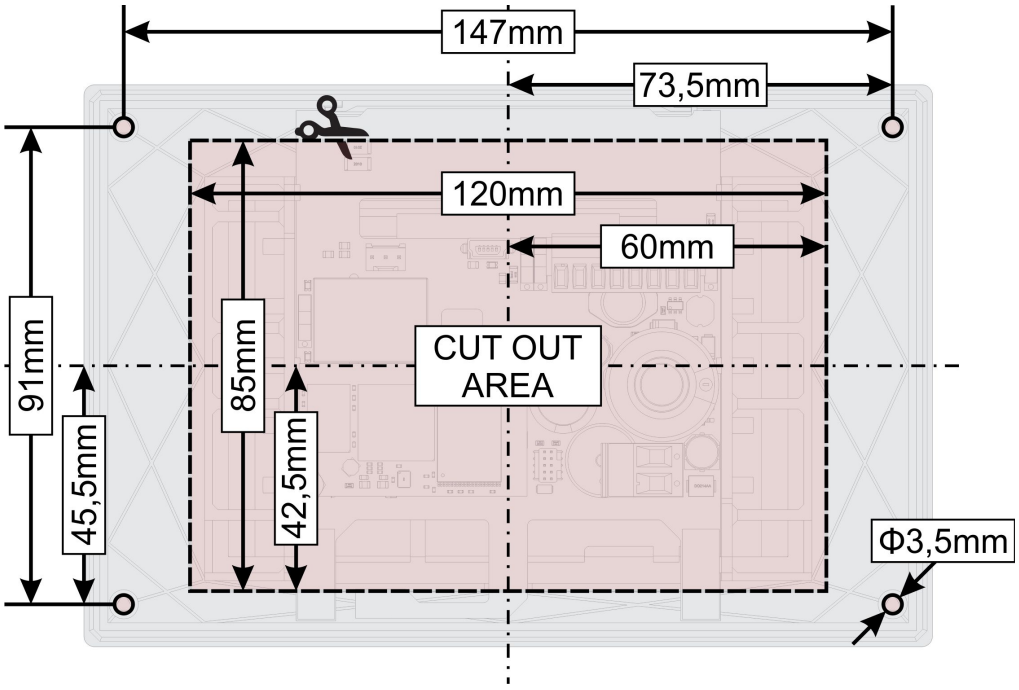
3 **Wires** connected to the module must have cross sectional area at least 0.14 mm$^2$. Use twisted-pair cables of type CAT5+ or better, shielding is recommended. Minimum temperature rating of wire insulation must be 85 °C.

4 **Different protocols** like Modbus RTU Master can be selected inside Smarteh IDE. **Wires** connected to the module must have cross sectional area at least 0.14 mm$^2$. Use twisted-pair cables of type CAT5+ or better, shielding is recommended. Minimum temperature rating of wire insulation must be 85 °C.

## 5.3 Mounting instructions

**Figure 4: Housing dimensions**




Dimensions in millimeters.

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 LPC-3.GOT.131 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.

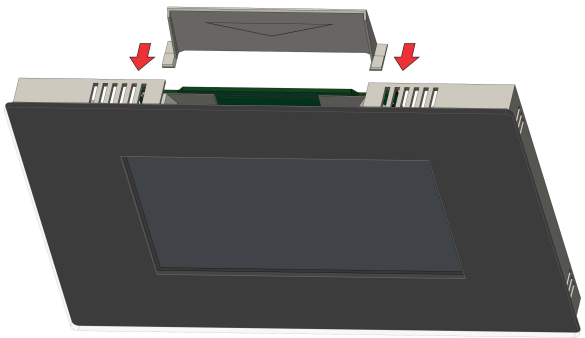
Wires connected to the PLC must have cross sectional area at least 0.75 $mm^2$. Minimum temperature rating of wire insulation must be 85 °C.

**Mounting instructions:**

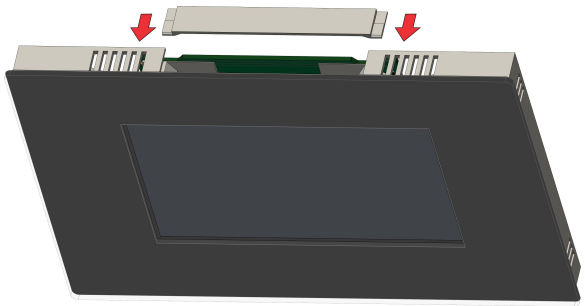
1. Switch off power supply.
2. Fasten mounting frame[5] with screws[5] into TEM VM4 HM40, TEM PM4 DM40, Elettrocanali EC37104, Legrand 801 42 or similar flush mounting box[6] - see Figure 6. The holder must be turned so that the opening is up, otherwise RFID will not work.[7]
3. Mount the desired plastic cover for RFID slot - card holder or card access - see Figure 5
4. Connect input, output and communication wires.
5. Mount LPC-3.GOT.131 into flush mounting box, using provided springs - see Figure 6.
6. Switch on power supply.

**Figure 5: Mounting cover for RFID slot**

Card holder cover

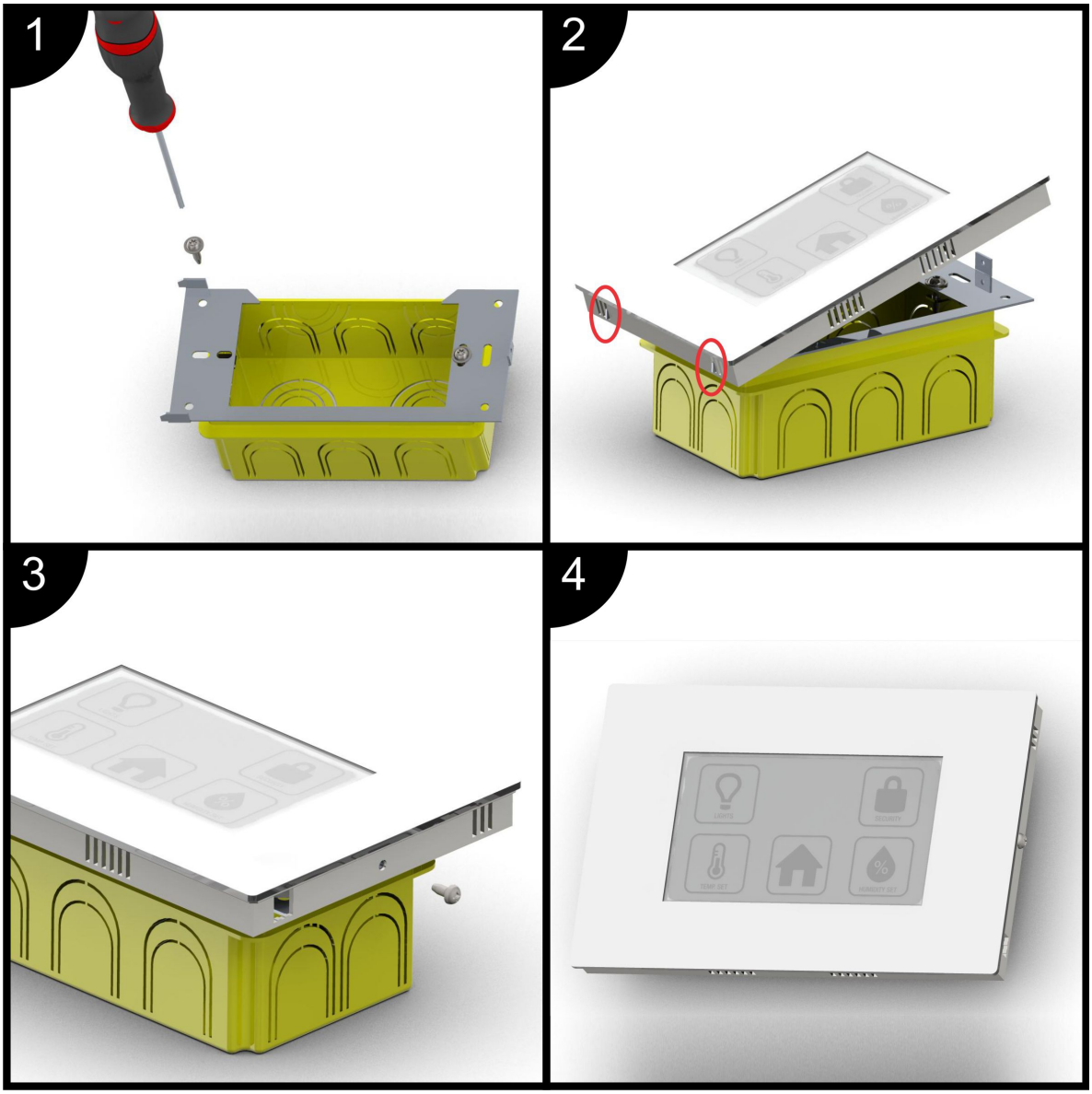


Card access cover



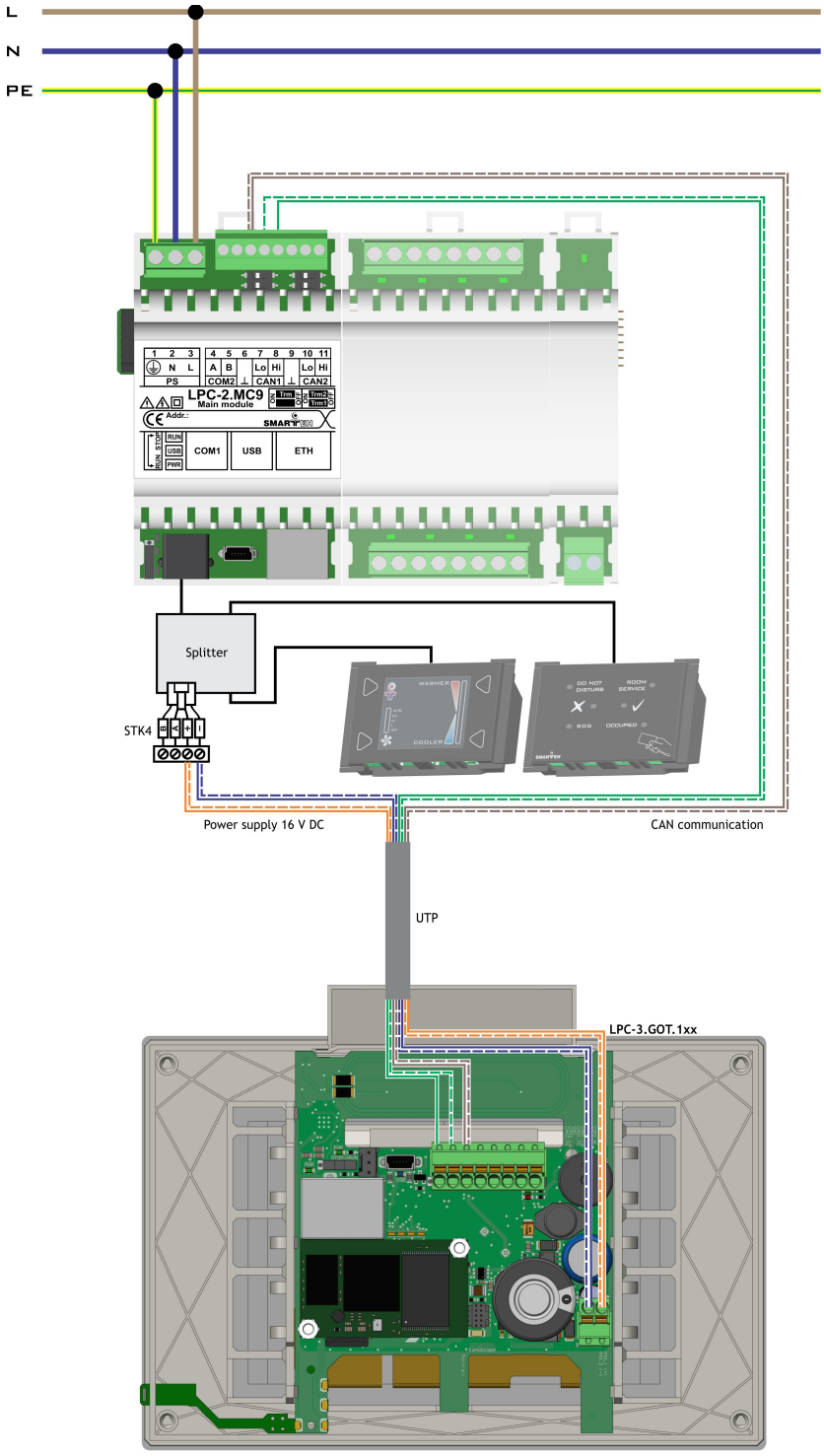
5 Mounting frame, screws and springs are provided in package with LPC-3.GOT.111.
6 Flush mounting box must be ordered separately - contact Smarteh.
7 In case that the bracket touches the walls of the mounting box, it can be folded inwards.

**Figure 6: Mounting instructions for flush mount**



## 5.4 Example of power supply from main module and CAN communication

**Figure 7: Example of power supply from main module and CAN communication**




NOTE: Example connection on Figure 7 loads main module with additional 5 W. Check if power consumption of main module configuration in Smarteh IDE, have additional 5 W available.

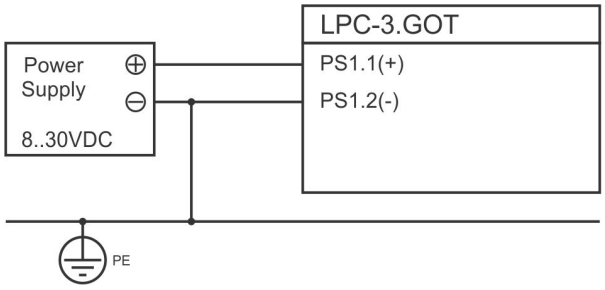
# 6 TECHNICAL SPECIFICATIONS

| Table 7: Technical specifications | |
|---|---|
| Power supply PS1 | 8 .. 30 V DC |
| Inrush current | max. 2 A |
| Power consumption PS1 | max. 5 W |
| Connection type for PS1 | disconnectable screw type connectors for stranded wire 0.75 to 2.5 $mm^2$ |
| Connection type for CAN1, CAN2, COM1 | disconnectable spring type connectors for stranded wire 0.14 to 1.5 $mm^2$ |
| RFID type - unique ID read | ISO/IEC 14443 A/MIFARE |
| RFID type - read/write NDEF data | Mifare classic 1k, 2k, 4k |
| Max. reading distance | 6 cm |
| CAN1 and CAN2 | non isolated |
| COM1 RS-485 port | non isolated, 2 wire |
| Ethernet | RJ-45 10/100T IEEE 802.3i |
| USB | mini B type, device mode or host mode (USB On-The-Go), high-speed/full-speed |
| RTC | capacitor backed up with retention of cca. 14 days |
| Operating system | Linux |
| CPU | SOC ARM9 454 MHz |
| RAM | 256 MB DDR2 |
| Flash | 512 MB SLC NAND |
| NV RAM | 512 kB, capacitor backed up with retention cca. 14 days |
| Display | 4.3", 480 × 272 resolution |
| Dimensions (L x W x H) | 118 x 160 x 34 mm |
| Display dimensions (L x W) | 54 x 95 mm |
| Weight | 300 g |
| Ambient temperature | 0 to 50°C |
| Ambient humidity | max. 95 %, no condensation |
| Maximum altitude | 2000 m |
| Mounting position | vertical |
| Transport and storage temperature | -20 to 60 °C |
| Pollution degree | 2 |
| Over-voltage category | II |
| Electrical equipment | class II (double insulation) |

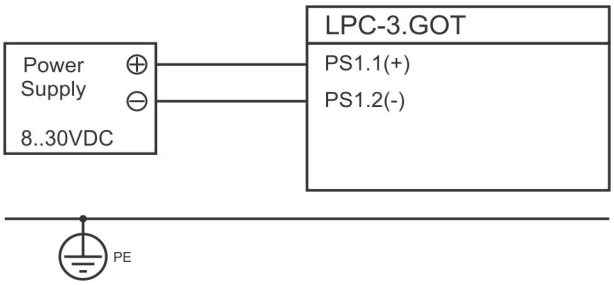
# 7 GROUNDING POSSIBILITIES

## 7.1 Grounding possibilities

**Figure 8: Grounding possibilities**




LPC-3.GOT negative power supply pole connected to the Protective Earth (PE) ⏚ functional earthing.




LPC-3.GOT negative power supply poles not connected to the Protective Earth (PE) ⏚ functional earthing.

# 8 PROGRAMMING GUIDE

This chapter is intended to offer the programmer additional informations about some of the functionalities and units integrated in this module.

## 8.1 Basic functionalities

**RTC unit**
For RTC back-up and for Retain variables there is Super Capacitor instead of battery integrated inside PLC. This way, replacement of the discharged battery is avoided. The Retention time is minimum 14 days from the power down. RTC time provides date and time information.

**Modbus TCP/IP master unit**
When configured for Modbus TCP/IP Master / Client mode, the LPC-3.GOT.131 functions as a master device, controlling the communications with other slave devices such as sensors, inverters, other PLCs, etc. LPC-3.GOT.131 sends Modbus TCP/IP commands to and receives Modbus TCP/IP responses from the slave units.

Following commands are supported:

01 – Read Coil Status
02 – Read Input Status
03 – Read Holding Registers
04 – Read Input Registers
05 – Write Single Coil
06 – Write Single Register
15 – Write Multiple Coils
16 – Write Multiple Registers

Note: each of this command can read/write up to 10000 addresses.

**Modbus TCP/IP slave unit**
Modbus TCP slave has 10000 addresses in each memory section:

| | |
|---|---|
| Coils: | 00000 to 09999 |
| Discrete inputs: | 10000 to 19999 |
| Input register: | 30000 to 39999 |
| Holding registers: | 40000 to 49999 |

Supports up to 5 connections to the slave units (defined with MaxRemoteTCPClient parameter).
Highest scan rate is 100 ms.

**Modbus RTU master unit**
When configured for Modbus RTU Master mode, the LPC-3.GOT.131 functions as a master device, controlling the communications with other slave devices such as sensors, inverters, other PLCs, etc. LPC-3.GOT.131 sends Modbus RTU commands to and receives Modbus RTU responses from the slave devices.

Following commands are supported:

01 – Read Coil Status
02 – Read Input Status

03 – Read Holding Registers
04 – Read Input Registers
05 – Write Single Coil
06 – Write Single Register
15 – Write Multiple Coils
16 – Write Multiple Registers

Note: each of this commands can read/write up to 246 bytes of data. For analog (Input and Holding registers) this means 123 values, while for digital (Statuses and Coils) this means 1968 values. When higher quantity of data is required, LPC-3.GOT.131 can execute up to 32 same or different supported commands simultaneous.

Physical layer: RS-485
Supported baud rates: 9600, 19200, 38400, 57600 and 115200bps
Parity: None, Odd, Even.
Stop bit: 1

**Modbus RTU slave unit**
Modbus TCP slave has 1024 addresses in each memory section:

| | |
|---|---|
| Coils: | 00000 to 01023 |
| Discrete inputs: | 10000 to 11023 |
| Input register: | 30000 to 31023 |
| Holding registers: | 40000 to 41023 |

Highest scan rate is 100 ms.

**BACnet IP unit**
When configured for BACnet IP (B-ACS), following commands are supported:

Data Sharing

ReadProperty-B (DS-RP-B)
WriteProperty-B (DS-WP-B)

Device and Network Management

Dynamic Device Binding-B (DM-DDB-B)
Dynamic Object Binding-B (DM-DOB-B)
Device Communication Control-B (DM-DCC-B)
Time Synchronization-B (DM-TS-B)
UTCTimeSynchronization-B (DM-UTC-B)

For more information, please contact producer.

**CANopen unit**
CANopen unit consists of Master and Slave communication ports. They are independent, thus can be connected to two different CAN network at the same time.

The ports can operate at baud rates 50 kbps, 125 kbps or 250 kbps.

It follows the internationally standardized (EN 50325-4) CAN-based higher-layer protocol for embedded control systems. Advised rules and concepts by this standard must be followed to fulfill the conditions and so achieving normal operation and results.

The structure of the network as cable type and lengths, baud rates, number of the nodes and termination must be taken into account within the recommendations and requirements, when

designing the network.

The bus network can consist of at least one Master and at list one Slave node by the standard, but it is advised that with increased number of nodes, the Master node fastest interval is extended. Below are two examples:

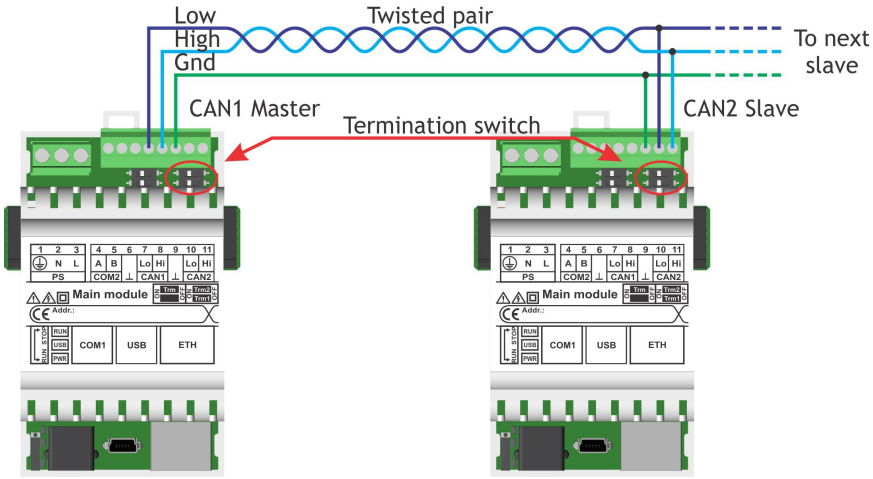
Example 1: network with 1 master and 9 slaves, every slave have defined 32 (4x8) byte of data and baud rate 125 Kbps. Fastest Cycle time for this configuration is 50 ms.

Example 2: network with 1 master and 4 slaves, every slave have defined 4 byte of data and baud rate 250 Kbps. Fastest Cycle time for this configuration is 5 ms.

5 ms is the fastest recommended cycle time.

It is recommended to power-up all the nodes on the same network at the same time, if some or all nodes had been reprogrammed (to reinitialize the communication properly).

**Figure 9: CAN Master and Slave wiring diagram example**




**RUN/STOP Switch**

Run: Status RUN status LED “on” indicate that the user graphical application is up and user program is running.

Stop: When the switch is turn to STOP state, the RUN status LED is “off” and user application is stopped.

**PLC task cycle time**

Main PLC task interval (under Project tab -> Resource → Tasks → Interval) time is not recommended to be set lower than 50 ms.

**MIFARE Classic memory layout -** see official application note from NXP: AN1304 NFC Type MIFARE Classic Tag Operation

## 8.2 GUI design and programming

**Figure 10: LPC Manager interface example**[8]

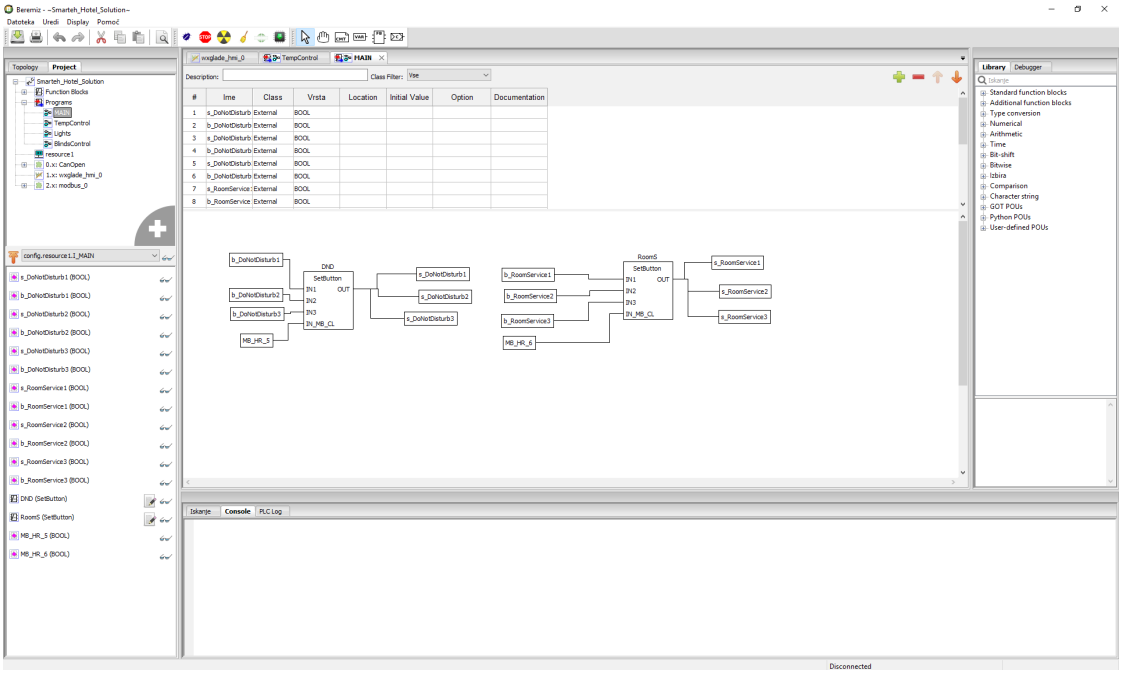
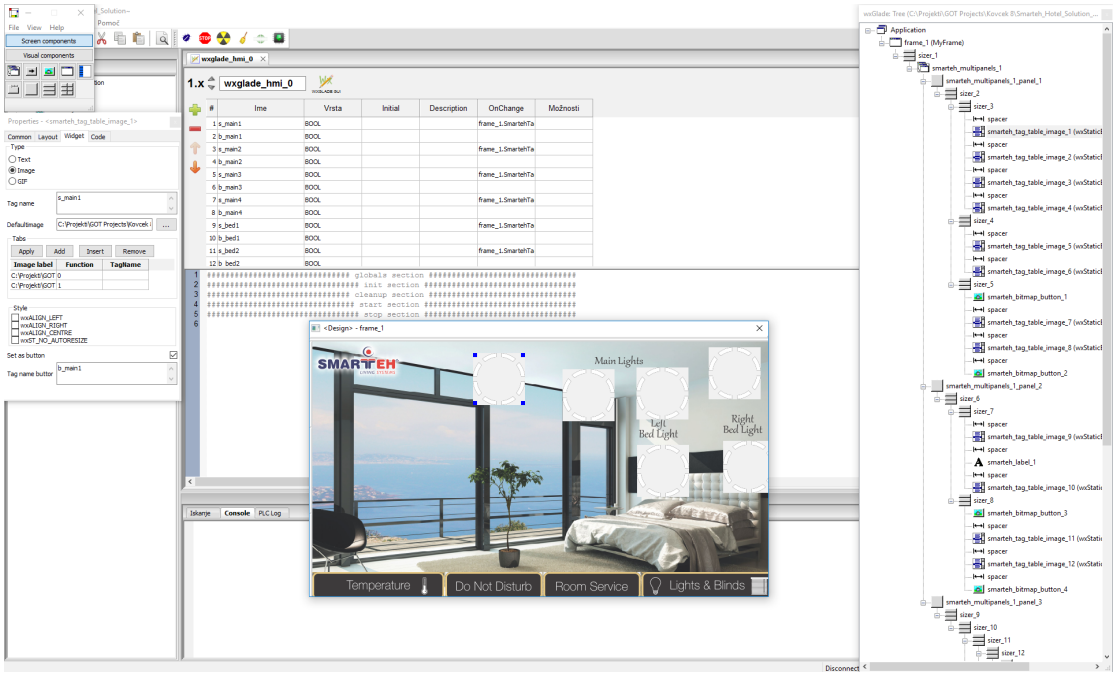


**Figure 11: LPC GUI Manager interface example**[9]




NOTE: Recommended minimum size of the touch object is 10 x 10 mm.

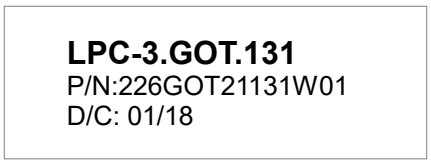
8 **Configuration** of the PLC is done using Smarteh IDE software tool. **Please refer to LPC Manager user manual** for details.

9 **Configuration** of the PLC is done using Smarteh IDE software tool. **Please refer to LPC GUI Manager user manual** for details.

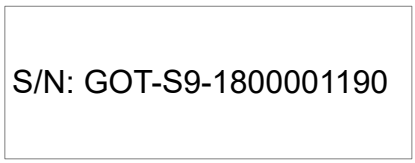
# 9 MODULE LABELING

## Figure 12: Labels

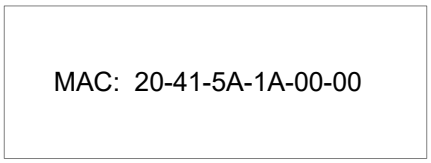
Label 1 (sample):




Label 2 (sample):




Label 3 (sample):




***Label 1 descriptions:***

1. **LPC-3.GOT.131** is the full product name.
2. **P/N: 226GOT21131W01** is the part number.
   - **226** – general code for product family,
   - **GOT** – short product name,
   - **21131** – sequence code,
     - 21 – year of code opening,
     - 131 – derivation code,
   - **W01** – version code (reserved for future HW and/or SW firmware upgrades).
3. **D/C: 01/18** is the date code.
   - **01** – week and
   - **18** – year of production.

***Label 2 descriptions:***

1. **S/N:GOT-S9-1700001190** is the serial number.
   - **GOT** – short product name,
   - **S9** – user code (test procedure, e.g. Smarteh person xxx),
   - **1800001190** – year and current stack code,
     - 18 – year (last two cyphers),
     - 00000190 – current stack number; previous module would have the stack number 00000189 and the next one 00000191.

***Label 3 description:***

MAC: 20-41-5A-1A-00-00 is the MAC address.

# 10 SPARE PARTS

For ordering spare parts following Part Numbers should be used:

| LPC-3.GOT.131 Graphical operation terminal | |
|---|---|
| LPC-3.GOT.131 - white | P/N: 226GOT21131W03 |
| LPC-3.GOT.131 - black | P/N: 226GOT21131B03 |

| Interconnection cable STK4-020 | |
|---|---|
| STK4-020 | P/N: 203STK17001001 |

# 11 CHANGES

The following table describes all the changes to the document.

| Date | V. | Description |
|---|---|---|
| 25.11.21 | 9 | Figures update. |
| 27.05.20 | 8 | Figure 7 update. |
| 16.04.20 | 7 | Black version added. |
| 27.03.20 | 6 | Mounting instructions update. |
| 09.03.20 | 5 | Modbus chapter update. |
| 24.10.19 | 4 | BACnet description added. |
| 01.03.18 | 3 | Added chapter 5.4. |
| 15.01.18 | 2 | Technical data update. |
| 30.09.17 | 1 | The initial version, issued as *LPC-3.GOT.131 User Manual*. |

# 12 NOTES