



USER MANUAL

— Longo programmable controller
LPC-2.MC8
Main module

Version 10



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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Index

Longo programmable controller LPC-2.MC8

1 ABBREVIATIONS.....	1
2 DESCRIPTION.....	2
3 FEATURES.....	3
4 OPERATION.....	4
5 INSTALLATION.....	6
5.1 Connection scheme.....	6
5.2 Mounting instructions.....	8
5.3 Module labeling.....	10
6 TECHNICAL SPECIFICATIONS.....	11
7 SPARE PARTS.....	12
8 CHANGES	13
9 NOTES.....	14





1 ABBREVIATIONS

Sorted by order of appearance in document:

IDE	Integrated development environment
TCP	Transmission control protocol
CAN	Controller area network
RFID	Radio frequency identification
IR	Infrared
RTC	Real time clock
PLC	Programmable logic controller
LED	Light emitting diode
IP	Ingress protection





2 DESCRIPTION

LPC-2.MC8 main module is an open programmable PLC controller.

On its sides, there are two extensions buses where various inputs, outputs, special and communication modules can be attached. It has integrated USB programming port, port for connection of intelligent peripheral modules and Ethernet Modbus port, for network connectivity.

Main module is powered from main power supply.

Main module is accompanied with Smarteh IDE application. It is a tool, where various modules can be put together to a configuration, based on number and type of electrical signals needed. Smarteh IDE takes care for proper modules position. Latest Smarteh IDE setup can be downloaded from Smarteh web page support section:

www.smarteh.si/Support/Downloads/Software/Development_tools.

NOTE: For proper system configuration and data allocation please refer to Smarteh IDE software help menu.



3 FEATURES

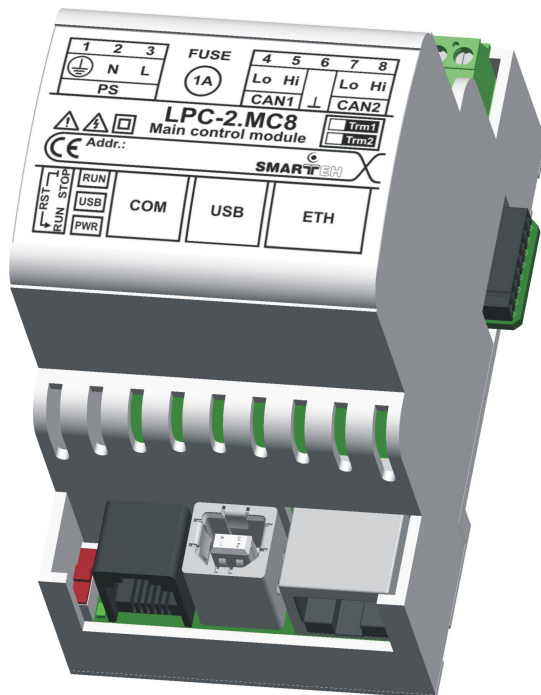


Figure 1: LPC-2.MC8 module

Table 1: Technical data

Ethernet connectivity with Modbus TCP slave (server) functionality
USB port for Debugging, Application and Default parameters transfer
CAN ports
RS-485 connectivity for intelligent peripheral modules (thermostat, RFID, IR, operator terminal...)
Integrated RTC with Super Cap backup
32 kB non-volatile memory
4 kb Flash memory available for parameter storage
Mains power supplied





4 OPERATION

There are several logical units attached with this module. They can be accessed from Smarteh IDE application. Some units are enabled by default, others can be enabled through Smarteh IDE. Unit is enabled when any of its variables is used.

PLC has 32 kB of non-volatile memory, which is available to any variable used inside application, simply by setting the variable Option to Retain.

PLC also provides 4 kB of ROM (flash) memory area to the user who would like to use some initialization data or some fixed parameters. This area can be accessed from application only for reading. Setting the values of variables in Flash can be issued with Flash uploader page. In Flash memory area there are some preloaded data stored:

MAC: is unique for every unit produced. This value can be also found on the label attached on the housing of the unit.

IP: default value is 192.168.19.223.

MASK: default value is 255.255.255.0

Gateway, Primary DNS, Secondary DNS: default 0.0.0.0

Flash memory unit

This unit enables only reading from its variables. Setting the variables is issued with one of Smarteh IDE plugins, Flash uploader page.

Flash unit provides reading of a portion of a flash memory inside MC8 module. Flash memory is non-volatile, therefor keeps data for ever.

Usually this area is used for setting some data to the default value, even before installation of the unit to its position. After, when PLC is commissioned, the data are already present and there is no need for further setting. This keeps its data in this area some startup parameters can be written.

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 30 days from the power down.

RTC time provides date and time information. Along, alarming function is also supported.

Modbus slave unit

ModbusTCP slave has 512 addresses in each memory section.

Coils: 00000 to 00511

Discrete Inputs: 10000 to 10511

Input Register: 30000 to 30511

Holding Registers: 40000 to 40511

Supports up to 3 connections to the slave unit.

Scan rate is 500 ms or greater.





CANopen unit

CANopen unit consists of Master and Slave communication ports. They are independent, thus can be connected to two different CAN networks 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:

Example1: 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.

Example2: 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 millisecond 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).

Additional operational information

After the installation of the PLC it must be at least 20 minute enabled power supply, before the internal battery is charged and the retain memory is ready to save variables without loosing them switching power supply off.

RUN / STOP Switch

Run mode: Status (RUN) LED on indicate that the PLC program is up and user program is running.

Stop mode: When the switch is turn to STOP state, the status (RUN) LED is Off. The application switch to the bootloader, this fact allow users to program LPC-2.MC8.

When the user is done programming the PLC via USB the switch must be turned ON and the MC8 starts the application.

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.



5.1 Connection scheme

Figure 2: Connection scheme

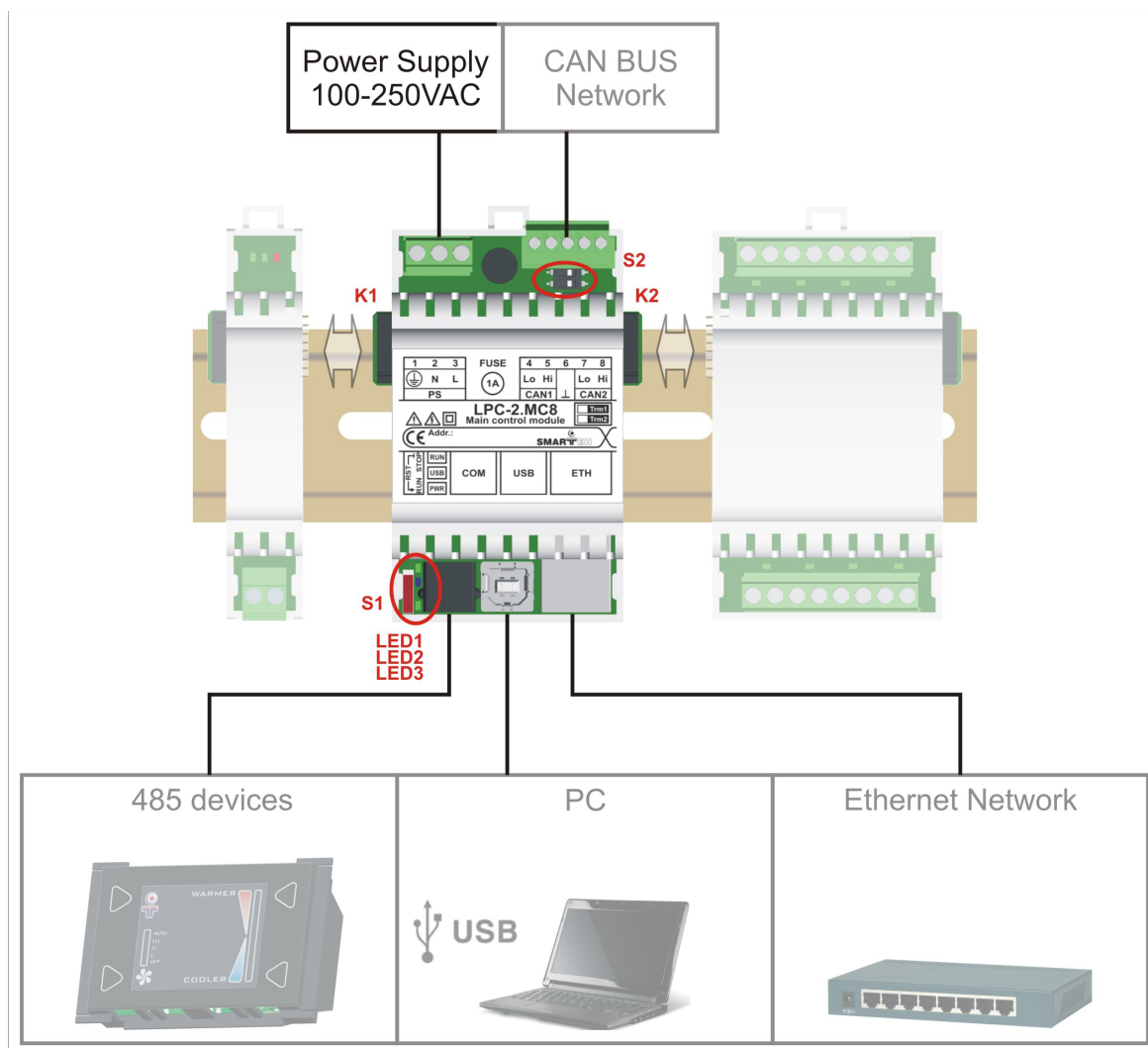


Table 2: Power supply

PS.1 (⊕)	Functional earthing	Provides better EMI/EMC
PS.2 (N)	Power supply	115/230 V AC, 50/60 Hz
PS.3 (L)		

Table 3: CAN

CAN1.4	CAN low	0 .. 5 V
CAN1.5	CAN high	
CAN.6	Reference point	0 V
CAN2.7	CAN low	0 .. 5 V
CAN2.8	CAN high	

Table 4: Switches

S1	Operation mode	RUN: PLC normal operational mode STOP: application not running, connected modules outputs in their off state RST: when moved from STOP to RUN mode, PLC is reset and application starts from its beginning
S2	CAN bus termination	ON: corresponding channel is internally terminated with 120 ohm OFF: no internal termination present

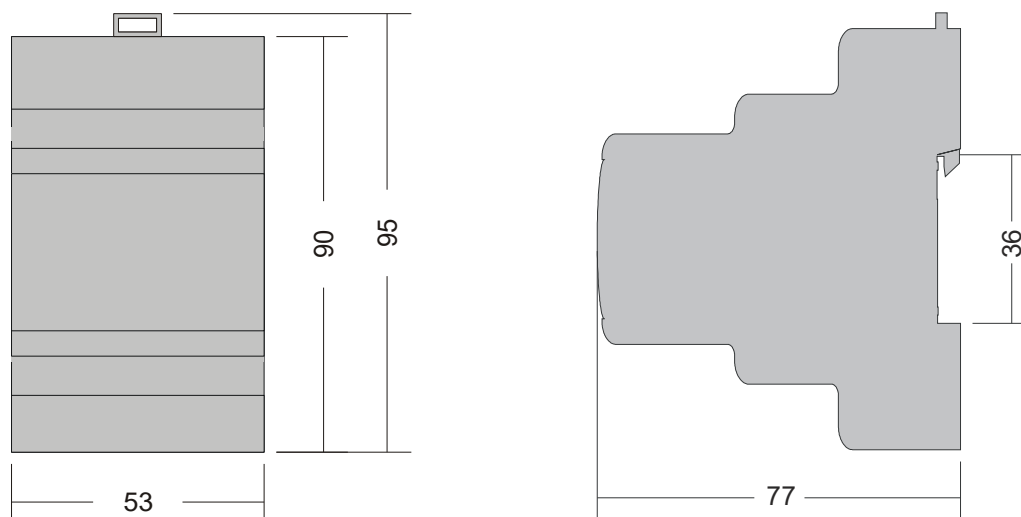
Table 5: LEDs

LED1	Application running	ON: application is running OFF: application is stopped or PLC in boot mode
LED2	USB connectivity	ON: USB connection established OFF: no USB connection
LED3	Power supply	ON: power supply OK OFF: power supply missing or power off



5.2 Mounting instructions

Figure 3: Housing dimensions



Dimensions in millimeters.



EXTERNAL SWITCH OR CIRCUIT-BREAKER AND EXTERNAL OVERCURRENT PROTECTION: The module is allowed to be connected to installation with over current protection that has nominal value of 16 A or less.

RECOMMENDATION ON SWITCH OR CIRCUIT-BREAKER PROTECTION: There should be two poles main switch in the installation in order to switch off the module. The switch should meet the requirements of standard IEC60947 and have a nominal value at least 6 A. The switch or circuit-breaker should be within easy reach of the operator. It should be marked as the disconnecting device for the equipment.

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

Wires connected to the module must have cross sectional area at least 0.75 mm². Minimum temperature rating of wire insulation must be 85 °C

1. Switch OFF main power supply.
2. Mount module to the provided place inside an electrical panel (DIN EN50022-35 rail mounting).
3. Mount other IO modules (if required). Mount each module to the DIN rail first, then attach modules together through K1, K2 connectors.
4. Connect needed input, output and communication wires.
5. Switch ON main power supply.

Dismount in reverse order. For mounting/dismounting modules to/from DIN rail a free space of at least one module must be left on the DIN rail.

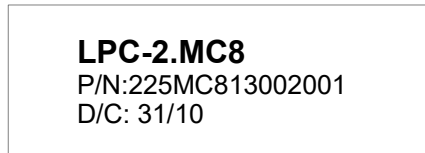




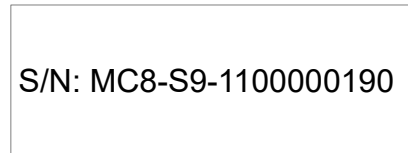
5.3 Module labeling

Figure 5: Labels on housing

Label 1 (sample):



Label 2 (sample):



Label 1 descriptions:

1. **LPC-2.MC8** is the full product name.
2. **P/N:225MC8040001001** is the part number.
 - **225** - general code for product family,
 - **MC8** - short product name,
 - **04001** - sequence code,
 - **04** - year of code opening
 - **001** - derivation code
 - **001** - version code (reserved for future HW and/or SW firmware upgrades).
3. **D/C:16/11** is the date code.
 - **16** - week and
 - **05** - year of production.

Label 2 descriptions:

1. **S/N:MC8-S9-1100000190** is the serial number.
 - **MC8** - short product name,
 - **S9** - user code (test procedure, e.g. Smarteh person xxx),
 - **1100000190** - year and current stack code,
 - **11** - year (last two cyphers)
 - **00000190** - current stack number; previous module would have the stack number 00000189 and the next one 00000191.



6 TECHNICAL SPECIFICATIONS

Table 6: Technical specifications

Power supply	115/230 V AC, 50/60 Hz
Power consumption	max. 24 W
Connection type	screw type connector for stranded wire 0.75 to 2.5 mm ²
USB	B connector type, device mode, Low speed, Full speed
RTC	capacitor backed up with retention cca. 30 days.
Dimensions (L x W x H)	90 x 53 x 77 mm
Weight	180 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)
Protection class	IP 30





7 SPARE PARTS

For ordering spare parts following Part Numbers should be used:

LPC-2.MC8 main module	
LPC-2.MC8	P/N: 225MC813001001
Programmable cable USB	
PMU	P/N: 203PMU12001001





8 CHANGES

The following table describes all the changes to the document.

Date	V.	Description
15.04.18	10	Technical data update.
20.01.17	9	Technical data update.
17.12.15	8	LPC Manager → Smarteh IDE.
01.09.15	7	Technical data update.
01.06.14	6	Technical data update. CANOpen Unit section added.
01.05.13	5	Technical data update. Modbus section added.
01.02.13	4	Technical data update.
01.07.13	3	Technical data update.
01.11.11	2	Technical data update.
23.09.11	0	The initial version, issued as <i>LPC-2.MC8 User Manual</i> .







9 NOTES

