USER MANUAL

Longo programmable controller
LPC-2.MU0
Remote input output main module

Version 5

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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.

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Longo programmable controller LPC-2.MU0

1 ABBREVIATIONS

PLC	Programmable logic controller
DC	Direct current
PS	Power supply
LED	Light emitting diode
Rx	Receive
Tx	Transmit

2 DESCRIPTION

The LPC-2.MU0 Remote I/O main module is designed to operate as a Modbus RTU Slave within the Smarteh LPC-2 or LPC-3 systems, as well as other compatible systems. It serves as an interface between a Modbus RTU Master device and the connected I/O configuration.

The module is powered by an external 20–28 V DC power supply. Its slim and compact design allows for easy installation in confined spaces. Four status LEDs on the module provide visual indication of the power supply status and Modbus RTU communication activity.

The LPC-2.MU0 enables data exchange between the Modbus RTU Master device and connected LPC-2 I/O modules via the Modbus RTU protocol over an RS-485 connection. Additionally, it supplies power to the attached LPC-2 I/O modules. For stable RS-485 communication, the module includes an integrated termination resistor switch, which can be enabled or disabled depending on the network topology.

3 FEATURES

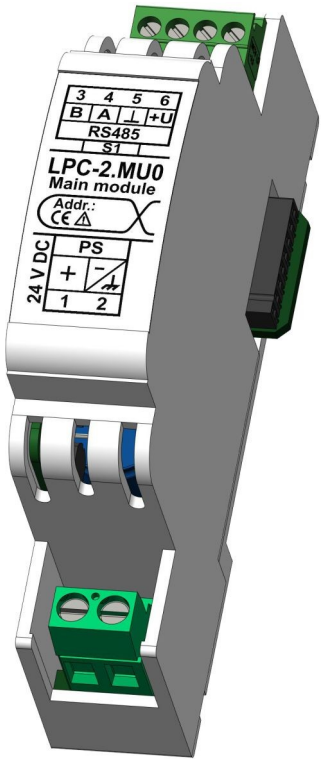


Figure 1: LPC-2.MU0 module

Table 1: Features
20 .. 28 V DC power supply
Four diagnose LEDs
RS-485 half duplex serial port for Modbus RTU Slave communication
Integrated RS-485 termination resistor switch
Standard DIN EN50022-35 rail mounting

4 INSTALLATION

Figure 2: LPC-2.MU1 module

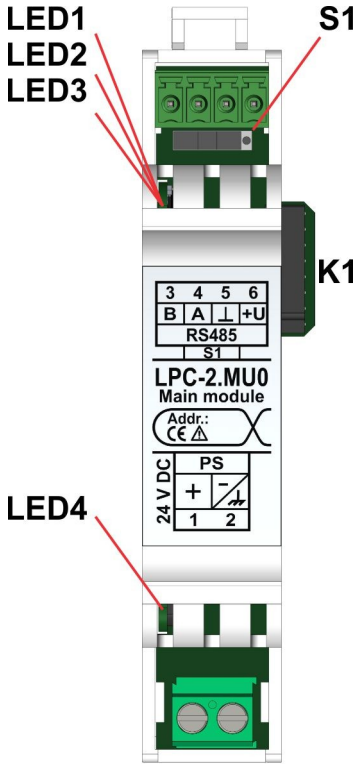


Table 2: PS1[1]		
PS.1	+	Power supply input, 20 .. 28 V DC
PS.2	- / ⏚	EGND

Table 3: RS485		
RS485.3	B	RS-485 data receive/send line B
RS485.4	A	RS-485 data receive/send line A
RS485.5	⊥	GND
RS485.6	+U	Power supply output, 15V

1 Supply wiring: power supply wires must have cross sectional area at least 0.75mm^2

Table 4: K1		
Internal BUS	Data & DC power supply	Connection to comm. module(s)

Table 5: Switches		
S1	RS485 Termination	LEFT: RS-485 channel is internally terminated with 1.2 kΩ RIGHT: no internal termination present

Table 6: LEDs		
LED1: red	Rx, RS-485 Rx status	Blinking: Receiving Modbus RTU data from Master OFF: No data received ON : A and/or B line in shortcut
LED2: green	Tx, RS-485 Tx status	Blink: Transmitting Modbus RTU data OFF: No data transmitted ON: A and/or B line in shortcut
LED3: green	Communication status	Slow blinking: No Modbus RTU communication with Master Fast blinking: Communication active with default parameters (after power-up) ON: Communication established with user-defined parameters OFF: Power off or fuse blown
LED4: green	Power supply status	ON: Module powered Blinking: Power supply overloaded OFF: Power off or fuse blown

4.1 Examples of usages

The LPC-2.MU0 module can be used in various ways, depending on the requirements of the application. Typical use cases include expanding the I/O configuration or establishing a remote I/O connection. In all cases, the LPC-2.MU0 acts as a communication and power interface between the Modbus RTU Master device and the connected I/O modules.

Multiple LPC-2.MU0 modules can be connected to a single Modbus RTU Master device to further expand the I/O capacity or enable remote I/O functionality. The following examples illustrate typical use cases:

4.1.1 Remote connection

The LPC-2.MU0 module allows you to connect a remote I/O configuration to an LPC-2 main module (see Figure 3), an LPC-3 graphical operation terminal (see Figure 4), or other Modbus RTU Master devices via an RS-485 connection. This enables decentralized I/O installation while maintaining reliable communication and power supply.

Figure 3: Example of remote connection of I/O configuration to LPC-2 main module

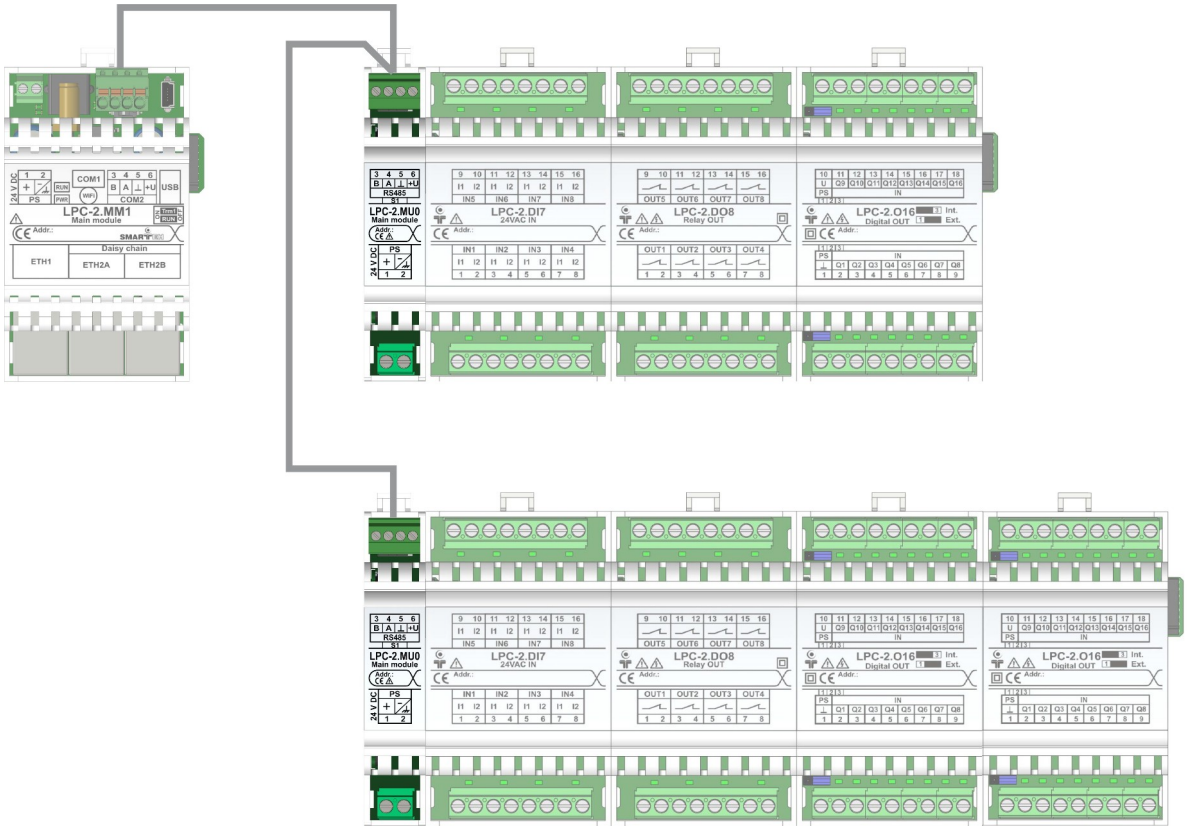
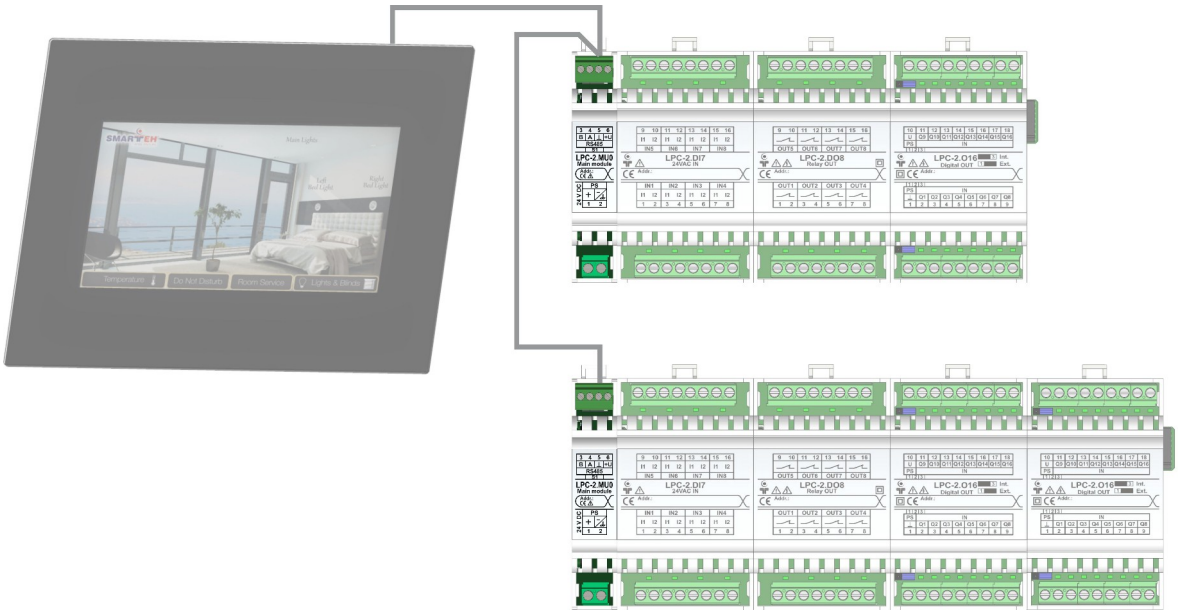


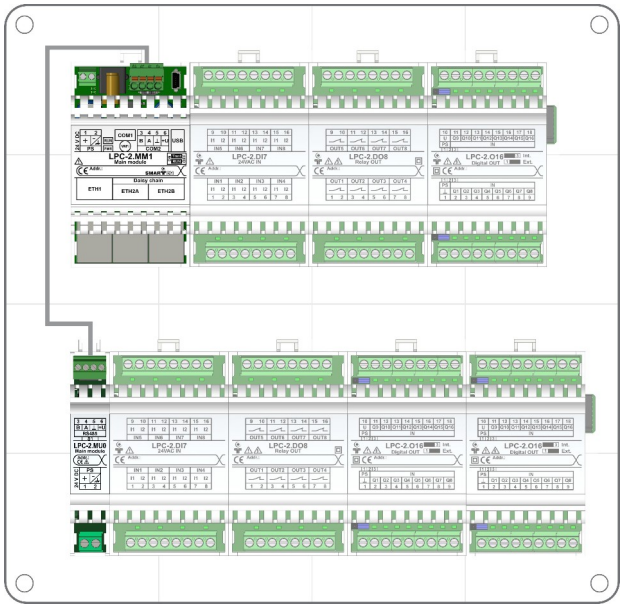
Figure 4: Example of remote connection of I/O configuration to LPC-3 graphical operation terminal



4.1.2 Expanding I/O configuration

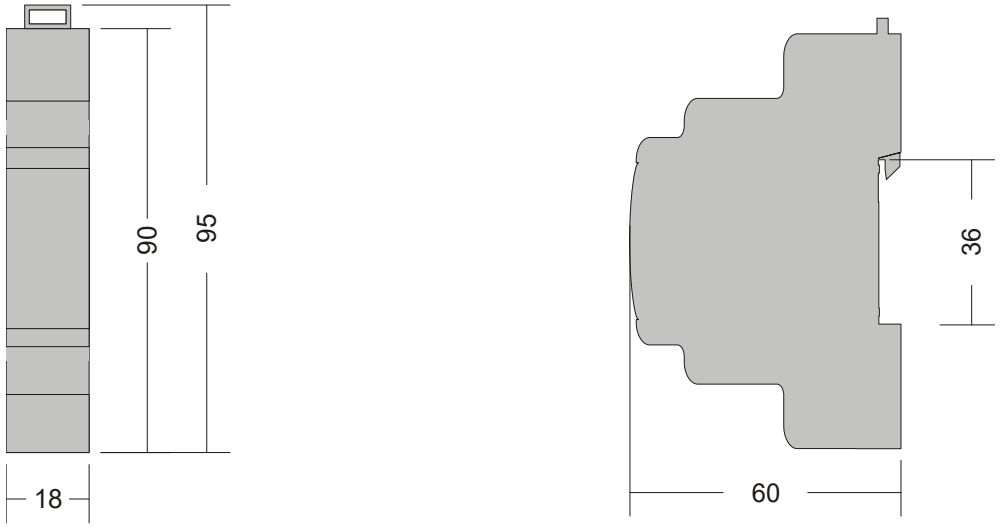
The LPC-2.MU0 module can also be used to expand the I/O configuration in cases where there is insufficient space in the main control panel (see Figure 5), or when more than seven LPC-2 I/O modules are required in the system (see Figure 6). In such cases, the LPC-2.MU0 is connected to the main controller via Modbus RTU communication over RS-485 and provides communication and power supply to the additional I/O modules.

Figure 5: Example of expansion for small spaces



4.2 Mounting instructions

Figure 6: Housing dimensions



Dimensions in millimeters.

RECOMMENDATION ON SWITCH OR CIRCUIT-BREAKER PROTECTION: There should be two poles main switch in the installation in order to switch off the unit. The switch must meet the requirements of standard IEC60947-1 and have a nominal value at least 10 A. The switch or circuit-breaker should be within easy reach of the operator. It must be used as the disconnected device for the equipment.

RATING AND CHARACTERISTICS OF FUSES: The unit must be connected with 10 A circuit breaker in + and – power supply conductor.

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 0.75mm^2.

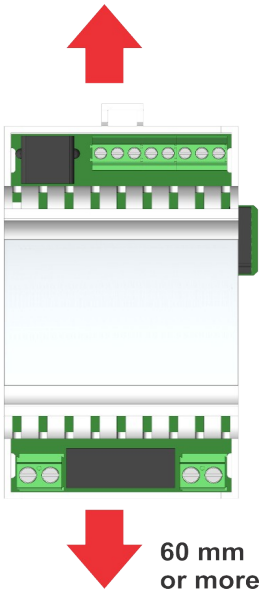
The modules must be installed in enclosure with no openings. Enclosure must provide electrical and fire protection The shall withstand dynamic test with 500 g steel sphere from distance is 1.3 m and also static test 30 N. When installed in enclosure, only authorized person can have a key to open it.

Mounting instructions:

1. Switch OFF 24V DC power supply.
2. Mount LPC-2.MU0 module to the provided place inside an electrical panel (DIN EN50022-35 rail mounting).
3. Mount other I/O modules. Mount each I/O module to the DIN rail first, then attach modules together through K1 connector.
4. Connect wiring according to the connection diagrams provided in Chapters 4.1 and 4.2. Recommended tightening torque for all screw terminals is 0.5 Nm (4.42 lbf·in); maximum tightening torque is 0.6 Nm (5.31 lbf·in).
5. Connect the power supply wires to the connector according to the connection scheme in *Chapter 4.1, 4.2*. Recommended/Highest tightening torque is 0.5/0.6 Nm (4.42/5.31 lbf in)
6. Ensure proper RS-485 termination.
7. Switch ON main power supply.
8. Power (LED4) green LED should switch on. See Table 6 for details.

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. A disconnect device shall be incorporated in the field wiring.

Figure 7: Minimum clearances



The clearances above must be considered before module mounting.

NOTE:
Signal wires must be installed separately from power and high voltage wires in accordance with general industry electrical installation standard.
When assembling the LPC-2.MU0 module with additional I/O modules, ensure that the total power consumption of the complete configuration does not exceed 24 W.
For proper I/O configuration setup, it is recommended to use the Smarteh IDE tool, which allows you to simulate the desired configuration on a selected main module (e.g. LPC-2.MC9, LPC-2.MM1, etc.). The tool automatically arranges the I/O modules correctly, based on I/O module requirements and calculates the total power consumption of the complete configuration.

5 PROGRAMMING GUIDE

The LPC-2.MU0 module communicates with Modbus RTU Master device using the Modbus RTU protocol over an RS-485 connection. The module provides access to data from the connected LPC-2 I/O modules and allows the master device to read inputs and control outputs via Modbus registers.

5.1 Modbus RTU Variables

By default, after power-up, the LPC-2.MU0 module communicates with the following parameters for the first 10 seconds:

- Slave ID: 234
- Baud rate: 115200 bps
- Data bits: 8
- Parity: None
- Stop bits: 1

If no valid Modbus request is received within 10 seconds after power-up, the module switches to the user-defined communication parameters. The factory-set user-defined parameters are:

- Slave ID: 1
- Baud rate: 115200 bps
- Data bits: 8
- Parity: None
- Stop bits: 1

The communication parameters can be changed by writing new values to the corresponding Modbus holding registers. The updated parameters can be stored in the module's non-volatile memory (EEPROM) using a password-protected command.

Important:
It is recommended not to use polling intervals shorter than 200 ms to ensure reliable communication.

5.2 Modbus Registers

The module provides access to the following Modbus register types:

- Input Registers: Used for reading real-time data from the connected I/O modules.
- Holding Registers: Used for controlling outputs and configuration parameters.

Some configuration parameters are defined as Retain parameters or Modbus settings. These parameters are saved to the module's non-volatile memory (EEPROM) only when the corresponding save command is executed.

- To save Retain parameters permanently, write the password 9055 to Holding Register 905.
- To save Modbus communication settings, write the password 9088 to Holding Register 908.

If the parameters are not saved using this procedure, they will be lost after the next power cycle.

A dedicated **Smarteh LPC-2.MU0 I/O Module Configurator** tool is available for the LPC-2.MU0 module. This tool allows you to automatically generate a customized list of Modbus registers based on the specific I/O modules connected to the LPC-2.MU0. The configurator simplifies the integration process by ensuring correct signal mapping and register addressing. See also the NOTE in section 4.2 regarding I/O configuration and power consumption recommendations.

The configuration tool for the **LPC-2.MU0 Remote I/O Main module, Modbus RTU** can be downloaded from the Smarteh website under **Setups & Installers**:

https://www.smarteh.com/support-downloads/software-firmware/development-tools/setups-installers/

For further support, contact Smarteh technical support at: support@smarteh.si

Detailed information about the available registers is provided in the following tables.

Table 7: 3xxxx, Input registers, Runtime

Reg.	Name	Description	Raw → Engineering data
14	FW_ver	FW version	0 .. 65535 → 0 .. 65535
31	ModulPos_7_ReadWord1	Modul position 7, read word 1	0 .. 65535 → 0 .. 65535
32	ModulPos_7_ReadWord2	Modul position 7, read word 2	0 .. 65535 → 0 .. 65535
33	ModulPos_7_ReadWord3	Modul position 7, read word 3	0 .. 65535 → 0 .. 65535
34	ModulPos_7_ReadWord4	Modul position 7, read word 4	0 .. 65535 → 0 .. 65535
35	ModulPos_7_ReadWord5	Modul position 7, read word 5	0 .. 65535 → 0 .. 65535
36	ModulPos_7_ReadWord6	Modul position 7, read word 6	0 .. 65535 → 0 .. 65535
37	ModulPos_7_ReadWord7	Modul position 7, read word 7	0 .. 65535 → 0 .. 65535
38	ModulPos_7_ReadWord8	Modul position 7, read word 8	0 .. 65535 → 0 .. 65535
39	ModulPos_7_ReadWord9	Modul position 7, read word 9	0 .. 65535 → 0 .. 65535
40	ModulPos_7_ReadWord10	Modul position 7, read word 10	0 .. 65535 → 0 .. 65535
...	..	...	...
62	ModulPos_7_ReadWord32	Modul position 7, read word 32	0 .. 65535 → 0 .. 65535
63	ModulPos_6_ReadWord1	Modul position 6, read word 1	0 .. 65535 → 0 .. 65535
64	ModulPos_6_ReadWord2	Modul position 6, read word 2	0 .. 65535 → 0 .. 65535

Table 7: 3xxxx, Input registers, Runtime			
65	ModulPos_6_ReadWord3	Modul position 6, read word 3	0 .. 65535 → 0 .. 65535
66	ModulPos_6_ReadWord4	Modul position 6, read word 4	0 .. 65535 → 0 .. 65535
67	ModulPos_6_ReadWord5	Modul position 6, read word 5	0 .. 65535 → 0 .. 65535
68	ModulPos_6_ReadWord6	Modul position 6, read word 6	0 .. 65535 → 0 .. 65535
69	ModulPos_6_ReadWord7	Modul position 6, read word 7	0 .. 65535 → 0 .. 65535
70	ModulPos_6_ReadWord8	Modul position 6, read word 8	0 .. 65535 → 0 .. 65535
71	ModulPos_6_ReadWord9	Modul position 6, read word 9	0 .. 65535 → 0 .. 65535
72	ModulPos_6_ReadWord10	Modul position 6, read word 10	0 .. 65535 → 0 .. 65535
…	…	…	…
94	ModulPos_6_ReadWord32	Modul position 6, read word 32	0 .. 65535 → 0 .. 65535
95	ModulPos_5_ReadWord1	Modul position 5, read word 1	0 .. 65535 → 0 .. 65535
96	ModulPos_5_ReadWord2	Modul position 5, read word 2	0 .. 65535 → 0 .. 65535
97	ModulPos_5_ReadWord3	Modul position 5, read word 3	0 .. 65535 → 0 .. 65535
98	ModulPos_5_ReadWord4	Modul position 5, read word 4	0 .. 65535 → 0 .. 65535
99	ModulPos_5_ReadWord5	Modul position 5, read word 5	0 .. 65535 → 0 .. 65535
100	ModulPos_5_ReadWord6	Modul position 5, read word 6	0 .. 65535 → 0 .. 65535
101	ModulPos_5_ReadWord7	Modul position 5, read word 7	0 .. 65535 → 0 .. 65535
102	ModulPos_5_ReadWord8	Modul position 5, read word 8	0 .. 65535 → 0 .. 65535
103	ModulPos_5_ReadWord9	Modul position 5, read word 9	0 .. 65535 → 0 .. 65535
104	ModulPos_5_ReadWord10	Modul position 5, read word 10	0 .. 65535 → 0 .. 65535
..	…	…	…
126	ModulPos_5_ReadWord32	Modul position 5, read word 32	0 .. 65535 → 0 .. 65535
127	ModulPos_4_ReadWord1	Modul position 4, read word 1	0 .. 65535 → 0 .. 65535
128	ModulPos_4_ReadWord2	Modul position 4, read word 2	0 .. 65535 → 0 .. 65535
129	ModulPos_4_ReadWord3	Modul position 4, read word 3	0 .. 65535 → 0 .. 65535
130	ModulPos_4_ReadWord4	Modul position 4, read word 4	0 .. 65535 → 0 .. 65535
131	ModulPos_4_ReadWord5	Modul position 4, read word 5	0 .. 65535 → 0 .. 65535
132	ModulPos_4_ReadWord6	Modul position 4, read word 6	0 .. 65535 → 0 .. 65535
133	ModulPos_4_ReadWord7	Modul position 4, read word 7	0 .. 65535 → 0 .. 65535
134	ModulPos_4_ReadWord8	Modul position 4, read word 8	0 .. 65535 → 0 .. 65535
135	ModulPos_4_ReadWord9	Modul position 4, read word 9	0 .. 65535 → 0 .. 65535
136	ModulPos_4_ReadWord10	Modul position 4, read word 10	0 .. 65535 → 0 .. 65535
…	…	…	…
158	ModulPos_4_ReadWord32	Modul position 4, read word 32	0 .. 65535 → 0 .. 65535

Table 7: 3xxxx, Input registers, Runtime

159	ModulPos_3_ReadWord1	Modul position 3, read word 1	0 .. 65535 → 0 .. 65535
160	ModulPos_3_ReadWord2	Modul position 3, read word 2	0 .. 65535 → 0 .. 65535
161	ModulPos_3_ReadWord3	Modul position 3, read word 3	0 .. 65535 → 0 .. 65535
162	ModulPos_3_ReadWord4	Modul position 3, read word 4	0 .. 65535 → 0 .. 65535
163	ModulPos_3_ReadWord5	Modul position 3, read word 5	0 .. 65535 → 0 .. 65535
164	ModulPos_3_ReadWord6	Modul position 3, read word 6	0 .. 65535 → 0 .. 65535
165	ModulPos_3_ReadWord7	Modul position 3, read word 7	0 .. 65535 → 0 .. 65535
166	ModulPos_3_ReadWord8	Modul position 3, read word 8	0 .. 65535 → 0 .. 65535
167	ModulPos_3_ReadWord9	Modul position 3, read word 9	0 .. 65535 → 0 .. 65535
168	ModulPos_3_ReadWord10	Modul position 3, read word 10	0 .. 65535 → 0 .. 65535
...	...	...	...
190	ModulPos_3_ReadWord32	Modul position 3, read word 32	0 .. 65535 → 0 .. 65535
191	ModulPos_2_ReadWord1	Modul position 2, read word 1	0 .. 65535 → 0 .. 65535
192	ModulPos_2_ReadWord2	Modul position 2, read word 2	0 .. 65535 → 0 .. 65535
193	ModulPos_2_ReadWord3	Modul position 2, read word 3	0 .. 65535 → 0 .. 65535
194	ModulPos_2_ReadWord4	Modul position 2, read word 4	0 .. 65535 → 0 .. 65535
195	ModulPos_2_ReadWord5	Modul position 2, read word 5	0 .. 65535 → 0 .. 65535
196	ModulPos_2_ReadWord6	Modul position 2, read word 6	0 .. 65535 → 0 .. 65535
197	ModulPos_2_ReadWord7	Modul position 2, read word 7	0 .. 65535 → 0 .. 65535
198	ModulPos_2_ReadWord8	Modul position 2, read word 8	0 .. 65535 → 0 .. 65535
199	ModulPos_2_ReadWord9	Modul position 2, read word 9	0 .. 65535 → 0 .. 65535
200	ModulPos_2_ReadWord10	Modul position 2, read word 10	0 .. 65535 → 0 .. 65535
...	...	...	...
222	ModulPos_2_ReadWord32	Modul position 2, read word 32	0 .. 65535 → 0 .. 65535
223	ModulPos_1_ReadWord1	Modul position 1, read word 1	0 .. 65535 → 0 .. 65535
224	ModulPos_1_ReadWord2	Modul position 1, read word 2	0 .. 65535 → 0 .. 65535
225	ModulPos_1_ReadWord3	Modul position 1, read word 3	0 .. 65535 → 0 .. 65535
226	ModulPos_1_ReadWord4	Modul position 1, read word 4	0 .. 65535 → 0 .. 65535
227	ModulPos_1_ReadWord5	Modul position 1, read word 5	0 .. 65535 → 0 .. 65535
228	ModulPos_1_ReadWord6	Modul position 1, read word 6	0 .. 65535 → 0 .. 65535
229	ModulPos_1_ReadWord7	Modul position 1, read word 7	0 .. 65535 → 0 .. 65535

Table 7: 3xxxx, Input registers, Runtime			
230	ModulPos_1_ReadWord8	Modul position 1, read word 8	0 .. 65535 → 0 .. 65535
231	ModulPos_1_ReadWord9	Modul position 1, read word 9	0 .. 65535 → 0 .. 65535
232	ModulPos_1_ReadWord10	Modul position 1, read word 10	0 .. 65535 → 0 .. 65535
233	ModulPos_1_ReadWord11	Modul position 1, read word 11	0 .. 65535 → 0 .. 65535
234	ModulPos_1_ReadWord12	Modul position 1, read word 12	0 .. 65535 → 0 .. 65535
...	...	...	
372	ModulPos_1_ReadWord150	Modul position 1, read word 150	0 .. 65535 → 0 .. 65535

Table 8: 4xxxx, Holding registers, Runtime			
Reg.	**Name**	**Description**	**Raw → Engineering data**
31	ModulPos_7_WriteWord1	Modul position 7, write word 1	0 .. 65535 → 0 .. 65535
32	ModulPos_7_WriteWord2	Modul position 7, write word 2	0 .. 65535 → 0 .. 65535
33	ModulPos_7_WriteWord3	Modul position 7, write word 3	0 .. 65535 → 0 .. 65535
34	ModulPos_7_WriteWord4	Modul position 7, write word 4	0 .. 65535 → 0 .. 65535
35	ModulPos_7_WriteWord5	Modul position 7, write word 5	0 .. 65535 → 0 .. 65535
36	ModulPos_7_WriteWord6	Modul position 7, write word 6	0 .. 65535 → 0 .. 65535
37	ModulPos_7_WriteWord7	Modul position 7, write word 7	0 .. 65535 → 0 .. 65535
38	ModulPos_7_WriteWord8	Modul position 7, write word 8	0 .. 65535 → 0 .. 65535
39	ModulPos_7_WriteWord9	Modul position 7, write word 9	0 .. 65535 → 0 .. 65535
40	ModulPos_7_WriteWord10	Modul position 7, write word 10	0 .. 65535 → 0 .. 65535
...	...	...	...
62	ModulPos_7_WriteWord32	Modul position 7, write word 32	0 .. 65535 → 0 .. 65535
63	ModulPos_6_WriteWord1	Modul position 6, write word 1	0 .. 65535 → 0 .. 65535
64	ModulPos_6_WriteWord2	Modul position 6, write word 2	0 .. 65535 → 0 .. 65535
65	ModulPos_6_WriteWord3	Modul position 6, write word 3	0 .. 65535 → 0 .. 65535
66	ModulPos_6_WriteWord4	Modul position 6, write word 4	0 .. 65535 → 0 .. 65535
67	ModulPos_6_WriteWord5	Modul position 6, write word 5	0 .. 65535 → 0 .. 65535
68	ModulPos_6_WriteWord6	Modul position 6, write word 6	0 .. 65535 → 0 .. 65535
69	ModulPos_6_WriteWord7	Modul position 6, write word 7	0 .. 65535 → 0 .. 65535
70	ModulPos_6_WriteWord8	Modul position 6, write word 8	0 .. 65535 → 0 .. 65535
71	ModulPos_6_WriteWord9	Modul position 6, write word 9	0 .. 65535 → 0 .. 65535
72	ModulPos_6_WriteWord10	Modul position 6, write word 10	0 .. 65535 → 0 .. 65535
...	...	...	...

Table 8: 4xxxx, Holding registers, Runtime			
94	ModulPos_6_WriteWord32	Modul position 6, write word 32	0 .. 65535 → 0 .. 65535
95	ModulPos_5_WriteWord1	Modul position 5, write word 1	0 .. 65535 → 0 .. 65535
96	ModulPos_5_WriteWord2	Modul position 5, write word 2	0 .. 65535 → 0 .. 65535
97	ModulPos_5_WriteWord3	Modul position 5, write word 3	0 .. 65535 → 0 .. 65535
98	ModulPos_5_WriteWord4	Modul position 5, write word 4	0 .. 65535 → 0 .. 65535
99	ModulPos_5_WriteWord5	Modul position 5, write word 5	0 .. 65535 → 0 .. 65535
100	ModulPos_5_WriteWord6	Modul position 5, write word 6	0 .. 65535 → 0 .. 65535
101	ModulPos_5_WriteWord7	Modul position 5, write word 7	0 .. 65535 → 0 .. 65535
102	ModulPos_5_WriteWord8	Modul position 5, write word 8	0 .. 65535 → 0 .. 65535
103	ModulPos_5_WriteWord9	Modul position 5, write word 9	0 .. 65535 → 0 .. 65535
104	ModulPos_5_WriteWord10	Modul position 5, write word 10	0 .. 65535 → 0 .. 65535
...	...	...	...
126	ModulPos_5_WriteWord32	Modul position 5, write word 32	0 .. 65535 → 0 .. 65535
127	ModulPos_4_WriteWord1	Modul position 4, write word 1	0 .. 65535 → 0 .. 65535
128	ModulPos_4_WriteWord2	Modul position 4, write word 2	0 .. 65535 → 0 .. 65535
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131	ModulPos_4_WriteWord5	Modul position 4, write word 5	0 .. 65535 → 0 .. 65535
132	ModulPos_4_WriteWord6	Modul position 4, write word 6	0 .. 65535 → 0 .. 65535
133	ModulPos_4_WriteWord7	Modul position 4, write word 7	0 .. 65535 → 0 .. 65535
134	ModulPos_4_WriteWord8	Modul position 4, write word 8	0 .. 65535 → 0 .. 65535
135	ModulPos_4_WriteWord9	Modul position 4, write word 9	0 .. 65535 → 0 .. 65535
136	ModulPos_4_WriteWord10	Modul position 4, write word 10	0 .. 65535 → 0 .. 65535
...	...	...	...
158	ModulPos_4_WriteWord32	Modul position 4, write word 32	0 .. 65535 → 0 .. 65535
159	ModulPos_3_WriteWord1	Modul position 3, write word 1	0 .. 65535 → 0 .. 65535
160	ModulPos_3_WriteWord2	Modul position 3, write word 2	0 .. 65535 → 0 .. 65535
161	ModulPos_3_WriteWord3	Modul position 3, write word 3	0 .. 65535 → 0 .. 65535
162	ModulPos_3_WriteWord4	Modul position 3, write word 4	0 .. 65535 → 0 .. 65535
163	ModulPos_3_WriteWord5	Modul position 3, write word 5	0 .. 65535 → 0 .. 65535
164	ModulPos_3_WriteWord6	Modul position 3, write word 6	0 .. 65535 → 0 .. 65535
165	ModulPos_3_WriteWord7	Modul position 3, write word 7	0 .. 65535 → 0 .. 65535

Table 8: 4xxxx, Holding registers, Runtime			
166	ModulPos_3_WriteWord8	Modul position 3, write word 8	0 .. 65535 → 0 .. 65535
167	ModulPos_3_WriteWord9	Modul position 3, write word 9	0 .. 65535 → 0 .. 65535
168	ModulPos_3_WriteWord10	Modul position 3, write word 10	0 .. 65535 → 0 .. 65535
...	...	...	...
190	ModulPos_3_WriteWord12	Modul position 3, write word 32	0 .. 65535 → 0 .. 65535
191	ModulPos_2_WriteWord1	Modul position 2, write word 1	0 .. 65535 → 0 .. 65535
192	ModulPos_2_WriteWord2	Modul position 2, write word 2	0 .. 65535 → 0 .. 65535
193	ModulPos_2_WriteWord3	Modul position 2, write word 3	0 .. 65535 → 0 .. 65535
194	ModulPos_2_WriteWord4	Modul position 2, write word 4	0 .. 65535 → 0 .. 65535
195	ModulPos_2_WriteWord5	Modul position 2, write word 5	0 .. 65535 → 0 .. 65535
196	ModulPos_2_WriteWord6	Modul position 2, write word 6	0 .. 65535 → 0 .. 65535
197	ModulPos_2_WriteWord7	Modul position 2, write word 7	0 .. 65535 → 0 .. 65535
198	ModulPos_2_WriteWord8	Modul position 2, write word 8	0 .. 65535 → 0 .. 65535
199	ModulPos_2_WriteWord9	Modul position 2, write word 9	0 .. 65535 → 0 .. 65535
200	ModulPos_2_WriteWord10	Modul position 2, write word 10	0 .. 65535 → 0 .. 65535
...	...	...	...
222	ModulPos_2_WriteWord32	Modul position 2, write word 32	0 .. 65535 → 0 .. 65535
223	ModulPos_1_WriteWord1	Modul position 1, write word 1	0 .. 65535 → 0 .. 65535
224	ModulPos_1_WriteWord2	Modul position 1, write word 2	0 .. 65535 → 0 .. 65535
225	ModulPos_1_WriteWord3	Modul position 1, write word 3	0 .. 65535 → 0 .. 65535
226	ModulPos_1_WriteWord4	Modul position 1, write word 4	0 .. 65535 → 0 .. 65535
227	ModulPos_1_WriteWord5	Modul position 1, write word 5	0 .. 65535 → 0 .. 65535
228	ModulPos_1_WriteWord6	Modul position 1, write word 6	0 .. 65535 → 0 .. 65535
229	ModulPos_1_WriteWord7	Modul position 1, write word 7	0 .. 65535 → 0 .. 65535
230	ModulPos_1_WriteWord8	Modul position 1, write word 8	0 .. 65535 → 0 .. 65535
231	ModulPos_1_WriteWord9	Modul position 1, write word 9	0 .. 65535 → 0 .. 65535
232	ModulPos_1_WriteWord10	Modul position 1, write word 10	0 .. 65535 → 0 .. 65535
233	ModulPos_1_WriteWord11	Modul position 1, write word 11	0 .. 65535 → 0 .. 65535
234	ModulPos_1_WriteWord12	Modul position 1, write word 12	0 .. 65535 → 0 .. 65535
...	...	...	
372	ModulPos_1_WriteWord150	Modul position 1, write word 150	0 .. 65535 → 0 .. 65535

Table 8: 4xxxx, Holding registers, Runtime

409	ModulSelPos_1 **Retain** parameter	Module selector for internal bus position 1	0→ None 1→ LPC-2.A01, LPC-2.A02, LPC-2.A03, LPC-2.A04, LPC-2.R02, LPC-2.DD4 2→ LPC-2.DI5, LPC-2.DI6, LPC-2.DI7, LPC-2.DI8 3→ LPC-2.DO6, LPC-2.DO8, LPC-2.DO7, LPC-2.DO9 4→ LPC-2.DI1, LPC-2.DI2, LPC-2.DI3, LPC-2.DI4 5→ LPC-2.DO1, LPC-2.DO2, LPC-2.DO3, LPC-2.DO4, LPC-2.SO2, LPC-2.DOL 6→ LPC-2.DL1 13→ LPC-2.VV1, LPC-2.VV4,LPC-2.DX1 15→ LPC-2.I16 16→ LPC-2.O16 17→ LPC-2.EO1 19→ LPC-2.R01 21→ LPC-2.C06, LPC-2.CXX 22→ LPC-2.A05
410	ModulSelPos_2 **Retain** parameter	Module selector for internal bus position 2	0→ None 1→ LPC-2.A01, LPC-2.A02, LPC-2.A03, LPC-2.A04, LPC-2.R02, LPC-2.DD4 2→ LPC-2.DI5, LPC-2.DI6, LPC-2.DI7, LPC-2.DI8 3→ LPC-2.DO6, LPC-2.DO8, LPC-2.DO7, LPC-2.DO9 4→ LPC-2.DI1, LPC-2.DI2, LPC-2.DI3, LPC-2.DI4 5→ LPC-2.DO1, LPC-2.DO2, LPC-2.DO3, LPC-2.DO4, LPC-2.SO2, LPC-2.DOL 6→ LPC-2.DL1 13→ LPC-2.VV1, LPC-2.VV4,LPC-2.DX1 15→ LPC-2.I16 16→ LPC-2.O16 17→ LPC-2.EO1 19→ LPC-2.R01 21→ LPC-2.C06, LPC-2.CXX 22→ LPC-2.A05

Table 8: 4xxxx, Holding registers, Runtime

411	ModulSelPos_3 **Retain** parameter	Module selector for internal bus position 3	0→ None 1→ LPC-2.A01, LPC-2.A02, LPC-2.A03, LPC-2.A04, LPC-2.R02, LPC-2.DD4 2→ LPC-2.DI5, LPC-2.DI6, LPC-2.DI7, LPC-2.DI8 3→ LPC-2.DO6, LPC-2.DO8, LPC-2.DO7, LPC-2.DO9 4→ LPC-2.DI1, LPC-2.DI2, LPC-2.DI3, LPC-2.DI4 5→ LPC-2.DO1, LPC-2.DO2, LPC-2.DO3, LPC-2.DO4, LPC-2.SO2, LPC-2.DOL 6→ LPC-2.DL1 13→ LPC-2.VV1, LPC-2.VV4,LPC-2.DX1 15→ LPC-2.I16 16→ LPC-2.O16 17→ LPC-2.EO1 19→ LPC-2.R01 21→ LPC-2.C06, LPC-2.CXX 22→ LPC-2.A05
412	ModulSelPos_4 **Retain** parameter	Module selector for internal bus position 4	0→ None 1→ LPC-2.A01, LPC-2.A02, LPC-2.A03, LPC-2.A04, LPC-2.R02, LPC-2.DD4 2→ LPC-2.DI5, LPC-2.DI6, LPC-2.DI7, LPC-2.DI8 3→ LPC-2.DO6, LPC-2.DO8, LPC-2.DO7, LPC-2.DO9 4→ LPC-2.DI1, LPC-2.DI2, LPC-2.DI3, LPC-2.DI4 5→ LPC-2.DO1, LPC-2.DO2, LPC-2.DO3, LPC-2.DO4, LPC-2.SO2, LPC-2.DOL 6→ LPC-2.DL1 13→ LPC-2.VV1, LPC-2.VV4,LPC-2.DX1 15→ LPC-2.I16 16→ LPC-2.O16 17→ LPC-2.EO1 19→ LPC-2.R01 21→ LPC-2.C06, LPC-2.CXX 22→ LPC-2.A05

Table 8: 4xxxx, Holding registers, Runtime

413	ModulSelPos_5 **Retain** parameter	Module selector for internal bus position 5	0→ None 1→ LPC-2.A01, LPC-2.A02, LPC-2.A03, LPC-2.A04, LPC-2.R02, LPC-2.DD4 2→ LPC-2.DI5, LPC-2.DI6, LPC-2.DI7, LPC-2.DI8 3→ LPC-2.DO6, LPC-2.DO8, LPC-2.DO7, LPC-2.DO9 4→ LPC-2.DI1, LPC-2.DI2, LPC-2.DI3, LPC-2.DI4 5→ LPC-2.DO1, LPC-2.DO2, LPC-2.DO3, LPC-2.DO4, LPC-2.SO2, LPC-2.DOL 6→ LPC-2.DL1 13→ LPC-2.VV1, LPC-2.VV4,LPC-2.DX1 15→ LPC-2.I16 16→ LPC-2.O16 17→ LPC-2.EO1 19→ LPC-2.R01 21→ LPC-2.C06, LPC-2.CXX 22→ LPC-2.A05
414	ModulSelPos_6 **Retain** parameter	Module selector for internal bus position 6	0→ None 1→ LPC-2.A01, LPC-2.A02, LPC-2.A03, LPC-2.A04, LPC-2.R02, LPC-2.DD4 2→ LPC-2.DI5, LPC-2.DI6, LPC-2.DI7, LPC-2.DI8 3→ LPC-2.DO6, LPC-2.DO8, LPC-2.DO7, LPC-2.DO9 4→ LPC-2.DI1, LPC-2.DI2, LPC-2.DI3, LPC-2.DI4 5→ LPC-2.DO1, LPC-2.DO2, LPC-2.DO3, LPC-2.DO4, LPC-2.SO2, LPC-2.DOL 6→ LPC-2.DL1 13→ LPC-2.VV1, LPC-2.VV4,LPC-2.DX1 15→ LPC-2.I16 16→ LPC-2.O16 17→ LPC-2.EO1 19→ LPC-2.R01 21→ LPC-2.C06, LPC-2.CXX 22→ LPC-2.A05

Table 8: 4xxxx, Holding registers, Runtime			
415	ModulSelPos_7 **Retain** parameter	Module selector for internal bus position 7	0→ None 1→ LPC-2.A01, LPC-2.A02, LPC-2.A03, LPC-2.A04, LPC-2.R02, LPC-2.DD4 2→ LPC-2.DI5, LPC-2.DI6, LPC-2.DI7, LPC-2.DI8 3→ LPC-2.DO6, LPC-2.DO8, LPC-2.DO7, LPC-2.DO9 4→ LPC-2.DI1, LPC-2.DI2, LPC-2.DI3, LPC-2.DI4 5→ LPC-2.DO1, LPC-2.DO2, LPC-2.DO3, LPC-2.DO4, LPC-2.SO2, LPC-2.DOL 6→ LPC-2.DL1 13→ LPC-2.VV1, LPC-2.VV4,LPC-2.DX1 15→ LPC-2.I16 16→ LPC-2.O16 17→ LPC-2.EO1 19→ LPC-2.R01 21→ LPC-2.C06, LPC-2.CXX 22→ LPC-2.A05
418	CommErrorI2CDisableTimeout **Retain** parameter	Defines the timeout after which all I/O modules are disabled if Modbus communication with the Master is lost.	0 → Function disabled 1 .. 10000 → 1 .. 10000 s
419	EnableRS485PullUpDown **Retain** parameter	Enable pull-up & pull-down resistors on RS-485 A-B lines	0 → Disabled resistors 1 → Enabled resistors

Table 9: 4xxxx, Holding registers, Modbus settings			
Reg.	**Name**	**Description**	**Raw → Engineering data**
801	Slave_ID **Modbus** settings	Slave address for Modbus	1 .. 247 → SlaveID 1 .. SlaveID 247 234 → SlaveID 234 (default)
802	Baudrate **Modbus** settings	Baud rate for Modbus	0 → 115k2 (default) 1 → 4k8 2 → 9k6 3 → 14k4 4 → 19k2 5 → 38k4 6 → 56k0 7 → 57k6 8 → 115k2
803	Parity **Modbus** settings	Parity for Modbus	0 → None (default) 1 → Even 2 → Odd
804	StopBits **Modbus** settings	Stop bits for Modbus	1 → 1 (default) 2 → 2

Table 10: 4xxxx, Holding registers, Passwords			
Reg.	**Name**	**Description**	**Valid password on rising-edge**
905	SaveRetainParameters	On rising edge of password 9055, parameters are written to EEPROM	9055
908	SaveModbusSettings	On rising edge of password 9088, Modbus settings are written to EEPROM, which are used after power-up	9088

6 TECHNICAL SPECIFICATIONS

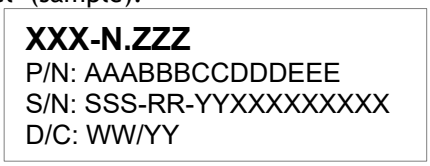
Table 11: Technical specifications	
Main power supply	20 .. 28 V DC
Inrush current	2.5 A
Power consumption (no additional modules connected)	Up to 4 W depending on additional modules connected to main module.
Max. total power consumption	Up to 24W depending on additional modules connected to main module.
Connection type for PS	screw type connectors for stranded wire from 0.75 to 2.5mm^2
Connection type for RJ485	disconnectable screw type connectors for stranded wire 0.75 to 1.5 mm2
Maximum number of devices in Modbus RTU network	32
Dimensions (L x W x H)	90 x 18 x 60 mm
Weight	55 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
Overvoltage category	II
Electrical equipment	Class II (double insulation)
Protection class	IP 30

Attention:
The total power consumption of the LPC-2.MU0 module, including all connected I/O expansion modules, must not exceed **24 W**.

7 MODULE LABELING

Figure 8: Label

Label (sample):



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,
   - **XXXXXXXXX**– 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***

8 CHANGES

The following table describes all the changes to the document.

Date	V.	Description
05.08.25	5	Added LPC-2.DX1 in LPC-2.VV4 cards, updated table 11, added link to Modbus RTU configuration tool.
04.03.25	4	Added recommendation to use Smarteh IDE tool for I/O configuration planning. Change holding registers positions.
03.28.25	3	Improved wording and structure in chapters 2, 3, 4.1, 4.2 and 5. Added information about factory-set Modbus parameters, RS-485 termination switch, and maximum power consumption limitation. Included information about I/O Configuration Tool availability.
13.03.25	2	Updated Modbus RTU register Table.
28.02.25	1	The initial version, issues as *LPC-2.MU0 module UserManual*.

9 NOTES