



Product line of programmable controllers and extension modules

UniPi Neuron



S103, S103-G, S103-IQRF

M103, M203, M303, M523

L203, L303, L403, L523, L533

xS11, xS30, xS40, xS51

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1 Introduction

What is UniPi Neuron?

UniPi Neuron is a product line of compact freely programmable controllers for automatic regulation and monitoring in residential and commercial premises and light industry areas, except for system which are critical for security.

Whole Neuron product line consists of a variety of controllers which differ in configuration and number of inputs / outputs. It also includes Neuron extension modules for RS485 bus (Modbus).

What can be UniPi Neuron products used for?

Products of Neuron line can be used in a variety of implementations thanks to a great variability of Input / Output configurations in controllers and in extension modules. Implementations examples are:

- Single-purpose devices (heat pumps, automatic barrier gate control)
- Monitoring and data collection systems
- Home automation / Smart Homes (light switching, automatic shutters, grass watering systems)
- Complex applications (Control of boiler rooms, cascade boiler control, air-conditioning systems)

Available Neuron models

The following table describes input / output and communication interface configurations of each Neuron controller.

Models	DI	DO	RO	AI	AO	Ethernet	RS485	1-Wire
S103	4	4	0	1	1	1	1	1
M103	12	4	8	1	1	1	1	1
M203	20	4	14	1	1	1	1	1
M303	34	4	0	1	1	1	1	1
M523	8	4	5	5	5	1	2	1
L203	36	4	28	1	1	1	1	1
L303	64	4	0	1	1	1	1	1
L403	4	4	56	1	1	1	1	1
L523	24	4	19	5	5	1	2	1
L533	12	4	10	9	9	1	3	1

Each Neuron controller has these common parameters:

CPU	RAM	Others
4×1.2 GHz	1 GB	Wifi + Bluetooth

Available Neuron Extension models

The following table describes input / output and communication interface configurations of each Neuron extension.

Models	DI	DO	RO	AI	AO
xS11	12	0	13	0	0
xS30	24	0	0	0	0
xS40	8	0	14	0	0
xS51	4	0	5	4	4

Certification

Devices of Neuron product line have CE marking and ES Declaration of Conformity. They are compliant with ČSN EN 6095-1 ed. 2, ČSN EN 61000-6-3 ed. 2, ČSN EN 55014-1 ed. 3, ČSN EN 55022 ed. 3 and with EMC standards.

Products are also compliant with government orders and EU directives including all amendments:

- GD no. 17/2003 Coll. as amended, 2006/95/EC – including amendments
- GD no. 616/2006 Coll. as amended, 2004/108/ES – including amendments
- LVD - 2014/35/EU
- EMC – 2014/30/EC

Identification for countries outside the EU

Device is to be distributed as a development board.

2 Installation and connection

Basic instructions

Always follow these instructions during the installation:

- Make sure you meet the actual standards and rules and all regional and state regulations.
- Always turn off the power supply before any manipulation (mounting / demounting).
- Use a wire with appropriate wire gauge.
- Do not exceed screw torque of removable screw connectors.
- Follow installation and operating conditions.
- Keep the cabling as short as possible. If longer cables are necessary, you should use shielded versions. You should always route your cables in pairs: i.e. one neutral conductor plus one phase conductor or signal line.
- Always keep separate:
 - The AC wiring
 - High-voltage DC circuits with high-frequency switching cycles
 - Low-voltage signal wiring
- Ensure that the wires are installed with appropriate strain relief.
- Installation of the device must be performed in stable and closed distribution box.

Note

Neuron devices may only be installed and wired by skilled personnel who are familiar with and follow relevant rules, regulations, and standards.

Warning

It's an open device. Death, serious bodily injury, or considerable property damage can occur. Box, Neuron device is installed in, must be accessible only with a key. Access to the must be allowed only to authorized personnel.

2.1 Neuron product structure

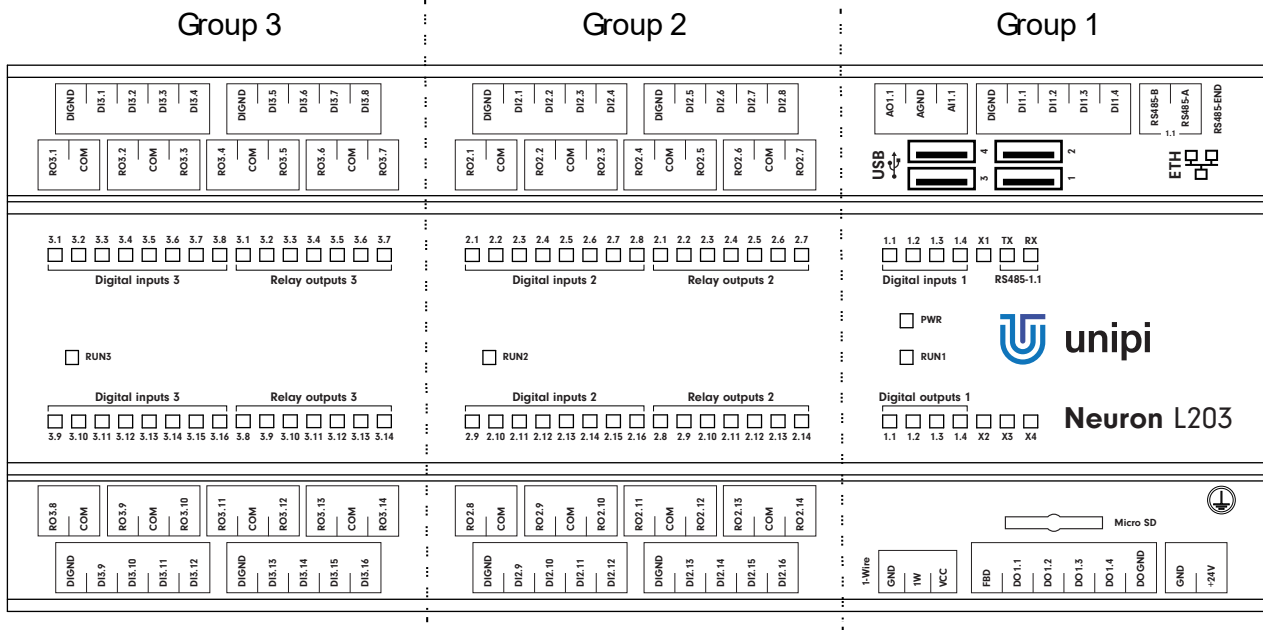
Each Neuron product is divided into 1 to 3 groups which depends on specific type of product. Groups are numbered from right to left in the direction from the main group (1). Each group consists of inputs, outputs, or communication channels – these are numbered from left to right separately for each group.

Some advanced features are only available to specific group. Each group features its own processor, which handles events and monitors communication with the main processor. Groups does not communicate with each other. Connectors of given group are always divided according to the purpose to avoid possible mistake. The purpose of each screw connector is described atop the product case. The position of connector corresponds with the position in the description.

Note

Screw connectors are numbered like DiX or DiY.X. – the X stands for the number of input / output while the Y stands for the group number. If no group number is stated it is always the group 1.

The following picture shows numbering of inputs, outputs, and groups of the product Neuron L40x.



2.2 Control units and extension modules

Control units compared to extension modules feature CPU and memory for custom program settings on OS Linux (for more see chapter 3). Extension modules are connected to control units over RS485 with Modbus communication protocol and it is not possible to store custom system within.

2.2.1 Neuron control units

The advantage of control units is the possibility to load custom program thanks to the open Linux platform. The other advantage is a high-speed communication within the unit resulting in minimal latency when executing commands. Control units also feature communication interfaces such as Ethernet, RS485/RS232, 1-Wire and other. It is also possible to equip them with additional module for wireless communication - GPRS, ZigBee, Lora, Sigfox, etc.

2.2.2 Neuron Extension modules

Extension are used to increase the number of inputs and outputs in the system even for greater distances thanks to RS485 communication line with Modbus protocol. Extension modules which have digital or relay output and also digital inputs can use Direct Switch (more on this topic in chapter 3.4.1).

Communication parameter settings

It is possible to configure communication parameters in two ways. Either directly via integrated DIP switch (hardware settings) or through software configuration in the corresponding registers (software settings).

Hardware configuration always supersedes the software configuration. To enable software configuration the hardware configuration must be set to 0.

Default settings

By default, all DIP switches are set to Off state which equals to address 0 and so the preconfigured software settings take place. Default software settings has the following parameters: **19 200 bps, 8 data bits, no parity, Modbus address 15.**

Note

Models, where the communication speed and parity cannot be set by hardware, are preconfigured to use 19 200 bps without parity.

2.2.2.1 Hardware settings

The integrated DIP switch is used to configure communication of the device. Purpose of each switch is always described atop the box above the DIP switch.

Purpose of each switch also describes the following table:

Switch	Description	Off state	On state
1	Modbus address	-	Bit weight 1
2	Modbus address	-	Bit weight 2
4	Modbus address	-	Bit weight 4
8	Modbus address	-	Bit weight 8
19,2 / 9,6	Bit rate	19 200 bps	9 600 bps
E / N	Parity	Even	None

Example configuration – Address 3, 9 600 bps, even parity

Address switches 1 and 2 set to On state (lower position), switches 4 and 8 set to Off state (upper position). Switch 19,2/9,6 set to On state and switch E/N set to Off state.

Note

Please note that the switch no. 2 in some models is not used. Its number is not relevant nor has a meaning. The true meaning of each DIP switch is described atop the module case.

2.2.2.2 Software settings

Software settings is done via corresponding registers of the device. More specifically registers UART_mode (for communication parameter settings) and Modbus_Address (for device address settings).

Register UART_mode is described in detail in Modbus register map of each extension module.

Register Modbus_Address is supposed to store values in range from 1 – 254. If the value written to this register is not in that range, the configuration is ignored.

To apply the configuration of both registers it is necessary to save configuration (chapter 3.4.3.6) and restart the device either via software (chapter 3.4.3.5) or manually by power cycle.

After the restart the module communicates according to the newly set configuration values.

Note

Saving the configuration also saves the complete current configuration as default including output settings and other parameters (more in chapter 3.4.3.6).

2.3 Description of connectors and indication LED diodes

2.3.1 LED diode description

Name	Function	Purpose	Color
PWR	Emit light	Indication of power supply voltage	Red
RUN	Emit light/Not emit light	HW malfunction indication	Green
	Short blink after 2 sec	Communication OK	Green
	Emit light 2 sec + not emit light 2 sec	Communication timeout reached MWD	Green

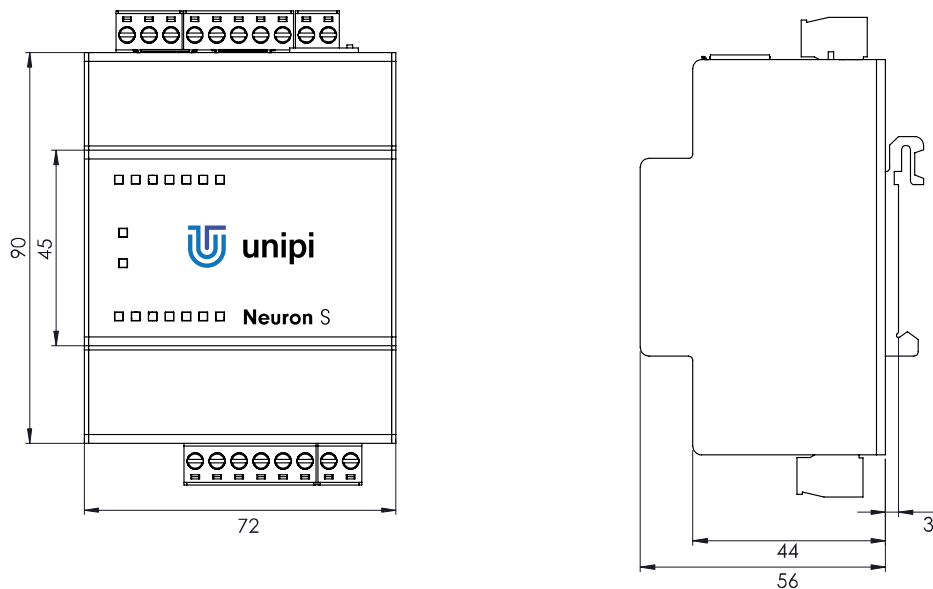
Digital inputs	Emit light	Indication of Log 1 on input	Green
Digital outputs	Emit light	Indication of switch on output	Green
Relay outputs	Emit light	indication of switch on output	Green
TX	Blink	Serial link transmission indication	Green
RX	Blink	Serial link reception indication	Green
ULED	Emit light	User programmable LED	Green

2.3.2 Connector description

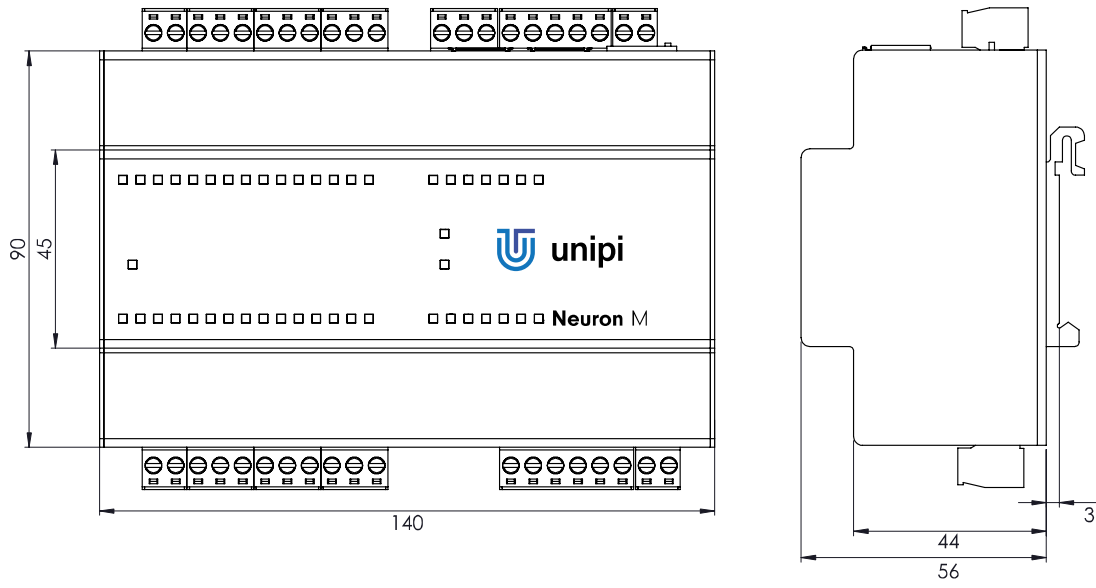
Screw connector name	Purpose
+24V	Positive pole of power supply
GND	Negative pole of power supply
DI	Digital input
DIGND	Common screw connector of digital input – negative pole
DIVOUT	Positive pole 24V for use with digital inputs
DIVGND	Negative pole 24V for use with digital inputs
DO	Digital output
DOGND	Common screw connector of digital output – negative pole
RO	Relay output
COM	Common screw connector of relay output
AI	Analog input
AIS	Current source for given AI
AO	Analog output – universal
AOV	Analog output – Voltage only
AGND	Common screw connector of negative pole of analog input / output
RS485-A/RS485-B	Screw connectors for RS485 communication interface

2.4 Dimensions

2.4.1 UniPi Neuron Type S



2.4.2 UniPi Neuron Type M



2.4.3 UniPi Neuron Type L

