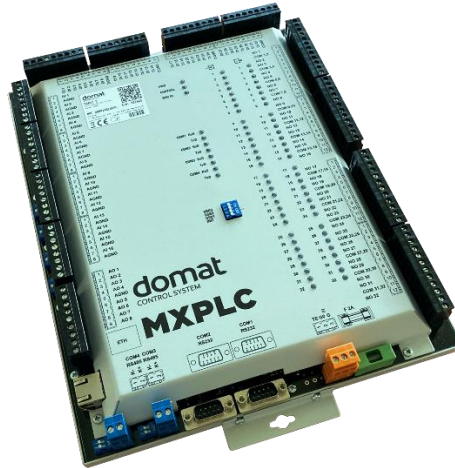


MXPLC

Compact PLC process station



Summary

The MXPLC is a programmable process station with integrated I/O module with the I/O mix optimized for larger HVAC control applications. The multi-interface process station may be extended with other I/O modules to accommodate plants with more I/Os.

MXPLC – BECK RTOS-PPC, for program upload the SoftPLC is used
MXPLC-L – Linux, for program upload the SCP protocol is used

Application

- HVAC control systems, data acquisition, interfacing 3rd party systems

Function

The I/O part (16 × AI, 8 × AO, 32 × DI, 32 × DO) communicates with the PLC over a RS485 data bus. The internal module communicates as a RXIO at COM port 3, address 2. There may be more modules at the same bus, connected over the COM3 port. On the base board there is also a PLC module which contains the PLC processor and memory including the SoftPLC application. The base board hosts all physical interfaces (COM ports and Ethernet).

In the case of the MXPLC-L variant, the compiled program is uploaded via the SCP protocol via terminal, see the [instructions](#).

The communication circuits are galvanically separated and protected against overvoltage. LEDs indicate states of the binary I/Os, red LED flashes for bus communication (TX) and green LEDs (ON and RUN) indicates supply voltage and system module cycle.

The PLC can be mounted on the base plate of the switchboard, or on another flat and smooth surface by two screws.

See domat - Technical application notes for connection and function examples.

Technical data

Supply voltage	24 V AC/DC, $\pm 10\%$
Consumption	20 W
Processor	ARM i.MX6UL 528 MHz
Memory	64 MB FLASH (MXPLC-L: 128 MB FLASH), 128 MB SRAM, 128 KB NVRAM
Ethernet	Ethernet 10/100BaseT, RJ45 2 \times LED (Link, Data) integrated in the socket
RS232	COM1, COM2 2 \times CANNON 9 male; pin 2 = TX, 3 = RX, 5 = GND 300...115 200 bit/s, parity and bits are set in software
RS485	COM3, COM4 RS485 (K+, K-) 2 separated buses galvanically insulated from each other, insulating voltage 1 kV 300...115 200 bit/s, parity and bits are set in SW maximal bus length 1200 m maximum number of modules depends on requested response time – up to 255 addresses, for common HVAC applications use about 300...400 physical data points on the bus
Dimensions	292.3 (h) \times 237 (w) \times 40 (d) mm (module) 325 (h) \times 237 (w) \times 40 (d) mm (incl. fixtures)
Protection degree	IP20 (EN 60529 + A2:2019)
Analogue inputs	8 \times Pt 1000, resistance 0...1600 Ohm, 0...5000 Ohm 8 \times 0...10 V DC, Pt 1000, resistance 0...1600 Ohm, 0...5000 Ohm, 0(4)...20 mA – selected with DIP switch and over the bus (the rest of ranges, for example Pt100, Ni1000, can be transformed from input by predefined transformation in SW of process station)
Analogue outputs	8 \times 0...10 V DC
Analogue outputs load	min. 10 k Ω , max. current 10mA each output; outputs are short-circuit protected by current limitation to 20 mA
Digital inputs	32 \times 24V AC/DC – voltage must be applied (no dry contacts)
Input voltage for log. „0“	max. 5 V AC/DC
Input voltage for log. „1“	18...30 V DC, 18...26V AC @ 7 mA
Digital outputs	32 \times relay, normally open: 5 A/250 V AC, 5 A/30 V DC, 750 VA, 90 W
Ambient conditions	from -20...50 $^{\circ}$ C; 5...85% relative humidity; non-condensing gases, chemically non-aggressive conditions, fog, ice and frost (according EN IEC 60721-3-3 ed. 2:2019 climatic class 3K22, 1K21, 3M11) for installation at high altitude, it is necessary to consider the reduction of dielectric strength and a limited cooling air (EN IEC 60664-1 ed.3: 2020)

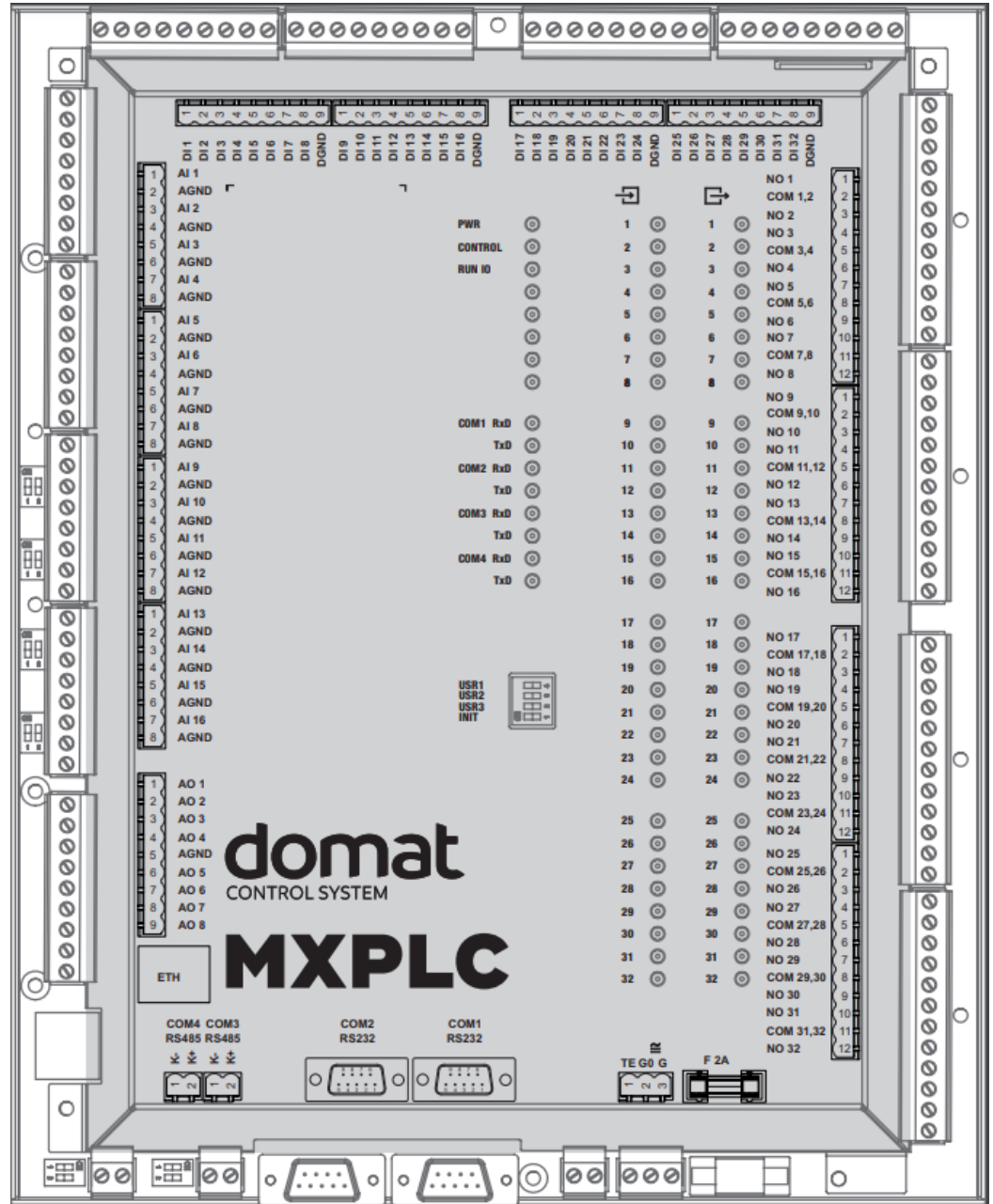
Standards of conformity

EMC EN IEC 61000-6-2 ed. 4:2019, EN IEC 61000-6-4 ed. 3:2019 (industrial environment)

electrical safety EN IEC 62368-1 ed. 2:2020+A11:2020

hazardous substances reduction EN IEC 63000:2019

Terminals



Analogue inputs

AI1 to AI8 are designed as **passive only**. The range (0...1600 Ω or 0...5000 Ω) can be set over the configuration software ModComTool or over SoftPLC IDE.

AI9 to AI16 can be set so as to measure

- **resistance** (same as AI1 to AI8),
- **voltage** 0...10 V or
- **current** 0...20 mA.

The AI9 to AI16 0...20 mA ranges are set over a DIP switch **for each input independently**. The DIP switch are accessible from outside of the module.

Switch settings:

Range	DIP switch
resistance, passive temperature sensors	OFF (default)
voltage 0...10 V	OFF (default)
current 0...20 mA	ON

All analogue inputs AI1 to AI16 have common ground AGND. The inputs are optically separated from the other parts of the I/O module.

For three-wire connection (active sensors, e.g. pressure, humidity), the analogue input ground AGND must be connected with the peripheral 24 V AC power ground. As all I/O types are mutually separated in the module, it is possible to use one common transformer to power both the active peripherals and the MXPLC.

Analogue outputs

The 0...10 V analogue outputs maximum load is 10 mA, however, they are permanently short-circuit proof and the output current is limited to 20 mA. The outputs are optically separated from the other circuits in the module, and their ground (AGND) is not connected to the analogue inputs ground.

For three-wire connection (dampers, valves), the analogue output ground AGND must be connected with the peripheral 24 V AC power ground. As all I/O types are mutually separated in the module, it is possible to use one common transformer to power both the active peripherals and the MXPLC.

Digital inputs

Digital inputs operate with 24 V AC/DC. Each set of eight digital inputs have own common DGND terminals. The inputs are optically separated from the other circuits in the module, and they may be linked to the same transformer or power supply which supplies the MXPLC.

The statuses of the inputs are indicated by LEDs at the front panel of the module.

Digital outputs

Digital outputs are normally open relays with maximum voltage 250 V, 5 A. Each pair of outputs has one common terminal (COM X, Y).

The statuses of the outputs are indicated by LEDs at the front panel of the module.

Others

COM1 and COM2

The CANNON 9 communication connectors marked as COM1 and COM2 are for free assignment in the PLC program, such as for M-Bus converters, Modbus server for 3rd party integration, etc. See SoftPLC IDE.

COM3 and COM4

Serial RS485 ports for I/O modules, room units, room controllers, 3rd party integrations, etc. Remember that **the internal I/O module is connected to COM3**, and the COM3 port must be configured as Modbus RTU to reach the module.

Bus End switches: If both set to ON the bus is terminated, in the OFF position the terminating resistors are disconnected. NB. The first and the last module on the bus should have the BUS END on. The K+ and K- terminals link the module with the I/O bus.

The DIP switch is accessible through a small aperture close to the K+, K- terminals.

Fuse F 2 A

Replace only with the same type if fuse broken: F2A (fast, CF 5x20mm).

TE terminal

The TE terminal should be connected to the ground potential (PES, shielding terminal).

Ethernet

The 10/100 Ethernet RJ45 connector links the MXPLC to



- engineering notebook with SoftPLC IDE
- web client (if web access is configured)
- RcWare Vision – SCADA
- other process stations for data exchange
- other clients (e.g. Domat SoftPLC OPC server)
- the Internet for e-mail alarming.

Other topologies on request, contact Domat Control System technical support please.

Addressing

The Modbus address of the internal I/O module is set to 2, default communication parameters are 9600, 8, N, 1.

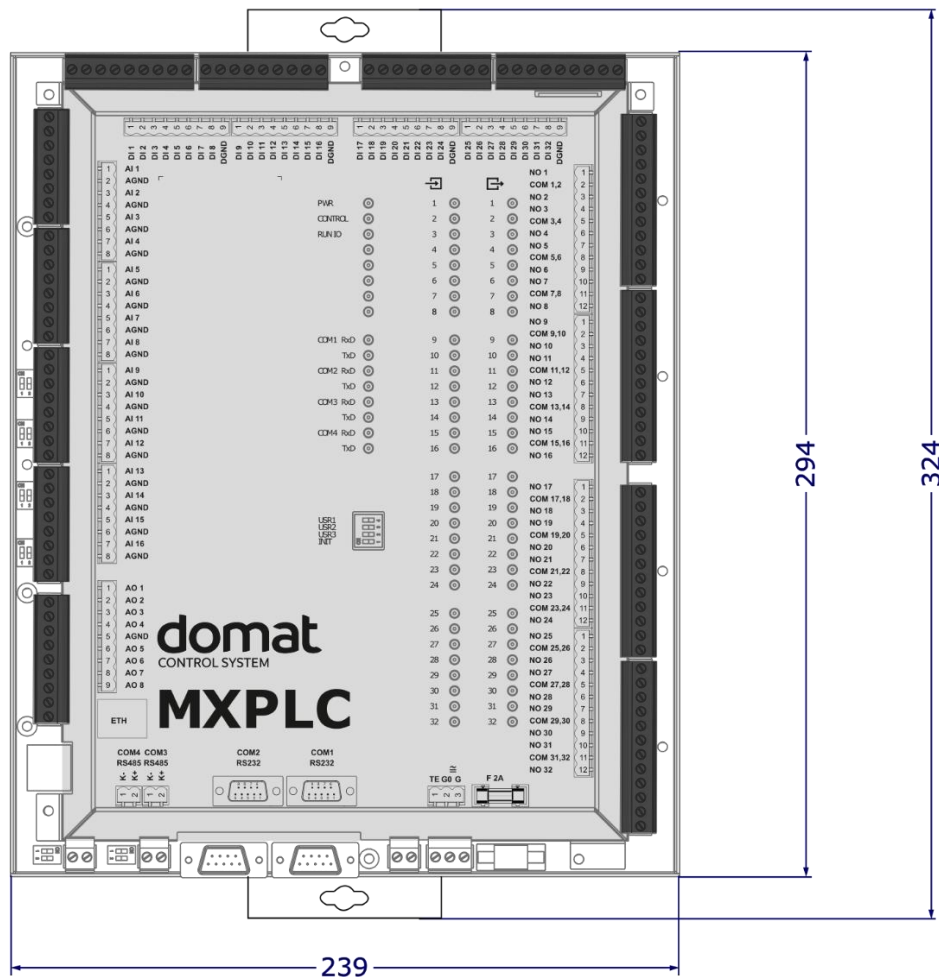
LEDs

PWR	On: MXPLC powered OK. Off: No power applied.
CONTROL	On: PLC board booted OK. Off: Booting in progress or error state.
RUN I/O	Flashing: I/O module OK Off: I/O module problem
COMx RxD	Flashing: Receiving data at COMx port Off: No data traffic
COMx TxD	Flashing: Transmitting data at COMx port Off: No data traffic
	Digital inputs (1...32) – input status (On: active, Off: inactive)
	Digital outputs (1...32) – output status (On: active, Off: inactive)

DIP switches

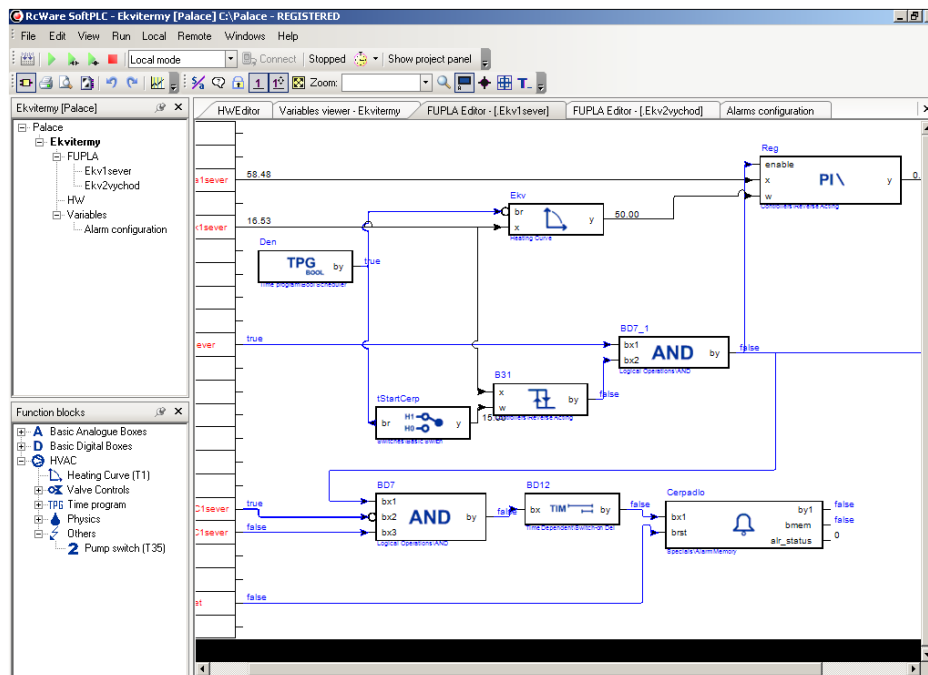
INIT	init of the I/O module (9600 bps, N, 8, 1)
USR1	disable PLC runtime
USR2 MXPLC-B	PLC Converter mode
USR2 MXPLC-L	init PLC
USR3	reserved

Dimensions



Dimensions are in *mm*.

Programming



The main programming tool is the **RcWare SoftPLC** package which contains I/O editor, graphical editor of the function plan, compiler (**RcWare SoftPLC IDE**), and LCD menu editor as well as touchscreen and web interface editor (**RcWare SoftPLC HMI Editor**).

The application program consists of function blocks which are stored in libraries. Those contain analogue and digital functions, mathematical blocks including goniometric functions, time schedulers, alarm blocks, and HVAC specific blocks (heat recovery, dewpoint calculation, enthalpy, pump switch etc.).

The application (project) is uploaded into the process stations using RcWare SoftPLC IDE. The installation package RcWare SoftPLC, manual and videotutorials are available at www.domat.cz.

Limitations

Number of communication channels (on the serial lines and Ethernet) to I/O modules and subsystems: max. 5, from this max. 3 of the same type (e.g. 3x Modbus RTU / serial, 2x DALI over M090)

Number of connections from clients: max. 5. This includes connections from RcWare Vision, IDE, Touchscreen application, LCD menu, browser to internal web server, connection from other PLCs over SoftPLC Link etc.

Communication drivers: The MXPLC and MXPLC-L versions differs considerably by the number of communication protocols supported. For a current list of supported protocols, see www.domat-int.com/en/downloads/technical-documentation - List of supported protocols.

MXPLC-L does not include a web server, the MXPLC version contains web server.

Program upload is only possible in a local network (LAN). If a remote program upload over the Internet is required, security rules must be observed to prevent the building control system from network attacks. A VPN or similar technology is recommended to access the PLC from the Internet.

WEEE notice

The device contains a non-rechargeable battery which backups the real-time clock and part of the memory. After the device is not operable, please return it to the manufacturer or dispose of it in compliance with local regulations.

Safety note

The device is designed for monitoring and control of heating, ventilation, and air conditioning systems. It must not be used for protection of persons against health risks or death, as a safety element, or in applications where its failure could lead to physical or property damage or environmental damage. All risks related to device operation must be considered together with design, installation, and operation of the entire control system which the device is part of.

Cyber security note

The product may influence the information and cyber security (ICS) of the control system. It is supplied in default settings. Implementation and continuous compliance with the ICS rules (e.g. creating and upload of certificates and keys, their updates and management, protection against misuse, etc.) are fully the responsibility of the control system operator. The manufacturer is not responsible for damages which originated or may originate due of wrong or insufficient implementation of ICS rules when using the device. In case of questions, please contact Domat Control System technical support.

**Changes in
versions**

09/2022 – First version of datasheet.

08/2023 – Added cyber security note and information about DIP switches.