

IPLC5xx Process station MiniPLC



Summary The IPLC5xx range is a family of digital process stations – communicative DDC controllers with ARM i.MX6UL processor and OS Linux. All types contain one RS485 interface for connecting of I/O modules and one Ethernet port for communication with a management station for remote management, extended types provide two more RS232 ports and one RS485 port.

Application

- Free programmable control units for HVAC systems and other applications with local HMI
- Optional customized firmware – protocol converters with data presentation
- Data acquisition, processing, and presentation systems with advanced networking features
- Energy management systems, photovoltaic plants

Function The controller contains an embedded operating system which boots up the runtime with the application. On the board there is a real time clock with battery backup, alarm buzzer, flash memory containing OS, runtime, application, and other data (time programs, setpoints etc.), NVRAM, and a watchdog. The RS485 communication is indicated by two LEDs at the bus end switch. SW1 set to ON at boot stops runtime and enables service access to the controller.

The application is downloaded over a SCP connection to the file system of the controller. A recommended client is WinSCP. See the instructions.: <https://www.domat-int.com/en/configuration-and-program-upload-iplc510> .

IPLC500 and IPLC510 provide a HMI: backlit 16 × 3 characters display and 6 pushbuttons. The user menu structure is configured in the LCD Menu Editor and contains actual values, setpoints, alarms, time schedules etc. in a tree structure. The branches are either freely accessible or protected by a PIN.

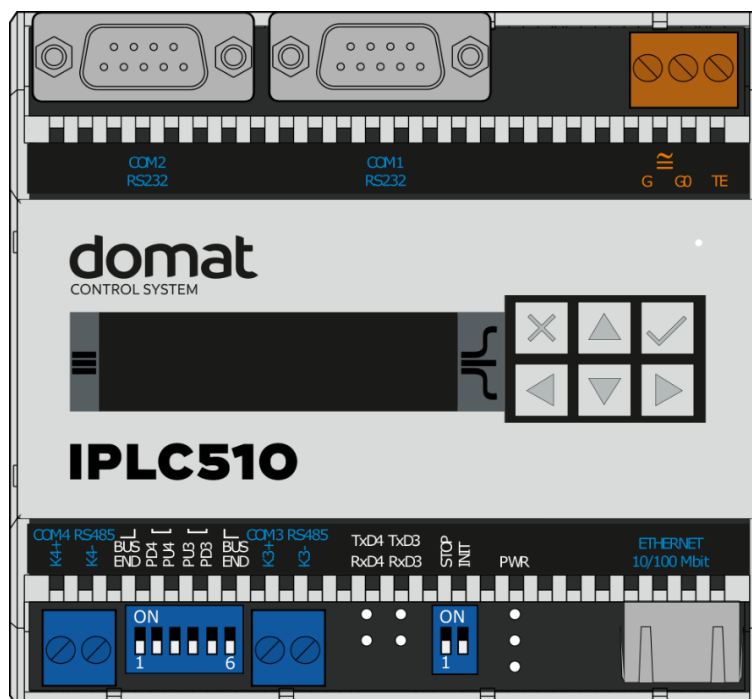
The module is 105 mm wide and mounts on a standard DIN rail.
Application examples: see *domat – Design and application guide*.

Technical data

Power	24 V AC/DC ± 20 %, 6 W
Communication	
Ethernet	1× Ethernet 10/100BaseT RJ45, 2 LED (link, data) integrated in the connector
RS232	COM1, COM2 2× CANNON 9 male; pin 2=TX, 3=RX, 5=GND galvanic insulation 1 kV 300...115 200 bit/s, parity and bits are set in SW
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
LCD display	3 rows × 16 characters, blue backlight manually adjustable backlight intensity
Buttons	6 pushbuttons with backlight
4x LED	PWR, RUN, RS485 TxD/RxD
HW	ARM i.MX6UL 528 MHz, 128 MB FLASH, 128 MB SRAM, 128 KB NVRAM
SW	SoftPLC IDE
Housing	Polycarbonate box (certification UL94V0)
Dimensions	105.6 × 98.7 × 61.4 mm
Aperture dimensions	102 (width) × 45 (high) mm; tolerance +1 mm (notice: the previous type of housing of IPLC201 has different dimensions)
Protection degree	IP20 (EN 60529)
Terminals	screw terminals M3, recommended wire diameter 0.35...1.5 mm ²
Ambient temperature	from -20...50 °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
Accessories	optional - markPLCkit – frame for mounting into an aperture in panel door or any suitable box (notice: the previous type of housing has different dimensions)

Terminals



Terminals and connectors

COM1	port COM1 - serial link RS232; CANNON 9 male
COM2	port COM2 - serial link RS232; CANNON 9 male
COM3	port COM3 - serial link RS485, terminals K+, K-
COM4	port COM4 - serial link RS485, terminals K+, K-
Ethernet	network interface
G	power
GO	power
TE	optional connection for shielding (on the back side in the DIN rail groove there is a metal strip which connects TE to DIN rail after the device is snapped on the rail)

LED indication

PWR	green LED – power (ON: power OK; OFF: no power applied, weak or damaged power supply, ...)
RxD3	green LED – RS485 receiving data at COM3 (flashing: receiving data; OFF: no data traffic)
TxD3	red LED – RS485 transmitting data at COM3 (flashing: transmitting data; OFF: no data traffic)
RxD4	green LED – RS485 receiving data at COM4 (flashing: receiving data; OFF: no data traffic)
TxD4	red LED – RS485 transmitting data at COM4 (flashing: transmitting data; OFF: no data traffic)

DIP switches

STOP	if switched to ON program execution is stopped, runtime is stopped after device restart
INIT	if ON at power-up, configuration parameters are brought to defaults (see Configuration parameters in Merbon IDE; for example IP address, user and password, database settings, proxy, ...)
BUS END	(DIP6 next to COM3 RS485) bus end COM3; the first and last devices on bus should have bus end ON
BUS END	(DIP1 next to COM4 RS485) bus end COM4; the first and last devices on bus should have bus end ON
PU3	pull-up resistor for COM3
PD3	pull-down resistor for COM3
PU4	pull-up resistor for COM4
PD4	pull-down resistor for COM4

When powered by DC voltage the polarity is not relevant.

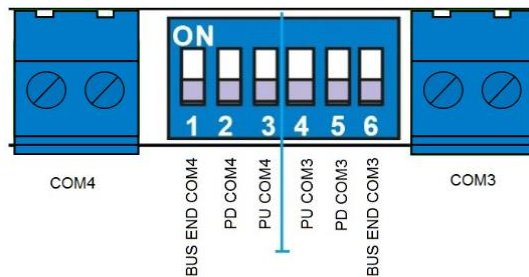
Bus End and pull up / pull down switches:

Three switches on the left belong to COM4, three switches on the right belong to COM3.

Unlike for the other modules and controllers, the bus is terminated (BUS END) with one switch only (SW1 and SW6).

The inner switches (2 and 3 for COM4, 4 and 5 for COM3) are pull-up and pull-down switches for K+, and K- wires:

The K- signal is bound over a resistor to RS485 ground (switch marked PD), the K+ links over a resistor to +5V power of the bus driver (switch marked PU).



NB:

In case it is necessary to use the pull-up and pull-down resistors because of strong EMC interference or extremely long wiring, the resistors may be activated for one line only – either COM3 or COM4, never both at the same time! The RS485 lines are mutually galvanically separated. When the PU and PD switches are activated at different buses at the same time, mutual interference of the signals may appear which results in communication errors.

Types and their properties

Typ	LCD	COM1 RS232	COM2 RS232	COM3 RS485	COM4 RS485
IPLC500	✓				✓
IPLC510	✓	✓	✓	✓	✓
IPLC500B					✓
IPLC510B		✓	✓	✓	✓

The IPLC510 is suitable for more complex applications or where integration of 3rd party systems or serial communication with other devices than domat I/O modules is required.

Programming

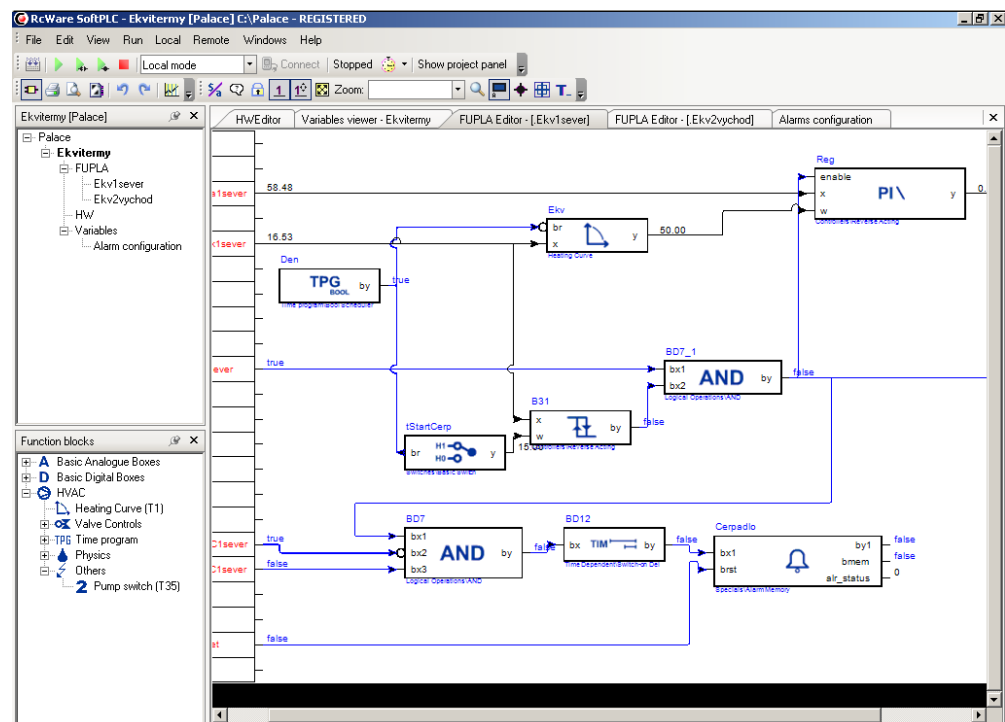
SoftPLC IDE

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 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 integrated web server functionality is NOT implemented.

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.



RcWare SoftPLC IDE

Communication Default network settings are:

IP address	192.168.1.10
subnet mask	255.255.255.0
default gateway	192.168.1.1

SCP user / password: root / "code", the default password ("code") is written on the label on the side of the device.

Remember to note the new IP address after readdressing!

After these values have been changed (see RcWare MiniPLC IDE handbook), it is possible to bring the process station into default settings by DIP switch SW2: set SW2 to ON and restart the station. It will respond at the default address and it is possible to change the old address in the network config file.

The controllers can share variables over the Ethernet network (outside temperature, heat demands etc.) together with IPLC2../3.., IPCT, and other platforms.

In case of integration into a SCADA system the controller links over TCP/IP (default TCP port number is 12345) to an OPC server (**RcWare SoftPLC OPC server**). The server can acquire data from more than one controller. This is how the IPLC can be easily integrated into majority of SCADA systems.

The runtime provides drivers for communication with numerous subsystems, e.g. Modbus TCP / RTU, BACnet, M-Bus, meter readout according to IEC 61107 / EN 62056, EN 60870-5-104, Advantech, Refusol, PowerOne, Saia, Sauter 2400, Landis & Gyr, and much more. See the latest list of drivers in the SoftPLC IDE channel definition dialogue. New drivers may be developed on request, contact the Domat Control System support department for details.

Limitations **Number of communication channels** (on the serial lines and Ethernet) to I/O modules and subsystems: unlimited

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

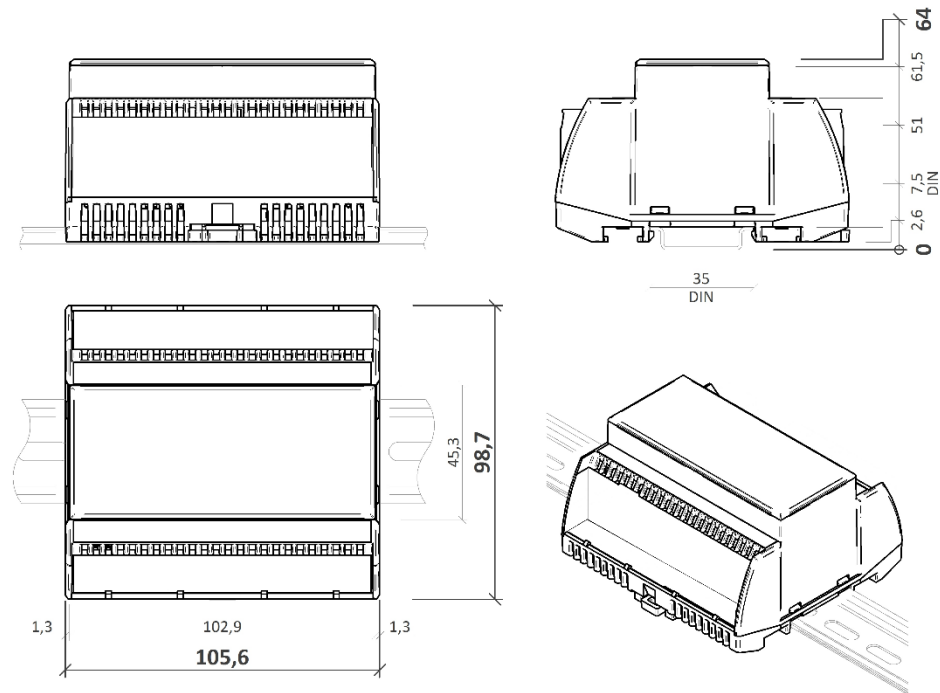
Communication drivers: find the updated list at <https://www.domat-int.com/en/technical-documentation> - List of supported protocols.

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.

Others The IP address, other network properties, and SoftPLC project location and runtime parameters are set up in configuration files. The steps are described in the RcWare SoftPLC MiniPLC Configuration manual in the *IPLC500* section.

Note that in the current version, the integrated web server functionality is NOT implemented.

Dimensions



All dimensions are in mm.

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.

**Changes in
versions**

07/2021 — First version of the datasheet.

03/2022 — DIP switch STOP - description change, link updates.