

IPLC

MiniPLC process station



Summary

The IPLC range is a family of digital process stations – communicative DDC controllers. All types contain one RS485 interface for connecting of I/O modules and one Ethernet port for communication with a management station or a web browser for remote management, extended types provide two more RS232 ports and one more RS485 port.

Applications

- Free programmable control units for HVAC systems and other applications with local HMI and web access
- Optional customized firmware – protocol converters with data presentation
- Data acquisition, processing, and presentation systems with advanced networking features
- Communicative home automation etc.

Functions

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.), and a watchdog. The controller also includes one Ethernet port, 2x RS232, and 2x RS485 serial interfaces. The RS485 communication is indicated by two LEDs at the bus end switch, another LED is software-controlled from the application. The SW1 – if set to ON – disables runtime start after power up and thus opens safe service access to the OS in case of corrupted application.

The application is downloaded either in the Integrated Development Environment (IDE) or over a FTP connection in the file system of the controller.

IPLC201 and IPLC301 provide a HMI: backlit 16 x 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.

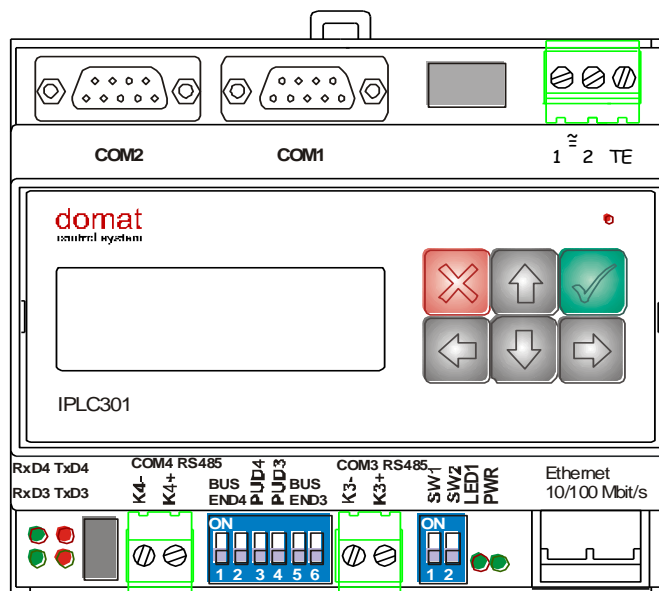
The module is 105 mm wide and mounts on a standard DIN rail.

Application examples: see *domat – Design and application guide*.

Technical data

Power supply	10 V ÷ 35 V DC, 14 V ÷ 24 V AC (terminals 1,2)
Consumption	1,7 VA
Ambient temperature	0 ÷ 60 °C
Communication	Ethernet 10/100BaseT, RJ45 COM1 (CANNON 9 M) RS232, 300 ... 115 200 bit/s (only IPLC301) COM2 RS232 (CANNON 9 M) (only IPLC301) COM3 RS485 (K3+, K3-), 300 ... 115 200 bit/s (only IPLC301) COM4 RS485 (K4+, K4-), 300 ... 115 200 bit/s
Processor	MPC5200, 400 MHz, 760 MIPS
Memory	64MB RAM, 32 MB Flash, 128 kB NVRAM FRAM
Max. bus length	1200 m
LCD display	3 rows, 16 characters each IPLC201 yellow backlight IPLC301 blue backlight Backlight intensity may be set manually.
Buttons	6 buttons with backlight
Dimensions	105 (l) x 90 (w) x 58 (h) mm
Mounting hole dimensions	105(d) x 45 (š) mm
Accessories	optional – FRAME – for mounting MiniPLC into panel door

Terminals



Terminals and connectors:

COM1	port COM1 – serial line RS232
COM2	port COM1 – serial line RS232-
1, 2	Power supply – any polarity
TE	Optional connection to technical ground
PWR	green LED – power OK
LED1	green LED –program cycle
SW1	active (at ON) at startu does not allow application to run
SW2	active (at ON) at start switches to converter mode Ethernet-RS485 (support in IDE)
Ethernet	Network interface
RxD3/TxD3	green/red LED communication at COM3
RxD4/TxD4	green/red LED communication at COM4
BusEnd3	(SW6) bus end COM3
BusEnd4	(SW1) bus end COM4
PUD3	Pull-up (SW4), pull-down (SW5) resistors for COM3
PUD4	Pull-up (SW3), pull-down (SW2) resistors for COM2
K3+ K3-	Port COM3 – serial line RS485
K4+ K4-	Port COM4 – serial line RS485

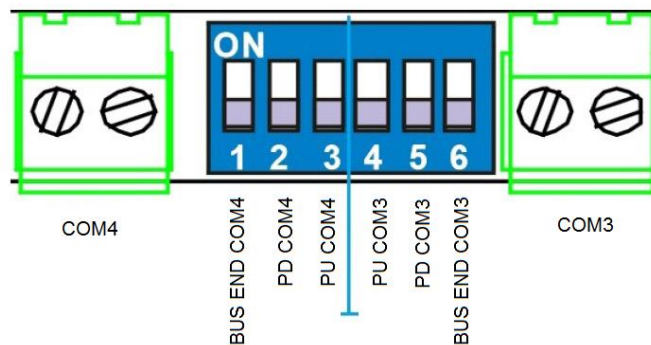
Bus End and pull up / pull down switches:

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 not 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

IPLC201	LCD display 3 rows x 16 characters, yellow backlight, Ethernet, COM4 I/O bus RS485
IPLC301	LCD display 3 rows x 16 characters, blue backlight, Ethernet, COM1 RS232, COM2 RS232, COM3 I/O bus RS485, COM4 I/O bus RS485
IPLC201B	no HMI, Ethernet, COM4 I/O bus RS485
IPLC301B	no HMI, Ethernet, COM1 RS232, COM2 RS232, COM3 I/O bus RS485, COM4 I/O bus RS485

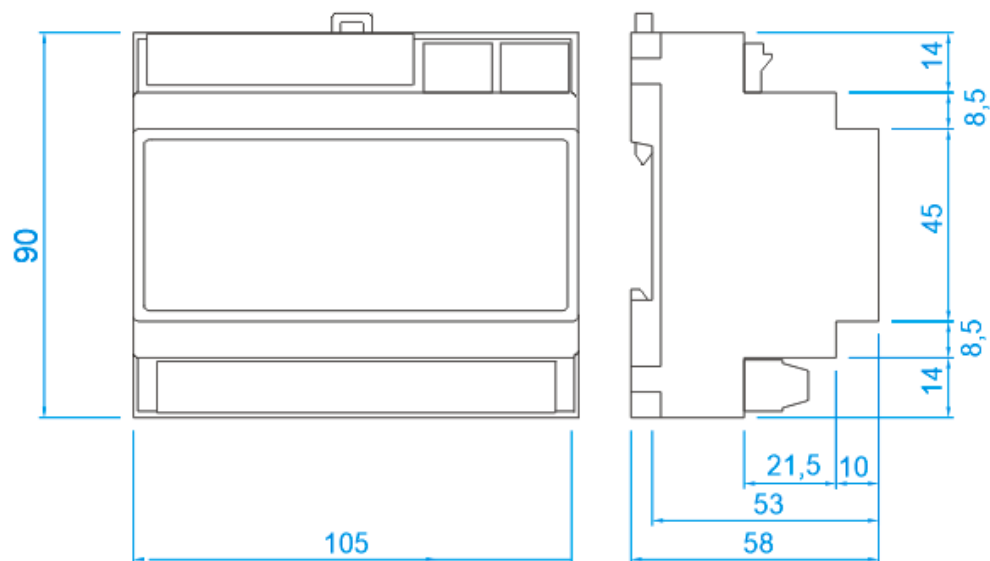
The IPLC301.. is suitable for more complex applications or where integration of 3rd party systems or serial communication with other devices than domat I/O modules is required. The most used type is IPLC201.

Relation to older types IPLC200.., IPLC300

The IPLC201, IPLC301 are programmed in the same way as the older types IPLC200 and IPLC300. The difference is in the computing power: IPLC201 and IPLC301 can host up to appr. 400 physical data points (I/Os), which is 3x more than the old hardware. There are also differences in ports and their numbering:

Typ	IPLC200	IPLC300	IPLC201(B)	IPLC301(B)
COM1	-	RS232	-	RS232
COM2	-	RS232/485	-	RS232
COM3	RS485	RS485	-	RS485
COM4	-	-	RS485	RS485

Dimensions



Dimensions are in v mm.

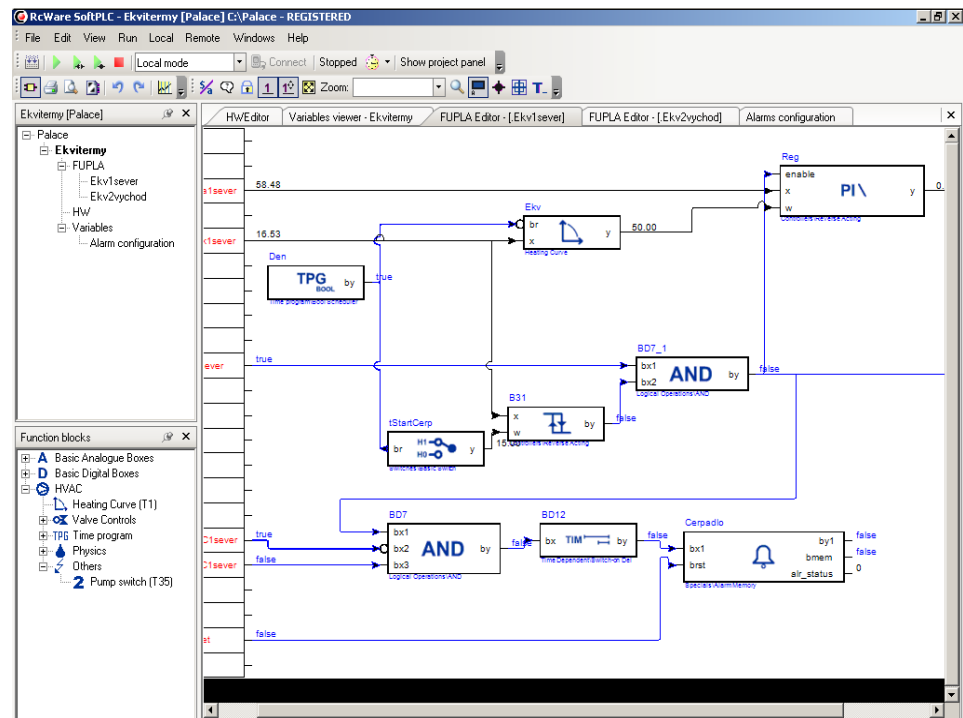
Programming

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.



RcWare SoftPLC IDE

Communication

The controllers can share variables over the Ethernet network (outside temperature, heat demands etc.). For integration into foreign systems, the Modbus RTU server serves through a serial interface that can work with any port. Or, via Ethernet, via http POST - for details, contact Technical Support at support@domat.cz.

Web access HMI is configured in the **web interface** editor. Texts, images, actual values, setpoints, time schedulers, online graphs, and multistate animations are inserted in different screens – panels. This web graphics is available over the network at the IP address of the controller, protected by user name and password. According to the user rights, parameters and time schedules can be changed, alarms acknowledged and reset etc.

In case of integration into a 3rd party 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 communicate with more than one controller.

A simple HMI interface can be created with the **Touchscreen** application which is

controllable over a touch screen or a mouse or another pointing device.

To integrate the MiniPLC data into 3rd party systems, the serial Modbus RTU server working on any COM port can be used, or http POST communication over the Ethernet – ask for details at support@domat.cz.

Limitations	<p>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)</p> <p>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.</p> <p>Communication drivers: find the updated list at www.domat.cz, Download, Technical documentation, Supported protocols.</p> <p>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.</p>
RoHS notice	<p>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.</p>
Safety note	<p>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.</p>

**Changes in
versions**

02/2016 – Limitations part added.

11/2017 – Datasheet template change, description of communication and safety note added.