domat IDE

# mark130.2        DDC controllers

**Summary**        **DDC (Direct digital control) controller mark130.2 is free programmable process station with ARM i.MX6UL processor and OS Linux. It is suitable for control of larger installation or use like control panel for other mark process station with Domat runtime. Mark130.2 contains 1 × Ethernet port, 1 × RS485 interface, 1 × RS232 interface and external 128 MB SRAM.**

**Application**
- **Control panel incl. mark process station with Domat runtime for HVAC systems or other technologies**
- **Free programmable control units for small HVAC systems and other applications**

**Function**        The controller hosts an embedded Linux operating system which boots up the Domat runtime with the application. The board contains real time clock with battery backup, flash memory containing OS, runtime, application, and other data (time programs, setpoints etc.), and a watchdog. It is also possible to use NVRAM to backup parameters in case of unexpected system shutdown.

The application is created and uploaded in the Domat IDE development environment. The maximum application program size depends on number of physical and software data points, amount of function blocks which require more memory (e.g. time schedulers), degree of code optimisation, and number of connections the PLC has to handle.

For communication with other devices, mark130.2 contains 1 × Ethernet port, 1 × a RS485 interface and 1 × a RS232 interface.

The process station contains a web server for remote connection and user intervention. The web pages and LDC menu are created and uploaded to the process station through Domat IDE. From the security point of view, the website is not

recommended for use in the public network, it is intended for operation in a local network. Therefore it is necessary to integrate the configured router or other element that ensures network security during the design of the network topology.

The process station can be operated through a 4 × 20 characters backlit LCD display and 6 pushbuttons. Users move in the menu using buttons – the **active row is the second row** from the top, which is enhanced by the red line on the printed cover. Objects such as Value setting, Alarm, and Time schedule have predefined functionality, and thus for the configuration it is only necessary to set addresses, assign data points, and complete user texts.

The user menu structure is configured and uploaded to the process station through Domat IDE (see LCD menu definition in PLC properties).

The device is installed using three plastic clamps into an aperture in panel door or any suitable box. The aperture dimensions are 153 × 100 mm, with tolerance 2 mm.

| Technical data | | |
|---|---|---|
| Power | 24 V AC/DC ± 20 %; max. 5 W | |
| **Communication** | | |
| Ethernet | 1 × Ethernet 10/100BaseT | |
| | RJ45, 2 LED (link, data) integrated in the connector | |
| RS232 | COM2 | |
| | 1 × CANNON 9 male; pin 2=RX, 3=TX, 4=DSR, 5=GND, 6=DTR, 7=RTS, 8=CTS | |
| | galvanically insulated, insulating voltage 1 kV | |
| | 300...115 200 bit/s, parity and bits are set in SW | |
| RS485 | COM1 RS485 (K+, K-) | |
| | galvanically insulated, 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 | 4 rows × 20 characters, blue backlight | |
| | possibility to switch off the backlight through application software | |
| Buttons | 6 buttons on a membrane keyboard, water and dirt resistant | |
| 4 × LED | PWR, RUN, RS485 TxD/RxD | |
| HW | ARM i.MX6UL 528 MHz, 64 MB FLASH, 128 MB RAM, 128 kB NVRAM FRAM | |
| SW | Domat IDE | |

| | |
|---|---|
| Housing | polycarbonate (PC) box (UL94V-2); front panel polyester membrane keypad |
| Front panel dimensions | 171.8 × 116.5 × 39.3 mm; see scheme below |
| Aperture dimensions | 153 × 100 mm (deviation +2 mm) |
| Front protection degree | IP65 (EN 60529 + A2:2019) |
| 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 |

**Terminals**
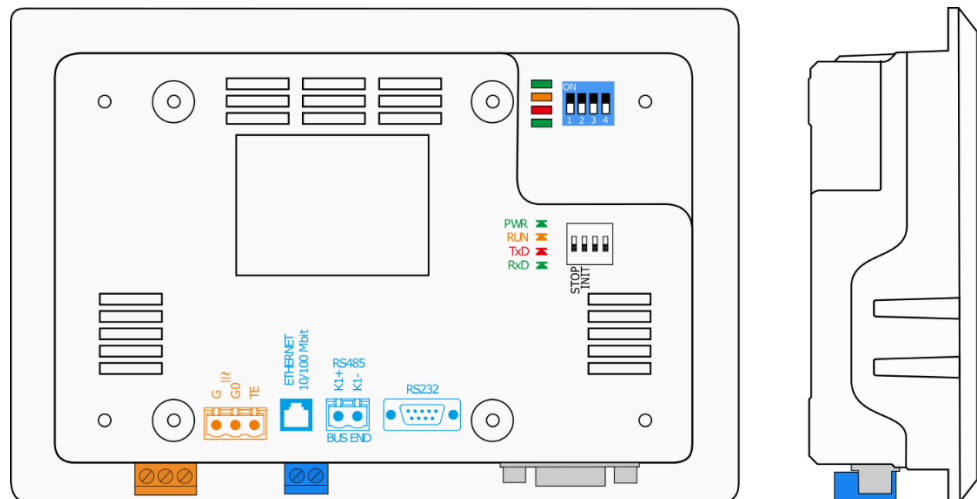


**Terminals and connectors**

| | |
|---|---|
| **G** | power |
| **G0** | power |
| **TE** | optional connection for shielding |
| **Ethernet** | network interface |
| **RS232** | port COM2 - serial link RS232; CANNON 9 male |
| **RS485** | port COM1 - serial link RS485, terminals K+, K- |

**LED indication**

| | |
|---|---|
| **PWR** | green LED – power (ON: power OK; OFF: no power applied, weak or damaged power supply, …) |
| **RUN** | orange LED – system cycle (OK: LED flashes periodically 1 s ON, 1 s OFF; ERROR: LED flashes in other pattern, LED is still ON or OFF) |

| | |
|---|---|
| **TxD** | red LED – RS485 transmitting data at COM1 (flashing: transmitting data; OFF: no data traffic) |
| **RxD** | green LED – RS485 receiving data at COM1 (flashing: receiving data; OFF: no data traffic) |

**DIP switches**

| | |
|---|---|
| **STOP** | DIP1 if ON runtime is running, program execution is stopped |
| **INIT** | DIP2 if ON at power-up, configuration parameters are brought to defaults (see Configuration parameters in Domat IDE; for example IP address, user and password, database settings, proxy, …) |
| **BUS END** | If ON = bus end COM1; the first and last devices on bus should have bus end ON; switch is under the RS485 terminals |

**Dimensions**
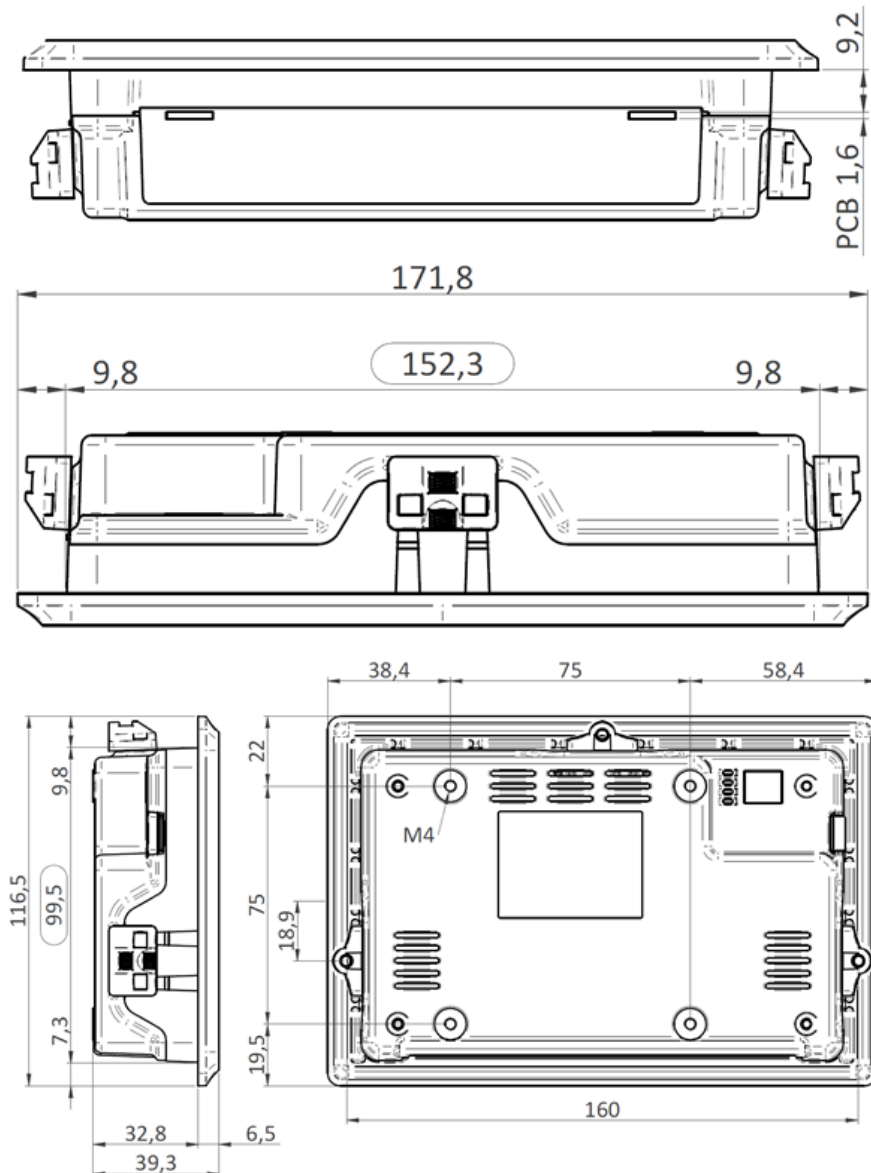


Dimensions are in *mm*.

**Programming**          **Domat IDE**

Programming tool Domat IDE contains I/O editor, graphical editor of the function plan (FBD), structure text editor, web page editor and LCD menu editor (HMI) for PLC and compiler.

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.). In addition to function blocks, the application program can also be compiled from structured text, or a combination of both languages can be used.

The minimum guaranteed number of records for history on the PLC is 79 000, but the actual number of stored samples may be larger depending on the data types that are stored in the history. The program can be set up also as structure text (ST) or with combination of both types of programming languages.

**Communication**      Default network settings are:

IP address               192.168.1.10
subnet mask              255.255.255.0
default gateway          192.168.1.1

SSCP user: admin
Password: rw

Notice: Do not forget to note the new network settings after change!

After these values have been changed, it is possible to bring the process station into default settings by the INIT DIP switch: set INIT to ON and restart the station. All values in the PLC configuration are set to defaults. The PLC will respond at the default IP address and it is possible to change the old address through Domat IDE.

The controllers can share variables over the Ethernet network (outside temperature, heat demands etc.) together with other PLC platforms.

The runtime provides drivers for communication with I/O modules and other subsystems. For example Domat runtime contains: Modbus TCP / RTU (server/client), M-Bus, IEC62056-21, SSCP, SoftPLC link and BACnet IP server/client (viz PICS). The complete list of drivers can be found in the Channel configuration dialogue in the most recent Domat release. Please check the required protocol features and functions with the list of implemented features in the Domat IDE help. It is also possible to program own communication drivers using the I/O library functions in structure text language.

**Number of communication channels** (on the serial lines and Ethernet) to I/O modules and subsystems is not directly restricted. It depends on available RAM PLC memory.

**Number of connections from SSCP clients is max. 5.** This includes connections from RcWare Vision, Domat IDE, HT102/HT104/200, mobile application Domat Menu Reader, connection from other PLCs over SSCP etc.

**Number of connections from Modbus TCP clients on Modbus TCP server is max. 5.**

In case of implementation of your own ST driver, there is limitation of max. 10 clients connected simultaneously.

Other clients channels (web, …) are not directly restricted.

**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**

07/2022 – First version of datasheet.
09/2022 – Flash memory size correction.
08/2023 – Change of names from Merbon to Domat.
04/2024 – Addition of pin descriptions for CAN 9 (RS-232) ports.