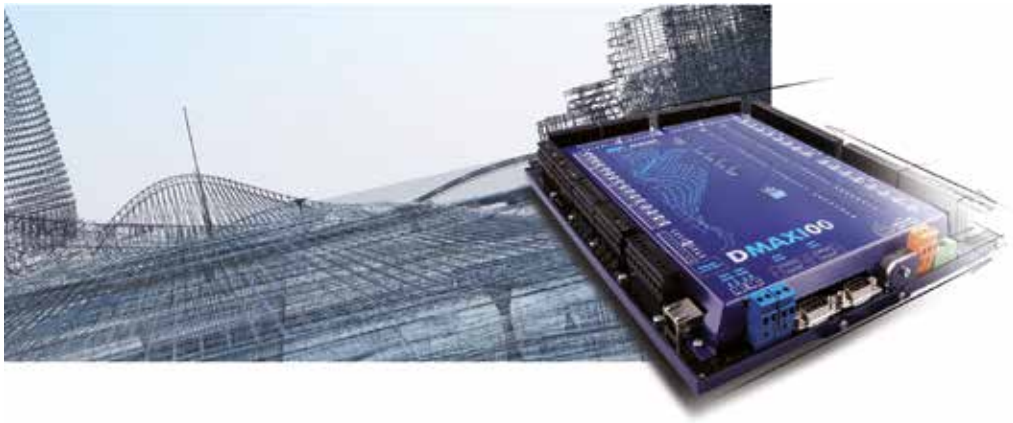
MIDAM
CONTROL SYSTEM

MIDAM DMAXI00

Free programmable controller with multiple I/O



Cloud bow

PLC / HMI

Free programmable process station equipped with with MPC5200 processor and Linux operating system. It is suitable for control of extensive HVAC installations, home automation or field data acquisition. It features one Ethernet port, two RS232 interfaces, and two RS485 interfaces for expanding I/O modules, 16 AI, 32 DI, 8 AO, and 32 DOs as well as integrated web interface. The enclosure body is made of painted steel for extra durability.

Application

- Free programmable control of common HVAC systems
- Web access and visualisation of HVAC systems
- Direct control through multiple inputs /outputs
- Data acquisition, processing, and presentation
- Protocol converters with web data presentation

Function

The DMAXI00 controller possesses an embedded Linux operating system which boots up the runtime with the application. It features 16 AI, 32 DI, 8 AO and 32 DO which makes the device suitable for control of installations up to approximately 500 physical data points (with extension IO modules). There is a RTC backed up with battery, flash memory containing OS, runtime, application, and other necessary data like time programs, setpoints etc., as well as a watchdog. It is also possible to use NVRAM as a backup for key parameters in case of unexpected system shutdown or connectivity drop. The application is created and uploaded in the integrated development environment (IDE). The complexity of application program size depends on number of physical and software data points, amount of function blocks which require more memory (e.g. time schedulers), level of code optimisation, and number of connections the controller is supposed to maintain. It contains one Ethernet (RJ45) two RS232 and two RS485 ports for seamless communication with other control devices. It features an integrated web server for remote connection and direct user intervention. The web pages can be created in WEB-PLC editor. The user menu structure as well as the exported web definition components are uploaded to the PLC through IDE (refer to Web definition in PLC properties). The web functionality as such is intended for operation in a local network. Therefore it is recommended to integrate any appropriate web router or other element that will ensure or add extra network security. The enclosure body is made of sheet steel which provides high durability when mounted on the base plate of the switchboard, or on another flat and smooth surface using fixtures delivered together with the device.

SCADA system integration

Direct integration into various SCADA systems through wired Modbus TCP, OPC UA, or BACnet/IP (RJ45) protocols is possible.

Programming

The main programming tool is the IDE package which contains I/O editor, graphical editor of the function plan (FBD), structure text editor (according to IEC 61131-3) 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.). The program can be set up also as structured text (ST) or with combination of both types of programming languages. The IDE package contains LCD menu editor as well as web editor (HMI).

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Technical data

Power supply	24 V ± 10% DC/ACmax. 20 VA; Nonresettable glass fuse 2 A, replace with the same type only if broken.
Consumption	max. 20 VA; fuse 2 A
Communication	**Ethernet** 1x Ethernet 10/100 BaseT; RJ45, 2x LED (link, data) integrated in the connector, galvanic isolation 1 kV **RS232, COM1; RS232 COM2** 2x CANNON 9 male; pin 2=TX, 3=RX, 5=GND 300 ... 115 200 bit/s, parity and bits are set in software **RS485, Modbus RTU (K3+, K3-); RS485, Modbus RTU (K4+, K4-)** baud rates 300 ... 115 200 bit/s, parity and bits are set over Modbus RTU, default 9600, N, 8, 1 maximal bus length 1200 m, galvanic isolation 1 kV
Protocol	Modbus RTU;128 node (RS485), Modbus TCP client/server; 128 node, OPC UA, BACnet/IP
Indication	PWR (green, power supply), RUN RT(yellow, device active), RUN IO (red, IOs active), 3x RxD (green, receiving data at the respective COM) TxD (red, transmitting data at the respective COM), LINK/DATA (Ethernet), 1-32x (green, DI1 - DI32 active), 1-32x (green, DO1 - DO32 active)
SW	IDE 2.4+ (IEC61131-3, FUPLA, ST language)
CPU	MPC5200, 400 MHz, 760 MIPS, 128 MB RAM, 64 MB flash, 128kB NVRAM FRAM
Inputs	**Analog inputs** AI1 - AI8 passive only range (0...1600 Ohm (default), 0...5000 Ohm, Pt1000) can be set over CloudBow Designer. AI9 - AI16 can be set to measure resistance (same as AI1 - AI8), voltage 0..10 Vdc (default) or current sensing 0..20 mA. The AI9 to AI16 0...20 mA ranges are set using jumpers independently for each input. These are accessible from outside of the device, 16-bit resolution is used, with 0.25% absolute accuracy, galvanic isolation 1 kV. All analogue inputs AI1 to AI16 have common ground AIC. 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 AIC must be connected with the peripheral 24 V AC power ground(or 0 V terminal for DC peripheral). 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 DMAXI00 module. **Digital inputs** 32x 24V AC/DC – voltage must be applied (no dry contact), e.g. from G and G0, input current 4 mA. Max. peak voltage 60 VDC, 40 VAC, galvanic isolation 1 kV. Digital inputs operate with 24 V AC/DC. Each set of eight digital inputs have their own common COM 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 DMAXI00.

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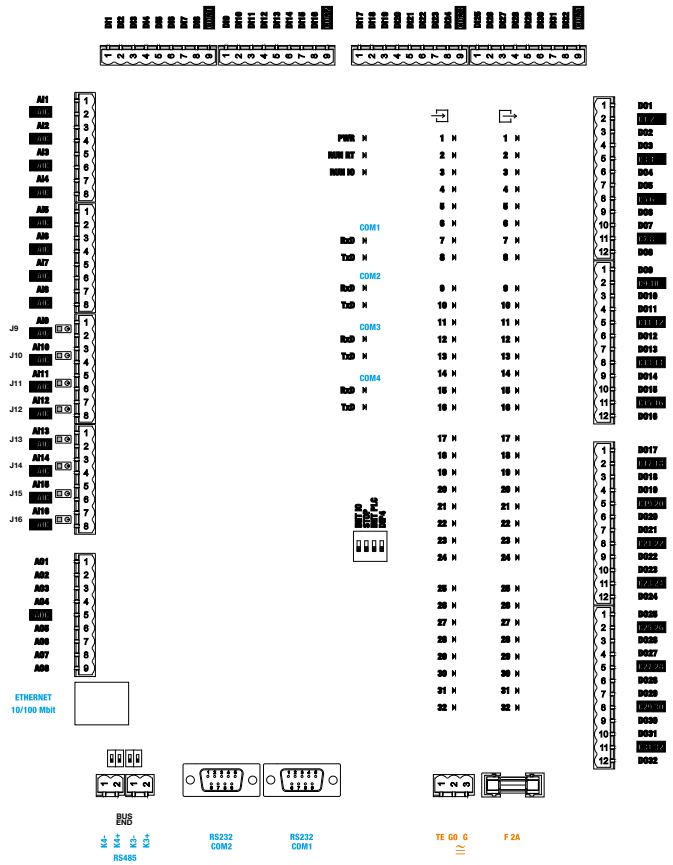
Outputs	**Analog outputs** 8x 0-10 VDC. Typical load 10 kOhm, max. current 10mA, permanent short circuit protection – 20 mA limit, 12-bit resolution, galvanic isolation 1 kV. For three-wire connection (active periphery, e.g. valves actuators, frequency changer), the analogue input ground AOC must be connected with the peripheral 24 V AC power ground (or 0 V terminal for DC peripheral). 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 markMX module. **Digital outputs** 32x relay, normally open (NO, SPST): 5A/250 V ac 1250 VA, 5A/30 V DC, 150W, galvanic isolation 1 kV. EN 60947-4-1 ed. 3 general usage, AC1, non-inductive load
Mechanical and dimensions	292.3 x 237 x 40 mm (l x w x h) Painted sheet steel enclosure, IP20, 1x DIP switch blocks - INIT IO, STOP, INIT PLC, DIP4(default configuration)
Terminals	134 x M3 screw terminals. Recommended wire diameter 0.35 to 1.5 mm^2
Ambient conditions	+5 to +40 °C, 5 % to 85 % rH non-condensation (EN 60721-3-3. Class 3K3).
RoHS 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.

PLC / HMI

Terminals and connection

DI1 - 8	Digital inputs 1 - 4
COM1	Digital input ground (common) for DI1 - 8
DI9 - 16	Digital inputs 9 - 16
COM2	Digital input ground (common) for DI9 - 16
DI17 - 24	Digital inputs 17 - 24
COM3	Digital input ground (common) for DI17 - 24
DI25 - 32	Digital inputs 25 - 32
COM4	Digital input ground (common) for DI25 - 32
AI1 - 16	Analog input 1 - 16
AIC	Analog input ground (common) for AI1 - 16
AO1 - 8	Analog outputs 1 - 8
Ethernet	Network interface (RJ45)
DO01 - DO32	Analog outputs ground (common)
C1 - 32	Common conductor for two neighbouring digital outputs.
K4-	Serial line RS485 –
K4+	Serial line RS485 +
K3-	Serial line RS485 –
K3+	Serial line RS485 +
COM2/RS232	Serial line RS232
COM1/RS232	Serial line RS232
TE	Technical ground
G0	Power
G	Power
F 2A	Fuse 2A.



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LED indication, DIP switches and Jumpers

J9 - J16	Set measurement range on AI9 - AI16 (see scheme below, add 125 Ohm resistors in parallel to AIC and selected input).
PWR	Green LED: Power supply indicator (ON: power OK; OFF: no power applied, weak or damaged power supply).
RUN RT	Yellow 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).
RUN IO	Red LED - flashes: I/O module OK; OFF: error in the I/O module
RxD	Green LED – receiving data at the respective COM (flashing: receiving data; OFF: no data traffic).
TxD	Red LED - transmitting data to the field bus at respective COM port (flashing: transmitting data; OFF: no data traffic).
DI1 - DI32	Green LED - Digital input 1 - 32 status indication (ON: voltage 24 AC/DC ±10 %; OFF: no or low voltage).
DO1 - DO32	Green LED - Digital output 1 - 32 status indication (ON: relay closed; OFF: relay open).
INIT IO	In ON position at power-up; configuration parameters of the IO internal module are brought to defaults (refer to Configuration parameters in IDE; for example IP address, user and password, database settings, proxy, ...).
STOP	In ON position; runtime is running, program execution is stopped.
INIT PLC	In ON at power-up; configuration parameters are brought to defaults (see Configuration parameters in IDE; for example IP address, user and password, database and proxy settings, etc.).
DIP4	Not used.
BUS END	DIP1 and DIP2 both set to ON ; the indicated RS485 bus is terminated, the first and last devices on the bus should have bus end in ON position.

Analog inputs configuration

AI9 - AI16 **Pt1000, 0 - 5000 Ohm, 0 - 10 V, default setting**
0 - 20 mA

Communication settings

Default network settings

IP address 192.168.1.10

Subnet mask 255.255.255.0

Default gateway 192.168.1.1

SSCP user: admin

Password: rw

Note the changed network settings for future reference!

As soon as these values have been changed, it is possible to bring the PLC into default settings by the INIT DIP switch. Set INIT to ON and restart the PLC. 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 IDE. The PLC 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 subsystems. Runtime contains e.g. Modbus TCP / RTU (server/client), M-Bus, IEC62056-21, SSCP. The complete list of drivers can be found in the Channel configuration dialog in the most recent IDE release available. Please consult the required protocol features and functions with the list of implemented features in the IDE help. It is also possible to program own communication drivers using the I/O library functions in ST language.

Number of communication channels (on the serial lines and Ethernet) to I/O modules and subsystems is not directly restricted and relates to available RAM PLC memory. Maximum five SSCP client connections are available. Number of connections from Modbus TCP clients on Modbus TCP server is also limited to five. Other client channels (web interface, etc.) are not directly restricted.

Changes in versions

12/2020	New datasheet version (v20/12).
11/2025	Analog output resolution changed (v25/11).

Subject to technical changes and General Terms and Conditions.