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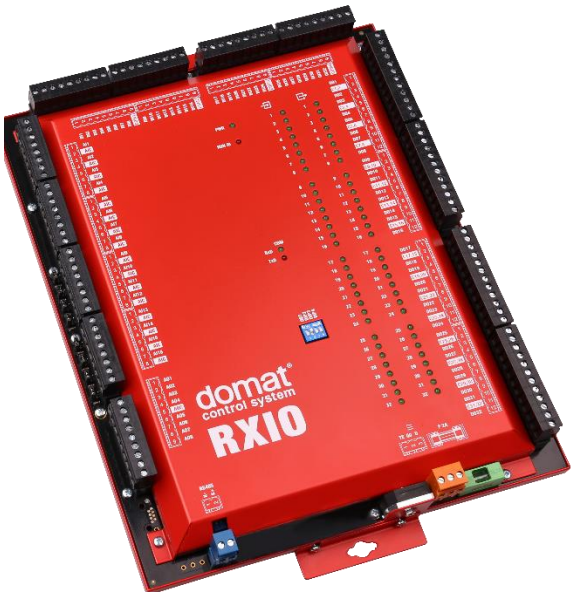
RXIO Compact I/O module



Summary **The RXIO multiple I/O compact module is a microprocessor-controlled, communicative module with the I/O mix optimized for larger HVAC control applications. The module uses a RS485 bus for communication, and can be easily integrated in a variety of supervision and control systems.**

Application

- **Compact I/O module for data acquisition and HVAC control systems**

Function

The RXIO module is a multiple I/O module (16 AI, 8 AO, 32 DI, 32 DO). The module communicates by means of a RS485 data bus. It is fully integrated into the SoftPLC environment, however, the Modbus RTU communication protocol ensures smooth and easy integration in a number of control and data acquisition systems. The Modbus register description is available in a separate document.

The communication circuits are protected against overvoltage. If the module is terminating the communication bus, i.e. it is the last in line, terminating resistors may be switched on by short-circuiting of the BUS END DIP switches (close to the K+, K- terminals). LEDs indicate states of the binary I/Os, red LED flashes for outgoing communication (TX), system module cycle (RUN), and green LED (ON) indicates supply voltage.

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

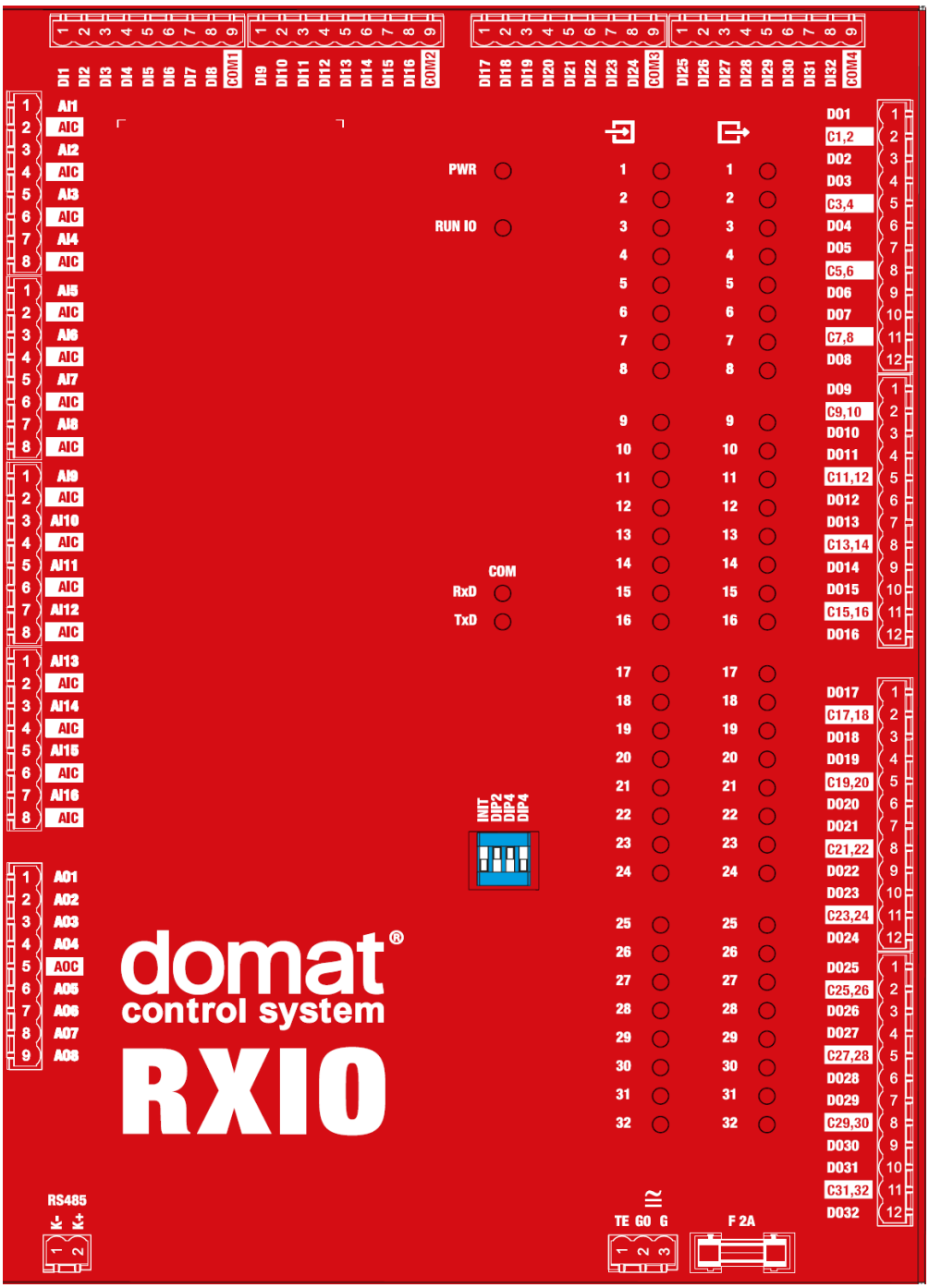
See domat - Technical application notes for connection and function examples.

Technical data

Supply voltage	18…35 V DC, 14…24 V AC
Consumption	19.5 W
Fuse	T2A/250 V
Working temperature of the module	0…70 °C
Communication	RS485, galvanic isolation 1 kV, Modbus RTU, 1200…19200 bps
RS485 - K+, K- terminals	
Max. bus length	1200 m
Max. number of modules on the bus	256 addresses, maximum number of modules depends on requested response time: for common HVAC applications with IPLCx01 or IPCT.1 use about 4 RXIO (about 300...400 data points on the bus)
Analogue inputs	8 × 0…10 V DC, 0…20 mA DC, Pt1000, 0…1600 Ω, 0…5000 Ω; 16 bit resolution, 0.25% accuracy (jumper current range) 8 × Pt1000, 0…1600 Ohm, 0…5000 Ohm; 16-bit resolution, accuracy 0.25% (other ranges, like Pt100, Ni1000, … can be transformed from input by predefined transformation in the PLC software)
Analogue outputs	8 × 0…10 V DC
Analogue outputs load	min. 10 kΩ, max. current 10 mA each output; outputs are short-circuit protected by current limitation to 20 mA
Digital inputs	32 × 24 V AC/DC – voltage must be applied (no dry contacts), input current 4 mA, galvanic isolation 1.5 kV
Input voltage for log. „0“	max. 5 V AC/DC
Input voltage for log. „1“	18...30 V DC, 18...26 V AC
Digital outputs	32 × relay SPST 5 A (AC1, general use, non-inductive load according to ČSN EN 60947-4-1 ed. 3), 250 V AC /30 V DC
Dimensions	293 (h) × 237 (w) × 40 (d) mm (module) 324 (h) × 237 (w) × 40 (d) mm (incl. fixtures)
Housing	sheet metal
Protection	IP20 (ČSN EN 60529)
Recommended wire cross section	0.14…1.5 mm2
SW	ModComTool
Ambient conditions	external conditions: EN 60721-3-3. climatic class 3K5 (-5…45 °C; 5 %...95 % relative humidity, non-condensing gases and chemically non-agressive conditions).

	storage: EN 60721-3-1 climatic class 1K3 (- 5…45 °C; 5…95 % relative humidity, non-condensing gases and chemically non-agressive conditions).
Standards of conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial enviroment) electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016 hazardous substances reduction EN 50581:2012

Terminals



Terminals and connectors

F 2 A	Fuse F2A. Replace only with the same type if fuse broken.
G	power
G0	power
TE	optional connection for shielding
COM1 RS485	port COM1 – serial link RS485, terminals K+, K-

Analogue inputs

AI1…8 **analogue inputs 1…8**

are designed as **passive only**. The range (0...1600 Ω (default), 0...5000 Ω, Pt1000) can be set over Merbon IDE or ModComTool.

AI9…16 **analogue inputs 9…16**

can be set so as to measure

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

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

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

AIC **analogue inputs ground** (common for all AI)

Notice:

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. 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 RXIO module.

Analogue outputs

AO1…8 **analogue outputs1…8**

Notice:

The 0…10 V outputs are short-circuit protected (with current limitation to 20 mA) and optically separated from the other circuits in the module, and their ground (AOC) is not connected to the analogue inputs ground.

AOC **analogue outputs ground**

Notice:
The ground is optically separated from the other parts of the I/O module. For three-wire connection (active peripherals, e.g. valve actuators, variable speed drives), the analogue input ground AOC 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 RXIO module.

Digital inputs

DI1…32	**digital inputs 1…32** 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 RXIO module. The statuses of the inputs are indicated by LEDs at the front panel of the module.
COM1	**digital inputs ground DI1…8** The ground is optically separated from the other parts of the I/O module.
COM2	**digital inputs ground DI9…16** The ground is optically separated from the other parts of the I/O module.
COM3	**digital inputs ground DI17…24** The ground is optically separated from the other parts of the I/O module.
COM4	**digital inputs ground DI25…32** The ground is optically separated from the other parts of the I/O module.

Digital outputs

DO1…32	**digital outputs 1…32** Digital outputs are normally open relays with maximum voltage 250 V, 5 A. Each pair of outputs has one common terminal (CX, Y). The statuses of the outputs are indicated by LEDs at the front panel of the module.
CX,Y	Common terminal for two neighbouring digital outputs with number X and Y.

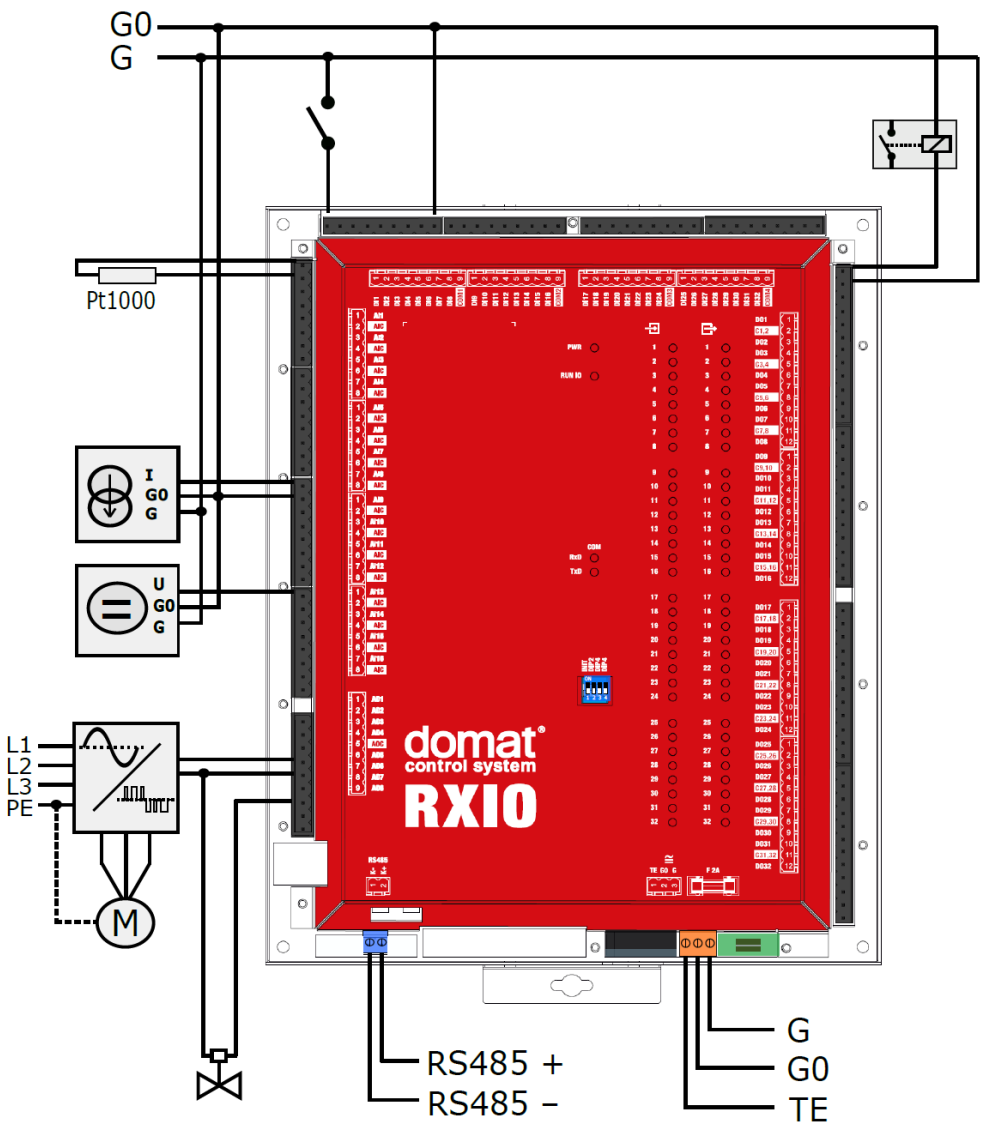
DIP switches

INIT	INIT (DIP1): if ON at power-up, configuration parameters are brought to defaults (see Configuration parameters in Merbon IDE). Default parameters are: address 1,baud rate 9600 bps, data bits 8, parity None, number of stop bits 1. Another function of the INIT switch is to bring EEPROM into default factory settings. To init the EEPROM, proceed as follows: - connect the device over RS485 to a PC with **ModComTool** (Modbus Configuration Tool)

- set INIT to ON
- apply power
- find the controller in the tool (Scan)
- set INIT to OFF
- in the **ModComTool**, open the controller window
- click the Initialisation button in the tool
- remove and apply power.

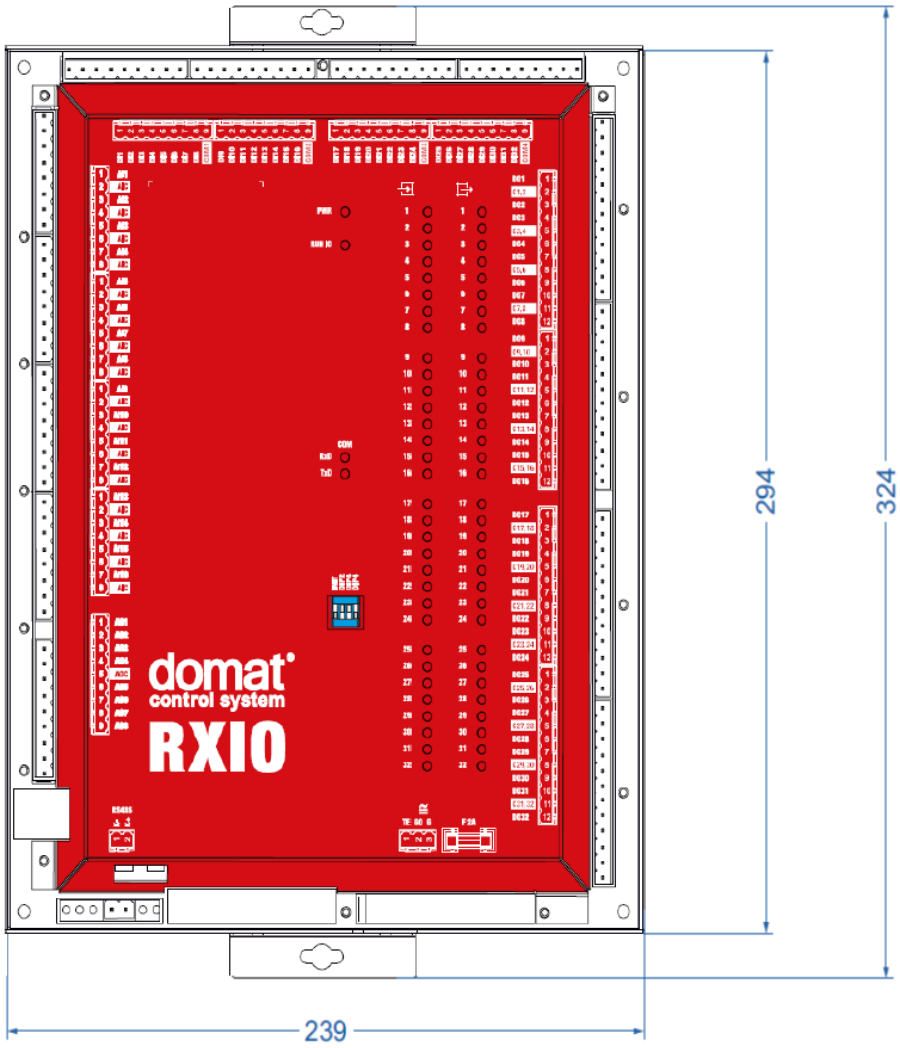
DIP2…4 not used

Connection



Addressing The Modbus address is set with the configuration software, **ModComTool**, which is free to download at http://domat-int.com/en/downloads/software. The default address is 1, default communication parameters are 9600, 8, N, 1.

Dimensions



Dimension are in *mm.*

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	12/2017 – First datasheet version. 08/2021 – Stylistic adjustments, change of logo.

RCIO Multi I/O compact module

Summary

The RCIO is a microprocessor-controlled, compact, communicative module with the I/O mix optimized for HVAC and home control applications. The module uses a RS485 bus for communication, and can be easily integrated in a variety of supervision and control systems.

Application

- **Compact I/O module data acquisition and HVAC control systems**

Function

The RCIO module is a multiple I/O module (8 AI, 6 AO, 8 DI, 8 DO). The module communicates by means of a RS485 data bus. The Modbus RTU communication protocol ensures smooth and easy integration in a number of control and data acquisition systems.

The communication circuits are protected against overvoltage. If the module is terminating the communication bus, i.e. it is the last in line, a terminating 120 Ω resistor may be switched on by short-circuiting of the BUS END jumpers (right pack, No. 3 and 4). Green LEDs indicate states of the I/Os, red LED communication (TX), yellow LED system module cycle (RUN), and green LED power on.

The module can be mounted on a standard DIN rail.

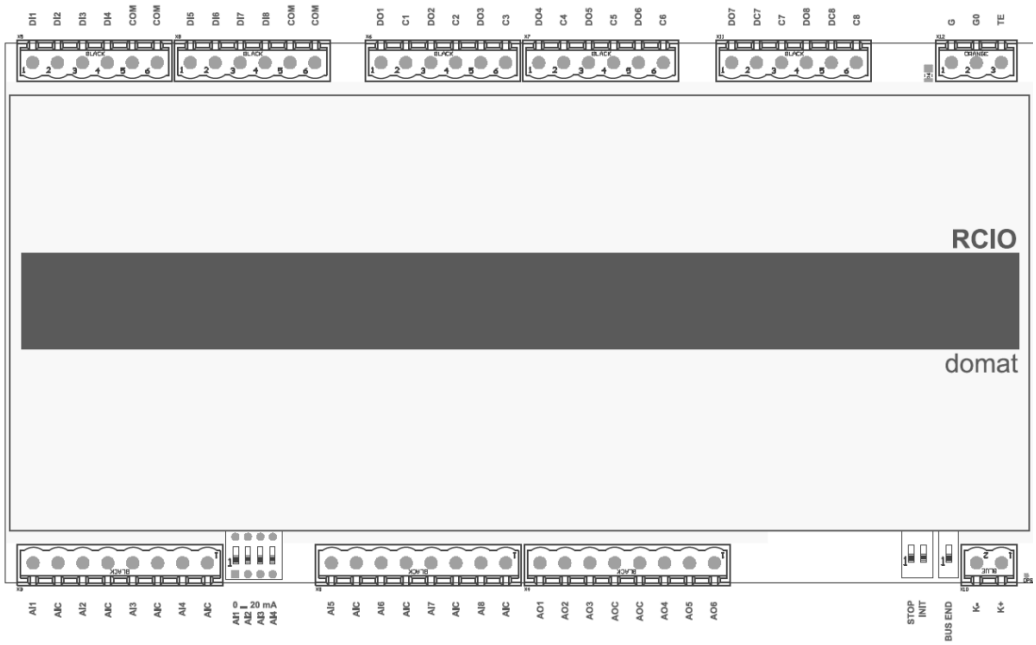
See domat - *Technical application notes* for connection and function examples.

RCIO module is backward compatible with MCIO2 module.

Technical data

Power	24 V AC/DC ±20 %
Consumption	max. 8 W
Communication	Modbus RTU RS485, 1200...115200 bit/s
Galvanic isolation	1 kV
Max. bus length	1200 m
Max. amount of modules on the bus	256
Analogue inputs	8 × analogue input 0…10 VDC, Pt1000, 0…1600 Ohms, 0…5000 Ohms; resolution 16 bitu, measurment error 0.25 % 0…20 mA DC (only AI1…AI4) (current range changeble by jumper/sw)
Analogue outputs	6 × analogue output 0…10 VDC (max. 10 mA, short-circuit proof, current 20 mA)
Digital inputs	8 × digital input 24 VDC/VAC, input current 4 mA, galvanic isolation 1.5 kV
Digital outputs	6 × digital output, NO, relay SPST 3 A (AC1, general use, non-inductive load according to EN 60947-4-1 ed. 3), 250 VAC/30 VDC 2 × digital output change-over, rele SPDT 8 A (AC1, general use, non-inductive load according to EN 60947-4-1 ed. 3), 250 VAC/30 VDC
Software for configuration and control	ModComTool 4.2.4.6 or higher for parameters setting Merbon IDE, SoftPLC IDE – predefined Modbus devices any Modbus RTU master PLC
Housing	steel
Terminals	screw terminals M3, detachable
Dimensions	217 (l) × 115 (w) × 40 (h) mm
Protection degree	IP20 (EN 60529)
Recommended wire	0.35…1.5 mm^2
Ambient temperature	external conditions: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K5) storage: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-1 climatic class 1K3)
Standards conformity	EMC EN 61000-6-2 ed.3:2005 + 2005-09, EN 61000-6-4 ed.2:2007 + A1:2011 (industrial environment) electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2013 + Opr.1:2011-10 hazardous substances reduction EN 50581:2012

Terminals



Terminals and connectors

RS485 K+	port COM1 - serial link RS485, terminals K+
RS485 K-	port COM1 - serial link RS485, terminals K-
G	G power supply
G0	G0 power supply
TE	optional connection for shielding, technical ground
AI1…AI8	analogue input 1…8
AIC	**analogue input ground** (common) Notice: All analogue inputs AI1 to AI8 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 RCIO module.
AO1…AO6	digital input 1…6
AOC	**analogue output ground** (common) Notice: The ground is optically separated from the other parts of the I/O module. For three-wire connection (active periphery, e.g. valves actuators, frequency changer), the analogue output 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 RCIO module.
DO1…DO6	digital output 1…6

C1…C6	common terminal for DO1…DO6
NO7, 8	digital output 7, 8
NC7, 8	digital output 7, 8
C7, 8	common terminal for DO7, 8
DI1…DI8	digital input 1…8
AOC	common terminal for digital inputs DI1…DI8

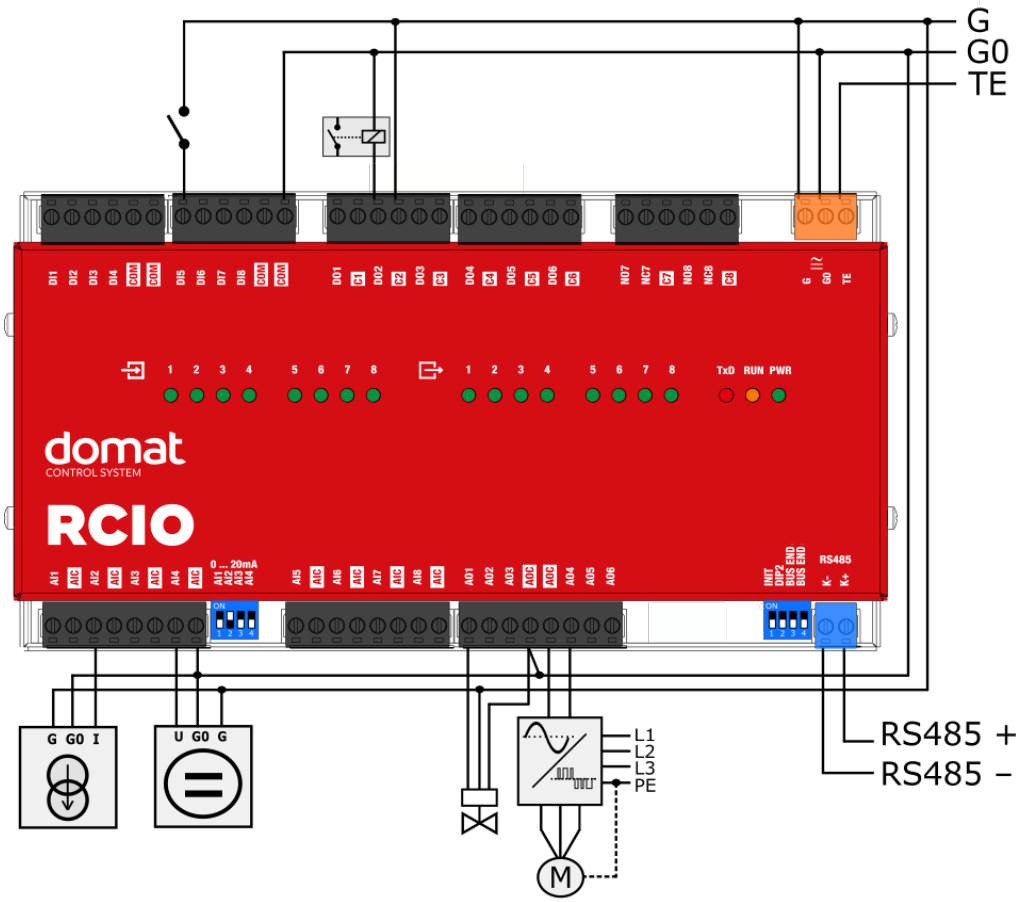
LED indication

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)
PWR	green LED – power supply (ON: power OK; OFF: no power applied, weak or damaged power supply, …)

DIP switches

AI1…4	To use AI1...AI4 as 0(4)...20 mA set the corresponding switch 1...4 to ON. This connects an internal resistor which changes the voltage input to current input. No external resistors are required at these inputs.
INIT	INIT - if are all switches ON at power-up, configuration parameters are set to defaults
BUS END	2 Switches for bus RS485 termination (located at the RS485 connector); ON = bus end; the first and last devices on bus should have bus end ON

Connection



Addressing

The Modbus address can be set:

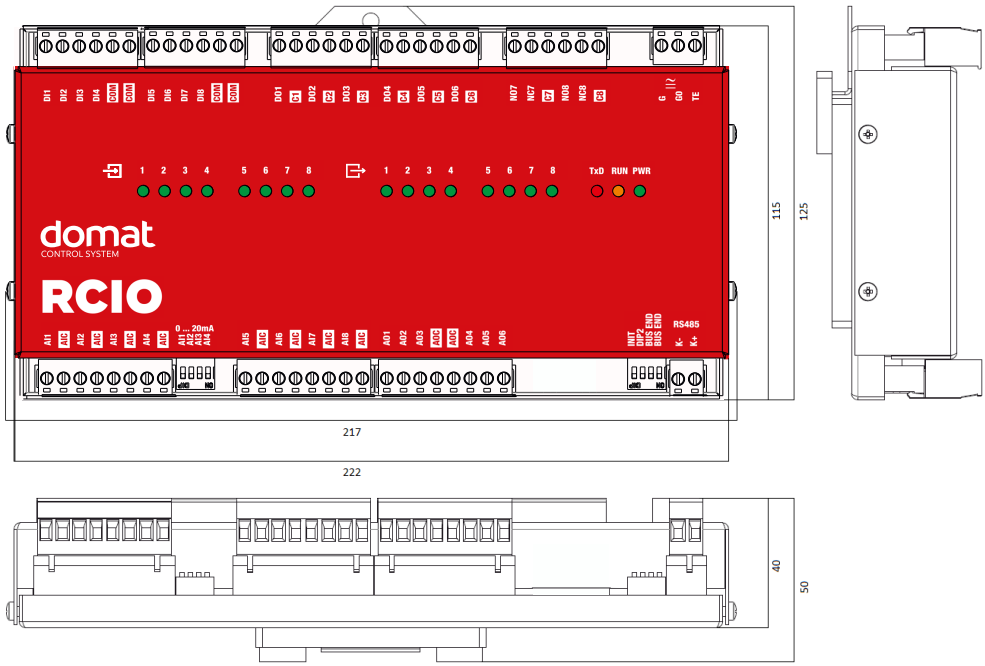
- **softwarewise** using the ModComTool software, available for free at **www.domat.cz**. The default address (factory setting) is 1, default communication parameters are 9600, 8, N, 1. Parity and stopbits can be set in Modbus register 1005 LSB.

All changes apply after the module is switched off and on again.

Installation

The module can be mounted on a standard DIN rail. To remove the modul, pull the plate at the upper part of the module which releases both DIN rail locks at the same time. Move the plate upwards with a screwdriver and remove the module.

Dimensions



Dimensions are in *mm*.

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	04/2019 – First datasheet version. 08/2021 – Stylistic adjustments, change of logo. 09/2022 – Addition of information on AOC, AIC. 08/2023 – Analogue inputs (0…20 mA) technical data clarified.

MLIO Small distributed I/O module

Summary

Small I/O module MLIO is a microprocessor-controlled, communiccative module for installation outside the control panel. It is used for topologies with distributed inputs and outputs which save cabling costs and cabinet space. The module communicates over a RS485 bus with Modbus RTU (slave) protocol, and can be integrated in a variety of control systems easily

Application

- **Small I/O module for control of heating circuits, AHUs and zone controllers**
- **Estension and add-on module for larger systems, even 3rd party**
- **Data acquisition and process control**

Function

MLIO is a module containing inputs and output (4 universal AI, 1 AO, 2 DO). Communication follows over a galvanically separated RS485 bus. The Modbus RTU protocol enables seamless integration into many control systems ands PLCs, see the Modbus table below.

The Modbus RTU addressing may be selected as manual using a rotary switch and DIP switches in the range of 1...39, or as software (as with all other Domat I/O modules) in the range of 1...255. Manual (hardware) addressing is easy to perform even for the installers, on the other hand, software addressing offers larger address range.

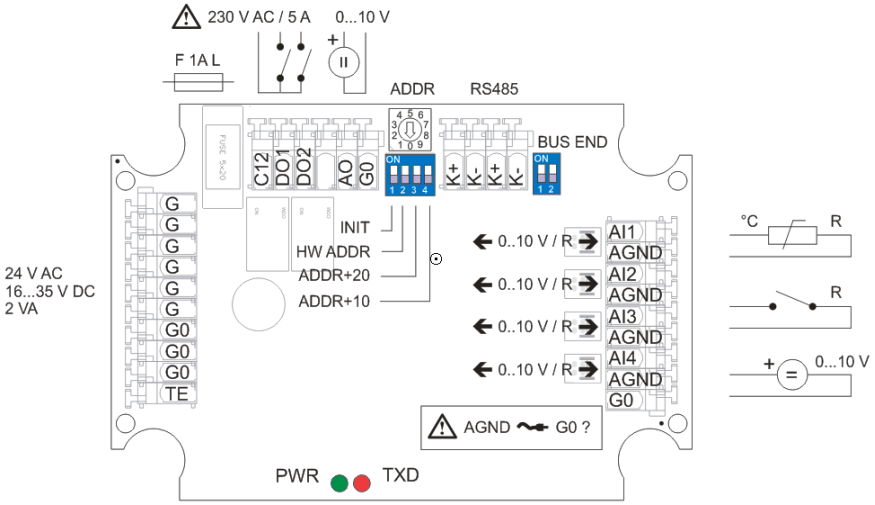
Analogue input measuring range (0...10 V or passive resistance / temperature) is also set manually by switches at the board.

The communication circuits are surge-protected. If the module is the first or the last on the bus, it must terminate the bus by setting the BUS END switches to ON. The module is supplied in a ABB installation box and has flexible cable glands for cables, so that it may be installed on a flat wall, air duct, or installation tray using four apertures in the box bottom.

Technical data

Power supply Protection	16...35 V DC (G…+, G0…-), 14...24 V AC glass fuse F 1A
Consumption	nominal 5 VA, maximal 7 VA (all relays on)
Working temperature of the module	0…70 °C
Communication	RS485, 1200 ... 19200 bit/s Modbus RTU slave
RS485 - terminals K+, K-	
Max. bus length	1200 m
Max. number of MLIOs on the bus	depends on maximum allowed response time, for HVAC application about 50 modules, data collection up to 100, physical addressing up to 250
Analogue inputs	4x Pt 1000, Pt100, Ni1000, resistance 20...5000 Ohm, configurable with DIP switches also as 0…10 V DC measuring current in the passive mode (0…1600 Ohm): 200 uA at 12.5 % of time inputs can be used as binary for potential-free contacts, too.
Analogue output	1 x 0…10 V DC
Analogue output load	typically 10 kΩ, max. current 10 mA, the output is resistant to permanent short-circuit with current limitation to 20 mA.
Digital outputs	2 x relay, normally open contact: 5 A/250 V AC 1250 VA, 5 A/30 V DC, 150 W
Protection	IP20 after the cable glands are perforated
Dimensions	162 (l) x 120 (w) x 72 (h) mm

Terminals



G	power supply, +
G0	power supply, -, signal ground AO
C12	common relay contact
DO1	relay 1, NO contact
DO2	relay 2, NO contact
AO	analogue output 0...10 V against G0
G0	power supply, -, signal ground AO
K-	communication RS485, negative
K+	communication RS485, positive

AI1 analogue input 1
AGND analogue input ground
AI2 analogue input 2
AGND analogue input ground
AI3 analogue input 3
AGND analogue input ground
AI4 analogue input 4
AGND analogue input ground
G0 power supply, -, signal ground AO – the terminal is used for optional connection of AGND and G0 if active sensors are used

As default, **AGND and G0 are disconnected**, which means that the analogue inputs are galvanically separated from the power part and thus immune against EMC influences. This is useful if the module is used in a harsh environment, such as close to variable speed drives, at PV plants etc. If any of the analogue inputs is connected to an active 0..10 V sensor, the terminals AGND and G0 must be connected so as the inputs have their reference potential.

Control and indication elements

INIT if ON, sets address 1 and communication parameters 9600, N, 8, 1 after power-up
HW ADDR – **if ON, the module is addressed using rotary switch ADDR** and the switches ADDR+10, ADDR+20. If the address switch is set to 0, address 1 is used automatically. **If OFF, software addressing is used** (as at all other domat I/O modules), e.g. using the domat.exe configuration software.
ADDR+10 – if ON, the hardware address is increased by 10
ADDR+20 – if ON, the hardware address is increased by 20
ADDR sets the hardware address (if the HW ADDR is set to ON)

Examples – HW ADDR = ON:
ADDR = 8, ADDR+10 = OFF, ADDR+20 = OFF : the address is 8
ADDR = 5, ADDR+10 = ON, ADDR+20 = OFF : the address is 15
ADDR = 2, ADDR+10 = ON, ADDR+20 = ON : the address is 32

If the address switch is set to 0 with HW addressing, address 1 is used automatically.

BUS END – terminates the bus; set both switches to ON if the MLIO is the first or the last on the bus.
0..10 V/R – switches the corresponding input between active input for voltage measuring (if set to left) and resistance, or temperature (if set to right). Presence of voltage up to 24 V AC on the input at any position of the switch does not damage the input.
PWR green LED indicating power supply voltage presence (steady on)
TXD red LED indicating data transmission on the bus (flashing)

Communication cirtuits are optically separated from other parts of the module.

The switches are at the printed circuit board. They are accessible after removal of the plastic cover of the MLIO.

If the LED PWR is not on with power supply applied,
- check the polarity if MLIO is powered by DC power
- check and replace the fuse (with the same type only).

Installation

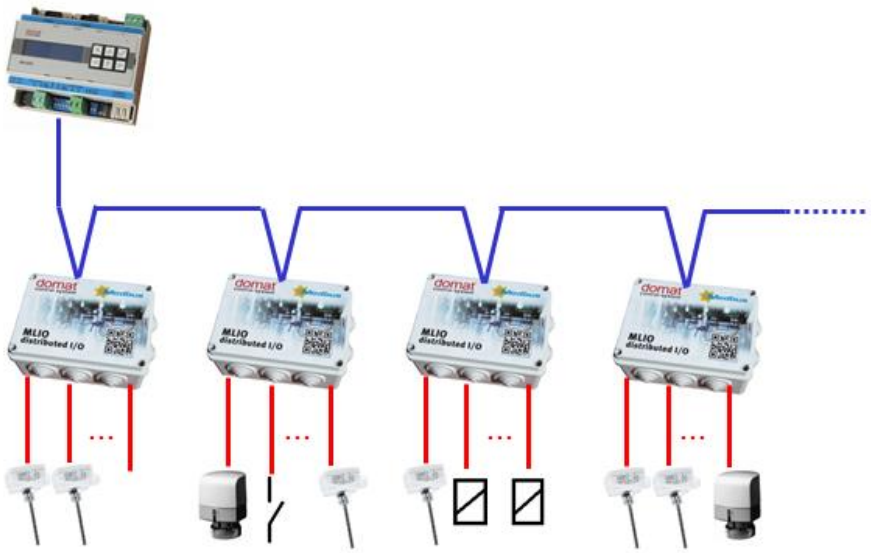
The MLIO is installed on a flat wall or any fixed plate (air handling unit, cable tray, etc.) using four screws. The holes are accessible after the cover is removed. Cut the tops of the cable glands to the diameter of the cables for power, communication, and peripherals.

MLIO must be installed indoors. Choose the installation place so as the module is freely accessible and the cover can be removed. The point in using distributed I/Os is to reduce cable costs, this is why the module shall be installed close to the peripherals – valves, sensors, damper actuators and other controlled elements so that only bus and low voltage power wiring is connected between the modules and the cabinet. The cable lengths between the module and the peripherals are then reduced as much as possible.

Please check address settings and input range switch positions at all modules after installation. It will speed up the software commissioning and tests.

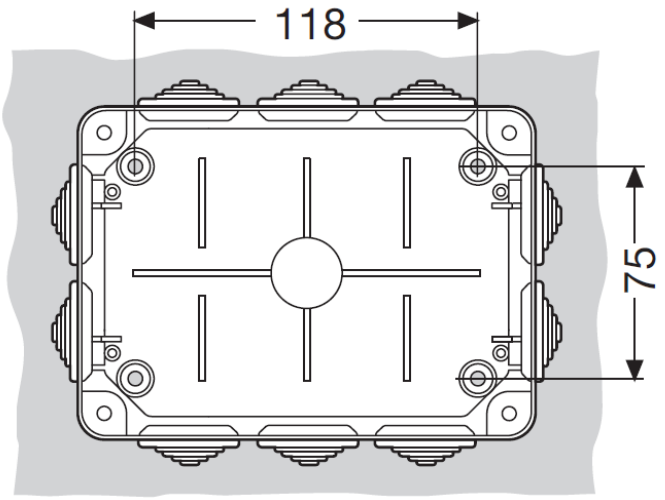
Topology

The bus topology must be linear. The first and the last device on the bus (MLIO, another I/O module, room unit, or a PLC) must terminate the bus by setting the BUS END switches to ON. Maximum possible distance between two modules is not limited. Maximum bus length must not exceed 1200 m. A pair of communication terminals on the module board makes the linear topology installation more convenient.

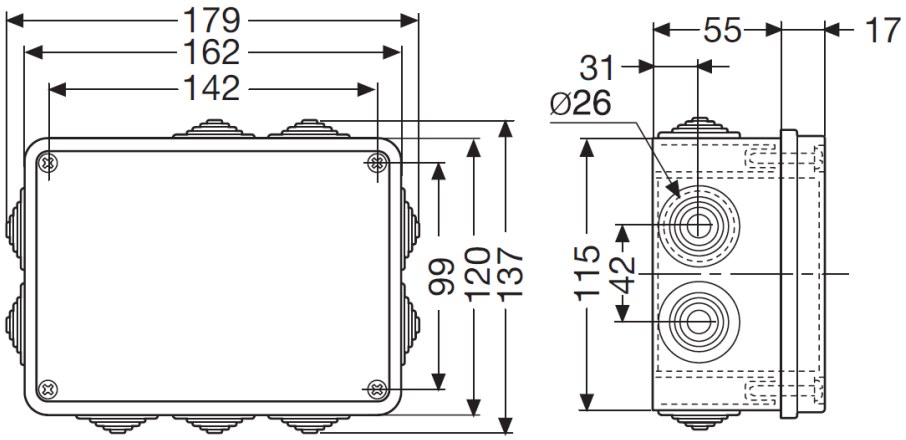


Together with the MLIO modules, there may be other module types on the bus, room units, variable speed drives etc., communicating Modbus RTU. However, separate buses for modules installed in the cabinet and outside the cabinet are recommended: with a common bus for all modules a and short-circuit of the bus in the field, the communication with the modules in the cabinet would be broken.

Installation apertures



Dimensions



Dimensions are in *mm*.

Safety notice

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Third party integration

Thanks to open Modbus communication, MLIO can be used in a variety of control and monitoring systems as a distributed input / output module. The Modbus table, see below, contains registers which provide the input values in several formats.

Supported Modbus functions are:

- **01 Read Coil Status** – read bits
- **03 Read Holding Registers** – read words
- **15 Force Multiple Coils** – write bits
- **16 Force Multiple Registers** – write words.

For a comfortable access to all registers, a free Modbus client domat.exe may be used. You can download it at www.rcware.eu. The Modbus register description is in the following table.

Name	Address	Type	Description	Note
module LSB	1 LSB	R	module ID lower byte	0x0104 hex
module MSB	1 MSB	R	module ID upper byte	
firmware LSB	2 LSB	R	firmware version, lower byte	
firmware MSB	2 MSB	R	firmware version, upper byte	
status LSB	3 LSB	R	module status, lower byte **bit 0** – EEPROM writing enabled **bit 4** – EEPROM init **bit 5** – calibration offset **bit 6** – calibration span **bit 7** – calibration enabled	**EEPROM init** is executed if the INIT was ON at the module power-up; when writing 1 to bit 4, the switch must be OFF (indicated by bit 2 of **status MSB**) **calibration enabled** is executed by writing a 1 into bit 7 (indicated by bit 3 in status MSB) **calibration offset** is executed by writing a 0 (must have been 1) to bit 7 and writing a 1 to bit 5. After calibration, the bit 5 goes to zero. **calibration span** is executed by writing a 0 (must have been 1) to bit 7 and writing a 1 to bit 6. After calibration, the bit 6 goes to zero.
status MSB	3 MSB	R	module status, upper byte **bit 0** 0... normal mode 1... init mode **bit 1** 1... at next write attempt to EEPROM the data will be written to EEPROM 0... at next write attempt to EEPROM the data will be written to RAM only **bit 2** – 1 – EEPROM initialized **bit 3 –** 1 – calibration enabled **bit 4** – 0 **bit 5** - 1 **bit 6** - 0 **bit 7** – 1	
address	4 LSB	R, W EEPROM (0x01)	module address **!!!** the change will be effective after restart only (however the register will be set immediately)	This is the actual module address configured by software or hardware switches.

baud rate	4 MSB	R,W EEPROM (9600 bps, 13dec)	communication, no parity 10_{dec} = 1200 bps 11_{dec} = 2400 bps 12_{dec} = 4800 bps 13_{dec} = 9600 bps 15_{dec} = 19200 bps 16_{dec} = 57600 bps 17_{dec} = 115200 bps	**!!!** the change will be effective after restart only (however the register will be set immediately)
input range for channels AI1, AI2	5 LSB	R (0x11)	2 … voltage 0 to 10 V 3 … resistance 0 to 1600 ohm	bit 0 – bit 3… channel 1 bit 4 – bit 7… channel 2
input range for channels AI3, AI4	5 MSB	R (0x12)	2 … voltage 0 to 10 V 3 … resistance 0 to 1600 ohm	bit 0 – bit 3… channel 3 bit 4 – bit 7… channel 4
SSR threshold value	6 LSB 6 MSB	R,W EEPROM (0x32)	**NOT USED - RESERVED**! There is a position for another output (SSR) on the board. The output is optionally linked with the analogue output. The value in this register specifies the switching threshold value. It is multiplied by 10, e.g. **50** (0x32) is for **5V**. With this setting the SSR will be off for 0...5V, and on for 5.1V to 10.0V.	If this register is set to 0, the SSR is controllerd separately over register **relay (9LSB)**
SSR hysteresis	7 LSB 7 MSB	R, W EEPROM (0x1)	Hysteresis for SSR relay switching. The hysteresis applies both above and below the setpoint. See register **6LSB, MSB**. The value is multiplied by 10. 1 = 0.1 V	Example: if the value is 2 dec and register 6 value is 50dec, the SSR switches on at 5.2 V, and off at 4.8 V
relay state	8 LSB	R, W EEPROM (0x0)	relays go on or off (according to corresponding bits) if there was no communication with module for a given time and in **relay com** the corresponding relay bit is set to 1	**bit 0** is relay 1 **bit 1** is relay 2
relay time	8 MSB	R, W EEPROM (0x0)	time in [s] of no communication which is considered as communication failure	if set to 0, the function is disabled
relay start enable	9 LSB	R, W EEPROM (0x0)	startup relay behaviour **0** – relays are not commanded **1** – the corresponding relay is set to its **relay start** value after module startup	**bit 0** is relay 1 **bit 1** is relay 2
relay start	9 MSB	R, W EEPROM (0x0)	relay status between power-up and first bus command	**bit 0** is relay 1 **bit 1** is relay 2

relay	10 LSB	R, W, RAM	value for commanding the digital outputs	**bit 0** is relay 1 **bit 1** is relay 2 bit 2 is SSR (reserved)
reserved	10 MSB			
AO value	11 LSB 11 MSB	R, W, RAM	analogue output value in %, or V * 10 maximum value is 100 dec	0 = 0 V 100 = 10 V
relay com	12 LSB 12 MSB	R, W EEPROM (0x0)	**0** – when no communication, relays stay in last state **1** – when no communication, relays are set to **relay state** values	**bit 0** is relay 1 **bit 1** is relay 2
reserved	13			
input AI1 voltage	14 LSB, 14 MSB	R, RAM	**0 to 10V** 0dec … 0.00V 9999dec … 10.00V	measured values at the inputs
input AI2 voltage	15 LSB, 15 MSB	R, RAM	**0 to 10V** 0dec … 0.00V 9999dec … 10.00V	measured values at the inputs
input AI3 voltage	16 LSB, 16 MSB	R, RAM	**0 to 10V** 0dec … 0.00V 9999dec … 10.00V	measured values at the inputs
input AI4 voltage	17 LSB, 17 MSB	R, RAM	**0 to 10V** 0dec … 0.00V 9999dec … 10.00V	measured values at the inputs
input AI1 resistance	18 LSB, 18 MSB	R, RAM	**0 to 5000 Ohm** 0dec … 0 Ohm 50 000dec … 5 000 Ohm	measured values at the inputs
input AI2 resistance	19 LSB, 19 MSB	R, RAM	**0 to 5000 Ohm** 0dec … 0 Ohm 50 000dec … 5 000 Ohm	measured values at the inputs
input AI3 resistance	20 LSB, 20 MSB	R, RAM	**0 to 5000 Ohm** 0dec … 0 Ohm 50 000dec … 5 000 Ohm	measured values at the inputs
input AI4 resistance	21 LSB, 21 MSB	R, RAM	**0 to 5000 Ohm** 0dec … 0 Ohm 50 000dec … 5 000 Ohm	measured values at the inputs

input AI1 temperature	22 LSB, 22 MSB	R, RAM	a **Pt 1000** must be connected 60536dec … -50.00 °C 0dec … 0.00 °C 15000dec … 150.00 °C	measured values at the inputs
input AI2 temperature	23 LSB, 23 MSB	R, RAM	a **Pt 1000** must be connected 60536dec … -50.00 °C 0dec … 0.00 °C 15000dec … 150.00 °C	measured values at the inputs
input AI3 temperature	24 LSB, 24 MSB	R, RAM	a **Pt 1000** must be connected 60536dec … -50.00 °C 0dec … 0.00 °C 15000dec … 150.00 °C	measured values at the inputs
input AI4 temperature	25 LSB, 25 MSB	R, RAM	a **Pt 1000** must be connected 60536dec … -50.00 °C 0dec … 0.00 °C 15000dec … 150.00 °C	measured values at the inputs
AI values as binary inputs	26 LSB, 26 MSB	R, RAM	AI values, if the inputs are used as potential-free on/off contacts. true ... contact closed false... contact open	bit 0 = AI1 bit 1 = AI2 bit 2 = AI3 bit 3 = AI4
input AI1 special	27 LSB, 27 MSB	R, RAM	AI1 value is changed according to the HW input range switch: VOLTAGE (0...10V) *100 0 = 0,00 V, 9999 = 10.00 V RESISTANCE (R) *10 0 = 0.0 Ohm 50000 = 5000.0 Ohm	measured values at the inputs
input AI2 special	28 LSB, 28 MSB	R, RAM	AI2 value, same as AI1	measured values at the inputs
input AI3 special	29 LSB, 29 MSB	R, RAM	AI3 value, same as AI1	measured values at the inputs
input AI4 special	30 LSB, 30 MSB	R, RAM	AI4 value, same as AI1	measured values at the inputs

MW240-B Small I/O module for lights and blinds control

Summary **MW240-B is a small I/O module featuring 2 DI and 2 DO (relays). It is used for control of two lighting groups (using switches or buttons) or as a simple I/O module with no embedded bindings between inputs and outputs – the logical functionality is implemented in a master PLC.**

Application

- **Control of two lighting groups, with override from a PLC or SCADA over the bus**
- **Control of a blinds**
- **I/O module 2 × DI, 2 × DO for general use**

Function

In a plastic casing suitable for monting into a flush box there is a board with terminals, and other components. As the device is energized the the outputs set into predefined states and then are controlled either by input signals, or by bus commands, or by combination of both. Priorities may be set: the outputs permanently copy the states of the inputs (local control), or change their states as input states change (the last command is valid), with optional override over the bus.

It is also possible to set the function of bus override: relays are updated either at each change of the bus command, or at each bus command, or permanently with no regards of bus commands frequency. See details in the Modbus map (**domat-int.com/en/downloads/technical-documentation/modbus-tables**).

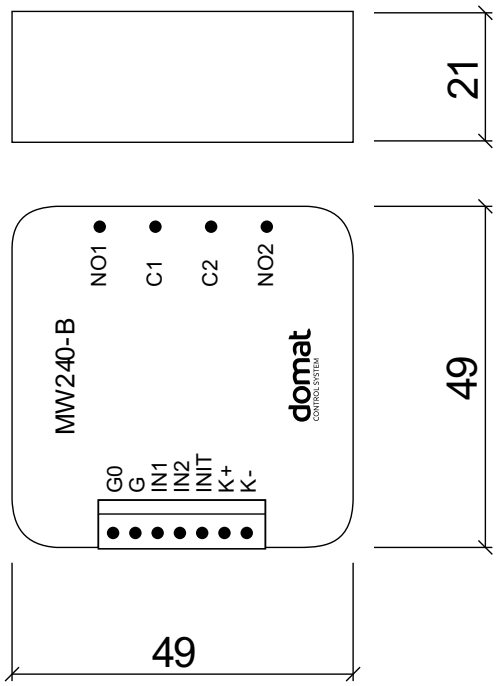
The module communicates over RS485 as Modbus RTU slave.

Technical data

Power	24 V AC/DC ± 10 %
Consumption	max. 2 W
Number of outputs (relays)	2 (NO)
Relay load	230 V AC, max. 4 A (AC1)
Connection - relays	Wires 1.5 mm^2, length 7 cm, stripped tinned ends 10 mm
Connection - others	Screw terminals, for 0.14 – 1 mm^2 wires
Contact lifespan	> 10^5 cycles
Inputs	for potential-free contacts, against G0
Initialization	Short - circuit terminals INIT and G0
Communication	Modbus RTU / RS485, galvanically separated (1 kV), 1200...115200 bps
Dimensions	49 × 49 × 21 mm
Ambient temperature	Working temperature of the module: 0…70 °C external influences according to EN 60721-3-3. Class 3K5 (-5…+45 °C; 5 %...95 % relative non-condensing humidity) storage according to EN 60721-3-1 Class 1K3 (-5…+45 °C; 5 %...95 % relative non-condensing humidity)
Standards of conformity	EMC EN 61000-6-2 ed.3:2005, EN 55022 ed.3:2010 (industrial environment) electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 limitation of hazardous substances EN 50581:2012

The new version MW240-B could be set to the communication INIT (Modbus address 1, 9600, N, 8) shorting terminals INIT and G0, then switch off and switch on device. For BUS END is necessary to connect an external resistor (120 Ω) to terminals K1+ and K1-.

Dimensions
Terminals



Dimensions are in *mm*.

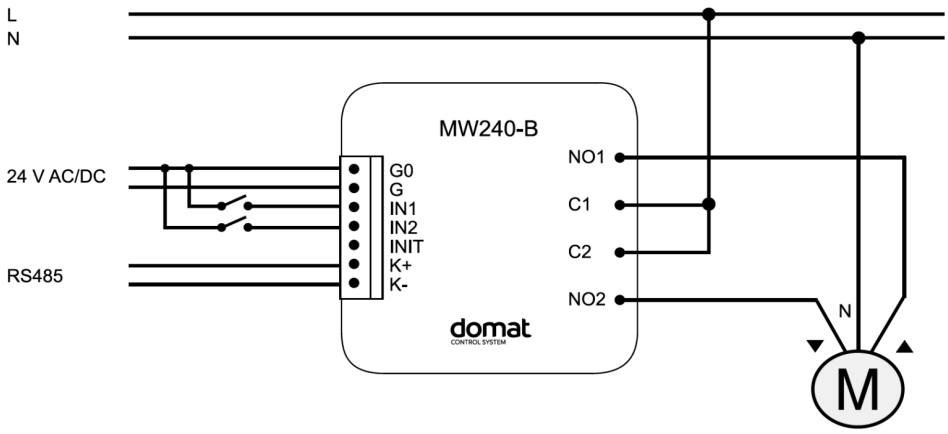
Screw terminals

G0	common ground
G	power supply 24 V AC/DC
IN1	input A (referred to as Input 0 in the Modbus table)
IN2	input B (referred to as Input 1 in the Modbus table)
INIT	initialization terminal
K1+	RS485, +
K1-	RS485, -

Outputs (wires)

NO1	output relay A (referred to as Relay 0 in the Modbus table)
C1	common relay A
C2	common relay B
NO2	output relay B (referred to as Relay 1 in the Modbus table)

Connection

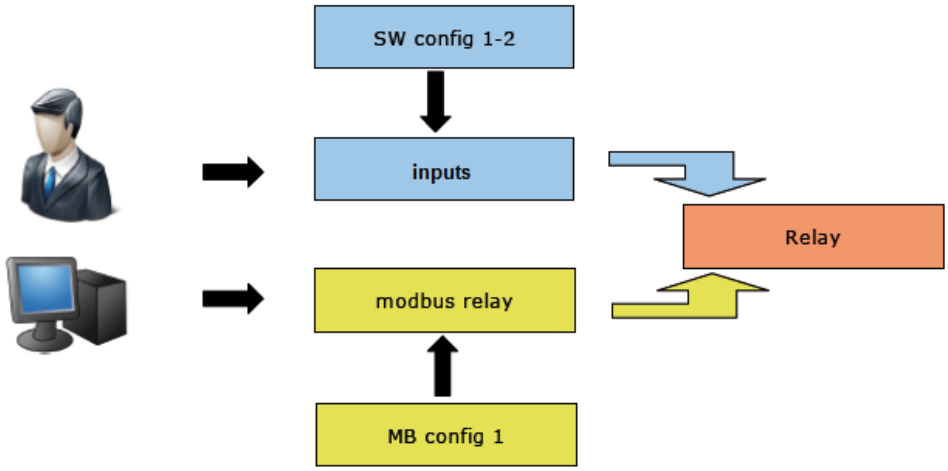


Installation

For installation of MW240-B module is recommended to use flat surface or a flush-mounting box with minimal inner diameter 65 mm and minimal depth 65 mm.

General function notes

The MW240-B controls the relays according to the states of inputs (pushbuttons or switches) and Modbus commands. Priorities and function regarding Modbus write events can be set using Modbus configuration registers, see tables below. The module can be configured for local control (switches / pushbuttons), bus control override, combined control („the last command is valid“), etc.

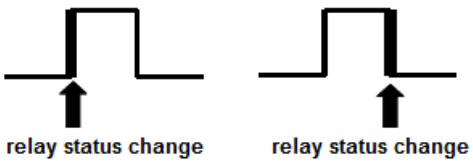


Inputs function settings

Edge

The relay status is changed at an edge on the input. Rising or falling edge is selected.

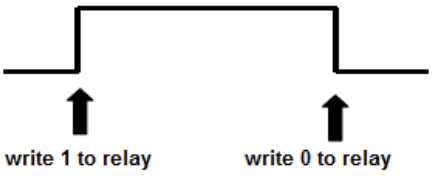
Register	Value
SW config 1	0x05
SW config 2	0x00



State change

The input state is copied to the output, the *Relay* register is written to only at a change of the input state.

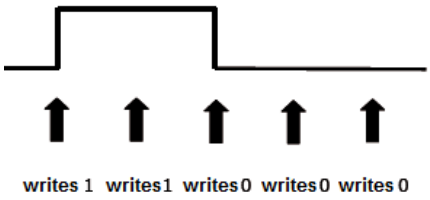
Register	**Value**
SW config 1	0x50
SW config 2	0x00



Copying of inputs

Periodically (as fast as the processor cycle allows) copies the input state to the output.

Register	Value
SW config 1	0x00
SW config 2	0x05

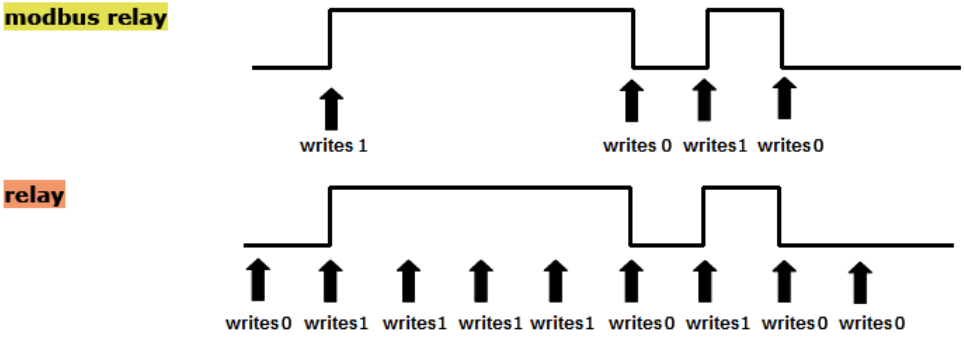


Writing from the bus

Modbus state

The *Modbus relay* values are periodically (as fast as the processor cycle allows) copied to the *Relay* register.

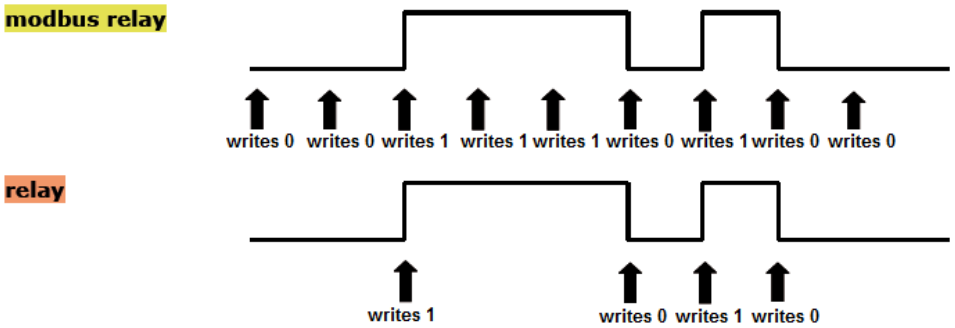
Register	Value
MB config 1	0x05



Modbus change

Each *Modbus relay* value change initiates copying of the new state into the *Relay* register.

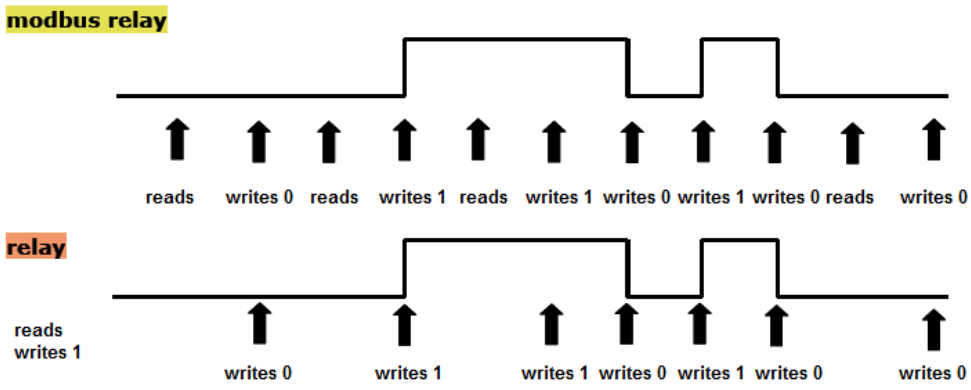
Register	Value
MB config 1	0x0A



Modbus writing

Each write event into the *Modbus relay* register initiates copying of the register value into the *Relay* register.

Register	Value
MB config 1	0x0F



If the function **Copying of inputs** together with function **Modbus state** is selected, priority is set in the *SW/MB config 1* (6 LSB) register.

Changes

Reg. 17 has been split into two registers (25, 26) for easier value writes from the Merbon IDE. Reg. 25 contains only bit values and reg. 26 contains int value. Now it doesn't matter that the rest of the registry is overwritten with zeros.

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

03/2015 – Changes in initialization mode, bus end, bus galvanic separation, power and relay. Modbus table is now available in separate document.
06/2016 – Added information about support higher serial communication speed.
06/2018 – *Safety note* added, front image changed, minor changes.
05/2020 – *Installation* added, main image and connection image changed, added image with dimensions and terminals.
08/2021 – Stylistic adjustments, change of logo.
05/2023 – Added info about *Changes* in relation to reg. 17.

MW241 Small I/O module for LED lights control

Summary **MW241 is a small I/O module featuring 2 DI and 2 DO (solid state relays). It is used for control of two lighting groups (using switches or buttons) or as a simple I/O module with no embedded bindings between inputs and outputs – the logical functionality is implemented in a master PLC.**

Application

- **Control of two lighting groups, with override from a PLC or SCADA over the bus**
- **Control of a blind**
- **I/O module 2 × DI, 2 × DO for general use**

Function

In a plastic casing suitable for mounting into a flush box there is a board with terminals, and other components. As the device is energized the the outputs set into predefined states and then are controlled either by input signals, or by bus commands, or by combination of both. Priorities may be set: the outputs permanently copy the states of the inputs (local control), or change their states as input states change (the last command is valid), with optional override over the bus.

It is also possible to set the function of bus override: relays are updated either at each change of the bus command, or at each bus command, or permanently with no regards of bus commands frequency. See details in the Modbus map (**domat-int.com/en/downloads/technical-documentation/modbus-tables**).

The module communicates over RS485 as Modbus RTU slave.

Technical data

Power	24 V AC/DC, ± 20 %
Consumption	max. 2 W
Working temperature of the module	0…70 °C
Number of outputs (SSR)	2 (NO)

SSR load	230 V AC, max. 1 A, AC1, general use, non-inductive load according to EN 60947-4-1, galv. insulation 1,5 kV
Connection - SSR	Wires 1.5 mm^2, length 7 cm, stripped tinned ends 10 mm
Connection – other terminals	Screw terminals, for 0.14…1 mm^2 wires
Contact lifespan	virtually unlimited
Inputs	for potential-free contacts, against G0
Initialization	short-circuit terminals INIT and G0
Communication	Modbus RTU / RS485, galvanically separated (1 kV), 1200...115200 bps
Dimensions	49 × 49 × 30 mm
Protection degree	IP20 (EN 60529)

The MW241 can be set to the communication INIT (Modbus address 1, 9600, N, 8) by short-circuiting of terminals INIT and G0 followed by a power cycle. To terminate the bus, please connect an external resistor (120 Ω) to terminals K1+ and K1-.

Harmonisation with standards

Environmental conditions:

- **external influences** according to EN 60721-3-3. Class 3K5 (-5 to +45 °C; 5 % to 95 % relative non-condensing humidity)
- **storage** according to EN 60721-3-1 Class 1K3 (-5 to +45 °C; 5 % to 95 % relative non-condensing humidity)

Standards conformance:

- EMC EN 61000-6-2 ed.3:2005, EN 55022 ed.3:2010 (industrial environment)
- electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012
- limitation of hazardous substances EN 50581:2012

Terminals

Screw terminals

G0	common ground
G	power
IN1	input A (referred to as Input 0 in the Modbus table)
IN2	input B (referred to as Input 1 in the Modbus table)
INIT	initialization terminal
K1+	RS485, +
K1-	RS485, -

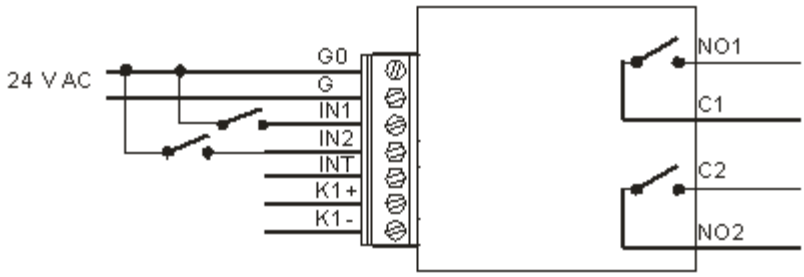
Outputs (wires)

NO1	output SSR relay A (referred to as Relay 0 in the Modbus table)
C1	common relay A
C2	common relay B
NO2	output SSR relay B (referred to as Relay 1 in the Modbus table)

LED

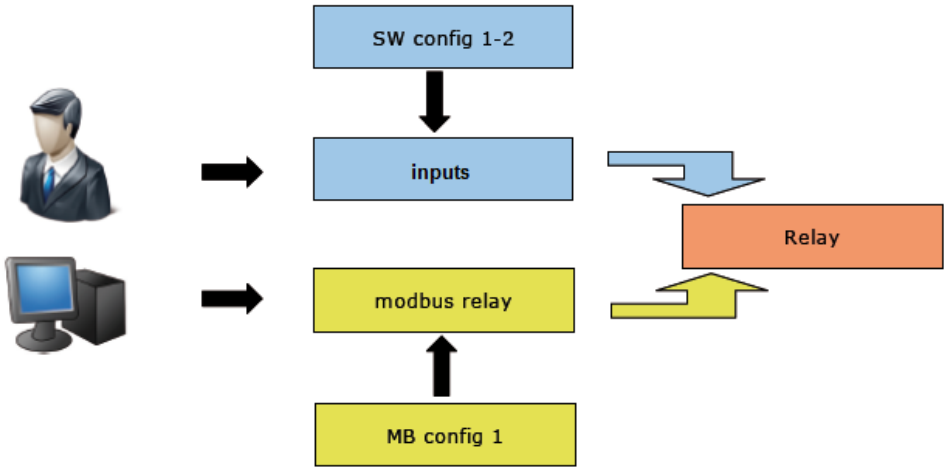
green power (on = power OK)
red Tx RS485 (flashes = data transmit)

Connection



General function notes

The MW241 controls the outputs according to the states of inputs (pushbuttons or switches) and Modbus commands. Priorities and function regarding Modbus write events can be set using Modbus configuration registers, see tables below. The module can be configured for local control (switches / pushbuttons), bus control override, combined control („the last command is valid“), etc.

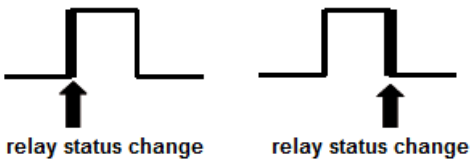


Inputs function settings

Edge

The output status is changed at an edge on the input. Rising or falling edge is selected.

Register	Value
SW config 1	0x05
SW config 2	0x00

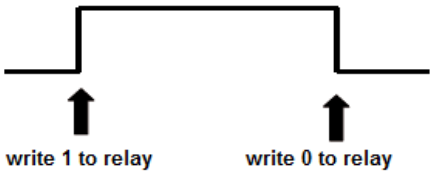


State change

The input state is copied to the output, the *Relay* register is written to only at a

change of the input state.

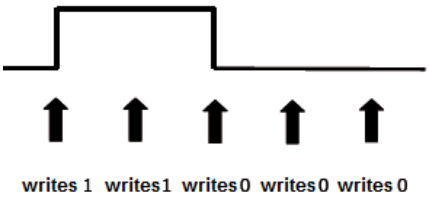
Register	Value
SW config 1	0x50
SW config 2	0x00



Copying of inputs

Periodically (as fast as the processor cycle allows) copies the input state to the output.

Register	Value
SW config 1	0x00
SW config 2	0x05

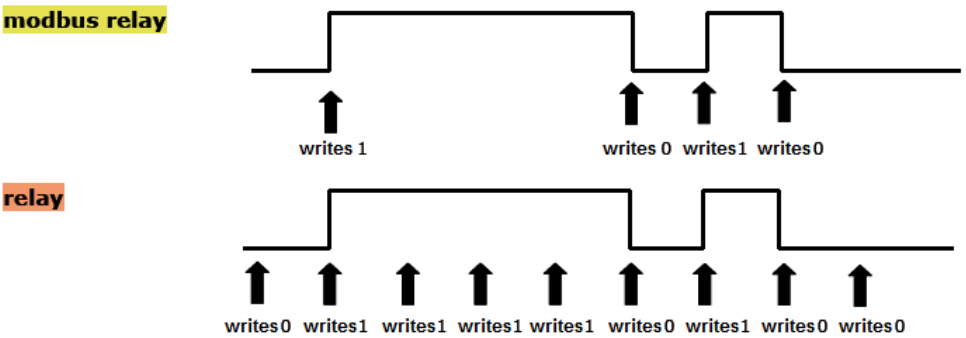


Writing from the bus

Modbus state

The *Modbus relay* values are periodically (as fast as the processor cycle allows) copied to the *Relay* register.

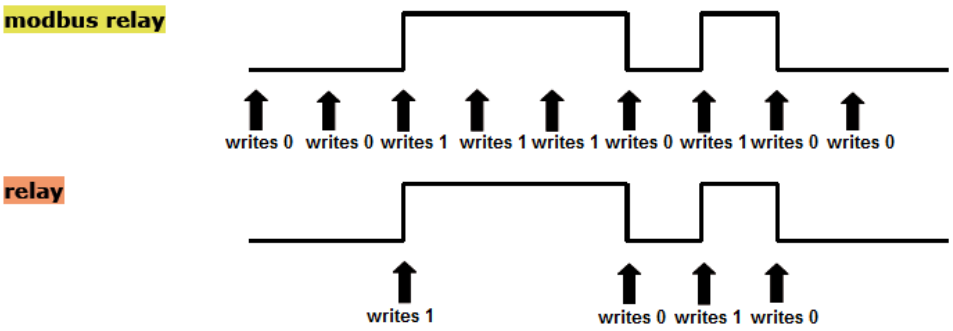
Register	Value
MB config 1	0x05



Modbus change

Each *Modbus relay* value change initiates copying of the new state into the *Relay* register.

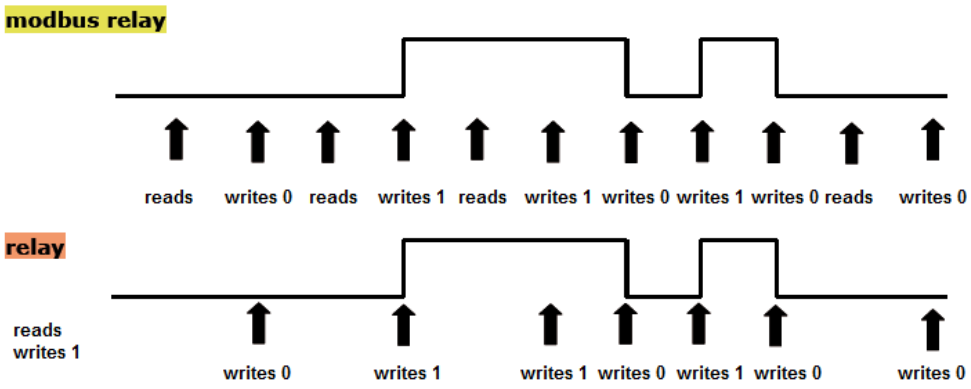
Register	Value
MB config 1	0x0A



Modbus writing

Each write event into the *Modbus relay* register initiates copying of the register value into the *Relay* register.

Register	Value
MB config 1	0x0F



If the function **Copying of inputs** together with function **Modbus state** is selected, priority is set in the *SW/MB config 1* (6 LSB) register.

Changes in versions	01/2017 – First version of the data sheet 08/2021 – Stylistic adjustments, change of logo, legislation removed.

MW501

Communicative module, Modbus RTU, 1 analog input 0 – 10 V

Summary

MW501 is communicative device with 1 analog input 0-10 V. They use Modbus RTU / RS485.

Applications

- **HVAC systems – voltage measurement.**
- **Input module 1× AI for general use.**

Functions

The MW501 module has 1 analog input. The resolution of the A/D converter is 16 bits. Suitable for mounting to wall or any other flat surface. The value from the A/D converter can be read from the corresponding modbus map register. see below.

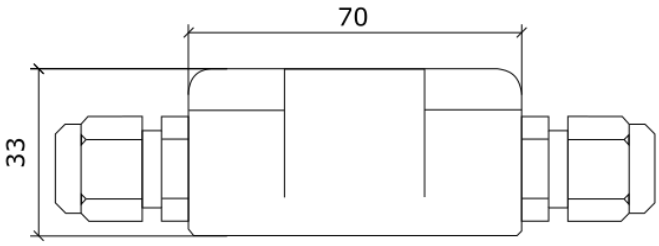
See details in the Modbus map (**https://www.domat-int.com/en/modbus-tables**).

Technical data

Power	10...35 V DC, 14...24 V AC
Consumption	typically 0.3 W; max. 2 W
Input	1× analog input
Measuring range	0…10V DC
Galvanic isolation input	no
A/D converter accuracy	16 bit
Measurement error	measurement deviation for all measured quantities is 0.25 % of the entire range.
Communication bus	Modbus RTU / RS485 (1200...115200 bps)
Galvanic isolation	1 kV
Cover	polyamide
Dimensions	70 × 63 × 33 mm, without cable glands, see drawing below
Protection degree	IP65 (EN 60529 + A2:2019)
Terminals	screw terminals for wires 0.35…1.5 mm^2; outer cable diameter 4…8 mm
Ambient conditions according to EN IEC 60721-3-3 ed. 2: 2019	class 3K22 (operational) class 1K21 (storage)

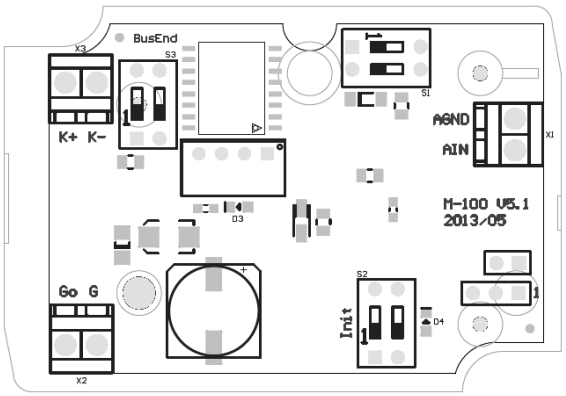
	class 3M11 (mechanical requirements)
Ambient conditions	ambient temperature -5…45 °C, rH 5…85 %.
	condensation, precipitation, ice or icing etc. not allowed.
	for instalation in higher altitude is necessary to consider reduction of dieletrical stability and reduced air cooling (EN IEC 60664-1 ed.3:2020).
	if not specified otherwise.
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
	Restriction of hazardous substances (RoHS) EN IEC 63000:2019

Dimensions



Dimensions are in *mm*.

Terminals



Terminals and connectors	
G	Power
G0	Power
K+	Communication RS485+
K-	Communication RS485-
Ain	Analogue input 0…10 V DC
AGND	Analogue input common
LED	
PWR	green, power on
RS485 TX	red; transmission on the bus
DIP	
BUS END	both ON terminate the bus (set if the device is the first or

the last on the bus)

INIT sets the initial communication parameters: Modbus address 1, baudrate 9600 bps.

The devices are set to the initial communication parameters by default. INIT the device only if the factory default settings shall be retrieved. Proceed as follows:
- connect the device over RS485 to a PC with configuration software ModComTool
- set the INIT switch to ON
- connect power (to terminals G, G0)
- search the device in the program (Scan)
- set INIT to OFF
- in ModComTool double click the device
- click to the „Initialization“ button in ModComTool
- switch the power off and on again.

Installation

Use a flat screwdriver to open the cover of the plastic housing. Connect the cabling according to the terminal description. Recommended wire crosssection is 0,35 - 1,5 mm^2 (outer cable diameter 4 - 8 mm). To keep the protection degree, the cable gland must be fastened and the cover put back after installation. The module is fixed to wall or any other flat surface using two screws (not included).

The module is intended for operation in a normal, non-agressive environment. They can be installed in any position. No maintenance is necessary.

Modbus

The sensor is addressed over the ModComTool. Default Modbus address is 1, communication parameters 9600, N, 8, 1. Measured voltage is in **register 6** formatted as follows:

*register value = measured value in V * 1000*

thus

measured value in V = register value / 1000

See details in the Modbus map **(https://www.domat-int.com/en/modbus-tables)**.

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	05/2021 — First release of the data sheet.

R220 Digital outputs module

Summary **The R220 digital output module is a microprocessor-controlled, communicative 12 binary outputs module. The module uses a RS485 bus with Modbus RTU for communication, and can be easily integrated in a variety of supervision and control systems.**

Application

- **HVAC and industrial control systems – binary signal control: fans, pumps, lights etc.**

Function

The R220 module controls 9 normally open and 3 change-over relays. All outputs are galvanically separated from each other as well as from the control and communication part.

The module uses RS485 bus for communication and is connected to the process station either directly (to process stations with RS485 interface), or through R012 (optically separated RS485 to RS232 converter). Removable connectors are used for incoming and outgoing data line so that mounting is fast and easy. The module mounts on a DIN rail.

The communication circuits are protected against overvoltage. If the module is terminating the communication bus, i.e. it is the last in line, a terminating 120 Ω resistor may be switched on by switching the BUS END DIP switch to ON. Two LEDs located inside of the housing enable fast diagnostics – power up and communication (Tx). Twelve LEDs at the outputs indicate the status of each of the outputs separately.

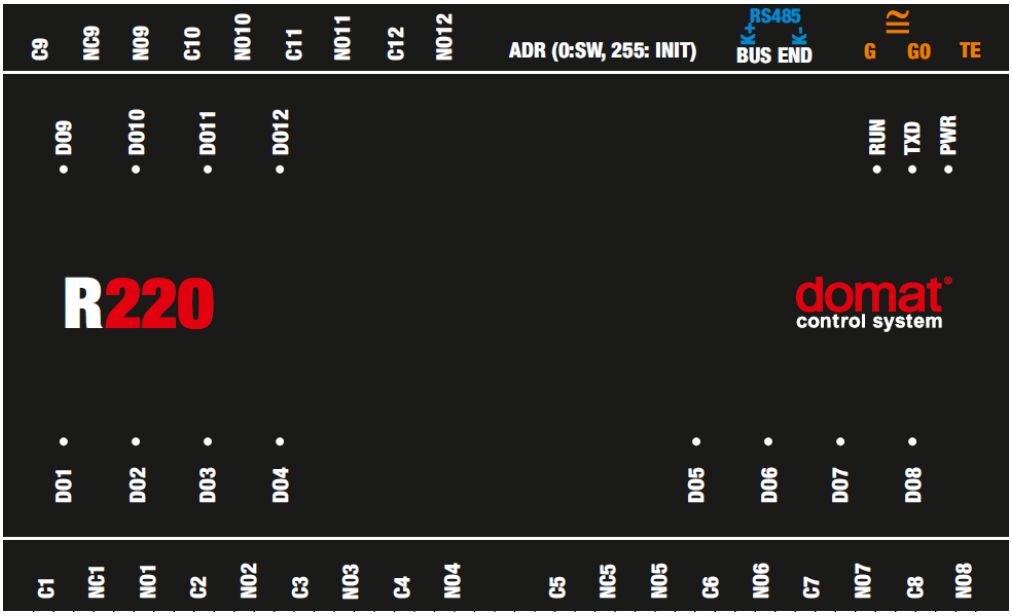
Connection examples: see *domat - Technical application notes*.

All the settings are backed up in a EEPROM chip. The module is equipped with a watchdog circuit.

Technical data

Power	24 V AC/DC ±20 %
Consumption	4 W
Communication	Modbus RTU RS485, 1200...115200 bit/s
Galvanic isolation	1 kV
Max. bus length	1200 m
Max. amount of modules on the bus	256
Number of digital outputs	12
Relay type	DO1, DO5, DO9 – SPDT
	nominal load: 8 A (AC1, general use, non-inductive load acc. to EN 60947-4-1 ed. 3), 250 VAC/30 VDC
	DO2-DO4, DO6-DO08, DO10-DO12 – SPST
	nominal load: 5 A (AC1, general use, non-inductive load acc. to EN 60947-4-1 ed. 3), 250 VAC/30 VDC
SW	ModComTool for parameters setting
	Merbon IDE, SoftPLC IDE – predefined Modbus devices
Protection degree	IP20 (EN 60529)
Housing	polycarbonate box (certification UL94V0)
	elbox 6U
Terminals	screw terminals M3
Dimensions	105.6 × 98.7 × 61.5 mm
Recommended wire	0.14…1.5 mm^2
Ambient temperature	external conditions: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K5)
	storage: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-1 climatic class 1K3)
Standards conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial environment)
	electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016
	hazardous substances reduction EN 50581:2012

Terminals



Terminals and connectors

RS485 K+	port COM1 - serial link RS485, terminals K+
RS485 K-	port COM1 - serial link RS485, terminals K-
G	G power supply
G0	G0 power supply
TE	optional connection for shielding, technical ground
C1…C12	common terminals for relays 1…12
NO1…12, NC1…12	relay output 1…12

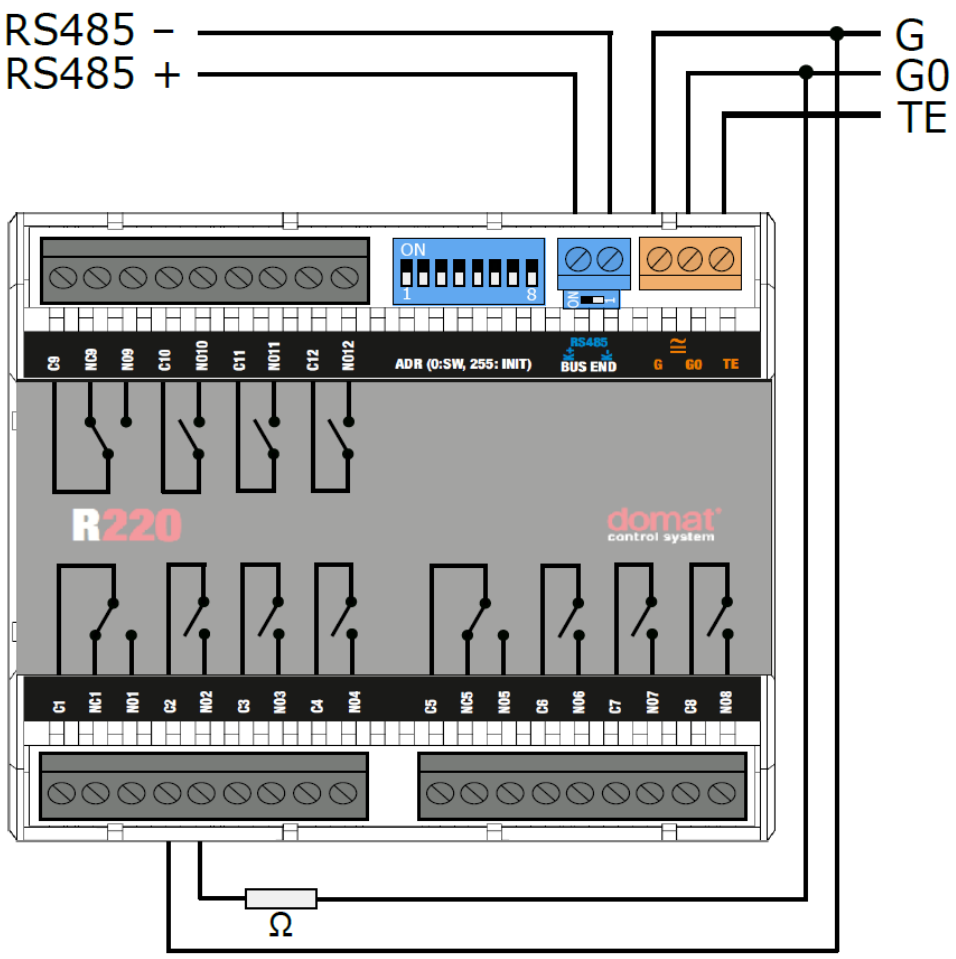
LED indication

TxD	red LED – RS485 transmitting data at COM1 (flashing: transmitting data; OFF: no data traffic)
PWR	green LED – power supply (ON: power OK; OFF: no power applied, weak or damaged power supply, …)

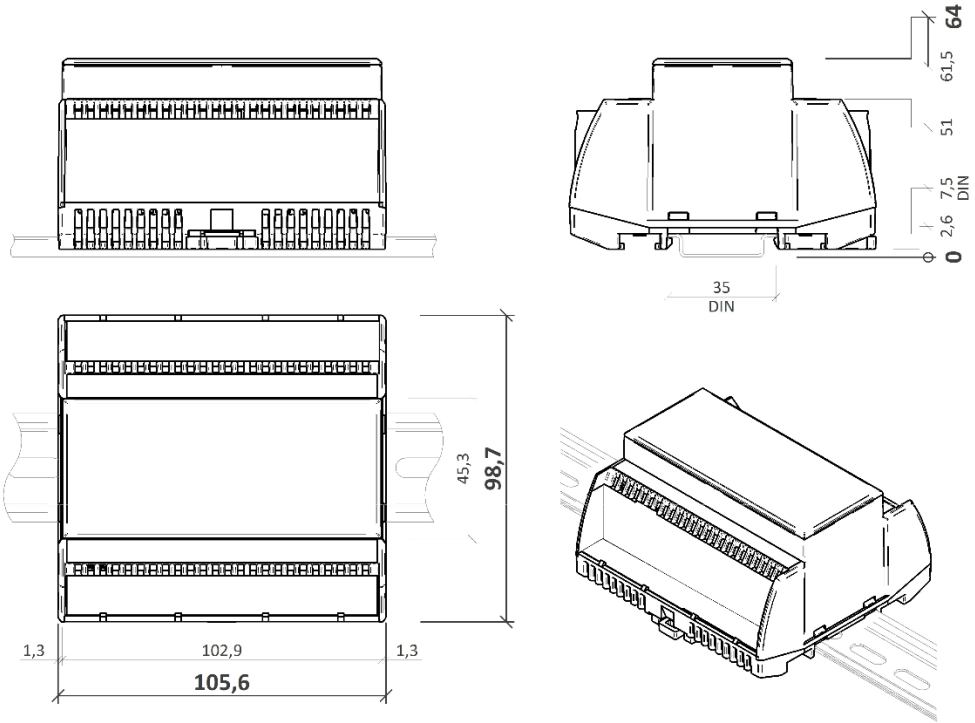
DIP switches

ADR	AUTO – if all switches are OFF, the address is used according to Modbus register 4 LSB USER – address is set by DIP switches configuration INIT - if are all switches ON at power-up, configuration parameters are set to defaults **DIP 8 = bit 0; switches increase their bit weight from right to left, see below**
BUS END	Switch for bus RS485 termination (located at the RS485 connector); ON = bus end; the first and last devices on bus should have bus end ON

Connection



Dimensions

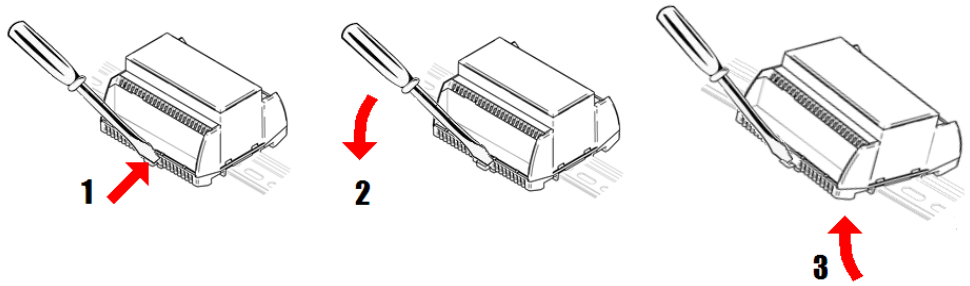


Dimensions are in *mm*.

Installation

The R220 module is fixed on standard DIN rail (by snapping).

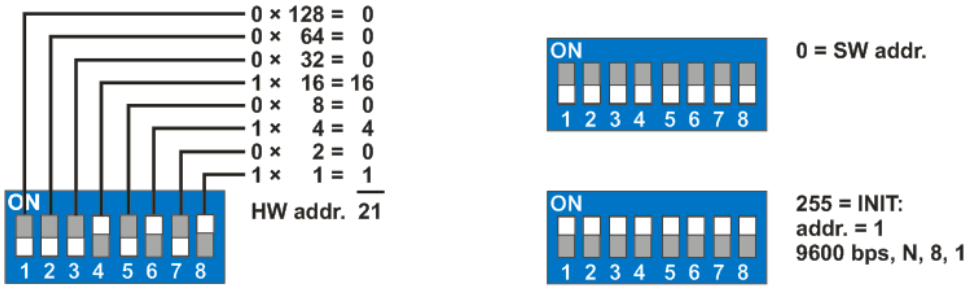
When removing the module from the DIN rail proceed as follows: Place a screwdriver in the plastic slot which is in the middle of bottom part of the module (1). Then push the screwdriver upwards (2). After that, the module can be removed by tilting it upwards (3).



Addressing

The Modbus address can be set as follows:

- **hardwarewise:** using DIP switches. The switches increase their bit weight from right to left, see image with example where address of 21 is set by activation of switches 4, 6, and 8 with bit weight of 16, 4, and 1 respectively.
  Valid settable range is 1 to 254. Address 0 (all switches OFF) means that the address is set as entered in the Modbus table. Address 255 (all switches ON) brings the module to INIT mode, where Modbus address is 1 and communication parameters are set to N, 8, 1, see image below.
  All changes apply after the module is switched off and on again.



- **softwarewise** using the ModComTool software, available for free at **www.domat-int.com/en/**. The default address (factory setting) is 1, default communication parameters are 9600, 8, N, 1. Parity and stopbits can be set in Modbus register 1005 LSB.
  The software address is only active if the hardware addressing switch is set to 0.
  All changes apply after the module is switched off and on again.

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	06/2018 – First datasheet version. 08/2018 – Correction (12 DO in Summary) 08/2021 – Stylistic adjustments, change of logo.

R312, R313 Triac PWM output module

Summary **The R312, R313 are a microprocessor controlled, communicative modules with 8 triac outputs. Triacs are controlled by analog variables – PWM signal with adjustable period or as binary outputs by using binary variables. The module uses a RS485 bus for communication, and can be easily integrated in a variety of supervision and control systems.**

Application

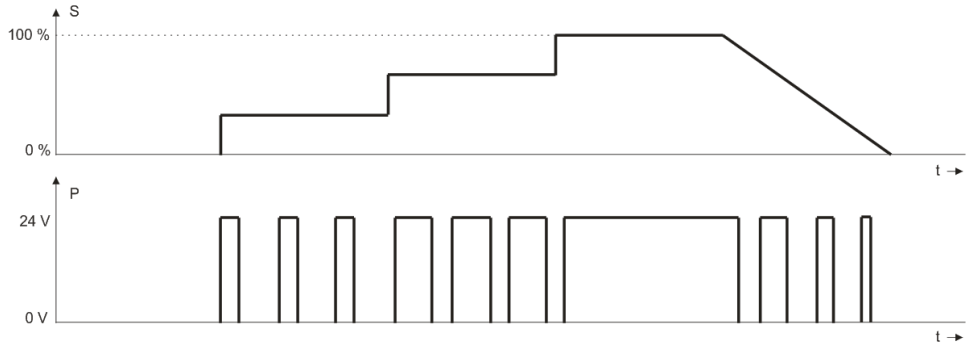
- **HVAC control systems – floor heating distribution points**
- **Inexpensive output module with 24 V AC (R312) or 230 V AC (R313) triac outputs**

Function

The R31x modules have eight independent triac outputs which are capable of switching voltage up to 50 V AC (R312) or 500 V AC (R313). Output triacs are protected by a fuse, accessible from the front of the device. Replace the fuse only with the same type and rating.

Using the configuration software ModComTool it is possible to set every output as binary (on / off), or as PWM (pulse-width modulation), which is a pulse signal with common adjustable period (default value 100 s) for all eight outputs, and duty time proportional to the analogue output signal 0 to 1000 (which corresponds to duty time 0 to 100 % of the period time). For binary control, values are written as binary variables. The register values are listed in the Modbus table of R312, for SoftPLC IDE and Merbon IDE the modules are predefined in the software libraries.

The PWM signal principle for R312 is shown at the following figure, where S is the control signal (0 to 100 %), and P is the resulting output voltage. The higher is the control signal, the longer is the output signal duty time and the more the thermic actuator at the output opens.



The module communicates by means of a RS485 data bus (optically separated). The communication protocol Modbus RTU ensures smooth and easy integration in a number of control and data acquisition systems. The Modbus table is available on **www.domat.cz** as a separate document.

The communication circuits are protected against overvoltage and galvanically isolated from the module electronics. If the module is terminating the communication bus, i.e. it is the first or last in line, a terminating 120 Ω resistor may be switched on by short-circuiting of the BUS END jumper. Two LEDs located inside of the housing enable fast diagnostics – power up and communication (Tx).

See *domat - Technical application notes* for connection examples.

All settings are backed up in a EEPROM chip. The module is equipped with a watchdog circuit.

To bring the module into INIT state, set the INIT DIP switch to ON and restart the module (if ON at power-up, the module address will be set to 1 and bitrate to 9600 bps, 8 N 1).

Technical data

Power	24 V AC/DC ± 20 %
Consumption	1 W
Galvanic isolation	1 kV
Communication	RS485, 1200...19200 bit/s
Max. bus length	1200 m
Max. amount of modules on the bus	256
Number of outputs	8 × solid state relay
SW	ModComTool 4.2.2.5 or higher for parameters setting Merbon IDE, SoftPLC IDE – predefined modbus devices
Housing	polycarbonate box (certification UL94V0) elbox 4U low
Protection degree	IP20 (EN 60529)
Recommended wire	0.14…1.5 mm^2 (screw terminals M3)
Ambient temperature	external conditions: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K5)

	storage: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-1 climatic class 1K3)
Standards conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial enviroment) electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016 hazardous substances reduction EN 50581:2012

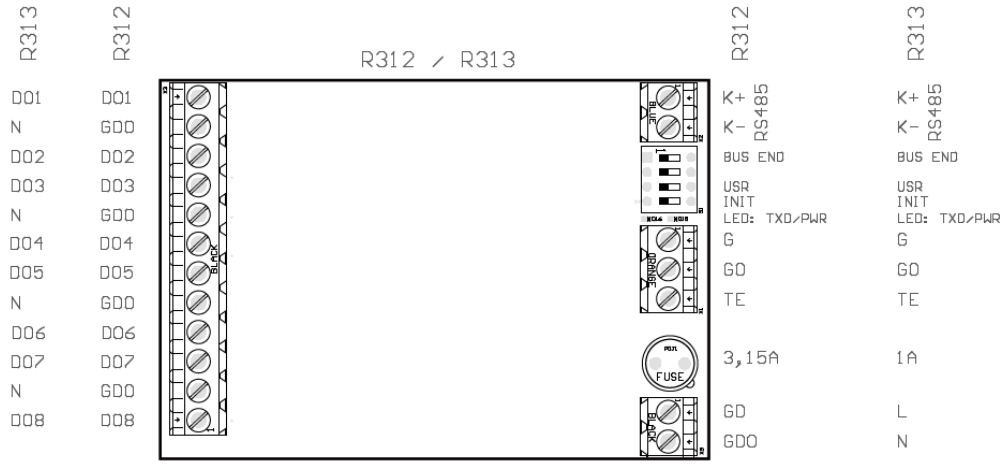
R 312

Output element	optotriac, zero switching
Maximum switched voltage	60 V AC
Output load	24 V AC, 0.4 A, max. voltage 60 V
Fuse	F3.15 A / 250 V
Minimum load current	5 mA
Minimum switched voltage	20 V AC

R 313

Output element	optotriac, zero switching
Maximum switched voltage	250 V AC
Output load	230 V AC, 0.12 A, max. voltage 600 V
Fuse	F1 A / 250 V

Terminals



Terminals and connectors

RS485 K+	port COM1 - serial link RS485, terminals K+
RS485 K-	port COM1 - serial link RS485, terminals K-
G	G power supply
G0	G0 power supply
TE	optional connection for shielding, technical ground
GD (L)	power supply for outputs
GDO (N)	power supply for outputs, common
DO1	output 1
GDO (N)	power supply for outputs, common
DO2	output 2
DO3	output 3
GDO (N)	power supply for outputs, common
DO4	output 4
DO5	output 5
GDO (N)	power supply for outputs, common
DO6	output 6
DO7	output 7
GDO (N)	power supply for outputs, common
DO8	output 8

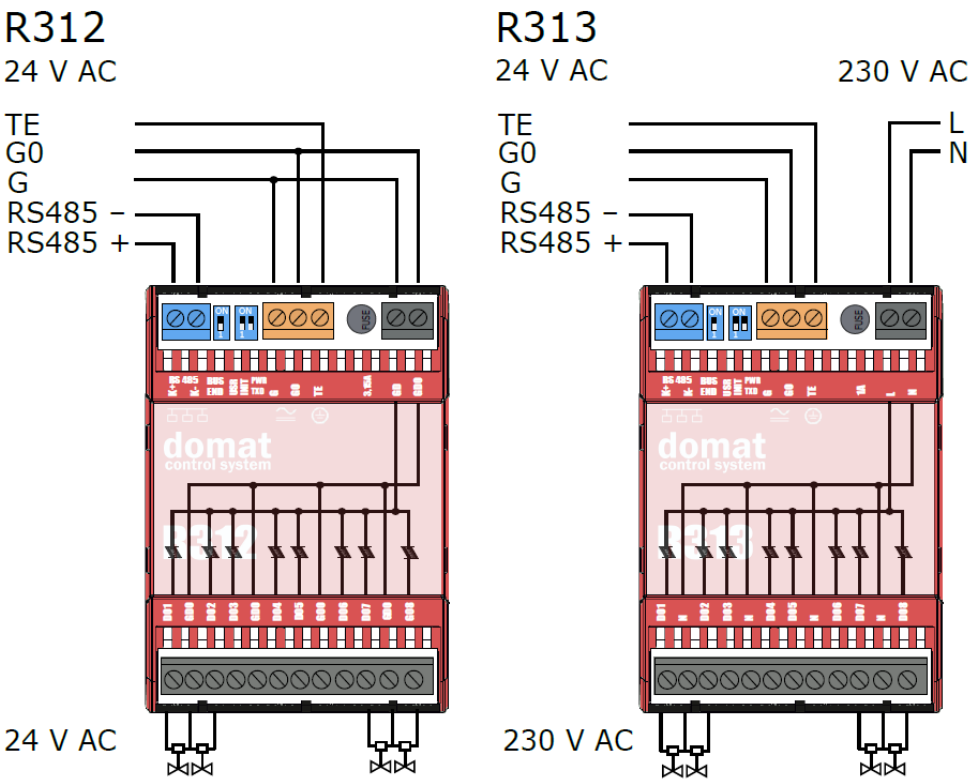
LED indication

TxD	red LED – RS485 transmitting data at COM1 (flashing: transmitting data; OFF: no data traffic)
PWR	green LED – power (ON: power OK; OFF: no power applied, weak or damaged power supply, …)

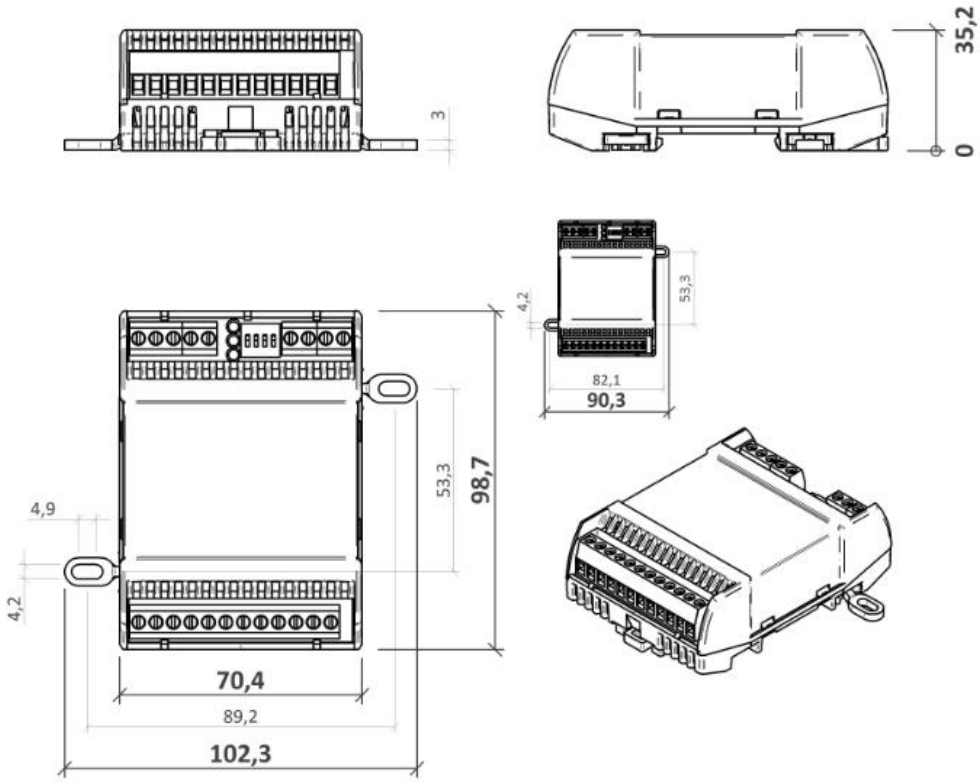
DIP switches

BUS END	micro DIP switches next to terminals RS485; both ON = bus end; the first and last devices on bus should have bus end ON
INIT	INIT - if ON at power-up, configuration parameters are brought to defaults (see Configuration parameters in Merbon IDE)
USR	Can be defined in customer configuration

Connection



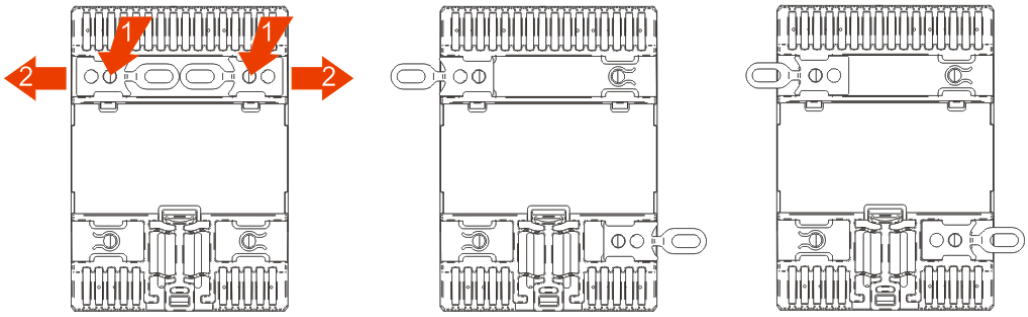
Dimensions



Dimensions are in *mm*.

Installation The module is fixed on standard DIN console or is fixed by mounting spots.

Mounting spots are attached to the rear side of module. Push mounting spots out (2) while simultaneously pressing safety lock which is located under the inner round hole (1). For module attachment, carefully push mounting spots back but reversed (rings must face out). You can choose between two lock positions.



Addressing The Modbus address is set through ModComTool, a configuration software which is free to download at **www.domat.cz**. Default (factory settings) address is 1, default communication parameters are 9600, 8, N, 1.

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	07/2019 – First datasheet version. 08/2021 – Stylistic adjustments, change of logo.

R420 16 digital input module

Summary **The R420 digital input module is a microprocessor-controlled, communicative 16 binary inputs module. The module uses a RS485 bus with Modbus RTU, and can be easily integrated in a variety of supervision and control systems.**

Application

- **HVAC and industrial control systems – binary signal acquisition**

Function

The inputs are designed for small voltage up to 50 V DC, 30 V AC. All inputs have a common ground – COM. The inputs are optically separated from the rest of the circuitry.

The module communicates by means of a optically insulated RS485 data bus. The communication protocol ensures smooth and easy integration in a number of control and data acquisition systems. Removable connectors are used for incoming and outgoing data line so that mounting is fast and easy. The module is installed on a DIN rail.

The communication circuits are protected against overvoltage. If the module is terminating the communication bus, i.e. it is the first or last in line, a terminating 120 Ω resistor shall be switched on by short-circuiting of the BUS END DIP switches (1, 2). Three LEDs located inside of the housing enable fast diagnostics – power up and communication. 16 LEDs at the inputs indicate the status of each of the inputs separately.

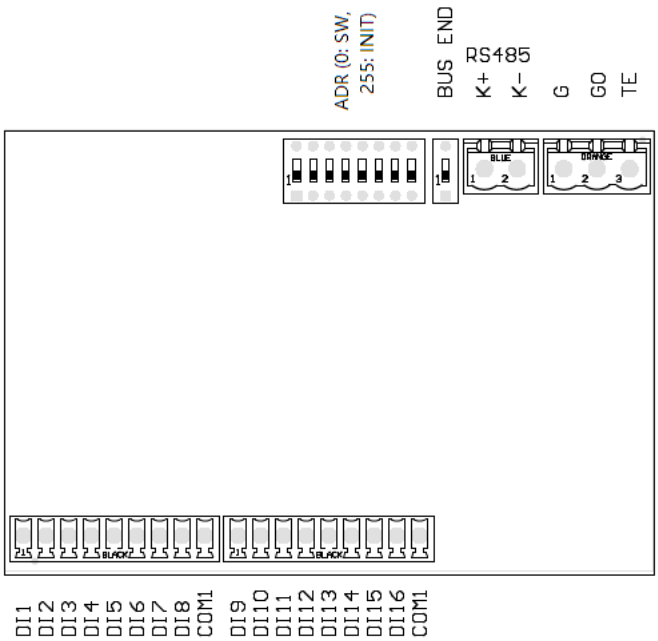
All settings are stored in a EEPROM. The module is equipped by a watchdog.

See *domat - Technical application notes* for connection examples.

Technical data

Power	24 V AC/DC ± 20 %
Consumption	1 W
Communication	Modbus RTU RS485, 1200...115200 bit/s
Galvanic isolation	1 kV
Max. bus length	1200 m
Max. amount of modules on the bus	256
Number of digital inputs	16 × digital inputs
	(logical zero is <5 VAC/DC, logical one is >18 VAC/DC, 7 mA)
Software	ModComTool 4.2.3.9 or higher for parameter setting,
	Merbon IDE, SoftPLC IDE – predefined Modbus devices
Housing	polycarbonate box (certification UL94V0)
	Elbox 6
Terminals	screw terminals M3 (bus, power), M2 (digital inputs)
Dimensions	105.6 × 98.7 × 61.5 mm
Protection degree	IP20 (EN 60529)
Recommended wire	0.14…1.5 mm^2
Ambient temperature	external conditions: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K5)
	storage: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-1 climatic class 1K3)
Standards conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial environment)
	electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016
	hazardous substances reduction EN 50581:2012

Terminals



Terminals and connectors

RS485 K+	port COM - serial link RS485, terminals K+
RS485 K-	port COM - serial link RS485, terminals K-
G	G power supply
G0	G0 power supply
TE	optional connection for shielding, technical ground
COM1	common terminals for DI1…DI16
DI1 … DI16	inputs 1…16

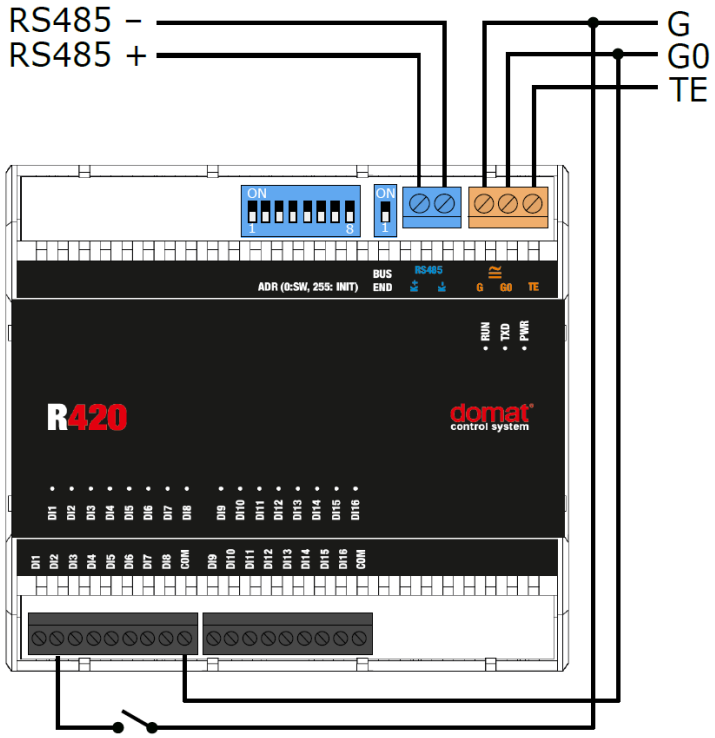
LED indication

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 COM (flashing: transmitting data; OFF: no data traffic)
PWR	green LED – power supply (ON: power OK; OFF: no power applied, weak or damaged power supply, …)

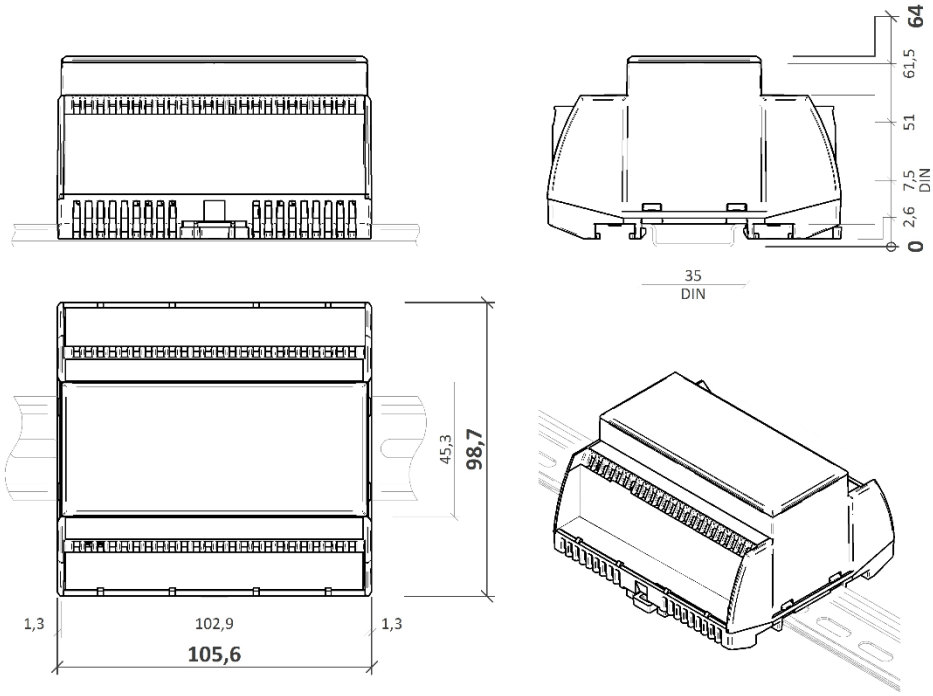
DIP switches

ADR	AUTO – if all switches are OFF, the address is used according to Modbus register 4 LSB USER – address is set by DIP switches configuration INIT - if are all switches ON at power-up, configuration parameters are set to defaults **DIP 8 = bit 0; switches increase their bit weight from right to left, see below**
BUS END	Switch for bus RS485 termination (located at the RS485 connector); ON = bus end; the first and last devices on bus should have bus end ON

Connection



Dimensions

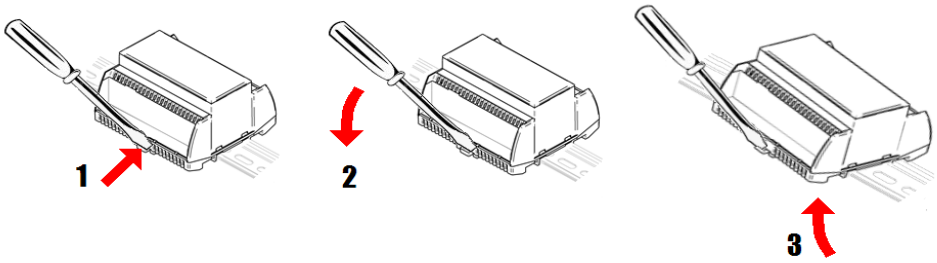


Dimensions are in *mm*.

Installation

The R420 module is fixed by snapping on standard DIN rail.

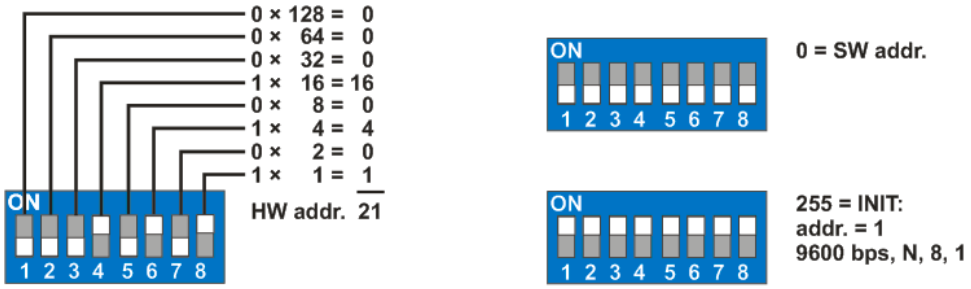
When removing the module from the DIN rail proceed as follows: Place a screwdriver in the plastic slot which is in the middle of bottom part of the module (1). Then push the screwdriver upwards (2). After that, the module can be removed by tilting it upwards (3).



Addressing

The Modbus address can be set as follows:

- **hardwarewise:** using DIP switches. The switches increase their bit weight from right to left, see image with example where address of 21 is set by activation of switches 4, 6, and 8 with bit weight of 16, 4, and 1 respectively. Valid settable range is 1 to 254. Address 0 (all switches OFF) means that the address is set as entered in the Modbus table. Address 255 (all switches ON) brings the module to INIT mode, where Modbus address is 1 and communication parameters are set to N, 8, 1, see image below.
  All changes apply after the module is switched off and on again.



- **softwarewise** using the ModComTool software, available for free at **www.domat-int.com/en/**. The default address (factory setting) is 1, default communication parameters are 9600, 8, N, 1. Parity and stopbits can be set in Modbus register 1005 LSB.
  The software address is only active if the hardware addressing switch is set to 0.
  All changes apply after the module is switched off and on again.

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	06/2018 – First datasheet version. 08/2021 – Stylistic adjustments, change of logo.

R430 32 digital input module

Summary **The R430 digital input module is a microprocessor-controlled, communicative 32 binary inputs module. The module uses a RS485 bus with Modbus RTU, and can be easily integrated in a variety of supervision and control systems.**

Application

- **HVAC and industrial control systems – binary signal acquisition**

Function

The inputs are designed for small voltage up to 50 V DC, 30 V AC. Inputs DI1 to DI24 have common ground – GND1. Inputs DI25 to DI32 have common ground – GND2. The GNDx terminals are not interconnected inside of the module and therefore each of them may host another potential. The inputs are optically separated from the rest of the circuitry.

The module communicates by means of a optically insulated RS485 data bus. The communication protocol ensures smooth and easy integration in a number of control and data acquisition systems. Removable connectors are used for incoming and outgoing data line so that mounting is fast and easy. As some communication cables include more pairs in one cable, free cores may be used for powering the module. The module is installed on a DIN rail.

The communication circuits are protected against overvoltage. If the module is terminating the communication bus, i.e. it is the last in line, a terminating 120 Ω resistor may be switched on by short-circuiting of the BUS END DIP switches (1, 2). Two LEDs located inside of the housing enable fast diagnostics – power up and communication. 32 LEDs at the inputs indicate the status of each of the inputs separately.

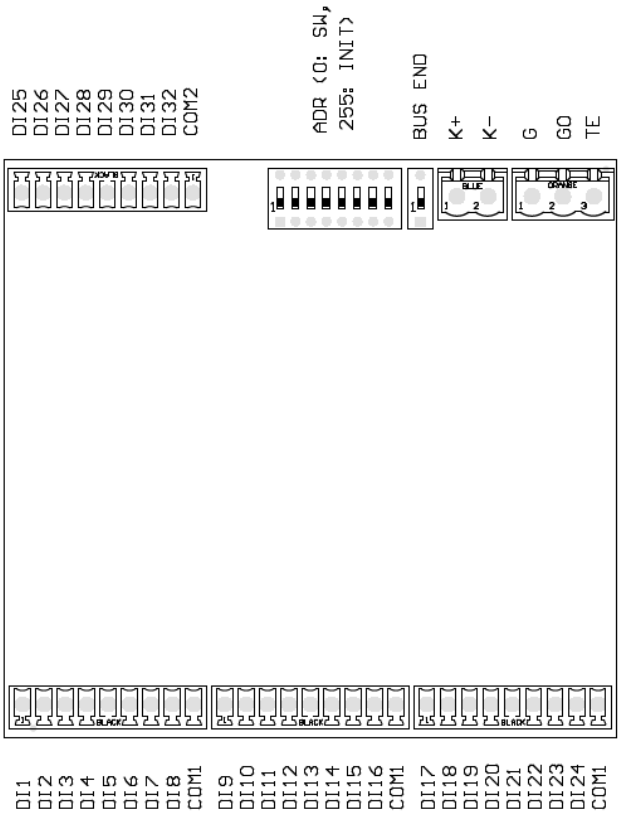
All settings are stored in a EEPROM. The module is equipped by a watchdog.

See *domat - Technical application notes* for connection examples.

Technical data

Power	24 V AC/DC ± 20 %
Consumption	1 W
Communication	Modbus RTU RS485, 1200...115200 bit/s
Galvanic isolation	1 kV
Max. bus length	1200 m
Max. amount of modules on the bus	256
Number of digital inputs	32 × digital input
	(logical zero is <5 VAC/DC, logical one is >18 VAC/DC, 7 mA)
Software	ModComTool 4.2.3.9 or higher parameters setting,
	Merbon IDE, SoftPLC IDE – predefined Modbus devices
Housing	polycarbonate box (certification UL94V0)
	Elbox 6
Terminals	screw terminals M3 (bus, power), M2 (digital inputs)
Dimensions	105.6 × 98.7 × 64 mm
Protection degree	IP20 (EN 60529)
Recommended wire	0.14…1.5 mm^2
Ambient temperature	external conditions: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K5)
	storage: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-1 climatic class 1K3)
Standards conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial environment)
	electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016
	hazardous substances reduction EN 50581:2012

Terminals



Terminals and connectors

RS485 K+	port COM - serial link RS485, terminals K+
RS485 K-	port COM - serial link RS485, terminals K-
G	G power supply
G0	G0 power supply
TE	optional connection for shielding, technical ground
COM1	common terminals for DI1…DI24
COM2	common terminal for DI25…DI32
DI1 … DI32	inputs 1…32

LED indication

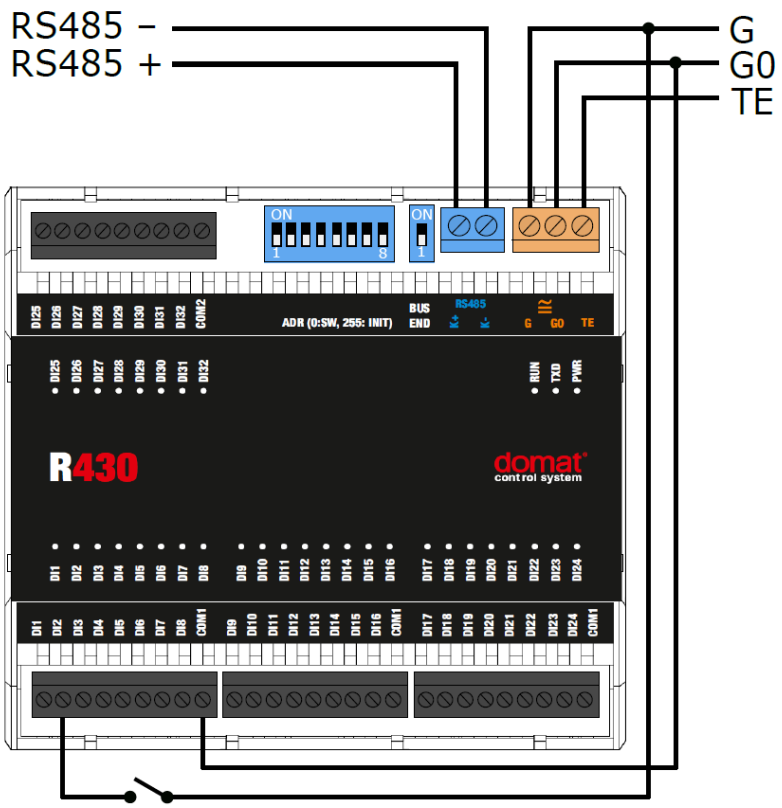
RUN	orange LED – system cycle (OK: LED flashes periodically 1 s ON, 1 s OFF; ERROR: LED flashes in other pattern, LED is still ON or OFF)
TxD	red LED – RS485 transmitting data at COM (flashing: transmitting data; OFF: no data traffic)
PWR	green LED – power supply (ON: power OK; OFF: no power applied, weak or damaged power supply, …)

DIP switches

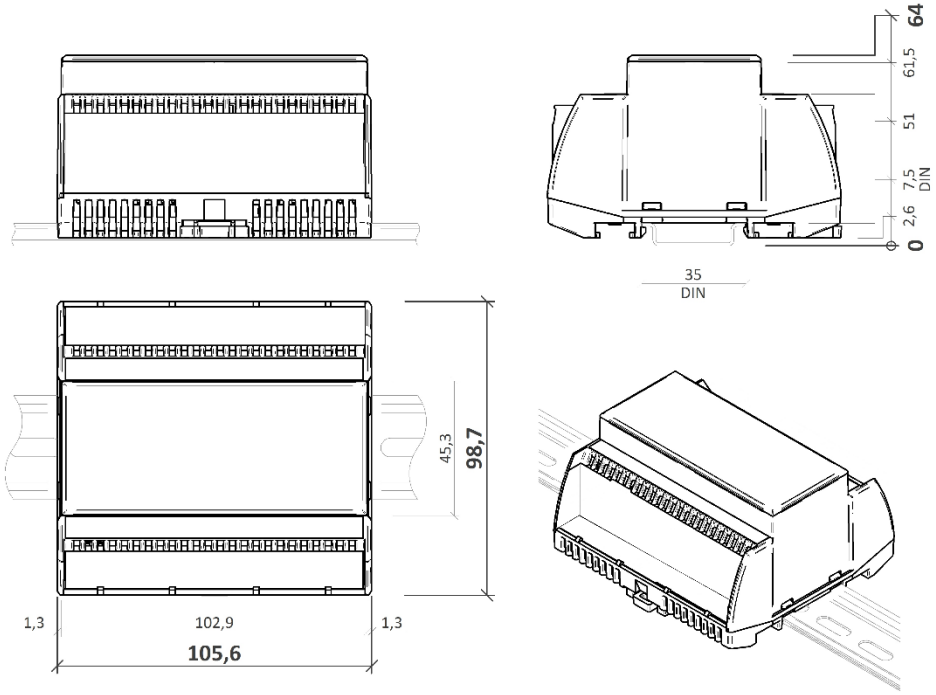
ADR	AUTO – if all switches are OFF, the address is used according to Modbus register 4 LSB USER – address is set by DIP switches configuration INIT - if are all switches ON at power-up, configuration parameters are set to defaults **DIP 8 = bit 0; switches increase their bit weight from right to left, see below**

BUS END Switch for bus RS485 termination (located at the RS485 connector); ON = bus end; the first and last devices on bus should have bus end ON

Connection



Dimensions

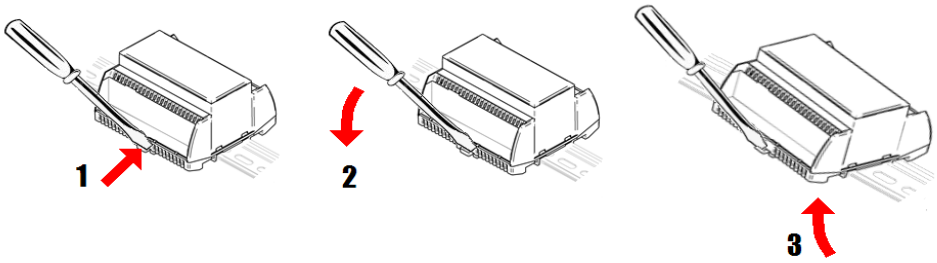


Dimensions are in *mm*.

Installation

The R430 module is fixed by snapping on standard DIN rail.

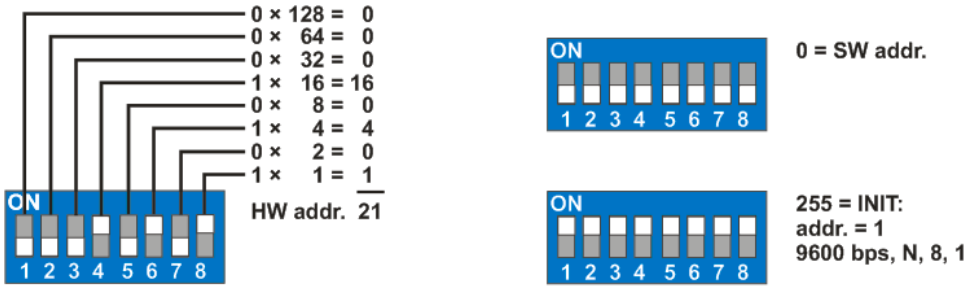
When removing the module from the DIN rail proceed as follows: Place a screwdriver in the plastic slot which is in the middle of bottom part of the module (1). Then push the screwdriver upwards (2). After that, the module can be removed by tilting it upwards (3).



Addressing

The Modbus address can be set as follows:

- **hardwarewise:** using DIP switches. The switches increase their bit weight from right to left, see image with example where address of 21 is set by activation of switches 4, 6, and 8 with bit weight of 16, 4, and 1 respectively. Valid settable range is 1 to 254. Address 0 (all switches OFF) means that the address is set as entered in the Modbus table. Address 255 (all switches ON) brings the module to INIT mode, where Modbus address is 1 and communication parameters are set to N, 8, 1, see image below.
  All changes apply after the module is switched off and on again.



- **softwarewise** using the ModComTool software, available for free at **www.domat.cz**. The default address (factory setting) is 1, default communication parameters are 9600, 8, N, 1. Parity and stopbits can be set in Modbus register 1005 LSB.
  The software address is only active if the hardware addressing switch is set to 0.
  All changes apply after the module is switched off and on again.

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	09/2017 – First datasheet version. 06/2018 – Minor changes, *Safety note* added. 08/2021 – Stylistic adjustments, change of logo.

R500 Analogue input module

Summary **The R500 is a microprocessor controlled, communicative module with 8 analogue inputs with variable measuring range (voltage, current loop). The module uses a RS485 bus for communication, and can be easily integrated in a variety of supervision and control systems.**

Application

- **HVAC and industrial control systems – measuring of temperature, pressure, and other values**

Function

The module incorporates 8 analogue inputs. The input signals are processed and multiplexed into a 16 bit A/D converter. Each input is rangeable separately (see Technical data), and inputs can also be used as 0 to 20 mA current measurement inputs if the corresponding DIP switch is activated. The individual inputs are separated from each other.

The module communicates by means of RS485 data bus. The Modbus RTU communication protocol ensures smooth and easy integration in a variety of control and data acquisition systems. It connects to process stations (PLCs) directly or through the R012 interface (RS485 to RS232 converter with galvanic isolation).
Removable connectors are used for all signals as well as for data line so that mounting is fast and easy. The module has a DIN rail clip.

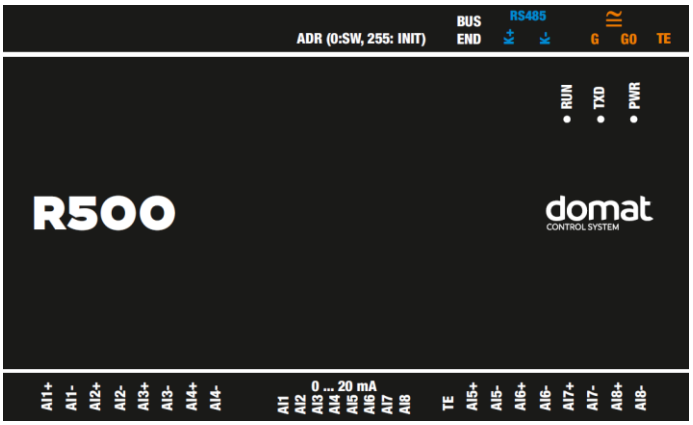
The communication circuits are protected against overvoltage and galvanically isolated from other parts of the module. If the module is terminating the communication bus, i.e. it is the first or last in line, a terminating 120 Ω resistor may be switched on by activating the BUS END switches. Two LEDs located inside of the housing enable fast diagnostics – power and communication.

All module settings are backed up in an EEPROM chip. The module is equipped with a watchdog circuit.
See *domat - Technical application notes* for connection examples. R500 is a more universal replacement of M500.

Technical data

Power	24 V AC/DC ±20 %
Consumption	1.5 W
Communication	Modbus RTU RS485, 1200...115200 bit/s
Galvanic isolation	1 kV
Max. bus length	1200 m
Max. amount of modules on the bus	256
Number of analogue inputs	8
Galvanic isolation from supply	1 kV
Input ranges	+/- 150mV, +/- 500mV, +/- 1V, +/- 5V, +/- 10V, 0...20 mA
Sampling	10 samples/s
Effective resolution	16 bit
Measurement error	The measurement deviation for all measured variables is 0.25 % of the whole range.
Input impedance	>10MΩ
SW	ModComTool 4.2.7.5 or higher parameters setting, GUI
	Merbon IDE, SoftPLC IDE – predefined modbus devices
Housing	Polycarbonate box (certification UL94V0)
	elbox 6U
Terminals	screw terminals M3 (bus, power), M2 (AI inputs)
Recommended wire	0.35…1.5 mm^2 (AI)
Dimensions	105.6 × 98.7 × 61.5 mm
Protection degree	IP20 (EN 60529)
Ambient temperature	external conditions: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K5)
	storage: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-1 climatic class 1K3)
Standards conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial environment)
	electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016
	hazardous substances reduction EN 50581:2012

Terminals



Terminals and connectors

RS485 K+	port COM1 - serial link RS485, terminals K+
RS485 K-	port COM1 - serial link RS485, terminals K-
G	G power supply
G0	G0 power supply
TE	optional connection for shielding, technical ground
AI1+	Input 1, positive
AI1-	Input 1, negative
AI2+	Input 2, positive
AI2-	Input 2, negative
…	
AI8+	Input 8, positive
AI8-	Input 8, negative

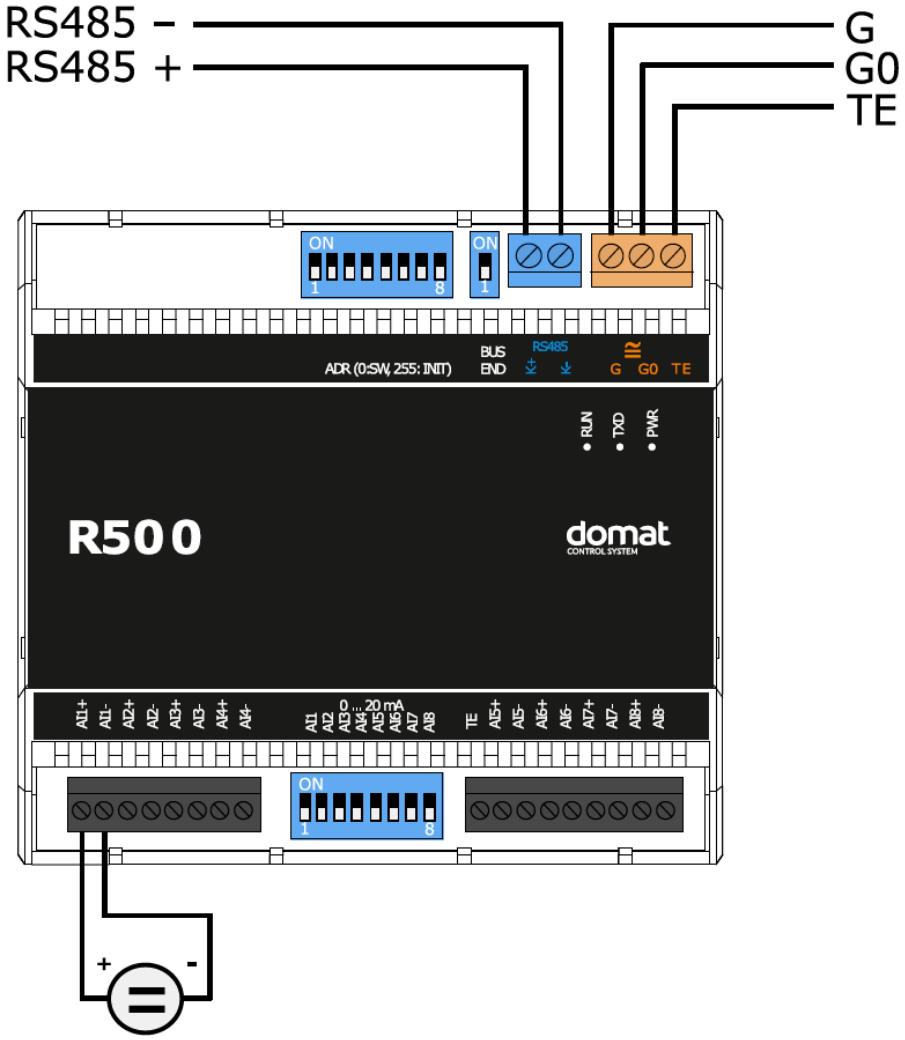
LED indication

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)
PWR	green LED – power supply (ON: power OK; OFF: no power applied, weak or damaged power supply, …)

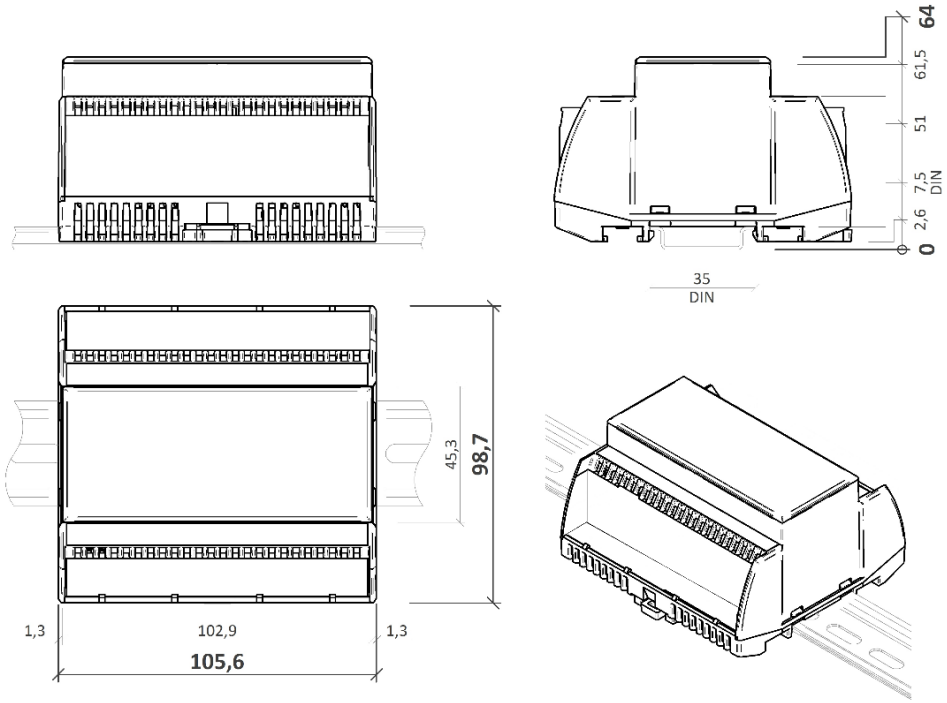
DIP switches

ADR	AUTO – if all switches are OFF, the address is used according to Modbus register 4 LSB USER – address is set by DIP switches configuration INIT - if are all switches ON at power-up, configuration parameters are set to defaults **DIP 8 = bit 0; switches increase their bit weight from right to left, see below**
BUS END	Switch for bus RS485 termination (located at the RS485 connector); ON = bus end; the first and last devices on bus should have bus end ON
0...20 mA	For current measurement (0-20 mA) on individual channels switch the particular DIP switch to ON The 0...20 mA range must be also set over Modbus (e.g. using Domat ModComTool)

Connection



Dimensions

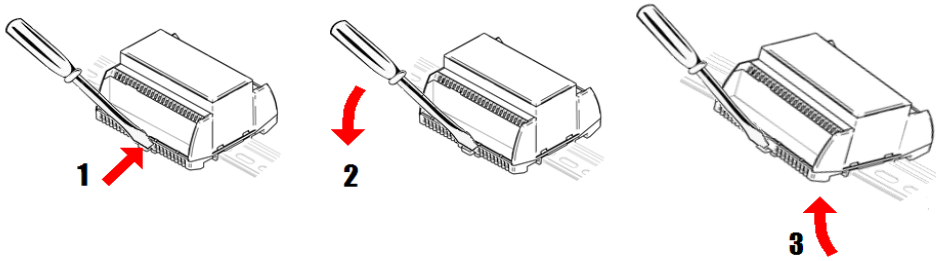


Dimensions are in *mm*.

Installation

The R500 module is fixed on standard DIN rail (by snapping).

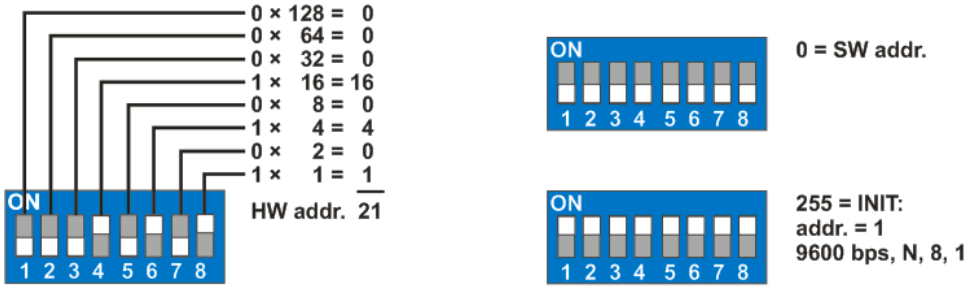
When removing the module from the DIN rail proceed as follows: Place a screwdriver in the plastic slot which is in the middle of bottom part of the module (1). Then push the screwdriver upwards (2). After that, the module can be removed by tilting it upwards (3).



Addressing

The Modbus address can be set as follows:

- **hardwarewise:** using DIP switches. The switches increase their bit weight from right to left, see image with example where address of 21 is set by activation of switches 4, 6, and 8 with bit weight of 16, 4, and 1 respectively. Valid settable range is 1 to 254. Address 0 (all switches OFF) means that the address is set as entered in the Modbus table. Address 255 (all switches ON) brings the module to INIT mode, where Modbus address is 1 and communication parameters are set to N, 8, 1, see image below.
  All changes apply after the module is switched off and on again.



- **softwarewise** using the ModComTool software, available for free at **www.domat.cz**. The default address (factory setting) is 1, default communication parameters are 9600, 8, N, 1. Parity and stopbits can be set in Modbus register 1005 LSB.
  The software address is only active if the hardware addressing switch is set to 0.
  All changes apply after the module is switched off and on again.

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	12/2019 – First datasheet version. 08/2021 – Stylistic changes, logo change. 02/2022 – Added info about separating inputs.

R560 Universal analogue input module

Summary **The R560 is a microprocessor controlled, communicative module with 8 analogue inputs with variable measuring range: voltage, resistance, temperature, current loop). The module uses a RS485 bus for communication, and can be easily integrated in a variety of supervision and control systems.**

Application

- **Building and industrial control systems – measuring of temperature, pressure, and other values**

Function

The module incorporates 8 analogue inputs. The input signals are processed and multiplexed into a 16 bit A/D converter. Each input is rangeable separately (see Technical data), and inputs can also be used as 0 to 20 mA current measurement inputs if the corresponding DIP switch is activated.

The module communicates by means of RS485 data bus. The Modbus RTU communication protocol ensures smooth and easy integration in a variety of control and data acquisition systems. It connects to process stations (PLCs) directly or through the R012 interface (RS485 to RS232 converter with galvanic isolation).

Removable connectors are used for all signals as well as for data line so that mounting is fast and easy. The module has a DIN rail clip.

The communication circuits are protected against overvoltage and galvanically isolated from other parts of the module. If the module is terminating the communication bus, i.e. it is the first or last in line, a terminating 120 Ω resistor may be switched on by activating the BUS END switches. Two LEDs located inside of the housing enable fast diagnostics – power and communication.

All module settings are backed up in an EEPROM chip. The module is equipped with a watchdog circuit.

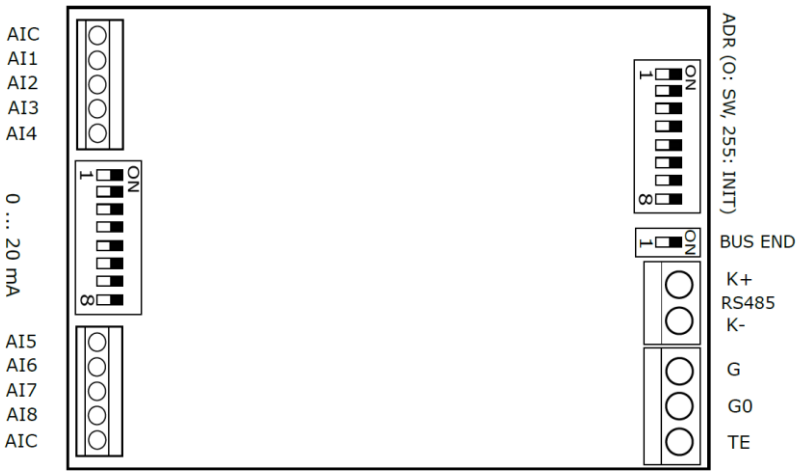
See *domat - Technical application notes* for connection examples. R560 is a more universal replacement of M550 (which has 8 inputs for passive sensors) and it can be used also as a replacement of M500 (8 voltage inputs) for most of the applications. Please note that the R560, unlike M500, has asymmetrical inputs (0 to 10 V rather than -10...10 V).

Technical data

Power	10…35 V DC, 14…24 V AC
Consumption	2.5 W
Communication	Modbus RTU RS485, 1200...115200 bit/s
Galvanic isolation	1 kV
Max. bus length	1200 m
Max. amount of modules on the bus	256
Number of analogue inputs	8
Input ranges	Pt1000* (-50...150 °C), 20...1600 Ohm, 20...5000 Ohm, 0...10 V, 0...20 mA resistance ranges may be used for temperature measurement with Pt100, Pt1000, Ni1000/5000 and Ni100/6180 passive sensors. Linearisation must be done in controllers (Domat PLC… for example) just like at e.g. MCIO2 module. In the R560 module there is recalculation to °C for the Pt1000 sensor only.
Sampling	10 samples/s
Effective resolution	16 bits
Measurement error	the measurement deviation for all measured variables is 0.25% of the whole range
Input impedance	>10MΩ
SW	ModComTool 4.2.3.9 or higher parameters setting, GUI Merbon IDE, SoftPLC IDE – predefined modbus devices
Housing	polycarbonate box (certification UL94V0) elbox 4
Terminals	screw terminals M3 (bus, power), M2 (AI inputs)
Dimensions	70.4 × 98.7 × 61.5 mm
Protection degree	IP20 (EN 60529)
Recommended wire	0.14…1.5 mm^2
Ambient temperature	external conditions: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K5) storage: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-1 climatic class 1K3)

Standards conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial environment) electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016 hazardous substances reduction EN 50581:2012

Terminals



Terminals and connectors

RS485 K+	port COM1 - serial link RS485, terminals K+
RS485 K-	port COM1 - serial link RS485, terminals K-
G	G power supply
G0	G0 power supply
TE	optional connection for shielding, technical ground
AIC	common terminals for AI1…AI8
AI1…AI8	input 1…8

LED indication:

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)
PWR	green LED – power supply (ON: power OK; OFF: no power applied, weak or damaged power supply, …)

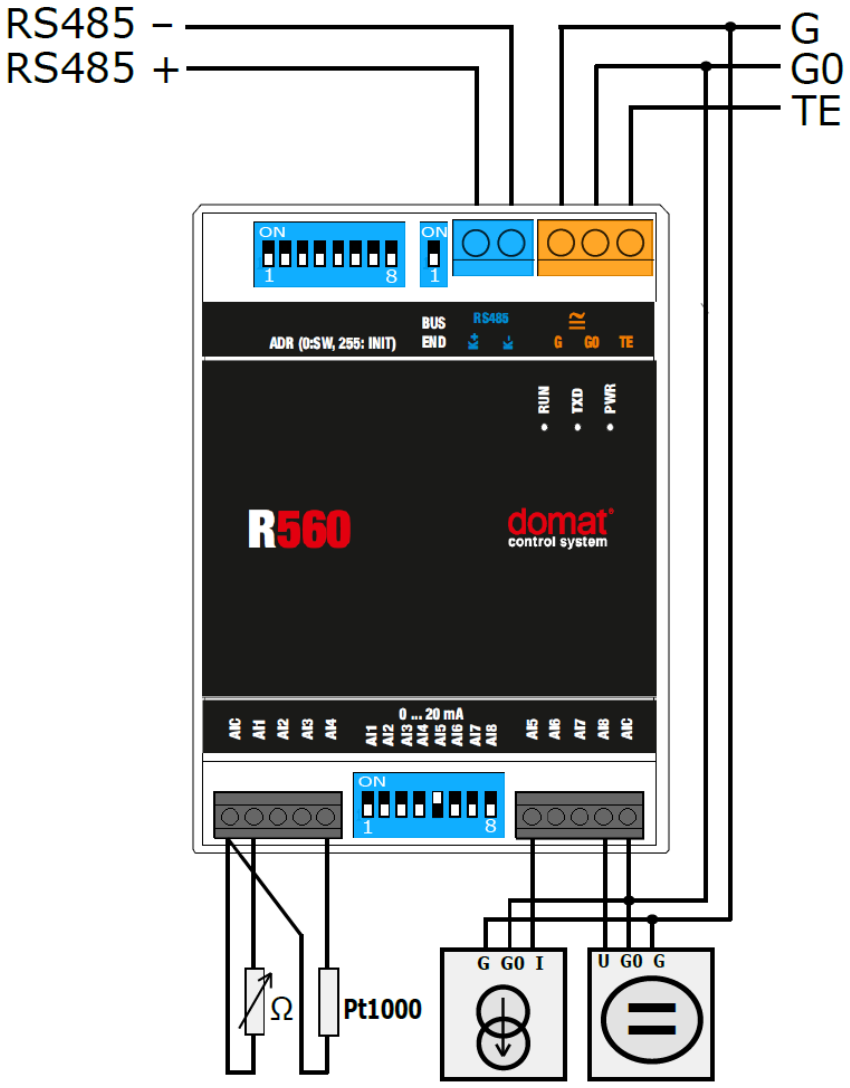
DIP switches:

ADR	AUTO – if all switches are OFF, the address is used according to Modbus register 4 LSB USER – address is set by DIP switches configuration INIT - if are all switches ON at power-up, configuration parameters are set to defaults **DIP 8 = bit 0; switches increase their bit weight from right to left, see below**
BUS END	Switch for bus RS485 termination (located at the RS485 connector); ON = bus end; the first and last devices on bus should have bus end ON

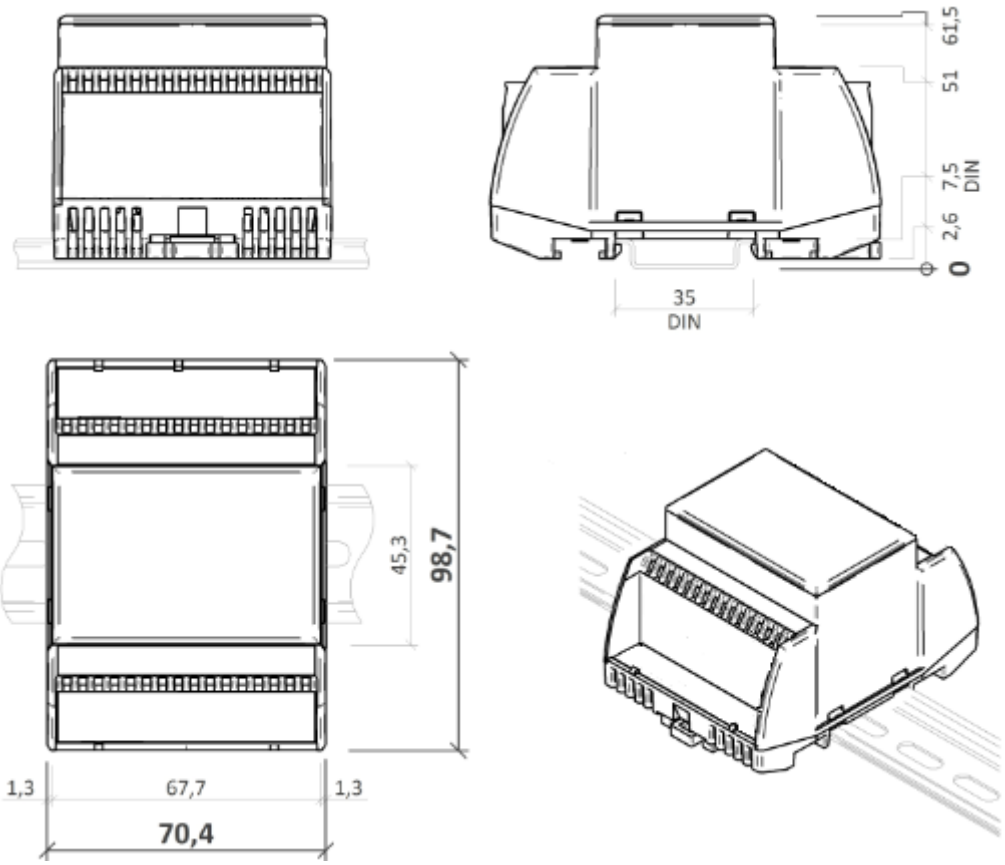
0…20 mA

For current measurement (0…20 mA) on individual channels switch the particular DIP switch to ON
The 0...20 mA range must be also set over Modbus (e.g. using Domat ModComTool)

Connection



Dimensions

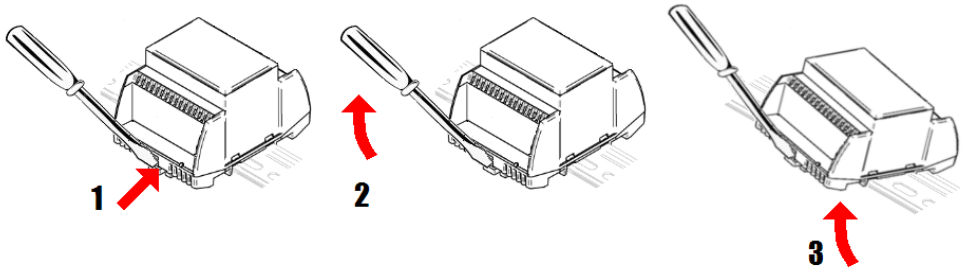


Dimensions are in *mm*.

Installation

The R560 module is fixed on standard DIN rail (by snapping).

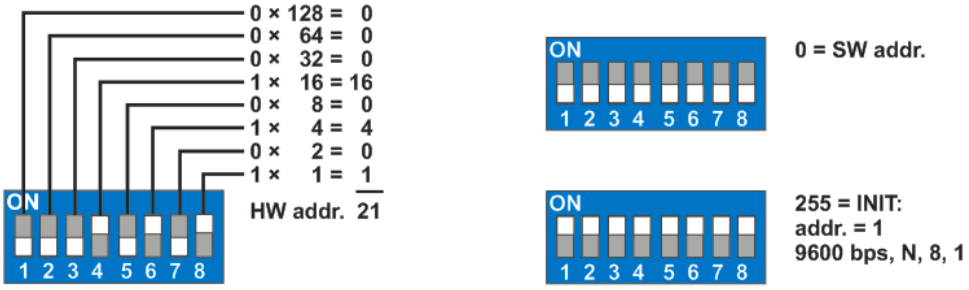
When removing the module from the DIN rail proceed as follows: Place a screwdriver in the plastic slot which is in the middle of bottom part of the module (1). Then push the screwdriver upwards (2). After that, the module can be removed by tilting it upwards (3).



Addressing

The Modbus address can be set as follows:

- **hardwarewise:** using DIP switches. The switches increase their bit weight from right to left, see image with example where address of 21 is set by activation of switches 4, 6, and 8 with bit weight of 16, 4, and 1 respectively. Valid settable range is 1 to 254. Address 0 (all switches OFF) means that the address is set as entered in the Modbus table. Address 255 (all switches ON) brings the module to INIT mode, where Modbus address is 1 and communication parameters are set to N, 8, 1, see image below.
  All changes apply after the module is switched off and on again.



- **softwarewise** using the ModComTool software, available for free at **www.domat.cz**. The default address (factory setting) is 1, default communication parameters are 9600, 8, N, 1. Parity and stopbits can be set in Modbus register 1005 LSB.
  The software address is only active if the hardware addressing switch is set to 0.
  All changes apply after the module is switched off and on again.

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	07/2017 – First datasheet version. 10/2017 – Added measurement error value, new image. 02/2018 – Added Safety note. 11/2018 – Minor changes. 08/2021 – Stylistic adjustments, change of logo.

R610 Analogue outputs module

Summary **The R610 is a microprocessor controlled, communicative module with 8 analogue outputs (0…10 V). The module uses a RS485 bus for communication and can be easily integrated in a variety of supervision and control systems.**

Application

- **HVAC and industrial control systems – analogue signals output for dampers and valves, VAV box control etc.**

Function

The outputs of the module are controlled via the communication bus and can be used as eight independent 0...10V voltage outputs. When using 3-wire connection, connect COM to the G0 potential. The module may be powered from the same source as the peripherials.

The module communicates by means of a RS485 data bus. The communication protocol ensures smooth and easy integration in a number of control and data acquisition systems. The Modbus register table is available on demand.

The communication circuits are protected against overvoltage. If the module is terminating the communication bus, i.e. it is the last in line, a terminating 120 Ω resistor may be switched on by short-circuiting of the BUS END jumpers. Two LEDs located inside of the housing enable fast diagnostics – power up and communication.

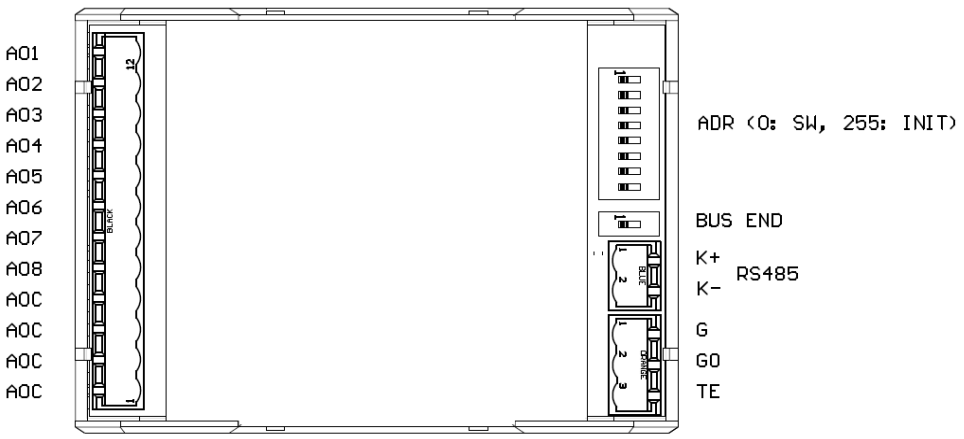
See *domat - Technical application notes* for connection examples.

All the settings are backed up in a EEPROM chip. The module is equipped with a watchdog circuit and the communication part is galvanically separated.

Technical data

Power	24 V AC/DC ± 20 %
Consumption	3 W
Communication	Modbus RTU RS485, 1200...115200 bit/s
Galvanic isolation	1 kV
Max. bus length	1200 m
Max. amount of modules on the bus	256
Number of analogue inputs	8 (0…10 V DC)
Output impedance	> 10kΩ
Short-circuit current	20 mA, permanently short-circuit proof
SW	ModComTool 4.2.5.6 or higher for parameter setting, Merbon IDE, SoftPLC IDE – predefined Modbus devices
Housing	Polycarbonate box (certification UL94V0) elbox 4
Terminals	screw terminals M3 (power, bus), M2 (analogue outputs)
Dimensions	70.4 × 98.7 × 61.5 mm
Protection degree	IP20 (EN 60529)
Recommended wire	0.14…1.5 mm^2
Ambient temperature	external conditions: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K5) storage: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-1 climatic class 1K3)
Standards conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2007 + A1:2011 (industrial environment) electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2013 + Corr.1:2011-10 hazardous substances reduction EN 50581:2012

Terminals



Terminals and connectors

RS485 K+	port COM1 - serial link RS485, positive
RS485 K-	port COM1 - serial link RS485, negative
G	G power supply
G0	G0 power supply
TE	optional connection for shielding, technical ground
AOC	common terminals for AI1…AI8
AO1 … AO8	input 1…8

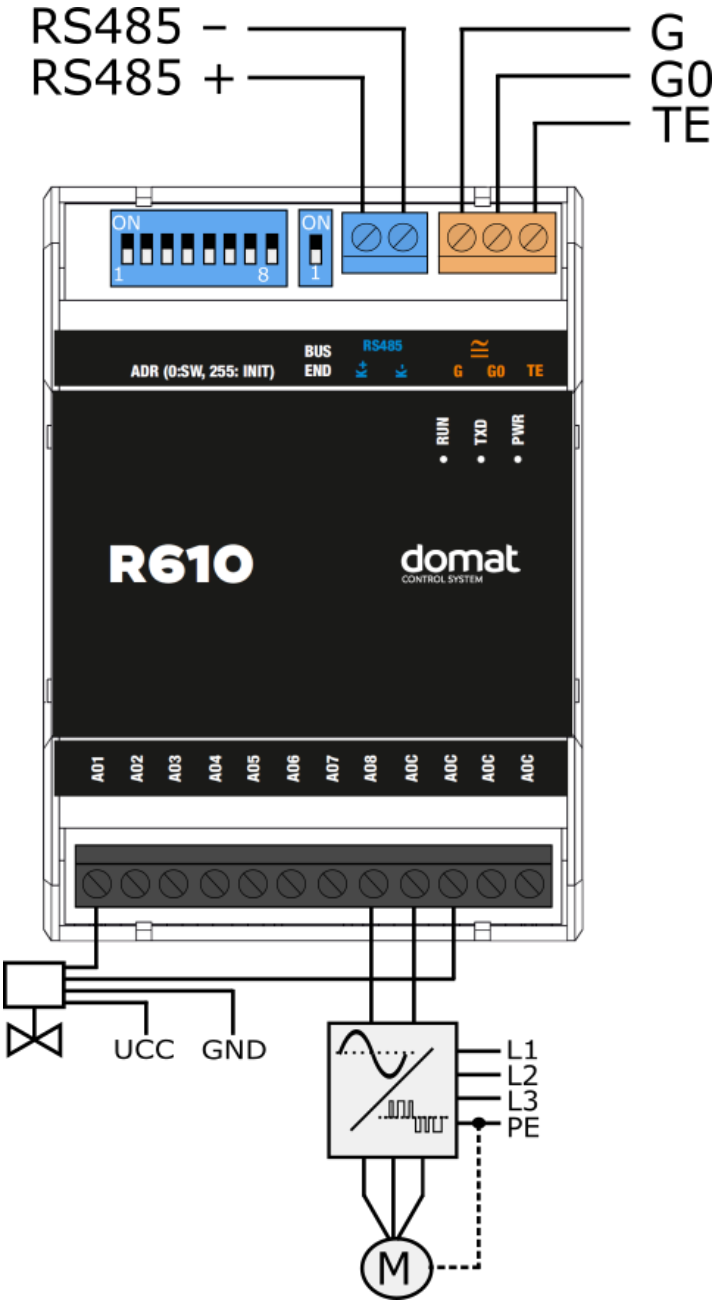
LED indication

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)
PWR	green LED – power supply (ON: power OK; OFF: no power applied, weak or damaged power supply, …)

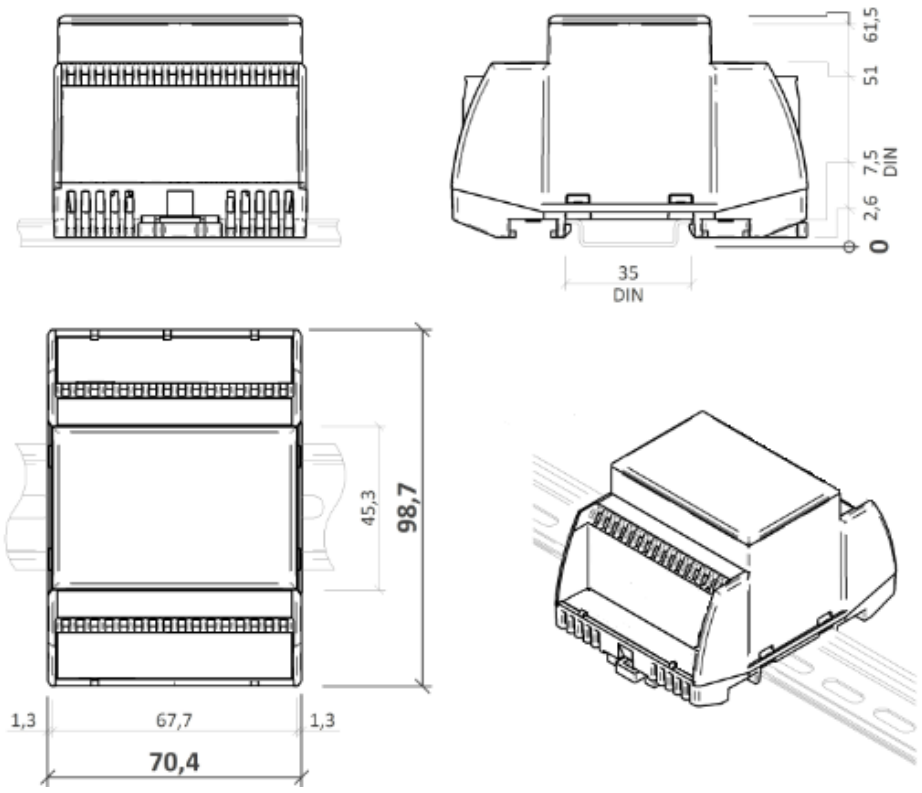
DIP switches

ADR	AUTO – if all switches are OFF, the address is used according to Modbus register 4 LSB USER – address is set by DIP switches configuration INIT - if are all switches ON at power-up, configuration parameters are set to defaults **DIP 8 = bit 0; switches increase their bit weight from right to left, see below**
BUS END	Switch for bus RS485 termination (located at the RS485 connector); ON = bus end; the first and last devices on bus should have bus end ON

Wiring


RS485 –
RS485 +
G
G0
TE
ON
1
8
ON
1
BUS
END
RS485
ADR (0:SW, 255: INIT)
G
G0
TE
RUN
TXD
PWR
R610
domat
CONTROL SYSTEM
AO1
AO2
AO3
AO4
AO5
AO6
AO7
AO8
AOC
AOC
AOC
AOC
UCC
GND
L1
L2
L3
PE
M

Dimensions

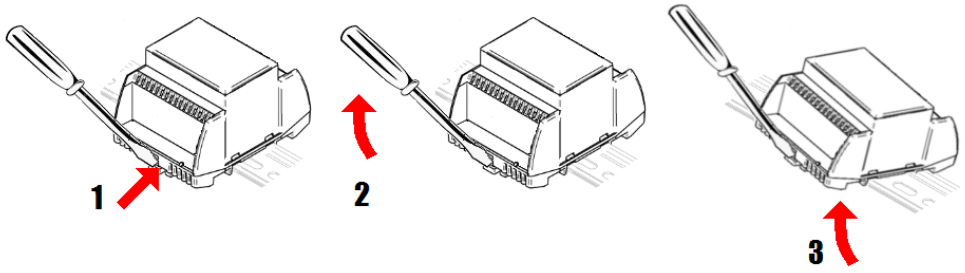


Dimensions are in *mm*.

Installation

The R610 module is fixed on standard DIN rail (by snapping).

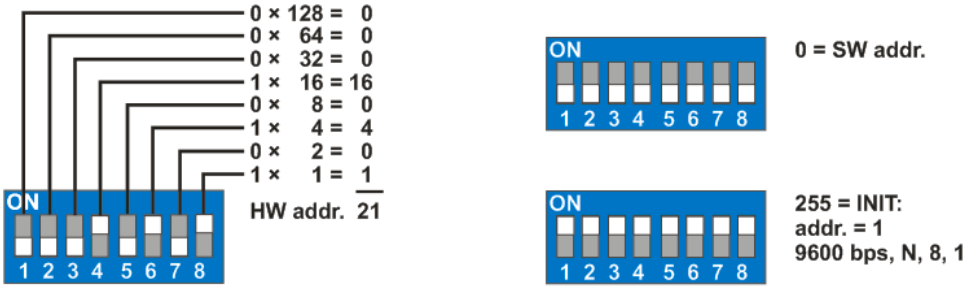
When removing the module from the DIN rail proceed as follows: Place a screwdriver in the plastic slot which is in the middle of bottom part of the module (1). Then push the screwdriver upwards (2). After that, the module can be removed by tilting it upwards (3).



Addressing

The Modbus address can be set as follows:

- **hardwarewise:** using DIP switches. The switches increase their bit weight from right to left, see image with example where address of 21 is set by activation of switches 4, 6, and 8 with bit weight of 16, 4, and 1 respectively. Valid settable range is 1 to 254. Address 0 (all switches OFF) means that the address is set as entered in the Modbus table. Address 255 (all switches ON) brings the module to INIT mode, where Modbus address is 1 and communication parameters are set to N, 8, 1, see image below. All changes apply after the module is switched off and on again.



- **softwarewise** using the ModComTool software, available for free at **www.domat.cz**. The default address (factory setting) is 1, default communication parameters are 9600, 8, N, 1. Parity and stopbits can be set in Modbus register 1005 LSB.
  The software address is only active if the hardware addressing switch is set to 0.
  All changes apply after the module is switched off and on again.
-

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	11/2019 – First datasheet version. 01/2020 – Power supply description amended. 08/2021 – Stylistic adjustments, change of logo.

R710 Digital counter module

Summary **The R710 digital counter module is a microprocessor-controlled, communicative 4 binary input counter module. The module uses Modbus RTU on a RS485 bus for communication, and can be easily integrated in a variety of supervision and control systems.**

Application

- **HVAC and industrial control systems – pulse counting from meters, load shedding etc.**

Function

The M710 module has four binary inputs which provide 12 V for external contact or open collector signal. The COM terminals are interconnected inside of the module and are common for all inputs.

The module communicates by means of a RS485 data bus. The Modbus RTU communication protocol ensures smooth and easy integration in a number of control and data acquisition systems.

The counters provide 4 byte values (longint). The module offers advanced functions for load shedding algorithm (E-Max): use CNT1 for energy pulses, CNT2 for 15 min. sync pulses. Additional variables are:

- pulses in current 15 min. period (resets with each sync pulse)
- pulses in last 15 min. period (copy of pulses in current period on period end)
- seconds in current 15 min. period (resets with each sync pulse).

Removable connectors are used for incoming and outgoing data line so that mounting is fast and easy. The module is mounted on a DIN rail.

The communication circuits are protected against overvoltage and galvanically separated from the rest of the module. If the module is terminating the communication bus, i.e. it is the last in line, a terminating 120 Ω resistor may be

switched on by short-circuiting of the BUS END jumpers. Two LEDs located inside of the housing enable fast diagnostics – power up and communication. To set the module to factory defaults (9600 bps, address 1), set the INIT switch to ON and remove power for 2…3 secs.

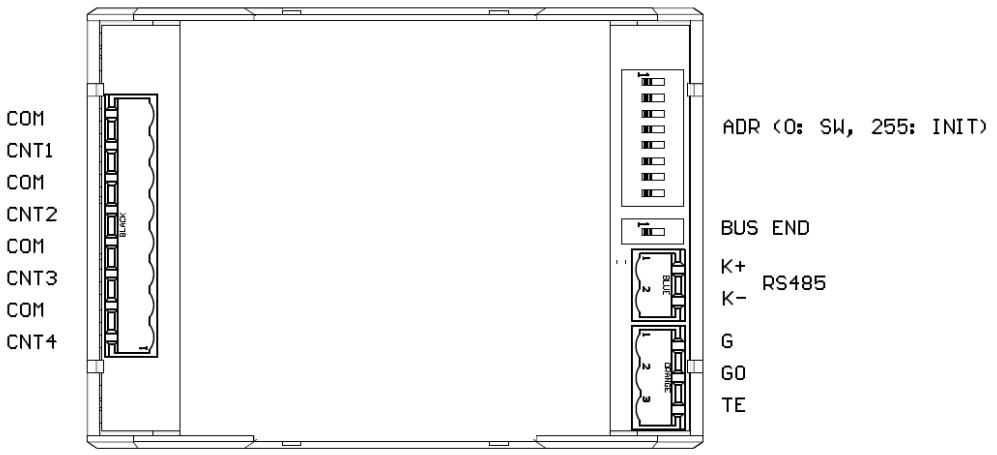
See *domat - Technical application notes* for connection examples.

All the settings are backed up in a EEPROM chip. The module is equipped with a watchdog circuit and the communication part is galvanically separated.

Technical data

Power	24 V AC/DC ±20 %
Consumption	0.8 W
Communication	Modbus RTU RS485, 1200...115200 bit/s
Galvanic isolation	1 kV
Max. bus length	1200 m
Max. amount of modules on the bus	256
Number of inputs	4 × dry contact or open collector, 5 mA
Max. input frequency	50 Hz
Min. duty time	10 ms
Max. distance to contact	10 m
SW	ModComTool 4.2.4.6 or higher for parameters setting, Merbon IDE, SoftPLC IDE – predefined Modbus devices
Housing	Polycarbonate box (certification UL94V0)
	elbox 4
Terminals	screw terminals M3 (bus, power), M2 (AI inputs)
Dimensions	70.4 × 98.7 × 61.5 mm
Protection degree	IP20 (EN 60529)
Recommended wire	0.14…1.5 mm^2
Ambient temperature	external conditions: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K5)
	storage: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-1 climatic class 1K3)
Standards conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial environment)
	Electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016
	Hazardous substances reduction EN 50581:2012

Terminals



Terminals and connectors

RS485 K+	port COM1 - serial link RS485, positive
RS485 K-	port COM1 - serial link RS485, negative
G	G power supply
G0	G0 power supply
TE	optional connection for shielding, technical ground
COM	common terminals for inputs AI1…AI8
CNT1 … CNT4	inputs 1…8

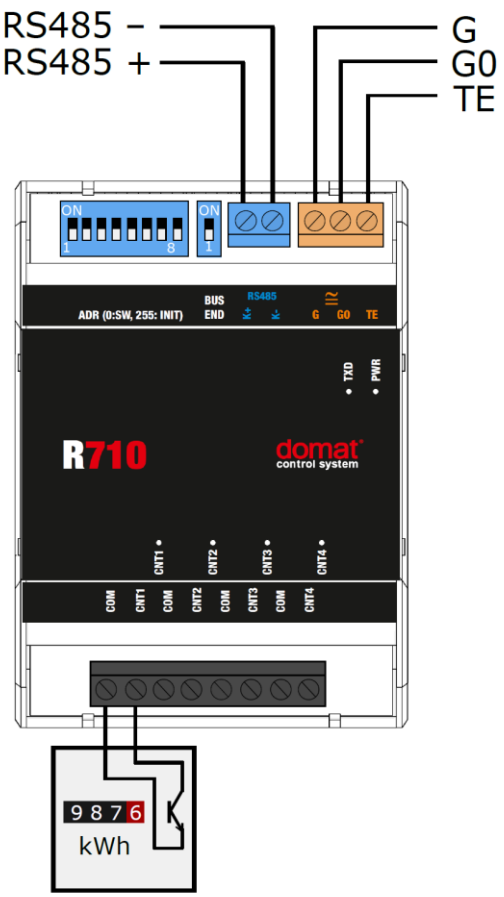
LED indication

TxD	red LED – RS485 transmitting data at COM1 (flashing: transmitting data; OFF: no data traffic)
PWR	green LED – power supply (ON: power OK; OFF: no power applied, weak or damaged power supply, …)

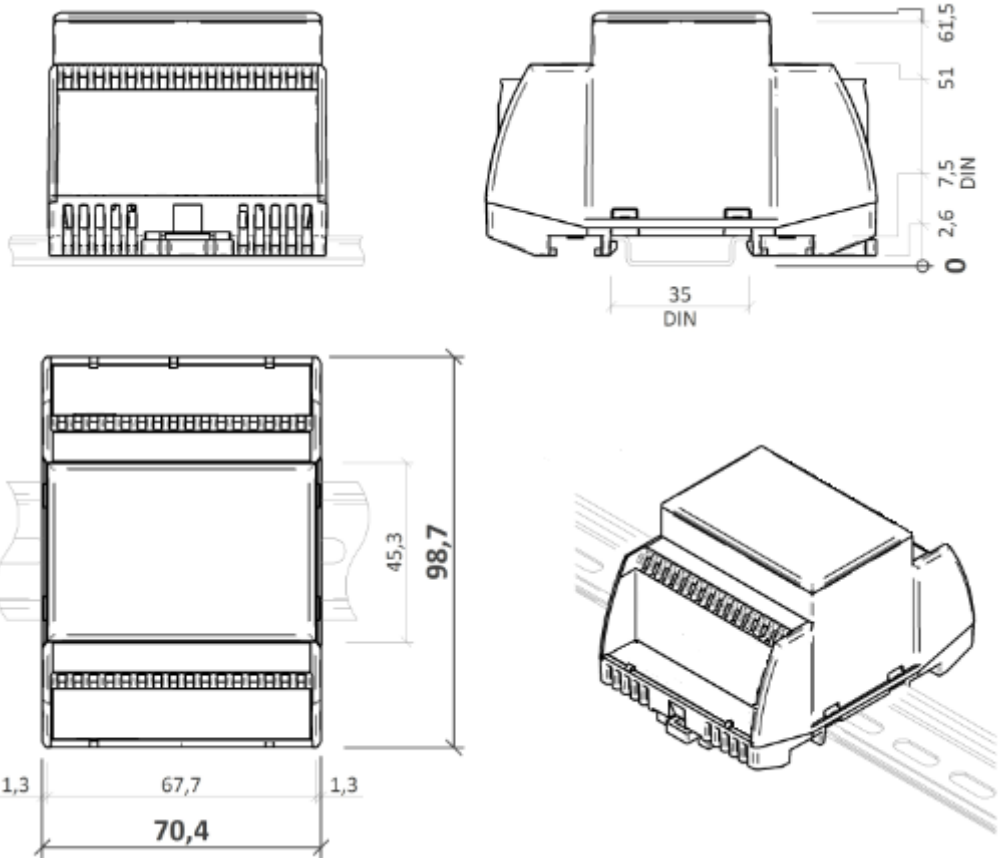
DIP switches

ADR	AUTO – if all switches are OFF, the address is used according to Modbus register 4 LSB USER – address is set by DIP switches configuration INIT - if are all switches ON at power-up, configuration parameters are set to defaults DIP 8 = bit 0; switches increase their bit weight from right to left, see below
BUS END	Switch for bus RS485 termination (located at the RS485 connector); ON = bus end; the first and last devices on bus should have bus end ON

Connection



Dimensions

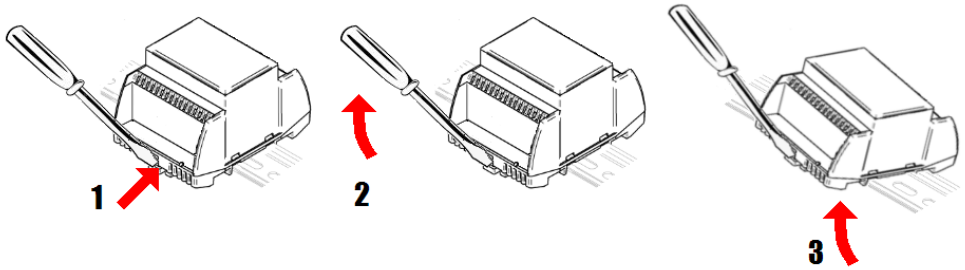


Dimensions are in *mm*.

Installation

The R710 module is fixed on standard DIN rail (by snapping).

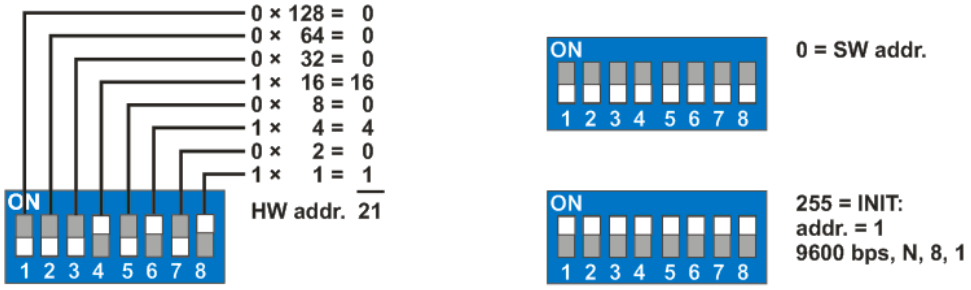
When removing the module from the DIN rail proceed as follows: Place a screwdriver in the plastic slot which is in the middle of bottom part of the module (1). Then push the screwdriver upwards (2). After that, the module can be removed by tilting it upwards (3).



Addressing

The Modbus address can be set as follows:

- **hardwarewise:** using DIP switches. The switches increase their bit weight from right to left, see image with example where address of 21 is set by activation of switches 4, 6, and 8 with bit weight of 16, 4, and 1 respectively. Valid settable range is 1 to 254. Address 0 (all switches OFF) means that the address is set as entered in the Modbus table. Address 255 (all switches ON) brings the module to INIT mode, where Modbus address is 1 and communication parameters are set to N, 8, 1, see image below.
  All changes apply after the module is switched off and on again.



- **softwarewise** using the ModComTool software, available for free at **www.domat-int.com/en/**. The default address (factory setting) is 1, default communication parameters are 9600, 8, N, 1. Parity and stopbits can be set in Modbus register 1005 LSB.
  The software address is only active if the hardware addressing switch is set to 0.
  All changes apply after the module is switched off and on again.
-

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	01/2020 – First datasheet version. 08/2021 – Stylistic adjustments, change of logo.

R800 Module 16 analog inputs/outputs

Summary

The R800 microprocessor-controlled module contains 8 analog inputs and 8 analog outputs. It communicates via the RS485 bus using the Modbus RTU protocol

Application

- **Building and technology management systems – collection of analog signals, measurement of temperatures, pressures and other quantities**

Function

The R800 module monitors/controls up to 8 analog inputs and 8 analog outputs. The input signals are processed and multiplexed into a 16-bit A/D converter. Each input is individually adjustable (see Technical Data) and the inputs can also be used as 0 to 20 mA current measurement inputs if the respective DIP switch is activated.

If the module terminates the communication bus, i.e. the last in the series, the termination resistor 120 R can be switched by shorting the DIP BUS END switch. Three LEDs located inside the housing enable quick diagnostics – power, communication and system circle indication. Communication circuits are protected against overvoltage and are galvanically isolated from other parts of the module. All settings are stored in EEPROM chip. The module is equipped with a watchdog.

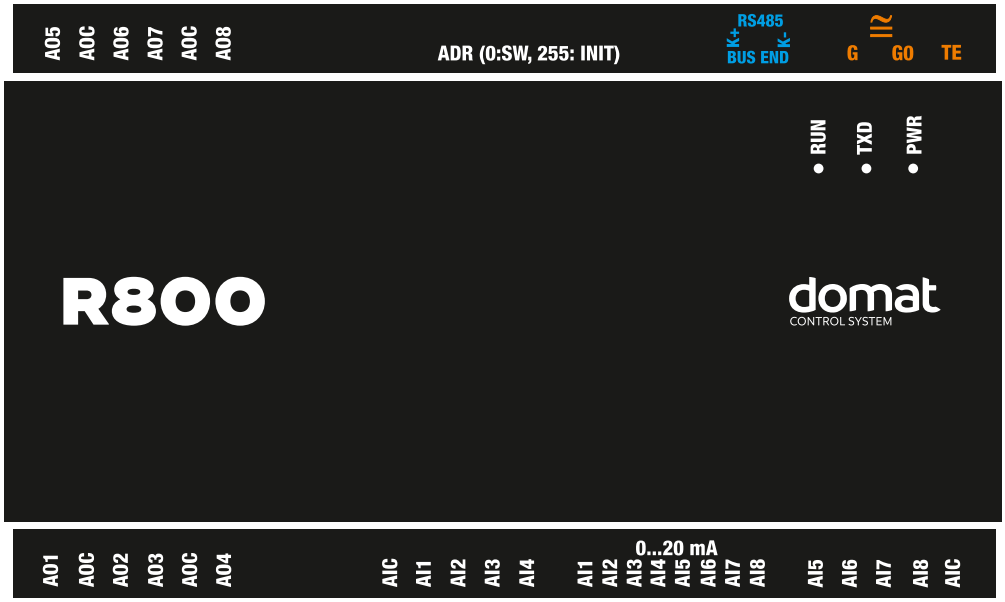
The module can be mounted on DIN rail. For inputs and outputs, power supply and communication are used removable screw connectors.

Technical data

Power	24 V ss/st ±20 %
Consumption	4 W
Communication	Modbus RTU RS485, 1200 ... 115200 bit/s
Galvanic isolation	1 kV
Max. bus length	1200 m
Max. amount of modules on the bus	256

Number of inputs	8× analog input (16 bit, 10 sps - multiplex, 0.25%, 0-10 V, 0-20 mA, 20-1600 Ohm, 20-5000 Ohm, Pt1000 - 50…150 °C, Ni1000 / Pt100 SW)
Number of outputs	8× analog output 0-10 VDC, load impedance >10 kOhm, short-circuit proof
SW	Domat IDE, ModComTool
Housing	Polycarbonate box (certification UL94V0)
Terminals	power and bus M3 screws, for AI and AO M2 screws
Recommended wire	0.35 … 1.5 mm^2
Protection degree	IP20 (EN 60529)
Dimensions	105.6 × 98.7 × 64 mm
Ambient temperature	External conditions: -5 – 45 °C; 5 – 95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K5) Storage: -5 – 45 °C; 5 – 95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K5)
Standards conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial environment) Electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + Opr.1:2012 + Z1:2016 Hazardous substances reduction EN 50581:2012

Terminals



Terminals and connectors:

RS485 K+	port COM1 - serial link RS485, positive
RS485 K-	port COM1 - serial link RS485, negative
G	G power supply
G0	G0 power supply
TE	optional connection for shielding, technical ground
AIC	common wire for input 1 … 8
AI1 … AI8	input 1 … 8

AOC	common wire for output 1 … 8
AO1 … AO8	output 1 … 8

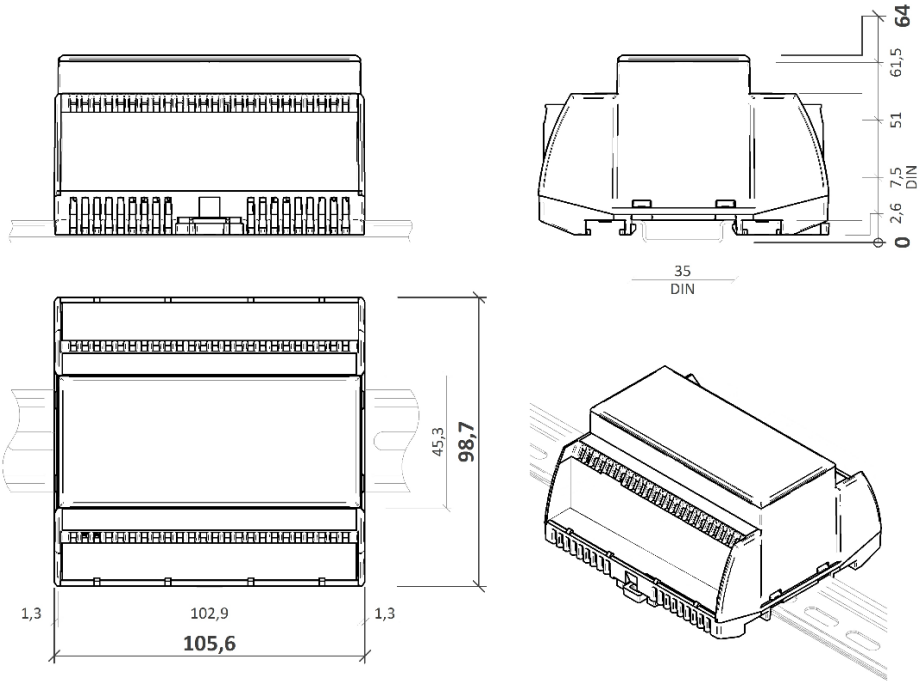
LED indication

RUN	orange LED – system cycle (OK: LED blinks at an interval of 1 s ON, 1 s OFF; ERROR: different LED blinking pattern, LED permanently on or off)
TxD	red LED – RS485 transmitting data at COM1 (flashing: transmitting data; OFF: no data traffic)
PWR	green LED – power supply (ON: power OK; OFF: no power applied, weak or damaged power supply, …)

DIP switches

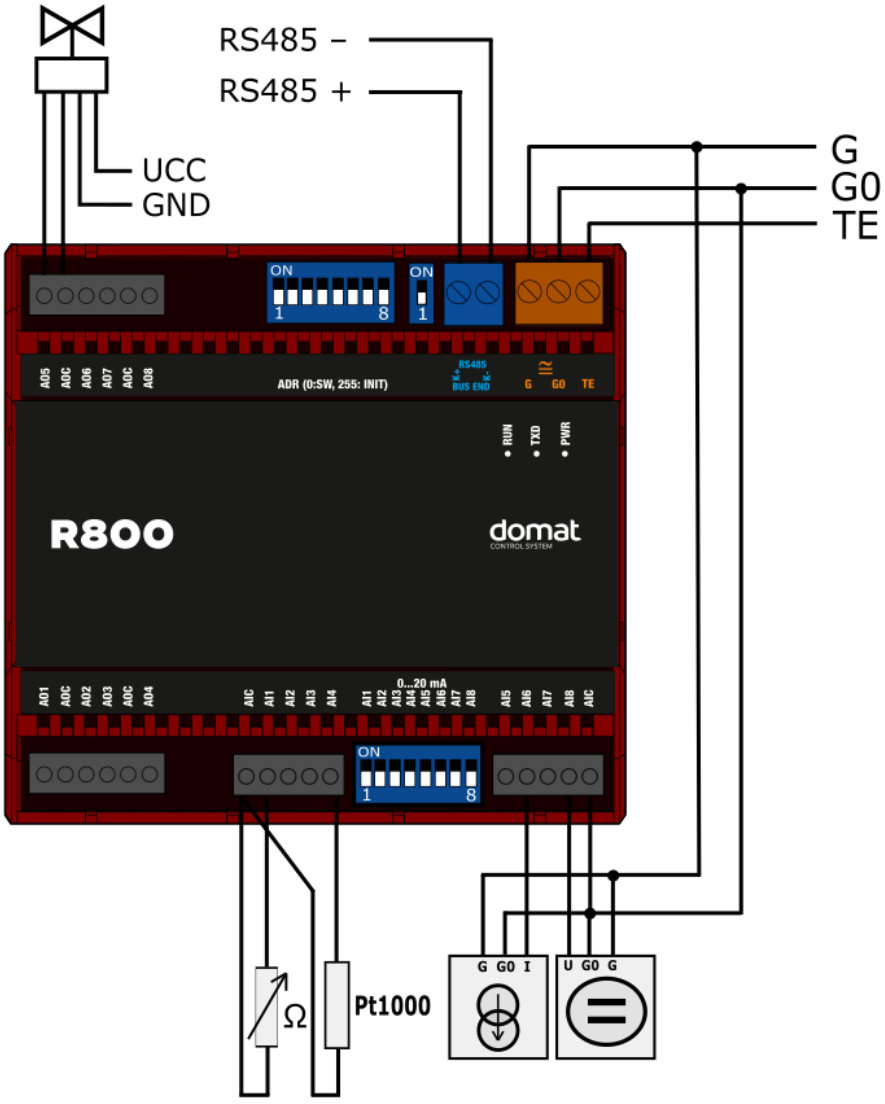
ADR	SW – if all switches are OFF, the address is used according to Modbus register 4 LSB USER – address is set by DIP switches configuration INIT - if are all switches ON at power-up, configuration parameters are set to defaults DIP 8 = bit 0; switches increase their bit weight from right to left, see below
BUS END	Switch for bus RS485 termination (located at the RS485 connector); ON = bus end; the first and last devices on bus should have bus end ON
0…20 mA	To measure the current (0...20 mA) on individual channels, switch the corresponding DIP switch to the ON position. The range must also be set in the Modbus table (e.g. using the configuration software Domat IDE or ModComTool).

Dimensions



Dimensions are in *mm*.

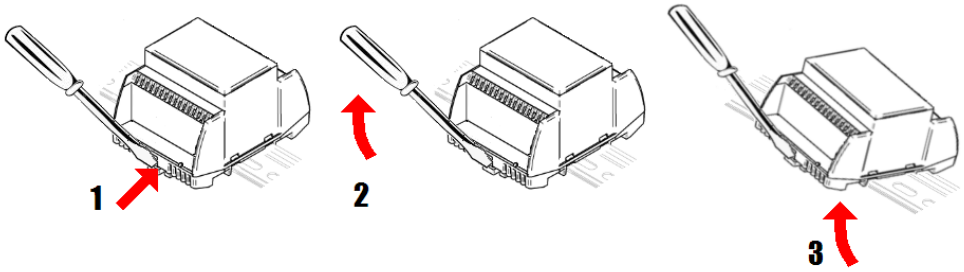
Connection



Installation

The R800 module is fixed on standard DIN rail (by snapping).

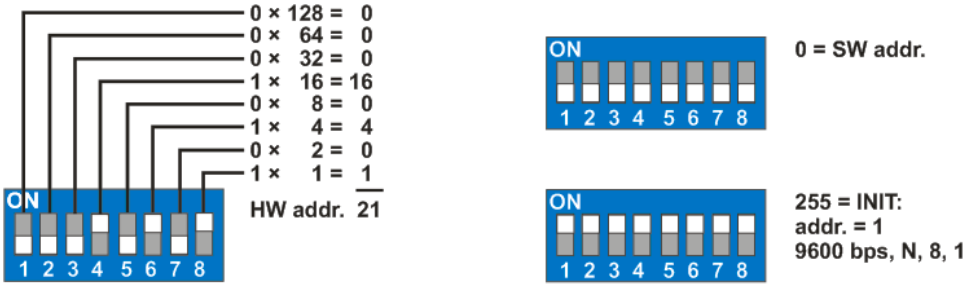
When removing the module from the DIN rail proceed as follows: Place a screwdriver in the plastic slot which is in the middle of bottom part of the module (1). Then push the screwdriver upwards (2). After that, the module can be removed by tilting it upwards (3).



Addressing

The Modbus address can be set as follows:

- **hardwarewise:** using DIP switches. The switches increase their bit weight from right to left, see image with example where address of 21 is set by activation of switches 4, 6, and 8 with bit weight of 16, 4, and 1 respectively. Valid settable range is 1 to 254. Address 0 (all switches OFF) means that the address is set as entered in the Modbus table. Address 255 (all switches ON) brings the module to INIT mode, where Modbus address is 1 and communication parameters are set to N, 8, 1, see image below. All changes apply after the module is switched off and on again.



- **softwarewise** using the ModComTool software, available for free at **www.domat-int.com/en/**. The default address (factory setting) is 1, default communication parameters are 9600, 8, N, 1. Parity and stopbits can be set in Modbus register 1005 LSB.
  The software address is only active if the hardware addressing switch is set to 0.
  All changes apply after the module is switched off and on again.
-

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	03/2024 – First datasheet version.

RMIO Compact I/O module

Summary

The RMIO is a universal, compact, microprocessor controlled, communicative module with its I/O mix optimized for control of small HVAC units, fancoils, and floor heating. It communicates over a RS485 bus with Modbus RTU (slave) and thus can be easily integrated in a range of control systems.

Application

- **Compact I/O module for small heat exchange stations, fancoils and IRC applications, add-on module for larger systems, data acquisition.**

Function

The RMIO contains inputs and outputs (4× analogue input, 2× analogue output, 4× digital input, 7× digital output). The inputs and outputs are controlled over RS485 with Modbus RTU. Find the Modbus register table in a separate document. The universal compact module RMIO is replacement of the older MMIO module.

The communication circuits are protected against overvoltage and galvanically isolated from other parts of the module. If the module is installed as the first or the last on the bus, set the BUS END DIP switches to ON to terminate the bus. The module is installed on a standard DIN rail. Two LEDs located inside of the housing enable fast diagnostics – power and communication.

The RMIO module is fixed on standard DIN rail (by snapping).

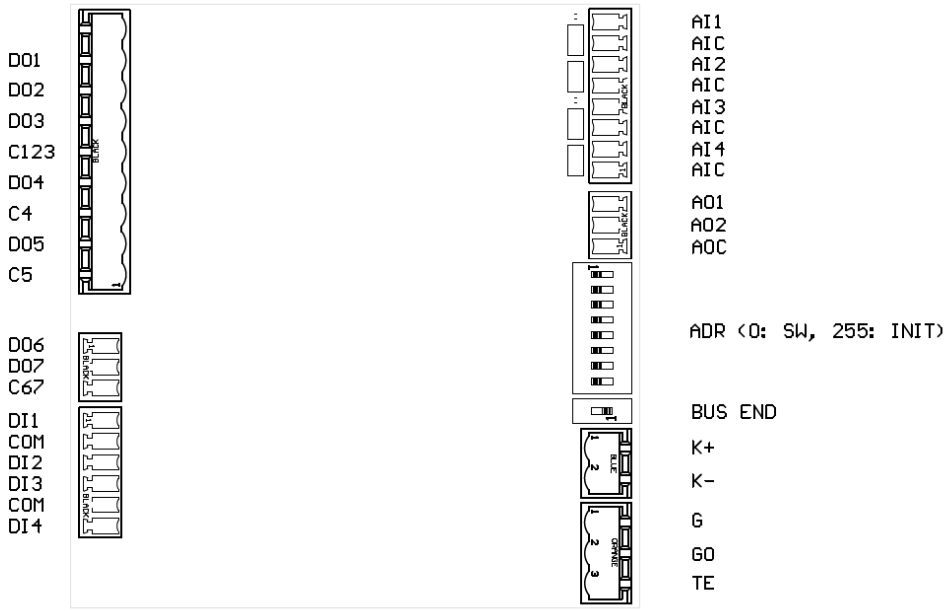
All module settings are backed up in an EEPROM chip.

See *domat - Technical application notes* for connection examples.

Technical data

Power	24 V AC/DC ±20 %
Consumption	7 W
Communication	Modbus RTU RS485, 1200...115200 bit/s
Galvanic isolation	1 kV
Max. bus length	1200 m
Max. amount of modules on the bus	256
Analogue inputs	2× analogue inputs (AI1, AI2): 0…10 V DC, 0…20 mA DC, Pt1000, 0…1600 Ω, 0…5000 Ω; resolution 16 bit, measurement error 0.25 % For current measurement, external resistor 125 Ω must be connected! 2× analogue inputs (AI3, AI4): Pt1000, 0…1600 Ω, 0…5000 Ω; resolution 16 bit, measurement error 0.25 %
Analogue outputs	2× analogue outputs 0…10 VDC (max. 10 mA, short-circuit proof, short-circuit current 50 mA, 8 bit A/D converter)
Digital inputs	4× digital inputs 24 VDC/VAC, Input current 4 mA, galvanic isolation 1.5 kV Max. switching frequency 10 Hz
Digital outputs	(DO1…DO5) 5× digital output, relay SPST 5 A (AC1, general use, non-inductive load according to EN 60947-4-1 ed. 3), 250 VAC/30 VDC (DO6…DO7) 2× solid state relay with zero switching for AC or DC load, 24 V DC / AC, max. Switching current 0.4 A
Software for configuration and control	ModComTool 4.2.4.6 or higher for parameters setting Merbon IDE, SoftPLC IDE – predefined Modbus devices any Modbus RTU master PLC
Housing	polycarbonate box (certification UL94V0) elbox 6U
Terminals	power supply, bus and DO1 - DO5 screw terminals M3, for AI, AO, DI and DO6,7 screw terminals M2
Dimensions	105 (l) x 98.5 (w) x 64 (h) mm
Protection degree	IP20 (EN 60529)
Recommended wire	0.14…1.5 mm^2
Ambient temperature	external conditions: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-3 climatic class 3K5) storage: -5…45 °C; 5…95 % relative humidity; non-condensing gases and chemically non-aggressive conditions (according to EN 60721-3-1 climatic class 1K3)
Standards conformity	EMC EN 61000-6-2 ed.3:2005, EN 61000-6-4 ed.2:2006 + A1:2010 (industrial environment) Electrical safety EN 60950-1 ed.2:2006 + A11:2009 + A12:2011 + A1:2010 + A2:2014 + cor.1:2012 + Z1:2016 Hazardous substances reduction EN 50581:2012

Terminals



Terminals and connectors

RS485 K+	port COM1 - serial link RS485, terminals K+
RS485 K-	port COM1 - serial link RS485, terminals K-
G	G power supply
G0	G0 power supply
TE	optional connection for shielding, technical ground
AI1…AI4	analogue input 1…4
AIC	common terminal for inputs AI1…AI4
DI1…DI4	digital input 1…4
COM	common terminals for inputs DI1…DI4
DO1…DO7	digital output 1…7
C123	common terminal for DO1…DO3
C4, C5	terminals for DO4 and DO5
C67	common terminal for DO6 and DO7
AO1, AO2	analogue output 1 and 2
AOC	common terminal for AO1 and AO2

LED indication

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)
PWR	green LED – power supply (ON: power OK; OFF: no power applied, weak or damaged power supply, …)

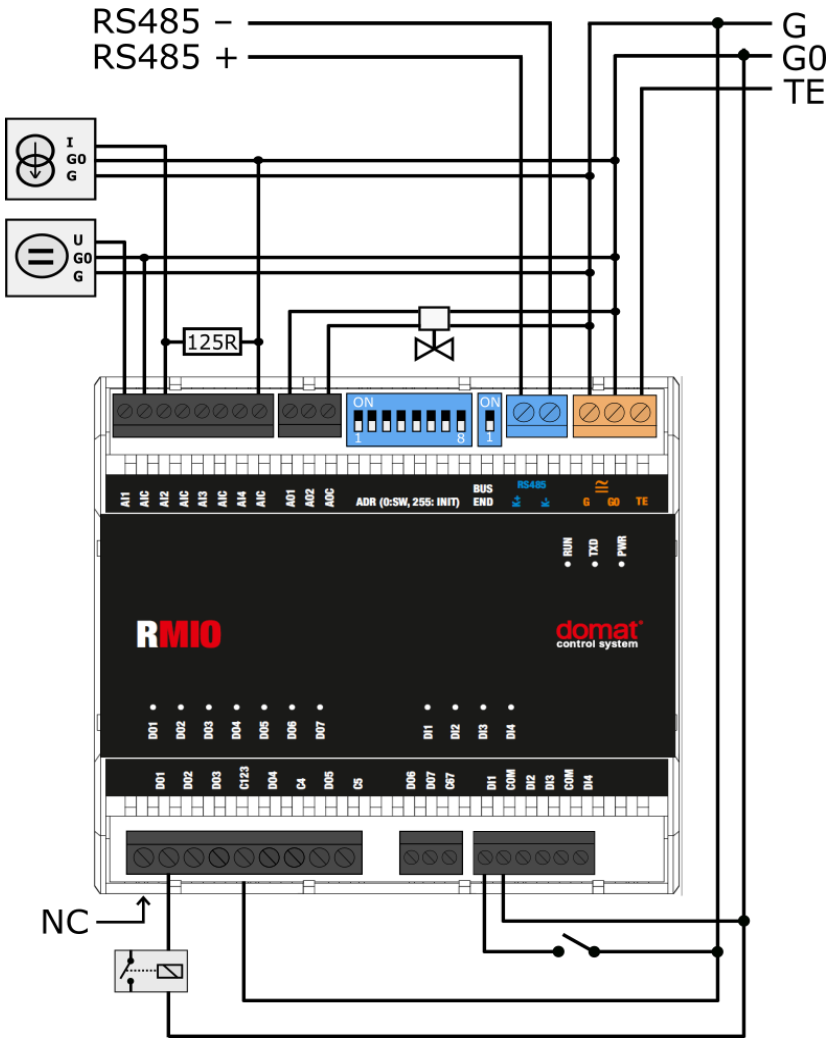
DIP switches

ADR	AUTO – if all switches are OFF, the address is used according to Modbus register 4 LSB USER – address is set by DIP switches configuration INIT - if are all switches ON at power-up, configuration parameters are set to defaults

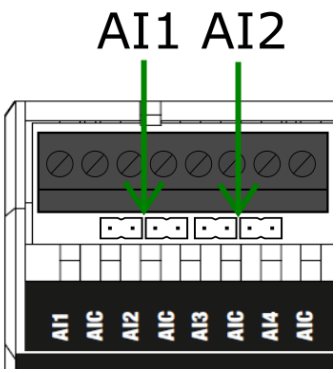
DIP 8 = bit 0; switches increase their bit weight from right to left, see below

BUS END Switch for bus RS485 termination (located at the RS485 connector); ON = bus end; the first and last devices on bus should have bus end ON

Connection



Analog inputs AI1 and AI2 have adjustable measuring ranges by jumpers facing the inner side of analog input terminals. AI3 and AI4 inputs have a fixed range (R, temp):



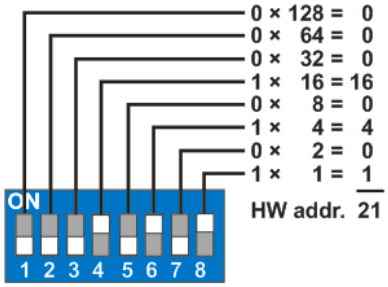
Setting of analogue inputs AI1 and AI2 is as follows:

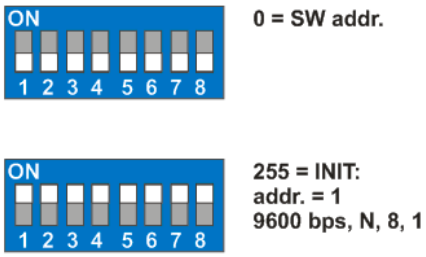
Range	AI1	AI2
R, temp		
0…10 V		
0…20 mA		

Addressing

The Modbus address can be set as follows:

- **hardwarewise:** using DIP switches. The switches increase their bit weight from right to left, see image with example where address of 21 is set by activation of switches 4, 6, and 8 with bit weight of 16, 4, and 1 respectively.
  Valid settable range is 1 to 254. Address 0 (all switches OFF) means that the address is set as entered in the Modbus table. Address 255 (all switches ON) brings the module to INIT mode, where Modbus address is 1 and communication parameters are set to N, 8, 1, see image below.
  All changes apply after the module is switched off and on again.



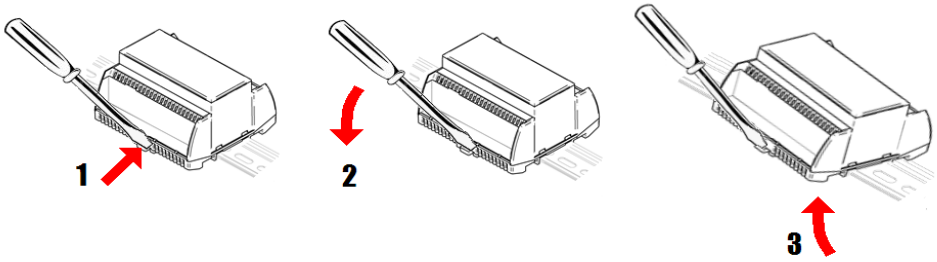


- **softwarewise** using the ModComTool software, available for free at **www.domat.cz**. The default address (factory setting) is 1, default communication parameters are 9600, 8, N, 1. Parity and stopbits can be set in Modbus register 1005 LSB.
  The software address is only active if the hardware addressing switch is set to 0.
  All changes apply after the module is switched off and on again.

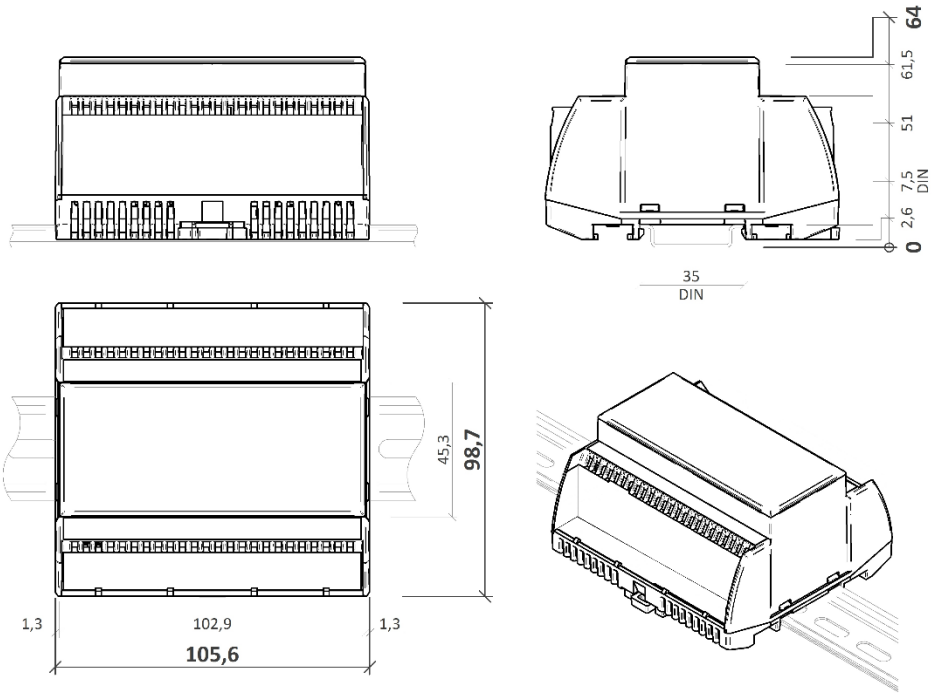
Installation

The RMIO module is fixed on standard DIN rail (by snapping).

When removing the module from the DIN rail proceed as follows: Place a screwdriver in the plastic slot which is in the middle of bottom part of the module (1). Then push the screwdriver upwards (2). After that, the module can be removed by tilting it upwards (3).



Dimensions



Dimensions are in *mm*.

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	04/2018 – First datasheet version. 05/2018 – AI ranges setting added in section *Connection.* 10/2018 – Connection scheme and terminals description corrected. 10/2020 – Added max. switching frequency, new logo. 07/2021 – Stylistic adjustments, logo change, added digital outputs description.