![domat logo — MEMBER OF CEZ ESCO]

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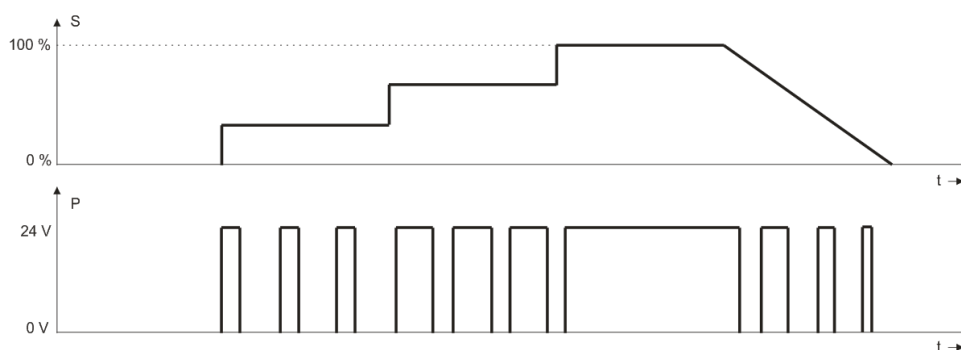
The module communicates by means of a RS485 data bus (optically separated). The communication protocol Modbus RTU ensures smooth and easy integration in a number of control and data acquisition systems. The Modbus table is available on **www.domat.cz** as a separate document.

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).

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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 mm² (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

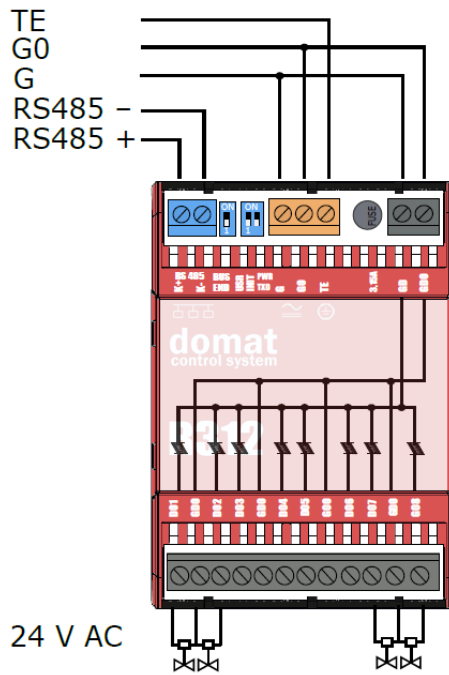|	
Output element	optotriac, zero switching
Maximum switched voltage	250 V AC
Output load	230 V AC, 0.12 A, max. voltage 600 V
Fuse	F1 A / 250 V

Terminals
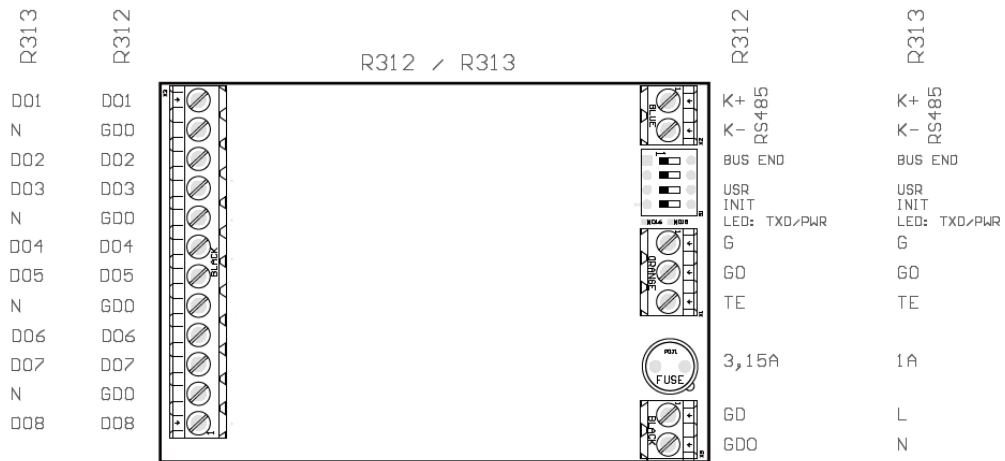
Terminals and connectors

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

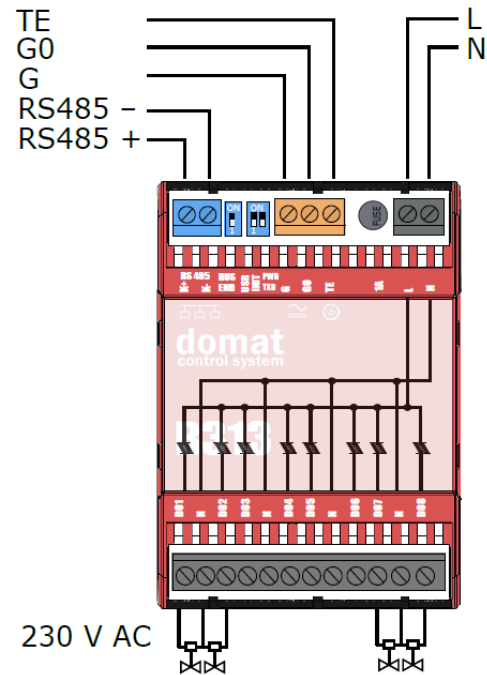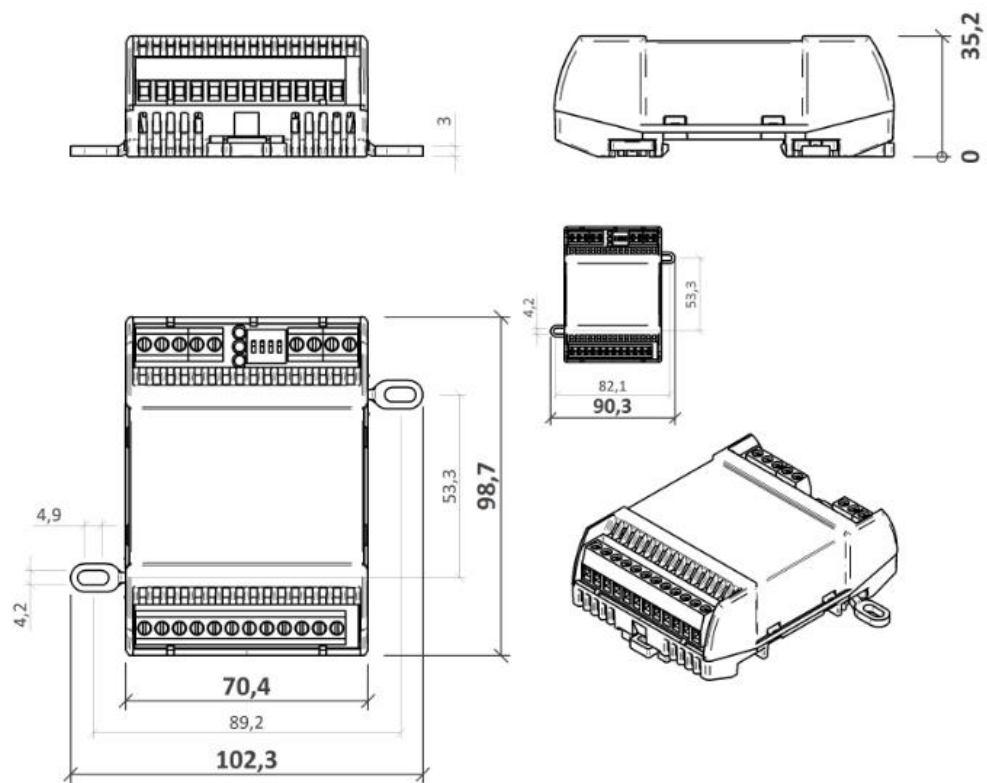|	
BUS END	micro DIP switches next to terminals RS485; both ON = bus end; the first and last devices on bus should have bus end ON
INIT	INIT - if ON at power-up, configuration parameters are brought to defaults (see Configuration parameters in Merbon IDE)
USR	Can be defined in customer configuration

Connection

R312
24 V AC

TE
G0
G
RS485 −
RS485 +

24 V AC

R313
24 V AC   230 V AC

TE
G0   L
G   N
RS485 −
RS485 +

230 V AC

Dimensions

35,2

3

4,2   53,3

82,1
90,3

4,9

4,2

98,7

53,3

70,4
89,2
102,3

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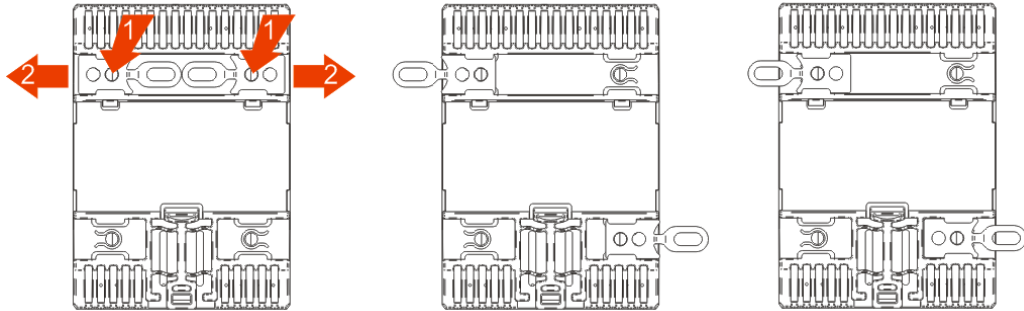
Addressing   The Modbus address is set through ModComTool, a configuration software which is free to download at **www.domat.cz**. Default (factory settings) address is 1, default communication parameters are 9600, 8, N, 1.

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.