



LABOR – ASTER

INDUSTRIAL AUTOMATION



AC 083
QMS

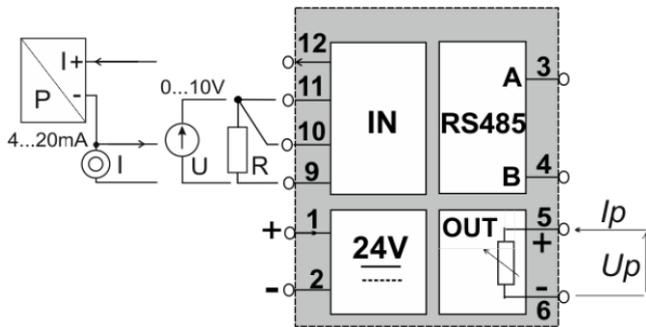
RESISTANCE SIMULATOR (Pt100) with separation type SIM-R-MUX

- Conversion of any analog standard into resistance
- Repetition of the input resistance from a RTD sensor for example Pt100
- Accuracy class 0.2%
- At the input additional power for a two-wire transmitter
- Measure reading and setting resistance via the MODBUS RTU protocol
- RS485 with galvanic optoisolation
- Input, output, power supply and transmission circuits are separated from one another
- Adapted to the commutated (multiplexed) measuring current of the simulated resistance

APPLICATION:

The basic purpose of the SIM-R-MUX is to repeat the input resistance to the output with galvanic separation. The simulated output resistance can also be controlled by any standard analog signal. Measurement reading and value setting can be done by MODBUS RTU. The reading of the input measurement and setting of the output resistance value can be realized by the MODBUS RTU protocol.

The simulator SIM-R-MUX was created on the basis of the Simulator-R due to modern drivers and measurement cards with multiplexed resistance inputs (e.g. for Pt100 sensors). Such cards have one current source that is switched between several measurement inputs. The short measurement time slightly reduces the class of the device and limits the possibilities of simulating the resistance to a value $R_{out} < 2.4V / I_p$ in relation to the universality of the Simulator-R. Such a limitation allows the SIM-R-MUX to mainly simulate Pt100 RTD sensors.

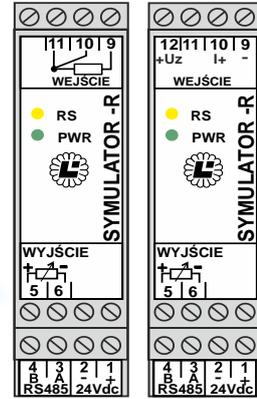
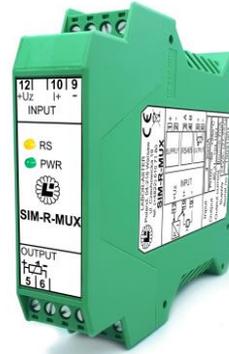
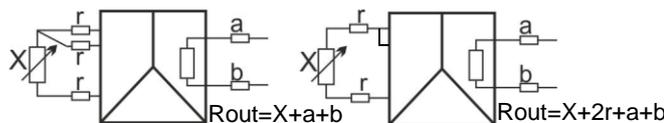


Block diagram, description of SIM-R-MUX terminals

HOW TO ORDER:

SIM-R-MUX (input range)/(output range)-(max measuring current)
Example: SIM-R-MUX-(0-100Ω)/(0-100Ω)-(1mA)

Attention: information about the maximal permissible measuring current is valid. The current tolerance range is included in the basic technical information!



BASIC TECHNICAL PARAMETRES:

- | | |
|---|--|
| Supply voltage | - 24Vdc (21...28Vdc) / 60mA |
| Input | - as ordered, for e.g.:
0...20mA, 4...20mA / 50Ω
0...10V / 100kΩ,
resistive sensor Pt100 etc. |
| Auxiliary voltage on input for two-wire transmitter Uz | - 20V/30mA |
| Output | - resistance 60Ω±2000Ω,
limitation: Rout < 2.4V / Ip |
| Minimum range span for output resistance | - 100 Ω |
| Output current at output Ip | - as ordered, for ex. 1mA |
| Measuring current range | - ±30% of defined |
| Stability of the current in measurement cycle | - 0.03% |
| Voltage connected to the Up output | - max 2.4V (range as ordered) |
| Settling time after switching on the measurement current | - 30ms |
| Recommended measuring current multiplexing period | - minimum 60ms |
| Class | - 0.2% |
| Nonlinearity | - (10 bits) ±0.1% |
| Temperature drift | - ±0.05% / °C |
| Connection of Pt100 sensor | - three wires line |
| Communication connector | - RS485 |
| Transmission protocol | - MODBUS RTU |
| Galvanic separation | - 2kV, 50Hz or equivalent between all circuits |
| Housing | - 22,5 x 99 x 114,5mm |
| level of security mounting | - IP20
- on rail TS35 |
| Safety requirements | - PN-EN 61010-1:2002 |
| EMC requirements | - PN-EN 61000-6-1
PN-EN 61000-6-3 |
| Working conditions : | |
| Ambient temperature for safe | - -30 ÷ +70°C |
| Ambient temperature for working | - -30 ÷ +70°C |
| Relative humidity | - max 90% |
| ambient atmosphere | - dust and corrosive gases free |
| Working position | - all |

Production and distribution:

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e-mail: biuro@labor-automatyka.pl ; labor@labor-automatyka.pl ; [http:// www.labor-automatyka.pl](http://www.labor-automatyka.pl)

The manufacturer reserves the right to make changes to the product.

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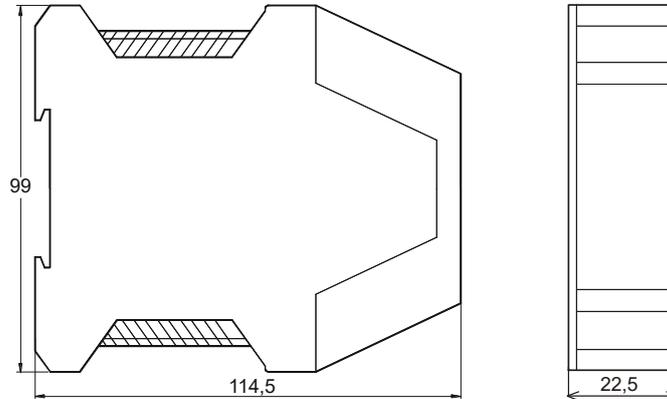


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Description of the program

The program has two basic modes of operation that differ in the state of the RES input signal and 3 states for the resistance simulation. The RES signal is always generated when the unit is turned on and flashes with the power LED. After about 10 seconds, the signal turns off if configuration registers aren't read. During RES activity, sending any accepted read frame (READ_HOLD_REG {0x03} or READ_INPUT_REG {0x04}) of the MODBUS RTU protocol to the 127 address and register number greater than or equal to 7 results in a refresh time of 10 seconds. When the RES signal is active, the transmission parameters are fixed at 9600 8 N 1 and the device address 127 (0x7F) irrespective of the programmed registers. In this mode it is possible to program the device and write every MODBUS registers.

Simulation and calculations are performed during the interrupt so after correct current measurement the output is very fast.

Program mode (register 15)

0	Device simulates resistance from analog input according to the analog primary readings and its settings. The read resistance is written to the initial registers 3 and 4 and it can be used by other devices to retransmit the signal through by the MODBUS RTU protocol. In this case, the register 3 represents the value of read resistance with scale correlation (register 2) and the register 4 has steering value in units of 0.01% (0...10000).
1	Device simulates resistance as the signal source is a pair of registers 1 and 2 set from the MODBUS RTU protocol. Device tries to simulate the given resistance. If this is not possible, the resistance closest to that is set. In this case, the limit is only physical capabilities and depends on the correlation of the permissible current and the ability to control voltage of device. Specification of these parameters is included in execution documentation.

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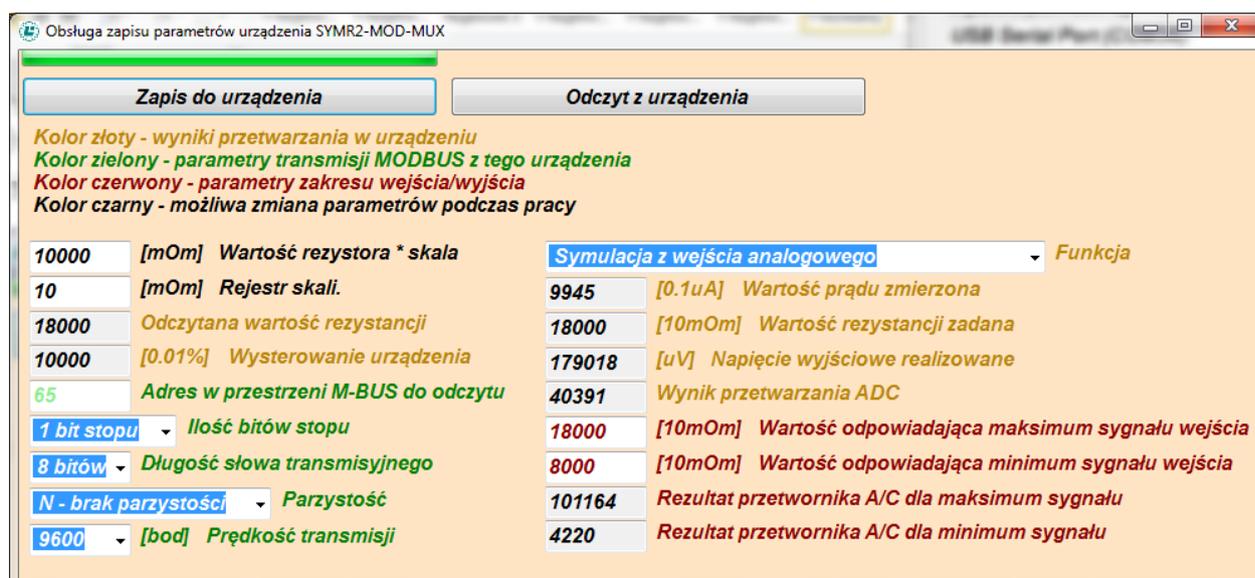
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Map of MODBUS RTU registers

Register	~RES	RES ⁱ	Describe
1.	RO RW	RW	The value of the simulated resistor. The value multiplied by the scale register will always result in milliohms. Recordable in simulation mode of resistance and SLAVE MODBUS.
2.	RO	RW	Scale register. Specifies the value in milliohms [mΩ] unit in registers 1 and 3.
3.	RO	RW	Read resistance value. The value divided by the previous scale register. The value used for retransmission to the second device and execution control in the resistance simulation mode.
4.	RO	RW	Steering of the device. Value from range 0...10000 (0...100%).
7.	RW	RW	Device address in Modbus space.
8.	RW	RW	Number of stop bits.
9.	RW	RW	Length of byte. Value 8,9. In RES equal 8.
10.	RW	RW	Parity. 'N' (no control) 'E' (even) 'O' (odd). In RES mode It sets to default 'N'.
11.	RW	RW	The youngest register of baud rate. In RES mode It sets 9600.
12.	RW	RW	The oldest register of baud rate. In RES mode It sets 0.
13.	RO	RO	The youngest register of real baud rate.
14.	RO	RO	The oldest register of real baud rate.
15.	RO	RW	Program mode

Attention: Device has many other registers written and read at other addresses e.g. factory calibration data. Their recording in RES mode may result in the device being calibrated.

For the programming of the device requires "labor.inf" driver installed and program "Labor Programmer" - all for download at www.labor-automatyka.pl. The program was written in bilingual Polish-English version. The driver installation guide for Windows XP, Windows 7 and Windows 10 is available on the website. Below the program window in English version.



ⁱ The power LED flashes when the signal is activated. Always active for 10 seconds. In order to maintain the state, it is necessary to continuously read the parameters from the MODBUS RTU protocol. There is a special function that forces the RES state from the serial interface and is available in the corresponding program.

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