

# AR650

## Universal controller with single reading

### Single-channel universal regulator with elements fuzzy logic PID



- regulation and monitoring of temperature and other physical values (humidity, pressure, level, speed, etc.) processed to a standard electrical signal (0/4÷20mA, 0÷10V, 0÷60mV, 0÷2,5kΩ)
- 1 universal measurement input (thermoresistance, thermocouple, and analog) with memory of the minimum and maximum measured value and a remote data display function (over the MODBUS-RTU protocol)
- BIN programmable digital input to change the controller's mode of operation: control start/stop, manual mode for outputs, step-wise change of the preset value (day/night), keypad block, display indications stop (HOLD function)
- 2 or 3 outputs of ON/OFF type with the following characteristics:
  - output 1 (main): ON-OFF with hysteresis, PID, fuzzy logic (auto-tuning) PID
  - output 2, 3 (auxiliary/alarm): ON-OFF with hysteresis
- analogue output 0/4÷20mA or 0/2÷10V (constant-control, retransmission)
- advanced function of selecting PID parameters with fuzzy logic elements
- available for binary and analogue outputs, for setting the value of the output signal in the range of 0 ÷ 100%
- digital LED readout with programmable color and illumination brightness
- signaling of alarm states (connected outputs) with a variable display color
- built-in 24 Vdc power supply for supplying on-site transducers
- RS485 serial interface, galvanically isolated, MODBUS-RTU
- compensation of line resistance for resistance sensors
- temperature compensation of thermocouple cold ends
- programmable input, range of indications (for analogue inputs), options for adjustment, alarms, communication, access and other configuration parameter
- access to configuration parameters is protected by the user's password
- methods for configuring parameters:
  - via membrane keyboard (IP65) located on the front panel of the device
  - via RS485 or PRG AR955/GP programmer and freeware: ARsoft-LOG (Windows 7/8/10)
- software and programmer allow you to view the measured value and quickly configure single or few sets of parameters previously saved in the computer for re-use, e.g. in other controllers of the same type (duplicate configuration)
- ingress protection rating: IP65 from the front
- high accuracy, long-term stability and immunity to interference
- optional to choose (in the ordering method): power supply 24Vac/dc, output SSR, analog output 0/2÷10V, digital input BIN and interface RS485

#### Contents of set:

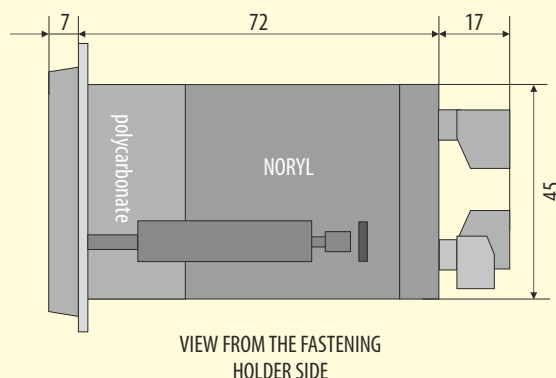
- regulator with handles mounting in the window
- user manual
- warranty card

#### Available accessories:

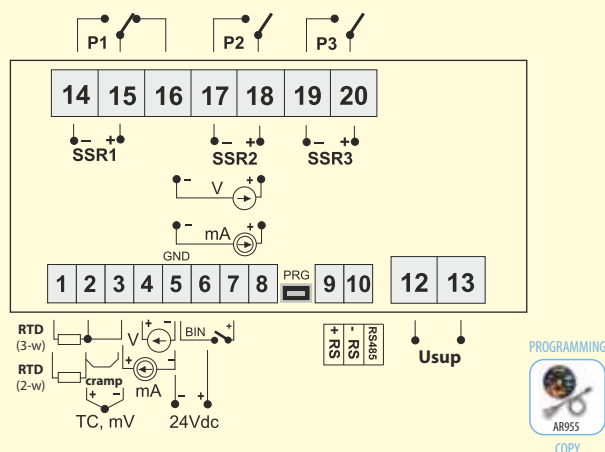
- programmer AR955/GP (with optional adapter)
- RS485 to USB converter

#### DIMENSIONS, INSTALLATION DATA

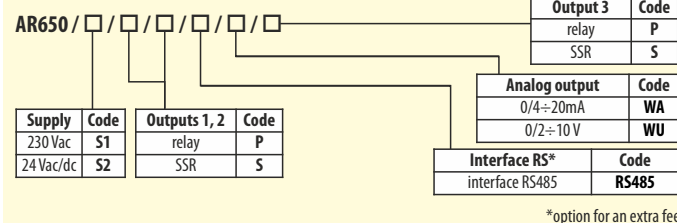
Enclosure dimensions	96x48x79 mm
Panel window	92x46 mm
Fixing methods	panel, grips on the side of the enclosure
Material	self-extinguishing polycarbonate NORYL 94V-0



#### TERMINAL STRIPS, ELECTRICAL CONNECTIONS



#### How to order



\*option for an extra fee

**For example:**  
**AR650 / S1 / S / P / RS485 / P**  
 AR650, supply 230 Vac, main output (1) SSR, auxiliary output (2 i 3) relays, interface RS485

**TECHNICAL DATA**

<b>Universal inputs</b> (programmable)		<b>measurement ranges</b>
- Pt100 (RTD, 3- or 2-wire)		-200 ÷ 850 °C
- Ni100 (RTD, 3- or 2-wire)		-50 ÷ 170 °C
- Pt500 (RTD, 3- or 2-wire)		-200 ÷ 620 °C
- Pt1000 (RTD, 3- or 2-wire)		-200 ÷ 520 °C
- thermocouple J (TC, Fe-CuNi)		-40 ÷ 800 °C
- thermocouple K (TC, NiCr-NiAl)		-40 ÷ 1200 °C
- thermocouple S (TC, PtRh 10-Pt)		-40 ÷ 1600 °C
- thermocouple B (TC, PtRh30PtRh6)		300 ÷ 1800 °C
- thermocouple R (TC, PtRh13-Pt)		-40 ÷ 1600 °C
- thermocouple T (TC, Cu-CuNi)		-25 ÷ 350 °C
- thermocouple E (TC, NiCr-CuNi)		-25 ÷ 820 °C
- thermocouple N (TC, NiCrSi-NiSi)		-35 ÷ 1300 °C
- current ( $R_{me} = 50 \Omega$ )		0/4 ÷ 20 mA
- voltage ( $R_{me} = 110 k\Omega$ )		0 ÷ 10 V
- voltage ( $R_{me} > 2 M\Omega$ )		0 ÷ 60 mV
- resistance (3- or 2-wire)		0 ÷ 2500 $\Omega$
<b>Number of measurement inputs</b>		1
<b>Response time for measurements</b> (10 ÷ 90%)		0,25 ÷ 3 s (programmable)
<b>Resistance of leads</b> (RTD, $\Omega$ )		$R_L < 25 \Omega$ (for each line)
<b>Resistance current</b> (RTD, $\Omega$ )		400 $\mu$ A (Pt100, Ni100), 200 $\mu$ A (remaning)
<b>Processing errors</b> (at 25°C ambient temperature):		
- basic	- for RTD, mA, V,mV, $\Omega$	0,1 % of measuring range $\pm$ 1 digit
	- for thermocouples	0,2 % of measuring range $\pm$ 1 digit
- additional for thermocouples		<2 °C (cold ends temperature)
- additional caused by ambient temperature changes		< 0,003 % of input range /°C
<b>Resolution of measured temperature</b>		0,1 °C
<b>Binary inputs</b> (contact or voltage <24V)		bistable, active level: short-circuit or < 0,8 V
<b>Communication interface</b> (RS485 i PRG, do not use at the same time)	- RS485 (galvanically separated), option - PRG programming link (no separation), standard	- bitrate 2,4 ÷ 115,2 kb/s, - format 8N1 (8 data bit, 1 bit stop, no parity bit), - MODBUS-RTU protocol (SLAVE)
<b>Outputs</b> (2 relays or SSR)	- relay (P1, P2), standard - SSR (SSR1, SSR2), option	8A / 250Vac (for resistive loads), 1 main (SPDT), 2 additional (SPST-NO) transistor type NPN OC, 11V, internal resistance 440 $\Omega$
<b>Analogue outputs</b> (1 current or voltage)	- current 0/4 ÷ 20 mA (standard) - voltage 0/2 ÷ 10 V (option) - output basic error	maximum resolution 1,4 $\mu$ A (14 bit) output load $R_o < 350 \Omega$ maximum resolution 0,7 mV (14 bit) output load $I_o < 3,7$ mA ( $R_o > 2,7 k\Omega$ ) < 0,1 % of output range
<b>7-segment LCD display</b> with programmable color and brightness		4 digits, height 20 mm, 5 colors (red, dark- and bright-orange, yellow, green)
<b>Signalling</b>	- relays active - messages and errors	LED's red, programmable alarm color of LED display LED display
<b>Power supply</b> (Usup)	- 230Vac (standard) - 24Vac/dc (option)	85 ÷ 260 Vac/ 3VA 20 ÷ 50 Vac/ 3VA, 20 ÷ 72 Vdc/ 3W
<b>Power supply to filed transmitters</b>		24Vdc / 30mA
<b>Rated operating conditions</b>		0 ÷ 50°C, <100 %RH (non-condensing)
<b>Working environment</b>		air and neutral gases
<b>Protection rating</b>		IP65 front, IP20 of the connections side
<b>Weight</b>		~200g
<b>Electromagnetic compatibility</b> (EMC)		- immunity: acc. to PN-EN 61000-6-2 - emission: acc. to PN-EN 61000-6-4

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