AR654 Universal four-channel controller with process recording, timer and touch panel

PROTECTION RATING IP65 REAR USB PORT

PROTECTION RATING IP30 FRONT AND REAR USB PORTS

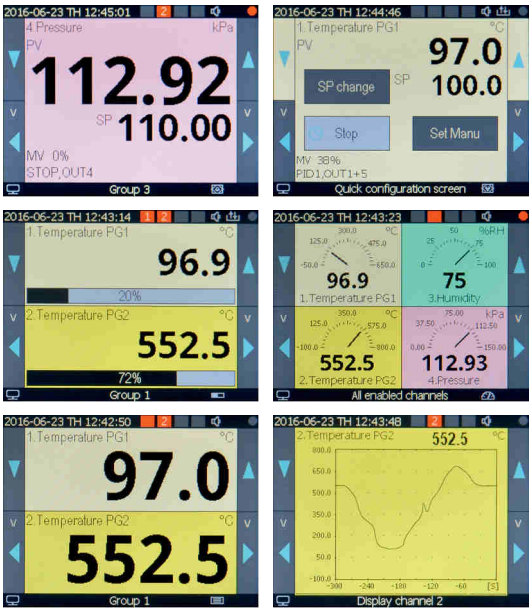
4GB MEMORY

MODBUS TCP

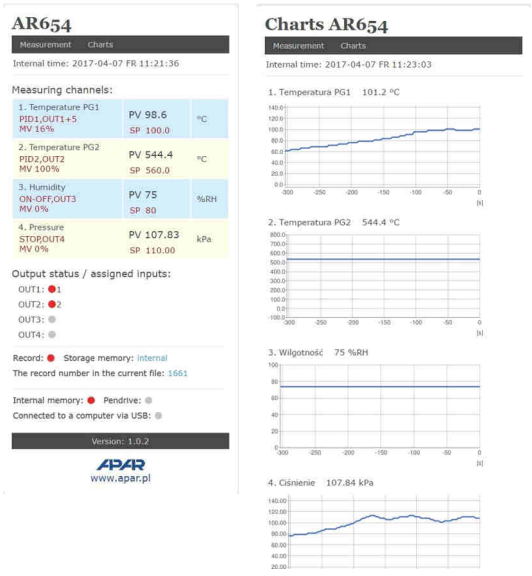
DDNS

Timer | USB | Ethernet | RS485 Modbus RTU | http www | e-mail alarms

Methods of data presentation



Web server



- control, monitoring, and recording of temperature and other physical values (humidity, pressure, level, flow rate, speed, etc.) processed into a standard electric signal (0/4÷20 mA, 0÷10 V, 0÷60 mV, 0÷850 Ω);
- 4 universal inputs (thermoresistance, thermocouple, analogue) with the possibility to create inter-channel mathematical formulas such as difference, average, sum, larger or smaller than, and ratio of measured values;
- 4 control/alarm outputs with independent adjustment algorithms: ON-OFF with hysteresis, PID, autotuning PID, 12-section programmed control;
- an optional module of 4 analogue outputs (0/4÷20mA or 0/2V÷10V) and 5 functional binary inputs (BIN) to change the operating modes of the associated outputs (control start/stop, selection of the day/night setpoint value, manual/automatic mode for outputs); the analogue outputs are logically connected to the two-state outputs (P/SSR) and are used for control or retransmission of measurements and setpoint values; the inputs and the outputs are not insulated (common ground);
- selection of setpoint values for outputs from among 2 defined for each output, the common value from the 1st output (without and with offset for 3-way control), from the selected program or measurement from any input
- selection of independent PID sets (from the 8 available sets) for individual setpoint values (gain scheduling)
- advanced automatic PID parameter selection function with fuzzy logic elements for each of the outputs
- 4 programs with the possibility to define for each section such parameters as type (gradient/time/stop), setpoint value, hysteresis, set of PID parameters, selection and status of auxiliary output, sound alarm, etc.
- time control/timer, options: continuous operation, periodic daily (hourly), or limited by date and time
- manual mode (open control loop) available for 2-state and analogue outputs with setting of the output signal value in the range of 0÷100% (the impulse period or the entire range of variability for mA/V)
- shockless switching of analogue outputs from manual mode to automatic mode and vice versa
- possibility to select the measured values to be displayed, independently, the type of control signals for outputs (associated inputs or mathematic functions on the measurement signals, such as difference, average, etc.)
- possibility to assign many outputs to one measurement channel and many inputs to one output
- sound and visual signalling of the status of operation of outputs and email alarm notification
- programmable type of control/alarm: heating, cooling, in the band, outside of the band, manual mode
- recording of data in a standard text file located in the internal memory of the controller (4 GB) or an USB memory in a FAT system, with possibility to edit in spreadsheet software, e.g. Microsoft Excel, CRC protection of recorded data
- rich standard equipment with serial interfaces: USB (for work with a computer and USB memories), RS485 (MODBUS-RTU), and Ethernet (100base-T, TCP/IP protocols: MODBUS-TCP, HTTP, SMTP, etc.)
- WWW server for work with any web browser (Opera, IE, Firefox, etc.); the site contains information about active measurement channels, control parameters and status, real time, status of the outputs, recording, etc., with the possibility to show diagrams using the Google Chart API service (diagrams require constant Internet access)
- the DDNS service, which enables easy access over the Internet to a controller connected to a network that has no fixed public IP address, through a friendly Internet address defined by the user; the service is available only for registered users of popular DDNS services, such as DynDNS (www.dyndns.org), No-IP (www.no-ip.com), and DNS-O-Matic (www.dnsomatic.com)
- a colour LCD TFT graphic display 320x240 dots (QVGA), with a touch screen, brightness adjustment, and programmable background colour for individual measurement channels
- intuitive use, quick configuration, and clear signalling of device operating statuses and menu position
- a programmable language of the menu and WWW server (Polish, English)
- graphic and text methods of presentation of the measured values (numerical values, bar graph, counter, graph)
- grouping of measurement channels to be displayed, with automatic formatting of the screen (font size, etc.)
- programmable screen function buttons (F1) for each of the displayed control channels for quick selection of one of the available functions (the same as for the binary inputs BIN of the optional module)
- programmable F button for quick selection of one of the available functions: start/stop of control for all outputs, status of the device and of the Internet services, start/stop of recording, copying or moving archives to a USB memory, blocking of sound alarms or the touch screen and the keypad
- a broad selection of recording start methods (continuous, limited by date and time, periodic daily, above or below the permission threshold related to any measurement signal, only during control)
- internal real time clock with a battery backup power supply (up to 8 years of continuous operation)
- free software provided (for Windows 7/8/10) that enables presentation in a graphic or text form of the recorded results (ARSOFT-LOG-WZ3) and configuration of parameters (ARSOFT-CFG-WZ1)
- programmable display options, presented measured values and control signals for the outputs (measurements, mathematic functions, etc.), types of measurement inputs, indication ranges, alphanumeric description of measurement channels and groups, control/alarm, recording, communication, and access options, and other configuration parameters
- administrator and user password, two levels protections of access to the configuration parameters
- parameters configuration methods:
  - from the film keypad and a touch screen located on the front panel of the device
  - through the USB, RS485, or Ethernet and free ARSOFT-CFG software or a user's (MODBUS-RTU and MODBUS-TCP)
  - from configuration files saved in the USB memory or on a computer disk
- recording of data until memory is full (at least 2 years of continuous operation with recording of 4 channels every 1 s)
- possibility to transfer archive data and configuration data to a USB memory or to computer via USB, Ethernet
- simultaneous recording of data from all active measurement channels
- controller's software update via USB memory
- an enclosure for panel installation, protection rating from the front side IP65 or IP30 (depending on the version)
- an integrated 24 V DC power supply supplying the field transducers (current output depending on the version)

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TECHNICAL DATA

Number of measuremant inputs	4 universal, without galvanic separation (common earth)		
Universal inputs (programmable, 16 types, 18-bit A/C processing), measurement ranges			
- Pt100 (RTD, 3- or 2-wire)	-200 ÷ 850 °C	- thermocouple R (TC, PtRh13-Pt)	-40 ÷ 1600 °C
- Pt500 (RTD, 3- or 2-wire)	-200 ÷ 620 °C	- thermocouple T (TC, Cu-CuNi)	-25 ÷ 350 °C
- Pt1000 (RTD, 3- or 2-wire)	-200 ÷ 620 °C	- thermocouple E (TC, NiCr-CuNi)	-25 ÷ 850 °C
- Ni100 (RTD, 3- or 2-wire)	-50 ÷ 170 °C	- thermocouple N (TC, NiCrSi-NiSi)	-35 ÷ 1300 °C
- thermocouple J (TC, Fe-CuNi)	-40 ÷ 800 °C	- current (mA, Rwe = 100 Ω)	0/4 ÷ 20 mA
- thermocouple K (TC, NiCr-NiAl)	-40 ÷ 1200 °C	- voltage (V, Rwe = 150 kΩ)	0 ÷ 10 V
- thermocouple S (TC, PtRh 10-Pt)	-40 ÷ 1600 °C	- voltage (mV, Rwe > 2 M Ω)	0 ÷ 60 mV
- thermocouple B (TC, PtRh30PtRh6)	300 ÷ 1800 °C	- resistance (R, 3- lub 2-wire)	0 ÷ 850 Ω
Response time for measurements (10÷90%)		0,5 ÷ 2,5 s (programmable)	
Resistance of leads (RTD, R)		Rd < 25 Ω (for each line), compensation of line resistance	
Resistance input current (RTD, R)		650 µA (Pt100, Ni100, 850Ω), 150 µA (Pt500, Pt1000), multiplexed	
Processing errors (at ambient temperature of 25 °C):			
- basic	- for RTD, mA, V,mV, R	≤ 0.1% of the measurement range ±1 digit	
	- for thermocouples	≤ 0,2 % of the measurement range ±1 digit	
- additional for thermocouples		≤ 2 °C (compensation of temperature of cold tips)	
- additional from ambient temp. changes		≤ 0.005% of the input range /°C	
Indication range (programmable)		total: -9999÷99999, resolution for analogue inputs -9999÷19999	
Display resolution / dot point position		programmable, for thermometric inputs 0.1°C or 1 °C, for other inp. 0÷0.000	
Outputs (4 separate)	- relay P1÷P4	5A / 250Vac (for resistance loads), SPST; as a standard option	
	- SSR1÷ SSR4 (optional)	transistor, type NPN OC, 24V, internal resistance 850 Ω	
Analogue outputs (4, option) **(1)**	- current output 5÷8	0/4 ÷ 20 mA, load: Ro < 1000 Ω, max resolution 0,33 µA, 16 bit	
	- voltage output 5÷8	0/2 ÷ 10 V, load: Io<3,7mA (Ro>2,7kΩ), max resolution 0,17mV, 16 bit	
Digital input BIN (5, option)		contact or voltage <24V, bistable, active level: short circuit or < 0,8V	
Power supply	- 230Vac (standard)	85 ÷ 260 Vac/ 10VA	
	- 24Vac/dc (option)	20 ÷ 50 Vac/ 10VA, 22 ÷ 72 Vdc/ 10W	
Power supply of field transducers 24Vdc (2)	when 230Vac/24Vac/dc	200/100mA (without optional module mA/V and BIN)	
	when 230Vac+module mA/V	150mA-21mA*N (N=number of active current outputs)	
	when 24Vac/dc+module A/V	50mA-21mA*N (N=number of active current outputs)	
Communication interfaces (in IP30 version USB port also available from the front of controller)	- **USB** (connection type A4, programmable mode of operation)	- slave mode (communication with a computer)	drivers for the Windows XP/7/8/10: exchangeable disk (mass memory, read speed: 335kB/s) + virtual COM port (MODBUS-RTU protocol)
		- master mode (host)	support USB memory(pendrive) up to 4GB (~135kB/s)
	- **RS485**	MODBUS-RTU protocol, SLAVE, speed 2,4÷115,2 kbit/s, sign format 8N1, galvanic separation	
	- **Ethernet**	100base-T, RJ45, server www, MODBUS-TCP, e-mail client (SMTP), DDNS server client, TCP/IP protocols: DHCP (client, server), SMTP, NetBIOS, ICMP, UDP, TCP, data transfer up to 135 kB/s (depending on the network)	
Real time clock (RTC)		quartz, takes leap years into account, backup lithium battery CR1220	
Data recording interval		programmable from 1s to 8 h. **(3)**	
Data storage memory (non-volatile, recording of approx. 59 million measurements from 4 channels and 4 GB memory):			
- internal		4GB, micro SDHC card (industrial, MLC), FAT32 file system	
- external USB memory (pendrive)		maximum size 4GB, FAT16, FAT32, A4 USB socket type	
Graphical display LCD (with touch panel)		TFT, 320x240 pixels (QVGA), 3.5", background brightness adjustment	
Rated operating conditions		0 ÷ 50°C, <100 %RH (no condensation), air and neutral gases, no dust	
Protection rating		IP65 or IP30 from the front, IP20 from the side of the connections	
Electromagnetic compatibility (EMC)		immunity: according to the PN-EN 61000-6-2, emission: PN-EN 61000-6-4	
Safety requirements according to PN-EN 61010-1 standard		overvoltage category: II	pollution degree: 2
		voltage to the ground (earth): 300 V for power supply and output relay circuits, 50 V for other inputs/outputs circuits and communication interfaces	
		insulation resistance > 20 MΩ	height above sea level < 2000 m

Notes:

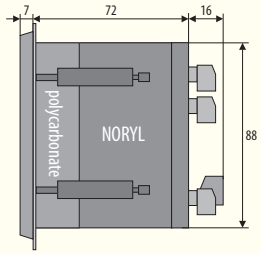
(1) - each of the outputs can work in only one programmed standard: 0/4 ÷ 20 mA or 0/2 ÷ 10 V

(2) - output power depends on the equipment version (type of power supply, presence and number of current outputs used); in the case of insufficient current efficiency, an external power supply and/or voltage outputs instead of current outputs should be used

(3) - for a recording interval equal to 1 s, uneven recording may take place during transfer of an archive via Ethernet and also because of an excessive number of files, their sizes, and type and manufacturer of the USB memory (pendrive) used

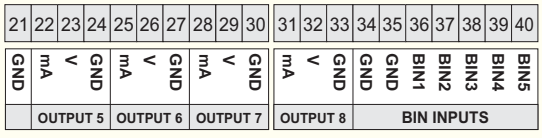
DIMENSIONS, INSTALLATION DATA

Fixing methods	panel, grips on the side of the enclosure
Enclosure dimensions and weight	96 × 96 × 79 mm, ~420 g
Panel window	92 × 89 mm
Material	self-extinguishing NORYL 94V-0, polycarbonate
Conductor cross-sections (separable connectors)	2.5 mm2 (supply and outputs P/SSR), 1.5mm2 (others)

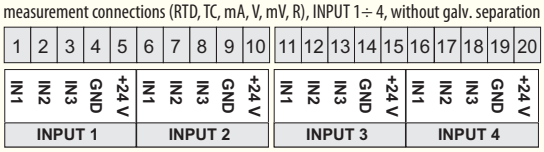


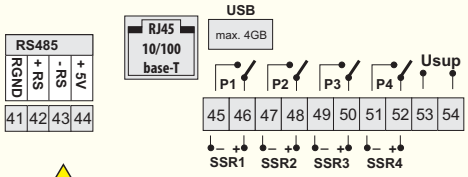
TERMINAL STRIPS, ELECTRICAL CONNECTIONS

connections of the optional analogue output module (OUTPUT 5 ÷ 8) and of functional binary inputs (BIN1÷BIN5), without galvanic separation (common ground)



measurement connections (RTD, TC, mA, V, mV, R), INPUT 1÷ 4, without galv. separation



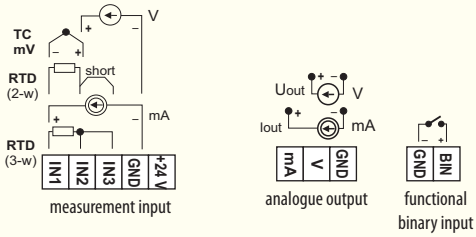


NOTE:

In the IP30 version, the USB connection is also available on the front panel.

DO NOT USE SIMULTANEOULYWITH THE BACK CONNECTION!

Connection method for sensors and electrical signals:



How to order:

AR654 / □ / □ / □ / □ / □ / □ / □

Supply	Code
230 Vac	S1
24 Vac/dc	S2

Outputs 1, 2, 3, 4	Code
relay	P
SRR	S

Inputs/Outputs module*	Code
4 outputs mA/V, 5 bin inputs	W

* option for an extra fee

Protection ratio	Code
IP30, USB also from the front	IP30
IP65, USB only at the back	IP65

Order examples:

AR654 / S2 / P / P/ P / P / IP65

supply24 Vac/dc, 4 relay outputs, IP65, USB port only at the back

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