AR200.B

TWO-INPUT UNIVERSAL DATA RECORDER WITH CONTROL AND TIMER

2 inputs
RTD, TC, mA
V, mV, Ω, BIN

Outputs
2 x relay/SSR
1 x mA/V

Control
ON/OFF, PID
Program, Servo

Alarms
STB Function
LATCH

Memory
up to ~94k.
records

Clock
Timer

RS485
MODBUS-RTU

USB
memory
COM port

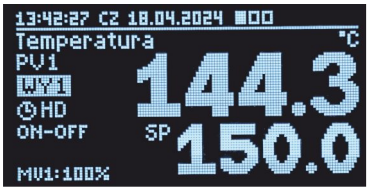
Ethernet
MODBUS-TCP
MQTT, files

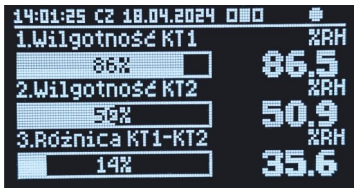
Software
ARSOFT-CFG
ARSOFT-LOG

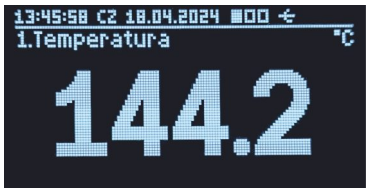
Access protection
Password

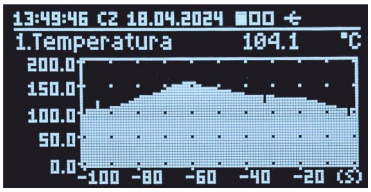
Protection rating
From the front

Sample methods of data presentation









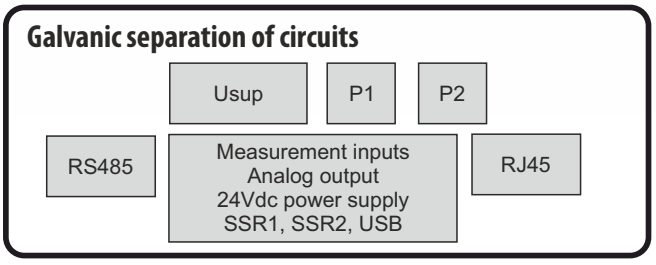
- control, measurement and registration of temperature and other physical values (humidity, pressure, level, flow, speed, etc.) processed to a standard electrical signal with the possibility of presenting **up to 3** displayed channels
- customizable architecture enabling use in many fields and applications (industrial, heating, food, energy, etc.)
- **2 universal measuring inputs** (resistance thermometers RTD, thermocouple TC, analog 0/4÷20mA, 0÷10V, 0÷60mV, 0÷2,5kΩ) **with mathematical functions** (difference, sum, average, greater or lesser of the measurements) available independently for displaying and controlling control/alarm/outputs
- saving data in the internal memory of the recorder in the FAT system, reading files via the USB or Ethernet interface
- files in the standard CSV text format, ability to read and edit in available software or in any spreadsheets such as Excel or OpenOffice Calc, recording **up to 3 channels** (measurements and their mathematical formulas)
- **2 function buttons** (**F** and **SET**) and a **digital input** (**BIN**) for quick change of the controller's operating mode, separately programmable: start/stop of regulation and registration, manual/automatic mode for outputs, step change of the SP set value (day/night, with separate control parameters), keyboard lock, clearing STB alarms (LATCH), etc.
- 3 control/alarm channels (**2** hardware outputs relay/SSR+ **1** software output) ON/OFF type with independent functionalities and control algorithms (set values defined by a parameter or taken from measurement input 1/2):
  - **ON-OFF with hysteresis** (characteristics for heating and cooling, band alarms in range, out of range and with deviation for 3-position control)
  - **PID** (choice of **3 separate sets of parameters**, gain scheduling for SP setpoint taken from measurement input 1 or 2), advanced functions of automatic selection of PID **smart logic** parameters
  - programmed control characteristic (**process controller with timer**, up to **6 sections**, including 3 **ramping** sections - inclination for heating/cooling or for cooling/defrosting, 3 setpoints SP with ON-OFF or PID control, selection of the auxiliary output and its status, displaying remaining time for the entire section or after exceeding SP, etc.)
  - thermostat/safety controller **STB** (alarm state open or closed, resettable with F/SET/BIN, can be used as **LATCH alarm memory** e.g. when exceeds a minimum, maximum or a band)
  - ability to control a three-way mixing valve with an actuator (**step control, servo**) with two contact inputs (open - close), implementation on outputs 1 and 2
  - **manual mode** (open loop control) with initial value of control signal (MV) taken from current automatic mode or programmed by user in 0÷100% range, also for sensor failure
  - direct or inverse copy of the output 1 state (applies to output 2, can be used e.g. to take over the function of damaged P1)
  - **limiting** maximum level of output signal (**power**), also includes associated mA/V analog output
  - audio and visual indication of the outputs operating status (low volume buzzer and displayed icons)
- **0/4÷20mA or 0/2÷10V analog output** for regulation or retransmission of measurements and set values:
  - taking control parameters from any associated output/alarm (1, 2, 3) in automatic and manual mode
  - impact-free (soft) switching of the output signal e.g. after changing manual/automatic or start/stop mode
  - adjustment (calibration) of the range of changes in the output signal (offset for extreme values allowing to obtain non-standard ranges e.g. 2÷16mA or 1÷9V)
  - possibility of using an SSR type relay to control (as the 3rd ON-OFF control output)
- time control/timer, choosable: continuous operation, cyclical daily (hourly) operation or limited by date and time
- wide range of supply voltages (**18÷265 Vac** / **22÷350 Vdc**) and built-in power supply for supplying on-site transducers **24Vdc**/50mA
- **OLED display** 128x64 points, one-color, with brightness control, showing of **up to 3** displayed channels
- serial interface **RS485**, protocole **MODBUS-RTU** for reading measurements and parameter configuration
- interface **Ethernet**, protocols **MODBUS-TCP** and **MQTT** (for internet of things **IoT/M2M**, cloud and mobile applications), possibility of data exchange via the **Internet**
- interface **USB** (micro USB port, standard equipment, for reading recorded data, accessing internal memory, parameter programming, viewing measurements and updating firmware)
- automatic or fixed line resistance compensation for resistive sensors and thermocouple cold junction temperature
- programmable type of input, indication range (for analog inputs), options of recording, control options, alarms, display, communication, access, real-time clock, menu language (polish and english) and other configuration parameters
- access to configuration parameters protected with a user password or without protection
- methods for configurating parameters:
  - via membrane keyboard IP65 located on the front panel
  - via USB, RS485 or Ethernet and freeware ARsoft-CFG (for Windows 7/10/11) or user application (using protocols MODBUS-RTU and TCP)
- **free software** (downloaded from www.apar.pl) enabling text and graph presentation of recorded data (**ARsoft-LOG**) and configuration/copying of parameters (**ARsoft-CFG**)
- broad selection of methods of initiation of recording (continuous, limited by date and time, repeated daily, only with active control/alarm or set by user with F, SET buttons or BIN digital input
- possibility to distinguish archives from many recorders of the same type due to individual assignment of an identification number (ID)
- recording in infinite mode (when the memory is full the oldest archives are deleted) or until the memory is full (recording is stopped), up to 94k records (while recording one measurement channel)
- internal clock with the possibility of precise adjustment of the real-time counting speed
- panel housing, IP65 protection rating from the front (with additional accessory gasket or other sealing), IP54 without the gasket
- intuitive and clear operation, **high accuracy** and long-term stability as well as resistance to interference
- optional to choose from (in the ordering method): control outputs for SSR, analog output 0/2÷10V (instead of 0/4÷20mA)

TECHNICAL DATA

Number of measuring inputs	2 universal (not separated, common ground)		
Universal input (programmable, 17 types, conversion A/C 18 bits), measuring 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 ÷ 520 °C	- thermocouple E (TC, NiCr-CuNi)	-25 ÷ 820 °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, Rin = 50 Ω)	0/4 ÷ 20 mA
- thermocouple K (TC, NiCr-NiAl)	-40 ÷ 1200 °C	- voltage (V, Rin = 110 kΩ)	0 ÷ 10 V
- thermocouple S (TC, PtRh 10-Pt)	-40 ÷ 1600 °C	- voltage (mV, Rin > 2 M Ω)	0 ÷ 60 mV
- thermocouple B (TC, PtRh30PtRh6)	300 ÷ 1800 °C	- resistance (R, 3-or 2-wire)	0 ÷ 2500 Ω
Response time for measurements (10÷90%)	0,5 ÷ 5 s (programmable, default ~1,0 s)		
Resistance of leads (RTD, R)	Rd < 25 Ω (for each line), compensation of line resistance		
Resistive input current (RTD, R)	400 µA (Pt100, Ni100), 200 µA (Pt500, Pt1000, 2500 Ω)		
Processing errors (at 25°C ambient temperature):			
- basic - for RTD, mA, V,mV, R	0,1 % of the measurement range ±1 digit		
- basic - for thermocouple	0,2 % of the measurement range ±1 digit		
- additional for thermocouples	< 2 °C (thermocouple cold junction temperature compensation)		
-additional from ambient temp. changes	< 0,004 % of the input range /°C		
Indication range (programmable)	total -9999÷19999 (maximum range of indications for analog inputs)		
Display resolution / dot position	programmable, 0 ÷ 0.000 , for thermometric inputs 0,1 °C or 1 °C		
Outputs P/SSR (2 indepentend) - relays P1, P2	8A/250Vac (for res.), 1xSPDT, 1xSPST-NO		
Outputs P/SSR (2 indepentend) - SSR1, SSR2 (option)	transistor type NPN OC, 11V, current < 23mA		
Analog output (mA or V, without separation from input) - current (standard)	0/4 ÷ 20 mA, load Ro<1 kΩ, max resolution 1,4 µA, 14 bit, active		
Analog output (mA or V, without separation from input) - voltage (option)	0/2 ÷ 10 V, load Io < 3,7mA (Ro > 2,7 kΩ), max resolution 0,7mV, 14 bit		
Analog output (mA or V, without separation from input) - errors (in 25°C)	basic < 0,1 % output range, additional < 0,004 % /°C		
Digital input BIN (2-state)	contact or voltage <24V, active level: short circuit or < 0,8V		
Power (Usup, universal, comply with the standards 24Vac/dc and 230Vac)	18 ÷ 265 Vac, <3VA (alternating current, 50/60Hz)		
	22 ÷ 350 Vdc, <4W (direct current)		
Power supply for object transducers	24Vdc/50mA		
Communication interfaces (indepentend, can be used simultaneously) - **USB** (micro USB type B port)	drivers for Windows 7/10/11 (virtual serial port COM, communication with computer, protocole MODBUS-RTU, Slave)		
Communication interfaces (indepentend, can be used simultaneously) - **RS485**	protocole MODBUS-RTU (Slave), bitrate 2,4÷115,2 kbit/s, programmable sign format (8N1, 8E1, 8o1, 8N2), galvanic separation		
Communication interfaces (indepentend, can be used simultaneously) - **Ethernet**	RJ45 connector, 10base-T, protocols TCP/IP: MODBUS-TCP (Server), MQTT (client, v.3.1.1), DHCP (client), ICMP (ping), galvanic separation		
Data storage memory (built-in, non-volatile, FLASH type, FAT file system)	4MB, recording in infinite mode (looped) or up to fulling memory, up to 94k for one channel, min. 80k for 2 and up to 71k for 3 channels		
Data recording interval	programmable **1 second to 8 hours (1)**		
Real time clock (RTC)	quartz, date and time, takes leap years into account, Cr1220 lithium battery		
Display (graphic OLED)	128x64 points, white color, 2.42", with brightness adjustment		
Rated operating conditions	0 ÷ 50°C, <90 %RH, without condensation, air and neutral gases		
IP protection rating	IP65 from the front woth gasket (IP54 without), IP20 from the connections side		
Electromagnetic compatibility (EMC)	immunity: according to PN-EN 61000-6-2, emmision: 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 Vfor other inputs/outputs circuits and communication interface		
	insulation resistance > 20 MΩ	height above sea level < 2000 m	

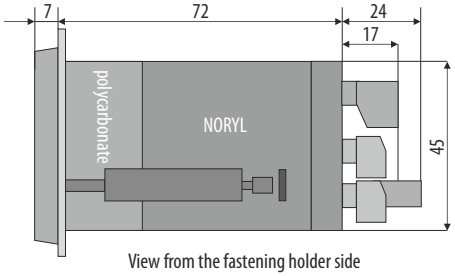
(1) - for a recording interval of 1 second, uneven registration is possible during archive transfer via Ethernet, also due to too many files and their size
- recording is always suspended (paused) during connection to the computer's USB port

Galvanic separation of circuits



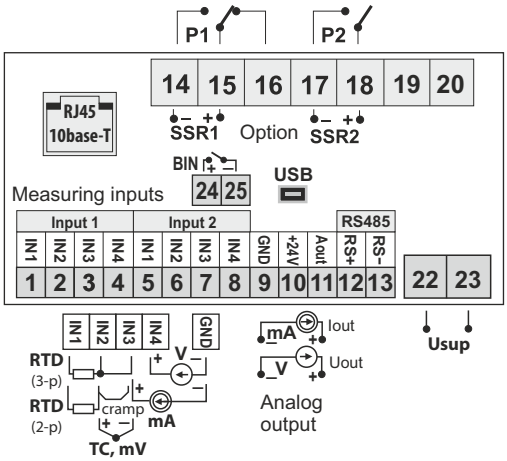
INSTALLATION DATA

Fixing method	panel, grips on the side of the enclosure
Dimensions and weight	96 × 48 × 79 mm, ~200 g
Panel window	92 × 46 mm
Material	self-extinguishing NORYL 94V-0, polycarbonate
Cable cross sections (for separable connectors)	2.5mm2 (power supply and outputs P/SSR), 1.5mm2 (others)



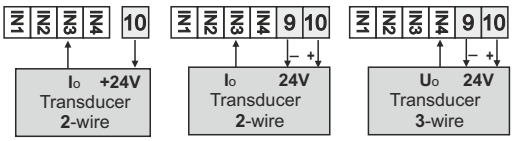
View from the fastening holder side

TERMINAL



CONNECTION OF A 2- AND 3- WIRE TRANSDUCER

(Io - current, Uo - voltage output)



Ordering procedure

AR200.B / □ / □ / □

Output 1, 2	Code
2 x relay	**P/P**
1 x relay, 1 x SSR	**P/S**
2 x SSR	**S/S**

Analog output	Code
0/4÷20 mA	**WA**
0/2÷10 V **	**WU**

** 0/2÷10 V output is mounted **instead of** the 0/4÷20mA output (standard)

Order example (standard execution):
AR200.B / P / P / WA
AR200.B, 1 and 2 relay outputs, analog output 0/4÷20 mA (active), with USB, RS485 and Ethernet interface

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