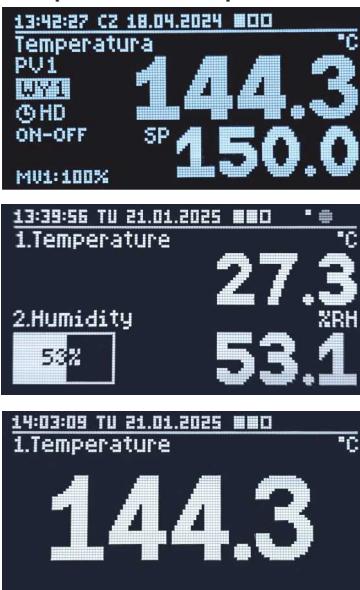


AR230.B Two-input universal data recorder with control and timer



2 inputs RTD, TC, mA V, mV, Ω, BIN	Outputs 2x relay/SSR 1x 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 IP67

Sample methods of data presentation



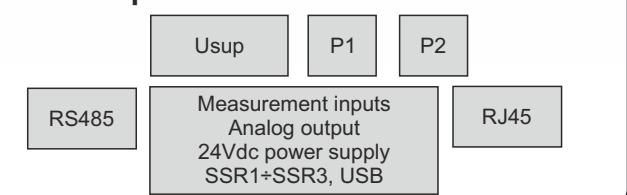
- control, measurement and registration of temperature and other physical values (humidity, pressure, level, flow, speed, etc.) processed to a standard electrical signal with the possibility of presenting **up to 3** displayed channels
- customizable architecture enabling use in many fields and applications (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, software compatibility for the entire series (i.e. AR200.B, AR260.B)
- 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 an additional 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÷265Vac / 22÷350Vdc**) 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**, protocol **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** (USB-C 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), scale Celsius/Fahrenheit (°C/°F) and other configuration parameters
- access to configuration parameters protected with a user password or without protection
- methods for configuring parameters:
 - via membrane keyboard IP65 located on the front panel
 - via USB, RS485 or Ethernet and freeware ARsoft-CFG (for Windows 10/11) or user application (using protocols MODBUS)
- **free software** (for Windows 10/11) 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
- industrial housing with a high degree of protection IP67, adapted to work in difficult environmental conditions, wall mounting
- 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 (max. 3100°F=1724°C)					
- 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 = 50Ω)	0/4 ÷ 20mA		
- thermocouple K (TC, NiCr-NiAl)	-40 ÷ 1200°C	- voltage (V, Rin = 110kΩ)	0 ÷ 10V		
- thermocouple S (TC, PtRh 10-Pt)	-40 ÷ 1600°C	- voltage (mV, Rin > 2MΩ)	0 ÷ 60mV		
- thermocouple B (TC, PtRh30PtRh6)	300 ÷ 1800°C	- resistance (R, 3- or 2-wire)	0 ÷ 2500Ω		
Response time for measurements (10÷90%)	0,5 ÷ 5s (programmable, default ~1,0s)				
Resistance of leads (RTD, R)	Rd < 25Ω (for each line), compensation of line resistance				
Resistive input current (RTD, R)	400µA (Pt100, Ni100), 200µA (Pt500, Pt1000, 2500 Ω)				
Processing errors (after 15 min. work at 25°C ambient temperature):					
- basic	for RTD, mA, V,mV, R	0,1% of the measurement range ±1 digit			
	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 -1999 ÷ 19999 (maximum range of indications for analog inputs)				
Display resolution / dot position	programmable, 0 ÷ 0.000, for thermometric inputs 0,1 °C/°F or 1 °C/°F				
Outputs P/SSR	- relays P1, P2, P3	P1- 8A/250Vac (SPDT), P2, P3(option)- 5A/250Vac (SPST-NO)			
(2 independend)	- SSR1, SSR2, SSR3(option)	transistor type NPN OC, 11V, current < 23mA, standard for output 3(SSR3)			
Analog output	- current (standard)	0/4 ÷ 20mA, load Ro < 1kΩ, max resolution 1,4µA, 14 bit, active			
(mA or V, without separation from input)	- voltage (option)	0/2 ÷ 10V, load Io < 3,7mA (Ro > 2,7kΩ), max resolution 0,7mV, 14 bit			
	- 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 ÷ 265Vac, <3VA (alternating current, 50/60Hz) 22 ÷ 350Vdc, <4W (direct current)				
Power supply for object transducers	24Vdc/50mA				
Communication interfaces	- USB (USB-C port)	drivers for Windows 10/11 (virtual serial port COM, communication with computer, protocole MODBUS-RTU, Slave) + removable disk (4MB)			
(independend, can be used simultaneously)	- RS485	protocole MODBUS-RTU (Slave), bitrate 2,4÷115,2kbit/s, programmable sign format (8N1, 8E1, 8o1, 8N2), galvanic separation			
	- 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	-20 ÷ 60°C, <100%RH, without condensation, air and neutral gases				
IP protection rating	IP67				
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 voltage to the ground (earth): 300V for power supply and output relay circuits, 50V for other inputs/outputs circuits and communication interface insulation resistance > 20MΩ height above sea level < 2000m				

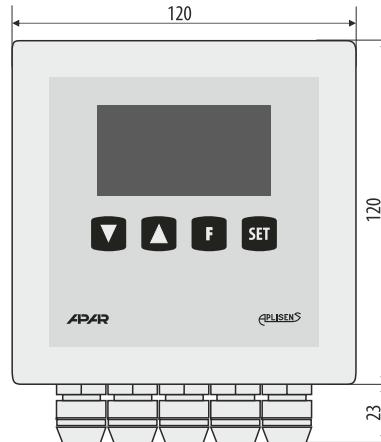
(1) - for a recording interval of 1 second, uneven registration is possible during archive transfer via Ethernet, also due to too many files and their size
- recording is always suspended (paused) during connection to the computer's USB port

Galvanic separation of circuits

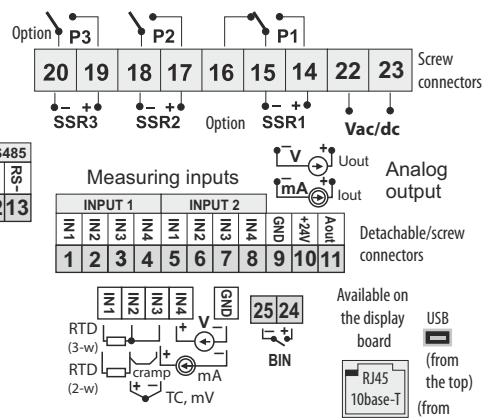


INSTALLATION DATA

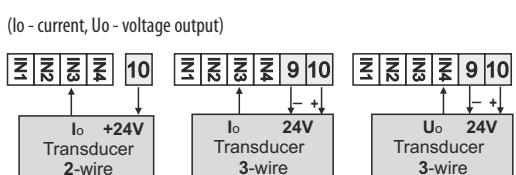
Enclosure, material	industrial IP67, polycarbonate
Dimensions and weight	120 x 120 x 60mm (no gland), ~450g
Fixing method	4 holes Ø 4,5mm, spacing 106,3x88,7mm, mounting holes are accessible after removing the front cover
Cable cross sections (for gland M12x1,5)	2,5 mm² (power supply and outputs P/SSR) 1,5mm² (others), cable ext. diameter 3...6,5mm



TERMINAL



CONNECTION OF A 2- AND 3- WIRE TRANSDUCER



Ordering procedure

AR230.B / / / /

Output 1, 2, 3	code	Analog output	code
relay	P	0/4÷20mA	WA
SSR*	S	0/2÷10V **	WU

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

* an order with only one SSR output is only available for output 3 (fully functional)

Order example (standard execution)::

AR230.B / P / P / S / WA

AR230.B, outputs 1, 2 relay, output 3 SSR, analog output 0/4÷20mA (active), with interface USB, RS485 i Ethernet