USER MANUAL

AR904.B

SETTER - METER OF STANDARD ANALOGUE SIGNALS

$$C \, \epsilon$$

Thank you for choosing our product.
This manual will enable proper handling, secure
use and full use of the device.
Before assembling and starting the device please read
and understand this manual.
If you have additional questions, please contact our technical consultant.

TABLE OF CONTENTS

⚠ Special attention should be paid to texts marked with this sign

The manufacturer reserves the right to make changes to the design and software of the device without any deterioration of technical parameters (some functions may not be available in older versions). Upgrading to the latest firmware version may require reconfiguration of the device.

1. SAFETY RULES ⚠️

■ before using the device, please read this manual carefully
■ in order to avoid electric shock or damage to the device mechanical and electrical assembly
should be commissioned to qualified personnel
■ before turning on the power, make sure that all cables have been connected correctly
■ before making any modifications to the wiring connections, turn off the voltage
supplied to the device
■ ensure proper working conditions, compliant with the technical data of the device (supply voltage, levels of
measured signals, humidity, temperature, chapter 5), do not expose the device to direct and strong
thermal radiation

2. ASSEMBLY RECOMMENDATIONS ⚠️

The device has been designed to provide an adequate level of resistance to most of the disturbances that can
occur in industrial environment. In environments with an unknown level of interference, it is recommended to use
the following measures to prevent any possible disruption of the device's operation:

■ do not supply power to the device from the same lines as high-power devices without proper mains filters
■ use shielding of power and signal cables, whereby the shield grounding should be
single-point, made as close as possible to the device
■ avoid running signal wires in the immediate vicinity and parallelly to the
power and power supply cables
■ it is advisable to twist the signal wires in pairs
■ avoid the proximity of remotely controlled devices, electromagnetic meters, high power loads,
loads with phase or group power control and other devices generating large interference
■ ground or neutralize the metal rails on which the rail devices are mounted

Before starting working with the device, remove the protective foil of the LED display.

3. GENERAL CHARACTERISTICS OF THE DEVICE

■ the device allows to control or test devices with current or voltage input
(transducers, proportional valves, actuators, inverters, motors, etc.)
■ 2 configurable analog outputs:
- current 0/4÷20mA (active, passive)
- voltage 0/2÷10V
■ possibility of testing the 4÷20mA current loop (current output connected as passive)
■ soft start/stop (ramping) or triangle waveform generator triggered and stopped manually or automatically
after switching on the power
■ programmable configuration parameters (operating and signal mode, range and step of output signal
changes, options of soft start/stop, zero and amplification calibration of the measured or set signal, etc.)
■ fast and simple reading of the actual value of the output or measured signal (mA, V or converted to
programmable range of indications), type of set signal and direction of operation
■ diagnostic messages presented on the display to facilitate the detection of faults in the tested system, e.g.
short circuit in the voltage signal system, open circuit in the current loop
■ possibility of password protection of access to configuration parameters
■ 4-colour, 7-segment LED display with brightness adjustment
■ optional RS485 network interface (galvanically insulated, MODBUS-RTU protocol)

- ■ ways to configure parameters:
  - from the IP65 membrane keyboard placed on the front panel of the device
  - via AR955 programmer or RS485 interface and free ARSoft-CFG program (Windows 7/8/10)
- ■ software and programmer to view the setpoint, actual and measured values and fast configuration of single or ready parameter sets previously stored in the computer for the purpose of reuse, for example in the setters of the same type (duplication of configuration)
- ■ high accuracy, long-term stability and resistance to noise
- ■ available accessories:
  - AR955 programmer
  - RS485 to USB converter
  - front gasket IP65

NOTE: ⚠️

Before starting work with the setter, read this manual and perform the parameter configuration and electrical connections correctly.

4. CONTENTS OF THE SET

- ■ setter
- ■ user manual
- ■ warranty card

5. TECHNICAL DATA

Analog Outputs/Inputs		1/1 (operating modes: setting OUT, measuring IN)
current signal 0÷20 mA	full range of current changes	0÷21 mA
	power supply, load resistance, measuring resistance	Up = 5,0 ÷ 36 Vdc (output, chap.7, Fig. 7.b), $R_O \leq$ (Up - 3 V) / 21 mA $\leq$ 1500 Ω (output), R_O = 47 Ω (input)
	resolution	2 µA (maximum programmable), 10 µA standard (for scale expressed in [mA])
voltage signal 0/2÷10 V	full range of voltage changes	0÷10,5 V
	load resistance	R_O > 2,7 kΩ (output), $R_O \approx$ 100 kΩ (input)
	resolution	1 mV (maximum programmable), 10 mV standard (for scale expressed in [V])
Processing errors (at an ambient temperature of 25 ° C):		
main		0,15 % (output), 0,2 % (input) of full signal variation range ±1 digit
additional - from changes in ambient temperature		< 0,005 % of input range/ °C
Output/input response time (10÷90%)		0,2 s (output), 0,1 1 s (input, programmable with parameter 6: `Filt`)
RS485 communication	speed	0,6 ÷ 115,2 kb/s
	character format	programmable parity bit, stop bit (22: `cFor`)

interface (MODBUS-RTU, SLAVE)	galvanic insulation	500 V, 50 Hz, 1 min
Display **7-segment LED** (1 line, 4 digits)	height	20 mm (4 colors - Table 12.c)
	range of indications	-1999 ÷ 9999 (maximum programmable), standard 0,00÷21,00 mA or 0,00÷10,50 V
Power supply, Usup - universal, compliant with standards 24 and 230 V, direct or alternating		24 ÷ 250 Vac, <3 VA (AC voltage, 50/60 Hz)
		24 ÷ 350 Vdc, <3 W (DC voltage)
Rated operating conditions		0 ÷ 50 ℃, <90%RH (without condensation)
Working environment		air and neutral gases
Protection degree		IP65 from the front (front gasket required), IP20 from connectors side
Weight		~165 g
Electromagnetic compatibility (EMC)		resistance: according to PN-EN 61000-6-2 norm
		emissivity: according to PN-EN 61000-6-4 norm
Safety requirements **acc. PN-EN 61010-1**		installation category - II
		Pollution degree - 2
		value of voltage to earth for the power supply circuit, output - 300 V
		value of voltage to earth for input circuits - 50 V
		insulation resistance> 20 MΩ
		altitude above the sea level <2000 m

6. HOUSING DIMENSIONS AND ASSEMBLY DATA

Housing type	panel, Incabox XT
Material	self-extinguishing NORYL 94V-0, polycarbonate
Housing dimensions (W x H x D)	96x48x79 mm
Panel window (W x H)	92 x 46 mm
Mounting	with handles on the side of the housing
Cable cross-sections **(for separable connectors)**	2,5mm^2(power supply), 1.5mm^2 (other)
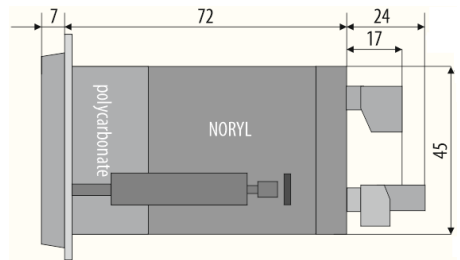
7. DESCRIPTION OF CLAMPING RAILS AND ELECTRICAL CONNECTIONS

Table 7. Numbering and description of clamping rails

Clamps	Specification
1-5	24V internal power supply output (max. 30mA)
2-5	current output
3-5	voltage input
4-5	current input
6-5	voltage output
PRG	programming connector for cooperation with the AR955 programmer (do not use with RS485 interface at the same time)
9-10	RS485 interface (Modbus-RTU transmission protocol, SLAVE)
12-13	Usup power input (24V, 230V)

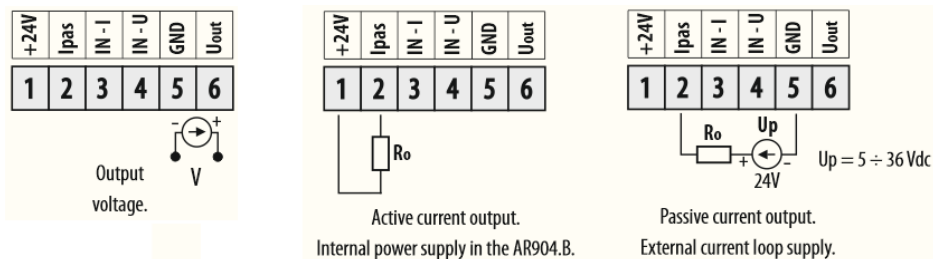Fig. 7.a) connection of inputs, PRG, RS485 and Usup power supply socket - description in Table 7
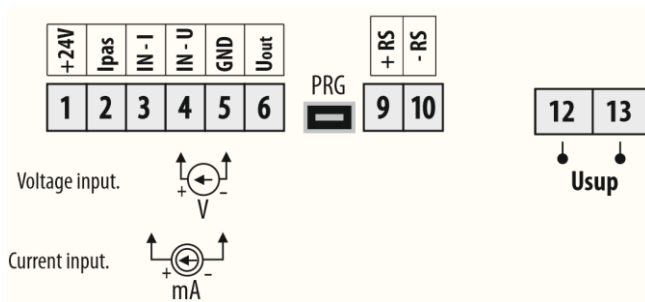
Fig. 7.b) connection of outputs - description in Table 7

7 segment LED display

programming keys

signaling LEDs

Fig.8. Description of the front elevation

Table 8.a) functions of keys in measurement display mode

Key	Description [and the method of marking in the content of the manual]
or	**[UP]** or **[DOWN]**: change of the setpoint (parameter 10:)
SET	**[SET]** : - short press - preview of the measurement of the actual setpoint in the mode out - press and hold approx. 2s - entering the quick access menu (chapter 9.1)
+	**[UP]** and **[DOWN]** (simultaneously): enter the parameter configuration menu (after holding time greater than 2 seconds). If parameter 18: Prot = on (password protection is enabled) enter the access password (chapter 10)

Table 8.b) functions of the keys in the parameter configuration menu and in the quick access menu (chapters 9.1 and 10)

Key	Description [and the method of marking in the content of the manual]
SET	**[SET]** : - entering the editing of the current parameter (the edited value flashes) - confirmation and saving of the changed parameter value
or	**[UP]** or **[DOWN]**: - go to the next or previous parameter - changing the value of the edited parameter
+	**[UP]** and **[DOWN]** (simultaneously): - cancelling changes of the edited value (flashing stops) - return to the measurement display mode (holding time> 1s)

Table 8.c) LED signaling diode functions

Diode [marking]	Specification
IN	signaling of operation in input mode, meter
OUT	signaling of operation in the output mode, setter

9. CHANGE OF SETPOINT

Depending on the setting of parameter 2: `d ir A` (chapter 10, Table 10), the value of the set/measured signal can be presented directly in real units (mA or V, when 2: `d ir A` = `un it`) or converted to any programmable range of indications tailored to a specific application (parameters 3: `rbot` and 4: `rtoP`, when 2: `d ir A` = `boto`).

In the setpoint display mode, pressing the [**UP**] or [**DOWN**] key changes this value by a set step (parameter 9: `StEP`). The changes in the output signal are proportional to the changes in the displayed value. Using the **[SET]** + **[DOWN] key combination** immediately sets the output in the lower limit of the range (0/4 mA, 0/2V, 3: `rbot` or 7: `t iLo`) while **[SET]** + **[UP]** sets the output in the upper limit of the range (20 mA, 10V, 4: `rtoP` or 8: `t iHi`). In addition, the output signal can also be set in parameter programming mode (parameter 10: `SEt`). In addition, it is possible to set the setpoint outside the range of indications resulting from the parameters 3: `rbot` and 4: `rtoP` . The amount of this override is 5% (according to the full range of changes of the output signal described in chapter 5).

9.1. QUICK ACCESS MENU

The quick access menu allows you to quickly edit the parameters 0: `RodE` (device operation mode) and 24: `P-St` (soft start/stop triggering/stopping). The quick access menu can be entered by holding down the **[SET]** key for about 2 seconds. The quick access menu is not password protected.

9.2. VIEWING THE MEASUREMENT OF THE ACTUAL SETPOINT

To check the voltage or current level in the setting mode, briefly press the **[SET]** key. To differentiate the setpoint from the measured value, the LED display should change to yellow (Table 12.c). The value measured at the output is always expressed in units (mA, V) regardless of the setting of the parameter 2: `d ir A` .

10. CONFIGURATION PARAMETERS SETTING

All device configuration parameters are stored in the non-volatile EEPROM internal memory.
There are two ways to configure the parameters:

1. From the IP65 membrane keyboard placed on the front panel of the device:
- from the setpoint display mode, enter the configuration menu (at the same time press the **[UP]** and **[DOWN]** keys for more than 2 sec.) If parameter 18: `PPro` = `on` (password protection is enabled) the display will show a message `CodE` and then `0000` with the flashing number first from the left with the **[UP]** or **[DOWN]** key, enter the access password (default parameter
17: `PASS` = `1111`), the **[SET]** key is used to move to the next positions and confirm the code
- after entering the configuration menu, the mnemonic names of parameters are displayed (`RodE` <-> `StYP` <-> `d ir A` <-> etc.), the **[UP]** key will take you to the next, **[DOWN]** to the previous parameter (see Table 10 for a summary list of configuration parameters)
- to change or preview the value of the current parameter, press the **[SET]** key
  - change the value of the parameter being edited using the **[UP]** or [DOWN] keys
  - confirm the changed parameter value with the **[SET]** key or cancel it with **[UP]** and **[DOWN]** (at the same time), return to the parameter name display.

2. Via RS485 port **or** AR955 programming set and ARSoft - CFG computer program:
  - connect the setter to the computer port and run the ARSOFT-CFG application
- after establishing the connection, the current setpoint is displayed in the program window
- setting and viewing device parameters are available in the parameter configuration window
- new parameter values must be confirmed with the *Approve changes* key
- the current configuration can be saved to a file or set with values read from the file
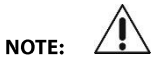
NOTE: ⚠️
- do not use the RS485 port and AR955 programming kit at the same time, because this will result in communication errors.

In order to restore the factory settings, press the **[UP]** and **[DOWN]** keys during start until the password entry menu appears (`CodE`), and then enter the code `0112`. Alternatively, you can use the file with the default configuration in the ARSOFT-CFG program.

Table 10. Configuration parameters

Parameter	Range of parameter variability and description		Default settings
0: `ModE` operating mode	`in`	as a meter, input (measurement)	`out`
	`out`	as a setter, output (setting)	
1: `StYP` type of output / input signal	`0-20`	current 0÷20mA	`0-20`
	`4-20`	current 4÷20mA	
	`0-10`	voltage 0÷10 V	
	`2-10`	voltage 2÷10 V	
2: `dirA` type of scale displayed	`unit`	direct in real units (mA or V)	`boto`
	`boto`	programmable with parameters 3: `rbot` and 4: `rtoP`	
3: `rbot` bottom of the indication range	`-1999` ÷ `9999` of units - indication for 0/4mA, 0/2V - start of the input / output scale		`0.0`
4: `rtoP` top of the indication range	`-1999` ÷ `9999` of units - indication for 20mA, 10V - end of input / output scale		`100.0`
5: `dot` dot position for the programmable scale, when parameter 2: `dirA` = `boto`	`0`	no dot	`1` (`0.0`)
	`1`	`0.0` (0,0)	
	`2`	`0.00` (0,00)	
	`3`	`0.000` (0,000)	
6: `Filt` degree of filtration	`3` ÷ `30`	digital filtration of measurements (response time), for `Filt` = `3` response time is approx. 0,1s , for `Filt` = `30` approx. 1s. A higher degree of filtration means a smoother measurement value and a longer response time.	`9`
7: `L Lo` lower limit of settings	`-1999` ÷ `9999` of units, lower limit of the setpoint (parameter 10: `SEt`) when setting from the setter keys		`-1999`
8: `hd3U` upper limit of settings	`-1999` ÷ `9999` of units, upper limit of the setpoint (parameter 10: `SEt`) when setting from the setter keys		`9999`

9: `FULL` step of changes	`1` ÷ `5000` of units, change step for the setpoint (parameter 10: `SEt`) when setting from the setter keys		`10`
10: `SEt` setpoint for outputs	lower limit of settings: 0/4mA, 0/2V, parameter 3: `rbot` or 8: `L.Lo`, upper limit of settings: 20mA, 10V, parameter 4: `rtoP` or 9: `L.HI`, change step: 9: `StEP`, applies to setting from keys in normal mode (chapter 9)		`00`
11: `r.SE` soft-start time	`oFF` `1` ÷ `8160` s	rising edge duration (ramp), function disabled for value `oFF`, description in chapter 11	`oFF` off
12: `FALL` soft-stop time	`oFF` `1` ÷ `8160` s	falling edge duration (ramp), for the `oFF` value the function is disabled, description in chapter 11	`oFF` off
13: `cALo` zero calibration	zero offset for measurements and setting `-500` ÷ `500` of units		`0.00`
14: `cALG` amplification	`850` ÷ `1150` %	slope calibration (sensitivity) for measurements and setting	`100.0` %
15: `tr.id` soft start/stop triggering method (ramp)	`Auto` automatic	soft start/stop (ramp) triggering after each power on, description in chapter 11	`AAnu` manual mode
	`AAnu` manual	triggering of soft start/stop (ramp) manually in the quick MENU (parameter 24: `P-St` = `on`)	
16: `bLSE` setpoint setting lock	`oFF` disabled	no lock of changes of setpoint	
	`on` enabled	locking changes of setpoint with the [**UP**] and [**DOWN**] keys	
17: `PASS` access password	`0000` ÷ `9999`	password to access the configuration menu (when 18: `Prot` = `on`)	`1111`
18: `Prot` protecting configuration with an access password	`oFF`	entering the configuration menu without password protection	`on` enabled
	`on`	entry to the configuration menu is protected with an access password	
19: `br.id` display brightness	`10` ÷ `100` % regulation step every 10 %		`100` %
20: `Addr` address MODBUS-RTU	`1` ÷ `247`	individual address of the device in the RS485 network (chapter x) or for the AR955 programmer (communication with ARSoft-CFG)	`1`
21: `br` baud rate	`0.6` ÷ `115.2` kbit/s	baud rate for RS485 or AR955 programmer (communication with ARSoft-CFG)	`19.2`
22: `tFor` configuration of the RS485 sign, last character bit	`8n1`	no parity bit or second stop bit in the character	`8n1`
	`8E1`	parity bit, even	
	`8o1`	parity bit, odd	
	`8n2`	two stop bits	
23: `S.in` initial setpoint (10: `SEt`) after power-on	`LASt`	last saved setpoint (10: `SEt`)	`LASt`
	`bot`	beginning of scale (3: `rbot`)	
	`toP`	end of scale (4: `rtoP`)	
24: `P-St` manual ramp start	`oFF`	Parameter available only in the quick MENU (chapter 9.1)	`oFF`
	`on`	Parameter set automatically to `oFF` after soft START and soft STOP end	

The device is equipped with a ramp function (soft start and stop) operating in accordance with the diagrams presented below (Figures 11.1, 11.2, 11.3). To start the function, configure the soft start duration (rising slope, parameter 11: `rISE`, chapter 8) or the stop duration (falling slope, 12: `FALL`). If both times are non-zero (11: `rISE` and 12: `FALL`), periodic triangular waveforms are generated at the outputs. The limits (amplitudes) of the output signal are equal to the limits of the signal used (dependent on parameter 1: `StYP`) or can be narrowed by the lower limit of 7: `t.Lo` and the upper limit of 8: . Display indications are expressed in actual units (mA or V when 2: `dirA` = `unit`) or in a defined scale through parameters 3: `rbot`, 4: `rtoP` (when 2: `dirA` = `boto`). The function is activated automatically or manually via the quick access menu (chapter 9.1). The ramp can be stopped or resumed at any time (a temporary message appears - `StAr` - start or - `StoP` - stop).
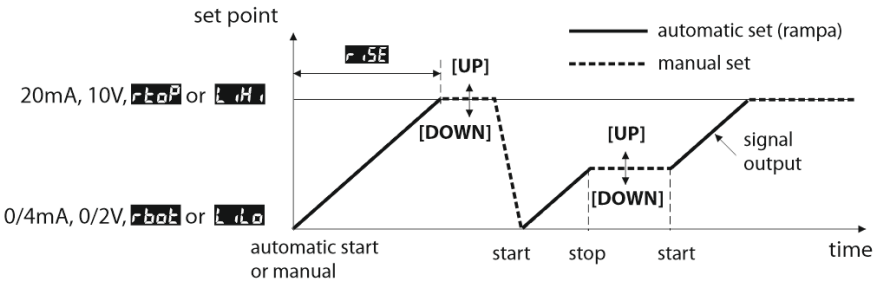The state of the outputs in this operating mode is updated about 17 times per second.

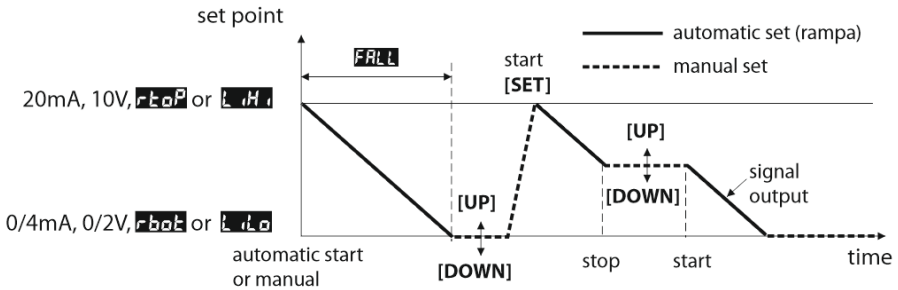Fig.11.1. Principle of operation of outputs in **soft start** mode (parameter `rISE` > 0, `FALL` = `oFF`).

Fig.11.2. Principle of operation of outputs in **soft stop** mode (parameter `rISE` = `oFF`, `FALL` > 0).

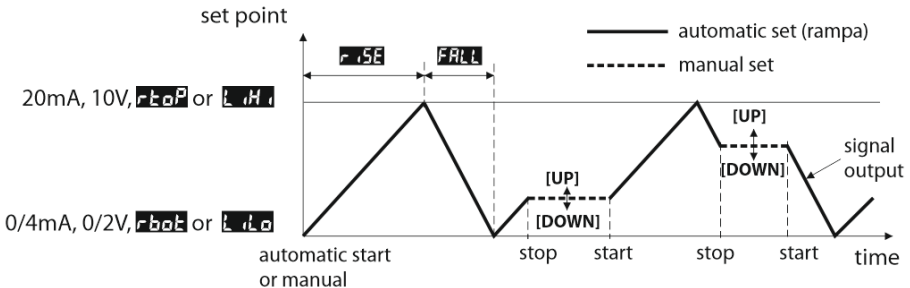

Fig.11.3. Principle of operation of outputs in **triangular wave form generator mode** (parameter `rISE` > 0, `FALL` > 0).

Table 12.a) measurement and setting errors (diagnostic functions):

| Code	Possible causes of the error
▬▬▬	- exceeding the permissible measuring range/set signal from top (▬▬) or from bottom (▬▬) - a different signal than the one set in the configuration is included (chapter 10, parameter 1: **StYP**)
5.00	- flashing setpoint - open circuit in the current loop or short circuit in the voltage signal system. The message occurs when the expected set value of the signal differs from the measured actual value by more than 1% of the total range of variation of this signal.

Table 12.b) messages and temporary errors (one time or periodic):

Code	Description of the message
CodE	entering the password entry mode to access the configuration parameters (chapter 8)
Err	an incorrect access password has been entered
ErrE	eEPROM memory writing error
ConF	entry in the parameter configuration menu
bLoc	setpoint or key lock enabled (parameter 16: **bLSE**, chapter 8)
rAMP	setpoint lock enabled due to performing ramp function (chapter 11)
StAr	manual activation of soft start or stop function
StoP	manual stop of soft start or stop function
SAuE	recording of company parameter values (chapter 10)

Table 12.c) meaning of LED display colors

Display color	Specification
red	output operating mode, setter, setpoint is displayed
green	input operating mode, meter, measurement from analog input is displayed
yellow	view of the measurement of the actual setpoint (mA, V) in the output mode, setter
orange	editing in the configuration menu or quick access menu

13. CONNECTING TO A COMPUTER AND AVAILABLE SOFTWARE

Connecting the device to a computer may be useful (or necessary) to configure the parameters, or to copy the settings to other devices of the same type. As standard, the device is equipped with a **PR** port enabling connection to the computer using the AR955 programmer using the Modbus-RTU communication protocol. The following application is available for download from the *www.apar.pl* website in the "*Download*" section, for Windows 7/8/10 operating systems):

Name	Description of the program
ARsoft-CFG (free of charge)	- display of current measurement data from the connected device - setting configuration parameters such as the type of measurement signal, range of indications, options, display, etc. - creation the disc a file with the extension "cfg" containing the current configuration of parameters for reuse (copying of configuration) - the program requires communication with the device via **PR** port (AR955 programmer)

NOTE: ⚠️
Before establishing a connection, make sure that the baud rate and MODBUS address in the ARsoft options are the same as the device settings. In addition, in the ARSoft options, select the serial COM port used (for the AR955 programmer or RS485/USB converter, this is the name given by the operating system during the installation of the drivers).

14. RS485 COMMUNICATION INTERFACE (according to EIA RS-485)

The installation specification for the interface in the RS485 standard is as follows:
- maximum cable length - 1 km (follow installation guidelines, chapter 2, sub-items b, c, d
- maximum number of devices in a RS485 line - 30, in order to increase the number, use RS485/RS485 amplifiers
- termination and polarizing resistors when the MASTER is at the start of the line (Fig.14):
- at the start of the line - 2 x 820Ω to the ground and +5V MASTER-A and 150Ω between lines
- at the end of the line -   150Ω between lines
- termination and polarizing resistors when the MASTER is in the center of the line:
- at the converter -   2 x 820Ω, to the ground and +5V to the converter
- at both ends of the line - 150Ω each between the lines
Equipment from different manufacturers that form the RS485 network (e.g. RS485/USB converters) may have integrated polarizing and terminating resistors; in such a case there is no need to use external elements.
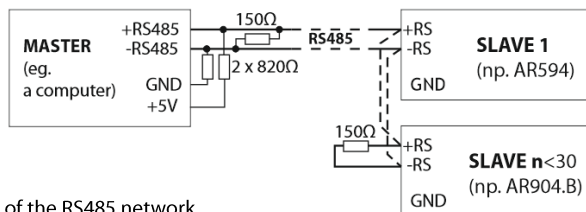

Fig.14. Pictorial diagram of the RS485 network

Character format   : 8 bits, 1 stop bit, no parity bit
Available functions   : READ - 3 or 4, WRITE - 6

Table 15.1. Query frame format for the READ function (frame length - 8 bytes):

address of the device	function 4 or 3	address of register to be read: 0 ÷ 37 (0x001E)	number of registers to be read: 1 ÷ 38 (0x001F)	CRC checksum
1 byte	1 byte	2 bytes (HB-LB)	2 bytes (HB-LB)	2 bytes (LB-HB)

Example 15.1. Reading of a register with address 0: 0x01 - 0x04 - 0x0000 - 0x0001 - 0x31CA

Table 15.2. Query frame format for the WRITE function (frame length - 8 bytes):

address of the device	function 6	register address to be written: 0 ÷ 37 (0x001E)	register value to be written	CRC checksum
1 byte	1 byte	2 bytes (HB-LB)	2 bytes (HB-LB)	2 bytes (LB-HB)

Example 15.2. Writing a register with address 10 (0xA) with the value 0: 0x01 - 0x06 - 0x000A - 0x0000 - 0xA9C8

Table 15.3. Response frame format for the READ function (minimum frame length - 7 bytes):

address of the device	function 4 or 3	number of bytes in the data field (max. 38*2=76 bytes)	data field - register value	CRC checksum
1 byte	1 byte	1 byte	2 ÷ 64 bytes (HB-LB)	2 bytes (LB-HB)

Example 15.3. Response frame for register value equal to 0: 0x01 - 0x04 - 0x02 - 0x0000 - 0xB930

Table 15.4. Reply frame format for the WRITE function (frame length - 8 bytes):

copy of the query frame for the WRITE function (Table 15.2)

Table 15.5. Specific answer (errors: function field = 0x84 or 0x83, in case of the READ function and 0x86 in case of the WRITE function):

Error code (HB-LB in data field)	Error description
0x0001	non-existing register address
0x0002	incorrect register value to be written
0x0003	incorrect function number

Example 15.5. Error frame for a non-existing register address to be read:
0x01 - 0x84 - 0x02 - 0x0001 –0x5130

Table 15.6. Map of registers for the MODBUS-RTU protocol

Register address HEX (DEC)	Value (HEX or DEC)	Description of register and access type (R- read only register, R/W - read and write register)		
0x00 (0)	-1999 ÷ 9999	value measured in meter mode, input	value in the U2 code, no comma **(resolution 0,1)**	R
0x01 (1)	9041 ÷9049	device ID		R
0x02 (2)	0 ÷ 99	software version		R
0x03 ÷ 0x06	-	not used or reserved		R
0x07 (7)	0 ÷ 2000	the result of the measurement of the output in the setting mode expressed in mA and V units	value in the U2 code, no comma **(resolution 0,01)** [mA, V]	R
0x08 ÷ 0x0C (12)	-	not used or reserved		R
Configuration parameters (chapter 9, table 9.2)				
0x0D (13)	0 ÷ 1	parameter 0: **ModE** operating mode		R/W
0x0E (14)	0 ÷ 3	parameter 1: **StYP** type of output / input signal		R/W
0x0F (15)	0 ÷ 1	parameter 2: **dirA** type of scale displayed		R/W
0x10 (16)	-1999 ÷ 9999	parameter 3: **rbot** bottom of the indication range		R/W
0x11 (17)	-1999 ÷ 9999	parameter 4: **rtoP** top of the indication range		R/W
0x12 (18)	0 ÷ 3	parameter 5: **dot** dot position		R/W
0x13 (19)	3 ÷ 30	parameter 6: **FiLt** degree of filtration		R/W
0x14 (20)	-1999 ÷ 9999	parameter 7: **LrLo** lower limit of settings		R/W
0x15 (21)	-1999 ÷ 9999	parameter 8: **LrHi** upper limit of settings		R/W
0x16 (22)	1 ÷ 5000	parameter 9: **StEP** change step		R/W
0x17 (23)	-1999 ÷ 9999	parameter 10: **SEt** setpoint for outputs		R/W
0x18 (24)	0 ÷ 8160	parameter 11: **riSE** soft start time		R/W
0x19 (25)	0 ÷ 8160	parameter 12: **FALL** soft stop time		R/W
0x1A (25)	–500 ÷ 500	parameter 13: **cALo** zero calibration, zero offset for measurements and setting		R/W
0x1B (27)	850 ÷ 1150	parameter 14: **cALG** amplification, calibration of the inclination for measurements and setting		R/W
0x1C (28)	0 ÷ 1	parameter 15: **trid** soft start/stop trigger method (ramp)		R/W
0x1D (29)	0 ÷ 1	parameter 16: **bLSE** setpoint settings lock		R/W
0x1E (30)	0 ÷ 9999	parameter 17: **PASS** access password		R/W
0x1F (31)	0 ÷ 1	parameter 18: **Prot** protection of the configuration with an access password		R/W
0x20 (32)	10 ÷ 100	parameter 19: **briG** display brightness		R/W
0x21 (33)	1 ÷ 247	parameter 20: **Addr** MODBUS-RTU address		R/W
0x22 (34)	0 ÷ 9	parameter 21: **br** MODBUS-RTU baud rate		R/W
0x23 (35)	0 ÷ 3	parameter 22: **CFor** RS485 character configuration, last bit		R/W
0x24 (36)	0 ÷ 2	parameter 23: **S in** initial setpoint after power on		R/W
0x25 (37)	0 ÷ 1	parameter 24: **P-St** manual ramp triggering (auto zeroed)		R/W