WIKA

TRONIC

User's guide

Compact Indicator, 4-digit

Model A-RD-1

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V 3.0 2008980 07.99

I N D E X

1. Safety Regulations

In order to exclude any risk whatsoever for the operator the following points have to be observed :

a) Immediately switch off the unit in case of visible damage or obvious malfunctions.

b) Make it a rule to always disconnect voltage source and unit befor opening it up. The entire unit and its connection have to be fingerproof after installation.

c) Standard regulations for operation and safety for electrical, light and heavy current equipment have to be observed, with particular attention having to be paid to national safety regulations (e.g. VDE 0100).

d) When connecting the unit to other units (e.g. PC) the interconnection has to be designed most thoroughly as internal connections in third-party units (e.g. connection GND with protective earth) may lead to undesired voltage potentials.

Attention: When running electric devices, parts of these will always be highly energised. Unless the warnings are observed serious personal injuries or damage to property may result. Skilled personnel only should be allowed to work with this unit. For trouble-free and safe operation of the unit please ensure professional transport, storage, installation and connection as well as proper operation and maintenance.

Skilled personal

are persons familiar with installation, connection, commissioning, and operation of the product and have professional qualification relating to their job.

For example:

- Trainig or instruction and/or qualification to switch on/off, isolate, ground and mark electric circuits and devices/systems.
- Training or instruction according to the state of the art of safety technology to maintain and operate safety equipment.
- First-aid trainig.

2. Introduction

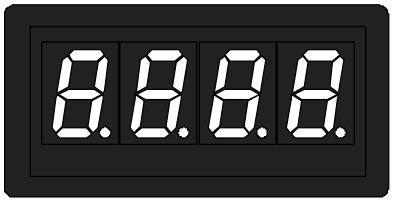
Our compact indicator A-RD-1 is a microprocessor controlled display, supervision and control unit for universal applications.

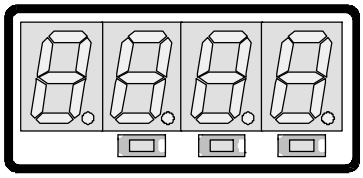
There are connections for four standard signals (0 to 20 mA 4 to 20 mA, 0 to 1 Volt and 0 to 10 Volt), two temperature sensors (KTY87-205 and Pt1000), frequency measuring and counter functions.

In addition, two switching outputs are available, which can be configurated as two-level controller, three-level controller, two-level controller with min./max. alarm, common or individual min./max. alarm.

Furthermore, the unit is equipped with a standard RS485 interface, thus allowing communication with a host computer.

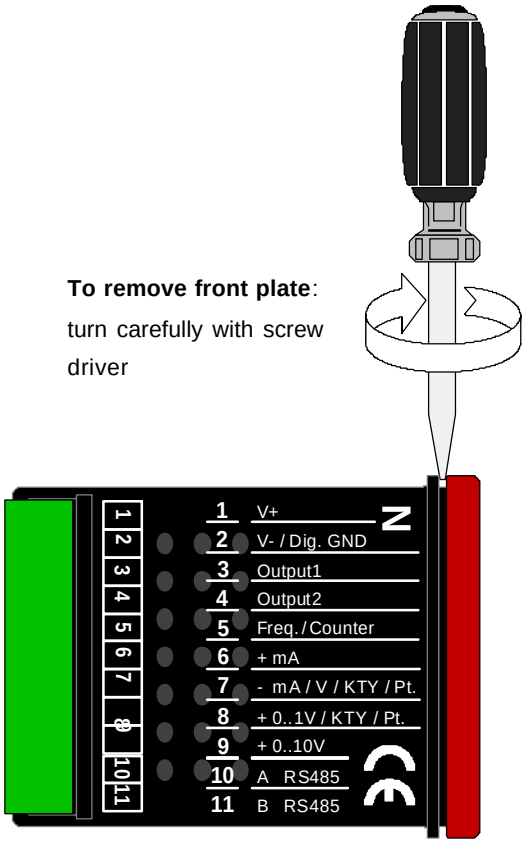
When leaving our factory the compact indicator has been subjected to various inspection tests and is completely calibrated.





button 1 button 2 button 3

Before it can actually be used, the compact indicator will have to be configurated for customer's application.



To remove front plate: turn carefully with screw driver

Please proceed as follows:

- connect compact indicator completely (see chapter 3 'Electric connection').
- remove red front plate (see sketch).
- switch on supply voltage and wait for segment test to be completed.
- adjust compact indicator to the input signal required proceeding as per chapter 4 'Input configuration'.
- set compact indicator outputs according to the directions given in chapter 5 'Output configuration'.
- red front plate to be snapped back on

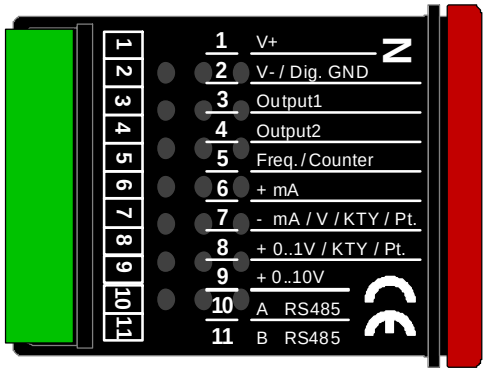
3. Electric connection

Wiring and commissioning of the unit must be carried out by trained personnel.

Wrong wiring may lead to the destruction of the digital display, in which case we cannot assume any warranty.

3.1. Terminal assignment

1	Supply voltage +Uv (9-28 V DC)
2	Supply voltage -Uv / GND
3	Switching output 1
4	Switching output 2
5	Frequency input / counter input
6	Input mA
7	Input GND
8	Input 0-1V
9	Input 0-10V
10	A ┐ RS485 interface
11	B ┘



Note: the terminals 2 (Supply voltage -Uv/GND) and 7 (Input GND) are internaly connected in the unit.

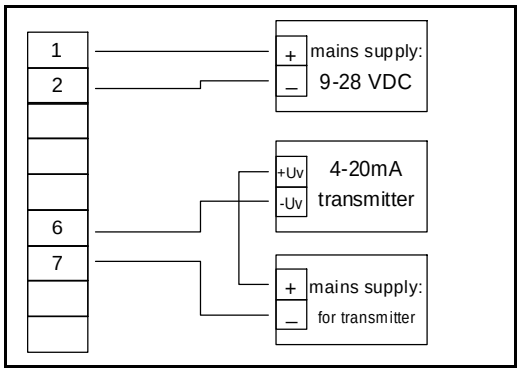
3.2. Connection data

	between terminals	typ.		Limitations		Notes
		min	max	min	max	
Supply voltage	1 and 2	9V	28V	0V	30V	DC voltage
Switching output 1 a. 2	3 a. 2, 4 a.2		30V 50mA	0V	30V 50mA	DC voltage
Input mA	6 and 7	0mA	20mA	0mA	40mA	
Input 0-1V	8 and 7	0V	1V	-0.5V	5V	
Input 0-10V	9 and 7	0V	10V	-1V	30V	
Frequency/counter input	5 and 2	< 0.8V	>2.4V	-0.5	30V	

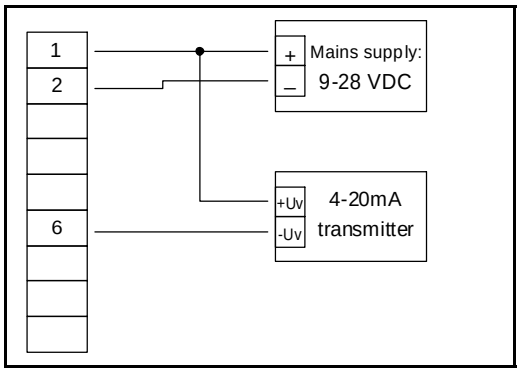
Before connection of the unit, please make sure that the permissible voltage and current values will not be exceeded.

3.3 Wiring of input signal

3.3.1 Wiring of a 4 to 20 mA measuring transducer in 2-wire technoloy

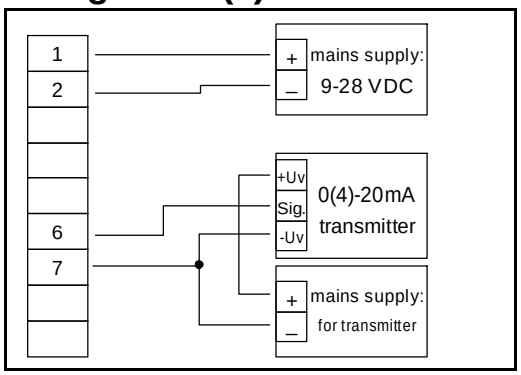


with individual transmitter supply

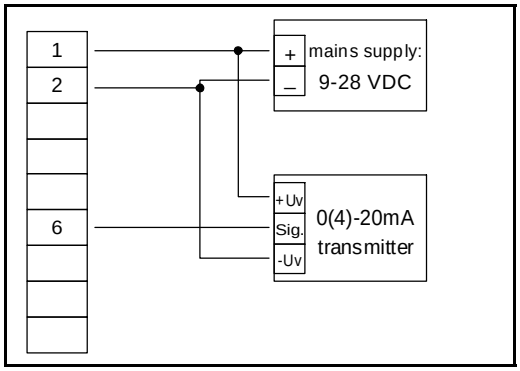


without individual transmitter supply

3.3.2. Wiring of a 0(4) to 20 mA measuring transducer in 3-wire technology

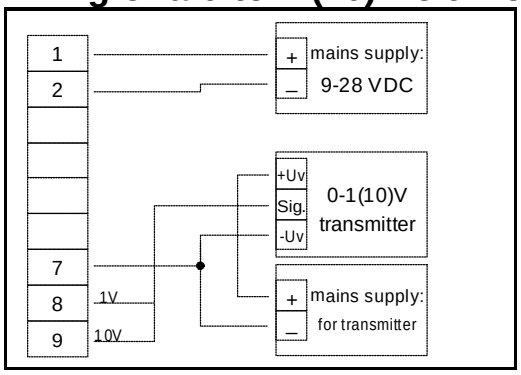


with individual transmitter supply

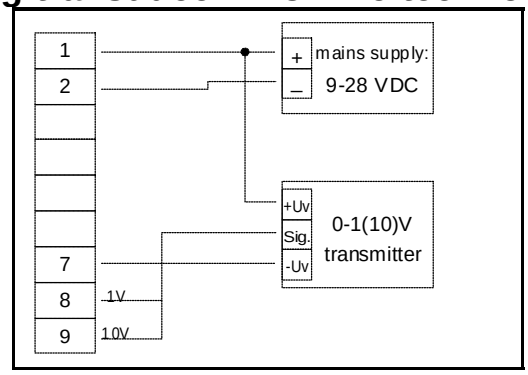


without individual transmitter supply

3.3.3. Wiring of a 0 to 1 (10) Volt measuring transducer in 3-wire technology

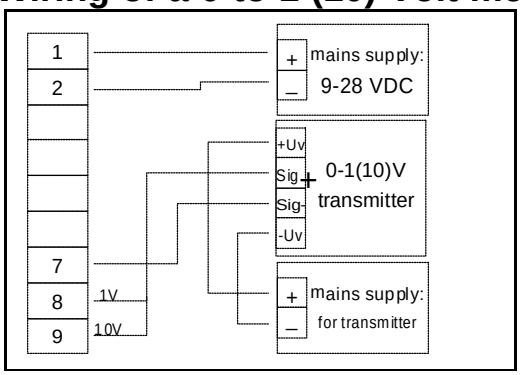


with individual transmitter supply

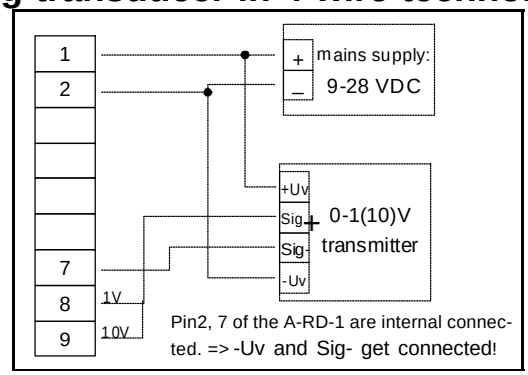


without individual transmitter supply

3.3.4. Wiring of a 0 to 1 (10) Volt measuring transducer in 4-wire technology

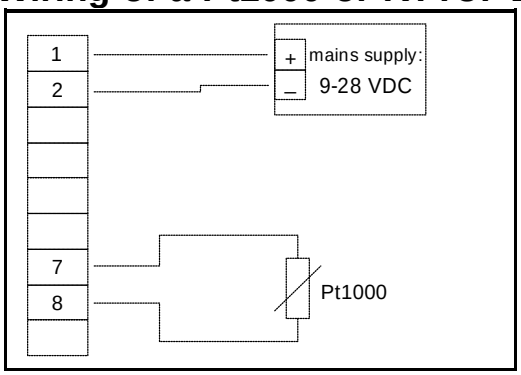


with individual transmitter supply

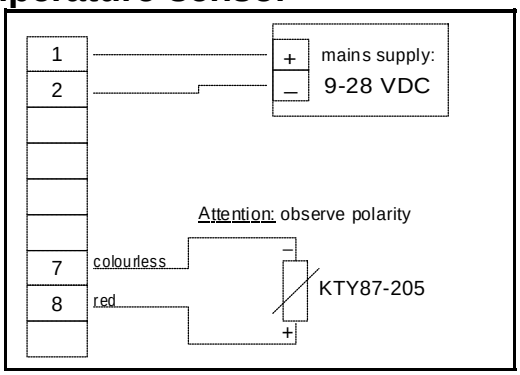


without individual transmitter supply

3.3.5. Wiring of a Pt1000 or KTY87-105 temperature sensor

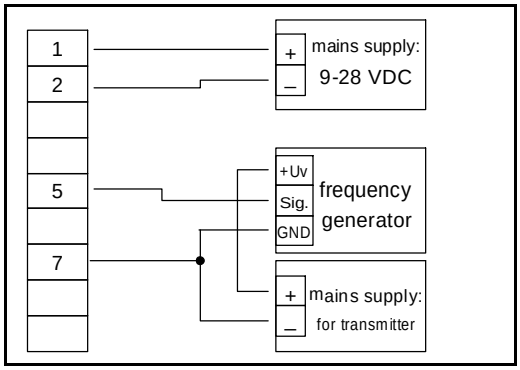


Pt1000 temperature sensor

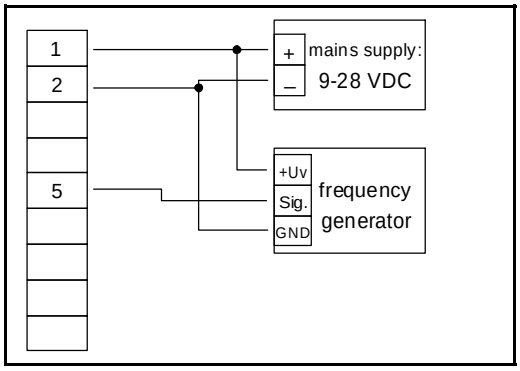


KTY87-205 temperature sensor

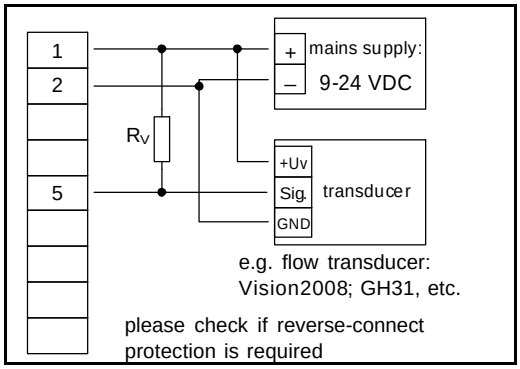
3.3.6. Wiring of a frequency signal



with individual frequency generator supply

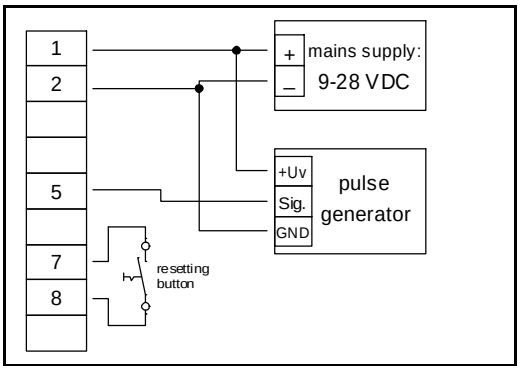


without individual frequency generator supply

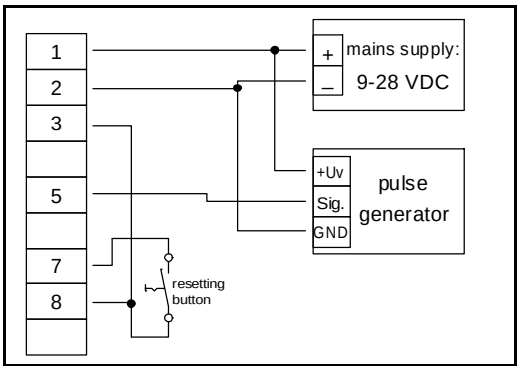


Connection of a transducer with open collector output

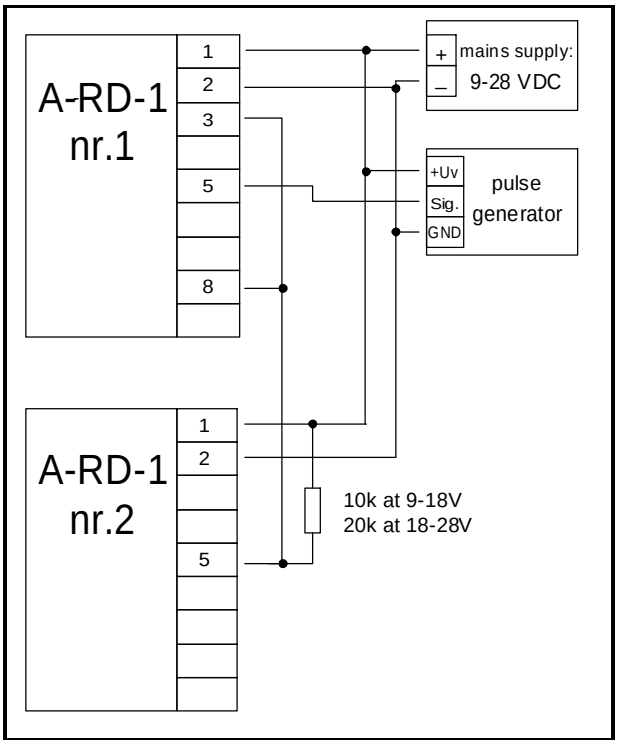
3.3.7. Wiring of a counter signal



Manual resetting with external button



Automatic resetting via output 1, additionally manual resetting with external button



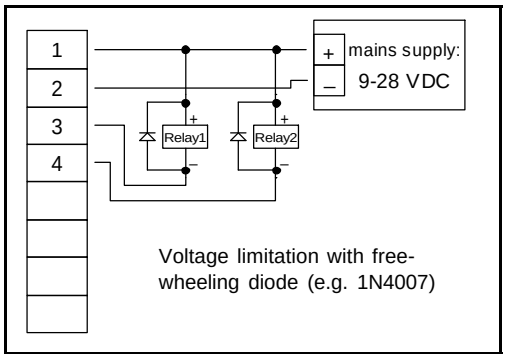
Cascading of A-RD-1

3.4. Wiring of switching outputs

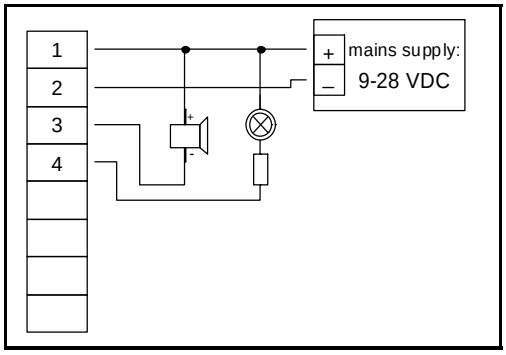
Both switching outputs are designed as open collector transistor outputs. In the active mode the signal (switching output on) existing at the switching
output will be switched reversely to the negative pole of the supply voltage (connection 2).

If an output is configurated for alarm, it will be 'on' as long as in idle state (no alarm). In case of an alarm condition being fulfilled, the output transistor will 'open'.
Please note that the max. permissible voltage of 30 Volt and the max. switching current of 50 mA must not be exceeded (not even for a short time).
Especially when switching inductive loads (e.g. relays, coils etc,) protective arrangements to limit voltage peaks have to be taken.

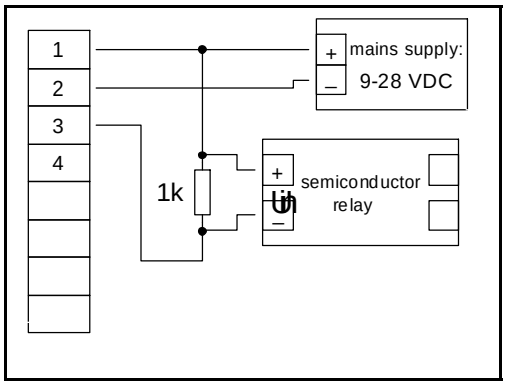
When switching large capacitive loads the making current will have to be limited to the permissible amperage by connecting a series resistor or a current limiter. The same applies to incandescent lamps, whose making current is also quite high due to their low cold resistance.



Connection of relay



Connection of audible piezo alarm and lamp



Connection of a semiconductor relay

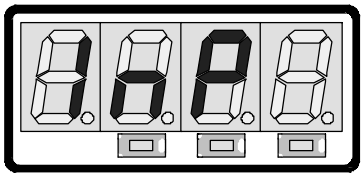
3.5 Wiring of several A-RD-1

Input and outputs as well as the RS485 interface
are **not** electrically isolated. If several A-RD-1 will be interconnected you have to make sure to avoid accidental energization.

Make sure to observe the following points :

- If several A-RD-1 are supplied by one supply voltage source, the sensors, measuring transducers etc. have to be electrically isolated.
- If the sensors, measuring transducers etc. cannot be electrically isolated, the digital display will have to be operated with electrically isolated supply voltage sources. Please note, that an electric connection may also be created via the media to be measured (e.g. pH-electrode and conductivity electrode in liquid).
- If the A-RD-1 units are connected via the RS485 interface, the sensors, measuring transducers etc. will have to be electrically isolated. If the compact indicators are supplied from one voltage source, the accidental energization (-Uv to -Uv) must not exceed 1 Volt.

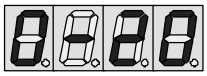
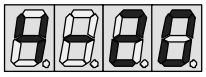
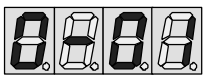
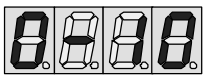
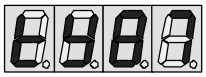
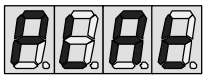
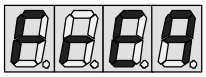
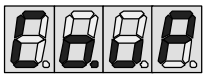
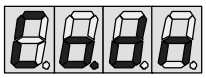
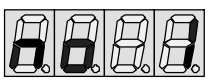
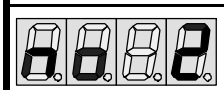
4. Input configuration



button 1 button 2 button 3

4.1 Selection of input signal

- Commission digital display and wait for segment test to be completed.
- Press button 3 (e.g. using small screw driver). INP ('INPUT') will be displayed.
- Select input signal by pressing button 1 or button 2 (left-hand respectively centre button).

Display	Input signal	Also refer to chapter
	0 to 20mA	4.2
	4 to 20mA	4.2
	0 to 1 Volt	4.2
	0 to 10 Volt	4.2
	KTY87-205 temperature sensor	4.3
	Pt1000 - temperature sensor	4.3
	frequency	4.4
	upwards counter	4.5
	downwards counter	4.5
	digital display mode 1 (only selectable by interface)	7.1
	digital display mode 2 (only selectable by interface)	7.2

- Acknowledge signal selected by pressing button 3. Display shows INP again.

Depending on the input signal selected, additional inputs will be required. Please proceed as per the instructions given in

chapter 4.2 for **0 to 20 mA, 4 to 20 mA, 0 to 1 Volt or 0 to 10 Volt;**

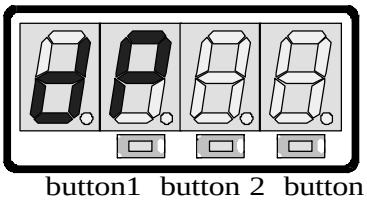
chapter 4.3 for **KTY87 or Pt1000;**

chapter 4.4 for **frequency and**

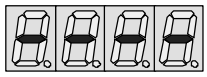
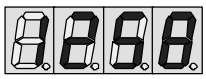
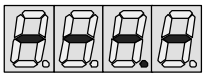
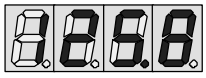
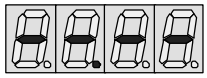
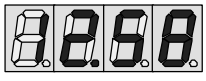
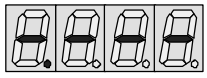
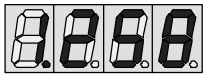
chapter 4.5 for **upwards or downwards counter.**

4.2. Standard signals 0 to 20 mA, 4 to 20 mA, 0 to 1 Volt and 0 to 10 Volt

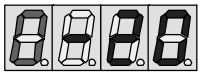
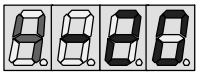
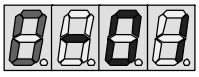
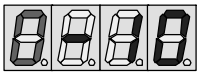
This chapter describes the configuration for standard signals. The following instructions are based on the assumption that an input signal, ie 0 to 20 mA, 4 to 20 mA, 0 to 1 Volt or 0 to 10 Volt has been selected according to the directions given in chapter 4.1. The display shows INP.



- Press button 3, display shows dP (decimal point).
- Select desired place for decimal point by pressing buttons 1 and 2

Display	Number of places after decimal point	Example
	0	
	1	
	2	
	3	

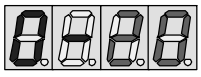
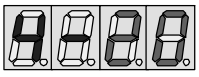
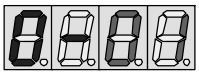
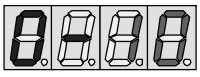
- Acknowledge position of decimal point by pressing button 3. Display shows dP again.
- After pressing button 3 again, the display will show the input signal set (0 to 20, 4 to 20, 0 to 1 or 0 to 10) with the left-hand figure flashing.

 or  or  or 

- Use buttons 1 and 2 to enter the value to be displayed for an input signal of 0 mA, 4 mA or respectively 0 Volt.

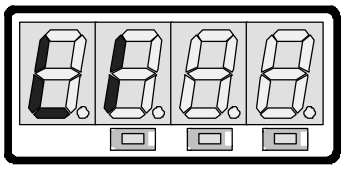
  Rolling function: Buttons 1 and 2 are equipped with a rolling function for entering values. Short pressing of the buttons increases (button 1) respectively decreases (button 2) value by one digit. After pressing of the buttons (>1s) for an extended time the values start counting up or downwards, with the counting speed being increased after 8 s.

- Acknowledge value displayed by pressing button 3. The display will show the input signal again.
- Switch over to next parameter by pressing button 3 once again. The display will continue showing the input signal selected with both right-hand figures flashing.

 or  or  or 

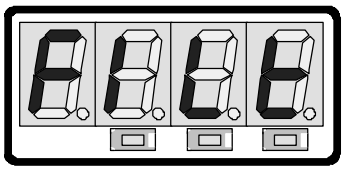
- Via buttons 1 and 2 you may now enter the value to be displayed on the A-RD-1 for either one of the following input signals: 20 mA, 1 Volt or 10 Volt.
- Acknowledge value set by pressing button 3. The display will show the input signal again.

- Press button 3 once again. The display will show LI (Limit).
- Use buttons 1 and 2 to select desired measuring range limitation.



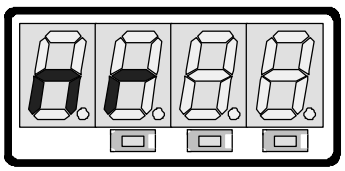
Display	Measuring range limitation	Application
0	The measuring range limits ard approx. 10% over/under the standard signal set.	Standard setting
1	Measuring range is exactly limited to the desired standard signal.	In case signals above/below the standard signal range result in errorneous display values: Examples rel. humidity > 100% pH-value < 0pH

- Acknowledge selection by pressing button 3. The display will show LI again.
- Press button 3 once again. The display will show FILt (Filter).
- Select desired input filter 0, 1 or 2 with buttons 1 and 2.



Display	Filter range	Delay in display	Notes
0	off	-----	
1	on	approx. 1.5 seconds	If no valid measuring values can be found, an "average value" of the latest measuring series will be displayed.
2	on	approx. 1.5 seconds	If no valid measuring values can be found the fault message FE5 will be displayed.

- Acknowledge by pressing button 3 once again. The display will show FILt again.
- Press button 3 once again. The display will show nr (Number).
- Use buttons 1 and 2 to enter the address numbers for accessing the A-RD-1 in a data communication network. For more detailed information please refer to chapter 6 'RS485-interface'.



If you do not intend to use the RS485 interface, please disregard and skip both this point and the following one.

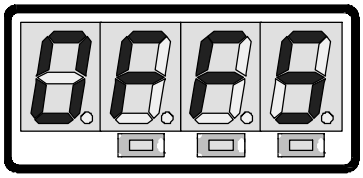
- Acknowledge your input by pressing button 3. The display will show nr again.

You have now completed setting up and adjusting of your display to your measuring transducer. Please proceed to the next step of commissioning, i.e. configuration of the A-RD-1 outputs as described in chapter 5.

4.3 Temperature sensor KTY87-205 and Pt1000

This chapter describes the configuration for direct connection of a temperature sensor type KTY87-205 or Pt1000. The following instructions are based on the assumption that you have selected input signal KTY87 or Pt1000 as described in chapter 4.1.
The display should show INP.

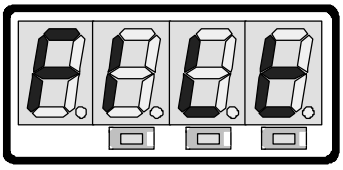
- Press button 3, the display will show OFFS (Offset).
- Set offset value (zero offset) with buttons 1 and 2. **We recommend that the offset value be set to 0.0 respectively 0.**



button 1 button 2 button 3

The offset value offers the possibility of correcting display faults resulting from very long and thin connecting lines respectively sensor tolerances. The value input here will be subtracted from the measuring result (offset of characteristic curve parallel to zero value).

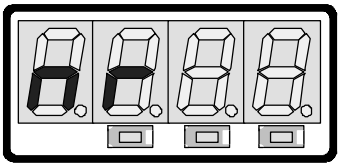
- Acknowledge offset value by pressing button 3. The display will show OFFS again.
- Press button 3 once again. The display will show FILt (Filter).



- Select desired input filter 0, 1 or 2 with buttons 1 and 2.

Display	Filter state	Delay in display	Notes
0	off	-----	
1	on	approx. 1.5 seconds	If no valid measuring values can be found, an "average value" of the latest measuring series will be displayed.
2	on	approx. 1.5 seconds	If no valid measuring values can be found the fault message FE5 will be displayed.

- Acknowledge by pressing button 3 once again. The display will show FILt again.
- Press button 3 once again. The display will show nr (Number).



- Use buttons 1 and 2 to enter the address numbers for accessing the A-RD-1 in a data communication network. For more detailed information please refer to chapter 6 'RS485-interface'

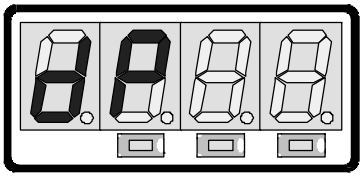
If you do not intend to use the RS485 interface, please disregard and skip both this point and the following one.

- Acknowledge your input by pressing button 3. The display will show nr again.

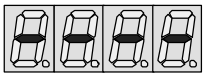
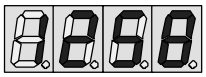
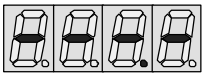
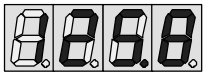
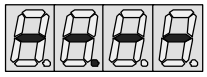
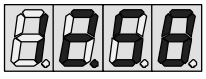
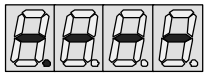
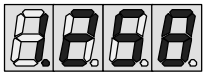
You have now completed setting up and adjusting of your A-RD-1 to your measuring transducer. Please proceed to the next step of commissioning, i.e. configuration of the A-RD-1 outputs as described in chapter 5.

4.4 Frequency measuring

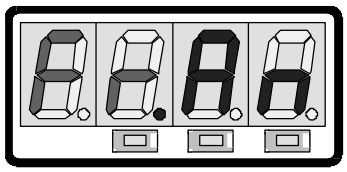
This chapter describes the configuration of the digital display when used for frequency measuring. The following instructions are based on the assumption that you have selected input signal 'frequency' as described in chapter 4.1.
The display should show INP.



- Press button 3, the display will show dP (decimal point).
- Select position of decimal point as desired by pressing buttons 1 and 2.

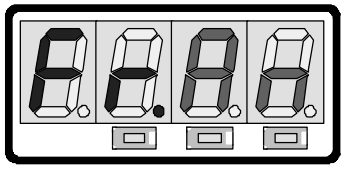
Display	Number of places after decimal point	Example
	0	
	1	
	2	
	3	

- Acknowledge position of decimal point by pressing button 3. The display will show dP again.
- Press button 3, the display will show Fr.An., with Fr (frequency) flashing.
- Enter highest frequency value to be measured by pressing buttons 1 and 2.

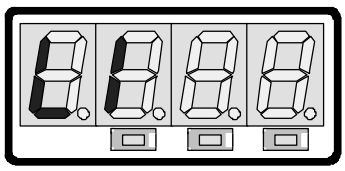


Rolling function: Buttons 1 and 2 are equipped with a rolling function for entering values. Short pressing of the buttons increases (button 1) respectively decreases (button 2) value by one digit. After pressing of the buttons for an extended time (>1s) the values start counting up or downwards, with the counting speed being increased after 8 s.

- Acknowledge input with button 3. The display will show Fr.An. again.
- Press button 3 once again. The display continues showing Fr. An., with An (Anzeige=display) flashing.
- Use buttons 1 and 2 to enter value to be displayed on the A-RD-1 for the highest possible frequency set before.

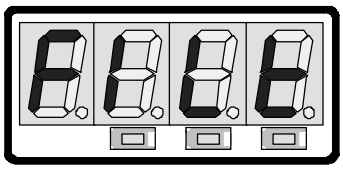


- Acknowledge value to be displayed by pressing button 3. The display will show Fr.An. again.
- Press button 3 once again. The display will show LI (Limit).
- Select desired limitation of measuring range by pressing buttons 1 and 2.



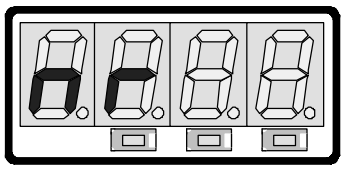
Display	Measuring range limitation	Application
0	Frequencies up to 10kHz will be measuredl	Standard setting
1	Frequencies exceeding the highest possible frequency set will result in erroneous displays.	In case signals exceed the highest frequency this will result in erroneous display values: Examples: rel. humidity > 100%

- Acknowledge selection by pressing button 3. The display will show LI again.
- Press button 3 once again, the display will show FILt (Filter).
- Select desired input filter 0, 1 or 2 by pressing buttons 1 and 2.



Display	Filter state	Delay in display	Notes
0	off	-----	
1	on	approx. 1.5 seconds	If no valid measuring values can be found, an "average value" of the latest measuring series will be displayed.
2	on	approx. 1.5 seconds	If no valid measuring values can be found the fault message FE5 will be displayed.

- Acknowledge by pressing button 3 once again. The display will show FILt again.
- Press button 3 once again. The display will show nr.
- Use buttons 1 and 2 to enter the address numbers for accessing the A-RD-1 in a data communication network. For more detailed information please refer to chapter 6 'RS485-interface'.



If you do not intend to use the RS485 interface, please disregard and skip both this point and the following one.

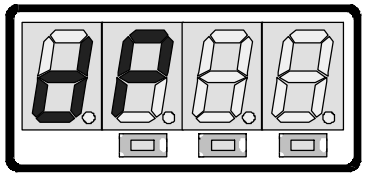
- Acknowledge your input by pressing button 3. The display will show nr again.

You have now completed adjusting of your display to the measuring transducer. Please proceed to the next step of commissioning, i.e. configuration of the A-RD-1 outputs as described in chapter 5.

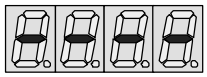
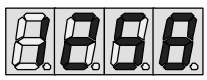
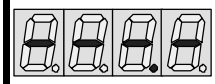
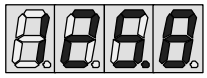
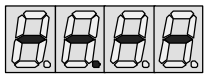
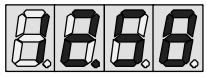
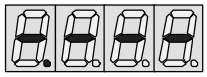
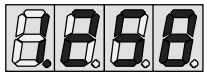
4.5 Upwards/downwards counter

This chapter describes the configuration of the display when used as counter. The following instructions are based on the assumption that you have selected input signal 'upwards counter' (Co.uP) or 'downwards counter' (Co.dn) as described in chapter 4.1. The display should show INP.

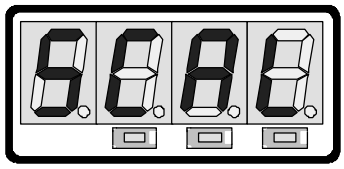
- Press button 3, the display will show dP (decimal point).
- Select position of decimal point as desired by pressing buttons 1 and 2.



button 1 button 2 button 3

Display	Number of places after decimal point	Example
	0	
	1	
	2	
	3	

- Acknowledge position of decimal point by pressing button 3. The display will show dP again.
- Press button 3, the display will show SCAL (scaler).
- Set desired scaler value (1 to 255) by pressing buttons 1 and 2.



Rolling function: Buttons 1 and 2 are equipped with a rolling function for entering values. Short pressing of the buttons increases (button 1) respectively decreases (button 2) value by one digit. After pressing of the buttons for an extended time (>1s) the values start counting up or downwards, with the counting speed being increased after 8 s.

The pulses received at the input will be divided by the scaler value before being evaluated.

*The digital display is able to process a maximum number of 20 pulses directly. By entering a corresponding scaler value pulse frequencies of up to 5100 pulses (= 20 pulse/s *255) can be displayed.*

*The A-RD-1 counter ranges from 0 to 32767 pulses. By means of the scaler this range can be extended to up to 8355585 pulses (32767*255).*

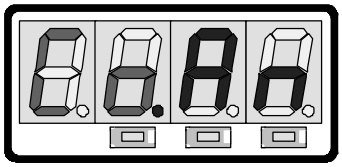
Coarse scaling is also facilitated by the scaler value.

Example: A flow sensor emits 120 pulses per litre. By entering a scaler value of 120 one pulse per litre will be transferred to the A-RD-1 for evaluation.

If possible, we recommend setting a scaler value above 1, as this will render the compact indicator unit more insensitive to high frequency interference signals.

- Acknowledge scaler value by pressing button 3. The display will show SCAL again.

- Press button 3, the display will show "CoAn", with Co (counter) flashing.

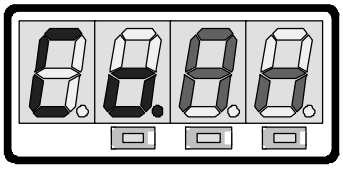


- Use buttons 1 and 2 to set
  - max. number of pulses to be counted (for upwards counter).
  - number of pulses as of which to start downwards counting (for downwards counter).

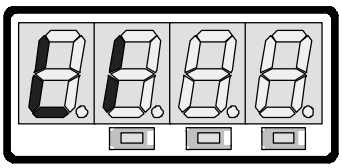
A value of 9999 has to be set for the required number of pulses from 10000 to 32767.

Please note: *At this point set number of pulses to be transferred to the display after the scaler. In order to calculate overall number of pulses, this value has to be multiplied by the scaler value set.*

- Acknowledge input by pressing button 3 once again. The display will show Co.An again.
- Press button 3 once again. The display will continue showing Co.An, with An (display) flashing.



- Use buttons 1 and 2 to enter the value to be displayed by the A-RD-1 for any preselected number of pulses.
- Acknowledge display value by pressing button 3. The display will show Co.An again.
- Press button 3 once again. The display will show LI (Limit).



- Select desired limitation of measuring range by pressing buttons 1 and 2.

Display	Measuring range limitation	Application
0	Frequencies up to 10kHz will be measuredl	Standard setting
1	Frequencies exceeding the highest possible frequency set will result in erroneous displays.	In case signals exceed the highest frequency this will result in erroneous display values: Examples: rel. humidity > 100%

- Acknowledge selection by pressing button 3. The display will show LI again.

You have now completed adjusting of your A-RD-1 to the measuring transducer.

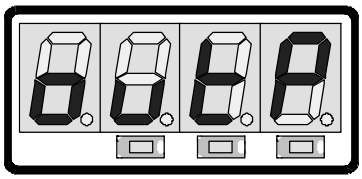
Please proceed to the next step of commissioning, i.e. configuration of the A-RD-1 outputs as described in chapter 5.

5. Output configuration

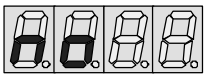
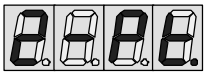
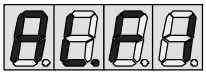
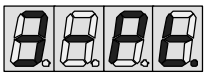
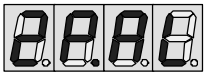
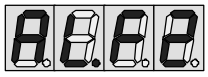
The switching outputs must never be configurated prior to the configuration of the input (please refer to chapter 4).

5.1 Setting of output function

- Commission A-RD-1 and wait for segment test to be completed.
- Press button 3 till outP ('Output') will be displayed.
- Select desired output function by pressing buttons 1 and 2.



button 1 button 2 button 3

Display	Description	Function		continue with chapter
		Output 1	Output 2	
	no function, used as display only	--------	--------	
	2-level controller	digital 2-level controller	--------	5.2
	common min./max. alarm	min. and max. alarm	--------	5.3
	3-level controller	digital 2-level controller	digital 2-level controller	5.2
	2-level controller with min./max. alarm	min. and max. alarm	digital 2-level controller	5.4
	individual min./max. alarm	max. alarm	min. alarm	5.3

- Acknowledge output function selected by pressing button 3. The display will show outP again.

Depending on the output signal selected, the various making/breaking points respectively min./max. alarm limits will have to be entered. Please proceed as per the instructions given in

chapter 5.2 for 2-level controller.

chapter 5.3 for common min./max. alarm.

chapter 5.2 for 3-level controller.

chapter 5.4 for 2-level controller with min./max. alarm.

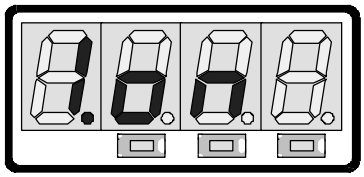
chapter 5.3 for individual min./max. alarm.

If you have not selected any function, the configuration is now completed. Press button 3 to switch over to display of measuring value.

5.2. 2-level controller, 3-level controller

This chapter describes the setting of the making points when using the A-RD-1 as digital 2-level controller or 3-level controller. The following instructions are based on the assumption that you have selected output function '2-level controller' or '3-level controller' as described in chapter 5.1. The display should show outP.

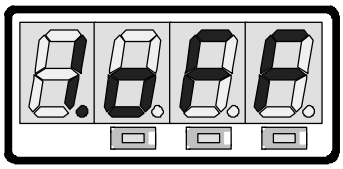
- Press button 3, the display will show I.on (making point of output 1).
- Use buttons 1 and 2 to set value at which output 1 is to be made.



button 1 button 2 button 3

Rolling function: Buttons 1 and 2 are equipped with a rolling function for entering values. Short pressing of the buttons increases (button 1) respectively decreases (button 2) value by one digit. After pressing of the buttons for an extended time (>1s) the values start counting up or downwards, with the counting speed being increased after 8 s.

- Acknowledge making point set by pressing button 3. The display will show I.on again.
- Press button 3 once again, the display will show I.oFF (breaking point of output 1).
- Use buttons 1 and 2 to set value at which output 1 is to be broken.

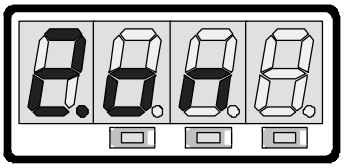


- Acknowledge value by pressing button 3. The display will show I.oFF again.

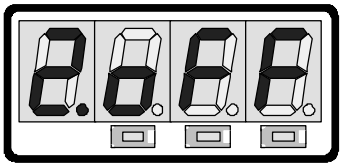
If you have selected the '2-level controller' function the configuration of the display is now completed. Press button 3 once again to switch over to display of measuring value.

If you have selected the '3-level controller' function, please proceed as follows:

- Press button 3. The display will show 2.on (making point of output 2).
- Use buttons 1 and 2 to set making point of output 2.
- Acknowledge by pressing button 3. The display will show 2.on again.



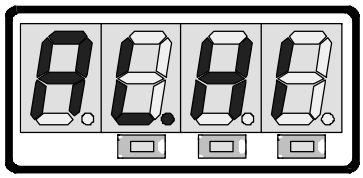
- Press button 3 once again. The display will show 2.oFF (breaking point of output 2).
- Use buttons 1 and 2 to set breaking point.
- Acknowledge breaking point by pressing button 3. The display will show 2.oFF again.



The configuration is now completed. Press button 3 once again to switch over to display of measuring value.

5.3. Min./max. alarm

This chapter describes the setting of the making points when using the A-RD-1 for min./max. value monitoring. The following instructions are based on the assumption that you have selected output function 'common min./max. alarm' or 'individual min./max. alarm' as described in chapter 5.1. The display should show outP.

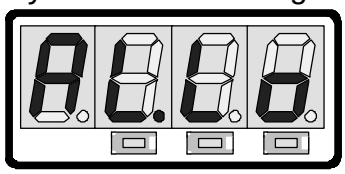


button 1 button 2 button 3

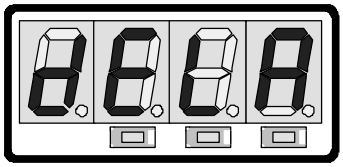
- Press button 3, the display will show AL.HI (max. alarm limit).
- Use buttons 1 and 2 to set max. alarm limit.

  Rolling function: Buttons 1 and 2 are equipped with a rolling function for entering values. Short pressing of the button increases (button 1) respectively decreases (button 2) value by one digit. After extended pressing of the buttons (>1s) the values start counting up or downwards, with the counting speed being increased after 8 s..

- Acknowledge alarm limit set by pressing button 3. The display will show AL.HI. again.



- Press button 3 once again. The display will show AL.Lo (min. alarm limit).
- Use buttons 1 and 2 to set minimum alarm limit.
- Acknowledge by pressing button 3. The display will show AL.Lo again.



- Press button 3 once again. The display will show dELA (alarm delay).
- Use buttons 1 and 2 to set alarm delay.

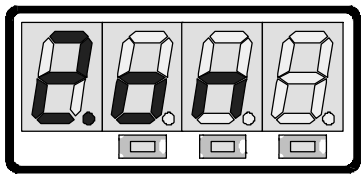
  The value displayed corresponds to the delay time in minutes.

- Acknowledge delay set by pressing button 3. The display will show dELA again.

The configuration is now completed. Press button 3 once again to switch over to display of measuring value.

5.4. 2-level controller with min./max. alarm

This chapter describes the setting of the making points when using the display as digital 2-level controller with min./max. alarm. The following instructions are based on the assumption that you have selected output function '2-level controller with min./max. alarm' as described in chapter 5.1. The display should show outP.

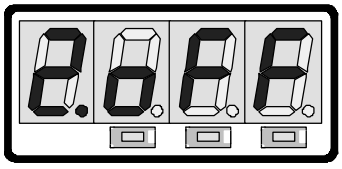


- Press button 3, the display will show 2.on (making point of output 2).
- Use buttons 1 and 2 to set making point of output 2.

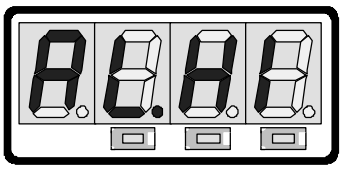
  Rolling function: Buttons 1 and 2 are equipped with a rolling function for entering values. Short pressing of the button increases (button 1) respectively decreases (button 2) value by one digit. After extended pressing of the buttons (>1s) the values start counting up or downwards, with the counting speed being increased after 8 s.

button 1 button 2 button 3

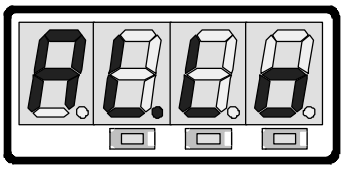
- Acknowledge making point by pressing button 3. The display will show 2.on again.



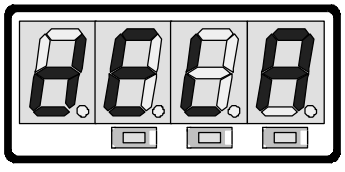
- Press button 3 once again. The display will show 2.oFF (breaking point of output 2).
- Use buttons 1 and 2 to set breaking point of output 2.
- Acknowledge breaking point by pressing button 3. The display will show 2.oFF again.



- Press button 3. The display will show AL.HI (max. alarm limit).
- Use buttons 1 and 2 to set max. alarm limit.
- Acknowledge alarm limit set by pressing button 3. The display will show AL.HI again.



- Press button 3 once again. The display will show AL.Lo (minimum alarm limit).
- Use buttons 1 and 2 to set min. alarm limit
- Acknowledge by pressing button 3. The display will show AL.Lo. again



- Press button 3 once again. The display will show dELA (alarm delay).
- Use buttons 1 and 2 to set alarm delay.

  The value displayed corresponds to the delay time in minutes.

- Acknowledge delay set by pressing button 3. The display will show dELA again.

The configuration is now completed. Press button 3 once again to switch over to display of measuring value.

6. RS485 - interface

The serial interface of the digital display allows communication of the unit with a host computer. Data polling and transfer is done in the master/slave mode, ie the A-RD-1 will only transmit data upon request. A separate unit address can be attributed to each A-RD-1. Addresses 0 to 15 are implemented. The A-RD-1 will only respond if requested to do so by the host, provided the unit number of the request string corresponds to the one set (It will respond within 30 to 60ms after the end of the request). This method as well as the fact that the interface operates in the half-duplex mode ensure that up to 16 devices can be called via only one 2-wire line.

6.1. Interface configuration

Type	RS485
Transfer mode	half-duplex
Connection	2-pin screw/plug-in connection
Connecting cable	2-pin, twisted

6.2. Data transfer format

2400 baud
1 start bit
7 data bits
no parity bit
1 stop bit

Communication is entirely achieved by means of printable ASCII code.

6.3. Data transfer processing protocol

Request data from A-RD-1:

Request string to A-RD-1

	!	Nr.	Nr.	F1	F2	/
Byte	1	2	3	4	5	6

Response from A-RD-1

	#	F1	F2	$	D1	D2	D3	D4	/
Byte	1	2	3	4	5	6	7	8	9

Send data to A-RD-1:

Send sting to A-RD-1

	!	Nr.	Nr.	#	F1	F2	$	D1	D2	D3	D4	/
Byte	1	2	3	4	5	6	7	8	9	10	11	12

Response from A-RD-1

	#	a	/	if data have been successfully taken over
Byte	1	2	3	

6.4. Description of characters used:

! : ASCII code: 21H

his character interrupts a connection, if any is existing, and resets all compact indicators connected to their original state thus initialising a check to ensure that the following two characters correspond to their respective unit numbers.

Nr. : Permissible area "0" to "9" and "A" to "F"
(corresponding to ASCII code 30H to 39H and 41H to 46H)

As a precaution unit number will be transmitted twice.

Data will not be processed unless the unit number transmitted is identical to the one set in the respective indicator. If numbers are not identical the unit will only check if the data stream contains another "!" character thus indicating a new data circuit.

F1,F2 : Permissible range see table 1

Functional codes, specifying the parameter and/or value to be processed. For assignments please refer to table 1 of chapter 6.5 'functional code'.

/ : ASCII code: 2FH
Indicates the end of a data transfer process.

Each data transfer process, either from host to display or from display to host is completed by putting "/".

: ASCII code: 23H
Indicates the beginning of a data transfer process.

'#' is issued by the compact indicator prior to starting transfer of data to the host. If the character '#' is transferred by the host after issuing of the unit number, the A-RD-1 will know that data are to be transferred from the host to the display (programming).

$: ASCII code: 24H

Signals that the data following will be transferred in hexadecimal code.

D1..D4 : Permissible range '0' to '9' and 'A' to 'F'.
(corresponding to ASCII code 30H to 39H and 41H to 46H)

Data will be presented in the hexadecimal mode. For more detailed information please refer to chapter 6.6 'Data formats'.

a : ASCII code: 61H

transferred as hand-shake signal after successful data input to the memory.

6.5. Functional code

The value (parameter) to be read respectively re-programmed is specified by two bytes, designed F1 and F2 in the data transfer protocol.

Table 1 illustrates the assignment of functional code and value (parameter) as well as of the correspondingly vlaid data format.

It is vital to ensure that only those functional codes and their permissible data as stated in table 1 are transmitted to the display as otherwise internal settings of the unit could be changed.

Parameter resp. value	ASCII character		ASCII code		Data format
	F1	F2	F1	F2	
Display value	0	0	30H	30H	1
System state	0	3	30H	33H	2
Input signal	0	4	30H	34H	3
Position of decimal point	0	5	30H	35H	4
Scaler for counter function	0	6	30H	36H	5
Display value for 0mA, 4mA resp. 0 Volt, highes t frequency to be measured, max. number of pulses	0	7	30H	37H	1 11 11
Display value for 20mA, 1 Volt resp. 10 Volt, display value for max. frequency, display value for max. number of pulses	0	8	30H	38H	1
Limitation of measuring range	0	9	30H	39H	6
Filter	0	A	30H	41H	7
Unit address	0	B	30H	42H	8
Output prompt	0	C	30H	43H	9
Making point, switching output 1	0	D	30H	44H	1
Breaking point, switching output 1	0	E	30H	45H	1
Making point, switching output 2	0	F	30H	46H	1
Breaking point, switching output 2	1	0	31H	30H	1
Max. alarm limit	1	1	31H	31H	1
Min. alarm limit	1	2	31H	32H	1
Alarm delay	1	3	31H	33H	10

Table 1

6.6. Data format

General information:

The four bytes termed D1 to D4 in the data transfer protocol represent the parameter value specified by F1 and F2.
The value is represented in hexadecimal printable ASCII characters.

The A-RD-1 treats all values as 16 bit words, which means that a range of values from -32768 to +32767 and correspondingly a range from 8000H to 7FFFH can be displayed.

The following 4 data bytes contain the 16 bits mentioned above:

D1	equalising	Bit	15	to	12
D2	equalising	Bit	11	to	8
D3	equalising	Bit	7	to	4
D4	equalising	Bit	3	to	0

Examples:

Value		ASCII character				ASCII code			
decimal	**hex**	**D1**	**D2**	**D3**	**D4**	**D1**	**D2**	**D3**	**D4**
0	0000H	0	0	0	0	30H	30H	30H	30H
-1	FFFFH	F	F	F	F	46H	46H	46H	46H
-1999	F831H	F	8	3	1	46H	38H	33H	31H
+9999	270FH	2	7	0	F	32H	37H	30H	46H
-100	FF9CH	F	F	9	C	46H	46H	39H	43H
+100	0064H	0	0	6	4	30H	30H	36H	34H

Data format 1:

Data format 1 corresponds to the general data format. It is only the range of values that is limited to the display range of -1999 to +9999 equalising F831H to 270FH.

The decimal point will not be considered. The decimal point position can be called up separately.

Data format 2:

This format is used to call up and reset the system state. Data bytes D1 to D4 contain information regarding the alarm and fault state of the unit.

The assignment is as follows:

Data byte D1:	Bit 0 = 1 :	Fault FE5 active
	Bit 2 = 1 :	Fault FE7 active
	Bit 3 = 1 :	Fault FE8 active
Data byte D2:	Bit 0 = 1 :	Fault FE1 active
	Bit 1 = 1 :	Fault FE2 active
Data byte D4:	Bit 0 = 1 :	max. alarm
	Bit 1 = 1 :	min. alarm
	Bit 3 = 1 :	alarm

Data format 3:

This format is used to call up and program the input signal.

The assignment is as follows:

0 : Current input 0 to 20 mA
1 : Current input 4 to 20 mA
2 : Voltage input 0 to 1 Volt
3 : Voltage input 0 to 10 Volt
4 : Resistance input KTY87-205
5 : Resistance input Pt1000
6 : Frequency input
7 : Upwards counter
8 : Downwards counter
9 : Digital indicator: mode 1 (only selectable by interface)
10 : Digital indicator: mode 2 (only selectable by interface)

Data format 4:

This format is used to call up and/or program the position of the decimal point.

The assignment is as follows:

0 : no decimal point
1 : decimal point after 2 digits (10)
2 : decimal point after 3 digits (100)
3 : decimal point after 4 digits (1000)

Data format 5:

This format is used to call up and program the scaler for the counter function. The scaler can be set to a value between 1 and 255.

Data format 5 corresponds to the general data format. It is only the range of values that is limited to the permissible scaler range of 1 to 255 equalising 0001H to 00FFH.

Data format 6:

This format is used to program the limitation of the measuring range:

The assignment is as follows:

0 : extended measuring range limits (LI = 0)
1 : narrow measuring range limits (LI = 1)

Data format 7:

This format is used to call up and program the filter:

The assignment is as follows:

0 : filter off (FILt = 0)
1 : filter on with "calculation of average value" (FILt = 1)
2 : filter on with FE7 message being active (FILt = 2)

Data format 8:

This format is used to program the unit address. Permissible addresses range from 0 to 15.

Data format 8 corresponds to the general data format. It is only the range of values that is limited to the permissible unit addresses from 0 to 15 equalising 0000H to 000FH.

Data format 9:

This format is used to call up and program the output configuration application:

The assignment is as follows:

0 : no output active, unit used as display only
1 : 2-level controller
2 : common min./max. alarm
3 : 3-level controller
4 : 2-level controller with alarm
5 : individual min./max. alarm

Data format 10:

This format is used to call up and/or program the alarm delay time. The delay time programme range is 0 to 99 minutes.

Data format 10 corresponds to the general data format. It is only the range of values that is limited to the permissible delay time of 0 to 99 minutes equalising 0000H to 0063H.

Data format 11:

corresponds to the general data format.

6.7. Availability

The RS485 interface cannot be used if the compact indicator is configurated as upwards or downwards counters.

When used in connection with the frequency measuring function, the following limitations have to be taken into account:

Any data exchange whatsoever at the RS485 input of the A-RD-1, will interrupt the frequency measuring. The display will continue to show the value measured last. In case of the data exchange lasting for some time, the display will show the fault code FE8, thus signalling that frequency measuring has been interrupted.

In order to allow frequency measuring and data communication to take place simultaneously, a break of at least 2 s will have to be introduced between two data request/transfer.

7. A-RD-1 - digital display only

The digital display is equipped with the "no 1" and "no 2" functions. In this mode the A-RD-1 is a display unit only, no measurements are taken.

Please note that the "no 1" and/or "no 2" functions can only be activated via the RS485 - interface and cannot be set via the keys located at the unit.

7.1. Digital display mode 1:

In this mode the value transmitted via the interface is displayed.

Please note: The display value and decimal point position will be transmitted separately (see data format 1 and/or 4).

7.2. Digital display mode 2:

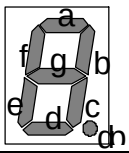
This mode can be used to call up the display elements directly.
In addition a blinking mode can be activated for each of the 7 display elements individually.
The segment information is transferred via the two F1/F2-Codes "01" (30H, 31H) and "02" (30H, 31H).
As the A-RD-1 works with ASCII-Codes only it is possible to transmit 16 segment informations (16 bit) per F1/F2-Code.
To control the 32 segments of the display two F1/F2-Codes are required.

First of all send Code "02" prior to sending Code "0".

Sending of "02" ‚freezes' the display value.
By sending "01" the value is made available for the display.
Please refer to the opposite table for the segment assignment.

In addition to controlling the individual segments the blinking mode can be activated for each of the four 7-segment displays.
Use the F1/F2-Codes "00" to activate and deactivate the blinking mode.
By sending of "00" the value will be made available for the display simultaneously.

F1/F2 code	Data byte	Bit	
0 0	D4	0	Blinking at 1 step (1=on)
		1	Blinking at 10 step (1=on)
		2	Blinking at 100 step (1=on)
		3	Blinking at 1000 step (1=on)

F1/F2 code	Data byte	Bit		
0 1	D4	0	segment e	
		1	segment d	
		2	segment c	
		3	segment b	1 step
	D3	0	segment a	
		1	segment f	
		2	segment g	
		3	segment dp	
	D2	0	segment e	
		1	segment d	
		2	segment c	
		3	segment b	10 step
	D1	0	segment a	
		1	segment f	
		2	segment g	
		3	segment dp	
0 2	D4	0	segment e	
		1	segment d	
		2	segment c	
		3	segment b	100 step
	D3	0	segment a	
		1	segment f	
		2	segment g	
		3	segment dp	
	D2	0	segment e	
		1	segment d	
		2	segment c	
		3	segment b	1000 step
	D1	0	segment a	
		1	segment f	
		2	segment g	
		3	segment dp	

8. Malfunction codes:

A corresponding fault code will be displayed as soon as the digital display detects an operating state that is not permissible.

Fault codes are defined as follows:

FE1: Measuring range has been exceeded

This fault code indicates that the measuring range has been exceeded.

Potential causes: input signal too high
sensor broken (KTY87-205 and Pt1000)
sensor short circuit (0(4) to 20mA)
counter overflow

Remedies: The fault code is reset as soon as the input signal has returned to within the permissible limits.
Check sensor, measuring transducer and/or frequency generator.
Reset counter.

FE2: Values below measuring range

This fault code indicates that the values of the A/D converter are below the measuring range.

Potential causes: input signal negative
current below 4mA
sensor short circuit (0(4) to 20mA)
sensor broken (4 to 20mA)
counter underflow

Remedies: The fault code is reset as soon as the input signal has returned to within the permissible limits.
Check sensor, measuring transducer and/or frequency generator.
Reset counter.

FE3: Display range has been exceeded

This fault code indicates that the permissible display range has been exceeded.

Potential causes: please refer to FE1

Remedies: please refer to FE1

FE4: Values below display range

This fault signal indicates that the values are below the permissible display range.

Potential causes: please refer to FE2

Remedies: please refer to FE2

FE5: Measuring signal interfered

This signal indicates that the measuring signal at the input of the display is unstable.

Potential causes: strong EMC interferences
defective measuring transducer

Remedies: The fault message will disappear as soon as the measuring values are stable again.
Check wiring, sensor and/or measuring transducer.
Use screened cables if operating in an environment with strong interferences.

FE7: System fault

The display is equipped with a self-diagnosis function for constantly checking essential parts. In case of a defect, the fault message FE7 is displayed.

Potential causes: permissible operating temperature has been exceeded
operating temperature below permissible range
A-RD-1 defective

Remedies: Observe permissible operating temperature
Exchange defective A-RD-1.

FE8: Frequency measuring not possible

Potential causes: continuos data transfer at RS485 interface

Remedies: increase interface idle time between transfer to 2s at lenst.

9. Specification

Sensor inputs:

Can be selected via 3 buttons located under the removable front plate or via the standard RS485 interface.

Standard signals:
4 to 20mA; Ri=50Ohm
0 to 20mA; Ri=50Ohm
0 to1V; Ri=30kOhm
0 to 10V; Ri=300kOhm

Resistance input:
for temperature measuring (2-wire).Two characteristic sensor curves are implemented:
KTY87-205: -40...110°C, resolution: 0,1°C
Pt1000: -50...600°C, resolution: 1°C
Digital zero point offset can be carried out via buttons or interface.
Please note**:** Any temperature sensor with measuring transducer (Pt100, NiCr-Ni, etc.) can be connected via standard signal input

Frequency input:
Measured frequency: 0 bis 9999Hz
Resolution: 1Hz
Level: 'LOW' < 0.8 Volt
'HIGH' > 2.4 Volt
Permissible voltage: 0 to 28V
Application: e.g. frequency measurements, flow, flow rate (current values), speed, velocity etc.

Counter input:
Up- and down-counter up to max. 32768 pulses.
Display max. 9999.
Level: 'LOW' < 0.8 Volt
'HIGH' > 2.4 Volt
Permissible voltage: 0 bis 28V
Switchable scaler (can be programmed from 1 to 255). Pulse frequency up to 20 pulses/second, in connection with max. scaler value up to 5100 pulses/second.
Cascade arrangement of several indicators possible, thus allowing unlimited extension of counting range (4 places per unit).
Application: e.g. flow quantity (overall quantity counter), piece counter, pulse counter, sum counter etc.

Data Display:
for use as a data display (without measuring function). Two display modes are possible.

Please note: the data display function can only be activated by RS485 interface!

- Digital display mode 1 ("no 1"):
a numeric value (translate by the interface) ist displayed.

- Digital display mode 2 ("no 2"):

all display elements can be accessed directly. Additinally every 7-segment display can be set to 'flashing'.

Accuracy:

< ± 0.5% ± 1 sigit

Display:

Red LED with 4 digits, 10 mm high

Range of application:

Standard signal inputs:
-1999 to 9999 digits. Recommended display range: max. 2000 digits.

KTY87-205: -40.0 to 110.0 °C
Pt1000: -50 to 600 °C

Scale:

(can be adjusted via buttons or interface)

Standard signal inputs:
Any decimal point can be selected.
Display range freely adjustable by entering of start and end values.

Resistance input:
Two characteristic sensor curves with preset measuring range implemented. Zero point offset can be carried out after entering an offset value.

Frequency:
Any decimal point can be selected.
Freely adjustable gradient by entering the highest possible frequency and the corre
Counter input (counter):
Any decimal point can be selected.

Freely adjustable gradient by entering the number of pulses and the corresponding display value.
Switchable scaler (1 to 255).

Filter:

Digital filter, can be selected via buttons or interface.

0 = no interference rejection (approx. 2 to 3 measurements/second).

1 = interference rejection filter active (approx. 1.5 seconds delay).

2 = interference filter active (same as 1 but fault code FE5 displayed in addition in case of continuous measuring interference)

Switching outputs:

2 individual transistor switching outputs (GND switching).
Switching current: 50mA
Switching voltage: 30V DC
Response time: <1 sec. after display change

Possible configurations:

Display
2-level controller
Common min./max. alarm
2-level controller with min./max. alarm
3-level controller
Individual min./max. alarm generator
Counter with preselector switch

Alarm delay:

Range from 0 to 99 minutes can be set.

Limitation of set-point value:

Automatic with regard to the display range set.

Supervisory function:

Broken sensor and sensor short-circuit
Values above/below permissible range
Self-diagnosis integrated
Hardware-Watchdog.

Segment test:

Automatic whenever unit is switched on.

Data storage:

All values programmed will be stored for at least 10 years even without current supply (EEPROM).

Interface:

Standard RS485 interface. Up to 16 units can be connected in a network via this 2-wire interface (Units no. 0 to 15 can be directly addressed via front-side keys or via interface).
Connection to interface RS232: via interface converter GRS 485 or via any commercial interface adaptor RS232 to RS485.

Please note: In case of counter input no interface required.

Supply voltage:

9 to 28 V DC

Current consumption:

Max. 60mA at 12V DC (without interface!)

Electromagnetic compatibility:

In accordance with EN50081-1 and EN50082-2 for unrestricted use in housing and industrial areas.
Additional error: <1%
Unit tested with Filter = 1

Housing:

Glass-fibre reinforced Noryl.
Dimensions: 24 x 48 mm.
Mounting depths: approx. 65mm

Panel mounting:

With stainless steel spring clip. Panel thickness from 1 to approx. 10 mm.
Panel cutout: $21.7^{+0.5}$ x $45^{+0.5}$ mm (h x w)

Electric connection:

Standard connection by means of screw-type/plug-in terminals: 2-pin for interface and 8-pin for all remaining connections. Wire dia from 0.14 to 1.5 mm^2.

IP-rating:

IP54 with optional O-rings for front side
IP65 upon request.

Special accessories:

- Power pack with switching relay
- Interface converter

10. Examples

10.1. 2-level humidity control with min./max. alarm

Transducer, Measuring range: 0.0% r.h. to 100.0% r.h.
Output signal: 0 Volt to 10 Volt
Control (humidify), unit on: 50.0% r.h.
unit off: 52.0% r.h
Alarm monitoring: alarm to be issued if humidity exceeds a value of 60% or falls below 45% for more than 10 minutes.

Adjustment of A-RD-1 to measuring transducer.

- Remove red front plate
- Apply supply voltage and wait for segment test to be completed.
- Start configuration process by briefly pressing button 3. The display will show **INP**.
- Press button 1 o. 2 several times till the display shows **0-10**.
  When pressing button 1 or 2 for the first time, the compact indicator will switch from the menue prompt INP to the input signal actually set. You can, then, select an input signal with the same buttons, ie 0 to 10 Volt in our example.
- Acknowledge input signal selected by pressing button 3. The display will show **INP** again.
  After selecting the respective input signal, it has to be acknowledged by pressing button 3. Only then will it be taken over into the internal memory. The A-RD-1 switches back to the menue prompt display.
- The following menue prompt is called up by pressing button 3 again. The display will show **dP**.
- Press button 1 respectively 2 several times till the display shows ----.
  Programming of the decimal point will also determine the display resolution. In our example we can choose between resolutions of 1% (display 0 to 100) or 0.1% (0.0 to 100.0). Resolution 0.1% will be selected.
- Acknowledge decimal point selected by pressing button 3 once again. The display will show **dP** again.
- Call up next menue prompt by pressing button 3 again. The display will show **0-10**, with 0 flashing.
  The A-RD-1 requests the value, which is to be displayed if an input signal of 0 Volt has been applied, ie 0.0 in our example.
- Set display value to 0.0 using buttons 1 and 2.
  Rolling function to be considered.
- Acknowledge display value by pressing button 3. The display will show **0-10** again.
- Press button 3 once again. The display will show **0-10** with 10 flashing.
  The A-RD-1 requests the value which is to be displayed if an input signal of 10 Volt has been applied, ie 100.0 in example.
- Set display value to 100.0 using buttons 1 and 2.
- Acknowledge display value by pressing button 3. The display will show **0-10** again.
- Press button 3 once again. The display will show **LI**.
  In order to prevent the display of incorrect values such as 100.5% r.h. when temperature sensor comes into contact with condensation, the display range of the A-RD-1 has to be limited to the permissible measuring range limits. This is done by selecting 1 in the menue prompt "LI".
- Set display to 1 using buttons 1 and 2.
- Acknowledge by pressing button 3. The display will show **LI** again.
- Press button 3 once again. The display will show **FILt**.
- Set display to 1 using buttons 1 and 2.
- Acknowledge by pressing button 3. The display will show **FILt** again.
- Press button 3 once again. The display will show **nr**.
  As we will not use the serial interface in our example, no unit address will have to be entered.

The adjustment of the digital display to the measuring transducer has been completed.

Please proceed to **selecting of the control/supervisory functions and to setting the making/breaking points and alarm limits.**

- Press button 3 once again. The display will show **OUtP**.
  *The first menue prompt of the output configuration is always **OUtP** (select output function).*
- Use buttons 1 and 2 to set display to **2P.AL** (2-level controller with alarm).
- Acknowledge by pressing button 3. The display will show **OUtP**.
- Press button 3 once again. The display will show **2.on**.
  The A-RD-1 requests the making point of switching output 2, ie 50.0 in our example.
- Set switching point to 50.0 using buttons 1 and 2.
- Acknowledge making point by pressing button 3. The display will show **2.on** again.
- Press button 3 once again.. The display will show **2.off**.
  The A-RD-1 requests the breaking point of switching output 2, ie 52.0 in our example.
- Set switching point to 52.0 using buttons 1 and 2.
- Acknowledge breaking point by pressing button 3. The display will show **2.off** again.
- Press button 3 once again. The display will show **AL.HI**.
  The A-RD-1 requests the max. alarm limit, ie 60.0 in example.
- Set unit to alarm limit 60.0 using buttons 1 and 2.
- Acknowledge max. alarm limit by pressing button 3. The display will show AL.HI.
- Press button 3 once again. The display will show **AL.Lo.**
  The A-RD-1 requests the min. alarm limit, ie 45.0 in example.
- Set unit to alarm limit 45.0 using buttons 1 and 2.
- Acknowledge min. alarm limit by pressing button 3. The display will show AL.Lo.
- Press button 3 once again.. The display will show **dELA**.
  The A-RD-1 requests input of the alarm delay. This value indicates for how long an alarm condition needs to be active before the A-RD-1 will issue an alarm, ie 10 min. in example.
- Set display to 10 using buttons 1 and 2.
  The delay time will be displayed in minutes.
- Acknowledge delay time by pressing button 3. The display will show dELA.
- Press button 3 once again. The display will show the current humidity. The configuration has now been completed.
  Correct wiring of the A-RD-1 and of the measuring transducer is the main precondition for the unit displaying the correct humidity. Configuration is also possible with the measuring transducer not connected. In this case, the A-RD-1 will show FE2 after configuration.