INSTALLATION AND MAINTENANCE INSTRUCTIONS

UD-720
UNIVERSAL DISPLAY

CONTENTS

1. GENERAL

- These instructions must be carefully read before any work involving products supplied by VALSTEAM ADCA ENGINEERING S.A. is undertaken.

Note:

- Current regional safety regulations should be taken in to account and followed, while doing the installation and maintenance work.
- Handling, installation and maintenance work must be carried out by trained personnel. A supervisor must follow and check all activities.
- For the problems that cannot be solve with the help of this instructions, please contact the supplier or the manufacturer.
- The manufacturer reserves the right to change the design and material of this product without notice.

2. APPLICATION

The UD-720 is a programmable digital panel display used for the measurement of standard sensor and analog signals applied in automation. It is ideally suited for use with our range of instrumentation such as pressure transmitters, temperature probes and TDS controllers.

3. TRANSPORT AND STORAGE

- Handling of materials should be made with adequate equipments.
- The equipments should be protected from impacts and forces during transportation and storage.
- The equipment should be stored in a dry environment.
- The manufacturer does not assume the responsibility of damaged equipments due to inappropriate handling during the transportation and storage.

4. DELIVERED SET

- When unpacking the equipment, please check whether the type and version code on the data sticker corresponds to the ordered one.

The delivered set is composed of:

1. UD-720 universal display..... 1 piece
2. Plug with 16 screw terminals..... 2 pieces
3. Screw clamp to fix the device in the panel..... 4 pieces
4. Rubber seal..... 1 piece
5. User's manual..... 1 piece

5. BASIC REQUIREMENTS AND OPERATIONAL SAFETY

In the safety service scope, the display meets the requirements of the EN 61010-1 standard.

ATTENTION

- All operations concerning transportation, installation, and commissioning as well as maintenance, must be carried out by qualified, skilled personnel, and national regulations for the prevention of accidents must be observed.
- Before switching the device on, one must check the correctness of all the connections to the network.
- Do not connect the device to the network through an autotransformer.
- The removal of the devices casing during the guarantee contract period may cause its avoidance.
- The equipment fulfils all requirements related to electromagnetic compatibility in the industrial environment.
- When connecting the supply, one must remember that a switch or a circuit-breaker should be installed in the room. This switch should be located near the equipment, with easy accessibility for the operator, and suitably marked as an element able of switching the devices' power off.
- Non-authorized removal of the casing, inappropriate use, incorrect installation or operation, create the risk of injury to personnel or damage to the device.

6. INSTALLATION

6.1. DEVICE INSTALLATION

Insert the display in the panel and fix it with the four screw clamps according to Figure 1. The panel cut-out should have 92 x 45 mm.

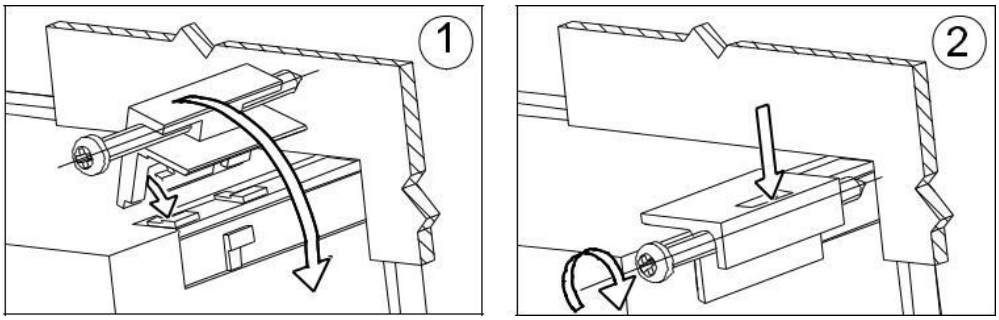

Figure 1: Display fixation in the panel.

The overall dimensions of the UD-720 digital display are presented on Figure 2 (in millimeters).

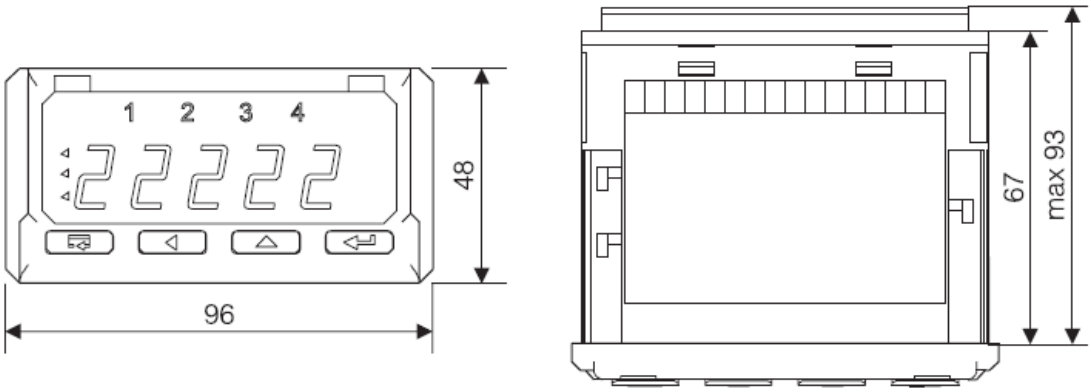

Figure 2: Display dimensions.

6.2. ELECTRICAL CONNECTIONS

The display has two separable terminal strips with screw terminals. The strips enable the connection of wires with a cross-section of 1.5 mm^2 for input signals and 2.5 mm^2 for other signals.

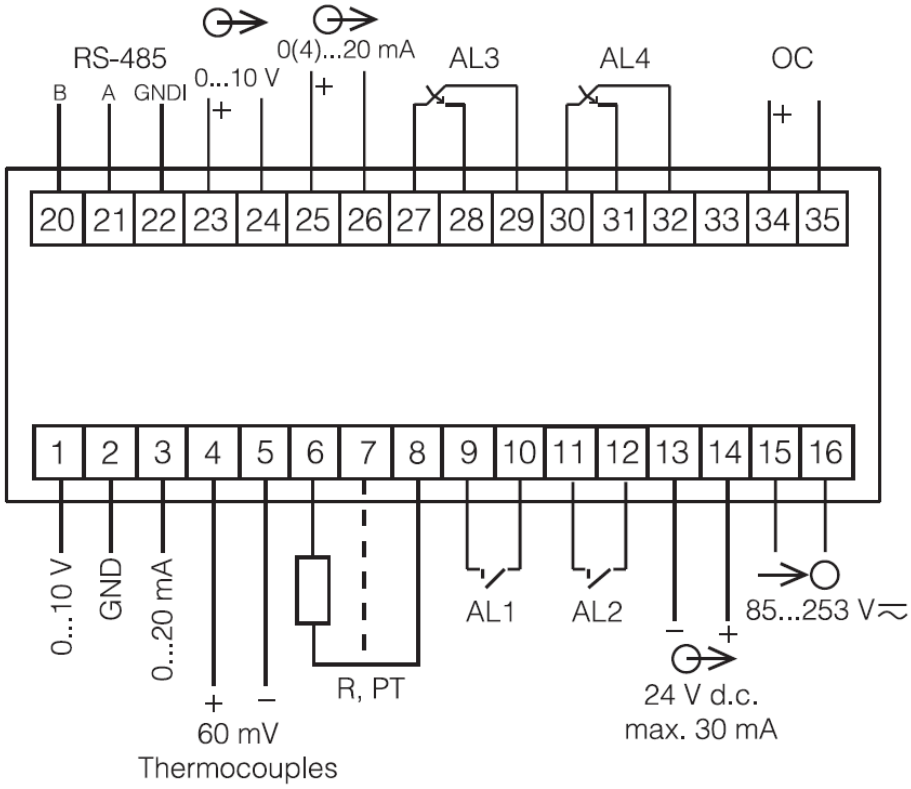

Figure 3: View of the displays' connection strips.

6.3. INSTALLATION RECOMMENDATIONS

In order to obtain a full protection against electromagnetic noise, it is recommended to follow the principles below:

- Do not supply energy to the device from the network in the proximity of equipments generating high pulse noises.
- Apply network filters.
- Wires leading measuring signals should be twisted in pairs, and for resistance sensors in 3-wire connection, twisted of wires of the same length, cross-section and resistance, and led in a shield as above.
- All shields should be one-side earthed or connected to the protection wire, the nearest possible to the device.
- Apply the general principle, that wires leading different signals should be led at the maximal distance between them (no less than 30 cm), and the crossing of these groups of wires made at right angle (90º).

7. STARTING TO WORK

After turning the supply on, the display carries out the test procedure, showing the program version followed by the measured value.

7.1. DISPLAY DESCRIPTION

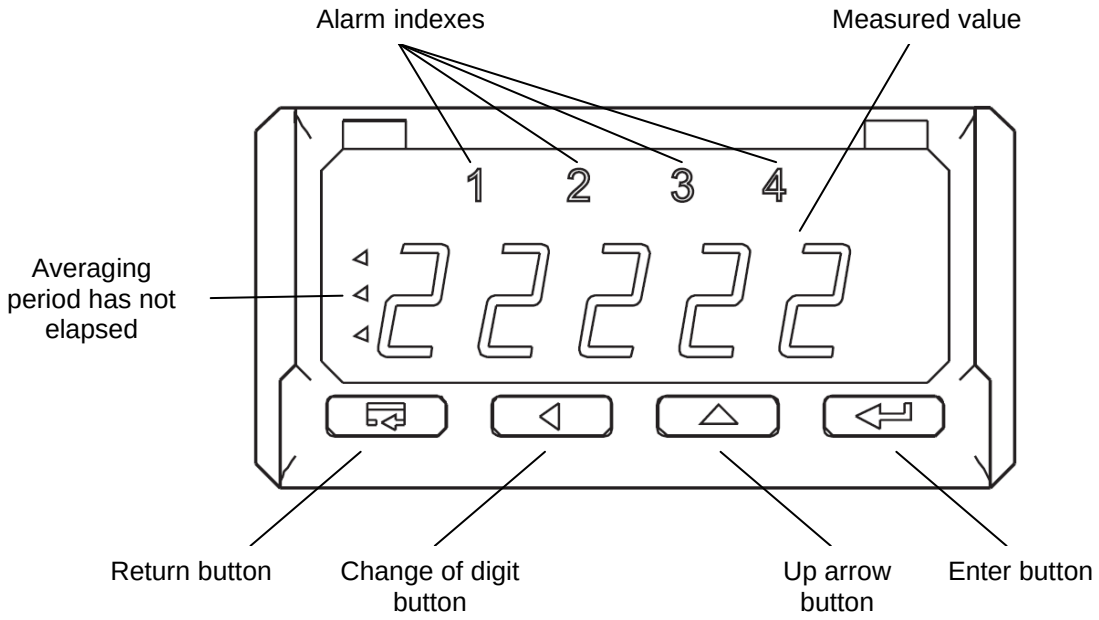

Figure 4: Device front face panel.

7.2. BUTTON FUNCTIONS

Enter button ↵:

- Entry in programming mode, by hold down for 3 seconds.
- Moving through the menu (level choice).
- Entry in the mode changing the parameter value.
- Acceptance of the changed parameter value.
- Freezing the measurement (when holding down the button, the display of the input signal is not updated. The measurement is still carried out).

Up arrow button ▲:

- Display of maximal value (the pressure of the button causes the display of the maximal value during 3 seconds).
- Entry in the level of parameter group.
- Moving through the chosen level.
- Change of the chosen parameter value (increasing the value).

Change of digit button ◄ :

- Display of minimal value (the pressure of the button causes the display of the minimal value during 3 seconds).
- Entry in the level of parameter group.
- Moving through the chosen level.
- Change of the chosen parameter value (shift to the next digit).

Return button :

- Entry in the menu monitoring the meter parameters (by holding down the button for 3 seconds).
- Exit from the menu monitoring meter parameters.
- Escape from the parameter change.
- Exit from the programming mode (by holding down the button for 3 seconds).

The pressure of the button combination, for 3 seconds, causes the reset of alarm signaling. This operation acts only when the support function is switched on.

The pressure of the button combination causes the erasing of the minimal value.

The pressure of the button combination causes the erasing of the maximal value.

The pressure of the button for 3 seconds causes the entry in the programming matrix. The programming matrix can be protected by the safety code.

The pressure of the button during 3 seconds causes the entry in the menu for monitoring the device parameters. Move through the monitoring menu by pressing or buttons. In this menu, all the devices' programmable parameters are only available for readout. In this mode, the menu **Ser** is not available. To exit from this menu press the button. In the monitoring menu, parameter symbols are displayed alternately with their values.

8. SERVICE

Figure 5 displays a diagram with the menu of the device in normal working mode.

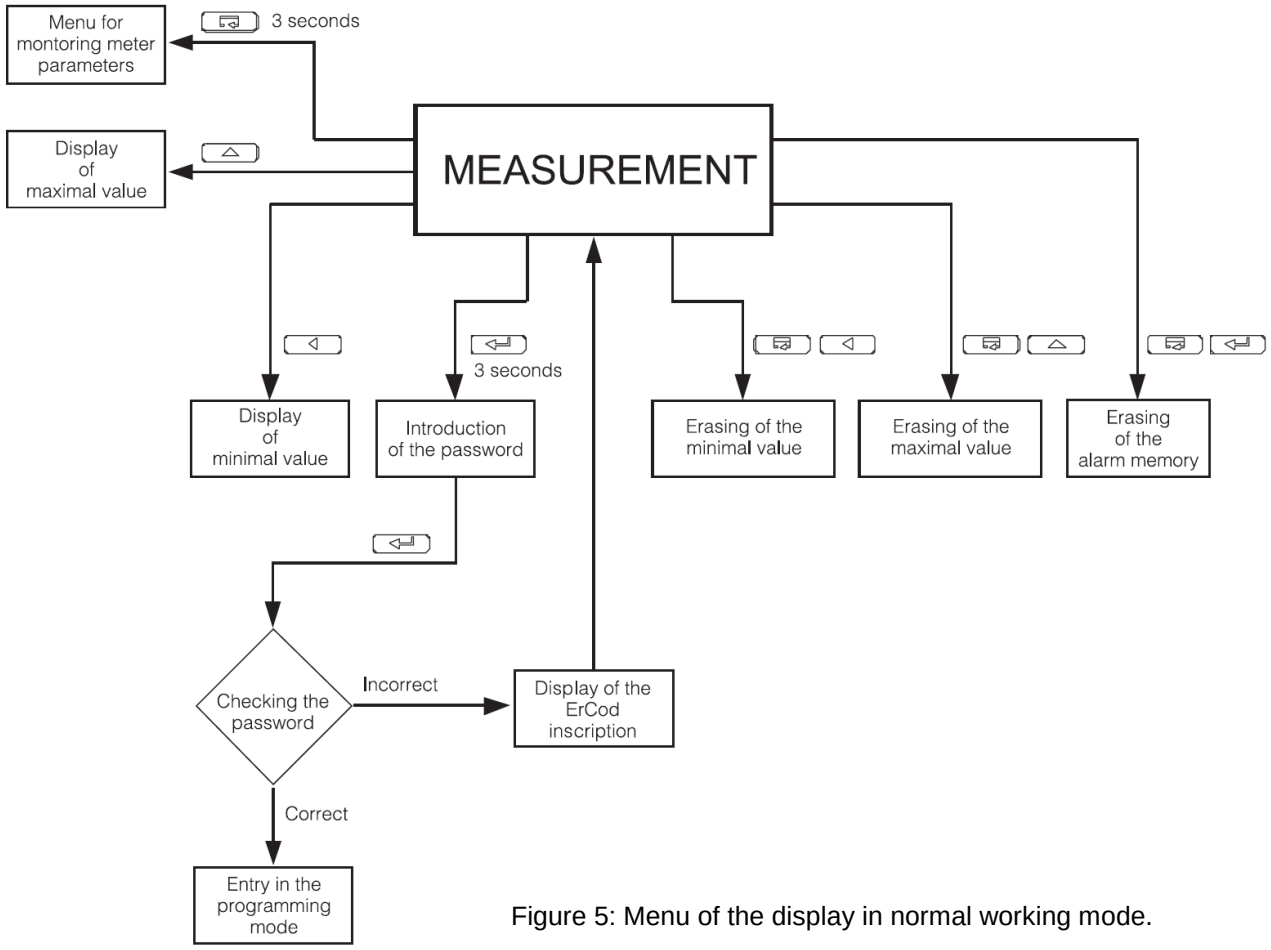

Figure 5: Menu of the display in normal working mode.

8.1. PROGRAMMING

By pressing and holding down the ↵ button during 3 seconds one can enter the programming matrix. The programming matrix can be protected by an access code. If the entry is protected by a password, then the safety code symbol **SEC** is displayed alternately with the set value **0**. The insertion of the correct code causes the entry in the matrix, and the insertion of an incorrect code causes the display of the **ErCod** symbol.

Figure 6 presents the transition matrix in the programming mode. The choice of the level is made by means of the ↵ button, however the entry and cycling through the parameters of the current level is carried out by means of the ◄ and ▲ button. Parameter symbols are displayed alternately with their current values. In order to change the value of the current parameter, use the ↵ button. To escape from the change, use the ↩ button. In order to exit from the chosen level, chose the ----- symbol and press the ↵ button. To exit from the programming matrix, press the ↩ button during 1 second. Then, the symbol **End** appears for 3 seconds and the meter transits to displaying the measured value. If the device is left in programming mode it will return to the normal working mode automatically 30 seconds after the last pressure of any button.

In order to increase the values of the selected parameter press the ▲ button. A single pressure of the button causes the increase of the value by 1. The To change to the following digit press ◄. In order to accept the set parameter, hold down the ↵ button.

8.2. PROGRAMMING MATRIX

Item										
1	**Inp1** Parameters of main input	**tYP1** Type of Measured quantity	**Con** Kind of compen-sation	**Cnt1** Measu-rement time	-----					
2	**Ind** Parameters of individ. charact.	**IndCp** Number of points of individ. charact.	**H1** First point of the individ. charact. Point x.	**Y** First point of the individ. charact. Point y.	...	**H21** Last point of the characte-ristic	**Y21** Last point of the characte-risitc	-----		
3	**diSP** Display Parameters	**d_P** Minimal decimal point	**Coldo** Lower colour	**CoLbe** Middle colour	**Colup** Upper colour	**CoLLo** Lower thres-hold of colour change	**CoLHi** Upper threshold of colour change	**ovrLo** Lower overflow	**ovrHi** Upper overflow	-----
4	**ALr1** Alarm 1	**P_A1** Type of input quantity for alarm 1	**PrL1** Lower threshold	**PrH1** Upper threshold	**tYP1** Alarm type	**dLY1** Alarm delay	**LED1** Signaling support	-----		
5	**ALr2** Alarm 2	**P_A2** Type of input quantity for alarm 1	**PrL2** Lower threshold	**PrH2** Upper threshold	**tYP2** Alarm type	**dLY2** Alarm delay	**LED2** Signaling support	-----		
6	**ALr3** Alarm 3	**P_A3** Type of input quantity for alarm 1	**PrL3** Lower threshold	**PrH3** Upper threshold	**tYP3** Alarm type	**dLY3** Alarm delay	**LED3** Signaling support	-----		
7	**ALr4** Alarm 4	**P_A4** Type of input quantity for alarm 2	**PrL4** Lower threshold	**PrH4** Upper threshold	**tYP4** Alarm type	**dLY4** Alarm delay	**LED4** Signaling support	-----		
8	**Out** Outputs	**P_An** Type of quantity of the analog output	**Anl** Lower threshold of the analog output	**AnH** Upper threshold of the analog output	**typ_A** Kind of output (volt/curr)	**bAud** Baud rate	**prot** Kind of frame	**addr** Device address	-----	
9	**SEr** Service	**Set** Write the standard parameters	**SEC** Introduction of the password	**Hour** Setup of the time	**unit** Highlight the unit	**tESt** Display test	-----			

Figure 6: Programming matrix

8.3. CHANGING FLOATING-POINT VALUES

The change is carried out in two stages (the transition to the next stage follows after pressing ↵):

1) Setting the value from the range -19999M...99999, similarly as for integral values.

2) Setting the decimal point position (00000., 0000.0, 000.00, 00.000, 0.0000). ◄ shifts the decimal point to the left and ▲ shifts the decimal point to the right.

The pressure of the ↩ button during the change of the parameter value will cause the cancelation of the process.

8.4. PARAMETER DESCRIPTION

The list of the menu configuration parameters is presented in Table 1.

Table 1: List of configuration parameters.

InP 1		
Parameter symbol	**Description**	**Range of changes**
tYP1	Kind of the connected input signal	Pt1 – Pt100 Pt5 – Pt500 Pt10 – Pt1000 rEZL – measurement of resistance up to 400 Ω rEZH – measurement of resistance up to 4000 Ω tE-J – J (Fe-CuNi) tE-h – K (NiCr-NiAl) tE-n – N (NiCrSi-NiSi) tE-E – E (NiCr-CuNi) tE-r – R (PtRh13-Pt) tE-S – S (PtRh10-Pt) 0_10U – voltage measurement, range 10 V. 0_20A – current measurement, range 20mA 0_60n – voltage measurement, range 60mV. HOUr – current time.

Con	Choice of the measured value compensation. Concerns only the work in the mode of temperature or resistance measurement. The wire linking the meter with the sensor defines the resistance for RTD sensors, however for thermocouples, the compensation is defined by the cold junction temperature. The choice of a value beyond the range causes the switching of the automatic compensation on.	**-19999...99999** Introduction of values: **0..20 Ω -** causes the switching of the manual compensation on for the resistance or temperature measurement by means of RTD (resistance thermometers). **0...60°C** – causes the switching of the manual compensation on for thermocouples.
Cnt1	The measurement time is expressed in seconds. The result on the display presents the mean value counted in the Cnt1 period. This parameter is not taken into consideration during the measurement in counter modes.	**1...3600**

Ind		
Parameter symbol	**Description**	**Range of changes**
IndCp	Number of points of the individual characteristic. For a value lower than 2, the individual characteristic is switched off. The number of segments is the number of points decreased of one. The individual characteristic is not taken into consideration in the CountH and HoUr modes.	**1...21**
Hn	The point value for which we will expect Yn (n-point number)	**-19999...99999**
Yn	Expected value for Xn.	**-19999...99999**

dISP		
Parameter symbol	**Description**	**Range of changes**
d_P	Minimal position of the decimal point When displaying the measured value - display format. This parameter is not taken into consideration during tCountH and HoUr modes.	**0.0000 – 0** **00.000 – 1** **000.00 – 2** **0000.0 – 3** **00000 – 4**
CoLdo	Display colour, when the displayed value is ower than CoLLo	**rEd – red** **grEEn – green** **orAnG - orange**
CoLbE	Display colour, when the displayed value is higher than CoLLo and lower than CoLHi	
CoLuP	Display colour when the displayed value is higher than CoLHi	
CoLLo	Lower threshold of colour change	**-19999..99999**
CoLHi	Upper threshold of colour change	**-19999..99999**
ovrLo	Lower threshold of display narrowing Values below the declared threshold are signaled on the display by the _ _ _ _ symbol.	**-19999..99999**
ovrHi	Upper threshold of display narrowing Values above the declared threshold are signaled on the display by the - - - - symbol.	**-19999..99999**

ALr1, ALr2, ALr3, ALr4		
Parameter symbol	**Description**	**Range of changes**
P_A1 **P_A2** **P_A3** **P_A4**	Input quantity, steering the alarm.	**InP1** – Main input (indicated value). **HoUr** – Real-time clock.

tYP1 **tYP2** **tYP3** **tYP4**	Alarm type.	**n-on** – normal (transition from 0 na 1), **n-oFF** – normal (transition from 1 na 0), **on** - switched on, **oFF** – switched off, **H-on** – manually switched on; till the change time of the alarm type, the alarm output remains switched on **H-oFF** – manually switched off; till the change time of the alarm type the output alarm remains switched off for good.
PrL1 **PrL2** **PrL3** **PrL4**	Lower alarm threshold.	**-19999...99999**
PrH1 **PrH2** **PrH3** **PrH4**	Upper alarm threshold.	**-19999...99999**
dLY1 **dLY2** **dLY3** **dLY4**	Delay of alarm switching.	**0...32400**

LEd1 **LEd2** **LEd3** **LEd4**	Support of alarm signaling. In the situation when the support function is switched on, After the alarm state retrea, the signaling diode is not blanked. It signals the alarm state till its blanking moment by means of the  button combination. This function concerns only and exclusively the alarm signaling thus relay contacts will operate without support according to the chosen type of alarm.	**oFF** – function switched off **on** – function switched on

out		
Parameter symbol	**Description**	**Range of changes**
P_An	Input quantity, which the analog output has to react on.	**InP1** – main input (indicated value). **Hour** – real-time clock.
tyPA	Type of analog output	**0_10U** – voltage 0...10 V **0_20A** – current 0...20 mA **4_20A** – current 4...20 mA
AnL	Lower threshold of the analog output. give the value, on which we want to obtain the minimal value of signal on the analog output.	**-19999...99999**
AnH	Upper threshold of the analog output. give the value on which we want to obtain the maximal value of signal on the analog output(10 V or 20 mA).	**-19999...99999**

bAud	Baud rate of the RS485 interface	**4.8** – 4800 bit/s **9.6** – 9600 bit/s **19.2** – 19200 bit/s **38.4** – 38400 bit/s **57.6** – 57600 bit/s **115.2** – 115200 bit/s
prot	Type of transmission frame of the RS-485 interface.	**r8n2** **r8E1** **r8o1** **r8n1**
Addr	Address in the MODBUS network. The write of the value 0 switches the interface off.	**0...247**

SEr		
Parameter symbol	**Description**	**Range of changes**
SEt	Write of manufacturer's settings. The setting of the value YES causes the write of standard parameters into the meter. The value of manufacturer's parameters is presented in the table 7.	**no** – do nothing. **YeS** – causes the write of manufacturer's settings.
SEC	Introduction of a new password. The introduction of the value 0 switches the password off.	**0...60000**
HOUR	Setting of the current time. The introduction of a wrong time cancels the introduction of time. The introduced value is not taken.	**0,00...23,59**
unIt	Highlight of the unit.	**On** – unit highlight switched on. **Off** – unit highlight switched off.

tESt	Display test. The test consists in a successive lighting up of digital display segments. Alarm diodes and unit highlighting diodes should be lighted.	**YeS** – causes the test start The pressure of the ⏎ button ends the test. **no** – do nothing.

ATTENTION

- The accessibility of parameters depends on the device version and its current settings.

8.5. INDIVIDUAL CHARACTERISTIC

The UD-720 digital display is able to recalculate the measured value into any other value, thanks to the implemented individual characteristic function. This function rescales the input signal measured according to the set characteristic.

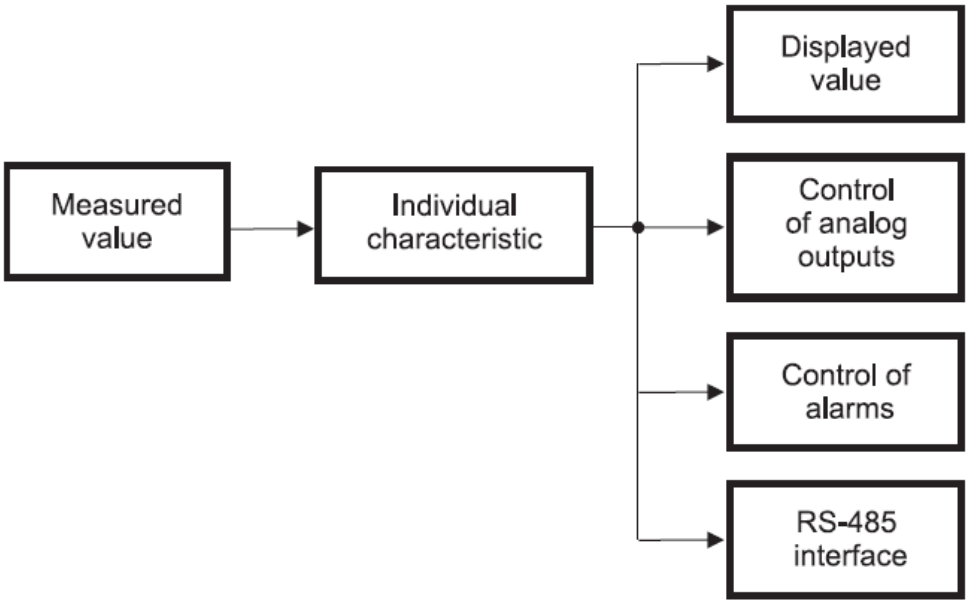

Figure 7: Individual characteristic.

The user can introduce a maximum of twenty functions through giving intervals and expected values for successive points.
The programming of the individual characteristic consists on the definition of the number of points which the input function will be linearized upon. Remember that the number of linearization functions is of one number smaller than the actual number of points. Next, program successive points by giving the measured value (Hn) and the expected value corresponding to it – value which has to be displayed (Yn). A graphical interpretation of the individual characteristic function is presented in Figure 8.

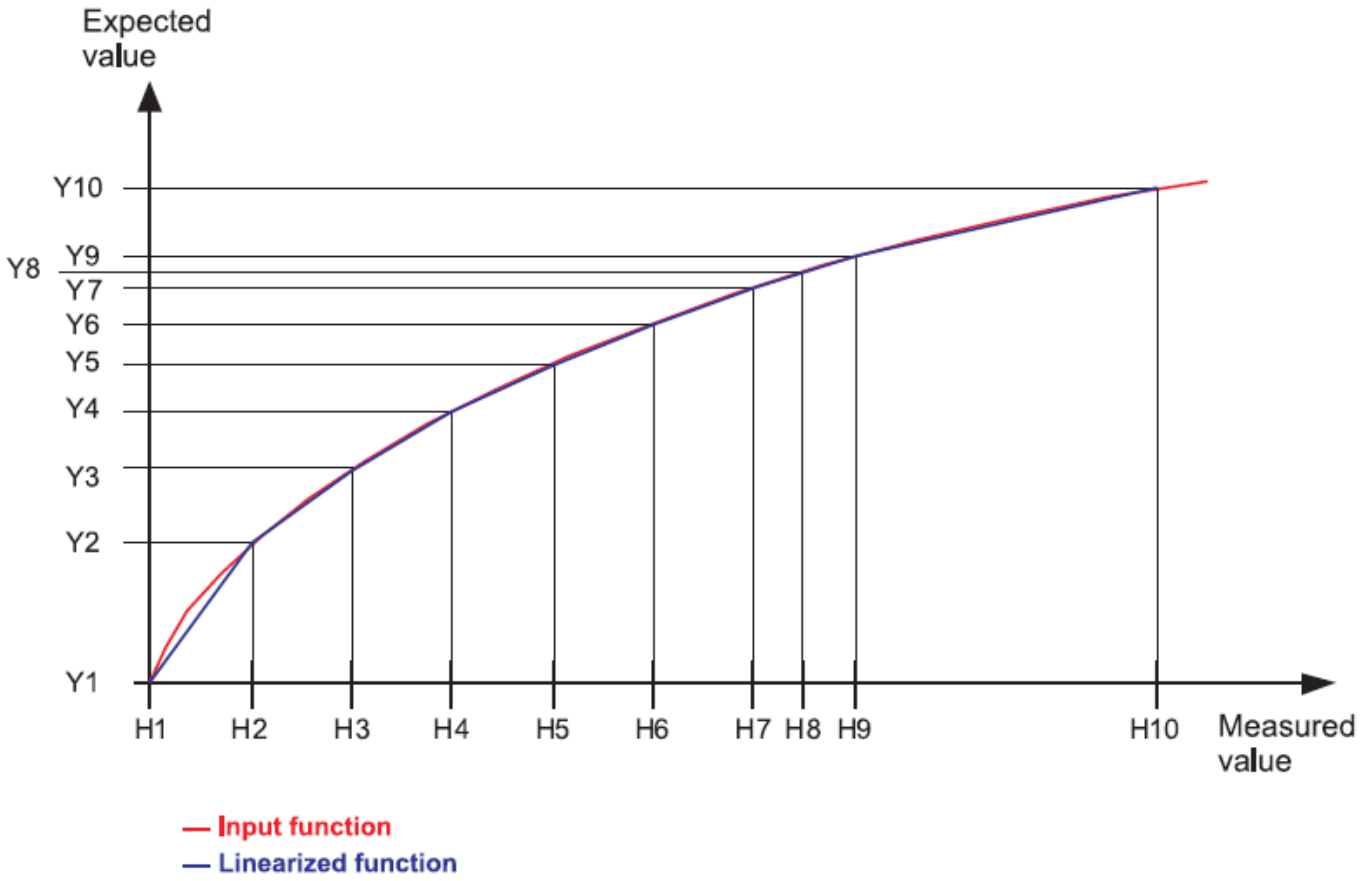

Figure 8: Individual characteristic graphical interpretation.

During the function approximation, remember that for the approximation of functions strongly differing from the linear characteristic the higher the number of linearizing segments, the smaller the error related to the linearization will be.
If measured values are smaller than H1, recalculations will be made based on the first straight line calculated on the base of points (H1,Y1) and (H2,Y2). However, for values higher than Hn (where n is the last declared measured value) the value to display will be calculated based on the last assigned linear function.

Note: All introduced points of the measured value (Hn) must be arranged in an increasing sequence in order to preserve the following relationship:

$$H1 < H2 < H3 < ... < Hn$$

If the above relationship is not fulfilled, the individual characteristic function will be automatically switched off (will not be realized) and a diagnostic flag will be set in the status register.

8.6. ALARMS

The device contains 2 alarm outputs with NOC contact (SPST) and two alarm outputs with NOC/NCC contact (SPDT) (option). Each of this alarm outputs can work in one of six different modes. Figure 10 shows how four of those alarms work (n-on, n-off, on, off). The two other remaining alarm modes (h-on, h-off) are always switched on and off respectively. These two last modes are destined to be used for manual simulation/test of alarm states.

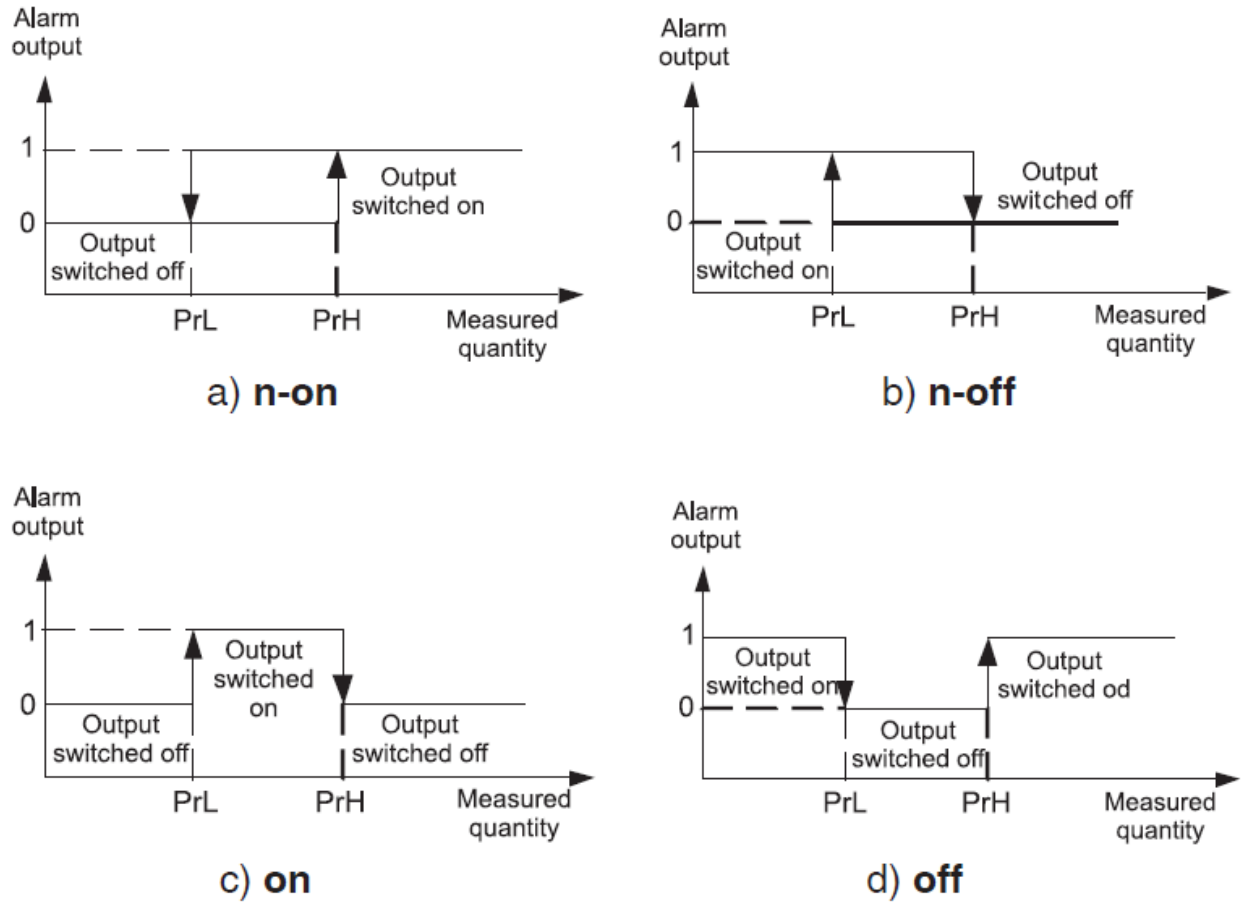

Figure 10: Types of alarms.

ATTENTION

- If for any reason the programmer defines PrL > PrH, the respective alarm will be switched off.
- In case of a measuring range overflow, the reaction of the relays is compatible with the written PrL, PrH, tYP parameters. In spite of the displayed overflow, the device will still carry out measurements.

8.7. DISPLAY FORMAT

The device adapts the display format (precision) to the value of measured quantity automatically. In order to use this function fully, please choose the format **0.0000**, and then the meter will display the measured value with the highest accuracy possible.
This function does not operate over the time display. Here the format is set automatically. The current time (mode HOUr) is displayed in a 24 hour format (in the shape hh.mm where hh is the current hour, and mm are the current minutes).

ATTENTION

- Remember that the highest resolution is not always desired since it can result in a deterioration of the indication stability.

8.8. MANUFACTURER'S PARAMETERS

Table 2 shows the default factory parameter values of the device. These settings can be restored, by choosing the option **Set** in the menu **Ser**.

Table 2: Factory parameter values.

Parametru symbol	Level in the matrix	Standard value
tYP1	1	Pt1
Con	1	0
Cnt1	1	1
indCP	2	no
H0	2	0
Y0	2	0
H1	2	100
Y1	2	100
...	...	...
Hn	2	(n-1)*100
Yn	2	(n-1)*100
d_P	3	00000
CoLdo	3	grEEn
CoLbE	3	orAng

CoLuP	3	rEd
CoLLo	3	5000
CoLHi	3	8000
ovrLo	3	-19999
ovrHi	3	99999
P_A1, P_A2, P_A3, P_A4	4, 5, 6, 7	InP1
tYP1, tYP2, tYP3, tYP4	4, 5, 6, 7	h-off
PrL1, PrL2, PrL3, PrL4	4, 5, 6, 7	1000
PrH1, PrH2, PrH3, PrH4	4, 5, 6, 7	2000
dLY1, dLY2, dLY3, dLY4,	4, 5, 6, 7	0
LEd1, LEd2, LEd3, LEd4	4, 5, 6, 7	oFF
P_An	8	InP1
tYPA	8	0_10U
AnL	8	0
AnH	8	99999
bAud	8	9.6
prot	8	r8n2
Addr	8	1
SEt	9	no
SEC	9	0
HOUR	9	Not defined
unit	9	off
tESt	9	off

9. RS-485 INTERFACE WITH MODBUS PROTOCOL

9.1. INTRODUCTION

The UD-720 digital display is equipped with a serial interface in RS-485 standard with implemented asynchronous MODBUS communication protocol.

Following is the list of serial interface parameters for the UD-720 digital display:

- Device address: 1 ... 247;
- Baud rate: 4800, 9600, 19200, 38400, 57600, 115200 bit/s;
- Operating mode: RTU;
- Information unit: 8N2, 8E1, 8O1, 8N1;
- Data format: integer (16 bit), float (32 bit);
- Float (2x16 bit);
- Maximal response time: 100 ms;
- Maximal number of registers read out/ written by a single Modbus frame: 116.

The parameter configuration of the serial link consists in the definition of the baud rate (**bAUd** parameter), device address (**Addr** parameter), and the format of the information unit (**prot** parameter).

Note: Each meter connected to the communication network must have a unique address, different from addresses of other devices connected to the network and an identical baud rate and type of information unit.

The following MODBUS functions have been implemented on the UD-720:

- 03 – Readout of the register group.
- 04 – Readout of input registers.
- 06 – Write a single register.
- 16 – Write register group.
- 17 – Identification of the slave device.

9.2. REGISTER MAP

Table 3 presents the register mapping of the UD-720 digital display.

ATTENTION

- All given addresses are physical addresses. In some computer programs logic addressing is used. In those cases increase the address by 1.

Table 3: Map of register groups.

Range of address	Value type	Description
4000-4049	integer (16 bits)	Value placed in a 16-bit register.
7000-7039	float (32 bits)	Value placed in two successive 16-bit registers. Registers include the same data as 32-bit register from the area 7500. Registers are only for readout.
7200-7326	float (32 bits)	Value placed in two successive 16-bit registers. Registers include the same data as 32-bit register from the area 7600. Registers can be read out and written.
7500-7519	float (32 bits)	Value placed in a 32-bit register. Registers are only for readout.
7600-7663	float (32 bits)	Value placed in a 32-bit register. Registers can be read out and written.

Table 4: Register map for address 4000.

The value is placed in 16-bit registers	Symbol	write (w)/readout (r)	Range	Description	
4000	**tYP1**	w/r	0...14	Input type	
				Value	
				0	Pt1 – Pt100
				1	Pt5 – Pt500
				2	Pt10 – Pt1000
				3	rEZL – Resistance, range 400 Ω
				4	rEZL – Resistance, range 4000 Ω
				5	tE-J – J – thermocouple of J type
				6	tE-h – K – thermocouple of K type
				7	tE-n – N – thermocouple of N type
				8	tE-E – E – thermocouple of E type
				9	tE-r – R – thermocouple of R type
				10	tE-S – S – thermocouple of S type
				11	0_10U – voltage measurement, range 10 V
				12	0_20A – current measurement, range 20 mA
				13	0_60n – voltage measurement, range 60 mV
				14	HoUr – current time
4001		w/r		Reserved	
4002		w/r		Reserved	
4003	**Cnt**	w/r	1...3600	Measurement time expressed in seconds. This time defines the averaging time of the measured value. The displayed value is the mean value calculated from the Cnt1 period.	
4004		w/r		Reserved	
4005		w/r		Reserved	
4006		w/r		Reserved	
4007		w/r		Reserved	

4008	**IndCp**	w/r	1...21	Number of points of the individual characteristic. For the value 1, the individual characteristic is switched off. Segments of the individual characteristic are defined by parameters Xn and Yn, where n – point number.	
4009	**d_P**	w/r	0...4	Minimal position of the decimal point when displaying the measured value.	
				Value	**Description**
				0	0.0000
				1	00.000
				2	000.00
				3	0000.0
				4	00000
4010	**CoLdo**	w/r	0...2	Display colour when the displayed value is smaller than **coLLo**	
				Value	**Description**
				0	red
				1	green
				2	orange
4011	**CoLbE**	w/r	0...2	Display colour when the displayed value is higher than **coLLo** and smaller than **coLHi**	
				Value	**Description**
				0	red
				1	green
				2	orange
4012	**CoLUp**	w/r	0...2	Display colour when the displayed value is higher than **coLHi**	
				Value	**Description**
				0	red
				1	green
				2	orange
4013	**P_a1**	w/r	0, 1	Input quantity controlling the alarm	
				Value	**Description**
				0	Main input
				1	clock

4014	**tyP1**	w/r	0...5	Type of alarm 1 (description – fig. 6)	
				Value	**Description**
				0	n-on
				1	n-off
				2	on
				3	off
				4	h-on
				5	h-off
4015	**dLY1**	w/r	0...32400	Delay of alarm 1 (in seconds)	
4016	**LEd1**	w/r	0...1	Support of alarm 1 signaling	
				Value	**Description**
				0	Support switched off
				1	Support switched on
4017	**P_a2**	w/r	0, 1	Input quantity controlling the alarm	
				Value	**Description**
				0	Main input
				1	clock
4018	**tyP2**	w/r	0...5	Type of alarm 2 (description – fig. 6)	
				Value	**Description**
				0	n-on
				1	n-off
				2	on
				3	off
				4	h-on
				5	h-off
4019	**dLY2**	w/r	0...32400	Delay of alarm 2 (in seconds)	
4020	**LEd2**	w/r	0...1	Support of alarm 2 signaling	
				Value	**Description**
				0	Support switched off
				1	Support switched on
4021	**P_a3**	w/r	0, 1	Input quantity controlling the alarm	
				Value	**Description**
				0	Main input
				1	clock

4022	**tyP3**	w/r	0...5	Type of alarm 3 (description – fig. 6)	
				Value	**Description**
				0	n-on
				1	n-off
				2	on
				3	off
				4	h-on
				5	h-off
4023	**dLY3**	w/r	0...32400	Delay of alarm 3 (in seconds)	
4024	**LEd3**	w/r	0...1	Support of alarm 3 signaling	
				Value	**Description**
				0	Support switched off
				1	Support switched on
4025	**P_a4**	w/r	0, 1	Input quantity controlling the alarm	
				Value	**Description**
				0	Main input
				1	clock
4026	**tyP4**	w/r	0...5	Type of alarm 4 (description – fig. 6)	
				Value	**Description**
				0	n-on
				1	n-off
				2	on
				3	off
				4	h-on
				5	h-off
4027	**dLY4**	w/r	0...32400	Delay of alarm 4 (in seconds)	
4028	**LEd4**	w/r	0...1	Support of alarm 4 signaling	
				Value	**Description**
				0	Support switched off
				1	Support switched on
4029	**P_an**	w/r	0, 1	Input quantity, which the analog output has to react on.	
				Value	**Description**
				0	Main input
				1	clock

4030	**tYPa**	w/r	0...2	Type of analog output	
				Value	**Description**
				0	voltage input 0...10 V
				1	current input 0...20 mA
				2	current input 4...20 mA
4031	**bAud**	w/r	0...5	Baud rate	
				Value	**Description**
				0	4800 bit/s
				1	9600 bit/s
				2	19200 bit/s
				3	38400 bit/s
				4	57600 bit/s
				5	115200 bit/s
4032	**prot**	w/r	0...3	Transmission mode	
				value	**Description**
				0	RTU 8N2
				1	RTU 8E1
				2	RTU 8O1
				3	RTU 8N1
4033	**Addr**	w/r	0...247	Meter address. The write of the value 0 causes the interface switching off	
4034	**sAvE**	w/r	0...1	Update transmission parameters. Causes the application of introduced RS-485 interface settings.	
4035	**SEt**	w/r	0...1	Write of standard parameters	
				Value	**Description**
				0	without changes
				1	set standard parameters
4036	**SEc**	w/r	0...6000	Password for parameters	
				Value	**Description**
				0	without password
				...	Entry in parameters preceded by a request about the password
4037	**hour**	w/r	0...2359	Current time	
				This parameter occurs in the ggmm format, where: gg - means hours, mm – means minutes. The introduction of a wrong hour will cause the setting of 23, however the introduction of wrong minutes will generate the setting of the value 59.	

4038	**unit**	w/r	0, 1	Switch on/off the unit highlight	
				Value	**Description**
				0	highlight swiched off
				1	highlight swiched on
4039		w/r	0, 1	Reset of extrem values	
				Value	**Description**
				0	no change
				1	Reset of min. and max. values
---	---	---	---	Reserved	
4048	Status1	w/r	0...65535	Meter status. Describes the current state of the meter. Successive bits represent the given event. The bit set on 1 means, that the event took place. Events can be only erased.	
				Bit 15	Break of the supply
				Bit 14	Re-set of the RTC clock
				Bit 13	Not used
				Bit 12	Lack of communication with data memory
				Bit 11	Wrong settings
				Bit 10	Manufacturer' s setting restored
				Bit 9	Lack of measured values in data memory
				Bit 8	Not used
				Bit 7	Output plate is detected
				Bit 6	Output plate – error or lack of calibration
				Bit 5	Not used
				Bit 4	Not used
				Bit 3	Wrong configuration of the individual characteristic
				Bit 2	Not used
				Bit 1	Not used
				Bit 0	Averaging period is not elapsed
4049	Status2	w/r		Meter status. Describes the current state of the meter. Successive bits represent the given event. The bit set on 1 means, that the event took place. Events can be only cancelled.	
				Bit 15	Not used
				Bit 14	Not used
				Bit 13	Not used
				Bit 12	Not used
				Bit 11	Not used
				Bit 10	Not used
				Bit 9	Not used
				Bit 8	Not used

4049	Status2	z/o		Bit 7	LED4 – Signaling of alarm nr 4.
				Bit 6	LED3 – Signaling of alarm nr 3.
				Bit 5	LED2 – Signaling of alarm nr 2.
				Bit 4	LED1 – Signaling of alarm nr 1.
				Bit 3	Status of the alarm relay nr 4.
				Bit 2	Status of the alarm relay nr 3.
				Bit 1	Status of the alarm relay nr 2.
				Bit 0	Status of the alarm relay nr 1.

Table 5: Register map for address 7200.

The value is placed in two successive 16-bit registers. These registers include the same data as 32-bit registers from the area 7600	The value is placed in 32-bit registers	Symbol	write (w) / read-out (r)	Range	Description
7200	7600	**CoLLo**	w/r	-19999...99999	Lower threshold of the display colour change
7202	7601	**CoLHI**	w/r	-19999...99999	Upper threshold of the display colour change
7204	7602	**ovrLo**	w/r	-19999...99999	Lower threshold of the display narrowing
7206	7603	**ovrHI**	w/r	-19999...99999	Upper threshold of the display narrowing
7208	7604	**PRL 1**	w/r	-19999...99999	Lower threshold of alarm 1
7210	7605	**PrH 1**	w/r	-19999...99999	Upper threshold of alarm 1
7212	7606	**PRL 2**	w/r	-19999...99999	Lower threshold of alarm 2
7214	7607	**PrH 2**	w/r	-19999...99999	Upper threshold of alarm 2
7216	7608	**PRL 3**	w/r	-19999...99999	Lower threshold of alarm 3
7218	7609	**PrH 3**	w/r	-19999...99999	Upper threshold of alarm 3
7220	7610	**PRL 4**	w/r	-19999...99999	Lower threshold of alarm 4

7222	7611	**PrH 4**	w/r	-19999...99999	Upper threshold of alarm 4
7224	7612	**AnL**	w/r	-19999...99999	Lower threshold of analog output
7226	7613	**AnH**	w/r	-19999...99999	Upper threshold of analog output
7228	7614	**Con**	w/r	-19999...99999	Reserved
7230	7615		w/r	0...60000	Reserved
7232	7616		w/r	0...60000	Reserved
7234	7617		w/r	-19999...99999	Reserved
7236	7618		w/r	-19999...99999	Reserved
7238	7619		w/r	0...60000	Reserved
7240	7620		w/r	0...60000	Reserved
7242	7621		w/r	-19999...99999	Reserved
7244	7622	**H1**	w/r	-19999...99999	Point of the individual characteristic. Point nr 1
7246	7623	**Y1**	w/r	-19999...99999	Expected value for the point nr 1
7248	7624	**H2**	w/r	-19999...99999	Point of the individual characteristic. Point nr 2
7250	7625	**Y2**	w/r	-19999...99999	Expected value for the point nr 2
7252	7626	**H3**	w/r	-19999...99999	Point of the individual characteristic. Point nr 3
7254	7627	**Y3**	w/r	-19999...99999	Expected value for the point nr 3
7256	7628	**H4**	w/r	-19999...99999	Point of the individual characteristic. Point nr 4
7258	7629	**Y4**	w/r	-19999...99999	Expected value for the point nr 4
7260	7630	**H5**	w/r	-19999...99999	Point of the individual characteristic. Point nr 5
7262	7631	**Y5**	w/r	-19999...99999	Expected value for the point nr 5
7264	7632	**H6**	w/r	-19999...99999	Point of the individual characteristic. Point nr 6
7266	7633	**Y6**	w/r	-19999...99999	Expected value for the point nr 6
7268	7634	**H7**	w/r	-19999...99999	Point of the individual characteristic. Point nr 7
7270	7635	**Y7**	w/r	-19999...99999	Expected value for the point nr 7
7272	7636	**H8**	w/r	-19999...99999	Point of the individual characteristic. Point nr 8
7274	7637	**Y8**	w/r	-19999...99999	Expected value for the point nr 8
7276	7638	**H9**	w/r	-19999...99999	Point of the individual characteristic. Point nr 9

7278	7639	**Y9**	w/r	-19999...99999	Expected value for the point nr 9
7280	7640	**H10**	w/r	-19999...99999	Point of the individual characteristic. Point nr 10
7282	7641	**Y10**	w/r	-19999...99999	Expected value for the point nr 10
7284	7642	**H11**	w/r	-19999...99999	Point of the individual characteristic. Point nr 11
7286	7643	**Y11**	w/r	-19999...99999	Expected value for the point nr 11
7288	7644	**H12**	w/r	-19999...99999	Point of the individual characteristic. Point nr 12
7290	7645	**Y12**	w/r	-19999...99999	Expected value for the point nr 12
7292	7646	**H13**	w/r	-19999...99999	Point of the individual characteristic. Point nr 13
7294	7647	**Y13**	w/r	-19999...99999	Expected value for the point nr 13
7296	7648	**H14**	w/r	-19999...99999	Point of the individual characteristic. Point nr 14
7298	7649	**Y14**	w/r	-19999...99999	Expected value for the point nr 14
7300	7650	**H15**	w/r	-19999...99999	Point of the individual characteristic. Point nr 15
7302	7651	**Y15**	w/r	-19999...99999	Expected value for the point nr 15
7304	7652	**H16**	w/r	-19999...99999	Point of the individual characteristic. Point nr 16
7306	7653	**Y16**	w/r	-19999...99999	Expected value for the point nr 16
7308	7654	**H17**	w/r	-19999...99999	Point of the individual characteristic. Point nr 17
7310	7655	**Y17**	w/r	-19999...99999	Expected value for the point nr 17
7312	7656	**H18**	w/r	-19999...99999	Point of the individual characteristic. Point nr 18
7314	7657	**Y18**	w/r	-19999...99999	Expected value for the point nr 18
7316	7658	**H19**	w/r	-19999...99999	Point of the individual characteristic. Point nr 19
7318	7659	**Y19**	w/r	-19999...99999	Expected value for the point nr 19
7320	7660	**H20**	w/r	-19999...99999	Point of the individual characteristic. Point nr 20
7322	7661	**Y20**	w/r	-19999...99999	Expected value for the point nr 20
7324	7662	**H21**	w/r	-19999...99999	Point of the individual characteristic. Point nr 21
7326	7663	**Y21**	w/r	-19999...99999	Expected value for the point nr 21

Table 6: Register map for address 7000 (read only).

The value placed In two successive 16-bit registers. These registers include the same data as 32-bit registers from the area 7500	The value is placed in 32-bit registers	Name	Write (w) /readout (r)	Unit	Name of the quantity
7000	7500	Identifier	O	—	Constant identifying the device. The value 183 means the N30U meter
7002	7501	Status	O	—	Status is register describing the current state of the meter
7004	7502	Control	O	%	It is a register defining the control of the analog output
7006	7503	Minimum	O	—	Minimal value of the currently displayed value
7008	7504	Maximum	O	—	Maximal value of the currently displayed value
7010	7505	Displayed value	O	—	Currently displayed value
7012	7506	Current time	O	—	Current time
7014	7507	Wire resistance	O	Ω	Wire resistance - for resistance measurement - measured value
7016	7508	ADC	O	—	ADC (analog-to- digtal converter) value
7018	7509	Terminal temperature	O	°C	Temperature of terminals – the measurement is only carried out during the temperature measurement by means of thermoelectric sensors or during time measurements

7020	7510	Measured value	O		Measured value - not recalculated in relation to the individual character-istic, a.s.l.
7022	7511	EMF	O	µV	EMF measured on meter terminals, when measuring temperature by means of thermocouples.
7024	7512	Resistance	O	Ohm	Resistance measured on the mean line – only for the resistance measure-ment or when measuring temperature by means of resistance thermometers (RTD)

10. ERROR CODES

After turning the device on, or eventually during work, error messages may appear. Table 7 presents different possible error codes and their meanings.

Table 18: Character messages.

Error message	Description
	Overflow of upper value of the measuring range value or the programmed indication range. The message can also mean a break in the sensor circuit (thermocouples or resistance thermometers).
	Overflow of lower value of the measuring range value or the programmed indication range. The message can also mean a shorting in the sensor circuit (thermocouples or resistance thermometers).
ErFrt	Communication error with the data memory. Contact the service workshop.
ErPar	Parameter error. Wrong configuration data. Manufacturer's settings will be restored after pressing any button.
ErdEF	Default settings have been restored. Press any button to transit to a normal work.
ErFPL	Error of measured values stored by the meter (measured, maximal and minimal values). Press any button to transit to a normal work. After pressing the button during 1 sec, the ErdEF message will be displayed.
ErCAo	Lack of calibration of analog outputs. Press any button to transit to the normal work. Analog outputs will not be serviced. Contact the service workshop.
ErCAL	Error of calibration. The work is stopped – The meter is not in the state to carry out measurements in a correct way. Incorrect checksum of calibration coefficients or lack of calibration.

11. TECHNICAL DATA

TECHNICAL DATA		
RATED OPERATING CONDITIONS		
Supply Voltage	85...253 V ac/dc or 20...40 V ac, 20…60 V dc	
Temperature	Ambient: -25…23…55 ºC; Storage: -30…70 ºC	
Humidity	< 85% without condensation	
Operating Position	Any	
External magnetic field	0…400 A/m	
SAFETY AND COMPATIBILITY REQUIREMENTS		
Electromagnetic Compatibility	Noise immunity acc. to EN 61000-6-2	
	Noise emissions acc. to EN 61000-6-4	
Pollution level	Level 2 acc. to EN 61010-1	
Installation category	Cat. III acc. to EN 61010-1	
Maximal phase-to-earth operating voltage	Supply circuit: 300 V; Remaining circuits: 50 V acc. to EN 61010-1	
Altitude above sea level	< 2000 m acc. to EN 61010-1	
INPUT [1)]		
Type	***Range***	***Class***
PT100	-200…850 ºC	0.1
PT500	-200…850 ºC	0.1
PT1000	-200…850 ºC	0.1
Fe-CuNi (J)	-100…1200 ºC	0.1
NiCr-NiAl (K)	-100…1372 ºC	0.1
PtRh10-Pt (S)	0…1767 ºC	0.1
PtRh13-Pt (R)	0…1767 ºC	0.1
NiCr-CuNi (E)	-100…1000 ºC	0.1
NiCrSi-NiSi (N)	-100…1300 ºC	0.1
Current input (I)	-20…20 mA	0.1
Voltage input (U)	-10…10 V	0.1
mV input (mV)	0…60 mV	0.1
OUTPUT		
Type	***Properties***	***Load Capacity***
Relay (voltageless)	NO contacts	0.5 A/ 230 V ac
	Change-over contacts	0.5 A/ 230 V ac
OC open-collector	Passive NPN	Max. 30 V dc, 30 mA
Continuous voltage	0…10 V	$R_{load} \geq 500\ \Omega$
Continuous current	0/4…20 mA	$R_{load} \leq 500\ \Omega$
Transducer supply	24 V dc	Max. 30 mA
DIGITAL INTERFACE		
Interface type	RS-485	
Protocol	Modbus RTU 8N2, 8E1, 8O1, 8N1	
Baud rate	4.8, 9.6, 19.2, 38.4, 57.6, 115.2 kbit/s	
EXTERNAL FEATURES		
Readout field	5 digit display; Digit height: 14 mm; Colors: red, green and orange	
Overall dimensions	96 x 48 x 93 mm	
Weight	< 0.2 kg	

Protection grade	From frontal side: IP65; From rear side: IP10

1) Additional errors:
   Due to automatic compensation of the reference junction temperature: ≤ 1°C.
   Due to automatic compensation of the cable resistance for RTDs: ≤ 0.5°C.
   Due to automatic compensation of the cables for resistance measurement: ≤ 0.2 Ω.
   From temperature changes: 100% of the class / 10 K.

12. ORDERING CODES

ORDERING CODES UD-720			
Group Designation	**UD720**	**.1**	**.0**
Universal display	**UD720**		
Power Supply			
85...253 V ac/dc		**.1**	
20...40 V ac, 20…60 V dc		**.2**	
Additional Outputs			
No additional outputs			**.0**
OC open-collector output, RS-485 and analog outputs			**.1**
OC open-collector output, RS-485, analog outputs and 2 change-over relay outputs			**.2**

13. PRODUCT RETURNING

ATTENTION

- Information regarding any hazards and precautions to be considered because of contaminating fluids and residues or mechanical damage that may represent a health, safety or environmental risk, must be provided in writing by the distributors and customers when returning products to Valsteam ADCA engineering.
- Health and safety data sheets regarding substances identified as hazardous or potentially hazardous must be provided with the information mention above.

ATTENTION

- **LOSS OF WARRANTY: Total or partial disregard of above instructions involves loss of any right to warranty.**