



# PROGRAMMABLE DIGITAL PANEL METER N120



(96 × 48 × 93) mm

## USER'S GUIDE





# **PROGRAMMABLE DIGITAL PANEL METER N120 TYPE**

---

## **CONTENTS**

	Page
1. APPLICATION .....	5
2. BASIC REQUIREMENTS, OPERATIONAL SAFETY .....	6
3. FITTING .....	7
4. CONNECTION .....	8
5. SERVICING .....	9
6. PROGRAMMING .....	14
7. RS-485 INTERFACE .....	24
7.1. Connection way of the serial interface .....	24
7.2. Description of the MODBUS protocol implementation .....	25
7.3. Description of used functions .....	26
7.4. Register map of the N12 meter .....	28
7.5. Register for writing and read-out .....	28
7.6. Register only for read-out .....	34
8. TECHNICAL DATA .....	38
9. BEFORE A FAILURE WILL BE DECLARED .....	42
10. PROGRAMMING EXAMPLES OF N120 METERS .....	44
11. EXECUTION CODES .....	48
12. MAINTENANCE AND WARRANTY .....	49



## 1. APPLICATION

N120 programmable digital panel meters are destined for measurement of the number of pulses, number of rotations, number of working hours, frequency, period and rotational speed. These meters additionally enable the indication of the current time.

A 5 or 4-digit display field (14 or 20 mm high), in red or green colour ensures a good legibility at a long distance.

N120 meters can work with all accessible on the market voltageless revolution sensors or with a 5... 24 V a.c./d.c. output.

They realized other additional functions as:

- possibility to rescale the input signal,
- signalling of the set alarm value exceeding,
- counting of pulses up and down,
- automatic resetting of counters at the set value,
- possibility of external resetting, stoppage and start of counters,
- automatic setting of the decimal point,
- signalling of the measuring range exceeding,
- programmable measurement repetition rate,
- storage of maximal and minimal values,
- monitoring of set parameters values,
- blocking of the parameter introduction by means of a password,
- recounting of the measured quantity into any quantity on the base of an individual linear characteristic,
- lead out to sensor supply (24 V d.c.),
- highlighting of any optional measuring unit as per the order,
- servicing of the interface with the MODBUS protocol, both ASCII and RTU,
- conversion of the measured value into a standard-programmable current or voltage signal.

With the meter we deliver:

- a warranty card,
- 2 holders to fix the meter on a panel,
- a service manual,
- a plug with screw connections or self-locking connections,
- a set of stickers with units.

**When unpacking the meter, please check whether the type and execution code on the data plate correspond to the order.**

Symbols located in this service manual mean:



*- especially important, one must acquaint with this before connecting the meter*



*- one must take note of this when the meter is working inconsistently to the expectations*

## **2. BASIC REQUIREMENTS, OPERATIONAL SAFETY**

N120 meters are destined to be mounted into panels and cubicles.

In the range of operational safety they are in conformity with the IEC 1010-1+A1:1996 standard requirements.

### **Remarks concerning the operator safety:**

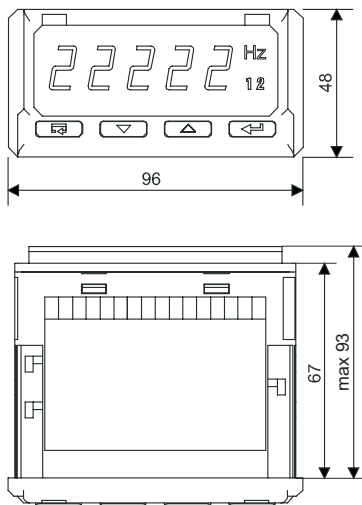
- The installation and meter connection should be operated by a qualified personnel.
- One must take into consideration all accessible protection requirements.
- Before switching the instrument on, one must check the correctness of the network lead connection IEC 1010-1 p.6.10 and p.6.11.2. standard
- In case of the protection terminal connection with a separate lead one must remember to connect it before the connection of network leads.
- Do not connect the meter to the network through an autotransformer.

- Before taking the meter housing out one must turn the supply off.
- The removal of the meter housing during the warranty period may cause its cancellation.

### 3. FITTING

Prepare a  $(92^{+0.6} \times 45^{+0.6})$  mm hole in the panel. The thickness of the material from which the panel is made can not exceed 15 mm. One should introduce the meter from the front of the panel with disconnected supply circuit.

After introducing the meter, fasten it by means of holders.



**Fig. 1. Overall dimensions**

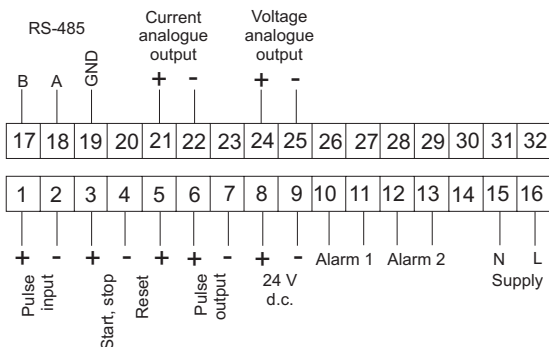
## 4. CONNECTION

At the rear side of the meter there is a terminal strip seat. A connector with screw terminals or a self-locking connector is added to the meter depending on the meter type chosen in the ordering code.

The fig. 2. shows the connection way of external signals. The description of the connector is also printed on the meter housing. In case of a meter working in an environment of high perturbances one should use external filters.

It is recommended to use screened leads on the meter input. As a feeder cable one must use a two-wire cable and choose the lead cross-section such that in case of a short-circuit from the device side, the protection of the cable was ensured by means of the electric installation fuse.

Requirements related to the feeder cable are regulated by the IEC 1010-1 p.6.10. and p.6.11.2. standard.



**Fig. 2. Connection way of the N120 meter**

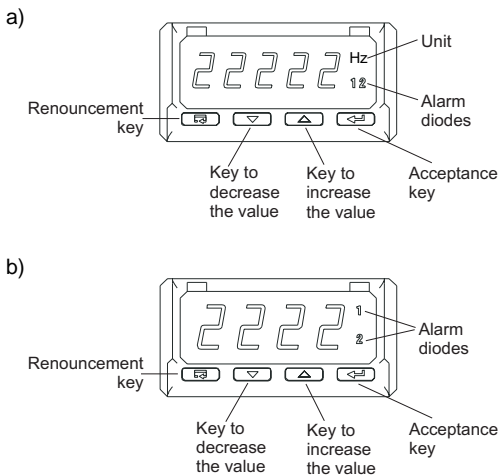


## 5. SERVICING

After switching the meter on, its type and next the program version are displayed. After ca 10 sec., the meter transits automatically into the measuring mode and the input signal value is displayed.

The meter blanks automatically insignificant zeros. The exceeding of the alarm threshold is signalled by means of alarm diodes 1 and 2.

The basic unit of the measured value is automatically highlighted by the meter <sup>1)</sup>.




**Fig. 3. Description of the meter faceplate**

a) 5-digit execution


b) 4-digit execution

<sup>1)</sup> No exists in the 4-digit (20 mm) execution.

## Key functions:

 - acceptance key


- entry into the programming mode (hold down during ca 3 seconds),
- moving through the menu - choice of the level,
- entry into the change mode of the parameter value,
- acceptance of the changed parameter value.

 - key to increase the value



- displaying of the maximal value,
- start of the counter (if E\_In = „OFF“)
- entry to the parameter group level,
- moving through the chosen level,
- change of the chosen parameter value - increase of the value
- succeeding parameter in the monitoring mode

 - key to decrease the value

- displaying of the minimal value,
- stoppage of the counter (if E\_In = „OFF“)
- entry to the parameter group level,
- moving through the chosen level,
- change of the chosen parameter value - decrease of the value
- succeeding parameter in the monitoring mode

 - renouncement key

- entry to the menu of parameter monitoring (hold down during ca 3 seconds),
- exit from the monitoring menu,
- renouncement of the parameter change,
- absolute exit from the programming mode


The pressure of the   key combination and hold down during ca 3 sec. causes the erasing of alarm signalling. This operation exclusively acts when the support function is switched on.

The pressure of the   key combination causes:

- the erasing of the minimal value when measuring the period, frequency or rotational speed,
- the resetting and stoppage of counters in case of pulse number, rotation number measurements or a working time counter when E\_In = „OFF”.


The pressure of the   key combination causes:

- the erasing of the maximal value when measuring the period, frequency or rotational speed,
- the resetting and start of counters in case of pulse number, rotation number measurements or a working time counter when E\_In = „OFF”.

The pressure of the  key during the measurement causes:


- in case of frequency, period or rotational speed, the display of the maximal value,
- in other cases, the counter start when E\_In = „OFF”.





The release of the key causes the return to the display of the currently measured value.

The pressure of the  key during the measurement causes:

- in case of frequency, period or rotational speed, the display of the minimal value,
- in other cases, the counter stoppage when E\_In = „OFF”.

The release of the key causes the return to the display of the currently measured value.

The pressure and hold down of the  key during ca 3 sec. causes the entry into the programming matrix. The programming matrix is secured by the safeguard code.

The pressure and hold down the  key during ca 3 sec. causes the entry into the monitoring menu. After the monitoring menu one must move by means of  and  keys. In this menu, all programmable meter parameters, except service parameters, are only accessible to the read-out. The exit from the monitoring menu takes place by means of the  key.

On the monitoring menu, parameter symbols are alternately displayed together with their values. The fig. 4. shows the operation algorithm of the meter.

In case of switching on the external functions **E\_In = „0n”**, the start, stop and resetting of the counters are carried out from external leads 3, 4, 5 (see fig. 2). Giving a 5...24 V d.c. signal on the lead -out „start”, „stop” we will cause the stoppage of the counter. The break of the signal will cause the start of the counter. Giving a 5...24 V d.c. voltage on the lead-out „Reset”, we will cause the reset of the counter.

The appearance of the following symbols on the digital displays means:



**Err**

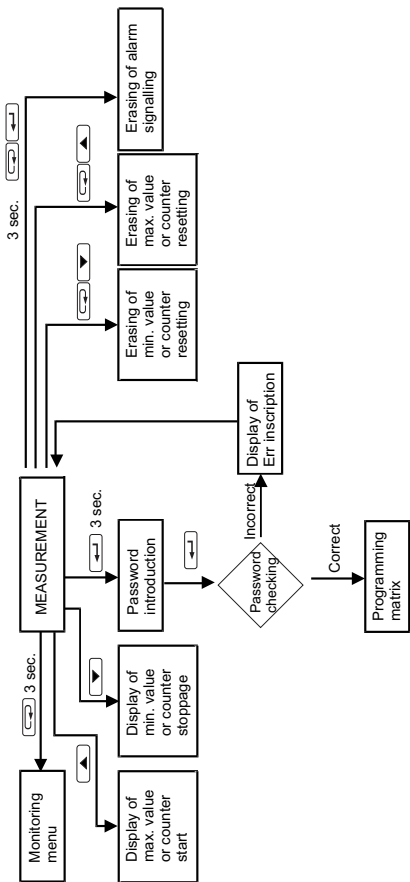
- Incorrect introducing of the security code.



- Exceeding of the upper measuring range.







- Exceeding of the lower measuring range or lack of signal.







**Fig. 4. Operation algorithm of the N120 meter**

## 6. PROGRAMMING

The key  pressure and its holding down during ca 3 seconds causes the display of the security code symbol **SEC** alternately with the **0** value set up by the manufacturer. The writing of the correct code causes the entry into the programming matrix. The transition matrix into the programming mode is shown on the fig. 5.



We choose the level by means of the  key, whereas the entry and moving through parameters of the chosen level is carried out by means of the  and  keys. Parameter symbols are displayed alternately with their actual values.

In order to change the value, one must use the  key. To renounce of the parameter change one must press the  key. To exit from the chosen level one must select the - - - symbol and press the  key.

In order to exit from the programming matrix into measurement, one must press the  key.

The inscription **HEY** occurs and after ca 5 sec. the meter will automatically enter into the measurement of the input quantity.



### Way of changing the value of the chosen parameter

In order to increase the value of the chosen parameter one must press the  key. A single pressure of this key causes a value increase of 1. The hold of the pressed  key causes a continuous increase of the value up to display the **0** value.

The jump to the next digit follows after this value . The further change is similar. The key release in any moment causes a jump to the first digit. It is similarly in case of the value decrease.

The single pressure of the  key causes a value decrease of one. The hold of the  key pressure causes a continuous

decrease of the value till the display of 0. The jump to the next digit follows after this value. The further change is similar. The key release in any moment causes a jump on the first digit.

In order to accept the set up parameter one must press the  key. Then, the writing of the parameter and display of its symbol follow alternately with the new value. The pressure of the  key during the change of the parameter causes the renouncement of the record.

Pos. no.	InP	tYP	SCAL	ConS	E_In	Auto	Cnt	Ind	H1	Y1	H2	Y2	d_P	...
1	Input param.	Input type	Kind of rescal.	Rescal. constant	Extern. functions	Autom. reset	Measur. number	Linear charact.	(1)	(1)	(1)	(1)	Decimal point	...
2	ALr1 Alarm 1	PrL1 Lower threshold	PrH1 Upper threshold	tYP1 Alarm type	dLY1 Alarm delay	LEd1 Signal support	...							
3	ALr2 Alarm 2	PrL2 Lower threshold	PrH2 Upper threshold	tYP2 Alarm type	dLY2 Alarm delay	LEd2 Signal support	...							
4	Out Output	tYPO Output function	ConO Output divider	tYPA Kind of output (U/I)	AnL Lower threshold anal. outp.	AnH Upper threshold anal. outp.	bAud baud rate	trYb	Adr	...				
								kind of transm.	Device address					
5	SEr Service	SEt Writing standard param.	SEC Password introd.	tSt Display test	Hour Hour setup	JEd Unit highlight (2)	...							

(1) - exists only, when the individual characteristic is included (Ind = On)

(2) - exists only in executions with 5 displayed digits

**Fig. 5. Transition matrix into the programming mode**

TABLE 1

Parameter symbol	Description	Range of changes
<b>tYP</b>	Selection of the measured value	<b>Cntr</b> - pulse number <b>FrEC</b> - frequency <b>turn</b> - rotation number <b>tACH</b> - rotational speed <b>PEr</b> - period <b>PErH</b> - long period > 10 sec <b>CntH</b> - work time counter <b>Hour</b> - current time
<b>SCAL</b>	<p>Choice of input quantity rescaling kind. The measured quantity is multiplied or divided by the set value (<b>Cons</b> parameter).</p> <p>In case of the choice of the input type as a pulse counter, rotations or time counter and multiplication function, each impulse causes the increase of the displayed quantity by the <b>Cons</b> value. In case of the choice of the input type as a pulse counter, rotations or time counter and division function, only a pulse number equal to the <b>Cons</b> constant will cause the change of the displayed value by 1.</p> <p>In other cases the input signal is multiplied or divided by the <b>Cons</b> constant.</p>	<b>And</b> - multiplication by constant <b>diu</b> - division by constant
<b>Cons</b>	<p>Rescaling constant of the input value. The writing of a negative value in case of counting pulses, rotation number and work time causes a count down.</p> <p>The writing of a negative value in other cases causes the resetting of the indication.</p>	<p>In 4-digit execution:  <b>-1999...9999</b></p> <p>In 5-digit execution:  <b>-19999...99999</b></p>
<b>E_In</b>	Permission for external functions: start, stop, reset.	<b>On</b> - external function switched on <b>OFF</b> - external function switched off



table 1 (continuation)

<b>Auto</b>	Automatic counter reset. The counter is automatically reset at the set number. This parameter is not take into consideration when measuring the frequency, rotational speed and period.	In 4-digit execution: <b>0...9999</b> In 5-digit execution: <b>0...99999</b>
<b>Cnt</b>	Measurement time expressed in seconds	In 4-digit execution: <b>0.0...999.9</b> In 5-digit execution: <b>0.0...9999.9</b> The <b>0</b> writing causes the measurement switching off and the display blanking.
<b>Ind</b>	Switching off or on of the individual linear characteristic of the user.	<b>On</b> - switched on characteristic <b>OFF</b> - switched off characteristic
<b>H1, Y1 H2, Y2</b>	Parameters of the individual characteristic. On the base of given coordinates of two points by the user, the meter assigns coefficients of the individual characteristic a and b $Y = aH + b$ . H1 and H2 - measured value Y1 and Y2 - expected value on the display	In 4-digit execution: <b>-1999...9999</b> In 5-digit execution: <b>-19999...99999</b>
<b>d_P</b>	Setup of the decimal point. This setup works only at switched on individual characteristic.	Setting possibilities in 4-digit execution: <b>0000</b> <b>000.0</b> <b>00.00</b> <b>0.000</b> in 5-digit execution: <b>00000</b> <b>0000.0</b> <b>000.00</b> <b>00.000</b> <b>0.0000</b>

table 1 (continuation)

<b>PrL1</b> <b>PrL2</b>	Alarm lower threshold	In 4-digit execution: <b>-1999...9999</b> In 5-digit execution: <b>-19999...99999</b>
<b>PrH1</b> <b>PrH2</b>	Alarm upper threshold	In 4-digit execution: <b>-1999...9999</b> In 5-digit execution: <b>-19999...99999</b>
<b>tYP1</b> <b>tYP2</b>	Alarm type. The fig. 6. shows the graphical illustration of alarm types	<b>nor</b> - normal <b>On</b> - switched on <b>OFF</b> - switched off <b>H_On</b> - manually switched on, till the time of changing the alarm type, the alarm output is switched on for good. <b>H_OF</b> - manually switched off, till the time of changing the alarm type, the alarm output is switched off for good.
<b>dLY1</b> <b>dLY2</b>	Delay of alarm operation. The parameter is defined by the number of measurements, one must give after how many measurements the alarm operation follows. The alarm switching off follows without delay. The parameter takes in account the number of averaged measurements <b>Cnt</b> and treats the whole cycle of averaging as a single measurement.	In 4-digit execution: <b>0...9999</b> In 5-digit execution: <b>0...99999</b> The introduction of <b>0</b> causes the operation at the moment of alarm appearance.

table 1 (continuation)







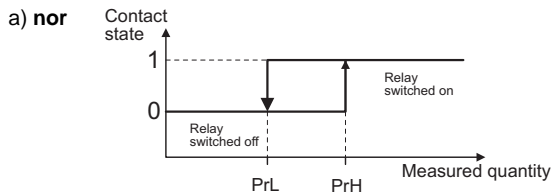
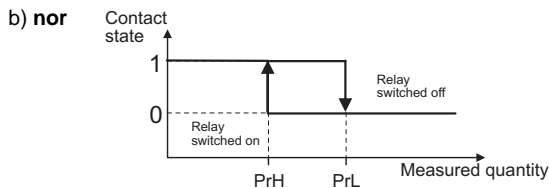
<b>LEd1</b> <b>LEd2</b>	<p>Support of the alarm signalling. In the situation when the function of support is switched on after the withdrawal of the alarm state, the signalling diode is not blanked. The function signals the alarm state till the moment of its blanking by means of the combination of  and  keys. This function only and exclusively concerns the alarm signalling and the relay contacts will act without support, according the chosen alarm type.</p>	<b>On</b> - support switched on <b>OFF</b> - support switched off
<b>tyPO</b>	<p>The choice of the quantity which will be converted into pulses and sent to the pulse output.          In case of a work time counter, pulses are sent every each <b>Con0</b> seconds to the pulse output.          In case of a pulse counter, pulses with a <b>2<sup>Con0</sup></b> frequency are sent to the pulse output.</p>	<b>OFF</b> - switched off <b>Cntr</b> - pulse number <b>CntH</b> - work time counter
<b>ConO</b>	Constans by which the input signal is divided	In 4-digit execution: <b>0...9999</b> In 5-digit execution: <b>0...99999</b>
<b>tyPA</b>	Analogue output mode	<b>PrAd</b> - current <b>nAP</b> - voltage
<b>AnL</b>	Lower threshold of the analogue output	In 4-digit execution: <b>-1999...9999</b> In 5-digit execution: <b>-19999...99999</b>
<b>AnH</b>	Upper threshold of the analogue output	In 4-digit execution: <b>-1999...9999</b> In 5-digit execution: <b>-19999...99999</b>

table 1 (continuation)

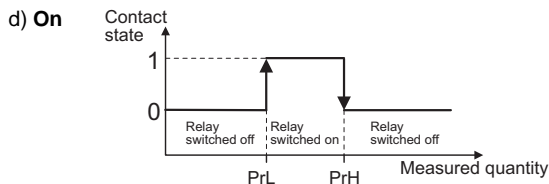
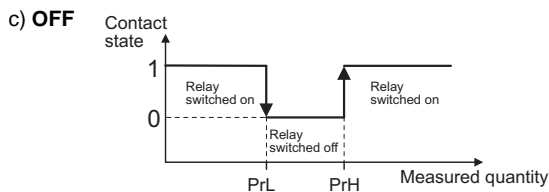
<b>bAud</b>	Baud rate of the RS-485 interface	<b>2400</b> - 2400 bit/s <b>4800</b> - 4800 bit/s <b>9600</b> - 9600 bit/s
<b>trYb</b>	Baud rate through the RS-485 interface	<b>OFF</b> - interface off <b>A8n1</b> - ASCII 8N1 <b>A7E1</b> - ASCII 7E1 <b>A7o1</b> - ASCII 7O1 <b>r8n2</b> - RTU 8N2 <b>r8E1</b> - RTU 8E1 <b>r8o1</b> - RTU 8O1
<b>Adr</b>	Device address	<b>0... 247</b>
<b>SEt</b>	Writing down of manufacturer's settings. Parameter values set up by the manufacturer are shown in the table 2.	A pressure of the  key causes the writing down of standard parameters into the meter. The execution of this operation is signalled by the inscription <b>End</b> .
<b>SEC</b>	Introduction of a new password	In 4-digit execution: <b>-1999...9999</b> In 5-digit execution: <b>-19999...99999</b>
<b>tSt</b>	Display test. The test consists on consecutive switching on of digital display segments. Alarm diodes should be lighting or flickering. A flickering diode means the relay switching off.	The pressure of the key causes the  test switching on. The  ends the test.
<b>JEd</b>	Highlight switching on of the unit.	<b>On</b> - highlighting switched on <b>OFF</b> - highlighting switched off
-----	Exit of the parameter group from the chosen level.	The pressure of the  key causes the exit of the parameter group from the chosen level.



**$PrH > PrL$**



**$PrH < PrL$**



**Fig. 6. Alarm type a) b) normal  
c) switched off d) switched on**

## CAUTION !



- In case of **On** and **OFF** alarm types, the writing down of **PrL>PrH** will cause an automatic transcription of the value from the threshold **PrL** into **PrH** and from threshold **PrH** into **PrL**.  
The alarm type will not change.
- In case of a measuring range exceeding the relay reaction is concordant with written down **PrL**, **PrH** and **tYP** parameters. In spite of displaying the exceeding, the meter will carry out the measurement as before.
- In case of an individual characteristic switching on (**Ind=On**) the measurement result is transformed linearly in accordance with introduced **H1**, **Y1**, **H2**, **Y2** parameters. The linear characteristic does not operate in case of choice of the current time as the input type.
- The meter currently checks up the value of the actually introduced parameter. In case when the introduced value exceeds the upper range of changes given in the table 1, the meter will automatically carry out the change into the minimal value. Similarly, in case when the introduced value exceeds the lower range of changes given in the table 1, the meter will automatically carry out the change into the maximal value.
- The display format of the current time in the 5-digit meter:  
g.mmss, after exceeding 9.5959:ggg.mm, after exceeding 999.59:ggggg.  
The display format in the 4-digit meter: gg.mm, after exceeding 99.59 gggg.  
where: g=number of hours, m=number of minutes, s=number of seconds.
- The position of the decimal point, in the programming mode, in dependence on the input signal:
  - number of pulses, rotations, number of work hours, long period, rotational speed - lack of point.
  - frequency - 0.00
  - period - 0.0.

Parameter symbol	Level in the matrix	Standard value
tYP	1	Cntr
Con	1	diu
d_P	1	2
Cnt	1	OFF
Ind	1	9999 lub 99999
H1,Y1,H2,Y2	1	0
PrL1, PrL2	2, 3	0
PrH1, PrH2	2, 3	9999 or 99999
tYP1, tYP2	2, 3	OFF
dLY1, dLY2	2, 3	0
LEd1, LEd2	2, 3	OFF
tYPO	4	OFF
ConO	4	1
tYPA	4	PrAd
AnL	4	0
AnH	4	9999 or 99999
bAud	4	9600
trYb	4	r8n2
Adr	4	1
SEC	5	0
Hour	5	0.00
JEEd	5	On

## 7. RS-485 INTERFACE

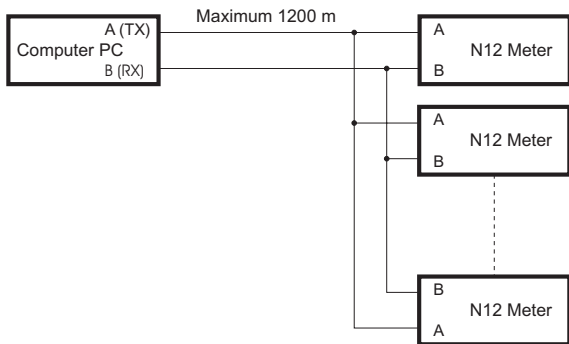
N12 programmable digital meters have their serial link in the RS-485 standard to communicate in computer systems and with other devices fulfilling the Master function. The MODBUS asynchronous character communication protocol has been implemented on the serial link. The transmission protocol describes the ways of information exchange between devices through the serial link.

### 7.1. Connection way of the serial interface

The RS-485 standard enables the direct connection to 32 devices on a single serial link of 1200 m length.

For the connection of a greater quantity of devices it is necessary to apply additional intermediate-separating systems.

The lead out of the interface line is given in the meter service manual. To obtain a correct transmission it is necessary to connect lines **A** and **B** in parallel with their equivalents in other devices.



**Fig. 7. Way of the RS-485 interface connection**



The connection must be carried out with a screened lead. The screen must be connected to the protective grounding in a single point. The **GND** line serves to an additional protection of the interface line for long connections.

One must connect it to the protective grounding (this is not necessary for the interface correct work).

In order to obtain the connection with an IBM PC computer, an RS-485 interface card or a RS-232/RS-485 converter is indispensable.

On the Fig. 7. the device connection is shown.

The marking of the transmission line for the card in the PC computer depends on the card producer.

## 7.2. Description of the MODBUS protocol implementation

The implemented protocol is compatible with the PI-MBUS-300 Rev G Modicon Company.

Combination of meter serial link parameters in the MODBUS protocol:

- meter address 1...247
- baud rate 2400, 4800, 9600 bps
- working modes ASCII, RTU
- information unit ASCII: 8N1, 7E1, 7O1  
RTU: 8N2, 8E1, 8O1
- maximal response time 300 ms

The parameter configuration of the serial link is described in the further parts of this service manual. It consists on the settlement of the baud rates (**bAud** parameter), device address (**Adr** parameter) and the information unit type (**trYb** parameter).

### Caution:

Each meter connected to the communication network must have:

- a unique address, different from addresses of other devices connected in the network,
- an identical baud rate and information type.

### 7.3. Description of used functions

Following functions of the MODBUS protocol have been implemented in meters of N12 series:

Description of functions

Table 3

<b>Code</b>	<b>Meaning</b>
03	Reading of n-registers
06	Writing of a single register
16	Writing of n-registers
17	Identification of the slave device

#### Caution:

In meters of N12 series the response frame to the function 17 looks as follows:

Device address	Function	Quantity of bytes	Device identifier	Device state	Field depending on the device type	Control total
X	11	08	X	FF	XXXXXX	

**Device address**

- depending on the set value

**Function**

- function No: 0x11;

**Number of bytes**

- 0x08;

**Device identifier**

- 0x60 - N12S

- 0x61 - N12H

- 0x62 - N12T

- 0x63 - N12O

- 0x64 - N12P

- 0x65 - N12B

**Device state**

- 0xFF;

**Field depending on the**

**device type**

- XXXXXX

- Device name** - transmitted as ASCII character and defines the meter type  
 S - 0x53, 53 X X X X X  
 H - 0x48, 48 X X X X X  
 T - 0x54, 54 X X X X X  
 O - 0x4F, 4F X X X X X  
 P - 0x50, 50 X X X X X  
 B - 0x42, 42 X X X X X
- Quantity of display** - Field depending on the quantity of meter displays  
 - 0x04 - 4-digit meters, X 04 X X X X  
 - 0x05 - 5-digit meters, X 05 X X X X
- No of the programming version** - programming version implemented in the meter X X \_ \_ \_ \_ - 4-byte variable of float type
- Control total** - 2 bytes in the case of work in the RTU mode 1 byte in the case of work in the ASCII code

**Example:**

Work in the **RTU** mode, e.g.: **trYb=r8n2** (value 0x02 in the case of reading/writing through the interface).

**N120** meter

Execution with a **4**- digit display,

No of the programming version **1.00**,

Device address set on **Adr=0x01**,

For this type of meter the frame will have the following shape:

Device address	Function	Quantity of bytes	Device identifier	Device state	Field depending on the device type	Control total (CRC)
01	11	08	63	FF	4F 04 3F 80 00 00	8E 89

## 7.4. Register map of N12 meter

Register map of the N12 series meter

Table 4.

Address range	Value type	Description
7000-7200	float (32 bits)	The value is placed in two successive 16 bit registers. Registers include the same data as 32-bit registers from the 7500 area. Registers are only for read-out.
7200-7400	float (32 bits)	The value is placed in two successive 16 bit registers. Registers include the same data as 32-bit registers from the 7600 area. Registers can be read out and written in.
7500-7600	float (32 bits)	The value is placed in a 32-bit register. Registers are only for read-out.
7600-7700	float (32 bits)	The value is placed in a 32-bit register. Registers can be read out and written in.

## 7.5. REGISTERS FOR WRITING AND READ-OUT

N12O meters

Table 5.

The value is placed in two successive 16-bit registers. Registers include the same data as 32-bit register from the 7600 area.	The value is placed in 32-bit registers	Symbol	writing(w)/ reading(r)	Range	Description	
7200	7600	<b>Identifier</b>	r	-	<b>Device identifier</b>	
					<b>Value</b>	
					60 xx	Identifier
					xx 04	4-digits execution
					xx 05	5-digits execution

**Table 5 (continuation)**

7202	7601	<b>tYP</b>	w/r	0... 7	<b>Input type</b>	
					<b>Value</b>	
					0	number of puls
					1	frequency
					2	number of revolutions
					3	rotational speed
					4	period
					5	long period > 10s
					6	Counter of working hours
7	current time					
7204	7602	<b>Ranu</b>	No occurs <sup>1)</sup>			
7206	7603	<b>Rani</b>	No occurs <sup>1)</sup>			
7208	7604	<b>Tru</b>	No occurs <sup>1)</sup>			
7210	7605	<b>Tri</b>	No occurs <sup>1)</sup>			
7212	7606	<b>Aur</b>	No occurs <sup>1)</sup>			
7214	7607	<b>Ual</b>	No occurs <sup>1)</sup>			
7216	7608	<b>Con</b>	No occurs <sup>1)</sup>			
7218	7609	<b>SCAL</b>	w/r	0... 1	<b>Kind of rescaling</b>	
					<b>Value</b>	
					0	Division by the constant
					1	Multiplication by the constant
7220	7610	<b>ConS</b>	w/r	-1999...99999	<b>Rescaling constant</b>	
					<b>Value</b>	
					-1999...9999	4-digit meters
					-19999...99999	5-digit meters
7222	7611	<b>E_in</b>	w/r	0...1	<b>Permission for external functions Start/Stop</b>	
					<b>Value</b>	
					0	External functions switched off
					1	External functions switched on
7224	7612	<b>Auto</b>	w/r	0...99999	<b>Automatic resetting of counters</b>	
					<b>Value</b>	
					0...9999	4-digit meters
					0...99999	5-digit meters
7226	7613	<b>d_P</b>	w/r	0... 4	<b>Decimal point</b>	
					<b>Value</b>	
					0... 3	4-digit meters
					0... 4	5-digit meters

**Table 5 (continuation)**

7228	7614	Cnt	w/r	0... 9999.9	<b>Quantity of measurements</b>		
					<b>Value</b>		
					0... 999.9	4-digit meters	
					0... 9999.9	5-digit meters	
7230	7615	Ind	w/r	0... 1	<b>Individual characteristic</b>		
					<b>Value</b>		
					0	Characteristic switched off	
					1	Characteristic switched on	
7232	7616	H1	w/r	-1999... 99999	Parameter of the individual characteristic		
					<b>Value</b>		
					-1999... 9999	4-digit meters	
					-19999... 99999	5-digit meters	
					<b>Number of decimal places</b>	<b>Kind of input</b>	
					0	Number of pulses	
					0.00	Frequency	
					0	Number of revolutions	
					0	Rotational speed	
					0.0	Period	
					0	Long period > 10s	
					0	Counter of working hours	
					- - -	Current time	
							The range of <b>H1</b> and <b>H2</b> parameters depends on the max. range of the input signal. The writing of the value with a greater number of significant places after the decimal point will cause its round-off. Values beyond the range cause the return of the error code 03 (not allowed data value).
					7234	7617	Y1
					<b>Value</b>		
					-1999... 9999	4-digit meters	
					-19999... 99999	5-digit meters	
					The parameter <b>Y1</b> , <b>Y2</b> , range depends only on the set decimal point <b>d_P</b> . The writing of the value with a greater number of significant places after the decimal point will cause its round-off. Values beyond the range cause the return of the error code 03 (not allowed data value).		

**Table 5 (continuation)**

7236	7618	<b>H2</b>	w/r	-1999... 99999	<b>Parameter of the individual characteristic</b>
					Change range as for the <b>H1</b> parameter
7238	7619	<b>Y2</b>	w/r	-1999... 99999	<b>Parameter of the individual characteristic</b>
					Change range as for the <b>Y1</b> parameter
7240	7620	<b>P_a1</b>	No occurs <sup>1)</sup>		
7242	7621	<b>PrL1</b>	w/r	-1999... 99999	<b>Lower threshold of alarm 1</b>
					<b>Value</b>
					-1999... 9999 4-digit meters
					-19999... 99999 5-digit meters
					For <b>Ind = 0</b> - „OFF“ When the individual characteristic is switched off the change range as/or the parameter <b>H1</b>
					For <b>Ind = 1</b> - „On“ When the individual characteristic is switched off the change range as/or the parameter <b>Y1</b>
7244	7622	<b>PrH1</b>	w/r	-1999... 99999	<b>Upper threshold of alarm 1</b>
					Change range as for the <b>PrL1</b> parameter
7246	7623	<b>TYP1</b>	w/r	0... 4	<b>Type of alarm 1</b>
					<b>Value</b>
					0 Normal
					1 Switched on
					2 Switched off
					3 Switched on manually
					4 Switched off manually
7248	7624	<b>dLY1</b>	w/r	0... 99999	<b>Delay of alarm 1</b>
					<b>Value</b>
					0... 9999 4-digit meters
					0... 99999 5-digit meters
7250	7625	<b>LEd1</b>	w/r	0... 1	<b>Support of alarm 1 signalling</b>
					<b>Value</b>
					0 support switched off
					1 support switched on
7252	7626	<b>P_a2</b>	No occurs <sup>1)</sup>		

**Table 5 (continuation)**

7254	7627	PrL2	w/r	-19999... 99999	<b>Lower threshold of alarm 1</b>	
					Change range as for the PrL1 parameter	
7256	7628	PrH2	w/r	-19999... 99999	<b>Upper threshold of alarm 1</b>	
					Change range as for the PrL1 parameter	
7258	7629	tYP2	w/r	0... 4	<b>Type of alarm 2</b>	
					Value	
					0	Normal
					1	Switched on
					2	Switched off
					3	Switched on manually
					4	Switched off manually
7260	7630	dLY2	w/r	0... 99999	<b>Delay of alarm 2</b>	
					Value	
					0... 9999	4-digit meters
					0... 99999	5-digit meters
7262	7631	LEd2	w/r	0... 1	<b>Support of alarm 2 signalling</b>	
					Value	
					0	support switched off
					1	support switched on
7264	7632	tYPO	w/r	0... 2	Choice of quantity which will be converted into pulses	
					Value	
					0	switched off
					1	Number of pulses, revolutions
					2	Counter of working hours
7266	7633	ConO	w/r	0... 99999	<b>Constant by which the input signal is divided</b>	
					Value	
					0... 9999	4-digit meters
					0... 99999	5-digit meters
7268	7634	P_an	No occurs <sup>1)</sup>			
7270	7635	tYPa	w/r	0... 1	<b>Analogue output type</b>	
					Value	
					0	Current
					1	Voltage



**Table 5 (continuation)**

7272	7636	AnL	w/r	-19999... 99999	<b>Lower threshold of analogue output</b>	
					Change range as for the PrL1 parameter	
7274	7637	AnH	w/r	-19999... 99999	<b>Upper threshold of analogue output</b>	
					Change range as for the PrL1 parameter	
7276	7638	hour	w/r	0... 99999	<b>Current time</b>	
					<p>This parameter occurs with two places after the decimal point in the gg, mm, format where:  gg - means hours  mm - means minutes</p> <p>In case of introduction of minutes with value higher than 0.59 (e.g. 0.70), the meter will make the correction of the error and write the value 1.10.</p> <p>In case of introduction of hours with a value higher than 23 (e.g. 27), the meter will make the correction of the error and write the value 3.00.</p>	
7278	7639	Jed	w/r	0... 1	<b>ON, OFF, unit highlighting</b>	
					<b>Value</b>	
					0	Highlighting switched off
					1	Highlighting switched on
					Occurs only in 5-digit meters	
7280	7640	Del_min	w/r	0... 1	<b>Erasing of the minimal value</b>	
					<b>Value</b>	
					0	Lack of operation
					1	Erasing of the minimal value
7282	7641	Del_max	w/r	0... 1	<b>Erasing of the maximal value</b>	
					<b>Value</b>	
					0	Lack of operation
					1	Erasing of the maximal value
7284	7642	Start/Stop/ resetting	w/r	0... 3	<b>Start, stop, resetting of the pulse counter, revolution center, counter of working hours</b>	
					<b>Value</b>	
					0	Start
					1	Stop
					2	Resetting and stop
					3	Resetting and start

**Table 5 (continuation)**

7286	7643	<b>CEnP</b>	No occurs <sup>1)</sup>
7288	7644	<b>CEnq</b>	No occurs <sup>1)</sup>
7290	7645	<b>CEnS</b>	No occurs <sup>1)</sup>
7292	7646	<b>CPAu</b>	No occurs <sup>1)</sup>
7294	7647	<b>CUAu</b>	No occurs <sup>1)</sup>

<sup>1)</sup> In case of registers no occurring in the given series of meters, their value is equal 1E+20

## 7.6. Registers only for reading

The value is placed in two successive 16-bit registers. Registers include the same data as 32-bit register from the 7500 area.	The value is placed in 32-bit registers	Name	Writing (w) /reading (r)	Unit	Quantity name
7000	7500	Identifier	r	-	Constant identifying the device. 0 x 63 - N120
7002	7501	Status	r	-	The status is the register describing the meter present state.
7004	7502	Steering	r	%	It is the register defining the steering of the analogue output.
7006	7503	Minimum	r	-	Minimal value of the currently displayed value.
7008	7504	Maximum	r	-	Maximal value of the currently displayed value.
7010	7505	Displayed value	r	-	Currently displayed value
7012	7506	Number of pulses Number of revolutions	r	-	Number of pulses, number of revolutions
7014	7507	Hour	r	gg.mmss	Current time
7016	7508	Number of working hours	r	gg.mmss	Number of working hours
7018...7096	7509...7548	No occurs <sup>1)</sup>			

<sup>1)</sup> In case of registers no occurring in the given series of meters, their value is equal 1E+20

## Caution!

The value 1E+20 occurs for parameters „minimum”, „maximum”:

- in case when the parameter **Cnt**=0,
- in case when one of these types of input is selected:
  - 0 - number of pulses,
  - 2 - number of revolution,
  - 6 - counter of working hours,
  - 7 - current time.

The value 1E+20 occurs for the „displayed value” parameter:

- in case of the range overrunning,
- in case when the parameter **Cnt**=0.

The value 1E+20 occurs for following parameters: „number of pulses”, „number of revolutions”, „hour”, „number of working hours”:

- in case when the parameter **Cnt**=0,
- in case when one of these types of input is selected:
  - 1 - frequency,
  - 2 - rotational speed,
  - 4 - period,
  - 5 - long period > 10s.

## Description of the status register

bits	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0						
	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						
	Kind of display		Compensation error of lead resistance		Kind of output (voltage, current)		Working mode and information unit		Baud rate		Position of the decimal piont		Signalling the range upper overrunning		Signalling the range lower overrunning		Relay state (alarm) 2		Relay state (alarm) 1		Individual characteristic or lack of it	
MSB																LSB						

### Bit-15 Kind of display

- 0 - meter with a 4-digit display
- 1 - meter with a 5-digit display

### Bit-14 Compensation error of the lead resistance

- 0 - lack of error
- 1 - signalling a compensation error

#### Caution!

This bit is only set in the N12T meter. For other types of N12 meter executions, the value of this bit is optional.

### Bit-13 Kind of output (voltage, current)

- 0 - current
- 1 - voltage

**Bit-12...10 Working mode and information unit**

- 000 - interface switched off
- 001 - 8N1 - ASCII
- 010 - 7E1 - ASCII
- 011 - 7O1 - ASCII
- 100 - 8N2 - RTU
- 101 - 8E1 - RTU
- 110 - 8O1 - RTU

**Bit-8...9 Baud rate**

- 00 - 2400 bit/s
- 01 - 4800 bit/s
- 10 - 9600 bit/s

**Bit-5...7 Position of the decimal point**

- 000 - lack
- 001 - 0.0
- 010 - 0.00
- 011 - 0.000
- 100 - 0.0000 (only for 5-digit meter executions)

**Bit-4 Signalling the range upper overrunning**

- 0 - normal work
- 1 - range overrunning

**Bit-3 Signalling the range lower overrunning**

- 0 - normal work
- 1 - range overrunning

**Bit-2 Relay state (alarm 2)**

- 0 - switched off
- 1 - switched on

**Bit-1 Relay state (alarm 1)**

- 0 - switched off
- 1 - switched on

**Bit-0 Individual characteristic**

- 0 - Individual characteristic switched off
- 1 - Individual characteristic switched on

## 8. TECHNICAL DATA

Panel meter dimensions	96 ´ 48 ´ 93 mm
Protection index ensured by the housing	IP50
Protection index ensured from the terminal side	IP20

### Rated operating conditions:

- supply voltage depended on the execution code  
85...230...253 V a.c. d.c.  
20...24...40 V a.c. d.c.
- supply voltage frequency  
40...50...440 Hz
- ambient temperature  
-20...23...50°C
- air relative humidity  
< 95% (water vapour condensation inadmissible)

### Power consumption

max 7 VA

### Storage temperature

-20°C...+85°C

### Display field

N1204

four 7-segment LED displays  
two alarm diodes

N1205

five 7-segment LED displays  
two alarm diodes, two diodes  
for the unit highlighting

### Indication range of the digital display:

N1204

-1999...9999

N1205

-19999...99999

### Servicing

four keys



## Relay outputs

- programmable alarm thresholds,
- three types of alarms (see chapter 6),
- hysteresis defined by means of the lower and upper alarm threshold,
- signalling of alarm action by means of diodes,
- programmable delay of the alarm operation,
- two relay outputs,
- voltageless make contacts - maximal load capacity:
  - voltage: 250 V a.c., 150 V d.c.
  - current: 5 A 30 V d.c., 250 V a.c.
  - resistance load: 1250 VA, 150 W

## Analogue output

- current programmable 0/4...20 mA
  - load resistance  $\leq 500 \Omega$
- voltage programmable 0...10 V
  - load resistance  $\geq 500 \Omega$
- galvanic insulation,
- resolution: 0.01% of the range
- basic error:  $\pm (0.1 \% \text{ i.v.} + 0.2\% \text{ u.l.})^2$

## Digital output

- RS-485 interface ,
- MODBUS transmission protocol:
  - ASCII: 8N1, 7E1, 7O1
  - RTU: 8N2, 8E1, 8O1,
- Baud rate: 2400, 4800, 9600 bauds,
- Maximal response time for query frame: 300 ms

---

<sup>2</sup> i.v. - indicated value

u.l.- upper limit of the measuring subrange

**Pulse output:**

- voltageless, OC type with npn transistor (max. load 25 mA)
- range of connected voltages: 5... 24 V d.c.
- galvanic insulation

**Steering input (start, stop, erasing):**

- voltageless transistor
- range of connected voltages: 5... 24 V d.c.
- galvanic insulation

**Sensor supply:**

- 24 V d.c./max 30 mA - (galvanic insulation)

**Fastness against supply decays** acc. EN 50082-2

**Electromagnetic compatibility:**

- immunity acc. EN 50082-2
- emission acc. EN 50081-2

**Safety requirements:** 

according IEC 1010-1 standard:

- installation category III
- level of pollution 2
- maximal voltage in relation to the earth 600 V a.c.

**Meter parameter:**

- long-lasting exceeding of the upper range 10%
- entry galvanically insulated 5... 24 V a.c., d.c.
- maximal frequency of the counter operation 20 kHz



Kind of input	Indication range		Basic error
	5 digits	4 digits	
Number of pulses	0...99999	0...9999	0,01% u.l. <sup>2)</sup>
Number of rotations	0...99999	0...9999	0,01% u.l.
Number of working hours	0...99999	0...9999	1sec/24 hours
Frequency	0.05...9.999 Hz	0.05...9.999 Hz	0.02% u.l.
Frequency	10.00...99.99 Hz	10.00...99.99 Hz	0.02% u.l.
Frequency	100.0...1000.0 Hz	100.0...999.9 Hz	0.2 % i.v.
Rotational speed	0...10000 rpm	0...9999 rpm	0,02% u.l.
Rotational speed	10000...99999 rpm	lack	0.2% i.v.
Period	0...999.99 ms	0...999.9 ms	0,01% u.l.
Period	1.0000...9.9999 s	1.000...9.999 s	0.02% u.l.
Period	10...99999 s	10...9999 s	1 second
Current time	0.00...23.59	0.00...23.59	1 sec/24 hours

<sup>2)</sup> where: i.v. = indicated value  
u.l. = upper limit of the measuring subrange

**Time of preliminary heating** 5 minutes  
**Weight** 200 g  
**Time of measurement** programmable, min. 100 ms

## 9. BEFORE A FAILURE WILL BE DECLARED



SYMPTOMS	PROCEDURE
1. The meter does not operate	Check the connection of the feeder cable
2. Only the diodes are lighting	Number of measurements = 0 has been introduced. The meter operates in the SLEEP mode - the display is blanked.
3. Only the horizontal dashes are displayed	Check the correctness of the input signal connection. See page 8 in the service manual.
4. Only the inscription <b>noC</b> is displayed	The meter is discalibrated, Contact the nearest authorized service workshop.
5. The entry into the programming mode is not possible. The inscription <b>Err</b> is displayed	The programming mode is protected by the password. If the user forgets which password has been introduced one must contact the nearest authorized service workshop.
6. Lack of certainty if all display segments are efficient	Enter into the service mode and switch the display test on. In the same time the same segments should be lighted on all displays. The state with blanked displays does never occur. Otherwise, submit the defect to the nearest authorized service workshop.

<p>7. During the operation in the programming mode, parameter values inconsistent with the range of changes given in the table 1, occur on the display</p>	<p>Enter into the servicing mode and accept the <b>SEt</b> parameter. The meter will introduce values in accordance with the table 2.</p>
<p>8. A result inconsistent with our expectations occurs on the display.</p>	<p>Check if the individual characteristic is not switched on. In case of necessity, enter into the service mode and accept the <b>SEt</b> parameter. The meter will introduce parameters in accordance with the table 2.</p>
<p>9. <b>H1, Y1, H2, Y2</b> parameter symbols are not displayed in the programming mode.</p>	<p>In case of switched individual characteristic off, mentioned symbols are omitted.</p>
<p>10. Despite of the alarm threshold exceeding, neither the alarm relay nor the signalling diode is switched on.</p>	<p>Check the introduced delay in the alarm operations into the meter. If need be, correct the <b>dLY</b> parameter.</p>
<p>11. Despite of the relay switching off, the alarm diode does not switch off.</p>	<p>Check if the alarm signalling support is not switched on. In case of need, switch the <b>LEd</b> parameter off.</p>
<p>12. Lack of possibility to erase the signalling diode by means of the key combination (fig. 4.) when the parameter of alarm signalling support is switched on.</p>	<p>The alarm still lasts. The erased diode is immediately re-lighted.</p>
<p>13. Despite the fact that the alarm still remains, the signalling diode does not light up.</p>	<p>Check if a delay of the alarm operation has not been introduced. <b>dLY</b> parameter</p>

<p>14. Instead to display the measurement result, the meter displays the parameter symbol alternately with its value despite we were not entered into the programming mode.</p>	<p>The meter works in the reviewing mode.</p>
<p>15. A delay of the alarm operation has been introduced, e.g. 30 measurements, however after this time the alarm has not operated.</p>	<p>The lasting alarm state was shorter than the programmed, e.g. during the lasting time of the alarm the state of alarm withdrawal occurs. In that case the meter begins counting the measurements from the beginning.</p>
<p>16. The meter does not establish a communication with the computer.</p>	<p>Check whether leads of interface (<b>A, B, GND</b>) were correctly connected. Then, check the setting of the interface (<b>trYb, bAud, Adr</b>) in the programming matrix. These parameters must be the same as in the used software.</p>

## 10. PROGRAMMING EXAMPLES OF N120 METERS

### Example 1: Programming of an individual characteristic.

If we want to programme so that to the value 0.0 ms will correspond the value 0 on the display, whereas to the value 500.0 ms will correspond the value 10,000 ms, one must:

- choose the **Ind** parameter and switch the individual characteristic on,
- choose the **H1** parameter and introduce the value 0.0
- pass on the **Y1** parameter and introduce the value 0,
- pass on the **H2** parameter and introduce the value 500.0,
- pass on the **Y2** parameter and introduce the value 10,000.

### Example 2 - Programming of an inverse individual characteristic.

If we want to programme so that to the value 50.00 Hz will correspond the value 1200.5 on the display, whereas the value 999.99 Hz will correspond the value 10.8, one must:

- choose the **Ind** parameter and switch the individual characteristic on,
- choose the **H1** parameter and introduce the value 50.00
- pass on the **Y1** parameter and introduce the value 1200,5
- pass on the **H2** parameter and introduce the value 999.99
- pass on the **Y2** parameter and introduce the value 10.8
- pass on the **d\_P** parameter and place the decimal point on the position 0000,0.

### Example 3 - Programming of the alarm with hysteresis

If we want to programme the alarm 1 operation so that the alarm will be switched on at the value 850.0 ms, whereas switched off at the value 100 ms, and the alarm 2 so that at the value 1000.0 ms the alarm will be switched off and on at the value 1.0 ms, one must:

- enter into the programming mode and choose the level with the **ALr1** symbol,
- enter on the **ALr1** level, choose the **PrL1** parameter and introduce the value 100.0,
- pass on the **PrH1** parameter and introduce the value 850.0
- pass on the **tYP1** parameter and choose the function designated as **nor**,
- exit from the **ALr1** level and pass on the **ALr2** level,
- choose the **PrL2** parameter and introduce the value 1000.0,
- pass on the **PrH2** parameter and introduce the value 1.0,
- pass on the **tYP2** parameter and choose the function **nor**.

#### **Example 4 - Programming of an alarm operating in the given interval with delay.**

If we want that the alarm 1 will be switched on in the interval from 1000 up to 3000 and operate only after 10 sec., one must:

- enter into the programming mode and choose the **Air1** level,
- pass on the **PrL1** parameter and introduce the value 1000,
- pass on the **PrH1** parameter and introduce the value 3000,
- pass on the **tYP1** parameter and choose the **On** function,
- pass on the **dLY1** parameter and set 10,
- introduce under the **Cnt** parameter the value 1.0,
- exit from the programming mode.

In case of the alarm state lasting longer than 10 seconds, the meter will switch the alarm relay on and the alarm diode will be lighted.

#### **Example 5 - Programming of the meter so that it counts the revolutions. The meter co-operates with a sensor with a constant: 60 pulses / turn.**

- enter into the programming mode and choose the **tYP** parameter,
- choose the input type as **turn**,
- pass on the **SCAL** parameter and set **diu**,
- pass on the **Cons** parameter and set the value 60,
- exit from the programming mode.

The meter starts to count the revolutions. The increase of the value on the display of 1 follows after 60 pulses on the input.

### Example 6 - Programming of the pulse counter so that it counts down and so that after exceeding 0 it starts to count from the value 12546 again.

- enter into the programming mode and choose the **tYP** parameter,
- choose the input type as **Cntr**,
- pass on the **ConS** parameter and set the value -1,
- pass on the **Auto** parameter and set the value 12546,
- exit from the programming mode.

The meter starts to count the number of pulses from 12546...0 and after exceeding 0, it starts to count from 12546...0 again.

### Example 7 - Programming of the analogue output.

If we want to programme that to the value 50.00 Hz, the value 4 mA will correspond on the current analogue output, whereas to the 150.00 Hz, the value 20 mA will correspond, one must:

- enter into the programming mode and choose the **tYPA** parameter responsible for the analogue output type. Choose the **PrAd** current output.

Under the **AnL** parameter one must write the value of the input signal for which we want 0 mA on the analogue output. One must for this calculate the **AnL** parameter:

$$(150 - 50)/(20 - 4) = 6.25 \rightarrow 50 - (4 \times 6.25) = 25$$

- choose the **AnL** parameter and introduce the value 25.00,
- choose the **AnH** parameter and introduce the value 150.00.

## 11. EXECUTION CODES

N12 METER	X	X	X	X	X	XX	X	XXX	
<b>Input:</b> temperature, programmable input 1 V, 10 V, 20 mA, 200 mA (all d.c. ranges) 600 V, 1 A, 5 A (all d.c. ranges) revolutions, frequency, period, pulses single-phase network parameters indicator for synoptic panels on the order	T	S	H	O	P	B	X	unit field	
<b>Number of displays:</b> 4 digits of 20 mm high 5 digits of 14 mm high + unit		4	5						
<b>Display colour:</b> red green			0	1					
<b>Supply voltage</b> 230 V a.c. d.c. 24 V a.c. d.c.				1	2				
<b>Kind of terminals:</b> socket-plug with screw connections socket-plug with self-locking connections						0	1		
<b>Execution:</b> standard custom-made						00	XX		
<b>Acceptance tests:</b> without a quality inspection certificate with a quality inspection certificate acc. customer's agreement							0 1 X		
<b>Unit field:</b> introduce the unit symbol									XXX



**Order example: N12-O-5-0-1-0-00-1 Hz** means: a frequency meter standard signals, with 5 displays in red colour, supply voltage: 230 V a.c., d.c., kind of terminals: socket-plug with screw connections, standard execution, with a quality inspection certificate, with the highlighted Hz unit.

- In case of a custom-made execution or need of more detailed technical information please contact our Export Department.
- In case of any meter failure one must contact the nearest authorized service workshop.

## 12. MAINTENANCE AND WARRANTY

The N120 meter does not require any periodical maintenance. In case of some incorrect unit operations:

### 1. In the period of 12 months from the date of purchase:

One should take the meter down from the installation and return to the Quality Control Dept. If the unit has been used in compliance with the instructions, we warrants to repair it free of charge.

### 2. After the warranty period:

One should turn over the meter to repair in a certified service workshop.

The disassembling of the housing causes the cancellation of the granted warranty.

Spare parts are available for the period of ten years from the date of purchase.

We reserve the right to make changes in design and specifications of any products as engineering advances or necessity requires.





## **SALES PROGRAMME**

- DIGITAL PANEL METERS
- BARGRAPH INDICATORS
- MEASURING TRANSDUCERS
- ANALOGUE PANEL METERS (DIN INSTRUMENTS)
- DIGITAL CLAMP-ON METERS
- PROCESS and HOUSEHOLD CONTROLLERS
- CHART and SCREEN RECORDERS
- POWER CONTROL UNITS and FREQUENCY INVERTERS
- AUTOMOTIVE DASHBOARD INDICATORS
- STATIONARY and PORTABLE CALIBRATORS
- MEASUREMENT ACCESSORIES (SHUNTS, SENSORS, TRANSFORMERS)
- MEASURING SYSTEMS (ENERGY, HEAT, CONTROL, MEASUREMENT)
- CUSTOM-MADE PRODUCTS

## **MEASUREMENT CONTROL RECORDING**

### **WE ALSO OFFER OUR SERVICES IN THE PRODUCTION OF:**

- ALUMINIUM ALLOY PRESSURE CASTINGS
- PRESSURE CASTING DIES AND INJECTION MOULDS
- PRECISION ENGINEERING AND THERMOPLASTICS PARTS

### **QUALITY PROCEDURES:**

According ISO 9001 international requirements.

All our instruments have CE mark.

For more information, please write to or phone our Export Department.



### **Lubuskie Zakłady Aparatów Elektrycznych LUMEL S.A.**

ul. Sulechowska 1, 65-022 Zielona Góra, Poland

Tel.: (48-68) 3295 100 (exchange)

Fax: (48-68) 3295 101

e-mail: [lumel@lumel.com.pl](mailto:lumel@lumel.com.pl)

<http://www.lumel.com.pl>

### **Export Department:**

Tel.: (48-68) 3295 302 or 304

Fax: (48-68) 3254 091

e-mail: [export@lumel.com.pl](mailto:export@lumel.com.pl)