LUMEL
EVERYTHING COUNTS

PANEL DIGITAL RECORDER

# N30B


USER'S MANUAL

CE

# CONTENTS

# 1. APPLICATION AND RECORDER DESIGN

The N30B recorder is a panel programmable digital instrument, destined to display and archive digital values from connected devices through the RS-485 interface. Additionally, the recorder enables to show the actual time. The readout field is composed of a LED display which allows the exposition of results in colours: red, green and orange. The measured readout values can be freely converted by means of the 21-point individual characteristic.

Features of the N30B recorder:

- Display colour programmed individually in three intervals.
- Programmable thresholds of displayed overflows.
- Two relay alarms with NOC contacts operating in 6 modes.
- Two relay alarms with switching over contact operating in 6 modes (option).
- Signalling of the measuring range overflow.
- Automatic setting of the decimal point.
- Programming of alarm and analog outputs with reaction on the selected input quantity (any register read out or recorded or real time lock).
- Real time lock with the supported supply function of the clock in case of a recorder supply decay.
- Automatic change of time from the summer to winter time and inversely (this function can be disabled).
- Programmed averaging time – function of walking window with the averaging time up to 1 hour.
- Monitoring of set parameters.
- Locking of introduced parameters by means of a password.
- Recounting of measured value on the base of a 21-point individual characteristic.

- Data archiving in data internal memory with a capacity of 308000 records.
- Any configuration of the archived data – any values with established time intervals can be archived.
- Conditional archiving – archiving of alarm states.
- Service of MMC / SD cards with capacity up to 4GB – - serviced system of FAT and FAT32 files.
- Automatic copying of the internal archive on the memory card.
- Signalling of the transmission state and the memory card state on the recorder display.
- Service of the interface with MODBUS protocol in RTU mode (implemented Master and Slave mode.
- Data readout of 10 devices with 10 registers in each device.
- Monitoring of readout/recorded register values directly accessible from the recorder keyboard.
- Retransmission of read out/recorded quantities into a standard, programmable current or voltage signal (option).
- Backlight of any measuring unit as per order.
- Signalling of alarm operation – The alarm supply causes the backlight of the output number.
- Galvanic separation between terminals: alarming, supplying, analog, RS-485 interfaces ( port 1 and port 2).
- Protection grade from frontal face: IP65, overall recorder dimensions: 96 x 48 x 93 mm (with terminals). The recorder casing is made of plastics.


***Fig. 1. View of the N30B recorder***

## 2. RECORDER SET

The set is composed of:

- N30B recorder ..... 1 pc
- user's manual ..... 1 pc
- Guarantee card ..... 1 pc
- Clamps to fix in the panel ..... 4 pcs
- Seal ..... 1 pc

When unpacking the recorder, please check whether the type and version code on the data plate correspond to the order.

# 3. BASIC REQUIREMENTS, OPERATIONAL SAFETY

In the safety service scope, the N30B recorder meets the requirements of the EN 61010-1 standard.

Symbols located in this manual are:

Especially important, one must get acquainted before connecting the recorder. Disregard of notices marked by this symbol can cause the recorder damage.

One must take into consideration when the recorder operates inconsistently with expectations.

**Observations concerning the operational safety:** 

- All operations concerning transport, 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.
- The programming of N30B recorder parameters must be carried out after disconnecting measuring circuits.
- Before switching the recorder on, one must check the correctness of connections.
- The recorder is destined to be installed and exploited in electromagnetic industrial environment conditions.

- Non-authorized removal of the housing, inappropriate use, incorrect installation or operation, creates the risk of injury to personnel or recorder damage.
- For more detailed information, please study the User's Manual.
- When connecting the supply, one must remember that a switch or a circuit-breaker should be installed in the building. This switch should be located near the device, easy accessible by the operator, and suitably marked as an element switching the recorder off.

# 4. INSTALLATION

The recorder has separable strips with screw terminals, which enable the connection of external wires of 1.5 $mm^2$ cross-sections for the RS-485 object interface and 2.5 $mm^2$ for other signals.

One must prepare a hole of $92^{+0.6}$ x $45^{+0.6}$ mm in the panel, which the thickness should not exceed 6 mm.

The recorder is adapted to be mounted in a panel. The recorder must be introduced from the panel front with disconnected supply voltage. Before the insertion into the panel, one must check the correct placement of the seal. After the insertion into the hole, fix the recorder by means of clamps (fig.2).

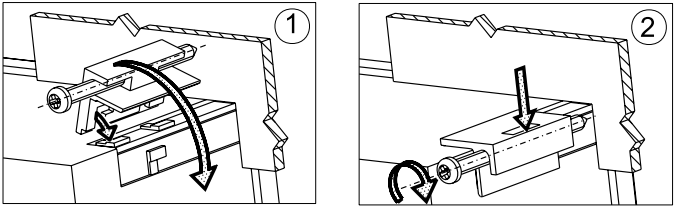
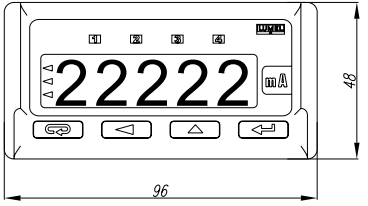



*Fig. 2. Recorder fixing.*



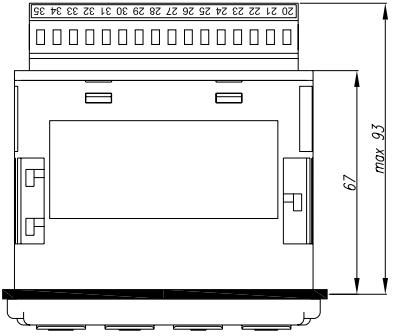




*Fig. 3. Overall dimensions.*

## 4.1 Lead-outs of Signals

Signals led out on the recorder connectors are presented on the fig. 4. Circuits of successive groups of signals are separated between them. RS-485 interfaces are separated between them and separated from remaining connectors.

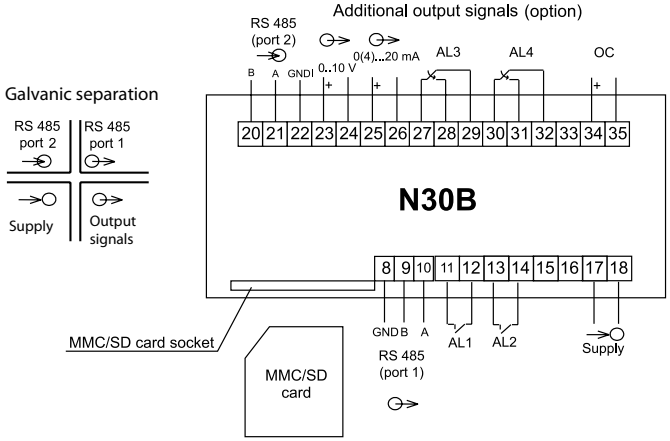



***Fig. 4. Description of signals on connection strips.***

The N30B recorder has one or two led out RS-485 interface operating in MODBUS RTU standard. In case of a recorder version equipped with a plate with additional signals, the interface of the port 1 always operates in master mode, however the interface on the port 2 always operates in slave mode. For versions without additional signals (without the upper plate) the interface of the port 1

works depending on the ALYPE parameter setting in the recorder menu as master or slave (table 1). The OC output is used for signalling the transmission error with devices added on during the master mode operation.

**Notice !: the memory card must be inserted into the recorder with contacts on the upper side. Before the card insertion, one must acquaint with the memory card description (Chapter 7 of the user's manual)**

**Notice !: The connection of RS-485 interface signals must be made by means of a wire composed of twisted pairs placed in a braided screen. During the assembly, one must take into consideration that A and B lines constitute one pair of wires twisted together. The screen must be connected to the terminal PE in the nearer proximity of the N30B recorder.**

# 5. SERVICE

## 5.1 Display Description

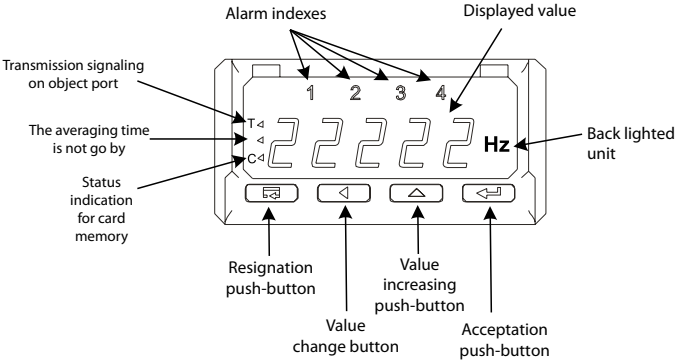



***Fig. 5. Description of the recorder frontal plate.***

Special symbols placed on the recorder display mean:

- **T** – transmission symbol on the object port. The symbol is flickering during broadcasting (red colour) or receiving (green colour) data by the recorder.
- **C** – the symbol defines the state of the memory card. In case when the symbol is blank, that means there is no card in the recorder or the card has been disassembled. The symbol in green colour signal the record of data in the memory card. The lighting of the symbol in red colour means an error in the card initiating – the card is damaged, not formatted or the type of card is not serviced. The lighting of symbol in orange colour means that a protection against recording is enabled on the card.

- the averaging time is not go by – the index is lighted if the value displayed on the display is not averaged in the full **Cnt** period. Such an event takes place after connecting the supply or in case of a transmission error with the co-operating device, which the value has to be averaged. After the error decay, the averaging period begins again.

### 5.2 Messages after Switching the Supply on

After switching the supply on, the recorder displays its name n30-b and next, the software version in the shape „ x.xx" – where x.xx is the number of the current software version or the number of a custom-made version. Next, the recorder transits to the normal operation and begins to display values according to the set parameter rd.SP (table 1). When displaying values, the recorder sets automatically the comma position, and at the same time, the format (number of places after the comma) can be limited by the user.

### 5.3 Functions of Push-buttons

[↵] – Acceptation push-button:

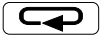
- ⇨ entry in programming mode (press and hold down ca 3 seconds),
- ⇨ moving through the menu – choice of level,
- ⇨ entry in the mode changing the parameter value,
- ⇨ acceptation of the changed parameter value,
- ⇨ stop the displayed value – when holding down the push-button, the result on the display is not updated.

[▲] – push-button increasing the value:

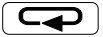
- ⇨ display of the maximal value, The pressure of the push-button causes the display of the maximal value during ca 3 seconds. ,
- ⇨ entry in the level of the parameter group,
- ⇨ moving through the selected level,
- ⇨ change of the selected parameter value – increasing the value.

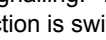
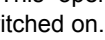
[◄] – push-button changing the digit:

- ⇨ display of minimal value, The pressure of the push-button causes the display of the minimal value during ca 3 seconds.
- ⇨ entry in the level of parameter group,
- ⇨ moving through the selected level,
- ⇨ change of the selected parameter value – shift on the next digit.

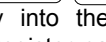
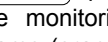
 – resignation push-button:

- ⇨ entry in the menu monitoring the recorder parameters (by holding down ca 3 seconds),
- ⇨ exit from the menu monitoring recorder parameters,
- ⇨ resignation of the parameter change,
- ⇨ absolute exit from the programming mode.

The pressure of the  and  push-button combination and holding them down ca 3 seconds causes the erasing of alarm signalling. This operation acts exclusively when the support function is switched on.

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

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

The pressure of the   push-button combination causes the entry into the monitoring mode of read out value registers. The register name (orange colour) and the value in the register (green colour) appear alternately on the display. The selection of the currently displayed register is carried out by means of the increasing or decreasing push-button. The name of the displayed register is composed of two values. The first value, preceded by the letter **d**, means the device number which data have been read out from. The second value preceded by the letter **r**, means the register number read out from the device.

The pressure of the   push-button

combination causes the data transfer from internal memory onto a card. Till the time to remove, the inscription SynCh twinkles interchangeably with the percentage quantity of copied data on the display. After removing the card from the recorder the inscription disappears automatically and the recorder returns to the normal operating mode.

The pressure and holding down the [↵] push-button during ca 3 seconds causes the entry in the programming matrix. The programming matrix can be protected by a safety code. The programming matrix can be protected by a safety code.

The pressure and holding down the [↩] push-button during ca 3 seconds causes the entry to the monitoring menu of recorder parameters. One must move through the monitoring menu by means of [◄] and [▲] push-buttons. In this menu, all programmable recorder parameters are only available for readout. In this mode, the menu SEr is not available. The exit from the monitoring menu is carried out by means of the [↩] push-button. In the monitoring menu, parameter symbols are displayed alternately with their values.

The service algorithm of the recorder is presented on the fig. 6.

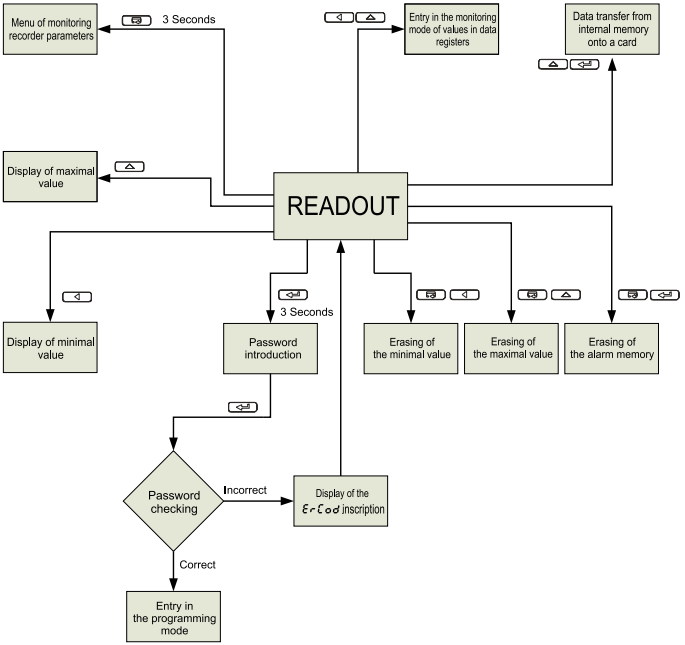



***Fig. 6. Service algorithm of the N30B recorder.***

### 5.4 Programming

The pressure of the [↵] push-button and holding it down through ca 3 seconds causes the entry in the programming matrix. If the entry is protected by a password, then the safety code symbol SEC is displayed alternately with the set value **0**. The write of the correct code causes the entry in the matrix, the write of an incorrect code causes the display of the ErCod symbol. The matrix of transitions into the programming mode is presented on the fig. 6. The selection of the level is made by means of the [↵] button, however the entry and moving through the parameters of the chosen level is carried out by means of [◄] and [▲] push-buttons. Parameter symbols are displayed alternately with their current values. In order to change the value of the selected parameter, one must use the [↵] push-button. To resign from the change, one must use the [↩] push-button. In order to exit from the selected level, one must choose the **-----** symbol and press the [↵] push-button. To exit from the programming matrix, one must press the End appears for ca 3 seconds and the recorder transits to the display of the set parameter. In case of leaving the recorder in the parameter programming mode, the automatic abandon of the programming mode (parameter, and next the menu) follows after 30 seconds and the transition to display values of the set parameter.

| Item | | | | | |
|---|---|---|---|---|---|
| 1 | inPUt<br>Parameters of main input | rd iSP<br>Displayed register | Cnt<br>Measurement time | AtYPE<br>Archiving type | ----- |
| 2 | Ind<br>Parameters of individual characte-ristic | IndCP<br>Number of points of individual characteris-tic. | H I<br>First point of the indiv. characteristic. Point x. | Y I<br>First point of the indiv. characteristic. Point y. | ... |
| 3 | d ISP<br>Display parameters | dP<br>Minimum decimal point | coLdo<br>Lower colour | coLbE<br>Middle colour | coLUP<br>Upper colour |
| 4 | ALr 1<br>Alarm 1 | P_A 1<br>Type of input quantity of alarm 1 | PrL_ 1<br>Lower thres-hold | PrH_ 1<br>Upper thres-hold | tYP_ 1<br>Alarm type |
| ... | ... | ... | ... | ... | ... |
| 7 | ALr4<br>Alarm 4 | P_A4<br>Type of input quantity of alarm 4 | PrL_4<br>Lower thres-hold | PrH_4<br>Upper thres-hold | tYP_4<br>Alarm type |
| 8 | OUt<br>Outputs | P_An<br>Type of quantity for analog output | An_Lo<br>Lower thres-hold of analog output | An_HI<br>Upper threshold of analog output | tYP_A<br>Kind of output (volt./cu-rrent) |
| 9 | SEr<br>Service | SEt<br>Write standard parameters | SECUr<br>Introduce the password | HoUr<br>Set the time | YEAr<br>Set the date -year |
| 11 | dEv0 | Addr0<br>Address of the device No 0 | r_bA0<br>Basic address | r_no0<br>Number of rea-dout registers | rtYP0<br>Type of readout registers |
| ... | ... | ... | ... | ... | ... |
| 20 | dEv9 | Addr9<br>Address of the device No 9 | r_bA9<br>Basic address | r_no9<br>Number of rea-dout registers | rtYP9<br>Type of readout registers |

| | | | | | | |
|---|---|---|---|---|---|---|
| H2 1<br>Last point of the characteristic | Y2 1<br>Last point of the characteristic. | ----- | | | | |
| coLLo<br>Lower threshold of colour change | coLHI<br>Upper threshold of colour change | ourLo<br>Lower overflow | ourHI<br>Upper overflow | ----- | | |
| dLY_ 1<br>Alarm delay | LEd_ 1<br>Signalling support | ----- | | | | |
| ... | ... | ----- | | | | |
| dLY_4<br>Alarm delay | LEd_4<br>Signalling support | ----- | | | | |
| bAUd<br>Baud rate | Prot<br>Kind of frame | Addr<br>Device address | bAUd 1<br>Baud rate on the object port | Prot 1<br>Kind of frame on the object port | t_oUt<br>Waiting time for the response | --- |
| dAtE<br>Set the date – month and day | Ct<br>Change the time –summer/ winter | Un it<br>Backlight the unit | tESt<br>Display test | AI U<br>Degree of memory occupancy | dEL_A<br>Erase the archive | --- |
| rFr90<br>Scanning frequency | ArE60<br>Selection of archived registers | AFr90<br>Archiving frequency | AtyP0<br>Kind of archiving | dPrL0<br>Lower threshold of conditional archiving | dPrH0<br>Upper threshold of conditional archiving | --- |
| ... | ... | ... | ... | ... | ... | --- |
| rFr99<br>Scanning frequency | ArE69<br>Selection of archived registers | AFr99<br>Archiving frequency | AtyP9<br>Kind of archiving | dPrL9<br>Lower threshold of conditional archiving | dPrH9<br>Upper threshold of conditional archiving | --- |

***Fig. 7. Programming matrix.***

### 5.4.1 Way to Change the Selected Parameter Value

In order to increase the value of the selected parameter, one must press the [▲] push-button. A single pressure of the push-button, causes the increase of the value of 1. The increase of value when displaying the digit 9 causes the setting of 0 on this digit. The change of the digit follows after pressing the [◄] push-button.

In order to accept the set up parameter, one must hold down the [↵] button. Then, the write of the parameter and the display of its symbol follows alternately with the new value. The pressure of the [↩] push-button during the change of the parameter value will cause the resignation of the write.

### 5.4.2 Changing Floating-Point Values

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

1) setting the value from the range -19999…99999, similarly as for integral values;
2) setting of the decimal point position (00000., 0000.0, 000.00, 00.000, 0.0000); the [◄] push-button shifts the decimal point to the left, however the [▲] push-button shifts the decimal point to the right;

The pressure of the [↩] push-button during the change of the parameter value will cause the resignation of the write.

### 5.4.3 Setting of Archived Registers

The setting of archived registers are carried out in the configuration menu of devices (group dEUn, where n defines the device number) after choosing the parameter ArEEn , where n defines the device number. After choosing the parameter, 10 vertical lines will be displayed on the dis-

play. Lines symbolize registers ( from the left side, first read out register). The lighting of lines in green colour means, that the register archiving is enabled. The lighting of lines in red colour means, that the register archiving is disabled.

The first register read out from the device No 0 is placed in the register 8000, however the second read out register in the register 8001 etc. For the second device, the first read out register will be placed in the recorder register 8010. The second register is read out in the register 8011, etc. Remaining read out registers will be placed in a similar way.

During the programming of registers, which have to be archived, the ◄ push-button serves to choose the register number, however the ▲ push-button serves to change the state – to enable or disable the archiving of the given register.

The exemplary view during programming is presented on the fig. 8.

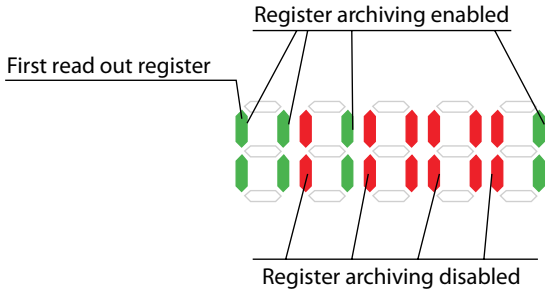



***Fig. 8 Way of register archiving presentation***

The presented drawing means that for the selected device, read out registers 1, 2, 4 and 10, will be archived. E.g., for the device No 0, that will be registers 8000, 8001, 8003 and 8009.

### 5.4.4 Characteristic of Programmed Parameters

Programming parameters and the change range of their quantities are presented in the table below.

**Table 1**

| INPUT | | |
|---|---|---|
| **Parameter symbol** | **Description** | **Range of changes** |
| rd ISP | Selection of displayed register.<br>The selected register can be averaged with the set averaging time and can be submitted to conversion on the base of the individual characteristic. | d0r0 .. d9r9 – number of the displayed register in the form dnrm, where: n – device number, m – number of read out register from the device.<br>HoUr – current time. |
| Cnt | Measurement time expressed in seconds. The result on the display represents the mean value calculated in the Cnt. period.<br>This parameter is not taken into consideration during the time display. | 1…600 s |
| AtYPE | Recorder operating type. Defines the way of recorder interface operating and enables the archiving switching on or off. | StoP – Stopping of archiving and device polling.<br>SLu – operating in slave mode without archiving. In the case of a version with an additional output plate, the upper interface operates in the slave mode, however the object interface is not used. For a version without additional outputs, the object interface operates in the slave mode. |

| | | |
|---|---|---|
| | | SLU A – similar operation as for SLU, but the archiving is enabled.<br>nAS – Operation in master mode. The interface of the port 1 operates in the master mode, however the interface of the port 2 (on the additional output plate) operates in the slave mode.<br>nAS A – Operation as in the nAS, mode, but the archiving is enabled. |

**Table 2**

| Ind | | |
|---|---|---|
| **Parameter symbol** | **Description** | **Range of changes** |
| IndCP | Number of points of the individual characteristic. For values lower than two the individual characteristic is disabled. The number of segments is the number of points decreased by one. In the HoUr mode , the individual characteristic is not taken into consideration. | 1..21 |
| Hn | Value of the point for which we will expect Yn (n - point number). | -19999..99999 |
| Yn | Expected value for Hn. | -19999..99999 |

**Table 3**

| dISP | | |
|---|---|---|
| **Parameter symbol** | **Description** | **Range of changes** |
| dP | Minimal position of the decimal point when displaying the value – display format. This parameter is not taken into consideration during the HoUr mode. | 0.0000 – 0<br>00.000 – 1<br>000.00 – 2<br>0000.0 – 3<br>00000 – 4 |
| CoLdo | Display colour, when the displayed value is lower than CoLLo. | rEd – red<br>GrEEn – green<br>orAnG – yellow |
| 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 |
| ourLO | Lower threshold of display narrowing. Values lower than the declared threshold are signalled on the display by the symbol ----- . | -19999..99999 |
| ourHI | Upper threshold of display narrowing. Values higher than the declared threshold are signalled on the display by the symbol ----- . | -19999..99999 |

**Table 4**

| ALr 1_ ALr2_ ALr3_ ALr4-19999..99999 | | |
|---|---|---|
| **Parameter symbol** | **Description** | **Range of changes** |
| P_A1_<br>P_A2_<br>P_A3_<br>P_A4_ | Input quantity, controlling the alarm. | d0r0 .. d9r9 – Number of the read out register in the form dXrY, where: X – device number, Y – number of the read out register from the device.<br>HoUr – current time<br>InP – value on the display |
| PrL_1_<br>PrL_2_<br>PrL_3_<br>PrL_4_ | Lower alarm threshold. | -19999..99999 |
| PrH_1_<br>PrH_2_<br>PrH_3_<br>PrH_4_ | Upper alarm threshold. | -19999..99999 |
| tYP_1_<br>tYP_2_<br>tYP_3_<br>tYP_4_ | Alarm type. Fig. 11 shows the graphical presentation of alarm types. | n-on – normal (transition from 0 to 1)<br>n-oFF – normal (transition from 1 to 0).<br>on - enabled<br>oFF – disabled<br>H-on – Manually enabled. Till the time to change the alarm type, the alarm output remains enabled for good.<br>H-oFF – Manually disabled. Till the time to change the alarm type, the alarm output remains disabled for good. |

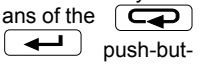
| | | |
|---|---|---|
| dLY_1_<br>dLY_2_<br>dLY_3_<br>dLY_4_ | Delay of alarm switching. | 0…32400 s |
| LEd_1_<br>LEd_2_<br>LEd_3_<br>LEd_4_ | Support of alarm signalling.<br>In situation when the support function is enabled after stopping the alarm state, the signalling diode is not blank. It signals the alarm state till the moment of its blank by means of the  push-button combination.<br>The function concerns only and exclusively the alarm signalling, thus the relay contacts will operate without supporting in accordance with the selected alarm type. | oFF – function disabled<br>on – function enabled |

**Table 5**

| oUt | | |
|---|---|---|
| **Parameter symbol** | **Description** | **Range of changes** |
| P_An | Input quantity, to which the analog output has to react. | d0r0 .. d9r9 – register number readout in the form dXrY, where: X – device number, Y – register number read out from the device.<br>HoUr – current time<br>inP – value on the display |
| An_Lo | Lower threshold of the analog output. One must give the value, on which we want to obtain a minimal signal value on the analog output. | -19999..99999 |
| An_HI | Upper threshold of the analog output. One must give the value, on which we want to obtain a maximal signal value on the analog output (10 V or 20 mA). | -19999..99999 |
| tYP_A | Type of analog output | 0. 10U – voltage 0..10 V<br>0_20A – current 0..20 mA<br>4_20A – current 4..20 mA |

| | | |
|---|---|---|
| bAUd | Baud rate of the external interface RS-485 of port 2 | 4.8 – 4800 bit/s<br>9.6 – 9600 bit/s<br>19.2 – 19200 bit/s<br>38.4 – 38400 bit/s<br>57.6 – 57600 bit/s<br>115.2 – 115200 bit/s |
| Prot | Type of the transmission frame of the external interface RS-485 of port 2. | rtn2<br>rtE1<br>rto1<br>rtn1 |
| Addr | Recorder address. The write of zero value cause the disable of the port 1interface. | 0..247 |
| bAUd1 | Baud rate of the object interface RS-485 of port 1. | 4.8 – 4800 bit/s<br>9.6 – 9600 bit/s<br>19.2 – 19200 bit/s<br>38.4 – 38400 bit/s<br>57.6 – 57600 bit/s<br>115.2 – 115200 bit/s |
| Prot1 | Type of the transmission frame of the interface RS-485 of port 1. | rtn2<br>rtE1<br>rto1<br>rtn1 |
| t_out | Waiting time to begin the response from the co-operating device of slave type. This time is expressed in milliseconds. | 100…5000 ms |

**Notice! In the version without additional outputs, one can switch the port 1 interface to operate in the interface mode for programming – Operation in the slave mode. Then, the recorder accepts settings in accordance with bAUd1, trYb1, Addr.**

**Table 6**

| SEr | | |
|---|---|---|
| **Parameter symbol** | **Description** | **Range of changes** |
| SEt | Write of manufacturer's settings. The setting of YES value causes the write of standard parameters in the recorder. Values of manufacturer's parameters are presented in the table X. | no – do nothing<br>YES – causes the write of manufacturer's settings. |
| SECUr | Introduction of a new password. The introduction of the value 0 disables the alarm. | 0..60000 |
| HoUr | Setting of the current time. Introduction of an erroneous time cancels the introduction of time.The introduced value will not be collected. | 0.00..23.59 |
| YEAr | Setting of the current year. The introduction of an erroneous year cancels the data introduction The introduced value will not be collected. | 2001…2099 |
| Ct | Automatic change of time from summer to winter and inversely. | oFF – automatic change of time disabled<br>on – automatic change of time enabled. |

| | | |
|---|---|---|
| Unit | Backlight of the unit. | oFF – backlight of units disabled<br>on – backlight of units enabled |
| tESt | Display test. The test consist on a successive lighting of digits. Alarm diodes and diodes of unit backlight should be lighted. | no – do nothing<br>YES – causes the test start. The pressure of the [↵] push-button ends the test. |
| AIU | Fulfilling of the archive internal memory . This value is not only for readout and is expressed in percentage. | 0…100 % |
| dEL_A | Command to erase the archive internal memory. After choosing YES, archive data will be removed and the value no will be admitted. | no – do nothing<br>YES – erase the archive memory |
| StAt | Displays the state of devices added to the recorder. In case, when one of the bar is in red colour, that means there is a transmission error with the given device. The first bar from the left side symbolizes the device No 0. | No concerned |

**Table 7**

| d0r0 .. d9r9 | | |
|---|---|---|
| **Parameter symbol** | **Description** | **Range of changes** |
| Addr0 ... Addr9 | Address of the co-operating device. The write of the 0 value disables the data readout from the device. | 0..247 |
| r_bA0 ... r_bA9 | Basic address from which follows the data readout from the device. | 0…65535 |
| r_no0 ... r_no9 | Number of registers read out from the device. | 1…10 |
| rtYP0 ... rtYP9 | Type of registers read out from the device. | **Read-out registers with function 3**<br>3 CH – 8 bits with a sign.<br>3 UCH – 8 bits without a sign.<br>3 Sh – 16 bits with a sign.<br>3 USh – 16 bits without a sign.<br>3 LG – 32 bits with a sign.<br>3 ULG – 16 bits without a sign.<br>3 FLt – 32-bit register– floating point variable.<br>3 F21 – value of float type located in two 16-bit registers with bytes sequence 3210.<br>3 F12 – value of float type located in two 16-bit registers with bytes sequence 1032. |

| | | |
|---|---|---|
| | | 3 L21 – value of long type with a sign located in two 16-bit registers with bytes sequence 3210.<br>3 L 12 – value of long type located in two 16-bit registers with bytes sequence 1032.<br>3UL21 – value of long type with a sign located in two 16-bit registers with bytes sequence 3210.<br>3UL 12 – value of long type without a sign located in two 16-bit registers with bytes sequence 1032.<br><br>**Read-out registers with function 4**<br>4 CH – 8 bits with a sign.<br>4 UCH – 8 bits without a sign.<br>4 Sh – 16 bits with a sign.<br>4 USh – 16 bits without a sign.<br>4 L6 – 32 bits with a sign.<br>4 UL6 – 32 bits without a sign.<br>4 FLt – 32-bit register– floating point variable<br>4 F21 – value of float type located in two 16-bit registers with bytes sequence 3210.<br>4 F 12 – value of float type located in two 16-bit registers with bytes sequence 1032.<br>4 L21 – value of long type with a sign located in two 16-bit registers with bytes sequence 3210.<br>4 L 12 – value of long type with a sign located in two 16-bit registers with bytes sequence 1032.<br>4UL21 – value of long type without a sign located in two 16-bit registers with bytes sequence 3210.<br>4UL 12 – value of long type without a sign located in two 16-bit registers with bytes sequence 1032. |

| | | |
|---|---|---|
| FrE90<br>...<br>FrE99 | Sampling period (data read-out from the device Expressed in seconds. | 1…60 s |
| ArE60<br>...<br>ArE69 | Archived registers. The menu serves for the register configuration, which will be archived, and which will be only read-out (see section 5.4.3.). | No concerned |
| AFr90<br>...<br>AFr99 | Archiving period expressed in tens of second. The value 1 corresponds to the 10 sec time. It defines the length of periods in which data read out from the device have to be placed in the archive. | 1…360 |
| AtyP0<br>...<br>AtyP9 | Kind of archiving. The user can choose the continuous archiving or indicate the register which value will decide about the conditional archiving beginning.<br>The archiving begins if the value in the indicated register does not be situated in the range defined by dnPrL and dnPrh, where n – device number. | Cont – continuous archiving<br>rE60 … rE69 – register number read out, which the value decides about the beginning of the conditional archiving. |

| | | |
|---|---|---|
| dOPrL<br>...<br>d9PrL | Lower threshold of the conditional archiving. Below this value, the conditional archiving begins – if this type of archiving has been chosen. | -19999…99999 |
| dOPrH<br>...<br>d9PrH | Upper threshold of the conditional archiving. Above this value, the conditional archiving begins – if his type of archiving has been chosen. | -19999…99999 |

### 5.4.5 Individual Characteristic

N30B recorders can recount the value to display into any value thanks to the implemented individual characteristic function. The individual characteristic rescales the input signal stored/read out through the RS-485 interface. The way of the individual characteristic interaction on the recorder operation has been presented on the fig. 9.

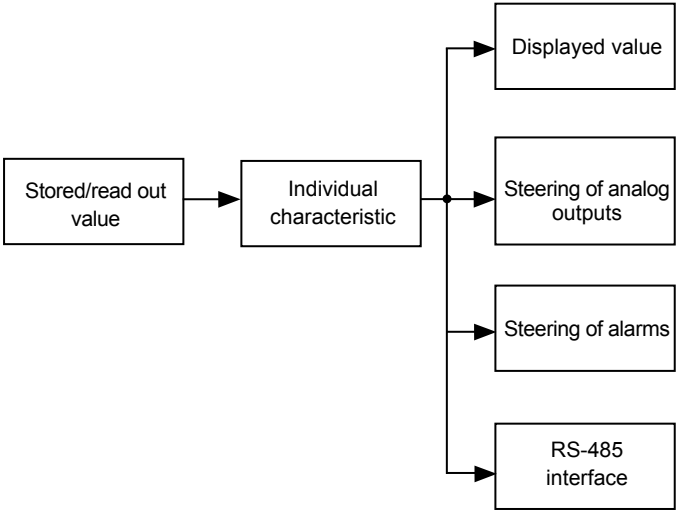



***Fig. 9. Action of the individual characteristic.***

The user can introduce maximally twenty functions through given points defining intervals and expected values for successive points.

The programming of the individual characteristic consists in the definition of the number of points which the input function will be linearized by. One must remember, that the number of linearizing functions is of one less than the number of points. Next, one must program successive points by giving the measured value (Hn) and the expected value corresponding to it, – value which has to be displayed (Yn).

The graphic interpretation of the individual characteristic is presented on the fig. 10.

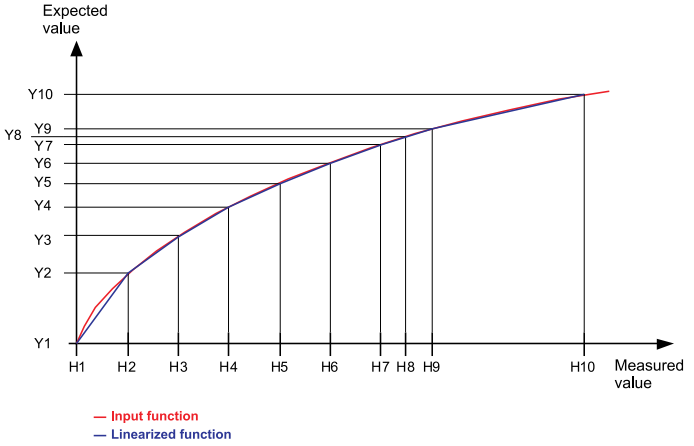



***Fig. 10. Individual characteristic.***

During the function approximation, one must remember that for the approximation of curves strongly differing from the linear characteristic, higher the number of linearizing segments smaller the error related to the linearization.

If measured values are smallest from H1 then, recalculations will be made on the base of the first straight line calculated on the base of points (H1,Y1) and (H2,Y2). However, for values higher than Hn (where n – the last declared measured value), the value to display will be calculated on the base of the last assigned linear function.

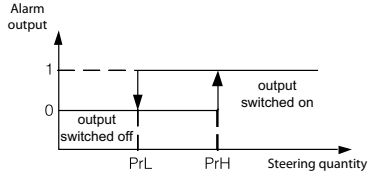
**Notice!** All introduced points of the measured value (Hn) must be arranged in the increasing sequence, such to preserve the following dependence:

H1<H2<H3…<Hn

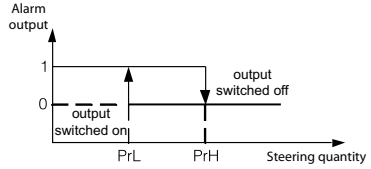
If the above is not fulfilled, the individual characteristic function will be automatically switched off (will not be realized) and a diagnostic flag will be set up in the status register.

### 5.4.6 Alarm Types

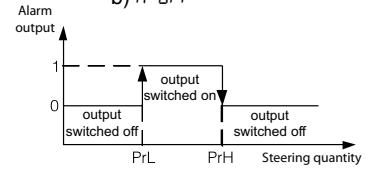
The N30B recorder is equipped with 2 alarm outputs with NOC contact (make contact) and two alarm outputs with NOC/NCC contact (make and break contact) (option). Each of alarms can work in one of the six modes. The work of alarms in modes n-on, n-oFF, on, oFF. is presented in the fig. 11. Two remaining modes: H-on and H_oFF mean suitably, always switched on and always switched off. These modes are destined for the manually simulation of alarm states.



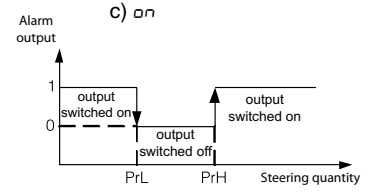

a) n-on




b) n-oFF




c) on




d) oFF

***Fig. 11. Alarm types: a) n-on; b) n-oFF; c) on; d) oFF***

**Caution!** 

- In case of alarms of n-on, n-oFF, on, oFF types, the write of PrL > PrH will cause the alarm switching off.
- In case of a measuring range overflow, the reaction of relays is compatible with written PrL, PrH, tYP.
- The recorder controls currently the value of the introduced parameter at the moment. In case when the introduced value overflows the upper change range given in the table 1, the recorder will make automatically the change into the maximal value. Similarly, in case when the introduced value overflows the lower change range given in the table 1, the recorder will make automatically the change into the minimal value.

### 5.4.7 Display Format

The N30B recorder adapts automatically the display format (precision) to the value of measured quantity destined to be displayed. So that the function could be fully used, one must choose the format **0.0000**, then the recorder will display the measured value with the possible highest accuracy. This function does not operate for the time display, where the format is set up automatically. The current time (mode HoUr) is displayed in the 24 hours' format, in the hh.mm shape, where hh – current hour, and mm – current minute.

### 5.5 Recorder Configuration to Work in the Master Mode

The N30B recorder using the port 1 interface can fulfil the role of master of the MODBUS RTU network, reading out data from added devices. Maximally, the recorder can pool 10 devices, and can maximally read out 10 registers from each device. For data readout from devices the function MODBUS readout of n-registers (No 3) is used. If there is the need to readout a higher number of registers from the given device, one must configure the readout from the device as two devices (e.g. menu dEu0 and dEu 1) with different basic addresses. The recorder configuration to work in the master mode consists in:

- setting the RtYPE option on the nAS value in the InPUt menu (data readout without archiving or nAS-A (readout and data archiving).
- configuration of transmission parameters in the oUt menu. One must configure parameters: bAUd 1 (baud rate), Prot 1 (type of data frame) and t-oUt (waiting time to begin the response from co-operating devices).
- configuration of readout parameters from devices. In the dEun menu, where n – device number, one must configure readout parameters for the given device by giving:
  - the device address Addrn,
  - the basic register from which will follow the readout of r-non ,
  - the number of registers that will be read out,
  - the type of registers including data in the device from which the readout rtYPn will be carried out,
  - the device sampling period expressed in seconds and defining sequences of time in which the device - parameter rFrgn.

- configuration of archiving parameters, data read out from devices. For his aim, one must configure following parameters:
  - ArEGn – one must define, which among read out registers have to be archived.
  - AFr9n – one must define the period between successive data records in the archive for the given device.
  - AtYPn – defines the type of archiving. One must choose if the archiving have to be carried out in a continuous way or in dependence of the value in the register controlling the conditional archiving. In case of conditional archiving the parameter AtYPn indicates the read out register number controlling the conditional archiving.
  - dnPrL – lower threshold of the conditional archiving. This parameter has a significance only for a conditional archiving. If the value in the controlling register is lower than the value definite by dnPrL, then the archiving of indicated registers takes place with the archiving period determined by the parameter APn.
  - dnPrH – upper threshold of the conditional archiving. This parameter has a significance only for a conditional archiving. If the value in the controlling register is higher than the value definite by dnPrH, then the archiving of indicated registers takes place with the archiving period determined by the parameter AFr9n.

the operation in the master mode the recorder sounds out devices in the network and read out data from them are available in data registers (registers 8000…8099).
Devices are pooled in a sequence acc. to the configuration (dEu0, dEu1, dEu2 etc.) although the pooling frequency of devices, for a large degree, depends on the rate of devices

operating on the bus. For devices with a long response time it can be happened, that the time between successive data readouts from devices is longer than the time set in the recorder configuration. The difference of times results from the waiting time for the device response and the duration of data transmission. In case of a long waiting time setting for the response and lack of device from which have to follow readouts, the recorder after each query transmission is waiting for the defined time (by the t_oUt), parameter) , and for this reason, in case if the co-operating device is switched off from the network, one must switch off its service in the N30B recorder through the setting of the variable Addr n on the value 0 (device switching off).

The recorder operating in the master mode with data archiving (mASA value of the AtYPE parameter in the InPUt menu) causes, that the recorder archives data in the internal data memory, and in case the memory is full, the data will be automatically copied on the memory card. When the card is missing, the oldest data will be overwritten. The readout of internal data memory, in case of a recorder without additional outputs (port 2) is possible in two ways:

- Location of a memory card in the recorder. After pressing of the [▲] [↵] push-button data from the internal archive memory will be automatically copied in the memory card, and after finishing the copying process, data from the internal memory will be erased, so as after the next archive readout only new records will be added in the card. After finishing the copying process (the SYnCh) inscription disappears) the card can be disassembled and removed (see recorder service, chapter 5).
- Data readout through the interface of the port 1. For this aim, one must set the AtYPE parameter at the SLu value in the InPUt menu. The object interface will be switched in the slave working mode

with parameters determined by Addr, bAUd 1, Prot 1. After finishing the data readout, in order to return to the normal operation, one must change the AtYPE parameter into the previous value (e.g nAS A).

During the operation in master mode, the user has the possibility to check the co-operation correctness of the recorder with added devices. For this aim, one must choose the StAt option from the SEr menu level. Vertical bars will be displayed on the recorder display where the first bar from the left corresponds to the device No 1 (dEu0), the second, to the device No 2 (dEu 1) etc.

Bars in green colour mean a correct communication with the given device. In case of a data transmission error, the bar symbolizing the device lights in red colour.

### 5.6 Recorder Configuration to Work in the Slave Mode

N30B recorders can operate in the slave mode. For a recorder without additional outputs (port 2) the operation in slave mode is carried out using the port 1interface. However, for a recorder with assembled upper plate of additional outputs, the operation in slave mode is always carried out using the port 2 located on the plate with additional outputs.

This interface always fulfils the slave role, and the choice of the slave mode switches on the possibility to write data in data registers 8000…8099 on, which can be additionally archived.

The recorder switching in the slave mode requires the setting of the AtYPE parameter on the SLu value in the InPut menu (operation without archiving) or SLuA (operation with archiving of recorded values). During the operation in slave mode, connector parameters depend on the used interface. For the port 2 interface, transmission parameters are determined by:

- Addr – defines the device address.
- bAUd – baud rate.
- Prot – type of the information frame.

For a recorder with the additional plate of outputs, transmission parameters on the port 1 are defined by parameters:

- Addr – defines the device address.
- bAUd 1 – baud rate.
- Prot 1 – type of the information frame.

After performing the configuration of transmission parameters (OUt menu) and choosing the working mode (InPUt menu), the recorder is ready to work in slave mode. Data can be recorded and read out from the recorder. For recording data which have to be archived, displayed, have to control alarms or analog outputs, 32-bit registers of float type 8000…8099 (or registers 8200..8399/8400...8599 – float value located in two 16-bit registers) are destined. The value located in data register can be reviewed from the recorder level through the entry in the value monitoring mode (see section 5.3).

Values stored in register 8000..8099 can be archived. The archiving is carried out in a similar way as archiving in the master working mode (see section 5.5.), where read out values from devices are located in registers 8000…8099. In order to switch the archiving of the given register on, one must set the ArEGn variable (n – device number) in the dEvn menu. Although, the first ten registers (8000..8009) are available in the dEv0 menu etc. The second group of ten registers are available in the dEv 1 menu, etc.The kind of archiving depends on the AtyPn parameter. However the archiving period is defined by the AFrqn parameter.

The archive readout in slave mode can be carried out directly by the mediation of the interface operating in the slave mode or through copying the archive on the memory card

(see section 5.5.). The degree of archive occupation can be checked in the SEr menu of the recorder (AI U parameter). From the SEr menu level, one can erase the archive contents (dEL_A parameter).

During the data archiving configuration in slave mode, one must remember that the configuration of archived registers is carried out in 10 groups, where for each group, one can configure parameters related to: archived register, frequency and archiving type. The detailed recorder register map and serviced functions are presented in the chapter 8.

### 5.7 Manufacturer's Parameters

Standard settings of the N30B recorder are presented in the table 5. These settings can be restored by means of the recorder menu through the choice of the option SEt from the menu SEr.

**Table 8**

| Parameter symbol | Matrix level | Default value |
|---|---|---|
| rd.SP | 1 | HoUr |
| Cnt | 1 | 1 |
| AtYPE | 1 | StoP |
| I ndCP | 2 | no |
| H0 | 2 | 0 |
| Y0 | 2 | 0 |
| H 1 | 2 | 100 |
| Y 1 | 2 | 100 |
| | ... | ... |

| | | |
|---|---|---|
| Hn | 2 | (n-1)*100 |
| Yn | 2 | (n-1)*100 |
| dP | 3 | 0 |
| CoLdo | 3 | GrEEn |
| CoLbE | 3 | orAnGE |
| CoLUP | 3 | rEd |
| CoLHI | 3 | 5000 |
| CoLLo | 3 | 8000 |
| ourLo | 3 | -19999 |
| ourHI | 3 | 99999 |
| P_A 1, P_A 2, P_A 3, P_A 4 | 4, 5, 6, 7 | dOrO |
| tYP 1, tYP 2, tYP 3, tYP 4 | 4, 5, 6, 7 | H-oFF |
| PrL 1, PrL 2, PrL 3, PrL 4 | 4, 5, 6, 7 | 1000 |
| PrH 1, PrH 2, PrH 3, PrH 4 | 4, 5, 6, 7 | 2000 |
| dLY 1, dLY 2, dLY 3, dLY 4 | 4, 5, 6, 7 | 0 |
| LEd 1, LEd 2, LEd 3, LEd 4 | 4, 5, 6, 7 | oFF |
| PAn | 8 | dOrO |
| An_Lo | 8 | 0 |
| An_HI | 8 | 99999 |
| tYP_A | 8 | O_ 10U |
| bAUd | 8 | 9.6 |
| Prot | 8 | rBn2 |
| Addr | 8 | 1 |
| bAUd 1 | 8 | 9.6 |
| Prot 1 | 8 | rBn2 |
| t_oUt | 8 | 500 |

| | | |
|---|---|---|
| SEt | 9 | no |
| SECUr | 9 | 0 |
| HoUr | 9 | No concerned |
| YEAr | 9 | No concerned |
| Ct | 9 | oFF |
| Un it | 9 | oFF |
| tESt | 9 | no |
| AI U | 9 | 0 |
| dEL_A | 9 | no |
| StAt | 9 | No concerned |
| Addr0 ... Addr9 | 10…19 | oFF |
| r_bA0 ... r_bA9 | 10…19 | 7505 |
| r_no0 ... r_no9 | 10…19 | 1 |
| rtyP0 ... rtyP9 | 10…19 | 3 FLt |
| rFr90 ... rFr99 | 10…19 | 1 |
| ArE60 ... ArE69 | 10…19 | 0 |
| AFr90 ... AFr99 | 10…19 | 1 |
| AtyP0 ... AtyP9 | 10…19 | Cont |
| dOPrL ... dOPrL | 10…19 | 100 |
| dOPrH ... dOPrH | 10…19 | 200 |

# 6. INTERNAL ARCHIVE

N30B recorders are equipped in standard with an internal memory destined to store registered data by the recorder. The recorder memory allows to store 308000 records. The memory have the character of a circular buffer. After fulfilling the memory, the oldest data are overwritten. The internal archive can be read out, copied and erased.

After the insertion of the memory card, follows it's checking, archiving of the date and time of its insertion. After fulfilling the internal archive, the data will be automatically transferred onto the card. The further archiving is carried out in the internal memory. In every moment one can copy the data from internal memory onto the memory card through pressing the ▲ ↵ push-button.

### 6.1 Memory Structure

The internal recorder memory is divided in 7000 pages. 44 records of archived data can be located in each memory page. On the page, records begin always from the beginning of the page and occupy the whole page space. Each memory page includes 528 bytes (one can store together 308000 records).

The beginning of archive data is determined by the page number on which there is the first archive record and by the initial byte determining from which byte begins the first record.

The archive end is determined in the similar way through the page number on which there is the last page record and the byte where begins the record of the next archive record.

Data of internal archive memory are stored in the shape of records including 12 bytes.

## 6.2 Record Construction

All data in the internal data memory are stored in the shape of records composed of 12 bytes. The record structure is presented in the table 9.

**Table 9**

| Field name | Value range | Description | Field type |
|---|---|---|---|
| ID | 0..9 | Knot identifier – Device number from which the data origins | byte |
| RegID | 0..9 | read out register number, which the value is stored | byte |
| Year | 1..255 | Year. Value 9 means 2009. | byte |
| Month | 1..12 | Month. | byte |
| Day | 1..31 | Day. | byte |
| Hour | 0..23 | | byte |
| Minute | 0..59 | | byte |
| Second | 0..59 | | byte |
| Data | --- | Data archived in the float format | 4 bytes |

### 6.3 Archive Data Downloading

Downloading of archive data from the internal memory is carried out through the mediation of the memory card or through the interface operating in the slave mode (see sections 5.5 and 5.6).

The algorithm of archive data downloading through the mediation of the RS-485 interface is presented below. The presented description includes only the way to download data without the description of further data processing and data conversion.

The archive data downloading consists to download successive memory pages including records with data. The archive downloading algorithm is presented on the fig. 12.

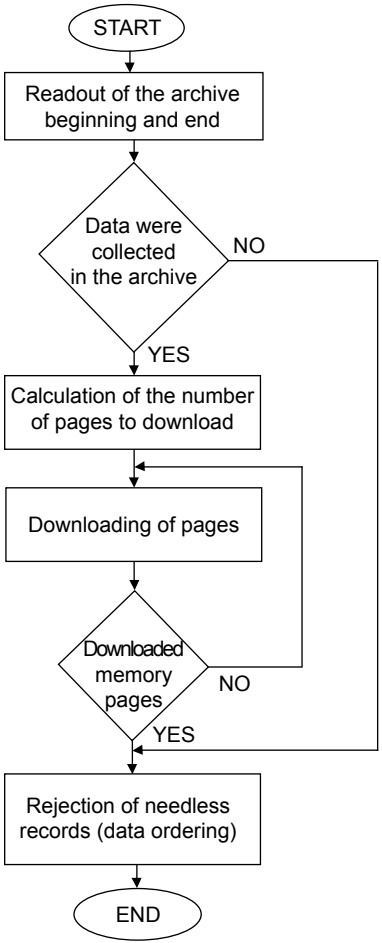



***Fig. 12. Algorithm of archive readout from the internal memory.***

Acc. to the presented figure above, in order to download data from the internal archive memory, one must download in the first sequence the beginning and the end of the archive (values in registers 4046..4049). On the base of registers 4046 and 4047, determine the number of pages to download from equations:

*Is* = $R_{4047}$ - $R_{4046}$ *+1;* or from the equation: *Is = 7000* + $R_{4046}$ - $R_{4047}$, if the value of the initial page is higher than the value of the last page (the memory has the structure of a circular buffer).

If the initial page and the last page are equal each other and registers 4048 and 4049 are equal each other, that means that the archive is empty. In the contrary, download the number Is of pages, beginning from the indicated page by the register 4046. After writing the number of the read out page in the register 4500, one can read out from registers 4501…4764 the page contents from the internal memory. Begin the page downloading by the write of the page number, which we want to download in the register 4500, and next the readout of registers 4501…4764 ( (memory page with number placed in the register 4500). We download all pages in the similar way, till the moment of downloading of all required pages (Is). After downloading the memory contents, we divide the downloaded contents into records (1 record equals 12 bytes). After performing the division into records, filter data by the rejection of records in front, then the number of records to be rejected in front is calculated as the contents of the register 4048/12. after the rejection of records in front, reject records from the end.

The number of records to reject from the end is calculated as: 528 – value of register 4049)/12.

After the rejection of records we obtain ready data in the memory (e.g. in the table).

# 7. MEMORY CARD

N30B recorders are serviced by memory cards of MMC and SD types and capacity up to 4 GB. The FAT and FAT32 system of files is serviced. In case, when the possessed memory card is not formatted, one must carry out its formatting in the card reader from the computer level. During the work, the N30B recorder creates catalogues and files including archived data. Before the card insertion into the recorder, one must check whether the card does not have a switched protection against recording.

**Notice!** One must never pull out the memory card from the recorder before its disassembling when the data are transferred from the internal memory onto the card (see section 5.3).

The memory card state is displayed by the marker placed on the recorder display (see section 5.1.) and is contained in the recorder's registers (see section 8.4.).

Below an exemplary number of records on the card for 10 archived devices (with 10 registers in each) with the quickest updating time (every 10 seconds):

- 64 MB: ca 4 320 000 records ( ca 120 hours – 5 days)
- 512 MB: ca 34 560 000 records ( ca 960 hours – 40 days)
- 2 GB: ca 136 512 000 records ( ca 3792 hours – 158 days)

**Notice!** The time needed to transfer the data from internal memory depends on the card and can take even about an hour.

### 7.1 Catalogue Structure

The N30B recorder installs catalogues and files in the memory card during archiving. The exemplary catalogue structure is presented on the fig. 13.

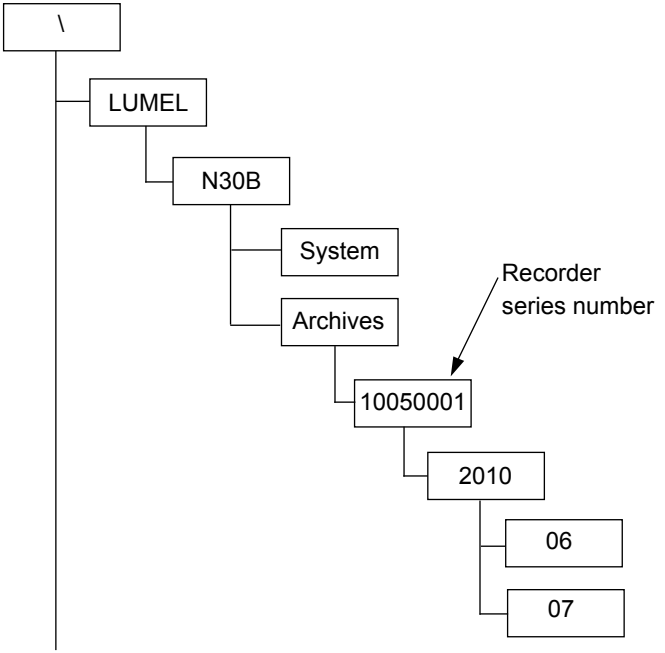



***Fig. 13 Catalogue structure in the memory card.***

Beyond the Archives catalogue, the System catalogue is also created on the card, in which the start.txt file is placed. The date and time of the memory card initialization is stored in this file ( also during the start after a supply decay).
Data on the card are stored in files located in catalogues corresponding to the date – see fig 13. However, file names correspond to numbers of the archiving day: Day_01.dat, Day_02.dat, etc.

### 7.2 Construction of Archive Files

Files including archive data, have a bar (column) construction, where successive data bars are separated between them by the tabulator mark. In the first file row, the bar heading is placed. Data records are arranged successively in rows, and fields of the given record are separated between them by the tabulation mark. The view of an exemplary file is presented on the fig. 14.

| date | time | DEV | R0 | R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | R9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2009-12-03 | 16:57:00 | | | 1 | 2.236000e+01 | | 3.286079e+01 | | * | * | * | * | * |
| 2009-12-03 | 16:58:00 | | | 1 | 2.232000e+01 | | 3.310589e+01 | | * | * | * | * | * |
| 2009-12-03 | 16:59:00 | | | 1 | 2.231000e+01 | | 3.317587e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:02:00 | | | 1 | 2.225000e+01 | | 3.331576e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:03:00 | | | 1 | 2.222000e+01 | | 3.328080e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:04:00 | | | 1 | 2.220000e+01 | | 3.328080e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:05:00 | | | 1 | 2.218000e+01 | | 3.335072e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:07:00 | | | 1 | 2.217000e+01 | | 3.338567e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:12:00 | | | 1 | 2.207000e+01 | | 3.335072e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:14:00 | | | 1 | 2.204000e+01 | | 3.349050e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:15:00 | | | 1 | 2.206000e+01 | | 3.359528e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:16:00 | | | 1 | 2.206000e+01 | | 3.338567e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:17:00 | | | 1 | 2.204000e+01 | | 3.342062e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:18:00 | | | 1 | 2.201000e+01 | | 3.335072e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:19:00 | | | 1 | 2.200000e+01 | | 3.331576e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:20:00 | | | 1 | 2.197000e+01 | | 3.335072e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:23:00 | | | 1 | 2.197000e+01 | | 3.370000e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:24:00 | | | 1 | 2.202999e+01 | | 3.401387e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:25:00 | | | 1 | 2.210000e+01 | | 3.390930e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:26:00 | | | 1 | 2.215000e+01 | | 3.390930e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:27:00 | | | 1 | 2.220000e+01 | | 3.383956e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:28:00 | | | 1 | 2.224000e+01 | | 3.390930e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:29:00 | | | 1 | 2.230000e+01 | | 3.390930e+01 | | * | * | * | * | * |
| 2009-12-03 | 17:30:00 | | | 1 | 2.234000e+01 | | 3.390930e+01 | | * | * | * | * | * |

***Fig. 14 Exemplary file with data.***

Successive fields included in the row and describing the record have the following meaning:

- date – date of data registration. The date separator is the mark: '-'.
- time – time of data registration. The time separator is the mark: ':'.
- DEV – device number – value 0 for dev0, 1 for dev1, etc.
- R0..R9 – value of successive registers. The decimal point is the dot: '.' . Values are stored in the engineer's format allowing to preserve the precision.

**Notice:** The number of rows in the file depends on the number of stored data. For 10 devices archived 10 seconds, the number of lines in the dayly file is 86402 (8640 for each device). For this reason, before beginning the data analysis, one must be sure that the used program (e.g.: Excell) services such a number of rows.

# 8. INTERFACE RS-485

Programmable digital N30B recorders have one or two serial links in RS-485 standards for the communication in computer systems and with other devices fulfilling Master or slave functions. An asynchronous communication character protocol MODBUS has been implemented on the serial link (links).

### 8.1 Connection Way of the Serial Interface

The RS-485 standard allows to a direct communication of 32 devices on a single serial link of 1200m long (at baud rate 9600 b/s). For the connection of a higher quantity of devices, it is necessary to apply additional intermediate-separating systems, e.g. PD51 converter, of LUMEL S.A.'s production.
The outlet of the interface line is presented on the fig. 4. To obtain a correct transmission, it is necessary to connect lines A and B in parallel with their equivalents in other devices. The connection must be made through a screened wire. The wire screen must be connected to the protective terminal in the nearest possible proximity of the recorder (connect the screen only to a single point of the protective terminal).
The GND line serves to the additional protection of the interface line at long connections. Then, one must connect GND signals of all devices on the RS-485 bus.
To obtain the connection with the computer, a RS-485 interface card or a suitable converter is indispensable, or a suitable converter as e.g. PD51 or PD10.
The connection way of devices is shown on the fig. 15.

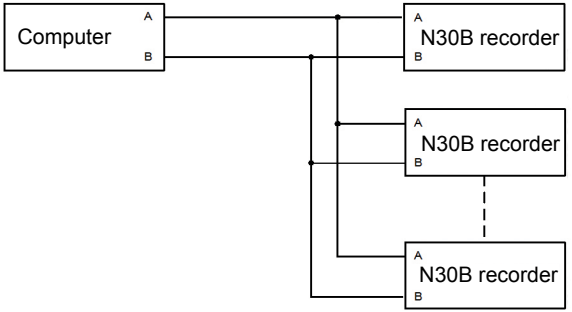



***Fig. 15. Connection Way of the RS-485 Interface.***

The designation of transmission lines for the card in the PC computer depends on the card producer.

### 8.2 Description of the MODBUS Protocol Implementation.

The implemented protocol is in accordance with the PI-MBUS-300 Rev G of Modicon Company specification.
Set of the serial link parameters of N30B recorders in MODBUS protocol:

- recorder address: 1..247.
- baud rate: 4800, 9600, 19200, 38400, 57600, 115200 [b/s].
- work mode: RTU z ramką w formacie: 8n2, 8e1, 8o1, 8n1.
- maximal time to start the response: 200 ms (work without card), 1000 ms (work with a card).

The parameter configuration of the serial link consists in the settlement of the baud rate (bAUd or bAUd I parameter), device address (Addr parameter), and the format of the informa-

tion unit ( Prot or Prot 1 parameter).

**Notice:** Each device connected to the communication network must have:

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

### 8.3 Description of Applied Functions

Following functions of the MODBUS protocol have been implemented in the N30B recorder:

- 03, 04 – Readout of register group.
- 06 – Write of one register (only during the slave mode operation).
- 16 – Write of register group (only during the slave mode operation).
- 17 – Identification of the slave device (only during the slave mode operation).

### 8.4 Register Map

The N30B recorder data are placed in 16- and 32-bit registers. Process variables and meter parameters are placed in the address space of registers in a manner dependent on the type of the variable. The bits in the 16-bit register are numbered from the youngest to the oldest (b0-b15). 32-bit registers contain numbers of float type in IEEE-754 standard.

**Notice:** All given addresses are physical addresses. In some computer programs, logic addressing is applied, then addresses must be increased of 1.

**Table 10**

| Range of addresses | Value type | Description |
|---|---|---|
| 4000-4062, 4300-4379 | integer (16 bits) | Value placed in a 16-bit register. Registers can be read out and recorded. |
| 4500-4764, | integer (16 bits) | Value placed in a 16-bit register. Enables the readout of the archive internal memory contents. |
| 6000-6099 | float (2x16 bits) | Value placed in two successive 16-bit registers. Registers include the same data as 32-bit registers from the area 7500-7549. Registers are only for readout. Bytes sequence (1-0-3-2). |
| 6200-6367 | float (2x16 bits) | Value placed in two successive 16-bit registers. Registers include the same data as 32-bit registers from the area 7600-7683. Registers can be read out and recorded. Bytes sequence (1-0-3-2). |
| 7000–7099 | float (2x16 bits) | Value placed in two successive 16-bit registers. Registers include the same data as 32-bit registers from the area 7500-7549. Registers are only for readout. Bytes sequence (3-2-1-0). |

| | | |
|---|---|---|
| 7200-7367 | float (2x16 bits) | Value placed in two successive 16-bit registers. Registers include the same data as 32-bit register from the area 7600-7683. Registers can be read out and recorded. Bytes sequence (3-2-1-0). |
| 7500-7549 | float (32 bity) | Value placed in a 32-bit register. Registers are only for readout. Bytes sequence (3-2-1-0). |
| 7600-7683 | float (32 bity) | Value placed in a 32-bit register. Registers can be read out and recorded. Bytes sequence (3-2-1-0). |
| 8000-8099 | float (32 bity) | Value placed in a 32-bit register. Registers can be read out and recorded. Bytes sequence (3-2-1-0). |
| 8200-8399 | float (2x16 bits) | Value placed in two successive 16-bit registers. Registers include the same data as 32-bit register from the area 8000. Registers can be read out and recorded. Bytes sequence (3-2-1-0). |
| 8400-8599 | float (2x16 bits) | Value placed in two successive 16-bit registers. Registers include the same data as 32-bit register from the area 8000. Registers can be read out and recorded. Bytes sequence (1-0-3-2). |

## 8.5 Registers for Write and Readout

**Table 11**

| Values placed In 16-bit registers | Symbol | write (w)/ readout (r) | Range | Description |
|---|---|---|---|---|
| 4000 | rd ISP | w/r | 0..100 | Number of the displayed register. Defines which read out register will be displayed. Registers 0…9 – values read out from the device number 1. Registers 10…19 – read out from the device number 2, etc. Value 100 means, that the time will be displayed. |
| 4001 | | w/r | | Reserved |
| 4002 | | w/r | | Reserved |
| 4003 | Cnt | w/r | 1..600 | Measurement time expressed in seconds. This time defines the averaging time of the measured (displayed) value. The displayed value is the mean value calculated from the Cnt period. |
| 4004 | AtYPE | w/r | 0..4 | Archiving status: |
| | | | | Value: 0 — StoP - stoppage of device archiving and pooling |
| | | | | Value: 1 — SLu – work in slave mode without archiving |
| | | | | Value: 2 — SLu A – work in slave mode with archiving |
| | | | | Value: 3 — nAS – work in master mode with archiving disabled |
| | | | | Value: 4 — nAS A – work in master mode with archiving enabled |
| 4005 | | w/r | | Reserved |

<table>
<tr><td>4006</td><td></td><td>w/r</td><td></td><td colspan="2">Reserved</td></tr>
<tr><td>4007</td><td></td><td>w/r</td><td></td><td colspan="2">Reserved</td></tr>
<tr><td>4008</td><td>IndCP</td><td>w/r</td><td>1..21</td><td colspan="2">Number of points of the individual characteristic. For the value 1, the individual characteristic is disabled. Segments of the individual characteristic are defined by parameters Xn and Yn, where n – point number.</td></tr>
<tr><td rowspan="6">4009</td><td rowspan="6">dP</td><td rowspan="6">w/r</td><td rowspan="6">0..4</td><td colspan="2">Minimal position of the decimal point when displaying the measured value.</td></tr>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>0.0000</td></tr>
<tr><td>1</td><td>00.000</td></tr>
<tr><td>2</td><td>000.00</td></tr>
<tr><td>3</td><td>0000.0</td></tr>
<tr><td>4</td><td>00000</td></tr>
<tr><td rowspan="4">4010</td><td rowspan="4">coLdo</td><td rowspan="4">w/r</td><td rowspan="4">0..2</td><td colspan="2">Display colour when the displayed value is lower than CoLLo.</td></tr>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>red</td></tr>
<tr><td>1</td><td>green</td></tr>
<tr><td>2</td><td>orange</td></tr>
<tr><td rowspan="4">4011</td><td rowspan="4">coLbE</td><td rowspan="4">w/r</td><td rowspan="4">0..2</td><td colspan="2">Display colour when the displayed value is higher than coLLo and lower than CoLH1.</td></tr>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>red</td></tr>
<tr><td>1</td><td>green</td></tr>
<tr><td>2</td><td>orange</td></tr>
<tr><td rowspan="4">4012</td><td rowspan="4">coLUP</td><td rowspan="4">w/r</td><td rowspan="4">0..2</td><td colspan="2">Display colour when the displayed value is higher than CoLH.</td></tr>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>red</td></tr>
<tr><td>1</td><td>green</td></tr>
<tr><td>2</td><td>orange</td></tr>
</table>

| | | | | | |
|---|---|---|---|---|---|
| 4013 | P_A 1 | w/r | 0...101 | Input quantity which the alarm output has to react on | |
| | | | | Value | Description |
| | | | | 0..99 | Number of read out register from the device |
| | | | | 100 | Main input |
| | | | | 101 | Clock |
| 4014 | tYP_1 | w/r | 0…5 | Type of alarm 1 (description – fig 11) | |
| | | | | Value | Description |
| | | | | 0 | n-on |
| | | | | 1 | n-off |
| | | | | 2 | on |
| | | | | 3 | off |
| | | | | 4 | H-on |
| | | | | 5 | H-off |
| 4015 | dLY_1 | w/r | 0.. 32400 | Delay of alarm 1(in seconds) | |
| 4016 | LEd_1 | w/r | 0…1 | Support of alarm 1 signalling | |
| | | | | Value | Description |
| | | | | 0 | Support disabled |
| | | | | 1 | Support enabled |
| 4017 | P_A 2 | w/r | 0… 101 | Input quantity which the alarm output has to react on | |
| | | | | Value | Description |
| | | | | 0..99 | Number of read out register from the device |
| | | | | 100 | Main input |
| | | | | 101 | Clock |

<table>
<tr><td>4018</td><td>tYP_2</td><td>w/r</td><td>0…5</td><td colspan="2">Type of alarm 2 (description – fig. 11)</td></tr>
<tr><td rowspan="8"></td><td rowspan="8"></td><td rowspan="8"></td><td rowspan="8"></td><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>n-on</td></tr>
<tr><td>1</td><td>n-off</td></tr>
<tr><td>2</td><td>on</td></tr>
<tr><td>3</td><td>off</td></tr>
<tr><td>4</td><td>H-on</td></tr>
<tr><td>5</td><td>H-off</td></tr>
<tr><td>4019</td><td>dLY_2</td><td>w/r</td><td>0.. 32400</td><td colspan="2">Delay of alarm 2 ( in seconds)</td></tr>
<tr><td>4020</td><td>LEd_2</td><td>w/r</td><td>0…1</td><td colspan="2">Support of alarm 2 signalling</td></tr>
<tr><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>Support disabled</td></tr>
<tr><td>1</td><td>Support enabled</td></tr>
<tr><td>4021</td><td>P_A 3</td><td>w/r</td><td>0… 101</td><td colspan="2">Input quantity which the alarm output has to react on</td></tr>
<tr><td rowspan="5"></td><td rowspan="5"></td><td rowspan="5"></td><td rowspan="5"></td><td>Value</td><td>Description</td></tr>
<tr><td>0..99</td><td>Number of read out register from the device</td></tr>
<tr><td>100</td><td>Main input</td></tr>
<tr><td>101</td><td>Clock</td></tr>
<tr><td>4022</td><td>tYP_3</td><td>w/r</td><td>0…5</td><td colspan="2">Type of alarm 3 (description – fig.11)</td></tr>
<tr><td rowspan="8"></td><td rowspan="8"></td><td rowspan="8"></td><td rowspan="8"></td><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>n-on</td></tr>
<tr><td>1</td><td>n-off</td></tr>
<tr><td>2</td><td>on</td></tr>
<tr><td>3</td><td>off</td></tr>
<tr><td>4</td><td>H-on</td></tr>
<tr><td>5</td><td>H-off</td></tr>
<tr><td>4023</td><td>dLY_3</td><td>w/r</td><td>0… 32400</td><td colspan="2">Delay of alarm 3 (in seconds)</td></tr>
</table>

| | | | | | |
|---|---|---|---|---|---|
| 4024 | LEd_3 | w/r | 0…1 | Support of alarm 3 signalling | |
| | | | | Value | Description |
| | | | | 0 | Support disabled |
| | | | | 1 | Support enabled |
| 4025 | P_A 4 | w/r | 0… 101 | Input quantity which the alarm output has to react on. | |
| | | | | Value | Description |
| | | | | 0..99 | Number of read out register from the device |
| | | | | 100 | Main input |
| | | | | 101 | Clock |
| 4026 | tYP_4 | w/r | 0…5 | Type of alarm 4 (description – fig. 11) | |
| | | | | Value | Description |
| | | | | 0 | n-on |
| | | | | 1 | n-off |
| | | | | 2 | on |
| | | | | 3 | off |
| | | | | 4 | H-on |
| | | | | 5 | H-off |
| 4027 | dLY_4 | w/r | 0… 32400 | Delay of alarm 4(in seconds) | |
| 4028 | LEd_4 | w/r | 0…1 | Support of alarm 4 signalling | |
| | | | | Value | Description |
| | | | | 0 | Support disabled |
| | | | | 1 | Support enabled |
| 4029 | P_An | w/r | 0…101 | Input quantity, which the analog output has to react on. | |
| | | | | Value | Description |
| | | | | 0..99 | Register number read out from devices |
| | | | | 100 | Main input |
| | | | | 101 | Clock |

<table>
<tr><td>4030</td><td>tYP_A</td><td>w/r</td><td>0…2</td><td colspan="2">Type of analog output</td></tr>
<tr><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"></td><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>Voltage input 0..10V</td></tr>
<tr><td>1</td><td>Current input 0..20mA</td></tr>
<tr><td>2</td><td>Current input 4..20mA</td></tr>
<tr><td>4031</td><td>bAUd</td><td>w/r</td><td>0…5</td><td colspan="2">Baud rate of the port 2 interface</td></tr>
<tr><td rowspan="6"></td><td rowspan="6"></td><td rowspan="6"></td><td rowspan="6"></td><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>4800 bit/s</td></tr>
<tr><td>1</td><td>9600 bit/s</td></tr>
<tr><td>2</td><td>19200 bit/s</td></tr>
<tr><td>3</td><td>38400 bit/s</td></tr>
<tr><td>4</td><td>57600 bit/s</td></tr>
<tr><td>4032</td><td>Prot</td><td>w/r</td><td>0..3</td><td colspan="2">Transmission mode of the external interface</td></tr>
<tr><td rowspan="5"></td><td rowspan="5"></td><td rowspan="5"></td><td rowspan="5"></td><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>RTU 8N2</td></tr>
<tr><td>1</td><td>RTU 8E1</td></tr>
<tr><td>2</td><td>RTU 8O1</td></tr>
<tr><td>3</td><td>RTU 8N1</td></tr>
<tr><td>4033</td><td>Addr</td><td>w/r</td><td>0…<br>247</td><td colspan="2">Device address. The write of the value 0 causes the port 2 interface switching off.<br>Notice: in the version without additional outputs, one can switch the port 1 interface to work in the interface mode for programming – see the recorder service. Then, the recorder accepts settings in compliance with bAUd 1_ trYb 1 and Addr parameters.</td></tr>
<tr><td>4034</td><td>SAvE</td><td>w/r</td><td>0…1</td><td colspan="2">Update transmission parameters. Causes the application of introduced RS-485 interface settings.</td></tr>
</table>

<table>
<tr><td>4035</td><td>bAUd 1</td><td>w/r</td><td>0..5</td><td colspan="2">Baud rate of the port 1 interface</td></tr>
<tr><td rowspan="8"></td><td rowspan="8"></td><td rowspan="8"></td><td rowspan="8"></td><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>4800 bit/s</td></tr>
<tr><td>1</td><td>9600 bit/s</td></tr>
<tr><td>2</td><td>19200 bit/s</td></tr>
<tr><td>3</td><td>38400 bit/s</td></tr>
<tr><td>4</td><td>57600 bit/s</td></tr>
<tr><td>5</td><td>115200 bit/s</td></tr>
<tr><td>4036</td><td>trYb 1</td><td>w/r</td><td>0..3</td><td colspan="2">Transmission mode of the port 1 interface</td></tr>
<tr><td rowspan="5"></td><td rowspan="5"></td><td rowspan="5"></td><td rowspan="5"></td><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>RTU 8N2</td></tr>
<tr><td>1</td><td>RTU 8E1</td></tr>
<tr><td>2</td><td>RTU 8O1</td></tr>
<tr><td>3</td><td>RTU 8N1</td></tr>
<tr><td>4037</td><td>t_oUt</td><td>w/r</td><td>100.. 5000</td><td colspan="2">Waiting time for the response from devices expressed in milliseconds</td></tr>
<tr><td>4038</td><td>SEt</td><td>w/r</td><td>0, 1</td><td colspan="2">Write of standard parameters</td></tr>
<tr><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td><td>Value</td><td></td></tr>
<tr><td>0</td><td>Without change</td></tr>
<tr><td>1</td><td>Set standard parameters</td></tr>
<tr><td>4039</td><td>SECUr</td><td>w/r</td><td>0… 60000</td><td colspan="2">Password for parameters</td></tr>
<tr><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td><td>Value</td><td></td></tr>
<tr><td>0</td><td>Without password</td></tr>
<tr><td>…</td><td>Input into parameters preceeded by the query for password</td></tr>
<tr><td>4040</td><td>HoUr</td><td>w/r</td><td rowspan="2">0… 2359</td><td colspan="2">Current time</td></tr>
<tr><td colspan="2">This parameter occurs in the ggmm format where:<br>gg – means hour,<br>mm – means minute<br>the introduction of erroneous hours will cause the setting 23, however the introduction of erroneous minutes will cause the setting 59.</td></tr>
</table>

<table>
<tr><td>4041</td><td>dAtE</td><td>w/r</td><td>101..<br>1231</td><td colspan="2">Current date in month *100 + day format</td></tr>
<tr><td>4042</td><td>YEAr</td><td>w/r</td><td>2001..<br>2099</td><td colspan="2">Current year in YYYY format.</td></tr>
<tr><td rowspan="4">4043</td><td rowspan="4">Ct</td><td rowspan="4">w/r</td><td rowspan="4">0, 1</td><td colspan="2">Automatic change of time summer/winter and inversely.</td></tr>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>disabled</td></tr>
<tr><td>1</td><td>enabled</td></tr>
<tr><td rowspan="4">4044</td><td rowspan="4">Unit</td><td rowspan="4">w/r</td><td rowspan="4">0, 1</td><td colspan="2">Switching the unit backlight on and off</td></tr>
<tr><td>Value</td><td></td></tr>
<tr><td>0</td><td>Backlight switched off</td></tr>
<tr><td>1</td><td>Backlight switched on</td></tr>
<tr><td>4045</td><td>dEL_A</td><td>w/r</td><td>0, 1</td><td colspan="2">Erase the archive contents. The write of the value 1 causes the archive erasing and setting the value 0 in the register.</td></tr>
<tr><td>4046</td><td></td><td>O</td><td>0…<br>7956</td><td colspan="2">Memory page defining the memory beginning.</td></tr>
<tr><td>4047</td><td></td><td>O</td><td>0…<br>7956</td><td colspan="2">Memory page defining the memory end.</td></tr>
<tr><td>4048</td><td></td><td>O</td><td>0…<br>527</td><td colspan="2">Byte defining the archive beginning. The value in the register shows from which byte of archive beginning begins the archive.</td></tr>
<tr><td>4049</td><td></td><td>O</td><td>0…<br>527</td><td colspan="2">Byte defining the archive end. The value in the register shows the successive byte under which the archive record will be written.</td></tr>
<tr><td>4050</td><td>StAt</td><td>O</td><td>0…<br>1023</td><td colspan="2">Status of added devices, the bit setting in the given position signals a communication error in the given device. The bit 0 corresponds to the first device.</td></tr>
</table>

| | | | | | |
|---|---|---|---|---|---|
| 4051 | StAt 1 | w/r | 0.. 65535 | Recorder status. Describes the current recorder state. Successive bits present event data. The set bit on 1 means that the event took place. Events can be only erased. | |
| | | | | Bit 15 | Supply break |
| | | | | Bit 14 | RTC clock – loss of settings |
| | | | | Bit 13 | Not used |
| | | | | Bit 12 | Lack of communication with data memory |
| | | | | Bit 11 | Erroneous settings |
| | | | | Bit 10 | Manufacturer' settings restored |
| | | | | Bit 9 | Lack of measured values in data memory |
| | | | | Bit 8 | Not used |
| | | | | Bit 7 | Output plate has been found out |
| | | | | Bit 6 | Output plate –error or lack of calibration |
| | | | | Bit 5 | Not used |
| | | | | Bit 4 | Not used |
| | | | | Bit 3 | Erroneous configuration of individual characteristic. |
| | | | | Bit 2 | Not used |
| | | | | Bit 1 | Not used |
| | | | | Bit 0 | The averaging period has not been expired. |

| | | | | | |
|---|---|---|---|---|---|
| 4052 | StAt2 | w/r | | Recorder status. Describes the current recorder state. Successive bits represent event data. The bit set on 1 means, that the event took place. Events can be only erased. | |
| | | | | 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 |
| | | | | Bit 7 | LED4 – Signalling of alarm No 4. |
| | | | | Bit 6 | LED3 – Signalling of alarm No 3. |
| | | | | Bit 5 | LED2 – Signalling of alarm No 2. |
| | | | | Bit 4 | LED1 – Signalling of alarm No 1. |
| | | | | Bit 3 | State of the alarm relay No 4. |
| | | | | Bit 2 | State of the alarm relay No 3. |
| | | | | Bit 1 | State of the alarm relay No 2. |
| | | | | Bit 0 | State of the alarm relay No 1. |
| 4053 | tF | r | 0, 1 | Reserved (time flag). | |
| 4054 | | r | 0…5 | Status of memory card: | |
| | | | | Value | Description |
| | | | | 0 | Lack of card. |
| | | | | 1 | Card inserted, but not initiated (disassembled). |
| | | | | 2 | Card inserted, but the initiation test is ended by an error. |

| | | | | | |
|---|---|---|---|---|---|
| | | | | 3 | Card inserted, correctly initiated but the protection against writing is switched on. After detecting against writing, the card is automatically disassembled. |
| | | | | 4 | Card inserted and initiated with success. |
| | | | | 5 | Card inserted and initiated with success, but entirely filled. |
| 4055 | | w/r | 0, 1 | Erasing of minimum and maximum values. The write of value 1 causes the erase of minimum and maximum values and sets the register on the value 0. | |
| … | | … | … | Reserved | |
| 4061 | | w/r | 0… 65535 | MSB serial number | |
| 4062 | | w/r | 0… 65535 | LSB serial number | |

Series number = $Register_{4061}$ *65536 + $Register_{4062}$

**Table 12**

| The value is placed in 16-bit registers | Symbol | Write (z) readout (o) | Range | Description |
|---|---|---|---|---|
| **Device number 0** | | | | |
| 4300 | AddrD | w/r | 0… 247 | Device address number 0. The write of value 0 switches the readout and archiving off from the given device. |
| 4301 | r_bAD | w/r | 0… 65535 | Basic address – address from which the readout will follow. |

<table>
<tr><td>4302</td><td>r_no0</td><td>w/r</td><td>1..10</td><td colspan="2">Number of read out registers from the device or number of data in case of float registers located in two 16-bit registers.</td></tr>
<tr><td rowspan="12">4303</td><td rowspan="12">rtYP0</td><td rowspan="12">w/r</td><td rowspan="12">0…7</td><td colspan="2">Type of being read out register:</td></tr>
<tr><td>Value</td><td>Description</td></tr>
<tr><td colspan="2">Read-out registers with the function 3 of Modbus</td></tr>
<tr><td>0</td><td>Register of char type (8 bits with sign)</td></tr>
<tr><td>1</td><td>Register of unsigned char type(8 bits without sign)</td></tr>
<tr><td>2</td><td>Register of short type (16 bits with sign)</td></tr>
<tr><td>3</td><td>Register of unsigned short type(16 bits without sign)</td></tr>
<tr><td>4</td><td>Register of long type (32 bits with sign)</td></tr>
<tr><td>5</td><td>Register of unsigned long type (32 bits without sign)</td></tr>
<tr><td>6</td><td>Register of float type(32 bits variable comma with sign)</td></tr>
<tr><td>7</td><td>Register of float type (2 x 16 bits with sequence 3210)</td></tr>
<tr><td>8</td><td>Register of float type (2 x 16 bits with sequence 1032)</td></tr>
<tr><td>9</td><td>Register of long type (2 x 16 bits with sequence 3210 with a sign)</td></tr>
<tr><td>10</td><td>Register of long type (2 x 16 bits with sequence 1032 with a sign)</td></tr>
</table>

| | | | | | |
|---|---|---|---|---|---|
| | | | | 11 | Register of *unsigned long* type (2 x 16 bits with sequence 3210 without a sign) |
| | | | | 12 | Register of *unsigned long* type (2 x 16 bits with sequence 1032 without a sign) |
| | | | | **Read-out registers with the function 4 of Modbus** | |
| | | | | 13 | Register of *char* type (8 bits with sign) |
| | | | | 14 | Register of *unsigned chart* type (8 bits without sign) |
| | | | | 15 | Register of *short* type (16 bits with sign) |
| | | | | 16 | Register of *unsigned short* type (16 bits without sign) |
| | | | | 17 | Register of *long* type (32 bits with sign) |
| | | | | 18 | Register of *unsigned short* type (32 bits without sign) |
| | | | | 19 | Register of *float* type (32 bits variable comma with sign) |
| | | | | 20 | Register of *float* type (2 x 16 bits with sequence 3210) |
| | | | | 21 | Register of *float* type (2 x 16 bits with sequence 1032) |
| | | | | 22 | Register of *long* type (2 x 16 bits with sequence 3210 with a sign) |
| | | | | 23 | Register of long type (2 x 16 bits with sequence 1032 with a sign) |
| | | | | 24 | Register of *unsigned long* type (2 x 16 bits with sequence 3210 without a sign) |

| | | | | | |
|---|---|---|---|---|---|
| | | | | 25 | Register of *unsigned long* type (2 x 16 bits with sequence 1032 without a sign) |
| 4304 | rFr90 | w/r | 1..60 | Scanning period (data readout) from the device, expressed in seconds. | |
| 4305 | ArE60 | w/r | 0..1023 | Registers are defined on successive bits, which have to be archived. So, bit 0 defines that the first read out register has to be archived. Bit 1 means that the second register has to be archived, etc. | |
| 4306 | AFr90 | w/r | 1..360 | The archiving period expressed in tens of a second, determines every which period, data have to be stored in the memory. | |
| 4307 | AtyP0 | w/r | 0..10 | Kind of archiving – number of the register releasing the conditional archiving. | |
| | | | | **Value** | **Description** |
| | | | | 0 | Continuous archiving |
| | | | | 1 | The value of the first read out register decides about the archiving beginning. If the read out value does not fit in the range definite by d0PrL and d0PrH, the archiving with period follows. |
| | | | | 2 | The value of the second read out register decides about the archiving beginning. |
| | | | | 3 | The value of the third read out register decides about the archiving beginning. |
| | | | | 4 | The value of the fourth read out register decides about the archiving beginning. |

| | | | | | |
|---|---|---|---|---|---|
| | | | | 5 | The value of the fifth read out register decides about the archiving beginning. |
| | | | | 6 | The value of the sixth read out register decides about the archiving beginning. |
| | | | | 7 | The value of the seventh read out register decides about the archiving beginning. |
| | | | | 8 | The value of the eighth read out register decides about the archiving beginning. |
| | | | | 9 | The value of the ninth read out register decides about the archiving beginning |
| | | | | 10 | The value of the tenth read out register decides about the archiving beginning. |
| Device number 1 | | | | | |
| 4308 | Addr 1 | w/r | 0…247 | Address of the device number 1. The write of value 0 switches the readout and archiving from the given device off. | |
| 4309 | r_bA 1 | w/r | 0… 65535 | Basic address – address which the readout will follow from. | |
| 4310 | r_no 1 | w/r | 1..10 | Number of read out registers from the device or number of data in case of float registers located in two 16-bit registers. | |
| 4311 | rtyP 1 | w/r | 0…25 | Type of being read out register: | |
| | | | | **Value** | **Description** |
| | | | | The same data as for register 4303 | |
| 4312 | rFrq 1 | w/r | 1..60 | Scanning period (data readout) from the device, expressed in seconds. | |

<table>
<tr><td>4313</td><td>ArEG 1</td><td>w/r</td><td>0..1023</td><td colspan="2">Registers are defined on successive bits, which have to be archived. So, bit 0 defines that the first read out register has to be archived. Bit 1 means that the second register has to be archived, etc.</td></tr>
<tr><td>4314</td><td>AFr9 1</td><td>w/r</td><td>1..360</td><td colspan="2">The archiving period expressed in tens of a second, determines every which period, data have to be stored in the memory.</td></tr>
<tr><td rowspan="7">4315</td><td rowspan="7">AtyP 1</td><td rowspan="7">w/r</td><td rowspan="7">0..10</td><td colspan="2">Kind of archiving – number of the register releasing the conditional archiving.</td></tr>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>Continuous archiving</td></tr>
<tr><td>1</td><td>The value of the first read out register decides about the archiving beginning. If the read out value does not fit in the range definite by dOPrL and dOPrH, the archiving with period follows.</td></tr>
<tr><td>2</td><td>The value of the second read out register decides about the archiving beginning.</td></tr>
<tr><td>3</td><td>The value of the third read out register decides about the archiving beginning.</td></tr>
<tr><td>4</td><td>The value of the fourth read out register decides about the archiving beginning.</td></tr>
<tr><td>5</td><td>The value of the fifth read out register decides about the archiving beginning.</td></tr>
</table>

| | | | | | |
|---|---|---|---|---|---|
| | | | | 6 | The value of the sixth read out register decides about the archiving beginning. |
| | | | | 7 | The value of the seventh read out register decides about the archiving beginning. |
| | | | | 8 | The value of the eighth read out register decides about the archiving beginning. |
| | | | | 9 | The value of the ninth read out register decides about the archiving beginning. |
| | | | | 10 | The value of the tenth read out register decides about the archiving beginning. |
| Device number 2 | | | | | |
| 4316 | Addr2 | w/r | 0…247 | Device address number 2. The write of value 0 switches the readout and archiving off from the given device. | |
| 4317 | r_bA2 | w/r | 0… 65535 | Basic address – address which the readout will follow from. | |
| 4318 | r_no2 | w/r | 1..10 | Number of read out registers from the device or number of data in case of float registers located in two 16-bit registers. | |
| 4319 | rtyP2 | w/r | 0…25 | Type of being read out register: | |
| | | | | **Value** | **Description** |
| | | | | The same data as for register 4303 | |
| 4320 | rFr92 | w/r | 1..60 | Scanning period (data readout) from the device, expressed in seconds. | |
| 4321 | ArE62 | w/r | 0..1023 | Registers are defined on successive bits, which have to be archived. So, bit 0 defines that the first read out register has to be archived. Bit 1 means that the second register has to be archived, etc. | |

<table>
<tr><td>4322</td><td>AFr92</td><td>w/r</td><td>1..360</td><td colspan="2">The archiving period expressed in tens of a second, determines every which period, data have to be stored in the memory.</td></tr>
<tr><td>4323</td><td>AtyP2</td><td>w/r</td><td>0..10</td><td colspan="2">Kind of archiving – number of the register releasing the conditional archiving.</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Value</td><td>Description</td></tr>
<tr><td></td><td></td><td></td><td></td><td>0</td><td>Continuous archiving</td></tr>
<tr><td></td><td></td><td></td><td></td><td>1</td><td>The value of the first read out register decides about the archiving beginning. If the read out value does not fit in the range definite by dOPrL and dOPrH, the archiving with period follows.</td></tr>
<tr><td></td><td></td><td></td><td></td><td>2</td><td>The value of the second read out register decides about the archiving beginning.</td></tr>
<tr><td></td><td></td><td></td><td></td><td>3</td><td>The value of the third read out register decides about the archiving beginning.</td></tr>
<tr><td></td><td></td><td></td><td></td><td>4</td><td>The value of the fourth read out register decides about the archiving beginning.</td></tr>
<tr><td></td><td></td><td></td><td></td><td>5</td><td>The value of the fifth read out register decides about the archiving beginning.</td></tr>
<tr><td></td><td></td><td></td><td></td><td>6</td><td>The value of the sixth read out register decides about the archiving beginning.</td></tr>
<tr><td></td><td></td><td></td><td></td><td>7</td><td>The value of the seventh read out register decides about the archiving beginning.</td></tr>
<tr><td></td><td></td><td></td><td></td><td>8</td><td>The value of the eighth read out register decides about the archiving beginning.</td></tr>
</table>

| | | | | | |
|---|---|---|---|---|---|
| | | | | 9 | The value of the ninth read out register decides about the archiving beginning. |
| | | | | 10 | The value of the tenth read out register decides about the archiving beginning. |
| Device number 3 | | | | | |
| 4324 | Addr3 | w/r | 0…247 | Device address number 3. The write of value 0 switches the readout and archiving off from the given device. | |
| 4325 | r_bA3 | w/r | 0… 65535 | Basic address – address which the readout will follow from. | |
| 4326 | r_no3 | w/r | 1..10 | Number of read out registers from the device or number of data in case of float registers located in two 16-bit registers. | |
| 4327 | rtyP3 | w/r | 0…25 | Type of being read out register: | |
| | | | | Value | Description |
| | | | | The same data as for register 4303 | |
| 4328 | rFr93 | w/r | 1..60 | Scanning period (data readout) from the device, expressed in seconds. | |
| 4329 | ArE63 | w/r | 0..1023 | Registers are defined on successive bits, which have to be archived. So, bit 0 defines that the first read out register has to be archived. Bit 1 means that the second register has to be archived, etc. | |
| 4330 | AFr93 | w/r | 1..360 | The archiving period expressed in tens of a second, determines every which period, data have to be stored in the memory. | |

| | | | | | |
|---|---|---|---|---|---|
| 4331 | AtYP3 | w/r | 0..10 | Kind of archiving – number of the register releasing the conditional archiving. | |
| | | | | **Value** | **Description** |
| | | | | 0 | Continuous archiving |
| | | | | 1 | The value of the first read out register decides about the archiving beginning. If the read out value does not fit in the range definite by dOPrL and dOPrH, the archiving with period follows. |
| | | | | 2 | The value of the second read out register decides about the archiving beginning. |
| | | | | 3 | The value of the third read out register decides about the archiving beginning. |
| | | | | 4 | The value of the fourth read out register decides about the archiving beginning. |
| | | | | 5 | The value of the fifth read out register decides about the archiving beginning. |
| | | | | 6 | The value of the sixth read out register decides about the archiving beginning. |
| | | | | 7 | The value of the seventh read out register decides about the archiving beginning. |
| | | | | 8 | The value of the eighth read out register decides about the archiving beginning. |
| | | | | 9 | The value of the ninth read out register decides about the archiving beginning. |
| | | | | 10 | The value of the tenth read out register decides about the archiving beginning. |

<table>
<tr><th colspan="6">Device number 4</th></tr>
<tr><td>4332</td><td>AddrH</td><td>w/r</td><td>0…247</td><td colspan="2">Device address number 4. The write of value 0 switches the readout and archiving from the given device off.</td></tr>
<tr><td>4333</td><td>r_bAH</td><td>w/r</td><td>0… 65535</td><td colspan="2">Basic address – address which the readout will follow from.</td></tr>
<tr><td>4334</td><td>r_noH</td><td>w/r</td><td>1..10</td><td colspan="2">Number of read out registers from the device or number of data in case of float registers located in two 16-bit registers.</td></tr>
<tr><td rowspan="3">4335</td><td rowspan="3">rtYPH</td><td rowspan="3">w/r</td><td rowspan="3">0…25</td><td colspan="2">Type of being read out register:</td></tr>
<tr><td>Value</td><td>Description</td></tr>
<tr><td colspan="2">The same data as for register 4303</td></tr>
<tr><td>4336</td><td>rFrH</td><td>w/r</td><td>1..60</td><td colspan="2">Scanning period (data readout) from the device, expressed in seconds.</td></tr>
<tr><td>4337</td><td>ArEGH</td><td>w/r</td><td>0..1023</td><td colspan="2">Registers are defined on successive bits, which have to be archived. So, bit 0 defines that the first read out register has to be archived. Bit 1 means that the second register has to be archived, etc.</td></tr>
<tr><td>4338</td><td>AFrH</td><td>w/r</td><td>1..360</td><td colspan="2">The archiving period expressed in tens of a second, determines every which period, data have to be stored in the memory.</td></tr>
<tr><td rowspan="3">4339</td><td rowspan="3">AtYPH</td><td rowspan="3">w/r</td><td rowspan="3">0..10</td><td colspan="2">Kind of archiving – number of the register releasing the conditional archiving.</td></tr>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>Continuous archiving</td></tr>
<tr><td></td><td></td><td></td><td></td><td>1</td><td>The value of the first read out register decides about the archiving beginning. If the read out value does not fit in the range definite by d0PrL and d0PrH, the archiving with period follows.</td></tr>
</table>

| | | | | | |
|---|---|---|---|---|---|
| | | | | 2 | The value of the second read out register decides about the archiving beginning. |
| | | | | 3 | The value of the third read out register decides about the archiving beginning. |
| | | | | 4 | The value of the fourth read out register decides about the archiving beginning. |
| | | | | 5 | The value of the fifth read out register decides about the archiving beginning. |
| | | | | 6 | The value of the sixth read out register decides about the archiving beginning. |
| | | | | 7 | The value of the seventh read out register decides about the archiving beginning. |
| | | | | 8 | The value of the eighth read out register decides about the archiving beginning. |
| | | | | 9 | The value of the ninth read out register decides about the archiving beginning. |
| | | | | 10 | The value of the tenth read out register decides about the archiving beginning. |
| Device number 5 | | | | | |
| 4340 | AddrS | w/r | 0…247 | Device address number 5. The write of value 0 switches the readout and archiving from the given device off. | |
| 4341 | r_bAS | w/r | 0… 65535 | Basic address – address from which the readout will follow. | |
| 4342 | r_noS | w/r | 1..10 | Number of read out registers from the device or number of data in case of float registers located in two 16-bit registers. | |

| | | | | | |
|---|---|---|---|---|---|
| 4343 | rtYPS | w/r | 0…25 | Type of being read out register: | |
| | | | | Value | Description |
| | | | | The same data as for register 4303 | |
| 4344 | rFrSS | w/r | 1..60 | Scanning period (data readout) from the device, expressed in seconds. | |
| 4345 | ArEGS | w/r | 0..1023 | Registers are defined on successive bits, which have to be archived. So, bit 0 defines that the first read out register has to be archived. Bit 1 means that the second register has to be archived, etc. | |
| 4346 | AFrSS | w/r | 1..360 | The archiving period expressed in tens of a second, determines every which period, data have to be stored in the memory. | |
| 4347 | AtYPS | w/r | 0..10 | Kind of archiving – number of the register releasing the conditional archiving. | |
| | | | | **Value** | **Description** |
| | | | | 0 | Continuous archiving |
| | | | | 1 | The value of the first read out register decides about the archiving beginning. If the read out value does not fit in the range definite by dOPrL and dOPrH, the archiving with period follows. |
| | | | | 2 | The value of the second read out register decides about the archiving beginning. |
| | | | | 3 | The value of the third read out register decides about the archiving beginning. |
| | | | | 4 | The value of the fourth read out register decides about the archiving beginning. |

| | | | | | |
|---|---|---|---|---|---|
| | | | | 5 | The value of the fifth read out register decides about the archiving beginning. |
| | | | | 6 | The value of the sixth read out register decides about the archiving beginning. |
| | | | | 7 | The value of the seventh read out register decides about the archiving beginning. |
| | | | | 8 | The value of the eighth read out register decides about the archiving beginning. |
| | | | | 9 | The value of the ninth read out register decides about the archiving beginning. |
| | | | | 10 | The value of the tenth read out register decides about the archiving beginning |
| Device number 6 | | | | | |
| 4348 | AddrB | w/r | 0…247 | Device address number 6. The write of value 0 switches the readout and archiving from the given device off. | |
| 4349 | r_bAB | w/r | 0… 65535 | Basic address – address from which the readout will follow. | |
| 4350 | r_noB | w/r | 1..10 | Number of read out registers from the device or number of data in case of float registers located in two 16-bit registers. | |
| 4351 | rtYPB | w/r | 0…25 | Type of being read out register: | |
| | | | | Value | Description |
| | | | | The same data as for register 4303 | |
| 4352 | rFr9B | w/r | 1..60 | Scanning period (data readout) from the device, expressed in seconds. | |
| 4353 | ArEBB | w/r | 0..1023 | Registers are defined on successive bits, which have to be archived. So, bit 0 defines that the first read out register has to be archived. Bit 1 means that the second register has to be archived, etc. | |

<table>
<tr><td>4354</td><td>AFr96</td><td>w/r</td><td>1..360</td><td colspan="2">The archiving period expressed in tens of a second, determines every which period, data have to be stored in the memory.</td></tr>
<tr><td rowspan="10">4355</td><td rowspan="10">AtyP6</td><td rowspan="10">w/r</td><td rowspan="10">0..10</td><td colspan="2">Kind of archiving – number of the register releasing the conditional archiving.</td></tr>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>Continuous archiving</td></tr>
<tr><td>1</td><td>The value of the first read out register decides about the archiving beginning. If the read out value does not fit in the range definite by dOPrL and dOPrH, the archiving with period follows.</td></tr>
<tr><td>2</td><td>The value of the second read out register decides about the archiving beginning.</td></tr>
<tr><td>3</td><td>The value of the third read out register decides about the archiving beginning.</td></tr>
<tr><td>4</td><td>The value of the fourth read out register decides about the archiving beginning.</td></tr>
<tr><td>5</td><td>The value of the fifth read out register decides about the archiving beginning.</td></tr>
<tr><td>6</td><td>The value of the sixth read out register decides about the archiving beginning.</td></tr>
<tr><td>7</td><td>The value of the seventh read out register decides about the archiving beginning.</td></tr>
<tr><td>8</td><td>The value of the eighth read out register decides about the archiving beginning.</td></tr>
</table>

| | | | | | |
|---|---|---|---|---|---|
| | | | | 9 | The value of the ninth read out register decides about the archiving beginning. |
| | | | | 10 | The value of the tenth read out register decides about the archiving beginning. |
| Device number 7 | | | | | |
| 4356 | Addr7 | w/r | 0…247 | Device address number 7. The write of value 0 switches the readout and archiving from the given device off. | |
| 4357 | r_bA7 | w/r | 0… 65535 | Basic address – address from which the readout will follow. | |
| 4358 | r_no7 | w/r | 1..10 | Number of read out registers from the device or number of data in case of float registers located in two 16-bit registers. | |
| 4359 | rtyP7 | w/r | 0…25 | Type of being read out register: | |
| | | | | **Value** | **Description** |
| | | | | The same data as for register 4303 | |
| 4360 | rFr97 | w/r | 1..60 | Scanning period (data readout) from the device, expressed in seconds. | |
| 4361 | ArE67 | w/r | 0..1023 | Registers are defined on successive bits, which have to be archived. So, bit 0 defines that the first read out register has to be archived. Bit 1 means that the second register has to be archived, etc. | |
| 4362 | AFr97 | w/r | 1..360 | The archiving period expressed in tens of a second, determines every which period, data have to be stored in the memory. | |

| | | | | | |
|---|---|---|---|---|---|
| 4363 | AtyP1 | w/r | 0..10 | Kind of archiving – number of the register releasing the conditional archiving. | |
| | | | | **Value** | **Description** |
| | | | | 0 | Continuous archiving |
| | | | | 1 | The value of the first read out register decides about the archiving beginning. If the read out value does not fit in the range definite by dOPrL and dOPrH, the archiving with period follows. |
| | | | | 2 | The value of the second read out register decides about the archiving beginning. |
| | | | | 3 | The value of the third read out register decides about the archiving beginning. |
| | | | | 4 | The value of the fourth read out register decides about the archiving beginning. |
| | | | | 5 | The value of the fifth read out register decides about the archiving beginning. |
| | | | | 6 | The value of the sixth read out register decides about the archiving beginning. |
| | | | | 7 | The value of the seventh read out register decides about the archiving beginning |
| | | | | 8 | The value of the eighth read out register decides about the archiving beginning. |
| | | | | 9 | The value of the ninth read out register decides about the archiving beginning. |

<table>
<tr><td></td><td></td><td></td><td></td><td>10</td><td>The value of the tenth read out register decides about the archiving beginning.</td></tr>
<tr><td colspan="6">Device number 8</td></tr>
<tr><td>4364</td><td>Addr8</td><td>w/r</td><td>0…247</td><td colspan="2">Device address number 8. The write of value 0 switches the readout and archiving from the given device off.</td></tr>
<tr><td>4365</td><td>r_bA8</td><td>w/r</td><td>0… 65535</td><td colspan="2">Basic address – address from which the readout will follow.</td></tr>
<tr><td>4366</td><td>r_no8</td><td>w/r</td><td>1..10</td><td colspan="2">Number of read out registers from the device or number of data in case of float registers located in two 16-bit registers.</td></tr>
<tr><td rowspan="3">4367</td><td rowspan="3">rtyP8</td><td rowspan="3">w/r</td><td rowspan="3">0…25</td><td colspan="2">Type of being read out register:</td></tr>
<tr><td>Value</td><td>Description</td></tr>
<tr><td colspan="2">The same data as for register 4303</td></tr>
<tr><td>4368</td><td>rFr98</td><td>w/r</td><td>1..60</td><td colspan="2">Scanning period (data readout) from the device, expressed in seconds.</td></tr>
<tr><td>4369</td><td>ArE68</td><td>w/r</td><td>0..1023</td><td colspan="2">Registers are defined on successive bits, which have to be archived. So, bit 0 defines that the first read out register has to be archived. Bit 1 means that the second register has to be archived, etc.</td></tr>
<tr><td>4370</td><td>AFr98</td><td>w/r</td><td>1..360</td><td colspan="2">The archiving period expressed in tens of a second, determines every which period, data have to be stored in the memory.</td></tr>
<tr><td rowspan="3">4371</td><td rowspan="3">AtyP8</td><td rowspan="3">w/r</td><td rowspan="3">0..10</td><td colspan="2">Kind of archiving – number of the register releasing the conditional archiving.</td></tr>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>Continuous archiving</td></tr>
<tr><td></td><td></td><td></td><td></td><td>1</td><td>The value of the first read out register decides about the archiving beginning. If the read out value does not fit in the range definite by d0PrL and d0PrH, the archiving with period follows.</td></tr>
</table>

| | | | | | |
|---|---|---|---|---|---|
| | | | | 2 | The value of the second read out register decides about the archiving beginning. |
| | | | | 3 | The value of the third read out register decides about the archiving beginning. |
| | | | | 4 | The value of the fourth read out register decides about the archiving beginning. |
| | | | | 5 | The value of the fifth read out register decides about the archiving beginning. |
| | | | | 6 | The value of the sixth read out register decides about the archiving beginning. |
| | | | | 7 | The value of the seventh read out register decides about the archiving beginning. |
| | | | | 8 | The value of the eighth read out register decides about the archiving beginning. |
| | | | | 9 | The value of the ninth read out register decides about the archiving beginning. |
| | | | | 10 | The value of the tenth read out register decides about the archiving beginning. |
| Device number 9 | | | | | |
| 4372 | Addr9 | w/r | 0…247 | Device address number 9. The write of value 0 switches the readout and archiving from the given device off. | |
| 4373 | r_bA9 | w/r | 0… 65535 | Basic address – address from which the readout will follow. | |
| 4374 | r_no9 | w/r | 1..10 | Number of read out registers from the device or number of data in case of float registers located in two 16-bit registers. | |

<table>
<tr><td rowspan="3">4375</td><td rowspan="3">rtYPG</td><td rowspan="3">w/r</td><td rowspan="3">0…25</td><td colspan="2">Type of being read out register:</td></tr>
<tr><td>Value</td><td>Description</td></tr>
<tr><td colspan="2">The same data as for register 4303</td></tr>
<tr><td>4376</td><td>rFrG</td><td>w/r</td><td>1..60</td><td colspan="2">Scanning period (data readout) from the device, expressed in seconds.</td></tr>
<tr><td>4377</td><td>ArEG</td><td>w/r</td><td>0..1023</td><td colspan="2">Registers are defined on successive bits, which have to be archived. So, bit 0 defines that the first read out register has to be archived. Bit 1 means that the second register has to be archived, etc.</td></tr>
<tr><td>4378</td><td>AFrG</td><td>w/r</td><td>1..360</td><td colspan="2">The archiving period expressed in tens of a second, determines every which period, data have to be stored in the memory.</td></tr>
<tr><td rowspan="6">4379</td><td rowspan="6">AtYPG</td><td rowspan="6">w/r</td><td rowspan="6">0..10</td><td colspan="2">Kind of archiving – number of the register releasing the conditional archiving.</td></tr>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>Continuous archiving</td></tr>
<tr><td>1</td><td>The value of the first read out register decides about the archiving beginning. If the read out value does not fit in the range definite by dOPrL and dOPrH, the archiving with period follows.</td></tr>
<tr><td>2</td><td>The value of the second read out register decides about the archiving beginning.</td></tr>
<tr><td>3</td><td>The value of the third read out register decides about the archiving beginning.</td></tr>
<tr><td>4</td><td>The value of the fourth read out register decides about the archiving beginning.</td></tr>
</table>

| | | | | | |
|---|---|---|---|---|---|
| | | | | 5 | The value of the fifth read out register decides about the archiving beginning. |
| | | | | 6 | The value of the sixth read out register decides about the archiving beginning. |
| | | | | 7 | The value of the seventh read out register decides about the archiving beginning |
| | | | | 8 | The value of the eighth read out register decides about the archiving beginning. |
| | | | | 9 | The value of the ninth read out register decides about the archiving beginning. |
| | | | | 10 | The value of the tenth read out register decides about the archiving beginning |

**Table 13**

| The value is located in 16-bit registers | write (w)/ readout (r) | Range | Description |
|---|---|---|---|
| 4500 | z/o | 0..8191 | Number of the memory page to which we want to obtain the access. |
| 4501 | o | 0...65535 | Two first data bytes from the page indicated by the register 4500. |
| 4502 | o | 0...65535 | Two successive bytes. |
| --- | --- | --- | --- |
| 4764 | o | 0...65535 | Two last bytes of the memory page (bytes 526 and 527). |

**Table 14**

| The value is located in two successive 16-bit registers. These registers include the same data as 32-bit registers from the area 7600 | The value is located in 32-bit registers | Symbol | write (w) / readout (r) | range | Description |
|---|---|---|---|---|---|
| 6200/7200 | 7600 | CoLLo | w/r | -19999…99999 | Lower threshold of the display colour change |
| 6202/7202 | 7601 | CoLHI | w/r | -19999…99999 | Upper threshold of the display colour change |
| 6204/7204 | 7602 | ourLo | w/r | -19999…99999 | Lower threshold of the display narrowing |
| 6206/7206 | 7603 | ourHI | w/r | -19999…99999 | Upper threshold of the display narrowing |
| 6208/7208 | 7604 | PrL_1 | w/r | -19999…99999 | Lower display of alarm 1 (Aoff) |
| 6210/7210 | 7605 | PrH_1 | w/r | -19999…99999 | Upper display of alarm 1 (Aon) |
| 6212/7212 | 7606 | PrL_2 | w/r | -19999…99999 | Lower display of alarm 2 (Aoff) |
| 6214/7214 | 7607 | PrH_2 | w/r | -19999…99999 | Upper display of alarm 2 (Aon) |

| | | | | | |
|---|---|---|---|---|---|
| 6216/7216 | 7608 | PrL_3 | w/r | -19999…99999 | Lower display of alarm 3 (Aoff) |
| 6218/7218 | 7609 | PrH_3 | w/r | -19999…99999 | Upper display of alarm 3 (Aon) |
| 6220/7220 | 7610 | PrL_4 | w/r | -19999…99999 | Lower display of alarm 4 (Aoff) |
| 6222/7222 | 7611 | PrH_4 | w/r | -19999…99999 | Upper display of alarm 4 (Aon) |
| 6224/7224 | 7612 | An_Lo | w/r | -19999…99999 | Lower display of the analog output |
| 6226/7226 | 7613 | An_HI | w/r | -19999…99999 | Upper display of the analog output |
| … | … | | … | … | Reserved |
| 6244/7244 | 7622 | H 1 | w/r | -19999…99999 | Point of the individual characteristic. Point No 1 |
| 6246/7246 | 7623 | y 1 | w/r | -19999…99999 | Expected value for the point No 1 |
| 6248/7248 | 7624 | H2 | w/r | -19999…99999 | Point of the individual characteristic. Point No 2 |
| 6250/7250 | 7625 | y2 | w/r | -19999…99999 | Expected value for the point No 2 |
| 6252/7252 | 7626 | H3 | w/r | -19999…99999 | Point of the individual characteristic. Point No 3 |
| 6254/7254 | 7627 | y3 | w/r | -19999…99999 | Expected value for the point No 3 |
| 6256/7256 | 7628 | H4 | w/r | -19999…99999 | Point of the individual characteristic. Point No 4 |
| 6258/7258 | 7629 | y4 | w/r | -19999…99999 | Expected value for the point No 4 |

| | | | | | |
|---|---|---|---|---|---|
| 6260/7260 | 7630 | H5 | w/r | -19999…99999 | Point of the individual characteristic. Point No 5 |
| 6262/7262 | 7631 | Y5 | w/r | -19999…99999 | Expected value for the point No 5 |
| 6264/7264 | 7632 | H6 | w/r | -19999…99999 | Point of the individual characteristic. Point No 6 |
| 6266/7266 | 7633 | Y6 | w/r | -19999…99999 | Expected value for the point No 6 |
| 6268/7268 | 7634 | H7 | w/r | -19999…99999 | Point of the individual characteristic. Point No 7 |
| 6270/7270 | 7635 | Y7 | w/r | -19999…99999 | Expected value for the point No 7 |
| 6272/7272 | 7636 | H8 | w/r | -19999…99999 | Point of the individual characteristic. Point No 8 |
| 6274/7274 | 7637 | Y8 | w/r | -19999…99999 | Expected value for the point No 8 |
| 6276/7276 | 7638 | H9 | w/r | -19999…99999 | Point of the individual characteristic. Point No 9 |
| 6278/7278 | 7639 | Y9 | w/r | -19999…99999 | Expected value for the point No 9 |
| 6280/7280 | 7640 | H10 | w/r | -19999…99999 | Point of the individual characteristic. Point No 10 |
| 6282/7282 | 7641 | Y10 | w/r | -19999…99999 | Expected value for the point No 10 |
| 6284/7284 | 7642 | H11 | w/r | -19999…99999 | Point of the individual characteristic. Point No 11 |
| 6286/7286 | 7643 | Y11 | w/r | -19999…99999 | Expected value for the point No 11 |

| | | | | | |
|---|---|---|---|---|---|
| 6288/7288 | 7644 | H 12 | w/r | -19999…99999 | Point of the individual characteristic. Point No 12 |
| 6290/7290 | 7645 | У 12 | w/r | -19999…99999 | Expected value for the point No 12 |
| 6292/7292 | 7646 | H 13 | w/r | -19999…99999 | Point of the individual characteristic. Point No 13 |
| 6294/7294 | 7647 | У 13 | w/r | -19999…99999 | Expected value for the point No 13 |
| 6296/7296 | 7648 | H 14 | w/r | -19999…99999 | Point of the individual characteristic. Point No 14 |
| 6298/7298 | 7649 | У 14 | w/r | -19999…99999 | Expected value for the point No 14 |
| 6300/7300 | 7650 | H 15 | w/r | -19999…99999 | Point of the individual characteristic. Point No 15 |
| 6302/7302 | 7651 | H 15 | w/r | -19999…99999 | Expected value for the point No 15 |
| 6304/7304 | 7652 | H 16 | w/r | -19999…99999 | Point of the individual characteristic. Point No 16 |
| 6306/7306 | 7653 | У 16 | w/r | -19999…99999 | Expected value for the point No 16 |
| 6308/7308 | 7654 | H 17 | w/r | -19999…99999 | Point of the individual characteristic. Point No 17 |
| 6310/7310 | 7655 | У 17 | w/r | -19999…99999 | Expected value for the point No 17 |
| 6312/7312 | 7656 | H 18 | w/r | -19999…99999 | Point of the individual characteristic. Point No 18 |
| 6314/7314 | 7657 | У 18 | w/r | -19999…99999 | Expected value for the point No 18 |

| | | | | | |
|---|---|---|---|---|---|
| 6316/7316 | 7658 | H 19 | w/r | -19999…99999 | Point of the individual characteristic. Point No 19 |
| 6318/7318 | 7659 | y 19 | w/r | -19999…99999 | Expected value for the point No 19 |
| 6320/7320 | 7660 | H20 | w/r | -19999…99999 | Point of the individual characteristic. Point No 20 |
| 6322/7322 | 7661 | H20 | w/r | -19999…99999 | Expected value for the point No 20 |
| 6324/7324 | 7662 | H2 1 | w/r | -19999…99999 | Point of the individual characteristic. Point No 21 |
| 6326/7326 | 7663 | y2 1 | w/r | -19999…99999 | Expected value for the point No 21 |
| 6328/7328 | 7664 | d0PrL | w/r | -19999…99999 | Lower value of the conditional archiving threshold for the device number 0 |
| 6330/7330 | 7665 | d0PrH | w/r | -19999…99999 | Upper value of the conditional archiving threshold for the device number 0 |
| 6332/7332 | 7666 | d 1PrL | w/r | -19999…99999 | Lower value of the conditional archiving threshold for the device number 1 |
| 6334/7334 | 7667 | d 1PrH | w/r | -19999…99999 | Upper value of the conditional archiving threshold for the device number 1 |
| 6336/7336 | 7668 | d2PrL | w/r | -19999…99999 | Lower value of the conditional archiving threshold for the device number 2 |

| | | | | | |
|---|---|---|---|---|---|
| 6338/7338 | 7669 | d2PrH | w/r | -19999…99999 | Upper value of the conditional archiving threshold for the device number 2 |
| 6340/7340 | 7670 | d3PrL | w/r | -19999…99999 | Lower value of the conditional archiving threshold for the device number 3 |
| 6342/7342 | 7671 | d3PrH | w/r | -19999…99999 | Upper value of the conditional archiving threshold for the device number 3 |
| 6344/7344 | 7672 | d4PrL | w/r | -19999…99999 | Lower value of the conditional archiving threshold for the device number 4 |
| 6346/7346 | 7673 | d4PrH | w/r | -19999…99999 | Upper value of the conditional archiving threshold for the device number 4 |
| 6348/7348 | 7674 | d5PrL | w/r | -19999…99999 | Lower value of the conditional archiving threshold for the device number 5 |
| 6350/7350 | 7675 | d5PrH | w/r | -19999…99999 | Upper value of the conditional archiving threshold for the device number 5 |
| 6352/7352 | 7676 | d6PrL | w/r | -19999…99999 | Lower value of the conditional archiving threshold for the device number 6 |
| 6354/7354 | 7677 | d6PrH | w/r | -19999…99999 | Upper value of the conditional archiving threshold for the device number 6 |

| | | | | | |
|---|---|---|---|---|---|
| 6356/7356 | 7678 | d7Pr L | w/r | -19999…99999 | Lower value of the conditional archiving threshold for the device number 7 |
| 6358/7358 | 7679 | d7Pr H | w/r | -19999…99999 | Upper value of the conditional archiving threshold for the device number 7 |
| 6360/7360 | 7680 | d8Pr L | w/r | -19999…99999 | Lower value of the conditional archiving threshold for the device number 8 |
| 6362/7362 | 7681 | d8Pr H | w/r | -19999…99999 | Upper value of the conditional archiving threshold for the device number 8 |
| 6364/7364 | 7682 | d9Pr L | w/r | -19999…99999 | Lower value of the conditional archiving threshold for the device number 9 |
| 6366/7366 | 7683 | d9Pr H | w/r | -19999…99999 | Upper value of the conditional archiving threshold for the device number 9 |

## 8.6 Registers Only for Readout

**Table 15**

| The value is located in two successive 16-bit registers. These registers include the same data as 32-bit registers from the area 7500 | The value is located in 32-bit registers | Name | write (w) / readout (r) | Unit | Description |
|---|---|---|---|---|---|
| 6000/7000 | 7500 | Identifier | r | — | Constant identifying the device. Value 181 means the N30B recorder |
| 6002/7002 | 7501 | Status | r | — | Status is the register describing the current recorder state |
| 6004/7004 | 7502 | Control | r | % | This is the register defining the analog output control |
| 6006/7006 | 7503 | Minimum | r | — | Minimal value of currently displayed value |
| 6008/7008 | 7504 | Maksimum | r | — | Maximal value of currently displayed value |
| 6010/7010 | 7505 | Displayed value | r | — | Currently displayed value |
| 6012/7012 | 7506 | Current time | r | — | Current time |
| 6014/7014 | 7507 | Current date and time | r | — | Year in YYYY format. |

| | | | | | |
|---|---|---|---|---|---|
| 6016/7016 | 7508 | Current date month and date | r | — | Month and day in MM,DD format |
| 6018/7018 | 7509 | Filling of archive memory | r | % | Filling degree of the archive memory |
| 6020/7020 | 7510 | | r | | Measured value – not recounted in relation to the individual characteristic |
| … | … | … | … | … | … |
| 6040/7040 | 7520 | — | r | % | Communication correctness with the device number 0, expressed in percentage. |
| 6042/7042 | 7521 | | r | % | Communication correctness with the device number 1, expressed in percentage. |
| 6044/7044 | 7522 | | r | % | Communication correctness with the device number 2, expressed in percentage. |
| 6046/7046 | 7523 | | r | % | Communication correctness with the device number 3, expressed in percentage. |
| 6048/7048 | 7524 | | r | % | Communication correctness with the device number 4 expressed in percentage. |
| 6050/7050 | 7525 | | r | % | Communication correctness with the device number 5, expressed in percentage. |
| 6052/7052 | 7526 | | r | % | Communication correctness with the device number 6, expressed in percentage. |

| | | | | | |
|---|---|---|---|---|---|
| 6054/7054 | 7527 | | r | % | Communication correctness with the device number 7, expressed in percentage. |
| 6056/7056 | 7528 | | r | % | Communication correctness with the device number 8, expressed in percentage. |
| 6058/7058 | 7529 | | r | % | Communication correctness with the device number 9, expressed in percentage. |
| 6060/7060 | 7530 | | r | — | Number of transmissions with the device number 0. |
| 6062/7062 | 7531 | | r | — | Number of transmissions with the device number 1. |
| 6064/7064 | 7532 | | r | — | Number of transmissions with the device number 2. |
| 6066/7066 | 7533 | | r | — | Number of transmissions with the device number 3. |
| 6068/7068 | 7534 | | r | — | Number of transmissions with the device number 4. |
| 6070/7070 | 7535 | | r | — | Number of transmissions with the device number 5. |
| 6072/7072 | 7536 | | r | — | Number of transmissions with the device number 6. |
| 6074/7074 | 7537 | | r | — | Number of transmissions with the device number 7. |
| 6076/7076 | 7538 | | r | — | Number of transmissions with the device number 8. |

| | | | | | |
|---|---|---|---|---|---|
| 6078/7078 | 7539 | | r | — | Number of transmissions with the device number 9. |
| 6080/7080 | 7540 | | r | — | Number of erroneous communications with the device number 0. |
| 6082/7082 | 7541 | | r | — | Number of erroneous communications with the device number 1. |
| 6084/7084 | 7542 | | r | — | Number of erroneous communications with the device number 2. |
| 6086/7086 | 7543 | | r | — | Number of erroneous communications with the device number 3. |
| 6088/7088 | 7544 | | r | — | Number of erroneous communications with the device number 4. |
| 6090/7090 | 7545 | | r | — | Number of erroneous communications with the device number 5. |
| 6092/7092 | 7546 | | r | — | Number of erroneous communications with the device number 6. |
| 6094/7094 | 7547 | | r | — | Number of erroneous communications with the device number 7. |
| 6096/7096 | 7548 | | r | — | Number of erroneous communications with the device number 8. |
| 6098/7098 | 7549 | | r | — | Number of erroneous communications with the device number 9. |

**Note:** The contents of registers 7520..7549 (and their equivalents) is zeroed after the supply decay.

## 8.7 Registers of Values for Readout and Write

Values located in registers can be always read out. The write in registers is only possible in the slave mode - *AtYPE* parameter.

**Table 16**

| The value is located in two successive 16-bit registers. These registers include the same data as 32-bit registers from the area 8000 | The value is located in 32-bit registers | Name | write (w) / readout (r) | Unit | Quantity name |
|---|---|---|---|---|---|
| 8400/8200 | 8000 | Device 0 register 1 | w/r | — | Device 0 – first read out register |
| ... | ... | ... | ... | ... | ... |
| 8418/8218 | 8009 | Device 0 register 10 | w/r | — | Device 0 – tenth read out register |
| 8420/8220 | 8010 | Device 1 register 1 | w/r | — | Device 1 – first read out register |
| ... | ... | ... | ... | ... | ... |
| 8438/8238 | 8019 | Device 1 register 10 | w/r | — | Device 1 – tenth read out register |
| 8440/8240 | 8020 | Device 2 register 1 | w/r | — | Device 2 – first read out register |

| | | | | | |
|---|---|---|---|---|---|
| ... | ... | ... | ... | ... | ... |
| 8458/8258 | 8029 | Device 2 register 10 | w/r | — | Device 2 – tenth read out register |
| 8460/8260 | 8030 | Device 3 register 1 | w/r | — | Device 3 – first read out register |
| ... | ... | ... | ... | ... | ... |
| 8478/8278 | 8039 | Device 3 register 10 | w/r | — | Device 3 – tenth read out register |
| 8480/8280 | 8040 | Device 4 register 1 | w/r | — | Device 2 – first read out register |
| ... | ... | ... | ... | ... | ... |
| 8498/8298 | 8049 | Device 4 register 10 | w/r | — | Device 4 – tenth read out register |
| 8500/8300 | 8050 | Device 5 register 1 | w/r | — | Device 5 – first read out register |
| ... | ... | ... | ... | ... | ... |
| 8518/8318 | 8059 | Device 5 register 10 | w/r | — | Device 5 – tenth read out register |
| 8520/8320 | 8060 | Device 6 register 1 | w/r | — | Device 6 – first read out register |
| ... | ... | ... | ... | ... | ... |
| 8538/8338 | 8069 | Device 6 register 10 | w/r | — | Device 6 – tenth read out register |
| 8540/8340 | 8070 | Device 7 register 1 | w/r | — | Device 7 – first read out register |
| ... | ... | ... | ... | ... | ... |
| 8558/8358 | 8079 | Device 7 register 10 | w/r | — | Device 7 – tenth read out register |

| | | | | | |
|---|---|---|---|---|---|
| 8560/8360 | 8080 | Device 8 register 1 | w/r | — | Device 8 – first read out register |
| ... | ... | ... | ... | ... | ... |
| 8578/8378 | 8089 | Device 8 register 10 | w/r | — | Device 8 – tenth read out register |
| 8580/8380 | 8090 | Device 9 register 1 | w/r | — | Device 9 – first read out register |
| ... | ... | ... | ... | ... | ... |
| 8598/8398 | 8099 | Device 9 register 10 | w/r | — | Device 9 – tenth read out register |

# 9. ERROR CODES

After switching the recorder on or during the work, messages about errors can appear.
Messages about errors and their reasons are presented below.

**Table 17**

| Error message | Description |
|---|---|
|  | Overflow of upper value of the measuring range value or communication error with the co-operating device. |
|  | Overflow of lower value of the programmed indication range |
|  | No communication with the device. |
| FULL | The memory card is filled. One must replace it by a new one. |
| ErFrt | Communication error with the data memory. One must contact the service workshop. |
| ErPAr | Parameter error. Wrong configuration data. Manufacturer's settings will be restored after pressing any push-button. |
| ErdEF | Default settings have been restored. One must press any push-button to transit to a normal work. |
| ErFPL | Error of measured values stored by the recorder (measured value, maximal value and minimal value). One must press any push-button to transit to the normal work. After pressing the push-button, the ErdEF message will be displayed during one second. |

| | |
|---|---|
| ErCAo | Error of analog output calibration. One must press any push-button to transit to the normal work. Analog outputs will not be serviced. One must contact the Service Department. |
| ErAPL | Configuration error of archive parameters – data have been lost. |
| ErdFC | Communication error with the internal archive memory. |

# 10. TECHNICAL DATA

**Relay outputs:**

- relays, NOC voltageless contacts load capacity 250 V~/0.5 A~
- relays, switching over voltageless contacts load capacity 250 V~/0.5 A~

**Analog outputs (option):**

- programmable, current 0/4..20 mA load resistance ≤ 500 Ω
- programmable, voltage 0..10 V load resistance ≥ 500 Ω

**Alarm OC output (option):**

output of OC type, passive npn, 30 V d.c./30 mA.

| | |
|---|---|
| **Serial interface port 1 and 2:** | address 1..247<br>mode: 8N2, 8E1, 8O1,8N1<br>baud rate: 4.8, 9.6, 19.2, 38,4, 57,6, 115,2kbit/s<br>transmission protocol: Modbus RTU<br>time to start a response: 200 ms (work without card)<br>time to start a response: 1000 ms (work with card) |
| **Archive memory card:** | SD, MMC |
| **Error of analog output:** | 0.2% of the set range |
| **Protection grade ensured by the casing:** | frontal side IP65<br>terminal side IP10 |
| **Weight:** | < 0.2 kg |
| **Overall dimensions:** | 96 x 48 x 93 mm |

**Reference Conditions and Rated Operating Conditions**

| | |
|---|---|
| - supply voltage | 85 .. 253V a.c. (40..400Hz); 90 .. 320V d.c.<br>or 20 .. 40V a.c. (40..400Hz); 20 .. 60V d.c. |
| - ambient temperature | -25..23..+55°C |
| - storage temperature | -30..+70°C |
| - relative air humidity | 25..95 % (inadmissible condensation) |

- external magnetic field 0..40..400 A/m
- work position any
- power consumption < 6 VA

**Additional errors:**
- from temperature changes
  for analog outputs: 50% of the class / 10 K

**Standards fulfilled by the recorder:**
Electromagnetic compatibility:
- noise immunity acc. to EN 61000-6-2
- noise emissions acc. to EN 61000-6-4

**Safety requirements:**
Acc. to standard EN61010-1
- isolation between circuits: basic,
- installation category: III,
- pollution level: 2,
- maximal phase-to-earth working voltage:
  300V for the supply circuit
  and 50 V for remaining circuits,
- altitude above sea level < 2000 m.

# 11. ORDER CODES

Order codes for the N30B recorder

**Table 18**

| Digital panel recorder N30B | X | X | XX | XX | X | X |
|---|---|---|---|---|---|---|
| **Supply voltage:** | | | | | | |
| 85...253 V a.c. (40 ... 400 Hz); 90 ... 320 V d.c. | 1 | | | | | |
| 20...40 V a.c. (40 ... 400 Hz); 20 ... 60 V d.c. | 2 | | | | | |
| **Additional outputs:** | | | | | | |
| lack | | 0 | | | | |
| OC output, RS485, analog outputs | | 1 | | | | |
| OC output, RS485, analog outputs, switched relay outputs, | | 2 | | | | |
| **Unit:** | | | | | | |
| unit code number acc to tab. 19 | | | XX | | | |
| **Version:** | | | | | | |
| standar | | | | 00 | | |
| custom-made* | | | | XX | | |
| **Language:** | | | | | | |
| Polish | | | | | P | |
| English | | | | | E | |
| other* | | | | | X | |
| **Acceptance tests:** | | | | | | |
| Without extra quality requirements | | | | | | 0 |
| With an extra quality inspection certificate | | | | | | 1 |

* - After agreeing with the manufacturer,

Code of the backlighted unit

**Table 19**

| Code | Unit | Code | Unit | Code | Unit |
|---|---|---|---|---|---|
| 00 | lack of unit | 20 | kVAh | 40 | szt |
| 01 | V | 21 | MVAh | 41 | imp |
| 02 | A | 22 | Hz | 42 | rps |
| 03 | mV | 23 | kHz | 43 | m/s |
| 04 | kV | 24 | Ω | 44 | l/s |
| 05 | mA | 25 | kΩ | 45 | obr/min |
| 06 | kA | 26 | °C | 46 | rpm |
| 07 | W | 27 | °F | 47 | mm/min |
| 08 | kW | 28 | K | 48 | m/min |
| 09 | MW | 29 | % | 49 | l/min |
| 10 | var | 30 | %RH | 50 | $m^3$/min |
| 11 | kvar | 31 | pH | 51 | szt/h |
| 12 | Mvar | 32 | kg | 52 | m/h |
| 13 | VA | 33 | bar | 53 | km/h |
| 14 | kVA | 34 | m | 54 | $m^3$/h |
| 15 | MVA | 35 | l | 55 | kg/h |
| 16 | kWh | 36 | s | 56 | l/h |
| 17 | MWh | 37 | h | XX | on order* |
| 18 | kvarh | 38 | $m^3$ | | |
| 19 | Mvarh | 39 | obr | | |

* - After agreeing with the manufacturer.

**ORDER EXAMPLE:**

the code: **N30B-1.0.29.00.E.8** means:
**N30B** – programmable digital recorder type,
**1** – supply: 85…253 V a.c. (40…400 Hz),
**0** – lack of additional outputs,
**29** – unit „%" acc. to the table 16,
**00** – standard option,
**E** – English language
**8** – without extra quality requirements.

# 12. MAINTENANCE AND GUARANTEE

The N30B digital panel recorder does not require any periodical maintenance.
In case of some incorrect operations:

**1. From the shipping date, during the period given in the annexed guarantee card:**
One should take the recorder down from the installation and return it to the Manufacturer's Quality Control Dept.
If the recorder has been used in compliance with the instructions, the Manufacturer warrants to repair it free of charge.

**2. After the Guarantee Period:**
One should turn over the recorder to repair it in a certified service workshop.
The disassembly of the housing causes the cancellation of the granted guarantee.

**Our policy is one of continuous improvement and we reserve the right to make changes in design and specifications of any products as engineering advances or necessity requires and revise the above specifications without notice.**

LUMEL
EVERYTHING COUNTS

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