LUMEL
EVERYTHING COUNTS

# TRANSDUCER OF DIRECT CURRENT NETWORK PARAMETERS

# P30H


## USER'S MANUAL

CE

# *Contents*

# 1. Application

Programmable transducer P30H is suited for voltage, current (voltage measurement from a shunt) and power measurement in d.c. circuits and for conversion of measured value into a standard d.c. and a.c. signal. Output signal is galvanically insulated from input signal and power signal. Transducer uses 2x8 characters LCD.

Characteristics of P30H Transducer:

- conversion of measured values into an output signal on the base of the individual linear characteristic,
- one or two relay alarms with the n/o contact operating in 6 modes,
- 24 VDC 30 mA auxiliary power turned on/off according to program (optional)
- signaling of the set alarm values tripping,
- programming of alarm output and analog outputs reacting to the selected input value,
- real time clock with the clock power support function in case of the transducer power failure,
- input signal registration in the internal memory and SD/SDHC cards within the programmed time intervals (optional),
- internal memory with 534336 record capacity,
- automatic decimal point set,
- set parameters display,
- password protection for the input parameters,

- compatibility with RS-485 interface with MODBUS protocol, in RTU mode,
- measurement averaging time programming,
- SD/SDHC card use – FAT and FAT32 system compatibility,
- Master RS-485 mode – 1 device query,
- Ethernet interface10/100 BASE-T (optional)
  - protocol: Modbus TCP/IP, HTTP, FTP,
  - services: web server, FTP server, DHCP client

The values measured and calculated by the transducer:

⇒voltage+ rescaling constant
⇒current (as measured voltage at the shunt ± 150 mV) + rescaling constant
⇒power
⇒voltage difference in time 5 s, 30 s, 1 min, 5 min, 15 min (dU)
⇒current difference in time 5 s, 30 s, 1 m, 5 m, 15 m (dI)
⇒averaged voltage (eg.15 min.)
⇒averaged current (eg.15 min.)
⇒averaged power (eg.15 min.)
⇒time in seconds
⇒time in hours and minutes
⇒charge capacity in Ah
⇒imported energy
⇒exported energy
⇒maximum and minimum values.

Transducer allows for the use of voltage and current rescaling constants, which will be included in the measurement and calculation of all measurement values. Value upgrade time does not exceed 1 second. All values and configuration parameters are available through RS-485 and Ethernet (Modbus protocol) (option).

*Fig. 1 Appearance of P30H transducer different versions.*

## 2. Transducer set

- P30H Transducer 1 pc
- user's manual 1 pc
- warranty card 1 pc
- plug with the screw terminals 2 pc

## 3. Basic requirements, operational safety

In the security scope, the transducer meets the requirements of the EN 61010-1 standard.

***Comments concerning safety***

- Assembly and installation of the electrical connections should conducted only by people authorised to perform assembly of electric devices.

●Always check the connections before turning the transducer on.

●The transducer is designed to installation and usage in the industrial electromagnetic environment.

●A switch or a circuit-breaker should be installed in the building or facility. It should be located near the device, easily accessible by the operator, and suitably marked.

●Removal of the transducer housing during the warranty period voids the warranty.

# 4. Installation

## 4.1. Mounting

The P30 transducer are designed for installation on a 35 mm rail acc. to EN 60715. Overall dimensions and mounting is shown in Figure 2.

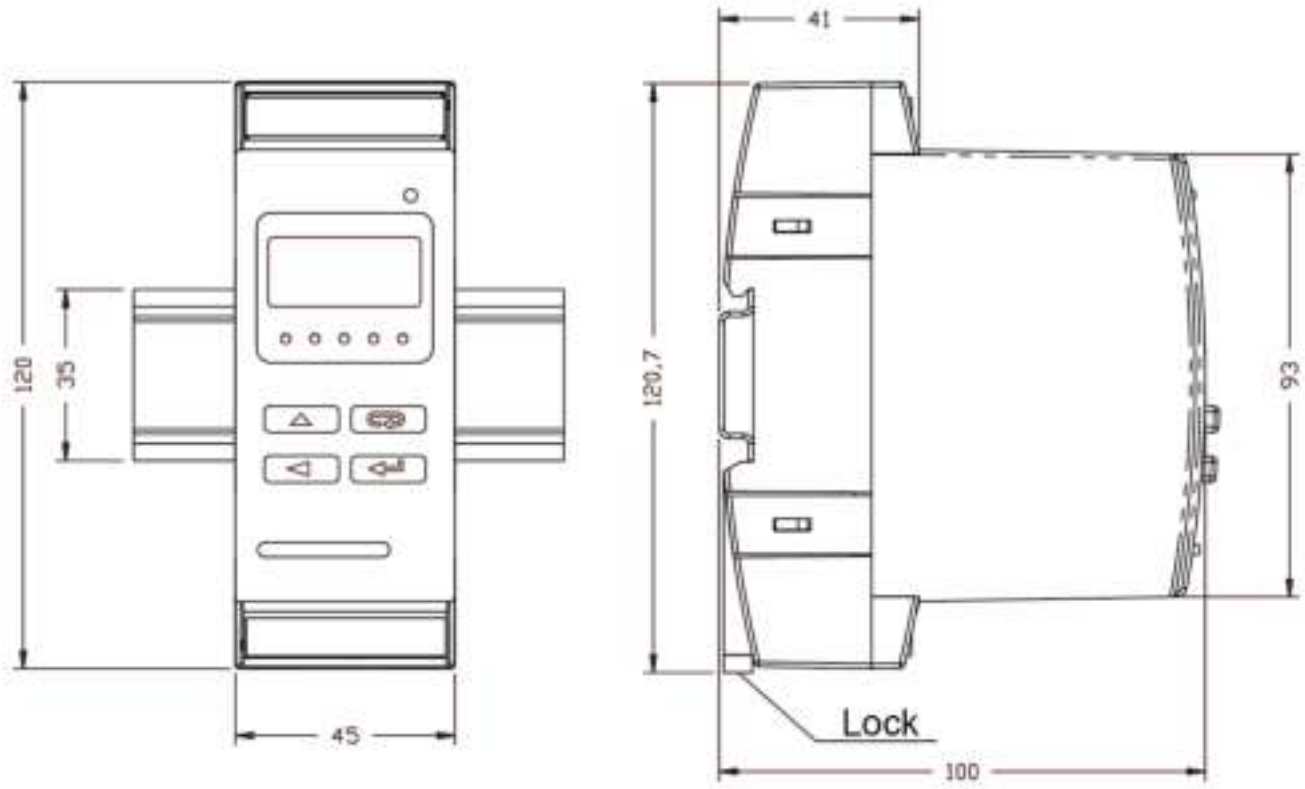



*Fig.2 Overall dimensions and mounting of the transducer.*

The output signals are galvanically isolated from the input signals and power supply.

The meter housing is made of plastic. On the outside two clamping strips that can accommodate cables up to 2.5 $mm^2$ in diameter.

## 4.2. External connection diagrams

***Note!***

*If you need to measure voltages higher than 300V d.c., must use an external additional resistor type D5 / 1 (600V) or D5 / 2 (1000V)*

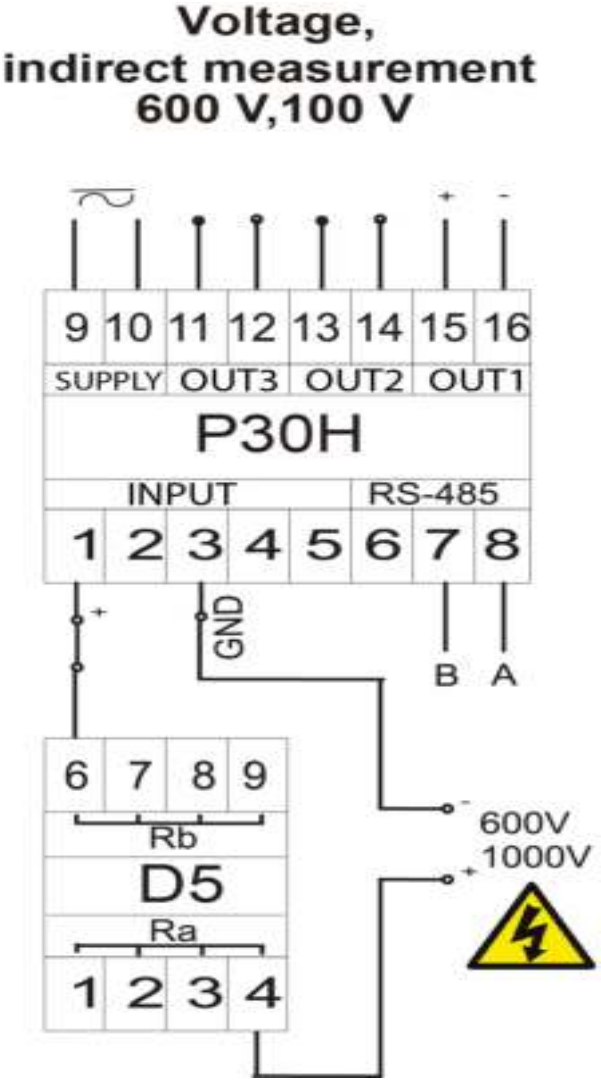



*Fig.3 Wiring diagram of the P30H transducer*

*For the measured voltage range 300...600V P30H set with additional resistor D5 meets the requirements:*

*- CAT III,*

*- basic isolation between input circuits (terminals 1-4) and other circuits ( 60s /3,51kV a.c. )*

*For the measured voltage range 600...1000V P30H set with additional resistor D5 meets the requirements:*

*- CAT III,*

*- basic isolation between input circuits (terminals 1-4) and other circuits ( 60s /3,51kV a.c. )*

# 5. Service

## 5.1. Description of P30H transducer's frontal plate

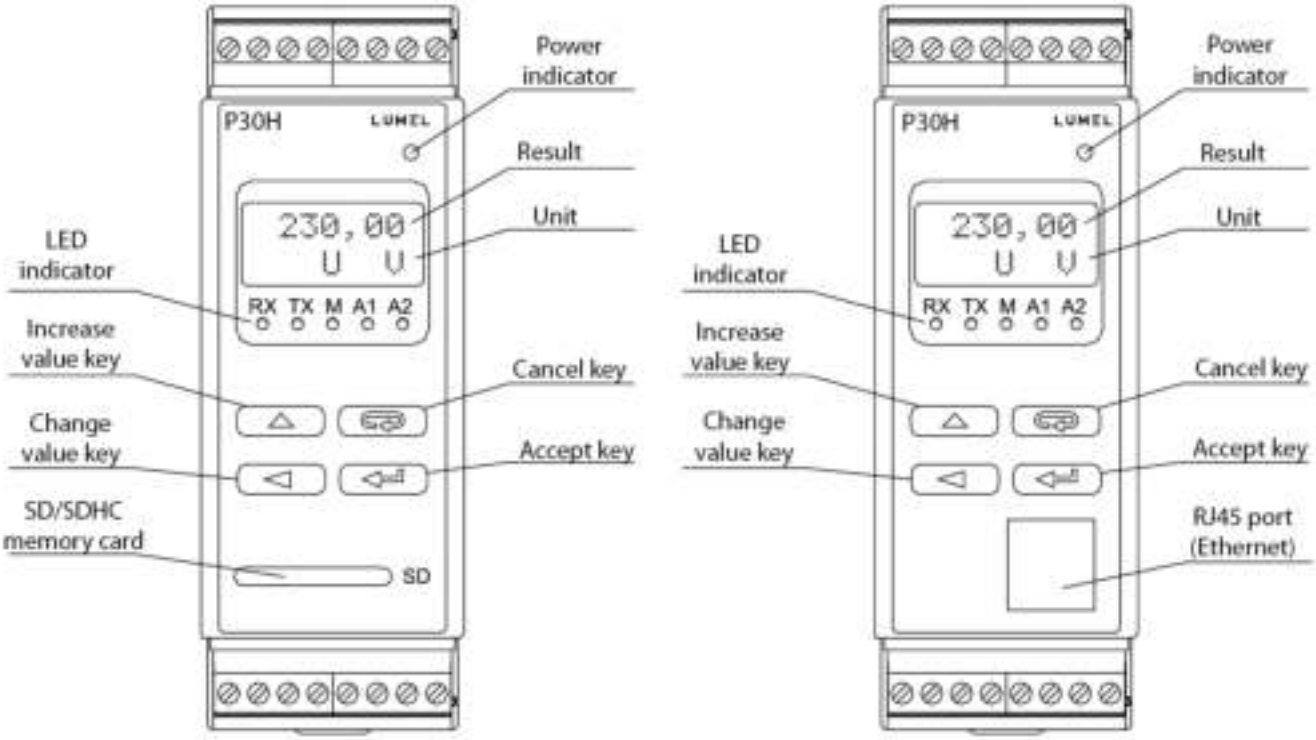



*Fig.4 Description of the transducer's frontal plate*

**Note:** Memory card (optional) should be inserted into the transducer with contacts on the bottom side.

Description of LED indicator:

RX – green LED - indicator of data receiving on RS-485 link

TX – yellow LED - indicator of data transmission on RS-485 link

M – red LED – indicates reaching the limit of the internal archive memory and saving the data on the SD/SDHC card - when the internal memory is 95% full, LED in constantly on, if the transducer is using a memory card, LED is pulsating during the saving process until it is finished.

A1 – red LED – indicates engaging the first alarm

A2 – red LED – indicates engaging the second alarm or 24VDC power.

Power indicator – green LED

## 5.2. Power-on messages

After connecting the external signals and turning the power on accompanied by turning the green LED (power indicator) on, transducer displays the type, current software version and the serial number. If the transducer is equipped with Ethernet interface (P30H-XX2XXXXXXX), then after displaying the serial no., the device displays also the IP address saved in memory or received from DHCP server.

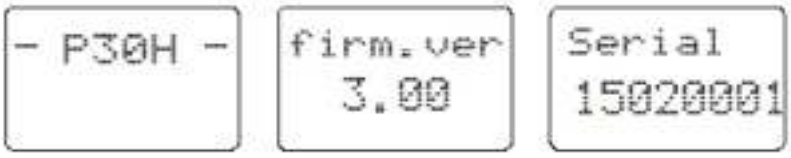



*Fig.5 Starting messages of the transducer not equipped with Ethernet interface*

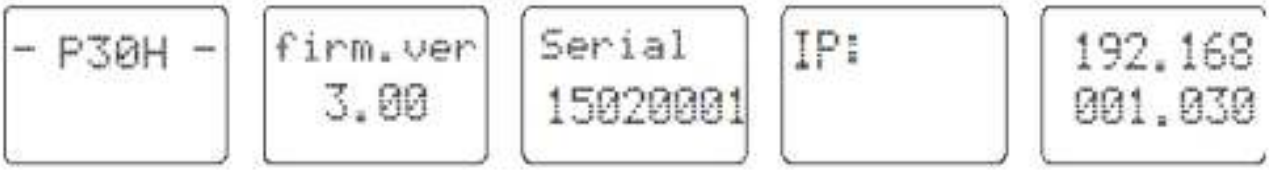



*Fig.6 Starting messages of the transducer equipped with Ethernet interface*

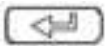
*The transducer* automatically switches to the operating mode of

measurement and processing the analog output signal after approx. 3 seconds. Measured value is displayed in the upper line of the display, the additional information is displayed in the lower line, see 5.5.4).

LED display shows the RS-485 transmission status, internal memory usage and alarm status. Ethernet services (WWW server, FTP server, Modbus TCP/IP) are started for transducers equipped with Ethernet interface.

## 5.3. Functions of the buttons

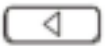
### 5.3.1. Functions of single buttons

 - confirm button

- entering the programming mode (hold the button for at least 3 seconds),
- menu item selection – level selection,
- entering the parameter value change mode,
- accepting the altered parameter value,
- change of content displayed on the bottom line of the display
- turning the transducer on and holding down the button - entering into software update mode via RS-485 interface, the link parameters: baud rate 9600 bit/s, 8N2 mode.

 - increase value button

- change of the displayed value,
- navigation within selected level,
- change of the selected parameter value – value increase,

 - digit change button

●change of the displayed value

●moving to the parameter group level,

●navigation within selected level

●selected parameter value change – moving to subsequent number

●turning the transducer on and holding down the button - entering into software update mode via RS-485 interface, the link parameters: baud rate 115200 bit/s, 8N2 mode.

 - cancel button

●enters the transducer parameter display mode (hold the button for at least 3 seconds),

●quits the transducer parameter display menu

●change of content displayed on the bottom line of the display

●cancels the parameter change

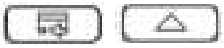
●forced exit from the programming mode (hold the button for at least 3 seconds),

●turns the transducer with the button pressed – forces loading transducer configuration from the P30H_PAR.CON file saved to the external SD/SDHC card or internal file system memory (depends on the version).

## 5.3.2. Functions of button combinations

 - holding down for approx. 3 second

●deletes alarm signalization; this operation works only with support function turned on;

 - holding down for approx. 1 second

● displays maximum of the currently displayed value

 - holding down for approx. 1 second

● displays minimum of the currently displayed value

 - holding down for approx. 1 second

●unmounts the SD/SDHC card allowing it to be safely removed – for the transducers with external SD/SDHC card slot

 - holding down for approx. 1 second

●forces the rewriting of the archive from internal memory to the SD/SDHC card – for the transducers with external SD/SDHC card slot

●overrides the rewriting of the archive from internal memory to file system memory – for the transducers with Ethernet interface; this operation allows for the loading the files with current archive data from transducer via FTP protocol

 - holding down for approx. 3 seconds, deleting extremal values

Pressing and holding the button for approx. 3 seconds ⏎ causes exiting to the programming matrix. The programming matrix can be protected by an access code.

### 5.3.3. Programming matrix

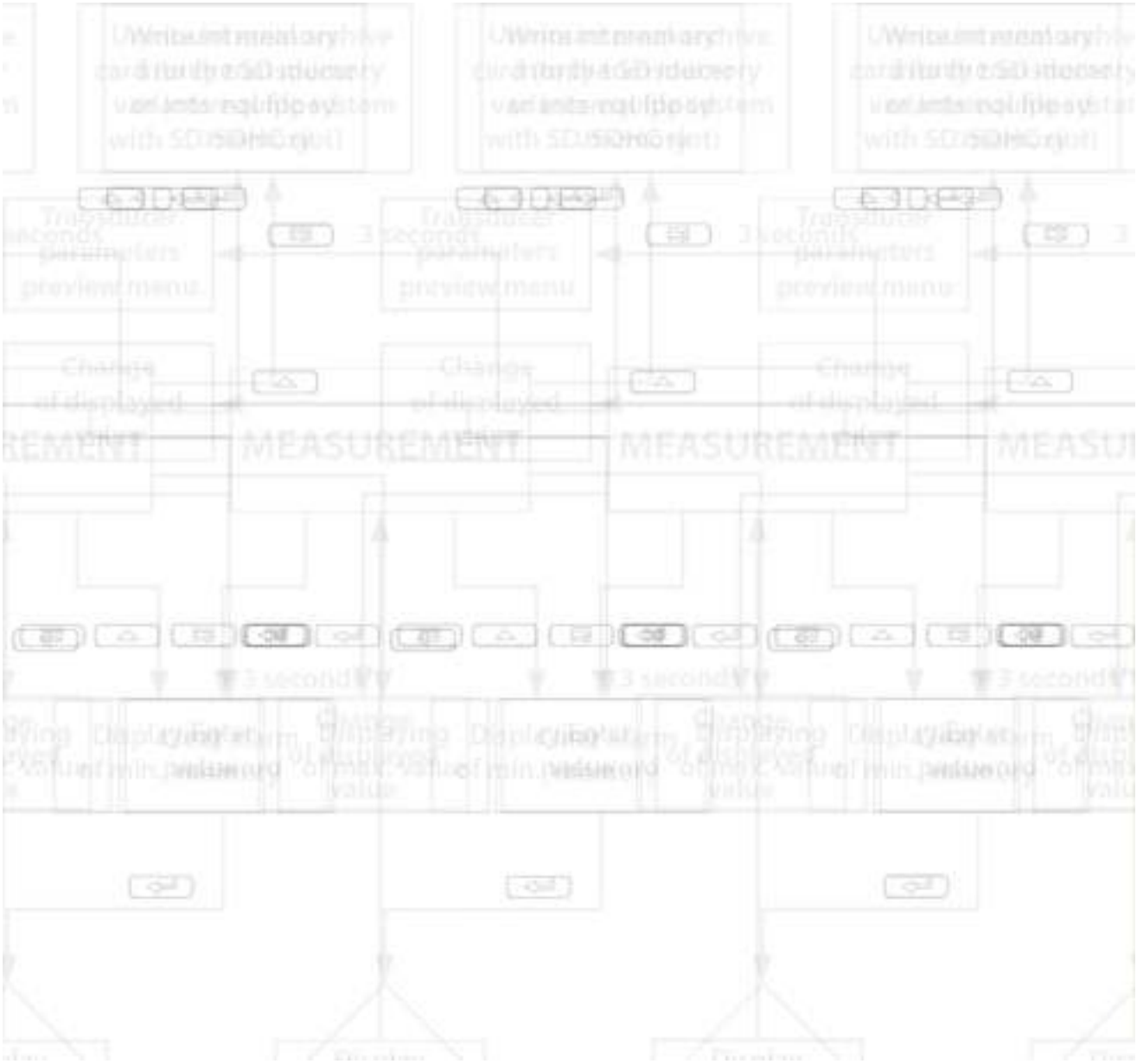
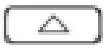


*Fig. 7 P30H Transducer service algorithm*

## 5.4. Programming parameters of the transducer

Pressing the button  Pressing and holding down the button for approx. 3 seconds allows to exit to the programming matrix. If the output is password-protected, a password entry message will be displayed. If the entered password is incorrect, a following message appears: `Invalid Code`. Entering a valid password starts programming matrix. The Fig. 8. shows the transition matrix in the programming mode. Buttons allow the selection of the menu level and moving through the sublevel parameters  or  . Parameter symbol is displayed in the upper display line, the parameter itself is displayed in the lower line. To edit a given parameter, press the following button:  . To cancel the parameter change, press the following button:  . To exit the programming matrix and enter the measurement mode, press and hold the following button:  . If the transducer is left in the parameter programming mode, after 30 seconds it will exit programming mode and start to display the displayed value.

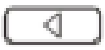
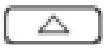
| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | `Settings Input`<br>Parameters of the main input | `VoltRang`<br>range of voltage measurement 12 / 48 / 100 / 250 V | `DemandTm`<br>method of averaging the mean values P, I, U | `Averag.`<br>Averaging time of instantaneous values | `I direct`<br>Program possibility to reverse the current direction | `Clear En`<br>Clear energy counter | `Reset AV`<br>Restart counting the average values | `TempMeas`<br>The choice of how to obtain temperature values | `Rst.Coun`<br>Timer reset | `Syn.Time`<br>Selection of timer synchronization | `DeltTime`<br>Selecting the time to indicate the delta voltages and currents |
| | | `CurrThrs`<br>Current threshold above which time is counted | `Primar.U`<br>Input voltage (included when calculating the rescaling ratio) | `Second.U`<br>Output voltage (included when calculating the rescaling ratio) | `Shunt I`<br>Shunt nominal current | `Shunt mV`<br>The voltage corresponding to the nominal current shunt | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Settings Display<br>Display parameters | DecimalP<br>Minimum decimal point | Bcklight<br>Time of a display panel illumination | Bckl.Int<br>Intensity of LCD display panel illumination | | | | | | | |
| | Settings Alarm 1<br>Alarm 1 parameters | Param.A1<br>Input value type for alarm 1 | Type A1<br>Alarm type 1 | OverLoA1<br>Alarm 1 lower limit | OverHiA1<br>Alarm 1 upper limit | DlyOnA1<br>Alarm 1 activation delay | DlyOffA1<br>Alarm 1 deactivation delay | OnLockA1<br>Alarm 1 re-activation delay | SgKeepA1<br>Alarm 1 signalization latch | | |
| | Settings Alarm 2<br>Alarm 2 parameters | Param.A2<br>Input value type for alarm 1 | Type A2<br>Alarm type 2 | OverLoA2<br>Alarm 2 lower limit | OverHiA2<br>Alarm 2 upper limit | DlyOnA2<br>Alarm 2 activation delay | DlyOffA2<br>Alarm 2 deactivation delay | OnLockA2<br>Alarm 2 re-activation delay | SgKeepA2<br>Alarm 2 signalization latch | | |
| | Settings Output<br>Output parameters (analog output #2 parameters available only when the transducer is equipped with an additional output) | ParamAn1<br>Control value of analog output 1 type | AnIn Lo1<br>Input 1 lower limit | AnIn Hi1<br>Input 1 upper limit | AnOutLo1<br>Output 1 lower limit | AnOutHi1<br>Output 1 upper limit | OverSer1<br>Enabling an overrun of output 1 | Parameters available only when the OverSer1 option is on<br>OvOutLo1<br>Output 1 lower limit overrun | OvOutHi1<br>Output 1 upper limit overrun | OvrOutL1<br>Output 1 expected value when the lower limit is exceeded | OvrOutH1<br>Output 1 expected value when the upper limit is exceeded |
| | | ParamAn2<br>Control value of analog output 2 type | AnIn Lo2<br>Input 2 lower limit | AnIn Hi2<br>Input 2 upper limit | AnOutLo2<br>Output 2 lower limit | AnOutHi2<br>Output 2 upper limit | OverSer2<br>Enabling an overrun of output 2 | Parameters available only when the OverSer2 option is on<br>OvOutLo2<br>Output 2 lower limit overrun | OvOutHi2<br>Output 2 upper limit overrun | OvrOutL2<br>Output 2 expected value when the lower limit is exceeded | OvrOutH2<br>Output 2 expected value when the upper limit is exceeded |
| | Settings Mbus 485<br>RS-485 interface parameters | Address<br>Device address | ModeUnit<br>Frame type | BaudRate<br>Baud rate | Base.Reg<br>Base register number (Master mode) | No.ofVal<br>Number of the queried values (Master mode) | ValType<br>Type of the queried values (Master mode) | Interv.<br>Query period (Master mode) | AnswTime<br>Max. response time (Master mode) | Mode<br>Interface RS-485 operating mode | Mast.Fun<br>Selection of the function type for the interface operation in Master mode |
| | | No.OfErr<br>Allowed number of the failed queries for RS-485 Master mode | | | | | | | | | |
| | Settings Archive<br>Archiving parameters | Arch.Val<br>Archived values selection | Param.Ar<br>Value type triggerining conditional archiving | Ar. Mode<br>Archiving type | OverLoAr<br>Archiving lower limit | OverHiAr<br>Archiving upper limit | Ar. Time<br>Archiving period | Ar.Erase<br>Deleting an internal archive | Rec.ToSD<br>Override allowing for copying of the internal archive to SD/SDHC card | Param.SD<br>The percentage of the internal archive space used which triggers automatic writing on SD/SDHC card | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Settings Ethernet<br><br>Ethernet interface parameters | DHCP<br><br>Enable/disable DHCP client | addrIP32<br><br>B3,B2 byte of IP address (IPv4) | addrIP10<br><br>B1,B0 byte of IP address (IPv4) | mask 32<br><br>B3,B2 byte of the subnet mask | mask 10<br><br>B1,B0 byte of the subnet mask | gate 32<br><br>B3,B2 byte of the default gateway address | gate 10<br><br>B1,B0 byte of the default gateway address | MAC 54<br><br>B5,B4 byte of the transducer MAC address | MAC 32<br><br>B3,B2 byte of the transducer MAC address | MAC 10<br><br>B1,B0 byte of the transducer MAC address |
| | | | acquired from DHCP or entered manually when DHCP is off, format: B3.B2.B1.B0 | | | | | | format : B5:B4:B3:B2:B1:B0 | | |
| | | AddrmTCP<br><br>Device address for Modbus TCP/IP service | PortMbus<br><br>Modbus TCP/IP port | TimeMbus<br><br>Port closing time of Modbus TCP/IP service port if idle [s] | no.c.TCP<br><br>The number of allowed simultaneous connections to Modbus TCP/IP service | p.comFTP<br><br>FTP server data port | port FTP<br><br>FTP server command port | portHTTP<br><br>Web server port number | 10/100Mb<br><br>Baud rate | EthStdPa<br><br>Setting the new parameters of Ethernet interface | ReInitEt<br><br>Executing the changes in the Ethernet interface parameters |
| | Settings Service<br><br>service parameters | Fabr.Par<br><br>Enter standard parameters. | Security<br><br>Enter a password | Time<br><br>Setting the current time | Date<br><br>Setting the current date | AutoTime<br><br>Automatic DST and inversely | DispTest<br><br>LCD display and LED indicators test | Language<br><br>Menu language selection | SaveFile<br><br>Override allowing for saving the configuration file to SD/SDHC card | Separat.<br><br>Decimal separator character in the file archive | |

*Fig. 8 Programming matrix*

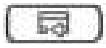
### 5.4.1. Type of selected parameter value change

To increase the value of selected parameter, press the following button:  . Pressing the button once increases the value by 1. Increasing the value by one when 9 is displayed, changes this number to 0. Number is changed after the following button is pressed:  . Pressing the button  during the most important number allows to change the number sign after the following button is pressed:  .

To accept the set parameter, press the following button:  . The parameter will be saved. Pressing the following button:  while changing the parameter value will cancel the writing.

### 5.4.2. Changing the floating-point values

The change is done in 3 stages (to move to a next stage press the following button:  ).

- setting the decimal point (00000., 0000.0, 000.00, 00.000, 0.0000);  button moves the point to the left, while  button moves point to the right. Pressing the following button:  while changing the parameter value will cancel the writing.

- setting the value from -99999…99999 ranges for the normal values;

- setting the order of magnitude x1, $x10^3$, $x10^6$, $x10^9$ (symbols „k”, „M” and „G” for orders of $10^3$, $10^6$, $10^9$ respectively are displayed)

### 5.4.3. Programmable parameters of the transducer

The following table shows the programmable parameters and the range of their values.

Table 1

| Settings<br>Input | | | |
|---|---|---|---|
| Parameter symbol | Description | Range of changes | |
| VoltRang | Selection of range of voltage measurement | 12 V | Input range 12 V |
| | | 48 V | Input range 48 V |
| | | 100 V | Input range 100 V |
| | | 250 V | Input range 250 V |
| DemandTm | Synchronization of voltage, current and average power | Mov.Wind | 15-minute moving window, value not synchronized with the clock |
| | | 15 min | The measurement synchronized with the clock, the time aggregation 15 minutes |
| | | 30 min | The measurement |

| | | | |
|---|---|---|---|
| | | | synchronized with the clock, the time aggregation 30 minutes |
| | | 60 min | The measurement synchronized with the clock, the time aggregation 60 minutes |
| Averag. | Averaging time of instantaneous values | 20ms | Averaging time 20 ms |
| | | 200 ms | Averaging time200 ms |
| | | 500 ms | Averaging time 500 ms |
| | | 1 s | Averaging time 1 s |
| | | 3 s | Averaging time 3 s |
| | | 5 s | Averaging time 5 s |
| | | 10 s | Averaging time 10 s |
| I direct | Reverse the current direction in measuring circuit | Normal. | Acc. to connection diagramm |
| | | Reversed | Inversely with connection diagramm |
| Clear En | Clear energy counter | No | No changes |
| | | Consumed | Clear imported energy counter |
| | | Produced | Clear exported energy counter |
| | | Capacity | Clear capacity counter |
| | | All | Clear all energy counters |
| Reset AV | Restart counting the average values | No | No changes |
| | | Yes | restart |
| TempMeas | Switching on the temperature mesurement | No | No temperature measurement |
| | | RS-485 | Value from register 8000 |
| | | | |
| Rst.Coun | Timer reset | Yes | Timer reset |
| | | No | No changes |
| CurrThrs | Current threshold above which time is counted | -99999G...99999G | |
| Syn.Time | Selection of timer | stop | Stop the timer |

| | | | |
|---|---|---|---|
| | synchronization | start | Timer start |
| | | synch.I | Automatic timer start after the threshold of startup current CurrThrs is exeeded |
| DeltTime | Selecting the time to indicate the delta voltages and currents | 5 s | The time interval in determining the delta voltages and currents – 5 s |
| | | 30 s | The time interval in determining the delta voltages and currents – 30 s |
| | | 1 min | The time interval in determining the delta voltages and currents – 1 min |
| | | 5 min | The time interval in determining the delta voltages and currents – 5 min |
| | | 15 min | The time interval in determining the delta voltages and currents – 15 min |
| CurrThrs | Current threshold above which time is counted | -99999G...99999G | |
| Primar.U | Input voltage (inculded when calculating the rescaling ratio) | 0...99999G | |
| Second.U | Output voltage (included when calculating the rescaling ratio) | 0...99999G | |
| Shunt I | Shunt nominal current | 0...99999G | |
| Shunt mV | Voltage corresponding to the shunt nominal current [mV] | 0...99999G | |

Table 2

| Settings<br>Display | | |
|---|---|---|
| Parameter symbol | Description | Range of changes |
| Bcklight | Time of a display panel illumination | On - permanently switched on<br>Off - permanently switched off<br>1 - switched on for X seconds<br>2<br>...<br>60 |
| Bckl.Int | Intensity of LCD display panel illumination | 10% - LCD display panel illumination, 10% of max. illumination<br>20% - LCD display panel illumination, 20% of max. illumination<br>...<br>100% - LCD display panel illumination, 100% of max. illumination |
| Disp.Reg | Register number displayed on the bottom line of the display | 0...65535 |

Table 3

| Settings<br>Alarm 1, Alarm 2 | | | |
|---|---|---|---|
| Parameter symbol | Description | Range of changes | |
| Param.A1<br>Param.A2 | Input value type controlling the alarm | U | voltage |
| | | I | current |
| | | P | power |
| | | dU | Delta of voltage in the time interval |
| | | dI | Delta of current in the time interval |
| | | t s | Timer in seconds |
| | | t<br>GG,MM | Timer in hours, minutes |
| | | C Ah | Capacity |
| | | PAV | Avarage power |
| | | UAV | Avarage voltage |

| | | | |
|---|---|---|---|
| | | IAV | Avarage current |
| | | Temper. | temperature |
| | | 2nd Val | second value displayed |
| | | Clock | time |
| Type A1<br>Type A2 | Alarm type. Fig. 12 shows the rendering of the alarm types. | n-on | normal (change from 0 to 1). |
| | | n-off | normal (change from 1 to 0). |
| | | on | on |
| | | off | off |
| | | h_on | manual off; alarm output is permanently switched on until change of the alarm type. |
| | | h_off | manual off; alarm output is permanently switched on until change of the alarm type. |
| OverLoA1<br>OverLoA2 | Alarm lower limit | -99999G...99999G | |
| OverHiA1<br>OverHiA2 | Alarm upper limit | -99999G...99999G | |
| DlyOnA1<br>DlyOnA2 | Alarm activation delay (s) | 0...900 | |
| DlyOffA1<br>DlyOffA2 | Alarm deactivation delay (s) | 0...900 | |
| OnLockA1<br>OnLockA2 | Alarm re-activation delay (s) | 0...900 | |
| SgKeepA1<br>SgKeepA2 | Alarm signalization latch after the alarm is off (alarm memory) | Off | no alarm signalization latch |
| | | On | alarm signal support by the pulsating A1 and A2 LEDs after the alarm sound ends |

Table 4

| Settings Output | | | |
|---|---|---|---|
| Parameter symbol | Description | Range of changes | |
| Param.A1 | Input value type controlling the analog output | U | voltage |
| | | I | current |
| | | P | power |
| | | dU | Delta of voltage in the time interval |
| | | dI | Delta of current in the time interval |
| | | t s | Timer in seconds |
| | | t GG,MM | Timer in hours, minutes |
| | | C Ah | Capacity |
| | | PAV | Avarage power |
| | | UAV | Avarage voltage |
| | | IAV | Avarage current |
| | | Temper. | temperature |
| | | 2nd Val | second value displayed |
| | | Clock | time |
| AnIn Lo1 | Individual characteristic of analog output 1- lower limit of the input | -99999G...99999G | |
| AnIn Hi1 | Individual characteristic of analog output 1- upper limit of the input | -99999G...99999G | |
| AnOutLo1 | Individual characteristic of analog output 1- lower limit of the output | 0...24.000 | |
| AnOutHi1 | Individual characteristic of analog output 1- upper limit of the output | 0...24.000 | |
| OverSer1 | Enabling an overrun of the analog output 1 | Off | Overrun support disabled |
| | | On | Overrun support enabled |

| | | |
|---|---|---|
| OvOutLo1 | Lower limit overrun of output 1 (value x1000) | 0...24000 |
| OvOutHi1 | Upper limit overrun of output 1 (value x1000) | 0...24000 |
| OvrOutL1 | Output expected value when the lower limit is exceeded (value x1000) | 0...24000 |
| OvrOutH1 | Output expected value when the upper limit is exceeded (value x1000) | 0...24000 |
| Param.A2<br>OvrOutH2 | Parameters as for A1; available only for the transducers with additional no. 2 output | |

Table 5

| Settings<br>Mbus 485 | | | |
|---|---|---|---|
| Parameter symbol | Description | Range of changes | |
| Address | MODBUS network address. Entering the 0 value turns the interface off; if the RS-485 interface operates in the Master mode, it is an address of the queried device. | 0...247 | |
| ModeUnit | The transmission frame type of RS-485 interface | r8n2<br>r8e1<br>r8o1<br>r8n1 | |
| BaudRate | RS-485 interface baud rate | 4800 | 4800 bit/s |
| | | 9600 | 9600 bit/s |
| | | 19200 | 19200 bit/s |
| | | 38400 | 38400 bit/s |
| | | 57600 | 57600 bit/s |

| | | | |
|---|---|---|---|
| | | 115200 | 115200 bit/s |
| | | 230400 | 230400 bit/s |
| | | 256000 | 256000 bit/s |
| Base.Reg | Number of the base register queried/monitored in the Master or Monitor mode of RS-485 interface | 0 ... 65536 | |
| No.ofVal | Number of values queried in Master mode or monitored in Monitor mode | 0 ... 50 | |
| ValType | Type of the values queried/monitored by RS-485 interface | char 8 | Register type *char* (8 bits signed) |
| | | uchar 8 | Register type *unsigned char* (8 bits unsigned) |
| | | short 16 | Register type *short* (16 bits signed) |
| | | ushort16 | Register type *unsigned short* (16 bits unsigned) |
| | | long 32 | Register type: *slong* (32 bits unsigned) |
| | | ulong 32 | Register type: *unsigned long* (32 bits unsigned) |
| | | flt 32 | Register type *char* (32 bits, signed variable comma) |
| | | sflt2x16 | Register type: swapped *float,* value in two 16-bit registers (byte sequence: 3,2,1,0) |
| | | flt 2x16 | Register type: *float,* value in two 16-bit registers (byte sequence: 1,0,3,2) |
| | | lng 2x16 | Register type *long,* value in two 16-bit registers (32 bits signed, byte sequence |

| | | | |
|---|---|---|---|
| | | | 1,0,3,2) |
| | | slng2x16 | Register type *swapped long,* value in two 16-bit registers (32 bits signed, byte sequence 3,2,1,0) |
| | | ulng2x16 | Register type *unsigned long,* value in two 16-bit registers (32 bits unsigned, byte sequence 1,0,3,2) |
| | | uSln2x16 | Register type *unsigned swapped long,* value in two 16-bit registers (32 bits unsigned, byte sequence 3,2,1,0) |
| Interv. | Query period for the device in Master mode | 1...36000 | [0.1 … 3600 s] |
| AnswTime | Maximum time before the response from the device queried by transducer with RS-485 interface operating in Master mode or Monitor mode | 10...5000 | [ms] |
| Mode | Interface RS-485 operating mode | Slave | The transducer serves as Slave on the RS485 line, waiting for the queries and responds if they are addressed |
| | | Monitor | The transducer monitors the traffic on the RS485 line and reacts to data exchange between the external devices working as Master and Slave |
| | | Master | Transducer uses Master function on the RS-485 link, sends queries and analyzes responses received from the Slave device |

| | | | |
|---|---|---|---|
| Mast.Fun | Modbus protocol function used by the transducer working with RS-485 interface in Master mode | fun.0x03 | Function 0x03 |
| | | fun.0x04 | Function 0x04 |
| No.OfErr | Maximum allowed number of repeated queries for the transducer with RS-485 interface in Master mode | 0...10 | |

Table 6

| Settings Archive | | | |
|---|---|---|---|
| Parameter symbol | Description | Range of changes | |
| Arch.Val | Selecting archived values Press again ↵ to select the value<br><br>(Each of the 16 measured values must be assigned „Yes” or „No” option, depending on whether the selected value should be archived or not)<br><br>**Caution:** *change of register value will result in deletion of the internal memory archive!* | U | voltage |
| | | I | current |
| | | P | power |
| | | dU | Delta of voltage in the time interval |
| | | dI | Delta of current in the time interval |
| | | t s | Timer in seconds |
| | | t GG,MM | Timer in hours, minutes |
| | | C Ah | Capacity |
| | | PAV | Avarage power |
| | | UAV | Avarage voltage |
| | | IAV | Avarage current |
| | | Temper. | temperature |
| | | 2nd Val | second value displayed |
| | | Clock | Real Time Clock |
| Param.Ar | Input value type controlling the conditional archiving | U | voltage |
| | | I | current |
| | | P | power |
| | | dU | Delta of voltage in the time interval |

| | | | |
|---|---|---|---|
| | | dI | Delta of current in the time interval |
| | | t s | Timer in seconds |
| | | t GG,MM | Timer in hours, minutes |
| | | C Ah | Capacity |
| | | PAV | Avarage power |
| | | UAV | Avarage voltage |
| | | IAV | Avarage current |
| | | Temper. | temperature |
| | | 2nd Val | second value displayed |
| | | Clock | time |
| Ar. Mode | Archiving engagement condition. Fig. 19 shows the types of archiving engagement conditions (as per the types of alarms). | n-on | normal (change from 0 to 1). |
| | | n-off | normal (change from 1 to 0). |
| | | on | on |
| | | off | off |
| | | h_on | manual off; alarm output is permanently switched on until change of the alarm type. |
| | | h_off | manual off; alarm output is permanently switched on until change of the alarm type. |
| OverLoAr | Conditional archiving lower limit | -99999G...99999G | |
| OverHiAr | Conditional archiving upper limit | -99999G...99999G | |
| Ar. Time | Archiving period (s) | 1...3600 | |
| Ar.Erase | Deleting an internal archive | Yes | deleting an internal archive |
| | | No | do nothing |
| Rec.ToSD | Forced rewriting of the archive contents from internal memory to external SD/SDHC card (type: P30H- | Yes | rewriting of the internal archive to the SD/SDHC card |
| | | No | do nothing |

| | | | |
|---|---|---|---|
| | X1XXXXXX) or to file system internal memory (type: P30H-X2XXXXXX) | | |
| Param.SD | The percentage of the internal archive space used which triggers automatic writing to SD/SDHC card | 5 ... 95 | |

Table 7

| Settings<br>Ethernet (option, only type P30H-XX2XXXXXX) | | | |
|---|---|---|---|
| Parameter symbol | Description | Range of changes | |
| DHCP | Enabling/disabling the DHCP Client (supports automatic obtaining of IP protocol parameters of the transducer Ethernet interface from external DHCP servers in the same LAN) | Off | DHCP disabled - you should manually configure the IP address and subnet mask of the transducer; |
| | | On | DHCP enabled, transducer will automatically receive the IP address, subnet mask, and gateway address from the DHCP server when switching power is turned or ZastozZm option is selected from the menu; The gateway address is the address of the server that assigned the parameters to the transducer; |
| addrIP32 | Third and second byte (B3.B2) of the transducer IP address, a value is displayed in decimal format, IPv4 address format: B3.B2.B1.B0 | 000.000 ... 255.255 | |
| addrIP10 | First and zero byte (B1.B0) of the transducer IP address, a value is displayed in | 000.000 ... 255.255 | |

| | | |
|---|---|---|
| | decimal format, IPv4 address format: B3.B2.B1.B0 | |
| mask 32 | Third and second byte (B3.B2) of the transducer subnet mask, a value is displayed in decimal format, mask format: B3.B2.B1.B0 | 000.000 ... 255.255 |
| mask 10 | First and zero byte (B1.B0) of the transducer subnet mask, a value is displayed in decimal format, mask format: B3.B2.B1.B0 | 000.000 ... 255.255 |
| Gate 32 | Third and second byte (B3.B2) of the transducer default gateway, a value is displayed in decimal format, gateway address format: B3.B2.B1.B0 | 000.000 ... 255.255 |
| Gate 10 | First and zero byte (B1.B0) of the transducer default gateway, a value is displayed in decimal format, gateway address format: B3.B2.B1.B0 | 000.000 ... 255.255 |
| MAC 54 | Fifth byte and fourth (B5.B4) of the transducer MAC address, a value is displayed in decimal format; format B5:B4:B3:B2:B1:B0 | 000.000 ... 255.255 |
| MAC 32 | Third and second (B3.B2) of the transducer MAC address, a value is displayed in decimal format; format B5:B4:B3:B2:B1:B0 | 000.000 ... 255.255 |
| MAC 10 | First and zero byte (B1.B0) of the transducer MAC address, a value is displayed in decimal format; format B5:B4:B3:B2:B1:B0 | 000.000 ... 255.255 |
| AddrmTCP | Device address for Modbus TCP/IP protocol | 0 ... 255 |
| PortMbus | Modbus TCP port number | 0 ... 65535 |

| | | | |
|---|---|---|---|
| TimeMbus | Port closing time of Modbus TCP/IP service, in seconds | 10 ... 600 | |
| no.c.TCP | The maximum simultaneous connections to Modbus TCP/IP service | 1 ... 4 | |
| p.komFTP | FTP server commands port number | 20...65535 | |
| FTP port | FTP server data port number | 20...65535 | |
| PortHTTP | Web server port number | 80...65535 | |
| 10/100Mb | Baud rate | Auto | automatic |
| | | 10 Mb/s | 10 Mbit/s |
| | | 100 Mb/s | 100 Mbit/s |
| EthStdPa | Setting the new parameters of Ethernet interface | Yes | Restoring the default parameters of Ethernet interface |
| | | No | no change |
| ReInitEt | Saving the new parameters of the Ethernet interface | Yes | Saving the new parameters and initiate Ethernet interface |
| | | No | no change |

Table 8

| Settings Support | | | |
|---|---|---|---|
| Parameter symbol | Description | Range of changes | |
| Fabr.Par | Entering default setting. Setting "yes" value resets transducer parameters to their default values. Values of default parameters are presented in Table 15. | No | do nothing |
| | | Yes | sets default factory values. |
| Security | Entering new password. Entering 0 value turns password protection off. | -99999...99999 | |
| Time | Setting the current time. Entering invalid time value cancels time setting. | 00:00...23:59 | |

| | | | |
|---|---|---|---|
| | Entered value will not be used. | | |
| Date | Date setting - month+day. Entering invalid date value cancels date setting. Entered value will not be used. | 01-01-10...31-12-99 | |
| AutoCzas | Automatic DST and inversely | No | no automatic daylight saving time change |
| | | Yes | with automatic daylight saving time change |
| TestWysw | LCD display and LED indicators test | No | do nothing |
| | | Yes | starts the test |
| Language | Menu language selection | Polish | selection of Polish language |
| | | English | selection of English language |
| SaveFile | | No | do nothing |
| | | Yes | Forced transducer configuration file saving to the external SD/SDHC card or file system internal memory |
| Separat. | Decimal point selection for archive files | . | dot |
| | | , | comma |

## 5.5. Functions of the transducer

### 5.5.1. Measuring input

The transducer measures the voltage and current values on the basis of which calculates other parameters such as - power, energy, capacity. Measuring signals of voltage and current are sampled at a frequency of 6,4 kHz.

#### 5.5.1.1 Averaging time of instantaneous values

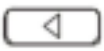
The default averaging time of instantaneous values is sent to 1

second fir P30H transducer. This time can be changed to one of the predefined values: 0.02, 0.2, 0.5, 1, 3, 5, 10 seconds. Instantaneous values include: voltage, current (registers 7500...7507).

### 5.5.1.2 Mean values, synchronized with the clock

For the values of active power, apparent power and current (registers 7508..7510) an averaging function for the period of 15, 30 and 60 minutes is available average values are synchronized with the real time clock, so that the values change after every full quarter, 30 minutes or every hour. Synchronization with the stepped 15-minutes window not synchronized wit the real time clock is also available.

### 5.5.1.3 Maximum and minimum values displayed

P30H transducer uses a minimum and maximum value memory function for all displayed values (registers 7500... 7514). Minimum and maximum values can be read and deleted using the transducer registers via Modbus protocol (RS-485, TCP/IP – see Tab. 43) or WWW server, they can also be displayed for the current displayed value after pressing the following key sequence:  - maximum value,  - minimum value. Maximum and minimum values can be deleted via the keyboard by pressing the following key sequence:   . Maximum and minimum values are available in the register range 7532...7561.

### 5.5.1.4. Transducer configuration example for control of charging lead acid battery

Schematic below illustrates connection of P30H transducer used for control of charging process of lead acid battery with nominal voltage of 12V and capacity of 60Ah, with the use of the external DC voltage source.

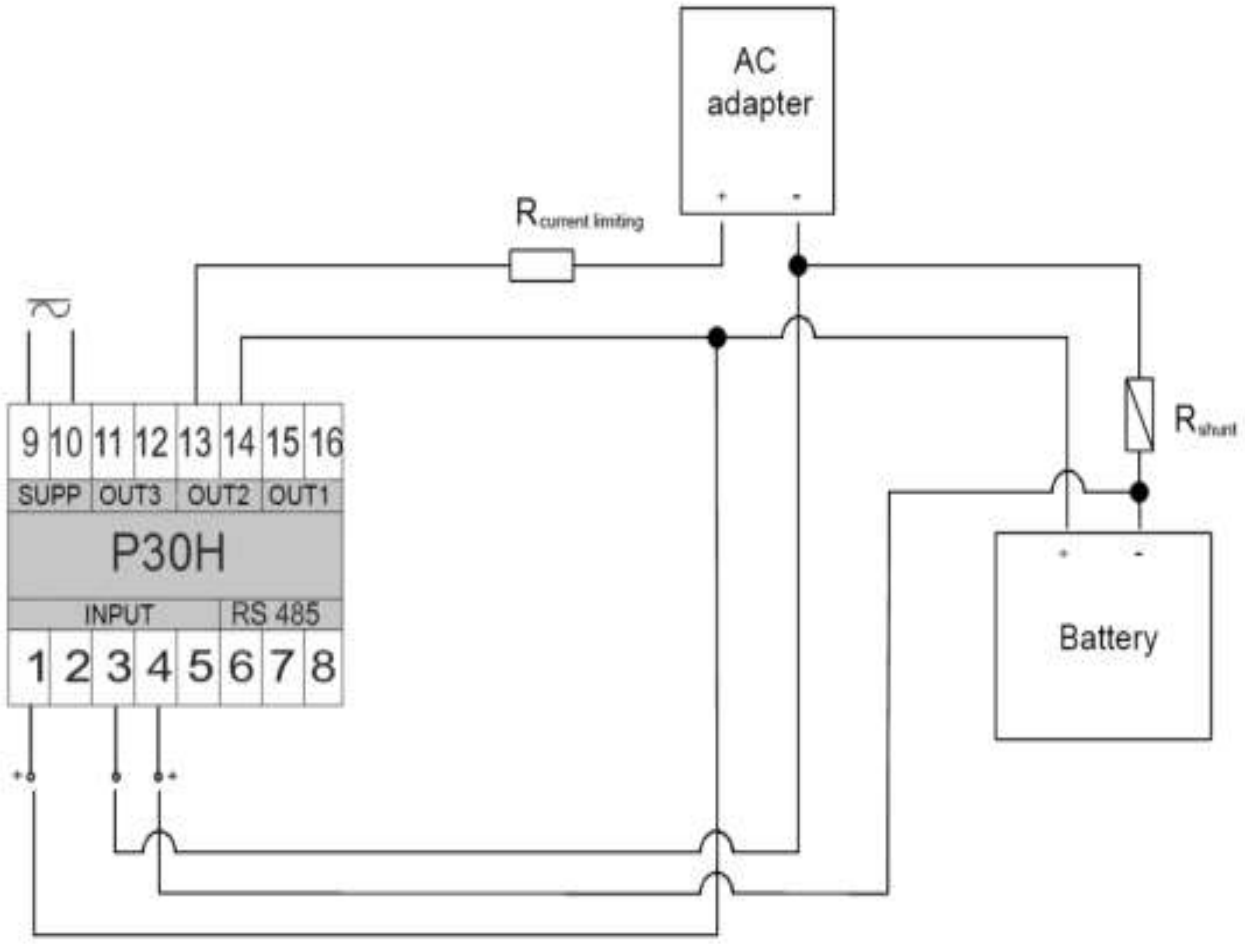



*Fig. 9 P30H connection schematics in configuration for control of battery charging*

Assumed charging parameters:

◆loading time – ca. 24h

◆loading start condition – voltage level <= 9,0 V

◆loading end condition – voltage level >= 14,4 V

◆parameters of external DC supply - 16 V d.c., 150 W

If the 60Ah battery is discharged to, for example 9V level, it should be loaded with average current of $I_{av}$ = 2,5 A ( 2,5 A * 24 h = 60 Ah).

If loading is made through DC source, it is necessary to use the current limiting resistor. $R_{current\ limiting}$ with proper nominal power. The initial current can be established to have double value of average current:

$I_{initial}$ = 2* $I_{av}$ = 5 A.

Current limiting resistor $R_{current\ limiting}$ shall be chooen in such way, that initial current value would be 5A at the battery voltage of 9V. Nominal power of resistor must be sufficient.

$R_{current\ limiting}$ = ( 14,4 V – 9 V) / 5 A = 1.08 $\Omega \approx 1\ \Omega$

Power losses on the resistor in first phase of loading are:

$P_{current\ limiting} = U^2/R_{current\ limiting}$ = ( 14,4 V – 9 V)$^2$/ 1 $\Omega = 29{,}16$ W

$I_{initial\ max}$ = U/R = ( 14,4 V – 9 V) / 1 $\Omega = 5{,}4$ A

Measuring shunt $R_{shunt}$ should be chosen in such way, that it allows to fully utilize the shunt input measuring range - $U_{shunt}$= 150 mV.

$R_{shunt} = U_{shunt}/I_{initial\ max}$ = 0,15V/5,4A = 0,0277 $\Omega \approx 0{,}02\ \Omega$, - the shunt should be $0{,}02\ \Omega$ (or less)

Configuration of P30H transducer:

The circuit will be controlled with the usage of alarm relay no. 1 (stopping the loading process when the 14,4V threshold is met)

| Register no | Parameter symbol in Menu | Register value | Parameter symbol in Menu | Description |
|---|---|---|---|---|
| 4000 | VoltRang | 0 | 12 V | Voltage measuring range |
| 4001* | Rst.Coun | 1 | Yes | Timer reset |

| | | | | |
|---|---|---|---|---|
| 4003 | Averag. | 6 | 10 s | Averaging time of instantaneous values |
| 4004 | Syn.Time | 2 | Synch. I | Synchronization of timer with value of charging current |
| 7619 | CurrThrs | 0,05 | 0,05 | Current threshold above which time is counted |
| 4005 | I direct | 0 | Normal. | Normal direction of current |
| 4008* | Clear En | 4 | 4 | Clearing all energy counters and capacity |
| 4012 | DeltTime | | 5 min | The interval for calculating difference of voltage and current( dU, dI) |
| 4026 | Param.A1 | 0 | U | Alarm no 1 control with voltage value |
| 4027 | Type A1 | 1 | n-off | Workin mode of Alarm 1 |
| 4028 | DlyOnA1 | 0 | 0 | Alarm 1 activation delay |
| 4029 | DlyOffA1 | 0 | 0 | Alarm 1 activation delay |
| 4030 | OnLockA1 | 0 | 0 | Alarm 1 reactivation delay |
| 4031 | SgKeepA1 | 1 | 1 | Alarm 1 signalization latch |
| 7600 | OverLoA1 | 9,0000 | 9,0000 | Alarm 1 lower limit |
| 7601 | OverHiA1 | 14,400 | 14,400 | Alarm 1 upper limit |
| 7621 | Primar.U | 1,0000 | 1,0000 | Rescaling ratio for voltage measuring input value is 1 |
| 7622 | Second.U | 1,0000 | 1,0000 | |
| 7623 | Shunt I | 5,0000 | 5,0000 | Rescaling ratio for current measuring |

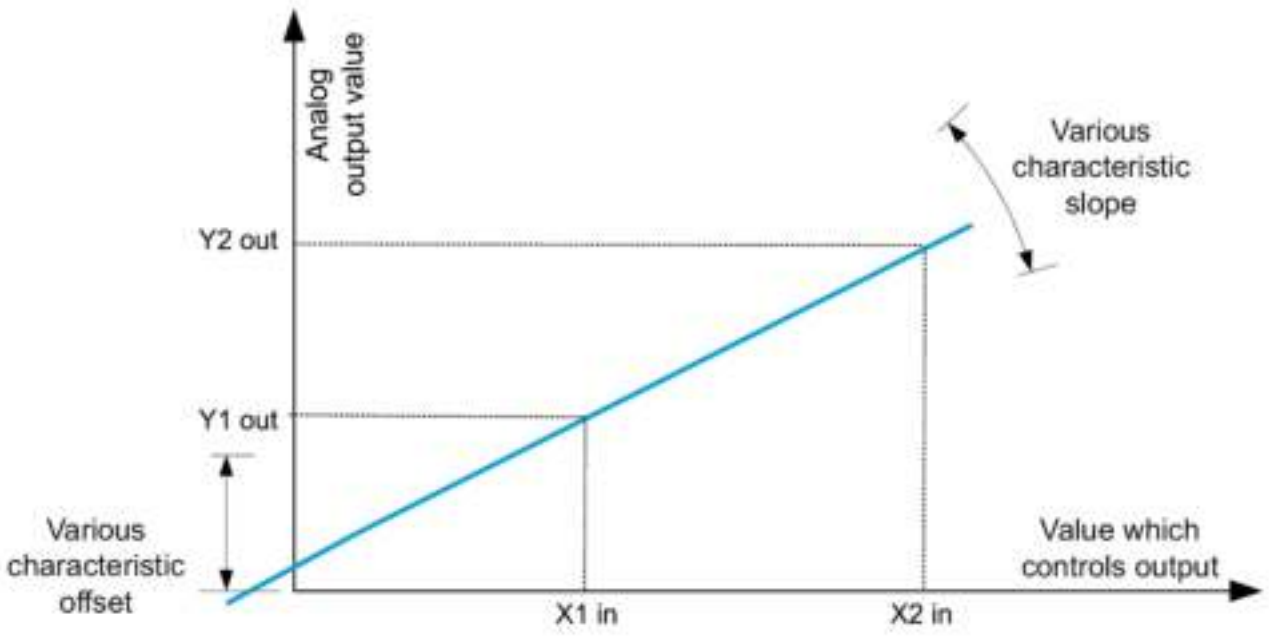
| | | | | |
|---|---|---|---|---|
| 7624 | Shunt mV | 100,00 | 100,00 | input value for: $R_{shunt}$ = 0,02 Ω, I = 5A $U_{shunt}$ = 100 mV rescaling ration is therefore 5A/0,1V = 50 A/V |
| *- after saving the parameter the register value will automatically set to "0" | | | | |

### 5.5.2. Analog outputs

P30H transducer is always equipped with one main analog output (output #1) for current (source) or voltage, depending on the version. Output is connected to the terminals 15 and 16. Depending on the version, transducer can be equipped with an additional analog output (output #2) in place of the alarm output using the terminals 13-14.

#### 5.5.2.1. Individual characteristic of analog outputs

T30P transducer allows for processing measured values that are converted to output signal based on the analog output linear characteristics. On the base of given coordinates of two points by the user, the transducer determines (from the system of equations) coefficients a and b of the individual characteristic.




where *X1 in* and *X2 in* – displayed value, *Y1 out* and *Y2 out* – expected value on analog output.

*Fig.10 Individual characteristic of analog output*

### 5.5.2.2 Analog outputs overrun support

P30H transducer allows the user to configure the analog outputs to handle the overrun of the defined threshold values. Overrun support is disabled by default – in such case, after the value controlling the output is overrun, the output is still controlled proportionally to the controlling value outside the basic output range. After the overrun support is enabled, user can define the output controlling value in case of the maximum or minimum output value overrun.

***Example: Main analog output 1 configuration***

Output set to react to the value of averaged power. Individual characteristics of the current analog output is set as follows:

Table 9

| Register no. | Parameter symbol in the menu | Register value | Parameter value symbol in the menu |
|---|---|---|---|
| 4100 | ParamAn1 | 8 | PAV |
| 4101 | OverSer1 | 0 | Off |
| 7606 | AnIn Lo1 | -200 | -200.0 |
| 7607 | AnIn Hi1 | 1200 | 1200.0 |
| 7608 | AnOutLo1 | 4000* | 4000* |
| 7609 | AnOutHi1 | 20000* | 20000* |

* value in the register is an integer value multiplied by 1000 (4mA → value 4000)

The Fig. 10 presents the reaction of the analog output when the analog output overrun support is off – analog output standard operating mode.

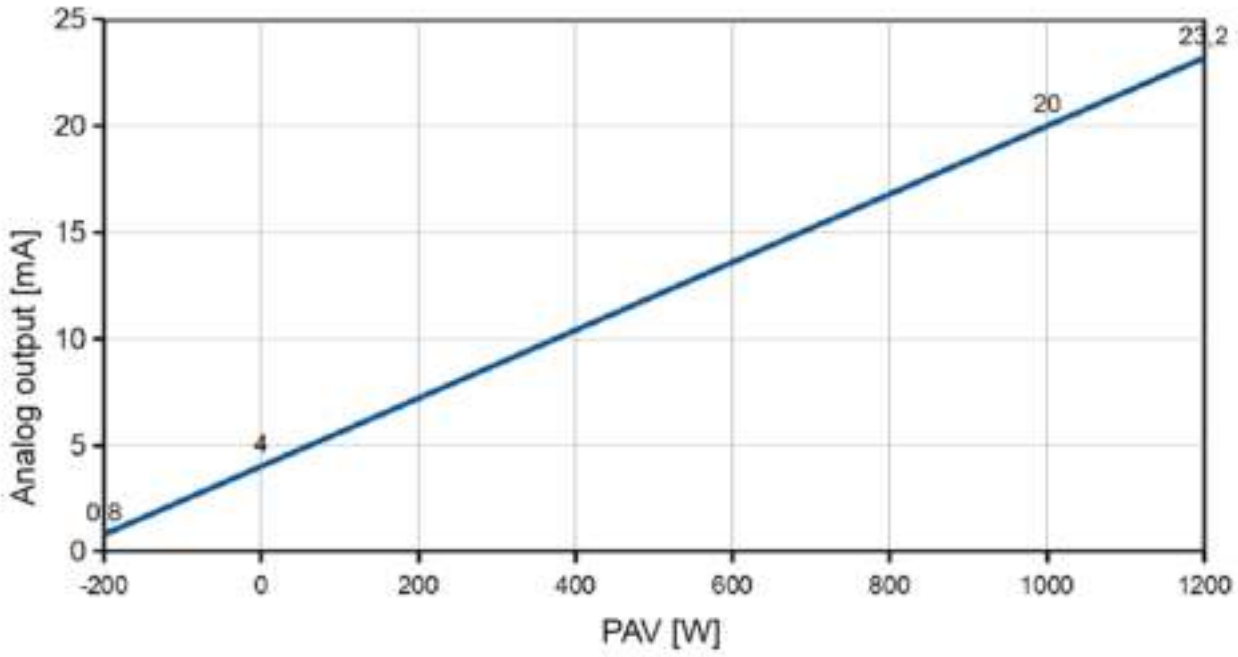



*Fig.11 Analog output with overrun support off*

If the overrun support is turned on with all remaining values unchanged (parameters set according to Tab. 10), then the analog output will react as shown in the Fig. 11.

Table 10

| Register no. | Parameter symbol in the menu | Register value | Parameter value symbol in the menu |
|---|---|---|---|
| 4100 | ParamAn1 | 8 | PAV |
| 4101 | OverSer1 | 1 | On |
| 7606 | AnIn Lo1 | -200 | -200.0 |
| 7607 | AnIn Hi1 | 1200 | 1200.0 |
| 7608 | AnOutLo1 | 4000* | 4000* |
| 7609 | AnOutHi1 | 20000* | 20000* |
| 4102 | OvOutLo1 | 0 | 0 |
| 4103 | OvOutHi1 | 1000 | 1000 |
| 4104 | OvrOutL1 | 1500* | 1500* |
| 4105 | OvrOutH1 | 3500* | 3500* |

* value in the register is an integer value multiplied by 1000 (4mA → value 4000)

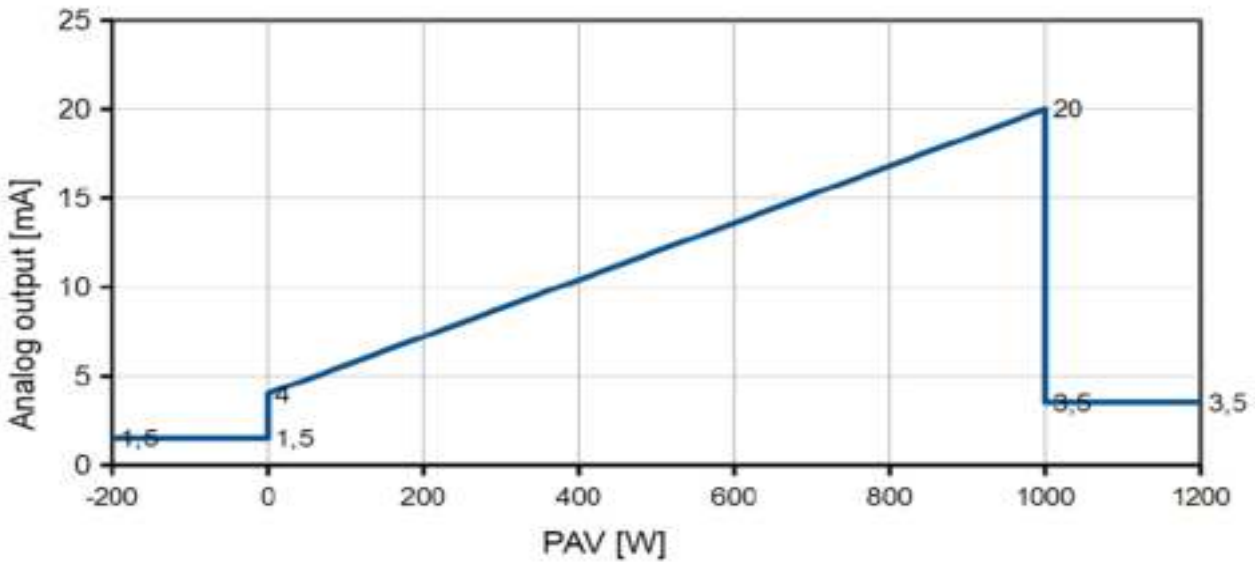



*Fig. 12 Analog output with threshold limit handling on*

### *Example: Main analog output (no. 1) configuration for the time reaction*

Individual characteristics of the analog output no. 1 (current) are set so that the output reacts to the real time (hour*100+minute), i.e. for the 00:00 hours, the expected value is 4 mA and for 23:59 hours, the expected value is equal to 20 mA:

Table 11

| Register no. | Parameter symbol in the menu | Register value | Parameter value symbol in the menu |
|---|---|---|---|
| 4100 | ParamAn1 | 16 | Clock |
| 4101 | OverSer1 | 0 | Off |
| 7606 | AnIn Lo1 | 0 | 0.0 |
| 7607 | AnIn Hi1 | 23.59 | 23.59 |
| 7608 | AnOutLo1 | 4 | 4 |
| 7609 | AnOutHi1 | 20 | 20.0 |

If the transducer is equipped with additional analog output (no. 2), it should be configured in the same way as main output, using the transducer → parameter menu: ParamAn2 …OvrOutH2 or with registers (according to their description in Tab. 37).

**Caution!**

If the transducer is not equipped in additional analog outputs, then relevant parameters are not available. If the analog output has the threshold handling turned on, then configuration parameters for threshold handling are not available in the menu.

### 5.5.3 Alarm and power outputs

P30H transducer can be equipped with 2 normally open alarm contacts or 1 output with normally open contact and 1 24 VDC power output. (depending on version) Each alarm (24 VDC power output should be treated like one) can operate in one of six available modes. The Fig. 12 presents alarm operating in the following modes: n-on, n-off, on, off. Other two modes: h-on and h-off stand for always on and always off, respectively. These modes are used for manual simulation of the alarm state.

In case of the transducer version fitted with 24 VDC power output, second alarm should set as h-on, the auxiliary power output will be always on.

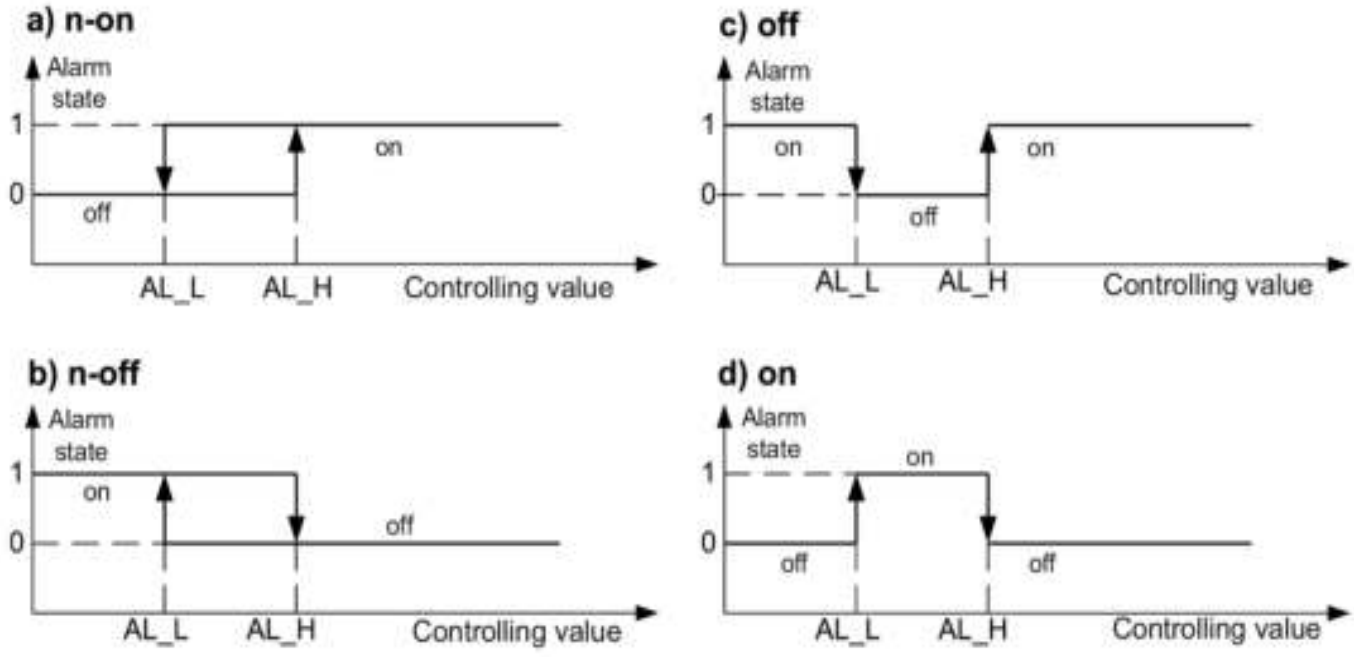



*Fig. 13 Alarm types: a) n-on; b) n-off; c) on; d) off.*

AL_L - Alarm lower limit
AL_H – Alarm upper limit

**Caution:** In case of alarm type n-on, n-oFF, on, oFF entering the AL_L > AL_H value will disable the alarm.

## 5.5.4 LCD display

P30H transducer is equipped with illuminated LCD display with two lines, 8 characters each. Upper display line is used to show values displayed in float format (5 digits for the value < 1000.0 or 4 digits + magnitude symbol for values ≥1000.0) and to display status icons of the SD/SDHC card, or after pressing the key sequence  or  to display icons of the minimum and maximum value of the displayed parameter. Displayed values belong to the range of -9999G...9999G.

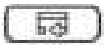
Table 12

| Symbol | Display mode | Meaning |
|---|---|---|
|  | continuous | SD/SDHC card or file system internal memory mounted and ready |
| | flashing | SD/SDHC card unmounted and ready to remove |
|  | flashing | SD/SDHC card write-protected |
|  | flashing | SD/SDHC card or file system internal memory is full |
|  | continuous | Displaying maximum value |
|  | continuous | Displaying minimum value |

P30H transducer automatically sets the format (precision) of the display to the displayed value.

Measurement range overrun is signaled by special signs displayed in the upper line of the LCD.

- ▼▼▼▼▼▼ – overrun of the lower range limit for the value displayed
- ▲▲▲▲▲▲ – overrun of the upper range limit for the value displayed

Lower line of the P30H transducer display can perform several functions. Pressing the following button:  or  cycles the functions of the lower display line:

- name of the displayed value complete with the unit and the internal memory fill indicator. (  )
- time in HH:MM:SS
- date in DD:MM:YY
- bar graph showing the percentage control of the analog output
- second displayed value  - value of any transducer register projected onto the float number – number of the register to be displayed should be entered into the register 4024 (to display the float value contained in 16-bit registers, e.g. register 7000, a relevant 32-bit register number should be entered, in this case - > 7500.)

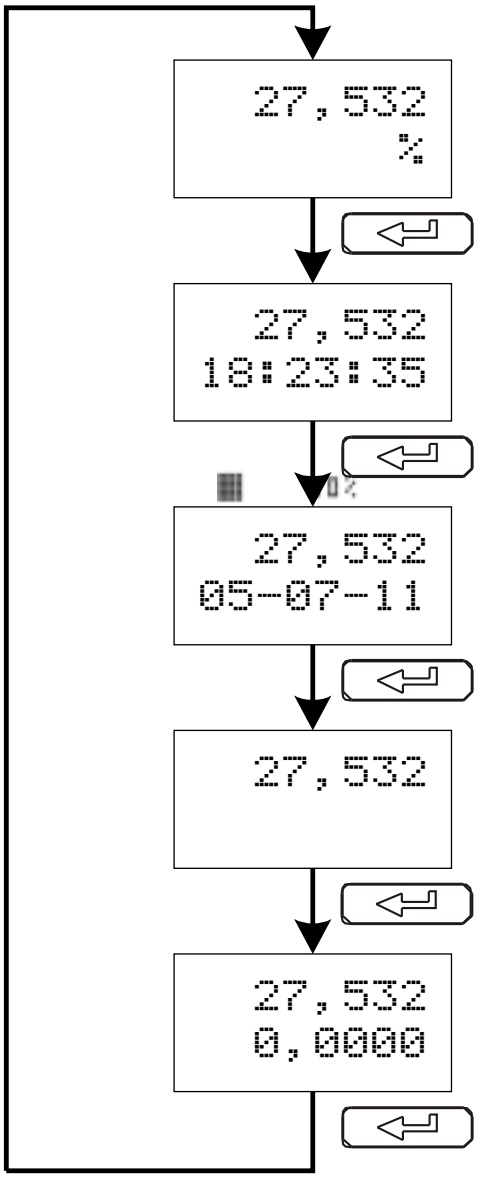



*Fig. 14 Graph showing the cycling of the lower display line information.*

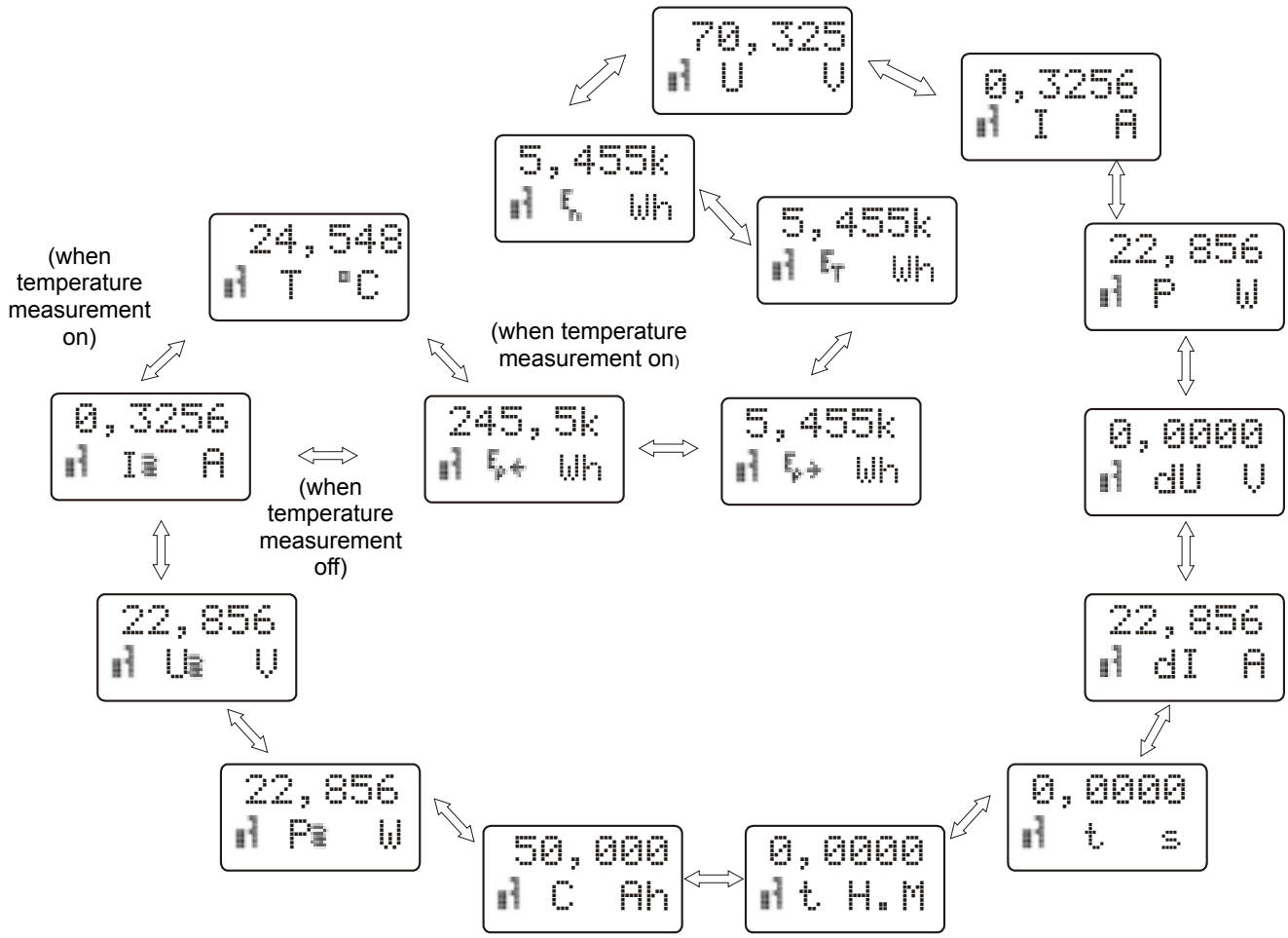



*Fig. 15 Graph showing displayed information when buttons are used for cycling.* ◁ *And* △ *.*

Table 13

| Symbol | Description |
|---|---|
| U V | Voltage |
| I A | Current |
| P W | Power |
| dU V | Delta of voltage in the time interval – difference between tvalues of voltage values at the end and at the beginning of the set time interval |
| dI A | Delta of current in the time interval– difference between tvalues of voltage values at the end and at the beginning of the set time interval |

| | |
|---|---|
| t. s | Timer in seconds |
| t. H, M | Timer in hours, minutes |
| C Ah | Capacity |
| PAV W | Avarage power |
| UAV V | Avarage voltage |
| IAV I | Avarage current |
| T °C | Temperature (option) |
| $E_{\blacktriangleright}$ Wh | Imported energy |
| $E_{\blacktriangleright}$ Wh | Exported energy |
| $E_T$ Wh | Sum of energy (imported and exported) |
| $E_n$ Wh | Difference of energy (imported and exported) |

After the power is turned on, the first value displayed is by default the voltage shown in the upper display line, while the lower line shows symbol and unit of the displayed value.

Displayed values are cycled by following buttons: ◁ and △ According to the diagram shown in Fig. 14. For every displayed value it is possible to show minimum and maximum values using the following buttons: ▭◁ and ▭△.

LCD can also show service and maintenance information showing the transducer status – see Tab. 14

Table 14

| Message | Description |
|---|---|
| Restore Fabr.Par | Default value setting message, e.g. after the software update, transducer can operate normally – it is necessary to revert to factory settings; the message does not interfere with the display of the measured values – it is cycled. |
| Fabr.Par done | Successful reset to factory settings message, the message does not interfere with the display of the measured values – it is cycled every 20 seconds. |

## 5.5.5 Saving and reading transducer configuration file

P30H transducer in P30H-X1XXXXXX and P30H-X2XXXXXX version allow for reading and writing the configuration file from the external SD/SDHC card or file system internal memory.

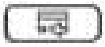
### *5.5.5.1 Saving transducer configuration file*

Writing of the current configuration file is possible after selecting a Service → SaveFile → Yes option from the menu or after entering value “1” into register 4078. Configuration text file will be saved in the ***P30H*** folder, filename: ***P30H_PAR.CON*** (point 5.8.4, Fig. 19). Subsequent configuration file write command will overwrite previously created file.

### *5.5.5.2 Reading transducer configuration file*

Loading the transducer configuration from the file allows for quick configuration of the transducer equipped with the external SD/SDHC card or file system internal memory. Configuration file should be located in the ***P30H*** folder and be named ***P30H_PAR.CON.*** File can be generated by properly configured P30H transducer or by the eCon

software used to configure P30H transducers (ModBus RS-485 or TCP/IP). For P30H transducers in P30H-X2XXXXXX version, file can be transferred between devices via FTP. For P30H transducers in P30H-X1XXXXXX version, single file on a memory card can be used to configure several transducers equipped with SD card slot.

To force parameter update from the file, power the transducer on while holding the following button:  . If the file contains correct data and the configuration is accepted, the display will show following message:

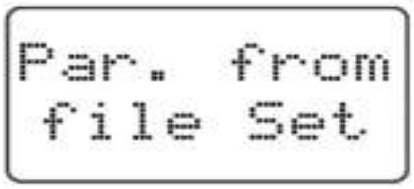



Fig. 16 Message after successful loading of the configuration file.

If the parameter update was forced but no file was present or the file contains invalid data (at least one invalid parameter), the current configuration is not overwritten and the following message appears on the display:

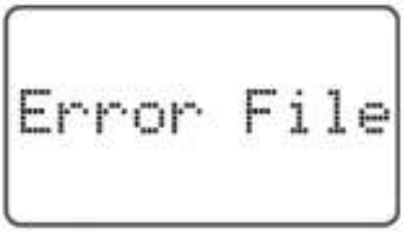



Fig. 17 Message after unsuccessful loading of the configuration file

## 5.6. Default settings

Table 15 shows the standard settings of the P30D transducer. These settings can be reverted via the following option in the transducer menu: Settings Service → Fabr.Par → Yes or via the RS-485 interface after entering value “1” into register 4055.

Table 15

| | Parameter symbol | Standard value |
|---|---|---|
| Input | VoltRang | 12 V |
| | DemandTm | Mov.Wind |
| | Averag. | 1s |
| | I direct | Normal |
| | Clear En | No |
| | Reset AV | No |
| | TempMeas | No |
| | Rst.Coun | No |
| | Syn.Time | stop |
| | DeltTime | 5s |
| | CurrThrs | 0,0000 |
| | Primar.U | 1,0000 |
| | Second.U | 1,0000 |
| | Shunt I | 150,00 |
| | Shunt mV | 150,00 |
| Display | Bcklight | On |
| | Bckl.Int | 70,00% |
| | Disp.Reg | 7509 |
| Alarm 1,2 | Param.A1 Param.A2 | U |
| | Type A1 Type A2 | h-off |
| | OverLoA1 OverLoA2 | 0 |
| | OverHiA2 OverHiA2 | 0 |
| | DlyOnA1 DlyOnA2 | 0 |

| | | | |
|---|---|---|---|
| | DlyOffA1 | DlyOffA2 | 0 |
| | OnLockA1 | OnLockA2 | 0 |
| | SgKeepA1 | SgKeepA2 | On |
| Output | Param.A1 | Param.A2 | C Ah |
| | AnIn Lo1 | AnIn Lo2 | 40 |
| | AnIn Hi1 | AnIn Hi2 | 60 |
| | AnOutLo1 | AnOutLo2 | 4 |
| | AnOutHi1 | AnOutHi2 | 20 |
| | OverSer1 | OverSer2 | Off |
| | OvOutLo1 | OvOutLo2 | 4000 |
| | OvOutHi1 | OvOutHi2 | 20000 |
| | OvrOutL1 | OvrOutL2 | 4000 |
| | OvrOutH1 | OvrOutH2 | 20000 |
| Mbus 485 | Address | | 1 |
| | ModeUnit | | r8n2 |
| | BaudRate | | 9600 |
| | Base.Reg | | 7510 |
| | No.ofVal | | 1 |
| | ValType | | flt 32 |
| | Interv. | | 10 |
| | AnswTime | | 1000 |
| | Mode | | Slave |
| | Mast.Fun | | 0x03 |
| | No.OfErr | | 2 |
| Archive | Arch.Val | | U, I, P, Q, S |
| | Param.Ar | | U |
| | Ar. Mode | | h_off |
| | OverLoAr | | 0 |
| | OverHiAr | | 20 |
| | Ar. Time | | 10 |
| | Ar.Erase | | No |
| | Rec.ToSD | | No |
| | Param.SD | | 1.05.2000 |
| | Fabr.Par | | No |
| | Security | | 00000 |
| | Time | | Undefined |

| | | |
|---|---|---|
| Service | Date | Undefined |
| | AutoTime | No |
| | DispTest | No |
| | Language | Polish (for versions P30H-XXXXXXXXPX English (for versions P30H-XXXXXXXXEX) |
| | SaveFile | No |
| | Separat. | , (for versions P30H-XXXXXXXXPX) . (for versionsP30H-XXXXXXXXEX) |
| Ethernet (optional) | DHCP | On |
| | addrIP32 | 192.168 |
| | addrIP10 | 001.030 |
| | mask 32 | 255.255 |
| | mask 10 | 255.000 |
| | Gate 32 | 192.168 |
| | Gate 10 | 001.001 |
| | MAC 54 | Variable value - individual for each transducer |
| | MAC 32 | |
| | MAC 10 | |
| | AddrmTCP | 1 |
| | PortMbus | 502 |
| | TimeMbus | 60 |
| | no.c.TCP | 4 |
| | p.comFTP | 21 |
| | FTP port | 1025 |
| | PortHTTP | 80 |
| | 10/100Mb | Auto |
| | EthStdPa | No |
| | ReInitEt | No |

## 5.7. Software upgrades

A feature implemented in the P30H transducers enables to upgrade firmware using a PC with eCon software installed. Free eCon software and the update files are available at www.lumel.com.pl. Upgrade is possible if a PC is connected to RS485 to USB converter, such as PD10 converter.

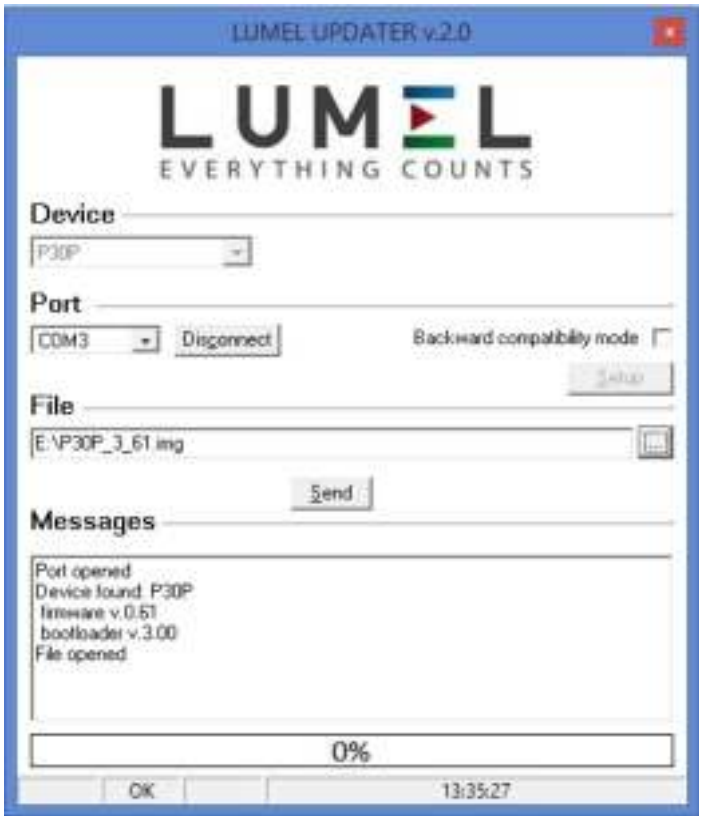



*Fig.18 View of the program for updating transducer software.*

**Caution!** Software update automatically resets transducer settings to default, so it is recommended to save the settings using eCon software before upgrading.

After starting the eCon software, go to the ***Communication*** tab and set baud rate, mode, transducer address and RS-485 interface port. Then click the **Connect** icon and read all set parameters (it is

necessary to revert them later). Next, click the **Firmware update** link, the LUMEL UPDATER (LU) software will appear – Fig. 24. Press the ***Connect*** *button.* The **Messages** information window displays information concerning upgrade process. If the port is opened correctly, a ***Port opened*** message appears. Upgrade mode is enabled using either of the two methods: remotely via LU (using eCon settings: address, mode, baud rate, COM port) and by turning a transducer on while pressing the following button: ⏎ - update with standard communication parameters, i.e.: baud rate: 9600 kb/s, mode: 8N2 or with the following button pressed: ◁ - update with recommended communication parameters, i.e.: baud rate: 115200 kb/s, mode: 8N2. When all LEDs are lit and the „Connect. UPDATER” message is displayed in the upper display line, the transducer is ready for the communication with PC. When transducer successfully connects to the LUMEL UPDATER software, LU program displays the following message: ***Device found: P30H*** , main program version and connected device bootloader version, while the transducer display shows the ”Device is ready” message. Next, press the following button: ***...*** ” to load the file with new software version in LUMEL UPDATER software. If the file is opened correctly, a ***File opened*** message is displayed in LU program window. Press the ***Send*** button. During update, signal LEDs are being lit in sequence, and the lower display line shows the percentage progress of the update. When upgrade is successfully completed, the transducer starts normal operation while the information window displays **Done** message and upgrade elapsed time.

Current software version can be checked by reading the welcome message when switching the transducer on.

**Note:** Software update is possible only when transducer is connected to PC (no other ***Master*** devices present on RS-485).

**Caution:** Turning the transducer power supply off during upgrade process may result in permanent damage!

## 5.8. Measuring values archiving

### 5.8.1 Transducer memory structure

P30 transducers are by default (regardless of the version) are equipped with 4MB internal memory to store data registered by the transducer. Any displayed value (registers 7500...7515) can be a registered parameter with an exception of meter values (energy meters). Second displayed value can be registered optionally. Internal memory of the transducer can store up to 534336 records. Memory is organized as a circular buffer. After the memory is full, the oldest data are overwritten first. Internal archive can be read, copied and deleted.

Additionally, P30H-XX1XXXXXX version is equipped with SD/SDHC card slot, allowing the archive data as files on the external SD/SDHC card.

P30H-XX2XXXXXX version is equipped with 8GB internal file system memory (memory size can be increased by manufacturer or on special order) storing the data automatically rewritten from the internal

memory. The files can be downloaded via Ethernet using FTP.

**Caution:** Changing the menu parameter value Archive → Arch.Val will result in erasing the internal memory archive!!!

### 5.8.2 Internal memory

Transducer internal memory is divided into 8192 pages. Every memory page can accommodate up to 66 data records. Records within one page begin from the beginning of the page and fill the entire page space. Every memory page is 528 bytes long. Memory is divided into two areas: first 8096 pages are the basic archive memory, while the remaining 96 pages are the reserve archive that is used only during rewriting memory contents to the SD/SDHC card (total memory is 8096*528B + 96*528B = 4275312 bytes).

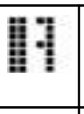
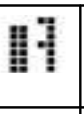
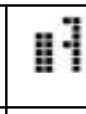
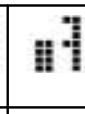
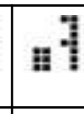
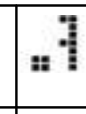
The starting point of the archived data is marked by the number of the page containing the first archive record and the starting byte determining page byte the first record starts from. The ending point of the archive is likewise marked by the number of the page containing the last archive record on that page and the first byte of the subsequent archive record to be written.

Deletion of the internal archive memory contents is done by assigning the archive end parameters to the archive start. This allows to retrieve memory contents in case archive is deleted.

Data in the internal archive memory are stored as 8-byte records. Current memory fill status can be displayed on LCD after setting the lower display line to show the unit and internal memory fill

indicator. Table 16 describes the internal memory fill indicator.

Table 16

| Symbol |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|
| Internal memory fill percentage | 87.5...100% | 75...87.5% | 62.5...75% | 50...62.5% | 37.5...50% | 25...37.5% | 12.5...25% | 0...12.5% |

### 5.8.2.1 Structure of the record

All data written to the internal data memory are stored as 8-byte records. Structure of the record is presented in the table below.

Table 17

| Internal memory record (8 bytes) | | | | | |
|---|---|---|---|---|---|
| Registration time (4 bytes) | | | Data archived in the float format (4 bytes) | | |
| | | | | | |
| Year - 2010 | Month | Day | Hour | Minute | Second |
| 6 bits | 4 bits | 5 bits | 5 bits | 6 bits | 6 bits |

*Example: Example of internal memory record coding – e.g. record no. 13 on page no. 559*

Record no. 13 (rec=13) on 559 page is read from registers 4553 – 4556 (unsigned short type registers – 2 bytes, 1 record covers 4 unsigned short type registers) after entering the value 559 into the register 4500. Starting register holding the record starting point can be found according to the following formula: $R_0$ = 4501 + rec*4 = 4553.

Table 18

| Register | HEX value |
|---|---|
| 4553 | 0x0170 |
| 4554 | 0xBB95 |
| 4555 | 0xE87C |
| 4556 | 0xB942 |

rec = 0x0170BB95E87CB942

Data = 0xE87CB942 → (float) → 92.743958;

Table 19

| Registration time = 0x0170BB95 → b10111000010111101110010101 | | | | | |
|---|---|---|---|---|---|
| Year + 2010 | Month | Day | Hour | Minute | Second |
| 6 bits | 4 bits | 5 bits | 5 bits | 6 bits | 6 bits |
| 0 0 0 0 0 0 | 0 1 0 1 | 1 1 0 0 0 | 0 1 0 1 1 | 1 0 1 1 1 0 | 0 1 0 1 0 1 |
| 0 + 2010 | 5 | 24 | 11 | 46 | 21 |
| 10-05-24 11:46 | | | | | |

Rec : 2010-05-24 11:46:21 92.743958

### 5.8.2.2. Acquisition of archived data from the internal memory

Archived data in the internal memory can be downloaded by a memory card (optional), internal FTP server (optional) or RS-485 interface. Archived data acquisition is done by downloading memory pages containing data records. Downloading separate pages is possible thanks to eCon software.

Transducers equipped with SD/SDHC card slot allow for automatic rewriting of archived data to the memory card (the fastest way of archived data acquisition). To download the data using the card,

insert the SD/SDHC card into the slot (contacts side down), making sure that the card was successfully mounted (a following card icon is displayed in the upper left corner of the display:  ). It is necessary to set the percentage fill threshold, because after this value is reached, the data will be automatically saved to card of file system internal memory – register 7614 or from menu: Archive → Param.SD. For example, if the value '20.0' is entered into the register 7614, data will be stored in the internal device memory until it is filled in 20%, when the device starts to write all subsequently saved data to SD/SDHC card or to file system internal memory. If the maximum percentage fill value is higher (e.g. 95%), data will be written to SD/SDHC card less often, but the saving process will be longer. Saving data to the card is marked by the progress bar on the lower LCD line. Do not remove SD/SDHC card from the device until the saving is completed, as this may cause data corruption or reset the device. Saving can be interrupted and the card removed after the card is unmounted, (see section 5.3.2).

It is also possible to force the rewriting of the archive to SD/SDHC card or to file system internal memory (only versions with Ethernet interface) after pressing the following key sequence:   . For the transducer with the Ethernet interface, archived data can be loaded from the file system memory via FTP with any FTP client.

***Note:*** If the transducer is connected to FTP client, the ability to write archived data from internal memory to the file system internal memory is not available! To download current data from the archive, you have to disconnect from the FTP session, force the archive rewriting (e.g. via

following the combination of buttons: ◁ ↵ and connect the transducer to FTP client again.

### 5.8.3 Archiving configuration

Archiving parameters can be configured via the registers 4064 – 4069 (Tab. 37) and transducer menu in the Settings → Archive group. Archiving can be continuous or conditional. Conditional archiving can be realized in one of four conditions presented on Fig. 19 (n-on, n-off, off, on). Continuous archiving can be enabled by selecting the 'h-on' option and disabled by selecting 'h-off'.

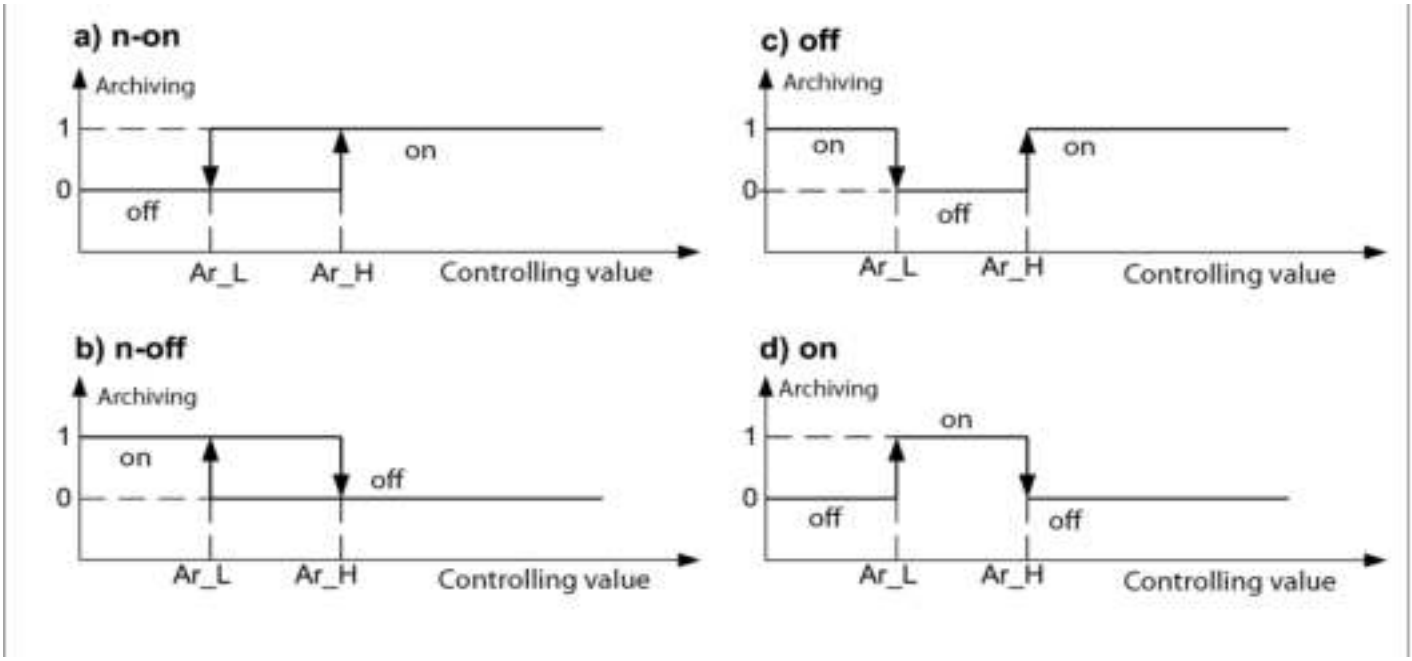



*Fig. 19 Conditional archiving types*

Ar_L - Archiving lower limit → OverLoAr → Register 7608
Ar_H – Archiving upper limit → OverHiAr → Register 7609

**Example 1:** Transducer configured for monitoring voltage, current, active power, THD U, THD I. Conditional archiving of five displayed values triggered by active power coefficient level – if PF falls below 0,9, transducer archives the values displayed every 10 seconds:

Table 20

| Figure description | Register no. | Parameter symbol in the menu | Register value | Parameter value symbol in the menu |
|---|---|---|---|---|
| | 4064 | Arch.Val | 7 | U, I, P |
| | 4065 | Param.Ar | 2 | P |
| | 4066 | Ar. Mode | 1 | n-off |
| Ar_L | 7608 | OverLoAr | 10 | 0.9 |
| Ar_H | 7609 | OverHiAr | 10 | 0.9 |
| | 4067 | Ar. Time | 10 | 10 |
| | 4068 | Ar.Erase | 0 | No |
| | 4069 | Rec.ToSD | 0 | No |
| | 7614 | Param.SD | 10 | 95.0 |

### 5.8.4 Memory card or internal memory file system (optional)

Transducers P30 in P30H-XX1XXXXXXX versions use memory card compatible with SD and SDHC standard. Transducers P30 in P30H-XX2XXXXXXX versions are equipped with file system internal memory – memory size 8GB. It is compatible with both FAT and FA32 file systems. If the memory card is not formatted, it should be formatted in the card reader from the PC level. P30H transducer creates directories and files containing archive data. Before the card is inserted in the transducer, make sure that the card is not write-protected. Never attempt to remove the card from the transducer before the card is

unmounted (see sec. 5.3.2) – the card is unmounted by pressing the buttons  . Removal of the card that was not unmounted may corrupt the card contents. Memory card status is described in the transducer registers (sec. 5.9.8. Tab. 42). After the card is inserted into the slot, the displays shows card status for about 3 seconds, as presented in the table below:

Table 21

| Message | Description |
|---|---|
| Eject SD | The card inserted but not installed (uninstalled). |
| DamageSD | Card inserted but the attempt failed. |
| UnlockSD | The card inserted, installed correctly but write-protected. The card is uninstalled automatically when write-protection is detected. |
| SD OK or SDHC OK | The card inserted and installed. |
| Full SD | The card inserted and installed but full. |
| Install. | Card inserted – installation in progress |

For example, number of records on the SD/SDHC card with archiving period of 1 second and for one archived value equals:

- 64 MB card: approx. 1.900.000 records (approx. 22 days)
- 2 GB card: approx. 60.800.000 records (approx. 700 days)

***Caution:*** It is recommended to use industrial-grade SD/SDHC cards, with minimum 6th write class. It is also possible to use a consumer-grade cards compatible with the w 6th writing speed class (it should be remembered that consumer-grade cards can operate in the temperature range of 0...40°C).

P30H transducer creates directories and files on the card during registration. An example of the directory structure is shown in Figure 20.

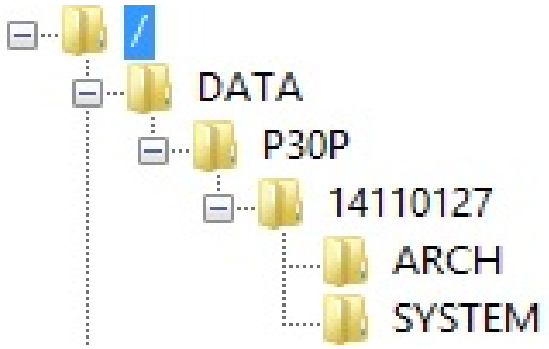


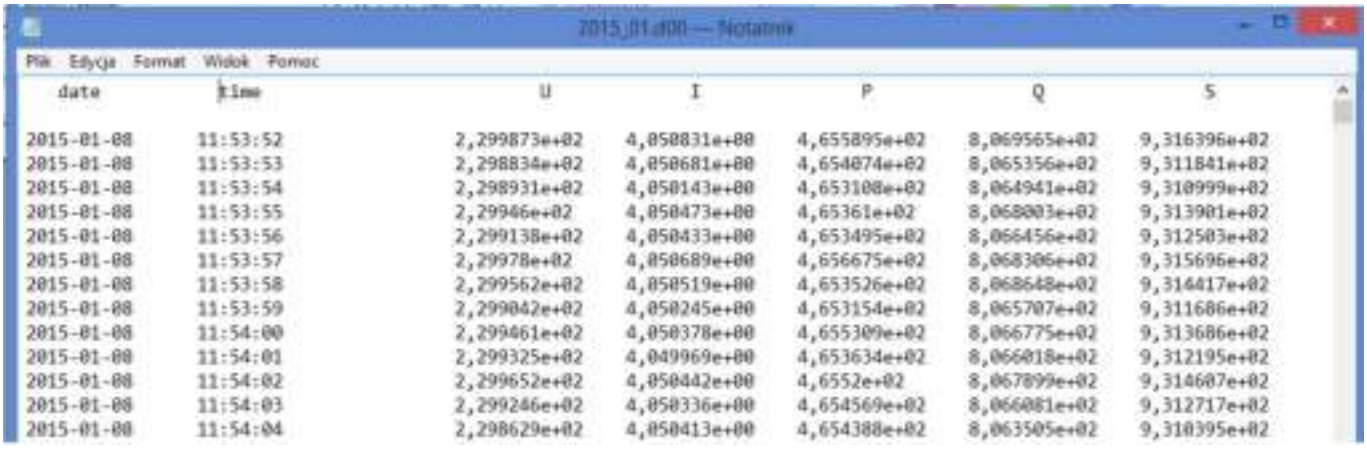

*Fig. 20 The directory structure on the SD card.*

Besides the ARCH directory, holding the archived data, a SYSTEM directory is created on the card and complete with the file start.txt holding the date and hour of the installation of card or file system internal memory (also after the transducer is started after power failure).

Data on the card are stored in the files within directories corresponding to the name and serial number of the device – see Fig. 20. File names correspond to the registration date and follow the *XXXX_YY.Dzz* format, where*XXXX* → year, YY → month. Archive files extension is given in Dzz format, where „zz" is the following number of the archive file in given month. For example, first archive file in May 2015 will be named 2015_05.D00, the nest file will be named 2015_05.D01 etc. For every month a maximum of 32 files can be created (*.D00 … *.D31). File is automatically changed to another after it reaches the size of 12 MB when 1 or 2 values are archived. When more than 2 values are archived, the upper file size limit is set bu the transducer.

### 5.8.5 Archive files structure

Archive data files on external SD/SDHC card or in file system internal memory are organized by columns separated by tab. A column description is located in the first line of the file. Data records are located in the subsequent lines and the record fields are separated by tab. An example of the file is shown in Fig. 21



| date | time | U | I | P | Q | S |
|---|---|---|---|---|---|---|
| 2015-01-08 | 11:53:52 | 2,299873e+02 | 4,050831e+00 | 4,655895e+02 | 8,069565e+02 | 9,316396e+02 |
| 2015-01-08 | 11:53:53 | 2,298834e+02 | 4,050681e+00 | 4,654074e+02 | 8,065356e+02 | 9,311841e+02 |
| 2015-01-08 | 11:53:54 | 2,298931e+02 | 4,050143e+00 | 4,653108e+02 | 8,064941e+02 | 9,310999e+02 |
| 2015-01-08 | 11:53:55 | 2,29946e+02 | 4,050473e+00 | 4,65361e+02 | 8,068003e+02 | 9,313901e+02 |
| 2015-01-08 | 11:53:56 | 2,299138e+02 | 4,050433e+00 | 4,653495e+02 | 8,066456e+02 | 9,312503e+02 |
| 2015-01-08 | 11:53:57 | 2,29978e+02 | 4,050689e+00 | 4,656675e+02 | 8,068306e+02 | 9,315696e+02 |
| 2015-01-08 | 11:53:58 | 2,299562e+02 | 4,050519e+00 | 4,653526e+02 | 8,068648e+02 | 9,314417e+02 |
| 2015-01-08 | 11:53:59 | 2,299042e+02 | 4,050245e+00 | 4,653154e+02 | 8,065707e+02 | 9,311686e+02 |
| 2015-01-08 | 11:54:00 | 2,299461e+02 | 4,050378e+00 | 4,655309e+02 | 8,066775e+02 | 9,313686e+02 |
| 2015-01-08 | 11:54:01 | 2,299325e+02 | 4,049969e+00 | 4,653634e+02 | 8,066018e+02 | 9,312195e+02 |
| 2015-01-08 | 11:54:02 | 2,299652e+02 | 4,050442e+00 | 4,6552e+02 | 8,067899e+02 | 9,314607e+02 |
| 2015-01-08 | 11:54:03 | 2,299246e+02 | 4,050336e+00 | 4,654569e+02 | 8,066081e+02 | 9,312717e+02 |
| 2015-01-08 | 11:54:04 | 2,298629e+02 | 4,050413e+00 | 4,654388e+02 | 8,063505e+02 | 9,310395e+02 |

*Fig. 21 Example archive data file*

Fields in the record line have the following meanings:

- *date* – date of data recording, separated by dash (-)
- *time* – hour, minute, second of recorded data, separated by colon (:) .
- U, I, P... – archived values displayed by the transducer, separated by period (.) what can be changed. to comma (,) by selecting appropriate option in Service menu or entering value “1” into register 4070; archived values are written in the engineering format

## 5.9. RS-485 interface

Programmable digital P30H transducers are equipped with serial RS-485 link for communication with computer systems and other Master devices. Asynchronous character MODBUS communication protocol has been implemented in a serial link. The transmission

protocol describes how to exchange information between devices via a serial link.

### 5.9.1 Connection of the serial interface

RS-485 standard allows for a direct connection of up to 32 devices on a single serial link with a length up to 1200 m (at baud rate 9600 b/s). It is necessary to use additional intermediate-separation circuits for connecting higher number of the devices, for example PD51 manufactured by LUMEL S.A.

Output of the interface line is shown in Fig. 3. To obtain the correct transmission it is necessary to connect the lines A and B in parallel with their equivalents in other devices. The connection must use a shielded wire. The cable shield should be connected to the protective terminal in close proximity to the transmitter (connect a shield to the protective terminal at one point only).

GND line serves as the additional security device in case of significant connection line length. In such case, GND signals of all RS-485 bus devices should be interconnected.

RS-485 interface card or the converter is required for a connection to a PC, for example PD51 or PD10. The method of connecting devices is shown in Fig. 22.

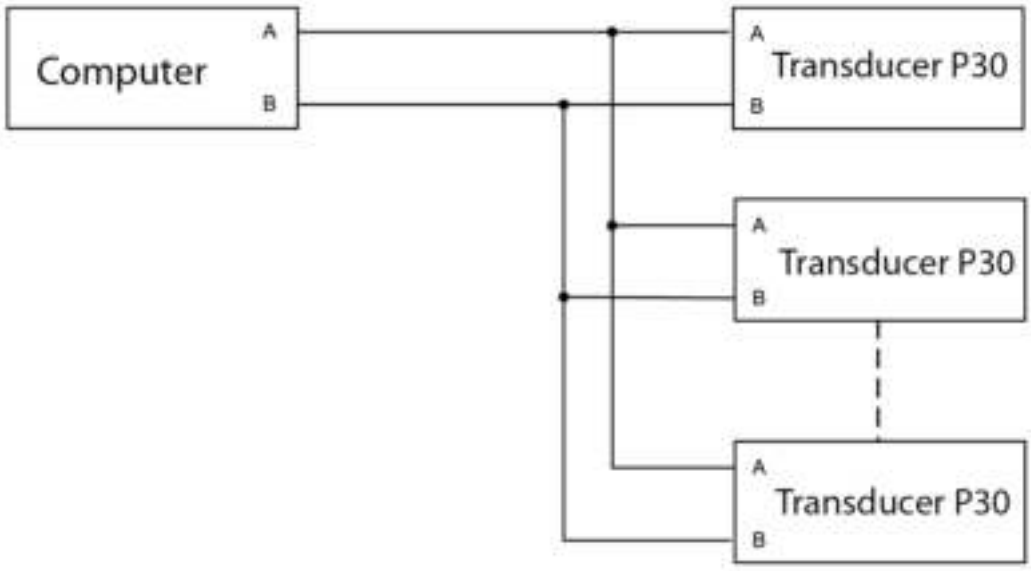



*Fig.22 Connecting the RS-485 interface.*

**Transmission line markings for the PC cards may vary depending on the card manufacturer.**

### 5.9.2 Description of the MODBUS protocol implementation

The implemented protocol is compliant with the PI-MBUS-300 Rev G specification of Modicon.

Overview of P30H transducer MODBUS protocol serial port parameters:

- Transducer address 1..247.
- Baud rate: 4800, 9600, 19200, 38400, 57600, 115200, 230400, 256000 [b/s].
- Operating mode: RTU frame format: 8n2, 8e1, 8o1, 8n1.
- Maximum response time: 200 ms (time until the response start can be

extended up to 500ms during writing to a SD/SDHC card or to the file system internal memory).

Configuration of the serial link parameters consists of determining the baud rate, the device address and the format of the transmission mode - protocol.

**Note:** Each transmitter connected to the communication network must:

- have a unique address, different from the addresses of other devices connected to the network.
- Identical baud rate and a type of transmission mode

### 5.9.3 Description of the implemented functions

The following functions of the MODBUS protocol have been implemented in P30H transducers:

- 03 (03h) – readout of registers group
- 04 (04h) – readout of input registers group
- 06 (06h) – single register writing
- 16 (10h) – registers group writing
- 17 (11h) – slave device identification

#### Readout of n-registers (code 03h)

**Example 1:** Readout of 2 registers, starting with the register address 1DB0h (7600) float (32-bit), (register values 10, 100.)

Request:

Table 22

| Device address | Function | Register address | | Number of registers | | CRC checksum |
|---|---|---|---|---|---|---|
| | | B1 | B0 | B1 | B0 | |
| 01h | 03h | 1Dh | B0h | 00h | 02h | C380h |

Response:

Table 23

| Device address | Function | Number of bytes | Value from the register 1DB0 (7600) | | | | Value from the register 1DB1 (7601) | | | | CRC checksum |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | B3 | B2 | B1 | B0 | B3 | B2 | B1 | B0 | |
| 01h | 03h | 08h | 41h | 20h | 00h | 00h | 42h | C8h | 00h | 00h | E46Fh |

**Example 2**: Readout of two 32-bit float registers (7501, 7502) as a combination of 2 x 2 16-bit registers (7002, 7003, 7004, 7005), starting with the register address 1B5Ah (7002) - 32-bit register values 25.68, 20.25.

Request:

Table 24

| Device address | Function | Register address | | Number of registers | | CRC checksum |
|---|---|---|---|---|---|---|
| | | B1 | B0 | B1 | B0 | |
| 01h | 03h | 1Bh | 5Ah | 00h | 04h | 62FEh |

Response:

Table 25

| Device address | Function | Number of bytes | Value from the register 1B5A h (7002) | | Value from the register 1B5Bh (7003) | | Value from the register 1B5Ch (7004) | | Value from the register 1B5Dh (7005) | | CRC checksum |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Value from the register 7501 (32 bits) | | | | Value from the register 7502 (32 bits) | | | | |
| | | | B3 | B2 | B1 | B0 | B3 | B2 | B1 | B0 | |
| 01h | 03h | 08h | 41h | CDh | 70h | A4h | 41h | A2h | 00h | 00h | 83D0h |

**Example 3:** Readout of two 32-bit float registers (7501, 7502) as a combination of 2 x 2 16-bit registers (6002, 6003, 6004, 6005), starting with the register address 1772h (6002) - 32-bit register values 25.68, 20.25.

Request:

Table 26

| Device address | Function | Register address | | Number of registers | | CRC checksum |
|---|---|---|---|---|---|---|
| | | B1 | B0 | B1 | B0 | |
| 01h | 03h | 17h | 72h | 00h | 04h | E1A6h |

Response:

Table 27

| Device address | Function | Number of bytes | Value from the register 1772h (6002) | | Value from the register 1773h (6003) | | Value from the register 1774h (6004) | | Value from the register 1775h (6005) | | CRC checksum |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Value from the register 7501 (32 bits) | | | | Value from the register 7502 (32 bits) | | | | |
| | | | B1 | B0 | B3 | B2 | B1 | B0 | B3 | B2 | |
| 01h | 03h | 08h | 70h | A4h | 41h | CDh | 00h | 00h | 41h | A2h | E411h |

## Single register writing (code 06h)

**Example 4:** Writing the value 543 (0x021F) to the register 4001 (0x0FA1)

Request:

Table 28

| Device address | Function | Register address | | Register value | | CRC checksum |
|---|---|---|---|---|---|---|
| | | B1 | B0 | B1 | B0 | |
| 01h | 06h | 0Fh | A1h | 02h | 1Fh | 9B94h |

Response:

Table 29

| Device address | Function | Register address | | Register value | | CRC checksum |
|---|---|---|---|---|---|---|
| | | Hi | Lo | Hi | Lo | |
| 01h | 06h | 0Fh | A1h | 02h | 1Fh | 9B94h |

## Writing to n-registers (code 10h)

### **Example 5:** Writing two registers starting with the register address 1DB0h (7600)

Writing the values 20, 200.

Request:

Table 30

| Device address | Function | Address reg.Hi | Address reg.Lo | No. of registers Hi | No. of registers Lo | Number of bytes | Value for the register 1DB0 (7600) | | | | Value for the register 1DB1 (7601) | | | | CRC checksum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | B1 | B0 | B3 | B2 | B1 | B0 | B3 | B2 | |
| 01h | 10h | 1Dh | B0h | 00h | 02h | 08h | 41h | A0h | 00h | 00h | 43h | 48h | 00h | 00h | C9E2h |

Response:

Table 31

| Device address | Function | Register address | | Number of registers | | CRC checksum |
|---|---|---|---|---|---|---|
| | | B1 | B0 | B1 | B0 | |
| 01h | 10h | 1Dh | B0h | 00h | 02h | 4643h |

## Device identification report (code 11h)

### **Exapmle 6:** Device identification

Request:

Table 32

| Device address | Function | Checksum |
|---|---|---|
| 01h | 11h | C02Ch |

Response:

Table 33

| Address | Function | Number of bytes | Device ID | Device status | Field dependent on device | | Checksum (CRC) |
|---|---|---|---|---|---|---|---|
| | | | | | Firmware v 2.00 | Registers 4308,4309, 4310, 4311 describing serial number, and device configuration of the transducer (ser. no.: 13100001) | |
| 01h | 11h | 0Ch | C1h | FFh | 02h 00h | A0h 01h 6Ch 0Dh A0h 01h 6Ch 0Dh | 69FCh |

*Field dependent on the device* – 4 bytes corresponding to the value of the registers 4308...4311, see Tab. 42. Production status 1...4.

### 5.9.4 Interface RS-485 Master mode

RS-485 interface can operate in Master mode, when the device can query single connected slave device. Both devices need to share communication parameters. Master mode is enabled by selecting the appropriate RS-485 operation mode from the menu: Mbus 485 → Mode → Master or entering value "2" to register 4042. In Master mode, following parameters have to be configured in Mbus 485 menu:

Table 34

| Item | Mbus 485 | |
|---|---|---|
| 1 | Address | Queried device address |
| 2 | ModeUnit | Transmission mode of a link |
| 3 | BaudRate | Baud rate |
| 4 | Base.Reg | Base register number |
| 5 | No.ofVal | Number of values queried |
| 6 | ValType | Type of values queried |
| 7 | Interv. | Query time [x100 ms] |
| 8 | AnswTime | Maximum response time [ms] |
| 9 | Mode | Serial interface operating mode |

| | | |
|---|---|---|
| 10 | Mast.Fun | Function selection for Master mode (0x03 or 0x04) |
| 11 | No.OfErr | Number of query retries when no response is received |

Parameters 4 - 6 can also be configured via RS-485 (registers 4048-4052) before Master mode is selected. After the Master mode is selected, transducer cannot be queried by another *Master* device.

All values read in Master mode are projected onto the float values and stored in registers 8000...8049, where first value read is put in the register 8000, second one is put in register 8001 etc.

In Mbus 485 menu you can find the No.OfErr parameter, defining allowed number of retries (number of repeated queries before error is signaled). This parameter is also modifiable via RS-485 (register 4005) before Master mode is selected.

To return the RS-485 interface to the Slave *mode,* select the desired serial interface mode from the device menu: Mbus 485 → Mode → Slave.

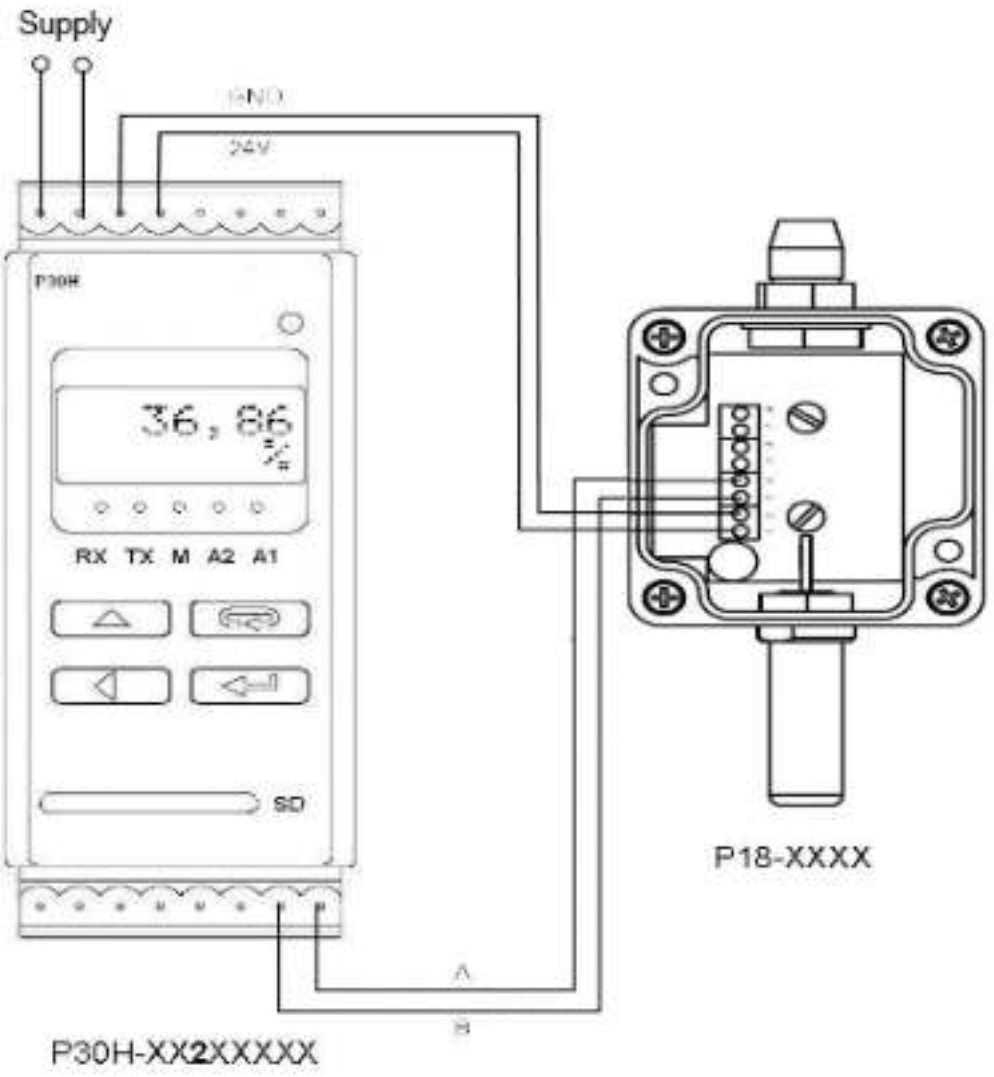



*Fig. 23 Example: P30H transducer in Master mode used to read and store temperature from external transducer.*

### 5.9.5 Interface RS-485 Monitor mode

RS-485 interface can operate in Monitor mode, allowing for monitoring RS-485 network traffic and react to particular response register of the selected device. P30H has to share the communication parameters with monitored devices. Serial interface Monitor mode is

enabled by selecting the following mode from menu: Mbus 485 → Mode → Monitor or entering the value “1” to register 4042. In the Monitor mode, configure the following parameters in Mbus 485 menu:

Table 35

| Item | Modbus | |
|---|---|---|
| 1 | Address | Monitored device address |
| 2 | ModeUnit | Transmission mode of a link |
| 3 | Baudrate | Baud rate |
| 4 | Base.Reg | Base - monitored - register number |
| 5 | ValType | Type of monitored values |
| 6 | AnswTime | Maximum response time of monitored device [ms] |

Parameters 4 - 6 can also be configured via RS-485 (registers 4048-4052) before Monitor mode is selected. After the Monitor mode is selected, transducer cannot be queried by *Master* device.

As in the Master mode, monitored registers are copied to the register range 8000...8049. First monitored register is copied to register 8000 and can be treated as the main displayed value. If the parameter No.ofVal > 1 then values of the subsequent monitored registers are put in the subsequent registers from the range 8000...8049. For example, third monitored register is to be displayed, it is necessary to set the Display → Disp.Reg parameter to „8002” or enter the „8002” value into register 4024.

To return the RS-485 interface to Slave mode, select proper serial interface mode from the menu: Mbus 485 → Mode → Slave.

### 5.9.6 Map of the registers

In the P30H transducer, data are placed in 16-bit and 32-bit registers. Process variables and transducer parameters are placed in the register address area in a way depending on the variable value type. Bits in 16-bit registers are numbered from the youngest to the oldest (b0 … b15). The 32-bit registers (4 bytes) contain numbers of float type in IEEE-754 standard. Bytes sequence: B3 B2 B1 B0 – the oldest byte is transmitted as the first. 16-bit registers representing 32-bit values on two subsequent registers are duplicated in another address area wit the following byte sequence: B1 B0 B3 B2 (tab. 36).

A register map of P30H transducer is shown below.

**Caution:** All listed addresses are physical addresses. Some computer programs use logic addressing, then the addresses should be increased by 1.

Table 36

| Address range | Value type | Description |
|---|---|---|
| 0 - 0140 | integer (16 bits) | The value is located in the 16-bit register (reserved) |
| 4000 - 4127 | integer (16 bits) | The value is located in the 16-bit register. |
| 4300 - 4325 | integer (16 bits) | The value is located in the 16-bit register. |
| 4500 - 4764 | integer (16 bits) | The value is located in the 16-bit register. |
| 6000-6198 | float (32 bits) | Value set in the two following 16-bit registers. These registers contain the same data as 32-bit registers from 7500 range. Readout registers. Bytes sequence (B1,B0,B3,B2) |

| | | |
|---|---|---|
| 7000-7198 | float (32 bits) | Value set in the two following 16-bit registers. These registers contain the same data as 32-bit registers from 7500 range. Readout registers. Bytes sequence (B3,B2,B1,B0) |
| 6200 - 6337 | float (32 bits) | Value set in the two following 16-bit registers. These registers contain the same data as 32-bit registers from 7600 range. Write and readout registers. Bytes sequence (B1,B0,B3,B2) |
| 7200-7337 | float (32 bits) | Value set in the two following 16-bit registers. These registers contain the same data as 32-bit registers from 7600 range. Write and readout registers. |
| 7500-7599 | float (32 bits) | The value is located in the 32-bit register. Registers are only for readout. |
| 7600-7668 | float (32 bits) | The value is located in the 32-bit register. The registers can be written and readout. |
| 8000-8049 | float (32 bits) | The value is located in the 32-bit register. The registers can be written and readout. |
| 8100-8199 | float (32 bits) | Value set in the two following 16-bit registers. These registers contain the same data as 32-bit registers from 8000 range. Write and readout registers. Bytes sequence (B3,B2,B1,B0) |
| 8200-8299 | float (32 bits) | Value set in the two following 16-bit registers. Registers contain the same data as 32-bit registers from the area 8000. The registers can be written and readout. Bytes sequence (B1,B0,B3,B2) |

## 5.9.7 Registers for writing and readout

Table 37

| The value is located in the 16-bit registers | Symbol | Write (w)/readout (r) | Range | Default value | Description |
|---|---|---|---|---|---|
| 4000 | VoltRang | w/r | 0...3 | 0 | |
| | | | | | Value: Range of voltage input<br>0: 12 V<br>1: 48 V<br>2: 100 V<br>3: 250V |
| 4001 | Rst.Coun | w/r | 0...1 | 0 | Timer reset<br>Value: Description<br>0: no changes<br>1: Timer reset |
| 4002 | DemandTm | w/r | 0...3 | | Averaging time for avarage values P, U, I<br>Value:<br>0: 15-minute moving window, value not synchronized with the clock<br>1: 15-minute moving window, value synchronized with the clock<br>2: 30-minute moving window, value synchronized with the clock<br>3: 60-minute moving window, value synchronized with the clock |
| 4003 | Averag. | | | | Averaging time of the instantaneous values U, I, P<br>0: No averaging, value based on 8 intervals<br>1: 200ms<br>2: 500ms<br>3: 1s<br>4: 3s<br>5: 5s |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | 6 | 10s |
| 4004 | Syn.Time | w/ r | 0...1 | 0 | Selection of timer synchronization | |
| | | | | | Value | |
| | | | | | 0 | Timer off |
| | | | | | 1 | Timer permanently on |
| | | | | | 2 | Counter tiggering with current threshold – when current value > value in register 7619 |
| 4005 | I direct | w/ r | 0...1 | 0 | Current direction | |
| | | | | | Value | |
| | | | | | 0 | Normal |
| | | | | | 1 | Reversed |
| 4006.. 4007 | | | | | RESERVED | |
| 4008 | Clear En | w/ r | 0...4 | 0 | Energy counters erasing | |
| | | | | | 0 | No change |
| | | | | | 1 | Resetting the imported energy counter |
| | | | | | 2 | Resetting the exported energy counter |
| | | | | | 3 | Resetting the capacitive counter |
| | | | | | 4 | Reset of all counters |
| 4009 | Rest. AV | w/ r | 0...1 | 0...1 | Resetting the P, S, I average | |
| | | | | | 0 | No change |
| | | | | | 1 | Resetting average values |
| 4010 | TempMeas | w/ r | 0...2 | | Temperature measurement activation | |
| | | | | | 0 | without temperature measurement |
| | | | | | 1 | measurement on the RS-485 interface operating in Master mode (register 8000) |
| | | | | | | |
| 4011 | | | | | Reserved Wire resitance value for temperature measurement *100 | |
| 4012 | DeltTime | w/ r | | | Selecting the time to indicate the differences in voltages and currents (delta U, delta I) | |
| | | | | | 5 s | The time interval in |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | determining the delta voltages and currents – 5 s |
| | | | | | 30 s | The time interval in determining the delta voltages and currents – 30 s |
| | | | | | 1 min | The time interval in determining the delta voltages and currents – 1 min |
| | | | | | 5 min | The time interval in determining the delta voltages and currents – 5 min |
| | | | | | 15 min | The time interval in determining the delta voltages and currents – 15 min |
| 4013.... ..4015 | | w/ r | | | RESERVED | |
| 4016 | | w/ r | 0...3 | 0 | Reseting maximum and minimum value | |
| | | | | | Value | Description |
| | | | | | 0 | no change |
| | | | | | 1 | reseting minimum values |
| | | | | | 2 | reseting maximum values |
| | | | | | 3 | reseting maximum and minimum values |
| 4017 | | w/ r | 0...1 | 0 | Transducer status resetting | |
| | | | | | Value | Description |
| | | | | | 0 | no change |
| | | | | | 1 | status resetting |
| 4018 | | | | | | |
| 4019 | Bckl.Int | w/ r | 1...10 | 7 | Value | Description |
| | | | | | 1 | Intensity of LCD display panel illumination – 10% of max. illumination |
| | | | | | ... | |
| | | | | | 10 | Intensity of LCD display panel illumination – 100% of max. illumination |
| 4020 | | | | | | |
| 4021 | | | | | RESERVED | |
| 4022 | Backlight | w/ | 0.....61 | 61 | LCD display panel illumination | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | r | | | Value | Description |
| | | | | | 0 | Disabled |
| | | | | | 1...60 | Disabled for 1...60 s |
| | | | | | 61 | Permanently enabled |
| 4023 | | | | | RESERVED | |
| 4024 | Disp.Reg | w/r | 0....65535 | 7509 | Number of the register displayed on the lower display line (to display float type register value within the 16-bit registers input corresponding number of the 32-bit register) | |
| 4025 | | w/r | 0...1 | 0 | Resetting of the alarm signal support on LED (A1, A2) | |
| 4026 | Param.A1 | w/r | 0...14 | 0 | Input value controlling the alarm 1 | |
| | | | | | Value | Description |
| | | | | | 0 | Register values 7500 - voltage |
| | | | | | 1 | Register values 7501 – current |
| | | | | | 2 | Register values 7502 – power |
| | | | | | 3 | Register values 7503 |
| | | | | | ... | .... |
| | | | | | 11..13 | reserved |
| | | | | | 14 | Register values 7514 - temperature |
| | | | | | 15 | Second value displayed |
| | | | | | 16 | Clock |
| | | | | | | |
| 4027 | Type A1 | | | 0 | Alarm 1 type (description – Fig. 12) | |
| | | | | | Value | Description |
| | | | | | 0 | n-on |
| | | | | | 1 | n-off |
| | | | | | 2 | on |
| | | | | | 3 | off |
| | | | | | 4 | h_on |
| | | | | | 5 | h_off |
| 4028 | DlyOnA1 | w/r | 0...900 | 0 | Alarm 1 activation delay time (s) | |
| 4029 | DlyOffA1 | w/r | 0...900 | 0 | Alarm 1 deactivation delay time (s) | |

| | | | | | |
|---|---|---|---|---|---|
| 4030 | OnLockA1 | w/r | 0...900 | 0 | Alarm 1 re-activation delay time (s) |
| 4031 | SgKeepA1 | w/r | 0...1 | 1 | Alarm 1 signalization latch (LED flashing) |
| | | | | Value | Description |
| | | | | 0 | Latch disabled |
| | | | | 1 | Latch enabled |
| 4032 | | w/r | | | RESERVED |
| 4033 | Param.A2 | w/r | 0...14 | 0 | Input value controlling the alarm 2 |
| | | | | Value | Description |
| | | | | 0 | Register values 7500 - voltage |
| | | | | 1 | Register values 7501 – current |
| | | | | 2 | Register values 7502 – power |
| | | | | 3 | Register values 7503 |
| | | | | .. | .. |
| | | | | 14 | Register values 7514 - temperature |
| | | | | 15 | Second value displayed |
| | | | | 16 | Clock |
| 4034 | Type A2 | | | 0 | Alarm 2 type (description – Fig. 12) |
| | | | | Value | Description |
| | | | | 0 | n-on |
| | | | | 1 | n-off |
| | | | | 2 | on |
| | | | | 3 | off |
| | | | | 4 | h_on |
| | | | | 5 | h_off |
| 4035 | DlyOnA2 | w/r | 0...900 | 0 | Alarm 2 activation delay time (s) |
| 4036 | DlyOffA2 | w/r | 0...900 | 0 | Alarm 2 deactivation delay time (s) |
| 4037 | OnLockA2 | w/r | 0...900 | 0 | Alarm 2 re-activation delay time (s) |
| 4038 | SgKeepA2 | w/r | 0...1 | 1 | Alarm 2 signalization latch (LED flashing) |
| | | | | Value | Description |
| | | | | 0 | Latch disabled |
| | | | | 1 | Latch enabled |

| | | | | | | |
|---|---|---|---|---|---|---|
| 4039... 4041 | | w/ r | | | RESERVED | |
| 4042 | Mode | w/ r | 0...2 | 0 | Interface RS-485 operating mode | |
| | | | | | 0 | The transducer serves as Slave on the RS485 line, waiting for the queries and responds if they are addressed |
| | | | | | 1 | The transducer monitors the traffic on the RS485 line and reacts to data exchange between the external devices working as Master and Slave |
| | | | | | 2 | Transducer uses Master function on the RS-485 link, sends queries and analyzes responses received from the Slave device |
| 4043 | Address | w/ r | 0...247 | 1 | Transducer address for RS-485 interface. Entering the value "0" disables the function. | |
| 4044 | ModeUnit | w/ r | 0...3 | 0 | Interface RS-485 transmission mode | |
| | | | | | 0 | RTU 8N2 |
| | | | | | 1 | RTU 8E1 |
| | | | | | 2 | RTU 8O1 |
| | | | | | 3 | RTU 8N1 |
| 4045 | BaudRate | w/ r | 0...7 | 1 | RS-485 interface baud rate | |
| | | | | | Value | Description |
| | | | | | 0 | 4800 bit/s |
| | | | | | 1 | 9600 bit/s |
| | | | | | 2 | 19200 bit/s |
| | | | | | 3 | 38400 bit/s |
| | | | | | 4 | 57600 bit/s |
| | | | | | 5 | 115200 bit/s |
| | | | | | 6 | 230400 bit/s |
| | | | | | 7 | 256000 bit/s |
| 4046 | Mast.Fun | w/ r | 0....1 | 0 | Modbus protocol function used by the transducer working with RS-485 interface in Master mode | |
| | | | | | 0 | function 0x03 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | 1 | function 0x04 |
| 4047 | No.OfErr | w/r | 0...10 | 2 | Allowed number of errors in the RS-485 interface Master mode | |
| 4048 | AnswTime | w/r | 10...5000 | 1000 | Maximum time until response in serial interface Master and Monitor modes [ms] | |
| 4049 | ValType | w/r | 0...12 | 6 | Type of values queried/monitored in serial interface Master or Monitor mode | |
| | | | | | char 8 | Register type *char* (8 bits signed) |
| | | | | | uchar 8 | Register type *unsigned char* (8 bits unsigned) |
| | | | | | short 16 | Register type *short* (16 bits signed) |
| | | | | | ushort16 | Register type *unsigned short* (16 bits unsigned) |
| | | | | | long 32 | Register type *long* (32 bits signed) |
| | | | | | ulong 32 | Register type: *unsigned long* (32 bits unsigned) |
| | | | | | flt 32 | Register type *char* (32 bits, signed variable comma) |
| | | | | | sflt2x16 | Register type: swapped *float,* value in two 16-bit registers (byte sequence 3,2,1,0) |
| | | | | | flt 2x16 | Register type: *float,* value in two 16-bit registers (byte sequence 1,0,3,2) |
| | | | | | lng 2x16 | Register type *long,* value in two 16-bit registers (32 bits signed, byte sequence 1,0,3,2) |
| | | | | | slng2x16 | Register type *swapped long,* value in two 16-bit registers (32 bits signed, byte sequence 3,2,1,0) |
| | | | | | ulng2x16 | Register type *unsigned long,* value in two 16-bit registers (32 bits unsigned, byte sequence 1,0,3,2) |
| | | | | | uSln2x16 | Register type *unsigned swapped long,* value in two |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | 16-bit registers (32 bits unsigned, byte sequence 3,2,1,0) |
| 4050 | Base.Reg | w/r | 0...65535 | 7510 | Number of the base register queried/monitored in the RS-485 interface Master or Monitor mode | |
| 4051 | No.ofVal | w/r | 0...50 | 1 | Number of values queried/monitored in serial interface Master or Monitor mode | |
| 4052 | Interv. | w/r | 1...36000 | 10 | Query period for the device in RS-485 Master mode | |
| 4053 | | w/r | 0...1 | 0 | Transmission parameters update. It uses the entered settings of RS-485 interface. | |
| 4054 | Language | w/r | 0...3 | 0 | Transducer language menu: | |
| | | | | | Value | Description |
| | | | | | 0 | Polish |
| | | | | | 1 | English |
| 4055 | Fabr.Par | w/r | 0...1 | 0 | Standard parameters saving | |
| | | | | | Value | Description |
| | | | | | 0 | No change |
| | | | | | 1 | Standard parameters setting |
| 4056 | Security | w/r | 0...9999 | 0 | Password for parameters setting | |
| | | | | | Value | Description |
| | | | | | 0 | No change |
| | | | | | ... | Enters the parameters setting menu after accepting the correct password. |
| 4057 | Time | w/r | 0...2359 | - | Current time – hours, minutes | |
| | | | | | This parameter is given in ggmm format, where:<br>gg - stands for hours, mm – stands for minutes.<br>Entering incorrect value (out of range) results in setting the value 23 for hours and 59 for minutes. After the save is completed, register 4055 (seconds) is zeroed. | |
| 4058 | | w/r | 0...60 | - | Current time – seconds | |
| 4059 | | r | 0...100 | - | Current time – 1/100 second | |
| 4060 | Date | w/ | 101...12 | - | Current date in month*100 + day format | |

<table>
<tr><td></td><td></td><td>r</td><td>31</td><td></td><td colspan="2"></td></tr>
<tr><td>4061</td><td></td><td>w/r</td><td>2001...2099</td><td>-</td><td colspan="2">Current year in YYYY format.</td></tr>
<tr><td rowspan="4">4062</td><td rowspan="4"></td><td rowspan="4">w/r</td><td rowspan="4">0...1</td><td rowspan="4">0</td><td colspan="2">Automatic DST and inversely</td></tr>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>Off</td></tr>
<tr><td>1</td><td>On</td></tr>
<tr><td>4063</td><td></td><td>w/r</td><td></td><td></td><td colspan="2">RESERVED</td></tr>
<tr><td rowspan="11">4064</td><td rowspan="11">Arch.Val</td><td rowspan="11">w/r</td><td rowspan="11">0...65535</td><td rowspan="11">0</td><td colspan="2">Selecting archived values<br>**Caution:** *change of register value will result in deletion of the internal memory archive!*</td></tr>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0x0001</td><td>Bit 1 – registry 7500 value registration</td></tr>
<tr><td>0x0002</td><td>Bit 2 – registry 7501 value registration</td></tr>
<tr><td>0x0004</td><td>Bit 3 – registry 7502 value registration</td></tr>
<tr><td>0x0008</td><td>Bit 4 – registry 7503 value registration</td></tr>
<tr><td>..</td><td>..</td></tr>
<tr><td></td><td>Second value displayed</td></tr>
<tr><td>0x7FFF</td><td>Registration of register value 7500...7514 + second displayed value</td></tr>
<tr><td rowspan="12">4065</td><td rowspan="12">Param.Ar</td><td rowspan="12">w/r</td><td rowspan="12">0...16</td><td rowspan="12">0</td><td colspan="2">Value controlling conditional archiving trigger</td></tr>
<tr><td>Value</td><td>Description</td></tr>
<tr><td>0</td><td>Register values 7500 - voltage</td></tr>
<tr><td>1</td><td>Register values 7501 – current</td></tr>
<tr><td>2</td><td>Register values 7502 – power</td></tr>
<tr><td>3</td><td>Register values 7503 – reactive power</td></tr>
<tr><td>..</td><td>..</td></tr>
<tr><td>11...13</td><td>reserved</td></tr>
<tr><td>14</td><td>Register values 7514 - temperature</td></tr>
</table>

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | 15 | Second value displayed |
| | | | | | 16 | Clock |
| 4066 | Ar. Mode | w/r | 0...5 | 5 | Archiving type (description – Fig. 18) | |
| | | | | | Value | Description |
| | | | | | 0 | n-on |
| | | | | | 1 | n-off |
| | | | | | 2 | on |
| | | | | | 3 | off |
| | | | | | 4 | h_on |
| | | | | | 5 | h_off |
| 4067 | Ar. Time | w/r | 1...3600 | 10 | Archiving period in seconds | |
| 4068 | Ar.Erase | w/r | 0...1 | 0 | Deleting an internal archive | |
| 4069 | Rec.ToSD | w/r | 0...1 | 0 | Saving of the internal archive to SD/SDHC card | |
| | | | | | Value | Description |
| | | | | | 0 | No action |
| | | | | | 1 | Start of internal archive saving to SD/SDHC card |
| 4070 | | w/r | 0...1 | 0 | Decimal point selection for archive files | |
| | | | | | Value | Description |
| | | | | | 0 | comma |
| | | | | | 1 | dot |
| 4071.... ..4077 | | w/r | | | RESERVED | |
| | | | | | | |
| 4078 | SaveFile | w/r | 0...2 | 0 | Value | Description |
| | | | | | 0 | No action |
| | | | | | 1 | Transducer configuration saving to ***P30H_PAR.CON*** file on the external SD/SDHC card or in the file system internal memory |
| | | | | | 2 | Transducer configuration readout from ***P30H_PAR.CON*** file on the external SD/SDHC card or in the file system internal memory |

| | | | | | |
|---|---|---|---|---|---|
| 4079 | | w/r | | - | RESERVED |
| 4080 | EthStdPa | w/r | 0...1 | 0 | Setting the new parameters of Ethernet interface<br>Value: Description<br>0: No change<br>1: Restoring the default parameters of Ethernet interface |
| 4081 | addrIP32 | w/r | 0...65535 | 49320 | The third and the second byte (B3.B2) of the IP address of the transducer, the IPv4 address format: B3.B2.B1.B0 |
| 4082 | addrIP10 | w/r | 0...65535 | 286 | The first and zero byte (B1.B0) of the IP address of the transducer, the IPv4 address format: B3.B2.B1.B0 |
| 4083 | mask 32 | w/r | 0...65535 | 65535 | The third and the second byte (B3.B2) of the transducer subnet mask, mask format: B3.B2.B1.B0 |
| 4084 | mask 10 | w/r | 0...65535 | 65280 | The first and zero byte (B1.B0) of the transducer subnet mask, the mask format: B3.B2.B1.B0 |
| 4085 | MAC 54 | r | 0...65535 | - | The fifth and fourth byte (B5.B4) of the transducer MAC address, format B5:B4:B3:B2:B1:B0 |
| 4086 | MAC 32 | r | 0...65535 | - | The third and the second byte (B3.B2) of the transducer MAC address, format B5:B4:B3:B2:B1:B0 |
| 4087 | MAC 10 | r | 0...65535 | - | The first and zero byte (B1.B0) of the transducer MAC address, format B5:B4:B3:B2:B1:B0 |
| 4088 | Gate 32 | w/r | 0...65535 | 49320 | The third and the second byte (B3.B2) of the transducer default gateway, the gateway address format: B3.B2.B1.B0 |
| 4089 | Gate 10 | w/r | 0...65535 | 257 | The first and zero byte (B1.B0) of the transducer default gateway, the gateway address format: B3.B2.B1.B0 |
| 4090 | DHCP | w/r | 0...1 | 1 | Enabling/disabling the DHCP Client (supports automatic obtaining of IP protocol parameters of the transducer Ethernet interface from external DHCP servers in the same LAN)<br>Value: Description<br>0: DHCP disabled - you should |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | manually configure the IP address and subnet mask of the transducer; |
| | | | | | 1 | DHCP enabled, the transducer will automatically receive the IP address, subnet mask, and gateway address from the DHCP server when switching the supply on or selecting ReInitEt option from the menu or entering the value "1" to the register 4099; the gateway address is the address of the server that assigned the parameters to the transducer; |
| | | | | | | |
| 4091 | 10/100Mb | w/r | 0...2 | 0 | Baud rate of the Ethernet interface: | |
| | | | | | Value | Description |
| | | | | | 0 | Automatic selection of the baud rate |
| | | | | | 1 | 10 Mb/s |
| | | | | | 2 | 100 Mb/s |
| 4092 | p.comFTP | w/r | 20... 65535 | 21 | FTP server commands port number | |
| 4093 | Port FTP | w/r | 20... 65535 | 1025 | FTP server data port number | |
| 4094 | no.c.TCP | w/r | 1...4 | 4 | The maximum simultaneous connections to Modbus TCP/IP service | |
| 4095 | TimeMbus | w/r | 10...600 | 60 | Port closing time of Modbus TCP/IP service, in seconds | |
| 4096 | AddrmTCP | w/r | 0...255 | 1 | Device address for Modbus TCP/IP protocol | |
| 4097 | PortMbus | w/r | 0... 65535 | 502 | Modbus TCP port number | |
| 4098 | PortHTTP | w/r | 80...65535 | 80 | Web server port number | |
| 4099 | ReInitEt | w/r | 0...1 | 0 | Saving the new parameters and initiate Ethernet interface | |
| | | | | | Value | Description |
| | | | | | 0 | No change |
| | | | | | 1 | Saving the new parameters and |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | initiate Ethernet interface |
| | | | | | | |
| 4100 | ParamAn1 | w/r | 0..16 | 7 | Input value controlling the analog output 1 | |
| | | | | | Value | Description |
| | | | | | 0 | Register values 7500 - voltage |
| | | | | | 1 | Register values 7501 – current |
| | | | | | 2 | Register values 7502 – power |
| | | | | | 3 | Register values 7503 |
| | | | | | .. | .. |
| | | | | | 14 | Register values 7514 - temperature |
| | | | | | 15 | Second value displayed |
| | | | | | 16 | Clock |
| 4101 | OverSer1 | w/r | 0...1 | 0 | Analog output 1overrun support | |
| | | | | | Value | Description |
| | | | | | 0 | Off |
| | | | | | 1 | On |
| 4102 | OvOutLo1 | w/r | 0...24000 | 0 | Output 1 lower overrun value x1000 | |
| 4103 | OvOutHi1 | w/r | 0...24000 | 20000 | Output 1 upper overrun value x1000 | |
| 4104 | OvrOutL1 | w/r | 0...24000 | 0 | Output 1 expected value when its lower limit is exceeded x1000 | |
| 4105 | OvrOutH1 | w/r | 0...24000 | 0 | Output 1 expected value, when its upper limit x1000 is exceeded | |
| 4106 | Param.A2 | w/r | 0..16 | 0 | Input value controlling the analog output 2 (option) | |
| | | | | | Value | Description |
| | | | | | 0 | Register values 7500 - voltage |
| | | | | | 1 | Register values 7501 – current |
| | | | | | 2 | Register values 7502 – power |
| | | | | | 3 | Register values 7503 |
| | | | | | .. | .. |
| | | | | | 14 | Register values 7514 - temperature |
| | | | | | 15 | Second value displayed |
| | | | | | 16 | Clock |

| | | | | | |
|---|---|---|---|---|---|
| 4107 | OverSer2 | w/r | 0...1 | 0 | Analog output 2 overrun support<br>Value: Description<br>0: Off<br>1: On |
| 4108 | OvOutLo2 | w/r | 0...24000 | 0 | Output 2 lower overrun value x1000 |
| 4109 | OvOutHi2 | w/r | 0...24000 | 20000 | Output 2 upper overrun value x1000 |
| 4110 | OvrOutL2 | w/r | 0...24000 | 0 | Output 2 expected value, when its lower limit x1000 is exceeded |
| 4111 | OvrOutH2 | w/r | 0...24000 | 0 | Output 2 expected value, when its upper limit x1000 is exceeded |
| 4112... 4127 | | w/r | | | RESERVED |

Table 38

| The value is located in the 16-bit registers. | Write (w)/readout (r) | Range | Default value | Description |
|---|---|---|---|---|
| 4500 | w/r | 0...7712 | 0 | Number of the memory page being accessed. Page number saving |
| 4501 | r | 0...65535 | - | First two bytes from the page indicated by 4500 register. |
| 4502 | r | 0...65535 | - | Two subsequent bytes |
| --- | --- | --- | - | --- |
| 4764 | r | 0...65535 | - | Two last bytes of a memory page (bytes 526 and 527) |

Table 39

| Value set in the two following 16-bit registers. Registers contain 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 | Default value | Description |
|---|---|---|---|---|---|---|
| 6200/7200 | 7600 | OverLoA1 | w/r | -9.9999e13 ...99999e13 | 0 | Alarm 1 lower limit |
| 6204/7202 | 7601 | OverHiA1 | w/r | -9.9999e13 ...99999e13 | 20 | Alarm 1 upper limit |
| 6206/7204 | 7602 | OverLoA2 | w/r | -9.9999e13 ...99999e13 | 0 | Alarm 2 lower limit |
| 6208/7206 | 7603 | OverHiA2 | w/r | -9.9999e13 ...99999e13 | 20 | Alarm 2 upper limit |
| 6210/7208 | 7604 | OverLoAr | w/r | -9.9999e13 ...99999e13 | 0 | Lower limit of conditional archiving |
| 6212/7210 | 7605 | OverHiAr | w/r | -9.9999e13 ...99999e13 | 20 | Upper limit of conditional archiving |
| 6214/7212 | 7606 | AnIn Lo1 | w/r | -9.9999e13 ...99999e13 | 0 | Individual characteristic of analog output 1- lower limit of the controlling value |
| 6214/7214 | 7607 | AnIn Hi1 | w/r | -9.9999e13 ...99999e13 | 100 | Individual characteristic of analog output 1 - upper limit of controlling value |
| 6214/7216 | 7608 | AnOutLo1 | w/r | 0...24 | 0 | Individual characteristic of analog output 1- lower limit of the controlling value |
| 6218/7218 | 7609 | AnOutHi1 | w/r | 0...24 | 20 | Individual characteristic of analog output 1- upper limit of the controlling value |
| 6220/7220 | 7610 | AnIn Lo2 | w/r | -9.9999e13 ...99999e13 | 0 | Individual characteristic of analog output 2- lower |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | limit of the controlling value |
| 6222/7222 | 7611 | AnIn Hi2 | w/r | -9.9999e13 ...99999e13 | 100 | Individual characteristic of analog output 2 - upper limit of controlling value |
| 6224/7224 | 7612 | AnOutLo2 | w/r | 0...24 | 0 | Individual characteristic of analog output 2- lower limit of the controlling value |
| 6226/7226 | 7613 | AnOutHi2 | w/r | 0...24 | 20 | Individual characteristic of analog output 2- upper limit of the controlling value |
| 6228.. 6235/7228 ..7235 | 7614... 7617 | | | | 0 | RESERVED |
| 6236/7236 | 7618 | Param.SD | w/r | 0.05 … 95 | 50 | The percentage of the internal archive space used which triggers automatic writing on SD/SDHC card |
| 6238/7238 | 7619 | CurrThrs | w/r | -99999G ...99999G | | Current threshold above which time is counted |
| 6240/7240 | 7620 | Primar.U | w/r | 0.0001... 99999G | | Input voltage (inculded when calculating the rescaling ratio) |
| 6242/7242 | 7621 | Second.U | w/r | 0.0001... 99999G | | Output voltage (included when calculating the rescaling ratio) |
| 6244/7244 | 7622 | Shunt I | w/r | 0.0001... 99999G | | Shunt nominal current |
| 6246/7246 | 7623 | Shunt mV | w/r | 0.0001... 99999G | | Voltage corresponding to the shunt nominal current [mV] |
| 6248... 6258/ 7248... 7258 | 7624... 7629 | | | | | RESERVED |

Table 40

| Value set in the two following 16-bit registers. Registers contain the same data as 32-bit registers from the area 8000. | The value is located in the 32-bit registers. | Write (w)/ readout (r) | Quantity name |
|---|---|---|---|
| 8100/8200 | 8000 | w/r | The value of the 1st register readout by the transducer operating in serial interface Master or Monitor mode |
| 8102/8202 | 8001 | w/r | The value of the 2nd register readout by the transducer operating in serial interface Master or Monitor mode |
| 8104/8204 | 8002 | w/r | The value of the 3rd register readout by the transducer working in serial interface Master of Monitor mode |
| 8106...8197 / 8206...8297 | 8003... ...8049 | | The value of the nth register readout by the transducer operating in serial interface Master or Monitor mode |
| 8198/8298 | 8049 | w/r | The value of the 50th register readout by the transducer operating in serial interface Master or Monitor mode |

## 5.9.8 Registers for readout

Table 41

| The value is located in the 16-bit registers. | Write (w)/readout (r) | Range | Description | |
|---|---|---|---|---|
| 4300 | r | 0...9999 | Software version * 100 | |
| 4301 | r | 0...9999 | Bootloader version * 100 | |
| 4302 | r | 0...65535 | Status no. 1 of the transducer. Describes the current status of the transducer. Successive bits represent the event. Bit set to 1 indicates that the event took place. The events can be only deleted. | |
| | | | Bit15 31 | Loss of the calibration parameters |
| | | | Bit14 30 | Real Time Clock – loss of settings – battery |

| | | | | |
|---|---|---|---|---|
| | | | | failure |
| | | | Bit13 29 | Clock – daylight saving on/off |
| | | | Bit12 28 | No communication with data memory |
| | | | Bit11 27 | Invalid settings |
| | | | Bit10 26 | Default settings restored |
| | | | Bit9 25 | |
| | | | Bit8 24 | Internal archive communication error |
| | | | Bit7 23 | Archive parameters error |
| | | | Bit6 22 | |
| | | | Bit5 21 | Internal archive 100% full |
| | | | Bit4 20 | Reset to default settings necessary |
| | | | Bit3 19 | |
| | | | Bit2 18 | not used |
| | | | Bit1 17 | not used |
| | | | Bit0 16 | not used |
| 4303 | r | 0...65535 | Status no. 2 of the transducer. Describes the current status of the transducer. Successive bits represent the event. Bit set to 1 indicates that the event took place. The events can be only deleted. | |
| | | | Bit15 | not used |
| | | | Bit14 | not used |
| | | | Bit13 | not used |
| | | | Bit12 | not used |
| | | | Bit11 | not used |
| | | | Bit10 | not used |
| | | | Bit9 | not used |
| | | | Bit8 | not used |
| | | | Bit7 | not used |
| | | | Bit6 | Overrun of output 1 enabled |
| | | | Bit5 | LED2 – Alarm signal no. 2. |
| | | | Bit4 | LED1 – Alarm signal no. 1. |
| | | | Bit3 | not used |
| | | | Bit2 | not used |
| | | | Bit1 | State of the alarm 2 relay. |
| | | | Bit0 | State of the alarm 1 relay. |
| 4304 | r | 0...5 | Memory card status | |

| | | | Value | Description |
|---|---|---|---|---|
| | | | 0 | No card |
| | | | 1 | The card inserted but not installed (uninstalled). |
| | | | 2 | Card inserted but the attempt failed. |
| | | | 3 | The card inserted, installed correctly but write-protected. The card is uninstalled automatically when write-protection is detected. |
| | | | 4 | The card inserted and installed. |
| | | | 5 | The card inserted and installed but full. |
| | | | 6 | Card being installed |
| 4305 | r | | Measurement status | |
| | | | bit 0...6 | reserved |
| | | | bit 7 | „1” - voltage signal lower than measurement threshold |
| | | | bit 8 | „1” - current signal lower than measurement threshold |
| | | | bit 9 | „1” - voltage signal higher than measurement threshold |
| | | | bit 10 | „1” - current signal higher than measurement threshold |
| | | | bit 11...15 | reserved |
| 4306 | r | | Ethernet interface status | |
| | | | bit 0 | „1” transducer equipped with the Ethernet system |
| | | | bit 1 | „1” - automatic link parameter negotiation ongoing |
| | | | bit 2 | „1” - automatic negotiation successfully completed |
| | | | bit 3 | „1” - connection completed successfully |
| | | | bit 4 | „1” - connection parameters acquired from DHCP server |
| | | | bit 5 | „1” - connection parameter should be refreshed by DHCP server |
| | | | bit 6 | „1” - Ethernet interface cables successfully connected |
| | | | bit 7 | „1” - FTP connection successfully completed |
| | | | bit 8 | „1” - Ethernet interface in energy saving mode |

| | | | | |
|---|---|---|---|---|
| | | | bit 9 | reserved |
| | | | bit 10 | „1” - Ethernet interface clock - correct operation<br>„0” - no signal for Ethernet interface clock |
| | | | bit11...bit 15 | reserved |
| 4307 | r | | reserved | |
| 4308 | r | | Production status 1 | |
| | | | Bit15 ... Bit0 | Serial number (1...99999) |
| 4309 | r | | Production status 2 | |
| | | | Bit15 … Bit12 | RESERVED |
| | | | Bit11 … Bit6 | Year of production (0...63) |
| | | | Bit5 … Bit0 | Month of production (0...12) |
| 4310 | r | | Production status 3 | |
| | | | Bit15 … Bit14 | „01” - high power<br>„10” - low power |
| | | | Bit13 … Bit11 | „01” - output no. 2 – N/O relay<br>„10” - output no. 2 – out Power 24 VDC |
| | | | Bit10 … Bit8 | „001” - output no. 2 – N/O relay<br>„010” - output no. 2 – analog current output<br>„011” - output no. 2 – analog voltage output |
| | | | Bit7 … Bit5 | „000” – accessories – no ext. SD slot, no Ethernet<br>„001” – accessories - ext. SD slot, no Ethernet<br>„010” – accessories - Ethernet interface with internal memory |
| | | | Bit4 … Bit3 | „001” - voltage output in 100 VAC range<br>„010” - voltage output in 230 VAC range |
| | | | Bit2 … Bit0 | reserved |
| 4311 | r | | Production status 4 | |
| | | | Bit15 … Bit7 | reserved |
| | | | Bit6 | „0” - Polish language version<br>„1” - English language version |
| | | | Bit5 … Bit0 | reserved |
| 4312 | r | 0...8192 | Memory page indicating start of archive | |

| | | | | |
|---|---|---|---|---|
| 4313 | r | 0...8192 | Memory page indicating end of archive | |
| 4314 | r | 0...527 | Byte indicating start of archive. Register value indicates the byte on the archive start page marking the start of archive. | |
| 4315 | r | 0...527 | Byte indicating end of archive. Register value indicates the subsequent byte where the archive record will be written. | |
| 4316.. ...4329 | | | RESERVED | |
| 4330 | r | 0...65535 | Imported energy, 2 older bytes | Value type **long**, [0,1*kW], 4 unfeigned bytes (0…199999999) |
| 4331 | r | 0...65535 | Imported energy, 2 younger bytes | |
| 4332 | r | 0...65535 | Exported energy, 2 older bytes | Value type **long**, [0,1*kW], 4 unfeigned bytes (0…99999999) |
| 4333 | r | 0...65535 | Exported energy, 2 younger bytes | |
| 4334 | r | 0...65535 | Sum of energy (imported and exported), 2 older bytes | Value type **long**, [0,1*kW], 4 unfeigned bytes (0…199999999) |
| 4335 | r | 0...65535 | Sum of energy (imported and exported), 2 younger bytes | |
| 4336 | r | 0...65535 | Capacity, 2 older bytes | Value type **long**, 4 feigned bytes [0,1*kAh] (-49999999 … 49999999) |
| 4337 | r | 0...65535 | Capacity, 2 younger bytes | |
| 4338 | r | 0...65535 | Timer [s], 2 older bytes | Value type **long**, 4 unfeigned bytes [s] (0...999999999) |
| 4339 | r | 0...65535 | Timer [s], 2 younger bytes | |
| 4340 | r | 0...65535 | Difference of energy (imported and exported), 2 older bytes | Value type **long**, 4 feigned bytes [0,1*kWh] (- 99999999 … 99999999) |
| 4341 | r | 0...65535 | Difference of energy (imported and exported), 2 younger bytes | |

**Example for reading of energy values from registers 43xx – reading of energy difference (imporeted and exported) (registers 4340, 4341) – positive value**

values read from the registers are:

reg. 4340 →hexadecimal value: 0x027A (2 older value bytes)

reg. 4341 → hexadecimal value: 0xF3E0 (2 younger value bytes)
we make 4 bytes value (feigned total value):
hexadecimal value: 0x027AF3E0 → decimal value: 41612256
[0,1*kWh] = 4 161 225,6 [kWh]

**Example for reading of energy values from registers 43xx – reading of energy difference (imporeted and exported) (registers 4340, 4341) – negative value**
values read from the registers are:
reg. 4340 →hexadecimal value: 0xFF44 (2 older value bytes)
reg. 4341 → hexadecimal value: 0x00BB (2 younger value bytes)
we make 4 bytes value (feigned total value):
**hexadecimal value: 0xFF4400BB → decimal value: -12320581**
**[0,1*kWh] = -1 232 058,1 [kWh]**

Table 42

| Value set in the two following 16-bit registers. Registers contain the same data as 32-bit registers from the area 7500. | The value is located in the 32-bit registers. | Name | Write (w)/readout (r) | Unit | Quantity name |
|---|---|---|---|---|---|
| 6000/7000 | 7500 | U | r | V | Voltage |
| 6002/7002 | 7501 | I | r | A | Current |
| 6004/7004 | 7502 | P | r | W | power |
| 6006/7006 | 7503 | dU | r | V | Delta voltage in the time interval |
| 6008/7008 | 7504 | dI | r | A | Delta current in the time interval |
| 6010/7010 | 7505 | t [s] | r | s | Timer in seconds |
| 6012/7012 | 7506 | t [H.M] | r | | Timer in hours, minutes |
| 6014/7014 | 7507 | C | r | Ah | Capacity |

| | | | | | |
|---|---|---|---|---|---|
| 6016/7016 | 7508 | PAV | r | W | Average power 15, 30, 60 minutes |
| 6018/7018 | 7509 | UAV | r | V | AverageVoltage 15, 30, 60 minutes |
| 6020/7020 | 7510 | IAV | r | A | Avarage current 15, 30, 60 minutes |
| 6022/7022 | 7511 | | | | Reserved |
| 6024/7024 | 7512 | | | | Reserved |
| 6026/7026 | 7513 | | | | Reserved |
| 6028/7028 | 7514 | T | r | C | Temperature (optional) |
| 6030/7030 | 7515 | $E_{P}\leftarrow$ | o | Wh | Imported energy (0... 99,999 G ) |
| 6032/7032 | 7516 | $E_{P}\rightarrow$ | o | Wh | Exported energy (0... 99,999 G ) |
| 6034/7034 | 7517 | $E_{T}$ | o | Wh | Sum of energy (imported and exported) (0... 199,999 G) |
| 6036/7036 | 7518 | C | o | Ah | Capacity (-49,999 G ... 49,999 G ) |
| 6038/7038 | 7519 | En | | Wh | Difference of energy (imported and exported) (-99,999 G ... 99,999 G ) |
| 6040/7040 | 7520 | $E_{P}\leftarrow$ | r | 100 MWh | Imported energy (no. of register 7521 overflows, resets to 0 after reaching 99999999.9 kWh) |
| 6042/7042 | 7521 | $E_{P}\leftarrow$ | r | kWh | Imported energy (counter counting up to 99999.9 kWh) |
| 6044/7044 | 7522 | $E_{P}\rightarrow$ | r | 100 MWh | Exported energy (no. of register 7523 overflows, resets to 0 after reaching 99999999.9 kWh) |
| 6046/7046 | 7523 | $E_{P}\rightarrow$ | r | kWh | Exported energy (counter counting up to 99999.9 kWh) |
| 6048/7048 | 7524 | ET | r | 100 MWh | Sum of energy (imported and exported) (no. of register 7525 overflows, resets to 0 after reaching 199999999,9 kWh) |
| 6050/7050 | 7525 | ET | r | kWh | Sum of energy (imported and exported) (counter counting up to 99999,9 kWh) |
| 6052/7052 | 7526 | C | r | 100 MAh | Capacity (no. of register 7527 overflows, resets to 0 after reaching ±49999999,9 kAh) |
| 6054/7054 | 7527 | C | r | kAh | Capacity (counter counting from -99999,9 up to 99999,9 kAh) |
| 6056/7056 | 7528 | En | r | 100 MWh | Difference of energy (imported and exported) (no. of register 7529 overflows, resets to 0 after reaching ±99999999,9 kWh) |

| | | | | | |
|---|---|---|---|---|---|
| 6058/7058 | 7529 | En | r | kWh | Difference of energy (imported and exported) (counter counting from -99999,9 up to 99999,9kWh) |
| 6060/7060 | 7530 | | | | Reserved |
| 6062/7062 | 7531 | | | | Reserved |
| 6064/7064 | 7532 | $U_{MIN}$ | r | V | Minimum voltage |
| 6066/7066 | 7533 | $U_{MAX}$ | r | V | Maximum voltage |
| 6068/7068 | 7534 | $I_{MIN}$ | r | A | Minimum current |
| 6070/7070 | 7535 | $I_{MAX}$ | r | A | Maximum current |
| 6072/7072 | 7536 | $P_{MIN}$ | r | W | Min. power |
| 6074/7074 | 7537 | $P_{MAX}$ | r | W | Max. power |
| 6076/7076 | 7538 | $dU_{MIN}$ | r | V | Delta voltage minimum |
| 6078/7078 | 7539 | $dU_{MAX}$ | r | V | Delta voltage maximum |
| 6080/7080 | 7540 | $dI_{MIN}$ | r | A | Delta current minimum |
| 6082/7082 | 7541 | $dI_{MAX}$ | r | A | Delta current maximum |
| 6084/7084 | 7542 | | | | Reserved |
| 6086/7086 | 7543 | | | | Reserved |
| 6088/7088 | 7544 | | | | Reserved |
| 6090/7090 | 7545 | | | | Reserved |
| 6092/7092 | 7546 | $C_{MIN}$ | r | Ah | Capacity miniumum |
| 6094/7094 | 7547 | $C_{MAX}$ | r | Ah | Capacity maximum |
| 6096/7096 | 7648 | $PDM_{MIN}$ | r | W | power averaged 15, 30, 60 minutes, min. |
| 6098/7098 | 7549 | $PAV_{MAX}$ | r | W | power averaged 15, 30, 60 minutes, max. |
| 6100/7100 | 7550 | $UAV_{MIN}$ | r | V | voltage averaged 15, 30, 60 minutes, min. |
| 6102/7102 | 7551 | $UAV_{MAX}$ | r | V | voltage averaged 15, 30, 60 minutes, max. |
| 6104/7104 | 7552 | $IAV_{MIN}$ | r | A | Current averaged 15, 30, 60 minutes, min. |
| 6106/7106 | 7553 | $IAV_{MAX}$ | r | A | Current averaged 15, 30, 60 minutes, max. |
| 6108/7108 | 7554 | | | | Reserved |
| 6110/7110 | 7555 | | | | Reserved |
| 6112/7112 | 7556 | | | | Reserved |
| 6114/7114 | 7557 | | | | Reserved |

| | | | | | |
|---|---|---|---|---|---|
| 6116/7116 | 7558 | | | | Reserved |
| 6118/7118 | 7559 | | | | Reserved |
| 6120/7120 | 7560 | $T_{MIN}$ | r | C | Temperature min. (optional) |
| 6122/7122 | 7561 | $T_{MAX}$ | r | C | Temperature max. (optional) |
| | | | | | |
| 6124...6139 / 7124...7139 | 7562 ...7569 | | | | RESERVED |
| 6140/7140 | 7570 | ID | r | - | Constant value identifying the device The value of 196 represents P30H transducer. |
| 6142/7142 | 7571 | Status | r | - | Register describing current transducer state - register value 4302 „Status no. 2”. |
| 6144/7144 | 7572 | Output 1 actuated | r | % | The register linked to the analog output 1 activation. |
| 6146/7146 | 7573 | Output 2 actuated | r | % | The register linked to the analog output 2 activation. |
| 6148/7148 | 7574 | Output 3 actuated | r | % | The register linked to the analog output 3 activation. |
| 6150/7150 | 7575 | Displayed value | r | - | Currently displayed value |
| 6152/7152 | 7576 | Displayed value multiplier | r | - | Exponent of displayed value multiplier |
| 6154/7154 | 7577 | Current time | r | - | Current time |
| 6156/7156 | 7578 | Date - year | r | YYYY | Current date - year |
| 6158/7158 | 7579 | Month, day | r | MMDD | Current date – month, day |
| 6160/7160 | 7580 | Archive fill rate | r | % | Current internal archive memory fill rate |
| 6162/7162 | 7581 | | r | - | reserved |
| 61647164 | 7582 | Second value displayed | r | | Value displayed on lower LCD line - any register value |
| 6166/7166 | 7583 | | r | | Free space on SD/SDHC card (kB), value „-1” means no card installed |

| | | | | | |
|---|---|---|---|---|---|
| 6168/7168 | 7584 | | r | | Total space on SD/SDHC card (kB), value „-1” means no card installed |
| 6170...6172 / 7170...7172 | 7585... 7586 | | | | RESERVED |
| 6174/7174 | 7587 | Analog value | r | - | Numerical value controlling the analog output 1 of the transducer |
| 6176/7176 | 7588 | Analog value | r | - | Numerical value controlling the analog output 2 of the transducer |
| 6178/7178 | 7589 | Analog value | r | - | Numerical value controlling the analog output 3 of the transducer |
| 6180...6182 / 7180...7182 | 7590...7 591 | | | | RESERVED |
| 6184/7184 | 7592 | Status no. 1 | r | - | Register value 4301 projected onto the floating-point value |
| 6186/7186 | 7593 | Status no. 1 | | | Register value 4302 projected onto the floating-point value |
| 6188/7188 | 7594 | | r | - | RESERVED |
| 6190/7190 | 7595 | | r | | Rescaling value on voltage input |
| 6192/7192 | 7596 | | r | | Rescaling value on current input |
| 6194..6198 /7194..7198 | 7597... 7599 | | | | RESERVED |

**Example for reading of energy values from registers 7520...7529 – reading of energy difference (imporeted and exported) (registers 7528, 7529) – positive value**

values read from the registers are:

reg. 7528 → decimal value (float): 41,0 → no. of register 7529 overflows → N = 41

reg. 7529 → decimal value (float): 61225,6 → counter → C = |61225,6| = 61225,6; energy sign → S „+”

energy value $E_N$= S(N*100 MWh + C) = +(41,0 * 100 * 1000 kWh + 61225,6) = 4 161 225,6 [kWh]

**Example for reading of energy values from registers 7520...7529 – reading of energy difference (imporeted and exported) (registers 7528, 7529) – negative value**

values read from the registers are:

reg. 7528 → decimal value (float): 12,0 → no. of register 7529 overflows → N = 12

reg. 7529 → decimal value (float): -32087,3 → counter → C = |-32087,3| = 32087,3; energy sign → S „-”
energy value$E_N$= S(N*100 MWh + C) = - (12 * 100 * 1000 kWh + 32087,3) = - 1 232 087,3 [kWh]

## 5.10. Ethernet interface 10/100-BASE-T

P30H transducers in P30H-XX2XXXXXX version are equipped with an Ethernet interface for connecting the device (using the RJ45 socket) to the local or global network (LAN or WAN) and using transducer's net services: web server, FTP server, Modbus slave TCP/IP. Configure Ethernet group parameters to use the transducer network services. Standard Ethernet parameters of the transducer are shown in Tab. 15. IP address is the main web parameter of the transducer, by default it is 192.168.1.30, but must set to unique value within a network the device is connected to. The IP address can be assigned to the transducer automatically by the DHCP server present in the network if the transducer has an option to obtain an address from DHCP server enabled: Ethernet → DHCP → On. If the DHCP service is disabled then the transducer will work with the default IP address allowing the user to change the IP address, e.g. from the transducer menu. Every change of transducer's Ethernet parameters requires confirmation of the parameter change, e.g. from Ethernet → ReInitEt → Yes menu or by entering value "1” into register 4099. The Ethernet interface is rebooted in accordance with the new parameters after applying changes - all services of the Ethernet interface are restarted.

**Note:** Transducer allows for up to 4 simultaneous connections! Applications prebuilt in the transducer use 1 or 2 connections:

- modbus TCP/IP - 1 connection
- web server - 1 connection
- FTP server - 2 connections

### 5.10.1 Connecting 10/100-BASE-T interface

Connect the device to a TCP/IP network using the RJ45 socket located at the front of the transducer to access the Ethernet services.

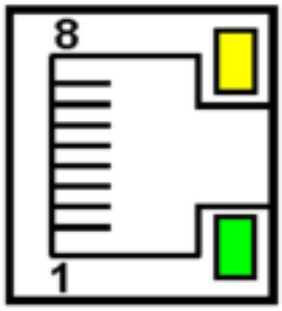



*Fig. 24 View and pin numbering of the RJ45 socket*

RJ45 socket LEDs description:

- yellow LED lights up when the transducer is properly connected to the Ethernet 100 Base-T and is off when the transducer is not connected to a network or is connected to a 10-Base-T.
- green LED Tx/Rx, blinks irregularly whenever the transducer is sending and receiving data, lights up continuously when no data is transmitted

It is recommended to use a twisted pair cable to connect the transducer to the network:

- U/FTP – twisted pair cable with a separate foil for every pair
- F/FTP – twisted pair cable with separate foil for every pair and additional foil shielding for the cable

●S/FTP (former SFTP) – twisted pair cable with separate foil for every pair and additional mesh cable shielding

●SF/FTP (former S-STP) – twisted pair cable with separate foil for every pair and additional mesh and foil cable shielding

The twisted pair cable categories according to the European standard EN 50171 are minimum: Class D (category 5) - for high-speed local area networks, includes the applications using the frequency band up to 100 MHz. Connection was described in Tab. 44. For Ethernet connection use the category 5 STP type twisted-pair cable (shielded) with RJ-45 connector, wiring colors (according to Tab. 43), compliant with the following standards:

●EIA/TIA 568A for both connectors in strike-through connection between P30H and hub or switch,

●EIA/TIA 568A for the first connector and EIA/TIA 568B for the second one in the cross-over connection (i.e. when connecting the P30H transducer to the PC).

Table 43

| Wire no. | Signal | Wire color according to the standard | |
|---|---|---|---|
| | | EIA/TIA 568A | EIA/TIA 568B |
| 1 | TX+ | white-green | white-orange |
| 2 | TX- | green | orange |
| 3 | RX+ | white-orange | white-green |
| 4 | EPWR+ | blue | blue |
| 5 | EPWR+ | white-blue | white-blue |
| 6 | RX- | orange | green |
| 7 | EPWR- | white-brown | white-brown |
| 8 | EPWR- | brown | brown |

### 5.10.2 Web Server

P30H transducer provides its own web server which enables remote monitoring of the measuring values, remote configuration and reading a transducer status. A web page allows in particular to:

- obtain information about the device (serial number, code execution, software version, bootloader version, version (standard or special)
- preview current measuring values
- read a device status
- select the web page language

You can access the web server via web browser by entering the IP address of the transducer, e.g.: http://192.168.1.30 (where 192.168.1.30 is current IP address of the meter). The default web server port is the port "80". The server port can be changed by the user.

**Note:** A browser with JavaScript enabled and compatible with XHTML 1.0 is required for correct operation of the website (all popular browsers, Internet Explorer version 8 minimum).

### 5.10.2.1. General view

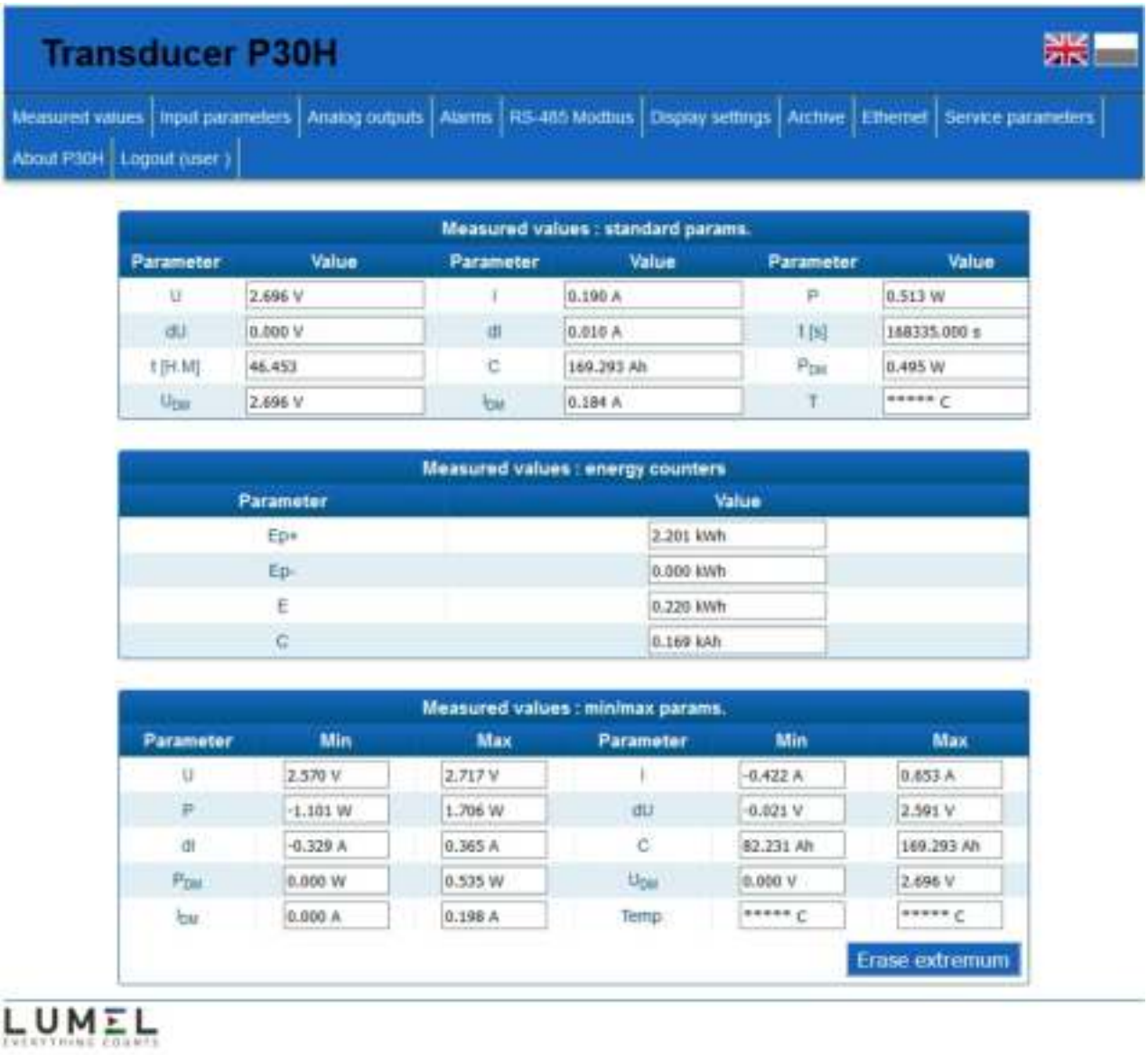



*Fig. 25 Transducer WWW page*

### 5.10.2.2. Web user selection

The transducer has two user accounts for the web server protected by the individual passwords:

- user: „**admin**”, password: „**admin**” - access to the configuration and preview of the parameters
- user: „**user**”, password: „**pass**” - access to parameters preview only.

Entering the transducer IP address into a browser, e.g. http://192.168.1.30 will display a startup website to enter the user name and password.


*Fig.26 View of the transducer web server login window*

The web server user names can not be changed but you can change the password for each user - for safety reasons it is recommended to change the passwords. Changing the password is possible only through a web page in the "Ethernet" parameter group. The passwords can be up to 8 characters. If the password is lost (what disables using the web server), restore the default settings of the Ethernet interface e.g. from the menu: Ethernet → EthStdPa → Yes, or by entering the value "1" to the register 4080. All standard Ethernet interface parameters (see Tab. 15) and the passwords of the FTP server users will be restored: Table 15

user „**admin**” → password: „**admin**”;
user "**user**” → password "**pass**”.

The session lasted five minutes opens when you log in to the web server. After five minutes a user will be automatically logged out

from a web server. The change of the group parameters renews time to expiry of the session.

### 5.10.3 FTP Server

The FTP file sharing protocol has been implemented in the P30H transducers. The transducer acts as a server, allowing the users to access the internal memory of its file system. Access to the files is possible using a computer, a tablet with installed FTP client or other device acting as a FTP client. The standard FTP ports are used for transferring files, "20" - data port and "21" -- commands port. A user can change the port used by the FTP protocol if necessary. Please note, that the port configuration of the FTP server and the client must be the same.

It is recommended to set the FTP client in the passive mode, because the connection is then fully configured by the FTP client (a client chooses the data port). Only one connection at one time can be used for the file transfer, so the maximum number of a FTP client connections should be set to "1".

#### *5.10.3.1. FTP user selection*

The transducer has two FTP server user accounts protected by individual passwords:

- user: „**admin**”, password: "**admin**” - access to read and write the files
- user: „**user**”, password: "**passftp**” - access to read only the archive files.

The FTP user names can not be changed but you can change the password for each user - for safety reasons it is recommended to change the passwords. Changing the password is possible only through a web page in the "Ethernet" parameter group. The passwords can be up to 8 characters. If the password is lost (what disables using the FTP server), restore the default settings of the Ethernet interface e.g. from the menu: Ethernet → EthStdPa → Yes, or by entering the value "1" to the register 4080. All standard Ethernet interface parameters (see Tab. 15) and the passwords of the FTP server users will be restored: Table 15

user „**admin**" → password: „**admin**";
user "**user**" → password "**passftp**".

Internet browser can be used as a rudimentary FTP client. By entering the IP address of transducer with the "ftp" header into the address field, e.g.: ftp://192.168.1.30 it is possible to browse and download archive files from the Internet browser directly.

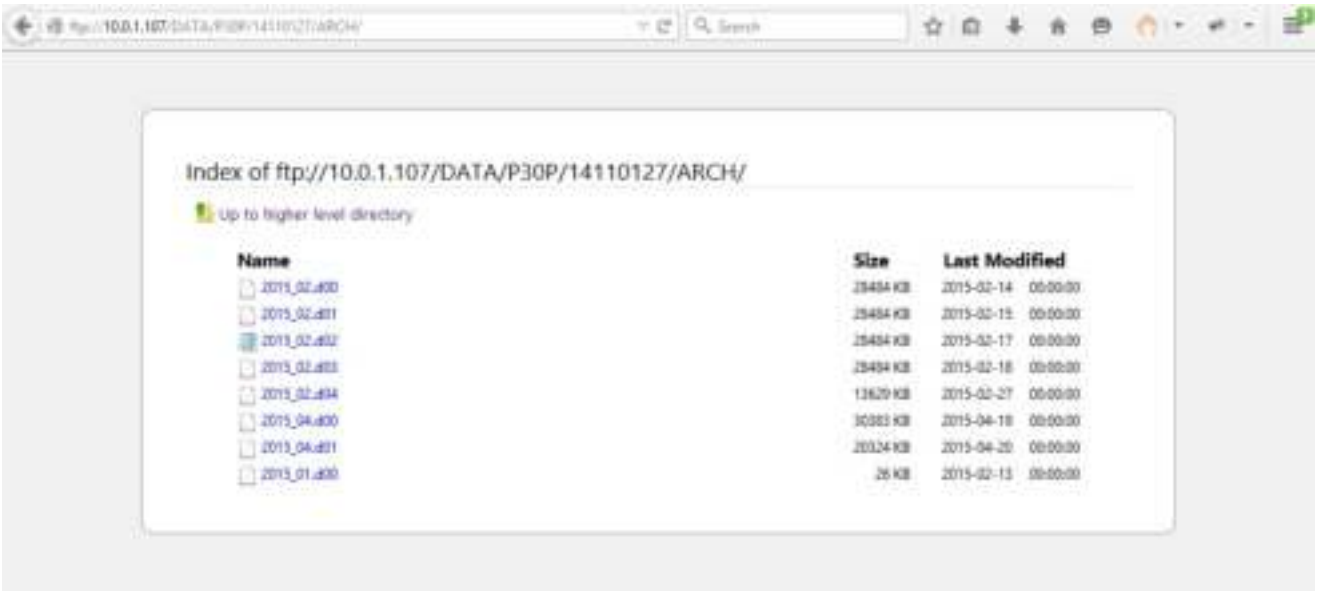



*Fig. 27 View of the FTP session in browser window*

### 5.10.4 Modbus TCP/IP

P30H transducers allow access to the internal registers via the Ethernet interface and Modbus TCP/IP Slave protocol. Modbus protocol functions and register structure are described in section 5.9.3 - 5.9.6. It is necessary to set the unique IP address of the transducer and the connection parameters listed in Tab.44 to set up a connection.

Table 44

| Symbol | Description | Default value |
|---|---|---|
| AddrmTCP | Device address for Modbus TCP/IP protocol | 1 |
| PortMbus | Modbus TCP port number | 502 |
| TimeMbus | Port closing time of Modbus TCP/IP service [s] | 60 |
| no.c.TCP | The maximum simultaneous connections to Modbus TCP/IP service | 2 |

Device address ( Ethernet → AddrmTCP) is Modbus TCP/IP protocol device address and is not identical to the corresponding value of Modbus RS-485 protocol (Mbus 485 → Address). When AddrmTCP parameter is set to „255”, the transducer will skip address analysis in the Modbus protocol frame (announce mode).

# 6. Accessories

## 6.1. Memory card

In case of the transducer version P30H-XX1XXXXXXX using SD/SDHC cards, it is possible to order industrial-grade SD cards with the capacity suited to the user's needs, as shown in the table below. **It is not recommended to use commercial-grade cards** due to high parameter differences and short life span.

Table 45

| Item | Order code | Capacity |
|---|---|---|
| 1 | 20-199-00-00023 | 1 GB |
| 2 | 20-199-00-00025 | 2 GB |

## 6.2. Additional resistor D5

If there is a need to measure voltages higher than 300V, D.C. one must use an external additional resistor type D5-1XX (600V) or D5-2XX (1000V). The additional resistor D5 is intended for mounting on 35mm DIN according to EN 60715.

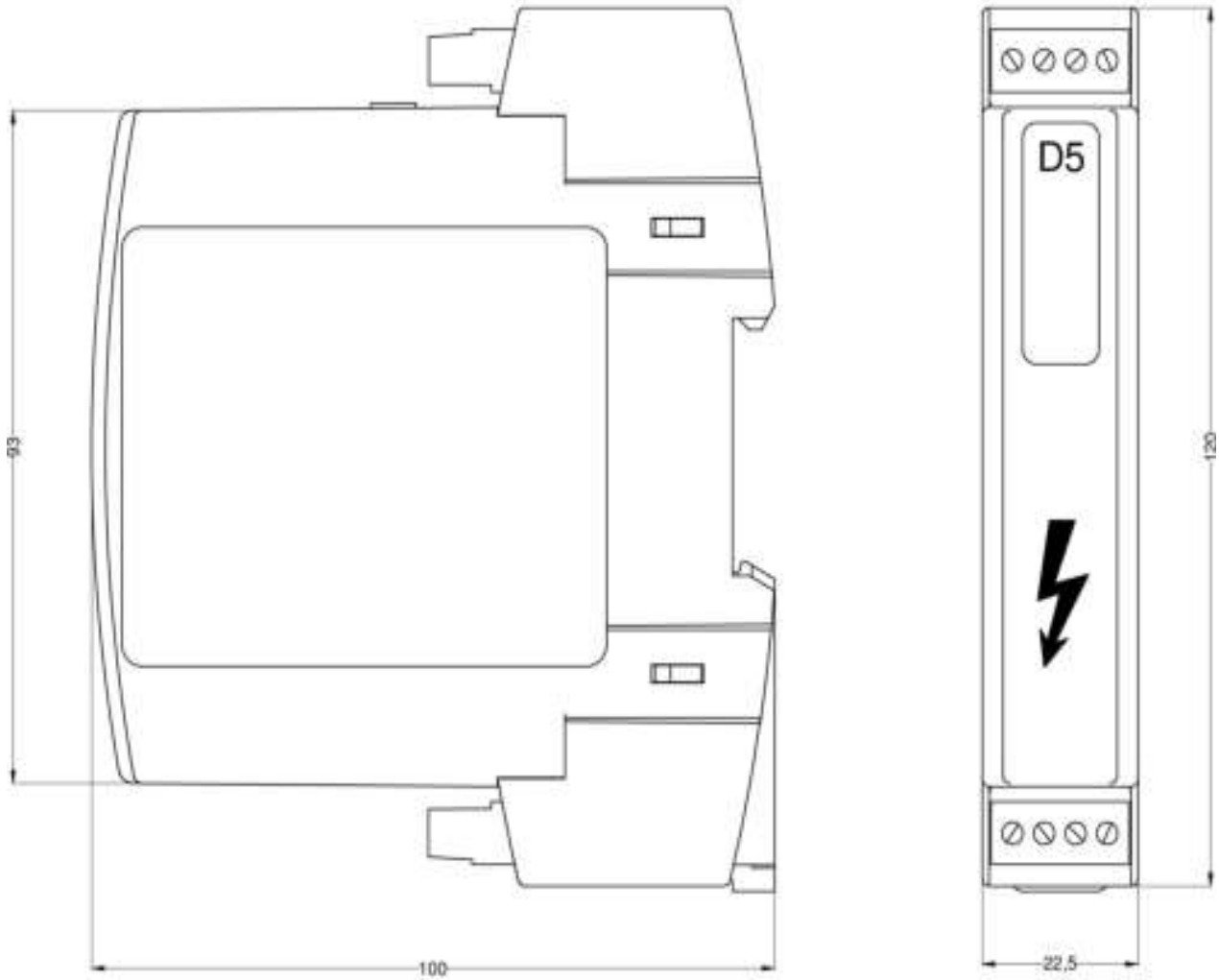



*Fig. 28 External dimensions of additional resistor D5*

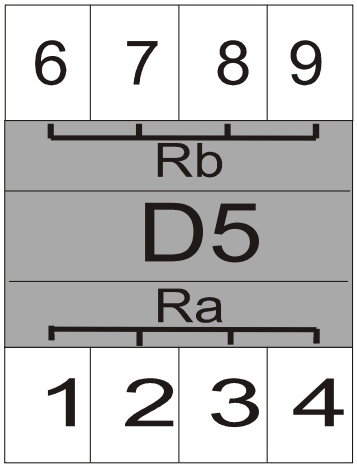



*Fig. 29 Connection diagram of additional resistor D5*

Terminal no 1…4 of slot Ra and terminals no. 5…8 of slot Rb, are internally shorted. Electrical connections must be perfomed with wires from 0.14 up to 1.5 $mm^2$ cross-section.

Connections of P30H and additional resitor shows figure 28.

To obtain the measurement class equal to P30H transducer's class it should be ordered D5\/XX1 additional resisotr version - then the resistor is scaled in a set with the transducer. Ordering codes for the additional resistor is shown in table 3 below.

**Technical data:**

- accuracy class 0.5;
- ambient temperature -25..23..+55 °C
- storage temperature -30..+70 °C
- humidity 25..95 % (inadmissible condensation)
- working position any
- external dimensions 22.5 x 120 x 100 mm

- weight 0.1 kg
- resistance 1.5 MΩ ( D5-2XX)
  0.75 MΩ ( D5-1XX)

Table 46

| Additional resistor D5 | X | XX | X | X |
|---|---|---|---|---|
| Mesuring range in set with transducer P30H | | | | |
| 600 V | 1 | | | |
| 1000 V | 2 | | | |
| Version | | | | |
| Standard | | 00 | | |
| Custom-made | | XX | | |
| Language | | | | |
| Polish | | | P | |
| English | | | E | |
| other | | | X | |
| Acceptance tests | | | | |
| Without extra requirement | | | | 0 |
| With an extra quality inspection certificate | | | | 1 |
| Acc. to customer's request | | | | X |

***Order example:***

**D5-200E1** means additional resistor *D5 for measuring range 1000 V, standard version,in English, with an extra quality inspection certificate.*

# 7. Error codes

During the transducer's operation, various error messages might be displayed on the display. The table below lists the error codes which are possible to be displayed and their reasons as well as the recommended user responses.

Table 47

| Message | Description |
|---|---|
| Err FRAM Service | Calibration parameters memory error - send the transducer for maintenance, message blocks the display of measured values |
| Err DF | Archive internal memory error - measurement archiving is not possible, transducer can operate, it is recommended to send the transducer for maintenance; message does not block the display of measured values – it is displayed in cycles. |
| Err Cal. | No calibration parameters - send the transducer for maintenance, message does not block the display of measured values – it is displayed in cycles. |
| Err Batt Service | Real Time Clock battery voltage too low – RTC settings will be deleted after the transducer is powered off, transducer can operate, it is recommended to send the transducer for battery change; message does not block the display of measured values – it is displayed in cycles, setting of date or time turns the message off. |
| Err Par. | Parameters error – transducer settings error, return to factory defaults, transducer can operate but it is not recommended until the factory settings are reverted, message does not block the display of measured values – it is displayed in cycles |
| Error File | Attempt to read the file from external SD/SDHC or file system internal memory failed – no file present, or invalid file format, transducer can operate, message does not block the display of measured values – it is cycled approx. every 20 seconds. |

# 8. Technical data

## Input:

Table 48

| Measured value | | Nominal range $K_U$=1, $K_I$=1000 | Measuring range (maximal) | Class |
|---|---|---|---|---|
| Voltages (input resistance 500kΩ) U, dU, $U_{AV}$ | VoltRang | | | |
| | 12V | −4 … 12 V | -5...15 V | 0.2 |
| | 48V | −4 … 48 V | -10...57.6 V | |
| | 100V | −5 … 100 V | -10...120 V | |
| | 250V | −5 … 250 V | -10 … 300 V | |
| | 600V* | −10 … 500 V | -10 … 600 V | 0.2 + class of additional resistor |
| | 1000V* | −10 … 1000 V | -10 ...1000 V | |
| Currents (shunt voltage) (input resistance 250kΩ) I, dI, $I_{AV}$ | | −15000 … 15000 A (−150 … 150 mV) | -18000 … 18000 A (-180 … 180 mV) | 0.2+ shunt class (voltage measurement 0.2) |
| Timer t[s] t[H.M] | | 0...999999999 s 0...277777.5 h.m | | 1s/ 24h, resolution 1 s |
| Capacity C | | -49 999 999 … 49 999 999 kAh | | ±0.5 % |
| Power P, $P_{AV}$ | 12V | -60…180 kW | -75…225 kW | 0.4 + shunt class |
| | 48V | -60…720 kW | -150…864 kW | |
| | 100V | -0,075…1,5 MW | -0,15…1,8 MW | |
| | 250V | -0,075…3,75 MW | -0,15…4,5 MW | |
| | 600 V* | -0,15…7,5 MW | -0,3…9 MW | 0.4 + class of additional resistor + shunt class |
| | 1000 V* | -0,3…15 MW | -0,6…18 MW | |
| | | | | |

| | | |
|---|---|---|
| Imported energy $E_{P\leftarrow}$ Exported energy $E_{P\rightarrow}$ | 0 ... 99 999 999.9 kWh | ±0.5 % + shunt class |
| Sum of energy (imported and exported) $E_T$ | 0 ... 199 999 999.9 kWh | ±1 % + shunt class |
| Difference of energy (imported and exported) $E_n$ | -99 999 999.9 ... 99 999 999.9 kWh | ±1 % + shunt class |
| | | |
| **$K_U$ -** voltage ratio (Primar U / Second U), **$K_I$ –** current ratio ( Shunt I / Shunt mV, $K_I$ = 100 000 eg.For shunt 15 000 A/ 150mV) | | |
| * - in set with additional resistor D5 ($K_U \neq 1$) | | |

The maximum range display of measured values on the LCD display are -99999G ... 99999G. These ranges depend upon the size parameters of the primary and secondary voltage divider and the shunt ratio (parameters Primar.U, Second.U, Shunt I, Shunt mV).

## Outputs:

### Main analog output OUT1

- analog, programmable, galvanically isolated
- * current $I_{OUT}$ = 0/4...20 mA, load resistance ≤ 500 Ω; or
- * voltage $U_{OUT}$ 0...10 V, load resistance ≥ 500 Ω,
- analog output class 0.1;
- processing time < 200 ms
- overload 1.2 $I_{OUT,}$ or 1.2 $U_{OUT,}$

**Additional analog output (OUT2, interchangeably with relay output)**

- 1 analog output (interchangeably with alarm output)

* current $I_{OUT}$ = 0/4...20 mA, load resistance ≤ 250 Ω; or
* voltage $U_{OUT}$ 0...10 V, load resistance ≥ 500 Ω,

- class 0.5
- processing time < 500 ms
- overload 1.1 $I_{OUT}$, or 1.1 $U_{OUT}$,

**Alarm outputs**

- relay – 1 or 2 relays; volt-free NO contacts – max. load capacity 5 A 30 VDC, 250 VAC; 100 000 switching cycles

**Digital output – RS-485 interface:**

- transmission protocol: Modbus RTU
- address: 1...247
- mode: 8N2, 8E1, 8O1, 8N1
- baud rate: 4800, 9600, 19200, 38400, 57600, 115200, 230400, 256000 b/s
- max. response time: 200 ms [1]
- min. interval between successive queries 5 ms

**Ethernet interface: 10/100-Base-T**

- max. simultaneous connections 4

**Power output**

- auxiliary supply (optional - interchangeably with alarm output A2) 24 VDC / 30 mA.

**Power consumption** <5 VA

**Weight** < 0.25 kg

**Dimensions** 120 x 45 x 100 mm

**Fixing** 35 mm rail acc. to EN 60715

**Protection grade ensured by the housing**

from housing side (version without a support of SD/SDHC cards) IP40

from housing side (version with a support of SD/SDHC cards) IP30

from terminals side IP20

**Readout field** LCD text display 2x8 characters with LED illumination

**Preheating time of the transducer** 15 min

[1]the response time can be extended to 500 ms while writing data to the SD card

**Registration**

Registration to the internal memory of 4MB (max. 534336 records) - registration with time stamp, ordering versions with the external SD/SDHC card slot allow for automatic saving the internal archive to the SD/SDHC card; ordering versions with Ethernet interface and file system internal memory allow for automatic saving the internal archive into files.

**Reference and rated operating conditions**

- supply voltage 85...253 V a.c (40..400 Hz)., 85...300 V d.c. or 20..40 V a.c.(40..400 Hz), 20...60 V d.c.
- ambient working temperature -25..23..+55 °C
- storage temperature -30..+70 °C

- humidity 25...95% (no condensation)
- working position any

**Short-term overload (5s)**

- voltage input (terminals 1,3) 1,5Un ($Un_{MAX}$ = 250V)
- current input (terminals 3,4) 20Un ($Un_{MAX}$ = 0,15V)

**Additional errors:**

- from temperature changes: for analog output 50% of class / 10 K
  for measuring inputs 100% of class / 10 K

**Standards compliance:**

**Electromagnetic compatibility:**

- Noise immunity acc. to EN 61000-6-2
- Noise emission acc. to EN 61000-6-4

**Safety requirements:**

according to EN 61010-1 standard

- isolation between circuits (P30H-X0XXXXXX, P30H-X1XXXXXX):

 - increased between input circuits (terminals 1-4) and remaining circuits (60s/3.51 kV a.c.) for input voltages up to 300 V d.c.

 - basic between input circuits (terminals 1-4) and remaining circuits (60s/3.51 kV a.c.) for input voltages from the range 300...1000 V d.c. (measurement with use of additional resistor D5)

 - basic between all remaining circuits (1min/2.21kV d.c.)

- isolation between circuits (P30H-X2XXXXXX,):

 - increased between input circuits (terminals 1-4) and remaining circuits (60s/3.51 kV a.c.) for input voltages from the range 300...1000 V d.c. (measurement with use of additional resistor D5)

- basic between all remaining circuits (1 min/2.21 kV d.c.) ), save for ordering version:

P30H-X2X2XXXXX– isolation between power output 24 VDC (terminals 11, 12) and Ethernet slot (60s/1.4 kVAC)

- Installation categorie
  - III for input voltage up to 300 V d.c.,
  - III for input voltage 300…600 V d.c. with additonal resistance D5,
  - II for input voltage 600…1000 V d.c. with additonal resistance D5
- pollution grade 2,
- maximum phase-to-earth operating voltage: 300 V for supply and measurement circuits and 50 V for other circuits.
- altitude a.s.l. < 2000

# 9. Ordering code

Table 49

| P30H transducer | X | X | X | X | X | X | XX | X | X |
|---|---|---|---|---|---|---|---|---|---|
| Analog output OUT1 | | | | | | | | | |
| current (0/4...20 mA) | | 1 | | | | | | | |
| voltage (0...10 V) | | 2 | | | | | | | |
| Optional accessories | | | | | | | | | |
| none | | | 0 | | | | | | |
| Slot of the external memory SD/SDHC | | | 1 | | | | | | |
| Ethernet interface with internal memory file system | | | 2 | | | | | | |
| Output OUT2 | | | | | | | | | |
| Relay A1, 5A 30V d.c., 250V a.c. | | | | 1 | | | | | |
| Analog current output (0/4...20 mA) | | | | 2 | | | | | |
| Analog voltage output (0...10 V) | | | | 3 | | | | | |
| Output OUT3 | | | | | | | | | |
| Relay A2, 5A 30V d.c., 250V a.c. | | | | | 1 | | | | |
| Power output 24 V d.c. / 30 mA. | | | | | 2 | | | | |
| Supply | | | | | | | | | |
| 85...253 V a.c., 85...300 V d.c. | | | | | | 1 | | | |
| 20...40 V a.c., 20...60 V d.c. | | | | | | 2 | | | |
| Version | | | | | | | | | |
| standard | | | | | | | 0 | | |
| custom-made * | | | | | | | XX | | |
| Language | | | | | | | | | |
| Polish | | | | | | | | P | |
| English | | | | | | | | E | |
| other | | | | | | | | X | |
| Quality inspection tests | | | | | | | | | |
| Without extra requirements | | | | | | | | | 0 |
| Quality inspection certificate | | | | | | | | | 1 |
| Acc. to customer’s request | | | | | | | | | X |

*as per agreement with the manufacturer

## ***Code example:***

**P30H-111210E1** *The code means transducer in standard version with analog current output, with external SD/SDHC card, with relay alarm no.1, with power output 24 V/30mA, with supply 85...235 V a.c./d.c., in English, with an extra quality inspection certificate.*

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P30H-09B