Operating Instructions

CE

Ht100

Multichannel Meter

Ht100, 08/04, soft 5.01/rev. 1

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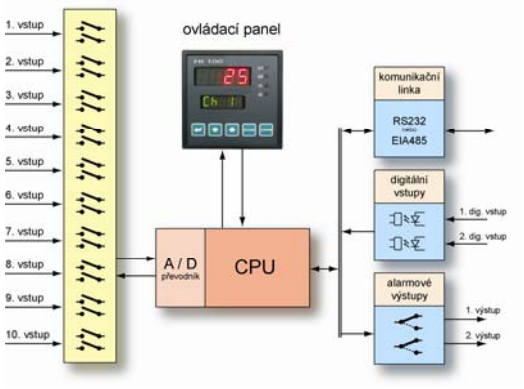
1 Important Information at the Start

The **Ht100** multi-channel metering device is intended for the measurement of up to 10 process-bound current or voltage signals, obtained from thermocouples. The device is designed for installation into panel, with front-side frame of 96x96 mm size.

The multi-channel meter is capable of measuring the following input signals:

- thermocouple inputs type J, K, T, E, N, R, S, B, C, D, or
- process-bound voltage inputs for signals within the range of 0 to 5 V, 1 to 5 V, 0 to 10 V, or
- process-bound current inputs for signals within the range of 0 to 20 mA, 4 to 20 mA.

The inputs are separated each from the other by galvanic separation.



The meter can be equipped with:

- the RS232 or EIA485 communication line with the MODUS RTU protocol,
- a pair of digital inputs,
- one or two relay outputs,
- data logger to log the measured values, of logging capacity of either 1000 or 2000 measurements

The meter features an easy operation. After having been set the parameters can be locked, which prevents them against overwriting.

The Ht100 meter can be arranged in groups. During the installation and commissioning it is recommended to proceed as follows:

You are the final user, your meter has already been installed and adjusted by the supplier

If you are the final user you get the meter with parameters already adjusted. You get the access to only those parameters you need for your work. In the course of getting familiarized with the device focus your attention to the following sections:

- ***Basic Terms*** - here the operation of the pushbuttons, displays and other components is explained
- ***Basic State*** – this section describes the basic operation state of the meter.
- ***User Level*** – here you find information about parameters that the user has access to, and the basic properties of the meter.

Your job is to carry out the complete installation process and adjustment of the device

In such a case proceed in accordance with instructions in the following chapters:

- ***Installation*** – this chapter describes the installation of the meter in the panel.
- ***Basic Principles of Installation, Sources of Interference*** – we recommend to observe the installation principles described in this section.
- ***Wiring Diagrams*** – explanation of the wiring diagram of the meter.

Adhere to the instructions given and carry out the installation, wiring connections and basic adjustment of the device. Further and optional functions of the device and its mode of control are explained in the subsequent chapters.

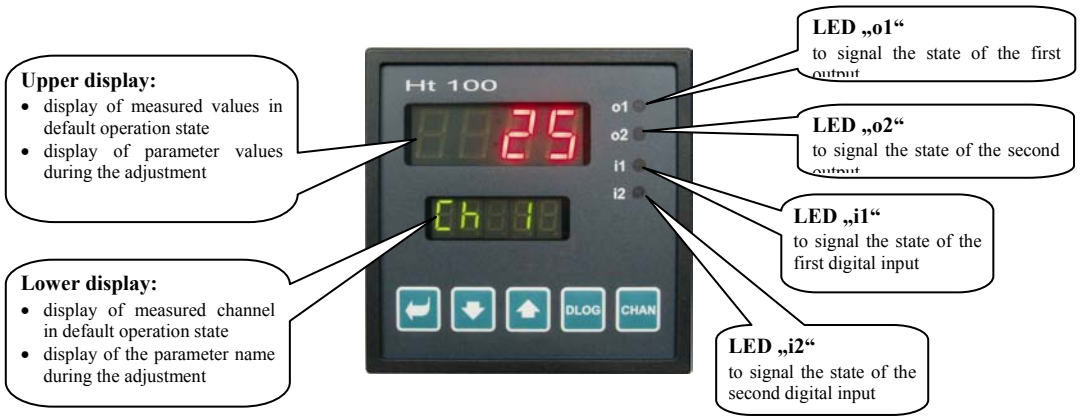
2 Basic Terms

To provide for a trouble-free operation and easy working with the meter the user is obliged to make himself familiarize with the operating instructions, the parameter adjustment etc.

2.1 Meter Control

The meter panel includes two display units and four LEDs to indicate the operating state of the outputs and digital inputs. The meter is operated via five pushbuttons.

Function of the indication elements



Keyboard Function

Parameters are adjusted using the keyboard. The function of the keys is as follows:

- , key for the adjustment and viewing of parameters at the user, operator, configuration and servicing level. By operating this button the **parameter once adjusted is confirmed**, and the meter proceeds to the following parameter.
- , key for changing the parameter values downwards. The parameter value is a number or an abbreviation composed of four letters, at maximum.
- , key for changing the parameter values upwards.
- DLOG, key used to provide access to the data logger (operative only if the meter is equipped with the data logger).
- CHAN, key for setting the mode of manual switching of channels.

2.2 Informative and Error Messages

The informative and error messages are displayed in the ***Basic State***, only – see page No. 5.

Informative Messages, Upper Display

- `----` … defect of the input sensor, or missing adjustment of the input.

Informative Messages, Lower Display

The blinking informative messages in the lower display can be, as follows:

- `Man` … the multi-channel meter is set in manual switching of the channels displayed.
- `DLoG` … viewing of data in the data logger.

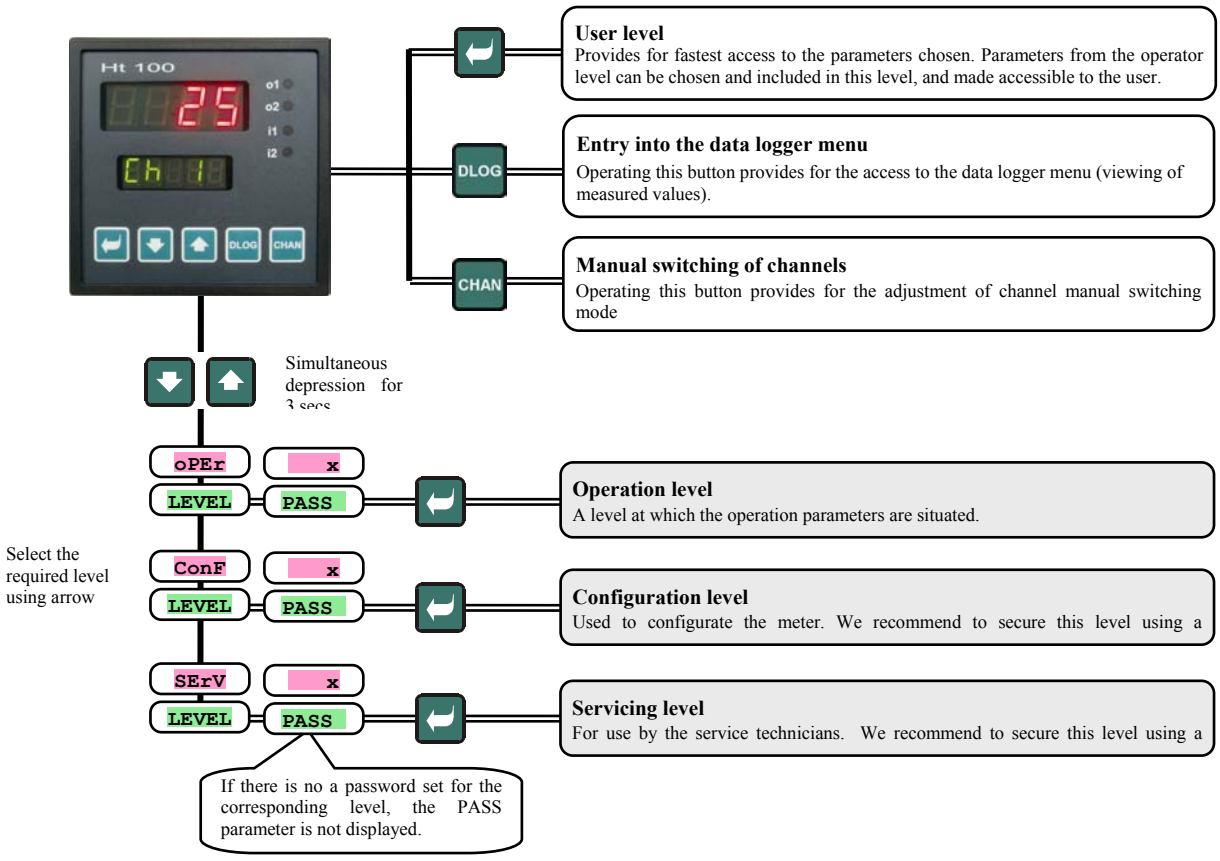
Error Messages, Lower Display

A displayed error message is accompanied with the activation of alarm output. Error messages are displayed in blinking mode in the lower display.

- `Err0` … error of the FLASH program memory. Switch the meter off and switch it on once again. If the problem persists, contact the supplier.
- `Err1` … error of the EEPROM configuration parameters memory. In some cases the defect can be removed by restarting of all parameters at the ***servicing level*** Following the restart the readjustment of the parameters has to take place. This can be done only by users with adequate experience. If the problems persist, contact the supplier.
- `Err2` … error of the data logger memory. This error may appear only during the restart of data logger (memory deletion).
- `Err3` … convertor error. Can be caused by electric impulse at the convertor input, by too low temperature or excessive humidity, and by other reasons. Switch the meter off and on again. If the problems persist, contact the supplier.

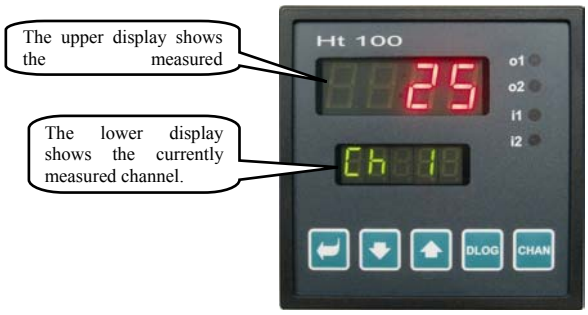
2.3 List of Levels, the Menu

Proper functioning of the meter necessitates to have the parameters properly adjusted. For greater clarity the parameters are classified in groups (levels, and the menu). One level denotes the higher entity (***the configuration level***), menu is a part of the level (menu `In 1`).
The menu structure is shown in the following figure.



3 Basic State of the Meter

The ***Basic State*** adjusts following the activation of powering voltage.
The upper display shows the measured values, the lower display shows the currently measured channel.



Return Back to the Basic State

- Return of the meter back into its ***Basic State*** can be done by the operator by short depression of the  buttons.
- If none of the pushbuttons is operated within 60 seconds, the meter resumes in its ***Basic State.***

Informative and Error Messages

In the basic operation state the information and error messages can twinkle in the lower display. If the letters **Man** are twinkling there, the mode of manual switching of channels has been set. Twinkling of the legend **DLoG** means the operation mode of viewing the values in the data logger was set.
Err0 , **Err1** and **Err3** mean error messages.

4 User Level

The user level provides for quick access for the user to the most common parameters.

User level is entered and passed through by operating the the  pushbutton.
Return back from the user level can be done either by passing through all the parameters or by a short and simultaneous depression of the following pushbuttons  .

The structure of the user level can be freely set and:

- determined what parameters and menu items are to be contained on the user level,
- determined on what position these parameters will be located.
- The displaying of specific parameters is done only if it makes sense to display these.

List of all parameters and menu items on the user level

Display	Procedure
AoFF	**Menu for continuous alarm switch off**. By setting YES and confirmating the option the continuous alarm will be switched off.
CLK ?	**Entry into a menu for setting the real time clock**. The menu is entered by setting YES in the upper display and by confirmating the selection. The menu is described on page 11.
dtPEr	**Period of measured data archivation in the data logger, in minutes.** Scope: 1 to 60 minutes.
dtSto	**Conditions to be met for the archivation of measured values in the data logger:** • oFF, archivation disabled. • Cont, continuous archivation. • ALMr, archivation upon the alarm. • DIn1, archivation takes place upon the activation of the 1st digital input. • DIn2, archivation takes place upon the activation of the 2nd digital input.
A1Lo	**Alarm lower limit for the 1st input**. The alarm is enabled for measured value ***smaller*** than the set limit value. Scope: -499 to A1hI °C.
A1hI	**Alarm upper limit for the 1st input.** The is enabled for measured values ***greater*** than the set limit value. Scope: A1Lo to 2999 °C.
A2Lo	**Alarm lower limit for the 2nd input**. The alarm is enabled for measured values ***smaller*** than the set limit value. Scope: -499 to A2hI °C.
A2hI	**Alarm upper limit for the 2nd input.** The alarm is enabled for measured values ***greater*** than the set limit value. Scope: A2Lo to 2999 °C.
A3Lo	**Alarm lower limit for the 3rd input**. The alarm is enabled for measured values ***smaller*** than the set limit value. Scope: -499 to A3hI °C.
A3hI	**Alarm upper limit for the 3rd input.** The alarm is enabled for measured values ***greater*** than the set limit value. Scope: A3Lo to 2999 °C.
A4Lo	**Alarm lower limit for the 4th input**. The alarm is enabled for measured values ***smaller*** than the set limit value. Scope: -499 to A4hI °C.
A4hI	**Alarm upper limit for the 4th input.** The alarm is enabled for measured values ***greater*** than the set limit value. Scope: A4Lo to 2999 °C.
A5Lo	**Alarm lower limit for the 5th input**. The alarm is enabled for measured values ***smaller*** than the set limit value. Scope: -499 to A5hI °C.
A5hI	**Alarm upper limit for the 5th input.** The alarm is enabled for measured values ***greater*** than the set limit value. Scope: A5Lo to 2999 °C.
A6Lo	**Alarm lower limit for the 6th input**. The alarm is enabled for measured values ***smaller*** than the set limit value. Scope: -499 to A6hI °C.
A6hI	**Alarm upper limit for the 6th input.** The alarm is enabled for measured values ***greater*** than the set limit value. Scope: A6Lo to 2999 °C.
A7Lo	**Alarm lower limit for the 7th input**. The alarm is enabled for measured values ***smaller*** than the set limit value. Scope: -499 to A7hI °C.
A7hI	**Alarm upper limit for the 7th input.** The alarm is enabled for measured values ***greater*** than the set limit value. Scope: A7Lo to 2999 °C.
A8Lo	**Alarm lower limit for the 8th input**. The alarm is enabled for measured values ***smaller*** than the set limit value. Scope: -499 to A8hI °C.
A8hI	**Alarm upper limit for the 8th input.** The alarm is enabled for measured values ***greater*** than the set limit value. Scope: A8Lo to 2999 °C.
A9Lo	**Alarm lower limit for the 9th input**. The alarm is enabled for measured values ***smaller*** than the set limit value. Scope: -499 to A9hI °C.

A9hI	**Alarm upper limit for 9th input.** The alarm is enabled for measured values ***greater*** than the set limit value. Scope: A9Lo to 2999 °C.
A10Lo	**Alarm lower limit for the 10th input**. The alarm is enabled for measured values ***smaller*** than the set limit value. Scope: -499 to A10hI °C.
A10hI	**Alarm upper limit for the 10th input.** The alarm is enabled for measured values ***greater*** than the set limit value. Scope: A10Lo to 2999 °C.

Parameter Adjustment and Menu on the User Level

The user level provides the user with the easiest access for parameter viewing and adjustment. The list of parameters to be present on the user level and their sequence are freely configurable.
Define the user level in the ***Configuration Level***, the uSEr menu.

Example of how to compose the user menu:

You want to locate the alarm upper limit of the 1st input A1hI at the 1st menu position of the ***user level***, the alarm upper limit of the 2nd input A2hI at the 2nd menu position. Proceed as follows:

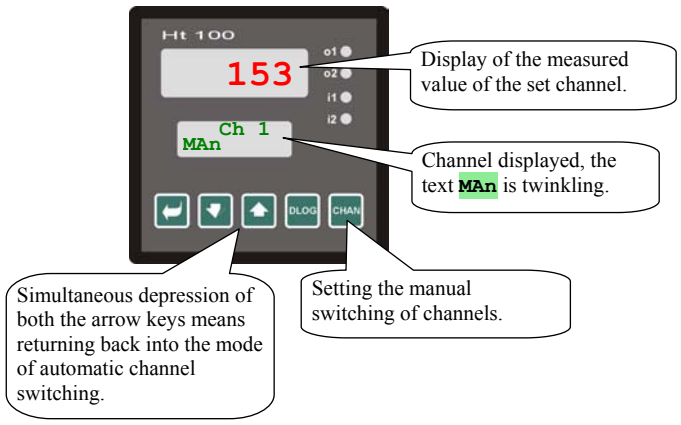
- Set the StP1 parameter to A1hI.
- Set the StP2 parameter to A2hI.
- Positions 3 to 12 are not utilized. Therefore set the StP3 to StP12 parameters to no.

Check the result in the ***User Level***

4.1 Automatic/Manual Switching of Displayed Channels

After switching on the meter channels are automatically switched over and displayed in the display.
The switching period can be set at the ***Configuration Level***, the SYS menu, parameter dISP, from 1 to 60 seconds.

If you need to have only one channel displayed, set the meter into the mode of manual switching of channels using the CHAN key. In this operation mode the required channel is switched with the arrow keys. Return to the automatic switching of channels is achieved by simultaneous depression of the arrow keys.



4.2 Data Logger

The meter can be equipped with a data logger, in which the measured data is registered. Based on the configuration 1000 measurements (Ht100 – xx – xxx**1** – xxx) or 2000 measurements (Ht100 – xx – xxx**2** – xxx) can be registered.
Each measurement consists of the following items:

- time data (year, month, day, hour, minute),
- signal value measured in channel 1 to 10.

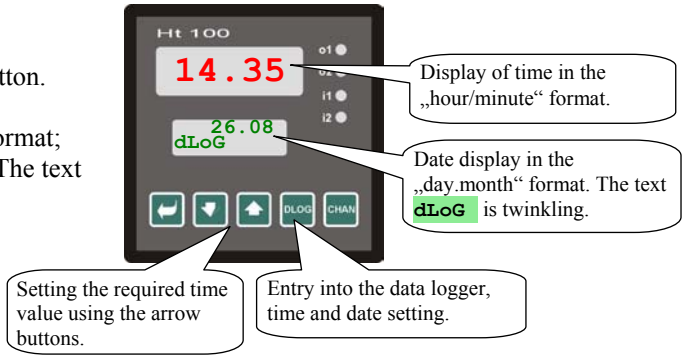
In case the memory becomes full, the oldest records are overwritten with the latest ones.

Data Readout from the Display

For entry into the data logger menu press the DLOG pushbutton.

The upper display shows the time, in the „hour.minute“ format; the lower display shows the date in „day.month“ format. The text `dLog` is twinkling.

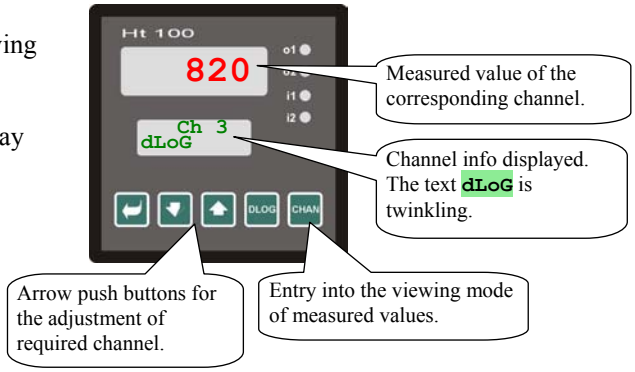
Set the required time using the arrow pushbuttons.



By operating the CHAN pushbutton you enter the menu of viewing the measured values.

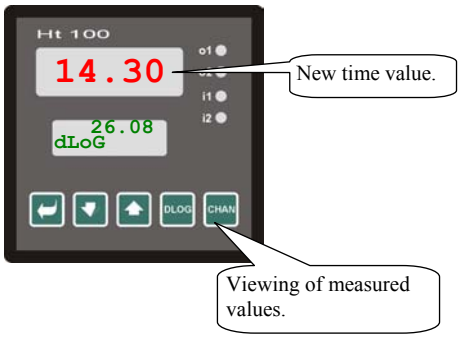
The upper display shows the measured value, the lower display the corresponding channel. The `dLog` text is twinkling.

Set the required channel using the arrow pushbuttons.



Press the DLOG pushbutton to set a new time value. Select the new time value using the arrow pushbuttons.

Browse through the measured values by operating the CHAN pushbutton.



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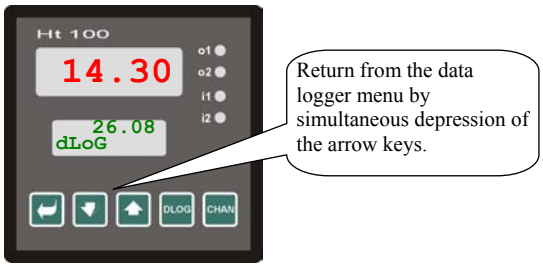
Return from the data logger menu is done by simultaneous depression of the arrow keys.



Set the measured value archivation period at the ***Operator Level*** (parameter `Dtper`). Set the condition for data entry into the datalogger using the `DtSto` parameter.
Both parameters can be made accessible at the ***User Level.***

4.3 Alarm Outputs

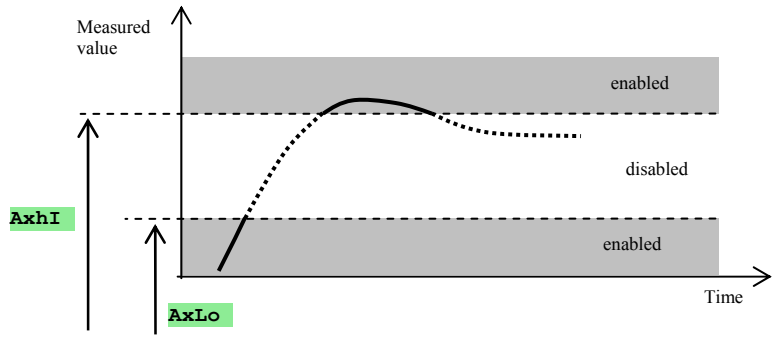
Alarms can be set for each input separately.

Alarm can be enabled and allocated to either the No. 1 or 2 output at the ***Configuration Level***, menu `In 1` to `In 10`, parameters `AL 1` to `AL 10`.

When setting `AL xx` = `ot 1` the alarm indication takes place by the first output, when setting `AL xx` = `ot 2` the alarm is indicated by the second output. When setting `AL xx` = `no` the alarm to be present at the corresponding output is inhibited and no access is allowed to the `AxLo`, `AxhI`, … parameters.

You can find the `A1Lo`, `A1hI`, … alarm threshold parameters in the ***Operator Level***, menu `AL1` to `AL10`. The parameters can be accessed also in the ***User Level***.

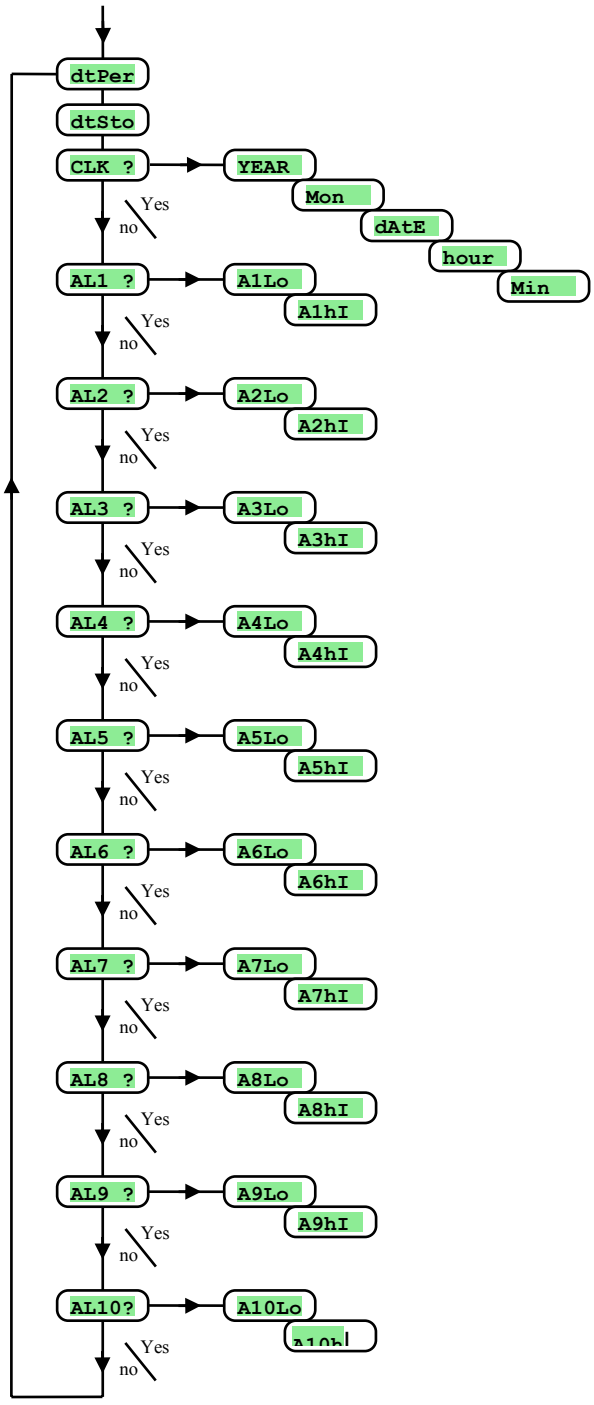
The meaning of the alarm thresholds is explained in the following picture.



5 Operator Level

The operator level serves for setting of parameters opened up to the operator of the meter.

The transition from the basic state into the operator level is done by simultaneous depression of the pushbuttons for about 3 seconds. The indication LEVEL appears in the lower display. Select oPEr in the upper display and confirm the selection by operating the pushbutton. If PASS appears in the lower display, it does mean that the operator level is protected with a password. In such a case enter the correct password using the arrow keys and confirm the selection using the pushbutton.



Operator Level Menu

Display	Meaning
DtPer	**Period of measured data archivation in the data logger, in minutes.** Scope: 1 to 60 minutes.
DtSto	**Conditions to be met for the archivation of measured values in the data logger:** • oFF, archivation disabled. • Cont, continuous archivation. • ALMr, archivation upon the alarm. • DIn1, archivation takes place upon the activation of the 1st digital input. • DIn2, archivation takes place upon the activation of the 2nd digital input.
CLK ?	**Entry in to a menu for setting the real time clock.**
AL1 ?	**Entry into a menu for setting the alarm limits of the 1st input.**
AL2 ?	**Entry into a menu for setting the alarm limits of the 2nd input.**
…	
AL10?	**Entry into a menu for setting the alarm limits of the 10th input.**

CLK , Menu for Clock Adjustment

This menu serves for the adjustment of real time clock. The clock is not provided with an automatic transition from summer into the winter time, and vice versa. The menu can be opened up only if the meter is equipped with the data logger.

Display	Meaning
YEAr	**Set the current year.**
Mon	**Set the current month.**
dAtE	**Set the current day.**
hour	**Set the current hour.**
MIn	**Set the current minute.**

AL1 , Menu for Alarm Limit Values for the 1st Input

This menu is used to set the lower and upper alarm limit value of the 1st input. The menu becomes opened up by setting YES in the upper display and confirmating the selection.

Display	Meaning
A1Lo	**Alarm lower limit for the 1st input**. The alarm becomes enabled for measured values ***smaller*** than the set limit value. Scope: -499 to A1hI °C.
A1hI	**Alarm upper limit for the 1st input**. The alarm becomes enabled for measured values ***greater*** than the set limit value. Scope: A1Lo to 2999 °C.

AL2 , Menu for Alarm Limit Values for the 2nd Input

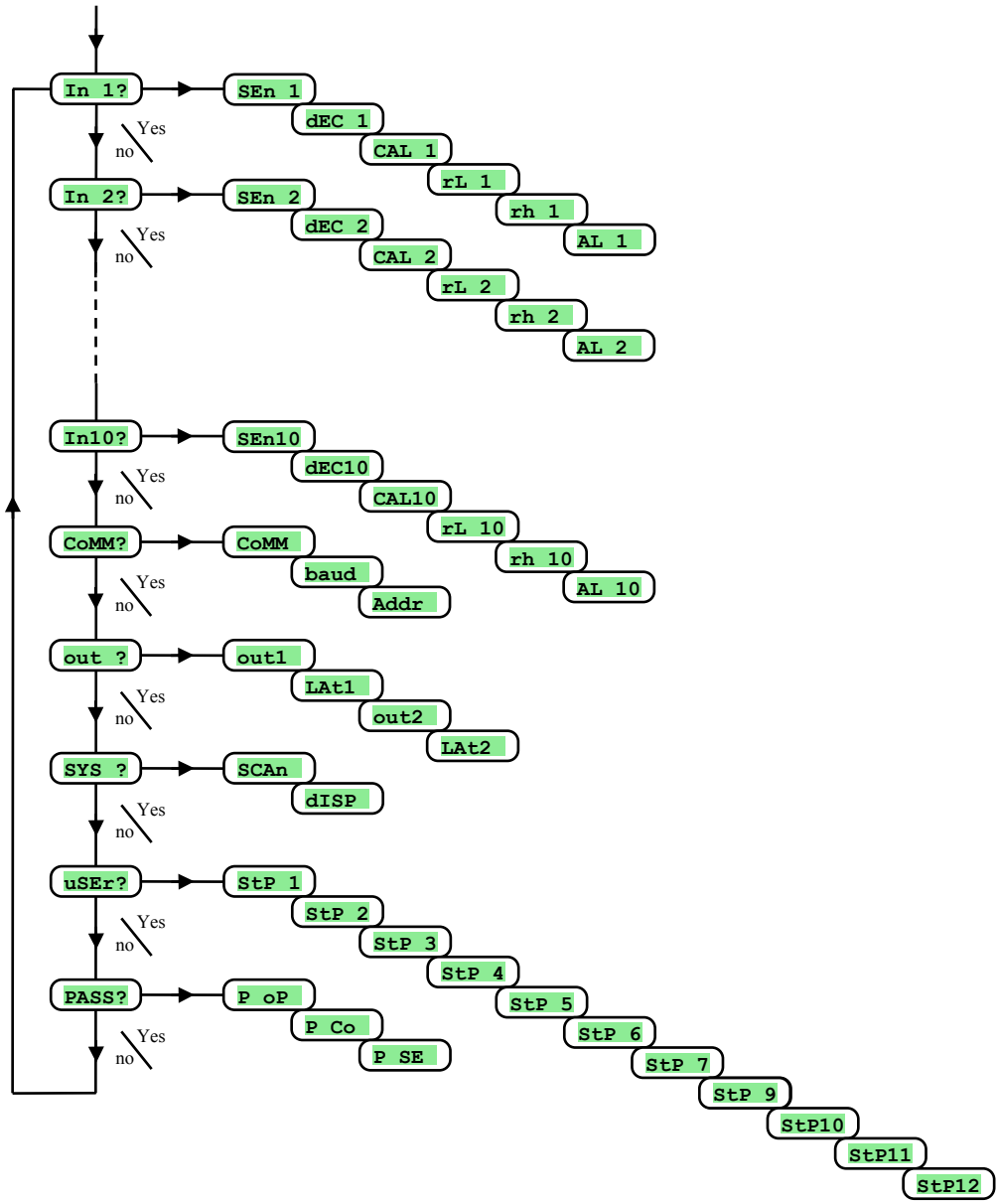
This menu is used to set the lower and upper alarm limit value of the 2nd input. The menu becomes opened up by setting YES in the upper display and confirmating the selection.

Display	Meaning
A2Lo	**Alarm lower limit for the 2nd input**. The alarm becomes enabled for measured values ***smaller*** than the set limit value. Scope: -499 to A2hI °C.
A2hI	**Alarm upper limit for the 2nd input**. The alarm becomes enabled for measured values ***greater*** than the set limit value. Scope: A2Lo to 2999 °C.

In the same way we proceed for setting the alarm limit values of the 3rd to 10th input.

6 Configuration Level

The configuration level serves for basic adjustments of the meter. The transition from the basic state into the configuration level is done by simultaneous depression of the pushbuttons, for about 3 seconds. The indication **LEVEL** appears in the lower display. Select **ConF** in the upper display and confirm the selection by operating the pushbutton. If **PASS** appears in the lower display, it does mean that the service level is protected with a password. In such a case enter the correct password using the arrow keys and once more confirm the selection using the pushbutton.



In , Input Adjustment

Display	Meaning
SEn1 ... SEn10	**Adjustment of the first sensor.** The first input cannot be set to Sen1 = no. **Thermocouple input:** • no … no input set. • J … the J thermocouple; temperature range from -200 to 900°C. • K … the K thermocouple; temperature range from -200 to 1360°C. • t … the T thermocouple; temperature range from -200 to 400°C. • n … the N thermocouple; temperature range from -200 to 1300°C. • E … the E thermocouple; temperature range from -200 to 700°C. • r … the R thermocouple; temperature range from 0 to 1760°C. • S … the S thermocouple; temperature range from 0 to 1760°C. • b … the B thermocouple; temperature range from 300 to 1820°C. • C … the C thermocouple; temperature range from 0 to 2320°C. • d … the D thermocouple; temperature range from 0 to 2320°C. **Process-bound current input:** • no … no input set. • 0-20 … 0 – 20 mA, range: -499 to 2999 units. • 4-20 … 4 – 20 mA, range: -499 to 2999 units. **Process-bound voltage input:** • no … no input set. • 0-5 … 0 – 5 V, range: -499 to 2999 units. • 1-5 … 1 – 5 V, range: -499 to 2999 units. • 0-10 … 0 – 10 V, range: -499 to 2999 units.
dEC1 ... dEC10	**Setting the number of decimal places to be shown in the display … thermocouple input** • 0 … without any decimal place displayed. • 0.0 … one decimal place displayed. **Setting the mode of decimal places to be shown in the display … process-bound input:** • 0 … without decimal place displayed. • 0.0 … one decimal place displayed. • 0.00 … two decimal places displayed. • 0.000 … three decimal places displayed.
CAL1 ... CAL10	**Sensor calibration**. The set value is added up to the measured value. Setting range: -999 to 999 °C.
rL 1 ... rL 10	Along with the rh 1 to rh 10 parameters serves for the **setting of scale in which the values are shown in the display** for process-bound ranges. Range: -499 to 2999.
rh 1 ... rh 10	Along with the rL 1 to rL 10 parameters serves for the **setting of scale in which the values are shown in the display** for process-bound ranges. Range: -499 to 2999.
AL 1 ... AL 10	**Allocation of output for alarm evaluation.** • no … none output allocated. • ot 1 … output No. 1 allocated. • ot 2 … output No. 2 allocated.

CoMM , Communication Line

Display	Meaning
CoMM	**Selection of communication line transmission protocol.** Fix setting to CoMM = Mod , which means the MODBUS RTU protocol.
bAud	**Communication speed**; fix setting to 9600Bd.
Addr	**Address of the meter.** Range: 1 to 255.

out , Setting of Outputs

Display	Meaning
out1	**Function of the 1st output:** • oFF … Output No. 1 is off. • AL … Alarm; during the alarm the output is ***disabled***. • ALn … Alarm; during the alarm the output is ***enabled***.
LAt1	**Setting the alarm duration for the 1st output:** • oFF … temporary alarm. • on … continuous alarm.
out2	**Function of the 2nd output:** • oFF … Output No. 2 is off. • AL … Alarm; during the alarm the output is ***disabled***. • ALn … Alarm; during the alarm the output is ***enabled***.
LAt2	**Setting the alarm duration for the 2nd output:** • oFF … temporary alarm. • on … continuous alarm.

SYS , System-bound Parameters

Display	Meaning
SCAn	**Setting the measurement period for one channel** (channel switching period): Scope: 1 to 10 seconds.
dISP	**Setting the time duration a channel will be displayed in the display** (display switching period): Scope: 1 to 60 seconds.

uSEr, Setting the User Menu

Display	Meaning
StP 1	Parameter located on the first position of the user menu: • no … no parameter set • AoFF … disabling of continuous alarm. • CLK … provides access to a menu for real clock time setting. • DPEr … archivation period of measured data in the data logger. • DSto … condition to apply for the registration of measured values in the data logger. • A1Lo … alarm lower limit for input No. 1. • A1hI … alarm upper limit for input No. 1. • A2Lo … alarm lower limit for input No. 2. • A2hI … alarm upper limit for input No. 2. • A3Lo … alarm lower limit for input No. 3. • A3hI … alarm upper limit for input No. 3. • A4Lo … alarm lower limit for input No. 4. • A4hI … alarm upper limit for input No. 4. • A5Lo …alarm lower limit for input No. 5. • A5hI … alarm upper limit for input No. 5. • A6Lo … alarm lower limit for input No. 6. • A6hI … alarm upper limit for input No. 6. • A7Lo … alarm lower limit for input No. 7. • A7hI … alarm upper limit for input No. 7. • A8Lo … alarm lower limit for input No. 8. • A8hI … alarm upper limit for input No. 8. • A9Lo … alarm lower limit for input No. 9. • A9hI … alarm upper limit for input No. 9. • A10L … alarm lower limit for input No. 10. • A10h … alarm upper limit for input No. 10.
StP 2 … StP12	Parameter which is located on the position No. 2 to 12 of the user menu. The list of parameters is the same as for StP1.

PASS, Passwords for the Entry into Higher Levels of Menu

Display	Meaning
P oP	**Password to provide for the entry into the service level.** If oFF is set, the access into the level is password protected. Scope: oFF, 1 to 9999.
P Co	**Password to provide for the entry into the configuration level**. If oFF is set, the access into the level is password protected. Scope: oFF, 1 to 9999.
P SE	**Password to provide for the entry into the service level**. If oFF is set, the access is not protected with password. The password initialization adjustment is 995. Scope: oFF, 1 to 9999.

6.1 Setting the Measuring Inputs

For correct functioning of the meter it is essential to correctly select, install, connect and place the sensors in the system, and to set the parameters of the meter in a proper way.
Parameters for the configuration of measuring inputs can be found at the ***Configuration Level***, menu In 1 to In10 .

Setting of Inputs

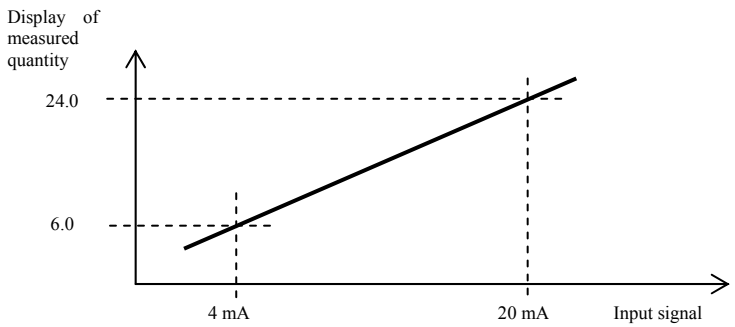
- SEn 1 to SEn10 … set the required input sensor. List of input sensors can be found in the ***Engineering Parameters*** section – see page No. *30*.
- dEC 1 to dEC10 … set the number of decimal places for the corresponding input. For thermocouple inputs 1 decimal place can be set, at the maximum, with process-bound inputs up to 3 decimal places, at maximum.
- CAL 1 to CAL10 … set the calibration of sensor. The parameter value is added up to the measured value.
- rL 1 to rL 10 … these parameters are displayed with process-bound inputs, only. Along with the rh 1 to rh 10 parameters they are used for setting the display scaling factor for displaying the values in the display.
- rh 1 to rh 10 … these parameters are displayed with process-bound inputs, only. Along with the rL 1 to rL 10 parameters they are used for setting the display scaling factor for displaying the values in the display.
- AL 1 to AL 10 … these parameters enable the setting of alarm with the corresponding input and define the output which the alarm indication shall pass through. The setting AL xx = ot 1 means that alarm will pass through the first output, setting AL xx = ot 2 means that alarm will pass through the second output. The setting AL xx = no means that alarm for the corresponding input is not allowed.

Measuring Range of the Process-Bound Inputs

The parameters rL xx, rh xx and dECxx can be utilized for setting the measuring range of the process-bound inputs.

Example of setting the process-bound input:

You want to have the input signal of 4 to 20 mA be displayed within the value range of 6.0 to 24.0 in the display.
Set dEC1 = 0.0, r Lo1 = 6.0 and r hI1 = 24.0. The distribution between the values 6.0 and 24.0 will be linear.



6.2 Setting the Alarm Outputs

The meter can be equipped with two alarm outputs. The functioning of the outputs can be set at the ***Configuration Level***, in the `out` menu.

Setting the Function of Outputs

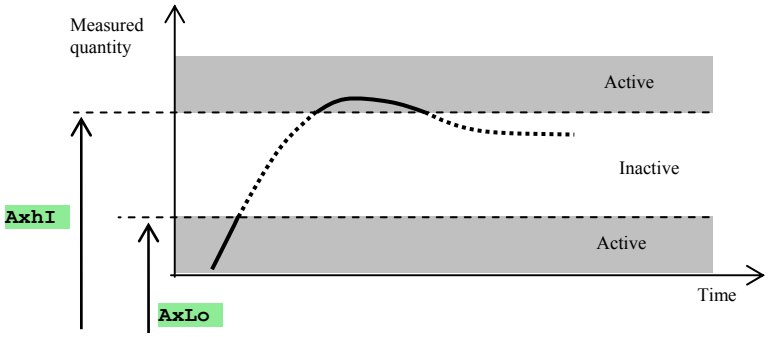
The setting of output function is done using the `out1` and `out2` parameters:

- `out1` , `out2` = `oFF` -> alarm output disabled
- `out1` , `out2` = `AL` -> during the alarm the output is ***disabled***.
- `out1` , `out2` = `ALn` - > during the alarm the output is ***enabled***.

Temporary and Permanent Alarm

The alarm can be of temporary (`LAt1` , `LAt2` = `oFF`) or permanent (`LAt1` , `LAt2` = `on`) nature.

- Temporary alarm becomes automatically disables after the disappearance of alarm conditions.
- Permanent alarm remains enabled also after the disappearance of alarm conditions. The disabling can be done after finishing the alarm conditions using the `AoFF` function, which is to be found at the ***User Level***. Permanent alarm is also disabled following the failure of powering voltage.



Alarm limits are set at the ***Service or User Level***

6.3 Setting Passwords to Enable Access to Higher Levels of Menu

The password for access to the operator, configuration and servicing level can be set individually. In such a way the overwriting of the parameters by the operator's staff can be prevented.

Set the passwords for the corresponding levels at the ***Configuration Level,*** in the `PASS` menu, using the following parameters:

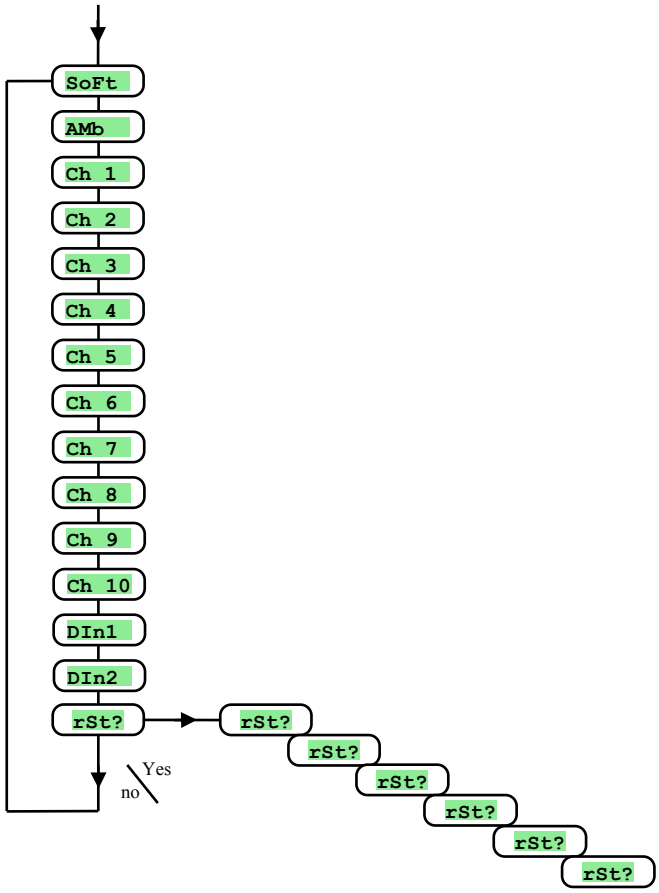
- `P oP` … setting password for entry into the ***User Level***,
- `P Co` … setting password for entry into the ***Configuration Level***,
- `P SE` … setting password for entry into the ***Servicing Level***. The initialization setting of the password is 995.

If the password is not known to the operating staff, the latter is prevented to enter the required level.

7 Servicing Level

The servicing level is intended to be used by the servicing staff.

Entry into the basic state of the servicing level is done by simultaneous depression of the keys during approx. 3 seconds. In the lower display appears the `LEVEL` message and the upper display shows `SErV` . Confirm these. If then the `PASS` message is shown in the lower display, the servicing level is protected with a password. Enter the correct password and reconfirm it. Password initialization setting is 995.



Display	Meaning
`SoFt`	**Sotftware release number**
`AMb`	**Actual surrounding temperature.**
`Ch 1`	**Measured value on the 1st input** (0 to 60mV … thermocouple input; 0 to 10V … voltage input; 0 to 20mA … current input).
`Ch 2`	**Measured value on the 2nd input** (0 to 60mV … thermocouple input; 0 to 10V … voltage input; 0 to 20mA … current input).
`Ch 3`	**Measured value on the 3rd input** (0 to 60mV … thermocouple input; 0 to 10V … voltage input; 0 to 20mA … current input).
`Ch 4`	**Measured value on the 4th input** (0 to 60mV … thermocouple input; 0 to 10V … voltage input; 0 to 20mA … current input).
`Ch 5`	**Measured value on the 5th input** (0 to 60mV … thermocouple input; 0 to 10V … voltage input; 0 to 20mA … current input).
`Ch 6`	**Measured value on the 6th input** (0 to 60mV … thermocouple input; 0 to 10V … voltage input; 0 to 20mA … current input).
`Ch 7`	**Measured value on the 7th input** (0 to 60mV … thermocouple input; 0 to 10V … voltage input; 0 to 20mA … current input).
`Ch 8`	**Measured value on the 8th input** (0 to 60mV … thermocouple input; 0 to 10V … voltage input; 0 to 20mA … current input).
`Ch 9`	**Measured value on the 9th input** (0 to 60mV … thermocouple input; 0 to 10V … voltage input; 0 to 20mA … current input).
`Ch 10`	**Measured value on the 10th input** (0 to 60mV … thermocouple input; 0 to 10V … voltage input; 0 to 20mA … current input).
`DIn1`	**Condition of the 1st digital input**.
`DIn2`	**Condition of the 2nd digital input**.
`rSt?` `rSt?` `rSt?` `rSt?` `rSt?`	The entry of initialization parameters represents a significant intervention into the system of adjustments of the meter. It must be confirmed 5-times by setting YES.
`rSt?`	Selection of the initialization mode: • `no` … no initialization is carried out. • `ConF` … initialization of the configuration (the operator and configuration levels). • `dLoG` … deletion of measured values from the data logger. • `All` … initialization of the configuration; erasion of measured values from data logger.

8 Communication Line

The communication line is utilized for mutual communication between the instruments, the reading and monitoring of the devices and other purposes.

The communication line can be accessed only after all the input channels have been measured.

8.1 The Interfaces

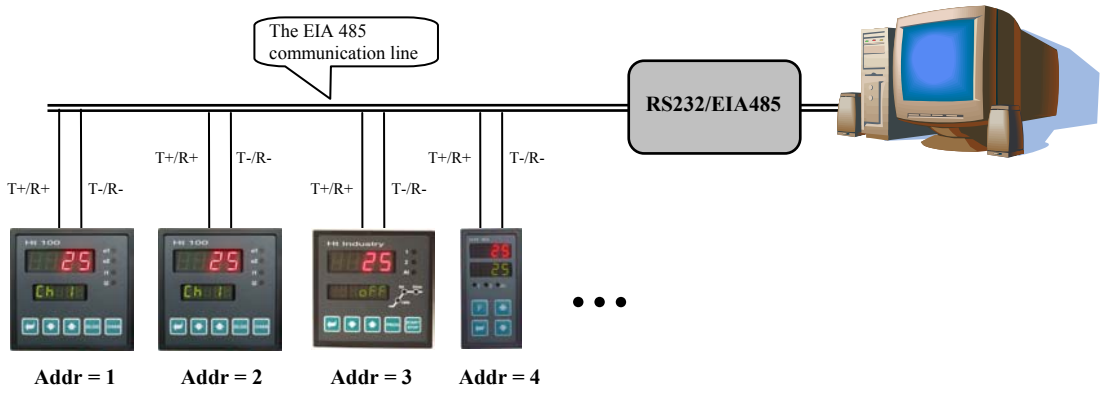
The devices can be equipped with the RS232 or EIA485 interfaces.

RS232 Interface

The RS 232 serial interface is used as a connection link between one computer and one meter. The highest length of the cable can be 12 m. The wiring diagram on the part of the computer can be found in the ***Wiring Connection*** section.

EIA485 Interface

The EIA485 interface is used for use in industrial environments to establish communication of more devices over a communication line, at a distance of up to 1200 m. The computer has to be equipped with the RS232 / EIA485 converter (most often an external converter), and the devices have to be equipped with the EIA 485 communication line. Each device/meter has assigned a specific addres. One of the connecting options is shown in the following picture:



8.2 The MODBUS RTU protocol

The communication protocol features a simple but reliable structure for which the following is typical:

- defined length of the transmitted commands
- identification of the end terminal using an address
- back confirmation of each of the commands
- message protection using the CRC code
- transmission of error messages

General Structure of the Protocol

Address of the device	Command length	Address of the register and/or data	CRC
1 byte	1 byte	n bytes	2 bytes

The commands:

- **Reading:** 03H or 04H
- **Entry** into one register: 06H
- **Callback:** 08H

The Reading Operation (03H or 04H)

This operation makes it possible to read up to 32 registers one after another. If a register is not defined, the reading is returned with a code value 32000.

Command:

Address of the device	03H	Address of the 1st register read	Number or registers read	CRC
1 byte	1 byte	2 bytes (1st byte of higher significance)	2 bytes (1st byte of higher significance)	2 bytes

Answer:

Address of the device	03H	Number of bytes	1st register read	…	Last register read	CRC
1 byte	1 byte	1 byte	2 bytes (1st byte of higher significance)		2 bytes (1st byte of higher significance)	2 bytes

Example: reading the register No. 100 (64H; desired value); the device's address is 12 (0CH)

- Command: 0C 03 00 64 00 01 C4 C8
- Answer: 0C 03 02 01 C8 95 83

The „Entry" Operation (06H)

This operation provides for the entry of a value into one of the device's registers:

Command:

Address of the device	06H	Address of the register	Data	CRC
1 byte	1 byte	2 bytes (1st byte of higher significance)	2 bytes (1st byte of higher significance)	2 bytes

Answer, providing the command was executed (is identical with the command):

Address of the device	06H	Address of the register	Data	CRC
1 byte	1 byte	2 bytes (1st byte of higher significance)	2 bytes (1st byte of higher significance)	2 bytes

Example: entry into the No. 100 register (64H; desired value); the device's address is 12 (0CH)

- Command: 0C 06 00 64 01 C8 C9 0E
- Answer: 0C 06 00 64 01 C8 C9 0E

Answer; error message:

Address of the device	Command + 80H	Error messages	CRC
1 byte	1 byte	1 byte	2 bytes

Error messages:

- 01 – defective command entered, CRC error.
- 02 – not-existing register or read-only register.
- 03 – data beyond limits.
- 04 – entry into register without success (caused e.g. by a hardware defect, too high level of interferences etc.)

Example: register error

- Command: 0C 01 00 64 04 20 7F D0
- Answer: 0C 81 01 10 53

Example: error, non-existing register

- Command: 0C 06 00 69 04 20 5B D3
- Answer: 0C 86 02 52 62

Example: error, data beyond limits

- Command: 0C 06 00 64 4E 20 FD 70
- Answer: 0C 86 03 93 A2

The „Callback“ Operation (08H)

This operation is used only to identify the device at the corresponding address.

Command:

Address of the device	08H	Data	CRC
1 byte	1 byte	4 bytes	2 bytes

Answer:

Address of the device	08H	Data	CRC
1 byte	1 byte	4 bytes	2 bytes

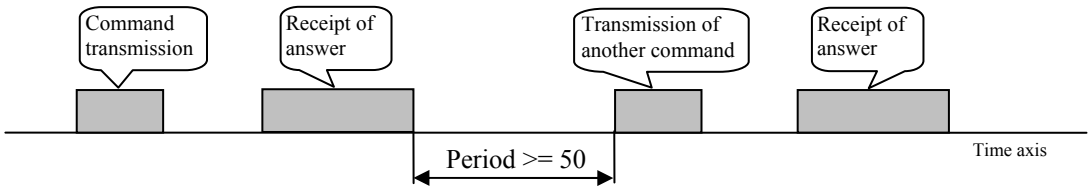
Example: callback, device registered at the address 12 (0CH)

- Command: 0C 08 0A 14 1E 28 AB 74
- Answer: 0C 08 0A 14 1E 28 AB 74

Communication Line Timing

If more than 1 device is connected to the communication line (applies only to the EIA 485 line) it is necessary to adhere to the timing structure shown in the following picture.
The **time interval** (delay between the termination of command receipt and the start of transmission of another command) has to be **longer or equal to 50 msecs.**

Otherwise a data collision may happen.



8.3 Table of Registers

The table contains a complete list or registers with access to the communication line. The meaning of the columns is as follows:

- **Display** … designation of the register in the display. If not filled in the register designation does not appear in the display.
- **Address** … address of the register. Access to the register appears behind the address; r … read-only, r/w … read/write.
- **Description, scope** … description and scope (range) of register values.
- **Initialization** … initialization value during the first switch-on or following the restart.
- **Decimal point** … determines the number of decimal places displayed. The conversion is shown in the following table.
- **Note**… referring mostly to the significance of the register

Decimal point	Value entered via the communication line	Displayed value	Note
0	2300	2300	fix setting, without decimal place
1		230.0	fix setting, 1st decimal place
2		23.00	fix setting, 2 decimal places
dEC 1 (0)		230	to par. dEC 1 (without dec. place), the tc input
dEC 1 (1)		230.0	to par. dEC 1 (1 dec. place), the tc input
dEC 1 (0)		230	to par. dEC 1 (without dec. place), the proc input
dEC 1 (1)		23.0	to par. dEC 1 (1 dec. place), the proc input
dEC 1 (2)		2.30	to par. dEC 1 (2 dec. places), the proc input
dEC 1 (3)		0.230	to par. dEC 1 (3 dec. places), the proc input

8.4 List of Registers

The list of registers is arranged in discursive manner in tables (HW configuration of the meter, servicing level,…)

HW Configuration of the Meter

Display	Address	Term, scope	Initialization	Dec. place	Note, comment
SoFt	0 r				Software release No.
	1 r	0 … thermocouple 1 … process-bound, current input 2 … process-bound, voltage input			Measuring input.
	2 r	0 … 2 channels 1 … 4 channels 2 … 6 channels 3 … 8 channels 4 … 10 channels			Number of channels.
	3 r	0 … without outputs 1 … 1 output 2 … 2 outputs			Alarm outputs.
	4 r	0 … not installed 1 … 1 communication line			Communication line.
	5 r	0 … not installed 1 … 2 digital inputs			Digital inputs.
	6 r	0 … not installed 1 … memory for 1000 measurements 2 … memory for 2000 measurements			Data logger memory.
	10 r	0 … non-system error 1 … system error (FLASH, EEPROM, data logger memory, converter)			Internal error/defect of the meter.

Readout of Meter Conditions

Display	Address	Term, scope	Initialization	Dec. place	Note, comment
	20 r	1st channel, measured value		dEC 1	If the cause consists in a defective sensor, the meter returns the value of -22001.
	21 r	2nd channel, measured value		dEC 2	If the cause consists in the non-adjustment of the sensor, the meter returns the value of -22000. If it is the error of sensor, the meter returns with: -22001.
	22 r	3rd channel, measured value		dEC 3	If the cause consists in the non-adjustment of the sensor, the meter returns the value of -22000. If it is the error of sensor, the meter returns with: -22001.
	23 r	4th channel, measured value		dEC 4	If the cause consists in the non-adjustment of the sensor, the meter returns the value of -22000. If it is the error of sensor, the meter returns with: -22001.
	24 r	5th channel, measured value		dEC 5	If the cause consists in the non-adjustment of the sensor, the meter returns the value of -22000. If it is the error of sensor, the meter returns with: -22001.
	25 r	6th channel, measured value		dEC 6	If the cause consists in the non-adjustment of the sensor, the meter returns the value of -22000. If it is the error of sensor, the meter returns with: -22001.
	26 r	7th channel, measured value		dEC 7	If the cause consists in the non-adjustment of the sensor, the meter returns the value of -22000. If it is the error of sensor, the meter returns with: -22001.
	27 r	8th channel, measured value		dEC 8	If the cause consists in the non-adjustment of the sensor, the meter returns the value of -22000. If it is the error of sensor, the meter returns with: -22001.
	28 r	9th channel, measured value		dEC 9	If the cause consists in the non-adjustment of the sensor, the meter returns the value of -22000. If it is the error of sensor, the meter returns with: -22001.
	29 r	10th channel, measured value		dEC10	If the cause consists in the non-adjustment of the sensor, the meter returns the value of -22000. If it is the error of sensor, the meter returns with: -22001.
	30 r	Surrounding temperature		1	

Display	Address	Term, scope	Initialization	Dec. place	Note, comment
	40 r	0 … off 1 … on			1st output.
	41 r	0 … off 1 … on			2nd output.
	42 r	0 … disabled 1 … enabled			1st digital input. The register copies the state of digital input.
	43 r	0 … disabled 1 … enabled			1st digital input. Setting of register takes place at the moment when the logic value changes (rising edge) at the digital input. After readout the register is reset.
	44 r	0 … disabled 1 … enabled			2nd digital input. The register copies the state of the digital input.
	45 r	0 … disabled 1 … enabled			2nd digital input. Setting of register takes place at the moment when the logic value changes (rising edge) at the digital input. After readout the register is reset.
AoFF	80 r/w	0 … without intervention 1 … cancellation of continuous alarm		0	By setting „1“ you cancel the continuous alarm.

Servicing Level

Display	Address	Term, scope	Initialization	Dec. place	Note, comment
A1Lo	130 r/w	-4990 to A1hI	-4990	dEC 1	Lower alarm limit of the 1st input.
A1hI	131 r/w	A1Lo to 29990	29990	dEC 1	Upper alarm limit of the 1st input.
A2Lo	132 r/w	-4990 to A2hI	-4990	dEC 2	Lower alarm limit of the 2nd input.
A2hI	133 r/w	A2Lo to 29990	29990	dEC 2	Upper alarm limit of the 2nd input.
A3Lo	134 r/w	-4990 to A3hI	-4990	dEC 3	Lower alarm limit of the 3rd input.
A3hI	135 r/w	A3Lo to 29990	29990	dEC 3	Upper alarm limit of the 3rd input.
A4Lo	136 r/w	-4990 to A4hI	-4990	dEC 4	Lower alarm limit of the 4th input.
A4hI	137 r/w	A4Lo to 29990	29990	dEC 4	Upper alarm limit of the 4th input.
A5Lo	138 r/w	-4990 to A5hI	-4990	dEC 5	Lower alarm limit of the 5th input.
A5hI	139 r/w	A5Lo to 29990	29990	dEC 5	Upper alarm limit of the 5th input.
A6Lo	140 r/w	-4990 to A6hI	-4990	dEC 6	Lower alarm limit of the 6th input.
A6hI	141 r/w	A6Lo to 29990	29990	dEC 6	Upper alarm limit of the 6th input.
A7Lo	142 r/w	-4990 to A7hI	-4990	dEC 7	Lower alarm limit of the 7th input.
A7hI	143 r/w	A7Lo to 29990	29990	dEC 7	Upper alarm limit of the 7th input.
A8Lo	144 r/w	-4990 to A8hI	-4990	dEC 8	Lower alarm limit of the 8th input.
A8hI	145 r/w	A8Lo to 29990	29990	dEC 8	Upper alarm limit of the 8th input.
A9Lo	146 r/w	-4990 to A9hI	-4990	dEC 9	Lower alarm limit of the 9th input.
A9hI	147 r/w	A9Lo to 29990	29990	dEC 9	Upper alarm limit of the 9th input.
A10Lo	148 r/w	-4990 to A10hI	-4990	dEC10	Lower alarm limit of the 10th input.
A10hI	149 r/w	A10Lo to 29990	29990	dEC10	Upper alarm limit of the 10th input.
dtPEr	180 r/w	1 … 60	10	0	Archivation period in minutes.
dtSto	181 r/w	0 … oFF 1 … Cont 2 … Almr 3 … dIn1 4 … dIn2	1		Condition for archivation.

Configuration Level

Display	Address	Term, scope	Initialization	Dec. place	Note, comment
SEn 1	200 r/w	Thermocouple input: 0 … no 1 … J 2 … K 3 … t 4 … n 5 … E 6 … r 7 … S 8 … b 9 … C 10 … d Process-bound current input: 0 … no 1 … 0-20 2 … 4-20 Process-bound voltage input: 0 … no 1 … 0-5 2 … 1-5 3 … 0-10	1		Setting the measuring input.
dEC 1	201 r/w	Thermocouple input: 0 … 0 1 … 0.0 Process-bound input: 0 … 0 1 … 0.0 2 … 0.00 3 … 0.000	0		Setting the decimal point.
CAL 1	202 r/w	-9990 to 9990	0	dEC 1	Measuring input calibration.
rL 1	203 r/w	-4990 to 29990	0	dEC 1	Scope of the process-bound input, lower limit.
rh 1	204 r/w	-4990 to 29990	1000	dEC 1	Scope of the process-bound input, upper limit.
AL 1	205 r/w	0 … no 1 … ot 1 2 … ot 2	0		Allocation of outputs for alarm evaluation.
Identically, the other inputs are set: • input 2: address: 210 to 215, • input 3: address: 220 to 225, • input 4: address: 230 to 235, • input 5: address: 240 to 245, • input 6: address: 250 to 255, • input 7: address: 260 to 265, • input 8: address: 270 to 275, • input 9: address: 280 to 285, • input 10: address: 290 to 295.					
out1	310 r/w	0 … oFF 1 … AL 2 … ALn	1		Function of the 1st output
Lat1	311 r/w	0 … oFF 1 … on	0		Setting the duration of alarm at the 1st output
out2	312 r/w	0 … oFF 1 … AL 2 … ALn	1		Function of the 2nd output.
Lat2	313 r/w	0 … oFF 1 … on	0		Setting the duration of alarm at the 2nd output
SCAn	320 r/w	1 to 10	1		Channel switching period.
dISP	321 r/w	1 to 60	2		Display switching period.

Display	Address	Term, scope	Initialization	Dec. place	Note, comment
StP 1	330 r/w	0 … no 1 … AoFF 2 … CLK 3 … dPEr 4 … dSto 5 … A1Lo 6 … A1hI 7 … A2Lo 8 … A2hI 9 … A3Lo 10 … A3hI 11 … A4Lo 12 … A4hI 13 … A5Lo 14 … A5hI 15 … A6Lo 16 … A6hI 17 … A7Lo 18 … A7hI 19 … A8Lo 20 … A8hI 21 … A9Lo 22 … A9hI 23 … A10L 24 … A10h	1		1st position of user menu.
StP 2	331 r/w	as StP1	0		2nd position of user menu.
StP 3	332 r/w	as StP1	0		3rd position of user menu.
StP 4	333 r/w	as StP1	0		4th position of user menu.
StP 5	334 r/w	as StP1	0		5th positio of user menu.
StP 6	335 r/w	as StP1	0		6th position of user menu.
StP 7	336 r/w	as StP1	0		7th position of user menu.
StP 8	337 r/w	as StP1	0		8th position of user menu.
StP 9	338 r/w	as StP1	0		5th position of user menu.
StP10	339 r/w	as StP1	0		6th position of user menu.
StP11	340 r/w	as StP1	0		7th position of user menu.
StP12	341 r/w	as StP1	0		8th position of user menu.
P oP	350 r/w	0 to 9999 0 … oFF	0	0	Password for access into the service level.
P Co	351 r/w	0 to 9999 0 … oFF	0	0	Password for access into the configuration level.
P SE	352 r/w	0 to 9999 0 … oFF	0	0	Password for access into the service level.

Setting the Real Time Clock

Display	Address	Description, scope	Initialization	Decimal point	Note
YEAr	500 r/w	0 to 99		0	Year
Mon	501 r/w	1 to 12		0	Month
dAY	502 r/w	1 to 31		0	Day
Hour	503 r/w	0 to 23		0	Hour
Min	504 r/w	0 to 59		0	Minute

Data Transmission From The Data Logger

Display	Address	Description, scope	Initialization	Decimal place	Note
	700 r/w	0 to 999 for 32kB memory 0 to 1999 for 64kB memory	0	0	Setting the position of history data readout. 0 sets the latest value, 999 (1999) sets the first (oldest) value.
	701 r	1st input value at a position specified by the address 700		dEC 1	If the sensor is not set, the value of -22000 is returned by the meter. If it is the error of sensor, the meter returns with: -22001.
	702 r	2nd input value at a position specified by the address 700		dEC 2	If the sensor is not set, the value of -22000 is returned by the meter. If it is the error of sensor, the meter returns with: -22001.
	703 r	3rd input value at a position specified by the address 700		dEC 3	If the sensor is not set, the value of -22000 is returned by the meter. If it is the error of sensor, the meter returns with: -22001.
	704 r	4th input value at a position specified by the address 700		dEC 4	If the sensor is not set, the value of -22000 is returned by the meter. If it is the error of sensor, the meter returns with: -22001.
	705 r	5th input value at a position specified by the address 700		dEC 5	If the sensor is not set, the value of -22000 is returned by the meter. If it is the error of sensor, the meter returns with: -22001.
	706 r	6th input value at a position specified by the address 700		dEC 6	If the sensor is not set, the value of -22000 is returned by the meter. If it is the error of sensor, the meter returns with: -22001.
	707 r	7th input value at a position specified by the address 700		dEC 7	If the sensor is not set, the value of -22000 is returned by the meter. If it is the error of sensor, the meter returns with: -22001.
	708 r	8th input value at a position specified by the address 700		dEC 8	If the sensor is not set, the value of -22000 is returned by the meter. If it is the error of sensor, the meter returns with: -22001.
	709 r	9th input value at a position specified by the address 700		dEC 9	If the sensor is not set, the value of -22000 is returned by the meter. If it is the error of sensor, the meter returns with: -22001.
	710 r	10th input value at a position specified by the address 700		dEC10	If the sensor is not set, the value of -22000 is returned by the meter. If it is the error of sensor, the meter returns with: -22001.
	711 r	0 to 99 … year value at a position specified by the address 700		0	
	712 r	1 to 12 … month value at a position specified by the address 700		0	
	713 r	1 to 31 … day value at a position specified by the address 700		0	
	714 r	0 to 23 … hours value at a position specified by the address 700		0	
	715 r	0 to 59 … minute value at a position specified by the address 700		0	
	720 r/w	0 … without any action 1 … memory deletion	0		By entering „1“ to this address the data logger memory will be deleted.

Sequence of steps for data readout from the data logger:

- enter the read position (0) into a register at the No. 700 address
- read the registers at the addresses 701 to 715,
- enter another read position (1) into a register at the No. 700 address,
- read the registers at the addresses 701 to 715,
- …

9 Table of Parameters

Table of parameters at the configuration level:

SEn 1	SEn 5	SEn 9	StP 1
dEC 1	dEC 5	dEC 9	StP 2
CAL 1	CAL 5	CAL 9	StP 3
rL 1	rL 5	rL 9	StP 4
rh 1	rh 5	rh 9	StP 5
AL 1	AL 5	AL 9	StP 6
SEn 2	SEn 6	SEn10	StP 7
dEC 2	dEC 6	dEC10	StP 8
CAL 2	CAL 6	CAL10	StP 9
rL 2	rL 6	rL 10	StP10
rh 2	rh 6	rh 10	StP11
AL 2	AL 6	AL 10	StP12
SEn 3	SEn 7	CoMM	P oP
dEC 3	dEC 7	baud	P Co
CAL 3	CAL 7	Addr	P SE
rL 3	rL 7	out1	
rh 3	rh 7	LAt1	
AL 3	AL 7	out2	
SEn 4	SEn 8	LAt2	
dEC 4	dEC 8	SCAn	
CAL 4	CAL 8	dISP	
rL 4	rL 8		
rh 4	rh 8		
AL 4	AL 8		

Table of parameters at the operator level:

dtPEr	A1Lo	A6Lo
dtSto	A1hI	A6hI
	A2Lo	A7Lo
	A2hI	A7hI
	A3Lo	A8Lo
	A3hI	A8hI
	A4Lo	A9Lo
	A4hI	A9hI
	A5Lo	A10Lo
	A5hI	A10hI

10 Installation

The meter is to be built-in into a panel. The attachment is done using two flanges, being a part of the delivery. The installation necessitates to have a free access to the back panel.

Dimensions for the Installation

- width x height x depth: 96 x 96 x 121 mm (incl. the terminal board).
- built-in depth: 114 mm (incl. the terminal board).
- panel cutout size: 91 x 91 mm.
- panel thickness: 1,5 to 10 mm.

Installation Steps

- make a cutout of 91 x 91 mm in the panel;
- put the meter in this cutout;
- put the fixing flanges into the stamped out openings in the upper and bottom part, or along the sides of the meter;
- screw in and retighten the screws on the flanges.

Now the meter is installed. Prior connecting power to the meter we recommend to make yourself familiar with the following section in which the potential sources of interference are described.

Explanation of the wiring diagram starts on the page No. *28*.

10.1 Principles of Installation, Sources of Interference

The installed equipment includes a lot of places at which interference signals are generated. The strongest sources of interference are:

- devices with inductive loads, such as the electric motors, relay coils, contactors…
- thyristors and other types of solid state equipment switched on outside of the powering period zero point,
- welding equipment
- heavy-current conductors,
- fluorescent and neon lamps.

10.2 Reduction of Interferences

During the design of the system try to adhere to the following principles:

- All powering lines and power cabling has to be laid separately from signal lines (e.g. the thermocouple lines, communication lines etc.). A distance of at least 30 cm should be kept in between these types of lines.
- If a crossing between signal and power lines is to be made, it is preferable to establish such a crossing at right angle.
- From the very beginning try to specify the potential sources of interference and make efforts to lead the conductors off these sources.
- Do not install relays and contactors near the meter.
- Do not use the powering voltage to the meter also to the powering of inductive and phase-controlled equipment.
- Use twisted and screened line for signal transmission. Interconnect the screening at various places with the plant's ground potential.
- In case of necessity use backup power units (UPS) for the powering of the devices.

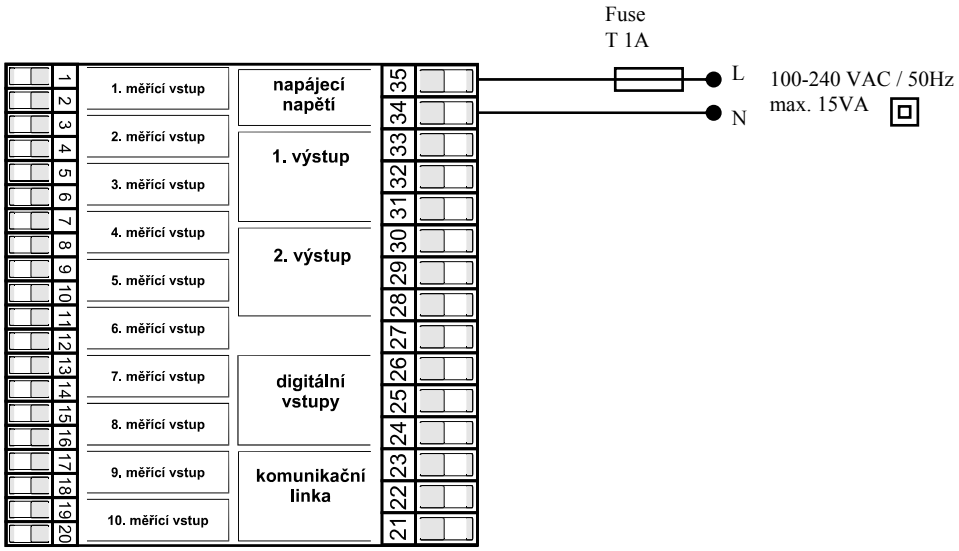
11 Wiring Connection

The electrical connection of the meter may be done by authorized staff, only, meeting the corresponding regulations and provisions in force. Improper electrical connection can cause serious damages.

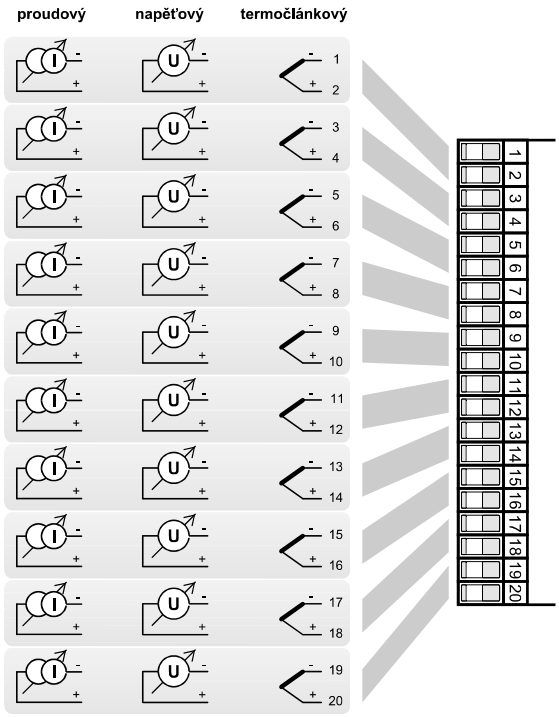
If it is to assume that an error inside of the meter might be a reason for damages to the surrounding, the meter has to be equipped with an independent protective element connected in the upstream line.

Powering Voltage

Prior connecting the powering voltage verify the engineering parameters of the powering line. The meter is intended to be used in industrial or laboratory equipment of the **overvoltage category No. II, and the contamination degree of 2.**



Measuring Inputs

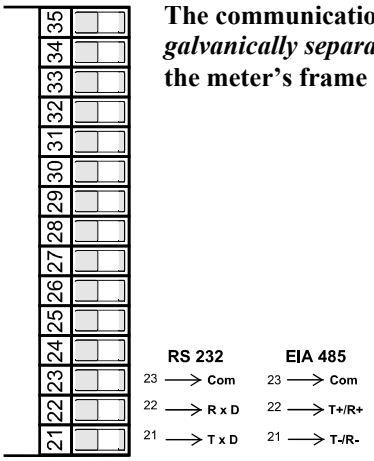


The inputs are *galvanically separated each from other* (and switched over using a relay).

Input impedance of the inputs:

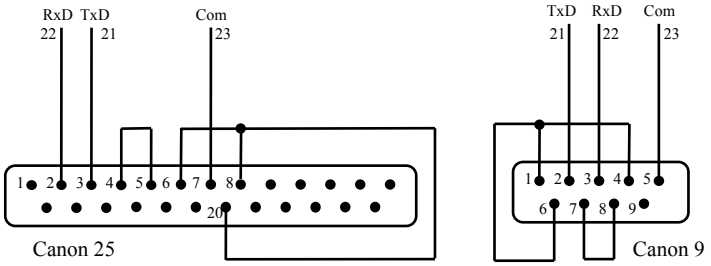
- thermocouple … approx. 20 MOhm
- current input … 40 Ohm
- voltage input … 10 kOhm

The CoMM Communication Line

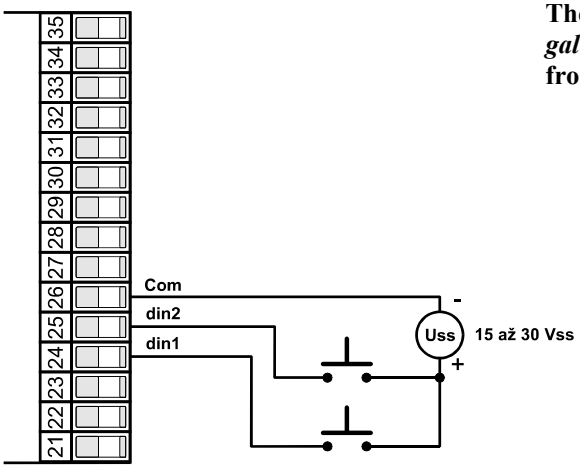


The communication line is *galvanically separated* from the meter's frame

Connection of the RS232 interface to the computer

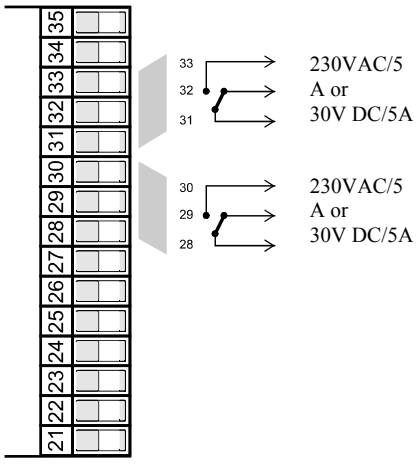


Digital Inputs



The digital inputs are *galvanically separated* from the meter's frame

Relay (Alarm) Outputs



The relay outputs are *galvanically separated* from the meter's frame

12 Engineering Parameters

The meter is intended for use in industrial or laboratory equipment, with the overvoltage category No. II, and the contamination degree of 2.

Alarm

- absolute alarm; upper and lower limit of alarm,
- temporary or continuous alarm.

Indication and Control Elements

- one 4-digit 14 mm display, one 5-digit 10 mm display,
- two indication LEDs of relay outputs, two indication LEDs of digital inputs
- 5 pushbuttons; meter control via menu

Sensors, the Inputs

Thermocouple input, check of sensor integrity:

- `no` … no input set,
- `J` … J thermocouple; temperature range from -200 to 900°C.
- `K` … K thermocouple; temperature range from -200 to 1360°C.
- `t` … T thermocouple; temperature range from -200 to 400°C.
- `n` … N thermocouple; temperature range from -200 to 1300°C.
- `E` … E thermocouple; temperature range from -200 to 700°C.
- `r` … R thermocouple; temperature range from 0 to 1760°C.
- `S` … S thermocouple; temperature range from 0 to 1760°C.
- `b` … B thermocouple; temperature range from 300 to 1820°C.
- `C` … C thermocouple; temperature range from 0 to 2320°C.
- `d` … D thermocouple; temperature range from 0 to 2320°C.

Process-bound current input (input resistance 40 Ohms), without sensor integrity check:

- `no` … no input set,
- `0-20` … 0 – 20 mA, range: -499 to 2999 units,
- `4-20` … 4 – 20 mA, range: -499 to 2999 units,

Process-bound voltage input (10 kOhm), without sensor integrity check:

- `no` … no input set,
- `0-5` … 0 – 5 V, range: -499 to 2999 units,
- `1-5` … 1 – 5 V, range: -499 to 2999 units,
- `0-10` … 0 – 10 V, range: -499 to 2999 units.

Accuracy of Inputs

- ±0.1% of full range (min. 540ºC) , ±1 digit at 25ºC ±3ºC surrounding temperature, and for ±10% of rated powering voltage,
- temperature stability of ±0.1ºC/ºC of surrounding temperature,
- voltage stability of ±0.01%/% of powering voltage fluctuation.

Relay (Alarm) Outputs

- elektromechanical relay, 230V AC/5A, or 30V DC/5A, changeover contacts, without attenuation element.

Digital Inputs

- Logic levels of 0-5 V DC/15-30 V DC, with galvanic separation between the corresponding levels.

Communication Line

- RS 232; galvanic separation; the Modbus RTU protocol,
- EIA 485; galvanic separation; the Modbus RTU protocol

Powering Voltage

- 100 to 240 V AC/50 Hz, internally built-in slow fuse 2 A/250 V,
- power consumption max. 15 VA,
- data stored in non-volatile memory.

Operating Environment

- temperature: 0 to 50 ºC,
- air relative humidity 0 to 90 % RH, without water condensation.

Transport and Storing Conditions

- temperature: -20 to 70 ºC.

Dimensions

- W x H x D: 96 x 96 x 121 mm,
- built-in depth: 114 mm,
- panel cutout: 91 x 91 mm, panel thickness: 1.5 to 10 mm.

12.1 Liability

The supplier shall be liable for this product during a period 36 months, except for defects that have been caused by mechanical or electrical wear of the outputs. Excluded from the liability are also all defects entailed as a consequence of improper storage or transport, improper use and incorrect wiring, or damaged due to external effects (in particular the effects of overvoltages, non-permissible level of electrical quantities and temperatures, the effect of chemical substances or mechanical damage), and both the electrical and mechanical overload of the inputs and outputs, howsoever caused.

12.2 Description of the Model

Ht100 – a b – c d e f – g h i

- **a: the input**
  T = thermocouple input
  N = process-bound voltage input
  P = process-bound current input
- **b: number of inputs**
  2 = 2 inputs
  4 = 4 inputs
  6 = 6 inputs
  8 = 8 inputs
  10 = 10 inputs
- **c: communication line**
  0 = not installed
  X = the RS 232 line
  A = the EIA 485 line
- **d: digital inputs**
  0 = not installed
  D = 2 digital inputs
- **e: relay outputs**
  0 = not installed
  1 = 1 relay output
  2 = 2 relay output
- **f: data logger**
  0 = not installed
  1 = small volume memory (1000 measurements)
  2 = large volume memory (2000 measurements)
- **g, h, i: 0 0 0**

13 Table of Contents