MAP 4000

4 DIGIT PROGRAMMABLE
UNIVERSAL INSTRUMENT

DC VOLTmeter/ammeter
Process Monitor
Ohmmeter
Thermometer for PT 100/500/1 000
Thermometer for NI 1 000
Thermometer for Thermocouples
Displays for Lin. Potentiometers
SAFETY INSTRUCTIONS
Please, read the enclosed safety instructions carefully and observe them!
These instruments should be safeguarded by isolated or common fuses (breakers)!
For safety information the EN 61 010-1 + A2 standard must be observed.
This instrument is not explosion-safe!

TECHNICAL DATA
Measuring instruments of the MAP 4000 series conform to the European regulation 89/336/EWG and the Ordinance 168/1997 Coll.

The instruments are up to the following European standards:
EN 55 022, class B
EN 61000-4-2, -4, -5, -6, -8, -9, -10, -11

The instruments are applicable for unlimited use in agricultural and industrial areas.

CONNECTION
Supply of energy from the main line has to be isolated from the measuring leads.
2.1 Description

The MAP 4000 model series are 4 digit panel programmable instruments designed for maximum efficiency and user comfort while maintaining their favourable price.

Type MAP 4000 is a multifunction instrument with the option of configuration for 7 various input options, easily configurable in the instrument menu. By further options of input modules it is feasible to measure larger ranges of DC voltage and current or increase the number of inputs up to 4 (applies for PM).

The instrument is based on an 8-bit microcontroller with a multichannel 24-bit sigma-delta converter, which secures high accuracy, stability and easy operation of the instrument.

The MAP 4000 is a multifunction instrument available in following types and ranges

**type UNI**

**DC:** 0…60/150/300/1200 mV

**PM:** 0…5 mA/0…20 mA/0…20 mA/±2 V/±5 V/±10 V/±40 V

**OHM:** 0…100 Ω/0…1 kΩ/0…10 kΩ/0…100 kΩ

**RTD-Pt:** Pt 50/100/Pt 500/Pt 1 000

**RTD-Cu:** Cu 50/Cu 100

**RTD-Ni:** Ni 1 000/Ni 10 000

**T/C:** J/K/T/E/B/S/R/N/L

**DU:** Linear potentiometer (min. 500 Ω)

**type UNI, option A**

**DC:** 0…1 A/0…5 A/120 V/±250 V/±500 V

**type UNI, option B (expansion by 3 more inputs)**

**PM:** 3x 0…5 mA/0…20 mA/0…20 mA/±2 V/±5 V/±10 V/±40 V

**PROGRAMMABLE PROJECTION**

Selection: of type of input and measuring range

Measuring range: adjustable as fixed or with automatic change

Setting: manual, optional projection on the display may be set in the menu for both limit values of the input signal, e.g. input 0…20 mA > 0…850,0

Projection: -9999…9999 (-99999…999999)

**COMPENSATION**

of conduct: in the menu it is possible to perform compensation for 2-wire connection

of conduct in probe: internal connection (conduct resistance in measuring head)

of CJC (T/C): manual or automatic, in the menu it is possible to perform selection of the type of thermocouple and compensation of cold junctions, which is adjustable or automatic (temperature at the brackets)

**LINEARIZATION**

Linearization: * by linear interpolation in 50 points (solely via data)

**DIGITAL FILTERS**

Expon. average: from 2…100 measurements

Rounding: setting the projection step for display

**MATHEMATICS FUNCTIONS**

Min/max. value: registration of min./max. value reached during measurement

Tare: designed to reset display upon non-zero input signal

Peak value: the display shows only max. or min. value

Mat. operations: polynome, 1/x, logarithm, exponential, power, root, sin x

* only for types DC, PM, DU
EXTERNAL CONTROL

Lock: control keys blocking
Hold: display/instrument blocking
Tare: tare activation/resetting tare to zero
Resetting MM: resetting min/max value
Memory: data storage into instrument memory

2.2 Operation

The instrument is set and controlled by five control keys located on the front panel. All programmable settings of the instrument are performed in three adjusting modes:

LIGHT  Simple programming menu
- contains solely items necessary for instrument setting and is protected by optional number code

PROFI  Complete programming menu
- contains complete instrument menu and is protected by optional number code

USER  User programming menu
- may contain arbitrary items selected from the programming menu (LIGHT/PROFI), which determine the right (see or change)
- access without password

All programmable parameters are stored in the EEPROM memory (they hold even after the instrument is switched off).

2.3 Options

Excitation is suitable for supplying power to sensors and transmitters. It has a galvanic separation.

Comparators are assigned to monitor one, two, three or four limit values with relay output. The user may select limits regime: LIMIT/DOSING/FROM-TO. The limits have adjustable hysteresis within the full range of the display as well as selectable delay of the switch-on in the range of 0...99,9 s. Reaching the preset limits is signalled by LED and simultaneously by the switch-on of the relevant relay.

Data outputs are for their rate and accuracy suitable for transmission of the measured data for further projection or directly into the control systems. We offer an isolated RS232 and RS485 with the ASCII or DIN MessBus protocol.

Analog outputs will find their place in applications where further evaluating or processing of measured data is required in external devices. We offer universal analog output with the option of selection of the type of output - voltage/current. The value of analog output corresponds with the displayed data and its type and range are selectable in Menu.

Measured data record is an internal time control of data collection. It is suitable where it is necessary to register measured values. Two modes may be used. FAST is designed for fast storage (40 records/s) of all measured values up to 8 000 records. Second mode is RTC, where data record is governed by Real Time with data storage in a selected time segment and cycle. Up to 250 000 values may be stored in the instrument memory. Data transmission into PC via serial interface RS232/485.
The instrument supply leads should not be in proximity of the incoming low-potential signals. Contactors, motors with larger input power should not be in proximity of the instrument. The leads into the instrument input (measured quantity) should be in sufficient distance from all power leads and appliances. Provided this cannot be secured it is necessary to use shielded leads with connection to ground (bracket E). The instruments are tested in compliance with standards for use in industrial area, yet we recommend to abide by the above mentioned principles.

### MEASURING RANGES

<table>
<thead>
<tr>
<th>Type</th>
<th>Input I</th>
<th>Input U</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td>0...60/150/300/1 200 mV</td>
<td>±2/±5/±10/±40 V</td>
</tr>
<tr>
<td>PM</td>
<td>0...5/20 mA/4...20 mA</td>
<td>±2/±5/±10/±40 V</td>
</tr>
<tr>
<td>OHM</td>
<td>0...0,1/1/10/100 kΩ/Autorange</td>
<td></td>
</tr>
<tr>
<td>RTD-Pt</td>
<td>Pt 100/Pt 500/ Pt 1 000</td>
<td></td>
</tr>
<tr>
<td>RTD-Cu</td>
<td>Cu 50/100</td>
<td></td>
</tr>
<tr>
<td>RTD-Ni</td>
<td>Ni 1 000/10 000</td>
<td></td>
</tr>
<tr>
<td>T/C</td>
<td>J/K/T/E/B/S/R/N</td>
<td></td>
</tr>
<tr>
<td>DU</td>
<td>Linear potentiometer (min. 500 Ω)</td>
<td></td>
</tr>
</tbody>
</table>

### OPTION “A”

<table>
<thead>
<tr>
<th>Type</th>
<th>Input I</th>
<th>Input U</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td>±0,1 A/±0,25 A/±0,5 A to GND (C)</td>
<td>±100 V/±250 V/±500 V to GND (C)</td>
</tr>
<tr>
<td></td>
<td>±2 A/±5 A to GND (B)</td>
<td></td>
</tr>
</tbody>
</table>

### OPTION “B”

<table>
<thead>
<tr>
<th>Type</th>
<th>Input 2, 3, 4/I</th>
<th>Input 2, 3, 4/U</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM</td>
<td>0...5/20 mA/4...20 mA</td>
<td>±2/±5/±10/±40 V</td>
</tr>
</tbody>
</table>
Excitation has the minus pole common with the input - the bracket no. 20 - GND and you may set its value by trimmer above the bracket no. 17
### INSTRUMENT SETTING

#### For expert users
- Complete instrument menu
- Access is password protected
- Possibility to arrange items of the „User“ menu
- Tree menu structure

#### For trained users
- Only items necessary for instrument setting
- Access is password protected
- Possibility to arrange items of the „User“ menu
- Linear menu structure

#### For user operation
- Menu items are set by the user (Profi/Light) as per request
- Access is not password protected
- Optional menu structure either tree (PROFI) or linear (LIGHT)
4.1 Setting

The instrument is set and controlled by five control keys located on the front panel. All programmable settings of the instrument are performed in three adjusting modes:

**LIGHT** Simple programming menu
- contains solely items necessary for instrument setting and is protected by optional number code

**PROFI** Complete programming menu
- contains complete instrument menu and is protected by optional number code

**USER** User programming menu
- may contain arbitrary items selected from the programming menu (LIGHT/PROFI), which determine the right (see or change)
- access without password

All programmable parameters are stored in the EEPROM memory (they hold even after the instrument is switched off).

Scheme of processing the measured signal

![Diagram of signal processing](attachment:image.png)
Setting and controlling the instrument is performed by means of 5 control keys located on the front panel. With the aid of these keys it is possible to browse through the operation menu and to select and set required values.

**Symbols used in the instructions**

- **DC PM DU OHM RTD T/C** Indicates the setting for given type of instrument
- **DEF** values preset from manufacture
- **42** symbol indicates a flashing light (symbol)
- **MIN** inverted triangle indicates the item that can be placed in USER menu
- **CONNECT** broken line indicates a dynamic item, i.e. it is displayed only in particular selection/version
- **30** continues on page 30

**Setting the decimal point and the minus sign**

**DECIMAL POINT**

Its selection in the menu, upon modification of the number to be adjusted it is performed by the control key with transition beyond the highest decade, when the decimal point starts flashing. Positioning is performed by  /  .

**THE MINUS SIGN**

Setting the minus sign is performed by the key on higher decade. When editing the item substraction must be made from the current number (e.g.: 013 > on class 100 > -87)
**Control keys functions**

<table>
<thead>
<tr>
<th>Key</th>
<th>Measurement</th>
<th>Menu</th>
<th>Setting numbers/selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>🔄</td>
<td>access into USER menu</td>
<td>exit menu</td>
<td>quit editing</td>
</tr>
<tr>
<td>⬅️</td>
<td>programmable key function</td>
<td>back to previous level</td>
<td>move to higher decade</td>
</tr>
<tr>
<td>⬇️</td>
<td>programmable key function</td>
<td>move to previous item</td>
<td>move down</td>
</tr>
<tr>
<td>⬆️</td>
<td>programmable key function</td>
<td>move to next item</td>
<td>move up</td>
</tr>
<tr>
<td>🔄</td>
<td>programmable key function</td>
<td>confirm selection</td>
<td>confirm setting/selection</td>
</tr>
</tbody>
</table>

- 🔄 + ⬇️ access into LIGHT/PROFI menu
- 🔄 + ⬆️ direct access into PROFI menu
- 🔄 + ⬆️ configuration of an item for “USER” menu
- 🔄 + ⬇️ determine the sequence of items in “USER - LIGHT” menu

**Setting items into „USER“ menu**

- in LIGHT or PROFI menu
- no items permitted in USER menu from manufacture
- on items marked by inverted triangle

- 🔄 + ● item will not be displayed in USER menu
- 🔄 + ⬆️ item will be displayed in USER menu with the option of setting
- 🔄 + ⬇️ item will be solely displayed in USER menu
5.0 Setting “LIGHT”

**LIGHT**
Simple programming menu
- contains only items necessary for instrument setting and is protected by optional number code

- For capable users
- Only items necessary for instrument setting
- Access is password protected
- Possibility to arrange items of the „User” menu
- Linear menu structure

### Preset from manufacture

<table>
<thead>
<tr>
<th>Password</th>
<th>“0”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menu</td>
<td>LIGHT</td>
</tr>
<tr>
<td>USER menu</td>
<td>off</td>
</tr>
<tr>
<td>Setting the items</td>
<td>DEF</td>
</tr>
</tbody>
</table>
Upon delay exceeding 60 s the programming mode is automatically discontinued and the instrument itself restores the measuring mode.

Returning to measuring mode.
**INSTRUCTIONS FOR USE**

**MAP 4000**

**Selection of the type of instrument**

- primary selection of the type of instrument
- performs default setting of values from manufacture, incl. calibration

**Access into instrument menu**

- access into menu is unrestricted, after releasing keys you automatically move to first item of the menu

**PAS = 0**

**PAS > 0**

- access into menu is protected by number code

**Set “Password” = 42**

Example

<table>
<thead>
<tr>
<th>Type</th>
<th>Menu</th>
<th>Type of instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td>DC</td>
<td>DC voltmeter</td>
</tr>
<tr>
<td>PM</td>
<td>PM</td>
<td>Process monitor</td>
</tr>
<tr>
<td>OHM</td>
<td>OHM</td>
<td>Ohmmeter</td>
</tr>
<tr>
<td>RTD-Pt</td>
<td>RTD-Pt</td>
<td>Thermometer for sensors Pt</td>
</tr>
<tr>
<td>RTD-Ni</td>
<td>RTD-Ni</td>
<td>Thermometer for sensors Ni</td>
</tr>
<tr>
<td>TC</td>
<td>TC</td>
<td>Thermometer for thermocouples</td>
</tr>
<tr>
<td>DU</td>
<td>DU</td>
<td>Display for lin. potentiometer</td>
</tr>
<tr>
<td>RTD-Cu</td>
<td>RTD-Cu</td>
<td>Thermometer for sensors Cu</td>
</tr>
</tbody>
</table>

**Type “PM”**

Example
**INSTRUCTIONS FOR USE**

**MAP 4000**

- **Projection for 0 mV > MIN A = 0**
  - Position of the DP does not affect display projection
  - The DP is automatically shifted after the value is confirmed
  
  **DEF = 0**

- **Example**
  - Setting display projection for minimum value of input signal
  - Range of the setting is -99999...99999
  
  **MIN A**

- **Example**
  - Setting for minimum input signal
  
  **MIN A**

- **Example**
  - Selection of the instrument measuring range
  
  **MODE =**
  
<table>
<thead>
<tr>
<th>Menu</th>
<th>Measuring range</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 mV</td>
<td>±60 mV</td>
</tr>
<tr>
<td>150 mV</td>
<td>±150 mV</td>
</tr>
<tr>
<td>300 mV</td>
<td>±300 mV</td>
</tr>
<tr>
<td>1200 mV</td>
<td>±1,2 V</td>
</tr>
<tr>
<td>100 V</td>
<td>±100 V</td>
</tr>
<tr>
<td>250 V</td>
<td>±250 V</td>
</tr>
<tr>
<td>500 V</td>
<td>±500 V</td>
</tr>
<tr>
<td>0.10 A</td>
<td>±0,1 A</td>
</tr>
<tr>
<td>0.25 A</td>
<td>±0,25 A</td>
</tr>
<tr>
<td>0.50 A</td>
<td>±0,5 A</td>
</tr>
<tr>
<td>1.00 A</td>
<td>±1 A</td>
</tr>
<tr>
<td>5.00 A</td>
<td>±5 A</td>
</tr>
</tbody>
</table>

- **Example**
  - Type "DC"
  
  **DC**
**Setting for maximum input signal**

- Range of the setting is -99999...999999
- Position of the DP does not affect display projection
- The DP is automatically shifted after the value is confirmed

**Example**

**Projection for 150 mV > MAX A = 3500**

- **DEF** = 100

---

**Setting projection of the decimal point**

- Positioning of the DP is set here in the measuring mode

**Example**

- Projection of DP on display > 00000.0

*Subsequent item on the menu depends on instrument equipment*
**SETTING**

**INSTRUCTIONS FOR USE**

**MAP 4000**

### Selection of the instrument measuring range

**DEF** = 4 - 20 mA

<table>
<thead>
<tr>
<th>Menu</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5mA</td>
<td>0...5 mA</td>
</tr>
<tr>
<td>0-20mA</td>
<td>0...20 mA</td>
</tr>
<tr>
<td>4-20mA</td>
<td>4...20 mA</td>
</tr>
<tr>
<td>0-2 V</td>
<td>±2 V</td>
</tr>
<tr>
<td>0-5 V</td>
<td>±5 V</td>
</tr>
<tr>
<td>0-10 V</td>
<td>±10 V</td>
</tr>
<tr>
<td>0-40 V</td>
<td>±40 V</td>
</tr>
</tbody>
</table>

### Setting display projection for minimum value of input signal

- position of the DP does not affect display projection
- the DP is automatically shifted after the value is confirmed

**DEF** = 0

### Setting for minimum input signal

### Projection for 0 mA > MIN A = -25

- range of the setting is -99999...99999

**PM**
### Setting Display Projection for Maximum Value of Input Signal

**Setting display projection for maximum value of input signal**

- Range of the setting is -99999...999999
- Position of the DP does not affect display projection
- The DP is automatically shifted after the value is confirmed

**DEF** = 100

#### Example

<table>
<thead>
<tr>
<th>Projection for 20 mA &gt; MAX A = 2500</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>300</td>
<td>500</td>
</tr>
<tr>
<td>500</td>
<td>750</td>
</tr>
</tbody>
</table>

---

### Setting Projection of the Decimal Point

**Setting projection of the decimal point**

- Positioning of the DP is set here in the measuring mode

**DEF** = 0000.00

#### Example

<table>
<thead>
<tr>
<th>Projection of DP on display &gt; 00000.0</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000.00</td>
<td>00000.0</td>
</tr>
</tbody>
</table>
Type "DU"

**MIN A**

Setting display projection for minimum value of input signal
- range of the setting is \-99999 \ldots 999999
- position of the DP does not affect display projection
- the DP is automatically shifted after the value is confirmed

**DEF** = 0

**Projection for the beginning > MIN A = 0**

Example

**MAX A**

Setting display projection for maximum value of input signal
- range of the setting is \-99999 \ldots 999999
- position of the DP does not affect display projection
- the DP is automatically shifted after the value is confirmed

**DEF** = 100

**Projection for the end > MAX A = 5000**

Example
Calibration of the beginning and the end of range of linear potentiometer is on page 37.
INSTRUCTIONS FOR USE

MAP 4000

**Type “OHM”**

**MODE**

<table>
<thead>
<tr>
<th>Menu</th>
<th>Measuring range</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 R</td>
<td>0…100 Ω</td>
</tr>
<tr>
<td>1 k</td>
<td>0…1 k</td>
</tr>
<tr>
<td>10 k</td>
<td>0…10 k</td>
</tr>
<tr>
<td>100 k</td>
<td>0…100 k</td>
</tr>
<tr>
<td>AUTO</td>
<td>Autorange</td>
</tr>
</tbody>
</table>

**Range 0…10 kΩ**

**MIN A**

- Setting display projection for minimum value of input signal
  - range of the setting is -99999...999999
  - position of the DP does not affect display projection
  - the DP is automatically shifted after the value is confirmed
  **DEF** = 0

**CONECT.**

**Selection of the type of sensor connection**

**DEF** = 2-WIRE

**Type of connection - 3 wire > CONECT. = 3-WIRE**

**MIN A**

Setting for minimum input signal

**CONECT.**

Selection of instrument measuring range

**DEF** = 100 Ω

**MODE**

**CONECT.**

Menu Connection

- 2-WIRE 2-wire
- 3-WIRE 3-wire
- 4-WIRE 4-wire
**INSTRUCTIONS FOR USE**

**MAP 4000**

- **MAP 4000** Setting display projection for maximum value of input signal
  - Range of the setting is -99999...999999
  - Position of the DP does not affect display projection
  - The DP is automatically shifted after the value is confirmed

**MAX A Setting for maximum input signal**

```
OHM     OHM     OHM     OHM     OHM     OHM     OHM     OHM     OHM
```

Example:
```
00000
0000.0
```

**FORM A** Setting projection of the decimal point

- Positioning of the DP is set here in the measuring mode

**Projection of DP on display > 00000.0**

```
00000.0 0000.0 0000 000 00 0 0 0
```

*Subsequent item on the menu depends on instrument equipment*
**INSTRUCTIONS FOR USE**

**MAP 4000**

**Type “RTD-Pt”**

- **More**
  - EU-100
  - EU-500
  - EU-1k0
  - US-100
  - US-100
  - US-100

**NOTE**

Selection of instrument measuring range

- **Def** = Pt 100

<table>
<thead>
<tr>
<th>Mode</th>
<th>Measuring range</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU-100</td>
<td>Pt 100 (3 850 ppm/°C)</td>
</tr>
<tr>
<td>EU-500</td>
<td>Pt 500 (3 850 ppm/°C)</td>
</tr>
<tr>
<td>EU-1k0</td>
<td>Pt 1000 (3 850 ppm/°C)</td>
</tr>
<tr>
<td>US-100</td>
<td>Pt 100 (3 920 ppm/°C)</td>
</tr>
<tr>
<td>RU-50</td>
<td>Pt 50 (3 910 ppm/°C)</td>
</tr>
<tr>
<td>RU-100</td>
<td>Pt 100 (3 910 ppm/°C)</td>
</tr>
</tbody>
</table>

**Example**

**Range - Pt 1000 > MODE = EU-1k0**

- EU-100
- EU-500
- EU-1k0
- **Connect**

**Connect**

Selection of the type of sensor connection

- **Def** = 2-WIRE

<table>
<thead>
<tr>
<th>Menu</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-WIRE</td>
<td>2-wire</td>
</tr>
<tr>
<td>3-WIRE</td>
<td>3-wire</td>
</tr>
<tr>
<td>4-WIRE</td>
<td>4-wire</td>
</tr>
</tbody>
</table>

**Example**

**Type of connection - 3 wire > Connect = 3-WIRE**

- 2-WIRE
- 3-WIRE
- **Enter**
**FORM. A** Setting projection of the decimal point

- positioning of the DP is set here in the measuring mode

<table>
<thead>
<tr>
<th>Projection of DP on display &gt; 000000</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000.0</td>
<td>0000.0</td>
</tr>
</tbody>
</table>

* subsequent item on the menu depends on instrument equipment
**INSTRUCTIONS FOR USE**

**MAP 4000**

Type "RTD-Cu"

**MODE**

Selection of instrument measuring range

- **DEF** = Cu 50/4 280 ppm

**MODE**

Menu | Measuring range
--- | ---
428-50 | Cu 50 (4 280 ppm/°C)
428-0.1 | Cu 100 (4 280 ppm/°C)
426-50 | Cu 50 (4 260 ppm/°C)
426-0.1 | Cu 100 (4 260 ppm/°C)

**MODE**

Selection of the type of sensor connection

- **DEF** = 2-WIRE

**MODE**

Menu | Connection
--- | ---
2-WIRE | 2-wire
3-WIRE | 3-wire
4-WIRE | 4-wire

**MODE**

Type of connection: 3 wire > **CONNEC** = 3-WIRE

- **CONNEC**

**MODE**

Selection of instrument measuring range

- **DEF** = Cu 50/4 280 ppm

**MODE**

Menu | Measuring range
--- | ---
428-50 | Cu 50 (4 280 ppm/°C)
428-0.1 | Cu 100 (4 280 ppm/°C)
426-50 | Cu 50 (4 260 ppm/°C)
426-0.1 | Cu 100 (4 260 ppm/°C)
**Setting projection of the decimal point**

- positioning of the DP is set here in the measuring mode

<table>
<thead>
<tr>
<th>Projection of DP on display</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEF = 00000.0</td>
<td></td>
</tr>
</tbody>
</table>

* subsequent item on the menu depends on instrument equipment
Type "RTD-Ni"

**Selection of instrument measuring range**

**DEF** = Ni 1 000 - 5 000 ppm/°C

<table>
<thead>
<tr>
<th>MODE</th>
<th>Measuring range</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0-1k</td>
<td>Ni 1 000 (5 000 ppm/°C)</td>
</tr>
<tr>
<td>6.2-1k</td>
<td>Ni 1 000 (6 180 ppm/°C)</td>
</tr>
<tr>
<td>5.0-10k</td>
<td>Ni 10 000 (5 000 ppm/°C)</td>
</tr>
<tr>
<td>6.2-10k</td>
<td>Ni 10 000 (6 180 ppm/°C)</td>
</tr>
</tbody>
</table>

Range - Pt 1 000 > MODE = EU-1k0

**Example**

**Selection of the type of sensor connection**

**DEF** = 2-WIRE

<table>
<thead>
<tr>
<th>Connection</th>
<th>Menu</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-WIRE</td>
<td>2-wire</td>
</tr>
<tr>
<td>3-WIRE</td>
<td>3-wire</td>
</tr>
<tr>
<td>4-WIRE</td>
<td>4-wire</td>
</tr>
</tbody>
</table>
### Setting projection of the decimal point

- Positioning of the DP is set here in the measuring mode.

**Example**

<table>
<thead>
<tr>
<th>Projection of DP on display</th>
<th>DEF</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 000000</td>
<td>00000.0</td>
</tr>
</tbody>
</table>

*Subsequent item on the menu depends on instrument equipment.*
INSTRUCTIONS FOR USE

**Type of Thermocouple**

- Setting the input range depends on the measuring range ordered

**DEF** = Type “J”

<table>
<thead>
<tr>
<th>Type of Thermocouple</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>T/C B B</td>
<td></td>
</tr>
<tr>
<td>T/C E E</td>
<td></td>
</tr>
<tr>
<td>T/C J J</td>
<td></td>
</tr>
<tr>
<td>T/C K K</td>
<td></td>
</tr>
<tr>
<td>T/C N N</td>
<td></td>
</tr>
<tr>
<td>T/C R R</td>
<td></td>
</tr>
<tr>
<td>T/C S S</td>
<td></td>
</tr>
<tr>
<td>T/C T T</td>
<td></td>
</tr>
</tbody>
</table>

**Selection of the Type of Sensor Connection**

**DEF** = EXT. 1TC

<table>
<thead>
<tr>
<th>Connection</th>
<th>Ref. T/C</th>
</tr>
</thead>
<tbody>
<tr>
<td>INT.1TC</td>
<td></td>
</tr>
<tr>
<td>INT.2TC</td>
<td></td>
</tr>
<tr>
<td>EXT.1TC</td>
<td></td>
</tr>
<tr>
<td>EXT.2TC</td>
<td></td>
</tr>
</tbody>
</table>

**Type of Connection > CONECT. = EXT. 2TC**

<table>
<thead>
<tr>
<th>Connection</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXT.1TC</td>
<td>C.J. TEM.</td>
</tr>
<tr>
<td>EXT.2TC</td>
<td></td>
</tr>
</tbody>
</table>
### Setting Temperature of Cold Junction

**Setting temperature of cold junction**

- Range 0...99°C with compensation box

### Setting Projection of the Decimal Point

**Setting projection of the decimal point**

- Positioning of the DP is set here in the measuring mode

### Important Notes

- For thermocouple type "B" the items CONECT. and C.J. TEM. are not available
- Method and procedure of setting the cold junctions is described in separate chapter on page 76
INSTRUCTIONS FOR USE

MAP 4000

Displayed only with options > Comparators

**LIM L.1** Setting boundary for limit 1

- range of the setting is -99999...999999
- default "Hysteresis"=0 "Delay"=0

**DEF** = 20

```
Setting limit 1 > L 1 = 32
```

Example

```
* subsequent item on the menu depends on instrument equipment
```

**LIM L.2** Setting boundary for limit 2

- range of the setting is -99999...999999
- default "Hysteresis"=0 "Delay"=0

**DEF** = 40

```
Setting limit 2 > L 2 = 53.1
```

Example

```
Items for "Limits" and "Analog output" are accessible only if incorporated in the instrument.

Setting only with options > Comparators
**LIM L.3** Setting boundary for limit 3

- range of the setting is \(-99999...999999\)
- default “Hysteresis”=0 “Delay”=0

**DEF** = 60

<table>
<thead>
<tr>
<th>Setting limit 3 &gt; L 3 = 85</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>62</td>
<td>61</td>
</tr>
<tr>
<td>85</td>
<td>85</td>
</tr>
</tbody>
</table>

* subsequent item on the menu depends on instrument equipment.

---

**LIM L.4** Setting boundary for limit 4

- range of the setting is \(-99999...999999\)
- default “Hysteresis”=0 “Delay”=0

**DEF** = 80

<table>
<thead>
<tr>
<th>Setting limit 4 &gt; L 4 = 103</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>82</td>
<td>81</td>
</tr>
<tr>
<td>103</td>
<td>103</td>
</tr>
</tbody>
</table>

* subsequent item on the menu depends on instrument equipment.
Items for "Limits" and "Analog output" are accessible only if incorporated in the instrument.
Assigning the display value to the end of the AO range

- range of the setting is -99999...999999

Display value for the end of the AO range > MAX A.O. = 120

Example:

```
100
100
120
```

Displayed only with options > Analog output
**INSTRUCTIONS FOR USE**

**MAP 4000**

---

**Menu LIGHT > MENU = LIGHT**

**Light**
- menu LIGHT, a simple menu, which contains only the most essential items necessary for instrument setting
- linear tree structure

**Profi**
- menu PROFI, a complete menu for complete instrument setting
- tree menu structure

**DEF = LIGHT**

---

**Setting the menu type LIGHT/PROFI**

---

**Restoration of manufacture calibration**
- in the event of error calibration it is feasible to restore manufacture calibration.

---

**Restoration of manufacture setting > CALIB.**

---

**Restoration of manufacture instrument setting**
- in the event of error setting the manufacture setting may be restored
- restoration is performed for the currently selected type of the instrument input (select "TYPE")
- provided you stored your user setting in the "PROFI" menu, it may also be restored (select "USER")
- loading manufacture calibration and primary setting of items on the menu (DEF)

---

**Type “DC”**
- 38

**Type “PM”**
- 38

**Type “DU”**
- 37

**Type “OHM”**
- 38

**Type “RTD-Pt”**
- 38

**Type “RTD-Co”**
- 38

**Type “RTD-Ni”**
- 38

**Type “T/C”**
- 38

---

"subsequent item on the menu depends on instrument type, for "DU" > "K. MIN"
C. MIN
Calibration of input range - the potentiometer traveller in initial position
- prior confirming the flashing “YES” sign the potentiometer traveller has to be in given idle position

Calibration of the beginning of the range > C. MIN
Example

C. MAX
Calibration of input range - the potentiometer traveller in end position
- prior confirming the flashing “YES” sign the potentiometer traveller has to be in given idle position

Calibration of the end of the range > C. MAX
Example

Type “DU”

Only for type “DU”
**LANG**  Selection of language in instrument menu

- selection of language version of the instrument menu
  
  **DEF** = ENGL

**Example**

Language selection: ENGLISH > LANG. = ENGL.

**N.PASS**  Setting new access password

- access password for menu LIGHT/PROFI
- range of the number code 0…9999

- upon setting the password to “000” the access to menu LIGHT/PROFI is free without prompt to enter it
- in the event of loss universal password “8177” may be used

**DEF** = 0

**Example**

New password: 341 > N.PASSW. = 341
- the display shows the type of instrument indication, SW number, SW version and current input setting (Mode)

- if SW version contains a letter in first position, then it is a customer SW
- after the identification is completed the menu is automatically exited and the instrument restores the measuring mode

Return to measuring mode
6.0 Setting “PROFI”

PROFI Complete programming menu
- contains complete instrument menu and is protected by optional number code
- designed for expert users
- preset from manufacture is menu LIGHT

Switching over to “PROFI” menu

+ temporary switch-over to PROFI menu, which is suitable to edit a few items
- after quitting PROFI menu the instrument automatically switches to LIGHT menu
- access is password protected (if it was not set under item N. PASS. =0)

+ access into LIGHT menu and transition to item „MENU“ with subsequent selection of „PROFI“ and confirmation
- after re-entering the menu the PROFI type is active
- access is password protected (if it was not set under item N. PASS. =0)

- For expert users
- Complete instrument menu
- Access is password protected
- Possibility to arrange items of the „User“ menu
- Tree menu structure
6.1 Setting “PROFI” - INPUT

The primary instrument parameters are set in this menu:

- **CLEAR** - Resetting internal values
- **CONFIG** - Selection of measuring range and parameters
- **RTC** - Setting date and time for option with RTC
- **EXT. IN.** - Setting external inputs functions
- **KEYS** - Assigning further functions to keys on the instrument

6.1.1 Resetting internal values

- **CLEAR** - Resetting internal values
- **CL. TAR.** - Tare resetting
- **CL. M.M.** - Resetting min/max value
  - resetting memory for the storage of minimum and maximum value achieved during measurement
- **CL. MEM.** - Resetting the instrument memory
  - resetting memory with data measured in the “FAST” or “RTC” modes
  - not in standard equipment
**6.1.2a Selection of measuring rate**

Input: CLEAR

Channel: CONFIG

Output: RTC

Service: EXT.

Config: KEYS

Inputs: TYPE

**Selection of measuring rate**

<table>
<thead>
<tr>
<th>SETTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.0</td>
</tr>
<tr>
<td>20.0</td>
</tr>
<tr>
<td>10.0</td>
</tr>
<tr>
<td>5.0</td>
</tr>
<tr>
<td>2.0</td>
</tr>
<tr>
<td>1.0</td>
</tr>
<tr>
<td>0.5</td>
</tr>
<tr>
<td>0.2</td>
</tr>
<tr>
<td>0.1</td>
</tr>
</tbody>
</table>

**6.1.2b Selection of “instrument” type**

Input: CLEAR

Channel: CONFIG

Output: RTC

Service: EXT.

Config: KEYS

Inputs: TYPE

**Selection of “instrument” type**

- selection of particular type of “instrument” is bound to relevant dynamic items

<table>
<thead>
<tr>
<th>SETTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
</tr>
<tr>
<td>PM</td>
</tr>
<tr>
<td>OHM</td>
</tr>
<tr>
<td>RTD-Pt</td>
</tr>
<tr>
<td>RTD-Ni</td>
</tr>
<tr>
<td>TC</td>
</tr>
<tr>
<td>DU</td>
</tr>
<tr>
<td>RTD-Cu</td>
</tr>
</tbody>
</table>
Upon delay exceeding 60 s the programming mode is automatically discontinued and the instrument itself restores the measuring mode.
6.1.2c Selection of measuring range

Switching in the mode AUTO - “OHM”

<table>
<thead>
<tr>
<th>Resistance Range</th>
<th>Measuring Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 &gt; 1 k</td>
<td>0.101 k</td>
</tr>
<tr>
<td>1 k &gt; 10 k</td>
<td>1.010 k</td>
</tr>
<tr>
<td>10 k &gt; 100 k</td>
<td>10.10 k</td>
</tr>
<tr>
<td>100 &gt; 10 k</td>
<td>9.900 k</td>
</tr>
<tr>
<td>10 k &gt; 1 k</td>
<td>0.990 k</td>
</tr>
<tr>
<td>1 k &gt; 0.1 k</td>
<td>0.099 k</td>
</tr>
</tbody>
</table>

When selecting the “AUTO” range, the items “MIN”, “MAX”, “P. TAR. A” will not be displayed in the “CHAN. A” setting.
6.1.2d Selection of type of sensor connection

RTD OHM T/C

<table>
<thead>
<tr>
<th>CONECT</th>
<th>Selection of type of sensor connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTD</td>
<td>2-wire connection</td>
</tr>
<tr>
<td>OHM</td>
<td>3-wire connection</td>
</tr>
<tr>
<td>T/C</td>
<td>4-wire connection</td>
</tr>
</tbody>
</table>

**T/C**

- **INT.1TC**: Measurement without reference thermocouple
  - measuring cold junction at instrument brackets
- **INT.2TC**: Measurement with reference thermocouple
  - measuring cold junction at instrument brackets with anti-series connected reference thermocouple
- **EXT.1TC**: Measurement without reference thermocouple
  - the entire measuring set is working under invariant and constant temperature
- **EXT.2TC**: Measurement with reference thermocouple
  - when using compensation box

**Method and procedure of setting the cold junctions is described in separate chapter on page 76**

**For thermocouple type “B” the items CONECT. and C.J. TEM. are not available**
6.1.2e Setting temperature of cold junction

- range 0...99°C with compensation box
- DEF = 23°C

6.1.2f Compensation of 2-wire conduct

- in cases when it is necessary to offset the beginning of the range by certain value, e.g. while using sensor in measuring head
- entered directly in Ohm (0...9999)
- DEF = 0

6.1.2g Compensation of 2-wire conduct

- for measurement accuracy it is necessary to perform compensation of conduct always in case of 2-wire connection
- prior confirmation of the displayed prompt „YES“ it is necessary to substitute the sensor at the end of the conduct by a short-circuit
- DEF = 0
### 6.1.3 Setting the real time clock

<table>
<thead>
<tr>
<th>INPUTS</th>
<th>CLEAR</th>
<th>TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHANNEL</td>
<td>CONFIG</td>
<td>RTC</td>
</tr>
<tr>
<td>OUTPUT</td>
<td>E\textsc{xt} \textsc{in}</td>
<td>E\textsc{xt} \textsc{s}</td>
</tr>
</tbody>
</table>

**RTC**

- **TIME**
  - Time setting
  - Format: 23.59.59
- **DATE**
  - Date setting
  - Format: DD.MM.YY

### 6.1.4a External input function selection

<table>
<thead>
<tr>
<th>INPUTS</th>
<th>CLEAR</th>
<th>E\textsc{xt} 1</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHANNEL</td>
<td>CONFIG</td>
<td>E\textsc{xt} 2</td>
<td>HOL\textsc{t}</td>
</tr>
<tr>
<td>OUTPUT</td>
<td>RTC</td>
<td>E\textsc{xt} 3</td>
<td>LOC \textsc{t}</td>
</tr>
<tr>
<td>SERVIC</td>
<td>E\textsc{xt} \textsc{in}</td>
<td>H. HOL\textsc{t}</td>
<td>CL. MM</td>
</tr>
<tr>
<td></td>
<td>E\textsc{xt} \textsc{s}</td>
<td>TARE</td>
<td>B. PASS</td>
</tr>
</tbody>
</table>

**E\textsc{xt} \textsc{in}**

- **OFF**
  - Input is off
- **HOL\textsc{t}**
  - Activation of HOLD
- **LOC \textsc{t}**
  - Locking keys on the instrument
- **TARE**
  - Tare activation
- **CL. MM**
  - Resetting min/max value
- **CL. TAR**
  - Tare resetting
- **B. PASS**
  - Activation of locking access into programming menu LIGHT/PROFI
- **STORE**
  - Activation of measured data record in instrument memory (not in standard equipment)
- **DEF**
  - Ext. 1 > HOLD
  - Ext. 2 > LOCK K.
  - Ext. 3 > TARE

* Setting procedure is identical for EXT. 2 and EXT. 3
### 6.1.4b Selection of function “HOLD”

**DISP.**
“HOLD” locks only the value displayed

**DIS.+AO.**
“HOLD” locks the value displayed and on AO

**D.+AO.+L.**
“HOLD” locks the value displayed, on AO and limit evaluation

**ALL**
“HOLD” locks the entire instrument

### 6.1.5a Optional accessory functions of the keys

**FN. LE.**
Assigning further functions to instrument keys
- „FN. LE.“ > executive functions
- „TMP. LE.“ > temporary projection of selected values
- „MNU. LE.“ > direct access into menu on selected item
- after confirmation of this selection the “MNU. LE.” item is displayed on superior menu level, where required selection is performed

**TEMP. V.**
Temporary projection of selected values
- after confirmation of this selection the item “TMP. LE.” is displayed on superior menu level, where required selection is performed

**CL. TAR.**
Tare function activation

---

**Preset values of the control keys (DEF):**
- LEFT: Show Tare
- UP: Show Max. value
- DOWN: Show Min. value
- ENTER: w/o function

**Setting is identical for LEFT, DOWN, UP and ENTER**
Optional accessory functions of the keys - Temporary projection

- “Temporary” projection of selected value is displayed for the time of keystroke
- “Temporary” projection may be switched to permanent by pressing + “Selected key”, this holds until the stroke of any key

### TEMP. LE
Temporary projection of selected item

*Setting is identical for LEFT, DOWN, UP and ENTER*
Optional accessory functions of the keys - Direct access to item

Assigning access to selected menu item

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LIM 1</td>
<td>Direct access to item “LIM 1”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIM 2</td>
<td>Direct access to item “LIM 2”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIM 3</td>
<td>Direct access to item “LIM 3”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIM 4</td>
<td>Direct access to item “LIM 4”</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Setting is identical for LEFT, DOWN, UP and ENTER
6.2 Setting “PROFI” - CHANNELS

6.2.1a Display projection

The primary instrument parameters are set in this menu:
- Setting parameters of measuring “Channel”
- Setting parameters of mathematic functions
- Selection of access and evaluation of Min/max value

6.2.1b Setting fixed tare

- Setting display projection for minimum value of input signal
  - range of the setting is -99999...999999
  - DEF = 0
- Setting display projection for maximum value of input signal
  - range of the setting is 999999...999999
  - DEF = 100

- Setting “Fixed tare” value
  - setting is designed for the event when it is necessary to firmly shift the beginning of the range by known size
  - when setting (P.TAR. A > 0) display shows “T” symbol
  - range of the setting is 0...999999
  - DEF = 0
6.2.1c Digital filters

- at times it is useful for better user projection of data on display to modify it mathematically and properly, wherefore the following filters may be used:

**NO:** Filters are off

**AVER.** Measured data average
- arithmetic average from given number ("CON.F. A.") of measured values
- range 2...100

**FLOAT.** Selection of floating filter
- floating arithmetic average from given number ("CON.F. A.") of measured data and updates with each measured value
- range 2...30

**E#:PON.** Selection of exponential filter
- integration filter of first prvního grade with time constant ("CON.F. A.") measurement
- range 2...100

**ROUN** Measured value rounding
- is entered by any number, which determines the projection step (e.g. "CON.F. A." = 2.5 > display 0, 2.5, 5,...)

**CON.F. A.** Setting constants
- this menu item is always displayed after selection of particular type of filter
- **DEF** = 2
6.2.1d  Projection format - positioning of decimal point

- the instrument allows for classic projection of a number with positioning of the DP as well as projection with floating DP, allowing to display a number in its most exact form „FLOAT.P.“

- Setting DP - XXXXXX.
- Setting DP - XXXXX.x
- Setting DP - XXXX.xx
- Setting DP - XXX.xxx
- Setting DP - XX.xxx
- Setting DP - X.xxx

- Floating DP

6.2.1e  Projection of description - the measuring units

- projection of measured data may be extended (at the expense of the number of displayed places) by two characters for description
- description is set by shifted ASCII code, when two first places show the set description and two last characters their code in period 0…95
- description is cancelled by code 00

- RTD  T/C  DEF  = °C
- DC  PM  DU  OHM  DEF  = none

Table of signs on page 81
6.2.1f Selection of storing data into instrument memory

- by selection in this item you allow to register values into instrument memory
- another setting in item “OUTPUT > MEMORY” (not in standard experiment)

Measured data are stored in the memory
Measured data are not stored
### 6.2.2a Mathematic functions

#### MATH F: Selection of mathematic functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Mathematic functions are off</td>
</tr>
<tr>
<td>POLIN</td>
<td>Polynome</td>
</tr>
<tr>
<td>EXP 1/MUL</td>
<td>$A x^5 + B x^4 + C x^3 + D x^2 + E x + F$</td>
</tr>
<tr>
<td>LOGAR</td>
<td>Logarithm</td>
</tr>
<tr>
<td>EXP E:POH</td>
<td>$A \ln \left( \frac{B x + C}{D x + E} \right) + F$</td>
</tr>
<tr>
<td>POWER</td>
<td>Exponential</td>
</tr>
<tr>
<td>EXP POWER</td>
<td>$A \times \left( \frac{B x + C}{D x + E} \right)^2 + F$</td>
</tr>
<tr>
<td>ROOT</td>
<td>Power</td>
</tr>
<tr>
<td>EXP ROOT</td>
<td>$A x \sqrt[3]{B x + C} \sqrt[3]{D x + E} + F$</td>
</tr>
<tr>
<td>SIN</td>
<td>Root</td>
</tr>
<tr>
<td>EXP SIN</td>
<td>$A \sin^3 x + B \sin^4 x + C \sin^3 x \sin x + D \sin^5 x + E \sin x + F$</td>
</tr>
</tbody>
</table>

#### Setting constants for calculation of mat. functions
- This menu is displayed only after selection of given mathematic function
6.2.2b Mathematic functions - decimal point

- The instrument allows for classic projection of a number with positioning of the DP as well as projection with floating DP, allowing to display a number in its most exact form, "Floa.P."

- Selection of decimal point
- Setting DP - XXXXXX.
- Setting DP - XXXXX.x
- Setting DP - XXXX.xx
- Setting DP - XXX.xxx
- Setting DP - XX.xxxx
- Setting DP - X.xxxxx
- Floating DP
- DEF

6.2.2c Mathematic functions - measuring units

- Projection of measured data may be extended (at the expense of the number of displayed places) by two characters for description
- Description is set by shifted ASCII code, when two first places show the set description and two last characters their code in period 0...95
- Description is cancelled by code 00
- DEF = no description

! Table of signs on page 81
### 6.2.2d Mathematic functions - selection of storing data into instrument memory

**Selection of storing data into instrument memory**

- by selection in this item you allow to register values into instrument memory
- another setting in item “OUTPUT > MEMORY” (not in standard experiment)

- **YES** Measured data are stored in the memory
- **NO** Measured data are not stored

### 6.2.3 Selection of evaluation of min/max value

**Selection of evaluation of min/max value**

- selection of value from which the min/max value will be calculated

- **NO** Evaluation of min/max value is off
- **CHANNEL A** From “Channel A”
- **FIL. A** From “Channel A” after digital filters processing
- **MAT. FN.** From “Mathematic functions”
In this menu it is possible to set parameters of the instrument output signals:

- **MEMORY**: Setting data logging into memory
- **LIMITS**: Setting type and parameters of limits
- **DATA**: Setting type and parameters of data output
- **AN. OUT.**: Setting type and parameters of analog output
- **DISP.**: Setting display projection and brightness

### 6.3.1a Selection of mode of data logging into instrument memory

- **REHPIT**: Selection of the mode of data logging
  - selection of the mode in the event of full instrument memory
  - **NO**: Rewriting values prohibited
  - **YES**: Rewriting values permitted, the oldest get rewritten by the latest
6.3.1b Setting data logging into instrument memory - RTC

- **START**: Start of data logging into instrument memory
  - time format HH.MM.SS
- **STOP**: Stop data logging into instrument memory
  - time format HH.MM.SS
- **PERIOD**: Period of data logging into instrument memory
  - determines the period in which values will be logged in an interval delimited by the time set under items START and STOP
  - time format HH.MM.SS
  - records are made on a daily basis in selected interval and period
  - item not displayed if “STORE” is selected in menu (Input > EXT. IN.)

6.3.1c Setting data logging into instrument memory - FAST

- **TRIGER**: Setting logging data into inst. memory
  - logging data into inst. memory is governed by the following selection, which determines how many percent of the memory is reserved for data logging prior to initiation of trigger impulse
  - initiation is on ext. input or control key
  - Reser. of 10 % memory prior init. of data logging
  - Reser. of 50 % memory prior init. of data logging
  - Reser. of 90 % memory prior init. of data logging
  - After initiation of data logging the memory is cyclically transcribed
6.3.2a Selection of input for limits evaluation

Setting is identical for LIM 2, LIM 3 and LIM 4

6.3.2b Selection of type of limit

Setting is identical for LIM 2, LIM 3 and LIM 4

INP. L.1 Selection evaluation of limits
- selection of value from which the limit will be evaluated

<table>
<thead>
<tr>
<th>INP. L.1</th>
<th>CHAN. A</th>
<th>FIL. A</th>
<th>MAT. FN.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>OFF. L.1</td>
<td>MIN</td>
<td>MAX</td>
</tr>
</tbody>
</table>

MOD. L.1 Selection the type of limit
- Limit is in mode “Limit, hysteresis, delay”
  - for this mode the parameters of “LIM. L.” are set, at which the limit will shall react, “HYS. L.” the hysteresis range around the limit (LIM ±1/2 HYS) and time “TIM. L.” determining the delay of relay switch-on

<table>
<thead>
<tr>
<th>MOD. L.1</th>
<th>FROM.</th>
<th>LOSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYS. L.1</td>
<td>OFF. L.1</td>
<td>PER. L.1</td>
</tr>
<tr>
<td>ON. L.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Setting is identical for LIM 2, LIM 3 and LIM 4
6.3.2c Selection of type of output

**Setup Options**
- **INPUTS**
- **CHANNEL**
- **OUTPUT**
- **SERVICE**

**Limit Values**
- **LIM 1**
- **LIM 2**
- **LIM 3**
- **LIM 4**

**Outputs**
- **CLOSE**
- **OPEN**

- **TYP. L.1**
- **Selection of type of output**
  - Output switches on when condition is met
  - Output switches off when condition is met

**Setting Limit for Switch-on**
- **LIM. L1**

**Setting Hysteresis**
- **HYS. L1**
  - Indicates the range around the limit (in both directions, LIM. ±1/2 HYS.)

**Setting the Outset of the Interval of Limit Switch-on**
- **ON L1**

**Setting the End of the Interval of Limit Switch-on**
- **OFF L1**

**Setting the Period of Limit Switch-on**
- **PER L1**

**Setting the Time Switch-on of the Limit**
- **TIM L1**

**Notes**
- Setting is identical for LIM 2, LIM 3, and LIM 4

---

6.3.2d Setting values for limits evaluation

---

**Instruction for Use**

**Map 4000**
6.3.3a Selection of data output baud rate

<table>
<thead>
<tr>
<th>BAUD</th>
<th>Selection of data output baud rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>600</td>
<td>Rate - 600 Baud</td>
</tr>
<tr>
<td>1200</td>
<td>Rate - 1200 Baud</td>
</tr>
<tr>
<td>2400</td>
<td>Rate - 2400 Baud</td>
</tr>
<tr>
<td>4800</td>
<td>Rate - 4800 Baud</td>
</tr>
<tr>
<td>9600</td>
<td>Rate - 9600 Baud</td>
</tr>
<tr>
<td>19200</td>
<td>Rate - 19200 Baud</td>
</tr>
<tr>
<td>38400</td>
<td>Rate - 38400 Baud</td>
</tr>
<tr>
<td>57600</td>
<td>Rate - 57600 Baud</td>
</tr>
<tr>
<td>115200</td>
<td>Rate - 115200 Baud</td>
</tr>
<tr>
<td>230400</td>
<td>Rate - 230400 Baud</td>
</tr>
</tbody>
</table>

6.3.3b Setting instrument address

<table>
<thead>
<tr>
<th>DEF</th>
<th>Setting instrument address</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>- setting in range 0...31</td>
</tr>
<tr>
<td>247</td>
<td>- setting in range 1...247</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEF</th>
<th>Setting instrument address - MODBUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td></td>
</tr>
<tr>
<td>247</td>
<td></td>
</tr>
</tbody>
</table>
6.3.3c Selection of data output protocol

- Selection of the type of analog output
  - ASCII
  - M.BUS
  - MOD BUS
  - PROT

6.3.4a Selection of input for analog output

- Selection evaluation analog output
  - NO
  - CHAN. A
  - FIL. A
  - MAT. FN.

- selection of value from which the analog output will be evaluated
  - AO evaluation is off
  - AO evaluation from “Channel A”
  - AO evaluation from “Math.functions”
  - AO evaluation from “Min.value”
  - AO evaluation from “Max.value”
6.3.4b Selection of the type of analog output

- Analog output is isolated and its value corresponds with displayed data. It is fully programmable, i.e. it allows to assign the AO limit points to two arbitrary points of the measuring range.

### Setting of the type of analog output

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-20mA</td>
<td>Type - 0...20 mA</td>
</tr>
<tr>
<td>E 4-20</td>
<td>Type - 4...20 mA with indication of error statement (&lt; 3.0 mA)</td>
</tr>
<tr>
<td>4-20mA</td>
<td>Type - 4...20 mA</td>
</tr>
<tr>
<td>0-5mA</td>
<td>Type - 0...5 mA</td>
</tr>
<tr>
<td>0-2V</td>
<td>Type - 0...2 V</td>
</tr>
<tr>
<td>0-5V</td>
<td>Type - 0...5 V</td>
</tr>
<tr>
<td>0-10V</td>
<td>Type - 0...10 V</td>
</tr>
</tbody>
</table>

6.3.4c Setting the analog output range

- Analog output is isolated and its value corresponds with displayed data. It is fully programmable, i.e. it allows to assign the AO limit points to two arbitrary points of the measuring range.

### Setting the analog output range

**Assigning the display value to the beginning of the AO range**
- Range of the setting is -99999...999999
- **DEF** = 0

**Assigning the display value to the end of the AO range**
- Range of the setting is -99999...999999
- **DEF** = 100
6.3.5a Selection of input for display projection

- **PERM.** Selection of input for display projection
  - selection of value which will be shown on the instrument display

  - **CHAN. A** Projection of values from “Channel A”
  - **FIL. A** Projection of values from “Channel A” after digital filters processing
  - **MAT. FN.** Projection of values from “Math.functions”
  - **MIN.** Projection of values from “Min.value”
  - **MAX.** Projection of values from “Max.value”

- **BRIGHT** Selection of display brightness
  - by selecting display brightness we may appropriately react to light conditions in place of instrument location

  - **0%** Display is off
  - **25%** Display brightness - 25%
  - **50%** Display brightness - 50%
  - **75%** Display brightness - 75%
  - **100%** Display brightness - 100%
6.4 Setting “PROFI” - SERVIS

The instrument service functions are set in this menu:

- **MENU** Selection of menu type LIGHT/PROFI
- **RESTOR.** Restore instrument manufacture setting and calibration
- **CALIB.** Input range calibration for “DU” version
- **LANG.** Language version of instrument menu
- **N. PASS.** Setting new access password
- **IDENT.** Instrument identification

6.4.1 Selection of type of programming menu

- **MENU** Selection of menu type - LIGHT/PROFI
  - Enables setting the menu complexity according to user needs and skills
  - **LIGHT** Active LIGHT menu
    - Simple programming menu, contains only items necessary for configuration and instrument setting
    - Linear menu - items one after another
  - **PROFI** Active PROFI menu
    - Complete programming menu for expert users
    - Tree menu

Change of setting is valid upon next access into menu.
6.4.2 Restoration of manufacture setting

- in the event of error setting or calibration, manufacture setting may be restored.

- prior executing the changes you will be asked to confirm you selection „YES“

- generating the manufacture setting for currently selected type of instrument (items marked DEF)

- generating the instrument user setting, i.e. setting stored under SERVIC./RESTOR./SAVE

- storing the user setting allows the operator to restore it in future if needed

---

Jobs performed

<table>
<thead>
<tr>
<th>Jobs performed</th>
<th>Restore</th>
<th>Calibration</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>cancels USER menu rights</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>deletes table of items order in USER - LIGHT menu</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>adds items from manufacture to LIGHT menu</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>deletes data stored in FLASH</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>cancels or linearization tables</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>clears tare</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>clears conduct resistances</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>restore manufacture calibration</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>restore manufacture setting</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

After restoration the instrument switches off for couple seconds
6.4.3 Calibration - Input range

- when “C. MIN” is displayed, move the potentiometer traveller to the required minimum position and confirm by “Enter”, calibration is confirmed by “YES”

- when “C. MAX” is displayed, move the potentiometer traveller to required maximum position and confirm by “Enter”, calibration is confirmed by “YES”

6.4.4 Selection of instrument menu language version

- Instrument menu is in Czech
- Instrument menu is in English

6.4.5 Setting new access password

- this selection enables changing number code that blocks the access into LIGHT and PROFI Menu.
- range of the number code is 0…9999
- universal password in the event of loss is “8177”
6.4.6 Instrument identification

- display shows type identification of the instrument, SW number, SW version and current input setting (Mode)
- if the SW version reads a letter on first position, it is a customer SW
7.0 Setting items into "USER" menu

- **USER** menu is designed for users who need to change only several items of the setting without the option to change the primary instrument setting (e.g. repeated change of limit setting)
- there are no items from manufacture permitted in **USER** menu
- on items indicated by inverse triangle \( L \)
- setting may be performed in **LIGHT** or **PROFI** menu, with the **USER** menu then overtaking the given menu structure

- **For user operation**
- **Menu items are set by the user (Profi/Light) as per request**
- **Access is not password protected**
Setting sequence of items in “USER” menu

In compiling USER menu from active LIGHT menu the items (max. 10) may be assigned a sequence, in which they will be projected in the menu.

Example:
Into USER menu were selected these items
(keys $+$ > CL.TAR., LIM 1, LIM 2, LIM 3, for which we have preset this sequence (keys $+$ +)$:

<table>
<thead>
<tr>
<th>Item</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>CL.TAR.</td>
<td>5</td>
</tr>
<tr>
<td>LIM 1</td>
<td>0 (sequence not determined)</td>
</tr>
<tr>
<td>LIM 2</td>
<td>2</td>
</tr>
<tr>
<td>LIM 3</td>
<td>1</td>
</tr>
</tbody>
</table>

Upon entering USER menu
(key $+$) items will be projected in the following sequence: LIM 3 > LIM 2 > CL.TAR. > LIM 1
Instrument with input for temperature measurement with thermocouple allows to set two types of measurement of cold junction.

**WITH REFERENCE THERMOCOUPLE**
- a reference thermocouple may be located in the same place as the measuring instrument or in place with stable temperature/compensation box
- when measuring with reference thermocouple set CONNECT in the instrument menu to INT2TC or EXT2TC
- when using a thermostat (a compensation box or environment with constant temperature) set in the instrument menu CJC.TCN its temperature (applies for setting CONNECT to EXT2TC)
- if the reference thermocouple is located in the same environment as the measuring instrument then set in the instrument menu CONNECT to INT2TC. Based on this selection the measurement of the ambient temperature is performed by a sensor located in the instrument terminal board.

**WITHOUT REFERENCE THERMOCOUPLE**
- inaccuracy originating from the creation of dissimilar thermocouples on the transition point terminal/conductor of the thermocouple is not compensated for in the instrument
- when measuring without reference thermocouple set CONNECT in the instrument menu to INT1TC or EXT1TC
- when measuring temperature without reference thermocouple the error in measured data may be as much as 10°C (applies for setting CONNECT to EXT1TC)
The instruments communicate via serial line RS232 or RS485. For communication they use the ASCII protocol. Communication runs in the following format:

ASCII: 8 bit, no parity, one stop bit  
DIN MessBus: 7 bit, even parity, one stop bit

The transfer rate is adjustable in the instrument menu. The instrument address is set in the instrument menu in the range of 0 ÷ 31. The manufacture setting always presets the ASCII protocol, rate of 9600 Baud, address 00. The type of line used - RS232 / RS485 - is determined by an output board automatically identified by the instrument.

### DETAILED DESCRIPTION OF COMMUNICATION VIA SERIAL LINE

<table>
<thead>
<tr>
<th>Event</th>
<th>Type</th>
<th>Protocol</th>
<th>Transmitted data</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data solicitation (PC)</td>
<td>232</td>
<td>ASCII</td>
<td># A A &lt;CR&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>485</td>
<td>ASCII</td>
<td># A A &lt;CR&gt;</td>
<td></td>
</tr>
<tr>
<td>Data transmission (instrument)</td>
<td>232</td>
<td>ASCII</td>
<td>&gt; D (D) (D) (D) (D) (D) (D) (D) &lt;CR&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>485</td>
<td>ASCII</td>
<td>&gt; D (D) (D) (D) (D) (D) (D) (D) &lt;CR&gt;</td>
<td></td>
</tr>
<tr>
<td>Confirmation of data acceptance (PC) - OK</td>
<td>485</td>
<td>MessBus</td>
<td>&lt;DLE&gt; 1</td>
<td></td>
</tr>
<tr>
<td>Confirmation of data acceptance (PC) - Bad</td>
<td>485</td>
<td>MessBus</td>
<td>&lt;NAK&gt;</td>
<td></td>
</tr>
<tr>
<td>Sending address (PC) prior command</td>
<td>485</td>
<td>MessBus</td>
<td>&lt;EADR&gt; &lt;ENQ&gt;</td>
<td></td>
</tr>
<tr>
<td>Confirmation of address (instrument)</td>
<td>485</td>
<td>MessBus</td>
<td>&lt;SADR&gt; &lt;ENQ&gt;</td>
<td></td>
</tr>
<tr>
<td>Command transmission (PC)</td>
<td>232</td>
<td>ASCII</td>
<td># A A N P (D) (D) (D) (D) (D) (D) &lt;CR&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>485</td>
<td>ASCII</td>
<td># A A N P (D) (D) (D) (D) (D) (D) &lt;CR&gt;</td>
<td></td>
</tr>
<tr>
<td>Command confirmation (instrument)</td>
<td>232</td>
<td>ASCII</td>
<td>OK ! A A &lt;CR&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>485</td>
<td>ASCII</td>
<td>OK ! A A &lt;CR&gt;</td>
<td></td>
</tr>
<tr>
<td>Command confirmation (inst.) - OK</td>
<td>485</td>
<td>MessBus</td>
<td>! A A &lt;CR&gt;</td>
<td></td>
</tr>
<tr>
<td>Command confirmation (inst.) - Bad</td>
<td>485</td>
<td>MessBus</td>
<td>? A A &lt;CR&gt;</td>
<td></td>
</tr>
<tr>
<td>Instrument identification</td>
<td>485</td>
<td>ASCII</td>
<td># A A 1Y &lt;CR&gt;</td>
<td></td>
</tr>
<tr>
<td>HW identification</td>
<td>485</td>
<td>ASCII</td>
<td># A A 1Z &lt;CR&gt;</td>
<td></td>
</tr>
<tr>
<td>One-time transmission</td>
<td>485</td>
<td>ASCII</td>
<td># A A 7X &lt;CR&gt;</td>
<td></td>
</tr>
<tr>
<td>Repeated transmission</td>
<td>485</td>
<td>ASCII</td>
<td># A A 8X &lt;CR&gt;</td>
<td></td>
</tr>
</tbody>
</table>
LEGEND

<table>
<thead>
<tr>
<th>#</th>
<th>35</th>
<th>23 H</th>
<th>Command beginning</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A</td>
<td>0...31</td>
<td>Two characters of instrument address (sent in ASCII - tens and units, e.g. “01”, “99” universal)</td>
</tr>
<tr>
<td>&lt;CR&gt;</td>
<td>13</td>
<td>0D H</td>
<td>Carriage return</td>
</tr>
<tr>
<td>&lt;SP&gt;</td>
<td>32</td>
<td>20 H</td>
<td>Space</td>
</tr>
<tr>
<td>N, P</td>
<td></td>
<td></td>
<td>Number and command - command code</td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
<td>Data - usually characters “0”...“9”, “.”; (D) - dp. and (I) may prolong data</td>
</tr>
<tr>
<td>R</td>
<td>30 H...3F H</td>
<td>Relay and tare status</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>33</td>
<td>21 H</td>
<td>Positive confirmation of command (ok)</td>
</tr>
<tr>
<td>?</td>
<td>63</td>
<td>3F H</td>
<td>Negative confirmation of command (point)</td>
</tr>
<tr>
<td>&gt;</td>
<td>62</td>
<td>3E H</td>
<td>Beginning of transmitted data</td>
</tr>
<tr>
<td>&lt;STX&gt;</td>
<td>2</td>
<td>02 H</td>
<td>Beginning of text</td>
</tr>
<tr>
<td>&lt;ETX&gt;</td>
<td>3</td>
<td>03 H</td>
<td>End of text</td>
</tr>
<tr>
<td>&lt;SADR&gt;</td>
<td>address +60 H</td>
<td>Prompt to send from address</td>
<td></td>
</tr>
<tr>
<td>&lt;EADR&gt;</td>
<td>address +40 H</td>
<td>Prompt to accept command at address</td>
<td></td>
</tr>
<tr>
<td>&lt;ENQ&gt;</td>
<td>5</td>
<td>05 H</td>
<td>Terminate address</td>
</tr>
<tr>
<td>&lt;DLE&gt;</td>
<td>16</td>
<td>10 H...31 H</td>
<td>Confirm correct statement</td>
</tr>
<tr>
<td>&lt;NAK&gt;</td>
<td>21</td>
<td>15 H</td>
<td>Confirm error statement</td>
</tr>
<tr>
<td>&lt;BCC&gt;</td>
<td></td>
<td></td>
<td>Check sum - XOR</td>
</tr>
</tbody>
</table>

RELAY, TARE

<table>
<thead>
<tr>
<th>Sign</th>
<th>Relay 1</th>
<th>Relay 2</th>
<th>Tare</th>
<th>Change relay 3/4</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Q</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>R</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>S</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>T</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>U</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>V</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>W</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>p</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>q</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>r</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>s</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>t</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>u</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>v</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>w</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Relay status is generated by command #AA6X<CR>. The instrument immediately returns the value in the format >HH<CR>, where HH is value in HEX format and range 00 H...FF H. The lowest bit stands for „Relay 1”, the highest for „Relay 8”
## ERROR STATEMENTS

<table>
<thead>
<tr>
<th>ERROR</th>
<th>CAUSE</th>
<th>ELIMINATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.  U.</td>
<td>Number is too small (large negative) to be displayed</td>
<td>change DP setting, channel constant setting</td>
</tr>
<tr>
<td>E.  D.</td>
<td>Number is too large to be displayed</td>
<td>change DP setting, channel constant setting</td>
</tr>
<tr>
<td>E. T. U.</td>
<td>Number is outside the table range</td>
<td>increase table values, change input setting (channel constant setting)</td>
</tr>
<tr>
<td>E. T. O.</td>
<td>Number is outside the table range</td>
<td>increase table values, change input setting (channel constant setting)</td>
</tr>
<tr>
<td>E. I. U.</td>
<td>Input quantity is smaller than permitted input quantity range</td>
<td>change input signal value or input (range) setting</td>
</tr>
<tr>
<td>E. I. O.</td>
<td>Input quantity is larger than permitted input quantity range</td>
<td>change input signal value or input (range) setting</td>
</tr>
<tr>
<td>E.  H!</td>
<td>A part of the instrument does not work properly</td>
<td>send the instrument for repair</td>
</tr>
<tr>
<td>E.  EC</td>
<td>Data in EEPROM corrupted</td>
<td>perform restoration of manufacture setting upon repeated error statement send instrument for repair</td>
</tr>
<tr>
<td>E.  ATA</td>
<td>Data in EEPROM outside the range</td>
<td>perform restoration of manufacture setting upon repeated error statement send instrument for repair</td>
</tr>
<tr>
<td>E.  CLR.</td>
<td>Memory was empty (presetting carried out)</td>
<td>upon repeated error statement send instrument for repair, possible failure in calibration</td>
</tr>
</tbody>
</table>
The instrument allows to add two descriptive characters to the classic numeric formats (at the expense of the number of displayed places). The setting is performed by means of a shifted ASCII code. Upon modification the first two places display the entered characters and the last two places the code of the relevant symbol from 0 to 95. Numeric value of given character equals the sum of the numbers on both axes of the table.

Description is cancelled by entering characters with code 00

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>`</td>
<td>`</td>
<td>`</td>
<td>`</td>
<td>`</td>
<td>`</td>
<td>`</td>
</tr>
<tr>
<td>8</td>
<td>`</td>
<td>`</td>
<td>`</td>
<td>`</td>
<td>`</td>
<td>`</td>
<td>`</td>
</tr>
<tr>
<td>16</td>
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<td>2</td>
<td>3</td>
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<td>6</td>
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<tr>
<td>24</td>
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<td>9</td>
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<td>`</td>
<td>`</td>
<td>`</td>
<td>`</td>
</tr>
<tr>
<td>32</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>40</td>
<td>H</td>
<td>I</td>
<td>J</td>
<td>K</td>
<td>L</td>
<td>M</td>
<td>N</td>
</tr>
<tr>
<td>48</td>
<td>P</td>
<td>Q</td>
<td>R</td>
<td>S</td>
<td>T</td>
<td>U</td>
<td>V</td>
</tr>
<tr>
<td>56</td>
<td>x</td>
<td>y</td>
<td>z</td>
<td>[</td>
<td>\</td>
<td>]</td>
<td>^</td>
</tr>
<tr>
<td>64</td>
<td>a</td>
<td>b</td>
<td>c</td>
<td>d</td>
<td>e</td>
<td>f</td>
<td>g</td>
</tr>
<tr>
<td>72</td>
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<td>i</td>
<td>j</td>
<td>k</td>
<td>l</td>
<td>m</td>
<td>n</td>
</tr>
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<td>80</td>
<td>p</td>
<td>q</td>
<td>r</td>
<td>s</td>
<td>t</td>
<td>u</td>
<td>v</td>
</tr>
<tr>
<td>88</td>
<td>x</td>
<td>y</td>
<td>z</td>
<td>{</td>
<td></td>
<td></td>
<td>}</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>0</th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>!</td>
<td>&quot;</td>
<td>#</td>
<td>$</td>
<td>%</td>
<td>&amp;</td>
<td>'</td>
</tr>
<tr>
<td>8</td>
<td>(</td>
<td>)</td>
<td>*</td>
<td>+</td>
<td>,</td>
<td>-</td>
<td>.</td>
</tr>
<tr>
<td>16</td>
<td>0</td>
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<td>2</td>
<td>3</td>
<td>4</td>
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<td>6</td>
</tr>
<tr>
<td>24</td>
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<td>9</td>
<td>:</td>
<td>;</td>
<td>&lt;</td>
<td>=</td>
<td>&gt;</td>
</tr>
<tr>
<td>32</td>
<td>@</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
</tr>
<tr>
<td>40</td>
<td>H</td>
<td>I</td>
<td>J</td>
<td>K</td>
<td>L</td>
<td>M</td>
<td>N</td>
</tr>
<tr>
<td>48</td>
<td>P</td>
<td>Q</td>
<td>R</td>
<td>S</td>
<td>T</td>
<td>U</td>
<td>V</td>
</tr>
<tr>
<td>56</td>
<td>X</td>
<td>Y</td>
<td>Z</td>
<td>[</td>
<td>\</td>
<td>]</td>
<td>^</td>
</tr>
<tr>
<td>64</td>
<td>a</td>
<td>b</td>
<td>c</td>
<td>d</td>
<td>e</td>
<td>f</td>
<td>g</td>
</tr>
<tr>
<td>72</td>
<td>h</td>
<td>i</td>
<td>j</td>
<td>k</td>
<td>l</td>
<td>m</td>
<td>n</td>
</tr>
<tr>
<td>80</td>
<td>p</td>
<td>q</td>
<td>r</td>
<td>s</td>
<td>t</td>
<td>u</td>
<td>v</td>
</tr>
<tr>
<td>88</td>
<td>x</td>
<td>y</td>
<td>z</td>
<td>{</td>
<td></td>
<td></td>
<td>}</td>
</tr>
</tbody>
</table>
### INPUT

<table>
<thead>
<tr>
<th>Range</th>
<th>Input Resistance</th>
<th>DC</th>
<th>DU</th>
</tr>
</thead>
<tbody>
<tr>
<td>±60 mV</td>
<td>&gt;100 MOhm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>±150 mV</td>
<td>&gt;100 MOhm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>±300 mV</td>
<td>&gt;100 MOhm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>±1200 mV</td>
<td>&gt;100 MOhm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DC - option “A”**

<table>
<thead>
<tr>
<th>Range</th>
<th>DC Resistance</th>
<th>Input U</th>
<th>Input I</th>
</tr>
</thead>
<tbody>
<tr>
<td>±0,1 A</td>
<td>&lt; 300 mV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>±0,25 A</td>
<td>&lt; 300 mV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>±0,5 A</td>
<td>&lt; 300 mV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>±1 A</td>
<td>&lt; 30 mV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>±5 A</td>
<td>&lt; 150 mV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>±100 V</td>
<td>20 MOhm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>±250 V</td>
<td>20 MOhm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>±500 V</td>
<td>20 MOhm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PM**

<table>
<thead>
<tr>
<th>Range</th>
<th>DC Resistance</th>
<th>Input I</th>
</tr>
</thead>
<tbody>
<tr>
<td>0/4...20 mA</td>
<td>&lt; 400 mV</td>
<td></td>
</tr>
<tr>
<td>±2 V</td>
<td>1 MOhm</td>
<td></td>
</tr>
<tr>
<td>±5 V</td>
<td>1 MOhm</td>
<td></td>
</tr>
<tr>
<td>±10 V</td>
<td>1 MOhm</td>
<td></td>
</tr>
<tr>
<td>±40 V</td>
<td>1 MOhm</td>
<td></td>
</tr>
</tbody>
</table>

**PM**

<table>
<thead>
<tr>
<th>Range</th>
<th>DC Resistance</th>
<th>Input U</th>
</tr>
</thead>
<tbody>
<tr>
<td>0...100 Ohm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0...1 kOhm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0...10 kOhm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0...100 kOhm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**OHM**

<table>
<thead>
<tr>
<th>Scale</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°...99°C</td>
<td>or automatic</td>
</tr>
</tbody>
</table>

**RTD**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pt xxxx</td>
<td>-200°...850°C</td>
</tr>
<tr>
<td>Pt xxxx/3910 ppm</td>
<td>-200°...1 100°C</td>
</tr>
<tr>
<td>Ni xxxx</td>
<td>-50°...250°C</td>
</tr>
<tr>
<td>Cu/4260 ppm</td>
<td>-50°...200°C</td>
</tr>
<tr>
<td>Cu/4280 ppm</td>
<td>-200°...200°C</td>
</tr>
</tbody>
</table>

**Type Pt:**

- EU > 100/500/1 000 Ohm, with 3 850 ppm/°C
- US > 100 Ohm, with 3 920 ppm/°C
- RU > 50/100 Ohm, with 3 910 ppm/°C

**Type Ni:**

- Ni 1 000/ Ni 10 000 with 5 000/6 180 ppm/°C

**Type Cu:**

- Cu 50/Cu 100 with 4 260/4 280 ppm/°C

**Connection:**

- 2, 3 or 4 wire

**T/C**

**Type:**

- J (Fe-CuNi) -200°...900°C
- K (Ni-CuNi) -200°...1 300°C
- T (Cu-CuNi) -200°...400°C
- E (Ni-Cu-CuNi) -200°...690°C
- B (PtRh30-PtRh6) 300°...1 820°C
- S (PtRh10-Pt) -50°...1 760°C
- R (PtRh20-Pt) -50°...1 740°C
- N (Omegalloy) -200°...1 300°C

**COMPARATOR**

**Type:**

- digital, adjustable in menu

**Mode:**

- Hysteresis, From, Dosing

**Limita:**

- 999999...999999

**Hysteresis:**

- 0...999999

**Delay:**

- 0...99,9 s

**Outputs:**

- 2x relays with switch-on contact (Form A)
  - (230 VAC/30 VDC, 3 A)*
- 2x relays with switch-off contact (Form C)
  - (230 VAC/50 VDC, 3 A)*
- 2x SSR (250 VAC/1 A)*
- 2x/4x open collector (30 VDC/100 mA)
- 2x bistabil relays (250 VAC/250 VDC, 3 A/0,3 A)*

**Relay:**

- 1/8 HP 277 VAC, 1/10 HP 125 V, Pilot Duty D300

---

* values apply for resistance load
DATA OUTPUTS

Protocols: ASCII, DIN MessBus, MODBUS, PROBUS
Data format: 8 bit + no parity + 1 stop bit (ASCII), 7 bit + even parity + 1 stop bit (MessBus)
Rate: 600…230 400 Baud
RS 232: isolated, two-way communication
RS 485: isolated, two-way communication, addressing (max. 31 instruments)
PROFIBUS Data protocol SIEMENS

ANALOGO OUTPUTS

Type: isolated, programmable with resolution of max. 10 000 points, analog output corresponds with displayed data, type and range are adjustable
Non-linearity: 0,2 % of range
TC: 100 ppm/°C
Rate: response to change of value < 150 ms
Voltage: 0…2 V/5 V/10 V
Current: 0…5/20 mA/4…20 mA
- compensation of conduct to 500 Ohm/12 V or 1 000 Ohm/24 V

MEASURED DATA RECORD

Type RTC: time-controlled logging of measured data into instrument memory, allows to log up to 250 000 values
Type FAST: fast data logging into instrument memory, allows to log up to 8 000 values at a rate of 40 records/s
Transmission: via data output RS 232/485

EXCITATION

Adjustable: 5…24 VDC/max. 1,2 W, isolated

POWER SUPPLY

Options: 10…30 V AC/DC, 10 VA, isolated,
- fuse inside (T 4000 mA)
80…250 V AC/DC, 10 VA, isolated
- fuse inside (T 630 mA)

MECHANIC PROPERTIES

Material: Noryl GFN2 SE1, incombustible UL 94 V-I
Dimensions: 96 x 48 x 120 mm
Panel cut-out: 90,5 x 45 mm

OPERATING CONDITIONS

Connection: connector terminal board, conductor cross-section <1,5 mm² / <2,5 mm²
Stabilisation period: within 15 minutes after switch-on
Working temp.: 0°…60°C
Storage temp.: -10°…85°C
Cover: IP65 (front panel only)
Construction: safety class I
Overvoltage category: EN 61010-1, A2
Insulation resistance: for pollution degree II, measurement category III
instrum.power supply > 670 V (PI), 300 V (DI)
Input/output > 300 V (PI), 150 (DI)
EMC: EN 61000-3-2+A12; EN 61000-4-2, 3, 4, 5, 8, 11; EN 55022, A1, A2

**Table of rate of measurement in relation to number of inputs**

<table>
<thead>
<tr>
<th>Channels/Rate</th>
<th>40</th>
<th>20</th>
<th>10</th>
<th>5</th>
<th>2</th>
<th>1</th>
<th>0,5</th>
<th>0,2</th>
<th>0,1</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.of channels: 1 (Type: DC, PM, DU)</td>
<td>40,00</td>
<td>20,00</td>
<td>10,00</td>
<td>5,00</td>
<td>2,00</td>
<td>1,00</td>
<td>0,50</td>
<td>0,20</td>
<td>0,10</td>
</tr>
<tr>
<td>No.of channels: 2</td>
<td>5,00</td>
<td>2,50</td>
<td>1,25</td>
<td>1,00</td>
<td>0,62</td>
<td>0,38</td>
<td>0,22</td>
<td>0,09</td>
<td>0,05</td>
</tr>
<tr>
<td>No.of channels: 3</td>
<td>3,33</td>
<td>1,66</td>
<td>0,83</td>
<td>0,66</td>
<td>0,42</td>
<td>0,26</td>
<td>0,14</td>
<td>0,06</td>
<td>0,03</td>
</tr>
<tr>
<td>No.of channels: 4</td>
<td>2,50</td>
<td>1,25</td>
<td>0,62</td>
<td>0,50</td>
<td>0,31</td>
<td>0,19</td>
<td>0,11</td>
<td>0,05</td>
<td>0,02</td>
</tr>
<tr>
<td>No.of channels: 1 (Type: OHHM, RTD, T/C)</td>
<td>5,00</td>
<td>2,50</td>
<td>1,25</td>
<td>1,00</td>
<td>0,62</td>
<td>0,38</td>
<td>0,22</td>
<td>0,09</td>
<td>0,05</td>
</tr>
<tr>
<td>No.of channels: 2</td>
<td>3,33</td>
<td>1,066</td>
<td>0,83</td>
<td>0,66</td>
<td>0,42</td>
<td>0,26</td>
<td>0,14</td>
<td>0,06</td>
<td>0,03</td>
</tr>
<tr>
<td>No.of channels: 3</td>
<td>2,50</td>
<td>1,25</td>
<td>0,62</td>
<td>0,50</td>
<td>0,31</td>
<td>0,19</td>
<td>0,11</td>
<td>0,05</td>
<td>0,02</td>
</tr>
<tr>
<td>No.of channels: 4</td>
<td>2,00</td>
<td>1,00</td>
<td>0,50</td>
<td>0,40</td>
<td>0,25</td>
<td>0,15</td>
<td>0,08</td>
<td>0,04</td>
<td>0,02</td>
</tr>
</tbody>
</table>

PI - Primary insulation, DI - Double insulation
**INSTRUCTIONS FOR USE MAP 4000**

**Instrument installation**
1. insert the instrument into the panel cut-out
2. fit both travellers on the box
3. press the travellers close to the panel

**Instrument disassembly**
1. slide a screw driver under the traveller wing
2. turn the screw driver and remove the traveller
3. take the instrument out of the panel

**Panel thickness:** 0,5...20 mm

**Dimensions and Installation**

- **Panel cut**
  - Width: 90,5 mm
  - Height: 45 mm

- **Front view**
  - Width: 96 mm
  - Height: 48 mm

- **Side view**
  - Width: 119 mm
  - Height: 13,5 mm

**INSTR. DIMENSIONS AND INSTALLATION**
<table>
<thead>
<tr>
<th>Product</th>
<th>MAP 4000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td></td>
</tr>
<tr>
<td>Manufacturing No.</td>
<td></td>
</tr>
<tr>
<td>Date of sale</td>
<td></td>
</tr>
</tbody>
</table>

A guarantee period of 60 months from the date of sale to the user applies to this instrument. Defects occurring during this period due to manufacture error or due to material faults shall be eliminated free of charge.

For quality, function and construction of the instrument the guarantee shall apply provided that the instrument was connected and used in compliance with the instructions for use.

The guarantee shall not apply to defects caused by:

- mechanic damage
- transportation
- intervention of unqualified person incl. the user
- unavoidable event
- other unprofessional interventions

The manufacturer performs guarantee and post-guarantee repairs unless provided for otherwise.