

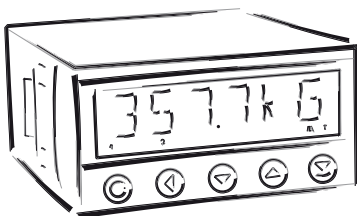


# OM 402LC

---

4 DIGIT PROGRAMMABLE  
INSTRUMENT

DISPLAY INSTRUMENT FOR TENSIO METER



## 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 OM 402 series conform to the European regulation 89/336/EWG.

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.



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**2.1 Description**

The OM 402LC model is 4 digit panel programmable instrument designed for DMS sensors connection.

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.

**PROGRAMMABLE PROJECTION**

Measuring range:	adjustable in menu (0,2...4 mV/V; 0,4...8 mV/V; 0,8...16 mV/V)
Setting:	manual, optional projection on the display may be set in the menu for both limit values of the input signal
Projection:	-9999...9999 (-99999...999999)

**LINEARIZATION**

Linearization: by linear interpolation in 50 points (solely via OM Link)

**TENSIOMETER VOLTAGE**

Fixed: 10 VDC, max. load 80 Ohm

**DIGITAL FILTERS**

Floating average:	from 2...30 measurements
Arithmetic. average:	from 2...100 measurements
Exponen. average:	from 2...100 measurements
Rounding:	setting the projection step for display

**MATHEMATIC FUCTIONS**

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

**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).



Complete instrument operation and setting may be performed via OM Link communication interface, which is a standard equipment of all instruments.

The operation program is freely accessible ([www.orbit.merret.cz](http://www.orbit.merret.cz)) and the only requirement is the purchase of OML cable to connect the instrument to PC. It is manufactured in version RS 232 and USB and is compatible with all ORBIT MERRET instruments. Another option for connection is with the aid of data output RS 232 or RS 485 (without the need of the OML cable).

The program OM LINK in „Basic“ version will enable you to connect one instrument with the option of visualization and archiving in PC. The OM Link „Standard“ version has no limitation of the number of instruments connected.

## 2.3 Options

**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 and OM Link.

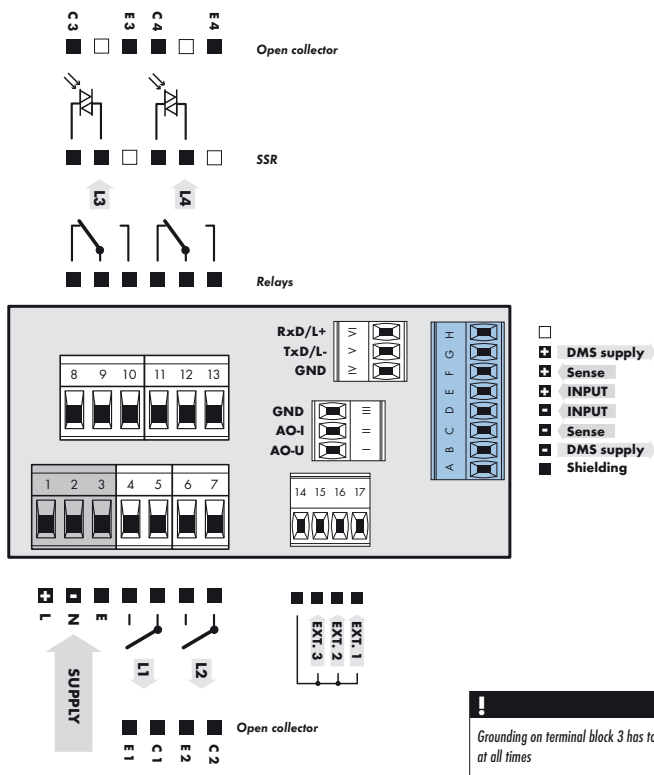
# 3 INSTRUMENT CONNECTION

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.



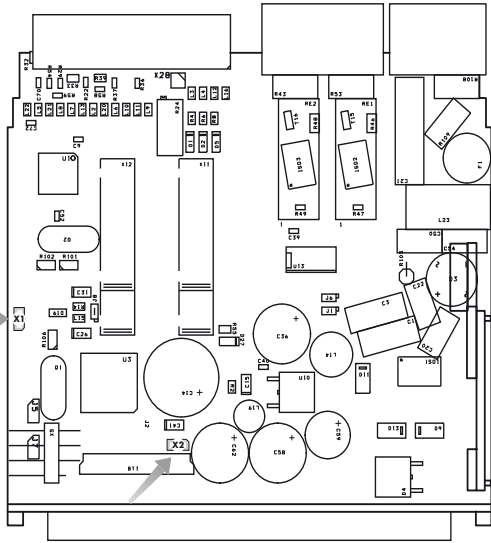
Signal „SENSE“ measures supply voltage on tension-meter upon 6-wire connection, for 4-wire connection join brackets B+C and F+G directly on the instrument. When using the instrument in highly disturbing environment we recommend using 4-wire connection.

Grounding on terminal block 3 has to be connected at all times

Terminal block “Shielding” is designed for connecting shielding of the supply lead (connected only on the side of the instrument). The “Shielding” and “GND” terminal blocks MUST NOT be connected

## Selection of jumpers

**X1 - Calibration**  
 no calibration enabled  
 yes calibration disabled



**X2 - Battery for RTC**  
 no Battery off  
 yes Battery on

PROFI

Setting

*profi*

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

LIGHT

Setting

*light*

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

USER

Setting

*profi light**user*

- ▶ 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:

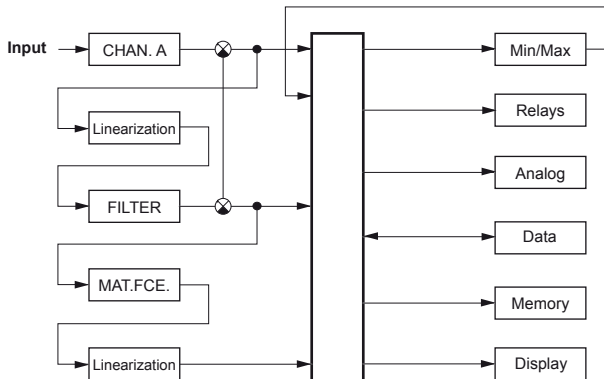
- LIGHT**      **Simple programming menu**  
 - contains solely items necessary for instrument setting and is protected by optional number code
- PROFI**      **Complete programming menu**  
 - contains complete instrument menu and is protected by optional number code
- USER**      **User programming menu**  
 - may contain arbitrary items selected from the programming menu (LIGHT/PROFI), which determine the right (see or change)  
 - acces without password

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

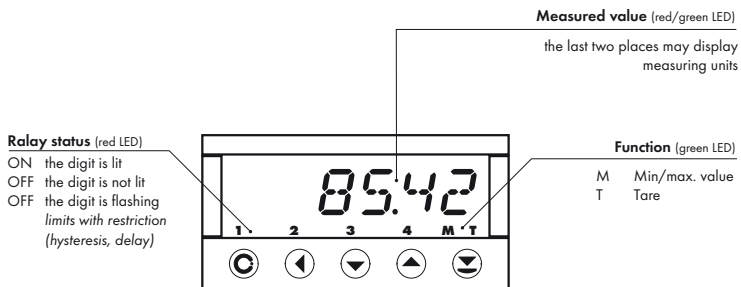
Complete instrument operation and setting may be performed via OM Link communication interface, which is a standard equipment of all instruments.

The operation program is freely accessible ([www.orbit.merret.cz](http://www.orbit.merret.cz)) and the only requirement is the purchase of OML cable to connect the instrument to PC. It is manufactured in version RS 232 and USB and is compatible with all ORBIT MERRET instruments. Another option for connection is with the aid of data output RS 232 or RS 485 (without the need of the OML cable).








## Scheme of processing the measured signal



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



-  values preset from manufacture
-  symbol indicates a flashing light (symbol)
-  inverted triangle indicates the item that can be placed in USER menu
-  broken line indicates a dynamic item, i.e. it is displayed only in particular selection/version
-  after pressing the key the set value will not be stored
-  after pressing the key the set value will be stored
-  **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 subtraction must be made from the current number (e.g.: 013 > , on class 100 > -87)

## Control keys functions

Key	Measurement	Menu	Setting numbers/selection
	access into USER menu	exit menu	quit editing
	programmable key function	back to previous level	move to higher decade
	programmable key function	move to previous item	move down
	programmable key function	move to next item	move up
	programmable key function	confirm selection	confirm setting/selection
			numeric value is set to zero
	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

**user**

*Legend is flashing - current setting is displayed*



- 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

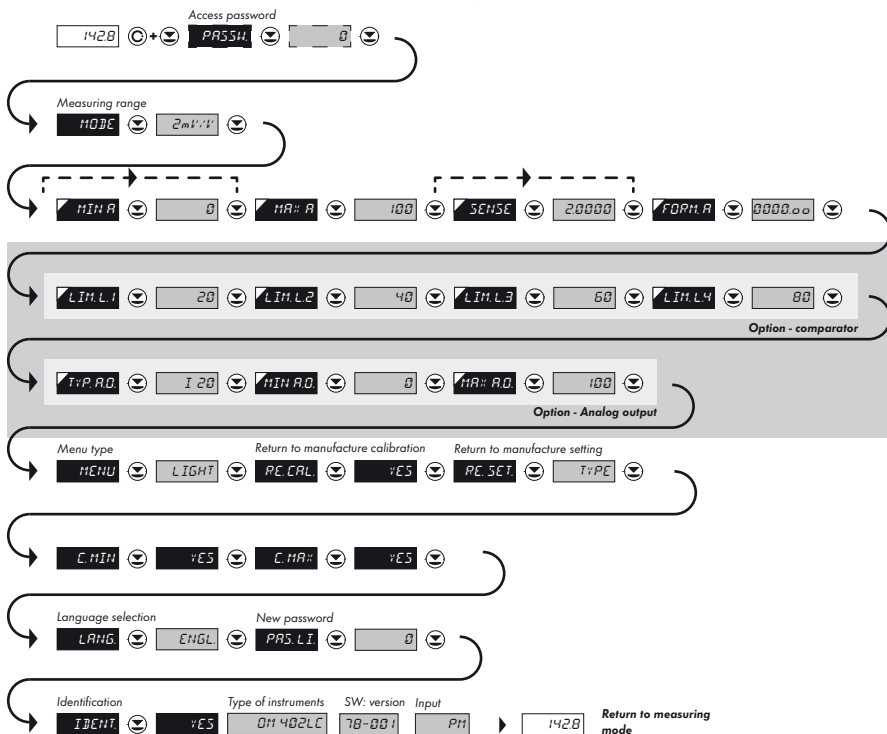
SETTING LIGHT

*Light*

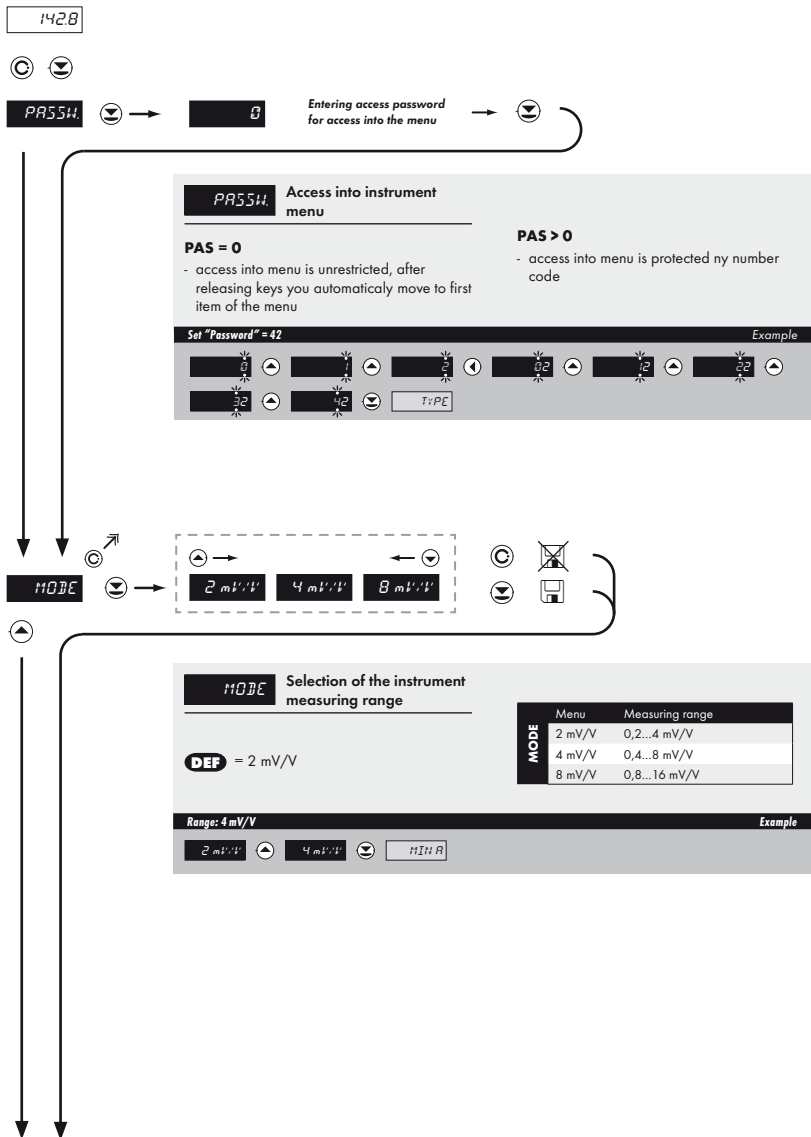
- For capable users
- Only items necessary for instrument setting
- Access is password protected
- Possibility to arrange items of the „User“ menu
- Linear menu structure

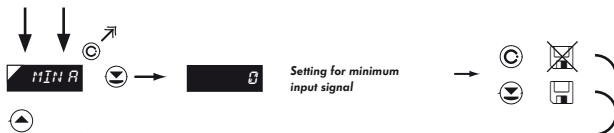
**Preset from manufacture**

Password	"0"
Menu	LIGHT
USER menu	off
Setting the items	<b>DEF</b>



**!**  
Upon delay exceeding 60 s the programming mode is automatically discontinued and the instrument itself restores the measuring mode





**MIN A** 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

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

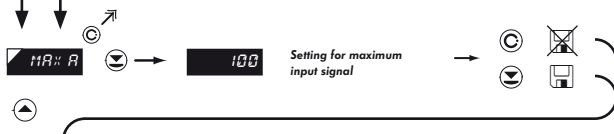
**DEF** = 0

**Projection for 0 mV > MIN A = 0** Example

The example shows a screen with 'MIN A' and a value of '0'. A vertical bar on the left indicates the projection range. A cursor is positioned at the '0'.

**!**

The item in "automatic calibration" does not appear



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

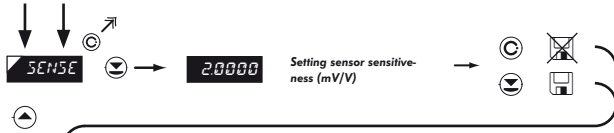
- position of the DP does not affect display projection
- the DP is automatically shifted after the value is confirmed

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

**DEF** = 100

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

The example shows a screen with 'MAX A' and a value of '100'. Below it, a series of screens show the projection range for values 100, 200, 300, 400, 500, and 3500. Each screen has a vertical bar and a cursor. The final screen shows '3500' and a 'FORM A' button.



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

- range of the setting: 0,2...4,0 (1...4 mV/V)
- range of the setting: 0,4...8,0 (2...8 mV/V)
- range of the setting 0,8...16,0 (1...4 mV/V)

- DP is automatically shifted after the value is confirmed

**DEF** = 2.00

Sensitiveness 2.0018 > SENSE = 2.0018 Example

0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18

F0P11.11

**!**

Manual calibration:

MAX Sensor range

SENSE Sensor sensitiveness

Automatic calibration  
(after calibration in menu "SERVICE/CALIB."):

MIN size of load, with which minimum calibration was performed

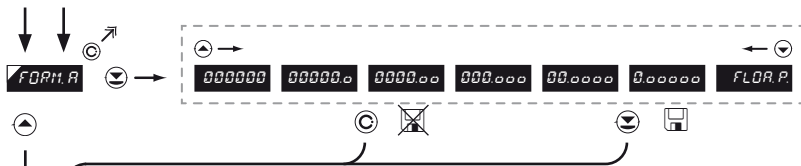
MAX size of load, with which maximum calibration was performed

- upon maximum calibration we recommend the reference load value in the upper third of the measuring range

**!**

The item in "automatic calibration" does not appear



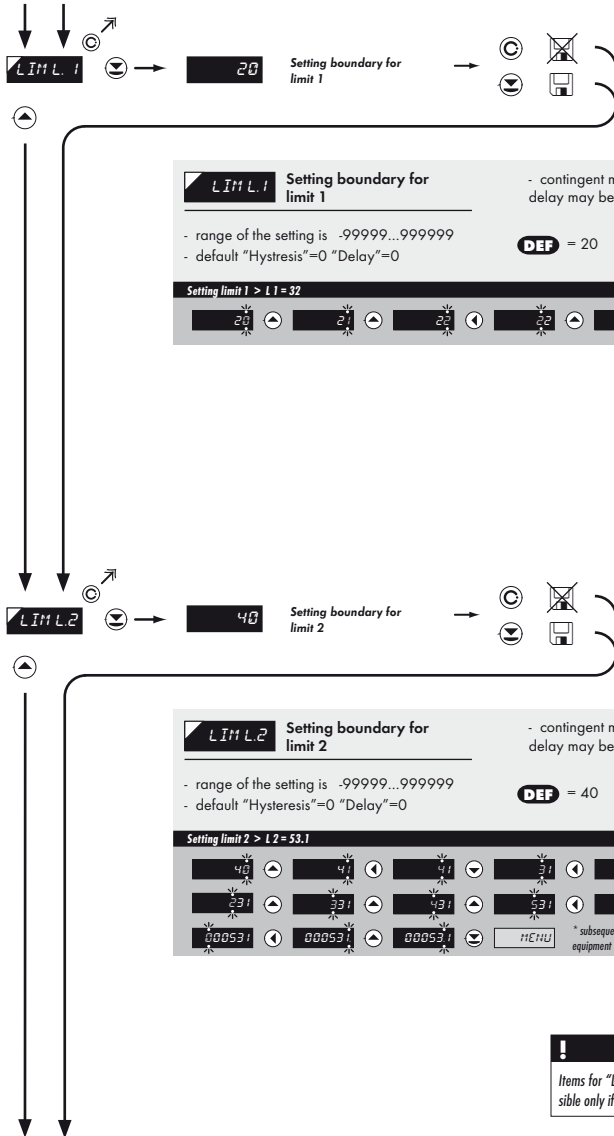


**FORM.R** Setting projection of the decimal point **DEF** = 0000.00

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

**Projection of DP on display > 00000.0** Example

0000.00    00000.0     \*subsequent item on the menu depends on instrument equipment



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



**LIM L3** Setting boundary for limit 3

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

**DEF** = 60

---

**Setting limit 3 > L3 = 85** Example

60	61	62	63	64	65
65	75	85	11E+11U		

\* subsequent item on the menu depends on instrument equipment



**LIM L4** Setting boundary for limit 4

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

**DEF** = 80

---

**Setting limit 4 > L4 = 103** Example

80	81	82	83	84	85
83	803	103	11E+11U		

\* subsequent item on the menu depends on instrument equipment

Diagram illustrating the settings for the analog output (A.O.) range and the display value assignment.

The top section shows the **TYP.A.O.** menu, which allows setting the type of analog output. The menu options are: 0-20mA, Er.4-T, 4-20 T, Er.4-20, ..., 0-10 V, and +-10 V. The **DEF** (default) value is 4...20 mA.

The middle section shows the **Setting the type of analog output** screen. The menu options and their descriptions are:

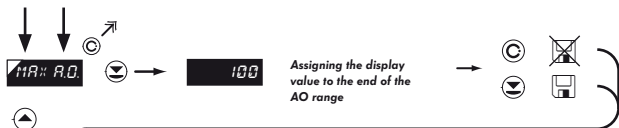
Menu	Range	Description
0-20mA	0...20 mA	
Er.4-T	4...20 mA	signaling interrupted current loop and displaying an error message (<3,6 mA)
4-20 T	4...20 mA	signaling broken current loop
E. 4-20mA	4...20 mA	with indication of error statement (<3,6 mA)
4-20mA	4...20 mA	
0.5mA	0...5 mA	
0.2 V	0...2 V	
0.5 V	0...5 V	
0-10 V	0...10 V	
+10 V	±10 V	

The **DEF** value is 4...20 mA. The example shows the setting: **Type of analog output - 0...10 V > TYP.A.O. = 0-10 V**.

The bottom section shows the **MIN.A.O.** menu, which allows assigning the display value to the beginning of the AO range. The **DEF** (default) value is 0.

The example shows the setting: **Display value for the beginning of the AO range > MIN.A.O. = 0**.

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



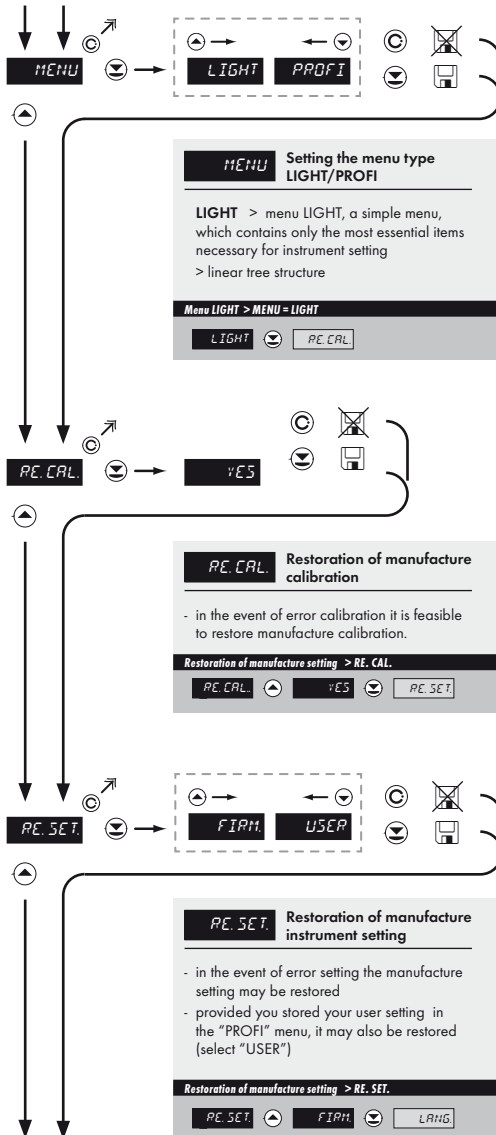
**11A:: R.O.** Assigning the display value to the end of the AO range **DEF** = 100

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

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

100 [Left Arrow] 100 [Right Arrow] 110 [Right Arrow] 120 [Down Arrow] MENU

Displayed only with options > **Analog output**



## MENU Setting the menu type LIGHT/PROFI

**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

Menu LIGHT > MENU = LIGHT

Example

LIGHT RE.CAL.

## RE.CAL. Restoration of manufacture calibration

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

Prior to execution of any modifications you  
will be asked to confirm your selection.  
(YES)

Restoration of manufacture setting > RE.CAL.

Example

RE.CAL. YES RE.SET.

## RE.SET. Restoration of manufacture instrument setting

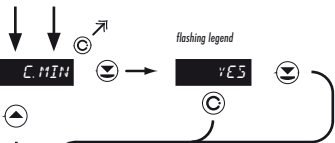
- in the event of error setting the manufacture  
setting may be restored  
- provided you stored your user setting in  
the "PROFI" menu, it may also be restored  
(select "USER")

- loading manufacture calibration and  
primary setting of items on the menu (DEF)

Restoration of manufacture setting > RE.SET.

Example

RE.SET. FIRM. LANG.

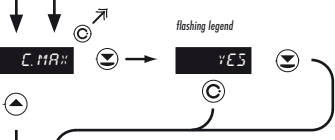


**C.MIN** Calibration of the beginning of the measuring range

- prior performing any changes you will be asked to confirm your selection "YES"
- prior confirmation of the selection the reference signal has to be connected

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

YES  C.MAX



**C.MAX** Calibration of the end of the measuring range

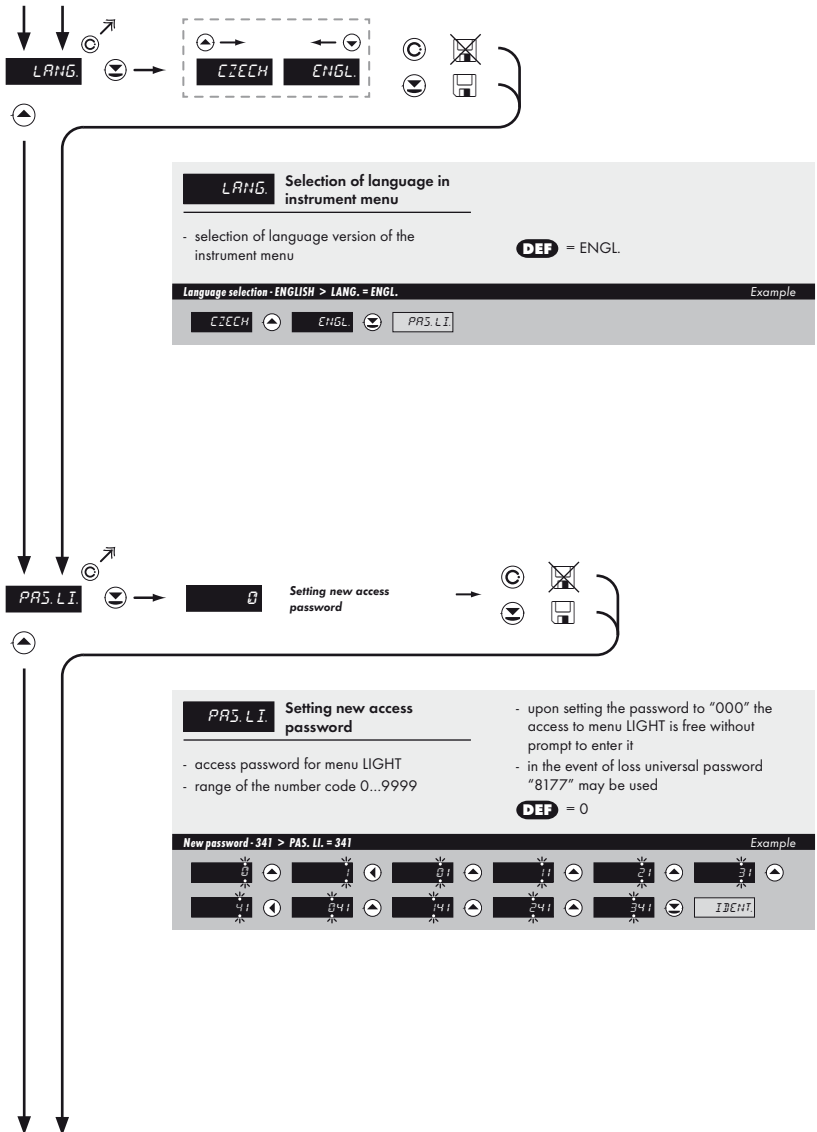
- prior performing any changes you will be asked to confirm your selection "YES"
- prior confirmation of the selection the reference signal has to be connected

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

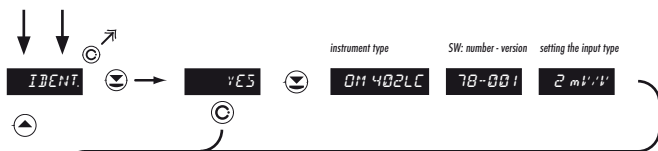
YES  LANG

**!**  
After incorrect client calibration it is always possible to restore manufacture calibration ("SERVIC./RESTOR./CALIB.")

**!**  
**Manual calibration:**  
MAX      Sensor range  
SENSE    Sensor sensitiveness  
**Automatic calibration**  
(after calibration in menu "SERVIC./CALIB."):  
MIN      Size of load with which minimum calibration was performed  
MAX      Size of load with which maximum calibration was performed  
- upon maximum calibration we recommend the reference load value in the upper third of the measuring range







### IDENT. Instrument SW version

- 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

1428

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**

SETTING  
PROFI*profi*

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

**Switching over to "PROFI" menu**

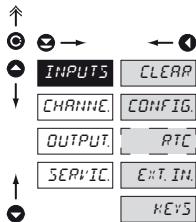
- access to **PROFI** menu
- authorization for access to **PROFI** menu does not depend on setting under item **SERVIC. > MENU**
- password protected access (unless set as follows under the item **SERVIC. > N. PASS. > PROFI =0**)



- access to menu selected under item **SERVIC. > MENU > LIGHT/PROFI**
- password protected access (unless set as follows under the item **SERVIC. > N. PASS. > LIGHT =0**)
- for access to **LIGHT** menu passwords for **LIGHT** and **PROFI** menu may be used



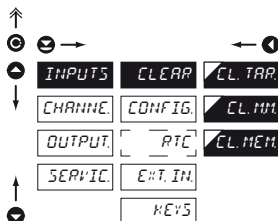
## 6.1 Setting "PROFI" - INPUT



The primary instrument parameters are set in this menu

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

## 6.1.1 Resetting internal values



<b>CLEAR</b>	Resetting internal values
<b>CL. TAR</b>	Tare resetting
<b>CL. MIN</b>	Resetting min/max value
<b>CL. MEM</b>	Resetting the instrument memory

- resetting memory for the storage of minimum and maximum value achieved during measurement
- resetting memory with data measured in the "FAST" or "RTC" modes
- not in standard equipment

### 6.1.2a Selection of measuring rate

↑

⊙ →

↑

INPUTS CLEAR READ./S 40.0 DEF

↓

CHANNEL CONFIG MODE 20.0

OUTPUT [PTC] 10.0

SERVIC. EXT. IN. 5.0

KEYS 2.0

1.0

0.5

0.2

0.1

↑

⊙

**READ./S** Selection of measuring rate

---

40.0 40,0 measurements/s

20.0 20,0 measurements/s

10.0 10,0 measurements/s

5.0 5,0 measurements/s

2.0 2,0 measurements/s

1.0 1,0 measurement/s

0.5 0,5 measurements/s

0.2 0,2 measurements/s

0.1 0,1 measurements/s

### 6.1.2b Selection of measuring range

↑

⊙ →

↑

INPUTS CLEAR READ./S 2 mV/V DEF

↓

CHANNEL CONFIG MODE 4 mV/V

OUTPUT [PTC] 8 mV/V

SERVIC. EXT. IN. KEYS

↑

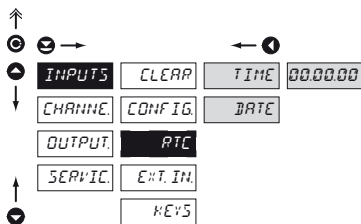
⊙

**TYPE** Selection of the instrument measuring range

---

MODE	Menu	Measuring range
	2 mV/V	0,2...4 mV/V
	4 mV/V	0,4...8 mV/V
	8 mV/V	0,8...16 mV/V

## 6.1.3 Setting the real time clock

**RTC** Setting the real time clock (RTC)

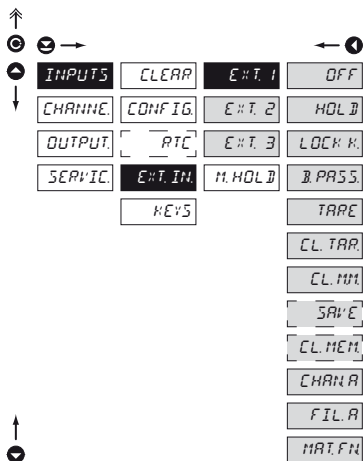
**TIME** Time setting

- format 23.59.59

**DATE** Date setting

- format DD.MM.YY

## 6.1.4a External input function selection

**EXT. IN.** External input function selection

**OFF** Input is off

**HOLD** Activation of HOLD

**LOCK K.** Locking keys on the instrument

**PASS** Activation of locking access into programming menu LIGHT/PROFI

**TARE** Tare activation

**CL. TARE** Tare resetting

**CL. MIN** Resetting min/max value

**SAVE** Activation of measured data record in instrument memory

**CL. MEM.** Clearing memory for option FAST/RTC

**CHAN. A** Displaying value of "Channel A"

**FIL. A** Displaying value of "Channel A" after being processed by digital filters

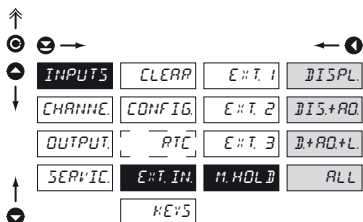
**MAT. FN.** Displaying value of "Mathematical function"

- **DEF** EXT. 1 > HOLD
- **DEF** EXT. 2 > LOCK K.
- **DEF** EXT. 3 > TARE

\*

Setting procedure is identical for EXT. 2 and EXT. 3

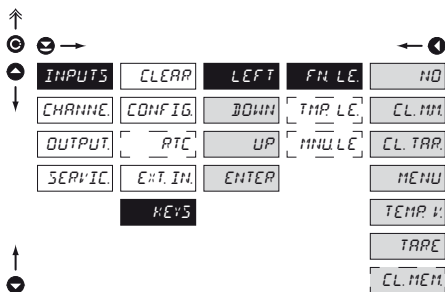
### 6.1.4b Selection of function "HOLD"



#### M.HOLD Selection of function "HOLD"

- DISPL.** "HOLD" locks only the value displayed
- DIS+AQ.** "HOLD" locks the value displayed and on AO
- DIS+AD+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

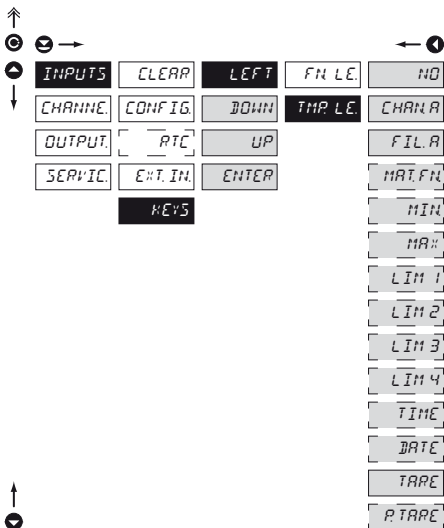
- „FN. LE.“ > executive functions
- „TMP. LE.“ > temporary projection of selected values
- „MNU. LE.“ > direct access into menu on selected item
- **NO** Key has no further function
- **CL.MN.** Resetting min/max value
- **CL.TAR.** Tare resetting
- **MENU** Direct access into menu on selected item
- 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
- **TARE** Tare function activation
- **CL.MEM.** Clearing memory
- clearing memory with data measured in modes "FAST" or "RTC"

**!**  
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

## 6.1.5b Optional accessory functions of the keys - Temporary projection

**TMP LE** Temporary projection of selected item

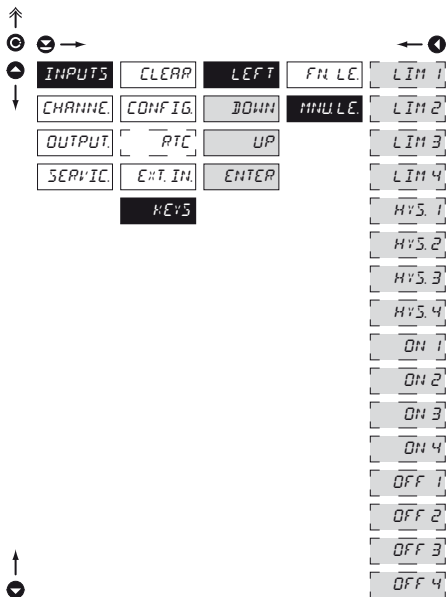
- "Temporary" projection of selected value is displayed for the time of keystroke
- "Temporary" projection may be switched to permanent by pressing **☉** + "Selected key", this holds until the stroke of any key

<b>NO</b>	Temporary projection is off
<b>CHANNEL A</b>	Temporary projection of "Channel A" value
<b>FILTER</b>	Temporary projection of "Channel A" value after processing digital filters
<b>MATH.FN</b>	Temporary projection of "Mathematic functions" value
<b>MIN</b>	Temporary projection of "Min. value"
<b>MAX</b>	Temporary projection of "Max. value"
<b>LIM 1</b>	Temporary projection of "Limit 1" value
<b>LIM 2</b>	Temporary projection of "Limit 2" value
<b>LIM 3</b>	Temporary projection of "Limit 3" value
<b>LIM 4</b>	Temporary projection of "Limit 4" value
<b>TIME</b>	Temporary projection of "TIME" value
<b>DATE</b>	Temporary projection of "DATE" value
<b>TARE</b>	Temporary projection of "TARE" value
<b>P. TARE</b>	Temporary projection of "P. TARE" value

**!** Setting is identical for **LEFT**, **DOWN**, **UP** and **ENTER**



### 6.1.5c Optional accessory functions of the keys - Direct access to item

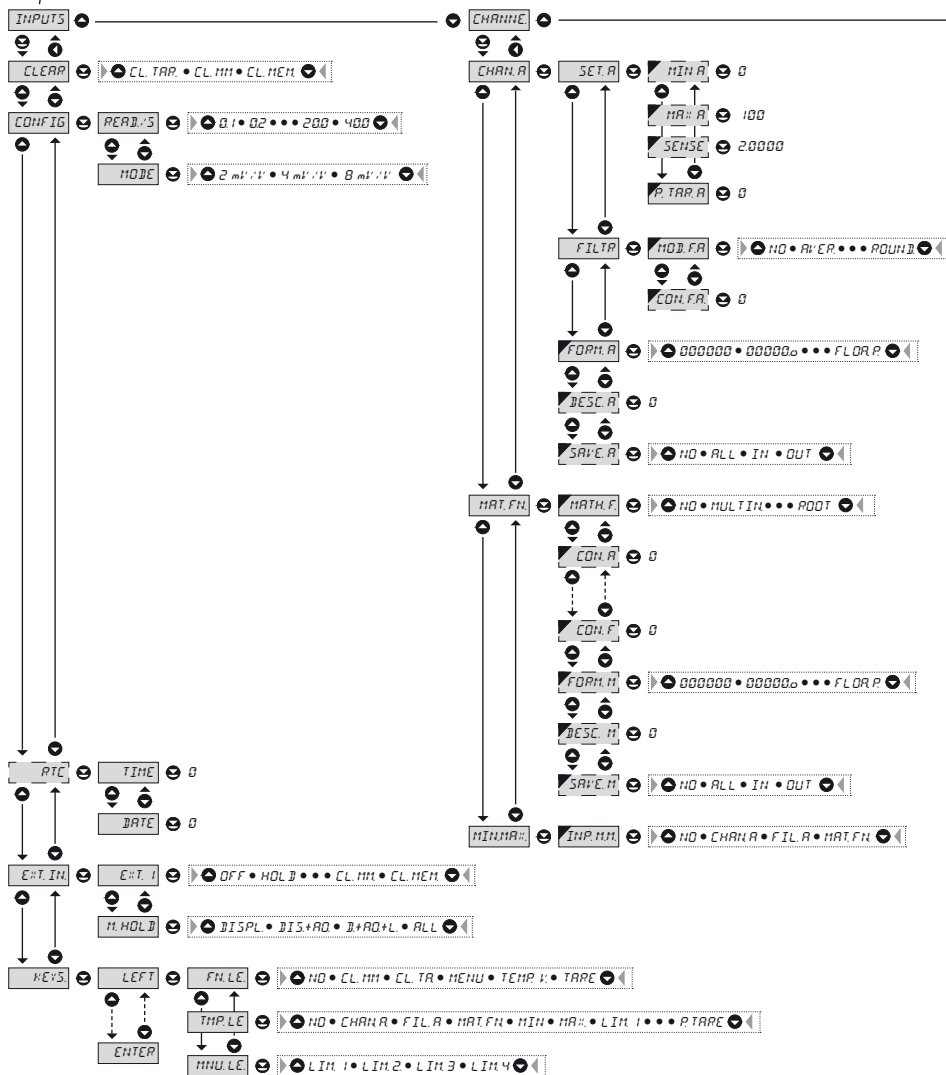


#### MNU L.E. Assigning access to selected menu item

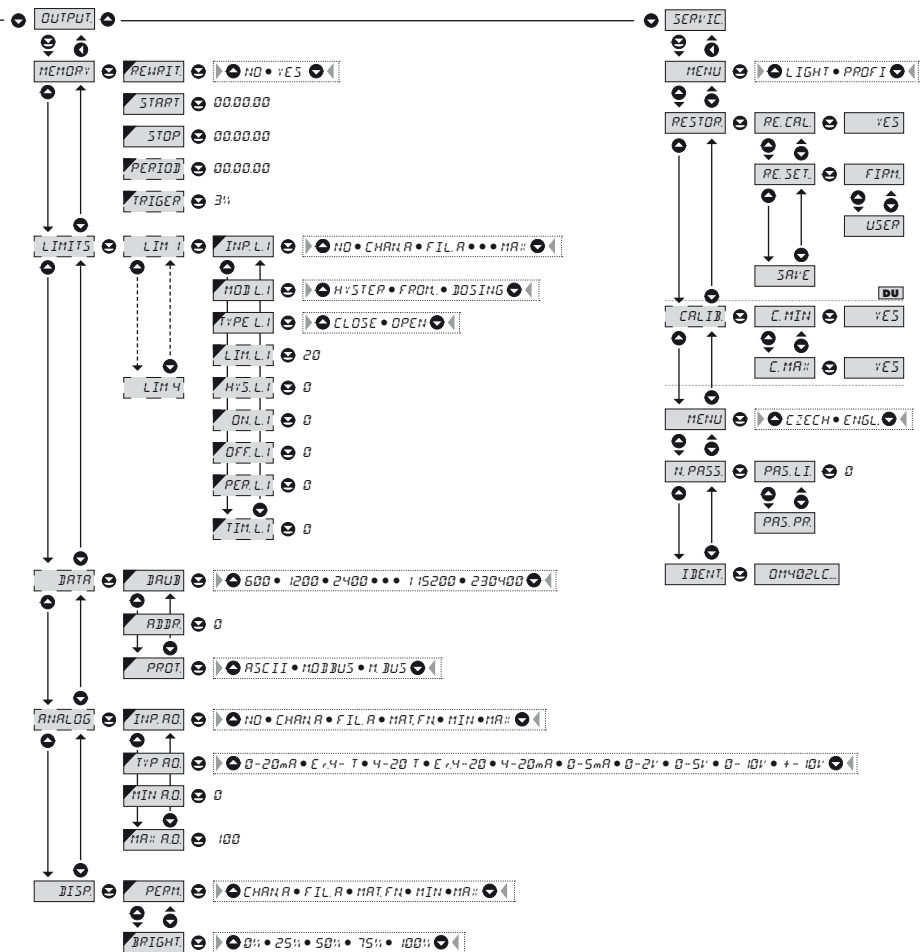
- [ LIM 1 ] Direct access to item "LIM 1"
- [ LIM 2 ] Direct access to item "LIM 2"
- [ LIM 3 ] Direct access to item "LIM 3"
- [ LIM 4 ] Direct access to item "LIM 4"
- [ HYS. 1 ] Direct access to item "HYS. 1"
- [ HYS. 2 ] Direct access to item "HYS. 2"
- [ HYS. 3 ] Direct access to item "HYS. 3"
- [ HYS. 4 ] Direct access to item "HYS. 4"
- [ ON 1 ] Direct access to item "ON 1"
- [ ON 2 ] Direct access to item "ON 2"
- [ ON 3 ] Direct access to item "ON 3"
- [ ON 4 ] Direct access to item "ON 4"
- [ OFF 1 ] Direct access to item "OFF 1"
- [ OFF 2 ] Direct access to item "OFF 2"
- [ OFF 3 ] Direct access to item "OFF 3"
- [ OFF 4 ] Direct access to item "OFF 4"

**!**  
Setting is identical for LEFT, DOWN, UP and ENTER

142B + PASSW 0 Access password

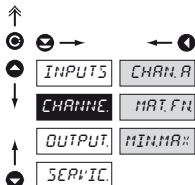


### name PROFI MENU



**!**  
 Upon delay exceeding 60 s the programming mode is automatically discontinued and the instrument itself restores the measuring mode

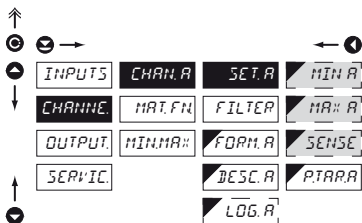
## 6.2 Setting "PROFI" - CHANNELS



The primary instrument parameters are set in this menu

- CHAN:A** Setting parameters of measuring "Channel"
- MAT:FN** Setting parameters of mathematic functions
- MIN:MA::** Selection of access and evaluation of Min/max value

## 6.2.1 a Display projection


**SET:A** Setting display projection

- MIN:A** Setting display projection for minimum value of input signal
  - range of the setting is -99999...999999
  - menu is dynamic, in manual calibration this item is not displayed
  - **DEF** = 0

- MA::A** Setting display projection for maximum value of input signal
  - range of the setting is -99999...999999
  - **DEF** = 100

- SENSE** Setting the tensionmeter sensitiveness (mV/V)
  - range 1...4/2...8/4...16 mV/V
  - fixed resolution in 4 decimal points
  - menu is dynamic, the item is displayed only in automatic calibration


**Manual calibration:**

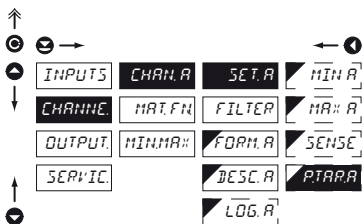
- MAX** Sensor range
- SENSE** Sensor sensitiveness

**Automatic calibration**

(after calibration in menu "SERVICE/CALIB."):

- MIN** size of load, with which minimum calibration was performed
- MAX** size of load, with which maximum calibration was performed
  - upon maximum calibration we recommend the reference load value in the upper third of the measuring range

### 6.2.1b Setting fixed tare



#### P.TAR.A 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) is in effect, display does not show the "T" symbol
- range of the setting is: -99999...999999
- **DEF** = 0

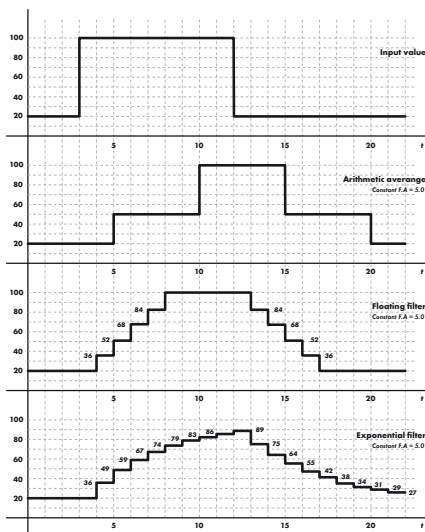
### 6.2.1d Digital filters



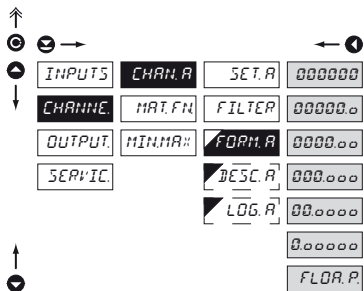
#### MOD.FA Selection of digital filters

- 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
- AV:ER** 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 prvnho grade with time constant („CON.F.A.“) measurement
  - range 2...100
- ROUND** 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



## 6.2.1e Projection format - positioning of decimal point

**FORM.A** Selection 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 „FLOOR.P.“

000000 Setting DP - XXXXXX.

00000.0 Setting DP - XXXXX.x

0000.00 Setting DP - XXXX.xx

**DEF**

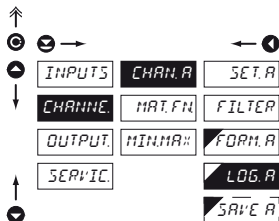
000.000 Setting DP - XXX.xxx

00.0000 Setting DP - XX.xxxx

0.000000 Setting DP - X.xxxxx

FLOOR.P Floating DP

## 6.2.1f Projection of description - the measuring units

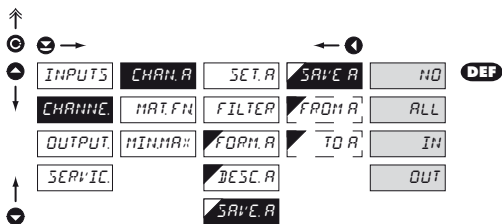
**DESC.A** Setting projection of descrip. for "Channel A"

- 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** =none

! Table of signs on page 63

### 6.2.1g Selection of storing data into instrument memory



#### **SAVE A** 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)

- NO** Measured data is not stored
- ALL** Measured data is stored in memory
- IN** Only data measured within the set interval is stored in memory
- OUT** Only data measured outside the set interval is stored in memory

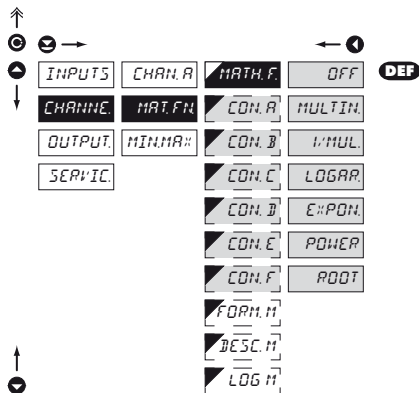
**FROM A** Setting the initial interval value

- setting range: -99999...999999

**TO A** Setting the final interval value

- setting range: -99999...999999

## 6.2.2a Mathematic functions


**MATH.F** Selection of mathematic functions

OFF

Mathematic functions are off

MULTIN

Multinomial

$$Ax^2 + Bx^4 + Cx^3 + Dx^2 + Ex + F$$

1/MUL

1/x

$$\frac{A}{x^3} + \frac{B}{x^4} + \frac{C}{x^2} + \frac{D}{x^2} + \frac{E}{x} + F$$

LOGAR

Logarithm

$$A \times \ln\left(\frac{Bx+C}{Dx+E}\right) + F$$

E:PNL

Exponential

$$A \times e^{\left(\frac{Bx+C}{Dx+E}\right)} + F$$

POWER

Power

$$A \times (Bx+C)^{(Dx+E)} + F$$

ROOT

Root

$$A \times \sqrt{\frac{Bx+C}{Dx+E}} + F$$

CON. -

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

#### FORM.M Selection 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 „FLOA.P.“

- 000000. Setting DP - XXXXXX.
- 00000.0 Setting DP - XXXXX.x
- 0000.00 Setting DP - XXXX.xx
- 000.000 Setting DP - XXX.xxx
- 00.0000 Setting DP - XX.xxxx
- 0.00000 Setting DP - X.xxxxx
- FLOA.P. Floating DP
- DEF

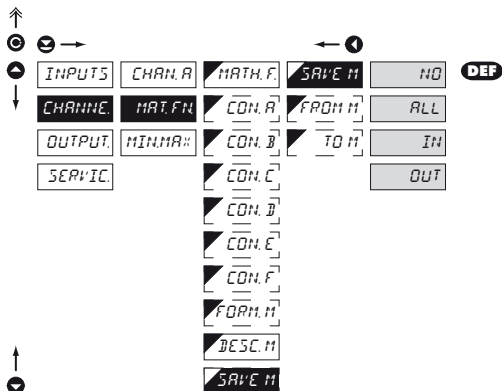
### 6.2.2c Mathematic functions - measuring units

#### DESC.M Setting projection of description for "MAT.FN"

- 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 63

**6.2.2d** Mathematic functions - selection of storing data into instrument memory

**SAVE M** 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)

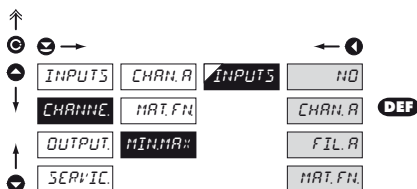
- NO** Measured data is not stored
- ALL** Measured data is stored in memory
- IN** Only data measured within the set interval is stored in memory
- OUT** Only data measured outside the set interval is stored in memory

**FROM M** Setting the initial interval value

- setting range: -99999...999999

**TO M** Setting the final interval value

- setting range: -99999...999999

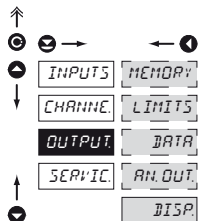
**6.2.3** Selection of evaluation of min/max value

**INPUTS** 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
- CHAN. A** From "Channel A"
- FIL. A** From "Channel A" after digital filters processing
- MAT. FN.** From "Mathematic functions"



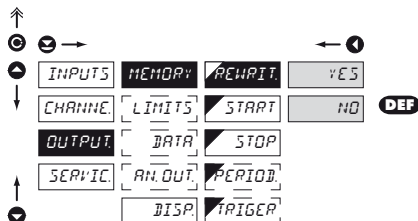
## 6.3 Setting „PROFI“ - OUTPUTS



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

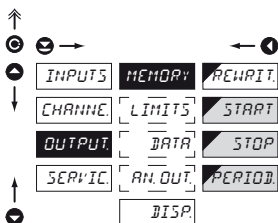


#### REWRIT. Selection of the mode of data logging

- 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

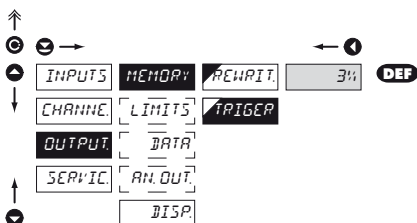
- records are made on a daily basis in selected interval and period

- item not displayed if "SAVE" is selected in menu (INPUT > EXT. IN.)

#### RTC

The lowest recording rate possible is once a day, the highest is every second. Under exceptional circumstances it is possible to set the rate to 8 times per second by entering the recording period as 00:00:00. However, this mode is not recommended due to the memory overload. Recordings are realised in a timeframe of one day and are repeated periodically every following day. Recordings can take place either inside or outside of selected time intervals. The duration of re-writing can be determined by the number of channels recorded as well as by the recording rate.

#### 6.3.1c Setting data logging into instrument memory - FAST



**TRIGGER** 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

- initialization is on ext. input or button

- setting in range 1...100 %

- when setting 100 %, datalogging works in the mode ROLL > data keep getting rewritten in cycles

#### 1. Memory initialization

- clear memory (ext.input, button)

- LED "M" flashes, after reading TRIGGER (%) memory is permanently shining. In ROLL flashes constantly.

#### 2. Triggering

- external input, button

- after the memory LED is full "M" turns off

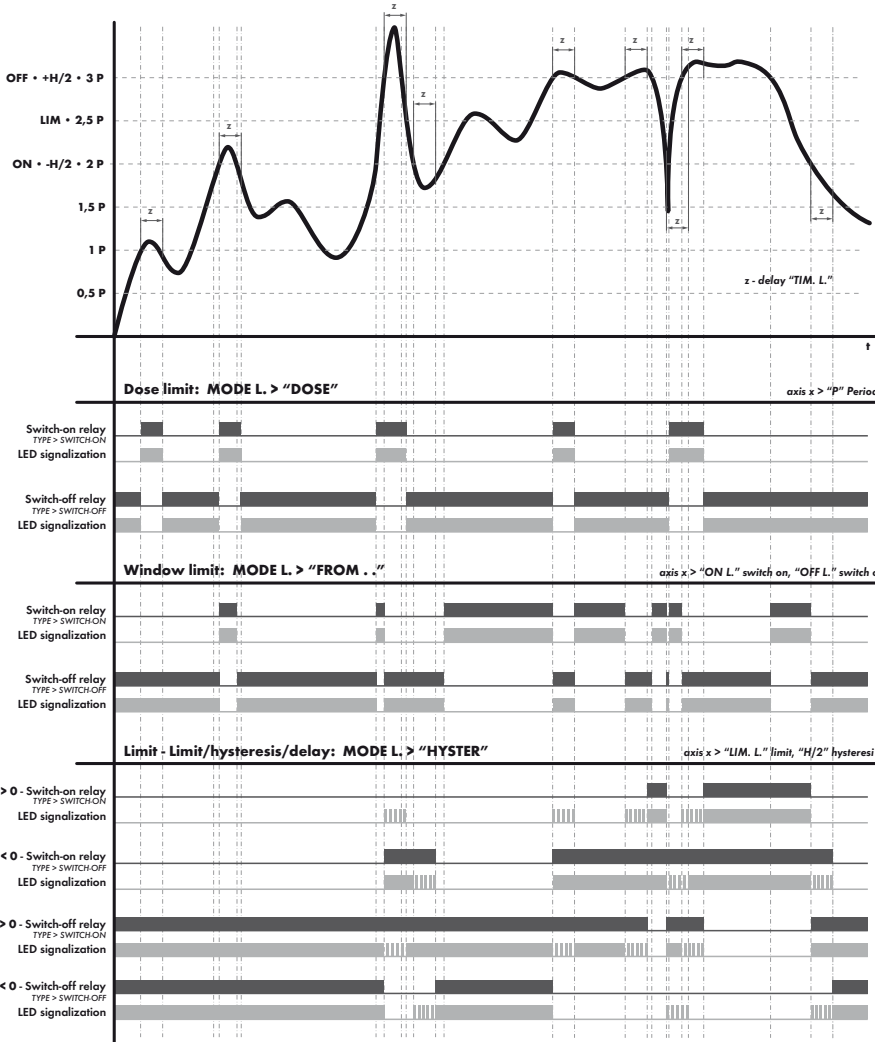
- in the ROLL mode the trigger ends datalogging and LED turns off

#### 3. Termination

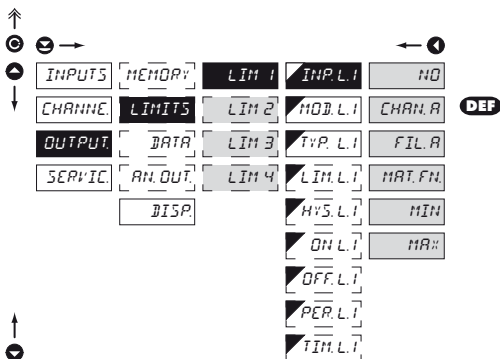
- ext. input, button or reading data via RS

#### FAST

The memory operates on the basis of memory oscilloscope. Select an area of 0...100% of the memory capacity (100% represents 8 192 individual recordings for a single channel measurement). This area is filled cyclically up to the point when the recording starts (activated by the front panel button or by an external input). When the remaining memory capacity fills up the recording stops. A new recording is possible after the deletion of the latest recording. It is possible to abort a recording before its completion by reading out the data.



### 6.3.2a Selection of input for limits evaluation



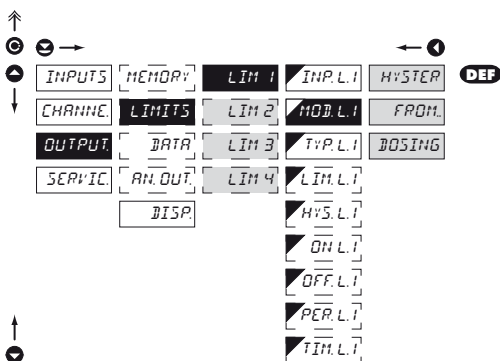
! Setting is identical for LIM 2, LIM 3 and LIM 4

#### INP.L.1 Selection evaluation of limits

- selection of value from which the limit will be evaluated

- NO** Limit evaluation is off
- CHAN.A** Limit evaluation from "Channel A"
- FIL.R** Limit evaluation from "Channel A" after digital filters processing
- MAT.FN** Limit evaluation from "Mathematic functions"
- MIN** Limit evaluation from "Min.value"
- MAX** Limit evaluation from "Max.value"

### 6.3.2b Selection of type of limit

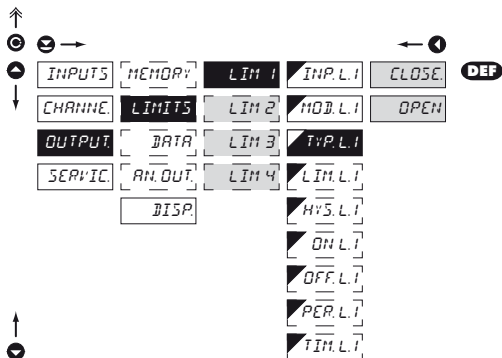


! Setting is identical for LIM 2, LIM 3 and LIM 4

#### MOD.L.1 Selection the type of limit

- HYS.TER** 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  $\pm 1/2$  HYS) and time "TIM. L." determining the delay of relay switch-on
- FROM** Frame limit
  - for this mode the parameters are set for interval "ON. L." the relay switch-on and "OFF. L." the relay switch-off
- DOSING** Dose limit (periodic)
  - for this mode the parameters are set for "PER. L." determining the limit value as well as its multiples at which the output is active and "TIM. L." indicating the time during which is the output active

## 6.3.2c Selection of type of output


**TYP.L.1** Selection of type of output

CLOSE

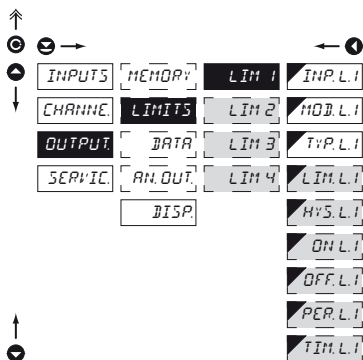
Output switches on when condition is met

OPEN

Output switches off when condition is met

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

## 6.3.2d Setting values for limits evaluation


**LIM.L.1** Setting limit for switch-on

- for type "HYSTER"

**HYS.L.1** Setting hysteresis

- for type "HYSTER"

- indicates the range around the limit (in both directions, LIM.  $\pm 1/2$  HYS.)
**ON.L.1** Setting the outset of the interval of limit switch-on

- for type "FROM"

**OFF.L.1** Setting the end of the interval of limit switch-on

- for type "FROM"

**PER.L.1** Setting the period of limit switch-on

- for type "DOSE"

**TIM.L.1** Setting the time switch-on of the limit

- for type "HYSTER" and "DOSE"

- setting within the range:  $\pm 0...99,9$  s

- positive time &gt; relay switches on after crossing the limit (LIM. L1) and the set time (TIM. L1)

- negative time &gt; relay switches off after crossing the limit (LIM. L1) and the set negative time (TIM. L1)



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



### 6.3.3a Selection of data output baud rate

Navigation diagram for selecting data output baud rate. The menu structure is as follows:

- INPUTS
- MEMORY
- CHANNEL
- LIMITS
- OUTPUT
- DATA
- SERVIC.
- AN. OUT.
- DISP.
- AD. MOD.
- AD. P. B.
- PROT.

The 'BAUD' menu is selected, showing the following options:

- 600
- 1200
- 2400
- 4800
- 9600 (DEF)
- 19200
- 38400
- 57600
- 115200
- 230400

BAUD	Selection of data output baud rate
600	Rate - 600 Baud
1200	Rate - 1 200 Baud
2400	Rate - 2 400 Baud
4800	Rate - 4 800 Baud
9600	Rate - 9 600 Baud
19200	Rate - 19 200 Baud
38400	Rate - 38 400 Baud
57600	Rate - 57 600 Baud
115200	Rate - 115 200 Baud
230400	Rate - 230 400 Baud

### 6.3.3b Setting instrument address

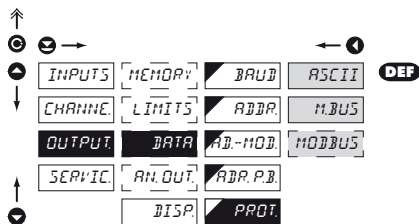
Navigation diagram for setting instrument address. The menu structure is as follows:

- INPUTS
- MEMORY
- CHANNEL
- LIMITS
- OUTPUT
- DATA
- SERVIC.
- AN. OUT.
- DISP.
- AD. MOD.
- AD. P. B.
- PROT.

The 'AD. P. B.' menu is selected, showing the value '0' in the adjacent field.

AD. P. B.	Setting instrument address
-	setting in range 0...31
DEF	= 00
AD. MOD.	Setting instrument address - MODBUS
-	setting in range 1...247
DEF	= 1
AD. P. B.	Setting instrument address - PROFIBUS
-	setting in range 1...127
DEF	= 19

## 6.3.3c Selection of data output protocol


**PROT** Selection of the type of analog output

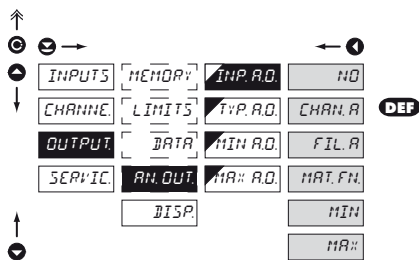
**ASCII** Data protocol ASCII

**M.BUS** Data protocol DIN MessBus

**MODBUS** Data protocol MODBUS-RTU

- option is available only for RS 485

## 6.3.4a Selection of input for analog output


**INP.AO** Selection evaluation analog output

- selection of value from which the analog output will be evaluated

**NO** AO evaluation is off

**CHAN.A** AO evaluation from "Channel A"

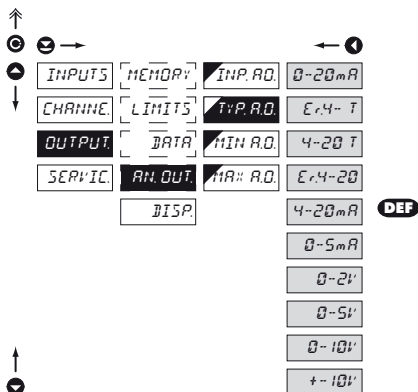
**FIL.A** AO evaluation from "Channel A" after digital filters processing

**MAT.FN** AO evaluation from "Math.functions"

**MIN** AO evaluation from "Min.value"

**MA::** AO evaluation from "Max.value"

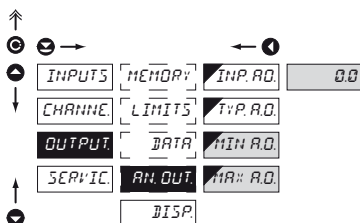
### 6.3.4b Selection of the type of analog output



#### TYP. A.O. Selection of the type of analog output

- 0-20mA** Type - 0...20 mA
- 0-5mA** Type - 4...20 mA with broken loop detection and indication of error statement
- 4-20mA** Type - 4...20 mA with broken loop detection
- 0-5mA** Type - 4...20 mA, with indic. of error statement (< 3,0 mA)
- 4-20mA** Type - 4...20 mA
- 0-5mA** Type - 0...5 mA
- 0-2V** Type - 0...2 V
- 0-5V** Type - 0...5 V
- 0-10V** Type - 0...10 V
- + - 10V** Type - ±10 V

### 6.3.4c Setting the analog output range



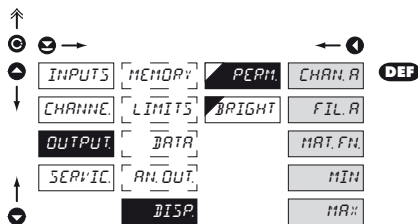
#### AN. OUT. Setting the analog output range

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

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

**MAX. A.O.** Assigning the display value to the end of the AO range  
 - range of the setting is -99999...999999  
 - **DEF** = 100

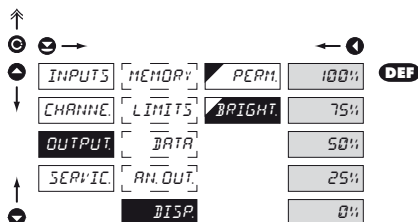
## 6.3.5a Selection of input for display projection


**PERM** Selection 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"

## 6.3.5b Selection of display brightness

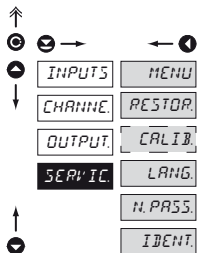

**BRIGHT** Selection of display brightness

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

- 0%** Display is off
- after keystroke display turns on for 10 s
- 25%** Display brightness - 25 %
- 50%** Display brightness - 50 %
- 75%** Display brightness - 75 %
- 100%** Display brightness - 100 %



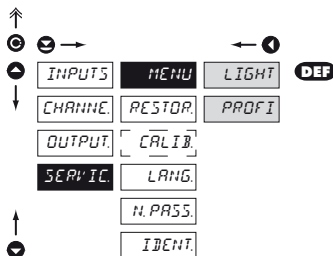
## 6.4 Setting "PROFI" - SERVIS



The instrument service functions are set in this menu

<b>MENU</b>	Selection of menu type LIGHT/PROFI
<b>RESTOR.</b>	Restore instrument manufacture setting and calibration
<b>CALIB.</b>	Input range calibration for „DU“ version
<b>LANG.</b>	Language version of instrument menu
<b>H.PASS.</b>	Setting new access password
<b>IDENT.</b>	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

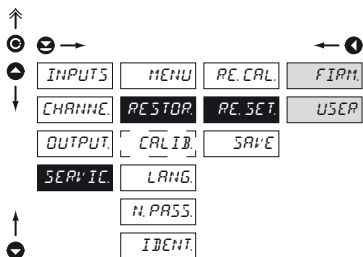
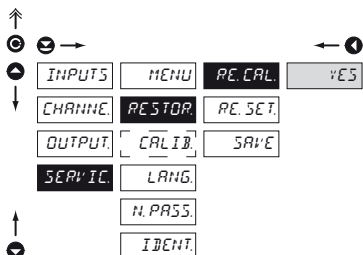
**PROFI** Active PROF I menu

- 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



#### RESTOR. Restoration of manufacture setting

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

**RE.CAL.** Restoration of manufacture calibration of the instrument

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

#### RE.SET. Restoration of instrument manufacture setting

**FIRM.** Restoration of instrument manufacture setting

- generating the manufacture setting (items marked DEF)

**USER** Restoration of instrument user setting

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

**SAVE** Save instrument user setting

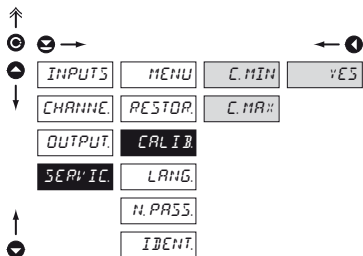
- storing the user setting allows the operator to restore it in future if needed

Jobs performed	Restore	
	Calibration	Setting
cancel USER menu rights	✓	✓
deletes table of items order in USER - LIGHT menu	✓	✓
adds items from manufacture to LIGHT menu	✓	✓
deletes data stored in FLASH	✓	✓
cancel or linearization tables	✓	✓
clears tare	✓	✓
clears conduct resistances	✓	✓
restore manufacture calibration	✓	✗
restore manufacture setting	✗	✓



After restoration the instrument switches off for couple seconds

## 6.4.3 Calibration - Input range



After incorrect client calibration it is always possible to restore manufacture calibration ("SERVIC./RESTOR/CALIB.")

**CALIB** Input range calibration

- prior performing any changes you will be asked to confirm your selection "YES"

**C. MIN** Calibration of the beginning of the measuring range

- prior confirmation of the selection the reference signal has to be connected

**C. MAX** Calibration of the end of the measuring range

- prior confirmation of the selection the reference signal has to be connected


**Manual calibration:**

**MAX** Sensor range

**SENSE** Sensor sensitiveness

**Automatic calibration**

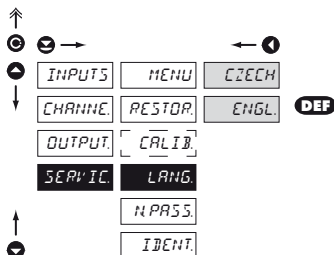
(after calibration in menu "SERVIC./CALIB."):

**MIN** Size of load with which minimum calibration was performed

**MAX** Size of load with which maximum calibration was performed

- upon maximum calibration we recommend the reference load value in the upper third of the measuring range

## 6.4.4 Selection of instrument menu language version

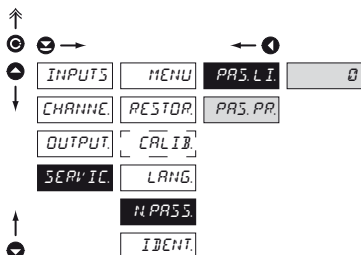

**LANG** Selection of instrument menu language version

**CZECH** Instrument menu is in Czech

**ENGL** Instrument menu is in English



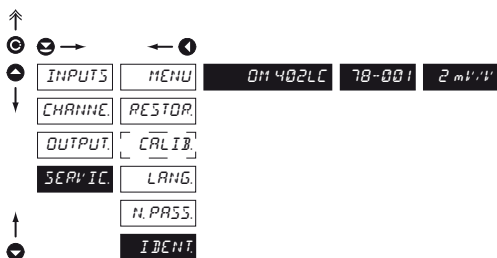
### 6.4.5 Setting new access password



#### N.PASS. Setting new password for access to LIGHT and PROFi menu

- this option allows to change the numeric code, which blocks the access into LIGHT and PROFi Menu.
- numeric code range: 0...9999
- universal passwords in the event of loss: LIGHT Menu > „8177“ PROFi Menu > „7915“

### 6.4.6 Instrument identification




#### IDENT. Projection of instrument SW version

- 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

IDEN.	pos	Description
	1.	
2.		SW: number - version
3.		the input type

## 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 i
- 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

flashing legend - current setting is displayed



H0

item will not be displayed in USER menu

YES

item will be displayed in USER menu with editing option

SHOW

item will be solely displayed in USER menu

### 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 + )>

CL. TAR.	5
LIM 1	0 (sequence not determined)
LIM 2	2
LIM 3	1

Upon entering USER menu

(key ) items will be projected in the following sequence: LIM 3 > LIM 2 > CL.TAR. > LIM 1

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.

The commands are described in specifications you can find at [na www.orbit.merret.cz/rs](http://na.www.orbit.merret.cz/rs) or in the OM Link program.

### DETAILED DESCRIPTION OF COMMUNICATION VIA SERIAL LINE

Event	Type	Protocol	Transmitted data																			
Data solicitation (PC)	232	ASCII	#	A	A	<CR>																
		MessBus	No - data is transmitted permanently																			
	485	ASCII	#	A	A	<CR>																
		MessBus	<SADR>	<ENQ>																		
Data transmission (instrument)	232	ASCII	>	D	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	<CR>				
		MessBus	<SADR>	D	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	<ETX>	<BCC>		
	485	ASCII	>	D	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	<CR>			
		MessBus	<SADR>	D	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	<ETX>	<BCC>		
Confirmation of data acceptance (PC) - OK	485	MessBus	<DLE>	1																		
Confirmation of data acceptance (PC) - Bad			<NAK>																			
Sending address (PC) prior command			<EADR>	<ENQ>																		
Confirmation of address (instrument)			<SADR>	<ENQ>																		
Command transmission (PC)	232	ASCII	#	A	A	N	P	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	<CR>				
		MessBus	<STX>	\$	N	P	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	<ETX>	<BCC>			
	485	ASCII	#	A	A	N	P	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	<CR>				
		MessBus	<SADR>	\$	N	P	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	<ETX>	<BCC>			
Command confirmation (instrument)	232	ASCII	OK	!	A	A	<CR>															
			Bad	?	A	A	<CR>															
		MessBus	No - data is transmitted permanently																			
			OK	!	A	A	<CR>															
	485	ASCII	OK	!	A	A	<CR>															
			Bad	?	A	A	<CR>															
		MessBus	OK	<DLE>	1																	
			Bad	<NAK>																		
Command confirmation (inst.) - OK	485	MessBus	!	A	A	<CR>																
Command confirmation (instrument) - Bad			?	A	A	<CR>																
Instrument identification			#	A	A	1Y	<CR>															
HW identification			#	A	A	1Z	<CR>															
One-time transmission			#	A	A	7X	<CR>															
Repeated transmission			#	A	A	8X	<CR>															

## LEGEND

#	35	23 <sub>H</sub>	Command beginning
A	A	0...31	Two characters of instrument address (sent in ASCII - tens and units, e.g. "01", "99" universal)
<CR>	13	0D <sub>H</sub>	Carriage return
<SP>	32	20 <sub>H</sub>	Space
N, P			Number and command - command code
D			Data - usually characters "0"... "9", "-", ".", ";"; (D) - dp. and (-) may prolong data
R	30 <sub>H</sub> ...	3F <sub>H</sub>	Relay and tare status
!	33	21 <sub>H</sub>	Positive confirmation of command (ok)
?	63	3F <sub>H</sub>	Negative confirmation of command (point)
>	62	3E <sub>H</sub>	Beginning of transmitted data
<STX>	2	02 <sub>H</sub>	Beginning of text
<ETX>	3	03 <sub>H</sub>	End of text
<SADR>	address +	60 <sub>H</sub>	Prompt to send from address
<EADR>	address +	40 <sub>H</sub>	Prompt to accept command at address
<ENQ>	5	05 <sub>H</sub>	Terminate address
<DLE>	16 49	10 <sub>H</sub> 31 <sub>H</sub>	Confirm correct statement
<NAK>	21	15 <sub>H</sub>	Confirm error statement
<BCC>			Check sum -XOR

## RELAY, TARE

Sign	Relay 1	Relay 2	Tare	Change relay 3/4
P	0	0	0	0
Q	1	0	0	0
R	0	1	0	0
S	1	1	0	0
T	0	0	1	0
U	1	0	1	0
V	0	1	1	0
W	1	1	1	0
p	0	0	0	1
q	1	0	0	1
r	0	1	0	1
s	1	1	0	1
t	0	0	1	1
u	1	0	1	1
v	0	1	1	1
w	1	1	1	1

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<sub>H</sub>...FF<sub>H</sub>. The lowest bit stands for „Relay 1“, the highest for „Relay 8“

ERROR	CAUSE	ELIMINATION
<i>E. D. U<sub>n</sub></i>	Number is too small (large negative) to be displayed	change DP setting, channel constant setting
<i>E. D. O<sub>r</sub></i>	Number is too large to be displayed	change DP setting, channel constant setting
<i>E. T. U<sub>n</sub></i>	Number is outside the table range	increase table values, change input setting (channel constant setting)
<i>E. T. O<sub>r</sub></i>	Number is outside the table range	increase table values, change input setting (channel constant setting)
<i>E. I. U<sub>n</sub></i>	Input quantity is smaller than permitted input quantity range	change input signal value or input (range) setting
<i>E. I. O<sub>r</sub></i>	Input quantity is larger than permitted input quantity range	change input signal value or input (range) setting
<i>E. HW</i>	A part of the instrument does not work properly	send the instrument for repair
<i>E. EE</i>	Data in EEPROM corrupted	perform restoration of manufacture setting, upon repeated error statement send instrument for repair
<i>E. SET</i>	Change of a linked item in the menu, Data in EEPROM outside the range	change of contiguous items, perform restoration of manufacture setting, upon repeated error statement send instrument for repair
<i>E. CLR.</i>	Memory was empty (presetting carried out)	upon repeated error statement send instrument for repair, possible failure in calibration
<i>E. OUT.</i>	Analogue output current loop disconnected	check wire connection

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

	0	1	2	3	4	5	6	7		0	1	2	3	4	5	6	7
0		Q	"	£	\$	¥	€	'	0	!	"	#	\$	%	&	'	
8	:	:	*	+	,	-	.	/	8	(	)	*	+	,	-	.	/
16	0	1	2	3	4	5	6	7	16	0	1	2	3	4	5	6	7
24	8	9	VA	Vr	<	=	>	?	24	8	9	VA	Vr	<	=	>	?
32	Q	R	B	C	D	E	F	G	32	@	A	B	C	D	E	F	G
40	H	I	J	K	L	M	N	O	40	H	I	J	K	L	M	N	O
48	P	Q	R	S	T	U	V	W	48	P	Q	R	S	T	U	V	W
56	X	Y	Z	[	\	]	^	_	56	X	Y	Z	[	\	]	^	_
64	`	a	b	c	d	e	f	g	64	`	a	b	c	d	e	f	g
72	h	i	j	k	l	m	n	o	72	h	i	j	k	l	m	n	o
80	p	q	r	s	t	u	v	w	80	p	q	r	s	t	u	v	w
88	X	Y	Z	{		}	~		88	x	y	z	{		}	~	

**INPUT**

range is adjustable in configuration menu

Sensitivity: 0,2...4 mV/V  
0,4...8 mV/V  
0,8...16 mV/V

Connection: 4/6-wire

Tensiometer voltage: 10 VDC, max. load 80 Ohm

**PROJECTION**

Display: 999999, intensive red or green  
14-segment LED, digit height 14 mm

Projection: ±9999 (-99999...999999)

Decimal point: adjustable - in menu

Brightness: adjustable - in menu

**INSTRUMENT ACCURACY**

TC: 50 ppm/°C

Accuracy: ±0,1 % of range + 1 digit  
**Above accuracies apply for projection 9999**

Rate: 0,1...40 measurements/s\*\*

Overload capacity: 10x (t < 100 ms), 2x (long-term)

Linearisation: by linear interpolation in 38 points  
- solely via OM Link

Digital filters: Averaging, Floating average, Exponential filter, Rounding

Functions: Tare - display resetting  
Hold - stop measuring (at contact)  
Lock - control key locking  
MM - min/max value  
Mathematic functions

OM Link: company communication interface for setting, operation  
and update of instrument SW

Watch-dog: reset after 400 ms

Calibration: at 25°C and 40 % of r.h.

**COMPARATOR**

Type: digital, adjustable in menu

Mode: Hysteresis, From, Dosing

Limits: -99999...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

**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  
9 600 Baud...12 Mbaud (PROFIBUS)  
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 12 bits D/A convertor,  
analogoutput corresponds with displayed data, type and  
range are adjustable

Non-linearity: 0,1 % of range

TC: 15 ppm/°C

Rate: response to change of value < 1 ms

Voltage: 0...2 V/5 V/10 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 or via OM Link

**EXCITATION**

Fixed: 10 VDC, max. load 80 Ohm

**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

\* values apply for resistance load



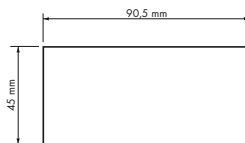
**OPERATING CONDITIONS**

Connection:	connector terminal board, conductor cross-section $<1,5 \text{ mm}^2$ / $<2,5 \text{ mm}^2$
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
Dielectric strength:	4 kVAC after 1 min between supply and input 4 kVAC after 1 min between supply and data/analog output 4 kVAC after 1 min between supply and relay output 2,5 kVAC after 1 min between supply and data/analog output
Overvoltage cat.:	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 550222, A1, A2

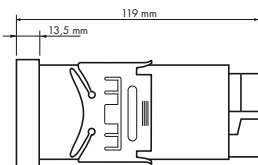
Front view



Panel cut



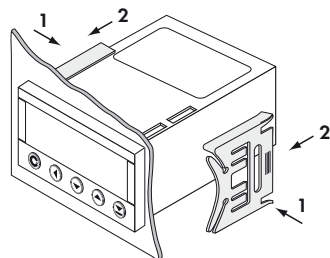
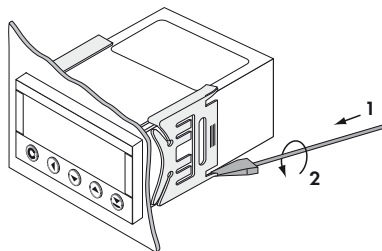
Side view



Panel thickness: 0,5...20 mm

### 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

Product **OM 402LC**  
Type .....  
Manufacturing No. ....  
Date of sale .....

# GUARANTEE

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.



# YEARS

Stamp, signature

# ES DECLARATION OF CONFORMITY

**Company:** **ORBIT MERRET, spol. s r.o.**  
Klánska 81/141, 142 00 Prague 4, Czech Republic, IDNo.: 00551309

**Manufactured:** **ORBIT MERRET, spol. s r.o.**  
Vodňanská 675/30, 198 00 Prague 9, Czech Republic

declares at its explicit responsibility that the product presented hereunder meets all technical requirements, is safe for use when utilised under the terms and conditions determined by ORBIT MERRET, spol.s r.o. and that our company has taken all measures to ensure conformity of all products of the types referred-to hereunder, which are being brought out to the market, with technical documentation and requirements of the appurtenant Czech statutory orders.

**Product:** Programmable panel instrument

**Type** **OM 402**

**Version:** UNI, PWR

## That has been designed and manufactured in line with requirements of:

Statutory order no. 17/2003 Coll., on low-voltage electrical equipment (directive no. 73/23/EHS)  
Statutory order no. 616/2006 Coll., on electromagnetic compatibility (directive no. 2004/108/EHS)

## The product qualities are in conformity with harmonized standard:

El. safety: EN 61010-1

EMC: EN 61326-1

Electronic measuring, control and laboratory devices – Requirements for EMC “Industrial use”  
EN 50131-1, chap. 14 and chap. 15, EN 50130-4, chap. 7, EN 50130-4, chap. 8  
(EN 61000-4-11, ed. 2), EN 50130-4, chap. 9 (EN 61000-4-2), EN 50130-4, chap. 10  
(EN 61000-4-3, ed. 2), EN 50130-4, chap. 11 (EN 61000-4-6), EN 50130-4, chap. 12  
(EN 61000-4-4, ed. 2), EN 50130-4, chap. 13 (EN 61000-4-5), EN 61000-4-8,  
EN 61000-4-9, EN 61000-6-1, EN 61000-6-2, EN 55022, chap. 5 and chap. 6

Seismic resistance: IEC 980: 1993, par.6

The product is furnished with CE label issued in 2006.

## As documentation serve the protocols of authorized and accredited organizations:

EMC MO CR, Testing institute of technical devices, protocol no. 80/6-46/2006 of 03/03/2006  
MO CR, Testing institute of technical devices, protocol no. EMI.80/6-333/2006 of 15/01/2007

Seizmická odolnost VOP-026 Stemberk, protocol no.: 6430-16/2007 of 07/02/2007

Place and date of issue: Prague, 19. Juli 2010

Miroslav Hackl  
Company representative

Assessment of conformity pursuant to §22 of Act no. 22/1997 Coll. and changes as amended by Act no.71/2000 Coll. and 205/2002 Coll