RusAutomation

GUARANTEE 5 YEARS

OM 402PWR

4 DIGIT PROGRAMMABLE UNIVERSAL WATTMETER

AC VOLTMETER/AMMETER
NETS ANALYSER
WATTMETERS

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

Seismic capacity:
IEC 980: 1993, čl. 6

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.

PAP

2.1 DESCRIPTION

The OM 402PWR model is a universal 4-digit panel wattmeter with independent measuring of AC voltage/current, frequency, power factor and other quantities.
The instrument is based on an 8-bit microcontroller and precise RMS converter, which secures high accuracy, stability and easy operation of the instrument

PROGRAMMABLE PROJECTION

Measured quantities	voltage (V_{RMS})
	current (A_{RMS})
	active power (P)
	frequency (Hz)
with calculation	idle power (Q)
	apparent power (S)
	power factor (cos fi)
Measuring range:	adjustable as fixed or with automatic change
Setting:	manual, it is possible to set arbitrary projection on the display for maximum value of the input signal in the menu, e.g. input 0...250 V/0...5 A > 0...1.500 kW
Projection:	-9999...9999

LINEARIZATION

Linearization	by linear interpolation in 45 points/channel (solely via OM Link)

DIGITAL FILTERS

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

MATEMATICKÉ FUNKCE

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

EXTERNAL CONTROL

Lock	control keys blocking
Hold	display/instrument blocking
Tare	tare activation/resetting tare to zero
Resetting MM	resetting min/max value

* only for types DC, PM, DU

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)
- acces without password

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

OMLINK

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.eu) 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 transmis sion into PC via serial interface RS232/485 and OM Link.

3. INSTRUMENT CONECTION

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

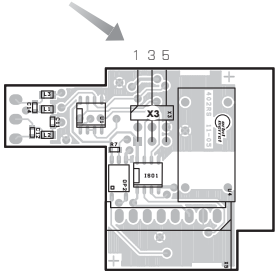
RANGE	INPUT 1 - „I"	INPUT 2 - „U"	INPUT 3 - „U"
K	0...60/150/300 mV		
P	0...1/2,5/5 A		
S		0...10 V	0...120 V
U		0...250 V	0...450 V

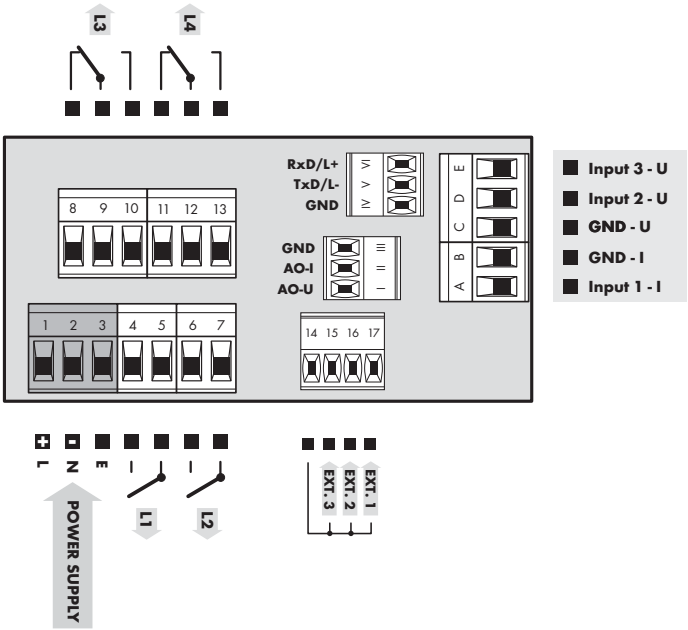
Termination of RS 485 communication line

X3 - Termination of commuication line RS 485

Full	Significance	Default	Recomendation
1-2	connect L+ to (+) source	terminalconnected	
3-4	termination of line 120 Ohm	disconnected	connect at the end of line
5-6	connect L- to (-) source	terminalconnected	do not disconnect

RS 485 line should have a linear structure - wires (ideally shielded and twisted) should lead from one device to another.





!

Clips GND - U and GND - I have galvanic connection

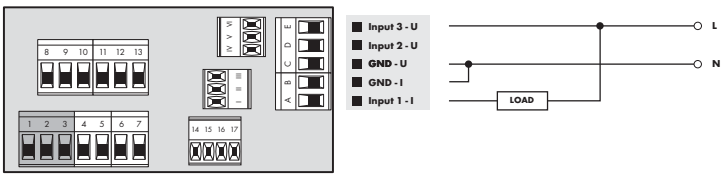
!

In case of connecting clips GND - U or GND - I to a phase, on this potential is subsequently the connector OM Link and secondary inputs.

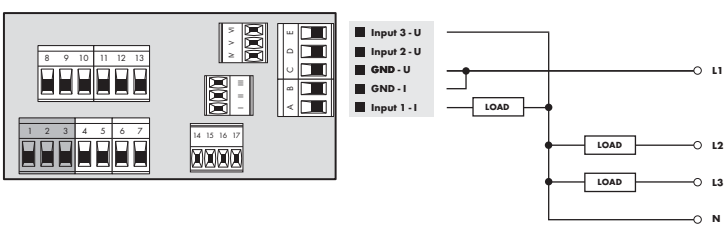
It is necessary to abide by the precautions of hazardous contact with active parts of the instrument in compliance with relevant standards and regulations

3. INSTRUMENT CONECTION

Connection for measuring on one phase



Connection for measuring on three phase



SETTING **PROFI**

For expert users
Complete instrument menu
Access is password protected
Possibility to arrange items of the **USER MENU**
Tree menu structure

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

SETTING **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:

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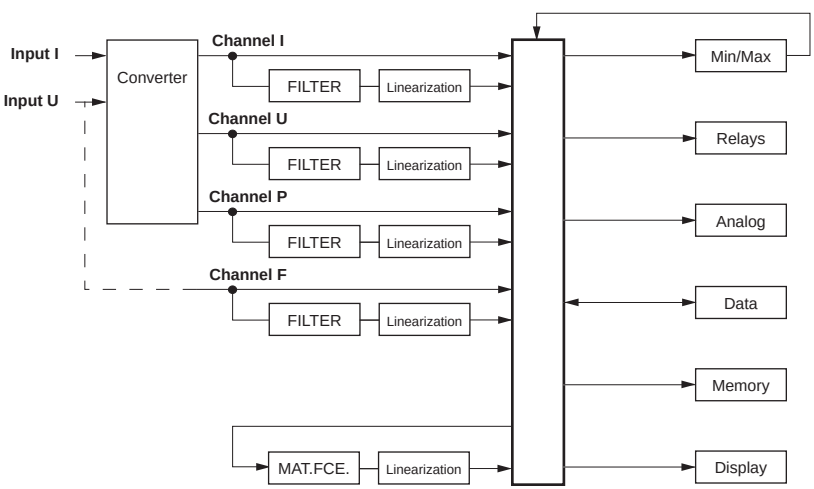
PROFI **Complete programming menu**
- contains complete instrument menu and is protected by optional number code

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).

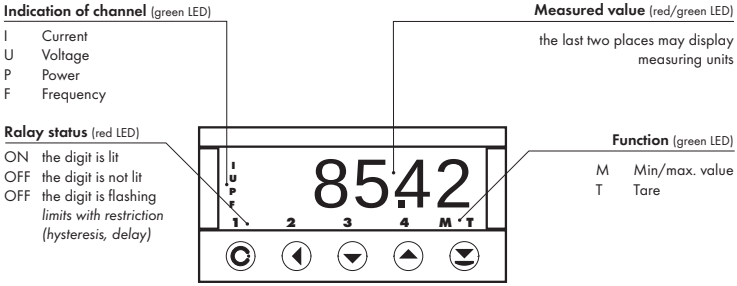
Complete instrument operation and setting may be performed via OM Link communication interface, which is a standard equipment of all instruments.
The operation program is freely accessible (www.orbit.merret.cz) and the only requirement is the purchase of OML cable to connect the instrument to PC. It 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



4. INSTRUMENT SETTING

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 possble to browse through the operation menu and to select and set required values.



Symbols used in the instructions

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

CONECT 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 substraction must be made from the current number (e.g.: 013 > ▼, on class 100 > -87)

Control keys functions

KEY	MEASUREMENT	MENU	SETTING NUMBERS/SELECTION
C	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
C + ▼▼	access into LIGHT/PROFI menu		
C + ▼	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

NO item will not be displayed in USER menu

YES item will be displayed in USER menu with the option of setting

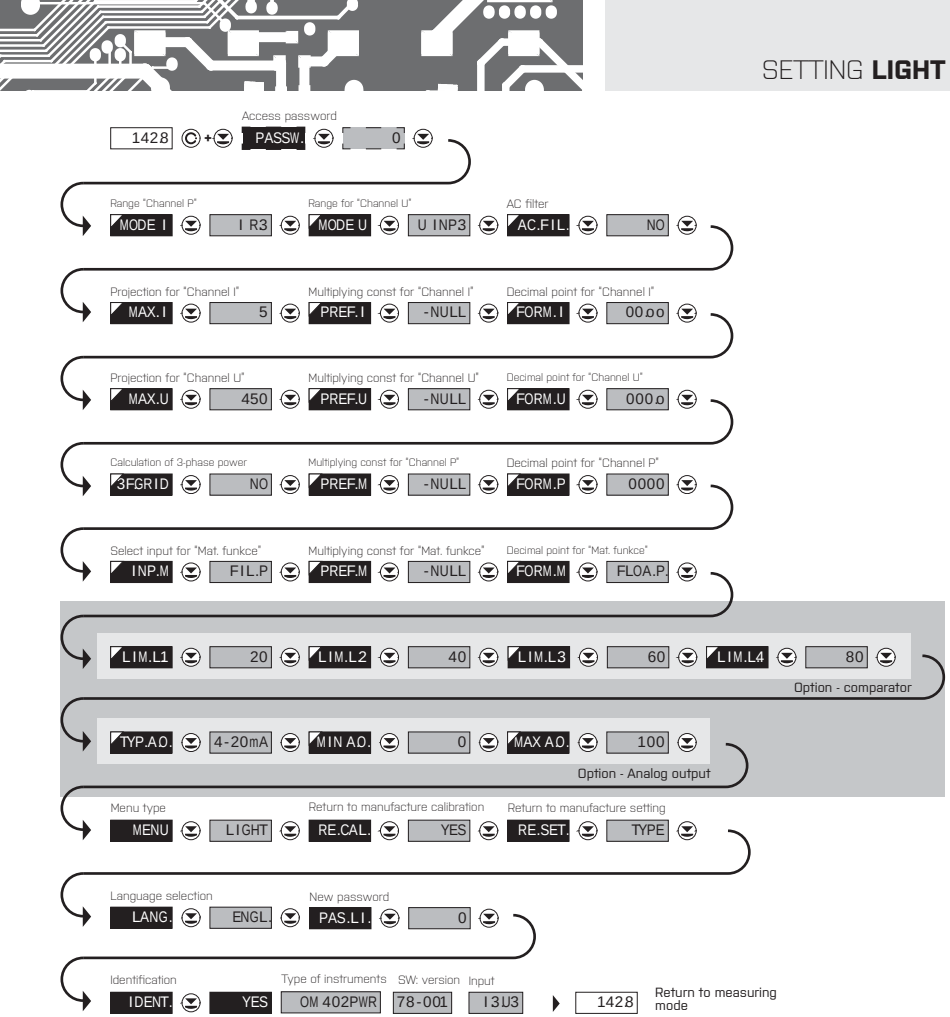
SHOW item will be solely displayed in USER menu

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

PROJECTION OF MEASURING UNITS ON THE DISPLAY

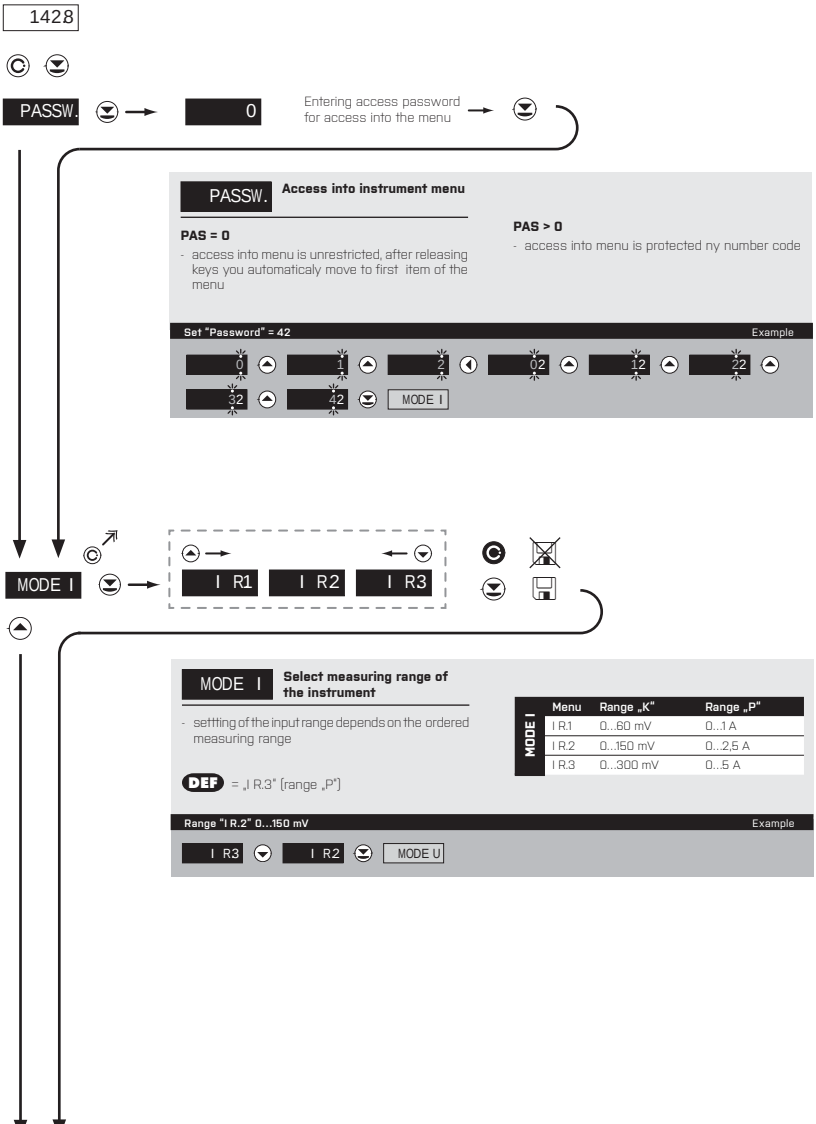
	MULTIPLYING CONSTANT		
	MILI (0,001)	WITHOUT (1)	KILO (1000)
"CHANNEL I" - CURRENT	mA	A	kA
"CHANNEL U" - VOLTAGE	mV	V	kV
"CHANNEL P" - ACTIVE POWER	mW	W	kW
"CHANNEL FR" - FREQUENCY	Hz	Hz	Hz
"S" - APPARENT POWER	mVA	VA	kVA
"Q" - IDLE POWER	mVr	VAr	kVr
"COS FI" - POWER FACTOR	-	-	-

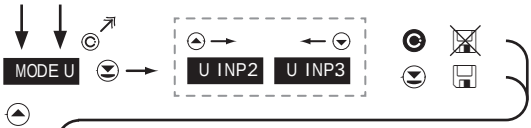


Preset from manufacture	
Password	"0"
Menu	LIGHT
USER menu	OFF
Setting the items	DEF
Preset	"POWER"

!

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


1428
PASSW.
0
Entering access password for access into the menu
PASSW.
Access into instrument menu
PAS = 0
- access into menu is unrestricted, after releasing keys you automaticaly move to first item of the menu
PAS > 0
- access into menu is protected ny number code
Set "Password" = 42
Example
0
1
2
02
12
22
32
42
MODE I
MODE I
I R1
I R2
I R3
MODE I
Select measuring range of the instrument
- settting of the input range depends on the ordered measuring range
DEF = „I R.3" (range „P")
MODE I
Menu
Range „K"
Range „P"
I R.1
0...60 mV
0...1 A
I R.2
0...150 mV
0...2,5 A
I R.3
0...300 mV
0...5 A
Range "I R.2" 0...150 mV
Example
I R3
I R2
MODE U



MODE U **Select measuring range of the instrument**

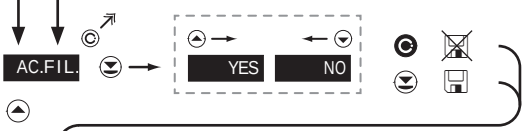
- setting of the input range depends on the ordered measuring range

DEF = U INP.3

MODE U	Menu	Range „S"	Range „U"
	U INP.2	0...10 V	0...250 V
	U INP.3	0...120 V	0...450 V

Range 0...250 V Example

U INP3 → U INP2 → AC.FIL.



AC.FIL. **Input filter function - suppressing the DC component**

- allows for measurement solely of the AC component

DEF = NO

NO Filter is off

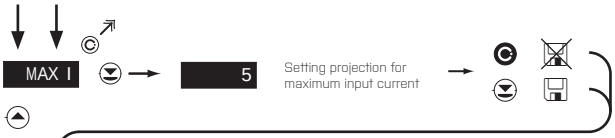
- measures both the DC and the AC component of the input signal

YES Filter is on

- measures solely the AC component of input signal

Measurrement of alternating component onlyy Example

NO → YES → MAX I

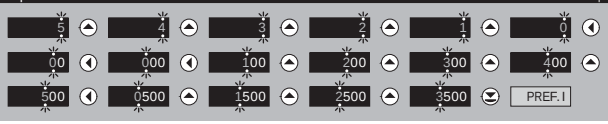


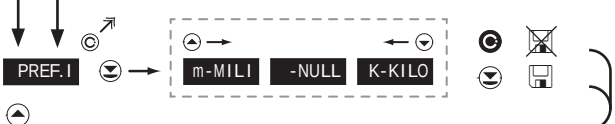
MAX I **Setting display projection for maximum value of input current**

- range of the setting: -999...9999
- position of the DP does not affect display projection

DEF = 5

Projection for 150 mV > Max = 3500 Example





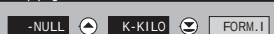
PREF.I **Select the multiplying constant**

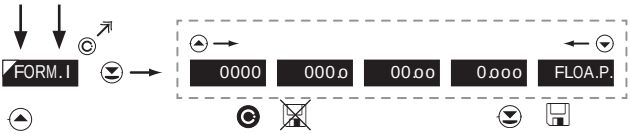
- the constant allows for another mathematical calculation with the option of extended projection of measuring units, display projection

DEF = 1 [- NULL]

m-MILI	Constant 0,001 prefix "m" added
- NULL	Constant 1 without prefix
K-KILO	Constant 1000 prefix "K" added

Multiplying constant 1000 > PREF. I = K-KILO Example





FORM. I — Setting projection of the decimal point

DEF = 00.00

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

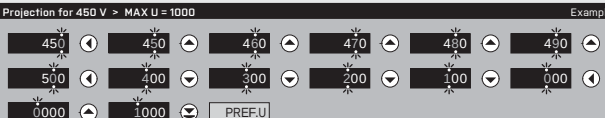
Projection of DP on display > 000.0 — Example

MAX U — Setting display for maximum value of input voltge

DEF = 450

- range of the setting is -999...9999
- position of the DP does not affect display projection

Projection for 450 V > MAX U = 1000 — Example



PREF.U — Select multiplying constant

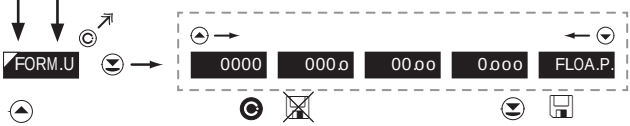
- the constant allows for another mathematical calculation with the option of extended projection of measuring units, display projection

DEF = 1 [- NULL]

m-MILI	Constant 0,001 prefix "m" added
- NULL	Constant 1 without prefix
K-KILO	Constant 1000 prefix "K" added

Multiplying constant 1000 > PREF. U = K-KILO — Example

-NULL ▲ K-KILO ▼ FORM.U



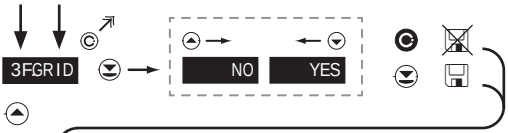
FORM.U — Setting projection of the decimal point

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

DEF = 000.0

Projection of DP on display > 0000 — Example

000.0 ▼ 0000 ▼ 3FGRID



3FGRID **Select calulation for 3-phase network**

DEF = NO

NO	Calculation is inactive
YES	Calculation is active

- value is calculated with presumption of balanced take-off in all phases
- for P, S Q the value is multiplied by 3x

Calculation for 3-phase network > 3F. GRID = YES Example

NO ▲ YES ▼ PREF.P

PREF.P **Select multiplying constant**

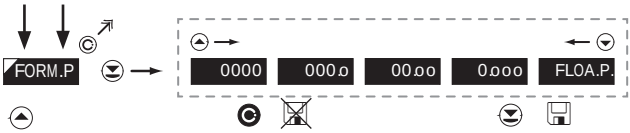
- the constant allows for another mathematical calculation with the option of extended projection of measuring units, display projection

DEF = 1 [- NULL]

m-MILI	Constant 0,001 prefix "m" added
- NULL	Constant 1 without prefix
K-KILO	Constant 1000 prefix "K" added

Multiplying constant 1000 > PREF. P = K-KILO Example

-NULL ▲ K-KILO ▼ FORM.U



FORM.P **Setting projection of the decimal point**

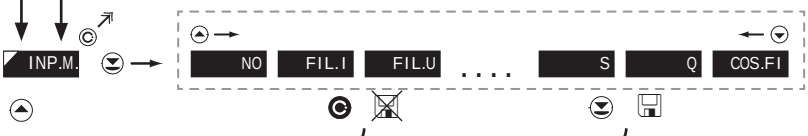
DEF = 0000

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

Projection of DP on display > 000.0 Example

0000 ▲ 000.0 ▼ INP.M.

* subsequent item on the menu depends on instrument equipment



INP.M. **Select input for calculation of mathematic function**

- select value from which mathematic function will be calculated

DEF = FIL. P

INP. M	Menu	Description
	NO	Mat. functions off
	FIL. I	From „Chan. I" after filtration
	FIL. U	From „Chan. U" after filtration
	FIL. P	From „Chan. P" after filtration
	FIL. F	From „Chan. F" after filtration
	MIN	From „Min. value"
	MAX	From „Max. value"
	S	From „Apparent power"
	Q	From „Idle power"
	COS. FI	From „Cos Fi"

Input Mat. functions from "Channel U" > INP. M = FIL. U Example

FIL.P ▼ FIL.U ▼ INP.M.

PREF.M. Select multiplying constant

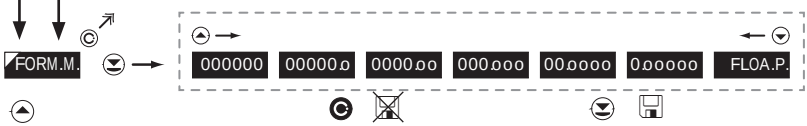
- the constant allows for another mathematical calculation with the option of extended projection of measuring units, display projection

DEF = 1 [- NULL]

m-MILI	Constant 0,001 prefix "m" added
- NULL	Constant 1 without prefix
K-KILO	Constant 1000 prefix "K" added

Multiplying constant 1000 > PRE. I = K-KILO Example

-NULL → K-KILO → FORM.M.



FORM.M. Setting projection of the decimal point

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

DEF = FLOA. P.

Projection of DP on display > 000000 Example

FLOA.P. → 000000 → MENU

*subsequent item on the menu depends on instrument equipment

LIM L1 **Setting boundary for limit 1**

- range of the setting: -9999...9999
- contingent modification of hysteresis or delay may be performed in "**PROFI**" menu

DEF = 20

DEF „Hystresis"=0, „Delay"=0

Setting limit 1 > L 1 = 32 — Example

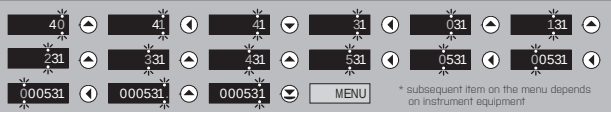
LIM L2 **Setting boundary for limit 2**

- range of the setting: -9999...9999
- contingent modification of hysteresis or delay may be performed in "**PROFI**" menu

DEF = 40

DEF „Hystresis"=0, „Delay"=0

Setting limit 2 > L 2 = 53.1 — Example



* 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: -9999...9999
- contingent modification of hysteresis or delay may be performed in "**PROFI**" menu

DEF = 60

DEF „Hystresis"=0, „Delay"=0

Setting limit 3 > L 3 = 85 Example

* subsequent item on the menu depends on instrument equipment

LIM L4 **Setting boundary for limit 4**

- range of the setting: -9999...9999
- contingent modification of hysteresis or delay may be performed in "**PROFI**" menu

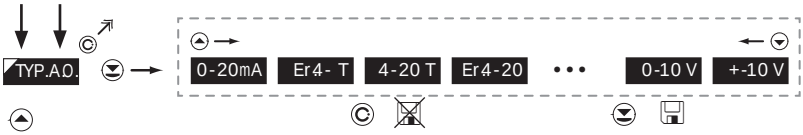
DEF = 80

DEF „Hystresis"=0, „Delay"=0

Setting limit 4 > L 4 = 103 Example

* subsequent item on the menu depends on instrument equipment

DISPLAYED ONLY WITH OPTIONS > **ANALOG OUTPUT**

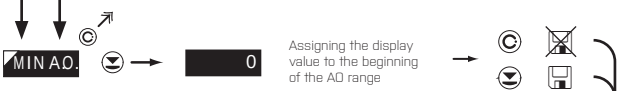


TYP.AO. **Setting the type of analog output**

TYP. A.O.	Menu	Range	Description
	0-20mA	0...20 mA	
	Er.4- T	4...20 mA	with error message indication and broken loop indication (<3,6 mA)
	4-20 T	4...20 mA	with broken loop indication (<3,6 mA)
	Er.4-20	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	

DEF = 4...20 mA

Type of analog output - 0...10 V > TYP. A.O. = 0-10 V Example



MIN AO. **Assigning the display value to the beginning of the AO range**

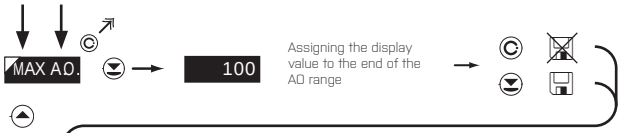
DEF = 0

- range of the setting: -9999...9999

Display value for the beginning of the AO range > MIN A.O. = 0 Example

!

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



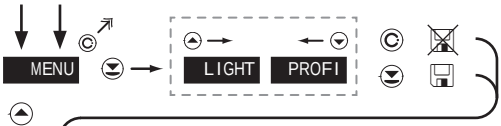
MAX AO. **Assigning the display value to the end of the AO range**

- range of the setting: -9999...9999

DEF = 100

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

5. SETTING **LIGHT**



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

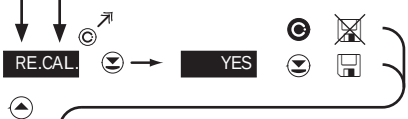
PROFI > menu PROFI, a complete menu for complete instrument setting

> tree menu structure

DEF = LIGHT

Menu LIGHT > MENU = LIGHT Example

LIGHT ▼ RE.CAL.



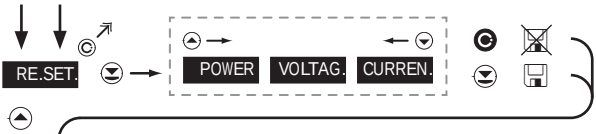
RE.CAL. **Restoration of manufacture calibration**

- 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 > YES Example

RE.CAL. ▲ YES ▼ RE.SET



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

- in the event of error setting or calibration it is possible to return to manufacture setting. Prior to execution of changes you will be asked to confirm your selection (YES)
- reading manufacture calibration and primary setting of items in menu (DEF)

Restore manufacture

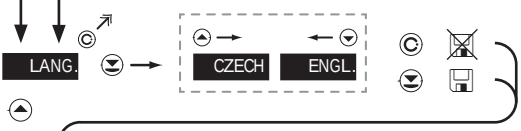
Presetting constants and evaluation

- presetting "source" for further evaluation (e.g.: select "VOLTAGE" > evaluation of limits, analog, min/max. value, etc... from "Channel U"

POWER	Setting for measurement of power output - "Channel P"
VOLTAG.	Setting for measurement of voltage - "Channel U"
CURREN.	Setting for measurement of current - "Channel I"

Restoration of manufacture setting > POWER Example

POWER → LANG.



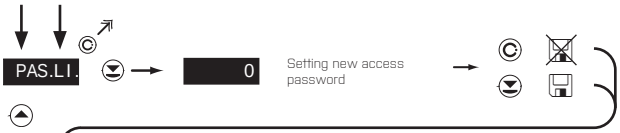
LANG. **Selection of language in instrument menu**

- selection of language version of the instrument menu

DEF = ENGL.

Language selection - ENGLISH > LANG. = ENGL. Example

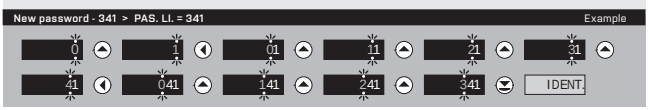
CZECH → ENGL. → PAS.LI.

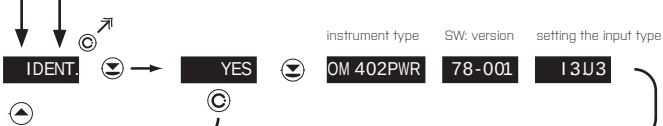


PAS.LI. **Setting new access password**

- access password for menu **LIGHT**
- range of the number code 0...9999
- upon setting the password to "**0000**" the access to menu **LIGHT** is free without prompt to enter it
- in case the password is lost, please contact the adminstrator of this device

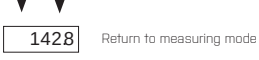
DEF = 0





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



SETTING
PROFI

For expert users
Complete instrument menu
Access is password protected
Possibility to arrange items of the **USER MENU**
Tree menu structure

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

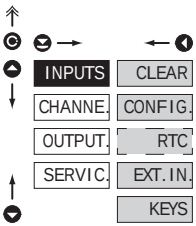
C + ▼
- access to **PROFI** menu
- authorization for access to **PROFI** menu does not depend on setting under item SERVIC. > MENU
- password protected access (unless set as follows under the item SERVIC. > N. PASS. > PROFI =0)

C + ▲
- 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

PROJECTION OF MEASURING UNITS ON THE DISPLAY

	MULTIPLYING CONSTANT		
	MILI (0,001)	WITHOUT (1)	KILO (1000)
"CHANNEL I" - CURRENT	mA	A	kA
"CHANNEL U" - VOLTAGE	mV	V	kV
"CHANNEL P" - ACTIVE POWER	mW	W	kW
"CHANNEL FR" - FREQUENCY	Hz	Hz	Hz
"S" - APPARENT POWER	mVA	VA	kVA
"Q" - IDLE POWER	mVr	VAr	kVr
"COS FI" - POWER FACTOR	-	-	-

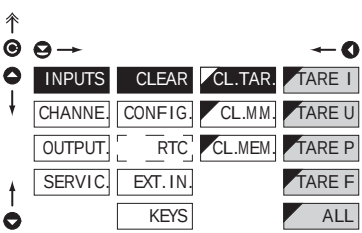
6.1 SETTING "PROFI" - INPUT

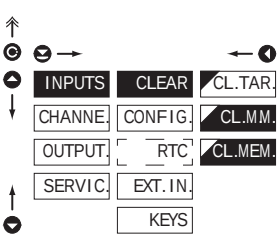


The primary instrument parameters are set in this menu

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**

TARE I	Tare resetting Channel - Current
TARE U	Tare resetting Channel - Voltage
TARE P	Tare resetting Channel - Power
TARE F	Tare resetting Channel - Frequency
ALL	Tare resetting on all channels

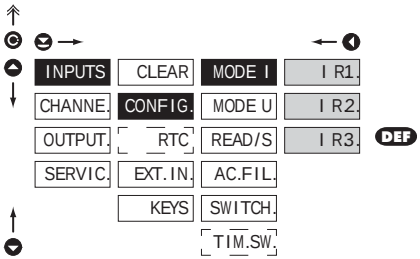
CL.MM. — Resetting min/max value

- 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 SELECT MEASURING MODE - MEASURING CHANNEL I

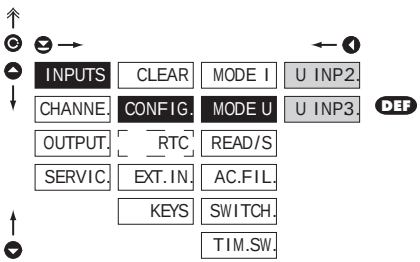


MODE I **Select measuring mode - Current**

- selection of measuring range depends on the ordered version

I R1.	Range 1 0...60 mV/1 A
I R2.	Range 2 0...150 mV/2,5 A
I R3.	Range 3 0...300 mV/5 A

6.1.2b SELECT MEASURING RANGE - MEASURING CHANNEL U

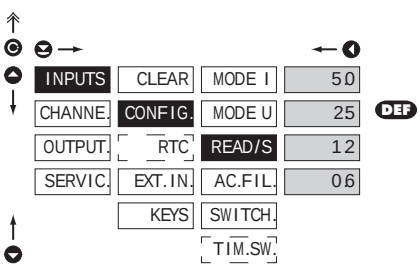


MODE U **Select measuring mode - Voltage**

- selection of measuring range (input) depends on the ordered version

U INP2	Voltage input 2 0...10 V/250 V
U INP3	Voltage input 3 0...120 V/450 V

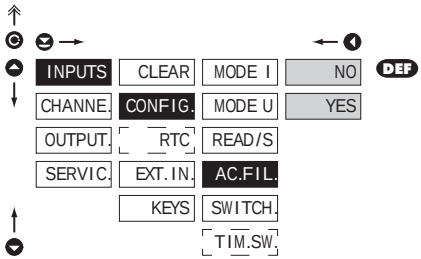
6.1.2c SELECTION OF MEASURING RATE



READ/S **Selection of measuring rate**

50	5,0 measurements/s
25	2,5 measurements/s
12	1,2 measurements/s
06	0,6 measurements/s

6.1.2d SELECT FUNCTION OF INPUT FILTER



AC.FIL. Input filter function - supressing DC component

- allows for measurement of alternating component of the input signal

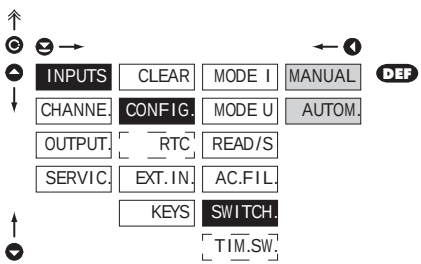
NO Filter is off

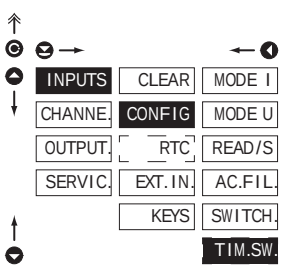
- measures both DC and AC components of the input signal

YES Filter is on

- measures only AC component of the input signal

6.1.2e SELECT PROJECTION OF MEASURING CHANNELS





SWITCH. Select switching of projection of measuring channels

- in this menu it s possible to select switching for projection of measuring channels I, U, P, F, MF
- selection of quantities for switching can be set separately for individual channels (e.g. for Channel I >> "CHANNELS > CHAN. I > SWITCH.")

MANUAL Manual switching of projection

- projection may be switched by selected button ("INPUT > BUTTON") or external input ("INPUT > EXT. IN.")

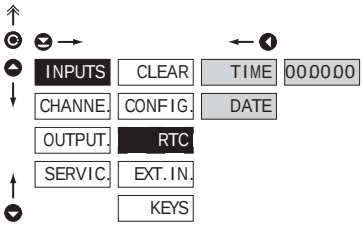
AUTOM. Switching of projection is automatic

- switching time is adjustable in item "TIM. SW."

TIM.SW. Setting switching interval for projection

- time is adjustable in range 0,5...99,9 s
- DEF = 2

6.1.3 SETTING THE REAL TIME CLOCK



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

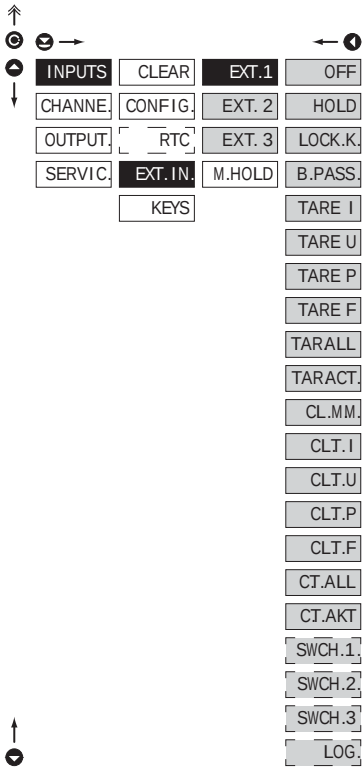
TIME Time setting

- format 23.59.59

DATE Date setting

- format DD.MM.YY

6.1.4a EXTERNAL INPUT FUNCTION SELECTION



EXT. IN.	**Select function of external input**
OFF	Input is off
HOLD	Activation of HOLD
LOCK.K.	Locking keys on the instrument
B.PASS.	Activation of locking access into programming menu
LIGHT/PROFI	
TARE I	Tare activation for "Channel I"
TARE U	Tare activation for "Channel U"
TARE p	Tare activation for "Channel P"
TARE F	Tare activation for "Channel F"
TAR.ALL	Tare activation on all channels
TAR.ACT.	Tare activation on active channel
CL.MM.	Resetting min/max value
CL.T.I	Clear Tare for "Channel I"
CL.T.U	Clear Tare for "Channel U"
CL.T.p	Clear Tare for "Channel P"
CL.T.F	Clear Tare for "Channel F"
CT.ALL	Clear tare on all channels
CT.ACT.	Clear tare on active channel
SWCH.1	Successive switching of channels projection
SWCH.2	BCD switching of channels projection - Ext. 1, 2
- control see table	
- after selecting this option setting for "INPUT 2" is automatically banned	
SWCH.3	BCD switching of channels projection - EXT. 1, 2, 3
- control see table	
- after selecting this option setting for "EXT. 2" and "EXT. 3"	
LOG.	Selection of storing data into instrument memory

External inputs table

Channel	Ext 1	Ext 2	Ext 3
"I"	0	0	
"U"	0	1	
"P"	1	0	
"F"	1	1	
"MF"	0	0	1
"Cos fi"	0	1	1
"Min"	1	0	1
"Max"	1	1	1

DEF EXT. 1 > HOLD

DEF EXT. 2 > LOCK. K.

DEF EXT. 3 > SWCH. 1

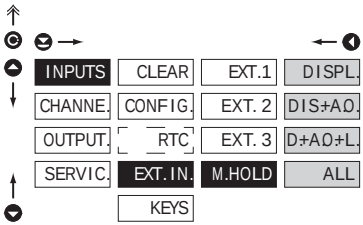
!

Response to change of input is approx. 100 ms

*****

Procedure identical for **EXT. 2** and **EXT. 3**.

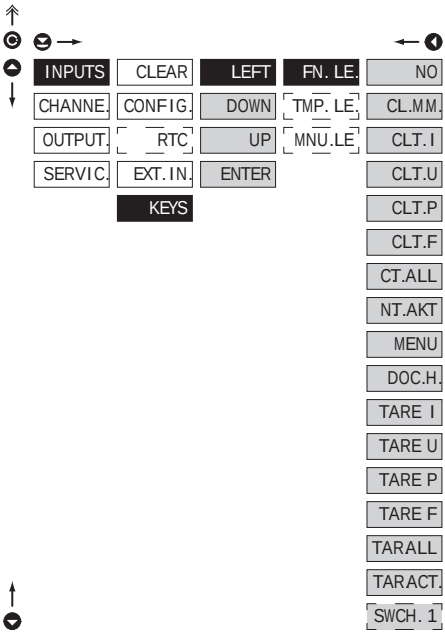
6.1.4b SELECTION OF FUNCTION "HOLD"



M.HOLD **Selection of function "HOLD"**

DISPL.	"HOLD" locks only the value displayed
DIS+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



!

Preset values of the control keys DEF.

Preset > POWER	
LEFT	Current (Chan. I)
UP	Frequency (Chan. F)
DOWN	Voltage (Chan. U)
ENTER	cos fi (Mat. Fn.)
Preset > VOLTAGE	
LEFT	Current (Chan. I)
UP	Frequency (Chan. F)
DOWN	Power (Chan. P)
ENTER	cos fi (Mat. Fn.)
Preset > CURRENT	
LEFT	Power (Chan. P)
UP	Frequency (Chan. F)
DOWN	Voltage (Chan. U)
ENTER	cos fi (Mat. Fn.)

FN. LE. **Assigning further functions to instrument keys**

- „FN. LE." > executive functions

NO	Key has no further function
CL.MM.	Resetting min/max value
CL.T.I	Clear Tare for "Channel I"
CL.T.U	Clear Tare for "Channel U"
CL.T.p	Clear Tare for "Channel P"
CL.T.F	Clear Tare for "Channel F"
CT.ALL	Clear tare on all channels
CT.ACT.	Clear tare on active channel
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. N.	Temporary projection of selected values

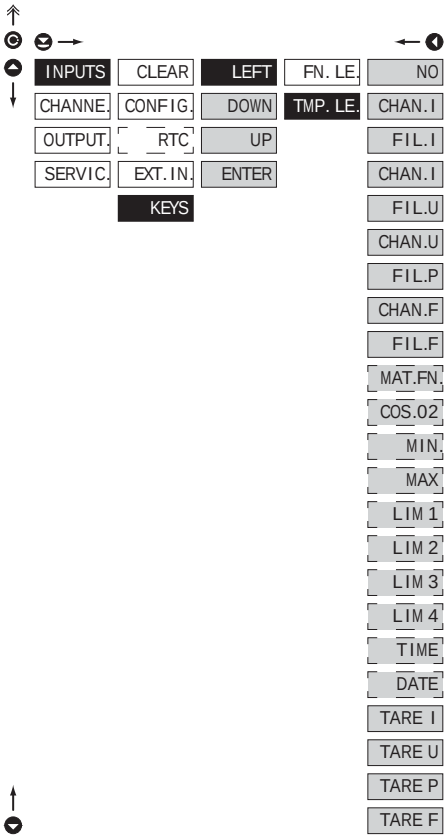
- after confirmation of this selection the item "TMP. LE." is displayed on superior menu level, whererequired selection is performed

TARE I	Tare activation for "Channel I"
TARE U	Tare activation for "Channel U"
TARE p	Tare activation for "Channel P"
TARE F	Tare activation for "Channel P"
TAR.ALL	Tare activation on all channels
TAR.ACT.	Tare activation on active channel
SWCH.1	Successive switching of channels projection

!

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

6.1.5b OPTIONAL ACCESSORY FUNCTIONS OF THE KEYS - TEMPORARY PROJECTION



!

"COS. 02" is derived from "COS. FI." where for evaluation -1...1 range is converted to to 0...2

!

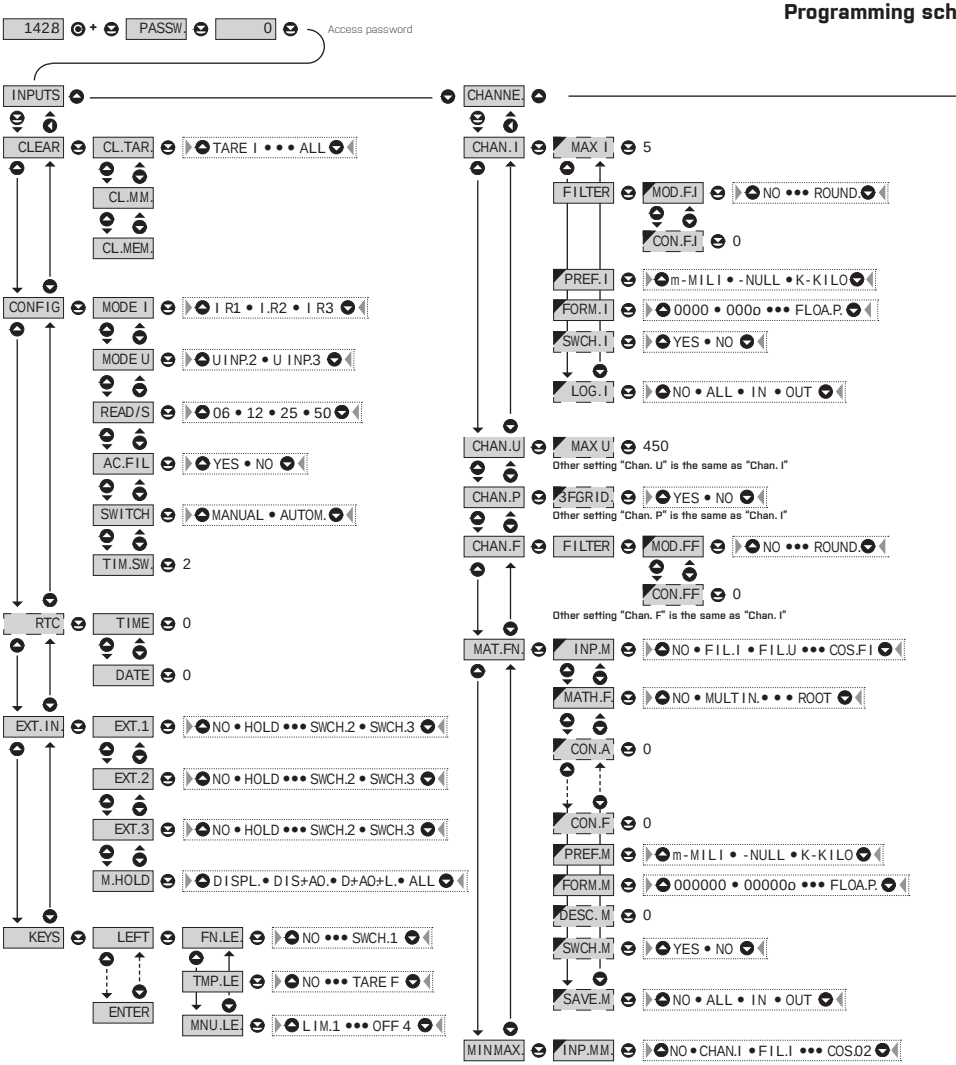
Setting is identical for **LEFT**, **DOWN**, **UP** and **ENTER**

TMP.LE. **Temporary projection of selected item**

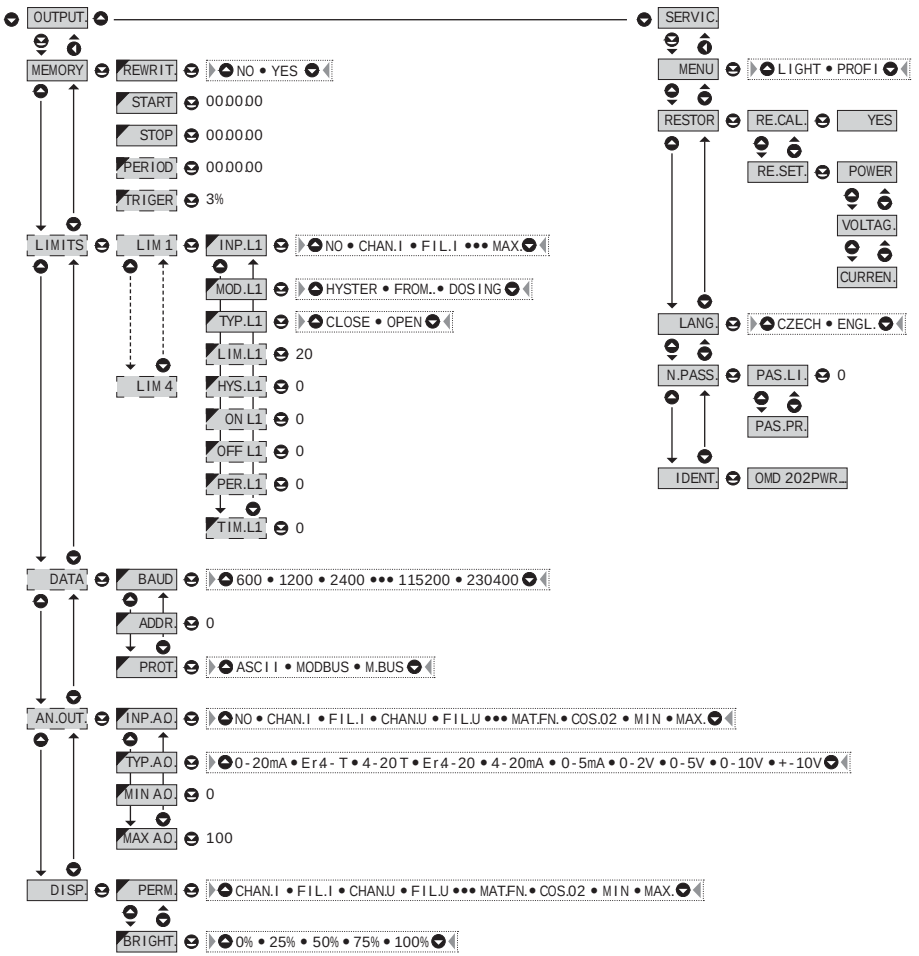
- „TMP. LE." > temporary projection of selected values
- "Temporary" projection of selected value is displayed for the time of keystroke
- "Temporary" projection may be switched to permanent by pressing ⊙ + "Selected key", this holds until the stroke of any key

NO	Temporary projection is off
CHAN. I	Temporary projection of "Channel I" value
FIL. I	Temporary projection of "Channel I" value after processing digital filters
CHAN.U	Temporary projection of "Channel U" value
FIL.U	Temporary projection of "Channel U" value after processing digital filters
CHAN.P	Temporary projection of "Channel P" value
FIL.P	Temporary projection of "Channel P" value after processing digital filters
CHAN.F	Temporary projection of "Channel F" value
FIL.F	Temporary projection of "Channel F" value after processing digital filters
MAT.FN.	Temporary projection of "Mathematic functions" value
COS.02	Temporary projection of value of auxiliary channel cos fi (range 0-2)
MIN	Temporary projection of "Min. value"
MAX	Temporary projection of "Max. value"
LIM -	Temporary projection of Limit 1...4 value
TIME	Temporary projection of "TIME" value
DATE	Temporary projection of"DATE" value
TARE I	Temporary projection of tare for „Channel I"
TARE U	Temporary projection of tare for „Channel U"
TARE p	Temporary projection of tare for „Channel P"
TARE F	Temporary projection of tare for „Channel F"

Programming sch



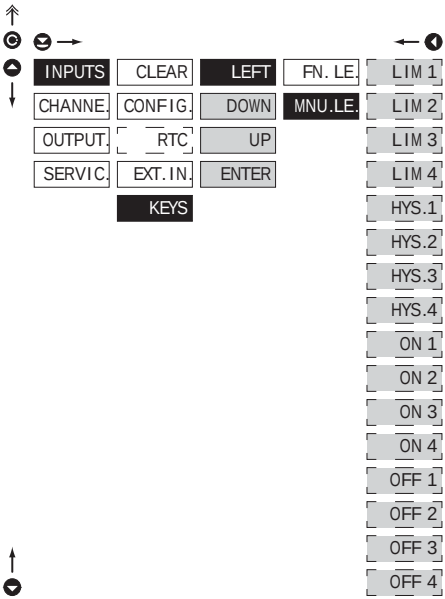
eme PROFI MENU



!

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

6.1.5c OPTIONAL ACCESSORY FUNCTIONS OF THE KEYS - DIRECT ACCESS TO ITEM



MNU.LE. **Assigning access to selected menu item**

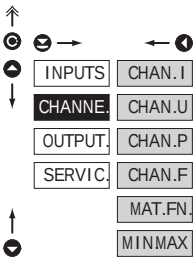
- „MNU. LE." > direct access into menu on selected item

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**

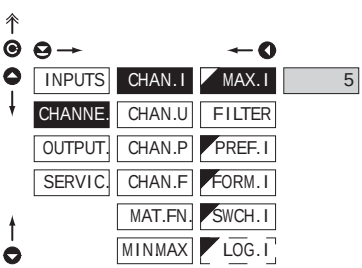
6.2 SETTING "PROFI" - CHANNELS



In this menu the instrument input parameters are set

CHAN.I	Setting parameters of measuring "Channel I"
CHAN.U	Setting parameters of measuring "Channel U"
CHAN.P	Setting parameters of measuring "Channel P"
CHAN.F	Setting parameters of measuring "Channel F"
MAT.FN.	Setting parameters of mathematic functions
MINMAX	Selection of access and evaluation of Min/max value

6.2.1a DISPLAY PROJECTION - „CHANNEL I"



MAX.I **Setting display projection for maximum value of input signal**

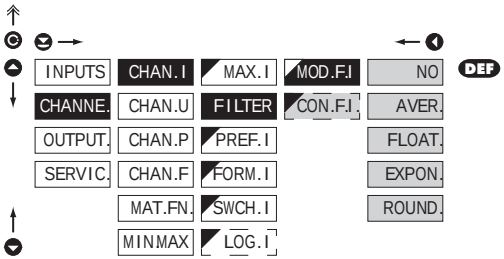
- range of the setting is -9999...9999

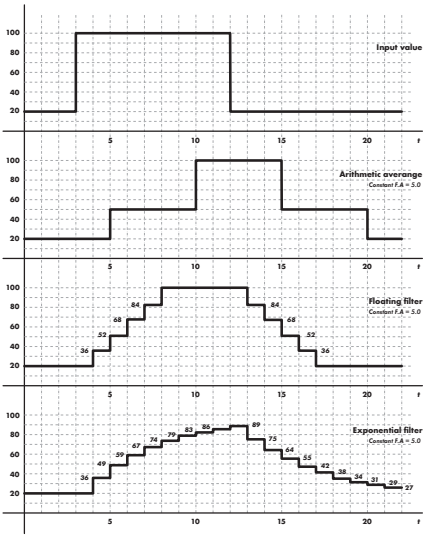
- DEF = 5

!

Setting is identical for "CHAN. U"

6.2.1b SETTING DIGITAL FILTERS - „CHANNEL I"





MOD.F.I **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

AVER. Measured data average*

- arithmetic average from given number („CON. F.I") of measured values
- range 2...100

FLOAT. Selection of floating filter*

- floating arithmetic average from given number („CON. F.I") of measured data and updates with each measured value
- range 2...30

EXPON. Selection of exponential filter*

- integration filter of first prvního grade with time constant („CON. F.I") measurement
- range 2...100

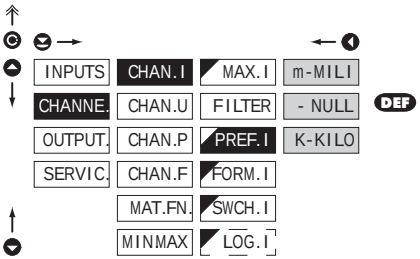
ROUND. Measured value rounding

- is entered by any number, which determines the projection step
  [e.g: "CON. F.I"=2,5 > display 0, 2.5, 5,..]

CON.F.I Setting constants

- this menu item is always displayed after selection of particular type of filte
- DEF = 2

6.2.1c SETTING MULTIPLYING CONSTANT - „CHANNEL I"

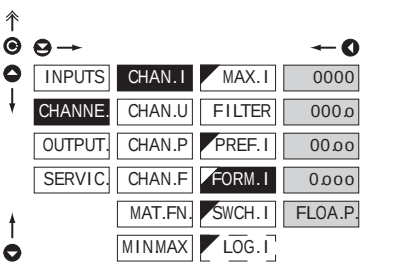


PREF.I **Select multiplying constant**

- the constant allows for another mathematical calculation with the option of extended projection of measuring units, display projection

m-MILI	Constant 0,001 prefix "m" added
- NULL	Constant 1 without prefix
K-KILO	Constant 1000 prefix "K" added

6.2.1d PROJECTION FORMAT - POSITIONING OF DECIMAL POINT



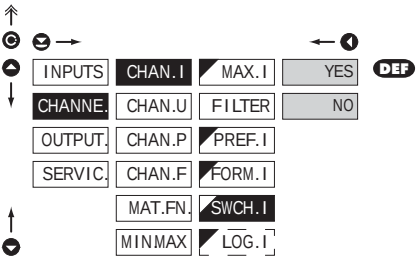
FORM.I **Selection of decimal point**

- the instrument can project numbers in a standard way incl. the decimal point, time formats and also floating decimal point which ensures the most accurate value projection when „**FLOA. P.**" is selected

0000.	Setting DP - XXXX.
000.0	Setting DP - XXX.x
00.00	Setting DP - XX.xx
0.000	Setting DP - X.xxx
FLOA.P.	Floating DP

DEF "Channel I" - 00.00
DEF "Channel U" - 000.0
DEF "Channel P" - 0000
DEF "Channel F" - 00.00

6.2.1e SELECTION OF CHANNEL PROJECTION UPON SWITCHING



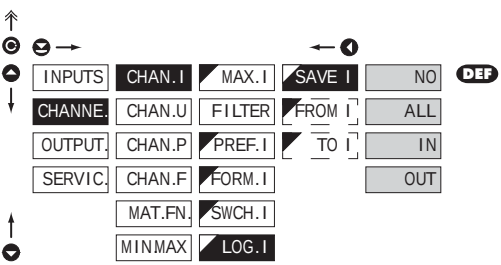
SWIT.I **Selection of channel rojection upon switching**

- setting in this item enables the user to select individual measuring channels which will be displayed upon switching the channel functions „SWIT. I"

NO — Projection permitted

YES — Projection restricted

6.2.1f SELECTION OF STORING DATA INTO INSTRUMENT MEMORY



SAVE I **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

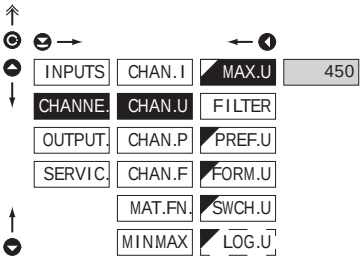
IN — Only data measured within the set interval is stored in memory

OUT — Only data measured outside the set interval is stored in memory

FROM I — Setting the initial interval value
- setting range: -9999...9999

TO I — Setting the final interval value
- setting range: -9999...9999

6.2.2a DISPLAY PROJECTION - „CHANNEL U"



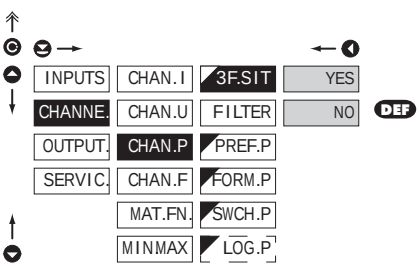
MAX.U **Setting display projection for maximum value of input signal**

- range of the setting is -9999...9999
- DEF = 450

!

Setting is identical for "CHAN. I"

6.2.3a SETTING OF PARAMETERS FOR "CHANNEL P"



3FGRID **Select calulation for 3-phase network**

NO — Calculation is inactive

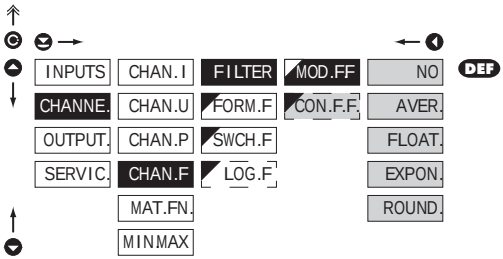
YES — Calculation is active

- value is calculated with presumption of balanced take-off in all phases
- for P, S Q the value is multiplied by 3x

!

Setting is identical for "CHAN. I"

6.2.4a SETTING OF PARAMETERS FOR "CHANNEL F"



MOD.FF **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

AVER. Measured data average*

- arithmetic average from given number („**CON. F.F**") of measured values
- range 2...100

FLOAT. Selection of floating filter*

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

EXPON. Selection of exponential filter*

- integration filter of first prvního grade with time constant („**CON. F.F**") measurement
- range 2...100

ROUND Measured value rounding

- is entered by any number, which determines the projection step (e.g: "**CON. F.F**"=2,5 > display 0, 2.5, 5,..)

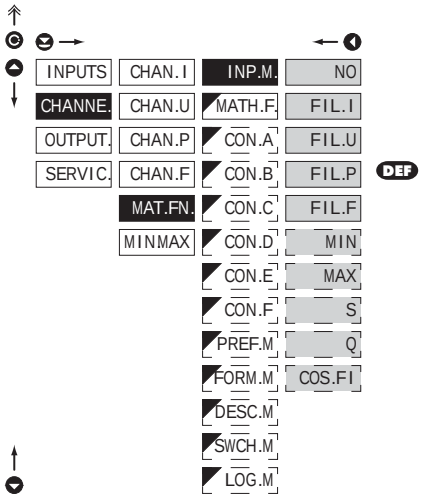
CON.FF Setting constants

- this menu item is always displayed after selection of particular type of filte
- **DEF** = 2

!

Other settings are identical with settings for "Channel I"

6.2.5a MATHEMATICAL FUNCTIONS - INPUT SELECTION

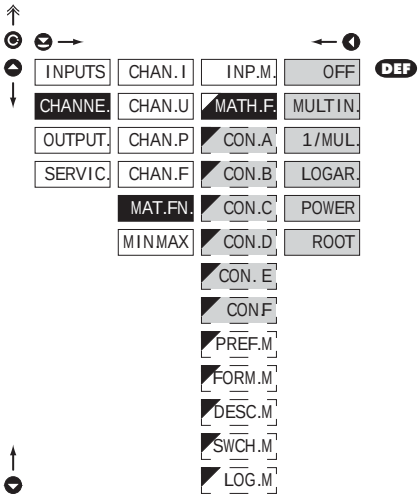


INP.M **Selecting the channel to be processed by mathematical function**

- selecting the value from which the mathematical function will be calculated

NO	Mathematical functions are off
FIL.I	From „Channel I" - current after digital filter
FIL.U	From „Channel U" - voltage after digital filter
FIL.P	From „Channel P" - power after digital filter
FIL.F	From „Channel F" - frequency after digital filter
MIN	From "Min. value"
MAX	From "Max. value"
S	From "Apparent power"
Q	From "Idle power"
COS.FI	From "Cos fi"

6.2.5a MATHEMATIC FUNCTIONS



MATH.F. **Selection of mathematic functions**

OFF Mathematic functions are off

MULTIN. Polynomial

$$Ax^5 + Bx^4 + Cx^3 + Dx^2 + Ex + F$$

1/MUL. 1/x

$$\frac{A}{x^5} + \frac{B}{x^4} + \frac{C}{x^3} + \frac{D}{x^2} + \frac{E}{x} + F$$

LOGAR. Logarithm

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

POWER Power

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

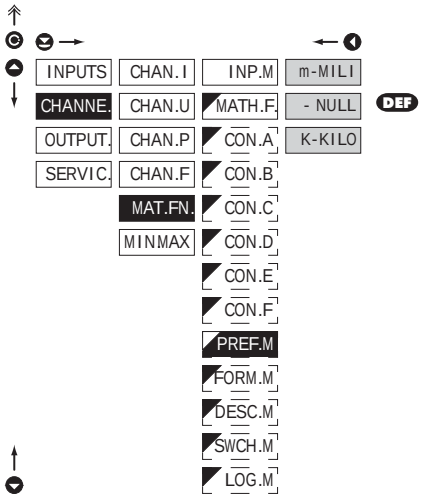
ROOT Root

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

CON. - Setting constants for calculation of mat.functions

- this menu is displayed only after selection of given mathematic function

6.2.5c MATHEMATIC FUNCTIONS - SETTING MULTIPLYING CONSTANT

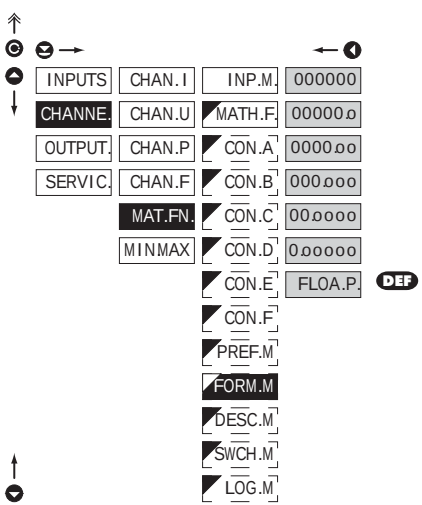


PREF.M **Select multiplying constant**

- the constant allows for another mathematical calculation with the option of extended projection of measuring units, display projection

m-MILI	Constant 0,001 prefix "m" added
- NULL	Constant 1 without prefix
K-KILO	Constant 1000 prefix "K" added

6.2.5d MATHEMATIC FUNCTIONS - POSITIONING OF DECIMAL POINT

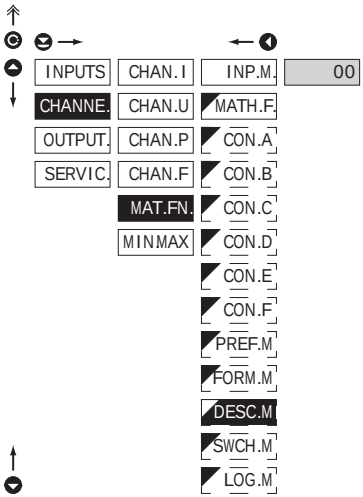


FORM.M **Selection of decimal point**

- the instrument can project numbers in a standard way incl. the decimal point, time formats and also floating decimal point which ensures the most accurate value projection when „FLOA. P." is selected

000000.	Setting DP - XXXXXX.
00000.0	Setting DP - XXXXX.x
0000.00	Setting DP - XXXX.xx
000.000	Setting DP - XXX.xxx
FLOA.P.	Floating DP

6.2.5e MATHEMATIC FUNCTIONS - MEASURING UNITS



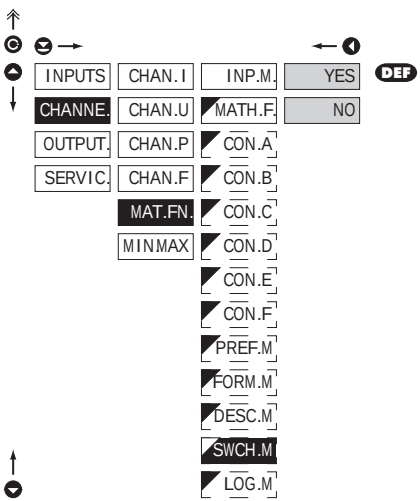
DESC. M **Setting projection of description for "MAT. FN."**

- projection of mesured 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 = 00 (no description)

!

Table of signs on page 77

6.2.5f MATHEMATIC FUNCTIONS - SELECTION OF CHANNEL PROJECTION UPON SWITCHING



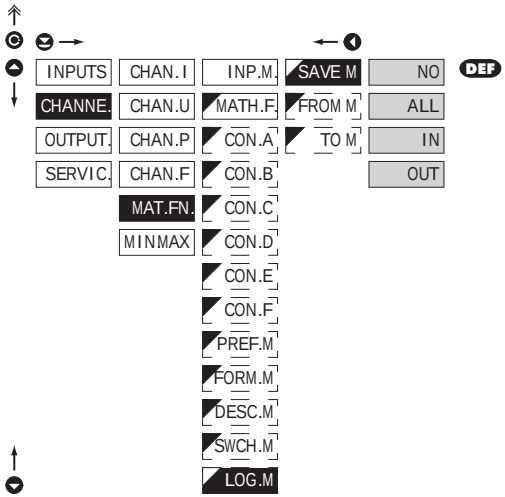
SWIT.M **Selection of channel rojection upon switching**

- setting in this item enables the user to select individual measuring channels which will be displayed upon switching the channel functions „SWIT. M"

NO — Projection permitted

YES — Projection restricted

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

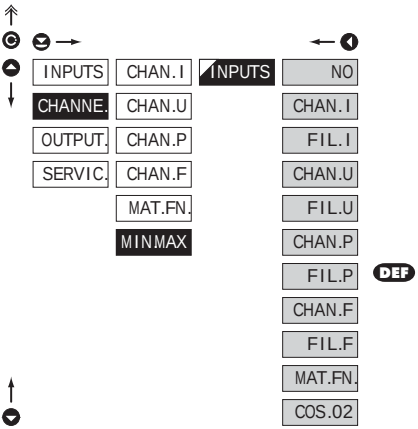
IN — Only data measured within the set interval is stored in memory

OUT — Only data measured outside the set interval is stored in memory

FROM M — Setting the initial interval value
- setting range: -9999...9999

TO M — Setting the final interval value
- setting range: -9999...9999

6.2.6 SELECTION OF EVALUATION OF MIN/MAX VALUE



INP.MM. Selection of evaluation of min/max value

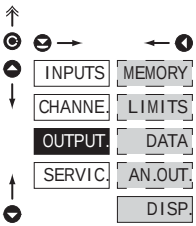
- selection of value from which the min/max value will be calculated

NO	Evaluation of min/max value is off
CHAN.I	From „Channel I" - corrent
FIL.I	From „Channel I" - corrent after digital filter
CHAN.U	From „Channel U" - voltage
FIL.U	From „Channel U" - voltage after digital filter
CHAN.P	From „Channel P" - power
FIL.P	From „Channel P" - power after digital filter
CHAN.F	From „Channel F"
FIL.F	From „Channel F" - frequency after digital filter
MAT.FN.	From "Mathematic function"
COS.FI	From "Cos fi"

!

"**COS. 02**" is derived from "**COS. FI.**" where for evaluation -1...1 range is converted to to 0...2

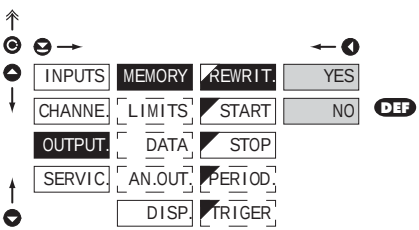
6.3 SETTING „PROFI" - OUTPUTS



In this menu it is possible to set parame ters 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

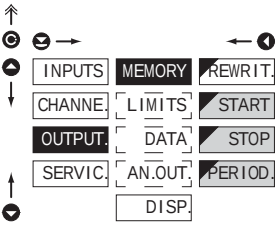


REWRIT. **Selection of the mode of data logging**

- 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

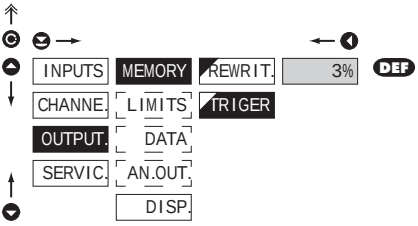
PERIOD. Period of data logging into instrument memory

- 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



TRIGER **Setting logging data into inst. memory**

- logging data into inst. memory is governed by the folowing selection, which determines how many percent of the memory is reserved for data logging prior to initiation of trigger imputse
- 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

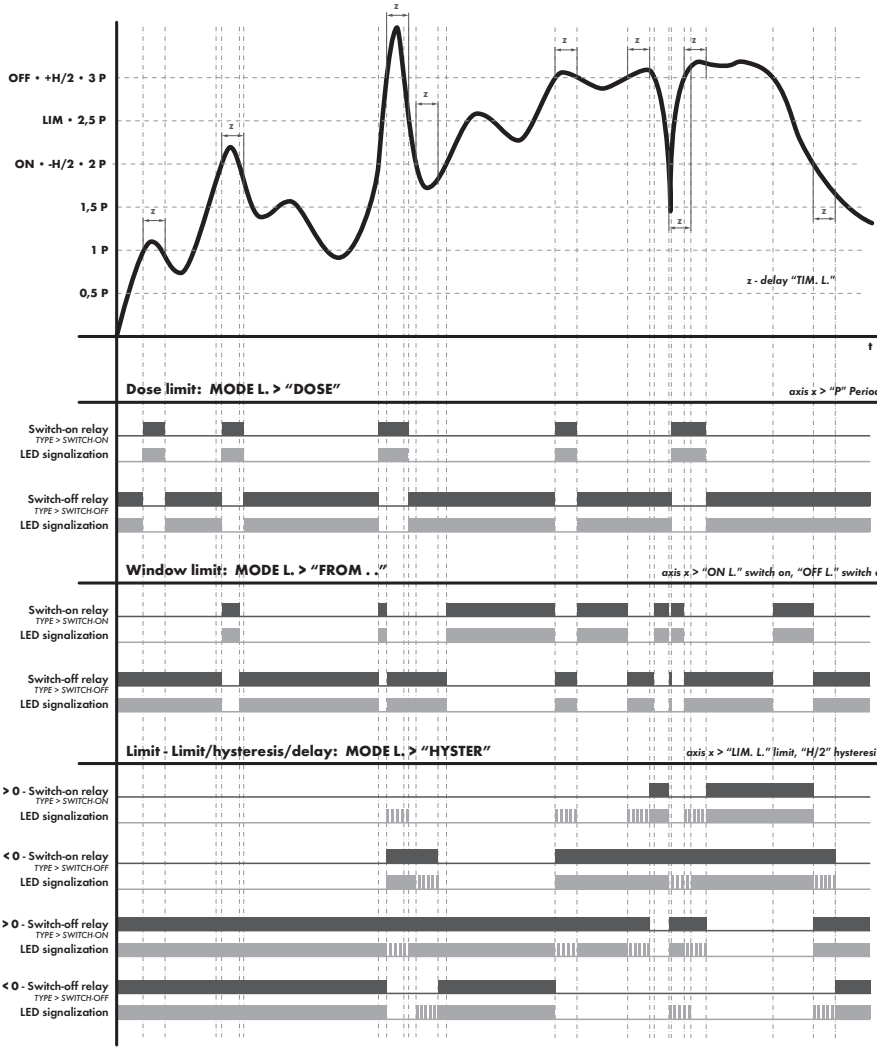
- ext. input, button or reading data via RS

FAST

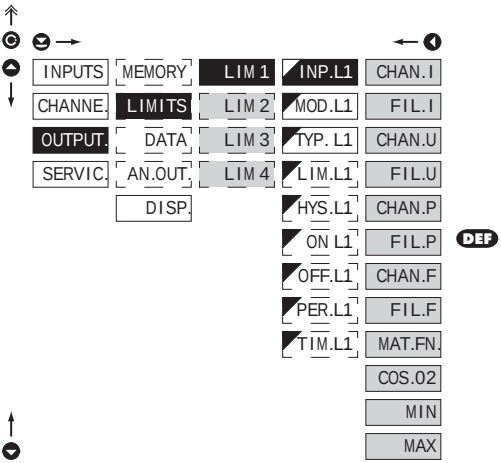
The memory operates on the basis of memory oscilloscope. Select an area of 0...100% of the memory capacity (100% represents 8 192 individual recordings for a single channel measurement). This area is filled cyclically up to the point when the recording starts (activated by the front panel button or by 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.

DESCRIPTION OF RELAY FUNCTION

MODE > HYSTER • FROM - TO • DOSING



6.3.2a SELECTION OF INPUT FOR LIMITS EVALUATION



!

"COS. 02" is derived from "COS. FI." where for evaluation -1...1 range is converted to to 0...2

INP.L1 **Selection evaluation of limits**

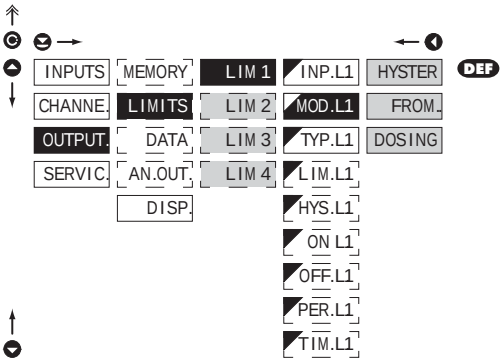
- selection of value from which the limit will be evaluated

CHAN.I	From „Channel I" - current
FIL.I	From „Channel I" - current after digital filter
CHAN.U	From „Channel U" - voltage
FIL.U	From „Channel U" - voltage after digital filter
CHAN.P	From „Channel P" - power
FIL.P	From „Channel P" - power after digital filter
CHAN.F	From „Channel F"
FIL.F	From „Channel F" - frequency after digital filter
MAT.FN.	From "Mathematic function"
COS.FI	From "Cos fi"
MIN.	From "Min. value"
MAX.	From "Max. value"

!

Setting is identical for LIM 1, LIM 2, LIM 3 and LIM 4

6.3.2b SELECTION OF TYPE OF LIMIT



MOD.L1 **Selection the type of limit**

HYSTER Limit is in mode "Limit, hysteresis, delay"

- for this mode the parameters of "**LIM. L.1**" are set, at which the limit will shall react, "**HYS. L.1**" the hysteresis range around the limit (LIM ±1/2 HYS) and time "**TIM. L.1**" determining the delay of relay switch-on

FROM. Frame limit

- for this mode the parameters are set for interval "**ON. L.1**" the relay switch-on and "**OFF. L.1**" the relay switch-off

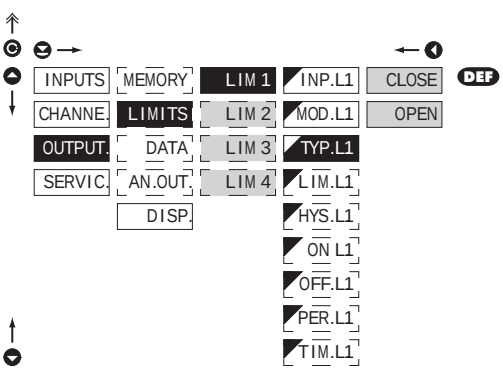
DOSING Dose limit (periodic)

- for this mode the parameters are set for "**PER. L.1**" determining the limit value as well as its multiples at which the output is active and "**TIM. L.2**" indicating the time during which is the output active

!

Setting is identical for **LIM 1**, **LIM 2**, **LIM 3** and **LIM 4**

6.3.2c SELECTION OF TYPE OF OUTPUT



TYP.L1 **Selection of type of output**

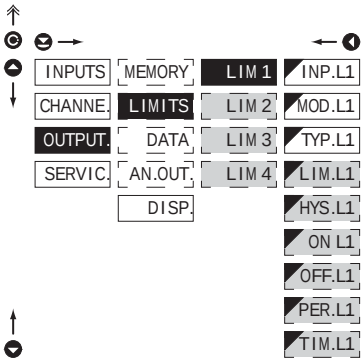
CLOSE Output switches on when condition is met

OPEN Output switches off when condition is met

!

Setting is identical for **LIM 1**, **LIM 2**, **LIM 3** and **LIM 4**

6.3.2d SETTING VALUES FOR LIMITS EVALUATION



LIM.L1 Setting limit for switch-on

- for type "**HYSTER**"

HYS.L1 Setting hysteresis

- for type "**HYSTER**"
- indicates the range around the limit (in both directions, LIM. ±1/2 HYS.)

ON.L1 Setting the outset of the interval of limit switch-on

- for type "**FROM..**"

OFF.L1 Setting the end of the interval of limit switch-on

- for type "**FROM..**"

PER.L1 Setting the period of limit switch-on

- for type "**DOSING**"

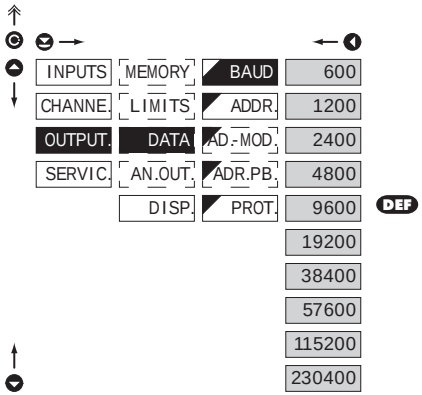
TIM.L1 Setting the time switch-on of the limit

- for type "**HYSTER**" and "**DOSING**"
- setting within the range: ±0...99,9 s
- positive time > relay switches on after crossing the limit (**LIM. L1**) and the set time (**TIM. L1**)
- negative time > relay switches off after crossing the limit (**LIM. L1**) and the set negative time (**TIM. L.1**)

!

Setting is identical for **LIM 1**, **LIM 2**, **LIM 3** and **LIM 4**

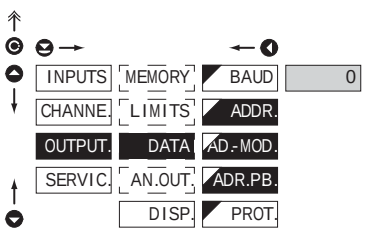
6.3.3a SELECTION OF DATA OUTPUT BAUD RATE



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



ADDR. — **Setting instrument address**

- setting in range 0...31
- DEF = 00

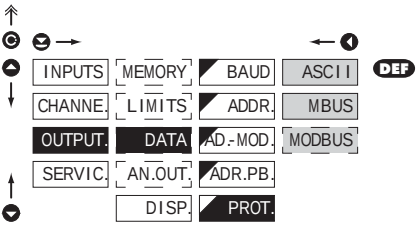
ADDR. — **Setting instrument address - MODBUS**

- setting in range 1...247
- DEF = 1

ADR.PB. — **Setting instrument address - PROFIBUS**

- setting in range 1...127
- DEF = 19

6.3.3c SELECTION OF DATA OUTPUT PROTOCOL

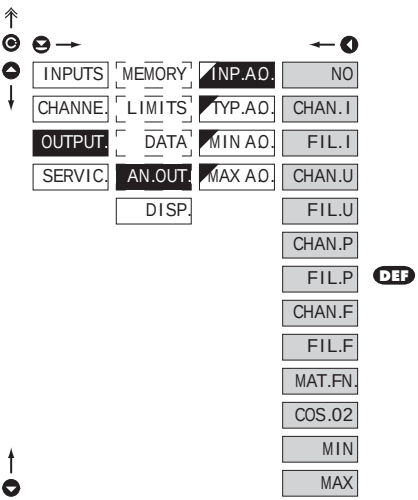


PROT. Selection of the type of analog output

- **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

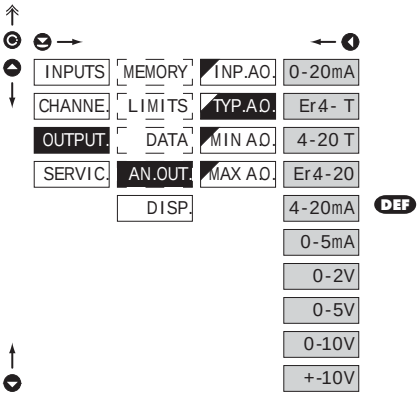
- **NO** Analogue output is off
- **CHAN.I** From „Channel I" - current
- **FIL.I** From „Channel I" - current after digital filter
- **CHAN.U** From „Channel U" - voltage
- **FIL.U** From „Channel U" - voltage after digital filter
- **CHAN.P** From „Channel P" - power
- **FIL.P** From „Channel P" - power after digital filter
- **CHAN.F** From „Channel F"
- **FIL.F** From „Channel F" - frequency after digital filter
- **MAT.FN.** From "Mathematic function"
- **COS.FI** From "Cos fi"
- **MIN** From "Min. value"
- **MAX** From „Max. value"

DEF "Channel I" - FIL. I
DEF "Channel U" - FIL. U
DEF "Channel P" - FIL. P

!

"COS. 02" is derived from "COS. FI." where for evaluation -1...1 range is converted to to 0...2

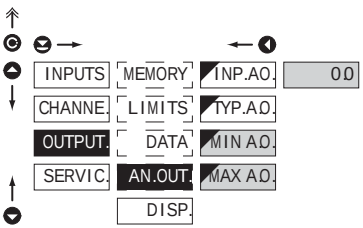
6.3.4b SELECTION OF THE TYPE OF ANALOG OUTPUT



TYP. AO. **Selection of the type of analog output**

- **0-20mA** Type - 0...20 mA
- **Er4- T** Type: 4...20 mA with indication
  - with broken loop detection and indication of error statement (< 3,6 mA)
- **4-20 T** Type: 4...20 mA with indication
  - with broken loop detection (< 3,6 mA)
- **Er4-20** Type: 4...20 mA with indication
  - with indic. of error statement (< 3,6 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 with 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

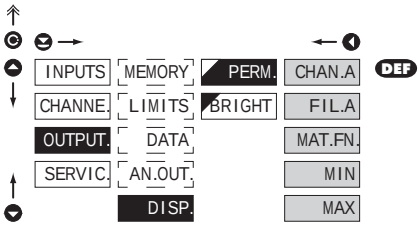
MIN AO. Assigning the display value to the beginning of the AO range

- range of the setting: -999...9999
- DEF = 0

MAX AO. Assigning the display value to the end of the AO range

- range of the setting: -9999...9999
- DEF = 100

6.3.5a SELECTION OF INPUT FOR DISPLAY PROJECTION

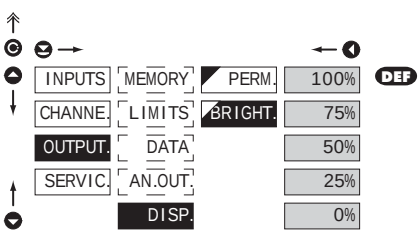


PERM. Selection display projection

- 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

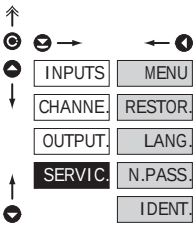
- by selecting display brightness we may appropriately react to light conditions in place of instrument location

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%

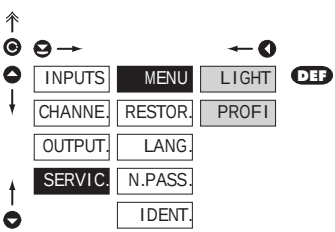
6.4 SETTING "PROFI" - SERVIS



The instrument service functions are set in this menu

MENU	Selection of menu type LIGHT/PROFI
RESTOR.	Restore instrument manufacture setting and calibration
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

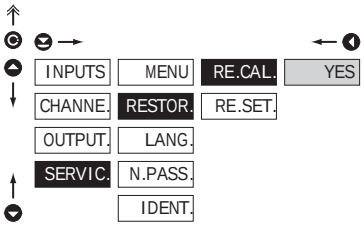
PROFI Active PROFI menu

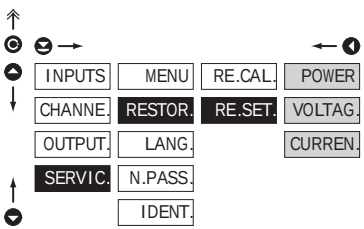
- complete programming menu for expert users
- tree menu

!

Change of setting is valid upon next access into menu

6.4.2 RESTORATION OF MANUFACTURE SETTING





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 you selection „YES"

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

- in the event of error setting or calibration it is possible to return to manufacture setting. Prior to execution of changes you will be asked to confirm your selection (YES)
- reading manufacture calibration and primary setting of items in menu (DEF)

Presetting constants and evaluation

- presetting "source" for further evaluation (e.g.: select "VOLTAGE" > evaluation of limits, analog, min/max. value, etc... from "Channel U"

POWER Setting for measurement of power output - "Channel P"

VOLTAG. Setting for measurement of voltage - "Channel U"

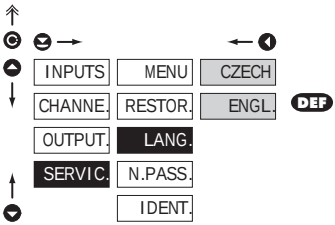
CURREN. Setting for measurement of current - "Channel I"

!

After restoration the instrument switches off for couple seconds

JOBS PERFORMED	RESTORE	
	CALIBRATION	SETTING
cancels USER menu rights	✓	✓
deletes table of items order in USER - LIGHT menu	✓	✓
adds items from manufcture to LIGHT menu	✓	✓
deletes data stored in FLASH	✓	✓
cancels or linearization tables	✓	✓
clears tare	✓	✓
restore manufacture calibration	✓	✗
restore manufacture setting	✗	✓

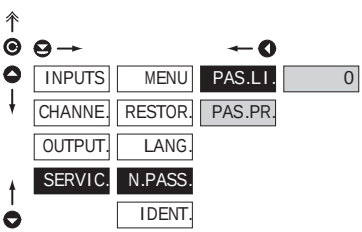
6.4.3 SELECTION OF INSTRUMENT MENU LANGUAGE VERSION



LANG. **Selection of instrument menu language version**

- **CZECH** Instrument menu is in Czech
- **ENGL.** Instrument menu is in English

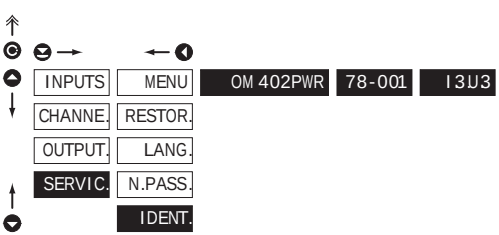
6.4.4 SETTING NEW ACCESS PASSWORD



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.
- numerci code range: 0...9999
- universal passwords in the event of loss:
  LIGHT Menu > „**8177**"
  PROFI Menu > „**7915**"

6.4.5 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

IDENT.	Pos.	Description
	1.	type of instrument
	2.	SW: number - version
	3.	the input type

SETTING
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)

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 LIM 1
- setting may be performed in **LIGHT** or **PROFI** menu, with the **USER** menu then overtaking the given menu structure

Setting

NO item will not be displayed in USER menu

YES item will be displayed in USER menu with editing option

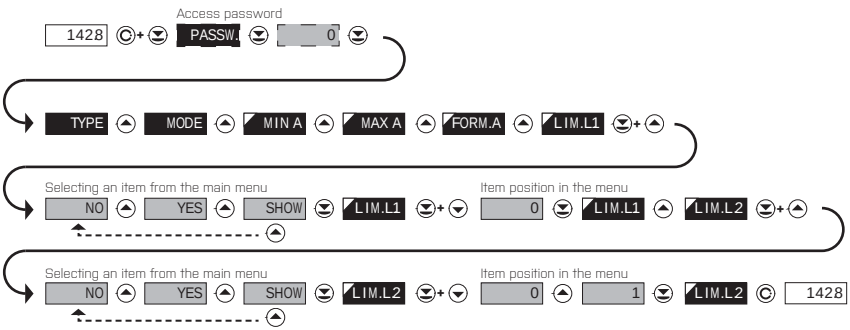
SHOW item will be solely displayed in USER menu

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 of ranking the order of menu items in the "USER" menu

In this example we want to have a direct access to menu items Limit 1 and Limit 2 (example show is for the Light menu, but can equaly be used in the Profi menu).



The result of this setting is that when the © button is pressed, the display will read „**LIM L.1**". By pressing ⏬ button you confirm your selection and then you can set the desired limit value, or by pressing the ⏫ button you can go to setting of „**LIM. L.2**" where you can proceed identically as with Limit one.

You can exit the setting by pressing the ⏬ button by which you store the latest setting and pressing the © button will take you back to the measuring mode

8. DATA PROTOCOL

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 www.orbit.merret.eu or sofware OM Link.

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) <CR>
		MessBus	<STX> 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) <CR>
		MessBus	<STX> D (D) (D) (D) (D) (D) (D) (D) (D) (D) (D) <ETX> <BCC>
Confirmation of data acceptannce (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) <CR>
		MessBus	<STX> $ N P (D) (D) (D) (D) (D) (D) (D) (D) <ETX> <BCC>
	485	ASCII	# A A N P (D) (D) (D) (D) (D) (D) (D) (D) <CR>
		MessBus	<STX> $ N P (D) (D) (D) (D) (D) (D) (D) (D) <ETX> <BCC>
Command confirmation (instrument)	232	ASCII OK	! A A <CR>
		ASCII Bad	? A A <CR>
		Messbus	No - data is transmitted permanently
	485	ASCII OK	! A A <CR>
		ASCII Bad	? A A <CR>
		Mess-Bus OK	<DLE> 1
		Mess-Bus Bad	<NAK>
Instrument identification			# A A 1 Y <CR>
HW identification			# A A 1 Z <CR>
One-time transmission			# A A 7 X <CR>
Repeated transmission			# A A 8 X <CR>

LEGEND

SING	RANGE		DESCRIPTION
#	35	23_H	Command beginning
A A	0...31		Two characters of instrument address (sent in ASCII - tens and units, e.g. "01", "99" universal
<CR>	13	$0D_H$	Carriage return
<SP>	32	20_H	Space
N, P			Number and command - command code
D			Data - usually characters "0"...."9", ".", "."; (D) - dp. and (-) may prolong data
R	30_H...$3F_H$		Relay and tare status
!	33	21_H	Positive confirmation of command (ok)
?	63	$3F_H$	Negative confirmation of command (point)
>	62	$3E_H$	Beginning of transmitted data
<STX>	2	02_H	Beginning of text
<ETX>	3	03_H	End of text
<SADR>	adresa +60$_H$		Prompt to send from address
<EADR>	adresa +40$_H$		Prompt to accept command at address
<ENQ>	5	05_H	Terminate address
<DLE>1	16 49	10_H 31_H	Confirm correct statement
<NAK>	21	15_H	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_H...FF_H. The lowest bit stands for „Relay 1", the highest for „Relay 8"

9. ERROR STATEMENTS

ERROR	CAUSE	ELIMINATION
E.DIS._	Number is too small (large negative) to be displayed	change DP setting, channel constant setting
E.DIS.-	Number is too large to be displayed	change DP setting, channel constant setting
E.TAB._	Number is outside the table range	increase table values, change input setting (channel constant setting)
E.TAB.-	Number is outside the table range	increase table values, change input setting (channel constant setting)
E.INP._	Input quantity is smaller than permitted input quantity range	change input signal value or input (range) setting
E.INP.-	Input quantity is larger than permitted input quantity range	change input signal value or input (range) setting
E.HW.	A part of the instrument does not work properly	send the instrument for repair
E.EE.	Data in EEPROM corrupted	perform restoration of manufacture setting, upon repeated error statement send instrument for repair
E.SET.	Data in EEPROM outside the range	perform restoration of manufacture setting, upon repeated error statement send instrument for repair
E.CLR	Memory was empty (presetting carried out)	upon repeated error statement send instrument for repair, possible failure in calibration
E.OUT.	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		!	"	#	$	%	&	'
8	(	)	*	+	,	-	.	/
16	0	1	2	3	4	5	6	7
24	8	9	VA	Vr	<	=	>	?
32	@	A	B	C	D	E	F	G
40	H	I	J	K	L	M	N	O
48	P	Q	R	S	T	U	V	W
56	X	Y	Z	[	\	]	^	_
64	`	a	b	c	d	e	f	g
72	h	i	j	k	l	m	n	o
80	p	q	r	s	t	u	v	w
88	x	y	z	{	|	}	~	

11. TECHNICAL DATA

INPUT

range is adjustbale in according to order

Voltage:	0...10 V	150 kΩ	Input 2 - U
	0...120 V	930 kΩ	Input 3 - U
	0...250 V	730 kΩ	Input 2 - U
	0...450 V	930 kΩ	Input 3 - U
Current:	0...60 mV	21 kΩ	Input 1 - I
	0...150 mV	21 kΩ	Input 1 - I
	0...300 mV	21 kΩ	Input 1 - I
	0...1 A	< 150 mV	Input 1 - I
	0...2,5 A	< 150 mV	Input 1 - I
	0...5 A	< 150 mV	Input 1 - I

input ferquency:	0...400 Hz (amplitude max. 8 V)
Meas. quantities	Voltage (V_{RMS})
	Current (A_{RMS})
	Active power (P)
	Frequency (Hz)
with calculation	Idle power (Q)
	Apparent power (S)
	Power factor (cos fi)

PROJECTION

Display:	999999, intensive red or green 14-ti segment LED, digit height 14 mm
Projection:	-9999...9999
Decimal point:	adjustable - in menu
Brightness:	adjustbale - in menu

INSTRUMENT ACCURACY

TC:	50 ppm/°C	
Accuracy:	±0,3% of range + 1 digit	U, I, P, F
	±0,6% of range + 1 digit	S
	±0,9% of range + 1 digit	Q, Cos Fi
Rate:	0,6...5 measurements/s	
Overload capacity:	10x (t < 100 ms) not for 250 V and 5 A, 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
Limita:	-9999...9999
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 NPN 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

ANALOG OUTPUTS

Type:	isolated, programmable with 16 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
Curernt:	0...5/20 mA/4...20 mA - compensation of conduct to 500 Ω/12 V or 1 000 Ω/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

* values apply for resistance load

POWER SUPPLY

Options:	10...30 V AC/DC, 13,5 VA PF ≥ 0,4, I_{STP}< 40 A/1 ms, isolated fuse inside (T 4000 mA) 80...250 V AC/DC, 13,5 VA PF ≥ 0,4, I_{STP}< 40 A/1 ms,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

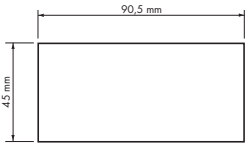
Connection:	connector terminal board, conductor cross-section <1,5 mm^2 /<2,5 mm^2
Stabilisation period:	within 15 minutes after switch-on
Working temp.:	-20°...60°C
Storage temp.:	-20°...85°C
Cover:	IP64 (front panel only)
Construction:	safety class I
Dielectric strength:	4 kVAC after 1 min between 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 resist.:	for pollution degree II, measurement cat. III instrum.power supply > 670 V (PI), 300 V (DI) Input/output > 300 V (PI), 150 (DI)
EMC:	EN 61326-1

PI - Primary insulation, DI - Double insulation

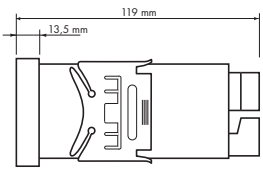
12. INSTRUMENT DIMENSIONS AND INSTALLATION

Front view

Panel cut



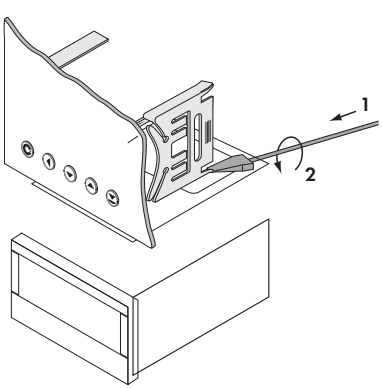
Side view

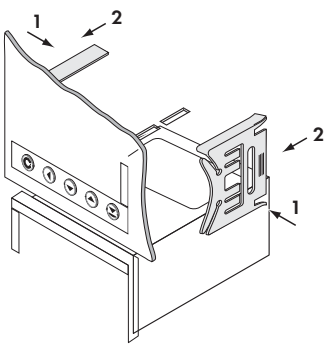


Panel thickness: 0,5...20 mm

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

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