



OM 602AV

6 DIGIT PROGRAMMABLE
ANALOG OUTPUT



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 602 series conform to the European regulation 89/336/EWG and the Ordinance 168/1997 Coll.

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

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

CONNECTION

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



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2.1 Description

The OM 602AV type is universal programmable analog output.

The instrument is based on a microcontroller, which secures high precision, stability and easy operation of the instrument.

The instrument generates analog output signal, which is set by buttons on the front panel, contacts on external inputs (EXT. 1, 2, 3) or automatically selected function.

PROGRAMMABLE PROJECTION

Setting: manual, optional display projection may be set for both limit values of the output signal in the menu, e.g. output 0...20 mA > 0...850,0
 Projection: -99999...999999

ANALOG OUTPUT

Type: isolated with resolution 10 000 points
 Setting: type and range is selectable in the menu
 Output: manual, sinus, ramp, triangle, square or at random generated sinus

LINEARIZATION

Linearization: by linear interpolation in 50 points (solely via OM Link)
 - enables the user to set the path of the analog output curve

DIGITAL FILTERS

Floating average: from 2...30 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
 Mat. operations: polynome, 1/x, logarithm, exponential, power, root, sin x

EXTERNAL CONTROL


Lock: control keys blocking
 Hold: display/instrument blocking
 Resetting MM: resetting min/max value
 Function: selectable in the instrument menu

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) 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

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

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

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

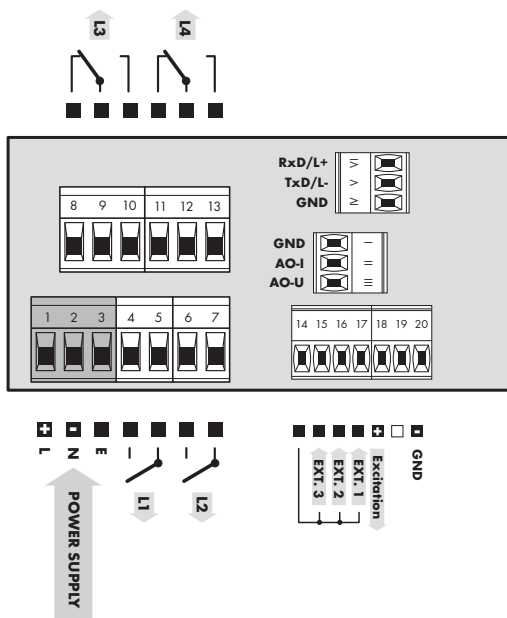
3 INSTRUMENT CONNECTION

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.



!
Excitation has the minus pole common with the input - the bracket no. 20 - GND and you may set its value by trimmer above the bracket no. 17

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)
- access without password

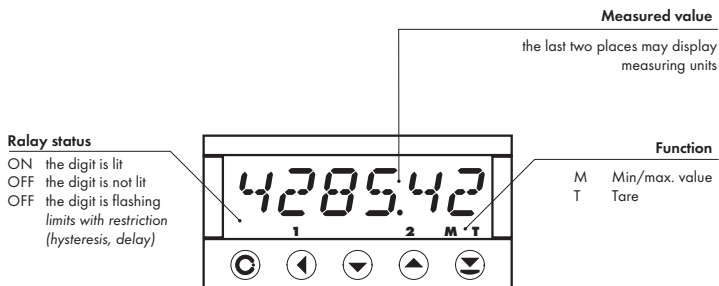
All programmable parameters are stored in the EEPROM memory (they hold even after the instrument is switched off).

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) 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).

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

- DEF** 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
	step 1 - up		
	step 1 - down		
	step 2 - up		
	step 2 - down		
	maximum AO		
	minimum AO		
	display AO value		
	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 PROFIL menu		
		CONFIG.uration of an item for "USER" menu	
		determine the sequence of items in "USER - LIGHT" 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

- 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	DEF

1428

⊕ ⊖

PASSW. 0 Access password

MODE MANUAL **MIN** 0 **VALUE** 0

HA# 100 **STEP 1** 1 **STEP 2** 10

FREQ. 0.3333 **MIN. T.** 0.5 **HA# T.** 2

COUNT 0 **BACKUP** YES

LIM. L1 20 **LIM. L2** 40

LIM. L3 60 **LIM. L4** 80

TYP. A.D. I 20 **AUT. A.D.** I 20 **MIN. A.D.** 0

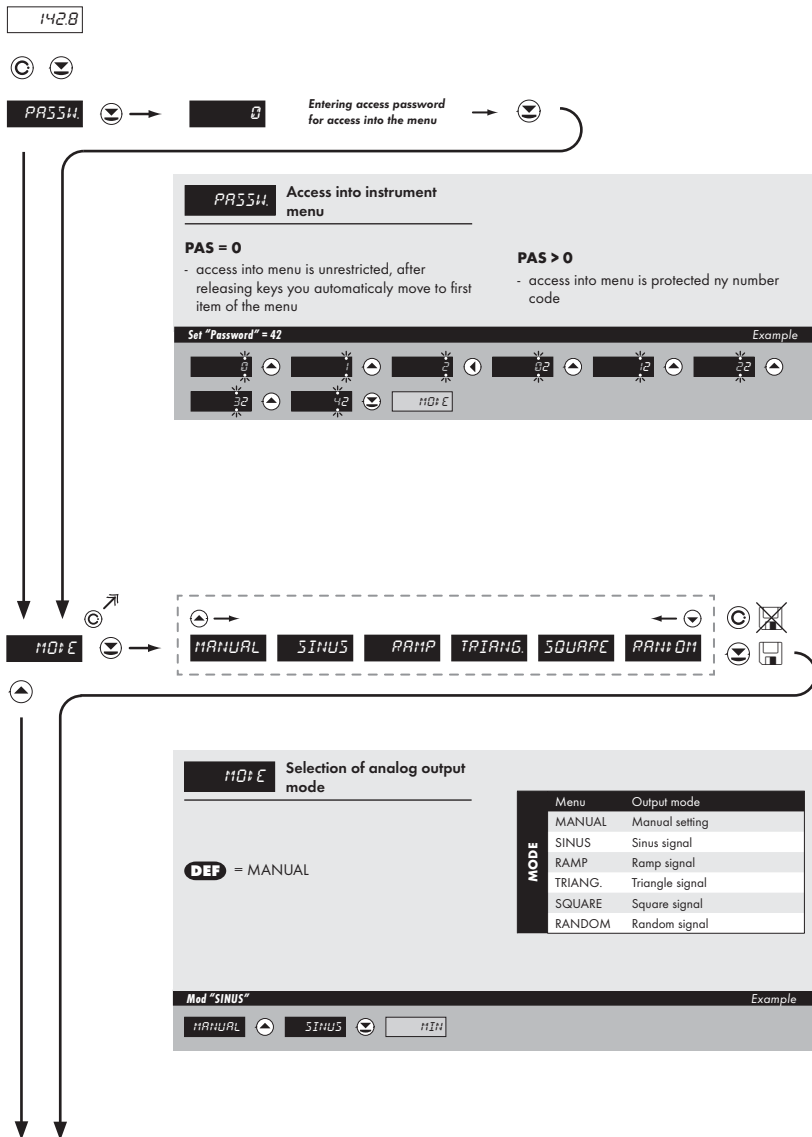
HA# A.D. 100 **Menu type** MENU **Return to manufacture setting** LIGHT **SETTING** FIRM

Language selection **LANG.** ENGL. **New password** N. PASSW. 0

Identification **I+ENT** YES 0M 602... 1428 **Return to measuring mode**

Option - comparator

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





MIN Setting display projection for minimum value of output 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 mA > MIN = 0 Example

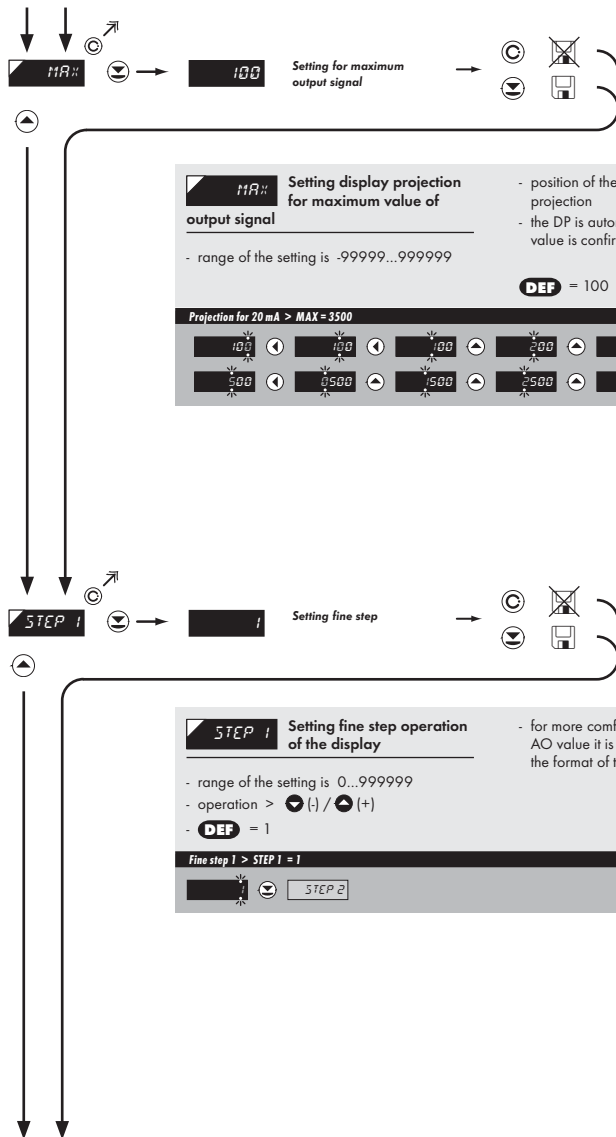


VALUE Setting the initial analog output value

- range of the setting is 0...999999
- only for "MODE - MANUAL"
- analog output value which is set after the instrument is connected to the mains and provided that the backup function ("BACKUP") is not active

DEF = 0

Beginning = 50 > VALUE = 50 Example





STEP 2 Setting rough step of the display

- range of the setting is 0...999999
- operation > **◀** + **▶** (-) / **◀** + **▶** (+)
- **DEF** = 10

- for more comfortable change of setting the AO value it is possible in this item to preset the format of the rough step

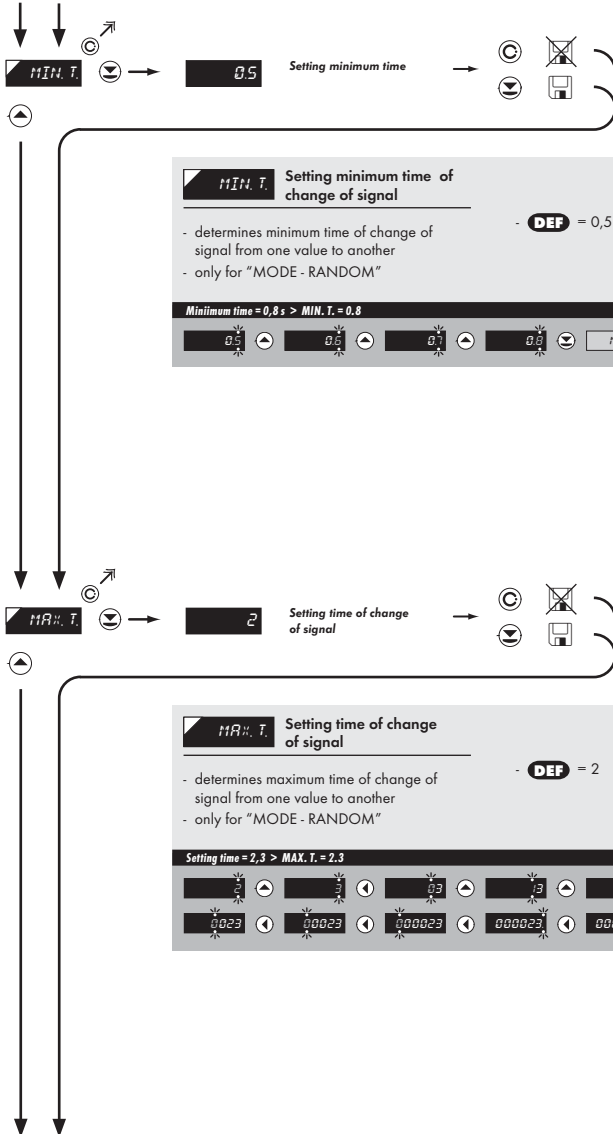
Rough step = 25 > STEP 2 = 25 Example



FREQ. Setting AO output frequency

- range of the setting is 0,001...3 Hz
- only for "MODE" - "SINUS", "RAMP", "TRIANG.", "SQUARE"
- **DEF** = 0,33333 Hz

Frequency = 1 Hz > FREQ. = 1 Example





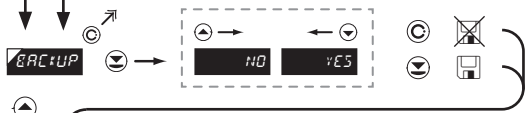
COUNT Setting defined number of periods

number of periods
- only for "MODE" - "SINUS", "RAMP", "TRIANG.", "SQUARE"

- if "0" value is set, the output signal is permanently generated
- if non-zero value is set, the signal will be generated after pushing a button or the switch-on by control input in a selected

- **DEF** = 0

Number of cycles = 11 > COUNT= 11 Example



BACKUP Selection of display status backup

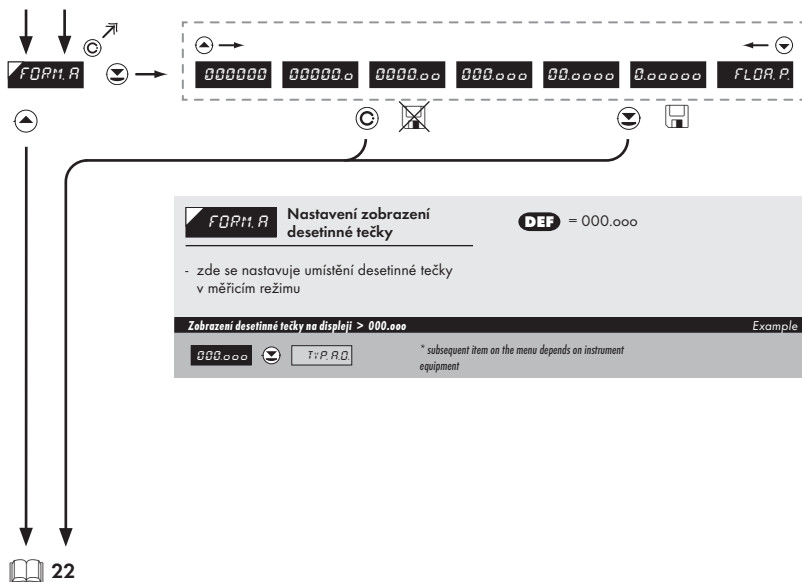
Instrument is set to "VALUE" after switch-on

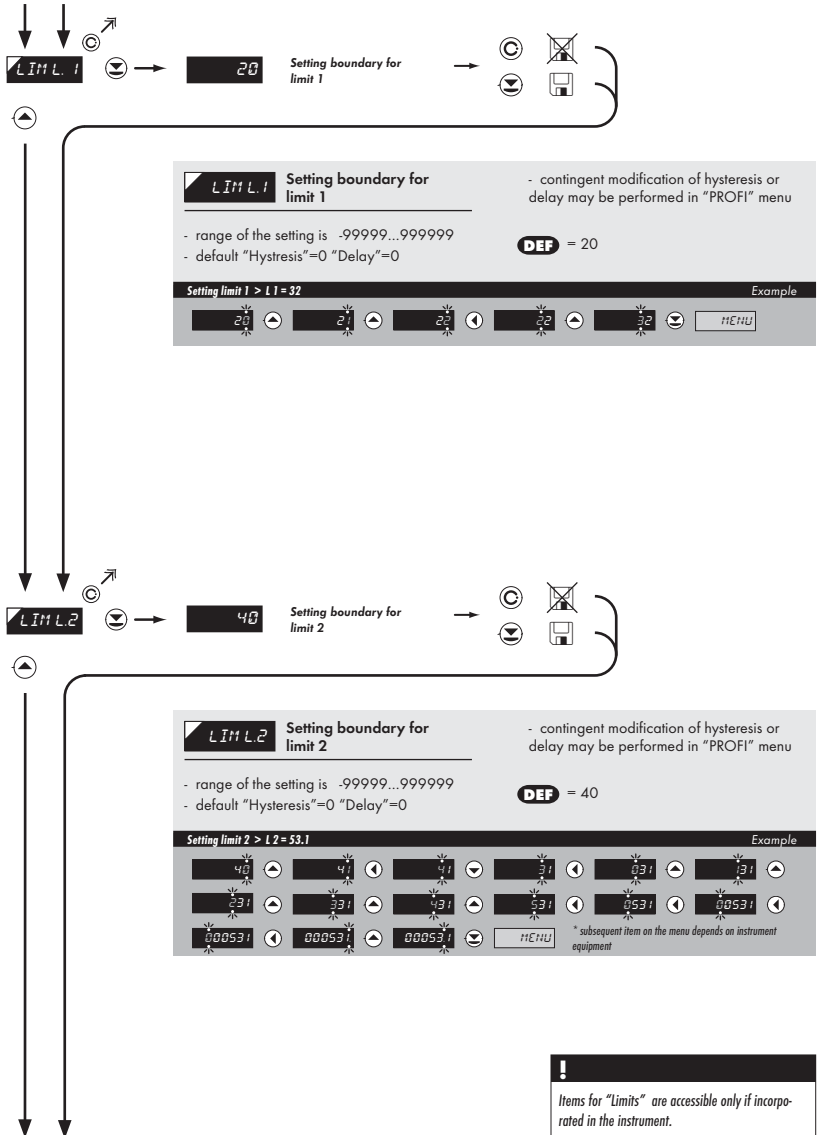
- only for "MODE - MANUAL"
- value is set in "VALUE"

- **DEF** = YES

After switch-on the instrument restores status prior switch-off

Backup - No > BACKUP= No Example







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

* subsequent item on the menu depends on instrument equipment



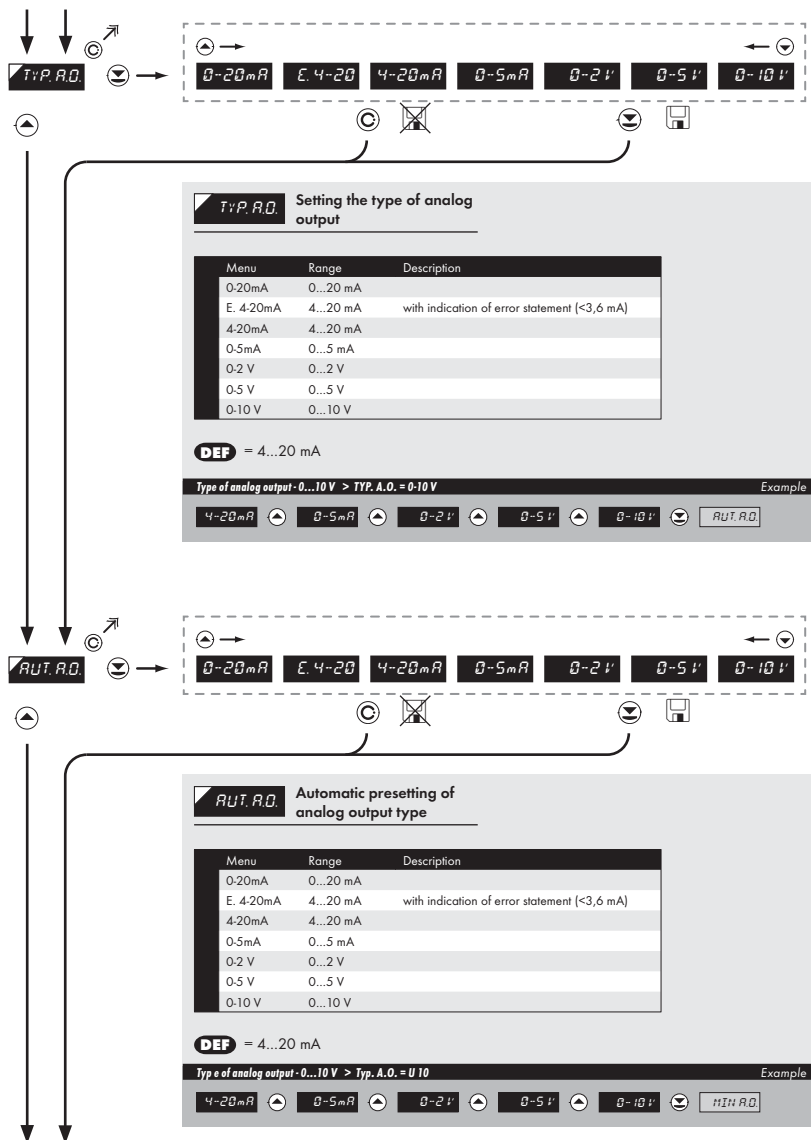
LIM L4 Setting boundary for limit 4

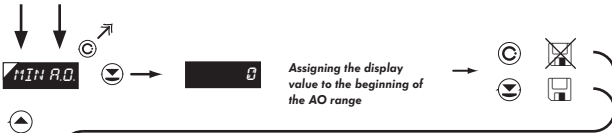
- range of the setting is -99999...999999
- default "Hysteresis"=0 "Delay"=0

DEF = 80

Setting limit 4 > L4 = 103 Example

* subsequent item on the menu depends on instrument equipment

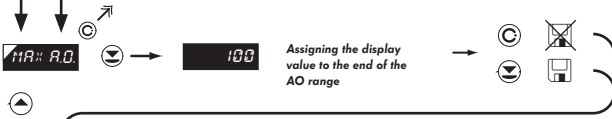




MIN A.O. Assigning the display value to the beginning of the AO range **DEF = 0**

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

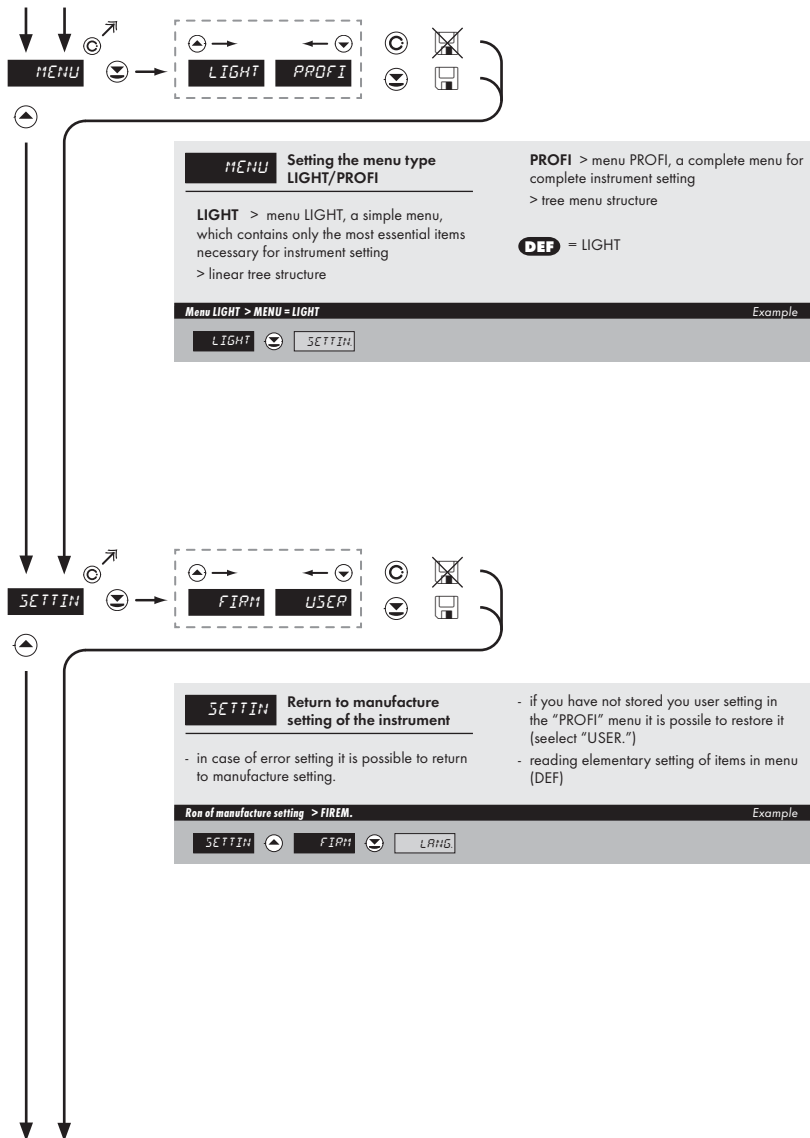
Display value for the beginning of the AO range > MIN A.O. = 0 Example

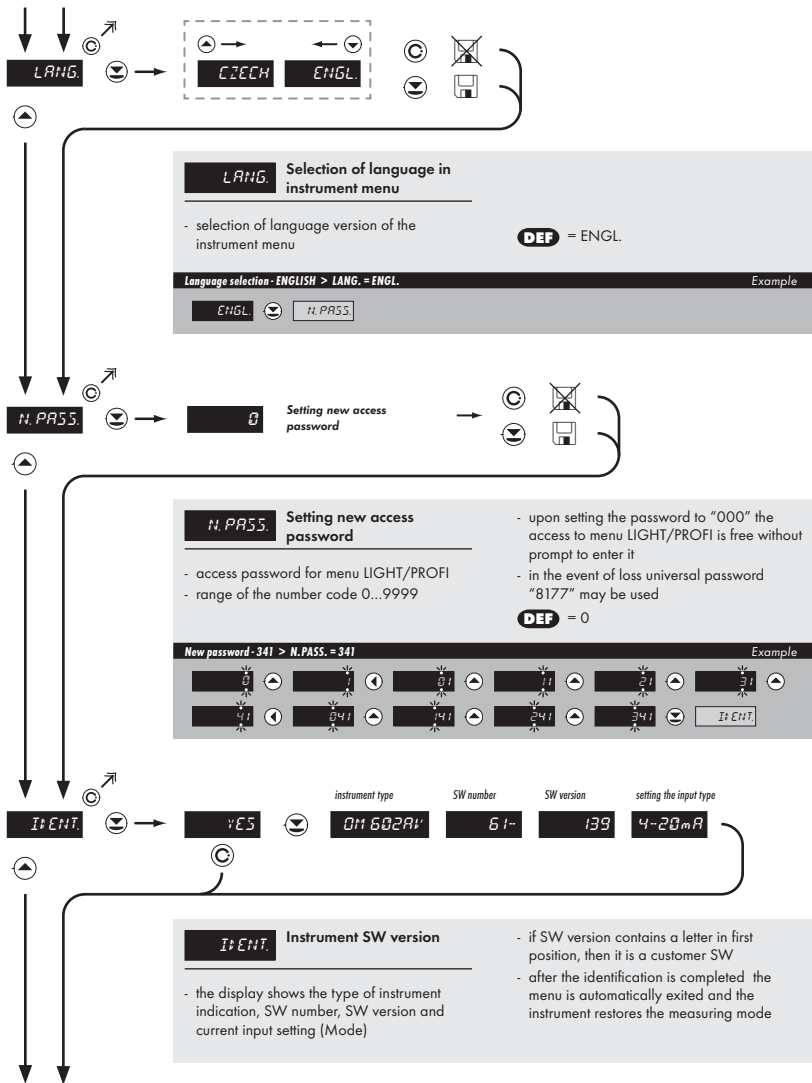


MAX A.O. Assigning the display value to the end of the AO range **DEF = 100**

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

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





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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
 PROFIL
 


- 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

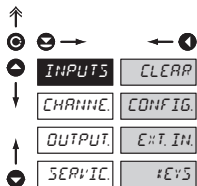


- temporary switch-over to **PROFI** menu, which is suitable to edit a few items
- after quitting **PROFI** menu the instrument automatically switches to **LIGHT** menu
- access is password protected (if it was not set under item N. PASS. =0)



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

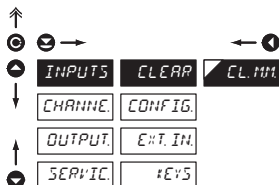
6.1 Setting "PROFI" - INPUTS



The primary instrument parameters are set in this menu

CLEAR	Resetting internal values
CONFIG	Selection of measuring range and parameters
EXT. IN	Setting external inputs functions
TEST	Assigning further functions to keys on the instrument

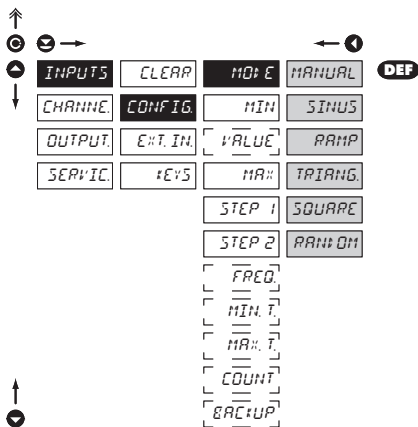
6.1.1 Resetting internal values



CLEAR	Resetting internal values
CL.MIN	Resetting min/max value

- resetting memory for the storage of minimum and maximum value achieved during measurement

6.1.2a Selection of operation mode



MODE Selection of operation mode

MANUAL Manual setting of output value

- instrument generates signal in the range from "MIN A.O." to "MAX A.O."

SINUS Output signal - Sinus

- instrument generates sinus signal in range from "MIN A.O." to "MAX A.O." at frequency set under "FREQ."

RAMP Output signal - Ramp

- instrument generates ramp signal in range from "MIN A.O." to "MAX A.O." at frequency set under "FREQ."

TRIANG Output signal - Triangle

- instrument generates triangle signal in range from "MIN A.O." to "MAX A.O." at frequency set under "FREQ."

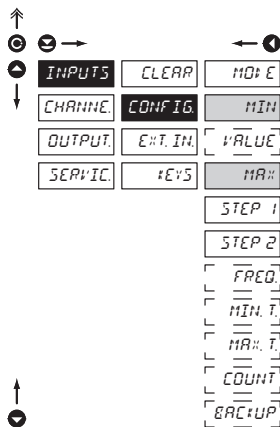
SQUARE Output signal - Square

- instrument generates square signal in range from "MIN AV." to "MAX AV." at frequency set under "FREQ."

RANDOM Output signal generated at random

- instrument generates signal composite from sections with linear change of value. Extent of the change is random in the range from "MIN AO." to "MAX A.O.", The time of change is set at random in interval „MIN C.-MAX C.“

6.1.2b Setting display projection

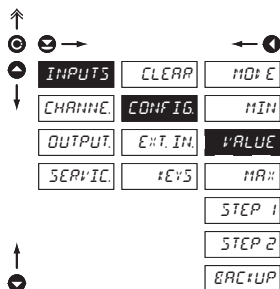


MIN Setting display projection for minimum value of output signal

MAX Setting display projection for maximum value of output signal

- setting display projection may be set for both limit values of the output signal in the menu, (OUTPUT/ANALOG)
e.g. output: 4...20 mA > 0...100, for "MIN" =0, "MAX" =100

6.1.2c Setting the initial analog output value

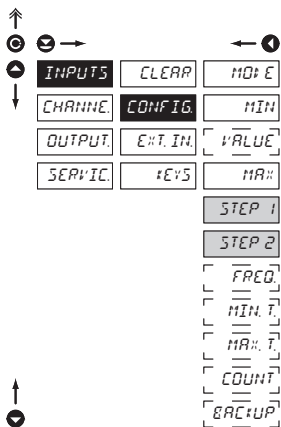


VALUE Setting the initial analog output value

- range of the setting is 0...999999
- only for "MODE - MANUAL"
- analog output value which is set after the instrument is connected to the mains and provided that the backup function ("BACKUP") is not active

DEF = 0

6.1.2d Setting step operation of the display/value AO



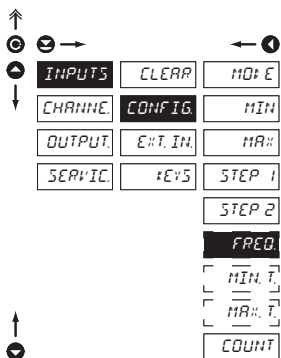
STEP 1 Setting fine step operation of the display

- for more comfortable change of setting the AO value it is possible in this item to preset the format of the fine step
- operation > ∇ (-) / \blacktriangle (+)
- **DEF** = 1

STEP 2 Setting rough step of the display

- for more comfortable change of setting the AO value it is possible in this item to preset the format of the rough step
- operation > \odot + ∇ (-) / \odot + \blacktriangle (+)
- **DEF** = 10

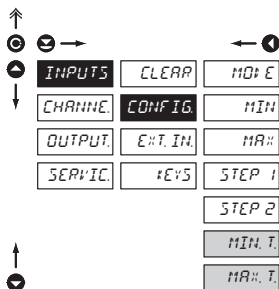
6.1.2e Setting analog output frequency



FREQ. Setting AO output frequency

- range of the setting is 0,001...3 Hz
- only for "MODE" - "SINUS", "RAMP", "TRIANG.", "SQUARE"
- **DEF** = 0,33333 Hz

6.1.2f Setting of change signal in "Random" mode

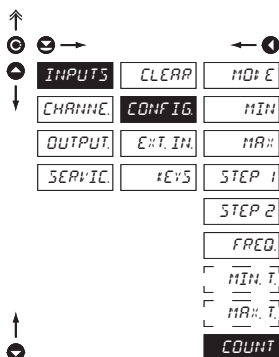
**MIN. T.** Setting minimum time of change of signal

- determines minimum time of change of signal from one value to another
- only for "MODE - RANDOM"
- **DEF** = 0,5

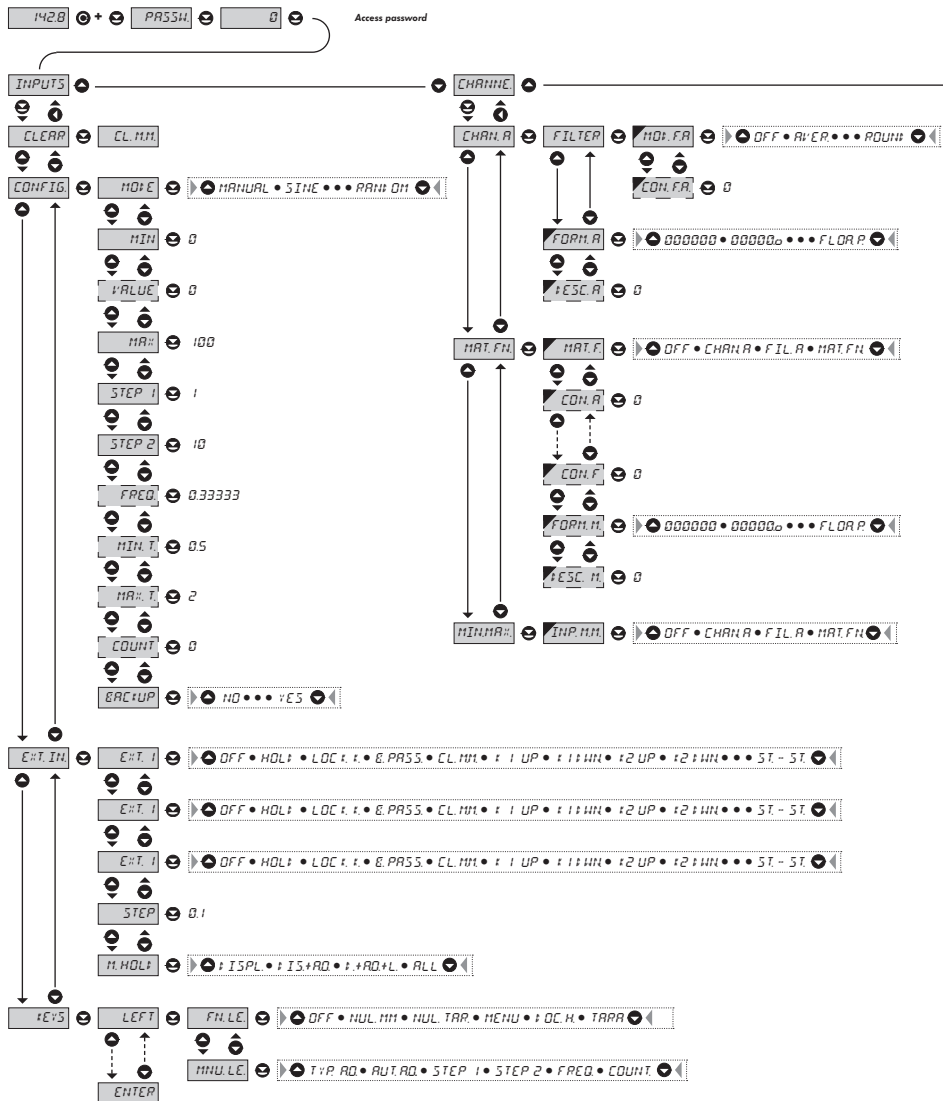
MAX. T. Setting time of change of signal

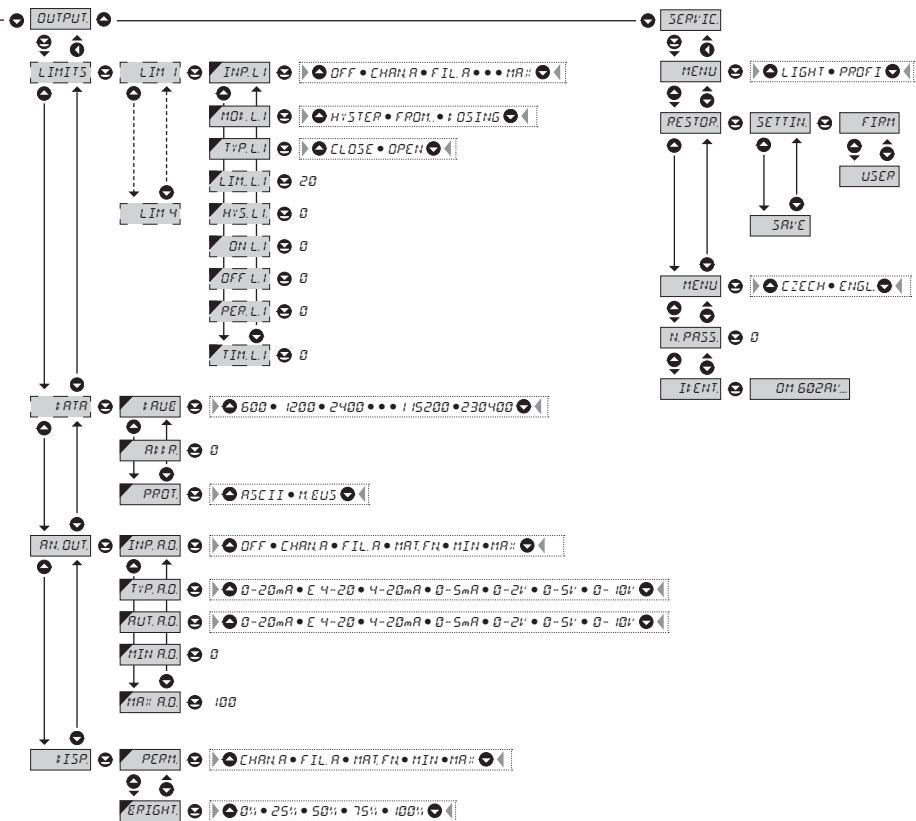
- determines maximum time of change of signal from one value to another
- only for "MODE - RANDOM"
- **DEF** = 2

6.1.2g Setting defined number of period

**COUNT** Setting defined number of periods

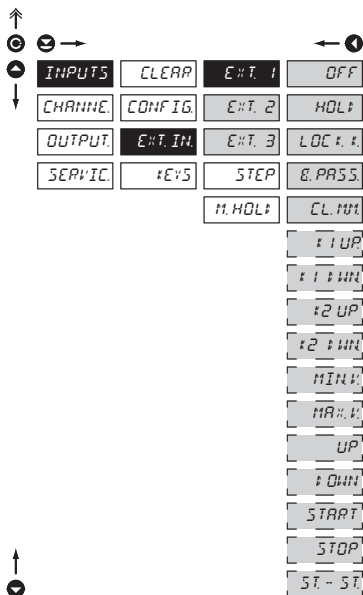
- if "0" value is set, the output signal is permanently generated
- if non-zero value is set, the signal will be generated after pushing a button or the switch-on by control input in a selected number of periods
- only for "MODE" - "SINUS", "RAMP", "TRIANG.", "SQUARE"
- **DEF** = 0





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

6.1.3a External input function selection



! Preset values of the ext. inputs **DEF**:

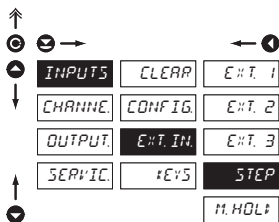
EXT. 1	Hold
EXT. 2	K1 Up
EXT. 3	K1 Down

EXT. IN. External input function selection

- OFF** Input is off
- HOLD** Activation of HOLD
- LOC. 1** Locking keys on the instrument
- E. PASS** Activation of locking access into programming menu LIGHT/PROFI
- CL. MIN** Resetting min/max value
- 1 UP** Step 1 - Up
- 1 DOWN** Step 1 - Down
- 2 UP** Step 2 - Up
- 2 DOWN** Step 2 - Down
- MIN. V.** Minimum range
- MAX. V.** Maximum range
- UP** Increases output signal value
 - with active input the "STEP" is added every 10 ms
- DOWN** Decreases output signal value
 - with active input the "STEP" is subtracted every 10 ms
- START** Start of cycle
 - if „NUMBER“ > 0 it will start anew from the beginning
- STOP** Stop cycle
- ST. - ST.** Start/Stop cycle
 - if „NUMBER“ > 0 it will start anew from the beginning

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

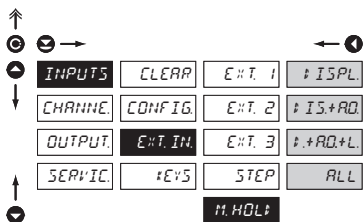
6.1.3c Setting the "Step"



STEP Setting "step" for ext. control

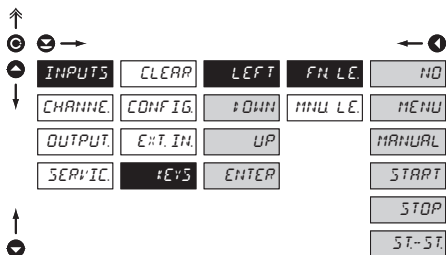
- with active input the AO value will be changing every 10ms by preset value
- range 0...999999
- **DEF** = 0,1

6.1.3c Selection of function "HOLD"



M.HOLD Selection of function "HOLD"

- ISPL** "HOLD" locks only the value displayed
- IS+AO** "HOLD" locks the value displayed and on AO
- +AO+L** "HOLD" locks the value displayed, on AO and limit evaluation
- ALL** "HOLD" locks the entire instrument

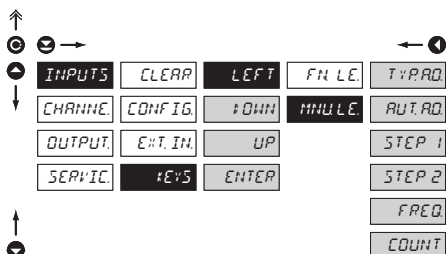
6.1.5a Optional accessory functions of the keys


Setting is identical for LEFT, DOWN, UP and ENTER

FN LE Assigning further functions to instrument keys

- „FN. LE.“ > executive functions
- „MNU. LE.“ > direct access into menu on selected item

NO	Key has no further function
MENU	Direct access into menu on selected item
	- after confirmation of this selection the “MENU” item is displayed on superior menu level, where required selection is performed
MANUAL	Manual setting
START	Start of cycle
STOP	Stop of cycle
ST-ST	Start/Stop cycle

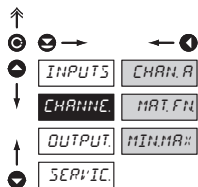
6.1.5b Optional accessory functions of the keys - Direct access to item


Setting is identical for LEFT, DOWN, UP and ENTER

MNU LE Assigning access to selected menu item

TYP AD	Direct access to item “TYPE A.O.”
AUT AD	Direct access to item “AUT. A.O.”
STEP 1	Direct access to item “STEP 1”
STEP 2	Direct access to item “STEP 2”
FREQ	Direct access to item “FREQ.”
COUNT	Direct access to item “COUNT”

6.2 Setting "PROFI" - CHANNELS



The primary instrument parameters are set in this menu

CHANNEL

Setting parameters of measuring "Channel"

MAT.FN

Setting parameters of mathematic functions

MIN:MAX

Selection of access and evaluation of Min/max value

6.2.1a 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

AVER Measured data average

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

FLOAT Selection of floating filter

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

EXPON Selection of exponential filter

- integration filter of first prvnho grade with time constant („CON.F.A.“) measurement
- range 2...100

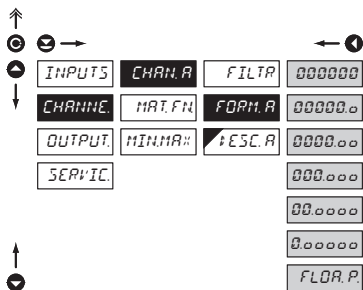
ROUN# Measured value rounding

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

CON.F.A. Setting constants

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

6.2.1b 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 „FLOA.P.“

000000 Setting DP - XXXXXX.

00000.0 Setting DP - XXXXX.x

0000.00 Setting DP - XXXX.xx

000.000 Setting DP - XXX.xxx

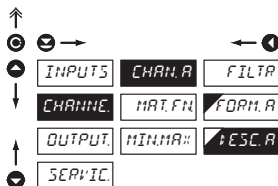
DEF

00.0000 Setting DP - XX.xxxx

0.00000 Setting DP - X.xxxxx

FLOA.P. Floating DP

6.2.1e Projection of description - the measuring units



!ESC.A Setting projection of descrpt. for "Channel A"

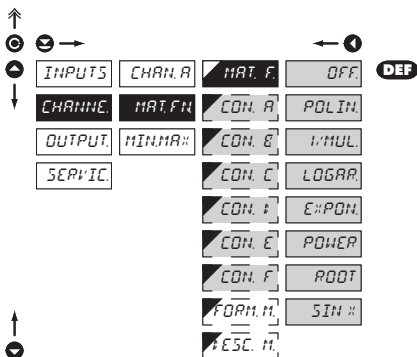
- projection of measured data may be extended (at the expense of the number of displayed places) by two characters for description
- description is set by shifted ASCII code, when two first places show the set description and two last characters their code in period 0...95
- description is cancelled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

DEF = nnone



Table of signs on page 65

6.2.2a Mathematic functions



MATH.F. Selection of mathematic functions

OFF

Mathematic functions are off

POLIN

Polynome

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

1/MUL

1/x

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

LOGAR

Logarithm

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

E:POH

Exponential

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

POWER

Power

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

ROOT

Root

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

SIN:H

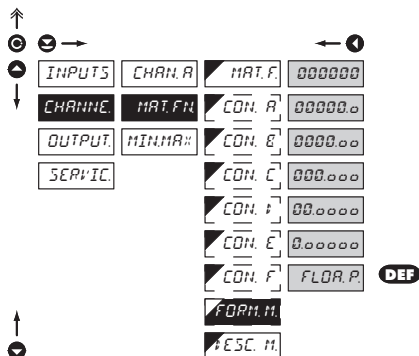
Sin x

$$A \sin^5 x + B \sin^4 x + C \sin^3 x + D \sin^2 x + E \sin x + F$$

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

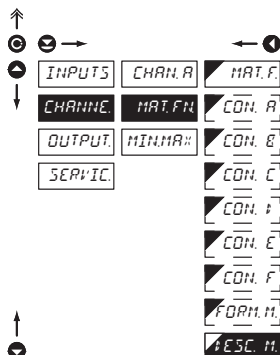
000.000 Setting DP - XXX.xxx

00.0000 Setting DP - XX.xxxx

0.00000 Setting DP - X.xxxxx

FLOA.P Floating DP

DEF

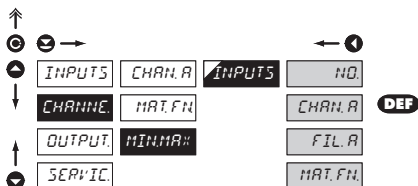
6.2.2c **Mathematic functions - measuring units****ESC.M** Setting projection of description for "MAT.FN"

- 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 65

6.2.3 Selection of evaluation of min/max value

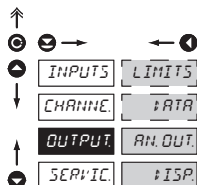


INPUTS Selection of evaluation of min/max value

- 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"

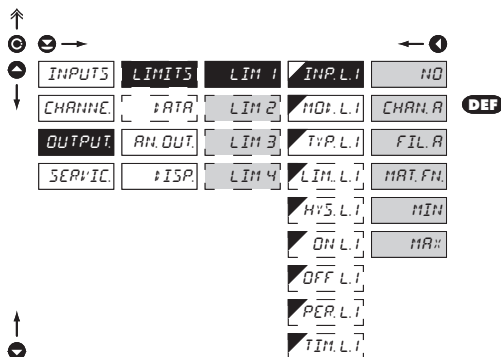
6.3 Setting „PROFI“ - OUTPUTS



In this menu it is possible to set parameters of the instrument output signals

- LIMITS** Setting type and parameters of limits
- #ATA** Setting type and parameters of data output
- AN. OUT.** Setting type and parameters of analog output
- #ISP** Setting display projection and brightness

6.3.1a Selection of input for limits evaluation

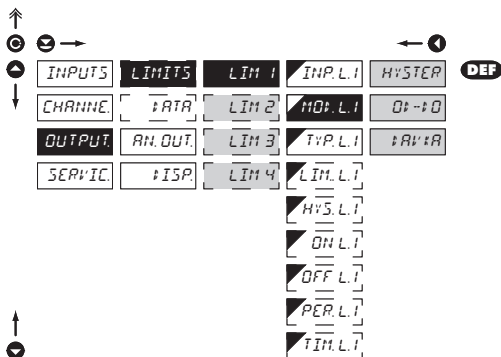

INP.L.1 Selection evaluation of limits

- 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"

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

6.3.1b Selection of type of limit



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

MOD.L.1 Selection of 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

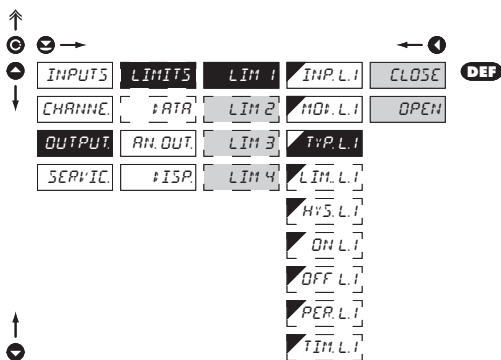
FROM Frame limit

- 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

6.3.1c Selection of type of output



TRP.L.1 Selection of type of output

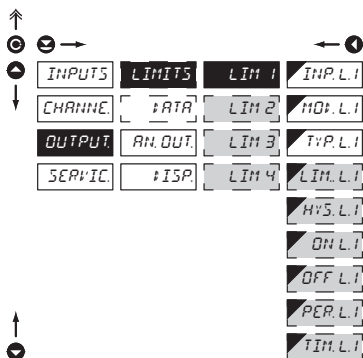
CLOSE Output switches on when condition is met

OPEN Output switches off when condition is met



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

6.3.1d Nastavení hodnot pro vyhodnocení mezi



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

LIM. L. I Setting limit for switch-on

- for type "HYSTER"

HYS. L. I Setting hysteresis

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

ON. L. I Setting the outset of the interval of limit switch-on

- for type "FROM"

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

- for type "FROM"

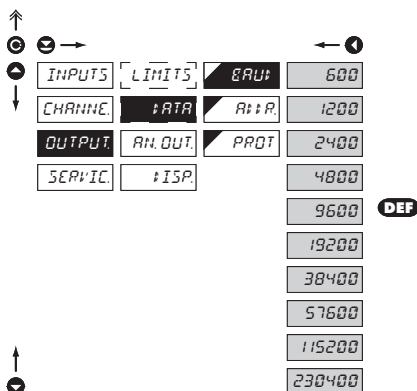
PER. L. I Setting the period of limit switch-on

- for type "DOSING"

TIM. L. I Setting the time switch-on of the limit

- for type "HYSTER" and "DOSING"

6.3.2a 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

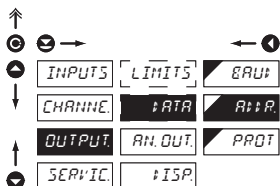
38400 Rate - 38 400 Baud

57600 Rate - 57 600 Baud

115200 Rate - 115 200 Baud

230400 Rate - 230 400 Baud

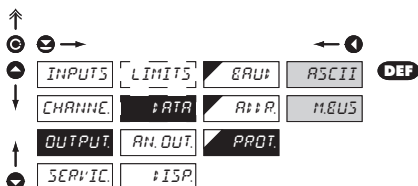
6.3.2b Setting instrument address



A:I:A Setting instrument address

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

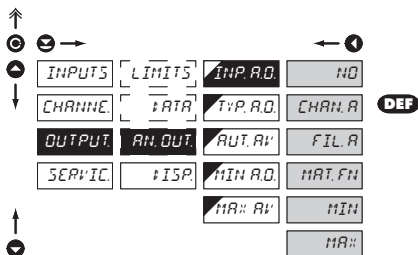
6.3.2c Selection of data output protocol



PROT Selection of the type of analog output

- ASCII** Data protocol ASCII
- MEUS** Data protocol DIN MessBus

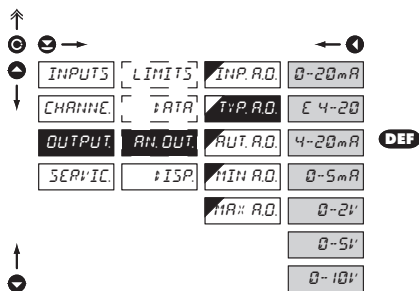
6.3.3a Selection of input for analog output



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.FH** AO evaluation from "Math.functions"
- MIN** AO evaluation from "Min.value"
- MA::** AO evaluation from "Max.value"

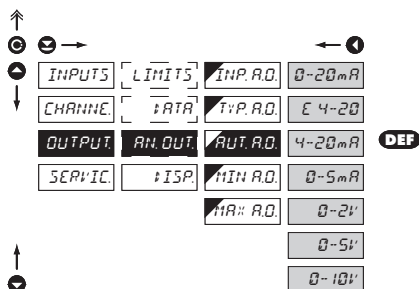
6.3.3b Selection of the type of analog output



Typ. A.D. Selection of the type of analog output

- 0-20mA Type - 0...20 mA
- 4-20 Type - 4...20 mA
- with indication 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

6.3.3c Automatic presetting of analog output type



AUT. A.D. Automatic presetting of analog output type

- 0-20mA Type - 0...20 mA
- 4-20 Type - 4...20 mA
- with indication 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

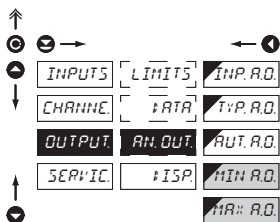
Table of automatic presetting of analog output

Automatic presetting serves for fast change of output while maintaining or recalculating the original presetting to new range.

Upon the change of AO range are the values "*" from the following table dependant on the setting from which it is switching to (i.e. it changes according to current setting). As an example serve the "DEF" values from manufacture setting.

Items menu/Output AO	0 - 20 mA	E 4 - 20 mA	4 - 20 mA	0 - 5 mA	0 - 2 V	0 - 5 V	0 - 10 V
MIN	0	4	4	0	0	0	0
VALUE *	0	4	4	0	0	0	0
MAX	20	20	20	5	2	5	10
STEP 1 *	4	3,2	3,2	1	0,4	1	2
STEP 2 *	0,2	0,16	0,16	0,05	0,02	0,05	0,01
STEP *	0,02	0,016	0,016	0,005	0,002	0,005	0,01
FORM. A	XXXX.xx	XXXX.xx	XXXX.xx	XXXX.xx	XXXX.xx	XXXX.xx	XXXX.xx
DESC. A	mA	mA	mA	mA	V	V	V
MIN. A.O.	0	4	4	0	0	0	0
MAX. A.O.	20	20	20	5	2	5	10

6.3.3d Setting the analog output range



AN. OUT. Setting the analog output range

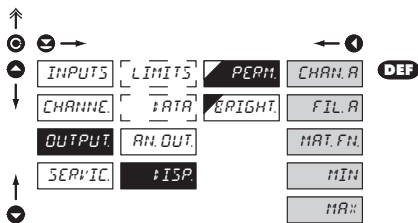
- analog output is isolated and its value corresponds with displayed data. It is fully programmable, i.e. it allows to assign the AO limit points to two arbitrary points of the entire measuring range

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

- range of the setting is -99999...999999
- **DEF** = 0

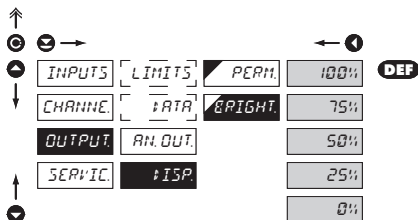
MR. R.D. Assigning the display value to the end of the AO range

- range of the setting is -99999...999999
- **DEF** = 100

6.3.4a Selection of input for display projection

PERM Selection display projection

- selection of value which will be shown on the instrument display

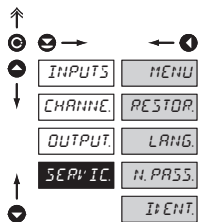
- CHAN.A** Projection of values from "Channel A"
- FIL.A** Projection of values from "Channel A" after digital filters processing
- MAT.FN** Projection of values from "Math.functions"
- MIN** Projection of values from "Min.value"
- MAX** Projection of values from "Max.value"

6.3.4b 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%

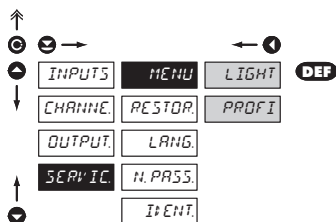
6.4 Setting "PROFI" - SERVICE



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
I: ENT.	Instrument identification

6.4.1 Selection of type of programming menu



Change of setting is valid upon next access into menu

MENU Selection of menu type - LIGHT/PROFI

- enables setting the menu complexity according to user needs and skills

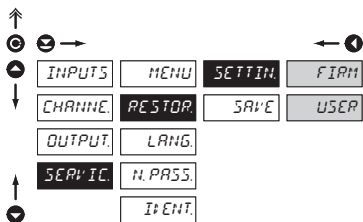
LIGHT Active LIGHT menu

- simple programming menu, contains only items necessary for CONFIG.uration and instrument setting
- linear menu > items one after another

PROFI Active PROF I menu

- complete programming menu for expert users
- tree menu

6.4.2 Restoration of manufacture setting



SETTING Restoring manufacture setting of the instrument

FIRM Return to manufacture setting of the instrument

- reading manufacture setting (items marked DEF)

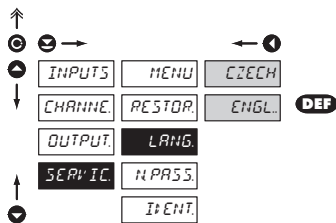
USER Return to user setting of the instrument

- reading user setting, i.e. setting which was stored under SERVIC./RESTOR./SAVE

SAVE Storing user setting of the instrument

- storing the setting enables the operator its future contingent restoration

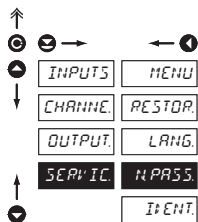
6.4.3 Selection of instrument menu language version



LANG. Selection of instrument menu language version

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

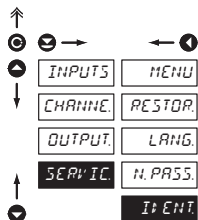
6.4.4 Setting new access password



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

- this selection enables changing number code that blocks the access into LIGHT and PROFIL Menu.
- range of the number code is 0...9999
- universal password in the event of loss is „8177”


6.4.6 Instrument identification



I+ENT. 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

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 specification you can find at www.orbit.merret.cz/rs.

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>	<ENG>														
Data transmission (instrument)	232	ASCII	>	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)	<ETX>	<BCC>	
	485	ASCII	>	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)	<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>	<ENG>														
Confirmation of address (instrument)			<SADR>	<ENG>														
Command transmission (PC)	232	ASCII	#	A	A	N	P	(D)	(D)	(D)	(D)	(D)	(D)	(D)	<CR>			
		MessBus	<STX>	\$	N	P	(D)	(D)	(D)	(D)	(D)	(D)	<ETX>	<BCC>				
	485	ASCII	#	A	A	N	P	(D)	(D)	(D)	(D)	(D)	(D)	<CR>				
		MessBus	<SADR>	\$	N	P	(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														
		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 confirmati (instrument) - Bad	485	MessBus	?	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 _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			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

SENDING DATA TO INSTRUMENT

#AA 9 ddddd <CR> ddddd are data to be displayed

Protocol DIN MessBus

<EADR><ENQ> >>> respons OK <DLE> 1

<STX>\$9 ddddd <ETX><BCC>

ERROR	CAUSE	ELIMINATION
<i>E. P. U n</i>	Number is too small (large negative) to be displayed	change DP setting, channel constant setting
<i>E. P. O r</i>	Number is too large to be displayed	change DP setting, channel constant setting
<i>E. T. U n</i>	Number is outside the table range	increase table values, change input setting (channel constant setting)
<i>E. T. O r</i>	Number is outside the table range	increase table values, change input setting (channel constant setting)
<i>E. I. U n</i>	Input quantity is smaller than permitted input quantity range	change input signal value or input (range) setting
<i>E. I. O r</i>	Input quantity is larger than permitted input quantity range	change input signal value or input (range) setting
<i>E. H H</i>	A part of the instrument does not work properly	send the instrument for repair
<i>E. E E</i>	Data in EEPROM corrupted	perform restoration of manufacture setting, upon repeated error statement send instrument for repair
<i>E. E A T A</i>	Data in EEPROM outside the range	perform restoration of manufacture setting, upon repeated error statement send instrument for repair
<i>E. C L R</i>	Memory was empty (presetting carried out)	upon repeated error statement send instrument for repair, possible failure in calibration

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		7	"	#	\$	%	&	'		0	!	"	#	\$	%	&	'	
8	:)	*	+	,	-	.	/		8	()	*	+	,	-	.	/
16	0	1	2	3	4	5	6	7		16	0	1	2	3	4	5	6	7
24	8	9	:	;	<	=	>	?		24	8	9	:	;	<	=	>	?
32	P	R	E	C	T	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	{		}	~	

PROJECTION

Display:	999999, intensive red or green 14-ti segment LED, digit height 14 mm
Projection:	.99999...999999
Decimal point:	adjustable - in menu
Brightness:	adjustable - in menu

INSTRUMENT ACCURACY

TC:	100 ppm/°C
Linearisation:	by linear interpolation in 50 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, Dose
Limita:	.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)*
Relay:	1/8 HP 277 VAC, 1/10 HP 125 V, Pilot Duty D300

DATA OUTPUTS

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

ANALOGO OUTPUTS

Type:	isolated, programmable with resolution of max.10 000 points, analog output corresponds with displayed data, type and range are adjustable
Mode:	MANUAL, SINE, RAMP, TRIANGL, SQUARE, RANDOM
Non-linearity:	0,2 % of range
TC:	100 ppm/°C
Rate:	response to change of value < 40 ms
Voltage:	0...2 V/5 V/10 V
Current:	0...5/20 mA/4...20 mA - compensation of conduct to 500 Ohm

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

Adjustable:	5...24 VDC/max. 1,2 W, isolated
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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 6300 mA)
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MECHANIC PROPERTIES

Material:	Noryl GFN2 SE1, incombustible UL 94 V-1
Dimensions:	96 x 48 x 120 mm
Panel cut-out:	90,5 x 45 mm

OPERATING CONDITIONS

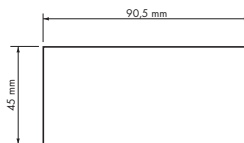
Connection:	connector terminal board, conductor cross-section <1,5 mm ² / <2,5 mm ²
Stabilisation period:	within 15 minutes after switch-on
Working temp.:	0°...60°C
Storage temp.:	-10°...85°C
Cover:	IP65 (front panel only)
Construction:	safety class I
Overvoltage category:	EN 61010-1, A2
Insulation resistance:	for pollution degree II, measurement category III instrum. power supply > 670 V (PI), 300 V (DI) Input/output > 300 V (PI), 150 (DI)
EMC:	EN 61000-3-2-A12; EN 61000-4-2, 3, 4, 5, 8, 11; EN 550222, A1, A2

* values apply for resistance load

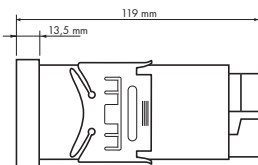
Front view



Panel cut



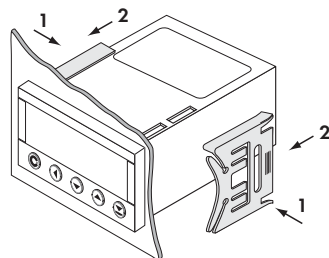
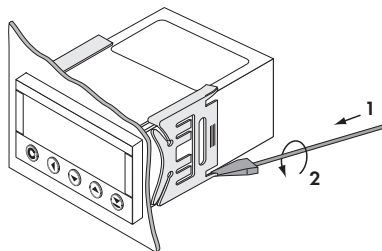
Side view



Panel thickness: 0,5...20 mm

Instrument installation

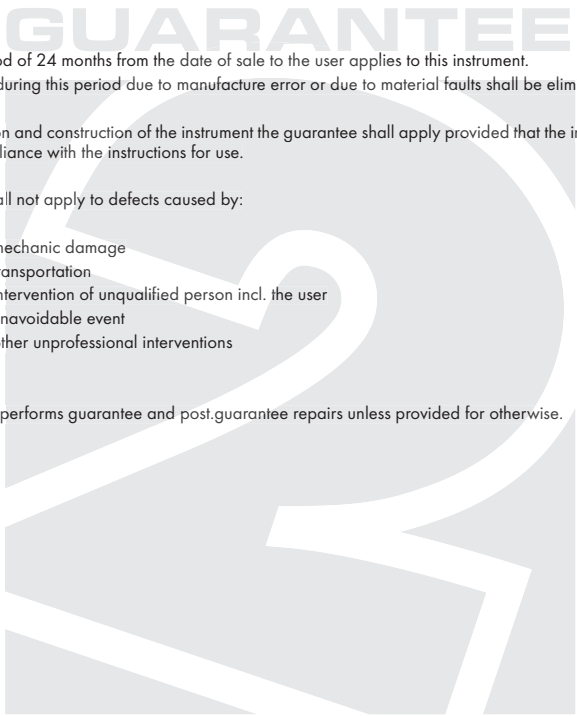
1. insert the instrument into the panel cut-out
2. fit both travellers on the box
3. press the travellers close to the panel



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 602AV**
 Type
 Manufacturing No.
 Date of sale



A guarantee period of 24 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.

Y E A R S

Stamp, signature

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 full 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 type listed hereunder, which are being brought out to the market, with technical documentation and requirements of the appurtenant statutory orders.

Product: 6-digit programmable panel instrument

Type: **OM 602**

Version: UQC, AV, RS

Conformity is assessed pursuant to the following standards:

El. safety:	EN 61010-1
EMC:	EN 50131-1, chapter 14 and chapter 15
	EN 50130-4, chapter 7
	EN 50130-4, chapter 8
	EN 50130-4, chapter 9
	EN 50130-4, chapter 10
	EN 50130-4, chapter 11
	EN 50130-4, chapter 12
	EN 50130-4, chapter 13
	EN 50130-5, chapter 20
	prEN 50131-2-1, par. 9.3.1
	EN 61000-4-8
	EN 61000-4-9
	EN 61000-3-2 ed. 2:2001
	EN 61000-3-3: 1997, Cor. 1:1998, Z1:2002
	EN 55022, chapter 5 and chapter 6

and Ordinance on:

El. safety:	No. 168/1997 Coll.
EMC:	No. 169/1997 Coll.

The evidence are the protocols of authorized and accredited organizations:

VTÚE Praha, experimental laboratory No. 1158, accredited by ČIA
VTÚPV Vyškov, experimental laboratory No. 1103, accredited by ČIA

Place and date of issue: Prague, 18. March 2006

Miroslav Hackl v.r.
Company representative

Mode of asses. of conformity §12, par. 4 b, d Act No. 22/1997 Coll.