OC7060 – DATA MONITOR

FOR RS485 / MODBUS

Orbit Controls AG
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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 O$7060 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.

CONNECTIONS

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

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2 DESCRIPTION

2.1 DESCRIPTION

The OC7060 - Modbus type is a 6 digit panel display device for data from serial lines of RS 232 and RS 485. The Communication is with Modbus protocol.
All ASCII symbols may be displayed which are usable for 14-segment display.

PROGRAMMABLE PROJECTION – DISPLAY SETTING

Setting: manual, optional projection on the display may be set in the menu for both limit values of the input signal , e.g. input $2^{-31}…2^{31}$ > 0…850,0
Display: -99999…999999

LINEARIZING

Linearizing: by linear interpolation in 50 points (by using OM Link)

DIGITAL FILTERS

Average value: from 2 to 30 measurements
Exponential: from 2 to 30 measurements
Rounding: increments of the display

MATHEMATIC FUCTIONS

Min/max. Value: registration of min./max. value reached during measurement
Tare: designed to reset display upon non-zero input signal
Peak value: the display shows only max. or min. value
Mat. Operations: Polynomial, 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
Memory: data storage into instrument memory

2.2 OPERATION

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

LIGHT **Simple programming menu**

- contains steps required for instrument setting. It is protected by a password.

PROFI **Complete programming menu**

- contains complete menu steps and is protected by a password.

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 (stored 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 OC7060.

This operation program is free and can be ordered at info@orbitcontrols.ch. The only requirement is the purchase of the communication cable to connect the instrument to a PC. The communication is via RS 232 and USB. Another possible connection is with the data output RS 232 or RS 485 (without the need of the communication cable).

2.3 OPTIONS

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

Comparators- Set Points are 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. The Set Point is indicated with LED at the display.

Data outputs are suitable for transmission of the measured data for further usage in another control systems or displays. Available are isolated RS232 and RS485 with the ASCII or DIN MessBus Protocol.

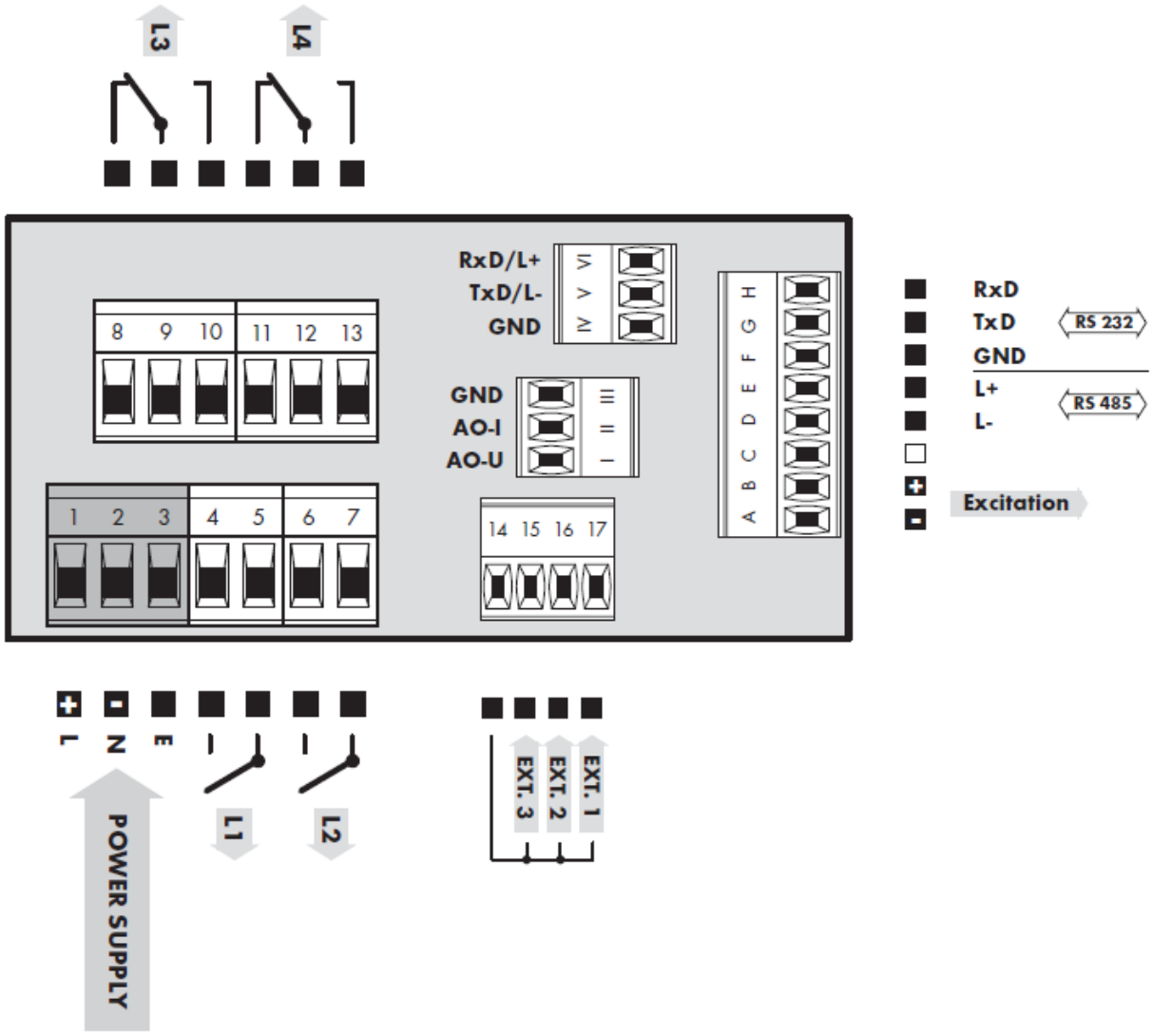
Analog outputs voltage or current are derived from the display and can be free assigned to any required display reading. The output type and range is menu selectable and is isolated from the input and the supply.

Measured data record is an internal time control of data collection. Two modes FAST and RTC can be selected. FAST permits storing of 40 records/s of all measured values up to 8 000 records. RTC will be used controlled by internal Clock with selected time segments and cycle. Up to 250 000 values may be stored. The stored data can be uploaded to the PC via RS232/485 or OM-Link.

3 CONNECTION

NOTE

The power supply leads should not be installed in close proximity of the input signals. Contacts, motors with larger input power should not be in proximity of the instrument.
The leads into the instrument's input should be in sufficient distance from all power leads and appliances.



4 INSTRUMENT SETTINGS

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

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

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

4.1 SETTING

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

LIGHT **Simple programming menu**
- contains only items necessary for instrument function and is protected by password

PROFI **Complete programming menu**
- contains complete instrument menu and is protected by password

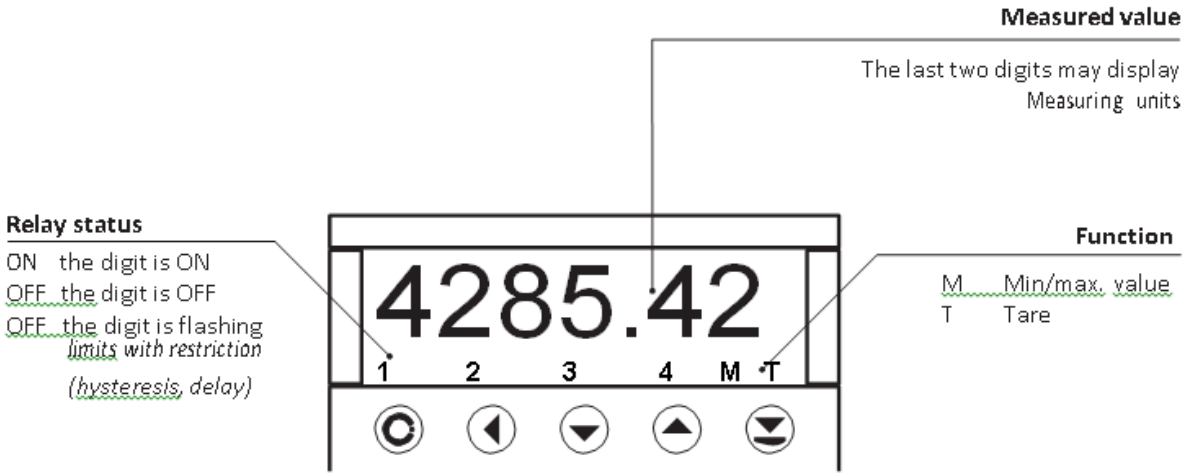
USER **User programming menu**
- may contain arbitrary items selected from the programming menu (LIGHT/PROFI), which determine the right (see or change)
- access without password

All programmable parameters are stored in the EEPROM.

The entire instruments operation and settings may be performed via OM-Link communication interface, which is a standard equipment of OC7060.

The operation program is freely accessible (www.orbitcontrols.ch) and the only requirement is the purchase of OML-Cable to connect the instrument to a PC. The communication is via RS 232 and USB. Another possible connection is with the data output RS 232 or RS 485 (without the need of the OML-Cable).

Setting of operation parameters with 5 keys on the front panel.



SYMBOLS USED

DEF Values preset at the factory

42 Symbol indicates a flashing Digit

MIN Inverted triangle indicates the item that can be placed in USER menu

MEMORY 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 Continue on page 30

Setting the Decimal Point and the Sign

DECIMAL POINT

Selection in the menu with a control key until flashing decimal point appears. Set the position with /.

MINUS SIGN

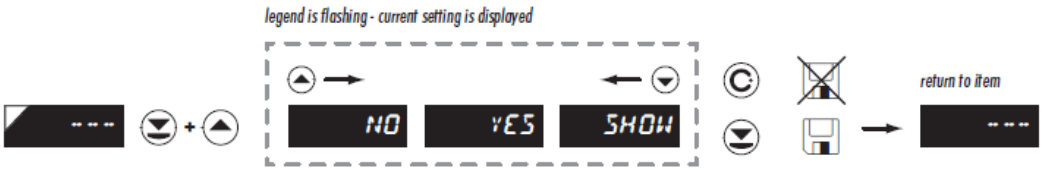
The Minus Sign will be set with . During edition the subtraction will be done from the current number, e.g. 013 > at order 100 > -87.

Keys Function

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	

Settings in „USER" Menu

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



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

5 SETTING “LIGHT”

5.0 Setting “LIGHT”

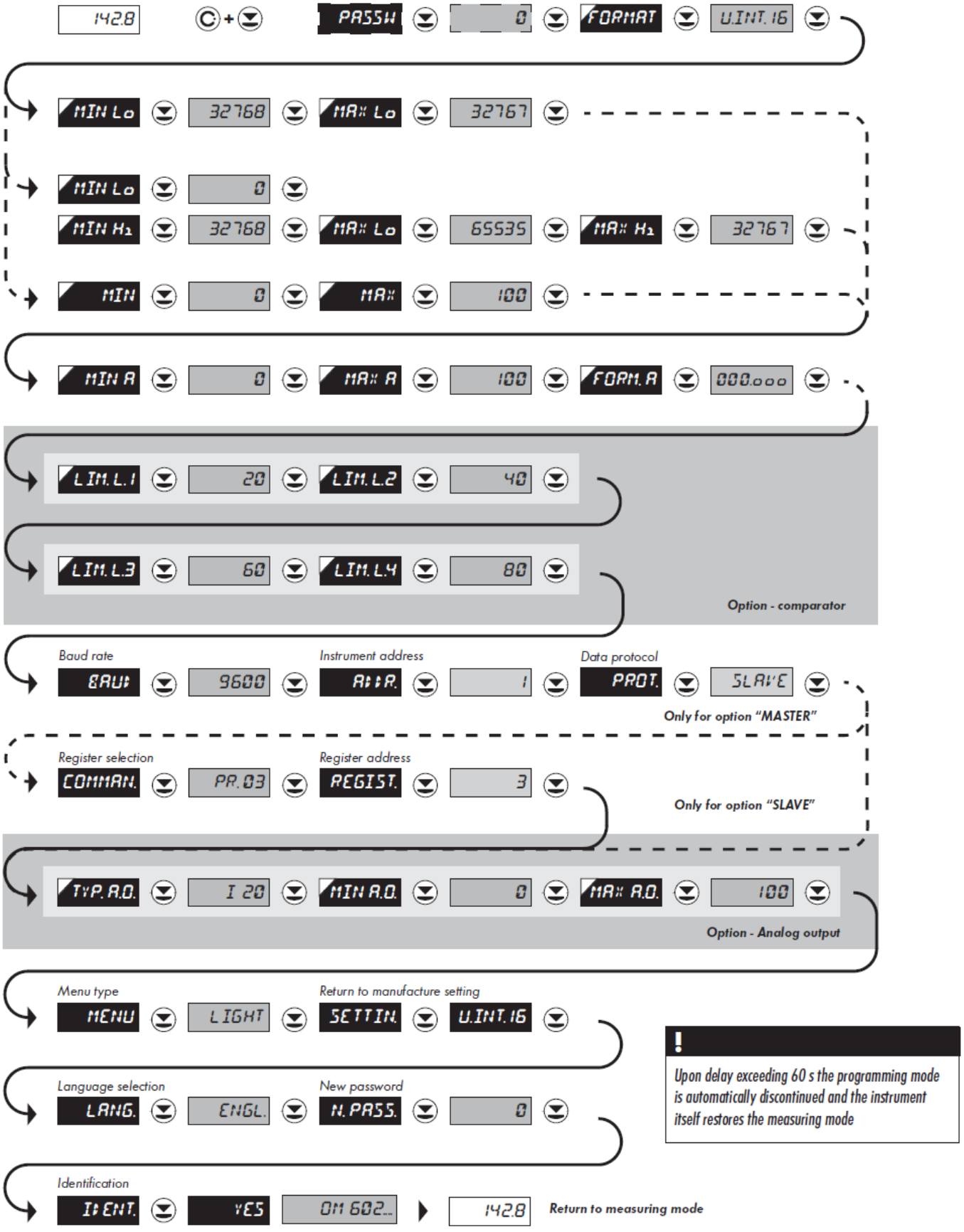
LIGHT **Simple programming menu**

- contains only items necessary for instrument setting and is protected by optional number code

Setting | LIGHT

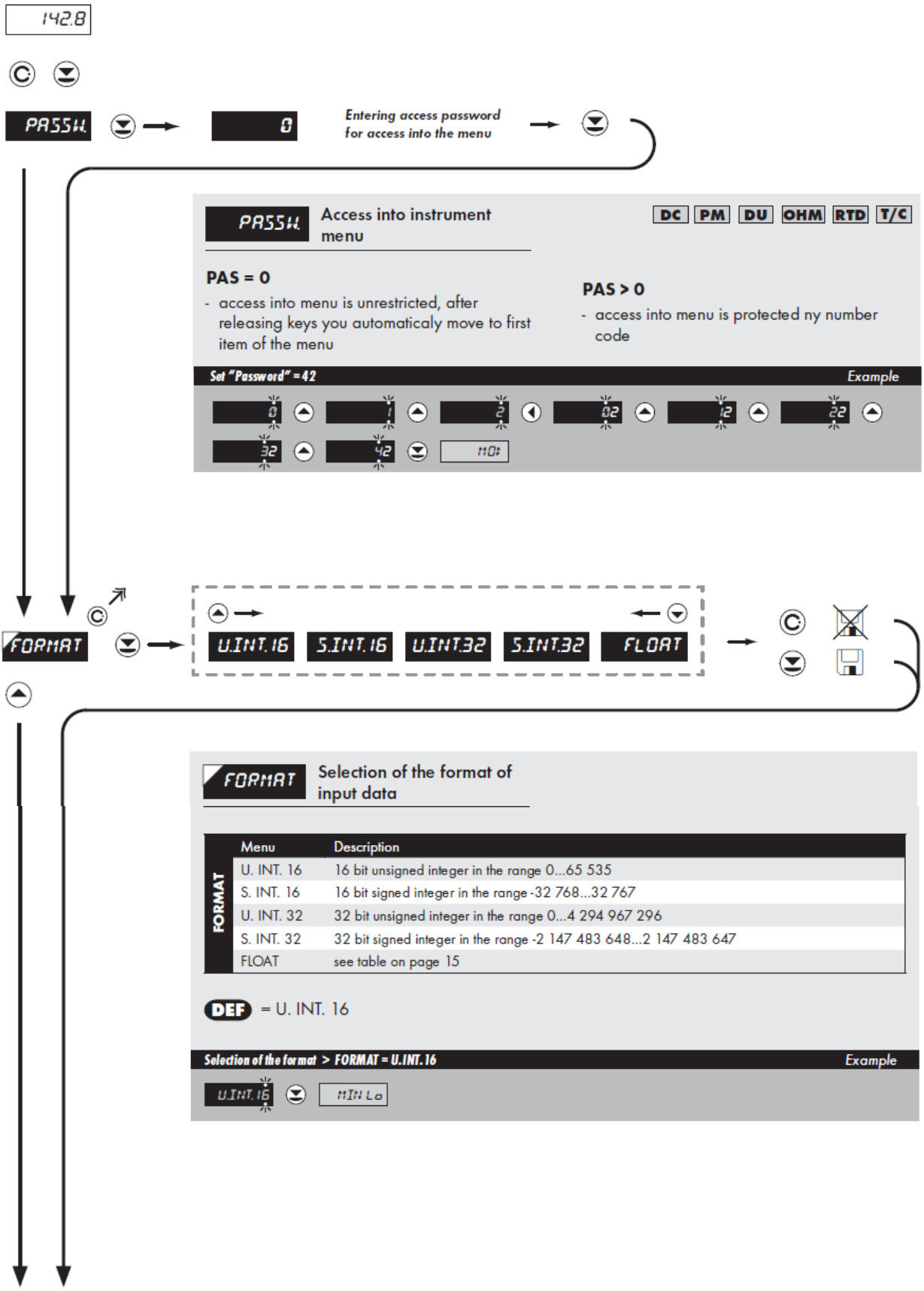
- For capable users
- Only items necessary for instrument setting
- Access is password protected
- Possibility to arrange items of the „User“ menu
- Linear menu structure

Preset from manufacture	
Password	*“0”*
Menu	*LIGHT*
USER menu	*off*
Setting the items	DEF



!

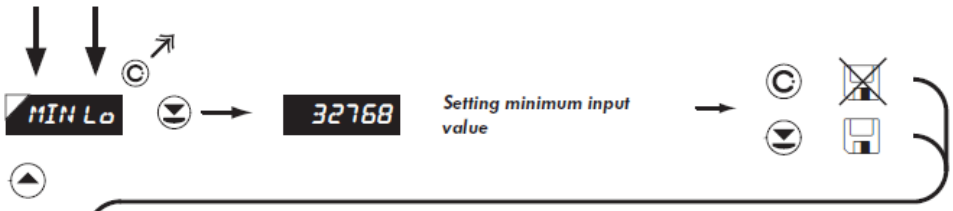
Upon delay exceeding 60 s the programming mode is automatically discontinued and the instrument itself restores the measuring mode


142.8
PASSW.
0
Entering access password for access into the menu
PASSW. Access into instrument menu
DC PM DU OHM RTD T/C
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
nOn
FORMAT
U.INT.16
S.INT.16
U.INT.32
S.INT.32
FLOAT
FORMAT Selection of the format of input data
FORMAT
Menu
Description
U. INT. 16
16 bit unsigned integer in the range 0...65 535
S. INT. 16
16 bit signed integer in the range -32 768...32 767
U. INT. 32
32 bit unsigned integer in the range 0...4 294 967 296
S. INT. 32
32 bit signed integer in the range -2 147 483 648...2 147 483 647
FLOAT
see table on page 15
DEF = U. INT. 16
Selection of the format > FORMAT = U.INT.16
Example
U.INT.16
MIN Lo

FORMAT	ORDER	COMMAND	DATA
U. INT. 16	n/a	0x06	<AA> 06 00 00 <Word Hi> <Word Lo> <CRC Lo> <CRC Hi>
S. INT. 16	n/a	0x06	<AA> 06 00 00 <Word Hi> <Word Lo> <CRC Lo> <CRC Hi>
U. INT. 32	LO - HI	0x10	<AA> 10 00 00 00 02 04 <Lo Word Hi> <Lo Word Lo> <Hi Word Hi> <Hi Word Lo> <CRC Lo> <CRC Hi>
S. INT. 32	LO - HI	0x10	<AA> 10 00 00 00 02 04 <Lo Word Hi> <Lo Word Lo> <Hi Word Hi> <Hi Word Lo> <CRC Lo> <CRC Hi>
FLOAT	LO - HI	0x10	<AA> 10 00 00 00 02 04 <Lo Word Hi> <Lo Word Lo> <Hi Word Hi> <Hi Word Lo> <CRC Lo> <CRC Hi>
U. INT. 32	HI - LO	0x10	<AA> 10 00 00 00 02 04 <Hi Word Hi> <Hi Word Lo> <Lo Word Hi> <Lo Word Lo> <CRC Lo> <CRC Hi>
S. INT. 32	HI - LO	0x10	<AA> 10 00 00 00 02 04 <Hi Word Hi> <Hi Word Lo> <Lo Word Hi> <Lo Word Lo> <CRC Lo> <CRC Hi>
FLOAT	HI - LO	0x10	<AA> 10 00 00 00 02 04 <Hi Word Hi> <Hi Word Lo> <Lo Word Hi> <Lo Word Lo> <CRC Lo> <CRC Hi>

LEGEND

#	Beginning of command
<AA>	Instrument address (1...247)
<Word xx>	16-bit data
<Lo Word xx>	32 bit data (lower part)
<Hi Word xx>	32 bit data (higher part)

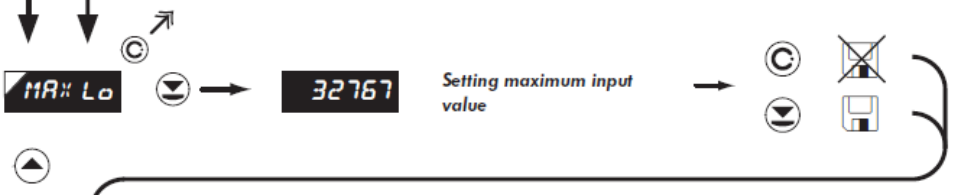


MIN Lo Setting mimum value of input data

- setting minimum input value
- range of setting 0...65 535

MIN Lo DEF = 0 (U.INT.16)
MIN Lo DEF = 32 768 (S.INT.16)

Setting for minimum Lo > MIN Lo = 0 *Example*

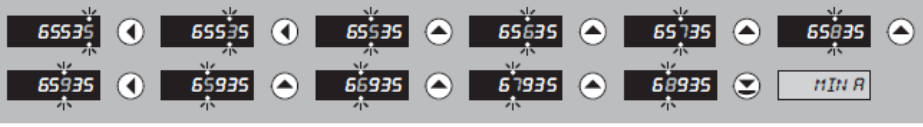


MAX Lo Setting maximum value of input data

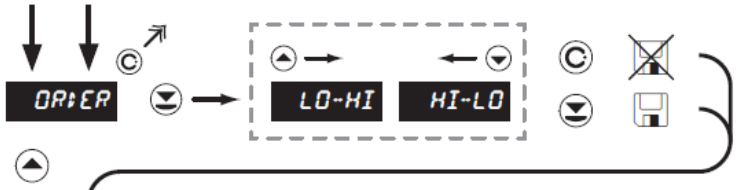
- setting maximum input value
- range of setting 0...65 535

MAX Lo DEF = 65 535 (U.INT.16)
MIN Lo DEF = 32 767 (S.INT.16)

Setting for maximum Lo > MAX Lo = 68935 *Example*



22

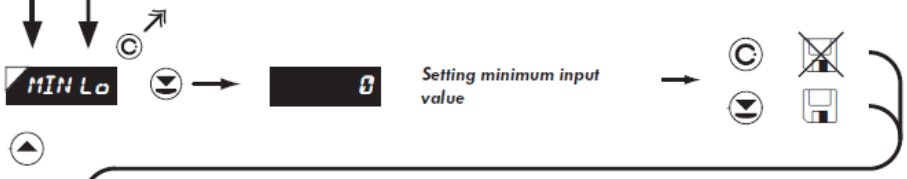


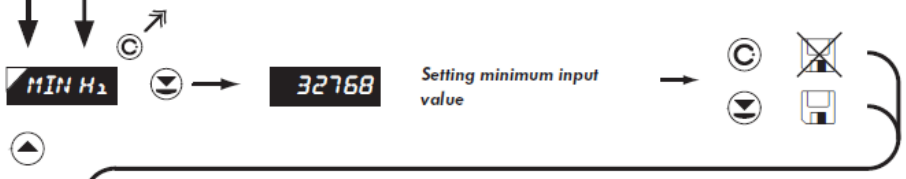
ORDER Selection of order of the 32 bit data parts

DEF = LO - HI

LO - HI > lower 16 bit is transmitted first
HI - LO > higher 16 bit is transmitted second

First transmission of lower 16 bit > ORDER = LO-HI *Example*





MIN -- Setting mimum value of input data

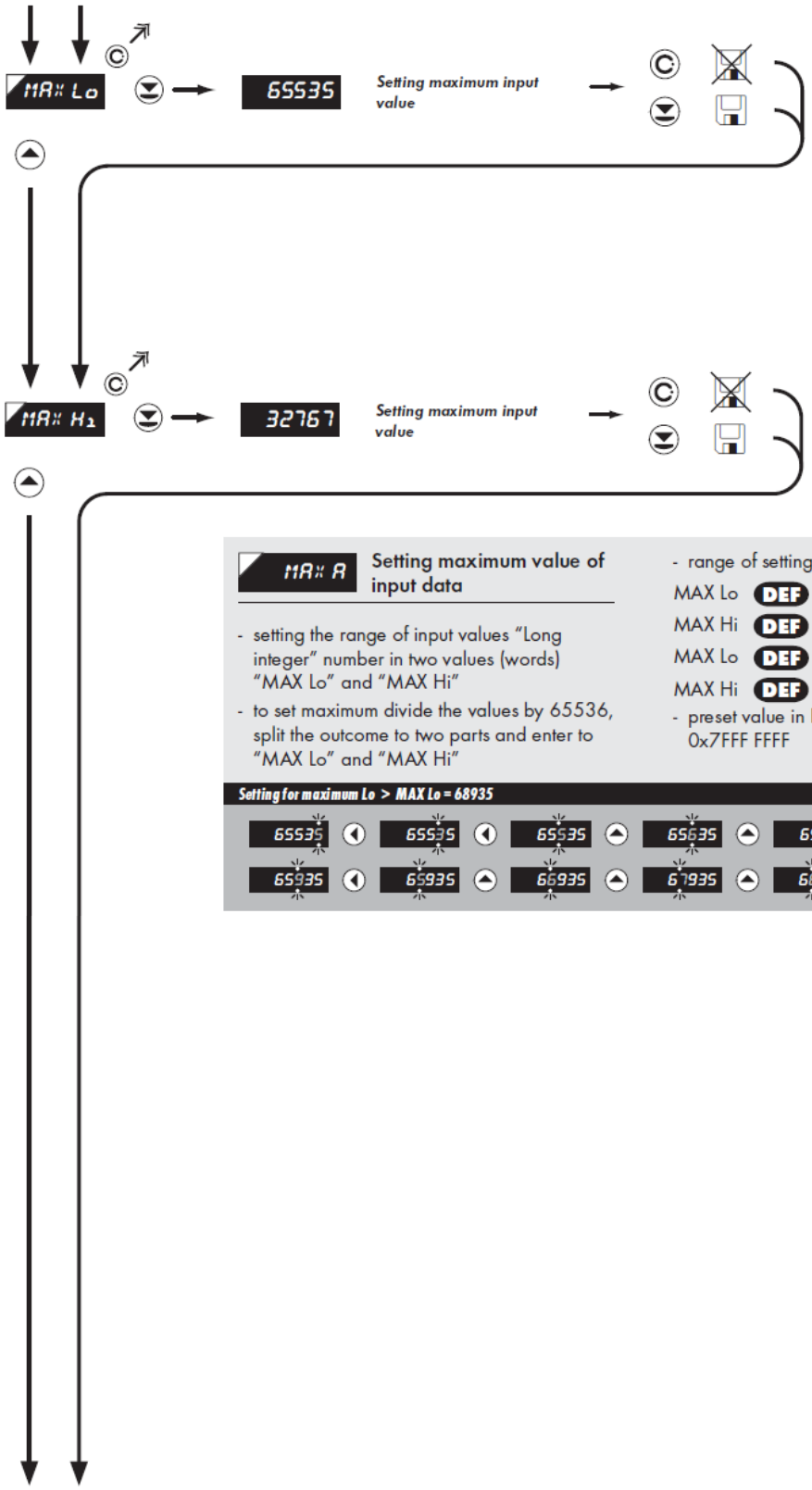
- setting the range of input values "Long integer" number in two values (words) "MIN Lo" and "MIN Hi"
- to set minimum divide the values by 65536, split the outcome to two parts and enter to "MIN Lo" and "MIN Hi"

- range of setting -99999...999999

MIN Lo DEF = 0 (U.INT.32)
MIN Hi DEF =0 (U.INT.32)
MIN Lo DEF = 0 (S.INT.32)
MIN Hi DEF = 32768 (S.INT.32)

- preset value in HEX format equals 0x800 0000

Setting for minimum Lo > MIN Lo = 0 *Example*



MAX A **Setting maximum value of input data**

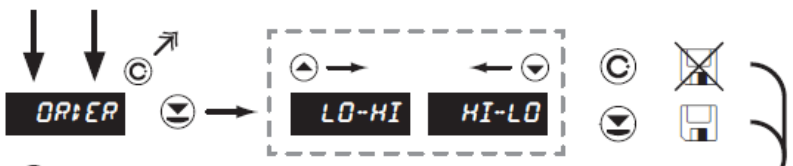
- setting the range of input values "Long integer" number in two values (words) "MAX Lo" and "MAX Hi"
- to set maximum divide the values by 65536, split the outcome to two parts and enter to "MAX Lo" and "MAX Hi"

- range of setting -99999...999999

MAX Lo DEF = 65535 (U.INT.32)
MAX Hi DEF = 65535 (U.INT.32)
MAX Lo DEF = 65535 (S.INT.32)
MAX Hi DEF = 32767 (S.INT.32)

- preset value in HEX format equals 0x7FFF FFFF

Setting for maximum Lo > MAX Lo = 68935 *Example*

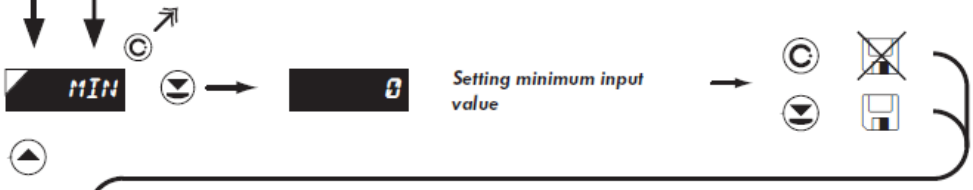


ORDER Selection of order of the 32 bit data parts

DEF = LO - HI

LO - HI > lower 16 bit is transmitted first
HI - LO > higher 16 bit is transmitted second

First transmission of lower 16 bit > ORDER = LO-HI — Example

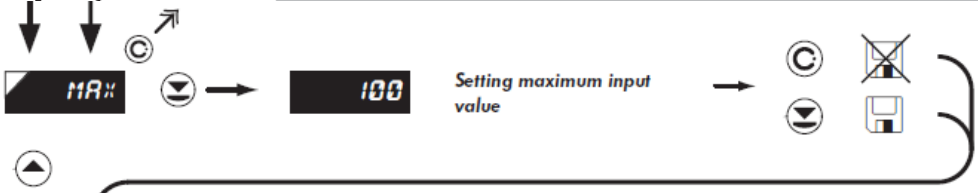


MIN Setting mimum value of input data

- range of setting -99999...999999

MIN DEF = 0

Setting for minimum > MIN = 0 — Example



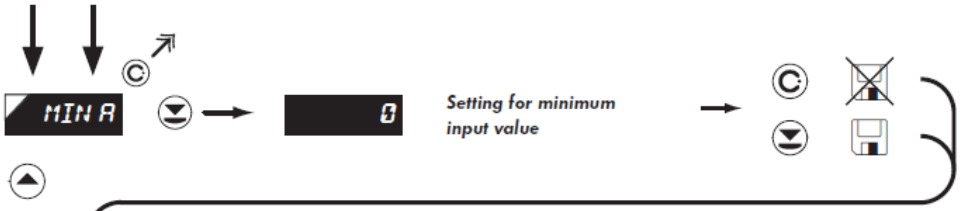
MAX Setting maximum value of input data

- range of setting -99999...999999

MAX DEF = 100

Setting for maximum > MAX = 300 — Example

22

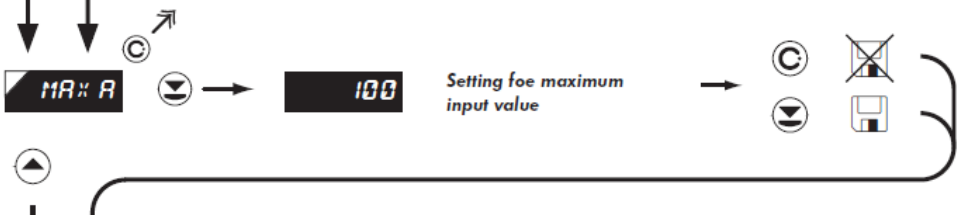


MIN A **Setting display projection for minimum input value**

- range of the setting is -99999...999999
- position of the DP does not affect display projection
- the DP is automatically shifted after the value is confirmed

DEF = 0

Projection for min. > MIN A = 0 *Example*

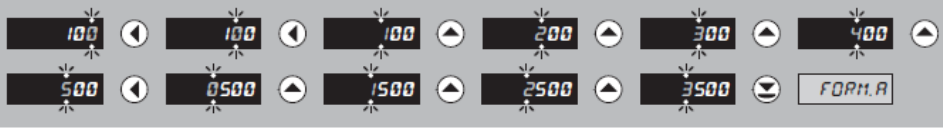


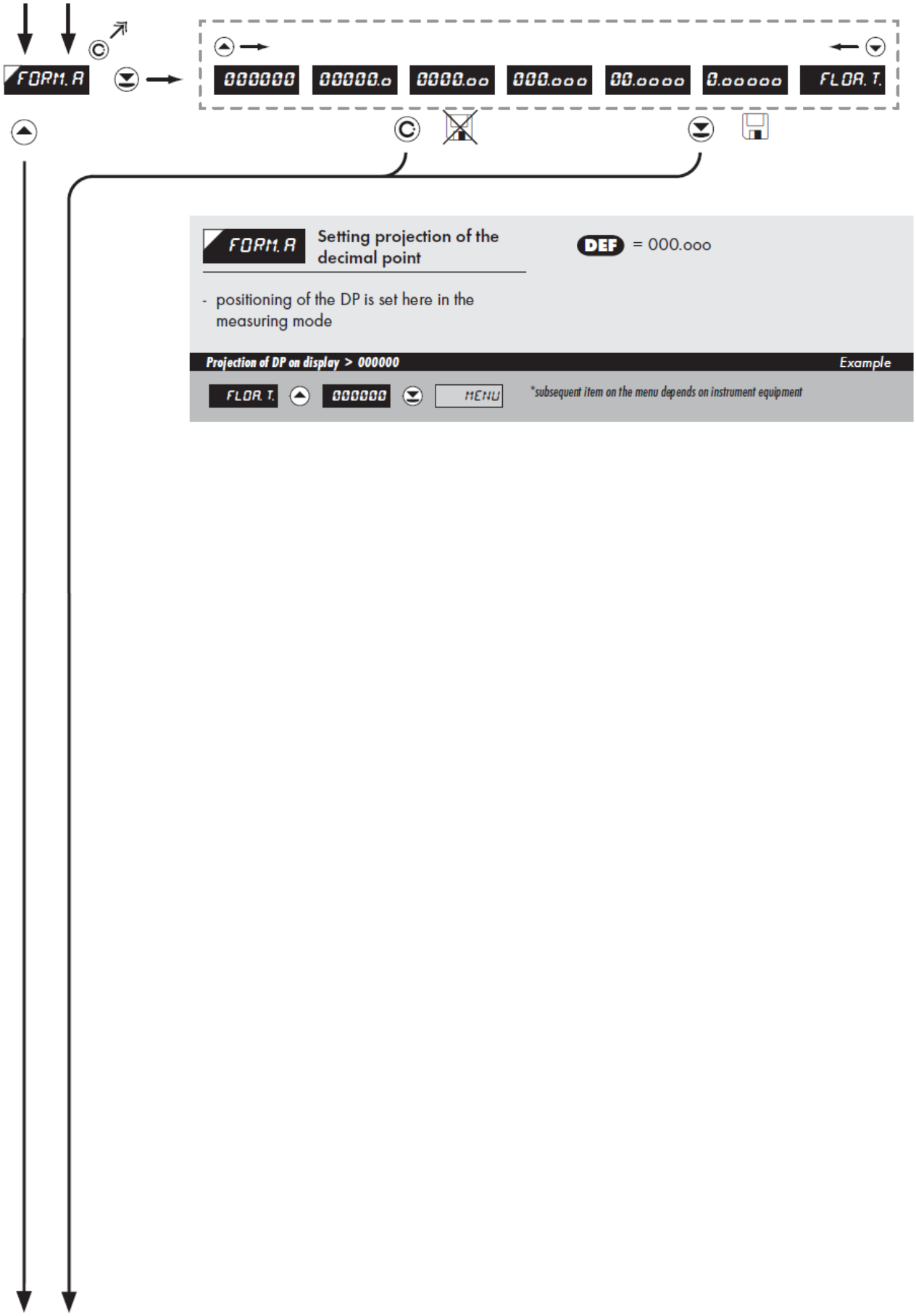
MAX A **Setting display projection for maximum input value**

- range of the setting is -99999...999999
- position of the DP does not affect display projection
- the DP is automatically shifted after the value is confirmed

DEF = 100

Projection for max. > MAX A = 3500 *Example*





FORM. A Setting projection of the decimal point

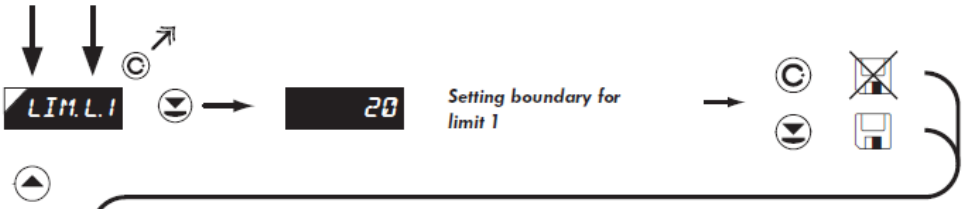
DEF = 000.000

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

Projection of DP on display > 000000 *Example*

FLOA. T. ▲ 000000 ▼ MENU

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



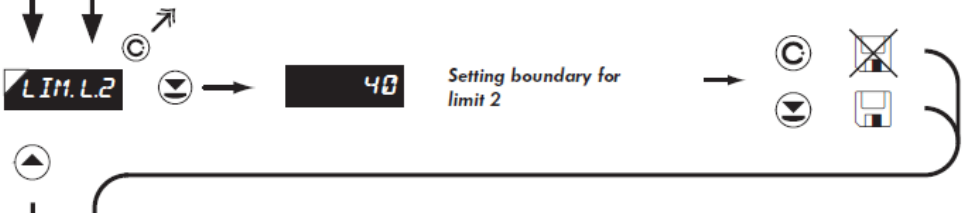
LIM.L.1 **Setting boundary for limit 1**

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

- contingent modification of hysteresis or delay may be performed in "PROFI" menu

DEF = 20

Setting limit 1 > LIM L 1 = 32 *Example*



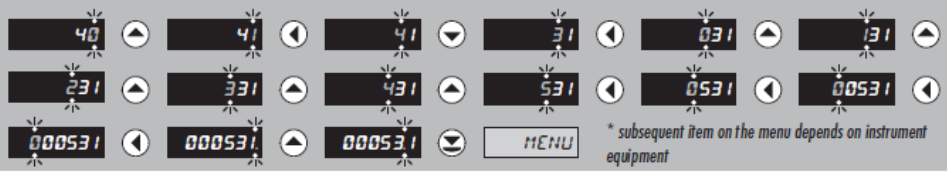
LIM.L.2 **Setting boundary for limit 2**

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

- contingent modification of hysteresis or delay may be performed in "PROFI" menu

DEF = 40

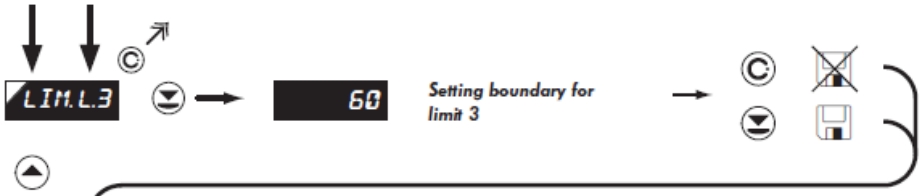
Setting limit 2 > LIM L 2 = 53.1 *Example*



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

!

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



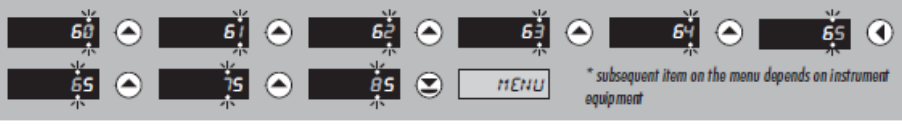
LIM.L3 **Setting boundary for limit 3**

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

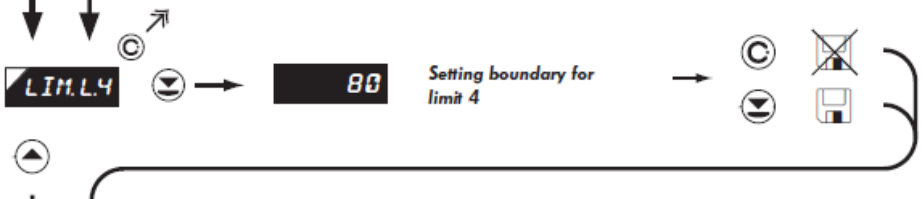
- contingent modification of hysteresis or delay may be performed in "PROFI" menu

DEF – 60

Setting limit 3 > LIM L 3= 85 *Example*



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



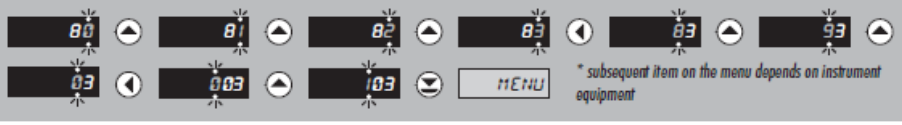
LIM.L4 **Setting boundary for limit 4**

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

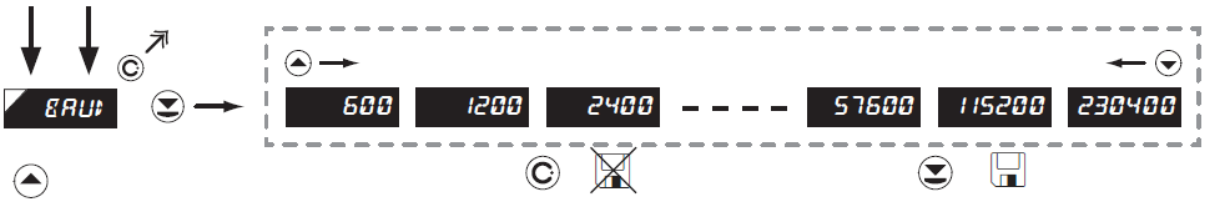
- contingent modification of hysteresis or delay may be performed in "PROFI" menu

DEF – 80

Setting limit 4 > LIM L 4= 103 *Example*



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



BAUd Selection of transmission rate of the data output

- selection of range: 600/1200/2400/9600/19200/38400/57600/115200/230400 Baud

DEF = 9600

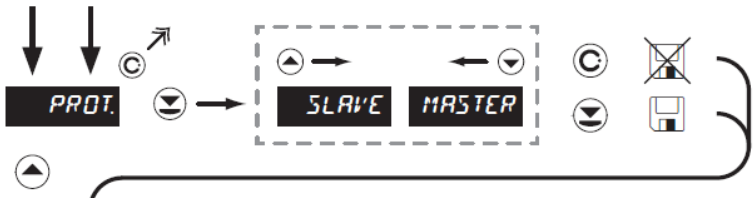
Selection of rate 115200 Baud > BAUD = 115200 — *Example*

Addr. Setting instrument address

- range of setting 1...247

DEF = 1

Instrument address 1 > ADDR. = 1 — *Example*

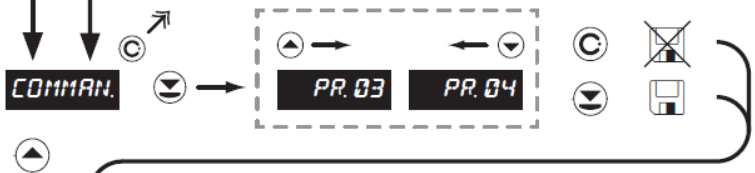


PROT. Selection of data protocol

SLAVE > display shows data entered through commands 0x06 nebo 0x10
MASTER > instrument solicits data by selected command from given register

DEF = SLAVE

Protocol SLAVE > PROT. = SLAVE — *Example*



COMMAN. Selection of register

- applies only for option "MASTER"

PR. 03 > reading setup (holding) registers at address 4xxxx
PR. 04 > reading input (input) registers at address 3xxxx

DEF = PR. 03

Register at address 4xxxx > COMMAN. =PR. 03 — *Example*

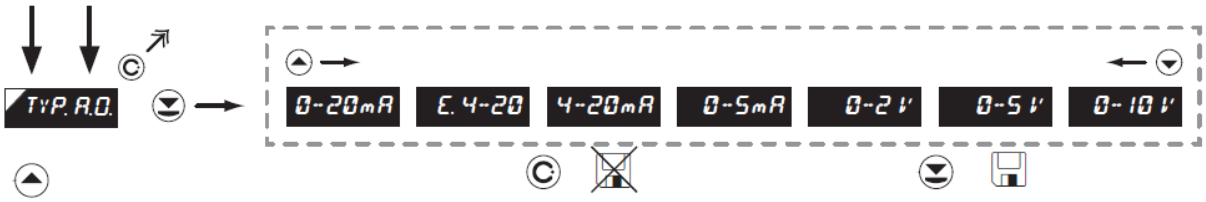
REGIST. Setting register address

- defines address of the register to be read

- range of setting 0...65 535
- the address usually entered is 0...999 (without highest digit)

DEF = 3

Register address 3 > REGIST. = 3 — *Example*

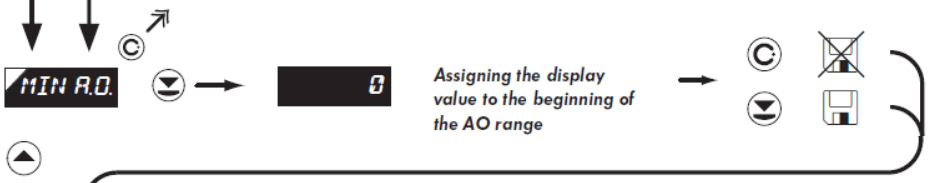


TYP. A.O. Setting the type of analog output

Menu	Range	Description
0-20mA	0...20 mA	
E. 4-20mA	4...20 mA	with indication of error statement (<3,6 mA)
4-20mA	4...20 mA	
0-5mA	0...5 mA	
0-2 V	0...2 V	
0-5 V	0...5 V	
0-10 V	0...10 V	

DEF = 4...20 mA

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



Assigning the display value to the beginning of the AO range

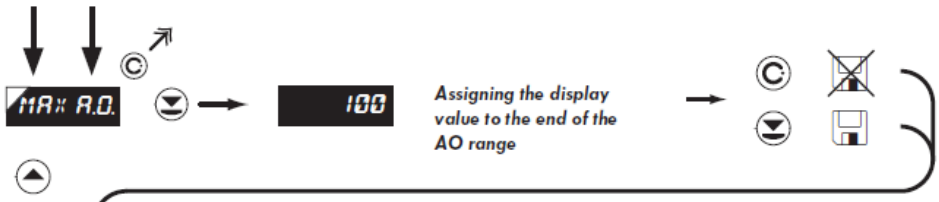
MIN A.O. Assigning the display value to the beginning of the AO range

DEF = 0

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

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

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

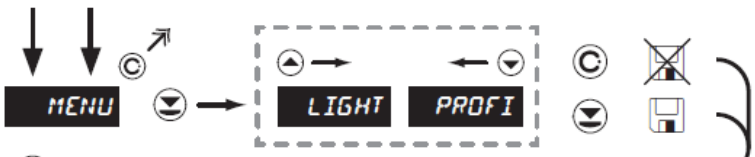


MAX A.O. Assigning the display value to the end of the AO range

DEF = 100

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

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



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

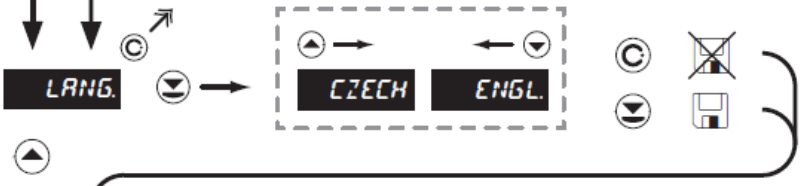
DEF = LIGHT

Menu LIGHT > MENU = LIGHT *Example*

SETTIN. **Restoration of manufacture instrument setting**

- in the event of error setup it is possible to return to manufacture setting
- restoration is performed for currently selected type of data format
- provided you stored your user setting in the "PROFI" menu it is possible to restore it (option "USER")
- reading the primary setting of items in the menu (DEF)

Restoration of manufacture setting > SETTIN. - U.INT.16 *Example*



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

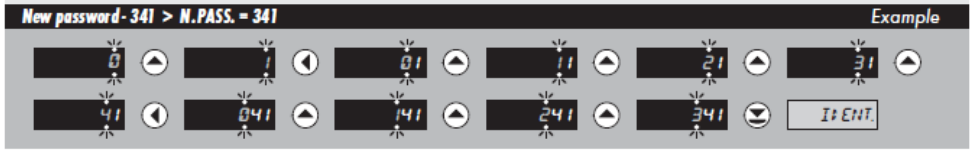
- selection of language version of the instrument menu

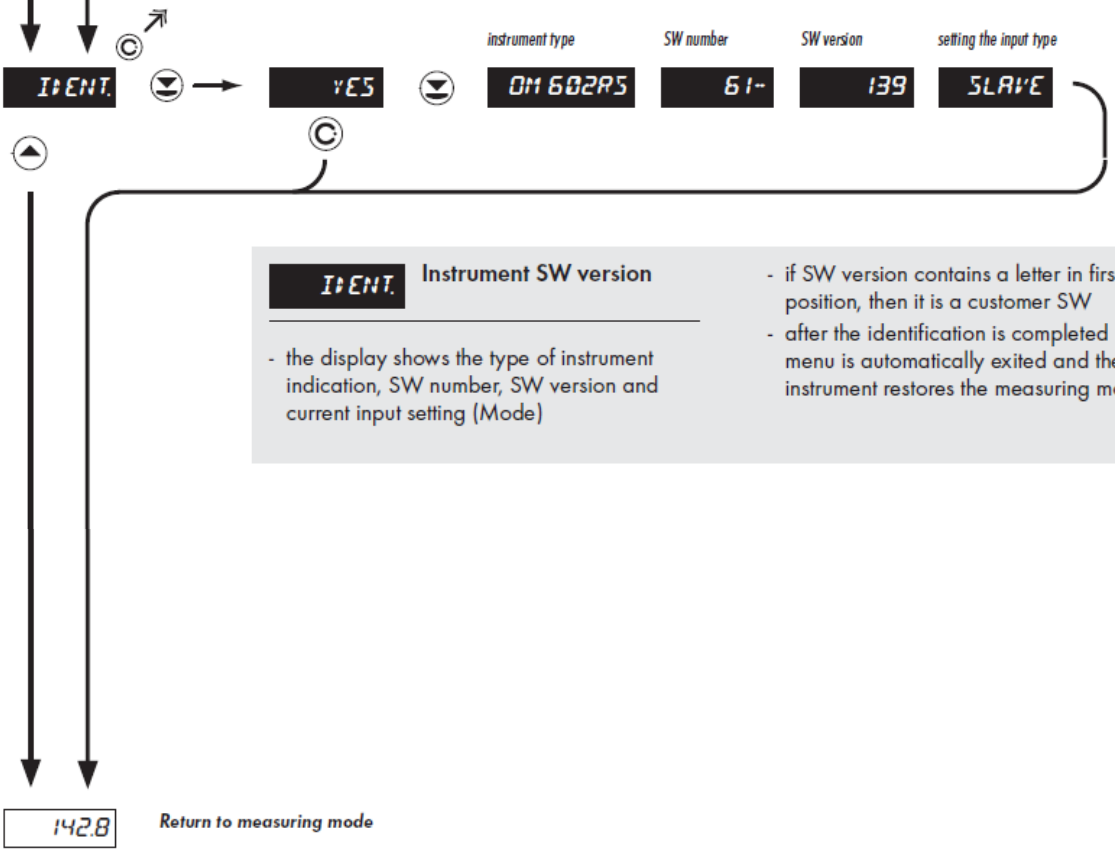
DEF = ENGL.

Language selection - ENGLISH > LANG. = ENGL. *Example*

N. PASS. **Setting new access password**

- access password for menu LIGHT/PROFI
- range of the number code 0...9999
- upon setting the password to "000" the access to menu LIGHT/PROFI is free without prompt to enter it
- in the event of loss universal password "8177" may be used





IDENT. **Instrument SW version**

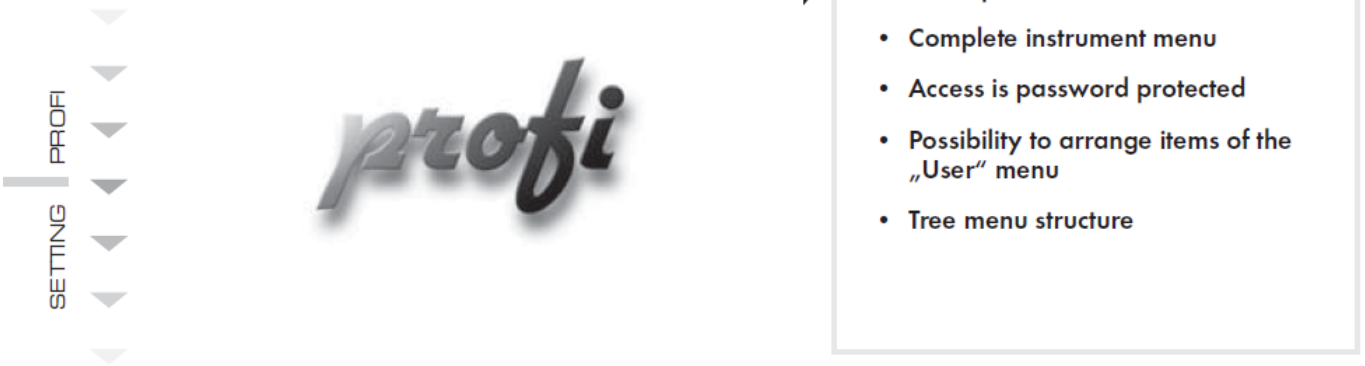
- the display shows the type of instrument indication, SW number, SW version and current input setting (Mode)
- if SW version contains a letter in first position, then it is a customer SW
- after the identification is completed the menu is automatically exited and the instrument restores the measuring mode

6 SETTING „PROFI“

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**

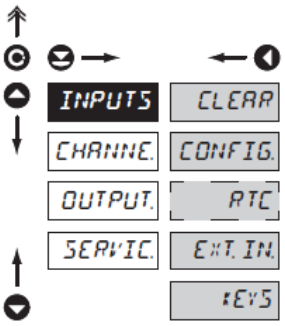


Switching into „PROFI“ Menu

- 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)

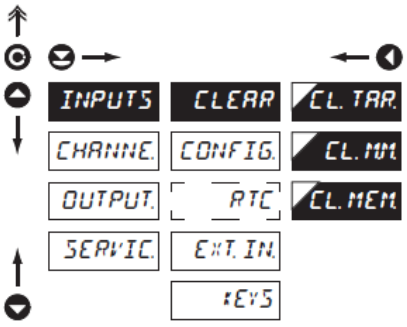
6.1 Setting “PROFI” - INPUT



The primary instrument parameters are set in this menu

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

6.1.1 Resetting internal Values



CLEAR **Resetting internal values**

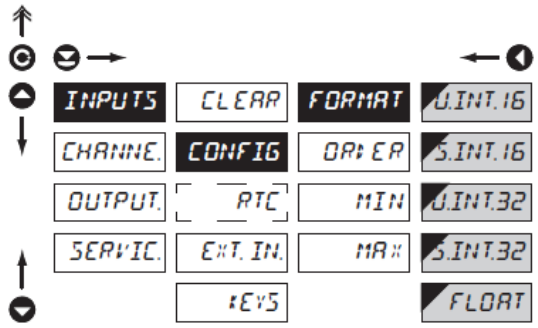
CL. TAR.	Tare resetting
CL. M.M.	Resetting min/max value

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

CL. MEM.	Resetting the instrument memory

- resetting memory with data measured in the “FAST” or “RTC” modes
- not in standard equipment

6.1.2a Selection of the Input Data Format



FORMAT Selection of the format of input data

U.INT.16 16-bit unsign integer

- in range 0...65 535

S.INT.16 16-bit sign integer

- in range -32 768...32 767

U.INT32 32 bit unsign integer

- in range 0...4 294 967 296

S.INT32 32 bit sign integer

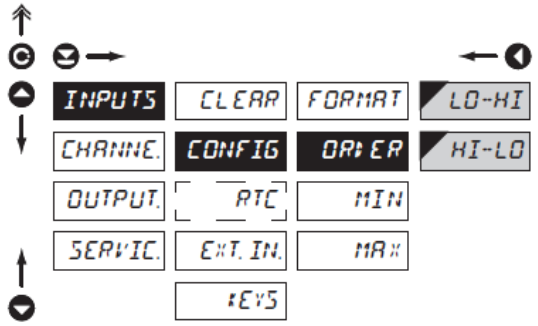
- in range -2 147 483 648 ... 2 147 483 647

FLOAT IEEE format

- in range ±6,80564693277058E+38

- for description see table on page 69

6.1.2b Selection of Order of the 32 Bit Data Parts

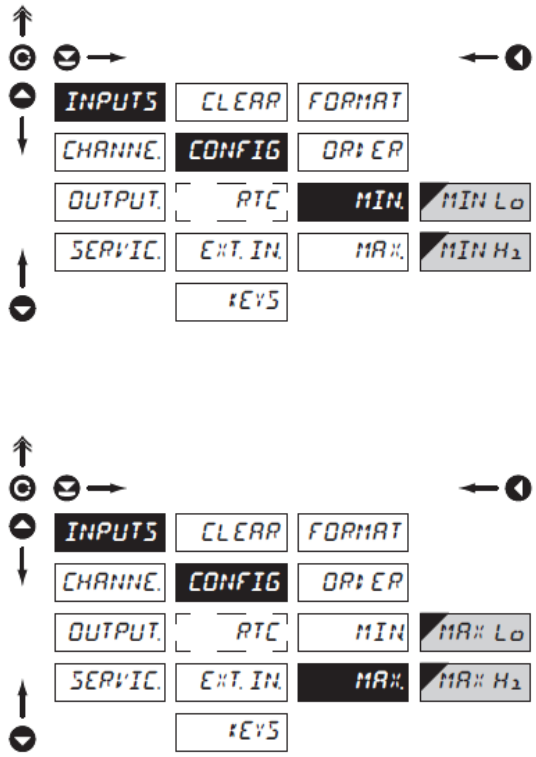


ORDER Selection of order of the 32 bit parts

LO-HI Lower 16 bit is transmitted first

HI-LO Higher 16 bit is transmitted second

6.1.2c Setting Input Values



CONFIG Setting input value

„FORMAT" > U.INT.16/S.INT.16

- range of the setting : 0...65 535

MIN Lo Setting mimum value of input data

MIN Lo DEF = 0 (U.INT.16)
MIN Lo DEF = 32 768 (S.INT.16)

MAX Lo Setting maximum value of input data

MAX Lo DEF = 65 535 (U.INT.16)
MAX Lo DEF = 32 767 (S.INT.16)

„FORMAT" > U.INT.32/S.INT.32

- range of the setting: -99 999...999 999
- setting the range of input values "Long integer" number in two values (words) "MIN Lo", "MIN Hi" and "MAX Lo", "MAX Hi"
- to set minimum/maximum divide the values by 65536, split the outcome to two parts and enter to "MIN Lo" and "MIN Hi" /"MAX Lo" and "MAX Hi"

MIN -- Setting mimum value of input data

MIN Lo DEF = 0 (U.INT.32)
MIN Hi DEF = 0 (U.INT.32)
MIN Lo DEF = 0 (S.INT.32)
MIN Hi DEF = 32 768 (S.INT.32)

MAX -- Setting maximum value of input data

MAX Lo DEF = 65 535 (U.INT.32)
MAX Hi DEF = 65 535 (U.INT.32)
MAX Lo DEF = 65 535 (S.INT.32)
MAX Hi DEF = 32 767 (S.INT.32)

„FORMAT" > FLOAT

- range of the setting: -99 999...999 999

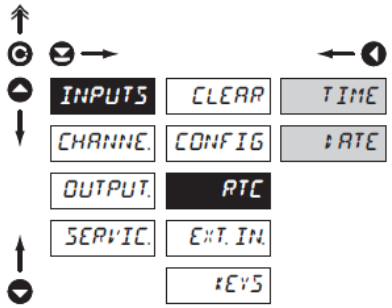
MIN Setting mimum value of input data

DEF = 0

MAX Setting maximum value of input data

DEF = 100

6.1.3 Setting the Real Time Clock



RTC Setting the real time clock (RTC)

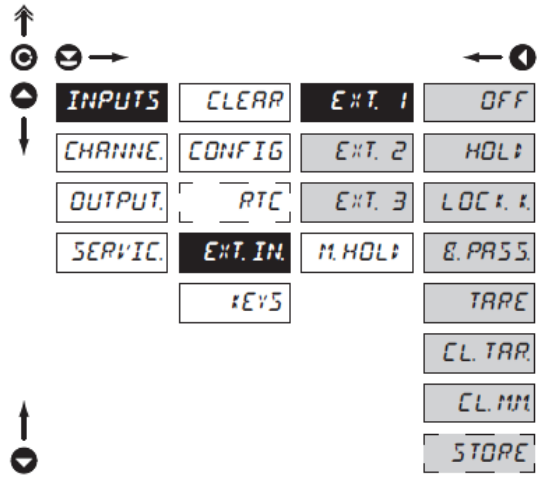
TIME Time setting

- format 23.59.59

DATE Date setting

- format DD.MM.YY

6.1.4a External Input Function Selection



EXT. IN. External input function selection

OFF Input is off

HOLD Activation of HOLD

LOCK K. Locking keys on the instrument

E.PASS. Activation of locking access into programming menu LIGHT/PROFI

TARE Tare activation

CL. TAR. Tare resetting

CL.MM Resetting min/max value

STORE Activation of measured data record in instrument memory (not in standard equipment)

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

*

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

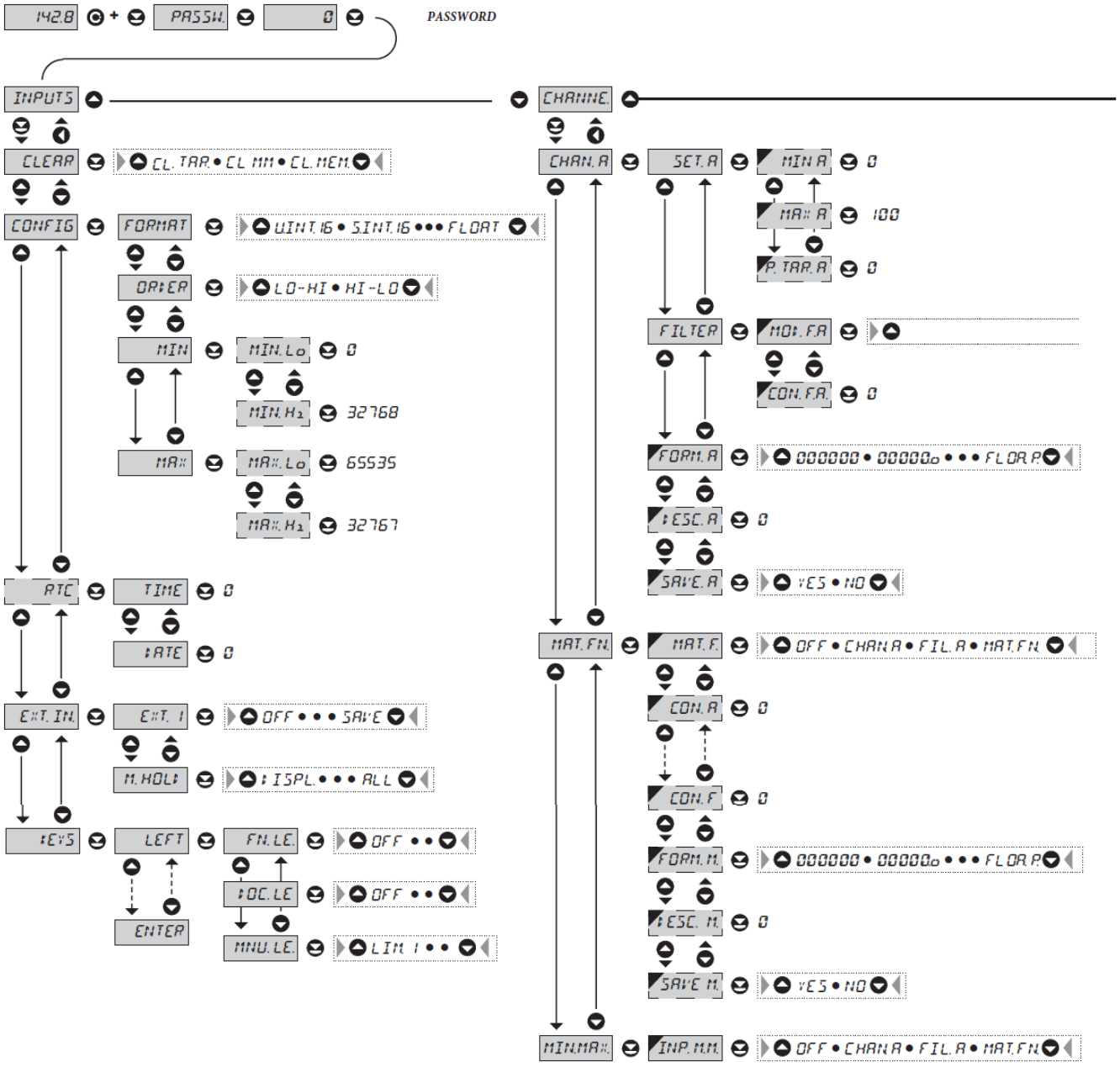
!

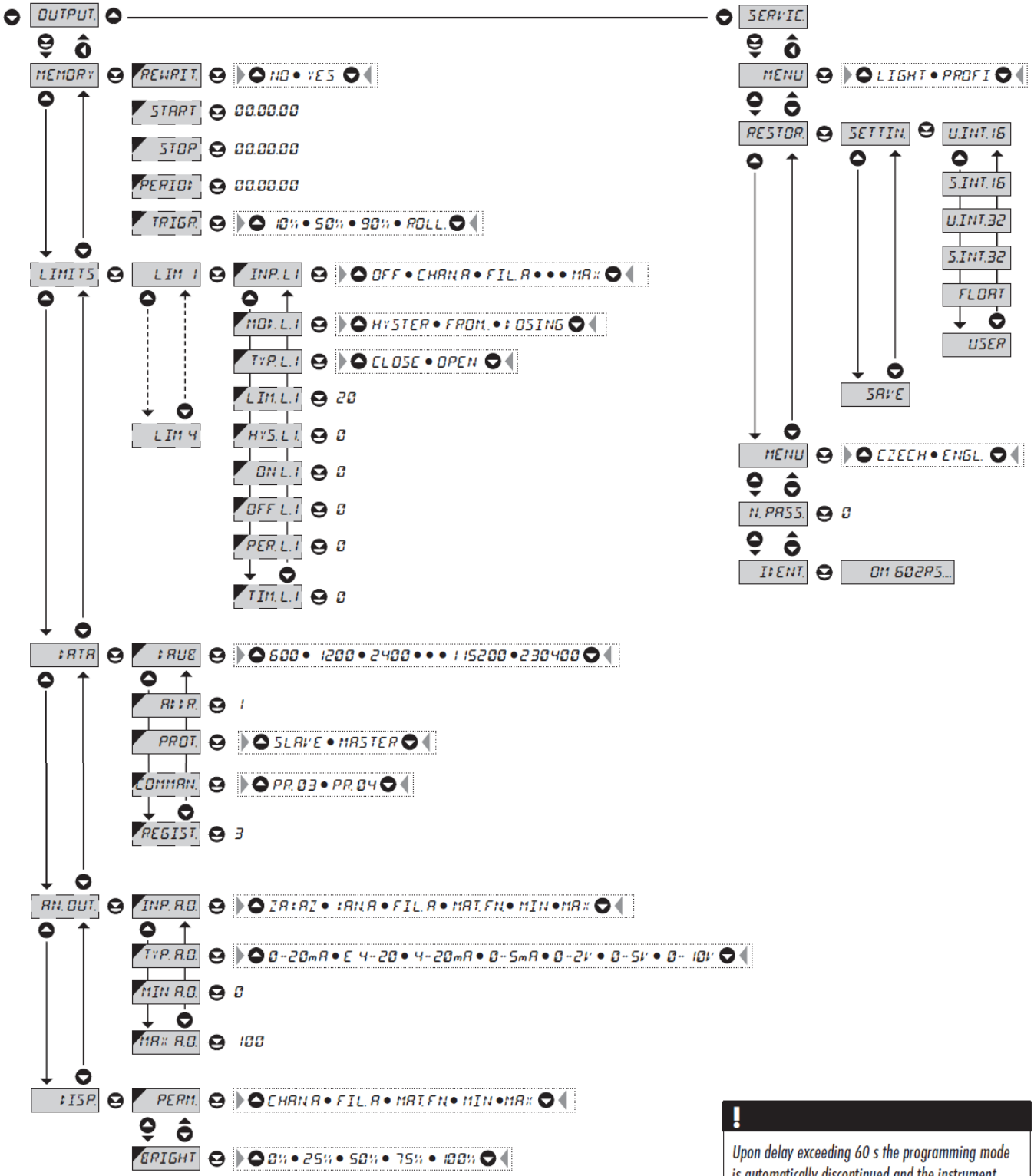
Preset values of the control keys DEF:

LEFT	Show Tare
UP	Show Max. value
DOWN	Show Min. value
ENTER	w/o functione

!

Setting is identical for LEFT, DOWN, UP and ENTER

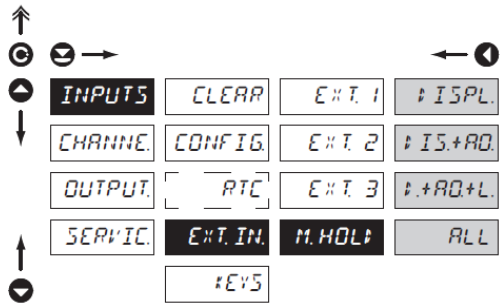

1428
PASSW.
0
PASSWORD
INPUTS
CLEAR
CL. TAR. • CL. MM • CL. MEM.
CONFIG
FORMAT
UINT.16 • SINT.16 ••• FLOAT
ORDER
LO-HI • HI-LO
MIN
MIN.Lo
0
MIN.Hi
32768
MAX
MAX.Lo
65535
MAX.Hi
32767
RTC
TIME
0
DATE
0
EXT. IN.
EXT. 1
OFF ••• SAVE
M.HOLD
DISPL ••• ALL
KEYS
LEFT
FN.LE.
OFF ••
DOC.LE
OFF ••
MNU.LE.
LIM 1 ••
ENTER
CHANNE.
CHAN.A
SET.A
MIN.A
0
MAX.A
100
P.TAR.A
0
FILTER
MOV.FA
CON.FA
0
FORM.A
000000 • 00000. ••• FLOA.P
DESC.A
0
SAVE.A
YES • NO
MAT.FN.
MAT.F.
OFF • CHAN.A • FIL.A • MAT.FN.
CON.A
0
CON.F
0
FORM.M.
000000 • 00000. ••• FLOA.P
DESC.M.
0
SAVE.M.
YES • NO
MIN.MAX.
INP.MM.
OFF • CHAN.A • FIL.A • MAT.FN.



!

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

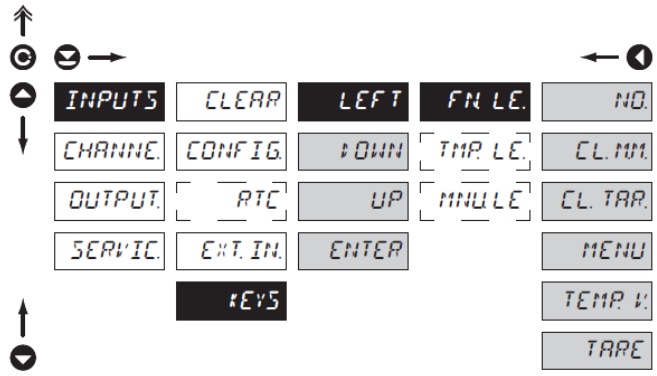
6.1.4b “HOLD” Selection



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 Key Functions

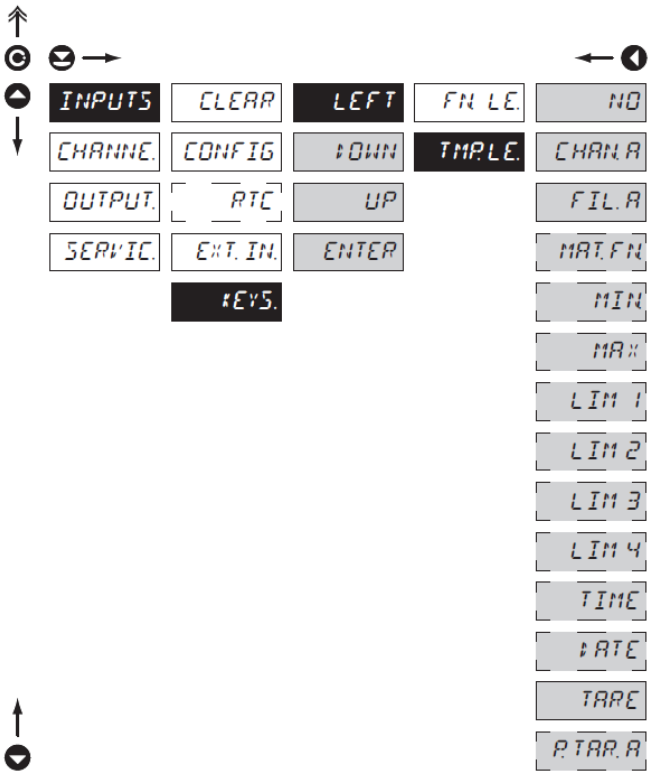


FN. LE. — **Assigning further functions to instrument keys**

- „*FN. LE.*“ > executive functions
- „*TMP. LE.*“ > temporary projection of selected values
- „*MNU. LE.*“ > direct access into menu on selected item

- **NO** — Key has no further function
- **CL. MM.** — Resetting min/max value
- **CL. TAR.** — Tare resetting
- **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
- **TEMP. V.** — Temporary projection of selected values
  - after confirmation of this selection the item *“TEMPOR.”* is displayed on superior menu level, whererequired selection is performed
- **TARE** — Tare function activation

6.1.5b Optional Key Functions – Temporary Display Projection



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

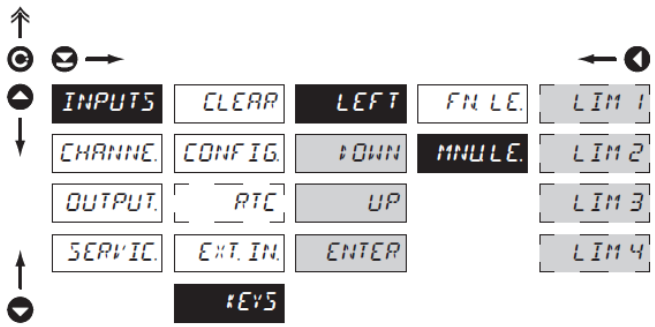
- "Temporary" projection of selected value is displayed for the time of keystroke
- "Temporary" projection may be switched to permanent by pressing + "Selected key", this holds until the stroke of any key

NO	Temporary projection is off
CHAN.A	Temporary projection of "Channel A" value
FIL.A	Temporary projection of "Channel A" value after processing digital filters
MAT.FN.	Temporary projection of "Mathematic functions" value
MIN	Temporary projection of "Min. value"
MAX	Temporary projection of "Max. value"
LIM 1	Temporary projection of "Limit 1" value
LIM 2	Temporary projection of "Limit 2" value
LIM. 3	Temporary projection of "Limit 3" value
LIM. 4	Temporary projection of "Limit 4" value
TIME	Temporary projection of "TIME" value
DATE	Temporary projection of "DATE" value
TARE	Temporary projection of "TARE" value
P. TAR. A	Temporary projection of "P. TARE" value

!

Setting is identical for LEFT, DOWN, UP and ENTER

6.1.5c Optional Key Functions – Direct access to Item



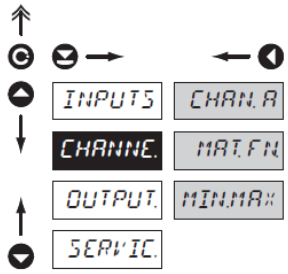
MNU. LE. Assigning access to selected menu item

- LIM 1 — Direct access to item "LIM 1"
- LIM 2 — Direct access to item "LIM 2"
- LIM 3 — Direct access to item "LIM 3"
- LIM 4 — Direct access to item "LIM 4"

!

Setting is identical for LEFT, DOWN, UP and ENTER

6.2 Setting “PROFI” Channel



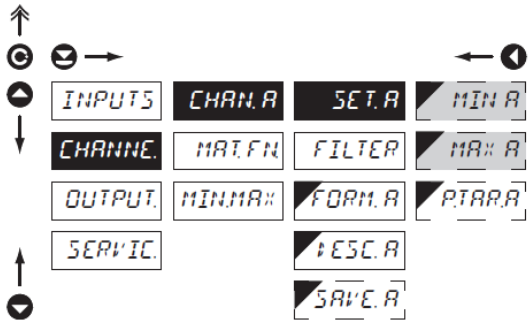
The primary instrument parameters are set in this menu

CHAN.A — 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 Display Projection



SET.A — **Setting display projection**

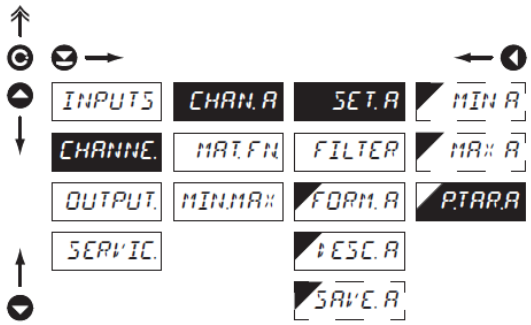
MIN A — **Setting display projection for minimum input value**

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

MAX A — **Setting display projection for maximum input value**

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

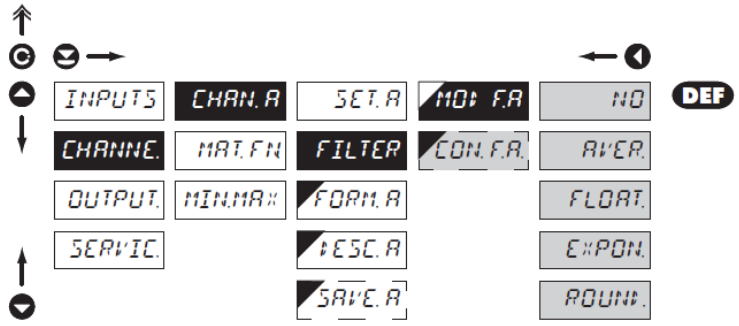
6.2.1b Setting “Fixed Tare”



P. TAR. A — **Setting “Fixed tare” value**

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

6.2.1c Digital Filters



MOD. F.A **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 prvního grade with time constant („CON.F. A.") measurement
- range 2...100

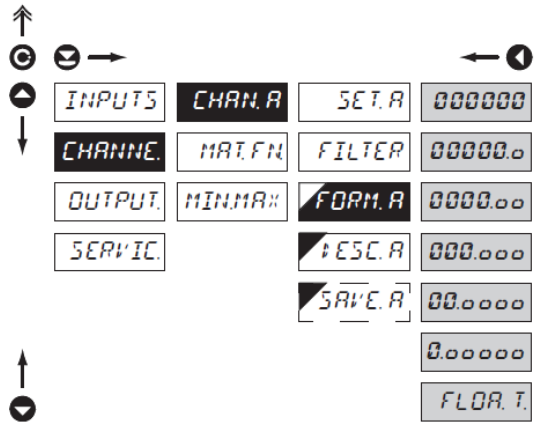
ROUND Measured value rounding

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

CON. F. A. Setting constants

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

6.2.1d Decimal Point setting



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 „*FLOAT.P.*"

000000. Setting DP - XXXXXX.

00000.0 Setting DP - XXXXX.x

0000.00 Setting DP - XXXX.xx

000.000 Setting DP - XXX.xxx

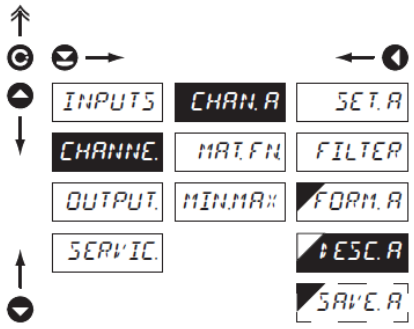
- **DEF**

00.0000 Setting DP - XX.xxxx

0.00000 Setting DP - X.xxxxx

FLOA.T. Floating DP

6.2.1e Measured – Process Units



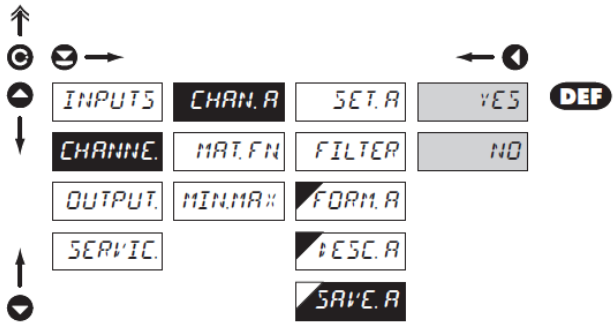
ESC.A **Setting projection of descript. for "Channel A"**

- 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

!

Table of signs on page 71

6.2.1f Data Storing

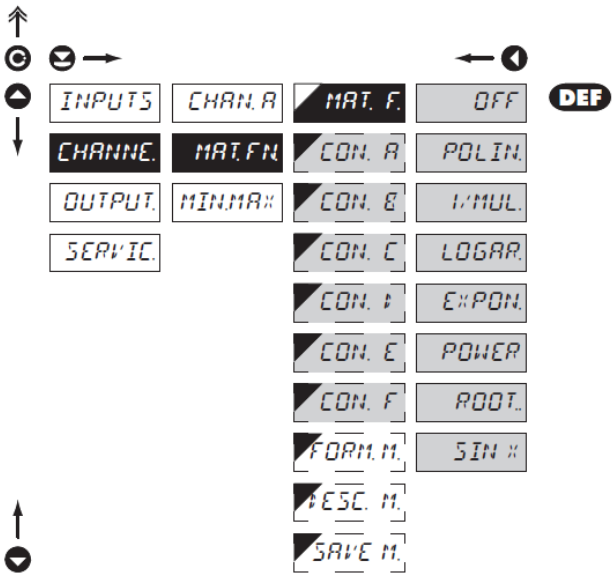


SAVE A **Selection of storing data into instrument memory**

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

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

6.2.2a Mathematic Functions



MATH.F. Selection of mathematic functions

OFF Mathematic functions are off

POLIN Polynome

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

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

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

EXPON. Exponential

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

POWER Power

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

ROOT Root

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

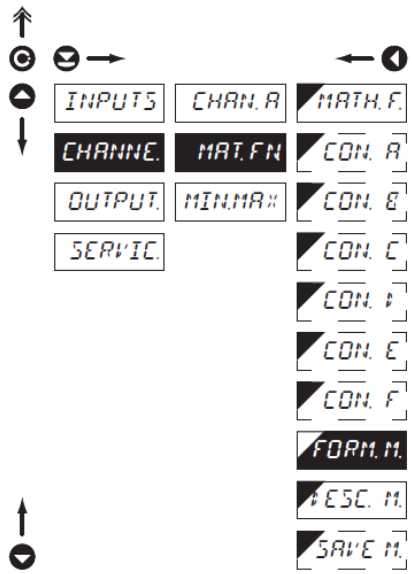
SIN x Sin x

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

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



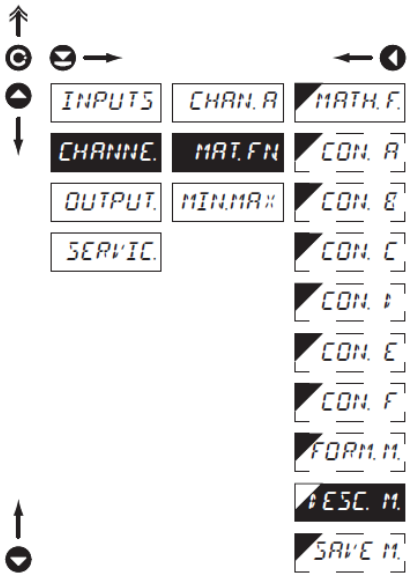
FORM.M. Selection of decimal point

- 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 – Process Units



ESC.M. Setting projection of description for "MAT.FN"

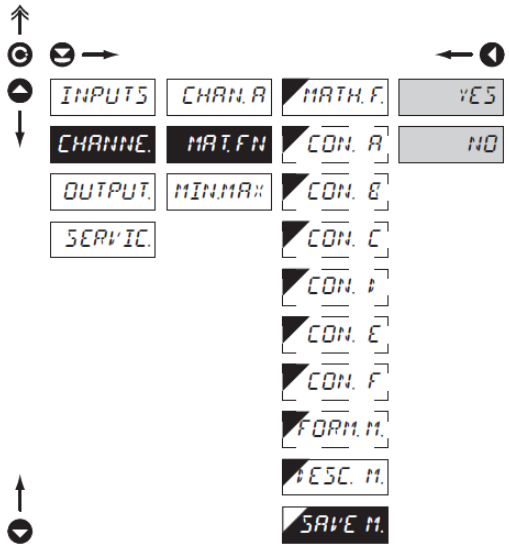
- projection of mesured data may be extended (at the expense of the number of displayed places) by two characters for description
- description is set by shifted ASCII code, when two first places show the set description and two last characters their code in period 0...95
- description is cancelled by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

- DEF = no description

!

Table of signs on page 71

6.2.2d Mathematic Functions – Data Storing



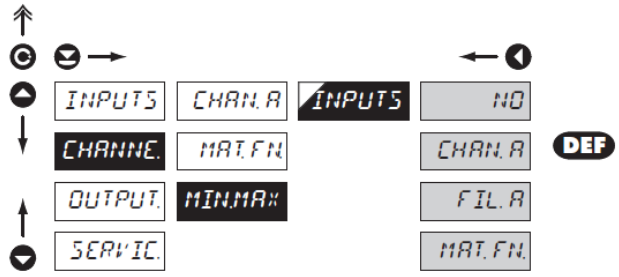
SAVE M. Selection of storing data into instrument memory

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

YES — Measured data are stored in the memory

NO — Measured data are not stored

6.2.3 Minimum and Maximum Values



INPUTS Selection of evaluation of min/max value

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

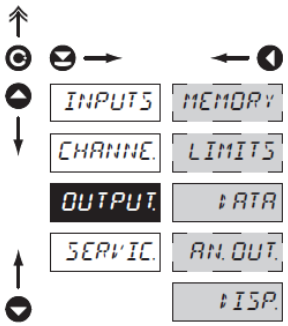
NO — Evaluation of min/max value is off

CHAN.A — From "Channel A"

FIL.A — From "Channel A" after digital filters processing

MAT.FN. — From "Mathematic functions"

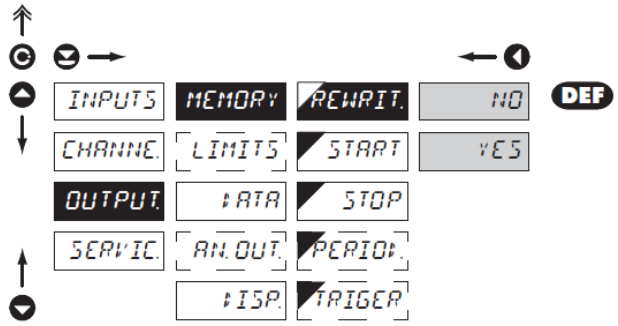
6.3 Setting “PROFI” – OUTPUTS



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

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

6.3.1a Data Logging Modes

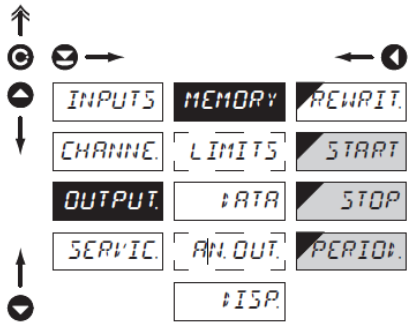


REWRIT. — Selection of the mode of data logging

- 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 – RTC



START Start of data logging into instrument memory

- time format HH.MM.SS

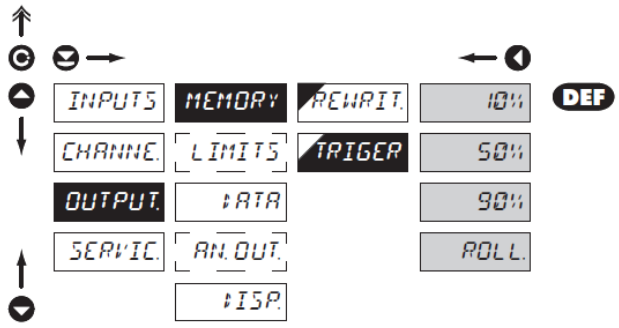
STOP Stop data logging into instrument memory

- 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 data hold valid for one day, where the logging is valid for every day without limitation
- time format HH.MM.SS
- item not displayed if "STORE" is selected in menu *(Input > EXT. IN.)*

6.3.1c Setting Data Logging – FAST



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

- values will be logged in an interval delimited by the time set under items *START* and *STOP*, time data hold valid for one day, where the logging is valid for every day without limitation
- 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
- initiation is on ext. input or control key

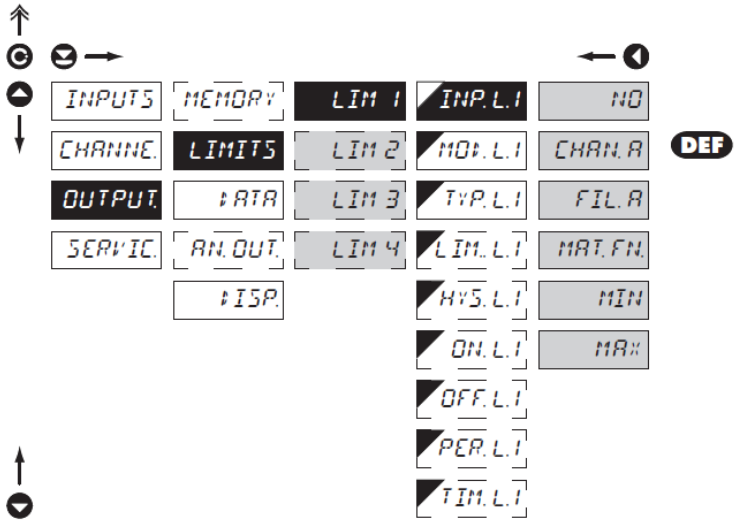
10% Reser. of 10 % memory prior init. of data logging

50% Reser. of 50 % memory prior init. of data logging

90% Reser. of 90 % memory prior init. of data logging

ROLL After initiation of data logging the memory is cyclically transcribed

6.3.2a LIMITS – Selection



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.A — Limit evaluation from "Channel A" after digital filters processing

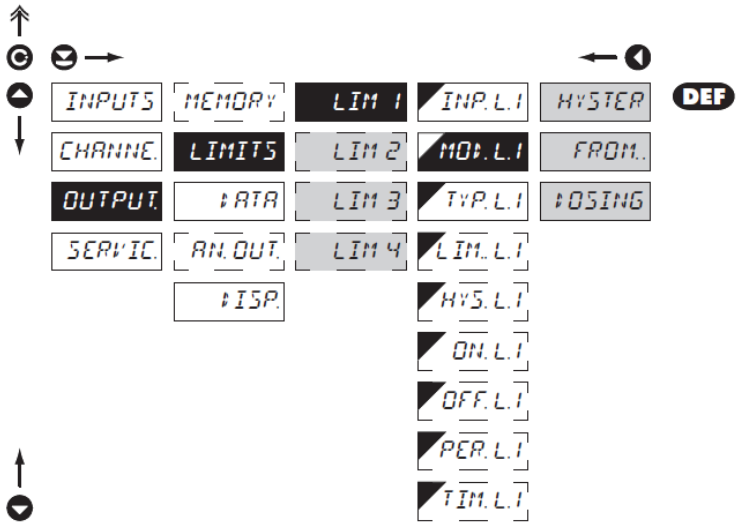
MAT.FN. — Limit evaluation from "Mathematic functions"

MIN — Limit evaluation from "Min.value"

MAX — Limit evaluation from "Max.value"

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

6.3.2b LIMITS – Type



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

MOD.L.1 Selection the type of limit

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

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

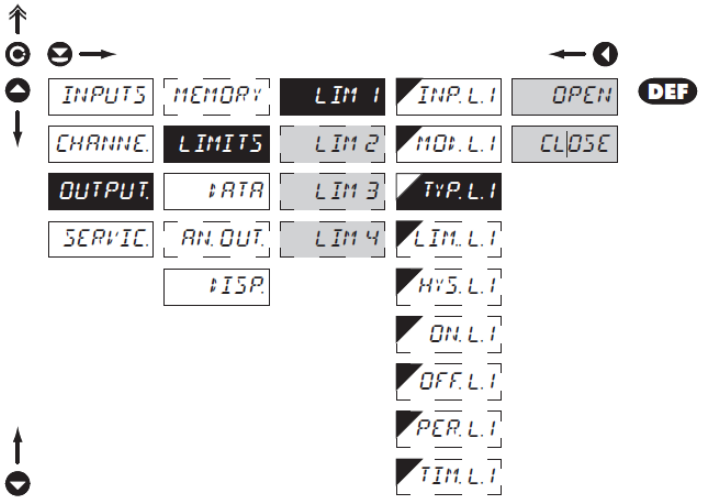
FROM.. — Frame limit

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

DOSING — Dosing limit (periodic)

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

6.3.2c OUTPUT – Selection

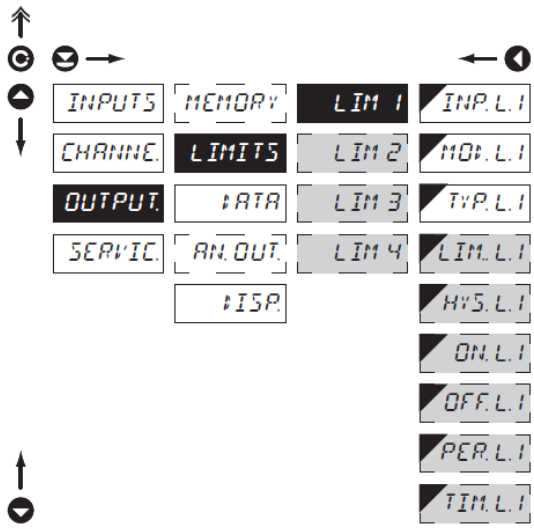


INP. L. 1 Selection of type of output

- OPEN: Output switches on when condition is met
- CLOSE: Output switches off when condition is met

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

6.3.2d Setting LIMITS



LIM. L. 1 Setting limit for switch-on
- for type *"HYSTER"*

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

ON. L. 1 Setting the outset of the interval of limit switch-on
- for type *"FROM"*

OFF. L. 1 Setting the end of the interval of limit switch-on
- for type *"FROM"*

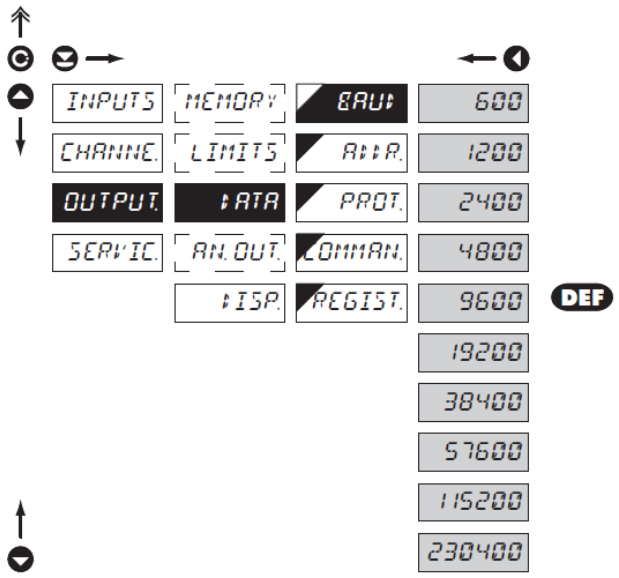
PER. L. 1 Setting the period of limit switch-on
- for type *"DOSING"*

TIM. L. 1 Setting the time switch-on of the limit
- for type *"HYSTER"* and *"DOSING"*

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

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

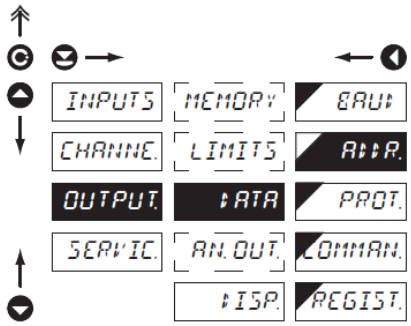
6.3.3a Baud Rate of the Data Output



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

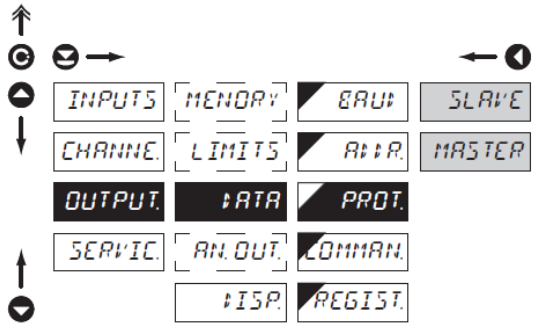
6.3.3b Address



ADDR. Setting instrument address

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

6.3.3c Data Protocol Selection



PROT. Setting instrument address

SLAVE Instrument projects received data

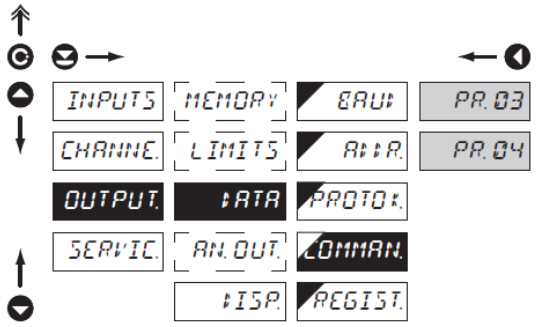
- entered by commands 0x06 nebo 0x10

MASTER Instrument solicits data from subordinate system

- instrument controls data tansmission from subordinate system
- "COMMAN" may be used for selection of received data (for commands see data protocol)
- instrument asks 10 questions/s, if no response arrives within 2s the display shows "----"

DEF = 00

6.3.3d Registers Selection



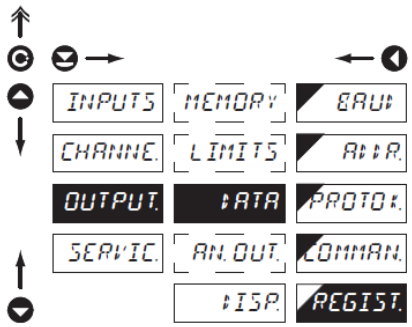
COMMAN. Selection of registers

- the item is accessible only after setting "MASTER" in "DATA/PROT."

PR.03 Reading setup (holding) registers at address 4xxxx

PR.04 Reading input (input) registers at address 3xxxx

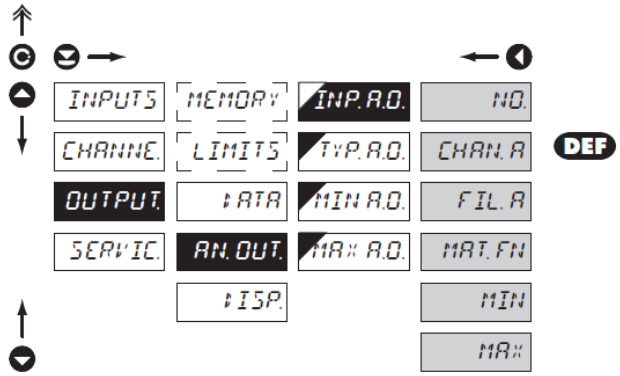
6.3.3e Register Address Setting



REGIST. Setting register address

- the item s accessible only after setting "MASTER" in "DATA/PROT."
- defines the address of the register to be read
- allows to enter the range 0...65535, the address usually set is in range 0...9999 (without highest digits)
- DEF = 3

6.3.4a Selection of Input for Analogue Output

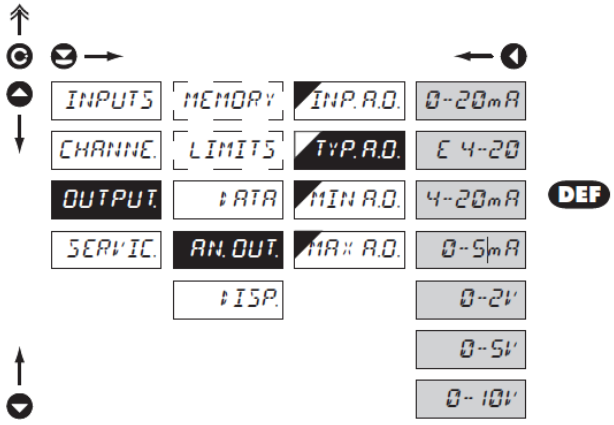


INP.AO. Selection evaluation analog output

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

NO	AO evaluation is off
CHAN.A	AO evaluation from "Channel A"
FIL.A	AO evaluation from "Channel A" after digital filters processing
MAT.FN.	AO evaluation from "Math.functions"
MIN	AO evaluation from "Min.value"
MAX	AO evaluation from "Max.value"

6.3.4b Analogue Output – Type



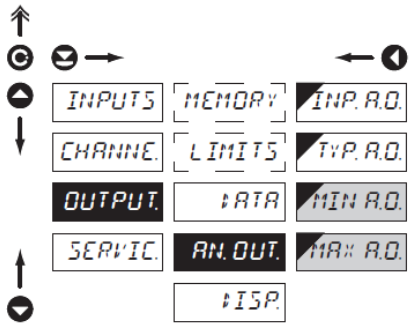
TYP. A.O. Selection of the type of analog output

0-20mA	Type - 0...20 mA
E 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

6.3.4c Analogue Output Range



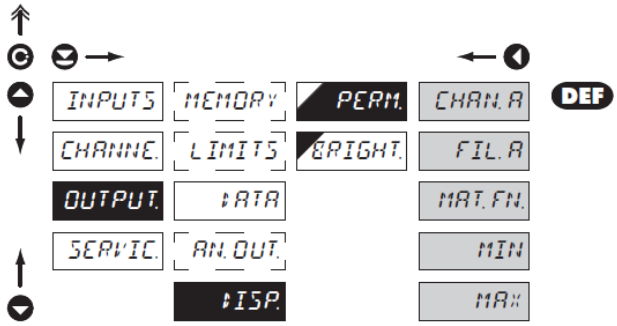
AN.OUT. Setting the analog output range

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

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

6.3.5a Selection of Input for Display Reading



PERM. Selection display projection

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

CHAN.A Projection of values from "Channel A"

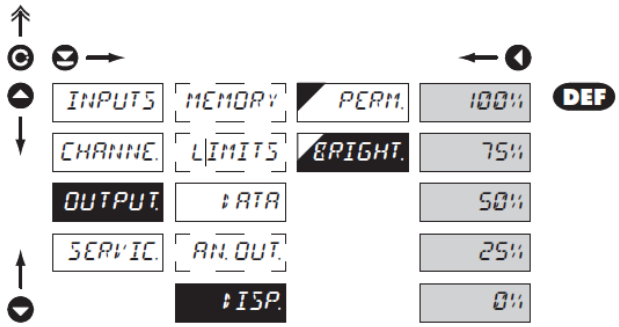
FIL.A Projection of values from "Channel A" after digital filters processing

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 Display Brightness



BRIGHT. Selection of display brightness

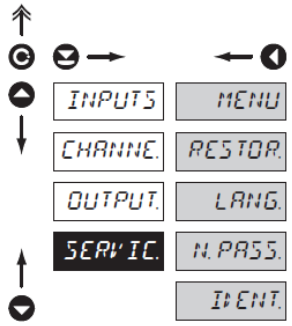
- by selecting display brightness we may appropriately react to light conditions in place of instrument location

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 %

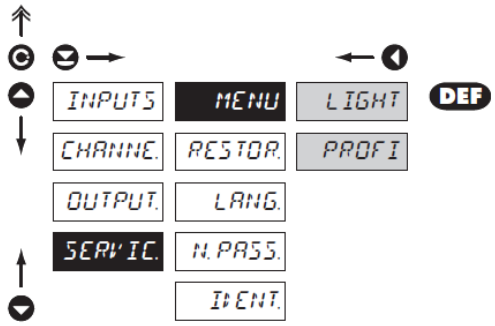
6.4 Setting “PROFI” – SERVICE



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
IDENT.	Instrument identification

6.4.1 Programming MENU – Type



!

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

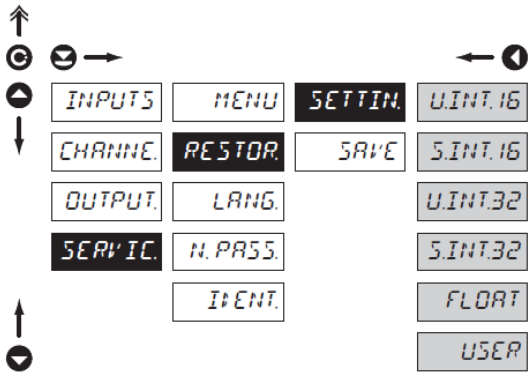
LIGHT Active LIGHT menu

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

PROFI Active PROFI menu

- complete programming menu for expert users
- tree menu

6.4.2 Factory Setting - Recall



SETTIN. **Return to manufacture setting of the instrument**

XXX Return to manufacture setting of the instrument

- in the event of error setting it is possible to return to manufacture setting
- restoration is performed for currently selected type of data format
- provided you stored your user setting in the "PROFI" menu it is possible to restore it (option "USER")
- reading the primary setting of items in menu (DEF)

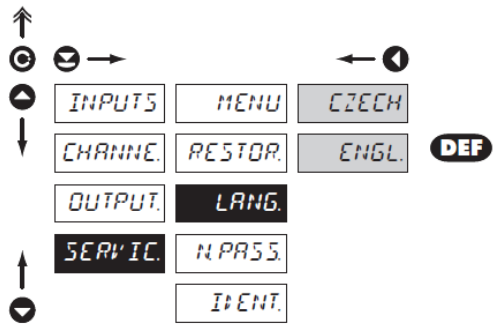
USER Restore user setting of the instrument

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

SAVE Save user setting of the instrument

- saving the setting allows the operator its future contingent restoration

6.4.3 Language

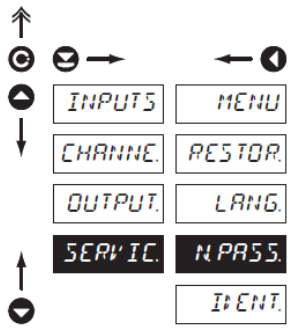


LANG. **Selection of instrument menu language version**

CZECH Instrument menu is in Czech

ENGL. Instrument menu is in English

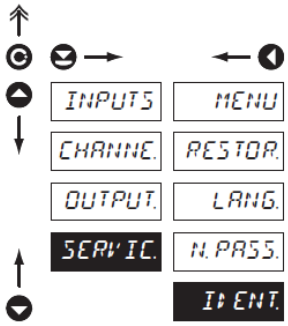
6.4.4 PASSWORD – New Setting



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

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

6.4.5 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

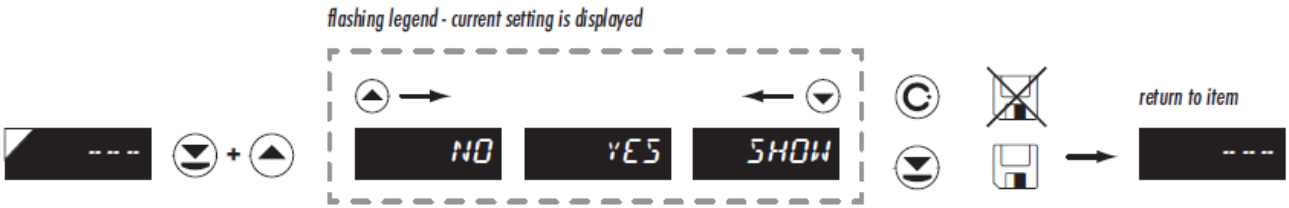
7.0 Setting items in the “USER” Menu

- **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 

- 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



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:

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

Command 6h > Input Value

<AA> 06 00 00 <Word Hi> <Word Lo> <CRC Lo> <CRC Hi>
where:
Word is the value in the format signed integer -32 768 (8000h) - 0 - 32 767 (7FFFh)
When displayed this value is recalculated with the aid of values entered in menu "INPUTS/CONFIG/MIN/MIN. Lo and MAX. Lo. Values "MIN. Hi" and "MAX. Hi" are of no significance in this case.

Response:
<AA> 06 00 00 <Word Hi><Word Lo><CRC Lo><CRC Hi>.

Command 10h > Input Value

<AA> 10 00 00 00 02 04 <Lo Word Hi> <Lo Word Lo> <Hi Word Hi> <Hi Word Lo> <CRC Lo> <CRC Hi>
where:
<Hi Word><Lo Word> together they create the value LONG INT.

Input values are calculated through the following values:

$$\textbf{CHAN. A} = \text{MIN. A} + \frac{(\text{MAX. A} - \text{MIN. A})}{(\text{MAX.} - \text{MIN.})} \times (\text{input data} - \text{MIN.}$$

Chan. A	value to be displayed and futher processed in the instrument
MIN. A, MAX. A	values entered in menu CHANNELS/CHAN. And/SETTIN.
MIN., MAX.	values entered in menu INPUTS/CONFIG
	MIN. = MIN. Hi x 65536 + MIN. Lo
	MAX. = MAX. Hi x 65536 + MAX. Lo

Response:
Command copied without data part <AA> 10 00 00 00 02 <CRC Lo><CRC Hi>.

Command 20h > NON-STANDARD COMMAND for MODBUS

making instrument control accessible through standard commands of the OM ASCII protocol

<AA> 20 <number of symbols in standard message> standard message <CRC Lo> <CRC Hi>

Response:
provided no error occurs in MODBUS frame:
<AA> 20 <number of characters in standard message> standard message <CRC Lo> <CRC Hi>
In this format is also the response ?00, reporting error in processing standard OM command.
Address field of standard message will always be 00 - here without any significance.

ERROR STATUS

With a wrong address or CRC nothing returns.
In case of error command (CRC is not controlled) <AA> A0 01 <CRC Lo> <CRC Hi> will return.
If an error is in 10h the command error statement "2" or "3" will be reported.
If other command is used than the one corresponding with selected data format, it is evaluated as an error command.

In Common
<AA> instrument address - binary 1 - 247 (set in instrument menu)
<CRC Lo> <CRC Hi> is a control word according to definitions in Appendix C of MODBUS protocol description.

TERMINATING COMMUNICATION

Communication is terminated provided no data arrives during 3 1/2 characters. This period is determined with uncertainty of ±250 µs. MODBUS has standard rates up to 19 200. For higher rate it is necessary to count with this uncertainty - e.g. 115 200 Baud -> 500±250 µs, 230 400 Baud -> 250 ±250 µs.

FORMAT	ORDER	COMMAND	DATA
U. INT. 16	n/a	0x06	<AA> 06 00 00 <Word Hi> <Word Lo> <CRC Lo> <CRC Hi>
S. INT. 16	n/a	0x06	<AA> 06 00 00 <Word Hi> <Word Lo> <CRC Lo> <CRC Hi>
U. INT. 32	LO - HI	0x10	<AA> 10 00 00 00 02 04 <Lo Word Hi> <Lo Word Lo> <Hi Word Hi> <Hi Word Lo> <CRC Lo> <CRC Hi>
S. INT. 32	LO - HI	0x10	<AA> 10 00 00 00 02 04 <Lo Word Hi> <Lo Word Lo> <Hi Word Hi> <Hi Word Lo> <CRC Lo> <CRC Hi>
FLOAT	LO - HI	0x10	<AA> 10 00 00 00 02 04 <Lo Word Hi> <Lo Word Lo> <Hi Word Hi> <Hi Word Lo> <CRC Lo> <CRC Hi>
U. INT. 32	HI - LO	0x10	<AA> 10 00 00 00 02 04 <Hi Word Hi> <Hi Word Lo> <Lo Word Hi> <Lo Word Lo> <CRC Lo> <CRC Hi>
S. INT. 32	HI - LO	0x10	<AA> 10 00 00 00 02 04 <Hi Word Hi> <Hi Word Lo> <Lo Word Hi> <Lo Word Lo> <CRC Lo> <CRC Hi>
FLOAT	HI - LO	0x10	<AA> 10 00 00 00 02 04 <Hi Word Hi> <Hi Word Lo> <Lo Word Hi> <Lo Word Lo> <CRC Lo> <CRC Hi>

LEGEND

#	Command beginning	
<AA>	Instrument address (1...247)	
<Word xx>	16-bit data	
<Lo Word xx>	32 bit data (lower part)	
<Hi Word xx>	32 bit data (higher part)	
U.INT.16	unsingned integer	0 (0x0000)...65 535 (0xFFFF)
S.INT.16	singned integer	-32 768 (0x8000)...65 535 (0x7FFF)
U.INT.32	unsingned integer	0 (0x0000 0000)...4 294 967 295 (0xFFFF FFFF)
S.INT.32	singned integer	-2 147 483 648 (0x8000 0000)...65 535 (0x7FFF FFFF)
FLOAT	IEEE floating point	±6,80564693277058E+38 <Hi Word Hi> = ZEEE EEE; <Hi Word Lo> = EMMM MMMM <Lo Word Hi> = MMMM MMMM; <Lo Worg Lo> = MMMM MMMM Z...sign (1(0)/-1(1)); E...Exponent (-127(0x00)...0(0x7F)...128(0xFF)) M...Mantisa (1.0...2.0), highest mantisa bit is always 1 and it is covered by the lowest exponent bit e.g.: 0x3F80 0000 = Z*2^E*M = 1*2^(0)*1 = 1

9 ERROR STATEMENTS

ERROR	CAUSE	ELIMINATION
E. P. Un	Number is too small (large negative) to be displayed	change DP setting, channel constant setting
E. P. Ov.	Number is too large to be displayed	change DP setting, channel constant setting
E. T. Un	Number is outside the table range	increase table values, change input setting (channel constant setting)
E. T. Ov.	Number is outside the table range	increase table values, change input setting (channel constant setting)
E. I. Un	Input quantity is smaller than permitted input quantity range	change input signal value or input (range) setting
E. I. Ov.	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. PATA	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

10 TABLE OF SIGNS

The instrument allows adding 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 values of given character equals the sum of the numbers on both axes of the table.

	0	1	2	3	4	5	6	7
0		!	"	#	$	%	&	'
8	(	)	*	+	,	-	.	/
16	0	1	2	3	4	5	6	7
24	8	9	:	;	<	=	>	?
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 SPECIFICATIONS

INPUT

Protocol:	Modicon ModBus
Data format:	8 bit + no parity + 1 stop bit
(ASCII) Rate:	600...230 400 Baud
RS 232:	isolated, two-way communication
RS485	isolated, two-way communication, addressing, range 1-247

PROJECTION

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

INSTRUMENT ACCURACY

Linearization:	by linear interpolation in 50 points with 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	Communication interface
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
Limit:	-99999...999999
Hysteresis:	0...999999
Delay:	0...99,9 s
	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

ANALOGUE OUTPUTS

Type:	isolated, programmable, resolution 10 000 points, derived from displayed data, type and range are adjustable
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 to 500 Ohm

MEASURED DATA RECORD

Type RTC:	time-controlled logging permits logging up to 250 000 values
Type FAST:	fast data logging permits logging 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

POWER SUPPLY

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

MECHANIC PROPERTIES

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

OPERATING CONDITIONS

Connection:	connector terminal board, conductor < 1,5 mm^2 / < 2,5 mm^2
Settling Time:	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:	EN 61010-1, A2

Insulation resistance for pollution degree II, measurement category III

	Power supply > 670 V (PI), 300 V (DI)
	Input/output > 300 V (PI), 150 (DI)
E M C:	EN 61000-3-2+A12; EN 61000-4-2, 3, 4, 5, 8, 11; EN 550222, A1, A2

CONFORMITY STATEMENT

El. safety:	EN 61010-1
EMC:	EN 50131-1, chapter 14 and chapter 15
	EN 50130-4, chapter 7 EN 61000-4-11
	EN 50130-4, chapter 8 EN 61000-4-11
	EN 50130-4, chapter 9 EN 61000-4-2
	EN 50130-4, chapter 10 EN 61000-4-3
	EN 50130-4, chapter 11 EN 61000-4-6
	EN 50130-4, chapter 12 EN 61000-4-4
	EN 50130-4, chapter 13 EN 61000-4-5
	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

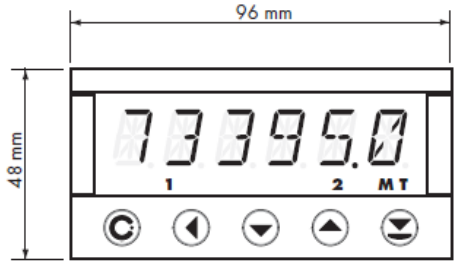
and Ordinance on:

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

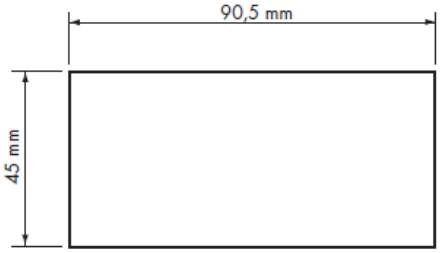
The evidence are the protocols of authorized and accredited organizations:
VTUE Praha, experimental laboratory No. 1158, accredited by CIA
TUPV Vyskov, Experimental Laboratory No. 1103, accredited by CIA

12 MECHANICAL

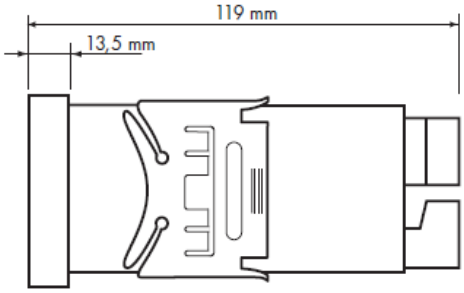
Front view



Panel cut



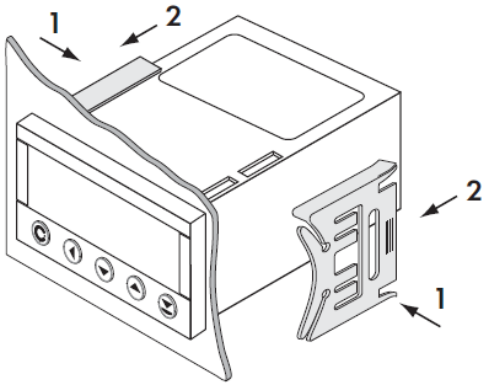
Side view

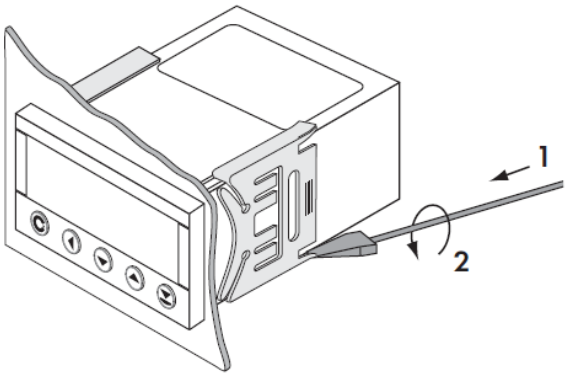


Panel thickness: 0,5...20 mm

Instrument installation

1. insert the instrument into the panel cut-out
2. fit both sliders on the box
3. press the sliders against the panel





Instrument disassembly

1. slide a screw driver under the slider wing
2. turn the screw driver and remove the slider
3. take the instrument out of the panel