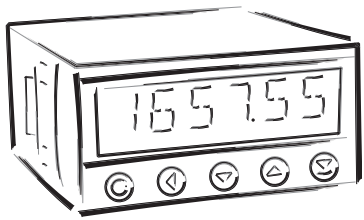
GUARANTEE 5 YEARS

OM 653UQC

6 DIGIT PROGRAMMABLE

IMPULSE COUNTER
FREQUENCY METER
STOPWATCH/TIMER



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 653 series conform to the European regulation 89/336/EWG.

The instruments are up to the following European standards:
EN 61010-1, Electric safety
EN 61326-1, Electronic measuring, control and laboratory devices – Requirements for EMC "Industrial use"

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.

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

Tel: +420 - 281 040 200
Fax: +420 - 281 040 299
e-mail: orbit@merret.cz
www.orbit.merret.cz

2.1 DESCRIPTION

The OM 653UQC model is a universal 6 digit panel programmable impulse counter/frequencymeter and stopwatch/timer.
The instrument is based on an 8-bit microprocessor, which secures high accuracy, stability and easy operation of the instrument.

MEASURING MODES

SINGLE	Counter/Frequencymeter	C / F
QVADR	Counter/Frequencymeter for IRC sensors	C / F
UP/DW	UP/DW Counter/Frequencymeter - used in inputs A, C (direction) and can display count/frequency	C / F
UP - DW	UP - DW Counter/Frequencymeter - used in inputs A (UP), C (DW) and can display count/frequency	C / F
TIME	Stopwatch	H
RTC	Timer	H

PROGRAMMABLE PROJECTION

Calibration	in „CM" (calibration mode) a multiplication and division constant can be set (division constant in the range of integer numbers from 2 to 100 will enable accurate measurements relative to the set value, or its multiplication)
Projection	-99999...999999 with fixed or floating DP, for measuring modes STOPWATCH/TIMER with the option of setting in format 10/24/60
Measuring channels	two independent functions may be evaluated from each input (Counter/Frequency)
Time base	0,5 s/1 s/2 s/5 s/10 s

LINEARIZATION

Linearization	by linear interpolation in 25 points (solely via OM Link) - a single table for frequency, alternativly for for counting pulses when frequency not used

DIGITAL FILTERS

Input filter	the instrument enables filtering the input signal and thus suppress unwatnted interfering signals (e.g. relay backswings). The parameter set gives maximum feasible measured frequency processed by the instrument, 5/40/100/1 000 Hz
Exponen.average	from 2...100 measurements
Rounding	setting projection step for display
1/Fr.	a filter which converts frequency to time

FUCTIONS

Setting the value	entering the current count when installing the counter during a countitng cycle
Preset	initial non-zero value, unloaded always after instrument resetting
Summation	used for cummulative summations of values (for example shifts in a factory), where the value on the dispaly is added to the total value (grand total) when the display is zeroed at the beginning of each shift
Tare	used for zeroing the display when the input frequency is not zero

EXTERNAL CONTROL

Hold	display/instrument blocking
Lock	locking the control keys for access into Configuration menu
Resettting	resetting/pre-setting the counter
Tare	tare activation
Start/Stop	stopwatch/timer control
Select	selecting the channel to be projected

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 realized in two adjusting modes:

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

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

USER **User programmable menu**
- may contain arbitrary items selected from programmable menu (LIGHT/PROFI), which determines the authorization (see or change)
- access is without password

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

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

The operation program is freely available (www.orbit.merret.cz) and the only requirement is the purchase of OML cable for connecting 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 for OML cable).

The OM LINK program version „Standard" allows you to connect an unlimited number of instruments with the option of visualizatiion and storage in PC.

2.3 EXTENSION

Extension is suitable for feeding sensors and converters. It has a galvanic isolation.

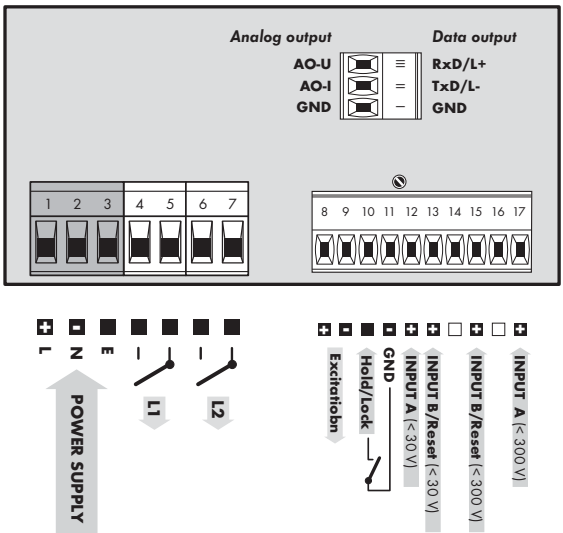
Comparators are assigned to control two limit values with relay output. The modes: „Hysteresis"/„Zero and pulse"/"Once" can be asigned by user to the first relay and for the second relay it is starting the stopwatch/clock. The limits have adjustable hysteresis as well as selectable delay of the switch-on. Reaching the preset limits is signalled by LED and simultaneously by the switch-on of the relevant relay.

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

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

Time backup by means of RTC circuit is designed for the „TIMER" measuring mode and secures time measuring even if the instrument is switched-off (without display projection).

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.



!

Grounding on bracket „**E**" has to connected at all times

CONNECTION

	DESCRIPTION	CONNECTION
INPUT A (< 30 V)	input signal < 43 V	GND + Input A (< 30 V)
INPUT A (< 300 V)	input signal < 300 V	GND + Input A (< 300 V)
INPUT B/Reset (< 30 V)	input signal < 43 V	GND + Reset (< 30 V)
INPUT B/Reset (< 300 V)	input signal < 300 V	GND + Reset (< 300 V)

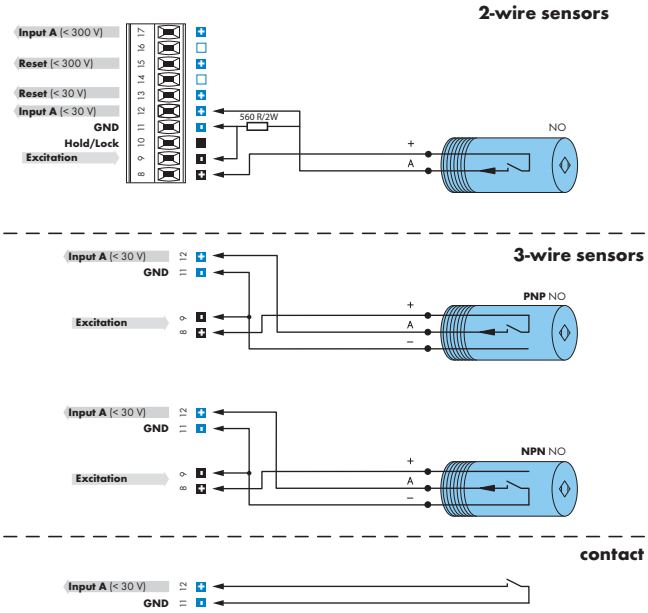
EXTERNAL INPUT

	DESCRIPTION	CONTROL
EXT.	According to setting in Menu (see Menu > EXT. IN., page 45)	upon contact, bracket (No. 10/11)

FUNCTIONS OF INPUTS ACCORDING TO SELECTED MODE

MODE	DESCRIPTION	FUNCTION OF INPUTS
SINGLE	Pulse counter/Frequency counter	Input A, Reseting (Input B)
QUADR.	Pulse counter/ Frequency counter for IRC sensors	Input A + Input B, Reseting is possible on terminal 10
UP/DW	UP or DW Pulse counter/Frequency counter	Input A, Input B - determines direction (Hi = UP, Lo = DW) Reseting is possible on terminal 10
UP - DW	UP/DW Pulse counter/Frequency counter	Input A (UP), Input B (DW), Reseting is possible on terminal 10
TIME	Stopwatch Clock	Input A, Reseting (Input B)
RTC	Stopwatch Clock with time back up	Input A, Reseting (Input B)

Sensor connection



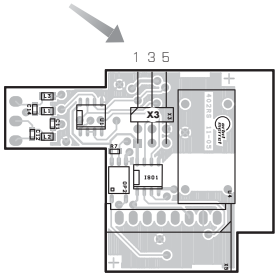
Sensors with PNP or NPN output have always only one „fixed" level and therefore it is extremely important the leads are properly shielded and separated from possible sources of interference. If interference occurs, it can be included in the measurement. One of the ways of eliminating this possible problem is applying an input signal filter in the Menu.

Termination of RS 485 communication line

X3 - Termination of commuication line RS 485

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

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



Comparator levels

Setting comparator levels for individual inputs is realised in the „LIGHT" or in the „PROFI" menu.
When setting the level manually by front panel buttons please set the required value first, then confirm by pressing the „ENTER" button. The value you have selected is automatically adjusted to the corresponding comparator level (see the table below).

TABLE OF COMPARATION LEVELS (V)

INPUT	TYPE OF INPUT	MAXIMUM INPUT VOLTAGE (LEVEL A, C)	MAXIMUM COMPARATION LEVELS	
			L > H	H > L
Input A Reseting [< 30 V]	NPN, Kontakt	xxx	0,5 V	4,5 V
	PNP	9,7 V	0,5 V	4,5 V
	PNP	14,4 V	1,0 V	9,0 V
	PNP	19,2 V	1,5 V	13,3 V
	PNP	23,9 V	2,0 V	17,8 V
	PNP	28,7 V	2,5 V	22,1 V
	PNP	33,5 V	3,0 V	26,6 V
	PNP	38,3 V	3,4 V	31,0 V
	PNP	43,0 V	3,9 V	35,5 V
Input A Reseting [< 300 V]	NPN, Contact		!!! prohibited !!!	
	PNP	84 V	4,9 V	39,8 V
	PNP	128 V	9,2 V	78,0 V
	PNP	170 V	13,6 V	117,8 V
	PNP	211 V	17,8 V	156,0 V
	PNP	253 V	22,3 V	195,8 V
	PNP	295 V	26,5 V	234,1 V
	PNP	301 V	30,9 V	273,9 V

SETTING **PROFI**

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

SETTING **LIGHT**

For trained users
Only items necessary for instrument setting
Access is password protected
Possibility to arrange items of the **USER MENU**
Linear menu structure

SETTING **USER**

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

4.1 SETTING

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

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

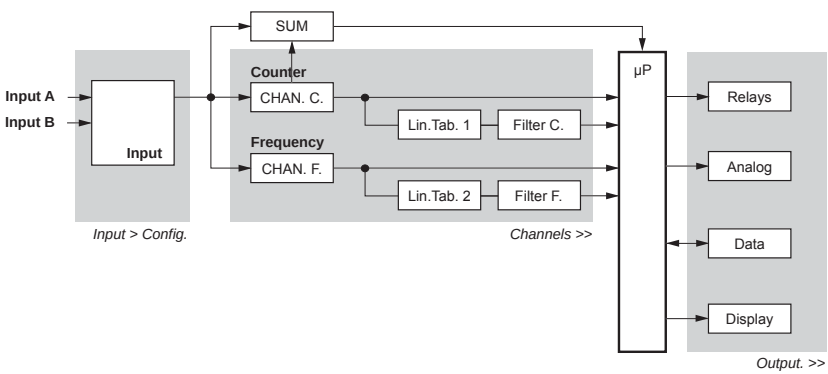
PROFI **Complete programming menu**
- contains complete instrument menu and is protected by an optional numeral code

USER **User programmable menu**
- may contain arbitrary items selected from programmable menu (LIGHT/PROFI), which determines the authorization (see or change)
- access is without password

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

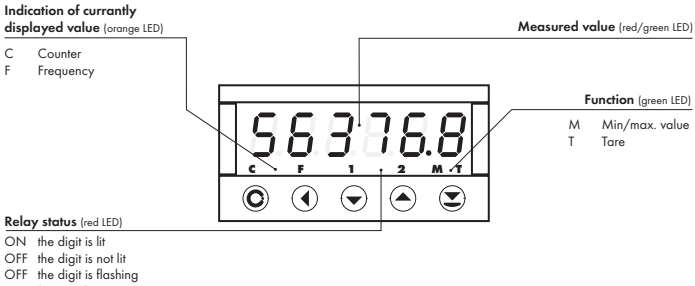
Complete operation and setting of the instrument may be performed via communication interface OM Link, which is a standard equipment of every instrument.
The operation program is freely available (www.orbit.merret.cz) and the only requirement is the purchase of OML cable for connecting the instrument 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 for OML cable).

Scheme of processing the measured signal



4. INSTRUMENT SETTING

Setting and controlling the instrument is performed by means of 5 control keys located on the front panel. With the aid of these keys it is possble to browse through the operation menu and to select and set required values.



Symbols used in the instructions

C F H Q Indicates the setting for given type of instrument

DEF values preset from manufacture

42 symbol indicates a flashing light (symbol)

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

CONECT broken line indicates a dynamic item, i.e. it is displayed only in particular selection/version

after pressing the key the set value will not be stored

after pressing the key the set value will be stored

30 continues on page 30

Setting the decimal point and the minus sign

DECIMAL POINT

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

THE MINUS SIGN

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

Control keys functions

KEY	MEASUREMENT	MENU	SETTING NUMBER/SELECTION
C	access into USER menu	exit menu w/o saving	transition to next item w/o saving
◀	programmable key function	return 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	setting/selection confirmation
▲ + ▼			numeric value is set to zero
C + ▼▼	access into LIGHT/PROFI menu		
C + ▼	direct access into PROFI menu temporary (remains LIGHT)		
▼▼ + ▲		configuration of an item for "USER" menu	
▼▼ + ▼		determine the sequence of items in "USER - LIGHT" menu	

Setting items into „USER" menu

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

USER

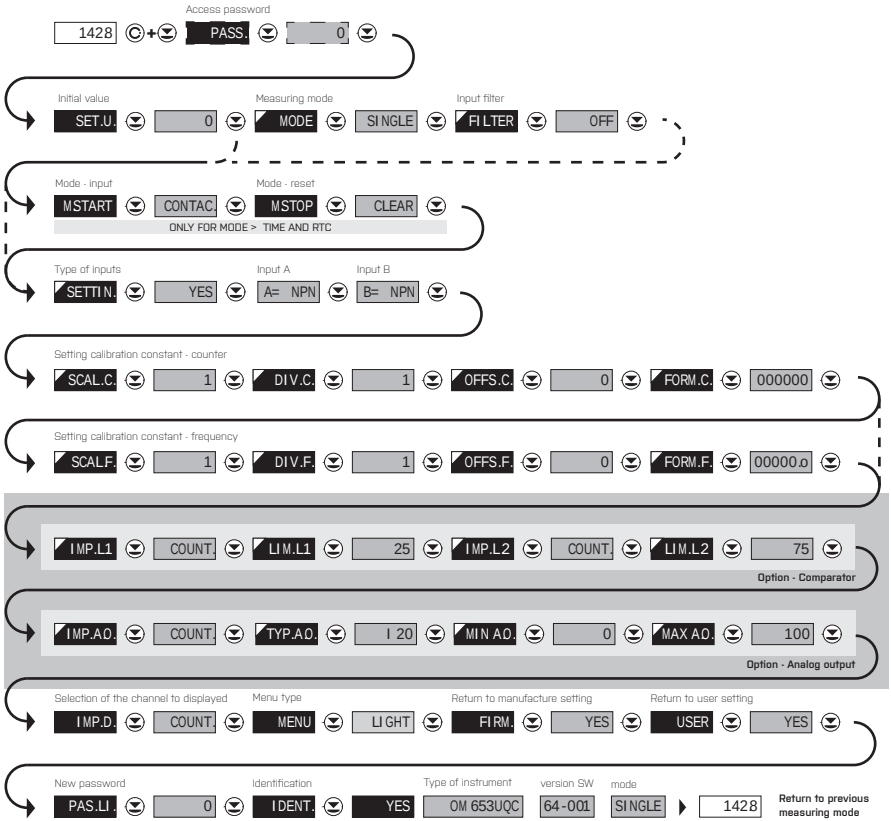
NO item will not be displayed in USER menu

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

SHOW item will be solely displayed in USER menu

SETTING **LIGHT**

For trained users
Only items necessary for instrument setting
Access is password protected
Possibility to arrange items of the **USER MENU**
Linear menu structure



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

!

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

1428

©+▼

PASS. ▼ → 0 Entering access password for access into the menu → ▼

PASS. **Access into instrument menu**

PASS. = 0

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

PASS. > 0

- access into menu is protected ny numeric code

Set "PASS" = 42 Example

0 ▲ 1 ▲ 2 ◀ 02 ▲ 12 ▲ 22 ▲

32 ▲ 42 ▼ TYP

©↗

SET V. ▼ → 0 Setting initial value → ▼

▲

SET V. **Setting initial value**

- the function allows the user a single-time setting of initial value of display projection
- the instrument is preset from manufacture into "**FREQU.**" measuring mode and unless another mode is set the item remains hidden
- if you need to set initial value for another mode it is necessary to do so upon next access to programming menu > after change of measuring mode

- setting "**SET V.**" is a one-time operation unlike the "**OFFSET**" option, i.e. after resetting the display value is "0", provided there is no other value set in the "**OFFSET**" item

DEF = 0

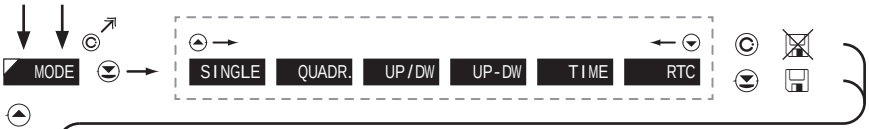
Set "SET V." = 233 Example

0 ▲ 1 ▲ 2 ▲ 3 ◀ 03 ▲ 13 ▲

23 ▲ 33 ◀ 033 ▼ 133 ▼ 233 ▼ MODE

!

The item „**SET V.**" is not projected for measuring mode „**FREQV.**"



MODE — Selection of instrument measuring mode

- elementary selection of instrument type

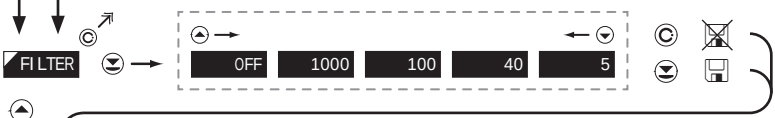
DEF = SINGLE

MODE	Menu	Measuring mode
	SINGLE	Counter/Frequencymeter
	QUADR.	Counter/Frequencymeter for IRC
	UP/DW	UP/DW - Counter/Frequencymeter
	UP-DW	UP/DW - Counter/Frequencymeter
	TIME	Stopwatch/timer
	RTC	Stopwatch/backup timer

- detail description of measuring modes is on page 7 and 40

Selection of - RTC > RTC Example

SINGLE → RTC → FILTER



FILTER — Selection of digital filter

- digital filter may suppress unwanted interfering impulses (e.g. relay backswings) on the input signal. The set parameter gives maximum possible frequency, which the instrument processes w/o limitation
- for pulse duty cycle of 50 % - equal duration of Hi and Lo level"

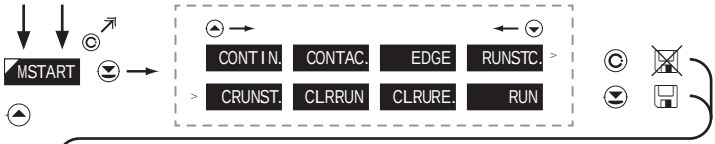
DEF = OFF

In this setting the instrument will only register signal of max 100 Hz, highrer freuency will be discarted Example
Filter > 100

OFF → 1000 → 100 → MSTART

!

When accessing upon contact and available maximum input frequency we recommend using filter



MSATRT **Selection of stopwatch/timer control**

- menu for time setting is accessible only in the stopwatch/timer mode

CONTIN. Stopwatch/timer is running constantly if the instrument is turned on

CONTAC. Stopwatch/timer is running upon contact making

EDGE Stopwatch/timer is controlled by the priming signal edge

- time is set off by the edge (by the signal passing across the comparing level) and stopped by the next edge

RUn.ST. Stopwatch/timer is controlled and reset by the edge of the priming signal

- time is set off by the edge (by the signal passing across the comparing level) and stopped by the next edge

CRUn.ST. Stopwatch/timer is controlled and reset by the edge of the priming signal

- time is set off by the edge (by the signal passing across the comparing level) and stopped by the next edge

CLRRUN. Stopwatch/timer is reset and set off by the edge of the priming signal

CLRURE. Stopwatch/timer is reset and set off by the edge of the priming signal, the cycle is repeated with every other edge

RUN Stopwatch/timer is only set off by the edge

DEF = CONTAC.

Selection of stopwatch control > EDGE Example

CONTAC. ▲ EDGE ▼ M.STOP

M.STOP **Selection of stopwatch resetting**

- menu of the resetting option is accessible only in the stopwatch/timer regime

DEF = CLEAR

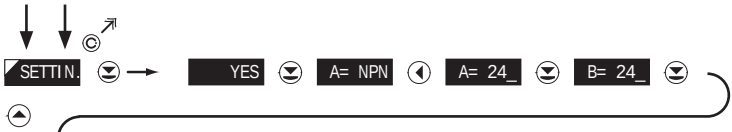
CLEAR Stopwatch/timer is reset through input „Clear"

ST.CLR. Stopwatch/timer is stopped and reset through input „Clear"

STOP Stopwatch/timer is stopped through input „Clear"

Selection of type of stopwatch resetting > St. CLR. Example

CLEAR ▲ ST.CLR. ▼ LEVEL A



SETTI N. **Automatic setting of the inputs**

- it is posible to choose in the menu between automatic or manual setting for input A and B
- for automatic detection the minimum frequency required is 10 Hz

DEF = NPN.CON.

- start of automatic input setting
- manual input setting - down
- manual input setting - up
- confirm the setting and proceed to second input (short key stroke)
  to copy the setting of Input A to Input B (long key stroke)

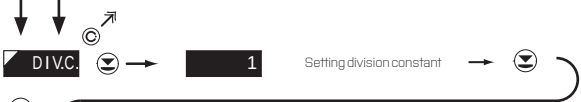
Example

In this example application we are using encoder Wenglor, model IB040BM37VB, type PNP powered by the instrument's own excitation of 24 V, reset on contact. Settin. > Automatic setting (button „LEFT")

SCAL.C. **Setting multiplying constant - Channel Counter**

- calibration constant serves for calculation of the input value to required display value
- by entering minus value direction of the calculation is changed, i.e. we count down
- range: -0,00001...999999
- DEF = 1

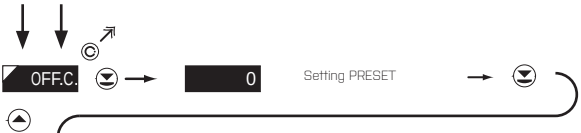
Sensor is apllied to a shaft equipped with a rotating pin (1 imp./ot) and ratio of 1:3 Example



DIV.C.. **Setting division constant - Channel Counter**

- calibration constant is for calculation of the input value to required display value
- range: -0,00001...999999
- DEF = 1

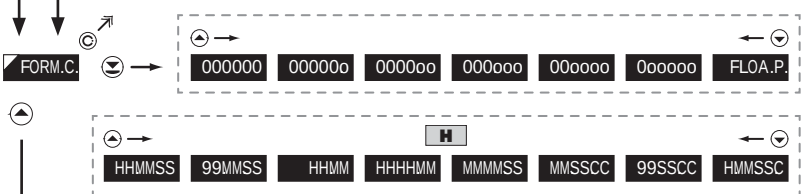
Sensor is apllied to a shaft equipped with a rotating pin (1 imp./ot) and ratio of 1:3 Example



OFF.C. **Setting additive constant - PRESET, Channel Counter**

- offset of the measuring by a set value, which shall be loaded always upon instrument resetting
- range: -99999...999999 (+ time formats)
- when in mode „STOPWATCH" and constant > 0 the mathematical symbol (+-) of the multiplication constant changes automatically (page. 54)
- DEF = 0

Setting „OFF. C." = 24 Example



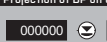
FORM.C. **Selection of projection format - Channel Counter**

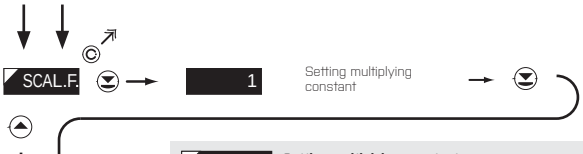
- instrument enables classical projection of number with fixed position of decimal point as well as projection with floating allowing fo projection of number in its most precise form „FLOA. P."
- for measuring modes „TIME" and „RTC" special time formats are preset

DEF = 000000

DEF = HH.MM.SS H

Projection of DP on display > 000000 Example

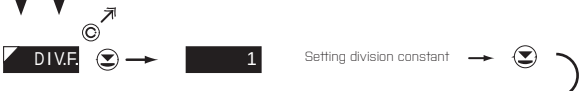




SCAL.F. **Setting multiplying constant - Channel Frequency**

- calibration constant serves for calculation of the input value to required display value
- range: -99999...999999
- DEF = 1

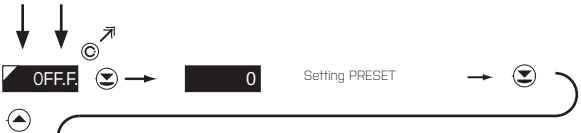
Sensor is apllied to a shaft equipped with a rotating pin (1 imp./ot) and ratio of 1:3 which is rotating at 3753 revs./min., (3753:60:3=20,85), SCALE. F > 20,85 Example



DIV.F. **Setting division constant - Channel Frequency**

- calibration constant is for calculation of the input value to the required display value
- division constant - an integer number in the range of 2 to 100 which will enable accurate measurements relative to the set value, or its multiplication. In reality this means that revolutions are measured precisely after a comlpete number of revolutions, which results in improved measurement stability. This mode is not suitable for higher frequencies, where it can increase the measurement period. If you do not wish to use this mode, use a decimal number instead and adjust the multiplication constant apropriately
- range: -99999...999999
- DEF = 1

On the display we want to see speed as revolutions/s. It is necessary to devide the figure by 60 (1 minute=60 s), Example **It is possible to ener the resulting value in to the multiplication constant, dIv. F. > 60**



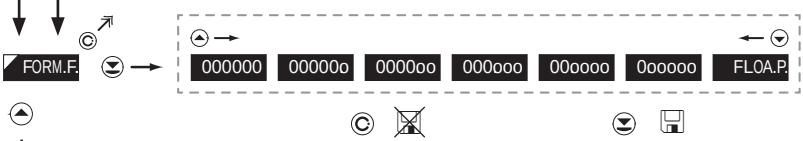
OFF.F. **Setting additive constant - PRESET, Channel Frequency**

- offset of the measuring by a set value, which shall be loaded always upon instrument resetting
- range: -99999...999999

- DEF = 0

Setting „OFF. F." = 0 Example

0 → FORM.F.



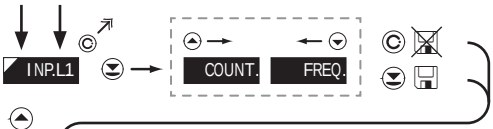
FORM.F. **Selection of projection format - Channel Frequency**

- instrument enables classical projection of number with fixed position of decimal point as well as projection with floating allowing fo projection of number in its most precise form „FLOA. P."

DEF = 00000.o

Projection of DP on display > 0000.oo Example

00000.o → 0000.oo → INP.D. * subsequent menu item depends on instrument equipment



INP.L1 **Selection of how Limit 1 is evaluated**

- selection of value to which the limit is related

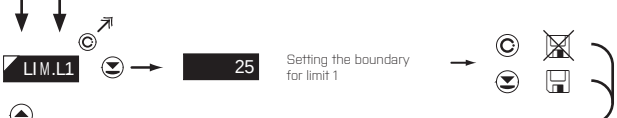
DEF = COUNT.

COUNT. From "Channel Counter"

FREQ. From "Channel Frequency"

Evaluation of the limit related to channel "Counter" > INP. L.1 = COUNT. Example

COUNT. → LIM.L1



LIM.L1 **Setting the boundary for limit 1**

- range: -99999...999999
- contingent modification of hysteresis or delay may be performed in "PROFI" menu

DEF = 25

DEF „Hystresis"=0, „Delay"=0

Setting limit 1 > LIM. L.1 = 30 Example

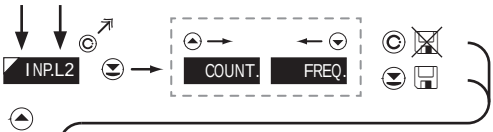
25 → 26 → 27 → 28 → 29 → 20 ←

20 → 30 → INP.L2

* subsequent menu item depends on instrument equipment

!

Items for "Limits" and "Analog output" are accessible only if the instrument contains them



INP.L2 **Selection of how Limit 2 is evaluated**

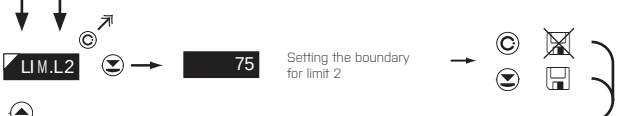
- selection of value to which the limit is related

DEF = COUNT.

COUNT. From "Channel Counter"

FREQ. From "Channel Frequency"Z "Kanálu Kmitočet"

Evaluation of the limit related to channel "Counter" > INP. L.2 = COUNT. Example



LIM.L2 **Setting the boundary for limit 2**

- range: -99999...999999
- contingent modification of hysteresis or delay may be performed in "PROFI" menu

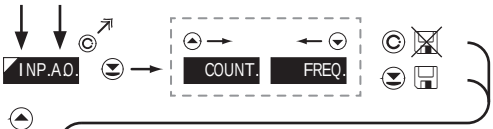
DEF = 75

DEF „Hystresis"=0, „Delay"=0

Setting limit 2 > LIM. L 2 = 230 Example

* subsequent menu item depends on instrument equipment

DISPLAYED ONLY WITH OPTIONS > **ANALOG OUTPUT**



INP.A0. **Selection of how analogue output is evaluated**

- selection of value to which the analogue output is related

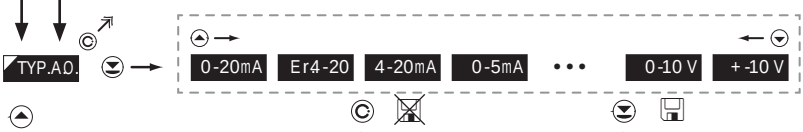
COUNT. From "Channel Counter"

FREQ. From "Channel Frequency"

DEF = COUNT.

Evaluation of analogue output from channel "Counter" > INP. A.O. = COUNT. Example

COUNT. ▼ TYP.A0.



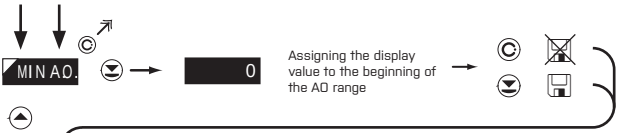
Typ.A0. **Setting the type of analog output**

TYP. A.O.	Menu	Range	Description
	0-20mA	0...20 mA	
	Er.4-20mA	4...20 mA	with indication of error statement (<3,6 mA)
	4-20mA	4...20 mA	
	0-5mA	0...5 mA	
	0-2 V	0...2 V	
	0-5 V	0...5 V	
	0-10 V	0...10 V	
	+-10 V	±10 V	

DEF = 4...20 mA

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

4-20mA ▲ 0-5mA ▲ 0-2 V ▲ 0-5 V ▲ 0-10 V ▼ MIN A.V.

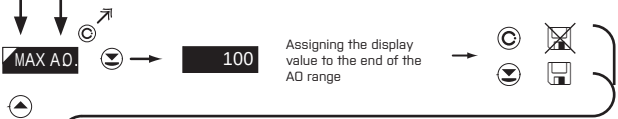


MIN AO. **Assigning the display value to the beginning of the AO range**

- range: -99999...999999

DEF = 0

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

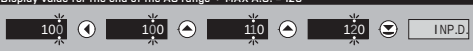


MAX AO. **Assigning the display value to the end of the AO range**

- range: -99999...999999

DEF = 100

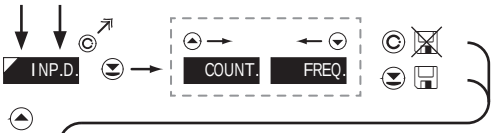
Display value for the end of the AO range > MAX A.O. = 120 Example



!

Items for "**Limits**" and "**Analog output**" are accessible only if the instrument contains them

5. SETTING **LIGHT**



INP.D. **Selection of the channel to be displayed**

- selection of the value which should be displayed

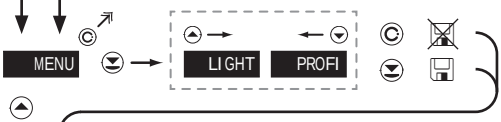
DEF = COUNT.

COUNT. Value taken from channel "Counter" will be displayed

FREQ. Value taken from channel "Frequency" will be displayed

Selection of the channel - counter > INP. d. = COUNT. Example

COUNT. MENU



MENU **Setting the menu type LIGHT/PROFI**

LIGHT > LIGHT menu, a simple menu, which contains only items necessary for instrument setting

> linear structure of the menu

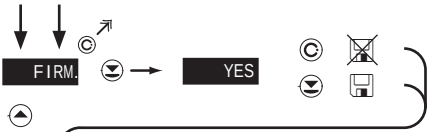
PROFI > PROFI menu, a complete menu for entire instrument setting

> tree structure of the menu

DEF = LIGHT

Menu LIGHT > MENU = LIGHT Example

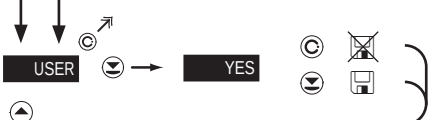
LIGHT FIRM.



FIRM. **Restoration of the instrument manufacture setting**

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

Restoration of manufacture setting > FIRM. Example



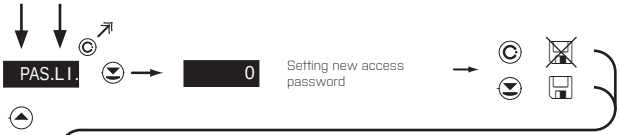
USER **Restoration of the instrument user setting**

- downloading user setting of the instrument, i.e. setting which was stored under item SERVIC./ RESTOR./SAVE

Restoration of user setting > USER. Example

!

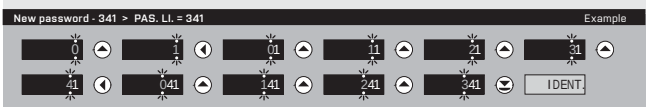
Do not perform restoration of user setting (USER) prior to its saving in Profi menu

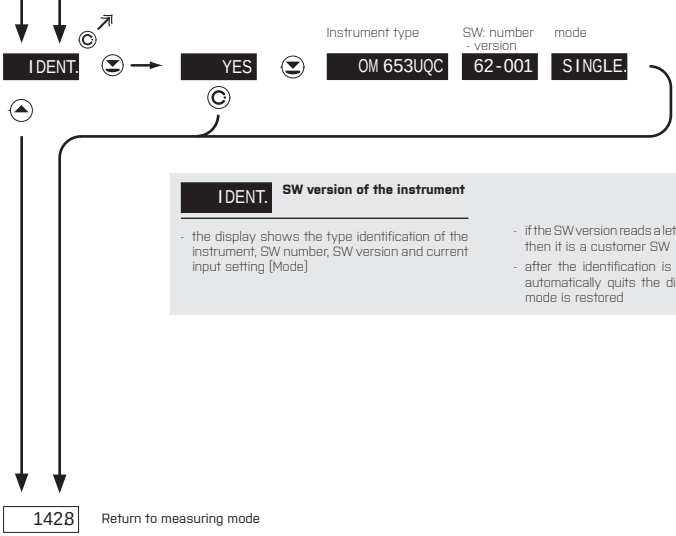


PAS.LI. **Setting new access password**

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

DEF = 0





IDENT. **SW version of the instrument**

- the display shows the type identification of the instrument, SW number, SW version and current input setting (Mode)
- if the SW version reads a letter on the first position, then it is a customer SW
- after the identification is completed the menu automatically quits the display and measuring mode is restored

SETTING **PROFI**

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

6.0 SETTING "PROFI"

PROFI **Complete programming menu**

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

Switching over to "PROFI" menu

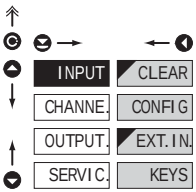
C + ▼

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

C + ▼

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

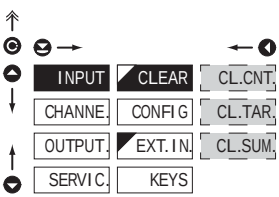
6.1 SETTING "PROFI" - INPUT



The basic instrument parameters are set in this menu

- **CLEAR** Resetting internal values
- **CONFIG** Primary instrument setting
- **EXT. IN.** Setting the external input function
- **KEYS** Setting the ENTER key function

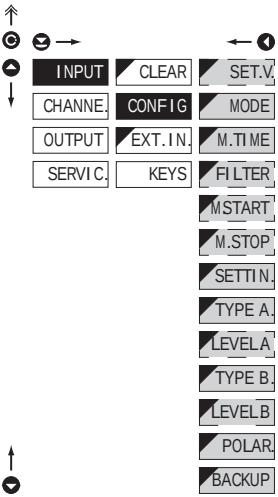
6.1.1 RESETTING INTERNAL VALUES



CLEAR **Resetting internal values**

- **CL.CNT.** Counter resetting
  - when zeroed, the figure on the display will be added to the total sum („grand total"), a value which is stored in the instrument's internal memory
- **CL.TAR.** Tare resetting
- **CL.SUM.** Zeroing of the sum
  - summation is used for cummulated values (i.e. factory shifts) when values ffrom individual shifts are added to the total sum

6.1.2 INSTRUMENT CONFIGURATION

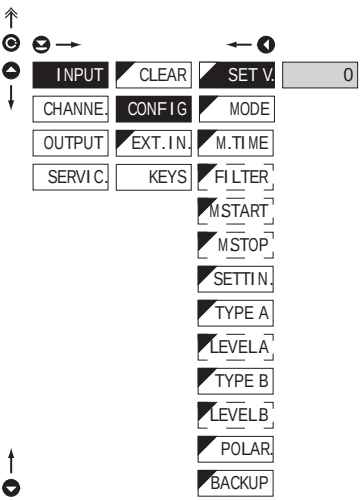


CONFIG **Primary instrument setting**

- **SET.V.** Setting the initial value
- **MODE** Setting the instrument measuring mode
- **M.TIME** Setting the time base
- **FILTER** Setting the input filtration constant
- **MSTART** Setting the stopwatch control
- **M.STOP** Setting stopwatch resetting
- **Settin.** Automatic setting of the inputs
- **TYPE -** Setting the type of input
- **LEVEL.-** Setting the input level
- **POLAR.** Selection of active level/edge
- **BACKUP** Setting data backup/time

6.1.2a SETTING THE INITIAL VALUE

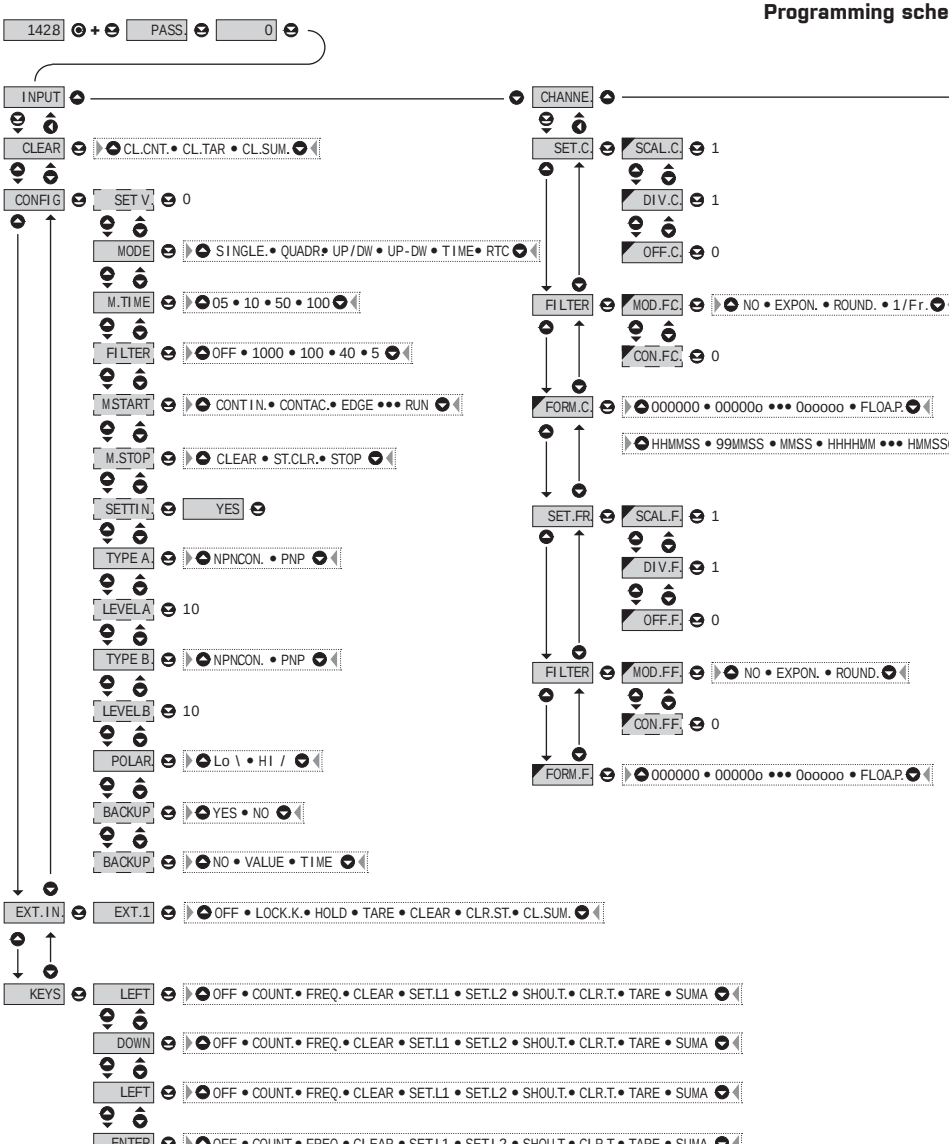
C H



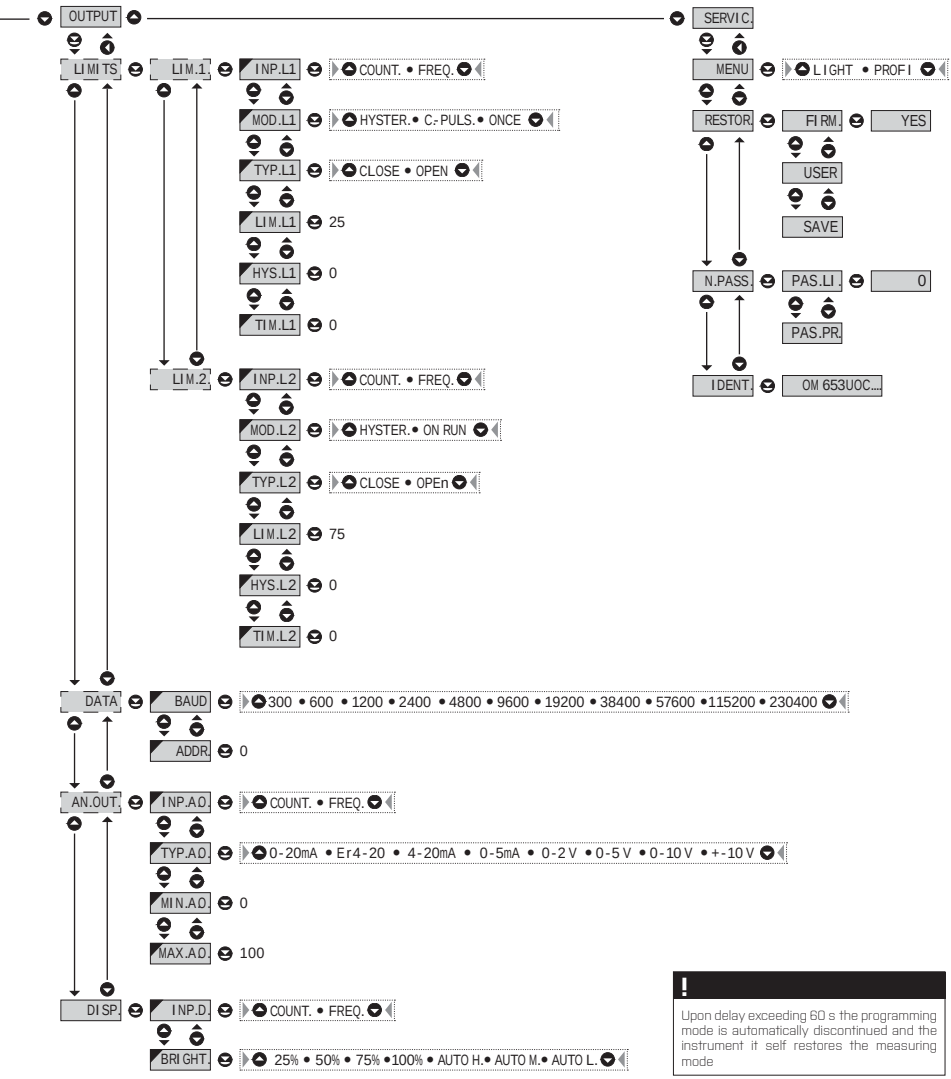
SET.V. **Setting the initial value**

- allows the user to enter a non-zero, actual value (for example when an old counter needs to be replaced while the count needs to transferred into a new meter)

Programming sche



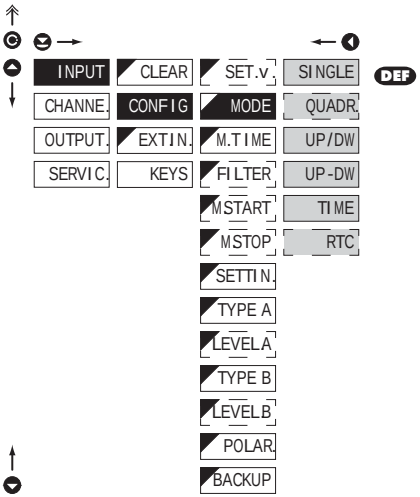
me of PROFI MENU



!

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

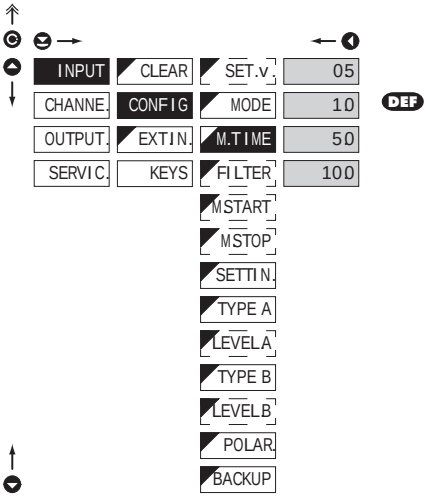
6.1.2b SELECTION OF MEASURING MODE



MODE — **Selection of instrument measuring mode**

- **SINGLE** — Impulse counter/Frequency measurement
- **QUADR.** — Impulse counter/Frequency measurement for IRC encoders
  - measurement on two inputs (A&B). Can display count and frequency
  - in this mode every single rising edge of singnal A and B is included in the count
- **UP/DW** — UP/DW Impulse counter/ Frequency meter
  - measurement on input A, (inp. B/direction). Can display count and frequency
- **UP-DW.** — UP-DW Impulse counter/ Frequency meter
  - measures on inputs A (UP), B (DW). Can display count and frequency
- **TIME** — Mode „Stopwatch/timer"
- **RTC** — Mode „Stopwatch/timer" with RTC backup
  - not in standard equipment

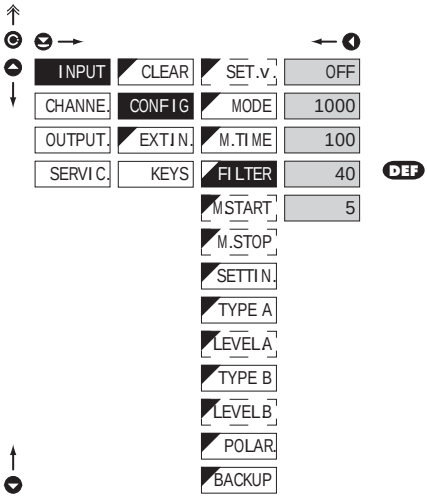
6.1.2c SELECTION OF MEASURING PERIOD/TIME BASE



M.TIME — **Selection of measuring period/time base**

- if you set measuring period e.g. for 1 s, the measuring runs approximtely from 1 s to 2 s (1 s + maximum one cycle of measured signal). If no signal arrives within 2 s it is taken that the signal has zero frequency
- range of setting of the time base is 0,5 s to 10 s
- in the „RTC" regime with data projection the set time defines the cycle of switching between time/date, min. is 5 s, datue is displayed for approx. 2,5 s

6.1.2d SELECTION OF INPUT FILTER PARAMETERS



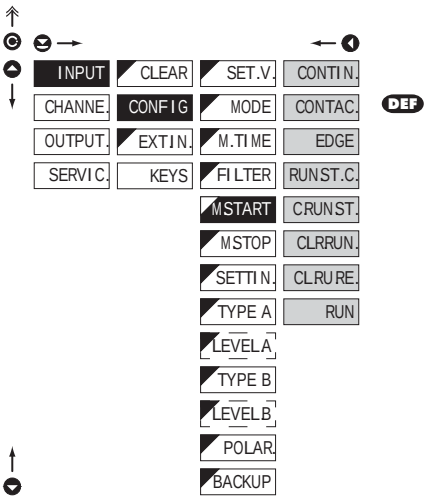
FILTER **Selection of digital input filter**

- digital filter may suppress unwanted interfering impulses (e.g. relay backswings) on the input signal. The set parameter gives maximum possible frequency (Hz) of the instrument, which the instrument w/o limitatio
- for pulse duty cycle of50% - equal duration of Hi and Lo level*
- in case if intereference the use of input filter is recommended

!

When accessing upon contact and available maximum input frequency we recommend using filter

6.1.2e SELECTION OF STOPWATCH/TIMER CONTROL **H**



MSTART **Selection of stopwatch/ timer control**

- time setting menu is accessible only in the stopwatch/timer regime

CONTIN. Stopwatch/timer is running constantly if the instrument is turned on

CONTAC. Stopwatch/timer is running upon contact making

EDGE Stopwatch/timer is controlled by the priming signal edge

- time is set off by the edge (by the signal passing across the comparing level) and stopped by the next edge

RUn.STC. Stopwatch/timer is controlled and reset by the edge of the priming signal

- time is set off by the edge (by the signal passing across the comparing level) and stopped by the next edge

CRUn.ST. Stopwatch/timer is controlled and reset by the edge of the priming signal

- time is set off by the edge (by the signal passing across the comparing level) and stopped by the next edge

CLRRUN. Stopwatch/timer is reset and set off by the edge of the priming signal (when the time is not running)

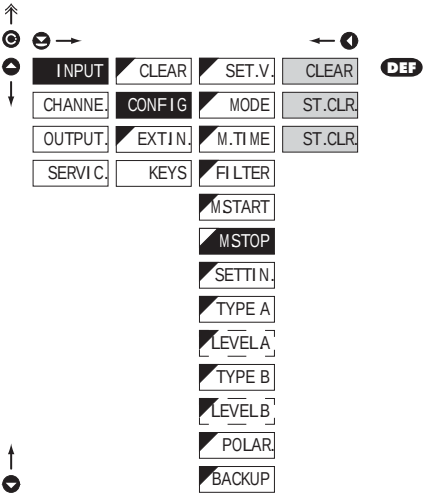
CLRURE. Stopwatch/timer is reset and set off by the edge of the priming signal, the cycle is repeated with every other edge

- regardles of whether the time is running or not

RUN Stopwatch/timer is only set off by the edge

6.1.2f SELECTION OF STOPWATCH/TIMER RESETTING

H



M.STOP **Selection of stopwatch resetting**

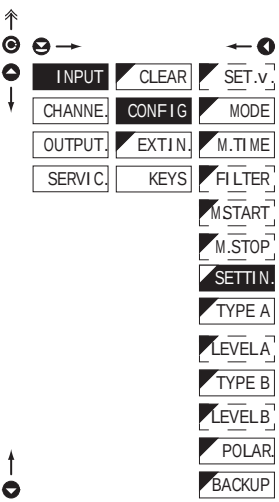
- menu of the resetting option is accessible only in the stopwatch/timer regime

CLEAR — Stopwatch/timer is reset through input „Clear"

ST.CLR. — Stopwatch/timer is stopped and reset through input „Clear"

STOP — Stopwatch/timer is stopped through input „Clear"

6.1.2g AUTOMATIC SETTING OF THE INPUTS



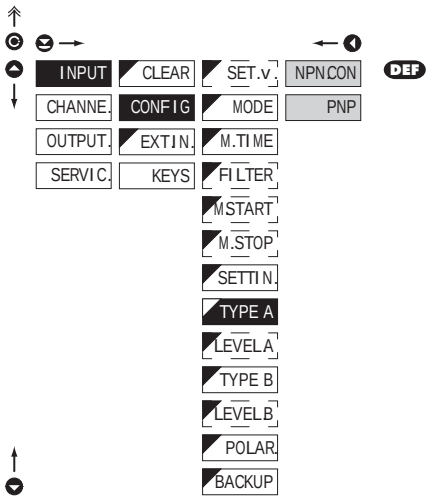
SETTIN. **Automatic setting of the inputs**

- it is posible to choose in the menu between automatic or manual setting for input A and B
- for automatic detection the minimum frequency required is 10 Hz

- start of automatic input setting
- manual input setting - down
- manual input setting - up
- confirm the setting and proceed to second input (short key stroke)
  to copy the setting of Input A to Input B (long key stroke)

DEF = NPN.CON

6.1.2h SELECTION OF THE TYPE OF INPUT



TYPE A **Selection of type of input**

- setting applies for Input A

NPN.CON Type of input NPN and upon contact

PNP Type of input PNP

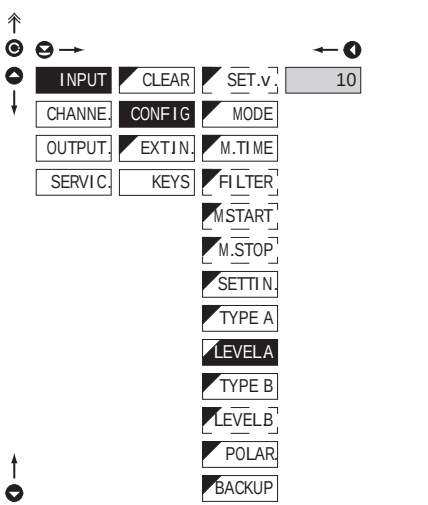
!

After selecting "**PNP**" it is necessary to set the input input level (**Level A**)

!

Setting for input Resetting (**Level. B**) is identical with setting for Input A

6.1.2i SETTING INPUT LEVEL



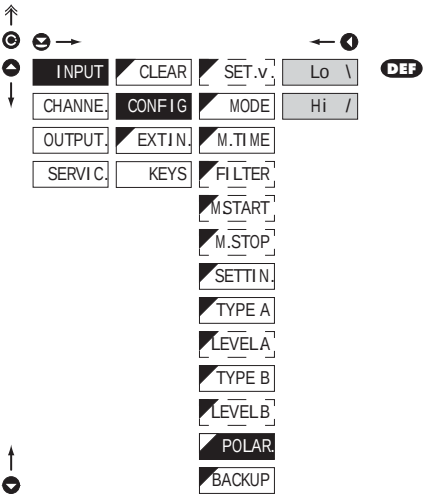
LEVEL A **Setting input level**

- setting applies for Input A
- setting level (only for type PNP) of the input voltage, the instrument subsequently automatically selects divider and thus comparing levels
- range of setting 0...43 V
  (Input A < 30 V, bracket No. 12)
  (Input B < 30 V, bracket No. 13)
- range of setting 43...300 V
  (Input A <300 V, bracket No. 17)
  (Input B <300 V, bracket No. 15)
- table of comparing levels is on page 8

!

Setting for input Resetting (**Level. B**) is identical with setting for Input A

6.1.2j SELECTION OF ACTIVE LEVEL OR EDGE

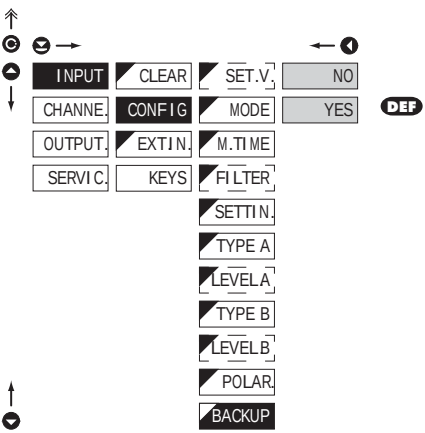


POLAR. **Selection of active level or edge**

**Lo ** Active upon change of declining edge Lo >Hi
- upon entering the contact > active on switch-on

Hi / Active upon change of entering edge Hi > Lo
- upon entering the contact > active on switch-off

6.1.2k SELECTION OF DISPLAY STATUS BACKUP



BACKUP **Selection of display status backup**

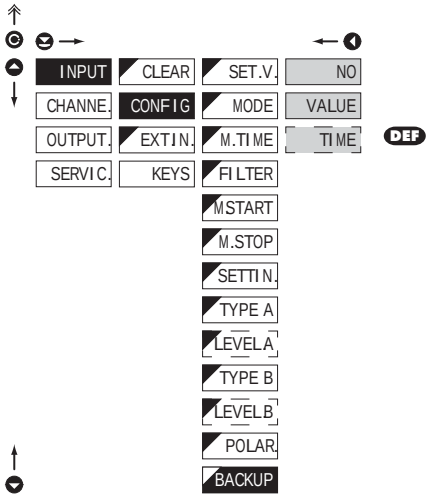
- setting display value restoration after power failure or instrument switch-off

NO After switch-on the instrument loads the display status from the memory

YES Instrument resets itself after switch-on

6.1.2i SETTING THE DISPLAY STATUS BACKUP

H



BACKUP **Setting the display status backup**

- time setting menu is accessible only in the stopwatch/timer regime
- setting display value restoration after power failure or instrument switch-off

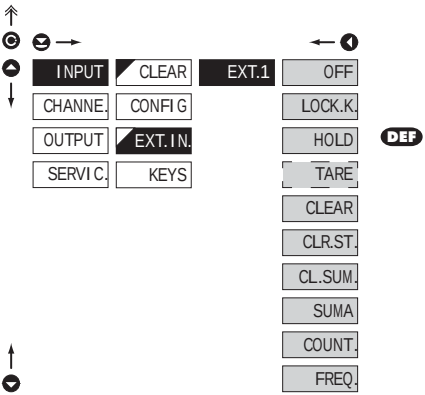
NO Instrument resets itself after every switch-on

VALUE After switch-on the instrument loads the display status from the memory

TIME Instrument downloads „running" time from RTC

- item accessible only with extension „Time backup"

6.1.3 EXTERNAL INPUT FUNCTION SELECTION



!

Response time to the change of input is approx 100 ms

EXT. I N. External input function selection

OFF Input is off

LOCK.K. Auxiliary input governs the „LOCK" function

- the input governs the blocking of control keys on front panel

HOLD Auxiliary input governs the „HOLD" function

- the input governs the HOLD function, which blocks all instrument functions

TARE Auxiliary input governs the „TARE" function

- the TARE function is activated through the input, only in the "Frequency" mode

CLEAR Auxiliary input governs the „Clear" function

- stopwatch/counter is cleared (preset) through the input

CLR.St. Auxiliary input governs the „Clear" function

- stopwatch/counter is cleared (preset) through the input, Stopwatcg stops altogether

CL.SUM. Auxiliary input governs the „Clear Sum" function"

- the "grand total" of the counter is zeroed

SUMA Auxiliary input governs the „SUM" function

- the cummulated value is displayed

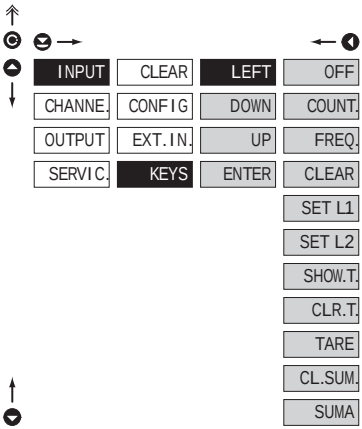
COUNT. Auxiliary input governs the counter display

- the value of "Counter" channel is displayed

FREQ. Auxiliary input governs the frequency display

- the value of "Frequency" channel is displayed

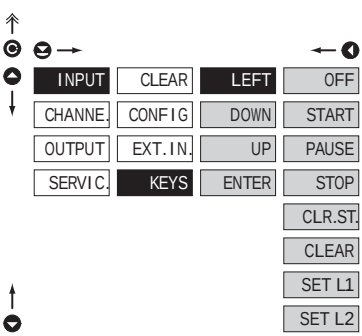
6.1.4 OPTIONAL ACCESSORY FUNCTIONS OF THE KEYS



KEYS	**Assigning accessory functions of control keys**

- this setting is identical for all control keys

OFF	Accessory functions are off
COUNT.	Displays value from channel "Counter"
FREQ.	Displays value from channel "Frequency"
CLEAR	Clears Counter
SET.L.-	Setting limit L1, resp. L2
SHOV.T.	Shows TARE
CLR.T.	Clears TARE
TARA	Activates function TARE
CL.SUM.	Clears the total sum
SUMA	Dispalys the total sum (grand total)



KEYS	**Assigning accessory functions of control keys**

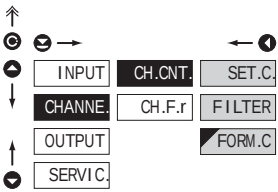
- can be used only in mode "TIME" and "RTC"
- this setting is identical for all control keys

OFF	Accessory functions are off
START	Start - stopwatch/clock
PAUSE	Pause - stopwatch/clock

- leaves the current value displayed until a new key stroke
- dot/dots indicate the stopwatch is running by flashing

STOP	Stop - stopwatch/clock
CLR.ST.	Stop and clear - stopwatch/clock
CLEAR	Clear- stopwatch/clock
SET.L.-	Setting limit L1, resp. L2

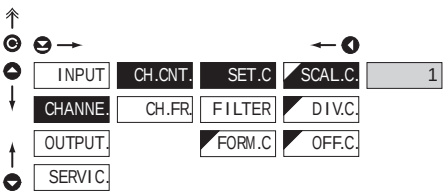
6.2 SETTING "PROFI" - CHANNEL



In this menu the instrument input parameters are set

- SET.C. — Setting calibration constant
- FILTER — Setting the digital filters
- FORM.C. — Selection of projection format

6.2.1a SETTING MULTIPLYING CONSTANT - CHANNEL COUNTER



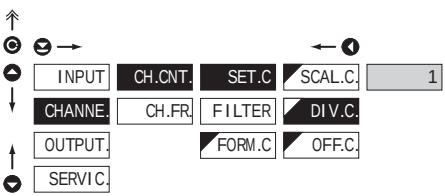
SCAL.C. Setting multiplying constant - Counter

- multiplying constant serves for calculation of input value to required display value
- by entering minus value the direction of calculation is changed, i.e. we count down
- range: -0,00001...999999
- DEF = 1

! H

If non-zero value is set in the "**TIME**" or "**RTC**" mode in the "**OFF. C.**" item, it applies that the multiplying constant "**SCAL. C.**" is negative

6.2.1b SETTING DIVISION CONSTANT - CHANNEL COUNTER



DIV.C. Setting division constant - Counter

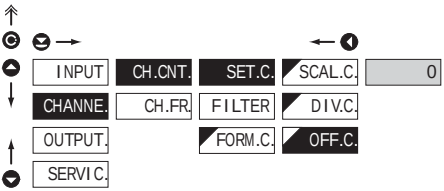
- division constant serves for calculation of input value to required display value
- range: 0,00001...999999
- DEF = 1

*****

Revolution measurement function

If you set the division constant (invariable) for channel **Ch. Fr.** as an integer number (range 1...255), the measurement will be realised according to the preset multiplications of revolutions/pulses. In reality this means that revolutions are measured precisely after a number of revolutions have been fully completed, which results in an improved stability of the measured value. This mode is not suitable for higher frequencies, where it can increase the measurement period. If you do not wish to use this mode, use a decimal number instead and adjust the multiplication constant apropriately. Please pay attention to the time platform (**TIME 1**), which must must alow for adding up the 1...255 pulses within the set time period. ATTN! When this option is used in the **QUADR** mode, it may result in an error when the direction of revolution is reversed.

6.2.1c SETTING ADDITIVE CONSTANT - PRESET, CHANNEL COUNTER



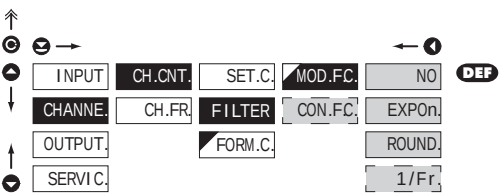
OFF.C **Setting PRESET constant - Counter**

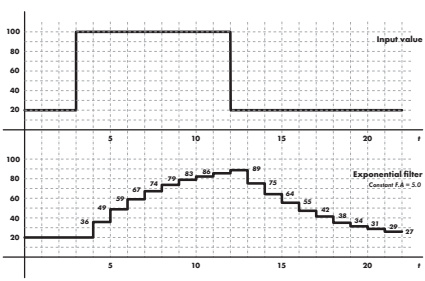
- offset of the measuring by a set value, which shall be loaded always upon instrument resetting
- range: -99999...999999
- DEF = 0

! H

If non-zero value is set in the "TIME" or "RTC" mode in the "OFF. C." item, it applies that the multiplying constant "SCAL. C." is negative

6.2.2 SETTING THE DIGITAL FILTERS - CHANNEL COUNTER





FILTER **Setting the digital filters - Counter**

CON.FC. Setting the constant

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

NO Filters are switched off

EXPON. Selection of exponential filter

- calculation of value from the number of measurements selected in „CON. F.C."

ROUND. Selection of value round-up

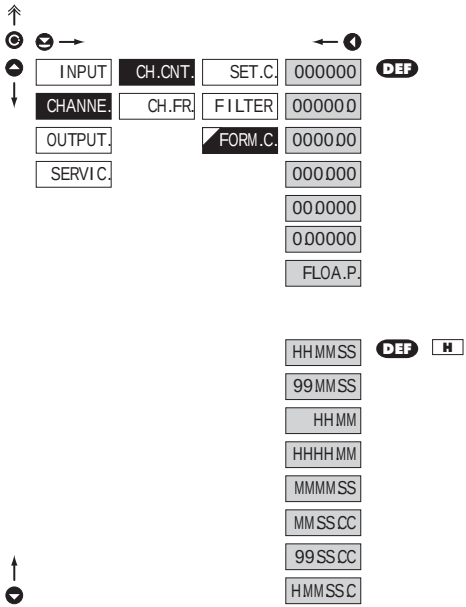
- it is set by arbitrary number, which determines the projection step
  [e.g.: "Con. F.C."=2,5 > display 0, 2.5, 5,...]

1/Fr. A filter which converts frequency to time

!

Identical setting is used for "CH. Fr."

6.2.3 SELECTION OF PROJECTION FORMAT - CHANNEL COUNTER



FORM.C. **Selection of projection format**

- 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."**

Shortcut

- "FLOA. P." > floating point
- "H." > hours
- "M." > minutes
- "S." > seconds
- "C." > 0,01 seconds

!

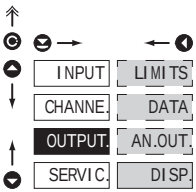
Identical setting is used for "**CH. Fr.**"

! **H**

In mode "**TIME**" or "**RTC**" the time base is preset according to projection format

in seconds >	000000...0.00000, Floa. P., HH.MM.SS, 99.MM.SS, MMMM.SS
in minutes >	HH.MM, HHHH.MM
in 0,1 seconds >	H.MM.SS.C
in 0,01 seconds >	MM.SS.CC, 99.SS.CC

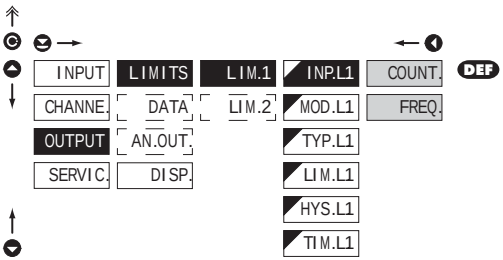
6.3 SETTING „PROFI" - OUTPUTS



It is possible to set the parameters of the instrument output signals in this menu

- **LIMITS** Setting the type and the switching of limits
- **DATA** Setting the type and the parameters ot data output
- **AN.OUT.** Setting the type and parameters of analog output
- **DISP.** Setting the display brightness

6.3.1a SELECTION OF HOW LIMIT 1 IS EVALUATED

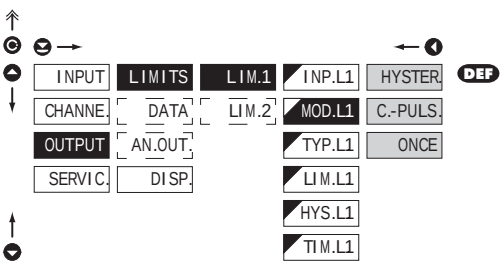


INP.L1 **Selection of how Limit 1 is evaluated**

- selection of value to which the limit is related

- **COUNT.** From "Channel Counter"
- **FREQ.** From "Channel Frequency"

6.3.1b SELECTION OF MODE OF OUTPUT L 1

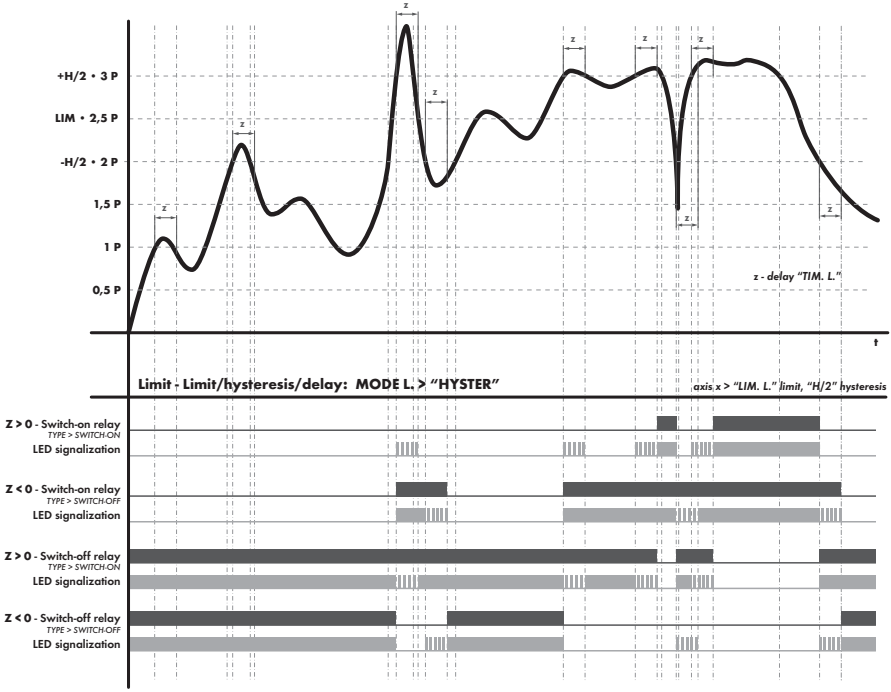


MOD.L1 **Mode of limit 1**

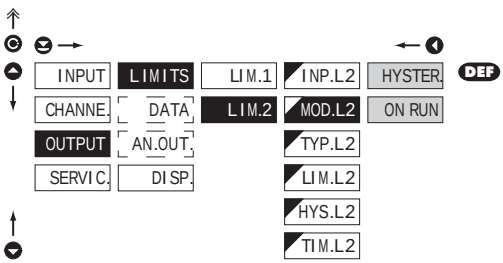
- **HYSTER.** Standard mode - limit, hysteresis and delay
- **C.-PULS.** Automatic zeroing of the counter at a preset value and a generating an impulse of duration set in "TIM. L.1"
- **ONCE** The relay will be activated once and will remain in the activated position until the counter is re-set.

!

Setting is available only for **LIM 1**



6.3.1c SELECTION OF MODE OF OUTPUT L 2



MOD.L2 **Mode of limit 2**

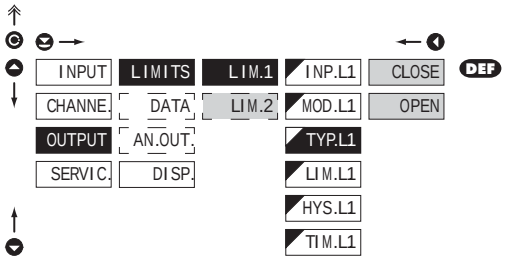
HYSTER. Standard mode - limit, hysteresis and delay

ON RUN Relay is switched on/off if the stopwatch is running

!

Setting is available only for LIM 2

6.3.3d SELECTIONOF TYPE OF OUTPUT



TYP.L1 **Setting the type of relay function**

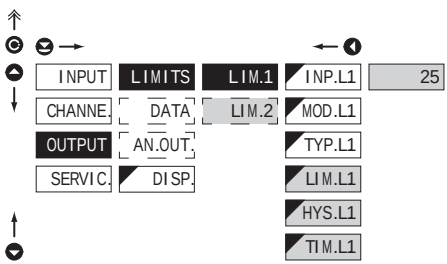
CLOSE Relay switches on when the condition is met

OPEN Relay switches off when the condition is met

!

Setting is identical for **LIM 1** and **LIM 2**

6.3.1e SETTING VALUES FOR LIMITS EVALUATION



LIM.L1 Setting limit for switch-on

HYS.L1 Setting hysteresis

- defines the band around the limit (on both sides, LIM. ±1/2 HYS.)

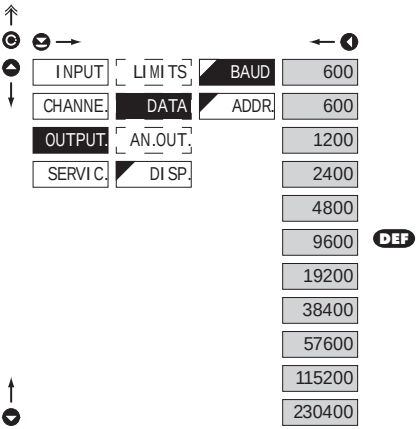
TIM.L1 Setting the time switch-on of the limit

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

!

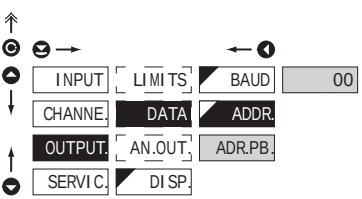
Setting is identical for **LIM 1** and **LIM 2**

6.3.2a SELECTION OF TRANSMISSION RATE OF DATA OUTPUT



BAUD	**Setting the data output rate**
300	Rate - 300 Baud
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 THE INSTRUMENT ADDRESS



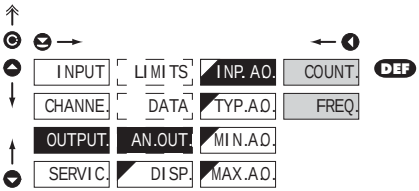
ADDR. **Setting the instrument address**

- setting within the range 0...31
- DEF = 00

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

- setting within the range 1...127
- DEF = 19

6.3.3a SELECTION OF HOW ANALOGUE OUTPUT IS EVALUATED

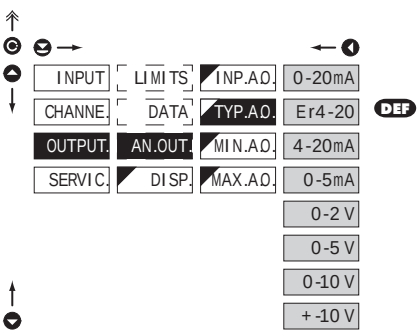


INP.AO. Selection of how analogue output is evaluated

- selection of value to which the analogue output is related

COUNT.	From "Channel Counter"
FREQ.	From "Channel Frequency"

6.3.3b SELECTION OF TYPE OF ANALOG OUTPUT



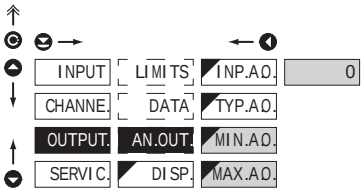
TYP.AO. Selection of type of analog output

0-20mA	Type - 0...20 mA
Er4-20	Type - 4...20 mA

- with indication of error statement (< 3,6 mA)

4-20mA	Type - 4...20 mA
0-5mA	Type - 0...5 mA
0-2 V	Type - 0...2 V
0-5 V	Type - 0...5 V
0-10 V	Type - 0...10 V
+-10 V	Type - ±10 V

6.3.3c SELECTION OF ANALOG OUTPUT RANGE



AN.OUT. Setting the analog output range

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

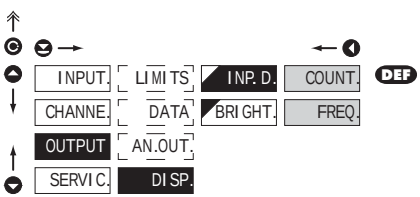
MIN.AO. Assigning the displayed value to the beginning of the analog output range

- range -99999...999999
- DEF = 0

MAX.AO. Assigning the displayed value to the end of the analog output range

- range: -99999...999999
- DEF = 100

6.3.4a SELECTION OF THE CHANNEL TO BE DISPLAYED



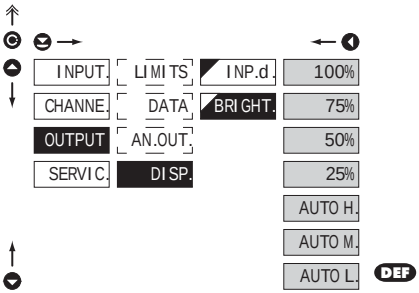
INP.D. Selection of the channel to be displayed

- selection of the value which should be displayed

COUNT. Value taken from channel "Counter" will be displayed

FREQ. Value taken from channel "Frequency" will be displayed

6.3.4b SELECTION OF DISPLAY BRIGHTNESS

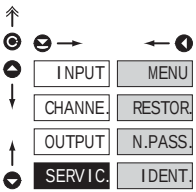


BRIGHT. Selection of display brightness

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

100%	Display brightness - 100%
75%	Display brightness - 75%
50%	Display brightness - 50%
25%	Display brightness - 25%
AUTO H.	Automatic brightness adjustment - High
AUTO M.	Automatic brightness adjustment - Medium
AUTO L.	Automatic brightness adjustment - Low

6.4 SETTING "PROFI" - SERVICE



The instrument's service functions are set in this menu

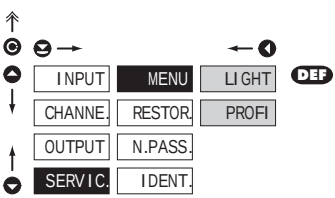
MENU Selection of menu type LIGHT/PROFI

RESTOR. Restoration of the manufacture setting and instrument calibration

N.PASS. Setting new access password

IDENT. Instrument identification

6.4.1 SELECTION OF THE TYPE OF PROGRAMMING MENU



MENU **Selection of menu type LiGHT/PROFI**

- allows to set the menu complexity as per user needs and abilities

LIGHT Active LIGHT menu

- simple programming menu, contains only items necessary for instrument configuraction and setting
- linear menu structure > items in succession

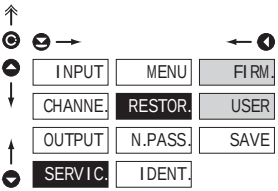
PROFI Active PROFI menu

- complete programming menu for expert users
- tree menu

!

Change of setting is valid with next access into menu

6.4.2 RESTORATION OF THE MANUFACTURE SETTING



!

After restoration of setting the instrument switches off for several seconds

RESTOR. **Restoration of the instrument manufacture setting**

FIRM. Return to manufacture setting of the instrument

- downloading manufacture setting for currently selected type of instrument (items described DEF)

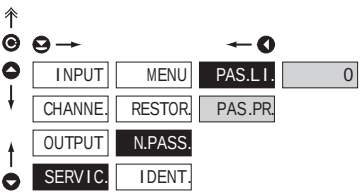
USER Return to user setting of the instrument

- downloading user setting of the instrument, i.e. setting which was stored under item SERVIC./RESTOR./SAVE

SAVE Storing user setting of the instrument

- storing the setting enables the operator its future contingent restoration

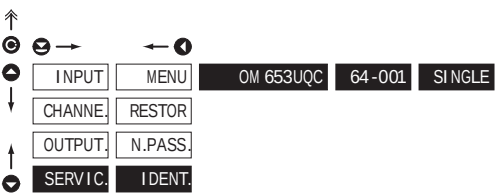
6.4.3 SETTING NEW ACCESS PASSWORD



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

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

6.4.4 INSTRUMENT IDENTIFICATION



IDENT. **Projection of instrument SW version**

- the display shows the type identification of the instrument, SW number, SW version and current input setting (Mode)
- if the SW version reads a letter on the first position, then it is a customer SW

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

SETTING
USER

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

7.0 SETTING ITEMS INTO "USER" MENU

- **USER** menu is designed for users who need to change only several items of the setting without the option to change the basic instrument setting (e.g. repeated change of limit setting)
- there are no default items from manufacture in **USER** menu
- menu configuration possible on items indicated by inverse triangle LIM.L1
- setting may be performed in **LIGHT** or **PROFI** menu, with the **USER** menu then overtaking the given menu structure

Setting

NO item will not be displayed in USER menu

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

SHOW item will be solely displayed in USER menu

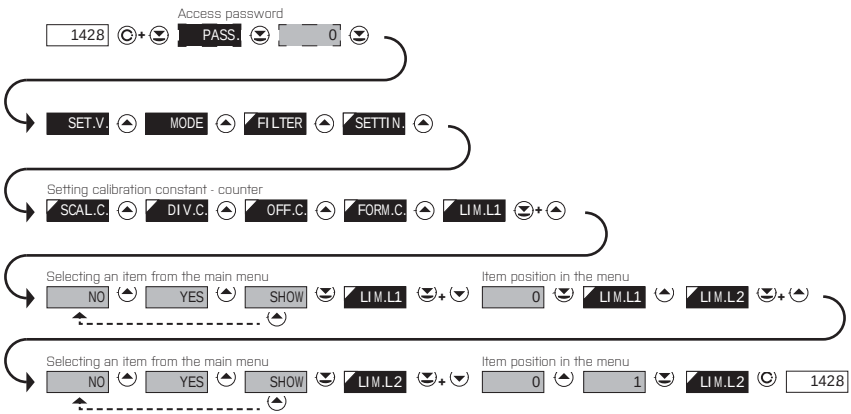
Setting sequence of items in "USER" menu

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

setting projection sequence

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

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



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

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

8. DATA PROTOCOL

The instruments communicate via serial line RS232 or RS485. For communication they use the ASCII protocol. Communication runs in the following format:

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

The transfer rate is adjustable in the instrument menu. The instrument address is set in the instrument menu in the range of 0 ÷ 31. The manufacture setting always presets the ASCII protocol, rate of 9600 Baud, address 00. The type of line used - RS232 / RS485 - is determined by an output board automatically identified by the instrument.
The commands are described in specifications you can find at www.orbit.merret.cz

DETAILED DESCRIPTION OF COMMUNICATION VIA SERIAL LINE

ACTIVITY	TYPE	PROTOCOL	DATA TRANSFERRED
Data solicitation (PC)	232	ASCII	# A A <CR>
		MessBus	No - data is transmitted permanently
	485	ASCII	# A A <CR>
		MessBus	<SADR> <ENQ>
Data transmission (instrument)	232	ASCII	> D (D) (D) (D) (D) (D) (D) (D) (D) (D) (D) <CR>
		MessBus	<STX> D (D) (D) (D) (D) (D) (D) (D) (D) (D) (D) <ETX> <BCC>
	485	ASCII	> D (D) (D) (D) (D) (D) (D) (D) (D) (D) (D) <CR>
		MessBus	<STX> D (D) (D) (D) (D) (D) (D) (D) (D) (D) (D) <ETX> <BCC>
Confirmation of data acceptannce (PC) - OK	485	MessBus	<DLE> 1
Confirmation of data acceptance (PC) - Bad			<NAK>
Sending address (PC) prior command			<EADR> <ENQ>
Confirmation of address (instrument)			<SADR> <ENQ>
Command transmission (PC)	232	ASCII	# A A N P (D) (D) (D) (D) (D) (D) (D) (D) <CR>
		MessBus	<STX> $ N P (D) (D) (D) (D) (D) (D) (D) (D) <ETX> <BCC>
	485	ASCII	# A A N P (D) (D) (D) (D) (D) (D) (D) (D) <CR>
		MessBus	<STX> $ N P (D) (D) (D) (D) (D) (D) (D) (D) <ETX> <BCC>
Command confirmation (instrument)	232	ASCII OK	! A A <CR>
		ASCII Bad	? A A <CR>
		Messbus	No - data is transmitted permanently
	485	ASCII OK	! A A <CR>
		ASCII Bad	? A A <CR>
		Mess-Bus OK	<DLE> 1
		Mess-Bus Bad	<NAK>
Instrument identification			# A A 1 Y <CR>
HW identification			# A A 1 Z <CR>
One-time transmission			# A A 7 X <CR>
Repeated transmission			# A A 8 X <CR>

LEGENDA

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

RELAY, TARE

SIGN	RELAY 1	RELAY 2	TARE	CHANGE RELAY 3/4
P	0	0	0	0
Q	1	0	0	0
R	0	1	0	0
S	1	1	0	0
T	0	0	1	0
U	1	0	1	0
V	0	1	1	0
W	1	1	1	0
p	0	0	0	1
q	1	0	0	1
r	0	1	0	1
s	1	1	0	1
t	0	0	1	1
u	1	0	1	1
v	0	1	1	1
w	1	1	1	1

Relay status is generated by command #AA6X <CR>.

The instrument immediately returns the value in the format >HH <CR>, where HH is value in HEX format and range 00H...FFH. The lowest bit stands for „Relay 1", the highest for „Relay 8"

9. ERROR STATEMENTS

ERROR	CAUSE	ELIMINATION
E.D.Un.	Number is too small (large negative) to be displayed	change DP setting, channel constant
E.D.OW.	Number is too large to be displayed	change DP setting, channel constant
E.T.Un.	Number is outside the table range	increase the table values, change input setting (channel constant)
E.T.OW.	Number is outside the table range	increase the table values, change input setting (channel constant)
E.V.Un.	Input quantity is smaller than permitted input quantity range	change input signal value or input (range) setting
E.V.OW.	Input quantity is larger than permitted input quantity range	change input signal value or input (range) setting
E. HW.	A part of the instrument does not work properly	send the instrument for repair
E. EE	Data in EEPROM corrupted	perform restoration of manufacture setting, upon repeated error statement send instrument for repair
E.SET.	Data in EEPROM outside the range	perform restoration of manufacture setting, upon repeated error statement send instrument for repair
E.CLR.	Memory was empty (presetting carried out)	upon repeated error statement send instrument for repair, possible failure in calibration

10. TECHNICAL DATA

INPUT

Type:	upon contact, TTL, NPN/PNP
Measuring:	1x counter/frequency UP or DOWN 1x counter/frequency UP/DOWN 1x counter/frequency for IRC sensor 1x stopwatch/timer - measuring range isadjustable
Input frequency:	0,1...50 kHz (Mode SINGLE) 0,1...20 kHz (Mode UP/DW) 0,1...20 kHz (Mode UP-DW) 0,1...20 kHz (Mode QUADR. - Frequency) 0,1...10 kHz (Mode QUADR. - Counter) (for frequency duty cycle of 50 %)
Voltage levels	9,7 - 14,4 - 19,2 - 23,9 - 28,7 - 33,5 - 38,3 - 43,0 V 84 - 128 - 170 - 211 - 253 - 295 - 301 V

PROJECTION

Display:	999999, intensive red or green 7-segment LED, digit height 14 mm
Projection:	-99999...999999
Decimal point:	adjustable - in programming mode
Brightness:	adjustable - in programming mode

INSTRUMENT ACCURACY

Temperature coef.:	50 ppm/°C
Accuracy:	±0,02 % of the range + 1 digit (frequency)
Time base:	0,5/1/5/10 s
Multiplying const.:	±0,00001....999999
Division constant:	±0,00001....999999
Filtration constant:	allows for setting max. valid frequency, which is processed (OFF/5...1000 Hz)
Type of filter:	digital
Preset:	-99999...999999
Data backup:	preservation of measured data even after instrument switch-off (EEPROM)
Functions:	Tare - display resetting Summation-(grandtotal)registrofshifts Hold - stop measuring (upon contact) Lock - control keys locking
RTC:	the course of time is backed up by battery upon disconnection from the instrument supply (may be turned off - jumper inside the instrument)
Battery:	Lithium cell CR 2032RV, 3V/220 mAh minimum lifetime 1 year
OM Link:	Company communication interface for instrument operaion, setting and update
Watch-dog:	reset after 540 ms
Calibration:	při 25°C a 40 % r.v.

COMPARATOR

Type:	digital, adjustable in the menu
Rate switching:	< 50 ms
Mode:	Hysteresis, Once, C-Puls, On Run
Limits:	-99999...999999
Hysteresis:	0...999999
Delay:	0...99,9 s
Outputs:	2x relays with switch-on contact (Form A) (250 VAC/30 VDC, 3 A)* 2x open collector (30 VDC/100 mA)
Relays:	1/8 HP 277 VAC, 1/10 HP 125 V, Pilot Duty D300

DATA OUTPUTS

Protocols:	ASCII, PROFIBUS
Data format:	8 bit + no parity + 1 stop bit
Rate:	600...230 400 Baud 9 600 Baud...12 Mbaud (PROFIBUS)
RS 232:	isolated, two-way communication
RS 485:	isolated, two-way communication, addressing (max. 31 instruments)
PROFIBUS:	Data protocol SIEMENS

ANALOG OUTPUTS

Type:	isolated, programmable with 12-bit D/A converter, type and range are selectable in programming mode
Non-linearity:	0,1% of the range
TC:	15 ppm/°C
Rate:	response to change of value < 1 ms
Voltage:	0...2 V/5 V/10 V/±10 V
Current:	0...5/20 mA/4...20 mA - compensation of conduct up to 500 Ω/12 V

EXCITATION

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

POWER SUPPLY

Option:	10...30 V AC/DC, 13,5 VA, isolated, PF ≥ 0,4 - fuse inside (T 4000 mA) 80...250 V AC/DC, 13,5 VA, isolated, PF ≥ 0,4 - fuse inside (T 630 mA)

MECHANIC PROPERTIES

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

* values apply for resistance load

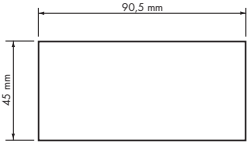
OPERATING CONDITIONS

Connection:	connector terminal board, conductor cross-section <1,5 mm² /<2,5 mm²
Stabilisation period:	within 15 minutes after switch-on
Working temp.:	-20°...60°C
Storage temp.:	-20°...85°C
Cover:	IP65 (front panel only)
Construction:	safety class I
Overvoltage cat.:	EN 61010-1, A2
Dielectric strength:	4 kVAC after 1 min between supply and input 4 kVAC after 1 min between supply and data/ analog output 4 kVAC after 1 min between supply and relay output 2,5 kVAC after 1 min between input and data/ analog output
Insulation resist.:	for pollution degree II, measurement category III Instrument power supply > 670 V (PI), 300 V (DI) Input/output > 300 V (PI), 150 (DI)
EMC:	EN 61326-1

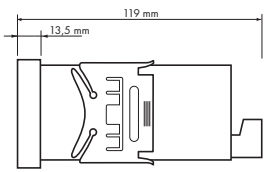
PI - Primary insulation, DI - Double insulation

Front view

Panel cut



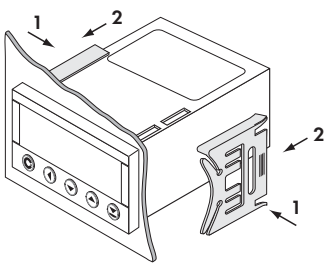
Side view

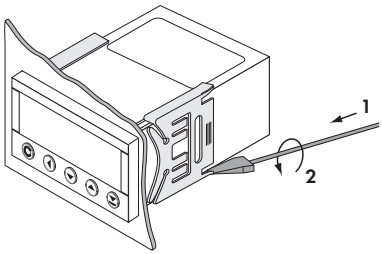


Panel thickness: 0,5...20 mm

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 653UQC**
Type	. . . . .
Manufacturing No.	. . . . .
Date of sale	. . . . .

A guarantee period of 60 months from the date of sale to the user applies to this instrument.
Defects occuring 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.

Stamp, signature

ES DECLARATION OF CONFORMITY

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

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

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

Product: Programmable panel instrument

Type: **OM 653**

Version: UQC

It has been designed and manufactured in line with requirements of:

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

The product qualities are in conformity with harmonized standard:

El. safety: EN 61010-1

EMC: EN 61326-1
Electronic measuring, control and laboratory devices – Requirements for EMC "Industrial use"
EN 50131-1, chap. 14 and chap. 15, EN 50130-4, chap. 7, EN 50130-4, chap. 8 (EN 61000-4-11, ed. 2), EN 50130-4, chap. 9 (EN 61000-4-2), EN 50130-4, chap. 10 (EN 61000-4-3, ed. 2), EN 50130-4, chap. 11, (EN 61000-4-6), EN 50130-4, chap. 12 (EN 61000-4-4, ed. 2), EN 50130-4, chap. 13 (EN 61000-4-5), EN 61000-4-8, EN 61000-4-9, EN 61000-6-1, EN 61000-6-2, EN 55022, chap. 5 and chap. 6

The product is furnished with CE label issued in 2010

As documentation serve the protocoles of authorized and accredited organizations:

EMC MO ČR, Zkušebna tech. prostředků, protocol No.: 80/6-280/2007 of 13/11/2007
MO ČR, Zkušebna tech. prostředků, protocol No.: 80/6-283/2007 of 26/10/2007

Place and date of issue: Prague, 1. March 2010

Miroslav Hackl
Company representative

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