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.

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2. INSTRUMENT DESCRIPTION

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

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINGLE</td>
<td>Counter/Frequencymeter</td>
<td></td>
</tr>
<tr>
<td>QVADR</td>
<td>Counter/Frequencymeter for IRC sensors</td>
<td></td>
</tr>
<tr>
<td>UP/DW</td>
<td>UP/DW Counter/Frequencymeter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- used in inputs A, C (direction) and can display count/frequency</td>
<td></td>
</tr>
<tr>
<td>UP - DW</td>
<td>UP - DW Counter/Frequencymeter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- used in inputs A (UP), C (DW) and can display count/frequency</td>
<td></td>
</tr>
<tr>
<td>TIME</td>
<td>Stopwatch</td>
<td></td>
</tr>
<tr>
<td>RTC</td>
<td>Timer</td>
<td></td>
</tr>
</tbody>
</table>

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, alternatively for counting pulses when frequency is not used

DIGITAL FILTERS

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

FUNCTIONS

- Setting the value: entering the current count when installing the counter during a counting cycle
- Preset: initial non-zero value, unloaded always after instrument resetting
- Summation: used for cumulative summations of values (for example shifts in a factory), where the value on the display 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
- Resetting: 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).

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](http://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 visualization 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 assigned 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.

**CONNECTION**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>CONNECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPUT A (&lt; 30 V)</td>
<td>GND + Input A (&lt; 30 V)</td>
</tr>
<tr>
<td>INPUT A (&lt; 300 V)</td>
<td>GND + Input A (&lt; 300 V)</td>
</tr>
<tr>
<td>INPUT B/Reset (&lt; 30 V)</td>
<td>GND + Reset (&lt; 30 V)</td>
</tr>
<tr>
<td>INPUT B/Reset (&lt; 300 V)</td>
<td>GND + Reset (&lt; 300 V)</td>
</tr>
</tbody>
</table>

**EXTERNAL INPUT**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXT.</td>
<td>upon contact, bracket (No. 10/11)</td>
</tr>
</tbody>
</table>

According to setting in Menu (see Menu > EXT. IN., page 45)

Grounding on bracket „E“ has to connected at all times.
### Functions of Inputs According to Selected Mode

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
<th>Function of Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINGLE</td>
<td>Pulse counter/Frequency counter</td>
<td>Input A, Reseting (Input B)</td>
</tr>
<tr>
<td>QUADR.</td>
<td>Pulse counter/ Frequency counter for IRC sensors</td>
<td>Input A + Input B, Reseting is possible on terminal 10</td>
</tr>
<tr>
<td>UP/DW</td>
<td>UP or DW Pulse counter/Frequency counter</td>
<td>Input A, Input B - determines direction (Hi = UP, Lo = DW) Reseting is possible on terminal 10</td>
</tr>
<tr>
<td>UP - DW</td>
<td>UP/DW Pulse counter/Frequency counter</td>
<td>Input A (UP), Input B (DW), Reseting is possible on terminal 10</td>
</tr>
<tr>
<td>TIME</td>
<td>Stopwatch Clock</td>
<td>Input A, Reseting (Input B)</td>
</tr>
<tr>
<td>RTC</td>
<td>Stopwatch Clock with time back up</td>
<td>Input A, Reseting (Input B)</td>
</tr>
</tbody>
</table>

### Sensor Connection

**2-wire sensors**

**3-wire sensors**

**Contact**

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.
3. INSTRUMENT CONNECTION

Termination of RS 485 communication line

<table>
<thead>
<tr>
<th>X3 - Termination of communication line RS 485</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Significance</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td>1-2 connect L+ to [+ ] source</td>
</tr>
<tr>
<td>3-4 termination of line 120 Ohm</td>
</tr>
<tr>
<td>5-6 connect L- to [ ] source</td>
</tr>
</tbody>
</table>

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)

<table>
<thead>
<tr>
<th>INPUT</th>
<th>TYPE OF INPUT</th>
<th>MAXIMUM INPUT VOLTAGE (LEVEL A, C)</th>
<th>MAXIMUM COMPARATION LEVELS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>L &gt; H</td>
<td>H &gt; L</td>
</tr>
<tr>
<td>Input A</td>
<td>NPN, Kontakt</td>
<td>0,5 V</td>
<td>4,5 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>0,5 V</td>
<td>4,5 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>1,0 V</td>
<td>9,0 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>1,5 V</td>
<td>13,3 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>2,0 V</td>
<td>17,8 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>2,5 V</td>
<td>22,1 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>3,0 V</td>
<td>26,6 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>3,4 V</td>
<td>31,0 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>3,9 V</td>
<td>35,5 V</td>
</tr>
<tr>
<td></td>
<td>NPN, Contact</td>
<td>4,9 V</td>
<td>39,8 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>9,2 V</td>
<td>79,0 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>13,6 V</td>
<td>117,8 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>17,8 V</td>
<td>156,0 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>22,3 V</td>
<td>195,8 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>26,5 V</td>
<td>234,1 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>30,9 V</td>
<td>273,9 V</td>
</tr>
<tr>
<td>Resetting (&lt; 30 V)</td>
<td>PNP</td>
<td>84 V</td>
<td>4,9 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>128 V</td>
<td>9,2 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>170 V</td>
<td>13,6 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>211 V</td>
<td>17,8 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>253 V</td>
<td>22,3 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>295 V</td>
<td>26,5 V</td>
</tr>
<tr>
<td></td>
<td>PNP</td>
<td>301 V</td>
<td>30,9 V</td>
</tr>
</tbody>
</table>

Full Significance  Default  Recommendation
1-2 connect L+ to [+ ] source  terminalconnected  connect at the end of line
3-4 termination of line 120 Ohm  disconnected  do not disconnect
5-6 connect L- to [ ] source  terminalconnected  connect at the end of line
4. INSTRUMENT SETTING

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

**Indication of currently displayed value** (orange LED)
- C Counter
- F Frequency

**Measured value** (red/green LED)
- M Min/max. value
- T Tare

**Function** (green LED)
- Tare

**Relay status** (red LED)
- ON the digit is lit
- OFF the digit is not lit
- OFF the digit is flashing

**Symbols used in the instructions**
- C Indicates the setting for given type of instrument
- F values preset from manufacture
- DEF symbol indicates a flashing light [symbol]
- 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
- continues on page 30

**Setting the decimal point and the minus sign**

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

**THE MINUS SIGN**
Setting the minus sign is performed by the key on higher decade. When editing the item subtraction must be made from the current number [e.g.: 013 > , on class 100 > -87]
Control keys functions

<table>
<thead>
<tr>
<th>KEY</th>
<th>MEASUREMENT</th>
<th>MENU</th>
<th>SETTING NUMBER/SELECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>✂️</td>
<td>access into USER menu</td>
<td>exit menu w/o saving</td>
<td>transition to next item w/o saving</td>
</tr>
<tr>
<td>🔬</td>
<td>programmable key function</td>
<td>return to previous level</td>
<td>move to higher decade</td>
</tr>
<tr>
<td>🔬</td>
<td>programmable key function</td>
<td>move to previous item</td>
<td>move down</td>
</tr>
<tr>
<td>🔬</td>
<td>programmable key function</td>
<td>move to next item</td>
<td>move up</td>
</tr>
<tr>
<td>🔬</td>
<td>programmable key function</td>
<td>confirm selection</td>
<td>setting/selection confirmation</td>
</tr>
<tr>
<td>🔬 + 🔬</td>
<td></td>
<td></td>
<td>numeric value is set to zero</td>
</tr>
<tr>
<td>🔬 + 🔬</td>
<td>access into LIGHT/PROFI menu</td>
<td></td>
<td></td>
</tr>
<tr>
<td>🔬 + 🔬</td>
<td>direct access into PROFI menu</td>
<td>temporary [remains LIGHT]</td>
<td></td>
</tr>
<tr>
<td>🔬 + 🔬</td>
<td></td>
<td>configuration of an item for &quot;USER&quot; menu</td>
<td></td>
</tr>
<tr>
<td>🔬 + 🔬</td>
<td></td>
<td>determine the sequence of items in &quot;USER - LIGHT&quot; menu</td>
<td></td>
</tr>
</tbody>
</table>

Setting items into „USER“ menu

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

Legend:
- 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

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

Entering access password for access into the menu

PASS. = 0
- access into menu is unrestricted, after releasing keys you automatically move to first item of the menu

PASS. > 0
- access into menu is protected by numeric code

Set "PASS" = 42
Example

Setting initial value

SET V.
- 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

DEF = 0
- 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

Example

The item "SET V." is not projected for measuring mode "FREQU."
INSTRUCTIONS FOR USE

**MODE**
Selection of instrument measuring mode
- elementary selection of instrument type

**DEF** = SINGLE

<table>
<thead>
<tr>
<th>Menu</th>
<th>Measuring mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINGLE</td>
<td>Counter/Frequencymeter</td>
</tr>
<tr>
<td>QUADR.</td>
<td>Counter/Frequencymeter for IRC</td>
</tr>
<tr>
<td>UP/DW</td>
<td>UP/DW - Counter/Frequencymeter</td>
</tr>
<tr>
<td>UP-DW</td>
<td>UP-DW - Counter/Frequencymeter</td>
</tr>
<tr>
<td>TIME</td>
<td>Stopwatch/timer</td>
</tr>
<tr>
<td>RTC</td>
<td>Stopwatch/backup timer</td>
</tr>
</tbody>
</table>

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

**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, higher frequency will be discarded

Example

![Example Image]

**FILTER**
Selection of digital filter

Example

![Example Image]

When accessing upon contact and available maximum input frequency we recommend using filter
5. SETTING LIGHT

M.START

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

CONT. IN.
- 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.
- 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

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

CLR.ST.
- Stopwatch/timer is reset and set off by the edge of the priming signal

ST. CLR.
- Stopwatch/timer is only set off by the edge

RUN

DEF = CONTAC.

Selection of stopwatch control > EDGE

Example

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
**SETTING LIGHT 5.**

**Automatic setting of the inputs**

- It is possible 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 the second input (short key stroke)
- To copy the setting of Input A to Input B (long key stroke)

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. Setting > Automatic setting (button “LEFT”).
5. SETTING LIGHT

CHANNEL > "COUNTER"

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 applied to a shaft equipped with a rotating pin (1 imp./rev) and ratio of 1:3

Example

DI V.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 applied to a shaft equipped with a rotating pin (1 imp./rev) and ratio of 1:3

Example
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)
- \( \text{DEF} = 0 \)

Setting \( \text{OFF. C.} \) = 24

Example

```
000000 000000 000000 000000 000000 000000 FLOA.P.
```

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 to projection of number in its most precise form "FLOA. P."
- for measuring modes "TIME" and "RTC" special time formats are preset

\( \text{DEF} = 000000 \)
\( \text{DEF} = \text{HH-MM-SS} \)

Projection of DP on display > 000000

Example

```
000000 SCAL.F
```
5. SETTING LIGHT

**Setting multiplying constant**
- Calibration constant serves for calculation of the input value to required display value
- Range: -99999...999999
- **DEF** = 1

Sensor is applied 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

**Setting division constant**
- Calibration constant serves 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 complete 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 appropriately
- Range: -99999...999999
- **DEF** = 1

On the display we want to see speed as revolutions/s. It is necessary to divide the figure by 60 (1 minute = 60 s), Example: It is possible to enter the resulting value in 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

```
| 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 to projection of number in its most precise form „FLOA. P.”

**DEF = 00000.a**

Projection of DP on display > 0000.oo

Example

```
0000.0 0000.0 0000.0 0000.0 0000.0 0000.0 0000.0 FLOA.P.
```

* subsequent menu item depends on instrument equipment
5. SETTING LIGHT

INSTRUCTIONS FOR USE OM 653UQC

**INP.L1** Selection of how Limit 1 is evaluated
- selection of value to which the limit is related
  - COUNT.
  - FREQ.
  DEF = COUNT.

From "Channel Counter"
From "Channel Frequency"

**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 "Hysteresis"=0, "Delay"=0

**Example**
**Setting limit 1 > LIM.L1 = 30**

* subsequent menu item depends on instrument equipment

DISPLAYED ONLY WITH OPTIONS > COMPARATORS

* Items for "Limits" and "Analog output" are accessible only if the instrument contains them.
### Setting the Boundary for Limit 2

**Selection of how Limit 2 is evaluated**

- Selection of value to which the limit is related
  
  **DEF** = COUNT.
  
  **Evaluation of the limit related to channel "Counter"**
  
  - From "Channel Counter"
  
  **DEF** = COUNT.
  
  - From "Channel Frequency" / "Kanálu Kmitočet"
  
  **Example**
  
  **COUNT.**

**Setting the boundary for limit 2**

- Range: -99999…999999
- Contingent modification of hysteresis or delay may be performed in "PROFI" menu

**Example**

**Setting limit 2**

- **DEF** = 75
- **Hysteresis** = 0, **Delay** = 0

**Example**

**COUNT.**

*Subsequent menu item depends on instrument equipment*
INSTRUCTIONS FOR USE
OM 653UQC

INP. A.O.
Selection of how analogue output is evaluated
- selection of value to which the analogue output is related

DEF = COUNT.
From "Channel Counter"

COUNT.
FREQ.
From "Channel Frequency"

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

Example
COUNT. TYP. A.O.

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

<table>
<thead>
<tr>
<th>Menu</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-20mA</td>
<td>0...20 mA</td>
<td></td>
</tr>
<tr>
<td>Er 4-20mA</td>
<td>4..20 mA</td>
<td>with indication of error statement (&lt;3,6 mA)</td>
</tr>
<tr>
<td>4-20mA</td>
<td>4...20mA</td>
<td></td>
</tr>
<tr>
<td>0.5mA</td>
<td>0...5 mA</td>
<td></td>
</tr>
<tr>
<td>0.2 V</td>
<td>0...2 V</td>
<td></td>
</tr>
<tr>
<td>0.5 V</td>
<td>0...5 V</td>
<td></td>
</tr>
<tr>
<td>0-10 V</td>
<td>0...10 V</td>
<td></td>
</tr>
<tr>
<td>+/10 V</td>
<td>±10 V</td>
<td></td>
</tr>
</tbody>
</table>

DEF = 4..20 mA

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

Example
4...20 mA 0.5 mA 0.2 V 0.5 V 0.10 V MN A.V.
Assigning the display value to the end of the AO range

**MIN A.O.**

- range: -99999...999999
- \( \text{DEF} = 0 \)

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

Example

---

Assigning the display value to the beginning of the AO range

**MAX A.O.**

- range: -99999...999999
- \( \text{DEF} = 100 \)

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**

### INSTRUCTIONS FOR USE

- **OM 653UQC**

#### LIGHT

- **Setting the menu type**
  - LIGHT: > LIGHT menu, a simple menu, which contains only items necessary for instrument setting
  - > linear structure of the menu
  - **DEF** = LIGHT

- **Selection of the channel to be displayed**
  - COUNT.
  - FREQ.
  - Value taken from channel “Counter” will be displayed
  - Value taken from channel “Frequency” will be displayed

- **Inp. d.**
  - Selection of the channel to be displayed
  - Value taken from channel
  - “Counter” will be displayed
  - “Frequency” will be displayed

- **Menu**
  - Selection of the channel - counter
  - **DEF** = COUNT.
  - Example

Example:

- **COUNT.**
  - **MENU**

Example:

- **LIGHT**
  - **FI RM.**
  - **PROFI**
  - Example
**INSTRUCTIONS FOR USE**

**OM 653UQC**

---

**Setting LIGHT 5.**

- **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

<table>
<thead>
<tr>
<th>Restoration of manufacture setting &gt; FIRM. Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRM.</strong> <strong>YES</strong> <strong>USER</strong></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Restoration of user setting &gt; USER. Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>USER.</strong> <strong>YES</strong> <strong>PAS.U</strong></td>
</tr>
</tbody>
</table>

- **!** Do not perform restoration of user setting [USER] prior to its saving in Profi menu
5. SETTING LIGHT

**IDENT.**  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

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

- in case the password is lost, please contact the administrator of this device

DEF = 0

New password - 341 > PAS. LI. = 341 Example

<table>
<thead>
<tr>
<th>Setting</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

**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

Return to measuring mode
SETTING PROFI

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

6.0 SETTING “PROFI”

PROFI Complete programming menu
• contains complete instrument menu and is protected by optional number code
• designed for expert users
• preset from manufacture is menu LIGHT

Switching over to “PROFI” menu

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

+ +
• access to menu selected under item SERVIC. > MENU > LIGHT/PROFI
• password protected access (unless set as follows under the item SERVIC. > N. PASS. > LIGHT =0)
• for access to LIGHT menu passwords for LIGHT and PROFI menu may be used
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**  
- **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 cumulated values (i.e. factory shifts) when values from individual shifts are added to the total sum
6.1.2 INSTRUMENT CONFIGURATION

6.1.2a 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 be transferred into a new meter)
Upon delay exceeding 60s, the programming mode is automatically discontinued and the instrument returns to the measuring mode.
6. SETTING PROFI

6.1.2b SELECTION OF MEASURING 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 signal 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

- Selection of measuring period/time base
  - if you set measuring period e.g. for 1 s, the measuring runs approximately 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, date is displayed for approx. 2.5 s
6.1.2d SELECTION OF INPUT FILTER PARAMETERS

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 of 50% - equal duration of Hi and Lo level
- in case if interference the use of input filter is recommended

When accessing upon contact and available maximum input frequency we recommend using filter
6. SETTING PROFI

6.1.2e SELECTION OF STOPWATCH/TIMER CONTROL

- **Selection of stopwatch/timer control**

<table>
<thead>
<tr>
<th><strong>MSTART</strong></th>
<th>Selection of stopwatch/timer control</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONTI N.</strong></td>
<td>Stopwatch/timer is running constantly if the instrument is turned on</td>
</tr>
<tr>
<td><strong>CONTAC.</strong></td>
<td>Stopwatch/timer is running upon contact making</td>
</tr>
<tr>
<td><strong>EDGE</strong></td>
<td>Stopwatch/timer is controlled by the priming signal edge</td>
</tr>
<tr>
<td><strong>RUN.ST.C.</strong></td>
<td>Stopwatch/timer is controlled and reset by the edge of the priming signal</td>
</tr>
<tr>
<td><strong>CLRRUN.</strong></td>
<td>Stopwatch/timer is reset and set off by the edge of the priming signal (when the time is not running)</td>
</tr>
<tr>
<td><strong>CLRURE.</strong></td>
<td>Stopwatch/timer is reset and set off by the edge of the priming signal, the cycle is repeated with every other edge</td>
</tr>
<tr>
<td><strong>RUN</strong></td>
<td>Stopwatch/timer is only set off by the edge</td>
</tr>
</tbody>
</table>
6.1.2f SELECTION OF STOPWATCH/TIMER RESETTING

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

- stopwatch/timer is reset through input „Clear”
- stopwatch/timer is stopped and reset through input „Clear”
- stopwatch/timer is stopped through input „Clear”

6.1.2g AUTOMATIC SETTING OF THE INPUTS

- it is possible 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.COM
6. SETTING PROFI

6.1.2h SELECTION OF THE TYPE OF INPUT

Selection of type of input

- setting applies for Input A

<table>
<thead>
<tr>
<th>NPN CON</th>
<th>Type of input NPN and upon contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNP</td>
<td>Type of input PNP</td>
</tr>
</tbody>
</table>

After selecting “PNP” it is necessary to set the input input level (Level A)

<table>
<thead>
<tr>
<th>LEVEL A</th>
<th>Setting input level</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE A</td>
<td>Setting input level</td>
</tr>
</tbody>
</table>

- 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

<table>
<thead>
<tr>
<th>LEVEL A</th>
<th>Setting input level</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE B</td>
<td>Setting input level</td>
</tr>
</tbody>
</table>

6.1.2i SETTING INPUT LEVEL

<table>
<thead>
<tr>
<th>LEVEL A</th>
<th>Setting input level</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE A</td>
<td>Setting input level</td>
</tr>
</tbody>
</table>

- 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 \ Hi**
  - upon entering the contact > active on switch-on
  - upon entering the contact > active on switch-off

6.1.2k SELECTION OF DISPLAY STATUS BACKUP

**BACKUP Selection of display status backup**

- **NO**
  - setting display value restoration after power failure or instrument switch-off
  - 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

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

Instrument resets itself after every switch-on
After switch-on the instrument loads the display status from the memory
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

EXTERNAL INPUT FUNCTION SELECTION

- **Input is off**
  - Auxiliary input governs the "LOCK" function
  - the input governs the blocking of control keys on front panel

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

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

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

- **CLR.ST.**
  - stopwatch/counter is cleared (preset) through the input, stopwatch stops altogether

- **CL. SUM.**
  - the "grand total" of the counter is zeroed

- **SUMA**
  - the cumulated value is displayed

- **COUNT.**
  - the value of "Counter" channel is displayed

- **FREQ.**
  - the value of "Frequency" channel is displayed
### 6. SETTING PROFI

#### 6.1.4 OPTIONAL ACCESSORY FUNCTIONS OF THE KEYS

#### INPUT CLEAR LEFT OFF

- **CHAN**
- **CONFIG**
- **DOWN COUNT.**
- **OUTPUT EXT. IN.**
- **UP FREQ.**
- **SERVICE KEYS ENTER CLEAR**
- **SET L1**
- **SET L2**
- **SHOW TARE.**
- **CL. SUM.**
- **SUMA**

#### 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

- **SHOW T.**
  - Shows TARE

- **CLR T.**
  - Clears TARE

- **TARE**
  - Activates function TARE

- **CL. SUM**
  - Clears the total sum

- **SUMA**
  - Displays the total sum (grand total)

#### INPUT CLEAR LEFT OFF

- **CHAN**
- **CONFIG**
- **DOWN START**
- **OUTPUT EXT. IN.**
- **UP PAUSE**
- **SERVICE KEYS ENTER STOP**
- **CLR ST.**
- **CLEAR**
- **SET L1**
- **SET L2**

#### 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

- **STOP**
  - Stop - stopwatch/clock

- **CLR ST.**
  - Stop and clear - stopwatch/clock

- **CLEAR**
  - Clear - stopwatch/clock

- **SET L.**
  - Setting limit L1, resp. L2

---

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6. SETTING PROFI

6.2 SETTING “PROFI” - CHANNEL

6.2.1a SETTING MULTIPLYING CONSTANT - CHANNEL COUNTER

6.2.1b SETTING DIVISION CONSTANT - CHANNEL COUNTER

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 appropriately. Please pay attention to the time platform (TIME 1), which must must allow for adding up the 1...255 pulses within the set time period. ATTENTION: 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
  - this menu item is always displayed after selection of a particular type of filter
  - **DEF** = 2

- **CON. F.C.** 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

- **1/Fr.** Identical setting is used for "CH. Fr."
6. SETTING PROFI

6.2.3 SELECTION OF PROJECTION FORMAT - CHANNEL COUNTER

- 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."

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 > HM.MS.C
- in 0.01 seconds > MM.SS.CC, 99.SS.CC
### Setting "Profi" - Outputs

#### 6.3 Setting "Profi" - Outputs

- **Input**
- **Channel**
- **Output**
- **Service**
- **Limits**
- **Data**
- **An. Out.**
- **Disp.**

**Setting „Profi“ - Outputs**

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

- **Limits**
- **Data**
- **An. Out.**
- **Disp.**

### 6.3.1a Selection of how Limit 1 is evaluated

- **Input**
- **Channel**
- **Output**
- **Service**
- **Limits**
- **Data**
- **An. Out.**
- **Disp.**

**Selection of how Limit 1 is evaluated**

- **Input L1**
  - Selection of value to which the limit is related
- **Channel L1**
- **Output L1**
- **Service L1**
- **Limits L1**
- **Data L1**
- **An. Out. L1**
- **Disp. L1**

### 6.3.1b Selection of mode of output L1

- **Input**
- **Channel**
- **Output**
- **Service**
- **Limits**
- **Data**
- **An. Out.**
- **Disp.**

**Mode of Limit 1**

- **Input L1**
  - Standard mode - limit, hysteresis and delay
- **Channel L1**
  - Automatic zeroing of the counter at a preset value and a generating an impulse of duration set in "Tim. L1"
- **Output L1**
  - 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

MODE > HYSTER

LIMIT - Limit/hysteresis/delay: MODE L. > “HYSTER”

Z > 0 - Switch-on relay
TYPE > SWITCH-ON
LED signalization

Z < 0 - Switch-off relay
TYPE > SWITCH-OFF
LED signalization

DESCRIPTION OF RELAY FUNCTION

MODE > 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. **SETTING PROFI**

**6.3.3d  SELECTION OF TYPE OF OUTPUT**

- **TYP.L1**
  - **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. L.1**
  - Setting limit for switch-on
- **HYS. L.1**
  - Setting hysteresis
  - defines the band around the limit (on both sides, LIM. ±1/2 HYS.)
- **TIM. L.1**
  - 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

Setting the data output rate

<table>
<thead>
<tr>
<th>BAUD</th>
<th>Setting the data output rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>Rate - 300 Baud</td>
</tr>
<tr>
<td>600</td>
<td>Rate - 600 Baud</td>
</tr>
<tr>
<td>1200</td>
<td>Rate - 1200 Baud</td>
</tr>
<tr>
<td>2400</td>
<td>Rate - 2400 Baud</td>
</tr>
<tr>
<td>4800</td>
<td>Rate - 4800 Baud</td>
</tr>
<tr>
<td>9600</td>
<td>Rate - 9600 Baud</td>
</tr>
<tr>
<td>19200</td>
<td>Rate - 19200 Baud</td>
</tr>
<tr>
<td>38400</td>
<td>Rate - 38400 Baud</td>
</tr>
<tr>
<td>57600</td>
<td>Rate - 57600 Baud</td>
</tr>
<tr>
<td>115200</td>
<td>Rate - 115200 Baud</td>
</tr>
<tr>
<td>230400</td>
<td>Rate - 230400 Baud</td>
</tr>
</tbody>
</table>

6.3.2b  SETTING THE INSTRUMENT ADDRESS

Setting the instrument address

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

Setting the instrument address - PROFIBUS

- setting within the range 1..127
- DEF = 19
6. SETTING PROFI

6.3.3a SELECTION OF HOW ANALOGUE OUTPUT IS EVALUATED

INP.A.O. 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.A.O. Selection of type of analog output

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

Er 4-20 Type - 4...20 mA
- with indication of error statement (< 3,6 mA)

4-20 mA Type - 4...20 mA

0-5 mA 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

- **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.A.O.** Assigning the displayed value to the beginning of the analog output range
  - Range: -99999...999999
  - **DEF** = 0

  **MAX.A.O.** 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

- **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

**INP.D.** Selection of the channel to be displayed
- Selection of the value which should be displayed
6. SETTING PROFI

6.3.4b SELECTION OF DISPLAY BRIGHTNESS

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

<table>
<thead>
<tr>
<th>Selection of display brightness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display brightness - 100%</td>
</tr>
<tr>
<td>100%</td>
</tr>
<tr>
<td>Display brightness - 75%</td>
</tr>
<tr>
<td>75%</td>
</tr>
<tr>
<td>Display brightness - 50%</td>
</tr>
<tr>
<td>50%</td>
</tr>
<tr>
<td>Display brightness - 25%</td>
</tr>
<tr>
<td>25%</td>
</tr>
<tr>
<td>Automatic brightness adjustment - High</td>
</tr>
<tr>
<td>AUTO H.</td>
</tr>
<tr>
<td>Automatic brightness adjustment - Medium</td>
</tr>
<tr>
<td>AUTO M.</td>
</tr>
<tr>
<td>Automatic brightness adjustment - Low</td>
</tr>
<tr>
<td>AUTO L.</td>
</tr>
</tbody>
</table>
6. **SETTING PROFI**

### 6.4 SETTING “PROFI” - SERVICE

The instrument’s service functions are set in this menu

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MENU</strong></td>
<td>Selection of menu type LIGHT/PROFI</td>
</tr>
<tr>
<td><strong>RESTOR.</strong></td>
<td>Restoration of the manufacture setting and instrument calibration</td>
</tr>
<tr>
<td><strong>N.PASS.</strong></td>
<td>Setting new access password</td>
</tr>
<tr>
<td><strong>IDENT.</strong></td>
<td>Instrument identification</td>
</tr>
</tbody>
</table>

**Selection of menu type LIGHT/PROFI**
- allows to set the menu complexity as per user needs and abilities

**ACTIVE LIGHT MENU**
- simple programming menu, contains only items necessary for instrument configuration and setting
- linear menu structure > items in succession

**ACTIVE PROFI MENU**
- complete programming menu for expert users
- tree menu

**Change of setting is valid with next access into menu**

### 6.4.1 SELECTION OF THE TYPE OF PROGRAMMING MENU
6.4.2 RESTORATION OF THE MANUFACTURE SETTING

- FI RM.: 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

After restoration of setting the instrument switches off for several seconds

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.
  - numeric 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

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>type of instrument</td>
</tr>
<tr>
<td>2.</td>
<td>SW: number - version</td>
</tr>
<tr>
<td>3.</td>
<td>the input type</td>
</tr>
</tbody>
</table>
7. 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
- setting may be performed in **LIGHT** or **PROFI** menu, with the **USER** menu then overtaking the given menu structure

<table>
<thead>
<tr>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
</tr>
<tr>
<td>YES</td>
</tr>
<tr>
<td>SHOW</td>
</tr>
</tbody>
</table>
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 equally be used in the Profi menu).

Access password

Setting calibration constant - counter

Selecting an item from the main menu

Selecting an item from the main 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.
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](http://www.orbit.merret.cz)

### Detailed Description of Communication via Serial Line

<table>
<thead>
<tr>
<th>Activity</th>
<th>Type</th>
<th>Protocol</th>
<th>Data Transferred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data solicitation (PC)</td>
<td>232</td>
<td>ASCII</td>
<td># A A &lt;CR&gt;</td>
</tr>
<tr>
<td>MessBus</td>
<td>No - data is transmitted permanently</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data solicitation (PC)</td>
<td>485</td>
<td>ASCII</td>
<td># A A &lt;CR&gt;</td>
</tr>
<tr>
<td>MessBus</td>
<td>&lt;SADR&gt; &lt;ENO&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data transmission (instrument)</td>
<td>232</td>
<td>ASCII</td>
<td>&gt; D (D) (D) (D) (D) (D) (D) (D) (D) (D) &lt;CR&gt;</td>
</tr>
<tr>
<td>MessBus</td>
<td>&lt;STX&gt; D (D) (D) (D) (D) (D) (D) (D) (D) (D) &lt;ETX&gt; &lt;BCC&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data transmission (instrument)</td>
<td>485</td>
<td>ASCII</td>
<td>&gt; D (D) (D) (D) (D) (D) (D) (D) (D) (D) &lt;CR&gt;</td>
</tr>
<tr>
<td>MessBus</td>
<td>&lt;STX&gt; D (D) (D) (D) (D) (D) (D) (D) (D) (D) &lt;ETX&gt; &lt;BCC&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confirmation of data acceptance (PC) - OK</td>
<td>485</td>
<td>MessBus</td>
<td>&lt;DLE&gt; 1</td>
</tr>
<tr>
<td>Confirmation of data acceptance (PC) - Bad</td>
<td>485</td>
<td>MessBus</td>
<td>&lt;NAK&gt;</td>
</tr>
<tr>
<td>Sending address (PC) prior command</td>
<td>485</td>
<td>EADR</td>
<td>&lt;ENQ&gt;</td>
</tr>
<tr>
<td>Confirmation of address (instrument)</td>
<td>485</td>
<td>&lt;SADR&gt; &lt;ENO&gt;</td>
<td></td>
</tr>
<tr>
<td>Command transmission (PC)</td>
<td>232</td>
<td>ASCII</td>
<td># A A N P (D) (D) (D) (D) (D) (D) (D) &lt;CR&gt;</td>
</tr>
<tr>
<td>MessBus</td>
<td>&lt;STX&gt; $ N P (D) (D) (D) (D) (D) (D) &lt;ETX&gt; &lt;BCC&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Command transmission (PC)</td>
<td>485</td>
<td>ASCII</td>
<td># A A N P (D) (D) (D) (D) (D) (D) (D) &lt;CR&gt;</td>
</tr>
<tr>
<td>MessBus</td>
<td>&lt;STX&gt; $ N P (D) (D) (D) (D) (D) (D) &lt;ETX&gt; &lt;BCC&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Command confirmation (instrument)</td>
<td>232</td>
<td>ASCII</td>
<td>OK ! A A &lt;CR&gt;</td>
</tr>
<tr>
<td>Bad</td>
<td>? A A &lt;CR&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Command confirmation (instrument)</td>
<td>485</td>
<td>MessBus</td>
<td>OK ! A A &lt;CR&gt;</td>
</tr>
<tr>
<td>Bad</td>
<td>? A A &lt;CR&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instrument identification</td>
<td></td>
<td>ASCII</td>
<td># A A 1 Y &lt;CR&gt;</td>
</tr>
<tr>
<td>HW identification</td>
<td></td>
<td>ASCII</td>
<td># A A 1 Z &lt;CR&gt;</td>
</tr>
<tr>
<td>One-time transmission</td>
<td></td>
<td>ASCII</td>
<td># A A 7 X &lt;CR&gt;</td>
</tr>
<tr>
<td>Repeated transmission</td>
<td></td>
<td>ASCII</td>
<td># A A 8 X &lt;CR&gt;</td>
</tr>
</tbody>
</table>
### LEGENDA

<table>
<thead>
<tr>
<th>SIGN</th>
<th>RANGE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>35-23n</td>
<td>Command beginning</td>
</tr>
<tr>
<td>A</td>
<td>0-31</td>
<td>Two characters of instrument address (sent in ASCII - tens and units, e.g. “01”, “99” universal)</td>
</tr>
<tr>
<td>&lt;CR&gt;</td>
<td>13</td>
<td>Carriage return</td>
</tr>
<tr>
<td>&lt;SP&gt;</td>
<td>32</td>
<td>Space</td>
</tr>
<tr>
<td>N</td>
<td>0-31</td>
<td>Number and command - command code</td>
</tr>
<tr>
<td>P</td>
<td>0-31</td>
<td>Data - usually characters “0”...“9”, “-”, “.”; (D) - dp. and (D) may prolong data</td>
</tr>
<tr>
<td>R</td>
<td>30-3F</td>
<td>Relay and tare status</td>
</tr>
<tr>
<td>t</td>
<td>33</td>
<td>Positive confirmation of command (ok)</td>
</tr>
<tr>
<td>?</td>
<td>63</td>
<td>Negative confirmation of command (point)</td>
</tr>
<tr>
<td>&gt;</td>
<td>62</td>
<td>Beginning of transmitted data</td>
</tr>
<tr>
<td>&lt;STX&gt;</td>
<td>2</td>
<td>Beginning of text</td>
</tr>
<tr>
<td>&lt;ETX&gt;</td>
<td>3</td>
<td>End of text</td>
</tr>
<tr>
<td>&lt;SADR&gt;</td>
<td>adresa +60</td>
<td>Prompt to send from address</td>
</tr>
<tr>
<td>&lt;EADR&gt;</td>
<td>adresa +40</td>
<td>Prompt to accept command at address</td>
</tr>
<tr>
<td>&lt;ENQ&gt;</td>
<td>5</td>
<td>Terminate address</td>
</tr>
<tr>
<td>&lt;DLE&gt;</td>
<td>18</td>
<td>Confirm correct statement</td>
</tr>
<tr>
<td>&lt;NAK&gt;</td>
<td>21</td>
<td>Confirm error statement</td>
</tr>
<tr>
<td>&lt;BCC&gt;</td>
<td>21</td>
<td>Check sum - XOR</td>
</tr>
</tbody>
</table>

### RELAY, TARE

<table>
<thead>
<tr>
<th>SIGN</th>
<th>RELAY 1</th>
<th>RELAY 2</th>
<th>TARE</th>
<th>CHANGE RELAY 3/4</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Q</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>R</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>S</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>T</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>U</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>V</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>W</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>p</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>q</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
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<td>r</td>
<td>0</td>
<td>1</td>
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<td>s</td>
<td>1</td>
<td>1</td>
<td>0</td>
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<td>0</td>
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<td>u</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>v</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>w</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

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“.
### ERROR STATEMENTS

<table>
<thead>
<tr>
<th>ERROR</th>
<th>CAUSE</th>
<th>ELIMINATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.D.Un.</td>
<td>Number is too small (large negative) to be displayed</td>
<td>change DP setting, channel constant</td>
</tr>
<tr>
<td>E.D.OW.</td>
<td>Number is too large to be displayed</td>
<td>change DP setting, channel constant</td>
</tr>
<tr>
<td>E.T.Un.</td>
<td>Number is outside the table range</td>
<td>increase the table values, change input setting (channel constant)</td>
</tr>
<tr>
<td>E.T.OW.</td>
<td>Number is outside the table range</td>
<td>increase the table values, change input setting (channel constant)</td>
</tr>
<tr>
<td>E.V.Un.</td>
<td>Input quantity is smaller than permitted input quantity range</td>
<td>change input signal value or input (range) setting</td>
</tr>
<tr>
<td>E.V.OW.</td>
<td>Input quantity is larger than permitted input quantity range</td>
<td>change input signal value or input (range) setting</td>
</tr>
<tr>
<td>E.HW.</td>
<td>A part of the instrument does not work properly</td>
<td>send the instrument for repair</td>
</tr>
<tr>
<td>E.EE</td>
<td>Data in EEPROM corrupted</td>
<td>perform restoration of manufacture setting, upon repeated error statement send instrument for repair</td>
</tr>
<tr>
<td>E.SET.</td>
<td>Data in EEPROM outside the range</td>
<td>perform restoration of manufacture setting, upon repeated error statement send instrument for repair</td>
</tr>
<tr>
<td>E.CLR.</td>
<td>Memory was empty (presetting carried out)</td>
<td>upon repeated error statement send instrument for repair, possible failure in calibration</td>
</tr>
</tbody>
</table>
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 is adjustable
Input frequency:
- 0,1...50 kHz (Mode SINGLE)
- 0,1...20 kHz (Mode UP/DOWN)
- 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 (grand total)/register of shifts
- 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 operation, setting and update
Watch-dog: reset after 540 ms
Calibration: at 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
Adjustable: 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...260 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

<table>
<thead>
<tr>
<th>Connection:</th>
<th>connector terminal board, conductor cross-section &lt;1.5 mm² / &lt;2.5 mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stabilisation period:</td>
<td>within 15 minutes after switch-on</td>
</tr>
<tr>
<td>Working temp.:</td>
<td>-20°...60°C</td>
</tr>
<tr>
<td>Storage temp.:</td>
<td>-20°...85°C</td>
</tr>
<tr>
<td>Cover:</td>
<td>IP65 (front panel only)</td>
</tr>
<tr>
<td>Construction:</td>
<td>safety class I</td>
</tr>
<tr>
<td>Overvoltage cat.:</td>
<td>EN 61010-1, A2</td>
</tr>
<tr>
<td>Dielectric strength:</td>
<td>4 kVAC after 1 min between supply and input</td>
</tr>
<tr>
<td></td>
<td>4 kVAC after 1 min between supply and data/ analog output</td>
</tr>
<tr>
<td></td>
<td>4 kVAC after 1 min between supply and relay output</td>
</tr>
<tr>
<td></td>
<td>2.5 kVAC after 1 min between input and data/ analog output</td>
</tr>
<tr>
<td>Insulation resist.:</td>
<td>for pollution degree II, measurement category III</td>
</tr>
<tr>
<td></td>
<td>Instrument power supply &gt; 670 V (PI), 300 V (DI)</td>
</tr>
<tr>
<td></td>
<td>Input/output &gt; 300 V (PI), 150 (DI)</td>
</tr>
<tr>
<td>EMC:</td>
<td>EN 61326-1</td>
</tr>
</tbody>
</table>

**PI** - Primary insulation, **DI** - Double insulation
11. 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

11. 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
A guarantee period of 60 months from the date of sale to the user applies to this instrument. Defects occurring during this period due to manufacture error or due to material faults shall be eliminated free of charge.

For quality, function and construction of the instrument the guarantee shall apply provided that the instrument was connected and used in compliance with the instructions for use.

The guarantee shall not apply to defects caused by:

- mechanic damage
- transportation
- intervention of unqualified person incl. the user
- unavoidable event
- other unprofessional interventions

The manufacturer performs guarantee and post-guarantee repairs unless provided for otherwise.
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

decares 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 61000-4-6), EN 61000-4-8, EN 61000-4-9, EN 61000-6-1, EN 61000-6-2, EN 65022, chap. 6 and chap. 6

The product is furnished with CE label issued in 2010

As documentation serve the protocols of authorized and accredited organizations:
EMC MD ČR, Zkušebna tech. prostředků, protocol No.: 80/6-280/2007 of 13/11/2007
MD 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