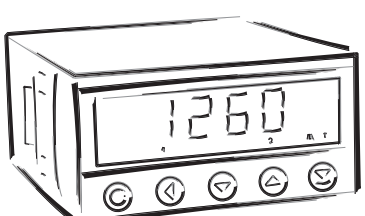
GUARANTEE 2 YEARS

OM 351

3 1/2 DIGIT PROGRAMMABLE

DC VOLTMETER/AMMETER
AC VOLTMETER/AMMETER
PROCESS MONITOR
OHMMETER
THERMOMETER FOR PT 100/500/1 000
THERMOMETER FOR NI 1 000
THERMOMETER FOR THERMOCOUPLES
DISPLAY INST. FOR LINEAR POTENTIOMETERS



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

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

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

CONNECTION

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

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2.1 DESCRIPTION

The OM 351 model series are 3 1/2 digit programmable panel instruments, manufactured in the following alternatives:

OM 351DC	DC voltmeter/ammeter
OM 351AC	AC voltmeter/ammeter
OM 351PM	Process monitor
OM 351RTD	Thermometer for Pt 100/500/1 000, Ni 1 000
OM 351T/C	Thermometer for thermocouples
OM 351DU	Display instrument for linear potentiometers
OM 351OHM	Ohmmeter

The instruments are based on an 8-bit microcontroller with A/D converter, which secures high accuracy, stability and easy operation of the instrument.

Programmable projection of the display

Setting	selection of measuring range
Calibration	projection for both limit values of the input signal
Projection	±1999

Linearisation

Linearisation	through linear interpolation in 25 points (pouze přes OM Link)**

Compensation of

Conduct	automatic compensation of 2-wire conduct
Probes	compensation of internal resistance of the measuring probe (conduct resistance in the measuring head)
Cold junctions	fixed or automatic

Digital filters

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

Mathematic functions

Tare*	assigned to reset display in case of non-zero input signal

External control

Hold	display/instrument blocking
Lock	locking the control keys for access into Configuration menu
Tára*	tare activation

** only for types DC, PM, DU **only for types DC, PM, OHM, DU*

2.2 OPERATION

The instrument is set and controlled by five control keys located on the front panel. All programmable settings of the instrument are 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

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

Comparators are assigned to control two limit values with relay output. 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 outputs 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.

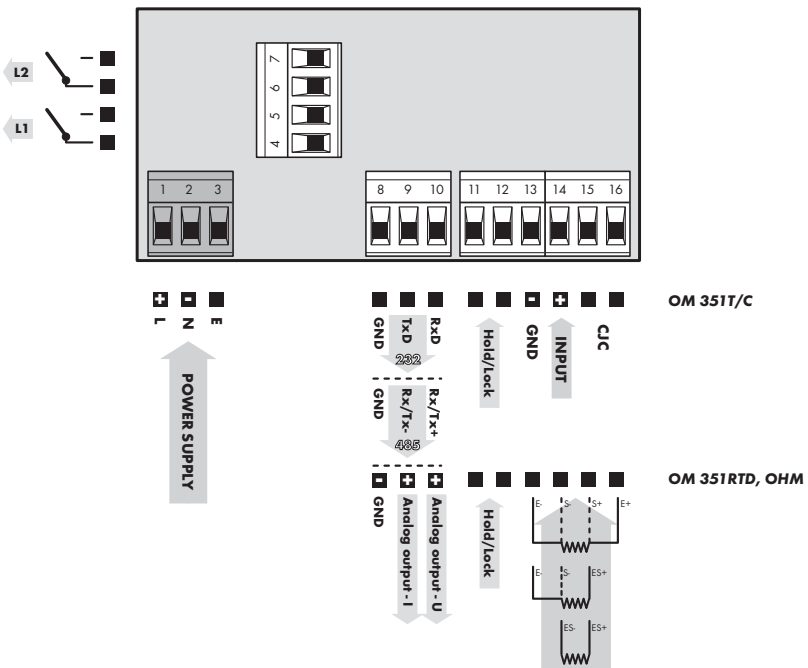
Analog outputs will find their place in applications where further evaluating or processing of measured data in external devices is required. We offer a universal analog output with the option of selection of output type - voltage/current. The value of analog output corresponds with the displayed data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

The lead for feeding of the instrument should not be in the proximity of incoming low-potential signals.

Contactors, motors with larger input power and other efficient elements should not be in the proximity of the instrument.

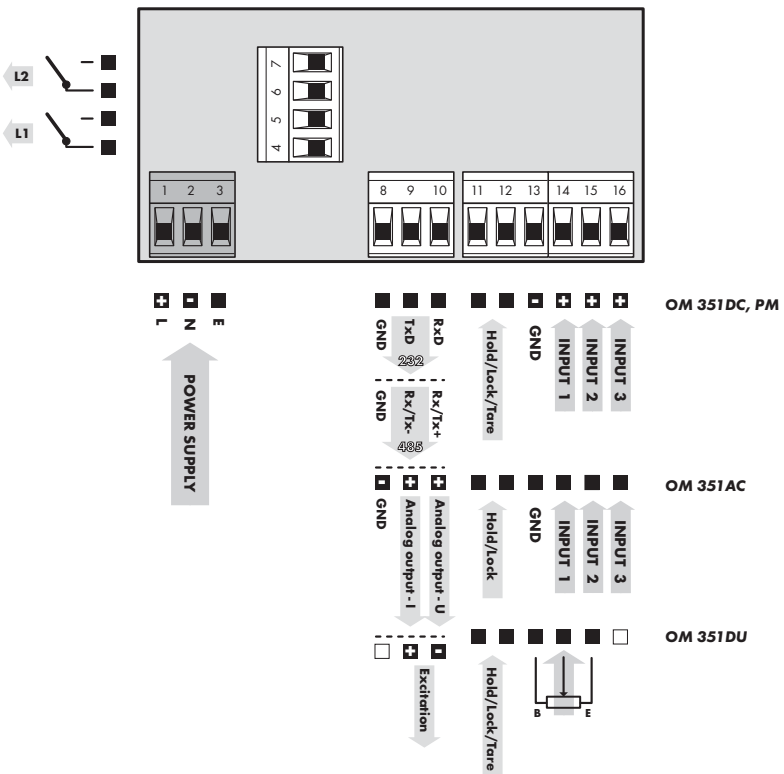
The lead into instrument input (the measured quantity) should be in sufficient distance from all power leads and appliances. Provided this cannot be secured, it is necessary to use shielded leads with connection to ground (terminal E).

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 terminal „E" has to be connected at all times.
In case of RTD and OHM inputs with 2- or 3- wire connection it is necessary to link the unconnected inputs on the terminal board (13+14/15+16 or 15+16).



MEASURING RANGES

Type/Input	Input 1	Input 2	Input 3
OM 351 AC	0...60/150/300 mV	0...10 V	0...120 V
OM 351 AC	0...1 (2,5)/5 A	0...250 V	0...450 V
OM 351 DC	±2/±20 mA	±0,2/±2 V	±20/±200 V
OM 351 DC	0...1/5 A	0...60/150 mV	
OM 351 PM	0/4...20 mA	0...2 V	0...5/10 V
OM 351 OHM	0...200 Ohm * 0...2 kOhm * 0...100 kOhm * 5...105 Ohm		

SETTING PROFI

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

SETTING LIGHT

- For trained users
- Only items necessary for instrument setting
- Password protected access
- Possibility to arrange items of the „User“ menu

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 DESCRIPTION

The instrument is set and controlled by means of five control keys located on the front panel. All programmable settings of the instrument are realised in three 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

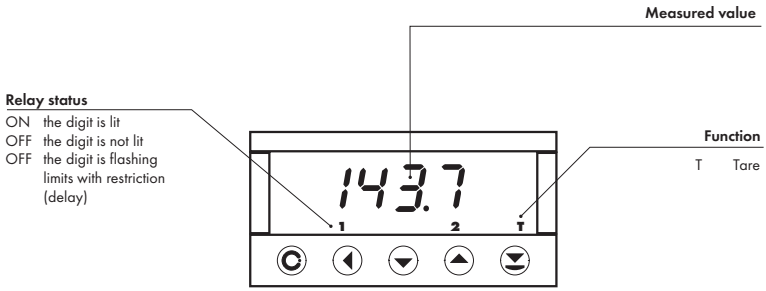
USER User programmable menu
- may contain arbitrary items selected from programmable menu (LIGHT/PROFI), which determines the authorization (see or change)
- access is without password

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).

Setting and controlling th 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

DC AC PM
DU OHM RTD T/C Indicates the setting for given type of instrument

DEF values preset from manufacture


symbol indicates a flashing light (symbol)


inverted triangle indicates the item that can be located into USER menu

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 to beyond the highest decade, when the decimal point starts flashing . Positioning is performed by ▲/▼.

THE MINUS SIGN

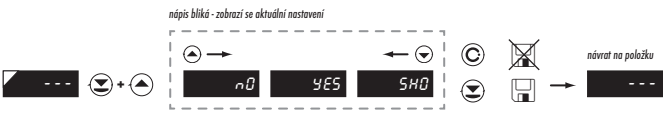
Setting the minus sign is performed by the key ▼ on higher decade. When editing the item substraction must be made from the current number (e.g..: 013 > ▼, on class 100 > -87)

CONTROL KEYS FUNCTIONS

Key	Measurement	Menu	Setting numbers/Selection
C	access into USER menu	exit menu w/o saving	transition to next item w/o saving
◀	tare value (DC, PM) resistance measured (RTD) cold junctions temperature (T/C)	back to previous level	move to higher decade
▼	cancel Tare	move to previous item	move down
▲	cancel Tare	move to next item	move up
▼▼	Tare	confirm selection	setting/selection confirmation
C + ▼▼	access into LIGHT/PROFI menu		
C + ▼	direct access into PROFI menu - temporary (remains LIGHT)		
▼▼ + ▲			configuration of an item for USER menu

CONFIGURATION OF USER MENU ITEMS

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



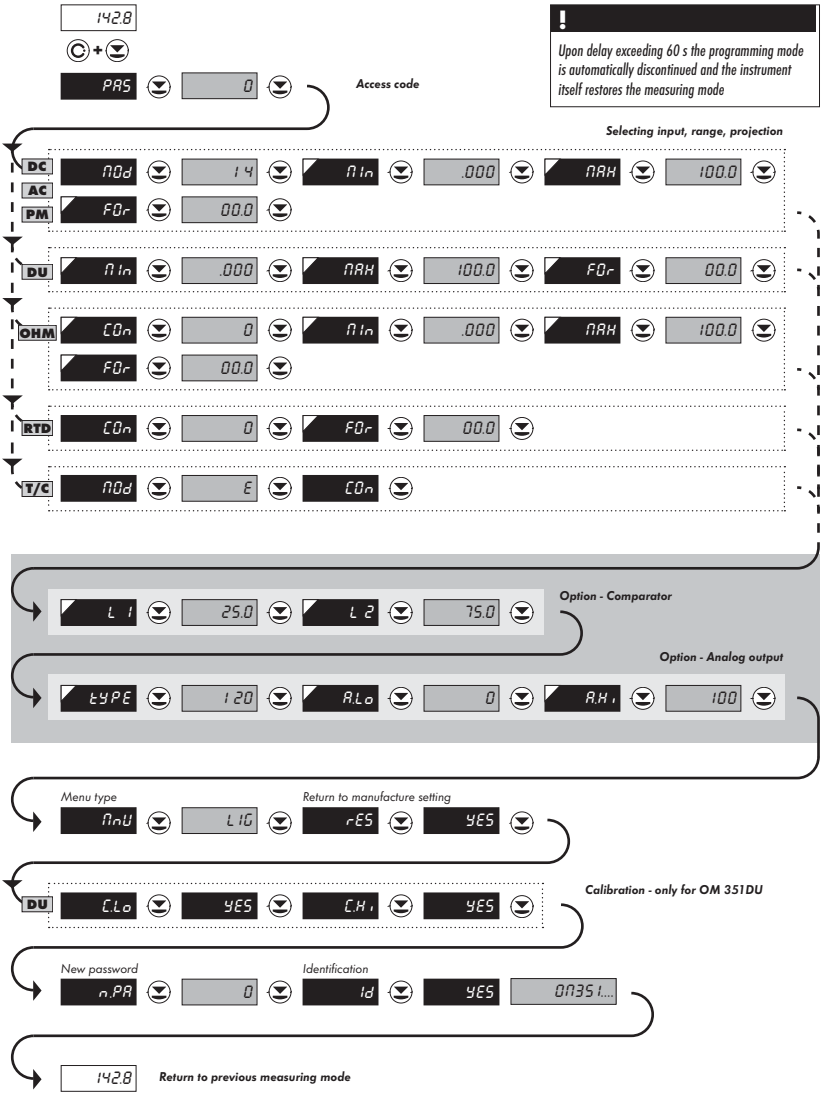
nO	item will not be displayed in USER menu
YES	item will be displayed USER menu with the option of setting options
SHO	item will be solely displayed in the USER menu

5.0 SETTING "LIGHT"

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

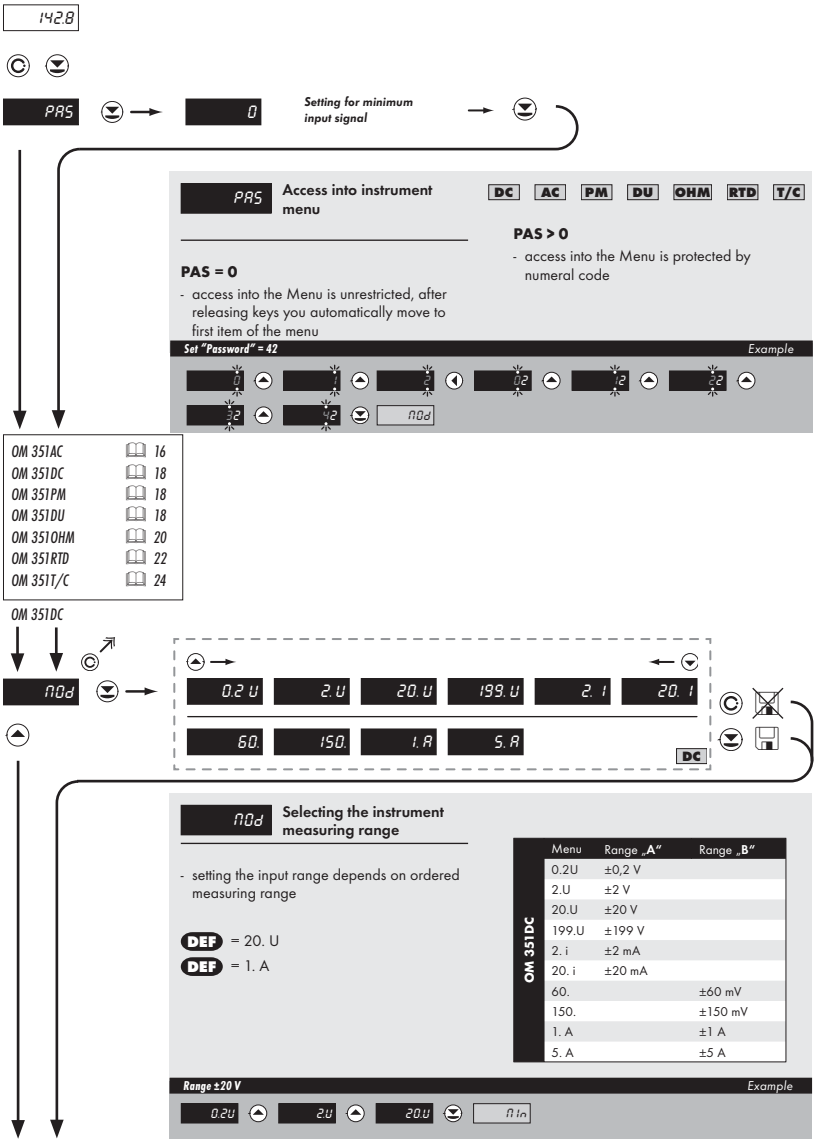
- **For capable users**
- **Only items necessary for instrument setting**
- **Password protected access**
- **Possibility to arrange items of the „User" menu**
- **Linear menu structure**

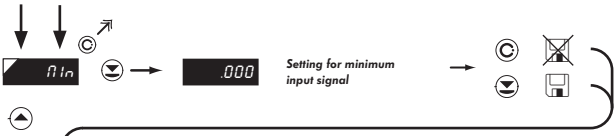
Preset from manufacture	
Password	*"0"*
Menu	*LIGHT*
USR menu	*off*
Setting the items	DEF



!

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


1428
PAS
0
Setting for minimum input signal
PAS
Access into instrument menu
DC AC PM DU OHM RTD T/C
PAS = 0
- access into the Menu is unrestricted, after releasing keys you automatically move to first item of the menu
PAS > 0
- access into the Menu is protected by numeral code
Set "Password" = 42
Example
POd
OM 351AC 16
OM 351DC 18
OM 351PM 18
OM 351DU 18
OM 351OHM 20
OM 351RTD 22
OM 351T/C 24
OM 351DC
POd
0.2 U
2. U
20. U
199. U
2. I
20. I
60.
150.
1. A
5. A
DC
POd
Selecting the instrument measuring range
- setting the input range depends on ordered measuring range
DEF = 20. U
DEF = 1. A
OM 351DC
Menu
Range „A"
Range „B"
0.2U ±0,2 V
2.U ±2 V
20.U ±20 V
199.U ±199 V
2. i ±2 mA
20. i ±20 mA
60. ±60 mV
150. ±150 mV
1. A ±1 A
5. A ±5 A
Range ±20 V
Example
0.2U
2U
20U
Min

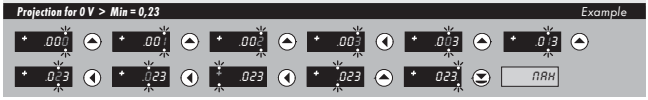


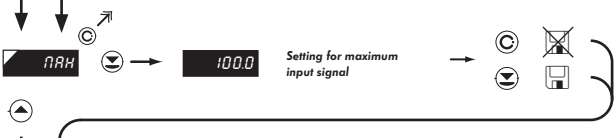
MIn **Setting display projection for minimum value of input signal**

- range of the setting is ±1999

- positioning the decimal point does not have effect on display projection
- after confirmation of the value the decimal point automatically moves to max. number of decimal places

DEF = 0





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

- range of the setting is ±1999

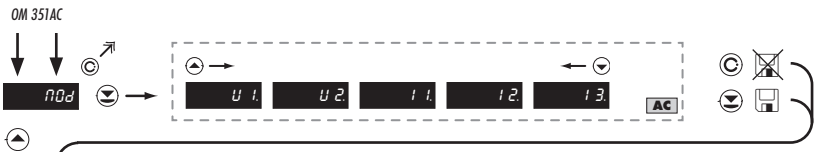
- positioning the decimal point does not have effect on display projection
- after confirmation of the value the decimal point automatically moves to max. number of decimal places

DEF = 100

FOr **Setting projection of decimal point**

DEF = 0

- positioning of decimal point in measuring mode on the display is set here



nOd Selecting the instrument measuring range

- setting the input range depends on ordered measuring range

DEF = U 1.

OM 351AC	Menu	Range „S"	Range „U"
	U 1.	0...10 V	0...250 V
	U 2.	0...120 V	0...450 V
	Menu	Range „K"	Range „P"
	I 1.	0...60 mV	0...1 A
	I 2.	0...150 mV	0...2,5 A
	I 3.	0...300 mV	0...5 A

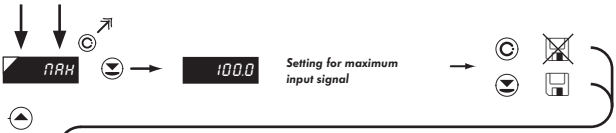
Range 0...5 A *Example*

nIn Setting display projection for minimum value of input signal

- range of the setting is ±1999
- positioning the decimal point does not have effect on display projection
- after confirmation of the value the decimal point automatically moves to max. number of decimal places

DEF = 0

Projection for 0 A > Min = 0 *Example*



nAH **Setting display projection for maximum value of input signal**

- range of the setting is ±1999
- positioning the decimal point does not have effect on display projection
- after confirmation of the value the decimal point automatically moves to max. number of decimal places

DEF = 100

Projection for 5 A > Max = 350 *Example*

FOr **Setting projection of decimal point**

DEF = 0

- positioning of decimal point in measuring mode on the display is set here

Projection of decimal point on the display > XXXX. *Example*

** following item of the menu depends on instrument equipment*

nOd **Selecting the instrument measuring range**

- setting the input range depends on ordered measuring range

DEF = I 4

OM 351PM	Menu	Range
	U 2.	0...2 V
	U 5.	0...5 V
	U 10.	0...10 V
	I 0.	0...20 mA
	I 4.	4...20 mA

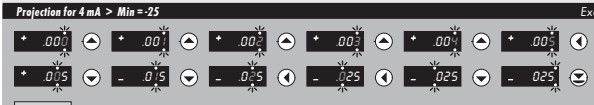
Range 4...20 mA *Example*

nIn **Setting display projection for minimum value of input signal**

- range of the setting is ±1999
- positioning the decimal point does not have effect on display projection
- after confirmation of the value the decimal point automatically moves to max. number of decimal places

DEF = 0

Projection for 4 mA > Min = -25 *Example*



nAH **Setting display projection for maximum value of input signal**

- range of the setting is ±1999
- positioning the decimal point does not have effect on display projection
- after confirmation of the value the decimal point automatically moves to max. number of decimal places

DEF = 100

Projection for 20 mA > Max = 250 *Example*

FOr **Setting projection of decimal point**

DEF = 0

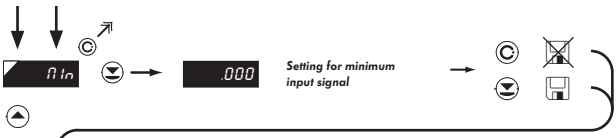
- positioning of decimal point in measuring mode on the display is set here

Projection of decimal point on the display > XXX.x *Example*

** following item of the menu depends on instrument equipment*

28

OM 351DU

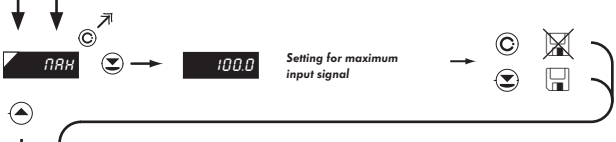


MIn **Setting display projection for minimum value of input signal**

- range of the setting is ±1999
- positioning the decimal point does not have effect on display projection
- after confirmation of the value the decimal point automatically moves to max. number of decimal places

DEF = 0

Projection for počátek > Min = 0 *Example*

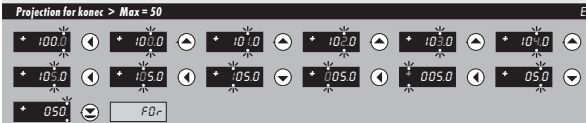


MAX **Setting display projection for maximum value of input signal**

- range of the setting is ±1999
- positioning the decimal point does not have effect on display projection
- after confirmation of the value the decimal point automatically moves to max. number of decimal places

DEF = 100

Projection for konec > Max = 50 *Example*



FOr Setting projection of decimal point

DEF = 00.0

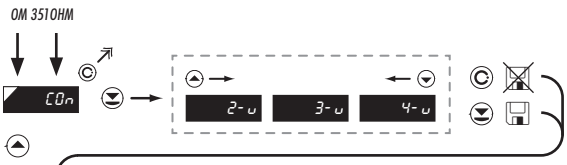
- positioning of decimal point in measuring mode on the display is set here

Projection of decimal point on the display > XXX.x *Example*

** following item of the menu depends on instrument equipment*

28

Calibration of the beginning and the end of range of linear potentiometer is on page 31



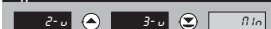
COn **Selecting the type of sensor connection**

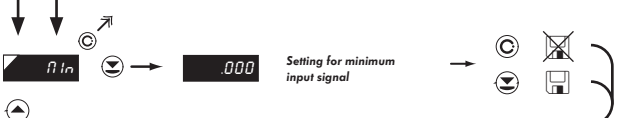
- in 2- or 3- wire connection it is necessary to link the unconnected inputs (see Chapter Connection)

DEF = 0

OM 351 OHM	Menu	Connection
	2-u	2-wire
	3-u	3-wire
	4-u	4-wire

Type of connection - 3-wire > COn = 3-u *Example*





Min **Setting display projection for minimum value of input signal**

- range of the setting is ±1999
- positioning the decimal point does not have effect on display projection
- after confirmation of the value the decimal point automatically moves to max. number of decimal places

DEF = 0

Projection for 5 Ohm > Min = 0 *Example*

nAH **Setting display projection for maximum value of input signal**

- range of the setting is ±1999
- positioning the decimal point does not have effect on display projection
- after confirmation of the value the decimal point automatically moves to max. number of decimal places

DEF = 100

Projection for 105 Ohm > Max = 350 *Example*

FOr **Setting projection of decimal point**

DEF = 00.0

- positioning of decimal point in measuring mode on the display is set here

Projection of decimal point on the display > XXX.x *Example*

** following item of the menu depends on instrument equipment*

28

OM 351RTD

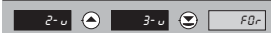
COn **Selecting the type of sensor connection**

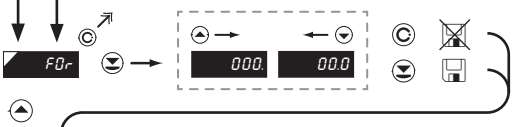
- in 2- or 3- wire connection it is necessary to link the unconnected inputs (see Chapter Connection)

DEF = 4-u

OM 351RTD	Menu	Connection
	2-u	2-wire
	3-u	3-wire
	4-u	4-wire

Type of connection - 3-wire > COn = 3-u *Example*





FOr **Setting projection of decimal point**

- positioning of decimal point in measuring mode on the display is set here

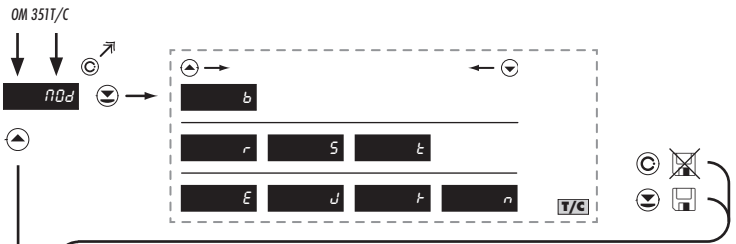
- **000.** > measuring range -50°...400°C
  00.0 > measuring range -50,0°...199,9°C

DEF = 00.0

Projection of decimal point on the display > XXX.x *Example*

* following item of the menu depends on instrument equipment

28



Selection of type of thermocouple

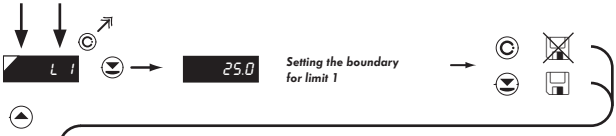
- setting the input range depends on ordered measuring range

DEF = B
DEF = S
DEF = K

OM 351T/C	Menu	Type „A"	Type „B"	Type „C"
	B	B		
	R		R	
	S		S	
	T		T	
	E			E
	J			J
	K			K
	N			N

Type of thermocouple "K" *Example*

28



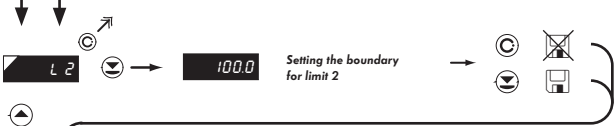
L 1 **Setting the boundary for limit 1**

- range of the setting is ±1999
- presetting "Hysteresis"=0 "Delay"=0

- contingent change of hysteresis or offset of the switch-on may be performed in the PROFI menu

DEF = 25

Nastaveni limity 1 > L1 = 30 *Example*



L 2 **Setting the boundary for limit 2**

- range of the setting is ±1999
- presetting "Hysteresis"=0 "Delay"=0

- contingent change of hysteresis or delay of the switch-on may be performed in the PROFI menu

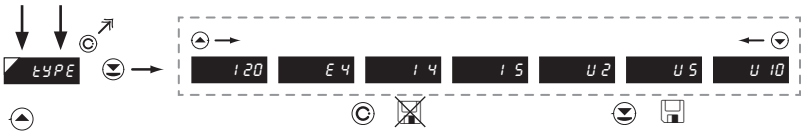
DEF = 75

Nastaveni limity 2 > L 2 = 230 *Example*

** following item of the menu depends on instrument equipment, provided it has an analog output the following item is „Type"*

!

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



tYPE Setting the type of analog output

DEF = E 4

Menu	Range	Description
i20	0...20 mA	
E 4	4...20 mA	with indication of error statement (<3,6 mA)
i 4	4...20 mA	
i 5	0...5 mA	
U 2	0...2 V	
U 5	0...5 V	
U10	0...10 V	

Type of analog output - 0...10 V > Type = U 10 *Example*

A.Lo Assigning the displayed value to the end of the analog output range

DEF = 0; 40 (RTD, T/C)

- range of the setting is ±1999

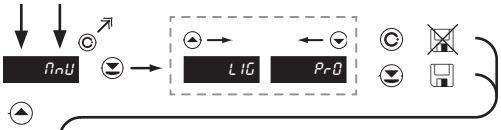
Display projection for the beginning of AO range > A.Lo = 0 *Example*

A.Hi Assigning the displayed value to the end of the analog output range

DEF = 100; 199.9 (RTD, T/C)

- range of the setting is ±1999

Display projection for the end of AO range > A.Hi = 120 *Example*



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

LIG > LIGHT menu, a simple menu, which contains only items necessary for instrument setting
> linear structure of the menu

PRO > PROFI menu, a complete menu for entire instrument setting
> tree structure of the menu

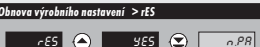
DEF = LIG

Menu LIGHT > MnU = LIG *Example*

rES **Restoration of the instrument manufacture setting**

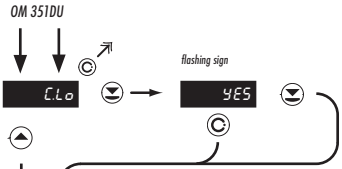
- in case of incorrect setting or calibration it is possible to return to manufacture setting. Prior execution of the changes you will be asked to confirm your selection (YES)
- reading the manufacture calibration and original setting of items in the menu

Obnova výrobního nastavení > rES *Example*



** following item depends on the instrument type, for OM 351DU > "C.Lo"*

OM 351AC	*32*
OM 351DC	*32*
OM 351PM	*32*
OM 351DU	*31*
OM 351OHM	*32*
OM 351RTD	*32*
OM 351T/C	*32*



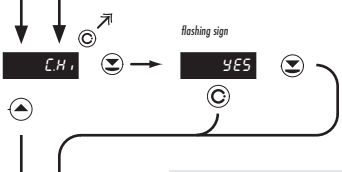
C.Lo **Input range calibration - potentiometer slider is in its initial position**

Only for type OM 351DU

- prior confirmation of the flashing sign "Yes" the potentiometer slider has to be in given position of rest

Calibration of the beginning of the range > C.Lo *Example*

YES → C.H1



C.H1 **Input range calibration - potentiometer slider is in its initial position**

Only for type OM 351DU

- prior confirmation of the flashing sign "Yes" the potentiometer slider has to be in given position of rest

Calibration of the end of the range > C.Hi *Example*

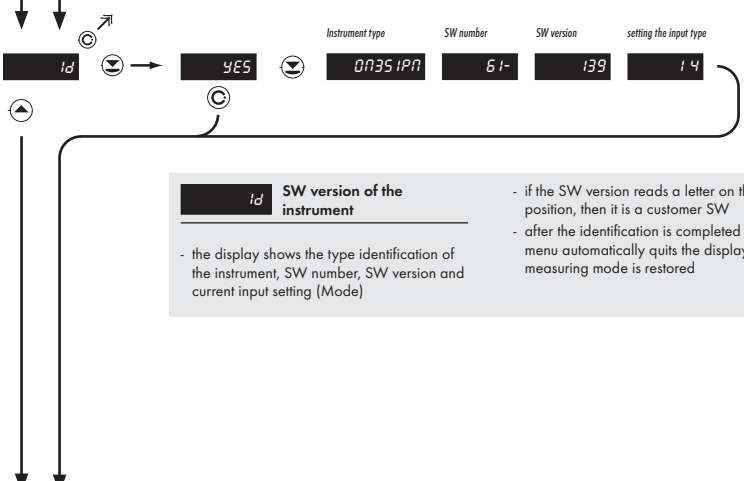
YES → n.PR

n.PA Setting new access password

- access password for LIGHT/PROFI menu
- range of the numeral code 0...1999
- when setting password to "000" the access into LIGHT/PROFI menu is accessible without call for entering it
- in case of loss of password universal password "177" may be used

DEF = 0

New password - 341 > n.PA = 341 *Example*



id 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

6.0 SETTING "PROFI"

PROFI ***Kompletní programovací menu***

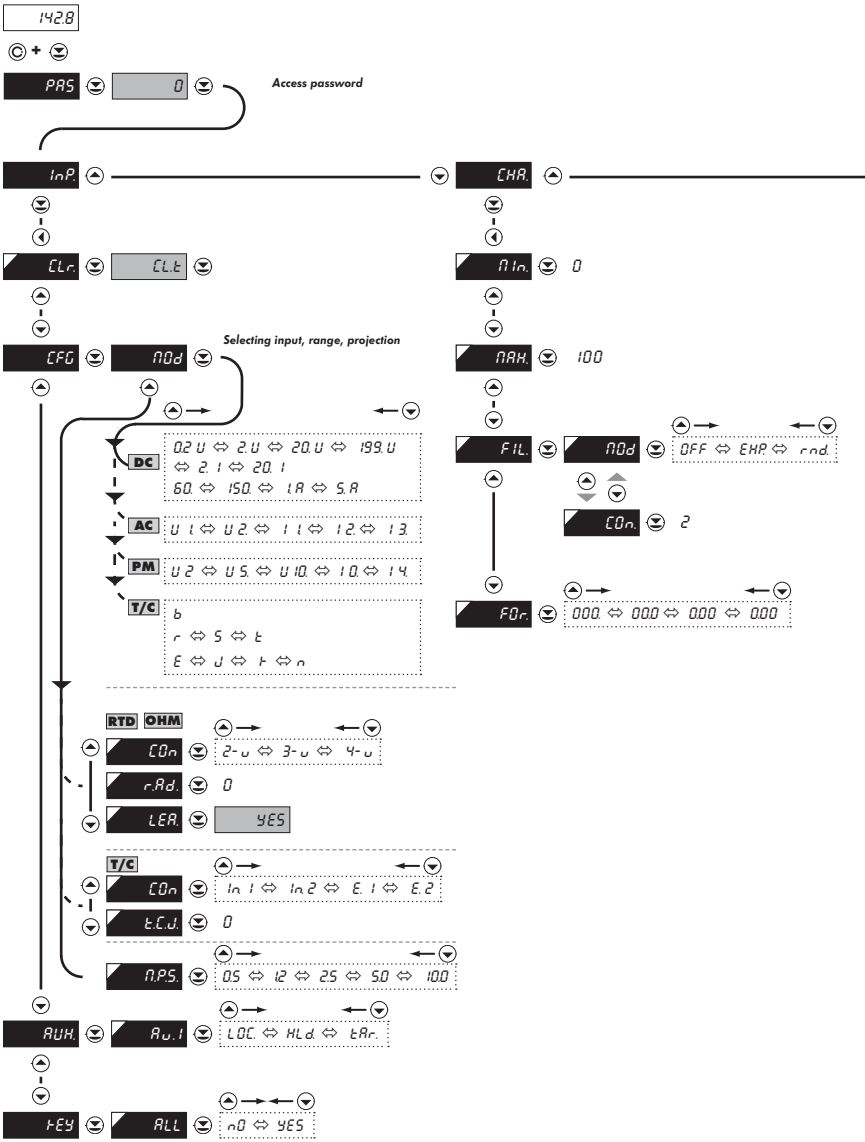
- contains complete instrument menu and is protected by an optional numeral code
- designed for expert users
- preset from manufacture is **LIGHT** menu

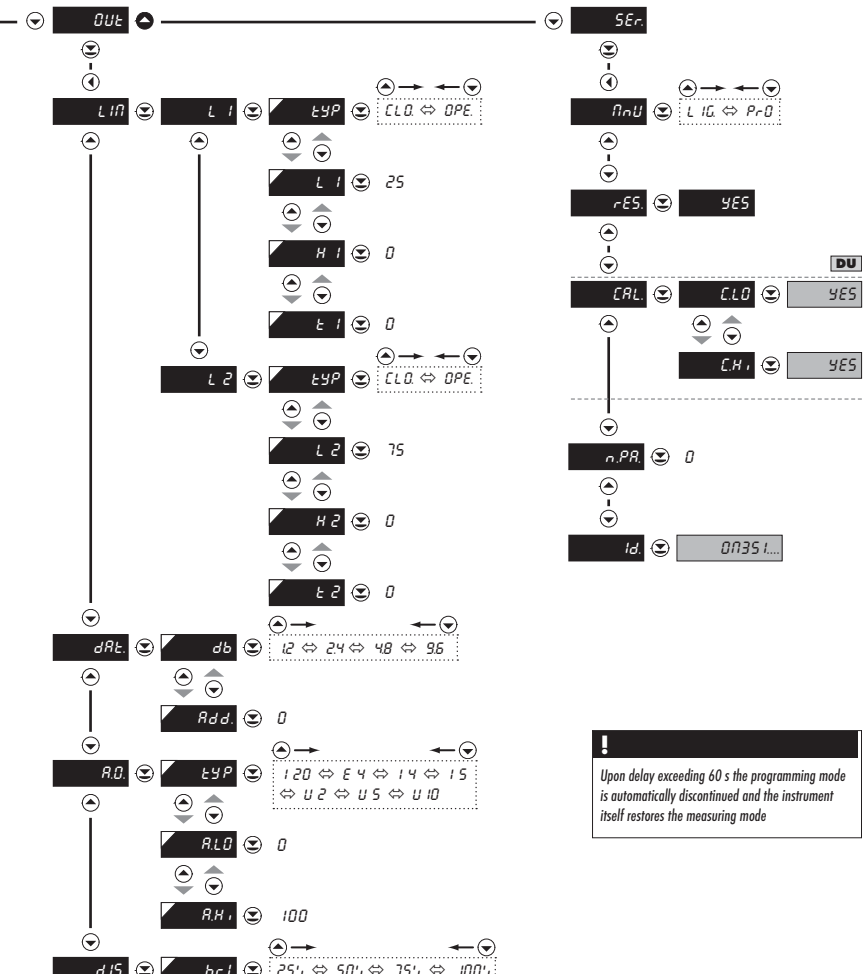
- **For expert users**
- **Complete instrument menu**
- **Access is password protected**
- **Possibility to arrange items of the „User" menu**
- **Tree menu structure**

SWITCHING OVER TO "PROFI" MENU

C + ▼
- temporary switch-over to **PROFI** menu, which is suitable to edit a few items
- after quitting **PROFI** menu the instrument automatically switches to **LIGHT** menu
- access is password protected

C + E
- access into **LIGHT** menu and transition to item „MnU" with subsequent selection of „PRO" and confirmation
- after re-accessing the menu the **PROFI** type is active
- access is password protected

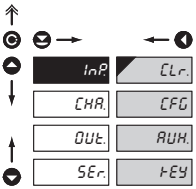

1428
PAS
0
Access password
InP.
CLr
CL.t
CFG
Selecting input, range, projection
nOd
DC
0.2 U ⇔ 2 U ⇔ 20 U ⇔ 199 U
⇔ 2 I ⇔ 20 I
60 ⇔ 150 ⇔ 1A ⇔ 5A
AC
U 1 ⇔ U 2 ⇔ 11 ⇔ 12 ⇔ 13
PM
U 2 ⇔ U 5 ⇔ U 10 ⇔ 10 ⇔ 14
T/C
b
r ⇔ S ⇔ t
E ⇔ J ⇔ K ⇔ n
RTD OHM
COn
2-u ⇔ 3-u ⇔ 4-u
r.Ad.
0
LER.
YES
T/C
COn
In 1 ⇔ In 2 ⇔ E. 1 ⇔ E. 2
t.C.J.
0
n.PS.
05 ⇔ 12 ⇔ 25 ⇔ 50 ⇔ 100
AUX.
Au.1
LOC ⇔ HLd ⇔ tAr.
KEY
ALL
nO ⇔ YES
CHA.
Min.
0
MAX.
100
FIL.
nOd
OFF ⇔ EXP ⇔ rnd.
COn.
2
FOr.
000. ⇔ 000 ⇔ 000 ⇔ 000



!

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

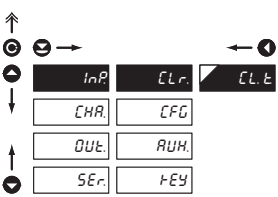
6.1 SETTING "PROFI" - INPUT



The basic instrument parameters are set in this menu

- CLr. — Tare reseting
- CFG — Selecting the measuring range and rate
- AUX. — Setting the external input function
- KEY — Setting the ENTER key function

6.1.1 TARE RESETING

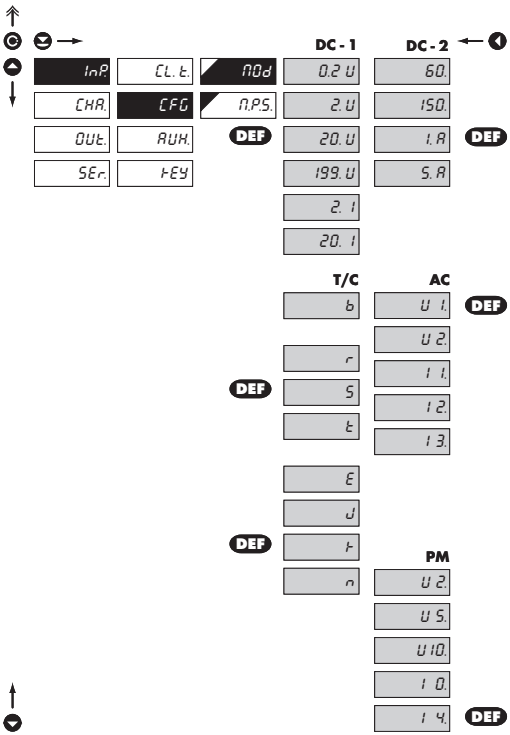


CL.t **Tare reseting**

!

Only for type DC, PM

6.1.2a SELECTING THE INSTRUMENT MEASURING RANGE



n0d **Selecting the instrument measuring range**

- setting the input range depends on ordered measuring range

OM 351AC

Menu	Range „S"	Range „U"
U 1.	0...10 V	0...250 V
U 2.	0...120 V	0...450 V
Menu	**Range „K"**	**Range „P"**
I 1.	0...60 mV	0...1 A
I 2.	0...150 mV	0...2,5 A
I 3.	0...300 mV	0...5 A

OM 351DC

Menu	Range „A"	Range „B"
0.2U	±0,2 V	
2.U	±2 V	
20.U	±20 V	
199.U	±199 V	
2. i	±2 mA	
20. i	±20 mA	
60.		±60 mV
150.		±150 mV
1. A		±1 A
5. A		±5 A

OM 351PM

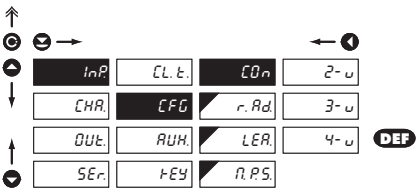
Menu	Range
U 2.	0...2 V
U 5.	0...5 V
U 10.	0...10 V
I 0.	0...20 mA
I 4.	4...20 mA

OM 351T/C

Menu	Type „A"	Type „B"	Type „C"
B	B		
R		R	
S		S	
T		T	
E			E
J			J
K			K
N			N

6.1.2b SETTING THE SENSOR CONNECTION

RTD OHM



CON Selecting the sensor connection

- in 2- or 3- wire connection it is necessary to link the unconnected inputs (see Chapter Connection)

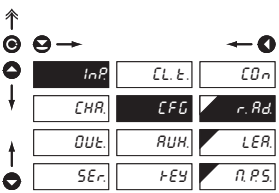
2-u 2-wire connection

3-u 3-wire connection

4-u 4-wire connection

6.1.2c OFFSET OF THE BEGINNING OF THE RANGE

RTD OHM



r.Rd. Offset of the beginning of the measuring range

- in cases when it is necessary to shift the beginning of the range by certain value, e.g. when sensor is used in a measuring head
- entered directly in Ohm (0...19,99)
- DEF = 0

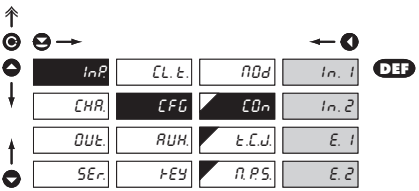
6.1.2d COMPENSATION OF 2-WIRE CONDUCT

RTD OHM

LEA. Compensation of 2-wire conduct

- for measurement accuracy it is necessary to perform compensation of the conduct always in case of 2-wire connection
- prior to confirmation of the displayed challenge „YES" it is necessary to substitute the sensor at the end of the conduct by a short circuit
- DEF = 0

6.1.2e SETTING THE METHOD OF EVALUATION OF THE COLD JUNCTION T/C



CJn Method of evaluation of the cold junction

In. 1 Measurement without reference termocouple

- cold junction measurement on the instrument brackets

In. 2 Measurement with reference thermocouple

- cold junction measurement on the instrument brackets with anti-series connection of ref. thermocouple

E. 1 Measurement without reference thermocouple

- the whole measuring system is working under the same and constant temperature

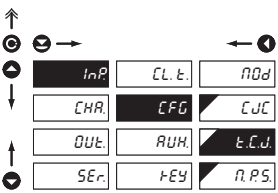
E. 2 Measurement with reference thermocouple

- upon the use of compensation box

!

Description of the method of evaluation of the cold junction is in chapter 8, page 56

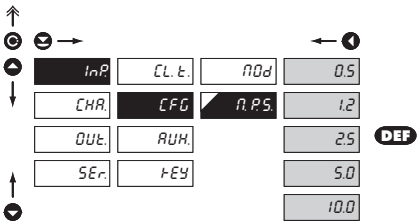
6.1.2f TEMPERATURE OF THE COLD JUNCTION T/C



t.C.J. Setting the temperature of the cold junction

- range 0...60 °C with compensation box
- DEF = 0 °C

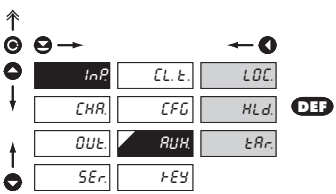
6.1.2g MEASURING RATE



n.P.S. Setting the measuring rate

- 0.5 — Rate - 0,5 meas./s
- 1.2 — Rate - 1,2 meas./s
- 2.5 — Rate - 2,5 meas./s
- 5.0 — Rate - 5 meas./s
- 10.0 — Rate - 10 meas./s

6.1.3 EXTERNAL INPUT FUNCTION SELECTION

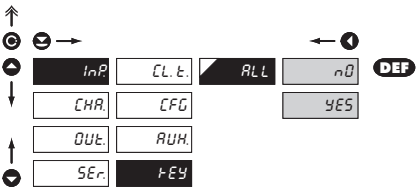


AUX. External input function selection

- LOC. — LOCK, locking the control keys on the instrument
- HLd. — HOLD, stop measuring of the entire instrument
- tAr. — TARA - Tare activation*

* *Only for type DC, PM, DU*

6.1.4 OPTIONAL ACCESSORY FUNCTIONS OF THE KEYS



tEY **Setting other functions of the control-keys**

ALL Setting all keys

- owing to limited space in the instrument's memory it is not feasible to set the keys' functions one by one

nO Accessory functions are off

YES Accessory functions are on

Tare value displayed

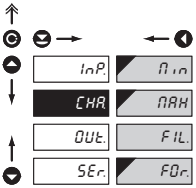
Display taring

Tare reset

!

Only for type DC, PM, DU

6.2 SETTING "PROFI" - CHANNELS



In this menu the instrument input parameters are set

Min Setting display projection for minimum value of input signal ❶

MAX Setting display projection for maximum value of input signal ❷

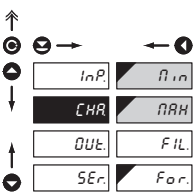
FIL. Setting the digital filters ❸

FOr. Setting the decimal point ❹

Input type	Setting options
DC	① ② ③ ④
AC	① ② ③ ④
PM	① ② ③ ④
DU	① ② ③ ④
OHM	① ② ③ ④
RTD	③ ④
T/C	③

6.2.1 PROJECTION ON THE DISPLAY

DC AC PM DU OHM



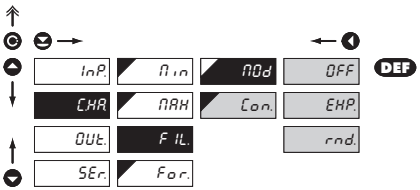
Min Setting display projection for minimum value of input signal

- range of the setting is ±1999
- DEF = 0

MAX Setting display projection for maximum value of input signal

- range of the setting is ±1999
- DEF = 100

6.2.3 DIGITAL FILTERS



FIL. Setting the digital filters

- the instrument allows for classic ptrojection of a number with decimal point as well as with floating DP, allowing for projection of a number in its most precise form "FL.P."

Con. Setting the constant

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

EXP. Selection of exponential filter

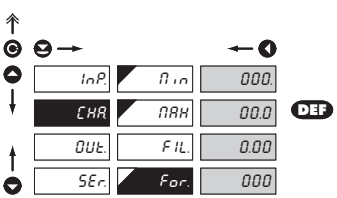
- the value is calculated from a number of measurements selected in „CON"
- range 2...100

rnd. Selection of value round-up

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

6.2.4 DECIMAL POINT

DC AC PM DU OHM RTD



For. Setting the decimal point

- the instrument allows for classic projection of a number with placement of the decimal point

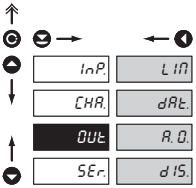
000. Setting the DP - XXXX.

00.0 Setting the DP - XXX.x

0.00 Setting the DP - XX.xx

000 Setting the DP - X.xxx

6.3 SETTING „PROFI“ - OUTPUTS



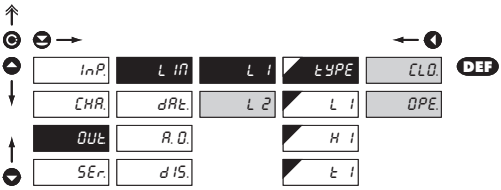
It is possible to set the parameters of the instrument output signals in this menu

- LIN — Setting the type and the switching of limits
- dAt — Setting the type and the parameters ot data output
- A.O. — Setting the type and parameters of analog output
- dIS. — Setting the display brightness

!

Analog and data outputs may not be fitted simultaneously

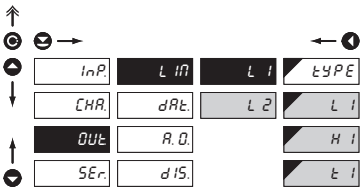
6.3.1a LIMITS - RELAY FUNCTIONS



tYPE — Setting the type of relay function

- CLO. — Relay switches on when the condition is met
- OPE. — Relay switches off when the condition is met

6.3.1b LIMITS - BOUNDARIES



L 1 Setting the boundaries

L 1 Setting the boundary for relay switch-on

- within the full display range (±1999)
- DEF = 25 (L 1), 75 (L 2)

H 1 Setting hysteresis

- within the full display range (±1999)
- DEF = 0

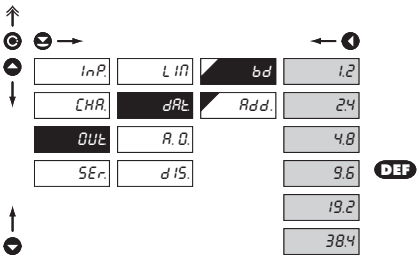
t 1 Setting the offset of the relay switch-on

- within the range 0...99,9 s
- DEF = 0

?

The process of setting the Limit 2 is identical with the setting for Limit 1

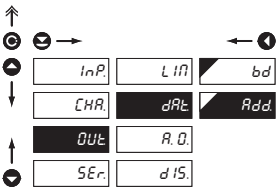
6.3.2a DATA OUTPUT - RATE



bd Setting the data output rate

- **1.2** Rate - 1 200 Baud
- **2.4** Rate - 2 400 Baud
- **4.8** Rate - 4 800 Baud
- **9.6** Rate - 9 600 Baud
- **19.2** Rate - 19 200 Baud
- **38.4** Rate - 38 400 Baud

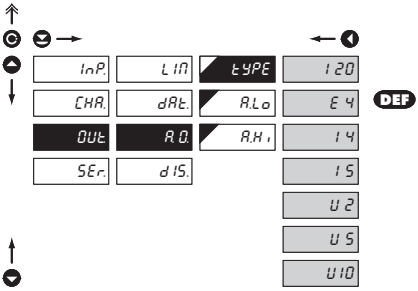
6.3.2b DATA OUTPUT - ADDRESS



Add. Setting the instrument address

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

6.3.3a ANALOG OUTPUT - TYPE



DEF

tYPE Setting the type of analog output

I 20 Type - 0...20 mA

E 4 Type - 4...20 mA

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

I 4 Type - 4...20 mA

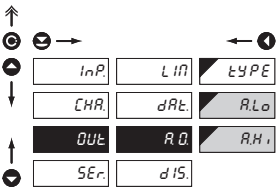
I 5 Type - 0...5 mA

U 2 Type - 0...2 V

U 5 Type - 0...5 V

U 10 Type - 0...10 V

6.3.3b ANALOG OUTPUT - RANGE



A.O. 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

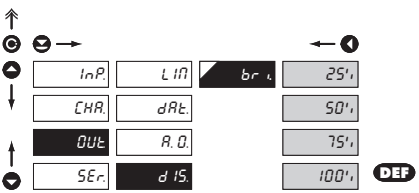
A.Lo Assigning the displayed value to the beginning of the analog output range

- range of the setting is ±1999
- DEF = 0, -40 (RTD, T/C)

A.H. Assigning the displayed value to the end of the analog output range

- range of the setting is ±1999
- DEF = 100, 199,9 (RTD, T/C)

6.3.4 DISPLAY BRIGHTNESS



brI. Setting the display brightness

- by selecting the display brightness we may react properly to light conditions in place of location of the instrument
- brightness in the programming menu is always 100 %

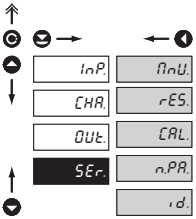
25' Display brightness - 25 %

50' Display brightness - 50 %

75' Display brightness - 75 %

100' Display brightness - 100 %

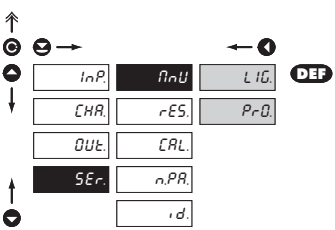
6.4 SETTING "PROFI" - SERVICE



The instrument's service functions are set in this menu

- AnU — Selection of menu type LIGHT/PROFI
- rES. — Restoration of the manufacture setting and instrument calibration
- CAL. — Calibration of input range for verion „DU"
- n.PA. — Setting new access password
- id. — Instrument identification

6.4.1 SELECTION OF THE TYPE OF PROGRAMMING MENU



AnU. Selection of menu type LiGHT/PROFI

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

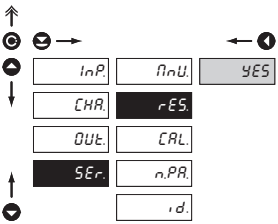
LiG. Active LIGHT menu

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

PrO Active PROFI menu

- complete programming menu for expert users
- tree menu

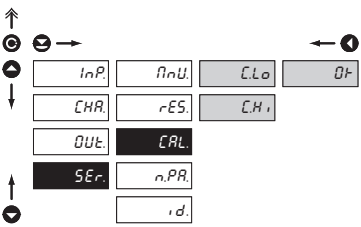
6.4.2 RESTORATION OF THE MANUFACTURE SETTING



rSE. 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 (DEF) call for confirmation of your selection „Yes"

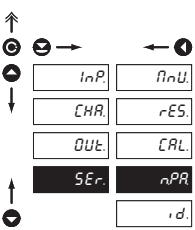
6.4.3 CALIBRATION OF THE INPUT RANGE DU



CAL. Calibration of the input range

- when MIN is displayed move the potentiometer slider into required minimum position and confirm by „Enter", calibration is confirmed by showing sign „OK"
- when MAX is displayed move the potentiometer slider into required maximum position and confirm by „Enter", calibration is confirmed by showing sign „OK""

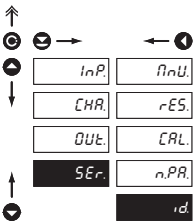
6.4.4 SETTING NEW ACCESS PASSWORD



n.PA. Setting new password for access into the LIGHT and PROFI menu

- this option allows to change the numeral code, which protects the access into the LIGHT and PROFI Menu.
- numeral code range is 0...1999
- universal password in case of loss „177"

6.4.5 INSTRUMENT IDENTIFICATION



id. **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
- after the identification is completed the menu automatically quits the display and measuring mode is restored

7.0 "USER" MENU CONFIGURATION

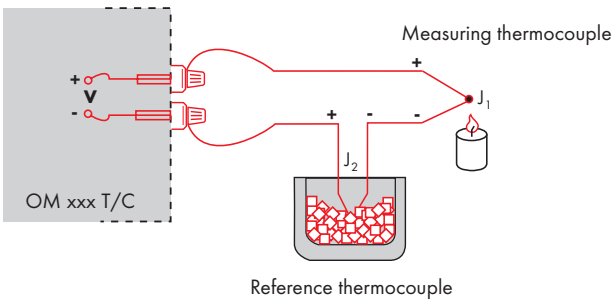
- **USER** menu is designed for users who need to change only several items of the setting without the option to change the basic instrument setting (e.g. repeated change of limit setting)
- there are no default items from manufacture in **USER** menu
- menu configuration possible on items indicated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

- **For user operation**
- **Menu items are set by the user (Profi/Light) as per request**
- **Access is not password protected**

SETTING

nO	item will not be displayed in USER menu
YES	item will be displayed in USER menu with the chance of editing
SHO	item will be solely displayed in USER menu

An istrument with input for temperature measurement with thermocouple allows for setting of two types of measurement of the cold junction.



WITH REFERENCE THERMOCOUPLE

- a reference thermocouple may be located in the same place as the measuring instrument or in place with stable temperature/compensation box
- when measuring with reference thermocouple set CJC in the instrument menu to In.2 or E.2
- when using a thermostat (a compensation box or environment with constant temperature) set in the instrument menu tCJ its temperature (applies for setting CJC to E.2)
- if the reference thermocouple is located in the same environment as the measuring instrument then set in the instrument menu CJC to In.2. Based on this selection the measurement of the surrounding temperature is performed by a sensor located in the instrument terminal board.

WITHOUT REFERENCE THERMOCOUPLE

- inaccuracy originating from the creation of dissimilar thermocouples on the transition point terminal-conductor of the thermocouple is not compensated for in the instrument
- when measuring without reference thermocouple set CJC in the instrument menu to In.1 or E.1
- when measuring temperature without reference thermocouple the error in the measured data may be even 10°C (applies for setting CJC to E.1)

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

ASCII: 8 bit, no parity, one stop bit

The transfer rate is adjustable in the instrument menu and depends on the control processor used. 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 exchangeable card automatically identified by the instrument.

COMMANDS FOR INSTRUMENT OPERATION

The commands are described in specification you can find at **www.orbit.merret.cz/rs**.
A command consists of a number and a letter. The size of the letters have a significance.

DETAILED DESCRIPTION OF COMMUNICATION VIA SERIAL LINE

Activity	Data transferred										
Data solicitation (PC)	#	A	A	<CR>							
Data transfer (Instrument)	>	R	<SP>	D	D	D	D	D	(D)	(D)	<CR>
Command corfirmation (Instrument) - OK	!	A	A	<CR>							
Command corfirmation (Instrument) - Bad	?	A	A	<CR>							
Instrument identification		A	A	1Y	<CR>						
HW identification		A	A	1Z	<CR>						
One-time mesasurement		A	A	7X	<CR>						
Repeated mesasurement		A	A	8X	<CR>						

LEGENDA

#		35	23_H	Beginning of the command
A	A	0...31		Two signs of the inst. address (sending in ASCII - decades and units, ex. "01", "99" universal
<CR>		13	$0D_H$	Carriage return
<SP>		32	20_H	Space
D				Data - usually signs "0"..."9", "-", ".", (D) - DP and (-) may prolong data
R		50_H...57_H		Relay and Tare status
!		33	21_H	Positive command corfirmation (ok)
?		63	$3F_H$	Negative command corfirmation (bad)
>		62	$3E_H$	Beginning of the transmitted data

RELAY, TARE

Signs	Relay 1	Relay 2	Tare
P	0	0	0
Q	1	0	0
R	0	1	0
S	1	1	0
T	0	0	1
U	1	0	1
V	0	1	1
W	1	1	1

ERROR	CAUSE	ELIMINATION
E. d. U.	Number is too small (large negative) to be displayed	change DP setting, channel constant
E. d. O.	Number is too large to be displayed	change DP setting, channel constant
E. t U	Number is outside the table range	increase the table values, change input setting (channel constant)
E. t O.	Number is outside the table range	increase the table values, change input setting (channel constant)
E. I. U.	Input quantity is smaller than permitted input quantity range	change input signal value or input (range) setting
E. I. O.	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. dt.	Data in EEPROM outside the range	perform restoration of manufacture setting, upon repeated error statement send instrument for repair
E. CL.	Memory was empty (presetting carried out)	upon repeated error statement send instrument for repair, possible failure in calibration

INPUT

selectable in configuration menu			*DC*
DC 1	±2 mA	< 200 mV	Input 1
	±20 mA	< 200 mV	Input 1
	±200 mV	100 kOhm	Input 2
	±2 V	100 kOhm	Input 2
	±20 V	10 MOhm	Input 3
	±200 V	10 MOhm	Input 3
DC 2	±1 A	< 150 mV	Input 1
	±5 A	< 150 mV	Input 1
	±60 mV	100 kOhm	Input 2
	±150 mV	100 kOhm	Input 2

range is fixed, as per order			*AC*
Range U:	0...10 V	100 kOhm	Input 2
	0...120 V	10 MOhm	Input 3
	0...250 V	10 MOhm	Input 2
	0...450 V	10 MOhm	Input 3
Range I:	0...60 mV	100 kOhm	Input 1
	0...150 mV	100 kOhm	Input 1
	0...300 mV	100 kOhm	Input 1
	0...1 A	< 150 mV	Input 1
	0...5 A	< 150 mV	Input 1

selectable in configuration menu			*PM*
	0/4...20 mA	< 400 mV	Input 1
	0...2 V	1 MOhm	Input 2
	0...5 V	1 MOhm	Input 3
	0...10 V	1 MOhm	Input 3

range is fixed, as per order	*OHM*
	0...200 Ohm
	0...2 kOhm
	0...20 kOhm
	0...100 kOhm
	5...105 Ohm
Connection:	2, 3 or 4-wire

	RTD
Pt xxxx	-50,0°...199,9°C/-50,0°...400°C
Ni xxxx	-30,0°...199,9°C
Type Pt:	100/500/1 000 Ohm, platinum couple s α=0,00385Ohm/Ohm/°C
Type Ni:	Ni 1 000, 5000 ppm/6180 ppm
Connection:	2, 3 or 4-wire

selectable in configuration menu		*T/C*
Type:	J (Fe-CuNi)	-200°...900°C
	K (NiCr-Ni)	-200°...1 300°C
	T (Cu-CuNi)	-200°...400°C
	E (NiCr-CuNi)	-200°...690°C
	B (PtRh30-PtRh6)	300°...1 820°C
	S (PtRh10-Pt)	-50°...1 760°C
	R (Pt13Rh-Pt)	-50°...1 740°C
	N (Omegalloy)	-200°...1 300°C

	DU
Lin. pot.supply	2,5 VDC/6 mA
	min. potentiometer resistance is 500 Ohm

PROJECTION

Display:	1999, intensive red or green 7-segment LED, digit height 14 mm
Projection:	±1999
Decimal point:	adjustable - in programming mode
Brightness:	adjustable - in programming mode

INSTRUMENT ACCURACY

Temperature coef.:	100 ppm/°C	
Accuracy:	±0,2% of the range + 1 digit	
	±0,3 % of the range + 1 digit	*T/C, AC*
Resolution:	0,1°/1°C	*RTD*
	1°C	*T/C*
Rate:	0,5 - 1,2 - 2,5 - 5 - 10 maeasurements/s	
Overload capacity:	10x (t < 100 ms), 2x (long-term)	
Digital filter	adjustable in configuration menu	
Comp.of conduct:	max. 40 Ohm	*RTD*
Comp.of cold junct.:	adjustable	*T/C*
	0°...60°C or automatic	
Functions:	Tare - display resetting	
	Hold - stop measuring (upon contact)	
	Lock - control keys locking	
OM Link:	Company communication interface for instrument operation, setting and update	
Watch-dog:	reset after 25 ms	
Calibration:	at 25°C and 40 % r.h.	

COMPARATOR

Type:	digital, adjustable in the menu
Limits:	±1999
Hysteresis:	0...999
Delay:	0...99,9 s
Outputs:	2x relays with switch-on contact (Form A) (230 VAC/30 VDC, 3 A)*
Relay:	1/8 HP 277 VAC, 1/10 HP 125 V, Pilot Duty D300

** values apply for resistance load*

DATA OUTPUTS

Protocols:	ASCII
Data format:	8 bit + no parity + 1 stop bit (ASCII)
Rate:	1 200...38 400 Baud
RS 232:	isolated, two-way communication
RS 485:	isolated, two-way communication, addressing (max. 31 instruments)

- cannot be combined with analog output

ANALOG OUTPUTS

Type:	isolated, programmable with resolution of max. 4 000 points, analog output corresponds with the displayed data, type and range are adjustable
Non-linearity:	0,2 % of the range
TC:	100 ppm/°C
Rate:	response to change of value < 250 ms
Voltage:	0...2 V/5 V/10 V
Current:	0...5/20 mA/4...20 mA - compensation of conduct up to 450 Ohm

- cannot be combined with data output

EXCITATION

Adjustable:	10...15 VDC/0,6 W, isolated

- cannot be combined with data/analog output

POWER SUPPLY

Options:	24/110/230 VAC, 50/60 Hz, ±10 %, 3 VA 12...24 VDC/max. 150 mA, nonisolated *- only in basic version (without AO, PN and RS xxx) and upon request* 10...30 VDC/max. 250 mA, isolated
Protection:	by a fuse inside the instrument VAC (T 80 mA), VDC (T 630 mA)

MECHANIC PROPERTIES

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

OPERATING CONDITIONS

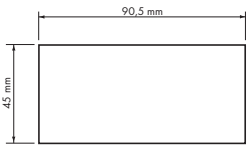
Connection:	connector terminal board, section < 2,5 mm^2
Stabilisation period:	within 15 minutes after switch-on
Working temp.:	0°...60°C
Storage temp.:	-10°...85°C
Cover:	IP65 (front panel only)
Construction:	safety class I
El. safety:	EN 61010-1, A2
Insul. resistance:	for pollution degree II, measuring cat. III. AC power supply > 670 V (ZI), 300 V (DI) DC power supply > 300 V (ZI), 150 V (DI) Input/Output > 300 V (ZI), 150 V (DI)

EMC:	EN 61000-3-2+A12; EN 61000-4-2, 3, 4, 5, 8, 11; EN 550222, A1, A2

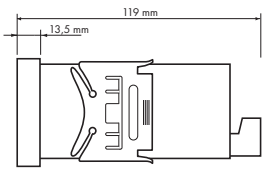
ZI - Primary insulation, DI - Double insulation

Front view

Panel cut



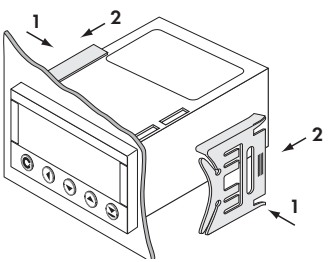
Side view

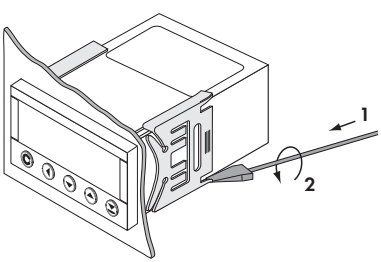


Panel thickness: 0,5...20 mm

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 351 DC AC PM DU RTD T/C OHM**
Type	. . . . .
Manufacturing No.	. . . . .
Date of sale	. . . . .

A guarantee period of 24 months from the date of sale to the user applies to this instrument.
Defects 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

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

Product: 3 ½ -digit programmable panel instrument

Type: **OM 351**

Version: DC, PM, AC, RTD, T/C, DU, OHM, UC

Conformity is assessed pursuant to the following standards:

Electrical safety:	EN 61010-1	
EMC:	EN 50131-1, chapter 14 and chapter 15	
	EN 50130-4, chapter 7	EN 61000-4-11
	EN 50130-4, chapter 8	EN 61000-4-11
	EN 50130-4, chapter 9	EN 61000-4-2
	EN 50130-4, chapter 10	EN 61000-4-3
	EN 50130-4, chapter 11	EN 61000-4-6
	EN 50130-4, chapter 12	EN 61000-4-4
	EN 50130-4, chapter 13	EN 61000-4-5
	EN 50130-5, chapter 20	
	prEN 50131-2-1, par. 9.3.1	
	EN 61000-4-8	
	EN 61000-4-9	
	EN 61000-3-2 ed. 2:2001	
	EN 61000-3-3: 1997, Cor. 1:1998, Z1:2002	
	EN 55022, chapter 5 and chapter 6	
and government ordinance:		
Electrical safety:	No. 168/1997 Sb.	
EMC:	No. 169/1997 Sb.	

The evidence are the protocols of authorized and accredited organization:
VTÚE Praha, experimental laboratory No. 1158, accredited by ČIA
VTÚPV Vyškov, experimental laboratory No. 1103, accredited by ČIA

Place and date of issue: Prague, 18. December 2003

Miroslav Hackl
Company representative

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