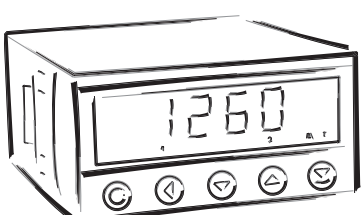
GUARANTEE 2 YEARS

OM 352

3 1/2 DIGIT PROGRAMMABLE UNIVERSAL INSTRUMENT

AC/DC 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 352 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.

CE

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2.1 Description

The OM 352 model series are 3 1/2 digit lowcost panel programmable instruments designed for maximum efficiency and user comfort while maintaining their favourable price. Three models are available: UNI, DC and PWR.

Type OM 352UNI is a multifunction instrument with the option of configuration for 7 various input options, easily configurable in the instrument menu.

The instrument is based on an 8-bit microcontroller with a multichannel 10-bit sigma-delta converter, which secures good accuracy, stability and easy operation of the instrument.

The OM 352 is a multifunction instrument available in following types and ranges

type UNI

DC:	0...20/60/1000 mV
PM:	0...20 mA/4...20 mA/0...2 V/0...5 V/0...10 V
OHM:	0...300 Ω; 0...1500 Ω; 0...3 kΩ; 0...30 kΩ
RTD-Pt:	Pt 100; Pt 500; Pt 1000
RTD-Ni:	Ni 1 000; Ni 10 000
T/C:	J/K/T/E/B/S/R/N
DU:	Linear potentiometer (min. 500 Ω)

type DC

DC:	0...500 mA/0...1 A/0...5 A/ 0...20 V/0...40 V/0...200 V

type AC

AC:	0...1 A/0...5 A/0...60 mV/0...300 mV/0...24 V/0...50 V/0...90 V/0...120 V/0...250 V/0...450 V

PROGRAMMABLE PROJECTION

Selection:	of type of input and measuring range
Measuring range:	adjustable or fixed
Setting:	manual, optional projection on the display may be set in the menu for both limit values of the input signal , e.g. input 0...20 mA > 0...150,0
Projection:	±1999

COMPENSATION

of conduct:	in the menu it is possible to perform compensation for 2-wire connection
of conduct in probe:	internal connection (conduct resistance in measuring head)
of CJC (T/C):	manual or automatic, in the menu it is possible to perform selection of the type of thermocouple and compensation of cold junctions, which is adjustable or automatic (temperature at the brackets)

LINEARIZATION

Linearization:*	by linear interpolation in 25 points (solely via OM Link)

DIGITAL FILTERS

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

MATHEMATIC FUCTIONS

Tare*:	designed to reset display upon non-zero input signal

EXTERNAL CONTROL

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

** Does not apply for version RTD, T/C*

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 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.

Measuring ranges

OM 352UNI

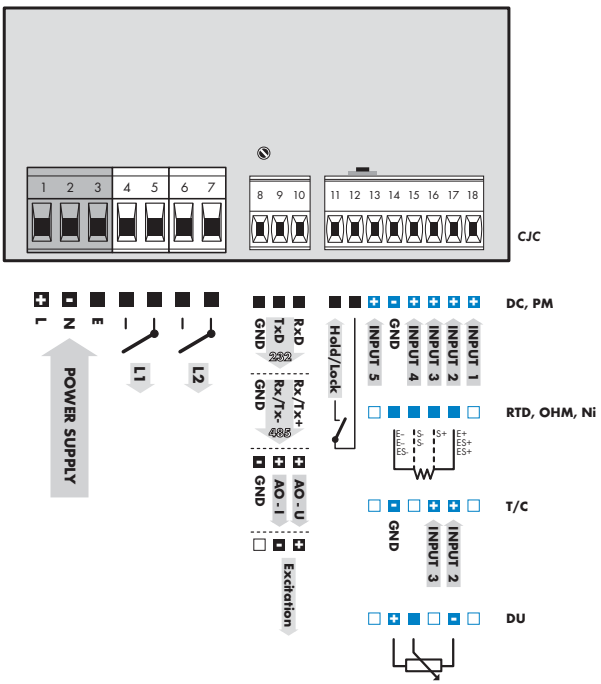
Type	Input 1	Input 2	Input 3	Input 4	Input 5
DC	0...1 000 mV		0...60 mV	0...20 mV	
PM	0...5/10 V			0...2 V	0/4...20 mA
OHM	0...300 Ω • 0...1,5 kΩ • 0...3 kΩ				
RTD-Pt	Pt 100 • Pt 500 • Pt 1 000				
RTD-Ni	Ni 1 000				
T/C			B, R, S, T	E, J, K, N	
DU	Linear potentiometer (min. 500 Ω)				

OM 352DC

Type	Input 1	Input 2	Input 3	Input 4	Input 5
DC		0...20/40/200 V			0...0,5/1/5 A

OM 352AC

Type	Input 1	Input 2	Input 3	Input 4	Input 5
DC	0...90/450 V	0...50/250 V	0...24/120 V	0...60/300 mV	0...1/5 A



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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 (14+15/16+17 or 16+17).

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 performed in three adjusting modes:

LIGHT **Simple programming menu**
- contains solely items necessary for instrument setting and is protected by optional number code

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

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

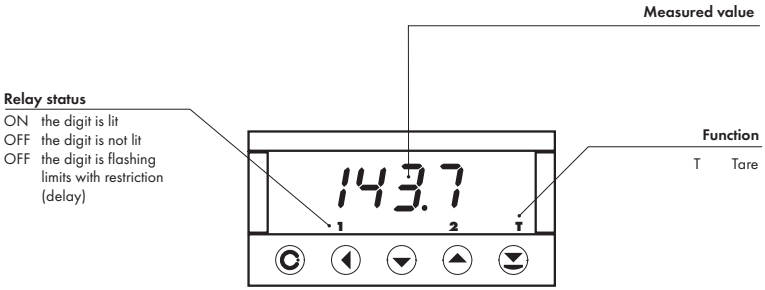
All programmable parameters are stored in the EEPROM memory (they hold even after the instrument is switched off).

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

The operation program is freely accessible (www.orbit.merret.cz) and the only requirement is the purchase of OML cable to connect the instrument to PC. It is manufactured in version RS 232 and USB and is compatible with all ORBIT MERRET instruments.

Another option for connection is with the aid of data output RS 232 or RS 485 (without the need of the OML cable).

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



Symbols used in the instructions

AC DC 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 placed in USER menu

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


after pressing the key the set value will not be stored


after pressing the key the set value will be stored

30 continues on page 30

Setting the decimal point and the minus sign

DECIMAL POINT

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

THE MINUS SIGN

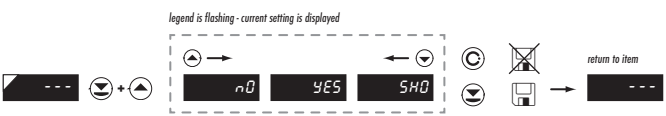
Setting the minus sign is performed by the key ▼ on higher decade. When editing the item substraction must be made from the current number (e.g..: 013 > ▼ , on class 100 > -87)

Controntrol 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

Setting items into „USER“ menu

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



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

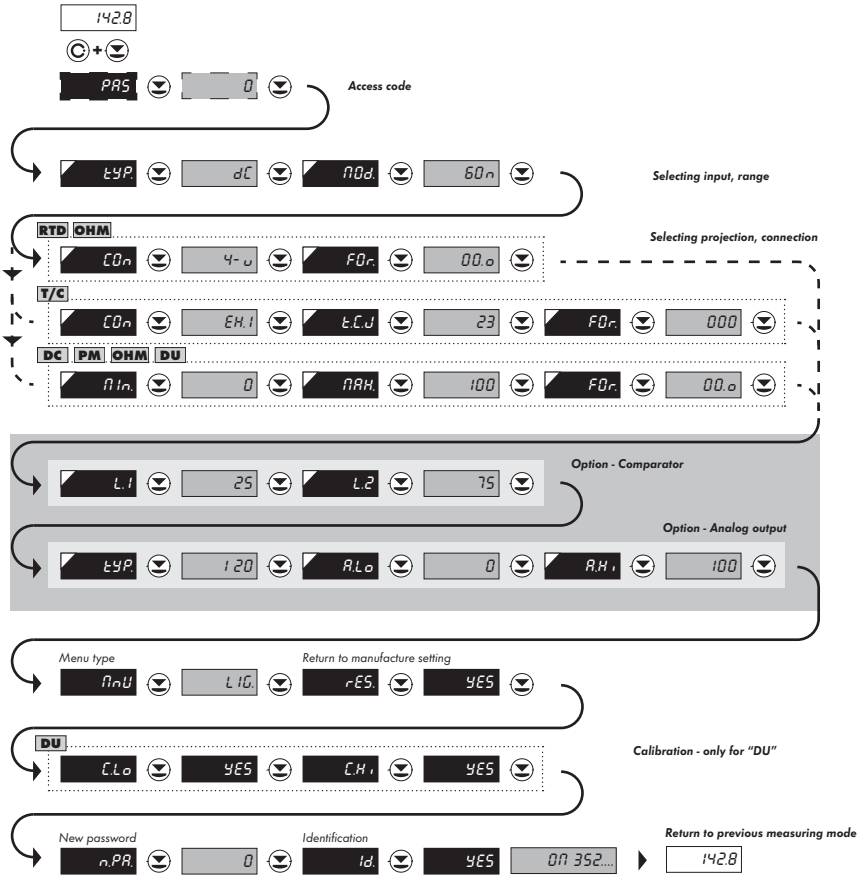
5.0 Setting "Light"

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



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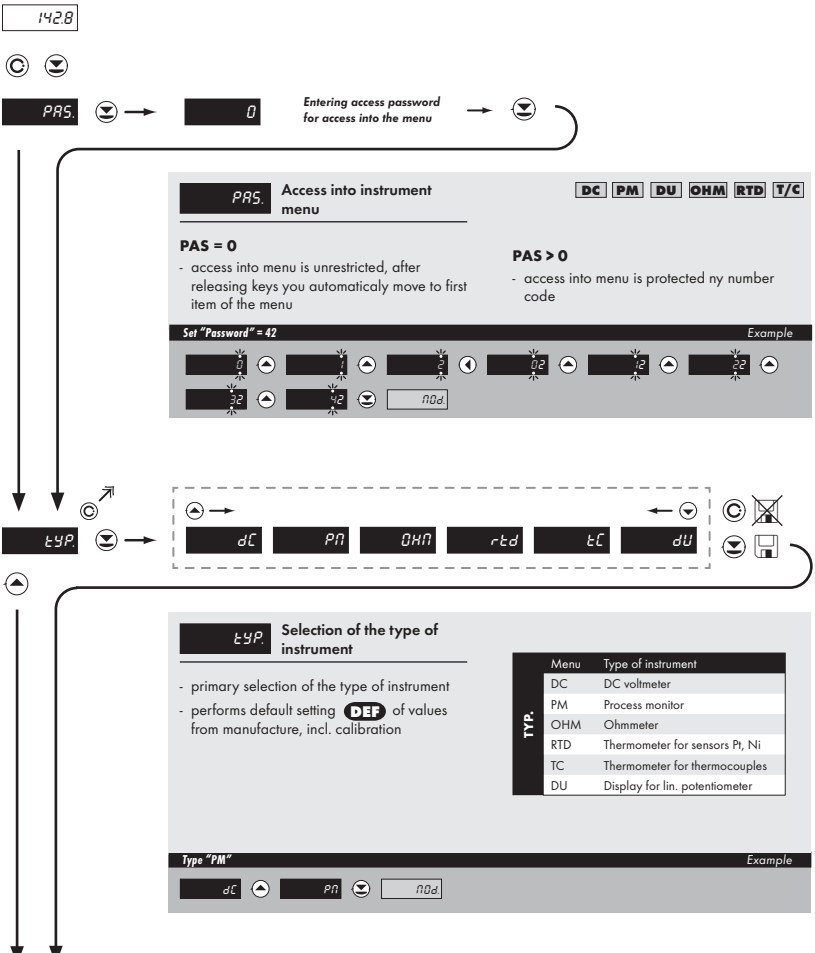
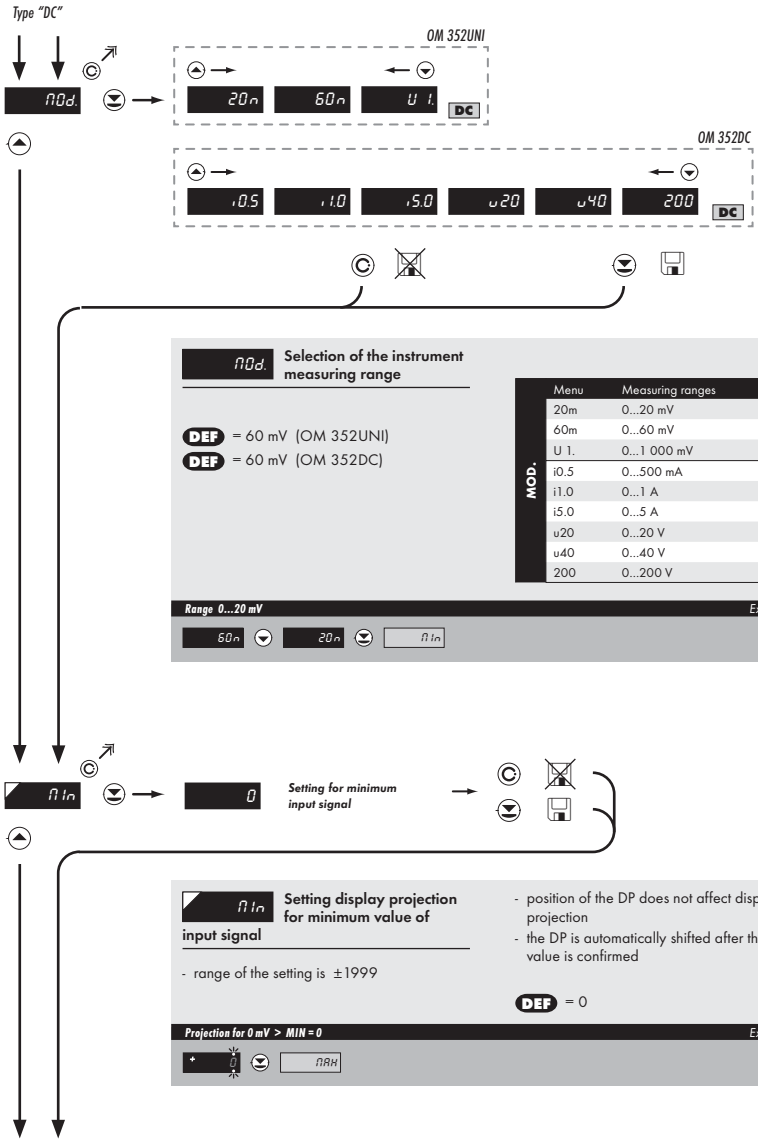
Upon delay exceeding 60 s the programming mode is automatically discontinued and the instrument itself restores the measuring mode





nOd. **Selection of the instrument measuring range**

DEF = 60 mV (OM 352UNI)
DEF = 60 mV (OM 352DC)

MOD.	Menu	Measuring ranges
	20m	0...20 mV
	60m	0...60 mV
	U 1.	0...1 000 mV
	i0.5	0...500 mA
	i1.0	0...1 A
	i5.0	0...5 A
	u20	0...20 V
	u40	0...40 V
	200	0...200 V

Range 0...20 mV *Example*

60m → 20m → MIn

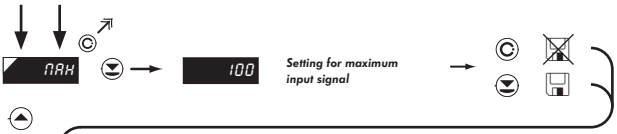
MIn **Setting display projection for minimum value of input signal**

- range of the setting is ±1999
- position of the DP does not affect display projection
- the DP is automatically shifted after the value is confirmed

DEF = 0

Projection for 0 mV > MIN = 0 *Example*

0 → MAX



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

- range of the setting is ±1999
- position of the DP does not affect display projection
- the DP is automatically shifted after the value is confirmed

DEF = 100

Projection for 20 mV > MAX = 1500 *Example*

FOr **Setting projection of the decimal point**

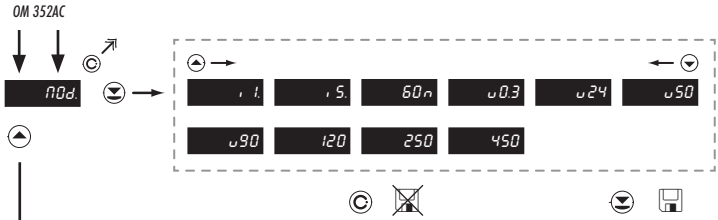
DEF = 00.o

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

Projection of DP on display > 000 *Example*

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

30



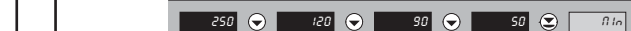
nOd. **Selection of the instrument measuring range**

DEF = 250 V

MOD ./ OM 352AC

Menu	Measuring ranges
i 1.	0...1 A
i 5.	0...5 A
60m	0...60 mV
u0.3	0...300 mV
u24	0...24 V
u50	0...50 V
u90	0...90 V
120	0...120 V
250	0...250 V
450	0...450 V

Range 0...50 V *Example*

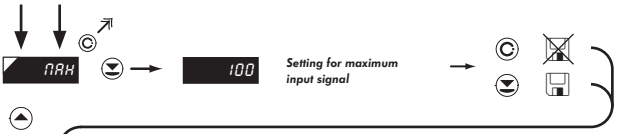


nIn **Setting display projection for minimum value of input signal**

- range of the setting is ±1999
- position of the DP does not affect display projection
- the DP is automatically shifted after the value is confirmed

DEF = 0

Projection for 0 A > MIN = 0 *Example*



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

- range of the setting is ±1999
- position of the DP does not affect display projection
- the DP is automatically shifted after the value is confirmed

DEF = 100

Projection for 5 A > Max = 350 *Example*

FOr **Setting projection of the decimal point**

DEF = 00.0

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

Projection of DP on display > 00.0 *Example*

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

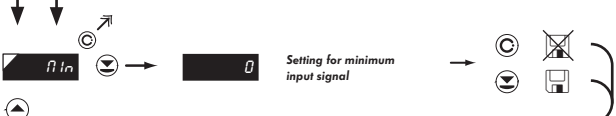
30

MOd. **Selection of the instrument measuring range**

DEF = I 4

MOD.	Menu	Measuring ranges
	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*

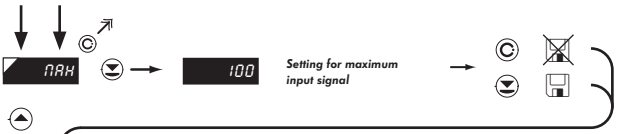


Min **Setting display projection for minimum value of input signal**

- range of the setting is ±1999
- position of the DP does not affect display projection
- the DP is automatically shifted after the value is confirmed

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
- position of the DP does not affect display projection
- the DP is automatically shifted after the value is confirmed

DEF = 100

Projection for 20 mA > Max = 250 *Example*

FOr **Setting projection of the decimal point**

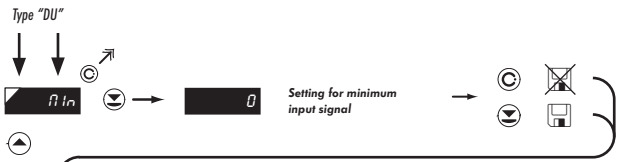
DEF = 00.o

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

Projection of DP on display > 000 *Example*

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

30

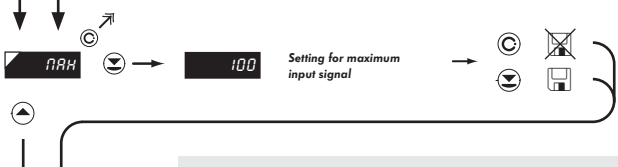


Min Setting display projection for minimum value of input signal

- range of the setting is ±1999
- position of the DP does not affect display projection
- the DP is automatically shifted after the value is confirmed

DEF = 0

Projection for begin > MIN = 0 *Example*

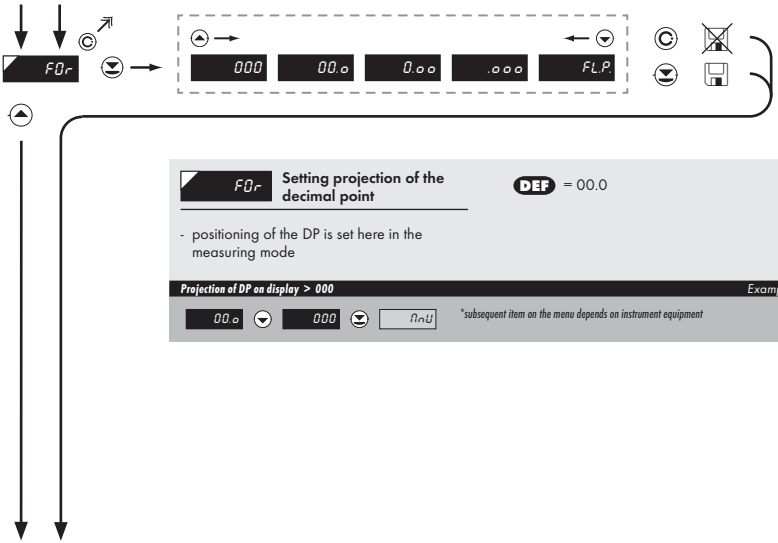


MAX Setting display projection for maximum value of input signal

- range of the setting is ±1999
- position of the DP does not affect display projection
- the DP is automatically shifted after the value is confirmed

DEF = 100

Projection for end > MAX = 50 *Example*



FOr Setting projection of the decimal point

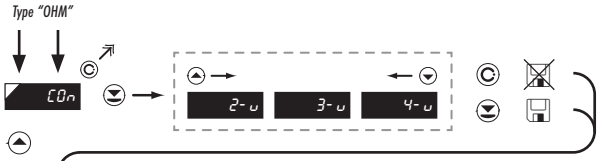
DEF = 00.0

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

Projection of DP on display > 000 *Example*

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

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



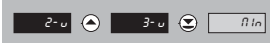
CON **Selection of the type of sensor connection**

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

DEF = 2-wire

CON.	Menu	Connection
	2-u	2-wire
	3-u	3-wire
	4-u	4-wire

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

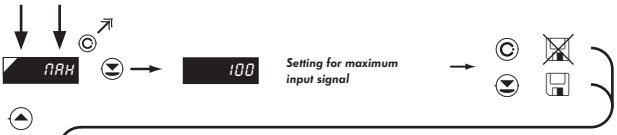


MIN **Setting display projection for minimum value of input signal**

- range of the setting is ±1999
- position of the DP does not affect display projection
- the DP is automatically shifted after the value is confirmed

DEF = 0

Projection for 0 Ohm > MIN = 0 *Example*



nAX Setting display projection for maximum value of input signal

- range of the setting is ±1999
- position of the DP does not affect display projection
- the DP is automatically shifted after the value is confirmed

DEF = 100

Projection for 300 Ohm > MAX = 350 — *Example*

FOr Setting projection of the decimal point

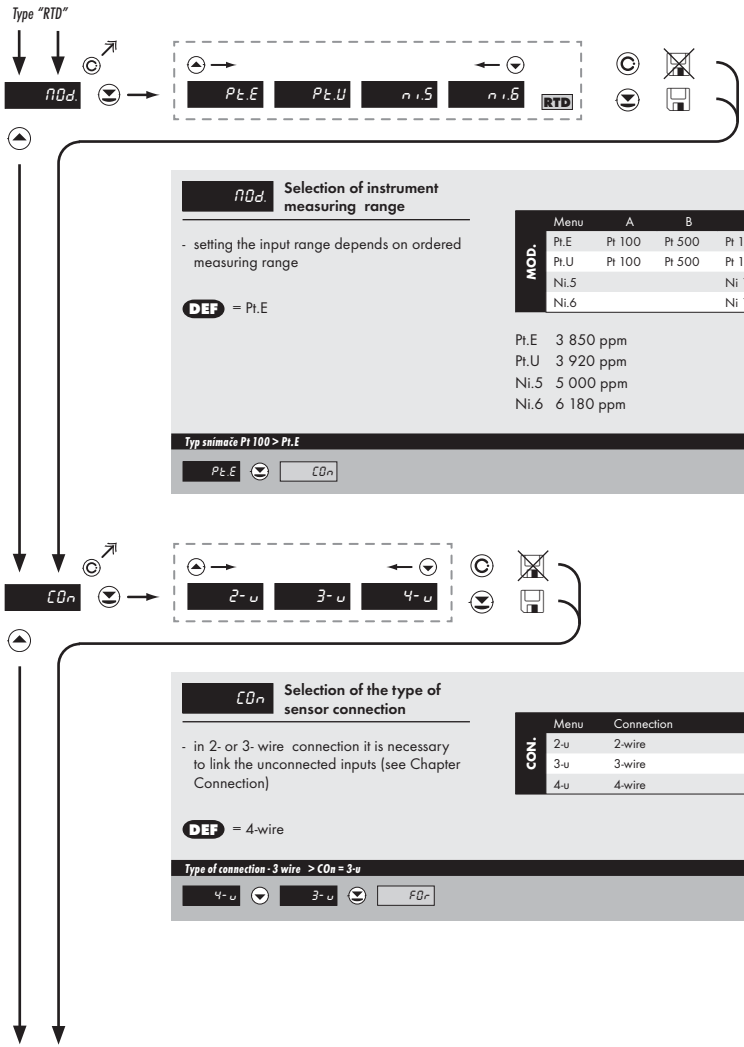
DEF = 00.0

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

Projection of DP on display > 000 — *Example*

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

30



MOd. Selection of instrument measuring range

- setting the input range depends on ordered measuring range

DEF = Pt.E

MOD.	Menu	A	B	C
	Pt.E	Pt 100	Pt 500	Pt 1000
	Pt.U	Pt 100	Pt 500	Pt 1000
	Ni.5			Ni 1000
	Ni.6			Ni 1000

Pt.E 3 850 ppm
Pt.U 3 920 ppm
Ni.5 5 000 ppm
Ni.6 6 180 ppm

Typ snímače Pt 100 > Pt.E — *Example*

Pt.E → COn

COn Selection of the type of sensor connection

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

DEF = 4-wire

CON.	Menu	Connection
	2-u	2-wire
	3-u	3-wire
	4-u	4-wire

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

4-u → 3-u → FOr

FOr **Setting projection of the decimal point**

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

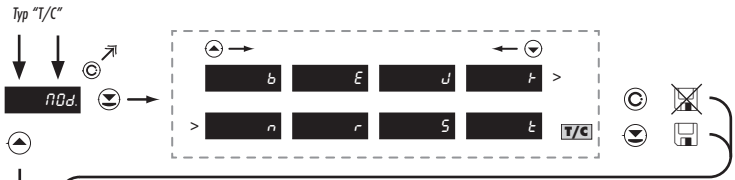
000. > for range -50°...400°C
00.0 > for range -50,0°...199,9°C

DEF = 00.0

Projection of DP on display > 000 *Example*

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

30

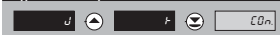


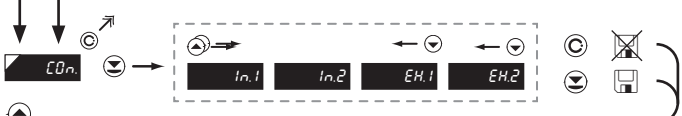
nOd. **Selection of the type of thermocouple**

DEF = Typ "J"

MOD.	Menu	Type of thermocouple
	B	T/C B
	E	T/C E
	J	T/C J
	K	T/C K
	N	T/C N
	R	T/C R
	S	T/C S
	T	T/C T

Type of thermocouple "K" *Example*





CON. **Selection of the type of sensor connection**

DEF = EX. 1

CON.	Menu	Connection	Ref. T/C
	IN.1	measuring C.J. at instrument brackets	×
	IN.2	measuring C. J. at instrument brackets with anti-series connected ref. TC	✓
	EX.1	the entire measuring set is working under invaried and constant temperature	×
	EX.2	when using compensation box	✓

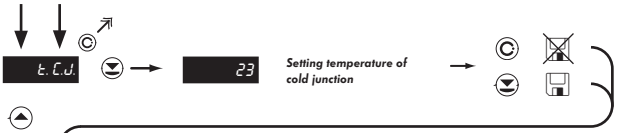
Zapojení s kompenzační krabicí > CON = EX. 2 *Example*

!

For thermocoule type "B" the items CON. and C.J. T. are not available

!

Method and procedure of setting the cold junctions is described in separate chapter on page 58

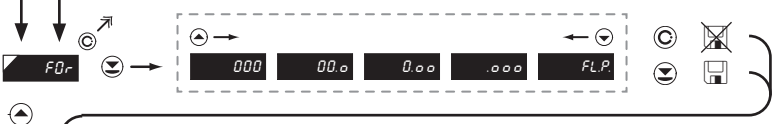


t.C.J. **Setting temperature of cold junction**

DEF = 23

- range 0...99 °C with compensation box

Setting temperature of cold junction > T.C.J. = 35 *Example*

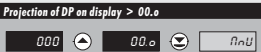


FOr **Setting projection of the decimal point**

DEF = 000

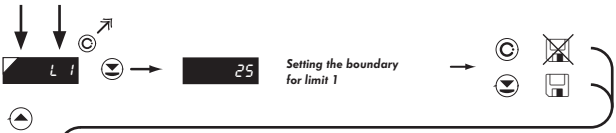
- positioning of the DP is set here in the measuring mode

Projection of DP on display > 00.o *Example*



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

30

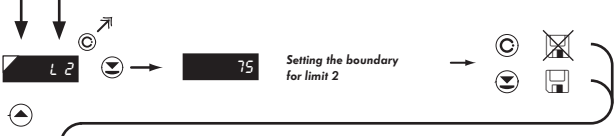


L 1 **Setting the boundary for limit 1**

- 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

Setting limit 1 > L 1 = 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 offset of the switch-on may be performed in the PROFI menu

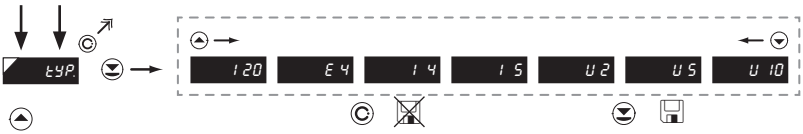
DEF = 75

Setting limit 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.



typ 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 > Typ = U 10 — *Example*

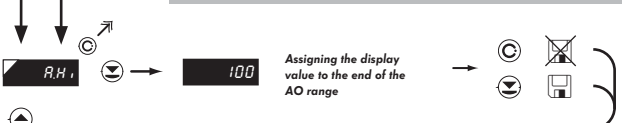
Assigning the display value to the beginning of the AO range

A.Lo Assigning the display value to the beginning of the AO range

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

- range of the setting is ±1999

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



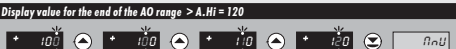
Assigning the display value to the end of the AO range

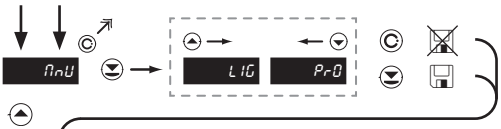
A.Hi Assigning the display value to the end of the AO range

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

- range of the setting is ±1999

Display value for the end of the 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

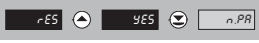
DEF = LIG

Menu LIGHT > MnU = LIG *Example*

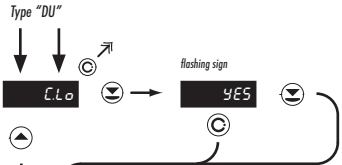
rES **Restoration of the instrument manufacture setting**

- 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

Restoration of manufacture setting > rES *Example*



** followng item depends on the instrument type, for OM 351DU > "CLo"*



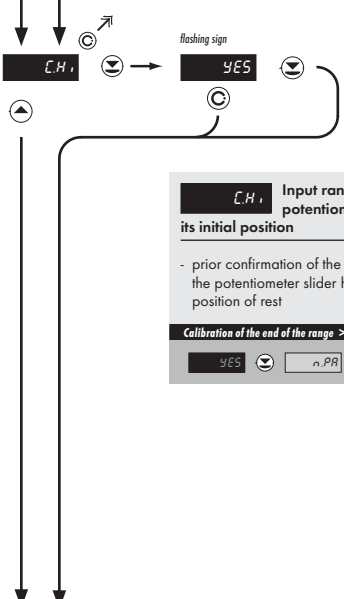
C.Lo **Input range calibration - potentiometer slider is in its initial position**

Only for type "DU"

- 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



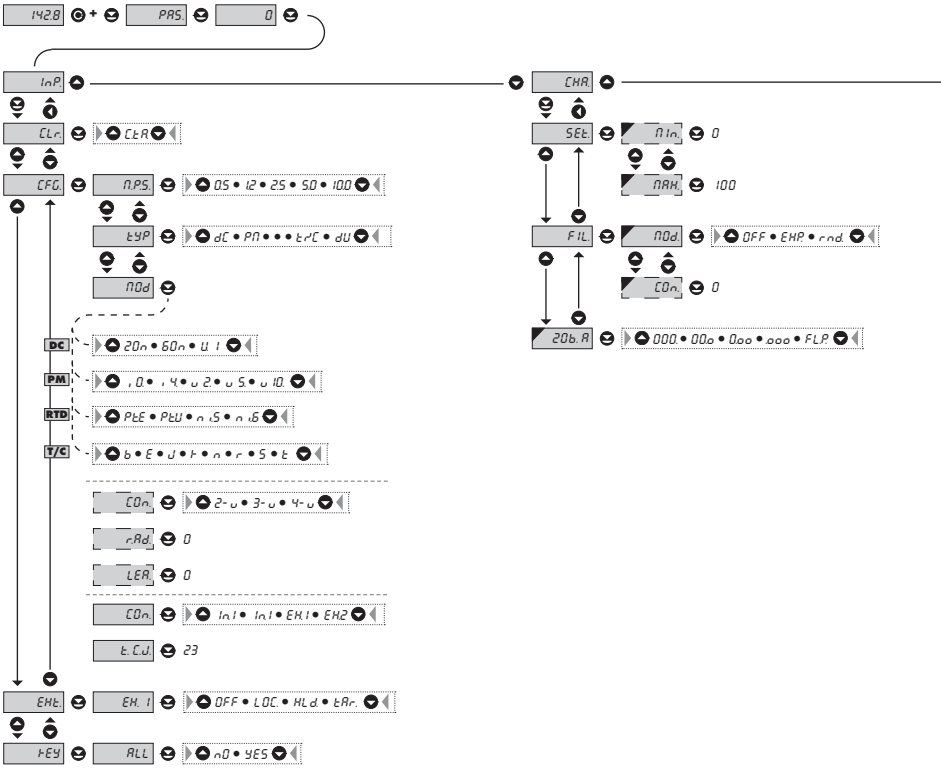
C.H1 **Input range calibration - potentiometer slider is in its initial position**

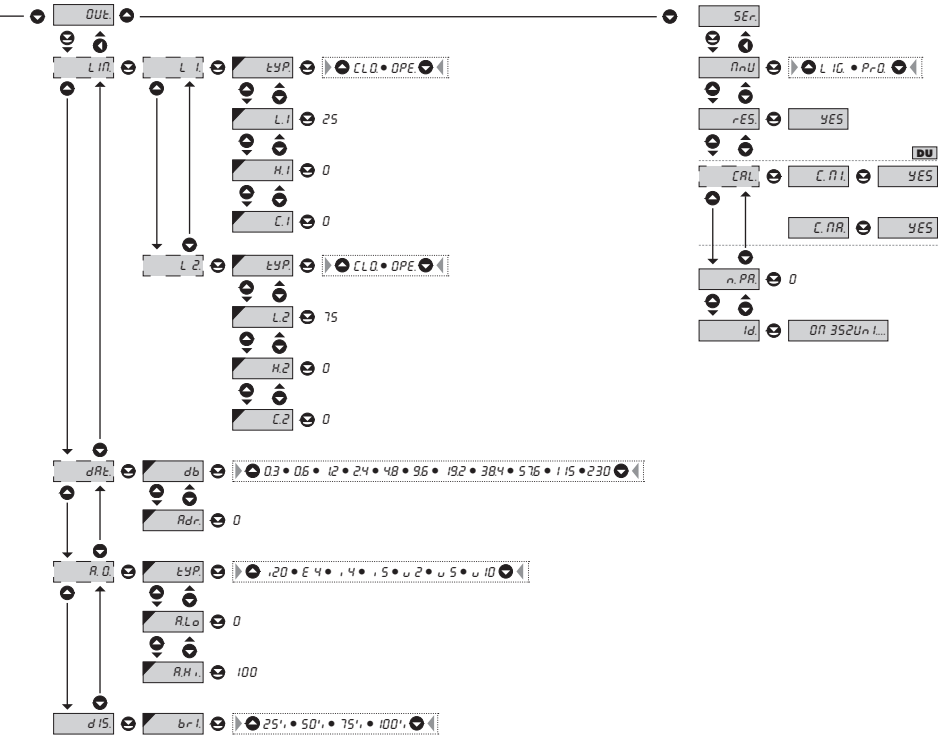
Only for type "DU"

- 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


1428
PAS
0
inP
CLr
CLEA
CFG
n.PS
05 • 12 • 25 • 50 • 100
tYP
dC • Pn • • • trC • dU
nOd
DC
20n • 60n • U 1
PM
1.0 • 1.4 • u 2 • u 5 • u 10
RTD
PtE • PtW • n.S • n.G
T/C
b • E • J • t • n • r • S • t
COn
2-u • 3-u • 4-u
rAd
0
LEA
0
COn
In1 • In1 • EH1 • EH2
t.CJ
23
EHt
EH. 1
OFF • LOC • HLd • tAr.
tEY
ALL
no • YES
CHA
SEt
Min
0
MAX
100
FIL
nOd
OFF • EHP • rnd
COn
0
20b.A
000 • 00o • 0oo • ooo • FLP



!

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

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

Return to measuring mode

6.0 Setting "PROFI"

PROFI **Complete programming menu**

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

- **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

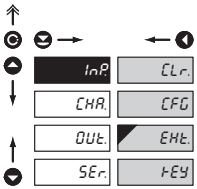
C + ▼

- 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 (if it was not set under item N. PA. =0)

C + ▲

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

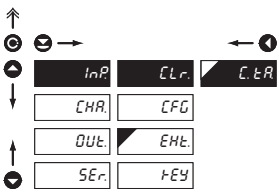
6.1 Setting "PROFI" - INPUT



The basic instrument parameters are set in this menu

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

6.1.1 Tare reseting

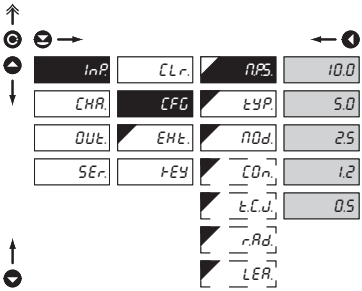


C.tA. **Tare reseting**

!

Does not apply for version RTD, T/C

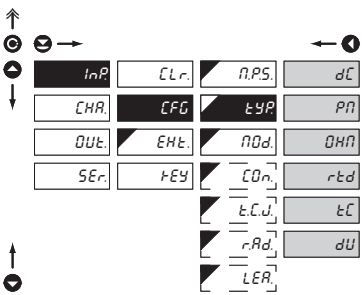
6.1.2a Selection of measuring rate



n.PS. Selection of measuring rate

10.0	10,0 measurements/s
5.0	5,0 measurements/s
2.5	2,5 measurements/s
1.2	1,2 measurements/s
0.5	0,5 measurements/s

6.1.2b Selection of „instrument“ type

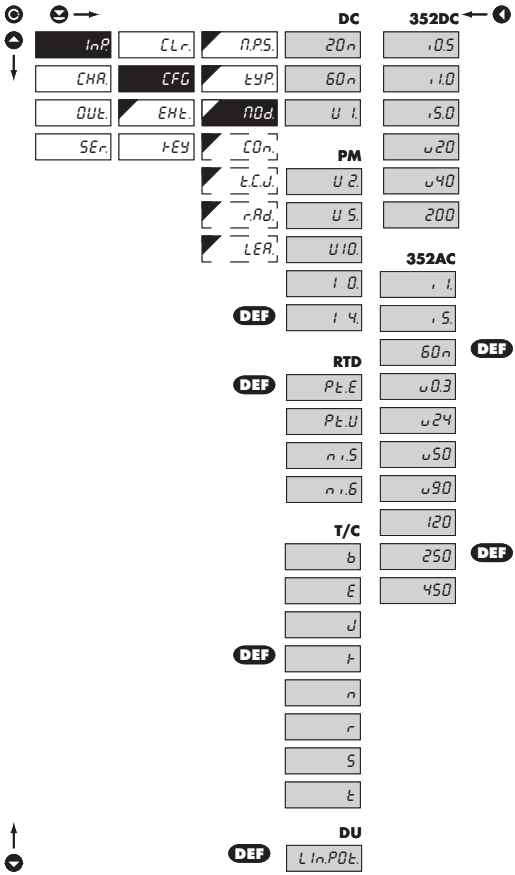


tYP. Selection of “instrument” type

- selection of particular type of “instrument” is bound to relevant dynamic items

dC	DC voltmeter
PM	Process monitor
OHM	Ohmmeter
rtd	Thermometer for Pt, Ni
tC	Thermometer for thermocouples
dU	Display for linear potentiometers

6.1.2c Selection of measuring range



nOd. Selection of instrument measuring range

„DC"/OM 352DC	Menu	Measuring range
	20m	0...20 mV
	60m	0...60 mV
	U 1.	0...1 000 mV
	i0.5	0...500 mA
	i1.0	0...1 A
	i5.0	0...5 A
	u20	0...20 V
	u40	0...40 V
	200	0...200 V

MOD. - OM 352AC	Menu	Measuring range
	i 1.	0...1 A
	i 5.	0...5 A
	60m	0...60 mV
	u0.3	0...300 mV
	u24	0...24 V
	u50	0...50 V
	u90	0...90 V
	120	0...120 V
	250	0...250 V
	450	0...450 V

„PM"	Menu	Measuring 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

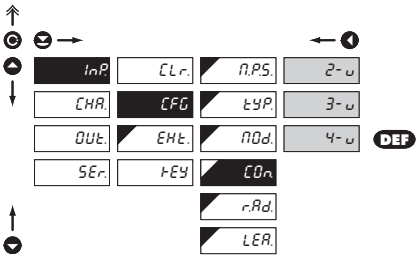
„RTD"	Menu	A	B	C
	Pt.E	Pt 100	Pt 500	Pt 1000
	Pt.U	Pt 100	Pt 500	Pt 1000
	Ni.5			Ni 1000
	Ni.6			Ni 1000

Pt.E 3 850 ppm Ni.5 5 000 ppm
Pt.U 3 920 ppm Ni.6 6 180 ppm

- setting the input range depends on ordered measuring range

„T/C"	Menu	Type of thermocouple
	B	T/C B
	E	T/C E
	J	T/C J
	K	T/C K
	N	T/C N
	R	T/C R
	S	T/C S
	T	T/C T

6.1.2d Selection of type of sensor connection RTD OHM



COn Selection of type of sensor connection

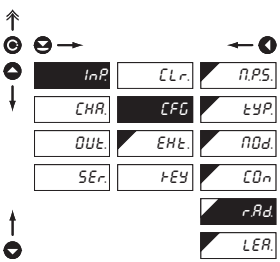
- in 2- or 3- wire connection it is necessary to link the unconnected inputs (see Chapter Connection)

2-u 2-wire connection

3-u 3-wire connection

4-u 4-wire connection

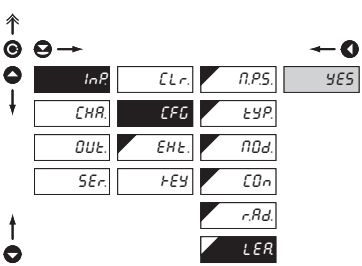
6.1.2e Offset of the beginning of the range RTD OHM



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

- in cases when it is necessary to offset the beginning of the range by certain value, e.g. while using sensor in measuring head
- entered directly in Ohm (0...1999)
- DEF = 0

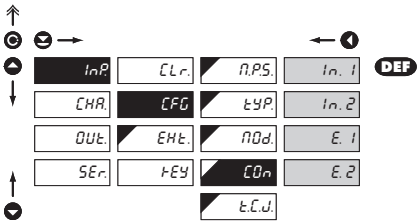
6.1.2f Compensation of 2-wire conduct RTD OHM



LEA. Compensation of 2-wire conduct

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

6.1.2g Selecting the instrument measuring range T/C



CON Method of evaluation of the cold junction

In. 1 Measurement without reference thermocouple
- measuring cold junction at instrument brackets

In. 2 Measurement with reference thermocouple
- measuring cold junction at instrument brackets with anti-series connected reference thermocouple

EH.1 Measurement without reference thermocouple
- the entire measuring set is working under invaried and constant temperature

EH.2 Measurement with reference thermocouple
- when using compensation box

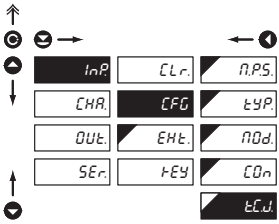
!

Method and procedure of setting the cold junctions is described in separate chapter on page 58

!

For thermocoule type "B" the items CON. and C.J. T. are not available

6.1.2h Setting temperature of cold junction T/C



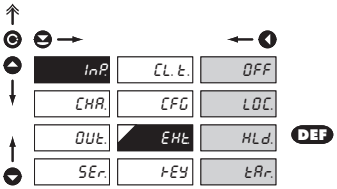
t.C.J. Setting temperature of cold junction

- range 0...60°C with compensation box
- DEF = 23°C

!

For thermocoule type "B" the items CON. and C.J. T. are not available

6.1.3 External input function selection



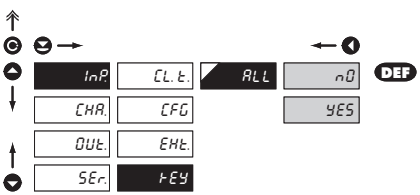
EHt. External input function selection

- OFF — Input is off
- LOC. — Locking keys on the instrument
- HLd. — HOLD, stop measuring of the entire instrument
- tAr. — TARE - Tare activation*

*****

Does not apply for version RTD, T/C

6.1.4 Optional accessory functions of the keys



rEY Assigning further functions to instrument 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

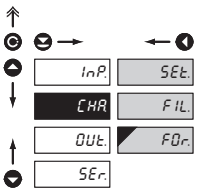
- nO — Accessory functions are off
- YES — Accessory functions are on

Tare value displayed
Display taring
Tare reset

!

Does not apply for version RTD, T/C

6.2 Setting "PROFI" - CHANNEL



In this menu the instrument input parameters are set

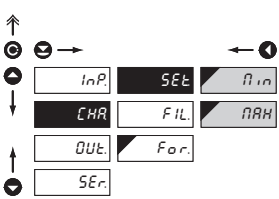
SEt. Setting display projection

FIL. Setting the digital filters

FOr. Setting the decimal point

6.2.1 Projection on the display

DC AC PM DU OHM

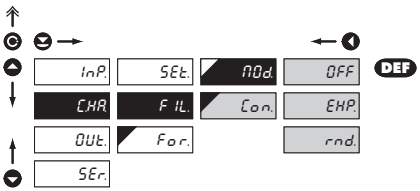


SEt. Setting display projection

Min Setting display projection for minimum value of input signal
- range of the setting is ±1999
- DEF = 0

MAH Setting display projection for maximum value of input signal
- range of the setting is ±1999
- DEF = 100

6.2.2 Setting the digital filters



MOd. 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

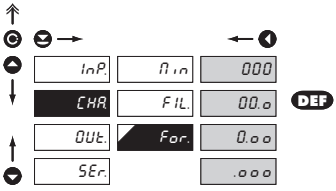
- the value is calculated from a number of measurements selected in „CON"
- range 2...100

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,...)

6.2.3 Setting the 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

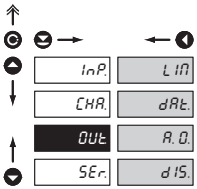
000 Setting the DP - XXXX.

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



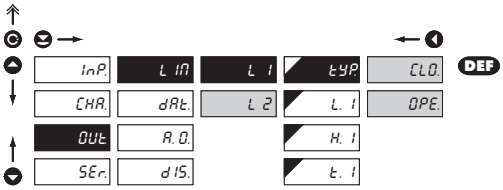
It is possible to set the parameters of the instrument output signals in this menu

- 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

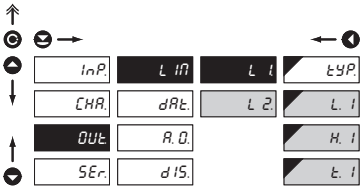
6.3.1a Limits - relay functions



tYP. 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

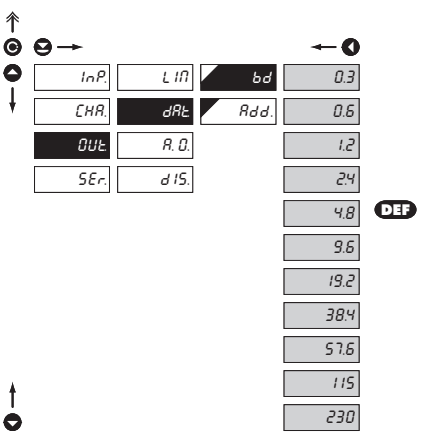
t. 1 Setting the offset of the relay switch-on

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

?

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

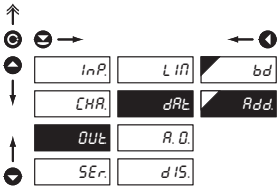
6.3.2a Data output - Rate



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
- **57.6** Rate - 57 600 Baud
- **115** Rate - 115 200 Baud
- **230** Rate - 230 400 Baud

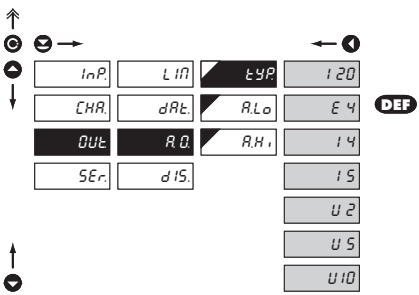
6.3.2b Data output - Address



Add. **Setting the instrument address**

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

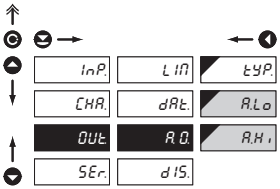
6.3.3a Analog output - Type



tYP. **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



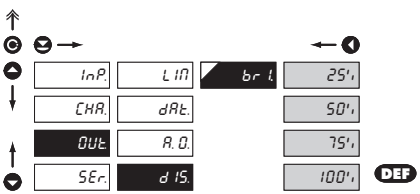
A.O. Setting the analog output range

- 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.Hi 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 %

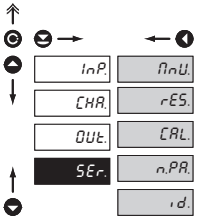
25' Display brightness - 25 %

50' Display brightness - 50 %

75' Display brightness - 75 %

100' Display brightness - 100 %

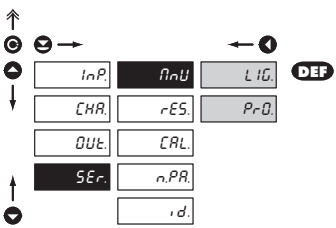
6.4 Setting "PROFI" - SERVICE



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

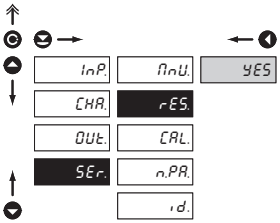
LIG. Active LIGHT menu

- 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

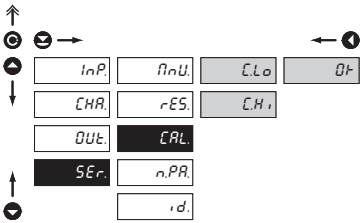
6.4.2 Restoration of the manufacture setting



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"

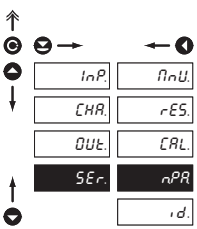
6.4.3 Calibration of the input range DU



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""

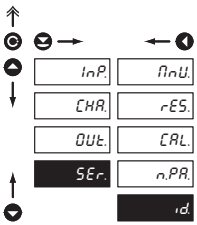
6.4.4 Setting new access password



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**

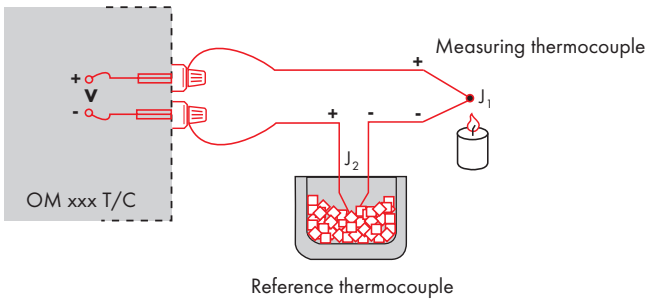
SETTING

item will not be displayed in USER menu

item will be displayed in USER menu with the chance of editing

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 tEJ. 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 - OM 352UNI

range is adjustbale in configuration menu — ***DC***

0...20 mV	10 MOhm	Input 4
0...60 mV	10 MOhm	Input 3
0...1000 mV	1 MOhm	Input 1

range is adjustbale in configuration menu — ***PM***

0/4...20 mA	< 200 mV	Input 5
0...2 V	10 MOhm	Input 4
0...5 V	1 MOhm	Input 1
0...10 V	1 MOhm	Input 1

range is fixed, as per order — ***OHM***

0...300 Ohm
0...1,5 kOhm
0...3 kOhm

Connection: 2, 3 or 4-wire

range is fixed, as per order — ***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, 3850 ppm/3920 ppm
Type Ni: Ni 1 000, 5000 ppm/6180 ppm
Connection: 2, 3 or 4-wire

range is adjustbale 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

INPUT - OM 352DC

range is adjustbale in configuration menu — ***DC***

0...500 mA	< 60 mV	Input 5
0...1 A	< 60 mV	Input 5
0...5 A	< 60 mV	Input 5
0...20 V	8,66 MOhm	Input 2
0...40 V	8,66 MOhm	Input 2
0...200 V	8,66 MOhm	Input 2

INPUT - OM 352AC

range is adjustbale in configuration menu — ***AC***

Range:	0...1 A	< 150 mV	Input 5
	0...5 A	< 150 mV	Input 5
	0...60 mV	1,2 kOhm	Input 4
	0...300 mV	1,2 kOhm	Input 4
	0...24 V	0,5 MOhm	Input 3
	0...50 V	1 MOhm	Input 2
	0...90 V	1,8 MOhm	Input 1
	0...120 V	0,5 MOhm	Input 3
	0...250 V	1 MOhm	Input 2
	0...450 V	1,8 MOhm	Input 1

Frequency input: 0...400 Hz

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 — ***T/C, AC***
±0,3 % of the range + 1 digit — ***RTD***
Resolution: 0,1°/1°C — ***T/C***
1°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

*** type "PM" has for range 0...5 V accuracy ±0,4 %* * values apply for resistance load*

DATA OUTPUTS

Protocols:	ASCII,
Data format:	8 bit + no parity + 1 stop bit
Rate:	300...230 400 Baud
RS 232:	isolated, two-way communication
RS 485:	isolated, two-way communication, addressing (max. 31 instruments)
PROFIBUS	Data protocol SIEMENS

- cannot be combined with analog output and excitation

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 and excitation

EXCITATION

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

- cannot be combined with data/analog output

POWER SUPPLY

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

MECHANIC PROPERTIES

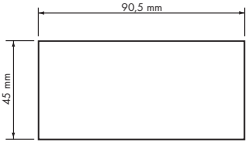
Material:	Noryl GFN2 SE1, incombustible UL 94 V-I
Dimensions:	96 x 48 x 120 mm
Panel cut-out:	90,5 x 45 mm

OPERATING CONDITIONS

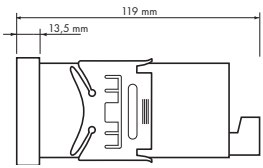
Connection:	connector terminal board, conductor cross-section <1,5 mm^2 /<2,5 mm^2
Stabilisation period:	within 15 minutes after switch-on
Working temp.:	0°...60°C
Storage temp.:	-10°...85°C
Cover:	IP65 (front panel only)
Construction:	safety class I
Overvoltage category:	EN 61010-1, A2
Insulation resistance: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

Front view

Panel cut



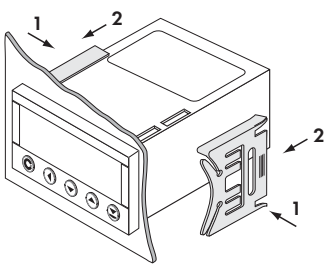
Side view

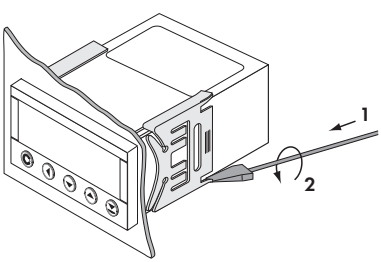


Panel thickness: 0,5...20 mm

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 352 UNI DC AC**
Type	. . . . .
Manufacturing No.	. . . . .
Date of sale	. . . . .

GUARANTEE

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.

Y E A R S

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 352**

Version: UNI, DC, AC

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, 1. September 2006

Miroslav Hackl
Company representative

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