OM 374

3 3/4 DIGIT PROGRAMMABLE

DC VOLTMETER/AMMETER
PROCESS MONITOR
OHMMETER
THERMOMETER FOR PT 100/500/1 000
THERMOMETER FOR NI 1 000/2 226/10 000
THERMOMETER FOR THERMOCOUPLES
DISPLAY INSTRUMENT FOR LIN.
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 374 series conform to European regulation 89/336/EWG and Ordinance 168/1997 Coll.

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

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

CONNECTION

Power supply from the main line has to be isolated from the measuring leads.

$$C \epsilon$$

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1. CONTENTS

2. INSTRUMENT DESCRIPTION

DESCRIPTION

The OM 374 model series are 3 3/4 digit panel instruments, manufactured in the following alternatives:

OM 374DC	DC voltmeter/ammeter
OM 374PM	Process monitor
OM 374RTD	Thermometer for Pt 100/500/1 000, Ni 1 000/2 226/10 000
OM 374T/C	Thermometer for thermocouples
OM 374DU	Display instrument for linear potentiometers
OM 374OHM	Ohmmeter

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

Programmable projection of the display

Calibration	projection for the beginning and the end of the input range
	setting the type of input
Projection	-999...3999

Digital filters

Radius of insensitiveness adjustable in process units

Mathematic functions

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

External control

Hold	display/instrument blocking
Lock	locking the control keys or the access into Configuration menu

Output

Limits	4 relays with switching contact,
	Limits have both adjustable hysteresis and optional delay of the switch-on. Reaching the limits is signalled by LED and at the same time by the switch-on of the relevant relay.

OPERATION

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

Configuration menu (hereinafter referred to as „CM") is protected by an optional numeric code and containis complete instrument setting

User menu may contain arbitrary programming setting defined in CM with another selective restriction (see, change)

All programmable parameters are stored in the EEPROM memory (they hold even after the instrument is switched off).
The measured units may be projected on the display.

EXTENSION

Excitation is suitable for feeding of sensors and converters. It has a galvanic isolation with continuously adjustable value in the range of 2...24 VDC

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 isolated RS232 and RS485 with the ASCII protocols.

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

3.   CONNECTION

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

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

The lead into the 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.

The instruments are tested in compliance with standards for use in industrial area, yet, we recommend to abide by the above mentioned principles.

OM 374T/C

OM 374RTD, OHM

! In RTD input with 2- or 3-wire connection it is necessary to link the unconnected inputs (9/10 and 11/12 or 11/12)

! Relay parameters specified in the technical data apply for resistance load. Upon connection of the induction load we recommend to fit the leads to relay 1 A with a fuse for maximum load protection.

Grounding on terminal „E" must be connected at all times

MEASURING RANGES

Type	Input 1 (I)	Input 2 (U)
OM 374 DC - U	0...60/150/300 mV	0...4/40/400 V
OM 374 DC - I	0...1/5 A	0...400 mA
OM 374 PM	0/4...20 mA	0...2/5/10 V
OM 374 OHM	0...0,4/4/40 kOhm or 5...105 Ohm/0...10/100 kOhm	

4. INSTRUMENT SETTING

The instrument is set and controlled by 5 control keys located on the front panel. By means of these control keys it is possible to browse through the operting program, to select and set the required values.

Measured value
last two places may display the measuring units

Relays status
ON   LED light is on
OFF LED light is off

Active function
T   Tare

$356.7ml'$

1   2   3   4   T
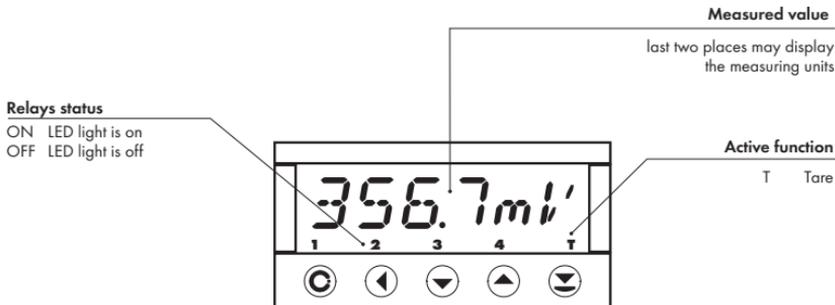
CONFIGURATION MODE

- designated for professional service and maintenance
- complete instrument setting
- access is password protected
- authorization for "User mode"

USER MODE

- designated for instrument service
- may contain setting the limits, analog and data output and brightness, with restriction as per the setting in "Configuration mode"

SYMBOLS USED IN THE INSTRUCTIONS

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

CONTROL KEYS FUNCTIONS

MENU	ENTER	LEFT	DOWN	UP
Measuring mode				
menu access	tare	tare projection		
Moving around in the menu				
exit the menu without saving	move to next level	back to previous level		move to enxt item
Setting/selecting - items				
cancel setting without saving	confirm selected item		move down	move up
Setting - numbers				
cancel setting without saving	cancel selected number	move to higher decade	change of current figure - down -	change of current figure - up -

SETTING THE DECIMAL POINT AND THE MINUS SIGN

DECIMAL POINT

Its selection in calibration modes, upon modification of the number to be adjusted is performed by the control key ◐ with transition behind the highest decade, when the decimal point starts flashing. Positioning is performed by ⬆. Decimal point is set only in the item „Input - MIN"

MINUS SIGN

It is adjustable upon the shift of the decimal point accross all decades, back to the first one, at which the minus sign will light up. The setting is repeated, i.e. 1x around only positioning of the decimal point and upon next passage accross all decades the minus sign lights up and the decimal point is placed.

Setting

⇨ „Calibration mode" ⇨ Input ⇨ Minimum
⇨ $INPUT$ ⇨ MIN

⇨ after transition behind the highest decade ◐ the decimal point starts flashing

⇨ by pressing ⬆ or ⬇ you will place the decimal point and confirm it by ⬇

! In the MIN item the setting of the decimal point is determining for the entire instrument

0000	→	⬆	→	⬇

◐
4x shift left

positioning of flashing DP

confirm the selection and return to superior item

ACCESS INTO THE CONFIGURATION MODE

⟳ + ⬇
↓

PASS → 0000 ⬇ → OK

w/o saving
⟳
↑
0, 1, 2...
⬆

shift left ◐ ⬇
9, 8, 7...
↓

⬆
N. PASS
↓
MENU
↑
CONFIG
⬇
INPUT
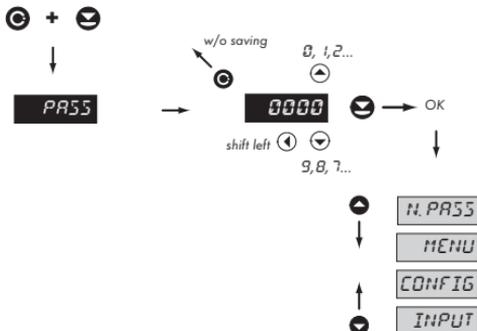
☼ The code is always preset from manufacture to 0000. In case of loss of access password it is possible to use universal access code "8177"

4.1 GUIDE THROUGH MINIMUM INSTRUMENT SETTING

❶ Access into the „Configuration menu"
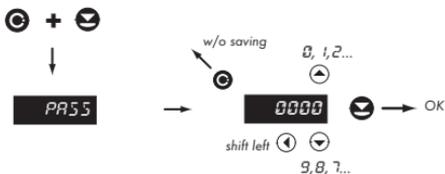
	Entering the introductory access password
PASS	

	Standard manufacture setting of the access password
0000	

❷ Selection of the meas. range/type of input   DC PM OHM RTD T/C

	Setting the instrument measuring range
TYPE	

DC Input

- ammeter and voltmeter are two independent instruments

PM Input

- setting the measuring range

RTD Input

- setting the type of sensor
- Pt 3850 ppm/°C   EU, standard
  Pt 3920 ppm/°C   US, upon request
  Ni 5000 ppm/°C   standard
  Ni 6180 ppm/°C   upon request

OHM Input

- setting the measuring range
- 400 R   0...400 Ohm
  4 K   0...4 kOhm
  40 K   0...40 kOhm
- 105 R   5...105 Ohm
  10 K   0...10 kOhm
  100 K   0...100 kOhm

T/C Input

- setting the type of thermocoupler
- B   type B
  R   type R
  S   type S
  T   type T
  E   type E
  J   type J
  K   type K
  N   type N
  CJC   the temperature of the cold junction

❸ Setting projection on the display
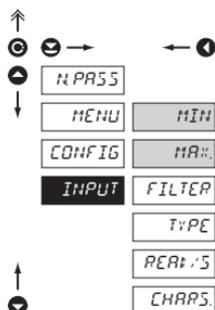
| INPUT | **Setting the input parameters** |

- *items necessary for minimum instrument setting*

Type of input	Displayed items of the menu
DC	MIN, MAX
PM	MIN, MAX
DU	MIN, MAX
OHM	MIN, MAX, *LEADS
RTD	*LEADS, CONNEC.
T/C	CJC, COMP.TC

only for 2-wire

4.2   USER MENU

- designated for instrument service
- may contain setting the limits, analog/data output and brightness, with restriction as per the setting in "Configuration mode"

| 23.6 |

| MENU | LIMITS | ANALOG | ꟸATA | BRIGHT. | CLR.TAR. |

Setting limits, hysteresis and delay

Setting the analog output

Setting the data output

Setting the display brightness

Tare resetting

MENU
Instrument setting

! *Projection of items and their accessibility depends on the setting of access rights in the „Configuration menu"*

4.2.1   LIMITS - ENTERING THE VALUES

MENU	LIMITS	LIM 1	LIMIT1
ANALOG	LIM 2	HYS 1
ꟸATA	LIM 3	TIME 1
BRIGHT.	LIM 4
CLR.TAR.
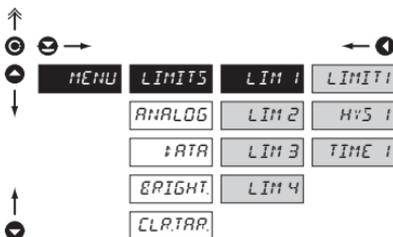
🔒 *Adjustable authorization of access into items, see page 19*

| LIMITS | **Entering the limit values for status evaluations** |

| LIM 1 | Setting for Limit 1 |

| LIM 2 | Setting for Limit 2 |

| LIM 3 | Setting for Limit 3 |

| LIM 4 | Setting for Limit 4 |

| LIMIT1 | Setting the limit for relay switch-on |

- *in full range of the display*

| HYS 1 | Setting hysteresis only in (+) values |

- *in 1/10 of the display range*

| TIME 1 | Setting the delay of relay activation |

- *in the range of 0...99,9 s*

4.2.2 ANALOG OUTPUT

ANALOG **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*

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

- *range of the setting is -999...3999*

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

- *range of the setting is -999...3999*

Adjustable authorization of access nito items, see page 20

Analog and data outputs may not be fitted simultaneously in this instrument
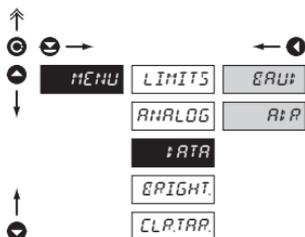
4.2.3 DATA OUTPUT

DATA **Setting the data output parameters**

BAUd Setting the transmission rate (baud)

- *setting in the range of 150/300/600/1200/2400/4800/9600/19200/38400/57600/115200 Baud*

AdR Setting the instrument address

- *setting in the range of 0...31*
- *manufacture setting 00* **DEF**

Adjustable authorization of access into items, see page 21

4.2.4 DISPLAY BRIGHTNESS
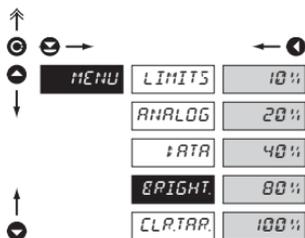
BRIGHT. **Setting the display brightness**

- *by selecting the display brightness we may properly react to light conditions in place of location of the instrument*
- *brightness in the programming menu is always 80 %*

Adjustable authorization of access into items, see page 21

13

4.2.5 TARE RESETTING
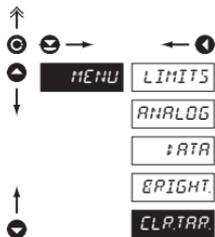
↟
◉ ☻→   ←◐
◐ `MENU`   `LIMITS`
↓   `ANALOG`
           `ꜜATA`
           `ƐPIGHT.`
↑   `CLA.TAR.`
◐

🔒 *Adjustable authorization of access into items,
see page 21*

`CLA.TAR.` **Tare resetting**

*- after confirmation the tare will be reset to zero
and the LED „T" will turn off*

4.3 CONFIGURATION MENU

- designated for professional service and maintenance
- complete instrument setting
- the access is protected by a password or a jumper on the input connector
- authorization for "User mode"

❗ *Upon delay longer than 15 s the programming mode is automatically discontinued and the instrument itself switches back to the measuring mode*

```
23.6
```

⟳ + ✉

```
PA55
```

```
0000
```
Entering the access password

N.PA55
Setting new access password

```
N.PA55
```

MENU
Instrument setting

MENU	LIMITS	ANALOG	⊦ATA	BRIGHT.	CLR.TAR.
	Setting the limits, hysteresis and delay	Setting the analog output	Setting the data output	Setting the display brightness	Tare resetting

CONFIG
Authorization setting

CONFIG	CON.LIM	CON.AO	CON.R5	CON.BR.	CON.TAR.
	Configuration of access into „Limits" menu + relay function	Configuration of access into „AO" menu + selection of the AO type	Configuration of access into „RS" menu + selection of the RS type	Configuration of access into „Brightness" menu	Configuration of access into „Tare" menu

INPUT
Input setting

INPUT	MIN	MAX	FILTER	TYPE	REAⱴ5	CHAR5.
	Setting projection for minimum input signal	Setting projection for maximum input signal	Setting digital filter	Setting the type of input	Setting the measuring rate	Setting projection of the measuring units

4.3.1   CONFIGURATION MODE - MENU
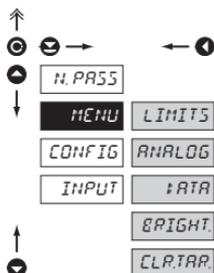
The basic instrument parameters are adjusted in this menu

LIMITS	Setting the limit values for status evaluation
ANALOG	Setting the analog output range
⊦ATA	Setting the data output parameters
ᴮRIGHT.	Setting the display brightness
CLR.TAR.	Tare resetting

4.3.1.1   LIMITS
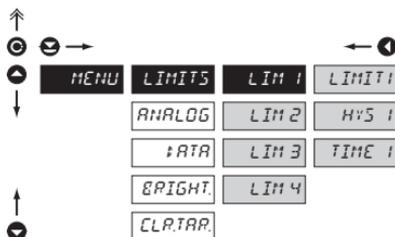
LIMITS	**Entering the limit values for status evaluations**
LIM 1	Setting for Limit 1
LIM 2	Setting for Limit 2
LIM 3	Setting for Limit 3
LIM 4	Setting for Limit 4

| LIMIT1 | Setting the limit for relay switch-on |

- *in full range of the display*

| HYS 1 | Setting hysteresis only in (+) values |

- *in 1/10 of the display range*

| TIME 1 | Setting the delay of relay activation |

- *in the range of 0...99,9 s*

❗ *The procedure of setting the limit 2, 3, 4 is identical as for limit 1*
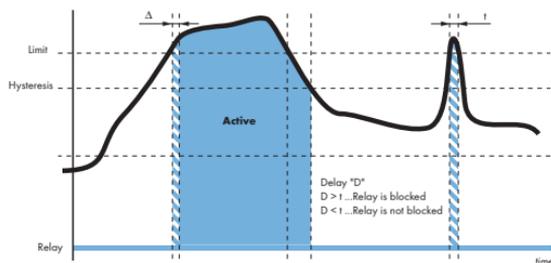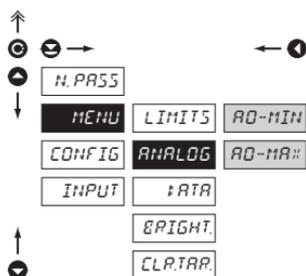
Limit
Hysteresis
Active
Delay "D"
D > t ...Relay is blocked
D < t ...Relay is not blocked
Relay
time

4.3.1.2 ANALOG OUTPUT

↑
◉ ⊜ →   ← ◀
● `N.PA55`
│ `MENU`   `LIMIT5`   `AO-MIN`
   `CONFIG` `ANALOG`   `AO-MA:`
   `INPUT`   `+ATA`
↑   `GRIGHT.`
●   `CLR.TAR.`

`ANALOG` **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 toany two arbitrary points of the entire measuring range

`AO-MIN` Assigning the displayed value to the beginning of the AO range

- range of the setting is -999...3999

`AO-MA:` Assigning the displayed value to the end of the AO range

- range of the setting is -999...3999

❗ *Analog and data outputs may not be fitted simultaneously in this instrument*

4.3.1.3 DATA OUTPUT
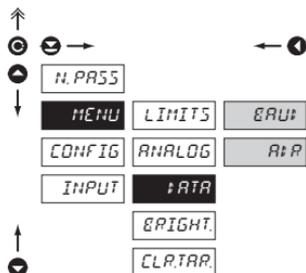
↑
◉ ⊜ →   ← ◀
● `N.PA55`
│ `MENU`   `LIMIT5`   `GRU+`
   `CONFIG` `ANALOG`   `A+R`
   `INPUT`   `+ATA`
↑   `GRIGHT.`
●   `CLR.TAR.`

`+ATA` **Setting the data output parameters**

`GRU+` Setting the transmission rate (baud)

- setting in the range of 150/300/600/1200/2400/4800/9600/19200/38400/57600/115200 Baud

`A+R` Setting the instrument address

- setting in the range of 0...31
- manufacture setting 00 **DEF**

❗ *Analog and data outputs may not be fitted simultaneously in this instrument*

4.3.1.4   DISPLAY BRIGHTNESS

MENU	LIMITS	10%
CONFIG	ANALOG	20%
INPUT	ɩATA	40%
BRIGHT.		80%
CLR.TAR.		100%

N.PASS
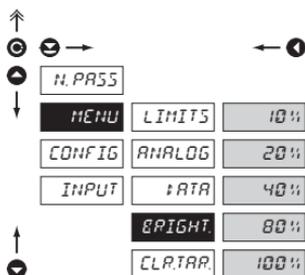
BRIGHT.   **Setting the display brightness**

- *by selectiung 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%*

10% Display brightness = 10%

20% Display brightness = 20%

40% Display brightness = 40%

80% Display brightness = 80%

100% Display brightness = 100%

4.3.1.5   TARE RESETTING
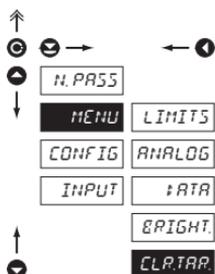
N.PASS

MENU	LIMITS
CONFIG	ANALOG
INPUT	ɩATA
	BRIGHT.
	CLR.TAR.

CLR.TAR.   **Tare resetting**

- *after confirmation the tare will be reset to zero and the LED „T" will turn off*

4.3.2 CONFIGURATION MODE - CONFIG

| CONFIG | **Setting the access rights to individual options for „User mode"** |

- one of the prime merits of this function is the feasibility to assign authorization for access and modification of parameters in individual steps of the "User mode". This setting will facilitate the instrument service staff easy operation and prevent unauthorized interference into the setting of vital functions.

| CON.LIM | Configuration of the access into „Limits" menu and relay function |

| CON. AO | Configuration of the access into „AO" menu and selection of the AO type |

| CON. RS | Configuration ot the access into „RS" menu |

| CON. BR. | Configuration of the access into „Brightness" menu |

| CON. TAR. | Configuration of the access into „Tare" menu |

💡 *The configuration code may consist of up to 6 numbers, which determine the operational setting of the instrument. Individual meaning and setting of the numbers are described in relevant chapters of the configuration mode.*

4.3.2.1.1 SETTING ACCESS INTO THE LIMITS MENU
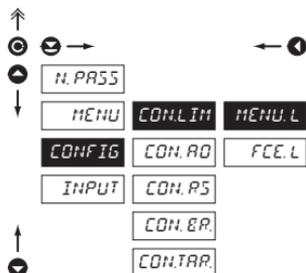
| CON.LIM | **Configuration of the access into „Limits" menu and relay function** |

| MENU. L | Setting the access rights |

- selection of the access rights for „User mode"

A - Limit 1, B - Limit 2, C - Limit 3, D - Limit 4

Rights	Limits	Hyst.	Time	DCBA
Prohibited	✗	✗	✗	0
	✓	✗	✗	1
Projection	✓	✓	✗	2
	✓	✓	✓	3
	✓	✗	✗	4
Change of setting	✓	✓	✗	5
	✓	✓	✓	6

4.3.2.1.2 SETTING THE RELAY FUNCTION
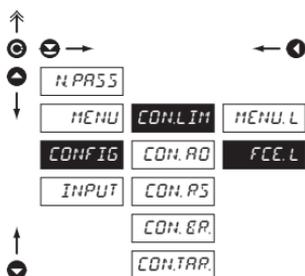
↑
◉ ⊖→   ←◑
⬤ | N PA55 |
↓
MENU	CON.LIM	MENU.L
CONFIG	CON.AO	FCE.L
INPUT	CON.PS
CON.ER.
↑
⬤ | CON.TAR. |

| FCE.L | Relay configuration

A - Limit 1, B - Limit 2, C - Limit 3, D - Limit 4

Relay fuunction		DCBA
Relay	switch-on	0
	switch-off	1

4.3.2.2.1 SETTING ACCESS INTO THE ANALOG OUTPUT MENU
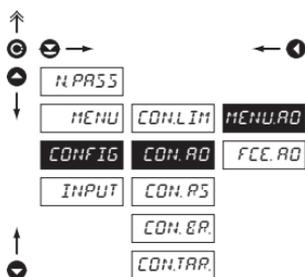
↑
◉ ⊖→   ←◑
⬤ | N PA55 |
↓
MENU	CON.LIM	MENU.AO
CONFIG	CON.AO	FCE.AO
INPUT	CON.PS
CON.ER.
↑
⬤ | CON.TAR. |

| CON.AO | **Configuration of the access into „AO" menu and selection of the AO type**

| MENU.AO | Setting the access rights

- selection of the access rights for „User mode"

Rigts	A
Prohibited	0
Projection	1
Change of setting	2

4.3.2.2.2 SETTING THE TYPE OF THE ANALOG OUTPUT

↑
◉ ⊖→   ←◑
⬤ | N PA55 |
↓
MENU	CON.LIM	MENU.AO	0-5mA
CONFIG	CON.AO	FCE.AO	0-20mA
INPUT	CON.PS		4-20mA
CON.ER.		0-2 V
CON.TAR.		0-5 V
		0-10 V
		E 4-20
↑
⬤
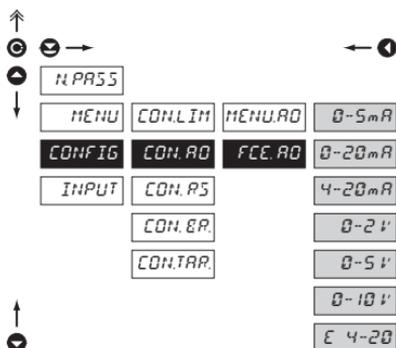
| FCE.AO | **Setting the type of the analog output**

| 0-5 mA | Range - 0...5 mA

| 4-20 mA | Range - 0...20 mA

| 0-20 mA | Range - 4...20 mA

| 0-2 V | Range - 0...2 V

| 0-5 V | Range - 0...5 V

| 0-10 V | Range - 0...10 V

| E 4-20 | Range - 4...20 mA with indication „ERROR"

- upon error statement the value on the output is < 3,6 mA

4.3.2.3 SETTING ACCESS INTO THE DATA OUTPUT MENU
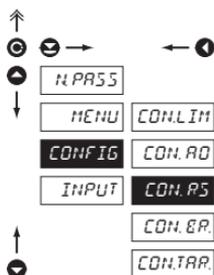
CON.PS **Setting the access rights**

- selection of the access rights for the „User mode"

Rights	A
Prohibited	0
Projection	1
Change of setting	2

4.3.2.4 SETTING ACCESS INTO THE MENU OF BRIGHTNESS SETTING
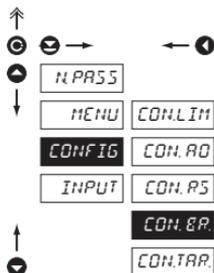
CON.8P. **Configuration of the access into „Brightness" menu**

- selection of access rights for the „User mode"

Rights	A
Prohibited	0
Projection	1
Change of setting	2

4.3.2.5 SETTING ACCESS INTO THE MENU OF TARE RESETTING
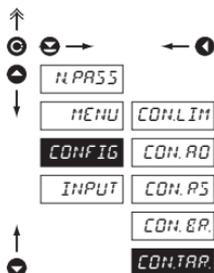
CON.TAR. **Configuration of the access into tare resetting**

- selection of access rights for the „User mode"

Rights	A
Prohibited, the function is off	0
Projection	1
Resetting to zero permitted	2

4.3.3 CONFIGURATION MODE - INPUT

	MENU	MIN	
	CONFIG	MAX.	
	INPUT	FILTER	
		TYPE	
		REAV.'S	
		CHARS.	
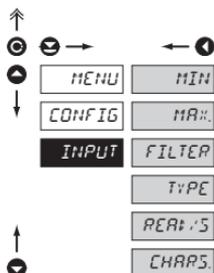
INPUT	**Setting the input parameters**
MIN	Setting display projection for minimum value of the input signal ❶
MAX	Setting display projection for maximum value of the input signal ❷
FILTER	Setting the digital filter ❸
OFFSET	Shift of the beginning of the measuring range ❹
LEAI:S	Compensation of 2-wire conduct ❺
TYPE	Setting the instrument meas. range and connection ❻
CONNEC.	Setting the type of input connection ❼
REAI:'S	Setting the instrument measuring rate ❽
CHARS.	Setting the projection of measuring units ❾
CJC	Setting the temperature of the cold junction ❿
COMP.TC	Method of measurement of the cold junction ⓞ

Input type	Setting options					
DC	① ② ③		⑥		⑧ ⑨	
PM	① ② ③		⑥		⑧ ⑨	
DU	① ② ③				⑧ ⑨	
OHM	① ② ③	⑤			⑧ ⑨	
RTD		③ ④ ⑤ ⑥ ⑦ ⑧				
T/C.		③	⑥	⑧	⑧ ⊙	

4.3.3.1 PROJECTION ON THE DISPLAY DC PM DU OHM
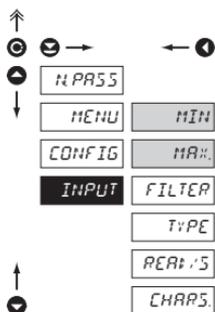
`MIN.` Setting display projection for minimum value of the input signal

- *range of the setting is -999...3999*
- *positioning of the decimal point in this item is determining for the entire instrument*

`MAX.` Setting display projection for maximum value of the input signal

- *range of the setting is -999...3999*

❗ *Setting of the decimal point in the MIN item is determining for the entire instrument*

SETTING FOR LINEAR POTENTIOMETER DU
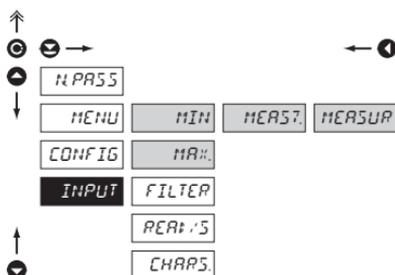
`MEAS` Call to place the potentiometer traveller into initial position

- *in the MIN and MAX items enter the required projection and confirm by pressing „Enter"*
- *before confirming the sign „MEAS?" by „Enter" the potentiometer traveller has to be positioned and stabilized at the beginning of the measuring range*
- *the „MEASUR" sign indicates automatic calibration of the measuring range, the potentiometer traveller has to be at rest*

❗ *Calibration for second position is identical with setting of the beginning*

4.3.3.2 SHIFTING THE BEGINNING OF THE RANGE RTD
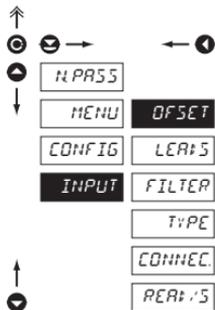
`OFFSET` **Shifting the beginning of the range**

- *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*

4.3.3.3 COMPENSATION OF 2-WIRE CONDUCT   `OHM` `RTD`

```
⇑
◉ ☻ →              ← ◀
⬤  ┌─────────┐
    │ N.PA55  │
 ↓   └─────────┘
      ┌───────┐  ┌────────┐  ┌───────┐
      │ MENU  │  │ OFFSET │  │ YES7. │
      └───────┘  └────────┘  └───────┘
      ┌────────┐ ┌───────┐
      │ CONFIG │ │ LEA:5 │
      └────────┘ └───────┘
      ┌───────┐  ┌────────┐
      │ INPUT │  │ FILTER │
      └───────┘  └────────┘
                 ┌───────┐
                 │ TYPE  │
                 └───────┘
                 ┌────────┐
 ↑               │ CONNEC.│
                 └────────┘
⬤               ┌───────┐
                 │ REA:.5│
                 └───────┘
```

| `LEA:5` | **Compensation of 2-wire conduct** |

- *for measurement accuracy it is necessary to perform compensation of the conduct always in case of 2-wire connection*
- *entered directly in Ohm*
- *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*
- *preset from manufacture to „0"*

! *The items are visible at all times but the active only upon set 2-wire connection*

4.3.3.4 SETTING THE TYPE OF CONNECTION   `RTD`

```
⇑
◉ ☻ →              ← ◀
⬤  ┌─────────┐
    │ N.PA55  │
 ↓   └─────────┘
      ┌───────┐  ┌────────┐  ┌────────┐
      │ MENU  │  │ OFFSET │  │ 2-WIRE │
      └───────┘  └────────┘  └────────┘
      ┌────────┐ ┌───────┐   ┌────────┐
      │ CONFIG │ │ LEA:5 │   │ 3-WIRE │
      └────────┘ └───────┘   └────────┘
      ┌───────┐  ┌────────┐  ┌────────┐
      │ INPUT │  │ FILTER │  │ 4-WIRE │
      └───────┘  └────────┘  └────────┘
                 ┌───────┐
                 │ TYPE  │
                 └───────┘
                 ┌────────┐
 ↑               │ CONNEC.│
                 └────────┘
⬤               ┌───────┐
                 │ REA:.5│
                 └───────┘
```
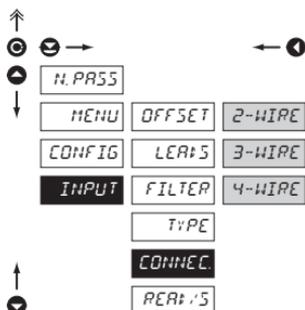
| `TYPE` | **Setting the type of connection** |

| `2-WIRE` | 2-wire input connection |

| `3-WIRE` | 3-wire input connection |

| `4-WIRE` | 4-wire input connection |

4.3.3.5 SETTING THE COLD JUNCTION   `T/C`
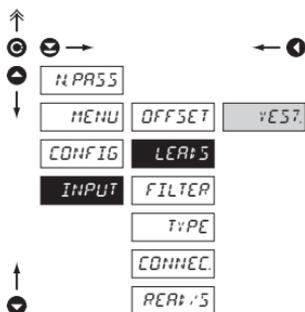
```
⇑
◉ ☻ →              ← ◀
⬤  ┌─────────┐
    │ N.PA55  │
 ↓   └─────────┘
      ┌───────┐  ┌────────┐
      │ MENU  │  │  CJC   │
      └───────┘  └────────┘
      ┌────────┐ ┌────────┐
      │ CONFIG │ │ FILTER │
      └────────┘ └────────┘
      ┌───────┐  ┌───────┐
      │ INPUT │  │ TYPE  │
      └───────┘  └───────┘
                 ┌───────┐
 ↑               │ REA:.5│
                 └───────┘
⬤               ┌────────┐
                 │COMP.TC │
                 └────────┘
```
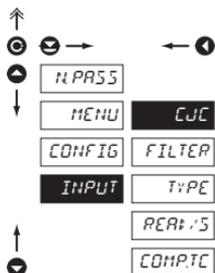
| `CJC` | **Setting the temperature of the cold junction** |

- *range of 0...98 °C with compensation box*
- *99 °C without compensation box, with/ without reference thermocouple, temperature of the cold junction is measured at the input brackets of the instrument*

☀ *Method and procedure of the setting of the cold junctions are described in a separate chapter on page 30*

4.3.3.6 SETTING THE METHOD OF MEASUREMENT OF THE COLD JUNCTION `T/C`

N.PA55		
MENU	CJC	C. YES
CONFIG	FILTER	C.NOT
INPUT	TYPE	
	REAL'S	
	COMPTC	
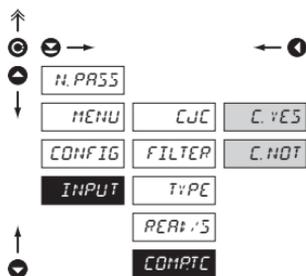
COMPTC **Setting the method of measurement of the cold junction**

- measurement with/without reference thermocouple

C. YES Measurement with reference thermocouple (antiserially)

C.NOT Measurement without reference thermocouple

Method and procedure of setting of the cold junctions are described in a separate chapter on page 30

4.3.3.7 DIGITAL FILTER

N.PA55		
MENU	MIN	
CONFIG	MAX.	
INPUT	FILTER	
	TYPE	
	REAL'S	
	CHARS.	
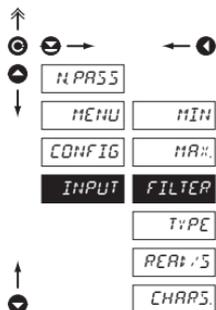
FILTER **Setting the digital filter**

- use of the digital filter will find its place in applications where the change of projection on the display (by given value) interferes or is not substantial in the measuring regime
- it is entered directly in digits and is valid symetrically
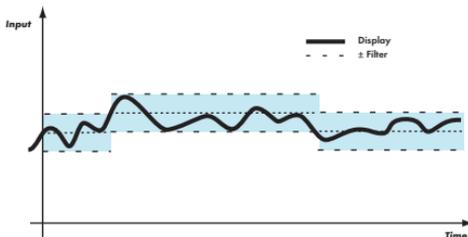
4.3.3.8   SETTING THE MEASURING RANGE   `DC` `PM` `RTD` `OHM` `T/C`

		DC - V	DC - A
`N PASS`			
`MENU`	`MIN`	`0-4V`	`400 mA`
`CONFIG`	`MAX.`	`0-40V`	`1 A`
`INPUT`	`FILTER`	`0-400V`	`5 A`
	`TYPE`	`0-60mV`	**OHM - 1**
	`PERIVS`	`0-150m`	`400 R`
	`CHARS.`	`0-300m`	`4 K`

PM
`0-2V`	`40 K`
`0-5V`	**OHM - 2**
`0-10V`	`105 R`
`0-20mA`	`10 K`
`4-20mA`	`100 K`

RTD - Pt	**T/C**
`Pt 100`	`E`
`Pt 500`	`R`
`Pt 1000`	`5`
RTD - NI	`T`
`Ni 1000`	`E`
`Ni 2226`	`J`
`Ni 10K`	`K`
	`N`
	`CJC`

! *Upon a change of the range check also the necessary jumper settings (page 28) and connection of given input (page 7)*

`TYPE` **Setting the measuring range of the instrument**

DC Input

- ammeter and voltmeter are two independent instruments

PM Input

- setting the measuring range

RTD Input

- setting the type of sensor
- Pt 3850 ppm/°C   EU, standard
  Pt 3920 ppm/°C   US, upon request
  Ni 5000 ppm/°C   standard
  Ni 6180 ppm/°C   upon request

OHM Input

- setting the measuring range
- 400 R   0...400 Ohm
  4 K   0...4 kOhm
  40 K   0...40 kOhm

- 105 R   5...105 Ohm
  10 K   0...10 kOhm
  100 K   0...100 kOhm

T/C Input

- setting the type of thermocouple
- B   type B
  R   type R
  S   type S
  T   type T
  E   type E
  J   type J
  K   type K
  N   type N
  CJC   the temperature of the
                 cold junction

4.3.3.9 SETTING THE MEASURING RATE

| `N PA55` |
`MENU`	`MIN`	`1.3 m/ɪ`
`CONFIG`	`MAᴙ.`	`2.5 m/ɪ`
`INPUT`	`FILTER`	`5 m/ɪ`
	`TᴠPE`	`10 m/ɪ`
	`REAᴉ/5`	`20 m/ɪ`
	`CHAP5.`	`40 m/ɪ`
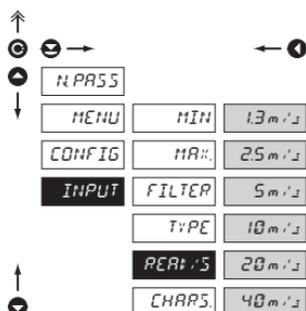
`REAᴉ/5` **Setting the measuring rate**

- setting the measuring rate is associated with the rate of response to evaluation of the relay status and analog output

`1.3 m/ɪ` Rate - 1,3 measurements/s

`2.5 m/ɪ` Rate - 2,5 measurements/s

`5 m/ɪ` Rate - 5 measurements/s

`10 m/ɪ` Rate - 10 measurements/s

`20 m/ɪ` Rate - 20 measurements/s

`40 m/ɪ` Rate - 40 measurements/s

4.3.3.10 SETTING THE DESCRIPTION OF MEASURING UNITS   **DC** **PM** **DU** **OHM**

| `N PA55` |
`MENU`	`MIN`
`CONFIG`	`MAᴙ.`
`INPUT`	`FILTER`
	`TᴠPE`
	`REAᴉ/5`
	`CHAP5.`
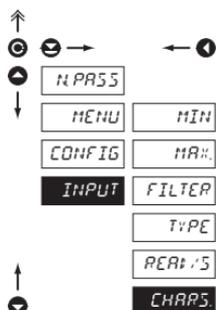
`CHAP5.` **Setting projection of measuring units on the display**

- the instrument allows to add two descriptive characters to the classic numeric formats (at the expense of the number of displayed places). The setting is performed by means of a shifted ASCII code. Upon setting the first two places display the entered characters and the last two places the code of the relevant symbol from 0 to 95.

  Description is cancelled by entering characters 00

- instruments with the input for temperature measurement display as a stadard °C

Table of symbols is on page 29

5.   CONFIGURATION INPUT

Jumpers are accessible after the instrument is opened

INPUT "2" (DC)		60 mV	150 mV	300 mV
J7	Not	✗	✓	✓
	Yes	✓	✗	✗
J8	Not	✗	✗	✗
	Yes	✗	✗	✗

FUNKTIONS		Hold	Lock
J1	Not	✓	✗
	Yes	✗	✓

INPUT "2", "U"		DC	PM
J9	5 - 6	0...4 V	0...2 V
	3 - 4	0...40 V	0...5 V
	1 - 2	0...400 V	0...10 V

Excitation

INPUT (T/C)		E, J, K, N	T, R, S	B
J7	Not	✓	✓	✗
	Yes	✗	✗	✓
J8	Not	✓	✗	✗
	Yes	✗	✓	✓

INPUT		RTD
J4	5 - 6	Pt 100/Ni 1 000
	3 - 4	Pt 500/Ni 2 226
	1 - 2	Pt 1 000/Ni 10 000

INPUT		OHM - Input 1
J5	5 - 6	0...400 Ohm
	3 - 4	0...4 kOhm
	1 - 2	0...40 kOhm

ORBIT MERRET OM371MB 05/03
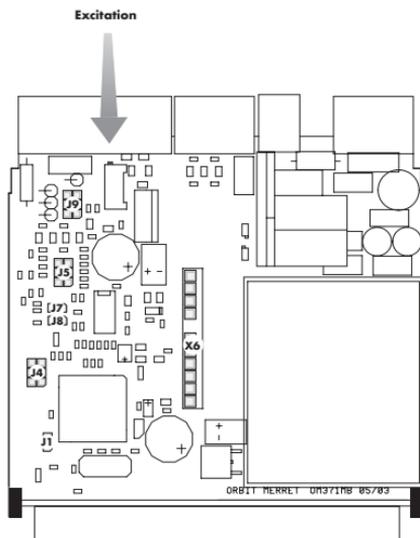
! *For every jumper setting disconnect the instrument from the mains*

6.   TABLE OF SYMBOLS

The instrument allows to add two descriptive characters to the classic numeric formats (at the expense of the number of displayed places). The setting is performed by means of a shifted ASCII code. Upon modification the first two places display the entered characters and the last two places the code of the relevant symbol from 0 to 95. Numeric value of given character equals the sum of the numbers on both axes of the table.

Description is cancelled by entering characters with code 00

	0	1	2	3	4	5	6	7
0		?.	' '	&	S	½	ã	'
8	‹	›	#	✝	,	··	·'
16	0	1	2	3	4	5	6	7
24	8	9	``	,,	‹	›	··	7.
32	P	A	E	C	♭	E	F	G
40	H	I	J	k	L	M	N	O
48	P	Q	R	S	T	U	V	W
56	X	Y	Z	C	\	J	⌐	_
64	'	a	b	c	d	e	F	G
72	h	ι	J	k	l	m	n	o
80	P	Q	r	J	t	∪	v	w
88	X	Y	z	·‹	l	›·	o

	0	1	2	3	4	5	6	7
0		!	"	#	$	%	&	'
8	(	)	*	+	,	-	.	/
16	0	1	2	3	4	5	6	7
24	8	9	:	;	<	=	>	?
32	@	A	B	C	D	E	F	G
40	H	I	J	K	L	M	N	O
48	P	Q	R	S	T	U	V	W
56	X	Y	Z	[	\	]	^	_
64	`	a	b	c	d	e	f	g
72	h	i	j	k	l	m	n	o
80	p	q	r	s	t	u	v	w
88	x	y	z	{			}	~

7. METHODE OF MEASURING OF THE CJC

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

Reference thermocouple
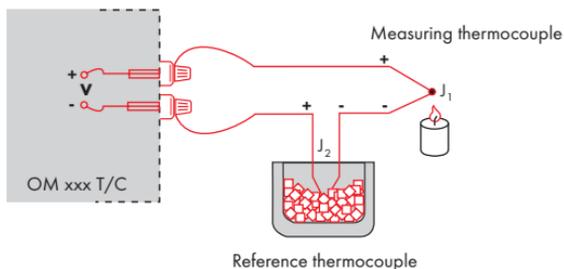
WITH REFERENCE THERMOCOUPLE

■ 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 $COMPTC$ in the instrument menu to $C. YES$

■ when using a thermostat (a compensation box or environment with constant temperature) set $CJC.$ in the instrument menu to its temperature

■ if the reference thermocouple is located in the same environment as the measuring instrument then set CJC in the instrument menu to number 99. Based on this selection the measurement of the surrounding temperature is performed by a sensor located in the instrument terminal board.

WITHOUT REFERENCE THERMOCOUPLE

■ innacuracy 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 $COMPTC.$ in the instrument menu to $C. NOT$

■ when measuring temperature without reference thermocouple the error in measured data maybe even 10°C

8. DATA PROTOCOL

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

ASCII: 8 bit, no parity, one stop bit

Transmission rate is adjustable in the instrument menu and depends on the used control processor. The instrument address is set in the instrument menu in the range of 0...31. Manufacture setting always presets the ASCII protocol, rate of 9600 Baud, address 00. Type of line used - RS232 / RS485 - is determined by exchangeable card automatically identified by the instrument.

COMMANDS FOR INSTRUMENT OPERATION

The commands are described in the description which can be found at **www.orbit.merret.cz/rs**.

The command consists of a couple number-letter, where the letter size is of importance.

Symbol	Meaning	Symbol	Meaning
⊕	Send unit value	**C**	Complete number
⊕	Set unit value	**V**	Selection = complete number
▣	Perform relevant action	**D**	Decimal number
		T	Text - printable ASCII characters
		H	Intel HEX format

DETAIL DESCRIPTION OF COMMUNICATION VIA SERIAL LINE

Activity	Type	Protocol		Data transferred											
Data solicitation (PC)	232	ASCII		#	A	A	<CR>								
	485	ASCII		#	A	A	<CR>								
Data transfer (Instrument)	232	ASCII		>	D	D	D	D	D	D	D	(D)	(D)	(D)	<CR>	
	485	ASCII		>	D	D	D	D	D	D	D	(D)	(D)	(D)	<CR>	
Command transfer (Instrument)	232	ASCII		#	A	A	N	P	D	D	D	D	(D)	(D)	(D)	<CR>
	485	ASCII		#	A	A	N	P	D	D	D	D	(D)	(D)	(D)	<CR>
Command confirmation (Instrument)	232	ASCII	ok	!	A	A	<CR>								
			bad	?	A	A	<CR>								
	485	ASCII	ok	!	A	A	<CR>								
			bad	?	A	A	<CR>								

Legend				
#		35	23$_H$	Beginning of the command
A	A	0...31		Two signs of the inst. address (sent in ASCII - decades and units, ex."01")
<CR>		13	0D$_H$	Carriage return
<SP>		32	20$_H$	Space
N	P			Number and command - command code
D				Data - usually signs "0"..."9","-","." ; (D) - dp. and (-) may prolong data
R		30$_H$...3F$_H$		Relay status; zero bit corresponds with 1st relay, 1st bit with 2nd relay, etc.
!		33	21$_H$	Positive command confirmation (ok)
?		63	3F$_H$	Negative command confirmation (bad)
>		62	3E$_H$	Beginning of the transmitted data

9.   ERROR STATEMENTS

ERROR	REASON	ELIMINATION
E. UNb .	range underflow (A/D converter)	change the input signal value or change display projection
E. OVER.	range overflow (A/D converter)	change the input signal value or change display projection
E. Mat	mathematic error, range of projection is out of display	change the set projection
Ei ataE	violation of data integrity in EEPROM, error upon data storage	in case of recurring report send the instrument for repair
E. Me m.	EEPROM error	the „Def" values will be used in emergency, instrument needs to be sent for repair
ECALIE	calibration error, loss of calibration data	instrument needs to be sent for repair

10. INSTRUMENT DIMENSIONS AND INSTAL.

Front view

96 mm

48 mm

3 9 5.0

1   2   3   4   ⊤

Panel cut

90,5 mm

45 mm

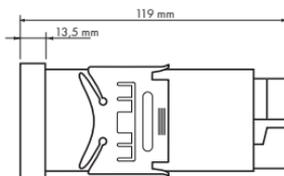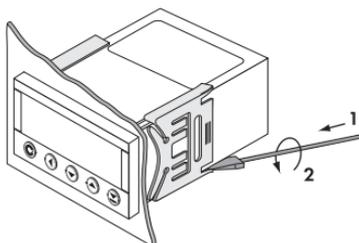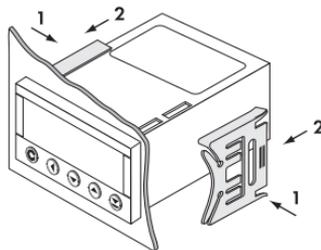**Side view**

119 mm

13,5 mm
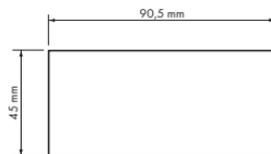
Panel thickness: 0,5...20 mm

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

11. TECHNICAL DATA

INPUT

selectable in configurationm menu			**DC**
	0...4 V	1 MOhm	Input 2
	0...40 V	1 MOhm	Input 2
	0...400 V	1 MOhm	Input 2
	0...60 mV	1 MOhm	Input 1
	0...150 mV	1 MOhm	Input 1
	0...300 mV	1 MOhm	Input 1
	0...400 mA	< 60 mV	Input 2
	0...1 A	< 60 mV	Input 1
	0...5 A	< 60 mV	Input 1
selectable in configurationm menu			**PM**
	0/4...20 mA	< 400 mV	Input I
	0...2 V	1 MOhm	Input U
	0...5 V	1 MOhm	Input U
	0...10 V	1 MOhm	Input U
selectable in configurationm menu			**OHM**
Range 1	0...400 Ohm		
	0...4 Ohm		
	0...40 kOhm		
Range 2	5...105 Ohm		
	0...10 kOhm		
	0...100 kOhm		
Connection:	2, 3 or 4 wire		

		RTD
Pt xxxx	-99,9°...399,9°C	
Ni xxxx	-30,0°...250,0°C	
Type Pt:	100/500/1 000 Ohm, platinum couple	
	s α=0,003850hm/Ohm/°C	
Type Ni:	Ni 1 000/2 226/10 000, 5000 ppm/6180 ppm	
Connection:	2, 3 or 4 wire	

selectable in configurationm menu			**T/C**
Type:	J (Fe-CuNi)	0°...900°C	
	K (NiCr-Ni)	0°...1 300°C	
	T (Cu-CuNi)	0°...400°C	
	E (NiCr-CuNi)	0°...690°C	
	B (PtRh30-PtRh6)	300°...1 820°C	
	S (PtRh10-Pt)	0°...1 760°C	
	R (Pt13Rh-Pt)	0°...1 740°C	
	N (Omegalloy)	0°...1 300°C	

- The instrument evaluates only temperatures higher than the temperature of the cold junction (C JC)

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

PROJECTION

Display:	999999, intensive red or green 14-ti segment LED, digit height 14 mm
Projection:	-999...3999
Decimal point:	adjustable - in programming mode
BRIGHT.:	adjustable - in programming mode

INSTRUMENT ACCURACY

Temperature coef.:	100 ppm/°C	
Accuracy:	±0,15 % of the range	**DC/PM/DU**
	±0,25 % of the range (for 60/150/300 mV)	**DC**
	±0,5 % of the range	**A C**
	±0,2 % of the range	**OHM/RTD/TC**
Resolution:	0,1°	**RTD**
	1°C	**T/C**
Rate:	1,3 - 2,5 - 5 - 10 - 20 - 40 measurements/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°...98°Cor automatic (99)	
Functions:	Tare - display resetting	
	Hold - stop measuring (upon contact)	
	Projection of measured units	
Watch-dog:	reset after 1,2 s	
Calibration:	at 25°C and 40 % r.h.	

COMPARATOR

Type:	digital, adjustable in the menu
Limits:	-999...3999
Hysteresis:	0...999
Delay:	0...99,9 s
Outputs:	4x relays with switch-on contact (230 VAC/30 VDC, 3 A)*
Relay:	1/8 HP 277 VAC, 1/10 HP 125 V, Pilot Duty D300

DATA OUTPUTS

Protocols:	ASCII
Data format:	8 bit + no parity + 1 stop bit (ASCII)
Rate:	150...115 200 Baud
RS 232:	isolated, two-way communication
RS 485:	isolated, two-way communication, addressing (max. 31 instruments)

* values apply for resistance load

ANALOG OUTPUTS

Type:	isolated, programmable with resolution of max. 10 000 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 < 100 ms
Voltage:	0...2 V/5 V/10 V
Current:	0...5/20 mA/4...20 mA
	- compensation of conduct up to 600 Ohm

EXCITATION   *PM*

Adjustable:	2...24 VDC/50 mA, isolated

POWER SUPPLY

Options:	24/110/230 VAC, 50/60 Hz, ±10 %, 5 VA
	10...30 VDC/max. 300 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,
	conductor section up to 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 cat.:	EN 61010-1, A2
	III. - instrument power supply (300 V)
	II. - input, output, excitation (300 V)
	for pollution degree II
EMC:	EN 61000-3-2+A12; EN 61000-4-2, 3, 4, 5, 8, 11;
	EN 550222, A1, A2

12. DECLARATION OF CONFORMITY

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

Manufactured: ORBIT MERRET, spol.s r.o. (Ltd.)
                           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 3/4 -digit programmable panel instrument

Type: OM 374, in versions: DC, PM, DU, OHM, RTD, T/C

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

Conformity is assessed pursuant to the following standards::
Electrical safety: EN 61010-1
EMC: EN 50131-1, par. 14 and par. 15
                           EN 55022
                           EN 61000-3-2 + A12, Cor. 1, change A1, change A2
                           EN 61000-4-2
                           EN 61000-4-3
                           EN 61000-4-4
                           EN 61000-4-5
                           EN 61000-4-6
                           EN 61000-4-8
                           EN 61000-4-11
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, o.p.s. with EN ISO/IEC 17025

Place and date of issue: Prague, 21. november 2001   Miroslav Hackl
                                                             Company representative

13. CERTIFICATE OF GUARANTEE

Product	**OM 374**	**DC**	**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 instrument quality, function and construction the guarantee shall apply provided that the instrument was connected and used in compliance with the instruction for use.

The guarantee shall not apply for defects caused by:

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

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

Stamp, signature

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