Instruction for use

OM 370PM

3 3/4 DIGIT PROCESS MONITOR

orbit merret

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

The measuring instrument OM 370PM conforms to the European regulation 89/336/EWG and the Ordinance 168/1997 Coll.

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

The instrument is applicable for unlimited use in agricultural and industrial areas.

ELECTRICAL LINKS

Grounding on terminal 3 has to be connected!
Supply of energy from the main line has to be isolated from the measuring leads.

CE

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Contents

Instrument description

Description

Type OM 370PM is a 3 3/4 digit multifunctional panel process monitor with the option of free and easy configuration of type or range of input signal, dedicated for direct display of analogue signals in required units with good accuracy and stability.

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

Operation

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

The "configuration mode" (hereinafter referred to as "CM") is blocked by a number code and contains a complete instrument setting, provided for qualified operator and maintenance.

The "user mode" (hereinafter referred to as "UM") may contain arbitrary programming settings allowed in "CM" with another selective restriction (see, change).

All programmable parameters are saved in the EEPROM memory (they hold even after the instrument is switched off). Dual comparator is a standard instrument feature is meant to monitor two limits with relay output. The limits have an adjustable hysteresis and delay. Reaching the preset limits is signalled on the LED and simultaneously by switching the relay.

The Hold function (stopping the measuring) is controlled via a contact with the connector. With the aid of digital filter we can suppress noise with a low pass filter characteristic. The measured units may be shown as characters on the display.

Calibration

In CM it is possible to set an arbitrary display on the display unit for both limit values of the input signal (e.g. input 4 ~ 20 mA ... display 0,0 ~ 150,0).

By jumper configuration and setup programming in CM it is possible to change the type and measuring range of the instrument.

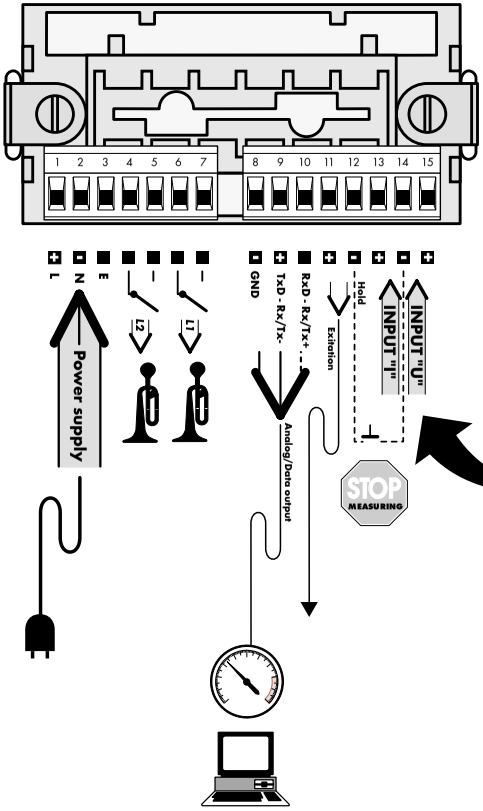
Extension

A galvanic isolated **sensor supply** voltage (sensor exitation) is suitable for feeding sensors (transmitters) and converters.

Data outputs are for their rate and accuracy suitable for transmission of the measured data for further display or directly into the control systems. We offer an isolated RS 232 and RS 485.

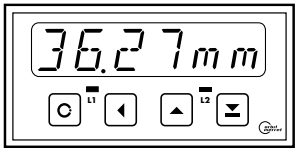
Analogue outputs will find their place in applications where further evaluating or processing of measured data in external devices is required. We offer several types of isolated current or voltage outputs. The value of analogue output corresponds with the displayed data and its range is selective in programming mode.

Connecting Plan



Setting

Access to programming steps depends on your order, i.e. on the overall equipment of the instrument. Setting and controlling the instrument is performed through 4 control keys on the front panel. By means of these controls it is possible to browse through the operating program and to select and set the required values



FUNCTIONS OF THE CONTROLS

[C] Access to the "User mode"

[C] + [▼] Access to the "Configuration mode"

FUNCTIONS OF THE CONTROLS IN THE PROGRAMMING MODES

[C] - return into the measuring mode
- premature termination of programming without confirmation of changes

[◀] - step/go to higher level
- shift/go to higher decade

[▲] - step/go to further item on the menu
- setting the number on one decade

[▼] - confirmation of selected programming mode (menu level)
- termination of setting an item with confirmation of valid value

⚠ ***In case of delay longer than 15 s the programming mode will be automatically discontinued and the instrument returns by itself into the measuring mode!***

Configuration mode:

- designated for skilled technical operation and maintenance
- access is password blocked
- setting the authorisation for "User mode"
- complete setting of the instrument

User mode:

- designated for operation of the instrument
- may contain setting of limits, analogue output and brightness with restriction which is adjustable in the "Configuration mode"

ACCESS INTO SETTING IN PROGRAMMING MODES

Menu	Configuration mode	User mode
Limits	yes	w/ adjustable limits
Analog/Data output	yes	w/ adjustable limits
Brightness	yes	w/ adjustable limits
Configuration		
Limits	yes	no
Analog/Data output	yes	no
Brightness	yes	no
Input		
Display	yes	no
Filter	yes	no
Type	yes	no
Units	yes	no

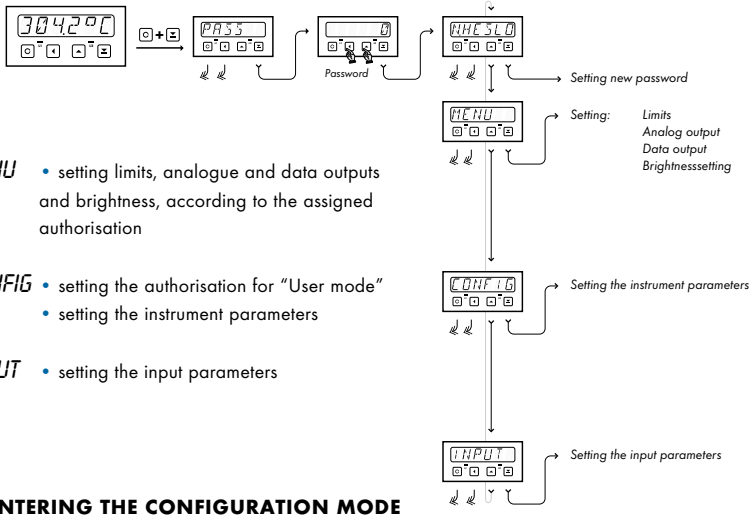
SETTING (.) AND (-)

The decimal point and the minus sign can be pre-set in the setting mode, in the limit, analogue output and display minimum menus.

You can set the **decimal point** by pressing [◂] repeatedly with subsequent transition to the highest decade, where the entire display starts glimmering. By pressing [▲] you move the point to required position which you confirm together with the whole pre-set number by pressing [▼].

The **minus sign** shall be set on the highest decade. By pressing [▲] you scroll in setting the numbers all the way past "9", which is followed by the minus sign.

Configuration mode



MENU • setting limits, analogue and data outputs and brightness, according to the assigned authorisation

CONFIG • setting the authorisation for "User mode"
• setting the instrument parameters

INPUT • setting the input parameters

ENTERING THE CONFIGURATION MODE

By pressing ⊙ + ⧗ at the same time and entering the correct access 4-digit password. From manufacture the password is always set on "0 ", which can be changed anytime as required.

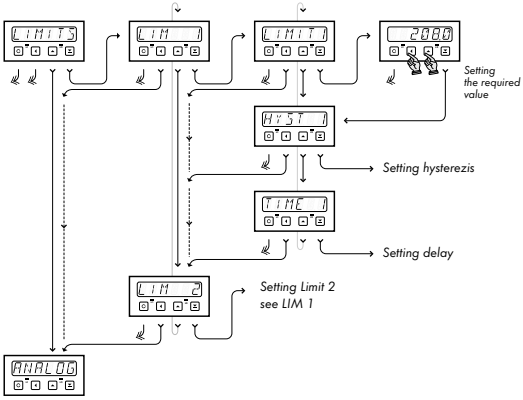
In the event of loss of password use the universal number "8177 ".

CONFIGURATION MODE – MENU

LIMITS • setting limits, hysteresis and delay
ANALOG • setting the value and type of analogue output*
DATA • data output parameters*
BRIGHT • setting the display brightness

* Symbols **ANALOG** and **DATA** are displayed in menu in compliance with the assigned equipment of the instrument.

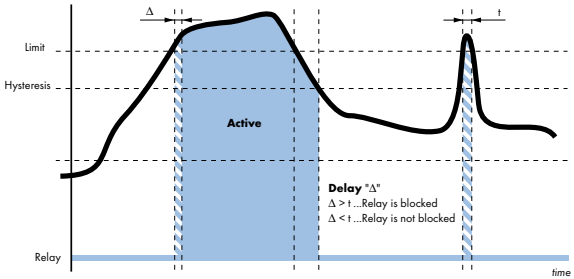
LIMITS



Limit values can be continuously adjusted within the entire measuring range. The switch will occur at the moment when the preset value is reached and exceeded (the relay function can be adjusted).

Hysteresis is adjustable in 100% of the measuring range and it informs about the difference by which the measured value has to decrease against the preset limit, so that the relay switched off.

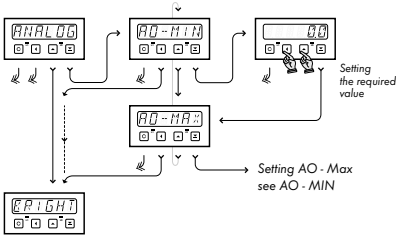
Delay is adjustable within the range of 0 ~ 99,9 s, with step 0,1 s and it indicates the time gap between reaching the limit and switch-on of the relevant relay.



ANALOG OUPUT

The analogue 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 point of the entire measuring range. (e.g.: 50,5...195,0 ⇨ 4...20 mA).

Maximum resolution of the output is 12 bits (i.e. 4096 points).



AO-MIN

- assigning the displayed value of the beginning of the AO range

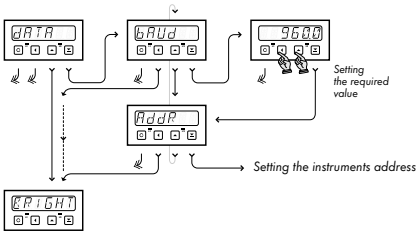
AO-MAX

- assigning the displayed value of the end of the AO range

The type of analogue output is adjustable – see chapter Configuration mode – Analogue output

DATA OUTPUT

The data output is isolated, either in the RS 232 or RS 485 finish. Both lines are duplex, with the option of direct control and setting of the instrument (see table xx).



BAUD

- setting the rate of data transfer
- 150 • 300 • 600 • 1 200
- 2 400 • 4 800 • 9 600
- 19 200 • 38 400
- 57 600 • 115 200

ADDR

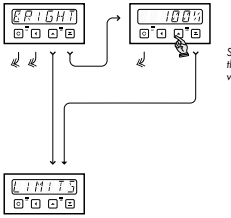
- setting the instruments address
- 0...31 (only for RS 485)

⚠ ***In the instrument the analogue and data outputs cannot be recessed simultaneously!***

DISPLAY BRIGHTNESS

By selecting the display brightness we may react properly to light conditions in place of location of the instrument. Brightness is adjustable in five levels (0% ď 25% ď 50% ď 75% ď 100%).

Setting brightness on 0% is used when feeding the instrument from a battery for small current demand. The display will light up on pressing any control key at random (in programming modes the brightness equals = 100%).

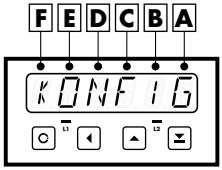


Setting the required value

- *0%* • the display is turned out
- *25%* • setting brightness on 25%
- *50%* • setting brightness on 50%
- *75%* • setting brightness on 75%
- *100%* • setting brightness on 100%

CONFIGURATION MODE – CONFIG

One of the main advantages of this function is the possibility to grant authorisation for access and modification of parameters in individual steps of the "User mode". This setting shall facilitate the instruments operator easy control and shall prohibit an unauthorised interference into setting important functions.



The configuration code may consist of up to 6 digits that determine the operational setting of the instrument.

The individual signification and setting of numbers are described in relevant chapters of the configuration mode.

- *CON.LIM.* • setting the authorisation for the "Limits" menu in user mode
  - • setting the relay function
- *CON.AO.* • setting the authorisation for the "Analogue output" menu in the user mode
  - • setting the type of the analogue output
- *CON.BR.* • setting the authorisation for the "Brightness" menu in user mode

LIMITS

Setting the attribute for access rights into the limits in User menu.

CON.LIM. ⇨ MENU.L.

A - limit 1
B - limit 2

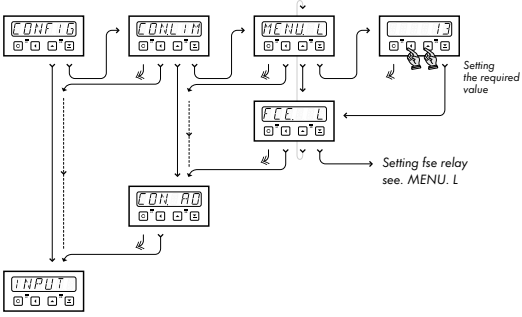
Rights for "Limits" menu	Limits	Hysteresis	Delay	AB
Restricted				0
Display	yes			1
	yes	yes		2
	yes	yes	yes	3
Change in setting	yes			4
	yes	yes		5
	yes	yes	yes	6

Setting the attribute for functions of individual relays.

CON.LIM. ⇨ FCE.L.

A - relay 1
B - relay 2

Configuration of the relay function		AB
Relay	switch-on	0
	switch-off	1



ANALOG OUPUT

Setting the attribute for access rights into the analogue output in User menu.

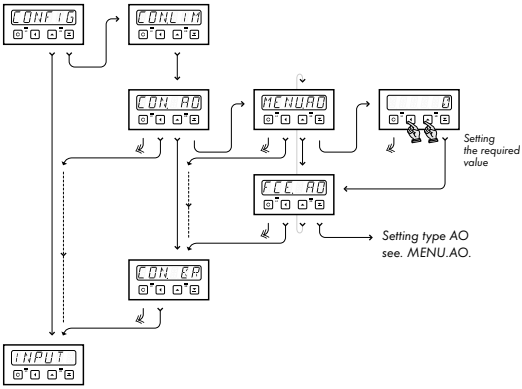
CON.AO. ⇨ MENU.AO.

Rights for the "Analog output" menu	A
Restricted	0
Display	1
Change in setting	2

Setting the attribute for the type of analogue output.

CON.AO. ⇨ FCE.AO.

Configuration of the type of "Analog output"		A
Turned off		0
0...2 V	0...20 mA	1
0...5 V	4...20 mA	2
0...10 V		3



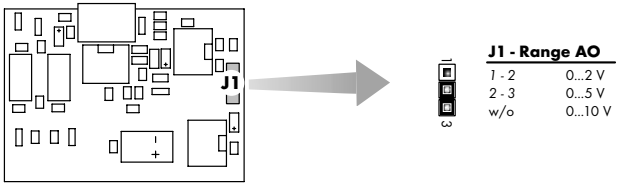
Change of type of the analogue output

- setting in the configuration menu ⇨ type of analogue output
- setting the jumper on the analogue output board located inside the instrument, perpendicularly to the base plate by the outlet green connector

The change may be performed **only** with the same type of output (voltage or current).

For better manipulation and setting the analogue output it is advisable to take it out from the connector on the base plate.
Upon placing the AO module back take care of precise location.
Change of type of output voltage/current is possible only in professional service!

Setting the jumper



DATA OUTPUT

Setting the attribute for access rights into the data output in user menu

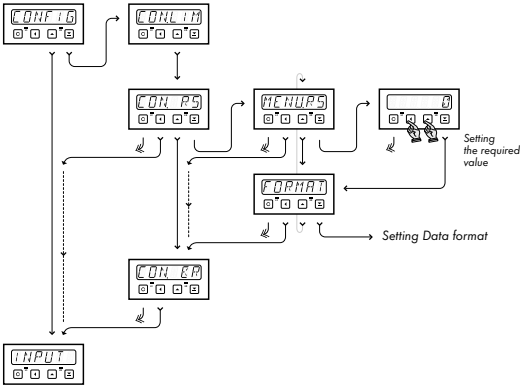
CON.RS. ⇨ MENU.RS.

Rights for the "Data output" menu	A
Restricted	0
Display	1
Change in setting	2

Setting the attribute for the type of data output.

CON.RS. ⇨ FORMAT

Configuration of the data output		A
ADAM		0
ADAM	with confirmation of orders	1
DIN MESSBUS	RS 232	2
DIN MESSBUS	RS 485	3



BRIGHTNESS

Setting the attribute for access rights into the brightness in user menu.

CON.BR.

Rights for the "Brightness" menu	A
Restricted	0
Display	1
Change in setting	2

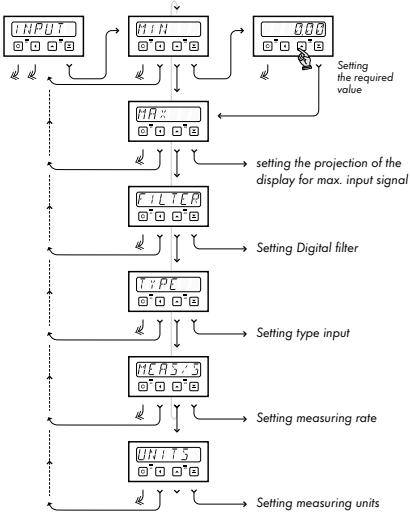
CONFIGURATION MODE – INPUT

In this step you can fully define the analogue output parameters.

- MIN • setting the projection of the display for minimum input signal
- MAX • setting the projection of the display for maximum input signal
- FILTER • setting the digital filter
- TYPE • setting the measuring range
- MEAS/S • setting the measuring rate
- SYMBOL • setting the measuring units

PROJECTION ON THE DISPLAY

In this programming step it is possible to set arbitrary projection on the display for both limit values of the input signal.



MIN
- setting the projection of the display for minimum input signal
- setting the projection of the decimal point, see page 7
- range of the setting: -999...9999

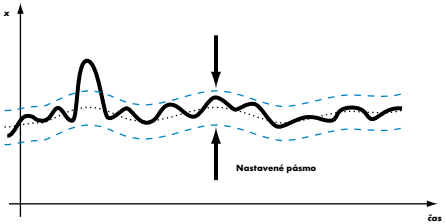
MAX
- setting the projection of the display for maximum input signal
- range of the setting: -999...9999

When changing the decimal point it is necessary to carry our correction of the decimal point in setting limits and analogue output (decimal point is fixed)!

DIGITAL FILTER

Using the digital filter will be employed everywhere where the change of projection on the display (of certain size) has a disturbing effect on the operator or when it is not important in the measuring process.

FILTER
- setting the digital filter
- value is set directly and it reads symmetrically from the displayed value



TYPE OF INPUT

The OM 370PM instrument is a multifunctional process monitor with the option of arbitrary change of type or range of the input signal.

VSTUP ⇨ TYP
- setting the measuring range
- 0 - 2 V...0 - 5 V...0 - 10 V...0 - 20 MA...4 - 20 MA

VSTUP ⇨ MER/S
- setting the measuring rate
- 1,3 M/S...2,5 M/S...5 M/S...10 M/S...20 M/S...40 M/S

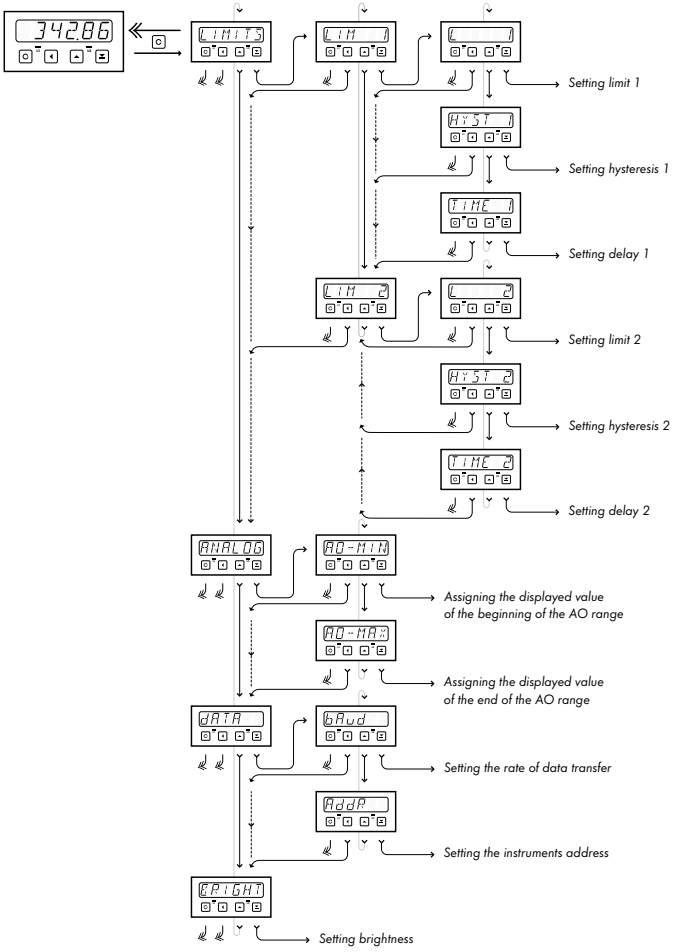
Setting the type of input and measuring rate are independent of one another! When changing the type of input or range it is necessary to change the placement of jumper, see page 20!.

MEASURING UNITS

Another advantage of the instrument OM 370PM is the possibility to display measuring units directly on the display.

UNITS
- setting the measuring units (max. 2 characters), see table on page 21
- setting without displaying the units (00 00), the data is centred
- when displaying the measuring units the displayed data is moved by one position to the left

User mode


342.86
LIMITS
LIM 1
L 1
Setting limit 1
HYST 1
Setting hysteresis 1
TIME 1
Setting delay 1
LIM 2
L 2
Setting limit 2
HYST 2
Setting hysteresis 2
TIME 2
Setting delay 2
ANALOG
AO-MIN
Assigning the displayed value of the beginning of the AO range
AO-MAX
Assigning the displayed value of the end of the AO range
DATA
bAud
Setting the rate of data transfer
AddR
Setting the instruments address
BRIGHT
Setting brightness

The user mode is an adjustable mode designated for the operator of the instrument. Access rights and setting options in individual steps are defined in the "Configuration mode".
Setting and operating the instrument in the "User mode" is consistent with that of the "Menu" item in the "Calibration mode".

The appurtenant authorisation is set in the "Configuration mode" - CONFIG.

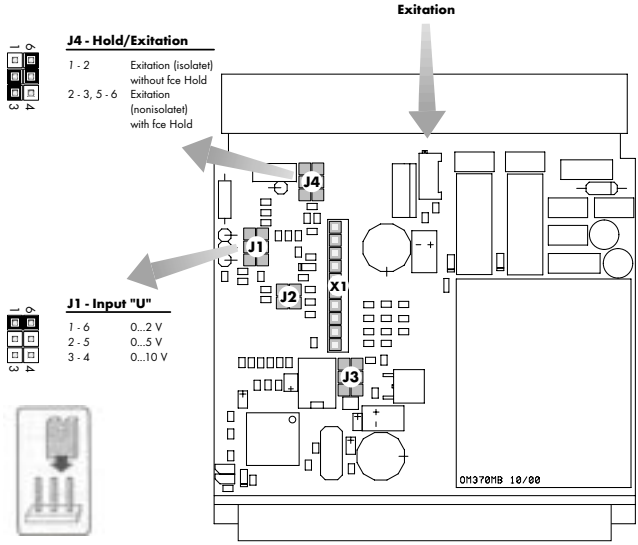
Both in the "User" and "Configuration modes" only one of the programming steps ANALOG or DATA is always displayed according to the equipment of the instrument.

ERROR STATEMENTS

Errors	Reason	Elimination
E. UND.	Range underflow (A/D converter)	change the value of input signal
E. OVER.	Range overflow (A/D converter)	change the value of input signal
E. MATH.	Mathematics error Projection range is beyond the display	Adjust the projection value of the display
E. MEM.	Wrong data storage	Upon repeated error statement send the instrument to have it repaired
E. DATA	Violation of data	Control of the setting of items in the menu
E. CAL.	Loss of calibration data	Pre-set values will be used It is necessary to send it for re-calibration
E. HARD	HW configuration (AO and RS outputs permitted)	Automatic elimination (AO will be restricted)

Input Configuration

Jumpers are accessible after opening of the instrument.



Every time when setting the jumper the instrument must be disconnected from the mains!

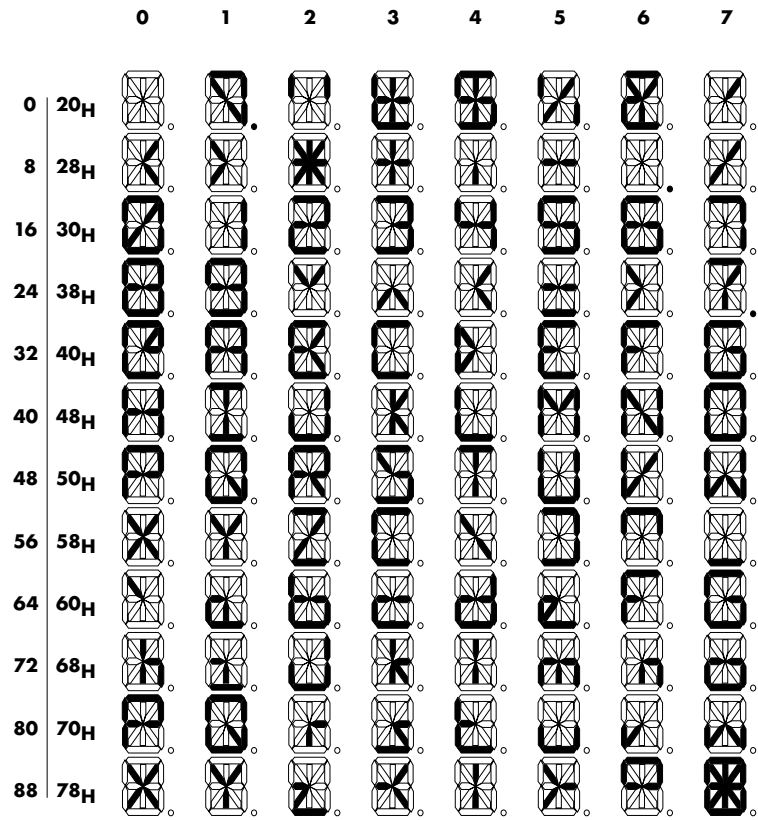
Setting the value of additional voltage is accessible from the back side of the instrument without the need of opening it.

Table of symbols

The following table illustrates all displayable symbols on a 14-segment display. When setting the measuring units, please use the sum of the columns by the required symbols in the table.

E.G.: mm ⇨ 77 77

w/o units ⇨ 00 00



Communication protocol

Communication is performed selectively by two protocols.

① ASCII, only printable symbols, modified ADAM, 8 bit, no parity, no BCC

② DIN-MessBus, 7 bit, even parity, BCC

RS232

①	data to display	#AA<CR>
	data transmission	>r<SP>data<CR>
	command entry	#AAPP(data)<CR>
	confirmation of receipt	!AA<CR> or ?AA<CR>
②	response in the form:	<STX>r<SP>data<ETX><BCC>
	command may be enforced	w/o confirmation of performance

RS485

①	data to display	#AA<CR> *(ADAM)* #AA9 (DATA) <CR>
	data transmission	>r<SP>data<CR>
	command entry	#AAPP(data)<CR>
	confirmation of receipt	!AA<CR> or ?AA<CR>
②	Soliciting response:	<SADR><ENQ>
	receipt is confirmed:	<DLE>1 when OK or <NAK> when wrong
	command registration:	<EADR><ENQ>
	the instrument confirms:	<SADR><ENQ>
	command despatch:	<STX>$command<ETX><BCC>
	the instr. confirms receipt:	<DLE>1 when OK
		<NAK> when wrong

Legend:

①	#	23_H	beginning of the command
	AA	$00_D \div 31_D$	BCD instrument address
	<CR>	OD_H	carriage return
	PP	command	
	r	relays status	(0...3)
	!,?	21_H ,$3F_H$	confirmation of command (OK, BAD)
	>	$3E_H$	beginning of the data transmitted
②	<STX>	02_H	beginning of the text
	<ETX>	03_H	end of the text
	<SADR>	address+60_H	prompt to despatch data from the address
	<EADR>	address+40_H	prompt to accept command on the address
	<ENQ>	05_H	address termination
	<DLE>	10_H,31_H	confirmation of correct information
	<NAK>	15_H	confirmation of wrong information

Commands common for ① and ②:

Command	Description	Note
xAyyyyyyy	Entering the AO parameters	x=1 MIN, 2 MAX, 3 functions/types
xB	Transmit AO parameters	x=1 MIN, 2 MAX, 3 functions/types
cC	Transmit the delay value	x limit number
xDyyyyyyy	Entering the delay value	x limit number, yyyyyyy value
xE	Transmit the relay function value	x limit number
xFy	Entering the relay function/assignment	x limit number, y value acc. to table
xG	Transmit the hysteresis value	x limit number
xHyyyyyyy	Entering the hysteresis value	x limit number, yyyyyyy value
xIyyyyyyy	Input parameters	x=1 MIN, 2 MAX, 3 filter, 4 type, 5 symbols
xJ	Transmit the input parameter	x see xIy
xK	Transmit the limit value	x limit value
xLyyyyyyy	Entering the limit value	x limit value, yyyyyyy value
xX	Transmit the displayed data	x=channel number
xY	Identification	x=1 presentation, 2 HW configuration

*) due to back compatibility, identical with 1Iyyyyyyy

If **yyyyyyy** represents real (FP) value, then it may have only 7 characters incl. the point and the minus sign (unless provided otherwise). If the number entered is longer, error is reported.

Technical data

Measuring range

Type:	selectable in the configuration menu		
	0/4...20 mA	Max.decrease < 75 mV	Input "I"
	0...2 V	Impendance < 1 MOhm	Input "U"
	0...5 V	Impendance < 1 MOhm	Input "U"
	0...10 V	Impendance < 1 MOhm	Input "U"

Display

Display:	-999...3999, intensive red on green LED, digit height 14 mm
Decimal point:	adjustable - in configuration mode
Brightness:	adjustable - in programming mode

Instrument accuracy

TK:	100 ppm/°C
Accuracy:	±0,1% of the range (applies for meas.range –999...3999)
Rate:	1,3 - 2,5 - 5 - 10 - 20 - 40 measurements/s
Overload capacity:	10x (t <100 ms), 2x (in the long-term)
Function:	Hold - holding the display unit (upon contact)
	Digital filter - in configuration mode
Calibration:	at 23°C and 40 % R. H.

Comparator

Type:	digital, adjustable in programming menus
Limit 1	-999...3999
Limit 2	-999...3999
Hysteresis:	0...999
Delay:	0...99,9 s
Outputs:	relay with switch-on (switch-off) contact (2 A/230 VAC)
	- the relay function is adjustable in the configuration menu

Data outputs

Data format:	7 bit + even parity + 1 stop bit (DIN MESSBUS)
	8 bit + no parity + 1 stop bit (ADAM 4000)
Rate:	150...115 200 Baud
Protocols:	DIN MESSBUS; ADAM 4000 (ASCII)
RS 232:	isolated, two-way communication
RS 485:	isolated, two-way communication, addressing (max. 32 instruments)

Analogue outputs

Type:	isolated, programmable with 12 bit resolution analogue output corresponds with the displayed data
Non-linearity:	0,2 % of the range
TK:	100 ppm/°C
Rate:	response to the change of value < 100 ms
Potential:	0...2 V/5 V/10 V selectable in the configuration mode and by shorting link
Current:	0/4...20 mA (compensation of the line up to 600 Ohm) selectable in the configuration menu

Additional voltage

Adjustable:	2...24VDC/50 mA, galvanicly isolated from the power supply and the input signal

Power supply

24/110/230 VAC/50 Hz
9...32 VDC, max. 500 mA, isolated (in preparation)

Connection

connector terminal board, conductor section up to 2,5 mm^2

Mechanical characteristics

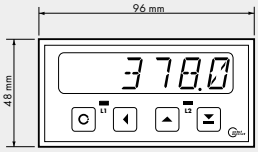
Material:	Noryl GFN2 SE1, non-flammable UL 94 V-I
Dimensions:	96 x 48 x 110 mm
Opening in panel:	92 x 45 mm

Operating conditions

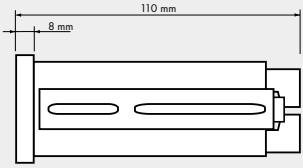
Stabilisation term:	up to 15 min from switch-on
Working temp.:	0°...50°C
Storage temp.:	-10°... 85°C
Shielding:	IP42, upon request IP64 – only the front panel
Construction:	safety class I
Isolation resistance:	2000 VAC (for AC supply), 500 VDC (for DC supply)
Electrical safety:	EN 61010-1, A2
EMC:	EN 50081, ISO 1000-4-2/Class 3, ISO 1000-4-4/Class 3, ISO 1000-4-5

Instrument dimensions

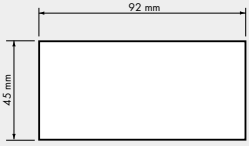
Front view



Side view



Panel cut



Panel thickness: 0,5 ... 8 mm

Certificate of guarantee

Product: **OM 370PM**

Type: . . . . . .

Manufacturing No: . . . . . .

Date of sale: . . . . . .

For this instrument applies a guarantee period of 12 months of the date of sale to the user. Defects occurring during this period due to manufacturing error or due to material faults shall be eliminated free of charge.

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

The guarantee does not apply to defects caused by:

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

Guarantee and post-guarantee repairs are performed by the manufacturer unless provided otherwise.

Stamp, signature

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