

OMM 370

3 3/4 DIGIT PROGRAMMABLE
DC VOLTMETER/AMMETER
PROCESS MONITOR
OHMMETER
THERMOMETER FOR PT 100
THERMOMETER FOR THERMOCOUPLES
INSTRUMENT 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 OMM 370 series conform to the European regulation 89/336/EWG and the 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

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



ORBIT MERRET, spol. s r.o.

Vodňanská 675/30

198 00 Praha 9

Czech Republic

Tel: +420 - 281 040 200

Fax: +420 - 281 040 299

e-mail: orbit@merret.cz

www.orbit.merret.cz



1. CONTENTS

1.	Contents	3
2.	Instrument description	4
3.	Connection	6
4.	Setting	8
4.1	Programming modes	9
4.1.1	Configuration mode	9
4.1.2	User mode	10
4.2	Setting the decimal point and the minus sign	10
4.3	Configuration mode	11
4.3.1	Entering the configuration mode	11
4.3.2	Configuration mode - menu	11
4.3.2.1	Limits	11
4.3.2.2	Display brightness	12
4.3.3	Configuration mode - config	12
4.3.3.1	Limits	12
4.3.3.2	Brightness	13
4.3.4	Configuration mode - input	13
4.3.4.1	Display on the display unit (DC/PM/DU)	13
4.3.4.2	Shifting the range outset - offset (RTD)	14
4.3.4.3	Compensation of the conduct (RTD/OHM)	15
4.3.4.4	Setting temperature of the cold junction (T/C)	15
4.3.4.5	Digital filter	15
4.3.4.6	Type of input	16
4.3.4.7	Measuring rate	17
4.3.4.8	Displaying the measuring units	17
5.	Error statements	21
6.	Table of symbols	22
7.	Methods of measuring of the cold junction	23
8.	Technical data	24
9.	Instrument dimensions	26
10.	Certificate of guarantee	27

2. INSTRUMENT DESCRIPTION

DESCRIPTION

The OMM 370 model series are 3 3/4 digit small panel instruments, manufactured in the following alternatives:

OMM 370DC	Direct-current voltmeter/ammeter
OMM 370PM	Process monitor
OMM 370OHM	Ohmmeter
OMM 370RTD	Thermometer for sensors Pt 100
OMM 370T/C	Thermometer for sensors J, K, T, E, B, S, R, N
OMM 370DU	Display instrument for linear potentiometers

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.

The standard equipment of the instruments include programmable display of the display unit, selection of the measuring rate, digital filter on the input signal and double comparator designed to control the two limits with relay output. The limits have adjustable hysteresis and selectable delay of the switch-on in the range. Reaching the preset limits is signalled by LED and at the same time by the switch-on of the relevant relay.

The digital filter allows to set the range of the insensitiveness in which the displayed data does not change even if the input signal is changed.

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.

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).

The Hold function (stopping the measuring) is controlled via a contact with the connector.

The measured units may be projected on the display.

CALIBRATION

In CM - the configuration input - it is possible to set complete parameters of the input part (calibration, compensation, digital filter, measuring rate, measuring units, etc.).

By selecting the shorting links and the setting in CM it is possible to change the type and measuring range of the instrument. The particular description of calibration for individual types of instruments is on page 147.

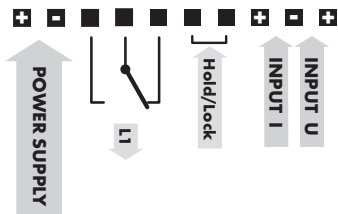
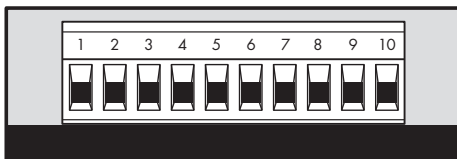
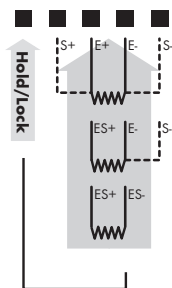
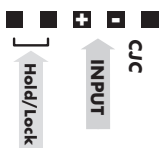
3. CONNECTION

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

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

The lead into the input of the instrument (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.

**OMM 370DC, PM****OMM 370RTD, OHM****OMM 370T/C**

4. INSTRUMENT 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 in the programming modes

- 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 in 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!

4.1. PROGRAMMING MODES

4.1.1. Configuration mode

- complete instrument setting - designed for professional service and maintenance
- access is password blocked
- setting the authorization for „User Mode“

 +  Access to the "Configuration mode"

PASS ⇨ *nPASS* ⇨ *MENU* ⇨ *CONF IG* ⇨ *INPUT*

nPASS Setting the new access password

MENU

LIMIT ⇨ *BRIGHT*

LIMIT Setting the limits, hysteresis and delay

BRIGHT Setting the display brightness

CONF IG

CONF IN ⇨ *CONF G*

CONF IN Configuration of access into the „Limits“ menu and relay function

CONF G Configuration of access into the „Brightness“ menu

INPUT

**this menu depends on the type of instrument*

MIN ⇨ *MAX* ⇨ *FILTER* ⇨ *TYPE* ⇨ *RATE* ⇨ *CHARS*

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 type of output

RATE Setting the measuring rate

CHARS Setting the projection of measuring units

4.1.2 User mode


- is designated for the operator of the instrument
- may contain setting the limits, analogue/data output and brightness with a restraint, which is adjustable in the "Configuration mode"

 Access into the "User mode"

l i m i t ⇨ *b r i g h t*

l i m i t Setting the limits, hysteresis and delay

b r i g h t Setting the display brightness

 *Setting is the same as in the Configuration mode, chapters 4.3.1.1 - 2*

4.2 SETTING (.) AND (-)


The option of setting the decimal point and the minus sign depends on the type of instrument.


Decimal point

- in „CM“ - projection on the display - minimum **DC/PM/DU/OHM**
- in other valid settings decimal point is displayed automatically
- limits, hysteresis, projection on the display - maximum, filter

Minus sign



- limits **DC/PM/DU/RTD/OHM**
- analogue output **DC/PM/DU/RTD/OHM**
- projection on the display **DC/PM/DU/OHM**

You can set the decimal point and the minus sign by repeatedly pressing .

Setting the decimal point proceeds from right and the minus sign follows in the highest decade of the entire continuous setting. Confirm your selection by pressing .

4.3 CONFIGURATION MODE

4.3.1 Entering the configuration mode

By pressing the keys  +  simultaneously 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 access password it is possible to use the universal number "8177"

4.3.2 Configuration mode - MENU

L IMt ⇨ br IGHt

4.3.2.1 Limit

L IM 1

L IMt 1 ⇨ HYS 1 ⇨ t INE 1

L IMt	Setting the limit value
HYS	Setting the hysteresis
t INE	Setting the delay for relay switch-on

Limit values can be continuously adjusted within the entire measuring range. The switch-on takes place 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 reports the difference by which the measured value has to decrease against the preset limit, so that the relay switched off (switched on).

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.

4.3.2.4 Display brightness

`br IGHt`

`br IGHt` Setting the display brightness
 25 % - 50 % - 75 % - 100 %

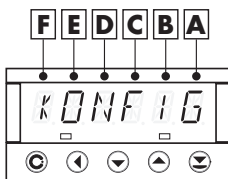
VBy selecting the display brightness we may react properly to light conditions in place of location of the instrument. Brightness is adjustable in four levels.

In the programming mode the brightness is always 100 %.

4.3.3 Configuration mode - CONFIG

`COnt IN` → `COntBrG`

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.

4.3.3.1 Limits

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

NE nUL ⇔ *FCE.L*

NE nUL

Setting the access rights into the limits menu
restricted - display - change of setting

Rights for the "LIMIT" menu		Limit	Hysterez	Delay	A
Disable					0
Show	yes				1
	yes	yes			2
	yes	yes	yes		3
Edit	yes				4
	yes	yes			5
	yes	yes	yes		6

FCE.L

Configuration of the relay function
switch-on - switch-off

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

4.3.3.2 BRIGHTNESS

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

CO nbrG.

CO nbrG.

Setting the access rights for the „Brightness“ menu
restricted - display - change of setting

Rights for the "BRIGHT" menu		A
Disable		0
Show		1
Edit		2

4.3.4 Configuration mode - INPUT

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

DC/PM

n In ⇨ *MAX* ⇨ *F ILT Er* ⇨ *tYPE* ⇨ *rEAd* ⇨ *CHArS*

DU

n In ⇨ *NEArS* ⇨ *MAX* ⇨ *NEArS* ⇨ *F ILT Er* ⇨ *rEAd* ⇨ *CHArS*

OHM

n In ⇨ *MAX* ⇨ *LEAd* ⇨ *F ILT Er* ⇨ *rEAd* ⇨ *CHArS*

RTD

OFFSEt ⇨ *LEAd* ⇨ *F ILT Er* ⇨ *rEAd*

T/C

CJC ⇨ *F ILT Er* ⇨ *tYPE* ⇨ *rEAd* ⇨ *CONP.tC*

4.3.4.1 Projection on the display

DC/PM/DU/OHM

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

n In

n In Setting the projection of the display for minimum input signal
Setting the decimal point, see page 10

MAX

MAX Setting the projection of the display for maximum input signal
NEArS Appeal to shift the traveller into relevant position

In the OMM 370DU the automatic calibration of range is performed, in the course of which, after MIN and MAX are shown (entry of relevant projection), follows the sign „MEAS“, which is a notice to shift the traveller of the linear potentiometer into relevant position that you confirm.



Change of position of decimal point in this menu měna umístění is contingent upon its position in the overall instrument setting.

4.3.4.2 Shifting the range outset

RTD

It is suitable in cases when it is necessary to shift the range outset by a given value, e.g. when using a sensor in measuring head.

OFFSET

OFFSET

Shifting the range outset, entered directly in Ohm

4.3.4.3 Compensation of the conduct

RTD/OHM

When using 2-wire connection, it is necessary to compensate it in this step

LEAD

LEAD

Compensation of 2-wire conduct, entered directly in Ohm

Procedure upon compensation

- replace the resistance sensor located at the end of conduct by short-circuit
- in the item *LEAD* confirm your selection *YES*, the instrument automatically measures the conduct resistance
- after completing the compensation reconnect the resistance sensor

4.3.4.4 Setting the cold junction

Procedure of setting and method of measuring the cold junction is described on page 23.

CJC

CJC

Setting the temperature of cold junction
with compensation box - setting the temperature in range 0...98°C
without compensation box, w/wo ref. thermocouple - set on 99,
temperature is measured on the instrument brackets

4.3.4.5 Digital filter

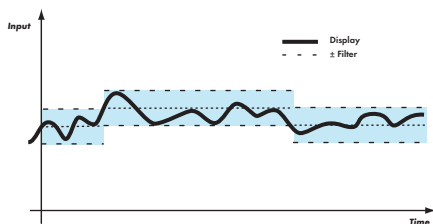
Use of digital filter finds its application where the change of projection on the display (by certain size) disturbs the maintenance or it is not important in the measuring process.

F ILtEr

F ILtEr

Setting the digital filter

It is set directly in digits and applies symmetrically from the currently measured value



4.3.4.6 Type of input

DC/PM/RTD/TC

Setting in this step depends on the type of instrument.

TYPE

TYPE

Setting the instrument measuring range

DC

0...60 mV - 0...150 mV - 0...600 mV - 0...3,999 V - 0...39,99 V - 0...399,9 V
0...39,99 mA - 0...399,9 mA - 0...3,999 A

Currently this function is not supported and the instrument has only one fixed range as per order

TYPE

Setting the measuring range of the instrument

PM

0...2 V - 0...5 V - 0...10 V - 0...20 mA - 4...20 mA

TYPE

Setting the type of connection

RTD

2 wire - 3 wire - 4 wire

TYPE

Setting the type of thermocouple

T/C

B - R - S - T - E - J - K - N

4.3.4.7 Measuring rate

In this step you set the rate of measurement which is also in relation with the rate of the relay equipment and the analogue output.

rERd

rERd

Setting the measuring rate

1,3 - 2,5 - 5 - 10 - 20 - 40 measurements/s

4.3.4.8 Measuring units

DC/PM/DU/OHM

Another merit of instruments of the OMM 370 series is the feasibility to project the measuring units directly on the display.

CHAR5

CHAR5

Setting the projected measuring units (2 symbols)

Thermometers have as a standard °C on display

Table of symbols is on page 22

5. ERROR STATEMENTS

ERROR	CAUSE	ELIMINATION
<i>EW_n</i>	range overflow (A/D converter)	change the value of input signal or change display projection
<i>ED_n</i>	range overflow (A/D converter)	change the value of input signal or change display projection
<i>ENR</i>	mathematic error, projection range is beyond the display	change the set projection
<i>EEE</i>	infringement of data integrity in EEPROM, error in data storage	when reported repeatedly send the instru- ment for repair
<i>EN</i>	EEPROM error	„Def“ values will be used in emergency, necessary to send for repair
<i>EC</i>	calibration error, loss of calibration data	necessary to send for repair

6. TABLE OF SYMBOLS

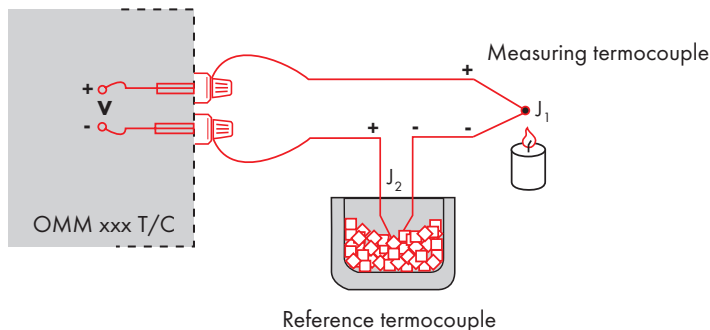
The following table lists all symbols that are projectable on a 7-segment display. To set the measuring units use the sum of values in columns by the required symbols in the table.

Example: mm \Rightarrow 77 77
without units \Rightarrow 00 00

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

7. MEASURING THE COLD JUNCTION

The OMM 370T/C allows to set two types of measuring of cold junction.



With reference thermocouple

- Reference thermocouple may be placed in the same place as the measuring instruments or in a place with stable temperature/compensation box.
- When measuring with reference thermocouple set the $\mathcal{C}07P.t.c.$ in the instrument's menu to $\mathcal{C}.455$
- When using thermostat (compensation box or environment with constant temperature), set its temperature in the instrument's menu $\mathcal{C}.44$
- If the reference thermocouple is located in the same environment as the measuring instrument then set number 99 in the instrument's menu $\mathcal{C}.44$ Based on this selection measurement of the ambient temperature is performed by a sensor located in the terminal block of the instrument.

Without reference thermocouple

- Inaccuracy originating from the creation of different thermocouples on the junction connector-conductor is not compensated for in the instrument.
- When measuring without a reference thermocouple set the $\mathcal{C}07P.t.c.$ in the instrument's menu to $\mathcal{C}.n0$
- When measuring temperature without the use of reference thermocouple the error of measured data may be as high as 10°C .

8. TECHNICAL DATA

Measuring range

range is fixed, as per order		DC
0...3,999 V	1 MOhm	Input U
0...39,99 V	1 MOhm	Input U
0...399,9 V	1 MOhm	Input U
0...39,99 mA	< 260 mV	Input I
0...399,9 mA	< 260 mV	Input I
0...3,999 A	< 260 mV	Input I

selectable in the configuration 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

range is fixed, as per order		OHM
0...399,9 Ohm		
0...3,999 Ohm		
0...39,99 kOhm		
0...100,0 kOhm		
5...105 Ohm		
Connection:	2 wire	

		RTD
Pt 100/Pt 1000	-99,9°...399,9°C	
Type:	100/1 000 Ohm, platinum element $\alpha = 0,003850 \text{ Ohm}/\text{Ohm}/^\circ\text{C}$	
Connection:	2, 3 or 4 wire	

selectable in the configuration 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

		DU
Power supply:	for linear potentiometer 2,5 VDC/6 mA min. potentiometer resistance is 500 Ohm	

Projection

Display:	-999...3999, intensive red or green LED, digit height 9,1 mm
Decimal point:	adjustable - in configuration menu
Brightness:	adjustable - in programming menu

Instrument accuracy

Temperature coef.:	100 ppm/°C	
Accuracy:	$\pm 0,15\%$ of the range	DC/PM/DU
	$\pm 0,2\%$ of the range	OHM/RTD/TC
Resolution:	0,1°	RTD
	1°C	TC
Rate:	1,3 - 2,5 - 5 - 10 - 20 - 40 measuring/s	
Overload capacity:	10x (t < 100 ms), 2x (long-term)	
Function:	Hold - holding the display unit (upon contact) Digital filter - adjustable in „CM“ Projection of measured units	
Comp. of conduct:	max. 40 Ohm	RTD
CJC:	adjustable	TC
	0°...98°C or automatic (99)	
Watch-dog:	reset after 1,2 s	
Calibration:	at 23°C and 40 % relative humidity	

Comparator

Type:	digital, adjustable in the menu
Limit	-999...3999
Hysteresis:	0...999
Delay:	0...99,9 s
Outputs:	relay with switch contact (2 A/230 VAC)

Power supply

12...28 VDC/max. 200 mA, isolated

Mechanical characteristics

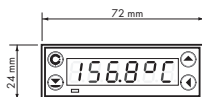
Connection:	connector terminal board conductor section up to 2,5 mm ²
Material:	Noryl GFN2 SE1, non-flammable UL 94 V-1
Dimensions:	72 x 24 x 110 mm
Opening in panel:	92 x 22,5 mm

Operating conditions

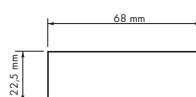
Stabilisation term:	up to 15 min from switch-on
Working temp.:	0°...50°C
Storage temp.:	-10°...85°C
Cover:	IP42, only the front panel
Construction:	Safety class I
Isolation resistance:	100 VDC
Electrical safety:	EN 61010-1, A2
EMC:	EN 50081
	ISO 1000-4-2/Class 3
	ISO 1000-4-4/Class 3, ISO 1000-4-5

9. INSTRUMENT DIMENSIONS

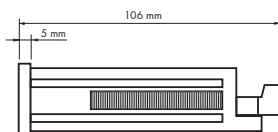
Front view



Cut into panel



Side view



Panel thickness: 0,5...20 mm

10. CERTIFICATE OF GUARANTEE

Product: **OMM 370 DC PM OHM RTD T/C DU**

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

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

Stamp, signature

ORBIT MERRET, spol. s r.o.

Vodňanská 675/30
198 00 Praha 9
Czech Republic
tel: +420 - 281 040 200
fax: +420 - 281 040 299
e-mail: orbit@merret.cz
www.orbit.merret.cz

Austria

ING.E.GRUBER GmbH
Edu. Kittenberger Gasse 97 Top2
A-1230 Wien
tel: +43 - 1 - 869 23 39-0
fax: +43 - 1 - 865 18 75
e-mail: office@gruber-components.at
www.gruber-components.at

The Netherlands

AE SENSORS B.V.
J. Valsterweg 92
3301 AB Dordrecht
Tel: +31 - 78 - 621 31 52
Fax: +31 - 78 - 621 31 46
e-mail: aesensors@aesensors.nl
www.aesensors.nl

Switzerland

ORBIT CONTROLS AG
Zürcherstrasse 137
8952 Schlieren
Tel: +41 - 1 - 730 27 53
fax: +41 - 1 - 730 27 83
e-mail: info@orbitcontrols.ch
www.orbitcontrols.ch

USA

METRIX Instruments Co.
1711 Townhurst Dr.
Houston, Texas 77043-2899
tel: +1 - 713 - 461 21 31
fax: +1 - 713 - 461 82 83
e-mail: sales@metrix1.com
www.metrix1.com

Germany

MEGATRON Elektronik AG & Co.
Hermann-Oberth-Str. 7
85640 Putzbrunn/München
tel: +49 - 89 - 460 94 - 0
fax: +49 - 89 - 460 941 01
e-mail: sales@megatron.de
www.megatron.de

Russian Federation

PO <INTERFACE>
a.b. 3408
Krasnodar, 350044
tel: +1 - 8612 - 660 483
fax: +1 - 8612 - 623 000
e-mail: iff@au.ru
www.meter.chat.ru

Turkey

ALFA ELEKTRONIK Ltd.
Baglarbasi Mah. Ergenekon No: 33
TR - 81540 Maltepe - ISTANBUL
Tel: +90 - 216 - 442 39 49
Fax: +90 - 219 - 305 54 50
e-mail: sb@elmak.com.tr
www.alfa-technik.com

Lithuania

RIFAS UAB
Tinklu g. 29a
LT-5300 Panevėžys
tel: +370 - 5 - 510 400
fax: +370 - 5 - 582 729
e-mail: sales@metrix1.com
www.metrix1.com

Slovakia

TECHREG, s.r.o.
Dukelských hrdinov 2
984 22 Lučenec
tel: +421 - 47 - 433 15 92
fax: +421 - 47 - 433 15 92
e-mail: techreg@bb.psg.sk
www.techreg.sk

Ukraine

OOO <KOTRIS>
Nesterova 3, Office 907
030 57 Kyjev
tel: +44 - 446 - 21 42
fax: +44 - 446 - 21 42
e-mail: metrix-ua@svitonline.com