Precision Resistance Decade OCM-602

Owner's Manual

ORBIT CONTROLS AG
CH-8952 Schlieren ZH
www.orbitcontrols.ch
Tel: +41 44 730 2753

Content

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1. Programmable Resistance decade

The Resistance Decade OCM-602 is designed for checking of parameters of resistance meters, regulators and process meters, which are using external resistance sensors for temperature measurements. Both Pt and Ni sensors can be simulated. Low thermal voltage relays and very stable foil resistors with low temperature coefficient are used to achieve high accuracy and stability. The selected value of the resistance or the temperature is displayed at the front panel display. The instrument is supplied from external power line adapter or from internal battery as option.

The Instrument is especially suitable for automatic testing procedures. RS232 line (optionally IEEE488 bus) can be used for communication with a PC.

2. Contents of delivery

RS232 Model

Resistance decade OCM602-V1xxx
Power line adapter
Cable RS-232
Demo Program
User's manual
Test report

IEEE488 Model

Resistance decade OCM602-V2xxx
Power line adapter
Demo program
User's manual
Test report

3. Specifications

Resistance range	10 Ω - 300 kΩ (basic version OCM602)	
	100 mΩ - 10 MΩ (version OCM602A)	
	SHORT, OPEN terminals	
	(Model OCM602-Vx1xx only)	
Pt sensor temperature simulation	-200.000 °C … 850.000 °C (-328 °F … 1562 °F)	
Ni sensor temperature simulation	-60.000 °C … 300.000 °C (-76 °F … 572 °F)	
Type of temperature sensors	Pt100 … Pt1000, Ni100 … Ni1000 (OCM602)	
	Pt10 … Pt20000, Ni10 … Ni20000 (OCM602A)	
Resolution	0.001 Ω	for (10.000 – 300.000 Ω) (OCM602)
	0.01 Ω	for (300.01 – 1000.00 Ω)
	0.1 Ω	for (1000.1 – 3000.0 Ω)
	1 Ω	for (3000 – 10000 Ω)
	0.01 kΩ	for (10.00 – 30.00 kΩ)
	0.1 kΩ	for (30.0 – 100.0 kΩ)
	1 kΩ	for (100 – 300 kΩ)
	0.00001 Ω	for (0.10000 – 2.00000 Ω) (OCM602A)
	0.0001 Ω	for (2.0001 – 20.0000 Ω)
	0.001 Ω	for (20.001 – 200.000 Ω)
	0.01 Ω	for (200.01 – 2000.00 Ω)
	0.1 Ω	for (2000.1 – 20000.0 Ω)
	1 Ω	for (20001 – 200000 Ω)
	0.01 kΩ	for (200.01 – 2000.00 kΩ)
	0.1 kΩ	for (2000.1 – 10000.0 kΩ)
	0.01 °C	for Pt, Ni

Pt temperature standards	IEC 751 (1,3850 for IPTS68) IEC 751 (1,3851 for ITS90) US (US/JIS) (1,3916)
Ni temperature standards	DIN 43760 (6180)
Temperature coefficient	< 25 ppm/ °C
Maximum dissipation power	2 W
Maximum current	0.6 A
Maximum voltage	120 VDC, 50 VAC
Connection of output terminals	2, 4 wire
Connection of temperature sensors	2, 3 or 4 wire
Reaction time *	4 ms
Terminals	Output terminals 4mm, gold plated
Interface	Standard: RS232. Option: IEEE488
Power supply	Power line adapter 100 – 240 V/50Hz (internal battery 12 V type B-WP 1.9-12 is option
Operating time from battery	6 hours
Reference temperature	+18 °C … +28 °C
Working temperature	+5 °C … +40 °C
Storing temperature	-10 °C … +50 °C
Cabinet	Aluminium
Dimensions (table version)	W 325 mm, H 111 mm, D 316 mm
Dimensions (19” module)	W 483 mm, H 111 mm, D 316 mm
Weight	4.5 kg

Isolation resistance between output terminals and housing	> 2 GΩ (at 500V DC)
Test voltage between output terminals and housing	1 kV AC / 50 Hz

* *The reaction time is determined as a time between entering the value from the keyboard or receiving the command from the control bus, and settling the resistance value at the output terminals.*

Notes:

- *The values displayed with tolerances or with the band of limits are tested values. All other values have informative characters.*
- *During switching from one to another value, the output terminals might be opened for a period of about 1ms (typical 300µs).*

Accuracy

The specified accuracy is valid after 10 minutes warm up in the ambient temperature of 23 ± 10 °C. Uncertainties include the long term stability, the temperature coefficient, the linearity, the load and the line regulation and the traceability to the National Calibration Standards. The accuracy in % is related to the set value. The specified accuracy is valid for one year.

Resistance accuracy (OCM602)

Range	Accuracy
10 Ω - 200 Ω	0.05 % + 15 mΩ
200 Ω - 10 kΩ	0.02 %
10 kΩ - 50 kΩ	0.05 %
50 kΩ - 100 kΩ	0.1 %
100 kΩ - 300 kΩ	0.5 %

Resistance accuracy (OCM602A)

Range	Accuracy
0.1 Ω - 200 Ω	0.05 % + 15 mΩ
200 Ω - 2 MΩ	0.02 %
2 MΩ - 10 MΩ	0.05 %

Pt- temperature sensor simulation accuracy

Temperature range	Pt10-Pt200	Pt201-Pt20000
-200 … 0 °C	0.2 °C	0.2 °C
0 … 850 °C	0.2 °C	0.2 °C

Ni- temperature sensor simulation accuracy

Temperature range	Ni10-Ni200	Ni201-Ni20000
-60 … 0 °C	0.2 °C	0.1 °C
0 … 300 °C	0.1 °C	0.1 °C

SHORT and OPEN simulation (version OCM602-Vx1xx only)

When the function SHORT is selected, the output resistance is lower than 60 mΩ. The maximum allowed current is 500 mA.
When the function OPEN is selected, the output resistance is larger than 1 GΩ. The maximum allowed voltage is 120 VDC or 50 VAC RMS.

Note:
The resistance values in the range 0.1 Ω-10 MΩ are calibrated absolutely. The resistance value is not defined against SHORT position. Functions Short and Open positions are intended only for functional checking of the tested instrument.

4. Preparing for operation

OCM-602 Resistance decade is supplied from external power line adapter. The range of power line voltage is from 100 V to 240 V 50/60 Hz. OCM-602 is a laboratory device and its accuracy is guaranteed for a temperature range 23 ± 5 °C. The entire operating range is +5 … +40 °C. Instrument is designed for use in horizontal or slope position.

Unpack the instrument and put it on flat surface. Do not switch it ON. Have it first stabilized for the ambient temperature for at least 1 hour.

4.1. Switching on

Connect the power line adapter to the instrument and push the POWER button. The microcontroller performs internal tests for approx. 3 seconds. The display shows the type of the instrument and the manufacturer during the microcontroller performs internal tests. At the end of the test the display switches into the initial position of resistance mode, value 100Ω.

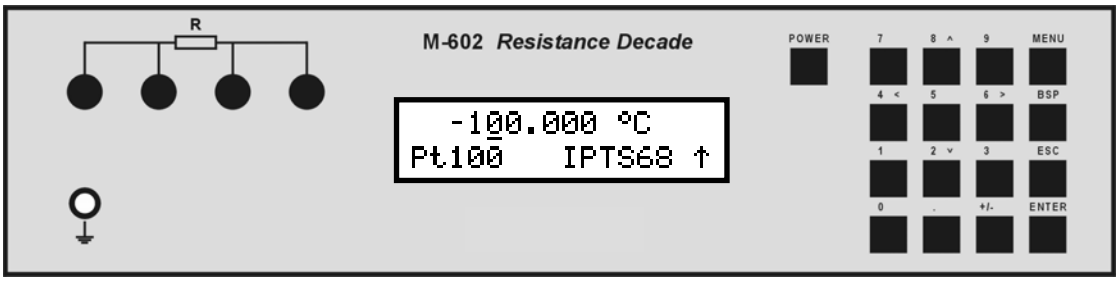
4.2. Warm-up time

The Instrument can operate immediately after switching on. After a warm-up time of 10 minutes the specified accuracy are met.

It is not recommended to perform the recalibration during the warm-up period.

5. Description

5.1. Front panel



The keyboard, the display and the output terminals are located at the front panel.

Keyboard

Numerical values can be entered from the numerical part of the keyboard. The keys 2, 4, 6, 8 are also cursor keys.

Key	**Meaning**
MENU	opens the SETUP/CALIBRATION Menu.
BSP	deletes the last entered number.
ESC	cancels the last entered value or leaves the last set mode
ENTER	confirms the value or the item in the MENU, or switches between numerical function (black labelled) and display cursor function (blue labelled) of the keys 2, 4, 6, 8. The switching is indicated with the symbol (↑) in the right lower corner of the display.
POWER	switches on and off the power. When switching-off is requested, the key must be pushed twice.

Display

Two-row alphanumerical display is used. The main value (the simulated temperature or output resistance) is displayed in the upper row. Additional information is displayed in lower row. Depending on the mode of operation, following symbols can be displayed in lower right:

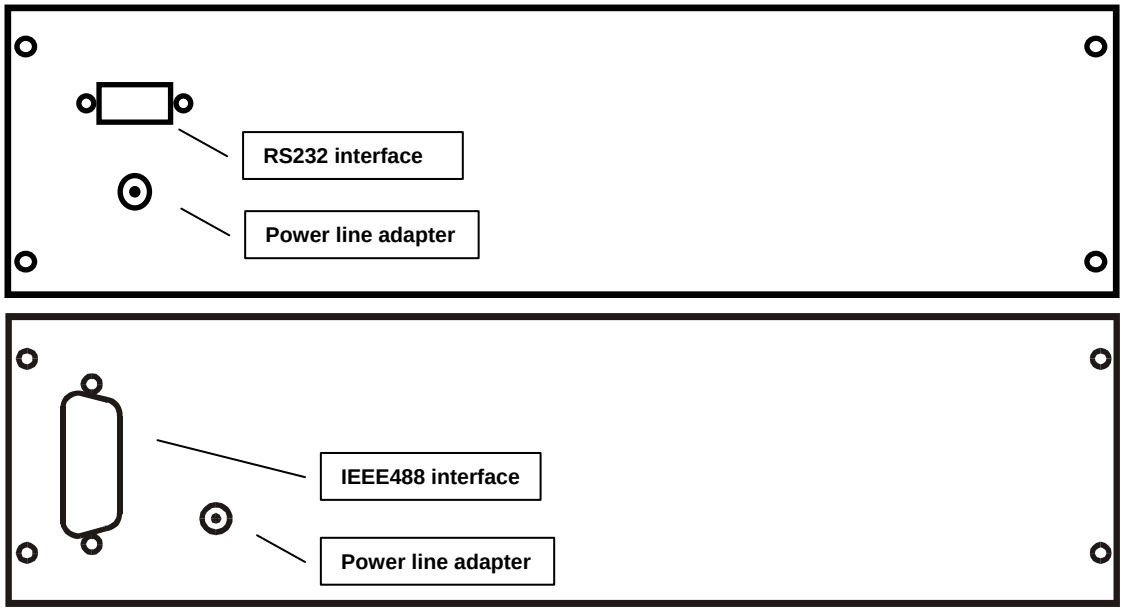
- ↑ Keys 2, 4, 6 and 8 are switched to the cursor function (blue labels are valid)
- The instrument is remotely controlled via RS232 or GPIB (option)
- Internal battery is discharged
- Power line adapter is connected

Output terminals

The generated resistance is connected to the output terminals in 2, 3 or 4 wire configuration. The left terminal with symbol “GROUND” is connected to the metal cabinet.

Note:
During operation the GROUND terminal should be connected to the Ground or Lo terminal of measuring instrument. This connection prevents interferences with the power supply voltage.

5.2. Rear panel



The rear panel contains the power supply connector, interface RS-232 or GPIB connectors and the instrument’s label.

6. Operation

6.1. Switch ON and OFF

The instrument can be switched-on with the key POWER. When pressed for a second time, the power will be switched-off. When supplied from the internal battery, the instrument is automatically switched-off when for 20 minutes none of the keys is used or when the internal battery discharged. One minute before automatic switch-off, the display shows the symbol of low battery and the beep sounds shortly.

6.2. Terminals and Connection

The output resistance is available at the R output terminals. The under test instrument can be connected with 2, 3 or 4 wire terminals. The left terminal with symbol “GROUND” is connected to the housing. The Ground terminal should be connected to the Ground (or Lo) terminal of the under test instrument.

6.3. Standard mode – numerical keyboard

After the power is applied to the instrument, the standard mode is activated. The display shows:

The upper row displays the simulated temperature [°C] or resistance [Ω]. The lower row displays the simulated temperature sensor (Pt100), temperature scale IPTS68, ITS90 according to the IEC751 or US/JIS standards. Arrow symbol in right corner informs that the cursor keys 2, 4, 6, 8 are activated. When the key MENU is pressed, the SETUP function is activated.

6.4. Standard mode – cursor keyboard

After pressing the key “ENTER” in the numerical mode, the display changes into the cursor mode:

The arrow symbol in right corner informs that the cursor function of keys 2, 4, 6, 8 is activated (blue arrows on front panel). The keys ↑ ↓ enable to increase or to decrease the activated display position. With the keys ← → the active position can be moved to the left or to the right. With the key ENTER the control between the cursor and the numerical keyboard can be selected. With the key MENU the SETUP function is activated.

Numerical keyboard

The temperature (or resistance) can be directly entered with the numerical keys. The recently entered value is displayed in brackets under the actual value. Push the key ENTER to confirm the new value.

The key ENTER switches between the cursor and the numerical function. With ESC the setting is terminated, with BSP the last entered number will be deleted.

6.5. The Setup Mode

In this mode some auxiliary parameters will be displayed.

To enter this mode push the key MENU in the standard mode. To leave the Setup Mode push the key ESC. Following items will be displayed with the cursor keys ↑ ↓ :

Function

R	Resistance function. Total resistance range is 10 Ω to 300 kΩ (0.1 Ω to 10 MΩ).
Pt (68)	Simulation of Pt temperature sensors according to standard IEC 751 (temperature scale IPTS68, coefficient 1,3850). The range of settings is -200 °C to 850 °C (-328 °F to 1562 °F). The parameter R0 (resistance at 0°C) can be entered from 10 Ω to 20 000 Ω.
Pt (90)	Simulation of Pt temperature sensors according to standard IEC 751 (temperature scale ITS90, coefficient 1,3851). The range of settings is -200 °C to 850 °C (-328 °F to 1562 °F). The parameter R0 (resistance at 0°C) can be entered from 10 Ω to 20 000 Ω.
Pt (US)	Simulation of Pt temperature sensors according to standard US/JIS (temperature scale ITS90, coefficient 1,3851). The range of settings is -200 °C to 850 °C (-328 °F to 1562 °F). The parameter R0 (resistance at 0°C) can be entered from 10 Ω to 20 000 Ω.
Ni	Simulation of Ni temperature sensors according to standard DIN 43760 (coefficient 6180). The range of settings is -60 °C to 300 °C (-76 °F to 572 °F). The parameter R0 (resistance at 0°C) can entered from 10 Ω to 20 000 Ω.
User	By the user defined temperature function. The NTC Thermistor sensor with temperature function R(T) = 330*exp (-4050*((1/298,15)-(1/(T+273,15)))) is default. The range of simulation is -30 °C to 110 °C. This function can be changed upon request at the Orbit Controls premises.
Short	Simulates short of the output terminals. Function SHORT is an option.
Open	Simulates open on the output terminals. Function OPEN is an option.

The MENU items are displayed in the lower row. After selecting the item and pressing the key ENTER, the new symbol of the selected temperature/resistance function is displayed in the upper row. The newly selected function is memorized and valid also when the instrument is switched-off and switched-on again. The exceptions are SHORT and OPEN.

R0 (Pt,Ni) (resistance at 0°C)

This function enables to define the parameter R0. The value set is valid for both Pt and Ni sensors. New value can be memorized with ENTER. The value can be set from 100 to 2000 (10 to 20000 for OCM602A). To confirm the new value press ENTER. The new value is memorized and valid also when the instrument is switched-off and switched-on again.

T. unit (temperature unit)

With the keys ← → the temperature in °C or °F can be selected. The unit is shown in the lower row. The selected unit is memorized with ENTER. The new value is memorized and valid also when the instrument is switched-off and switched-on again.

Volume

With the keys ← → the beep can be selected: OFF (beep off), LOW (volume low) or HIGH (volume high). The selected symbol is displayed in lower row. To change the currently selected parameter, press the key ENTER. The newly set parameter is displayed in the upper row.

Baud rate RS-232 (option IEEE488 address)

In the standard version, the baud rate 300, 600, 1200, 2400, 4800, 9600 or 19200 Bd of the serial data port RS-232 can be selected with the keys ← →. The value is displayed in the lower row. With the key ENTER the newly selected value appears in the upper row.
When the option IEEE488 is installed, the address 00 to 30 will be displayed in this position.

Illumination

With keys ← → the back light can be set for OFF (the back light is switched off), 30 s (the back light is switched on for 30 sec. after last key pressing), 5m (the back light is switched on for 5 minutes after last key pressing) or ON (the back light is switched on permanently) Confirm the setting with ENTER. The selected parameter is in the upper row.
If the instrument is supplied from the external power adapter, the back light is switched-on permanently.
Note: The back light consumes a significant part of battery power. The battery operation prolongs by approx. 50% when the back light is not used.

Calibration mode password setting

The Calibration Password contains five digits, which have to be entered in order to access the calibration mode. The calibration password appears in the Setup Menu only when set to “00000”. New calibration password can be directly entered via the numeric keyboard and confirmed with ENTER. Non-zero calibration code is displayed with *****.
The purpose of the calibration code is to prevent unauthorized users from changing the calibration of the changing the calibration of the instrument.

The password can be changed. The new password can be entered directly from the keyboard. If previous password was “00000”, the new 5-digit code has to be entered and confirmed with ENTER. The new password is saved and cannot be read in the MENU. If previous password was non-zero, the new password can be entered in two steps. In the first step the original password has to be entered and confirmed with ENTER. For a correct password “00000” appears at the display. In the second step the new password will be entered and saved as described above.

New password is valid even if the instrument is switched-off and switched-on again.

Note: it is advisable to note the actual password. Without it, the calibration mode can not be accessed and the instrument has to be returned to the manufacturer.

Serial Number

The serial number of the instrument can not be changed.

Write Start-up

Definition of the mode after the power is applied to the instrument. The instrument memorizes the actual state (function and value) after pushing the key ENTER.

Cancel Start-up

Clears the “Start-up state”. The instrument returns to standard mode: 100 Ω (100 °C).

6.6. Calibration mode

In the calibration mode the internal resistors can be recalibrated. Access to the calibration mode is enabled after double pushing the key MENU from the standard mode or after single pushing the same key from the setup mode.

Correct password must be entered before calibration. Without correct password the access to the calibration mode is refused. Return to standard mode is possible after pushing

the key ESC

The Recalibration Procedure consists of measuring of 36 basic resistance values and entering their actually measured values. The calibration values can be moved with keys ↑ ↓. In following table nominal values of calibration points and requested recalibration accuracy are described:

Standard (terminals)	Nominal value	Requested Accuracy
R00	*190 mΩ*	*4 mΩ*
R01	*370 mΩ*	*4 mΩ*
R02	*720 mΩ*	*4 mΩ*
R03	*1,38 Ω*	*4 mΩ*
R04	*2,66 Ω*	*4 mΩ*
R05	*5,15 Ω*	*4 mΩ*
R06	*9,99 Ω*	*5 mΩ*
R07	19,4 Ω	6 mΩ
R08	38,3 Ω	8 mΩ
R09	75,5 Ω	10 mΩ
R10	149 Ω	20 mΩ
R11	294 Ω	15 mΩ
R12	580 Ω	25 mΩ
R13	1140 Ω	50 mΩ
R14	2240 Ω	100 mΩ
R15	4410 Ω	200 mΩ
R16	8700 Ω	400 mΩ
R17	17,2 kΩ	1 Ω
R18	33,8 kΩ	5 Ω
R19	66,5 kΩ	10 Ω

R20	131 kΩ	20 Ω
R21	258 kΩ	50 Ω
R22	509 kΩ	100 Ω
R23	1000 kΩ	200 Ω
R24	2000 kΩ	500 Ω
R25	3900 kΩ	1000 Ω
R26	7500 kΩ	5 kΩ
R27	15 MΩ	20 kΩ
R28	30 MΩ	100 kΩ
R29	60 MΩ	500 kΩ
R30	118 MΩ	2 MΩ
R31	*3400 Ω*	*200 mΩ*
R32	*7500 Ω*	*400 mΩ*
R33	*15,4 kΩ*	*800 mΩ*
R34	*37,0 kΩ*	*1600 mΩ*
R35	*73,6 kΩ*	*3 Ω*
R36	*147 kΩ*	*6 Ω*
R37	*296 kΩ*	*12 Ω*
R38	*616 kΩ*	*30 Ω*
R39	*1230 kΩ*	*60 Ω*
R40	*2470 kΩ*	*200 Ω*
R41	*5000 kΩ*	*400 Ω*

Notes:

- *Values written in italic are for OCM602A only.*
- *Resistances R07 to R14 should be calibrated before resistances R31 to R41. There is a certain dependency between these values.*

The process of calibration consists of measuring partial resistances and writing their actual values via the keyboard into the memory:

- Enter the first calibration point (resistance). Use the keys ↑ ↓ .
- Measure the resistance of the selected element. Use an external ohm-meter with appropriate accuracy in 4-wire connection.
- Select the function of the keyboard to the numerical by using ENTER.
- Write measured resistance value (there is original value in the first row and newly entered value in the second row).

- Confirm new calibration data with ENTER.
- Repeat above for all resistors.

7. Performance verification test

This chapter describes the parameter verification procedure. The verification procedure is based on measuring resistance on the simulator output terminals with a precision digital ohmmeter in recommended points.

Required equipment

- Ohm-meter nominal accuracy 0.005% in ranges 200 mΩ to 10 MΩ (type HP34401A or KE2000)

Settings

Switch the instrument into the resistance mode. Connect the Ohm-Meter to the output terminals. Use four-wire connection.

Range of the test

- output resistance on terminals R checking

Procedure

Use the following procedure to perform the verification test:

1. Switch both instruments on and let them for 1 hour stabilized in the laboratory temperature of 23±2 °C. Connect the terminals R4W to the Ohm-Meter (multimeter).
2. The Cabinet has to be grounded or connected to the Lo terminal of Ohm-Meter.
3. Check the resistance values in the points of the table bellow.

Maximum deviation of OCM602

Nominal value [Ω]	Max. deviation [mΩ]
19	0.025
36	0.033
70	0.050
140	0.085
250	0.050
500	0.100
1000	0.200
2000	0.400
4000	0.800
8000	1.6
16000	8
30000	15
60000	60
120000	600
250000	1250

Maximum deviation of OCM602A

Nominal value [Ω]	Max. deviation [mΩ]
0.18	0.015
0.3	0.015
0.7	0.015
1.3	0.016
2.5	0.016
5.0	0.018
9.5	0.020
19	0.025
36	0.033
70	0.050
140	0.085
250	0.050
500	0.100
1000	0.200
2000	0.400
4000	0.800
8000	1.6
16000	3.2
40000	8
80000	16
150000	30
300000	60
700000	140
1500000	300
3000000	1500
6000000	3000

8. Remote control

The standard version is equipped with RS232 bus. The version with optional IEEE488 data bus is described in chapter 8.4. The commands for the both versions are the same.

8.1. Commands

The communication between OCM602 and the PC consists of a flow of periodically alternating commands type command-response or query-response. The command is always letters followed by parameter and terminated with the control sign <cr> or <lf>. The response is always terminated with the control signs <cr> <lf>.

Syntax description

<DNPD> = Decimal Numeric Program Data, this format is used to express decimal number with or without the exponent.
<CPD> = Character Program Data. Usually, it represents a group of alternative character parameters, e.g. {0 | 1 | 2 | 3}.
? = A flag indicating a request for the value of the parameter specified by the command. No other parameter than the question mark can be used.
(?) = A flag indicating a request for the parameter specified by the command. This command permits a value to be set as well as requested.
<cr> = carriage return. ASCII code 13. This code executes the program line.
<lf> = line feed. ASCII code 10. This code executes the program line.

8.2. Command list

Value setting / reading
A (?) <DNPD>

The command sets resistance value (resistance function) or temperature value (temperature sensor simulating function).

<DNPD>
It represents the resistance value in Ohm or simulated temperature in °C. When the temperature parameter is used, both negative and positive values are acceptable. For the resistance parameter positive value only is acceptable. Limit values are shown in the chapter “Specifications”.

In case of control, the instrument confirms correct setting with string „Ok <cr><lf>”.

In case of query, OCM-602 returns the set resistance/temperature value in the same format as it is on the display (number of decimal places).

For example value -120 °C is returned as -120.000<cr><lf>. Positive numbers are sent without polarity sign.

Example:

Command „A123.564 <cr>" sets temperature 123.564 °C if OCM602 is in the temperature simulation mode and 123.564 Ω if OCM-602 is in the resistance mode.

If query „A?<cr>" is sent, decade returns response in format „123.564<cr><lf>".

Decade function setting
F <CPD> { 0 | 1 | 2 | 3 | 4 | 5 | S | O }

Following function can be set:

- 0 resistance mode
- 1 Pt (68) temperature sensor simulation
- 2 Pt (90) temperature sensor simulation
- 3 Pt (US) temperature sensor simulation
- 4 Ni temperature sensor simulation
- 5 User temperature sensor simulation
- S Short simulation (extra ordered option)
- O Open simulation (extra ordered option)

OCM-602 confirms execution with string „Ok <cr><lf>".

Example:

„F1<cr>" sets Pt100 sensor simulation.

I/D (device identification)
***IDN?**

Response contains name of manufacturer, model type number, serial number, firmware version

Example:

If query „*IDN?<cr>" is sent, decade returns response:
„ORBIT,M602A,462351,2.4 <cr><lf>".

Switching off
P0

The command will switch-off the instrument. The command is executed if the instrument is supplied from the internal battery only. The correct execution is confirmed with the string „Ok <cr><lf>".

Example:

„P0<cr>" switches-off the OCM-602 (if not used external power adapter).

R0 setting / reading
R (?) <DNPD>

This command sets the resistance value R0 at temperature 0 °C. The value R0 is valid for all types of simulated temperature sensors.

<DNPD>
It represents resistance value R0 in Ω. Limits are shown in chapter Specifications. OCM-602 confirms execution with the string „Ok <cr><lf>". In case of query OCM-602 returns the set value in Ω.

Example:

„R100 <cr>" sets value R0 to 100 Ω (Pt100, Ni100).

After query „R?<cr>" decade returns string „100<cr><lf>".

Temperature unit setting
U <CPD> { 0 | 1 }

This command sets the temperature unit.

- 0 Degree Celsius °C
- 1 Degree Fahrenheit °F

OCM-602 confirms the execution with the string „Ok <cr><lf>".
Example:

„U0<cr>" sets °C.

Status reading
V?

OCM-602 returns the status in form „FxUx <cr><lf>". The positions „x" are values which correspond to the actual status of OCM-602.

Example:

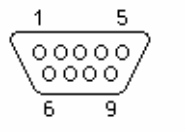
After query „V?<cr>" OCM-602 returns for example string „F2U0<cr><lf>", which means Pt (90), °C actual setting.

When unknown command is received OCM-602 returns string "? <cr><lf>". Correctly executed command is confirmed with the string "Ok <cr><lf>. When a correct query is received, OCM-602 returns response in the above described format. All commands must terminated with <cr> or <lf>. Both small and large letters can be used.

8.3. Remote control RS232

The transmission baud rate can be selected from 300 to 19200 Bd. The number of data bits is 8; the number of stop bits is 1, No Parity. The hardware handshake RTS/CTS and the program handshake XON/XOFF are not used. The RS 232 is optically isolated.

RS-232 connection



Pin	Label	I/O	Description
2	TXD	output	Transmitter
3	RXD	input	Receiver
5	GND	-	Ground

9 pin connector D-SUB MALE

Cable between decade and computer description (configuration 1:1)

Computer	D-Sub 1	D-Sub 2	M-622
Receiver	2	2	Transmitter
Transmitter	3	3	Receiver
Ground	5	5	Ground

8.4. Remote control IEEE488 (option)

The RS232 list of commands is also valid for the GPIB interface.

The instrument performs the following functions based on IEEE488 bus commands:

SH1, AH1, T5, L3, RL1, DC1

The instrument also recognizes the following general commands:

DCL Device Clear - resets the instrument to its basic state
SDC Selected Device Clear - resets the instrument to its basic state
GTL Go To Local - switches the remote control off
LLO Local Lock Out - switches the local control off.
OCM-602 cannot be controlled from the front panel.

The commands are identical to the commands for RS-232.
The detailed description is shown in 8.2.

8.5. Demo program

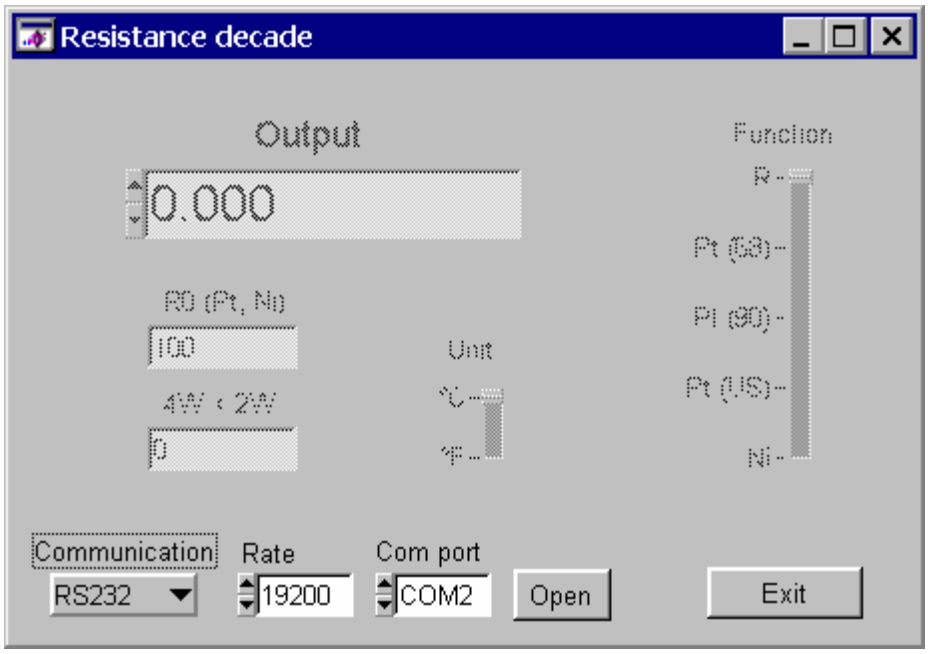
A simple supporting program is supplied with the instrument for easy communication with a PC via RS232 or IEEE488 Data bus. The resistance value or the mode of operation can be easily set from the PC. By using the IEEE488 communication, this program requires properly configured National Instruments IEEE488 card.

Program installation

After the SETUP.EXE has been opened, the installation program asks for the destination directory (pre-defined is R Decade) and executes the actual installation. To cancel the installation, use the UNINST.EXE.

Program description

When the installation has been finished, the display shows:

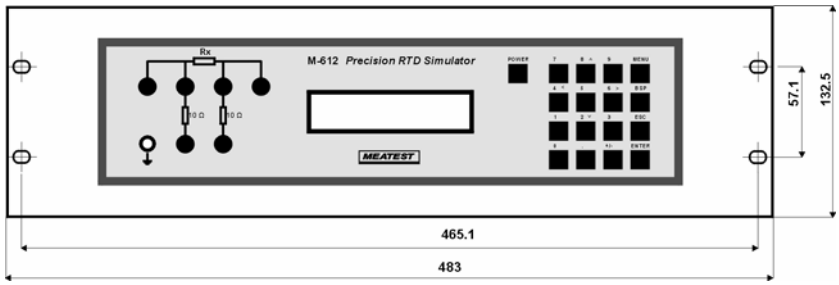


First the „Communication“ RS232 or IEEE488 will be selected. For the RS232 the COM and the Baud Rate have to be defined. By using the IEEE488 only the address will be selected. When the key “Open” is activated, the instrument is connected to the data bus and communicates with the PC. The resistance value can be entered with the keyboard into the window OUTPUT. The program can be terminated with the key “EXIT”.

The program can be terminated at any time by pressing the “Exit” button.

9. Module 19” (version OCM602-Vxx1x)

Option: 19” module 3HE for easy assembling in a 19” rack.



10. Table version with holder (version OCM602-Vxx2x)

Table version with the holder.

11. Electrical function

The internal resistors are switched to the output terminals with reed relays with low thermoelectric voltage and with low temperature coefficient. The metal cabinet is connected to the ground terminal.

The microcontroller generates all necessary internal control signals and calculates the optimum of the relays combination for achieving the highest accuracy of the output resistance. The calibration data and the set-up parameters are saved in internal memory.

12. Mechanical construction

The instrument is enclosed in an aluminium cabinet. The keyboard, the display and the output terminals are located at the front panel. The external power supply connector and the RS-232 terminals are located at the rear panel. Internal battery (option) is mounted to the rear panel inside the cabinet.

12.1. Battery maintenance (OCM602-Vxxx1)

The charging time is approx. 40 hours. The battery has to be charged when the instrument has not been used for longer than 3 months.

12.2. Battery replacement (OCM602-Vxxx1)

The internal 12V, 2.6Ah battery is sealed maintenance-free long-life rechargeable unit.

To replace battery make following steps:

- Disconnect the external power supply adapter and the RS-232 (IEEE488) cable.
- Switch-off the instrument.
- Remove 4 screws located in the corners of the rear panel.
- Remove slightly the top cover.
- Disconnect the terminals from the battery and take-off the metal belt to release the battery.
- Replace the battery pack for a new one.
- Connect the terminals and close the cabinet.

13. Ordering information – options

OCM602-Vxxxx - basic version (10Ω - 300kΩ)
OCM602A-Vxxxx - extended version (0.1Ω - 10MΩ)

Communication Data Bus
OCM602-V1xxx - RS232
OCM602-V2xxx - IEEE488

Additional Functions
OCM602-Vx0xx - none
OCM602-Vx1xx - Short/Open function

Cabinet
OCM602-Vxx0x - table version
OCM602-Vxx1x - module 19“, 3HE
OCM602-Vxx2x - table version with holder

Power supply
OCM602-Vxxx0 - power line adaptor
OCM602-Vxxx1 - battery + power line adaptor

Example of order:
OCM602A-V2110 - Resistance Decade 0.1Ω - 10MΩ, IEEE488, Short/Open, 19“rack, without battery

Manufacturer

ORBIT CONTROLS AG
Zürcherstrasse 137
CH-8952 Schlieren

Tel: +41 44 730 2753
www.orbitcontrols.ch
info@orbitcontrols.ch