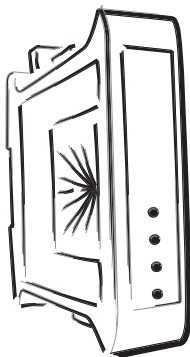




# **OMX Profibus**

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**DIGITAL TRANSDUCER  
PROFIBUS/RS 485**



## 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 OMX xxx series conform to the European regulation 89/336/EWG and the Ordinance 168/1997 Coll.

They are up to the following European and Czech standards:

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.



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## 2.1 Description

OMX Profibus is a transducer designed for easy and budget-priced connection of ORBIT MERRET™ instruments to PROFIBUS line.

One apparatus may control as many as 31 instrument via the RS 485 line with communication protocol OM ASCII.

It is possible to download individual values from the OM xxx instruments from as many as 9 channels (for one instrument) as well as to set limit status.

Another option is the projection of values and texts on displays of individual instruments.

## 2.2 Operation

The transducer has no setting units. All settings are performed either from the OM xxx instrument with „00“ address or from the PROFIBUS line.

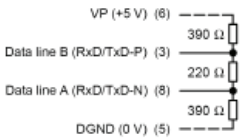
The instrument is fitted with four LEDs for the signalization of operation or error status and communication in progress.

Connection to Profibus bus line is either via standard connector Canon 9 or connector terminal board.

### Connector Canon connection

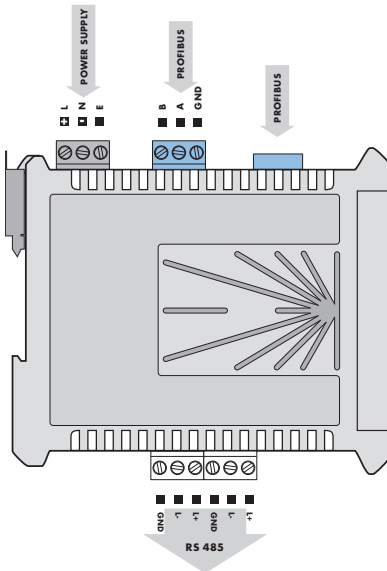
- |    |      |   |                                       |
|----|------|---|---------------------------------------|
| 3: | B    | RxD/TxD-P   | data reception/transmission, positive |
| 4: | CNTR | signal for repeater control                           |                                       |
| 5: | DGND | reference potential for data a +5 V                   |                                       |
| 6: | VP   | +5 V (terminal resistance supply in external version) |                                       |
| 8: | A    | RxD/TxD-N   | data reception/transmission, negative |

### Line termination



Ends of the Profibus line (bus segment) need to be equipped with terminal resistors (see the diagram). Terminal resistors may either be part of the connectors or wired to the OMX Profibus transducer. Termination in the transducer is performed by plugging in all three jumpers next to the connector SUB-D (Canon).

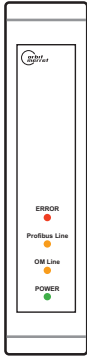
The RS 485 line for connecting OM instruments also needs to be on both line ends terminated in OM instruments through jumpers. In the OMX Profibus transducer the RS 485 line is terminated by plugging in all three jumpers next to the connector for RS 485.



**!**  
Grounding on terminal „E“ has to be connected at all times.

## 4.1

## LED signalization



Status	LED red Error	LED yellow Profibus line	LED yellow OM line	LED green Power
Start - initial delay and initialisation	light on	light on	light on	light on
Start - identification of OM instruments on RS 485 line	flashing	flashing	flashing	light on
Communication with OM instruments via RS 485 line	light off	light off	light on (flashing)	light on
Communication via Profibus line	light off	light on (flashing)	light off	
The set function is unknown to the OMX transducer	light off	light on	light off	light on
Error in communication w/ OM instruments	light on	light off	light on	light on
Error in communication via Profibus line	light on	light on	light off	light on
OM instrument not connected to RS 485 line	light on	light off	light off	light on

## 4.1.1 PROFIBUS and OM line interface status

After supply connection the OMX Profibus transducer initialises itself, tests and links up to OM xxx instruments and Profibus interface. All LEDs are lit on in the initial phase and upon testing and establishing links to OM xxx instruments. Yellow and red LED are flashing. At the same time the „PB“ signs are displayed on the instruments (starting with instrument with „00“ address). Instruments with six digits further display the address of the OM instrument and OMX Profibus transducer separated with a gap. Instruments with four or three digits display only Profibus address. The address for profibus is set in the instrument with the address to RS 485 „00“ from where the OMX Profibus transducer downloads the address.

If the transducer is set into a mode, which is downloaded in cycles or by setting OM xxx apparatus, yellow LEDs start flashing in turns.

In a mode where the OM xxx instrument is set in single step or information from OMX Profibus transducer are downloaded only yellow LED is flashing, signalling the Profibus line communication progress.

In the event of error red LED lights up, signalling error as per table.

## 4.2 Description of communication on the line

### 4.2.1 Connection of OM xxx instruments to OMX Profibus transducer

On line RS 485 there has to be connected at least one instrument with „00“ address and communication rate from 600 to 115200 baud (600, 1 200, 2 400, 4 800, 9 600, 19 200, 38 400, 57 600, 115 200).

Here, in this apparatus with „00“ address is set the address for Profibus.

The following instruments need to have their addresses in sequence one after another and communication rate identical with the instrument with „00“ address.

Upon initialisation the OM Profibus transducer downloads instrument identification (e.g. „OM 402UNI.....“), information about the number of measuring channels + channel of math functions and integral and the number of relay outputs, plus counts the linked OM xxx instruments.

### 4.2.2 OMX Profibus transducer modes and data structure of received and transmitted telegram

#### Telegram transmitted into OM instrument

Addr.	Data type	Function	Note
0	Byte	„Function“	Defines „Function“ (the transducer behaviour mode) - downloading values + setting limits - displaying values Float (Real)/Signed Long - displaying texts - sending OM ASCII commands
1	Float	Address	Address of the instrument with which it is communicating at the moment (sets/downloads/displays) (00 to 31)
2...5	Byte	Display value	Decimal number, which is displayed through functions 10 to 15, 20
2...5	signed long	Display value	Integer number with 4 byte sign, which is displayed through function 30
6...37	8x Float	Value of limits 1...8	Values to which limits are set in current instrument by means of configuration byte „Relay Mask“
6...37	32x Char	OM Command	Text of command for OM instruments sent by functions 129, 130, 229 and 230
38...45	8x Char	Display text	Text displayed on OM instrument through function 100
46...49	Float	Reserve	
50	Byte	Function + Address EEPROM	Downloading / recoding transducer paramters stored in its EEPROM (< 128 = downloading, >127 = recording + downloading)
51	Byte	Value to EEPROM	Value to which transducer parameter is to be set in EEPROM
52	Byte	Relay mask	Permission to change limit values 1 to 8 as per significance of bits 0 to 7
53	Byte	Reserve	

## Telegram transmitted from OM apparatus

Addr.	Data type	Function	Note
0	Byte	„Function*“	Mirrored value of set "Function"
1	Byte	Address*	Mirrored value of set Address
2...37	9x Float	Value of channels 1 to 9	Value of measuring channels of OM xxx instrument in 0 mode
2...37	36x Char	Response OM xxx Data	Response to command sent to OM xxx instrument through functions 129, 130 returned data through functions 128, 131 až 134
38	Byte	Number of OM xxx instruments	Identified number of connected OM xxx instruments
39	Byte	Flag	Valid data market
40	Byte	Number of channels	Number of measuring channels of current instrument
41	Byte	Number of relays	Number of relays of current instrument
42	Byte	Value from EEPROM	Value of transducer parameters stored in its EEPROM
43	Byte	Index	Value increasing upon every data transmission

## OMX Profibus transducer parameters stored in EEPROM

Addr.	Record value	Function	Manu- facture value	Note
3	131	TimeOut - OM xxx	4 - 260 ms	Delay for reporting errors in communication with OM xxx instruments $X * 65$ ms
4	132	TimeOut - Profibus	4 - 260 ms	Delay for reporting errors in communication to Profibus $X * 65$ ms
5	133	Transmission delay	6 - 520 ms	Delay used for downloading in cycles or display projection $130$ ms + $X * 65$ ms
6	134	Delay prior to transmission to RS 485	93 - 6 ms	Delay requisite for switching RS 485 line to transmission $X * 0,064$ ms
7	135	Delay after transmission to RS 485	19 - 1,2 ms	Delay requisite for switching RS 485 line to reception $X * 0,064$ ms
10...29	138... 147	reserve		May be used for value recording (Max. 100 000 records (100k Write Cycles))



## List of modes („Functions“) of OMX Profibus transducer

„Function“	Function	Note
0	Downloading values from OM xxx instruments	Channel values are downloaded in cycles from the OM xxx instrument with set Address. Between downloadings there is a delay inserted, which is set in „Transmission delay“ in EEPROM of the OMX Profibus transducer.
10...15	Displaying number on OM xxx instrument	Setting display onto decimal number value is repeated in cycles (function 10 = w/o d.p., 5 = 5 decimal places) After function termination (interrupted communication, change of address) the number stops displaying itself after approx. 2,5 s
20	Inserting and projecting decimal number in OM xxx instrument	Functions are designed for OM xxxRS instruments, which are able to receive and process the value (re-calculate, evaluate limit statuses, set the analog output, display the value in relevant format, change the display colour as per value size).
30	Inserting and projecting integer number in OM xxx instrument	The value stays projected in the instrument until another value is recorded or the instrument switches off.
100	Projection of text on display	Projection of text on OM xxx instrument display is repeated in cycles.
128	Projection of OM xxx instrum.identification	Projection of current OM xxx instrument identification ascertained upon initialisation of transducer switch-on
129...130 229...230	Sending OM command	Upon the change of function OM command is sent to RS 485 line. Functions 129 and 130 are waiting for response from OM xxx instrument. Received answer is stored in transmitted telegram.
131	Bulk parameter downloading	The telegram area designed for data is completed with the EEPROM content of OMX Profibus transducer, in which the transducer parameters are stored
132	Downloading SW version	The telegram area designed for data is completed with SW identification of the OMX Profibus transducer e.g.: „V.1.1.2 - 11/16/07 16:47:20[B737]“, the brackets give a check sum of the transducer program memory
133	EEPROM check sum	The telegram area designed for data is completed with a check sum of the EEPROM memory in which the OMX Profibus transducer parameters are stored. E.g.: „1327“
134	Downloading counters	The telegram area designed for data is completed with service counters readings (transducer switch-on and running) E.g.: „000012;000006“

No data is downloaded unless the „Flag“ value is set to 1 and the „Function“ and „Address“ values are not identical in both telegrams (the received and the transmitted).

Similar rule applies to an executed command: unless the „Function“ and „Address“ values are not identical in both telegrams (the received and the transmitted), the function is not performed.

#### 4.2.3 Downloading values from OM instruments

Downloading from OM instruments is performed through the „0“ function. If the function is active, downloading channel values from OM xxx instrument with set address is performed in cycles. Between downloadings there is a delay inserted, which is set in „Transmission delay“, in EEPROM of the OMX Profibus transducer.

No data is downloaded unless the „Flag“ value is set to 1 and the „Function“ and „Address“ values are identical in both telegrams (the received and the transmitted).

The values are in Float (4 byte) format.

#### 4.2.4 Change of relay outputs limit margins

Under item „Number of relays“ you learn how many and which relay outputs does the current instrument contain. The value is determined according to the significance of individual bits from 0 to 7 if the instrument contains relays 1 to 8.

If there are relay outputs in the instrument the limit margins may be readjusted. For values of the limits 1 to 8 the required values are entered in the Float (4 byte) format. The value is sent to the instrument after setting the relevant relay bit in „Relay mask“. After recording the mask should restore the 0 value.

#### 4.2.5a Projection of text in OM xxx instruments

Every OM xxx instrument supporting Profibus includes the option of text projection on display. Projection is performed in cycles with delay „Transmission delay“ by means of command „100“. Displayed are the characters stored under „Display text“. Projection is performed for characters with code > 31. First character < 31 terminates the text processing and the text is sent to display. The stop character is being tagged on to the previous character.

For projection of a 6 character text the text gets displayed for approx. 2,5 s unless another command arrives.

For projection of a text exceeding 6 character the text gets displayed for approx. 1 minute.

For instruments with fewer than 6 characters the texts need to be completed from the front with gaps up to 6 characters.

#### 4.2.5b Projection of numbers in OM xxx instruments

There are three options for projection of numbers in OM xxx instruments. Two apply solely for OM xxxRS instruments (monitors and RS communication display devices).

- Number projection (Float 4 byte) to set number of decimal places for a period of approx. 2,5 s.  
Projection is performed through functions „10“ to „15“ (function „10“ = w/o d.p., „15“ = 5 decimal places). Transducer displays this data in cycles with inserted „Transmission delay“
- Inserting and projecting decimal number (Float 4 byte) to OM xxx instrument through function „20“.
  - Number is sent to OM xxxRS instrument where the value is received and processed:
    - Recalculates with the set minimum and maximum,
    - May be recalculated with linearisation table, Mathematic function
    - evaluates limit statuses, sets the analog output,
    - projects the value in relevant format,
    - allows for changing the display colour in relation to value significance
  - The value stays projected in the instrument until another value is recorded or the instrument switches off.
- Inserting and projecting integer number (signed long 4 byte) to OM xxx instrument through function „30“.
  - Number is sent to OM xxxRS instrument where the value is received and processed:
    - Recalculates with the set minimum and maximum,
    - May be recalculated with linearisation table, Mathematic function
    - evaluates limit statuses, sets the analog output,
    - projects the value in relevant format,
    - allows for changing the display colour in relation to value significance
  - The value stays projected in the instrument until another value is recorded or the instrument switches off.

#### 4.2.5c Downloading of OM xxx instrument identification

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Function „128“ enables to find out the identification of a connected OM xxx instrument with currently set address. Identification is filled in under „Response OM xxx/Data“. Identification is obtained upon initialisation after supply switch-on.

#### 4.2.5d Downloading of SW identifications of OMX Profibus transducer

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Function „132“ enables to find out the SW identification of OMX Profibus transducer  
e.g.: „V.1.1.2 - 11/16/07 16:47:20[B737]“ In brackets there is the check sum of the transducer program memory  
Identification is filled in under „Response OM xxx/Data“.

#### 4.2.5e Downloading of check sum of the EEPROM memory, stored OMX Profibus transducer

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Function „133“ enables to find out the check sum of EEPROM memory, in which the OMX Profibus transducer parameters are stored.

This function together with function „132“ always has to return the same information. In case the information value changes, it is not certain the the OMX Profibus transducer will attend to its function.

Check sum shall be filled in under „Response OM xxx/Data“.

#### 4.2.5f Downloading of counter status

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Function „134“ enables to find out the service counters statuses (number of transducer's switch-ons and total running time)  
The counters status is filled in under „Response OM xxx/Data“. E.g.: „000012;000006“

#### 4.2.6 Working with OMX Profibus transducer paramters in EEPROM

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The transducer retains several parameters affecting communication via RS 485. These parameters are listed in the table abpve.

The parameters may be changed, however, from manufacture they are set for optimum values for communication with OM xxx instruments. Parameters may be downloaded by entering address under „Function + EEPROM Address“ and downloading from „Value from EEPROM“ or by using function „131“.

The change is performed by recording the new value under „Value to EEPROM“ and by storing an address by 128 higher to „Function + EEPROM address“. After the completion of recording the value into the EEPROM please check that the value has been recorded correctly by reading out „Value to EEPROM“. If all is correct, the „Function + EEPROM address“ needs to be set to a number < 128.

#### 4.2.7 Sending OM commands

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For the sake of use of older types of OM instruments and use of further functions of the instruments the OMX Profibus transducer allows also for sending commands of a standard OM ASCII protocol. Functions „129“/„130“ and „229“/„230“ serve this purpose. The first two wait for response from OM xxx instrument and the others do not wait.

Functions send out command recorded character by character under „OM Command“. Only characters with code > 31 are being sent.

First character < 32 terminates the OM command processing and sends it out to the RS 485 line.

OM command is sent out after a change of function to one of the listed. The response will be stored under „Response OM xxx/ Data“.

The lists of OM Instrument functions may be obtained from the OM Link program, which is available on the web site of the company ORBIT MERRET, s.r.o..

<http://www.orbit.merret.cz/en/catalog/software/om-link/podpora>

**PROFIBUS INTERFACE**

Connection: 9-pin SUB-D (Canon) - female or screw-in terminals  
 Standard interface: EIA RS-485  
 Interface protocol: PROFIBUS-DP  
 Recommended cable: shielded twisted double-line  
     characteristic resistance 135...165 Ω  
     cable capacity < 30 pF/m  
     conductor diameter Cu, Cu > 0.64 mm  
     conductor cross section > 0.32 mm<sup>2</sup>  
     conductor resistance (1 wire) < 55 Ω/km  
     loop resistance (2 wires) < 110 Ω/km  
 Transmission rate: 9.6 kBit/s to 12 000 kBit/s  
 Max. cable length: 1 200 m at baud rate 9.6 / 19.2 / 93.75 kBit/s  
     1 000 m at baud rate 187.5 kBit/s  
     400 m at baud rate 500 kBit/s  
     200 m at baud rate 1 500 kBit/s  
     100 m at baud rate 3 000/6 000/12 000 kBit/s  
 Moving conduct: permitted up to transmission rate of max. 1 500 kBit/s, for security purposes should not be used for transmission rates higher than 500 kBit/s  
 Insulation resistance: for pollution degree II, meas.category III.  
     > 600 V (Z1), 300 V (D1)  
 Status projection: 4 LED  
 No of participants in one network segment (master/slave): max. 32  
 No of participants upon repeater uses: max. 126

**RS 485 INTERFACE (FOR OM XXX INSTRUMENTS)**

Connection: terminal board, conductor section <2,5 mm<sup>2</sup>  
 Interface standard: RS-485  
 Recommended cable: (shielded) twisted double-line  
 Transmission rate: 600 Bit/s to 115 200 Bit/s  
 How often: 0.1s to 17s + duration of communication according to Baud rate (default 0.6s)  
 Insulation resistance: for pollution degree II, meas.category III.  
     > 600 V (Z1), 300 V (D1)  
 Status projection: 4 LED  
 No of OM instruments: max. 32

**INSTRUMENT ACCURACY**

Watch-dog: reset after 0,4 s  
 Calibration: at 25°C and 40 % r.h

**POWER SUPPLY**

Options: 10...30 V AC/DC, max. 1 VA, isolated,  
     - fuse inside (T 630 mA)  
     80...250 V AC/DC, max. 1 VA, isolated  
     - fuse inside (T 630 mA)

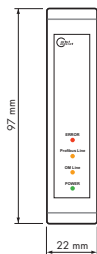
**MECHANIC PROPERTIES**

Material: PA 66, incombustible UL 94 V-1, blue  
 Dimensions: 113 x 98 x 22 mm  
 Installation: to DIN rail, width 35 mm

**OPERATING CONDITIONS**

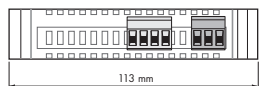
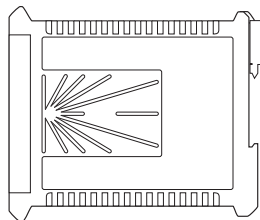
Connection: connector terminal board,  
     conductor cross-section <1,5 mm<sup>2</sup> / <2,5 mm<sup>2</sup>  
 Stabilisation period: within 15 minutes after switch-on  
 Working temp.: 0°...60°C  
 Storage temp.: -10°...85°C  
 Cover: IP65 (front panel only)  
 Construction: safety class I  
 Overvoltage category: EN 61010-1, A2  
 Insulation resistance: for pollution degree II, measurement category III  
     > 670 V (P1), 300 V (D1)  
 EMC: EN 61000-3-2-A12; EN 61000-4-2, 3, 4, 5, 8, 11;  
     EN 55022; A1, A2

Front view



Installation to DIN rail of 35 mm width

Side view



Product **OMX Profibus**  
 Type .....  
 Manufacturing No. ....  
 Date of sale .....

**GUARANTEE**

A guarantee period of 60 months from the date of sale to the user applies to this instrument.  
 Defects occurring during this period due to manufacture error or due to material faults shall be eliminated free of charge.

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

The guarantee shall not apply to defects caused by:

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

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



**Y E A R S**

Stamp, signature

# DECLARATION OF CONFORMITY

**Company:** **ORBIT MERRET, spol. s r.o.**  
Klánská 81/141, 142 00 Prague 4, Czech Republic, IDNo: 00551309

**Manufactured:** **ORBIT MERRET, spol. s r.o.**  
Vodňanská 675/30, 198 00 Prague 9, Czech Republic

declares at its full responsibility that the product presented hereunder meets all technical requirements, is safe for use when utilised under the terms and conditions determined by ORBIT MERRET, spol.s r.o. and that our company has taken all measures to ensure conformity of all products of the type listed hereunder, which are being brought out to the market, with technical documentation and requirements of the appurtenant statutory orders.

**Product:** Transmitter to DIN rail

**Type:** **OMX 38/100**

**Version:** UNI, DC, AC, PM, RTD, T/C, DU, OHM, PB

Conformity is assessed pursuant to the following standards:

Electrical safety:	EN 61010-1
EMC:	EN 50131-1, chapter 14 and chapter 15
	EN 50130-4, chapter 7
	EN 50130-4, chapter 8
	EN 50130-4, chapter 9
	EN 50130-4, chapter 10
	EN 50130-4, chapter 11
	EN 50130-4, chapter 12
	EN 50130-4, chapter 13
	EN 50130-5, chapter 20
	prEN 50131-2-1, par. 9.3.1
	EN 61000-4-8
	EN 61000-4-9
	EN 61000-3-2 ed. 2:2001
	EN 61000-3-3: 1997, Cor. 1:1998, Z1:2002
	EN 55022, chapter 5 and chapter 6

and government ordinance:

Electrical safety:	No. 168/1997 Sb.
EMC:	No. 169/1997 Sb.

The evidence are the protocols of authorized and accredited organization:

VTÚE Praha, experimental laboratory No. 1158, accredited by ČIA  
VTÚPV Vyškov, experimental laboratory No. 1103, accredited by ČIA

Place and date of issue: Prague, 1. September 2006

Miroslav Hackl  
Company representative

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