OM ProfiBus

DESCRIPTION OF COMMUNICATION ON THE LINE

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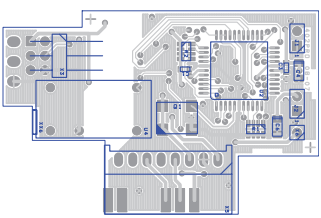
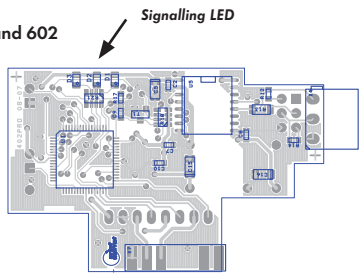
Connection to Profibus bus line is either via standard connector Canon 9 or connector terminal board.

Line termination

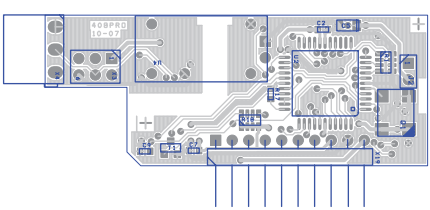
Ends of the Profibus line (bus segment) need to be equipped with terminal resistances see the schema. Terminal resistances may either be part of the connectors or wired to the data card. Termination in the transducer is performed by plugging in all three jumpers next to the connector X3.

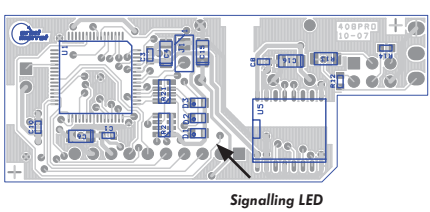
Data card in instruments of these models: OM 402, 502 and 602





Data card in OMU 408





Connector arrangement - OM 402, 502 and 602

- B - Positive (original Canon - pin 3)
- A - Negative (original Canon - pin 8)
- GND (original Canon - pin 5)

Connector arrangement - OMU 408, OMX 102

- GND (original Canon - pin 5)
- A - Negative (original Canon - pin 8)
- B - Positive (original Canon - pin 3)

2.1 LED signalisation

Status	„D 3“ LED red Error	„D 2“ LED red Profi Bus line	„D 1“ LED red OM communication
Start – initial delay and initialisation	flashing	flashing	flashing
Start – identification of OM instruments	light on	light on	light on
Communication with OM instruments	light off	light off	light on (flashing)
Communication via Profibus line	light off	light on (flashing)	light off
The set function is unknown	light off	light on	light off
Error in communication with OM instruments	light on	light off	light on
Error in communication via Profibus line	light on	light on	light off
Error of OM instrument (communication speed is out of range)	light on	light off	light off

2.1.1 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.

2.2 Description of communication on the line

2.2.1 Connection of OM xxx instruments to OMX Profibus transducer

OM ProfiBus card supports the following interprocessor communication speeds: 600, 1 200, 2 400, 4 800, 9 600, 19 200, 38 400, 57 600, 115 200 Baud.
When initialised, the card reads out identification of the device (i.e. "OM 402UNI"), also the information about the number of measuring channels, mathematical channel and integral and the number of relay outputs.

2.2.2 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	Byte	Address=00	00 (used only with OMX Profibus)
2...5	Float	Display value	Decimal number, which gets displayed through functions 10 to 15, 20
2...5	signed long	Display value	Integer number with 4 byte sign, which gets displayed through function 30
6...37	8x Float	Value of limits 1...8	Values on 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 in EEPROM	Value to which transducer parameter is to be set in EEPROM
52	Byte	Relay mask	Permission for change of limit value 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*“	Mirrorred value of set “Function”
1	Byte	Address*	Mirrorred 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	1	Identified number of connected OM xxx instruments (used only with OMX Profibus)
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 cirrent 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	Manufacture value	Note
3	131	TimeOut - OM xxx	4 197... 260 ms	Delay for reporting errors in communication with OM xxx instruments X * 66 ms (inaccuracy from X – 1 to X)
4	132	TimeOut - Profibus	76 aprox. 5 s	Delay for reporting errors in communication to Profi Bus X * 66 ms (inaccuracy from X – 1 to X)
5	133	Transmission delay	6 – 520 ms	Delay used for downloading in cycles or display projection (66...131 ms) + X * 66 ms
6	134			Unused (Only for OMX Profi Bus)
7	135			Unused (Only for OMX Profi Bus)
10...29	138... 147	reserve		May be used to record values (Max. 100 000 records (100k Write Cycles))

List of modes („Functions")

„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). The value stays projected in the instrument until another value is recorded or the instrument switches off.
30	Inserting and projecting integer number in OM xxx instrument	
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 změně funkce se odeslání OM command to RS 485 line. Functions 129 and 130 are waiting for response from OM xxx instrument. Received answer is stored in transmitted telegramu.
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 has not been performed.

2.2.3 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 not identical in both telegrams (the received and the transmitted).

The values are in Float (4 byte) format.

2.2.4 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 shoud restore the 0 value.

2.2.5a 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 tacked on to the previous character.

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

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

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

2.2.5b 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).

1. 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 placs). Transducer displays this data in cycles with inserted „Transmission delay"
2. 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 processesed:
   - 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.
3. 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.

2.2.5c Projection of OM xxx instrument identification

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.

2.2.5d Projection of SW identifications of OMX Profibus transducer

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".

2.2.5e Projection of check sum of the EEPROM memory, stored OMX Profibus transducer

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".

2.2.5f Projection of counter status

Function „134" enables to find out the service counters statuses (transducer switch-on and running)
The counters status is filled in under „Response OM xxx/Data". E.g.: „000012;000006"

2.2.6 Working with OMX Profibus transducer paramters in EEPROM

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 porformed by recording the new value under „Value to EEPROM" and by storing an address by 128 higher to „Function + EEPROM address". After the „EEPROM values" address is again recorded under „Function + EEPROM address".

2.2.7 Sending OM commands

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. First two are waiting for response from OM xxx instrument and the other are not even waiting.

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 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 restored from the OM Link program, which is available on the web site of the company ORBIT MERRET, s.r.o..

www.orbit.merret.cz/engine/produkt.asp?IDP=269&zl=04&set_lang=1

PROFIBUS INTERFACE

Connection:	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^2
	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. > 300 V (ZI), 150 V (DI)	
Status projection:	3 LED	

No of participants in one network segment (master/slave): max. 32

No of participants upon repeater uses: max. 126