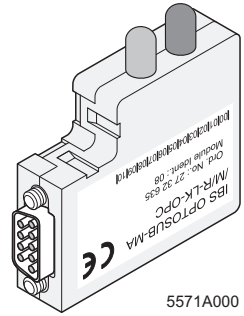


# IBS OPTOSUB-MA/M/R-LK- OPC(-2MBD)

**Optical Fiber Converter  
With a Data Transmission Rate of  
500 kbaud or 2 Mbaud**



Data Sheet 5571D

07/2001

5571A000

## Function

The IBS OPTOSUB-MA/M/R-LK-OPC(-2MBD) module converts the INTERBUS remote interface to polymer fibers.

An INTERBUS controller board can be equipped with an optical fiber interface using this converter. Unlike other converters, this interface can automatically control the optical transmission power and provides improved bus system diagnostics (optical path diagnostics).

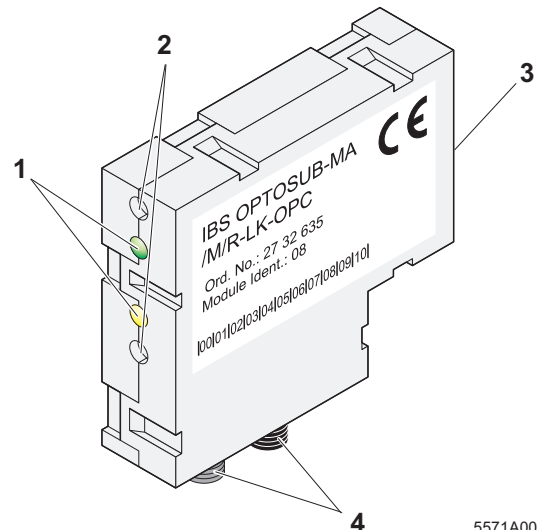
The converter is a bus device, since it is equipped with an INTERBUS protocol chip (OPC).

## Features

- 9-pos. D-SUB connector for plugging onto the controller board
- Optical fiber connection via F-SMA connectors
- 500 kbaud or 2 Mbaud data transmission rate
- Optical path diagnostics
- Extended diagnostic options
- Voltage supply through the INTERBUS interface
- Supports paths with optical transmission



Please observe the Optical Fiber  
Installation Guidelines  
(DB GB IBS SYS FOC ASSEMBLY).



5571A001

Figure 1 IBS OPTOSUB-MA/M/R-LK-OPC

- 1 Diagnostic indicators
- 2 Threaded joint for the D-SUB connector
- 3 9-pos. D-SUB male connector
- 4 Connection for F-SMA connectors

## Connector Pin Assignment

### Incoming Remote Bus (9-pos. D-SUB))

| Pin | Signal | Designation                                                                         |
|-----|--------|-------------------------------------------------------------------------------------|
| 1   | DO     | Data, sending direction                                                             |
| 2   | DI     | Data, receiving direction                                                           |
| 3   | GND    | GND (pin 3 and pin 4 internally jumpered)                                           |
| 4   | GND    |                                                                                     |
| 5   | VCCI   | 5V DC supply, electrically isolated (is only required for RBST connector detection) |
| 6   | /DO    | Negated data, sending direction                                                     |
| 7   | /DI    | Negated data, receiving direction                                                   |
| 8   | VCC    | 5 V DC supply                                                                       |
| 9   | RBST   | Connector detection (pin 5 and pin 9 are internally jumpered)                       |

### Outgoing Remote Bus (F-SMA Connectors))

| Connector | Direction    | Wire Color |
|-----------|--------------|------------|
| IN        | Receive data | Black      |
| OUT       | Send data    | Orange     |

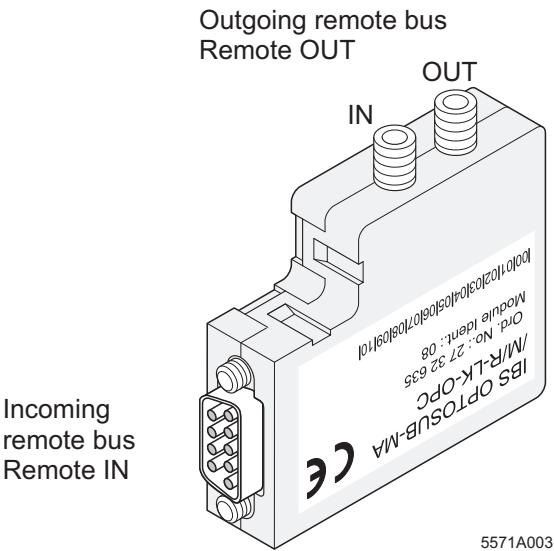


Figure 2 Position of the connectors

**Local Diagnostic and Status Indicators**

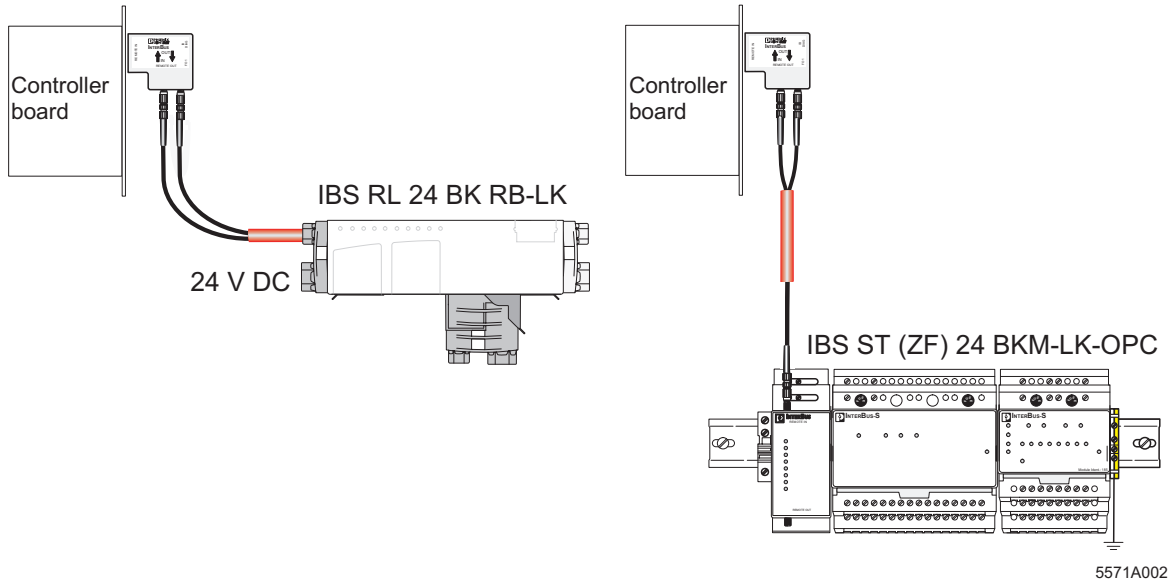
| Des.           | Color               | Meaning                                                                                                          |
|----------------|---------------------|------------------------------------------------------------------------------------------------------------------|
| <b>IB DIAG</b> | Green               | INTERBUS diagnostics                                                                                             |
|                | ON:                 | Supply voltage present, bus active, no module error                                                              |
|                | Flashing at 0.5 Hz: | Supply voltage present, bus not active                                                                           |
|                | Flashing at 2 Hz:   | Supply voltage present, module error (bus can be active or not active)                                           |
|                | OFF:                | Supply voltage not present                                                                                       |
| <b>FO1</b>     | Yellow              | Status of the incoming optical fiber path                                                                        |
|                | ON:                 | If the previous device has optical path diagnostics, the system reserve of the optical transmission has dropped. |
|                | OFF:                | Incoming optical fiber path is OK or the previous device does not have optical path diagnostics.                 |

## Special Features

### Supports Paths with Optical Transmission

- 1** Adjustment of optical transmission power:
  - Automatic recognition of the control function on other modules
  - Additional diagnostics for optical transmission
- 2** Confirmation of optical system quality:
  - No need for an optical cable measuring device
  - Early error detection through I/O error message to the higher-level control or computer system and diagnostic display on the device
  - Long-term monitoring of the transmission path is possible
- 3** Optical path diagnostics

## Installation



5571A002

Figure 3 Connection examples

### Connecting the Converter to the Controller Board

- Insert the converter into the INTERBUS interface of your controller board.
- Tighten the two screws manually with a bladed type screwdriver (e.g., SZF 1-0,6X3,5) through the openings above and below the diagnostics display.

An external voltage supply is not required for the converter. The converter is supplied via the INTERBUS interface.

### Connecting Optical Fibers



Please refer to the Optical Fiber Installation Guidelines DB GB IBS SYS FOC ASSEMBLY when assembling polymer fiber cables.

Recommended F-SMA connector with bending protection: PSM-SET-FSMA/4-KT.

- Fit both wires of the polymer fiber cables with F-SMA connectors.
- Plug the F-SMA connectors into the connections provided and secure the connection with the cap nuts.

Please note that you must always connect sender and receiver with one another.



The label for the optical fiber connection (black arrow/orange arrow) corresponds to the color of the optical fiber cables.

Connect the individual optical fiber cables between adjacent terminals according to their color (e.g., orange cable for orange connections).

## Compatibility With Controller Boards

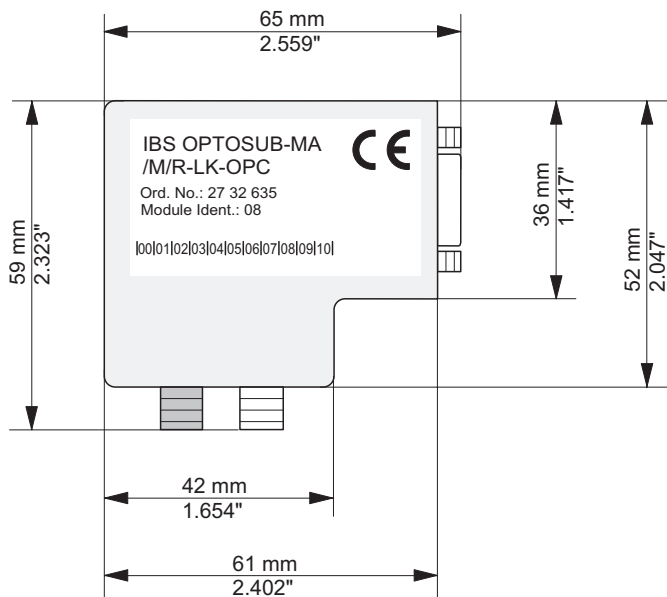
You can connect the converter to the following controller boards.

| Order Designation       | Order No.  | Plug-in Converter | Remark                                                   |
|-------------------------|------------|-------------------|----------------------------------------------------------|
| IBS 24 ETH DSC/I-T      | 27 22 92 0 | yes               |                                                          |
| IBS 24 RFC/486DX/ETH/-T | 27 23 00 0 | yes               |                                                          |
| IBS ABB DSC/SL/MEMC/I-T | 27 22 89 4 | yes               |                                                          |
| IBS BA DSC/I-T          | 27 23 04 2 | yes               |                                                          |
| IBS GE 90-70 SC/I-T     | 27 22 84 9 | yes               |                                                          |
| IBS ISA FC/486DX/I-T    | 27 22 08 5 | no                |                                                          |
| IBS ISA FC/DI/I-T       | 27 25 11 8 | no                |                                                          |
| IBS ISA FC/I-T          | 27 22 02 7 | no                |                                                          |
| IBS ISA SC/486DX/I-T    | 27 23 94 5 | no                |                                                          |
| IBS MEA SC/I-T          | 27 25 59 0 | yes               |                                                          |
| IBS PC 104 SC-T         | 27 21 70 1 | –                 | Connection is not present.                               |
| IBS PC ISA SC/I-T       | 27 19 23 4 | no                |                                                          |
| IBS PLC5 DSC/I-T        | 27 19 02 7 | yes               |                                                          |
| IBS S5 DSC/I-T          | 27 52 00 0 | yes               |                                                          |
| IBS S7 300 DSC-T        | 27 19 97 5 | no                |                                                          |
| IBS ST 24 RFC-T         | 27 25 52 9 | yes               | Observe the maximum power of the power supply unit used. |
| IBS STME 24 RFC-T       | 27 25 51 6 | yes               |                                                          |
| IBS USC/4-EVA           | 27 46 25 2 | –                 | Connection is not present.                               |
| IBS VME3H SC/I-T        | 27 22 86 5 | yes               |                                                          |
| IBS VME6H SC/I-T        | 27 22 85 2 | yes               |                                                          |
| IBS VME6H SC/RI/I-T     | 27 22 83 6 | yes               |                                                          |
| IBS S7 400 DSC/I-T      | 27 19 96 2 | yes               |                                                          |
| IBS S7 400 ETH DSC/I-T  | 27 31 10 2 | yes               |                                                          |

## Programming Data

|                         |                   |
|-------------------------|-------------------|
| ID code                 | 08 <sub>hex</sub> |
| Length code             | 00 <sub>hex</sub> |
| Process data channel    | 0 bits            |
| Input address area      | 0 bytes           |
| Output address area     | 0 bytes           |
| Parameter channel (PCP) | 0 bytes           |
| Register length (bus)   | 0 bytes           |

## Housing Dimensions



5571A004

Figure 4 Dimensions

## Technical Data

| General Data                                                                 |                                                                                      |
|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Degree of protection                                                         | IP 20                                                                                |
| Ambient temperature                                                          | Operation: 0°C to +55°C (32°F to +131°F)<br>Storage: -20°C to +70°C (-4°F to +158°F) |
| Air and creepance distances                                                  | DIN VDE 0110-1:1989-01                                                               |
| Supply Voltage                                                               |                                                                                      |
| Nominal voltage                                                              | 5 V DC                                                                               |
| Permissible range                                                            | 4.75 V DC to 5.25 V DC                                                               |
| Current consumption                                                          |                                                                                      |
| IBS OPTOSUB-MA/M/R-LK-OPC                                                    | 200 mA, maximum                                                                      |
| IBS OPTOSUB-MA/M/R-LK-OPC-2MBD                                               | 220 mA, maximum                                                                      |
| Permissible line length                                                      | The module should only be connected directly to the controller board.                |
| Surge protection                                                             | No                                                                                   |
| Protection against polarity reversal                                         | No                                                                                   |
| INTERBUS Interface                                                           |                                                                                      |
| Incoming remote bus                                                          | 9-pos. D-SUB male connector<br>Differential voltage interface according to RS-485    |
| Outgoing remote bus                                                          | F-SMA connector<br>Optical fiber (polymer fiber 980/1000 µm)                         |
| Data transmission rate                                                       |                                                                                      |
| IBS OPTOSUB-MA/M/R-LK-OPC                                                    | 500 kbaud                                                                            |
| IBS OPTOSUB-MA/M/R-LK-OPC-2MBD                                               | 2 Mbaud                                                                              |
| Wavelength                                                                   | 650 nm, typical                                                                      |
| Optical output power for operation<br>at 0°C to +55°C (32°F to 131°F)        | -2.0 dBm $\geq$ P <sub>opt</sub> $\geq$ -6.2 dBm                                     |
| Optical output power after voltage reset<br>at 0°C to +55°C (32°F to +131°F) | -3.5 dBm $\geq$ P <sub>opt</sub> $\geq$ -7.7 dBm                                     |
| Optical receiver responsivity<br>at 0°C to +55°C (32°F to 131°F)             | $\leq$ -20 dBm                                                                       |



| <b>INTERBUS Interface</b>                              |                          |
|--------------------------------------------------------|--------------------------|
| Optical overrange<br>at 0°C to +55°C (32°F to 131°F)   | > -2.0 dBm               |
| Power reduction resulting from the wavelength<br>drift | Taken into consideration |
| System reserve                                         | > 3 dBm                  |
| Bit error rate                                         | 10 <sup>-9</sup>         |

| <b>Optical Fiber Cable</b>                                                                                                                                                         |                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| Cable type                                                                                                                                                                         | Step index                                       |
| Fiber (core/cladding diameter)                                                                                                                                                     | 980/1000 µm                                      |
| Numerical aperture                                                                                                                                                                 | 0.47                                             |
| Attenuation (50 m [164.042 ft.] fiber measured<br>with 660 nm LED source)                                                                                                          | ≤ 230 dB/km                                      |
| Transmission length between<br>IBS OPTOSUB-MA/M/R-LK-OPC(-2MBD) and<br>INTERBUS devices with 50 m (164.042 ft.)<br>system without optical path diagnostics                         | 1 m, minimum, to 35 m (3.281 ft. to 114.829 ft.) |
| Transmission length between<br>IBS OPTOSUB-MA/M/R-LK-OPC(-2MBD) and<br>INTERBUS devices with 70 m (229.659 ft.)<br>system or all INTERBUS devices with optical<br>path diagnostics | 1 m, minimum, to 50 m (3.281 ft. to 164.042 ft.) |
| Connector type                                                                                                                                                                     | F-SMA standard (type 905 acc. to IEC 60874-2)    |

| <b>I/O Error Message</b> |     |
|--------------------------|-----|
| MAU error                | Yes |

## Ordering Data

| Description                                                                                                                                                                                                                  | Order Designation              | Order No.  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|------------|
| Optical fiber converter with a transmission speed of 500 kbaud                                                                                                                                                               | IBS OPTOSUB-MA/M/R-LK-OPC      | 27 32 63 5 |
| Optical fiber converter with a transmission speed of 2 Mbaud                                                                                                                                                                 | IBS OPTOSUB-MA/M/R-LK-OPC 2MBD | 27 31 45 8 |
| F-SMA connector set for polymer fiber cables with bending protection (4 pieces)                                                                                                                                              | PSM-SET-FSMA/4-KT.             | 27 99 72 0 |
| Polymer fiber cables for use in humid climates, duplex, 980/100 µm, installation                                                                                                                                             | PSM-LWL-KDHEAVY-980/1000       | 27 44 31 9 |
| Polymer fiber cable with increased alternating bending ability (flexible cable tracks, industrial robots) for indoor use                                                                                                     | PSM-LWL/KDFLEX-980/1000        | 27 99 74 6 |
| Optical fiber data line:<br>Polymer fiber cable, duplex, 980/1000 µm, red, welding-splash-resistant in standard applications; sold by the meter, cable is not pre-assembled                                                  | PSM-LWL-RUGGED-980/1000        | 27 44 32 2 |
| Optical fiber data line (flexible):<br>Polymer fiber cable, duplex, 980/1000 µm, dark red, welding-splash-resistant in standard applications; tested for flexible cable tracks, sold by the meter cable is not pre-assembled | PSM-LWL-RUGGED-FLEX-980/1000   | 27 44 33 5 |
| Optical Fiber Installation Guidelines                                                                                                                                                                                        | DB GB IBS SYS FOC ASSEMBLY     | 94 23 43 9 |
| Bladed type screwdriver                                                                                                                                                                                                      | SZF 1-0,6X3,5                  | 12 04 51 7 |

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