MM/SM optical security signal converter

- Low-Rate optical signal converter dedicated to converting security interfaces
- Selecting the local interface mode for the 820/850nm version using a micro switch.
  - IEC103 standard operation
  - operation in non-standard mode
- Application:

- conversion from multimode fiber (820nm or 1310nm signal) to single-mode fiber (1310/1550nm)
- conversion of 820/850/1310nm signal to CWDM/DWDM wavelengths
- signal regeneration

- Optical interfaces:

- local interface: 820/850nm ST or 1310 connector, SC connector (optional ST, FC) speed up to 2 Mbps
- line interface: exchangeable SFP module or built-in (MM/SM/CWDM/DWDM) with SC connector

- Indication of port status and device status via LEDs
- Device available with one or two line ports (connection protection possible)
- Standard 12-60V DC redundant power supply

Description of the device

Functionality

The **BS-MC-5X** device is an optical interface converter dedicated to converting signals of protections (distance and line differential, overcurrent, overvoltage, transformer differential) or controllers equipped with 820nm, 850nm or 1300nm multimode optical interfaces. The converter on the local side is equipped with a fiber-optic interface dedicated to the transmission of low-speed signals, allowing seamless data transmission between a pair of protections installed in remote power substations.

BS-MC-5X can be used for:
- Signal conversion when transitioning between multimode and single-mode fiber,
- Convert standard 820/850/1300nm signal to CWDM/DWDM wavelength,
- Signal regeneration, the ability to increase the range of fiber-optic transmission between a pair of security.

In addition to the version with a single linear optical interface, the converter is also available in a version with two linear optical ports, enabling the implementation of connection protection.

The device is powered by DC voltage from 12 to 60V, or by an external power supply attached to the device in the case of AC voltage. The total power consumption of the device does not exceed 4 Watts. The device comes standard with an auxiliary power connector to provide power redundancy.

A typical application is shown in the figure below.

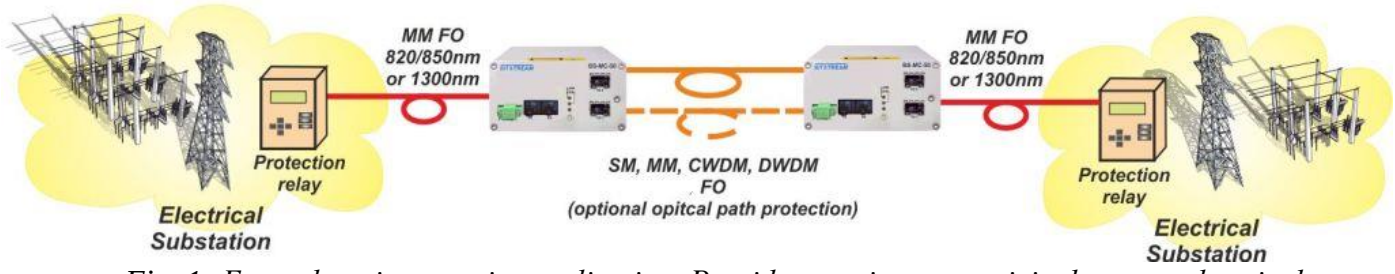

Fig. 1. Example point-to-point application. Provide security connectivity between electrical substations.

On the line side, the BS-MC-5X converter has the ability to work with the RSMUX3-FO multiplexer (using the first RS-232/485/422 interface of the multiplexer). In this configuration, the devices can provide a fiber-optic connection between a pair of security/controllers, one of which uses the RS232/422/485 fiber-optic interface, while the other uses the electrical interface.

Fig. 2. Example application of cooperation with RSMUX3-FO multiplexer.

Technical specifications

Supported standards, recommendations and directives EMC, safety*

- EN 55022:2010/AC:2011 - Electromagnetic compatibility (EMC) - Information technology equipment. Radio disturbance characteristics. Methods of measurement and permissible levels,
- *PN-EN 55024:2011/A1:2015-08 - Electromagnetic compatibility (EMC) - Information technology equipment Immunity characteristics - Limits and methods of measurement.*
- *PN-EN 60950-1:2007/A2:2014-05 - Information technology equipment - Safety - Part 1: Basic requirements.*
- *EN 55011:2012 - Industrial, scientific and medical equipment - Radio frequency disturbance characteristics - Limits and methods of measurement,*
- *PN-EN 60825-1:2014-11 - Safety of laser equipment - Part 1: Equipment classification and requirements.*
- *EMC 2014/30/EU - Electromagnetic Compatibility Directive.*
- *LVD 2014/35/EU - Low Voltage Directive.*
- IEC 61000-4-2 Electromagnetic compatibility (EMC)- Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test
- IEC 61000-4-3 *Electromagnetic compatibility (EMC)- Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test*
- IEC 61000-4-4 Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
- IEC 61000-4-5 Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
- *IEC 61000-4-6* Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
- IEC 61000-4-8 Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test
- IEC 61000-4-11 Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity test

** - The scope and list of supported standards may change as the device evolves.*

Local optical ports:

BS-MC-51 version:

- Selecting the local interface mode with a micro switch.
  - IEC103 standard operation
  - operation in non-standard mode
- Wavelength 820/850nm, MM, ST connector
- Transmission speed 0 - 2Mbit/s
- Approximate transmission range (for 62.5µm): 1500m
- Sensitivity: -25.4 dBm
- Optical power: -18.8dBm (50µm), -16dBm (62.5µm), -12dBm (100µm), -7dBm (200µm)

BS-MC-52 version:

- Wavelength 1310nm, MM, SC connector (optional ST*, FC*)
- Transmission speed 0 - 2 Mbit/s
- Approximate transmission range (for 62.5µm): 2000m
- Sensitivity: -18 dBm
- Average optical power: -7.0 dBm

BS-MC-54 version:

- 1310nm wavelength, SM, SC connector
- Transmission speed 0 - 2Mbit/s
- Approximate transmission range (for 9/125µm):10km

Environmental operating parameters:

- Operating temperature: +5C +40C
- Humidity: 80% at +20ºC

Linear optical ports:

- Built-in optical port with SC connector or SFP slot
- Transmission speed of 155Mbit/s
- Optional additional optical port for connection protection
- SM, MM, WDM. Ranges depending on the type of optical port: 15km, 50km and 100km (1550nm)
- For SFP version, optical parameters depending on the transceiver model (MM/SM/CWDM/DWDM)

Power parameters:

- Supply voltage range: 12-60V DC, with galvanic isolation,
- External 230V AC power supply included (optional)
- Power consumption up to 4W
- Redundant power supply as standard
- Connector: terminal block, screw 2x2, angled for 2.5 mm cable^2

Mechanical parameters:

- Dimensions 103x77x53mm
- Weight up to 0.3 kg

* - connector availability by arrangement with the manufacturer's R&D department.

Code

BS-MC-5X-S-(X)-(P)

Connection protection

Optional field valid only if WDM interface is selected in the preceding field:
1 - end - 1310/1550 nm for WS/WM/WL version or 1550/1570 nm for WLL version
2 - end - 1550/1310 nm for WS/WM/WL version or 1570/1550 nm for WLL version
3 - protection - 1310/1550 and 1550/1310 nm for WS/WM/WL versions or 1550/1570 and 1570/1550 nm for WLL versions

The "designation-3-P" applies only to devices with a WDM interface in the protection version.

Line interface type with SC connector:
S - 1310 nm SM/MM - range 15/5 km*.
M - 1310 nm SM - range up to 50 km
L - 1550 nm SM - range up to 100 km

WDM interfaces (additional field for transceiver required)
WS - 1310/1550 and 1550/1310 nm SM/MM - range up to 20/1 km*.
WM - 1310/1550 and 1550/1310nm SM - range up to 40 km
WL - 1310/1550 and 1550/1310 nm SM - range up to 60 km
WLL - 1550/1570 and 1550/1570 nm SM - range up to 100 km

SFP - interface realized by the SFP module

* - range for MM fiber is approximate depending on actual fiber parameters

Local interface type:
1 - 820/850nm MM - range up to 1.5 km, ST/PC connector - IEC103 standard support
2 - 1310nm MM - range up to 2 km, SC*/PC connector
4 - 1310nm SM - range up to 10 km, SC/PC connector
* - optional ST, FC connectors available by agreement with R&D

Example designations:

BS-MC-52-SFP - Fiber optic security signal converter with local MM optical interface with 1310nm wavelength, SC connector and linear optical interface realized by SFP module. Power supply 10-36V DC.

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