

Fiber Optic Amplifier Communication Converters

BFNC Series

INSTRUCTION MANUAL

TCD250013AD


Autonics

Thank you for choosing our Autonics product.

Be sure to read and fully understand the instruction manual and other manuals before using the product.

For your safety, read and follow the safety precautions, warnings, cautions, and handling instructions listed in the instruction manual, other manuals, and the Autonics website.

Keep this document in a location where it can be easily accessed.



Visit the Autonics website (www.autonics.com or QR code) for the latest information. Manuals, CAD files, certifications, software, etc. are available. The dimensions, specifications, certifications, etc. are subject to change without notice for product improvement. Certain models may be discontinued without notice.

Safety Precautions

- ‘Safety Precautions’ are provided to ensure safe and proper use of the product and to prevent accidents or hazards. Please make sure to follow them carefully.
- ⚠ symbol indicates a caution, warning of potential hazards under certain conditions.

⚠ Warning

Failure to follow instructions may result in serious injury or death.

01. Fail-safe device must be installed when using the product in applications that may cause serious injuries or property loss. (E.g. nuclear control systems, medical equipment, ships, vehicles, railroads, aircraft, combustion devices, safety devices, security systems, disaster prevention devices, etc.)

Failure to do so may result in personal injury, property loss or fire.

02. Do not use or store the product in environments containing flammable, explosive, or corrosive gases, or in places exposed to high humidity, direct sunlight, radiant heat, vibration, shock, or salt.

Failure to do so may result in explosion or fire.

03. Install the device inside a device panel before use.

Failure to do so may result in fire.

04. When expanding amplifiers, be sure to mount the units on a DIN rail. Securely fix the fiber optic amplifier and communication converter on the DIN rail by attaching end plates on each end. If using third-party end plates, make sure it meets the manufacturer’s specification requirements.

Failure to do so may result in fire or product malfunction due to poor contact of the side connectors.

05. The side connectors of the amplifiers on each end or any unused amplifiers must be covered with side connector protective caps.

Failure to do so may result in electric shock or product damage.

06. Do not disassemble, repair, or modify the product without authorization.

Failure to do so may result in fire or injury.

07. Wait at least 3 seconds after applying power before using the product.

08. Do not connect, repair, or inspect the unit while connected to a power source.

Failure to follow this instruction may result in fire.

09. Check the connection diagram before wiring.

Failure to do so may result in fire or product damage.

10. Installation, configuration, and integration with machine control system must be performed by a qualified supervisory user who is:

- fully familiar with the installation, configuration, operation, and maintenance of the product.
- fully familiar with national and regional standards, regulations, and laws applicable to the type of machine on which the product is installed.

Installation or configuration by personnel other than a supervisory user may result in improper operation or increase the risk of accidents.

11. After installing the product, check that the product’s functions and settings are working as intended before the machine is in operation.

Improper configuration of the product may result in personal injury.

12. This product is not a safety sensor and does not comply with any domestic or international safety standards.

Do not use the product in applications where personal injury, loss of life, or property damage may occur.

⚠ Caution

Failure to follow instructions may result in injury or product damage.

01. When wiring the BFNC-EC / CL power connectors, use copper (Cu) wires rated for temperatures of 60 °C or higher, with sizes between AWG 28 and AWG 16. Tighten the screws with a torque of 0.34 N・m.
- Failure to do so may result in fire or product malfunction due to contact failure.
02. Use the product within its rated specifications and performance limits.
- Failure to do so may result in fire or product damage.
03. Use a dry cloth to clean the product. Do not use water or organic solvents.
- Failure to do so may result in fire.
04. Prevent metal, dust, wiring debris, and other foreign material from entering the product.
- Failure to do so may result in fire, product malfunction, or product damage.

- Cautions During Use
- Make sure to follow the instructions in ‘Cautions During Use’. Failure to do so may result in unexpected accidents.
 - Power input should be supplied from an isolated and limited voltage/current source, or from a Class 2 or SELV power supply.
 - When supplying power with an SMPS, ground the F.G. terminal and connect a noise suppression capacitor between the 0 V and F.G. terminals.
 - When connecting inductive loads such as DC relays, use a diode, varistor, or similar component to suppress surges.
 - To prevent surges and inductive noise, separate the wiring from high-voltage and power lines, and keep wiring lengths as short as possible.
 - When installing power lines and input lines close to each other, use a line filter or varistor on the power lines and shielded wires on the input lines. For stable operation, use shielded wires and ferrite cores when installing communication lines, power lines, and signal lines.
 - Do not use the product near devices that generate strong magnetic fields or high-frequency noise.
 - The communication section of the product is isolated, but the input section is not isolated. Please exercise caution regarding electrical safety when using the product.
 - Turn off the power before connecting or disconnecting fiber optic amplifier units to the product. Failure to do so may result in product damage.
 - When connecting the product with fiber optic amplifiers, connect the power supply only to the communication converter. Do not connect separate power supplies to the communication converter and the fiber optic amplifier.
 - Use communication cables recommended by each communication association, and refer to the manuals published by the respective association for specific connection specifications. The communication distance must be within the rated specification range, and be sure to observe the following precautions when wiring.
 - Install communication cables with sufficient distance from power lines and high-voltage lines.
 - Avoid excessive bending or pulling of the communication cables.
 - Do not place objects on top of the communication cables.
 - Communication cables must be installed inside a duct.
 - When disposing of this product, treat it as industrial waste. For detailed information, refer to the applicable national and regional standards, regulations, and laws.
 - This product may be used in the following environmental conditions.
 - Indoors (in the environment condition rated in ‘Specifications’)
 - Altitude: up to 2,000 m
 - Pollution Degree 3
 - Installation Category II

Ordering Information

For reference only. The actual product does not support all combinations. To check all supported models, please refer to the Autonics website.

BFNC

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①

① Communication protocol

No-mark: Modbus RTU

EC: EtherCAT

CL: CC-Link

Product Components

- Product, instruction manual
- [BFNC-EC/CL] Power connector

- [BFNC-CL] Communication connector, Termination resistor ×2

Sold Separately

- Fiber optic amplifier: BFN Series
- End plate: BK-BFN-B

- Serial communication converter : SCM-US

Manuals and Software

Refer to the product manual for detailed product information and instructions, and be sure to follow the precautions in the technical documents. Manuals and software can be downloaded from the Autonics website.

■ BFNC Series Communication Manual

Provides communication tables for each protocol for the BFN Series dual display models.

■ DAQMaster

Comprehensive device management software used to configure parameters, monitor status, and manage data of supported Autonics devices..

Installing the Communication Converter

⚠ Turn off the power before starting installation.

Installation

01. Hook the DIN rail holder on the bottom (①) onto the DIN rail.

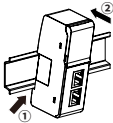
02. Push the top part of the converter (②) toward the DIN rail to lock it in place.

Removal

01. Push the bottom part of the converter upward and slightly lift it off the DIN rail.

02. Tilt the converter outward to remove it from the DIN rail.

- Install end plates (BK-BFN-B, sold separately) on each end to secure the converter. When installing the screws, tighten with a torque less than 0.59 N・m.



Connecting Communication Converters with Amplifiers

- This installation example is based on the BFNC-EC model. The external appearance and connector positions may differ depending on the model. Please refer to the specifications of each model before installation.

01. Turn off the power before starting installation.

02. Do not apply excessive force to the side connector.

Failure to do so may result in damaging or bending the connector pins.

03. Make sure the side connector is tightly and securely connected.

Failure to do so may result in reduced performance or product malfunction..

04. When using BFNC-EC/CL, connect the power only to the comm. converter.

05. Do not connect separate power supplies to the communication converter (BFNC-EC/CL) and the fiber optic amplifier.

⚠

01. Install the comm. converter (①) onto the DIN rail.

02. Mount the amplifiers (②) one by one onto the DIN rail in the correct order.

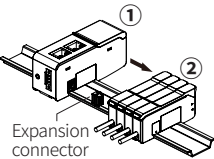
Check the mounting direction and order of each amplifier, and make sure to follow the amplifier installation instructions. If the expansion connector is covered with a protective cap, remove the cap before connecting the units.

03. Push the side connector on the right side of the converter toward the expansion connector of the amplifier to make the connection. Check that the connectors are securely and tightly connected.

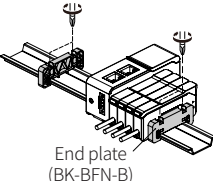
04. Check that all devices are firmly mounted and all connectors are properly engaged.

05. If a side connector of an amplifier is exposed after installation, reattach the protective cap to cover it.

06. Install the end plates (BK-BFN-B, sold separately) on both ends of the entire unit, and tighten the screws with a torque less than 0.59 N m to fix the position.



Expansion connector

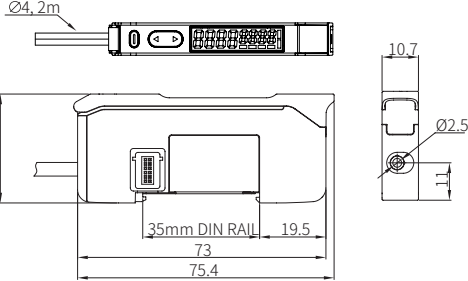


End plate (BK-BFN-B)

Dimensions

- Unit: mm (Refer to the CAD files from the Autonics website for exact dimensions)

■ BFNC



■ BFNC-EC/CL

BFNC-EC

BFNC-CL

31

31

94

94

19.2

28.9

19.3

112.1(max. value with cover open)

68.9(max. value with cover open)

40

110°

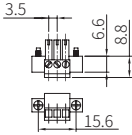
35mm DIN RAIL

19.2

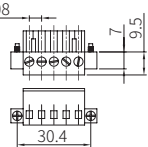
Protective cover fully open

110°


■ Power Connector (BFNC-EC/CL)









■ Comm. Connector (BFNC-CL)



■ Termination Resistor (BFNC-CL)




- Rated resistance: 120 Ω
- Tolerance: ± 1%
- Rated power: 0.25 W (1/4 W)
- Resistor type: Metal Film Resistor

Specifications			
Model	BFNC	BFNC-EC	BFNC-CL
Display	FND display (green: 4-digit, white: 4-digit)	Status indicator × 5	Status indicator × 4
Communication	RS-485	EtherCAT	CC-Link
Power voltage	10 - 30 VDC≡ (ripple P-P: ≤ 10%)		
Power supply	Side connector (amplifier)	Power connector (3-pin)	Power connector (3-pin)
No. of amplifier expansion units	≤ 30 units	≤ 16 units	≤ 16 units
Current consumption	≤ 80 mA (10 VDC≡), ≤ 50 mA (30 VDC≡)	≤ 300 mA (10 VDC≡), ≤ 200 mA (30 VDC≡)	≤ 200 mA (10 VDC≡), ≤ 140 mA (30 VDC≡)
Amp. allowable current	— ⁰¹⁾	≤ 2 A ⁰²⁾	≤ 2 A ⁰²⁾
Amp. connection	Via side connector		
Input	NPN / PNP non-contact input	—	—
Connection	Cable type	—	—
Cable specification	Ø 4 mm, 4-wire, 2 m	—	—
Wire specification	AWG23 (0.08 mm, 60-core), insulator outer diameter: Ø 1.25 mm	—	—
Certification	CE UK  	CE UK  	CE UK  
Weight (packaged)	≈ 73 g (≈ 137 g)	≈ 81 g (≈ 125 g)	≈ 75 g (≈ 128 g)

01) Power is not supplied to the amplifier.

02) The value indicates the total current supplied to connected or expanded amplifiers. Ensure that the total current consumption of the connected amplifiers does NOT exceed the allowable limit.

Protection circuit	Reverse power protection circuit, surge protection circuit
Insulation resistance	≥ 20 M.Ω (500 VDC= megger)
Dielectric strength	Between charging part and case: 1,000 VAC~ 50/60 Hz for 1 min
Vibration resistance	1.5 mm double amplitude at frequency 10 to 55 Hz in each X, Y, Z direction for 2 hours
Shock resistance	500 m/s ² (≈ 50 G) in each X, Y, Z direction for 3 times
Ambient temperature	-10 to 50 °C, storage: -20 to 70 °C (no freezing or condensation)
Ambient humidity	35 to 85% RH, storage: 35 to 85% RH (no freezing or condensation)
Installation	35 mm DIN rail installation
Protection rating	[BFNC] IP40 (IEC standard) [BFNC-EC/CL] IP20 (IEC standard)
Material	Case, cover: PC

Communication Interface	
■ RS-485	
Communication protocol	Modbus RTU
Application standard	EIA RS-485 compliant
Comm synchronization method	Asynchronous
Communication method	2-wire half duplex
Transmission speed	1,200 / 2,400 / 4,800 / 9,600 / 19,200 / 38,400 / 57,600 / 115,200 (default) bps
Transmission medium	RS-485 compliant or Modbus Association certified cable
Cable length	≤ 1 km
Address setting	FND display and button
Address range	1 to 99
Topology	Daisy Chain, Bus, Drop Line, Trunk
Start bit	1-bit
Data bit	8-bit
Parity bit	None (default), Even, Odd
Stop bit	1-bit, 2-bit (default)
■ EtherCAT	
Communication protocol	EtherCAT
Association certification ⁰¹⁾	EtherCAT 
Ethernet standard	100BASE-TX (IEEE802.3u)
Transmission speed	100 Mbps
Transmission medium	Category 5e STP or ETG certified cable
Cable length	≤ 100 m
Communication connector	RJ45 × 2
Node address setting	Hexadecimal rotary switch × 3
Node address range	0 to 4095
Topology	Daisy Chain
Communication function	Process Data Object Communication (PDO) / Mailbox Communication (CoE Compliant)
ESI file	Download from Autonics website

01) EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany

■ CC-Link						
Communication protocol	CC-Link Ver. 1.1 / Ver. 2.0					
Association certification	CC-Link					
Remote station type	Remote device station					
Transmission speed	156 kbps / 625 kbps / 2.5 Mbps / 5 Mbps / 10 Mbps					
Transmission medium	CLPA certified cable					
Distance between nodes	≥ 20 cm					
Cable length	Varies depending on transmission speed					
	156 kbps	≤ 1,200 m	625 kbps	≤ 900 m	2.5 Mbps	≤ 400 m
	5 Mbps	≤ 160 m	10 Mbps	≤ 100 m		
Communication connector	5-pin PCB × 1					
Node address setting	Decimal rotary switch × 2					
Node address range	1 to 64					
Number of stations	Ver. 1.1: 1, 2, 3, or 4 stations Ver. 2.0: 3 stations 2 cycles					
Topology	Daisy Chain, Bus, Drop Line, Trunk					
CSP+ file	Download from Autonics website					