

Fiber Optic Amplifier Communication Converters



BFC Series PRODUCT MANUAL

For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.

The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

Features

- Sets all Functional performance and parameters from external devices (PC, PLC)
- Supports various communications
 - : RS485 communication, Serial Communication, SW input
- Connected up to 32 amplifiers (BF5 series)
- Slim design with depth 10 mm (W 10 × H 30 × L 70 mm)

Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- ⚠ symbol indicates caution due to special circumstances in which hazards may occur.

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

- 01. Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss.** (e.g., nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)
Failure to follow this instruction may result in personal injury, economic loss or fire.
- 02. Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact or salinity may be present.**
Failure to follow this instruction may result in explosion or fire.
- 03. Install the unit on DIN rail to use.**
Failure to follow this instruction may result in fire.
- 04. Do not disassemble or modify the unit.**
Failure to follow this instruction may result in fire.
- 05. Do not connect, repair, or inspect the unit while connected to a power source.**
Failure to follow this instruction may result in fire.
- 06. Check 'Connections' before wiring.**
Failure to follow this instruction may result in fire.

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

- 01. Use the unit within the rated specifications.**
Failure to follow this instruction may result in fire or product damage.
- 02. Use a dry cloth to clean the unit, and do not use water or organic solvent.**
Failure to follow this instruction may result in fire.

Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- When connecting an inductive load such as a DC relay, remove surge by using a diode or varistor.
- Use the product after 3 sec of the power input.
- Wire as short as possible and keep it away from high voltage lines or power lines to prevent surge and inductive noise.
- When using switching mode power supply (SMPS), ground F.G. terminal and connect a condenser between 0V and F.G. terminal to remove noise.
- Since external disturbance light (sunlight, fluorescent lighting, etc.) can cause product malfunction, use the product with a light shield or slit.
- Be cautious that this product is non-insulated.
- Turn off the power of this product before installation or removal.
- Use twisted pair wire for communication line.
- This unit may be used in the following environments.
 - Indoors (in the environment condition rated in 'Specifications')
 - Altitude max. 2,000 m
 - Pollution degree 2
 - Installation category III

Ordering Information

This is only for reference, the actual product does not support all combinations. For selecting the specified model, follow the Autonics website.

BFC - ①

① Input method

N: NPN solid-state input

P: PNP solid-state input

Product Components

- Product
- Instruction manual
- Connector cable
- Side connector

Sold Separately

- Fiber optic amplifier: BF5 series
- Communication converter: SCM series

Software

Download the installation file and the manuals from the Autonics website.

■ DAQMaster

It is the comprehensive device management program for Autonics' products, providing parameter setting, monitoring and data management.

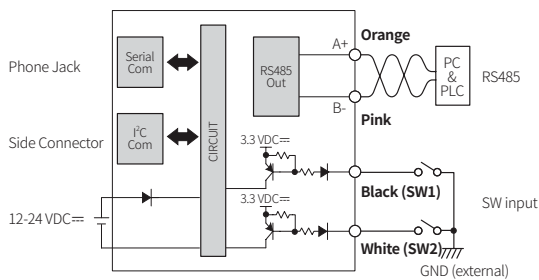
Manual

For proper use of the product, refer to the manuals and be sure to follow the safety considerations in the manuals.

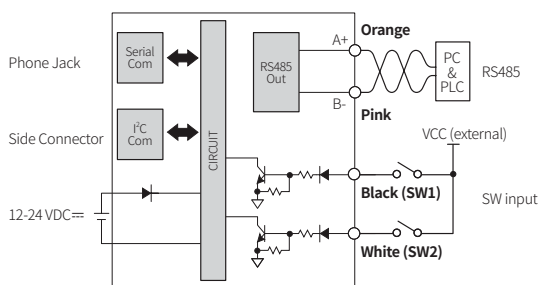
Download the manuals from the Autonics website.

Connections and Circuit

■ NPN solid-state input

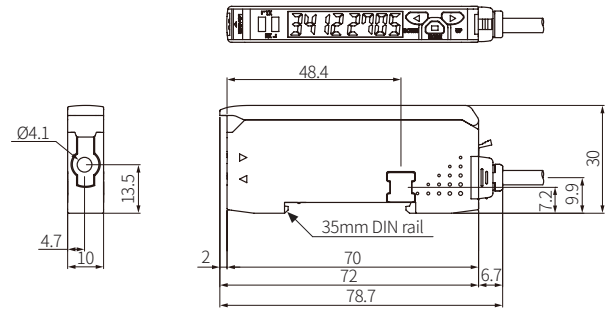


■ PNP solid-state input



Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.



Error

| Error | Cause | Troubleshooting |
|-------|---|--|
| E r A | Data read/write error occurs in EEPROM of the amplifier. | Check the circuitry around EEPROM inside the product. |
| E r b | - Slave fails to execute the Master's instructions such as 1:M copy, load all, save all, and group teaching due to unstable communication lines. - Another communication error occurs. | - Check the cascading status. - Check the circuitry around the side connector and hardware condition. |

Specifications

| | |
|----------------------------|--|
| Model | BFC-□ |
| Supported amplifier | BF5 Series |
| Comm. function | RS485, Serial communication, Switch (SW) input |
| Switch (SW) input | HIGH: 5-24 VDC≒, LOW: 0-1 VDC≒ |
| Function | Real-time monitoring (incident light level, output state), Executes all functions and sets the parameters of BF5 Series via external devices (PC, PLC) |
| Indicator | TX indicator (red), RX indicator (green), display screen (PV display part: red LED, SV display part: green LED) |
| Approval | CE, RoHS, ENEC |
| Unit weight | ≒ 15 g |
| Power supply | 12-24 VDC≒ ±10% (using the power supply of the connected amplifier) |
| Current consumption | ≤ 40 mA |
| Control output | NPN solid-state input / PNP solid-state input model |
| Vibration | 1 mm double amplitude at frequency 10 to 55 Hz in each X, Y, Z direction for 2 hours |
| Shock | 500 m/s ² (≒ 50 G) in each X, Y, Z direction for 3 times |
| Ambient temperature | -10 to 50 °C, storage: -20 to 60 °C (no freezing or condensation) |
| Ambient humidity | 35 to 85%RH, storage: 35 to 85%RH (no freezing or condensation) |
| Protection rating | IP40 (IEC standard) |
| Connection | Connector cable |
| Cable spec. | Ø 4 mm, 4-wire, 2 m |
| Wire spec. | AWG22 (0.08 mm, 60-core), insulator outer diameter: Ø 1.25 mm |
| Material | Case: PBT, cover: PC |

Communication Interface

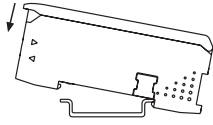
■ RS485

| | |
|---------------------------------|---|
| Comm. protocol | Modbus RTU |
| Application standard | Compliance with EIA RS485 |
| Max. connection | 31-unit (communication address setting: 01 to 99) |
| Comm. synchronous method | Asynchronous |
| Comm. method | 2-wire half duplex |
| Comm. distance | ≤ 800 m |
| Comm. speed | 1,200 / 2,400 / 4,800 / 9,600 / 19,200 / 38,400 bps |
| Comm. response time | 20 to 90 ms |
| Start bit | 1-bit |
| Data bit | 8-bit |
| Parity bit | None, Even, Odd |
| Stop bit | 1-bit, 2-bit |

DIN Rail Mount and Removal

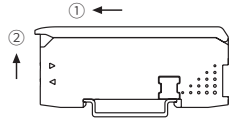
Mount

- Hang up the holder on the backside of the communication converter to the DIN rail (35 mm).
- Press the front side of the communication converter toward the DIN rail.



Removal

- Slide the communication converter to direction ①.
- Lift the front side of the communication converter to direction ②.



Connect and Remove Connector Cable

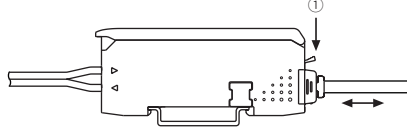
Caution: Do not connect the connector cable of the amplifier to the communication converter. Otherwise, it may result in product damage.

Connection

Insert the connector into the communication converter mounted to the DIN rail with a click.

Removal

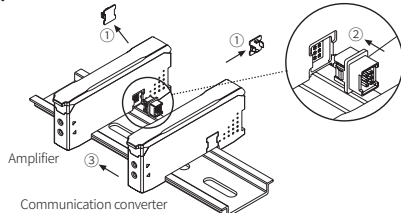
Press the lever lock to the direction ① and pull it from the communication converter.



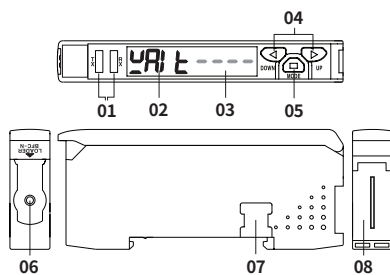
Connect Communication Converter and Amplifier

- Make sure that if you connect the side connector with excessive force, it may cause extruded pins.
- Be sure to mount the side connector to fit tightly. Otherwise, the communication connection may not normally work.

- Remove the side cover (①) on the communication converter and amplifier.
- Mount the side connector to the socket on the side of the communication converter like ②.
- Install the communication converter and amplifiers to the DIN rail and gently push the communication converter toward direction ③.
- Be sure to check the connection of the communication converter and side connector.



Unit Descriptions



- TX (transmission) indicator (red)**
RX (reception) indicator (green)
- PV display part (red 4-digit LED)**
It shows the parameter.
- SV display part (green 4-digit LED)**
It shows the parameter value.
- [◀|▶] key**
Selecting the setting value.
- [MODE] key**
Enter mode, move parameter
- Serial communication port**
Connection port for the USB/Serial converter (SCM-US, sold separately)
- Side cover**
Remove when connecting with the amplifiers
- Connector cable terminal**
Terminal for the RS485 communication / switch (SW) input mode

Parameter setting

- Return to the 2. Communication mode after the screen flashes twice.
- [MODE] key: saves the setting value and move to the next parameter, return to the 0. Communication standby after applying the input for 3 sec
- [◀], [▶] key: selects the setting value

| Mode | Display | Factory defaults | Setting range | |
|------|-------------------------|------------------|---------------|---|
| | PV | SV | | |
| 0 | Communication standby | 485 | ---- | • Entering method: [MODE] key 3 sec |
| 1 | Communication parameter | COA | PARA | - |
| 2 | Communication mode | COA | 485 | 485: RS485 communication BANK: switch (SW) input USB: serial communication • Refer to the detailed explanation of each mode. |
| 3 | Communication address | ADR | 1 | 1 to 99 |
| 4 | Communication speed | BPS | 9600 | 1200, 2400, 4800, 9600, 192K: 19200, 384K: 38400 |
| 5 | Response waiting time | RWT | 20 | 20 to 99 ms • The response time may increase up to 350 ms depending on the number of connected amplifiers. |
| 6 | Parity bit | PRTY | none | None, Even, Odd |
| 7 | Stop bit | STOP | 2bit | 2 bit, 1bit |

Functions Supported by DAQMaster

If you manage the amplifiers via PC under the RS485 and serial communication, DAQMaster supports the functions listed below. For the detailed information, refer to the 'DAQMaster User Manual.'

- Config**
It shows the number of cascaded amplifiers (BF5) with the communication converter (BFC).
- Status**
It shows the information of the cascaded amplifier (dual/single) by selecting the channel.
- Program Group**
You can change the setting values of the program mode of cascaded amplifiers. When setting values are changed, TX and RX indicators flash and apply the changed values to the amplifier.
- Data Bank Group**
It supports data bank function, group teaching (teaching all), and initialization.
- Data Bank**
It saves the settings of data bank (BANK 0, BANK 1, BANK 2).

Application of data bank group setting

| Mode | Unit | PV | SV |
|-----------------------|-------------------------|---------------------|---------------------|
| Communication standby | Communication converter | 485 | ---- |
| Bank Load | Communication converter | LOAD | BAED |
| | Amplifier | LOAD | END |
| Bank Save | Communication converter | SAVE | BAED |
| | Amplifier | SAVE | END |
| Bank Copy | Communication converter | COPY | ALL |
| | Amplifier | COPY | END |
| Bank Load All | Communication converter | LOAD ⁰¹⁾ | BAED ⁰¹⁾ |
| | Amplifier | LOAD | END |
| Bank Save All | Communication converter | SAVE ⁰¹⁾ | BAED ⁰¹⁾ |
| | Amplifier | SAVE | END |
| Teaching All | Communication converter | TECH | ALL |
| | Amplifier | TECH | END |
| Initialize | Communication converter | INIT | INIT |
| | Amplifier | INIT | INIT |

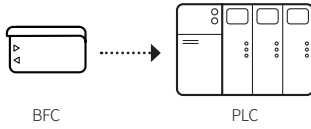
01) Flashing twice

RS485 Communication

- You can manage the cascaded amplifiers via PLC or PC.
- Refer to the 'Connections' for checking the correct wire connection.
- Do not overlap the communication address on the same communication line.
- In the parameter setting, set 2. Communication mode as RS485 communication.

■ PLC connection

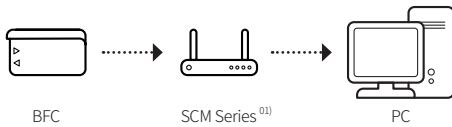
- Directly connect the cables of this product to the PLC.



■ PC connection

- DAQMaster should be installed on your PC.
- Be sure to set the same communication port and address of this product and DAQMaster.

- Connect the cables of this product to the serial communication converters (SCM Series, sold separately).
 - Connect the SCM Series and PC.
 - Proceed the settings via DAQMaster.
- For the detailed information, refer to the 'DAQMaster User Manual.'



01) SCM-WF48 / SCM-US48I / SCM-38I

Segment Table

The segments displayed on the product indicate the following meanings. It may differ depending on the product.

| 7 segment | | | | 11 segment | | | | 12 segment | | | | 16 segment | | | |
|-----------|---|---|---|------------|---|---|---|------------|---|---|---|------------|---|---|---|
| 0 | 0 | l | l | 0 | 0 | l | l | 0 | 0 | l | l | 0 | 0 | l | l |
| 1 | 1 | l | l | 1 | 1 | l | l | 1 | 1 | l | l | 1 | 1 | l | l |
| 2 | 2 | l | l | 2 | 2 | l | l | 2 | 2 | l | l | 2 | 2 | l | l |
| 3 | 3 | l | l | 3 | 3 | l | l | 3 | 3 | l | l | 3 | 3 | l | l |
| 4 | 4 | l | l | 4 | 4 | l | l | 4 | 4 | l | l | 4 | 4 | l | l |
| 5 | 5 | l | l | 5 | 5 | l | l | 5 | 5 | l | l | 5 | 5 | l | l |
| 6 | 6 | l | l | 6 | 6 | l | l | 6 | 6 | l | l | 6 | 6 | l | l |
| 7 | 7 | l | l | 7 | 7 | l | l | 7 | 7 | l | l | 7 | 7 | l | l |
| 8 | 8 | l | l | 8 | 8 | l | l | 8 | 8 | l | l | 8 | 8 | l | l |
| 9 | 9 | l | l | 9 | 9 | l | l | 9 | 9 | l | l | 9 | 9 | l | l |
| A | A | l | l | A | A | l | l | A | A | l | l | A | A | l | l |
| b | B | l | l | b | B | l | l | b | B | l | l | b | B | l | l |
| c | C | l | l | c | C | l | l | c | C | l | l | c | C | l | l |
| d | D | l | l | d | D | l | l | d | D | l | l | d | D | l | l |
| E | E | l | l | E | E | l | l | E | E | l | l | E | E | l | l |
| F | F | l | l | F | F | l | l | F | F | l | l | F | F | l | l |
| G | G | l | l | G | G | l | l | G | G | l | l | G | G | l | l |
| H | H | l | l | H | H | l | l | H | H | l | l | H | H | l | l |

Switch (SW) Input

- You can change all the banks of cascaded amplifiers at once.
- You can select the BANK via signal inputs connecting with the connector cable of the communication converter. (input time: ≥ 3 sec)

| | NPN | | PNP | |
|----------------|-------------|-------------|-------------|-------------|
| | SW1 (black) | SW2 (white) | SW1 (black) | SW2 (white) |
| Signal standby | H | H | L | L |
| BANK 0 | H | L | L | H |
| BANK 1 | L | H | H | L |
| BANK 2 | L | L | H | H |

- Refer to the 'Connections' for checking the correct wire connection.
- In the parameter setting, set 2. Communication mode as switch input mode (BANK).
- The example below is based on NPN and BANK 1.

| Unit | PV | SV | Descriptions |
|-------------------------|---------|---------|--|
| Communication converter | 5 4 | 6 8 7 4 | SW input mode |
| | 5 E t | 6 8 4 0 | Signal standby state, displaying the selected BANK |
| | 5 E t | 6 8 4 1 | SW input - SW1: L, SW2: H |
| | 5 H 0 1 | 0 4 | Change the BANK |
| 5 d R L | E n d | | |
| Amplifier | 5 0 R d | E n d | |

Serial Communication

- You can manage the cascaded amplifiers via PC. DAQMaster should be installed on your PC.
- In the parameter setting, set 2. Communication mode as serial communication mode (USB).
- Be sure to set the same communication port and address of this product and DAQMaster.

■ PC connection

- Connect the serial communication converters (SCM-US, sold separately) to the serial communication port on this product.
 - Connect the SCM-US and PC.
 - Proceed the settings via DAQMaster.
- For the detailed information, refer to the 'DAQMaster User Manual.'

