

## Dual Display Fiber Optic Amplifiers

# BFX Series

## INSTRUCTION MANUAL

TCD210064AB

**Autonics**

Thank you for choosing our Autonics product.

**Read and understand the instruction manual and manual thoroughly before using the product.**

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

Keep this instruction manual in a place where you can find easily.

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

Follow Autonics website for the latest information.

### 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.
- The power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- If the supplying power is out of the rated power supply, the internal power supply is unstable, causing product malfunction. Use the product within the rated specification range.
- 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.
- When sensing an object with the maximum sensitivity, an error of sensing distance can occur due to the deviation of each feature.
- Turn off the power of the fiber optic amplifier before installation or removal.
- When installing the fiber optic unit, check the bend radius of each unit written on the product manual. If the installed unit that has the bend radius under the rated range, causing optical loss so the sensing distance is shortened.
- Be sure not to scratch the surface of the fiber optic unit.
- Do not pull the cable of the fiber optic unit that is connected to the amplifier.
- 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.

**BFX - ① ② - ③**

#### ① Display part

D: Dual display

#### ② Function

1: General type

#### ③ Control output

N: NPN open collector output

P: PNP open collector output

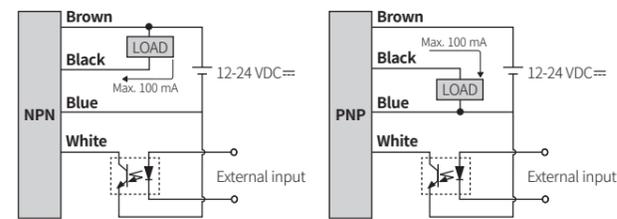
### Product Components

- Product
- Connector cable
- Instruction manual

### Sold Separately

- Fiber optic units

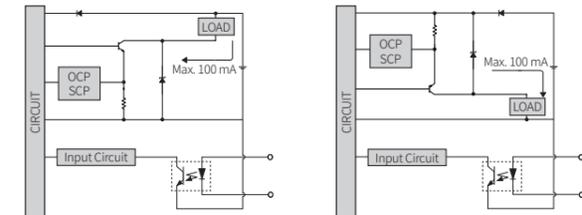
### Connections



- The duration of a signal over 2 ms is necessary for the external input function. For using the external input, use a photocoupler or external controller, etc. Otherwise, it may result in product damage.

### Circuit

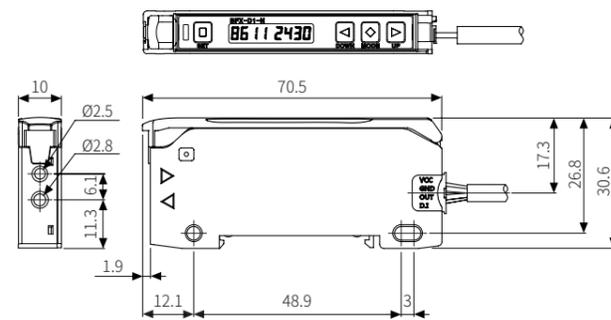
#### ■ NPN open collector output ■ PNP open collector output



- OCP (over current protection), SCP (short circuit protection)

### Dimensions

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



### Error

Error	Cause	Troubleshooting
Err	In RUN mode, the overcurrent has been detected from the output circuit.	Remove the overcurrent due to the overload.

### Specifications

Model	BFX-D1-□
Light source	Red LED
Peak emission wavelength	660 nm, modulated
Response time	Standard (500 μs), Long distance (4 ms), Ultra long distance (10 ms), Ultra fast (50 μs), Fast (150 μs) mode
Sensitivity setting	Manual, Teaching (Auto-tuning, 1-point, 2-point, positioning)
Operation mode	Light ON, Dark ON
Measured value display	7-segment LCD, 4-digit (decimal, percentage)
Operation mode of the timer	OFF, OFF Delay, ON Delay, One-shot
External input	Teaching sensitivity, initialization of the incident light level, emitter OFF, control output setting, energy saving mode release
Indicator	Operation indicator (red), display screen (PV display part: red LED, SV display part: green LED)
Approval	CE, RoHS
Unit weight (packaged)	≈ 16 g (≈ 115 g)

Power supply	12-24 VDC= ±10% (ripple P-P: ≤ 10%)
Current consumption	≤ 50 mA
Control output	NPN open collector output / PNP open collector output model
Load voltage	≤ 24 VDC=
Load current	≤ 100 mA
Residual voltage	NPN: ≤ 1 VDC=, PNP: ≤ 3 VDC=
Protection circuit	Reverse power protection circuit, output short overcurrent protection circuit, surge protection circuit
Insulation resistance	≥ 20 MΩ (500 VDC= megger)
Dielectric strength	Between the charging part and the case: 1,000 VAC~ 50 / 60 Hz for 1 min
Vibration	1 mm double amplitude at frequency 10 to 55 Hz in each X, Y, Z direction for 2 hours
Shock	500 m/s <sup>2</sup> (≈ 50 G) in each X, Y, Z direction for 3 times
Ambient illuminance (receiver)	Sunlight: ≤ 11,000 lx, incandescent lamp: ≤ 3,000 lx
Ambient temperature (01)	-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)
Protection rating	IP40 (IEC standard)
Connection	Connector cable
Cable spec.	∅ 4 mm, 4-wire, 2 m
Wire spec.	AWG22 (0.08 mm, 60-core), insulator outer diameter: ∅ 1.25 mm
Tightening torque for fiber optic unit	≥ 2kgf
Material	Case: POK, cover: PC

- 01) 1 to 2 units: -10 to 50 °C, 3 to 8 units: -10 to 35 °C  
Be cautious about the heat transfer when the number of connected units is more than 8.  
The ambient temperature varies with the number of connected amplifiers that are mounted on the DIN rail.  
Be sure to check the temperatures when installing in the enclosed area.

### Enter the Mode

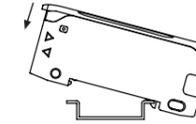
- For more detailed information on functions and settings, refer to the manual.

RUN	[MODE] 3 sec →	<b>Program mode</b>	[MODE] 3 sec →	RUN
	[SET] →	<b>Teaching sensitivity setting</b>	Auto →	
	[◀] + [▶] →	<b>Manual sensitivity setting</b>	[MODE] or after 3 sec →	
	[SET] + [▶] →	<b>Anti-saturation function</b>	Auto →	
	[MODE] →	<b>Incident light level monitoring</b>	[MODE] →	
	[MODE] 7 sec →	<b>Initialization</b>	Auto →	

### DIN Rail Mount and Removal

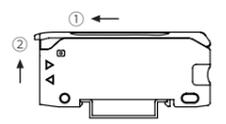
#### ■ Mount

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



#### ■ Removal

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



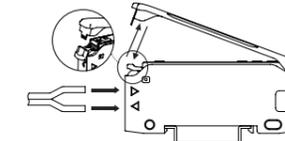
### Insert Fiber Optic Unit

- Lift the protective cover and lower down the lever lock.
- Insert the cable of the fiber optic unit to the slot completely. (▷ : receiver part, ◁ : emitter part)

Length (mm)	Receiver part	Emitter part
a <sup>01)</sup>	13	14
b	8	7

Amplifier 01) With the adaptor attached

- Lift the lever lock to fix the fiber optic unit and close the protective cover.



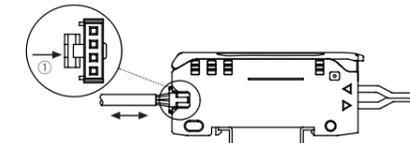
### Connect and Remove Connector Cable

#### ■ Connection

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

#### ■ Removal

Press the connector part to direction ① and pull it.



### Unit Descriptions

- Operation indicator (red)**  
ON or OFF depending on the operation mode
- [SET] key**  
Teaching sensitivity setting, incident light level monitoring
- PV display part (red 4-digit LED)**  
RUN mode: it shows PV (present value).  
Setting mode: it shows the parameter.
- SV display part (green 4-digit LED)**  
RUN mode: it shows SV (setting value).  
Setting mode: it shows the setting value, parameter value.
- [◀] [▶] key**  
Manual sensitivity setting, selecting the setting value
- [MODE] key**  
Enter mode, return to RUN mode, move parameter, save the setting value
- Lever lock**  
It is used to fix the fiber optic unit.