Volume Adjustment Fiber Optic Amplifiers

BFN Series (Volume Type)

INSTRUCTION MANUAL

TCD250012AD

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 instruction manual in a place where you can find easily.

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 product on a DIN rail or bracket before use.
Failure to do so may result in product malfunction.
04. Do not disassemble, repair, or modify the product without authorization.
Failure to do so may result in fire or injury.
05. Wait at least 3 seconds after applying power before using the product.
06. Do not connect, repair, or inspect the product while connected to a power source.
Failure to do so may result in fire.
07. Check the connection diagram before wiring.
Failure to do so may result in fire or product damage.
08. All unused input/output lines must be individually insulated.
Failure to do so may result in fire or product damage.

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

01. Use the product within its rated specifications and performance limits.
Failure to do so may result in fire or product damage.
02. Use a dry cloth to clean the product. Do not use water or organic solvents.
Failure to do so may result in fire.
03. When the fiber optic unit connection terminal is not in use, prevent dust, debris, or other foreign substances from entering the terminal.
04. Prevent metal, dust, wiring debris, and other foreign material from entering into 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.
- Do not use the product near devices that generate strong magnetic fields or high-frequency noise.
- To prevent malfunction caused by stray light (sunlight, fluorescent lamps, etc.), use a light shield, slit, or similar measures.
- When detecting at maximum sensitivity, variations in individual characteristics may cause deviations in detection distance.
- When using fiber optic units, please observe the following:
  - Refer to the fiber optic unit manual for the bending radius of the fiber optic cable.
  - Do not apply excessive physical stress such as pulling, compression, bending, or twisting to the fiber optic cable or hood.
  - Do not pull or forcibly move the fiber optic cable.
- 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 (UL Type 1 Enclosure)
  - 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.

BFN - ❶

❶ Control output
N: NPN open collector output
P: PNP open collector output

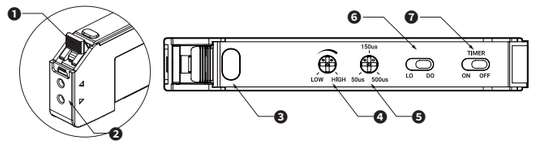
Product Components

- Product / Instruction manual × 1

Sold Separately

- Fiber optic units
- Bracket: BK-BFN-A
- End plate: BK-BFN-B

Unit Description



❶ Fiber optic unit locking lever

❷ Fiber optic unit connection terminal

❸ Output indicator (orange LED)
Compares PV to SV, and turns ON when there is an output..

❹ Sensitivity setting volume
Adjust the sensitivity.
• Clockwise ↑ / Counterclockwise ↓

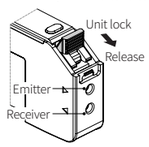
❺ Response time setting volume
Select the response time.
• 50 µs / 150 µs / 500 µs

❻ Operation mode switch
Select the operation mode.
• LO: Light-ON / DO: Dark-ON

❼ Timer switch
Set timer function ON or OFF.
• OFF Delay timer: 40 ms fixed

Connecting Fiber Optic Units

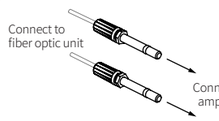
⚠
01. If a dedicated adapter is included with the fiber optic unit, attach the adapter before connecting it to the amplifier.
02. For coaxial fiber optic units, connect the single-core cable to the emitter terminal and the multi-core cable to the receiver terminal.
Failure to do so may compromise stable detection performance..



01. Open the protective cover.
02. Push the locking lever forward to release the lock.
03. Insert fiber optic units to the proper emitter/receiver connection terminals.
04. Pull the locking lever back to the lock position to secure the fiber optic units.
05. Close the protective cover.

■ Fiber Optic Unit Adapter

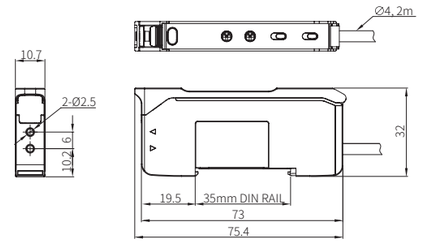
When attaching an adapter, make sure to use the appropriate adapter according to the fiber optic unit cable diameter.



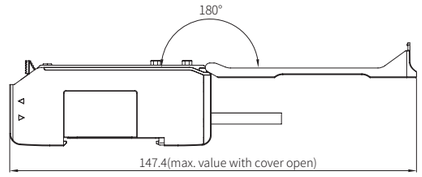
Fiber optic unit cable diameter	Adapter color
Ø 1.0 mm	Black
Ø 1.3 mm	Gray

Dimensions

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



- With protective cover wide open

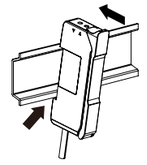


Installing the Amplifier

■ DIN Rail Installation

Installation
01. Hook the DIN rail holder on the bottom onto the DIN rail.
02. Push the top part towards the DIN rail to lock it in place.

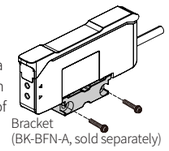
Removal
01. Push the bottom part of the amplifier upward and slightly lift it off the DIN rail.
02. Tilt the amplifier outward to remove it from the DIN rail.



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

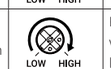
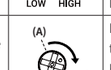
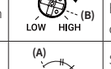
■ Bracket Installation (BK-BFN-A, Sold Separately)

Brackets can be used to install the amplifiers in environments where DIN rail installation is not feasible..
01. Place the bracket at the installation location. The installation surface must be flat with minimal vibration.
02. Tighten M3 screws in the bracket holes and tighten with a torque less than 0.59 N•m to fix it in place. The screws can be inserted from the top of the bracket, or from the side of the bracket as shown in the image.
03. Align the DIN rail holder of the amplifier to the bracket groove and secure it in place.



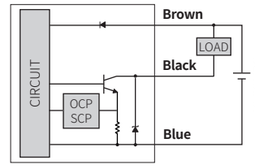
Sensitivity Settings

- Sensing sensitivity can be adjusted using the sensitivity setting volume. Using excessive force to turn the volume may damage the unit.
- The following explanation applies to the use of a reflective type fiber optic unit operating in Light ON mode.

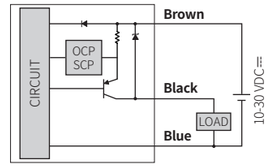
Step	Light ON Status	Description	
01	-		Turn the sensitivity to the lowest setting (LOW).
02	Light detection		Place the target object to be detected. Turn the sensitivity volume to the highest setting (HIGH), and check the location where the output indicator turns on (A).
03	Unstable light detection		If there is another object that may be detected, remove the target object. Turn the sensitivity volume towards the highest setting (HIGH) and check the location where the output indicator turns on (B).
04	Light blocked		Set the sensitivity to the middle position between (A) and (HIGH) in step 2, or the middle position between (A) and (B) in step 3.

Circuit / Wiring Diagram

■ NPN Open Collector Output

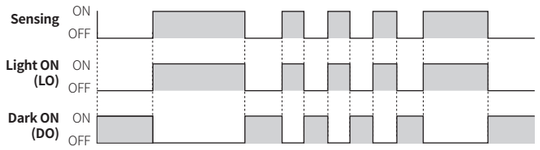


■ PNP Open Collector Output



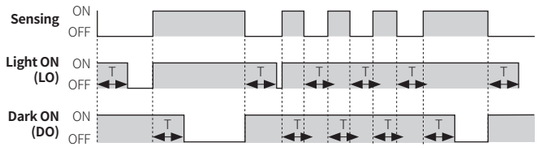
- The white wire is not used in this model. Do not connect the wire.
- OCP (over-current protection), SCP (short-circuit protection)
- If the control output terminal is short-circuited or a current exceeding the rated current is supplied, normal control signals will not be output due to the protection circuit.

Operation Timing Chart



■ OFF Delay Timer (40 ms, fixed)

- Set OFF Delay timer function ON or OFF using the timer switch.
- Use the timer to delay the time of control output turning OFF. (T = 40 ms, fixed)



Specifications

Model	BFN-□
Light source type	Red LED
Light source wavelength	660 nm
Sensitivity setting	Manual
Response time	50 µs / 150 µs / 500 µs
Operation mode	Light ON / Dark ON
Timer setting	OFF Delay (40 ms)
Indicator	Output indicator (orange LED)
Certification	CE UKCA cULus
Unit weight (with packaging)	≈ 71 g (≈ 135 g)

Power supply	10 - 30 VDC ⎓ (ripple P-P: ≤ 10%)
Current consumption	≤ 35 mA
Control output	NPN open collector output, PNP open collector output models
Load current	≤ 100 mA
Load voltage	≤ 30 VDC ⎓
Residual voltage	NPN: ≤ 2 VDC ⎓, PNP: ≤ 2 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 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/s² (≈ 50 G) in each X, Y, Z direction for 3 times
Ambient illuminance (receiver)	Sunlight: ≤ 30,000 lx, incandescent lamp: ≤ 20,000 lx
Ambient temp. 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	IP50 (IEC standard)
Connection	Cable type
Cable specifications	Ø 4 mm, 4-wire, 2 m
Wire specifications	AWG23 (0.08 mm, 60-core), insulator diameter: Ø 1.28 ± 0.05 mm
Material	Case, cover: PC

01) Ambient operating temperature is measured with the unit installed on a metal DIN rail. When installing the unit in an enclosed space, proper ventilation and temperature management is required.

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