

BFN Series

INSTRUCTION MANUAL

Autonics

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

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

- ⚠ 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 the product.**
Failure to do so may result in fire, product malfunction, or product damage.

Bracket
(BK-BFN-A, sold separately)

Specifications			
Type	Advanced		Standard
Model	BFN-D□-□-IL3	BFN-D2-A-□-IL3	BFN-D-□
Display resolution	9999 (SV (Green)) / PV (White): 4-digit, 7-segment		
Communication	BFNC Series compatible, IO-Link		BFNC Series compatible
No. of outputs	1-Output, 2-Output models	2-Output	1-Output
Output	Digital (OUT 1), Digital (OUT 1/2) models	Digital (OUT 1) + Analog (OUT 2)	Digital (OUT 1)
Light source type	Red LED		
Light source wavelength	660 nm		
Operation mode	Light ON, Dark ON (parameter setting)		
Sensitivity setting	Teaching mode (1-point, 2-point, Auto, Area, Rising / Falling edge ⁰¹⁾ / Manual		
Response mode (Response time)	MFST: Mega fast (25 μs) ⁰²⁾ UFST: Ultra fast (50 μs) FST: Fast (150 μs)	STD: Standard (500 μs) LONG: Long (4 ms) ULOG: Ultra long (10 ms) MLOG: Mega long (20 ms) ⁰²⁾	
Timer	ON Delay, OFF Delay, One Shot, ON/OFF Delay, One Shot ON Delay (parameter setting, time setting range: 1 to 9,999 msec)		
Maximum no. of expansion units	30 units		
Mutual interference prevention	YES (The number of supported units may differ by response mode and mutual interference prevention double settings. ⁰³⁾)		
Certification	CE 标志 符合 EN 60947-2 IO-Link	CE 标志 符合 EN 60947-2 IO-Link	CE 标志 符合 EN 60947-2
Unit weight (with packaging)	[Cable type] ≈ 74 g (≈ 139 g) [Connector type] ≈ 22 g (≈ 55 g)		

01) Rising / falling edge teaching mode is not supported in MFST response mode.

02) Only available for advanced type models.

03) Please refer to the user manual for detailed information.

Power supply	10 - 30 VDC≐ (ripple P-P: ≤ 10%)		
Current consumption		10 VDC≐	30 VDC≐
	Normal	≤ 62 mA	≤ 30 mA
	Eco: HALF	≤ 55 mA	≤ 28 mA
	Eco: FULL	≤ 48 mA	≤ 26 mA
Digital output	[Advanced] Push-pull, NPN, PNP output (parameter setting) [Standard] NPN, PNP output (parameter setting)		
Load current	[Advanced: digital 1-output, standard models] ≤ 100 mA, when 4 or more units connected: ≤ 20 mA [Advanced: digital 2-output models] ≤ 50 mA, when 4 or more units connected: ≤ 10 mA each		
Load voltage	≤ 30 VDC≐		
Residual voltage	NPN: ≤ 2 VDC≐, PNP: ≤ 2 VDC≐		
Analog output	[Advanced: digital + analog output models] only ⁰¹⁾		
Voltage output	1 - 5 VDC≐, ± 5% F.S. (output resistance: 1 kΩ)		
Protection circuit	Reverse power protection circuit, output short overcurrent protection circuit, surge protection circuit		
Insulation resistance	≥ 20 MΩ (500VDC≐ 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 illuminance (receiver)	Sunlight: ≤ 300,00 lx, incandescent lamp: ≤ 20,000 lx		
Ambient temp. ⁰²⁾	-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, M8 connector type models		
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) Analog output is not supported in MFST/UFST response modes.

02) 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.

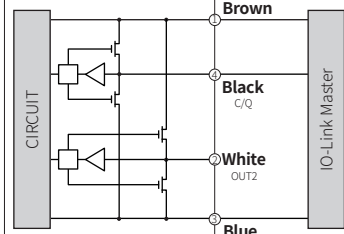
Communication Interface	
■ IO-Link	
Version	Ver. 1.1.3
Class	Class A
Baud rate	COM3 (230.4 kbps)
Min. cycle time	500 μs
Data length	PD: 4-byte, OD: 1-byte (M-sequence: TYPE_2_V)
Vendor ID	899 (0x383)

Circuit / Wiring Diagram

Load connections differ by output method. Please refer to the diagrams below.

■ [Advanced Model] IO-Link Mode

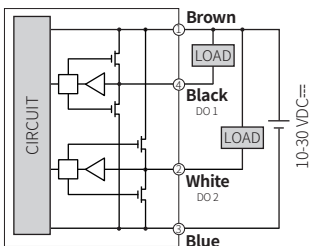
- [Advanced: digital 2-output model] shown as reference.
The white wire retains OUT 2 output method of the model regardless of IO-Link mode.



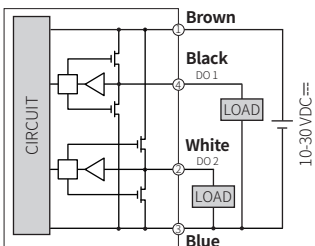
■ [Advanced: Digital 1,2-Output Model]

- [Advanced: digital 2-output model] shown as reference.
The white wire is not supported in [advanced: digital 1-output model].

NPN setting



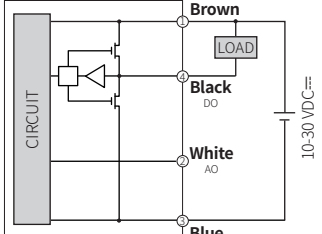
PNP setting



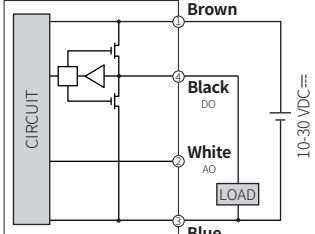
■ [Advanced: Digital + Analog Output Model]

- The black wire: digital output (DO) and white wire: analog output (AO, 1 - 5 VDC≐) are fixed.

NPN setting

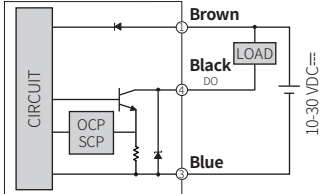


PNP setting

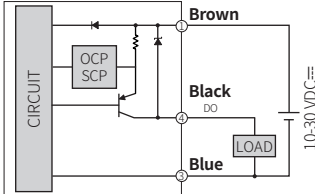


■ [Standard: Digital 1-Output Model]

NPN setting



PNP setting

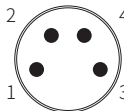


- The white wire is not used in this model. Do not connect the wire.
- OCP (over-current protection), SCP (short-circuit protection)
- If the control output terminal is short-circuited or a current exceeding the rated current is supplied, normal control signals will not be output due to the protection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

Connector Wiring

- For load connections, please refer to the wiring diagram.
- Tighten the connector using the screw thread. (Tightening torque: 0.39 to 0.49 N m)
- In environments with vibration, use PTFE tape around the connector to strengthen the connection.

Pin	Color	Function	
		Advanced	Standard
①	Brown	L+	VCC
②	White	[Digital 1-output model] - [Digital 2-output model] Digital OUT 2 (DO 2) [Digital+analog output model] Analog OUT (AO)	-
③	Blue	L-	GND
④	Black	C/Q	OUT



Entering Settings

- Directions to enter each settings from run mode.
- Please refer to the dedicated section of the user manual for details on each settings.

Settings	Method	Description
Sensitivity settings	[SET] key for 0.5 secs or more	Set the sensitivity based on teaching mode. - Press for (0.5 sec): teach for set amount of time - Press for (≥ 0.5 sec): teach for duration of hold
Manual sensitivity settings	[◀/▶] key for over 0.5 secs	Fine tune the sensitivity manually after initial setting.
Anti-saturation function	[SET + ▶] keys for over 0.5 secs	Enable or disable anti-saturation function.
Zero shift function	[◀ + MODE] keys for over 0.5 secs	Enable or disable zero shift function.
Select digital output	[◀ + ▶] keys for over 2 secs	[Digital 2-output model] Select OUT1 or OUT2. Selection is synchronized with settings from program mode P-2 digital output selection.
Incident light level monitoring	[MODE] key for 0.5 secs	Displays max value, min value, or output count.
Program mode	[MODE] key for over 2 secs	Enter program mode.
Data bank	[MODE] key for over 5 secs	Set or execute data bank.
Reset settings	[MODE] key for over 7 secs	Reset to default settings.

Manual Sensitivity Setting

Adjust the sensitivity manually after setting the sensitivity based on teaching mode. Press the [◀/▶] (UP / DOWN) keys during run mode to fine tune the sensitivity. Press [MODE] key for 0.5 secs and the set value will flash twice and return to run mode.

- The supported min/max values differ depending on settings from program mode P-2-A Teaching mode and P-9 Hysteresis.

Hysteresis	Setting Range	
	1/2-Point, Auto, Area ⁰¹⁾ Teaching	Rising / Falling Edge Teaching
LOW	10 to 9,980	150 to 9,999
MID	50 to 9,950	
HIGH	100 to 9,900	

01) Press the [MODE] key to switch between SV_H / SV_L and set sensitivity.

Incident Light Level Monitoring

Press the [MODE] key for 0.5 seconds in run mode to check incident light level value.

- [MODE] key: display next value / [SET] key: reset current display value

Display		Operation
SV	PV	
Run mode		Press the [MODE] key for 0.5 secs in run mode.
H P E 𐄂	5 𐄂 0 𐄂	Displays the high peak (max.) value from measured data.
L P E 𐄂	𐄂 0 𐄂	Displays the low peak (min.) value from measured data.
C n 𐄂	99	Displays output count. (Range: 0 to 9,999, then restarts from 0) Counts the number of times output changes from OFF → ON.
Run mode		Press the [MODE] key for 0.5 secs to return to run mode.

Reset to Default Settings

Reset SV1/SV2 and program mode settings to default settings. Press the [MODE] key for over 7 seconds to enter reset settings menu.

Display		Operation
SV	PV	
Run mode		Press the [MODE] key for over 7 secs in run mode.
I n I 𐄂	𐄂 𐄂 d E	SV display: INIT, PV display: MODE will flash twice.
I n I 𐄂	n 𐄂	Press the [◀/▶] keys to select reset option (YES / NO). Press the [MODE] key to execute selection.
I n I 𐄂	I n I 𐄂	SV display: INIT, PV display: INIT will flash twice. The settings have been reset to default settings.
Run mode		Returns to run mode automatically.

Error Display

Display		Error	Troubleshooting
SV	PV		
P 𐄂 E r	E r r	Exceeds rated power supply range	Check the power supply voltage and adjust it to the specified rated range.
C H	E r r	Unstable side expansion connection	Check the connections by referring to the 'Expanding Amplifiers' section.
𐄂 I 𐄂 C	E r r	Overcurrent in digital 1 output circuit	Remove the overload condition to eliminate the overcurrent.
𐄂 𐄂 𐄂 C	E r r	Overcurrent in digital 2 output circuit	

Program Mode

- Press the [MODE] key for over 2 seconds from run mode to enter program mode. SV display: PROG, PV display: MODE will flash twice, then enter into settings.
- [MODE] key: save and move to next item / [SET] key: save and move to previous item [◀/▶] keys: change value / [MODE] key over 3 secs: save and return to run mode
When idle for 120 seconds, the settings will be saved and return to run mode.
- Certain parameters may be enabled or disabled depending on the model or other parameter settings. Refer to the description on each item for details.
- Please refer to the dedicated section of the user manual for details on each settings.

Parameter		Display		Setting Range	Support Conditions
		SV	PV (default)		
P-1	Response mode ⁰¹⁾	r 𐄂 P 5	5 𐄂 d	MFST*: Mega fast (25 μs) ⁰²⁾ UFST: Ultra fast (50 μs) ⁰²⁾ STD: Standard (500 μs) LONG: Long (4 ms) ULOG: Ultra long (10 ms) MLOG*: Mega long (20 ms)	*Advanced model
P-2	Select digital output	5 𐄂 L	𐄂 O 𐄂 t I	[Digital 2-output model] OUT1: Digital output 1 OUT2: Digital output 2 • Set parameters for (P-2-A to E) based on selected output.	
P-2-A	Teaching mode	5 𐄂 n 5	𐄂 P n 𐄂 t	2PNT: 2-Point 1PNT: 1-Point AUTO: Auto AREA*: Area RISI*: Rising edge FALI*: Falling edge	*P-2 digital output: OUT1 **P-1 response mode: not MFST, P-2 digital output: OUT1, P-7 DPC: OFF
P-2-B	Operation mode	L 𐄂 𐄂 𐄂 n	L - 𐄂 n	L-ON: Light ON D-ON: Dark ON	
P-2-C	Output type	t 𐄂 P E	n P n	NPN: NPN PNP: PNP P-P*: Push-pull	*Advanced model (IO-Link)
P-2-D	Timer	t 𐄂 𐄂 𐄂 d	𐄂 𐄂 F F	OFF: Disabled OND: ON Delay OFD: OFF Delay SHOT: One Shot ONOF: ON/OFF Delay SH-O: One Shot ON Delay	P-1 response mode: not MFST
P-2-E	Timer value	t I 𐄂 E	5	1 to 9,999 msec	P-1 response mode: not MFST P-2-D timer: not OFF
P-3	Analog output direction	A L 𐄂 𐄂	A 5 𐄂 n	[Digital + analog output model] ASEN: Ascend DSEN: Descend	
P-4	Enable zero shift	𐄂 E r 𐄂	- - - -	DO: Enable zero shift CANC: Disable zero shift	P-6 Preset: OFF
P-5	Enable anti-saturation	5 A 𐄂 U	- - - -	DO: Enable anti-saturation CANC: Disable anti-saturation	
P-6	Preset	P r 5 t	𐄂 𐄂 F F	OFF: Disabled ON: Enabled • Set to ON before teaching. Incident light level is displayed as a percentage of preset value. (%=P)	P-7 DPC: OFF
P-7	DPC (Dynamic Power Control)	d P C	𐄂 𐄂 F F	OFF: Disabled ON: Enabled	P-1 response mode: not MFST
P-8	Mutual interference prevention double	I n 𐄂 F	5 𐄂 d	STD: Standard DBLE*: Double (double the no. of mutual interference prevention units and response speed)	*P-1 response mode: not MFST, UFST
P-9	Hysteresis	H 𐄂 5	L 𐄂 𐄂	LOW, MID, HIGH • Set hysteresis where incident light fluctuates widely to increase output stability and accuracy. Output may malfunction when set to LOW.	
P-10	Display direction	d I r	I 𐄂 3 𐄂	1234: Standard 𐄂 I C: Inverted	
P-11	Power-saving mode	E 𐄂 𐄂	𐄂 𐄂 F F	OFF: Disabled HALF: When there is no key input for 1 min, only the output indicator and PV display are left ON. FULL: When there is no key input for 1 min, only the output indicator is left ON. • Set to lower current consumption.	
P-12	Disable communication	C 𐄂 𐄂 𐄂	E n A	ENA: Run communication commands from master device. DISA: Blocks communication commands from master device. (only P-12/13 settings allowed)	
P-13	Lock	L 𐄂 C 𐄂	𐄂 𐄂 F F	OFF: Disabled LOC1: Only sensitivity and program mode check allowed LOC2: Only sensitivity check allowed	

01) When changed, sensitivity is reset, zero shift/anti-saturation are disabled, and P-6-Preset/P-7 DPC are turned OFF.

02) In digital + analog output models, analog output is not supported in MFST, UFST modes.