Picking Sensor

F3W-D

Compact, Resistant to Mutual Interference, and Ideal for Picking a Variety of Parts.

- Mounts to a parts rack and uses indicators to show parts picking procedures. Functions as a mistake-proofing Sensor.
- Models with direct UNI-WIRE connection are also available.
- Use either the built-in LED indicators or external picking indicators.

⚠ Be sure to read *Safety Precautions* on page 8.

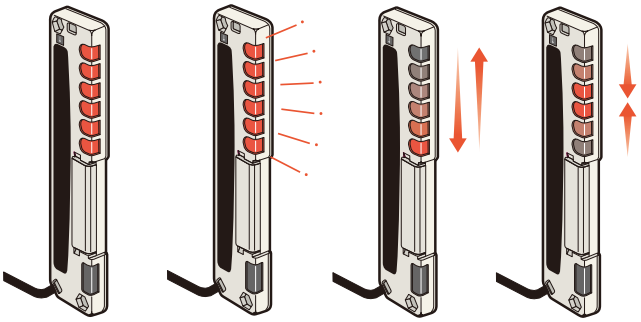
Features

Sensing Distance of 3 m

Selectable Display Mode: All Lighting, All Flashing, Elevator-like Lighting, Accordion-like Lighting

- Six picking indicators provide very clear displays.
- Selectable display speed (slow/fast)

All lit | All flashing | Elevator effect | Accordion effect

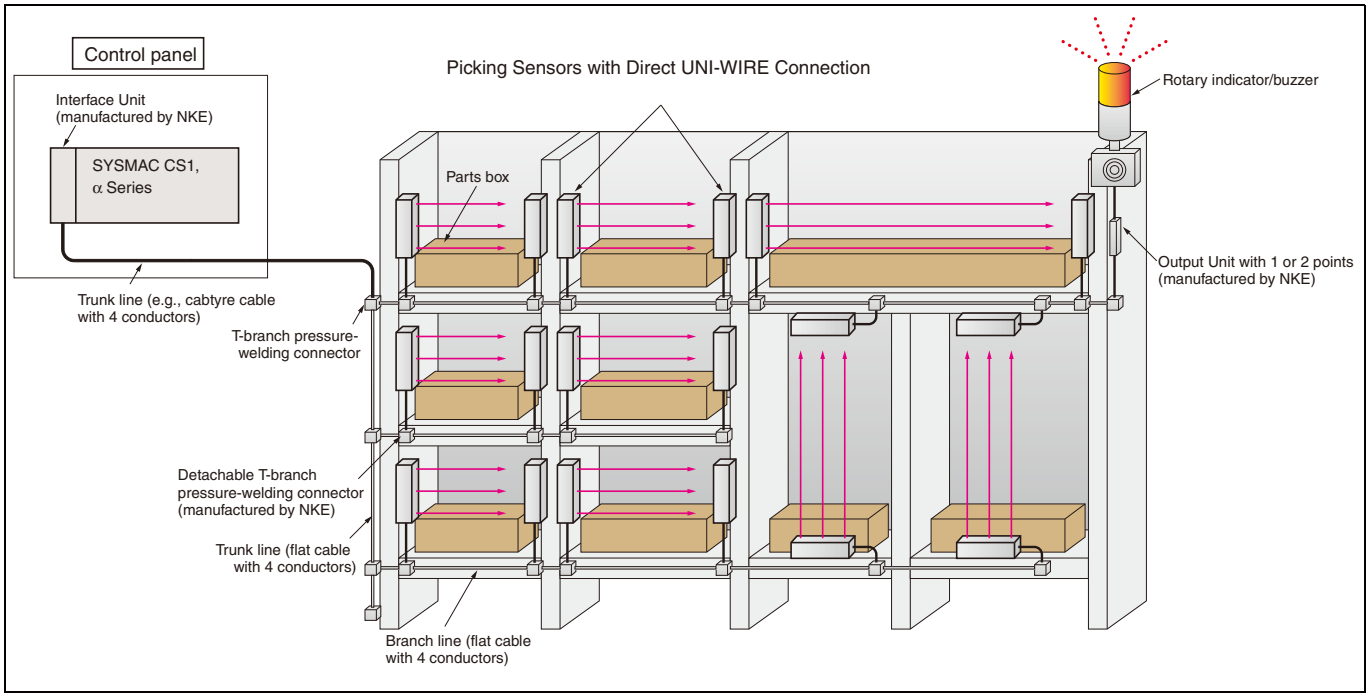


External Picking Indicators Can Be Connected

An external indicator can be directly connected to the Picking Sensor and mounted in an easy-to-see location.

Models with Direct UNI-WIRE Connection Enable Simplification of the Picking System Wiring

Up to 64 Picking Sensors can be connected to a single UNI-WIRE Interface Unit.



Ordering Information

Sensors

Infrared LED

Sensing method	Appearance	Connection method (cable length)	Sensing distance	Beams		Sensing width (mm)	Output type	External indicator	Model
				Gap	Qty				
Through-beam		Pre-wired (5 m)	3 m	25 mm	5	100	NPN open collector	---	**F3W-D052A** *2
								Possible	**F3W-D052AP** *2
		Pre-wired connector (2 m)						---	**F3W-D052B** *2, 3
								Possible	**F3W-D052BP** *2, 3
		Pre-wired (2 m)					UNI-WIRE SYSTEM direct connection *1	---	**F3W-D052U**
								Possible	**F3W-D052UP**

*1. The UNI-WIRE SYSTEM is a wire-saving system developed jointly by NKE Corporation and Kuroda Precision Industries, Ltd.
*2. Models with PNP outputs are also available. To order PNP Models, replace A with C in the model number for a Pre-wired Model and B with D in the model number for a Pre-wired Connector Model (Example: F3W-D052C).
*3. The XS2F-D521-□G0 is the applicable connector cable. The colors of the external sheathes of the conductors, however, are different. Refer to the XS2.

Accessories (Order Separately)

Mounting Brackets

Appearance	Model	Qty	Remarks
	**F39-L10**	2	L-shaped Mounting Bracket (mounting screws included)
	**F39-L11**	2	Flat Mounting Bracket (mounting screws included)

Protective Bracket

Appearance	Model	Qty
	**F39-L12**	One each for Emitter and Receiver (mounting screws included)

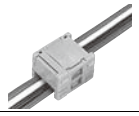
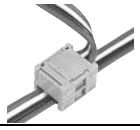
Y-shaped Joint Plugs and Sockets (Cable with Connectors on Both Ends)

Appearance	Overall length	Model	Qty
	2 m	**XS2R-D526 -S001-2**	1
	5 m	**XS2R-D526 -S001-5**	1

Y-shaped Joint Plugs and Sockets without Cable

Appearance	Model	Qty	Remarks
	**XS2R-D526 -S003**	1	Connecting cable: • Cable with connectors on both ends: XS2W Series • Cable with connector on one end: XS2F Series 4-conductor models

UNI-WIRE Direct Connection Peripheral Devices

Name	Appearance	Model	Qty	Remarks
Flat cable		**SCA1-4F10**	1	4 × 0.75 mm² 100 m
Extension IDC		**SCN1-TH4E**	1	---
T-branch IDC		**SCN1-TH4**	1	

NKE UNI-WIRE System Peripheral Devices

Name	Appearance	Model	Remarks
C200H/CS1 UNI-WIRE Interface Unit		**OMC02-HUW -Z285**	Applicable PLCs: C200H/HS C200HE/HG/HX CS1
1-point DC Input Unit		**L6S-H1F2O -Z285**	Small I/O Distribution Units
2-point DC Input Unit		**L6S-H2F2O -Z285**	
1-point Transistor Output Unit		**L6P-H1B2O -Z285**	
2-point Transistor Output Unit		**L6P-H2B2O -Z285**	
1-point DC Input/ 1-point Transistor Output Unit		**L6X-H2FB2O -Z285**	
Detachable T-branch IDC		**MAF-S407FO**	---
	Terminator 	**MAF-S407FEO**	
	Plug 	**MAF-P405CO**	Plug for MAF-S407FO/ MAF-S407FEO

Note: Consult an NKE sales office for purchasing information.

Ratings and Specifications of NKE UNI-WIRE Interface Unit

Item / Model	OMC02-HUW-Z285
Transmission method	Bi-directional: Orthogonal frequency division multiplexing
Synchronization method	Bit synchronization
Transmission protocol	UNI-WIRE protocol
Baud rate	7.35 kbps (Z12)
Transmission distance	100 m (trunk line) + 20 m (branch line)
Transmission delay	128 points: 66 ms max., 256 points: 120 ms max.
Connection method	Multi-drop
Number of I/O points	128 points or 256 points
Number of connected units	Picking Sensors: 64
Connecting cable	D and G trunk lines: 2 mm² min. Branch lines: 0.75-mm² flat cable

Note: Contacts for inquires regarding the UNI-WIRE Interface Unit
NKE Corporation
Sales office
Tokyo Sales Office, 2-12-2 Taito, Taito-ku, Tokyo 110-0016 (Fuji DIC Building)
TEL(03)3833-5330 FAX(03)3833-5350

Osaka Sales Office, 1-2-13 (Shinmachi Building) Shinmachi, Nishi-ku, Osaka 550-0013
TEL(06)6538-7136 FAX(06)6538-7138

Nagoya Sales Office, 2-13-22 Iseyama, Naka-ku, Nagoya 460-0026 (ITOH Building)
TEL(052)322-3481 FAX(052)322-3483

Kyoto Sales Office, 336-1 Hazukashi Hishikawacho, Fushimi-ku, Kyoto 612-8487
TEL(075)924-3293 FAX(075)924-3290
Toll-free TEL number: 0120-77-2018 (Only in Japan)

Ratings and Specifications

Sensing method		Through-beam		
Item / Model		F3W-D052A (P) *1	F3W-D052B (P) *1	F3W-D052U (P) *1
Sensing distance		3 m, switchable between LONG mode (1 to 3 m) and SHORT mode: (0.05 to 1 m), factory-set to SHORT mode.		
Beam gap		25 mm		
Number of beams		5		
Sensing width		100 mm		
Standard sensing object		Opaque, 35 mm dia. min.		
Light source (emission wavelength)		Infrared LED (860 nm)		
Power supply voltage		12 to 24 VDC±10% (ripple (p-p): 10% max.)		24 VDC ±10%, ripple (p-p) 10% max. (supplied by UNI-WIRE SYSTEM, other power supply also possible)
Power consumption		Emitter: 0.6 W max., Receiver: 0.7 W max.		Emitter/Receiver: 0.6 W max.
Control output		NPN open collector with 100 mA max. at 30 VDC NPN open collector output type Dark-ON or Light-ON (selectable)		Transmission output (output address set using DIP switch 3 control output address setting switch)
Picking instruction indicator input		Open collector with relay or transistor input Indicator ON: Input voltage of 0 to 2 V Indicator OFF: Open (with leakage current of 0.1 mA max.)		Transmission input (input address set using DIP switch 2 instruction input address setting switch)
Protection circuits		Reverse-connection protection, output short protection, and mutual interference prevention function (set with frequency switch)		
Response time		Operate/Reset: 10 ms max.		Operate/release: 39 ms (64-bit), 66 ms (128-bit), or 120 ms (256-bit) max.*2
Indicators	Receiver	Operation indicator (orange), stability indicator (green), and 6 picking indicators (orange), UNI-WIRE Direct Connection Models: Transmission indicator (orange) *3		
	Emitter	Power indicator (green), different frequency indicator (green), and 6 picking indicators (orange), UNI-WIRE Direct Connection Models: Transmission indicator (orange) *3		
Ambient temperature		Operating: −10° to 55°C, Storage: −25° to 70°C (with no icing or condensation)		
Ambient humidity		35% to 85% (with no condensation)		
Insulation resistance		20 MΩ min. (at 500 VDC)		
Dielectric strength		1,000 VAC 50/60 Hz for 1 min		
Vibration resistance (destruction)		10 to 50 Hz, 1.5-mm double-amplitude for 2 hours each in X, Y and Z directions		
Shock resistance (destruction)		500 m/s^2, 3 times each in X, Y and Z directions		
Degree of protection		IEC60529: IP62 (with the operation cover closed)		
Connection method		Pre-wired Standard cable length: 5 m *4	Pre-wired connector (M12 5-pin connector) Standard cable length: 2 m *4	Pre-wired Standard cable length: 2 m
Weight (packed state)		Approx. 360 g	Approx. 230 g	Approx. 220 g
Materials	Case, indicator windows	ABS resin		
	Lens	Acrylic resin		
	Operation cover	Nylon (PA6)		
Accessories		Instruction manual		

*1. The F3W-D052□P Emitters are provided with the external picking indicator output line shown in the following table.

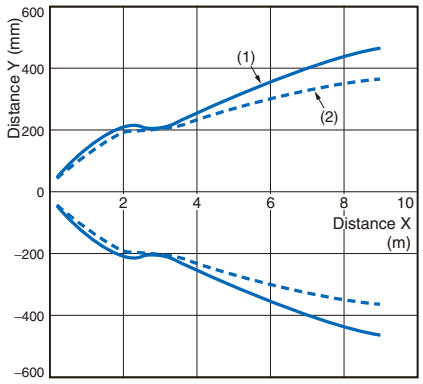
Item	F3W-D052AP, F3W-D052BP, F3W-D052UP
Connection method	Pre-wired (standard cable length: 300 mm)
Electrical specifications	Output current: 50 mA max. Output voltage: Fixed at Sensor power supply voltage

*2. Response time includes transfer delay time.
*3. The transmission indicator indicates bus transmission status.
*4. The following cable lengths are also available.
F3W-D052A (P): 2 m, 7 m
F3W-D052B (P): 1 m, 3.5 m

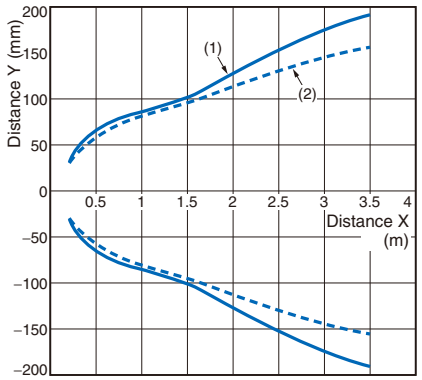
Engineering Data (Typical)

Parallel Operating Range

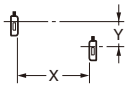
LONG Mode



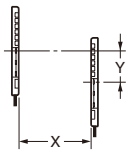
SHORT Mode



(1) Horizontal Movement Characteristics

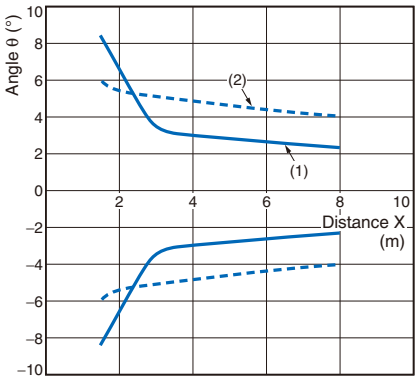


(2) Vertical Movement Characteristics

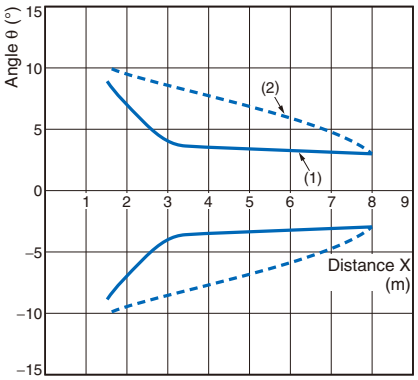


Angle Characteristics

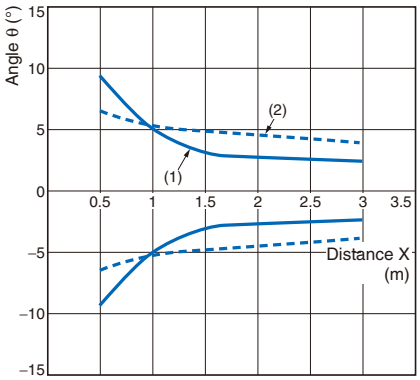
LONG Mode: Tilt



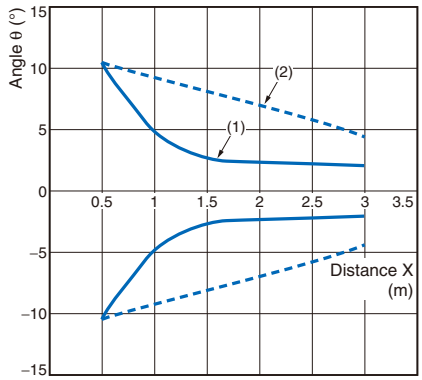
LONG Mode: Rotation



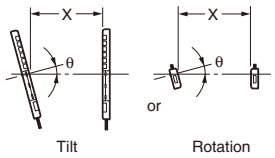
SHORT Mode: Tilt



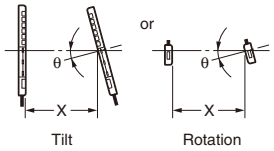
SHORT Mode: Rotation



(1) Emitter Angle Characteristics

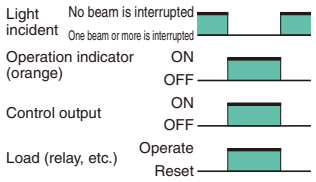
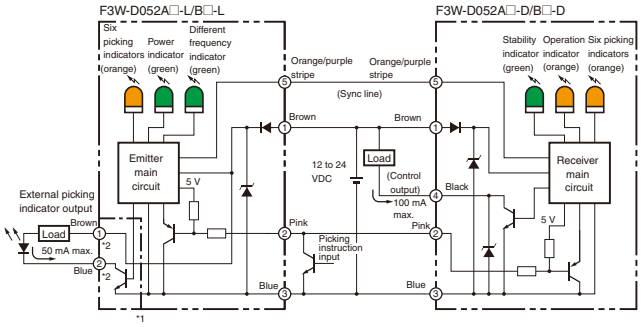
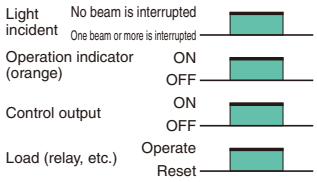


(2) Receiver Angle Characteristics



I/O Circuits

NPN Open-collector Outputs

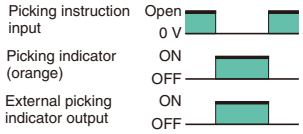
Model	Operation mode	Timing chart	Mode selector switch	Output circuit
F3W-D052A F3W-D052AP F3W-D052B F3W-D052BP	Dark-ON mode (ON: One beam or more is interrupted OFF: No beam is interrupted)		D-ON (DARK ON)	
	Light-ON mode (ON: No beam is interrupted OFF: One beam or more is interrupted)		L-ON (LIGHT ON)	

Note: The circled numbers represent the pin numbers for Pre-wired Connector Models.

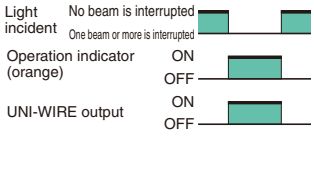
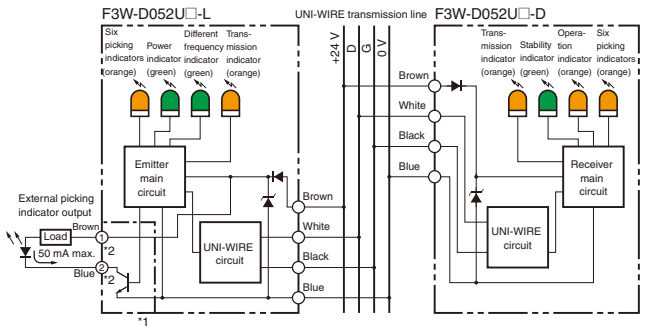
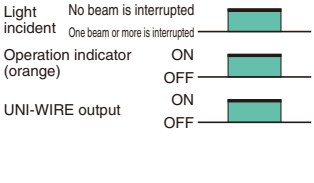
*1. The sections surrounded by single-dashed lines are applicable to the F3W-D052AP-L/BP-L only.

*2. The circled numbers represent external picking indicator output pin numbers.

The following diagram shows the relationship between the picking instruction input, picking indicator status, and external picking indicator output. DIP switch 1 is used to switch the picking display mode between all lighting, all flashing, elevator-like lighting, and accordion-like lighting. It is also possible to switch the external picking indicator display mode between lighting and flashing.



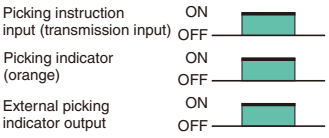
UNI-WIRE Transmission Outputs

Model	Operation Mode	Timing chart	Mode selector switch	Output circuit
F3W-D052U F3W-D052UP	Dark-ON mode (ON: One beam or more is interrupted OFF: No beam is interrupted)		D-ON (DARK ON)	
	Light-ON mode (ON: No beam is interrupted OFF: One beam or more is interrupted)		L-ON (LIGHT ON)	

*1. The sections surrounded by single-dashed lines are applicable to the F3W-D052UP-L only.

*2. The circled numbers represent external picking indicator output pin numbers.

The following diagram shows the relationship between the picking instruction input, picking indicator status, and external picking indicator output. DIP switch 1 is used to switch the picking display mode between all lighting, all flashing, elevator-like lighting, and accordion-like lighting. It is also possible to switch the external picking indicator display mode between lighting and flashing.
The instruction input address is set with DIP switch 2.



Setting Method

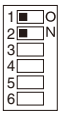
NPN Open-collector Output Models

DIP Switch 1 Mode Switching

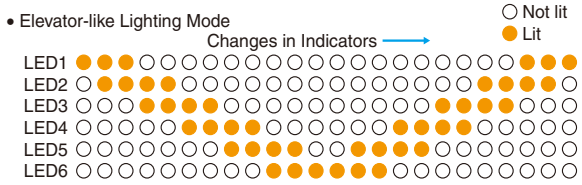
Emitters

DIP switch 1		Function	OFF(left) (■)	ON(right) (□)
	1	Flash Pattern (picking display mode setting)	See table below. *1	
	2			
	3	Flash Time *2 (picking indicator flashing speed setting)	Slow	Fast
	4	External Flash Pattern (external picking display mode setting) *3	Lit	Flashing
	5	Not used.	---	---
	6	Frequency Setting *4	A (frequency A)	B (frequency B)

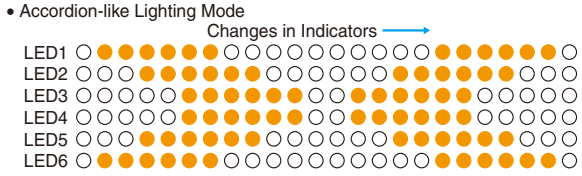
*1. DIP Switch 1 Picking Display Mode Setting

DIP switch 1	SW 1-1	SW 1-2	Display mode
	OFF	OFF	All lighting (All six indicators light.)
	ON	OFF	All flashing (All six indictors flash simultaneously.)
	OFF	ON	Elevator-like lighting (Two adjacent indicators simultaneously light so that lighting moves up and down.)
	ON	ON	Accordion-like lighting (Some or all indicators simultaneously light so that lighting moves like an accordion.)

• Elevator-like Lighting Mode



• Accordion-like Lighting Mode



*2. The flashing speed can be changed in picking display mode (all flashing, elevator-like lighting, or accordion-like lighting) or in external picking display mode. The flashing speed varies with each display mode.
*3. This setting is supported for F3W-D052□P-L Emitters only.
*4. Mutual Interference Prevention Function:
The frequency selector is used to switch the emitting frequency between A and B. Making the emitting frequencies of two Sensors different helps prevent malfunction caused by mutual interference.

Receivers

DIP switch 1		Function	OFF(left) (■)	ON(right) (□)
	1	Flash Pattern (picking display mode setting)	See table below. *1	
	2			
	3	Flash Time *2 (picking indicator flashing speed setting)	Slow	Fast
	4	Operation mode setting	Dark-ON	Light-ON
	5	Sensing distance (sensitivity) setting	LONG mode (1 to 3 m)	SHORT mode (0.05 to 1 m)
	6	Frequency Setting (F3W-D052U□ only) *4	A (frequency A)	B (frequency B)

Models with Direct UNI-WIRE Connection

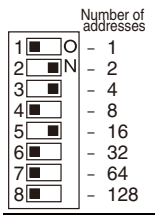
Setting Addresses

(1) Set the picking instruction input address using DIP switch 2 on the Emitter and Receiver.

(2) Set the control output addresses using DIP switch 3 on the Receiver.

- The total number of switch addresses set to ON determines the set address (e.g., address 22 in the diagram at right).
- Make sure that the addresses of the picking instruction inputs of the Emitter and the Receiver that are used as a set are the same.

DIP switches 2 and 3



Transmission Status

The transmission indicator indicates the status of bus transmission as follows:
Flashing: Normal operation
ON or OFF: Transmission error
Only one picking indicator flashing also indicates a transmission error.

Weight

The weight of the F3W-D052U in the UNI-WIRE SYSTEM is the weight of one terminal consisting of the Emitter and Receiver pair.

IDs

IDs are set separately for the Emitter and the Receiver.
Emitter: The picking instruction input address setting is the ID address.
Receiver: The control output address setting is the ID address.

Note: The ID is an identification number for broken wire position detection.

Power Supply

If a power voltage drop occurs in a remote section, consider using a local (separate) power supply.

Nomenclature

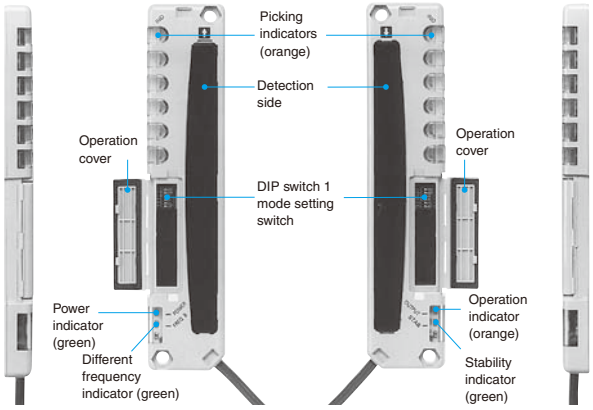
NPN Open Collector Output Models

Emitter

F3W-D052A(P)-L
F3W-D052B(P)-L

Receiver

F3W-D052A(P)-D
F3W-D052B(P)-D



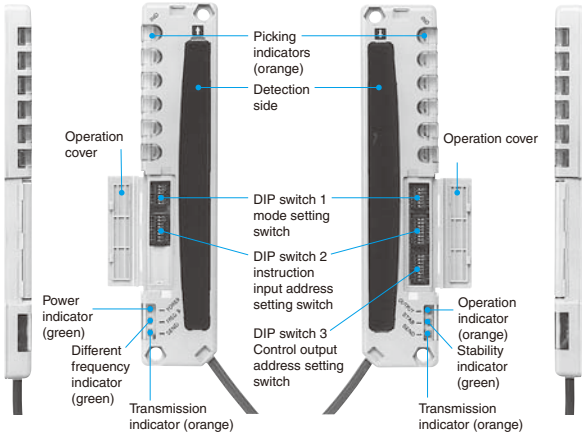
UNI-WIRE Direct Connection Models

Emitter

F3W-D052U(P)-L

Receiver

F3W-D052U(P)-D



Safety Precautions

Refer to *Warranty and Limitations of Liability*.

⚠ WARNING

Do not apply the F3W-D as safety mechanisms used in pressing machines or any other safety mechanisms for protecting the human body from danger.

(1) Do not apply the F3W-D as safety mechanisms used in pressing machines, shears, rolling machines, spinning machines, cotton mill machines, or robots for the protection of an operator's hands and body.
(2) The F3W-D is designed for detection of the human body or moving objects in the detection area but not for protection against danger.
(3) The F3W-D or any product incorporating the F3W-D may be exported to any country. Should the F3W-D cause any problem conflicting with local laws or related to product liability locally, however, OMRON shall, without exception, assume no responsibility for it.

⚠ CAUTION

Before using more than one F3W-D Sensor in parallel or series, take necessary countermeasures against mutual interference so that the Sensors will not malfunction. Refer to *Mutual Interference Prevention Function* on the right.

Precautions for Safe Use

● Operating Environment

- Do not use the Sensor in an environment containing flammable or volatile gases.
- Do not use the Sensor underwater.
- Do not disassemble, repair, or modify the Sensor.
- Always turn OFF the system power before installing or replacing the Sensor.

Precautions for Correct Use

Do not use the product in atmospheres or environments that exceed product ratings.

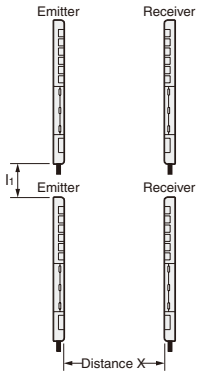
● System Design

Mutual Interference Prevention Function

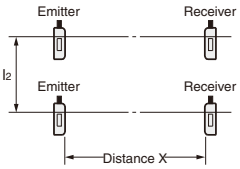
(1) Two Sets of Sensors:
Set these Sensors to different frequencies with the frequency selector. Refer to *DIP Switch 1 Mode Switching* on page 7.
If the mutual interference prevention function is not used, and there are two Sensors with the same frequency setting, a beam from the Emitter of one Sensor may hit the Receiver of the other Sensor, resulting in malfunction.
This function cannot prevent mutual interference between the F3W-D Sensor and a Photoelectric Sensor of a different model.
(2) Three or More Sets of Sensors:
When 3 or more sets of Sensors are used in parallel, mutual interference may result in malfunction. Take the following measures to prevent mutual interference, and check for mutual interference.
While in LONG mode, the Sensors are more easily affected by interference. Therefore, if the distance between the Emitter and Receiver of a Sensor is 1 m or less, use the SHORT mode.

- The distance between two adjacent sets of Sensors must be at least l_1 or l_2, which does not cause mutual interference between two Sensors with the same frequency setting. l_1 or l_2 is at least 1.5 times the distance shown in Parallel Operating Range of the Engineering Data.

Vertical Installation



Horizontal Installation



- Install a baffle so that there will not be mutual interference between Sensors with the same frequency setting. (See *Figure* 1.)
  A light reflection from the wall or floor may go around a baffle and reach the Receivers. Install a baffle so that it will also block any light reflection. (See *Figure* 2.)

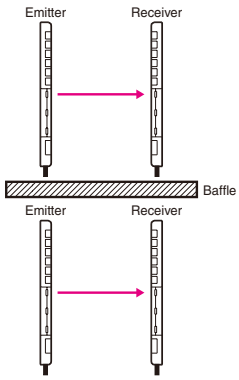


Figure 1

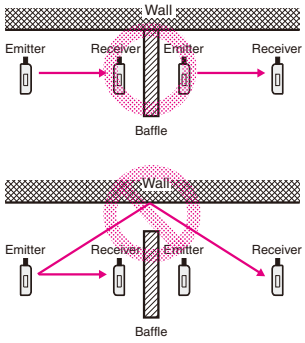


Figure 2

● Wiring Precautions

Connection

- Before turning ON the power, make sure that the supply voltage is within the maximum allowable voltage range.
- Always connect the sync lines.
- Be very careful not to get metal chips in the connector, especially during wiring.
- Incorrect wiring may damage the equipment. Make sure that the cable length and routing are appropriate to prevent the connectors and cables from getting disconnected.
- Always leave the operation cover closed during operation.
- Applying excessive force to the mode switch may result in damage. Do not apply a force of more than 5 N.

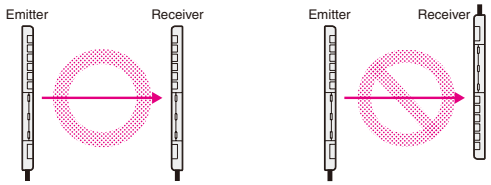
Cables

Make sure that the bending radius is 25 mm or more.

● Installation Precautions

Installation

- Install the Sensor so that its sensing face will not receive light from the sun, fluorescent lamps, incandescent lamps, and other light sources.
- Do not strike the Sensor with a hammer or any other tool during installation, otherwise the internal circuits of the Sensor may be damaged.
- Install the Emitter and Receiver in the same orientation as shown in the following figure. (The cables must be in the same direction.)

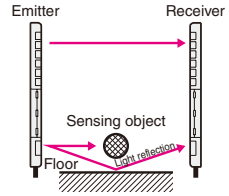


- Use M4 screws to secure the Sensor body.
- Secure the case to a tightening torque of 1.2 N·m or less.

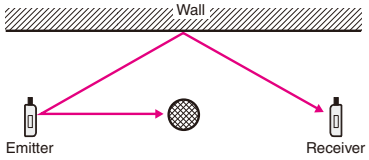
Reflection from Wall or Floor

If the Emitter and Receiver are installed as shown in the following illustration, all the axes may not be interrupted due to light reflection from the floor or wall. Make sure that the Emitter and Receiver detect the sensing object properly before using the F3W-D in actual operation.

Side View



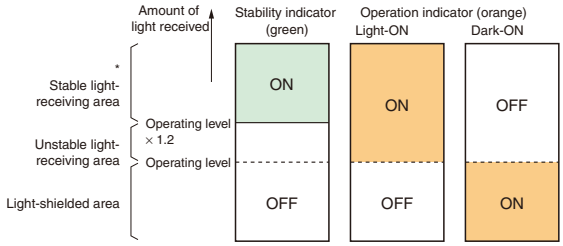
Top View



● Adjustment

Operation and Stability Status Display

- The following illustration shows the indicator status corresponding to each incident level.
- Install the Receiver so that the green stability indicators are both ON in light receiving status.

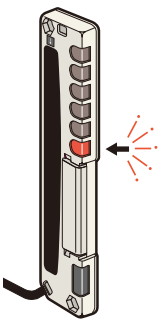


* If the Receiver is set to the stable light-receiving area, it will become more resistant to environmental fluctuations such as temperature, voltage, dust, and setting deviation after installation. For applications where a stable light-receiving area is not obtained, attention must be paid to environmental fluctuations.

Error Display

F3W-D052 Picking Sensors are provided with only one error display mode.

If an error occurs, the indicator on the Sensor's Receiver, as indicated by the arrow in the diagram on the right, will flash.
The error indicated in this example is a synchronization error.



The possible causes are as follows:
1. The sync line is not connected.
2. The sync line is shorted with another line.
3. UNI-WIRE communications are not being performed (when an F3W-D052U UNI-WIRE Direct Connection Model is being used).

Dimensions

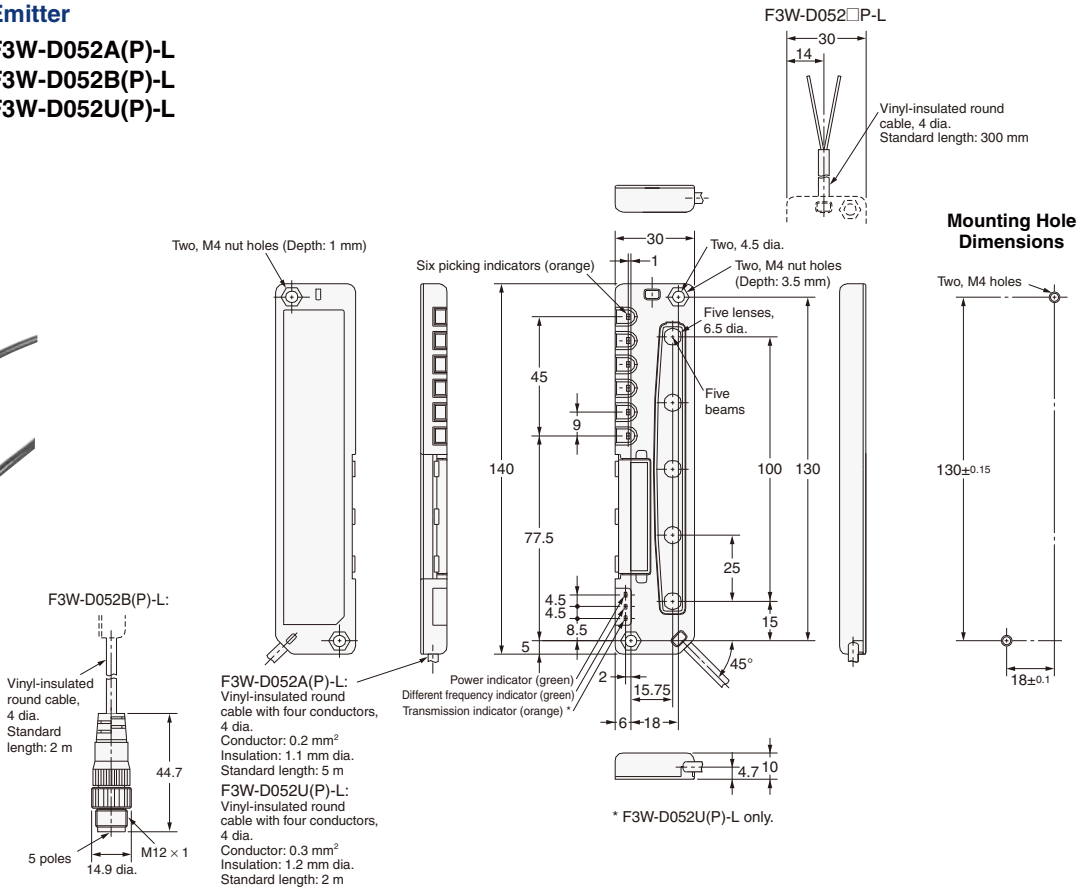
(Unit: mm)

Sensors

F3W-D

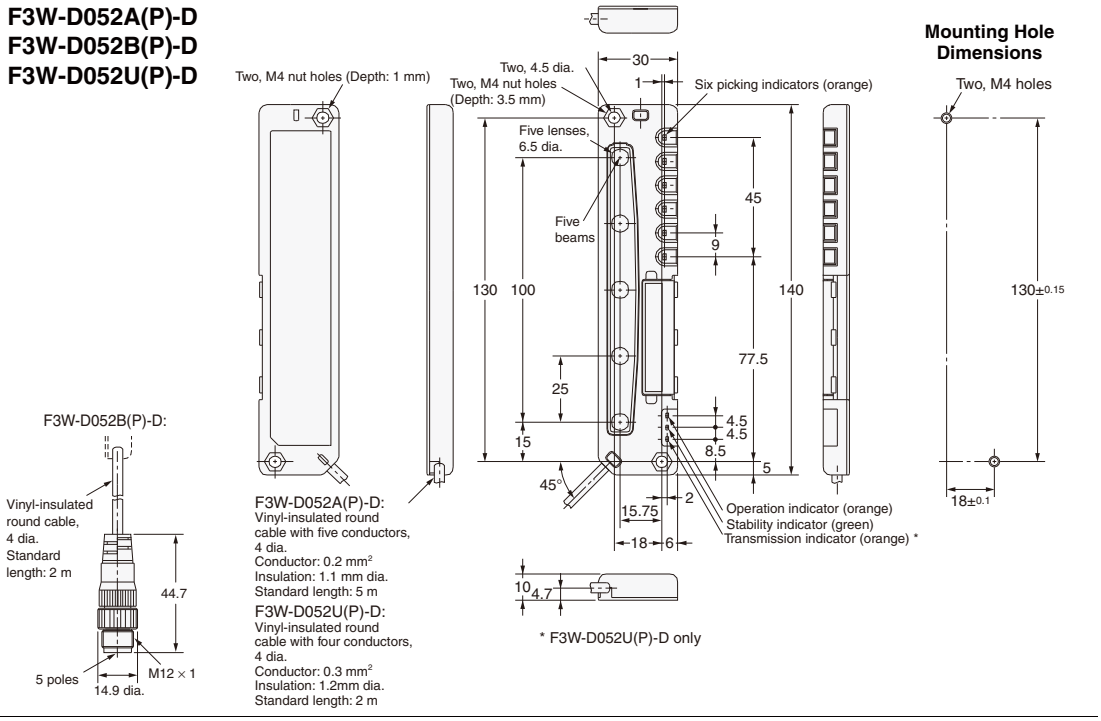
Emitter

F3W-D052A(P)-L
F3W-D052B(P)-L
F3W-D052U(P)-L



Receiver

F3W-D052A(P)-D
F3W-D052B(P)-D
F3W-D052U(P)-D

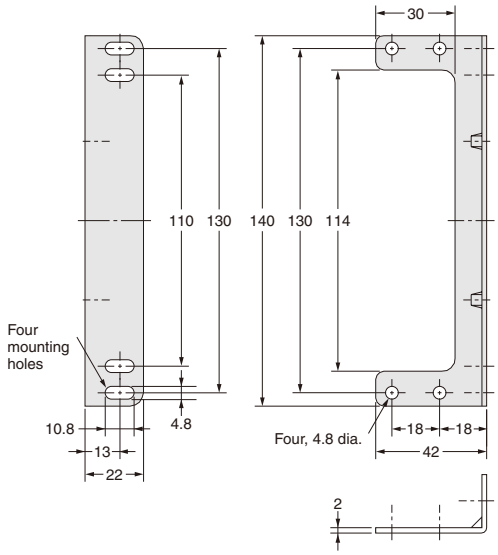


Accessories (Sold Separately)

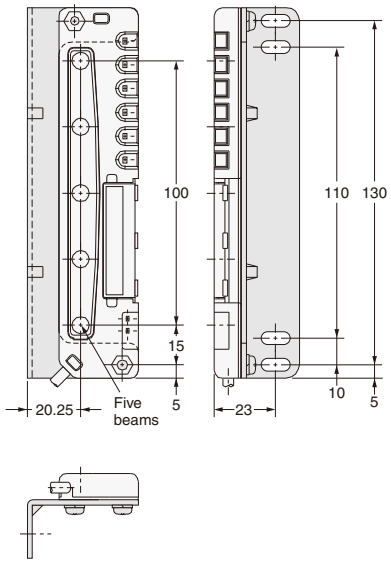
Mounting Brackets

F39-L10(L-shaped)

Material: Iron
(Thickness: 2 mm)
Mounting screws provided.



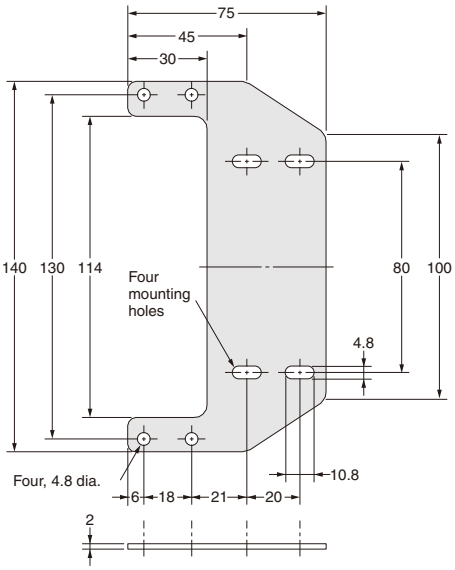
F3W-D052A-D with Mounting Bracket



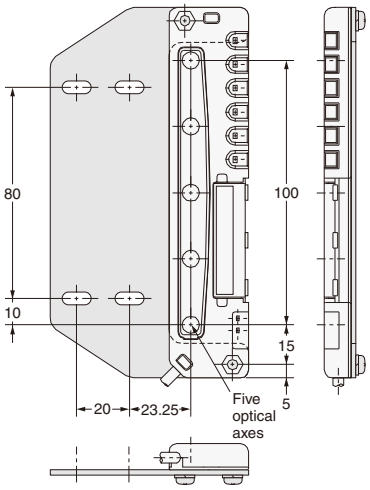
Mounting Brackets

F39-L11(Flat)

Material: Iron
(Thickness: 2 mm)
Mounting screws provided.



F3W-D052A-D with Mounting Bracket

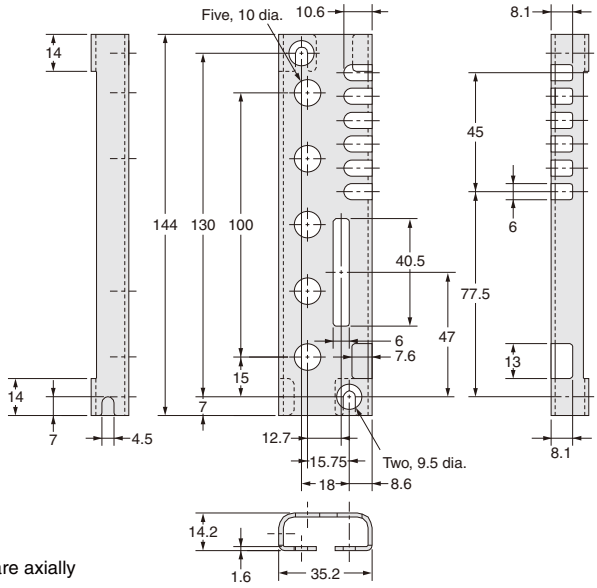


Protective Bracket

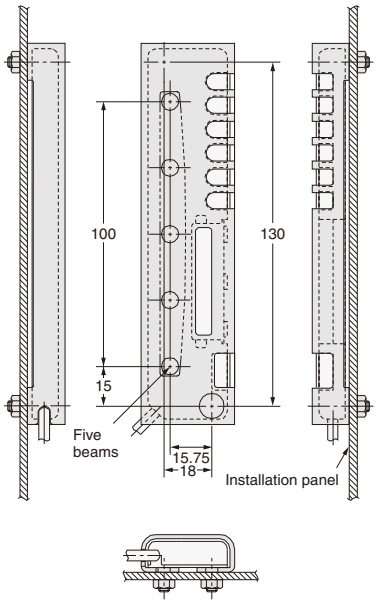
F39-L12(Receiver)

Material: Iron
(Thickness: 1.6 mm)
Mounting screws provided.

Note: The Emitter and Receiver are axially symmetrical.

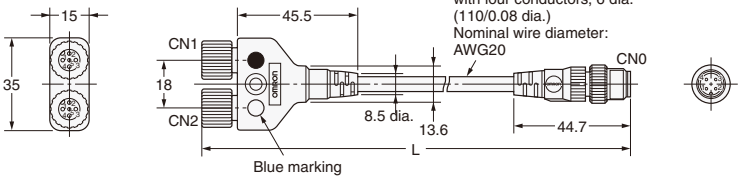


F3W-D052A-D with Protective Bracket

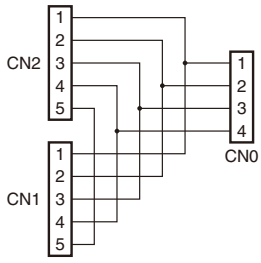


Y-shaped Joint Plugs and Sockets (Cable with Connectors on Both Ends)

XS2R-D526-S001-2 (L=2,000 mm)
XS2R-D526-S001-5 (L=5,000 mm)

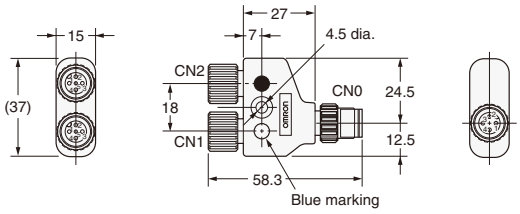


Wiring Diagram

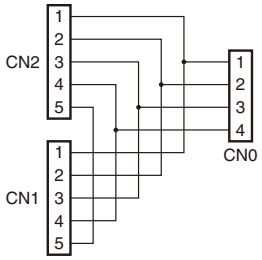


Y-shaped Joint Plugs and Sockets without Cable

XS2R-D526-S003



Wiring Diagram



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