



Multi-output Unit FS-MC8N/P

Instruction Manual

Read this manual before using the product in order to achieve maximum performance. Keep this manual in a safe place after reading it so that it can be used at any time.



■ Symbols

The following symbols are used in this instruction manual to enable the recognition of important information at a glance. Be sure to read these messages carefully.

	It indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	It indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	It indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	It indicates a situation which, if not avoided, could result in product damage as well as property damage.

It indicates tips for better understanding or useful information.

1 Before Operation

Safety Precautions

	- This product is only intended to detect objects. Do not use this product for the purpose of protecting a human body or a part of a human body. - This product is not intended for use as an explosion-proof product. Do not use this product in a hazardous location and/or potentially explosive atmosphere.
	- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. - This is a direct current (DC) power supply type sensor. Application of an alternating current may result in explosion or fire.
	- Use separate conduits for power lines and high-voltage lines. Use of a common conduit may result in device malfunction due to noise or damage to the sensor. - Always ground the frame ground terminal when using an off-the-shelf switching regulator. - Do not use this product outdoors.

Precautions on Regulations and Standards

■ CE Marking

KEYENCE Corporation has confirmed, on the basis of the following specifications, that this product complies with the essential requirements of the applicable EU Directive(s). Be sure to consider the following specifications when using this product in the member states of the European Union.

● EMC Directive, applicable standard: EN61326-1, Class A

Ensure that the cable length is 30 meters or less. These specifications do not give any guarantee that the end-product with this product incorporated complies with the essential requirements of the EMC Directive. The manufacturer of the end-product is solely responsible for confirming the compliance of the end-product itself according to the EMC Directive.

■ UL Certificate

- This product is a UL/c-UL Listed product.
- UL File No. E222809
 - Category QUXX/QUYX7
- Be sure to consider the following specifications when using this product as a UL/c-UL Listed product.
- Use this product with one of the following power supplies.
 - UL/CSA certified power supply that provides Class 2 output as defined in the NFPA70 (NEC: National Electrical Code) and CEC (Canadian Electrical Code).
 - UL/CSA certified power supply that has been evaluated as a Limited Energy circuit as defined in UL61010-1 and CAN/CSA-C22.2 No. 61010-1.
 - Ensure the circuits to be connected to the input/output terminals are SELV Circuits.
 - Use this product under pollution degree 2.
 - Use this product at the altitude of 2000 m or less.
 - Indoor use only.

■ FCC Regulations

- This product complies with the following regulations specified by the FCC.
- Applicable regulation FCC Part 15 Subpart B Class A
 - This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
 - FCC Caution
- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Package Contents

- Main unit
- Instruction manual
- End units

2 Installation

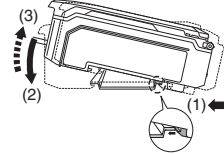
Expansion Unit Connection

This section explains how to install this product on a DIN rail and how to connect this product to an expansion unit. Up to 8 expansion units can be connected to 1 instance of this product. However, each dual output type will be treated as 2 expansion units.

NOTICE

Turn off the power supply before connecting this product to an expansion unit.

- Align the claw at the bottom of this product with the DIN rail. While pushing this product in the direction of arrow 1, push down in the direction of arrow 2.

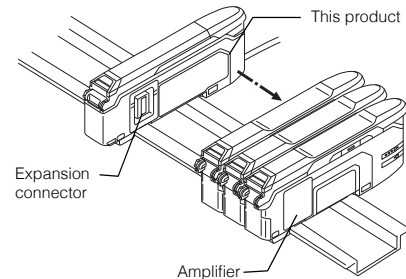


Reference

To remove this product, raise it in the direction of arrow 3 while pushing it in the direction of arrow 1.

- Repeat step 1 to install expansion units on the DIN rail and connect them to this product.

If the amplifier connector has an expansion protection cover, remove the cover before connecting the sensor.

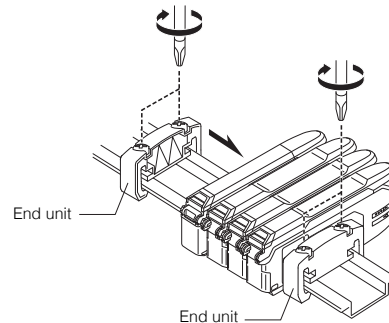


NOTICE

Securely connect this product and the expansion units. If they are connected at an angle or are not inserted fully, this product and the expansion units may be damaged when the power is turned on.

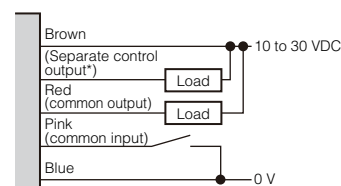
- Mount the end units (OP-26751: a two-unit set is included with this product) on both sides of this product and the expansion units. Then, fix the end units in place with the screws on the top of each end unit. (Tightening torque: 0.6 N·m or less)

Mount the end units on the DIN rail in the same manner as described above.

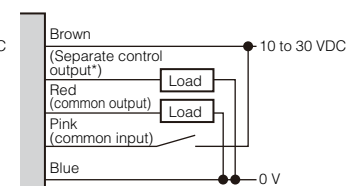


3 Connection Diagram

FS-MC8N



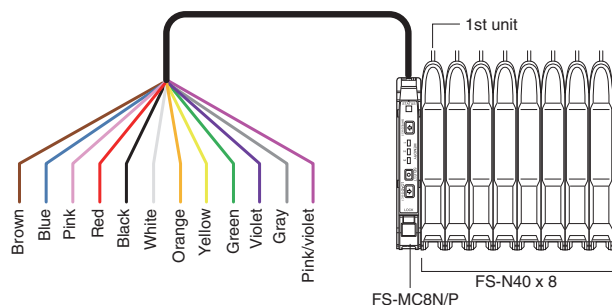
FS-MC8P



* Black, white, orange, yellow, green, violet, gray, pink/violet

4 Wire Colors

By connecting expansion units to this product, it is possible to send independent control output information from each expansion unit through this device. The control outputs are assigned to the wire colors in the following table in the order in which the expansion units are connected next to this product.



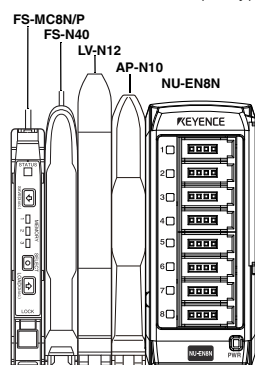
Brown	Blue	Pink	Red
Power supply	0 V	Common input	Common output

Black	White	Orange	Yellow	Green	Violet	Gray	Pink/violet
Unit 1 output	Unit 2 output	Unit 3 output	Unit 4 output	Unit 5 output	Unit 6 output	Unit 7 output	Unit 8 output

In the above example, only single output types have been used. When dual output types are used, each dual output type is treated as 2 expansion units.

Usage example:

When units are connected as shown in the following figure, the corresponding wire colors are assigned as shown in the table below. The LV-N12 is a dual output type, so it is treated as 2 expansion units.



Control output	Wire color
FS-N40 output	Black
LV-N12 output 1	White
LV-N12 output 2	Orange
AP-N10 output	Yellow
NU-EN8N No. 1 output	Green
NU-EN8N No. 2 output	Violet
NU-EN8N No. 3 output	Gray
NU-EN8N No. 4 output	Pink/violet

In the above usage example, the No. 5 to No. 8 outputs of the NU-EN8N cannot be used.

* The MU-N11/N12 and OP-87199 cannot be used with this product.

Reference If the order in which expansion units are connected is changed, the wire colors corresponding to the outputs will also change.

5 Part Names and Functions

SAVE button

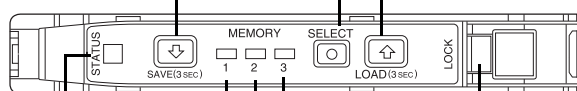
Save the settings of the connected expansion units.

SELECT button

Select the memory number.

LOAD button

Write settings to the connected expansion units.



STATUS indicator

Display status	Product status
Green (lit)	Normal operating status
Off	Power OFF
Green (blinking)	SAVE, LOAD, or initialization being performed
Red (blinking)	Error status

MEMORY indicators

The indicator whose memory number matches the expansion units model configuration and settings will be lit (in orange). While a memory number is selected, the corresponding memory indicator blinks.

LOCK indicator/button

This is both an indicator and a button. It lights (in orange) when the operation of the buttons are disabled.

6 Basic Operation and Functions

Saving settings [SAVE]

Up to three sets of settings for the expansion units connected to this product can be saved.

- 1 Press the **SELECT** button to select the memory number in which to save the settings. (Each time the **SELECT** button is pressed, the memory number that is blinking changes.)
- 2 With the desired **MEMORY** indicator blinking, hold down the **SAVE** button for 3 seconds or more.

Writing settings [LOAD]

Write the saved settings on this product to the connected expansion units.

- 1 Press the **SELECT** button to select the memory number in which the settings to write have been inserted. (Each time the **SELECT** button is pressed, the memory number that is blinking changes.)
 - 2 With the desired **MEMORY** indicator blinking, hold down the **LOAD** button for 3 seconds or more.
- * An error will occur if the settings to write do not match the number of expansion units, the expansion unit models, and/or the position in which the expansion units are connected. (See page 3.)

Preventing incorrect operations (batch key lock) [LOCK]

Disable button operations not only on this product but also on all expansion units that are connected to this product.

- 1 Hold down the **LOCK** button for 3 seconds or more. Cancel: Use the same procedure.

Common input

A common external input signal can be sent to the expansion units that support external input by controlling the common input (pink wire) of this product.

- * For details on the expansion units that support the common input, see page 3.
- * If the external input for an expansion unit is already in the ON state, the common external input will be ignored by that unit.

Common output

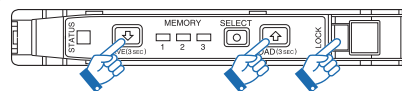
When an error occurs on this product or on an expansion unit connected to this product, the common output (red wire) turns ON. If the "Limit Detection" or "Limit Setting Output Mode" of an expansion unit is being used, the alarm output of each function will be linked to the common output (red wire).

7 Useful Functions

Setting initialization

Initialize all the settings and return this product to its factory default state.

- 1 Hold down the **SAVE** button, **LOAD** button, and **LOCK** button for 3 seconds or more.



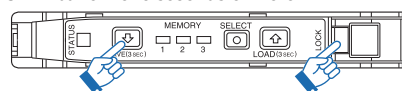
The connected expansion units are not initialized.

Save lock function

This function prevents incorrect operations of the **SAVE** button and only the **SAVE** button.

By using the **LOCK** button at the same time that the settings are saved, it can be ensured that it is not easy to overwrite the settings.

- 1 Press the **SELECT** button to select the memory number in which to save the settings. (Each time the **SELECT** button is pressed, the memory number that is blinking changes.)
- 2 With the desired **MEMORY** indicator blinking, hold down the **LOCK** button and the **SAVE** button for 3 seconds or more.



To overwrite the settings, perform the save lock function operation again. (The settings cannot be saved by just pressing the **SAVE** button.)

To cancel the save lock function, initialize the settings. (By initializing the settings, this product will return to its factory default state.)

8 Amplifier (Expansion Unit) Support Table

A list of the amplifiers (expansion units) that can be connected to this product to expand the system, and the supported functions, are shown below.

✓: supported, —: not supported

Series	Model	Type	Separate control output	Common output		Common input ^{*3}	Saving settings, writing settings	Batch key lock
				Expansion unit error output ^{*1}	Limit Detection ^{*2}			
FS-N40 Series	FS-N40	1 output	✓	✓	✓	✓ ^{*4}	✓	✓
	FS-N42N	1 output	✓	✓	✓	✓ ^{*4}	✓ ^{*5}	✓
	FS-N42P	1 output	✓	✓	✓	✓ ^{*4}	✓ ^{*5}	✓
	FS-N44N	2 outputs	✓	✓	✓	✓	✓	✓
	FS-N44P	2 outputs	✓	✓	✓	✓	✓	✓
FS-N10 Series	FS-N10	1 output	✓	✓	—	✓ ^{*4}	✓	✓
	FS-N12N	1 output	✓	✓	—	✓ ^{*4}	✓ ^{*5}	✓
	FS-N12P	1 output	✓	✓	—	✓ ^{*4}	✓ ^{*5}	✓
	FS-N12CN	1 output	✓	✓	—	✓	✓ ^{*5}	✓
	FS-N12CP	1 output	✓	✓	—	✓	✓ ^{*5}	✓
	FS-N12EN	1 output	✓	✓	—	✓	✓ ^{*5}	✓
	FS-N14N	2 outputs	✓	✓	✓(limit setting output mode)	✓	✓	✓
	FS-N14P	2 outputs	✓	✓	✓(limit setting output mode)	✓	✓	✓
	FS-N14CP	2 outputs	✓	✓	✓(limit setting output mode)	✓ ^{*4}	✓	✓
LV-N10 Series	LV-N10	1 output	✓	✓	✓(limit setting output mode)	✓ ^{*4}	✓	✓
	LV-N12N	2 outputs	✓	✓	✓(limit setting output mode)	✓	✓	✓
	LV-N12P	2 outputs	✓	✓	✓(limit setting output mode)	✓	✓	✓
	LV-N12CN	1 output	✓	✓	✓(limit setting output mode)	✓	✓ ^{*5}	✓
	LV-N12CP	1 output	✓	✓	✓(limit setting output mode)	✓	✓ ^{*5}	✓
PS-N10 Series	PS-N10	1 output	✓	✓	—	✓ ^{*4}	✓ ^{*5}	✓
	PS-N12N	1 output	✓	✓	—	✓ ^{*4}	✓ ^{*5}	✓
	PS-N12P	1 output	✓	✓	—	✓ ^{*4}	✓ ^{*5}	✓
	PS-N12CN	1 output	✓	✓	—	✓	✓ ^{*5}	✓
	PS-N12CP	1 output	✓	✓	—	✓	✓ ^{*5}	✓
AP-N10 Series	AP-N10	1 output	✓	✓	—	✓	✓	✓
	AP-N10D	2 outputs	✓	✓	—	✓	✓	✓
Other	NU-EN8N ^{*6}	8 outputs	✓	—	—	—	—	—

*1 The types of expansion unit errors are shown below. The NU-EN8N does not support expansion unit errors.

✓: supported, —: not supported

Expansion unit error type	Error description	Supported series				
		FS-N40/10	LV-N10	PS-N10	AP-N10	NU-EN8N
Overcurrent error	An overcurrent is flowing through the control output.	✓	✓	✓	—	—
EEPROM error	The attempt to write/read internal data failed.	✓	✓	✓	✓	—
DATUM correction error	A correction error occurred in DATUM mode.	✓	✓	✓	—	—
APC correction error	The reduction in LED light intensity exceeded the APC correction limit.	✓	—	—	—	—
Head error	The head cable is broken or not connected.	—	✓	✓	✓	—

*2 When using the Limit Detection (limit setting output mode), it is necessary to configure settings on the expansion unit side. See the instruction manual of the expansion unit.

*3 For details on the expansion unit settings, see the instruction manual (the sections related to external inputs) of the expansion unit.

*4 The external input function can be used when connected to this product.

*5 If the expansion unit's switch is set to [TERA] or [MEGA], the power mode setting may not be saved/written correctly. Change the switch to [SEL].

*6 Further expansion units cannot be connected after the NU-EN8N in order to expand the system.

9 Error Status

Indicator	Display	Error name	Common output	Description	Confirmation method and countermeasures
STATUS indicator (red)	Blinking slowly (lights and turns off once per second)	Configuration error	ON	The number of expansion units, the expansion unit models, or the position in which the expansion units are connected differs from the saved information.	Return the expansion units to their original status. When updating the expansion unit status, save the settings. Initialize the settings on this product.
	Blinking quickly (lights and turns off once per 0.25 of a second)	Overcurrent error	ON	An overcurrent is flowing through one of the separate control outputs.	Check the load and return it to a value within the rated range.
			OFF	An overcurrent is flowing through the common output.	Check the load and return it to a value within the rated range.
	Lit briefly one time (lit for 0.25 of a second once per 2 seconds)	Expansion unit error	ON	An error has occurred on an expansion unit.	Check the status of the connected expansion units.
	Lit briefly twice (lit for 0.25 of a second twice per 2 seconds)	System error	ON	Communication with an expansion unit has not been established.	Check whether the expansion units have been connected correctly to expand the system. Restart the system.
				The expansion unit configuration was changed during operation.	Check the position in which the expansion units are connected.
				The sensor is damaged.	Replace the expansion unit.
	Blinks for 3 seconds	Verification error	Previous status maintained	A function could not be executed correctly.	Perform the operation again.
				The save lock has been set.	For details on the save lock function, see page 2.
				The number of expansion units, the expansion unit models, or the position in which the expansion units are connected differs from the setting data that was written.	Return the expansion units to their original status. When changing the expansion unit status, save the settings again.
				An unsupported expansion unit has been connected to expand the system.	Remove the unsupported expansion unit.
MEMORY indicator (orange)	Blinks for 3 seconds	Memory selection error	Previous status maintained	The SAVE/LOAD button was pressed with no memory entry selected.	Perform the setting saving/writing operation correctly. (For the operation method, see page 2.)
LOCK indicator (orange)		Key lock error	Previous status maintained	The batch key lock function is enabled. An operation that is disabled while the batch key lock function is enabled was performed.	Release the batch key lock, and then perform the operation. (For the releasing method, see page 2.)

10 Specifications

Model	NPN output	FS-MC8N
	PNP output	FS-MC8P
Number of inputs and outputs	Separate control output: 8, common output: 1, common input: 1	
Response time	Depends on the response time settings of the connected expansion units	
Unit expansion	Up to 8 expansion units can be connected. (However, each dual output type will be treated as 2 expansion units.) Allowable passing current: 1200 mA or less	
Indicators	STATUS indicator (green and red two-color display) MEMORY indicator (orange) LOCK indicator (orange)	
Separate control output, common output	NPN output	NPN open-collector, 30 V or less, 20 mA or less per output, residual voltage: 1.4 V or less
	PNP output	PNP open-collector, 30 V or less, 20 mA or less per output, residual voltage: 1.6 V or less
External input time	Input time of the connected expansion units + 11 ms	
Protection circuit	Protection against reverse power connection, reverse output connection, output overcurrent, and output surge	
Power supply	Power supply voltage*1	10 to 30 VDC (including 10% ripple (P-P) or less), class 2 or LPS
	Power consumption*2	690 mW or less (when used as a solitary unit) (26 mA or less at 24 V/38 mA or less at 12 V [excluding the load current])
Environmental resistance	Ambient temperature	-20°C to +55°C (no freezing)
	Vibration resistance	10 to 55 Hz; double amplitude 1.5 mm; 2 hours each for X, Y, and Z axes
	Shock resistance	500 m/s ² ; 3 times each for X, Y, and Z axes
Case material	Main unit and cover: polycarbonate	
Weight	Approx. 110 g	

*1 Match the rated power supply voltage of the expansion units to be connected to expand the system.

*2 The power consumption including the load when the maximum number of units are connected is 38 W max.

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