

Cam Positioner 3F88L-160/-162

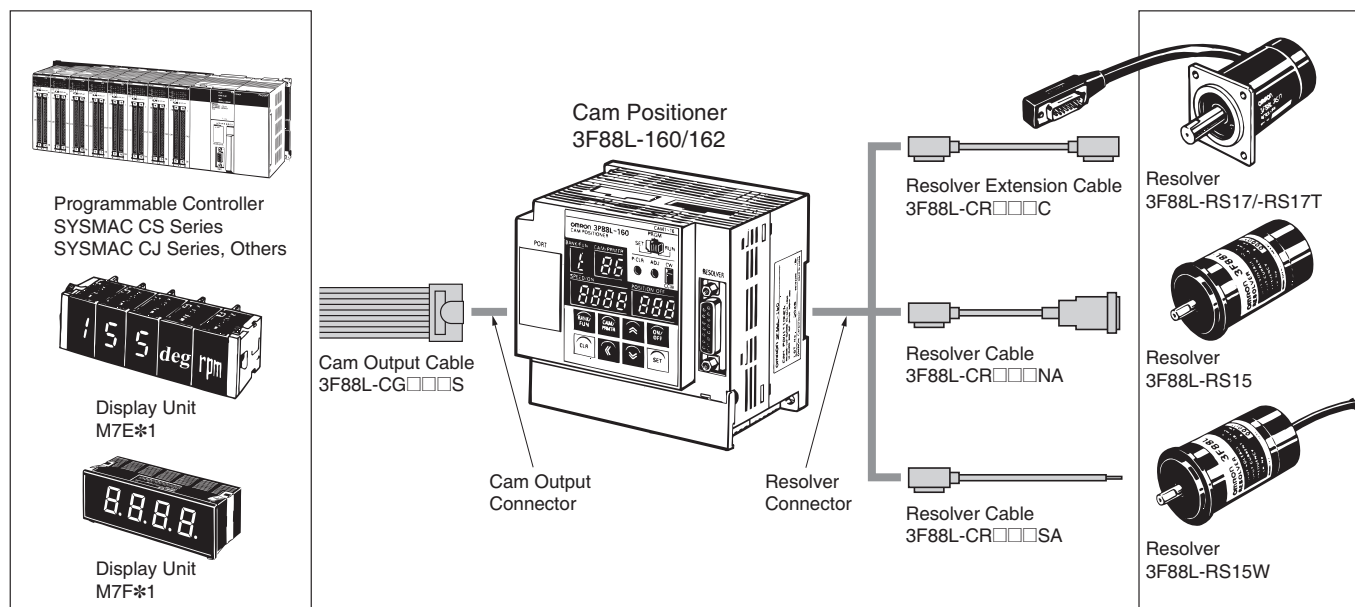
CSM_3F88L-160_-162_DS_E_2_3

Faster, More Advanced Rotational Control for Greater Precision and Improved Productivity

- High speed and high precision double machine productivity.
- Compact design saves space.
- Simple operations and settings match cam outputs to the rotational angles.
- UL/CSA listing and EC Directive compliance ensure worldwide application.
- Many convenient onsite functions.



System Configuration



*1. Final order entry date for M7F-series: The end of March 2016.
Final order entry date for M7E-series: The end of March, 2020.

Ordering Information

| Name | | Model | |
|---|----------------|-------------------|--------------|
| Cam Positioner | 16 outputs | 3F88L-160 | |
| | 32 outputs | 3F88L-162 | |
| Resolver | Shaft: 10 dia. | Standard model | 3F88L-RS17 |
| | | High-torque model | 3F88L-RS17T |
| | Shaft: 6 dia. | Connector type | 3F88L-RS15 |
| | | Lead-wire type | 3F88L-RS15W |
| Resolver Extension Cable with Connectors on Both Ends | | 2 m | 3F88L-CR002C |
| | | 5 m | 3F88L-CR005C |
| | | 10 m | 3F88L-CR010C |
| | | 20 m | 3F88L-CR020C |

| Name | | Model |
|--|------|---------------|
| RS15 Resolver Cable with Connectors on Both Ends | 3 m | 3F88L-CR003NA |
| | 5 m | 3F88L-CR005NA |
| | 10 m | 3F88L-CR010NA |
| | 15 m | 3F88L-CR015NA |
| | 20 m | 3F88L-CR020NA |
| RS15W Resolver Cable with Connector on One End | 3 m | 3F88L-CR003SA |
| | 5 m | 3F88L-CR005SA |
| | 10 m | 3F88L-CR010SA |
| Cam Output Cable with Connector on One End | 1 m | 3F88L-CG001S |
| | 3 m | 3F88L-CG003S |

Specifications

General Specifications

| Item | Model | 3F88L-160 | 3F88L-162 |
|---|-------|---|-----------|
| Supply voltage | | 100 to 240 VAC, 50/60 Hz | |
| Allowable supply voltage | | 85 to 264 VAC | |
| Power consumption | | 27 VA max. | |
| Inrush current | | 40 A at 10 ms max. | |
| I/O power supply | | 145 mA at 24 VDC | |
| Allowable I/O supply voltage | | 20.4 to 26.4 VDC | |
| Insulation resistance | | 20 MΩ min. between all external AC power supply terminals and the protective ground terminal (at 500 VDC) * | |
| Dielectric strength | | 2,300 VAC at 50/60 Hz for 1 min between all external AC power supply terminals and the protective ground terminal (leakage current: 10 mA max.) * | |
| Noise immunity | | IEC 61000-4-4: 2 kV power line | |
| Vibration resistance | | Conforms to JIS C0911: 10 to 57 Hz with 0.075-mm single amplitude 80 min each in X, Y, and Z directions, 57 to 150 Hz at 9.8-m/s ² acceleration (sweeps: 8 min × 10 sweeps = 80 min total) | |
| Shock resistance | | Conforms to JIS C0912: 147 m/s ² three times each in X, Y, and Z directions | |
| Ambient operating temperature | | 0 to 55°C | |
| Ambient operating humidity | | 10% to 90% (with no condensation) | |
| Ambient operating atmosphere | | No corrosive gases | |
| Ambient storage temperature | | -20 to 75°C | |
| Terminals screw size | | Power supply input: M3.5, control I/O: M3 | |
| Momentary power interruption detection time | | Does not detect momentary power interruptions lasting less than 15 ms. | |
| Dimensions | | 110 × 100 × 82.5 mm (W × H × D) | |
| Weight | | 1 kg max. | |
| Structure | | Mounted inside panel | |
| Mounting method | | Screw mounting (two M4 screws) or DIN Track mounting | |

* Disconnect the functional ground terminal from the protective ground terminal before performing insulation resistance or dielectric strength tests.

Characteristics

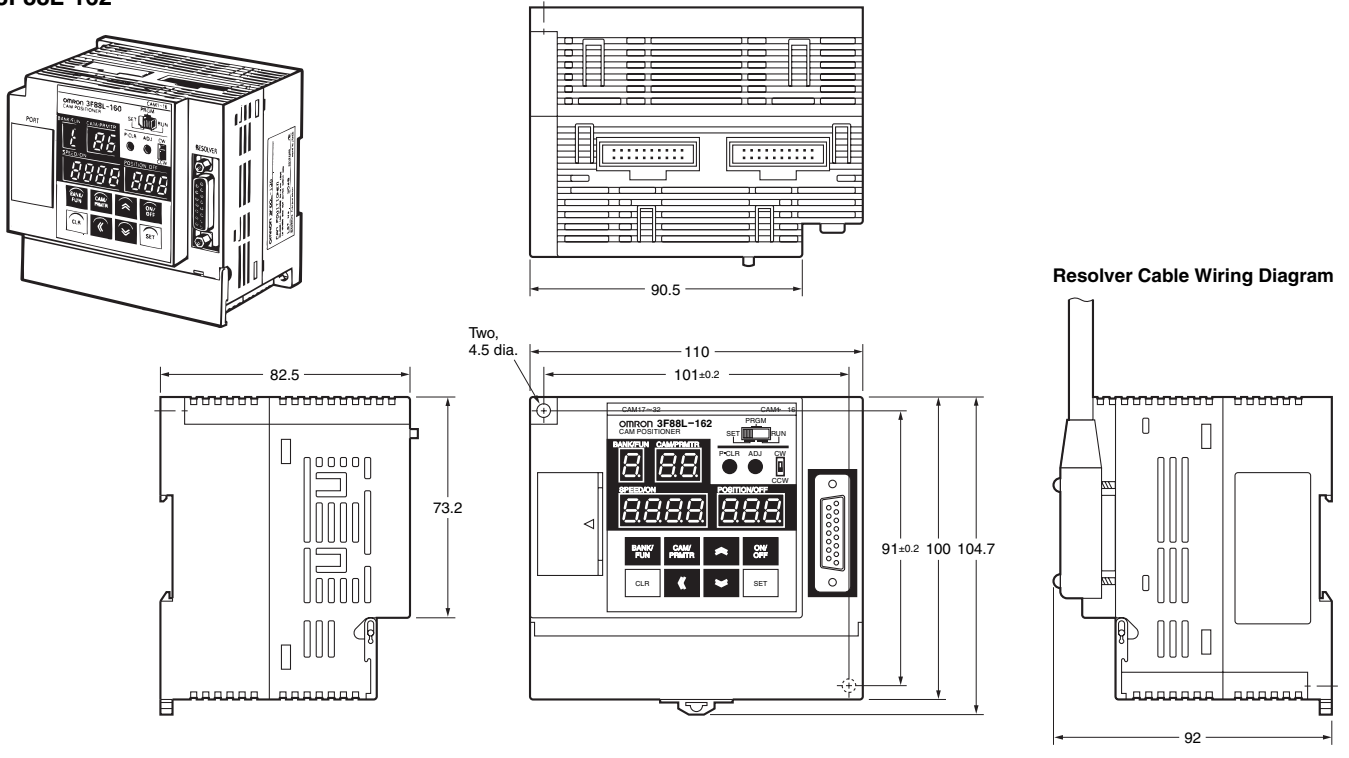
| Item | Model | 3F88L-160 | 3F88L-162 |
|----------------------------|-------|--|-----------|
| No. of outputs | | 16 | 32 |
| Output performance | | Open-collector output, maximum switching capacity: 300 mA at 26.4 VDC (1.6 A max. per connector) | |
| No. of banks | | 8 banks at 360 resolution, 4 banks at 720 resolution | |
| Display | | 7-segment LED (current bank, speed, current angle) | |
| Response speed | | 1,600 r/min at 360 resolution, 800 r/min at 720 resolution | |
| Detection cycle | | 100 μs max. | |
| Reproducibility | | 0.2° | |
| Memory backup | | No. of non-volatile memory (EEPROM) writes: 100,000 times | |
| Control unit | | 1/360 at 360 resolution, 1/720 at 720 resolution | |
| Origin compensation | | 1 to 359 at 360 resolution, 1 to 719 at 720 resolution | |
| Backlash compensation | | 1 to 179 at 360 resolution, 1 to 359 at 720 resolution | |
| Advance angle compensation | | Advance angle compensation Range: 1 to 359 at 360 resolution, 1 to 719 at 720 resolution Speed input range: 1 to 1,600 at 360 resolution, 1 to 800 at 720 resolution Note: Only zero will be accepted for the angle advancement input when the speed input is zero. | |
| Control inputs | | START, TRIG, BANK 1 to 3, and RESET Photocoupler input impedance: 4.7 kΩ | |
| Control outputs | | RUN, ERROR, and M-DET Open-collector output, maximum switching capacity, 300 mA at 26.4 VDC | |
| Speed detection accuracy | | 5 r/min max. | |

Dimensions

Note: All units are in millimeters unless otherwise indicated.

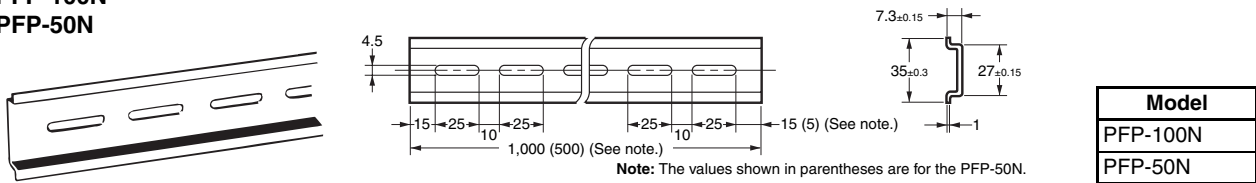
3F88L-160/-162

3F88L-160
3F88L-162



Mounting Track

PFP-100N
PFP-50N

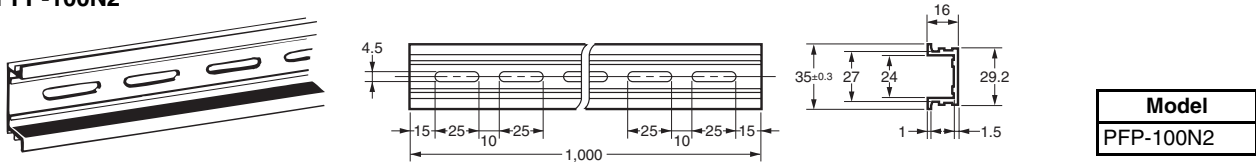


Note: The values shown in parentheses are for the PFP-50N.

| Model |
|----------|
| PFP-100N |
| PFP-50N |

Mounting Track

PFP-100N2

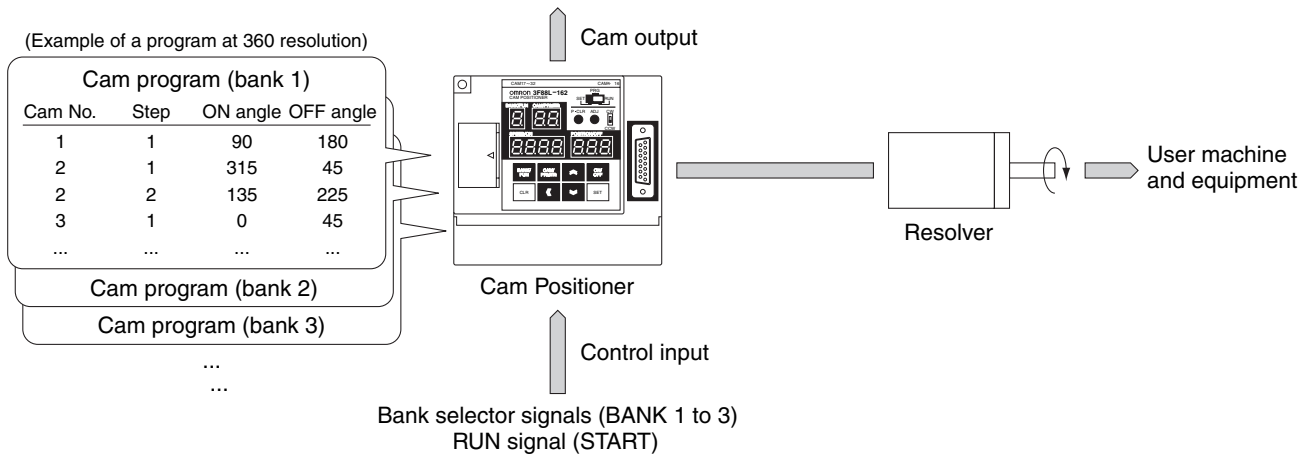
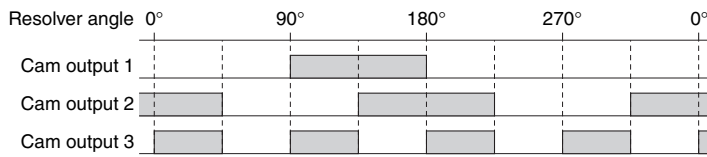


| Model |
|-----------|
| PFP-100N2 |

Overview of Functions

Basic Operating Procedure

Enter the cam program (i.e., the cam output ON/OFF pattern) into the Cam Positioner. Use the bank selector signals to select a bank and turn the RUN signal ON to start operation.



Resolution

- The angle resolution can be set to 360 increments/rotation or 720 increments/rotation.
- The function and performance of the following items depend on the resolution.

| Item | Resolution | Resolution of 360 | Resolution of 720 |
|--|------------|---------------------------------|-----------------------------------|
| Angle setting and display unit (See note.) | | 1° is set and displayed as "1". | 0.5° is set and displayed as "1". |
| Allowable Resolver speed | | 1,600 r/min | 800 r/min |
| No. of steps in the cam program | | 180 steps max. | 360 steps max. |
| No. of banks | | 8 banks | 4 banks |

Note: If you want the ON angle to be 90°, for example, set 90 for a 360 resolution and 180 for a 720 resolution.

Modes

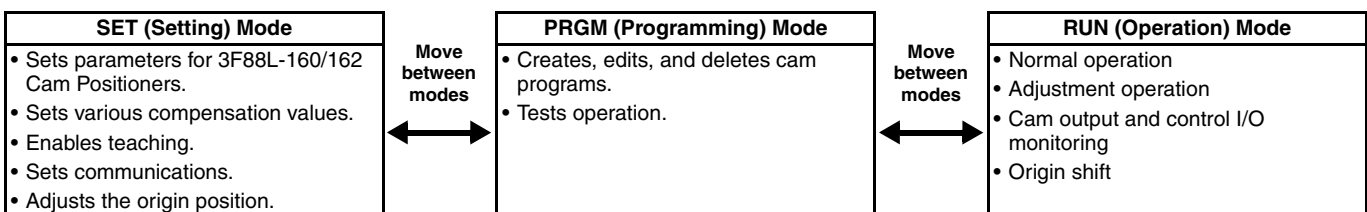
The 3F88L-160/162 Cam Positioners have three modes that can be selected from the mode selector switch on the front of the Positioner. They are RUN, PRGM, and SET.

The following functions are supported in each mode.

RUN mode: Normal operation or adjustment operation

PRGM mode: Creating, editing, deleting, or testing a cam program

SET mode: Entering Cam Positioner parameters and compensation settings, teaching, or entering communications settings



Selecting Function Levels

The following function levels are supported by the Cam Positioner using the Function Level Selector setting.

Function Level 0 (Monitor Only)

- Enables cam output and monitoring. You cannot write cam programs or set parameters in this level.
- This level is used to prevent accidental changes to cam programs and parameters.
- Functions that have already been set will operate from this level.

Function Level 1 (Basic Operation/Monitor Only)

- You can write cam programs in addition to performing all level 0 functions from this level.
- This level is used for basic operation.

Function Level 2 (All)

- All Cam Positioner functions are enabled in this level.
- This level provides access to the application functions.

Basic Functions

Cam Program Write Function

- A cam program is used to set the cam output ON/OFF angles. Up to 180 steps registered in 8 banks can be set per cam output at 360 resolution and up to 360 steps registered in 4 banks can be set per cam output at 720 resolution.
- Cam programs are generally input from the Operation Keys on the front of the Cam Positioner, but a computer using the CompoWay/F communications protocol can also be used to input them.

- Note:**
1. One step is one ON/OFF combination for a cam.
 2. A bank is a program unit with cam outputs 1 to 32 constituting a set for the 3F88L-162, and cam outputs 1 to 16 constituting a set for the 3F88L-160. Switch banks to change the program that is used for operation.

Cam Output Function

The cam output function is used to turn the cam outputs ON and OFF according to the ON/OFF angle settings for each cam in the bank specified by the BANK inputs while the START input is ON.

Monitor Function

The monitor function is used to monitor cam outputs and control I/O status.

Save Data

The save data function stores parameters and cam programs in EEPROM memory. The memory is non-volatile, and does not require battery replacement or any other maintenance.

No. of Programs Check

The number of programs check is used to check the number of programs and the origin compensation angle.

Initial Setting Function

Encoder Resolution Setting

The Encoder resolution per Resolver revolution can be set to 360 or 720.

Rotation Direction Setting

The direction in which the angle increases can be set to match the rotation direction of the Cam Positioner and the Encoder.

Application Functions

Origin Compensation

Any angular position can be changed to 0° to align the Cam Positioner origin with the Encoder origin.

Origin Shift

If the TRIG input turns ON in RUN mode, the origin shift function changes any angular position to 0° to align the Cam Positioner origin with the Encoder origin.

Backlash Compensation

The detection angles can be offset in the clockwise and counterclockwise directions to absorb the play in the mechanical system.

Advance Angle Compensation

The advance angle compensation function advances the cam output angle proportional to Resolver speed.

Cam Protection

The cam protection function applies levels of protection per cam or per bank to prevent cam ON/OFF data from being accidentally changed or deleted.

One-direction Function Setting

The one-direction function setting can be used to enable a cam output in one direction only. It can be set for each cam.

Output Hold Function

The output hold function holds the previous cam output status when you switch to the program mode or when an error occurs.

PV Output Function

The PV output function uses the cam output signals to output signals to a Display Unit (M7E*1, M7F*1, etc.). It can be used to display the present angle and speed on the Display Unit.

Pulse Output Function

The pulse output function allows ON/OFF data set at regular intervals for any bank or cam to be automatically set in memory.

Teaching

The teaching function allows you to enter Resolver angle data directly as cam program settings while you manually operate the Encoder.

Copy Function

The copy function allows you to set a master Cam Positioner so you can copy cam programs, compensation values, and settings all at once to other Cam Positioners.

Test Operation

The test operation allows you to change the ON/OFF angles in real time and produce cam outputs in PRGM mode, ignoring the control input signal status, to adjust the ON/OFF angles to match those of the Encoder.

- *1. Final order entry date for M7F-series: The end of March 2016.
Final order entry date for M7E-series: The end of March, 2020.

Adjustment Operation

The adjustment operation allows you to change the ON/OFF angles in real time under normal operating conditions (i.e., while producing cam outputs) to adjust the ON/OFF angles to match those of the Encoder.

Communications

The Cam Positioner has a communications port that conforms to CompoWay/F form B. Using communications allows you to read and write cam programs or monitor the present angle and speed via communications through this port.

Note: CompoWay/F is an integrated protocol used for OMRON general-purpose serial communications. It uses a uniform frame format and the factory interface network service (FINS) command structure widely used by OMRON products, such as Programmable Controllers, to facilitate communications between multiple components or between computers and components.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

Terms and Conditions Agreement

Read and understand this catalog.

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranties.

(a) Exclusive Warranty. Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.

(b) Limitations. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE.

Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right. (c) Buyer Remedy. Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Products unless Omron's analysis confirms that the Products were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any Products by Buyer must be approved in writing by Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty.

See <http://www.omron.com/global/> or contact your Omron representative for published information.

Limitation on Liability: Etc.

OMRON COMPANIES SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY.

Further, in no event shall liability of Omron Companies exceed the individual price of the Product on which liability is asserted.

Suitability of Use.

Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Programmable Products.

Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.

Performance Data.

Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.

Change in Specifications.

Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

Errors and Omissions.

Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

2020.2

In the interest of product improvement, specifications are subject to change without notice.

OMRON Corporation
Industrial Automation Company

<http://www.ia.omron.com/>

(c)Copyright OMRON Corporation 2020 All Right Reserved.