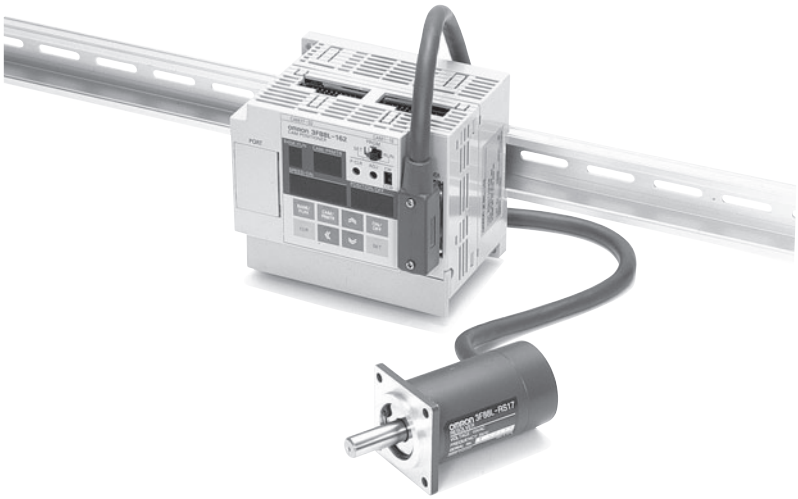
Cam Positioner

3F88L-160/-162

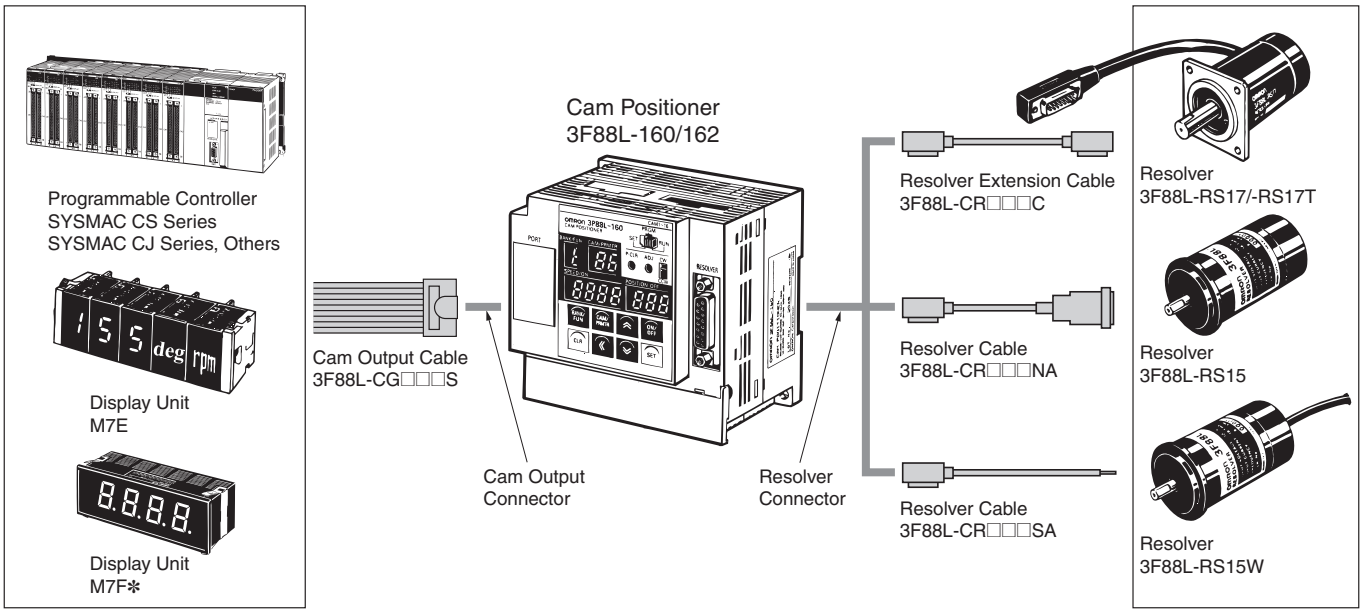
CSM_3F88L-160_-162_DS_E_2_2

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



* Display Unit M7F-series was discontinued at the end of March 2016.

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

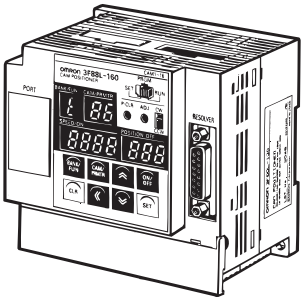
Item / Model	3F88L-160	3F88L-162
No. of outputs	16	32
Output performance	Open-collector output, maximum switching capacity: 300 mA at 26.4 VDC (1.6 A max. per connector)	
No. of banks	8 banks at 360 resolution, 4 banks at 720 resolution	
Display	7-segment LED (current bank, speed, current angle)	
Response 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.	

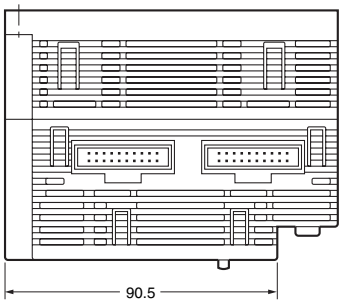
Dimensions

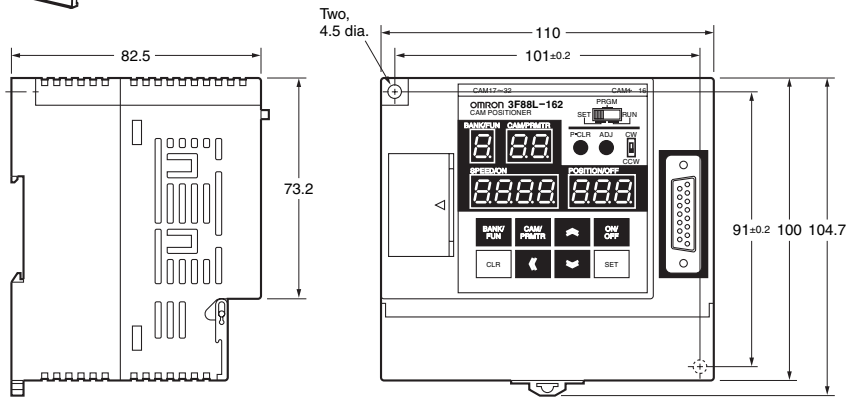
Note: All units are in millimeters unless otherwise indicated.

3F88L-160/-162

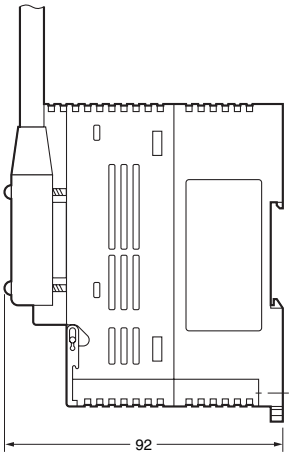
3F88L-160
3F88L-162





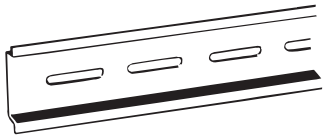


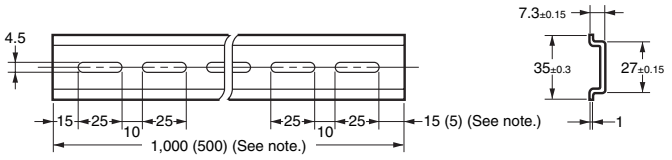
Resolver Cable Wiring Diagram



Mounting Track

PFP-100N
PFP-50N



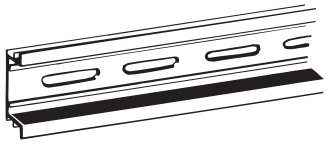


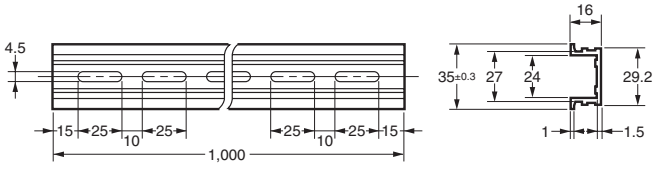
Note: The values shown in parentheses are for the PFP-50N.

Model
PFP-100N
PFP-50N

Mounting Track

PFP-100N2



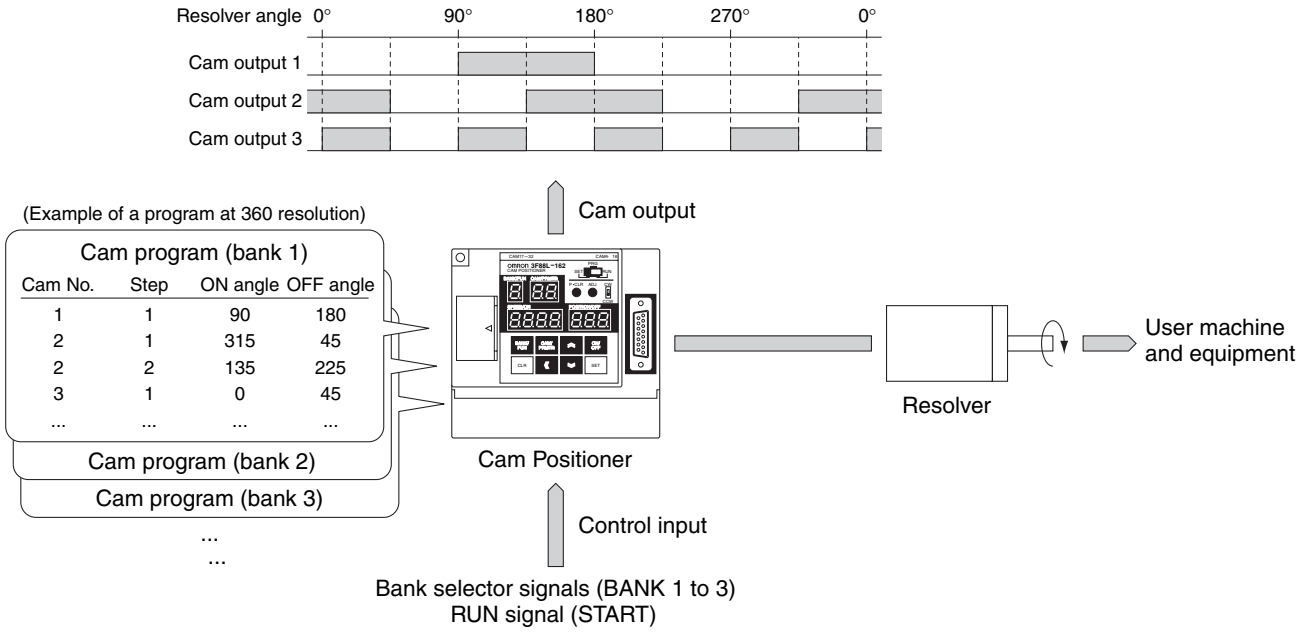


Model
PFP-100N2

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

SET (Setting) Mode	Move between modes	PRGM (Programming) Mode	Move between modes	RUN (Operation) Mode
• Sets parameters for 3F88L-160/162 Cam Positioners. • Sets various compensation values. • Enables teaching. • Sets communications. • Adjusts the origin position.	⟷	• Creates, edits, and deletes cam programs. • Tests operation.	⟷	• Normal operation • Adjustment operation • Cam output and control I/O monitoring • Origin shift

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, M7F✻, 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.

✻ Display Unit M7F-series was discontinued at the end of March 2016.

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.

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

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