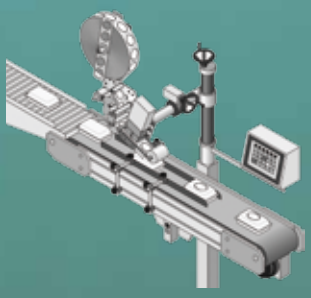
Panasonic
ideas for life

FP0R evolution

The new FP0R PLC: Perfect for low or high speed labeling applications

- **Control processes for up to 1200 labels/min.**
- **Fast motion start-up time of 30µs**
- **Controls up to 4 axes of motion**
- **6 channels for high speed inputs**
- **Easy-to-use motion instructions and function blocks for quick design**



Requirements

Accurate labeling at low or high speeds	Avoid tape damage	Minimize space between labels. Reduce tape length	Labeling speed adjustable to conveyor speed

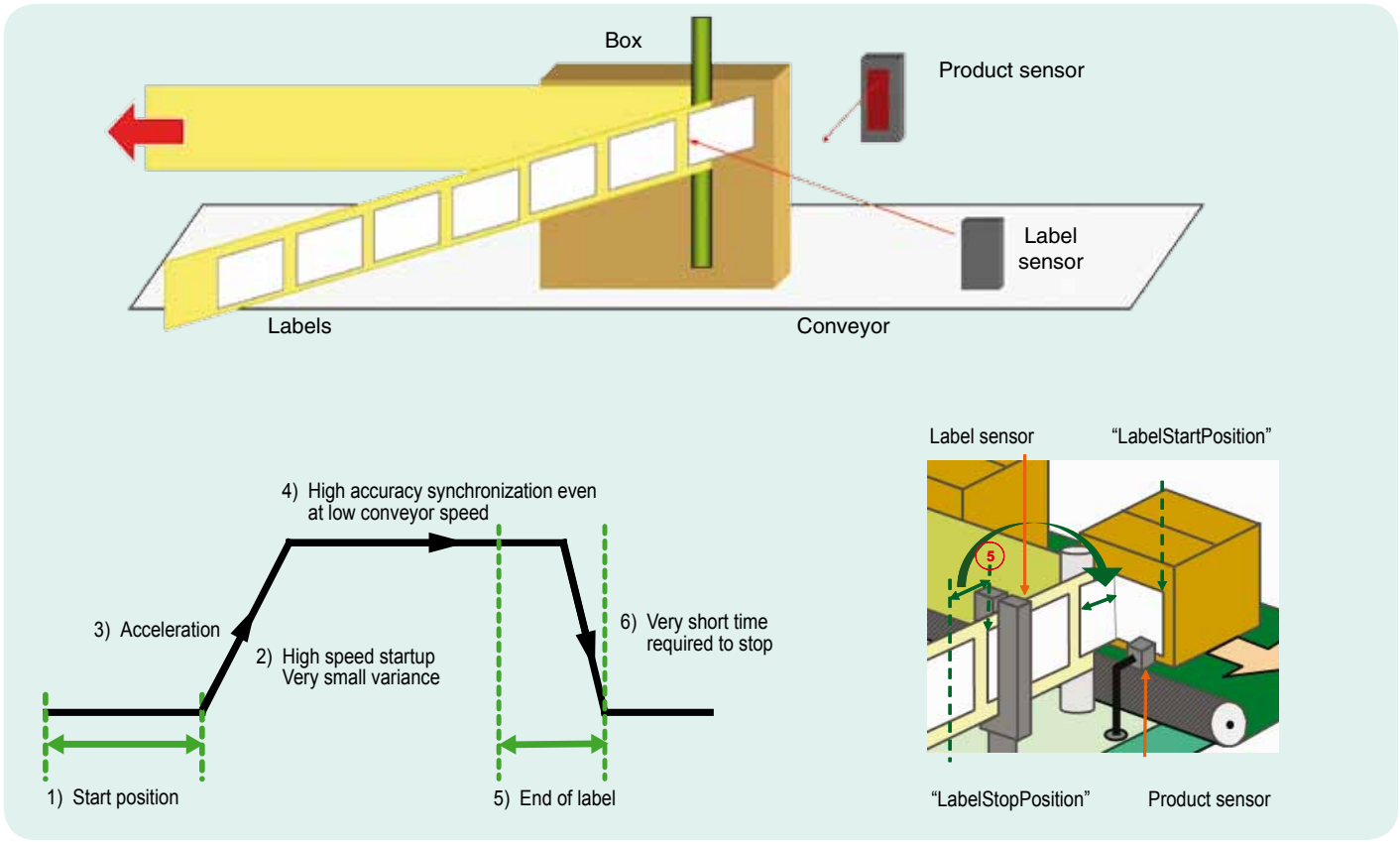
Quality ***Productivity*** ***Cost saving***

Immediate and precise start and stop	Slow acceleration prevents tape from tearing	Stop with faster deceleration to shorten the gap between two labels	Change speed during trapezoidal movement

Solution

3 Year Warranty

Tape winding motion application



1) When the product sensor is triggered by the box, motion is delayed until the start position is reached (FPWIN Pro variable "LabelStartPosition"). This distance is offset from the edge of the product, which is measured by an external encoder and input to the function block.

2) The startup time for motion is 30µs.

3) The acceleration ramp goes from an "InitialSpeed" to a "TargetSpeed" (see FPWIN Pro function block below). The acceleration time can be as low as 1ms.

4) The target speed can be fixed or variable to match the conveyor speed, etc.

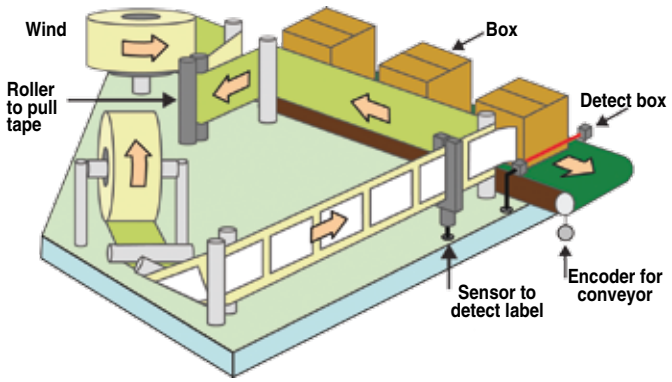
5) At the end of the label, the label sensor turns off. Motion continues in position control mode until the number of pulses set for "LabelStopPosition" is reached.

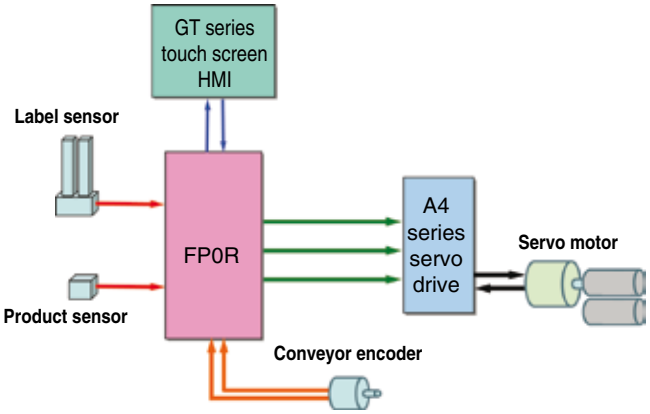
6) Motion will decelerate from the target speed to the initial speed, and then stop. Deceleration time can be set as low as 1ms and is independent from the acceleration time.

Customizable labeling function block available for FPWIN Pro

Labeling application example

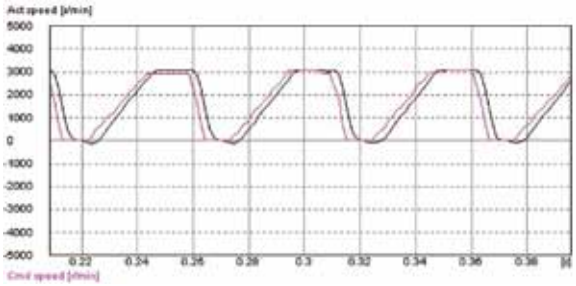
Application example for 20 labels per second





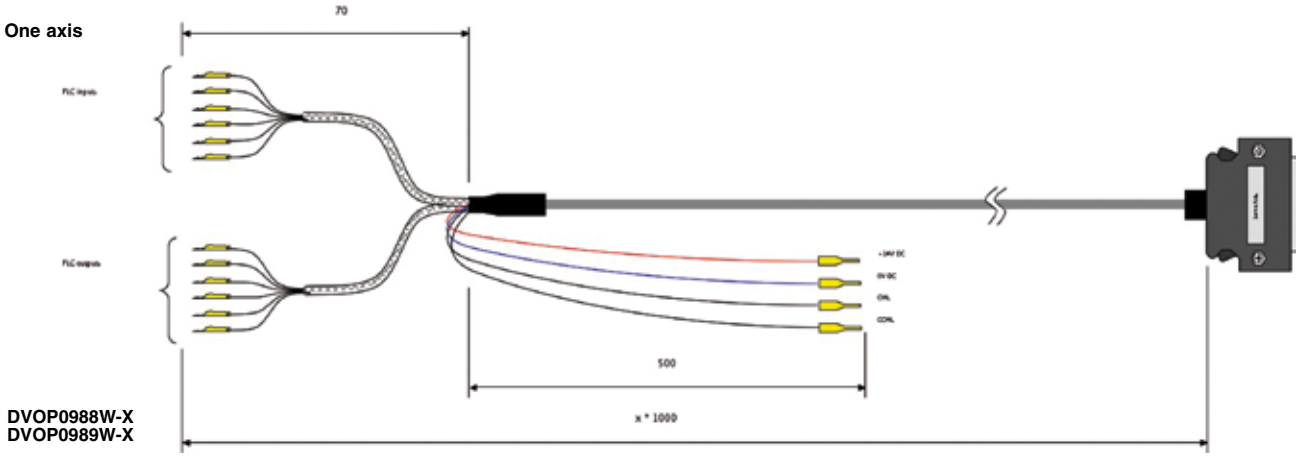
- Encoder input speed is 20,000 pulses per sec.
- 10 pulses after the product sensor is triggered, motion is executed.
- 35ms after motion starts, the falling edge of the label is detected.
- Motion continues for another 200 command pulses from the FP0R.
- The complete cycle for applying one label takes 50ms.

Servo motion (measured by PANATERM software):
Command motion profile sent from FP0R / Actual speed of A4 servo



Note: 3000rpm was configured for the A4 servo for a 50kHz pulse from the FP0R.

Flexible wiring between the FP0R and servo drives

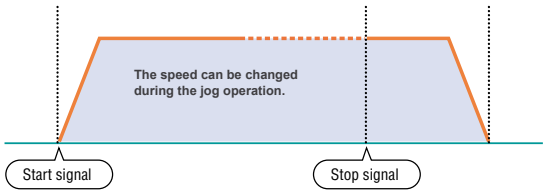


Product number	Description	Number of axes	Power range	Length	Connectors
DVOP0988W-X	FPΣ (Sigma)/FP0R PNP to CN I/F	1	0.05–5kW	1 to 3m	50-pin Molex to 2x10 pin MIL
DVOP0989W-X	FPΣ (Sigma)/FP0R NPN to CN I/F	1	0.05–5kW	1 to 3m	50-pin Molex to 2x10 pin MIL

Positioning highlights

Jog positioning control (F171 instruction)

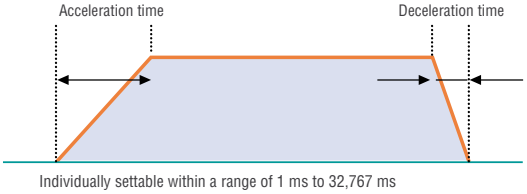
Motion can be started without a preset target value. When a stop signal is input, the target value is set, and the motion is slowed to a stop.



Useful for

- Labelers: Stopping the motion at a constant distance from the point where a label end detection signal is triggered
- Processing machines: Stopping the motion at a constant distance from the point where a processing object edge detection signal is triggered, and cut/drill the object

Individual settings for acceleration and deceleration (F171, F172, F174, and F175 instructions)

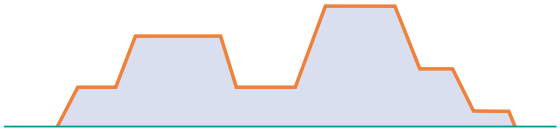


Useful for

- Labelers: Starting the operation at a relatively low acceleration to prevent tape from breaking
  Stopping the operation at high deceleration when detecting the label end to save the tape

Changing the speed (F171 and F172 instructions)

The target speed can be changed by an external signal input during the jog or trapezoidal control operation.

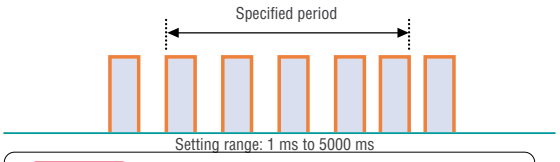


Useful for

- Speed synchronization of transfer/processing equipment.

Measuring the pulse frequency (F178 instruction)

Pulses input in a specified period by a single instruction are counted, and the frequency is calculated.

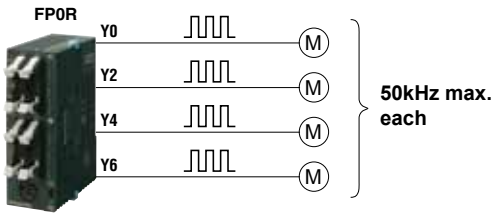


Useful for

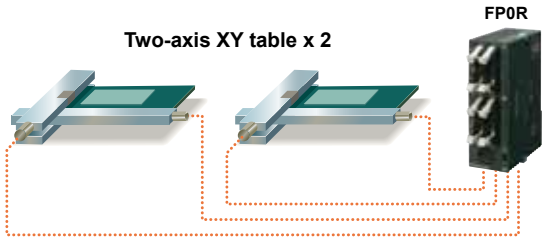
- Detection of motor rotation speed for encoder feedback control

Built-in 4-axis pulse outputs (Transistor output type)

Multi-axis (4-axis) control is available without expansion units.

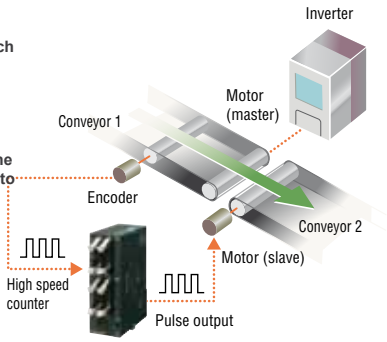


Two sets can simultaneously undergo two-axis linear interpolation (F175 instruction).



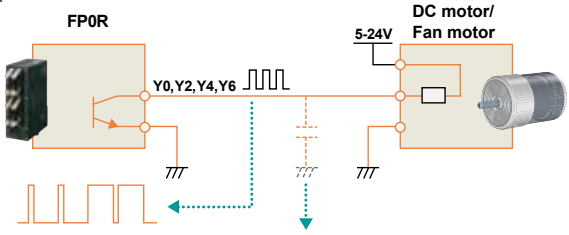
Simultaneously usable high speed counters (6 channels) and pulse outputs (4 channels)

The right-hand figure, the speed of conveyor 1, which is inverter-controlled, is measured based on the encoder pulse count, and pulses are output to the slave motor (for jog operation) according to the measured speed in order to synchronize the speed of conveyor 2.



Built-in multipoint PWM outputs (4 channels)

A single FP0R unit can control the speeds of up to six DC motors/fan motors. It also can serve as an analog voltage output unit.



The speed can be controlled by changing the ON width of the PWM output within a range of 0.1% to 99.9%.

The unit can also serve as an analog voltage output unit (resolution: 1/1000) when a smoothing capacitor is inserted in the circuit.

Part numbers & specifications

Control units

10 points	14 points	16 points	32 points	32 points	32 points
Terminal block type Input: 6, Relay output: 4	Terminal block type Input: 8, Relay output: 6	MIL connector type Input: 8, Transistor output: 8	MIL connector type Input: 16, Transistor output: 16	MIL connector type Input: 16, Transistor output: 16	MIL connector type Input: 16, Transistor output: 16
				 T type	 F type
AFP0RC10RS With RS232C AFP0RC10CRS	AFP0RC14RS With RS232C AFP0RC14CRS	AFP0RC16T AFP0RC16P With RS232C AFP0RC16CT AFP0RC16CP	AFP0RC32T AFP0RC32P With RS232C AFP0RC32CT AFP0RC32CP	With RS232C AFP0RT32CT AFP0RT32CP	With RS232C AFP0RF32CT AFP0RE32CP

Performance specifications (FP0R control units)

Product type			C10 series (Relay output type only)	C14 series (Relay output type only)	C16 series (Transistor output type only)	C32 series (Transistor output type only)	T32 series (Transistor output type only)	F32 series (Transistor output type only)
Programming method / Control method			Relay symbol / Cyclic operation					
Number of I/O points	No expansion (control unit only)		10 points [Input: 6, Relay Output: 4]	14 points [Input: 8, Relay Output: 6]	16 points [Input: 8, Transistor Output: 8]	32 points [Input: 16, Transistor Output: 16]	32 points [Input: 16, Transistor Output: 16]	
	W/expansion 1 * Same type of control and expansion units		Max. 58 points	Max. 62 points	Max. 112 points	Max. 128 points	Max. 128 points	
	W/expansion 2 * Mix type of relay and transistor units		Max. 106 points	Max. 110 points	Max. 112 points	Max. 128 points	Max. 128 points	
Program memory			EEP-ROM (no back up battery required)					
Program capacity			16 k steps			32 k steps		
Number of instructions		Basic	Approx. 110					
		High-level	Approx. 210					
Operation speed		Up to 3000 steps	Basic instructions: 0.08 µsec min. Timer instructions: 2.2 µsec min. High-level instructions: 0.32 µsec (MV instruction) min.					
		3001st and later steps	Basic instructions: 0.58 µsec min. Timer instructions: 3.66 µsec min. High-level instructions: 1.62 µsec (MV instruction) min.					
Operation memory points	Relay	Internal relay (R)	4096 points					
		Timer/Counter (T/C)	1024 points					
	Memory area	Data register (DT)	12315 words			32765 words		
		Index register (IX, IY)	14 words (IO to ID)					
Master control relay points (MCR)			256 words					
Number of labels (JMP and LOOP)			256 labels					
Differential points			Equivalent to the program capacity					
Number of step ladder			1000 stages					
Number of subroutines			500 subroutines					
Special functions	High speed counter		Single-phase: 6 points (50 kHz max. each) 2-phase: 3 channels (15 kHz max. each)*					
	Pulse output		—		4 points (50 kHz max. each) Two channels can be controlled individually.*			
	PWM output		—		4 points (6 Hz to 4.8 kHz)			
	Pulse catch input/interrupt input		Total 8 points (with high speed counter)					
	Interrupt program		Input: 8 programs (6 programs for C10 only) / Periodic: 1 program / Pulse match: 4 programs					
	Periodical interrupt		In units of 0.5 msec: 0.5 msec to 1.5 sec / In units of 10 msec: 10 msec to 30 sec					
	Constant scan		In units of 0.5 msec: 0.5 msec to 600 msec					
	RS232C port		One RS232C port is mounted on each of C10CRS, C10CRM, C14CRS, C14CRM, C16CT, C16CP, C32CT, C32CP, T32CT, T32CP, F32CT and F32CP type (3P terminal block) Transmission speed (Baud rate): 2400 to 115200 bits/s, Transmission distance: 15 m 9.843 ft. Communication method: half duplex					
Maintenance	Memory back up	Program and system register	Stored program and system register in EEP-ROM					
		Operation memory	Stored fixed area in EEP-ROM Counter: 16 points Internal relay: 128 points Data register: 315 words				Backup of the entire area by a built-in secondary battery	Backup of the entire area by FRAM (without the need for a battery)
	Self-diagnostic function		Watchdog timer (Approx. 690 msec), program syntax check					
	Real-time clock function		—				Available	—
	Other functions		Rewriting in RUN mode, download in RUN mode (incl. comments) 8-character password setting, and program upload protection					

* For the limitations while operating units, see the manual.

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