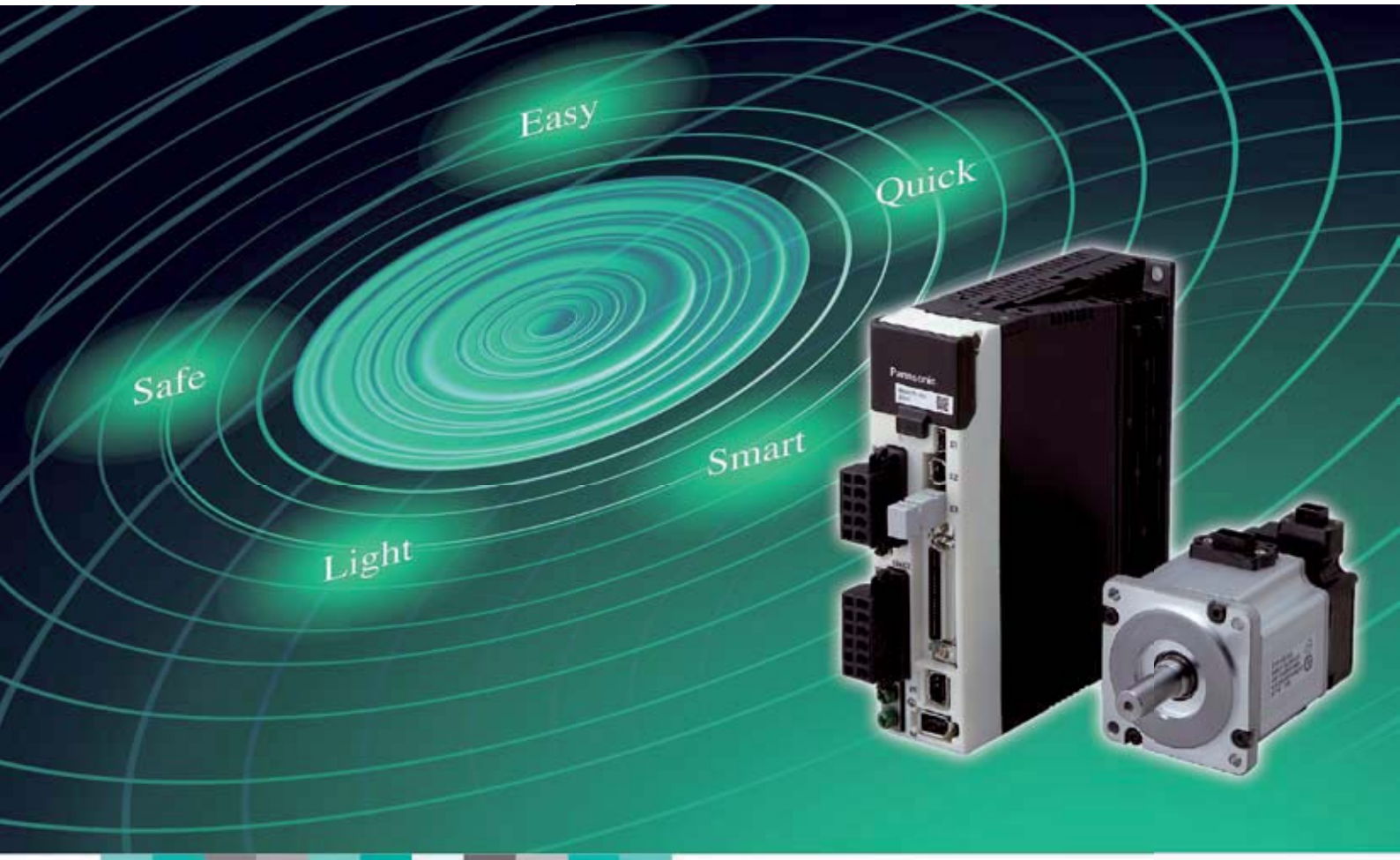
Panasonic
ideas for life



Motion Control Solutions

FP-Series PLCs FP0R, FP-X, FPΣ (Sigma), FP2
Minas Series Servo Drives

12/2009

Panasonic Motion Control Solutions

Overview

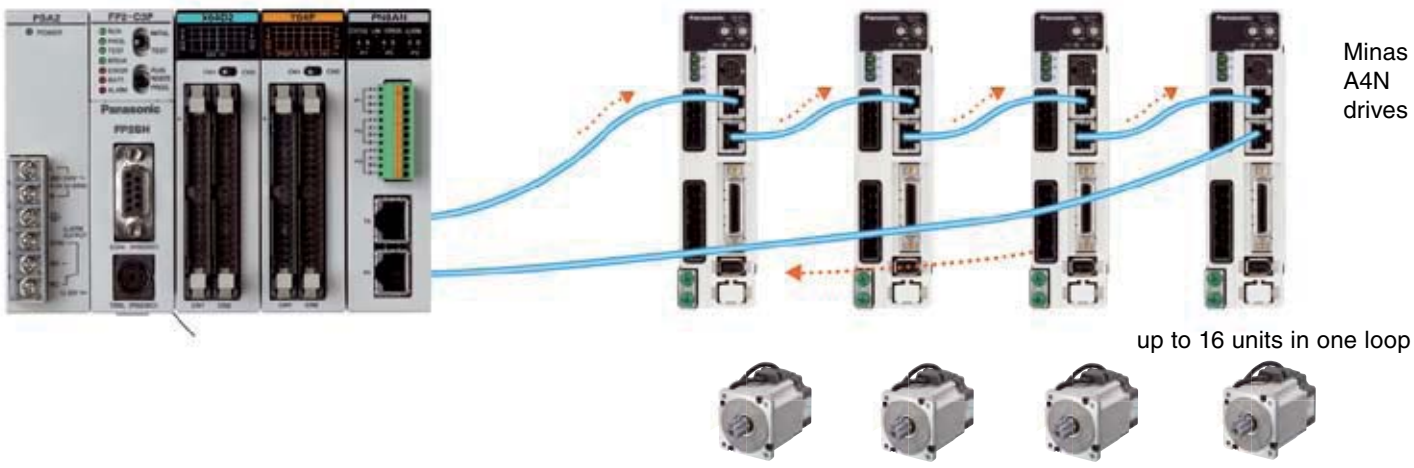
■ A POWERFUL COMBINATION: PANASONIC PLCs & PANASONIC SERVO DRIVES

1. Pulse train: highly accurate, fast, and efficient

CPU only or positioning expansion units

Minas A4 or Minas A5 drives

2. Real-Time Ethernet RTEX: intelligent, easy, powerful



Minas A4N drives

up to 16 units in one loop

3. Easy serial connection to Minas A4P servo drives

Free function block library for FPWin Pro available

RS485

Minas A4P drives

FP-X with COM cassette

up to 32 units

AUDIN - 8, avenue de la malle - 51370 Saint Brice Courcelles - Tel : 03.26.04.20.21 - Fax : 03.26.04.28.20 - Web : http: www.audin.fr - Email : info@audin.fr

FP-series PLCs

Overview

FP0R

PLC	FP0RC16	FP0RC32
Type	FP0RC16T / FP0RC16P	FP0RC32T / FP0RC32P
Type with 2nd RS232	FP0RC16CT / FP0RC16CP	FP0RT32CT / FP0RC32CP
Type with built-in FRAM	–	FP0RF32CT / FP0RF32CP
Number of axes supported	4x50kHz pulse train	
Main functions	Positioning	
Axis interpolation	2 axes linear	
Functions	Independent positioning	

FPΣ (Sigma)

PLC	FPG-C28P / FPG-C32T	FPG-C24R2 / FPG-C28P / FPG-C32T		FPG-C24R2 / FPG-C28P / FPG-C32T		
Type	Transistor output CPU only	Any FPΣ (Sigma) CPU with positioning unit		Any FPΣ (Sigma) CPU with RTEX positioning unit		
Expansion unit	Not required	FPG-PP11 / FPG-PP12	FPG-PP21 / FPG-PP22	FPG-PN2AN	FPG-PN4AN	FPG-PN8AN
Number of axes supported	2	4	8	4	8	16
Main functions	Positioning	Positioning		Positioning		
Axis interpolation	2 axes linear	2 axes linear and circular		2 axes circular, 3 axes linear		
Functions	Independent positioning	Home return with adjustable speed		100Mbps communication		
		High-speed startup		Easy setup with Configurator PM		
		Linear / S-curve acceleration and deceleration		Complete control via PLC		
		Real-time frequency adjustment		Less wiring needed		
		Pulser input		Pulser input		

FP-X

PLC	FP-X C14		FP-X C30 / FP-X C60	
CPU type	Relay output	Transistor output	Relay output	Transistor output
Pulse I/O cassettes	1 AFPX-PLS supported	Not supported	2 AFPX-PLS supported	Not supported
Number of axes supported	1	3	2	4
Output type	CW/CCW, pulse + direction output			
Axis interpolation	–	2 axes linear	2 axes linear	2 x 2 axes linear
Functions	Trapezoidal speed profile control			
	Positioning			
	Home return with adjustable speed			
	Table-shaped control			

FP2 / FP2SH

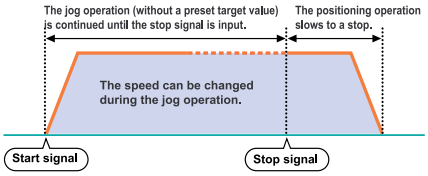
PLC	FP2	FP2SH	FP2 / FP2SH		
Type	Any FP2 CPU with Positioning unit		Any FP2 CPU with RTEX Positioning unit		
Expansion unit	FP2-PP21 / FP2-PP22 / FP-PP41 / FP-PP42		FP2-PN2AN	FP2-PN4AN	FP2-PN8AN
Number of axes supported	64	88	28	56	112
Main functions	Independent positioning (pulse train)		Independent positioning		
Axis interpolation	3 axes linear		3 axes linear		
	2 axes circular		2 axes circular		
	4		3 axes spiral		
Functions	Home return with adjustable speed		100Mbps communication		
	High-speed startup		Easy setup with Configurator PM		
	Linear / S-curve acceleration and deceleration		Complete control via PLC		
	Real-time frequency adjustment		Less wiring needed		
	Pulser input		Pulser input		

FP-series PLCs

Positioning with FP0R

■ Jog positioning control (F171 instruction)

The 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.

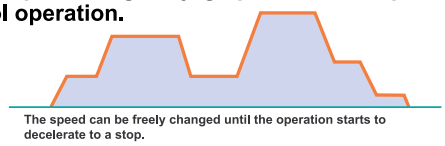


Useful for

- 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

■ Changing the speed (available for F171 and F172 instructions)

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



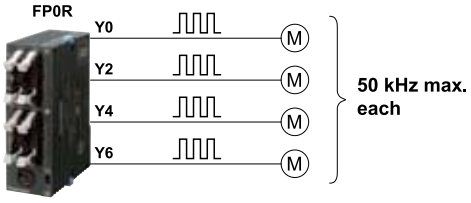
Useful for

- Speed synchronization of transfer/processing equipment.

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

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

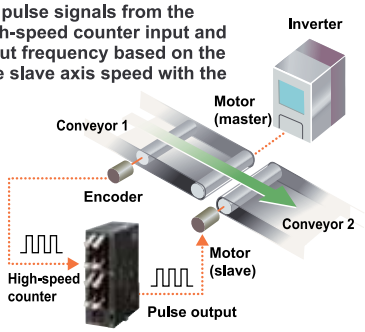
The built-in 4-axis pulse outputs allow multi-axis motor control without positioning units or other expansion units.



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

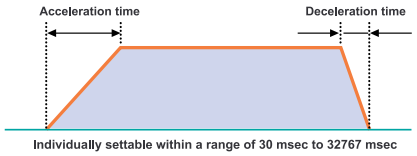
Ladder programs can be combined to create an application for counting pulse signals from the encoder through the high-speed counter input and adjusting the pulse output frequency based on the count to synchronize the slave axis speed with the master axis speed.

In 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.



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

The acceleration time and deceleration time can be individually set.

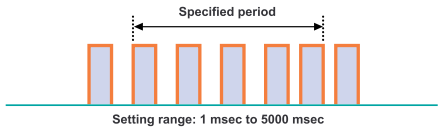


Useful for

- 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

■ Measuring the pulse frequency (F178 instruction)

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

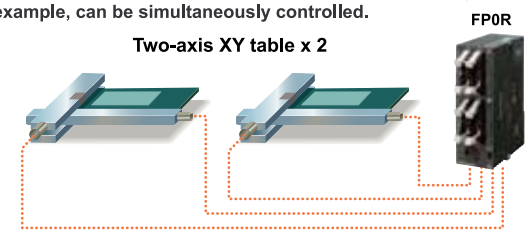


Useful for

- Detection of motor rotation speed for encoder feedback control

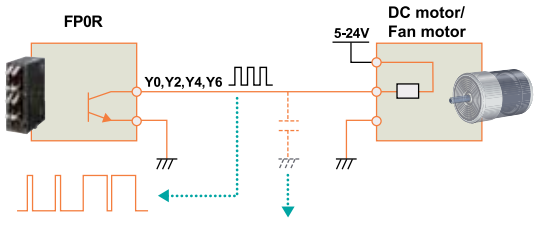
Two sets can simultaneously undergo two-axis linear interpolation.

No complicated speed calculation or programming is required. Two-axis linear interpolation is available by using the F175 dedicated instruction. Two sets such as two X-Y tables, for example, can be simultaneously controlled.



■ 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.

FP-series PLCs

Positioning with FPΣ (Sigma)

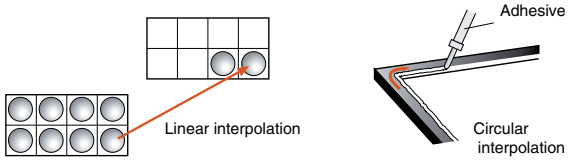
The FPΣ (Sigma) positioning unit supports ultra-high speed linear servo motors.
All-purpose device capable of linear interpolation and circular interpolation.

Pulse output of up to 4Mpps and high-speed startup at 0.005ms enable linear servo motor control.

FPΣ (Sigma) positioning unit

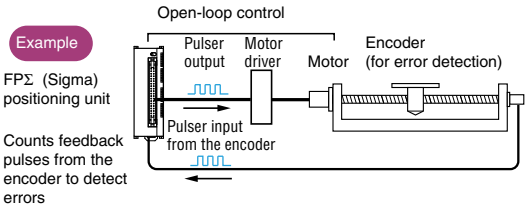
The linear and circular interpolation functions support a wide variety of applications.

These interpolation functions enable simultaneous two-axis control, which can support applications that up to now have been difficult to handle using conventional compact PLCs.

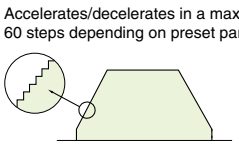


Error detection is available by using the high-speed counter in combination.

Unexpected accidents, such as errors in the driving system, can be detected by setting the counter so that it counts the feedback pulses from the encoder during positioning.

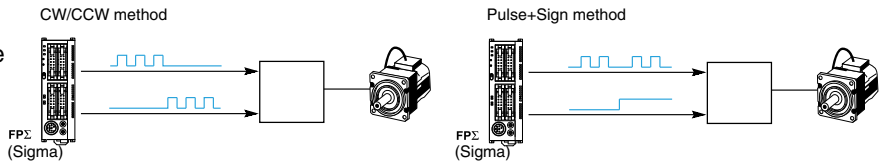


Smooth acceleration/deceleration enables smooth startup.



CW/CCW is also supported.

Pulse+Sign method. Cost reduction of the whole system can be achieved by using FPΣ (Sigma) with small stepping motors or servo motors that do not support the pulse-and-sign method.

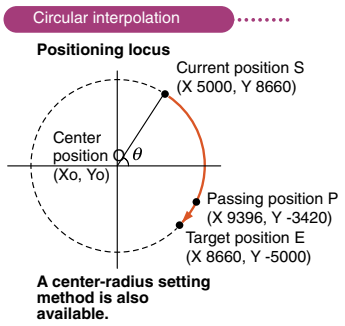


The control unit on its own can provide two-axis control.

The control unit has a pulse output of 100kpps and startup speed of 0.02ms, which provide sufficient performance for normal positioning.

Convenient and easy programming and selectable home return mode.

- Uses a data table for setting parameters, such as startup speed, target speed, acceleration/deceleration time.
- Comes with dedicated instructions for each mode: trapezoidal control, home return, JOG operation, free table operation, linear interpolation and circular interpolation.
- The home return method is selectable depending on the design, e.g. when only a single sensor is being used.
- Output of the deviation counter reset signal upon completion of return to home position is also available.



Unit type and product number

Type	Output type	Product number
1-axis type	Transistor	FPGPP11
2-axis type	Transistor	FPGPP21
1-axis type	Line driver	FPGPP12
2-axis type	Line driver	FPGPP22

Type	Output type	Product number
FPΣ (Sigma) CPU	Transistor NPN	FPG-C32T2H-A
FPΣ (Sigma) CPU	Transistor PNP	FPG-C28P2H-A

FP-series PLCs

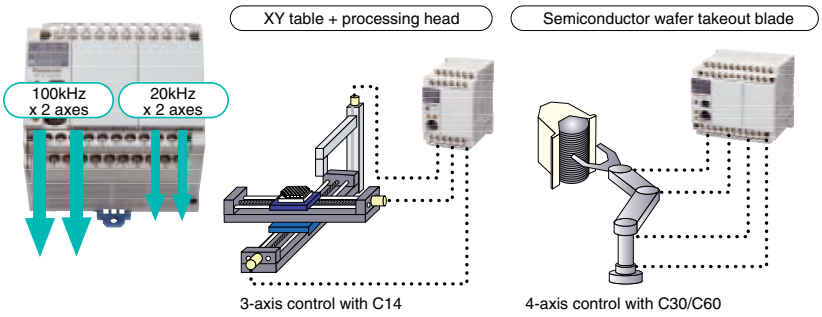
Positioning with FP-X

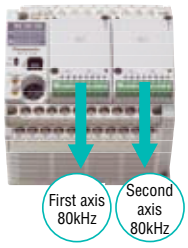
FP-X perfectly fits the need for low cost “multi-axis positioning control in small-scale equipment”.

Built-in 4-axis pulse output (transistor output type).

The transistor output type C14 comes with 3-axis pulse output while C30/60 comes with 4-axis pulse output inside the control unit. Multi-axis control, which previously required a higher-level PLC, additional positioning unit, or two or more PLC units, can now be achieved with only one FP-X transistor output type unit in a small space at a low cost. In addition, as this type does not require a pulse I/O cassette as needed for a relay output type, other function expansion cassettes such as communication or analog input can be attached for more diversified applications.

Item	Specification
Pulse output Max. frequency	C14: 100kHz (CH0,1), 20kHz (CH2) C30, C60: 100kHz (CH0,1), 20kHz (CH2,3)
Output type	Transistor output type PNP
Function	Trapezoidal control, multi-stage operation, jog operation, origin return, 2-axis linear interpolation



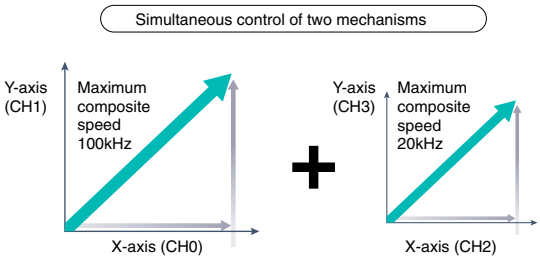


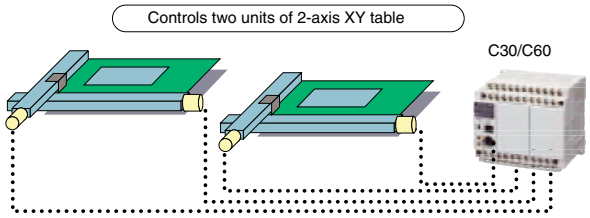
The relay output type can control two axes by using expansion cassettes.

2-axis 80kHz pulse output is possible by attaching two pulse I/O cassettes (AFPX-PLS). This type is also capable of performing 2-axis linear interpolation. The pulse I/O cassette does not work with the control unit transistor output type.

2-axis linear interpolation simultaneously in two sets (transistor output type).

2-axis linear interpolation simultaneously controls two motor shafts, allowing you, for example, to move a robot arm diagonally. It is used for palletising, component pick and place, XY table control, contour cutting of a PC board, etc. The FP-X transistor output type is capable of simultaneously controlling 2-axis linear interpolation, for the first time in the industry with a compact pulse-output PLC. This unit greatly expands the range of applications as well as providing the added convenience of programming by using the linear interpolation command F175 (SPSH).





The relay output type is also capable of 2-axis linear interpolation.

By adding two pulse I/O cassette units, linear interpolation is possible at a maximum composite speed of 80kHz. The command used for this unit is F175 (SPSH) as for the transistor output types.

FP-X type overview

		Power supply	Output type	In-puts	Out-puts
	AFPXC14TD	24VDC	Transistor NPN	8	6
	AFPXC14T	100 to 240VAC	Transistor NPN	8	6
	AFPXC14PD	24VDC	Transistor PNP	8	6
	AFPXC14P	100 to 240VAC	Transistor PNP	8	6
	AFPXC30TD	24VDC	Transistor NPN	16	14
	AFPXC30T	100 to 240VAC	Transistor NPN	16	14
	AFPXC30PD	24VDC	Transistor PNP	16	14
	AFPXC30P	100 to 240VAC	Transistor PNP	16	14

FP-X type overview

		Power supply	Output type	In-puts	Out-puts
	AFPXC60TD	24VDC	Transistor NPN	32	28
	AFPXC60T	100 to 240VAC	Transistor NPN	32	28
	AFPXC60PD	24VDC	Transistor PNP	32	28
	AFPXC60P	100 to 240VAC	Transistor PNP	32	28

FP-series PLCs

FP2 and FP2SH positioning units

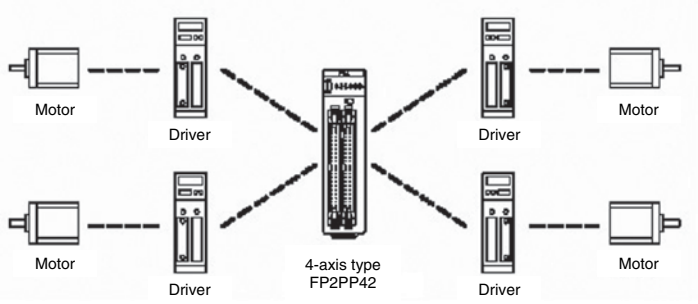
FEATURES

- Maximum 4Mpps command gives high-speed, high-precision positioning.
- 0.005ms high-speed drive reduces tact-time (start-up time is the time from reception of the CPU unit start-up command to release of the pulse output by the positioning unit).
- 4 axes per unit means versatility and saves space.
- S (sight-shaped) acceleration/deceleration function provides smooth starting and stopping.
- Feedback pulse count function makes output pulse counting possible for encoders, etc.
- The pulse input function allows users to generate pulses manually to adjust machines, for example.

Operation modes:

- E-point control
- P-point control
- Homing function
- Jog operation function
- Pulser input function
- Interpolation
- Single speed acceleration/deceleration
- Multistage acceleration/deceleration
- Fast startup of 0.02 or 0.005ms makes cycle time reduction possible
- Acceleration/deceleration control: Linear or 4 types of S-curve: Sine, quadratic, cycloid and cubic curves (for smooth startup and stopping)

UP TO 4 AXES PER POSITIONING MODULE:



FP2 CPU types		
Type	**Program capacity**	**Product number**
FP2 Standard CPU	16k steps	FP2C1
FP2SH CPU	60k steps	FP2C2
FP2SH CPU	120k steps	FP2C3

FP2 positioning units		
Number of axes	**Output type**	**Product number**
2	Transistor	FP2PP21
2	Line driver	FP2PP22
4	Transistor	FP2PP41
4	Line driver	FP2PP42

FP2 power supplies		
Supply voltage	**Power**	**Product number**
200–240VAC	2.5A	FP2PSA2
100–240VAC	5A	FP2PSA3

FP2 backplanes	
Description	**Product number**
FP2 backplane 5 modules	FP2BP05
FP2 backplane 7 modules	FP2BP07
FP2 backplane 9 modules	FP2BP09
FP2 backplane 12 modules	FP2BP12
FP2 backplane 14 modules	FP2BP14

FP-series PLCs

RTEX positioning units for FPΣ (Sigma) and FP2/FP2SH

REAL-TIME ETHERNET SERVO SYSTEM FOR MINAS A4N SERVO DRIVES

Positioning units for FPΣ (Sigma) and FP2 PLCs support Minas A4N network servo drives. A mutually optimised system consisting of PLC and servo drive greatly simplifies installation.

ADVANTAGES:

- Easy control of network servos with an ultracompact PLC.
- Allows highly accurate control of multi-axis positioning using high-speed 100Mbps communication.
- Commercial LAN cables greatly reduce wiring costs.
- New product lineup includes a new 2-axis unit in addition to the 4-axis and 8-axis units.
- Dedicated software tool Configurator PM provides total support, from configuration and startup to monitoring.
- Includes manual pulser input allowing support for precision teaching.

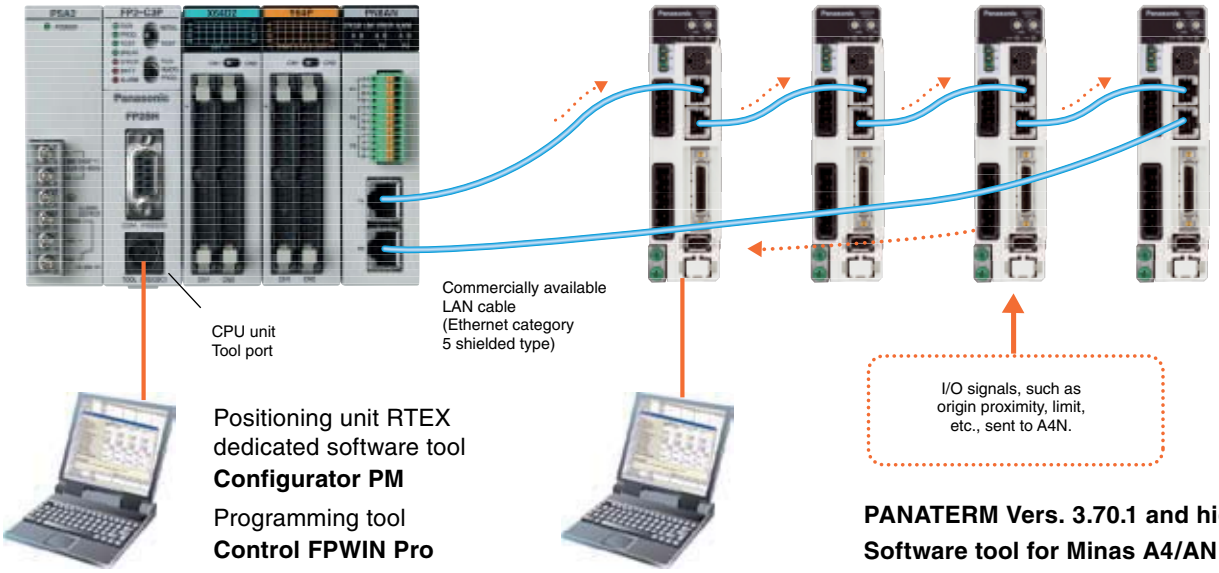
SYSTEM CONFIGURATION

No. of positioning units per RTEX unit

FPΣ (Sigma): 2 units

FP2: 14 units (limited by consumption current)

Control of 2 to 8 axes in one positioning unit



Positioning unit RTEX dedicated software tool
Configurator PM

Programming tool
Control FPWIN Pro

PANATERM Vers. 3.70.1 and higher
Software tool for Minas A4/AN servo drives

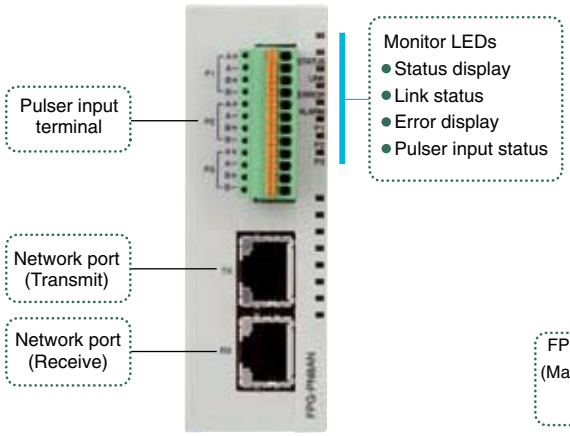
FP-series PLCs

RTEX multi-axis network servo system

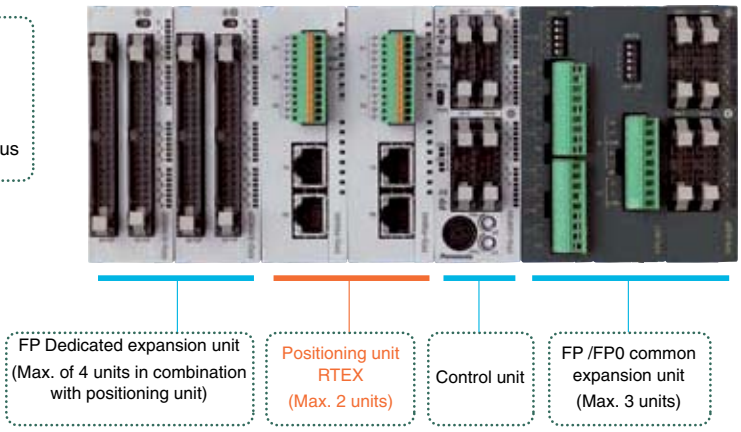
■ FPΣ (SIGMA) POSITIONING UNIT RTEX – THE WORLD'S FIRST SERVO SYSTEM WITH ULTRACOMPACT PLC!

- Maximum number of control axes: 16 axes. Realisation of highly accurate 2-axis circular interpolation, 3-axis linear interpolation and 3-axis spiral interpolation with high-speed 100Mbps communication.
- With 3 types in the product range, for 2 axes, 4 axes and 8 axes, provides flexible support even for control of small numbers of axes.
- Provides a rich environment for total control of equipment including I/O control, with a powerful control unit with 32k step program capacity/max. 320 I/O points/serial communication on 3 ports.

FPΣ Positioning unit RTEX



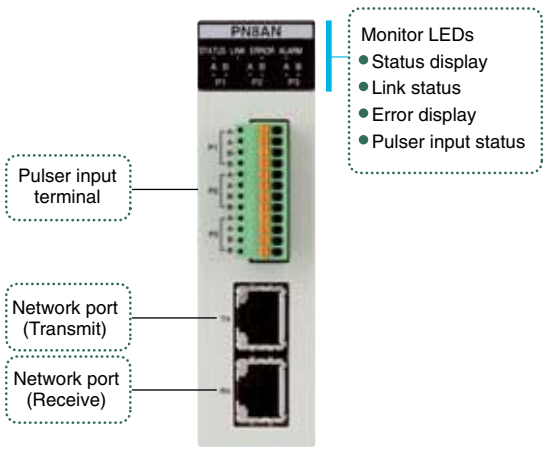
Configuration example: 16 axes + I/O (256)



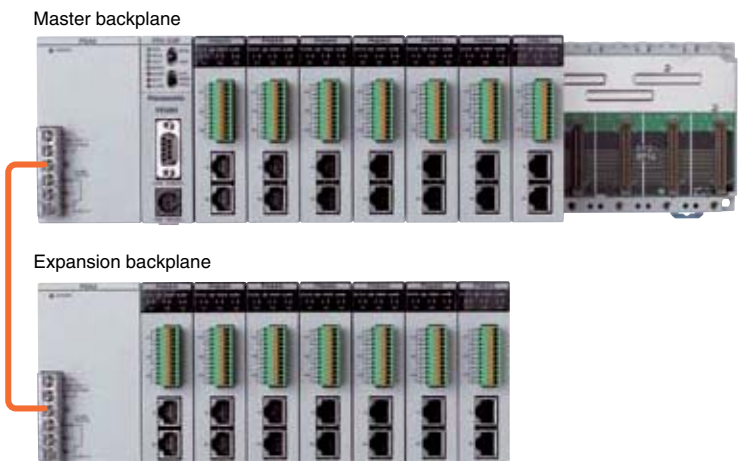
■ ULTRA-HIGH SPEED PROCESSING WITH FP2/FP2SH

- Installation of up to 14 units with 8 axes is possible bringing the number of control axes up to 112.
- With the addition of 2 axis, 4 axis and 8 axis units to the product lineup, flexible system configurations from small to large numbers of axes are possible.
- RTEX in combination with the ultra-high-speed and large capacity FP2SH CPU unit [20k steps/1ms (as measured in in-house experiments) and 120k step program capacity] provides sufficient support also for large-scale equipment.

FP2/FP2SH Positioning unit RTEX



Configuration example: 8 axes x 14 modules = 112 axes



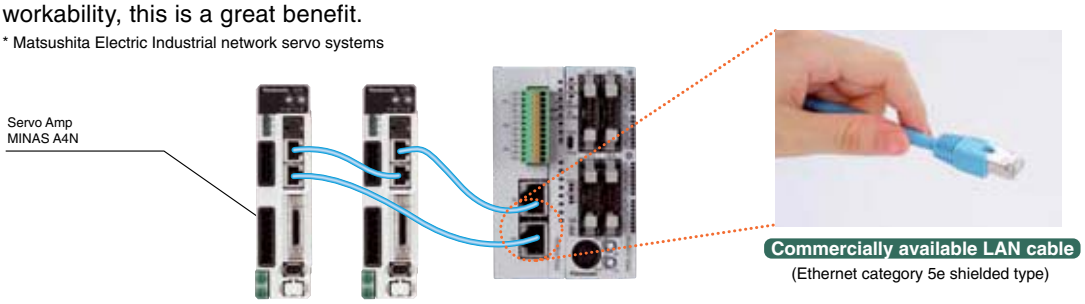
FP-series PLCs

RTEX multi-axis network servo system

BROAD REDUCTION IN WIRING COSTS

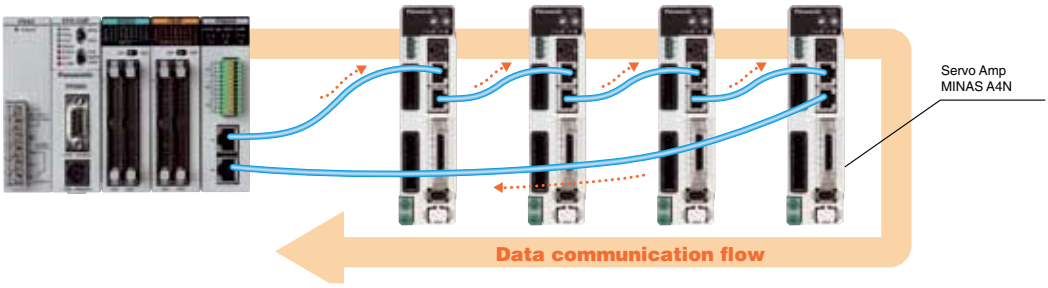
Realtime Express* uses commercially available LAN cables as wiring for its network. In terms of cost efficiency, availability and workability, this is a great benefit.

* Matsushita Electric Industrial network servo systems



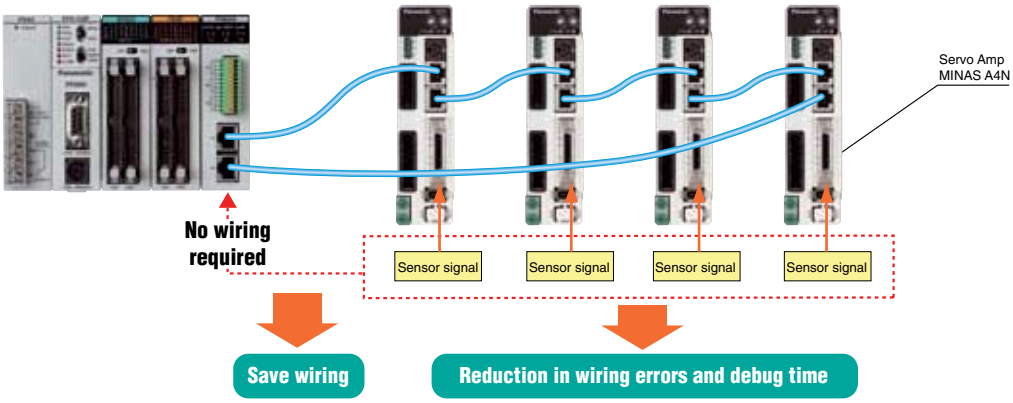
HIGH RELIABILITY WITH LOOP WIRING

Transmitted and received data in serial communication is normally sent and received at frequent intervals in the same cable making the communication state extremely sensitive to environmental conditions such as noise. However, by using loop wiring as shown in the figure below, Realtime Express provides high reliability by creating smooth communication conditions with the data flow always in the same direction. In addition, by utilising the 100Mbps high communication speed, Realtime Express reads the data transmissions which occur every 0.5ms twice and carries out data transfer in the extremely short period of 1ms, further improving reliability.



ADVANCED WIRING METHOD

Sensor input (origin proximity, limit) is wired directly to the servo amp of each axis and the signal is transferred through the network to the positioning unit. This enables you to check at a glance which sensor input is connected to which axis. Wiring errors are reduced and the time required for debugging shortened, especially when the system deals with large numbers of axes. In addition, even if the positioning unit and servo amp are far apart, it is not necessary to wire the signal from a sensor which is close to the servo amp to the distant positioning unit, further reducing the amount of wiring.



FP-series PLCs

RTEX multi-axis network servo system

FUNCTIONS

Operating patterns
- E-point trapezoidal control (PTP control)
- P-point change speed control (CP control)
- C-point repeated trapezoidal control (PTP control)

Low speed test operation mode (speed setting)
- The acceleration/deceleration time and target speed for each point indicated in the data table can be set to a low speed in the range of 1 to 100% without actually changing the data itself. Test operations can be carried out safely by checking the operation of the device at low speed.

Control methods
- Absolute method, increment method

Interpolation operation modes
- 2-axis circular, 2-axis linear
- 3-axis spiral, 3-axis linear

Movement unit settings
- Pulse (pulse), scale (µm, inch), angle (degree)

Auxiliary output
- Codes can be output during operation according to the data table number.

Acceleration/deceleration method
- Linear, S-curve

JOG operation
- Speed and acceleration/deceleration time can be changed during operation.

Origin return
- Origin proximity (DOG) search method

Pulser input
- 2-phase quad edge – max. 1Mpps
- Division ratio setting possible by specification of numerator/denominator.

SPECIFICATIONS OF RTEX POSITIONING UNITS

			2-axis type		4-axis type		8-axis type	
Unit specifications	Product number FPΣ (Sigma)/FP2		FPGPN2AN	FP2PN2AN	FPGPN4AN	FP2PN4AN	FPGPN8AN	FP2PN8AN
	Positioning control functions	Control method	PTP Control, Cursor Path (CP) Control					
		Interpolation control	2-axis/3-axis linear interpolation • 2-axis circular interpolation • 3-axis spiral interpolation					
		Control units	Pulse/µm/inch/degree					
		Position data	600 points for each axis					
		Backup	Parameters and data file can be saved to FROM					
		Acceleration/deceleration method	Linear acceleration/deceleration/S-curve acceleration/deceleration					
		Acceleration/deceleration time	0 to 10,000ms (1ms units) different settings for acceleration and deceleration are possible					
		Positioning area	(-1,073,741,823 to 1,073,741,823 pulse) increment and absolute specification					
	Speed control functions		Supported with JOG operation (free rund operation)					
	Origin functions	Search method	Origin proximity (DOG) search					
		Creep speed	Free settings possible					
	Other functions		Pulser input operation support					
			Auxiliary output code, auxiliary output contact support					
			Dwell time support					
Communication specifications	Communication speed		100Mbps					
	Cable		Commercially available LAN straight cable (shielded category 5e)					
	Connection method		Ring method					
	Communication cycle/no. of terminals		0.5ms: Max. 8 axes/system (command cycle: 1ms)					
	Transmission distance		Between terminals: 60m; total length: 200m					

Software

Motion Control Library for FPWIN Pro

Panasonic's Motion Control Library is designed to save programming time with a sophisticated yet user-friendly software solution. Our library includes function blocks programed according to PLCopen's specifications. Developed to simplify programming of FP2 and FPΣ (Sigma) positioning units.

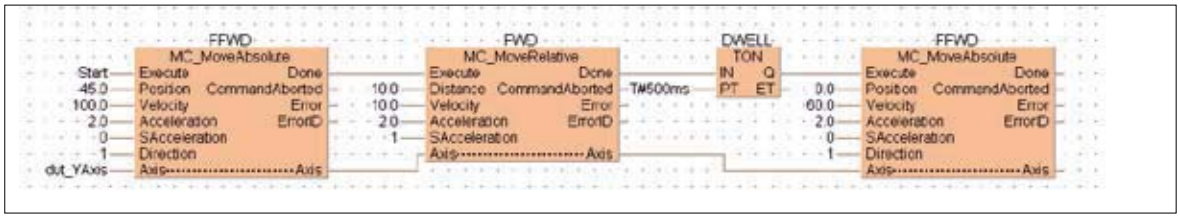
PLCopen, an independent international organization, aims to harmonize access across platforms during development, installation and maintenance based on the IEC 61131-3 environment.

See also: www.plcopen.org/MC_Certification/Panasonic/shortform_statement_Panasonic.htm

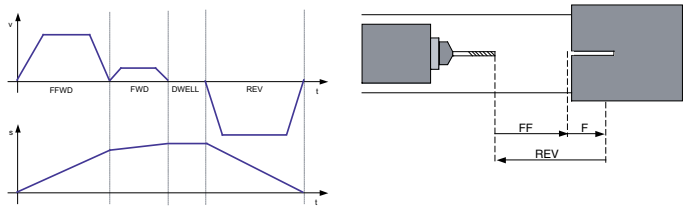
Administrative		Motion	
Single Axis	**Multiple Axis**	**Single Axis**	**Multiple Axis**
MC_Power	MC_CamTableSelect	MC_MoveAbsolute	MC_CamIn
MC_ReadStatus		MC_MoveRelative	MC_CamOut
MC_ReadAxisError		MC_MoveAdditive*	MC_GearIn
MC_ReadParameter		MC_MoveSuperimposed	MC_GearOut
MC_ReadBoolParameter		MC_MoveVelocity	
MC_WriteParameter		MC_Home	
MC_WriteBoolParameter		MC_Stop	
MC_ReadActualPosition		MC_PositionProfile	
MC_Reset		MC_VelocityProfile	
		MC_AccelerationProfile	

* If executed, the current motion is briefly interrupted due to hardware reasons.

PROGRAM, LADDER DIAGRAM BODY



EXAMPLE FOR CONSECUTIVE MOVEMENT IN A DRILLING APPLICATION



Timing diagram

Drilling setup

ADVANTAGES OF PLC PROGRAMS USING THE MOTION CONTROL LIBRARY COMPLIANT WITH THE PLCOPEN STANDARD:

- **Simple –** Easy programming and installation, even for complex applications
- **Efficient –** In the number of function blocks and in design and understanding
- **Consistent –** Compliant with the IEC 61131-3 PLC programming standard
- **Universal –** Hardware-independent
- **Flexible –** Add hardware or expand range of applications at any time
- **Complete –** Comprehensive product line solves typical positioning applications easily

Motion Control Library

Product number NCL-MC-LIB D

Note: FP2 positioning unit multifunction type version 5.4 or newer usable with FPΣ (Sigma) positioning unit

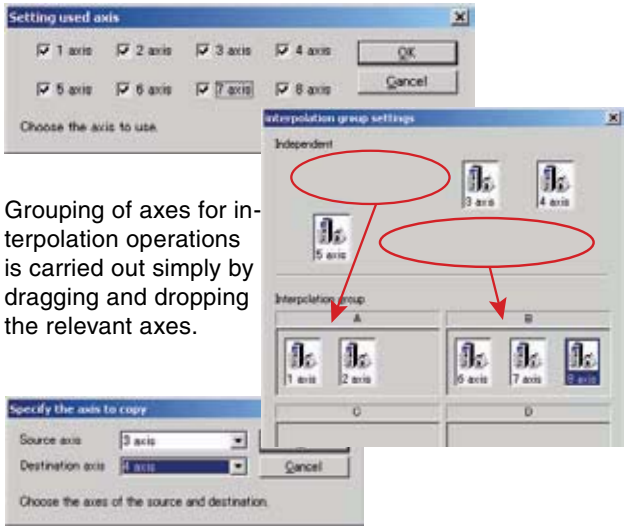
Software

Configurator PM software tool for RTEX

The Configurator PM provides powerful yet simple full support ranging from configuration settings and startup to operation monitoring. This reduces the time and man hours required for system setup.

Axis settings

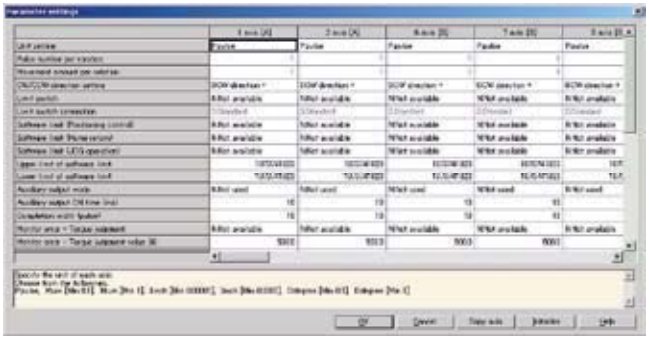
Check the axis to be used. Select axis no. used.



Grouping of axes for interpolation operations is carried out simply by dragging and dropping the relevant axes.

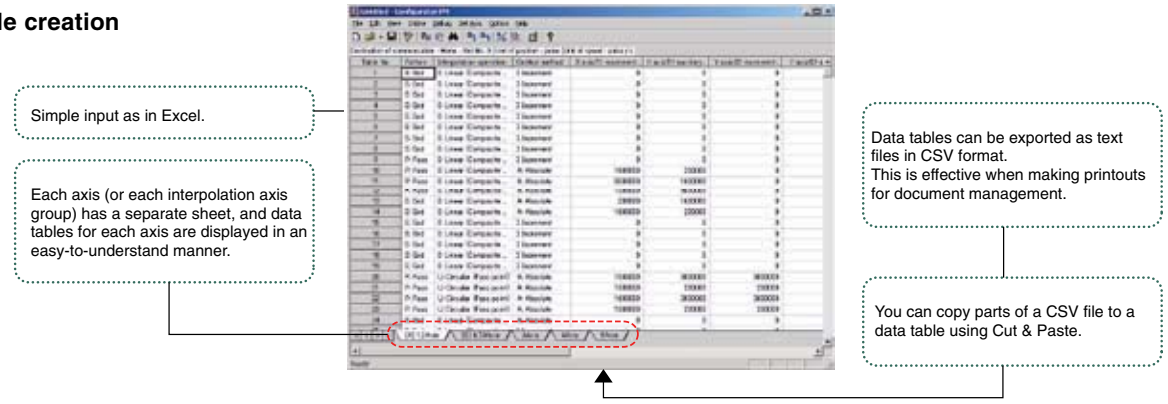
Parameter settings

The details of the settings can be displayed in a table. Details on how to create settings for each category are explained in the box below.



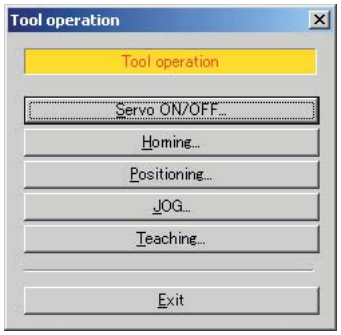
Parameters can be copied between axes. In instances where many settings are shared among the axes, this can reduce the number of repeat inputs.

Data table creation



■ TOOL OPERATIONS

- Each axis can be operated by tool operation independently from the operation modes (PROG and RUN) of the FP control unit (or the FP2 CPU unit).
- JOG operation and teaching can be carried out easily to index positioning points. Test operation is possible without having to create a rudder program.



■ DATA MONITOR

- Data table no. during operation
- Auxiliary output
- Current position, speed and vector
- Error code, warning code (Errors and warnings can also be cleared)

■ STATUS MONITOR

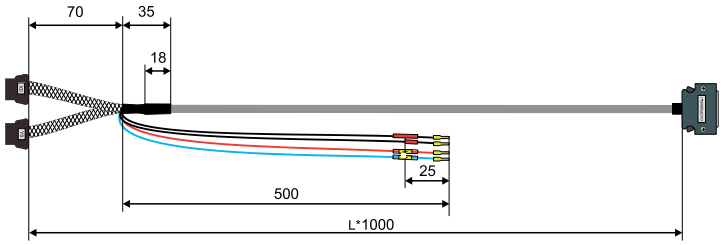
- Connection status of each axis
- Model code of each motor amp and motor connected
- Servo lock status
- Origin proximity input, limit input

Accessories

Direct connection cables to FP-series PLCs

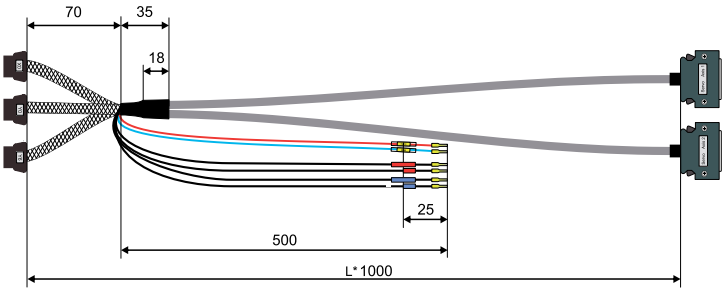
For FPΣ (Sigma) CPU PNP or NPN

One axis



DVOP0980W-1
DVOP0982W-1

Two axes

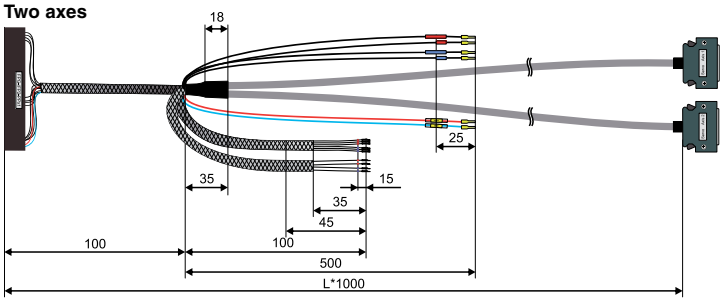


DVOP0981W-1
DVOP0983W-1
DVOP0984W-1

In/out connectors for the PLC FPΣ (Sigma). Unused inputs/outputs can be used for other purposes.

For FPΣ (Sigma) and FP2 Positioning Units (Not for Minas A4N/RTEX transistor or line driver types)

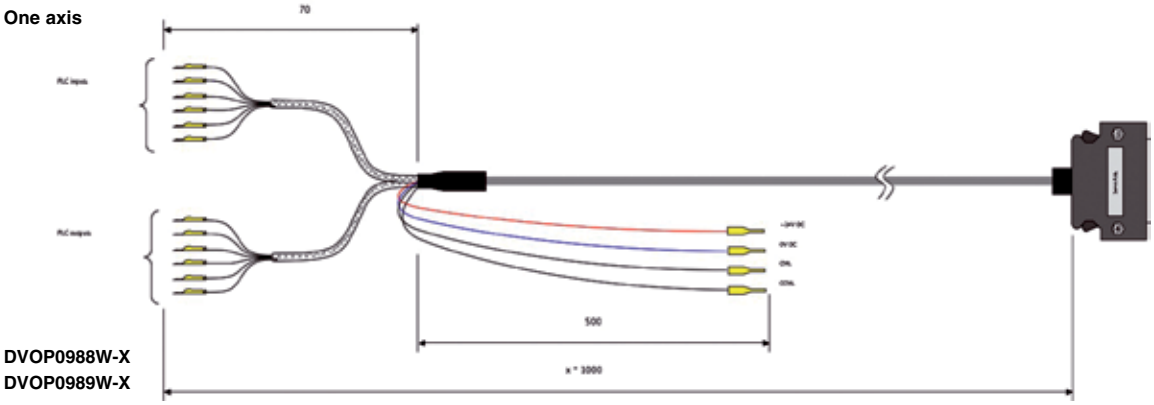
Two axes



DVOP0985W-1
DVOP0986W-1

For flexible wiring to FPΣ (Sigma)/FP0R/FP0

One axis



DVOP0988W-X
DVOP0989W-X

Accessories & additional brochures

Cables, PLCs, HMIs, Inverters

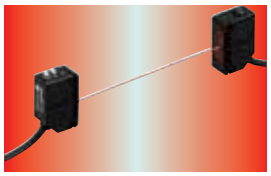
For pulse control, not for Minas A4N / RTEX

Product number	Description	Number of axes	Power range	Length	Connectors
DVOP0980W-1	FPΣ (Sigma) NPN to CN I/F	1	0.05–5kW	1m	50 pin Molex to 2x10 pin MIL
DVOP0981W-1	FPΣ (Sigma) NPN to CN I/F	2	0.05–5kW	1m	2x50 pin Molex to 3x10 pin MIL
DVOP0982W-1	FPΣ (Sigma) PNP to CN I/F	1	0.05–5kW	1m	50 pin Molex to 2x10 pin MIL
DVOP0983W-1	FPΣ (Sigma) PNP to CN I/F	2	0.05–5kW	1m	2x50 pin Molex to 3x10 pin MIL
DVOP0984W-1	FPΣ (Sigma) NPN to CN I/F, with TLC-signal	2	0.05–5kW	1m	50 pin Molex to 2x10 pin MIL, with TLC-signal
DVOP0985W-1	FPΣ (Sigma) / FP2 Positioning units transistor type	2	0.05–5kW	1m	50 pin Molex to 1x40 pin MIL
DVOP0986W-1	FPΣ (Sigma) / FP2 Positioning units line driver type	2	0.05–5kW	1m	50 pin Molex to 1x40 pin MIL
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

ADDITIONAL BROCHURES

Digital AC servo motor drive Minas A5

Advanced, high-performance, multifunctional, and easy to use.



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Programmable controllers from Panasonic offer control benefits that pay for themselves right from the start.

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