Panasonic

OVERVIEW

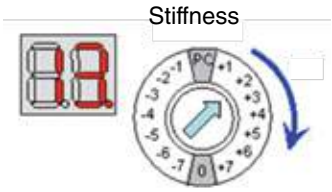
AC SERVO DRIVES & MOTION CONTROL

MINAS LIQI

MINAS LIQI, the simple and cost-effective servo drive solution from Panasonic. Especially for dynamic applications MINAS LIQI offers many advantages as far as reliability, speed, and precision is concerned compared to stepping motors, asynchronous motors or pneumatic solutions. As for the MINAS A5 series, the PANATERM software and the MINAS SELECTION TOOL assist users in setting up and configuring the MINAS LIQI series. The series is optimally suited for the processing industries involving food, packaging, printing, metals, and plastics.

Features

- Incremental encoder: 2500 pulses per revolution
- Response frequency: 1kHz bandwidth (velocity response)
- PANATERM: Free software for configuration and motion simulation via USB port
- Real-time autotuning function during operation
- Damping (1-200Hz) and notch filters (50-5000Hz)
- Rotary switch (RSW): to set the stiffness manually



Driver (50W–1000V AC 1-phase)								
Driver	MINAS LIQI	Type	MBDJT2207			MBDJT2210	MCDJT3220	
	Frame	mm	B (D: 55.5 x H: 150 x W: 150)				C (D: 65.5 x H: 150 x W: 190)	
Rated power		W	50	100	200	400	750	1000
Motor (MSMD*J1* low inertia)**								
Motor		Type	MSMD5AZJ1☐	MSMD012J1☐	MSMD022J1☐	MSMD042J1☐	MSMD082J1☐	MSMD102J1☐
Nominal torque (peak torque)		Nm	0.16 (0.48)	0.32 (0.95)	0.64 (1.91)	1.3 (3.8)	2.4 (7.1)	3.2 (9.5)
Rated rotational speed (max. rotational speed)		rpm	3000 (5000)				3000 (4500)	3000 (4000)
Inertia (with holding brake)		$x10^{-4}$ kg · m^2	0.025 (0.027)	0.051 (0.054)	0.14 (0.16)	0.26 (0.28)	0.87 (0.97)	1.16 (1.26)
Encoder			2500ppr, incremental, resolution: 10000					
Degree of protection			IP65 (excluding shaft feedthrough and connectors)					

☐ = Motor type T = With holding brake S = Without holding brake

MINAS LIQI driver functions

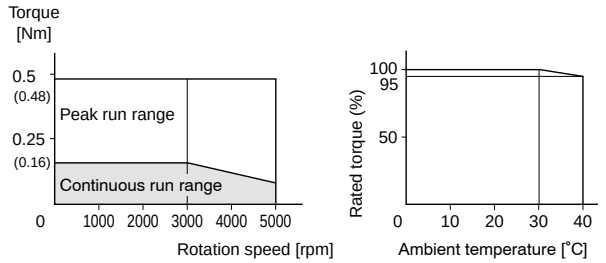
					Frame	MINAS LIQI
Basic specifications	Supply voltage	Main circuit	200V		B	1-phase, 220–240V +5%, -10%, 50/60Hz
					C	1-phase, 220-240V (+5%, -10%), 50/60Hz
		Control circuit			B	1-phase, 220-240V (+5%, -10%), 50/60Hz
					C	1-phase, 220-240V (+5%, -10%), 50/60Hz
	Operating conditions	Temperature				0–50°C, storage temperature: -20 to +65°C (max. temperature 80°C for 72 h)
		Ambient humidity				Operation and storage: 20–85% RH (non-condensing)
		Altitude				Max. 1000m above sea level
		Vibration				Max. 5.88m/s², 10–60Hz (no continuous use at resonance frequency)
	Control method					IGBT sinusoidal PWM
	Encoder	Incremental (default)				2500ppr (resolution 10000, serial incremental encoder)
	Control signals		Input points			6 (multifunctional, customizable)
			Output points			3 (multifunctional, customizable)
	Pulse signals		Input points			2 (photocoupler, line driver)
			Output points			3 line driver (A, B and Z-phase) and 1 open collector (Z-phase)
	Interface		USB			Interface to PC, etc.
	Front panel					2 digital 7-segment LED displays, 2 digital rotary switches
	Braking resistor					External braking resistor only
	Dynamic brake					Built-in
	Control mode					Position control

				MINAS LIQI
Functions	Position control	Control input		1. Clear deviation counter 2. Command pulse inhibition 3. Damping control switching
		Control output		Positioning complete etc.
		Pulse input	Line driver	500kpps
			Signal format	Differential input/square-wave pulse
			Electronic gear	Scaling of pulse frequency from 1/1000 to 1000 times
			Smoothing filter	Primary delay filter or FIR filter, customizable
		Damping control		Available
	Other features	Autotuning		Automatic adjustment of the servo controller's rigidity to the vibration behavior of the mechanical parts and changes to the load
		Division of encoder feedback pulse		Any value up to the max. number of encoder pulses
		Protective function	Error messages causing switch-off	Overvoltage, undervoltage, overspeed, overload, overheat, overcurrent and encoder error, etc.
			Error messages requiring acknowledgement	Excessive position deviation, command pulse division error, EEPROM error, etc.
		Alarm history		Can be logged for reference

☐ = Motor type, please refer to page 10.

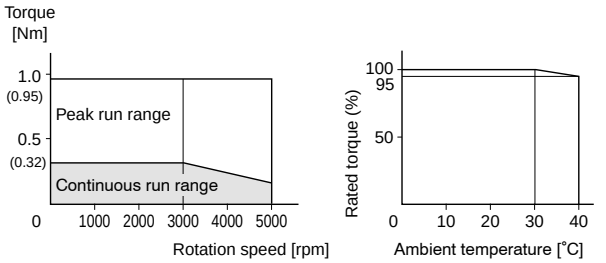
MSMD5AZJ1☐

Without oil seal



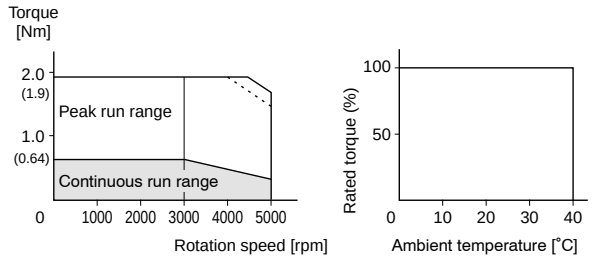
MSMD012J1☐

Without oil seal



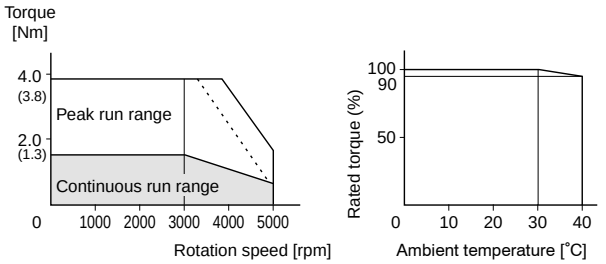
MSMD022J1☐

Without oil seal



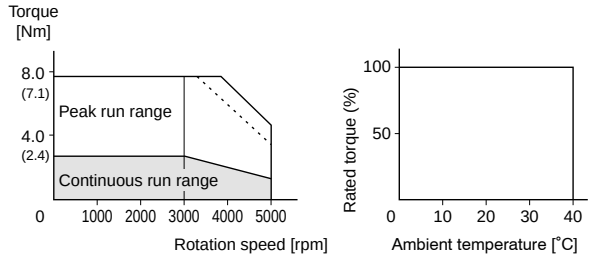
MSMD042J1☐

Without oil seal



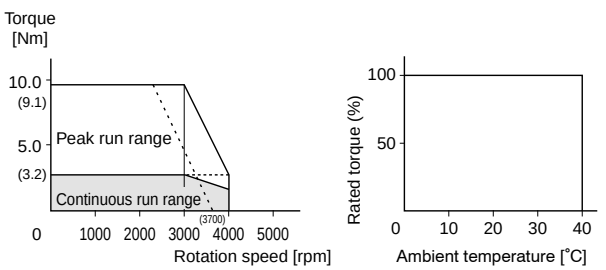
MSMD08J1☐

Without oil seal



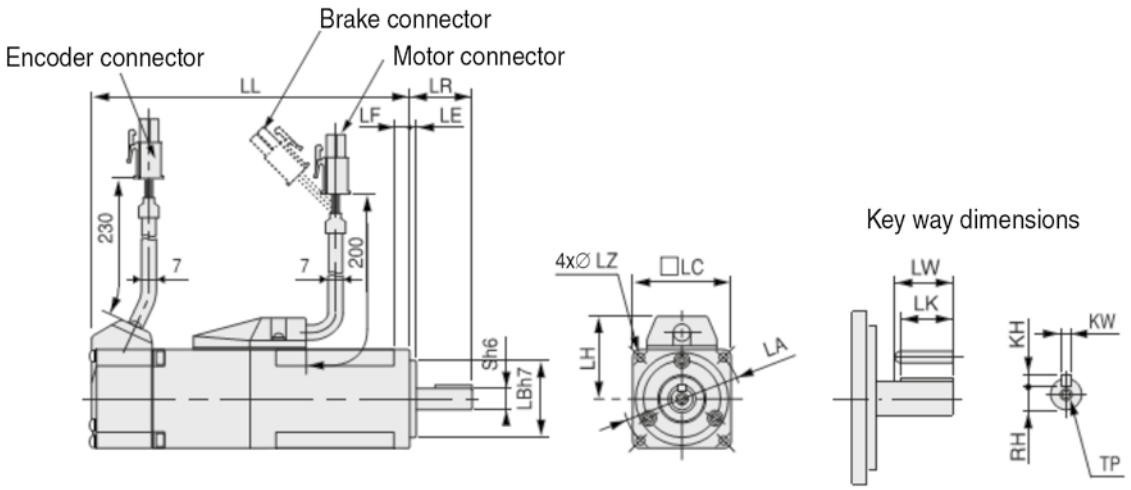
MSMD102J1☐

Without oil seal



☐ = Motor type, please refer to page 10.

MINAS LIQI motor dimensions

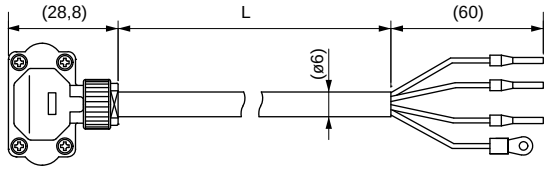
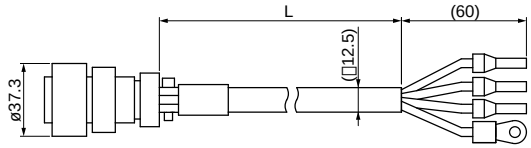
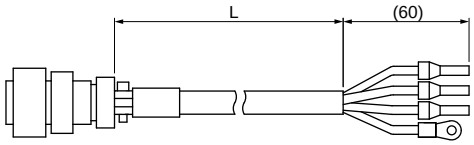
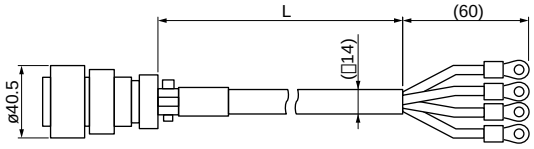
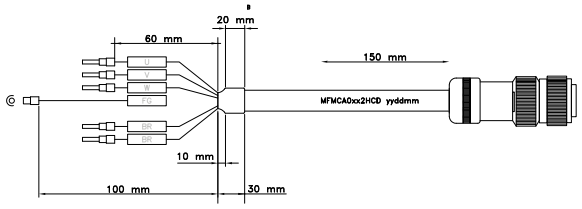
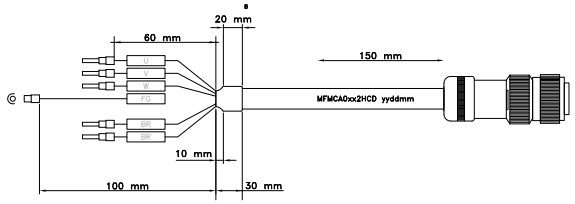
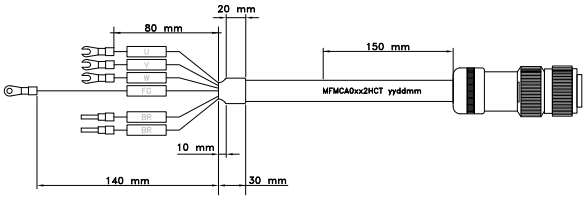
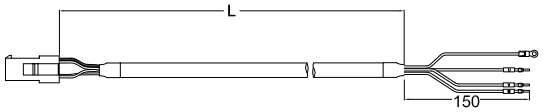


MINAS LIQI motors (low inertia)													
Motor		Type	MSMD5AZJ1□		MSMD012J1□		MSMD022J1□		MSMD042J1□		MSMD082J1□		MSMD102J1□	
Encoder			2500ppr, incremental, resolution: 10000											
Motor with/without holding brake			With-out	With	With-out	With	With-out	With	With-out	With	With-out	With	With-out	With
LL		mm	72	102	92	122	79.5	116	99	135.5	112	149.2	127.2	164.2
LR		mm	25				30				35			
S		mm	∅ 8 h6				∅ 11 h6		∅ 14 h6		∅ 19 h6			
LA		mm	∅ 45 ± 0.2				∅ 70 ± 0.2				∅ 90 ± 0.2			
LB		mm	∅ 30 h7				∅ 50 h7				∅ 70 h7			
LC		mm	38				60				80			
LE		mm	3											
LF		mm	6				6.5				8			
LZ		mm	4 x ∅ 3.4				4 x ∅ 4.5				4 x ∅ 6			
Key way	LW	mm	14				20		25		25			
	LK	mm	12.5				18		22.5		22			
	KW	mm	3 h9				4 h9		5 h9		6 h9			
	KH	mm	3				4		5		6			
	RH	mm	6.2				8.5		11		15.5			
	TP	mm	M3 depth 6				M4 depth 8		M5 depth 8		M5 depth 10			
Weight		kg	0.32	0.53	0.47	0.68	0.82	1.30	1.2	1.7	2.3	3.1	2.8	3.6

□ = Motor type, please refer to page 10.

Motor cables (motor – servo driver)

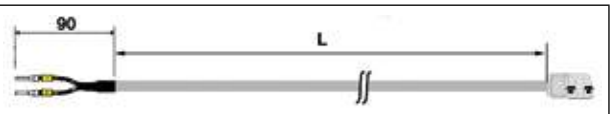
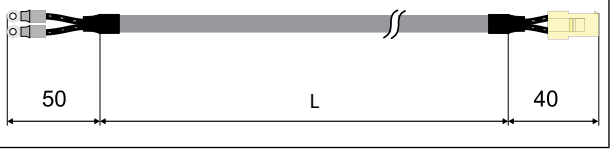
All dimensions are in mm

MSME motors 50–750W	MFMCA0☐☐0WJD	
MSME motors 1–2kW MDME motors 1–2kW MHME motors 1-1.5kW	MFMCD0☐☐2GCD	
MHME motors 2kW	MFMCE0☐☐2GCD	
MSME motors 3–5kW MDME motors 3–5kW MHME motors 3–5kW	MFMCA0☐☐2GCT	
MSME motors 1–2kW 200V with holding brake MDME motors 1–2kW 200V with holding brake	MFMCA0☐☐2HCD	
MSME motors 1–2kW 400V with holding brake MDME motors 1–2kW 400V with holding brake MHME motors 1–2kW 400V with holding brake	MFMCE0☐☐2HCD	
MSME motors 3–5kW with holding brake MDME motors 3–5kW with holding brake MHME motors 3–5kW with holding brake	MFMCA0☐☐2HCT	
MSMD motors 50–750W MHMD motors 200–750W MINAS LIQI motors 50W–1kW	MFMCA0☐☐0EEL	

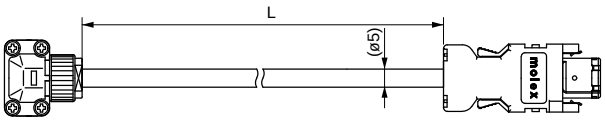
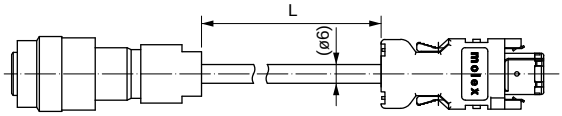
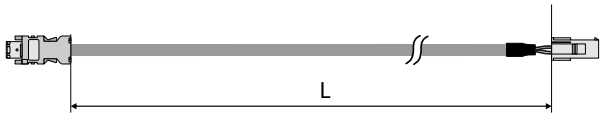
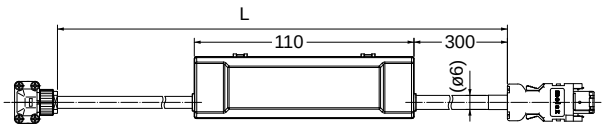
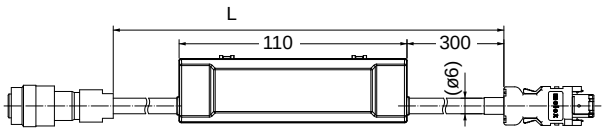
☐☐ = Length 0 1 = 1m 1 0 = 10m

Brake cable (motor – servo driver)

All dimensions are in mm

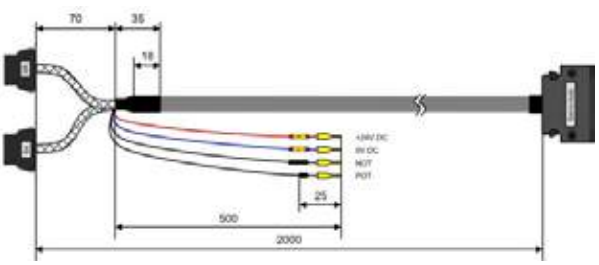
MSME motors 50–750W	MFMCB0☐☐0PJT	
MSMD motors 50–750W MHMD motors 200–750W MINAS LIQI motors 50W–1kW	MFMCB0☐☐0GET	

Encoder cable (motor – servo driver)

MSME motors 50–750W with 17/20-bit incremental encoder	MFECA0☐☐0WJD	
MSME, MDME, MHME motors 900W–15kW with 17/20-bit incremental encoder	MFECA0☐☐0GTD	
MINAS LIQI motors 50W–1kW MHMD, MSMD motors 200W–750W	MFECA0☐☐0EAM	
MSME motors 50–750W with 17-bit absolute encoder (battery box)	MFECA0☐☐0GJE	
MSME, MDME, MHME motors 900W–15kW with 17-bit absolute encoder (battery box)	MFECA0☐☐0GTE	

Control cable (PLC – MINAS LIQI driver)

Direct connection to FP series PLCs

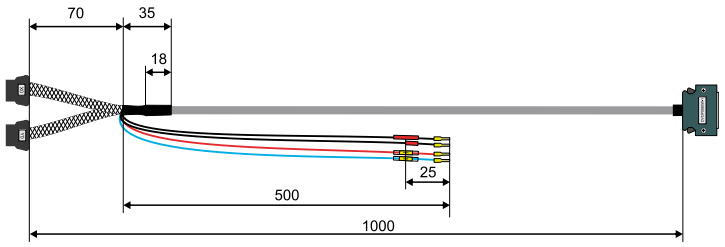
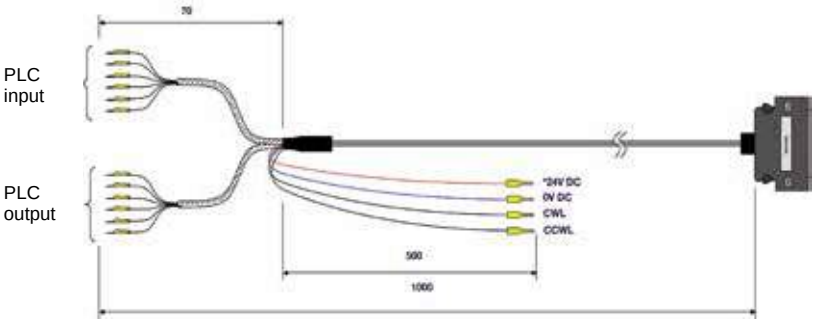
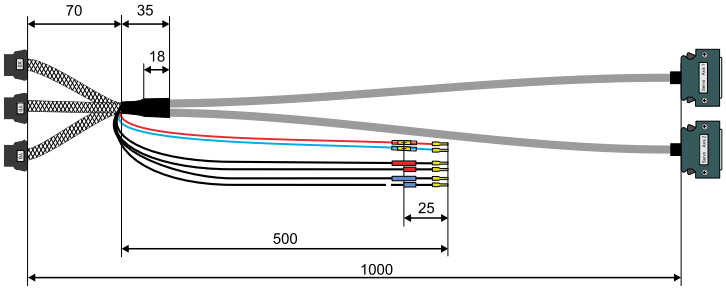
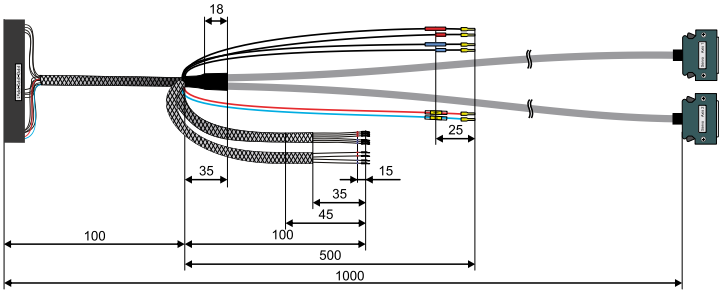
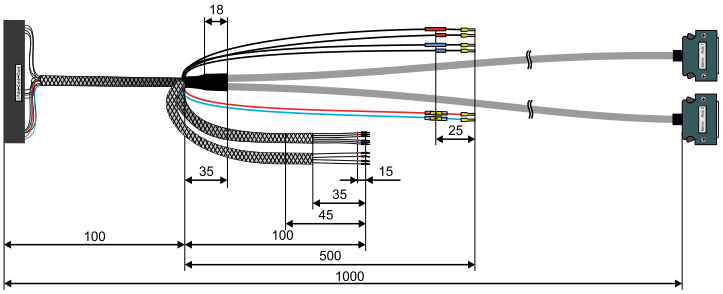
FPΣ (Sigma), FP0R	For 1 axis DV0P0800T01 (PNP types)	

☐☐ = Length 0 1 = 1m 1 0 = 10m

Control cable (PLC – MINAS A5 driver)

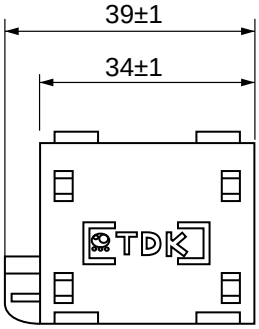
All dimensions are in mm

Direct connection to FP series PLCs

FPΣ (Sigma)	For 1 axis DVOP0980W-1 (NPN types) DVOP0982W-1 (PNP types)	
FPΣ (Sigma), FP0R	For 1 axis DV0P0988W-1 (PNP types) DV0P0989W-1 (NPN types)	
FPΣ (Sigma)	For 2 axes DVOP0981W-1 (NPN types) DVOP0983W-1 (PNP types)	
FPΣ (Sigma) Positioning unit FP2SH Positioning units	For 2 axes DVOP0985W1 (transistor) DVOP0986W1 (line driver)	
FP7 Positioning unit	For 2 axes DV0P0976W1 (line driver) DV0P0975W1 (transistor)	

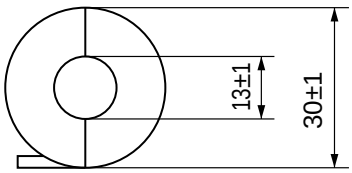
Product no.	Details/Comments/Dimensions			
Control cable				
DV0P4360	50W–15kW	50-pin type	I/O cable X4, loose wires, 2m	
DVOP4360P	50W–15kW	50-pin type	I/O cable X4, loose wires, 2m, position control	
DVOP4360V	50W–15kW	50-pin type	I/O cable X4, loose wires, 2m, velocity control	
DV0PM20024CAB020	50W–15kW	8-pin type	Communication cable X2, RS485, RS232, loose wires, 2m	
DV0PM20025CAB020	50W–15kW	8-pin type	Safety cable X3, loose wires, 2m	
DV0P0800T02	50W–15kW	26-pin type	I/O cable X4, loose wires, 2m	
Programming cable				
CABMINIUSB5D	50W–15kW	USB		
Connector set for servo driver				
DV0P4350	50W–15kW	50-pin type	I/Os, X4	
DVOP0770	50W–15kW	26-pin type	I/Os, X4	
DV0PM20026	50W–15kW	–	External encoder connector X5	
Connector set encoder, motor without holding brake				
DVOP4380	50W–1kW	–	MINAS LIQI/A4	
DV0PM20035	50W–750W	–	MINAS A5, IP67	
DV0PM20036	1kW–2kW	–	MINAS A5 MSME, MDME, MHME 1–1.5kW	
DV0PM20036A	1kW–2kW	–	Angled type; MINAS A5 MSME, MDME, MHME 1–1.5kW	
DV0PM20037	2kW–5kW	–	MINAS A5 MSME 3–5kW, MDME, MHME	
DV0PM20037A	2kW–5kW	–	Angled type; MINAS A5 MSME 3–5kW, MDME, MHME	
DV0PM20056	7.5kW–15kW	–	MINAS A5 MDME; MHME 7.5kW	
Connector set encoder, motor with holding brake				
DV0P4390	50W–1kW	–	MINAS LIQI/A4	
DV0PM20040	50W–750W	–	MINAS A5, IP67, holding brake connector kit	
DV0PM20038	1kW–2kW	–	MINAS A5 MSME, MDME, MHME 1–1.5kW	
DV0PM20038A	1kW–2kW	–	Angled type; MINAS A5 MSME, MDME, MHME 1–1.5kW	
DV0PM20039	2kW–5kW	–	MINAS A5 MSME 3–5kW, MDME, MHME	
DV0PM20039A	2kW–5kW	–	Angled type; MINAS A5 MSME 3–5kW, MDME, MHME	
DV0PM20057	7.5kW–15kW	–	MINAS A5 MDME; MHME 7.5kW	
EMC filter				
FN2080-6-06	50W–1000W	1-phase	250VAC, MINAS A5 50W–750W, MINAS LIQI 50W–1000W	
FS21238607	50W–750W	1-phase	Footprint filter, 250VAC	
FN2080-10-06	1kW–1.5kW	1-/3-phase	500V AC	
FN3268-7-44	1kW–3kW	3-phase	500V AC	
FN3268-16-44	4kW–5kW	3-phase	500V AC	
FN3258-30-33	15kW	3-phase	400V AC	
DV0P1460	50W–15kW	1-phase	Ferrite core, noise filter	
Braking resistors				
BWD250100	50W–100W	1-phase	100Ω,100W, 600VAC	110 x 80 x 15 (L x W x D in mm)
BWD250072	200W–750W	1-phase	72Ω, 100W, 600VAC	
BWD500035	1kW–1.5kW	1-phase	35Ω, 200W, 600VAC	216 x 80 x 15 (L x W x D in mm)
BWD500150	1kW–1.5kW	3-phase	150Ω, 200W, 600VAC	
BWD500100	2kW	3-phase	100Ω, 200W, 600VAC	
BWD600047	3kW–5kW	3-phase	47Ω, 240W, 600VAC	
BWD600027	7.5kW	3-phase	27Ω, 240W, 600VAC	
BWD600027K02LV	11/15kW	3-phase	13,5Ω, 480W, 600VAC	

Braking resistor



Ferrite core: DV0P1460

Weight: 62.8g

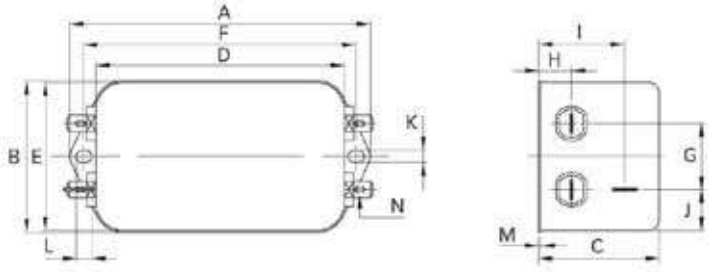


All dimensions are in mm.

EMC filter

200V AC:

FN2080-6-06 and FS21238607 for MINAS A5 50–750W and MINAS LIQI 50–1000W 1-phase drivers

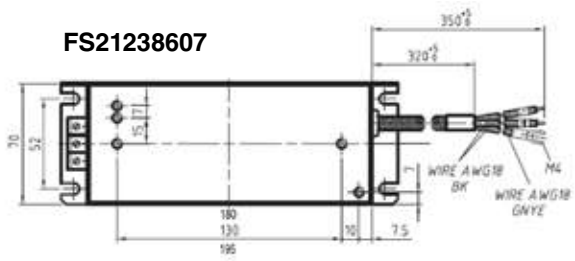


Dimensions (mm)	FN2080-6-06
A	113.5
B	57.5
C	45.4
D	94
E	56
F	103
G	25
H	12.4
I	32.4
J	15.5
K	4.4
L	6
M	0.9
N	6.3 x 0.8

All dimensions are in mm.

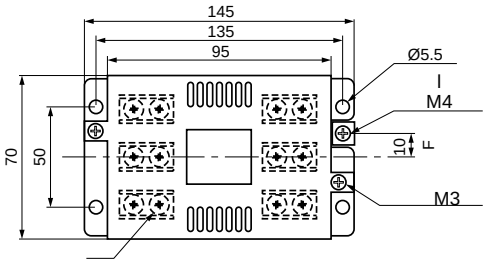
FN2080-6-06

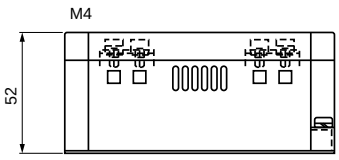
FS21238607



200V AC:

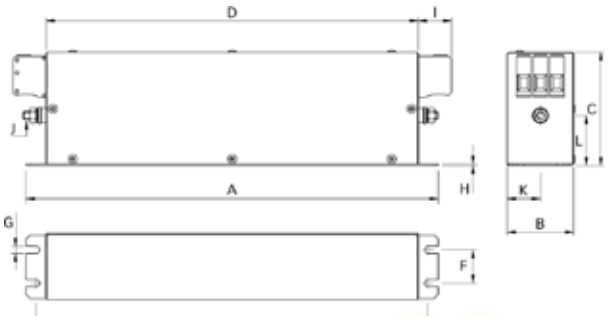
FN2080-10-06 for 1–1.5kW 1-phase driver





400V AC:

FN3268-7-44 for 1–3kW 3-phase driver, FN3268-16-44 for 4–5kW 3-phase driver



Dimensions (mm)	FN3268-7-44	FN3268-16-44
A	190	250
B	40	45
C	70	
D	160	220
E	180	235
F	20	25
G	4.5	5.4
H	1	
I	22	
J	M5	
K	20	22.5
L	29.5	

FP7

Modular high-performance PLC
- Scan time of 11ns/step
- Program capacity of 196k steps
- Additional program capacity with SDHC memory card
- Batteryless data backup
- Ethernet 100BASE-TX/10BASE-TX
- Expandable with up to 16 units for different applications

FP2SH

Modular high-performance PLC
- Scan time of 1ms for 20k steps
- As a high-performance PLC with fast scan times ideally suited for electronic device manufacturing
- High program capacity of 120k steps
- 32k, 60k step type also available
- Compatible with Small PC Cards, which serve as a program backup or extended memory for processing a large volume of data
- 8192 I/O points max. (remote I/O system)

FPΣ (Sigma)

Very compact high-performance PLC reliably supports the control of higher speed equipment with more functions featured
- Excellent basic performance, including program capacity of 32k steps, operation speed of 0.32μs/step and 384 I/O points
- Built-in 2-axis 100kHz pulse output capable of interpolation control
- Positioning units capable of controlling network motion controllers
- Can be equipped with up to 3 ports for program controlled communication without expansion unit
- Compatible with PROFIBUS, DeviceNet, CANopen and other open field networks

FP0R

Pocket-size ultracompact controller ideal for use in extremely narrow spaces
- Ultrahigh processing speed of 80ns/step within a range of 0 to 3000 steps
- Program capacity from 16k–32k steps
- 10–128 I/Os
- Up to 24 thermocouple input points connectable for multipoint temperature control
- Multiaxis control for up to 4 axes available without expansion units
- Batteryless backup of all data

FP-X

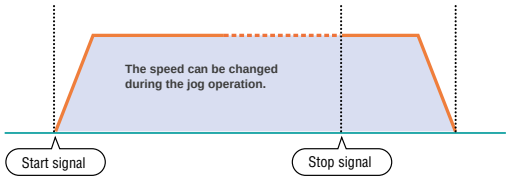
High-performance compact terminal-block type controller.Wide selection of add-on cassettes allows space saving use of the controller for a variety of purposes
- Up to three add-on cassettes can be attached to the top of the control unit. The unit is of the terminal block type, but is space saving and allows a variety of applications
- Ethernet cassette available for data collection
- Built-in 4-axis pulse output. Two axes for linear interpolation
- Comment memory for simple maintenance work
- USB port for direct connection to a PC

FP-X0

Entry level, compact, multifunctional PLC
- Max. 216 I/Os
- Combined relay and transistor output (NPN) types
- 2 analog input points and a clock/calendar function
- Max. 2 serial ports: 1 x RS232C, 1 x RS485
- Program capacity: from 2.5k to 8k steps
- Data registers: 2550 to 8192 words
- Ethernet TCP/IP, Modbus RTU, PLC Link
- Motion control functions

Jog positioning control (F171 instruction)

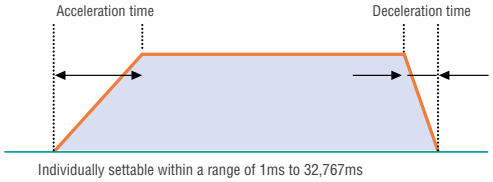
Motion can be started without a preset target value. When a stop signal is input, the target value is set, and the motion is slowed to a stop.



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)

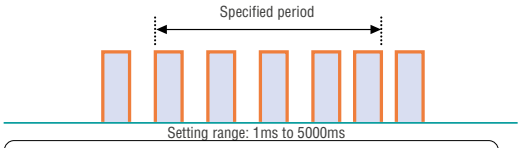
The target speed can be changed by an external signal input during the jog or trapezoidal control operation.

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.

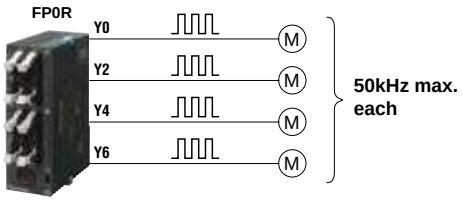


Useful for

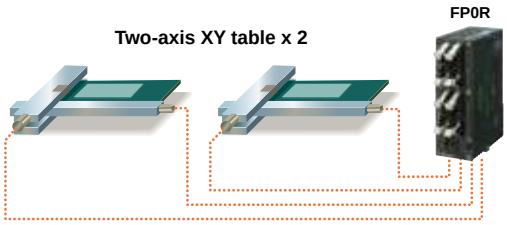
- Detection of motor rotation speed for encoder feedback control

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

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

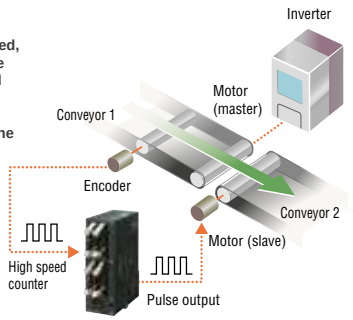


Two sets can simultaneously undergo two-axis linear interpolation (F175 instruction).



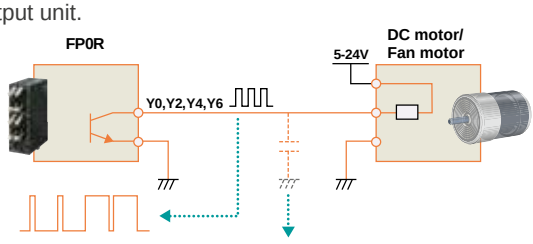
Simultaneously usable high speed counters (6 channels) and pulse outputs (4 channels)

The 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.



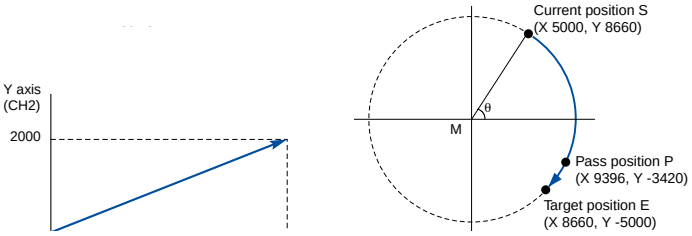
The speed can be controlled by changing the ON width of the PWM output within a range of 0.1% to 99.9%.

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

PLC	Product number	Voltage	Output	Input points (counters)	Output points (axes)
	AFP0RC16□□	24V DC	Transistor NPN	8 (6)	8 (4)
	AFP0RC32□□			16 (6)	16 (4)
	AFP0RF32□□				

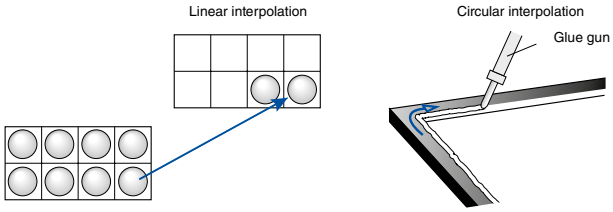
Integrated linear and circular interpolation control

Interpolation functions enable simultaneous control of two axes. Applications that a compact PLC couldn't previously cope with are no longer a challenge. With linear interpolation, the PLC achieves a coordinated, linear movement of the two axes and controls the speed of each axis. Circular interpolation allows points to be smoothly traversed by arced paths for which the user specifies the orientation plane, the radius of curvature, motion path profile and direction of motion.



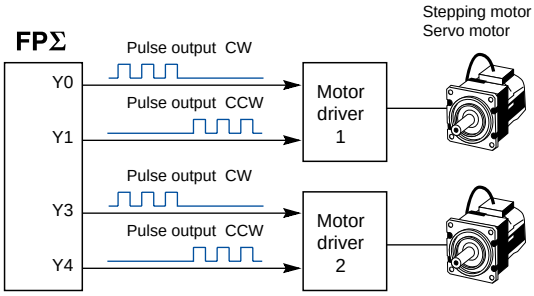
Simple and intuitive programming

For programming, a preset value table for starting speed, target speed, acceleration/deceleration time, and other factors will be used. Comes with dedicated instructions for each mode: trapezoidal control, home return, JOG operation, free table operation, linear interpolation and circular interpolation.



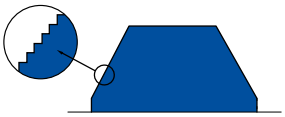
Clockwise/counter-clockwise output method

Reduce overall costs by designing systems that combine with servo motors and small stepping motors without support for Pulse and Sign method.



Smooth acceleration/deceleration

You can choose to set up to 60 steps of acceleration/deceleration. This allows for a smoother movement during long acceleration/ deceleration periods of stepping motors.



PLC	Product no.	Voltage	Output	Input points	Output points (axes)
	FPGC32T2HTM	24V DC	Transistor NPN	16	16 (2)
	FPGC28P2HTM	24V DC	Transistor PNP	16	12 (2)

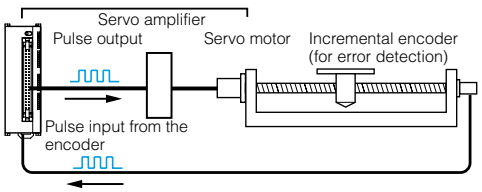
Home position return

Home search automatically reverses the motor rotation when the positive or negative limit switch is reached and searches for the home position or near home position.

Example:

Positioning unit of the FPΣ (Sigma) CPU

Counts feedback pulses from the encoder to detect errors



Pulse output up to 100kHz

A high output frequency and a rapid 0.02ms start allow for a precise and very fast positioning.

Positioning unit	Product no.	Output type	Output type
	FPGPP11	1-axis type	Transistor
	FPGPP21	2-axis type	
	FPGPP12	1-axis type	Line driver
	FPGPP22	2-axis type	

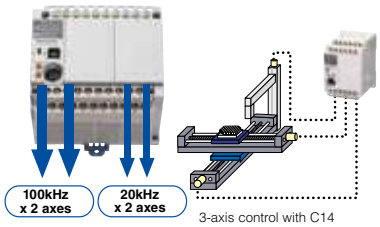
For low cost multi-axis position control

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

The transistor output type C14 comes with 3-axis while C30/C38 and C60 come with 4-axis pulse output inside the control unit. The multi-axis control, which previously required a higher-level PLC or 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.

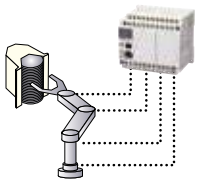
Characteristic	Specification
Max. pulse output	C14: 100kHz (CH0,1), 20kHz (CH2) C30, C38, C60: 100kHz (CH0,1), 20kHz (CH2,3)
Pulse output methods	CW/CCW, Pulse + direction
Function	Trapezoidal control, multi-stage operation, jog operation, origin return, 2-axis linear interpolation

XY table + processing head



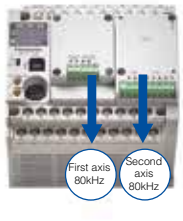
3-axis control with C14

Semiconductor wafer takeout blade



4-axis control with C30/C60

2-axis control with expansion cassettes for relay output types



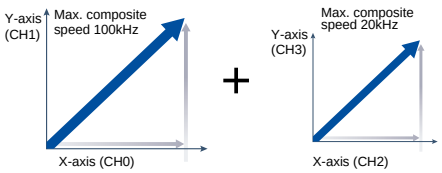
Pulse output up to 2-axis 80kHz is possible by loading 2 pulse I/O cassettes (AFPX-PLS). Also capable of performing 2-axis linear interpolation.

Note:
Pulse I/O cassette does not work with transistor CPU output type.

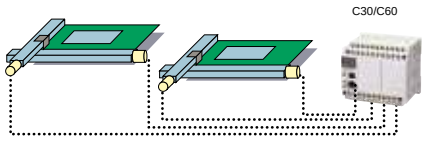
Linear interpolation simultaneously in 2 sets (transistor output type)

2-axis linear interpolation refers to moving a robot arm or equipment head diagonally on a straight line by simultaneously controlling 2 motor shafts. It is used for palletizing, component pick and place, XY table control, contour cutting of a PC board, etc. This makes the FP-X transistor output type the first compact pulse-output PLC capable of simultaneously controlling linear interpolation for 2 sets of axes. This unit dramatically expands the range of applications along with the added convenience of programming by using the linear interpolation command F175_PulseOutput_Linear.

Simultaneous control of 2 mechanisms



Controls two units of 2-axis XY table



2-axis linear interpolation with relay output types

By adding 2 pulse I/O cassettes (AFPX-PLS), linear interpolation is possible at the maximum composite speed of 80kHz. The command used for this unit is F175_PulseOutput_Linear, the same as that for the transistor output types.

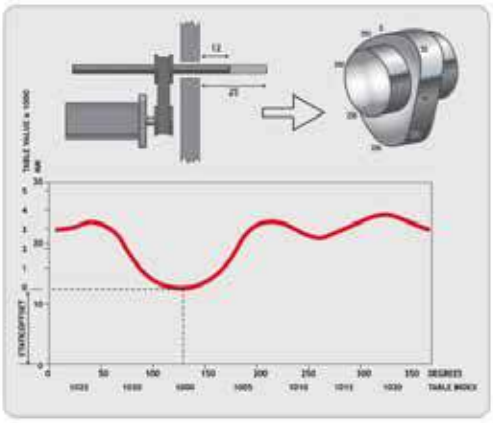
PLC	Product no.	Voltage	Output	Input points	Output points (axes)
	AFPXC14TDJ	24V DC	Transistor NPN	8	6 (3)
	AFPXC14TJ	100–240V AC			
	AFPXC14PDJ	24V DC	Transistor PNP		
	AFPXC14PJ	100–240V AC			
	AFPXC30TDJ	24V DC	Transistor NPN	16	14 (4)
	AFPXC30TJ	100–240V AC			
	AFPXC30PDJ	24V DC	Transistor PNP		
	AFPXC30PJ	100–240V AC			

PLC	Product no.	Voltage	Output	Input points	Output points (axes)
	AFPXC60TDJ	24V DC	Transistor NPN	32	28 (4)
	AFPXC60TJ	100–240V AC			
	AFPXC60PDJ	24V DC	Transistor PNP		
	AFPXC60PJ	100–240V AC			

FP7

Features

- Linear, circular, and spiral interpolation
- Max. speed 4Mpps (line driver), 500Kpps (transistor)
- Up to 600 points for each axis
- Integrated configurator software PM7 for parameter setting, JOG operation, home return, creation of data tables, etc.
- Electronic cam control and electronic gear



Product no.	Function	Output	Output points (axes)
AFP7PP02T	With interpolation	Open collector	2
AFP7PP04T			4
AFP7PP02L		Line driver	2
AFP7PP04L			4

FP2SH

Positioning units (interpolation type)

Features

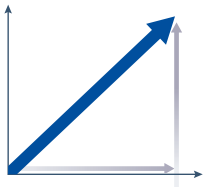
- A pulse output of up to 4Mpps allows high-speed, high-precision positioning.
- 0.005ms high-speed drive reduces tact-time (start-up time is the time from reception of the CPU unit start-up command to release of the pulse output by the positioning unit).
- 4 axes per unit means versatility and saves space.
- The four types of S-curve acceleration/deceleration control allow for smooth startup and stoppage.
- 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

.

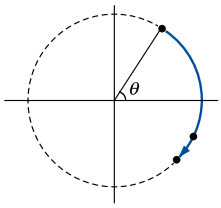
Functions

- Linear, circular, and spiral interpolation
- Synchronization operations
- E-point control
- P-point control
- JOG operation function
- Smooth acceleration/deceleration: Linear or in 4 curves sine curve, square curve, cycloid curve, and cubic curve

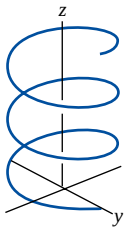
Linear



Circle



Spiral

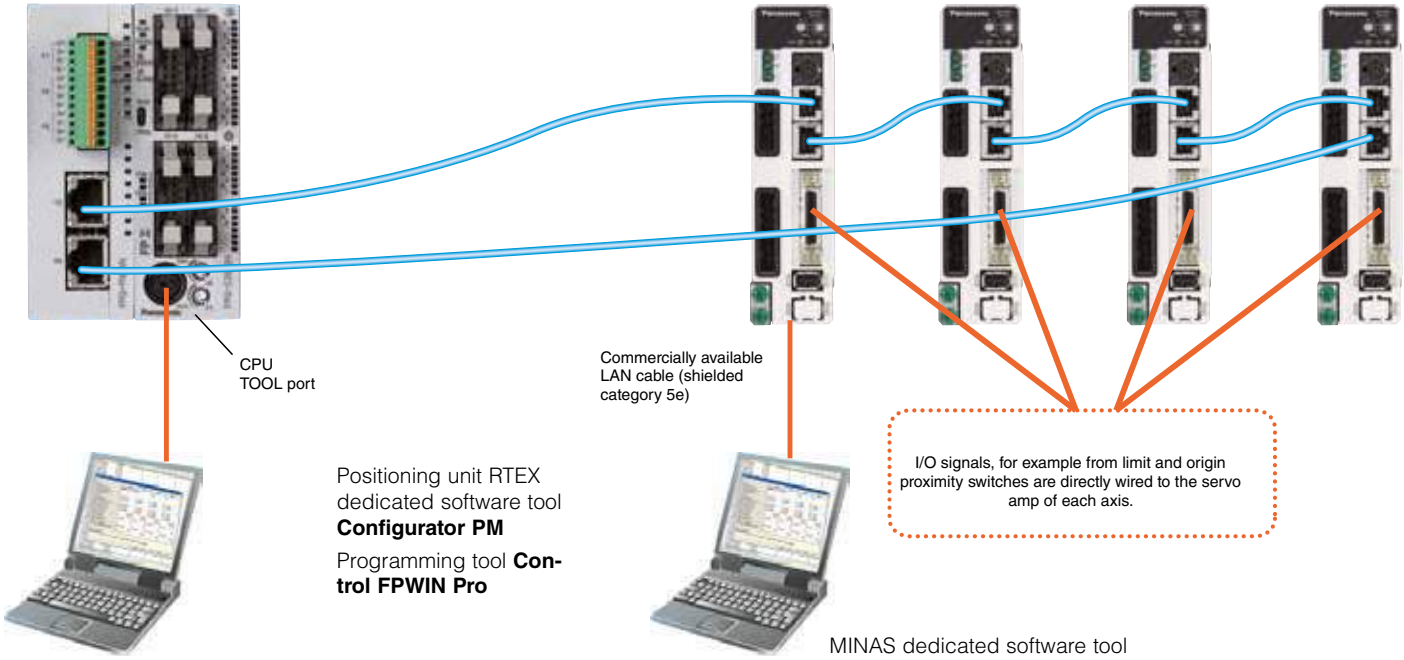


PLC	Product no.	Program-capacity	Other features
	FP2C2LJ	32k steps	–
	FP2C2J	60k steps	
	FP2C2PJ	60k steps	IC memory card interface

Positioning unit	Product no.	Functions	Output	Output points (axes)
	FP2-PP2T	With Interpolation	Open collector	2
	FP2-PP4T			4
	FP2-PP2L		Line driver	2
	FP2-PP4L			4
	FP2PP21	Without Interpolation	Open collector	2
	FP2PP41			4
	FP2PP22		Line driver	2
	FP2PP42			4

RTEX - the multiaxis Ethernet servo system

The RTEX positioning units support MINAS A5N network servo drives. A mutually optimized system consisting of PLC and servo driver greatly simplifies installation.



The main advantages of the RTEX positioning units:

- Unique: Allows easy control of network servos with an ultra-compact PLC.
- Allows highly accurate control of multi-axis positioning using high-speed 100Mbit/s communication.
- Minimization of wiring costs by using commercially available Ethernet cables. Position control of 2, 4, or 8 axes for servo drivers with Ethernet (RTEX) interface.
- Dedicated tool software Control Configurator PM supports operations from setup to startup and monitoring.
- Includes manual pulser input allowing support for precision teaching.

System configuration

Number of positioning units per RTEX unit
FPΣ (Sigma): 2 units (16 axes)
FP2SH: 32 units (256 axes)

Software Configurator PM for RTEX

The Configurator PM provides powerful yet simple full support ranging from configuration (axis and parameter settings, data table creation, JOG operation, home return, data monitor settings, etc.) to startup and operation monitoring. This saves time and makes commissioning considerably easier.

Product name	FPΣ (Sigma)	FP2SH	Number of axes	Output type	Product no.
Positioning units (interpolation type)	•		2	RTEX Ethernet	FPGPN2AN
		•			FP2SHPN2AN
	•		4		FPGPN4AN
		•			FP2SHPN4AN
	•		8		FPGPN8AN
		•			FP2SHPN8AN
Control Configurator PM	for all RTEX units				AFPS66510

Free of charge!

Motion control libraries for Control FPWIN Pro (PLC)

The motion control library contains the most important function blocks, e.g. for relative or absolute positioning and for home returns with linear axes. Panasonic offers libraries for all motion control tasks.

1. CPU Motion Control Library: Position control with FP series control units (FP0R, FPΣ (Sigma), FP-X, FP7)

2. PP Motion Control Library: Positioning with PP motion control units (FPΣ (Sigma), FP2SH),
   FP7: Library is included in the PLC programming software Control FPWIN Pro.

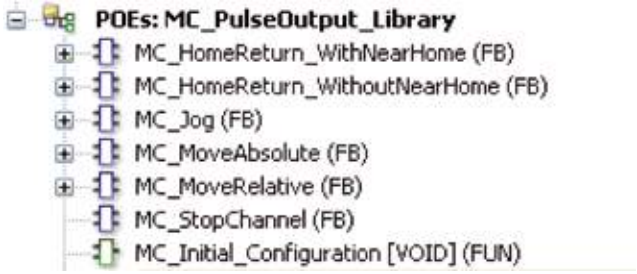
3. RTEX Motion Control Library: Positioning with RTEX motion control units (FPΣ (Sigma), FP2SH)

Advantages of PLC programs using the Motion Control Library

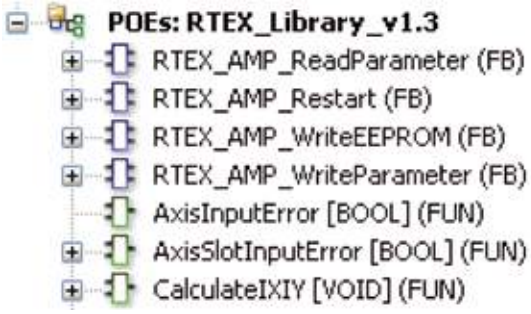
Free – just download it from Panasonic's website
Simple – easy programming and installation
Efficient – ready-to-use function blocks, only set the parameters
Consistent – compliant with IEC 61131-3
Universal – hardware-independent (works for every Panasonic PLC)
Flexible – expandable for up to 256 axes
Fast – short and easy commissioning (ready-to-use example programs)

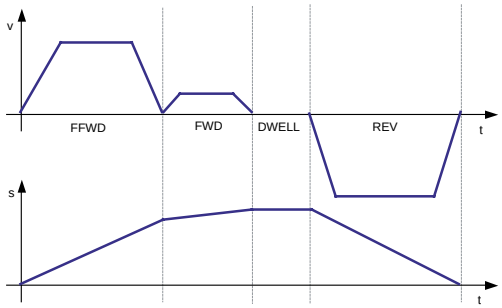
Download the software free of charge from Panasonic's website:
Home→ Downloads→ SPS→ FPWIN Pro→ Library

MC_CPU_Library Motion

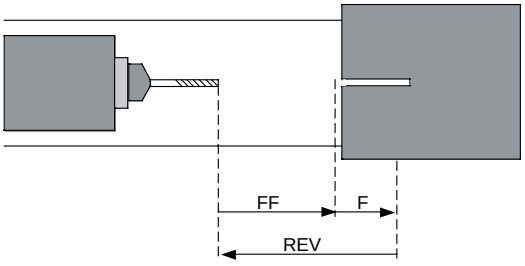


RTEX Motion Control Library





Time chart

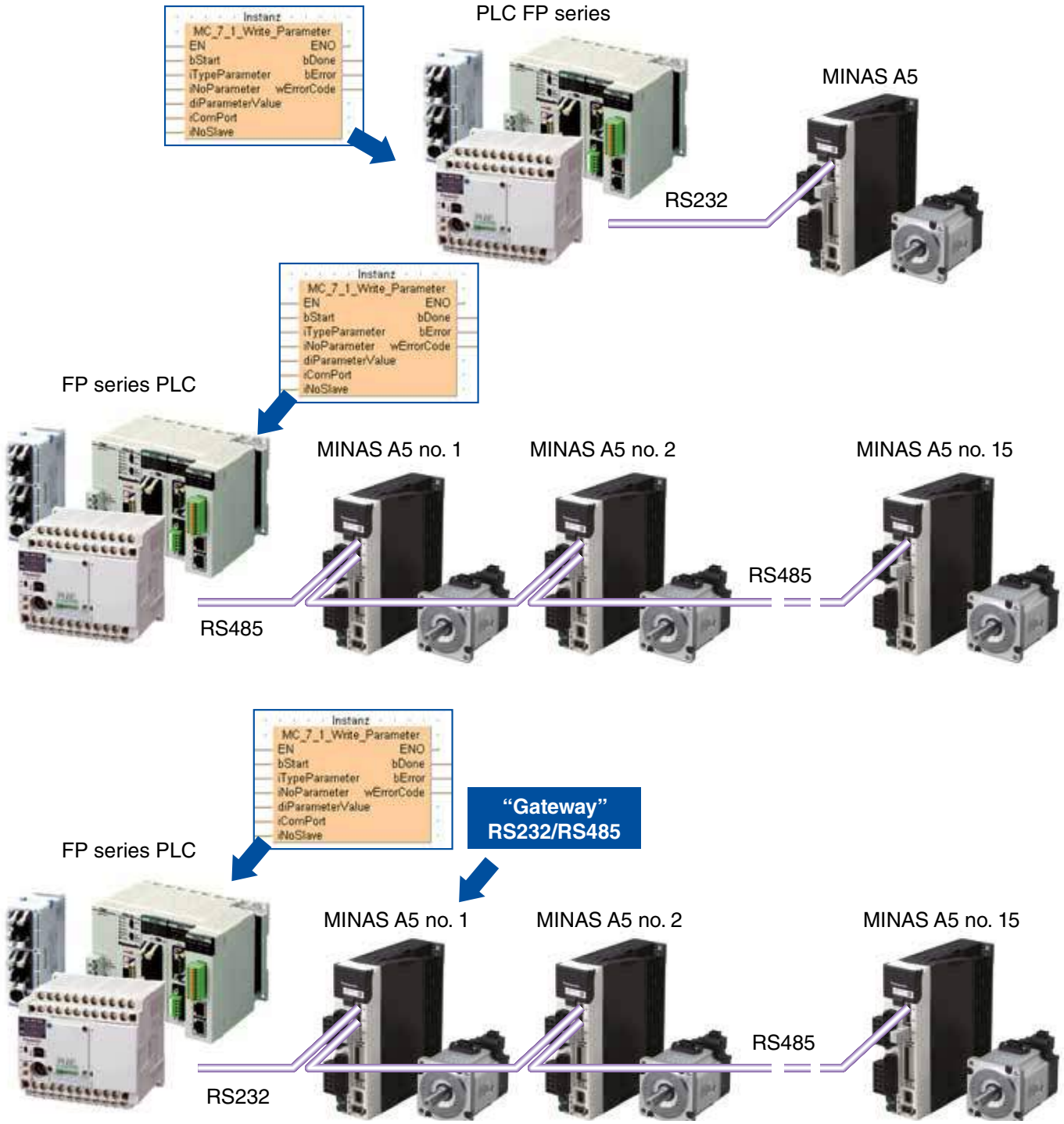


Drilling setup

Free of charge!

Direct access to servo drive parameters from the PLC

The libraries enable serial communication (RS232, RS485) between the FP series PLCs and the drivers of the MINAS A5 series.
The communication protocols for the drivers are also included in the libraries. The libraries allow full read and write access to the parameters. They also record the status and position data of the axes. All FP series PLCs come with an RS232 port (RS485 optional).
With RS232 connections, the first driver can be used as a gateway to downstream drivers so that all drivers can communicate with the PLC.



Download the software free of charge from Panasonic's website:
Home→ Downloads→ SPS→ FPWIN Pro→ Library

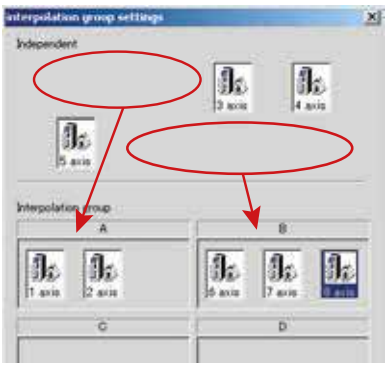
Software Configurator PM for RTEX

The Configurator PM offers multiple support from configuration (axis and parameter settings, data table creation, JOG operation, home return, data monitor settings, etc.) to startup and operation. This saves time and makes commissioning considerably easier.

Axis settings

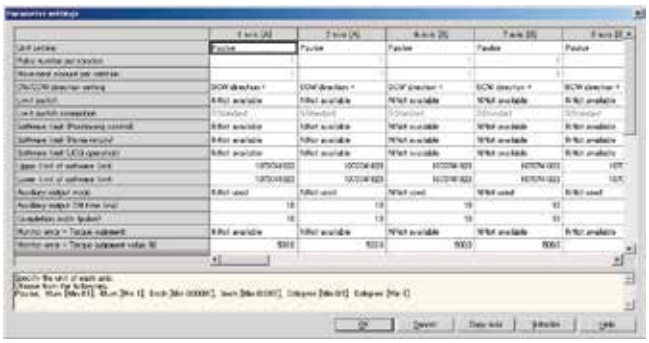
Check the axes to be used. Select the number of axes to be used.

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



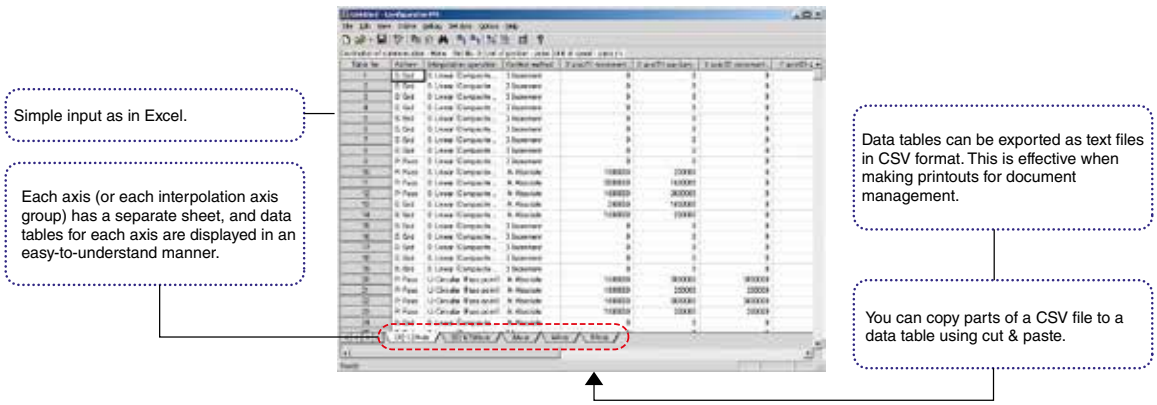
Parameter settings

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



Software Configurator PM for RTEX

Tool operations

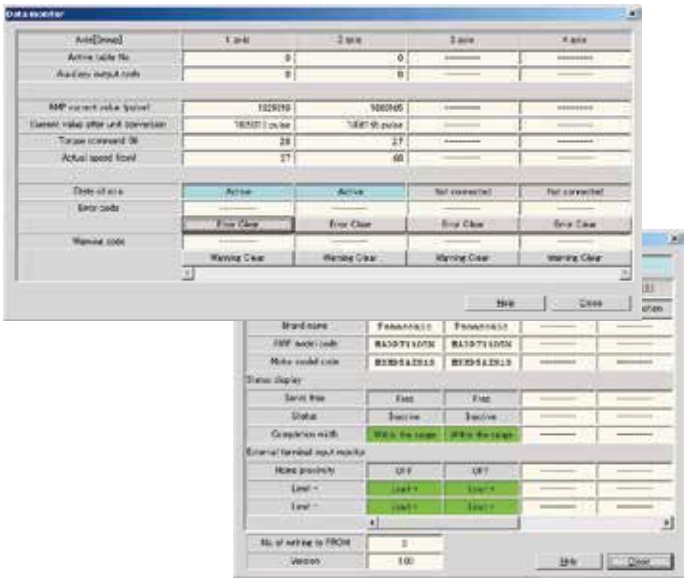
- Each axis can be operated by test sequences independently of the operation modes (PROG and RUN) of the RTEX or FP control unit.
- JOG operation and teaching can be carried out easily to index positioning points. Test operation is possible without having to create a rudder program.

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
- Near home input, limit input



Configuring servo drivers

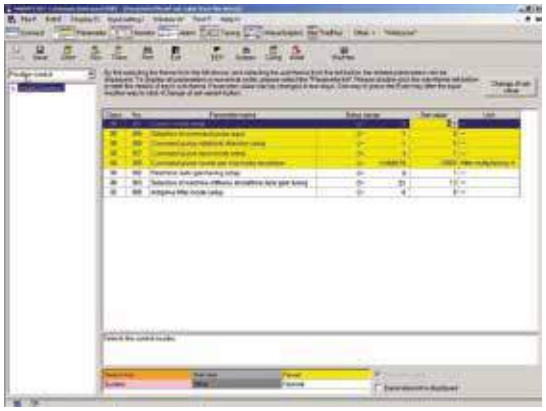
Free of charge!

Configuration software PANATERM for MINAS AC servo motors & drivers

PANATERM assists users in making parameter and control settings as well as creating and analyzing data tables during operation. The software can be installed on any commercially available personal computer. The connection to the MINAS series is established via the USB port.

Basic functions

- Parameter setup
- After a parameter has been defined on the screen, it will immediately be sent to the driver.
- Frequently used parameters can be listed separately in a second display.



Parameters

Monitoring control conditions

- Monitor
- Settings: control mode, velocity, torque, error and warning
- Driver input signal
- Load conditions: Overview of command/feedback pulses, load ratio, regenerative resistive load ratio
- Alarm
- Display/delete number and contents of the current alarm and the last 14 error events

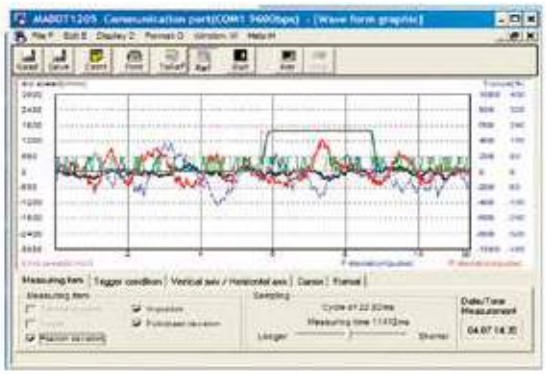
Setup

- Auto tuning
- Gain adjustment and inertia ratio measurement
- Line graph display
- The line graph diagram shows command and current velocity, torque, and the tracking error.
- Absolute encoder setup
- Clears absolute encoder at the origin
- Displays single turn/multi turn
- Displays absolute encoder status

Monitor

Analysis of mechanical operation data (frequency analysis)

- Measures frequency characteristics of the machine; displays Bode diagram



Line graph display

Download the software free of charge from Panasonic's website:
Home→ Downloads→ SPS→ FPWIN Pro→ Library

Motor capacity selection software

Free of charge!

M-SELECT software

M-SELECT is a software to help you select the correct motor capacity and servo driver from Panasonic's MINAS series. Find the optimal type of motor with regards to the mechanical layout and the dynamic requirements. It is a very valuable tool for mechanical engineering as it also provides CAD data in 2D and 3D. The software offers a complete analysis and detailed usage instructions for the MINAS A5 series in all sizes.

Figure 1

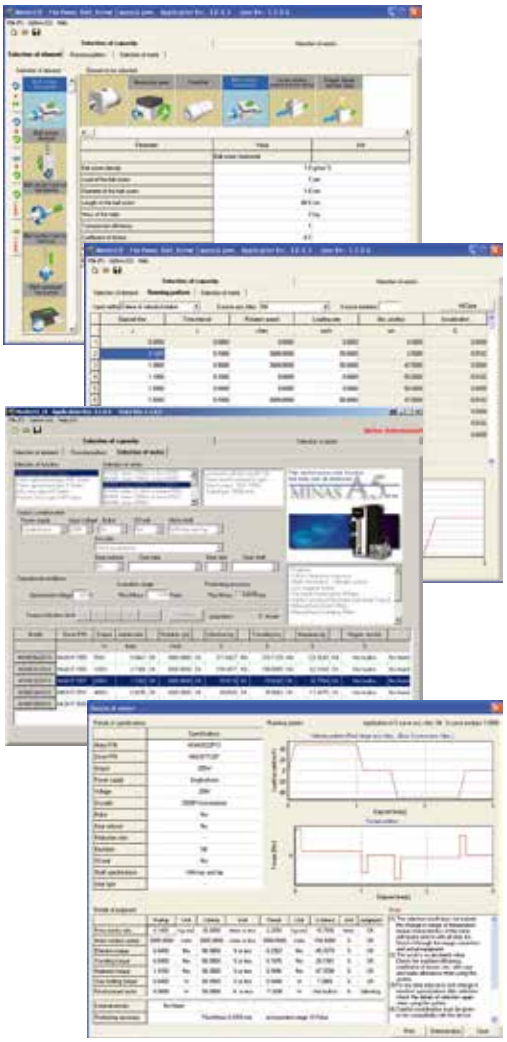


Figure 2

Figure 3

Figure 4

Selecting the motor capacity is done in four steps:

1. Select mechanical parts and input their parameters (figure 1)
The user can select parts from a database with all mechanical standard parts (gears, coupling, spindle axis, etc.).

2. Determine the motion profile (figure 2)
Speed, position, ramps, etc.

3. Select the correct motor series (figure 3)
1- or 3-phase, input voltage, torque, etc. The software calculates the parameters for the series selected and displays the different criteria with OK or NG (not good).

4. Check and print result (figure 4)

MINAS SELECTION TOOLS

This is an easy-to-use software to help you select the accessories. The software can be installed on any commercially available PC.

1. Enter motor data, encoder selection, and cable length

2. Click [Select_MINAS] to display all matching accessories
Drivers, filters, cables, etc.

3. You can even have the data sent to you or your customer by e-mail.

Download the software free of charge from Panasonic's website:
Home→ Downloads→ SPS→ FPWIN Pro→ Library