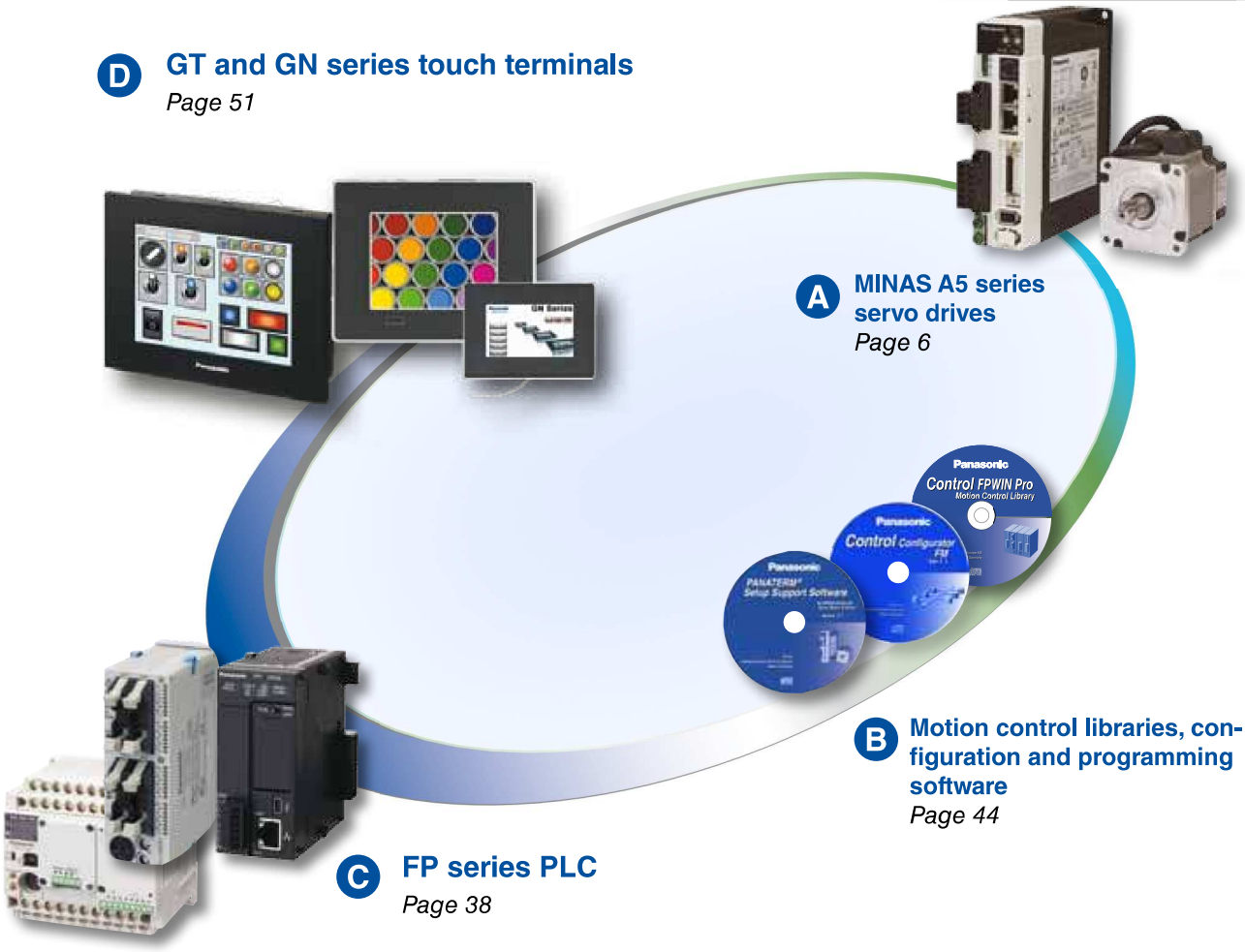
Panasonic

Comprehensive motion control solutions by Panasonic



A MINAS A5 series servo drives

Highly dynamic servo drives with state-of-the-art technology. Large power range (50W–15kW) combined with a lightweight and compact design. Innovative functions to suppress resonance frequencies and vibrations. Multiple control features such as pulse, analog, and network technology in real-time communication (100Mbit/s).

B Motion control libraries, configuration and programming software

PLC programming software Control FPWIN Pro (compliant with IEC 61131-3). The free configuration software PANATERM and Mselect3 support users in the system setup, thus shortening the time required for commissioning. In addition, you can download motion control libraries for free. With the libraries' predefined function blocks, it is easy to solve even complex positioning tasks.

C FP series PLC

The PLC comes already equipped with the hardware required for positioning tasks. FP0R, FPΣ (Sigma), and FPX are capable of controlling up to 4 axes independently. By using positioning units, the system can be expanded to control up to 10 axes. Add network technology in the shape of RTEX or EtherCAT positioning units, and the FP series allows you to control up to 256 axes with the real-time Ethernet bus.

D GT and GN series touch terminals

Touch terminals allow humans and machines to interact with each other. The machine's role therein is to display data, results, messages, etc. and to receive instructions and execute tasks assigned by people. Panasonic's new touch terminals are ideally suited for these tasks. They are optimally suited both for factory and building automation. Panasonic HMIs cover a wide spectrum, ranging in size from a compact 3" touch panel to a color 15" display for sophisticated applications.

Contents

MINAS series		LIQI	A5E	A5	A5N	A5B
Rated power		50–1000W	50–5000W	50-15,000W		
Supply voltage	up to 1500W	1x230V AC	1x/3x230V AC			
	from 1000W	–	3x400V AC			
Bandwidth (velocity response)		1000Hz	2000Hz			
Rated rotational speed		1500–3000 (r/min)				
Max. rotational speed		2000–6000 (r/min)				
Rated torque		0.16–3.2Nm	0.16–23.9Nm	0.16–99.5Nm		
Peak torque		0.48–9.5Nm	0.48–71.6Nm	0.48–224Nm		
Control functions		Position control		Position, velocity, and torque control		
Degree of protection (motor)		IP65	IP67			
Control input		Pulse		Pulse, analog		

Applications

With its power range of 50 to 15,000W, Panasonic servo drives are ideally suited to solve both small (1 or 2 axes) and complex tasks (up to 256 axes) easily and quickly.

The following industries make use of servo drives: packaging, textile, plastics, wood, paper, metal and mounting, and processing.

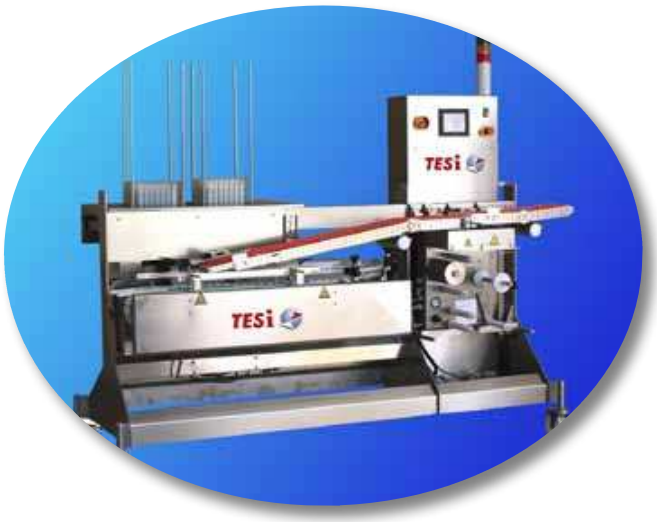
Application examples:

Packaging machine
A complete solution with PLC, touch terminal, and servo drives from Panasonic. Our compact drives offer a great advantage over competitor's products for packaging machines (labeling, packing, etc.).

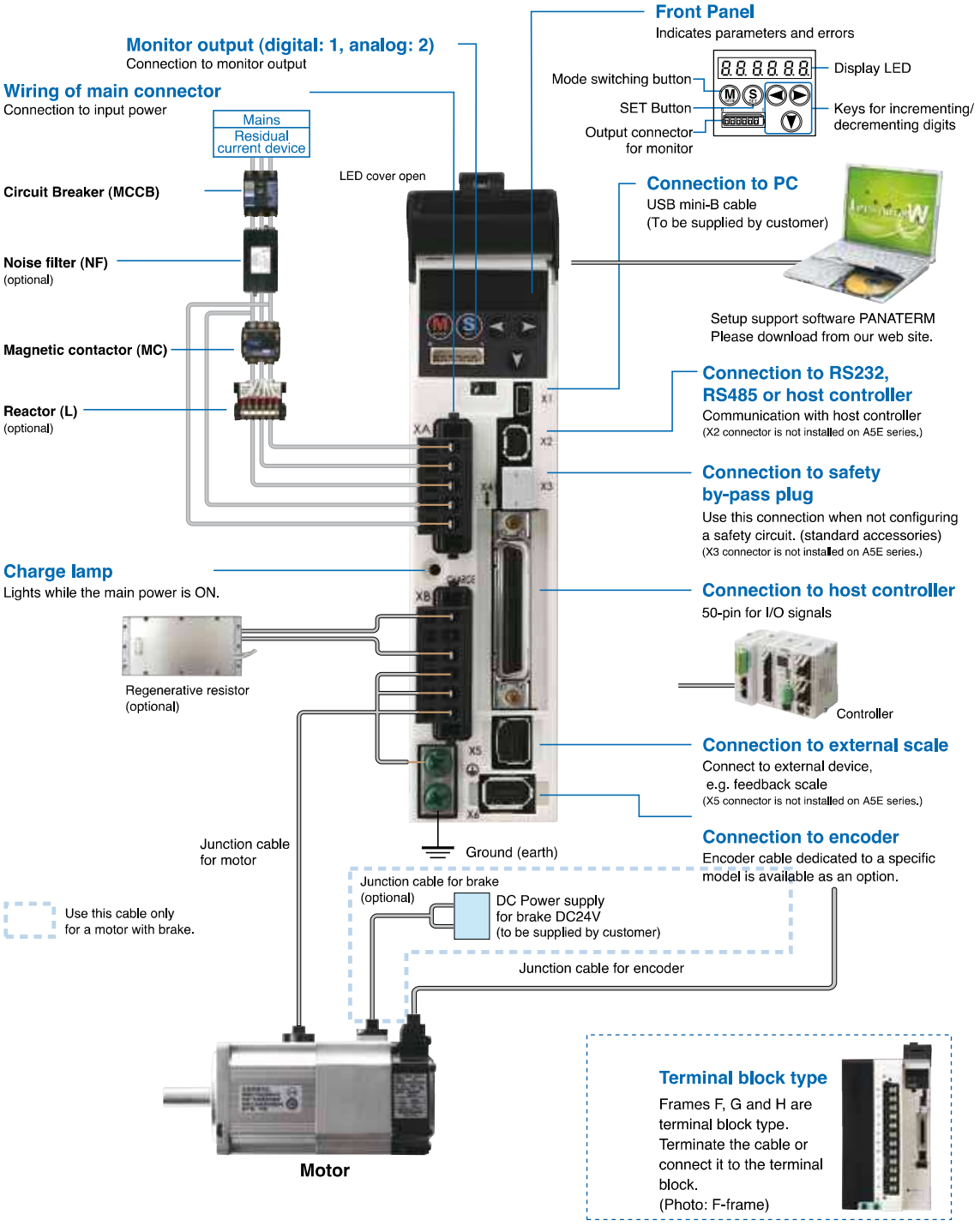
X-Y table
Positioning XY axes to apply adhesive.
One FPΣ (Sigma) controls 2 servo drives as well as the adhesive-dispensing device according to the predefined profile.

Cutting machine
The FP2SH PLC controls the positioning so that the machine can cut at high speed and with an accuracy of 10 micrometers.

Food processing machine
This solution from Panasonic includes an FP0R PLC, a GT32 touch terminal, a MINAS A5 driver, and a VF0 inverter. To make burgers, the movement of three axes has to be precisely synchronized.



Connector type (100/200V: A to E frame)



MINAS A5 series

The MINAS A5 series: Panasonic's standard AC servo drives.
The highly dynamic servo drives can be controlled by pulses or analog signals.

- Ultrafast response frequency: 2kHz bandwidth (velocity response)
- Pulse input and output with up to 4MHz
- Real-time autotuning function during operation
- 4 notch filters: manual/automatic
- 4 damping filters: manual/automatic
- PANATERM V5.0: Free software for configuration and motion simulation
- Conforms to the following safety standards: EN954-1(CAT3), ISO13849-1(PLd), EN61508(SIL2), EN62061(SIL2), EN61800-5-2(STO), IEC61326-3-1
- Full-closed control

Rated power	Driver MINAS A5E 230V AC	Drivers MINAS A5; A5N; A5B 230V AC	Drivers MINAS A5; A5N; A5B 3x380V AC	Frame
50/100W	MADHT1505E	MADHT1505***	–	A
200W	MADHT1507E	MADHT1507***		
400W	MBDHT2510E	MBDHT2510***		B
750W	MCDHT3520E	MCDHT3520***		C
1kW	–	MDDHT5540***	MDDHT2412***	D
1.5kW			MDDHT3420***	
2kW		–	MEDHT4430***	E
3kW			MFDHT5440***	F
4/5kW			MFDHTA464***	
7.5kW			MGDHTB4A2***	G
11/15kW			MHDHTB4A2***	H

Ordering code for drivers

M A D H T 1 5 0 5 *.*.*

Frame

Code	Type
MADH	A5 series, A frame
MBDH	A5 series, B frame
MCDH	A5 series, C frame
MDDH	A5 series, D frame
MEDH	A5 series, E frame
MFDH	A5 series, F frame
MGDH	A5 series, G frame
MHDH	A5 series, H frame

Max. current

Code	Type
T1	10A
T2	15A
T3	30A
T5	50A
T7	70A
TA	100A
TB	150A

Supply voltage

Code	Type
1	Single phase, 100V
3	3-phase, 200V
4	3-phase, 400V
5	Single/3-phase, 200V

Rated current

Code	Type
05	5A
07	7.5A
10	10A
20	20A
30	30A
40	40A
64	64A
90	90A
A2	120A

Series

Code	Type
	MINAS A5
E	MINAS A5E
N01	MINAS A5N RTEX with safety
NA1	MINAS A5N RTEX
BA1	MINAS A5B EtherCAT
B01	MINAS A5B EtherCAT with safety

MINAS A5 network series

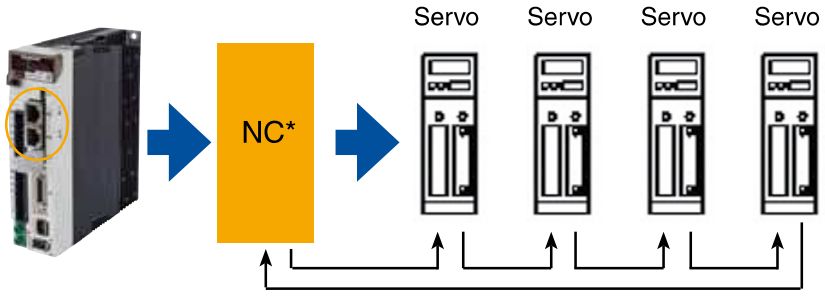
Thanks to its high transmission speed and sampling rate, RTEX (Realtime Express), the fast, real-time Ethernet bus for automation, is particularly well suited for highly dynamic single and multiple axes positioning tasks. The communication between master and slaves happens in real-time.

EtherCAT (Ethernet for Control Automation Technology) offers similar excellent features like RTEX. However, EtherCAT is an open, standardized field bus that allows an open data exchange with all other EtherCAT motion controllers.

RTEX EtherCAT

Features	MINAS A5N	MINAS A5B
Real-time communication 100Mbit/s	RTEX protocol	CAN over EtherCAT (CoE)
Supports position, velocity and torque control	✓	✓
Manual and automatic vibration suppression (adjustable in the driver)	✓	✓
Full control of	up to 32 axes	up to 64 axes
Conforms to the following safety standards: EN954-1(CAT3), ISO13849-1 (PLd), EN61508(SIL2), EN62061(SIL2), EN61800-5-2(STO), IEC61326-3-1	✓	✓
Easy wiring using standard Ethernet cables (CAT5e, up to 100m between units)	✓	✓
Positioning units for	FPΣ (Sigma), FP2SH and FP7	FP7

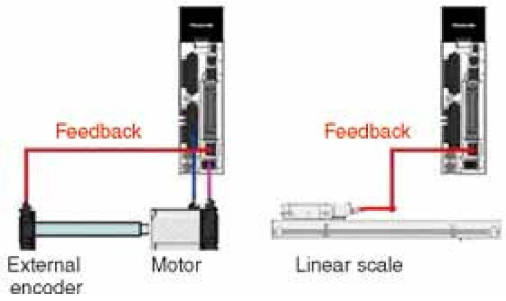
Easy mounting and reliable connections thanks to loop wiring



* NC: Numerical control (motion controller, positioning unit)

External encoders for full-closed control

Using an external encoder ensures high-precision positioning.
For most applications, positioning with a motor encoder works fine. However, mechanical parts may cause slight deviations that the motor encoder cannot control. This is where an external encoder or a linear scale is needed. They help to compensate even small inaccuracies so that positioning practically always works correctly.



Real-time auto-gain tuning

If this function is activated, tuning is performed automatically upon completion of several operations. When the response frequency has been adjusted, simple tuning results in a change to a single parameter value. Fine-tuning can be carried out by activating the gain adjustment mode in the setup software. The automatic vibration suppression function minimizes damage to the equipment. Additional mode and stiffness parameters enable easy response frequency optimization for specific machine types such as vertical axis or high-friction, belt-driven machines.

Belt drive

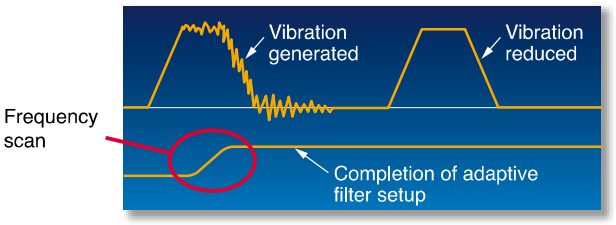
Autotuning approx. 12ms

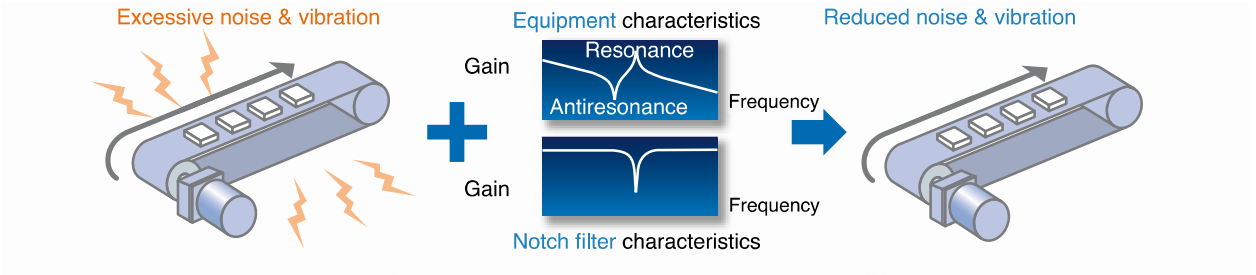
Vertical axis

Autotuning <2ms

Manual and automatic notch filters

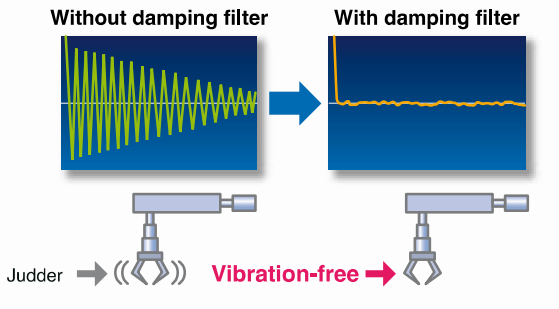
Highly sensitive notch filters eliminate the need to monitor troublesome vibration frequencies. By automatically detecting vibration and defining a simple auto-gain setting, the MINAS A5's filters greatly reduce interference and vibration caused by equipment resonance. For depth adjustment, the A5 features a total of four notch filters, two of which share the auto setup. The setup frequency range for the filters is 50–50,000Hz.





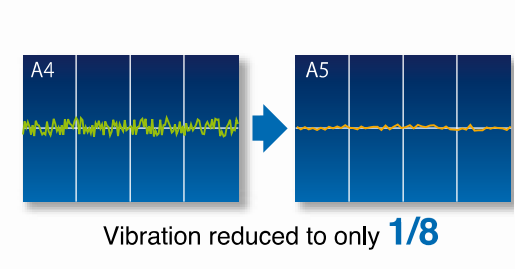
Manual and automatic damping filters

Damping filters that can be set automatically suppress the equipment's resonance and the natural vibration frequency component of the command input, which greatly reduces axis vibration at machine stoppage. The number of damping filters has been increased to four from the conventional two; of these four, two are for simultaneous use. The available frequency range has been extended significantly from 1 to 200Hz.



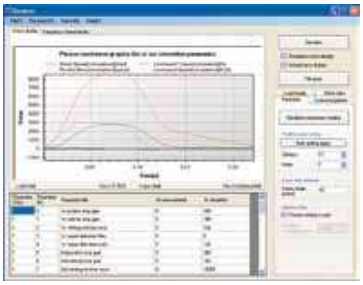
Low cogging torque

Compared to competitor products, the MINAS A5 achieves the industry's most stable speed and lowest cogging torque by minimizing pulse width. This was made possible by a new design featuring a 10-pole rotor for the motor as well as magnetic field analysis. With the reduction in torque variation, the MINAS A5's speed, stability and positioning behavior have been markedly improved.



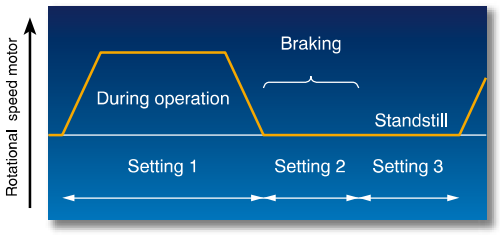
Software tool PANATERM with motion simulation

PANATERM reads response frequency data from the actual machine.
A simplified simulation function allows you to check gain and filter effects without adjusting the actual equipment.



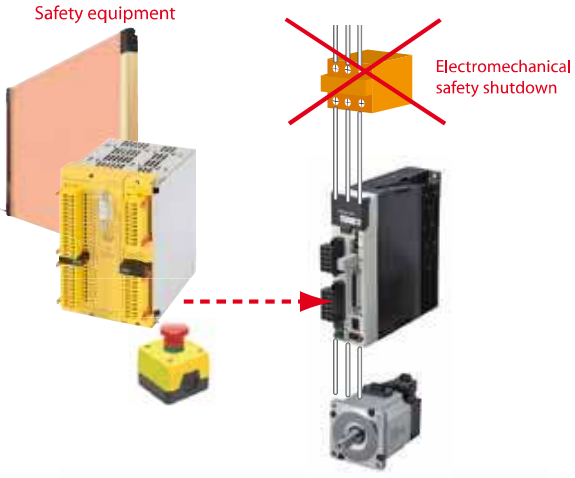
3-step control setting

Control parameters are activated according to the operating condition (deceleration during operation, stopping during fast positioning, standstill). By controlling the motion it is possible to perform even faster positioning with less vibration.



Integrated safety function (STO)

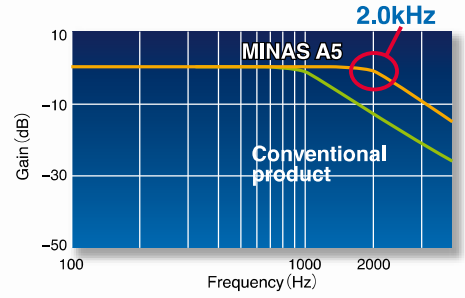
To insulate the motor power, MINAS A5 servo drivers feature independent, hardware-based, redundant circuits. Magnetic breakers prescribed for machines by the Low-Voltage Directive are thereby unnecessary. This saves both space and money. The servo driver's safety functions fulfill the following safety standards: EN954-1(CAT3), ISO13849-1 (PLd), EN61508 (SIL2), EN62061(SIL2), EN61800-5-2(STO), IEC61326-3-1.



Dynamic brake:
The dynamic brake is activated in case of an emergency, i.e. when:
- The main switch has been turned off,
- The input SRV-OFF is not active,
- One of the protective functions is activated or,
- The input INH is not active.

Torque limit
Torque limit is an indispensable function for torque-controlled applications or generally for protection against mechanical damages.

Possible settings:
- As specified by analog value,
- Different values for positive and negative direction,
- 2 digital input points for fixed values.



Overview MINAS A5 motors and accessories

Overview MINAS A5, motor, and accessories

	Motor								Driver	Cable				Filter	Brake resistor
	Rated power W	Max. torque Nm	Rated rotational speed (max.) r/min	Motor type	Holding brake	IP67 degree of protection	Key shaft	Encoder		Motor cable: Without holding brake	Motor cable: With holding brake	Encoder cable: 20-bit incremental	Encoder cable: 17-bit absolute	EMC filter	
Low inertia	**Low inertia 200V AC**														
	50	0.16 (0.48)	3000 (6000)	MSME5AZG1U		.	•	20-bit incremental encoder 1,048,576 p/r	MADHT1505	MFMCA0□□0WJD	--	MFECA□□0WJD	MFECA□□0GJE (with battery box)	FN2080-6-06 or FS21238607	BWD250100
				MSME5AZG1V	•	•	•				MFMCB0□□0PJT*				
	100	0.32 (0.95)	3000 (6000)	MSME012G1U		•	•				--				
				MSME012G1V	•	•	•				MFMCB0□□0PJT*				
	200	0.64 (1.91)	3000 (6000)	MSME022G1U		•	•		MADHT1507		--				BWD250072
				MSME022G1V	•	•	•				MFMCB0□□0PJT*				
	400	1.3 (3.8)	3000 (6000)	MSME042G1U		•	•		MBDHT2510		--				
				MSME042G1V	•	•	•				MFMCB0□□0PJT*				
	750	2.4 (7.1)	3000 (6000)	MSME082G1U		•	•		MCDHT3520		--				
				MSME082G1V	•	•	•				MFMCB0□□0PJT*				
	1000	3.18 (9.55)	3000 (5000)	MSME102G1G		•	•		MDDHT5540	MFMCD0□□2GCD		MFECA□□0GTD	MFECA□□0GTE (with battery box)	DV0P4220	BWD500035
				MSME102G1H	•	•	•			-	MFMCA0□□2HCD				
	1500	4.77 (13.3)	3000 (5000)	MSME152G1G		•	•			MFMCD0□□2GCD	--				
				MSME152G1H	•	•	•			-	MFMCA0□□2HCD				
	Low inertia 400V AC														
	1000	3.18 (9.55)	3000 (5000)	MSME104G1G		•	•	20-bit incremental encoder 1,048,576 p/r	MDDHT3420	MFMCD0□□2GCD	--	MFECA□□0GTD	MFECA□□0GTE (with battery box)	FN3268-7-44	BWD500150
				MSME104G1H	•	•	•			-	MFMCE0□□2HCD				
	1500	4.77 (13.3)	3000 (5000)	MSME154G1G		•	•			MFMCD0□□2GCD	--				
				MSME154G1H	•	•	•			-	MFMCE0□□2HCD				
	2000	6.37 (19.1)	3000 (5000)	MSME204G1G		•	•		MEDHT4430	MFMCD0□□2GCD	--				BWD500100
				MSME204G1H	•	•	•			-	MFMCE0□□2HCD				
	3000	9.55 (28.6)	3000 (5000)	MSME304G1G		•	•		MFDHT5440	MFMCA0□□2GCT	--				BWD600047
				MSME304G1H	•	•	•			-	MFMCA0□□2HCT				
	4000	12.7 (38.2)	3000 (4500)	MSME404G1G		•	•		MFDHTA464	MFMCA0□□2GCT	--			FN3268-16-44	
				MSME404G1H	•	•	•			-	MFMCA0□□2HCT				
	5000	15.9 (47.7)	3000 (4500)	MSME504G1G		•	•			MFMCA0□□2GCT	--				
				MSME504G1H	•	•	•			-	MFMCA0□□2HCT				
Medium inertia	**Medium inertia 200V AC**														
	1000	4.7 (14.3)	2000 (3000)	MDME102G1G		•	•	20-bit increm. encoder	MDDHT3530	MFMCD0□□2GCD	--	MFECA□□0GTD	MFECA□□0GTE (with battery box)	DV0P4220	BWD500035
				MDME102G1H	•	•	•			-	MFMCA0□□2HCD				
	1500	7.16 (21.5)	2000 (3000)	MDME152G1G		•	•		MDDHT5540	MFMCD0□□2GCD	--				
				MDME152G1H	•	•	•			-	MFMCA0□□2HCD				
	Medium inertia 400V AC														
	2000	9.55 (28.6)	2000 (3000)	MDME204G1G		•	•	20-bit incremental encoder 1,048,576 p/r	MEDHT4430	MFMCD0□□2GCD	--	MFECA□□0GTD	MFECA□□0GTE (with battery box)	FN3268-7-44	BWD500100
				MDME204G1H	•	•	•			-	MFMCE0□□2HCD				
	3000	14.3 (43.0)	2000 (3000)	MDME304G1G		•	•		MFDHT5440	MFMCA0□□2GCT	--				BWD600047
				MDME304G1H	•	•	•			-	MFMCA0□□2HCT				
	4000	19.1 (57.3)	2000 (3000)	MDME404G1G		•	•		MFDHTA464	MFMCA0□□2GCT	--			FN3268-16-44	
				MDME404G1H	•	•	•			-	MFMCA0□□2HCT				
	5000	23.9 (71.6)	2000 (3000)	MDME504G1G		•	•			MFMCA0□□2GCT	--				
				MDME504G1H	•	•	•			-	MFMCA0□□2HCT				
	7500	47.8 (119)	1500 (2000)	MDME754G1G		•	•		MGDHT-B4A2***	Use DV0PM20056	Use DV0PM20057			N/A	N/A
				MDME754G1H	•	•	•								
	11000	70 (175)	1500 (2000)	MDMEC14G1G		•	•		MHDHTB4A2						
				MDMEC14G1H	•	•	•								
	15000	95.5 (224)	1500 (2000)	MDMEC54G1G		•	•								
				MDMEC54G1H	•	•	•								
High inertia	**High inertia 200V AC**														
	200	0.64 (1.91)	3000 (5000)	MHMD022G1U		IP65	•	20-bit incremental encoder	MADHT1507	MFMCA0□□0EEL	--	MFECA□□0EAM	MFECA□□0EAE (with battery box)	FN2080-6-06 or FS21238607	BWD250072
				MHMD022G1V	•	IP65	•				MFMCB0□□0GET*				
	400	1.3 (3.8)	3000 (5000)	MHMD042G1U		IP65	•		MBDHT2510		--				
				MHMD042G1V	•	IP65	•				MFMCB0□□0GET*				
	750	2.4 (7.1)	3000 (4500)	MHMD082G1U		IP65	•		MCDHT3520		--				
				MHMD082G1V	•	IP65	•				MFMCB0□□0GET*				
	High inertia 400V AC														
	1000	4.77 (14.3)	2000 (3000)	MHME104G1G		•	•	20-bit incremental encoder 1,048,576 p/r	MDDHT2412	MFMCD0□□2GCD	--	MFECA□□0GTD	MFECA□□0GTE (with battery box)	FN3268-7-44	BWD500150
				MHME104G1H	•	•	•			-	MFMCE0□□2HCD				
	1500	7.16 (21.5)	2000 (3000)	MHME154G1G		•	•		MDDHT3420	MFMCD0□□2GCD	--				
				MHME154G1H	•	•	•			-	MFMCE0□□2HCD				
	2000	9.55 (43.0)	2000 (3000)	MHME204G1G		•	•		MEDHT4430	MFMCE0□□2GCD					BWD500100
				MHME204G1H	•	•	•				MFMCE0□□2HCD				
	3000	14.3 (28.6)	2000 (3000)	MHME304G1G		•	•		MFDHT5440	MFMCA0□□2GCT	--				BWD600047
				MHME304G1H	•	•	•			-	MFMCA0□□2HCT				
	4000	19.1 (57.3)	2000 (3000)	MHME404G1G		•	•		MFDHTA464	MFMCA0□□2GCT	--			FN3268-16-44	
				MHME404G1H	•	•	•			-	MFMCA0□□2HCT				
	5000	23.9 (71.6)	2000 (3000)	MHME504G1G		•	•			MFMCA0□□2GCT	--				
				MHME504G1H	•	•	•			-	MFMCA0□□2HCT				
	7500	47.8 (119)	1500 (3000)	MHME754G1G		•	•		MGDHTB4A2	Use DV0PM20056	Use DV0PM20056			N/A	N/A
				MHME754G1H	•	•	•								

* For motors with a holding brake < 1kW you need two cables: one for the motor, one for the brake.

□□ = Length 1 0 = 1m 5 0 = 5m

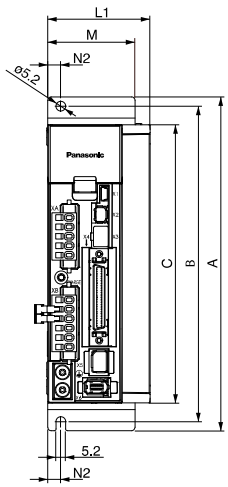
Basic specifications					Frame	MINAS A5E	MINAS A5, A5N,A5B
	Input power	Main circuit	200V		A, B, C, D	1-phase, 3-phase, 200–240V (+10%, -15%), 50/60Hz	
		Control circuit	200V		A, B, C, D	1-phase, 200–240V (+10%, -15%), 50/60Hz	
			200V		E, F	1-phase, 200-230V (+10%, -15%), 50/60Hz	
		Main circuit	400V		D, E, F, G, H	–	3-phase, 380–480V (+10%, -15%), 50/60Hz
		Control circuit	400V		D, E, F, G, H	–	24V DC (±15%)
	Operating conditions	Temperature				0–50°C, storage temperature: -20 to +65°C (max. temperature 80°C for 72h)	0-55°C, storage temperature: -20 to +65°C (max. temperature 80°C for 72h)
		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)				20-bit incremental encoder (resolution 1,048,576)	
		Absolute				–	17-bit absolute encoder on request (resolution 131,072)
	External feedback scale	A/B phase				–	Initialization signal differential input
		Serial				–	Compatible with Mitutoyo (AT500, ST771)
	Control signals	Input points				10	
		Output points				6	
	Analog/digital signals	Input points				–	3 (16-bit A/D: 1, 12-bit A/D: 2)
		Output points				2	
	Pulse signals	Input points				2 line driver	
		Output points				3 line driver (A, B, and Z-phase), 1 open collector (Z-phase)	
	Interface	USB				Interface to PC, etc.	
		RS232				–	1:1 communication
		RS485				–	1:n communication with up to 31 axes via host (FP series PLC)
	Safety functions					–	IEC61800-5-2 STO
	Front panel					5 buttons (MODE, SET, UP, DOWN, SHIFT), LED (6 digits), analog output	5 buttons (MODE, SET, UP, DOWN, SHIFT), LED (6 digits), analog output, digital output
	Regeneration					A, B, G, and H frame: no built-in brake resistor (only external brake resistor) C–F frame: built-in brake resistor (external brake resistor also possible)	
	Dynamic brake					A–G frame: built in (external brake resistor can be implemented in frame G) H frame: Only external resistor possible	
	Control mode					Position control	7 different control modes 1. Position control, 2. Velocity control, 3. Torque control, 4. Position/velocity control, 5. Position/torque control, 6. Velocity/torque control, 7. Full-closed control

Driver functions

				MINAS A5E	MINAS A5, A5N, A5B
Functions	Position control	Control input		1. Clear deviation counter, 2. Command pulse inhibition, 3. Electronic gear switching, 4. Damping control switching	
		Control output		Positioning complete etc.	
		Pulse input	Line driver A	500kpps	
			Open collector	200kpps	
			Line driver B	4Mpps	
			Signal format	Differential input/square-wave pulse	
			Electronic gear	Scaling of pulse frequency from 1/1000 – 1000 times	
			Smoothing filter	Primary delay filter or FIR filter, customizable	
		Analog input	Torque limit command	–	Individual torque limit for positive and negative direction
		Instantaneous speed observer		Available	
		Damping control		Available	
	Velocity control	Control input		–	1.-3. Selection of internal velocities, 4. Zero speed clamp
		Control output		–	Set velocity has been reached, etc.
		Analog input	Velocity command	–	Velocity and direction
			Torque limit command	–	Available
		Velocity range		–	1 – 6000r/min
		Internal velocity command		–	8 velocity set values
		Smooth start-up and stopping		–	Individual setup of acceleration and deceleration from 0 – 10s/1000r/min S-curve acceleration and deceleration ramp possible
		Zero speed clamp		–	Available
		Instantaneous speed observer		–	Available
		Velocity control filter		–	Available
	Torque control	Control input		–	Zero speed clamp, Torque direction command etc.
		Control output		–	Set torque has been reached (at predefined velocity)
		Analog input	Velocity command	–	Set speed can be scaled
			Speed limit function	–	Speed can be scaled
	Full-closed control	Control input		–	1. Clear deviation counter, 2. Command pulse inhibition, 3. Electronic gear switching, 4. Damping control switching
		Control output		–	Full-closed control complete
		Pulse input	Line driver A	–	500kpps
			Open collector	–	200kpps
			Line driver B	–	4Mpps
			Signal format	–	Differential input/square-wave pulse
			Electronic gear	–	Scaling of pulse frequency from 1/1000 – 1000 times
			Smoothing filter	–	Primary delay filter or FIR filter, customizable
		Analog input	Torque limit command	–	Torque limit available
		Setup range of division/multiplication of feedback scale		–	From 1/40 – 160 times
	Other features	Autotuning		Automatic adjustment of the driver'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 maximal resolution of the encoder	
		Protective function	Error messages causing switch-off	Overvoltage, undervoltage, overspeed, overload, overheat, overcurrent, encoder error, etc.	
			Error messages requiring acknowledgement	Excessive position deviation, command pulse division error, EEPROM error, etc.	
		Alarm history		Can be logged for reference	

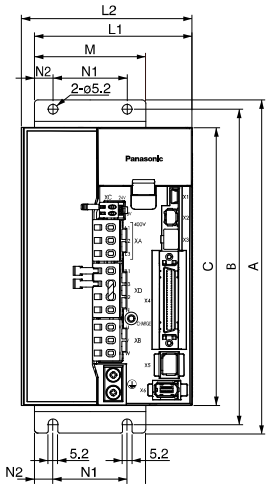
All dimensions are in mm

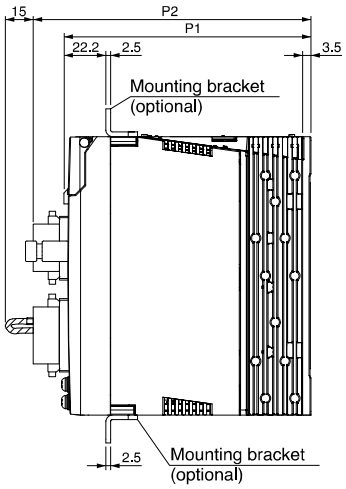
Frame A, B, C

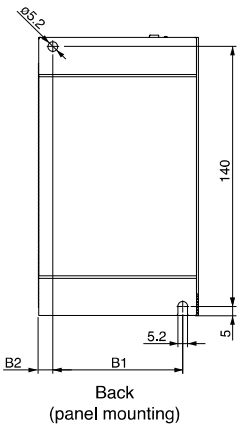


Rack mounting (mounting bracket optional)

Frame D

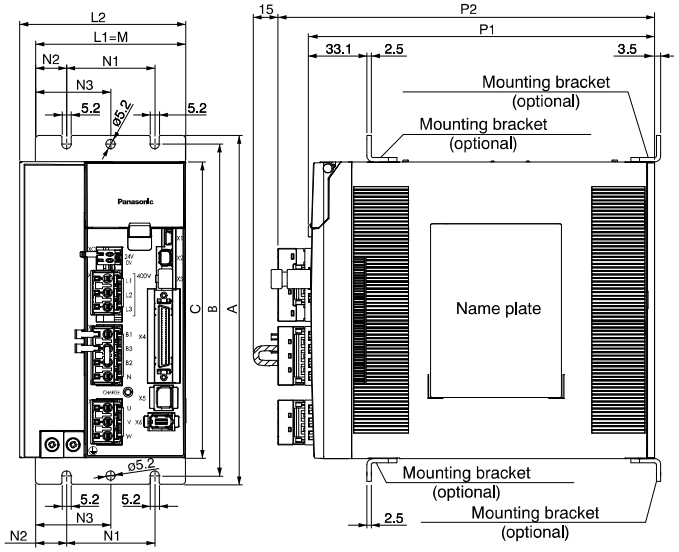




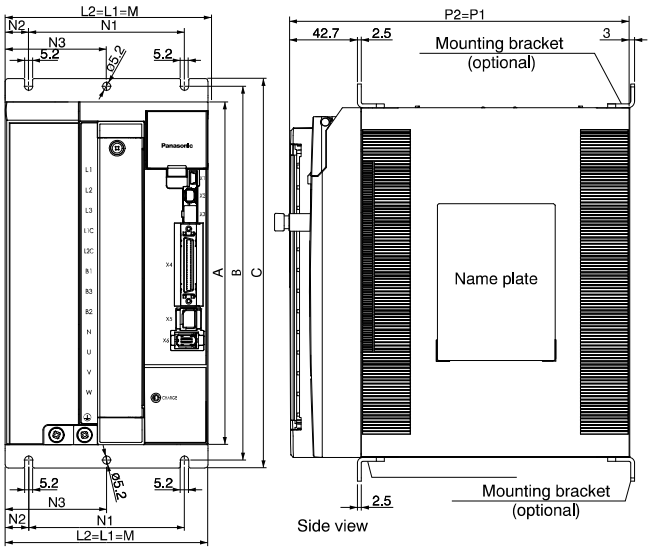


Back
(panel mounting)

Frame E



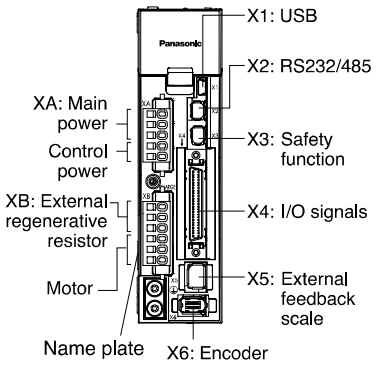
Frame F



Side view

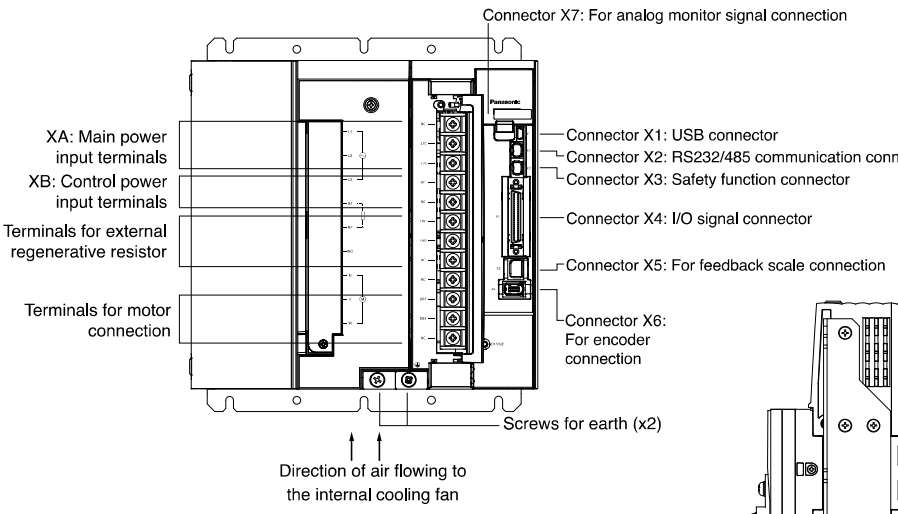
		Width		Mounting bracket				Height			Depth		Control panel		
Frame	Volt-age	L1	L2	M	N1	N2	N3	A	B	C	P1	P2	B1	B2	Weight
A	200V	40	-	40	-	7	-	180	170	150	133	151	28	6	0.8kg
B	200V	55	-	47	-	7	-	180	170	150	133	151	43	6	1.0kg
C	200V	65	-	40	-	20	-	180	170	150	173	191	50	7.5	1.6kg
D	200V	85	86	60	40	10	-	180	170	150	173	191	70	8.5	1.8kg
	400V	85	92	60	40	10	-	180	170	150	173	191	70	7.5	1.9kg
E	200V	85	86	85	50	17.5	42.5	198	188	168	196	212	*	*	2.7kg
	400V	85	94	85	50	17.5	42.5	198	188	168	196	212	*	*	2.7kg
F	200V	130	130	130	100	15	65	250	240	220	214	-	*	*	4.8kg
	400V	130	130	130	100	15	65	250	240	220	214	-	*	*	4.7kg

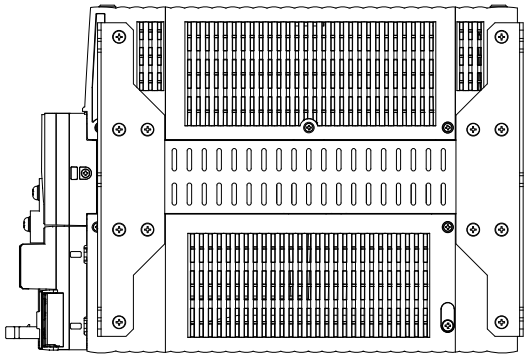
* For the dimensions, please refer to the data sheet of the mounting bracket

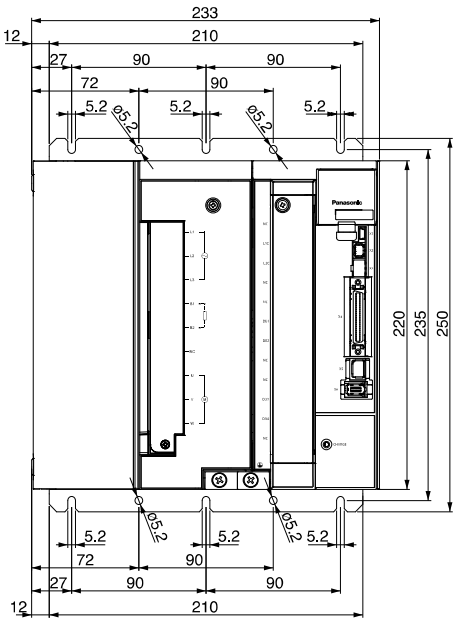


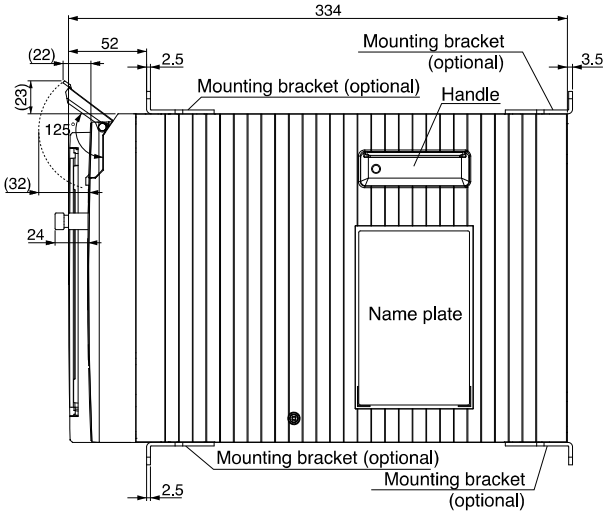
Frame G

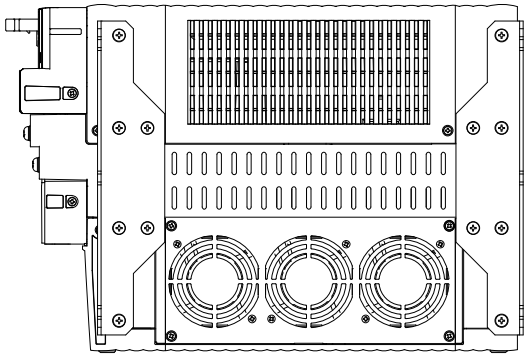
All dimensions are in mm



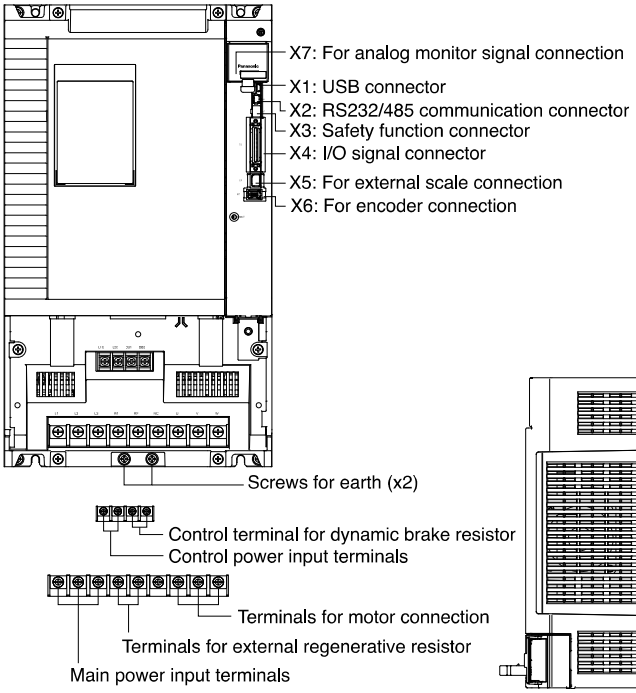


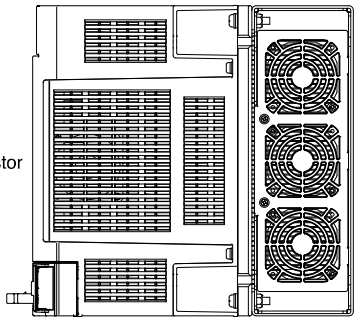


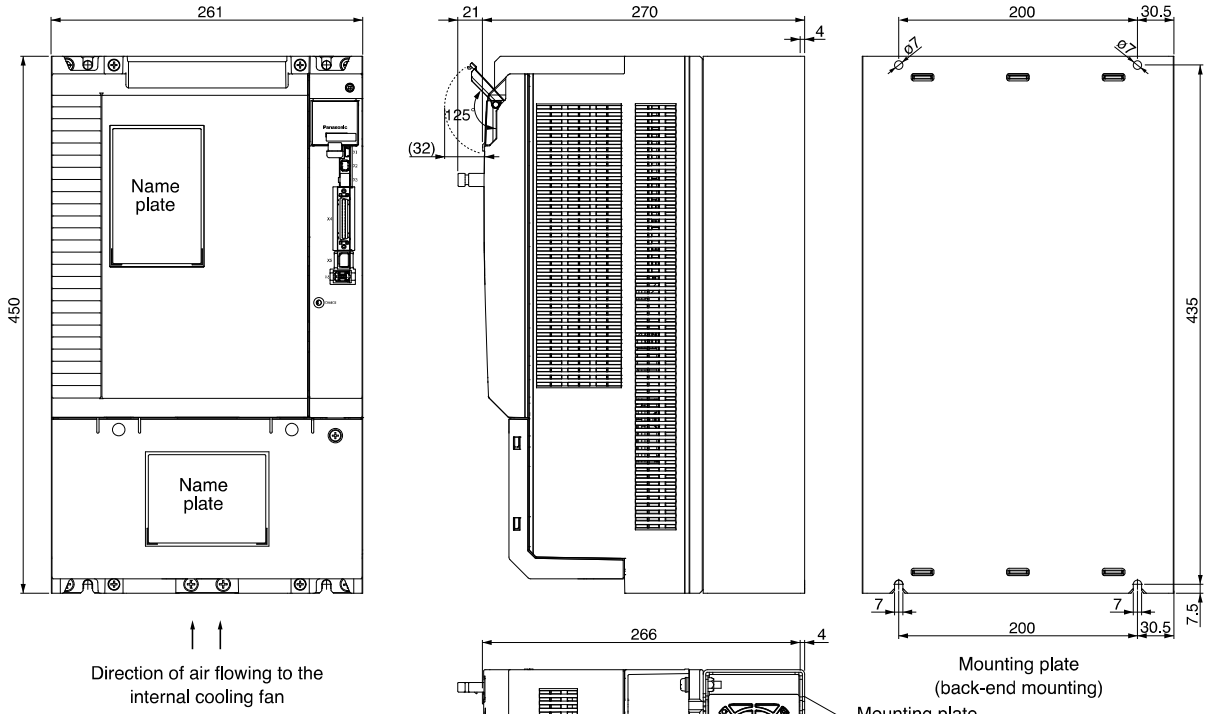




Frame H


X7: For analog monitor signal connection
X1: USB connector
X2: RS232/485 communication connector
X3: Safety function connector
X4: I/O signal connector
X5: For external scale connection
X6: For encoder connection
Screws for earth (x2)
Control terminal for dynamic brake resistor
Control power input terminals
Terminals for motor connection
Terminals for external regenerative resistor
Main power input terminals




261
450
Name plate
Name plate
21
270
4
125
(32)
200
30.5
ø7
ø7
435
7
7
200
30.5
7.5
266
4
Direction of air flowing to the internal cooling fan
Mounting plate (back-end mounting)
Mounting plate
Mounting plate

MSME (low inertia) 50–1500W 200V AC								
Motor		MSME5AZG1□	MSME012G1□	MSME022G1□	MSME042G1□	MSME082G1□	MSME102G1□	MSME152G1□
Rated power W		50	100	200	400	750	1000	1500
Required power kVA		0.5			0.9	1.3	1.8	3.3
Rated current A (rms)		1.1		1.5	2.4	4.1	6.6	8.2
Max. current A o-p		4.7		6.5	10.2	17.4	28	35
Rotational speed r/min	Rated rotational speed	3000						
	Max. rotational speed	6000					5000	
Weight kg	Without holding brake	0.31	0.46	0.78	1.2	2.3	3.5	4.4
	With holding brake	0.51	0.66	1.2	1.6	3.1	4.5	5.4
Torque Nm	Nominal	0.16	0.32	0.65	1.3	2.4	3.18	4.77
	Maximal	0.48	0.95	1.91	3.8	7.1	9.55	13.3
Encoder	Resolution	20 bit						
	p/r	1,048,576						
Regenerative brake frequency	With internal resistor	No limit						
	With external resistor	No limit						
Moment of inertia of rotor ($x10^{-4}$ kg · m²)	Without holding brake	0.025	0.051	0.14	0.26	0.87	2.03	2.84
	With holding brake	0.027	0.054	0.16	0.28	0.97	2.35	3.17
Recommended inertia ratio between load and rotor		Max. 30:1				Max. 20:1	Max. 15:1	
Operating conditions	Temperature (without frost)	0–40°C						
	Ambient humidity	20–85% RH (non-condensing)						
	Altitude	Max. 1000m above sea level						
	Vibration	49m/s²						
Holding brake specifications (The holding brake is engaged when the power for the servo driver is shut off. Do not use the holding brake when the motor is in motion.)								
Static friction torque Nm		Min. 0.29		Min. 1.27		Min. 2.45	Min. 7.8	
Engaging time ms		Max. 35		Max. 50		Max. 70	Max. 50	
Releasing time ms		Max. 20		Max. 15		Max. 20	Max. 15	
Excitation current A DC		0.3		0.36		0.42	0.81 ±10%	
Releasing voltage V DC		Min. 1						
Excitation voltage V DC		24 ±5%						
Permissible load and thrust at output shaft								
During installation	Radial load,	147		392		686	980	
During operation	P-direction (N)*	68.6		245		392	490	
During installation	Axial thrust (push),	88		147		294	588	
During operation	A-direction (N)*	58.8		98		147	196	
During installation	Axial thrust (pull),	117.6		196		392	686	
During operation	B-direction (N)*	58.8		98		147	196	

MSME (low inertia) 1000–5000W 400V AC							
Motor		MSME104G1□	MSME154G1□	MSME204G1□	MSME304G1□	MSME404G1□	MSME504G1□
Rated power W		1000	1500	2000	3000	4000	5000
Required power kVA		1.8	2.3	3.3	4.5	6.8	7.5
Rated current A (rms)		3.3	4.2	5.7	9.2	9.9	12
Max. current A o-p		14	18	24	39	42	51
Rotational speed r/min	Rated rotational speed	3000					
	Max. rotational speed	5000				4500	
Weight kg	Without holding brake	3.5	4.4	5.3	8.3	11	14
	With holding brake	4.5	5.4	6.3	9.4	12.6	16
Torque Nm	Nominal	3.18	4.77	6.37	9.55	12.7	15.9
	Maximal	9.55	13.3	19.1	28.6	38.2	47.7
Encoder	Resolution	20 bit					
	p/r	1,048,576					
Regenerative brake frequency	With internal resistor	No limit					
	With external resistor	No limit					
Moment of inertia of rotor ($x10^{-4}$ kg · m²)	Without holding brake	2.03	2.84	3.68	6.5	12.9	17.4
	With holding brake	2.35	3.17	4.01	7.85	14.2	18.6
Recommended inertia ratio between load and rotor		Max. 15:1					
Operating conditions	Temperature (without frost)	0–40°C					
	Ambient humidity	20–85% RH (non-condensing)					
	Altitude	Max. 1000m above sea level					
	Vibration	49m/s²					
Holding brake specifications (The holding brake is engaged when the power for the servo driver is shut off. Do not use the holding brake when the motor is in motion.)							
Static friction torque Nm		Min. 7.8			Min. 11.8	Min. 16.2	
Engaging time ms		Max. 50			Max. 80	Max. 110	
Releasing time ms		Max. 15				Max. 50	
Excitation current A DC		0.81 ±10%				0.9 ±10%	
Releasing voltage V DC		Min. 2					
Excitation voltage V DC		24 ±10%					
Permissible load and thrust at output shaft							
During installation	Radial load,	980					
During operation	P-direction (N)*	490				784	
During installation	Axial thrust (push),	588					
During operation	A-direction (N)*	196				343	
During installation	Axial thrust (pull),	686					
During operation	B-direction (N)*	196				343	

*For details, please refer to page 19.

MDME (middle inertia) 1000–1500W 200V AC			
Motor		MDME102G1☐	MDME152G1☐
Rated power W		1000	1500
Required power kVA		1.8	2.3
Rated current A (rms)		5.7	9.4
Max. current A o-p		24	40
Rotational speed r/min	Rated rotational speed	2000	
	Max. rotational speed	3000	
Weight kg	Without holding brake	5.2	6.7
	With holding brake	6.7	8.2
Torque Nm	Nominal	4.77	7.16
	Maximal	14.3	21.5
Encoder	Resolution	20 bit	
	p/r	1,048,576	
Regenerative brake frequency	With internal resistor	No limit	
	With external resistor	No limit	
Moment of inertia of rotor ($x10^{-4}$ kg · m^2)	Without holding brake	4.6	6.7
	With holding brake	5.9	7.99
Recommended inertia ratio between load and rotor		Max. 10:1	
Operating conditions	Temperature (without frost)	0–40°C	
	Ambient humidity	20–85% RH (non-condensing)	
	Altitude	Max. 1000m above sea level	
	Vibration	49m/s^2	
Holding brake specifications (The holding brake is engaged when the power for the servo driver is shut off. Do not use the holding brake when the motor is in motion.)			
Static friction torque Nm		Min. 4.9	Min. 13.7
Engaging time ms		Max. 80	Max. 100
Releasing time ms		Max. 70	Max. 50
Excitation current A DC		0.59 ±10%	0.79 ±10%
Releasing voltage V DC		Min. 2	
Excitation voltage V DC		24 ±10%	
Permissible load and thrust at output shaft			
During installation	Radial load,	980	
During operation	P-direction (N)*	490	
During installation	Axial thrust (push),	588	
During operation	A-direction (N)*	196	
During installation	Axial thrust (pull),	686	
During operation	B-direction (N)*	196	

MDME (middle inertia) 2000–15000W 400V AC								
Motor		MDME204G1☐	MDME304G1☐	MDME404G1☐	MDME504G1☐	MDME754G1☐	MDMEC14G1☐	MDMEC54G1☐
Rated power W		2000	3000	4000	5000	7500	11000	15000
Required power kVA		3.3	4.5	6.8	7.5	11	17	22
Rated current A (rms)		5.9	8.7	10.6	13	22	27.1	33.1
Max. current A o-p		25	37	45	55	83	101	118
Rotational speed r/min	Rated rotational speed	2000				1500		
	Max. rotational speed	3000				2000		
Weight kg	Without holding brake	8	11	15.5	18.6	36.4	52.7	70.2
	With holding brake	9.5	12.6	18.7	21.8	40.4	58.9	76.3
Torque Nm	Nominal	9.55	14.3	19.1	23.9	47.8	70	95.5
	Maximal	28.6	43.0	57.3	71.6	119	175	224
Encoder	Resolution	20 bit						
	p/r	1,048,576						
Regenerative brake frequency times/min	With internal resistor	No limit			120	No limit		
	With external resistor	No limit						
Moment of inertia of rotor ($x10^{-4}$ kg · m^2)	Without holding brake	8.72	12.9	37.6	48	101	212	302
	With holding brake	10	14.2	38.6	48.8	107	220	311
Recommended inertia ratio between load and rotor		Max. 10:1				Max. 1:1		
Operating conditions	Temperature (without frost)	0–40°C						
	Ambient humidity	20–85% RH (non-condensing)						
	Altitude	Max. 1000m above sea level						
	Vibration	49m/s^2				24.5m/s^2		
Holding brake specifications (The holding brake is engaged when the power for the servo driver is shut off. Do not use the holding brake when the motor is in motion.)								
Static friction torque Nm		Min. 13.7	Min. 16.2	Min. 24.5		Min. 58.8	Min. 100	
Engaging time ms		Max. 100	Max. 110	Max. 80		Max. 150	Max. 300	
Releasing time ms		Max. 50		Max. 25		Max. 50	Max. 140	
Excitation current A DC		0.79 ±10%	0.90 ±10%	1.3 ±10%		1.4 ±10%	1.08 ±10%	
Releasing voltage V DC		Min. 2						
Excitation voltage V DC		24 ±5%						
Permissible load and thrust at output shaft								
During installation	Radial load,	980		1666		2058	4508	
During operation	P-direction (N)*	490		784		1176	2254	
During installation	Axial thrust (push),	588		784		980	1470	
During operation	A-direction (N)*	196		343		490	686	
During installation	Axial thrust (pull),	686		980		1176	1764	
During operation	B-direction (N)*	196		343		490	686	

*For details, please refer to page 19.

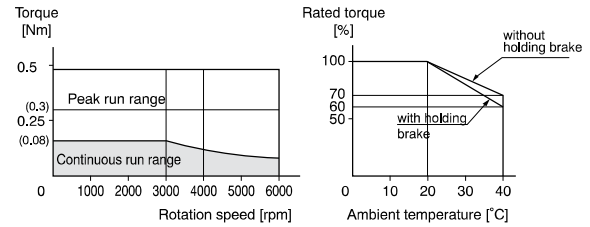
MHMD (high inertia) 200–750W 200V AC				
Motor		MHMD022G1□	MHMD042G1□	MHMD082G1□
Rated power W		200	400	750
Required power kVA		0.5	0.9	1.3
Rated current A (rms)		1.6	2.6	4
Max. current A o-p		6.9	11	17
Rotational speed r/min	Rated rotational speed	3000		
	Max. rotational speed	5000		4500
Weight kg	Without holding brake	0.96	1.4	2.5
	With holding brake	1.4	1.8	3.5
Torque Nm	Nominal	4.77	7.16	9.55
	Maximal	14.3	21.5	43.0
Encoder	Resolution	20 bit		
	p/r	1,048,576		
Regenerative brake frequency	With internal resistor	No limit		
	With external resistor	No limit		
Moment of inertia of rotor (x10^{-4} kg · m^2)	Without holding brake	0.42	0.67	1.51
	With holding brake	0.45	0.7	1.61
Recommended inertia ratio between load and rotor		Max. 30:1		Max. 20:1
Operating conditions	Temperature (without frost)	0–40°C		
	Ambient humidity	20–85% RH (non-condensing)		
	Altitude	Max. 1000m above sea level		
	Vibration	49m/s^2		
Holding brake specifications (The holding brake is engaged when the power for the servo driver is shut off. Do not use the holding brake when the motor is in motion.)				
Static friction torque Nm		Min. 1.27		Min. 2.45
Engaging time ms		Max. 50		Max. 70
Releasing time ms		Max. 30		Max. 20
Excitation current A DC		0.36		0.42
Releasing voltage V DC		Min. 1		
Excitation voltage V DC		24 ±5%		
Permissible load and thrust at output shaft				
During installation	Radial load,	392		686
During operation	P-direction (N)*	245		392
During installation	Axial thrust (push),	147		294
During operation	A-direction (N)*	98		147
During installation	Axial thrust (pull),	196		392
During operation	B-direction (N)*	98		147

MHME (high inertia) 1000–7500W 400V AC								
Motor		MHME104G1□	MHME154G1□	MHME204G1□	MHME304G1□	MHME404G1□	MHME504G1□	MHME754G1□
Rated power W		1000	1500	2000	3000	4000	5000	7500
Required power kVA		1.8	2.3	3.3	4.5	6.8	7.5	11
Rated current A (rms)		5.7	9.4	11.1	16	21	25.9	44
Max. current A o-p		24	40	47	68	83	110	165
Rotational speed r/min	Rated rotational speed	2000						1500
	Max. rotational speed	3000						
Weight kg	Without holding brake	6.7	8.6	12.2	16	18.6	23	42.3
	With holding brake	9.1	10.1	15.5	19.2	21.8	26.2	46.2
Torque Nm	Nominal	4.77	7.16	9.55	14.3	19.1	23.9	47.8
	Maximal	14.3	21.5	43.0	28.6	57.3	71.6	119
Encoder	Resolution	20 bit						
	p/r	1,048,576						
Regenerative brake frequency times/min	With internal resistor	83	22	45	19	17	10	No limit
	With external resistor	No limit	130	142	42	125	76	No limit
Moment of inertia of rotor (x10^{-4} kg · m^2)	Without holding brake	24.7	37.1	57.8	90.5	112	162	273
	With holding brake	26	38.4	59.6	92.1	114	164	279
Recommended inertia ratio between load and rotor		Max. 5:1						
Operating conditions	Temperature (without frost)	0–40°C						
	Ambient humidity	20–85% RH (non-condensing)						
	Altitude	Max. 1000m above sea level						
	Vibration	49m/s^2						24.5m/s^2
Holding brake specifications (The holding brake is engaged when the power for the servo driver is shut off. Do not use the holding brake when the motor is in motion.)								
Static friction torque Nm		Min. 4.9	Min. 13.7	Min. 24.5				Min. 58.8
Engaging time ms		Max. 80	Max. 100	Max. 80				Max. 150
Releasing time ms		Max. 70	Max. 50	Max. 25				Max. 50
Excitation current A DC		0.59 ±10%	0.79 ±10%	1.3 ±10%				1.41 ±10%
Releasing voltage V DC		Min. 2						
Excitation voltage V DC		24 ±5%						
Permissible load and thrust at output shaft								
During installation	Radial load,	980		1666				2058
During operation	P-direction (N)*	490		784				1176
During installation	Axial thrust (push),	588		784				980
During operation	A-direction (N)*	196		343				490
During installation	Axial thrust (pull),	686		980				1176
During operation	B-direction (N)*	196		343				490

*For details, please refer to page 19.

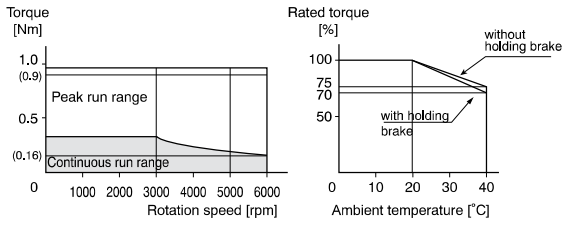
MSME5AZG1□

With oil seal



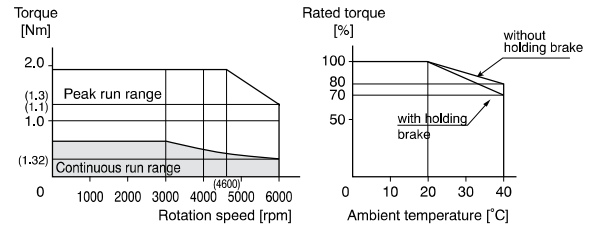
MSME012G1□

With oil seal



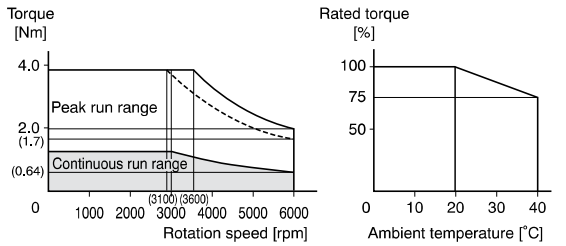
MSME022G1□

With oil seal



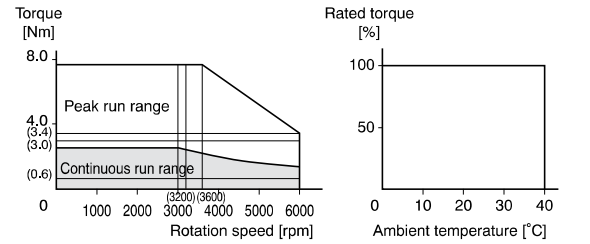
MSME042G1□

With oil seal



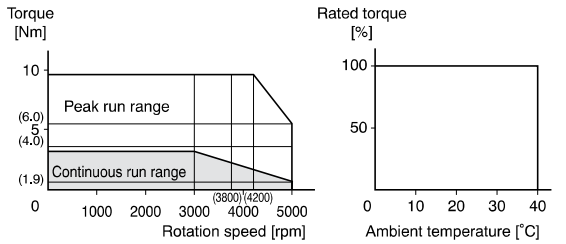
MSME082G1□

With oil seal



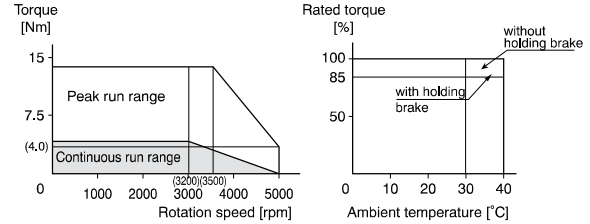
MSME102G1□

With oil seal



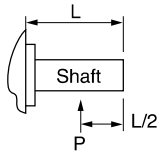
MSME152G1□

With oil seal

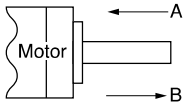


Permissible load at output shaft

Radial load (P) direction

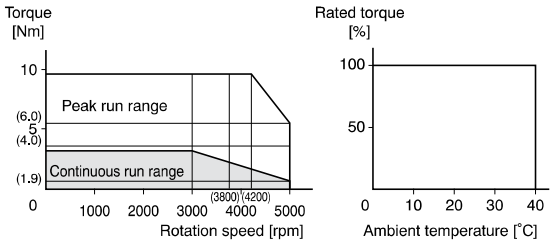


Thrust load (A and B) direction



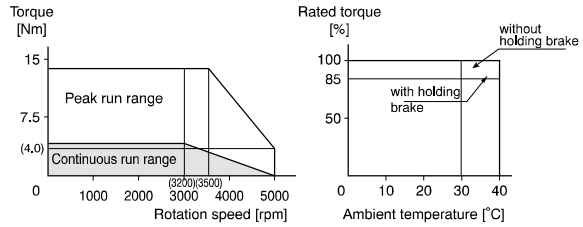
MSME104G1☐

With oil seal



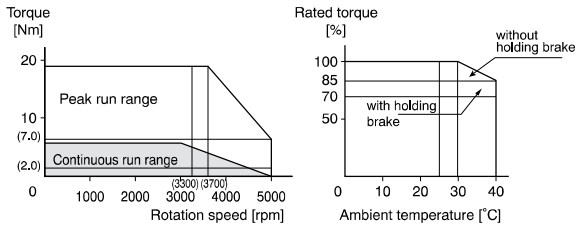
MSME154G1☐

With oil seal



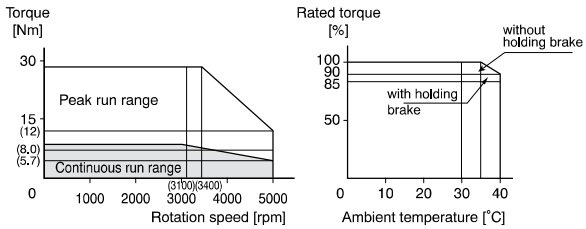
MSME204G1☐

With oil seal



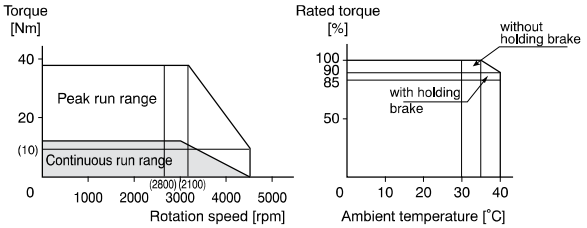
MSME304G1☐

With oil seal



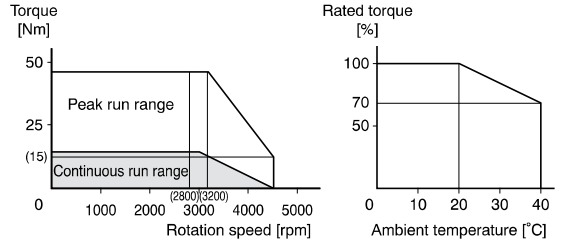
MSME404G1☐

With oil seal



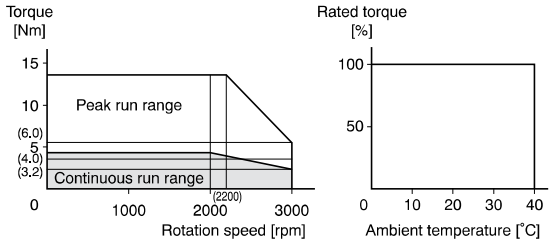
MSME504G1☐

With oil seal



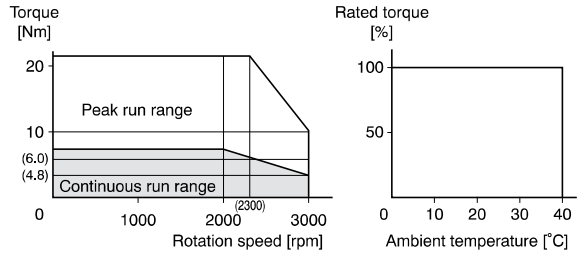
MDME102G1☐

With oil seal



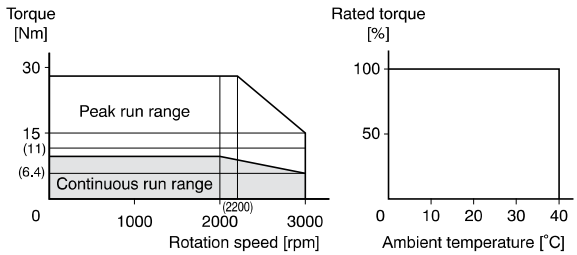
MDME152G1☐

With oil seal



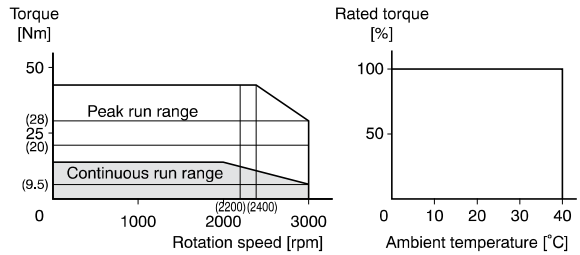
MDME204G1☐

With oil seal



MDME304G1☐

With oil seal



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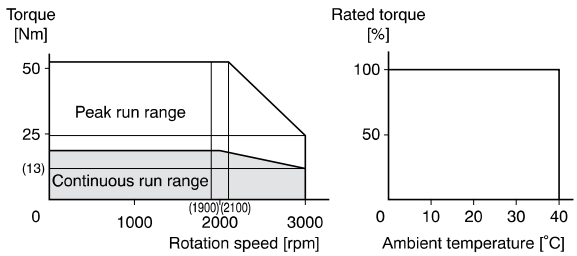
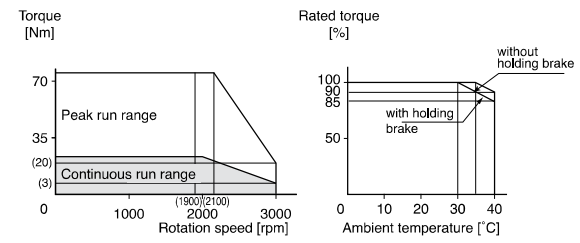
With oil seal



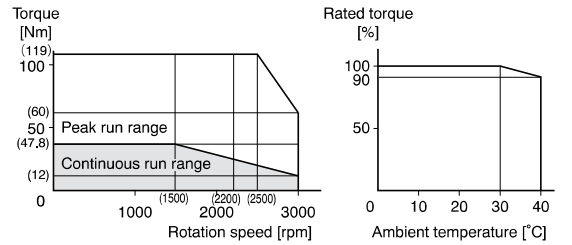
MDME504G1☐

With oil seal



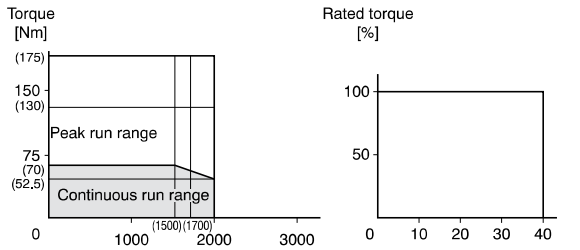
MDME754G1☐

With oil seal



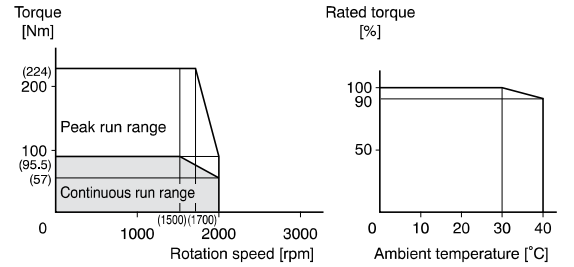
MDMEC14G1☐

With oil seal



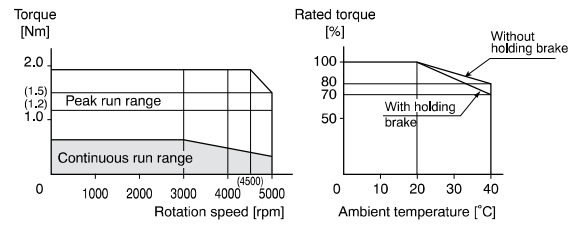
MDMEC54G1☐

With oil seal



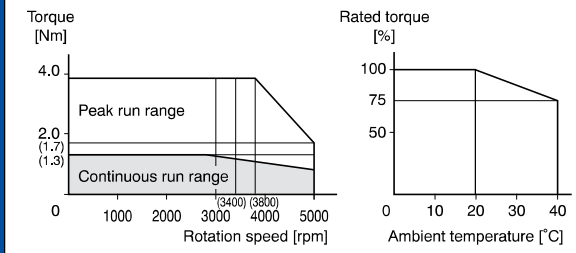
MHMD022G1☐

With oil seal



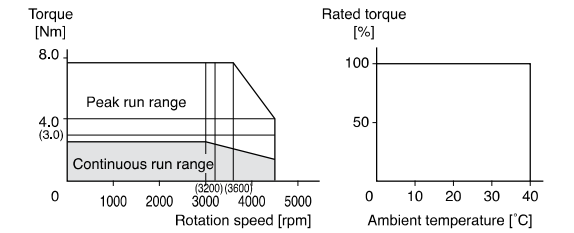
MHMD042G1☐

With oil seal



MHMD082G1☐

With oil seal



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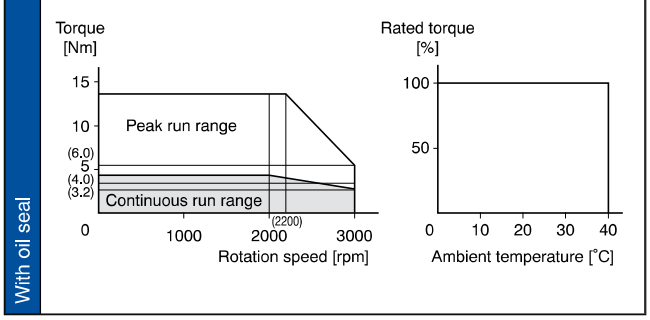

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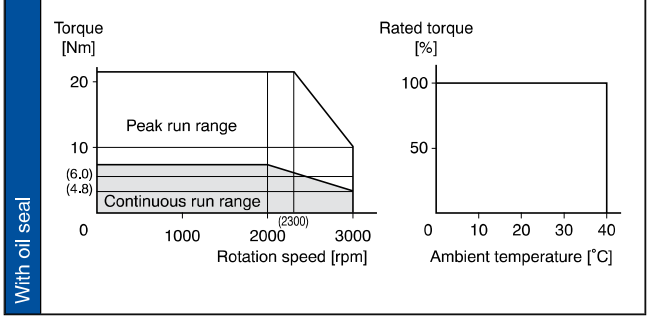

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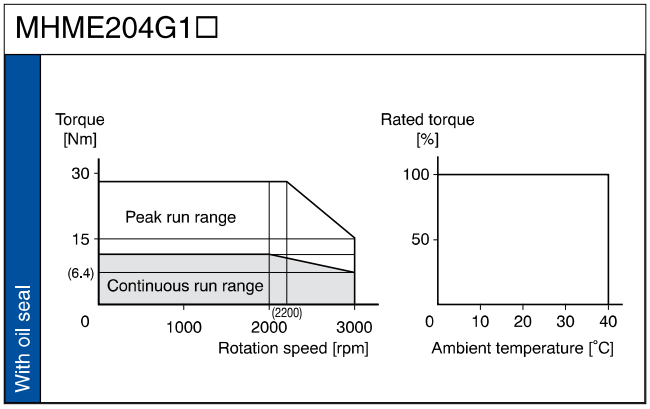

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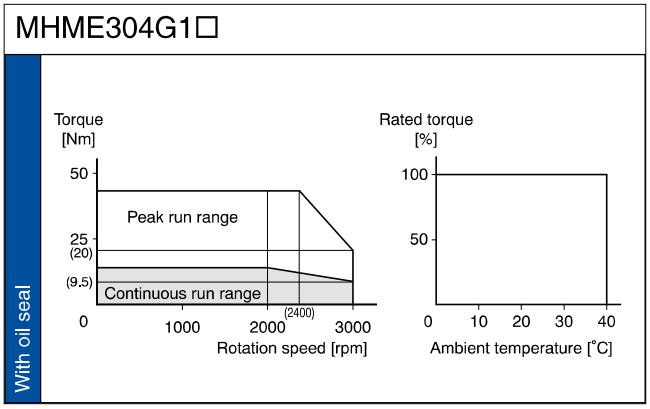

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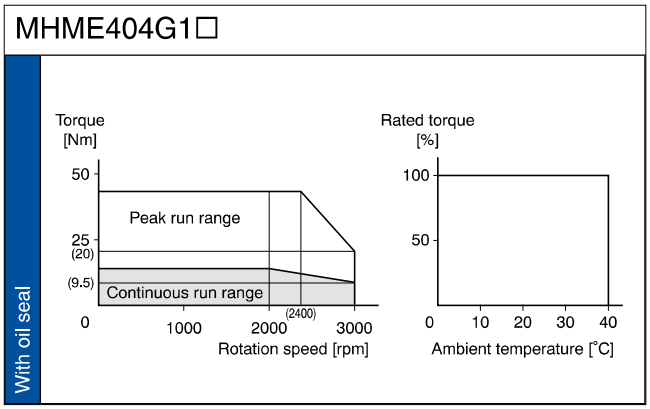

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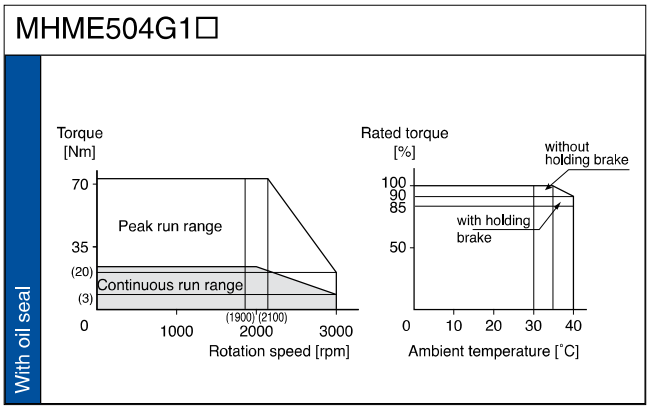

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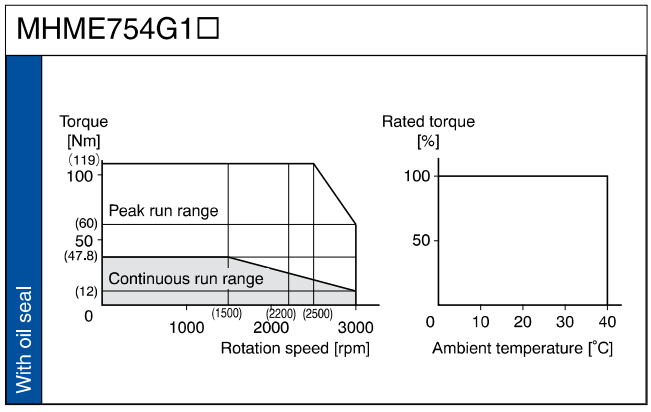
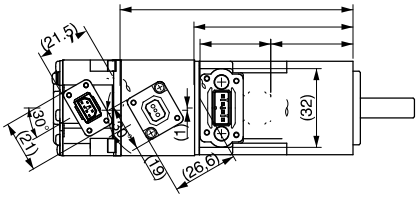
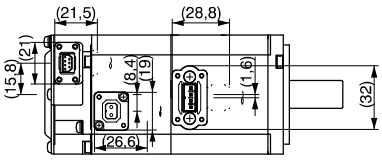


MINAS A5 motor dimensions

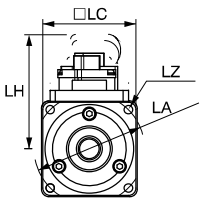
50W–100W

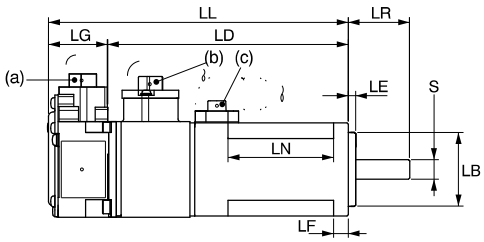


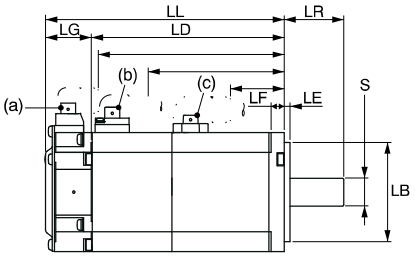
200W–750W

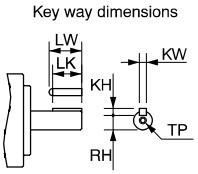


50W–750W







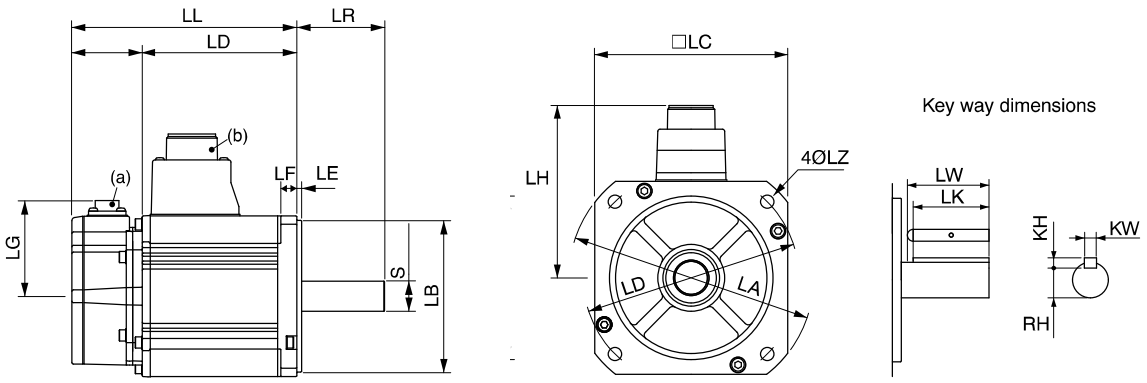


a) Encoder connector
b) Brake connector
c) Motor connector

MSME (low inertia) 50–750W 200V AC												
Rated power		W	50		100		200		400		750	
Motor		Type	MSME5AZG1□		MSME012G1□		MSME022G1□		MSME042G1□		MSME082G1□	
Encoder	Pulses	-	20-bit incremental									
	Resolution	p/r	1,048,576									
Motor with/without holding brake			Without	With	Without	With	Without	With	Without	With	Without	With
LL		mm	72	102	92	122	79.5	116	99	135.5	112	148.2
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	
LD		mm	48	78	68	98	56.5	93	76	112.5	86.2	122.2
LE		mm	3				3				3	
LF		mm	6				6.5				8	
LG		mm	24				23				26	
LH		mm	(46.6)				(52.5)				(61.6)	
LN		mm	43				-				-	
LZ		mm	4- ∅ 3.4				4- ∅ 3.4		4- ∅ 4.5		4- ∅ 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
Encoder cables		Type	MFECA0□□0WJD									
Motor cable		Type	MFMCA0□□0WJD									
Brake cables		Type	MFMCB0□□0PJT									
Connector set		Type	DV0PM20035 (motor+encoder)									

□□ = Length 10 = 1m 50 = 5m

1kW–5kW

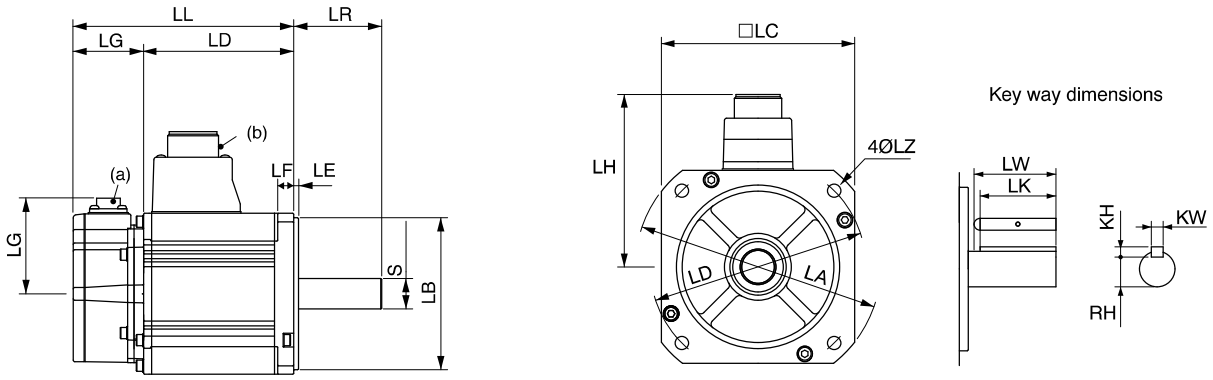


a) Encoder connector
b) Motor connector

MSME (low inertia) 1kW–1.5kW 200V AC, 1kW–5kW 400V AC								
Rated power		kW	1.0	1.5	2.0	3.0	4.0	5.0
Motor	200V AC	Type	MSME102G1□	MSME152G1□	-	-	-	-
	400V AC		MSME104G1□	MSME154G1□	MSME204G1□	MSME304G1□	MSME404G1□	MSME504G1□
LL	Without holding brake	mm	141	159.5	178.5	190	208	243
	With holding brake	mm	168	186.5	205.5	215	233	268
LR		mm	55			55	65	
S		mm	∅ 19 h6			∅ 22 h6	∅ 24 h6	
LA		mm	∅ 135			∅ 162	∅ 165	
LB		mm	∅ 95 h7			∅ 110 h7		
LC		mm	100			120	130	
LD		mm	∅ 115			∅ 145		
LE		mm	3				6	
LF		mm	10			12	12	
LG		mm	(60)			(60)		
LH		mm	(101)			(113)	(118)	
LZ		mm	4 ∅9					
Key way	LW	mm	45				55	
	LK	mm	42			41	51	
	KW	mm	6 h9			8 h9		
	KH	mm	6			7		
	RH	mm	15.5			18	20	
Weight	Without holding brake	kg	3.5	4.4	5.3	8.3	11	14
	With holding brake	kg	4.5	5.4	6.3	9.4	12.6	16
Encoder cables		Type	MFECA0□□0GTD					
Motor cable		Type	MFMCD0□□2GCD			MFMCA0□□2GCT		
Cable motor + holding brake	200V AC	Type	MFMCA0□□2HCD			MFMCA0□□2HCT		
	400V AC	Type	MFMCE0□□2HCD					
Connector set		Type	DV0PM20036 (motor+encoder)			DV0PM20037 (motor+encoder)		
Connector set with holding brake		Type	DV0PM20038 (motor+encoder+holding brake)			DV0PM20039 (motor+encoder+holding brake)		

□□ = Length 1 0 = 1m 5 0 = 5m

1kW–5kW

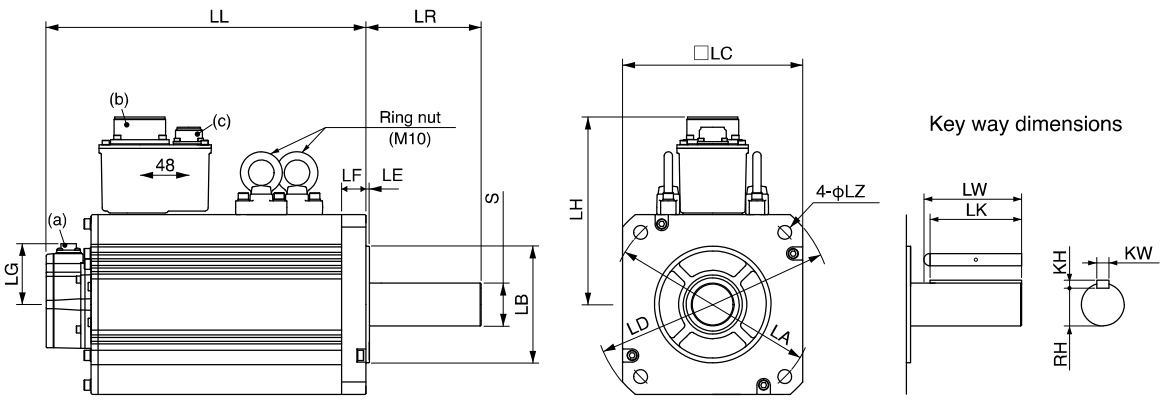


a) Encoder connector
b) Motor connector

MDME (middle inertia) 1kW–1.5kW 200VAC, 2–5kW 400VAC								
Rated power		kW	1.0	1.5	2.0	3.0	4.0	5.0
Motor	200V AC	Type	MDME102G1□	MDME152G1□	–	–	–	–
	400V AC		–	–	MDME204G1□	MDME304G1□	MDME404G1□	MDME504G1□
LL	Without holding brake	mm	138	155.5	173	208	177	196
	With holding brake	mm	163	180.5	198	233	202	221
LR		mm	55		55	65	70	
S		mm	∅ 22h6			∅ 24h6	∅ 35h6	
LA		mm	∅ 165				∅ 233	
LB		mm	∅ 110h7				∅ 114.3h7	
LC		mm	130				176	
LD		mm	∅ 145				∅ 200	
LE		mm	6				3.2	
LF		mm	12				18	
LG		mm	(84)					
LH		mm	(116)		(118)		(140)	
LZ		mm	4 x ∅9				4 x ∅13.5	
Key way	LW	mm	45				55	
	LK	mm	41		51		50	
	KW	mm	8 h9				10 h9	
	KH	mm	7				8	
	RH	mm	18		20		30	
Weight	Without holding brake	kg	5.2	6.7	8.0	11.0	15.6	18.6
	With holding brake	kg	6.7	8.2	9.5	12.6	18.7	21.8
Encoder cables		Type	MFECA0□□0GTD					
Motor cable		Type	MFMCD0□□2GCD			MFMCA0□□2GCT		
Cable motor + holding brake	200V AC	Type	MFMCA0□□2HCD			MFMCA0□□2HCT		
	400V AC	Type	MFMCE0□□2HCD					
Connector set		Type	DV0PM20036 (motor+encoder)			DV0PM20037 (motor+encoder)		
Connector set with holding brake		Type	DV0PM20038 (motor+encoder+holding brake)			DV0PM20039 (motor+encoder+holding brake)		

□□ = Length 10 = 1m 50 = 5m

7.5kW–15kW

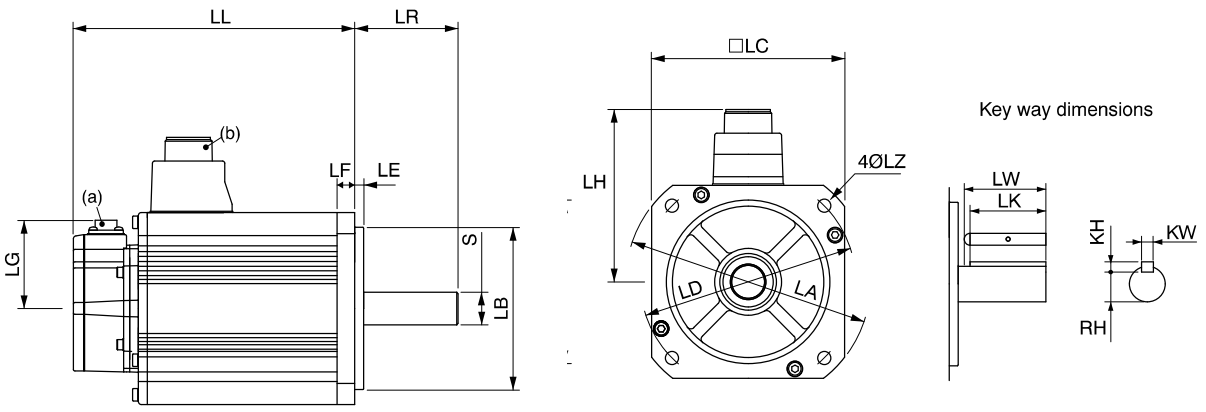


a) Encoder connector
b) Brake connector
c) Motor connector

MDME (middle inertia) 7.5kW–15kW 400VAC					
Rated power		kW	7.5	11	15
Motor	400V AC	Type	MDME754G1□	MDMEC14G1□	MDMEC54G1□
LL	Without holding brake	mm	312	316	384
	With holding brake	mm	337	364	432
LR		mm	113	116	
S		mm	∅ 42h6	∅ 55h6	
LA		mm	∅ 233	∅ 268	
LB		mm	∅ 114.3 h7	∅ 200 h7	
LC		mm	176	220	
LD		mm	∅ 200	∅ 235	
LE		mm	3.2	4	
LF		mm	24	32	
LG		mm	(60)		
LH		mm	(184)	(205)	
LZ		mm	4 x ∅ 13.5		
Key way	LW	mm	96	98	
	LK	mm	90		
	KW	mm	12 h9	16 h9	
	KH	mm	8	10	
	RH	mm	37	49	
Weight	Without holding brake	kg	36.4	52.7	70.2
	With holding brake	kg	40.4	58.9	76.3
Encoder cables		Type	MFECA0□□0GTD		
Cable motor + holding brake	400V AC	Type	To be used with DV0PM20056		
Connector set		Type	DV0PM20056 (motor+encoder)		
Connector set with holding brake		Type	DV0PM20057 (motor+encoder+holding brake)		

□□ = Length 10 = 1m 50 = 5m

1kW–7.5kW



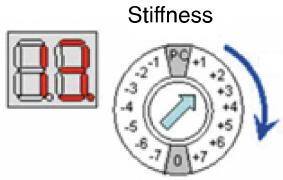
a) Encoder connector
b) Motor connector

MHME (medium inertia) 1kW–7.5kW 400V AC									
Rated power		kW	1.0	1.5	2.0	3.0	4.0	5.0	7.5
Motor	400V AC	Type	MHME104G1□	MHME154G1□	MHME204G1□	MHME304G1□	MHME404G1□	MHME504G1□	MHME754G1□
LL	Without holding brake	mm	173	190.5	177	196	209.5	238.5	357
	With holding brake	mm	198	215.5	202	221	234.5	263.5	382
LR		mm	70		80				113
S		mm	∅ 22h6		∅ 35h6				∅ 42h6
LA		mm	∅ 165		∅ 233				
LB		mm	∅ 110h7		∅ 114.3h7				
LC		mm	130		176				
LD		mm	∅ 145		∅ 200				
LE		mm	6		3.2				
LF		mm	12		18				24
LG		mm	(60)						
LH		mm	(116)		(140)				(184)
LZ		mm	4 x ∅9		4 x ∅13.5				
Key way	LW	mm	45		55				96
	LK	mm	41		50				90
	KW	mm	8 h9		10 h9				12 h9
	KH	mm	7		8				
	RH	mm	18		30				37
Weight	Without holding brake	kg	6.7	8.6	12.2	16	18.6	23	42.3
	With holding brake	kg	8.1	10.1	15.5	19.2	21.8	26.2	46.2
Encoder cables		Type	MFECA0□□0GTD						
Motor cable		Type	MFMCD0□□2GCD			MFMCE0□□2GCD	MFMCA0□□2GCD		–
Motor cable + holding brake	200V AC	Type	MFMCA0□□2HCD			MFMCA0□□2HCT			–
	400V AC	Type	MFMCE0□□2HCD						
Connector set		Type	DV0PM20036 (motor+encoder)			DV0PM20037 (motor+encoder)			DV0PM20056
Connector set with holding brake		Type	–						DV0PM20057

□□ = Length 10 = 1m 50 = 5m

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 V5.0: 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	MCDJT3230
	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)		r/min	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	Pulses per revolution	p/r	2500					
	Resolution		10,000					
Degree of protection			IP65 (excluding shaft feedthrough and connectors)					

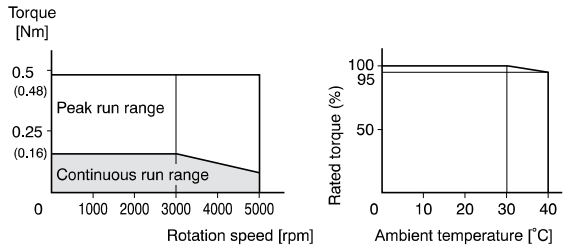
MINAS LIQI driver functions

					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)				2500 r/min (resolution 10,000, 5-core, 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
	Regenerative brake resistor					No built-in brake resistor (external brake 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 – 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

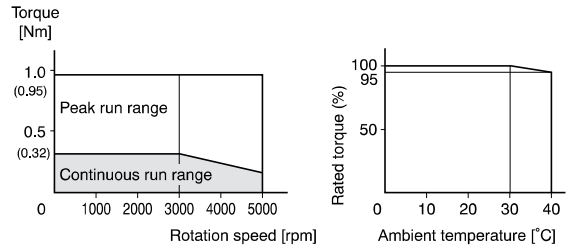
MSMD5AZJ1☐

Without oil seal



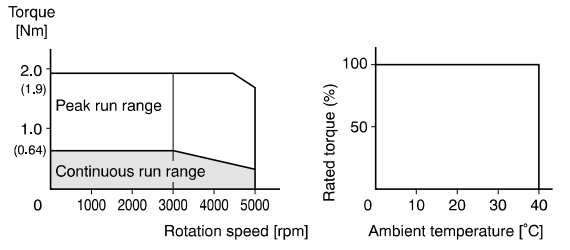
MSMD012J1☐

Without oil seal



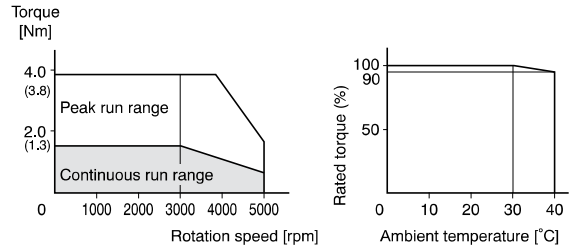
MSMD022J1☐

Without oil seal



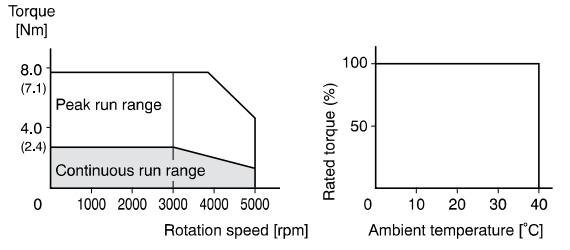
MSMD042J1☐

Without oil seal



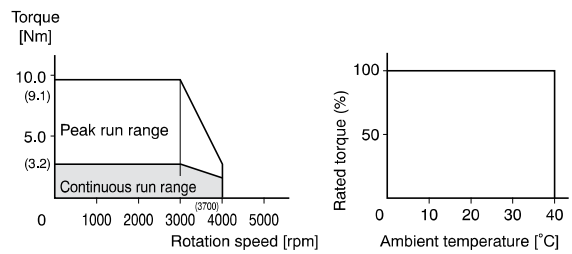
MSMD08J1☐

Without oil seal

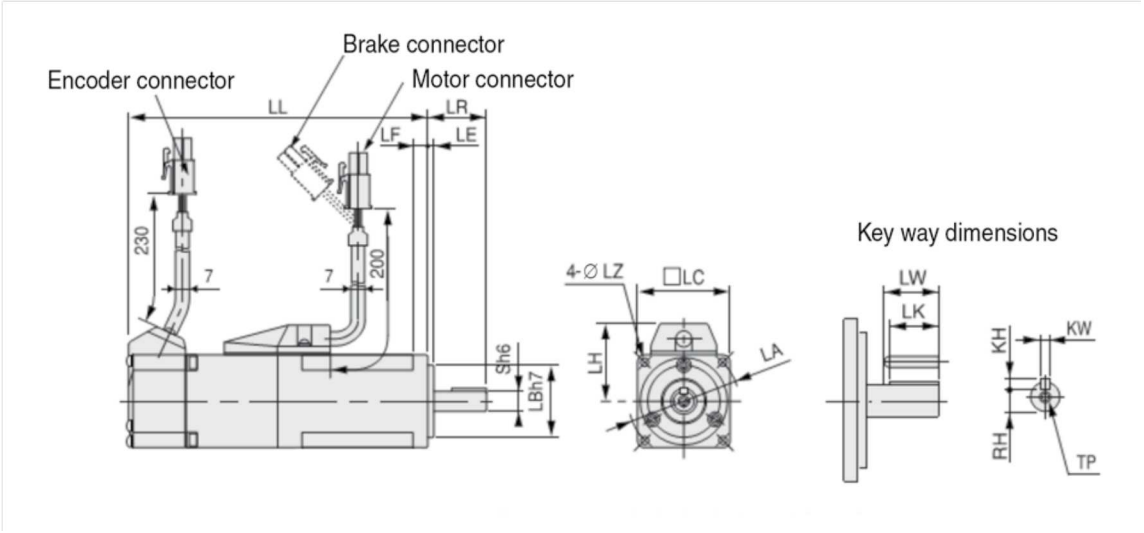


MSMD102J1☐

Without oil seal



MINAS LIQI motor dimensions

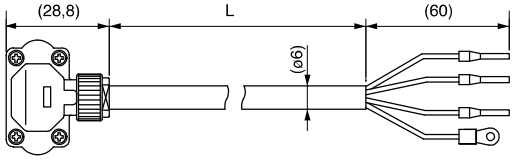
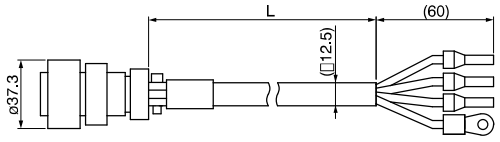
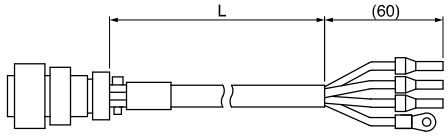
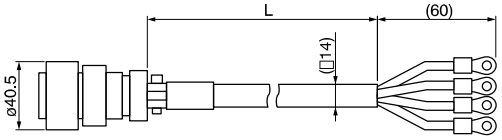
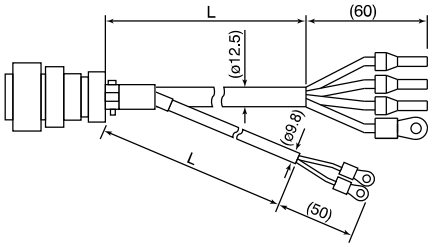
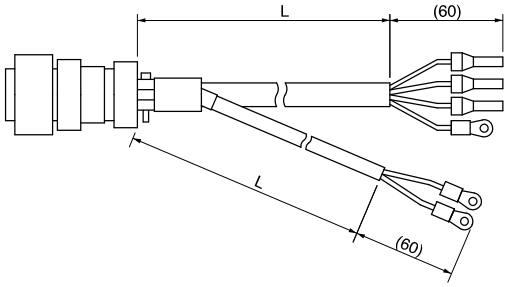
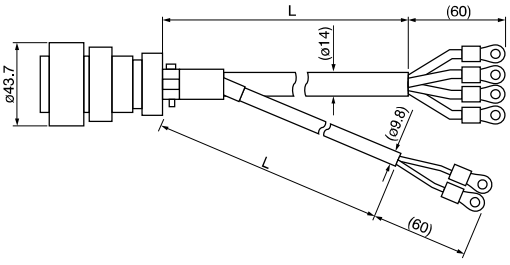
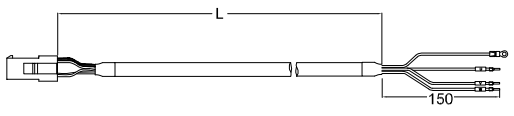


MINAS LIQI motors (low inertia)														
Motor		Type	MSMD5AZJ1□		MSMD012J1□		MSMD022J1□		MSMD042J1□		MSMD082J1□		MSMD102J1□	
En-coder	Resolution	Pulses/r	10,000 (2500p/r incremental)											
Motor with/without holding brake			With-out	With	With-out	With	With-out	With	With-out	With	With-out	With	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 ∅ 3.4				4 ∅ 4.5				4 ∅ 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

□□ = Length 10 = 1m 50 = 5m

Motor cables (motor–driver)

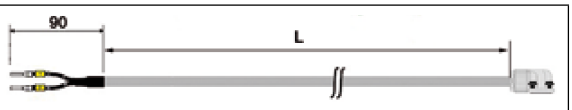
All dimensions are in mm

MSME motors 50–750W	MFMCA0☐☐0WJD	
MSME motors 1–2kW MDME motors 1–2kW MHME motors 1–11.5kW	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☐☐☐EEL	

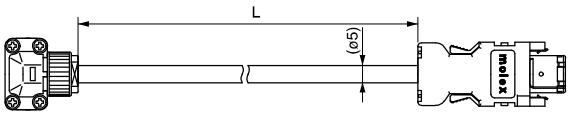
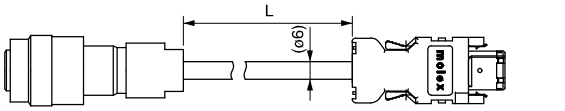
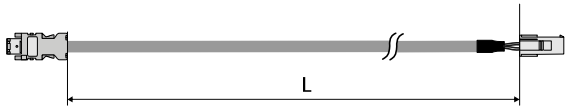
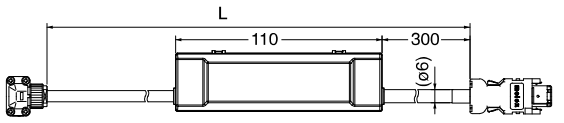
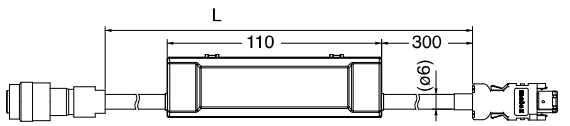
☐☐ = Length 1 0 = 1m 5 0 = 5m

Brake cable (motor–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☐☐GET	

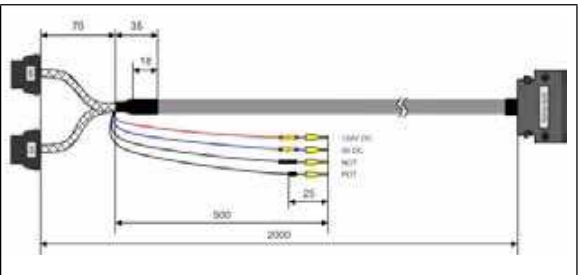
Encoder cable (motor–driver)

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

☐☐ = Length 1 0 = 1m 5 0 = 5m

Control cable (PLC–MINAS LIQI driver)

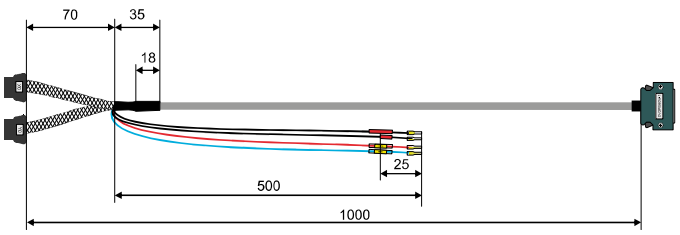
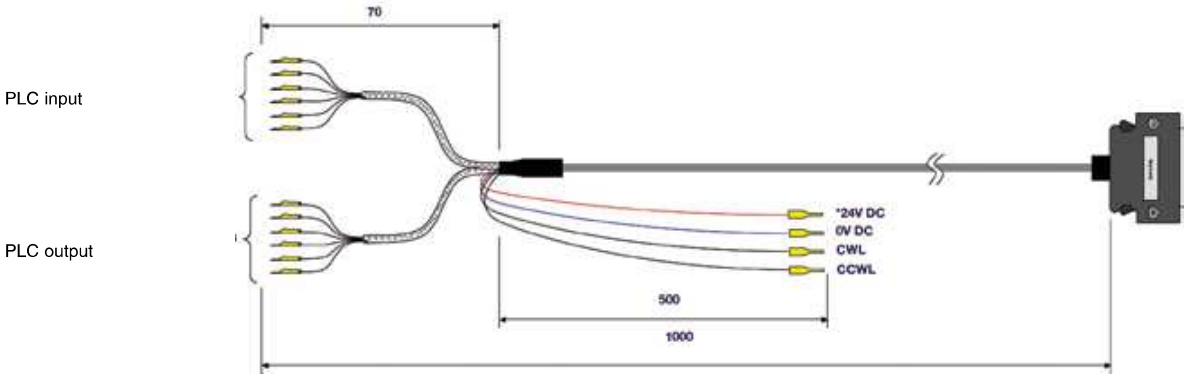
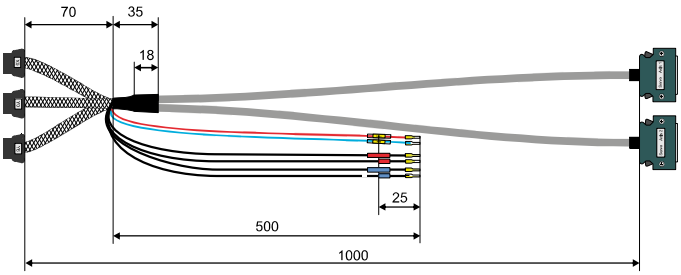
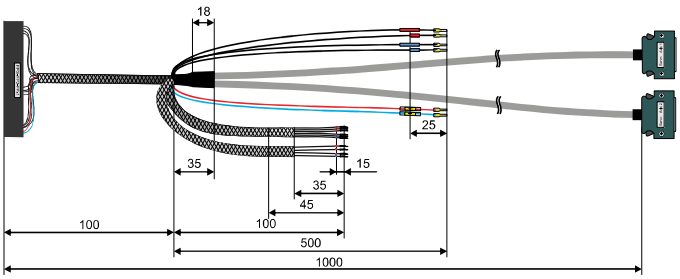
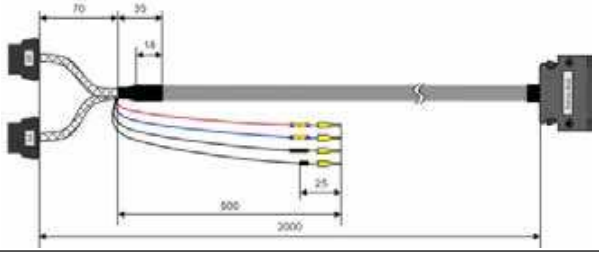
Direct connection to FP series PLCs

FPΣ (Sigma), FP0R	For 1 axis DV0P0800T01	

Control cable (PLC–MINAS A5 driver)

All dimensions are in mm

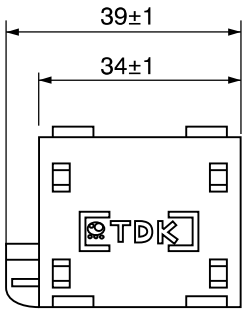
Direct connection to FP series PLCs

FPΣ (Sigma)	For 1 axis DV0P0980W-1 (NPN types) DV0P0982W-1 (PNP types)	
FPΣ (Sigma), FP0R	For 1 axis DV0P0988W-1 (PNP types) DV0P0989W-1 (NPN types)	
FPΣ (Sigma)	For 2 axes DV0P0981W-1 (NPN types) DV0P0983W-1 (PNP types)	
FPΣ (Sigma) Positioning unit FP2SH Positioning units	For 2 axes DV0P0985W1 (transistor) DV0P0986W1 (line driver)	
FPΣ (Sigma) Positioning unit	For 1 axis DV0P0800T01 (PNP types)	

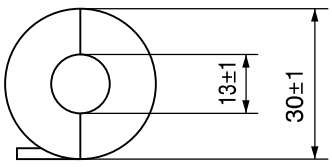
Product no.	Details/Comments/Dimensions			
Control cable				
DV0P4360	50W–15kW	50-pin type	I/O cable X4, loose wires, 2m	
DV0P4360P	50W–15kW	50-pin type	I/O cable X4, loose wires, 2m, position control	
DV0P4360V	50W–15kW	50-pin type	I/O cable X4, loose wires, 2m, velocity control	
DV0PM20024CAB020	50W–15kW	8-pin type	Communication cable X2, RS485, RS232, loose wires, 2m	
DV0PM20025CAB020	50W–15kW	8-pin type	Safety cable X3, loose wires, 2m	
DV0P0800	50W–15kW	26-pin type	I/O cable X4, loose wires, 2m	
Programming cable				
CABMINIUSB5D	50W–15kW	USB		
Connector set for motion controller				
DV0P4350	50W–15kW	50-pin type	I/Os, X4	
DV0P0770	50W–15kW	26-pin type	I/Os, X4	
DV0PM20026	50W–15kW	–	External encoder connector X5	
Connector set encoder, motor				
DV0P4380	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	
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	
EMC filter				
FN2080-6-06	50W–1000W	1-phase	250VAC, MINAS A5 50W–750W, MINAS LIQI 50W–1000W	
FS21238-60-7	50W–750W	1-phase	Footprint filter, 250VAC	
DV0P4220	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	
DV0P1460	50W–15kW	1-phase	Ferrite core, common-mode choke	
Brake resistors				
BWD250100	50W–100W	1-phase	100Ω,100W, 600VAC	110mmx80mmx15mm (LxWxD)
BWD250072	200W–750W	1-phase	100Ω, 100W, 600VAC	
BWD500035	1kW–1.5kW	1-phase	100Ω, 100W, 600VAC	216mmx80mmx15mm (LxWxD)
BWD500150	1kW–1.5kW	3-phase	120Ω, 200W, 600VAC	
BWD500100	2kW	3-phase	80Ω, 200W, 600VAC	
BWD600047	3kW–5kW	3-phase	40Ω, 240W, 600VAC	

Brake resistor

Ferrite core: DV0P1460



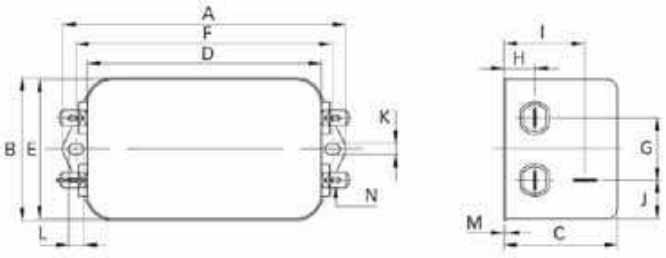
Weight: 62.8g



All dimensions are in mm.

EMC filter

FN2080-6-06 and FS21238-6-07 for MINAS A5 50–750W and MINAS LIQI 50–1000W 1-phase drivers

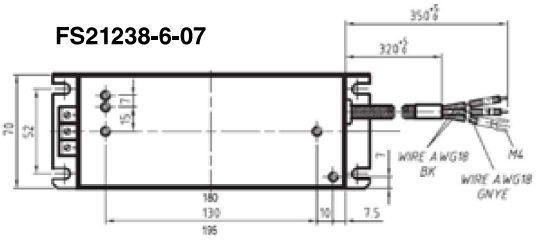


Dimensions (mm)	FN2080-6-06
A	113.5
B	57.5
C	45.4
D	94
E	56
F	103
G	25
H	12.4
I	32.4
J	15.5
K	4.4
L	6
M	0.9
N	6.3 x 0.8

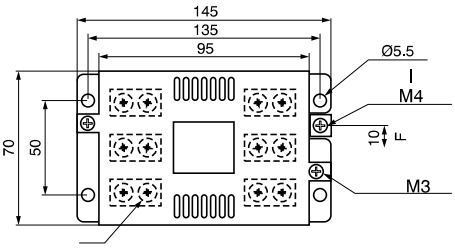
All dimensions are in mm.

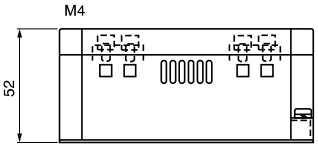
FN2080-6-06

FS21238-6-07

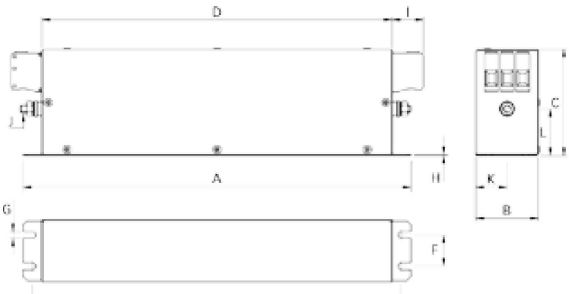


DV0P4220 for 1–1.5kW 1-phase driver





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	

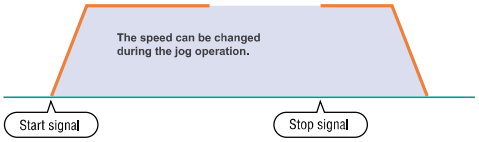
Type	FP7	FP2SH
Features		
	Modular high-performance PLC • Scan time of 11ns/step • Program capacity of 196k steps • Additional program capacity with SDHC memory card • Batteryless data backup • Ethernet 100BASE-TX/10BASE-TX • Expandable with up to 16 units for different applications	Modular high-performance 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)

Type	FPΣ (Sigma)	FP0R
Features		
	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	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

Type	FP-X	FP-X0
Features		
	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	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)

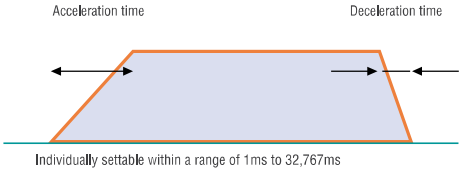
Motion can be started without a preset target value. When a stop signal is input, the target value is set, and the motion is slowed to a stop.



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)

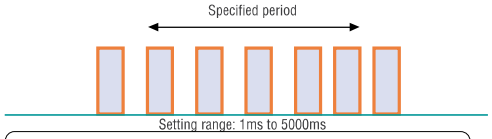
The target speed can be changed by an external signal input during the jog or trapezoidal control operation.

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.

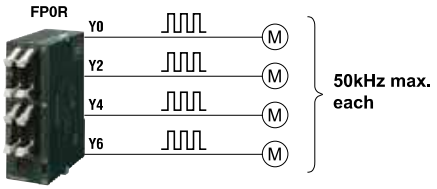


Useful for

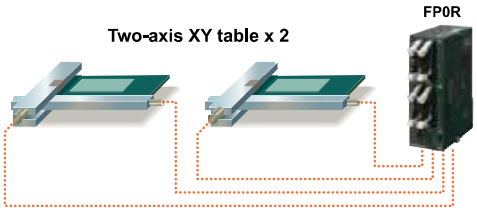
- Detection of motor rotation speed for encoder feedback control

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

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

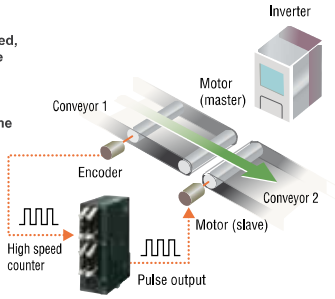


Two sets can simultaneously undergo two-axis linear interpolation (F175 instruction).



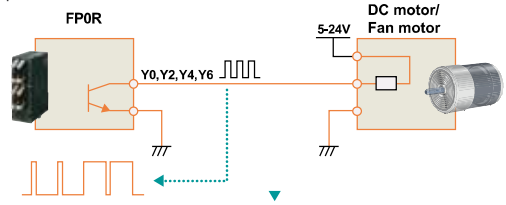
Simultaneously usable high speed counters (6 channels) and pulse outputs (4 channels)

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.

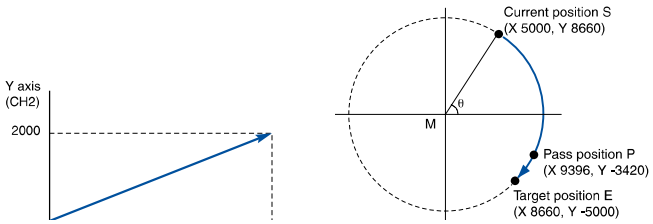


The speed can be controlled by changing the ON width of the PWM output within a range of 0.1% to 99.9%.

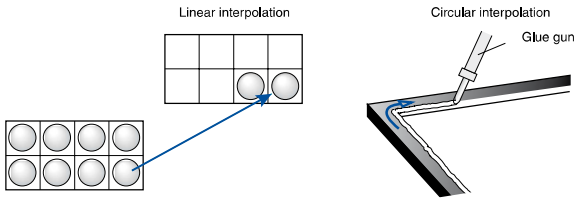
The unit can also serve as an analog voltage output unit (resolution: 1/1000) when a smoothing capacitor is inserted in the circuit.

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□□				

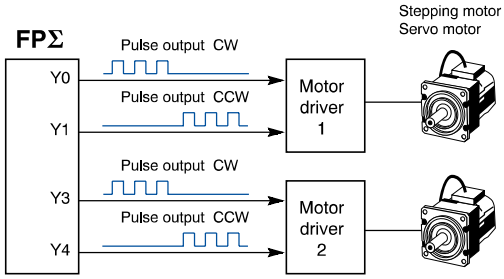
Integrated linear and circular interpolation control
Interpolation functions enable simultaneous control of two axes. Applications that a compact PLC couldn't previously cope with are no longer a challenge. With linear interpolation, the PLC achieves a coordinated, linear movement of the two axes and 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.



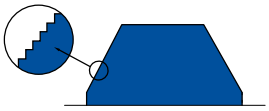
Simple and intuitive programming
For programming, a preset value table for starting speed, target speed, acceleration/deceleration time, and other factors will be used. Comes with dedicated instructions for each mode: trapezoidal control, home return, JOG operation, free table operation, linear interpolation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



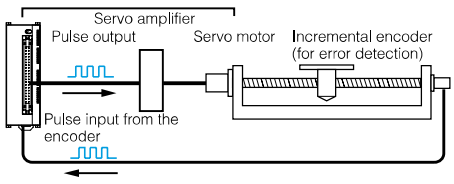
PLC	Product no.	Voltage	Output	Input points	Output points (axes)
	FPGC32T2H	24V DC	Transistor NPN	16	16 (2)
	FPGC28T2H	24V DC	Transistor NPN	16	12 (2)

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
	FPG-PP11	1-axis type	Transistor
	FPG-PP21	2-axis type	
	FPG-PP12	1-axis type	Line driver
	FPG-PP22	2-axis type	

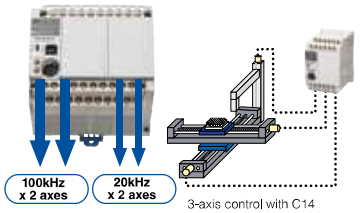
For low cost multi-axis position control

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

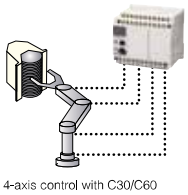
The transistor output type C14 comes with 3-axis while C30/C38 and C60 come with 4-axis pulse output inside the control unit. The multi-axis control, which previously required a higher-level PLC or additional positioning unit, or two or more PLC units, can now be achieved with only one FP-X transistor 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

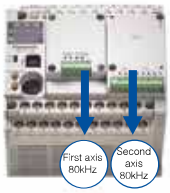
XY table + processing head



Semiconductor wafer takeout blade



2-axis control with expansion cassettes for relay output types



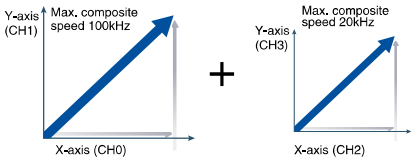
Pulse output up to 2-axis 80kHz is possible by loading 2 pulse I/O cassettes (AFPX-PLS). Also capable of performing 2-axis linear interpolation.

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

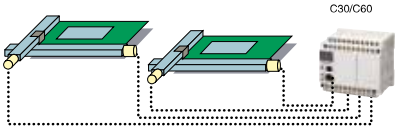
Linear interpolation simultaneously in 2 sets (transistor output type)

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.

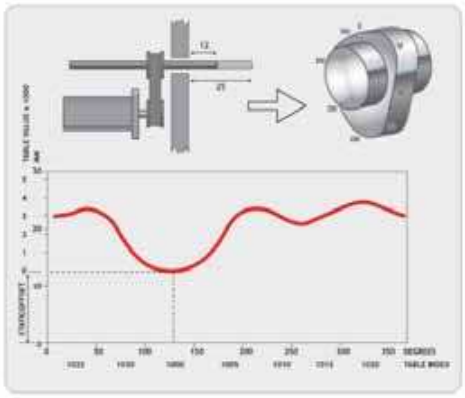
PLC	Product no.	Voltage	Output	Input points	Output points (axes)
	AFPXC14TDJ	24V DC	Transistor NPN	8	6 (3)
	AFPXC14TJ	100–240V AC			
	AFPXC14PDJ	24V DC	Transistor PNP		
	AFPXC14PJ	100–240V AC			
	AFPXC30TDJ	24V DC	Transistor NPN	16	14 (4)
	AFPXC30TJ	100–240V AC			
	AFPXC30PDJ	24V DC	Transistor PNP		
	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)
FP7-PP02T	With interpolation	Open collector	2
FP7-PP04T			4
FP7-PP02L		Line driver	2
FP7-PP04L			4

FP2SH

Positioning units (interpolation type)

Features

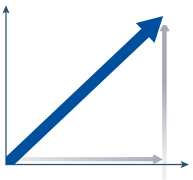
- A pulse output of up to 4Mpps allows high-speed, high-precision positioning.
- 0.005ms high-speed drive reduces tact-time (start-up time is the time from reception of the CPU unit start-up command to release of the pulse output by the positioning unit).
- 4 axes per unit means versatility and saves 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

.

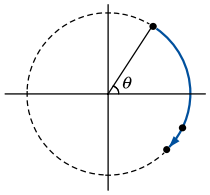
Functions

- 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

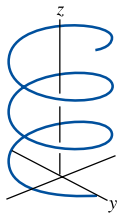
Linear



Circle



Spiral

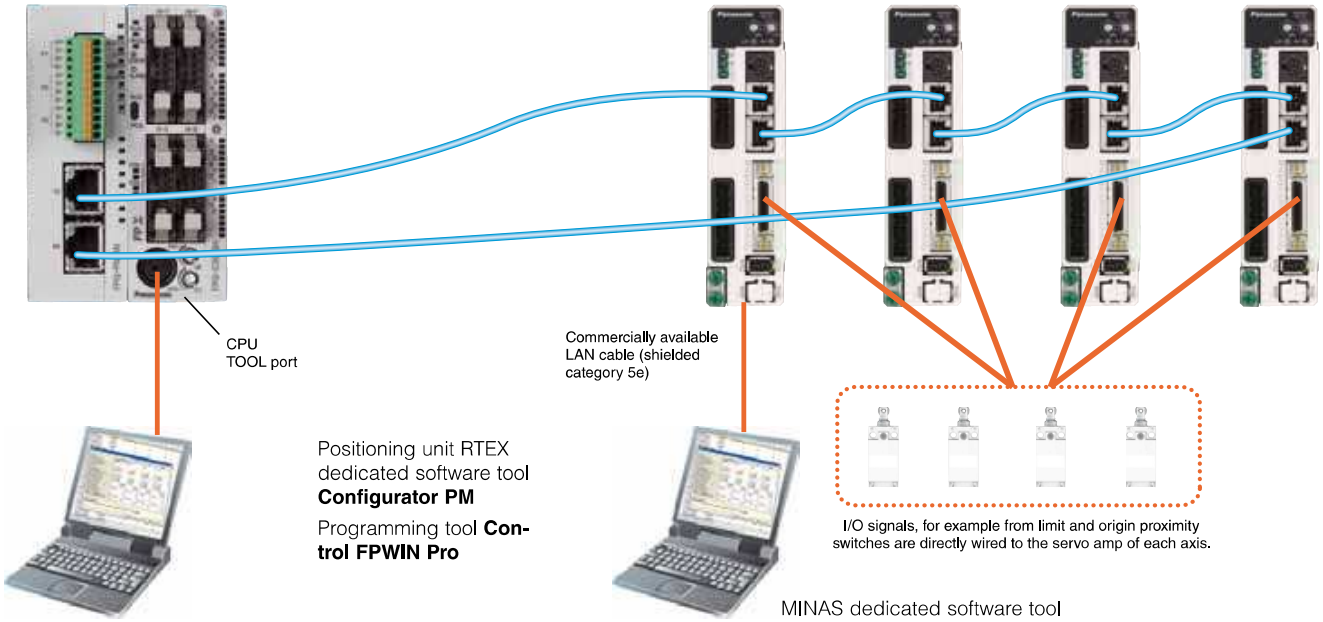


PLC	Product no.	Program-capacity	Other features
	FP2C2LJ	32k steps	–
	FP2C2J	60k steps	
	FP2C2PJ	60k steps	IC memory card interface

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
	FP2-PP21	Without Interpolation	Open collector	2
	FP2-PP41			4
	FP2-PP22		Line driver	2
	FP2-PP42			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 motion controller 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 motion controllers 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

No. 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)

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

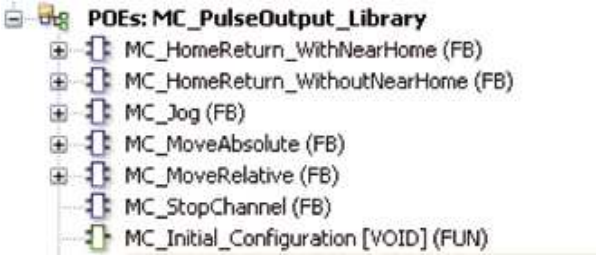
3. RTEX Motion Control Library: Positioning with RTEX motion control units (FPΣ (Sigma), FP2SH)

Advantages of PLC programs using the Motion Control Library

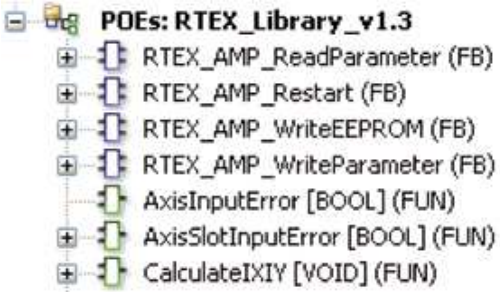
Free – just download it from Panasonic's website
Simple – easy programming and installation
Efficient – ready-to-use function blocks, only set the parameters
Consistent – compliant with IEC 61131-3
Universal – hardware-independent (works for every Panasonic PLC)
Flexible – expandable for up to 256 axes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

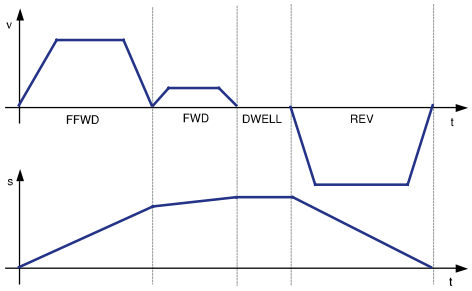
Download the software free of charge from Panasonic's website:
Home→ Downloads→ SPS→ FPWIN Pro→ Library

MC_CPU_Library Motion

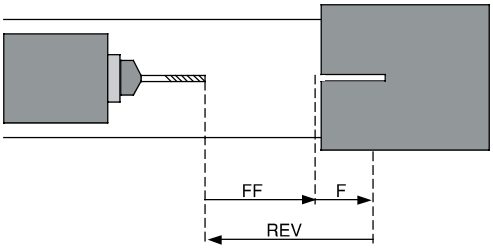


RTEX Motion Control Library





Time chart

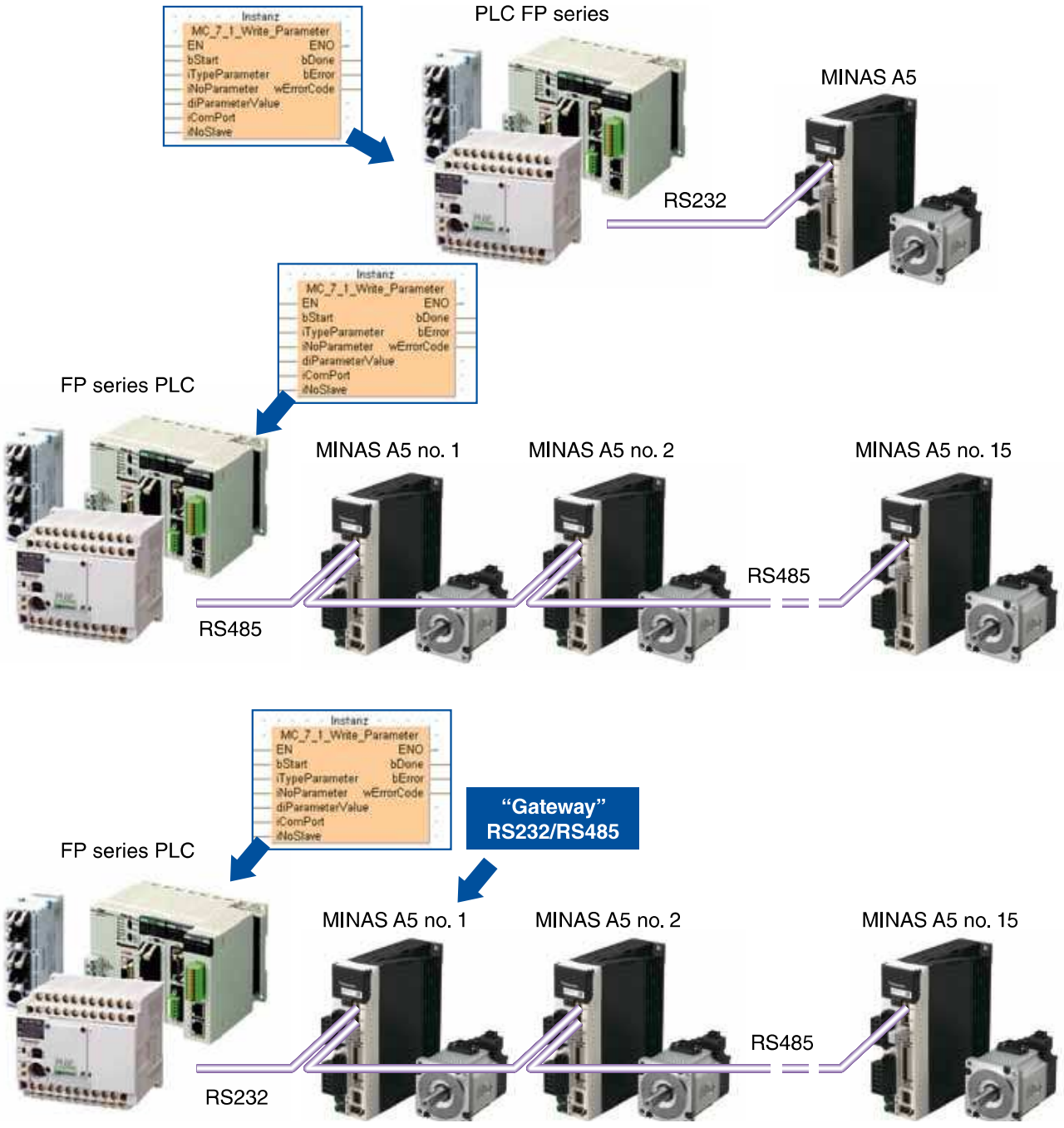


Drilling setup

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

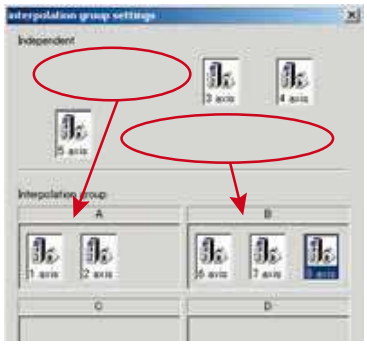
Software Configurator PM for RTEX

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

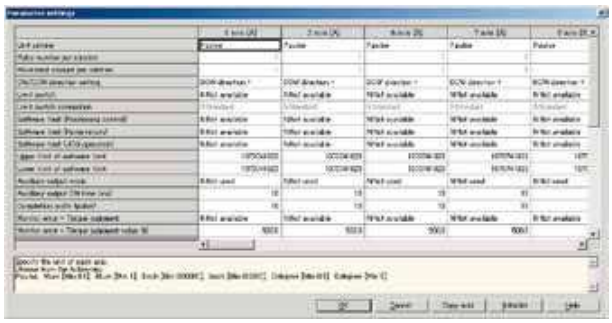
Check the axes to be used. Select the number of axes to be used.

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

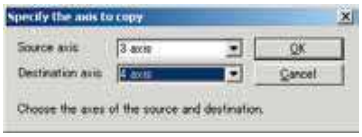


Parameter settings

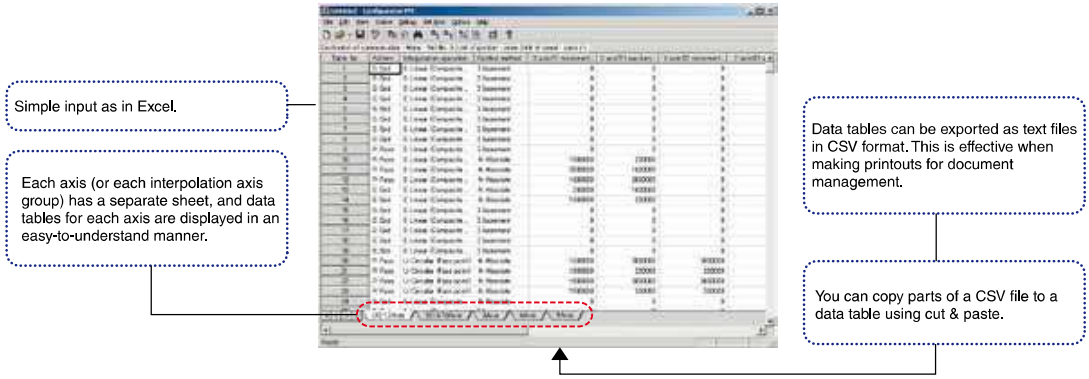
The details of the settings can be displayed in a table. Details on how to create settings for each category are explained in the box below.



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

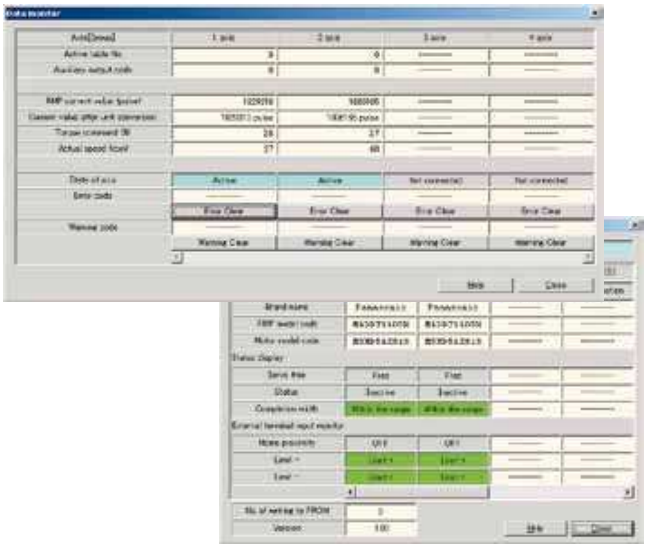
- Each axis can be operated by test sequences independently of the operation modes (PROG and RUN) of the RTEX or FP control unit.
- JOG operation and teaching can be carried out easily to index positioning points. Test operation is possible without having to create a rudder program.

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



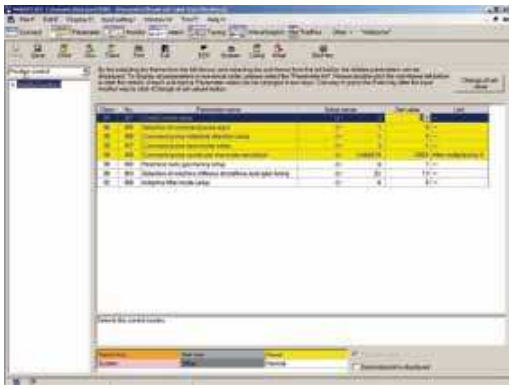
Configuring motion controllers

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

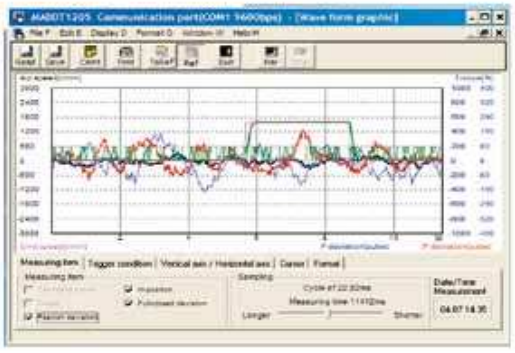
Monitoring control conditions
- Monitor
- Settings: control mode, velocity, torque, error and warning
- Driver input signal
- Load conditions: Overview of command/feedback pulses, load ratio, regenerative resistive load ratio
- Alarm
- Display/delete number and contents of the current alarm and the last 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 revolution/multirevolution data
- Displays absolute encoder status

Monitor

Analysis of mechanical operation data (frequency analysis)
- Measures frequency characteristics of the machine; displays Bode diagram

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



Line graph display

Motor capacity selection software

Free of charge!

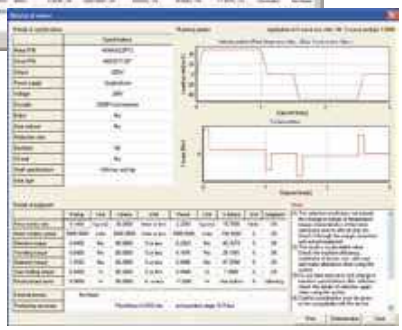
Mselect software
Mselect is a software to help you select the correct motor capacity and motion controller from Panasonic's MINAS series. Find the optimal type of motor with regards to the mechanical layout and the dynamic requirements. It is a very valuable tool for mechanical engineering as it also 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:

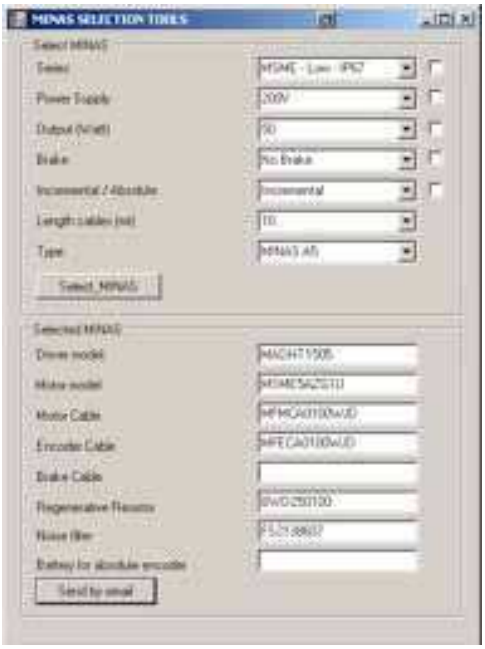
1. Select mechanical parts and input their parameters (figure 1)
The user can select parts from a database with all mechanical standard parts (gears, coupling, spindle axis, etc.).

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

Memo

Other Panasonic products

Panasonic Electric Works offers a wide product range from one source, from individual components to complete systems. Technology support for advice, design-in, installation and commissioning by our qualified application engineers round off the Panasonic service profile.

Human machine interfaces

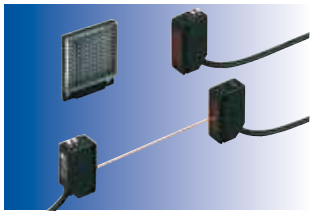
Our compact size, bright and easy-to-read human machine interfaces can be used to visualize inspection results. Touch panels can even replace the standard keypad if you so desire.

UV curing systems

Aicure UJ30 is a LED curing system that quickly hardens UV-sensitive resins such as adhesives, ink and coatings. Its cutting edge LED technology is especially suited for precise, high-intensity curing.

ACD components

Components such as Eco-POWER METERS, timers/counters, temperature controllers, limit switches and fans round off our wide factory automation product range.



Sensors

As a pioneering manufacturer of sensors, Panasonic provides high performance sensors for a wide range of applications, facilitating factory automation in various types of production lines, such as those used for the manufacturing of semiconductors.

Laser Markers

Panasonic Laser Markers are ideal for non-contact, permanent labeling of most materials, e.g. metal, plastics, glass, paper, wood and leather. Several CO_2 laser marking systems and a unique FAYb fiber laser marker can be easily integrated into existing production systems for a great variety of marking tasks.

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