

**Panasonic**  
INDUSTRY



**SERVO DRIVES**  
MINAS A6 SERIES



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## Application areas:



Pick-and-place machines



Handling systems



Machine tools



Robots



Printing machines



Automated machines



Materials handling



Packaging machinery



## Automation products from Panasonic Industry

With over 100 years of innovation and manufacturing expertise, Panasonic Industry Europe remains committed to its vision of creating "A Better Life, A Better World." Panasonic can look back on decades of experience in the electronics industry and, thanks to its dedicated customer orientation, is a competent and reliable partner for customers throughout Europe when it comes to technical expertise in combination with solution orientation. As a provider of tailor-made solutions, we focus on offering our customers products and services in the **Mobility, Living Space** and **Business** sectors that make a difference thanks to our proprietary innovations.

### Smart automation technology

The factory of the future will achieve new levels of productivity, effectiveness and profitability through comprehensive networking. Equipment and components from Panasonic Industry Europe offer leading-edge **Industry 4.0** features, as connectivity, energy efficiency, reliability and sturdiness play a pivotal role in modern production environments.

The Panasonic Industry Europe portfolio not only offers key electronic components, devices, modules and software but also complete solutions for production lines in a wide variety of industries. Panasonic Industry's comprehensive know-how along the entire value chain, combined with a corporate culture geared to customer needs, enables it to offer customer-specific solutions.

Our experience as a manufacturer and a sales partner for components and products allows us to share our experience with our customers. Customer wishes are specifically integrated into the development of new products, so that we can surpass our role as a supplier and become a competent, long-term partner for our customers.

### The most modern servo drives: the MINAS A6 series

With its **MINAS A6 series**, Panasonic Industry offers a highly dynamic servo driver family with a wide power range from 50W to 5kW for many different areas of applications. The servo drivers and motors of the **MINAS A6 series** are characterized by a consistently compact and robust but also lightweight design. In addition, they have been equipped with innovative functions for damping resonance frequencies and to eliminate vibration tendencies.

### Highly dynamic drive technology in a 400V network for maximum performance

With around 70% market share, 400V applications represent the largest segment in industrial automation. Take advantage of the 400V three-phase network by using the servo drives from Panasonic, which cover a power range from 0.4–5kW (in future up to 22kW).

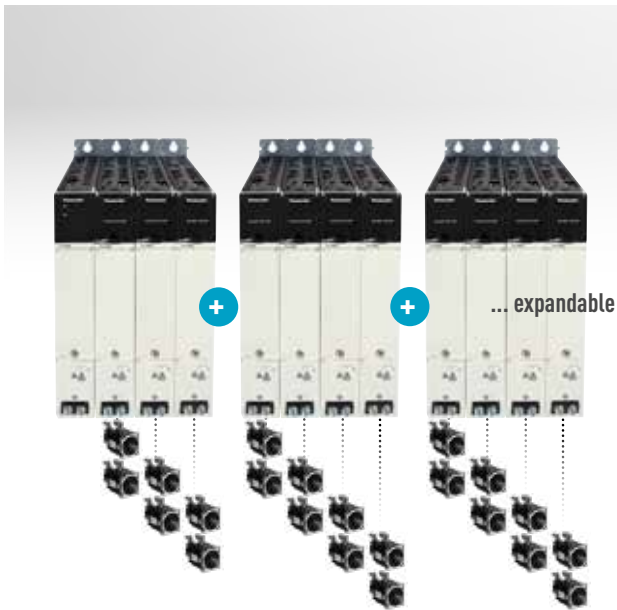
Proven technology paired with innovative functions and versatile control features such as pulse, analog and network technology with real-time communication characterize our solutions.



## Service

Panasonic Industry Europe's comprehensive service includes an expert hotline, workshops and on-site service to ensure the reliable and effective use of our servo drives. In addition to its wide-ranging product portfolio of programmable logic controllers, Panasonic Industry Europe also offers sensors, operating panels, drive technology, energy management systems, ionisers, automation components and many other products and complete solutions.

NEW!



## MINAS A6 Multi series: 400V servo drive system

Compact, modular design for maximum performance

### 400V servo drive system

- › **Compact servo drive in book format:** Only 25mm width per axis on the two-axis-unit
- › **Modular design:** One power supply unit supports several servo drivers
- › **DC link bus system:** Reliable connection without tools
- › **Quick servo control technology:** A frequency response of 3.2kHz enables high-speed operation for maximum productivity
- › **Anti-vibration technology:** Suitable for highly precise applications thanks to vibration damping.
- › **State-of-the-art network technology:** High-speed communication via EtherCAT with up to 10Mbit/s
- › **18 advanced safety functions:** MINAS A6 Multi achieves safety class SIL3
- › **Setup via EtherCAT:** Easy configuration and programming over EtherCAT (EoE) using the software tool PANATERM
- › **Robust connectors:** Servo motors with round connectors according to IEC, CENELEC, and IEEE

### Industries



Packaging industry



Plastics and metal processing



Presses

### Quick-connect technology

The MINAS A6 Multi can be wired at the top and bottom. No tools are needed.



### DC link bus

Beneath the front cover lies the DC link bus. Thanks to the screwless power bus system it allows quick and easy expansion of the servo drivers.



### Modular construction

Several two-axis servo drivers (50mm) can be coupled to just one compact power supply unit (50mm or 100mm width). Thanks to the DC link bus, the expansion is fast and reliable.



### Power supply units

Product no.	Size	Input voltage	Rated power
MADMPN14	A	3-phase 380–480V AC	15kW
MBDMPN24	B	3-phase 380–480V AC	30kW

### Servo driver units

Product no.	Size	Number of axes	Rated power
MADM2A4KBX	A	2	For motors 0.4–0.75kW**
MADM2A6KBX	A	2	For motors 0.75–1.5kW**
MADM2AAKBX	A	2	For motors 1.5–3.0kW**
MBDM1ABKBX	B	1	For motors 3.0–5.0kW

## The MINAS product family changes the world of industrial machine automation



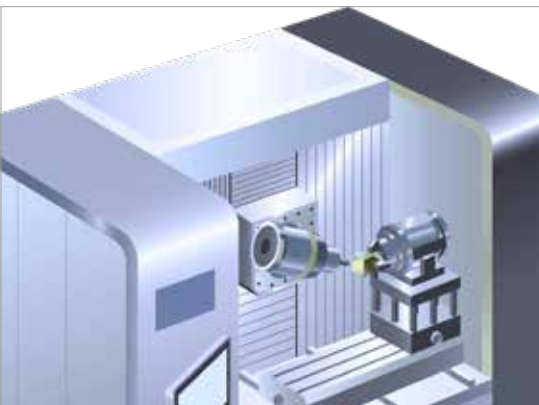
### Robots

A robot is required to operate stably independent of the constantly changing position, workload, or other condition affecting the robot arm. The MINAS A6 servo drive family guarantees stable operation by reducing the effects of loads to a minimum with the help of "adaptive load control".



### Processing machines

With metal-processing machines, it is very difficult to manufacture polygonal bodies with a mirror-like finishing. The MINAS A6 servo drive family realizes a frequency response of 3.2kHz to improve the feedback and to enable a mirror-like finish without lines or streaks.



### Pick-and-place machines

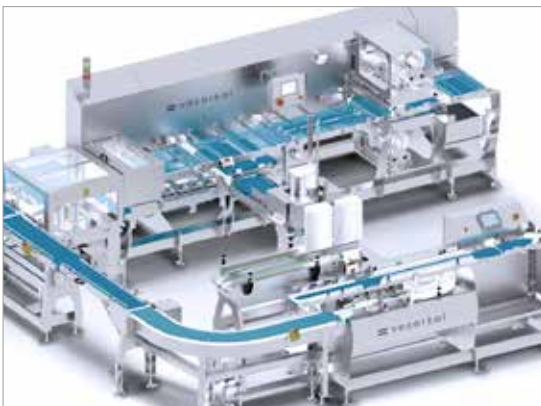
The MINAS A6 servo drive family shows its versatility especially when used with pick-and-place machines where speed and positional accuracy are a must.

In addition to the high-frequency response, the servo drives deal with random disturbances with the help of the built-in "adaptive load control", thus keeping productivity high.



#### **CNC milling machine**

Equipped with servo motors of the MINAS LIQI series for controlling 3 axes (X, Y, Z) and safety light curtains from Panasonic.



#### **Packaging machine for hamburgers and minced meat**

Equipped with MINAS A5 servo motors, FP7 programmable controllers, inverters, touch terminals and sensors from Panasonic.



#### **Press brake for metal sheet**

Machine system equipped with MINAS A5 motors with EtherCAT for moving back gauges.

Panasonic's MINAS A6 series follows in the footsteps of the highly successful predecessor, the MINAS A5 series. The A6 series has been improved further. At the same time, compatibility with the A5 series has been maintained.

➤ **Simple communication connection**

Modbus RTU (see also page 36)



➤ **One of the smallest and lightest motors**

Up to 30% shorter than for MINAS A5



**MINAS A6**

**servo motor**

Rated power: 50W to 5kW

➤ **Suitable for peak top performance demands**

Improved response frequency



**Network types MINAS A6N (RTEX)**






**and MINAS A6B (EtherCAT)**

**servo drivers**

**Analog/pulse type**

**MINAS A6**

**servo driver**

MINAS A6 series	200/400V AC				400V AC
	A6SE	A6SG	A6SF	A6N/A6B	A6 Multi
					
Rated power	50W–1.5kW (200V AC), 1kW–5kW (400V AC)				400W–5kW
Supply voltage	1/3-phase (200V AC), 3-phase (400V AC)				3-phase
Bandwidth (velocity response)	3200Hz				
Rated rotational speed	2000–3000rpm				
Max. rotational speed	3000–6500r/min (200V AC), 3000–5500rpm (400V AC)				
Rated torque	0.16–26.3Nm (200V AC), 3.18–23.9Nm (400V AC)				
Peak torque	0.48–71.6Nm (200V AC), 9.55–71.6Nm (400V AC)				
Control functions	Position control		Position, velocity, torque control		
IP degree of protection (motor)	IP67				
Control input	Pulse		Pulse, analog	Network	Network



## Compatible with MINAS A5 series

### Connections designed for compatibility

The A5 series connector cables and connectors can also be used for the A6 series (except for MHMF motors 50W–1000W).



MINAS A5



MINAS A6

### Identical accessories

EMC filter and braking resistor can be used for both the MINAS A5 series and the MINAS A6 series.

### Compatible flange dimensions

The motor can be exchanged 1:1 at the machine or gear flange.



## Improvements and new features of the MINAS A6 series

### Even more compact design

Thanks to the split core structure and a new housing, we have been able to reduce not only the length by 30%, but also the weight by up to 10%.

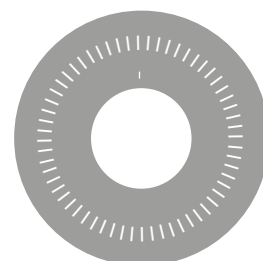


MHMF + MDMF models

10% lighter, 30% shorter

### High-resolution 23-bit encoder – can be used as an absolute or incremental rotary encoder

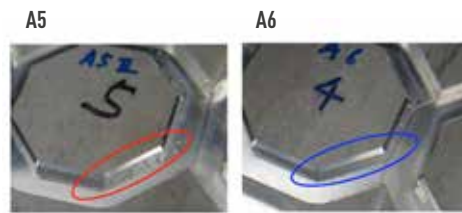
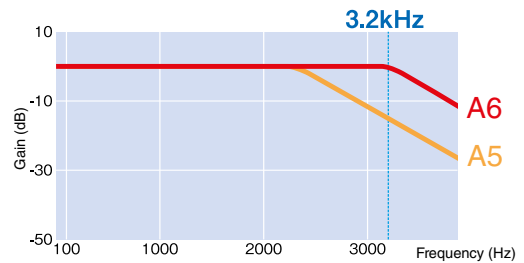
The 20-bit encoder (1048576 pulses per revolution = ppr) has been upgraded to 23 bit (8388608ppr).



Improvements and new features of the MINAS A6 series

Advanced controller settings

3.2kHz frequency response

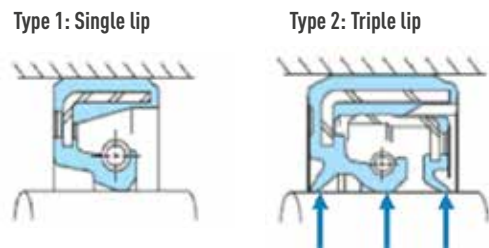


A5: Numerous interference bands; A6: Hardly any interference bands

Available with two different seals

(single/triple lip)

An oil seal with triple lip has just been developed. It is ideally suited for protection against ingress of dust and oil in ambient environments with a high degree of pollution.

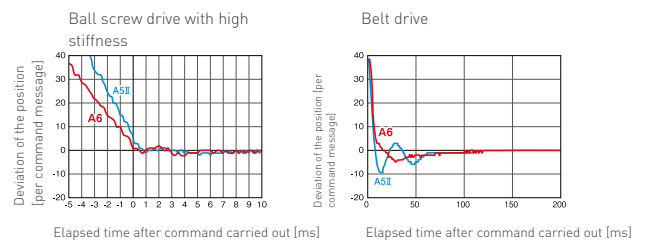


NEW!

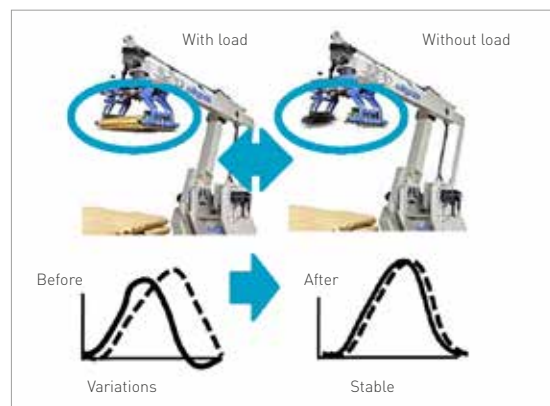
Improved suppression of vibrations

The tendency to vibrate when braking to a standstill is significantly reduced. This has shortened the transient recovery time.

Comparison of transient recovery curves



Improved reaction and adjustment to load variations



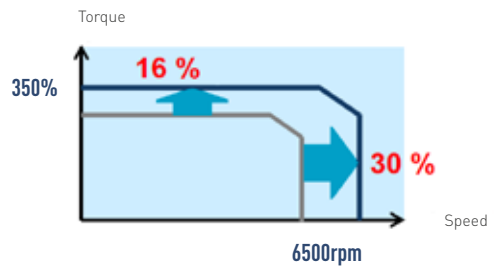
---- : with load  
 - - - - : without load

**Max. torque**

Up to 350% of the nominal torque (MHMF model)

**Max. speed**

Raised to max. 6500rpm (MHMF model)



**Semi/fully enclosed position control loop**

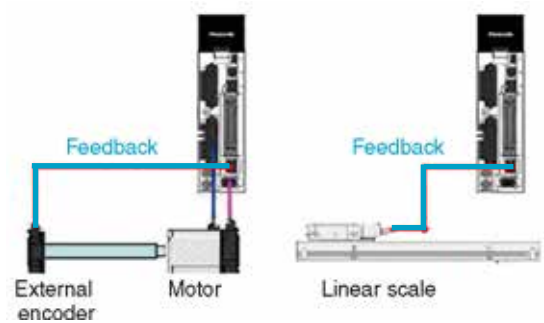
The A6 series enables a setting value of 8Mpps and a response with 4Mpps. This allows for high resolution as well as high-speed operation.



**General features**

**External encoders for full-closed control**

Using an external encoder or linear displacement measuring system ensures high-precision position control.



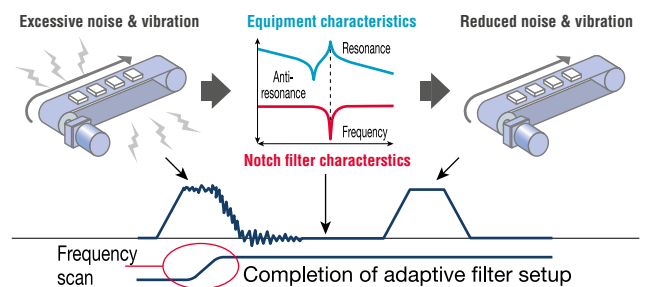
**Real-time auto-gain tuning**

Automatic tuning after completion of multiple operations. 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 high-friction, belt-driven machines or machines with low-friction ball screw drives.



**Manual and automatic notch filters**

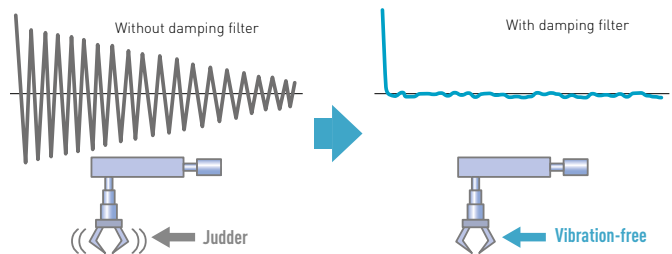
Highly sensitive notch filters log resonance frequencies and adapt them automatically.



## General features

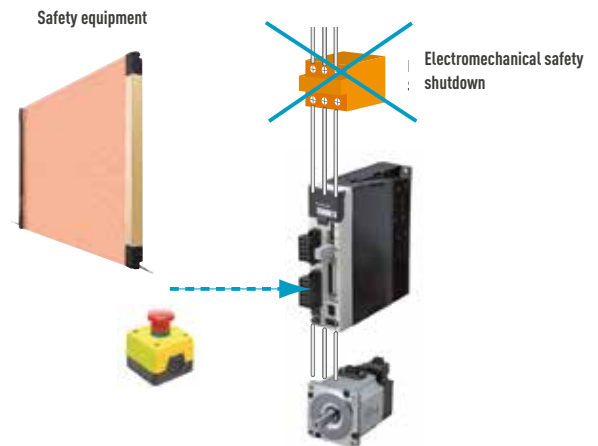
### Manual and automatic damping filters

Damping filters that can be set automatically suppress the equipment's resonance, which greatly reduces axis vibration at machine stoppage.



### Integrated safety function STO (Safe Torque Off)

Safety functions based on safety standards:  
ISO13849-1(PL e, CAT3), EN61508(SIL3), EN62061(SILCL3),  
EN61800-5-2(SIL3, STO), IEC61326-3-1, IEC60240-1.



### Dynamic brake

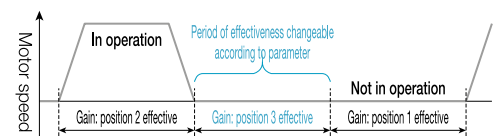
For dynamic braking that protects material.

### Torque limit

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

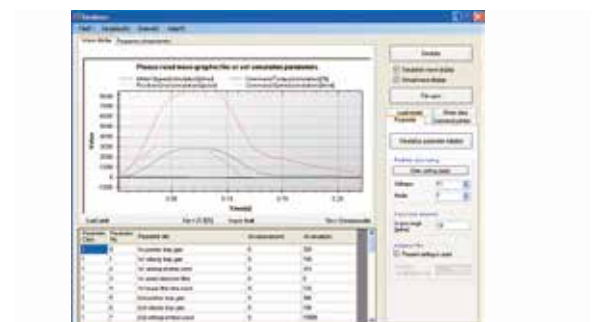
### 3-step control setting

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 a lower vibration tendency.








### 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 you having to adjust the actual parameter settings of the equipment.



Servo drivers and motors

Model	200/400V AC					400V AC
	Standard	RS485 communication	Multifunction	Network		400V AC compact
	A6SE	A6SG	A6SF	A6N	A6B	A6 Multi
						
RTEX	-	-	-	x	-	-
EtherCAT	-	-	-	-	x	x
External encoder	-	-	x	x		x
Safety function STO	-	-	x	x		x
Advanced safety function	-	-	-	-		x
RS232/485 (Modbus)	-	x	x	-		-
Velocity control, torque control	-	-	x	x		x
Position control with dig. I/O (like MINAS A4P)	x	x	x	-		-
Position control	x	x	x	x		x

Model	MSMF				MDMF		MHMF				
	Low inertia				Medium inertia		High inertia				
	Rated power W	Flange Ø mm	Rated rotational speed (max.) rpm	Flange Ø mm	Rated rotational speed (max.) rpm	Flange Ø mm	Rated rotational speed (max.) rpm	Flange Ø mm	Rated rotational speed (max.) rpm	Flange Ø mm	Rated rotational speed (max.) rpm
200V AC	50	38	3000 (6000)	-	-	-	-	40	3000 (6500)	-	-
	100	-	-	-	-	-	-	-	-	-	-
	200	60	-	-	-	-	60	-	-	-	-
	400	-	-	-	-	-	-	-	-	-	-
	750	80	-	-	-	-	80	3000 (6000)	-	-	-
	1000	-	-	100	3000 (5000)	130	2000 (3000)	-	-	130	2000 (3000)
400V AC	1000	-	-	100	3000 (5500)	130	2000 (3500)	-	-	130	2000 (3500)
	1500	-	-					-	-		
	2000	-	-	120	-	-	176				
	3000	-	-	130	3000 (5000)	176		2000 (3000)			
	4000	-	-	-	-	-	-				
5000	-	-	-	-	-	-	-				
Features	Low power range, low inertia, suitable for all kinds of applications, also suitable for high-speed applications		Medium power range, low inertia, suitable for machinery directly connected with a ball screw drive and with high machine rigidity and repetition rate		Medium power range, medium inertia, suitable for belt-driven machinery with low rigidity		Low power range, high inertia, suitable for belt-driven machinery with low rigidity		Medium power range, high inertia, suitable for belt-driven machinery with low rigidity		
Applications	Bonders, equipment for transistor production, packaging machines, etc.		SMD machinery, machines for food production and LCDs, etc.		Conveyor machinery, robots, textile machines, etc.		Conveyor machinery, robots, etc.		Conveyor machinery, robots, machines for LCD production, etc.		

## Servo driver model codes 100/200/400V AC

MAD	L	N	1	5	S	E	
<b>Frame:</b> MAD: A MBD: B MCD: C MDD: D MED: E MFD: F						<b>Type:</b> <b>Pulse/analog type:</b> SE: Standard (pulse) SF: Multifunction (pulse, analog) SG: RS485 (pulse)	
<b>L: A6 series</b>						<b>Network type:</b> NE: Without STO (RTEX) NF: With STO (RTEX) BE: Without STO (EtherCAT) BF: With STO (EtherCAT)	
<b>Safety function:</b> N: Without STO T: With STO						<b>Supply voltage:</b> 1: 1-phase, 100V AC 3: 3-phase, 200V AC 5: 1-/3-phase, 200V AC 4: 3-phase, 400V AC	
<b>Maximum rated current:</b> 0: 6A 1: 8A 2: 12A 3: 22A 4: 24A		5: 40A 8: 60A A: 100A B: 120A					

## Servo motor model codes 100/200V AC

MSM	F	5A	Z	L	1	A1	
<b>Motor model</b> MSM: Low inertia MDM: Medium inertia MHM: High inertia						<b>Motor specifications:</b> (shaft type, holding brake, oil seal, encoder clamp): A-D,G,H,S-V; 1-8	
<b>F: A6 series</b>						<b>1: Standard</b>	
<b>Rated power:</b> 5A: 50W 01: 100W 02: 200W 04: 400W		08: 750W 09: 1kW (Ø 80mm) 10: 1kW (Ø 100/130mm) 15: 1.5kW					<b>L: 23 bit absolute, 8388608ppr</b>
<b>Supply voltage:</b> 1: 100V 2: 200V Z: 100V/200V							



## Servo motor model codes 400V AC

	MSM	F	10	4	A1	G	9
<b>Motor model</b> MSM: Low inertia MDM: Medium inertia MHM: High inertia							
<b>F: A6 series</b>							
<b>Rated power:</b> 10: 1kW 15: 1.5kW 20: 2kW 30: 3kW 40: 4kW 50: 5kW							
<b>Supply voltage:</b> 4: 400V AC							
							<b>Oil seal:</b> 9: Single lip A: Triple lip  <b>Shaft type:</b> G: Without key way shaft, without holding brake H: With key way shaft, with holding brake  <b>Encoder type:</b> L1: Standard A1: Encoder without battery

## Power supply model codes A6 Multi

	MAD	M	P	N	1	4
<b>Frame:</b> MAD: A MBD: B						
<b>M: A6 Multi series</b>						
<b>Module type:</b> P: Power supply						
						<b>Supply voltage:</b> 4: 3-phase, 400V AC  <b>Rated power:</b> 1: 15kW 2: 30kW  <b>Safety function:</b> N: Without safety function

## Servo driver model codes A6 Multi 400V AC

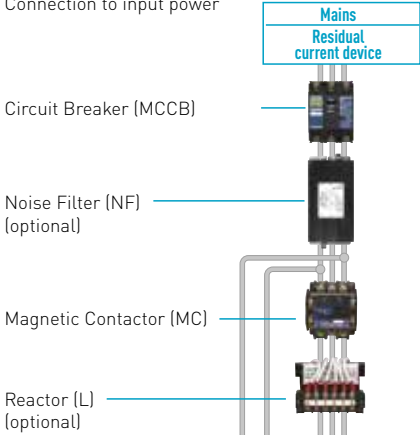
	MAD	M	2	A	4	K	B	X
<b>Frame:</b> MAD: A MBD: B								
<b>M: A6 Multi series</b>								
<b>Axis unit type</b> 1: 1-axis unit 2: 2-axis unit								
<b>Safety function:</b> A: With STO								
								<b>Other Features:</b> X: Advanced safety function  <b>Network type:</b> B: EtherCAT  <b>Supply voltage:</b> K: 560V DC  <b>Rated power:</b> 4: 750W 6: 1.5kW A: 3kW B: 5kW

### Connections and interfaces

Connector type (200V DC: frame A – F)

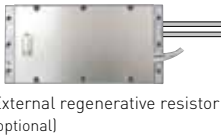
#### Wiring of Main Connector

Connection to input power



#### Charge lamp

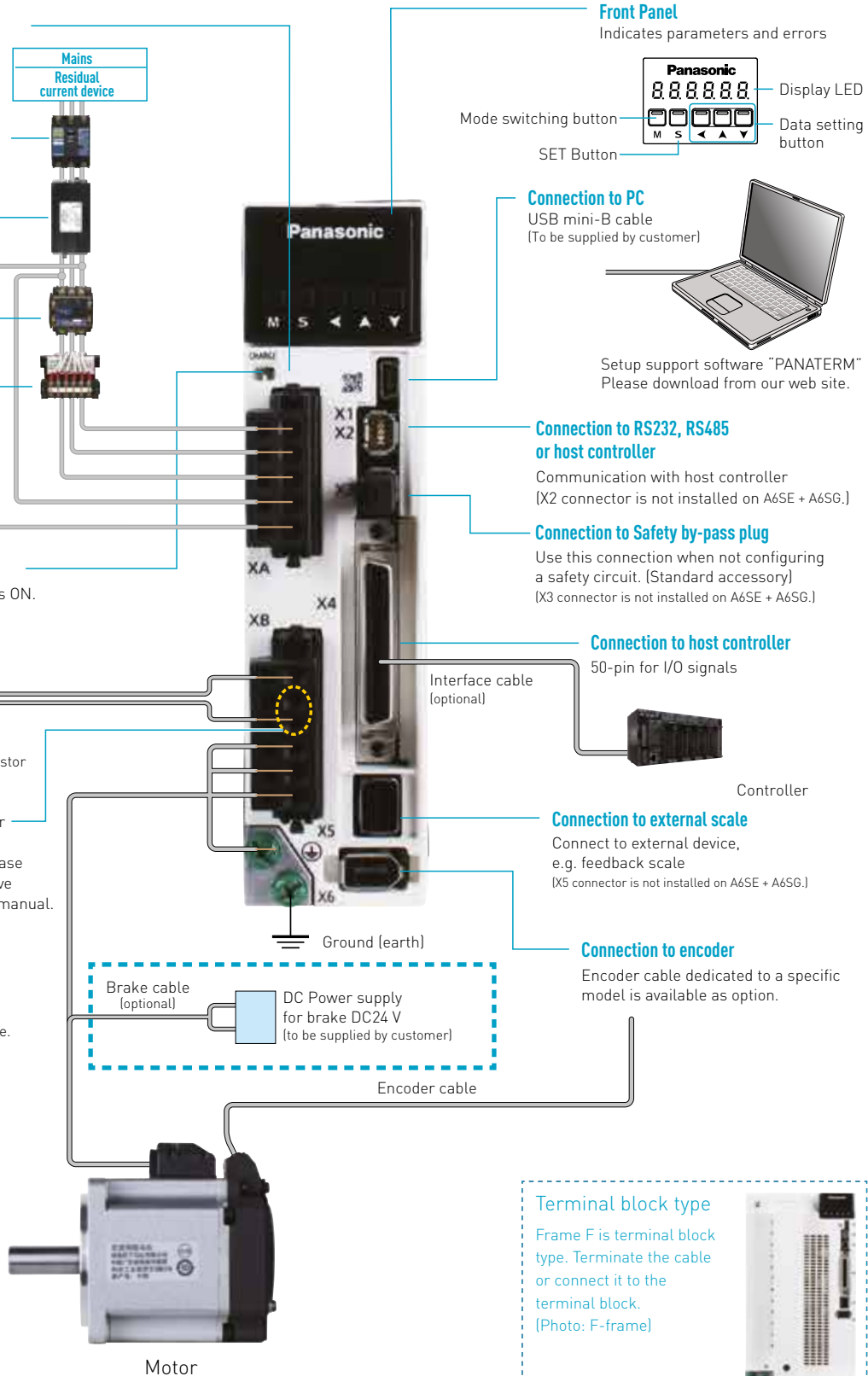
Lights while the main power is ON.



External regenerative resistor (optional)

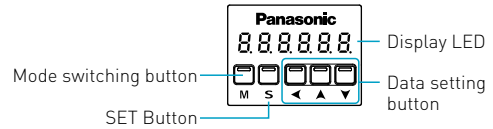
A short wire is not required for A-frame and B-frame.  
 • For handling and wiring in case of using external regenerative resistor, please refer to the manual.

Use this cable only for a motor with brake.



#### Front Panel

Indicates parameters and errors



#### Connection to PC

USB mini-B cable (To be supplied by customer)



Setup support software "PANATERM" Please download from our web site.

#### Connection to RS232, RS485 or host controller

Communication with host controller (X2 connector is not installed on A6SE + A6SG.)

#### Connection to Safety by-pass plug

Use this connection when not configuring a safety circuit. (Standard accessory) (X3 connector is not installed on A6SE + A6SG.)

#### Connection to host controller

50-pin for I/O signals

Interface cable (optional)



Controller

#### Connection to external scale

Connect to external device, e.g. feedback scale (X5 connector is not installed on A6SE + A6SG.)

#### Connection to encoder

Encoder cable dedicated to a specific model is available as option.

#### Terminal block type

Frame F is terminal block type. Terminate the cable or connect it to the terminal block. (Photo: F-frame)



Motor

# PRODUCT FINDER: FOR SERVO DRIVES



Find the best servo drive within seconds!

## Overview of MINAS A6 motors, servo drivers and accessories 200V AC

Servo motor										
	Rated power W	Flange Ø mm	Max. torque Nm	Max. nom. rotation speed rpm	Motor	Holding brake	Degree of protection IP67	Key shaft	Encoder	
<b>Low inertia 200V AC class</b>										
Low inertia	50	38	0.16 (0.48)	3000 (6000)	MSMF5AZL1U1		x	x	23 bit abso- lute encoder 8388608ppr	
					MSMF5AZL1V1	x	x	x		
	100	38	0.32 (0.95)		MSMF012L1U1		x	x		
					MSMF012L1V1	x	x	x		
	200	60	0.64 (1.91)		MSMF022L1U1		x	x		
					MSMF022L1V1	x	x	x		
	400	60	1.27 (3.82)		MSMF042L1U1		x	x		
					MSMF042L1V1	x	x	x		
	750	80	2.39 (7.16)	MSMF082L1U1		x	x			
				MSMF082L1V1	x	x	x			
	1000	80	3.18 (9.55)	MSMF092L1U1		x	x			
				MSMF092L1V1	x	x	x			
	1500	100	3.18 (9.55)	3000 (5000)	MSMF102L1G5		x	x		
					MSMF102L1H5	x	x	x		
MSMF152L1G5						x	x			
MSMF152L1H5					x	x	x			
<b>Medium inertia 200V AC class</b>										
Medium inertia	1000	130	4.77 (14.3)	2000 (3000)	MDMF102L1G5		x	x	23 bit abso- lute encoder 8388608ppr	
					MDMF102L1H5	x	x	x		
	1500		7.16 (21.5)		MDMF152L1G5		x	x		
					MDMF152L1H5	x	x	x		
<b>High inertia 200V AC class</b>										
High inertia	50	40	0.16 (0.56)	3000 (6500)	MHMF5AZL1U1		x	x	23 bit abso- lute encoder 8388608ppr	
					MHMF5AZL1V1	x	x	x		
	100	40	0.32 (1.11)		MHMF012L1U1		x	x		
					MHMF012L1V1	x	x	x		
	200	60	0.64 (2.23)		MHMF022L1U1		x	x		
					MHMF022L1V1	x	x	x		
	400	60	1.27 (4.46)		MHMF042L1U1		x	x		
					MHMF042L1V1	x	x	x		
	750	80	2.39 (8.36)	3000 (6000)	MHMF082L1U1		x	x		
					MHMF082L1V1	x	x	x		
	1000	80	3.18 (11.1)		MHMF092L1U1		x	x		
					MHMF092L1V1	x	x	x		
	1500	130	4.77 (14.3)	2000 (3000)	MHMF102L1G5		x	x		
					MHMF102L1H5	x	x	x		
MHMF152L1G5						x	x			
MHMF152L1H5					x	x	x			

Servo drivers		Cables				Filter	Brake resistor		
Model	Frame	Motor cable		Encoder cable		EMC filter	Model		
		For motors without holding brake	For motors with holding brake	23 bit incremental	23 bit absolute				
<b>Low inertia 200V AC class</b>									
MADL□05□□	A	MFMC A0□□0WJD	--	MFEC A0□□0WJD	MFEC A0□□0GJE (with battery box)	FN2080-6-06 or FS21238607	BWD250100		
		--	MFMC A0□□0WJD*						
		MFMC A0□□0WJD	--						
		--	MFMC A0□□0WJD*						
MADL□15□□		MFMC A0□□0WJD	--						
		--	MFMC A0□□0WJD*						
MBDL□25□□	B	MFMC A0□□0WJD	--						
		--	MFMC A0□□0WJD*						
MCDL□35□□	C	MFMC A0□□0WJD	--						
		--	MFMC A0□□0WJD*						
MDDL□45□□	D	MFMC A0□□0WJD	--	MFEC A0□□0GTD	MFEC A0□□0GTE (with battery box)	FN2090-10-06	BWD500035		
		--	MFMC A0□□0WJD*						
		MFMC D0□□2GCD	--						
		--	MFMC A0□□2HCD						
MDDL□55□□		MFMC D0□□2GCD	--						
		--	MFMC A0□□2HCD						
<b>Medium inertia 200V AC class</b>									
MDDL□45□□	D	MFMC D0□□2GCD	--			MFEC A0□□0GTD	MFEC A0□□0GTE (with battery box)	FN2090-10-06	BWD500035
		--	MFMC A0□□2HCD						
		MFMC D0□□2GCD	--						
		--	MFMC A0□□2HCD						
MDDL□55□□		MFMC D0□□2GCD	--						
		--	MFMC A0□□2HCD						
<b>High inertia 200V AC class</b>									
MADL□05□□	A	MFMC A0□□7WFD	--	MFEC A0□□0WJD	MFEC A0□□0GJE (with battery box)	FN2080-6-06 or FS21238607	BWD250100		
		--	MFMC A0□□7XFD						
		MFMC A0□□7WFD	--						
		--	MFMC A0□□7XFD						
MADL□15□□		MFMC A0□□0WFD	--						
		--	MFMC A0□□0XFD						
MBDL□25□□	B	MFMC A0□□0WFD	--						
		--	MFMC A0□□0XFD						
MCDL□35□□	C	MFMC A0□□0WFD	--						
		--	MFMC A0□□0XFD						
MDDL□55□□	D	MFMC A0□□0WFD	--	MFEC A0□□0GTD	MFEC A0□□0GTE (with battery box)	FN2090-10-06	BWD500035		
		--	MFMC A0□□0XFD						
		MFMC D0□□2GCD	--						
		--	MFMC E0□□2HCD						
MDDL□45□□		MFMC D0□□2GCD	--						
		--	MFMC E0□□2HCD						
MDDL□55□□		MFMC D0□□2GCD	--						
		--	MFMC E0□□2HCD						
□.□.□□ Servo driver type, see Page 16		□□ = Cable length (m) * For MSMF motors with a holding brake < 1.5kW, an additional brake cable MFMCB0□□0PJT is required for the motor cable.							

## Overview of MINAS A6 motors, servo drivers and accessories 400V AC

Servo motor												
	Rated power W	Flange Ø mm	Max. torque Nm	Rated rota- tional speed (max.) rpm	Motor	Holding brake	Degree of protec- tion IP67	Key shaft	Encoder			
<b>Low inertia 400V AC class</b>												
Low inertia	1000	100	3.18 (9.55)	3000 (5500)	MSMF104□G9		x	x	23-bit encoder 8388608ppr			
					MSMF104□H9	x	x	x				
	1500		MSMF154□G9			x	x					
					MSMF154□H9	x	x	x				
	2000		MSMF204□G9			x	x					
					MSMF204□H9	x	x	x				
	3000	120	9.55 (28.7)	MSMF304□G9		x	x					
					MSMF304□H9	x	x	x				
	4000	130	12.7 (38.2)	3000 (5000)	MSMF404□G9		x	x				
					MSMF404□H9	x	x	x				
5000	MSMF504□G9				x	x						
			MSMF504□H9		x	x	x					
<b>Medium inertia 400V AC class</b>												
Medium inertia	1000		130		4.77 (14.3)	2000 (3500)	MDMF104□G9		x	x	23-bit encoder 8388608ppr	
		MDMF104□H9		x			x	x				
	1500	MDMF154□G9			x		x					
				MDMF154□H9	x		x	x				
	2000	MDMF204□G9			x		x					
				MDMF204□H9	x		x	x				
	3000	176	14.3 (43.0)	MDMF304□G9		x	x					
					MDMF304□H9	x	x	x				
	4000	MDMF404□G9		x	x							
			MDMF404□H9	x	x	x						
5000	MDMF504□G9	23.87 (71.6)	2000 (3000)		x	x						
				MDMF504□H9	x	x	x					
<b>High inertia 400V AC class</b>												
High inertia	1000	130	4.77 (14.3)	2000 (3500)	MHMF104□G9		x	x	23-bit encoder 8388608-ppr			
					MHMF104□H9	x	x	x				
	1500		MHMF154□G9			x	x					
					MHMF154□H9	x	x	x				
	2000		MHMF204□G9			x	x					
					MHMF204□H9	x	x	x				
	3000	176	14.3 (43.0)	MHMF304□G9		x	x					
					MHMF304□H9	x	x	x				
	4000		MHMF404□G9		x	x						
				MHMF404□H9	x	x	x					
5000	MHMF504□G9		23.9 (71.6)	2000 (3000)		x	x					
					MHMF504□H9	x	x	x				
□ Motor type (L1 = standard, A1 = encoder without battery)												



Servo drivers		Cables			Filter	Brake resistor	
Model	Frame	Motor cable		Encoder cable	EMC filter	Model	
		For motors without holding brake	For motors with holding brake	23 bit, standard encoder/ encoder without battery			
<b>Low inertia 400V AC class</b>							
MDDL06400	D	MFMC A0001YUD	--	MFEC A0000YYE	Undergoing tests	BWD500150	
		--	MFMC A0001ZUD				
		MFMC A0001YUD	--				
		--	MFMC A0001ZUD				
MEDL08400	E	MFMC A0002YUD	--				
		--	MFMC A0002ZUD				
MFDL0A400	F	MFMC A0002YUD	--				
		--	MFMC A0002ZUD				
MFDL0B400		MFMC A0002YUD	--				
		--	MFMC A0002ZUD				
		MFMC A0002YUD	--				
		--	MFMC A0002ZUD				
<b>Medium inertia 400V AC class</b>							
MDDL05400		D	MFMC A0001YUD	--	MFEC A0000YYE	Undergoing tests	BWD500150
	--		MFMC A0001ZUD				
MDDL06400	MFMC A0001YUD		--				
	--		MFMC A0001ZUD				
MEDL08400	E	MFMC A0002YUD	--				
		--	MFMC A0002ZUD				
MFDL0A400	F	MFMC A0002YUD	--				
		--	MFMC A0002ZUD				
MFDL0B400		MFMC A0002YUD	--				
		--	MFMC A0002ZUD				
		MFMC A0002YUD	--				
		--	MFMC A0002ZUD				
<b>High inertia 400V AC class</b>							
MDDL05400		D	MFMC A0001YUD	--	MFEC A0000YYE	Undergoing tests	BWD500150
	--		MFMC A0001ZUD				
MDDL06400	MFMC A0001YUD		--				
	--		MFMC A0001ZUD				
MEDL08400	E	MFMC A0002YUD	--				
		--	MFMC A0002ZUD				
MFDL0A400	F	MFMC A0002YUD	--				
		--	MFMC A0002ZUD				
MFDL0B400		MFMC A0002YUD	--				
		--	MFMC A0002ZUD				
		MFMC A0002YUD	--				
		--	MFMC A0002ZUD				
□,□□ Servo driver type, see Page 16		□□ = Cable length (m)					

**MINAS A6 motors, MINAS A6 Multi servo drivers and accessories 400V AC**

Servo motor										Servo drivers		Cables			Filter	Brake resistor
Rated power W	Flange Ø mm	Max. torque Nm	Rated rotational speed [max.] rpm	Motor	Holding brake Degree of protection IP67	Key shaft	Encoder	Model	Frame	Motor cable		Encoder cable	EMC filter	Model		
										For motors with- out holding brake	For motors with holding brake	23-bit				
<b>Low inertia MINAS A6 Multi 400V AC class</b>																
Low inertia	750	* under development						MADM2A4KBX		A	MFMCA0□□1YUD	--	MFECA0□□0YYE	FN3288-90-34	Motor design depending on application	
	1000	100	3.18 (9.55)	3000 (5500)	MSMF104□G9M	x	x	MADM2A6KBX	A	MFMCA0□□1YUD	--					
					MSMF104□H9M	x	x			MFMCA0□□1ZUD	--					
	1500	100	4.77 (14.3)	3000 (5500)	MSMF154□G9M	x	x	MADM2A6KBX	A	MFMCA0□□1YUD	--					
					MSMF154□H9M	x	x			MFMCA0□□1ZUD	--					
	2000	100	6.37 (19.1)	3000 (5500)	MSMF204□G9M	x	x	MADM2AAKBX	A	MFMCA0□□1YUD	--					
					MSMF204□H9M	x	x			MFMCA0□□1ZUD	--					
	3000	120	9.55 (28.7)	3000 (5500)	MSMF304□G9M	x	x	MADM2AAKBX	A	MFMCA0□□1YUD	--					
					MSMF304□H9M	x	x			MFMCA0□□1ZUD	--					
	4000	130	12.7 (38.2)	3000 (5000)	MSMF404□G9M	x	x	MBDM1A9KBX	B	MFMCA0□□2YUD	--					
					MSMF404□H9M	x	x			MFMCA0□□2ZUD	--					
	5000	130	15.9 (47.8)	3000 (5000)	MSMF504□G9M	x	x	MBDM1A9KBX	B	MFMCA0□□2YUD	--					
MSMF504□H9M					x	x	MFMCA0□□2ZUD			--						
<b>Medium inertia MINAS A6 Multi 400V AC class</b>																
Medium inertia	750	* under development						MADM2A4KBX		A	MFMCA0□□1YUD	--	MFECA0□□0YYE	FN3288-90-34	Motor design depending on application	
	1000	130	4.77 (14.3)	2000 (3500)	MDMF104□G9M	x	x	MADM2A6KBX	A	MFMCA0□□1YUD	--					
					MDMF104□H9M	x	x			MFMCA0□□1ZUD	--					
	1500	130	7.16 (21.5)	2000 (3500)	MDMF154□G9M	x	x	MADM2A6KBX	A	MFMCA0□□1YUD	--					
					MDMF154□H9M	x	x			MFMCA0□□1ZUD	--					
	2000	130	9.55 (28.7)	2000 (3500)	MDMF204□G9M	x	x	MADM2AAKBX	A	MFMCA0□□1YUD	--					
					MDMF204□H9M	x	x			MFMCA0□□1ZUD	--					
	3000	130	14.3 (43.0)	2000 (3500)	MDMF304□G9M	x	x	MADM2AAKBX	A	MFMCA0□□1YUD	--					
					MDMF304□H9M	x	x			MFMCA0□□1ZUD	--					
	4000	176	19.1 (57.3)	2000 (3000)	MDMF404□G9M	x	x	MBDM1A9KBX	B	MFMCA0□□2YUD	--					
					MDMF404□H9M	x	x			MFMCA0□□2ZUD	--					
	5000	176	23.87 (71.6)	2000 (3000)	MDMF504□G9M	x	x	MBDM1A9KBX	B	MFMCA0□□2YUD	--					
MDMF504□H9M					x	x	MFMCA0□□2ZUD			--						
<b>High inertia MINAS A6 Multi 400V AC class</b>																
High inertia	750	* under development						MADM2A4KBX		A	MFMCA0□□1YUD	--	MFECA0□□0YYE	FN3288-90-34	Motor design depending on application	
	1000	130	4.77 (14.3)	2000 (3500)	MHMF104□G9M	x	x	MADM2A6KBX	A	MFMCA0□□1YUD	--					
					MHMF104□H9M	x	x			MFMCA0□□1ZUD	--					
	1500	130	7.16 (21.5)	2000 (3500)	MHMF154□G9M	x	x	MADM2A6KBX	A	MFMCA0□□1YUD	--					
					MHMF154□H9M	x	x			MFMCA0□□1ZUD	--					
	2000	176	9.55 (28.7)	2000 (3500)	MHMF204□G9M	x	x	MADM2AAKBX	A	MFMCA0□□1YUD	--					
					MHMF204□H9M	x	x			MFMCA0□□1ZUD	--					
	3000	176	14.3 (43.0)	2000 (3500)	MHMF304□G9M	x	x	MADM2AAKBX	A	MFMCA0□□1YUD	--					
					MHMF304□H9M	x	x			MFMCA0□□1ZUD	--					
	4000	176	19.1 (57.3)	2000 (3000)	MHMF404□G9M	x	x	MBDM1A9KBX	B	MFMCA0□□2YUD	--					
					MHMF404□H9M	x	x			MFMCA0□□2ZUD	--					
	5000	176	23.9 (71.6)	2000 (3000)	MHMF504□G9M	x	x	MBDM1A9KBX	B	MFMCA0□□2YUD	--					
MHMF504□H9M					x	x	MFMCA0□□2ZUD			--						
□ Motor type (L1 = standard, A1 = encoder without battery)										□□ = Cable length (m)						

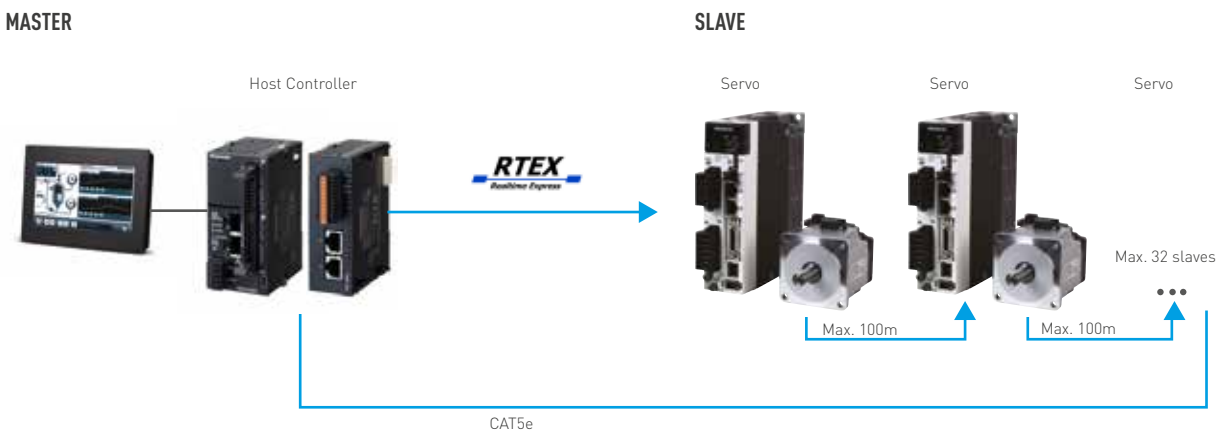
### MINAS A6N with RTEX protocol

#### RTEX (Realtime Express)

Thanks to its high transmission speed and sampling rate, this fast, real-time Ethernet bus for automation is particularly well suited for highly dynamic single and multiple axes position

control tasks. The communication between master and slaves happens in real time.

#### Easy mounting and reliable connections thanks to ring topology

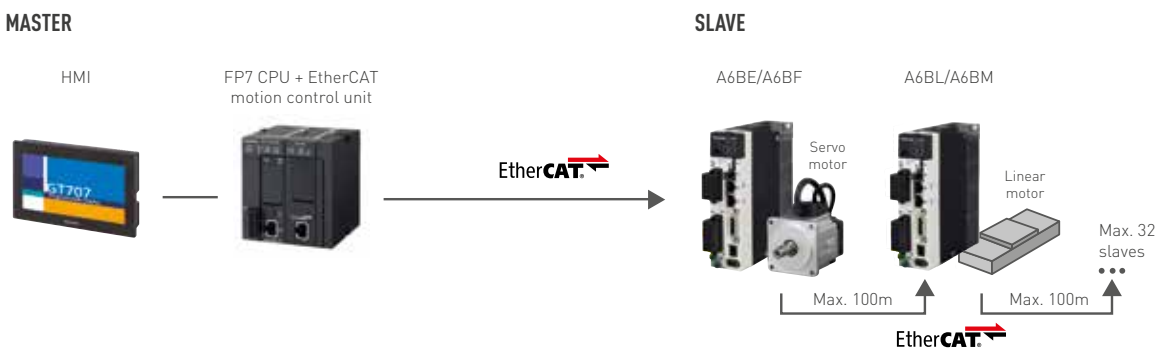




### MINAS A6B with EtherCAT protocol

#### EtherCAT (Ethernet for Control Automation Technology)

This Ethernet-based field bus system offers similarly outstanding features like RTEX. However, unlike RTEX, EtherCAT is an open, standardized field bus. This has the advantage that

data can be exchanged with other servo drivers if they have an EtherCAT port.



Features	MINAS A6N 	MINAS A6B 
General features	Supports position, velocity and torque control	
	Manual and automatic vibration suppression (adjustable in the driver)	
	Conforms to the following safety standards: ISO13849-1(PL e, CAT3), EN61508(SIL3), EN62061(SILCL3), EN61800-5-2(SIL3, STO), IEC61326-3-1, IEC60240-1	
Real-time communication 100Mbit/s	RTEX protocol	CAN over EtherCAT (CoE)
Full control of	up to 32 axes	up to 64 axes
Compatible positioning units	FP0H	FP7



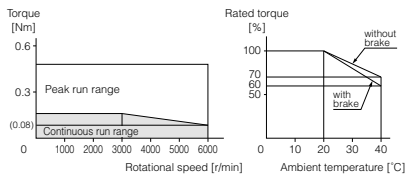
For more data about MINAS A6 servo controllers and motors such as technical data, dimensional diagrams, and torque characteristics, please use this download link:



### Examples of servo motor torque characteristics

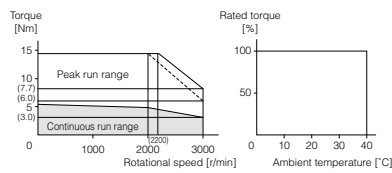
Motor with low inertia:

**MSMF5AZL1□□** With oil seal



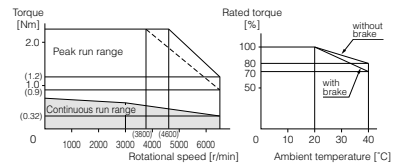
Motor with middle inertia:

**MDMF102L1□□** With oil seal



Motor with high inertia:

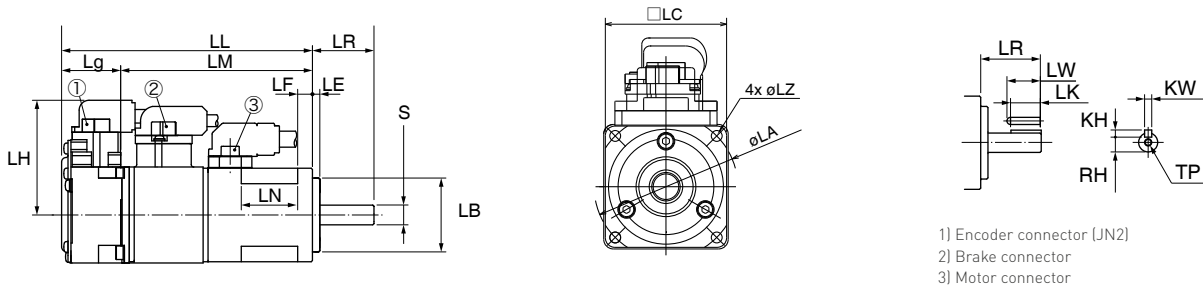
**MHMF022L1□□** With oil seal



### Examples of servo motor dimension diagrams

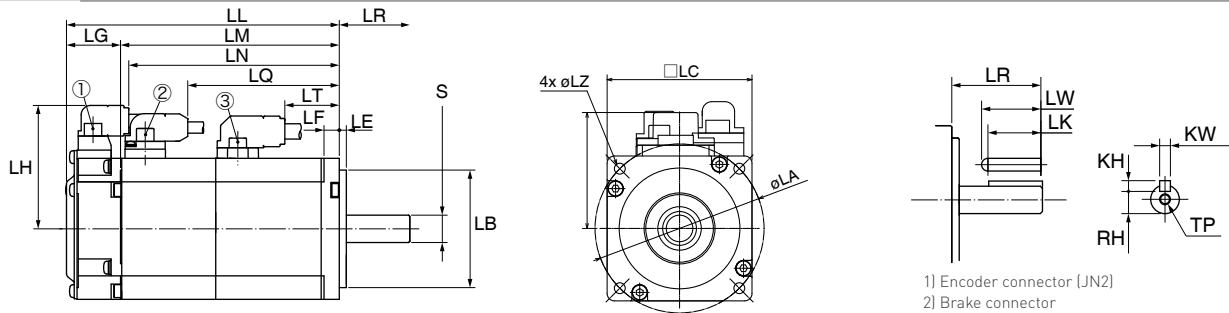
MSMF – low inertia (50–1500W, 200V AC)

50-100W Side Front Key way dimensions



- 1) Encoder connector [JN2]
- 2) Brake connector
- 3) Motor connector

200-1000W Side Front Key way dimensions



- 1) Encoder connector [JN2]
- 2) Brake connector
- 3) Motor connector



## MINAS A6V servo drives (24/48V DC)

**Low voltage, high performance**

### Features:

- › Servo drives and servo motors
- › 24/48V DC input voltage
- › 200W or 400W
- › 23-bit absolute encoder
- › Modbus RTU communication
- › Position, rotational speed, and torque control
- › Pulse train with up to 500kpps (kpps = thousand pulses/second)
- › Rated rotational speed 3000rpm

Battery-driven DC drives are very common in drive technology for applications where there is no AC or three-phase current network available. Especially in the area of drive technology for vehicles and the medical field there is a need for motors with battery voltages. These motors round off Panasonic's portfolio of drive technology products.

## Servo driver specifications:

Type		A6V	
Supply voltage		24/48V DC	48V DC
Rated current		8.6A	
Max. rated current		24.3A	
Rated power		200W	400W
Control mode		Position control, velocity control, torque control, full-closed control	
Positioning with digital I/Os (block operation table)		Yes	
Control input		Pulse, analog	
Encoder feedback	Rotating	23-bit absolute, serial	
	Linear	-	
External encoder		Yes	
Communication		USB, RS232, RS485, Modbus	
Inputs		5 multifunction inputs, 2 pulse inputs, 1 analog input, Modbus	
Outputs		3 multifunction outputs, A/B/Z-phase pulse output	
Weight		0.35kg approx.	
Dimensions (W x H x D in mm)		90 x 30 x 180	

## Servo motor specifications:

Type		A6V	
Rated power		200W	400W
Flange diameter		60mm	
Supply voltage		24/48V DC	48V DC
Rated rotational speed		3000rpm	
Max. rotational speed		3000rpm	
Motor length (without shaft)		79.5mm	99mm
External encoder		Yes	
Encoder	Resolution	23 bit absolute	
	Multi turn	23 bit	23 bit
IP degree of protection (motor)		IP65	
Rated torque		0.64-1.27Nm/0.64-1.91Nm	1.27-2.54Nm
Peak torque		1.27-2.54Nm	

## Types:

MINAS A6V	Rated power	Supply voltage	Type
Servo drivers	200W/400W	24V DC	MVDLN5CSF
		48V DC	MVDLN5BSF
Servo motor	200W	24V DC	MSMD02CL1S
			MSMD02CL1T
		48V DC	MSMD02BL1S
	MSMD02BL1T		
	MSMD04BL1S		
	400W		MSMD04BL1T

## Applications:



Medical technology,  
laboratories



Robots



AGVs (automated guided vehicles  
in households and warehouses,  
lawnmowers, etc.)



All dimensions are in mm

Cables

Cable (servo motor – servo driver), 200V DC			
For motors without holding brake	MSMF motors 50W–1kW	MFMCA0□□0WJD	
	MHMF motors 50W/100W	MFMCA0□□7WFD	
	MHMF motors 200W–1kW	MFMCA0□□0WFD	
	MSMF motors 1–2kW MDMF motors 1–2kW MHMF motors 1–1.5kW	MFMCD0□□2GCD	
Brake cables	MSMF motors 50W–1kW	MFMCB0□□0PJT	
For motors with holding brake	MHMF motors 50W/100W	MFMCA0□□7XFD	
	MHMF motors 200W–1kW	MFMCA0□□0XFD	
	MSMF motors 1–2kW 200V MDMF motors 1–2kW 200V	MFMCA0□□2HCD	
		□□ = Cable length (m)	

All dimensions are in mm

Encoder cable (servo motor – servo driver), 200V DC			
For motors with 23-bit incremental encoder	MSMF, MHMF motors 50W-1kW	MFECA0□□0WJD	
	MSMF-, MDMF-, MHMF- Motors 1kW-5kW	MFECA0□□0GTD	
For motors with 23-bit absolute encoder (battery box)	MSMF, MHMF motors 50W-1kW	MFECA0□□0GJE	
	MSMF-, MDMF-, MHMF- Motors 1kW-5kW	MFECA0□□0GTE	

Cable (servo motor – servo driver), 400V DC and MINAS A6 Multi series			
For motors without holding brake	Motors 200W-1.5kW	MFMCA0□□1YUD	
	Motors 2kW-5kW	MFMCA0□□2YUD	
For motors with holding brake	Motors 200W-1.5kW	MFMCA0□□1ZUD	
	Motors 2kW-5kW	MFMCA0□□2ZUD	

Encoder cable (servo motor – servo driver), 400V DC and MINAS A6 Multi series			
For motors with 23-bit encoder	Motors 200W-5kW	MFECA0□□0YYE	
		□□ = Cable length (m)	

All dimensions are in mm

Control cable (PLC – MINAS A6 servo driver), 200/400V DC			
For direct connections with FP series programmable controllers	FP0R	For 1 axis DV0P0988W-1 (PNP types) DV0P0989W-1 (NPN types)	
	FP0H, FP0R	For 1 axis DV0P0988WP-1 (PNP types)	
	FP7 positioning unit	For 2 axes DV0P0976W1 (line driver) DV0P0975W1 (transistor)	

## Other accessories:

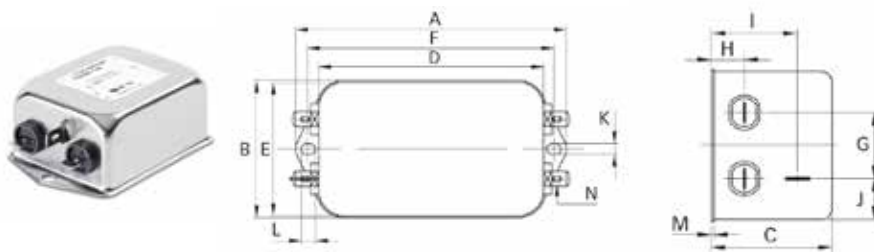
	Product no.	Details/Comments/Dimensions			
Cables	<b>Control cable 200/400V AC</b>				
	DV0P4360	50W-5kW	50-pin	I/O cable X4, loose wires, 2m	
	DV0P4360P	50W-5kW	50-pin	I/O cable X4, loose wires, 2m, position control	
	DV0P4360V	50W-5kW	50-pin	I/O cable X4, loose wires, 2m, velocity control	
	DV0PM20024CAB020	50W-5kW	8-pin	Communication cable X2, RS485, RS232, loose wires, 2m	
	DV0PM20025CAB020	50W-5kW	8-pin	Safety function cable X3, loose wires, 2m	
	DV0P0800-EU	50W-5kW	26-pin	I/O cable X4, loose wires, 2m	
	<b>Programming cable 200/400V AC</b>				
	CABMINIUSB5D	50W-5kW	USB		
Connector set	<b>Connector set for servo driver 200V AC</b>				
	DV0P4350-EU	50W-5kW	50-pin	I/Os, X4	
	DV0P0770-EU	50W-5kW	26-pin	I/Os, X4	
	DV0PM20026-EU	50W-5kW	-	External encoder connector X5	
	<b>Connector set encoder, servo motor without holding brake 200V AC</b>				
	DV0PM24581-EU	50/100W	-	MINAS A6 MHMF, IP67	
	DV0PM24582-EU	200W-1kW	-	MINAS A6 MHMF, IP67	
	DV0PM20035-EU	50W-1kW	-	MINAS A6 MSMF, IP67	
	DV0PM20036-EU	1kW-2kW	-	MINAS A6 MSMF, MDMF; MHMF 1-1,5kW	
	DV0PM20036A	1kW-2kW	-	Angled type; MINAS A6 MSMF, MDMF; MHMF 1-1,5kW	
	<b>Connector set encoder, servo motor with holding brake 200V AC</b>				
	DV0PM20040-EU	50W-1kW	-	MINAS A6 MSMF, IP67	
	DV0PM20038-EU	1kW-2kW	-	MINAS A6 MSMF, MDMF; MHMF 1-1,5kW	
	DV0PM20038A	1kW-2kW	-	Angled type; MINAS A6 MSMF, MDMF; MHMF 1-1,5kW	
	<b>Connector set for servo drives 400V AC</b>				
		DV0PM14576-EU	1kW-5kW	-	For mounting motor and encoder cables
Miscellaneous	<b>EMC filter 200V AC</b>				
	FN2080-6-06	50W-750W	1-phase	250V AC	
	FN2090-10-06	1kW-1.5kW	1-/3-phase	250V AC	
	FS21238607	50W-750W	1-phase	Footprint filter, 250V AC	
	FN3268-7-44	1kW-3kW	3-phase	400V AC	
	FN3268-16-44	4kW-5kW	3-phase	400V AC	
	DV0P1460	50W-22kW	1-phase	Ferrite core, noise filter	
	<b>Braking resistors 200V AC</b>				
	BWD250100	50W-100W	1-phase	100Ω, 100W, 600V AC	110 x 80 x 15 [L x W x D in mm]
	BWD250072	200W-750W	1-phase	72Ω, 100W, 600V AC	
	BWD500035	1kW-1.5kW	1-phase	35Ω, 200W, 600V AC	216 x 80 x 15 [L x W x D in mm]
	<b>EMC filter 400V AC (undergoing tests)</b>				
	FN3258-16-44	1kW-2kW	3-phase	400V AC	
	FN3258-30-33	3kW-5kW	3-phase	400V AC	
	<b>Braking resistors 400V AC</b>				
	BWD500150	1kW-1.5kW	3-phase	150Ω, 100W, 600V AC	216 x 80 x 15 [L x W x D in mm]
	BWD500100	2kW	3-phase	100Ω, 100W, 600V AC	216 x 80 x 15 [L x W x D in mm]
	BWD600047	3kW-5kW	3-phase	47Ω, 240(400)W, 600V AC	216 x 80 x 30 [L x W x D in mm]
	<b>EMC filter MINAS A6 Multi 400V AC</b>				
	FN3288-80-34	1kW-3kW	3-phase	530V AC, MINAS A6 Multi power supply 15kW	
	FN3288-160-40	4kW-5kW	3-phase	530V AC, MINAS A6 Multi power supply 30kW	
	<b>Braking resistors MINAS A6 Multi 400V AC</b>				
	Motor design depending on application				
<b>Miscellaneous MINAS A6 Multi 400V AC</b>					
	DV0PM24621-EU	USB license dongle "PANATERM for Safety"			

EMC filter

All dimensions are in mm

200V AC:

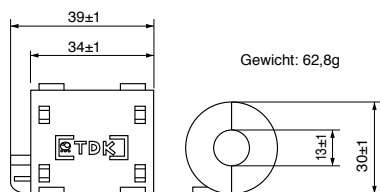
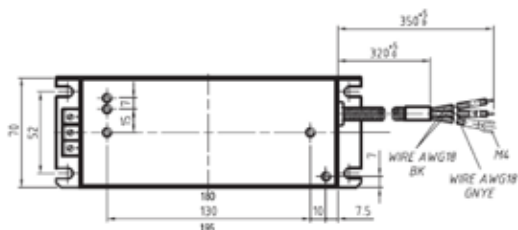
FN2080-6-06 for servo driver MINAS A6 50-750W, 1-phase / FN2090-10-06 for servo driver MINAS A6 1-1.5kW, 1-phase



Dimensions (mm)	FN2080-6-06	FN2080-10-06
A	113.5	156
B	57.5	57.5
C	45.4	45.4
D	94	130.5
E	56	56
F	103	143
G	25	25
H	12.4	12.4
I	32.4	32.4
J	15.5	15.5
K	4.4	5.3
L	6	6
M	1	1
N	6.3 x 0.8	6.3 x 0.8

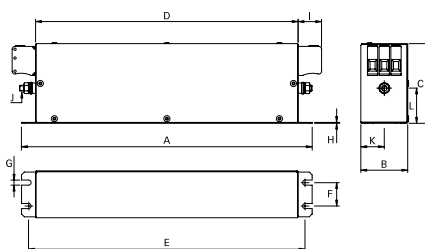
FS21238607 for servo driver MINAS A6 50-750W, 1-phase

DVOP1460 with ferrite core



400V AC (filters are undergoing tests):

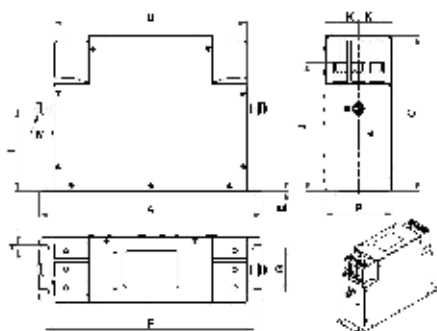
FN3258-16-44 for servo driver MINAS A6 1-2kW, 3-phase / FN3258-30-33 for servo driver MINAS A6 3-5kW, 3-phase



Dimensions (mm)	FN3258-16-44	FN3258-30-33
A	190	270
B	40	50
C	70	85
D	160	240
E	180	255
F	20	30
G	4.5	5.4
H	1	1
I	22	25
J	M5	M5
K	20	25
L	29.5	39.5

MINAS A6 Multi 400V AC:

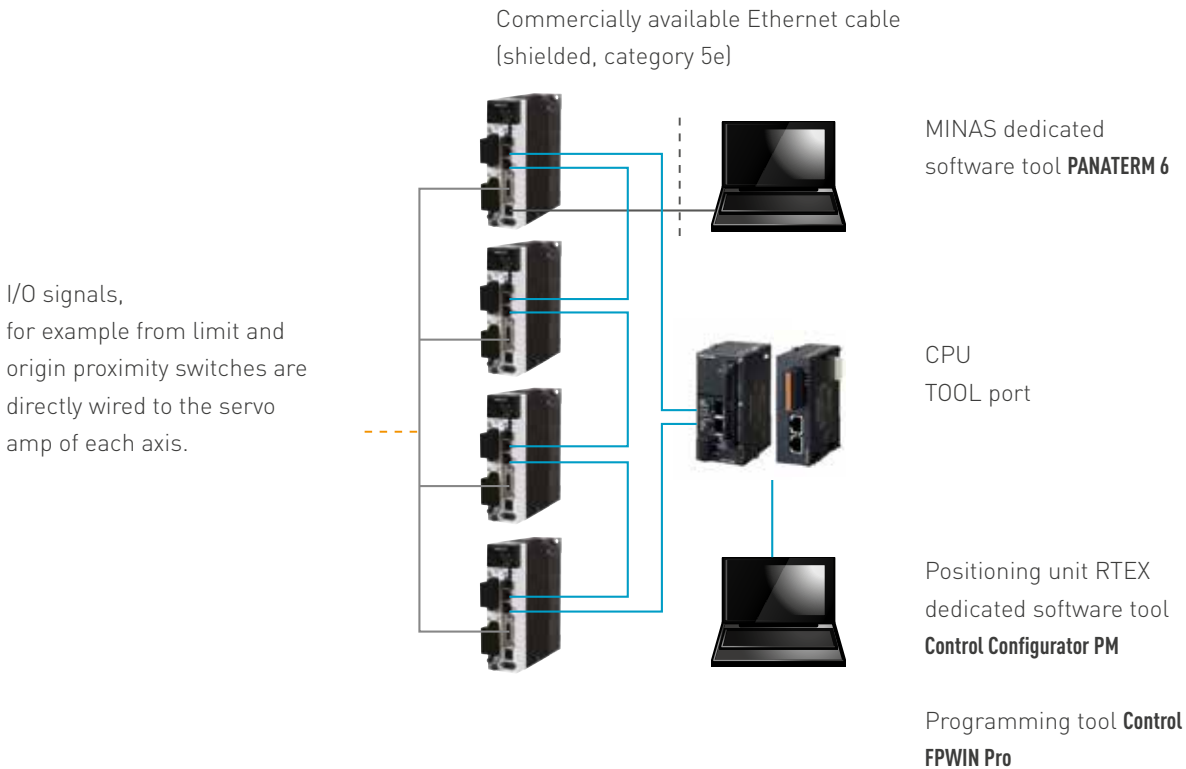
FN3288-80-34 for servo driver MINAS A6 Multi 1-3kW / FN3288-160-40 for servo driver MINAS A6 4-5kW



Dimensions (mm)	FN3288-80-34	FN3288-160-40
A	175	4.5
B	180	5.4
C	195	5.4
D	220	5.4
E	240	5.4
F	270	6.5
G	280	6.5
H	290	6.5
I	220	4.5
J	215	5.4
K	230	5.4
L	250	5.4
M	250	5.4
N	290	6.5
O	300	6.5
P	310	6.5
Q	170	4.5
R	185	5.4
S	190	5.4
T	200	5.4

### RTEX - the multiaxis Ethernet servo system

The RTEX positioning units support MINAS A6N network servo drives. A mutually optimized system consisting of PLC and servo driver greatly simplifies installation and reduces time needed for design.




**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 position control using high-speed 100Mbit/s communication.
- **Minimization** of wiring costs by using commercially available Ethernet cables.
- **Position control** of 4 or 8 axes for servo drivers with Ethernet (RTEX) interface.
- **Easy** configuration with the software Control Configurator PM instead of complex programming.
- Includes manual pulser input allowing support for **precision teaching**.

**System configuration**

Panasonic's compact PLC FP0H can be easily expanded with up to 2 RTEX positioning units (max. 2 x 8 axes + 4 axes (CPU)).

Product	Number of axes	Output type		Product no.
Positioning units FP0H 	4	RTEX Ethernet	Electronic gear, electronic clutch, electronic cam control	AFP0HM4N
	8			AFP0HM8N
Control Configurator PM	For all RTEX units			AFPS66510

## Motion control libraries for Control FPCWIN Pro (PLC)

The motion control library contains the most important function blocks, e.g.

- for relative or absolute position control
- and for home returns with linear axes.

Panasonic offers libraries for all motion control tasks.



CPU Motion Control Library	PP Motion Control Library	RTEX Motion Control Library
Position control with FP series control units (FP0R, FP-X, FPXH, FP0H, FP7)	<ul style="list-style-type: none"> <li>➤ Positioning with PP motion control unit FP0H</li> <li>➤ FP7: Library is included in the PLC programming software Control FPCWIN Pro.</li> </ul>	Positioning with RTEX positioning unit FP0H



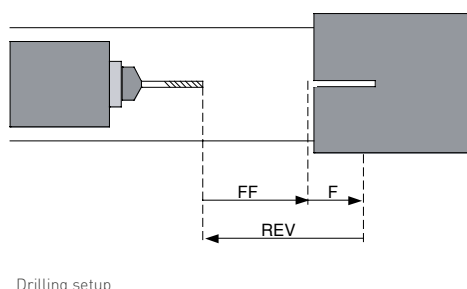
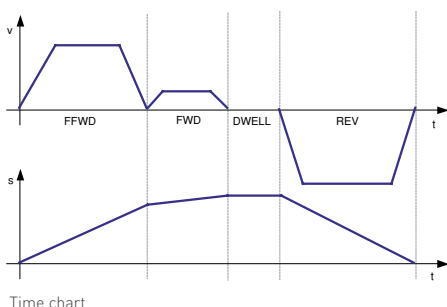
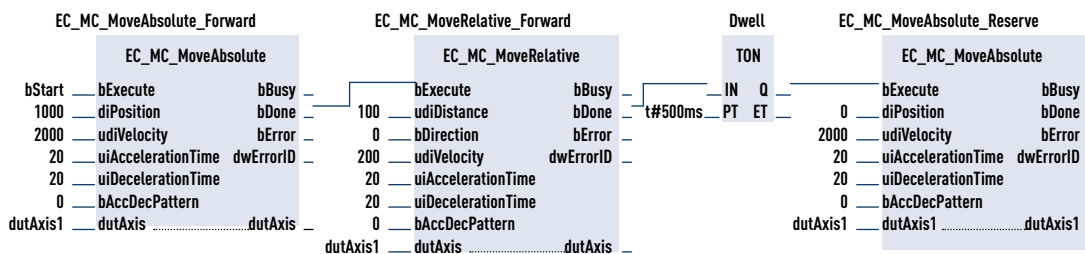
Simply download the software from the Panasonic website: <https://industry.panasonic.eu/downloads>  
Downloads -> Programmable controllers -> PLC software -> Software -> Library



### Advantages of PLC programs using the Motion Control Library

- **Free** – just download it from Panasonic’s website
- **Simple** – easy programming and installation
- **Efficient** – ready-made function blocks, set parameters instead of writing complex programs
- **Compliant** – compliant with IEC 61131- 3
- **Universal** – hardware-independent (works for every Panasonic PLC)
- **Flexible** – expandable for up to 256 axes
- **Fast** – fast and easy commissioning (ready-to-use example programs)

### Function block from the MC\_CPU\_Library Motion library used for an application



## Modbus RTU protocol



Field Bus

### Advantages

#### Improved performance

- › No position deviation caused by lost pulse signals (considerably improved reliability)

#### Improved functions

- › Editing parameters (moment of inertia, damping frequency)
- › Servo data logging (collection of data related to the utilization factor and torque for remote monitoring of machines)

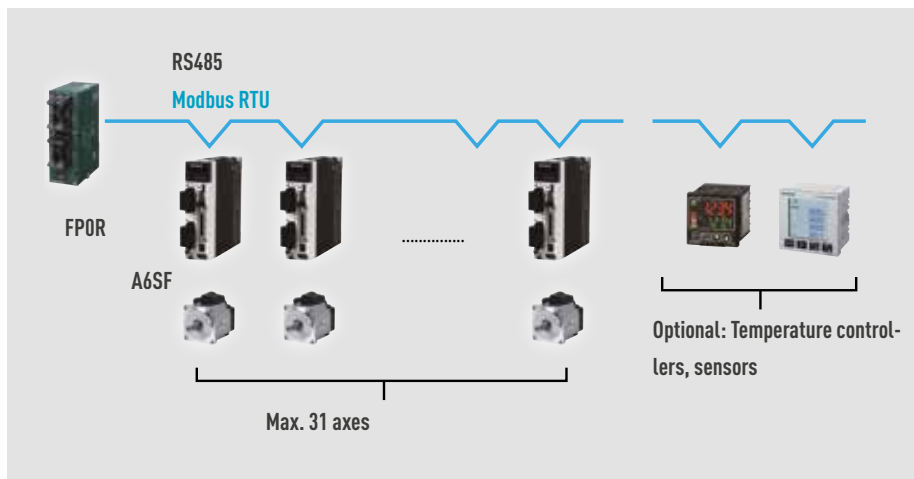
#### Reduced cost

- › Easy adding and removing of axes (simplified wiring thanks to bus system)
- › Less time needed for commissioning, e.g. thanks to instantaneous registration of the axis position

### Features

- › MINAS A6 series field bus
- › Modbus RTU is an open, serial (RS232 or RS485) protocol based on a master/slave or client/server architecture.
- › Widely used protocol due to its ease of operation and reliability
- › Cost-effective solution for programmable controllers based on RS485
- › Controlling a servo drive system based on the CANopen motion control profile CiA is possible

### Simple complete motion control solution with one Panasonic compact PLC



### Modbus RTU library for Motion Control





## Direct access to servo drive parameters from the PLC

### Libraries



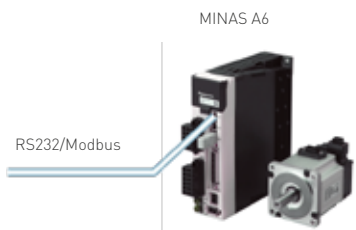
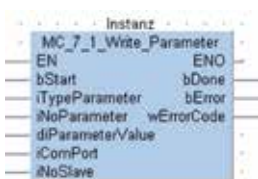
The libraries enable serial communication (RS232, RS485) between the FP series PLCs and servo drivers of the MINAS A6 series.

- › 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.
  - › The RS232 interface (optional RS485) is already included with the FP series.
- › With RS232 connections, the first driver can be used as a gateway to downstream drivers so that all drivers can communicate with the PLC.

### Communication via RS232

#### Communication software

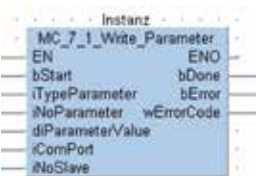
#### FP series PLCs



### Communication via RS485

#### Communication software

#### FP series PLCs



Download the software free of charge from Panasonic's website: <https://industry.panasonic.eu/downloads>  
Home-> Programmable controllers -> PLC software -> Software -> Library



## Software Configurator PM for RTEX

User-friendly, user-friendly commissioning

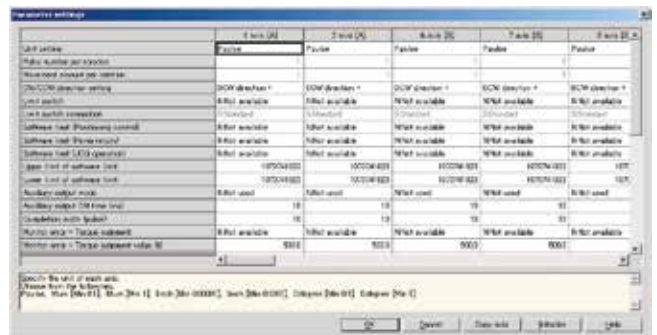
The Configurator PM offers numerous configuration options

- Axis and parameter settings
- Data table creation
- JOG operations
- Home return
- Data monitor settings
- and other settings for easy test operation

### 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.

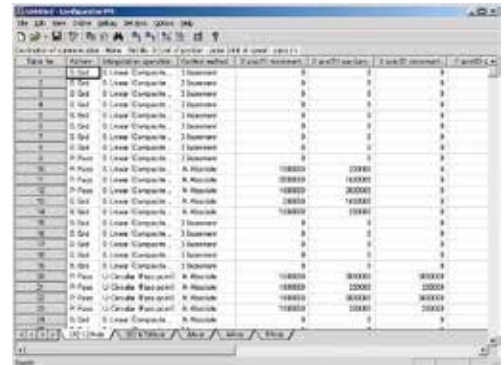
**Advantage:** In instances where many settings are shared among the axes, this can reduce the number of repeat inputs.



### Data table creation

- User-friendly data entry similar to an Excel sheet
- Data tables are displayed in an easy-to-understand manner
- Export of data tables to CSV format for document management systems, etc.
- Data ranges of a CSV file can be added to a table quickly with cut and paste
- A separate table for each axis (or each set of interpolation axes)

**Advantage:** Data is clearly arranged for fast easy handling

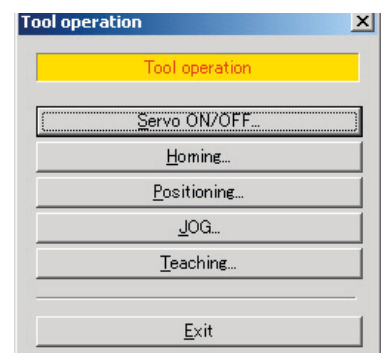


### Tool operations

Each axis can be operated by test sequences independently of the operation modes (PROG and RUN) of the RTEX unit (or the programmable controllers).

JOG operation and teaching can be carried out easily to index positioning points. Test operation is possible without having to create a rudder program.

**Advantage:** Trial operation in advance saves time



## Configuring servo drivers

### PANATERM configuration software

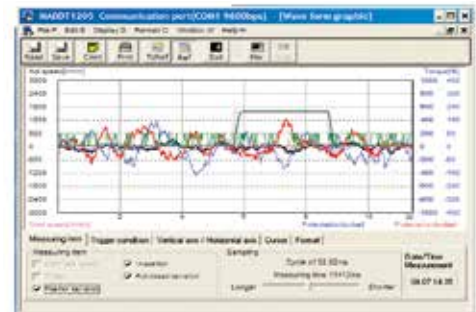
#### For MINAS AC servo motors & drive amplifiers

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.



#### Setup and basic functions

- › 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.
- › Display of the absolute encoder settings
- › Parameter setting  
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.



Line graph display

#### Monitoring function

Parameters and status can be monitored, e.g. operation mode, speed, torque, error and warning. overview of command/feedback pulses, load ratio, regenerative resistive load ratio and many more.



Monitor

#### Analysis of mechanical operation data (frequency analysis)

Frequency characteristics of a machine can be measured for display in a Bode diagram.



Simply download the software from Panasonic's website: <https://industry.panasonic.eu/downloads>  
Home -> Downloads -> Servo drives -> Software



## Software for designing drives

### M-SELECT software

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



### Selecting the motor capacity in just 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)

Display and determine speed, position and ramps, etc.

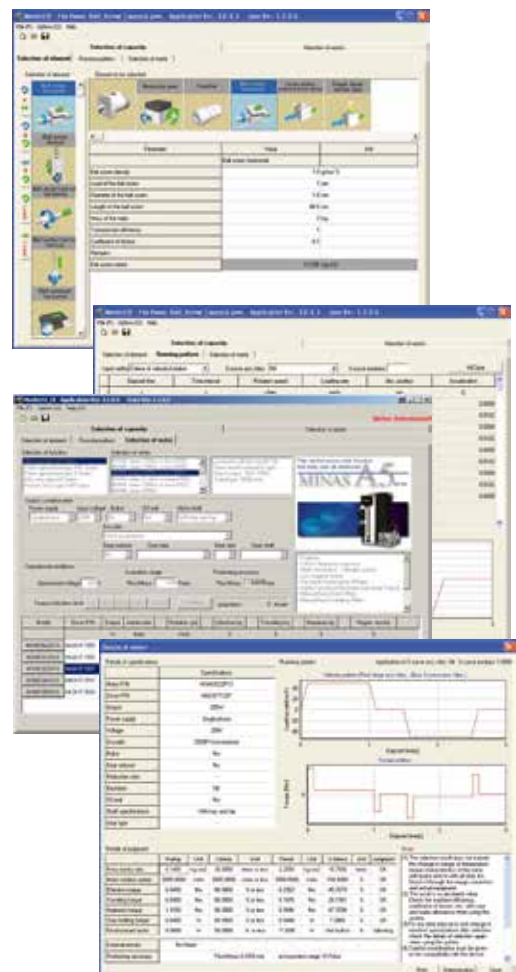
#### 3. Select the correct motor series (figure 3)

- 1- or 3-phase
- Input voltage
- Specify torque, etc.

The software calculates the parameters for the selected series. The various criteria are evaluated with OK or NG (not good).

#### 4. Result (figure 4)

Check and print result



Simply download the software from Panasonic's website:  
<https://industry.panasonic.eu/downloads>  
 Home -> Downloads -> Servo drives -> Software





## Quick start guides

The Quick start guides are intended to help you set up a MINAS servo drive system.

They are based on information from the MINAS series manuals and the practical experience of our engineers.

Step-by-step instructions will guide you through connecting a PLC to a MINAS servo driver and setting the most important parameters in the PC configuration software PANATERM.

### Quick start guides (English version) in our download center\*:



Easy download from the Panasonic website: <https://industry.panasonic.eu/downloads>  
Home -> Downloads -> Servo drives -> Manual



**QS2000, Position control by pulse and direction signals (MINAS A5/A5E/A6SG/A6SF)**

**QS2001, Position control by block operation using input signals (MINAS A6SG/A6SF)**

**QS2002, Position control by block operation using Modbus commands (MINAS A6)**

**QS2003, Position control in EtherCAT networks MINAS A5B/A6B**

**QS2004, Position control using RTEX (MINAS A5N/A6N)**

**QS3000, Velocity control (MINAS A5/A6F)**

**QS4000, Torque control (MINAS A5/A6)**

**QS5000, PANATERM – Trial run**

**QS5001, PANATERM – Auto-tuning**

**QS5002, PANATERM – Fit gain tuning**

\* Also available in other languages

More Quick start guides for the MINAS series are being prepared.

### A MINAS A6 series servo drives

Highly dynamic servo drives with state-of-the-art technology. Large power range (50W to 5kW) combined with a light-weight and compact design. Innovative functions for damping resonance frequencies and to eliminate vibration tendencies. Multiple control features such as pulse, analog, and network technology in real-time communication (100Mbit/s). [See page 10]



### B Motion control libraries, configuration and programming software

The PLC programming software Control FPCWIN Pro (compliant with IEC 61131-3) and the free configuration software PANATERM and M-SELECT shorten the time required for commissioning. In addition, you can download motion control libraries for free. By using the function blocks integrated in the freely available motion control libraries, complex positioning tasks can be solved quickly and efficiently. [See Page 35]



### C HM and GT 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 operators. Panasonic's innovative 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 terminal to a color 21" display for sophisticated applications.



### D FP series PLCs

The PLC comes already equipped with the functionality required for position control tasks. FP0R and FP-X are capable of controlling up to 4 axes independently. The FP-XH has an integrated Ethernet-based communication bus (RTEX), and the CPU of the FP0H can be expanded with modular positioning units to control up to 20 axes. The modular FP7 series can control 64 axes independently or synchronously in the network.



# MINAS A6 SERIES: COMPACT, LIGHT AND POWERFUL

As fast as our large motors!

Motors  
smaller than a  
business card



Illustration true to scale







North America

Europe

Asia Pacific

China

Japan

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	<b>Panasonic Fire &amp; Security Europe AB</b>	Jungmansgatan 12, 21119 Malmö, Tel. +46 40 697 7000, Fax +46 40 697 7099, <a href="http://www.panasonic-fire-security.com">www.panasonic-fire-security.com</a>
▶ <b>Poland</b>	<b>Panasonic Industry Poland sp. z o.o.</b>	Ul. Dowborczyków 25, 90-019 Łódź, Polska, Tel. +48 42 2309633, <a href="http://www.panasonic-electric-works.pl">www.panasonic-electric-works.pl</a>
▶ <b>Spain</b>	<b>Panasonic Industry Iberia S.A.</b>	Barajas Park, San Severo 20, 28042 Madrid, Tel. +34 913293875, Fax +34 913292976, <a href="http://www.panasonic-electric-works.es">www.panasonic-electric-works.es</a>
▶ <b>Switzerland</b>	<b>Panasonic Industry Switzerland AG</b>	Grundstrasse 8, 6343 Rotkreuz, Tel. +41 (0) 41 7997050, Fax +41 (0) 41 7997055, <a href="http://www.panasonic-electric-works.ch">www.panasonic-electric-works.ch</a>
▶ <b>United Kingdom</b>	<b>Panasonic Electric Works UK Ltd.</b>	Sunrise Parkway, Linford Wood, Milton Keynes, MK14 6 LF, Tel. +44 (0) 1908 231555, Fax +44 (0) 1908 231599, <a href="http://www.panasonic-electric-works.co.uk">www.panasonic-electric-works.co.uk</a>
North & South America		
▶ <b>USA</b>	<b>Panasonic Industrial Devices Sales Company of America</b>	Two Riverfront Plaza, 7th Floor, Newark, NJ 07102-5490, Tel. 1-8003-442-112, <a href="http://www.pewa.panasonic.com">www.pewa.panasonic.com</a>
Asia Pacific/China/Japan		
▶ <b>China</b>	<b>Panasonic Electric Works Sales (China) Co. Ltd.</b>	Tower C 3rd Floor, Office Park, NO.5 Jinghua South Street, Chaoyang District, Beijing 100020, Tel. +86-10-5925-5988, Fax +86-10-5925-5980
▶ <b>Hong Kong</b>	<b>Panasonic Industrial Devices Sales (HK) Co., Ltd.</b>	Suite 301, 3/F, Chinachem Golden Plaza, 77 Mody Road, TST East, Kowloon, Hong Kong, Tel. +852-2529-3956, Fax +852-2528-6991
▶ <b>Japan</b>	<b>Panasonic Corporation</b>	1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8501, Japan, Tel. +81-6-6908-1121, <a href="http://www.panasonic.net">www.panasonic.net</a>
▶ <b>Singapore</b>	<b>Panasonic Industrial Devices Automation Controls Sales Asia Pacific</b>	No.3 Bedok South Road, Singapore 469269, Tel. +65-6299-9181, Fax +65-6390-3953