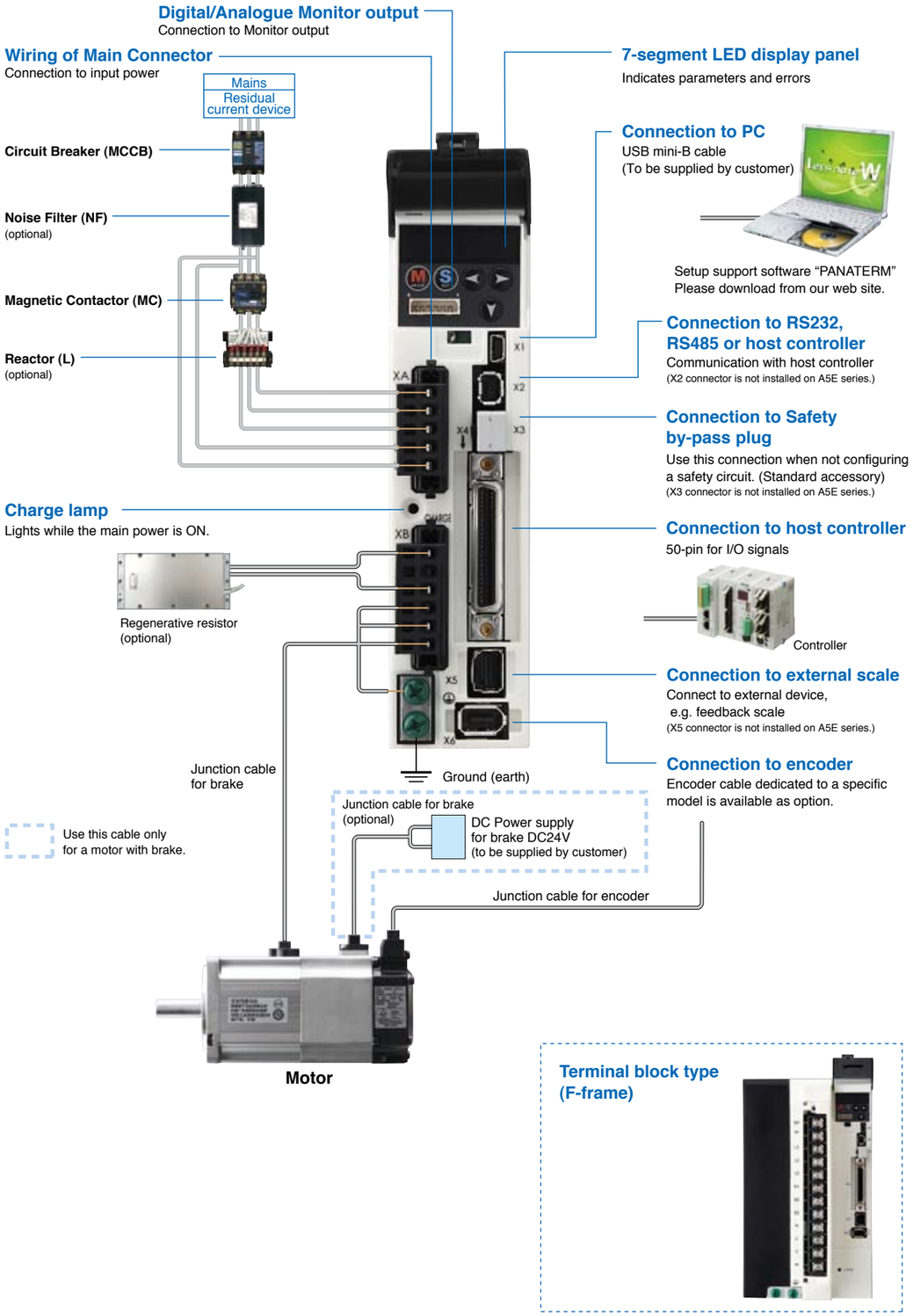
Basic Specifications

Input power	100V	Main circuit		Single phase, 100 to 120V +10% –15% 50/60Hz
		Control circuit		Single phase, 100 to 120V +10% –15% 50/60Hz
	200V	Main circuit	A to D-frame	Single/3-phase, 200 to 240V +10% –15% 50/60Hz
			E to F-frame	3-phase, 200 to 230V +10% –15% 50/60Hz
		Control circuit	A to D-frame	Single phase, 200 to 240V +10% –15% 50/60Hz
			E to F-frame	Single phase, 200 to 230V +10% –15% 50/60Hz
	400V	Main circuit	D to F-frame	Single phase, 380 to 480V +10% –15% 50/60Hz
		Control circuit	D to F-frame	DC 24V ± 15%
Withstand voltage				Primary to earth: withstand 1500 VAC, 1 min,(sensed current: 20 mA)
Environment		temperature		Ambient temperature: 0˚C to 55˚C (free from freezing) Storage temperature: –20˚C to 65˚C (Max.temperature guarantee: 80˚C for 72 hours)
		humidity		Both operating and storage : 20 to 85%RH or less (free from condensation)
		Altitude		Lower than 1000m
		Vibration		5.88m/s^2 or less, 10 to 60Hz (No continuous use at resonance frequency)
Control method				IGBT PWM Sinusoidal wave drive
Encoder feedback				17-bit (131072 resolution) absolute encoder, 7-wire serial 20-bit (1048576 resolution) incremental encoder, 5-wire serial
Feedback scale feedback				A/B phase, initialization signal differential input. Manufacturers that support serial communication scale: Mitsutoyo Corp. Sony Manufacturing Systems Corp.
Control signal		Input		General purpose 10 inputs The function of general-purpose input is selected by parameters.
		Output		General purpose 6 outputs The function of general-purpose input is selected by parameters.
Analog /Digital signal		Input		3 inputs (16Bit A/D : 1 input, 12Bit A/D : 2 inputs)
		Output		3 outputs (Analog monitor: 2 output, Digital monitor: 1 output)
Pulse signal		Input		2 inputs (Photo-coupler input, Line receiver input) Photocoupler input is compatible with both line driver I/F and open collector I/F. Line receiver input is compatible with line driver I/F.
		Output		4 outputs (Line driver: 3 output, open collector: 1 output) Feed out the encoder pulse (A, B and Z-phase) or feedback scale pulse (EXA, EXB and EXZ-phase) in line driver. Z-phase and EXZ-phase pulse is also fed out in open collector.
Communication function		USB		Connection with PC etc.
		RS232		1 : 1 communication to a host with RS23 interface is enabled.
		RS485		1 : n communication up to 15 axes to a host with RS485 interface is enabled.
Safety function				Used for IEC61800-5-2: STO.
Front panel				(1) 5 keys (MODE, SET, UP, DOWN, SHIFT) (2) LED (6-digit) (3) Analog monitor output (2ch) (4) Digital monitor output (1ch)
Regeneration				A, B-frame: no built-in regenerative resistor (external resistor only) C to F-frame: Built-in regenerative resistor (external resistor is also enabled.)
Dynamic brake				Built-in
Control mode				Switching among the following 7 mode is enabled, (1) Position control (2) Velocity control (3) Toque control (4) Position/Velocity control (5) Position/Torque control (6) Velocity/Torque control (7) Full-closed control

Function

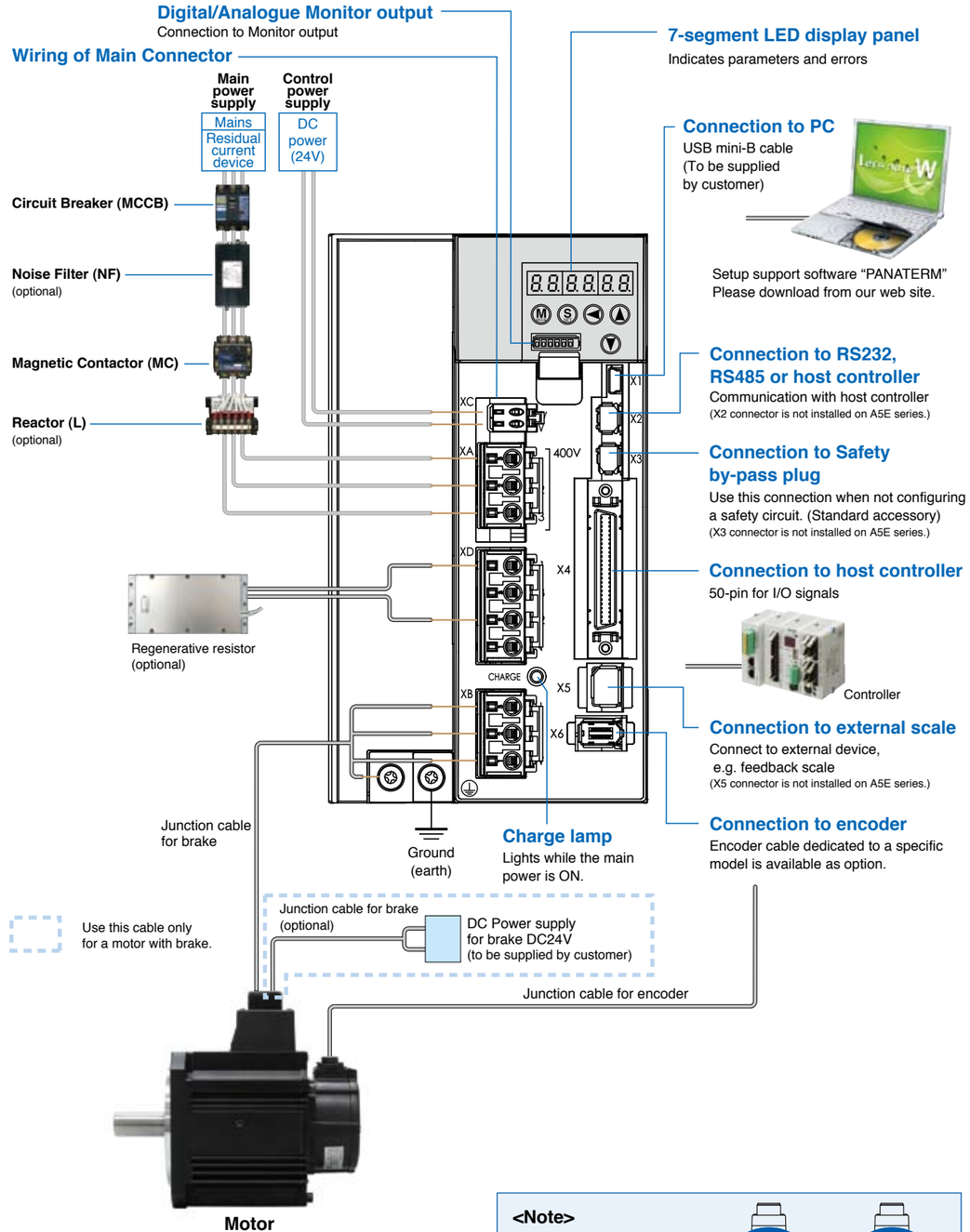
Position control	Control input		(1) Deviation counter clear (2) Command pulse inhibition (3) Command dividing gradual increase switching (4) Damping control switching etc.
	Control output		Positioning complete (In-position) etc.
	Pulse input	Max. command pulse frequency	Exclusive interface for Photo-coupler: 500kpps Exclusive interface for line driver : 4Mpps
		Input pulse signal format	Differential input. Selectable with parameter. ((1) Positive and Negative direction, (2) A and B-phase, (3) Command and direction)
		Electronic gear (Division/ Multiplication of command pulse)	Process command pulse frequency × electronic gear ratio $\left(\frac{1 \text{ to } 2^{30}}{1 \text{ to } 2^{30}}\right)$ as positional command input. Use electronic gear ratio in the range 1/1000 to 1000 times.
		Smoothing filter	Primary delay filter or FIR type filter is adaptable to the command input
	Analog input	Torque limit command input	Individual torque limit for both positive and negative direction is enabled. (3V/rated torque)
	Instantaneous Speed Observer		Available
	Damping Control		Available
Velocity control	Control input		(1) Selection of internal velocity setup 1 (2) Selection of internal velocity setup 2 (3) Selection of internal velocity setup 3 (4) Speed zero clamp etc.
	Control output		Speed arrival etc.
	Analog input	Velocity command input	Speed command input can be provided by means of analog voltage. Parameters are used for scale setting and command polarity.
		Torque limit command input	Individual torque limit for both positive and negative direction is enabled. (3V/rated torque)
	Internal velocity command		Switching the internal 8speed is enabled by command input.
	Soft-start/down function		Individual setup of acceleration and deceleration is enabled, with 0 to 10s/1000r/min. Sigmoid acceleration/deceleration is also enabled.
	Zero-speed clamp		0-clamp of internal velocity command with speed zero clamp input is enabled.
	Instantaneous Speed Observer		Available
	Velocity Control filter		Available
Torque control	Control input		Speed zero clamp, Torque command sign input etc.
	Control output		Speed arrival etc.
	Analog input	Torque command input	Speed command input can be provided by means of analog voltage. Parameters are used for scale setting and command polarity.
	Speed limit function		Speed limit value with parameter t is enabled.
Full-closed control	Control input		(1) Deviation counter clear (2) Command pulse inhibition (3) Command dividing gradual increase switching (4) Damping control switching etc.
	Control output		Full-closed positioning complete etc.
	Pulse input	Max. command pulse frequency	Exclusive interface for Photo-coupler: 500kpps Exclusive interface for line driver : 4Mpps
		Input pulse signal format	Differential input. Selectable with parameter. ((1) Positive and Negative direction, (2) A and B-phase, (3) Command and direction)
		Electronic gear (Division/ Multiplication of command pulse)	Process command pulse frequency × electronic gear ratio $\left(\frac{1 \text{ to } 2^{30}}{1 \text{ to } 2^{30}}\right)$ as positional command input. Use electronic gear ratio in the range 1/1000 to 1000 times.
		Smoothing filter	Primary delay filter or FIR type filter is adaptable to the command input
	Analog input	Torque limit command input	Individual torque limit for both positive and negative direction is enabled. (3V/rated torque)
	Setup range of division/ multiplication of feedback scale		1/40 to 160 times The ratio of encoder pulse (numerator) to external scale pulse (denominator) can be set to 1 to 2^{20} (numerator) to 1 to 2^{20} (denominator), but should be set to a ratio within the range shown above.
Common	Auto tuning		The load inertia is identified in real time by the driving state of the motor operating according to the command given by the controlling device and set up support software “PANATERM”. The gain is set automatically in accordance with the rigidity setting.
	Division of encoder feedback pulse		Set up of any value is enabled (encoder pulses count is the max.).
	Protective function	Hard error	Over-voltage, under-voltage, over-speed, over-load, over-heat, over-current and encoder error etc.
		Soft error	Excess position deviation, command pulse division error, EEPROM error etc.
	Traceability of alarm data		The alarm data history can be referred to.

[Connector type (A to E-frame)]



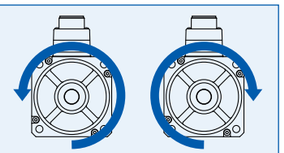
Terminal block type (F-frame)

[Connector type (D, E-frame 400V)]



<Caution>
Apply adequate tightening torque to the product mounting screw by taking into consideration strength of the screw and the characteristics of material to which the product is installed. Overtightening can damage the screw and/or material; undertightening can result in loosening.
Example) Steel screw (M5) into steel section: 2.7 to 3.3 N·m.

<Note>
Initial setup of rotational direction: positive = CCW and negative = CW.
Pay an extra attention.



Driver and List of Applicable Peripheral Equipments

Driver	Applicable motor	Voltage	Rated output	Required Power (at the rated load)	Circuit breaker (rated current)	Surge absorber	Noise filter for signal	Magnetic contactor	Cable diameter (main circuit)	Cable diameter (control circuit)	Connection
MADH	MSMD MSME MHMD	Single phase, 100V	50W to 100W	approx. 0.4kVA	10A	DV0P4190		20A	0.75mm²/ AWG18 to 2.0mm²/ AWG14	0.75mm²/ AWG18	Connection to exclusive connector
		Single/3-phase, 200V	50W to 200W	approx. 0.5kVA		DV0P4190 DV0P1450					
MBDH	MSMD MSME MHMD	Single phase, 100V	200W	approx. 0.5kVA		DV0P4190					
		Single/3-phase, 200V	400W	approx. 0.9kVA		DV0P4190 DV0P1450					
MCDH	MSMD MSME MHMD	Single phase, 100V	400W	approx. 0.9kVA		DV0P4190					
		Single/3-phase, 200V	750W	approx. 1.3kVA	15A	DV0P4190 DV0P1450					
MDDH	MDME	Single/3-phase, 200V	1.0kW	approx. 1.8kVA				30A	2.0mm²/ AWG14		
	MHME										
	MGME		900W	approx. 1.8kVA	20A						
	MSME		1.0kW	approx. 1.8kVA							
	MHME		1.5kW	approx. 2.3kVA							
	MDME										
	MSME										
	MSME	3-phase, 400V	1.0kW	approx. 1.8kVA	10A	DV0PM20050		20A		0.5mm²/ AWG 20～24	
	MDME										
	MHME										
	MGME		0.9kW								
	MSME		1.5kW	approx. 2.3kVA							
	MDME										
	MHME										
MEDH	MDME MSME MHME	3-phase, 200V	2.0kW	approx. 3.3kVA	30A	DV0P1450	DV0P1460	60A		0.75mm²/ AWG18	
	MSME MDME MHME	3-phase, 400V	2.0kW	approx. 3.3kVA	15A	DV0PM20050		30A		0.5mm²/ AWG 20～24	
MFDH	MGME	3-phase, 200V	2.0kW	approx. 3.8kVA	50A	DV0P1450		60A	3.5mm²/ AWG12	0.75mm²/ AWG18	 Terminal block M5
	MDME		3.0kW	approx. 4.5kVA							
	MHME										
	MSME										
	MGME										
	MDME		4.0kW	approx. 6kVA				100A			
	MHME										
	MSME										
	MDME		5.0kW	approx. 7.5kVA					5.3mm²/ AWG10		
	MHME										
	MSME										
	MGME	3-phase, 400V	2.0kW	approx. 3.8kVA	30A	DV0PM20050		60A	3.5mm²/ AWG12		
	MSME		3.0kW	approx. 4.5kVA							
	MDME										
	MGME										
	MHME										
	MSME		4.0kW	approx. 6.8kVA							
	MDME										
	MHME										
	MSME		5.0kW	approx. 7.5kVA							
	MDME										
	MHME										

- Select peripheral equipments for single/3phase common specification according to the power source.
- About circuit breaker and magnetic contactor

To comply to EC Directives, install a circuit breaker between the power and the noise filter without fail, and the circuit breaker should conform to IEC Standards and UL recognized (Listed and Ⓤ marked).

Suitable for use on a circuit capable of delivering not more than 5,000 rms symmetrical amperes, below the maximum input voltage of the product.

If the short-circuit current of the power supply exceeds this value, install a current limit device (current limiting fuse, current limiting circuit breaker, transformer, etc.) to limit the short-circuit current.

<Remarks>

- Select a circuit breaker and noise filter which match to the capacity of power supply (including a load condition).
- Terminal block and protective earth terminals

  Use a copper conductor cables with temperature rating of 75˚C or higher.

  The screws of protective earth terminals for Frame A to D are M4 (Fastening torque: 0.7 to 0.8N·m) and M5 (Fastening torque: 1.4 to 1.6N·m) for Frame E, F.

  Fastening torque of earth screws.

  Tighten the terminal block screw on frame F with a torque between 1.0 and 2.0 N·m. Application of overtorque (more than 2.0 N·m) will cause damage to terminal block. Maximum allowable torque to the screw securing terminal block cover is 0.19 to 0.21 N·m.
- The cable diameter of an earth cable.

  Use an earth cable with the same diameter or larger as that of the main circuit cable.

  If the diameter of the main circuit cable is 1.6mm² or less, use an earth cable with a diameter of 2.0mm² (AWG14).
- Use the attached exclusive connector for A to E-frame, and maintain the peeled off length of 8 to 9mm.
- Tighten the screws of the connector, Connector X4 for the host controller with the torque of 0.3 to 0.35 N·m.

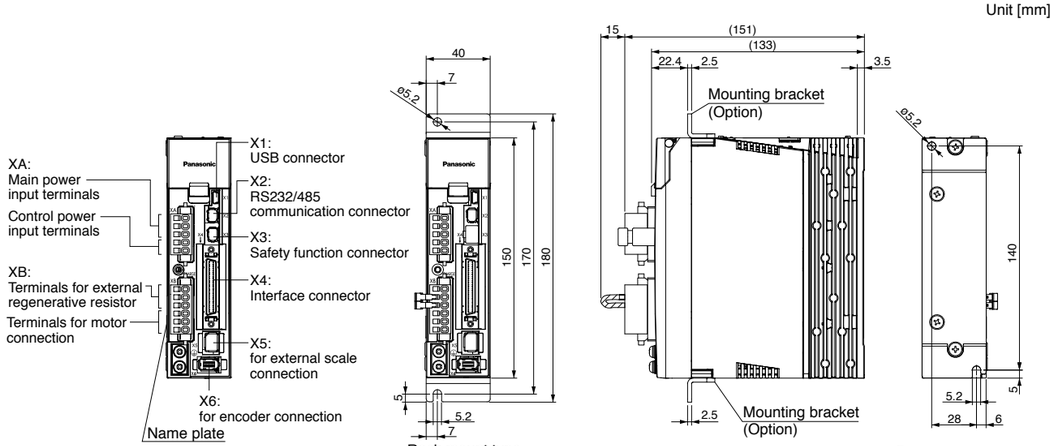
  Larger torque than 0.35N·m may damage the connector at the driver side.

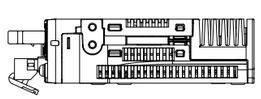
<Caution>

Do not turn on power without tightening all terminal block screws properly, otherwise, loose contacts may generate heat (smoking, firing).

A-frame

Unit [mm]



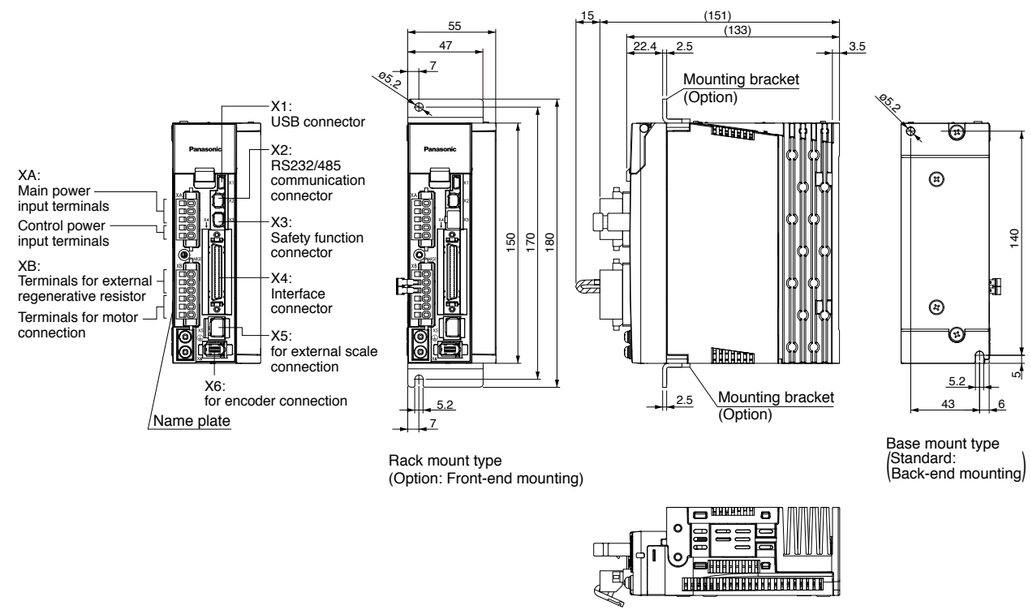


Connector of driver side		
Connector XA	S05B-F32SK-GGXR	J.S.T. Mfg. Co., Ltd.
Connector XB	S06B-F32SK-GGXR	J.S.T. Mfg. Co., Ltd.
Connector X1	UB-M5BR-DMP14-4S (or equivalent)	J.S.T. Mfg. Co., Ltd.
Connector X2	1-2040537-1 (or equivalent)	Tyco Electronics AMP k.k,
Connector X3	2040537-1 (or equivalent)	Tyco Electronics AMP k.k,
Connector X4	529865079 (or equivalent)	Japan Molex Inc.
Connector X5	MUF-RS10DK-GKXR (or equivalent)	J.S.T. Mfg. Co., Ltd.
Connector X6	53460-0629 (or equivalent)	Japan Molex Inc.
Connector X7	530140610 (or equivalent)	Japan Molex Inc.
Connector of power and motor side (Attached to the driver)		
Connector XA	05JFAT-SAXGF	J.S.T. Mfg. Co., Ltd.
Connector XB	06JFAT-SAXGF	J.S.T. Mfg. Co., Ltd.

Mass: 0.8kg

B-frame

Unit [mm]

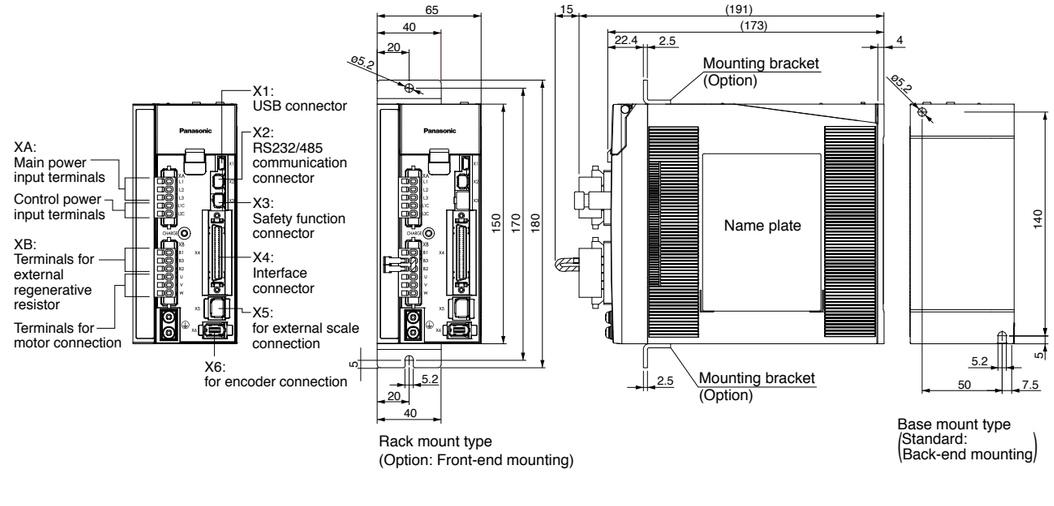


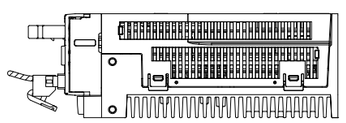
* For connectors used to connect to the driver, power supply and motor, refer to the A-frame table because both frames use the same connectors.

Mass: 1.0kg

C-frame

Unit [mm]



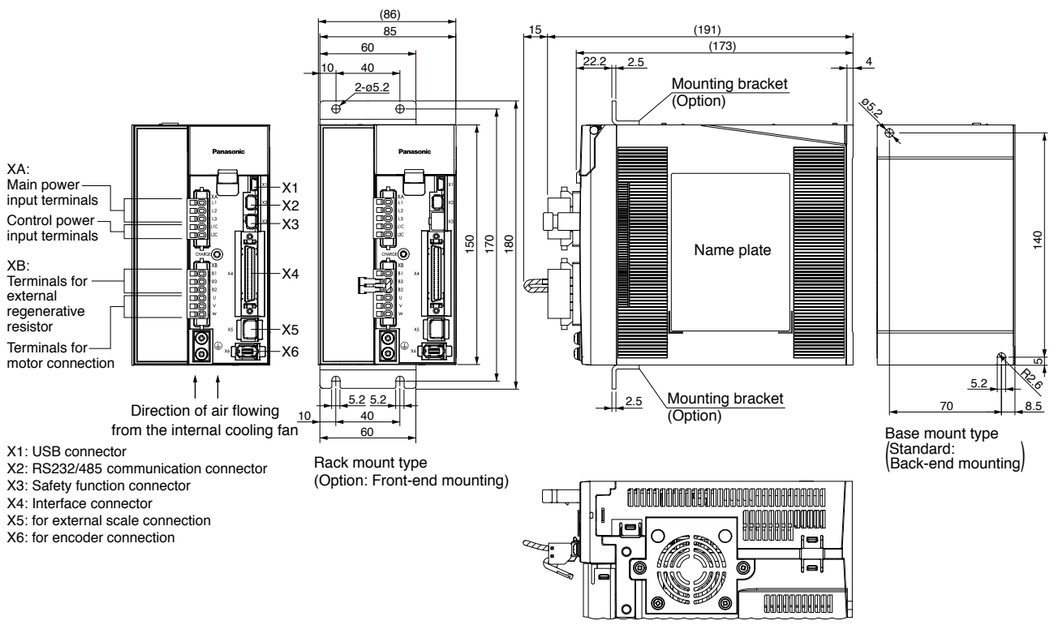


* For connectors used to connect to the driver, power supply and motor, refer to the A-frame table because both frames use the same connectors.

Mass: 1.6kg

D-frame (200V)

Unit [mm]



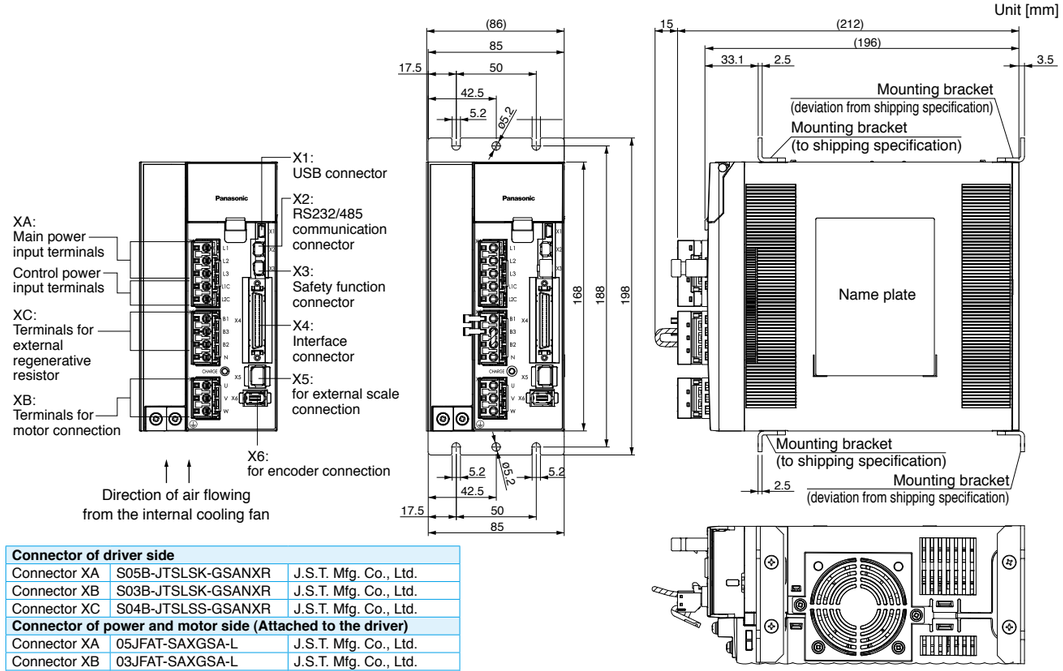
X1: USB connector
X2: RS232/485 communication connector
X3: Safety function connector
X4: Interface connector
X5: for external scale connection
X6: for encoder connection

* For connectors used to connect to the driver, power supply and motor, refer to the A-frame table because both frames use the same connectors.

Mass: 1.8kg

E-frame (200V)

Unit [mm]



Connector of driver side		
Connector XA	S05B-JTSLSK-GSANXR	J.S.T. Mfg. Co., Ltd.
Connector XB	S03B-JTSLSK-GSANXR	J.S.T. Mfg. Co., Ltd.
Connector XC	S04B-JTSLSS-GSANXR	J.S.T. Mfg. Co., Ltd.
Connector of power and motor side (Attached to the driver)		
Connector XA	05JFAT-SAXGSA-L	J.S.T. Mfg. Co., Ltd.
Connector XB	03JFAT-SAXGSA-L	J.S.T. Mfg. Co., Ltd.
Connector XC	04JFAT-SAXGSA-L	J.S.T. Mfg. Co., Ltd.

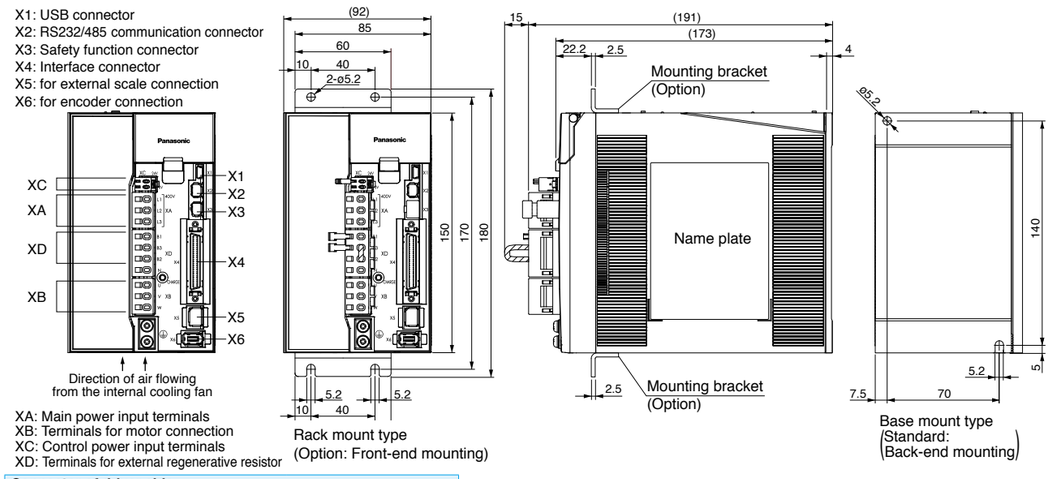
* For connectors X1 to X7 for connection to the driver, refer to those listed in the A-frame table because both frames use the same connectors.

Mass: 2.7kg

D-frame (400V)

Unit [mm]

X1: USB connector
X2: RS232/485 communication connector
X3: Safety function connector
X4: Interface connector
X5: for external scale connection
X6: for encoder connection



XA: Main power input terminals
XB: Terminals for motor connection
XC: Control power input terminals
XD: Terminals for external regenerative resistor

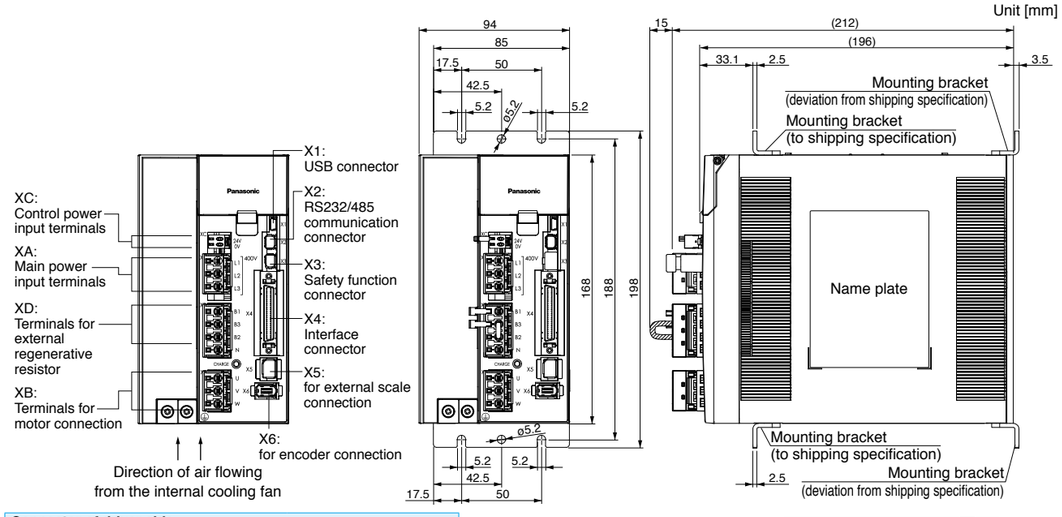
Connector of driver side		
Connector XA	S03B-JTSMSS-GSANYR	J.S.T. Mfg. Co., Ltd.
Connector XB	S03B-JTSMSK-GSANXR	J.S.T. Mfg. Co., Ltd.
Connector XC	S02B-J25SK-GGR	J.S.T. Mfg. Co., Ltd.
Connector XD	S04B-JTSMSK-GSANXR	J.S.T. Mfg. Co., Ltd.
Connector of power and motor side (Attached to the driver)		
Connector XA	03JFAT-SAYGSA-M	J.S.T. Mfg. Co., Ltd.
Connector XB	03JFAT-SAXGSA-M	J.S.T. Mfg. Co., Ltd.
Connector XC	02MJFAT-SAGF	J.S.T. Mfg. Co., Ltd.
Connector XD	04JFAT-SAXGSA-M	J.S.T. Mfg. Co., Ltd.

* For connectors X1 to X7 for connection to the driver, refer to those listed in the A-frame table because both frames use the same connectors.

Mass: 1.9kg

E-frame (400V)

Unit [mm]



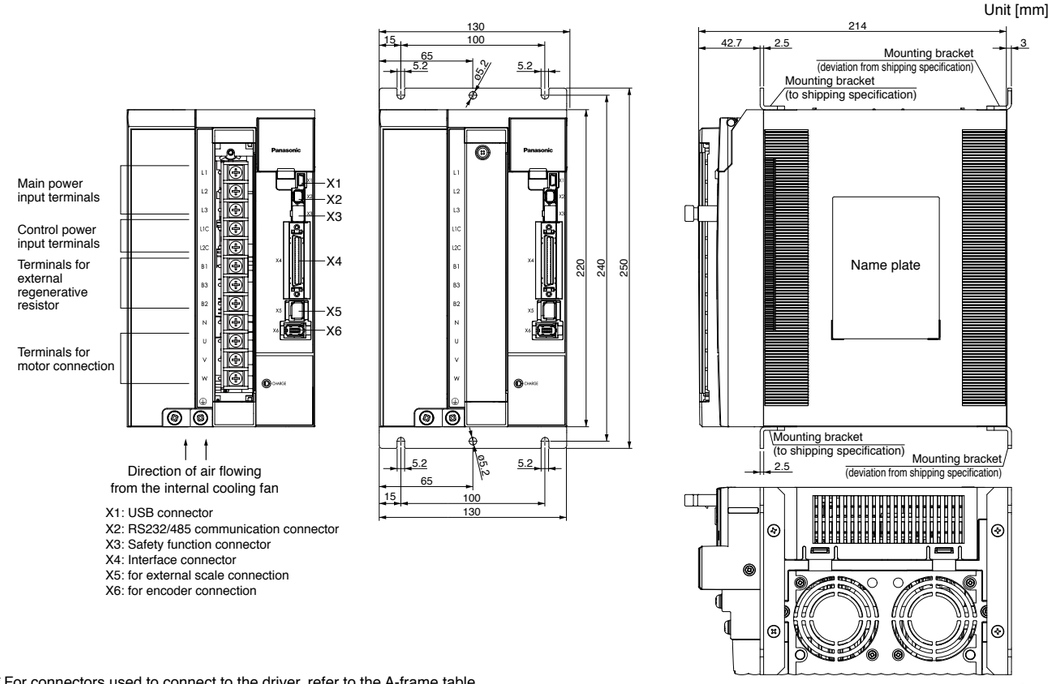
Connector of driver side		
Connector XA	S03B-JTSLSS-GSANYR	J.S.T. Mfg. Co., Ltd.
Connector XB	S03B-JTSLSK-GSANXR	J.S.T. Mfg. Co., Ltd.
Connector XC	S02B-J25SK-GGR	J.S.T. Mfg. Co., Ltd.
Connector XD	S04B-JTSLSK-GSANXR	J.S.T. Mfg. Co., Ltd.
Connector of power and motor side (Attached to the driver)		
Connector XA	03JFAT-SAYGSA-L	J.S.T. Mfg. Co., Ltd.
Connector XB	03JFAT-SAXGSA-L	J.S.T. Mfg. Co., Ltd.
Connector XC	02MJFAT-SAGF	J.S.T. Mfg. Co., Ltd.
Connector XD	04JFAT-SAXGSA-L	J.S.T. Mfg. Co., Ltd.

* For connectors X1 to X7 for connection to the driver, refer to those listed in the A-frame table because both frames use the same connectors.

Mass: 2.7kg

F-frame (200V)

Unit [mm]



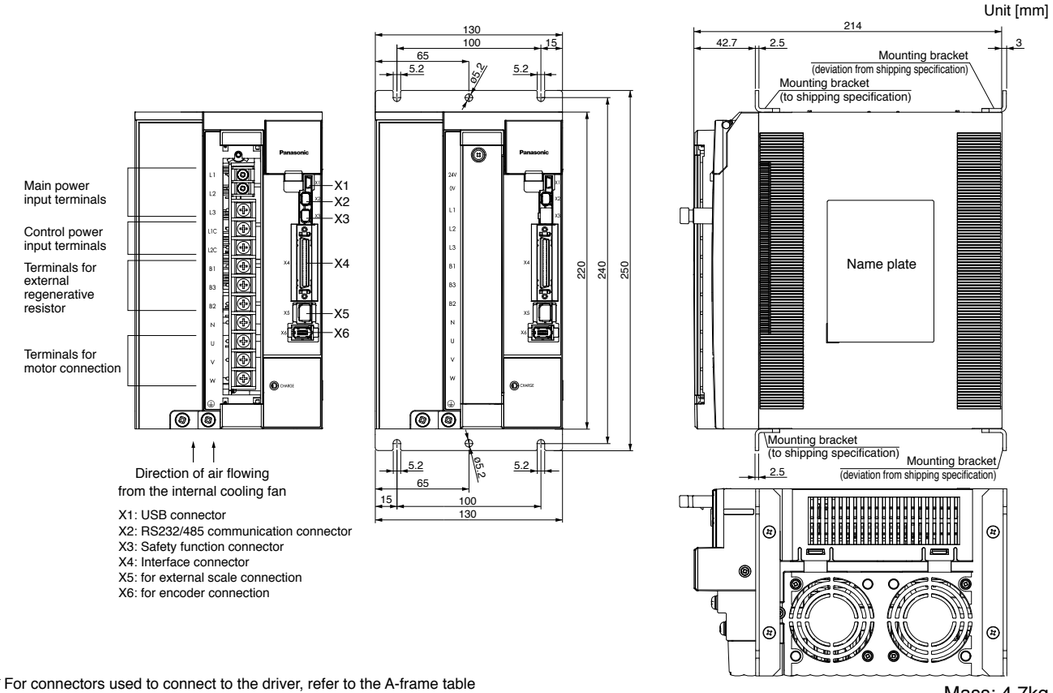
X1: USB connector
X2: RS232/485 communication connector
X3: Safety function connector
X4: Interface connector
X5: for external scale connection
X6: for encoder connection

* For connectors used to connect to the driver, refer to the A-frame table because both frames use the same connectors.

Mass: 4.8kg

F-frame (400V)

Unit [mm]



X1: USB connector
X2: RS232/485 communication connector
X3: Safety function connector
X4: Interface connector
X5: for external scale connection
X6: for encoder connection

* For connectors used to connect to the driver, refer to the A-frame table because both frames use the same connectors.

Mass: 4.7kg

Features

- Line-up: 50W to 5.0kW
- Max speed: 6000r/min (MSME 50W to 750W)
- Low inertia (MSME) to High inertia (MHME).
- Low cogging torque: Rated torque ratio 0.5% (typical value).
- 20-bit incremental encoder (1,048,576 pulse)
- 17-bit absolute encoder (131,072 pulse).
- Enclosure rating: IP67 (M*ME), IP65 (M*MD)
- Compact & Light weight

Small capacity type

[MSME (50W to 750W)]

Middle capacity type

[MSME (1.0kW to 5.0kW)]

Motor (Scheduled to be released.)

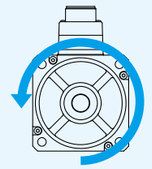
- MDME 7.5kW, 11kW, 15kW
- MHME 7.5kW
- MGME 4.5kW, 6.0kW
- MFME 1.5kW, 2.5kW, 4.5kW
- Motor with Gear Reduce: 100W, 200W, 400W, 750W

Environmental Conditions

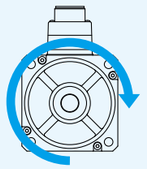
Item		Conditions
Ambient temperature *1		0˚C to 40˚C (free from freezing)
Ambient humidity		20% to 85% RH (free from condensation)
Storage temperature *2		–20˚C to 65˚C (Max.temperature guarantee: 80˚C for 72 hours)
Storage humidity		20% to 85% RH (free from condensation)
Vibration	Motor only	Lower than 49m/s^2 (5G) at running, 24.5m/s^2 (2.5G) at stall
Impact	Motor only	Lower than 98m/s^2 (10G)
Enclosure rating (Motor only)	Leadwire type *3	IP65 (except rotating portion of output shaft and readwire end.)
	Connector type*3*4	IP67 (except rotating portion of output shaft and connecting pin part of the motor connector and the encoder connector)
Altitude		Lower than 1000m

*1 Ambient temperature to be measured at 5cm away from the motor.
*2 Permissible temperature for short duration such as transportation.
*3 These motors conform to the test conditions specified in EN standards (EN60529, EN60034-5). Do not use these motors in application where water proof performance is required such as continuous wash-down operation.
*4 This condition is applied when the connector mounting screw in case of motor 750W or less are tightened to the recommended tightening torque (Refer to 1-16, 2-18, 2-00). Be sure to use mounting screw supplied with the connector.

<Note>
Initial setup of rotational direction: positive = CCW and negative = CW.
Pay an extra attention.



Positive direction (CCW)



Negative direction (CW)