

SPECIFICATIONS

M/S

MODEL AC Servo Motor. MINAS A6V Series
 MSMD (23bit absolute encoder)

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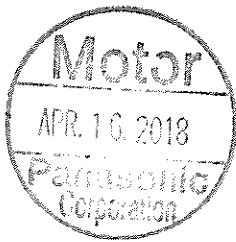
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REVISIONS

No SR-DSV12329

[illegible]

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1. Scope

This specification relates to the servo motor of an AC servo system manufactured and delivered by Motor Business Unit, Electromechanical Control Business Division, Automotive & Industrial Systems Company, Panasonic Corporation.

This product is intended for industrial equipment. It cannot be used for any other purposes (e.g. for household).

2. Applicable models, Specifications, Outline drawings.

Applicable models	Specifications (Oil seal)	Outline drawings
MSMD02CL1□	SR-DSV12329 7-2 (Without oil seal) 7-3 (With oil seal)	SR-DSV1232901 (Without brake) SR-DSV1232902 (With brake)
MSMD02BL1□	↑ 7-4 (Without oil seal) 7-5 (With oil seal)	↑
MSMD04BL1□	↑ 7-6 (Without oil seal) 7-7 (With oil seal)	↑

*□ shows motor structure

Oil Seal	Brake	Shaft		
		Straight	D cut	With key and screw tap
Without	Without	A	N	S
	With	B	P	T
With	Without	C	Q	U
	With	D	R	V

3. Serial numbers (Production numbers)

The serial number of a motor nameplate means as follows:

Ex.: SER. No. 18 04 0001
 Christian year Production month Serial number

4. Performance and Environmental condition

Performance	(1) Insulation resistance	Motor unit : 20 MΩ or more when cool by DC500 V megger. (between motor frame and motor lead wire)
	(2) Dielectric strength	Motor unit : To withstand AC1000 V for 1 minute. (between motor frame and motor lead wire) Brake unit : To withstand AC1000 V for 1 minute. (between motor frame and brake lead wire)
	(3) Allowable maximum rotating speed	120 % instantaneous of maximum speed. (100 % of utility speed)
	(4) Vibration resistance	49 m/s ² or less X,Y,Z directions (at center of frame, 20~3000 Hz, with not more than 1.5 mm amplitude) But when the motor doesn't operate, 24.5 m/s ² or less.
	(5) Impact resistance	98 m/s ² in X,Y,Z directions ; 3 times each (flange mounting position)
	(6) Dust-proof & Drip-proof ※1	Equivalent of IP65 (Except for output shaft through sections and connector sections)
Environmental condition	(7) Heat resistance ※2	Allowable ambient temperature (except for motor temperature rise) Operating 0 °C~+40 °C Storing: -20 °C~+65 °C (The maximum storing temperature:80 °C, accumulation 72 hours, normal humidity)
	(8) Humidity resistance ※2	Allowable ambient humidity 20~85 %RH (not to condensation)
	(9) Altitude	1000 m or less above sea level

※1 IP65 is one of the designations that mean classification of degrees of protection defined IEC60529 standard.

It means that the test has been performed to check and the motor passed the test as a result.

It does not guarantee to maintain the IP grade in the actual use.

※2 Condensation is likely to occur if the temperature decreases.

5. Assembling precision

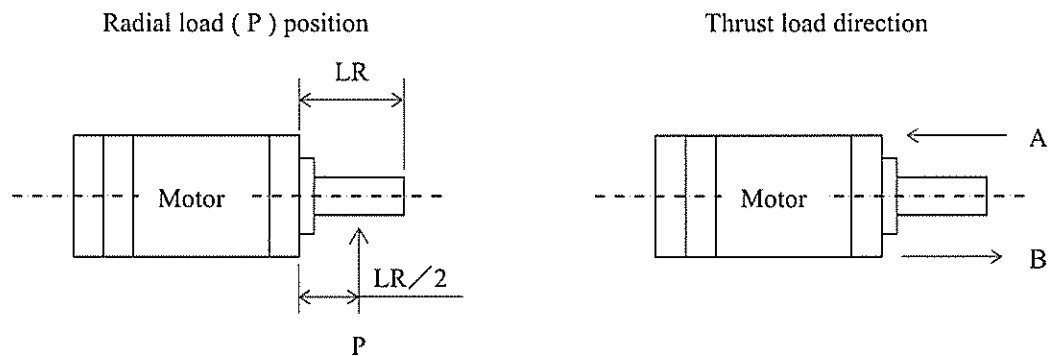
- (1) In accordance with the outline drawings.
 - The axial runout is measured in the lateral direction of the shaft.
 - The flange surface squareness and spigot eccentricity are measured in the vertical direction of the shaft.
- (2) End play (axial play) : 0.3 mm or less. (reference value)

6. Shaft allowable load

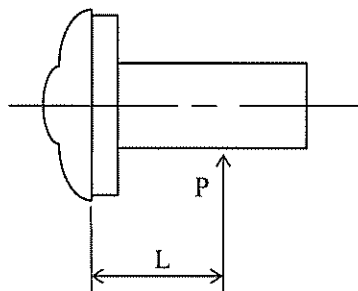
Unit : [N]

Motor	When assembling			When operating	
	Radial load	Thrust load		Radial load	Thrust load
		Direction A	Direction B		
MSMD02, MSMD04	392	147	196	245	98

Please refer to the outline drawings for dimensions LR.



When a load position is changed, calculate allowable radial load P by the following relational expression, using load position's distance L from the mounting flange surface, and set the load below a value resulting from such calculation.



Applicable models	Relational expression of load and load position
MSMD02	$P = \frac{14945}{L+46}$
MSMD04	$P = \frac{19723}{L+66.5}$

Unit : P (N) L (mm)

7. Rotary encoder specification

Absolute encoder 23bit, Two-way communication

In accordance with the specification No. SX-DSV02998

Precautions for battery exchange in the case of absolute encoder

When you exchange the battery, please hold the main power of encoder in the ON position (as supplying the encoder with 5 V) and exchange the battery.

Please notice that all data in the encoder would be disappeared if you exchange the battery with the main power of encoder being OFF.

8. Motor brake specification

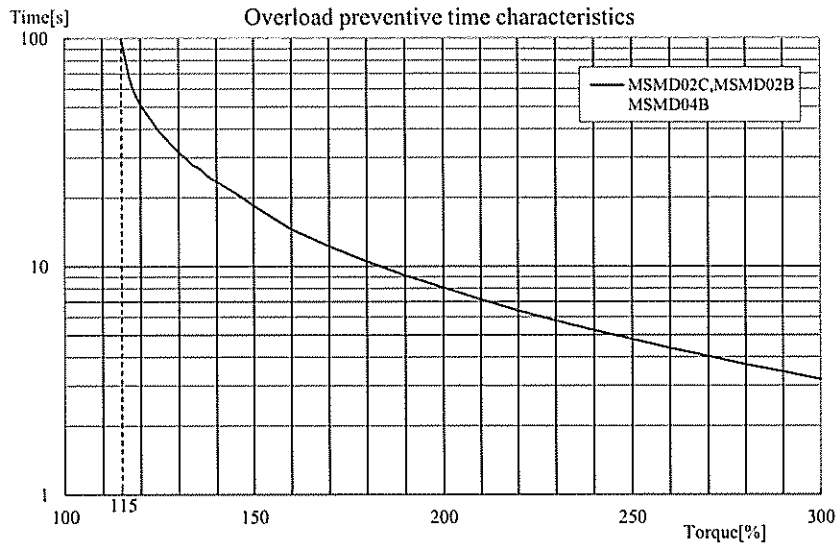
Items	Units	Applicable motor		
		MSMD02 MSMD04		
Static friction torque	N·m	1.27 or more		
Rotary part inertia	10^{-4} kg·m ²	0.018		
Armature pull in time	ms	50 or less		
Armature release time ※1	ms	15 or less		
Release voltage	DC,V	1 or more		
Excitation voltage	DC,V	24±1.2		
Excitation current	DC,A	0.36		
Allowable braking energy ; 1 time each	J	137		
All allowable braking energy	J	44.1×10^3		
Allowable angular acceleration	rad/s ²	30000		

(at 20 °C)

※1 By varistor (TND15G271K made by Nippon Chemi-Con Corporation.)

- (1) This brake is spring-actuated brake.
- (2) Rotary part inertia and Excitation current (at DC24 V) are representative characteristic values.
- (3) When the motor was forwarded, the brake's backlash is 2° or less.
- (4) Power supply for motor brake must be prepared by user side.
(Either way of connection for polarity would be acceptable)
- (5) The above-mentioned all allowable braking energy shall be braking energy complying with the brake specification (braking energy capable of performing a suction motion in consideration of brake temperature increases).
- (6) The motor life with the repetitions of acceleration and deceleration at the above allowable angular acceleration : 10 million times.
(The number of acceleration-deceleration cycles until brake's backlash changes rapidly)
- (7) The series connection of the protection parts such as fuses is recommended in the case of the use with varistor.

9. Time characteristics (our standard servo driver)



Please use the motor under conditions limiting effective torque within continuous duty zone of Speed - Torque characteristic.

About the Speed - Torque characteristic, please confirm each motor specification.

When anything other than our standard servo driver is used, be sure of setting its overload to the below time of the above.

As for the time characteristics of specific models, contact us to make an inquiry.

10. Compliance with the international standards



		Standards numbers
Compliance with CE	Applicable standards EN	EN 60034-1 : 2010 EN 60034-5 : 2001+A1
	Applicable standards UL	UL 1004-1, UL 1004-6 (File No. E327868)
	Applicable standards CSA	CSA 22.2, No. 100-04





Safety precautions

11. Safety Precautions

- The seriousness of injury or damage caused by using the product improperly without observing the indicated description is categorized using the signs below and the meaning is explained.

 Danger	The section with this sign contains items which are “assumed to cause imminently dangerous situation such as death or seriously injury if ignored.”
 Caution	The section with this sign contains items which are “assumed to cause injury or property damage only if ignored.”

- The type of description to be observed is categorized with the signs below and the meaning is explained.

	This sign shows that the item is “prohibited” to perform.
	This sign shows that the item is a “compulsory” to be performed without fail.

Danger



- (1) Be sure not to use the product in a place where the product may come in contact with foreign matters such as dust, metal particles, oil mist, liquids such as water, oil and polishing liquid, near flammable objects, in an atmosphere of corrosive gas (such as H_2S , SO_2 , NO_2 , Cl_2) or in an atmosphere of flammable gas.
- (2) Do not place inflammable material near a motor, a servo driver, or a regenerative resistance.
- (3) Do not drive the motor with external torque. Motor generates electricity by external torque. Dynamic brake circuit built in the servo driver will be damaged and it is possible that short-circuit current cause smoke or combustion. Also, the dynamic brake may break and the brake may not operate.
- (4) Do not damage the cable nor place too much stress or heavy object on the cable. Do not pinch the cable.
- (5) Do not operate the product while the cable is dipped in oil or water.
- (6) Do not install the equipment near a heating object such as a heater or a large wire-wound resistor. (Install a thermal shield, etc. to avoid the influences of heating object.)
- (7) Do not connect the motor to the commercial power source directly.
- (8) Do not use the equipment under conditions subject to strong vibrations or an impact shock. Please attach the anti-vibration equipment to servo driver mounting surface if you install the servo driver in the vicinity of the vibration source.
- (9) Be sure not to touch the rotating part of the motor during operation.
- (10) Do not touch the keyway of the output shaft of the motor with bare hands.
- (11) Be sure not to insert your hand into the servo driver.
- (12) Do not touch the motor, the heat sink of the servo driver nor the surrounding equipment since they will be hot.
- (13) Do not perform wiring nor operate the product with wet hand.
- (14) Be sure that the wiring task is performed by electrical engineer.



Safety precautions



Danger



- (15) There is no protective device attached to the motor other than the specified ones. Please protect them with an overcurrent protective device, a ground-fault circuit interrupter, an over temperature preventing device, an emergency stop device, and the like.
- (16) When starting operation of the servo driver after an earthquake, please make sure that there is no abnormality as to the installation condition of the servo driver and the motor and the safety of the machine before starting operation.
- (17) After turning off the power, the inside circuit remains charged at a high voltage for a while. When moving, wiring or inspection the equipment, completely shut off the power supply input outside the servo driver and leave for 15 minutes or longer before working.
- (18) To prevent causing fire or accident resulting in injury or death due to improper installation or mounting at the occurrence of earthquake, please install or mount the device securely.
- (19) Install an external emergency shutoff circuit to stop operation and interrupt power immediately upon emergency. Emission of smoke or dust may occur due to a fault of a motor or a servo driver used in combination. For example, if the system is energized with the regenerative control power transistor shorted by failure, overheating of a regenerative resistor installed outside the servo driver may occur and it may emit smoke and dust. If a regenerative resistor is connected outside a servo driver, provide a means of detecting overheating such as a thermal protector to shut off power upon detecting abnormal heating.
- (20) Install the motor, the servo driver, and the surrounding devices on nonflammables such as metal.
- (21) Perform wiring correctly and securely. Insecure and incorrect wiring may be the cause of abnormal motor operation and its damage by fire.
Also, please make sure that no electrical conducting material such as a scrap of electric wire get inside the servo driver at the time of performing installation and wiring task.
- (22) Connect the cables securely, and firmly insulate the current-carrying part with insulating material.
- (23) When using a bundling wire is inserted into the metal ducts, because burning for wire allowable current is decreased by the temperature rise.
- (24) Be sure to install a fuseless breaker in a power supply. Be sure to connect grounding terminals and grounding wires. To prevent an electric shock and malfunction, grounding resistance at 100 Ω or lower is recommended.
- (25) Tighten the screws on the terminal block for connection securely at appropriate torque shown in the specifications of the servo driver.
- (26) When building a system by using the safety feature, design it by fully understanding and being compliant with the related safety standards and items described in our operation manual or technical reference.



Caution



- (27) When transferring the product, do not hold the cable or the shaft of the motor.
- (28) Do not adjust or modify the gain of the servo driver extremely, nor let the operation or movement of the machine be unstable.
- (29) After recovering from power failure, do not get close to the machine because there is a possibility that the machine restarts suddenly.
Setting must be made to the machine so that safety for the worker is ensured when the machine restarted suddenly.
- (30) When the equipment is energized, keep away from the motor and mechanism driven by the motor in case of malfunction.
- (31) Do not apply strong shock to the shaft of the motor.
- (32) Be sure not to start or stop the motor with the electromagnetic contactor installed on the main power source side.
- (33) Do not switch on or off the main power supply of the servo driver frequently.
- (34) Since the brake built in the motor is used for maintenance, do not use it as a stopping device (braking) to ensure the safety of the machine.



Safety precautions



Caution



- (35) Be careful not to drop or to topple over the product when transferring or performing installation task.
- (36) Do not climb on the motor or place heavy object on the motor.
- (37) Do not cover the louver on the servo driver nor insert foreign matter.
- (38) Do not use the product in an area exposed to direct sunlight. And when storing the product, avoid direct sunlight and keep the temperature and the humidity within the range specified for when the product is in use.
- (39) Never overhaul or modify the motor.
Overhauling will be performed at our company or at the retailers approved by our company.
- (40) Do not start/stop the a product by the turning on/off the servo ON command (SRV-ON).
Otherwise the dynamic brake circuit built in the servo driver may get damaged.



- (41) Use the motor and the servo driver in the combination specified by our company. Please confirm the performance and the safety at your company when the motor is used in combination with another servo driver.
- (42) Due to the trouble with the motor or the servo driver combined, the motor may be damaged by fire, or smoking or dusting might occur. Please consider these possibilities when they are to be used in a clean room or the like.
- (43) Perform proper installation which is in proportion to the output and the weight of the main body.
- (44) Keep the ambient temperature and humidity of the installed servo driver and motor within the range of allowable temperature and humidity.
- (45) Observe the specified installation method and the orientation of the product.
- (46) Keep a space as specified between the servo driver and the inner surface of the control panel, or between the servo driver and the other devices when installing the product.
- (47) Use the eyebolt attached to motor only for transferring the motor, but not for transferring the equipment. And do not use them with the speed reducer or heat sink attached to the motor.
- (48) Install a relay used to break the circuit at the time of emergency stop in series with the relay used to control the brake.
- (49) Fix the motor at the time of test run, and confirm its movement after isolating it from the mechanical system, and then mount it on the machine.
- (50) Verify that an input power supply voltage satisfies the servo driver specifications before turning on the power and start operation.
An input voltage higher than rated may cause ignition and smoking in the servo driver, which may cause malfunction or burning of a motor in some cases.
- (51) When an alarm status occurs, remove a cause of the problem before restarting.
Careless restarting without removing a cause of problem may cause malfunction or burning of a motor.
- (52) The brake built in the motor may not be maintained due to its life span, the mechanical structure, and so on. Please install a stopping device to ensure the safety on the machine side.
- (53) The motor and the servo driver generates heat by operating the motor. A motor and a servo driver used in a sealed box may cause an extreme rise of temperature.
Consider cooling so that an ambient temperature around the motor and the servo driver satisfies an operating range.
- (54) Maintenance should be performed by the specialist.
- (55) If the product is not to be used for a long period of time, be sure to turn off the power.
- (56) Allow approx. 10 minutes pause when the dynamic brake built in the servo driver is activated during high-speed running. Resistor is damaged and the dynamic brake might not work when using it under more critical operating condition.
- (57) Fix the cable so that stress is not applied to the connection part such as connector and terminal block.



Safety precautions

Please be sure to read the instruction manual (the safety section) before use

We have been putting maximum effort to ensure the quality of this product. But since the possibility of the occurrence of the product's abnormal behavior not in accordance with the setting still exists due to the unexpectedly strong exogenous noise (including radiation and the like), the application of static electricity, or the rare event such as abnormality in the input power source, the wiring, and the parts, we ask our customers to take measures against the occurrence of unexpected behavior to fully ensure the safety.

12. Life and standard time for replacement (This is not a guarantee.)

(1) Expected basic rating life of bearing (calculated value)

Fatigue life at reliability 90 % under the allowable shaft load after statistically correcting variance: 20,000 hours or more at continuous rated load.

Avoid oscillating and repeated sliding movement with the motor shaft at a rotational angle 45 degree or lower, which may cause a fretting phenomenon.

(2) Expected life of rotary encoder

Life satisfying the specification of the rotary encoder (until a half-life period of light intensity): 30,000 hours or more at continuous rated load.

(3) Standard time for replacement of oil seals (only for models with oil seals)

5,000 hours at continuous rated load. (variable depending on the environment and operation)

13. Warranty

(1) Warranty period

The manufacturer warrants the quality of its product for one year after purchasing by a customer or one and a half year after the month of production at our factory. However, in case of a motor with braking functions, our warranty period does not exceed the maximum time of acceleration and deceleration of the shaft. In addition, consumables (oil seals) are exempted (only for models with oil seal). The warranty, however, is not applicable to the following, even within the period of warranty:

- (1) Failures due to wrong use, inappropriate repair or modifications.
- (2) Failures due to falling after purchase and damages during transportation.
- (3) Failures due to the use out of product specifications.
- (4) Failures due to fire, earthquake, lightning strike, wind and flood damage, salt pollution, abnormal voltage, and other natural disasters and accidents.
- (5) Failures due to penetration of water, oil, metal, or any other foreign materials.
- (6) Failures of internal components, which exceeded their described standard life.

(2) Warranty scope

During the warranty period, we will only replace or repair the defective single product we delivered, if the failure is caused due to our fault. In the above, our responsibility is limited to the replacement or repair of the above single product we delivered. We are not liable for any damage to you or a third party, caused in association with the failure of the product we delivered. Further, we are not liable for any failure and damage to you or a third party, caused by the above (1) exemptions and any one of the following.

- (1) Failures due to the mounting or use of our product against the instructions and warnings described in this specification.
- (2) Failures due to the combination of our product and the equipment that mounted our product.
- (3) Failures due to your negligence of our instructions described in this specification.
- (4) Other equipment failures not attributable to our responsibility.

(3) Warranty service

Please contact your dealers when you need to apply for warranty, including investigation of failure cause and request for repair. If you return our product directly to our company, after obtaining an approval from your dealer, please obtain the application form for repair and investigation from your dealer, enter the necessary information on it, and attach it to our product. In principle, you need to pay the transportation cost.

14. Other cautions

- (1) Precautions for export of this product and the equipment incorporating this product.
If the end user or end purpose of this product relates to military affairs, armament and so on, this product may be subject to the export regulations prescribed in "Foreign Exchange and Foreign Trade Control Law." To export this product, take thorough examination, and follow the required export procedure.
- (2) This product was designed to be used with general industrial products or the like. It is not designed to be used with a device dealing with human life or as a device to be used in unusual circumstances such as nuclear power management, use with aerospace instruments, use in transportation, use with medical equipment, use with various types of safety devices, or use with a device for which high level of cleanliness is required.
- (3) Please make the final decision at your company as to the specification of the completed product, compliance with laws and regulations, and its compatibility with the equipment and parts attached by your company in respects such as the structure, dimensions, service life, and characteristics.
- (4) We have made the best efforts to ensure the product quality. However, complete equipment at customer's site may malfunction due to a failure of this product. Therefore, take precautions by providing fail-safe design at customer's site, and ensure safety within the operating range of the work place.
- (5) Since excessive loading of the product may be the cause of load collapsing, follow the instructions indicated.
- (6) In the case of a shaft with a key, it should be fixed not only with the key but also with a set of screws or the like, and a grease to prevent fretting should be applied to the joining section with the axis of the motor.
- (7) When the motor is to be operated without electrically connecting the shaft of the motor to the ground, depending on the actual equipment and the installing environment, problems such as the bearing sound will be louder may occur due to the occurrence of electrical corrosion at the motor bearing. So please confirm and verify the matter at your company.
- (8) Please confirm the strength of the shaft at your company.
(There should be no load heavier than the allowable weight on the shaft during operation.)
- (9) 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.
- (10) An amount of grease (Albania No. 2: produced by Showa Shell Sekiyu) is applied to the end of the shaft of this motor. Please consider its influence on materials such as plastic.
- (11) If a seal is required when mounting a device of your company on the mounting surface of our motor, please address the matter at your company.
- (12) When the specification of the device of your company is to be changed, please carefully consider the compatibility with our motor.
- (13) When discarding the motor, dispose it as an industrial waste.
- (14) When discarding the battery, isolate the battery with a tape or the like, and discard it according to the regulations of the local government.
- (15) Some of the parts or the like may be modified to improve the performance, but the improvement will be implemented within the range of satisfying the items in this specification.
- (16) The specification change of the motor shall be implemented with the specification delivered by our company or a document specified by your company. And when the functions or characteristics are affected, the specification will be changed after being verified and confirmed with a prototype.
- (17) When the specification is changed, the price may also be changed in some cases.
- (18) If there is an item other than the items described in this specification and needs to be specified, please notify us beforehand.
- (19) If malfunctioning has occurred, the matter shall be addressed by discussing the matter with both parties according to the items indicated in this specification.
- (20) Failure of this product depending on its content, may generate smoke of about one cigarette.
Take this into consideration when the application of the machine is clean room related.
- (21) Do not use benzene, thinner, alcohol, and acid or alkaline detergent, because they can discolor and damage the motor.
- (22) When vibration or impact is applied to the motor, please use under the conditions that vibration and impact fall within the performance ranges described in (4) Vibration resistance and (5) Impact resistance of 4. Performance and Environmental condition.

15. Other

For safety precautions and other cautions, we assume the use the motor and the servo driver in the combination by our company, so please confirm the safety at your company when the motor used in combination with the servo driver of your company.

Reliability evaluation items

The contents of this evaluation only cover items used for the design verification of selective models at the initial development stage, and do not guarantee all items from regular production.

(Basic evaluation conditions)

Evaluation items	Evaluation conditions	Evaluation result
Vibration resistance / heat cycle test	20~3000 Hz 49 m/s ² , with not more than 1.5 mm amplitude 8hours each for X, Y and Z directions -30/+80 °C 1 cycle	No abnormality in outside appearance, structure and functions
Resonant point vibration endurance test	49 m/s ² each for X, Y and Z directions Number of cycles: 10 million cycles	No abnormality in outside appearance, structure and functions
High temperature & high humidity electric conduction test	60 °C 95 %RH 72-hour	No abnormality in outside appearance, structure and functions
Heat shock resistance test	-20/+80 °C 50 cycles	No abnormality in outside appearance, structure and functions
Impact resistance test	490 m/s ² with L flange mounted 3 cycles each for X, Y and Z directions	No abnormality in outside appearance, structure and functions
Rotor's high-speed rotation test	After 50 cycles of -20/+80 °C, rotate a motor for 10 seconds at the speed of 10,000 r/min at 100 °C.	No abnormality in outside appearance, structure and functions
Burnout test	Apply the maximum current to let a motor burn out. (Situation where the overload is negated.)	No ignition Not more than specified amount of smoke

Delivery inspection items

Inspection items	Inspection methods	Quantity
Outside appearance	Visual inspection	All
Dimensions	Slide gauge, Gauge	Sampling
Withstand voltage	Withstand voltage tester	All
Insulation resistance	Insulation resistance meter	All
Induced voltage constant	Automatic tester	All
Armature resistance	Ohm meter	All
Encoder test and servo driver combination test	Automatic tester	All
Brake static friction torque	Spring scale	All
Brake suction / release voltage	Voltmeter	All

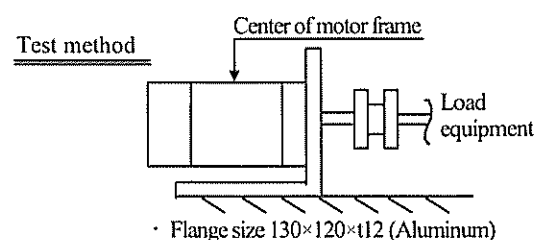
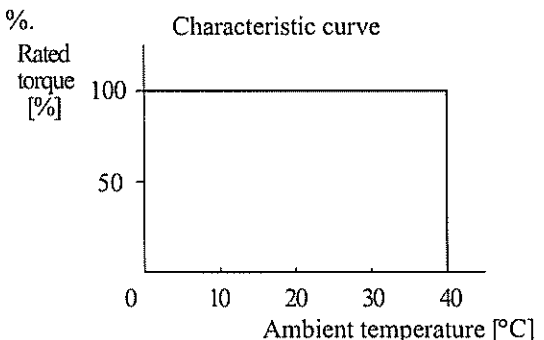
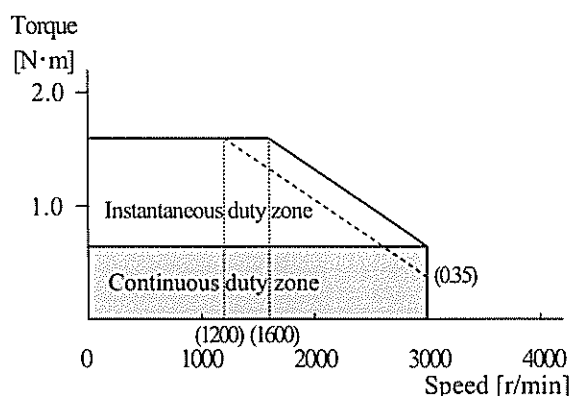
AC Servo Motor Specification

Motor model		MSMD02CL1□ (Without brake)	MSMD02CL1□ (With brake)	
Rated output	W	200	←	
Rating	%	100	←	
Number of poles		8	←	
Rated speed	r/min	3000	←	
Max. speed	r/min	3000	←	
Rated torque	N·m	0.64	←	
Max. torque	N·m	1.59	←	
Rated current	A(rms)	(9.4)	←	
Rotor inertia	$\times 10^{-4}$ kg·m ²	0.14	0.16	
Electrical time constant	ms	(2.0)	←	
Mechanical time constant	ms	0.86	1.0	
Power rate	kW/s	30.3	25.8	
Momentary max. current	A(o-p)	(33.2)	←	
Demagnetization current	A(o-p)	49.8	←	
Voltage constant per phase	$\times 10^{-3}$ V(rms)/min ⁻¹	2.4 ± 10 %	←	
Excitation voltage constant	$\times 10^{-3}$ V(o-p)/min ⁻¹	5.2 ± 10 %	←	
Torque constant	N·m/A(rms)	0.070 ± 10 %	←	
	N·m/A(o-p)	0.050 ± 10 %	←	
Phase resistance	Ω	0.11 ± 7 %	←	
Phase inductance	mH	(0.21)	←	* Center value
Thermal class		130(B)	←	
Vibration class		V-15	←	
Paint color		Without paint	←	Plastic part :Gray
Mass	kg	0.8	1.3	
Structure		Totally-enclosed self-cooled type	←	Without oil seal
Supply voltage	V _{DC}	24	←	

- This specification is guaranteed after combining and adjusting with the servo driver.
(Representative value at 20 °C)
- Rated torque is the result that have been considered dispersions of motor specification under our measurement method.
- Set the temperature of center of motor frame to 75 °C or less. (When ambient temperature is 40 °C)
- When the power supply voltage of the servo driver drops, the continuous duty zone may be less than the rated torque. For example, when the voltage drops by 10 %, please note that the right shoulder of the continuous duty zone is below the dotted line in the graph below.
- Speed - Torque characteristic (Representative value)

Servo driver power supply voltage : at DC24 V

Dotted line indicates fall of power supply voltage by 10 %.



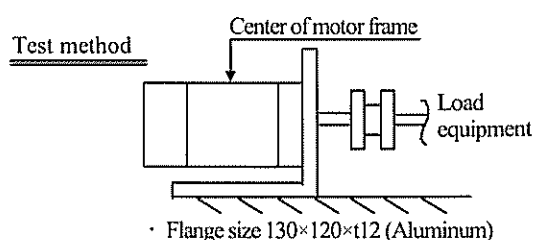
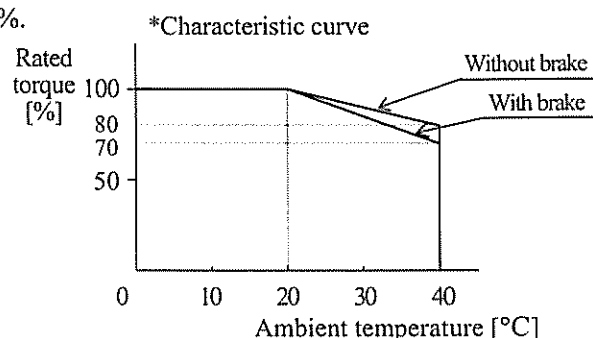
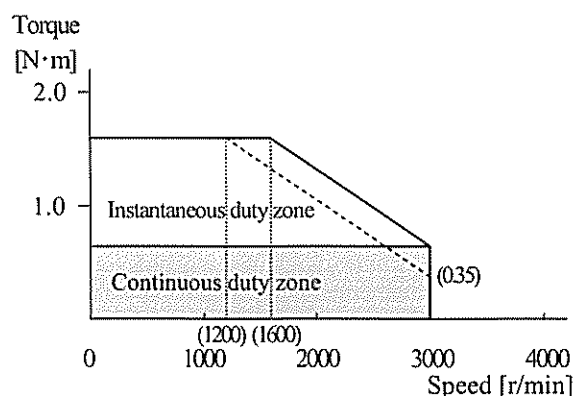
AC Servo Motor Specification

Motor model		MSMD02CL1□ (Without brake)	MSMD02CL1□ (With brake)	
Rated output	W	200	←	
Rating	%	(*100)	←	* refer to the
Number of poles		8	←	characteristic
Rated speed	r/min	3000	←	curve below
Max. speed	r/min	3000	←	
Rated torque	N·m	0.64	←	
Max. torque	N·m	1.59	←	
Rated current	A(rms)	(9.4)	←	
Rotor inertia	$\times 10^{-4}$ kg·m ²	0.14	0.16	
Electrical time constant	ms	(2.0)	←	
Mechanical time constant	ms	0.86	1.0	
Power rate	kW/s	30.3	25.8	
Momentary max. current	A(o-p)	(33.2)	←	
Demagnetization current	A(o-p)	49.8	←	
Voltage constant per phase	$\times 10^{-3}$ V(rms)/min ⁻¹	2.4 \pm 10 %	←	
Excitation voltage constant	$\times 10^{-3}$ V(o-p)/min ⁻¹	5.2 \pm 10 %	←	
Torque constant	N·m/A(rms)	0.070 \pm 10 %	←	
	N·m/A(o-p)	0.050 \pm 10 %	←	
Phase resistance	Ω	0.11 \pm 7 %	←	
Phase inductance	mH	(0.21)	←	* Center value
Thermal class		130(B)	←	
Vibration class		V-15	←	
Paint color		Without paint	←	Plastic part :Gray
Mass	kg	0.8	1.3	
Structure		Totally-enclosed self-cooled type	←	With oil seal
Supply voltage	V _{DC}	24	←	

- This specification is guaranteed after combining and adjusting with the servo driver.
(Representative value at 20 °C)
- Rated torque is the result that have been considered dispersions of motor specification under our measurement method.
- Set the temperature of center of motor frame to 75 °C or less. (When ambient temperature is 40 °C)
- When the power supply voltage of the servo driver drops, the continuous duty zone may be less than the rated torque. For example, when the voltage drops by 10 %, please note that the right shoulder of the continuous duty zone is below the dotted line in the graph below.
- Speed - Torque characteristic (Representative value)

Servo driver power supply voltage : at DC24 V

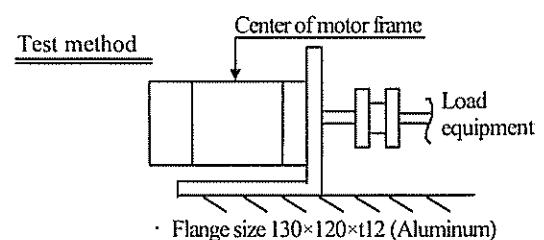
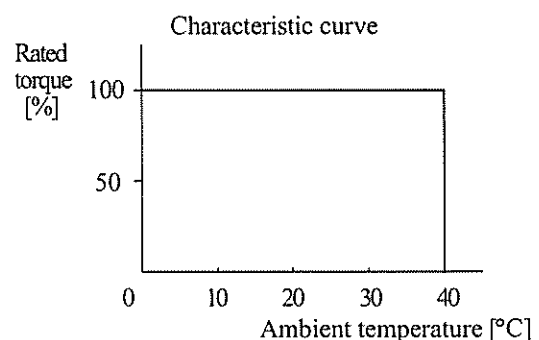
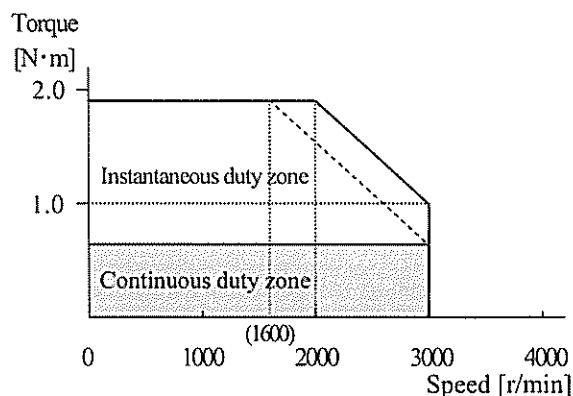
Dotted line indicates fall of power supply voltage by 10 %.



AC Servo Motor Specification

Motor model		MSMD02BL1□ (Without brake)	MSMD02BL1□ (With brake)	
Rated output	W	200	←	
Rating	%	100	←	
Number of poles		8	←	
Rated speed	r/min	3000	←	
Max. speed	r/min	3000	←	
Rated torque	N·m	0.64	←	
Max. torque	N·m	1.91	←	
Rated current	A(rms)	(5.6)	←	
Rotor inertia	$\times 10^{-4}$ kg·m ²	0.14	0.16	
Electrical time constant	ms	(2.5)	←	
Mechanical time constant	ms	0.72	0.82	
Power rate	kW/s	30.3	25.8	
Momentary max. current	A(o-p)	(23.7)	←	
Demagnetization current	A(o-p)	35.6	←	
Voltage constant per phase	$\times 10^{-3}$ V(rms)/min ⁻¹	4.3 \pm 10 %	←	
Excitation voltage constant	$\times 10^{-3}$ V(o-p)/min ⁻¹	9.1 \pm 10 %	←	
Torque constant	N·m/A(rms)	0.122 \pm 10 %	←	
	N·m/A(o-p)	0.087 \pm 10 %	←	
Phase resistance	Ω	0.26 \pm 7 %	←	
Phase inductance	mH	(0.65)	←	* Center value
Thermal class		130(B)	←	
Vibration class		V-15	←	
Paint color		Without paint	←	Plastic part :Gray
Mass	kg	0.8	1.3	
Structure		Totally-enclosed self-cooled type	←	Without oil seal
Supply voltage	V _{DC}	48	←	

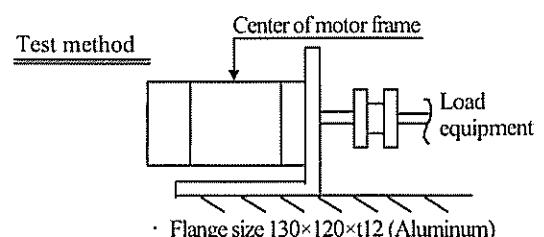
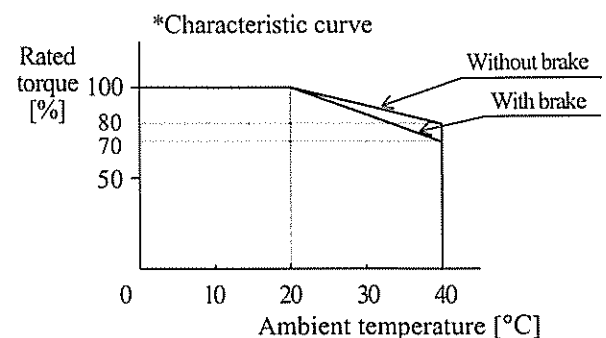
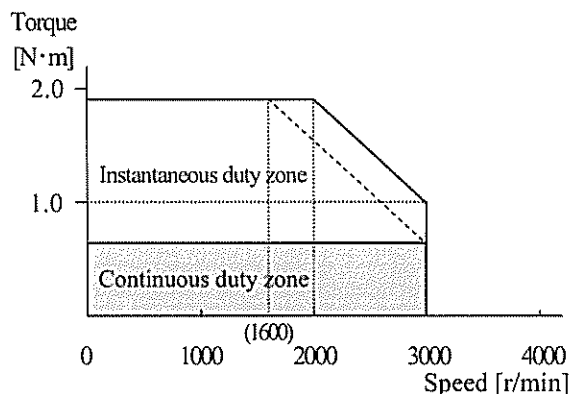
- This specification is guaranteed after combining and adjusting with the servo driver.
(Representative value at 20 °C)
- Rated torque is the result that have been considered dispersions of motor specification under our measurement method.
- Set the temperature of center of motor frame to 70 °C or less. (When ambient temperature is 40 °C)
- When the power supply voltage of the servo driver drops, the continuous duty zone may be less than the rated torque.
- Speed - Torque characteristic (Representative value)
Servo driver power supply voltage : at DC48 V
Dotted line indicates fall of power supply voltage by 10 %.



AC Servo Motor Specification

Motor model		MSMD02BL1□ (Without brake)	MSMD02BL1□ (With brake)	
Rated output	W	200	←	
Rating	%	(*100)	←	* refer to the
Number of poles		8	←	characteristic
Rated speed	r/min	3000	←	curve below
Max. speed	r/min	3000	←	
Rated torque	N·m	0.64	←	
Max. torque	N·m	1.91	←	
Rated current	A(rms)	(5.6)	←	
Rotor inertia	$\times 10^{-4}$ kg·m ²	0.14	0.16	
Electrical time constant	ms	(2.5)	←	
Mechanical time constant	ms	0.72	0.82	
Power rate	kW/s	30.3	25.8	
Momentary max. current	A(o-p)	(23.7)	←	
Demagnetization current	A(o-p)	35.6	←	
Voltage constant per phase	$\times 10^{-3}$ V(rms)/min ⁻¹	4.3 \pm 10 %	←	
Excitation voltage constant	$\times 10^{-3}$ V(o-p)/min ⁻¹	9.1 \pm 10 %	←	
Torque constant	N·m/A(rms)	0.122 \pm 10 %	←	
	N·m/A(o-p)	0.087 \pm 10 %	←	
Phase resistance	Ω	0.26 \pm 7 %	←	
Phase inductance	mH	(0.65)	←	* Center value
Thermal class		130(B)	←	
Vibration class		V-15	←	
Paint color		Without paint	←	Plastic part :Gray
Mass	kg	0.8	1.3	
Structure		Totally-enclosed self-cooled type	←	With oil seal
Supply voltage	V _{DC}	48	←	

- This specification is guaranteed after combining and adjusting with the servo driver.
(Representative value at 20 °C)
- Rated torque is the result that have been considered dispersions of motor specification under our measurement method.
- Set the temperature of center of motor frame to 70 °C or less. (When ambient temperature is 40 °C)
- When the power supply voltage of the servo driver drops, the continuous duty zone may be less than the rated torque.
- Speed - Torque characteristic (Representative value)
Servo driver power supply voltage : at DC48 V
Dotted line indicates fall of power supply voltage by 10 %.



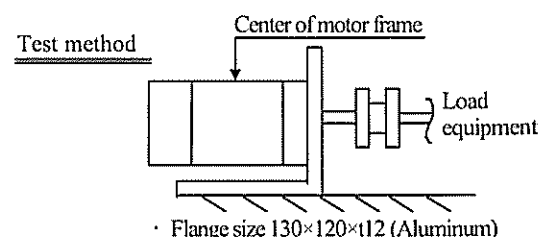
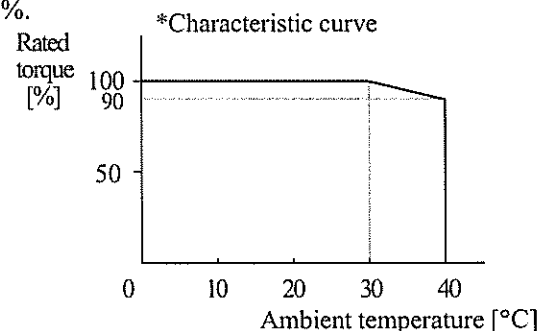
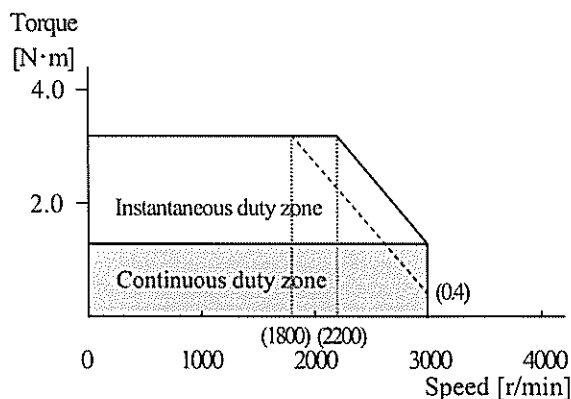
AC Servo Motor Specification

Motor model		MSMD04BL1□ (Without brake)	MSMD04BL1□ (With brake)	
Rated output	W	400	←	
Rating	%	(*100)	←	* refer to the
Number of poles		8	←	characteristic
Rated speed	r/min	3000	←	curve below
Max. speed	r/min	3000	←	
Rated torque	N·m	1.27	←	
Max. torque	N·m	3.18	←	
Rated current	A(rms)	(8.6)	←	
Rotor inertia	$\times 10^{-4}$ kg·m ²	0.26	0.28	
Electrical time constant	ms	(2.7)	←	
Mechanical time constant	ms	0.61	0.66	
Power rate	kW/s	62.5	57.2	
Momentary max. current	A(o-p)	(30.4)	←	
Demagnetization current	A(o-p)	45.6	←	
Voltage constant per phase	$\times 10^{-3}$ V(rms)/min ⁻¹	5.4 ± 10 %	←	
Excitation voltage constant	$\times 10^{-3}$ V(o-p)/min ⁻¹	11.5 ± 10 %	←	
Torque constant	N·m/A(rms)	0.15 ± 10 %	←	
	N·m/A(o-p)	0.11 ± 10 %	←	
Phase resistance	Ω	0.18 ± 7 %	←	
Phase inductance	mH	(0.50)	←	* Center value
Thermal class		130(B)	←	
Vibration class		V-15	←	
Paint color		Without paint	←	Plastic part :Gray
Mass	kg	1.2	1.7	
Structure		Totally-enclosed self-cooled type	←	Without oil seal
Supply voltage	V _{DC}	48	←	

- This specification is guaranteed after combining and adjusting with the servo driver.
(Representative value at 20 °C)
- Rated torque is the result that have been considered dispersions of motor specification under our measurement method.
- Set the temperature of center of motor frame to 85 °C or less. (When ambient temperature is 40 °C)
- When the power supply voltage of the servo driver drops, the continuous duty zone may be less than the rated torque. For example, when the voltage drops by 10 %, please note that the right shoulder of the continuous duty zone is below the dotted line in the graph below.
- Speed - Torque characteristic (Representative value)

Servo driver power supply voltage : at DC48 V

Dotted line indicates fall of power supply voltage by 10 %.



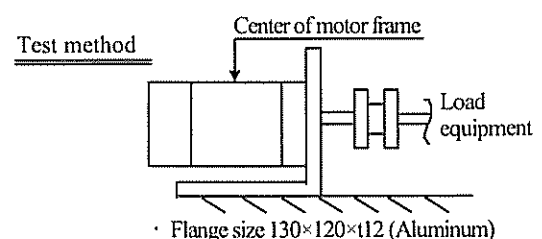
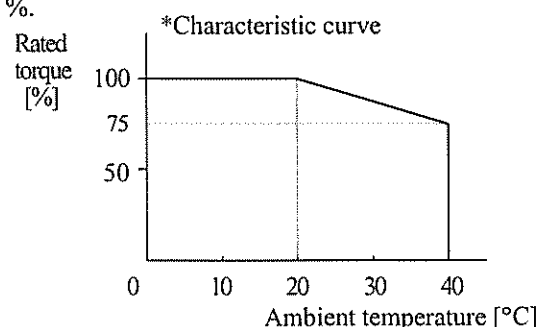
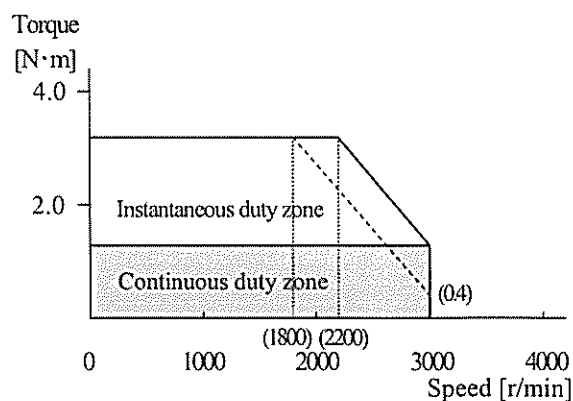
AC Servo Motor Specification

Motor model		MSMD04BL1□ (Without brake)	MSMD04BL1□ (With brake)	
Rated output	W	400	←	
Rating	%	(*100)	←	* refer to the
Number of poles		8	←	characteristic
Rated speed	r/min	3000	←	curve below
Max. speed	r/min	3000	←	
Rated torque	N·m	1.27	←	
Max. torque	N·m	3.18	←	
Rated current	A(rms)	(8.6)	←	
Rotor inertia	$\times 10^{-4}$ kg·m ²	0.26	0.28	
Electrical time constant	ms	(2.7)	←	
Mechanical time constant	ms	0.61	0.66	
Power rate	kW/s	62.5	57.2	
Momentary max. current	A(o-p)	(30.4)	←	
Demagnetization current	A(o-p)	45.6	←	
Voltage constant per phase	$\times 10^{-3}$ V(rms)/min ⁻¹	5.4 \pm 10 %	←	
Excitation voltage constant	$\times 10^{-3}$ V(o-p)/min ⁻¹	11.5 \pm 10 %	←	
Torque constant	N·m/A(rms)	0.15 \pm 10 %	←	
	N·m/A(o-p)	0.11 \pm 10 %	←	
Phase resistance	Ω	0.18 \pm 7 %	←	
Phase inductance	mH	(0.50)	←	* Center value
Thermal class		130(B)	←	
Vibration class		V-15	←	
Paint color		Without paint	←	Plastic part :Gray
Mass	kg	1.2	1.7	
Structure		Totally-enclosed self-cooled type	←	With oil seal
Supply voltage	V _{DC}	48	←	

- This specification is guaranteed after combining and adjusting with the servo driver.
(Representative value at 20 °C)
- Rated torque is the result that have been considered dispersions of motor specification under our measurement method.
- Set the temperature of center of motor frame to 85 °C or less. (When ambient temperature is 40 °C)
- When the power supply voltage of the servo driver drops, the continuous duty zone may be less than the rated torque. For example, when the voltage drops by 10 %, please note that the right shoulder of the continuous duty zone is below the dotted line in the graph below.
- Speed - Torque characteristic (Representative value)

Servo driver power supply voltage : at DC48 V

Dotted line indicates fall of power supply voltage by 10 %.



Opponent connector (No belongings)

Motor connector (JST)
Housing:F31MSF-04V-KX
Contact:SF3M-41GF-M2.0N

Detector connector (AMP)
Cap : 172161-1
Socket: 170361-3 (Gold plated)
or 170365-3 (Gold plated)

Detector connector (AMP)
 Plug: 172169-1
 Pin : 1-770835-0 (Gold plated)

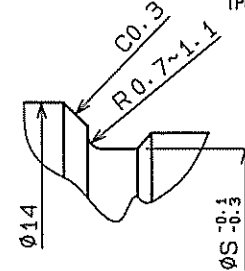
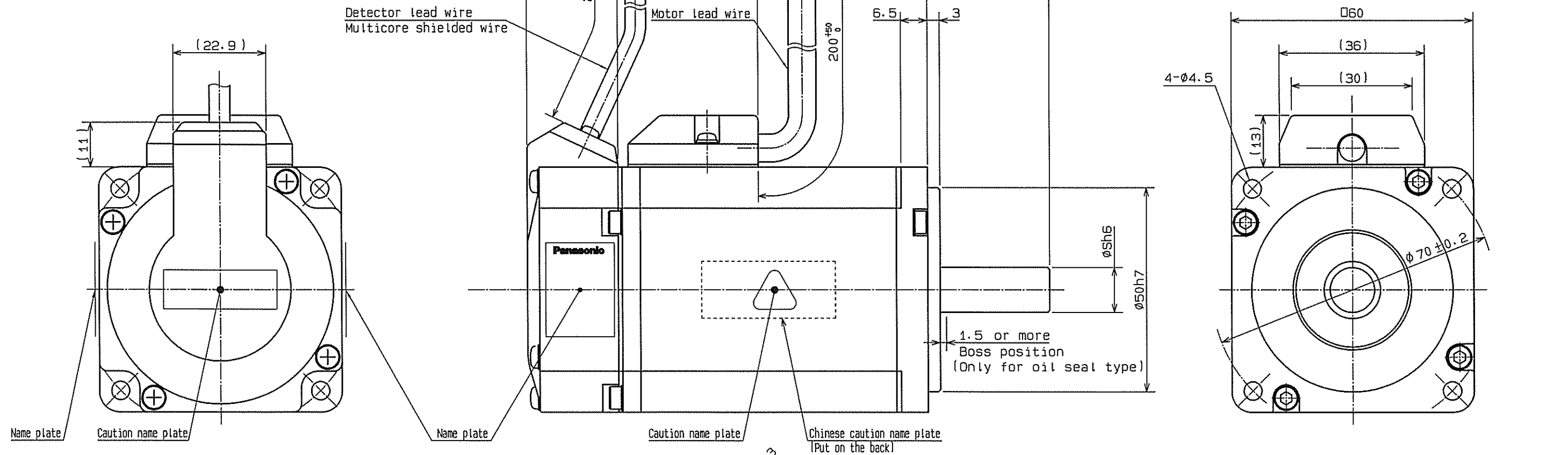
Motor connector (JST)
Housing: F31FSS-04V-KX
Contact: SF3F-41GF-P2.0
Caution
(Max. rated current is 10 A/contact.)

Rotary encoder unit
(23 bit absolute)

PIN No.	Color	Signal
1	Red	BAT +
2	Pink	BAT -
3	Shield	FG
4	Sky blue	PS(SD)
5	Violet	PS(SD)
6	—	NC
7	White	E5 V
8	Black	E0 V
9	—	NC

Motor unit

Contact No.	Color	Signal
1	Red	U
2	White	V
3	Black	W
4	Green/Yellow	E




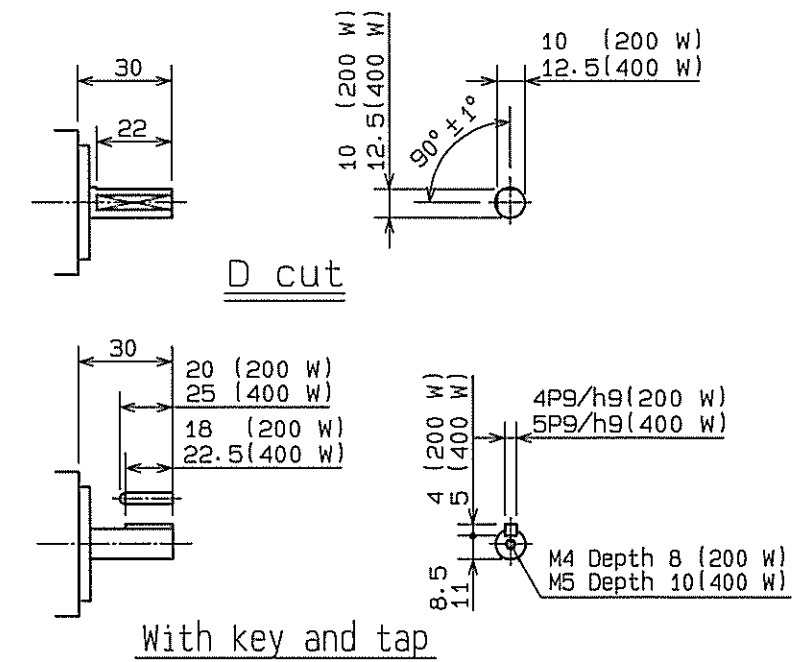
Detail of shaft step part (S=Free)

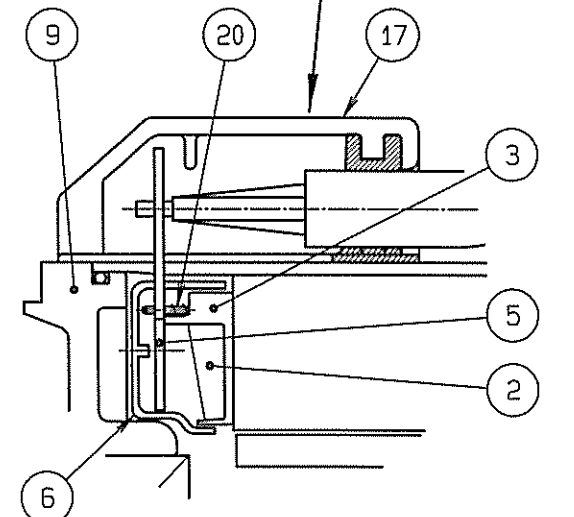
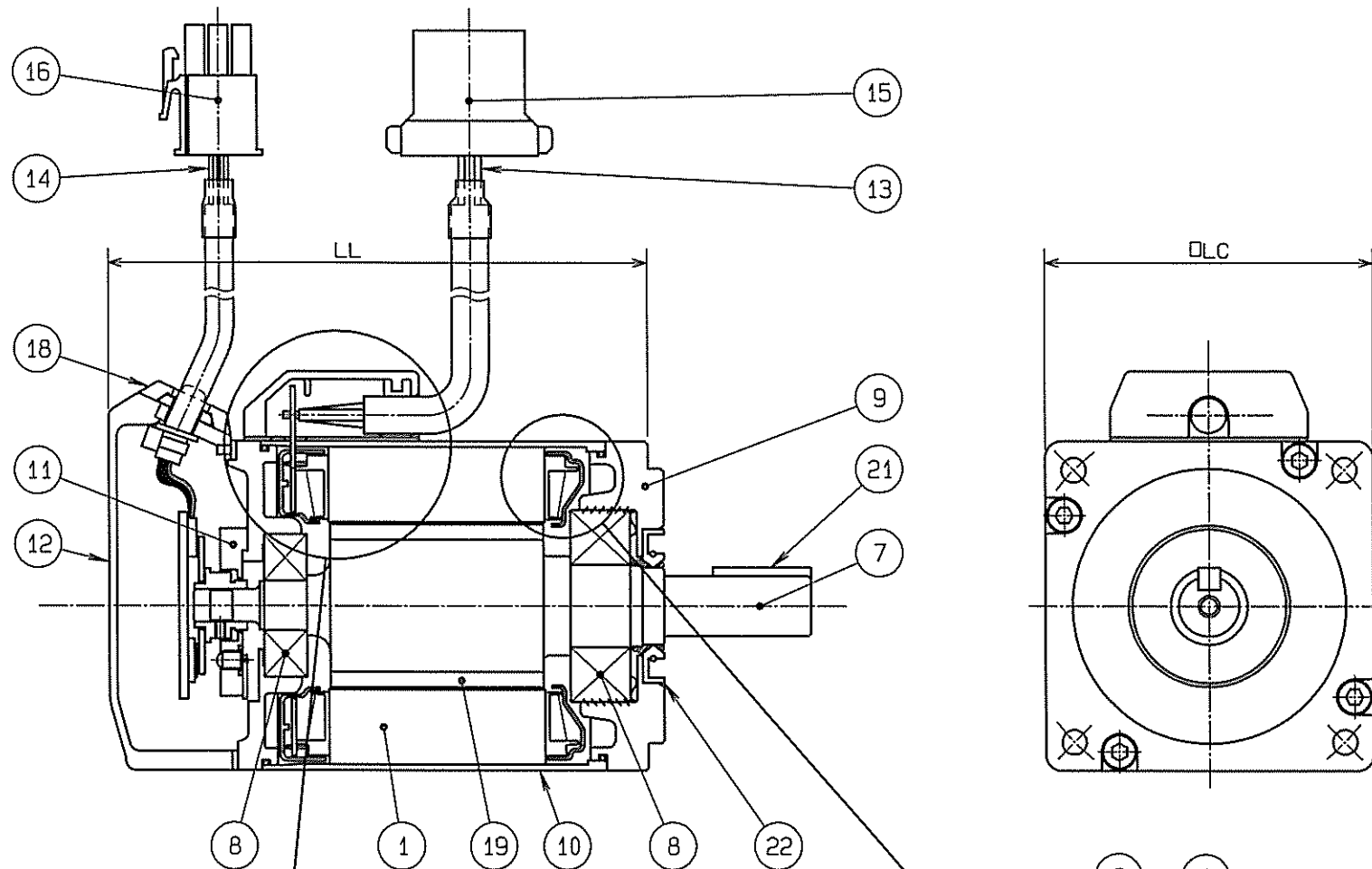
(200 W Only)

- NOTE 1. The assembling precision conforms to the Japan Machine Tool Association Standard (MAS402-1981). (TIR value)
- Shaft end runout: 0.03 (shaft exit middle)
 - Squareness of flange face to shaft: 0.08 (Ø70)
 - Eccentricity of flange fitting outside diameter to shaft: 0.06 (middle of spigot)
2. For flange mounting bolts, use hexagonal socket head bolts.

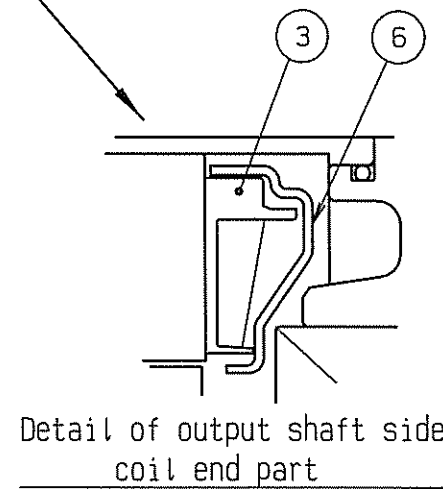
Model	Voltage (V)	Rated Speed (r/min)	Output (W)	LL	LM	S	LT	KB1
MSMD02CL10	DC24	3000	200	79.5	57	11	22.5	22.5
MSMD02BL10	DC48	↑	↑	↑	↑	↑	↑	↑
MSMD04BL10	↑	↑	400	99	76.5	14	↑	42

Scale	Panasonic Corporation			Agreement	Model	MSMD000L10 060
1 : 1	 3rd Angle System	Unit:mm				
Designed	Drawn	Checked	Checked	Checked	Name	OUTLINE DRAWING (WITHOUT BRAKE)
MIYAZAKI	MIYAZAKI	Nishio		Kira	No.	SR-DSV1232901
2018/04/13	2018/04/13	2018/4/16		2018/4/16		

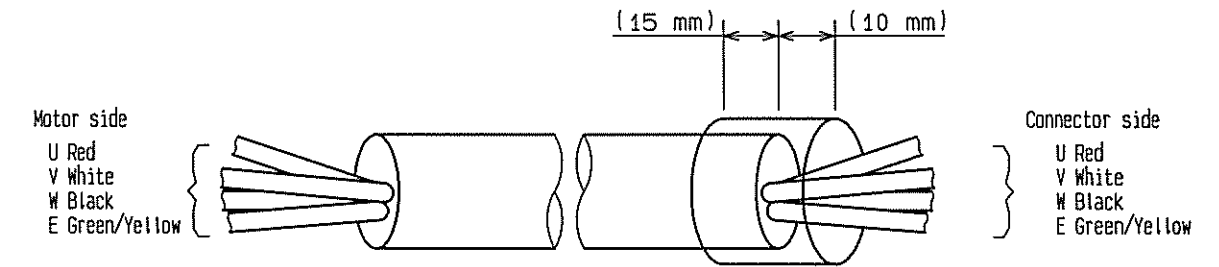




Detail of lead wire connection part

Detail of output shaft side
coil end part

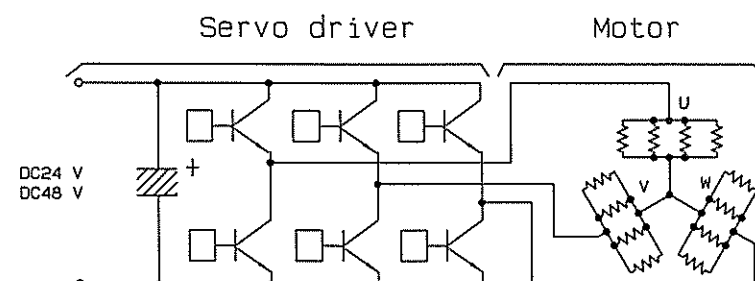
PIN No.	Color	Signal
1	Red	U
2	White	V
3	Black	W
4	Green/Yellow	E



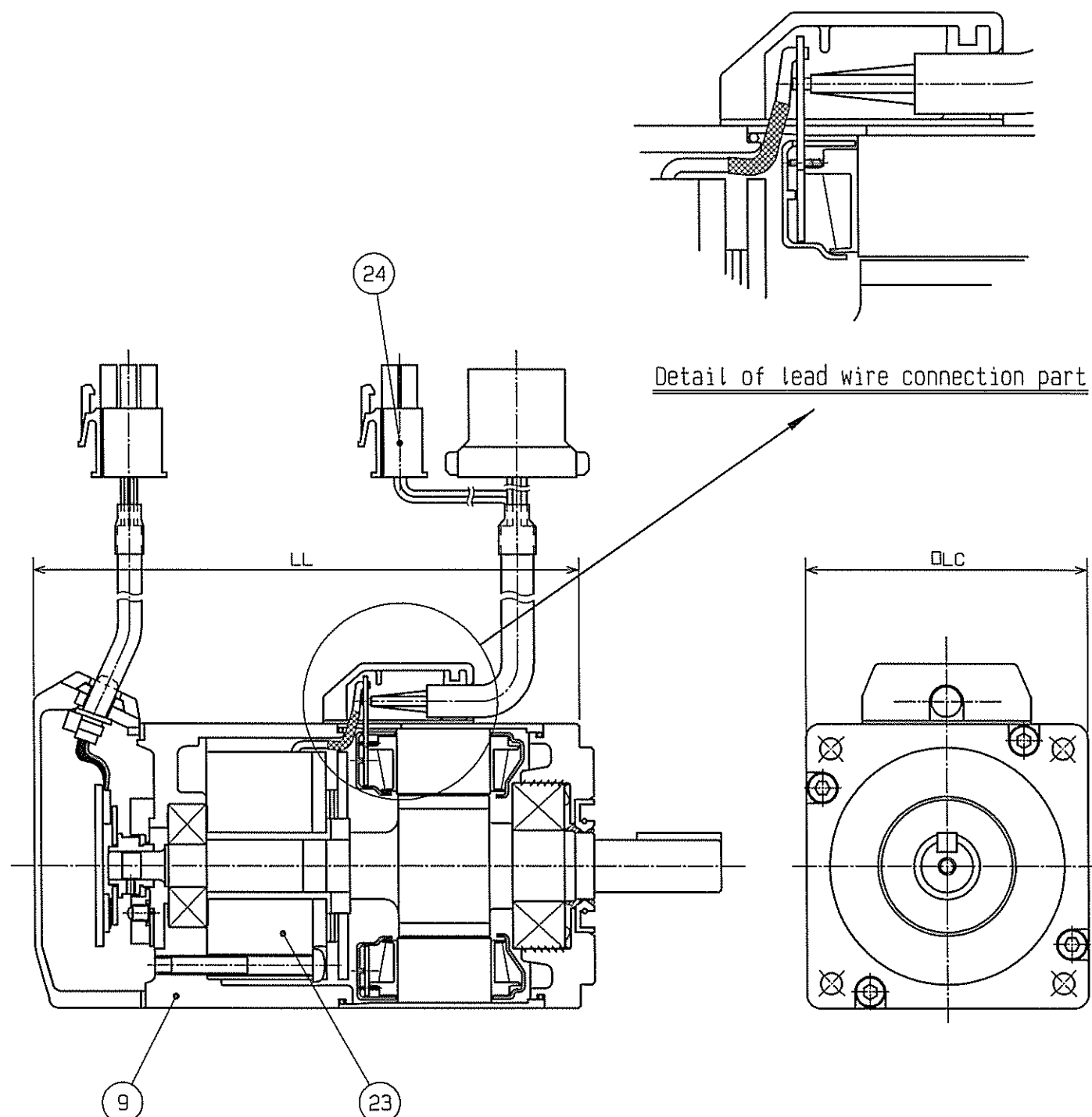
Detail of Motor lead wire

22	Oil seal	Nitrile rubber	1
21	Key	S45C	1
20	Pin	Phosphor copper	24
19	Permanent magnet	Rare earth magnet	
18	Detector lead fixer	Polyamide	1
17	Motor lead fixer	Polyamide	1
16	Detector connector	Polyamide(UL94V-0)	1
15	Motor connector	Polybutylene terephthalate(UL94V-0)	1
14	Detector leads	Multi-core ETFE wire UL2589 AWG28	
13	Motor leads	Cable 4 wires UL 2517 Wire composition : 4 core polyethylene wire (UL 3266, AWG 18)	
12	RE cover	Polyamide	1
11	Detector	23bit	1
10	Frame	Aluminium	1
9	End bracket	Aluminium	2
8	Ball bearing	Bearing steels	2
7	Motor shaft	S45C, SCM435	1
6	Insulating cap	Polyethylene terephthalate	2
5	Printing circuit board	Composite	1
4	Slot insulator	Polyester film	
3	End insulator	Polyethylene terephthalate	24
2	Winding	Polyester enameled copper wire	
1	Stator core	Electrical steel	
No.	Name	Material	Qt.

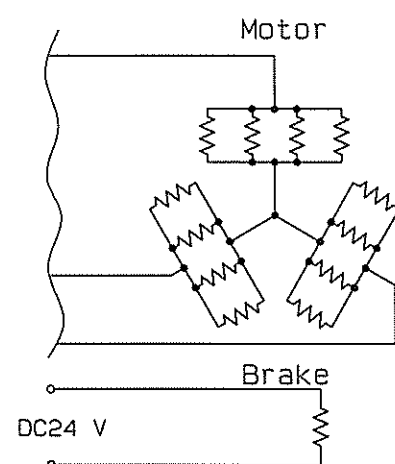
Scale	Panasonic Corporation	Agreement	Model	MSMD0□□L 1□
3rd Angle System	Unit:mm		Name	STRUCTURE SECTION VIEW DRAWING (Without Brake)
Designed	Drawn	Checked	Checked	Checked
MIYAZAKI	MIYAZAKI	Nishio	Kira	
2018/04/13	2018/04/13	2018/4/16	2018/4/16	
No.	SR-DSV1232903			



Model	LC	LL
MSMD02□L 1□	60	79.5
MSMD04□L 1□	60	99

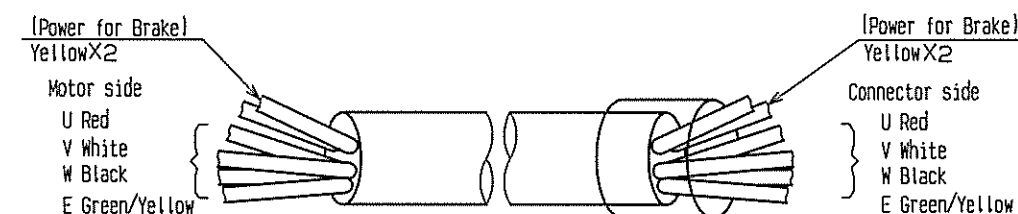


Detail of lead wire connection part



Model	LC	LL
MSMD02DL10	60	116
MSMD04DL10	60	135.5

PIN No.	Color	Signal
1	Red	U
2	White	V
3	Black	W
4	Green/Yellow	E
5	Yellow	Brake
6	Yellow	Brake

Detail of Motor lead wire
Detail of Brake lead wire

24	Brake connector	Polyamide(UL94V-0)	1
23	Brake	Non excited actuating type brake	1
22	Oil seal	Nitrile rubber	1
21	Key	S45C	1
20	Pin	Phosphor copper	24
19	Permanent magnet	Rare earth magnet	
18	Detector lead fixer	Polyamide	1
17	Motor lead fixer	Polyamide	1
16	Detector connector	Polyamide(UL94V-0)	1
15	Motor connector	Polybutylene terephthalate(UL94V-0)	1
14	Detector leads	Multi-core ETFE wire UL2589 AWG28	
13	Motor leads	Cabtire cable 6 wires UL 2103 Wire composition : 6 core ETFE wire (UL 11300, AWG 18)	
12	RE cover	Polyamide	1
11	Detector	23bit	1
10	Frame	Aluminium	1
9	End bracket	Aluminium	2
8	Ball bearing	Bearing steels	2
7	Motor shaft	S45C, SCM435	1
6	Insulating cap	Polyethylene terephthalate	2
5	Printing circuit board	Composite	1
4	Slot insulator	Polyester film	
3	End insulator	Polyethylene terephthalate	24
2	Winding	Polyester enameled copper wire	
1	Stator core	Electrical steel	
No.	Name	Material	Qt.

Scale	Panasonic Corporation	Agreement	Model	MSMD000L10
3rd Angle System	Unit:mm		Name	STRUCTURE SECTION VIEW DRAWING (With Brake)
Designed	Drawn	Checked	Checked	Checked
MIYAZAKI	MIYAZAKI	Nishio	Kira	
2018/04/13	2018/04/13	2018/4/16	2018/4/16	
No.	SR-DSV1232904			