Original Languages

1S-series

OMRON

AC Servomotors (Model: R88M-1AL□/-1AM□)
AC Servo Drives (Model: R88D-1SAN□-ECT)

INSTRUCTION MANUAL

Thank you for purchasing this OMRON Product. Please read this Instruction Manual and *User's Manual,* and thoroughly familiarize yourself with the functions and characteristics of the product before use. Be sure you are using the most recent version of the *User's Manual*. Please retain this Instruction Manual and the *User's Manual* for future reference, and be sure they are delivered to the final user of the Servomotor and Servo Drive.

OMRON Corporation

No. 2825225-5E

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Safety Precautions

- To ensure the safe operation of 1S-series Servomotors and Servo Drives, as well as peripheral devices, read all of this Instruction Manual and the *User's Manual* and be sure you understand the products, safely information, and precautions before attempting operation.
- The *User's Manual* may include illustrations of the products with protective covers removed in order to describe the components of the products in detail. Make sure that these protective covers are on the products before use.
- Consult your OMRON representative when using a product after a long period of storage.

■ Definition of Precautionary Information

- The precautions indicated here provide important information for safety. Be sure to heed the information provided with the precautions.
- The following signal words are used to indicate and classify precautions in this Instruction Manual.

⚠ DANGER	Indicates an imminently hazardous situation which, if not avoided, is likely to result in serious injury or may result in death. Additionally there may be severe property damage.
⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.

Failure to heed the precautions classified as "Caution" may also lead to serious results. Always heed these precautions.

■ Explanation of Symbols

The triangle symbol indicates precautions and warnings.
The specific operation is shown in the triangle and explained in text.
This example indicates a precaution for electric shock.

The triangle symbol indicates precautions and warnings.
The specific operation is shown in the triangle and explained in text.
This example indicates a general precaution.

The filled circle symbol indicates operations that you must do. The specific operation is shown in the circle and explained in text.
This example indicates a requirement for the ground.

■ Warning and Caution

● Transporting and Unpacking

⚠ WARNING

Do not damage, pull, or put excessive stress or heavy objects on the cables.
Doing so may cause electric shock, malfunction, or burning.

● Installation, Wiring and Maintenance

⚠ WARNING

Install the Servo Drive and Servomotor before wiring.
Not doing so may cause electric shock.

Be sure to ground the 200-VAC input model Servo Drive and Servomotor to 100 Ω or less, and the 400-VAC input model to 10 Ω or less.
Not doing so may cause electric shock.

Do not remove the front cover, terminal covers, cables, or peripheral equipment while the power is supplied.
Doing so may cause electric shock.

Before carrying out wiring or inspection, turn OFF the main circuit power and wait for at least the following specific time.
Not doing so may cause electric shock or burning.
10 minutes: R88D-1SAN10F-ECT, R88D-1SAN15F-ECT, R88D-1SAN20F-ECT, R88D-1SAN30F-ECT
20 minutes: R88D-1SAN02H-ECT, R88D-1SAN04H-ECT, R88D-1SAN08H-ECT, R88D-1SAN10H-ECT, R88D-1SAN15H-ECT, R88D-1SAN20H-ECT, R88D-1SAN30H-ECT

Do not damage, pull, or put excessive stress or heavy objects on the cables.
Doing so may cause electric shock, malfunction, or burning.

Use appropriate tools to wire terminals and connectors.
Check that there is no short-circuit before use.
Not doing so may cause electric shock.

⚠ WARNING

Connect the frame ground wire in the integrated cable securely to the ⏚ or FG of the Servo Drive.
Not doing so may cause electric shock.

Provide safety measures, such as a fuse, to protect against short circuiting of external wiring and failure of the Servo Drive.
Not doing so may cause a fire.

Install the Servomotor, Servo Drive, and peripheral equipment on non-flammable materials such as metals.
Not doing so may cause a fire.

Keep conductive or flammable foreign objects such as screws, metal pieces, and oil out of the Servo Drive and connectors. Pay particular attention to the connector on the top part of Servo Drive.
Not doing so may cause a fire or electric shock.

Design the configuration to cut off the main circuit power supply when the ERR signal (normally close contact) of the control output function is output (open).

Do not bundle the integrated cables.
Doing so may cause fire.

Lock the integrated cable and extension cable connectors.
Not doing so may cause fire.

When you connect more than one Servo Drive to one noise filter, ensure that the size of wires used for the input side of the noise filter and the size of wires used between the noise filter and the relay terminal blocks are thick enough to pass at least the rated current of the noise filter.
Not doing so may cause a fire or electric shock.

● Operation Check

⚠ WARNING

Use the Servomotor, Servo Drive and integrated cable in a specified combination.
Not doing so may cause fire or equipment damage.

● Usage

⚠ WARNING	
Do not enter the operating area during operation. Doing so may cause injury.	
Do not touch the Servo Drive radiator, Regeneration Resistor, or Servomotor while the power is supplied or for a while after the power is turned OFF because they get hot. Doing so may cause fire or a burn injury.	
Take appropriate measures to ensure that the specified power with the rated voltage is supplied. Be particularly careful in locations where the power supply is unstable. Not doing so may cause failure.	
When the power is restored after a momentary power interruption, the machine may restart suddenly. Do not come close to the machine when restoring power. Implement measures to ensure safety of people nearby even when the machine is restarted. Doing so may cause injury.	
Use appropriate tools to wire terminals and connectors. Check that there is no short-circuit before use. Not doing so may cause electric shock.	
Be sure to observe the radiator plate installation conditions that are specified in the manual. Not doing so may cause the Servo Drive or Servomotor to burn.	
If the load that exceeds the allowable range is installed, it may cause the dynamic brake to be damaged. Be sure to use the appropriate load. Not doing so may cause the Servo Drive to be damaged.	
The dynamic brake is intended for the stop at the time of an error and therefore it has a short-time rating. If the dynamic brake is activated, provide an interval of 3 minutes or more before the next activation to prevent a circuit failure and burning of the Dynamic Brake Resistor.	
Make a design of equipment with consideration of a distance until a Servomotor stops while safety monitoring functions are used. Not doing so may cause injury and equipment damage.	
Do not place flammable materials near the Servomotor, Servo Drive, or peripheral equipment. Doing so may cause a fire.	

⚠ WARNING

If the Servo Drive fails, cut off the power supply to the Servo Drive at the power supply.
Not doing so may cause a fire.

Use an appropriate External Regeneration Resistor. Install an external protective device such as temperature sensor to ensure safety when using the External Regeneration Resistor.
Not doing so run the risk of burnout.

Use the extension cables in a specified combination.
Not doing so may cause fire, equipment damage.

Before operating the Servo Drive in an actual environment, check if it operates correctly based on the newly set parameters.
Not doing so may cause equipment damage.

When constructing a system that includes safety functions, be sure you understand the relevant safety standards and all related information in user documentation, and design the system to comply with the standards.
Not doing so may cause injury or equipment damage.

An External Regeneration Resistor or an External Regeneration Resistor Unit may become hot. In order to ensure safety, install an external protection such as a guard so as not to touch them easily.
Not doing so may cause a burn injury.

- **Transporting and Unpacking**

⚠ CAUTION

When transporting the Servo Drive, do not hold it by the cables, shield clamp, integrated connector or motor shaft.
Injury or failure may result.

Do not step on the Servo Drive or place heavy articles on it.
Injury or failure may result.

Do not overload the product.
Injury or failure may result.

Be sure to observe the specified amount when piling up products.
Injury or failure may result.

● Wiring

⚠ CAUTION

Be careful about sharp parts such as the corner of the equipment when handling the Servo Drive and Servomotor.
Injury may result.

Wire the cables correctly and securely.
Damage to Servo Drive or fire may result.

Precautions for Safe Use

- Do not store or install the Servo Drive in the following locations. Electric shock, fire, equipment damage, or malfunction may result.
  - Locations subject to direct sunlight
  - Locations subject to temperatures outside the range specified in the specifications
  - Locations subject to humidity outside the range specified in the specifications
  - Locations subject to condensation as the result of severe changes in temperature
  - Locations subject to corrosive or flammable gases
  - Locations subject to dust (especially iron dust) or salts
  - Locations subject to exposure to water, oil, or chemicals
  - Locations subject to shock or vibration
- Medical electronics such as cardiac pacemakers may malfunction or injury may result.
- If an error occurs, remove the cause of the error and ensure safety, and then perform the error reset and restart the operation.
  Injury, equipment damage, or burning may result.
- Use a robot cable for the wiring to separately install the Servo Drive and Servomotor to moving and fixed parts of the equipment.
  Equipment damage may result.
- Connect the Servo Drive to the Servomotor without a contactor, etc.
  Malfunction or equipment damage may result.
- Be sure to observe the installation conditions. Burning or failure may result.
- Wire the cables correctly and securely.
  Runaway motor, Unintentional behavior of the brake, injury, or failure may result.
- Take appropriate and sufficient countermeasures to provide shielding when installing systems in the following locations.
  Failure may result.
  - Locations subject to static electricity or other forms of noise
  - Locations subject to strong electromagnetic fields
  - Locations subject to possible exposure to radioactivity
  - Locations close to power lines
- Do not move a integrated connector of a Servomotor over 5 times. Electric shock, equipment damage, or burning may result.
- Pay attention carefully to fingers where the levers of connectors are locked.
  Pinched fingers may result.

Precautions for Correct Use

- When unpacking, transporting, or installing the products, observe the following instructions. Injury or failure may result.
  - When lifting the products, do not drop the products.
  - Do not grasp a plastic part of the product.
  - When lifting the products at 20 kg or more, always have two people lift the products. Relevant model: R88M-1AM2K715T-B□, R88M-1AM3K015C-B□
  - When lifting a Servomotor, always lift the product by grasping a metal part other than the shaft or integrated connector.
- Check that the eye bolts are not loose after replacing them.
  If they are loose, the screws can come off and the Servomotor may fall during the transportation by the use of eye bolts.
  Do not put the human body under the Servomotor during the transportation.
- Be sure to observe the mounting direction.
  Failure may result.
- Provide the specified clearance between the Servo Drive and the inner surface of the control panel or other equipment.
  Fire or failure may result.
- Do not apply strong impact on the motor shaft, integrated connector or Servo Drive.
  Failure may result.
- Do not touch the key grooves with bare hands if the Servomotor with shaft-end key grooves is used.
  Injury may result.
- Use non-magnetic mounting screws. Note also that the depth of any mounted screw does not reach the effective thread length.
  Equipment damage may result.
- Be sure to observe the allowable axial load for the Servomotor.
  Equipment damage may result.
- Install equipment to prevent crash and reduce shock.
  Do not run the Servomotor outside the operable range by the use of the drive prohibition function such as overtravel.
  Crash against the stroke edge may occur depending on stopping distance and equipment damage may result.
- Do not block the intake or exhaust openings.
  Do not allow foreign objects to enter the Servo Drive.
  Fire may result.
- Tighten the mounting screws, terminal block screws, and shield clamp screws for the Servo Drive and Servomotor to the specified torque.
  Failure may result.
- Use crimp terminals to wire screw type terminal blocks.
  Do not connect bare stranded wires directly to terminals blocks.
  Fire may result.
- Always use the power supply voltage specified in this document.
  Burning may result.
- Do not apply a commercial power supply directly to the Servomotor.
  Fire or failure may result.
- Disconnect all connections to the Servo Drive and Servomotor before attempting a megger test (insulation resistance measurement) on the Servo Drive and Servomotor.
  Not doing so may result in Servo Drive and Servomotor failure.
  Do not perform a dielectric strength test on the Servo Drive and Servomotor.
  Internal elements may be damaged.

- Carefully perform the wiring and assembling.
  Injury may result.
- Wear the protective equipment when installing or removing the main circuit connector, main circuit connector A, main circuit connector B, control power supply connector, or motor connector.
  Do not apply a force after the protrusion of the connector opener reaches the bottom dead center. (As a guide, do not apply a force of 100 N or more.)
- Be sure to install surge suppressors when you connect a load with an induction coil such as a relay to the control output terminal. Malfunction or equipment damage may result.
- Be sure to install a shield clamp in accordance with a specified procedure. Electric shock may result.
- Do not give impact on connectors such as tapping by hammer. Damage may result.
- Install an immediate stop device externally to the machine so that the operation can be stopped and the power supply is cut off immediately.
  Injury may result.
- Do not adjust or set parameters to extreme values, because it will make the operation unstable.
  Injury may result.
- Secure a sufficient rigidity when you install a servo motor into equipment.
  Equipment damage or malfunction may result.
- If a problem occurs in serial communications or the computer during a test operation, you have no means to stop the Servomotor.
  Connect an externally installed emergency stop switch, etc. to the Error Stop Input of the general-purpose input so that the Servomotor can be stopped without fail.
- When using the Servomotor with key, run the Servomotor in a state in which the key cannot jump out of the shaft.
  Not doing so may result in hurting people around the equipment due to the jumping key.
- Fully check the shaft when you reset a brake interlock from PC tool.
- Do not drive the Servomotor by the use of an external drive source.
  Fire may result.
- Install a stopping device on the machine to ensure safety.
  The holding brake is not a stopping device to ensure safety.
  Injury may result.
- Conduct a test operation after confirming that the equipment is not affected.
  Equipment damage may result.
- Do not use the built-in brake of the Servomotor for normal braking operation.
  Failure may result.
- After an earthquake, be sure to conduct safety checks.
  Electric shock, injury, or fire may result.
- Connect an emergency stop (immediate stop) relay in series with the brake interlock output.
  Injury or failure may result.
- Do not use the cable when it is laying in oil or water.
  Electric shock, injury, or fire may result.
- Install safety devices to prevent idling or locking of the electromagnetic brake or the gear head, or leakage of grease from the gear head.
  Injury, damage, or taint damage result.
- Be sure to turn OFF the power supply when not using the Servo Drive for a prolonged period of time.
  Injury or malfunction may result.
- If the Servomotor is not controlled, it may not be possible to maintain the stop. To ensure safety, install a stop device.
  Equipment damage or injury may result.
- Periodically run the Servomotor approximately one rotation when the oscillation operation continues at a small angle of 45° or smaller.
  Servomotor failure may result.

- When a difference between a position indicated by the Servo Drive before the power supply OFF and a position after the power supply ON is one rotation or more, check that devices are placed in appropriate areas.
- Immediately stop the operation and cut off the power supply when unusual smell, noise, smoking, abnormal heat generation, or vibration occurs.
  The Servo Drive or Servomotor may be damaged or burn.
- After replacing the Servo Drive, transfer to the new Servo Drive all data needed to resume operation, before restarting operation.
  Equipment damage may result.
- Do not repair the Servo Drive by disassembling it.
  Electric shock or injury may result.

General Specifications for Servo Drives

Item			Specifications
Operating ambient temperature and humidity			0 to 55°C, 90% max. (with no condensation)
Storage ambient temperature and humidity			-20 to 65°C, 90% max. (with no condensation)
Operating and storage atmosphere			No corrosive gases
Operating altitude			1,000 m max.
Vibration resistance			10 to 60 Hz and at an acceleration of 5.88 m/s^2 or less (Not to be run continuously at the resonance frequency)
Insulation resistance			Between power supply terminals/power terminals and PE terminals: 0.5 MΩ min. (at 500 VDC)
Dielectric strength			Between power supply terminals/power terminals and PE terminals: 1,500 VAC for 1 min at 50/60 Hz
Protective structure			IP20 (Built into IP54 panel)
International Standard	EU Directives	EMC Directives	EN 61800-3 second environment, C3 category (EN 61000-6-7: Functional Safety)
		Low Voltage Directive	EN 61800-5-1
		Machinery Directive	EN ISO 13849-1 PLe/Cat.3 EN 61508 SIL3 EN 62061 SIL CL3 EN 61800-5-2 SIL3 (STO/SS1/SS2/SOS/SLS/SLP/SDI/SBC)
	UL standards		UL61800-5-1
	CSA standards		CSA C22.2 No.274

Note: 1. The above items reflect individual evaluation testing.
The results may differ under compound conditions.
2. Disconnect all connections to the Servo Drive before attempting a megger test (insulation resistance measurement) on a Servo Drive. Not doing so may result in the Servo Drive failure.
Do not perform a dielectric strength test on the Servo Drive. Internal elements may be damaged.

■ Servo Drive Rating

- 200-VAC Input Model: R88D-1SAN□□H-ECT

Item		Unit	Model (R88D-1SAN)		
			02H-ECT	04H-ECT	08H-ECT
Rated voltage		VAC	200 to 240 (170 to 252)*1		
			Single-phase/3-phase		
Power supply frequency		Hz	50/60 (47.5 to 63) *1		
Rated input current	Single-phase	Arms	2.7	4.6	7.3
	3-phase	Arms	1.5	2.7	4.0
Rated output		W	200	400	750

Item	Unit	Model (R88D-1SAN)		
		02H-ECT	04H-ECT	08H-ECT
Rated output current (FLA)	Arms	1.5	2.5	4.6
Weight	kg	2.6	2.6	2.6
External dimensions (W×H×D)	mm	85×180×215		

Item		Unit	Model (R88D-1SAN)			
			10H-ECT	15H-ECT	20H-ECT	30H-ECT
Rated voltage		VAC	200 to 240 (170 to 252)*1			
			3-phase	Single-phase/3-phase	3-phase	
Power supply frequency		Hz	50/60 (47.5 to 63) *1			
Rated input current	Single-phase	Arms	---	15.7	---	---
	3-phase	Arms	5.8	9.0	13.0	15.9
Rated output		W	1k	1.5k	2k	3k
Rated output current (FLA)		Arms	7.7	9.7	16.2	22.3
Weight		kg	2.6	4.2	4.2	4.2
External dimensions (W×H×D)		mm	85×180×215	110×180×225		

*1. The values outside parentheses indicate the rated value, and the values inside parentheses indicate the range of acceptable variation.

- 400-VAC Input Model: R88D-1SAN□□F-ECT
  Use a neutral grounded 400 VAC 3-phase power supply for the 400 VAC input models.

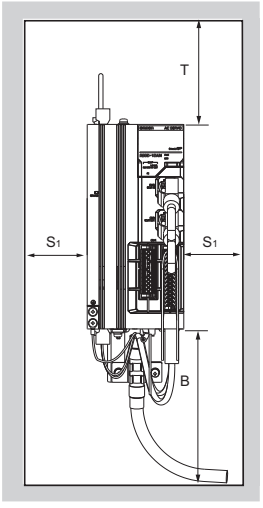
Item	Unit	Model (R88D-1SAN)			
		10F-ECT	15F-ECT	20F-ECT	30F-ECT
Rated voltage	VAC	380 to 480 (323 to 504)*1			
		3-phase			
Power supply frequency	Hz	50/60 (47.5 to 63) *1			
Rated input current	Arms	3.1	4.3	6.5	8.4
Rated output	W	1k	1.5k	2k	3k
Rated output current (FLA)	Arms	4.1	4.7	7.8	11.3
Weight	kg	4.2	4.2	4.2	4.2
External dimensions (W×H×D)	mm	110×180×225			

*1. The values outside parentheses indicate the rated value, and the values inside parentheses indicate the range of acceptable variation.

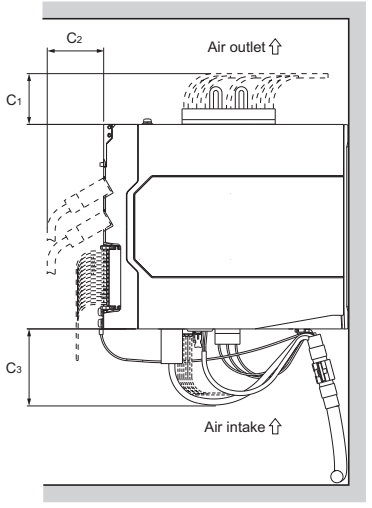
■ Space Conditions around Servo Drives

- Install the Servo Drives according to the dimension conditions shown in the following illustration, and ensure proper dispersion of heat from inside the Servo Drives and convection inside the panel.
  If the Servo Drives are installed side by side, install a fan for air circulation to prevent uneven temperatures inside the panel.

● Single-unit Installation

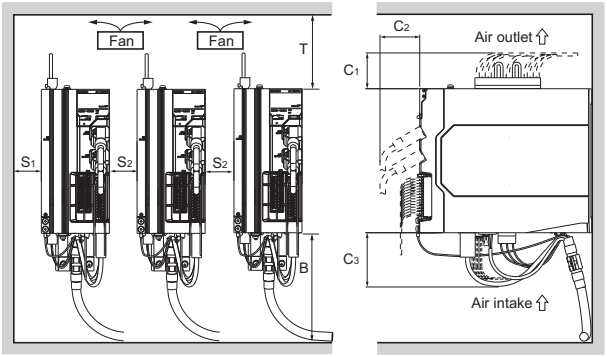


Front view



Side view

- Side-by-side Installation



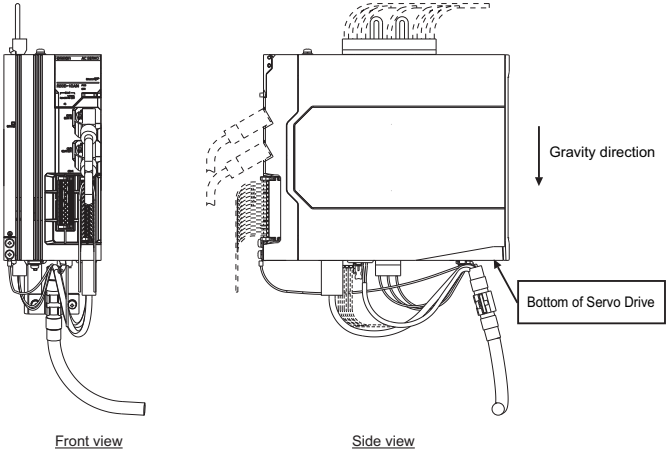
Front view Side view

Dimensions	Distance	
T	100 mm min.	
B	R88D-1SAN02H-ECT/-1SAN04H-ECT/ -1SAN08H-ECT	150 mm min.
	R88D-1SAN10H-ECT/-1SAN15H-ECT/ -1SAN20H-ECT/-1SAN30H-ECT/-1SAN10F-ECT/ -1SAN15F-ECT/-1SAN20F-ECT/-1SAN30F-ECT	180 mm min.
S_1	40 mm min.	
S_2	10 mm min.	
C_1	R88D-1SAN02H-ECT/-1SAN04H-ECT/ -1SAN08H-ECT/-1SAN10H-ECT	45 mm min.
	R88D-1SAN15H-ECT/-1SAN20H-ECT/ -1SAN30H-ECT/-1SAN10F-ECT/-1SAN15F-ECT/ -1SAN20F-ECT/-1SAN30F-ECT	60 mm min.
C_2	50 mm min.	
C_3	80 mm min.	

- Install the Servo Drive on the vertical metal surface.
- To provide electrical conduction, remove any paint from the surface on which you install the Servo Drives. Also, it is recommended that you apply conductive plating if you make the mounting bracket by yourself.
- The recommended tightening torque for installing the Servo Drive is 1.5 N·m. Make sure that the threaded portion has the sufficient strength to withstand the recommended torque.
- You can install Servo Drives without the clearance of S_2 if the operating ambient temperature is from 0 to 45°C.
- Install a shield clamp, using screws packed in the product or specified.

■ Mounting Direction

Turn the bottom of Servo Drive in the gravity direction.



■ Operating Environment Conditions

The environment in which the Servo Drive is operated must meet the following conditions. The Servo Drive may malfunction if it is operated under any other conditions.

Item	Specifications
Operating ambient temperature	0 to 55°C
Operating ambient humidity	90% max. (with no condensation)
Operating atmosphere	No corrosive gases
Operating altitude	1,000 m max.

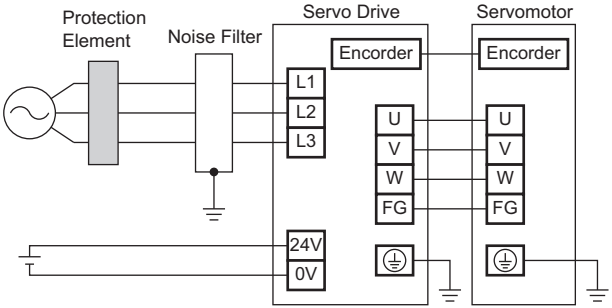
■ Ambient Temperature Control

- Operation in an environment in which there is minimal temperature rise is recommended to maintain a high level of reliability.
- When Servo Drives are installed in a closed space, such as a box, the ambient temperature may rise due to the heat that is generated from each unit. Use a fan or air conditioner to maintain the ambient temperature of the Servo Drive from under the operating environment conditions.
- The Servo Drive surface may rise in temperature of 30°C above the ambient temperature. Use heat-resistant materials for wiring, and provide a distance from any devices and wiring that are sensitive to heat.
- The use of the Servo Drive in a hot environment shortens its lifetime.
  When you use the Servo Drive in continuous operation, use a fan or air conditioner to maintain the ambient temperature at or below 40°C.

■ Keeping Foreign Objects Out of Units

- Take measures during installation and operation to keep foreign objects such as metal particles, oil, machining oil, dust, or water out of the Servo Drive.
- Place a cover over the Servo Drive or take other preventive measures to keep foreign objects such as drill filings out of the Servo Drive during installation. Be sure to remove the cover after installation is complete. If the cover is left on during operation, heat dissipation from the Servo Drive is blocked, which may result in malfunction.

■ Wiring Diagram



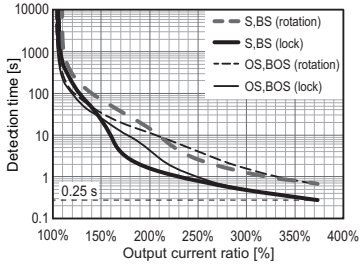
- The above diagram shows the wiring of Servomotor on the temperature protection.
- The length of integrated cable must be 50m or less.*1
- Connect a leakage breaker and fuse as a protection element.

*1 The cable length does not meet the EMC Directives.
Refer to Compatibility Conditions of EU Directives.

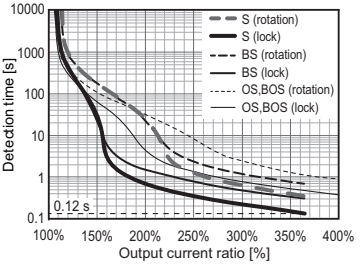
■ Overload Characteristics (Electronic Thermal Function)

- Solid state motor overload protection is provided in each model.
- The overload protection (electronic thermal) function is built into the Servo Drive to protect the Servo Drive and Servomotor from overloading. If an overload occurs, first eliminate the cause of the error and then wait for the Servomotor temperature to drop before you turn ON the power again. If the error reset is repeated at short intervals, the motor windings may burn out.
- The Servo Drive parameter shall be set at no more than the full load current rating of the Servomotor.

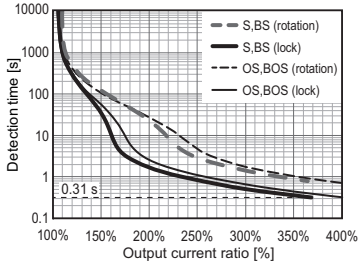
● R88M-1AM20030T



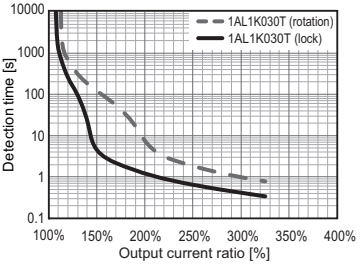
● R88M-1AM40030T



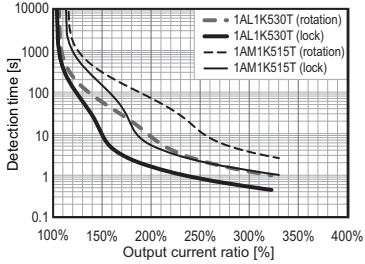
● R88M-1AM75030T



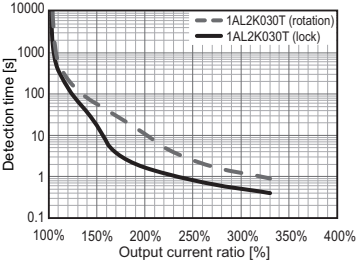
● R88M-1AL1K030T



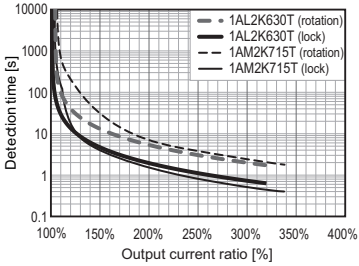
● R88M-1AL1K530T/-1AM1K515T



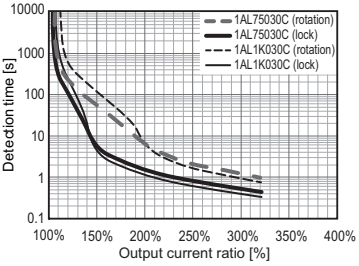
● R88M-1AL2K030T



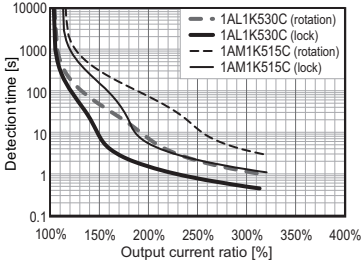
● R88M-1AL2K630T/-1AM2K715T



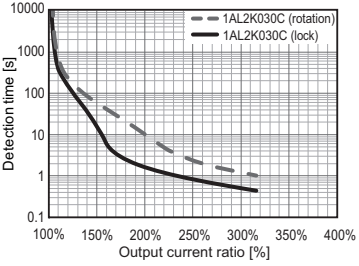
● R88M-1AL75030C/-1AL1K030C



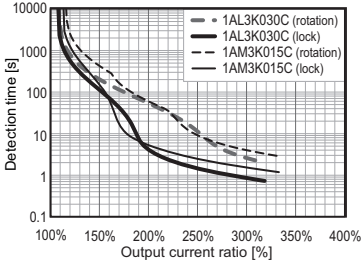
● R88M-1AL1K530C/-1AM1K515C



● R88M-1AL2K030C



● R88M-1AL3K030C/-1AM3K015C



Terminal Block

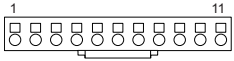
■ Terminal Block Specifications

Symbol	Name	Specifications	
L1 L2 L3	Main circuit power supply input *1	R88D-1SAN□□H-ECT • 200 to 750 W, 1.5 kW: Single-phase 200 to 240 VAC (170 to 252 VAC) 50/60 Hz (47.5 to 63 Hz) • 200 W to 3 kW: 3-phase 200 to 240 VAC (170 to 252 VAC) 50/60 Hz (47.5 to 63 Hz) R88D-1SAN□□F-ECT • 1 to 3 kW: 3-phase 380 to 480 VAC (323 to 504 VAC) 50/60 Hz (47.5 to 63 Hz)	
+24V *2 0V *3	Control circuit power supply input	24 VDC±10%	
B1 *4 B2 B3	External Regeneration Resistor connection terminals	When the Internal Regeneration Resistor is used: • Open between B1 and B2. • Short-circuit B2 and B3. When the External Regeneration Resistor is used: • Connect the External Regeneration Resistor between B1 and B2. • Open between B2 and B3.	
N1 N2	DC reactor connection terminals	When the DC reactor is not used: • Short-circuit N1 and N2. When the DC reactor is used: • Connect the DC reactor between N1 and N2.	
U	Motor connection terminals	Phase U	These are output terminals to the Servomotor. Be sure to wire them correctly.
V		Phase V	
W		Phase W	
FG *5		FG	This is a frame ground terminal for the Servomotor.

*1. For single-phase, connect between any two phases out of the following: L1, L2, and L3.
*2. For the R88D-1SAN0□H-ECT and R88D-1SAN10H-ECT, the symbol of this terminal is 24V.
*3. For the R88D-1SAN0□H-ECT and R88D-1SAN10H-ECT, the symbol of this terminal is Ø .
*4. For the R88D-1SAN0□H-ECT and R88D-1SAN10H-ECT, the symbol of this terminal is P/B1.
*5. Only the R88D-1SAN15H-ECT, R88D-1SAN20H-ECT, R88D-1SAN30H-ECT, and R88D-1SAN□□F-ECT have this terminal.

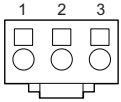
- Main circuit connector (CNA): R88D-1SAN0□H-ECT/R88D-1SAN10H-ECT

Pin No.	Symbol
1	L1
2	L2
3	L3
4	B3
5	B2
6	P/B1
7	N1
8	N2
9	N3 (Reserved)
10	24V
11	∅



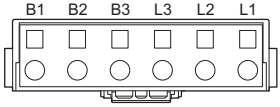
- Motor connector (CNC): R88D-1SAN0□H-ECT/R88D-1SAN10H-ECT

Pin No.	Symbol
1	U
2	V
3	W



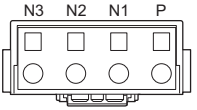
- Main circuit connector A (CNA): R88D-1SAN15H-ECT/R88D-1SAN20H-ECT/R88D-1SAN30H-ECT/R88D-1SAN□□F-ECT

Pin No.	Symbol
---	B1
---	B2
---	B3
---	L3
---	L2
---	L1



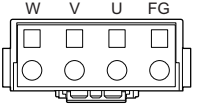
- Main circuit connector B (CNB): R88D-1SAN15H-ECT/R88D-1SAN20H-ECT/R88D-1SAN30H-ECT/R88D-1SAN□□F-ECT

Pin No.	Symbol
---	N3 (Reserved)
---	N2
---	N1
---	P (Reserved)



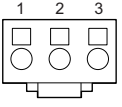
- Motor connector (CNC): R88D-1SAN15H-ECT/R88D-1SAN20H-ECT/R88D-1SAN30H-ECT/R88D-1SAN□□F-ECT

Pin No.	Symbol
---	W
---	V
---	U
---	FG



- Control power supply connector (CND): R88D-1SAN15H-ECT/ R88D-1SAN20H-ECT/ R88D-1SAN30H-ECT/ R88D-1SAN□□F-ECT

Pin No.	Symbol
1	+24V
2	0V
3	---



■ Terminal Block Wire Sizes

The following tables show the rated current that flows to the terminal block on the Servo Drive and the applicable wire sizes. Use the wire with the rated voltage of 600 V or higher for the main circuit.
The wire size is determined for when the heat-resistant polyvinyl chloride insulated wire (HIV) is used at the ambient temperature of 50°C.

- Wire Sizes for 200-VAC Input Model: R88D-1SAN□□H-ECT

Item		Unit	Model (R88D-1SAN)		
			02H-ECT	04H-ECT	08H-ECT
Power supply capacity		kVA	0.6	1.0	1.4
Main circuit power supply input *1	Rated current	Arms	2.7/1.5*2	4.6/2.7*2	7.3/4.0*2
	Wire size	---	AWG20 to 14 /0.5 to 2.0 mm^2	AWG18 to 14 /0.75 to 2.0 mm^2	AWG16 to 14 /1.3 to 2.0 mm^2
Control circuit power supply input	Wire size	---	AWG20 to 16/0.5 to 1.5 mm^2		

Item		Unit	Model (R88D-1SAN)		
			02H-ECT	04H-ECT	08H-ECT
Motor connection terminals*3	Rated current	Arms	1.5	2.5	4.6
	Wire size	---	AWG21 to 14/0.5 to 2.0 mm^2		
Protective earth	Wire size	---	AWG12/2.5 mm^2 or larger		
	Screw size	---	M4		
	Tightening torque	N·m	1.2		

*1. For single-phase, connect between any two phases out of the following: L1, L2, and L3.
*2. The first value is for single-phase input power and the second value is for 3-phase input power.
*3. Provide the same current capacity for the wiring of the motor connection terminals and for that of B1 and B2.

- Wire Sizes for 200-VAC Input Model: R88D-1SAN□□H-ECT

Item		Unit	Model (R88D-1SAN)			
			10H-ECT	15H-ECT	20H-ECT	30H-ECT
Power supply capacity		kVA	2.0	2.5	3.6	4.7
Main circuit power supply input*1	Rated current	Arms	5.8	15.7/9.0*2	13.0	15.9
	Wire size	---	AWG16 to 14 /1.3 to 2.0 mm^2	AWG12 to 8/3.3 to 8.4 mm^2		
Control circuit power supply input	Wire size	---	AWG20 to 16/0.5 to 1.5 mm^2			
Motor connection terminals*3	Rated current	Arms	7.7	9.7	16.2	22.3
	Wire size	---	AWG18 to 14 /1.0 to 2.0 mm^2	AWG18 to 8 /1.0 to 8.4 mm^2	AWG16 to 8 /1.5 to 8.4 mm^2	
Protective earth	Wire size	---	AWG12/2.5 mm^2 or larger			
	Screw size	---	M4			
	Tightening torque	N·m	1.2			

*1. For single-phase, connect between any two phases out of the following: L1, L2, and L3.
*2. The first value is for single-phase input power and the second value is for 3-phase input power.
*3. Provide the same current capacity for the wiring of the motor connection terminals and for that of B1 and B2.

- Wire Sizes for 400-VAC Input Model: R88D-1SAN□□F-ECT

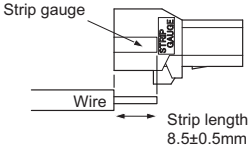
Item		Unit	Model (R88D-1SAN)			
			10F-ECT	15F-ECT	20F-ECT	30F-ECT
Power supply capacity		kVA	2.0	2.1	4.2	5.0
Main circuit power supply input	Rated current	Arms	3.1	4.3	6.5	8.4
	Wire size	---	AWG16 to 8/1.3 to 8.4 mm^2			AWG14 to 8/2.0 to 8.4 mm^2
Control circuit power supply input	Wire size	---	AWG20 to 16/0.5 to 1.5 mm^2			
Motor connection terminals*1	Rated current	Arms	4.1	4.7	7.8	11.3
	Wire size	---	AWG18 to 8/1.0 to 8.4 mm^2			
Protective earth	Wire size	---	AWG12/2.5 mm^2 or larger			
	Screw size	---	M4			
	Tightening torque	N·m	1.2			

*1. Provide the same current capacity for the wiring of the motor connection terminals and for that of B1 and B2.

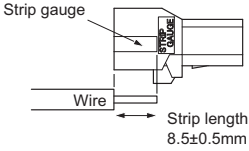
■ Terminal Block Wiring Procedure

1. Remove the terminal block from the Servo Drive before wiring.
   The Servo Drive may be damaged if the wiring is done with the terminal block in place.
2. Strip off the covering from the wire.
   If the stripped wire is bended, loose or too large in diameter due to twist, retwist it gently and check its strip length by the use of a gauge before you use it.
   Smoothen the cut surface of wires and the stripped surface of covering. Or, you can use a ferrule.

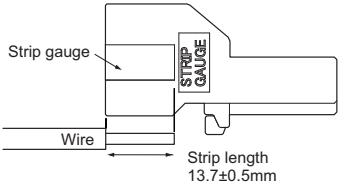
- R88D-1SAN02H-ECT/-1SAN04H-ECT/-1SAN08H-ECT/-1SAN10H-ECT



- R88D-1SAN15H-ECT/-1SAN20H-ECT/-1SAN30H-ECT/-1SAN10F-ECT/ -1SAN15F-ECT/-1SAN20F-ECT/-1SAN30F-ECT

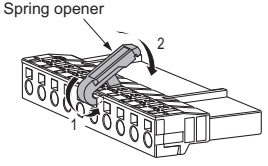


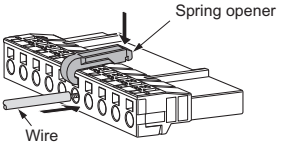
(CND)

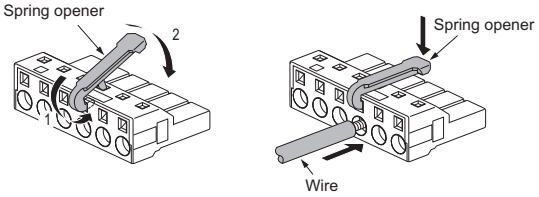


(CNA/CNB/CNC)

3. Connect the wires.
   Insert the hook of the spring opener into a square hole located on the same side as the wire holes, and use your thumb to press down the lever of the spring opener until it clicks into place.
   Insert the wire fully into the back of a wire hole while the lever of the spring opener is held down.
   Release the lever, and then pull the wire gently to check that it does not come out.

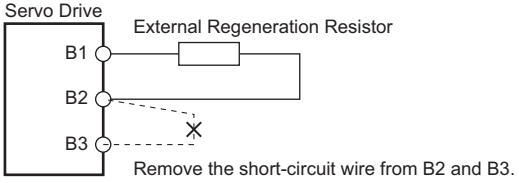






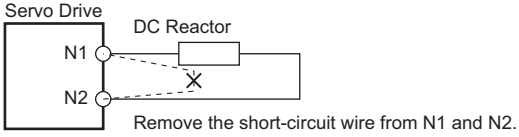
■ Connection of External Regeneration Resistor

When an External Regeneration Resistor is required, remove the short-circuit wire from B2 and B3, and connect an External Regeneration Resistor between B1 and B2 as shown below.



■ Connection of DC Reactor

When a DC reactor is required, remove the short-circuit wire from N1 and N2, and connect a DC reactor between N1 and N2 as shown below.



Compatibility Conditions of EU Directives

- This is a product designed for industrial environments.
  Use in residential area may cause radio interference, in which case the user may be required to take adequate measures to reduce interference.
- This type of PDS is not intended to be used on a low-voltage public network which supplies domestic premises.

■ Manufacturer and EU Representative

Manufacturer:	OMRON Corporation (Manufacturer) Shiokoji Horikawa, Shimogyo-ku, Kyoto, 600-8530, Japan
EU Representative:	OMRON Europe B.V. (Representative and Importer in EU) Wegalaan 67-69, 2132 JD Hoofddorp, The Netherlands

■ Compatibility Conditions of Low Voltage Directive

- Installation Environment

Item	Specifications
Operating ambient temperature and humidity	0 to 55°C, 90% max. (with no condensation)
Overvoltage category	III
Pollution Degree	2
Altitude	1,000 m max.
Protective structure	IP20 (To be built into the IP54 enclosure)
Protection class	I
Input power supply	AC power supply When the DC power input is used, the Servo Drive does not conform to EU standards.
Short-circuit current rating (SCCR)	5,000 Arms

■ Servo Drive Rating

- 200-VAC Input Model: R88D-1SAN□□H-ECT

Item		Unit	Model (R88D-1SAN)		
			02H-ECT	04H-ECT	08H-ECT
Rated voltage		VAC	200 to 240 Single-phase/3-phase		
Power supply frequency		Hz	50/60		
Rated input current	Single-phase	Arms	2.7	4.6	7.3
	3-phase	Arms	1.5	2.7	4.0
Rated output		W	200	400	750

Item	Unit	Model (R88D-1SAN)			
		10H-ECT	15H-ECT	20H-ECT	30H-ECT
Rated voltage	VAC	200 to 240 3-phase	Single-phase/ 3-phase	3-phase	

Item		Unit	Model (R88D-1SAN)			
			10H-ECT	15H-ECT	20H-ECT	30H-ECT
Power supply frequency		Hz	50/60			
Rated input current	Single-phase	Arms	---	15.7	---	---
	3-phase	Arms	5.8	9.0	13.0	15.9
Rated output		W	1k	1.5k	2k	3k

- 400-VAC Input Model: R88D-1SAN□□F-ECT
  Use a neutral grounded 400 VAC 3-phase power supply for the 400 VAC input models.

Item	Unit	Model (R88D-1SAN)			
		10F-ECT	15F-ECT	20F-ECT	30F-ECT
Rated voltage	VAC	380 to 480			
		3-phase			
Power supply frequency	Hz	50/60			
Rated input current	Arms	3.1	4.3	6.5	8.4
Rated output	W	1k	1.5k	2k	3k

- Control Circuit Power Supply
  Rating 24 VDC/1.2 A

- Installation of Short-circuit Protection Element
  Connect an IEC 60269-1 CLASS gG fuse or an equivalent fuse the melting time is shorter, to the main circuit power.
  Select a fuse that satisfies the maximum current rating of the following table.

Servo Drive model	Maximum current rating
R88D-1SAN02H-ECT	16 A
R88D-1SAN04H-ECT	16 A
R88D-1SAN08H-ECT	16 A
R88D-1SAN10H-ECT	16 A
R88D-1SAN15H-ECT	40 A
R88D-1SAN20H-ECT	40 A
R88D-1SAN30H-ECT	40 A
R88D-1SAN10F-ECT	20 A
R88D-1SAN15F-ECT	20 A
R88D-1SAN20F-ECT	20 A
R88D-1SAN30F-ECT	20 A

■ Terminal Block Wire Sizes

The following tables show the rated current that flows to the terminal block on the Servo Drive and the applicable wire sizes.

- Wire Sizes for 200-VAC Input Model: R88D-1SAN□□H-ECT

Item		Unit	Model (R88D-1SAN)		
			02H-ECT	04H-ECT	08H-ECT
Power supply capacity		kVA	0.6	1.0	1.4
Main circuit power supply input*1	Rated current	Arms	2.7/1.5*2	4.6/2.7*2	7.3/4.0*2
	Wire size	---	0.5 to 1.5 mm^2	0.75 to 1.5 mm^2	1.5 mm^2
Control circuit power supply input	Wire size	---	0.5 to 1.5 mm^2		
Motor connection terminals	Rated current	Arms	1.5	2.5	4.6
	Wire size	---	0.5 to 1.5 mm^2		0.75 to 1.5 mm^2
Protective earth	Wire size	---	2.5 mm^2 or larger		
	Screw size	---	M4		
	Tightening torque	N·m	1.2		

*1. For single-phase, connect between any two phases out of the following: L1, L2, and L3.
*2. The first value is for single-phase input power and the second value is for 3-phase input power.

- Wire Sizes for 200-VAC Input Model: R88D-1SAN□□H-ECT

Item		Unit	Model (R88D-1SAN)			
			10H-ECT	15H-ECT	20H-ECT	30H-ECT
Power supply capacity		kVA	2.0	2.5	3.6	4.7
Main circuit power supply input*1	Rated current	Arms	5.8	15.7/9.0*2	13.0	15.9
	Wire size	---	1.5 mm^2	4.0 to 6.0 mm^2		
Control circuit power supply input	Wire size	---	0.5 to 1.5 mm^2			
Motor connection terminals	Rated current	Arms	7.7	9.7	16.2	22.3
	Wire size	---	1.5 mm^2	2.5 to 6.0 mm^2	6.0 mm^2	
Protective earth	Wire size	---	2.5 mm^2 or larger	4.0 mm^2 or larger*3		
	Screw size	---	M4			
	Tightening torque	N·m	1.2			

*1. For single-phase, connect between any two phases out of the following: L1, L2, and L3.
*2. The first value is for single-phase input power and the second value is for 3-phase input power.
*3. The wire size of protective earth must be greater than or equal to the wire size of main circuit power supply input.

● Wire Sizes for 400-VAC Input Model: R88D-1SAN□□F-ECT

Item		Unit	Model (R88D-1SAN)			
			10F-ECT	15F-ECT	20F-ECT	30F-ECT
Power supply capacity		kVA	2.0	2.1	4.2	5.0
Main circuit power supply input	Rated current	Arms	3.1	4.3	6.5	8.4
	Wire size	---	1.5 to 6.0 mm^2			2.5 to 6.0 mm^2
Control circuit power supply input	Wire size	---	0.5 to 1.5 mm^2			
Motor connection terminals	Rated current	Arms	4.1	4.7	7.8	11.3
	Wire size	---	1.5 to 6.0 mm^2		2.5 to 6.0 mm^2	
Protective earth ⏚	Wire size	---	2.5 mm^2 or larger*1			
	Screw size	---	M4			
	Tightening torque	N·m	1.2			

*1. The wire size of protective earth must be greater than or equal to the wire size of main circuit power supply input.

● Wiring to Protective Earth Terminal
Use a round terminal for the protective earth terminal.

■ Overload Protection (Electronic Thermal Function)

- Servo Drive memorizes a load ratio after an overload occurs. Therefore, when you run a Servomotor under the same condition, an overload occurs earlier than when the first overload occurs.
- Overload protection does not have Speed Sensitive.

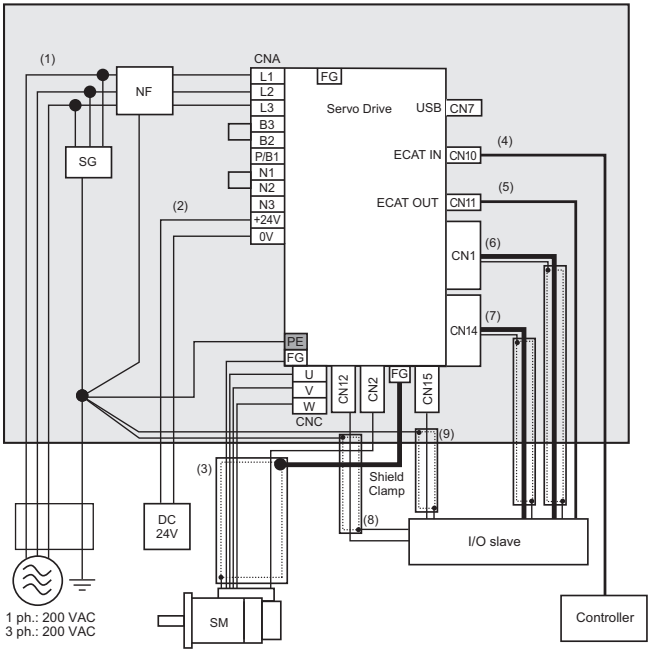
■ Compatibility Conditions of EMC Directives

● Wiring Conforming to EMC Directives
1S-series Servo Drives conform to EMC Directives (EN 61800-3) under the wiring conditions described in this section.
The following conditions are determined so that 1S-series products can conform to EMC Directives.
When the products are installed in the equipment, the customer must perform the check to confirm that the overall machine conforms to EMC Directives.

The following are the conditions required for conformance to the EMC Directives.

- Install the Servo Drive in a metal case (control panel). You do not need to cover the Servomotor with metal plates.
- Install a noise filter and lightening surge absorbing element (surge absorber) on the power line.
- Use braided-shield cables for the I/O signals and integrated cable. Tinned soft steel wires must be used for the shield.
- Connect the shield of each cable directly to the ground plate.

- Peripheral Equipment Connection Examples
  R88D-1SAN02H-ECT/-1SAN04H-ECT/-1SAN08H-ECT/-1SAN10H-ECT



Note: For single-phase inputs, connect between any two phases out of the following: L1, L2, and L3.

- Provide single-point grounding of the ground plate for unit frame grounding as shown in the above diagram.
- Use a ground wire with a minimum thickness of 2.5 mm^2 and arrange the wiring so that the protective earth wire is as short as possible.
- Install a surge absorber and noise filter near the main circuit connector of Servo Drive. Separate I/O wires from each other for the wiring.

• Device Details

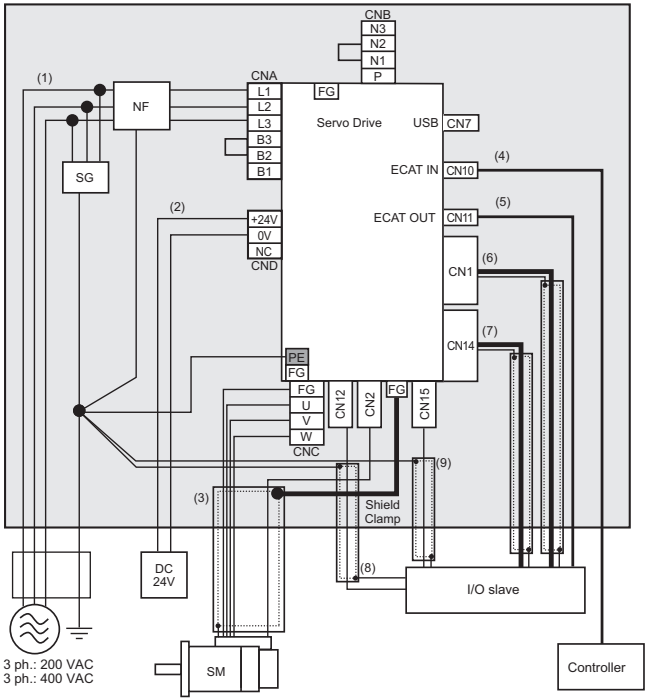
Symbol	Name	Manufacturer	Model	Remarks
SG	Surge absorber	SOSHIN ELECTRIC	LT-C12G801WS	1 ph. 200 VAC
			LT-C32G801WS	3 ph. 200 VAC
NF	Noise filter	SOSHIN ELECTRIC	HF2020C-SZA-33DDD	1 ph. 200 VAC (20 A)
			HF3020C-SZC-33DDD	3 ph. 200 VAC (20 A)
SD	Servo Drive	OMRON	---	*1
SM	Servomotor	OMRON	---	*1
---	I/O slave	---	---	---
---	Controller	---	---	---

*1. Servo Drives and Servomotors are combined according to the specifications.

• Cable Details

No.	Interface	Max. cable length/shield	Cable classification		Ferrite core
			EN/IEC 61800-3	EN/IEC 61000-6-7	
1	Power supply cable (main circuit)	3 m Non-shielded	Power supply port	AC input power supply port	None
2	Power supply cable (control circuit)	3 m Non-shielded	Port for process measurement and control	Signal and control line	None
3	Integrated cable (Motor/Encoder)	20 m Shielded	Power supply interface	Signal and control line	None
4	EtherCAT communi-cations cable (ECAT IN)	20 m Shielded	Signal interface	Signal and control line	None
5	EtherCAT communi-cations cable (ECAT OUT)	20 m Shielded	Signal interface	Signal and control line	None
6	control I/O cable	20 m Shielded	Signal interface	Signal and control line	None
7	Safety cable	20 m Shielded	Signal interface	Signal and control line	None
8	Brake interlock cable	20 m Shielded	Signal interface	Signal and control line	None
9	SBC cable	20 m Shielded	Signal interface	Signal and control line	None

- Peripheral Equipment Connection Examples
  R88D-1SAN15H-ECT/-1SAN20H-ECT/-1SAN30H-ECT/-1SAN10F-ECT/-1SAN15F-ECT/-1SAN20F-ECT/-1SAN30F-ECT



Note: For single-phase inputs, connect between any two phases out of the following: L1, L2, and L3.

- Provide single-point grounding of the ground plate for unit frame grounding as shown in the above diagram.
- Use a ground wire with a minimum thickness of 2.5 mm^2 and arrange the wiring so that the protective earth wire is as short as possible.
- Install a surge absorber and noise filter near the main circuit connector A of Servo Drive. Separate I/O wires from each other for the wiring.

• Device Details

Symbol	Name	Manufacturer	Model	Remarks
SG	Surge absorber	SOSHIN ELECTRIC	LT-C12G801WS	1 ph. 200 VAC
			LT-C32G801WS	3 ph. 200 VAC
			LT-C35G102WS	3 ph. 400 VAC
NF	Noise filter	SOSHIN ELECTRIC	HF2020A-SZC-33DDD	1 ph. 200 VAC (20 A)
			HF3020C-SZC-33DDD	3 ph. 200 VAC (20 A)
			HF3020C-SZC	3 ph. 400 VAC (20 A)
SD	Servo Drive	OMRON	---	*1
SM	Servomotor	OMRON	---	*1
---	I/O slave	---	---	---
---	Controller	---	---	---

*1. Servo Drives and Servomotors are combined according to the specifications.

• Cable Details

No.	Interface	Max. cable length/shield	Cable classification		Ferrite core
			EN/IEC 61800-3	EN/IEC 61000-6-7	
1	Power supply cable (main circuit)	3 m Non-shielded	Power supply port	AC input power supply port	None
2	Power supply cable (control circuit)	3 m Non-shielded	Port for process measurement and control	Signal and control line	None
3	Integrated cable (Motor/Encoder)	20 m Shielded	Power supply interface	Signal and control line	None
4	EtherCAT communications cable (ECAT IN)	20 m Shielded	Signal interface	Signal and control line	None
5	EtherCAT communications cable (ECAT OUT)	20 m Shielded	Signal interface	Signal and control line	None
6	control I/O cable	20 m Shielded	Signal interface	Signal and control line	None
7	Safety cable	20 m Shielded	Signal interface	Signal and control line	None
8	Brake Interlock cable	20 m Shielded	Signal interface	Signal and control line	None
9	SBC cable	20 m Shielded	Signal interface	Signal and control line	None

Compatibility Conditions of UL/CSA Standards

- Installation Environment

Item	Specifications
Maximum surrounding Air Temperature	55°C
Storage environment rating (For Canada)	-20 to 65°C
Overvoltage category	III
Pollution Degree	2
Location	At a maximum altitude of 1,000 m
Protection class	I
Input power supply	AC power supply When the DC power input is used, the Servo Drive does not conform to UL/CSA standards.

• Attach the included warning label inside the control panel.

■ Servo Drive Rating

- 200-VAC Input Model: R88D-1SAN□□H-ECT

Item		Unit	Model (R88D-1SAN)		
			02H-ECT	04H-ECT	08H-ECT
Rated voltage		VAC	200 to 240		
			Single-phase/3-phase		
Power supply frequency		Hz	50/60		
Rated input current	Single-phase	Arms	2.7	4.6	7.3
	3-phase	Arms	1.5	2.7	4.0
Rated output current (FLA)		Arms	1.5	2.5	4.6

Item		Unit	Model (R88D-1SAN)			
			10H-ECT	15H-ECT	20H-ECT	30H-ECT
Rated voltage		VAC	200 to 240			
			3-phase	Single-phase/3-phase	3-phase	
Power supply frequency		Hz	50/60			
Rated input current	Single-phase	Arms	---	15.7	---	---
	3-phase	Arms	5.8	9.0	13.0	15.9
Rated output current (FLA)		Arms	7.7	9.7	16.2	22.3

- 400-VAC Input Model: R88D-1SAN□□F-ECT

Item	Unit	Model (R88D-1SAN)			
		10F-ECT	15F-ECT	20F-ECT	30F-ECT
Rated voltage	VAC	380Y/219-480Y/277			
		3-phase			
Power supply frequency	Hz	50/60			
Rated input current	Arms	3.1	4.3	6.5	8.4
Rated output current (FLA)	Arms	4.1	4.7	7.8	11.3

- Control Circuit Power Supply
  Rating 24 VDC/1.2 A
  Control Circuit Overcurrent Protection is required.

■ Terminal Block Wire Sizes

The following tables show the rated current that flows to the terminal block on the Servo Drive and the applicable wire sizes.
Use 75°C Copper Conductors only.

- Wire Sizes for 200-VAC Input Model: R88D-1SAN□□H-ECT

Item		Unit	Model (R88D-1SAN)		
			02H-ECT	04H-ECT	08H-ECT
Power supply capacity		kVA	0.6	1.0	1.4
Main circuit power supply input*1	Rated current	Arms	2.7/1.5*2	4.6/2.7*2	7.3/4.0*2
	Wire size	---	AWG14		
Motor connection terminals	Rated current	Arms	1.5	2.5	4.6
	Wire size	---	AWG14		
Protective earth	Wire size	---	AWG12 or larger		
	Screw size	---	M4		
	Tightening torque	Lb·in	10.7		

*1. For single-phase inputs, connect between any two phases out of the following: L1, L2, and L3.
*2. The first value is for single-phase input power and the second value is for 3-phase input power.

- Wire Sizes for 200-VAC Input Model: R88D-1SAN□□H-ECT

Item		Unit	Model (R88D-1SAN)			
			10H-ECT	15H-ECT	20H-ECT	30H-ECT
Power supply capacity		kVA	2.0	2.5	3.6	4.7
Main circuit power supply input*1	Rated current	Arms	5.8	15.7/9.0*2	13.0	15.9
	Wire size	---	AWG14	AWG12 to 8		
Motor connection terminals	Rated current	Arms	7.7	9.7	16.2	22.3
	Wire size	---	AWG14	AWG14 to 8	AWG10 to 8	
Protective earth	Wire size	---	AWG12 or larger			
	Screw size	---	M4			
	Tightening torque	Lb·in	10.7			

*1. For single-phase inputs, connect between any two phases out of the following: L1, L2, and L3.

*2. The first value is for single-phase input power and the second value is for 3-phase input power.

- Wire Sizes for 400-VAC Input Model: R88D-1SAN□□F-ECT

Item		Unit	Model (R88D-1SAN)			
			10F-ECT	15F-ECT	20F-ECT	30F-ECT
Power supply capacity		kVA	2.0	2.1	4.2	5.0
Main circuit power supply input	Rated current	Arms	3.1	4.3	6.5	8.4
	Wire size	---	AWG14 to 8			
Motor connection terminals	Rated current	Arms	4.1	4.7	7.8	11.3
	Wire size	---	AWG14 to 8			
Protective earth	Wire size	---	AWG12 or larger			
	Screw size	---	M4			
	Tightening torque	Lb·in	10.7			

- Wiring to Main Circuit Terminal
  In order to conform to UL/CSA standards, be sure to use the connector which comes with the Servo Drive.
- Wiring to Protective Earth Terminal
  Use a UL-listed round terminal for the protective earth terminal.
- Main Circuit Wiring
  Suitable for use on a circuit capable of delivering not more than Short-Circuit Current Rating (SCCR) of the Servo Drives, maximum rated input voltage when protected by UL-listed fuses or by UL-listed braker.
  Be sure to connect a UL-listed molded case fuse.
  Integral solid state short circuit protection does not provide branch circuit protection.
  Branch circuit protection must be provided in accordance with the Manufacturer Instructions, National Electrical Code and any additional local codes.
- Integral solid state short circuit protection (For Canada)
  Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the Canadian Electrical Code, Part 1.
- Connect a breaker or a fuse
  Use a UL-certified (LISTED, marked) breaker or fuse that satisfy the conditions specified in the table below, meaning the voltage must be equal to or greater than the “Voltage (Minimum)” and the “Ampere” must be equal to or less than the listed value.
  Connect a breaker or fuse between the power supply and the noise filter.

Servo Drive model Model R88D-1SAN□□□-ECT	SCCR	Breaker / Fuse		UL CLASS-FUSE*1
		Voltage (Minimum)	Ampere	
02H / 04H / 08H / 10H	50,000Arms	240V	15A	CC, G, T
15H / 20H / 30H	50,000Arms	240V	40A	RK1, CF, G, J, T
10F / 15F / 20F / 30F	30,000Arms	480V	20A	RK1, CC, CF, G, J, T

*1. When using a power supply capable of delivering not more than 5000 rms symmetrical amperes, you can also use UL Listed fuses of Class RK5, CC, CF, G, J, R and T.

*2.The following specifications apply to servo drives manufactured prior to April 19, 2026.
SCCR: 5,000Arms
BCP (Branch Circuit Protection): UL Class fuses (RK5, CC, CF, G, J, R, or T)
The voltage(Minimum) and current specifications for BCP: Same as the table in this section.

⚠ WARNING

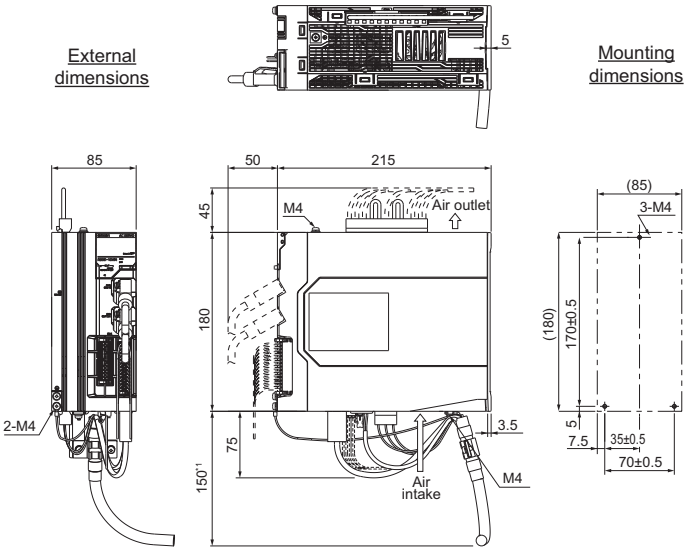
The opening of the branch-circuit protective device may be an indication that a fault current has been interrupted. To reduce the risk of fire or electric shock, the servo driver, servo motor, and associated peripheral devices should be examined and replaced if damaged.

⚠ AVERTISSEMENT

L'ouverture du dispositif de protection du circuit de dérivation peut indiquer qu'un courant de défaut a été interrompu.Pour réduire le risque d'incendie ou de choc électrique, le servovariateur, le servomoteur et les périphériques associés doivent être inspectés et remplacés s'ils sont endommagés.

■ External and Mounting Dimensions

- R88D-1SAN02H-ECT/R88D-1SAN04H-ECT/R88D-1SAN08H-ECT/ R88D-1SAN10H-ECT

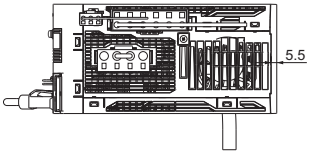


*1 The value is 180 for R88D-1SAN10H-ECT.

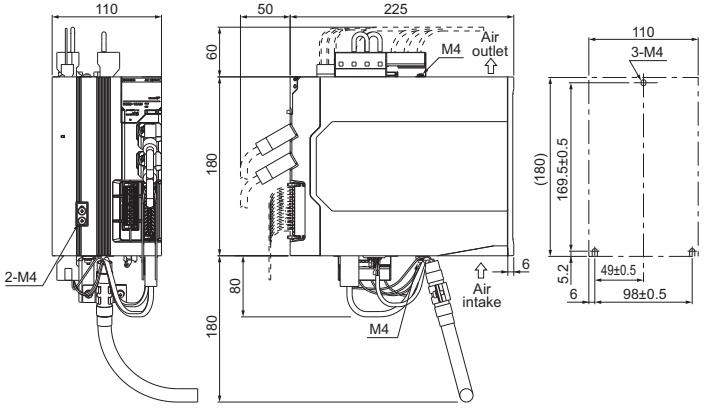
Servo Drive model	Weight
R88D-1SAN02H-ECT	2.6 kg
R88D-1SAN04H-ECT	2.6 kg
R88D-1SAN08H-ECT	2.6 kg
R88D-1SAN10H-ECT	2.6 kg

- R88D-1SAN15H-ECT/R88D-1SAN20H-ECT/R88D-1SAN30H-ECT/ R88D-1SAN□□F-ECT

External dimensions



Mounting dimensions



Servo Drive model	Weight
R88D-1SAN15H-ECT	4.2 kg
R88D-1SAN20H-ECT	4.2 kg
R88D-1SAN30H-ECT	4.2 kg
R88D-1SAN10F-ECT	4.2 kg
R88D-1SAN15F-ECT	4.2 kg
R88D-1SAN20F-ECT	4.2 kg
R88D-1SAN30F-ECT	4.2 kg

Korean Radio Regulations (KC)

- Observe the following precaution if you use this product in Korea.

사용자안내문
이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서
가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

■ Guide for Users

This equipment has been evaluated for conformity in a commercial environment.
When used in a residential environment, it may cause radio interference.
- The 1S-series Servo Drives comply with the Korean Radio Regulations (KC).
- The 1S-series Servomotors are exempt from the Korean Radio Regulations (KC).

National standard (GB)

Rated output 550 W or more Servomotors comply with the following national standard (GB).

GB 30253《永磁同步电动机能效限定值及能效等级》

Combinations of Servo Drives and Servomotors

■ Combination Tables

The tables in this section show the possible combinations of 1S-series Servo Drives and Servomotors. The Servomotors and Servo Drives can only be used in the listed combinations. "□" at the end of the motor model number is for options, such as the shaft type and brake.

- 3,000-r/min Servomotors and Servo Drives

Main circuit power supply voltage	Rated output	Servomotor	Servo Drive
Single-phase/3-phase 200 VAC	200 W	R88M-1AM20030T-□	R88D-1SAN02H-ECT
	400 W	R88M-1AM40030T-□	R88D-1SAN04H-ECT
	750 W	R88M-1AM75030T-□	R88D-1SAN08H-ECT
	1.5 kW	R88M-1AL1K530T-□	R88D-1SAN15H-ECT
3-phase 200 VAC	1 kW	R88M-1AL1K030T-□	R88D-1SAN10H-ECT
	2 kW	R88M-1AL2K030T-□	R88D-1SAN20H-ECT
	2.6 kW	R88M-1AL2K630T-□	R88D-1SAN30H-ECT
3-phase 400 VAC	750 W	R88M-1AL75030C-□	R88D-1SAN10F-ECT
	1 kW	R88M-1AL1K030C-□	R88D-1SAN10F-ECT
	1.5 kW	R88M-1AL1K530C-□	R88D-1SAN15F-ECT
	2 kW	R88M-1AL2K030C-□	R88D-1SAN20F-ECT
	3 kW	R88M-1AL3K030C-□	R88D-1SAN30F-ECT

- 1,500-r/min Servomotors and Servo Drives

Main circuit power supply voltage	Rated output	Servomotor	Servo Drive
Single-phase/3-phase 200 VAC	1.5 kW	R88M-1AM1K515T-□	R88D-1SAN15H-ECT
3-phase 200 VAC	2.7 kW	R88M-1AM2K715T-□	R88D-1SAN30H-ECT
3-phase 400 VAC	1.5 kW	R88M-1AM1K515C-□	R88D-1SAN15F-ECT
	3 kW	R88M-1AM3K015C-□	R88D-1SAN30F-ECT

■ Servomotor Characteristics

- 3,000-r/min Servomotors

Item	Unit	Model (R88M-) 200 VAC		
		1AM20030T	1AM40030T	1AM75030T
Rated output[*1]	W	200 (190)	400 (320)	750 (675)
Rated torque[*1]	N·m	0.637 (0.605)	1.27 (1.02)	2.39 (2.15)
Rated rotation speed	r/min	3,000		
Maximum rotation speed	r/min	6,000		
Rated current[*1]	Arms	1.5	2.5 (2.1)	4.6 (4.2)
Rated frequency	Hz	250	250	250

Item	Unit	Model (R88M-) 200 VAC			
		1AL1K030T	1AL1K530T	1AL2K030T	1AL2K630T
Rated output	W	1,000	1,500	2,000	2,600
Rated torque	N·m	3.18	4.77	6.37	8.28
Rated rotation speed	r/min	3,000			
Maximum rotation speed	r/min	5,000			
Rated current	Arms	5.2	8.8	12.5	14.8
Rated frequency	Hz	250	250	250	250

Item	Unit	Model (R88M-) 400 VAC				
		1AL75030C	1AL1K030C	1AL1K530C	1AL2K030C	1AL3K030C
Rated output	W	750	1,000	1,500	2,000	3,000
Rated torque	N·m	2.39	3.18	4.77	6.37	9.55
Rated rotation speed	r/min	3,000				
Maximum rotation speed	r/min	5,000				
Rated current	Arms	3.0	3.0	4.5	6.3	8.7
Rated frequency	Hz	250	250	250	250	250

*1. For models with an oil seal, values in parentheses are used due to derating. Derating is not required for models without values in parentheses.

- 1,500-r/min Servomotors

Item	Unit	Model (R88M-) 200 VAC		Model (R88M-) 400 VAC	
		1AM1K515T	1AM2K715T	1AM1K515C	1AM3K015C
Rated output	W	1,500	2,700	1,500	3,000
Rated torque	N·m	9.55	17.2	9.55	19.1
Rated rotation speed	r/min	1,500			
Maximum rotation speed	r/min	3,000			
Rated current	Arms	8.6	14.6	4.4	8.5
Rated frequency	Hz	125	100	125	100

Integrated Cable

■ Combinations of Integrated Cables and Servomotors

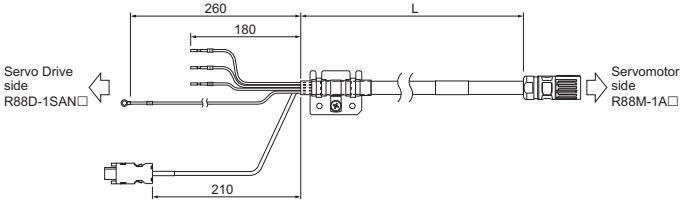
Applicable Servomotors		Model	
		Without brake wire	With brake wire
200 VAC	3,000-r/min Servomotors 200 W, 400 W, 750 W	R88A-CX1A□□□SF	R88A-CX1A□□□BF R88A-CX1AE□□BF*1
200 VAC	3,000-r/min Servomotors 1 kW	R88A-CX1B□□□SF	R88A-CX1B□□□BF R88A-CX1BE□□BF*1
200 VAC 400 VAC	200 VAC 3,000-r/min Servomotors 1.5 kW 1,500-r/min Servomotors 1.5 kW 400 VAC 3,000-r/min Servomotors 750 kW, 1 kW, 1.5 kW, 2 kW, 3 kW 1,500-r/min Servomotors 1.5 kW, 3 kW	R88A-CX1C□□□SF	R88A-CX1C□□□BF R88A-CX1BE□□BF*1
200 VAC	3,000-r/min Servomotors 2 kW, 2.6 kW 1,500-r/min Servomotors 2.7 kW	R88A-CX1D□□□SF	R88A-CX1D□□□BF R88A-CX1DE□□BF*1

*1. R88A-CX1□E□□BF is an extension cable. This cable can be used when extending an integrated cable whether it has a brake wire or not.
To extend the R88A-CX1C□□□□F integrated cable, use R88A-CX1BE□□BF.

■ External Dimensions of Integrated Cables

- R88A-CX1A□□□SF

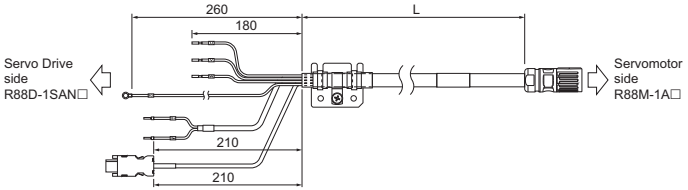
  Connection configuration and external dimensions [mm]



Model	Length [L]	Outer diameter of sheath	Weight
R88A-CX1A003SF	3 m	11.9 dia.	Approx. 0.9 kg
R88A-CX1A005SF	5 m		Approx. 1.2 kg
R88A-CX1A010SF	10 m		Approx. 2.0 kg
R88A-CX1A015SF	15 m		Approx. 2.8 kg
R88A-CX1A020SF	20 m		Approx. 3.7 kg

- R88A-CX1A□□□BF

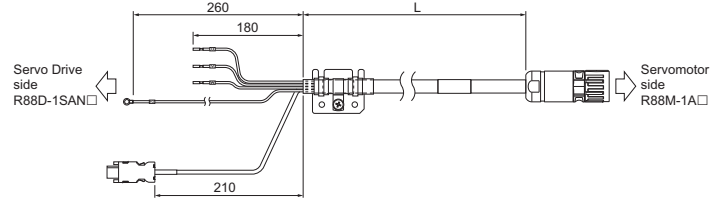
  Connection configuration and external dimensions [mm]



Model	Length [L]	Outer diameter of sheath	Weight
R88A-CX1A003BF	3 m	11.8 dia.	Approx. 0.9 kg
R88A-CX1A005BF	5 m		Approx. 1.2 kg
R88A-CX1A010BF	10 m		Approx. 2.1 kg
R88A-CX1A015BF	15 m		Approx. 2.9 kg
R88A-CX1A020BF	20 m		Approx. 3.8 kg

- R88A-CX1B□□□SF

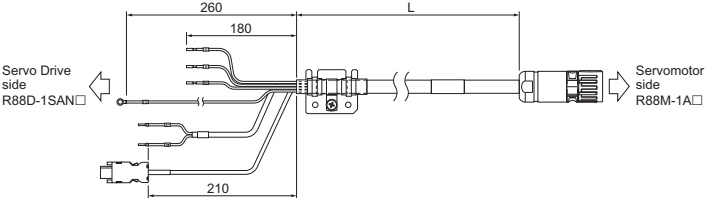
  Connection configuration and external dimensions [mm]



Model	Length [L]	Outer diameter of sheath	Weight
R88A-CX1B003SF	3 m	14.5 dia.	Approx. 1.3 kg
R88A-CX1B005SF	5 m		Approx. 1.8 kg
R88A-CX1B010SF	10 m		Approx. 3.1 kg
R88A-CX1B015SF	15 m		Approx. 4.4 kg
R88A-CX1B020SF	20 m		Approx. 5.8 kg

- R88A-CX1B□□□BF

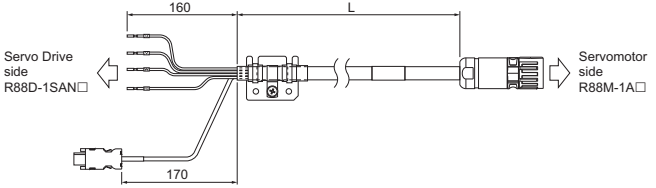
  Connection configuration and external dimensions [mm]



Model	Length [L]	Outer diameter of sheath	Weight
R88A-CX1B003BF	3 m	14.5 dia.	Approx. 1.3 kg
R88A-CX1B005BF	5 m		Approx. 1.8 kg
R88A-CX1B010BF	10 m		Approx. 3.1 kg
R88A-CX1B015BF	15 m		Approx. 4.4 kg
R88A-CX1B020BF	20 m		Approx. 5.8 kg

- R88A-CX1C□□□SF

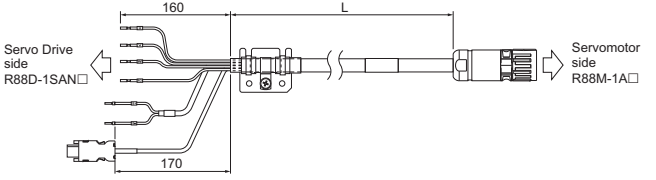
  Connection configuration and external dimensions [mm]



Model	Length [L]	Outer diameter of sheath	Weight
R88A-CX1C003SF	3 m	14.5 dia.	Approx. 1.3 kg
R88A-CX1C005SF	5 m		Approx. 1.8 kg
R88A-CX1C010SF	10 m		Approx. 3.1 kg
R88A-CX1C015SF	15 m		Approx. 4.4 kg
R88A-CX1C020SF	20 m		Approx. 5.8 kg

- R88A-CX1C□□□BF

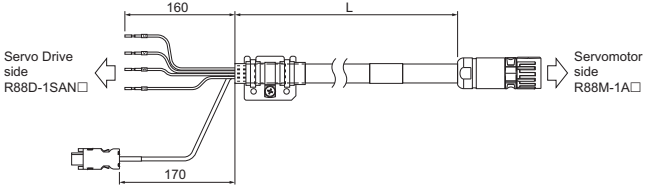
  Connection configuration and external dimensions [mm]



Model	Length [L]	Outer diameter of sheath	Weight
R88A-CX1C003BF	3 m	14.5 dia.	Approx. 1.3 kg
R88A-CX1C005BF	5 m		Approx. 1.8 kg
R88A-CX1C010BF	10 m		Approx. 3.1 kg
R88A-CX1C015BF	15 m		Approx. 4.4 kg
R88A-CX1C020BF	20 m		Approx. 5.8 kg

- R88A-CX1D□□□SF

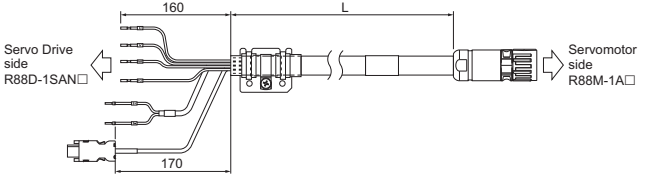
  Connection configuration and external dimensions [mm]



Model	Length [L]	Outer diameter of sheath	Weight
R88A-CX1D003SF	3 m	14.9 dia.	Approx. 1.4 kg
R88A-CX1D005SF	5 m		Approx. 2.0 kg
R88A-CX1D010SF	10 m		Approx. 3.5 kg
R88A-CX1D015SF	15 m		Approx. 5.1 kg
R88A-CX1D020SF	20 m		Approx. 6.7 kg

- R88A-CX1D□□□BF

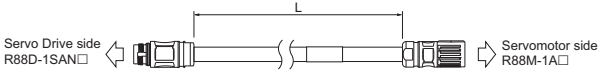
  Connection configuration and external dimensions [mm]



Model	Length [L]	Outer diameter of sheath	Weight
R88A-CX1D003BF	3 m	14.9 dia.	Approx. 1.4 kg
R88A-CX1D005BF	5 m		Approx. 2.0 kg
R88A-CX1D010BF	10 m		Approx. 3.5 kg
R88A-CX1D015BF	15 m		Approx. 5.1 kg
R88A-CX1D020BF	20 m		Approx. 6.7 kg

- R88A-CX1AE□□BF

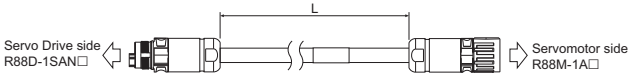
  Connection configuration and external dimensions [mm]



Model	Length [L]	Outer diameter of sheath	Weight
R88A-CX1AE10BF	10 m	11.8 dia.	Approx. 2.0 kg
R88A-CX1AE20BF	20 m		Approx. 3.8 kg

- R88A-CX1BE□□BF

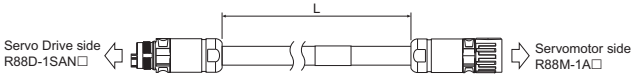
  Connection configuration and external dimensions [mm]



Model	Length [L]	Outer diameter of sheath	Weight
R88A-CX1BE10BF	10 m	14.5 dia.	Approx. 3.1 kg
R88A-CX1BE20BF	20 m		Approx. 5.8 kg

- R88A-CX1DE□□BF

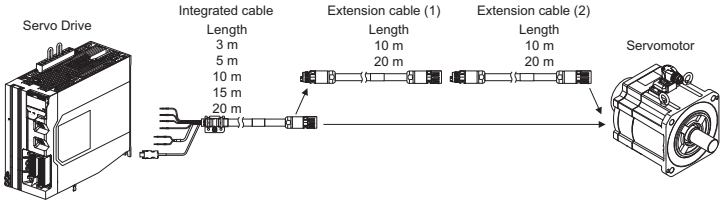
  Connection configuration and external dimensions [mm]



Model	Length [L]	Outer diameter of sheath	Weight
R88A-CX1DE10BF	10 m	14.9 dia.	Approx. 3.5 kg
R88A-CX1DE20BF	20 m		Approx. 6.6 kg

■ Combination of Integrated Cable and Extension Cable

Specifications for cases when an integrated cable is used with extension cables are given below.
When the integrated cable is over 20 m, follow the below list that specifies the combination of integrated cable with extension cable.



Length [L]				Combination
Total	Integrated cable	Extension cable (1)	Extension cable (2)	
3	3	---	---	Integrated cable
5	5	---	---	Integrated cable
10	10	---	---	Integrated cable
15	15	---	---	Integrated cable
20	20	---	---	Integrated cable
30	20	10	---	Integrated cable + extension cable (1)
40	20	20	---	Integrated cable + extension cable (1)
50	20	10	20	Integrated cable + extension cable (1) + extension cable (2)*1

*1. Extension cable (1); 20 m + Extension cable (2); 10 m can be usable.

Maintenance

■ Servo Drive Lifetime

- The lifetime of Servo Drive depends on application conditions. When the ambient temperature is 40°C and the average output is 70% of the rated output, the design life expectancy is ten years.
- The use of the Servo Drive in a hot environment shortens its lifetime. We recommend that the ambient temperature and the power supply ON time be reduced as much as possible to lengthen the lifetime of the Servo Drive.
- The lifetimes for the different parts of Servo Drive are given below.

Name	Lifetime
Inrush current prevention relay	Approx. 36,500 operations (lifetime depends on application conditions.)

Product Disposal

Comply with the local ordinance and regulations when disposing of the product.

Dispose of in accordance with WEEE Directive

Reference Manuals

Manual name	Models	Cat. No.
AC Servomotors/Servo Drives 1S-series with Built-in EtherCAT® Communications and Safety Functionality User's Manual	R88M-1AL□/-1AM□ R88D-1SAN□-ECT	I621

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Note: Specifications subjuect to change without notice.