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DataSheet

R88M-K/R88D-KN□-ECT-R

System Configuration

Controllers

Programmable Controller
SYSMAC CJ2/CJ1

NEW

Position Control Unit with EtherCAT interface
CJ1W-NC□81

Support Software

- CX-One FA Integrated Tool Package Including CX-Programmer

Support Software

- CX-One FA Integrated Tool Package (Including CX-Drive)
- CX-Drive WS02-DRVC1

EtherCAT Cables

Use a category 5 or higher cable with double, aluminium tape and braided shielding.

High-Speed and High-Precision OMNUC G5 Series EtherCAT Communications with the Controller

- High-accuracy positioning with fully-closed control.
- Servo Drives for 400VAC widens applicable systems and environment, including large-scale equipment and overseas facilities.
- Safe design and Safe Torque Off (STO) function (application pending)
- Vibration can be suppressed in acceleration/deceleration even in low-rigidity mechanical systems.

USB Communications

EtherCAT Communications

Servo Drive

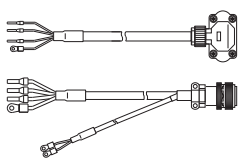
NEW

- **OMNUC G5 Series Drives with Built-in EtherCAT Communications R88D-KN□□-ECT-R**

I/O signals

Power Cables

- **Standard Cables**
- **Without Brake**
  R88A-CA□□□□□S
- **With Brake**
  R88A-CA□□□□□B
- **Robot Cables**
- **Without Brake**
  R88A-CA□□□□□SR
- **With Brake**
  R88A-CA□□□□□BR



Brake Cables (50 to 750 W max.)

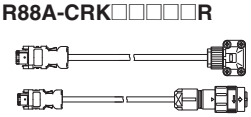
- **Standard Cables**
  R88A-CAKA□□□B
- **Robot Cable**
  R88A-CAKA□□□BR

Motor power signals

Feedback Signals

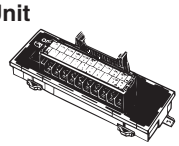
Encoder Cables

- **Standard Cables**
  R88A-CRK□□□□□
- **Robot Cable**
  R88A-CRK□□□□□R



Connector-Terminal Block Conversion Units and Cable

- **Connector-Terminal Block Conversion Unit**
  XW2□-20G□



- **Cable**
  XW2Z-□□□J-B34

AC Servomotors

- **OMNUC G5 Series motor**
  R88M-K

3000r/min
2000r/min
1000r/min

INC ABS INC

External scale

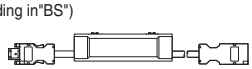
Peripheral Devices

- Reactors
  3G3AX-DL
  3G3AX-AL
- External Regeneration Resistors
  R88A-RR

Absolute Encoder Battery Cable

R88A-CRGD0R3C (-BS)

(One Battery is included with model numbers ending in"BS")



Note: Not required if a battery is connected to the control connector (CN1).

Decelerators

OMNUC G5-series AC Servo Drives with Built-in EtherCAT Communications

R88D-KN□-ECT-R

Contents

NEW

Ordering Information

Refer to the Ordering Information.

Specifications

General Specifications

Item			Specifications
Ambient operating temperature and operating humidity			0 to 55°C, 90%RH max. (with no condensation)
Storage ambient temperature and humidity			−20 to 65°C, 90%RH max. (with no condensation)
Operating and storage atmosphere			No corrosive gases
Vibration resistance			10 to 60 Hz and at an acceleration of 5.88 m/s^2 or less (Not to be run continuously at a resonance point)
Insulation resistance			Between power supply terminals/power terminals and FG terminal: 0.5 MΩ min. (at 500 VDC)
Dielectric strength			Between power supply/power line terminals and FG terminal: 1,500 VAC for 1 min at 50/60 Hz
Protective structure			Built into panel
International standard	EC Directives	EMC Directive	EN 55011, EN 61000-6-2, IEC 61800-3
		Low Voltage Directive	EN 61800-5-1
	UL standards		UL 508C
	CSA standards		CSA22.2 No. 14
	Functional safety (application pending)		EN 954-1, ISO 13849-1, EN 61508, EN 62061 and IEC 61800-5-2, and IEC 61326-3-1

Note: 1. The above items reflect individual evaluation testing. The results may differ under compound conditions.

2. Never perform dielectric strength or other megameter tests on the Servo Drive. Failure to follow this guideline may result in damaging the internal elements.

3. Depending on the operating conditions, some Servo Drive parts will require maintenance. For details, refer to Users Manual (I573).

Characteristics

● Servo Drives with 100 VAC Input Power

for Single-phase input type

Item			R88D-KNA5L-ECT-R	R88D-KN01L-ECT-R	R88D-KN02L-ECT-R	R88D-KN04L-ECT-R
Continuous output current (rms)			1.2 A	1.7 A	2.5 A	4.6 A
Input power supply	Main circuit	Power supply capacity	0.4 KVA	0.4 KVA	0.5 KVA	0.9 KVA
		Power supply voltage	Single-phase 100 to 120 VAC (85 to 132 V) 50/60 Hz			
		Rated current	1.4 A	2.6 A	4.3 A	7.6 A
	Control circuit	Power supply voltage	Single-phase 100 to 120 VAC (85 to 132 V) 50/60 Hz			
Control method			All-digital servo			
Inverter method			IGBT-driven PWM			
PWM frequency			12.0 kHz		6.0 kHz	
Weight			Approx. 0.8 kg	Approx. 0.8 kg	Approx. 1.0 kg	Approx. 1.6 kg
Maximum applicable motor capacity			50 W	100 W	200 W	400 W
Applicable Servomotor	3,000 r/min Servomotors	INC	K05030H	K10030L	K20030L	K40030L
		ABS	K05030T	K10030S	K20030S	K40030S
	2,000 r/min Servomotors	ABS	–	–	–	–
	1,000 r/min Servomotors	ABS	–	–	–	–

● Servo Drives with 200 VAC Input Power

for Single-phase/Three-phase input type

Item			R88D-KN01H-ECT-R	R88D-KN02H-ECT-R	R88D-KN04H-ECT-R	R88D-KN08H-ECT-R	R88D-KN10H-ECT-R	R88D-KN15H-ECT-R
Continuous output current (rms)			1.2 A	1.6 A	2.6 A	4.1 A	5.9 A	9.4 A
Input power supply	Main circuit	Power supply capacity	0.5 KVA	0.5 KVA	0.9 KVA	1.3 KVA	1.8 KVA	2.3KVA
		Power supply voltage	Single-phase or 3-phase 200 to 240 VAC (170 to 264 V) 50/60 Hz					
		Rated current	1.3 A	2.4/1.3 A*1	4.1/2.4 A*1	6.6/3.6 A*1	9.1/5.9 A*1	14.2/8.1 A*1
	Control circuit	Power supply voltage	Single-phase 200 to 240 VAC (170 to 264 V) 50/60 Hz					
PWM frequency			12.0 kHz		6.0 kHz			
Weight			Approx. 0.8 kg	Approx. 0.8 kg	Approx. 1.0 kg	Approx. 1.6 kg	Approx. 1.8 kg	Approx. 1.8 kg
Maximum applicable motor capacity			100 W	200 W	400 W	750 W	1 kW	1.5 kW
Applicable Servomotor	3,000 r/min Servomotors	INC	K05030H K10030H	K20030H	K40030H	K75030H	–	K1K030H K1K530H
		ABS	K05030T K10030T	K20030T	K40030T	K75030T	–	K1K030T K1K530T
	2,000 r/min Servomotors	INC	–	–	–	–	K1K020H	K1K520H
		ABS	–	–	–	–	K1K020T	K1K520T
	1,000 r/min Servomotors	INC	–	–	–	–	–	K90010H
		ABS	–	–	–	–	–	K90010T
Control method			All-digital servo					
Inverter method			IGBT-driven PWM					

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

● Servo Drives with 400 VAC Input Power

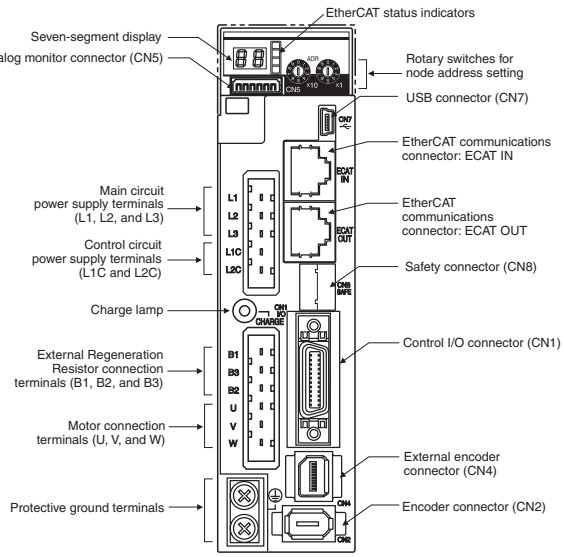
for Three-phase input type

Item			R88D-KN06F-ECT-R	R88D-KN10F-ECT-R	R88D-KN15F-ECT-R
Continuous output current (rms)			2.9 A	2.9 A	4.7 A
Input power supply	Main circuit	Power supply voltage	Three-phase 380 to 480 VAC (323 to 528 V) 50/60 Hz		
		Rated current	2.8 A	2.8 A	4.7 A
	Control circuit	Power supply voltage	24 VDC (20.4 to 27.6 V)		
PWM frequency			6.0 kHz		
Weight			Approx. 1.9 kg	Approx. 1.9 kg	Approx. 1.9 kg
Maximum applicable motor capacity			600 W	1 kW	1.5 kW
Applicable Servomotor	3,000 r/min Servomotors	INC	–	K75030F	K1K030F K1K530F
		ABS	–	K75030C	K1K030C K1K530C
	2,000 r/min Servomotors	INC	K40020F K60020F	K1K020F	K1K520F
		ABS	K40020C K60020C	K1K020C	K1K520C
	1,000 r/min Servomotors	INC	–	–	K90010F
			–	–	K90010C
Control method			All-digital servo		
Inverter method			IGBT-driven PWM		

EtherCAT Communications Specifications

Item	Specification
Communications standard	IEC 61158 Type 12, IEC 61800-7 CiA 402 Drive Profile
Physical layer	100BASE-TX (IEEE802.3)
Connectors	RJ45 × 2 ECAT IN: EtherCAT input ECAT OUT: EtherCAT output
Communications media	Category 5 or higher (cable with double, aluminum tape and braided shielding) is recommended.
Communications distance	Distance between nodes: 100 m max.
Process data	Fixed PDO mapping
Mailbox (CoE)	Emergency messages, SDO requests, SDO responses, and SDO information
Distributed clock	Synchronization in DC mode. DC cycle: 250 μs, 500 μs, 1 ms, 2 ms, 4 ms
LED indicators	L/A IN (Link/Activity IN) × 1 L/A OUT (Link/Activity OUT) × 1 RUN × 1 ERR × 1
CiA402 Drive Profile	• Cyclic synchronous position mode • Touch probe function (Latch function) • Torque limit function

Components and Functions



Display
A 2-digit 7-segment display shows the node address, error codes, and other Servo Drive status.

Charge Lamp
Lights when the main circuit power supply is turned ON.

EtherCAT Status Indicators
These indicators show the status of EtherCAT communications. For details, refer to Users Manual (I573).

Control I/O Connector (CN1)
Used for command input signals and I/O signals.

Encoder Connector (CN2)
Connector for the encoder installed in the Servomotor.

External Encoder Connector (CN4)
Connector for an encoder signal used during fully-closed control.

EtherCAT Communications Connectors (ECAT IN and ECAT OUT)
These connectors are for EtherCAT communications.

Analog Monitor Connector (CN5)
You can use a special cable to monitor values, such as the motor rotation speed, torque command value, etc.

USB Connector (CN7)
Communications connector for the computer.

Safety Connector (CN8)
Connector for safety devices.
If no safety devices are used, keep the factory-set safety bypass connector installed.

EtherCAT Communications Connector

This connector is used to connect the EtherCAT twisted-pair cable.

Connector Specifications

Specification	Description
Electrical characteristics	Conforms to IEEE 802.3 standards.
Connector structure	RJ45 8-pin modular connector (Conforms to ISO 8877.)

Pin Assignments

Pin No.	Signal name	Abbreviation	Signal direction
1	Transmission data +	TD+	Output
2	Transmission data -	TD-	Output
3	Reception data +	RD+	Input
4	Not used.	—	—
5	Not used.	—	—
6	Reception data -	RD-	Input
7	Not used.	—	—
8	Not used.	—	—
Hood	Frame ground	FG	—

EtherCAT Communications Cables

Use a category 5 or higher cable with double, aluminum tape and braided shielding.

Note: The maximum distance between any two nodes is 100 m. Some cables, however, are not rated for 100 m. Generally speaking, the transmission performance of stranded wires is worse than that of solid wire. Cables with stranded wires generally are not rated for 100 m.

Connector (Modular Plug) Specifications

Use a category 5 or higher, shielded connector.

Note: When selecting a connector, make sure that it is suitable for the cable that you are using. The following items must be confirmed: conductor size, whether connector is solid or stranded wire, whether there are 2 wire pairs or 4, the outside diameter, etc.

Functions

Basic control

Position control	Fully closed control

Advanced control

Vibration control	Gain switching	Friction torque compensation function
Adaptive filter	Torque limit	Inertia ratio switching function
Notch filter	Sequence I/O signal	Hybrid Vibration Suppression Function
Electronic gear function	Forward and reverse drive prohibition functions	Feed-forward function
Encoder dividing function	Disturbance observer function	Instantaneous speed observer function
Brake interlock	Gain switching 3 function	

Other functions

Safe Torque OFF (STO) Function (application pending)

Realtime autotuning
Manual tuning

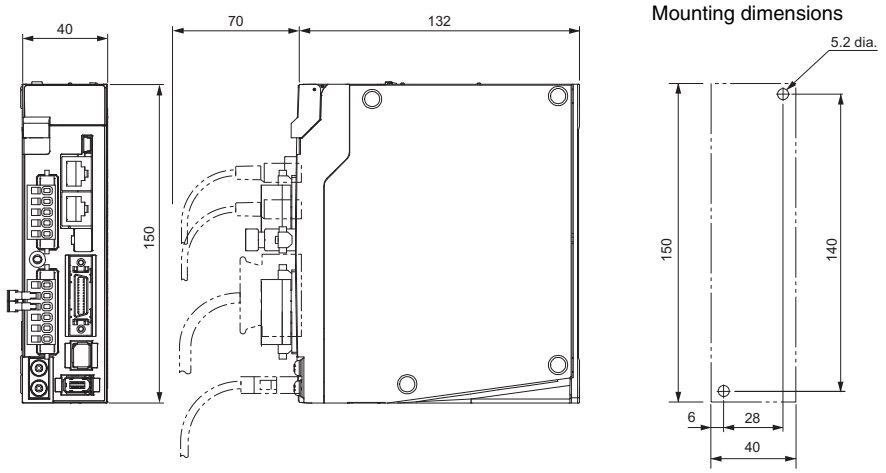
Various parameters

Basic Parameters	Interface Monitor Setting Parameters
Gain Parameters	Extended Parameters
Vibration Suppression Parameters	Special Parameters
Analog Control Parameters	

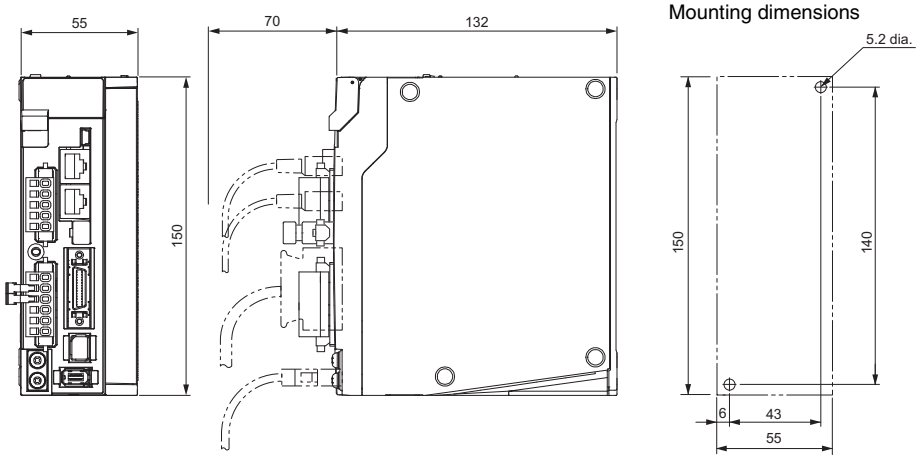
Dimensions

<Wall Mounting>

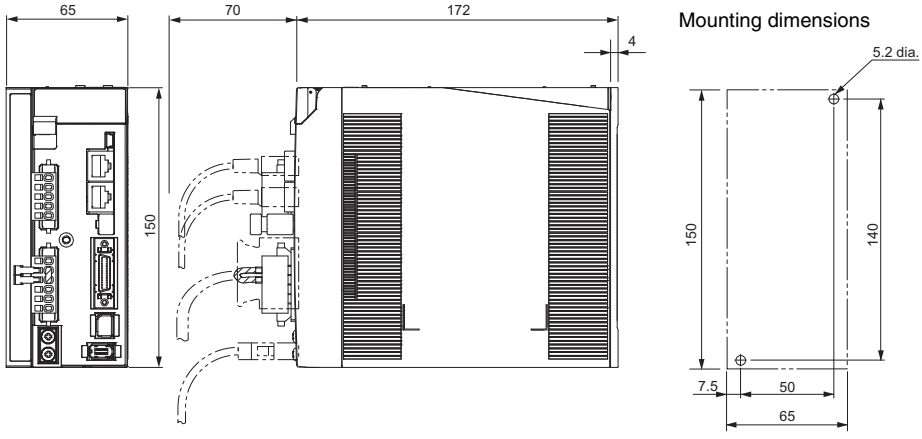
Single-phase 100 VAC R88D-KNA5L-ECT-R/-KN01L-ECT-R (50 to 100 W)
Single-phase/Three-phase 200 VAC R88D-KN01H-ECT-R/-KN02H-ECT-R (100 to 200W)



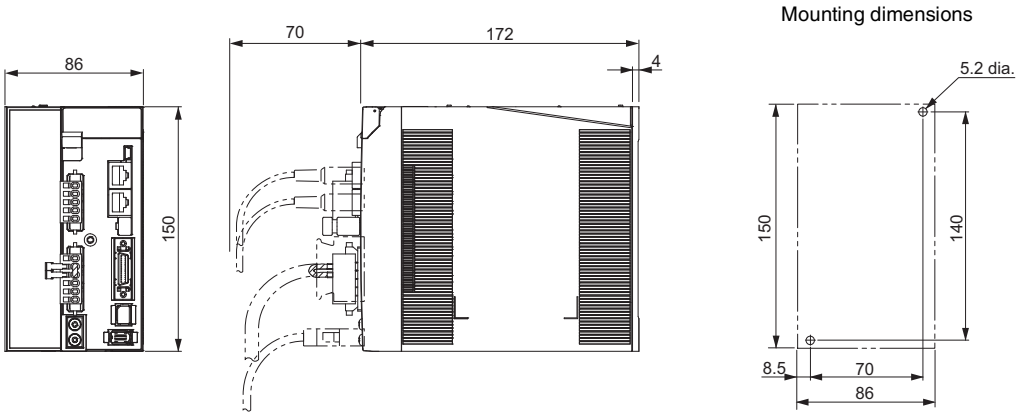
Single-phase 100 VAC R88D-KN02L-ECT-R (200W)
Single-phase/Three-phase 200 VAC R88D-KN04H-ECT-R (400W)



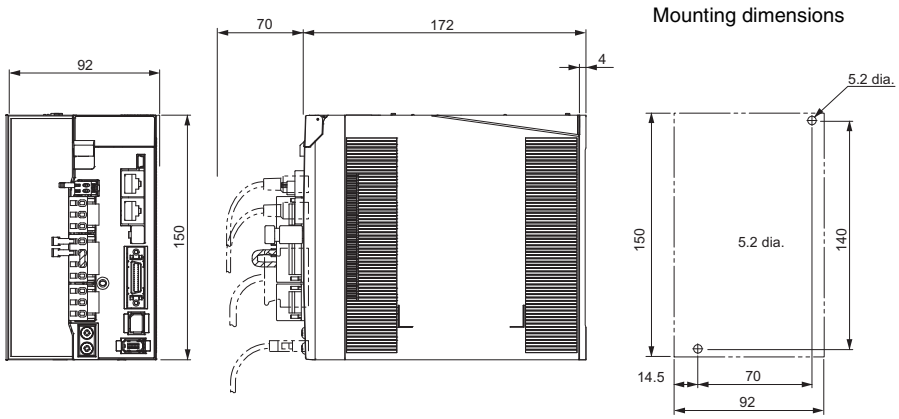
Single-phase 100 VAC R88D-KN04L-ECT-R (400W)
Single-phase/for Three-phase 200 VAC R88D-KN08H-ECT-R (750W)



Single-phase/Three-phase 200 VAC R88D-KN10H-ECT-R/-KN15H-ECT-R (900W to 1.5kW)



Three-phase 400 VAC R88D-KN06F-ECT-R/-KN10F-ECT-R (600W to 1.0kW)
Three-phase 400 VAC R88D-KN15F-ECT-R (1.5kW)



OMNUC G5-series AC Servomotors

R88M-K INC ABS/INC

Contents

Ordering Information

Refer to the Ordering Information.

Specifications

General Specifications

Item			3,000-r/min Servomotors		1,000-r/min Servomotors 2,000-r/min Servomotors
			50 to 750 W	1 to 1.5 kW	900 W to 1.5 kW
Ambient operating temperature and operating humidity			0 to 40°C, 20% to 85%RH (with no condensation)		
Storage ambient temperature and humidity			–20 to 65°C, 20% to 85%RH (with no condensation) Maximum temperature of 80°C (72 hours at normal humidity)		
Operating and storage atmosphere			No corrosive gases		
Vibration resistance *1			Acceleration of 49 m/s^2 24.5 m/s^2 max. in X, Y, and Z directions when the motor is stopped		
Impact resistance			Acceleration of 98 m/s^2 max. 3 times each in X, Y, and Z directions		
Insulation resistance			Between power terminal and FG terminal: 20 MΩ min. (at 500 VDC)		
Dielectric strength			1,500 VAC between power terminal and FG terminal for 1 min (voltage 100 V, 200 V) 1,800 VAC between power terminal and FG terminal for 1 min (voltage 400 V) 1,000 VAC between brake terminal and FG terminal for 1 min		
Protective structure			IP67 (except for through-shaft parts and motor and encoder connector pins)		
International standard	EC Directives	EMC Directive	EN 55011 class A group 1		
			EN 61000-6-2, IEC 61800-3 and IEC 61326-3-1		
		Low Voltage Directive	EN 60034-1/-5		
	UL standards		UL1004-1		
	CSA standards		CSA22.2 No. 100		

***1.** The amplitude may be increased by machine resonance. As a guideline, do not exceed 80% of the specified value.

Note: 1. Do not use the cable when it is laying in oil or water.

2. Do not expose the cable outlet or connections to stress due to bending or the weight of the cable itself.

Characteristics/Torque and Rotation Speed Characteristics

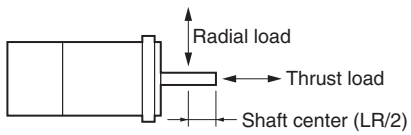
Characteristics
<Cylinder type>
3,000 r/min Servomotors (100 VAC Input Power)

Model (R88M-)			100 VAC			
			K05030H	K10030L	K20030L	K40030L
Item		Unit	K05030T	K10030S	K20030S	K40030S
Rated output *1		W	50	100	200	400
Rated torque *1		N • m	0.16	0.32	0.64	1.3
Rated rotation speed		r/min	3,000			
Maximum rotation speed		r/min	6,000			
Momentary maximum torque *1		N • m	0.48	0.95	1.91	3.8
Rated current *1		A (rms)	1.1	1.6	2.5	4.6
Momentary maximum current *1		A (rms)	4.7	6.9	10.6	19.5
Rotor inertia	Without brake	kg • m²	0.025×10^{-4}	0.051×10^{-4}	0.14×10^{-4}	0.26×10^{-4}
	With brake	kg • m²	0.027×10^{-4}	0.054×10^{-4}	0.16×10^{-4}	0.28×10^{-4}
Applicable load inertia		—	30 times the rotor inertia max. *2			
Torque constant *1		N • m/A	0.11±10%	0.14±10%	0.20±10%	0.21±10%
Power rate *1	Without brake	kW/s	10.1	19.8	28.9	62.3
	With brake	kW/s	9.4	18.7	25.3	57.8
Mechanical time constant	Without brake	ms	1.43	1.03	0.61	0.48
	With brake	ms	1.54	1.09	0.70	0.52
Electrical time constant		ms	0.82	0.91	3.0	3.4
Allowable radial load *3		N	68	68	245	245
Allowable thrust load *3		N	58	58	98	98
Weight	Without brake	kg	Approx. 0.31	Approx. 0.45	Approx. 0.78	Approx. 1.2
	With brake	kg	Approx. 0.51	Approx. 0.65	Approx. 1.2	Approx. 1.6
Radiator plate dimensions (material)			100 × 80 × t10 (Al)		130 × 120 × t12 (Al)	
Applicable drives (R88D-)			KTA5L/KNA5L-ML2/ KNA5L-ECT-R	KT01L/KNA01L-ML2/ KN01L-ECT-R	KT02L/KN02L-ML2/ KN02L-ECT-R	KT04L/KN04L-ML2/ KN04L-ECT-R
Brake specifications	Brake inertia	kg • m²	2×10^{-7}	2×10^{-7}	1.8×10^{-6}	1.8×10^{-6}
	Excitation voltage *4	V	24 VDC ± 10%			
	Power consumption (at 20°C)	W	7	7	9	9
	Current consumption (at 20°C)	A	0.3	0.3	0.36	0.36
	Static friction torque	N • m	0.29 min.	0.29 min.	1.27 min.	1.27 min.
	Attraction time *5	ms	35 max.	35 max.	50 max.	50 max.
	Release time *5	ms	20 max.	20 max.	15 max.	20 max.
	Backlash		1° (reference value)			
	Allowable work per braking	J	39.2	39.2	137	137
	Allowable total work	J	4.9×10^{3}	4.9×10^{3}	44.1×10^{3}	44.1×10^{3}
	Allowable angular acceleration	rad/s²	30,000 max. (Speed of 2,800 r/min or more must not be changed in less than 10 ms.)			
	Brake limit	—	10 million times min.			
	Insulation class	—	Type B			

✻1. These are the values when the motor is combined with a drive at normal temperature (20°C, 65%). The momentary maximum torque indicates the standard value.

✻2. Applicable load inertia.
- The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.
- If the dynamic brake is activated frequently with high load inertia, the Dynamic Brake Resistor may burn. Do not repeatedly turn the servo ON/OFF while the dynamic brake is enabled.

✻3. The allowable radial and thrust loads are the values determined for a limit of 20,000 hours at normal operating temperatures. The allowable radial loads are applied as shown in the following diagram.



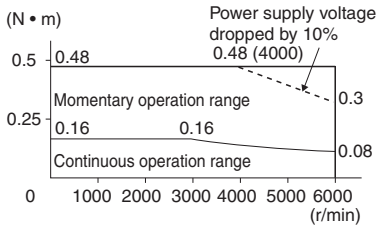
✻4. This is a non-excitation brake. (It is released when excitation voltage is applied.)

✻5. The operation time is the value (reference value) measured with a surge suppressor (CR50500 by Okaya Electric Industries Co., Ltd.).

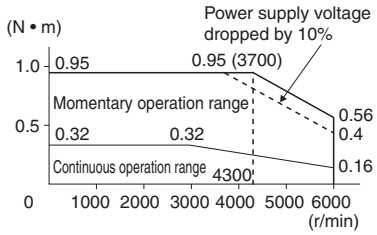
Torque and Rotation Speed Characteristics
3,000 r/min Servomotors (100 VAC Input Power)

The following graphs show the characteristics with a 3-m standard cable and a 100 VAC input.

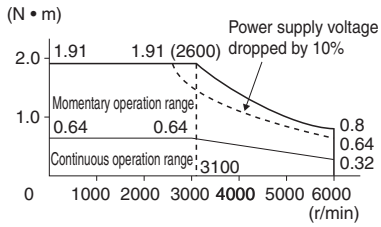
- R88M-K05030H/T (50W)



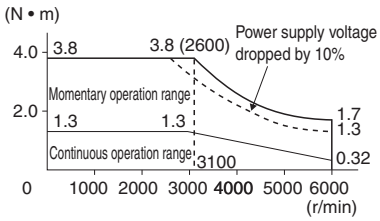
- R88M-K10030L/S (100W)



- R88M-K20030L/S (200W)



- R88M-K40030L/S (400W)



Characteristics

3,000 r/min Servomotors (200 VAC Input Power)

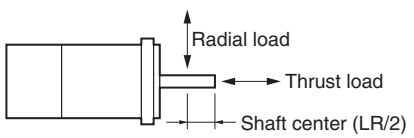
Item		Unit	200 VAC						
Model (R88M-)			K05030H	K10030H	K20030H	K40030H	K75030H	K1K030H	K1K530H
			K05030T	K10030T	K20030T	K40030T	K75030T	K1K030T	K1K530T
Rated output *1		W	50	100	200	400	750	1000	1500
Rated torque *1		N • m	0.16	0.32	0.64	1.3	2.4	3.18	4.77
Rated rotation speed		r/min	3,000				3,000		
Momentary maximum rotation speed		r/min	6,000				6,000	5,000	
Momentary maximum torque *1		N • m	0.48	0.95	1.91	3.8	7.1	9.55	14.3
Rated current *1		A (rms)	1.1	1.1	1.5	2.4	4.1	6.6	8.2
Momentary maximum current *1		A (rms)	4.7	4.7	6.5	10.2	17.4	28	35
Rotor inertia	Without brake	kg • m²	0.025×10^{-4}	0.051×10^{-4}	0.14×10^{-4}	0.26×10^{-4}	0.87×10^{-4}	2.03×10^{-4}	2.84×10^{-4}
	With brake	kg • m²	0.027×10^{-4}	0.054×10^{-4}	0.16×10^{-4}	0.28×10^{-4}	0.97×10^{-4}	2.35×10^{-4}	3.17×10^{-4}
Applicable load inertia		—	30 times the rotor inertia max.*2				20 times the rotor inertia max.	15 times the rotor inertia max. *2	
Torque constant *1		N • m/A	0.11±10%	0.21±10%	0.32±10%	0.40±10%	0.45±10%	0.37	0.45
Power rate *1	Without brake	kW/s	10.1	19.8	28.9	62.3	65.4	49.8	80.1
	With brake	kW/s	9.4	18.7	25.3	57.8	58.7	43.0	71.8
Mechanical time constant	Without brake	ms	1.43	1.07	0.58	0.43	0.37	0.61	0.49
	With brake	ms	1.54	1.13	0.66	0.46	0.42	0.71	0.55
Electrical time constant		ms	0.82	0.90	3.2	3.4	5.3	5.8	6.3
Allowable radial load *3		N	68	68	245	245	490	490	490
Allowable thrust load *3		N	58	58	98	98	196	196	196
Weight	Without brake	kg	Approx. 0.31	Approx. 0.46	Approx. 0.79	Approx. 1.2	Approx. 2.3	Approx. 3.5	Approx. 4.4
	With brake	kg	Approx. 0.51	Approx. 0.66	Approx. 1.2	Approx. 1.6	Approx. 3.1	Approx. 4.5	Approx. 5.4
Radiator plate dimensions (material)			100 × 80 × t10 (Al)		130 × 120 × t12 (Al)		170 × 160 × t12 (Al)	320 × 300 × t20 (Al)	
Applicable drives (R88D-)			KT01H/ KN01H-ML2/ KN01H-ECT-R	KT01H/ KN01H-ML2/ KN01H-ECT-R	KT02H/ KN02H-ML2/ KN02H-ECT-R	KT04H/ KN04H-ML2/ KN04H-ECT-R	KT08H/ KN08H-ML2/ KN08H-ECT-R	KT15H/ KN15H-ML2/ KN15H-ECT-R	KT15H/ KN15H-ML2/ KN15H-ECT-R
Brake specifications	Brake inertia	kg • m²	2×10^{-7}	2×10^{-7}	1.8×10^{-6}	1.8×10^{-6}	0.33×10^{-4}	0.33×10^{-4}	0.33×10^{-4}
	Excitation voltage *4	V	24 VDC ± 10%				24 VDC ± 10%		
	Power consumption (at 20°C)	W	7	7	9	9	17	19	19
	Current consumption (at 20°C)	A	0.3	0.3	0.36	0.36	0.70±10%	0.81±10%	0.81±10%
	Static friction torque	N • m	0.29 min.	0.29 min.	1.27 min.	1.27 min.	2.5 min.	7.8 min.	7.8 min.
	Attraction time *5	ms	35 max.	35 max.	50 max.	50 max.	50 max.	50 max.	50 max.
	Release time *5	ms	20 max.	20 max.	15 max.	15 max.	15 max. *6	15 max. *6	15 max. *6
	Backlash		1° (reference value)				±1° (reference value)		
	Allowable work per braking	J	39.2	39.2	137	137	392	392	392
	Allowable total work	J	4.9×10^{3}	4.9×10^{3}	44.1×10^{3}	44.1×10^{3}	4.9×10^{5}	4.9×10^{5}	4.9×10^{-5}
	Allowable angular acceleration	rad/s²	30,000 max. (Speed of 2,800 r/min or more must not be changed in less than 10 ms.)				10,000		
	Brake limit	—	10 million times min.						
	Insulation class	—	Type B					Type F	

✻1. These are the values when the motor is combined with a drive at normal temperature (20°C, 65%). The momentary maximum torque indicates the standard value.

✻2. Applicable load inertia.

- The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.
- If the dynamic brake is activated frequently with high load inertia, the Dynamic Brake Resistor may burn. Do not repeatedly turn the servo ON/OFF while the dynamic brake is enabled.

✻3. The allowable radial and thrust loads are the values determined for a limit of 20,000 hours at normal operating temperatures. The allowable radial loads are applied as shown in the following diagram.



✻4. This is a non-excitation brake. (It is released when excitation voltage is applied.)

✻5. The operation time is the value (reference value) measured with a surge suppressor (CR50500 by Okaya Electric Industries Co., Ltd.).

✻6. Direct current switching with a varistor (Z15D151 by Ishizuka Electronics Co.).

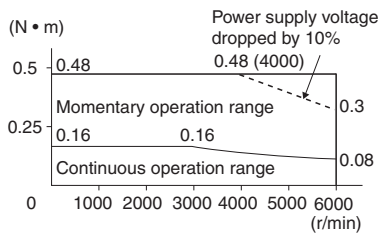
✻7. Direct current switching with a varistor (TNR9G820K by Nippon Chemi-Con Corporation).

Torque and Rotation Speed Characteristics

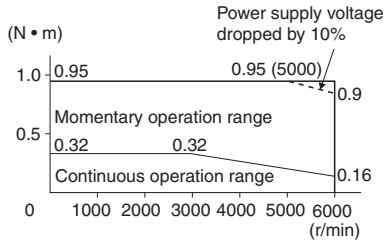
3,000 r/min Servomotors (200 VAC Input Power)

The following graphs show the characteristics with a 3-m standard cable and a 200 VAC input.

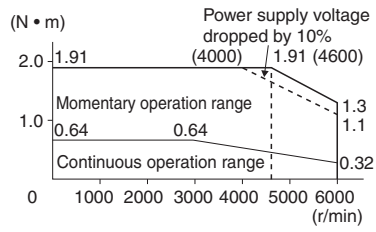
- R88M-K05030H/T (50W)



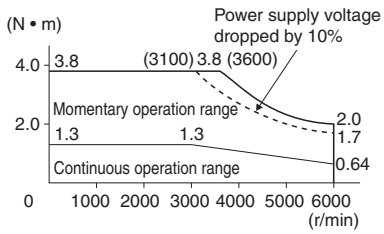
- R88M-K10030H/T (100W)



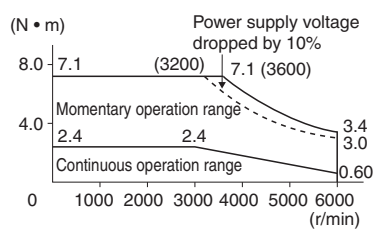
- R88M-K20030H/T (200W)



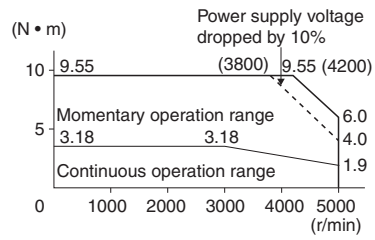
- R88M-K40030H/T (400W)



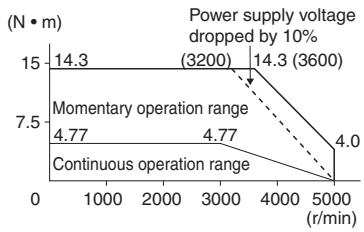
- R88M-K75030H/T (750W)



- R88M-K1K030H/T (1kW)



- R88M-K1K530H/T (1.5kW)



Characteristics

3,000 r/min Servomotors (400 VAC Input Power)

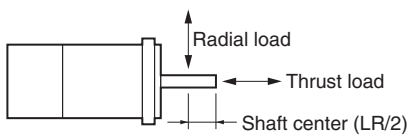
Item		Unit	400 VAC		
Model (R88M-)			K75030F	K1K030F	K1K530F
			K75030C	K1K030C	K1K530C
Rated output *1		W	750	1000	1500
Rated torque *1		N • m	2.39	3.18	4.77
Rated rotation speed		r/min	3,000		
Momentary maximum rotation speed		r/min	5,000		
Momentary maximum torque *1		N • m	7.16	9.55	14.3
Rated current *1		A (rms)	2.4	3.3	4.2
Momentary maximum current *1		A (rms)	10	14	18
Rotor inertia	Without brake	kg • m²	1.61×10^{-4}	2.03×10^{-4}	2.84×10^{-4}
	With brake	kg • m²	1.93×10^{-4}	2.35×10^{-4}	3.17×10^{-4}
Applicable load inertia		—	30 times the rotor inertia max. *2		
Torque constant *1		N • m/A	0.78	0.75	0.89
Power rate *1	Without brake	kW/s	35.5	49.8	80.1
	With brake	kW/s	29.6	43	71.8
Mechanical time constant	Without brake	ms	0.67	0.60	0.49
	With brake	ms	0.8	0.70	0.55
Electrical time constant		ms	5.9	5.8	6.5
Allowable radial load *3		N	490	490	490
Allowable thrust load *3		N	196	196	196
Weight	Without brake	kg	Approx. 3.1	Approx. 3.5	Approx. 4.4
	With brake	kg	Approx. 4.1	Approx. 4.5	Approx. 5.4
Radiator plate dimensions (material)			320 × 300 × t20 (Al)		
Applicable drives (R88D-)			KT10F/KN10F-ML2/ KN10F-ECT-R	KT15F/KN15F-ML2/ KN15F-ECT-R	KT15F/KN15F-ML2/ KN15F-ECT-R
Brake specifications	Brake inertia	kg • m²	0.33×10^{-4}	0.33×10^{-4}	0.33×10^{-4}
	Excitation voltage *4	V	24 VDC ± 10%		
	Power consumption (at 20°C)	W	17	19	19
	Current consumption (at 20°C)	A	0.70±10%	0.81±10%	0.81±10%
	Static friction torque	N • m	2.5 min.	7.8 min.	7.8 min.
	Attraction time *5	ms	50 max.	50 max.	50 max.
	Release time *5	ms	15 max. *6	15 max. *6	15 max. *6
	Backlash		1° (reference value)		
	Allowable work per braking	J	392	392	392
	Allowable total work	J	4.9×10^{5}	4.9×10^{5}	4.9×10^{5}
	Allowable angular acceleration	rad/s²	10,000		
	Brake limit	—	10 million times min.		
	Insulation class	—	Type F		

1. These are the values when the motor is combined with a drive at normal temperature (20°C, 65%). The momentary maximum torque indicates the standard value.

2. Applicable load inertia.

- The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.
- If the dynamic brake is activated frequently with high load inertia, the Dynamic Brake Resistor may burn. Do not repeatedly turn the servo ON/OFF while the dynamic brake is enabled.

3. The allowable radial and thrust loads are the values determined for a limit of 20,000 hours at normal operating temperatures. The allowable radial loads are applied as shown in the following diagram.



4. This is a non-excitation brake. (It is released when excitation voltage is applied.)

5. The operation time is the value (reference value) measured with a surge suppressor (CR50500 by Okaya Electric Industries Co., Ltd.).

6. Direct current switching with a varistor (Z15D151 by Ishizuka Electronics Co.).

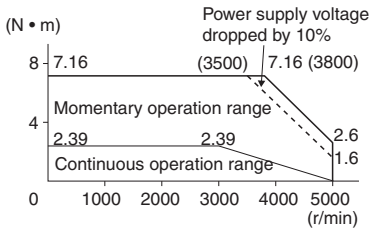
7. Direct current switching with a varistor (TNR9G820K by Nippon Chemi-Con Corporation).

Torque and Rotation Speed Characteristics

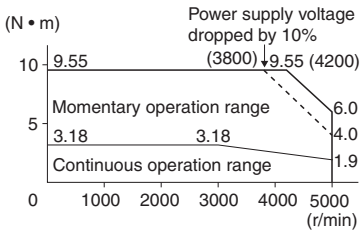
3,000 r/min Servomotors (400 VAC Input Power)

The following graphs show the characteristics with a 3-m standard cable and a 400 VAC input.

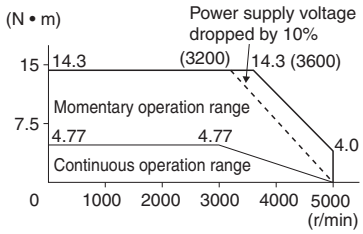
- R88M-K75030F/C (750W)



- R88M-K1K030F/C (1kW)



- R88M-K1K530F/C (1.5kW)



Characteristics

2,000 r/min Servomotors (200 VAC Input Power)

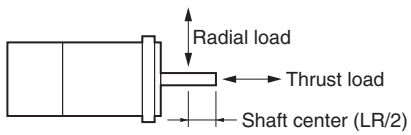
Model (R88M-)			200 VAC	
			K1K020H	K1K520H
Item		Unit	K1K020T	K1K520T
Rated output *1		W	1,000	1,500
Rated torque *1		N • m	4.77	7.16
Rated rotation speed		r/min	2,000	
Momentary maximum rotation speed		r/min	3,000	
Momentary maximum torque *1		N • m	14.3	21.5
Rated current *1		A (rms)	5.7	9.4
Momentary maximum current *1		A (rms)	24	40
Rotor inertia	Without brake	kg • m²	4.60×10^{-4}	6.70×10^{-4}
	With brake	kg • m²	5.90×10^{-4}	7.99×10^{-4}
Applicable load inertia		—	10 times the rotor inertia max. *2	
Torque constant *1		N • m/A	0.63	0.58
Power rate *1	Without brake	kW/s	49.5	76.5
	With brake	kW/s	38.6	64.2
Mechanical time constant	Without brake	ms	0.80	0.66
	With brake	ms	1.02	0.80
Electrical time constant		ms	9.4	10
Allowable radial load *3		N	490	490
Allowable thrust load *3		N	196	196
Weight	Without brake	kg	Approx. 5.2	Approx. 6.7
	With brake	kg	Approx. 6.7	Approx. 8.2
Radiator plate dimensions (material)			275 × 260 × t15 (Al)	
Applicable drives (R88D-)			KT10H/KN10H-ML2/KN10H-ECT-R	KT15H/KN15H-ML2/KN15H-ECT-R
Brake specifications	Brake inertia	kg • m²	1.35×10^{-4}	1.35×10^{-4}
	Excitation voltage *4	V	24 VDC ± 10%	
	Power consumption (at 20°C)	W	14	19
	Current consumption (at 20°C)	A	0.59±10%	0.79±10%
	Static friction torque	N • m	4.9 min.	13.7 min.
	Attraction time *5	ms	80 max.	100 max.
	Release time *5	ms	70 max. *6	50 max. *6
	Backlash		1° (reference value)	
	Allowable work per braking	J	588	1,176
	Allowable total work	J	7.8×10^{5}	1.5×10^{6}
	Allowable angular acceleration	rad/s²	10,000	
	Brake limit	—	10 million times min.	
	Insulation class	—	Type F	

***1.** These are the values when the motor is combined with a drive at normal temperature (20°C, 65%). The momentary maximum torque indicates the standard value.

***2.** Applicable load inertia.

- The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.
- If the dynamic brake is activated frequently with high load inertia, the Dynamic Brake Resistor may burn. Do not repeatedly turn the servo ON/OFF while the dynamic brake is enabled.

***3.** The allowable radial and thrust loads are the values determined for a limit of 20,000 hours at normal operating temperatures. The allowable radial loads are applied as shown in the following diagram.



***4.** This is a non-excitation brake. (It is released when excitation voltage is applied.)

***5.** The operation time is the value (reference value) measured with a surge suppressor (CR50500 by Okaya Electric Industries Co., Ltd.).

***6.** Direct current switching with a varistor (Z15D151 by Ishizuka Electronics Co.).

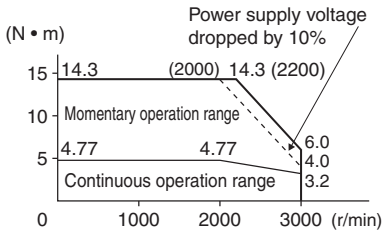
***7.** Direct current switching with a varistor (TNR9G820K by Nippon Chemi-Con Corporation).

Torque and Rotation Speed Characteristics

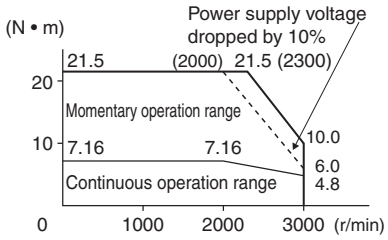
2,000 r/min Servomotors (200 VAC Input Power)

The following graphs show the characteristics with a 3-m standard cable and a 200 VAC input.

- R88M-K1K020H/T (1kW)



- R88M-K1K520H/T (1.5kW)



Characteristics

2,000 r/min Servomotors (400 VAC Input Power)

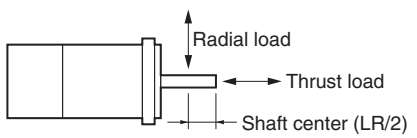
Model (R88M-)			400 VAC			
			K40020F	K60020F	K1K020F	K1K520F
Item		Unit	K40020C	K60020C	K1K020C	K1K520C
Rated output *1		W	400	600	1,000	1,500
Rated torque *1		N • m	1.91	2.86	4.77	7.16
Rated rotation speed		r/min	2,000			
Momentary maximum rotation speed		r/min	3,000			
Momentary maximum torque *1		N • m	5.73	8.59	14.3	21.5
Rated current *1		A (rms)	1.2	1.5	2.8	4.7
Momentary maximum current *1		A (rms)	4.9	6.5	12	20
Rotor inertia	Without brake	kg • m²	1.61×10^{-4}	2.03×10^{-4}	4.60×10^{-4}	6.70×10^{-4}
	With brake	kg • m²	1.90×10^{-4}	2.35×10^{-4}	5.90×10^{-4}	7.99×10^{-4}
Applicable load inertia		—	10 times the rotor inertia max. *2			
Torque constant *1		N • m/A	1.27	1.38	1.27	1.16
Power rate *1	Without brake	kW/s	22.7	40.3	49.5	76.5
	With brake	kW/s	19.2	34.8	38.6	64.2
Mechanical time constant	Without brake	ms	0.70	0.62	0.79	0.66
	With brake	ms	0.83	0.72	1.01	0.79
Electrical time constant		ms	5.7	5.9	10	10
Allowable radial load *3		N	490	490	490	490
Allowable thrust load *3		N	196	196	196	196
Weight	Without brake	kg	Approx. 3.1	Approx. 3.5	Approx. 5.2	Approx. 6.7
	With brake	kg	Approx. 4.1	Approx. 4.5	Approx. 6.7	Approx. 8.2
Radiator plate dimensions (material)			320 × 300 × t20 (Al)		275 × 260 × t15 (Al)	
Applicable drives (R88D-)			KT06F/KN06F-ML2/ KN06F-ECT-R	KT06F/KN06F-ML2/ KN06F-ECT-R	KT10F/KN10F-ML2/ KN10F-ECT-R	KT15F/KN15F-ML2/ KN15F-ECT-R
Brake specifications	Brake inertia	kg • m²	1.35×10^{-4}	1.35×10^{-4}	1.35×10^{-4}	1.35×10^{-4}
	Excitation voltage *4	V	24 VDC ± 10%			
	Power consumption (at 20°C)	W	17	17	14	19
	Current consumption (at 20°C)	A	0.70±10%	0.70±10%	0.59±10%	0.79±10%
	Static friction torque	N • m	2.5 min.	2.5 min.	4.9 min.	13.7 min.
	Attraction time *5	ms	50 max.	50 max.	80 max.	100 max.
	Release time *5	ms	15 max. *7	15 max. *7	70 max. *6	50 max. *6
	Backlash		1° (reference value)			
	Allowable work per braking	J	392	392	588	1176
	Allowable total work	J	4.9×10^{5}	4.9×10^{5}	7.8×10^{5}	1.5×10^{6}
	Allowable angular acceleration	rad/s²	10,000			
	Brake limit	—	10 million times min.			
	Insulation class	—	Type F			

***1.** These are the values when the motor is combined with a drive at normal temperature (20°C, 65%). The momentary maximum torque indicates the standard value.

***2.** Applicable load inertia.

- The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.
- If the dynamic brake is activated frequently with high load inertia, the Dynamic Brake Resistor may burn. Do not repeatedly turn the servo ON/OFF while the dynamic brake is enabled.

***3.** The allowable radial and thrust loads are the values determined for a limit of 20,000 hours at normal operating temperatures. The allowable radial loads are applied as shown in the following diagram.



***4.** This is a non-excitation brake. (It is released when excitation voltage is applied.)

***5.** The operation time is the value (reference value) measured with a surge suppressor (CR50500 by Okaya Electric Industries Co., Ltd.).

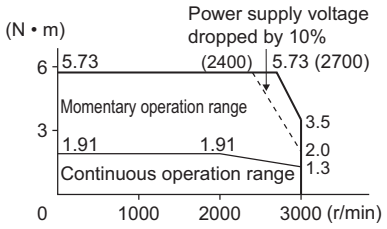
***6.** Direct current switching with a varistor (Z15D151 by Ishizuka Electronics Co.).

***7.** Direct current switching with a varistor (TNR9G820K by Nippon Chemi-Con Corporation).

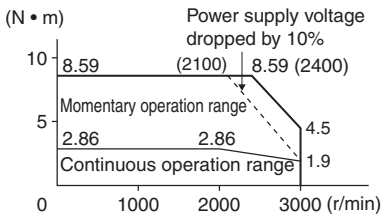
Torque and Rotation Speed Characteristics
2,000 r/min Servomotors (400 VAC Input Power)

The following graphs show the characteristics with a 3-m standard cable and a 400 VAC input.

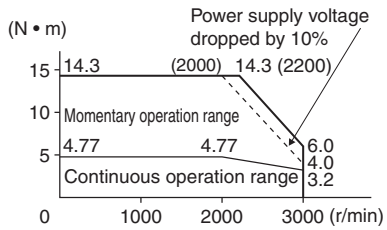
- R88M-K40020F/C (400W)



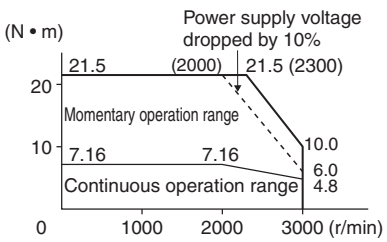
- R88M-K60020F/C (600W)



- R88M-K1K020F/C (1kW)



- R88M-K1K520F/C (1.5kW)



Characteristics

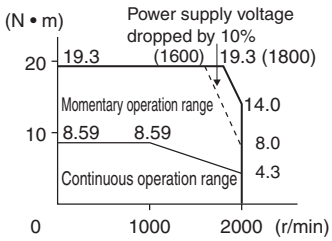
1,000 r/min Servomotors (200/400 VAC Input Power)

Item		Unit	200 VAC K90010H K90010T	400 VAC K90010F K90010C
Rated output *1		W	900	900
Rated torque *1		N • m	8.59	8.59
Rated rotation speed		r/min	1,000	
Momentary maximum rotation speed		r/min	2,000	
Momentary maximum torque *1		N • m	19.3	19.3
Rated current *1		A (rms)	7.6	3.8
Momentary maximum current *1		A (rms)	24	12
Rotor inertia	Without brake	kg • m²	6.70×10^{-4}	6.70×10^{-4}
	With brake	kg • m²	7.99×10^{-4}	7.99×10^{-4}
Applicable load inertia		—	10 times the rotor inertia max. *2	
Torque constant *1		N • m/A	0.86	1.72
Power rate *1	Without brake	kW/s	110	110
	With brake	kW/s	92.4	92.4
Mechanical time constant	Without brake	ms	0.66	0.66
	With brake	ms	0.78	0.79
Electrical time constant		ms	11	11
Allowable radial load *3		N	686	686
Allowable thrust load *3		N	196	196
Weight	Without brake	kg	Approx. 6.7	Approx. 6.7
	With brake	kg	Approx. 8.2	Approx. 8.2
Radiator plate dimensions (material)			270 × 260 × t15 (Al)	
Applicable drives (R88D-)			KT15H/KN15H-ML2/ KN15H-ECT-R	KT15F/KN15F-ML2/ KN15F-ECT-R
Brake specifications	Brake inertia	kg • m²	1.35×10^{-4}	1.35×10^{-4}
	Excitation voltage *4	V	24 VDC ± 10%	
	Power consumption (at 20°C)	W	19	19
	Current consumption (at 20°C)	A	0.79±10%	0.79±10%
	Static friction torque	N • m	13.7 min.	13.7 min.
	Attraction time *5	ms	100 max.	100 max.
	Release time *5	ms	50 max. *6	50 max. *6
	Backlash		1° (reference value)	
	Allowable work per braking	J	1176	1176
	Allowable total work	J	1.5×10^{6}	1.5×10^{6}
	Allowable angular acceleration	rad/s²	10,000	
	Brake limit	—	10 million times min.	
	Insulation class	—	Type F	

Torque and Rotation Speed Characteristics 1,000 r/min Servomotors (200/400 VAC Input Power)

The following graphs show the characteristics with a 3-m standard cable and a 200 VAC input.

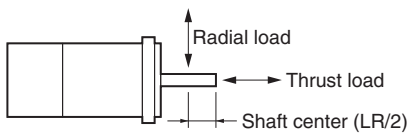
- R88M-K90010H/T/F/C (900W)



*1. These are the values when the motor is combined with a drive at normal temperature (20°C, 65%). The momentary maximum torque indicates the standard value.

*2. Applicable load inertia.
- The operable load inertia ratio (load inertia/rotor inertia) depends on the mechanical configuration and its rigidity. For a machine with high rigidity, operation is possible even with high load inertia. Select an appropriate motor and confirm that operation is possible.
- If the dynamic brake is activated frequently with high load inertia, the Dynamic Brake Resistor may burn. Do not repeatedly turn the servo ON/OFF while the dynamic brake is enabled.

*3. The allowable radial and thrust loads are the values determined for a limit of 20,000 hours at normal operating temperatures. The allowable radial loads are applied as shown in the following diagram.



*4. This is a non-excitation brake. (It is released when excitation voltage is applied.)

*5. The operation time is the value (reference value) measured with a surge suppressor (CR50500 by Okaya Electric Industries Co., Ltd.).

*6. Direct current switching with a varistor (Z15D151 by Ishizuka Electronics Co.).

*7. Direct current switching with a varistor (TNR9G820K by Nippon Chemi-Con Corporation).

Encoder Specifications

Incremental Encoders

Item	Specifications
Encoder system	Optical encoder
	20 bits
Number of output pulses	Phases A and B: 262,144 pulses/rotation Phase Z: 1 pulse/rotation
Power supply voltage	5 VDC ± 5%
Power supply current	180 mA (max.)
Output signal	+S, −S
Output interface	RS485 compliant

Absolute Encoders

Item	Specifications
Encoder system	Optical encoder
	17 bits
Number of output pulses	Phases A and B: 32,768 pulses/rotation Phase Z: 1 pulse/rotation
Maximum rotations	−32,768 to +32,767 rotations or 0 to 65,535 rotations
Power supply voltage	5 VDC ± 5%
Power supply current	110 mA (max.)
Applicable battery voltage	3.6 VDC
Current consumption of battery	265 μA (for a maximum of 5 s right after power interruption) 100 μA (for operation during power interruption) 3.6 μA (when power is supplied to the drive)
Output signal	+S, −S
Output interface	RS485 compliant

Dimensions

<Cylinder type>

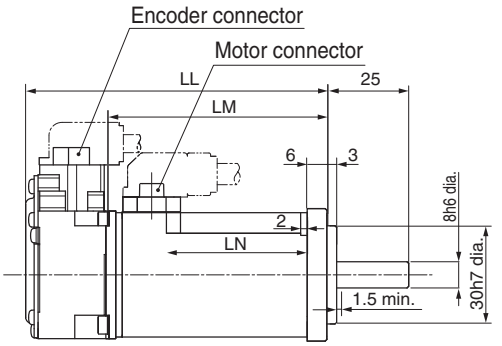
3,000 r/min Servomotors (100/200 VAC)

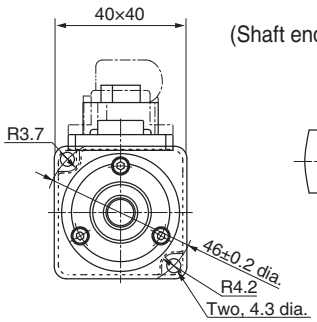
50W/100W

• Without brake

- R88M-K05030H (-S2)/-K10030L (-S2) **INC**
- R88M-K05030T (-S2)/-K10030S (-S2) **ABS**

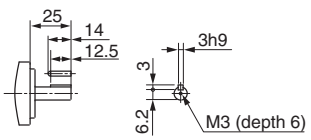
Speed	Voltage	Motor capacity	Brake
3000r/min	100/200V	50/100W	Without brake
			With brake





CAD data

(Shaft end specifications with key and tap)



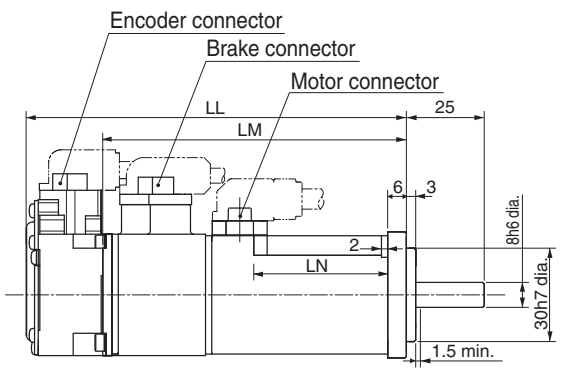
Model	Dimensions (mm)		
	LL	LM	LN
R88M-K05030□	72	48	23
R88M-K10030□	92	68	43

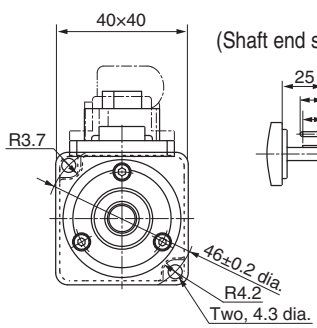
Note: The standard models have a straight shaft. A model with a key and tap is indicated by adding "S2" to the end of the model number.

• With brake

- R88M-K05030H-B (S2)/-K10030L-B (S2) **INC**
- R88M-K05030T-B (S2)/-K10030S-B (S2) **ABS**

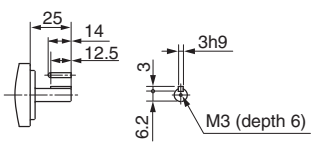
Speed	Voltage	Motor capacity	Brake
3000r/min	100/200V	50/100W	Without brake
			With brake





CAD data

(Shaft end specifications with key and tap)



Model	Dimensions (mm)		
	LL	LM	LN
R88M-K05030□-B□	102	78	23
R88M-K10030□-B□	122	98	43

Note: The standard models have a straight shaft. A model with a key and tap is indicated by adding "S2" to the end of the model number.

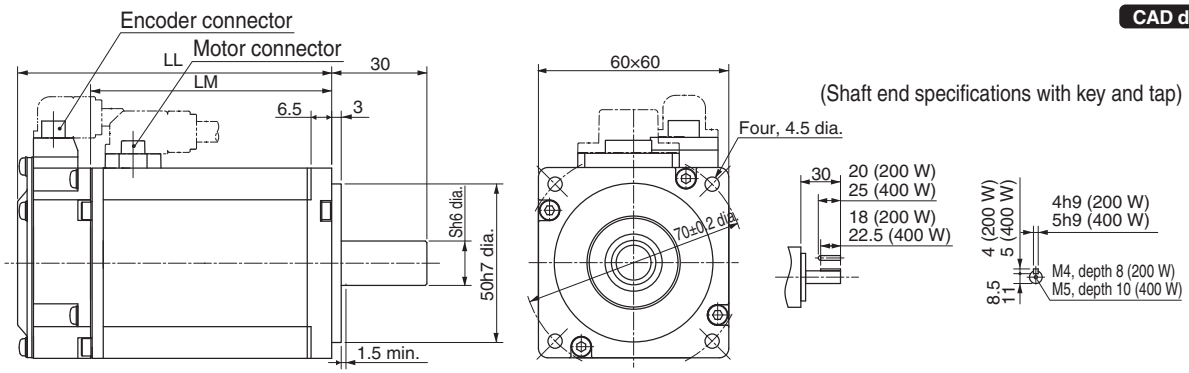
200W/400W

• Without brake

- R88M-K20030□ (-S2)/-K40030□ (-S2) **INC**
- R88M-K20030□ (-S2)/-K40030□ (-S2) **ABS**

Speed	Voltage	Motor capacity	Brake
3000r/min	100/200V	200/400W	Without brake
			With brake

CAD data



Model	Dimensions (mm)		
	LL	LM	LN
R88M-K20030□	79.5	56.5	11
R88M-K40030□	99	76	14

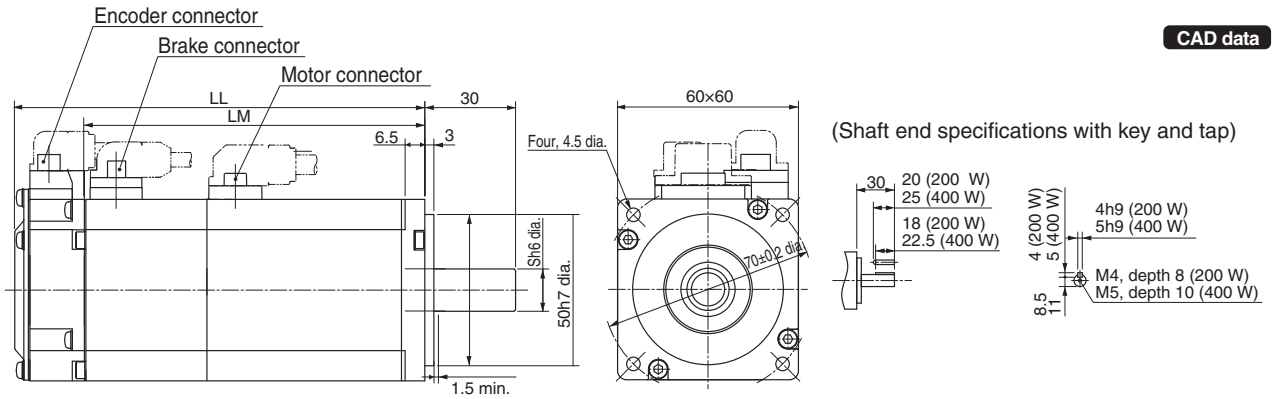
Note: The standard models have a straight shaft. A model with a key and tap is indicated by adding "S2" to the end of the model number.

• With brake

- R88M-K20030□-B (S2)/-K40030□-B (S2) **INC**
- R88M-K20030□-B (S2)/-K40030□-B (S2) **ABS**

Speed	Voltage	Motor capacity	Brake
3000r/min	100/200V	200/400W	Without brake
			With brake

CAD data



Model	Dimensions (mm)		
	LL	LM	S
R88M-K20030□-B□	116	93	11
R88M-K40030□-B□	135.5	112.5	14

Note: The standard models have a straight shaft. A model with a key and tap is indicated by adding "S2" to the end of the model number.