

AC Servomotor/Servo Drives

Replace Guide

From G5 Series with built-inEtherCAT[®]
to 1S Series with built-inEtherCAT[®]

R88M-1[]/R88D-1SN[]
R88M-K[]/R88D-KN[]-ECT



Replace
Guide

NOTE

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This Guide does not contain safety information and other details that are required for actual use. Thoroughly read and understand the manuals for all of the devices that are used in this Guide to ensure that the system is used safely. Review the entire contents of these materials, including all safety precautions, precautions for safe use, and precautions for correct use.

Intended Audience

This Guide is intended for the following personnel.

- Personnel in charge of introducing FA systems
- Personnel in charge of designing FA systems

The personnel must also have the following knowledge.

- Knowledge of electrical systems (an electrical engineer or the equivalent)
- Knowledge of NJ/NX-series CPU Units
- Knowledge of AC Servomotors/Drives
- Knowledge of operation procedure of Sysmac Studio

Applicable Products

This Guide covers the following products.

- Machine Automation Controller NJ/NX-series CPU Unit
- Automation Software Sysmac Studio
- 1S-series Servomotor/Servo Drive
- G5-series Servomotor/Servo Drive
- NX-series EtherCAT Coupler Unit

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- Thoroughly read and understand the manuals for all devices and equipment that will make up the system to ensure that the system is used safely. Review the entire contents of these manuals, including all safety precautions, precautions for safe use, and precautions for correct use.
- Confirm all regulations, standards, and restrictions that the system must adhere to.
- Check the user program for proper execution before you use it for actual operation.

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Revision History

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Revision code	Date	Revised content
01	March 2021	Original production
02	June 2021	List of Cables Supporting 1S-series Motors without Brake (Appendices 1 and 2 added)

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1. Outline

Thank you for adopting the Omron Servomotors and Servo Drives.

This manual describes the precautions for replacement and the specifications required for replacing the conventional G5-series Servomotors and Servo Drives with Built-in EtherCAT Communications, R88M-K□ and R88D-KN□-ECT, (hereinafter called the G5 series or G5) with the new 1S-series Servomotors and Servo Drives with Built-in EtherCAT Communications, R88M-1□ and R88D-1SN□, (hereinafter called the 1S series or 1S).

To check the details that are not described in this manual, refer to the User's Manual for the Servomotors and Servo Drives concerned.

No.	Manual No.	Manual name
1.	I586	1S-Series AC Servomotors and Servo Drives User's Manual (with Built-in EtherCAT® Communications) R88M-1L□/-1M□ (AC Servomotor) and R88D-1SN□-ECT (AC Servo Drive)
2.	I576	G5-Series AC Servomotors and Servo Drives User's Manual (with Built-in EtherCAT® Communications) R88M-K□ (AC Servomotor) and R88D-KN□-ECT (AC Servo Drive)

The 1S series is designed in consideration of replacing the G5 series, but it has incorporated new ideas in some parts.

Follow the procedure below to check the differences, and consider what to do in replacement.

- (1) Read **エラー! 参照元が見つかりません。** in this manual to grasp an outline of the differences between both series.
- (2) See **エラー! 参照元が見つかりません。** to clearly know the 1S-series model which your G5-series model is replaced with.
- (3) For details on the differences in (1), see the sections in Chapter 4 or later.

2. Precautions for Replacement

The 1S series is designed in consideration of replacing the G5 series, but it has incorporated new ideas in some parts. The precautions for replacement are divided into the following five sections, where you recognize the differences between both series.

In replacement, consider the design that eases the differences.

2.1. Main Specifications

The 1S series has the main specifications equivalent to or higher than those of the G5 series.

The following items show the performance and functions that are particularly improved in the 1S series.

By replacing the G5 series with the 1S series, you can also expect that the functions, performance, and system will improve.

No.	Item	G5 series	1S series	Remarks
1.	EtherCAT Communications cycle	<ul style="list-style-type: none"> Cycle in DC mode: 250 μs, 500 μs, 1 ms, 2 ms, 4 ms 	<ul style="list-style-type: none"> Cycle in DC mode: 125 μs, 250 μs, 500 μs, 750 μs, 1 to 10 ms (In 0.25 ms increments) 	You can improve the communications cycle by 125 us between NX7 and 1S series.
2.	Safety function	<ul style="list-style-type: none"> STO by safety input signal (physical wiring) 	<ul style="list-style-type: none"> STO by safety input signal (physical wiring) STO (FSoE) by EtherCAT communications 	The 1S series can have an STO function via EtherCAT communications. Physical STO wiring to all servos, which used to be required, is not required.
3.	Data backup of absolute (ABS) encoder	<ul style="list-style-type: none"> Battery required 	<ul style="list-style-type: none"> Battery not required 	The 1S series does not need any battery for data backup of the ABS encoder.
4.	Resolutions of absolute (ABS) and increment (INC) encoders	<ul style="list-style-type: none"> ABS type: 17 bits INC type: 20 bits 	<ul style="list-style-type: none"> ABS type: 23 bits INC type: Not supported 	The 1S series can make a more highly precise motor control. Although the INC type is not supported, you can use an ABS encoder as an INC encoder.

2.2. Main Performance

The 1S series is superior to the G5 series in encoder resolution and drive processing period.

Therefore, the 1S series has the servo performance equivalent to or higher than that of the G5 series.

It has also fully achieved the motor velocity ripple performance and motor velocity response performance equivalent to those of the G5 series.

No.	Item	G5 series	1S series	Remarks
1.	Velocity control range	<ul style="list-style-type: none"> 1:5000 	<ul style="list-style-type: none"> Equivalent to or higher than that of G5 series 	The 1S series is superior to the G5 series in encoder resolution and drive processing period. As a result, it retains the performance equivalent to or higher than that of the G5 series.
2.	Speed variation (load characteristic) * Rated torque 0% to 100%	<ul style="list-style-type: none"> 0.01% or less (Rated rotation speed) 	<ul style="list-style-type: none"> Equivalent to or higher than that of G5 series 	
3.	Speed variation (voltage characteristic) * Rated voltage \pm 10%	<ul style="list-style-type: none"> 0% (Rated rotation speed) 	<ul style="list-style-type: none"> Equivalent to or higher than that of G5 series 	
4.	Temperature variation (temperature characteristic) * 0 to 50°C	<ul style="list-style-type: none"> \pm0.01% or less (Rated rotation speed) 	<ul style="list-style-type: none"> Equivalent to or higher than that of G5 series 	
5.	Torque control reproducibility	<ul style="list-style-type: none"> Less than 2 kW: \pm1% 2 kW or more: \pm2% 	<ul style="list-style-type: none"> Equivalent to or higher than that of G5 series 	

2.3. Main Differences between Servomotors

■ Motor lineup

The following tables show a lineup of G5-series and 1S-series motors.

● 50 W to 1.5 kW motors

Power supply voltage	Rated rotation speed	Series	50 W	100 W	200 W	400 W	750 W	1 kW	1.5 kW
100 V type	3000 r/min	G5 series	Available	Available	Available	Available			
		1S series	Available	Available	Available	Available			
200 V type	3000 r/min	G5 series	Available	Available	Available	Available	Available	Available	Available
		1S series	Available	Available	Available	Available	Available	Available	Available
	2000 r/min	G5 series						Available	Available
		1S series						Available	Available
	1000 r/min	G5 series						900 W	
		1S series						900 W	
400 V type	3000 r/min	G5 series					Available	Available	Available
		1S series					Available	Available	Available
	2000 r/min	G5 series				Available	600 W	Available	Available
		1S series				Available	600 W	Available	Available
	1000 r/min	G5 series						900 W	
		1S series						900 W	

• 2 kW to 15 kW motors

Power supply voltage	Rated rotation speed	Series	2 kW	3 kW	4 kW	5 kW	7.5 kW	11 kW	15 kW
200 V type	3000 r/min	G5 series	Available	Available	Available	Available			
		1S series	Available	Available	Available	4.7 kW			
	2000 r/min	G5 series	Available	Available	Available	Available			
		1S series	Available	Available	Not available	Not available			
	1500 r/min	G5 series					Available	Available	Available
		1S series			Available	Available	Available	Available	Available
	1000 r/min	G5 series	Available	Available		4.5 kW	6 kW		
		1S series	Available	Available		Not available	Not available		
400 V type	3000 r/min	G5 series	Available	Available	Available	Available			
		1S series	Available	Available	Available	Available			
	2000 r/min	G5 series	Available	Available	Available	Available			
		1S series	Available	Available	Not available	Not available			
	1500 r/min	G5 series					Available	Available	Available
		1S series			Available	5.5 kW	Available	Available	Available
	1000 r/min	G5 series	Available	Available		4.5 kW	6 kW		
		1S series	Available	Available		Not available	Not available		

■ Replacement involving a change in rated rotation speed

In the 1S series, 4 kW or more motors with a rated rotation speed of 2000 r/min and 1000 r/min are converged into those with 1500 r/min.

Therefore, replacing the following G5-series motors with the 1S-series ones involves changes in motor dimensions and performance values.

Check especially the differences in motor dimensions, and then consider what to do.

- G5-series 2000 r/min 4 kW motor (200 V or 400 V type): R88M-K4K020□
To 1S-series 1500 r/min 4 kW motor (200 V or 400 V type): R88M-1M4K015□
- G5-series 2000 r/min 5 kW motor (200 V type): R88M-K5K020H/T□
To 1S-series 1500 r/min 5 kW motor (200 V type): R88M-1M5K015T□
- G5-series 2000 r/min 5 kW motor (400 V type): R88M-K5K020F/C□
To 1S-series 1500 r/min 5 kW motor (400 V type): R88M-1M5K515C□
- G5-series 1000 r/min 4.5 kW motor (200 V or 400 V type): R88M-K4K510□
To 1S-series 1500 r/min 7.5 kW motor (200 V or 400 V type): R88M-1M7K515□
- G5-series 1000 r/min 6 kW motor (200 V or 400 V type): R88M-K6K010□
To 1S-series 1500 r/min 11 kW motor (200 V or 400 V type): R88M-1M11K015□

- * The G5-series motors shown above are replaced with the 1S-series motors that can output higher torque. Under the actual usage condition, if your G5-series motor has enough torque, you may be able to select a one class smaller 1S-series motor. For the actual usage condition, use OMRON tools, such as a trace function, to check the effective torque and maximum torque of your G5-series motor, and consider whether it can tolerate the rated torque and maximum torque of a one class smaller 1S-series motor.

■ Replacement involving insufficient motor capacity

For the motors shown below, compared with the G5-series motor, the capacity of the 1S-series motor is insufficient. Under the actual usage condition, if your G5-series motor does not have enough torque, you should lighten the motor load.

For the usage condition, use OMRON tools, such as a trace function, to check the effective torque of your motor.

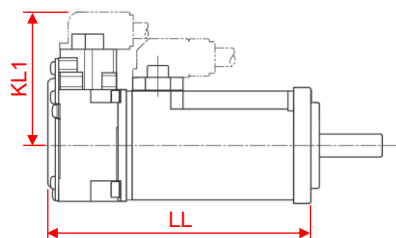
- G5-series 3000 r/min 5 kW motor (200 V type): R88M-K5K030H/T□
To 1S-series 3000 r/min 4.7 kW motor (200 V type): R88M-1L4K730T□

■ Motor dimensions to check

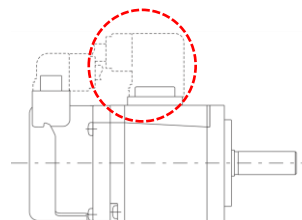
Except for the previous paragraph *Replacement involving a change in rated rotation speed*, check the following three points before proceeding with replacement.

- The cable exit direction of the motor power, brake, and encoder connector is different between G5 and 1S series.
- Main differences in motor dimensions are that in the dimension LL and in the dimension KL1.
- For 750 W or less 1S-series motors with a rated rotation speed of 3000 r/min, if you add oil seal as an option, the dimension LL will become longer by 5 to 7 mm.

● Reference: Outline of G5-series 100 W motor



● Reference: Outline of 1S-series 50 W motor



2.4. Main Differences between Servo Drives

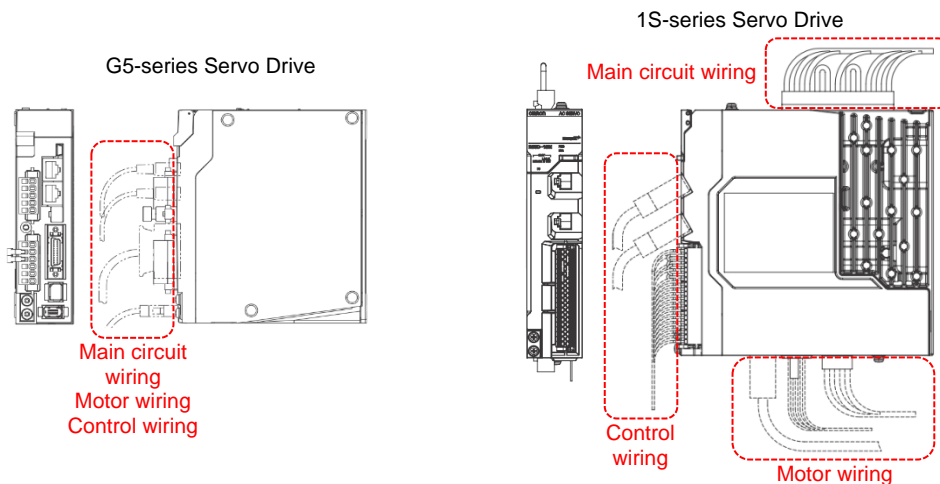
■ Dimensions, main circuit wiring direction, and motor wiring direction

Both series are different in dimensions. In designing, see **エラー! 参照が見つかりません。** to check the details.

In particular, both series are different in main circuit wiring and motor wiring directions.

For the G5-series Servo Drive, all the main circuit wiring, motor wiring, and control wiring used to be concentrated on the front.

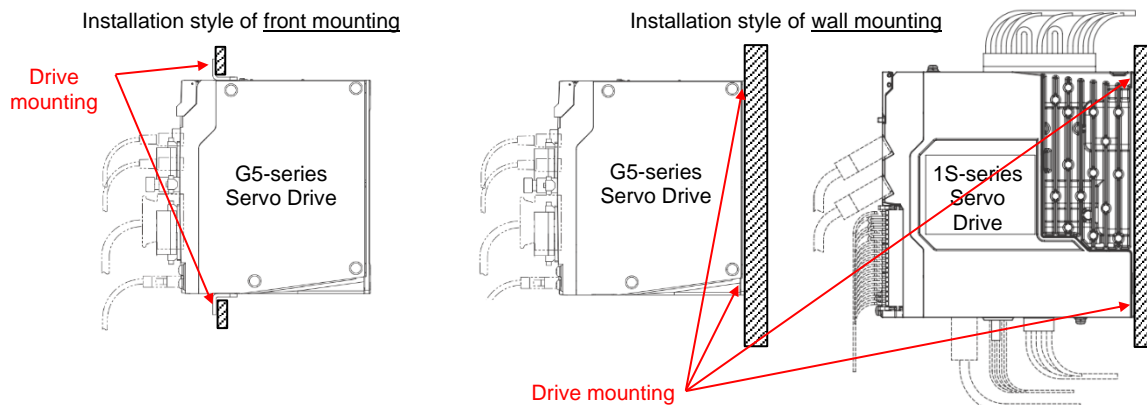
For the 1S-series Servo Drive, the main circuit wiring, motor wiring, and control wiring are respectively routed through the top, bottom, and front so that you can classify wiring routing paths separately. In designing, provide space for wiring routing especially at the top and the bottom.



■ Installation style of wall mounting only

For the G5-series Servo Drive, the installation style of front mounting used to be allowed. It is not supported by the 1S-series Servo Drive.

Therefore, in designing, adopt the installation style of wall mounting for the 1S-series Servo Drive.



■ Other differences

The following table shows other main differences between the G5-series Servo Drive and the 1S-series Servo Drive.

No.	Item	G5 series	1S series	Remarks
1.	Control power supply specifications	<ul style="list-style-type: none"> • 100 V type: 100 VAC • 200 V type: 200 VAC • 400 V type: 24 VDC 	<ul style="list-style-type: none"> • All models: 24 VDC 	The control power supply of the 1S series is standardized at 24 VDC.
2.	Harmonic suppression	<ul style="list-style-type: none"> • AC reactor only 	<ul style="list-style-type: none"> • AC reactor • DC reactor 	The 1S series supports a comparatively effective DC reactor.
3.	Support for shield clamp of motor power cable	Not supported	Supported by the following models. <ul style="list-style-type: none"> • R88D-1SN55□ • R88D-1SN75□ • R88D-1SN150□ 	They support effective motor power cable shield clamps in compliance with CE standards.

2.5. Differences in Main Functions

The following table shows a comparison of main functions between the G5 series and the 1S series.

For detailed differences in specific functions, refer to **エラー! 電源が見つかりません.**

No.	Item	G5 series	1S series	Remarks
1.	Control method	<ul style="list-style-type: none"> • One-degree-of-freedom control 	<ul style="list-style-type: none"> • Two-degree-of-freedom control • One-degree-of-freedom control 	For the 1S series, two-degree-of-freedom control is available to make an optimum positioning motor operation, and it is enabled by default. <ul style="list-style-type: none"> • Two-degree-of-freedom control: On the basis of host commands, internal commands are generated so that the control target can be followed, in order to control the optimum motor operation. • One-degree-of-freedom control: This is a conventional control method, and control is exercised in exact accordance with host commands. In particular, it is effective when you minimize the delay for host commands.
2.	Fully-closed control	Supported	Not supported	The 1S series does not support the fully-closed control. Consider the following solutions. <ul style="list-style-type: none"> • Use the host Controller of NX/NJ to achieve it. • Continue using the G5 series.
3.	Linear motor	Supported	Not supported	The 1S series does not support linear motors. To use the linear motors, continue using the G5 series.
4.	Analog monitor	Supported	Not supported	The 1S series does not support analog monitor functions. Use the analog output unit to output data, via the host Controller of NX/NJ.
5.	Motor brake control relay	<ul style="list-style-type: none"> • External relay 	Selectable among the following. <ul style="list-style-type: none"> • Built-in relay • External relay 	The 1S series has a built-in relay for motor brake control. Use a proper one as follows, depending on the situation. <ul style="list-style-type: none"> • Brake applied 10 times or less a day The built-in relay will do. • Brake applied 10 times or more a day Considering that a relay needs replacing when it reaches the relay service life, you are recommended to use the external relay.
6.	General input (high-speed)	Not supported	Supported (IN7, IN8)	The 1S series is ready for high-speed general inputs, whose hardware delay is within 4 μ s. You can increase the operation responsiveness and accuracy of external latch functions.

3. Replacement List

3.1. Servomotors with Rated Rotation Speed of 3000 r/min

Main circuit power supply voltage	G5 series			1S series			Remarks
	Motor capacity	Motor model R88M-	Drive model R88D-	Motor capacity	Motor model R88M-	Drive model R88D-	
Single-phase 100 V	50 W	K05030H/T□	KNA5L-ECT	50 W	1M05030S□	1SN01L-ECT	
	100 W	K10030L/S□	KN01L-ECT	100 W	1M10030S□	1SN01L-ECT	
	200 W	K20030L/S□	KN02L-ECT	200 W	1M20030S□	1SN02L-ECT	
	400 W	K40030L/S□	KN04L-ECT	400 W	1M40030S□	1SN04L-ECT	
Single-phase 200 V	50 W	K05030H/T□	KN01H-ECT	50 W	1M05030T□	1SN01H-ECT	
	100 W	K10030H/T□	KN01H-ECT	100 W	1M10030T□	1SN01H-ECT	
	200 W	K20030H/T□	KN02H-ECT	200 W	1M20030T□	1SN02H-ECT	
	400 W	K40030H/T□	KN04H-ECT	400 W	1M40030T□	1SN04H-ECT	
	750 W	K75030H/T□	KN08H-ECT	750 W	1M75030T□	1SN08H-ECT	
	1 kW	K1K030H/T□	KN15H-ECT	1 kW	—	—	Use 3-phase 200 V.
	1.5 kW	K1K530H/T□	KN15H-ECT	1.5 kW	1L1K530T□	1SN15H-ECT	
3-phase 200 V	50 W	K05030H/T□	KN01H-ECT	50 W	1M05030T□	1SN01H-ECT	
	100 W	K10030H/T□	KN01H-ECT	100 W	1M10030T□	1SN01H-ECT	
	200 W	K20030H/T□	KN02H-ECT	200 W	1M20030T□	1SN02H-ECT	
	400 W	K40030H/T□	KN04H-ECT	400 W	1M40030T□	1SN04H-ECT	
	750 W	K75030H/T□	KN08H-ECT	750 W	1M75030T□	1SN08H-ECT	
	1 kW	K1K030H/T□	KN15H-ECT	1 kW	1L1K030T□	1SN10H-ECT	
	1.5 kW	K1K530H/T□	KN15H-ECT	1.5 kW	1L1K530T□	1SN15H-ECT	
	2 kW	K2K030H/T□	KN20H-ECT	2 kW	1L2K030T□	1SN20H-ECT	
	3 kW	K3K030H/T□	KN30H-ECT	3 kW	1L3K030T□	1SN30H-ECT	
	4 kW	K4K030H/T□	KN50H-ECT	4 kW	1L4K030T□	1SN55H-ECT	
5 kW	K5K030H/T□	KN50H-ECT	4.7 kW	1L4K730T□	1SN55H-ECT	You need to lighten the load.	
3-phase 400 V	750 W	K75030F/C□	KN10F-ECT	750 W	1L75030C□	1SN10F-ECT	
	1 kW	K1K030F/C□	KN15F-ECT	1 kW	1L1K030C□	1SN10F-ECT	
	1.5 kW	K1K530F/C□	KN15F-ECT	1.5 kW	1L1K530C□	1SN15F-ECT	
	2 kW	K2K030F/C□	KN20F-ECT	2 kW	1L2K030C□	1SN20F-ECT	
	3 kW	K3K030F/C□	KN30F-ECT	3 kW	1L3K030C□	1SN30F-ECT	
	4 kW	K4K030F/C□	KN50F-ECT	4 kW	1L4K030C□	1SN55F-ECT	
5 kW	K5K030F/C□	KN50F-ECT	5 kW	1L5K030C□	1SN55F-ECT		

3.2. Servomotors with Rated Rotation Speed of 2000 r/min and 1500 r/min

Main circuit power supply voltage	G5 series			1S series			Remarks
	Motor capacity	Motor model R88M-	Drive model R88D-	Motor capacity	Motor model R88M-	Drive model R88D-	
Single-phase 200 V	1 kW	K1K020H/T□	KN10H-ECT	1 kW	—	—	Use 3-phase 200 V.
	1.5 kW	K1K520H/T□	KN15H-ECT	1.5 kW	1M1K520T□	1SN15H-ECT	
3-phase 200 V	1 kW	K1K020H/T□	KN10H-ECT	1 kW	1M1K020T□	1SN10H-ECT	
	1.5 kW	K1K520H/T□	KN15H-ECT	1.5 kW	1M1K520T□	1SN15H-ECT	
	2 kW	K2K020H/T□	KN20H-ECT	2 kW	1M2K020T□	1SN20H-ECT	
	3 kW	K3K020H/T□	KN30H-ECT	3 kW	1M3K020T□	1SN30H-ECT	
	4 kW	K4K020H/T□	KN50H-ECT	4 kW	1M4K015T□	1SN55H-ECT	1500-r/min Servomotors.* 1
	5 kW	K5K020H/T□	KN50H-ECT	5 kW	1M5K015T□	1SN55H-ECT	1500-r/min Servomotors.* 1
	7.5 kW	K7K515T□	KN75H-ECT	7.5 kW	1M7K515T□	1SN75H-ECT	
	11 kW	K11K015T□	KN150H-ECT	11 kW	1M11K015T□	1SN150H-ECT	
3-phase 400 V	15 kW	K15K015T□	KN150H-ECT	15 kW	1M15K015T□	1SN150H-ECT	
	400 W	K40020F/C□	KN06F-ECT	400 W	1M40020C□	1SN06F-ECT	
	600 W	K60020F/C□	KN06F-ECT	600 W	1M60020C□	1SN06F-ECT	
	1 kW	K1K020F/C□	KN10F-ECT	1 kW	1M1K020C□	1SN10F-ECT	
	1.5 kW	K1K520F/C□	KN15F-ECT	1.5 kW	1M1K520C□	1SN15F-ECT	
	2 kW	K2K020F/C□	KN20F-ECT	2 kW	1M2K020C□	1SN20F-ECT	
	3 kW	K3K020F/C□	KN30F-ECT	3 kW	1M3K020C□	1SN30F-ECT	
	4 kW	K4K020F/C□	KN50F-ECT	4 kW	1M4K015C□	1SN55F-ECT	1500-r/min Servomotors.* 1
	5 kW	K5K020F/C□	KN50F-ECT	5.5 kW	1M5K515C□	1SN55F-ECT	1500-r/min Servomotors.* 1
	7.5 kW	K7K515C□	KN75F-ECT	7.5 kW	1M7K515C□	1SN75F-ECT	
	11 kW	K11K015C□	KN150F-ECT	11 kW	1M11K015C□	1SN150F-ECT	
15 kW	K15K015C□	KN150F-ECT	15 kW	1M15K015C□	1SN150F-ECT		

*1. For the 1S series, the G5-series motor with a rated rotation speed of 2000 r/min is replaced with the motor with a rated rotation speed of 1500 r/min.
 Even if the 1S-series motor is rotated at 2000 r/min, it can deliver the performance equivalent to or higher than that of the G5-series motor.
 Thoroughly check the differences in motor dimensions and performance, and then consider what to do.

3.3. Servomotors with Rated Rotation Speed of 1000 r/min

Main circuit power supply voltage	G5 series			1S series			Remarks
	Motor capacity	Motor model R88M-	Drive model R88D-	Motor capacity	Motor model R88M-	Drive model R88D-	
Single-phase 200 V	900 W	K90010H/T□	KN15H-ECT	900 W	—	—	Use 3-phase 200 V.
3-phase 200 V	900 W	K90010H/T□	KN15H-ECT	900 W	1M90010T□	1SN10H-ECT	
	2 kW	K2K010H/T□	KN30H-ECT	2 kW	1M2K010T□	1SN20H-ECT	
	3 kW	K3K010H/T□	KN50H-ECT	3 kW	1M3K010T□	1SN30H-ECT	
	4.5 kW	K4K520T□	KN50H-ECT	7.5 kW	1M7K515T□	1SN75H-ECT	1500-r/min Servomotors.* 2
	6 kW	K6K020T□	KN75H-ECT	11 kW	1M11K015T□	1SN150H-ECT	1500-r/min Servomotors.* 2
3-phase 400 V	900 W	K90010F/C□	KN15F-ECT	900 W	1M90010C□	1SN10F-ECT	
	2 kW	K2K010F/C□	KN30F-ECT	2 kW	1M2K010C□	1SN20F-ECT	
	3 kW	K3K010F/C□	KN50F-ECT	3 kW	1M3K010C□	1SN30F-ECT	
	4.5 kW	K4K510C□	KN50F-ECT	7.5 kW	1M7K515C□	1SN75F-ECT	1500-r/min Servomotors.* 2
	6 kW	K6K010C□	KN75F-ECT	11 kW	1M11K015C□	1SN150F-ECT	1500-r/min Servomotors.* 2

*2. For the 1S series, the G5-series motor with a rated rotation speed of 1000 r/min is replaced with the motor with a rated rotation speed of 1500 r/min.

A larger capacity is selected for the 1S-series motor so that it can deliver the performance equivalent to or higher than that of the G5-series motor.

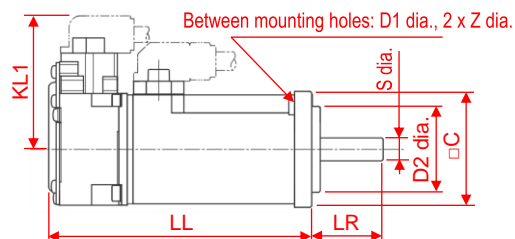
Thoroughly check the differences in motor dimensions and performance, and then consider what to do.

4. Comparison of Servomotor Dimensions

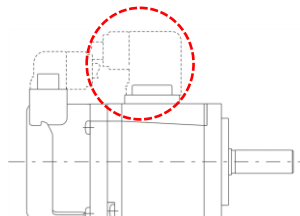
4.1. Servomotors with Rated Rotation Speed of 3000 r/min (Main Circuit Power Supply Voltage: 100 V or 200 V)

■ 50 W motor (100 V or 200 V)

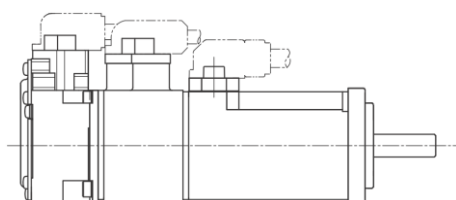
● G5 without 50 W brake



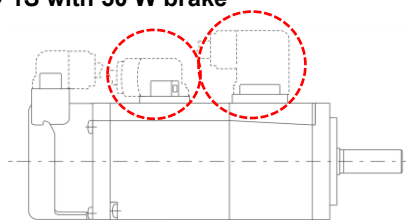
● 1S without 50 W brake



● G5 with 50 W brake



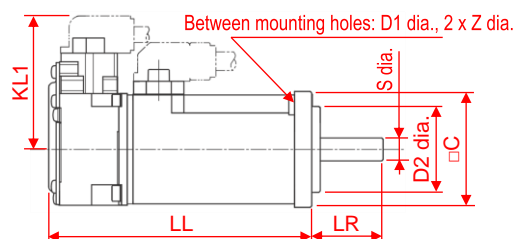
● 1S with 50 W brake



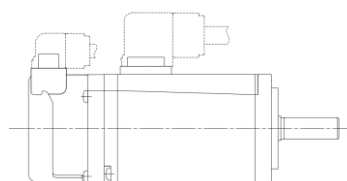
Motor capacity	Specifications	Series	Motor model R88M-	Dimension [mm]								Remarks
				LL	LR	S	D1	D2	C	Z	KL1	
50 W	Without brake	G5 series	K05030□	72	25	8	46	30	40	4.3	46.6	Power and brake connector directions are different. ● For G5, axis direction ● For 1S, encoder direction
		1S series	1M05030□	67.5	25	8	46	30	40	4.5	43	
	With brake	G5 series	K05030□-B□	102	25	8	46	30	40	4.3	46.6	
		1S series	1M05030□-B□	103.5	25	8	46	30	40	4.5	43	

■ 100 W motor (100 V or 200 V)

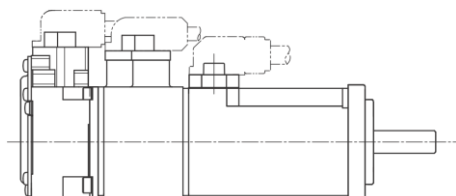
● G5 without 100 W brake



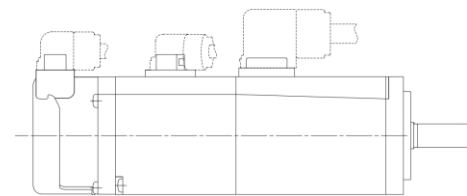
● 1S without 100 W brake



● G5 with 100 W brake



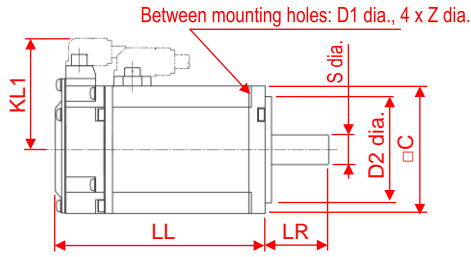
● 1S with 100 W brake



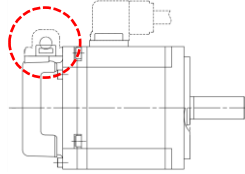
Motor capacity	Specifications	Series	Motor model R88M-	Dimension [mm]								Remarks
				LL	LR	S	D1	D2	C	Z	KL1	
100 W	Without brake	G5 series	K10030□	92	25	8	46	30	40	4.3	46.6	Connector directions are the same.
		1S series	1M10030□	90	25	8	46	30	40	4.5	43	
	With brake	G5 series	K10030□-B□	122	25	8	46	30	40	4.3	46.6	
		1S series	1M10030□-B□	126	25	8	46	30	40	4.5	43	

■ 200 W or 400 W motor (100 V or 200 V)

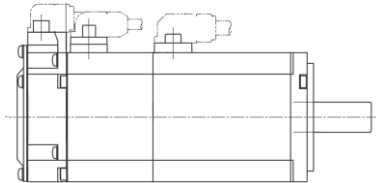
● G5 without 200 W or 400 W brake



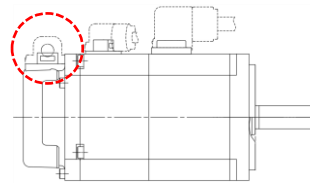
● 1S without 200 W or 400 W brake



● G5 with 200 W or 400 W brake



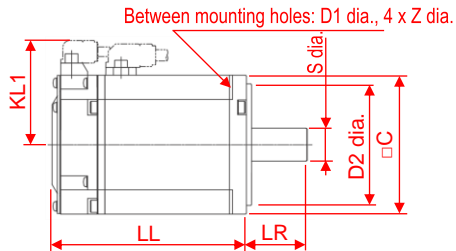
● 1S with 200 W or 400 W brake



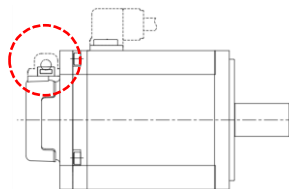
Motor capacity	Specifications	Series	Motor model R88M-	Dimension [mm]								Remarks
				LL	LR	S	D1	D2	C	Z	KL1	
200 W	Without brake	G5 series	K20030□	79.5	30	11	70	50	60	4.5	52.5	Encoder connector directions are different. ● For G5, axis direction ● For 1S, right to axis direction
		1S series	1M20030□	79.5	30	11	70	50	60	4.5	52.6	
		1M20030□-O□	86.5	30	11	70	50	60	4.5	52.6		
	With brake	G5 series	K20030□-B□	116	30	11	70	50	60	4.5	52.5	
		1S series	1M20030□-B□	107.5	30	11	70	50	60	4.5	52.6	
		1M20030□-BO□	114.5	30	11	70	50	60	4.5	52.6		
400 W	Without brake	G5 series	K40030□	99	30	14	70	50	60	4.5	52.5	
		1S series	1M40030□	105.5	30	14	70	50	60	4.5	52.6	
		1M40030□-O□	112.5	30	14	70	50	60	4.5	52.6		
	With brake	G5 series	K40030□-B□	135.5	30	14	70	50	60	4.5	52.5	
		1S series	1M40030□-B□	133.5	30	14	70	50	60	4.5	52.6	
		1M40030□-BO□	140.5	30	14	70	50	60	4.5	52.6		

■ 750 W motor (200 V)

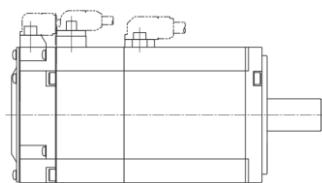
● G5 without 750 W brake



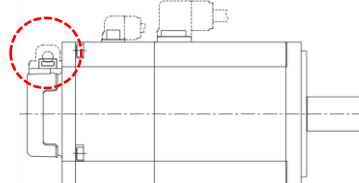
● 1S without 750 W brake



● G5 with 750 W brake



● 1S with 750 W brake

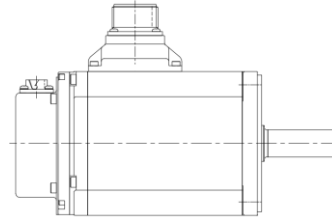
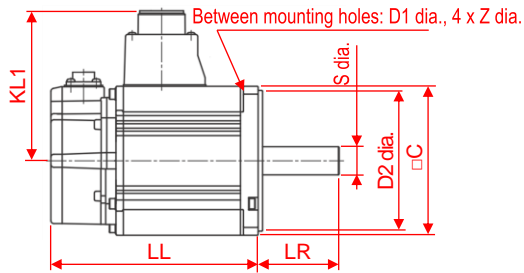


Motor capacity	Specifications	Series	Motor model R88M-	Dimension [mm]								Remarks
				LL	LR	S	D1	D2	C	Z	KL1	
750 W	Without brake	G5 series	K75030□	112.2	35	19	90	70	80	6	60	Encoder connector directions are different. ● For G5, axis direction ● For 1S, right to axis direction
		1S series	1M75030T□	117.3	35	19	90	70	80	6	63.2	
		1M75030T-O□	124.3	35	19	90	70	80	6	63.2		
	With brake	G5 series	K75030□-B□	148.2	35	19	90	70	80	6	61.6	
		1S series	1M75030T-B□	153	35	19	90	70	80	6	63.2	
		1M75030T-BO□	160	35	19	90	70	80	6	63.2		

■ 1 kW, 1.5 kW, 2 kW, or 3 kW motor (200 V)

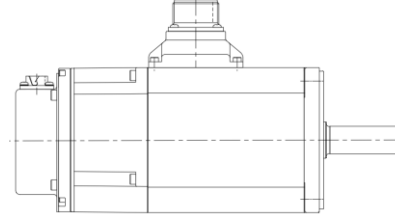
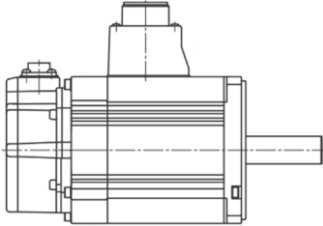
● G5 without 1 kW, 1.5 kW, 2 kW, or 3 kW brake

● 1S without 1 kW, 1.5 kW, 2 kW, or 3 kW brake



● G5 with 1 kW, 1.5 kW, 2 kW, or 3 kW brake

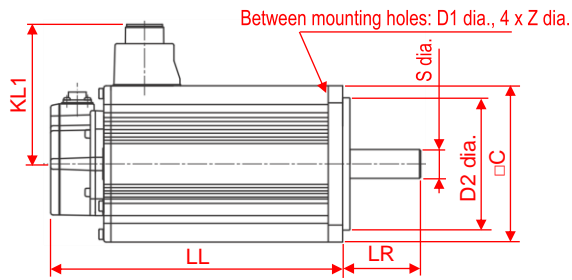
● 1S with 1 kW, 1.5 kW, 2 kW, or 3 kW brake



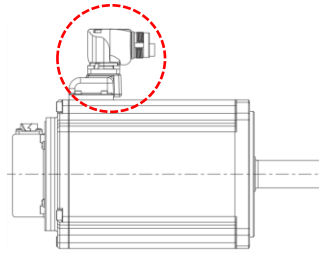
Motor capacity	Specifications	Series	Motor model R88M-	Dimension [mm]								Remarks
				LL	LR	S	D1	D2	C	Z	KL1	
1 kW	Without brake	G5 series	K1K030□	141	55	19	115	95	100	9	101	Connector directions are the same.
		1S series	1L1K030T□	168	55	19	115	95	100	9	97	
	With brake	G5 series	K1K030□-B□	168	55	19	115	95	100	9	101	
		1S series	1L1K030T-B□	209	55	19	115	95	100	9	97	
1.5 kW	Without brake	G5 series	K1K530□	159.5	55	19	115	95	100	9	101	
		1S series	1L1K530T□	168	55	19	115	95	100	9	97	
	With brake	G5 series	K1K530□-B□	186.5	55	19	115	95	100	9	101	
		1S series	1L1K530T-B□	209	55	19	115	95	100	9	97	
2 kW	Without brake	G5 series	K2K030□	178.5	55	19	115	95	100	9	101	
		1S series	1L2K030T□	179	55	19	115	95	100	9	102	
	With brake	G5 series	K2K030□-B□	205.5	55	19	115	95	100	9	101	
		1S series	1L2K030T-B□	220	55	19	115	95	100	9	104	
3 kW	Without brake	G5 series	K3K030□	190	55	22	145	110	120	9	113	
		1S series	1L3K030T□	184	55	22	145	110	130	9	116	
	With brake	G5 series	K3K030□-B□	215	55	22	145	110	120	9	113	
		1S series	1L3K030T-B□	230	55	22	145	110	130	9	119	

■ 4 kW or 5 kW motor (200 V)

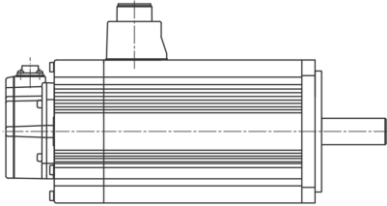
- G5 without 4 kW or 5 kW brake



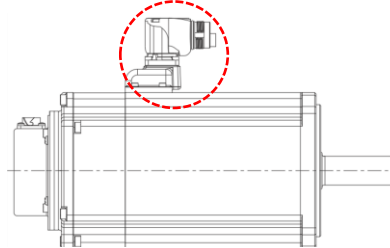
- 1S without 4 kW or 4.7 kW brake



- G5 with 4 kW or 5 kW brake



- 1S with 4 kW or 4.7 kW brake

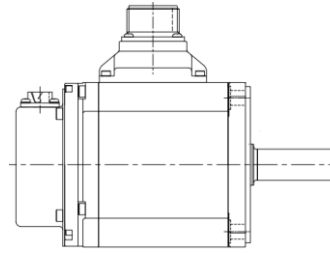
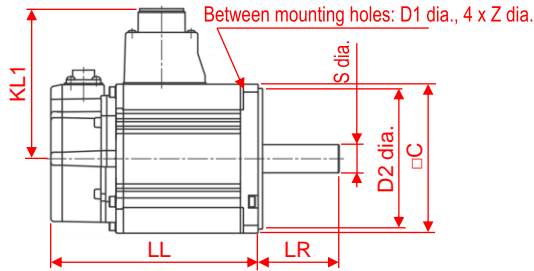


Motor capacity	Specifications	Series	Motor model R88M-	Dimension [mm]								Remarks
				LL	LR	S	D1	D2	C	Z	KL1	
4 kW	Without brake	G5 series	K4K030□	208	65	24	145	110	130	9	118	Power and brake connector directions are different. ● For G5, vertically upward direction ● For 1S, axis direction (Rotatable sideways by 310°)
		1S series	1L4K030T□	208	65	24	145	110	130	9	127	
	With brake	G5 series	K4K030□-B□	236	65	24	145	110	130	9	118	
		1S series	1L4K030T-B□	251	65	24	145	110	130	9	127	
5 kW 4.7 kW	Without brake	G5 series	K5K030□	243	65	24	145	110	130	9	118	
		1S series	1L4K730T□	232	65	24	145	110	130	9	127	
	With brake	G5 series	K5K030□-B□	271	65	24	145	110	130	9	118	
		1S series	1L4K730T-B□	275	65	24	145	110	130	9	127	

4.2. Servomotors with Rated Rotation Speed of 3000 r/min (Main Circuit Power Supply Voltage: 400 V)

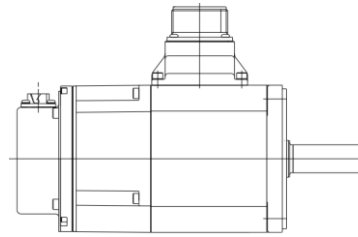
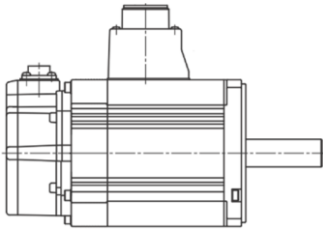
■ 750 W, 1 kW, 1.5 kW, 2 kW, or 3 kW motor (400 V)

- G5 without 750 W, 1 kW, 1.5 kW, 2 kW, or 3 kW brake
- 1S without 750 W, 1 kW, 1.5 kW, 2 kW, or 3 kW brake



- G5 with 750 W, 1 kW, 1.5 kW, 2 kW, or 3 kW brake

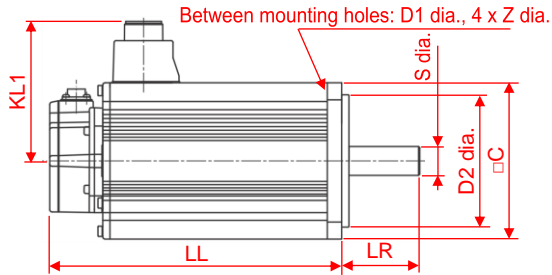
- 1S with 750 W, 1 kW, 1.5 kW, 2 kW, or 3 kW brake



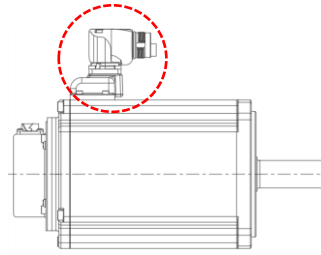
Motor capacity	Specifications	Series	Motor model R88M-	Dimension [mm]								Remarks
				LL	LR	S	D1	D2	C	Z	KL1	
750 W	Without brake	G5 series	K75030□	131.5	55	19	115	95	100	9	101	Connector directions are the same.
		1S series	1L75030C□	139	55	19	115	95	100	9	97	
	With brake	G5 series	K75030□-B□	158.5	55	19	115	95	100	9	103	
		1S series	1L75030C□-B□	180	55	19	115	95	100	9	104	
1 kW	Without brake	G5 series	K1K030□	141	55	19	115	95	100	9	101	
		1S series	1L1K030C□	168	55	19	115	95	100	9	97	
	With brake	G5 series	K1K030□-B□	168	55	19	115	95	100	9	103	
		1S series	1L1K030C□-B□	209	55	19	115	95	100	9	104	
1.5 kW	Without brake	G5 series	K1K530□	159.5	55	19	115	95	100	9	101	
		1S series	1L1K530C□	168	55	19	115	95	100	9	97	
	With brake	G5 series	K1K530□-B□	186.5	55	19	115	95	100	9	103	
		1S series	1L1K530C□-B□	209	55	19	115	95	100	9	104	
2 kW	Without brake	G5 series	K2K030□	178.5	55	19	115	95	100	9	101	
		1S series	1L2K030C□	179	55	19	115	95	100	9	97	
	With brake	G5 series	K2K030□-B□	205.5	55	19	115	95	100	9	103	
		1S series	1L2K030C□-B□	220	55	19	115	95	100	9	104	
3 kW	Without brake	G5 series	K3K030□	190	55	22	145	110	120	9	113	
		1S series	1L3K030C□	184	55	22	145	110	130	9	116	
	With brake	G5 series	K3K030□-B□	215	55	22	145	110	120	9	113	
		1S series	1L3K030C□-B□	230	55	22	145	110	130	9	119	

■ 4 kW or 5 kW motor (400 V)

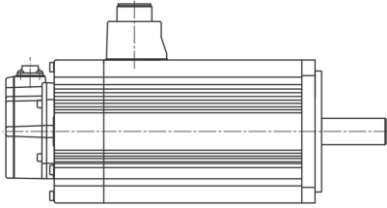
● G5 without 4 kW or 5 kW brake



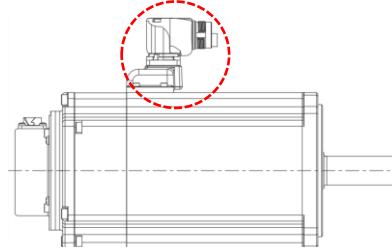
● 1S without 4 kW or 5 kW brake



● G5 with 4 kW or 5 kW brake



● 1S with 4 kW or 5 kW brake



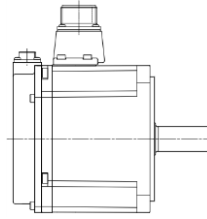
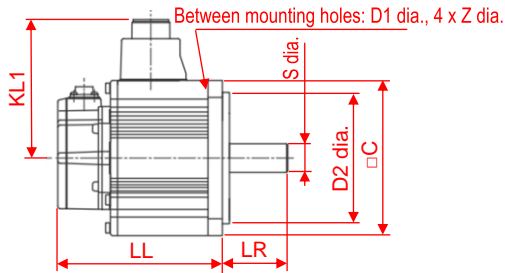
Motor capacity	Specifications	Series	Motor model R88M-	Dimension [mm]								Remarks
				LL	LR	S	D1	D2	C	Z	KL1	
4 kW	Without brake	G5 series	K4K030□	208	65	24	145	110	130	9	118	Power and brake connector directions are different. ● For G5, vertically upward direction ● For 1S, axis direction (Rotatable sideways by 310°)
		1S series	1L4K030C□	208	65	24	145	110	130	9	127	
	With brake	G5 series	K4K030□-B□	236	65	24	145	110	130	9	118	
		1S series	1L4K030C□-B□	251	65	24	145	110	130	9	127	
5 kW	Without brake	G5 series	K5K030□	243	65	24	145	110	130	9	118	
		1S series	1L5K030C□	232	65	24	145	110	130	9	127	
	With brake	G5 series	K5K030□-B□	271	65	24	145	110	130	9	118	
		1S series	1L5K030C□-B□	275	65	24	145	110	130	9	127	

4.3. Servomotors with Rated Rotation Speed of 2000 r/min (Main Circuit Power Supply Voltage: 200 V)

■ 1 kW, 1.5 kW, 2 kW, or 3 kW motor (200 V)

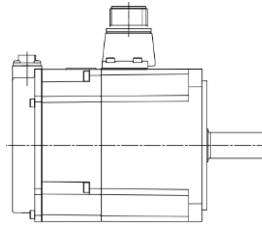
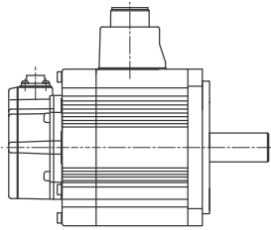
- G5 without 1 kW, 1.5 kW, 2 kW, or 3 kW brake

- 1S without 1 kW, 1.5 kW, 2 kW, or 3 kW brake



- G5 with 1 kW, 1.5 kW, 2 kW, or 3 kW brake

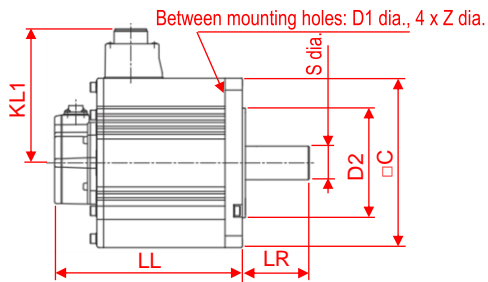
- 1S with 1 kW, 1.5 kW, 2 kW, or 3 kW brake



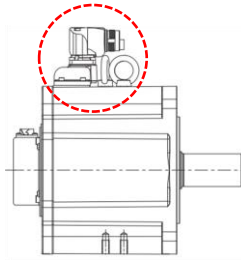
Motor capacity	Specifications	Series	Motor model R88M-	Dimension [mm]								Remarks
				LL	LR	S	D1	D2	C	Z	KL1	
1 kW	Without brake	G5 series	K1K020□	138	55	22	145	110	130	9	116	Connector directions are the same.
		1S series	1M1K020T□	120.5	55	22	145	110	130	9	118	
	With brake	G5 series	K1K020□-B□	166	55	22	145	110	130	9	116	
		1S series	1M1K020T-B□	162	55	22	145	110	130	9	118	
1.5 kW	Without brake	G5 series	K1K520□	155.5	55	22	145	110	130	9	116	
		1S series	1M1K520T□	138	55	22	145	110	130	9	118	
	With brake	G5 series	K1K520□-B□	183.5	55	22	145	110	130	9	116	
		1S series	1M1K520T-B□	179	55	22	145	110	130	9	118	
2 kW	Without brake	G5 series	K2K020□	173	55	22	145	110	130	9	116	
		1S series	1M2K020T□	160	55	22	145	110	130	9	116	
	With brake	G5 series	K2K020□-B□	201	55	22	145	110	130	9	116	
		1S series	1M2K020T-B□	201	55	22	145	110	130	9	119	
3 kW	Without brake	G5 series	K3K020□	208	65	24	145	110	130	9	118	
		1S series	1M3K020T□	191	65	24	145	110	130	9	116	
	With brake	G5 series	K3K020□-B□	236	65	24	145	110	130	9	118	
		1S series	1M3K020T-B□	234	65	24	145	110	130	9	119	

■ 4 kW or 5 kW motor (200 V)

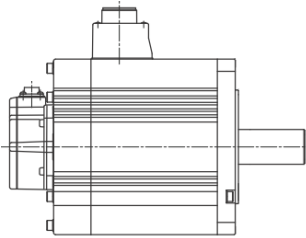
● G5 without 4 kW or 5 kW brake



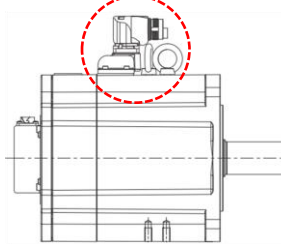
● 1S without 4 kW or 5 kW brake



● G5 with 4 kW or 5 kW brake



● 1S with 4 kW or 5 kW brake



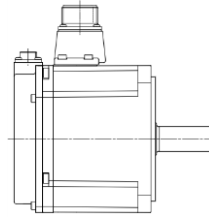
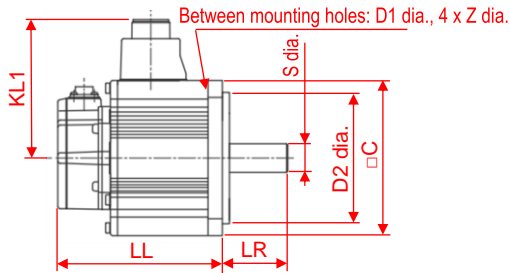
Motor capacity	Specifications	Series	Motor model R88M-	Dimension [mm]								Remarks
				LL	LR	S	D1	D2	C	Z	KL1	
4 kW	Without brake	G5 series	K4K020□	177	70	35	200	114.3	176	13.5	140	For 1S, the rated rotation speed is 1500 r/min. Power and brake connector directions are different. ● For G5, vertically upward direction ● For 1S, axis direction (Rotatable sideways by 310°)
		1S series	1M4K015T□	176	70	35	200	114.3	180	13.5	153	
	With brake	G5 series	K4K020□-B□	206	70	35	200	114.3	176	13.5	140	
		1S series	1M4K015T-B□	223	70	35	200	114.3	180	13.5	153	
5 kW	Without brake	G5 series	K5K020□	196	70	35	200	114.3	176	13.5	140	
		1S series	1M5K015T□	248	113	42	200	114.3	180	13.5	152	
	With brake	G5 series	K5K020□-B□	225	70	35	200	114.3	176	13.5	140	
		1S series	1M5K015T-B□	295	113	42	200	114.3	180	13.5	152	

4.4. Servomotors with Rated Rotation Speed of 2000 r/min (Main Circuit Power Supply Voltage: 400 V)

■ 400 W, 600 W, 1 kW, 1.5 kW, 2 kW, or 3 kW motor (400 V)

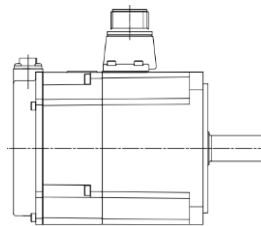
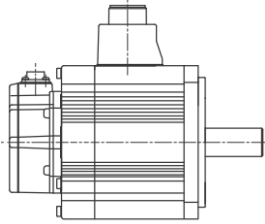
● G5 without 400 W, 600 W, 1 kW, 1.5 kW, 2 kW, or 3 kW brake

● 1S without 400 W, 600 W, 1 kW, 1.5 kW, 2 kW, or 3 kW brake



● G5 with 400 W, 600 W, 1 kW, 1.5 kW, 2 kW, or 3 kW brake

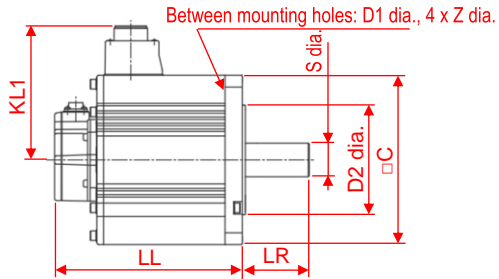
● 1S with 400 W, 600 W, 1 kW, 1.5 kW, 2 kW, or 3 kW brake



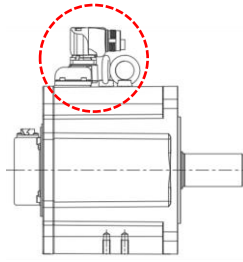
Motor capacity	Specifications	Series	Motor model R88M-	Dimension [mm]								Remarks
				LL	LR	S	D1	D2	C	Z	KL1	
400 W	Without brake	G5 series	K40020□	131.5	55	19	115	95	100	9	101	Connector directions are the same.
		1S series	1M40020C□	134.8	55	19	115	95	100	9	97	
	With brake	G5 series	K40020□-B□	158.5	55	19	115	95	100	9	103	
		1S series	1M40020C-B□	152.3	55	19	115	95	100	9	104	
600 W	Without brake	G5 series	K60020□	141	55	19	115	95	100	9	101	
		1S series	1M60020C□	151.8	55	19	115	95	100	9	97	
	With brake	G5 series	K60020□-B□	168	55	19	115	95	100	9	103	
		1S series	1M60020C-B□	169.3	55	19	115	95	100	9	104	
1 kW	Without brake	G5 series	K1K020□	138	55	22	145	110	130	9	116	
		1S series	1M1K020C□	120.5	55	22	145	110	130	9	118	
	With brake	G5 series	K1K020□-B□	166	55	22	145	110	130	9	118	
		1S series	1M1K020C-B□	162	55	22	145	110	130	9	119	
1.5 kW	Without brake	G5 series	K1K520□	155.5	55	22	145	110	130	9	116	
		1S series	1M1K520C□	138	55	22	145	110	130	9	118	
	With brake	G5 series	K1K520□-B□	183.5	55	22	145	110	130	9	118	
		1S series	1M1K520C-B□	179	55	22	145	110	130	9	119	
2 kW	Without brake	G5 series	K2K020□	173	55	22	145	110	130	9	116	
		1S series	1M2K020C□	160	55	22	145	110	130	9	118	
	With brake	G5 series	K2K020□-B□	201	55	22	145	110	130	9	118	
		1S series	1M2K020C-B□	201	55	22	145	110	130	9	119	
3 kW	Without brake	G5 series	K3K020□	208	65	24	145	110	130	9	118	
		1S series	1M3K020C□	191	65	24	145	110	130	9	116	
	With brake	G5 series	K3K020□-B□	236	65	24	145	110	130	9	118	
		1S series	1M3K020C-B□	234	65	24	145	110	130	9	119	

■ 4 kW or 5 kW motor (400 V)

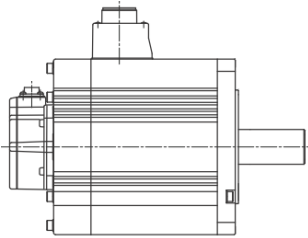
● G5 without 4 kW or 5 kW brake



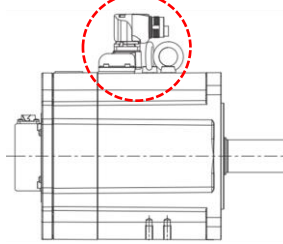
● 1S without 4 kW or 5.5 kW brake



● G5 with 4 kW or 5 kW brake



● 1S with 4 kW or 5.5 kW brake

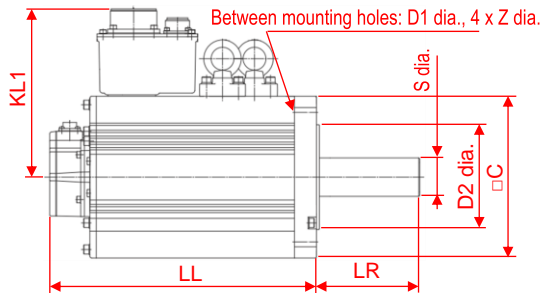


Motor capacity	Specifications	Series	Motor model R88M-	Dimension [mm]								Remarks
				LL	LR	S	D1	D2	C	Z	KL1	
4 kW	Without brake	G5 series	K4K020□	177	70	35	200	114.3	176	13.5	140	For 1S, the rated rotation speed is 1500 r/min. Power and brake connector directions are different. ● For G5, vertically upward direction ● For 1S, axis direction (Rotatable sideways by 310°)
		1S series	1M4K015C□	176	70	35	200	114.3	180	13.5	153	
	With brake	G5 series	K4K020□-B□	206	70	35	200	114.3	176	13.5	140	
		1S series	1M4K015C-B□	223	70	35	200	114.3	180	13.5	153	
5 kW 5.5 kW	Without brake	G5 series	K5K020□	196	70	35	200	114.3	176	13.5	140	
		1S series	1M5K515C□	248	113	42	200	114.3	180	13.5	152	
	With brake	G5 series	K5K020□-B□	225	70	35	200	114.3	176	13.5	140	
		1S series	1M5K515C-B□	295	113	42	200	114.3	180	13.5	152	

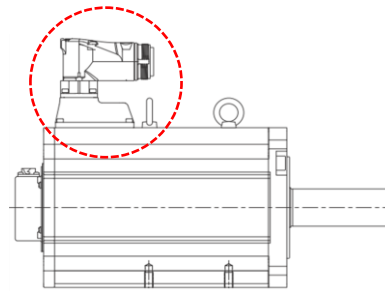
4.5. Servomotors with Rated Rotation Speed of 1500 r/min (Main Circuit Power Supply Voltage: 200 V)

■ 7.5 kW, 11 kW, or 15 kW motor (200 V)

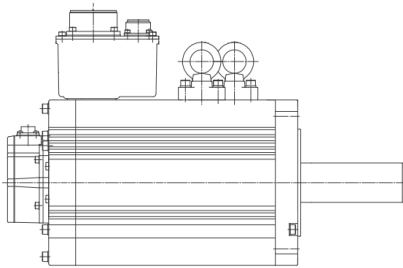
- G5 without 7.5 kW, 11 kW, or 15kW brake



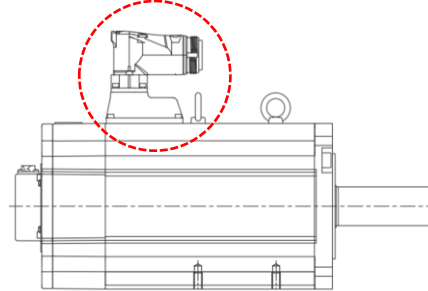
- 1S without 7.5 kW, 11 kW, or 15kW brake



- G5 with 7.5 kW, 11 kW, or 15kW brake



- 1S with 7.5 kW, 11 kW, or 15kW brake

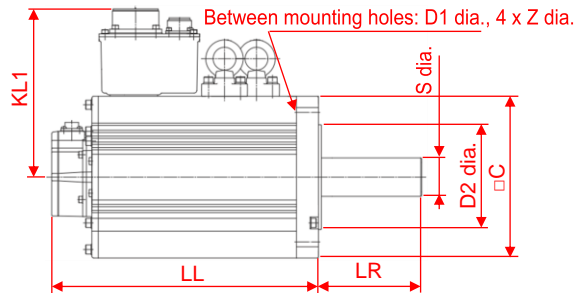


Motor capacity	Specifications	Series	Motor model R88M-	Dimension [mm]								Remarks
				LL	LR	S	D1	D2	C	Z	KL1	
7.5 kW	Without brake	G5 series	K7K515T□	312	113	42	200	114.3	176	13.5	184	Power and brake connector directions are different. <ul style="list-style-type: none"> • For G5, vertically upward direction • For 1S, axis direction (Rotatable sideways by 310°)
		1S series	1M7K515T□	295	113	42	200	114.3	180	13.5	190	
	With brake	G5 series	K7K515T-B□	337	113	42	200	114.3	176	13.5	184	
		1S series	1M7K515T-B□	352	113	42	200	114.3	180	13.5	190	
11 kW	Without brake	G5 series	K11K015T□	316	116	55	235	200	220	13.5	205	
		1S series	1M11K015T□	319	116	55	235	200	220	13.5	208	
	With brake	G5 series	K11K015T-B□	364	116	55	235	200	220	13.5	205	
		1S series	1M11K015T-B□	382	116	55	235	200	220	13.5	208	
15 kW	Without brake	G5 series	K15K015T□	384	116	55	235	200	220	13.5	205	
		1S series	1M15K015T□	397	116	55	235	200	220	13.5	208	
	With brake	G5 series	K15K015T-B□	432	116	55	235	200	220	13.5	205	
		1S series	1M15K015T-B□	493	116	55	235	200	220	13.5	208	

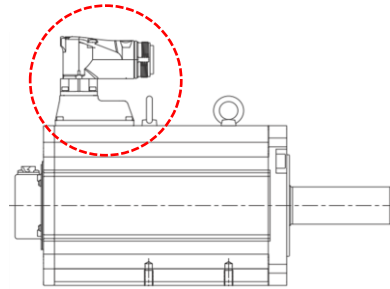
4.6. Servomotors with Rated Rotation Speed of 1500 r/min (Main Circuit Power Supply Voltage: 400 V)

■ 7.5 kW, 11 kW, or 15 kW motor (400 V)

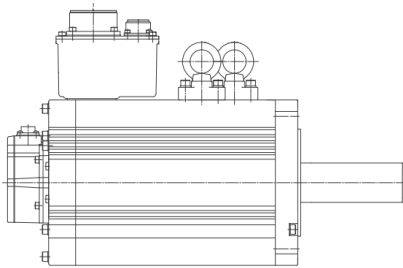
- G5 without 7.5 kW, 11 kW, or 15kW brake



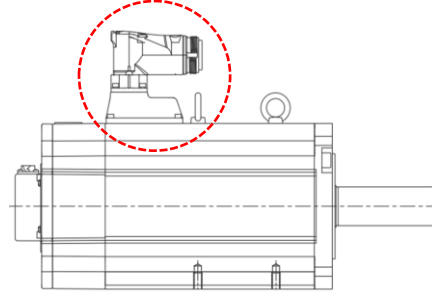
- 1S without 7.5 kW, 11 kW, or 15kW brake



- G5 with 7.5 kW, 11 kW, or 15kW brake



- 1S with 7.5 kW, 11 kW, or 15kW brake

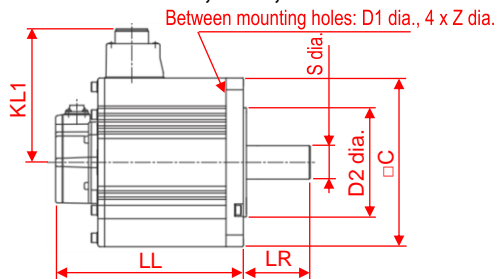


Motor capacity	Specifications	Series	Motor model R88M-	Dimension [mm]								Remarks
				LL	LR	S	D1	D2	C	Z	KL1	
7.5 kW	Without brake	G5 series	K7K515C□	312	113	42	200	114.3	176	13.5	184	Power and brake connector directions are different. <ul style="list-style-type: none"> • For G5, vertically upward direction • For 1S, axis direction (Rotatable sideways by 310°)
		1S series	1M7K515C□	295	113	42	200	114.3	180	13.5	152	
	With brake	G5 series	K7K515C-B□	337	113	42	200	114.3	176	13.5	184	
		1S series	1M7K515C-B□	352	113	42	200	114.3	180	13.5	152	
11 kW	Without brake	G5 series	K11K015C□	316	116	55	235	200	220	13.5	205	
		1S series	1M11K015C□	319	116	55	235	200	220	13.5	208	
	With brake	G5 series	K11K015C-B□	364	116	55	235	200	220	13.5	205	
		1S series	1M11K015C-B□	382	116	55	235	200	220	13.5	208	
15 kW	Without brake	G5 series	K15K015C□	384	116	55	235	200	220	13.5	205	
		1S series	1M15K015C□	397	116	55	235	200	220	13.5	208	
	With brake	G5 series	K15K015C-B□	432	116	55	235	200	220	13.5	205	
		1S series	1M15K015C-B□	493	116	55	235	200	220	13.5	208	

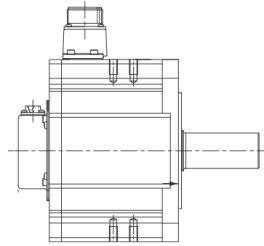
4.7. Servomotors with Rated Rotation Speed of 1000 r/min (Main Circuit Power Supply Voltage: 200 V)

■ 900 W, 2 kW, or 3 kW motor (200 V)

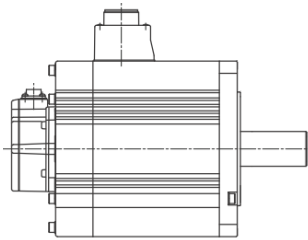
- G5 without 900 W, 2 kW, or 3 kW brake



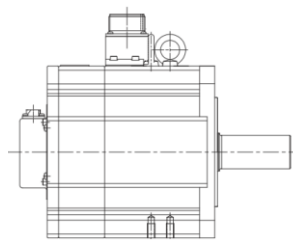
- 1S without 900 W, 2 kW, or 3 kW brake



- G5 with 900 W, 2 kW, or 3 kW brake



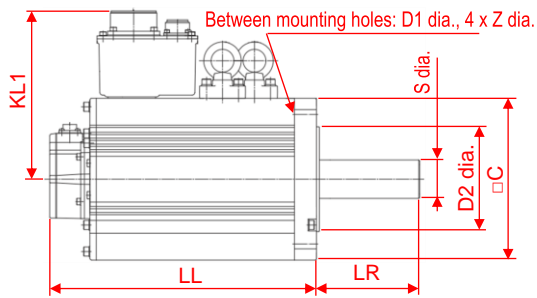
- 1S with 900 W, 2 kW, or 3 kW brake



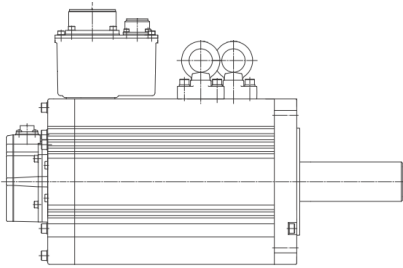
Motor capacity	Specifications	Series	Motor model R88M-	Dimension [mm]								Remarks
				LL	LR	S	D1	D2	C	Z	KL1	
900 W	Without brake	G5 series	K90010□	155.5	70	22	145	110	130	9	116	Connector directions are the same.
		1S series	1M90010T□	138	70	22	145	110	130	9	118	
	With brake	G5 series	K90010□-B□	183.5	70	22	145	110	130	9	116	
		1S series	1M90010T-B□	179	70	22	145	110	130	9	118	
2 kW	Without brake	G5 series	K2K010□	163.5	80	35	200	114.3	176	13.5	140	
		1S series	1M2K010T□	159	80	35	200	114.3	180	13.5	141	
	With brake	G5 series	K2K010□-B□	192.5	80	35	200	114.3	176	13.5	140	
		1S series	1M2K010T-B□	206	80	35	200	114.3	180	13.5	144	
3 kW	Without brake	G5 series	K3K010□	209.5	80	35	200	114.3	176	13.5	140	
		1S series	1M3K010T□	228	80	35	200	114.3	180	13.5	141	
	With brake	G5 series	K3K010□-B□	238.5	80	35	200	114.3	176	13.5	140	
		1S series	1M3K010T-B□	274	80	35	200	114.3	180	13.5	144	

■ 4.5 kW or 6 kW motor (200 V)

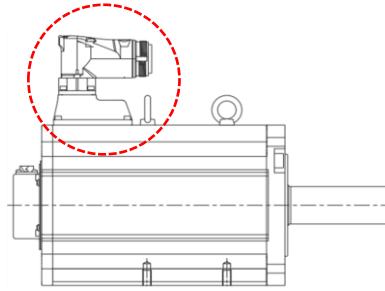
- G5 without 4.5 kW or 6 kW brake



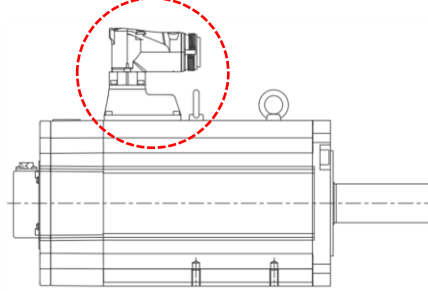
- G5 with 4.5 kW or 6 kW brake



- 1S without 7.5 kW or 11 kW brake



- 1S with 7.5 kW or 11 kW brake

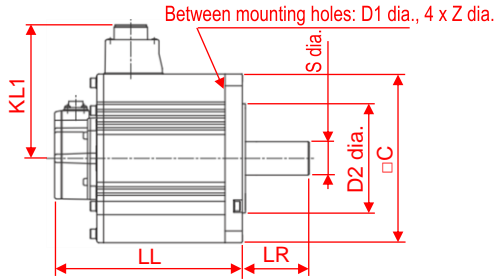


Motor capacity	Specifications	Series	Motor model R88M-	Dimension [mm]								Remarks
				LL	LR	S	D1	D2	C	Z	KL1	
4.5 kW 7.5 kW	Without brake	G5 series	K4K510T□	266	113	42	200	114.3	176	13.5	140	For 1S, the rated rotation speed is 1500 r/min. Power and brake connector directions are different. ● For G5, vertically upward direction ● For 1S, axis direction (Rotatable sideways by 310°)
		1S series	1M7K515T□	295	113	42	200	114.3	180	13.5	190	
	With brake	G5 series	K4K510T-B□	291	113	42	200	114.3	176	13.5	140	
		1S series	1M7K515T-B□	352	113	42	200	114.3	180	13.5	190	
6 kW 11 kW	Without brake	G5 series	K6K010T□	312	113	42	200	114.3	176	13.5	184	
		1S series	1M11K015T□	319	116	55	235	200	220	13.5	208	
	With brake	G5 series	K6K010T-B□	337	113	42	200	114.3	176	13.5	184	
		1S series	1M11K015T-B□	382	116	55	235	200	220	13.5	208	

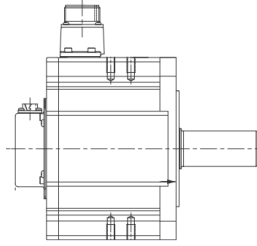
4.8. Servomotors with Rated Rotation Speed of 1000 r/min (Main Circuit Power Supply Voltage: 400 V)

■ 900 W, 2 kW, or 3 kW motor (400 V)

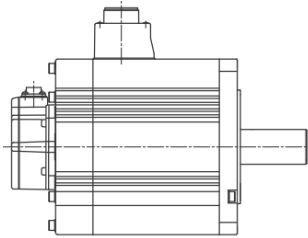
- G5 without 900 W, 2 kW, or 3 kW brake



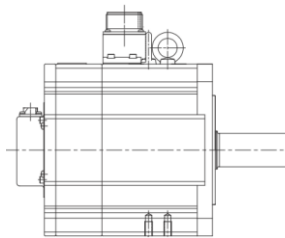
- 1S without 900 W, 2 kW, or 3 kW brake



- G5 with 900 W, 2 kW, or 3 kW brake



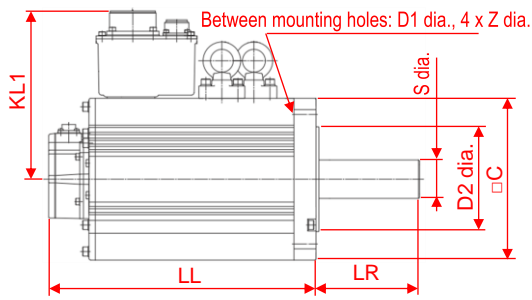
- 1S with 900 W, 2 kW, or 3 kW brake



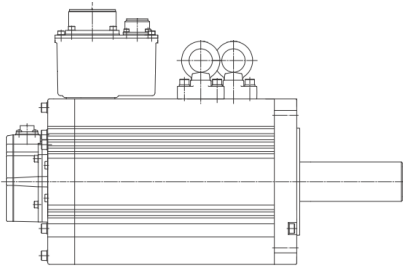
Motor capacity	Specifications	Series	Motor model R88M-	Dimension [mm]								Remarks
				LL	LR	S	D1	D2	C	Z	KL1	
900 W	Without brake	G5 series	K90010□	155.5	70	22	145	110	130	9	116	Connector directions are the same.
		1S series	1M90010C□	138	70	22	145	110	130	9	118	
	With brake	G5 series	K90010□-B□	183.5	70	22	145	110	130	9	118	
		1S series	1M90010C-B□	179	70	22	145	110	130	9	119	
2 kW	Without brake	G5 series	K2K010□	163.5	80	35	200	114.3	176	13.5	140	
		1S series	1M2K010C□	159	80	35	200	114.3	180	13.5	141	
	With brake	G5 series	K2K010□-B□	192.5	80	35	200	114.3	176	13.5	140	
		1S series	1M2K010C-B□	206	80	35	200	114.3	180	13.5	144	
3 kW	Without brake	G5 series	K3K010□	209.5	80	35	200	114.3	176	13.5	140	
		1S series	1M3K010C□	228	80	35	200	114.3	180	13.5	141	
	With brake	G5 series	K3K010□-B□	238.5	80	35	200	114.3	176	13.5	140	
		1S series	1M3K010C-B□	274	80	35	200	114.3	180	13.5	144	

■ 4.5 kW or 6 kW motor (400 V)

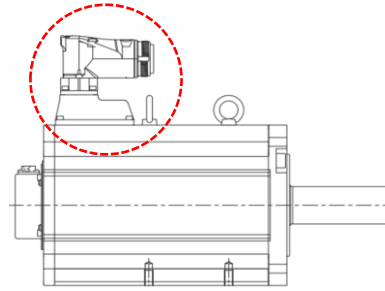
- G5 without 4.5 kW or 6 kW brake



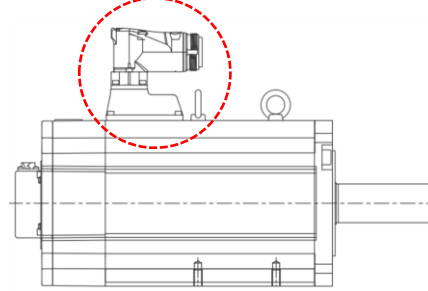
- G5 with 4.5 kW or 6 kW brake



- 1S without 7.5 kW or 11 kW brake



- 1S with 7.5 kW or 11 kW brake



Motor capacity	Specifications	Series	Motor model R88M-	Dimension [mm]								Remarks
				LL	LR	S	D1	D2	C	Z	KL1	
4.5 kW 7.5 kW	Without brake	G5 series	K4K510C□	266	113	42	200	114.3	176	13.5	140	For 1S, the rated rotation speed is 1500 r/min. Power and brake connector directions are different. ● For G5, vertically upward direction ● For 1S, axis direction (Rotatable sideways by 310°)
		1S series	1M7K515C□	295	113	42	200	114.3	180	13.5	152	
	With brake	G5 series	K4K510C-B□	291	113	42	200	114.3	176	13.5	140	
		1S series	1M7K515C-B□	352	113	42	200	114.3	180	13.5	152	
6 kW 11 kW	Without brake	G5 series	K6K010C□	312	113	42	200	114.3	176	13.5	184	
		1S series	1M11K015C□	319	116	55	235	200	220	13.5	208	
	With brake	G5 series	K6K010C-B□	337	113	42	200	114.3	176	13.5	184	
		1S series	1M11K015C-B□	382	116	55	235	200	220	13.5	208	

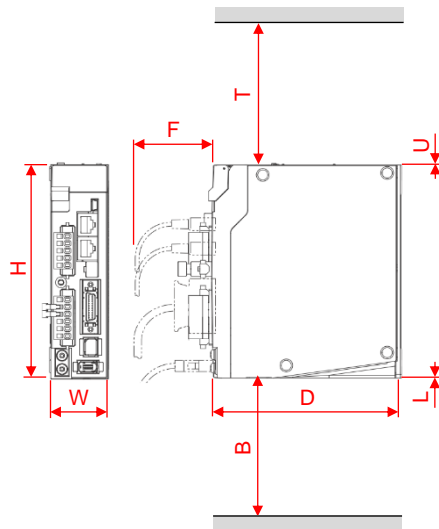
5. Comparison of Servo Drive Dimensions

Since the G5 series and the 1S series are different in drive dimensions and space conditions around Servo Drives, check the following comparison of dimensions in designing. In particular, be careful of the main circuit wiring and motor wiring directions of both series during designing.

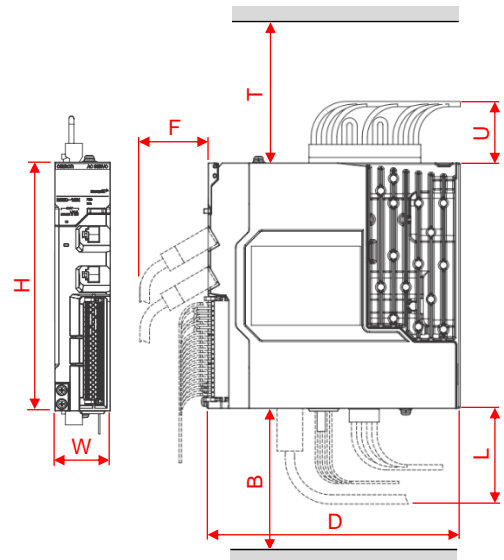
Also, take into consideration that the 1S-series Servo Drive does not support the installation style of front mounting.

■ Reference outline drawings of drives

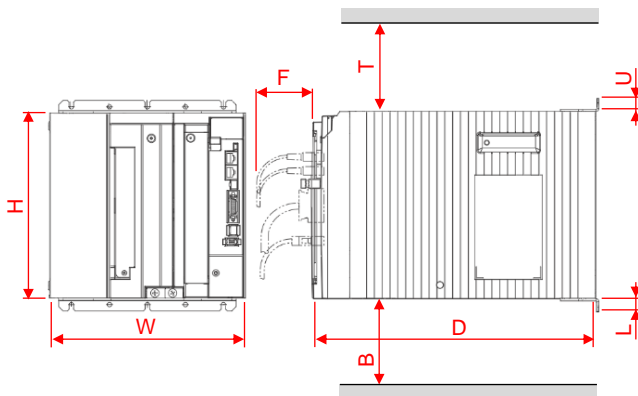
- Outline drawing of G5 Drive R88D-KN01H-ECT



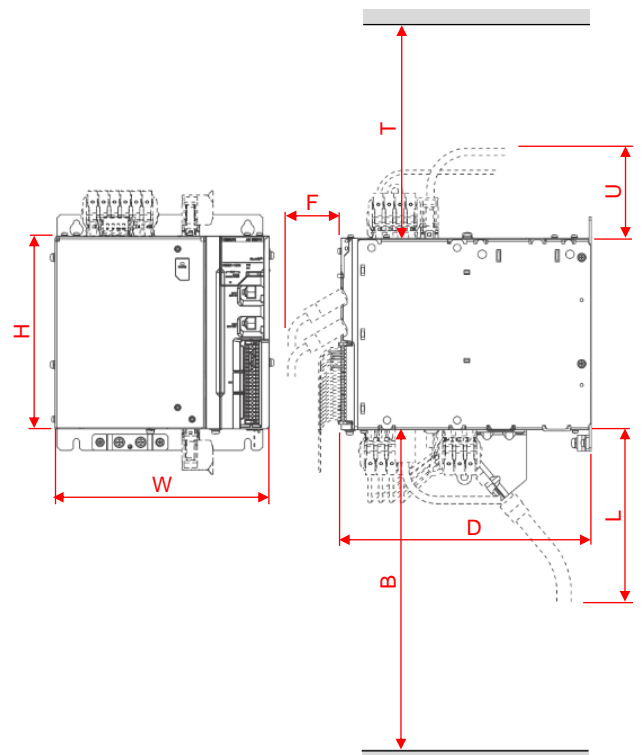
- Outline drawing of 1S Drive R88D-1SN01H-ECT



- Outline drawing of G5 Drive R88D-KN75H-ECT



- Outline drawing of 1S Drive R88D-1SN75H-ECT



■ Main circuit power supply voltage 200 V drive dimensions

Motor capacity	Series	Drive model R88D-	Dimension [mm]								Remarks
			H	W	D	F	U	L	T	B	
100 W or 200 W	G5 series	KN01H/KN02H-ECT	150	40	132	70	0	0	100	100	The dimensions U and B of the 1S Drive include the cable bending radius.
	1S series	1SN01H/1SN02H-ECT	180	40	185	50	45	70	100	100	
400 W	G5 series	KN04H-ECT	150	55	132	70	0	0	100	100	
	1S series	1SN04-ECT	180	55	185	50	45	70	100	100	
750 W	G5 series	KN08H-ECT	150	65	172	70	0	0	100	100	
	1S series	1SN08H-ECT	180	65	215	50	45	70	100	100	
1 kW	G5 series	KN10H-ECT	150	86	172	70	0	0	100	100	
	1S series	1SN10H-ECT	180	65	215	50	45	70	100	100	
1.5 kW	G5 series	KN15H-ECT	150	86	172	70	0	0	100	100	
	1S series	1SN15H-ECT	180	90	225	50	60	70	100	100	
2 kW	G5 series	KN20H-ECT	168	86	195	70	15	15	100	100	
	1S series	1SN20H-ECT	180	90	225	50	60	70	100	100	
3 kW	G5 series	KN30H-ECT	220	130	214	70	15	15	100	100	
	1S series	1SN30H-ECT	180	90	225	50	60	70	100	100	
5 kW (5.5 kW)	G5 series	KN50H-ECT	220	130	214	70	15	15	100	100	
	1S series	1SN55H-ECT	180	200	235	50	130	450	200	500	
7.5 kW	G5 series	KN75H-ECT	220	233	334	70	15	15	100	100	
	1S series	1SN75H-ECT	180	200	235	50	130	450	200	500	
15 kW	G5 series	KN150H-ECT	450	261	271	70	0	0	100	100	
	1S series	1SN150H-ECT	400	220	250	50	170	450	280	500	

■ Main circuit power supply voltage 400 V drive dimensions

Motor capacity	Series	Drive model R88D-	Dimension [mm]								Remarks
			H	W	D	F	U	L	T	B	
400 W to 1.5 kW	G5 series	KN06F to KN15F-ECT	150	92	172	70	0	0	100	100	The dimensions U and B of the 1S Drive include the cable bending radius.
	1S series	1SN06F to 1SN15F-ECT	180	90	225	50	60	70	100	100	
2 kW	G5 series	KN20F-ECT	168	94	195	70	15	15	100	100	
	1S series	1SN20F-ECT	180	90	225	50	60	70	100	100	
3 kW	G5 series	KN30F-ECT	220	130	214	70	15	15	100	100	
	1S series	1SN30F-ECT	180	90	225	50	60	70	100	100	
5 kW (5.5 kW)	G5 series	KN50F-ECT	220	130	214	70	15	15	100	100	
	1S series	1SN55F-ECT	180	200	235	50	130	450	200	500	
7.5 kW	G5 series	KN75F-ECT	220	233	334	70	15	15	100	100	
	1S series	1SN75F-ECT	180	200	235	50	130	450	200	500	
15 kW	G5 series	KN150F-ECT	450	261	271	70	0	0	100	100	
	1S series	1SN150F-ECT	400	220	250	50	170	450	280	500	

■ Main circuit power supply voltage 100 V drive dimensions

Motor capacity	Series	Drive model R88D-	Dimension [mm]								Remarks
			H	W	D	F	U	L	T	B	
50 W/100 W	G5 series	KNA5L/KN01L-ECT	150	40	132	70	0	0	100	100	The dimensions U and B of the 1S Drive include the cable bending radius.
	1S series	1SN01L-ECT	180	40	185	50	45	70	100	100	
200 W	G5 series	KN02L-ECT	150	55	132	70	0	0	100	100	
	1S series	1SN02L-ECT	180	55	185	50	45	70	100	100	
400 W	G5 series	KN04L-ECT	150	65	172	70	0	0	100	100	
	1S series	1SN04L-ECT	180	65	215	50	45	70	100	100	

6. Layout and Specifications of Connectors and Terminal Blocks of Servo Drive

The G5-series and 1S-series Servo Drives are significantly different in the layout of connectors and terminal blocks of main circuit wiring and motor wiring.

For the G5-series Servo Drive, all the connectors and terminal blocks of main circuit wiring, motor wiring, and control wiring used to be concentrated on the front.

For the 1S-series Servo Drive, the main circuit wiring, motor wiring, and control wiring are respectively routed through the top, bottom, and front connectors and terminal blocks so that you can classify wiring routing paths separately.

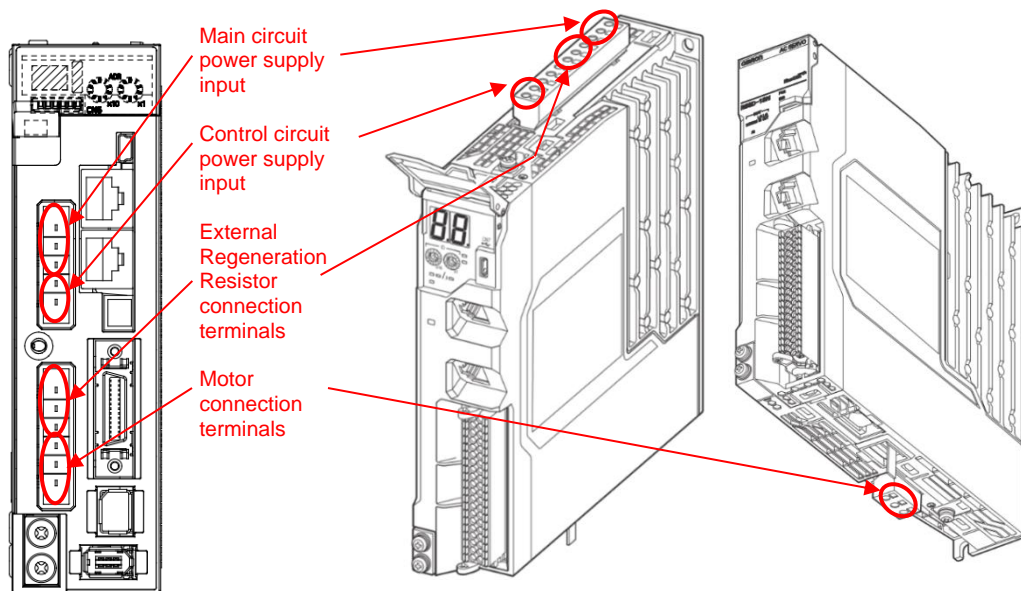
The below shows the layout and specifications of the connectors and terminal blocks of each drive model. Read the descriptions, and then consider replacement design.

6.1. Layout and Specifications of Connectors and Terminal Blocks of Main Circuit and Motor (100 V or 200 V)

■ 50 W to 1 kW drives (100 V or 200 V)

**G5 series: R88D-KNA5L-ECT/KN01L-ECT/KN02L-ECT/KN04L-ECT/KN01H-ECT/
KN02H-ECT/KN04-ECT/KN08H-ECT/KN10H-ECT**

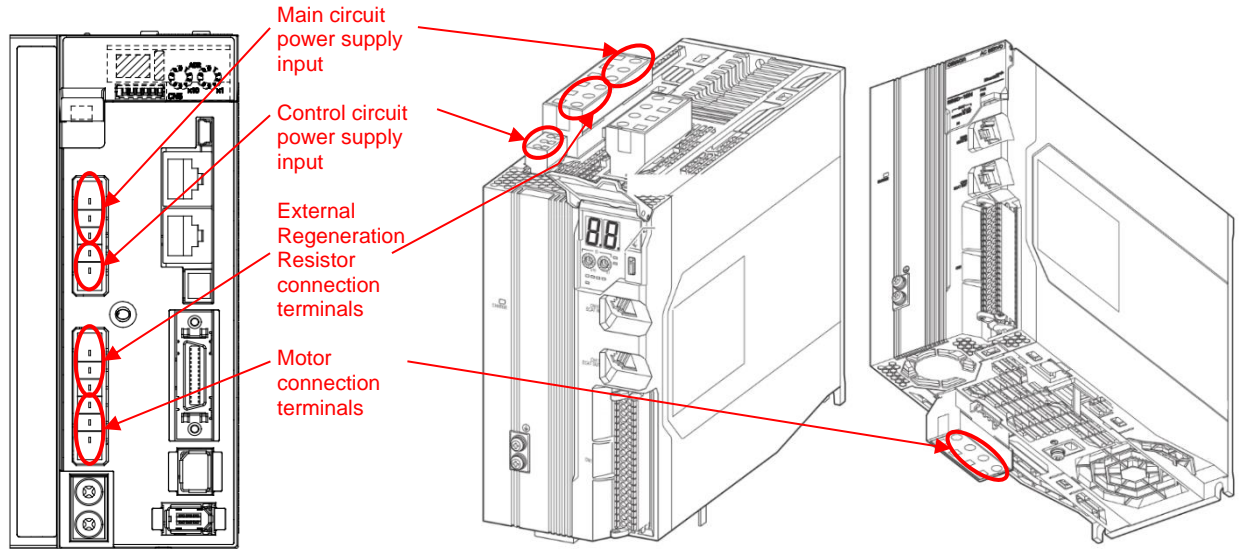
**1S series: R88D-1SN01L-ECT/1SN02L-ECT/1SN04L-ECT/1SN01H-ECT/
1SN02H-ECT/1SN04H-ECT/1SN08H-ECT/1SN10H-ECT**



Before installing the wiring, thoroughly check the connector positions and the terminal alignment. Be aware that the specifications of control circuit power supply are different between both series.

G5 series				1S series				
Terminal	Symbol	Name	Outline specifications	Terminal	No. Symbol	Name	Outline specifications	
CNA	L1	Main circuit power supply input	Single-phase 100 to 120 VAC Single-phase 200 to 240 VAC 3-phase 200 to 240 VAC	CNA	1	L1	Main circuit power supply input	Single-phase 100 to 120 VAC Single-phase 200 to 240 VAC 3-phase 200 to 240 VAC
	L2				2	L2		
	L3				3	L3		
	L1C	Control circuit power supply input	Single-phase 100 to 120 VAC Single-phase 200 to 240 VAC		4	B3	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: B2–B3 short-circuited External Regeneration Resistor: B1–B2 connected
	L2C				5	B2		
CNB	B1	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: B2–B3 short-circuited External Regeneration Resistor: B1–B2 connected		6	P/B1	DC reactor connection terminals	DC reactor Not used: N1–N2 short-circuited Used: N1–N2 connected
	B3							
	B2							
	U	Motor connection terminals	Motor output of phase U, phase V, and phase W		7	N1		
	V				8	N2		
	W				9	N3		
				10	24 V	Control circuit power supply input	24 VDC (21.6 to 26.4 V)	
				11	0			
				CNC	1	U	Motor connection terminals	Motor output of phase U, phase V, and phase W
					2	V		
					3	W		

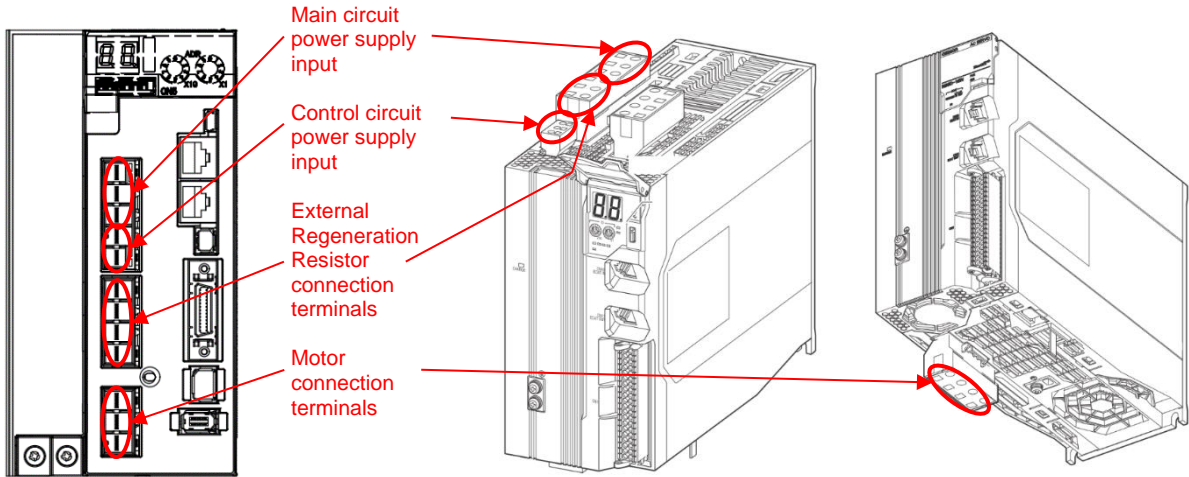
■ 1.5 kW drive (200 V)
 G5 series: R88D-KN15H-ECT
 1S series: R88D-1S15H-ECT



Before installing the wiring, thoroughly check the connector positions and the terminal alignment. Be aware that the specifications of control circuit power supply are different between both series.

G5 series				1S series			
Terminal	Symbol	Name	Outline specifications	Terminal	No. Symbol	Name	Outline specifications
CNA	L1	Main circuit power supply input	Single-phase 200 to 240 VAC 3-phase 200 to 240 VAC	CNA	B1	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: B2–B3 short-circuited External Regeneration Resistor: B1–B2 connected
	L2				B2		
	L3				B3		
	L1C	Control circuit power supply input	Single-phase 200 to 240 VAC		L3	Main circuit power supply input	Single-phase 200 to 240 VAC 3-phase 200 to 240 VAC
L2C		L2					
		L1					
CNB	B1	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: B2–B3 short-circuited External Regeneration Resistor: B1–B2 connected	CNB	N3	DC reactor connection terminals	DC reactor Not used: N1–N2 short-circuited Used: N1–N2 connected
	B3				N2		
	B2				N1		
	U	Motor connection terminals	Motor output of phase U, phase V, and phase W		P		
V							
W							
CND	1	+24 V	Control circuit power supply input	CND	2	0 V	24 VDC (21.6 to 26.4 V)
	2	0 V			3	-	Do not connect.
	3	-			-		
CNC	W	Motor connection terminals	Motor output of phase U, phase V, phase W, and FG	CNC	V		
	V						
	U						
	FG						

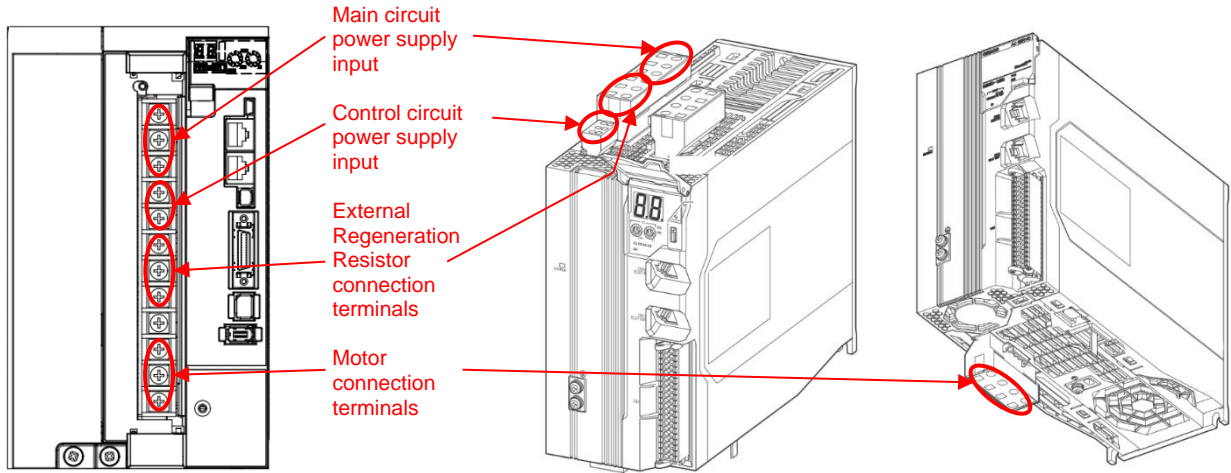
■ 2 kW drive (200 V)
G5 series: R88D-KN20H-ECT
1S series: R88D-1S20H-ECT



Before installing the wiring, thoroughly check the connector positions and the terminal alignment. Be aware that the specifications of control circuit power supply are different between both series.

G5 series				1S series			
Terminal	Symbol	Name	Outline specifications	Terminal	No. Symbol	Name	Outline specifications
CNA	L1	Main circuit power supply input	3-phase 200 to 230 VAC	CNA	B1	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: B2–B3 short-circuited External Regeneration Resistor: B1–B2 connected
	L2				B2		
	L3				B3		
	L1C	Control circuit power supply input	Single-phase 200 to 230 VAC		L3	Main circuit power supply input	3-phase 200 to 240 VAC
L2C	L2						
CNC	B1	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: B2–B3 short-circuited External Regeneration Resistor: B1–B2 connected	CNC	N3		
	B3				N2		
	B2				N1		
	NC	-	Do not connect.		P		
CNB	U	Motor connection terminals	Motor output of phase U, phase V, and phase W	CND	1	+24 V Control circuit power supply input	24 VDC (21.6 to 26.4 V)
	V				2		
	W				3	-	-
CNC	W	Motor connection terminals	Motor output of phase U, phase V, phase W, and FG	CNC	W	Motor connection terminals	Motor output of phase U, phase V, phase W, and FG
	V						
	U						
	FG						

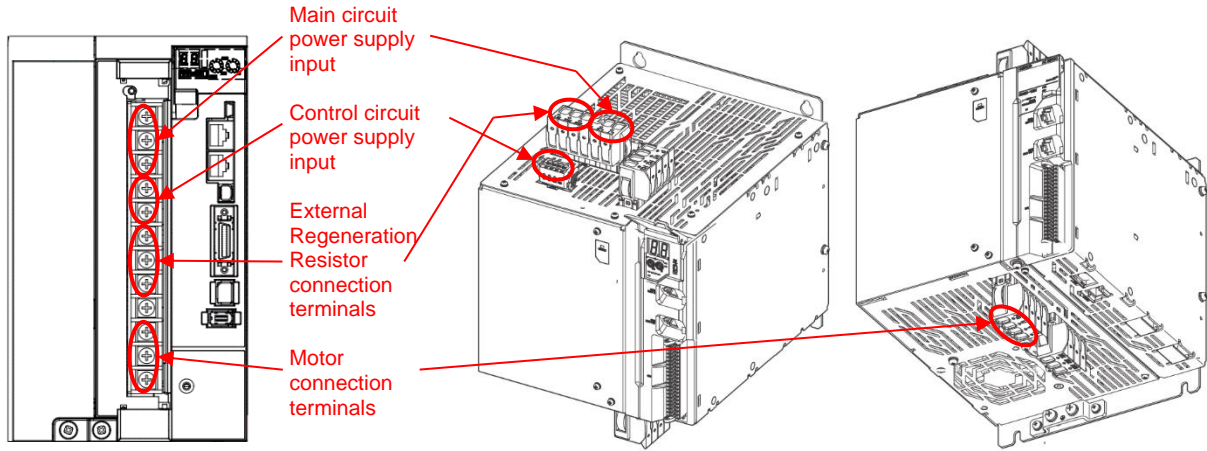
■ 3 kW drive (200 V)
G5 series: R88D-KN30H-ECT
1S series: R88D-1S30H-ECT



Before installing the wiring, thoroughly check the connector positions and the terminal alignment. Be aware that the specifications of control circuit power supply are different between both series.

G5 series				1S series			
Terminal	Symbol	Name	Outline specifications	Terminal	No. Symbol	Name	Outline specifications
TB	L1	Main circuit power supply input	3-phase 200 to 230 VAC	CNA	B1	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: B2–B3 short-circuited External Regeneration Resistor: B1–B2 connected
	L2				B2		
	L3				B3		
	L1C	Control circuit power supply input	Single-phase 200 to 230 VAC		L3	Main circuit power supply input	3-phase 200 to 240 VAC
	L2C				L2		
	B1	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: B2–B3 short-circuited External Regeneration Resistor: B1–B2 connected		CNB		
	B3			N2			
	B2			N1			
	NC	-	Do not connect.	P			
	U	Motor connection terminals	Motor output of phase U, phase V, and phase W	CND	1	+24 V	Control circuit power supply input
V	2				0 V		
W	3				-	-	Do not connect.
CNC	W	Motor connection terminals	Motor output of phase U, phase V, phase W, and FG	CNC	V	Motor connection terminals	Motor output of phase U, phase V, phase W, and FG
	V						
	U						
	FG						

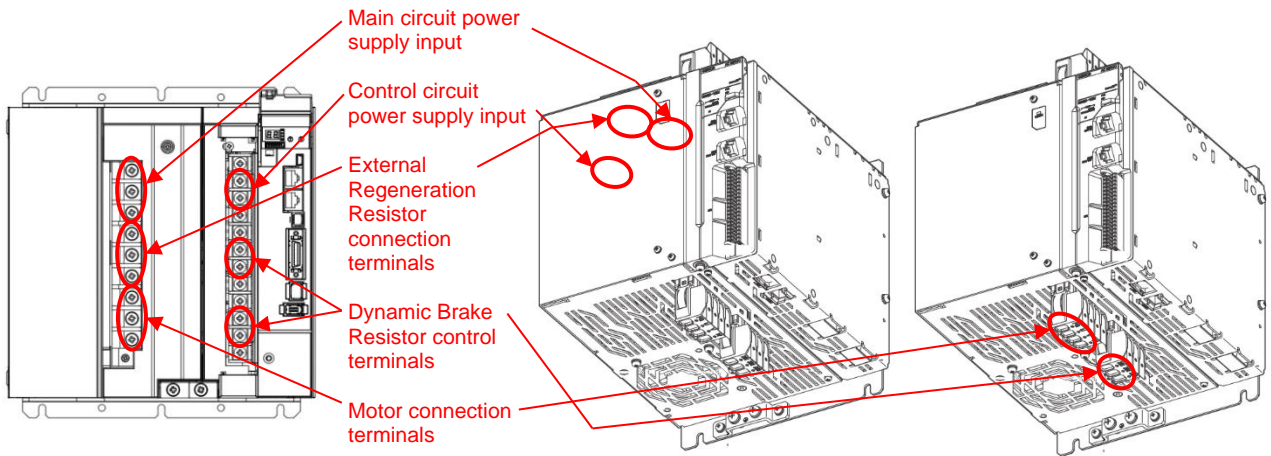
■ 5 kW drive (200 V)
G5 series: R88D-KN50H-ECT
1S series: R88D-1S55H-ECT



Before installing the wiring, thoroughly check the connector positions and the terminal alignment. Be aware that the specifications of control circuit power supply are different between both series.

G5 series				1S series			
Terminal	Symbol	Name	Outline specifications	Terminal	No. Symbol	Name	Outline specifications
TB	L1	Main circuit power supply input	3-phase 200 to 230 VAC	CNA	L1	Main circuit power supply input	3-phase 200 to 240 VAC
	L2				L2		
	L3				L3		
	L1C	Control circuit power supply input	Single-phase 200 to 230 VAC		B3	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: B2–B3 short-circuited External Regeneration Resistor: B1–B2 connected
	L2C				B2		
	B1	B1					
	B3	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: B2–B3 short-circuited External Regeneration Resistor: B1–B2 connected	CNB	P	DC reactor connection terminals	DC reactor Not used: N1–N2 short-circuited Used: N1–N2 connected
	B2				N1		
	NC	-	Do not connect.		N2		
	U	Motor connection terminals	Motor output of phase U, phase V, and phase W	CND	N3	Control circuit power supply input	24 VDC (21.6 to 26.4 V)
V	1				+24 V		
W	2				+24 V		
	3	0 V					
			4	0 V			
			CNC	FG	Motor connection terminals	Motor output of phase U, phase V, phase W, and FG	
				U			
				V			
				W			
			CNE	DB1	External Dynamic Brake Resistor connection terminals	Dynamic brake Internal resistor: DB2–DB3 short-circuited External resistor: DB1–DB2 connected	
				DB2			
				DB3			

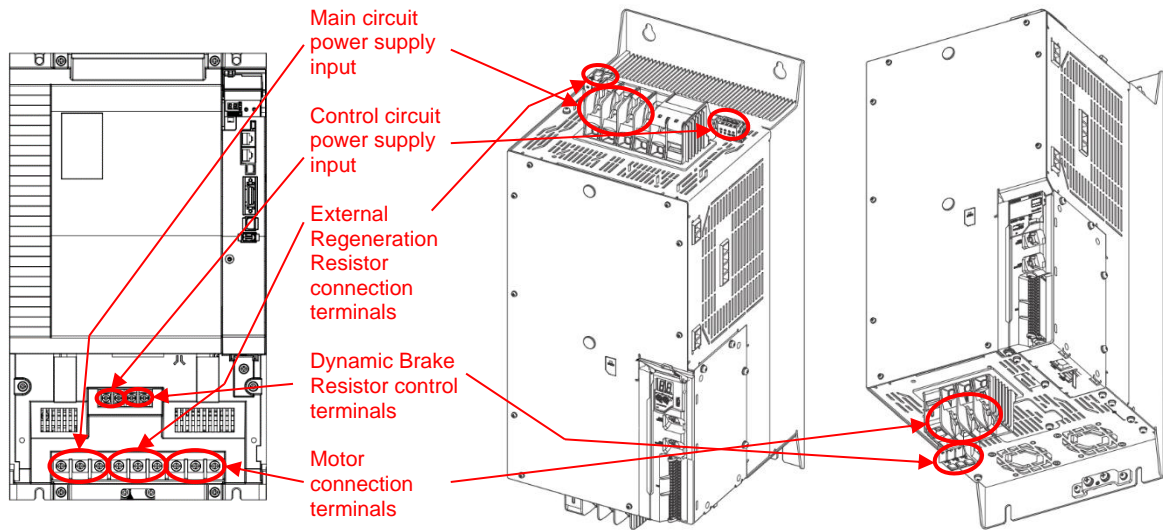
■ 7.5 kW drive (200 V)
G5 series: R88D-KN75H-ECT
1S series: R88D-1S75H-ECT



Before installing the wiring, thoroughly check the connector positions and the terminal alignment. Be aware that the specifications of control circuit power supply are different between both series.

G5 series				1S series				
Terminal	Symbol	Name	Outline specifications	Terminal	No. Symbol	Name	Outline specifications	
TB1	L1	Main circuit power supply input	3-phase 200 to 230 VAC	CNA	L1	Main circuit power supply input	3-phase 200 to 240 VAC	
	L2				L2			
	L3				L3			
	B1	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: Not supported External Regeneration Resistor: B1–B2 connected		B3	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: B2–B3 short-circuited External Regeneration Resistor: B1–B2 connected	
	B2				B2			
N	B1							
U	Motor connection terminals	Motor output of phase U, phase V, phase W, and FG	CNB	P	DC reactor connection terminals	DC reactor Not used: N1–N2 short-circuited Used: N1–N2 connected		
V				N1				
W				N2				
⊕				N3				
TB2	L1C	Control circuit power supply input		Single-phase 200 to 230 VAC	CND		1	Control circuit power supply input
	L2C		2					
	DB1	Dynamic Brake Resistor control terminals	Internal resistor: DB3–DB4 short-circuited External resistor: DB3–DB4 open * The DB1–DB2 output controls external dynamic brake resistor contacts.	3		0 V		
	DB2			4				
	DB3							
	DB4			CNC	FG	Motor connection terminals	Motor output of phase U, phase V, phase W, and FG	
⊕	Frame ground	Ground terminal	U					
			V					
			W	CNE	DB1	External Dynamic Brake Resistor connection terminals	Dynamic brake Internal resistor: DB2–DB3 short-circuited External resistor: DB1–DB2 connected	
			DB2					
			DB3					

■ 15 kW drive (200 V)
 G5 series: R88D-KN150H-ECT
 1S series: R88D-1S150H-ECT



Before installing the wiring, thoroughly check the connector positions and the terminal alignment. Be aware that the specifications of control circuit power supply are different between both series.

G5 series				1S series				
Terminal	Symbol	Name	Outline specifications	Terminal	No. Symbol	Name	Outline specifications	
TB1	L1C	Control circuit power supply input	Single-phase 200 to 230 VAC	CNA *2	P	-	Do not connect.	
	L2C				N3			
	DB1	Main circuit power supply input			3-phase 200 to 240 VAC			
	DB2					L3		
* The DB1–DB2 output controls external dynamic brake resistor contacts.			L2					
			L1					
TB2	L1	Main circuit power supply input	3-phase 200 to 230 VAC	CNB	B1	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: Not supported External Regeneration Resistor: B1–B2 connected	
	L2							
	L3							
	B1	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: Not supported External Regeneration Resistor: B1–B2 connected	CND	1	+24 V	Control circuit power supply input	24 VDC (21.6 to 26.4 V)
	B2							
	N	2	+24 V					
	U	3	0 V					
	V	Motor connection terminals	Motor output of phase U, phase V, phase W, and FG	4	0 V			
	W			CNC *2	U	Motor connection terminals	Motor output of phase U, phase V, phase W, and FG	
⊕								
⊕	W							
Frame ground			Ground terminal	FG				
				CNE	DB1	External Dynamic Brake Resistor connection terminals	Dynamic brake Internal resistor: DB2–DB3 short-circuited External resistor: DB1–DB2 connected	
					DB2			
					DB3			

*1. Formally called *Dynamic Brake Resistor control terminals*.

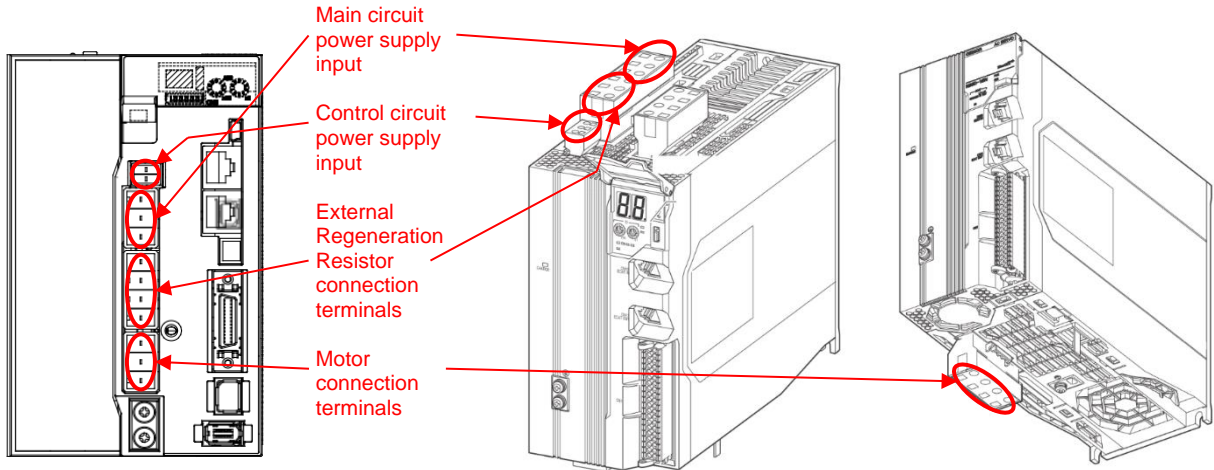
*2. CNA and CNC are not connectors but terminal blocks.

6.2. Layout and Specifications of Connectors and Terminal Blocks of Main Circuit and Motor (400 V)

■ 400 W to 2 kW drives (400 V)

G5 series: R88D-KN06F-ECT/KN10F-ECT/KN15F-ECT/KN20F-ECT

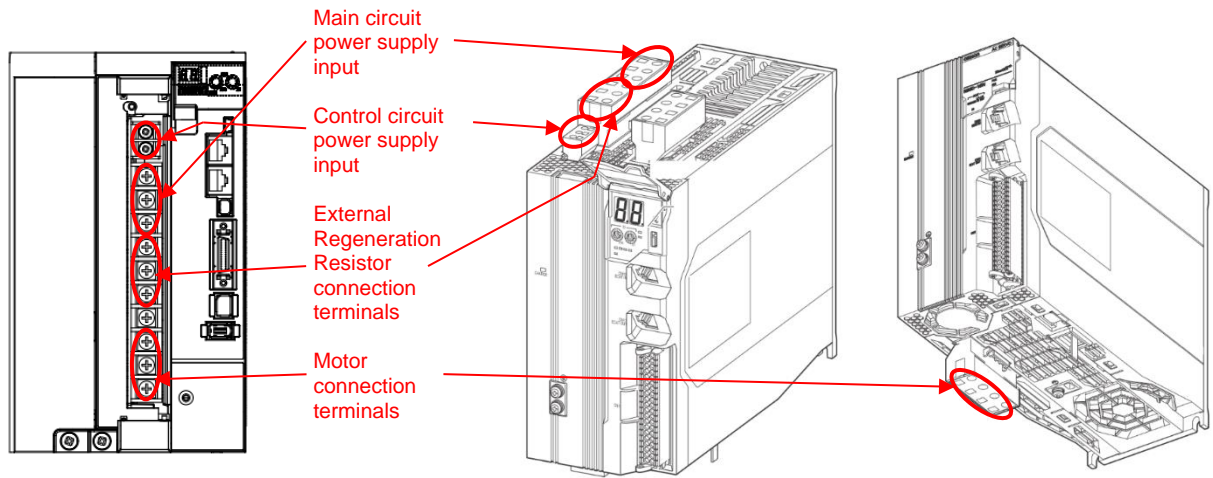
1S series: R88D-1SN06F-ECT/1SN10F-ECT/1SN15F-ECT/1SN20F-ECT



Before installing the wiring, thoroughly check the connector positions and the terminal alignment. In both series, control circuit power supply for the 400-V input model is 24 VDC.

G5 series				1S series				
Terminal	Symbol	Name	Outline specifications	Terminal	No. Symbol	Name	Outline specifications	
CNC	24 V	Control circuit power supply input	24 VDC±15%	CNA	B1	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: B2–B3 short-circuited External Regeneration Resistor: B1–B2 connected	
	0 V				B2			
CNA	L1	Main circuit power supply input	3-phase 380 to 480 VAC		B3			
	L2				Main circuit power supply input	3-phase 380 to 480 VAC		
	L3							
CND	B1	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: B2–B3 short-circuited External Regeneration Resistor: B1–B2 connected	CNB	N3	DC reactor connection terminals	DC reactor Not used: N1–N2 short-circuited Used: N1–N2 connected	
	B3							
	B2							
NC	-	Do not connect.	P					
CNB	U	Motor connection terminals	Motor output of phase U, phase V, and phase W	CND	1	+24 V	Control circuit power supply input	24 VDC (21.6 to 26.4 V)
	V							
	W							
				3	-	-	Do not connect.	
				CNC	W	Motor connection terminals	Motor output of phase U, phase V, phase W, and FG	
			V					
			U					
			FG					

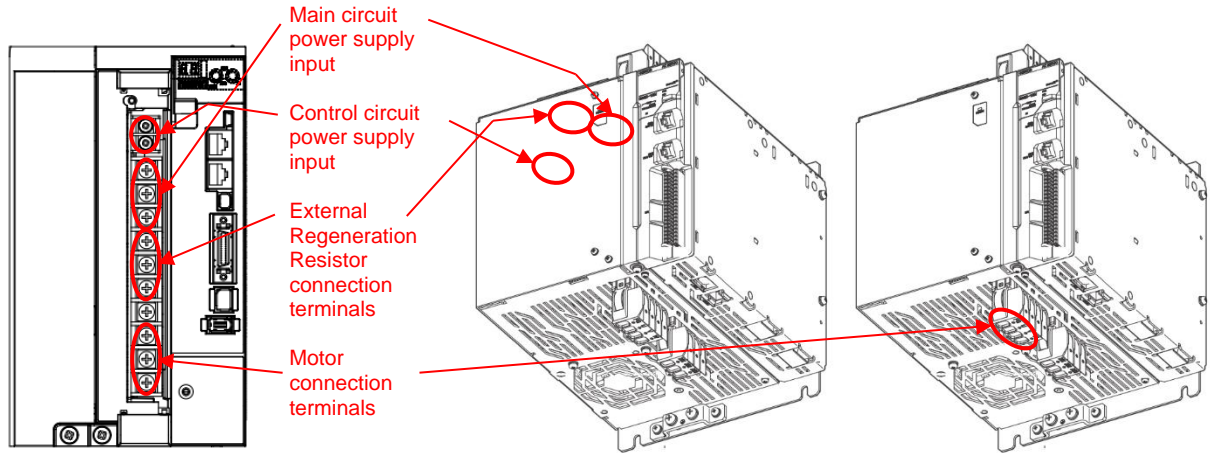
■ 3 kW drive (400 V)
G5 series: R88D-KN30F-ECT
1S series: R88D-1SN30F-ECT



Before installing the wiring, thoroughly check the connector positions and the terminal alignment. In both series, control circuit power supply for the 400-V input model is 24 VDC.

G5 series				1S series			
Terminal	Symbol	Name	Outline specifications	Terminal	No. Symbol	Name	Outline specifications
TB1	24 V	Control circuit power supply input	24 VDC±15%	CNA	B1	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: B2–B3 short-circuited External Regeneration Resistor: B1–B2 connected
	0 V				B2		
TB2	L1	Main circuit power supply input	3-phase 380 to 480 VAC		L3		
	L2				L2		
	B1			External Regeneration Resistor connection terminals	Internal Regeneration Resistor: Not supported External Regeneration Resistor: B1–B2 connected	L1	
	B3						
	B2	CNC	N3			DC reactor connection terminals	DC reactor Not used: N1–N2 short-circuited Used: N1–N2 connected
	NC		-	N2			
U	Motor connection terminals	Motor output of phase U, phase V, and phase W	P				
V			CND	1	+24 V	Control circuit power supply input	24 VDC (21.6 to 26.4 V)
W				2			
		3		-	-	Do not connect.	
					CNC	W	Motor connection terminals
				V			
				U			
				FG			

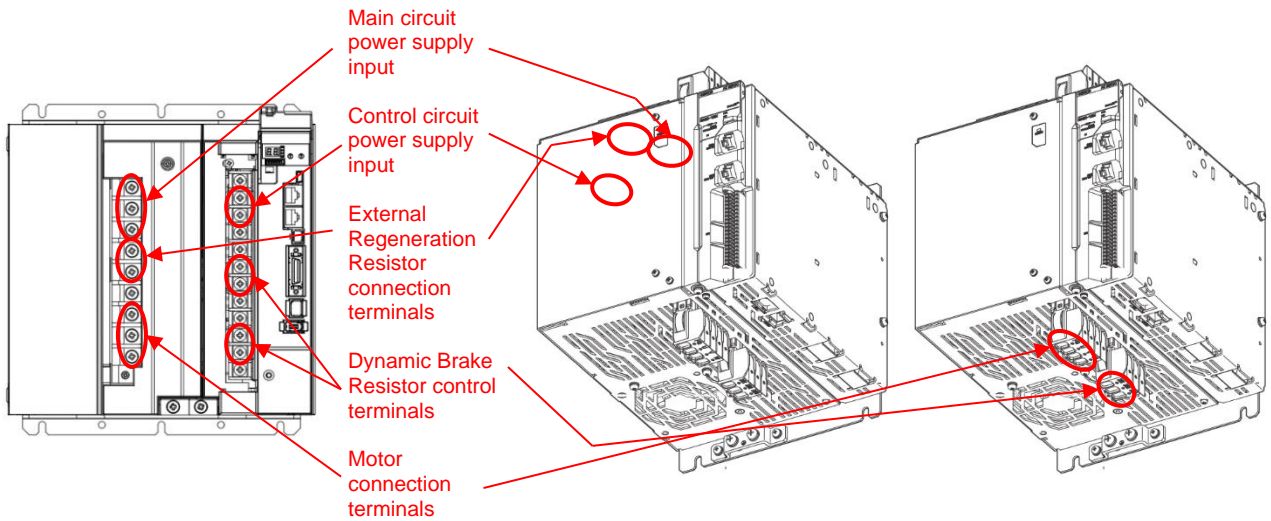
■ 5 kW drive (400 V)
G5 series: R88D-KN50F-ECT
1S series: R88D-1S55F-ECT



Before installing the wiring, thoroughly check the connector positions and the terminal alignment. In both series, control circuit power supply for the 400-V input model is 24 VDC.

G5 series				1S series				
Terminal	Symbol	Name	Outline specifications	Terminal	No. Symbol	Name	Outline specifications	
TB1	24 V	Control circuit power supply input	24 VDC±15%	CNA	L1	Main circuit power supply input	3-phase 380 to 480 VAC	
	0 V				L2			
TB2	L1	Main circuit power supply input	3-phase 380 to 480 VAC		L3			
	B1				External Regeneration Resistor connection terminals	B3		Internal Regeneration Resistor: Not supported External Regeneration Resistor: B1–B2 connected
	B3							
	B2							
	NC	-	Do not connect.	CNB	P	DC reactor connection terminals	DC reactor Not used: N1–N2 short-circuited Used: N1–N2 connected	
	U	Motor connection terminals	Motor output of phase U, phase V, and phase W		N1			
V								
W								
CND	1	+24 V	24 VDC (21.6 to 26.4 V)	CNC	FG	Motor connection terminals	Motor output of phase U, phase V, phase W, and FG	
	2	+24 V						
	3	0 V						
	4	0 V						
CNE	DB1	External Dynamic Brake Resistor connection terminals	Dynamic brake Internal resistor: DB2–DB3 short-circuited External resistor: DB1–DB2 connected	CNE	DB2			
	DB2							
	DB3							

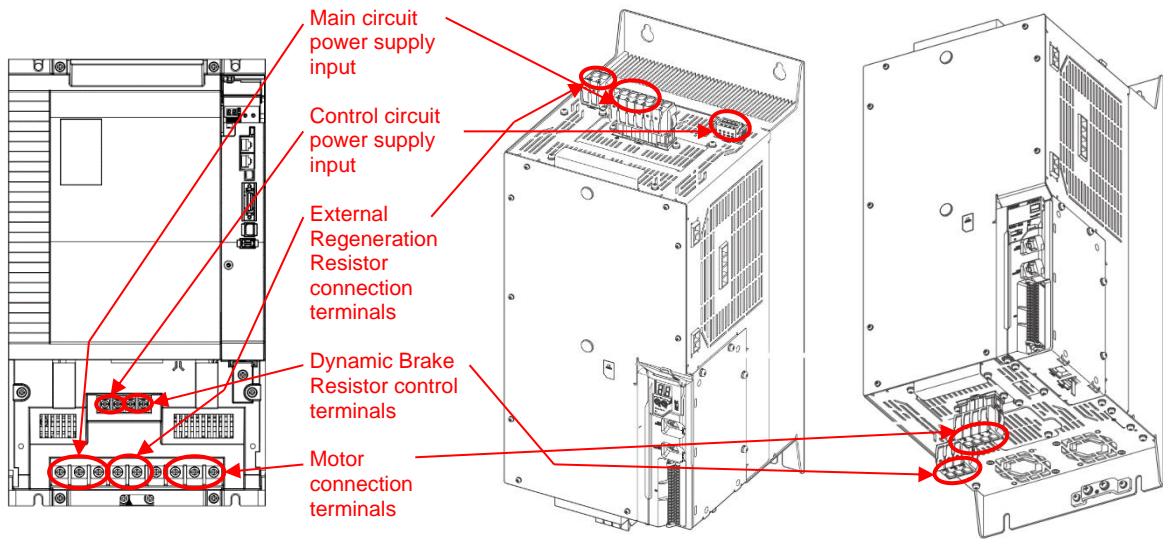
■ 7.5 kW drive (400 V)
G5 series: R88D-KN75F-ECT
1S series: R88D-1S75F-ECT



Before installing the wiring, thoroughly check the connector positions and the terminal alignment. In both series, control circuit power supply for the 400-V input model is 24 VDC.

G5 series				1S series			
Terminal	Symbol	Name	Outline specifications	Terminal	No. Symbol	Name	Outline specifications
TB1	L1	Main circuit power supply input	3-phase 380 to 480 VAC	CNA	L1	Main circuit power supply input	3-phase 380 to 480 VAC
	L2				L2		
	L3				L3		
	B1	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: Not supported External Regeneration Resistor: B1–B2 connected		B3	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: B2–B3 short-circuited External Regeneration Resistor: B1–B2 connected
	B2				B2		
NC	-	Do not connect.	B1	B1			
TB2	U	Motor connection terminals	Motor output of phase U, phase V, phase W, and FG	CNB	P	DC reactor connection terminals	DC reactor Not used: N1–N2 short-circuited Used: N1–N2 connected
	V				N1		
	W				N2		
	⊕				N3		
TB2	24 V	Control circuit power supply input	24 VDC±15%	CND	1 +24 V	Control circuit power supply input	24 VDC (21.6 to 26.4 V)
	0 V				2 +24 V		
	DB1	Dynamic Brake Resistor control terminals	Internal resistor: DB3–DB4 short-circuited External resistor: DB3–DB4 open * The DB1–DB2 output controls external dynamic brake resistor contacts.		3 0 V		
	DB2				4 0 V		
	DB3			CNC	FG	Motor connection terminals	Motor output of phase U, phase V, phase W, and FG
	DB4	U					
⊕	Frame ground	Ground terminal	W				
TB2	DB1	External Dynamic Brake Resistor connection terminals	Dynamic brake Internal resistor: DB2–DB3 short-circuited External resistor: DB1–DB2 connected	CNE	DB1		
	DB2				DB2		
	DB3				DB3		

■ 15 kW drive (400 V)
G5 series: R88D-KN150F-ECT
1S series: R88D-1S150F-ECT



Before installing the wiring, thoroughly check the connector positions and the terminal alignment. In both series, control circuit power supply for the 400-V input model is 24 VDC.

G5 series				1S series					
Terminal	Symbol	Name	Outline specifications	Terminal	No. Symbol	Name	Outline specifications		
TB1	24 V	Control circuit power supply input	24 VDC±15%	CNA	P	-	Do not connect.		
	0 V				N3				
TB2	DB1	Dynamic brake terminals*1	* The DB1–DB2 output controls external dynamic brake resistor contacts.		L3			Main circuit power supply input	3-phase 380 to 480 VAC
	DB2				L2				
TB2	L1	Main circuit power supply input	3-phase 380 to 480 VAC		L1				
	L2								
	L3								
	B1	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: Not supported External Regeneration Resistor: B1–B2 connected	CNB	B1	External Regeneration Resistor connection terminals	Internal Regeneration Resistor: Not supported External Regeneration Resistor: B1–B2 connected		
	B2				B2				
	NC	-	Do not connect.	CND	1	+24 V	Control circuit power supply input	24 VDC (21.6 to 26.4 V)	
	U	Motor connection terminals	Motor output of phase U, phase V, phase W, and FG		2	+24 V			
V	3				0 V				
W	4				0 V				
⊕	Frame ground	Ground terminal	Ground terminal	CNC	FG	Motor connection terminals	Motor output of phase U, phase V, phase W, and FG		
⊕					U				
⊕					V				
TB2	Motor connection terminals	Motor output of phase U, phase V, phase W, and FG	Ground terminal	CNE	DB1	External Dynamic Brake Resistor connection terminals	Dynamic brake Internal resistor: DB2–DB3 short-circuited External resistor: DB1–DB2 connected		
					DB2				
					DB3				

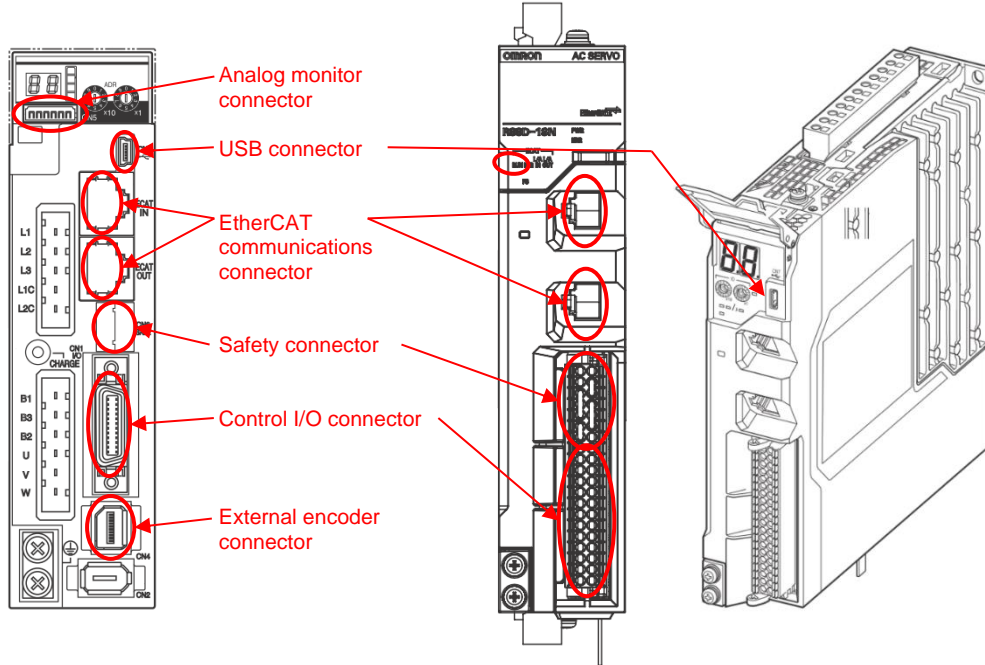
*1. Formally called *Dynamic Brake Resistor control terminals*.

6.3. Layout and Specifications of Connectors of Control Circuit

Layout of connectors of control circuit

The control circuit connectors are arranged on the drive front.

The 1S series does not support the external encoder input function (external encoder connector) and analog monitor function (analog monitor connector) that the G5 series has.



Control I/O connector

Control input

The 1S series does not need any battery for ABS data backup of the ABS encoder.

G5 series				1S series			
Terminal	No.	Symbol	Name	Terminal	No.	Symbol	Name
CN1	6	+24VIN	12 to 24-VDC Power Supply Input	CN1	36	COMMON	12 to 24-VDC Power Supply Input
	5	IN1	General-purpose Input 1 (Immediate Stop Input)		12	IN1	General input 1 (Error Stop Input)
	7	IN2	General-purpose input 2 (Forward Drive Prohibition Input)		32	IN2	General input 2 (Positive Drive Prohibition Input)
	8	IN3	General-purpose input 3 (Reverse Drive Prohibition Input)		13	IN3	General input 3 (Negative Drive Prohibition Input)
	9	IN4	General-purpose input 4 (Origin Proximity Input)		33	IN4	General input 4 (Home Proximity Input)
	10	IN5	General-purpose input 5 (External Latch Signal 3)		14	IN5	General input 5 (Monitor input 1)
	11	IN6	General-purpose input 6 (External Latch Signal 2)		34	IN6	General input 6 (Monitor input 2)
	12	IN7	General-purpose input 7 (External Latch Signal 1)		15	IN7	General input 7 (high-speed) (External Latch Input 1)
	13	IN8	General-purpose input 8 (Monitor input 0)		35	IN8	General input 8 (high-speed) (External Latch Input 2)
	14	BAT	Backup battery input				
	15	BATGND	* For ABS encoder.				

[Electrical specifications]

- G5 series:
 - 12 to 24-VDC Power Supply Input: 12 VDC-5% to 24 VDC+5%
 - General-purpose input: ON level: 10 V or more, OFF level: 3 V or less (input current: 10 mA max.)
- 1S series:
 - 12 to 24-VDC Power Supply Input: 12 VDC-5% to 24 VDC+5%
 - General input: ON level: 9 V or more, OFF level: 3 V or less (input current: 10 mA max.)
 - General input (high-speed): ON level: 10 V or more, OFF level: 2.3 V or less (input current: 10 mA max., hardware delay: within 4 μ s)

● Control output

G5 series				1S series			
Terminal	No.	Symbol	Name	Terminal	No.	Symbol	Name
CN1	3	/ALM	Error Output	CN1	8	/ERR+	Error Output
	4	ALMCOM			28	/ERR-	
	1	OUTM1	General-purpose Output 1 (Brake Interlock)		9	OUT1+	General Output 1 (Servo Ready Output)
	2	OUTM1COM			29	OUT1-	
	25	OUTM2	General-purpose Output 2 (Servo Ready Output)		10	OUT2+	General Output 2 (Remote Output 1)
	26	OUTM2COM			30	OUT2-	
			11	OUT3+	General Output 3 (Remote Output 2)		
			31	OUT3-			

[Electrical specifications]

- G5 series:
 - Maximum service voltage: 30 VDC, Maximum output current: 50 mA
- 1S series:
 - Maximum service voltage: 30 VDC, Maximum output current: 50 mA

■ Safety connector

Be aware that the voltage range of external power supply for safety input is no longer 12 VDC-5% to 24 VDC+5% for the G5 series but now 24 VDC±5% for the 1S series.

G5 series				1S series			
Terminal	No.	Symbol	Name	Terminal	No.	Symbol	Name
CN8	1	-	Reserved	CN1	22	SFA	Reserved
	2	-			7	SFB	
	3	SF1-	Safety Input 1		4, 24	SF1-	
	4	SF1+			3, 23	SF1+	
	5	SF2-	Safety Input 2		6, 26	SF2-	
	6	SF2+			5, 25	SF2+	
	7	EDM-	EDM output		21	EDM-	
	8	EDM+			2	EDM+	
Shell	FG	Frame ground	1	EDM+P	EDM Output (with short-circuit protection)		

[Electrical specifications]

- G5 series:
 - Safety Input External Power Supply: 12 VDC-5% to 24 VDC+5%
 - Safety input: ON level: 10 V or more, OFF level: 3 V or less
 - EDM output: Maximum service voltage: 30 VDC, Maximum output current: 50 mA
- 1S series:
 - Safety Input External Power Supply: 24 VDC±5%
 - Safety input: ON level: 20.8 V or more, OFF level: 5 V or less
 - EDM output: Maximum service voltage: 30 VDC, Maximum output current: 50 mA

■ EtherCAT communications connector

G5 series				1S series			
Terminal	No.	Symbol	Name	Terminal	No.	Symbol	Name
ECAT IN	1	Send data +	TD+ Output	ECAT IN (CN10)	1	Send data +	TD+ Output
	2	Send data -	TD- Output		2	Send data -	TD- Output
	3	Receive data +	RD+ Input		3	Receive data +	RD+ Input
ECAT OUT	4	Not used.	-	ECAT OUT (CN11)	4	Not used.	-
	5	Not used.	-		5	Not used.	-
	6	Receive data -	RD- Input		6	Receive data -	RD- Input
	7	Not used.	-		7	Not used.	-
	8	Not used.	-		8	Not used.	-
	Connector hood	Protective ground	-		Connector hood	Anti-noise ground	-

[Electrical specifications] In both the G5 series and the 1S series, the electrical characteristics conform to IEEE802.3 standards.

■ USB connector

The USB connector is no longer *Mini B type* for the G5 series but now *Micro B type* for the 1S series. Use a USB 2.0-ready cable that matches your connector.

G5 series				1S series			
Terminal	No.	Symbol	Name	Terminal	No.	Symbol	Name
CN7	1	VBUS	USB signal terminal	CN7	1	VBUS	USB signal terminal
	2	D-			2	D-	
	3	D+			3	D+	
	4	-	4		-	Not used.	
	5	GND	Signal ground		5	GND	Signal ground

[Electrical specifications] Both the G5 series and the 1S series conform to USB 2.0.

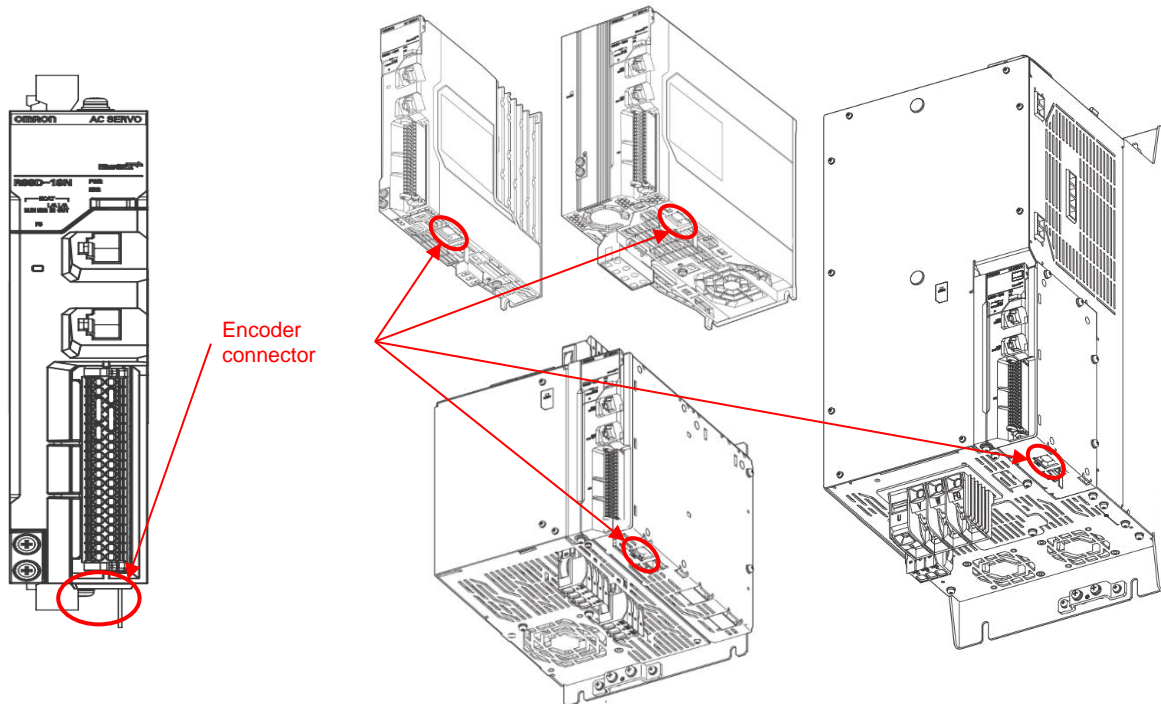
6.4. Layout and Specifications of Encoder Connector

■ Layout of encoder connector

For the G5-series Servo Drive, all the connectors and terminal blocks of main circuit wiring, motor wiring, and control wiring used to be concentrated on the front.

For the 1S-series Servo Drive, the motor wiring is arranged on the bottom so that you can classify wiring routing paths separately.

The encoder connector is also arranged on the drive bottom as follows.



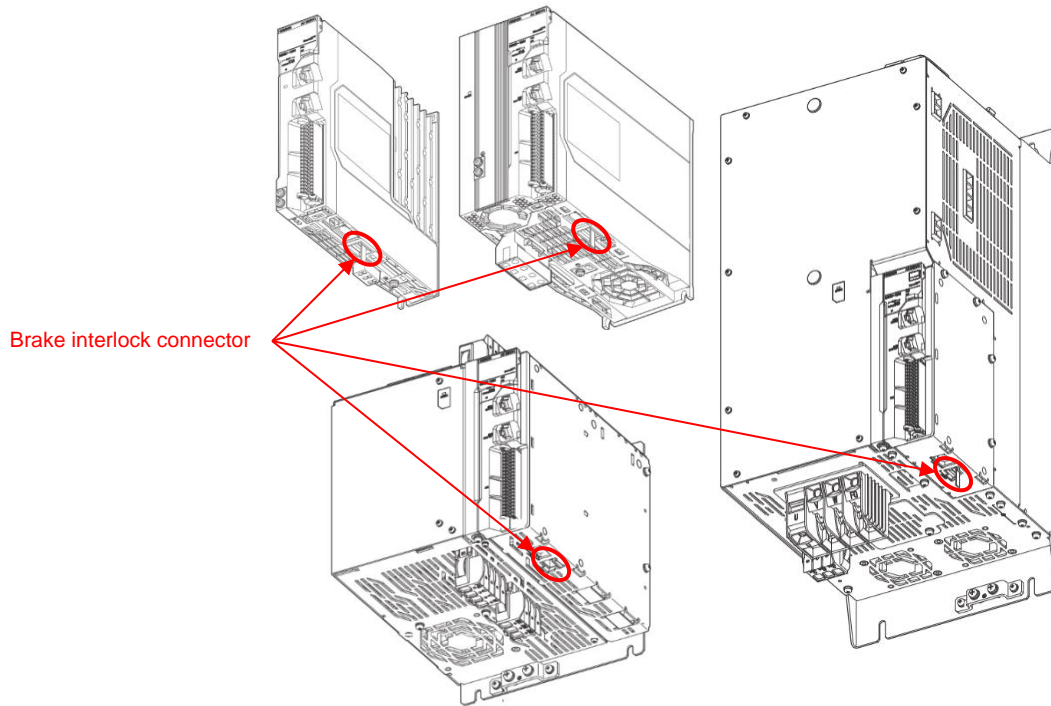
■ Encoder connector

G5 series				1S series			
Terminal	No.	Symbol	Name	Terminal	No.	Symbol	Name
CN2	1	E5V	Encoder power supply +5 V	CN2	1	E5V	Encoder power supply +5 V
	2	E0V	Encoder power supply GND		2	E0V	Encoder power supply GND
	3	BAT+	Battery +		3	Not used.	(Not used because of batteryless one)
	4	BAT-	Battery -		4	Not used.	(Not used because of batteryless one)
	5	PS+	Encoder + phase S input		5	PS+	Encoder + phase S I/O
	6	PS-	Encoder - phase S input		6	PS-	Encoder - phase S I/O
Shell		FG	Frame ground	Shell		FG	Frame ground

6.5. Brake Interlock Connector

Although the G5 series does not have any relay output that can directly control brakes, the 1S series has a *brake interlock connector*, which is the relay output that can directly control brakes. Use it for motor brake control. However, since the specified service life of the brake interlock output relay is 35600 times, if you use brakes more than 10 times a day, use an external relay with the same wiring as the G5 series to control brakes.

■ Layout of brake interlock connector



■ Brake interlock connector

G5 series				1S series			
Terminal	No.	Symbol	Name	Terminal	No.	Symbol	Name
				CN12	1	0V_BKIR	24-V power supply for brake (-)
					2	+24V_BKIR	24-V power supply for brake (+)
					3	BKIR-	Brake output (-)
					4	BKIR+	Brake output (+)

7. Servo Control and Gain Adjustment Methods

7.1. Servo Control (Two-Degree-of-Freedom Control and One-Degree-of-Freedom Control)

For the 1S series, in addition to one-degree-of-freedom control of the G5 series, two-degree-of-freedom control is available, and it is enabled by default.

Features of the two-degree-of-freedom control and one-degree-of-freedom control methods are shown below, so select them according to the application.

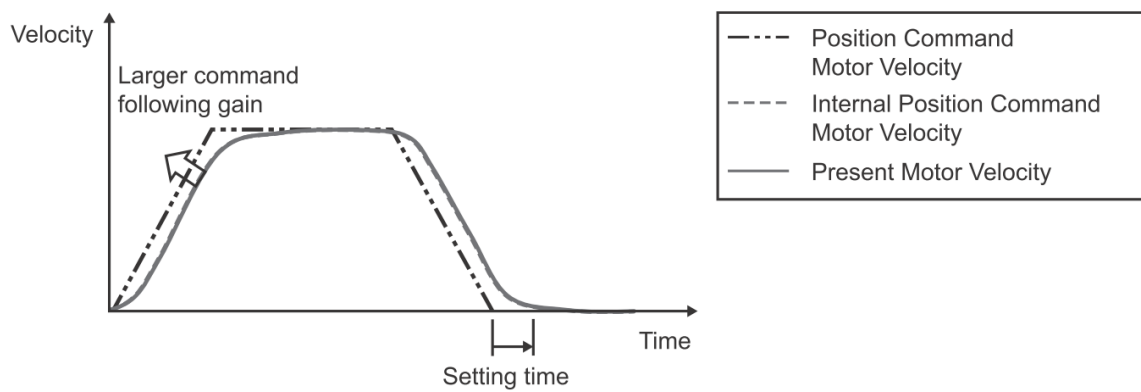
■ Two-degree-of-freedom control

For two-degree-of-freedom control, the smooth internal commands are generated so that the control target can be followed, and TDF controls the internal commands.

TDF control is a control method proper for positioning control, and reduces the positioning stabilization time because the following ability for the internal commands is improved and the overshooting is reduced.

This contributes to smoother motion, and also reduces the impact on devices.

However, internal commands are generated for host commands, so a delay due to that processing occurs.



Time response waveform in TDF control

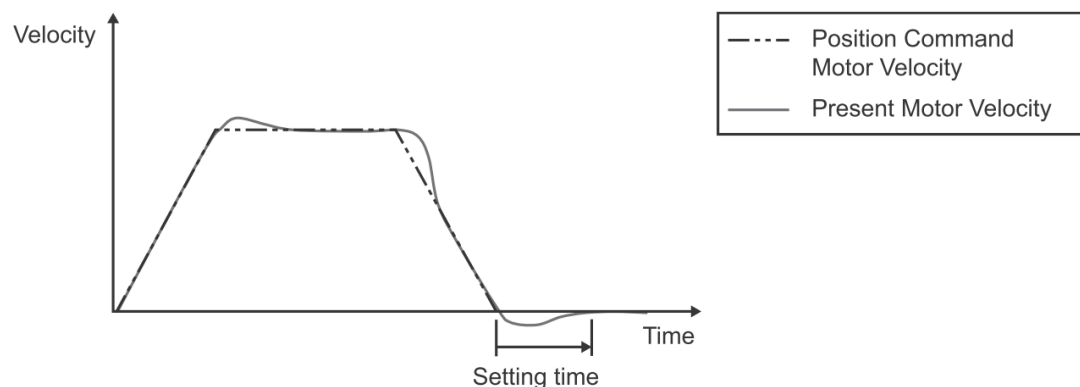
■ One-degree-of-freedom control

One-degree-of-freedom control is a conventional control method, and control is exercised in exact accordance with host commands.

Also, setting the speed feed-forward gain to 100% allows the delay for host commands to be minimized during operation.

However, if a command that changes the acceleration rapidly is given, the command cannot be followed, and the overshooting may occur.

Furthermore, overshooting tends to occur, so the positioning stabilization time becomes longer as compared with two-degree-of-freedom control.



Time response waveform in ODF control
(ODF Velocity Feed-forward Gain=100%)

■ Proper use of two-degree-of-freedom control and one-degree-of-freedom control

For position control and velocity control in general, considering the stability of control and the shortening of positioning stabilization time, choose two-degree-of-freedom control.

Even in case of synchronized control, as long as you have selected two-degree-of-freedom control for all axes, you can maintain synchronization between axes.

However, when a highly precise following ability is required for host commands or if you make a trajectory control by such means as circular interpolation, choose and use one-degree-of-freedom control with the speed feed-forward gain adjusted to almost 100%.

7.2. Gain Adjustment Method (Easy Tuning)

Using a Sysmac Studio tool allows auto tuning of the 1S series to be executed.

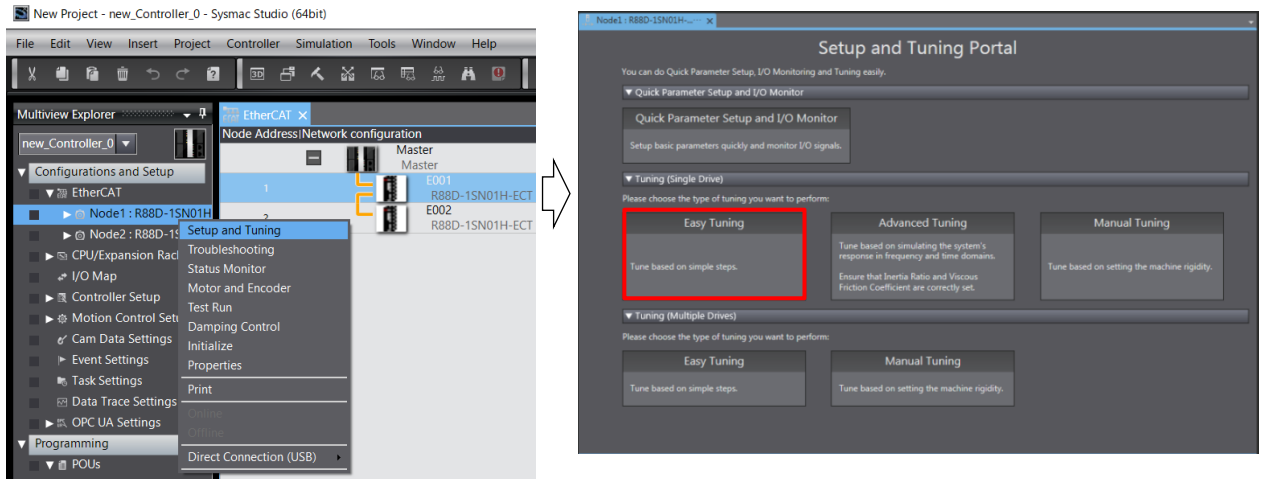
This section describes how to execute *easy tuning* of the 1S series, as compared with auto tuning of the G5 series.

■ Starting the 1S-series Setup and Tuning wizard

Right-click the target Drive of the Sysmac Studio tool, and select **Setup and Tuning** from the menu.

After the **Setup and Tuning** wizard started, choose easy tuning.

• Setup and tuning portal of 1S series

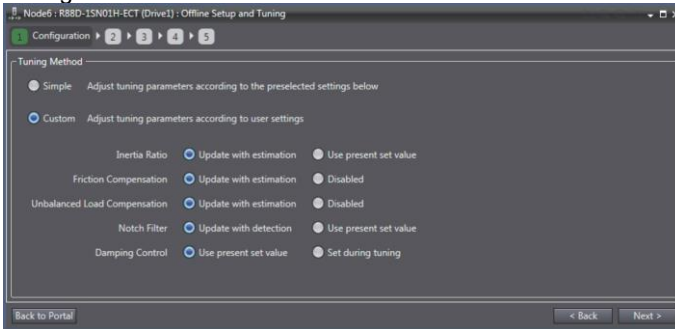


■ 1S-series easy tuning Step 1: Configuration

Select a tuning method. Choose *Simple*. The inertia ratio, torque compensation, and notch filter are tuned.

* When you execute tuning again, you can use a custom setup to make tuning operation settings for the inertia ratio, friction compensation, unbalanced load compensation, notch filter, and damping control.

• Configuration of 1S series

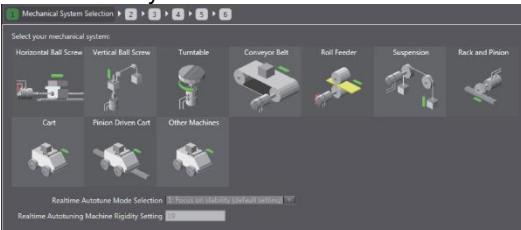


[For G5 series]

Auto tuning of the G5 series used to require *Mechanical System Selection* and *Rigidity Settings (Tune Start Value)* to be set.

The 1S series does not need these settings.

• Mechanical System Selection of G5 series



• Rigidity Settings (Tune Start Value) of G5 series



■ 1S-series easy tuning Step 2: Profile and Criteria

Set the command source for motor operation and the criteria for finishing auto tuning.

At *Motion Profile Generator*, select a command source from the following two.

- **The Motion Controller will perform the motion profile:** Issues commands from the drive controlling Controller.
- **Sysmac Studio (not the Motion Controller) will perform a Cyclic Step:** Issues operation commands from the Sysmac Studio.

* When you choose the Sysmac Studio to issue commands, set the operation direction, travel distance, command velocity, and acceleration/deceleration time for the motor under tuning.

At *Criteria for finishing Auto Tune*, set the positioning stabilization time when auto tuning is completed.

As the conditions for that motion, set *Vibration detection level*, *Position window*, *Responsiveness*, and *Movement interpolation*.

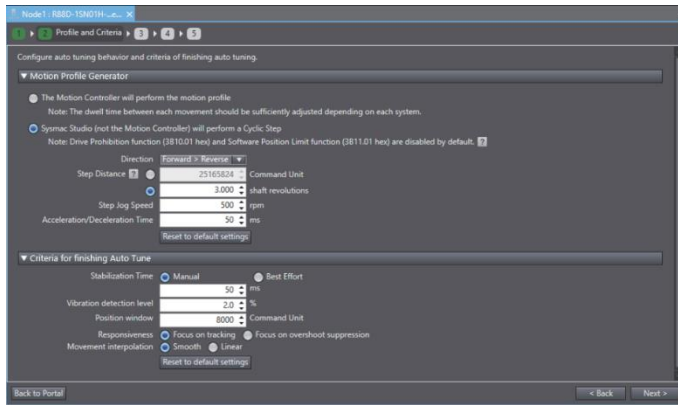
- * Detecting a vibration of *Vibration detection level* results in a stop. In that case, increase the setting within 10%.
- * It may not be completed depending on the setting of *Stabilization Time* or *Position window*. In that case, increase one of the settings.
- * The G5 series and the 1S series are different in motor resolution. Set *Position window* according to the resolution.

[For G5 series]

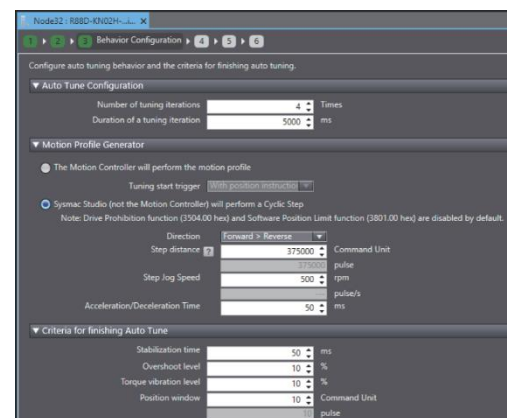
The G5 series used to determine the completion by the amount of overshooting.

For the 1S, the amount of overshooting is suppressed properly because it exercises two-degree-of-freedom control, so the completion is now determined by the stabilization time.

● Profile and Criteria of 1S series



● Profile and Criteria of G5 series



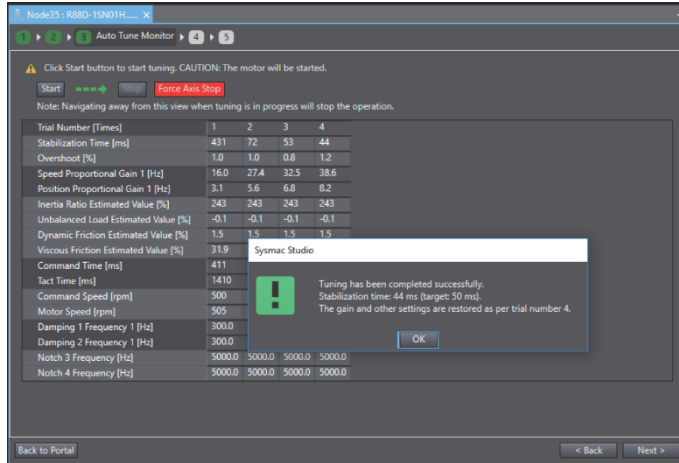
■ 1S-series easy tuning Step 3: Auto Tune Monitor

Pressing the *Start* button starts auto tuning. To abort auto tuning, press the *Stop* button.

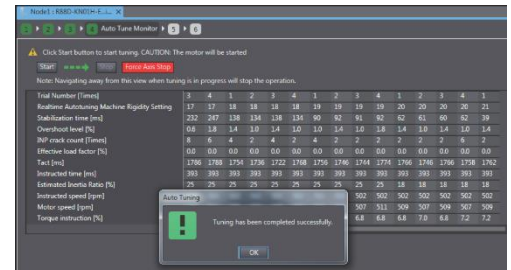
[For G5 series]

The same is true for the G5 series.

● Auto Tune Monitor of 1S series



● Auto Tune Monitor of G5 series



* If you perform auto tuning with rapid acceleration/deceleration applied in order to improve the motor responsiveness, an Excessive Position Deviation Error (Error No. 24.00 hex) may be detected.

In that case, temporarily increase the set value of **Position Detection Function – Following Error Window** (3B50.05 hex) or disable it, and perform auto tuning again.

To finish auto tuning, put the **Position Detection Function – Following Error Window** (3B50.05 hex) setting back to the original set value, or set it to a proper value again.

1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	
3B50.05 (6065.--)	Position Detection Function – Following Error Window	8.4x10 ⁷ Command unit	Set the detection level of an Excessive Position Deviation Error (Error No. 24.00 hex). <ul style="list-style-type: none"> ● 0 to 2147483647: Enabled at the value set in the Following error window ● 2147483648 to 4294967294: Enabled at 2147483647 hex as the value set in the Following error window ● 4294967295: Excessive position deviation detection disabled

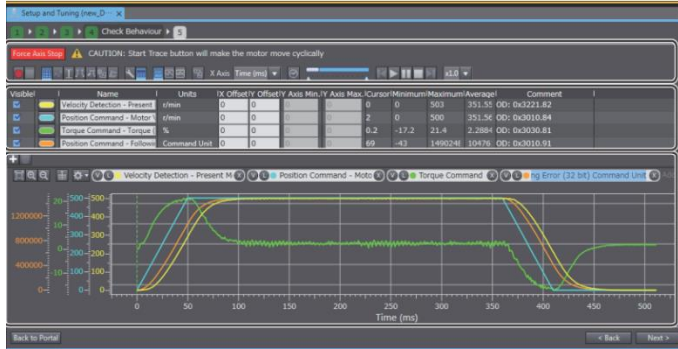
■ 1S-series easy tuning Step 4: Check Behavior

In this step, you can check the auto tuning results by data tracing. After setting trace conditions and trace targets, click the **Start Trace** button. The traced target data is displayed in graph form, and check whether vibration, overshooting, and others are acceptable to operation.

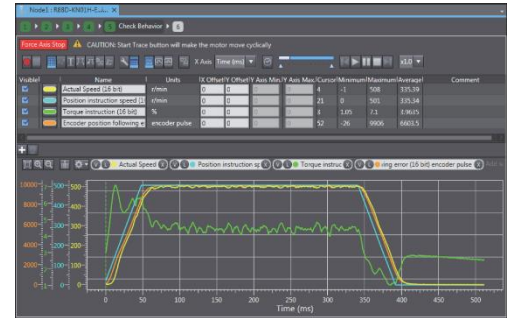
[For G5 series]

The same is true for the G5 series.

- Check Behavior of 1S series



- Check Behavior of G5 series



■ 1S-series easy tuning Step 5: Finish

A list of parameter values set as the results of auto tuning is displayed.

Check the tuning results of the parameters.

To continue using the set values in the future, be sure to click the **Save to EEPROM** button to save them to the non-volatile memory of the drive. If they are not saved, turning OFF the main power supply of the drive will put the set values back to the previous ones.

[For G5 series]

For the G5 series, parameters of the auto tuning results used to be saved automatically to the non-volatile memory of the drive.

For the 1S series, you can now choose whether to save them or not at your discretion.

- Finish of 1S series

OD	Description	Value	Drive Value	Default	Range	Units	Data Attribute
3000.05	Basic Functions - Control Method Selection	0	0	0	0 to 1	B	R
3001.01	Machine - Inertia Ratio	237	250	250	0 to 10000	%	A
3011.03	Position Command Filter - IR Filter Enable	1: Enabled	1	1	0 to 1	A	
3011.04	Position Command Filter - IR Filter Cutoff Freq.	22.6	21.9	10 to 5000.0	Hz	A	
3012.01	Damping Control - Damping Filter 1 Selection	0: Disabled	0	0	0 to 4	A	
3012.02	Damping Control - Damping Filter 2 Selection	0: Disabled	0	0	0 to 4	A	
3013.01	Damping Filter 1 - 1st Frequency	3000	3000	0.5 to 3000	Hz	A	
3013.02	Damping Filter 1 - 1st Damping Time Coefficient	100	100	100	50 to 200	%	A
3013.03	Damping Filter 1 - 2nd Frequency	3000	3000	0.5 to 3000	Hz	A	
3013.04	Damping Filter 1 - 2nd Damping Time Coefficient	100	100	100	50 to 200	%	A
3013.05	Damping Filter 1 - 3rd Frequency	3000	3000	0.5 to 3000	Hz	A	
3013.06	Damping Filter 1 - 3rd Damping Time Coefficient	100	100	100	50 to 200	%	A
3013.07	Damping Filter 1 - 4th Frequency	3000	3000	0.5 to 3000	Hz	A	

- Finish of G5 series

OD	Description	Value	Drive Value	Default	Range	Units	Data Attribute
Ph02	Machine Autotuning Machine Rigidity Setting	15	15	15	0 to 31	B	
Ph24	Feed Rate	228	220	220	0 to 10000	%	B
Ph100	Position Loop Gain 1	772	773	660	0.5 to 30000	1/s	B
Ph101	Speed Loop Gain 1	403	403	210	0.1 to 32767	Hz	B
Ph102	Speed Loop Integration Time Constant 1	144	144	210	0.1 to 30000	ms	B
Ph103	Speed Feedback Filter Time Constant 1	0	0	0	0 to 1	B	
Ph104	Torque Command Filter Time Constant 1	0.57	0.57	0.84	0.05 to 2500	ms	B
Ph105	Position Loop Gain 2	144	144	970	0.5 to 30000	1/s	B
Ph106	Speed Loop Gain 2	403	403	270	0.1 to 32767	Hz	B
Ph107	Speed Loop Integration Time Constant 2	10000	10000	10000	0.1 to 100000	ms	B
Ph108	Torque Command Filter Time Constant 2	0.57	0.57	0.84	0.05 to 2500	ms	B
Ph109	Position Loop Gain 3	0	0	0	0 to 1	B	
Ph110	Speed Loop Gain 3	0	0	0	0 to 1	B	
Ph111	Speed Loop Integration Time Constant 3	0	0	0	0 to 1	B	
Ph112	Torque Command Filter Time Constant 3	0	0	0	0 to 1	B	
Ph113	Position Loop Gain 4	0	0	0	0 to 1	B	
Ph114	Speed Loop Gain 4	0	0	0	0 to 1	B	
Ph115	Speed Loop Integration Time Constant 4	0	0	0	0 to 1	B	
Ph116	Torque Command Filter Time Constant 4	0	0	0	0 to 1	B	
Ph117	Position Loop Gain 5	0	0	0	0 to 1	B	
Ph118	Speed Loop Gain 5	0	0	0	0 to 1	B	
Ph119	Speed Loop Integration Time Constant 5	0	0	0	0 to 1	B	
Ph120	Torque Command Filter Time Constant 5	0	0	0	0 to 1	B	
Ph121	Position Loop Gain 6	0	0	0	0 to 1	B	
Ph122	Speed Loop Gain 6	0	0	0	0 to 1	B	
Ph123	Speed Loop Integration Time Constant 6	0	0	0	0 to 1	B	
Ph124	Torque Command Filter Time Constant 6	0	0	0	0 to 1	B	
Ph125	Position Loop Gain 7	0	0	0	0 to 1	B	
Ph126	Speed Loop Gain 7	0	0	0	0 to 1	B	
Ph127	Speed Loop Integration Time Constant 7	0	0	0	0 to 1	B	
Ph128	Torque Command Filter Time Constant 7	0	0	0	0 to 1	B	
Ph129	Position Loop Gain 8	0	0	0	0 to 1	B	
Ph130	Speed Loop Gain 8	0	0	0	0 to 1	B	
Ph131	Speed Loop Integration Time Constant 8	0	0	0	0 to 1	B	
Ph132	Torque Command Filter Time Constant 8	0	0	0	0 to 1	B	
Ph133	Position Loop Gain 9	0	0	0	0 to 1	B	
Ph134	Speed Loop Gain 9	0	0	0	0 to 1	B	
Ph135	Speed Loop Integration Time Constant 9	0	0	0	0 to 1	B	
Ph136	Torque Command Filter Time Constant 9	0	0	0	0 to 1	B	
Ph137	Position Loop Gain 10	0	0	0	0 to 1	B	
Ph138	Speed Loop Gain 10	0	0	0	0 to 1	B	
Ph139	Speed Loop Integration Time Constant 10	0	0	0	0 to 1	B	
Ph140	Torque Command Filter Time Constant 10	0	0	0	0 to 1	B	
Ph141	Position Loop Gain 11	0	0	0	0 to 1	B	
Ph142	Speed Loop Gain 11	0	0	0	0 to 1	B	
Ph143	Speed Loop Integration Time Constant 11	0	0	0	0 to 1	B	
Ph144	Torque Command Filter Time Constant 11	0	0	0	0 to 1	B	
Ph145	Position Loop Gain 12	0	0	0	0 to 1	B	
Ph146	Speed Loop Gain 12	0	0	0	0 to 1	B	
Ph147	Speed Loop Integration Time Constant 12	0	0	0	0 to 1	B	
Ph148	Torque Command Filter Time Constant 12	0	0	0	0 to 1	B	
Ph149	Position Loop Gain 13	0	0	0	0 to 1	B	
Ph150	Speed Loop Gain 13	0	0	0	0 to 1	B	
Ph151	Speed Loop Integration Time Constant 13	0	0	0	0 to 1	B	
Ph152	Torque Command Filter Time Constant 13	0	0	0	0 to 1	B	
Ph153	Position Loop Gain 14	0	0	0	0 to 1	B	
Ph154	Speed Loop Gain 14	0	0	0	0 to 1	B	
Ph155	Speed Loop Integration Time Constant 14	0	0	0	0 to 1	B	
Ph156	Torque Command Filter Time Constant 14	0	0	0	0 to 1	B	
Ph157	Position Loop Gain 15	0	0	0	0 to 1	B	
Ph158	Speed Loop Gain 15	0	0	0	0 to 1	B	
Ph159	Speed Loop Integration Time Constant 15	0	0	0	0 to 1	B	
Ph160	Torque Command Filter Time Constant 15	0	0	0	0 to 1	B	
Ph161	Position Loop Gain 16	0	0	0	0 to 1	B	
Ph162	Speed Loop Gain 16	0	0	0	0 to 1	B	
Ph163	Speed Loop Integration Time Constant 16	0	0	0	0 to 1	B	
Ph164	Torque Command Filter Time Constant 16	0	0	0	0 to 1	B	
Ph165	Position Loop Gain 17	0	0	0	0 to 1	B	
Ph166	Speed Loop Gain 17	0	0	0	0 to 1	B	
Ph167	Speed Loop Integration Time Constant 17	0	0	0	0 to 1	B	
Ph168	Torque Command Filter Time Constant 17	0	0	0	0 to 1	B	
Ph169	Position Loop Gain 18	0	0	0	0 to 1	B	
Ph170	Speed Loop Gain 18	0	0	0	0 to 1	B	
Ph171	Speed Loop Integration Time Constant 18	0	0	0	0 to 1	B	
Ph172	Torque Command Filter Time Constant 18	0	0	0	0 to 1	B	

7.3. Converting G5-Series Gain Adjustment Values into 1S-Series Ones

You can set the G5-series gain adjustment values that have been used, by converting them into 1S-series ones. If possible, however, for the following reasons, you are recommended to use the auto tuning function to adjust them again, after replacement with the 1S series.

- Compared with the G5 series, the 1S series has higher control performance and provides higher-speed and higher-precision operation.
- The G5 series and the 1S series are different in motor dimensions, rotor inertia, and others. Therefore, a possible minute change in resonance frequency may affect the equipment.

The following table shows the four basic parameters related to gain adjustment.

According to *Conversion of G5 set values into 1S ones*, convert the G5-series gain adjustment values into 1S-series ones.

G5 series			1S series			Conversion of G5 set values into 1S ones
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3100.--	Position Loop Gain	48.0/ 32.0 s ⁻¹ *1	3213.01	1st Position Control Gain – Proportional Gain	4.4/ 2.9 Hz *2	<ul style="list-style-type: none"> • Calculate the [1S set value] by the formula below. [1S set value [Hz]] = [G5 set value [s⁻¹]]/2 π
3101.--	Speed Loop Gain	27.0/ 18.0 Hz *1	3223.01	1st Velocity Control Gain – Proportional Gain	21.9/ 14.6 Hz *2	<ul style="list-style-type: none"> • There is no need to convert the set value. Set the G5 set value as a 1S set value.
3102.--	Speed Loop Integral Time Constant 1	21.0/ 31.0 ms *1	3223.02	1st Velocity Control Gain – Integral Gain	5.5/ 3.7 Hz *2	<ul style="list-style-type: none"> • Calculate the [1S set value] by the formula below. [1S set value [Hz]] = 1/(2 π x [G5 set value [ms]] x 10⁻³)
3104.--	Torque Command Filter Time Constant 1	0.84/ 1.26 ms *1	3233.02	1st Torque Command Filter – Cutoff Frequency	153.6/ 102.4 Hz *2	<ul style="list-style-type: none"> • Calculate the [1S set value] by the formula below. [1S set value [Hz]] = 1/(2 π x [G5 set value [ms]] x 10⁻³) * For the 1S series, set 1st Torque Command Filter – Enable (3233.01 hex) to 1: Enabled.

*1. For the numerical notation sv/SV, sv represents the setting for sub-1-kW motors of 100 V or 200 V type, and SV represents the setting for other motors.

*2. For the numerical notation sv/SV, sv represents the setting for 3 kW or less drives, and SV represents that for 5.5 kW or more ones.

8. Connecting with OMRON Controllers

8.1. Connecting with Machine Automation Controller NJ/NX Series

■ Parameter settings of 1S series

Set them as shown in the following table, so as to use the control functions of the Controller.

If you change a parameter setting in the following table, thoroughly consider the coordination with the Controller functions relevant to that setting.

1S series			Recommended setting [dec]	Description
Index Subindex [hex]	Object name	Default setting [dec]		
3001.05	Machine – Motor Revolutions	1	1	Set the electronic gear ratio of the 1S series to 1:1, and set command units by the Controller.
3001.06	Machine – Shaft Revolutions	1	1	
3330.01	Torque Limit – Switching Selection	0	2	With Positive Torque Limit Input (PCL) and Negative Torque Limit Input (NCL) in the OFF state, enable Positive Torque Limit Value (60E0 hex) and Negative Torque Limit Value (60E1 hex). The torque limit is enabled or disabled by the Controller.
3330.05	Torque Limit – Positive Torque Limit Value 2	500.0 %	500.0 %	
3330.06	Torque Limit – Negative Torque Limit Value 2	500.0 %	500.0 %	
3A00.06	Homing – Home Offset	0 Command unit	0 Command unit	The offset of the 1S series is not used, and it is set by the Controller.
3B10.01	Drive Prohibition – Enable	0	0	Disable drive prohibition of the 1S series, and the drive prohibition is handled by the Controller.
3B11.01	Software Position Limit – Enable Selection	0	0	Disable software position limit of the 1S series, and the software position limit is handled by the Controller.
3B30.01	Touch Probe 1 – Touch Probe 1 Source	1	1	In order to use the touch probe function, set External Latch Input 1 to Touch Probe 1 , and External Latch Input 2 to Touch Probe 2 .
3B31.01	Touch Probe 2 – Touch Probe 2 Source	2	2	
4020.04	Warning Customization – Warning Hold Selection	0 hex	0 hex	The 1S series does not retain warning, and it is handled by the Controller.
4510.01	Encoder – Operation Selection when Using Absolute Encoder	2	2	For the 1S series, set <i>Used as the absolute encoder and the Absolute Encoder Counter Overflow is ignored</i> . The multi-rotation counter overflow is handled by the Controller.
4630.01	Positive Drive Prohibition Input – Port Selection	2	2	Set Positive Drive Prohibition Input (POT) to General input 2 with negative logic, and Negative Drive Prohibition Input (NOT) to General input 3 with negative logic.
4630.02	Positive Drive Prohibition Input – Logic Selection	1	1	
4631.01	Negative Drive Prohibition Input – Port Selection	3	3	Drive prohibition function of the 1S series is disabled, but the Controller recognizes this input and handles the drive prohibition.
4631.02	Negative Drive Prohibition Input – Logic Selection	1	1	
4632.01	External Latch Input 1 – Port Selection	7	7	In order to use the touch probe function, set External Latch Input 1 to General input 7 (high-speed) with positive logic, and External Latch Input 2 to General input 8 (high-speed) with positive logic.
4632.02	External Latch Input 1 – Logic Selection	0	0	
4633.01	External Latch Input 2 – Port Selection	8	8	
4633.02	External Latch Input 2 – Logic Selection	0	0	
4634.01	Home Proximity Input – Port Selection	4	4	Set Home Proximity Input (DEC) to General input 4 with positive logic. These are used by the homing function executed by the Controller.
4634.02	Home Proximity Input – Logic Selection	0	0	

■ Axis parameter settings of Machine Automation Controller NJ/NX Series

Change the axis parameter of an assigned target axis as follows.

- *Command Pulse Count Per Motor Rotation* = 8388608 (23 bits)
 - * Normally, the G5 series has the following settings; however, change the settings according to the 1S series.
 - ABS-type encoder: 131072 (17 bits)
 - INC-type encoder: 1048576 (20 bits)

8.2. Connecting with Position Control Unit (CJ1W-NC□8□)

■ Parameter settings of 1S series

Set them as shown in the following table, so as to use the control functions of the Controller.

If you change a parameter setting in the following table, thoroughly consider the coordination with the Controller functions relevant to that setting.

1S series			Recommended setting [dec]	Description
Index Subindex [hex]	Object name	Default setting [dec]		
3001.05	Machine – Motor Revolutions	1	8	Set the electronic gear ratio of the 1S series to 8:1 (*1), and command units are set by the Controller.
3001.06	Machine – Shaft Revolutions	1	1	
3330.01	Torque Limit – Switching Selection	0	1	With Positive Torque Limit Input (PCL) and Negative Torque Limit Input (NCL) in the ON state, enable Positive Torque Limit Value (60E0 hex) and Negative Torque Limit Value (60E1 hex). The 1S series controls them according to the status of torque limit inputs.
3330.05	Torque Limit – Positive Torque Limit Value 2	500.0 %	500.0 %	
3330.06	Torque Limit – Negative Torque Limit Value 2	500.0 %	500.0 %	
3A00.06	Homing – Home Offset	0 Command unit	0 Command unit	The offset of the 1S series is not used, and it is set by the Controller.
3B10.01	Drive Prohibition – Enable	0	0	Disable drive prohibition of the 1S series, and the drive prohibition is handled by the Controller.
3B11.01	Software Position Limit – Enable Selection	0	0	Disable software position limit of the 1S series, and the software position limit is handled by the Controller.
3B30.01	Touch Probe 1 – Touch Probe 1 Source	1	1	In order to use the touch probe function, set External Latch Input 1 to Touch Probe 1 , and External Latch Input 2 to Touch Probe 2 .
3B31.01	Touch Probe 2 – Touch Probe 2 Source	2	2	
4020.04	Warning Customization – Warning Hold Selection	0 hex	0 hex	The 1S series does not retain warning, and it is handled by the Controller.
4510.01	Encoder – Operation Selection when Using Absolute Encoder	2	2	For the 1S series, set <i>Used as the absolute encoder and the Absolute Encoder Counter Overflow is ignored</i> . The multi-rotation counter overflow is handled by the Controller.
4630.01	Positive Drive Prohibition Input – Port Selection	2	2	Set Positive Drive Prohibition Input (POT) to General input 2 with negative logic, and Negative Drive Prohibition Input (NOT) to General input 3 with negative logic.
4630.02	Positive Drive Prohibition Input – Logic Selection	1	1	
4631.01	Negative Drive Prohibition Input – Port Selection	3	3	Drive prohibition function of the 1S series is disabled, but the Controller recognizes this input and handles the drive prohibition.
4631.02	Negative Drive Prohibition Input – Logic Selection	1	1	
4632.01	External Latch Input 1 – Port Selection	7	7	In order to use the touch probe function, set External Latch Input 1 to General input 7 (high-speed) with positive logic, and External Latch Input 2 to General input 8 (high-speed) with positive logic.
4632.02	External Latch Input 1 – Logic Selection	0	0	
4633.01	External Latch Input 2 – Port Selection	8	8	
4633.02	External Latch Input 2 – Logic Selection	0	0	
4634.01	Home Proximity Input – Port Selection	4	4	Set Home Proximity Input (DEC) to General input 4 with positive logic.
4634.02	Home Proximity Input – Logic Selection	0	0	These are used by the homing function executed by the Controller.

*1. The command output maximum velocity of CJ1W-NC□8□ is 104 [Mpps] (104857600 [pps]); when the resolution per motor rotation becomes high, the maximum velocity of the motor will decrease.

To issue a command to the 1S servomotor to reach the maximum rotation speed 6000 r/min, set the motor resolution to 20 bits or less.

■ Axis parameter settings of NJ/NX series

Change the axis parameter of an assigned target axis as follows.

- *Command Pulse Count Per Motor Rotation* = 1048576 (20 bits)
 - * Normally, the 1S motor is 8388608 (23 bits); however, the electronic gear ratio is set at 8:1, so set 1048576 (20 bits).
 - * Normally, the G5 series has the following settings; however, change the settings according to the 1S series.
 - ABS-type encoder: 131072 (17 bits)
 - INC-type encoder: 1048576 (20 bits)

8.3. Selection of Deceleration Method

The G5 series and the 1S series can set a deceleration method for each of the four PDS states of the drive. The default settings of the 1S series are slightly different from those of the G5 series, so check the descriptions and set them appropriately.

■ Deceleration methods for main circuit OFF and STO status: Shutdown Option Code (605B.-- hex)

The G5 series used to use the shutdown option code to set the deceleration method for main circuit OFF, and judge STO status to be an Safety Input Error (Error No. 30.00 hex) and use the fault reaction option code (605E.-- hex) to set the method.

The 1S series uses the shutdown option code to set the deceleration methods for main circuit OFF and STO status, because it does not judge STO status to be abnormal.

When the running motor decelerates and its speed reaches 30 r/min or lower, the deceleration operation changes from *Deceleration method* to *Operation after stopping*.

Stop Selection – Shutdown Option Code (3B20.01 hex) of the 1S series is a mirror object of 605B hex.

G5 series			1S series		
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]
605B.--	Shutdown Option Code	-1	605B.--	Shutdown Option Code	-5
			3B20.01	Stop Selection – Shutdown Option Code	-5

- The following table shows the set values.

G5 series			1S series			
Set value	Deceleration method	Operation after stopping	Set value	Deceleration method	Operation after stopping	
-	-	-	-7	Operation A*2	Deceleration stop*3	Free
				Operation B*2	Free-run	
-	-	-	-6	Operation A*2	Deceleration stop*3	Free
				Operation B*2	Dynamic brake	
-5	Immediate Stop*1	Free	-5	Operation A*2	Deceleration stop*3	Dynamic brake
				Operation B*2	Free-run	
-4	Immediate Stop*1	Dynamic brake	-4	Operation A*2	Deceleration stop*3	Dynamic brake
				Operation B*2	Dynamic brake	
-3	Dynamic brake	Free	-3	Dynamic brake	Free	
-2	Free-run	Dynamic brake	-2	Free-run	Dynamic brake	
-1	Dynamic brake	Dynamic brake	-1	Dynamic brake	Dynamic brake	
0	Free-run	Free	0	Free-run	Free	

*1. **Immediate Stop Torque (3511.-- hex)** is used to set the stop torque for immediate stop. If any error, such as a Main Circuit Power Supply Undervoltage (Error No. 13.00 hex or No. 13.01 hex), is detected during a stop, the operation will stop according to **Fault Reaction Option Code (605E.-- hex)**.

*2. The operation stops according to Operation B while in an STO status or when the P-N Voltage drops to the specified value or lower. In other cases, it stops according to Operation A.

*3. **Deceleration Stop – Torque (3B21.01 hex)** is used to set the stop torque for deceleration stop.

■ **Deceleration method for servo OFF: Disable Operation Option Code (605C.-- hex)**

The disable operation option code is used to set the deceleration method for servo OFF.

When the running motor decelerates and its speed reaches 30 r/min or lower, the deceleration operation changes from *Deceleration method* to *Operation after stopping*.

Stop Selection – Disable Operation Option Code (3B20.02 hex) of the 1S series is a mirror object of 605C hex.

G5 series			1S series		
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]
605C.--	Disable Operation Option Code	-1	605C.--	Disable Operation Option Code	-4
			3B20.02	Stop Selection – Disable Operation Option Code	-4

- The following table shows the set values.

G5 series			1S series		
Set value	Deceleration method	Operation after stopping	Set value	Deceleration method	Operation after stopping
-	-	-	-6	Deceleration stop*2	Free
-5	Immediate Stop*1	Free	-	-	-
-4	Immediate Stop*1	Dynamic brake	-4	Deceleration stop*2	Dynamic brake
-3	Dynamic brake	Free	-3	Dynamic brake	Free
-2	Free-run	Dynamic brake	-2	Free-run	Dynamic brake
-1	Dynamic brake	Dynamic brake	-1	Dynamic brake	Dynamic brake
0	Free-run	Free	0	Free-run	Free

*1. **Immediate Stop Torque (3511.-- hex)** is used to set the stop torque for immediate stop.

*2. **Deceleration Stop – Torque (3B21.01 hex)** is used to set the stop torque for deceleration stop.

■ **Halt for homing (hm), profile position mode (pp), or profile velocity mode (pv): Halt Option Code (605D.-- hex)**

You can bring the operation in homing (hm), profile position mode (pp), or profile velocity mode (pv) to a halt, by setting the bit 8 (Halt) in **Controlword** to 1. The halt option code is used to set the deceleration method for such a halt.

Stop Selection – Halt Option Code (3B20.03 hex) of the 1S series is a mirror object of 605D hex.

G5 series			1S series		
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]
605D.--	Halt Option Code	1	605D.--	Halt Option Code	1
			3B20.03	Stop Selection – Halt Option Code	1

- The following table shows the set values.

G5 series		1S series	
Set value	Meaning	Set value	Meaning
1	In pp or hm, the operation stops according to Profile Deceleration (6084.-- hex) .	1	The operation stops at a deceleration rate that is used in the selected operation mode. <ul style="list-style-type: none"> • pp, pv: Profile Deceleration (6084.-- hex) • hm: Homing Acceleration (609A.-- hex)
2	- (Not supported)	2	- (Not supported)
3	Immediate Stop*1	3	Deceleration stop*2

*1. **Immediate Stop Torque (3511.-- hex)** is used to set the stop torque for immediate stop.

*2. **Deceleration Stop – Torque (3B21.01 hex)** is used to set the stop torque for deceleration stop.

■ **Deceleration method for error occurrence (error detection): Fault Reaction Option Code (605E.-- hex)**

The fault reaction option code is used to set the deceleration method for error occurrence (error detection).

Depending on the situation of error occurrence (error detection), the drive cannot output to the motor, so the operation stops according to Operation B, not operation A.

For the deceleration method for each error (Operation A or Operation B), see *12-3-1 Error List* in the manual of each series.

When the running motor decelerates and its speed reaches 30 r/min or lower, the deceleration operation changes from *Deceleration method* to *Operation after stopping*.

Stop Selection – Fault Reaction Option Code (3B20.04 hex) of the 1S series is a mirror object of 605E hex.

G5 series			1S series		
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]
605E.--	Fault Reaction Option Code	-1	605E.--	Fault Reaction Option Code	-4
			3B20.04	Stop Selection – Fault Reaction Option Code	-4

• The following table shows the set values.

G5 series				1S series			
Set value	Deceleration method		Operation after stopping	Set value	Deceleration method		Operation after stopping
-7	Operati on A	Immediate Stop*1	Free	-7	Operati on A	Deceleration stop*2	Free
	Operati on B	Free-run			Operati on B	Free-run	
-6	Operati on A	Immediate Stop*1	Free	-6	Operati on A	Deceleration stop*2	Free
	Operati on B	Dynamic brake			Operati on B	Dynamic brake	
-5	Operati on A	Immediate Stop*1	Dynamic brake	-5	Operati on A	Deceleration stop*2	Dynamic brake
	Operati on B	Free-run			Operati on B	Free-run	
-4	Operati on A	Immediate Stop*1	Dynamic brake	-4	Operati on A	Deceleration stop*2	Dynamic brake
	Operati on B	Dynamic brake			Operati on B	Dynamic brake	
-3	Dynamic brake		Free	-3	Dynamic brake		Free
-2	Free-run		Dynamic brake	-2	Free-run		Dynamic brake
-1	Dynamic brake		Dynamic brake	-1	Dynamic brake		Dynamic brake
0	Free-run		Free	0	Free-run		Free

*1. **Immediate Stop Torque (3511.-- hex)** is used to set the stop torque for immediate stop.

*2. **Deceleration Stop – Torque (3B21.01 hex)** is used to set the stop torque for deceleration stop.

8.4. Precautions for Making a Test Run from Sysmac Studio

In both the G5 series and the 1S series, to make a test run from Sysmac Studio, assign the axes and set the axis parameters in Motion Control Function Module beforehand.

If you make a test run from Sysmac Studio without assigning the axes or setting the axis parameters, zero will be set to the torque limit values of the G5 and 1S series, only to prevent the servo drives and motors from operating.

Torque limit values are not included in the PDO default settings of the G5 and 1S series; however, these are used for Motion Control Function Module, so torque limit values are included in the PDO settings of the servo devices implemented in the Sysmac Studio.

When you create a network configuration via the Sysmac Studio and synchronize it with the actual network, the settings of PDO will be changed from the default settings to the PDO settings of servo devices.

When you have finished assigning the axes and setting the axis parameters in Motion Control Function Module, even if any torque limit values are set to PDO, initially set 500% values will be sent from Motion Control Function Module to permit operation.

However, if you have not executed assigning the axes or setting the axis parameters, 0% will be sent.

- PDO default settings of G5 series and 1S series

G5 and 1S series		
Index Subindex [hex]	Object name	Default setting [hex]
1C12.--	Sync Manager 2 PDO Assignment	1701
1C13.--	Sync Manager 3 PDO Assignment	1B01

* PDO Mapping 1 (Position Control and Touch Probe Function)

Classification	Mapping	Set value [hex]	Series	Meaning
RxPDO	258th receive PDO Mapping (Index 1701 hex)	1701	G5	Controlword (6040 hex), Target position (607A hex), Touch probe function (60B8 hex), and Digital outputs (60FE hex)
			1S	Controlword (6040 hex), Target position (607A hex), Touch probe function (60B8 hex), and Physical outputs (60FE.01 hex)
TxPDO	258th transmit PDO Mapping (Index 1B01 hex)	1B01	G5	Error code (603F hex), Statusword (6041 hex), Position actual value (6064 hex), Torque actual value (6077 hex), Following error actual value (60F4 hex), Touch probe status (60B9 hex), Touch probe pos1 pos value (60BA hex), Touch probe pos2 pos value (60BC hex), and Digital inputs (60FD hex)
			1S	Error code (603F hex), Statusword (6041 hex), Position actual value (6064 hex), Torque actual value (6077 hex), Following error actual value (60F4 hex), Touch probe status (60B9 hex), Touch probe 1 positive edge (60BA hex), Touch probe 2 positive edge (60BC hex), and Digital inputs (60FD hex)

- PDO settings of Sysmac Studio servo devices

G5 and 1S series		
Index Subindex [hex]	Object name	Default setting [hex]
1C12.--	Sync Manager 2 PDO Assignment	1704
1C13.--	Sync Manager 3 PDO Assignment	1B02

* PDO Mapping 4 (Position Control, Velocity Control, Torque Control, Touch Probe Function, and Torque Limit)

Classification	Mapping	Set value [hex]	Series	Meaning
RxPDO	261th receive PDO Mapping (Index 1704 hex)	1704	G5	Controlword (6040 hex), Target position (607A hex), Target velocity (60FF hex), Target torque (6071 hex), Modes of operation (6060 hex), Touch probe function (60B8 hex), Max profile velocity (607F hex), Positive torque limit value (60E0 hex), and Negative torque limit value (60E1 hex)
			1S	Controlword (6040 hex), Target position (607A hex), Target velocity (60FF hex), Target torque (6071 hex), Modes of operation (6060 hex), Touch probe function (60B8 hex), Max profile velocity (607F hex), Positive torque limit value (60E0 hex), and Negative torque limit value (60E1 hex)
TxPDO	259th transmit PDO Mapping (Index 1B02 hex)	1B02	G5	Error code (603F hex), Statusword (6041 hex), Position actual value (6064 hex), Torque actual value (6077 hex), Modes of operation display (6061 hex), Touch probe status (60B9 hex), Touch probe pos1 pos value (60BA hex), Touch probe pos2 pos value (60BC hex), and Digital inputs (60FD hex)
			1S	Error code (603F hex), Statusword (6041 hex), Position actual value(6064 hex), Torque actual value (6077 hex), Modes of operation display (6061 hex), Touch probe status (60B9 hex), Touch probe 1 positive edge (60BA hex), Touch probe 2 positive edge (60BC hex), and Digital inputs (60FD hex)

9. Detailed Comparison of Parameters

9.1. Basic Settings

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3000.--	Rotation Direction Switching	1	3000.01	Basic Functions – Motor Rotation Direction Selection	1	Set the motor rotation direction for the forward (positive direction) command. <ul style="list-style-type: none"> The default setting of the G5 or 1S series is <u>1: CCW (counterclockwise) direction seen from motor axis direction.</u>
3001.--	Control Mode Selection	0	3000.02	Basic Functions – Control Mode Selection	0	Select semi-closed control or fully-closed control. <ul style="list-style-type: none"> The default setting of the G5 or 1S series is <u>0: Semi-closed control.</u> For the 1S series, you cannot set the fully-closed control.
3002.--	Realtime Autotuning Mode Selection	1	3B80.01	Load Characteristic Estimation – Inertia Ratio Update Selection	1	Set the functional operation that estimates the load condition in real time and corrects the control constant. <ul style="list-style-type: none"> For the G5 series, select operating mode. For the 1S series, select whether to update each individual correction function.
			3B80.02	Load Characteristic Estimation – Viscous Friction Compensation Update Selection	0	
			3B80.03	Load Characteristic Estimation – Unbalanced Load Compensation Update Selection	0	
			3B80.04	Load Characteristic Estimation – Dynamic Friction Compensation Update Selection	0	
3003.--	Realtime Autotuning Machine Rigidity Setting	13 *1	-	-	-	Set the rigidity of equipment for real-time auto tuning. <ul style="list-style-type: none"> The 1S series has no parameter of machine rigidity.
3004.--	Inertia Ratio	250 %	3001.01	Machine – Inertia Ratio	250 %	Set the ratio of load inertia to the motor rotor inertia in units of %. <ul style="list-style-type: none"> For the G5 series, it is automatically updated when you enable Realtime Autotuning Mode Selection (3002.-- hex). For the 1S series, it is automatically updated when you enable Load Characteristic Estimation – Inertia Ratio Update Selection (3B80.01 hex).
3013.--	External Torque Limit 1	500.0 %	3330.03	Torque Limit – Positive Torque Limit Value	500.0 %	Set the forward (positive direction) torque limit value. <ul style="list-style-type: none"> For the G5 series, refer to Torque Limit Selection (3521.-- hex). For the 1S series, refer to Torque Limit – Switching Selection (3330.01 hex).
			(60E0.--)	Positive Torque Limit Value	500.0 %	
3015.--	Operation Switch when Using Absolute Encoder	2	4510.01	Encoder – Operation Selection when Using Absolute Encoder	2	Set the usage of the absolute encoder. <ul style="list-style-type: none"> You can configure the incremental encoder. The default setting of the G5 or 1S series is <u>2: Used as the absolute encoder and the Absolute Encoder Counter Overflow is ignored.</u>

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3016.--	Regeneration Resistor Selection	3 *2	4310.01	Regeneration – External Regeneration Resistor Selection	0	<p>Set the usage of the internal and the external regeneration resistor.</p> <ul style="list-style-type: none"> For the G5 series, the default setting of the drive with built-in regeneration resistor is <u>0: Built-in regeneration resistor</u>, and that of others is <u>3: No external regeneration resistor</u>. For the 1S series, the default setting is <u>0: No external regeneration resistor</u>, and the drive with built-in regeneration resistor uses the built-in regeneration resistor automatically.
3017.--	External Regeneration Resistor Setting	0	4310.02	Regeneration – External Regeneration Resistance	0.1 Ω	
			4310.03	Regeneration – External Regeneration Allowable Power	1 W	

*1. For 1 kW or more drives of 200 V type and drives of 400 V type, the default setting is 11.

*2. For 400 W drives of 100 V type, 750 W or more drives of 200 V type, and drives of 400 V type, the default setting is 0.

9.2. Gain Settings

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3100.--	Position Loop Gain	48.0/ 32.0 s ⁻¹ *3	3213.01	1st Position Control Gain – Proportional Gain	4.4/2.9 Hz*4	Set the proportional gain of position control. <ul style="list-style-type: none"> The setting unit differs between G5 and 1S series. Use (1S [Hz] = G5 [s⁻¹]/2 π) for unit conversion.
3101.--	Speed Loop Gain	27.0/ 18.0 Hz*3	3223.01	1st Velocity Control Gain – Proportional Gain	21.9/ 14.6 Hz*4	Set the proportional gain of velocity control.
3102.--	Speed Loop Integral Time Constant 1	21.0/ 31.0 ms*3	3223.02	1st Velocity Control Gain – Integral Gain	5.5/3.7 Hz*4	Set the integral gain of velocity control. <ul style="list-style-type: none"> The setting unit differs between G5 and 1S series. Use (1S [Hz] = 1/(2 π × G5 [ms] × 10⁻³)) for unit conversion.
3103.--	Speed Feedback Filter Time Constant 1	0	-	-	-	Set the filter time constant in the speed detection section. <ul style="list-style-type: none"> The 1S series has no parameter of speed feedback filter time constant 1.
3104.--	Torque Command Filter Time Constant 1	0.84/ 1.26 ms*3	3233.01	1st Torque Command Filter – Enable	1	Set the torque command filter of torque control. <ul style="list-style-type: none"> The setting unit differs between G5 and 1S series. Use (1S [Hz] = 1/(2 π × G5 [ms] × 10⁻³)) for unit conversion. For the 1S series, set 1: Enabled to 1st Torque Command Filter – Enable (3233.01 hex).
			3233.02	1st Torque Command Filter – Cutoff Frequency	153.6/ 102.4 Hz*4	
3105.--	Position Loop Gain 2	57.0/ 38.0 s ⁻¹ *3	3214.01	2nd Position Control Gain – Proportional Gain	4.4/2.9 Hz*4	Set the 2nd proportional gain of position control. <ul style="list-style-type: none"> The setting unit differs between G5 and 1S series. Use (1S [Hz] = G5 [s⁻¹]/2 π) for unit conversion.
3106.--	Speed Loop Gain 2	27.0/ 18.0 Hz*3	3224.01	2nd Velocity Control Gain – Proportional Gain	21.9/14.6 Hz*4	Set the 2nd proportional gain of velocity control.
3107.--	Speed Loop Integral Time Constant 2	1000.0 ms	3224.02	2nd Velocity Control Gain – Integral Gain	5.5/3.7 Hz*4	Set the 2nd integral gain of velocity control. <ul style="list-style-type: none"> The setting unit differs between G5 and 1S series. Use (1S [Hz] = 1/(2 π × G5 [ms] × 10⁻³)) for unit conversion.
3108.--	Speed Feedback Filter Time Constant 2	0	-	-	-	Set the filter time constant in the speed detection section. <ul style="list-style-type: none"> The 1S series has no parameter of speed feedback filter time constant 1.
3109.--	Torque Command Filter Time Constant 2	0.84/ 1.26 ms*3	3234.01	2nd Torque Command Filter – Enable	1	Set the 2nd torque command filter of torque control. <ul style="list-style-type: none"> The setting unit differs between G5 and 1S series. Use (1S [Hz] = 1/(2 π × G5 [ms] × 10⁻³)) for unit conversion. For the 1S series, set 1: Enabled to 2nd Torque Command Filter – Enable (3234.01 hex).
			3234.02	2nd Torque Command Filter – Cutoff Frequency	153.6/ 102.4 Hz*4	
3110.--	Speed Feed-forward Gain	30.0 %	3000.03	Basic Functions – Control Method Selection	1	Set the feed-forward gain of velocity control. <ul style="list-style-type: none"> For the 1S series, set 0: ODF control to Basic Functions – Control Method Selection (3000.03 hex).
			3112.01	ODF Velocity Feed-forward – Gain	30.0 %	

*3. For the numerical notation sv/SV, sv represents the setting for 750 W or less drives of 100 V or 200 V type, and SV represents the setting for other drives.

*4. For the numerical notation sv/SV, sv represents the setting for 3 kW or less drives, and SV represents that for 5.5 kW or more ones.

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3111.--	Speed Feed-forward Command Filter	0.50 ms	3000.03	Basic Functions – Control Method Selection	1	<p>Set the filter in the velocity control feed-forward section.</p> <ul style="list-style-type: none"> The setting unit differs between G5 and 1S series. Use (1S [Hz] = 1/(2 π × G5 [ms] × 10⁻³)) for unit conversion. For the 1S series, set 0: <u>ODF control</u> to Basic Functions – Control Method Selection (3000.03 hex). For the 1S series, set 1: <u>Enabled</u> to ODF Velocity Feed-forward – LPF Enable (3112.02 hex).
			3112.02	ODF Velocity Feed-forward – LPF Enable	0	
			3112.03	ODF Velocity Feed-forward – LPF Cutoff Frequency	5000.0 Hz	
3112.--	Torque Feed-forward Gain	0.0 %	3000.03	Basic Functions – Control Method Selection	1	<p>Set the feed-forward gain of torque control.</p> <ul style="list-style-type: none"> For the 1S series, set 0: <u>ODF control</u> to Basic Functions – Control Method Selection (3000.03 hex).
			3113.01	ODF Torque Feed-forward – Gain	0.0 %	
3113.--	Torque Feed-forward Command Filter	0.00 ms	3000.03	Basic Functions – Control Method Selection	1	<p>Set the filter in the torque control feed-forward section.</p> <ul style="list-style-type: none"> The setting unit differs between G5 and 1S series. Use (1S [Hz] = 1/(2 π × G5 [ms] × 10⁻³)) for unit conversion. For the 1S series, set 0: <u>ODF control</u> to Basic Functions – Control Method Selection (3000.03 hex). For the 1S series, set 1: <u>Enabled</u> to ODF Velocity Feed-forward – LPF Enable (3113.02 hex).
			3113.02	ODF Torque Feed-forward – LPF Enable	0	
			3113.03	ODF Torque Feed-forward – LPF Cutoff Frequency	5000.0 Hz	
3114.--	Gain Switching Input Operating Mode Selection	1	-	-	-	<p>Set the function of gain switching input (G-SEL).</p> <ul style="list-style-type: none"> For the G5 series, the default setting is 1: <u>Gain 1/gain 2 switching available</u>, which can be changed to 0: <u>PI/P switching enabled</u>. The 1S series has no parameter of gain switching input operating mode selection. To make a P control, set 0.0 Hz to 1st Velocity Control Gain – Integral Gain (3223.02 hex).
3115.--	Switching Mode in Position Control	0	3212.01	Gain Switching in Position Control – Mode Selection	0	<p>Set the method to switch between the 1st and the 2nd position control gain.</p> <ul style="list-style-type: none"> The default setting of the G5 or 1S series is 0: <u>Always Gain 1</u>.
3116.--	Gain Switching Delay Time in Position Control	5.0 ms	3212.02	Gain Switching in Position Control – Delay Time	5.0 ms	<p>Set the delay time of gain switching in position control.</p> <p>It functions when you return from the 2nd gain to the 1st gain.</p> <ul style="list-style-type: none"> For the G5 series, it is valid when Switching Mode in Position Control (3115.-- hex) is one of the settings: 3 and 5 to 10. For the 1S series, it is valid when Gain Switching in Position Control – Mode Selection (3212.01 hex) is 3: <u>Actual motor velocity with position command</u>.
3117.--	Gain Switching Level in Position Control	50	3212.03	Gain Switching in Position Control – Speed	50 r/min	<p>Set the switching level of gain switching in position control.</p> <ul style="list-style-type: none"> For the G5 series, it is valid when Switching Mode in Position Control (3115.-- hex) is one of the settings: 3, 5, 6, 9, and 10. The setting unit depends on the mode setting. For the 1S series, it is valid when Gain Switching in Position Control – Mode Selection (3212.01 hex) is 3: <u>Actual motor velocity with position command</u>.

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3118.--	Gain Switching Hysteresis in Position Control	33	-	-	-	Set the hysteresis of gain switching in position control. <ul style="list-style-type: none"> For the G5 series, it is valid when Switching Mode in Position Control (3115.-- hex) is one of the settings: 3, 5, 6, 9, and 10. The setting unit depends on the mode setting. The 1S series has no parameter of gain switching hysteresis in position control.
3119.--	Position Gain Switching Time	3.3 ms	3212.04	Gain Switching in Position Control – Time	10.0 ms	Set the switching time of gain switching in position control. It functions when the gain changes from a high value to a low value.
3120.--	Switching Mode in Speed Control	0	3222.01	Gain Switching in Velocity Control – Mode Selection	0	Set the method to switch between the 1st and the 2nd velocity control gain. <ul style="list-style-type: none"> The default setting of the G5 or 1S series is <u>0: Always Gain 1.</u>
3121.--	Gain Switching Delay Time in Speed Control	0.0 ms	-	-	-	Set the delay time of gain switching in speed control. It functions when you return from the 2nd gain to the 1st gain. <ul style="list-style-type: none"> For the G5 series, it is valid when Switching Mode in Speed Control (3120.-- hex) is one of the settings: 3 to 5. The 1S series has no parameter of gain switching delay time in speed control.
3122.--	Gain Switching Level in Speed Control	0	-	-	-	Set the switching level of gain switching in speed control. <ul style="list-style-type: none"> For the G5 series, it is valid when Switching Mode in Speed Control (3120.-- hex) is one of the settings: 3 to 5. The setting unit depends on the mode setting. The 1S series has no parameter of gain switching level in speed control.
3123.--	Gain Switching Hysteresis in Speed Control	0	-	-	-	Set the hysteresis of gain switching in speed control. <ul style="list-style-type: none"> For the G5 series, it is valid when Switching Mode in Speed Control (3120.-- hex) is one of the settings: 3 to 5. The setting unit depends on the mode setting. The 1S series has no parameter of gain switching hysteresis in speed control.
3124.--	Switching Mode in Torque Control	0	3232.01	Filter Switching in Torque Control – Mode Selection	0	Set the method to switch between the 1st and the 2nd torque command filter. <ul style="list-style-type: none"> The default setting of the G5 or 1S series is <u>0: Always 1st Filter.</u>
3125.--	Gain Switching Delay Time in Torque Control	0.0 ms	-	-	-	Set the delay time of torque command filter switching. It functions when you return from the 2nd gain to the 1st gain. <ul style="list-style-type: none"> For the G5 series, it is valid when Switching Mode in Torque Control (3124.-- hex) is <u>3: Torque command variation.</u> The 1S series has no parameter of gain switching delay time in torque control.

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3126.--	Gain Switching Level in Torque Control	0	-	-	-	<p>Set the switching level of torque command filter switching. Set 200 when the torque command variation during 1 ms is 10% of the rated torque.</p> <ul style="list-style-type: none"> For the G5 series, it is valid when Switching Mode in Torque Control (3124.-- hex) is <u>3: Torque command variation</u>. The 1S series has no parameter of gain switching level in torque control.
3127.--	Gain Switching Hysteresis in Torque Control	0	-	-	-	<p>Set the hysteresis of torque command filter switching. Set 200 when the torque command variation during 1 ms is 10% of the rated torque.</p> <ul style="list-style-type: none"> For the G5 series, it is valid when Switching Mode in Torque Control (3124.-- hex) is <u>3: Torque command variation</u>. The 1S series has no parameter of gain switching hysteresis in torque control.

9.3. Vibration Suppression Settings

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3200.--	Adaptive Filter Selection	0	3320.01	Adaptive Notch Filter – Adaptive Notch Selection	0	Set the operation of adaptive notch filters. <ul style="list-style-type: none"> The default setting of the G5 or 1S series is <u>0</u>: <u>Adaptive filter disabled</u>. The G5 series can set only the 3rd notch or both the 3rd and 4th notches, as adaptive filters. The 1S series can set one of the notches from 1st to 4th, as an adaptive filter.
3201.--	Notch 1 Frequency Setting	5000 Hz	3321.01	1st Notch Filter – Enable	0	Set the frequency of the 1st resonance suppression notch filter. <ul style="list-style-type: none"> For the G5 series, the notch function is disabled when <i>5000 Hz</i> is set. For the 1S series, set 1: Enabled to 1st Notch Filter – Enable (3321.01 hex).
			3321.02	1st Notch Filter – Frequency	5000.0 Hz	
3202.--	Notch 1 Width Setting	2	3321.03	1st Notch Filter – Q-value	1.40	Set the width (Q-value) of the 1st resonance suppression notch filter. <ul style="list-style-type: none"> For the G5 series, increasing the set value will obtain a larger width. For the 1S series, decreasing the Q-value will obtain a larger width.
3203.--	Notch 1 Depth Setting	0	3321.04	1st Notch Filter – Depth	60 dB	Set the depth of the 1st resonance suppression notch filter. <ul style="list-style-type: none"> For the G5 series, increasing the set value will obtain a shallower depth. For the 1S series, decreasing the set value will obtain a shallower depth.
3204.--	Notch 2 Frequency Setting	5000 Hz	3322.01	2nd Notch Filter – Enable	0	Set the frequency of the 2nd resonance suppression notch filter. <ul style="list-style-type: none"> For the G5 series, the notch function is disabled when <i>5000 Hz</i> is set. For the 1S series, set 1: Enabled to 2nd Notch Filter – Enable (3322.01 hex).
			3322.02	2nd Notch Filter – Frequency	5000.0 Hz	
3205.--	Notch 2 Width Setting	2	3322.03	2nd Notch Filter – Q-value	1.40	Set the width (Q-value) of the 2nd resonance suppression notch filter. <ul style="list-style-type: none"> For the G5 series, increasing the set value will obtain a larger width. For the 1S series, decreasing the Q-value will obtain a larger width.
3206.--	Notch 2 Depth Setting	0	3322.04	2nd Notch Filter – Depth	60 dB	Set the depth of the 2nd resonance suppression notch filter. <ul style="list-style-type: none"> For the G5 series, increasing the set value will obtain a shallower depth. For the 1S series, decreasing the set value will obtain a shallower depth.
3207.--	Notch 3 Frequency Setting	5000 Hz	3323.01	3rd Notch Filter – Enable	0	Set the frequency of the 3rd resonance suppression notch filter. <ul style="list-style-type: none"> For the G5 series, the notch function is disabled when <i>5000 Hz</i> is set. For the 1S series, set 1: Enabled to 3rd Notch Filter – Enable (3323.01 hex).
			3323.02	3rd Notch Filter – Frequency	5000.0 Hz	
3208.--	Notch 3 Width Setting	2	3323.03	3rd Notch Filter – Q-value	1.40	Set the width (Q-value) of the 3rd resonance suppression notch filter. <ul style="list-style-type: none"> For the G5 series, increasing the set value will obtain a larger width. For the 1S series, decreasing the Q-value will obtain a larger width.

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3209.--	Notch 3 Depth Setting	0	3323.04	3rd Notch Filter – Depth	60 dB	Set the depth of the 3rd resonance suppression notch filter. <ul style="list-style-type: none"> For the G5 series, increasing the set value will obtain a shallower depth. For the 1S series, decreasing the set value will obtain a shallower depth.
3210.--	Notch 4 Frequency Setting	5000 Hz	3324.01	4th Notch Filter – Enable	0	Set the frequency of the 4th resonance suppression notch filter. <ul style="list-style-type: none"> For the G5 series, the notch function is disabled when 5000 Hz is set. For the 1S series, set 1: <u>Enabled</u> to 4th Notch Filter – Enable (3324.01 hex).
			3324.02	4th Notch Filter – Frequency	5000.0 Hz	
3211.--	Notch 4 Width Setting	2	3324.03	4th Notch Filter – Q-value	1.40	Set the width (Q-value) of the 4th resonance suppression notch filter. <ul style="list-style-type: none"> For the G5 series, increasing the set value will obtain a larger width. For the 1S series, decreasing the Q-value will obtain a larger width.
3212.--	Notch 4 Depth Setting	0	3324.04	4th Notch Filter – Depth	60 dB	Set the depth of the 4th resonance suppression notch filter. <ul style="list-style-type: none"> For the G5 series, increasing the set value will obtain a shallower depth. For the 1S series, decreasing the set value will obtain a shallower depth.
3213.--	Damping Filter Selection	0	3012.01	Damping Control – Damping Filter 1 Selection	0	Set the operation of damping filters. <ul style="list-style-type: none"> The default setting of the G5 is 0: <u>Damping filters 1 and 2</u> can be used. You can also use the 3rd and 4th damping filters to switch among damping filters according to the rotation direction. The default setting of the 1S series is 0: <u>Damping filter disabled</u>.
			3012.02	Damping Control – Damping Filter 2 Selection	0	
3214.--	Damping Frequency 1	0.0 Hz	3013.01	Damping Filter 1 – 1st Frequency	300.0 Hz	Set the damping frequency of the damping filter 1. <ul style="list-style-type: none"> For the G5 series, set a single damping frequency. Setting 0.0 to 0.9 Hz disables the damping filter. For the 1S series, you can set damping frequencies 1 to 4. Set one of the four damping frequencies to use to Damping Control – Damping Filter 1 Selection (3012.01 hex). The setting of the damping frequency is changeable via communications.
			3013.03	Damping Filter 1 – 2nd Frequency	300.0 Hz	
			3013.05	Damping Filter 1 – 3rd Frequency	300.0 Hz	
			3013.07	Damping Filter 1 – 4th Frequency	300.0 Hz	
3215.--	Damping Filter 1 Setting	0.0 Hz	3013.02	Damping Filter 1 – 1st Damping Time Coefficient	100 %	Set the vibration suppression effect of the 1st damping filter. <ul style="list-style-type: none"> For the G5 series, increasing the value will shorten the time before suppressing the vibration. Decrease the value if torque saturation occurs to prevent vibration suppression. For the 1S series, decreasing the value will shorten the time before suppressing the vibration. Increase the value if torque saturation occurs to prevent vibration suppression.
			3013.04	Damping Filter 1 – 2nd Damping Time Coefficient	100 %	
			3013.06	Damping Filter 1 – 3rd Damping Time Coefficient	100 %	
			3013.08	Damping Filter 1 – 4th Damping Time Coefficient	100 %	

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3216.--	Damping Frequency 2	0.0 Hz	3014.01	Damping Filter 2 – 1st Frequency	300.0 Hz	Set the damping frequency of the damping filter 2. <ul style="list-style-type: none"> For the G5 series, set a single damping frequency. Setting 0.0 to 0.9 Hz disables the damping filter. For the 1S series, you can set damping frequencies 1 to 4. Set one of the four damping frequencies to use to Damping Control – Damping Filter 2 Selection (3012.02 hex). The setting of the damping frequency is changeable via communications.
			3014.03	Damping Filter 2 – 2nd Frequency	300.0 Hz	
			3014.05	Damping Filter 2 – 3rd Frequency	300.0 Hz	
			3014.07	Damping Filter 2 – 4th Frequency	300.0 Hz	
3217.--	Damping Filter 2 Setting	0.0 Hz	3014.02	Damping Filter 2 – 1st Damping Time Coefficient	100 %	Set the vibration suppression effect of the 2nd damping filter. <ul style="list-style-type: none"> For the G5 series, increasing the value will shorten the time before suppressing the vibration. Decrease the value if torque saturation occurs to prevent vibration suppression. For the 1S series, decreasing the value will shorten the time before suppressing the vibration. Increase the value if torque saturation occurs to prevent vibration suppression.
			3014.04	Damping Filter 2 – 2nd Damping Time Coefficient	100 %	
			3014.06	Damping Filter 2 – 3rd Damping Time Coefficient	100 %	
			3014.08	Damping Filter 2 – 4th Damping Time Coefficient	100 %	
3218.--	Damping Frequency 3	0.0 Hz	-	-	-	Set the damping frequency and vibration suppression effect of the 3rd or the 4th damping filter. <ul style="list-style-type: none"> For the G5 series, it is valid when you set 3: Switched with position command direction to Damping Filter Selection (3213.-- hex). The 1S series has no parameter of damping frequency 3, damping filter 3 setting, damping frequency 4, or damping filter 4 setting.
3219.--	Damping Filter 3 Setting	0.0 Hz	-	-	-	
3220.--	Damping Frequency 4	0.0 Hz	-	-	-	
3221.--	Damping Filter 4 Setting	0.0 Hz	-	-	-	
3222.--	Position Command Filter Time Constant	0.0 ms	3011.03	Position Command Filter – IIR Filter Enable	1	Set the position command filter. <ul style="list-style-type: none"> The setting unit differs between G5 and 1S series. Use $(1S [Hz] = 1/(2 \pi \times G5 [ms] \times 10^{-3}))$ for unit conversion. For the 1S series, set 1: Enabled to Position Command Filter – IIR Filter Enable (3011.03 hex).
			3011.04	Position Command Filter – IIR Filter Cutoff Frequency	21.9/14.6 Hz*4	

*4. For the numerical notation sv/SV, sv represents the setting for 3 kW or less drives, and SV represents that for 5.5 kW or more ones.

9.4. Analog Control Objects

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3312.--	Soft Start Acceleration Time	0 ms	3021.01	Velocity Command Filter – Acceleration Time	0 ms	<p>You can set the acceleration/deceleration time inside the servo, to a velocity command.</p> <ul style="list-style-type: none"> For the G5 series, set the acceleration/deceleration time of 0 to motor maximum velocity r/min. For the 1S series, set the acceleration/deceleration time of 0 to 1000 r/min.
3313.--	Soft Start Deceleration Time	0 ms	3021.02	Velocity Command Filter – Deceleration Time	0 ms	
3314.--	S-curve Acceleration/Deceleration Time Setting	0 ms	-	-	-	<p>You can set the S-curve acceleration/deceleration time inside the servo, to a velocity command.</p> <ul style="list-style-type: none"> For the G5 series, set the time during which an S-curve motion is produced. The 1S series has no parameter of S-curve acceleration/deceleration time setting.
3317.--	Speed Limit Selection	1	-	-	-	<p>Select a speed limit value for torque control.</p> <ul style="list-style-type: none"> The default setting of the G5 series is <u>1: Control the speed by Max profile velocity (607F.-- hex) or Speed Limit Value Setting (3321.-- hex), whichever is lower.</u> The 1S series has no parameter of speed limit selection. The velocity limit function of the 1S series is fixed at <u>Control the speed by Max profile velocity (607F.-- hex) or Velocity Limit in Torque Control – Velocity Limit Value (3031.01 hex), whichever is lower.</u>
3321.--	Speed Limit Value Setting	20000 r/min	3031.01	Velocity Limit in Torque Control – Velocity Limit Value	20000 r/min	Set a velocity limit value for torque control.
3323.--	External Feedback Pulse Type Selection	0	-	-	-	<p>Make the settings relevant to the external encoder used for fully-closed control.</p> <ul style="list-style-type: none"> The 1S series does not support the fully-closed control by external encoder. Therefore, it has no parameter for the external encoder.
3324.--	External Feedback Pulse Dividing Numerator	0	-	-	-	
3325.--	External Feedback Pulse Dividing Denominator	10000	-	-	-	
3326.--	External Feedback Pulse Direction Switching	0	-	-	-	
3327.--	External Feedback Pulse Phase-Z Setting	0	-	-	-	
3328.--	Hybrid Following Error Counter Overflow Level	16000 Command unit	-	-	-	
3329.--	Hybrid Following Error Counter Reset	0 Rotation	-	-	-	

9.5. Interface Monitor Settings

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3400.--	Input Signal Selection 1	0094 9494 hex	4630.01	Positive Drive Prohibition Input	2	<p>Set a function to set to the general input 1, and the logic for that.</p> <ul style="list-style-type: none"> For the G5 series, set a function to set, for each position, speed, and torque control, to the parameter of each of the general-purpose inputs 1 to 8, and the logic for that. For the 1S series, set one of the general inputs 1 to 8 corresponding to the parameter of each function, and the logic for that. You cannot switch among the setting functions for each position, velocity, and torque control. <ol style="list-style-type: none"> SubIndex01: Port Selection Set one of the general inputs 1 to 8 to set. SubIndex02: Logic SelectionSet the input logic of each function. In both the G5 and the 1S series, the default setting is NC contact (Negative logic) Immediate Stop Input (Error Stop Input).
			4631.01	Negative Drive Prohibition Input	3	
			4632.01	External Latch Input 1	7	
			4633.01	External Latch Input 2	8	
			4634.01	Home Proximity Input	4	
			4635.01	Positive Torque Limit Input	0	
			4636.01	Negative Torque Limit Input	0	
			4637.01	Error Stop Input	1	
			4638.01	Monitor Input 1	5	
			4639.01	Monitor Input 2	6	
			463A.01	Monitor Input 3	0	
			463B.01	Monitor Input 4	0	
			463C.01	Monitor Input 5	0	
			463D.01	Monitor Input 6	0	
			463E.01	Monitor Input 7	0	
463F.01	Monitor Input 8	0				
3401.--	Input Signal Selection 2	0081 8181 hex	Same as above			<p>These are the same as the above to the general input 2.</p> <ul style="list-style-type: none"> In both the G5 and the 1S series, the default setting is NC contact (Negative logic) Forward (Positive) Drive Prohibition Input.
3402.--	Input Signal Selection 3	0082 8282 hex	Same as above			<p>These are the same as the above to the general input 3.</p> <ul style="list-style-type: none"> In both the G5 and the 1S series, the default setting is NC contact (Negative logic) Reverse (Negative) Drive Prohibition Input.
3403.--	Input Signal Selection 4	0022 2222 hex	Same as above			<p>These are the same as the above to the general input 4.</p> <ul style="list-style-type: none"> In both the G5 and the 1S series, the default setting is NO contact (Positive logic) Home Proximity Input.
3404.--	Input Signal Selection 5	002B 2B2B hex	Same as above			<p>These are the same as the above to the general input 5.</p> <ul style="list-style-type: none"> For the G5, the default setting is NO contact (Positive logic) External Latch Signal 3. For the 1S, the default setting is NO contact (Positive logic) Monitor Input 1.
3405.--	Input Signal Selection 6	0021 2121 hex	Same as above			<p>These are the same as the above to the general input 6.</p> <ul style="list-style-type: none"> For the G5, the default setting is NO contact (Positive logic) External Latch Signal 2. For the 1S, the default setting is NO contact (Positive logic) Monitor Input 2.
3406.--	Input Signal Selection 7	0020 2020 hex	Same as above			<p>These are the same as the above to the general input 7.</p> <ul style="list-style-type: none"> For the G5, the default setting is NO contact (Positive logic) External Latch Signal 1. For the 1S, the default setting is NO contact (Positive logic) External Latch Input 1.

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3407.--	Input Signal Selection 8	002E 2E2E hex	Same as above			<p>These are the same as the above to the general input 8.</p> <ul style="list-style-type: none"> For the G5, the default setting is NO contact (Positive logic) Monitor Input 0. For the 1S, the default setting is NO contact (Positive logic) External Latch Input 2.
3410.--	Output Signal Selection 1	0003 0303 hex	4650.01	Error Output	0	<p>Set a function to set to the general output 1, and the logic for that.</p> <ul style="list-style-type: none"> For the G5 series, set a function to set, for each position, speed, and torque control, to the parameter of each of the general-purpose outputs 1 to 2, and the logic for that. For the 1S series, set one of the general outputs 1 to 3 output to the parameter of each function, and the logic for that. <p>You cannot switch among the setting functions for each position, velocity, and torque control.</p> <p>1) Subindex01: Port Selection Set the bits 0 to 2 corresponding to the general outputs 1 to 3 to set, to 1.</p> <p>2) Subindex02: Logic Selection Set the output logic of each function.</p> <ul style="list-style-type: none"> For the G5, the default setting is NO contact (Positive logic) Brake Interlock Output. For the 1S, the default setting is NO contact (Positive logic) Servo Ready Output.
			4651.01	Servo Ready Output	1	
			4652.01	Positioning Completion Output 1	0	
			4653.01	Positioning Completion Output 2	0	
			4654.01	Velocity Attainment Detection Output	0	
			4655.01	Torque Limit Output	0	
			4656.01	Zero Speed Detection Output	0	
			4657.01	Velocity Conformity Output	0	
			4658.01	Warning Output 1	0	
			4659.01	Warning Output 2	0	
			465A.01	Velocity Limiting Output	0	
			465B.01	Error Clear Attribute Output	0	
			465C.01	Remote Output 1	2	
			465D.01	Remote Output 2	4	
			465E.01	Remote Output 3	0	
			465F.01	Zone Notification Output 1	0	
			4660.01	Zone Notification Output 2	0	
			4661.01	Position Command Status Output	0	
			4662.01	Distribution Completed Output	0	
			4663.01	External Brake Interlock Output	0	
3411.--	Output Signal Selection 2	0002 0202 hex	Same as above			<p>These are the same as the above to the general output 2.</p> <ul style="list-style-type: none"> For the G5, the default setting is NO contact (Positive logic) Servo Ready Output. For the 1S, the default setting is NO contact (Positive logic) Remote Output 1.
-	-	-	Same as above			<p>These are the same as the above to the general output 3.</p> <ul style="list-style-type: none"> The G5 series does not have a general-purpose output 3. For the 1S, the default setting is NO contact (Positive logic) Remote Output 2.

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3416.--	Analog Monitor 1 Selection	0	-	-	-	Set a monitor function to output to the analog monitor output, and the monitor scale. <ul style="list-style-type: none"> The 1S series does not support analog monitor outputs. Therefore, it has no parameter for the analog monitor.
3417.--	Analog Monitor 1 Scale Setting	0 Monitor unit/V	-	-	-	
3418.--	Analog Monitor 2 Selection	4	-	-	-	
3419.--	Analog Monitor 2 Scale Setting	0 Monitor unit/V	-	-	-	
3421.--	Analog Monitor Output Selection	0	-	-	-	
3432.--	Positioning Completion Condition Selection	0	-	-	-	Set the output condition of the Positioning Completion Output (INP1). <ul style="list-style-type: none"> The default setting of the G5 series is <u>0: ON when the position error is equal to or less than Position window (6067.-- hex).</u> For the 1S series, select from among the following. <ul style="list-style-type: none"> Positioning Completion Output 1 (INP1): ON when the following error is less than or equal to the value set in the Position Window (6067.-- hex/3B51.01 hex). You cannot change the output condition. Positioning Completion Output 2 (INP2): You can use Positioning Completion Notification 2 – Notification Condition (3B52.02 hex) to set the same condition as in G5. The default setting is <u>1: ON when there is no position command and the following error is less than or equal to the Position Window (3B52.01 hex).</u>
3433.--	Positioning Completion Hold Time	0 ms	-	-	-	Set the output hold time of positioning completion. <ul style="list-style-type: none"> For the G5 series, it is valid when you set 3 to Positioning Completion Condition Selection (3432.-- hex). The default setting is <u>0 ms: Hold time invalid.</u> The 1S series has no parameter of positioning completion hold time.
3434.--	Zero Speed Detection	50 r/min	3B60.02	Speed Detection Function – Zero Speed Detection Level	50 r/min	Set the rotation rate at which the motor velocity is regarded as zero (stop). When the motor velocity becomes lower than the set velocity, the Zero Speed Detection Output (ZSP) will be made.
3435.--	Speed Conformity Detection Range	50 r/min	3B60.03	Speed Detection Function – Velocity Conformity Detection Range	50 r/min	Set the rotation rate range in which the motor velocity is regarded as conformed to the command velocity. When the motor velocity enters the set velocity conformity range, the Speed (Velocity) Conformity Output (VCMP) will be made.
3436.--	Rotation Speed for Motor Rotation Detection	1000 r/min	3B60.01	Speed Detection Function – Velocity Attainment Detection Level	1000 r/min	Set the motor rotation rate to be detected. When the motor velocity exceeds the set velocity, the Motor Rotation Speed Detection (Velocity Attainment Detection) Output (TGON) will be made.
3437.--	Brake Timing when Stopped	0 ms	4610.04	Brake Interlock Output – Hardware Delay Time	0 ms	Set the servo ON hold time, at servo OFF, after the brake interlock output turned OFF.

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3438.--	Brake Timing During Operation	0 ms	4610.02	Brake Interlock Output – Timeout at Servo OFF	500 ms	<p>When the Servo OFF is applied to the running motor, this function allows you to delay its being held by brakes until the rotation stops. Set the maximum time spent waiting for the brake interlock output to turn OFF.</p> <ul style="list-style-type: none"> The default setting differs between G5 and 1S series. <p>In the 1S series, to hold the motor by brakes regardless of its velocity, set sufficient motor velocity, such as 3000 r/min, to Brake Interlock Output – Threshold Speed at Servo OFF (4610.03 hex).</p> <ul style="list-style-type: none"> In the 1S series, if the Brake Interlock Output (BKIR) is turned OFF because the set value of Timeout at Servo OFF is detected, a Brake Interlock Error (Error No. 97.00 hex) will be detected.
3439.--	Brake Threshold Speed During Operation	30 r/min	4610.03	Brake Interlock Output – Threshold Speed at Servo OFF	80 r/min*5	<p>When the Servo OFF is applied to the running motor, this function allows you to delay its being held by brakes until the rotation stops. Set the rotation rate at which the motor is regarded as stopped.</p>
--	--	--	4663.01	External Brake Interlock Output – Port Selection	0	<p>Set the method to make a Brake Interlock Output that controls motor brakes.</p> <ul style="list-style-type: none"> Set 0 to use the Brake Interlock Output (BKIR-/BKIR+) that uses the built-in relay. To use the external relay through the use of general outputs, set 1: <i>Allocated</i> to the bit of the desired general output. <ul style="list-style-type: none"> bit 0: General Output 1 (OUT1) bit 1: General Output 2 (OUT2) bit 2: General Output 3 (OUT3)
3440.--	Warning Output Selection 1	0	4021.01	Warning Output 1 Setting – Selection 1	0000 0000 hex	Set the warning to be output by Warning Output 1 (WARN1).
			4021.03	Warning Output 1 Setting – Selection 3	0000 0000 hex	
3441.--	Warning Output Selection 2	0	4022.01	Warning Output 2 Setting – Selection 1	0000 0000 hex	Set the warning to be output by Warning Output 2 (WARN2).
			4022.03	Warning Output 2 Setting – Selection 3	0000 0000 hex	

*5. With the unit version Ver.1.3 or earlier, the default setting is 30 r/min.

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3442.--	Positioning Completion Range 2	10 Command unit	3B52.01	Positioning Completion Notification 2 – Position Window	8000 Command unit	<p>Set the position window of the Positioning Completion Output 2 (INP2) in units of command.</p> <ul style="list-style-type: none"> The G5 and the 1S series are different in motor resolution. Set it according to the resolution. The Positioning Completion Output (INP2) of the G5 series will turn ON when the following error is less than or equal to the value set in the Positioning Completion Range 2 (3442.- - hex). You cannot change the output condition. For the Positioning Completion Output (INP2) of the 1S series, you can use Positioning Completion Notification 2 – Notification Condition (3B52.02 hex) to set the output condition. The default setting is <u>1: ON when there is no position command and the following error is less than or equal to the Position Window (3B52.01 hex).</u>
			3B52.02	Positioning Completion Notification 2 – Notification Condition	1	

9.6. Extended Objects

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3504.--	Drive Prohibition Input Selection	1	3B10.01	Drive Prohibition – Enable	0	Set whether to enable or disable the drive prohibition function. <ul style="list-style-type: none"> In both the G5 and the 1S series, the default setting is <u>Disabled</u>.
3505.--	Stop Selection for Drive Prohibition Input	0	3B10.02	Drive Prohibition – Stop Selection	2	Set the deceleration method when the drive prohibition function is activated. <ul style="list-style-type: none"> The default setting of the G5 series is <u>0: Dynamic brake</u>. The default setting of the 1S series is <u>2: Lock at the stop position, after deceleration stop based on Deceleration Stop – Torque (3B21.01 hex)</u>.
3508.--	Undervoltage Error Selection	1	4320.02	Main Circuit Power Supply – Phase Loss Detection Enable	1	Set whether to enable or disable Main Power Supply Undervoltage – AC cutoff detected (Error No. 13.01 hex). <ul style="list-style-type: none"> In both the G5 and the 1S series, the default setting is <u>1: Enabled</u>.
3509.--	Momentary Hold Time	70 ms	4320.01	Main Circuit Power Supply – Momentary Hold Time	15 ms	Set the hold time for momentary interruption. <ul style="list-style-type: none"> For the G5 series, set the time spent waiting for Main Power Supply Undervoltage – AC cutoff detected (Error No. 13.01 hex) to be detected. For the 1S series, set the time when it is recognized as the cutoff of the main circuit power supply and the PDS state transitions to Switch on disabled.
3511.--	Immediate Stop Torque	0.0 %	3B21.01	Deceleration Stop – Torque	500.0 %	Set the torque for immediate stop (deceleration stop). It should be set in units of % with the rated motor torque regarded as 100%. <ul style="list-style-type: none"> For the G5 series, when you set <u>0.0%</u>, it will follow the setting of the usual torque limit function (Positive 60E0.-- hex/3013.-- hex/3525.-- hex, Negative 60E1.-- hex/3522.-- hex/3526.-- hex).
3512.--	Overload Detection Level Setting	0 %	4150.01	Overload – Warning Notification Level	85 %	Set the detection level of an Overload Error (Error No. 16.00 hex). <ul style="list-style-type: none"> For the G5 series, it should be set in units of % with the rated motor torque regarded as 100%. If you set <u>0%</u> or <u>115%</u> or more, the detection level will be 115%. For the 1S series, set a warning detection level to Overload – Warning Notification Level (4150.01 hex) with the overload error detection level regarded as 100%, and use the setting of Warning Customization – Warning Level Change 1 Selection (4020.05 hex) to change an Overload Warning (Error No. A0.00 hex) to the error level.
			4020.05	Warning Customization – Warning Level Change 1 Selection	0000 0000 hex	
3513.--	Overspeed Detection Level Setting	0 r/min	3B60.04	Speed Detection Function – Excessive Speed Detection Level	0 r/min	Set the detection level of an Overspeed (Excessive Speed) Error (Error No. 26.00 hex). <ul style="list-style-type: none"> In both the G5 and the 1S series, if you set <u>0 r/min</u>, it will be detected when the motor velocity is 1.2 times as high as the maximum one.

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3514.--	Overrun Limit Setting	1.0 Rotation	--	--	--	Set the allowable operating range for the position command input range. Going beyond the range causes an Overrun Limit Error (Error No. 34.00 hex) to be detected. <ul style="list-style-type: none"> The 1S series has no parameter of overrun limit setting. Substitute the software position limit function.
3515.--	Control Input Signal Read Setting	0	--	--	--	Set the read cycle of control input signals. <ul style="list-style-type: none"> The default setting of the G5 series is <u>0: 250 μs</u>. The 1S series has no parameter of control input signal read setting.
3520.--	Position Setting Unit Selection	0	--	--	--	Set the setting units of Positioning Completion Range 2 (3442.-- hex) and Following error window (6065.-- hex). <ul style="list-style-type: none"> The default setting of the G5 series is <u>0: Command units</u>. The 1S series has no parameter of position setting unit selection. Settings are always made in units of command.
3521.--	Torque Limit Selection	6	3330.01	Torque Limit – Switching Selection	0	Set the method to switch the torque limits to use. It is possible to switch torque limit values according to the torque limit input (PCL/NCL) and Controlword (P_CL/N_CL). <ul style="list-style-type: none"> The default setting of the G5 series is as follows. <u>6: PCL/NCL and P_CL/N_CL are both valid and switchable.</u> <ul style="list-style-type: none"> <u>Positive:</u> <u>Switch between Positive torque limit value (60E0.-- hex) or External Torque Limit 1 (3013.-- hex), whichever is smaller, and Forward External Torque Limit (3525.-- hex).</u> <u>Negative:</u> <u>Switch between Negative torque limit value (60E1.-- hex) or External Torque Limit 2 (3522.-- hex), whichever is smaller, and Reverse External Torque Limit (3526.-- hex).</u> The default setting of the 1S series is as follows. <u>0: PCL/NCL and P_CL/N_CL are both invalid.</u> <ul style="list-style-type: none"> <u>Positive: Positive Torque Limit Value (3330.03 hex).</u> <u>Negative: Negative Torque Limit Value (3330.04 hex).</u>
3522.--	External Torque Limit 2	500.0 %	3330.04	Torque Limit – Negative Torque Limit Value	500.0 %	Set the reverse (negative direction) torque limit value. <ul style="list-style-type: none"> For the G5 series, refer to <i>Torque Limit Selection (3521.-- hex)</i>. For the 1S series, refer to <i>Torque Limit – Switching Selection (3330.01 hex)</i>.
			(60E1.--)	Negative torque limit value	500.0 %	
3525.--	Forward External Torque Limit	500.0 %	3330.05	Torque Limit – Positive Torque Limit Value 2	500.0 %	Set the 2nd forward (positive direction) and reverse (negative direction) torque limit values. <ul style="list-style-type: none"> For the G5 series, refer to <i>Torque Limit Selection (3521.-- hex)</i>. For the 1S series, refer to <i>Torque Limit – Switching Selection (3330.01 hex)</i>.
3526.--	Reverse External Torque Limit	500.0 %	3330.06	Torque Limit – Negative Torque Limit Value 2	500.0 %	

9.7. Special Objects

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3602.--	Excessive Speed Error Setting	0 r/min	3B60.05	Speed Detection Function – Excessive Velocity Deviation Detection Level	0 r/min	Set the detection level of an Excessive Speed Deviation Error (Error No. 24.01 hex). <ul style="list-style-type: none"> In both the G5 and the 1S series, if you set 0 r/min, detection will be disabled.
3605.--	Gain 3 Effective Time	0.0 ms	–	–	–	Set the effective time of the gain 3 that changes the gain immediately before motor stop for a certain period of time. It is valid when you set 7: <i>Whether there is a position command to Switching Mode in Position Control</i> (3115.-- hex). <ul style="list-style-type: none"> The 1S series has no parameter of gain 3 effective time.
3606.--	Gain 3 Ratio Setting	100 %	–	–	–	Set the gain 3 that changes the gain immediately before motor stop for a certain period of time, as a multiple of gain 1. <ul style="list-style-type: none"> The 1S series has no parameter of gain 3 ratio setting.
3607.--	Torque Command Value Offset	0 %	3310.02	Torque Compensation – Unbalanced Load Compensation	0.0 %	Set the amount of unbalanced load torque compensation. It is valid in control mode other than torque control. It should be set in units of % with the rated torque regarded as 100%.
3608.--	Forward Direction Torque Offset	0 %	3310.03	Torque Compensation – Positive Dynamic Friction Compensation	0.0 %	Set the amount of dynamic friction compensation in the forward (positive) direction. It is valid in control mode other than torque control. It should be set in units of % with the rated torque regarded as 100%.
3609.--	Reverse Direction Torque Offset	0 %	3310.04	Torque Compensation – Negative Dynamic Friction Compensation	0.0 %	Set the amount of dynamic friction compensation in the reverse (negative) direction. It is valid in control mode other than torque control. It should be set in units of % with the rated torque regarded as 100%.
3610.--	Function Expansion Setting	0040 hex	3000.03	Basic Functions – Control Method Selection	1	Set whether to enable or disable multiple functions by the bit. <ul style="list-style-type: none"> For the G5 series, set the following functions. In the default setting, only the bit 6 is enabled. <ul style="list-style-type: none"> bit 0: Instantaneous speed observer function bit 1: Disturbance observer function bit 2: Disturbance observer operation setting bit 4: Electric current response improvement function bit 6: Command compensation for communications errors for CSP Those of the 1S series are as follows. <ul style="list-style-type: none"> It does not have the instantaneous speed observer function, disturbance observer function, disturbance observer operation setting, and electric current response improvement function; however, its standard control performance will do. Command compensation for communications errors for CSP: Command compensation is made the number of times set in Communications Error Setting (2200.-- hex).
			2200.--	Communications Error Setting	1 Time	

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3611.--	Electric Current Response Setting	100 %	–	–	–	Make a fine adjustment to electric current response, with the default setting regarded as 100%. <ul style="list-style-type: none"> The 1S series has no parameter of electric current response setting.
3614.--	Error Detection Allowable Time Setting	200 ms	–	–	–	Set the allowable time until stop (30 r/min or less) after an immediate stop (deceleration stop) is executed as a result an error. If the rotation exceeds the setting, an Overspeed 2 Error (Error No. 26.01 hex) will be detected. <ul style="list-style-type: none"> The 1S series has no parameter of error detection allowable time setting.
3615.--	Overspeed Detection Level Setting at Immediate Stop	0 r/min	–	–	–	If the motor velocity exceeds the set value during an immediate stop (deceleration stop) resulting from an error, an Overspeed 2 Error (Error No. 26.01 hex) will be detected. <ul style="list-style-type: none"> For the G5 series, if you set 0 r/min, it will be detected when the motor velocity is 1.2 times as high as the maximum one. The 1S series has no parameter of overspeed detection level setting at immediate stop.
3618.--	Power Supply ON Initialization Time	0.0 s	–	–	–	You can adjust the time until the internal protective functions of the drive start following 1.5 seconds of the standard initialization time after the control power supply is turned ON. Set the time to extend. <ul style="list-style-type: none"> The 1S series has no parameter of power supply ON initialization time.
3623.--	Disturbance Torque Compensation Gain	0 %	–	–	–	Set the operating characteristics of the disturbance torque correction enabled. <ul style="list-style-type: none"> For the G5 series, use Disturbance Observer Filter Setting (3624.-- hex) to adjust responsiveness, and use Disturbance Torque Compensation Gain (3623.-- hex) to adjust the power of that control.
3624.--	Disturbance Observer Filter Setting	0.53 ms	–	–	–	<ul style="list-style-type: none"> The 1S series has no parameter of disturbance torque compensation gain and disturbance observer filter setting.
3631.--	Realtime Autotuning Estimated Speed Selection	1	3B80.01	Load Characteristic Estimation – Inertia Ratio Update Selection	1	Set the operating characteristics of the realtime autotuning enabled. <ul style="list-style-type: none"> For the G5 series, use Realtime Autotuning Estimated Speed Selection (3631.-- hex) to disable it or set an estimated velocity. For the 1S series, select whether to update each individual correction function, and use Load Characteristic Estimation – Estimation Sensitivity Selection (3B80.06 hex) to adjust responsiveness.
			3B80.02	Load Characteristic Estimation – Viscous Friction Compensation Update Selection	0	
			3B80.03	Load Characteristic Estimation – Unbalanced Load Compensation Update Selection	0	
			3B80.04	Load Characteristic Estimation – Dynamic Friction Compensation Update Selection	0	
			3B80.06	Load Characteristic Estimation – Estimation Sensitivity Selection	1	

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3632.--	Realtime Autotuning Customization Mode Setting	0000 hex	3B80.01	Load Characteristic Estimation – Inertia Ratio Update Selection	1	<p>Customize the operation of the realtime autotuning enabled.</p> <ul style="list-style-type: none"> For the G5 series, it is valid when you set 6: Customization to Realtime Autotuning Mode Selection (3002.-- hex). Set a bit of each customization item, and set all as a hex value. For the 1S series, select whether to update each individual correction function.
			3B80.02	Load Characteristic Estimation – Viscous Friction Compensation Update Selection	0	
			3B80.03	Load Characteristic Estimation – Unbalanced Load Compensation Update Selection	0	
			3B80.04	Load Characteristic Estimation – Dynamic Friction Compensation Update Selection	0	
3634.--	Hybrid Vibration Suppression Gain	0.0 s ⁻¹	-	-	-	<p>Set the hybrid vibration suppression gain and filter in fully-closed control.</p> <ul style="list-style-type: none"> The 1S series has no function of fully-closed control and hybrid vibration suppression.
3635.--	Hybrid Vibration Suppression Filter	0.10 ms				
3637.--	Vibration Detection Threshold	0.0 %	3B70.01	Vibration Detection – Detection Level	500 %	<p>Set the detection level of vibration detection. It should be set in units of % with the rated torque regarded as 100%. If torque vibration more than or equal to the set value is detected, a Vibration warning (Motor Vibration Warning) (Error No. A6.00 hex) will be detected.</p> <ul style="list-style-type: none"> For the G5 series, if you set 0.0%, it will be disabled. For the 1S series, if you set 500%, it will be disabled.
3638.--	Warning Mask Setting	0004 hex	4020.01	Warning Customization – Warning Mask 1 Selection	0000 0000 hex	<p>By setting 1 to the bit assigned to each warning detection, you can disable the warning detection.</p>
3700.--	LED Display Selection	0	4210.01	Display – LED Display Selection	0	<p>Set data to be displayed on the 7-segment display on the front panel.</p>
3701.--	Power ON Address Display Duration Setting	0.0 s	-	-	-	<p>Set the time during which the node address is displayed when the control power supply is turned ON.</p> <ul style="list-style-type: none"> The 1S series has no parameter of power ON address display duration setting.
3703.--	Torque Limit Flag Output Setting	0	-	-	-	<p>Set the judgment criterion for torque limit flag output.</p> <ul style="list-style-type: none"> The 1S series has no parameter of torque limit flag output setting.
3704.--	Backlash Compensation Selection	0	3001.02	Machine – Backlash Compensation Selection	0	<p>Set whether to enable or disable backlash compensation in the position control, and the operation direction for the compensation.</p>
3705.--	Backlash Compensation Amount	0 Command unit	3001.03	Machine – Backlash Compensation Amount	0 Command unit	<p>Set the backlash compensation amount in the position control.</p>
3706.--	Backlash Compensation Time Constant	0.00 ms	3001.04	Machine – Backlash Compensation Time Constant	0.00 ms	<p>Set the backlash compensation time constant in the position control.</p>

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
3758.--	Touch Probe Trigger Selection	0100 hex	3B30.01	Touch Probe 1 – Touch Probe 1 Source	1	Set the trigger signals of touch probe 1 and touch probe 2. <ul style="list-style-type: none"> In both the G5 and the 1S series, the default setting is as follows. <ul style="list-style-type: none"> Touch Probe 1: External Latch Input 1 (EXT1) Touch Probe 2: External Latch Input 2 (EXT2)
			(60D0.01)	Touch probe source – Touch probe 1 source	1	
			3B31.01	Touch Probe 2 – Touch Probe 2 Source	2	
			(60D0.02)	Touch probe source – Touch probe 2 source	2	
3759.--	Warning Hold Selection	0000 hex	4020.04	Warning Customization – Warning Hold Selection	0000 0000 hex	Set whether to hold or not the detected warning state.
3781.--	Data Setting Warning Detection Setting	1 Time	4020.07	Warning Customization – Warning Level Change 3 Selection	0000 0000 hex	Set the number of times of Data Setting Warning (Error No. B0.00 hex) that causes a Command Error (Error No. 91.01). <ul style="list-style-type: none"> For the 1S series, use Warning Customization – Warning Mask 3 Selection (4020.07 hex) to set the level of Data Setting Warning (Error No. B0.00 hex) as the error.
3800.--	Communications Control	4000 hex	–	–	–	By setting 1 to the bit assigned to each error in EtherCAT communications, you can disable the error detection. <ul style="list-style-type: none"> For the 1S series, you cannot disable the error detection.
			4020.03	Warning Customization – Warning Mask 3 Selection	0000 0000 hex	By setting 1 to the bit assigned to each warning detection, you can disable the warning detection.
3801.--	Software Position Limit Function	3	3B11.01	Software Position Limit – Enable Selection	0	Set whether to enable or disable the software position limit function. <ul style="list-style-type: none"> In both the G5 and the 1S series, the default setting is <u>Disabled</u>.
(607D.01)	Min position limit	-5x10 ⁵ Command unit	3B11.03	Software Position Limit – Min Position Limit	-5x10 ⁵ Command unit	Set the reverse (negative direction) limit value of the software position limit function.
			(607D.01)	Software position limit – Min position limit	-5x10 ⁵ Command unit	
(607D.02)	Max position limit	5x10 ⁵ Command unit	3B11.04	Software Position Limit – Max Position Limit	5x10 ⁵ Command unit	Set the forward (positive direction) limit value of the software position limit function.
			(607D.02)	Software position limit – Max position limit	5x10 ⁵ Command unit	
3803.--	Origin Range	10 Command unit	3A00.01	Homing – Zero Position Range	8000 Command unit	Set the zero position detection range in the form of an absolute value.
3818.--	Position Command FIR Filter Time Constant	0.0 ms	3011.02	Position Command Filter – FIR Filter Moving Average Time	0.1 ms	Enable or disable the FIR filter to the position command, and set the filter time. <ul style="list-style-type: none"> In both the G5 and the 1S series, the default setting is <u>Disabled</u>. For the G5 series, set <u>-1: Enabled</u> to Motion profile type (6086.-- hex), and configure Position Command FIR Filter Time Constant (3818.-- hex). For the 1S series, set <u>1: Enabled</u> to Position Command Filter – FIR Filter Enable (3011.01 hex), and configure Position Command Filter – FIR Filter Moving Average Time (3011.02 hex).
(6086.--)	Motion profile type	0	3011.01	Position Command Filter – FIR Filter Enable	0	

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
4102.--	Absolute Encoder Setup	0000 0000 hex	4510.F1	Encoder – Absolute Encoder Setup	0000 0000 hex	<p>Clears the multi-rotation counter of the absolute encoder.</p> <ul style="list-style-type: none"> • In both the G5 and the 1S series, it is executed by the writing <i>6A646165 hex</i> via SDO communications.

9.8. Objects Added to 1S Series (Some for Reference)

1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	
3000.03	Basic Functions – Control Method Selection	1	<p>Choose TDF (two-degree-of-freedom) control or ODF (one-degree-of-freedom) control. The default setting is 1: TDF control.</p> <ul style="list-style-type: none"> • 0: ODF control One-degree-of-freedom control is as conventional a control method as that of the G5 series, and control is exercised in exact accordance with host commands. In particular, when a highly precise following ability is required for host commands or if you make a trajectory control by such means as circular interpolation, choose one-degree-of-freedom control. • 1: TDF control Two-degree-of-freedom control generates internal commands that allow following, and produces less overshooting, so that the positioning stabilization time can be reduced. For position control and velocity control in general, choose two-degree-of-freedom control.
3211.83	Position Detection – Present Position Time Stamp	– ns	Gives the time when Position Detection – Position Actual Value (3211.81 hex) and Position Detection – Position Actual Internal Value (3211.82 hex) are obtained.
3B30.83	Touch Probe 1 – Positive Edge Time Stamp	– ns	Gives the time when Touch Probe 1 – Touch Probe 1 Positive Edge (3B30.84) is obtained.
3B31.83	Touch Probe 2 – Positive Edge Time Stamp	– ns	Gives the time when Touch Probe 2 – Touch Probe 2 Positive Edge (3B31.84) is obtained.
3B40.01	Zone Notification 1 – Lower Limit	0 Command unit	Set the lower-limit and the upper-limit notification range of Zone Notification Output 1 (ZONE1) and Zone Notification Output 2 (ZONE2).
3B40.02	Zone Notification 1 – Upper Limit	0 Command unit	
3B41.01	Zone Notification 2 – Lower Limit	0 Command unit	
3B41.02	Zone Notification 2 – Upper Limit	0 Command unit	
3B71.01	Runaway Detection – Enable	1	This function detects that the motor rotates in the opposite direction because of incorrect motor wiring, and brings it to an error stop as a Runaway Detected (Error No. 20.00 hex). The default setting is 1: Enabled ; if you can confirm that the motor wiring is correct, you can set it to 0: Disabled .
4150.81	Overload – Load Ratio	– %	Gives the load ratio of Servo Drive or motor, whichever is higher. It is represented in units of % with the rated load regarded as 100%.
4310.81	Regeneration – Regeneration Load Ratio	– %	Gives the regenerative load ratio of the external regeneration resistor, when regeneration is processed by the external regeneration resistor. It is represented in units of % with the power set in Regeneration – External Regeneration Allowable Power (4310.03) regarded as 100%.
4510.89	Encoder – Encoder Temperature	– °C	Gives the temperature of the encoder which is mounted on the motor.

9.9. Servo Drive Profile Object (CiA402)

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
603F.--	Error code	0000 hex	603F.--	Error code	–	Gives the error (event) and warning code of the drive.
6040.--	Controlword	0000 hex	6040.--	Controlword	0000 hex	Controls the state machine of the drive.
6041.--	Statusword	0000 hex	6041.--	Statusword	0000 hex	Gives the present drive status.
605B.--	Shutdown option code	-1	605B.--	Shutdown option code	-5	Set the deceleration method for main circuit power supply OFF. <ul style="list-style-type: none"> The default setting of the G5 series is <u>-1: Dynamic brake stop, then Dynamic brake.</u> The default setting of the 1S series is <u>-5: Operation A Deceleration stop or Operation B Free-run stop, then Dynamic brake.</u>
605C.--	Disable operation option code	-1	605C.--	Disable operation option code	-4	Set the deceleration method for servo OFF. <ul style="list-style-type: none"> The default setting of the G5 series is <u>-1: Dynamic brake stop, then Dynamic brake.</u> The default setting of the 1S series is <u>-4: Deceleration stop, then Dynamic brake.</u>
605D.--	Halt option code	1	605D.--	Halt option code	1	Set the deceleration method for a halt put by turning ON the halt bit in Controlword. The halt bit is available in hm mode for G5, and in pp, pv, or hm mode for 1S. <ul style="list-style-type: none"> The default setting of the G5 series is <u>1: Stopping with Profile deceleration (6084.-- hex) in hm mode.</u> The default setting of the 1S series is <u>1: Stopping with Profile deceleration (6084.-- hex) in pp or pv mode, or stopping with Homing acceleration (609A.-- hex) in hm mode.</u>
605E.--	Fault reaction option code	-1	605E.--	Fault reaction option code	-4	Set the deceleration method for error occurrence. <ul style="list-style-type: none"> The default setting of the G5 series is <u>-1: Dynamic brake stop, then Dynamic brake.</u> The default setting of the 1S series is <u>-4: Operation A Deceleration stop or Operation B Dynamic brake stop, then Dynamic brake.</u>
6060.--	Modes of operation	0	6060.--	Modes of operation	0	Set the operation mode of the drive. <ul style="list-style-type: none"> For the G5 series, you can set csp, csv, cst, pp, or hm mode. For the 1S series, you can set csp, csv, cst, pp, pv, or hm mode.
6061.--	Modes of operation display	0	6061.--	Modes of operation display	–	Gives the present mode of operation.
6062.--	Position demand value	0 Command unit	6062.--	Position demand value	– Command unit	Gives the command position which is generated in the drive, in units of command.
6063.--	Position actual internal value	0 Encoder unit	6063.--	Position actual internal value	– Encoder unit	Gives the present position in units of encoder.
6064.--	Position actual value	0 Command unit	6064.--	Position actual value	– Command unit	Gives the present position in units of command.
6065.--	Following error window	10 ⁵ Command unit	6065.--	Following error window	8.4x10 ⁷ Command unit	Set the detection level of an Error Counter Overflow Error (Excessive Position Deviation Error) (Error No. 24.00 hex) in units of command. <ul style="list-style-type: none"> The G5 and the 1S series are different in motor resolution. Set it according to the resolution.

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
6067.--	Position window	10 Command unit	6067.--	Position window	8000 Command unit	Set the position window of the Positioning Completion Output (INP1) in units of command. ● The G5 and the 1S series are different in motor resolution. Set it according to the resolution.
–	–	–	606B.--	Velocity demand value	– Command unit/s	Gives the command velocity which is generated in the drive, in units of command.
606C.--	Velocity actual value	0 Command unit/s	606C.--	Velocity actual value	– Command unit/s	Gives the present velocity in units of command.
6071.--	Target torque	0.0 %	6071.--	Target torque	0.0 %	Set the torque command in cst mode in units of 0.1%, with the rated torque regarded as 100%.
6072.--	Max torque	500.0 %	6072.--	Max torque	500.0 %	Set the maximum torque limit value of the motor in units of 0.1%, with the rated torque regarded as 100%.
6074.--	Torque demand	0.0 %	6074.--	Torque demand	– %	Gives the torque command value which is generated in the drive in units of 0.1%, with the rated torque regarded as 100%.
6077.--	Torque actual value	0.0 %	6077.--	Torque actual value	– %	Gives the present torque value in units of 0.1%, with the rated torque regarded as 100%.
607A.--	Target position	0 Command unit	607A.--	Target position	0 Command unit	Set the command position in cst or pp mode, in units of command.
607C.--	Home offset	0 Command unit	607C.--	Home offset	0 Command unit	Set the offset value from the home of the absolute encoder to the zero position of Position actual value (6064.-- hex), in units of command.
607D.01	Software position limit – Min position limit	-5x10 ⁵ Command unit	607D.01	Software position limit – Min position limit	-5x10 ⁵ Command unit	Set the minimum value and maximum value of software position limit in units of command.
607D.02	Software position limit – Max position limit	5x10 ⁵ Command unit	607D.02	Software position limit – Max position limit	5x10 ⁵ Command unit	
607F.--	Max profile velocity	0 Command unit/s	607F.--	Max profile velocity	214748 3647 Command unit/s	Set the velocity limit value in units of command. ● For the G5 series, it is valid in cst. ● For the 1S series, it is valid in cst, pp, or pv mode.
6081.--	Profile Velocity	0 Command unit/s	6081.--	Profile velocity	0 Command unit/s	Set the target velocity to be used in pp mode, in units of command.
6083.--	Profile acceleration	10 ⁶ Command unit/s ²	6083.--	Profile acceleration	10 ⁶ Command unit/s ²	Set the acceleration in units of command. ● For the G5 series, it is valid in pp or hm mode. ● For the 1S series, it is valid in pp or pv mode.
6084.--	Profile deceleration	10 ⁶ Command unit/s ²	6084.--	Profile deceleration	10 ⁶ Command unit/s ²	Set the deceleration in units of command. ● For the G5 series, it is valid in pp or hm mode. ● For the 1S series, it is valid in pp or pv mode.
6086.--	Motion profile type	0	(3011.01)	Position Command Filter – FIR Filter Enable	0	Enable or disable the position command FIR filter. ● In both the G5 and the 1S series, the default setting is <u>Disabled</u> .
6091.01	Gear ratio – Motor revolutions	1	6091.01	Gear ratio – Motor revolutions	1	Set the electronic gear ratio. ● The G5 and the 1S series are different in motor resolution. Set it according to the resolution.
6091.02	Gear ratio – Shaft revolutions	1	6091.02	Gear ratio – Shaft revolutions	1	
6098.--	Homing method	0	6098.--	Homing method	0	Select the homing method in hm mode.
6099.01	Homing speeds – Speed during search for switch	5000 Command unit/s	6099.01	Homing speeds – Speed during search for switch	5000 Command unit/s	Set the operation speed to be used until the home proximity input signal is detected during homing, in units of command.
6099.02	Homing speeds – Speed during search for zero	5000 Command unit/s	6099.02	Homing speeds – Speed during search for zero	5000 Command unit/s	Set the operation speed to be used from when the home proximity input signal is detected during homing until the home signal is detected, in units of command.

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
--	--	--	609A.--	Homing acceleration	10 ⁶ Command unit/s ²	Set the acceleration and deceleration speed to be used during homing, in units of command. It is valid in hm mode.
60B0.--	Position offset	0 Command unit	60B0.--	Position offset	0 Command unit	Set the offset for the Target position (607A.-- hex) in units of command.
60B1.--	Velocity offset	0 Command unit/s	60B1.--	Velocity offset	0 Command unit/s	Set the offset for the Target velocity (60FF.-- hex) in units of command.
60B2.--	Torque offset	0.0 %	60B2.--	Torque offset	0.0 %	Set the offset for the Target torque (6071.-- hex) in units of 0.1%, with the rated torque regarded as 100%.
60B8.--	Touch probe function	0	60B8.--	Touch probe function	0	Set the operation of the touch probe function.
60B9.--	Touch probe status	0	60B9.--	Touch probe status	--	Gives the status of the touch probe function.
60BA.--	Touch probe pos1 pos value	0 Command unit	60BA.--	Touch probe 1 positive edge	-- Command unit	Gives the position which is latched by the touch probe function 1, in units of command.
60BC.--	Touch probe pos2 pos value	0 Command unit	60BC.--	Touch probe 2 positive edge	-- Command unit	Gives the position which is latched by the touch probe function 2, in units of command.
--	--	--	60C2.01	Interpolation time period – Interpolation time period value	1	Set the Command Dividing Function which is enabled in csp mode or csv mode. It is valid when EtherCAT communications synchronization mode is <i>Free Run Mode</i> . ● Interpolation time period = Interpolation time period value x 10 ^(Interpolation time index) [s]
--	--	--	60C2.02	Interpolation time period – Interpolation time index	-3	
--	--	--	60D0.01	Touch probe source – Touch probe 1 source	1	Select the trigger to be used for the touch probe source. It is valid when you select <u>Follow the setting in the Touch probe source (60D0 hex) in Touch probe function (60B8.-- hex)</u> . ● 1: External Latch Input 1 (EXT1) ● 2: External Latch Input 2 (EXT2) ● 6: Encoder Phase Z
--	--	--	60D0.02	Touch probe source – Touch probe 2 source	2	
--	--	--	60D9.--	Supported functions	0000 0001 hex	Gives the extended functions which are supported by the Servo Drive.
--	--	--	60DA.--	Function Settings	0000 0001 hex	Select whether to enable or disable the extended functions which are supported by the Servo Drive.
60E0.--	Positive torque limit value	500.0 %	60E0.--	Positive torque limit value	500.0 %	Set the forward (positive direction) and reverse (negative direction) torque limit values in units of 0.1%, with the rated torque regarded as 100%. ● For the G5 series, refer to <i>Torque Limit Selection (3521.-- hex)</i> . ● For the 1S series, refer to <i>Torque Limit – Switching Selection (3330.01 hex)</i> .
60E1.--	Negative torque limit value	500.0 %	60E1.--	Negative torque limit value	500.0 %	

G5 series			1S series			Remarks															
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]																
60E3.01	Supported homing method – 1st supported homing method	8	60E3.01	Supported homing method – 1st supported homing method	8	Gives the supported homing methods.															
60E3.02	Supported homing method – 2nd supported homing method	12	60E3.02	Supported homing method – 2nd supported homing method	12																
60E3.03	Supported homing method – 3rd supported homing method	19	60E3.03	Supported homing method – 3rd supported homing method	19																
60E3.04	Supported homing method – 4th supported homing method	20	60E3.04	Supported homing method – 4th supported homing method	20																
60E3.05	Supported homing method – 5th supported homing method	33	60E3.05	Supported homing method – 5th supported homing method	33																
60E3.06	Supported homing method – 6th supported homing method	34	60E3.06	Supported homing method – 6th supported homing method	34																
60E3.07	Supported homing method – 7th supported homing method	35	60E3.07	Supported homing method – 7th supported homing method	37																
60F4.--	Following error actual value	0 Command unit	60F4.--	Following error actual value	– Command unit	Gives the amount of following error in units of command.															
60FA.--	Control effort	0 Command unit/s	60FA.--	Control effort	– Command unit/s	Gives the velocity command value which is generated in the position control of the Servo Drive, in units of command.															
60FC.--	Position demand internal value	0 Encoder unit	60FC.--	Position demand internal value	– Encoder unit	Gives the command position which is generated in the Servo Drive, in units of encoder.															
60FD.--	Digital inputs	0000 0000 hex	60FD.--	Digital inputs	– hex	Gives each function I/O status of the Servo Drive.															
60FE.01	Digital outputs – Physical outputs	0000 0000 hex	60FE.01	Digital outputs – Physical outputs	0000 0001 hex	<p>You can change the actual hardware output status by writing a value in the bit of each function output.</p> <p>* Only in the case of the bit 0 <u>Brake Interlock Output</u>, it follows servo ON/OFF as follows.</p> <table border="1"> <thead> <tr> <th>Servo ON/OFF</th> <th>60FE.01 bit 0</th> <th>Actual output status of brakes</th> </tr> </thead> <tbody> <tr> <td>OFF (Held)</td> <td>0 (Held)</td> <td>Open (Held)</td> </tr> <tr> <td>ON (Released)</td> <td>0 (Held)</td> <td>Closed (Released)</td> </tr> <tr> <td>OFF (Held)</td> <td>1 (Released)</td> <td>Closed (Released)</td> </tr> <tr> <td>ON (Released)</td> <td>1 (Released)</td> <td>Closed (Released)</td> </tr> </tbody> </table>	Servo ON/OFF	60FE.01 bit 0	Actual output status of brakes	OFF (Held)	0 (Held)	Open (Held)	ON (Released)	0 (Held)	Closed (Released)	OFF (Held)	1 (Released)	Closed (Released)	ON (Released)	1 (Released)	Closed (Released)
Servo ON/OFF	60FE.01 bit 0	Actual output status of brakes																			
OFF (Held)	0 (Held)	Open (Held)																			
ON (Released)	0 (Held)	Closed (Released)																			
OFF (Held)	1 (Released)	Closed (Released)																			
ON (Released)	1 (Released)	Closed (Released)																			
60FE.02	Digital outputs – Bit mask	0000 0000 hex	60FE.02	Digital outputs – Bit mask	0000 0000 hex	Set whether to enable or disable Digital outputs – Physical outputs (60FE.01 hex). Set 1 to the bit to be reflected in the actual hardware output status.															
60FF.--	Target velocity	0 Command unit/s	60FF.--	Target velocity	0 Command unit/s	<p>Set the command velocity in units of command.</p> <ul style="list-style-type: none"> For the G5 series, it is valid in csv mode. For the 1S series, it is valid in csv or pv mode. 															

G5 series			1S series			Remarks
Index Subindex [hex]	Object name	Default setting [dec]	Index Subindex [hex]	Object name	Default setting [dec]	
6402.--	Motor type	3	6402.--	Motor type	3	Gives the type of the connected motor. <ul style="list-style-type: none"> In both the G5 and the 1S series, it is <u>3: PM synchronous motor (fixed)</u>.
6404.--	Motor manufacturer	OMRON ASCII	6404.--	Motor manufacturer	OMRON ASCII	Gives the motor manufacturer name.
6502.--	Supported drive modes	0000 03A1 hex	6502.--	Supported drive modes	0000 03A5 hex	Gives the supported modes of operation.

Appendix 1. List of Cables Supporting 1S-series Motors without Brake

Rated rotation speed	Main circuit power supply voltage	Motor capacity	Motor model R88M-	Power cable R88A-		Extension cable R88A-		Encoder cable R88A-			
				Standard	Flexible	Standard	Flexible	Standard	Flexible		
3000 r/min	100 V	50 W	1M05030S□	*1	CA1A△SFR	*2		CR1A△C	CR1A△CF		
		100 W	1M10030S□	CA1A△S	CA1A△SF *3						
		200 W	1M20030S□								
		400 W	1M40030S□								
	200 V	50 W	1M05030T□	*1	CA1A△SFR	*2		CR1B△N	CR1B△NF		
		100 W	1M10030T□	CA1A△S	CA1A△SF *3						
		200 W	1M20030T□								
		400 W	1M40030T□								
		750 W	1M75030T□	CA1B△S	CA1B△SF						
		1 kW	1L1K030T□								
		1.5 kW	1L1K530T□								
		2 kW	1L2K030T□								
	3 kW	1L3K030T□	CA1E△S	CA1E△SF	*1	CA1HE○BF	CR1B△V	CR1B△VF			
	4 kW	1L4K030T□	*1	CA1H△SF							
	4.7 kW	1L4K730T□	CA1C△S	CA1C△SF							
	750 W	1L75030C□									
	1 kW	1L1K030C□									
	400 V	1.5 kW	1L1K530C□	CA1E△S	CA1E△SF	*2		CR1B△N	CR1B△NF		
2 kW		1L2K030C□									
3 kW		1L3K030C□	*1	CA1H△SF							
4 kW		1L4K030C□									
5 kW		1L5K030C□									
2000 r/min	200 V	1 kW	1M1K020T□	CA1B△S	CA1B△SF	*2		CR1B△N	CR1B△NF		
		1.5 kW	1M1K520T□	CA1C△S	CA1C△SF						
		2 kW	1M2K020T□	CA1E△S	CA1E△SF						
		3 kW	1M3K020T□								
	400 V	400 W	1M40020C□	CA1C△S	CA1C△SF						
		600 W	1M60020C□								
		1 kW	1M1K020C□								
		1.5 kW	1M1K520C□								
		2 kW	1M2K020C□								
		3 kW	1M3K020C□							CA1E△S	CA1E△SF
1500 r/min	200 V	4 kW	1M4K015T□	*1	CA1H△SF	*1	CA1HE○BF	CR1B△V	CR1B△VF		
		5 kW	1M5K015T□								
		7.5 kW	1M7K515T□							CA1K△SF	
		11 kW	1M11K015T□								
		15 kW	1M15K015T□								
	400 V	4 kW	1M4K015C□		CA1H△SF		CA1HE○BF				
		5.5 kW	1M5K515C□								
		7.5 kW	1M7K515C□							CA1J△SF	CA1JE○BF
		11 kW	1M11K015C□								
		15 kW	1M15K015C□								
1000 r/min	200 V	900 W	1M90010T□	CA1B△S	CA1B△SF	*2		CR1B△N	CR1B△NF		
		2 kW	1M2K010T□	CA1E△S	CA1E△SF						
		3 kW	1M3K010T□	CA1F△S	CA1F△SF						
	400 V	900 W	1M90010C□	CA1C△S	CA1C△SF						
		2 kW	1M2K010C□	CA1E△S	CA1E△SF						
		3 kW	1M3K010C□								

*1. For 50 W and 4 kW or more motors, we have no plan to commercialize standard-type cables. Use the flexible type instead.

*2. For 3 kW or less motors, we have no plan to commercialize extension cables. Use the power cables within 50 m instead.

*3. You can also use the power cables with cable on non-load side "R88A-CA1A△SFR."

*4. □ represents an optional specification for the motor. △ represents a 3-digit cable length (005 for 5 m), and ○ represents a 2-digit cable length (05 for 5 m).

Appendix 2. List of Cables Supporting 1S-series Motors with Brake

Rated rotation speed	Main circuit power supply voltage	Motor capacity	Motor model R88M-	Power cable R88A-		Extension cable R88A-		Encoder cable R88A-		
				Standard	Flexible	Standard	Flexible	Standard	Flexible	
3000 r/min	100 V	50 W	1M05030S-B□	*1	CA1A△SFR, CA1A△BFR	*2		CR1A△C	CR1A△CF	
		100 W	1M10030S-B□	CA1A△S, CA1A△B	CA1A△SF, CA1A△BF *3					
		200 W	1M20030S-B□							
		400 W	1M40030S-B□							
	200 V	50 W	1M05030T-B□	*1	CA1A△SFR, CA1A△BFR	*2		CR1B△N	CR1B△NF	
		100 W	1M10030T-B□	CA1A△S, CA1A△B	CA1A△SF, CA1A△BF *3					
		200 W	1M20030T-B□							
		400 W	1M40030T-B□							
		750 W	1M75030T-B□	CA1B△B	CA1B△BF					
		1 kW	1L1K030T-B□							
		1.5 kW	1L1K530T-B□							
		2 kW	1L2K030T-B□	CA1E△B	CA1E△BF					
		3 kW	1L3K030T-B□							
		4 kW	1L4K030T-B□	*1	CA1H△BF					*1
	4.7 kW	1L4K730T-B□	CA1D△B	CA1D△BF	*2		CR1B△N	CR1B△NF		
	750 W	1L75030C-B□								
	1 kW	1L1K030C-B□								
	1.5 kW	1L1K530C-B□								
2 kW	1L2K030C-B□									
3 kW	1L3K030C-B□									
4 kW	1L4K030C-B□	CA1E△B	CA1E△BF							
5 kW	1L5K030C-B□									
				*1	CA1H△BF	*1	CA1HE○BF	CR1B△V	CR1B△VF	
2000 r/min	200 V	1 kW	1M1K020T-B□	CA1B△B	CA1B△BF	*2		CR1B△N	CR1B△NF	
		1.5 kW	1M1K520T-B□	CA1C△B	CA1C△BF					
		2 kW	1M2K020T-B□	CA1E△B	CA1E△BF					
		3 kW	1M3K020T-B□							
	400 V	400 W	1M40020C-B□	CA1D△B	CA1D△BF					
		600 W	1M60020C-B□							
		1 kW	1M1K020C-B□							
		1.5 kW	1M1K520C-B□							
		2 kW	1M2K020C-B□							
		3 kW	1M3K020C-B□							CA1E△B
1500 r/min	200 V	4 kW	1M4K015T-B□	*1	CA1H△BF	*1	CA1HE○BF	CR1B△V	CR1B△VF	
		5 kW	1M5K015T-B□		CA1K△BF		CA1KE○BF			
		7.5 kW	1M7K515T-B□							
		11 kW	1M11K015T-B□							
	400 V	15 kW	1M15K015T-B□		CA1H△BF		CA1J△BF			CA1HE○BF
		4 kW	1M4K015C-B□							
		5.5 kW	1M5K515C-B□							
		7.5 kW	1M7K515C-B□							
		11 kW	1M11K015C-B□							
		15 kW	1M15K015C-B□							
1000 r/min	200 V	900 W	1M90010T-B□	CA1B△B	CA1B△BF	*2		CR1B△N	CR1B△NF	
		2 kW	1M2K010T-B□	CA1E△B	CA1E△BF					
		3 kW	1M3K010T-B□	CA1F△B	CA1F△BF					
	400 V	900 W	1M90010C-B□	CA1D△B	CA1D△BF					
		2 kW	1M2K010C-B□	CA1E△B	CA1E△BF					
		3 kW	1M3K010C-B□							

*1. For 50 W and 4 kW or more motors, we have no plan to commercialize standard-type cables. Use the flexible type instead.

*2. For 3 kW or less motors, we have no plan to commercialize extension cables. Use the power cables within 50 m instead.

*3. You can also use the power cables with cable on non-load side "R88A-CA1A△SFR" and the brake cables "R88A-CA1A△BFR."

*4. □ represents an optional specification for the motor. △ represents a 3-digit cable length (005 for 5 m), and ○ represents a 2-digit cable length (05 for 5 m).

Note: Do not use this document to operate the Unit.

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