

Re-engineered AC SERVOPACK USER'S MANUAL

CACR-SR□□BF SERVOPACK



YASKAWA

YASKAWA ELECTRIC ENGINEERING CORPORATION

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About this manual

■ Description of Technical Terms

The terms in this manual are defined as follows:

- Re-engineered AC SERVOPACK:
The SERVOPACKs that have been developed to be used for replacement of the conventional SERVOPACK models prior to Σ series.
- CACR-SR□□BF1□:
The re-engineered AC SERVOPACK model designation. The code in □ differs depending on the SERVOPACK capacity and specifications. Refer to 2.2 *SERVOPACK Model Designations*.

■ Quick access to your required information

Read the chapters marked with ✓ to get the information required for your purpose.

| Chapter | SERVOPACKs, Servomotors, and Peripheral Devices | Ratings and Characteristics | Panel Configuration and Wiring | Trial Operation | Maintenance and Inspection |
|---|---|-----------------------------|--------------------------------|-----------------|----------------------------|
| Chapter 1 Outline | ✓ | | | | |
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| Chapter 4 Settings and Display | | | | ✓ | |
| Chapter 5 Maintenance, Inspection, and Alarm/Warning Display | | | | | ✓ |

■ Related Manuals

Refer to the following manuals as required.

| Manual Name | Manual Number | Contents |
|--|---------------|--|
| Σ -III Series SGM□S/SGDS Digital Operator Operation Manual | TOBPS80000001 | Provides detailed information on the operation of the JUSP-OP05A Digital Operator. |
| Σ -III Series SGM□S/SGDS User's Manual | SIEPS80000000 | Describes the following items of Σ -III Series SERVOPACKs and Servomotors. <ul style="list-style-type: none"> • Selection of model and capacity • Ratings, characteristics, and dimensional drawings • Cables and peripheral devices • Panel configuration and wiring • Trial operation, servo adjustment, and functions • Inspection, maintenance, and troubleshooting |

Safety Information

The following conventions are used to indicate precautions in this manual. Failure to heed precautions provided in this manual can result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.




Indicates precautions that, if not heeded, could possibly result in loss of life or serious injury.




Indicates precautions that, if not heeded, could result in relatively serious or minor injury, damage to the product, or faulty operation.

In some situations, the precautions indicated could have series consequences if not heeded.





Indicates prohibited actions that must not be performed. For example, this symbol would be used to indicate that fire is prohibited as follows: .



Indicates compulsory actions that must be performed. For example, this symbol would be used as follows to indicate that grounding is compulsory: .

The warning symbols for ISO and JIS standards are different, as shown below.

| ISO | JIS |
|---|---|
|  |  |

The ISO symbol is used in this manual.

Both of these symbols appear on warning labels on Yaskawa Electric Engineering products. Please abide by these warning labels regardless of which symbol is used.

Notes for Safe Operation

Read this manual thoroughly before checking products on delivery, storage and transportation, installation, wiring, operation and inspection, and disposal of the AC servo drives.

WARNING

- Never touch any rotating motor parts while the motor is running.
Failure to observe this warning may result in injury.
- Before starting operation with a machine connected, make sure that an emergency stop can be applied at any time.
Failure to observe this warning may result in injury.
- Never touch the inside of the SERVOPACKs.
Failure to observe this warning may result in electric shock.
- Do not touch terminals for five minutes after the power is turned OFF.
Residual voltage may cause electric shock.
- Do not touch terminals for five minutes after voltage resistance test.
Residual voltage may cause electric shock.
- Follow the procedures and instructions for trial operation precisely as noted in this Manual.
- Follow the procedures and instructions for the trial operation as noted in the applicable manual for that product.
Malfunctions that occur after the servomotor is connected to the equipment not only damage the equipment, but may also cause an accident resulting in death or injury.
- Do not remove the front cover, cables, connectors, or optional items while the power is ON.
Failure to observe this warning may result in electric shock.
- Installation, disassembly, or repair must be performed only by authorized personnel.
Failure to observe this warning may result in electric shock or injury.
- Do not damage, press, exert excessive force or place heavy objects on the cables.
Failure to observe this warning may result in electric shock, stopping operation of the product, or burning.
- Provide an appropriate stopping device on the machine side to ensure safety. A holding brake for a servomotor with brake is not a stopping device for ensuring safety.
Failure to observe this warning may result in injury.
- Do not come close to the machine immediately after resetting momentary power loss to avoid an unexpected restart. Take appropriate measures to ensure safety against an unexpected restart.
Failure to observe this warning may result in injury.
- Do not modify the product.
Failure to observe this warning may result in injury or damage to the product.
- Connect the ground terminal to electrical codes (ground resistance: 100 Ω or less).
Improper grounding may result in electric shock or fire.



■ Checking on Delivery

CAUTION

- Always use the servomotor and SERVOPACK in one of the specified combinations.
Failure to observe this caution so may result in fire or malfunction.

■ Storage and Transportation

CAUTION

- Do not store or install the product in the following places.
 - Locations subject to direct sunlight.
 - Locations subject to temperatures outside the range specified in the storage/installation temperature conditions.
 - Locations subject to humidity outside the range specified in the storage/installation humidity conditions.
 - Locations subject to condensation as the result of extreme changes in temperature.
 - Locations subject to corrosive or flammable gases.
 - Locations subject to dust, salts, or iron dust.
 - Locations subject to exposure to water, oil, or chemicals.
 - Locations subject to shock or vibration.Failure to observe this caution may result in fire, electric shock, or damage to the product.
- Do not hold the product by the cables or motor shaft while transporting it.
Failure to observe this caution may result in injury or malfunction.
- Do not place any load exceeding the limit specified on the packing box.
Failure to observe this caution may result in injury or malfunction.

■ Installation

CAUTION

- Never use the products in an environment subject to water, corrosive gases, inflammable gases, or combustibles.
Failure to observe this caution may result in electric shock or fire.
- Do not step on or place a heavy object on the product.
Failure to observe this caution may result in injury.
- Do not cover the inlet or outlet ports and prevent any foreign objects from entering the product.
Failure to observe this caution may cause internal elements to deteriorate resulting in malfunction or fire.
- Be sure to install the product in the correct direction.
Failure to observe this caution may result in malfunction.
- Provide the specified clearances between the SERVOPACK and the control panel or with other devices.
Failure to observe this caution may result in fire or malfunction.
- Do not apply any strong impact.
Failure to observe this caution may result in malfunction.

■ Wiring

CAUTION

- Do not connect a three-phase power supply to the U, V, or W output terminals.
Failure to observe this caution may result in injury or fire.
- Securely connect the power supply terminal screws and motor output terminal screws.
Failure to observe this caution may result in fire.
- Do not bundle or run power and signal lines together in the same duct. Keep power and signal lines separated by at least 30 cm (11.81 in).
- Use twisted-pair shielded wires or multi-core twisted pair shielded wires for signal and encoder (PG) feedback lines.
The maximum length is 3 m (118.11 in) for reference input lines and is 20 m (787.40 in) for PG feedback lines.
- Do not touch the power terminals for 5 minutes after turning power OFF because high voltage may still remain in the SERVOPACK.
Make sure the charge indicator is out first before starting an inspection.
- Avoid frequently turning power ON and OFF. Do not turn power ON or OFF more than once per minute.
Since the SERVOPACK has a capacitor in the power supply, a high charging current flows for 0.2 seconds when power is turned ON. Frequently turning power ON and OFF causes main power devices like capacitors and fuses to deteriorate, resulting in unexpected problems.
- Be sure to wire correctly and securely.
Failure to observe this caution may result in motor overrun, injury, or malfunction.
- Always use the specified power supply voltage.
An incorrect voltage may result in burning.
- Take appropriate measures to ensure that the input power supply is supplied within the specified voltage fluctuation range. Be particularly careful in places where the power supply is unstable.
An incorrect power supply may result in damage to the product.
- Install external breakers or other safety devices against short-circuiting in external wiring.
Failure to observe this caution may result in fire.
- Take appropriate and sufficient countermeasures for each when installing systems in the following locations.
Failure to observe this caution may result in damage to the product.
 - Locations subject to static electricity or other forms of noise.
 - Locations subject to strong electromagnetic fields and magnetic fields.
 - Locations subject to possible exposure to radioactivity.
 - Locations close to power supplies.
- Do not reverse the polarity of the battery when connecting it.
Failure to observe this caution may damage the battery or cause it to explode.

■ Operation

CAUTION

- Conduct trial operation on the servomotor alone with the motor shaft disconnected from machine to avoid any unexpected accidents.
Failure to observe this caution may result in injury.
- Before starting operation with a machine connected, change the settings to match the parameters of the machine.
Starting operation without matching the proper settings may cause the machine to run out of control or malfunction.
- Forward run prohibited (P-OT) and reverse run prohibited (N-OT) signals are not effective during JOG mode operation using parameter Fn002 and zero point search mode using parameter Fn003.
- When using the servomotor for a vertical axis, install the safety devices to prevent workpieces to fall off due to occurrence of alarm or overtravel. Set the servomotor so that it will stop in the zero clamp state at occurrence of overtravel.
Failure to observe this caution may cause workpieces to fall off due to overtravel.
- When not using the normal autotuning, set to the correct moment of inertia ratio.
Setting to an incorrect moment of inertia ratio may cause vibration.
- Do not touch the SERVOPACK heatsinks, regenerative resistor, or servomotor while power is ON or soon after the power is turned OFF.
Failure to observe this caution may result in burns due to high temperatures.
- Do not make any extreme adjustments or setting changes of parameters.
Failure to observe this caution may result in injury due to unstable operation.
- When an alarm occurs, remove the cause, reset the alarm after confirming safety, and then resume operation.
Failure to observe this caution may result in injury.
- Do not use the servo brake of the servomotor for ordinary braking.
Failure to observe this caution may result in malfunction.

■ Maintenance and Inspection

CAUTION

- When replacing the SERVOPACK, resume operation only after resetting the potentiometers, pins, and parameters to their original settings.
Failure to observe this caution may result in damage to the product.
- Do not attempt to change wiring while the power is ON.
Failure to observe this caution may result in electric shock or injury.
- Do not disassemble the SERVOPACK.
Failure to observe this caution may result in electric shock or injury.

■ Disposal

| |
|--|
|  CAUTION |
| • When disposing of the products, treat them as ordinary industrial waste. |

■ General Precautions

The following describes general precautions. Note the following to ensure safe application.

- The drawings presented in this manual are sometimes shown without covers or protective guards. Always replace the cover or protective guard as specified first, and then operate the products in accordance with the manual.
- The drawings presented in this manual are typical examples and may not match the product you received.
- This manual is subject to change due to product improvement, specification modification, and manual improvement. When this manual is revised, the manual code is updated and the new manual is published as a next edition. The edition number appears on the front and back covers.
- If the manual must be ordered due to loss or damage, inform your nearest Yaskawa Electric Engineering representative or one of the offices listed on the back of this manual.
- Yaskawa Electric Engineering will not take responsibility for the results of unauthorized modifications of this product. Yaskawa Electric Engineering shall not be liable for any damages or troubles resulting from unauthorized modification.

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1.1 Outline

The re-engineered AC SERVOPACK model CACR-SR□□BF has been developed to be used for replacement of the conventional SERVOPACK models that had been introduced before Σ -series, using the latest technologies in its circuit configuration.

The re-engineered AC SERVOPACK supports all the types of encoders for AC servodrives: serial encoders and encoders older than serial encoders

The re-engineered AC SERVOPACK provides the operating environment of the following conventional SERVOPACK models.

CACR-SR□□BA

(Speed control/analog control, incremental encoder applicable, base-mounted type)

CACR-SR□□BB

(Speed control/analog control, incremental encoder applicable, base-mounted type)

CACR-SR□□BZ

(Speed control/analog control, absolute encoder applicable, base-mounted type)

CACR-SR□□BE

(Speed control/digital control, incremental encoder applicable, base-mounted type)

CACR-SR□□BY

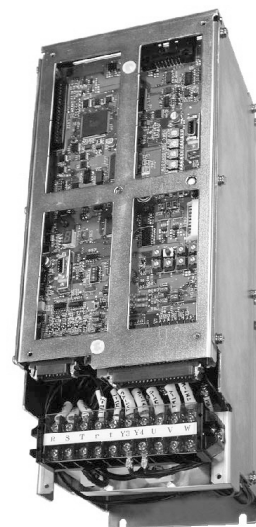
(Speed control/digital control, absolute encoder applicable, base-mounted type)

1.2 Features

1.2.1 Compatible with SERVOPACK Operating Environments Prior to Σ -Series

Operating Environments:

- External dimensions/installation
(Some models require attachments.)
- Main circuit terminals
- Control connector and signal layout
- Recognizes the encoder type prior to Σ series by the switch setting
(An encoder signal converter is built in.)
- Important adjustments such as speed gain adjustment can be made using the potentiometers VR.
(In the same way as of the conventional models CACR-SR□□BB and BZ)



1.2.2 Updated with the Latest Technologies

- The basic functions and performance are equivalent to those of Σ -III series SERVOPACK
- The parameters of Σ -III series SERVOPACK are applied.
(Parameter setting using a digital operator.)

1.2.3 Wide Range of Applicable Servomotors

The re-engineered AC SERVOPACKs can be combined with various models of servomotors by setting the internal parameters: C series, M series, F series, G series, D series, S series, Σ -series, Σ -II series, and Σ -III series Servomotors.

1.3 Applicable Servomotors and Encoders

The following servomotors besides Σ series, Σ -II series, Σ -III series are applicable.

Applicable Servomotor Models Prior to Σ Series

| C Series | M Series | F Series | G Series | D Series | S Series |
|------------|-----------|-----------|------------|------------|------------|
| USACED-03A | USAMED-03 | USAFED-02 | USAGED-02A | USADED-05E | USASEM-02A |
| USACED-05A | USAMED-06 | USAFED-03 | USAGED-03A | USADED-10E | USASEM-03A |
| USACED-12A | USAMED-09 | USAFED-05 | USAGED-05A | USADED-15E | USASEM-05A |
| USACED-20A | USAMED-12 | USAFED-09 | USAGED-09A | USADED-22E | USASEM-08A |
| USACED-30A | USAMED-20 | USAFED-13 | USAGED-13A | USADED-37E | USASEM-15A |
| USACED-44A | USAMED-30 | USAFED-20 | USAGED-20A | USAGED-44A | USASEM-30A |
| USACED-60A | USAMED-44 | USAFED-30 | USAGED-30A | | |
| | USAMED-60 | USAFED-44 | USAGED-44A | | |

Applicable Encoders

| | |
|-----------------------------------|--|
| Conventional Incremental Encoders | 1000 p/r, 1500 p/r, 2500 p/r, 4000 p/r, 5000 p/r, 6000 p/r |
| Multiplexed Incremental Encoders | 2048 p/r, 8192 p/r |
| Absolute Encoders | 1024 p/r, 8192 p/r |

1.4 SERVOPACK Part Names



Specifications and Dimensional Drawings

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2.1 Ratings and Specifications

| Re-engineered SERVOPACK Model CACR- | | SR03BF | SR05BF | SR07BF | SR10BF | SR15BF | SR20BF | SR30BF | SR44BF | SR60BF | | |
|--|----------------------------------|----------------------------|--|--|---|--------|--------|--------|--------|--------|------|--|
| Max. Applicable Servomotor Capacity [kW] | | 0.3 | 0.5 | 0.7 | 1.0 | 1.5 | 2.0 | 3.0 | 4.4 | 6.0 | | |
| Basic Specifications | Input Power Supply | Main Circuit | Three-phase 200 to 230 VAC +10 to -15 %, 50/60 Hz | | | | | | | | | |
| | | Control Circuit | Single-phase 200 to 230 VAC +10 to -15 %, 50/60 Hz | | | | | | | | | |
| | Continuous Output Current [Arms] | | 3.0 | 4.2 | 5.8 | 7.6 | 11.7 | 19.0 | 26.0 | 33.0 | 45.0 | |
| | Max. Output Current [Arms] | | 8.5 | 11.0 | 13.9 | 17.0 | 28.0 | 42.0 | 56.6 | 70.0 | 80.6 | |
| | Control Method | | Three-phase full-wave rectification IGBT-PWM (sine-wave driven) | | | | | | | | | |
| | Feedback | | Incremental encoder/Absolute encoder (8192 p/r, 2048 p/r, 1024 p/r, 6000 p/r, 5000 p/r, 4000 p/r, 2500 p/r, 1500 p/r, 1000 p/r, etc.) | | | | | | | | | |
| | Operating Conditions | Ambient Temperature | | 0 to 55 °C | | | | | | | | |
| | | Storage Temperature | | -20 to 85 °C | | | | | | | | |
| | | Ambient/Storage Humidity | | 90 % RH or less (with no condensation) | | | | | | | | |
| | | Vibration/Shock Resistance | | 5 m/s ² / 20 m/s ² (0.5G/2G) | | | | | | | | |
| Configuration | | Base-mounted | | | | | | | | | | |
| Approx. Mass | | 10 kg | | | | | | | | | | |
| Performance | Speed Control | Speed Control Range | | 1:3000 | | | | | | | | |
| | | Speed Regulation | Load Regulation | | 0 to 100 % load: 0.01 % max. (at rated speed) | | | | | | | |
| | | | Voltage Regulation | | 0 % | | | | | | | |
| | | | Temperature Regulation | | 25±25 °C: 0.1% max. (at rated speed) | | | | | | | |
| | Frequency Characteristics | | 100 Hz | | | | | | | | | |
| | Torque Control (Repeatability) | | ±2 % | | | | | | | | | |
| Acceleration Time Setting | | 0 to 10 s | | | | | | | | | | |

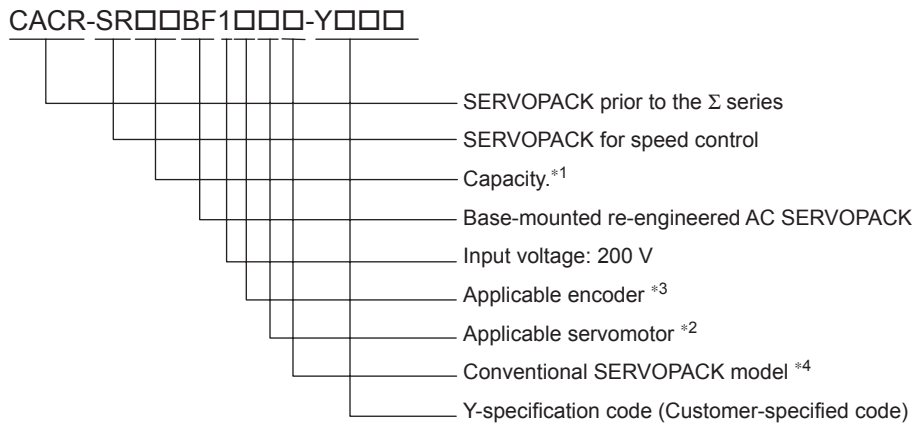
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| | | | | |
|-------------------------|----------------------------------|---|---|--|
| I/O Signals | Speed/Torque References | Rated Reference Voltage | Speed control mode | ± 6 VDC (forward rotation with positive reference) at rated speed |
| | | | Torque control mode | ± 3 VDC (forward rotation with positive reference) at rated torque |
| | | Input Impedance | About 30 k Ω | |
| | | Circuit Time Constant | About 70 μ s | |
| | Auxiliary Inputs | Rated Reference Voltage | ± 2 V to ± 10 VDC (forward rotation with positive reference) at rated speed. | |
| | | | Input Impedance | About 30 k Ω |
| | | Circuit Time Constant | About 70 μ s | |
| | Built-in Reference Power Supply | | ± 12 VDC ± 5 %, ± 30 mA | |
| | Position Output (PG pulses) | Form | Line-driver or open-collector (phase A, phase B, phase C) | |
| | | Frequency Dividing Ratio | Any setting ratio | |
| Sequence Input | | Servo ON, P control, forward run prohibited, reverse run prohibited, and alarm reset | | |
| Sequence Output | | Servo alarm, servo ready, TG ON, current limit, and alarm code (3-bit output) | | |
| External Current Limits | | ± 0 V to ± 9 VDC, forward rotation: -3 VDC/rated current, reverse rotation: 3 VDC/rated current | | |
| Built-in Functions | Dynamic Brake (DB) | | Operated at main power OFF, servo alarm, servo OFF. | |
| | Regenerative Processing | | Built-in | |
| | Allowable Load Moment of Inertia | | 5 times of rotor moment of inertia | |
| | Overtravel Prevention | | Operated at P-OT and N-OT | |
| | Protection | | Overcurrent, regeneration error, overvoltage, input overvoltage, overspeed, insufficient voltage, overload, zero-point pulse error, A/D error, overrun detection, open-phase, and CPU error | |
| | LED Display | | 7-segment LED (status and alarm display) | |
| | Monitor | | Speed monitor 1000 r/min ⁻¹ and torque monitor 3V/rated torque | |

2

2.2 SERVOPACK Model Designations

This section explains how to check the SERVOPACK model.



(1) SERVOPACK Capacity and Applicable Servomotors (*1, *2)

Unit: kW

| *1 Capacity code \ *2 Applicable servomotor code | M | F | G | S | D | C |
|--|-----|------|------|------|-----|------|
| 02 | — | 0.15 | 0.15 | 0.15 | — | — |
| 03 | 0.3 | 0.3 | 0.3 | 0.31 | — | 0.25 |
| 05 | — | 0.45 | 0.45 | 0.46 | 0.5 | 0.5 |
| 07 | 0.6 | — | — | — | — | — |
| 10 | 0.9 | 0.85 | 0.85 | 0.77 | — | — |
| 15 | 1.2 | 1.3 | 1.3 | 1.54 | 1.0 | 1.2 |
| 20 | 2.0 | 1.8 | 1.8 | — | 1.5 | 1.8 |
| 30 | 3.0 | 2.9 | 2.9 | 3.08 | 2.2 | 2.9 |
| 44 | 4.4 | 4.4 | 4.4 | — | 3.7 | 4.4 |
| 60 | 6.0 | — | — | — | — | 6.0 |

(2) Encoders (*3)

| Type | Pulse | Code |
|--------------------------|-------|------|
| Conventional incremental | 1000 | F |
| | 1440 | H |
| | 1500 | E |
| | 2000 | K |
| | 2500 | C |
| | 4000 | D |
| | 5000 | B |
| 6000 | A | |

| Type | Pulse | Code |
|-------------------------|-------|------|
| Multiplexed incremental | 2048 | 3 |
| | 8192 | 2 |
| | 2500 | 4 |
| | | |

| Type | Pulse | Code |
|----------|-------|------|
| Absolute | 1024 | W |
| | 8192 | S |
| | | |

(3) Conventional SERVOPACKs (*4)

| Model | Code |
|-------------|------|
| CACR-SR□□BB | B |
| CACR-SR□□BZ | Z |
| CACR-SR□□BE | E |
| CACR-SR□□BY | Y |
| CACR-SR□□BA | A |

2.3 Re-engineered AC SERVOPACK Selection

| Applicable Servomotors | | Conventional SERVOPACK Model SR□□BB and Re-engineered SERVOPACK Model | | Conventional SERVOPACK Model SR□□BZ and Re-engineered SERVOPACK Model | |
|------------------------|------------|---|----------------------------|---|----------------------------|
| | | Conventional Model SR□□BB | Re-engineered Model SR□□BF | Conventional Model SR□□BZ | Re-engineered Model SR□□BF |
| M | USAMED-03 | CACR-SR03BB1□M | CACR-SR03BF1□MB | CACR-SR03BZ1□M | CACR-SR03BF1□MZ |
| | USAMED-06 | CACR-SR07BB1□M | CACR-SR07BF1□MB | CACR-SR07BZ1□M | CACR-SR07BF1□MZ |
| | USAMED-09 | CACR-SR10BB1□M | CACR-SR10BF1□MB | CACR-SR10BZ1□M | CACR-SR10BF1□MZ |
| | USAMED-12 | CACR-SR15BB1□M | CACR-SR15BF1□MB | CACR-SR15BZ1□M | CACR-SR15BF1□MZ |
| | USAMED-20 | CACR-SR20BB1□M | CACR-SR20BF1□MB | CACR-SR20BZ1□M | CACR-SR20BF1□MZ |
| | USAMED-30 | CACR-SR30BB1□M | CACR-SR30BF1□MB | CACR-SR30BZ1□M | CACR-SR30BF1□MZ |
| | USAMED-44 | CACR-SR44BB1□M | CACR-SR44BF1□MB | CACR-SR44BZ1□M | CACR-SR44BF1□MZ |
| | USAMED-60 | CACR-SR60BB1□M | CACR-SR60BF1□MB | CACR-SR60BZ1□M | CACR-SR60BF1□MZ |
| F | USAFED-02 | CACR-SR03BB1□F | CACR-SR03BF1□FB | CACR-SR03BZ1□F | CACR-SR03BF1□FZ |
| | USAFED-03 | CACR-SR03BB1□F | CACR-SR03BF1□FB | CACR-SR03BZ1□F | CACR-SR03BF1□FZ |
| | USAFED-05 | CACR-SR05BB1□F | CACR-SR05BF1□FB | CACR-SR05BZ1□F | CACR-SR05BF1□FZ |
| | USAFED-09 | CACR-SR10BB1□F | CACR-SR10BF1□FB | CACR-SR10BZ1□F | CACR-SR10BF1□FZ |
| | USAFED-13 | CACR-SR15BB1□F | CACR-SR15BF1□FB | CACR-SR15BZ1□F | CACR-SR15BF1□FZ |
| | USAFED-20 | CACR-SR20BB1□F | CACR-SR20BF1□FB | CACR-SR20BZ1□F | CACR-SR20BF1□FZ |
| | USAFED-30 | CACR-SR30BB1□F | CACR-SR30BF1□FB | CACR-SR30BZ1□F | CACR-SR30BF1□FZ |
| | USAFED-44 | CACR-SR44BB1□F | CACR-SR44BF1□FB | CACR-SR44BZ1□F | CACR-SR44BF1□FZ |
| G | USAGED-02A | | | | |
| | USAGED-03A | | | | |
| | USAGED-05A | | | | |
| | USAGED-09A | | | | |
| | USAGED-13A | | | | |
| | USAGED-20A | | | | |
| | USAGED-30A | | | | |
| | USAGED-44A | | | | |
| D | USADED-05E | CACR-SR05BB1□D | CACR-SR05BF1□DB | CACR-SR05BZ1□D | CACR-SR05BF1□DZ |
| | USADED-10E | CACR-SR10BB1□D | CACR-SR10BF1□DB | CACR-SR10BZ1□D | CACR-SR10BF1□DZ |
| | USADED-15E | CACR-SR20BB1□D | CACR-SR20BF1□DB | CACR-SR20BZ1□D | CACR-SR20BF1□DZ |
| | USADED-22E | CACR-SR30BB1□D | CACR-SR30BF1□DB | CACR-SR30BZ1□D | CACR-SR30BF1□DZ |
| | USADED-37E | CACR-SR44BB1□D | CACR-SR44BF1□DB | CACR-SR44BZ1□D | CACR-SR44BF1□DZ |
| S | USASEM-02A | CACR-SR02BB1□S | CACR-SR02BF1□SB | CACR-SR02BZ1□S | CACR-SR02BF1□SZ |
| | USASEM-03A | CACR-SR03BB1□S | CACR-SR03BF1□SB | CACR-SR03BZ1□S | CACR-SR03BF1□SZ |
| | USASEM-05A | CACR-SR05BB1□S | CACR-SR05BF1□SB | CACR-SR05BZ1□S | CACR-SR05BF1□SZ |
| | USASEM-08A | CACR-SR10BB1□S | CACR-SR10BF1□SB | CACR-SR10BZ1□S | CACR-SR10BF1□SZ |
| | USASEM-15A | CACR-SR15BB1□S | CACR-SR15BF1□SB | CACR-SR15BZ1□S | CACR-SR15BF1□SZ |
| | USASEM-30A | CACR-SR30BB1□S | CACR-SR30BF1□SB | CACR-SR30BZ1□S | CACR-SR30BF1□SZ |

| Applicable Servomotors | | Conventional SERVOPACK Model SR□□BE and Re-engineered SERVOPACK Model | | Conventional SERVOPACK Model SR□□BY and Re-engineered SERVOPACK Model | |
|------------------------|------------|---|----------------------------|---|----------------------------|
| | | Conventional Model | Re-engineered Model SR□□BF | Conventional Model | Re-engineered Model SR□□BF |
| M | USAMED-03 | CACR-SR03BE1□M | CACR-SR03BF1□ME | CACR-SR03BY1□M | CACR-SR03BF1□MY |
| | USAMED-06 | CACR-SR07BE1□M | CACR-SR07BF1□ME | CACR-SR07BY1□M | CACR-SR07BF1□MY |
| | USAMED-09 | CACR-SR10BE1□M | CACR-SR10BF1□ME | CACR-SR10BY1□M | CACR-SR10BF1□MY |
| | USAMED-12 | CACR-SR15BE1□M | CACR-SR15BF1□ME | CACR-SR15BY1□M | CACR-SR15BF1□MY |
| | USAMED-20 | CACR-SR20BE1□M | CACR-SR20BF1□ME | CACR-SR20BY1□M | CACR-SR20BF1□MY |
| | USAMED-30 | CACR-SR30BE1□M | CACR-SR30BF1□ME | CACR-SR30BY1□M | CACR-SR30BF1□MY |
| | USAMED-44 | CACR-SR44BE1□M | CACR-SR44BF1□ME | CACR-SR44BY1□M | CACR-SR44BF1□MY |
| | USAMED-60 | CACR-SR60BE1□M | CACR-SR60BF1□ME | CACR-SR60BY1□M | CACR-SR60BF1□MY |
| F | USAFED-02 | CACR-SR03BE1□F | CACR-SR03BF1□FE | CACR-SR03BY1□F | CACR-SR03BF1□FY |
| | USAFED-03 | CACR-SR03BE1□F | CACR-SR03BF1□FE | CACR-SR03BY1□F | CACR-SR03BF1□FY |
| | USAFED-05 | CACR-SR05BE1□F | CACR-SR05BF1□FE | CACR-SR05BY1□F | CACR-SR05BF1□FY |
| | USAFED-09 | CACR-SR10BE1□F | CACR-SR10BF1□FE | CACR-SR10BY1□F | CACR-SR10BF1□FY |
| | USAFED-13 | CACR-SR15BE1□F | CACR-SR15BF1□FE | CACR-SR15BY1□F | CACR-SR15BF1□FY |
| | USAFED-20 | CACR-SR20BE1□F | CACR-SR20BF1□FE | CACR-SR20BY1□F | CACR-SR20BF1□FY |
| | USAFED-30 | CACR-SR30BE1□F | CACR-SR30BF1□FE | CACR-SR30BY1□F | CACR-SR30BF1□FY |
| | USAFED-44 | CACR-SR44BE1□F | CACR-SR44BF1□FE | CACR-SR44BY1□F | CACR-SR44BF1□FY |
| G | USAGED-02A | CACR-SR02BE1□G | CACR-SR02BF1□GE | CACR-SR02BY1□G | CACR-SR02BF1□GY |
| | USAGED-03A | CACR-SR03BE1□G | CACR-SR03BF1□GE | CACR-SR03BY1□G | CACR-SR03BF1□GY |
| | USAGED-05A | CACR-SR05BE1□G | CACR-SR05BF1□GE | CACR-SR05BY1□G | CACR-SR05BF1□GY |
| | USAGED-09A | CACR-SR10BE1□G | CACR-SR10BF1□GE | CACR-SR10BY1□G | CACR-SR10BF1□GY |
| | USAGED-13A | CACR-SR15BE1□G | CACR-SR15BF1□GE | CACR-SR15BY1□G | CACR-SR15BF1□GY |
| | USAGED-20A | CACR-SR20BE1□G | CACR-SR20BF1□GE | CACR-SR20BY1□G | CACR-SR20BF1□GY |
| | USAGED-30A | CACR-SR30BE1□G | CACR-SR30BF1□GE | CACR-SR30BY1□G | CACR-SR30BF1□GY |
| | USAGED-44A | CACR-SR44BE1□G | CACR-SR44BF1□GE | CACR-SR44BY1□G | CACR-SR44BF1□GY |
| D | USADED-05E | CACR-SR05BE1□D | CACR-SR05BF1□DE | CACR-SR05BY1□D | CACR-SR05BF1□DY |
| | USADED-10E | CACR-SR10BE1□D | CACR-SR10BF1□DE | CACR-SR10BY1□D | CACR-SR10BF1□DY |
| | USADED-15E | CACR-SR20BE1□D | CACR-SR20BF1□DE | CACR-SR20BY1□D | CACR-SR20BF1□DY |
| | USADED-22E | CACR-SR30BE1□D | CACR-SR30BF1□DE | CACR-SR30BY1□D | CACR-SR30BF1□DY |
| | USADED-37E | CACR-SR44BE1□D | CACR-SR44BF1□DE | CACR-SR44BY1□D | CACR-SR44BF1□DY |
| S | USASEM-02A | CACR-SR02BE1□S | CACR-SR02BF1□SE | CACR-SR02BY1□S | CACR-SR02BF1□SY |
| | USASEM-03A | CACR-SR03BE1□S | CACR-SR03BF1□SE | CACR-SR03BY1□S | CACR-SR03BF1□SY |
| | USASEM-05A | CACR-SR05BE1□S | CACR-SR05BF1□SE | CACR-SR05BY1□S | CACR-SR05BF1□SY |
| | USASEM-08A | CACR-SR10BE1□S | CACR-SR10BF1□SE | CACR-SR10BY1□S | CACR-SR10BF1□SY |
| | USASEM-15A | CACR-SR15BE1□S | CACR-SR15BF1□SE | CACR-SR15BY1□S | CACR-SR15BF1□SY |
| | USASEM-30A | CACR-SR30BE1□S | CACR-SR30BF1□SE | CACR-SR30BY1□S | CACR-SR30BF1□SY |

2.4 Dimensional Drawings

2.4.1 Re-engineered AC SERVOPACKs for CACR-SR02B□ to SR44B□

(1) Re-engineered AC SERVOPACK Models for Conventional Models CACR-SR□□BB and -SR□□BZ

Note: □ at the end of the model codes of the re-engineered AC SERVOPACK for CACR-SR□□BB is “B”, and that for CACR-SR□□BZ is “Z” .

| For Conventional M-series | For Conventional F-series | For Conventional D-series | For Conventional S-series |
|--|---------------------------|---------------------------|---------------------------|
| Models for which no mounting attachment is required | | | |
| CACR-SR03BF1□M□ | CACR-SR03BF1□F□ | CACR-SR05BF1□D□ | CACR-SR02BF1□S□ |
| CACR-SR07BF1□M□ | CACR-SR05BF1□F□ | CACR-SR10BF1□D□ | CACR-SR03BF1□S□ |
| CACR-SR10BF1□M□ | CACR-SR10BF1□F□ | | CACR-SR05BF1□S□ |
| CACR-SR15BF1□M□ | CACR-SR15BF1□F□ | | CACR-SR10BF1□S□ |
| | | | CACR-SR15BF1□S□ |
| | | | CACR-SR30BF1□S□ |
| Models for which the mounting attachment F352086-A is required | | | |
| CACR-SR20BF1□M□ | CACR-SR20BF1□F□ | CACR-SR20BF1□D□ | CACR-SR30BF1□S□ |
| CACR-SR30BF1□M□ | CACR-SR30BF1□F□ | CACR-SR30BF1□D□ | |
| CACR-SR44BF1□M□ | CACR-SR44BF1□F□ | CACR-SR44BF1□D□ | |

(2) Re-engineered AC SERVOPACK Models for Conventional Models CACR-SR□□BE and -SR□□BY

Note: □ at the end of the model codes of the re-engineered AC SERVOPACK for CACR-SR□□BE is “E”, and that for CACR-SR□□BY is “Y”.

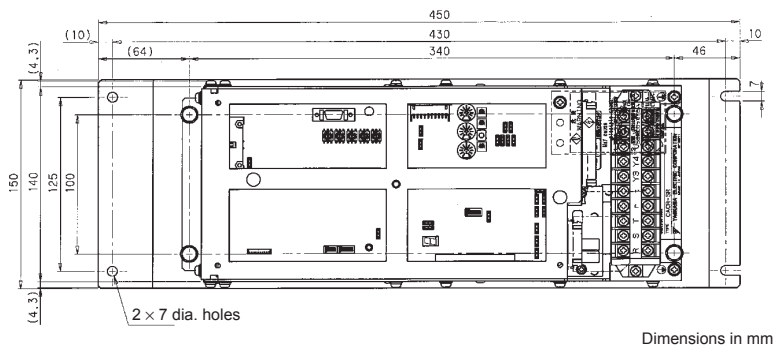
| For Conventional M-series | For Conventional F-series | For Conventional D-series | For Conventional S-series | For Conventional G-series |
|---|---------------------------|---------------------------|---------------------------|---------------------------|
| No mounting attachment is required for SERVOPACKs 4.4 kW or less. | | | | |
| CACR-SR03BF1□M□ | CACR-SR03BF1□F□ | CACR-SR05BF1□D□ | CACR-SR02BF1□S□ | CACR-SR02BF1□G□ |
| CACR-SR07BF1□M□ | CACR-SR05BF1□F□ | CACR-SR10BF1□D□ | CACR-SR03BF1□S□ | CACR-SR03BF1□G□ |
| CACR-SR10BF1□M□ | CACR-SR10BF1□F□ | CACR-SR20BF1□D□ | CACR-SR05BF1□S□ | CACR-SR05BF1□G□ |
| CACR-SR15BF1□M□ | CACR-SR15BF1□F□ | CACR-SR30BF1□D□ | CACR-SR10BF1□S□ | CACR-SR10BF1□G□ |
| CACR-SR20BF1□M□ | CACR-SR20BF1□F□ | CACR-SR44BF1□D□ | CACR-SR15BF1□S□ | CACR-SR15BF1□G□ |
| CACR-SR30BF1□M□ | CACR-SR30BF1□F□ | | CACR-SR30BF1□S□ | CACR-SR20BF1□G□ |
| CACR-SR44BF1□M□ | CACR-SR44BF1□F□ | | | CACR-SR30BF1□G□ |
| CACR-SR44BF1□M□ | CACR-SR44BF1□F□ | | | CACR-SR44BF1□G□ |



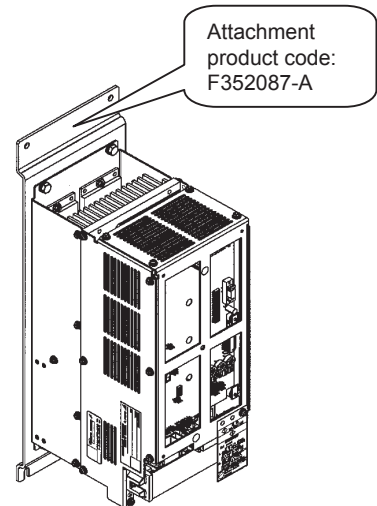
2.4.2 Re-engineered AC SERVOPACK Models for CACR-SR60BB, 60BZ, 60BE, and 60BY

(1) Re-engineered AC SERVOPACK Models for CACR-SR60BB, 60BZ, 60BE, and 60BY

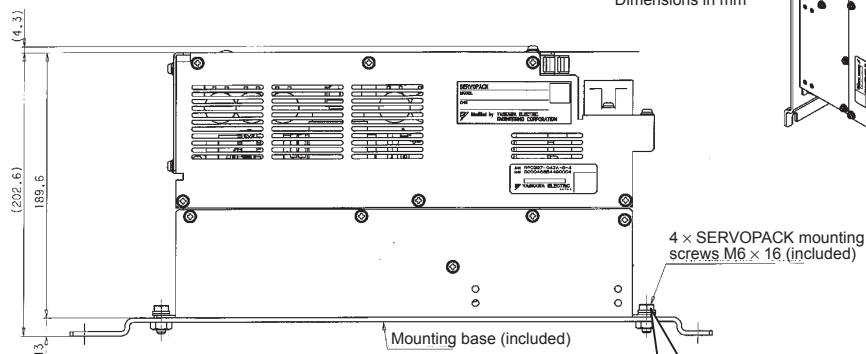
| |
|-----------------|
| CACR-SR60BF1□MB |
| CACR-SR60BF1□MZ |
| CACR-SR60BF1□ME |
| CACR-SR60BF1□MY |



Dimensions in mm



2



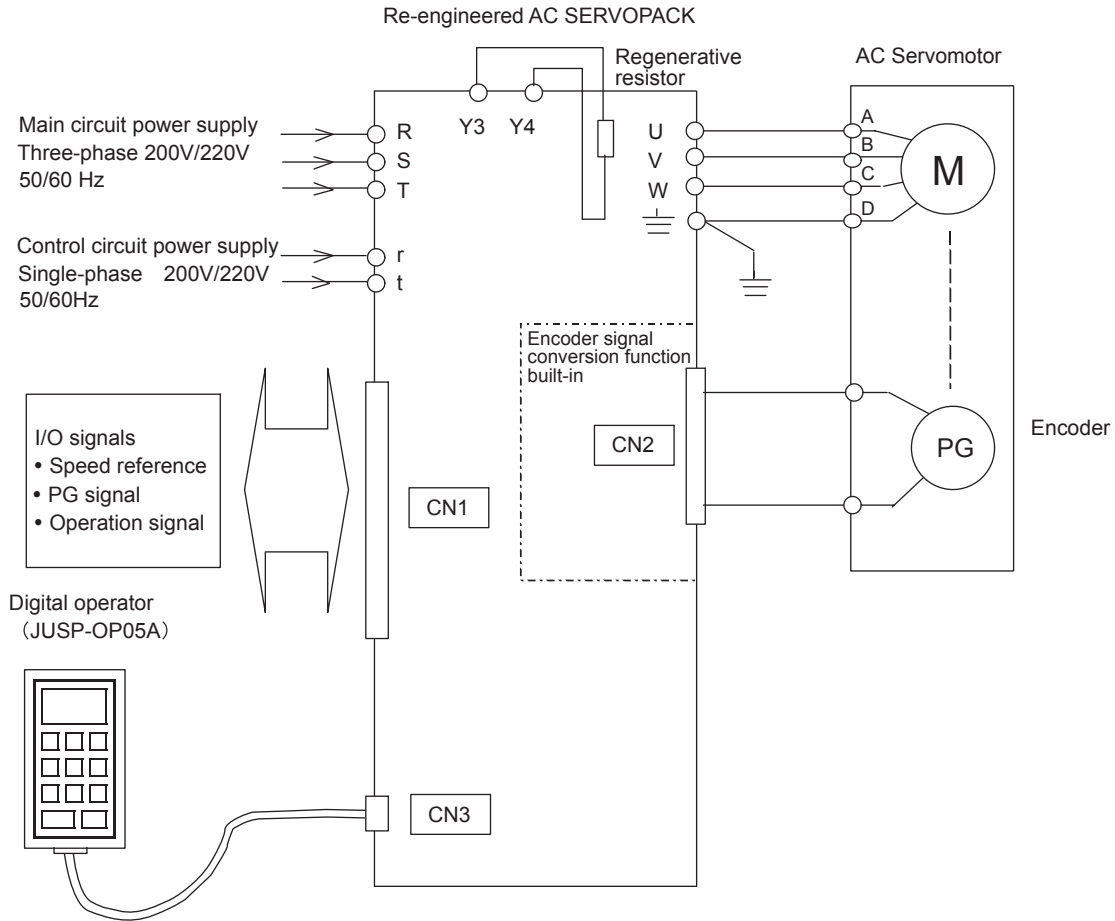
- F352087-A includes:
- Attachment
 - SERVOPACK mounting bolts

Attachment product code: F352087-A

| | | |
|--|-------|------|
| 3.1 Wiring for Re-engineered AC SERVOPACKs CACR-SR□□BF1□□□ | --- | 3-2 |
| 3.1.1 Connection Diagram | ----- | 3-2 |
| 3.1.2 Names and Description of Main Circuit Terminals | ----- | 3-2 |
| 3.1.3 Connector Receptacle Specifications | ----- | 3-3 |
| 3.1.4 CN1 I/O Signal Connector Terminal Layout | ----- | 3-3 |
| 3.1.5 CN2 Optical Encoder (PG) Connector Terminal Layout | ----- | 3-5 |
| 3.2 I/O Signal Connector Terminals | ----- | 3-6 |
| 3.2.1 Re-engineered SERVOPACKs for CACR-SR□□BE (for Multiplexed Incremental Encoder) | ----- | 3-6 |
| 3.2.2 Re-engineered SERVOPACKs for CACR-SR□□BB (for Conventional Incremental Encoder) | ----- | 3-8 |
| 3.2.3 Re-engineered SERVOPACKs for CACR-SR□□BY (for Absolute Encoder) | ----- | 3-10 |
| 3.2.4 Re-engineered SERVOPACKs for CACR-SR□□BZ (for Absolute Encoder) | ----- | 3-12 |

3.1 Wiring for Re-engineered AC SERVOPACKs CACR-SR□□BF1□□□

3.1.1 Connection Diagram



3.1.2 Names and Description of Main Circuit Terminals

| Terminal Symbol | Name | Description |
|-----------------|---------------------------------|--|
| (R) (S) (T) | Main circuit input terminals | Three-phase 200 to 230 VAC +10 to -15 %, 50/60 Hz |
| (U) (V) (W) | Servomotor connection terminals | Connect (U) to the terminal A, (V) to the terminal B, (W) to the terminal C of Servomotor. |
| (r) (t) | Control circuit input terminals | Single-phase 200 to 230 VAC +10 to -15 %, 50/60 Hz |
| ⊕ | Ground terminal | Connect to the power supply ground terminal and the Servomotor D terminal. |
| (Y3) (Y4) | Regenerative resistor terminals | Regenerative resistor connection terminals (normally not to be connected externally.) |

3.1.3 Connector Receptacle Specifications

CN1: For I/O signals

Applicable Receptacle Model

| Inside SERVOPACK | Soldered Type | Caulking Type | Case | Manufacturer |
|------------------|---------------|---------------|--------|--|
| MR-50RMA | MR-50F | MRP-50F01 | MR-50L | Honda Communication Industries Co., Ltd. |

CN2: For connecting the optical encoder (PG)

Applicable Receptacle Model

| Inside SERVOPACK | Soldered Type | Caulking Type | Case | Manufacturer |
|------------------|---------------|---------------|--------|--|
| MR-20RMA | MR-20F | MRP-20F01 | MR-20L | Honda Communication Industries Co., Ltd. |

CN3: For connecting the digital operator

Half-pitch Connector

| Plug | Shell | Manufacturer |
|--------------|----------------|---------------------|
| 10114-3000VE | 10314-52A0-008 | SUMITOMO 3M Limited |

3.1.4 CN1 I/O Signal Connector Terminal Layout

| Re-engineered AC SERVOPACK Model Pin No. | CACR-SR□□BF1□□□ | | | |
|---|---|---|---|---|
| | Model No. ended with B (Model for SR□□BB) | Model No. ended with Z (Model for SR□□BZ) | Model No. ended with E (Model for SR□□BE) | Model No. ended with Y (Model for SR□□BY) |
| 1 | SG | SG | SG | SG |
| 2 | SG | SG | SG | SG |
| 3 | SG | SG | SG | SG |
| 4 | PHA | SEN | PHA | SEN |
| 5 | /V-CMP+ | /V-CMP+ | /V-CMP+ | /V-CMP+ |
| 6 | /V-CMP- | /V-CMP- | /V-CMP- | /V-CMP- |
| 7 | +24V-IN | +24V-IN | +24V-IN | +24V-IN |
| 8 | /S-ON | /S-ON | /S-ON | /S-ON |
| 9 | TMON | TMON | TMON | TMON |
| 10 | VTG | VTG | VTG | VTG |
| 11 | SG | SG | SG | SG |
| 12 | IN-A | IN-A | V-REF | V-REF |
| 13 | SG | SG | SG | SG |
| 14 | IN-B | IN-B | T-REF | T-REF |
| 15 | SG | SG | SG | SG |
| 16 | +12V | +12V | +12V | +12V |
| 17 | SG | SG | SG | SG |
| 18 | FG | FG | FG | FG |
| 19 | PCO | PCO | PCO | PCO |
| 20 | /PCO | /PCO | /PCO | /PCO |
| 21 | PHC | BAT+ | PHC | BAT+ |
| 22 | /TGON+ | /TGON+ | /TGON+ | /TGON+ |
| 23 | /TGON- | /TGON- | /TGON- | /TGON- |

(cont'd)

| Re-engineered AC SERVOPACK Model Pin No. | CACR-SR□□BF1□□ | | | |
|---|---|---|---|---|
| | Model No. ended with B (Model for SR□□BB) | Model No. ended with Z (Model for SR□□BZ) | Model No. ended with E (Model for SR□□BE) | Model No. ended with Y (Model for SR□□BY) |
| 24 | /P-CON | /P-CON | /P-CON | /P-CON |
| 25 | OL- | OL- | AL01 | empty *2 |
| 26 | N-OT | N-OT | N-OT | N-OT |
| 27 | /S-RDY- | /S-RDY- | /S-RDY- | /S-RDY- |
| 28 | /S-RDY+ | /S-RDY+ | /S-RDY+ | /S-RDY+ |
| 29 | N-CL | N-CL | N-CL | N-CL |
| 30 | SG | SG | SG | SG |
| 31 | -12V | -12V | -12V | -12V |
| 32 | SG | SG | SG | SG |
| 33 | PAO | PAO | PAO | PAO |
| 34 | /PAO | /PAO | /PAO | /PAO |
| 35 | PBO | PBO | PBO | PBO |
| 36 | /PBO | /PBO | /PBO | /PBO |
| 37 | PHB | BAT- | PHB | BAT- |
| 38 | ALM+ | ALM+ | ALM+ | ALM+ |
| 39 | ALM- | ALM- | ALM- | ALM- |
| 40 | OL+ | OL+ | AL02 | empty *2 |
| 41 | P-OT | P-OT | P-OT | P-OT |
| 42 | empty *1 | empty *1 | AL03 | empty |
| 43 | empty *1 | empty *1 | /ALM-RST | /ALM-RST |
| 44 | P-CL | P-CL | P-CL | P-CL |
| 45 | SG | SG | SG | SG |
| 46 | -12V | -12V | -12V | -12V |
| 47 | SG | SG | SG | SG |
| 48 | +12V | +12V | +12V | +12V |
| 49 | SG | SG | SG | SG |
| 50 | FG | FG | FG | FG |

* 1. The MCB trip signal output function is not provided for SR□□BB and SR□□BZ.

* 2. The PG signal output phase S is not provided for SR□□BY.

3.1.5 CN2 Optical Encoder (PG) Connector Terminal Layout

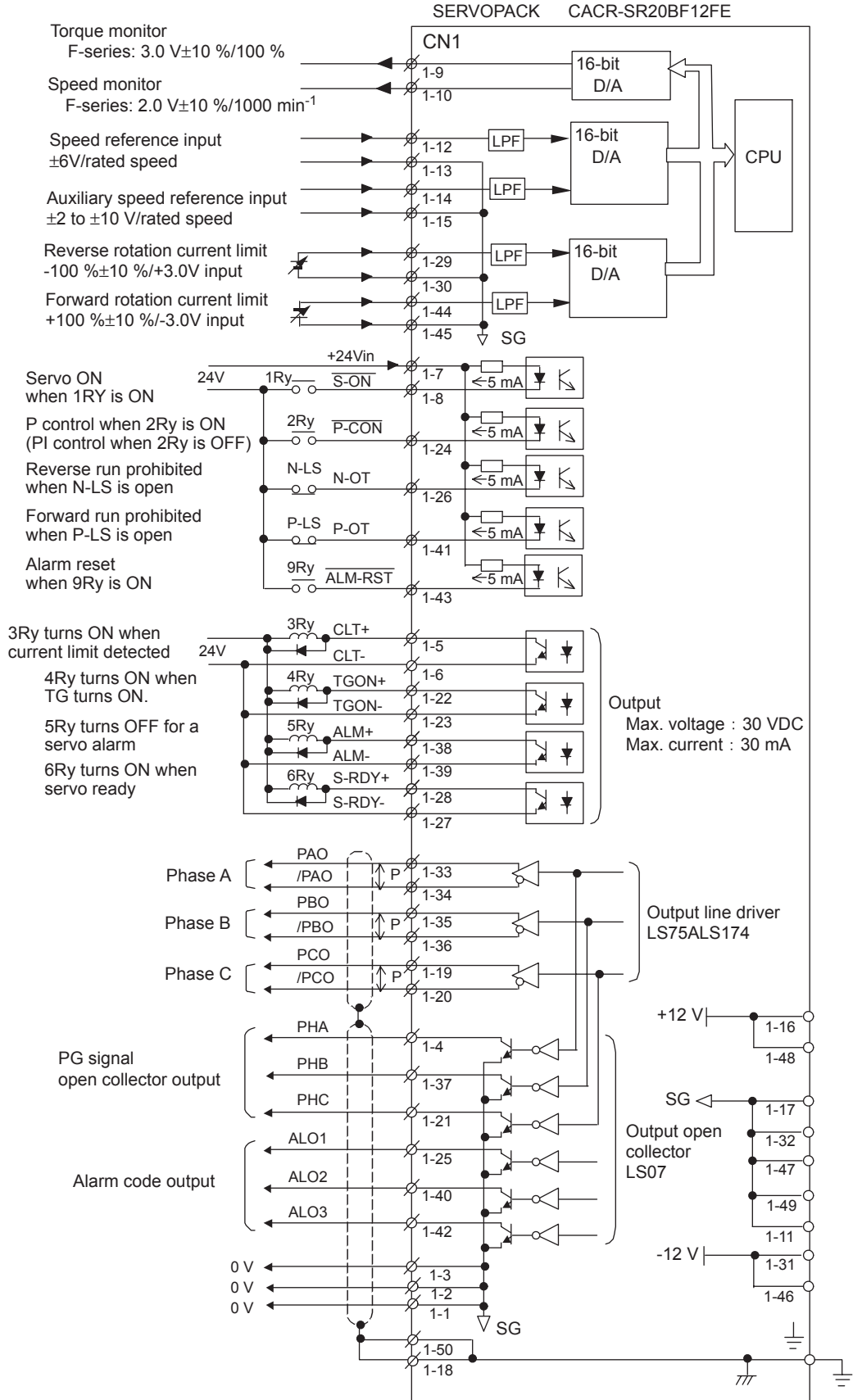
| Pin No. | For Conventional Incremental Encoder | For Multiplexed Type Incremental Encoder | For Absolute Encoder |
|---------|--------------------------------------|--|----------------------|
| 1 | 0 V | 0 V | 0 V |
| 2 | 0 V | 0 V | 0 V |
| 3 | 0 V | 0 V | 0 V |
| 4 | PG5 V | PG5 V | PG5 V |
| 5 | PG5 V | PG5 V | PG5 V |
| 6 | PG5 V | PG5 V | PG5 V |
| 7 | DIR | DIR | DIR |
| 8 | PU | – | – * |
| 9 | /PU | – | – * |
| 10 | PV | Absolute RST | Absolute RST |
| 11 | /PV | – | – |
| 12 | PW | BAT | BAT |
| 13 | /PW | BAT0 | BAT0 |
| 14 | PC | PC | PC |
| 15 | /PC | /PC | /PC |
| 16 | PA | PA | PA |
| 17 | /PA | /PA | /PA |
| 18 | PB | PB | PB |
| 19 | /PB | /PB | /PB |
| 20 | FG | FG | FG |

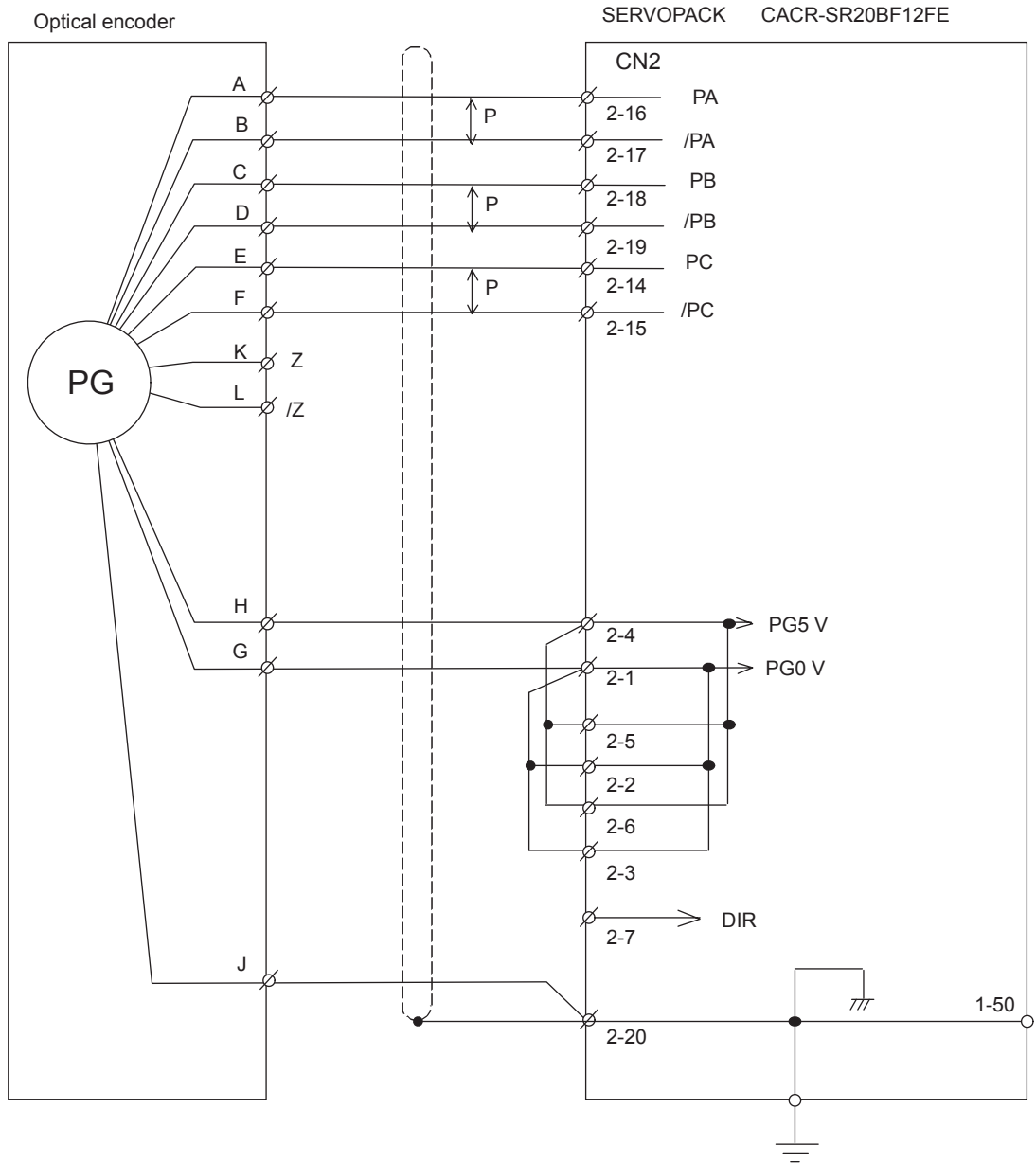
* The phase S rotation amount serial data of 12-bit absolute PG is not processed.

3.2 I/O Signal Connector Terminals

3.2.1 Re-engineered SERVOPACKs for CACR-SR□□BE (for Multiplexed Incremental Encoder)

Example: CACR-SR20BF12FE that have replaced CACR-SR20BE12F

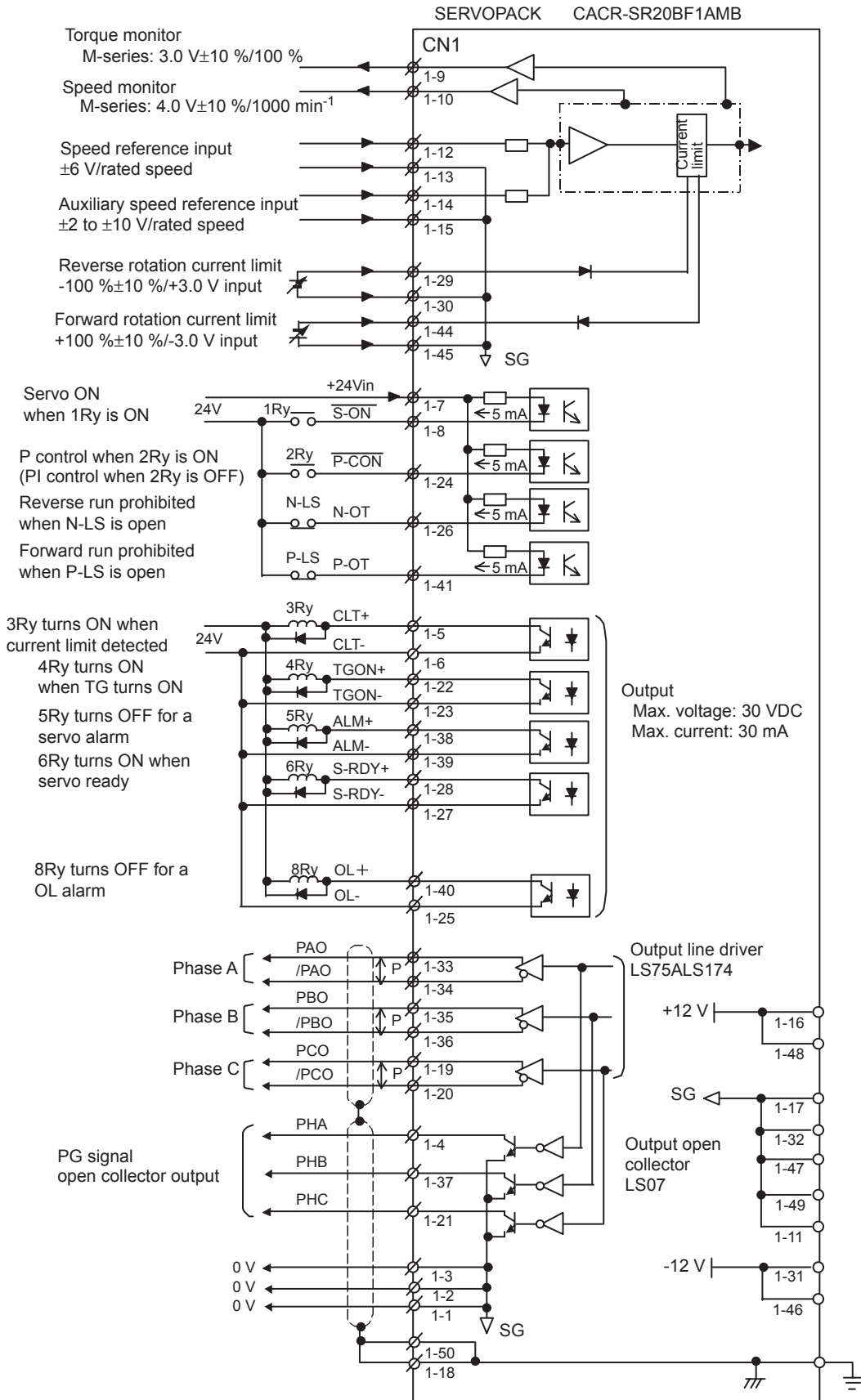




3

3.2.2 Re-engineered SERVOPACKs for CACR-SR□□BB (for Conventional Incremental Encoder)

Example: CACR-SR20BF1AMB that have replaced CACR-SR20BB1AM



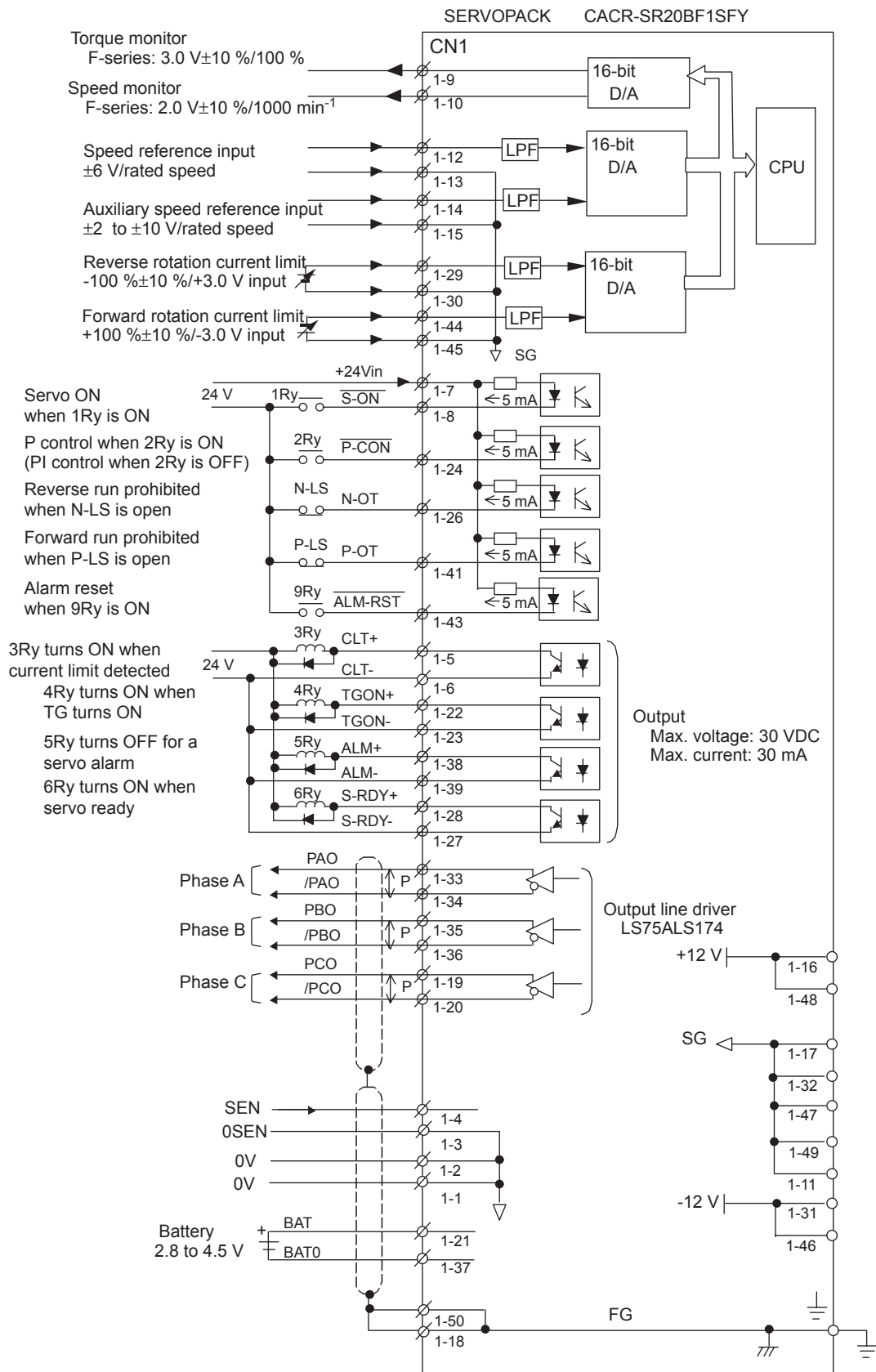
Note: MCB trip (CN1-43 and -42) outputs are not provided.

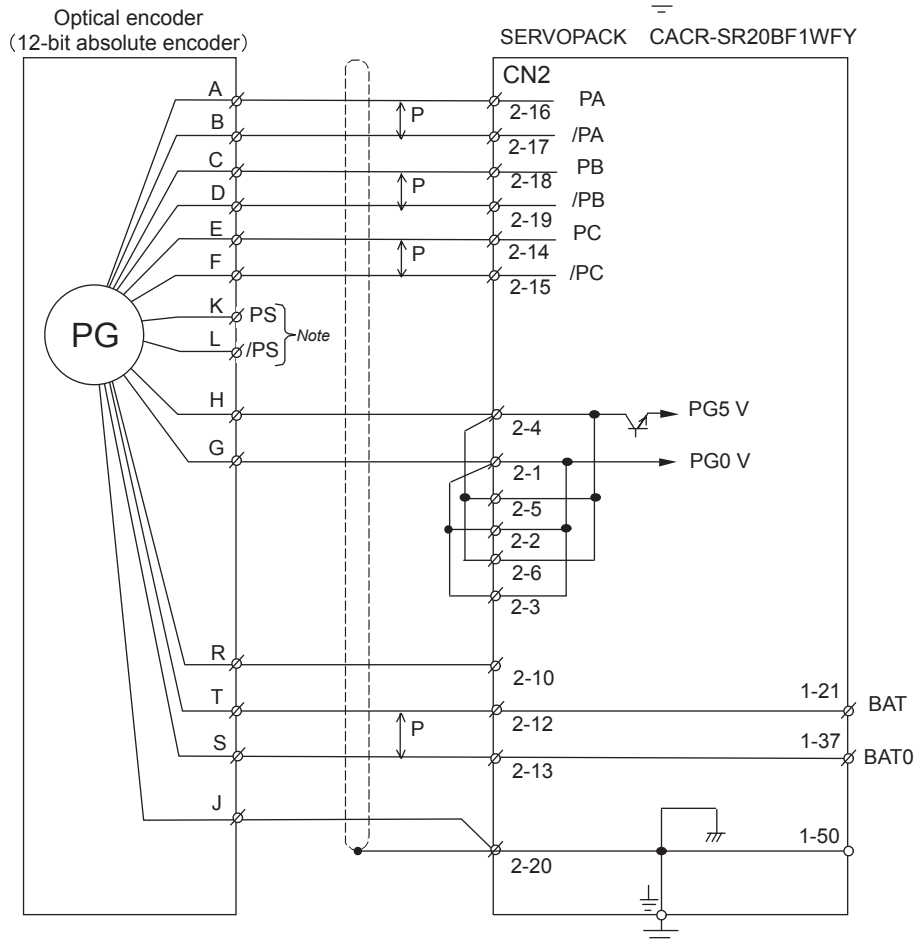
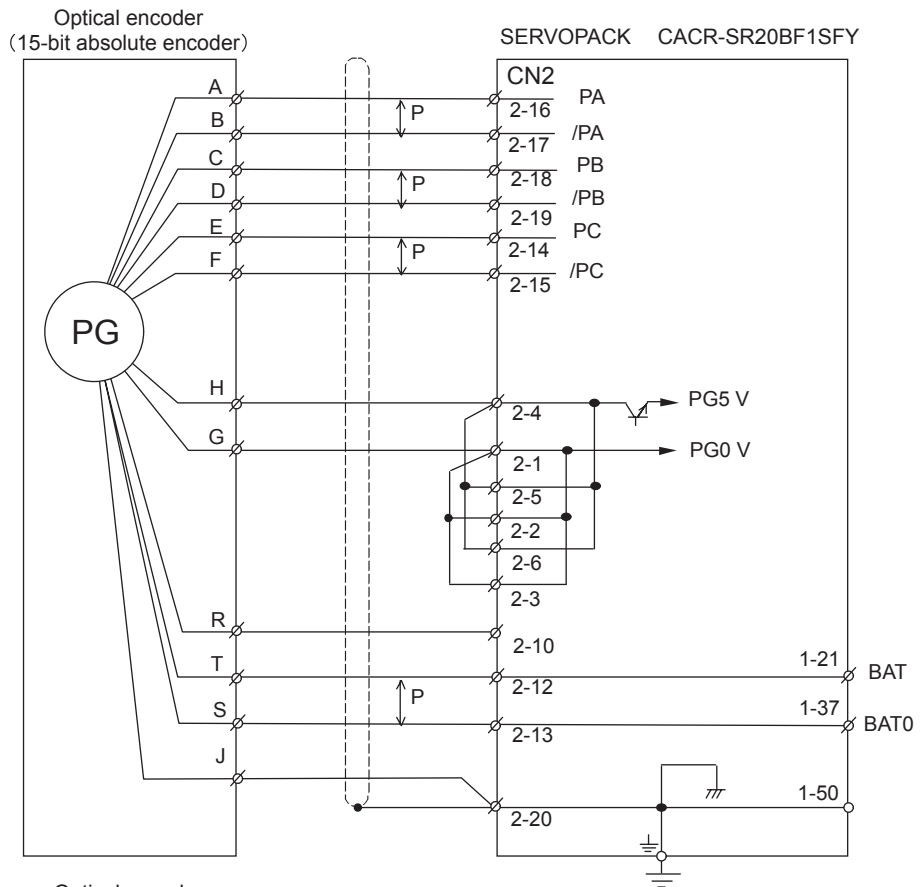


3

3.2.3 Re-engineered SERVOPACKs for CACR-SR□□BY (for Absolute Encoder)

Example: CACR-SR20BF1SFY that have replaced CACR-SR20BY1SF





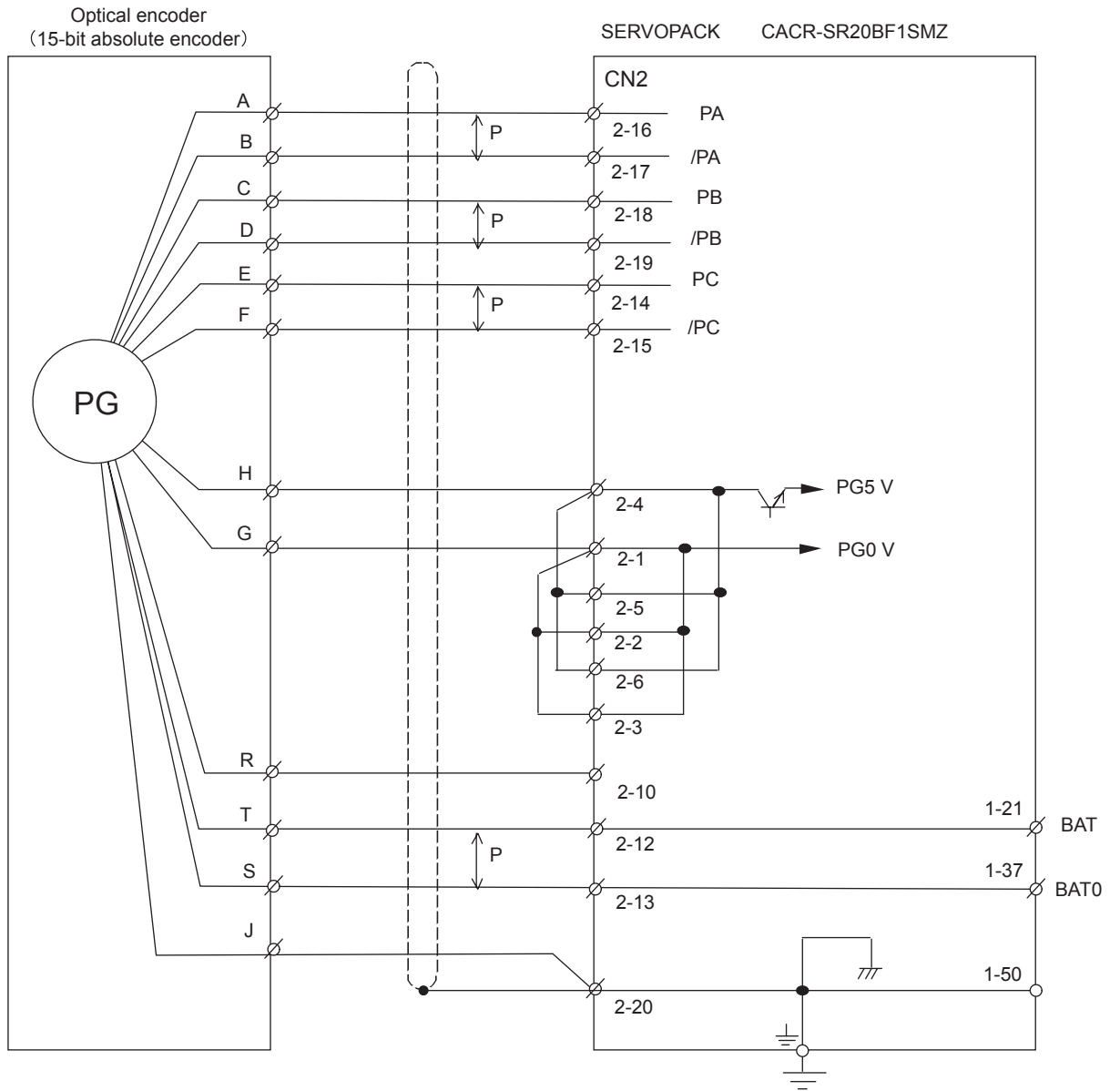
Note: Cut the rotation amount data signal line on the Servomotor encoder cable side.

3.2.4 Re-engineered SERVOPACKs for CACR-SR□□BZ (for Absolute Encoder)

Example: CACR-SR20BF1SMZ that have replaced CACR-SR20BZ1SM



Note: MCB trip (CN1-43 and -42) outputs are not provided.



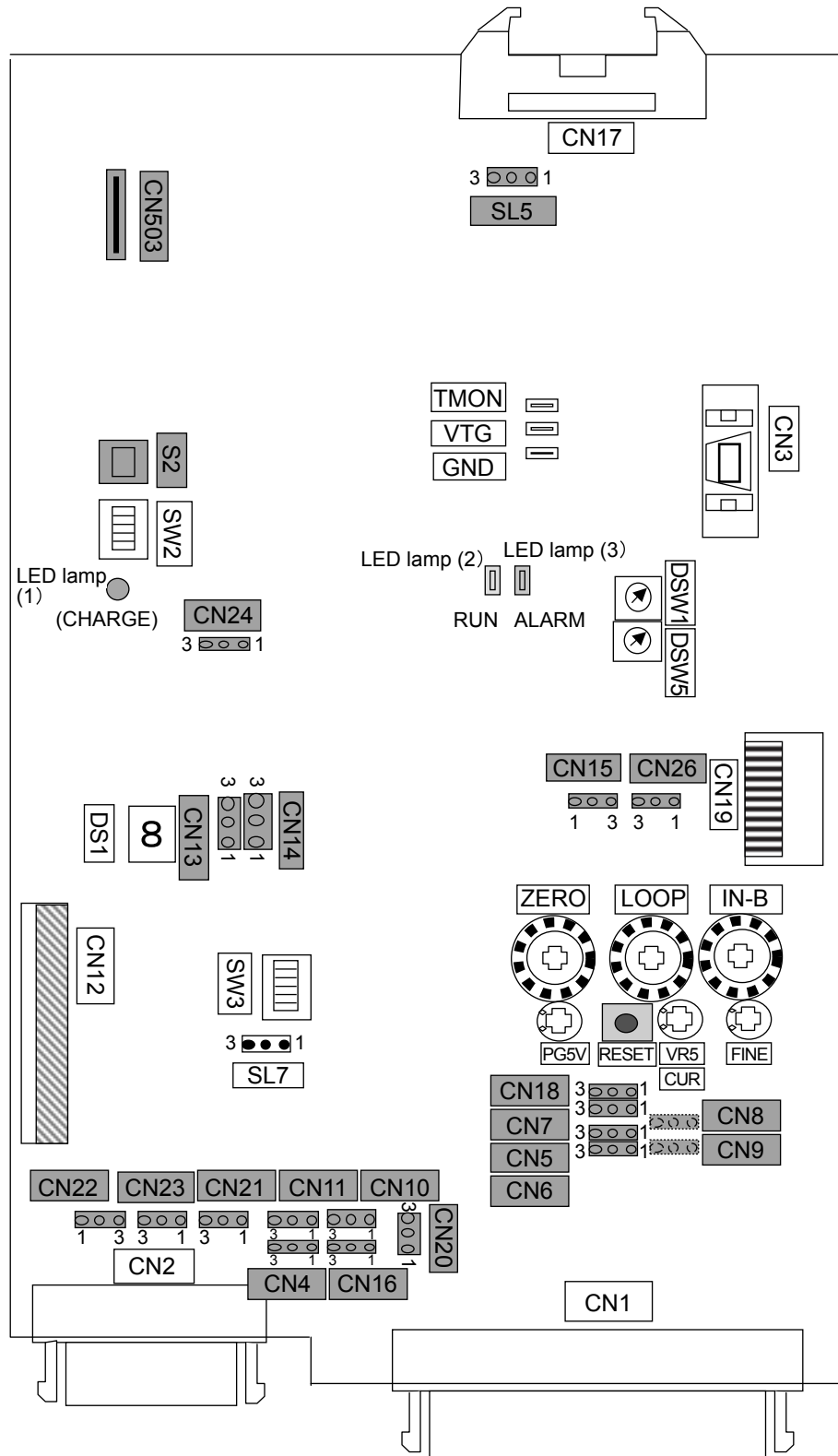
Settings and Display

| | |
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4.1 Setting Switches

The setting switches are provided on the board inside the re-engineered AC SERVOPACK CACR-SR□□BF to ensure the operating environment of the corresponding conventional model.

There are two types of switches: The switches that have been set and fixed according to the corresponding conventional model before shipment, and the switches that need to be set by users according to the application.



4.1.1 Setting Fixed Switches (User's Modification Prohibited)

The switches listed in the table below have been set to the appropriate values before shipment.

Do not change the settings of these switches. Doing so will cause motor runaway or SERVOPACK failure.

| Switch No. | Name | Remarks |
|------------|--|---------------------------------------|
| CN4 | Model depended function selection switch | |
| CN5 | Model depended function selection switch | |
| CN6 | Model depended function selection switch | |
| CN7 | Model depended function selection switch | |
| CN8 | Model depended function selection switch | Not mounted |
| CN9 | Model depended function selection switch | Not mounted |
| CN10 | Model depended function selection switch | |
| CN11 | Model depended function selection switch | |
| CN13 | Model depended function selection switch | |
| CN14 | Model depended function selection switch | |
| CN15 | Model depended function selection switch | |
| CN16 | Model depended function selection switch | |
| CN18 | Model depended function selection switch | |
| CN20 | Model depended function selection switch | |
| CN21 | Model depended function selection switch | |
| CN22 | Model depended function selection switch | |
| CN23 | Model depended function selection switch | |
| CN24 | Model depended function selection switch | |
| CN26 | Model depended function selection switch | |
| S2 | Model depended function selection switch | |
| SL5 | Speed feedback gain switching | |
| SW3-7 | Speed feedback gain switching | |
| CN503 | PC connection connector | Connector for personal computer cable |

4.1.2 Switches To Be Set According to Application

The switches listed in the table below need to be set by users according to the application.

| Switch No. | Name | Remarks |
|------------|----------------------------------|---------|
| SL7 | Torque filter switching | |
| SW2 | Frequency dividing ratio setting | |
| SW3 | Setting for CACR-SR□□BB/BZ | |
| DSW1 | Encoder setting | |
| DSW5 | Encoder setting | |

4.1.3 Potentiometers VR and RH

Set the following potentiometers to the same scale positions as those of your conventional SERVOPACK to obtain the same performance as before replacement.

| | | |
|-----|------|---------------------------------|
| VR1 | IN-B | IN-B input gain |
| VR6 | LOOP | Speed loop gain |
| VR3 | ZERO | Speed amplifier zero adjustment |
| VR4 | FINE | IN-B fine adjustment |
| VR5 | CUR | Starting current adjustment |
| RH2 | PG5V | PG voltage adjustment |

4.1.4 Alarm Reset Button

When a SERVOPACK alarm occurs, eliminate the cause and then press the RESET Button to reset the servo alarm.

If the cause has not been eliminated, the alarm will occur again.

| | |
|-------|--------------------|
| RESET | Alarm reset button |
|-------|--------------------|

4.1.5 LED Display

There are four LEDs on the board as follows.

| | | |
|--------------|-----------------------------|---------------------------------------|
| DS1 | 7-Segment LED | SERVOPACK status and alarm display |
| LED lamp (1) | Main circuit CHARGE LED | Main circuit with high-voltage |
| LED lamp (2) | Encoder conversion function | Lit in yellow during normal operation |
| LED lamp (3) | Encoder conversion alarm | Lit in red at alarm occurrence |

4.1.6 Monitoring Pins

The monitoring pins listed in the table below are provided for monitor signals.

The levels are the same as the conventional models.

| | | |
|------|-----------------------------|--|
| TMON | For torque monitor | |
| VTG | For speed monitor | |
| GND | GND for monitor signal line | |

4.1.7 Digital Operator Connector

When using the re-engineered SERVOPACK as the replacement of the conventional model CACR-SR□□BE or CACR-SR□□BY, the connector CN3 is used to connect the digital operator JUSP-OP05A.

| | | |
|-----|---|-----------------|
| CN3 | Connector for Σ -III series digital operator | Cable connector |
|-----|---|-----------------|

4.2 Factory Settings

4.2.1 Pin Settings

| Switch No. | Setting | Applicable Conventional SERVOPACK Model | | | | Remarks |
|------------|-----------------------|--|--------|--------|--------|---------------|
| | | SR□□BA SR□□BB | SR□□BE | SR□□BZ | SR□□BY | |
| CN4 | Short-circuited Pins | 1-2 | 2-3 | 1-2 | open | |
| CN5 | Short-circuited Pins | 1-2 | 1-2 | 2-3 | 2-3 | |
| CN6 | Short-circuited Pins | 1-2 | 1-2 | 2-3 | 2-3 | |
| CN7 | Short-circuited Pins | 1-2 | 1-2 | 2-3 | 2-3 | |
| CN8 | Short-circuited Pins | Not mounted | | | | |
| CN9 | Short-circuited Pins | | | | | |
| CN10 | Short-circuited Pins | 1-2 | 2-3 | 1-2 | 2-3 | |
| CN11 | Short-circuited Pins | 1-2 | 2-3 | 1-2 | 2-3 | |
| CN13 | Short-circuited Pins | 1-2 | 1-2 | 1-2 | 1-2 | |
| CN14 | Short-circuited Pins | 1-2 | 1-2 | 1-2 | 1-2 | |
| CN15 | Short-circuited Pins | Set to the defaults at factory depending on re-engineered AC SERVOPACK model | | | | See Table 4.1 |
| CN16 | Short-circuited Pins | 1-2 | 2-3 | 1-2 | open | |
| CN18 | Short-circuited Pins | 1-2 | 1-2 | 1-2 | 1-2 | |
| CN20 | Short-circuited Pins | 1-2 | 2-3 | 1-2 | 2-3 | |
| CN21 | Short-circuited Pins | 1-2 | 1-2 | 2-3 | 2-3 | |
| CN22 | Short-circuited Pins | 1-2 | 1-2 | 2-3 | 2-3 | |
| CN23 | Short-circuited Pins | 1-2 | 1-2 | 2-3 | 2-3 | |
| CN24 | Short-circuited Pins | 1-2 | 2-3 | 1-2 | 1-2 | |
| CN26 | Short-circuited Pins | Set to the defaults at factory depending on re-engineered AC SERVOPACK model | | | | See Table 4.1 |
| | | | | | | |
| S2 | 6-digit ON/OFF | Set to the defaults at factory depending on re-engineered AC SERVOPACK model | | | | See Table 4.1 |
| SL5 | Short-circuited Pins | Set to the defaults at factory depending on re-engineered AC SERVOPACK model | | | | See Table 4.3 |
| SL7 | Short-circuited Pins | These switches are set to the defaults at factory. Change the setting according to the application. | | | | See Table 4.5 |
| SW2 | 8-digit ON/OFF | | | | | See Table 4.6 |
| SW3 | 8-digit ON/OFF | | | | | See Table 4.4 |
| DSW1 | Hexadecimal switching | Set to the defaults at factory depending on encoder type | | | | See Table 4.2 |
| DSW5 | Hexadecimal switching | | | | | |

Table 4.1

| Model CACR- | S2-1 | S2-2 | S2-3 | S2-4 | S2-5 | S2-6 | CN15 | CN26 |
|----------------|------|------|------|------|------|------|------|------|
| SR03BF | OFF | ON | ON | ON | ON | ON | OPEN | OPEN |
| SR05BF | OFF | ON | ON | ON | ON | OFF | 2-3 | 2-3 |
| SR07BF to 10BF | OFF | ON | ON | ON | OFF | ON | 1-2 | 1-2 |
| SR15BF | OFF | ON | ON | OFF | ON | ON | 1-2 | 1-2 |
| SR20BF | OFF | ON | ON | OFF | OFF | OFF | 1-2 | 1-2 |
| SR30BF | OFF | ON | OFF | ON | ON | OFF | 1-2 | 1-2 |
| SR44BF | OFF | ON | OFF | ON | OFF | ON | 1-2 | 1-2 |
| SR60BF | OFF | ON | OFF | OFF | ON | ON | 1-2 | 1-2 |

Table 4.2

| Servomotor Encoder Specifications | | | Setting | | SW2 | | | | | | |
|-----------------------------------|------------|---------------|---------|------|--------|-----|-----|-----|-----|-----|-----|
| Encoder Type | Model Code | No. of Pulses | DSW1 | DSW5 | Status | | | | | | |
| | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Conventional incremental | F | 1000 P/R | 0 | 0 | ON | ON | ON | ON | OFF | OFF | OFF |
| | H | 1440 P/R | | 1 | ON | ON | ON | ON | OFF | ON | OFF |
| | E | 1500 P/R | | 2 | OFF | OFF | ON | ON | OFF | OFF | OFF |
| | K | 2000 P/R | | 3 | OFF | ON | OFF | ON | OFF | OFF | OFF |
| | C | 2500 P/R | | 4 | ON | ON | ON | OFF | OFF | OFF | OFF |
| | D | 4000 P/R | | 5 | ON | OFF | ON | OFF | OFF | OFF | OFF |
| | B | 5000 P/R | | 6 | ON | ON | OFF | OFF | OFF | OFF | OFF |
| | A | 6000 P/R | | 7 | OFF | ON | OFF | OFF | OFF | OFF | OFF |
| | M | 30000 P/R | | 9 | ON | ON | ON | ON | ON | ON | ON |
| Multiplexed incremental | 3 | 2048 P/R | 1 | 0 | ON | OFF | OFF | ON | OFF | OFF | OFF |
| | 2 | 8192 P/R | | 1 | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| Absolute | W | 1024 P/R | 2 | 0 | OFF | ON | ON | ON | OFF | OFF | OFF |
| | S | 8192 P/R | | 1 | OFF | OFF | OFF | OFF | OFF | OFF | OFF |

Set according to the number of encoder pulses.

When the SERVOPACK output dividing ratio is set to 1/1
Pn212 is enabled when SW2-8 is ON.

The settings shown in Tables 4.3, 4.4 and 4.5 are valid on the re-engineered AC SERVOPACKs for CACR-SR□□BB and -SR□□BZ, but invalid for the re-engineered AC SERVOPACK for CACR-SR□□BE and -SR□□BY.

Table 4.3 Motor Rated Speed
(Valid for CACR-SR□□BB and -SR□□BZ)

| Servomotor Rated Speed | SL5 | SW3-7 |
|--------------------------|-----|-------|
| 1000 r/min ⁻¹ | 1-2 | ON |
| 1500 r/min ⁻¹ | 2-3 | ON |
| 2000 r/min ⁻¹ | 2-3 | OFF |
| 3000 r/min ⁻¹ | 2-3 | ON |

Table 4.4 Speed Amplifier Gain (Valid for CACR-SR□□BB and -SR□□BZ)

| SW3 Specifications | | | | Factory Settings | | | |
|--------------------|------------------------------|---------|---------|----------------------|--------------------------------|--|----------|
| Pin No. | Functions | OFF | ON | M-series F-series | S-series 1 kW and 1.5 kW | S-series 0.5 kW or less, and 3.0 kW | D-series |
| 1 | Proportional gain 100 kΩ | Valid | Invalid | ON | OFF | OFF | OFF |
| 2 | Proportional gain 220 kΩ | Valid | Invalid | OFF | ON | ON | OFF |
| 3 | Imperfect integration 6.6 MΩ | Valid | Invalid | OFF | OFF | OFF | OFF |
| 4 | Integration 0.033 uF | Invalid | Valid | ON | OFF | ON | ON |
| 5 | Integration 0.033 uF | Invalid | Valid | OFF | OFF | OFF | OFF |
| 6 | Integration 0.22 uF | Invalid | Valid | OFF | ON | OFF | OFF |
| 7 | For servomotor rated speed | | | ON | ON | ON | OFF |
| 8 | Mode selection switch | Valid | Invalid | OFF | OFF | OFF | OFF |

Table 4.5 Torque Filter Switching
(Valid for CACR-SR□□BB and -SR□□BZ)

| SL7 Specifications | | Factory Setting |
|-----------------------------|--------------------|-----------------|
| Connection | Selected Capacitor | |
| Short-circuited between 1-2 | 3200 pF | |
| Short-circuited between 2-3 | 2000 pF | Factory setting |
| Open | 1000 pF | |

The PG pulse outputs from the SERVOPACK can be set using SW2 pins 1 through 8.

Caution: The maximum number of output pulses that can be set is the number of encoder pulses.

Table 4.6 SW2: No. of Dividing Output Pulses
Settings for Re-engineered AC SERVOPACKs CACR-SR□□BF

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | No. of Dividing Output Pulses |
|-----|-----|-----|-----|-----|-----|-----|-----|-------------------------------|
| OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | 8192 |
| ON | OFF | OFF | OFF | OFF | OFF | OFF | OFF | 8000 |
| OFF | ON | OFF | OFF | OFF | OFF | OFF | OFF | 6000 |
| ON | ON | OFF | OFF | OFF | OFF | OFF | OFF | 5000 |
| OFF | OFF | ON | OFF | OFF | OFF | OFF | OFF | 4096 |
| ON | OFF | ON | OFF | OFF | OFF | OFF | OFF | 4000 |
| OFF | ON | ON | OFF | OFF | OFF | OFF | OFF | 3000 |
| ON | ON | ON | OFF | OFF | OFF | OFF | OFF | 2500 |
| OFF | OFF | OFF | ON | OFF | OFF | OFF | OFF | 2400 |
| ON | OFF | OFF | ON | OFF | OFF | OFF | OFF | 2048 |
| OFF | ON | OFF | ON | OFF | OFF | OFF | OFF | 2000 |
| ON | ON | OFF | ON | OFF | OFF | OFF | OFF | 1600 |
| OFF | OFF | ON | ON | OFF | OFF | OFF | OFF | 1500 |
| ON | OFF | ON | ON | OFF | OFF | OFF | OFF | 1250 |
| OFF | ON | ON | ON | OFF | OFF | OFF | OFF | 1024 |
| ON | ON | ON | ON | OFF | OFF | OFF | OFF | 1000 |
| OFF | OFF | OFF | OFF | ON | OFF | OFF | OFF | 800 |
| ON | OFF | OFF | OFF | ON | OFF | OFF | OFF | 750 |
| OFF | ON | OFF | OFF | ON | OFF | OFF | OFF | 625 |
| ON | ON | OFF | OFF | ON | OFF | OFF | OFF | 600 |
| OFF | OFF | ON | OFF | ON | OFF | OFF | OFF | 512 |
| ON | OFF | ON | OFF | ON | OFF | OFF | OFF | 500 |
| OFF | ON | ON | OFF | ON | OFF | OFF | OFF | 480 |
| ON | ON | ON | OFF | ON | OFF | OFF | OFF | 400 |
| OFF | OFF | OFF | ON | ON | OFF | OFF | OFF | 375 |
| ON | OFF | OFF | ON | ON | OFF | OFF | OFF | 300 |
| OFF | ON | OFF | ON | ON | OFF | OFF | OFF | 256 |
| ON | ON | OFF | ON | ON | OFF | OFF | OFF | 250 |
| OFF | OFF | ON | ON | ON | OFF | OFF | OFF | 240 |
| ON | OFF | ON | ON | ON | OFF | OFF | OFF | 200 |
| OFF | ON | ON | ON | ON | OFF | OFF | OFF | 160 |
| ON | ON | ON | ON | ON | OFF | OFF | OFF | 150 |
| OFF | OFF | OFF | OFF | OFF | ON | OFF | OFF | 128 |
| ON | OFF | OFF | OFF | OFF | ON | OFF | OFF | 125 |
| OFF | ON | OFF | OFF | OFF | ON | OFF | OFF | 120 |
| ON | ON | OFF | OFF | OFF | ON | OFF | OFF | 100 |
| OFF | OFF | ON | OFF | OFF | ON | OFF | OFF | 80 |
| ON | OFF | ON | OFF | OFF | ON | OFF | OFF | 64 |
| OFF | ON | ON | OFF | OFF | ON | OFF | OFF | 60 |

Table 4.6 SW2: No. of Dividing Output Pulses
Settings for Re-engineered AC SERVOPACKs CACR-SR□□BF (cont'd)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | No. of Dividing Output Pulses |
|-----|-----|-----|-----|-----|----|-----|-----|-------------------------------|
| ON | ON | ON | OFF | OFF | ON | OFF | OFF | 50 |
| OFF | OFF | OFF | ON | OFF | ON | OFF | OFF | 40 |
| ON | OFF | OFF | ON | OFF | ON | OFF | OFF | 32 |
| OFF | ON | OFF | ON | OFF | ON | OFF | OFF | 30 |
| ON | ON | OFF | ON | OFF | ON | OFF | OFF | 25 |
| OFF | OFF | ON | ON | OFF | ON | OFF | OFF | 20 |
| ON | OFF | ON | ON | OFF | ON | OFF | OFF | 16 |
| OFF | ON | ON | ON | OFF | ON | OFF | OFF | 1200 |
| ON | ON | ON | ON | OFF | ON | OFF | OFF | 1440 |
| OFF | OFF | OFF | OFF | ON | ON | OFF | OFF | 360 |
| ON | OFF | OFF | OFF | ON | ON | OFF | OFF | 720 |
| OFF | ON | OFF | OFF | ON | ON | OFF | OFF | 2880 |
| ON | ON | OFF | OFF | ON | ON | OFF | OFF | 6000 |
| OFF | OFF | ON | OFF | ON | ON | OFF | OFF | 6000 |
| ON | OFF | ON | OFF | ON | ON | OFF | OFF | 6000 |
| OFF | ON | ON | OFF | ON | ON | OFF | OFF | 6000 |
| ON | ON | ON | OFF | ON | ON | OFF | OFF | 6000 |
| OFF | OFF | OFF | ON | ON | ON | OFF | OFF | 6000 |
| ON | OFF | OFF | ON | ON | ON | OFF | OFF | 6000 |
| OFF | ON | OFF | ON | ON | ON | OFF | OFF | 10000 |
| ON | ON | OFF | ON | ON | ON | OFF | OFF | 12500 |
| OFF | OFF | ON | ON | ON | ON | OFF | OFF | 15000 |
| ON | OFF | ON | ON | ON | ON | OFF | OFF | 20000 |
| OFF | ON | ON | ON | ON | ON | OFF | OFF | 25000 |
| ON | ON | ON | ON | ON | ON | OFF | OFF | 30000 |
| - | - | - | - | - | - | - | ON | Pn212 |

Settings for Conventional SERVOPACK SR□□BB with Incremental Encoder for Reference

Check the number of dividing output pulses on the SR□□BB in the following table.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | Dividing Ratio | (A) 6000 | (B) 5000 | (D) 4000 | (C) 2500 | (E) 1500 | (F) 1000 |
|---|---|---|---|---|---|---|----------------|-------------|-------------|-------------|-------------|-------------|-------------|
| ○ | ○ | ○ | ○ | ○ | ○ | ○ | 1/1 | 6000 | 5000 | 4000 | 2500 | 1500 | 1000 |
| | ○ | ○ | ○ | ○ | ○ | ○ | 1/2 | 3000 | 2500 | 2000 | 1250 | 750 | 500 |
| ○ | | ○ | ○ | ○ | ○ | ○ | 1/3 | 2000 | — | — | — | 500 | — |
| | | ○ | ○ | ○ | ○ | ○ | 1/4 | 1500 | 1250 | 1000 | 625 | 375 | 250 |
| ○ | ○ | | ○ | ○ | ○ | ○ | 1/5 | 1200 | 1000 | 800 | 500 | 300 | 200 |
| | ○ | | ○ | ○ | ○ | ○ | 1/6 | 1000 | — | — | — | 250 | — |
| | | | ○ | ○ | ○ | ○ | 1/8 | 750 | 625 | 500 | — | — | 125 |
| | ○ | ○ | | ○ | ○ | ○ | 1/10 | 600 | 500 | 400 | 250 | 150 | 100 |
| | | ○ | | ○ | ○ | ○ | 1/12 | 500 | — | — | — | 125 | — |
| ○ | | | | ○ | ○ | ○ | 1/15 | 400 | — | — | — | 100 | — |
| | | | | ○ | ○ | ○ | 1/16 | 375 | — | 250 | — | — | — |
| | | ○ | ○ | | ○ | ○ | 1/20 | 300 | 250 | 200 | 125 | 75 | 50 |
| | | | ○ | | ○ | ○ | 1/24 | 250 | — | — | — | — | — |
| ○ | ○ | ○ | | | ○ | ○ | 1/25 | 240 | 200 | 160 | 100 | 60 | 40 |
| | ○ | | | | ○ | ○ | 1/30 | 200 | — | — | — | 50 | — |
| | | | ○ | ○ | | ○ | 1/40 | 150 | 125 | 100 | — | — | 25 |
| | | | | ○ | | ○ | 1/48 | 125 | — | — | — | — | — |
| | ○ | ○ | ○ | | | ○ | 1/50 | 120 | 100 | 80 | 50 | 30 | 20 |
| | | ○ | | | | ○ | 1/60 | 100 | — | — | — | 25 | — |
| | ○ | ○ | ○ | ○ | ○ | | 2/2 | 6000 | 5000 | 4000 | 2500 | 1500 | 1000 |
| ○ | | ○ | ○ | ○ | ○ | | 2/3 | 4000 | — | — | — | 1000 | — |
| | | ○ | ○ | ○ | ○ | | 2/4 | 3000 | 2500 | 2000 | 1250 | 750 | 500 |
| ○ | ○ | | ○ | ○ | ○ | | 2/5 | 2400 | 2000 | 1600 | 1000 | 600 | 400 |
| | ○ | | ○ | ○ | ○ | | 2/6 | 2000 | — | — | — | 500 | — |
| | | | ○ | ○ | ○ | | 2/8 | 1500 | 1250 | 1000 | 625 | — | 250 |
| | ○ | ○ | | ○ | ○ | | 2/10 | 1200 | 1000 | 800 | 500 | 300 | 200 |
| | | ○ | | ○ | ○ | | 2/12 | 1000 | — | — | — | 250 | — |
| ○ | | | | ○ | ○ | | 2/15 | 800 | — | — | — | 200 | — |
| | | | | ○ | ○ | | 2/16 | 750 | — | 500 | — | — | 125 |
| | | ○ | ○ | | ○ | | 2/20 | 600 | 500 | 400 | 250 | 150 | 100 |
| | | | ○ | | ○ | | 2/24 | 500 | — | — | — | 125 | — |
| ○ | ○ | ○ | | | ○ | | 2/25 | 480 | 400 | 320 | 200 | 120 | 80 |
| | ○ | | | | ○ | | 2/30 | 400 | — | — | — | 100 | — |
| | | | ○ | ○ | | | 2/40 | 300 | 250 | 200 | 125 | 75 | 50 |
| | | | | ○ | | | 2/48 | 250 | — | — | — | — | — |
| | ○ | ○ | ○ | | | | 2/50 | 240 | 200 | 160 | 100 | 60 | 40 |
| | | ○ | | | | | 2/60 | 200 | — | — | — | 50 | — |

Note: The pin SW2-8 is reserved. The pins marked with ○ are short-circuited.

Settings for Conventional SERVOPACK SR□□BZ with Absolute Encoder for Reference
 Check the number of dividing output pulses on the SR□□BZ in the following table.

| 1 | 2 | 3 | 4 | 5 | 6 | (s) 8192 | 1 | 2 | 3 | 4 | 5 | 6 | (s) 8192 |
|---|---|---|---|---|---|-------------|---|---|---|---|---|---|-------------|
| ○ | ○ | ○ | ○ | ○ | ○ | 6000 | ○ | ○ | ○ | ○ | ○ | | 60 |
| | ○ | ○ | ○ | ○ | ○ | 5000 | | ○ | ○ | ○ | ○ | | 50 |
| ○ | | ○ | ○ | ○ | ○ | 4000 | ○ | | ○ | ○ | ○ | | 40 |
| | | ○ | ○ | ○ | ○ | 3000 | | | ○ | ○ | ○ | | 30 |
| ○ | ○ | | ○ | ○ | ○ | 2500 | ○ | ○ | | ○ | ○ | | 25 |
| | ○ | | ○ | ○ | ○ | 2400 | | ○ | | ○ | ○ | | 20 |
| ○ | | | ○ | ○ | ○ | 2000 | ○ | | | ○ | ○ | | 8192 |
| | | | ○ | ○ | ○ | 1600 | | | | ○ | ○ | | 4096 |
| ○ | ○ | ○ | | ○ | ○ | 1500 | ○ | ○ | ○ | | ○ | | 2048 |
| | ○ | ○ | | ○ | ○ | 1250 | | ○ | ○ | | ○ | | 1024 |
| ○ | | ○ | | ○ | ○ | 1200 | ○ | | ○ | | ○ | | 512 |
| | | ○ | | ○ | ○ | 1000 | | | ○ | | ○ | | 256 |
| ○ | ○ | | | ○ | ○ | 800 | ○ | ○ | | | ○ | | 128 |
| | ○ | | | ○ | ○ | 750 | | ○ | | | ○ | | 64 |
| ○ | | | | ○ | ○ | 625 | ○ | | | | ○ | | 3600 |
| | | | | ○ | ○ | 600 | | | | | ○ | | 2160 |
| ○ | ○ | ○ | ○ | | ○ | 500 | ○ | ○ | ○ | ○ | | | 1800 |
| | ○ | ○ | ○ | | ○ | 480 | | ○ | ○ | ○ | | | 1440 |
| ○ | | ○ | ○ | | ○ | 400 | ○ | | ○ | ○ | | | 1080 |
| | | ○ | ○ | | ○ | 375 | | | ○ | ○ | | | 720 |
| ○ | ○ | | ○ | | ○ | 320 | ○ | ○ | | ○ | | | 360 |
| | ○ | | ○ | | ○ | 300 | | ○ | | ○ | | | 180 |
| ○ | | | ○ | | ○ | 250 | ○ | | | ○ | | | 90 |
| | | | ○ | | ○ | 240 | | | | ○ | | | 45 |
| ○ | ○ | ○ | | | ○ | 200 | ○ | ○ | ○ | | | | (15) |
| | ○ | ○ | | | ○ | 160 | | ○ | ○ | | | | (12) |
| ○ | | ○ | | | ○ | 150 | ○ | | ○ | | | | (9) |
| | | ○ | | | ○ | 125 | | | ○ | | | | (8) |
| ○ | ○ | | | | ○ | 120 | ○ | ○ | | | | | (5) |
| | ○ | | | | ○ | 100 | | ○ | | | | | (4) |
| ○ | | | | | ○ | 80 | ○ | | | | | | (3) |
| | | | | | ○ | 75 | | | | | | | (2) |

Note: The pins SW2-7 and -8 are reserved. The pins marked with ○ are short-circuited.

4.2.2 List of Parameters

| Parameter No. | Name | Setting Range | Unit | Factory Setting | Setting Validation | Conventional Model SR□□BE/BY Constant No. |
|---------------|---|---|---------------------|-------------------------|--------------------|---|
| Pn000 | Function Selection Basic Switch 0 | | – | 0 | After restart | – |
| Pn001 | Function Selection Application Switch 1 | | – | 0 | After restart | – |
| Pn002 | Function Selection Application Switch 2 | | – | 0 | After restart | – |
| Pn100 | Speed Loop Gain | 1.0 to 2000.0 Hz | 0.1 Hz | 40.0 Hz | Immediately | Cn-04 |
| Pn101 | Speed Loop Integral Time Constant | 0.15 to 512.00 ms | 0.01 ms | 20.00 ms | Immediately | Cn-05 |
| Pn102 | Position Loop Gain | 1.0 to 2000.0/s | 0.1/s | 40.0/s | Immediately | – |
| Pn107 | Bias | 0 to 450 min ⁻¹ | 1 min ⁻¹ | 0 min ⁻¹ | Immediately | – |
| Pn108 | Bias Addition Width | 0 to 250 reference units | Reference unit | 7 reference units | Immediately | – |
| Pn109 | Feed Forward Gain | 0 to 100 % | 1% | 0 % | Immediately | – |
| Pn10B | Gain-related Application Switch | – | – | 0 | Immediately | – |
| Pn10C | Mode Switch (torque reference) | 0 to 800 % | 1% | 200% | Immediately | Cn-0C |
| Pn10D | Mode Switch (speed reference) | 0 to 10000 min ⁻¹ | 1 min ⁻¹ | 0 min ⁻¹ | Immediately | Cn-0D |
| Pn10E | Mode Switch (acceleration) | 0 to 30000 r/min/s | 1 r/min/s | 0 r/min/s | Immediately | Cn-0E |
| Pn10F | Mode Switch (position error pulse) | 0 to 10000 reference units | Reference unit | 0 reference unit | Immediately | – |
| Pn200 | Position Control Reference Form Selection Switch | | – | 0 | After restart | – |
| Pn209 | Position Reference Acceleration/Deceleration Bias | 0 to 65535 reference units/s | 1 reference unit/s | 0 | Immediately | – |
| Pn20E | Electronic Gear Ratio (Numerator) | 1 to 1073741824 (2 ³⁰) | – | 4 | After restart | – |
| Pn210 | Electronic Gear Ratio (Denominator) | 1 to 1073741824 (2 ³⁰) | – | 1 | After restart | – |
| Pn212 | PG Dividing Pulse (pulse unit) Enabled when SW2-8 is ON | 16 to 1073741824 (2 ³⁰) P/Rev | 1 P/Rev | 2048 P/Rev | After restart | Cn-0A |
| Pn300 | Speed Reference Input Gain | 1.50 to 10.00 V/ rated speed | 0.01 V/ rated speed | 6.00 V/ rated speed | Immediately | – |
| Pn304 | JOG Speed | 0 to 10000 min ⁻¹ | 1 min ⁻¹ | 500 min ⁻¹ | Immediately | Cn-10 |
| Pn305 | Soft Start Acceleration Time | 0 to 10000 ms | 1 ms | 0 ms | Immediately | Cn-07 |
| Pn306 | Soft Start Deceleration Time | 0 to 10000 ms | 1 ms | 0 ms | Immediately | Cn-23 |
| Pn30A | Auxiliary Speed Reference Input Gain | 1.50 to 10.00 V/ rated speed | 0.01 V/ rated speed | 10.00 V/ rated speed | Immediately | Cn-03 |
| Pn400 | Torque Reference Input Gain | 1.0 to 10.0 V/ rated torque | 0.1 V/ rated torque | 3.0 V/ rated torque | Immediately | Cn-13 |
| Pn401 | 1st Step 1st Torque Reference Filter Time Constant | 0.00 to 655.35 ms | 0.01 ms | 1.00 ms | Immediately | Cn-17 |
| Pn402 | Forward Torque Limit | 0 to 800 % | 1 % | 800 % | Immediately | Cn-08 |
| Pn403 | Reverse Torque Limit | 0 to 800 % | 1 % | 800 % | Immediately | Cn-09 |
| Pn406 | Emergency Stop Torque | 0 to 800 % | 1 % | 800 % | Immediately | Cn-06 |
| Pn407 | Speed Limit during Torque Control | 0 to 10000 min ⁻¹ | 1 min ⁻¹ | 10000 min ⁻¹ | Immediately | Cn-14 |
| Pn408 | Torque Related Function Switch | – | – | 0 | After restart | – |
| Pn415 | External Current Limit Input Gain | 1.0 to 10.0V/ rated torque | 0.1V/ rated torque | 3.0V/ rated torque | Immediately | – |

Note: The parameters in shaded area have been set according to the SERVOPACK model before shipment. Contact Yaskawa service division when changing the settings of these parameters.

(cont'd)

| Parameter No. | Name | Setting Range | Unit | Factory Setting | Setting Validation | Conventional Model SR□□BE/BY Constant No. |
|---------------|--|--|---------------------|------------------------|--------------------|---|
| Pn501 | Zero Clamp Level | 0 to 10000 min ⁻¹ | 1 min ⁻¹ | 10 min ⁻¹ | Immediately | Cn-0F |
| Pn502 | Zero Speed Level | 1 to 10000 min ⁻¹ | 1 min ⁻¹ | 20 min ⁻¹ | Immediately | Cn-0B |
| Pn503 | Speed Coincidence Signal Output Width | 0 to 100 min ⁻¹ | 1 min ⁻¹ | 10 min ⁻¹ | Immediately | – |
| Pn506 | Brake Reference - Servo OFF Delay Time | (0 to 50) × 10 ms | 10 ms | 0 ms | Immediately | Cn-12 |
| Pn507 | Brake Reference Output Speed Level | 0 to 10000 min ⁻¹ | 1 min ⁻¹ | 100 min ⁻¹ | Immediately | Cn-15 |
| Pn508 | Waiting Time for Brake Signal When Motor Running | (10 to 100) × 10 ms | 10 ms | 500 ms | Immediately | Cn-16 |
| Pn509 | Instantaneous Power Cut Hold Time | 20 to 1000 ms | 1 ms | 20 ms | Immediately | – |
| Pn50A | Input Signal Selection 1 | – | – | 2100 | After restart | – |
| Pn50B | Input Signal Selection 2 | – | – | 6543 | After restart | – |
| Pn50C | Input Signal Selection 3 | – | – | 8888 | After restart | – |
| Pn50D | Input Signal Selection 4 | – | – | 8888 | After restart | – |
| Pn50E | Output Signal Selection 1 | – | – | 3211 | After restart | – |
| Pn50F | Output Signal Selection 2 | – | – | 0 | After restart | – |
| Pn510 | Output Signal Selection 3 | – | – | 0 | After restart | – |
| Pn512 | Output Signal Reversal Setting | – | – | 0 | After restart | – |
| Pn520 | Excessive Position Error Alarm Level | 1 to 1073741824 (2 ³⁰) reference units | 1 reference unit | 262144 reference units | Immediately | – |
| Pn522 | Positioning Completed Width | 0 to 1073741824 (2 ³⁰) reference units | 1 reference unit | 7 reference units | Immediately | – |

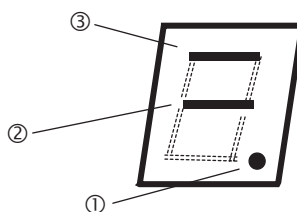
Note: The parameters in shaded area have been set according to the SERVOPACK model before shipment.
Contact Yaskawa service division when changing the settings of these parameters.

Maintenance, Inspection and Alarm/Warning Display

| | | |
|--|-------|-----|
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| 5.2 Alarm Display Table | ----- | 5-3 |
| 5.3 Warning Displays | ----- | 5-6 |
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5.1 Status Display

The 7-segment LED (DS1) on the re-engineered AC SERVOPACK indicates the SERVOPACK status.



- When no alarm occurs, the bits are lit as shown in the table below.

Bit Data Indication

| Item | Bit Data | Indication |
|------|---------------------------|--|
| ① | Control Power ON | Lights when the control power to the SERVOPACK turns ON. |
| ② | Baseblock | Lights when baseblocked (the servo turns OFF.) Goes out when the servo turns ON. |
| ③ | Rotation Detection (TGON) | Lights when the motor speed is higher than the value specified in Pn502. (Factory setting: 20 min ⁻¹) |

- When an alarm occurs, the corresponding alarm code is displayed and blinks digit by digit for 250 msec.

5.2 Alarm Display Table

The re-engineered SERVOPACK model CACR-SR□□BF has the same alarm function as that of Σ -III series SERVOPACK.

If an alarm occurs, the servomotor can be stopped by doing either of the following operations.

- DB stop: Stops the servomotor immediately using the dynamic brake.
- Zero-speed stop: Stops the servomotor by setting the speed reference to “0.”

Table 5.1 Alarm Display Table

| Alarm Display | Alarm Name | Meaning | Servomotor Stop Method | Alarm Reset | Alarm Code Output | | | Servo Alarm (ALM) Output |
|---------------|--|---|------------------------|-------------|-------------------|------|------|--------------------------|
| | | | | | ALO1 | ALO2 | ALO3 | |
| A.020 | Parameter Checksum Error | The data of the parameter in the SERVOPACK is incorrect. | DB stop | N/A | H | H | H | H |
| A.021 | Parameter Format Error | The data of the parameter in the SERVOPACK is incorrect. | DB stop | N/A | | | | |
| A.022 | System Checksum Error | The data of the parameter in the SERVOPACK is incorrect. | DB stop | N/A | | | | |
| A.023 | Parameter Password Error | The data of the parameter in the SERVOPACK is incorrect. | DB stop | N/A | | | | |
| A.030 | Main Circuit Detector Error | Detection data for power circuit is incorrect. | DB stop | Available | | | | |
| A.031 | Main Circuit (Power Pack) Alarm | The switch S2 is set incorrectly | DB stop | N/A | | | | |
| A.040 | Parameter Setting Error | The parameter setting is outside the allowable setting range. | DB stop | N/A | | | | |
| A.041 | Dividing Pulse Output Setting Error | The PG dividing pulse setting (Pn212) is outside the allowable setting range or not satisfies the setting conditions. This alarm may occur when using-SR□□BF1□□E or -SR□□BF1□□Y. | DB stop | N/A | | | | |
| A.042 | Parameter Combination Error | Combination of some parameters exceeds the setting range. | DB stop | N/A | | | | |
| A.050 | Combination Error | SERVOPACK and servomotor capacities do not match each other. | DB stop | Available | | | | |
| A.051 | Unsupported Product Alarm | The serial converter unit unsupported was connected. | DB stop | N/A | | | | |
| A.0b0 | Servo ON reference Invalid Alarm | The Host controller reference was sent to turn the Servo ON after the Servo ON function was used with the Digital Operator or SigmaWin+. | DB stop | Available | | | | |
| A.100 | Overcurrent or Heat Sink Overheated | An overcurrent flowed through the IGBT. Heat sink of SERVOPACK was overheated. | DB stop | N/A | L | H | H | H |
| A.300 | Regeneration Error Detected | Regenerative circuit or regenerative resistor is faulty. | DB stop | Available | L | L | H | H |
| A.320 | Regenerative Overload | Regenerative energy exceeds regenerative resistor capacity. | Zero speed stop | Available | | | | |
| A.330 | Main Circuit Power Supply Wiring Error | The power supply to the main circuit does not match the parameter Pn001 setting. | DB stop | Available | | | | |
| A.400 | Overvoltage | Main circuit DC voltage is excessively high. | DB stop | Available | H | H | L | H |
| A.410 | Undervoltage | Main circuit DC voltage is excessively low. | Zero speed stop | Available | | | | |

Table 5.1 Alarm Display Table (cont'd)

| Alarm Display | Alarm Name | Meaning | Servomotor Stop Method | Alarm Reset | Alarm Code Output | | | Servo Alarm (ALM) Output |
|---------------|--|--|------------------------|-------------|-------------------|------|------|--------------------------|
| | | | | | ALO1 | ALO2 | ALO3 | |
| A.510 | Overspeed | The servomotor speed is excessively high. | DB stop | Available | | | | |
| A.511 | Dividing Pulse Output Overspeed | The motor speed upper limit of the set PG dividing pulse (Pn212) is exceeded. | DB stop | Available | L | H | L | H |
| A.520 | Vibration Alarm | Vibration at the motor speed was detected. | DB stop | Available | | | | |
| A.521 | Autotuning Alarm | The moment of inertia ratio calculation error occurred. | DB stop | Available | | | | |
| A.710 | Overload: High Load | The motor was operating for several seconds to several tens of seconds under a torque largely exceeding ratings. | Zero speed stop | Available | | | | |
| A.720 | Overload: Low Load | The motor was operating continuously under a torque largely exceeding ratings. | DB stop | Available | | | | |
| A.730 | Dynamic Brake Overload | When the dynamic brake was applied, rotational energy exceeded the capacity of dynamic brake resistor. | DB stop | Available | L | L | L | H |
| A.740 | Overload of Surge Current Limit Resistor | The main circuit power was frequently turned ON and OFF. | DB stop | Available | | | | |
| A.7A0 | Heat Sink Overheated | The heat sink of SERVOPACK overheated. | Zero speed stop | Available | | | | |
| A.810 | Encoder Backup Error | All the power supplies for the absolute encoder have failed and position data was cleared. | DB stop | N/A | | | | |
| A.820 | Encoder Checksum Error | The checksum results of encoder memory is incorrect. | DB stop | N/A | | | | |
| A.830 | Absolute Encoder Battery Error | Battery voltage for the absolute encoder has dropped. | DB stop | Available | | | | |
| A.840 | Encoder Data Error | Data in the encoder is incorrect. | DB stop | N/A | | | | |
| A.850 | Encoder Overspeed | The encoder was rotating at high speed when the power was turned ON. | DB stop | N/A | | | | |
| A.860 | Encoder Overheated | The internal temperature of encoder is too high. | DB stop | N/A | H | H | H | H |
| A.b10 | Reference Speed Input Read Error | The A/D converter for reference speed input is faulty. | Zero speed stop | Available | | | | |
| A.b11 | Speed Reference A/D Data Error | A/D conversion data of speed reference is incorrect. | Zero speed stop | Available | | | | |
| A.b20 | Reference Torque Input Read Error | The A/D converter for reference torque input is faulty. | Zero speed stop | Available | | | | |
| A.b31 | Current Detection Error 1 | Phase-U current sensor is faulty. | DB stop | N/A | | | | |
| A.b32 | Current Detection Error 2 | Phase-V current sensor is faulty. | DB stop | N/A | | | | |
| A.b33 | Current Detection Error 3 | Phase-W current sensor is faulty. | DB stop | N/A | | | | |

Table 5.1 Alarm Display Table (cont'd)

| Alarm Display | Alarm Name | Meaning | Servomotor Stop Method | Alarm Reset | Alarm Code Output | | | Servo Alarm (ALM) Output |
|---------------|---|---|------------------------|-------------|-------------------|------|------|--------------------------|
| | | | | | ALO1 | ALO2 | ALO3 | |
| A.bF0 | System Alarm 0 (Internal program processing error) | “Internal program error 0” of SERVOPACK occurred. | DB stop | N/A | H | H | H | H |
| A.bF1 | System Alarm 1 (Internal program error) | “Internal program error 1” of SERVOPACK occurred. | DB stop | N/A | | | | |
| A.bF2 | System Alarm 2 (Current control processing program error) | “Internal program error 2” of SERVOPACK occurred. | DB stop | N/A | | | | |
| A.bF3 | System Alarm 3 (Encoder interface processing error) | “Internal program error 3” of SERVOPACK occurred. | DB stop | N/A | | | | |
| A.bF4 | System Alarm 4 (CPU watchdog timer error) | “Internal program error 4” of SERVOPACK occurred. | DB stop | N/A | | | | |
| A.C10 | Servo Overrun Detected | The servomotor ran out of control. | DB stop | Available | L | H | L | H |
| A.C80 | Absolute Encoder Clear Error and Multi-turn Limit Setting Error | The multi-turn for the absolute encoder was not properly cleared or set. | DB stop | N/A | | | | |
| A.C90 | Encoder Communications Error | Communications between SERVOPACK and encoder is not possible. | DB stop | N/A | | | | |
| A.C91 | Encoder Communications Position Data Error | An encoder position data calculation error occurred. | DB stop | N/A | | | | |
| A.C92 | Encoder Communications Timer Error | An error occurs in the communications timer between the encoder and the SERVOPACK. | DB stop | N/A | | | | |
| A.CA0 | Encoder Parameter Error | Encoder parameters are faulty. | DB stop | N/A | | | | |
| A.Cb0 | Encoder Echoback Error | Contents of communications with encoder is incorrect. | DB stop | N/A | | | | |
| A.CC0 | Multi-turn Limit Disagreement | Different multi-turn limits have been set in the encoder and SERVOPACK. | DB stop | N/A | | | | |
| A.d00 | Position Error Pulse Overflow | Position error pulse exceeded parameter (Pn520). | DB stop | Available | L | L | H | H |
| A.d01 | Position Error Pulse Overflow Alarm at Servo ON | When the servo turns ON, the position error pulses exceeded the parameter setting (Pn526). | DB stop | Available | | | | |
| A.d02 | Position Error Pulse Overflow Alarm by Speed Limit at Servo ON | If the servo turns ON with position error pulses accumulated, the speed is limited by Pn529. In this state, the reference pulse was input without resetting the speed limit, and the position error pulses exceeds the value set for the parameter Pn520. | Zero speed stop | Available | | | | |
| A.F10 | Power Line Open Phase | One phase is not connected in the main power supply. | Zero speed stop | Available | H | L | H | H |
| A.F20 | AC Overvoltage Alarm | A voltage higher than 200 VAC is supplied | DB stop | N/A | | | | |
| CPF00 | Digital Operator Transmission Error | Digital operator (JUSP-OP05A) fails to communicate with SERVOPACK (e.g., CPU error). | – | N/A | Not decided | | | |
| CPF01 | | | – | N/A | | | | |
| A.– | Not an error | Normal operation status | – | – | H | H | H | L |

5.3 Warning Displays

The relation between warning displays and warning code outputs are shown in table 5.2.

Table 5.2 Warning Displays and Outputs

| Warning Display | Warning Name | Meaning | Warning Code Output | | |
|-----------------|--|---|---------------------|------|------|
| | | | ALO1 | ALO2 | ALO3 |
| A.910 | Overload | This warning occurs before the overload alarms (A.710 or A.720) occur. If the warning is ignored and operation continues, an overload alarm may occur. | L | H | H |
| A.911 | Vibration | Abnormal vibration at the motor speed was detected. The detection level is the same as A.520. Set whether to output an alarm or warning by "Vibration Detection Switch" of Pn310. | L | H | H |
| A.920 | Regenerative Overload | This warning occurs before the regenerative overload alarm (A.320) occurs. If the warning is ignored and operation continues, a regenerative overload alarm may occur. | H | L | H |
| A.930 | Absolute Encoder Battery Voltage Lowered | This warning occurs when the absolute encoder battery voltage is lowered. | L | L | H |
| A.941 | Change of Parameters Requires Setting Validation | The change of the parameters can be validated only after turning the power ON from OFF. | L | H | H |

5.4 Inspection and Maintenance

5.4.1 Servomotor Inspection

The AC servomotors are brushless. Simple daily inspection is sufficient. The inspection and maintenance frequencies in the table are only guidelines. Increase or decrease the frequency to suit the operating conditions and environment.

IMPORTANT

During inspection and maintenance, do not disassemble the servomotor.

| Item | Frequency | Procedure | Comments |
|-----------------------------------|--|---|---|
| Vibration and Noise | Daily | Touch and listen. | Levels higher than normal? |
| Exterior | According to degree of contamination | Clean with cloth or compressed air. | – |
| Insulation Resistance Measurement | At least once a year | Disconnect SERVOPACK and test insulation resistance at 500 V. Must exceed 10 MΩ.* | Contact the Yaskawa service division if the insulation resistance is below 10 MΩ. |
| Replacing Oil Seal | At least once every 5000 hours | Remove the servomotor and replace the oil seal. | Applies only to servomotors with oil seals. |
| Overhaul | At least once every 20000 hours or 5 years | Contact the Yaskawa service division. | Do not disassemble and clean the servomotor by yourself. |

* Measure across the servomotor's FG and the phase-U, phase-V, or phase-W power line.

5.4.2 SERVOPACK Inspection

| Item | Frequency | Procedure | Comments |
|---------------------|----------------------|--|---------------------------------------|
| Exterior and Boards | At least once a year | Check for dust, dirt, and oil on the surfaces. | Clean with compressed air. |
| | | Check for discoloration, damage, and disconnected wires on the surfaces. | Contact the Yaskawa service division. |
| Loose Screws | | Check for loose terminal block and connector screws. | Tighten any loose screws. |

5.4.3 SERVOPACK's Parts Replacement Schedule

The following electric or electronic parts are subject to mechanical wear or deterioration over time. To avoid failure, replace these parts at the frequency indicated.

The parameters of any SERVOPACKs overhauled by Yaskawa service division are reset to the factory settings before shipping. Be sure to confirm that the parameters are properly set before starting operation.

| Part | Standard Replacement Period | Recommendations | Operating Conditions |
|--|-----------------------------|--|---|
| Cooling Fan | 4 to 5 years | Replace with a new SERVOPACK. | <ul style="list-style-type: none"> • Ambient Temperature: Annual average of 30°C • Load Factor: 80% max. • Operation Rate: 20 hours/day max. |
| Smoothing Capacitor | 7 to 8 years | Replace with a new SERVOPACK. (Depending on results of investigation.) | |
| Relays | – | Replace with a new SERVOPACK. (Depending on results of investigation.) | |
| Fuses | 10 years | Replace with a new SERVOPACK. | |
| Aluminum Electrolytic Capacitor on Circuit Board | 5 years | Replace with a new SERVOPACK. (Depending on results of investigation.) | |

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