

## Technical reference AC Servo Motor & Driver MINAS E-series

† This product is for industrial (b)(b) equipment. Don't use this (b)(b)(b) product at general household.



- Thank you very much for your purchase of Panasonic AC Servo Motor & Driver, MINAS E-series.
- Before use, refer this manual and safety instructions to ensure proper use. Keep this manual and read when necessary.
- Make sure to forward this manual for safety to the final user.

If you are the first user of this product, please be sure to purchase and read the optional Engineering Material (DV0P3700), or downloaded instruction Manual from our Web Site.

**[Web address of Motor Company, Matsushita Electric Industrial Co., Ltd.]**  
[http://industrial.panasonic.com/ww/i\\_e/25000/motor\\_fa\\_e/motor\\_fa\\_e.html](http://industrial.panasonic.com/ww/i_e/25000/motor_fa_e/motor_fa_e.html)

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# 1. Introduction

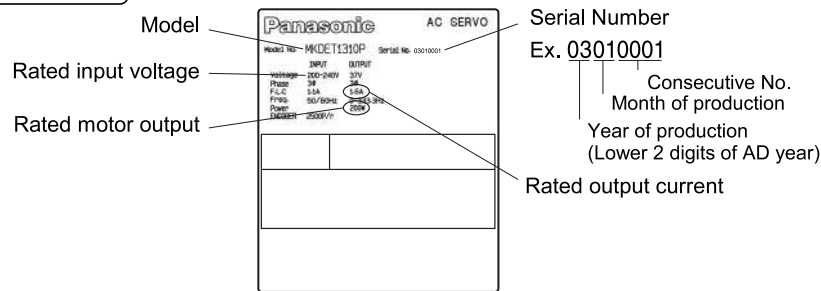
## After Opening the Package

- Make sure that the product is what you have ordered.
- Check whether the product has been damaged or not during transportation.
- The operating manual (Safety edition) is included in the received package.

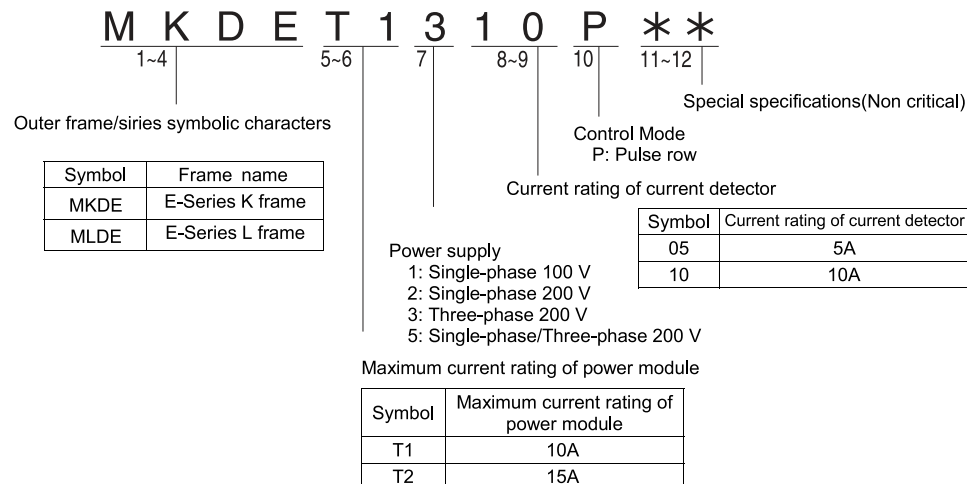
If the product is not correct, or it has been damaged, contact dealer or sales agent.

## Check the Model of Driver

### Name plate



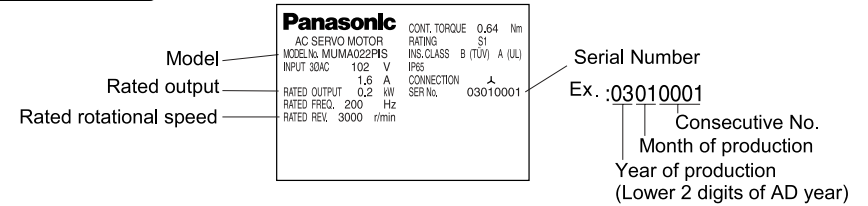
### Model Designation



# 1. Introduction

## Check the Model of Motor

### Name plate



### Model Designation

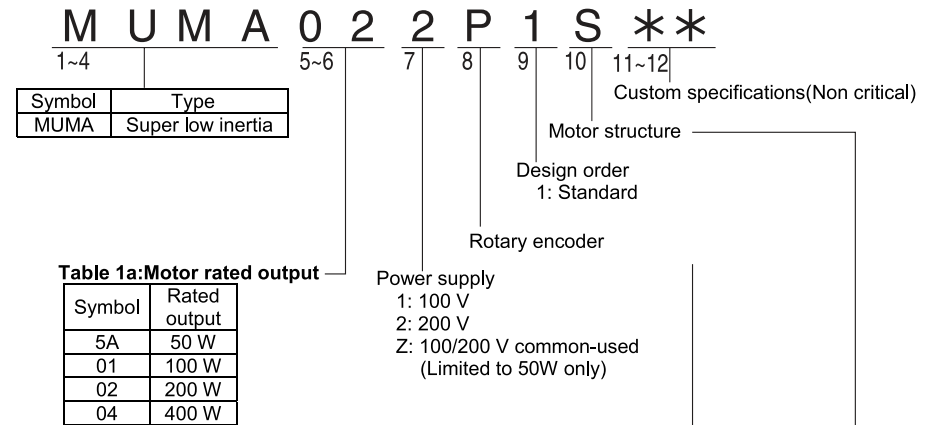


Table 1b: Rotary encoder

| Symbol | Specifications |               |            |           |
|--------|----------------|---------------|------------|-----------|
|        | Type           | No. of pulses | Resolution | Lead wire |
| P      | Incremental    | 2500 P/r      | 10000      | 5-wire    |

Table 1c: Motor structure

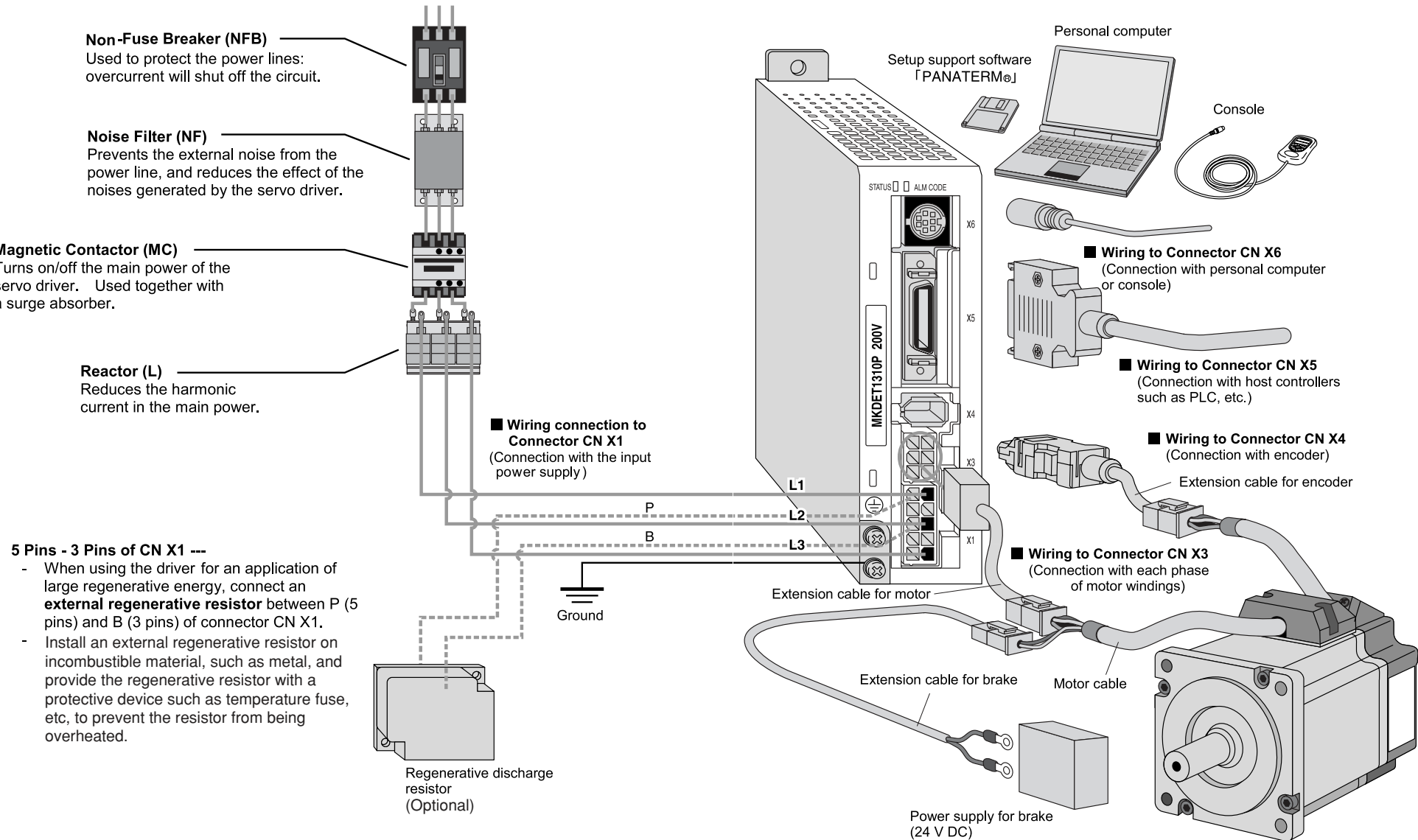
|   | Shaft                             | Holding brake |      | Oil seal |      |
|---|-----------------------------------|---------------|------|----------|------|
|   | Center tap on key-wayed shaft end | Without       | With | Without  | With |
| S | ●                                 | ●             |      | ●        |      |
| T | ●                                 |               | ●    | ●        |      |

The product with oil seal is a special order product.

## 2. System Configuration and Wiring

### General Wiring Diagram

#### ■ Main Circuits



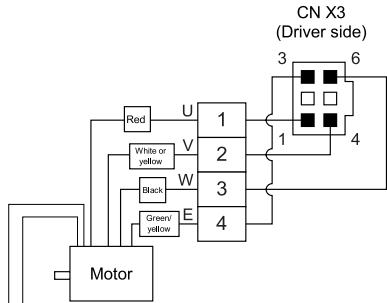
## 2. System Configuration and Wiring

### Wiring of Connectors CNX1, X3 (Wiring of Main Circuits)

- Don't fail to request an electric wiring specialist for wiring.
- Don't switch ON the electric power until completion of the wiring, to prevent electric shock.

#### Points in Wiring

- [1] For the cable diameter used, refer to the technical instruction manual (DV0P3700) for sale at option.
- [2] Insert securely the connectors.



- Do wiring in perfect color matching between the identification colors of the motor lead-out cable and corresponding motor output terminal (U, V, W). Connect U (1 pin), V (4 pins), W (6 pins) and E (3 pins) respectively.
- **Avoid shorting and ground fault.**
- **Don't connect the power supply with CN X3.**

- Adopt a duplex circuit as the brake control circuit so it can actuate even with emergency stop signal from external device.
- The magnetic brake has no polarity.
- For the power capacity and operation detail of the magnetic brake, refer to the Technical Instruction Manual (DV0P3700).
- Install the surge absorber (C-5A2 or Z15D151 made by Ishizuka Electronic). For the detail thereof refer to the Technical Instruction Manual (DV0P3700).

- Read the driver nameplate to check the power specification.
- Provide circuit breaker or leakage breaker without fail. In this case, use a leakage breaker to which countermeasure for high frequency is applied for "inverter application".
- Don't fail to provide noise filter.
- Provide the magnetic contactor coil with surge absorber.
- **Never start/stop the motor by magnetic contactor.**

- Install AC reactor.

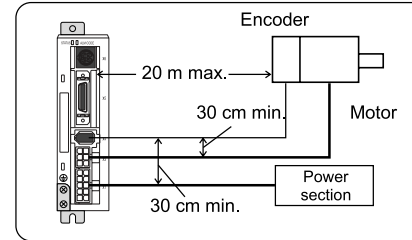
- For three-phase 200V, connect L1 (10 pins), L2 (8 pins) and L3 (6 pins).
- For single-phase 100V and 200V, connect L1 (10 pins) and L3 (6 pins).
- **Connect to the grounding system of the facility.** Connect the driver protective earth terminal (⊕) and the protective earth (earth plate) of the control panel for preventing of electric shock. In this case, don't co-clamp the earth wires to the protective earth terminal (⊕). Two protective earth terminals are provided.

Ground resistance: 100 Ω max.  
For applicable wire, see DV0P3700.

## 2. System Configuration and Wiring

### Wiring to Connector CN X4 (Connection with Encoder)

#### Points in Wiring

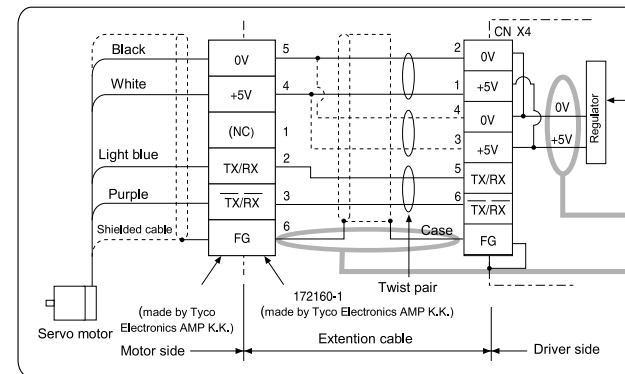


- Cable length between the driver and the motor – 20 m max. If this cable length exceeds 20m, consult with the dealer/distributor from which you have purchased the driver.
- Keep 30 cm or more spacing from the main circuit wiring. Neither guide this wiring through the same duct, together with the main circuit nor bundle these two together.

#### Wiring Diagram

- Requests, where extension cable for the encoder is self-manufactured (For the connector detail, refer to "Technical Instruction Manual" (DV0P3700) for sale at option)

- [1] Refer to the wiring diagram below.
- [2] Cable used: Shielded twist pair cable of 0.18 mm<sup>2</sup> (AWG 24) minimum in conductor diameter that is excellent in bending resistance.
- [3] For signal/power wiring in pair, use twist pair cable.



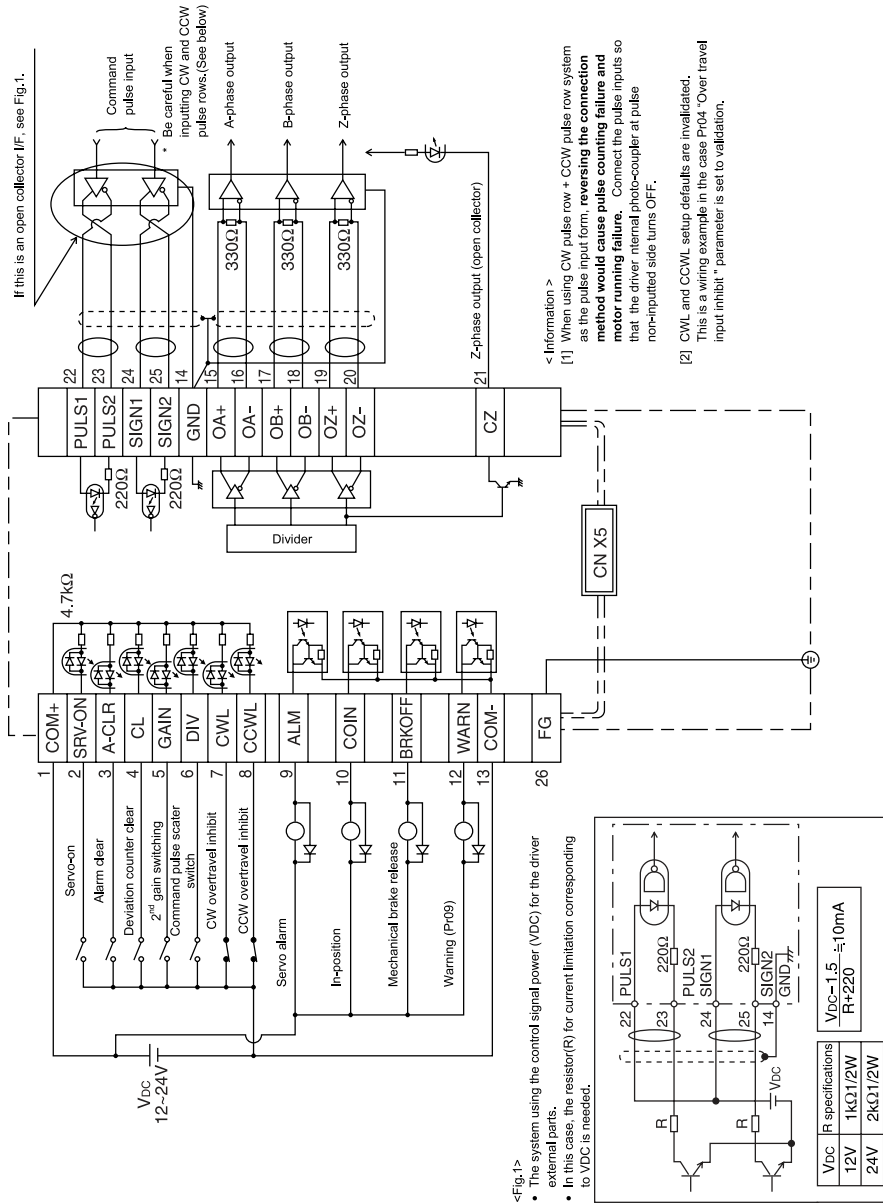
- [4] Shielding treatment
  - Driver-side shield sheath: Connect to CNX4 connector case (FG).
  - Motor-side shield sheath: Connect to 6 pin.
- [5] Where the cable length exceeds 10m, do double-wiring for the encoder power (+5V, 0V), as illustrated left.
- [6] Connect nothing to the empty terminal (NC) of the connector.

- [7] Don't use a cable pair composed of the motor cable and encoder cable which were shielded in batch.

## 2. System Configuration and Wiring

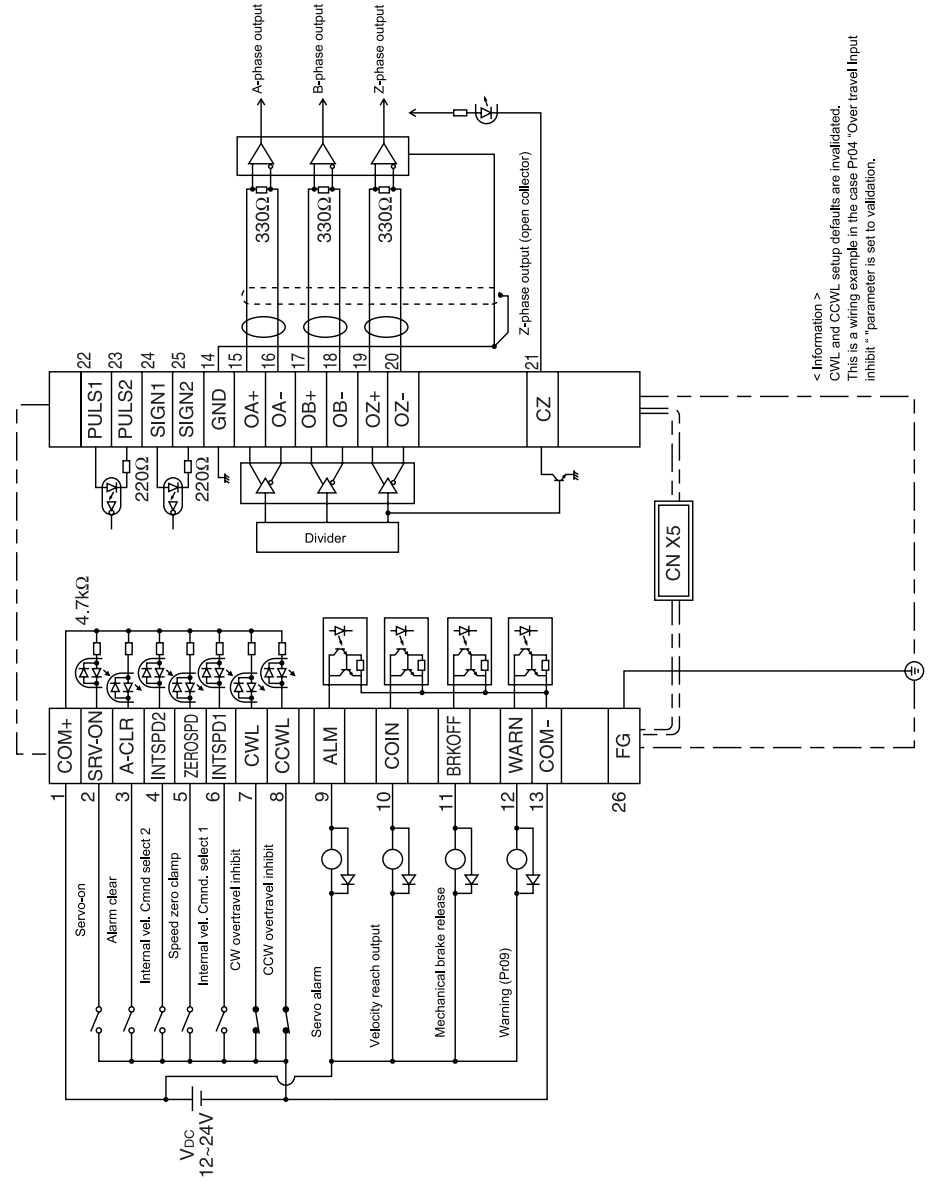
### Circuit Available for Typical Control Modes

#### Example of CN X5 Position control in Wiring



## 2. System Configuration and Wiring

#### Example of CN X5 Internal Velocity Control Mode in Wiring



### 3. Parameter

#### Parameters Related to Function Selection

| Parameter No. (Pr□□) | Parameter description                                       | Range  | Default | Unit | Related control mode            |
|----------------------|-------------------------------------------------------------|--------|---------|------|---------------------------------|
| *00                  | Axis address                                                | 1 - 15 | 1       | -    | All control modes               |
| *01                  | 7-segment LED status for console, initial condition display | 0 - 15 | 1       | -    | All control modes               |
| *02                  | Control mode set up                                         | 0 - 2  | 2       | -    | All control modes* <sup>1</sup> |
| 03                   | (For manufacturer use)                                      | -      | 0       | -    | -                               |
| *04                  | Overtravel Input inhibit                                    | 0 - 1  | 1       | -    | All control modes               |
| 05                   | (For manufacturer use)                                      | -      | 0       | -    | -                               |
| *06                  | ZEROSPD/TC input selection                                  | 0 - 2  | 1       | -    | All control modes               |
| 07                   | (For manufacturer use)                                      | -      | 0       | -    | -                               |
| 08                   | (For manufacturer use)                                      | -      | 0       | -    | -                               |
| 09                   | Warning output selection                                    | 0 - 6  | 2       | -    | All control modes               |
| 0A                   | (For manufacturer use)                                      | -      | 0       | -    | -                               |
| 0B                   | (For manufacturer use)                                      | -      | 0       | -    | -                               |
| *0C                  | Baud rate set-up of RS232C                                  | 0 - 2  | 2       | -    | All control modes               |
| 0D                   | (For manufacturer use)                                      | -      | 0       | -    | -                               |
| 0E                   | Auto recognition motor parameters                           | 0 - 1  | 0       | -    | All control modes               |
| 0F                   | (For manufacturer use)                                      | -      | 0       | -    | -                               |

- \*-marked parameter No. in the above table is validated by writing the parameter No. in EEPROM after set up and re-switching ON the power after once switched OFF.

#### < Information > \*1

| Pr | Parameter description           | Quick response positioning | High function positioning |
|----|---------------------------------|----------------------------|---------------------------|
| 02 | Control mode set up             | 0                          | 2                         |
| 1D | 1st notch frequency             | Limited<br>See below       | Validated                 |
| 2B | Damping frequency               | Limited<br>See below       | Validated                 |
| 21 | Real time auto tuning set up    | Limited<br>See below       | Validated                 |
| 2F | Adaptive notch filter frequency | Invalidated                | Validated                 |

Under "Quick Response Positioning control" mode, it is not allowed to use simultaneously the parameters of "1st notch frequency", "Damping frequency" and "Real time auto tuning set up". The parameter which is inputted in first is valid by priority.

(Ex.) By setting "Real time auto tuning" parameter, 1st notch frequency is set compulsorily to 1500 (Invalidated) at the driver side even it was input.

### 3. Parameter

#### Parameters for adjusting the servo gain and time constants of filter

| Parameter No. (Pr□□) | Parameter description                       | Range        | Default | Unit    | Related control mode            |
|----------------------|---------------------------------------------|--------------|---------|---------|---------------------------------|
| 10                   | 1st position loop gain                      | 0 - 32767    | <63>    | 1/s     | P·P2                            |
| 11                   | 1st velocity loop gain                      | 1 - 3500     | <35>    | Hz      | All control modes               |
| 12                   | 1st velocity loop integration time constant | 1 - 1000     | <16>    | ms      | All control modes               |
| 13                   | 1st velocity detection filter               | 0 - 5        | <0>     | -       | All control modes               |
| 14                   | 1st torque filter time constant             | 0 - 2500     | <65>    | 0.01 ms | All control modes               |
| 15                   | Velocity feed forward                       | -2000 - 2000 | <300>   | 0.1%    | P·P2                            |
| 16                   | Feed forward filter time constant           | 0 - 6400     | <50>    | 0.01 ms | P·P2                            |
| 17                   | (For manufacturer use)                      | -            | 0       | -       | -                               |
| 18                   | 2nd position loop gain                      | 0 - 32767    | <73>    | 1/s     | P·P2                            |
| 19                   | 2nd velocity loop gain                      | 1 - 3500     | <35>    | Hz      | All control modes               |
| 1A                   | 2nd velocity loop integration time constant | 1 - 1000     | <1000>  | ms      | All control modes               |
| 1B                   | 2nd velocity detection filter               | 0 - 5        | <0>     | -       | All control modes               |
| 1C                   | 2nd torque filter time constant             | 0 - 2500     | <65>    | 0.01 ms | All control modes               |
| 1D                   | 1st notch frequency                         | 100 - 1500   | 1500    | Hz      | All control modes* <sup>1</sup> |
| 1E                   | 1st notch width selection                   | 0 - 4        | 2       | -       | All control modes               |
| 1F                   | (For manufacturer use)                      | -            | 0       | -       | -                               |
| 26                   | Software limit set-up                       | 0 - 1000     | 10      | 0.1 rev | P·P2                            |
| 27                   | (For manufacturer use)                      | -            | 0       | -       | -                               |
| 28                   | (For manufacturer use)                      | -            | 0       | -       | -                               |
| 29                   | (For manufacturer use)                      | -            | 0       | -       | -                               |
| 2A                   | (For manufacturer use)                      | -            | 0       | -       | -                               |
| 2B                   | Damping frequency                           | 0 - 5000     | 0       | 0.1 Hz  | P·P2* <sup>1</sup>              |
| 2C                   | Damping filter setting                      | -200 - 2500  | 0       | 0.1 Hz  | P·P2                            |

#### Parameters for Auto Gain Tuning

| Parameter No. (Pr□□) | Parameter description                    | Range     | Default | Unit | Related control mode            |
|----------------------|------------------------------------------|-----------|---------|------|---------------------------------|
| 20                   | Inertia ratio                            | 0 - 10000 | <100>   | %    | All control modes               |
| 21                   | Real time auto tuning set-up             | 0 - 7     | 1       | -    | All control modes* <sup>1</sup> |
| 22                   | Machine stiffness set-up at auto turning | 0 - 15    | 4       | -    | All control modes               |
| 23                   | (For manufacturer use)                   | -         | 0       | -    | -                               |
| 24                   | (For manufacturer use)                   | -         | 0       | -    | -                               |
| 25                   | Normal auto tuning motion set-up         | 0 - 7     | 0       | -    | All control modes               |
| 2D                   | (For manufacturer use)                   | -         | 0       | -    | -                               |
| 2E                   | (For manufacturer use)                   | -         | 0       | -    | -                               |
| 2F                   | Adaptive notch filter frequency          | 0 - 64    | <0>     | -    | P2* <sup>1</sup>                |

### 3. Parameter

#### Parameters for Adjustment (Related to 2nd Gain)

| Parameter No.<br>(Pr□□) | Parameter description                 | Range     | Default | Unit                    | Related control mode |
|-------------------------|---------------------------------------|-----------|---------|-------------------------|----------------------|
| 30                      | 2nd gain action set-up                | 0 - 1     | <1>     | -                       | P·P2                 |
| 31                      | Position control switching mode       | 0 - 10    | <10>    | -                       | P·P2                 |
| 32                      | Position control switching delay time | 0 - 10000 | <33>    | 166 μs                  | P·P2                 |
| 33                      | Position control switching level      | 0 - 10000 | <50>    | -                       | P·P2                 |
| 34                      | Position control switching hysteresis | 0 - 10000 | <30>    | -                       | P·P2                 |
| 35                      | Position loop gain switching time     | 0 - 10000 | <20>    | Setup value<br>× 166 μs | P·P2                 |
| 36                      | (For manufacturer use)                | -         | 0       | -                       | -                    |
| 37                      | (For manufacturer use)                | -         | 0       | -                       | -                    |
| 38                      | (For manufacturer use)                | -         | 0       | -                       | -                    |
| 39                      | (For manufacturer use)                | -         | 0       | -                       | -                    |
| 3A                      | (For manufacturer use)                | -         | 0       | -                       | -                    |
| 3B                      | (For manufacturer use)                | -         | 0       | -                       | -                    |
| 3C                      | (For manufacturer use)                | -         | 0       | -                       | -                    |
| 3D                      | (For manufacturer use)                | -         | 0       | -                       | -                    |
| 3E - 3F                 | (For manufacturer use)                | -         | 0       | -                       | -                    |

< Requests >

- The parameters which of “default value” is enclosed with < > vary automatically with execution of the real time auto tuning function. For adjusting in MANUAL mode, set Pr21 (real time auto tuning mode) to “0” (invalidated).

This Manual expresses each control mode with the following symbols.

- P: Quick response positioning control  
P2: High function positioning control  
S: Internal velocity control

### 3. Parameter

#### Parameters for Positioning control

| Parameter No.<br>(Pr□□) | Parameter description                          | Range     | Default | Unit                     | Related control mode |
|-------------------------|------------------------------------------------|-----------|---------|--------------------------|----------------------|
| *40                     | Command pulse multiplier set-up                | 1 - 4     | 4       | -                        | P·P2                 |
| *41                     | Command pulse rotational direction set-up      | 0 - 3     | 0       | -                        | P·P2                 |
| *42                     | Command pulse input mode set-up                | 0 - 3     | 1       | -                        | P·P2                 |
| 43                      | (For manufacturer use)                         | -         | 0       | -                        | -                    |
| *44                     | Output pulses per single turn.                 | 1 - 16384 | 2500    | P/r                      | All control modes    |
| *45                     | Pulse output logic inversion                   | 0 - 1     | 0       | -                        | All control modes    |
| 46                      | Numerator of 1st command pulse ratio           | 1 - 10000 | 10000   | -                        | P·P2                 |
| 47                      | Numerator of 2nd command pulse ratio           | 1 - 10000 | 10000   | -                        | P·P2                 |
| 48                      | (For manufacturer use)                         | -         | 0       | -                        | -                    |
| 49                      | (For manufacturer use)                         | -         | 0       | -                        | -                    |
| 4A                      | Multiplier of numerator of command pulse ratio | 0 - 17    | 0       | 2 <sup>n</sup>           | P·P2                 |
| 4B                      | Denominator of command pulse ratio             | 1 - 10000 | 10000   | -                        | P·P2                 |
| 4C                      | Smoothing filter set-up                        | 0 - 7     | 1       | -                        | P·P2                 |
| 4D                      | (For manufacturer use)                         | -         | 0       | -                        | -                    |
| 4E                      | FIR filter set-up                              | 0 - 31    | 0       | (Setup value + 1) cycles | P·P2                 |
| *4F                     | (For manufacturer use)                         | -         | 0       | -                        | -                    |

- \*-marked parameter No. in the above table is validated by writing the parameter No. in EEPROM after set up and re-switching ON the power after once switched OFF.

#### Parameters for Internal Velocity Control and Torque Limit

| Parameter No.<br>(Pr□□) | Parameter description     | Range          | Default      | Unit             | Related control mode |
|-------------------------|---------------------------|----------------|--------------|------------------|----------------------|
| 50                      | (For manufacturer use)    | -              | 0            | -                | -                    |
| 51                      | (For manufacturer use)    | -              | 0            | -                | -                    |
| 52                      | (For manufacturer use)    | -              | 0            | -                | -                    |
| 53                      | 1st internal speed set-up | -20000 - 20000 | 0 r/         | min              | S                    |
| 54                      | 2nd internal speed set-up | -20000 - 20000 | 0 r/         | min              | S                    |
| 55                      | 3rd internal speed set-up | -20000 - 20000 | 0 r/         | min              | S                    |
| 56                      | 4th internal speed set-up | -20000 - 20000 | 0 r/         | min              | S                    |
| 57                      | JOG speed set-up          | 0 - 500        | 300          | r/min            | All control modes    |
| 58                      | Acceleration time set-up  | 0 - 5000       | 0            | 2 ms (1000r/min) | S                    |
| 59                      | Deceleration time set-up  | 0 - 5000       | 0            | 2 ms (1000r/min) | S                    |
| 5A                      | (For manufacturer use)    | -              | 0            | -                | -                    |
| 5B                      | (For manufacturer use)    | -              | 0            | -                | -                    |
| 5C                      | (For manufacturer use)    | -              | 0            | -                | -                    |
| 5D                      | (For manufacturer use)    | -              | 0            | -                | -                    |
| 5E*1                    | 1st torque limit set-up   | 0 - 500        | See DV0P3700 | %                | All control modes    |
| 5F                      | (For manufacturer use)    | -              | 0            | -                | -                    |

- \*1: Each default setup value in Pr5E differs depending on combination of driver and motor. For details please refer to the Technical Instruction Manual (DV0P3700) for sale at option.

### 3. Parameter

#### Parameters for Sequence

| Parameter No. (Pr□□) | Parameter description                              | Range     | Default | Unit      | Related control mode |
|----------------------|----------------------------------------------------|-----------|---------|-----------|----------------------|
| 60                   | In-position range                                  | 0 - 32767 | 10      | Pulse     | P·P2                 |
| 61                   | Zero speed                                         | 0 - 20000 | 50      | r/min     | All control modes    |
| 62                   | At-speed                                           | 0 - 20000 | 1000    | r/min     | S                    |
| 63                   | 1st position over-deviation set-up                 | 0 - 32767 | 1875    | 256 Pulse | P·P2                 |
| 64                   | Position over-deviation invalidation               | 0 - 1     | 0       | -         | P·P2                 |
| 65                   | (For manufacturer use)                             | -         | 0       | -         | -                    |
| *66                  | Mode set-up after overtravel limit detection.      | 0 - 2     | 0       | -         | All control modes    |
| 67                   | (For manufacturer use)                             | -         | 0       | -         | -                    |
| 68                   | Sequence at alarm                                  | 0 - 3     | 0       | -         | All control modes    |
| 69                   | Sequence at Servo-OFF                              | 0 - 7     | 0       | -         | All control modes    |
| 6A                   | Mech. break action set-up at motor standstill      | 0 - 100   | 0       | 2 ms      | All control modes    |
| 6B                   | Mech. break action set-up at motor in motion       | 0 - 100   | 0       | 2 ms      | All control modes    |
| 6C                   | External regenerative discharge resistor selection | 0 - 3     | 3       | -         | All control modes    |
| 6D                   | (For manufacturer use)                             | -         | 0       | -         | -                    |
| 6E - 6F              | (For manufacturer use)                             | -         | 0       | -         | -                    |

Pr63 position over-deviation is set up at the over-deviation detection value of “setup value × 256pulses”. The default setup value, before shipping, would result in position over-deviation error if the value of “1875 × 256pulses” is exceeded.

| Parameter No. (Pr□□) | Parameter description              | Range     | Default | Unit      | Related control mode |
|----------------------|------------------------------------|-----------|---------|-----------|----------------------|
| 70                   | 1st over-velocity level set-up     | 0 - 6000  | 0       | r/min     | All control modes    |
| 71                   | 2nd torque limit set-up            | 0 - 500   | 0       | %         | All control modes    |
| 72                   | 2nd position over-deviation set-up | 1 - 32767 | 1875    | 256 Pulse | P·P2                 |
| 73                   | 2nd over-velocity level set-up     | 0 - 6000  | 0       | r/min     | All control modes    |

### 4. Protective Functions

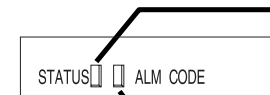
#### Protective Functions (What is alarm code?)

- The driver has various protective functions. If any of these functions acts, the motor stops immediately, being then put in trip condition, and simultaneously “Servo Alarm Output” (ALM) is turned OFF.
- Counteractions against motor trip
  - If the motor is in tripping, STATUS display on the front panel of the servo driver discolours into red display and Alarm Code LED (ALM Code) blinks simultaneously, then disabling “Servo ON”.

In addition, when the console is in use Alarm code No. is displayed on the LED display unit of the console, then disabling “Servo ON”.
- Motor trip condition can be reset (released) by keeping “Alarm Clear Input (A-CLR)” ON for 120 ms or more.
- If the overload protective function acts, the alarm can be cleared according to Alarm Clear (A-CLR) signal after elapse of 10 sec or more since alarm output. If the driver power is switched OFF, the overload time limit characteristic (OVERLOAD) is cleared.
- The above alarms can be cleared even by operation of “PANATERM®”.
- Furthermore, the above alarms can be cleared even by operation of the console.
- If any of \*-marked functions in “Table of Protective Functions” acts, Alarm Clear Input (A-CLR) is unable to be reset (cleared). In such a case, after switching OFF the driver power, search and remove the cause and thereafter re-switch ON the same power for resetting the alarm.

#### Check LED Status

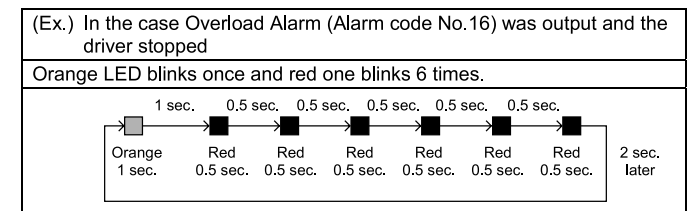
| Status LED color                | Content                                                                                                                                                                                                       |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Green  | Power ON. The driver power is switched ON.                                                                                                                                                                    |
| <input type="checkbox"/> Orange | This LED blinks (1 sec) against warning conditions. (LED in blinking indicates overload/over-regeneration/abnormal revolutions of cooling fan.) This is not displayed on the LED display unit of the console. |
| <input type="checkbox"/> Red    | Alarm output                                                                                                                                                                                                  |



Alarm code LED is not in blinking? (Normally OFF)

This LED blinks against alarm output. Alarm code No. is expressed by blinking frequency in orange and red. For the detail refer to the **Technical Instruction Manual (DV0P3700) for sale at option or the Instruction Manual downloaded from our web site.**

Orange: 10 digit, Red: 1 digit





## 4. Protective Functions

### ■ Protective Functions

| Alarm code No. | Code representation                           | Corrective actions                                                                                                                                                                                                                                                                      |
|----------------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11             | Under-voltage protection                      | Measure the power voltage to CNX1 and input the rated voltage.                                                                                                                                                                                                                          |
| 12             | Over-voltage protection                       | Measure the power voltage to CNX1 and input the rated voltage.                                                                                                                                                                                                                          |
| 14             | * Over-current and/or ground fault protection | This is caused by trouble of the motor/driver. If the inter-cable resistance in the motor is unbalanced upon check, replace the motor with new one. Repair the motor cable if shorted.                                                                                                  |
| 15             | * Internal resistor over-heat protection      | Improve the peripheral environment into the driver operating environment. Reduce load acting on the driver. Replace the cooling fan if it has resulted in trouble.                                                                                                                      |
| 16             | Overload protection                           | Check the load factor under "Monitor" mode and review the on-load running pattern. Readjust the gain. Check the motor cable for disconnection. Release the motor brake.                                                                                                                 |
| 18             | * Regenerative discharge protection           | Check load factor of the regenerative resistor under "Monitor" mode and review the on-load running pattern.                                                                                                                                                                             |
| 21             | * Encoder communication error protection      | Communication between the encoder and the driver was interrupted, and the encoder cable disconnection detecting function acted. Replace the encoder cable with new one.                                                                                                                 |
| 23             | * Encoder communication data error protection | Data from the encoder resulted in communication error. Undertake proper countermeasure against noise.                                                                                                                                                                                   |
| 24             | Position over-deviation protection            | The command pulse is inputted, but the motor is in stopping or in slow running. Adjust the gain so the motor rotates normally as commanded. Adjust the parameter Pr63 setup value.                                                                                                      |
| 26             | Over-speed protection                         | The motor rotational velocity exceeds the specified value. Readjust the gain. Reduce the commanded speed (pulse frequency).                                                                                                                                                             |
| 27             | Command pulse multiplier error protection     | Reduce the multiplication ratio set up on "command dividing multiplier" parameter.                                                                                                                                                                                                      |
| 29             | Deviation counter overflow protection         | The number of pulses on the deviation counter exceeded 2 <sup>31</sup> . Command pulse is inputted, but the motor is in stopping or in slow running. Adjust the gain so the motor rotates normally as commanded.                                                                        |
| 34             | Software limit protection                     | Readjust the gain. Adjust the parameter Pr26 setup value.                                                                                                                                                                                                                               |
| 36             | * EEPROM parameter error protection           | Re-set the parameter. If this error happens repeatedly several times, it is caused by trouble of the driver. In such a case, replace the driver with new one. Thereafter, return the defective driver to the dealer (from which you purchased the driver) for investigation and repair. |
| 37             | * EEPROM check code error protection          | This is caused by trouble of the driver. Replace it with new one and thereafter return the defective driver to the dealer (from which you purchased it) for investigation and repair.                                                                                                   |
| 38             | Overtravel inhibit protection                 | Check parameter setup value and wiring to the sensor detecting overtravel.                                                                                                                                                                                                              |
| 44             | ABS 1-revolution counter error protection     | This is caused by trouble of the motor. Replace the motor with new one and thereafter return it to the dealer (from which you purchased it) for investigation and repair.                                                                                                               |
| 45             | ABS multi-revolution counter error protection | This is caused by trouble of the motor. Replace the motor with new one and thereafter return it to the dealer (from which you purchased it) for investigation and repair.                                                                                                               |
| 48             | * Encoder Z-phase error protection            | This is caused by trouble of the motor. Replace the motor with new one and thereafter return it to the dealer (from which you purchased it) for investigation and repair.                                                                                                               |
| 49             | * Encoder CS signal error protection          | This is caused by trouble of the motor. Replace the motor with new one and thereafter return it to the dealer (from which you purchased it) for investigation and repair.                                                                                                               |
| 95             | * Motor auto recognition error protection     | The encoder cable is disconnected. Connect CN X4. The motor model is different.                                                                                                                                                                                                         |
| 96             | * LSI setup error protection                  | This is caused by trouble of the driver. Replace the driver with new one and thereafter return it to the dealer (from which you purchased it) for investigation and repair.                                                                                                             |
| Other No.      | Other trouble and error                       | Re-switch ON the power. If same trouble/error occurs repeatedly several times, it is caused by trouble of the motor/driver. In such a case, replace the motor/driver with new one and thereafter return it to the dealer (from which you purchased it) for investigation and repair.    |

### < Information >

- Load factor and regenerative resistor load factor can be checked in the monitor mode of PANATERM<sup>®</sup> or console.
- Under-voltage protection (Alarm Code No. 11), EEPROM parameter error protection (Alarm code No. 36), EEPROM check code error protection (Alarm code No. 37), and overtravel inhibit protection (Alarm code No. 38) are not memorized in "Alarm History".
- If other trouble/error occurs, STATUS LED and Alarm LED (ALM Code) could eventually turn ON simultaneously in 4 different modes given below, instead of blinking (flashing) as staged in the above Table.

| STATUS LED | Alarm Code LED | Alarm content       |
|------------|----------------|---------------------|
| ■ Red      | ■ Red          | Other trouble/error |
| ■ Red      | ■ Orange       |                     |
| ■ Orange   | ■ Red          |                     |
| ■ Orange   | ■ Orange       |                     |

## 5. Conformance to EC Directives and UL Standards

### EC Directives

The EC Directives apply to all such electronic products as those having specific functions and directly sold to general consumers in EU countries. These products are required to meet the EU unified standards and to be furnished with CE Marking.

However, our AC servos meet the EC Directives for Low Voltage Equipment so that the machine or equipment comprising our AC servos can meet relevant EC Directives.

### EMC Directives

Our servo systems can meet EMC Directives and related standards. However, to meet these requirements, the systems must be limited with respect to configuration and other aspects, e.g. the distance between the servo driver and motor is restricted, and some special wiring conditions must be met. This means that in some cases machines and equipment comprising our servo systems may not satisfy the requirements for wiring and grounding conditions specified by the EMC Directives. Therefore, conformance to the EMC Directives (especially the requirements for emission noise and noise terminal voltage) should be examined based on the final products that include our servo drivers and servo motors.

### Applicable Standards

| Subject          | Applicable standard |                                                                                                       |                                        |
|------------------|---------------------|-------------------------------------------------------------------------------------------------------|----------------------------------------|
| Motor            | IEC60034-1          | Standards referenced by Low-Voltage Directives                                                        |                                        |
| Motor and driver | EN50178             |                                                                                                       |                                        |
|                  | EN55011             | Radio Interference Wave Characteristics for Industrial, Chemical and Medical high frequency Equipment | Standards referenced by EMC Directives |
|                  | EN61000-6-2         | Generic standards-Immunity for industrial environments                                                |                                        |
|                  | — IEC61000-4-2      | Electrostatic Discharge Immunity Test                                                                 |                                        |
|                  | — IEC61000-4-3      | Radio Frequency Electromagnetic Field Immunity Test                                                   |                                        |
|                  | — IEC61000-4-4      | Electric High-Speed Transition Phenomenon - Burst Immunity Test                                       |                                        |
|                  | — IEC61000-4-5      | Lightning Surge Immunity Test                                                                         |                                        |
|                  | — IEC61000-4-6      | High Frequency Conduction Immunity Test                                                               |                                        |
|                  | — IEC61000-4-11     | Momentary Power Failure Immunity Test                                                                 |                                        |

IEC: International Electrotechnical Commission

EN: Europaischen Normen

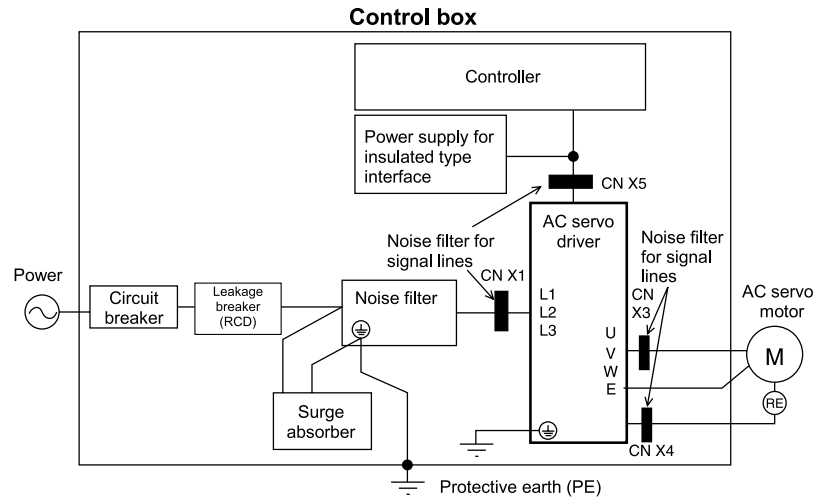
EMC: Electromagnetic Compatibility

## 5. Conformance to EC Directives and UL Standards

### Peripheral Equipment

#### Environment

The servo driver should be used under Contamination Level 2 or 1 specified by IEC60664-1 (housing the driver in an IP54 control box).



#### Power

- 100V system : Single-phase 100 to 115V +10%/-15%, 50/60 Hz
- 200V system : Single-phase 200 to 240V +10%/-15%, 50/60 Hz
- 200V system : Three-phase 200 to 240V +10%/-15%, 50/60 Hz

- (1) Use under the environment of Over-voltage Category II specified by IEC60664-1. In order to realize above environment of Over-voltage Category II, use the insulated transformer which conforms to EN60742 at the power source input.
- (2) The power for interface should be marked CE or appropriate EN Standard type (EN60950), 12VDC to 24VDC, insulated.

#### Circuit Breaker

Install a circuit breaker between the power supply and noise filter. The circuit breaker should be IEC Standard and UL listed ( marked ).

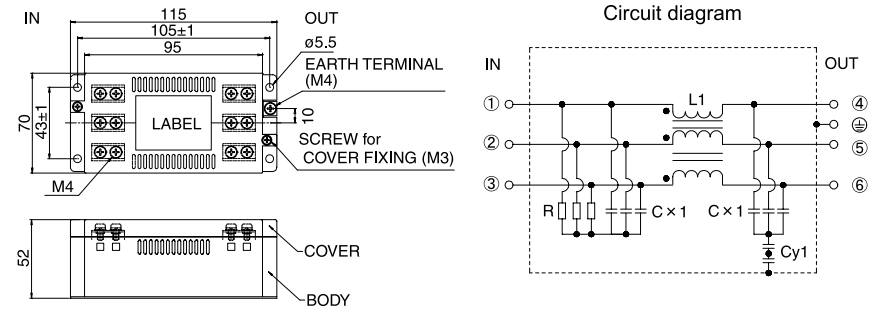
## 5. Conformance to EC Directives and UL Standards

#### Noise Filter

Install the noise filter on the primary line as shown in previous page.

Where two or more drivers are used and, in addition, one set of noise filters is installed in the power unit for all the drivers, feel free to consult with the noise filter manufacturer.

| Option Part No. | Manufacturer's part No. | Manufacturer                        |
|-----------------|-------------------------|-------------------------------------|
| DV0P4160        | 3SUP-HU10-ER-6          | Okaya Electric Industries Co., Ltd. |



#### Surge Absorber

Install the surge absorber on the primary line of the noise filter.

< Request >

**When performing voltage-resistant test on the machine/equipment, remove the surge absorber. Otherwise the absorber may be damaged.**

| Option Part No. | Manufacturer's part No. | Manufacturer                        |
|-----------------|-------------------------|-------------------------------------|
| DV0P1450        | R·A·V-781BXZ-4          | Okaya Electric Industries Co., Ltd. |

