Document No.	: SX-DSV02846
Revision No.	: 2.3
Date of Issue	: Apr. 1, 2022
Classification	: ☐ New ■ Change

REFERENCE SPECIFICATIONS

Product Name : AC servo driver

Product Series Name : MINAS-A5N Series M Size

Product Model Number :

Motion Control Business Unit, Industrial Device Business Division
Panasonic Industry Co., Ltd.
7-1-1 Morofuku, Daito－City, Osaka 574-0044, Japan

If you have any questions, please contact the seller (Sales office or Distributor) of the product.

Panasonic

REVISIONS

Date	Page	Rev.	Description	Signed
April 17, 2014	-	1.0	NEWLY ISSUED	-
June 2, 2014	2	1.1	Add the applicable motors.	-
	17		Add the note for plugs.	
April 30, 2015	-	1.2	Change the company name.	-
	6,9		Add the connector layout.	
	2,Appendix-3		Add the 20 bits absolute encoder to the applicable motor and encoder.	
April 6, 2016	-	2.0	Change the company name.	-
	-		Add the DC48 V input model.	
	2		Change the applicable motors.	
July 13, 2016	10	2.1	Corrected the part number of cable side connector’s pin.	-
Feb. 20, 2017	Appendix-6	2.2	Add the Optional Parts.	-
	Appendix		Add the default value of the parameters.	
Apr. 1, 2022	-	2.3	Changed the company name	-
	-		Changed the front cover format	

Contents

1. Scope

This document is the specification for M size model of servo driver MINAS-A5N series made by Motion Control Business Unit, Panasonic Industry Co., Ltd.

This product is for industrial equipment.
Don't use this product at general household.

<Software version>
This document applies to the servo drivers of the following software version:
Ver.3.06
For the software version, confirm it by the setup support software PANATERM or other function.

<Related documents>
SX-DSV02843: Technical Reference - Functional specification -
SX-DSV02844: Technical Reference - Realtime Express (RTEX) communication specification –
*This servo driver includes different specifications in part from technical reference - Functional specification -.
For details, refer to the page 3 or later of appendix.
*If the description of related documents is different from this document, make this document a priority.

<IMPORTANT>

• Motion Control Business Unit, Panasonic Industry Co., Ltd. oration reserves the right to make modifications and improvements to its products and/or documentation, including specifications and software, without prior notice.

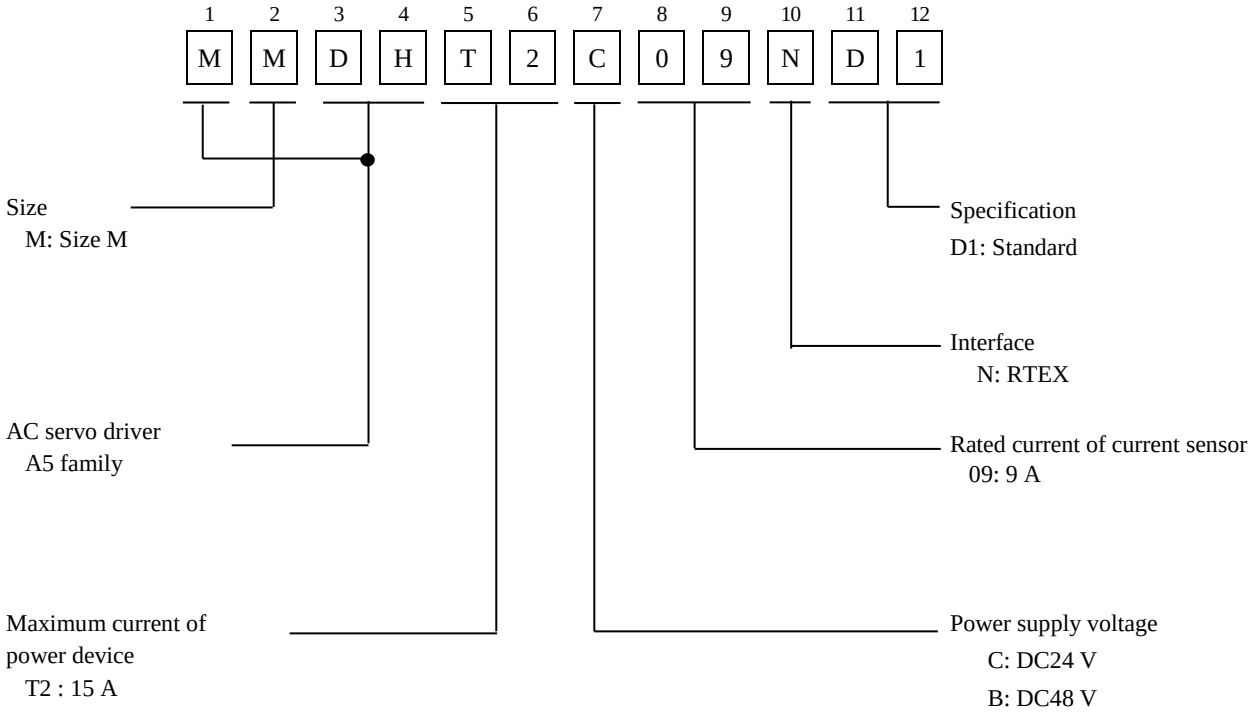
Operating Precautions

Pay a special attention to following items in order to prevent failure and degradation of the product.

- Implement the measure against static electricity and handle it with great caution.
- Do not touch the electronic component except the heat sink of the product when installing and carrying it.
- Do not touch the edge and corner of the connector and printed-circuit board of the driver.
- When the equipment is energized, do not touch the driver.
- Install in the metal control box in order to prevent malfunction by noises, such as the electromagnetic interference (EMI).
- Prevent foreign matter from getting into the product.
- Do not give the impact shock to the product.
- Do not add stress, such as the twist and bending, to the printed-circuit board of the product. Fix the cable so that stress is not added to the printed-circuit board and the connector of the product.

2. Model Number

The following shows how to interpret a Model number.



3. Applicable Motor

Driver			Applicable motor			
Model No.	Size	Power Supply	Model No.	Rated output	Rated speed	Encoder type
MMDHT2C09ND1	M	DC24 V	MMMA1ACF**	10 W	3000 r/min	Absolute 20bits resolution
			MMMA2ACF**	20 W	3000 r/min	Absolute 20bits resolution
			MMMA3ACF**	30 W	3000 r/min	Absolute 20bits resolution
			MNMA2ACF**	20 W	3000 r/min	Absolute 20bits resolution
MMDHT2B09ND1	M	DC48 V	MMMA1ABF**	10 W	3000 r/min	Absolute 20bits resolution
			MMMA2ABF**	20 W	3000 r/min	Absolute 20bits resolution
			MMMA3ABF**	30 W	3000 r/min	Absolute 20bits resolution
			MNMA2ABF**	20 W	3000 r/min	Absolute 20bits resolution

4. Basic Specifications

Item					Description
Input power supply (Note 1)	DC24 V	Voltage permission ripple			DC24 V ±10 %
		Capacity of power supply	Applicable motor	MMMA 10W	Rated current: 1.8 Arms Max current: 13 Ao-p
				MMMA 20W	Rated current: 3.1 Arms Max current: 11 Ao-p
				MMMA 30W	Rated current: 3.5 Arms Max current: 12 Ao-p
				MNMA 20W	Rated current: 3.1 Arms Max current: 14 Ao-p
	DC48 V	Voltage permission ripple			DC48 V ±10 %
		Capacity of power supply	Applicable motor	MMMA 10W	Rated current: 0.9 Arms Max current: 6 Ao-p
				MMMA 20W	Rated current: 1.6 Arms Max current: 11 Ao-p
				MMMA 30W	Rated current: 1.9 Arms Max current: 11 Ao-p
				MNMA 20W	Rated current: 1.5 Arms Max current: 9 Ao-p
Conditions		Temperature			Operation temperature: 0-55 degrees C Storage temperature: -20-65 degrees C Guarantee the maximum temperature: 80 degrees C 72 hours No condensation. (Note 2)
		Humidity			Operation and storage humidity 20-85 %RH or less No condensation. (Note 2)
		Height above the sea			1,000 meters or less
		Vibration			5. 88 m/s^2 or less, 10-60 Hz Continuous operation at resonance point is not allowed.(Note 3)
Protection rating					IP00 (Note 4)

(Note 1) DC power using stabilized power supply (SELV) are provided with reinforced insulation.
Do not exceed the voltage including rippl of DC power is supply voltage range of the servo driver.
Capacity of power supply depends on a applicable motor and a load.

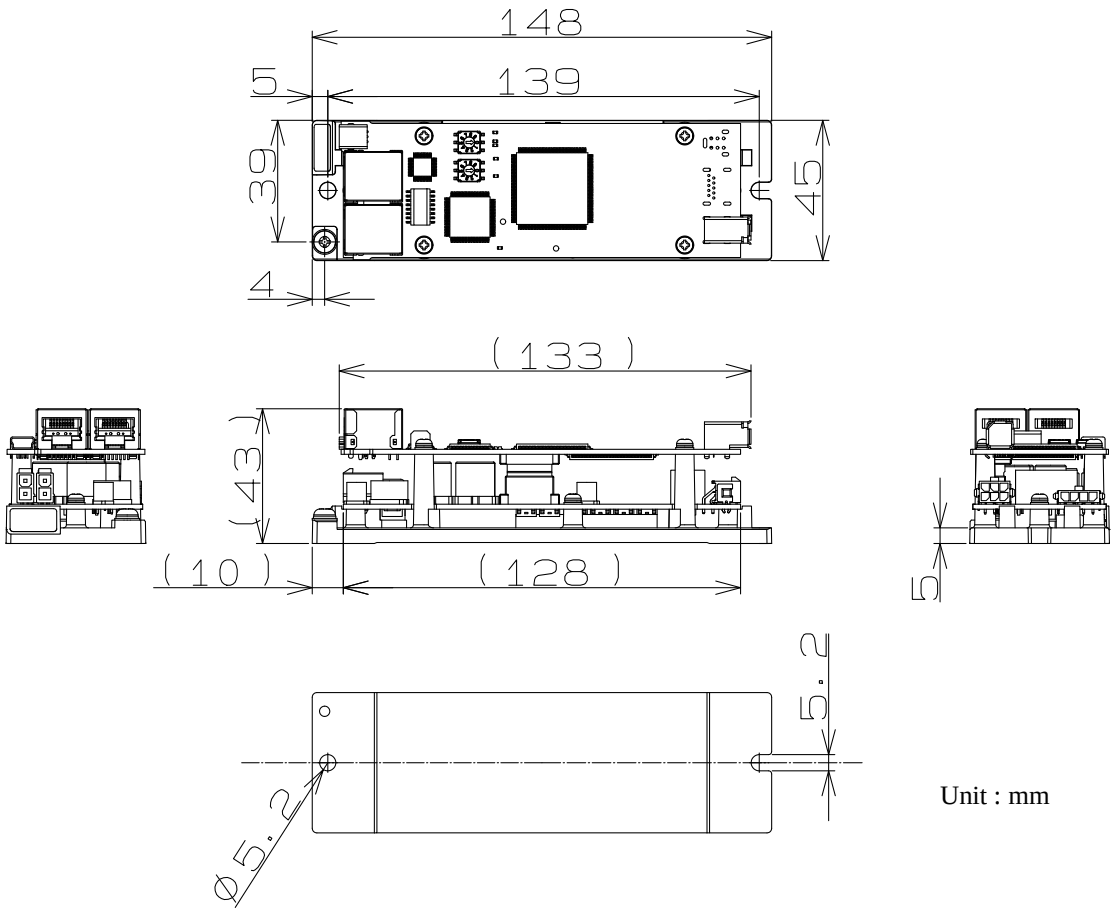
(Note 2) Easier condensation occurs when the temperature is reduced.

(Note 3) Do not install in a flexible region.

(Note 4) Protection rating of this servo driver is IP00 (No protection).
Make sure not to put the electric static discharge or the foreign matters such as dust when installing or handling the driver.

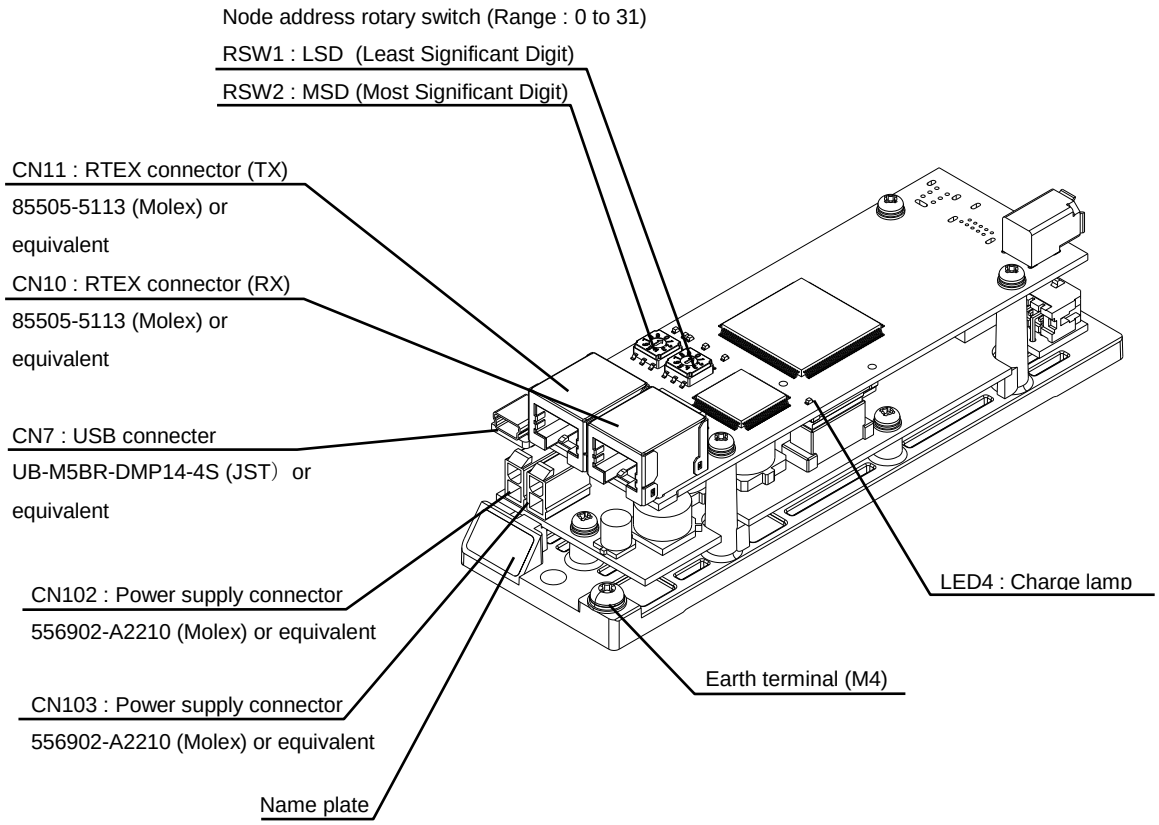
5. Dimensions

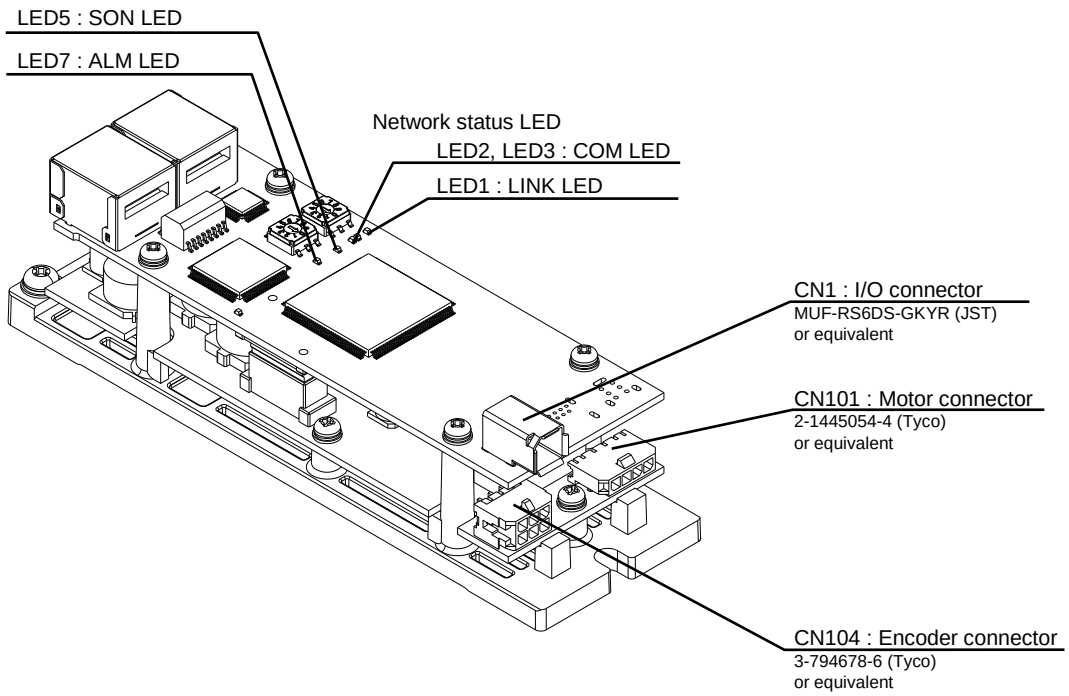
Size M



Unit : mm

6. Appearance and Part Names

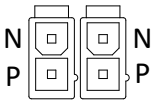




7. Connectors

7-1 Power Supply Connectors CN102 , CN103

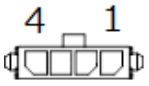
Servo driver side : Molex 556902-A2210 equivalent, Plating : TIN

Pin no.	Symbol	Description	Layout
1	P (+ Line)	• Input DC24 V or DC48 V. • DC power source using a stabilized power supply are provided with reinforced insulation.	
2	N (- Line)		

* There is no anti-connection function on the driver.
  Reverse connection is caused of failure.
  Enough attention to the power supply wiring.
* This servo driver has two power connectors, in order to install two or more daisy chain connection.
  In that case, be sure not to exceed the maximum current (9 A) of these connectors.

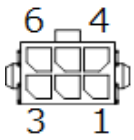
7-2 Moter Connector CN101

Servo driver side : Tyco Electronics 2-1445054-4 equivalent, Plating : TIN

Pin no.	Symbol	Description	Layout
1	U	Connect U phase of the motor winding	
2	V	Connect V phase of the motor winding	
3	W	Connect W phase of the motor winding	
4	FG	Connect ground wire of the motor	

7-3 Encoder Connector CN104

Servo driver side : Tyco Electronics 3-794678-6 equivalent, Plating : GOLD

Pin no.	Symbol	Description	Layout
1	NC	NC (No connection)	
2	PS	Encoder signal I/O (serial signal)	
3	$\overline{\text{PS}}$		
4	E5V	Power supply output for encoder	
5	E0V		
6	FG	Frame ground	

7-4 USB Connector CN7

Servo driver side : J. S. T. Mfg UB-M5BR-DMP14-4S equivalent, Plating : GOLD

By connecting to the PC through USB interface, various operations such as setting / changing of parameters, monitoring of control state, referencing of error/history, and saving/loading of parameters can be performed.

Pin no.	Symbol	Description
1	VBUS	USB communication signal
2	D-	
3	D+	
4	-	NC (No connection)
5	GND	Signal ground

<About the USB cable>

Use a commercial-release USB cable with a ferrite core.

Connector of the servo driver side is a mini-B.

For the connector of a computer side, use it united with the specification of the computer to be used.

7-5 RTEX Connectors CN10 , CN11

Servo driver side : Molex 85505-5113 equivalent, Plating : GOLD

[CN10] RX connector

Pin no.	Symbol	Description
1	-	Connect to pin 1 on TX connector of sending side node.
2	-	Connect to pin 2 on TX connector of sending side node.
3	RX+	Connect to pin 3 on TX connector of sending side node.
4	-	Connect to pin 4 on TX connector of sending side node.
5	-	Connect to pin 5 on TX connector of sending side node.
6	RX-	Connect to pin 6 on TX connector of sending side node.
7	-	Connect to pin 7 on TX connector of sending side node.
8	-	Connect to pin 8 on TX connector of sending side node.
Shell	FG	Connect to shield of cable

[CN11] TX connector

Pin no.	Symbol	Description
1	-	Connect to pin 1 on RX connector of receiving side node.
2	-	Connect to pin 2 on RX connector of receiving side node.
3	TX+	Connect to pin 3 on RX connector of receiving side node.
4	-	Connect to pin 4 on RX connector of receiving side node.
5	-	Connect to pin 5 on RX connector of receiving side node.
6	TX-	Connect to pin 6 on RX connector of receiving side node.
7	-	Connect to pin 7 on RX connector of receiving side node.
8	-	Connect to pin 8 on RX connector of receiving side node.
Shell	FG	Connect to shield of cable.

Be sure to use shielded twisted pair (STP) in compliance with CAT 5e or higher of TIA/EIA-568B.

7-6 I/O Connector CN1

Servo driver side : J. S. T. Mfg MUF-RS6DS-GKYR equivalent, Plating : GOLD

Input

Pin no.	Symbol	Description	I/O type	Layout
3	I-COM	• Connect to positive/negative polarity of the external power supply. • Use power supply: 12 V +/-5 % to 24 V +/-5 %	-	
4	SI5	• Assign functions using parameters. For details, refer to the technical data - Basic function specification - SX-DSV02202. • For factory default function assignment, refer to appendix "Specification for Each Model".	i-1	
5	SI6		i-1	
6	SI7		i-1	

(Note) SI1-SI4 and SI8 cannot be used with this servo driver.

Output

Pin no.	Symbol	Description	I/O type	Layout
1 2	SO1+ SO1-	• Assign functions using parameters. For details, refer to the technical data—Basic function specification — SX-DSV02202. • For factory default function assignment, refer to appendix "Specification for Each Model".	o-1	See above

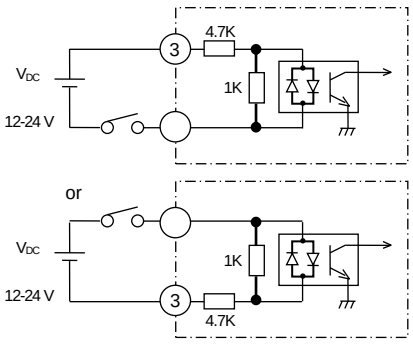
(Note) SI1-SI4 and SI8 cannot be used with this servo driver.

Other

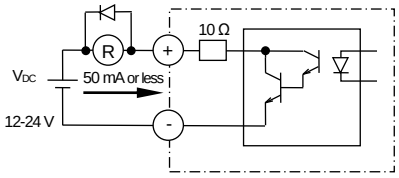
Pin no.	Symbol	Description	I/O type
Shell	FG	• Connected to the Frame ground inside the servo driver.	-

I/O interface type

i-1



o-1



Note: To directly run the relay, attach a diode in parallel with the relay and in the direction shown in the figure above.
VCE sat = 1.2 V

8. Wiring

8-1 Cables and Maximum Lengths

Name	Symbol	Maximum cable length	Cable
Power connection	CN102 CN103	-	AWG 18
Motor connection	CN101	3 m	AWG 20
Encoder connection	CN104	3 m	Overall twisted shielded pair Core wire: 0.18 mm^2or larger
I/O connection	CN1	1 m	
RTEX connection	CN10 CN11	100 m (Note 1)	Shielded twisted pair (STP) cable of category 5e or better

(Note 1) Refer to 8-3 (7) Connection to connectors CN10 , CN11 .

8-2 Cable Side Connectors

Symbol	Part name	Part number	Manufacturer
CN102 CN103	Connector	5557-02R	Molex
	Pin	5556TL	
CN101	Connector	1445022-4	Tyco Electronics
	Pin	794610-1	
	Connector	43645-0400	Molex
	Pin	43030-0001	
CN104	Connector	794617-6	Tyco Electronics
	Pin	1-794610-2	
	Connector	43025-0600	Molex
	Pin	43030-0002	
CN1	Connector	MUF-PK6W-Y	J. S. T. Mfg

Use connectors listed above or equivalents.

8-3 Precautions for Wiring

(1) Wiring to power connector

[1] Power connector of the servo driver is tin plated. In order to avoid a bad contact caused by dissimilar metals, connector pins for the connection, please use the tin plating.

[2] The DC power supply might have a trip to protect its components from over-voltage that is caused by the regenerated energy from motor. In that case, it is necessary to install the diode for protecting from the feedback current and also to install the DC bus capacitor for storing the regenerated energy between the DC power supply and drivers.

[3] So that the specified voltage at the input servo driver, consider the transient voltage drop due to the impedance wiring, select both the diameter of the power line and the length.

[4] This servo driver does not mount the inrush current limit circuit. Inrush current is dependent on the characteristics and wiring impedance of the connection power, please check the actual machine.

[5] Because this servo driver to assume a connection with a stabilized power supply is provided with reinforced insulation, protective ground terminal is not available. M4 screw on the heat-sink is functional earth (FG).
Considerations of noise resistance, static electricity, noise radiation, please give a connection on the FG of equipment side as necessary.

(2) Wiring to motor connector

[1] Motor connector of the servo driver is tin plated. In order to avoid a bad contact caused by dissimilar metals, connector pins for the connection, please use the tin plating.

[2] For a noise countermeasure, attach the ferrite core U, V, W as necessary.

(3) Wiring to encoder connector

[1] Encoder connector of the servo driver is gold plated. In order to avoid a bad contact caused by dissimilar metals, connector pins for the connection, please use the gold plating.

[2] For the encoder cable is a stranded wire of core wire, please use Collective shield twisted pair cable.

[3] Maximum cable length is within 3 m. In order to meet the mitigation of the voltage drop of 5 V power supply to the encoder to long wiring, select the appropriate wire diameter.

[4] Encoder cable should be located well away from power cable and motor cable with large current.

(4) Wiring to I/O connector

[1] I/O connector of the servo driver is gold plated. In order to avoid a bad contact caused by dissimilar metals, connector pins for the connection, please use the gold plating.

[2] Do not exceed the maximum voltage and current specification of the input and output.

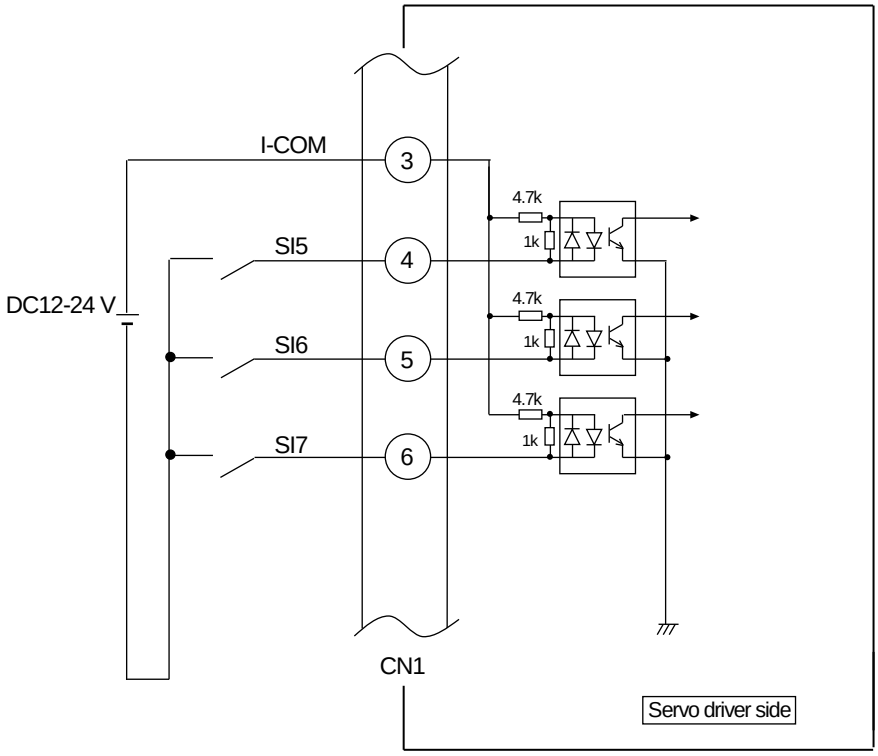
(5) Wiring to connector CN1

[1] The DC12–24 V power supply for the external control signal connected to the I-COM should be prepared by the customer.

[2] Place the servo driver and its peripheral device as nearly as possible (up to 3 m) so as to shorten the wiring.

[3] Wire the wiring as far away as possible (30 cm or more) from the power lines (P, N, U, V, W).
Do not put them in the same duct or bind them together.

Input



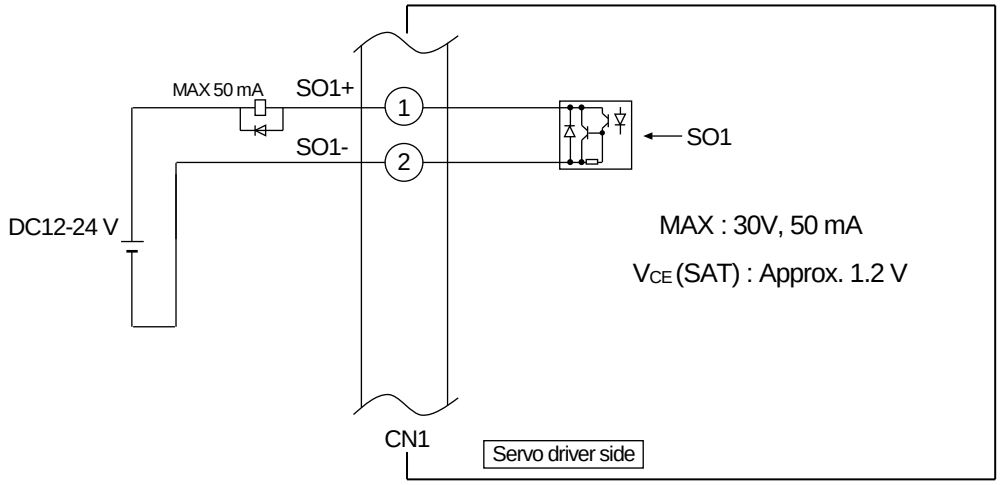
The functions of the pins SI5-SI7 are assigned by parameters. For factory default settings, refer to Appendix “Specification for Each Model”.

Output

[4] Be aware of the polarity of the power supply for control signals. The servo driver is damaged by reverse connection of the polarity shown in the following figure.

[5] To directly drive the relay with each output signal, make sure to attach a diode in parallel to the relay and in the direction as shown in the figure below. The servo driver can be damaged if the diode is not attached or the diode is attached in the reverse direction.

[6] Apply 50 mA or less of current to output.



The functions of the pins SO1 are assigned by parameters. For factory default settings, refer to Appendix “Specification for Each Model”.

(6) Wiring to connector CN104

[1] As for the encoder cable, use the batch shielded twisted wire pairs whose core is 0.18 mm^2 or more.

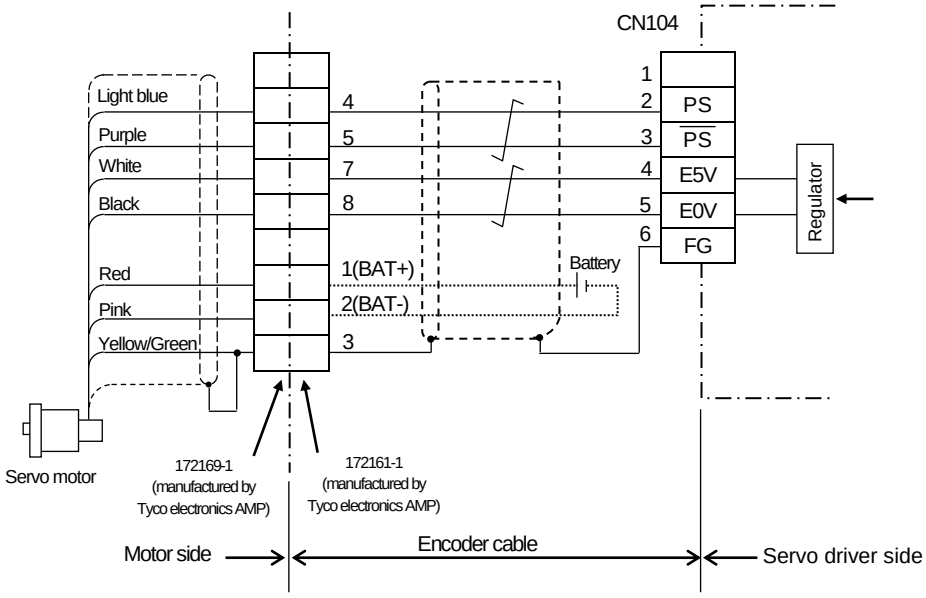
[2] The cable length should be up to 3 m. When the wiring is long, use the double wiring for the 5 V power supply in order to reduce the effects of voltage drop.

[3] Make sure to connect the coat of shielded cable at the servo driver side to the FG (6-pin) of CN104.

[4] Wire the wiring as far away as possible (30 cm or more) from the power lines (P, N, U, V, W). Do not put them in the same duct or bind them together.

[5] Do not connect anything to the empty pins of CN104.

Absolute 20bits encoder



Connect the absolute encoder battery directly to the BAT+ and BAT- connectors of the encoder at the motor for the absolute system.

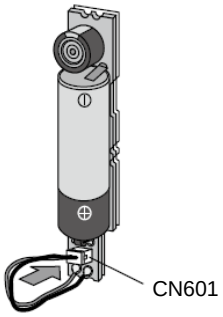
Precautions in using a battery for absolute encoder

An error arises from the absolute encoder when a battery voltage drop occurs.
The voltage drop occurs due to the life span of a battery or voltage delay.

(1) The life span of a battery may become short depending on ambient environment.
(2) Lithium batteries have a transient minimum voltage effect (voltage delay phenomenon), in which a voltage drop may occur temporarily when discharge starts. For this reason, the batteries should be refreshed when used.

<When a battery is used for the first time>

Before using our optional battery unit DV0P2990, connect the connector with lead wires to the battery as shown in the right figure and leave it for about 5 minutes. And then disconnect the connector from the CN601, and install it to the servo driver.
If using another battery, we recommend that you also refresh the battery. For refreshing a battery, consult with the manufacturer of the battery.



<After installing battery>

We recommend that control power be turned on/off once a day.

Other precautions

- If used incorrectly, batteries may cause troubles such as corrosion due to leakage and hazards such as explosion. So, observe the following rules:
  [1] Insert a battery correctly without confusing + and - terminals.
  [2] If a battery used for a long time or no longer used is left inside equipment, a trouble such as leakage may occur. Replace such a battery as soon as possible. (As a standard, we recommend replacing batteries every 2 years.)
    • The battery electrolyte is highly corrosive. It not only corrodes surrounding parts, but it also causes hazards such as a short-circuit due to its conductivity. Replace batteries periodically.
  [3] Do not disassemble batteries or throw them into fire.
    • Do not disassemble the battery because it is very dangerous if a splash of the contents comes into an eye. Also, do not throw the battery into fire or heat it because it may burst, causing hazards.
  [4] Do not short-circuit the battery or remove its tube.
    • If the battery + and - terminals are connected together with a conductive material such as a metal, a large current flows, not only weakening the battery, but also generating excessive heat, resulting in a burst to cause hazards.
  [5] Never attempt to charge the battery because it is not rechargeable.
- Disposal of old batteries after replacement may be restricted by local governments. Dispose of batteries following such a restriction.
- Air transportation
  Application for approval of hazardous material air transportation is required (for both passenger and cargo airplanes). (UN packing is required.)
  When you ask for air transportation, you are requested to submit necessary documents (parameter sheets and MSDS etc.). In this case, make a request to us through a dealer you purchased from.
- UN packing
  Consult with your transport company.

(7) Wiring to connector CN10 , CN11

[1] Use shielded twisted pair (STP) in compliance with category 5e or higher of TIA/E1A-568B.

If both ends of the shield are not grounded, EMC performance will degrade.

When installing connector plug on both ends of shielded cable, positively connect the shield to the metallic plug shell.

For colors of wire and matching connector pins, refer to TIA/E1A568B (see figure below).

Pins 3 and 6 are for signal wire.

Connect wire to 3 pin pairs on the connector: 1-2, 4-5 and 7-8.

When using 2-pair wire in place of 4-pair wire, use pins 1-2 and 3-6 and leave pins 4-5 and 7-8 on connector unconnected.

Use plugs compliant with IEC 60603-7 standard.

[2] Length of communication cable

a. Inter nodes: max. 100 m
b. Total length of cables between all nodes in the communication loop: max. 200 m

Both requirements should be met.

If the requirement b above cannot be met, consult with us.

Because specifications such as flexural characteristic, temperature range and insulation material differ from manufacturer to manufacturer, select the cable best suitable for your application.

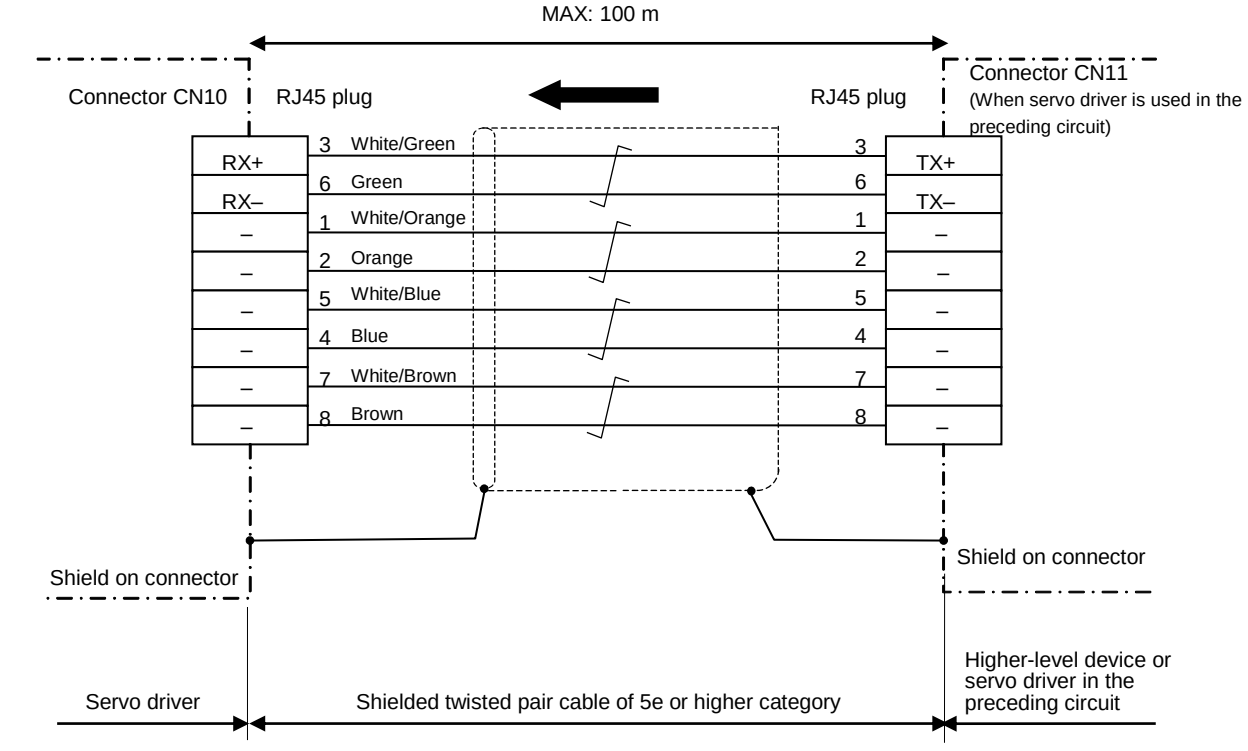
Select the cable for movable application according to your operating condition.

<Communication cable used in our evaluation>

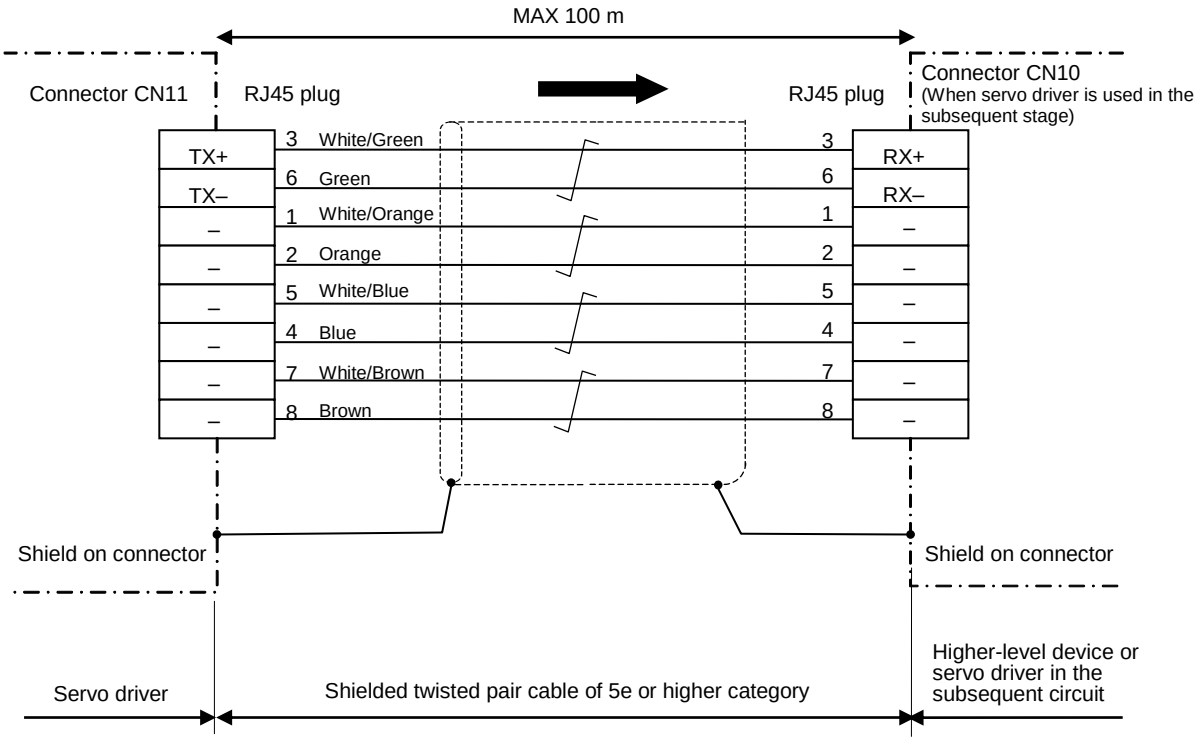
Manufacturer: Sanwa Supply Inc.

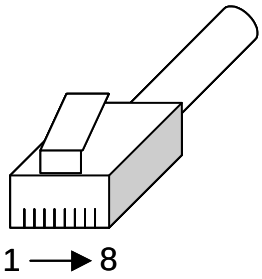
Part No.: KB-STP-*LN, Category: 5e, STP

Connection to CN10



Wiring to connector CN11





Pins on RJ45 plug

SAFETY PRECAUTIONS

9. Safety Precautions

■ Danger and damage caused when the safety precautions are ignored are described in the following categories and signs:

DANGER	Description of this sign indicates “urgent danger that may cause death or serious injury.”
CAUTION	Description of this sign indicates “danger that may cause injury or property damage.”

■ Rules to keep are categorized and described with the following graphics.

	This graphic indicates “Prohibited” acts that are not permitted.
	This graphic indicates “Mandatory” acts that must be performed forcibly.

DANGER

(1) Be sure not to store or use the equipment under conditions subjected to vibrations (5.88 m/s2 or heavier) or an impact shock, foreign matters such as dust, metal particles oil mist, liquids such as water, oil and polishing liquid, near flammable objects, in an atmosphere of corrosive gas (such as H2S, SO2, NO2, Cl2), or in an atmosphere of flammable gas.

(2) Do not place any flammable objects near a motor, a servo driver.

(3) Do not drive the motor with an external force.

(4) Do not damage or strain the cable, or do not apply excessive stress. Do not place a heavy item on the cable or do not pinch the cable.

(5) Do not use the equipment with the cable soaked in oil or water.

(6) Do not install the equipment near a heating object such as a heater or a large wire-wound resistor. (Install a thermal shield, etc. to avoid the influences of heating object.)

(7) Do not connect the motor directly with a commercial power.

(8) Do not use the equipment under conditions subject to strong vibrations or an impact shock.

(9) Be sure not to touch a rotating part of a motor during operation.

(10) Do not touch the key flutes of motor output shaft with bare hands.

(11) Be sure not to touch inside a servo driver.

(12) Motor servo driver heat sink and peripheral device become very hot. Do not touch them.

(13) Do not carry out wiring or do not operate the equipment with wet hands.

(14) Wiring work is strictly allowed only for an engineer specializing electrical work.

SAFETY PRECAUTIONS

(15) A motor other than specified is not provided with a protection device. Protect a motor with an overcurrent protection device, a ground-fault interrupter, overheating protection device, and emergency stop device, etc.

(16) When operating the servo driver after an earthquake, inspect installation conditions of the servo driver and the motor and safety of the equipment to make sure that no fault exists.

(17) After turning off the power, the inside circuit remains charged at a high voltage for a while. When moving, wiring or inspection the equipment, completely shut off the power supply input outside the servo driver and leave for 15 minutes or longer before working.

(18) Install and mount the equipment securely to prevent personal injury caused by poor installation or mounting on an earthquake.

(19) Install an external emergency shutoff circuit to stop operation and interrupt power immediately upon emergency.
Emission of smoke or dust may occur due to a fault of a motor or a servo driver used in combination.

(20) Mount the motor, the servo driver and the peripheral devices on a noncombustible material such as metal.

(21) IN considerration of strength of the screws and the material of the mounting base, select appropriate fastening torque for the product mounting screws, so that the screws will not be loosened or damaged.

Example)To tighten a steel screw into asteel base. M5:2.7 to 3.3 N・m

(22) Provide correct and secure wiring. Insecure wiring or incorrect wiring may cause runaway or burning of a motor. During wiring work, avoid entry of conductive dust such as wire chippings in a servo driver.

(23) Connect cables securely and provide secure insulation on current-carrying parts using insulation material.

(24) FG screw (M4) should be tighten to a torque of 1.0 ~ 1.2 N • m.

CAUTION

(25) Do not hold cables or motor shaft when carrying the equipment.

(26) Do not adjust or change servo driver gains extremely, and do not make operations of the machine instable.

(27) The equipment may suddenly restart after recovery from shutdown upon a power failure. Keep away from the equipment.
Specify settings of the equipment to secure safety for human against such restart operations.

(28) When the equipment is energized, keep away from the motor and mechanism driven by the motor in case of malfunction.

(29) Avoid a strong shock to the motor shaft.

(30) Avoid a strong shock to the product.

(31) Be sure not to use the electromagnetic contactor installed on the power supply to start or stop the motor.

(32) Avoid frequent switching on and off the main power supply of the servo driver.

(33) The built-in brake of the motor is used for holding only. Do not use the brake to stop (braking) for securing safety of the equipment.

(34) Do not fall or topple over the equipment when carrying or installing.

SAFETY PRECAUTIONS

CAUTION

(35) Do not climb the motor or do not place a heavy item on the motor.

(36) Do not put a foreign matter into the servo driver.

(37) Do not use the equipment under direct sunlight. When storing the equipment, avoid direct sunlight and store under conditions of operating temperatures and humidity.

(38) Be sure not to disassemble or modify the equipment.
Disassembling and repair is allowed only for the manufacturer or sales agency authorized by the manufacturer.

(39) Please use power are provided with reinforced insulation the stabilized power supply (SELV). Do not connect the positive side and the negative side and ground (FG) of the input power of servo driver.

(40) This servo driver is Built-in type (degree of protection IP00). Please note that during the installation so without applying static electricity. Static electricity is applied to runaway or burning, destruction, and cause of failure.

(41) Use a motor and a servo driver in combination specified by the manufacturer. A customer shall be responsible for verifying performances and safety of combination with other servo driver.

(42) A failure of a motor or a combined servo driver may cause burning of motor, or emission of smoke and dust. Take this into consideration when the application of the machine is clean room related.

(43) Install the equipment adequately in consideration of output and main unit weight.

(44) Keep the ambient conditions of an installed motor within a range of allowable ambient temperatures and of allowable humidity.

(45) Install the equipment by specified procedures and in specified orientation.

(46) Install the devices by keeping specified distances between a servo driver and inside control panel or other devices.

(47) If a motor has an eyebolt, use the eyebolt to carry the motor only. Do not use the eyebolt to carry equipment.

(48) Connect a relay breaking upon emergency stop in series with a brake control relay.

(49) For a test run, hold down a motor and disconnect from a mechanical system to verify operations before installing on the equipment. (A motor must run smoothly at 30 r/min driven with a servo driver.)

(50) Verify that an input power supply voltage satisfies the servo driver specifications before turning on the power and start operation.
An input voltage higher than rated may cause ignition and smoking in the servo driver, which may cause runaway or burning of a motor in some cases.

(51) When an alarm status occurs, remove a cause of the problem before restarting.
Careless restarting without removing a cause of problem may cause malfunction or burning of a motor.

(52) The built-in brake of the motor may not be able to hold due to expiring useful life or a mechanical structure. Install a braking device on the equipment to secure safety.

(53) Pay attention to heat radiation. The servo driver generates heat by operating a motor. A servo driver used in a sealed control box may cause an extreme rise of temperature.
Consider cooling so that an ambient temperature around the servo driver satisfies an operating range.

(54) Maintenance and inspection is allowed only for a specializing person.

(55) Turn off the power when the equipment is not used for a long term.

- Capacitance of the capacitors of power supply rectifier circuit drops over time. To avoid a secondary problem due to a failure, replacement of capacitors is recommended at an interval of approximately 5 years. Commission the manufacturer or sales agency authorized by the manufacturer to replace the parts.
- Be sure to read the operating manual (safety book) before use.

⚠ SAFETY PRECAUTIONS

Servo driver's ambient temperature

The driver's service life significantly depends on the ambient temperature.
Do measures cooling such as fan installation.

Operating temperature range: 0 to 55 degrees C

We have made the best efforts to ensure quality of this product. However, application of external noise (include radiation) or static electricity, or a defect of the input power supply, wiring or components may cause the servo driver to operate beyond the preset conditions. Therefore, you should exercise thorough caution to ensure safety against an unexpected operation.

10. Life and Warranty

10-1 Life Expectancy of the Driver

The Servo driver has 28,000 hours of life expectancy when used continuously under the following conditions.

Definition of the life Life end shall be defined as the capacitance of the electrolytic capacitor is reduced by 20 % from the ex-factory status.

Condition
- Input power source: DC 24 V / DC48V
- Ambient temperature: 55 degree C
- Output torque: Rated constant value
- Number of revolutions: Rated constant Number of revolutions

Note that the life varies due to the working conditions.

10-2 Warranty Period

(1) Warranty period

For a period of 12 months from the date of delivery or 18 months from the manufacturing month. whichever is shorter.

This warranty shall be exempted in the following cases,

[1] defects resulting from misuse and/or repair or modification by the customer

[2] defects resulting from drop of the product or damage during transportation

[3] defects resulting from improper usage of the product beyond the specifications

[4] defects resulting from fire, earthquake, lightning, flood, damage from salt, abnormal voltage or other act of God, or other disaster.

[5] defects resulting from the intrusion of foreign material to the product, such as water, oil or metallic particles.

This warranty shall be exempted when the life of component exceeds its rated standard life.

(2) Warranty scope

Panasonic warrants the replacement of the defected parts of the product or repair of them when the defects of the product occur during the warranty period, and when the defects are under Panasonic responsibility. This warranty only covers the product itself and does not cover any damage incurred by such defects.

11. Others

- Precautions for export of this product and the equipment incorporating this product If the end user or end purpose of this product relates to military affairs, armament and so on, this product may be subject to the export regulations prescribed in “Foreign Exchange and Foreign Trade Control Law”. To export this product, take thorough examination, and follow the required export procedure.
- We cannot warrant this product, if it is used beyond the specified operating conditions.
- Compliance with the relevant standards should be considered by the user.
- The final decision on the compatibility with the installations and components at the user’s site, in terms of structure, dimensions, characteristics and other conditions, should be made by the user.
- When using this product in your equipment, be careful about the compatibility with the servo motor and the servo driver to be used together.
- For performance improvement or other reasons, some components of this product may be modified in a range that satisfies the specifications given in this document.
- Any specification change shall be based on our authorized specifications or the documents presented by the user. If a specification change may affect the functions and characteristics of this product, we will produce a trial product, and conduct examination in advance. Note that the produce price may be changed with a change in its specifications.
- We have made the best efforts to ensure the product quality. However, complete equipment at customer’s site may malfunction due to a failure of this product. Therefore, take precautions by providing fail-safe design at customer’s site, and ensure safety within the operating range of the work place.
- Failure of this product depending on its content, may generate smoke of about one cigarette. Take this into consideration when the application of the machine is clean room related.
- When the equipment runs without connecting the servomotor’s shaft electrically to ground, electrolytic corrosion may occur on the motor bearing and the bearing noise may get louder depending on the equipment and installing environment. So, customer is responsible to check and verify it.
- A customer must verify and inspect the equipment. Please be careful when using in an environment with high concentrations of sulphur or sulphuric gases, as sulpharation can lead to disconnection from the chip resistor or a poor contact connection.
- Take care to avoid inputting a supply voltage which significantly exceeds the rated range to the power supply of this product. Failure to heed this caution may result in damage to the internal parts, causing smoking and/or a fire and other trouble.
- When discard batteries, provide insulation using a tape etc. and discard the batteries abiding by a municipal law.
- This production is designed for general industry applications, and is not designed for applications of nuclear plant, aerospace, transportation, medical, various safety equipments, highly clean equipments that involve human lives, or for usage under special environment.
- When discarding the equipment, process the item as an industrial waste.

Specification for Each Model

● MINAS-A5N Series Size M

Model	MMDHT2C09ND1	MMDHT2B09ND1
Power supply input	DC24 V	DC48 V
Maximum instantaneous output current	15 A	15 A
Maximum continuous output current	9 A	9 A
Regenerative processing function	Unprovided	Unprovided
Auto gain tuning function	Provided	Provided
Dynamic brake function	Provided	Provided
Ambient temperature	0–55 degrees C	0–55 degrees C
Main power supply cable	HVSF 0. 75–2. 0 mm^2	HVSF 0. 75–2. 0 mm^2
	AWG 14–18	AWG 14–18
Ground cable	HVSF 2. 0 mm^2	HVSF 2. 0 mm^2
	AWG 14	AWG 14
Motor cable	HVSF 0.50 mm^2	HVSF 0.50 mm^2
	AWG 20 (5 A rated)	AWG 20 (5 A rated)
Inrush Current	No limit by driver	No limit by driver
Weight	Approx. 0.2 kg	Approx. 0.2 kg
Dimensions	Size M	Size M

I/O connector (CN1) default function allocation

CN1 connector		Default function			
Name	Pin number	Signal name	Parameter setting ( ): decimal notation	Symbol	Logic
SI5	4	Home	00222222h (2236962)	HOME	Normally open
SI6	5	Positive overtravel	00010101h (65793)	POT	Normally open
SI7	6	Negative overtravel	00020202h (131586)	NOT	Normally open
SO1	1,2	Motor brake release	00030303h (197379)	BRK-OFF	Normally open

Differences of Specification

This servo driver differs in the following specification to technical documents (- Functional specification -).

■ Basic Specification

Item		Description
Control mode		Full-closed control is not supported.
Encoder feedback		20bits resolution 7-wire absolute encoder
External scale feedback		Not supported.
Control signal	Input	3-input can be assigned any function with the parameter.
	Output	1-output can be assigned any function with the parameter.
Pulse signal	Output	Not supported.
Safety terminal		Not supported.
Front panel		Equipped with the followings on the PCB instead of the front panel. 1. Network status LED (See the below). 2. SON LED (See the below). 3. ALM LED (See the below). 4. Rotary switches for node address setting.
Regeneration		Not supported.
Dynamic brake		Built-in

■LED Display

This servo driver does not have 7 segment LED and it has LED shown below as an alternative to this.

Network status LED (LINK, COM)

LINK LED

Display status		Description
LED1	Not lit	Not connected (Transmission node is not powered on, or cable is broken etc.)
	Lit green	Connected normally (TX of transmission node and RX of local node are correctly connected electrically.)

COM LED

Display status		Description				
		RTEX communication status	Pr7.23 bit4 = 0		Pr7.23 bit4 = 1	
			MNM1221 status *1)	State of synchronization between communication and servo	MNM1221 status *1)	State of synchronization between communication and servo
LED2 LED3	Not lit	Not established	・INITIAL	Independent	・INITIAL	Not established
LED3	Blinking green	Established In process	・RING_CONFIG ・READY		・RING_CONFIG ・READY ・RUNNING	Not established
	Lit green	Established	・RUNNING		・RUNNING	Established
LED2	Blinking red	RTEX communication-related clearable alarm occurs.				
	Lit red	RTEX communication-related unclearable alarm occurs.				

*1) MNM1221 is an ASIC for RTEX communication control.

SON LED

Display status		Description
LED5	Lit green	Servo ON
	Not lit	Servo OFF

ALM LED

Display status		Description
LED7	Not lit	Normally
	Lit red	Alarm occurs

This servo driver does not support the following protective and warning functions.

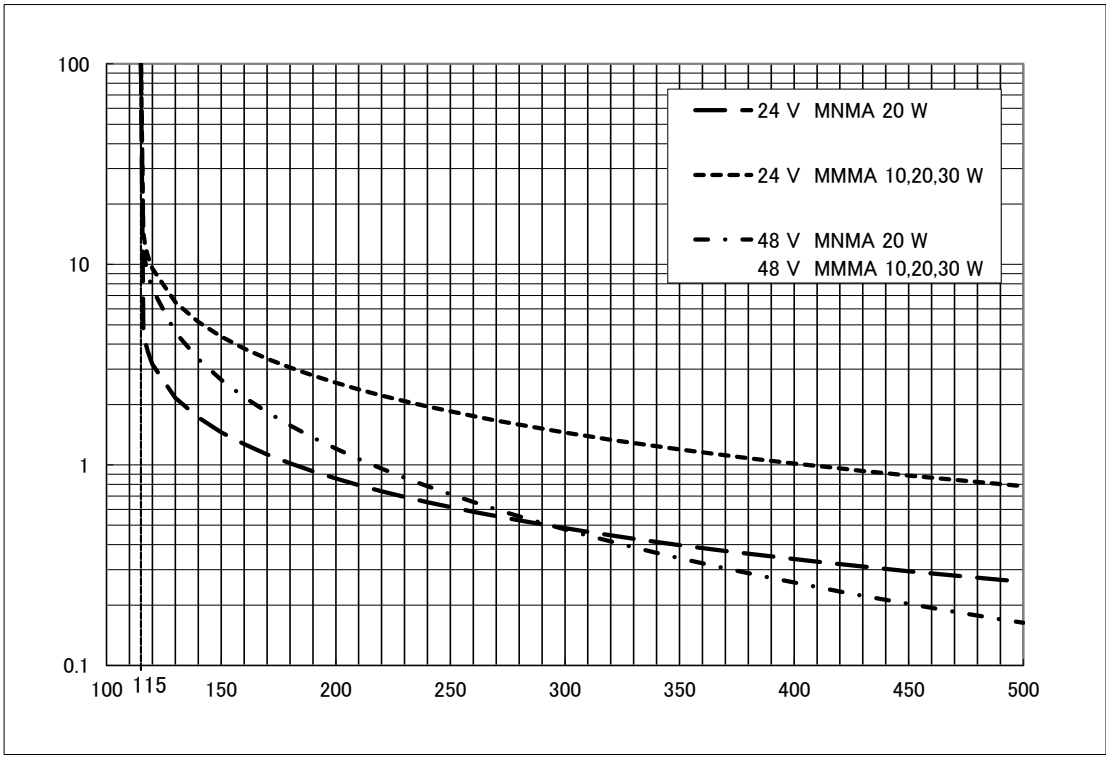
■ Protective functions

Error No.		Description
Main	Sub	
13	1	Main power supply undervoltage protection
14	1	IPM error protection
18	0	Over-regeneration load protection
	1	Over-regeneration Tr error protection
25	0	Hybrid deviation excess error protection
28	0	Limit of pulse replay error protection
29	1	Deviation counter overflow protection 1
30	0	Safety detection
33	0	Overlaps allocation error 1 protection
	2	Input function number error 1 protection
	4	Output function number error 1 protection
50	0	External scale connection error protection
	1	External scale communication error protection
51	0	External scale status 0 error protection
	1	External scale status 1 error protection
	2	External scale status 2 error protection
	3	External scale status 3 error protection
	4	External scale status 4 error protection
	5	External scale status 5 error protection
55	0	A-phase connection error protection
	1	B-phase connection error protection
	2	Z-phase connection error protection
92	1	External scale data recovery error protection
93	2	Parameter setting error protection 2
	3	External scale connection error protection

■ Warning functions

	Warning No. (Hex.)	Description
General warning	A1	Over-regeneration warning
	A3	Fan warning
	A8	External scale error warning
	A9	External scale communication warning
Extended warning	C3	Main power off warning

■ Time characteristics of overload protection



The above figure is the time characteristics of overload protection of the amplifier using the MMMA 10, 20, 30 W, and MNMA 20W motor.

Notes: Use the motor so that actual torque stays in the continuous running range shown in “S-T characteristic” of the motor.
For the S-T characteristics, see [SPECIFICATIONS] motor characteristics (S-T characteristics).

Optional Parts

Please contact Panasonic or authorized retailer for optional parts below.

Part location	Part number	Part name	Description
Power Connector CN102 CN103	DV0PM24600	Power cable	A cable with connector 5557-02R[MOLEX] on one end. (Length：around 2M)
	DV0PM24603	Connector kit for power cable	- Connector 5557-02R[MOLEX](1pc) - Connector pin 5556L[MOLEX](2pc) A connector set of the above item
I/O Connector CN1	DV0PM24602	Connector Kit for I/O cable	Connector kit MUF-PK6W-Y[JST](1pc)
Motor Connector CN101	MFMCG0036EEF	Motor cable	A cable with connector 1445022-4[TE] on one end and connector 172159-1[TE] on the other end. (Length: around 3 m)
	DV0PM24605	Motor connector kit	- Connector1445022-4[TE](1pc) - Connector pin794610-1[TE](4pc) A connector set of the above item. **(Note)For servo drive side only**.
Encoder Connector CN104	MFECA0030EAH	Absolute encoder cable (With battery case)	A cable with connector 794617-6[TE] on one end and connector 172161-1[TE] on the other end. (Length: around 3 m) A Panasonic battery case come with the cable.
	MFECA0030EAG	Absolute encoder cable (Without battery case)	A cable with connector 794617-6[TE] on one end and connector 172161-1[TE] on the other end. (Length: around 3 m)
	DV0PM24604	Connector kit for encoder	- Connector794617-6[TE](1pc) - Connector pin 1-794610-2[TE](6pc) A connector set of the above item. **(Note)For servo drive side only.**
Connector For Motor Side.	DV0PM24607	Connector kit for motor encoder connection.	- Connector 172159-1[TE](1pc) - Connector pin 170366-1[TE](4pc) - Connector 172161-1[TE](1pc) - Connector pin 170365-1[TE](9pc) A connector set of the above item. **(Note)For motor side only.**
Absolute Encoder	DV0P2990	Battery for absolute encoder	Lithium battery：3.6 V 2000 mAh (Note)When shipment by air（commercial or cargo aircraft）,there are situations where this item must be declared. When shipment by air please inquire with airlines.
Battery Case	DV0P4430	Battery case for absolute encoder	A case for absolute encoder battery to fit in to encoder cable.

(Note) These connectors may be replaced by a compatible one.

*TE: Tyco Electronics AMP

*JST: JST Group

[Default value of the parameters(1/2)]

No. SX-DSV02846

PARAMETER	MODEL	All common

Cate - gory	Pr.	Parameter	Default value
0	0	Rotational direction setup	1
	1	Control mode setup	0
	2	Real-time auto tuning setup	1
	3	Machine stiffness at real-time auto tuning	13
	4	Inertia ratio	250
	5	Not used	-
	6	Not used	-
	7	Not used	-
	8	Command pulse counts per motor revolution	0
	9	Numerator of electronic gear	1
	10	Denominator of electronic gear	1
	11	For manufacturer's use	2500
	12	For manufacturer's use	0
	13	1st Torque limit	500 *1
	14	Position deviation excess setup	100000
	15	Absolute encoder setup	1
	16	For manufacturer's use	3
	17	For manufacturer's use	0
1	0	1st gain of position loop	48.0
	1	1st gain of velocity loop	27.0
	2	1st time constant of velocity loop integration	21.0
	3	1st filter of speed detection	0
	4	1st time constant of torque filter	0.84
	5	2nd gain of position loop	57.0
	6	2nd gain of velocity loop	27.0
	7	2nd time constant of velocity loop integration	1000.0
	8	2nd filter of speed detection	0
	9	2nd time constant of torque filter	0.84
	10	Velocity feed forward gain	30.0
	11	Velocity feed forward filter	0.50
	12	Torque feed forward gain	0.0
1	13	Torque feed forward filter	0.00
	14	2nd gain setup	1
	15	Mode of position control switching	0
	16	Delay time of position control switching	5.0
	17	Level of position control switching	50
	18	Hysteresis at position control switching	33
	19	Position gain switching time	3.3
	20	Mode of velocity control switching	0
	21	Delay time of velocity control switching	0.0
	22	Level of velocity control switching	0
	23	Hysteresis at velocity control switching	0
	24	Mode of torque control switching	0
	25	Delay time of torque control switching	0.0
	26	Level of torque control switching	0
	27	Hysteresis at torque control switching	0
2	0	Adaptive filter mode setup	0
	1	1st notch frequency	5000
	2	1st notch width selection	2
	3	1st notch depth selection	0
	4	2nd notch frequency	5000
	5	2nd notch width selection	2
	6	2nd notch depth selection	0
	7	3rd notch frequency	5000
	8	3rd notch width selection	2
	9	3rd notch depth selection	0
	10	4th notch frequency	5000
	11	4th notch width selection	2
	12	4th notch depth selection	0
	13	Selection of damping filter switching	0
	14	1st damping frequency	0.0
	15	1st damping filter setup	0.0
2	16	2nd damping frequency	0.0
	17	2nd damping filter setup	0.0
	18	3rd damping frequency	0.0
	19	3rd damping filter setup	0.0
	20	4th damping frequency	0.0
	21	4th damping filter setup	0.0
	22	Position command smoothing filter	0.0
	23	Position command FIR filter	0.0
3	0	Not used	-
	1	Not used	-
	2	Not used	-
	3	Not used	-
	4	For manufacturer's use	0
	5	For manufacturer's use	0
	6	Not used	-
	7	Not used	-
	8	Not used	-
	9	Not used	-
	10	Not used	-
	11	Not used	-
	12	Acceleration time setup	0
	13	Deceleration time setup	0
	14	S-curve acceleration/deceleration time setup	0
	15	Not used	-
	16	Not used	-
	17	Speed limit selection	0
	18	Not used	-
	19	Not used	-
	20	Not used	-
	21	Speed limit value 1	0
	22	Speed limit value 2	0
3	23	For manufacturer's use	0
	24	For manufacturer's use	0
	25	For manufacturer's use	10000
	26	For manufacturer's use	0
	27	For manufacturer's use	0
	28	For manufacturer's use	16000
	29	For manufacturer's use	0
4	0	For manufacturer's use	0
	1	For manufacturer's use	0
	2	For manufacturer's use	0
	3	For manufacturer's use	0
	4	SI5 input selection	2236962
	5	SI6 input selection	65793
	6	SI7 input selection	131586
	7	For manufacturer's use	0
	8	Not used	-
	9	Not used	-
	10	SO1 output selection	197379
	11	For manufacturer's use	592137
	12	For manufacturer's use	65793
	13	Not used	-
	14	Not used	-
	15	Not used	-
	16	For manufacturer's use	0
	17	For manufacturer's use	0
	18	For manufacturer's use	4
	19	For manufacturer's use	0
	20	Not used	-
	21	For manufacturer's use	0
	22	For manufacturer's use	0
	23	For manufacturer's use	0.00
4	24	For manufacturer's use	0
	25	Not used	-
	26	Not used	-
	27	Not used	-
	28	Not used	-
	29	Not used	-
	30	Not used	-
	31	In-position range	10
	32	In-position output setup	0
	33	INP hold time	0
	34	Zero-speed	50
	35	Speed coincidence range	50
	36	At-speed	1000
	37	Mechanical brake action in stop	0
	38	Mechanical brake action in motion	0
	39	Brake release speed setup	30
	40	Warning output 1 selection	0
	41	Warning output 2 selection	0
	42	2nd in-position range	10
5	0	Not used	-
	1	Not used	-
	2	Not used	-
	3	For manufacturer's use	0
	4	Over-travel inhibit input setup	1
	5	Sequence at over-travel inhibit	0
	6	Sequence at servo-off	0
	7	For manufacturer's use	0
	8	For manufacturer's use	1
	9	For manufacturer's use	70
	10	Sequence at alarm	0
	11	Torque setup for quick stop	0

*1 The maximum Torque limit value (Pr.0.13,Pr.5.22,Pr.5.25,Pr.5.26) varies by the applicable motor.Refer to "The maximum value of Torque limit setup"

[Default value of the parameters(2/2)]

No. SX-DSV02846

PARAMETER	MODEL	All common

Cate - gory	Pr.	Parameter	Default value
5	12	Over-load level setup	0
	13	Over-speed level setup	0
	14	Motor working range setup	1.0
	15	Control input reading setup	0
	16	Not used	-
	17	Not used	-
	18	Not used	-
	19	Not used	-
	20	Position unit selection	0
	21	Torque limit selection	1
	22	2nd torque limit	500 *1
	23	Not used	-
	24	Not used	-
	25	Positive direction torque limit	500 *1
	26	Negative direction torque limit	500 *1
	27	Not used	-
	28	Not used	-
	29	For manufacturer's use	2
	30	Not used	-
	31	USB axis address	1
	32	Not used	-
	33	For manufacturer's use	0
	34	For manufacturer's use	4
6	0	Not used	-
	1	Not used	-
	2	Velocity deviation excess setup	0
	3	Not used	-
	4	Not used	-
	5	Position 3rd gain valid time	0.0
	6	Position 3rd gain scaling factor	100
	7	Torque command additional value	0

Cate - gory	Pr.	Parameter	Default value
6	8	Positive direction torque compensation	0
	9	Negative direction torque compensation	0
	10	Function expansion setup	0
	11	Current response setup	100
	12	Not used	-
	13	Not used	-
	14	Quick stop time at alarm	200
	15	2nd over-speed level setup	0
	16	Not used	-
	17	Not used	-
	18	Power-up wait time	0
	19	For manufacturer's use	0
	20	For manufacturer's use	0
	21	For manufacturer's use	0
	22	For manufacturer's use	0
	23	Disturbance torque compensating gain	0
	24	Disturbance observer filter	0.53
	25	Not used	-
	26	Not used	-
	27	Warning latch setup	0
	28	Not used	-
	29	Not used	-
	30	Not used	-
	31	Real-time auto tuning estimation speed	1
	32	Real-time auto tuning custom setup	0
	33	Not used	-
	34	For manufacturer's use	0.0
	35	For manufacturer's use	0.10
	36	Not used	-
	37	Oscillation detecting level	0.0
	38	Warning mask setup	4

Cate - gory	Pr.	Parameter	Default value
6	39	For manufacturer's use	0
	40	For manufacturer's use	0
	41	1st damping filter depth	0
	42	2 stage torque filter	0
	43	2 stage torque filter damping	1000
	44	Not used	-
	45	Not used	-
	46	Not used	-
	47	Function expansion setup 2	0
	48	Compensation filter	0
	49	Instruction and Compensation filter Attenuation clause setup	0
	50	Viscous friction compensation gain	0
	51	Immediate cessation completion waiting time	0
7	0	For manufacturer's use	0
	1	For manufacturer's use	0
	2	Not used	-
	3	Torque limited output setup	0
	4	For manufacturer's use	0
	5	For manufacturer's use	0
	6	For manufacturer's use	0
	7	For manufacturer's use	0
	8	For manufacturer's use	0
	9	For manufacturer's use	360
	10	Profile software-limit function	0
	11	Profile positive software-limit value	500000
	12	Profile negative software-limit value	-500000
	13	Home offset for absolute encoder	0
	14	For manufacturer's use	0
	15	NEAR range	10
	16	Torque number of protection Saturation error	-
	17	Not used	-

Cate - gory	Pr.	Parameter	Default value
7	18	Not used	-
	19	Not used	-
	20	RTEX communication period	3
	21	RTEX command update period	2
	22	RTEX function expansion 1	0
	23	RTEX function expansion 2	18
	24	RTEX function expansion 3	0
	25	RTEX velocity unit	0
	26	RTEX warning setup of continuous com. Error	0
	27	RTEX warning setup of cumulative com. Error	0
	28	RTEX update counter warning setup of error	0
	29	RTEX monitor selection 1	0
	30	RTEX monitor selection 2	0
	31	RTEX monitor selection 3	0
	32	RTEX monitor selection 4	0
	33	RTEX monitor selection 5	0
	34	RTEX monitor selection 6	0
	35	RTEX command setup 1	0
	36	RTEX command setup 2	0
	37	RTEX command setup 3	0
	38	RTEX update counter protection setup of error	0
	39	For manufacturer's use	0
8	0	For manufacturer's use	0
	1	Profile linear acceleration	100
	2	For manufacturer's use	0
	3	For manufacturer's use	0
	4	Profile linear deceleration	100
	5	For manufacturer's use	0
	6	Not used	-
	7	Not used	-
	8	Not used	-

Cate - gory	Pr.	Parameter	Default value
8	9	Not used	-
	10	Profile distance after position latched	0
	11	Not used	-
	12	Profile homing mode	0
	13	Profile homing speed 1	50
	14	Profile homing speed 2	5
	15	For manufacturer's use	0
	16	Not used	-
	17	Not used	-
	18	Not used	-
	19	For manufacturer's use	0

*1 The maximum Torque limit value (Pr.0.13,Pr.5.22,Pr.5.25,Pr.5.26) varies by the applicable motor.Refer to "The maximum value of Torque limit setup"

[The maximum value of Torque limit setup]

Size	Mode	Applicable motor	The maximum value of Torque limit setup
M	MMDHT2C09ND1	MMMA1AC***	330
		MMMA2AC***	250
		MMMA3AC***	250
		MNMA2AC***	285
	MMDHT2B09ND1	MMMA1AB***	300
		MMMA2AB***	300
		MMMA3AB***	300
		MNMA2AB***	300