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SPECIFICATIONS

Product Name : AC servo driver
Product Series Name : MINAS-A6N series
Product Model Number : DC24 / 48 V type

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

Panasonic

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1. Scope of Application

This specification relates to the MINAS A6N series of AC servo driver manufactured by the Motion Control Business Unit, Industrial Device Business Division, Panasonic Industry Co., Ltd.

This product is intended for use as industrial equipment. It must not be used for any other purpose (e.g., for home use).

<Related Materials>

Rotary type

Technical Reference - Function Specification - : SX-DSV03077

Technical Reference - Realtime Express (RTEX) Communication Specification - : SX-DSV03078

Linear / DD / VCM type

Technical Reference - Function Specification - : SX-DSV03182

Technical Reference - Realtime Express (RTEX) Communication Specification - : SX-DSV03212

* Please refer to the Panasonic web site for the above documents.

<Precautions >

- (1) Reproduction of the contents of this document in whole or in part is strictly prohibited.
- (2) Due to product improvements, this document is subject to change without notice.

<Applicable motor type >

The description of the terms on this document is based on "Rotary type".

When using "Linear type", read as shown in the table above.

Motor type	Rotary motor	Linear motor
Classification on this document	Rotary type	Linear type
Related terms	Inertia (unit : kgm ²)	Mass (unit : kg)
	Torque (unit : Nm)	Thrust (unit : N)
	r/min	mm/s
	rotation	movement

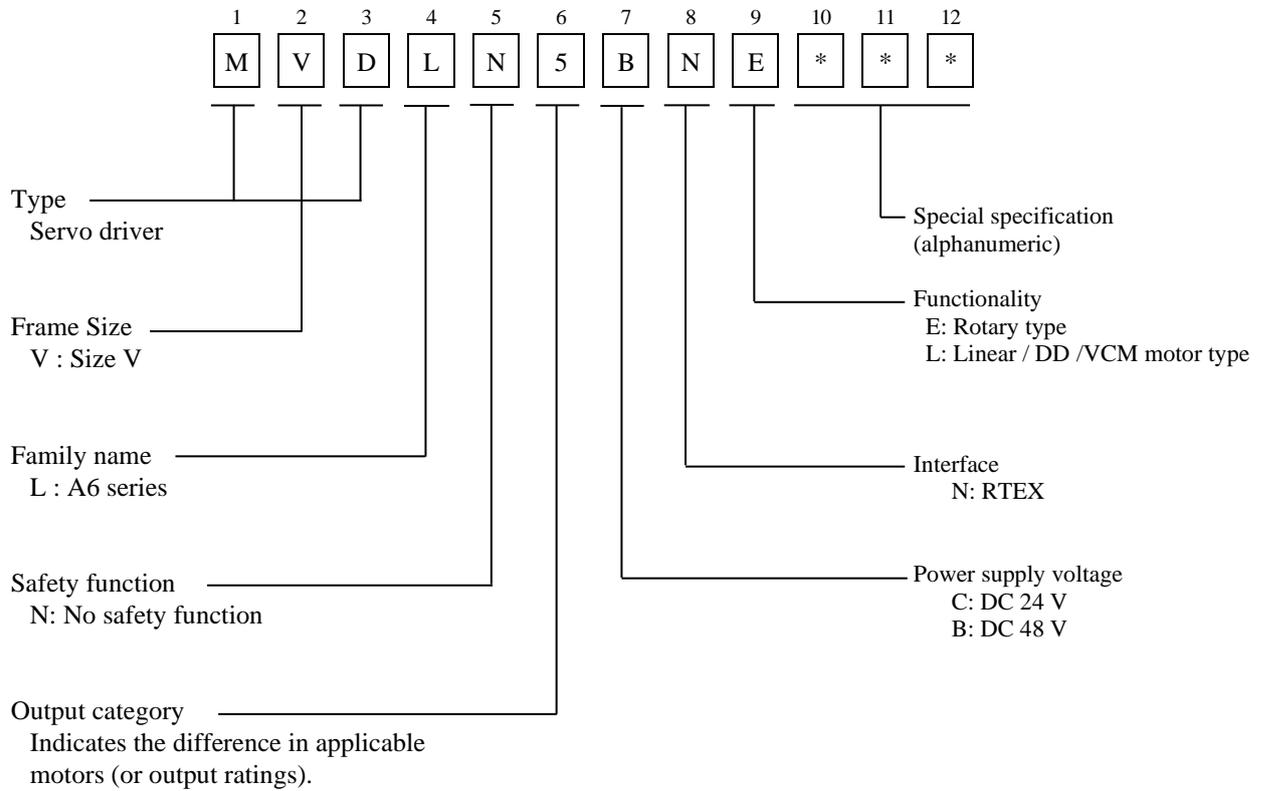
Operating Precautions

Pay a special attention to following items because the part of internal board is exposed.

- When unpacking and installing, implement the measure against static electricity and handle it with great caution.
- Install the servo driver in an environment of Pollution degree 2, such as in the control panel of IP54 or more.

2. How to Read Product Numbers

Product numbers are to be read as follows:



3. Product line-up

3-1 Rotary type

Servo driver			Applicable motor		
Model No.	Size	Power supply input	Model No.	Rated power	Rated speed
MVDLN4CNE	V	DC 24 V	MSMF5AC Δ 1□2*	50W	3000r/min
MVDLN5CNE			MSMF01C Δ 1□2*	100W	
			MQMF01C Δ 1□2*	133W	2000r/min
MVDLN4BNE		DC 48 V	MSMF5AB Δ 1□2*	50W	3000r/min
			MHMF5AB Δ 1□2*	100W	
MSMF01B Δ 1□2*			200W		
MQMF01B Δ 1□2*				266W	2000r/min
MVDLN5BNE		MHMF01B Δ 1□2*	266W		2000r/min
	MQMF02B Δ 1□2*				
MVDLN5BNE	MHMF02B Δ 1□2*	266W	2000r/min		
	MQMF2JB Δ 1□2*				
MVDLN5BNE	MHMF2JB Δ 1□2*	266W	2000r/min		
	MHMF2JB Δ 1□2*				

3-2 Linear / DD /VCM type

Servo driver			Applicable motor			
Model No.	Size	Power supply input	Rated current [Arms]			Maximum current [Arms]
			Carrier frequency			
			6 kHz	8 kHz	12 kHz	
MVDLN0CNL	V	DC 24 V	—	—	0.6	0.9
MVDLN1CNL			—	—	1.5	2
MVDLN2CNL			—	—	2.5	4
MVDLN3CNL			—	—	4	9
MVDLN4CNL			—	—	6	19
MVDLN5CNL			9.4	—	—	30.4
MVDLN0BNL		DC 48 V	—	—	0.6	0.9
MVDLN1BNL			—	—	1.5	2
MVDLN2BNL			—	—	2.5	4
MVDLN3BNL			—	—	4	9
MVDLN4BNL			—	—	6	19
MVDLN5BNL			8.6	—	—	30.4

4. Specifications

4-1 Basic specifications of rotary type

Basic specifications	Input power supply	24 V type	DC24 V	+21 % (DC29 V) -17 % (DC20 V)	(*Note 1,2)	
		48 V type	DC48 V	+21 % (DC58 V) -17 % (DC40 V)	(*Note 1,2)	
	Operation conditions	Temperature	Operation temperature: 0 - 55 degrees C (no freezing) Storage temperature: -20 - 65 degrees C (Max.temperature guarantee : 80 degrees C for 72 hours no condensation *Note 3)			
		Humidity	Operation and storage humidity 20 - 85 %RH or less (no condensation *Note 3)			
		Height above the sea	Height above the sea level: 1000 meters or less			
		Vibration	5.88 m/s ² or less, 10 - 60 Hz			
		Pollution degree	Pollution degree 2			
	Insulation voltage		Resistant to 500 V AC between primary power supply and ground for a minute			
	Control method		MOSFET PWM method, sinusoidal drive			
	Encoder feedback		23Bit(resolution:8388608) 7cores-serial absolute encoder			
	Control signal	Input	General purpose 8 input General purpose input functions can be selected by parameter.			
		Output	General purpose 2 output, alarm 1ouput General purpose output functions can be selected by parameter.			
	Pulse signal	Output	3 outputs Encoder pulse (A/B phase) or position comparison is output by using the line driver.			
	Communication	USB	USB interface to connect to computers (setup software PANATERM) for parameter setting or status monitoring.			
		Realtime Express (RTEX)	Real-time operation command transmission, parameter setting, status monitoring, etc.			
	Safety terminal		Not supported.			
	Front panel		Not supported.			
	Regenerative discharge		Not supported.			
	Dynamic brake		Built-in type			
	Control mode		Position control: Profile position control (PP), cyclic position control (CP) Speed control: Cyclic speed control (CV) Torque control: Cyclic torque control (CT) PP, CP, CV, and CT above are switched by the RTEX communication command.			

(Note 1) DC power using stabilized power supply (SELV) are provided with reinforced insulation.

Please do fluctuations in the DC power supply voltage does not exceed the supply voltage range of the servo driver also.

(Note 2) The servo driver can functionally drive the motor within the range of the input power supply voltage.

When input power supply voltage is below the rated value (24 V/48 V), overload protection might be triggered even speed and torque are within the rated range at some motor's specifications.

(Note 3) Please note that condensation tend to occur when temperature fall.

4-2 Basic specifications of linear / DD /VCM motor

Basic specifications	Input power supply		24 V type	DC24 V	+21 % (DC29 V) -17 % (DC20 V)	(*Note 1,2)	
			48 V type	DC48 V	+21 % (DC58 V) -17 % (DC40 V)	(*Note 1,2)	
	Operation conditions		Temperature	Operation temperature: 0 - 55 degrees C (no freezing) Storage temperature: -20 - 65 degrees C (Max.temperature guarantee : 80 degrees C for 72 hours no condensation *Note 3)			
			Humidity	Operation and storage humidity 20 - 85 %RH or less (no condensation *Note 3)			
			Height above the sea	Height above the sea level: 1000 meters or less			
			Vibration	5.88 m/s ² or less, 10 - 60 Hz			
			Pollution degree	Pollution degree 2			
	Insulation voltage		Resistant to 500 V AC between primary power supply and ground for a minute				
	Control method		MOSFET PWM method, sinusoidal drive				
	CS signal feedback		CS signal input (CS1, CS2, CS3) Compatible with TTL level input				
	Feedback scale		A/B phase, homing signal defferential input type Panasonic supported serial communication type				
	Control signal		Input	General purpose 8 input General purpose input functions can be selected by parameter.			
			Output	General purpose 2 output, alarm 1ouput General purpose output functions can be selected by parameter.			
	Pulse signal	Output	3 outputs Encoder pulse (A/B phase) or position comparison is output by using the line driver.				
	Communication		USB	USB interface to connect to computers (setup software PANATERM) for parameter setting or status monitoring.			
			Realtime Express (RTEX)	Real-time operation command transmission, parameter setting, status monitoring, etc.			
	Safety terminal		Not supported.				
	Front panel		Not supported.				
	Regenerative discharge		Not supported.				
	Dynamic brake		Built-in type				
Control mode		Position control: Profile position control (PP), cyclic position control (CP) Speed control: Cyclic speed control (CV) Torque control: Cyclic torque control (CT) PP, CP, CV, and CT above are switched by the RTEX communication command.					

(Note 1) DC power using stabilized power supply (SELV) are provided with reinforced insulation.

Please do fluctuations in the DC power supply voltage does not exceed the supply voltage range of the servo driver also.

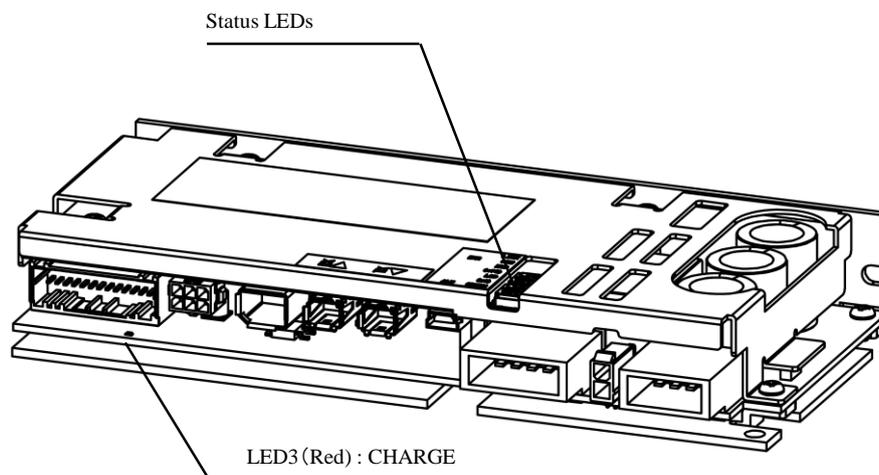
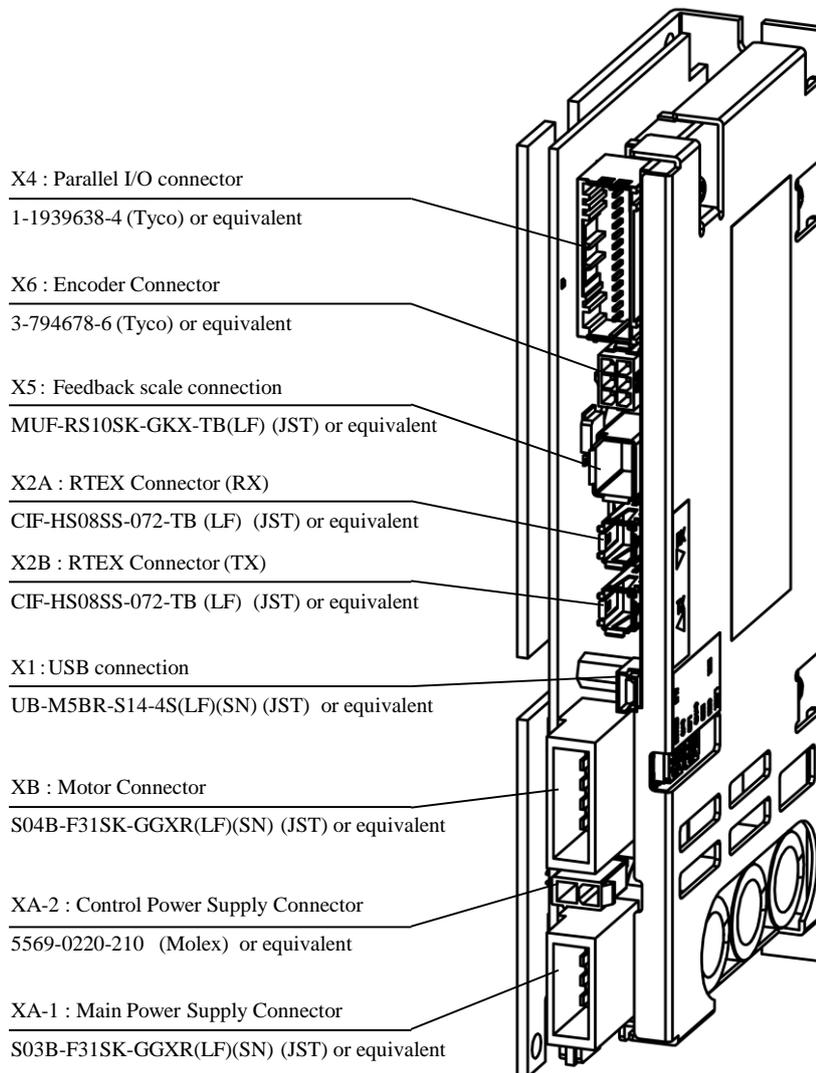
(Note 2) The servo driver can functionally drive the motor within the range of the input power supply voltage.

When input power supply voltage is below the rated value (24 V/48 V), overload protection might be triggered even speed and torque are within the rated range at some motor's specifications.

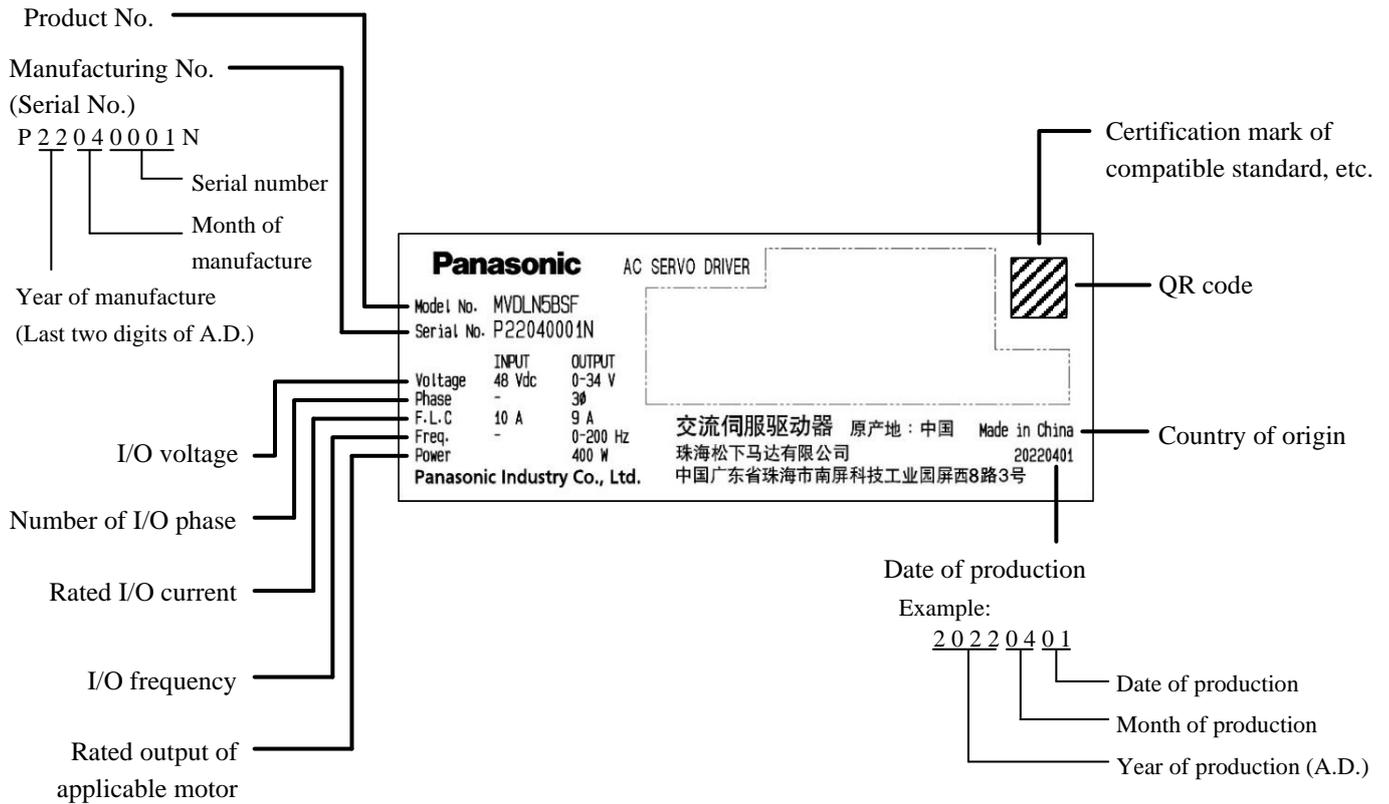
(Note 3) Please note that condensation tend to occur when temperature fall.

5. Appearance and name of each part

Below figure shows linear / DD / VCM type. Rotary type is not provided with X5 (feedback scale connector).



Example of a rating plate

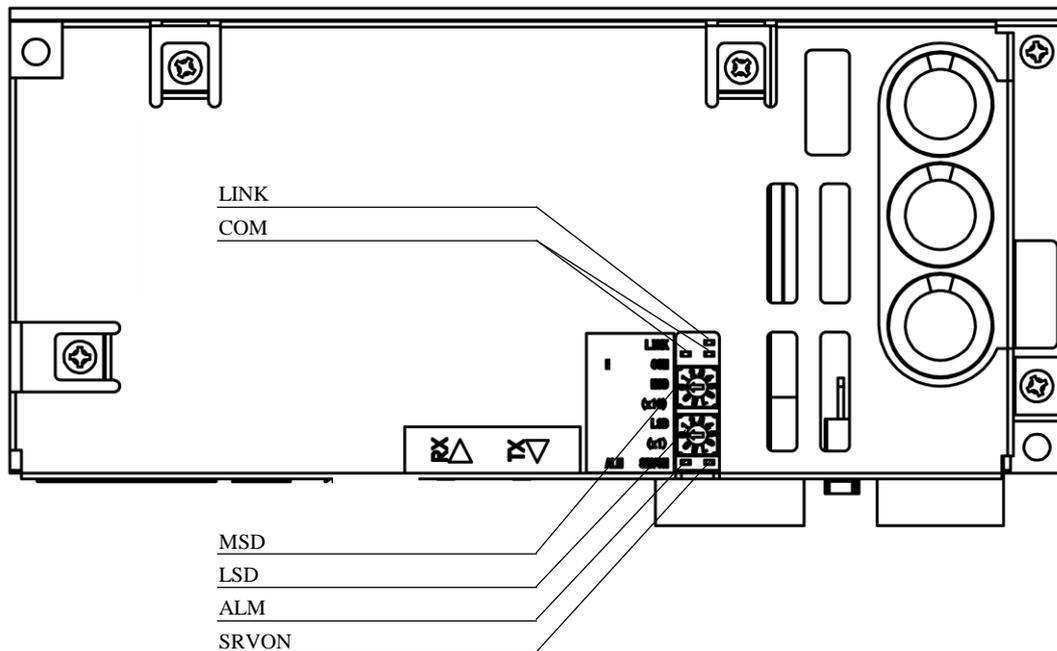


The values of the serial number part of the manufacturing number range from 1 to 33999. On the rating plate, it is indicated in four digits as in the format shown below.

“I” and “O” are not used for the fourth-digit alphabet.

Value of the serial number part	Indication on the rating plate
1 - 9999	0001 - 9999
10000 - 10999	A000 - A999
11000 - 11999	B000 - B999
⋮	⋮
17000 - 17999	H000 - H999
18000 - 18999	J000 - J999
⋮	⋮
22000 - 22999	N000 - N999
23000 - 23999	P000 - P999
⋮	⋮
33000 - 33999	Z000 - Z999

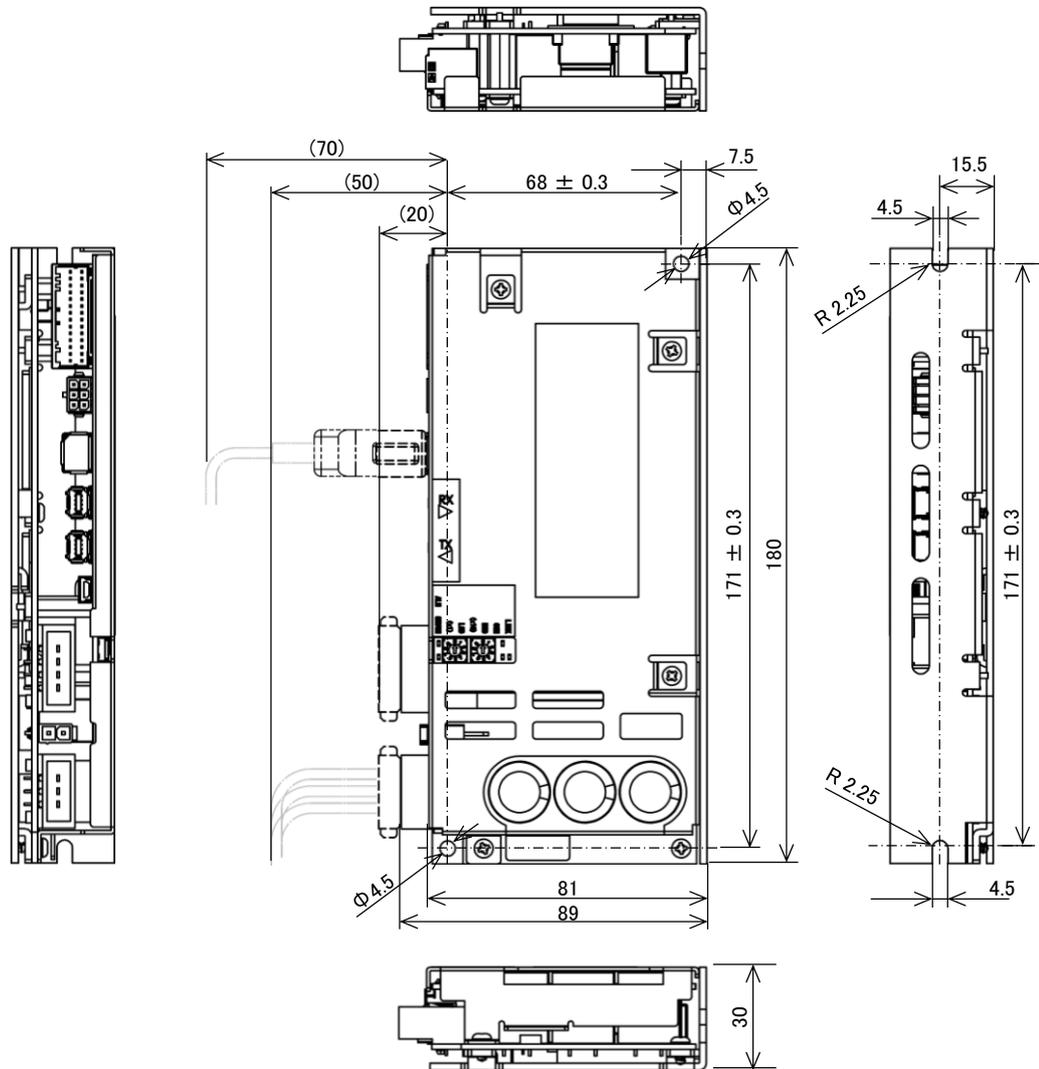
Status LEDs



Symbol	Name	Color	LED Status	Description
ALM	Alarm LED	Red	Lighting on	Alarm occurs
			Lighting off	Normally
SRVON	Servo-ON LED	Green	Lighting on	Servo ON
			Lighting off	Servo OFF
COM	Realtime Express (RTEX) Communication LED	Green	LED status indicate status of network communication. For details of communication status, please refer to Technical Reference - Realtime Express (RTEX) Communication Specification - .	
LINK		Red		
LINK		Green		
MSD	Rotary switch for node address setting	-	Rotary switch (2-digit) for node address setting. Setting range: 0 – 31. Node address = MSD value * 10 + LSD value.	
LSD				

6. Outside dimensions

Below figure shows linear / DD / VCM type. Rotary type is not provided with $\times 5$ (feedback scale connector).



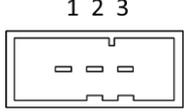
Unit: mm

* Do not use threaded screw holes that do not have description of dimensions.

7. Configuration of connectors and terminal blocks

7-1 Main Power Supply Connector **XA-1**

Servo driver side: J. S. T. Mfg S03B-F31SK-GGXR(LF)(AU)

Pin No.	Symbol	Description	Layout
1	P1 (+ Line)	<ul style="list-style-type: none"> • Input DC48 V or DC24 V. • Use stabilized DC power source with reinforced insulation. 	
2	N1 (- Line)		
3	FG	<ul style="list-style-type: none"> • Frame ground 	

7-2 Control Power Supply Connector **XA-2**

Servo driver side: Molex 5569-02A2-210

Pin No.	Symbol	Description	Layout
1	P2 (+ Line)	<ul style="list-style-type: none"> • Input DC48 V or DC24 V. • Use stabilized DC power source with reinforced insulation. 	
2	N2 (- Line)		

* There is no anti-connection function on the driver.

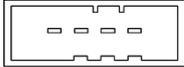
Reverse connection is caused of failure.

Enough attention to the power supply wiring.

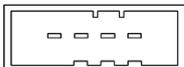
N-pin of Main power supply connector **XA-1** connect to control power supply connector **XA-2**.7-3 Motor Connector **XB**

Servo driver side: J. S. T. Mfg S04B-F31SK-GGXR(LF)(AU)

Rotary / Linear / DD type

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 frame ground wire of the motor	

VCM type

Pin No.	Symbol	Description	Layout
1	U	Connect U phase of the motor winding	
2	—	Do not connect anything	
3	W	Connect W phase of the motor winding	
4	FG	Connect frame ground wire of the motor	

* VCM is a single-phase motor, so use only 1-pin, 3-pin and 4-pin.

7-4 USB connector **X1**

Operations such as parameter setting/change, control status monitoring, error status/history browsing, and parameter saving/loading can be performed by connecting to a PC or a high-order NC via a USB connector.

Name	Symbol	Pin No.	Description
USB signal	VBUS	1	Used for communication with a PC or a high-order NC.
	D-	2	
	D+	3	
For manufacturer use	—	4	Do not connect anything.
Signal ground	GND	5	Signal ground

The connector shape on the driver side is USB mini-B.

7-5 RTEX connectors **X2A** **X2B****X2A** RX connector

Name	Symbol	Pin No.	Description
Not used	-	1	• Connect with the 1 pin of the TX connector for the transmission side node.
Not used	-	2	• Connect with the 2 pin of the TX connector for the transmission side node.
Network input +	RX+	3	• Connect with the 3 pin of the TX connector for the transmission side node.
Not used	-	4	• Connect with the 4 pin of the TX connector for the transmission side node.
Not used	-	5	• Connect with the 5 pin of the TX connector for the transmission side node.
Network input -	RX-	6	• Connect with the 6 pin of the TX connector for the transmission side node.
Not used	-	7	• Connect with the 7 pin of the TX connector for the transmission side node.
Not used	-	8	• Connect with the 8 pin of the TX connector for the transmission side node.
Frame ground	FG	Shell	• Connect with the cable shield.

X2B TX connector

Name	Symbol	Pin No.	Description
Not used	-	1	• Connect with the 1 pin of the RX connector for the reception side node.
Not used	-	2	• Connect with the 2 pin of the RX connector for the reception side node.
Network output +	TX+	3	• Connect with the 3 pin of the RX connector for the reception side node.
Not used	-	4	• Connect with the 4 pin of the RX connector for the reception side node.
Not used	-	5	• Connect with the 5 pin of the RX connector for the reception side node.
Network output -	TX-	6	• Connect with the 6 pin of the RX connector for the reception side node.
Not used	-	7	• Connect with the 7 pin of the RX connector for the reception side node.
Not used	-	8	• Connect with the 8 pin of the RX connector for the reception side node.
Frame ground	FG	Shell	• Connect with the cable shield.

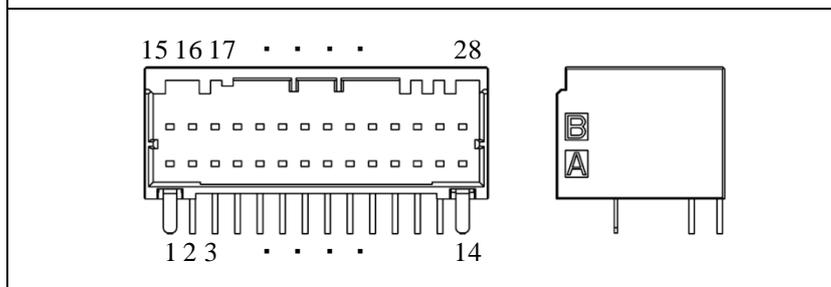
* Be sure to use shielded twisted pair (STP) compatible with 5e of TIA/EIA-568 or higher category

7-6 Parallel I/O connector, **X4**

A list of the pin assignment of the parallel I / O connector is as follows.
For details of each function, please refer the following pages.

Pin No.	Symbol	Description
1	SO1+	Control output 1
2	SO1-	
3	ALM+	Alarm output
4	ALM-	
5	SI1	Control input 1
6	SI-COM	Control input common
7	SI2	Control input 2
8	SI3	Control input 3
9	SI4	Control input 4
10	SI5	Control input 5
11	SI6	Control input 6
12	SI7	Control input 7
13	SI8	Control input 8
14	—	No use
15	—	
16	GND	Signal ground
17	OA+/OCMP1+	A-phase output / Position compare output 1
18	OA-/OCMP1-	
19	OB-/OCMP2-	B-phase output / Position compare output 2
20	OB+/OCMP2+	
21	OCMP3+	Position compare output 3
22	OCMP3-	
23	—	No use
24	GND	Signal ground
25	SO2+	Control output 2
26	SO2-	
27	GND	Signal ground
28	FG	Frame ground

Pin layout



Input signal (control)

Name	Symbol	Pin No.	Description	Circuit
Control input common	SI-COM	6	<ul style="list-style-type: none"> It is connected with the positive or negative electrode of the external DC power supply (12 - 24 V). Use 12 V ($\pm 5\%$) to 24 V ($\pm 5\%$) for power supply It needs to be isolated from the primary side power supply. Do not connect with the same power supply. Primary side power supply: Power supply for motor brake	i-1
Control input 1	SI1	5	<ul style="list-style-type: none"> Functions are allocated according to parameters. For details, refer to "Technical reference - Basic Functional Specifications -". Note that there are limitations on function allocation. 	
Control input 2	SI2	7		
Control input 3	SI3	8		
Control input 4	SI4	9		
Control input 5	SI5	10		
Control input 6	SI6	11		
Control input 7	SI7	12		
Control input 8	SI8	13		

Output signal (control)

Name	Symbol	Pin No.	Description	Circuit
Control output 1	SO1+ SO1-	1 2	<ul style="list-style-type: none"> Functions are allocated according to parameters. For details, refer to "Technical reference - Basic Functional Specifications -".	o-1
Control output 2	SO2+ SO2-	25 26		
Alarm output	ALM+ ALM-	3 4	<ul style="list-style-type: none"> Output for alarm of servo driver. Normally: output transistor ON Alarm: output transistor OFF 	

Encoder output signal / Position compare output signal

Name	Symbol	Pin No.	Description	Circuit
A-phase output / Position compare output 1	OA+ / OCMP1+	17	<ul style="list-style-type: none"> Encoder signals or feedback scale signals for which frequency division was performed (A-phase, B-phase) are output as differential signals. (Equivalent to RS422) The division ratio can be set for the corresponding parameter. 	Do-1
	OA- / OCMP1-	18		
B-phase output / Position compare output 2	OB+ / OCMP2+	20	<ul style="list-style-type: none"> The ground of the line driver for the output circuit is connected to the signal ground (GND), i.e. non-insulated. The maximum output frequency is 4 Mpps (after quad edge evaluation). This differential signal should be received by a line receiver. (AM26C32 or equivalent). Connect a terminating resistor (approx. 330 Ω) between the line receiver inputs. 	
	OB- / OCMP2-	19		
Position compare output 3	OCMP3+	21	<ul style="list-style-type: none"> Use a twisted pair cable with shield for wiring, and connect the shield wire to the connector shell. By setting bit 0 - bit 2 = 1 of Pr4.47 "Pulse output select", position compare function can be available. 	
	OCMP3-	22		

Other

Name	Symbol	Pin No.	Description	Circuit
Frame ground	FG	28	<ul style="list-style-type: none"> Internally connect to the case.. 	-
Signal ground	GND	16 24 27	<ul style="list-style-type: none"> Signal ground Internally connect to N-pin of power supply connector <u>XA-1</u> and <u>XA-2</u>. 	-
Reserved	-	14 15 23	<ul style="list-style-type: none"> Do not connect anything 	-

7-7 Feedback scale connector **X5**

This connector is supported only for the linear / DD / VCM type.

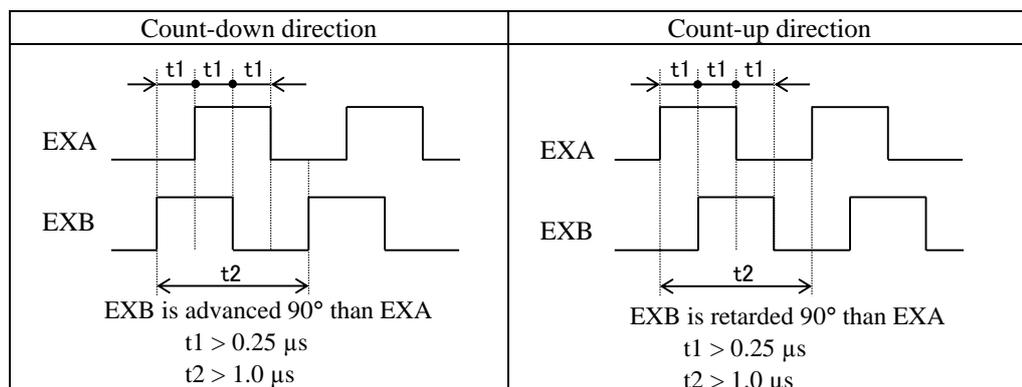
Name	Symbol	Pin No.	Description
Feedback scale power output	EX5V	1	• Feedback scale power output (Note 2) (Note 3)
	EX0V	2	• Ground of feedback scale power output (Note 1)
Feedback scale signal input/output (Serial signal)	EXPS	3	• Serial signal non-inverting input/output
	/EXPS	4	• Serial signal inverting input/output
Feedback scale signal input (A/B/Z-phase signal) (Note 4)	EXA	5	• A-phase signal non-inverting input
	/EXA	6	• A-phase signal inverting input
	EXB	7	• B-phase signal non-inverting input
	/EXB	8	• B-phase signal inverting input
	EXZ	9	• Z-phase signal non-inverting input
	/EXZ	10	• Z-phase signal inverting input
Frame ground	FG	Shell	• It is connected with the earth terminal inside the servo driver.

(Note 1) The feedback scale power output EX0V is connected with the control circuit ground that is connected to connector **X4**.

(Note 2) The feedback scale power output EX5V should be $5\text{ V}\pm 5\%$ and 250 mA at the maximum.
When using an feedback scale whose consumption current exceeds this value, external power supply should be prepared by the customer. It may take time to perform initialization after power-on, depending on feedback scales.

(Note 3) In case an external power supply is used for the feedback scale, make sure that the EX5V pin is open and no external power is supplied to the EX5V pin.

(Note 4) The maximum input frequency is 4 Mpps (after quad edge evaluation).
However, if the duty ratio of the feedback scale signal input is not 50%, it may not be able to be read normally.



7-8 Encoder / CS signal connector **X6**

Rotary type

Name	Symbol	Pin No.	Description	Layout
—	—	1	Do not connect.	
Encoder signal I/O (serial signal)	PS	2	Encoder signal non-inverting input/output	
	/PS	3	Encoder signal inverting input/output	
Encoder power supply output	E5V	4	E5V (*Note 1)	
	E0V	5	E0V (*Note 2)	
Frame ground	FG	6	FG	

*Note 1) The encoder power output E5V is connected with the control circuit ground that is connected to connector **X5** inside the servo driver.

*Note 2) The encoder power output E0V is connected with the control circuit ground that is connected to Pin.1(E5V) of connector **X5** and signal ground of connector **X4** inside the servo driver.

Linear / DD / VCM type

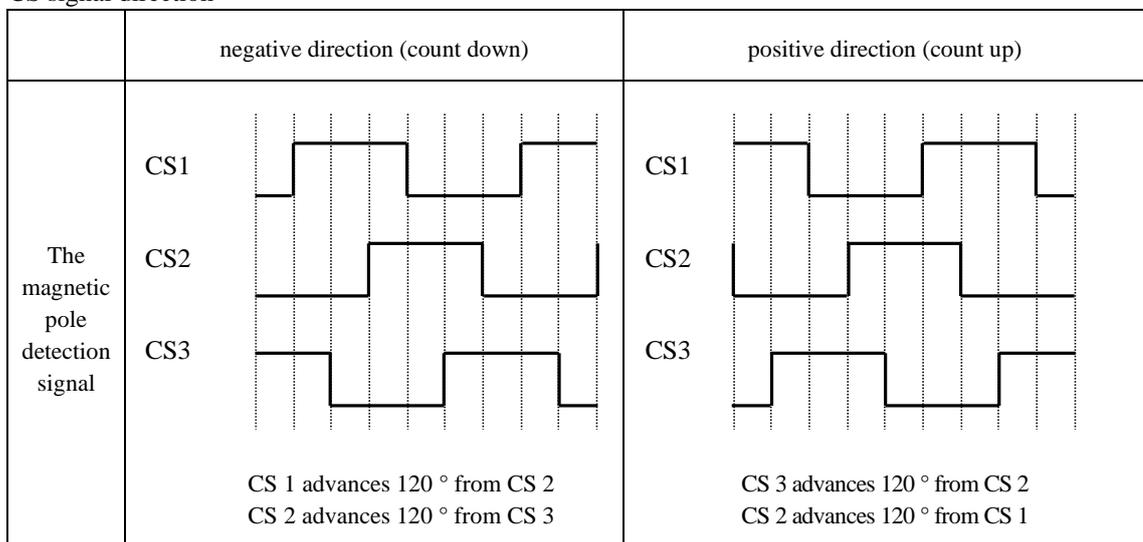
Name	Symbol	Pin No.	Description	Circuit	Layout
CS signal input	CS3	1	CS3 signal input	i-2	
	CS2	2	CS2 signal input		
	CS1	3	CS1 signal input		
CS signal power supply output	E5V	4	CS signal power supply output (*Note 1)	—	
	E0V	5	CS signal power supply output ground (*Note 2)	—	
Frame ground	FG	6	FG	—	

*Note 1) The CS signal power output E5V is connected with the control circuit ground that is connected to connector **X5** inside the servo driver.

*Note 2) The CS signal power output E0V is connected with the control circuit ground that is connected to Pin.1(E5V) of connector **X5** and signal ground of connector **X4** inside the servo driver.

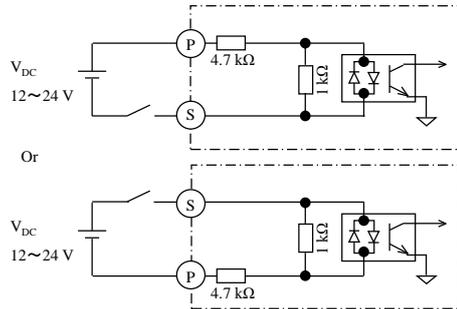
The relationship between the CS signal and the moving direction of the linear motor is shown below.

CS signal direction



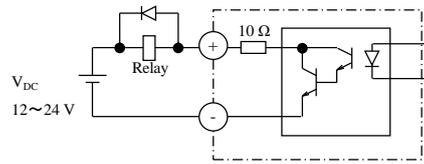
7-9 Input / output signal interface

i-1



Pins:
S: (X4) 5,7,8,9,10,11,12,13
P: (X4) 6

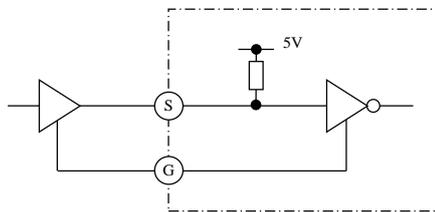
o-1



Pins:
+ : (X4)1, 3,25
- : (X4)2, 4,26

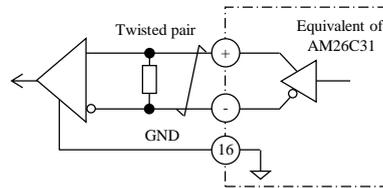
Note) To directly run the relay, attach a diode in parallel with the relay and in the direction shown in the figure above.

i-2



Pins:
S: (X6) 1, 2, 3
G: (X6) 5

Do-1



Pins:
+ : 17, 20, 21
- : 18, 19, 22

Note) Connect a terminating resistor (approx. 330 Ω) between the input terminals of the line receiver.

8. Wiring and system configuration

8-1 Wire rods used and maximum wiring length

Name	Symbol	Maximum cable length (*Note 1)	Used cable
Main power supply	XA-1	3 m	In accordance with “16. Specifications for Each Model”
Control power supply	XA-2	3 m	
Motor connection	XB	3 m	
RTEX connection	X2A, X2B	50 m (*Note 3)	TIA/EIA-568 CAT5e STP
Parallel I/O connection	X4	3 m	Common shielded twisted pair wire Core wire 0.18 mm ² or more
Feedback scale connection (*Note 2)	X5	3 m	
Encoder / CS signal connection	X6	3 m	

(Note 1) The above wiring length is the maximum value under the evaluation environment of Panasonic.

It does not guarantee the operation under the working environment of the customer.

The above wiring length is the maximum wiring length including tolerance of processing.

(Note 2) It is supported for the linear / DD / VCM type only.

(Note 3) For details, refer to “8-3-2 Connection to connectors X2A and X2B”.

8-2 Cable-Side connector

Connector symbol	Part name	Part number	Manufacturer
XA-1	Receptacle Housing	F31FSS-03V-KX	J.S.T. Mfg.
	Receptacle pin	SF3F-**GF-P2.0 (* = 41 or 71)	
XA-2	Receptacle Housing	5557-02R-210	Molex
	Receptacle pin	5556TL	
XB	Receptacle Housing	F31FSS-04V-KX	J.S.T. Mfg.
	Receptacle pin	SF3F-**GF-P2.0 (* = 41 or 71)	
X2A / X2B	Connector	1-2201855-2	Tyco electronics
		CIF-PCNS08KK-072R	J.S.T. Mfg.
X4	Receptacle Housing	1-1827863-4	Tyco electronics
	Receptacle pin	1827587-2	
X5	Connector	MUF-PK10K-X	J.S.T. Mfg.
X6	Connector	794617-6	Tyco Electronics
	Pin	1-794610-2	
	Connector	43025-0600	Molex
	Pin	43030-0002	

Use the above connector or equivalent.

8-3 Precautions for wiring

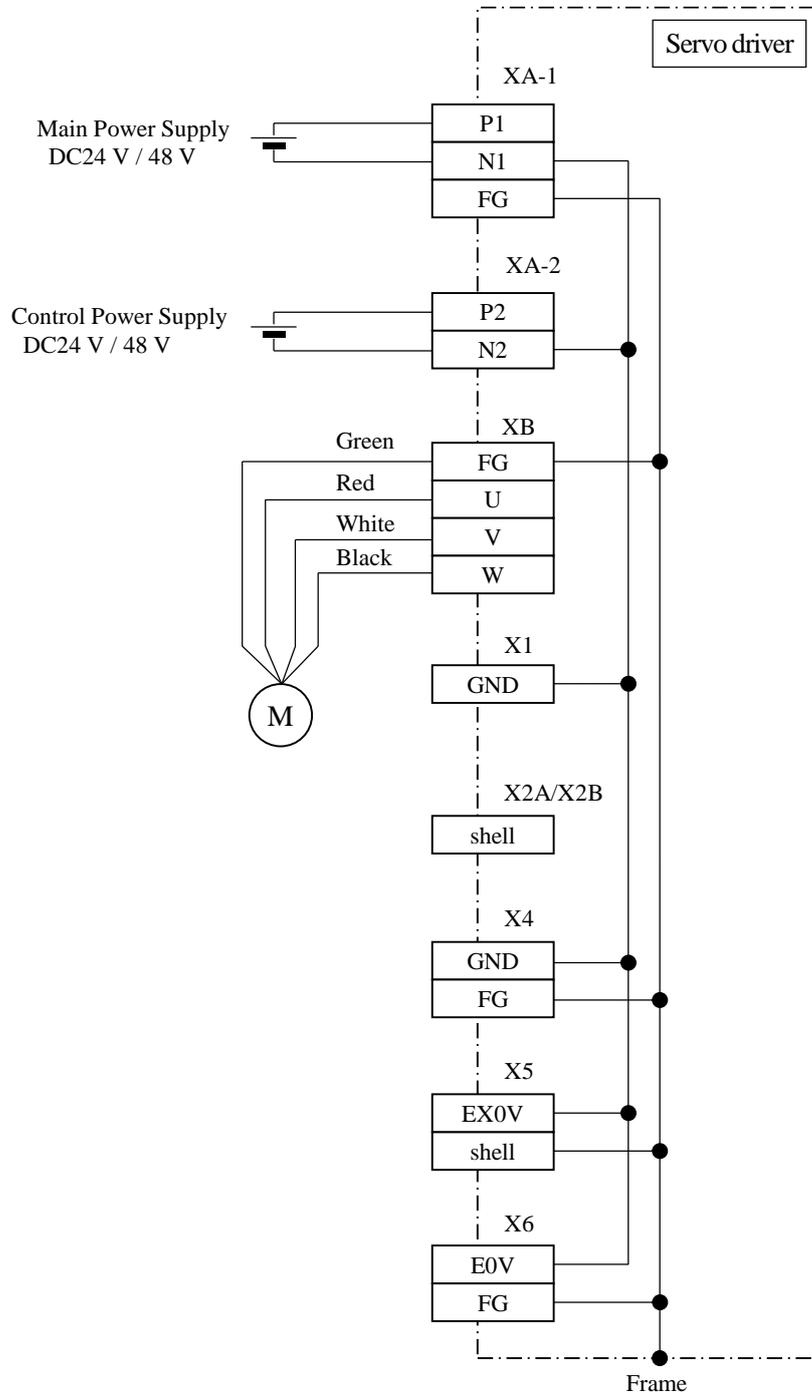
8-3-1 Wiring to the power connector

Below figure shows a linear / DD type.

Rotary type is not provided with **X5** (feedback scale connector).

Do not connect anything to V pin of Motor connector **XB** in VCM type.

Below figure do not shows all pins of each connector.



- [1] 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.
- [2] 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.
- [3] 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.
- [4] Because this servo driver to assume a connection with a stabilized power supply is provided with reinforced insulation, protective ground terminal is not available. The case is functional earth (FG).
- [5] Insert the connector securely until it is locked.
- [6] Apply power supply voltage as specified in the rating plate.
- [7] Install a molded-case circuit-breaker (MCCB), and in an emergency, be sure to shut off power supply outside the servo driver. When using an earth leakage breaker, take measures against high frequency.
- [8] Brake power supply for the motor with brake should be prepared by customer.
- [9] Apply power supply voltage after completing wiring.

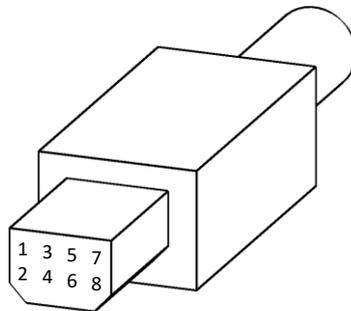
8-3-2 Wiring to connectors **X2A** and **X2B**

- [1] Use a shielded twisted pair (STP) cable in conformance with category 5e of SIA/EIA-568 or higher.
- [2] If both ends of the shield are not grounded, the EMC characteristic will deteriorate.
When attaching a connector plug to both ends of the cable, make sure to connect the shield wire of the cable to the metal shell of the plug.
- [3] Correspondence between the lead wire colors and the connector terminals should be in accordance with TIA/EIA-568B (see the figure below).
The 3-6pin pair is a signal line. Three pairs of 1-2, 4-5, and 7-8pins that are not used must also be connected to the connector.
- [4] When using a 2-pair line instead of a 4-pair line, connect the wires to the 1-2 and 3-6 pins of the connector and do not connect anything to the 4-5 and 7-8 pins.
- [5] The wiring length of the communication cable should be within the range that satisfies the following conditions.

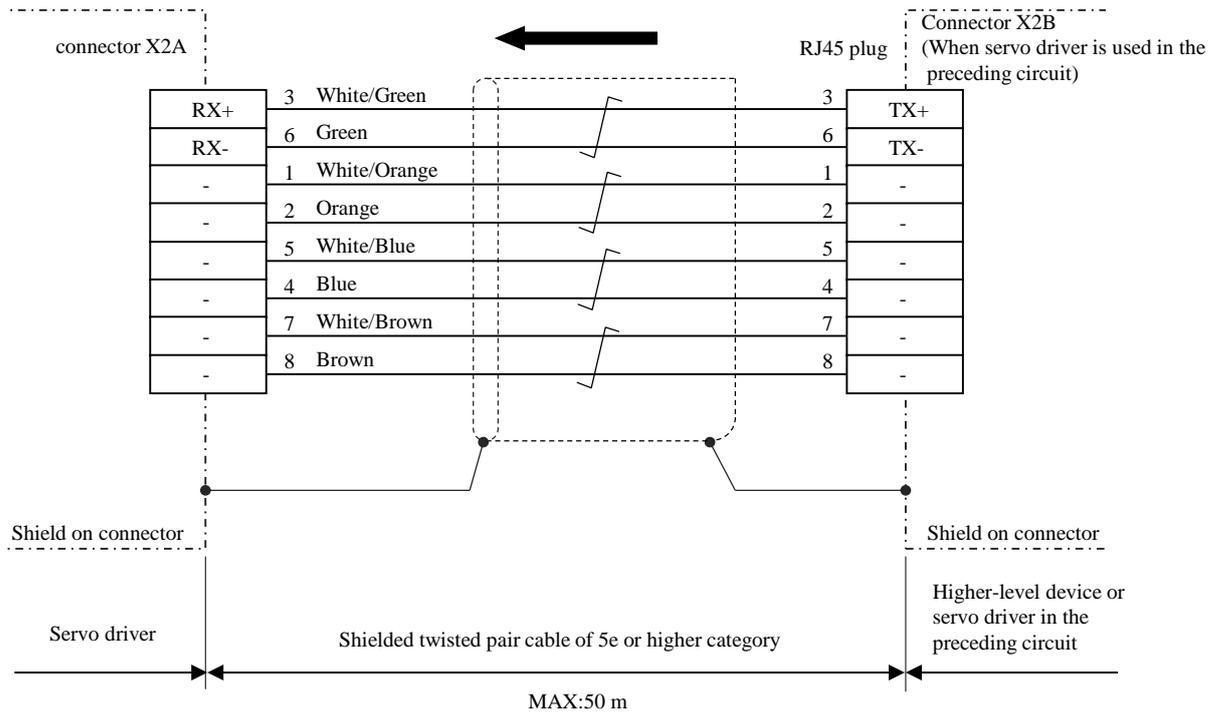
a. Length between respective nodes: within 50 m
b. Total length of cables among all nodes of the communication loop: within 100 m
- [6] Cable specifications including flexural property, temperature range, and materials used for covering are different according to manufacturers.
Select the cable according to the working conditions of the customer.
A movable cable should also be selected according to the working conditions of the customer.

<Communication cable used based on the evaluation by Panasonic>

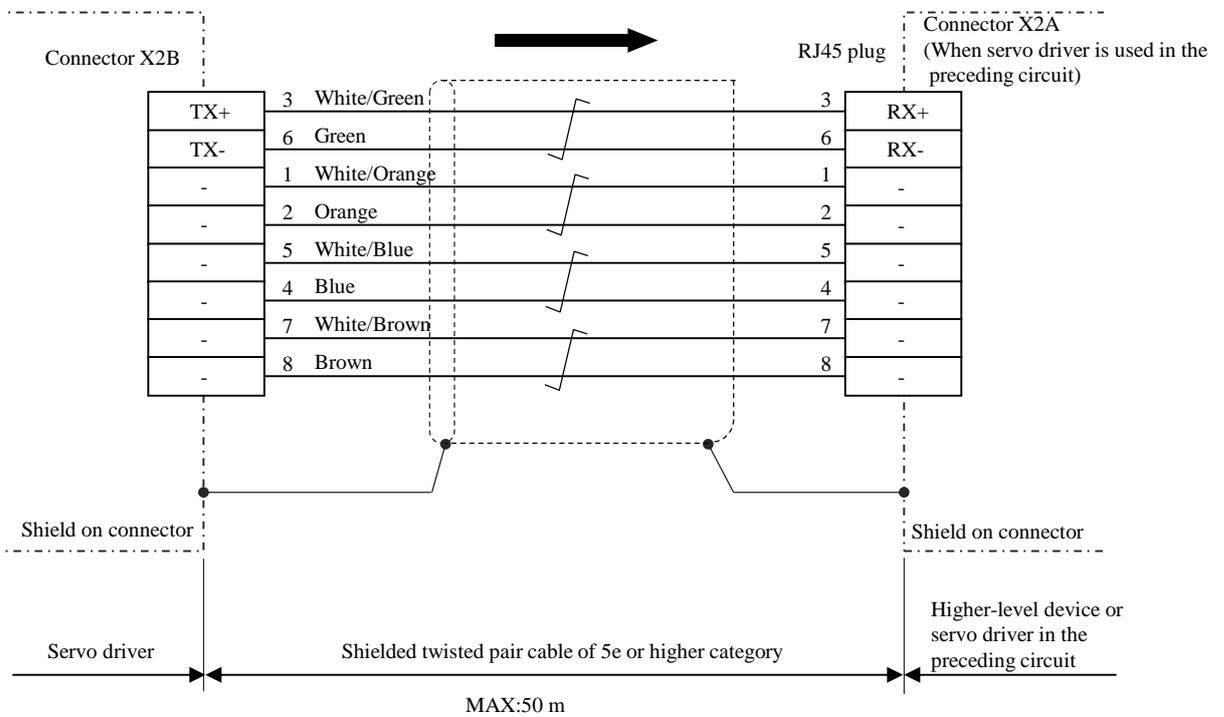
Manufacturer	: Kuramo Electric Co., Ltd.
Product No.	: FANC-IEF-Z-100
Specifications	: Category 5e, STP

Pin layout of the communication plug

Connection of X2A

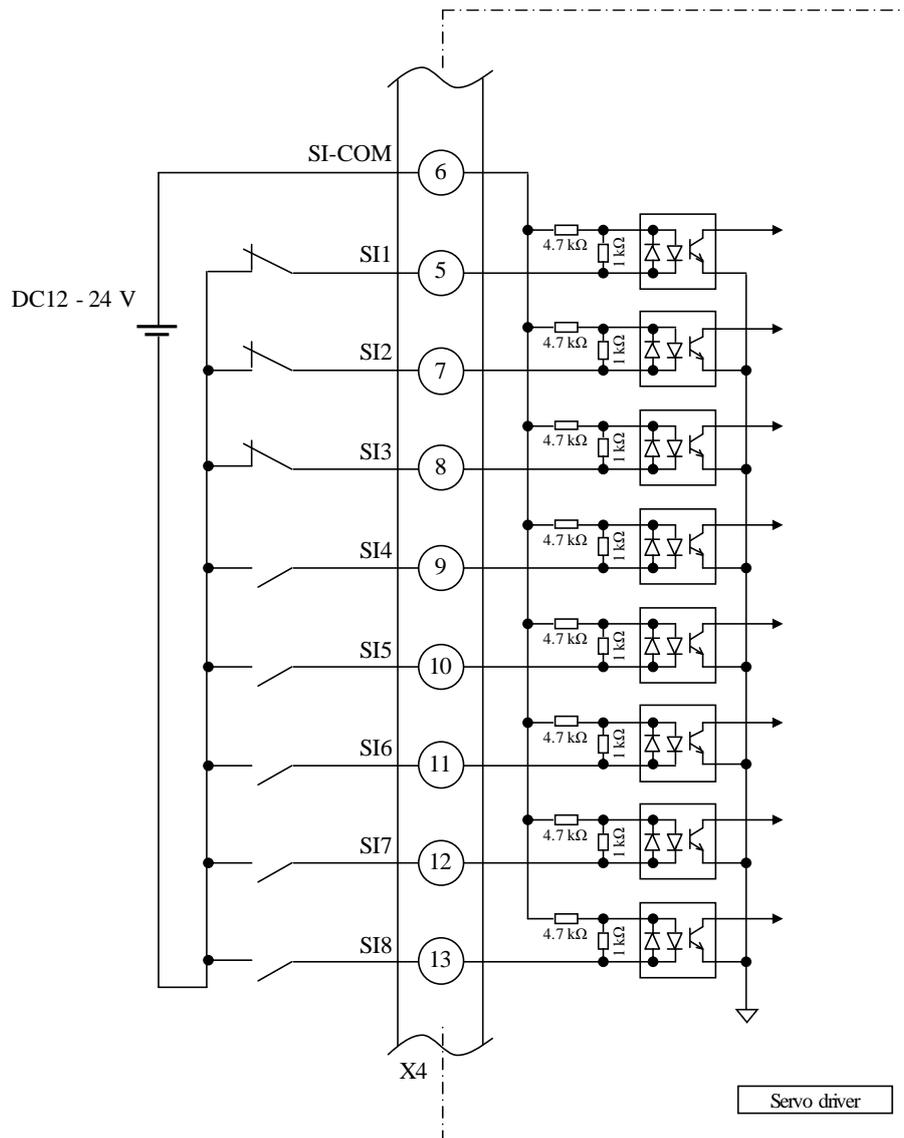


Connection of X2B



8-3-3 Wiring to connector **X4**

- [1] The customer is required to prepare the 12 to 24 VDC control signal power supply for external control to be connected to SI-COM.
- [2] Install peripheral devices close to the servo driver as much as possible so that wiring length is minimized (within 3 m).
- [3] Keep the wires away from the wiring of the power lines (P1, N1, P2, N2, U, V, W, FG) as much as possible (at least 30 cm). Do not route the wires through the same duct and do not tie them together.

Control input

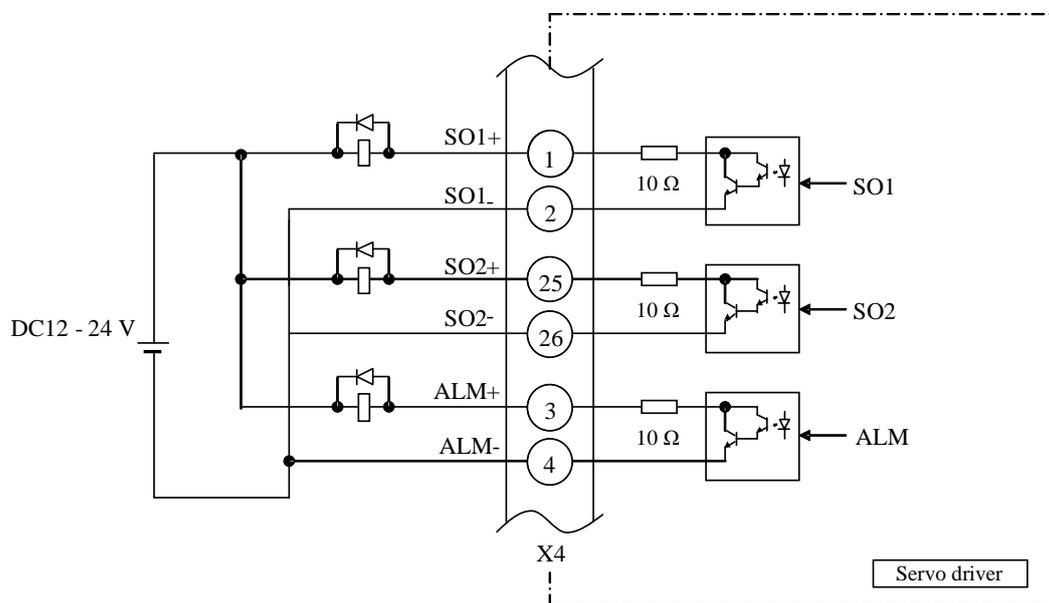
The functions of pins SI1 – SI8 should be allocated by parameters.
For details, refer to “Technical Reference - Functional Specifications -”.

Control output

- [1] Pay attention to the polarity of the control signal power supply. Connection to the polarity opposite to that in the figure can cause damage to the servo driver.
- [2] When driving the relay directly using each output signal, be sure to mount a diode in parallel with the relay in the direction shown in the figure below. If a diode is not mounted or it is mounted in the reverse direction, the servo driver may be damaged.
- [3] When receiving each output signal by a logical circuit such as a gate, be careful not to be affected by noise.
- [4] The rated current, maximum current, and rush current applied to each output should be 40 mA, 50 mA, and 90 mA or less respectively.
- [5] A limiting resistor (10 Ω) is connected to the output circuit.

For the purpose of Darlington connection of the output transistor, voltage between the collector and the emitter V_{CE} (SAT) is approx. 1 V when the transistor is turned ON.

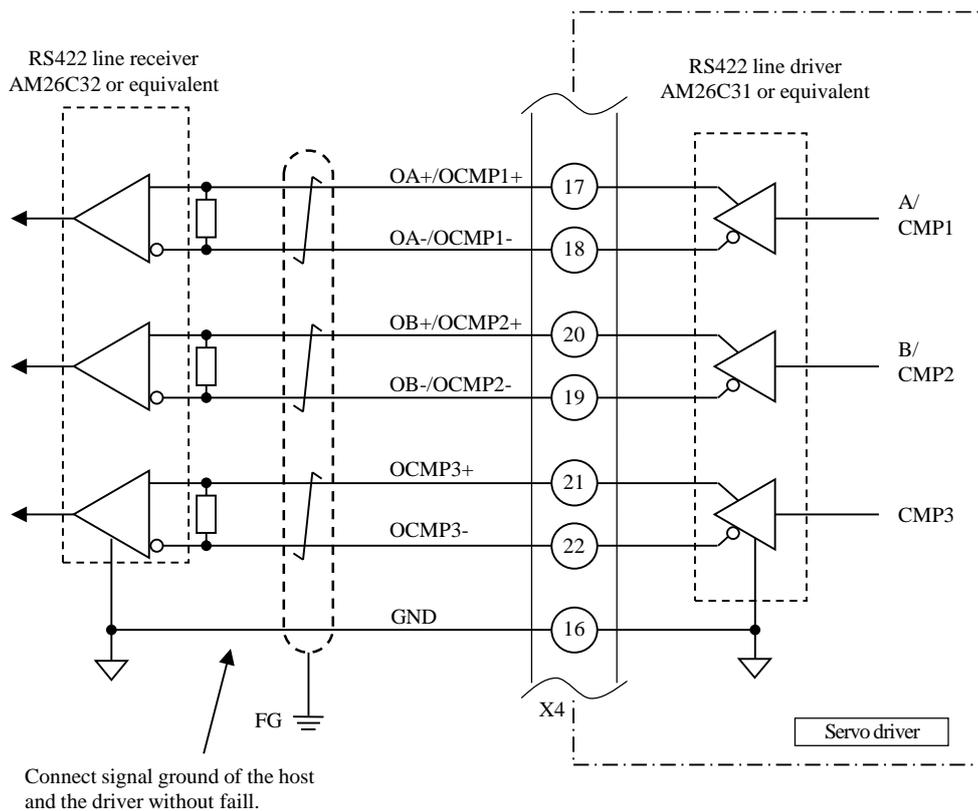
Note that direct connection is impossible because the normal TTL IC cannot satisfy the VIL.



The functions of pins SO1, SO2 should be allocated by parameters.

For details, refer to “Technical Reference - Functional Specifications -”.

Feedback pulse of the rotary encoder



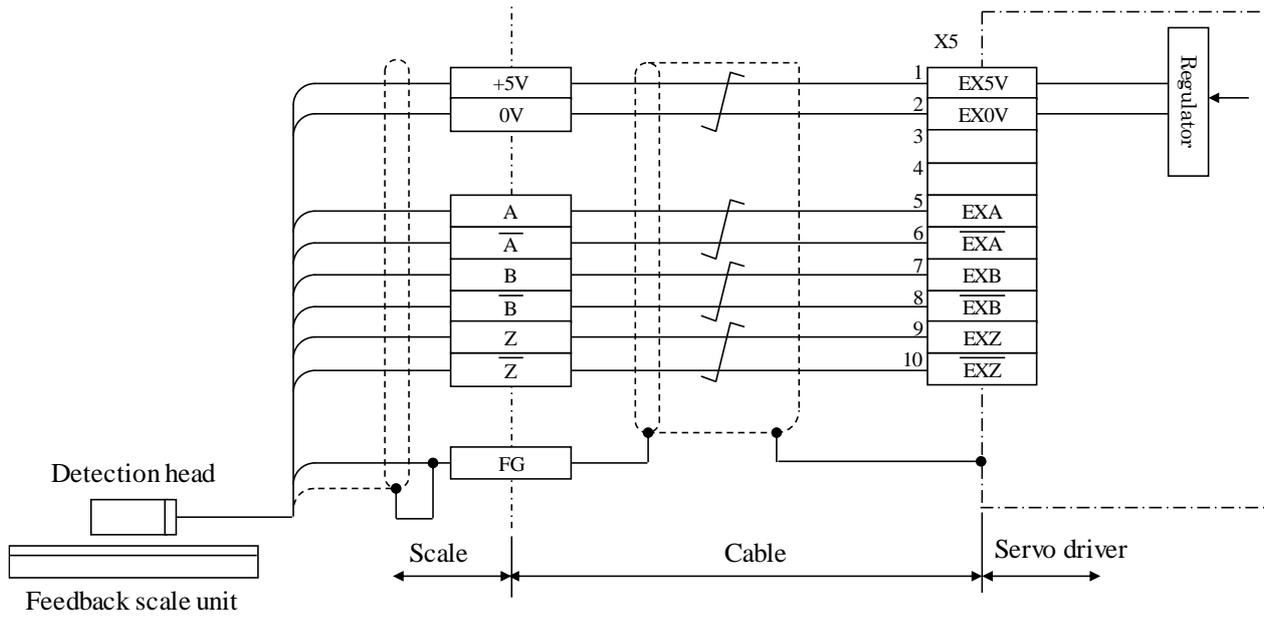
Note:

- [1] Use an RS422 line receiver (AM26C32 or equivalent) to receive output pulse.
At that time, mount an appropriate terminating resistor (approx. 330 Ω) between the line receiver inputs.
- [2] The maximum output frequency should be 4 Mpps (after quad edge evaluation) or less.

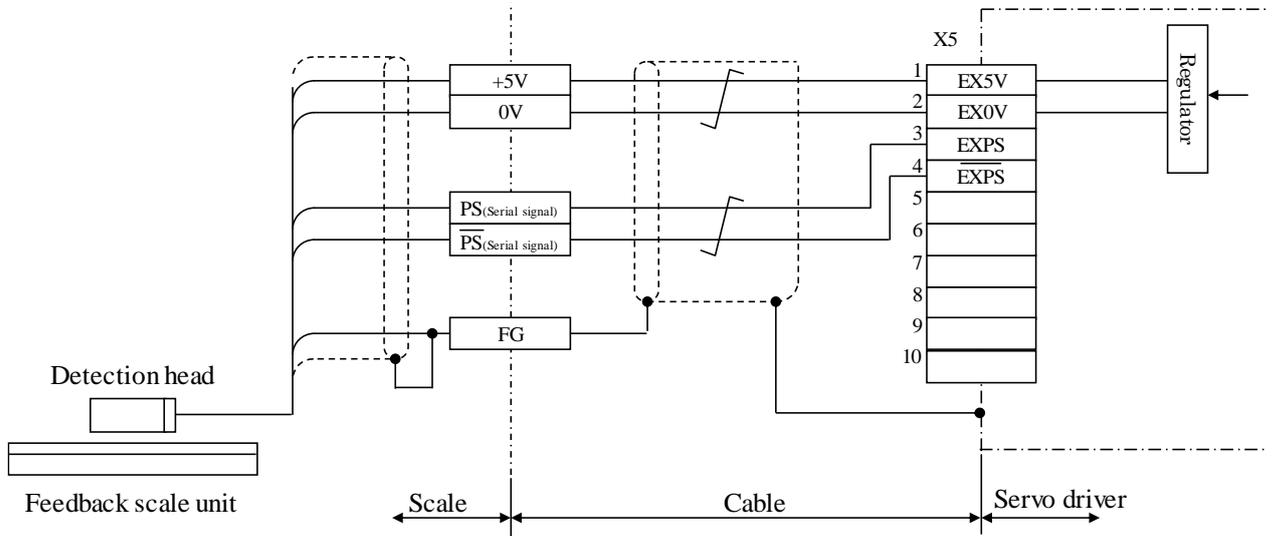
8-3-4 Wiring to connector X5

- [1] It is supported for linear / DD /VCM type only.
- [2] The core wire of the feedback scale cable should be a strand wire of 0.18 mm² or more. Use a common shielded twisted pair wire.
- [3] The maximum cable length should be 3 m or less. If the wiring length is long, double wiring is recommended for the 5 V power supply to reduce influence of voltage drop.
- [4] Connect the exterior covering of the shield wire on the motor side to the shield of the shield wire from the feedback scale.
Be sure to connect the exterior covering of the shield wire on the servo driver side to the shell of X5 (FG).
- [5] Keep the wires away from the wiring of the power lines (P1, N1, P2, N2, U, V, W, FG) as much as possible (at least 30 cm). Do not route the wires through the same duct and do not tie them together.
- [6] Do not connect anything to the idle pin of X5.
- [7] Power that can be supplied from X5 is max. 5 V \pm 5% and 250 mA. When using a feedback scale whose consumption current exceeds this value, the corresponding power supply should be prepared by the customer. It may take time to perform initialization after power-on, depending on feedback scales. Make a design so as to satisfy the operation timing after supplying power.
- [8] When driving a feedback scale using external power supply, make the EX5V pin open so that voltage is not supplied to this pin from outside. In addition, connect 0 V (GND) of the external power supply with EX0V (X5 2pin) of the driver to obtain the same electric potential.

Wiring example of A/B phase, the origin signal differential input type



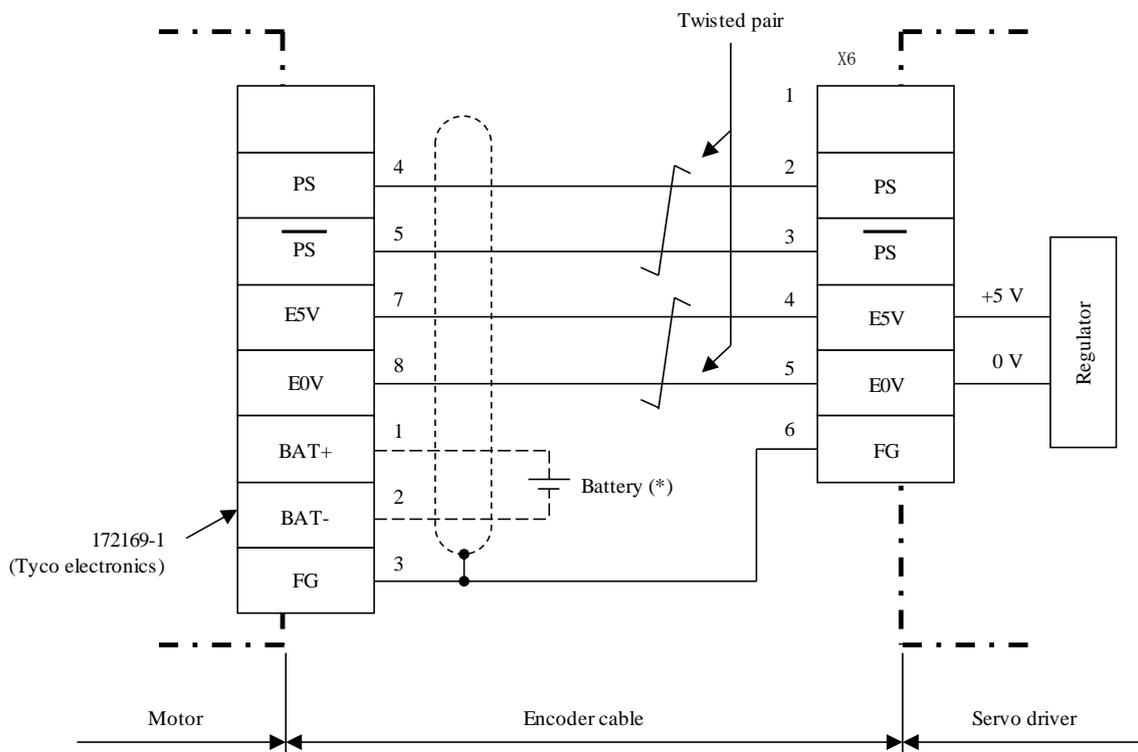
Wiring example of the serial communication type



8-3-5 Wiring to connector X6

Rotary type

- [1] The core wire of the encoder cable should be a strand wire of 0.18 mm^2 or more. Use a common shielded twisted pair wire.
- [2] The maximum cable length should be 3 m or less. If the wiring length is long, double wiring is recommended for the 5 V power supply to reduce influence of voltage drop.
- [3] Be sure to connect the shield wires of the encoder cable to the FG terminal on the motor side and the shell of X6 (FG) on the servo driver side.
- [4] Keep the wires away from the wiring of the power lines (P1, N1, P2, N2, U, V, W, FG) as much as possible (at least 30 cm). Do not route the wires through the same duct and do not tie them together.
- [5] Do not connect nothing to pin 1.



(*) When not use absolute system, remove battery.

Precautions when using the battery for the absolute encoder

- If the battery voltage drops, an error occurs in the absolute encoder.
Voltage drop is caused by either the end of the battery life or a voltage delay.
 - [1] Note that the battery life is shortened depending on surrounding environmental conditions.
 - [2] A lithium battery has the minimum transient voltage (voltage delay phenomenon). Voltage may drop temporarily when the battery starts discharging current. Therefore, it is necessary to refresh the battery before using it.
 - <When using the battery for the first time>

If you use battery unit DV0P2990 (built-in battery: ER6V 3.6V made by TOSHIBA LIFESTYLE PRODUCTS & SERVICES), which is an optional item of Panasonic, connect the connector with lead wire to CN601 as shown in the right figure and set it aside for five minutes.

Then, disconnect the connector from CN601 and attach it to the servo driver.

Even when a battery is prepared by the customer, it is recommended to perform refreshing before using it. For the refreshing procedure, consult with the corresponding battery manufacturer.
 - <After mounting the battery unit>

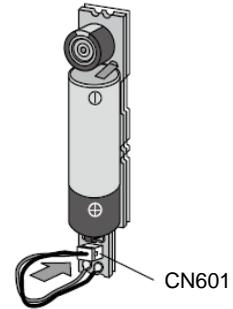
It is recommended to perform turning ON/OFF of the control power supply approx. once in a day.
- Incorrect use of the battery can cause troubles such as corrosion of the product due to leakage from the battery or risks such as breakage of the battery. Therefore, be sure to observe the following.
 - [1] Make sure that the directions of the positive and negative electrodes are correct.
 - [2] If the battery that has been used for a long period or the battery that cannot be used any more is kept set in the device, troubles such as leakage may occur. Replace it with a new one promptly. (As a guide, it is recommended to replace the battery every two years.)
 - The electrolytic solution of the battery is not only highly corrosive, which corrodes peripheral parts, but also conductive, which can cause short circuiting. Periodical replacement is needed.
 - [3] Do not dismantle the battery and do not put it into a fire.
 - Never dismantle it because it is very dangerous if the scattered content enters the eye. Putting it into a fire or heating it may cause a bursting, which is dangerous.
 - [4] Do not short circuit the battery and do not peel the battery tube.
 - If a metal or the like touches the positive or negative electrode terminal of the battery, large current is applied at a time, which weakens the battery.

Further, heavy heat generation may occur, resulting in bursting, which is dangerous.
 - [5] This battery cannot be charged. Do not charge the battery.
- Disposal of the used battery after replacement is regulated by some municipalities. Dispose of the battery according to the regulations of each municipality.
- Air transportation

At the time of transportation by aircraft (both passenger airplane and cargo airplane), it is necessary to make an application with regard to hazardous materials. (UN packaging is required.)

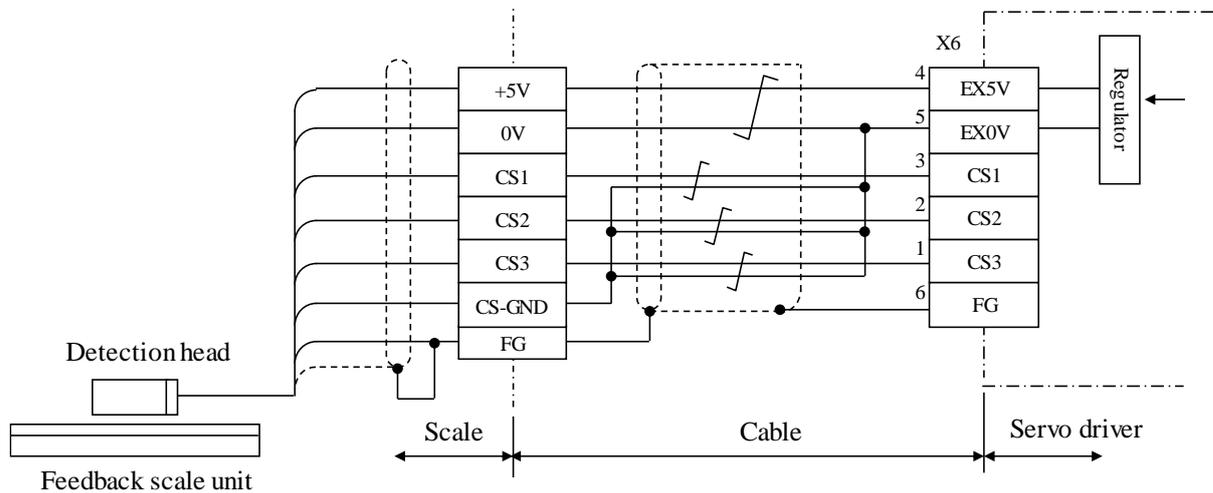
When requesting air transportation, it is required to submit necessary documents (such as a parameter sheet and SDS) to the transport company. Please make the request for it via the distributor.
- UN packaging

For details, contact each transport company.



Linear / DD / VCM type

- [1] For the CS signal cable, use a stranded wire with a core wire of 0.18 mm 2 or more, and use a cable with integrated shield (twisted pair wire is preferable).
- [2] The maximum cable length is 3 m. When the wiring length is long, double wiring is recommended to reduce the influence of voltage drop in the 5 V power supply.
- [3] Connect the ground of CS signal to E0V.
- [4] Connect the outer sheath of the feedback scale side shield wire to the shield wire shield from the feedback scale.
Be sure to connect the sheath of the shielded wire on the servo driver side to the X5 shell and X6 FG.
- [5] Keep away from the wiring of the power line (P1, N1, P2, N2, U, V, W, FG) as much as possible (30 cm or more).
Please do not pass through the same duct or bind together.
- [8] Please do not connect anything to empty pins of X6.
- [9] The power supply that can be supplied from X6 is $5\text{ V} \pm 5\%$ 250 mA MAX. If you are using a feedback scale with more current consumption, please prepare the power supply by the customer. Also, some feedback scale may take time to initialize after turning on the power. Please design so as to meet the operation timing after turning on the power supply described in the technical documents.
- [10] Wiring of X6 is unnecessary when magnetic pole position estimation function is used without using CS signal.



8-4 Dynamic brake

The servo driver has a dynamic brake built in for emergency stop.

The dynamic brake can be operated in the following cases.

- [1] When power supply is turned off
- [2] When the servo is turned off
- [3] When the protective function is operated
- [4] When drive prohibiting input (POT, NOT) of connector X4 is operated

During deceleration in the above cases [1] to [4] or after the stop of the servo driver, whether the dynamic brake is operated, or free run is applied can be selected by setting the parameter.

However, when the control power input is turned off, the dynamic brake of the servo driver is kept operated.

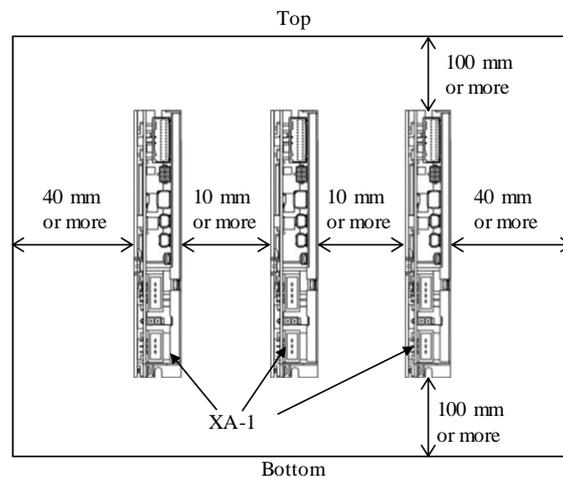
The dynamic brake is provided only for the short-time usage in case of emergency stop.

Therefore, note the following points.

- [1] Do not start or stop operation by turning on/off the servo ON signal. Otherwise, the dynamic brake circuit built in the servo driver may get damaged.
- [2] Do not drive the motor with external power.
If the motor is driven from outside, it will work as a generator. Therefore, short circuit current is applied during operation of the dynamic brake, which can cause smoking or ignition. In addition, the dynamic brake may be disconnected, which can cause disabling the operation.
- [3] If the dynamic brake is operated during high-speed operation, provide stop time for approx. 10 minutes.
If the dynamic brake is used beyond that condition, the brake may be disconnected, which can cause disabling the operation.

8-5 Mounting direction and interval

- Install the servo driver in an environment of Pollution degree 2, such as in the control panel of IP54 or more.
- Secure the surrounding space for effective cooling.
- Satisfy the environmental conditions for the inside of the control panel.
- Fix the servo driver to the conductive frame.
- If the servo driver is mounted to a painted portion, anti-noise measures can be taken by installing it after peeling off the paint.
- The temperature around the servo driver should be measured at a position 50 mm away from the side or bottom surface of the driver. If it is impossible to measure the temperature at a position 50 mm away from it, perform measurement at the midpoint in the clearance between the obstacle and the driver.
- As shown below, install the servo amplifier so that the connector XA - 1 faces downward.
When other installation directions, use at ambient temperature of 45 ° C or less.



9. Compliance with the international standards

9-1 List of compatible standards for the servo driver to be acquired

		Applicable standard
EU/UK standards	EMC	EN 55011:2016/A1:2020 (Group 1, Class A) EN 61000-6-2 EN 61000-6-4 EN 61800-3:2004/A1:2012 (Category C3, Second environment)
	Low voltage	EN 61800-5-1
UL standard		UL 61800-5-1 (File No. E164620) Power conversion equipment - component
CSA standard		C 22. 2 No. 274-13
KC		KN 11 KN 61000-4-2,3,4,5,6,8,11

EN : European Norm
EMC : Electromagnetic Compatibility
UL : Underwriters Laboratories
CSA : Canadian Standards Association
KC : Radio Waves Act(South Korea)

9-2 EU directives and UK regulations

Our products comply with standards associated with the EU low voltage directive/UK low voltage regulation in order to facilitate compliance of embedded equipment and devices with the EU directives/UK regulations.

9-2-1 Compliance with the EU EMC directive/UK EMC regulation

EN 55011

Warning: Class A equipment is intended for use in an industrial environment. Conductive and radio frequency interference can make it difficult to ensure electromagnetic compatibility in other environments.

Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

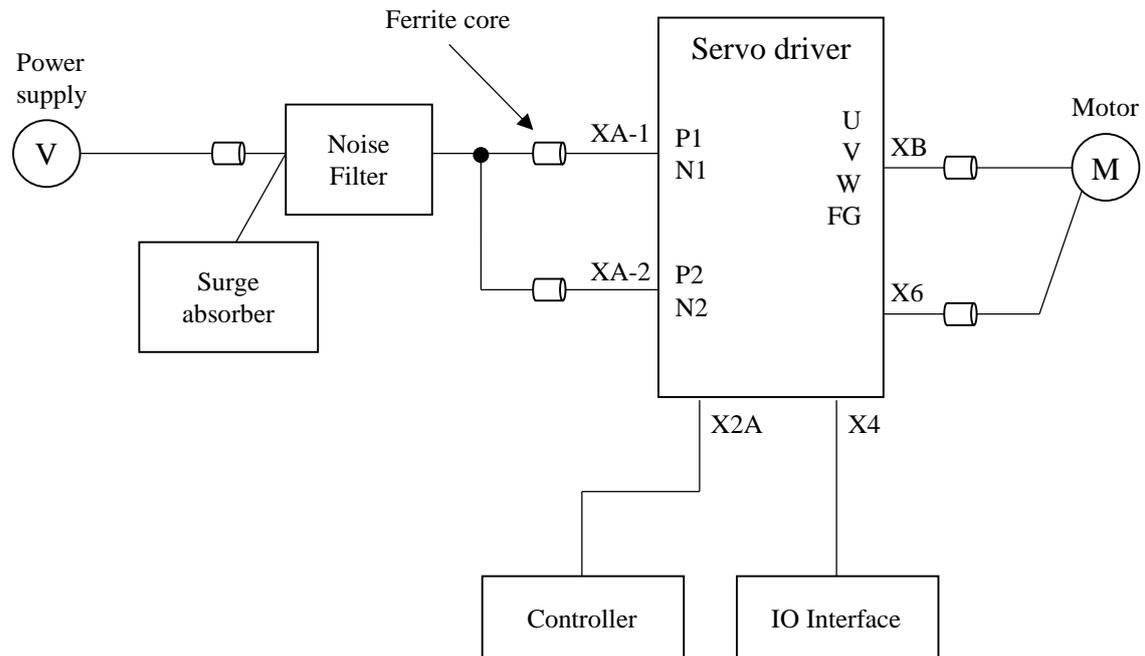
EN 61800-3

Servo drivers and servo motors are not intended for general household use or for connection to low-voltage public communication lines. Radio frequency interference may occur when connected to such circuits. To comply with the EU EMC directive/UK EMC regulation, use a noise filter, a surge absorber, and a ferrite core. The compliance of machinery and equipment with the EU EMC directive/UK EMC regulation must be confirmed on machinery and equipment in its final state incorporating servo drivers and servo motors.

9-3 Configuration of peripheral devices

9-3-1 Installation environment

Use the servo driver under the environment at pollution degree 2 stipulated in IEC60664-1.



9-3-2 Power supply

DC power using stabilized power supply (SELV) are provided with reinforced insulation or double insulation.

DC24 V	DC20 V – DC29 V	+21 % -17%
DC48 V	DC40 V – DC58 V	+21 % -17%

- (1) Use them under the environment of overvoltage category I defined in IEC60664-1.
- (2) Use insulated-type 12 to 24 VDC power supply for parallel I/O in compliance with the CE marking or the EN standard (EN60950).

9-3-3 Noise filter

When using multiple units of servo drivers and installing one noise filter collectively in the power supply section, consult with the noise filter manufacturer.

9-3-4 Surge absorber

Install a surge absorber on the primary side of the noise filter.

<Request>

When performing a withstand test for the machines and devices, be sure to remove the surge absorber. Otherwise, the surge absorber may get damaged.

9-3-5 Ferrite core

Install the ferrite cores for signal lines in all cables (power supply, motor, encoder, and interface cables).

9-4 List of servo drivers and applicable peripheral devices

	Optional part number	Part number of manufacturer	Manufacturer
Noise filter	—	SUP-EK15-ER-6	Okaya Electric Industries
Surge Absorber	—	B3082	Okaya Electric Industries
Ferrite Core	DV0P1460	ZCAT3035-1330	TDK

* The number of turns toward the ferrite core is once for each frame.

Note

- Select a noise filter with a capacity suitable for the power supply capacity (in consideration of load conditions).

9-5 Compliance with the UL standard

[1] Installation environment

Install the servo driver under the environment at pollution degree 2 stipulated in IEC60664-1.
Use copper conductor wires whose temperature rating is 75°C or higher.

[2] Branch circuit protection

Protect the branch circuit in accordance with the NEC (National Electrical Code) and the local standard.

[3] Overload protection and overheating protection

The servo driver has a built-in function to protect against servo motor overload.

The overload protection function is operated based on the specified time limit characteristics when current has reached 115% or more of the rating.

The servo motor is not provided with an overheating protection function.

When it is necessary to satisfy the NEC, implement overheating protection measures for the servo motor.

This servo driver has the thermal memory (shut down) function specified in EN61800-5-1: 2007 / A1: 2016, but does not have the thermal memory (loss of Power) and speed sensitivity functions.

[4] Other

This servo driver is certified as “Component”.

9-6 Radio Waves Act of South Korea

The servo driver is a Class A device (broadcast communication device for business use) based on the Radio Waves Act of South Korea.

Use the product after understanding the following precautions.

A 급 기기 (업무용 방송통신기자재)

이 기기는 업무용(A 급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

(대상기종 : **Servo Driver**)

[Reference translation]

Class A device (broadcast communication device for business use)

This product is an electromagnetic wave generating device for business use (Class A), which is intended for the use in places other than household.

The distributor and the user should be attentive to this point.

(Applicable model: Servo Driver)



Safety Precautions

10. Safety Precautions

This section explains precautions that must be taken to prevent harm to people and damage to property.

- The following symbols represent the extent of the harm or damage that may occur through improper use.

DANGER	This indicates “a significant risk of death or serious injury”.
CAUTION	This indicates “a risk of minor injury or damage to property”.

- The following symbols indicate how to comply with safety precautions.

	Something that you must not do.
	Something you must do.

DANGER



- (1) Ensure that the product is used in an environment of pollution degree 2 (places free from dust, metal powders, oil mists, and other foreign objects, as well as liquids such as water, oil, or grinding fluids). Do not store or use near combustible materials or in an environment containing corrosive gases (H₂S, SO₂, NO₂, Cl₂, etc.) or flammable gases.
- (2) Do not place flammable materials near the motor, servo driver, or regenerative resistor.
- (3) Do not run the motor using an external power source. If the motor is run externally, it will start acting as an electricity generator. This may cause it to short-circuit during operation of the dynamic brake, which is integrated into the servo driver, resulting in smoke and dust being emitted. Doing so may also cause the dynamic brake to become disconnected, preventing it from functioning.
- (4) Do not damage the cable, apply undue stress to it, place heavy objects on it, or pinch it.
- (5) Do not use with the cable submerged in oil or water.
- (6) Do not install the product next to heating elements such as heaters or large winding resistors. (Protection such as heat shields should be used to protect the product from heating elements.)
- (7) Do not connect a commercial power supply directly to the motor.
- (8) Do not use in places susceptible to strong vibrations or impacts. If installing a servo driver near a source of vibration, attach a vibration dampening device to the servo driver mounting surface.
- (9) Do not touch the rotating parts of the motor during operation.
- (10) Do not touch the keyway of the motor output shaft with bare hands.
- (11) Do not put hands inside the servo driver.
- (12) Do not touch the heat sink and peripheral devices of the motor or servo driver, as they can get very hot.
- (13) Do not performing wiring or operate the product with wet hands.
- (14) Wiring work should be carried out by an electrical engineer.
- (15) Motors other than that specified do not include protective devices. Protect them using overcurrent protection devices, ground-fault circuit interrupters, overheating prevention devices, emergency stop devices, etc.



Safety Precautions



DANGER



- (16) Before operating the servo driver following an earthquake, ensure that the servo driver and motor are properly installed and that the machine is safe.
- (17) After the power supply is switched off, the internal circuit will be charged at high voltage for a period of time. When relocating, wiring, or inspecting the driver, ensure that the power supply input is completely disconnected on the outside of the servo driver and wait at least 15 minutes before carrying out any work.
- (18) Install and set up the product so that it does not cause fire or personal injury in the event of an earthquake.
- (19) Install an external emergency stop circuit must be installed to enable the power supply to be immediately disconnected in the event of an emergency. Failure of the combined motor and servo driver may result in smoke and dust being emitted. For example, if an electric current is passed through the regenerative control power transistor built into the servo driver following a short-circuit fault, the regenerative resistor installed outside the servo driver may overheat, leading to smoke and dust being emitted.
If a regenerative resistor is connected to the outside of the servo driver, it must be installed so that the thermal protector or other overheating detection devices can detect abnormal overheating and to enable the power supply to be disconnected
- (20) Install the motor, servo driver, and peripheral devices to nonflammable materials such as metal.
- (21) Ensure that the product is wired correctly and securely. Insecure or incorrect wiring may cause the motor to malfunction or lead to thermal damage. Also, do not allow any conductive materials such as wire debris to enter the servo driver during installation and wiring.
- (22) Ensure that the cables are securely connected and that energized parts are insulated.
- (23) Binding and inserting wires into a metal duct will cause the temperature to increase, which will result in reduced wire current capacity and possibly lead to thermal damage. Please consider the current reduction coefficient before deciding on how to wire the product.
- (24) Make sure to install a molded case circuit breaker (MCCB) to the power supply. Also, make sure to ground the ground terminal or ground wire.
D-type grounding or higher (ground resistance less than 100 Ω) is recommended in order to prevent electric shocks and malfunctions
- (25) Securely tighten the screws for connecting the terminal block, as well as the grounding screw, using the torque indicated in the specification sheet.
- (26) When constructing a system using safety features, make sure you understand and comply with the relevant safety standards as well as the information in our user manuals or technical reference documents.



CAUTION



- (27) When transporting the product, do not hold it by the cable or motor shaft.
- (28) When adjusting the parameters of the servo driver, do not set the gain too high or make extreme modifications to settings simultaneously, as doing so may result in unstable operation.
- (29) Following a power outage, do not get close to the machine once power is restored, as it may restart suddenly. Settings must be made to ensure personal safety even in event the machine restarts suddenly.
- (30) Do not approach the motor or the machine when it is running during power-up to ensure safety in the event of an unexpected malfunction.
- (31) Do not subject the motor shaft to strong shock.
- (32) Do not use the electromagnetic contactor installed on the main power supply side to start or stop the motor.
- (33) Do not turn the servo driver main power supply on and off more frequently than necessary.
- (34) If the motor has a built-in brake, it is for maintenance purposes and should not be used as a stopping (braking) device in order to ensure machine safety.
- (35) Do not drop or tip over the product during transportation or installation.



Safety Precautions



CAUTION



- (36) Do not climb on the motor or place heavy objects on it.
- (37) Do not cover the servo driver louver or allow any foreign objects to enter.
- (38) Do not expose the product to direct sunlight. When storing the product, keep it away direct sunlight and store at temperatures and humidity within the specified ranges.
- (39) Do not attempt to overhaul or modify the motor. Overhauls must be carried out by Panasonic or an authorized dealer.
- (40) Do not start or stop the device by turning the servo-on command (SRV-ON) on or off as this may damage the dynamic braking circuit incorporated into the servo drive.



- (41) Use the motor and servo driver in the combination specified by Panasonic. If combining the motor with a different servo driver, make sure to confirm its performance and safety.
- (42) Failure of the motor or the servo driver it is combined with may result in thermal damage to the motor and may cause smoke and dust to be emitted. Please consider these possibilities when using the device in cleanrooms, etc.
- (43) Make sure the device is mounted in a manner suitable for the power output and the weight of the unit.
- (44) Keep the ambient temperature and humidity of the servo driver and motor are within the permitted ambient temperature and humidity ranges.
- (45) Observe the specified mounting method and orientation.
- (46) Keep the required distance between the servo driver and the control panel interior or other equipment.
- (47) If an eyebolt is attached to the motor, it should only be used to transport the motor and not to transport any other equipment. The eyebolt should also not be used if a decelerator, face plate, etc., is attached.
- (48) Connect the brake control relay in series with the relay that disconnects in the event of an emergency stop.
- (49) To perform a test run, secure the motor and check its operation with it disconnected from the mechanical system, then mount it onto the machine.
- (50) Confirm that the input power supply voltage is in line with the servo driver specifications before turning it on and operating.
Entering a voltage higher than the rated voltage could cause smoke and dust to be emitted inside the servo driver, which in some cases may cause the motor to malfunction or lead to thermal damage.
- (51) In the event of an alarm, eliminate the cause of the alarm and restart the device.
Restarting the device without eliminating the cause of the alarm may cause the motor to malfunction or lead to thermal damage.
- (52) If the motor has a built-in brake, it may not last due to reasons such as its life span or mechanical structure. A stopping device must be installed on the machine side to ensure safety.
- (53) The motor and servo drive emit heat while the motor is in operation. Ambient temperature may rise abnormally if used in an enclosed area. Take care to ensure that the ambient temperatures of the motor and servo driver are within the operating range.
- (54) Maintenance and inspections should be performed by a specialist.
- (55) Make sure to turn off the power supply if the device will not be used for a long period of time.
- (56) Allow approx. 10 minutes pause when the dynamic brake is activated during high-speed running.
Resistor is damaged, and the dynamic brake might not work when using it under more critical operating condition.
- (57) Fix the cable so that stress is not applied to the connection parts such as the connector and terminal block.
- (58) Use stabilized power supply (SELV) provided with reinforced insulation.

- The capacitance of the capacitors of the power supply rectifier circuit will drop over time. To avoid a secondary problem due to a failure, replacement is recommended approx. every five years. Replacement must be carried out by Panasonic or an authorized dealer.



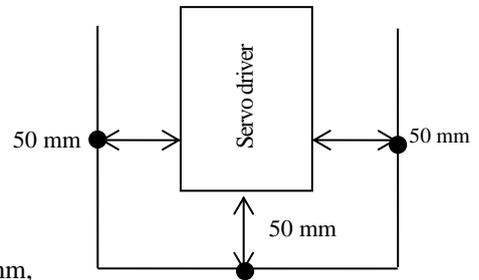
Safety Precautions

Servo Driver Ambient Temperature

The life span of the servo driver is largely dependent on the ambient temperature.

Make sure that the ambient temperature within 50 mm of the servo driver does not exceed the operating temperature range.

If the temperature cannot be measured from a distance of 50 mm, measure at the midpoint of the gap between the obstacle preventing measurement and the servo driver.



Operating temperature range: 0 - 55°C

11. Life span

(Life span is not guaranteed.)

11-1 Expected Life span of Servo Driver

When used continuously under the following conditions, the expected life span is 28,000 hours.

Definition of life span: "Life span" is defined as the time it takes for the electrolytic to decrease in capacity by 20% once shipped from the factory.

Conditions:	Input power supply	:	DC 24 V or DC 48 V
	Ambient temperature	:	55 °C
	Height above sea level	:	100 m or less
	Output torque	:	Rated torque constant
	Speed	:	Rated speed constant

Life span changes significantly depending on working conditions.

12. Warranty

12-1 Warranty period

The warranty period for the product is one year from the date of purchase or one year and six months from the date the product was manufactured.

However, the warranty will be void in any of the following cases, even within the warranty period:

- (1) If the issue is due to incorrect use or improper repair/modification
- (2) If the issue is due to the device being dropped after purchase or damaged during transit
- (3) If the issue is due to the device being used outside of its specifications
- (4) If the issue is due to a fire, earthquake, lightning strike, wind/water damage, salt damage, voltage abnormalities, other natural disasters, or natural damage
- (5) If the issue is due to ingress of water, oil, metal fragments, or other foreign objects
- (6) If parts with a stated standard life span have exceeded their respective life spans.

12-2 Warranty coverage

If the product fails during the warranty period for reason in which our company is at fault, we will only replace or repair the defective parts of the device that were provided by us. Please note that our above-stated responsibility is limited to the replacement and repair of the equipment provided by us and that we do not accept any responsibility for damage to your company or any third party that may occur in connection with the failure of the equipment provided by us.

We do not accept responsibility for any equipment failures or damage to your company or any third party in the case of any of the exclusions set forth in 12-1 above or in any of the following cases:

- (1) If the equipment has been incorporated or used in a way that does not conform to the instructions or precautions set forth in this specifications document
- (2) If the issue is due to a combination of products that incorporate different equipment
- (3) If you fail to comply with the requests made to your company in this specifications document
- (4) If the equipment failure is not caused by our company's actions.

12-3 Warranty service

If you require the warranty service (fault cause investigation, repair, etc.), please contact the retailer from which you purchased the product.

If you wish to send it directly to us with the permission of the retailer, please receive a repair/investigation request form from the place of purchase, fill out the necessary information, and send it to our motor service desk along with the product.

As a general rule, you will be responsible for shipping costs.

13. Network Security

As you will use this product connected to a network, your attention is called to the following security risks.

- (1) Leakage or theft of information through this product
- (2) Use of this product for fraudulent operation by persons with malicious intent
- (3) Interference with or stoppage of this product by persons with malicious intent

It is the customer's responsibility to ensure that sufficient network security measures are taken, including those listed below.

We will not be liable for any damage caused by insufficient network security.

< Notes >

- This product is to be used in an environment where only a limited number of parties are permitted access to the product.
- This product is not to be installed in locations where the product and its accessories, such as cables, can be easily destroyed.
- This product is to be used on a network that is not connected to the Internet.
- If an external device, such as a computer or tablet, is connected to this product, there are concerns about the effects of computer viruses and unauthorized programs.
Take appropriate security measures with external devices, such as ensuring that they are checked for computer viruses and that regularly cleaning of such viruses is performed before connecting them.
- If the product is to be disposed of, transferred, repaired, or otherwise transferred to a third party, important information may also be recorded on the product.
At customer's risk, please handle it with care, such as erasing it.

14. Additional Precautions

- (1) Precautions to be taken when exporting the product or equipment incorporating the product.
If the end user or end use of this product is related to the military or weaponry, etc., it may be subject to export restrictions as set forth in the Foreign Exchange and Foreign Trade Act. When exporting, please review and follow the necessary export procedures.
- (2) This product designed for general industrial use. This product is not for use in devices critical to human wellbeing or in specialized environments, such as nuclear power control, aerospace equipment, transportation systems, medical equipment, various safety devices, or equipment that requires a high degree of cleanliness.
- (3) Please ensure that finished equipment complies with standards, laws, and regulations, and confirm that the structure, dimensions, life span, and characteristics of the product match those of your installed equipment and components.
- (4) Since it is possible, albeit unlikely, that your finished equipment will operate abnormally due to a malfunction of our product (such as due to signal disconnections, signal open phases, or operation performed outside the settings as a result of external noise or static electricity being applied), please put in place failsafe and ensure adequate safety within the operational range of your site.
- (5) Make sure to follow indications as overloading products can cause loads to collapse.
- (6) Ensure that the motor shaft is not operated without being electrically grounded, as this may lead to electrolytic corrosion of the motor bearing and increased bearing noise, depending on the machine and the installation environment.
- (7) A tightening torque appropriate for the product mounting screws should be chosen to avoid loosening or damage, taking into account the strength of the screws used and the material to which they are mounted.
- (8) Because noise resistance may be affected by wiring conditions (e.g., grounding methods, cable length, signal wire shielding), please confirm the noise resistance of your equipment.
- (9) When disposing of the servo driver or motor, treat them as industrial waste.
- (10) When disposing of batteries, insulate them with tape and dispose of them in accordance with local regulations.
- (11) As long as you comply with this specifications document, certain components may be modified to improve performance, etc.
- (12) Changes to specifications shall be reflected in the delivery specifications document or in a document specified by your company. If this affects the function or characteristics of the product, the specifications will be changed following a test with a prototype.
- (13) Changes in specifications may affect the price of the product.
- (14) If you require clarification on something that is not covered by this specifications document, please contact us in advance.
- (15) In the event of a problem, the two parties shall resolve the issue following consultations as set forth in this specifications document.
- (16) Depending on the nature of the failure of the product, an amount of smoke equivalent to one cigarette may be emitted.
Please consider these possibilities when using the device in cleanrooms, etc.
- (17) Do not use detergents containing benzene, thinner, alcohol, acid, or alkaline as this may cause discoloration or damage to the product's exterior.
- (18) Please check the matching between the linear motor and the servo driver and check the safety at your own risk.
- (19) Do not reverse engineer, decompile, or disassemble this product.
- (20) Abnormal current may cause thermal damage with some linear motors.
- (21) Ensure safety against thermal damage on the equipment by covering the linear motor with nonflammable materials, etc.

15. Other notes of specification

- Main power supply and the control circuit are not isolated. Please Insulate processing if necessary

16. Specifications for each model

Model	MVDLN4CNE	MVDLN5CNE	MVDLN4BNE	MVDLN5BNE
Power supply input	DC 24 V	DC 24 V	DC 48 V	DC 48 V
Maximum output current	26.9 Ao-p	43 Ao-p	26.9 Ao-p	43 Ao-p
Input capacitance of Main power supply (*Note 1)	1800 uF	1800 uF	1640 uF	1640 uF
Input capacitance of Control power supply (*Note 1)	3600 uF	3600 uF	820 uF	820 uF
Ambient temperature	0 - 55 °C			
Main power supply cable	HVSF 1.25~2.0 mm ²			
	AWG14~16	AWG14~16	AWG14~16	AWG14~16
Control power supply cable	HVSF 0.5~0.75 mm ²			
	AWG18~20	AWG18~20	AWG18~20	AWG18~20
Functional Grounding cable	HVSF 1.25~2.0 mm ²			
	AWG14~16	AWG14~16	AWG14~16	AWG14~16
Motor cable	HVSF 1.25~2.0 mm ²			
	AWG14~16	AWG14~16	AWG14~16	AWG14~16
Rush current suppression	No limit by driver			
Regenerative discharge	Not supported	Not supported	Not supported	Not supported
Weight	Approx 0.35 kg	Approx 0.35 kg	Approx 0.35 kg	Approx 0.35 kg
Dimensions	89×180×30 mm	89×180×30 mm	89×180×30 mm	89×180×30 mm

(Note 1) Rated capacitance specified by parts manufacturer

Model	MVDLN0CNL	MVDLN1CNL	MVDLN2CNL	MVDLN3CNL
Power supply input	DC 24 V	DC 24 V	DC 24 V	DC 24 V
Maximum output current	1.3 Ao-p	2.9 Ao-p	5.7 Ao-p	12.8 Ao-p
Input capacitance of Main power supply (*Note 1)	1800 uF	1800 uF	1800 uF	1800 uF
Input capacitance of Control power supply (*Note 1)	3600 uF	3600 uF	3600 uF	3600 uF
Ambient temperature	0 - 55 °C			
Main power supply cable	HVSF0.5~20mm ²	HVSF0.5~20mm ²	HVSF0.75~20mm ²	HVSF0.75~20mm ²
	AWG14~20	AWG14~20	AWG14~18	AWG14~18
Control power supply cable	HVSF0.5~0.75mm ²	HVSF0.5~0.75mm ²	HVSF0.5~0.75mm ²	HVSF0.5~0.75mm ²
	AWG18~20	AWG18~20	AWG18~20	AWG18~20
Functional Grounding cable	HVSF1.25~20mm ²	HVSF1.25~20mm ²	HVSF1.25~20mm ²	HVSF1.25~20mm ²
	AWG14~16	AWG14~16	AWG14~16	AWG14~16
Motor cable	HVSF0.5~20mm ²	HVSF0.5~20mm ²	HVSF0.75~20mm ²	HVSF0.75~20mm ²
	AWG14~20	AWG14~20	AWG14~18	AWG14~18
Rush current suppression	No limit by driver			
Regenerative discharge	Not supported	Not supported	Not supported	Not supported
Weight	Approx 0.35 kg	Approx 0.35 kg	Approx 0.35 kg	Approx 0.35 kg
Dimensions	89×180×30 mm	89×180×30 mm	89×180×30 mm	89×180×30 mm

(Note 1) Rated capacitance specified by parts manufacturer

Model	MVDLN4CNL	MVDLN5CNL
Power supply input	DC 24 V	DC 24 V
Maximum output current	26.9 Ao-p	43 Ao-p
Input capacitance of Main power supply (*Note 1)	1800 uF	1800 uF
Input capacitance of Control power supply (*Note 1)	3600 uF	3600 uF
Ambient temperature	0 - 55 °C	0 - 55 °C
Main power supply cable	HVSF1.25~20mm ²	HVSF1.25~20mm ²
	AWG14~16	AWG14~16
Control power supply cable	HVSF0.5~0.75mm ²	HVSF0.5~0.75mm ²
	AWG18~20	AWG18~20
Functional Grounding cable	HVSF1.25~20mm ²	HVSF1.25~20mm ²
	AWG14~16	AWG14~16
Motor cable	HVSF1.25~20mm ²	HVSF1.25~20mm ²
	AWG14~16	AWG14~16
Rush current suppression	No limit by driver	No limit by driver
Regenerative discharge	Not supported	Not supported
Weight	Approx 0.35 kg	Approx 0.35 kg
Dimensions	89×180×30 mm	89×180×30 mm

(Note 1) Rated capacitance specified by parts manufacturer

Model	MVDLN0BNL	MVDLN1BNL	MVDLN2BNL	MVDLN3BNL
Power supply input	DC 48 V	DC 48 V	DC 48 V	DC 48 V
Maximum output current	1.3 Ao-p	2.9 Ao-p	5.7 Ao-p	12.8 Ao-p
Input capacitance of Main power supply (*Note 1)	1640 uF	1640 uF	1640 uF	1640 uF
Input capacitance of Control power supply (*Note 1)	820 uF	820 uF	820 uF	820 uF
Ambient temperature	0 - 55 °C			
Main power supply cable	HVSF0.5~2.0mm ²	HVSF0.5~2.0mm ²	HVSF0.75~2.0mm ²	HVSF0.75~2.0mm ²
	AWG14~20	AWG14~20	AWG14~18	AWG14~18
Control power supply cable	HVSF0.5~0.75mm ²	HVSF0.5~0.75mm ²	HVSF0.5~0.75mm ²	HVSF0.5~0.75mm ²
	AWG18~20	AWG18~20	AWG18~20	AWG18~20
Functional Grounding cable	HVSF1.25~2.0mm ²	HVSF1.25~2.0mm ²	HVSF1.25~2.0mm ²	HVSF1.25~2.0mm ²
	AWG14~16	AWG14~16	AWG14~16	AWG14~16
Motor cable	HVSF0.5~2.0mm ²	HVSF0.5~2.0mm ²	HVSF0.75~2.0mm ²	HVSF0.75~2.0mm ²
	AWG14~20	AWG14~20	AWG14~18	AWG14~18
Rush current suppression	No limit by driver			
Regenerative discharge	Not supported	Not supported	Not supported	Not supported
Weight	Approx 0.35 kg	Approx 0.35 kg	Approx 0.35 kg	Approx 0.35 kg
Dimensions	89×180×30 mm	89×180×30 mm	89×180×30 mm	89×180×30 mm

(Note 1) Rated capacitance specified by parts manufacturer

Model	MVDLN4BNL	MVDLN5BNL
Power supply input	DC 48 V	DC 48 V
Maximum output current	26.9 Ao-p	43 Ao-p
Input capacitance of Main power supply (*Note 1)	1640 uF	1640 uF
Input capacitance of Control power supply (*Note 1)	820 uF	820 uF
Ambient temperature	0 - 55 °C	0 - 55 °C
Main power supply cable	HVSF1.25~20mm ²	HVSF1.25~20mm ²
	AWG14~16	AWG14~16
Control power supply cable	HVSF0.5~0.75mm ²	HVSF0.5~0.75mm ²
	AWG18~20	AWG18~20
Functional Grounding cable	HVSF1.25~20mm ²	HVSF1.25~20mm ²
	AWG14~16	AWG14~16
Motor cable	HVSF1.25~20mm ²	HVSF1.25~20mm ²
	AWG14~16	AWG14~16
Rush current suppression	No limit by driver	No limit by driver
Regenerative discharge	Not supported	Not supported
Weight	Approx 0.35 kg	Approx 0.35 kg
Dimensions	89×180×30 mm	89×180×30 mm

(Note 1) Rated capacitance specified by parts manufacturer

Appendix List of Default parameters

The following pages show default parameters set when the servo driver is shipped from the factory.
Operation must be confirmed for each customer machine before use and the optimal parameters set.

PARAMETER

MODEL MINAS-A6NE SizeV series

Category	Pr.	Parameter	Default value	Category	Pr.	Parameter	Default value	Category	Pr.	Parameter	Default value	Category	Pr.	Parameter	Default value
3	0	No use	-	3	31	No use	-								
	1	No use	-		32	Judgment threshold for positional variation of external scale at virtual full-closed control mode	0								
	2	No use	-												
	3	No use	-												
	4	For manufacturer's use	0												
	5	For manufacturer's use	0												
	6	No use	-												
	7	No use	-												
	8	No use	-												
	9	No use	-												
	10	No use	-												
	11	No use	-												
	12	Acceleration time setup	0												
	13	Deceleration time setup	0												
	14	Sigmoid acceleration/ deceleration time setup	0												
	15	No use	-												
	16	No use	-												
	17	Selection of speed limit	0												
	18	No use	-												
	19	No use	-												
	20	No use	-												
	21	Speed limit value 1	0												
	22	Speed limit value 2	0												
	23	External scale selection	0												
	24	Numerator of external scale division	0												
	25	Denominator of external scale division	10000												
	26	Reversal of direction of external scale	0												
	27	External scale Z phase disconnection detection disable	0												
	28	Hybrid deviation excess setup	16000												
	29	Hybrid deviation clear setup	0												
	30	No use	-												

* 1 Parameter with decimal point setup. Describe the decimal point value displayed on Panatorm. When checking the parameter file directly with text etc., the digits are shifted by the digits after the decimal point.

Example) Pr 6.24 Load fluctuation compensation filter Panatorm display: 0.53 Parameter file setup value: 53 Shift two decimal place digits

* 2 The maximum value of torque limit setup (Pr0.13, Pr 5.22, Pr 5.25, Pr 5.26) varies depending on the applicable motor.

PARAMETER

MODEL MINAS-A6NE SizeV series

Category	Pr.	Parameter	Default value	Category	Pr.	Parameter	Default value	Category	Pr.	Parameter	Default value	Category	Pr.	Parameter	Default value
15	0	For manufacturer's use	0	15	31	For manufacturer's use	5								
	1	No use	-		32	No use	-								
	2	No use	-		33	For manufacturer's use	0								
	3	No use	-		34	For manufacturer's use	0								
	4	No use	-		35	For manufacturer's use	1								
	5	No use	-												
	6	No use	-												
	7	No use	-												
	8	No use	-												
	9	No use	-												
	10	No use	-												
	11	No use	-												
	12	No use	-												
	13	No use	-												
	14	No use	-												
	15	No use	-												
	16	For manufacturer's use	2												
	17	For manufacturer's use	4												
	18	No use	-												
	19	No use	-												
	20	No use	-												
	21	No use	-												
	22	No use	-												
	23	No use	-												
	24	No use	-												
	25	No use	-												
	26	No use	-												
	27	No use	-												
	28	No use	-												
	29	No use	-												
	30	For manufacturer's use	0												

* 1 Parameter with decimal point setup. Describe the decimal point value displayed on Panaterm. When checking the parameter file directly with text etc., the digits are shifted by the digits after the decimal point.

Example) Pr 6.24 Load fluctuation compensation filter Panaterm display: 0.53 Parameter file setup value: 53 Shift two decimal place digits

* 2 The maximum value of torque limit setup (Pr0.13, Pr 5.22, Pr 5.25, Pr 5.26) varies depending on the applicable motor.

PARAMETER

MODEL MINAS-A6NL SizeV series

Category	Pr.	Parameter	Default value	Category	Pr.	Parameter	Default value	Category	Pr.	Parameter	Default value	Category	Pr.	Parameter	Default value
1	0*1	1st gain of position loop	48.0	1	31	For manufacturer's use	0	1	62	For manufacturer's use	0				
	1*1	1st gain of velocity loop	27.0		32	For manufacturer's use	0		63	For manufacturer's use	0				
	2*1	1st time constant of velocity loop integration	21.0		33	For manufacturer's use	0		64	For manufacturer's use	0				
	3	1st filter of velocity detection	0		34	For manufacturer's use	0		65	For manufacturer's use	0				
	4*1	1st time constant of torque filter	0.84		35	For manufacturer's use	0		66	For manufacturer's use	0				
	5*1	2nd gain of position loop	48.0		36	For manufacturer's use	0		67	For manufacturer's use	0				
	6*1	2nd gain of velocity loop	27.0		37	For manufacturer's use	0		68	For manufacturer's use	0				
	7*1	2nd time constant of velocity loop integration	21.0		38	For manufacturer's use	0		69	For manufacturer's use	0				
	8	2nd filter of velocity detection	0		39	For manufacturer's use	0		70	For manufacturer's use	0				
	9*1	2nd time constant of torque filter	0.84		40	For manufacturer's use	0		71	For manufacturer's use	0				
	10*1	Velocity feed forward gain	100.0		41	For manufacturer's use	0		72	For manufacturer's use	0				
	11*1	Velocity feed forward filter	0.00		42	For manufacturer's use	0		73	For manufacturer's use	0				
	12*1	Torque feed forward gain	100.0		43	For manufacturer's use	0		74	For manufacturer's use	0				
	13*1	Torque feed forward filter	0.00		44	For manufacturer's use	0		75	For manufacturer's use	0				
	14	2nd gain setup	1		45	For manufacturer's use	0		76	For manufacturer's use	0				
	15	Mode of position control switching	0		46	For manufacturer's use	0		77	For manufacturer's use	0				
	16*1	Delay time of position control switching	1.0		47	For manufacturer's use	0		78	For manufacturer's use	0				
	17	Level of position control switching	0		48	For manufacturer's use	0								
	18	Hysteresis at position control switching	0		49	For manufacturer's use	0								
	19*1	Position gain switching time	1.0		50	For manufacturer's use	0								
	20	Mode of velocity control switching	0		51	For manufacturer's use	0								
	21*1	Delay time of velocity control switching	0.0		52	For manufacturer's use	0								
	22	Level of velocity control switching	0		53	For manufacturer's use	0								
	23	Hysteresis at velocity control switching	0		54	For manufacturer's use	0								
	24	Mode of torque control switching	0		55	For manufacturer's use	0								
	25*1	Delay time of torque control switching	0.0		56	For manufacturer's use	0								
	26	Level of torque control switching	0		57	For manufacturer's use	0								
	27	Hysteresis at torque control switching	0		58	For manufacturer's use	0								
	28	For manufacturer's use	0		59	For manufacturer's use	0								
	29	For manufacturer's use	0		60	For manufacturer's use	0								
	30	For manufacturer's use	0		61	For manufacturer's use	0								

* 1 Parameter with decimal point setup. Describe the decimal point value displayed on Panatern. When checking the parameter file directly with text etc., the digits are shifted by the digits after the decimal point.

Example) Pr 6.24 Load fluctuation compensation filter Panatern display: 0.53 Parameter file setup value: 53 Shift two decimal place digits

* 2 The maximum value of torque limit setup (Pr0.13, Pr 5.22, Pr 5.25, Pr 5.26) varies depending on the applicable motor.

PARAMETER

MODEL MINAS-A6NL SizeV series

Category	Pr.	Parameter	Default value	Category	Pr.	Parameter	Default value	Category	Pr.	Parameter	Default value	Category	Pr.	Parameter	Default value
4	0	SI1 input selection	3289650	4	31	Positioning complete (In-position) range	10								
	1	SI2 input selection	8487297		32	Positioning complete (In-position) output setup	0								
	2	SI3 input selection	8553090		33	INP hold time	0								
	3	SI4 input selection	3026478		34	Zero-speed	50								
	4	SI5 input selection	2236962		35	Speed coincidence range	50								
	5	SI6 input selection	2171169		36	At-speed (Speed arrival)	1000								
	6	SI7 input selection	2829099		37	Mechanical brake action at stalling setup	0								
	7	SI8 input selection	3223857		38	Mechanical brake action at running setup	0								
	8	No use	-		39	Brake release speed setup	30								
	9	No use	-		40	Selection of alarm output 1	0								
	10	SO1 output selection	197379		41	Selection of alarm output 2	0								
	11	SO2 output selection	1052688		42	2nd Positioning complete (In-position) range	10								
	12	SO3 output selection	65793		43	No use	-								
	13	No use	-		44	Position comparison output pulse width setting *1	0.0								
	14	No use	-		45	Position comparison output polarity selection	0								
	15	No use	-		46	No use	-								
	16	Type of analog monitor 1	0		47	Pulse output selection	0								
	17	Analog monitor 1 output gain	0		48	Position comparison value 1	0								
	18	Type of analog monitor 2	4		49	Position comparison value 2	0								
	19	Analog monitor 2 output gain	0		50	Position comparison value 3	0								
	20	No use	-		51	Position comparison value 4	0								
	21	Analog monitor output setup	0		52	Position comparison value 5	0								
	22	For manufacturer's use	0		53	Position comparison value 6	0								
	23	For manufacturer's use	0		54	Position comparison value 7	0								
	24	For manufacturer's use	0		55	Position comparison value 8	0								
	25	No use	-		56	Position comparison output delay compensation amount *1	0.0								
	26	No use	-		57	Position comparison output assignment setting	0								
	27	No use	-												
	28	No use	-												
	29	No use	-												
	30	No use	-												

* 1 Parameter with decimal point setup. Describe the decimal point value displayed on Panaterm. When checking the parameter file directly with text etc., the digits are shifted by the digits after the decimal point.

Example) Pr 6.24 Load fluctuation compensation filter Panaterm display: 0.53 Parameter file setup value: 53 Shift two decimal place digits

* 2 The maximum value of torque limit setup (Pr0.13, Pr 5.22, Pr 5.25, Pr 5.26) varies depending on the applicable motor.

PARAMETER				MODEL	MINAS-A6NL SizeV series											
Category	Pr.	Parameter	Default value	Category	Pr.	Parameter	Default value	Category	Pr.	Parameter	Default value	Category	Pr.	Parameter	Default value	
6	0	No use	-	6	31	Real time auto tuning estimation speed	1	6	62	1st resonance attenuation ratio	0	6	93	No use	-	
	1	No use	-		32	Real time auto tuning custom setup	0		63*1	1st anti-resonance frequency	0.0		94	No use	-	
	2	Velocity deviation excess setup	0		33	No use	-		64	1st anti-resonance attenuation ratio	0		95	No use	-	
	3	No use	-		34	For manufacturer's use	0		65*1	1st response frequency	0.0		96	No use	-	
	4	No use	-		35	For manufacturer's use	10		66*1	2nd resonance frequency	0.0		97	Function expansion setup 3	0	
	5*1	Position 3rd gain valid time	0.0		36	Dynamic brake operation input setup	0		67	2nd resonance attenuation ratio	0		98	Function expansion setup 4	0	
	6	Position 3rd gain scale factor	100		37*1	Oscillation detecting level	0.0		68*1	2nd anti-resonance frequency	0.0					
	7	Torque command additional value	0		38	Warning mask setup	4		69	2nd anti-resonance attenuation ratio	0					
	8	Positive direction torque compensation value	0		39	Warning mask setup2	0		70*1	2nd response frequency	0.0					
	9	Negative direction torque compensation value	0		40	No use	-		71	3rd damping depth	0					
	10	Function expansion setup	16		41	1st damping depth	0		72	4th damping depth	0					
	11	For manufacturer's use	100		42*1	Two-stage torque filter time constant	0.00		73*1	Load estimation filter	0.00					
	12	No use	-		43	Two-stage torque filter attenuation term	0		74*1	Torque compensation frequency 1	0.0					
	13	No use	-		44	No use	-		75*1	Torque compensation frequency 2	0.0					
	14	Emergency stop time at alarm	200		45	No use	-		76	Load estimation count	0					
	15	2nd over-speed level setup	0		46	No use	-		77	No use	-					
	16	No use	-		47	Function expansion settings 2	1		78	No use	-					
	17	No use	-		48*1	Adjust filter	5B/5C: 1.2 Other: 1.1		79	No use	-					
	18*1	Power-up wait time	0.0		49	Adjust/Torque command attenuation term	15		80	No use	-					
	19	For manufacturer's use	0		50*1	Viscous friction compensation gain	0.0		81	No use	-					
	20	For manufacturer's use	0		51	Immediate cessation completion wait time	0		82	No use	-					
	21	For manufacturer's use	0		52	For manufacturer's use	0		83	No use	-					
	22	A, B phase feedback scale pulse output method selection	0		53	For manufacturer's use	0		84	No use	-					
	23	Load change compensation gain	0		54	For manufacturer's use	0		85	Condition setting for escape operation	0					
	24*1	Load change compensation filter	0.53		55	No use	-		86	Alarm setting for escape operation	0					
	25	No use	-		56	No use	-		87	For manufacturer's use	0					
	26	No use	-		57	Torque saturation anomaly detection time	0		88	For manufacturer's use	0					
	27	Warning latch state setup	0		58	For manufacturer's use	0		89	No use	-					
	28	No use	-		59	For manufacturer's use	0		90	No use	-					
	29	No use	-		60	2nd damping depth	0		91	No use	-					
30	For manufacturer's use	0	61*1	1st resonance frequency	0.0	92	No use	-								

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Example) Pr 6.24 Load fluctuation compensation filter Panatern display: 0.53 Parameter file setup value: 53 Shift two decimal place digits

* 2 The maximum value of torque limit setup (Pr0.13, Pr 5.22, Pr 5.25, Pr 5.26) varies depending on the applicable motor.

