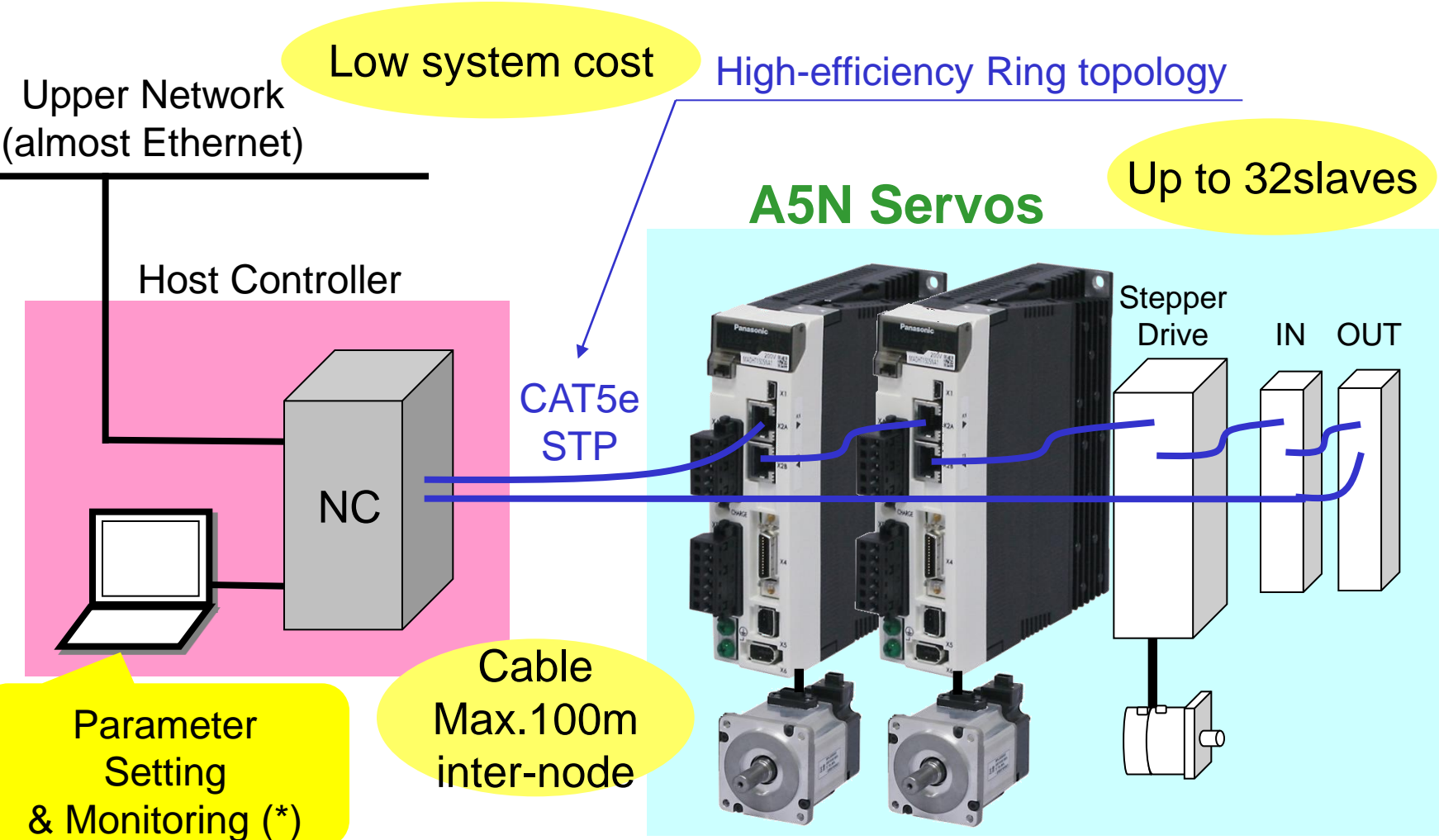


Overview of *MINAS A5N*  
*The Next Generation Network Servo*



200W 200V  
Frame Size A

# System Structure



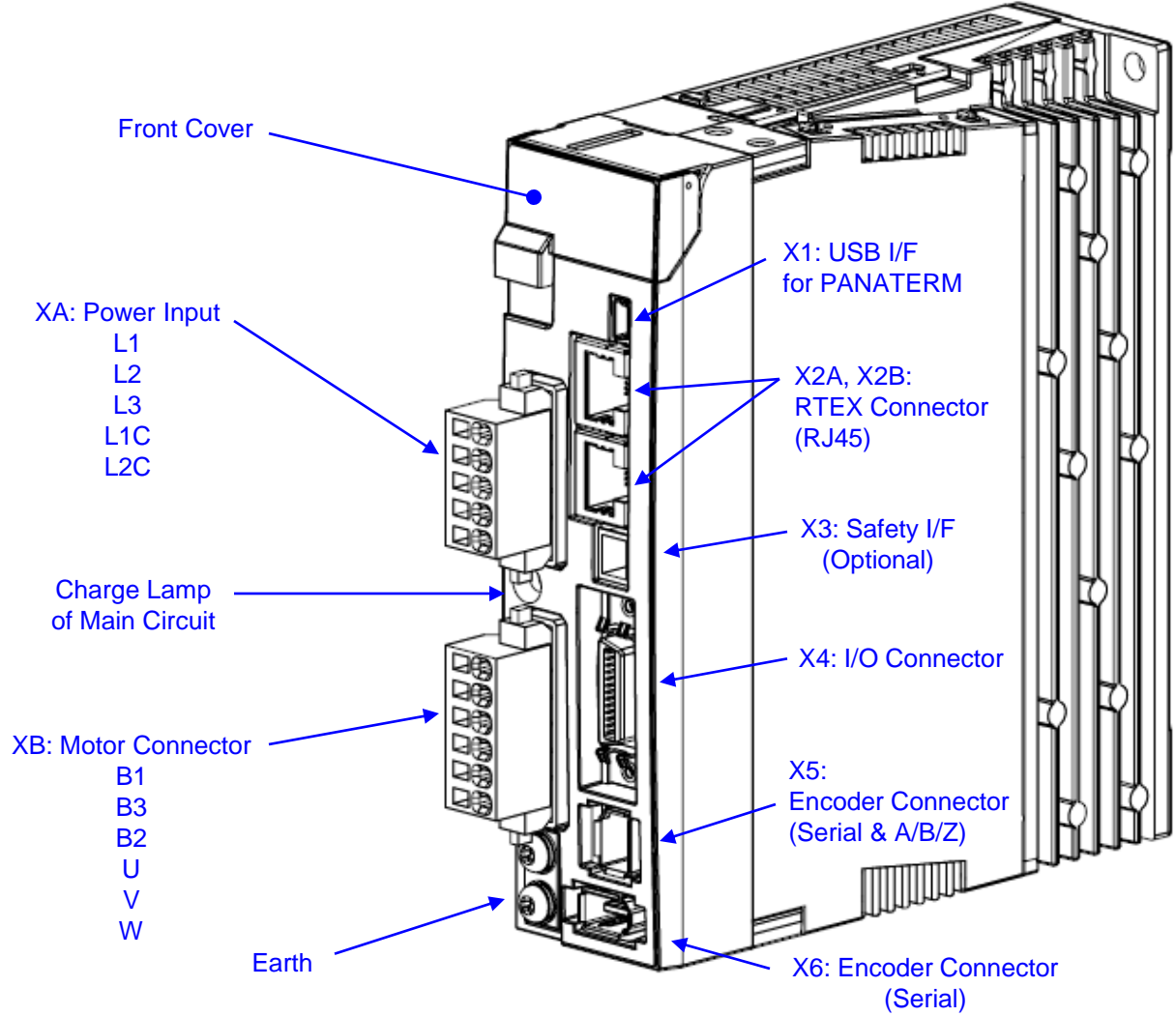
Parameter Setting & Monitoring (\*)

Cable Max. 100m inter-node

Except for Servo, Devices Provided by Partners

\*: Depends on a controller specification

# Appearance



Frame Size A  
 W 40  
 H 150  
 D 133  
 Unit: mm

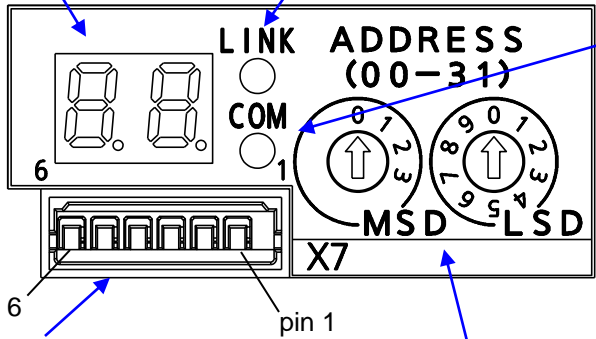
# Front Panel

## The Inside of Front Cover

7segments LED

LINK LED (Green)

LINK	Network State
OFF	Wiring Not Link
Solid Green	Link



COM LED (Green / Red)

COM	Network State
OFF	Initial
Blinking Green	In Configuration
Solid Green	Established
Blinking Red	Error
Solid Red	Serious Error (Reset needed)

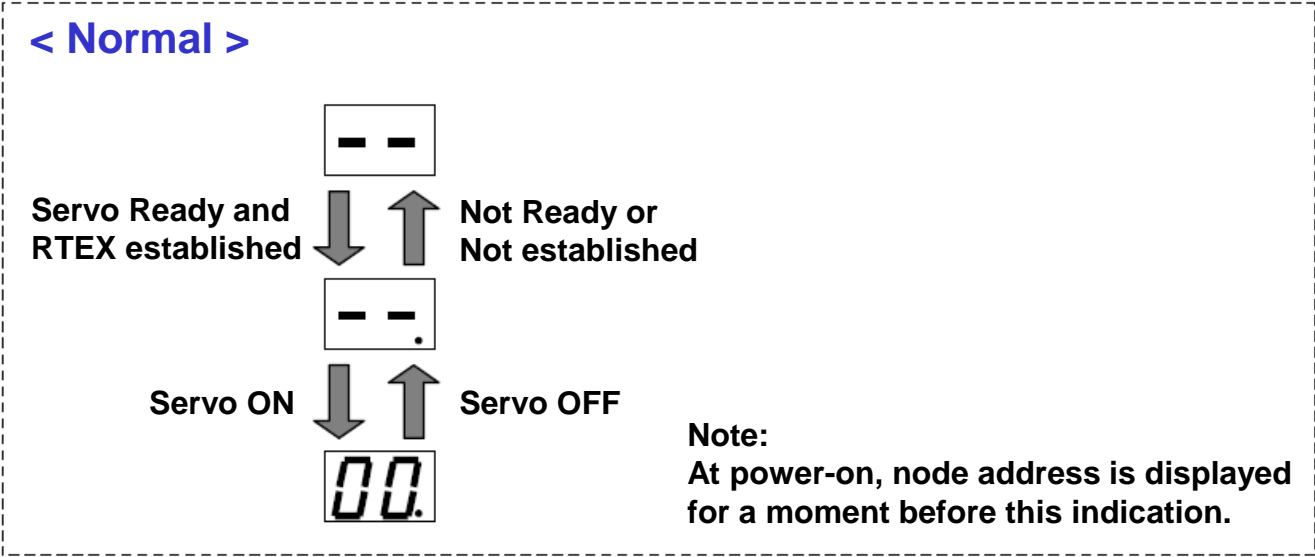
**X7: Analog Monitor Connector**  
Molex 53014-0610 (Note)

Pin #	Symbol	Description
1	AM1	Analog Monitor 1
2	AM2	Analog Monitor 2
3	GND	Signal Ground
4, 5, 6		For Firmware Update

Address Setting RSW  
Range: 00 to 31

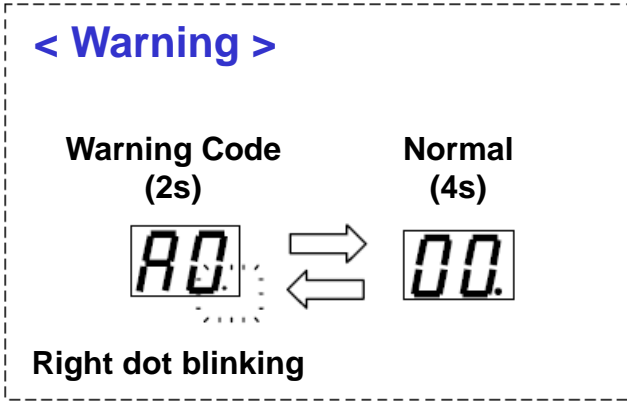
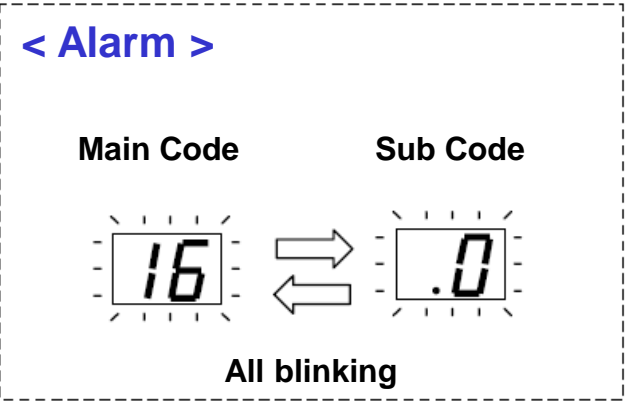
Note: Wire side connector  
Housing: 51004-0600  
Terminal: 50011-8100

# 7segments LED Display

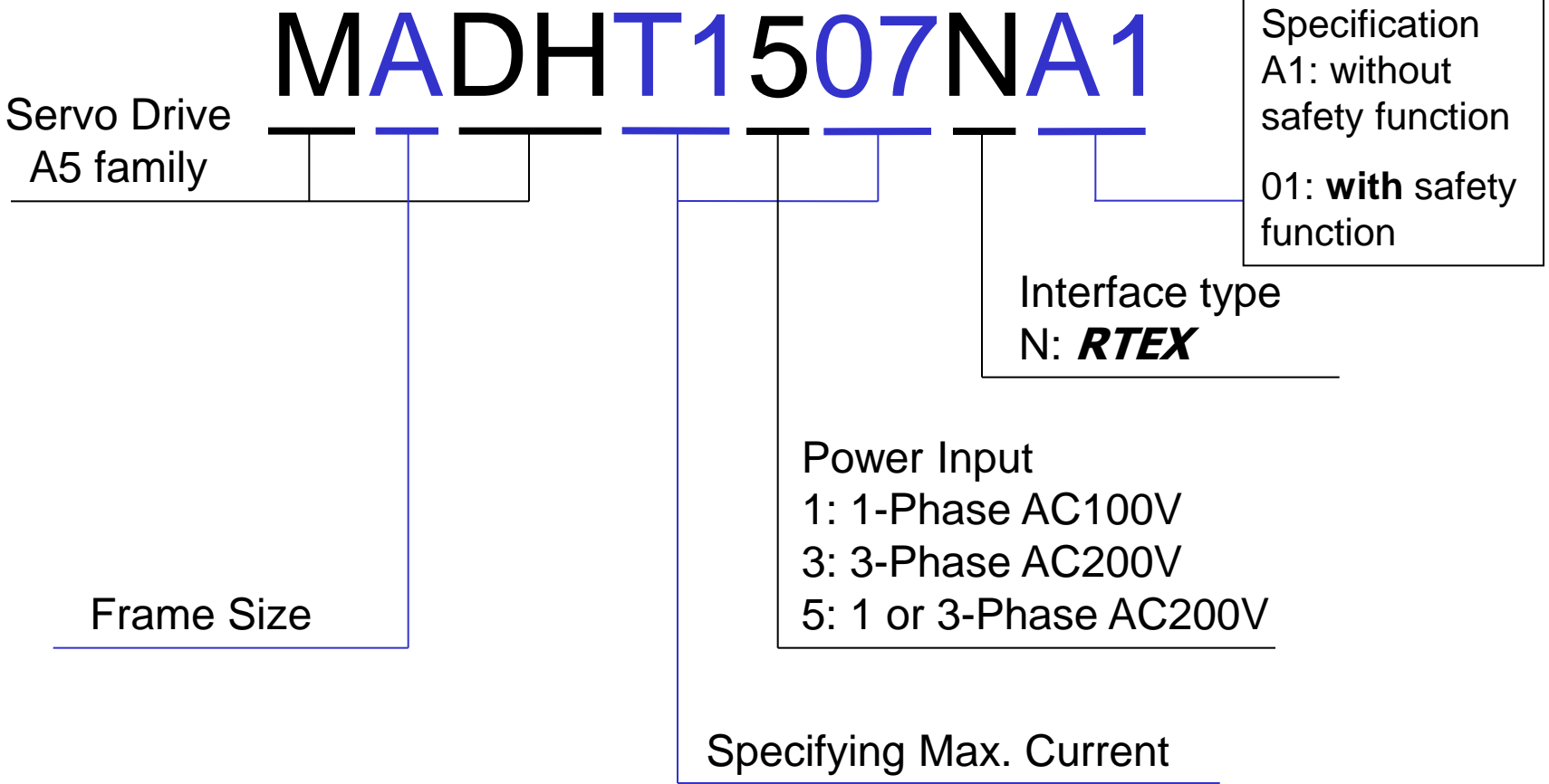


Alarm ↓ ↑ Cleared

Warning ↓ ↑ Cleared



# Structure of Model No.



# Lineup

Rated Output of Motor (W)

		50	100	200	400	750	1k	1.5k	2k	3k	4k	5k	7.5k	15k
Power Input of Drive	1 Phase AC 100-115V	<b>A</b>	<b>A</b>	<b>B</b>	<b>C</b>									
		MADH T1105 NA1	MADH T1107 NA1	MBDH T2110 NA1	MCDH T3120 NA1									
	1 or 3 Phase AC 200-240V	<b>A</b>		<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>							
		MADH T1505 NA1		MADH T1507 NA1	MBDH T2510 NA1	MCDH T3520 NA1	MDDH T5540 NA1							
	3 Phase AC 200-230V								<b>E</b>	<b>F</b>	<b>F</b>		<b>G</b>	<b>H</b>
									MEDH T7364 NA1	MFDH TA390 NA1	MFDH TB3A2 NA1		MGDH TC3B4 NA1	MHDH TC3B4 NA1

Upper: Frame size

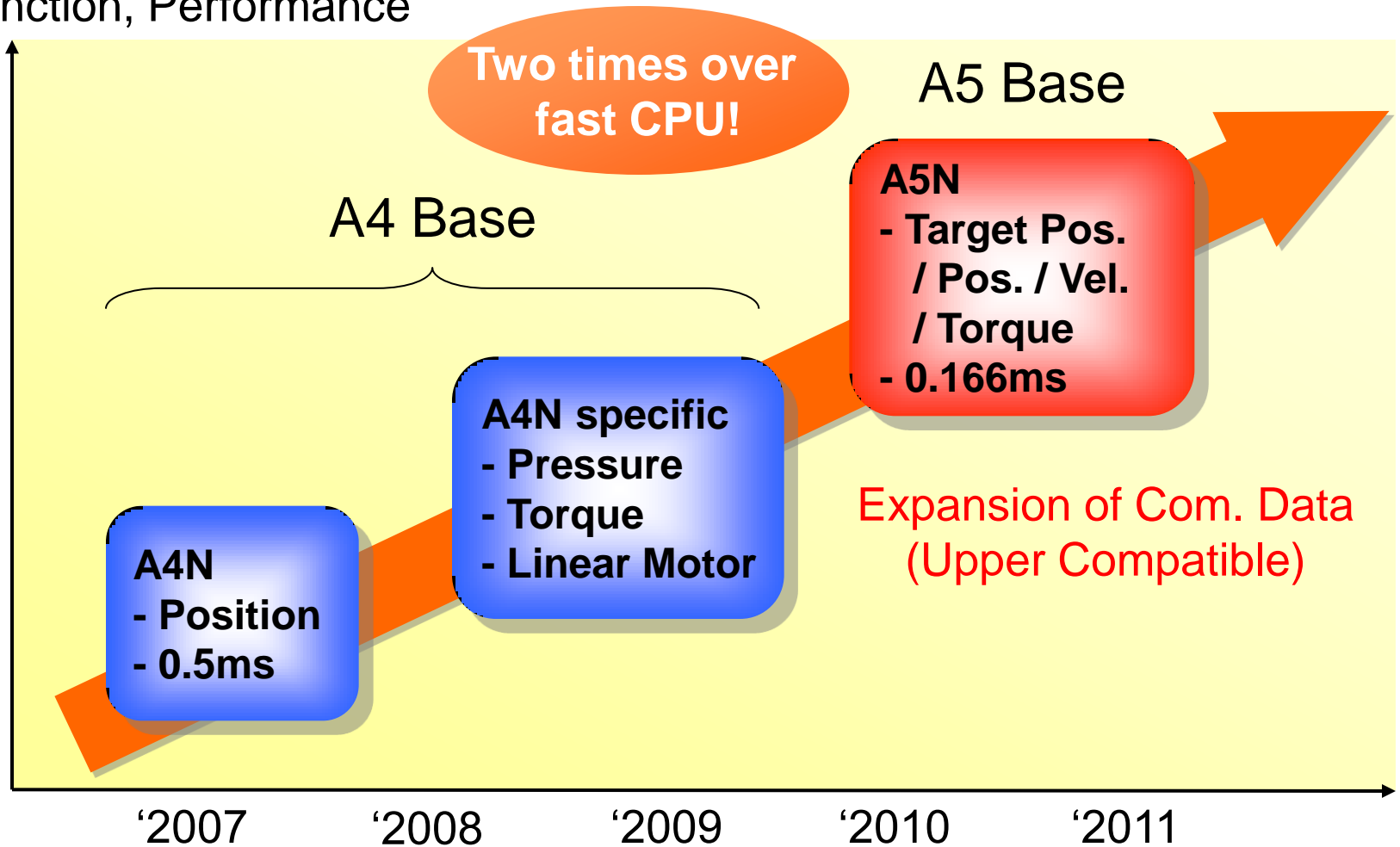
Lower: Typical model No. (Depending on combination with motor )



# Road Map

# Road Map

Function, Performance



# Evolution from A4N to A5N

High Performance  
MINAS A5

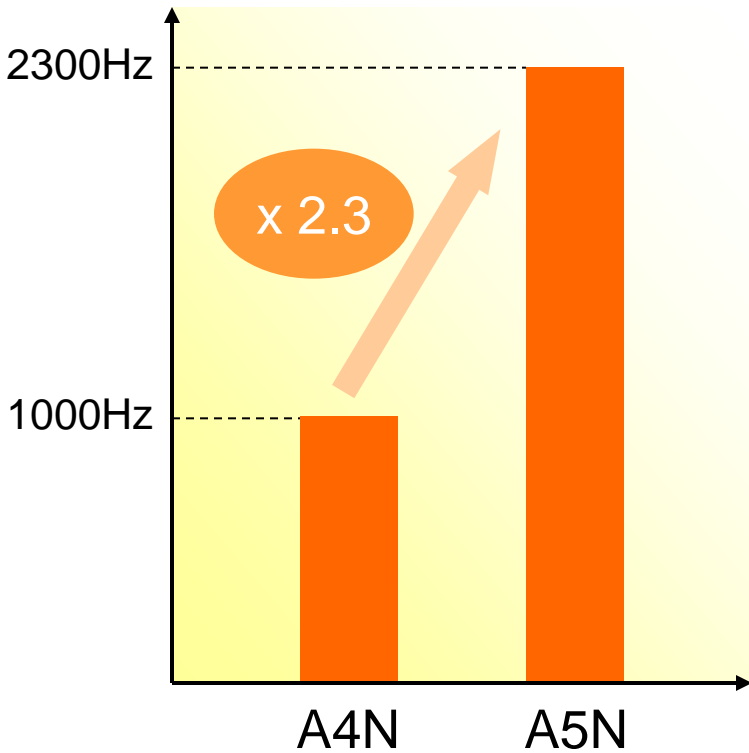
+

Extended  
RTEX protocol

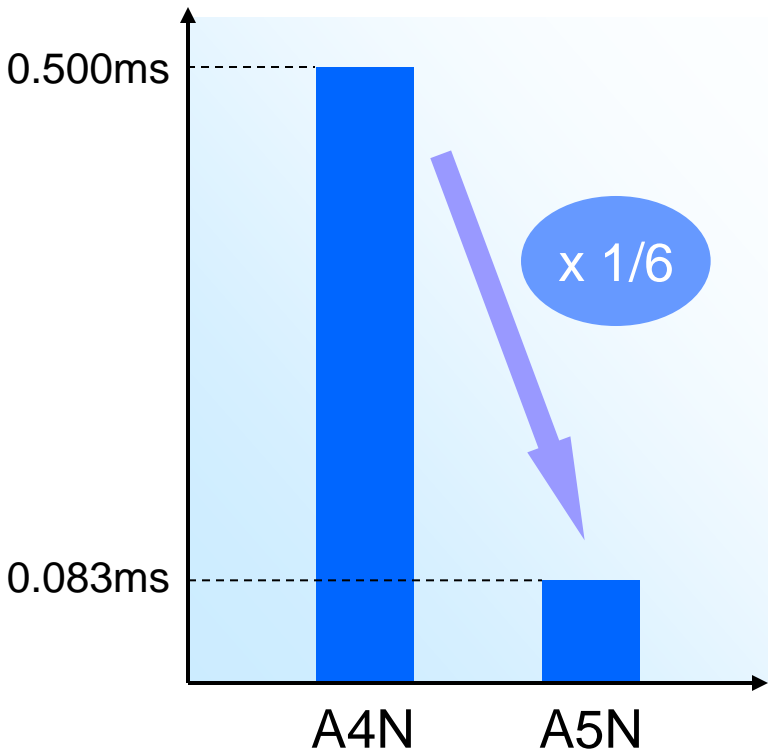
Note:  
RTEX hardware is not changed.  
Basically, A5N is upper compatible with A4N.

# Response and Com. Period

Velocity Response

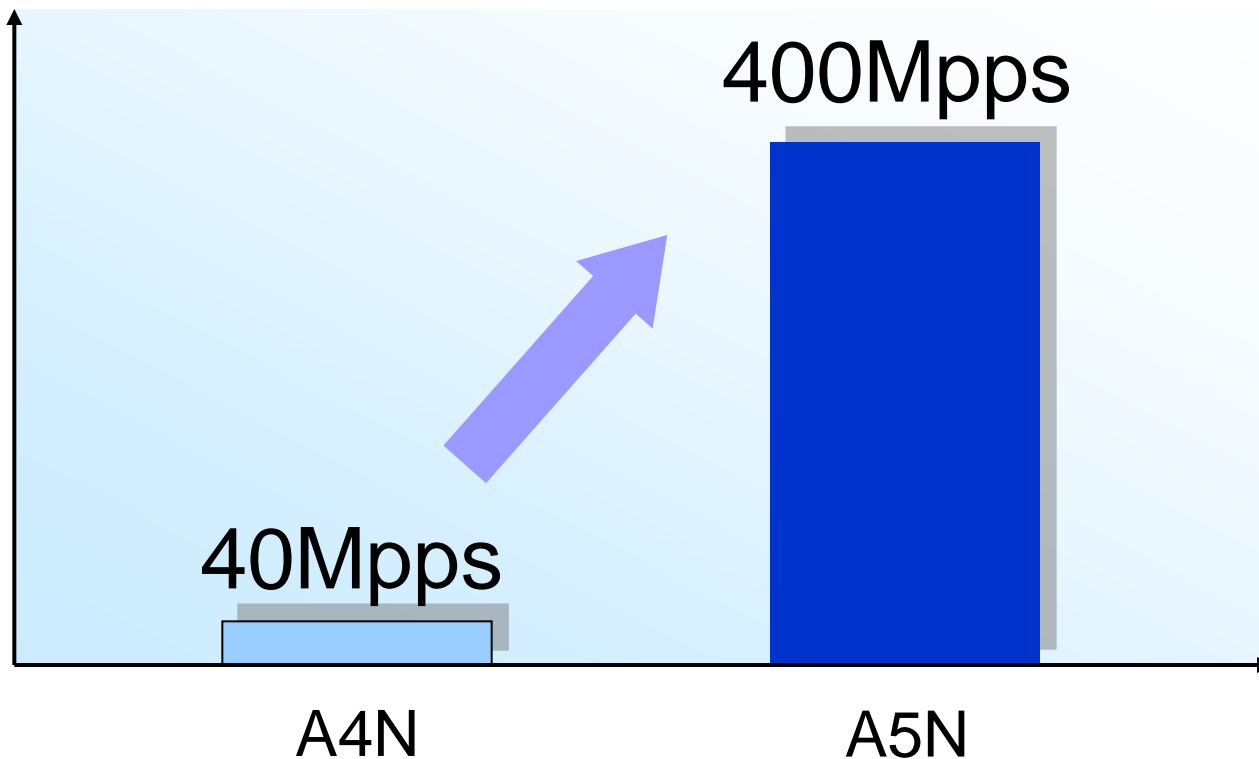


Communication Period (Min.)



# Max. Pulse Frequency

For More High-Resolution  
and High-Speed Applications



Note: If using A/B phase linear encoder, it is limited to maximum 4Mpps.

# Features of A5N

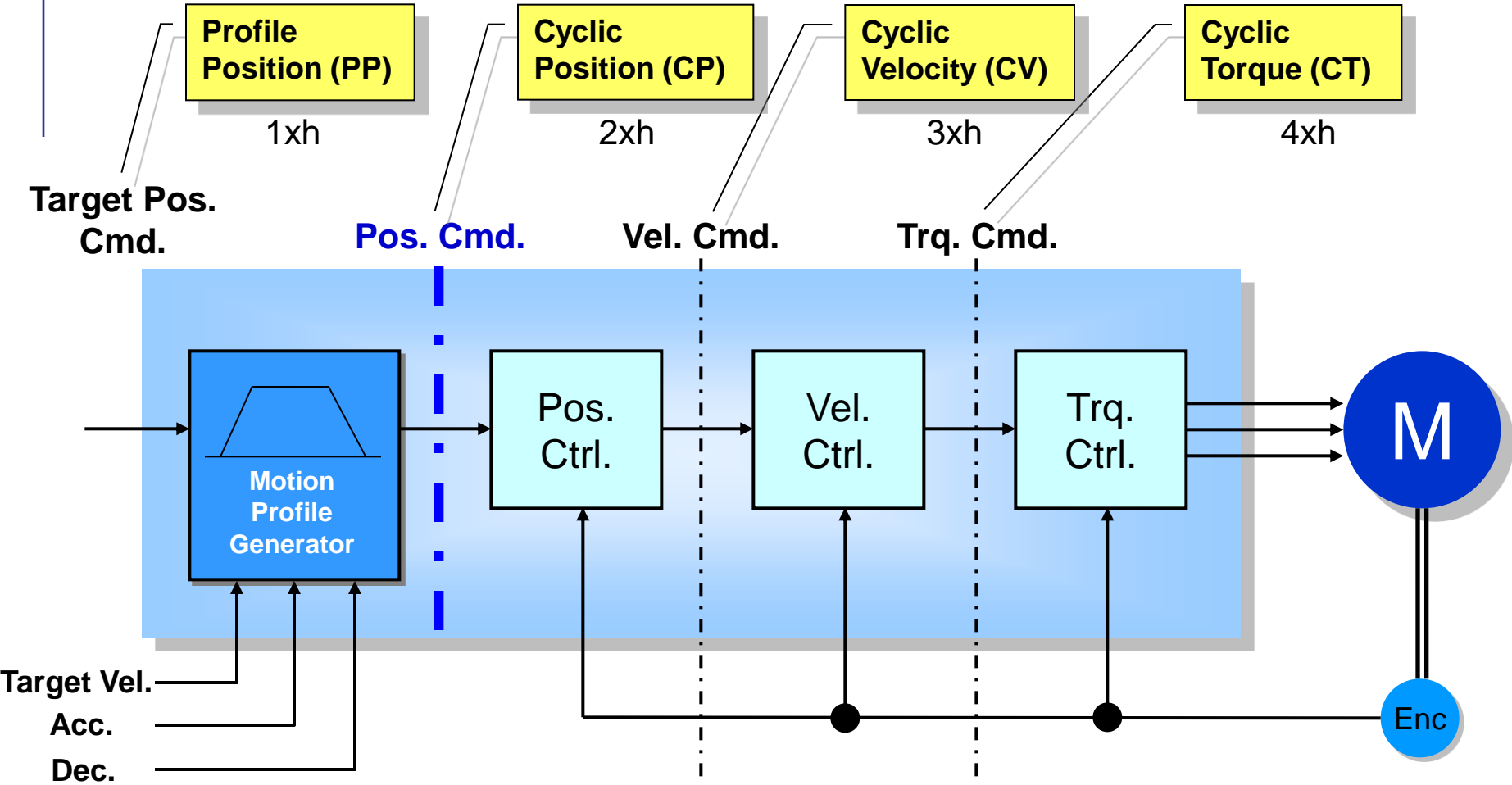
By the Expansion  
of Com. Data

- Multiple Motion I/F
- Shorter Communication Period
- 32bytes/axis Mode for Monitoring
- Position Capture
- Detection of Cable Breaking Down Point (Specific model)
- Waveform Data Reading (Specific model)
- Torque Feed Forward
- A/B-pulse Linear Encoder I/F
- 20bit/r Encoder
- Reduced Vibration by New Current Sensing
- Three-Phase Power Input
- Safety\* I/F (Specific model)

By A5 Base

Note \*: IEC61800-5-2 STO (Safe Torque Off), IEC61508 SIL2 (Safety Integrity Level 2)

# Motion I/F



# Period and Max. Axes

Update Period	Com. Period	Max. # of Axes		Available Mode
		16byte mode	32byte mode	
1.000ms	1.000ms	32	16	PP, CP, CV, CT
1.000ms	0.500ms	32	16	PP, CP, CV, CT
0.500ms	0.500ms	32	16	PP, CP, CV, CT
0.166ms	0.166ms	10	-	CP, CV, CT
0.166ms	0.083ms	5	-	CP, CV, CT

Com. Period: Frame transmitting period

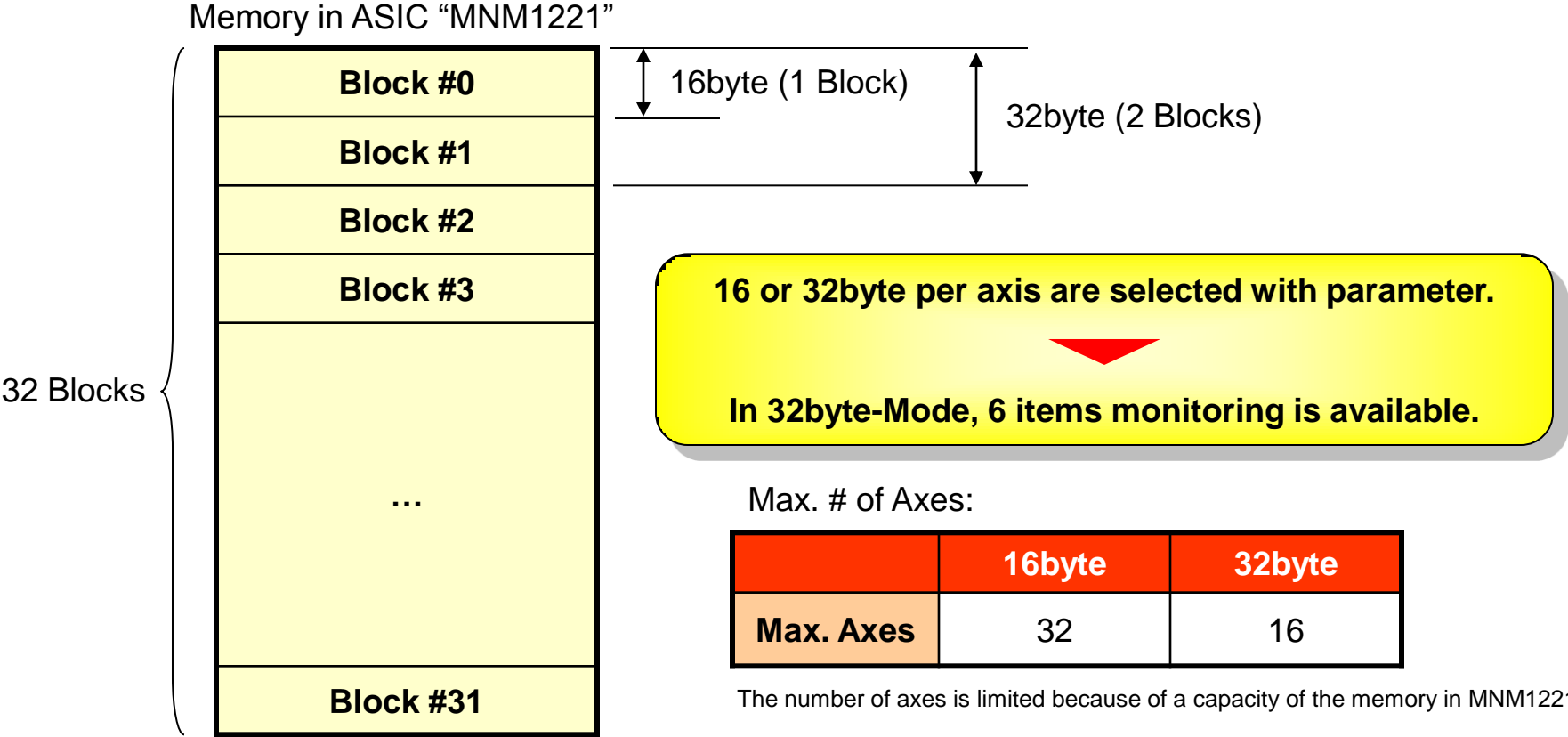
Update Period: Data updating period in frame

Note: In the update period 0.166ms, 32byte mode and full-closed control are not supported.



# 32byte-Mode Added

Occupied blocks per axis are selectable.



The number of axes is limited because of a capacity of the memory in MNM1221

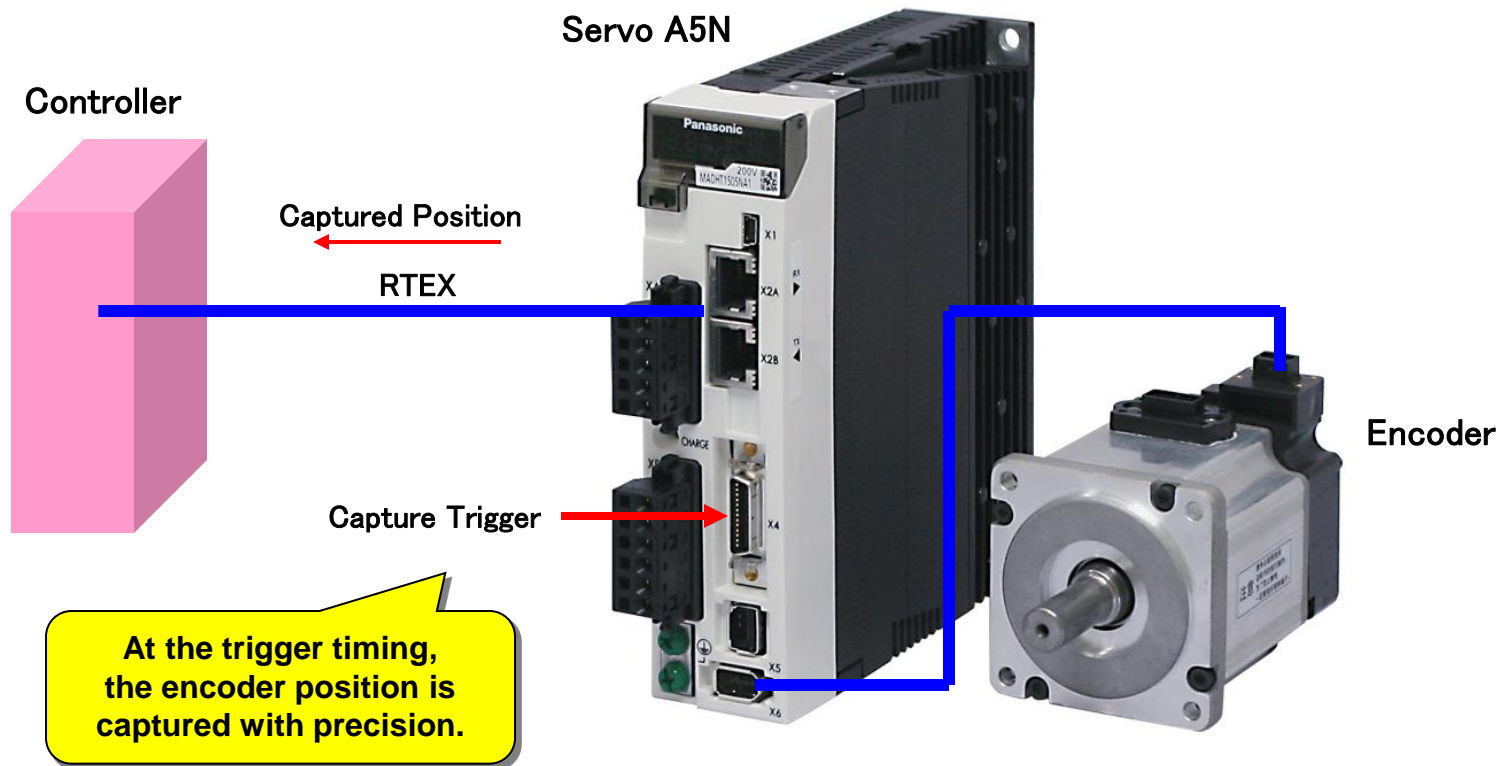
# Monitoring Item Examples

- Drive Model No.
- Drive Serial No.
- Firmware Version
- Motor Model No.
- Motor Serial No.
- Alarm Code (History)
- Warning Code
- Parameter
- Actual Position
- Actual Velocity
- Torque
- Position Error
- Encoder Resolution
- Command Position
- Latch Position
- Command Velocity
- Re-Generative Ratio
- Over-Load Ratio
- Inertia Ratio
- Rotor Mechanical Angle
- Rotor Electrical Angle
- Absolute Multi-turn Data
- P-N Voltage
- Com Err. Count
- Encoder Com. Err. Count
- X4 Connector Inputs
- Power-ON time
- Drive Temperature
- Encoder Temperature
- Relay Switch Times
- Fan ON Time
- Fan Life Time
- Capacitor Life Time

More Increased  
than A4N

# Position Capture

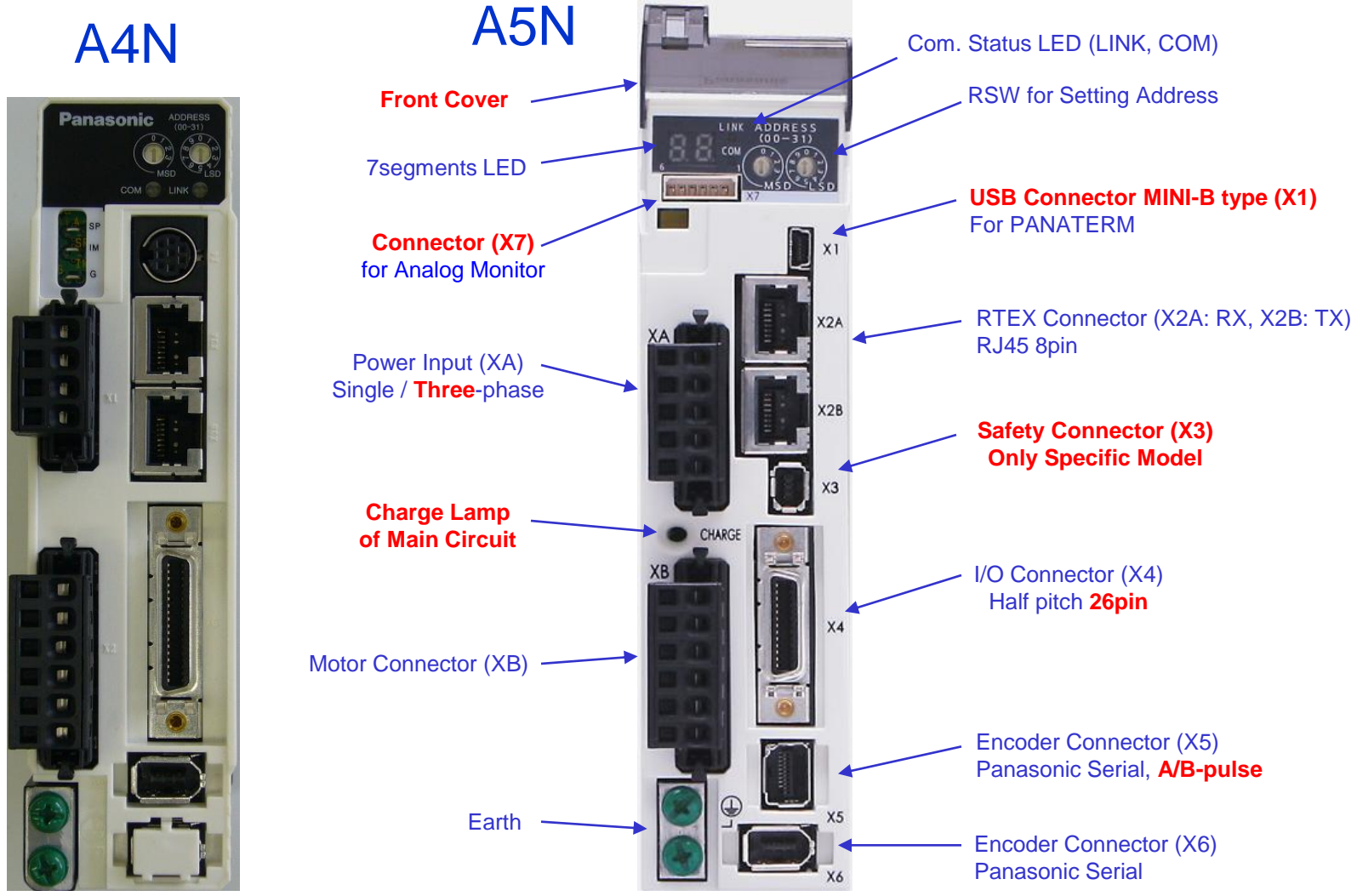
After the encoder position is captured at trigger input, it is sent to the controller with RTEX.



2ch available for trigger input

# The Difference between A4N and A5N

# Appearance Comparison



Red: Changes

# Compatibility with A4N

	Item	Compatibility	Remark
Installing	The Size of Drive	Yes	
Wiring	Power Input Connector	Yes	For frame-size A and B, the number of pins changed from 4 to 5
	Motor Connector	Yes	
	Encoder Connector X6	Yes	
	Encoder Connector X5	No	Connector type changed
	I/O Connector	No	From 36pin to 26pin
Tool	PANATERM	No	From RS232 to USB
RTEX	Position Command	Yes	
	Parameter Command	No	Changed to a combination of Category and No.
	Alarm Command	No	Changed to a combination of Main and Sub-code

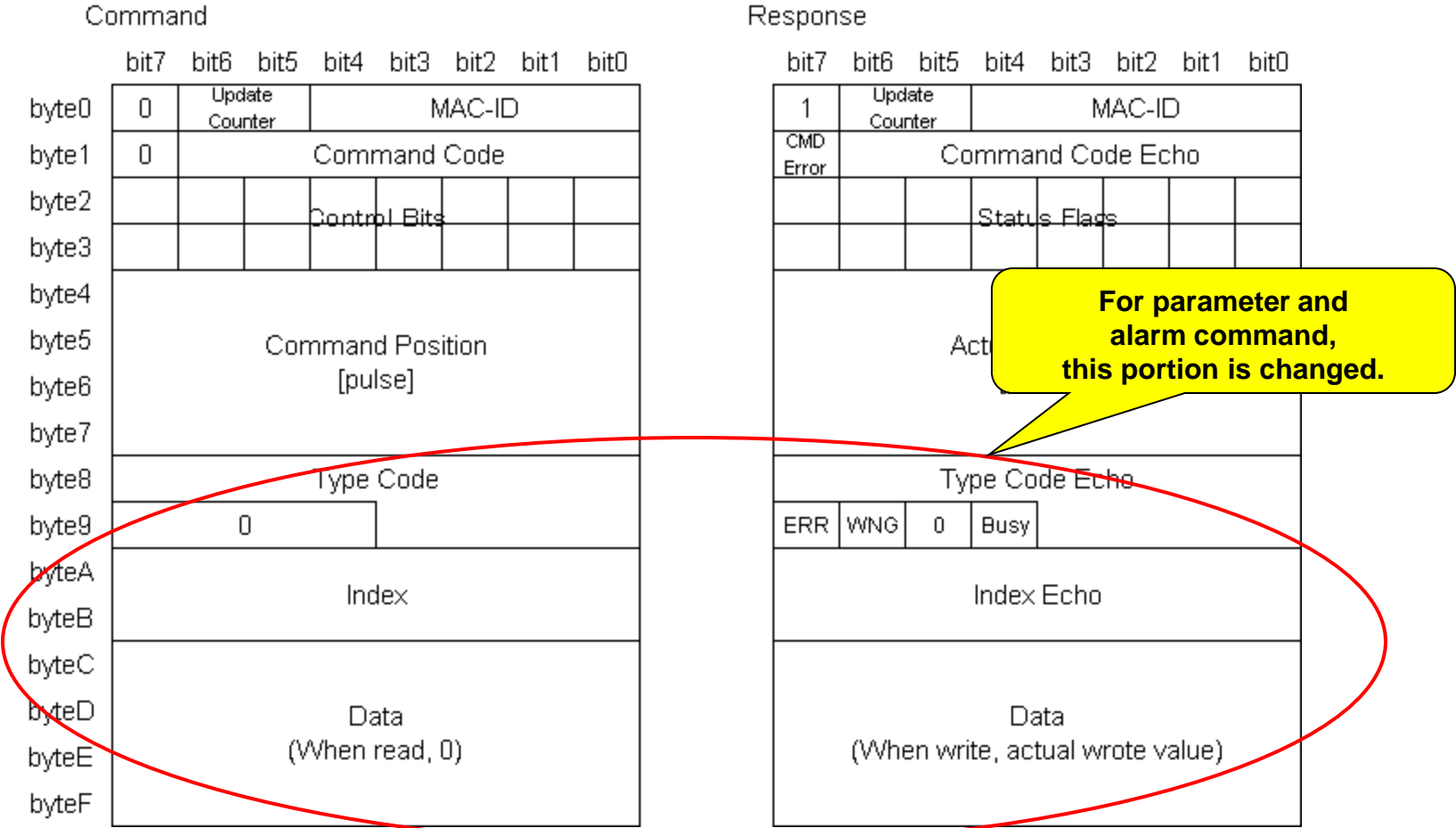
# Discriminating A5N

It is possible to discriminate between A4N and A5N with reading model No. For the fourth figure of the model No., 'D' means A4N, and 'H' means A5N. Using system ID command 22h and type code 120h, the model No. can be read.

	A4N	A5N
The fourth figure of model No.	'D'	'H'
Example (200V, 200W)	MAD <u>D</u> T1207N	MAD <u>H</u> T1507NA1

# Structure of Data Block

Although the structure of data block in A5N is the same as A4N, the contents in parameter and alarm commands are changed.





# Parameter Command (26h)

Type Code and Index are changed.

Type Code:

	A4N	A5N
Parameter Reading	000h	010h
Parameter Writing	001h	011h

Note: To prevent A4N's parameter-setting, Type Code is changed in A5N.  
(For the parameter, A4N and A5N are not compatible.)

Index:

	A4N	A5N
Byte A (Lower)	Parameter No.	Parameter No.
Byte B (Higher)	00h	Parameter Category

# Alarm Command (25h)

Alarm Code is changed.

Data:

	A4N	A5N
Byte C (Lower)	Alarm Code	Alarm Main-Code
Byte D (Higher)	00h	Alarm Sub-Code

Note: With parameter setting, it is also possible to make Sub-Code zero like A4N.

# I/O Connector

I/O	A4N (36pin)		A5N (26pin)				Remark
	Name	Pin#	Name	Pin#	Default Function	Default Meaning	
IN	I-COM	1	I-COM	6		Input Common	
IN	EMG-STP	2	SI1	5	SI-MON5	General Purpose Input 5	
IN	CCWL	19	SI2	7	POT	Positive Limit	
IN	CWL	20	SI3	8	NOT	Negative Limit	
IN	EX-IN1	5	SI4	9	SI-MON1	General Purpose Input 1	
IN	HOME	21	SI5	10	HOME	Home	
IN	EX-IN2	4	SI6	11	EXT2	External Latch 2	
IN	EX-IN3	3	SI7	12	EXT3	External Latch 3	
IN	EX-IN4/EX-SON	23	SI8	13	SI-MON4	General Purpose Input 4	
IN	Reserved	22					
IN	Reserved	6					
IN	AIN	25	AIN	23		Analog Input	Specific Model Only
IN	GND	24	GND	24		Analog GND	Specific Model Only
	BTP-I	34	BTP-I	14		Battery Plus Input	For Absolute Encoder
	BTN-I	33	BTN-I	15		Battery Minus Input	For Absolute Encoder
OUT	ALM+	15	SO3+	3	ALM+	Alarm +	
OUT	ALM-	16	SO3-	4	ALM-	Alarm -	
OUT	BRK-OFF+	36	SO1+	1	BRK-OFF+	Motor Breake Release +	
OUT	BRK-OFF-	35	SO1-	2	BRK-OFF-	Motor Breake Release -	
OUT	EX-OUT1+	29	SO2+	25	EX-OUT1+	General Purpose Output 1 +	
OUT	EX-OUT1-	30	SO2-	26	EX-OUT1-	General Purpose Output 1 -	
OUT	EX-OUT2+	31					
OUT	EX-OUT2-	32					
OUT	Reserved	17					
OUT	OA+	11	OA+	17		Encoder A +	RS422 Output
OUT	OA-	12	OA-	18		Encoder A -	RS422 Output
OUT	OB+	13	OB+	20		Encoder B +	RS422 Output
OUT	OB-	14	OB-	19		Encoder B -	RS422 Output
OUT	OZ+	9	Reserved	21			RS422 Output
OUT	OZ-	10	Reserved	22			RS422 Output
OUT	GND	26	GND	16		Signal GND	
	FG	18	FG	Shell		Frame GND	
	NC	7					
	NC						
	NC						
	NC	20					

Functions of SI1 to 8, and SO1 to 3 are changeable with parameters.

# Encoder Resolution

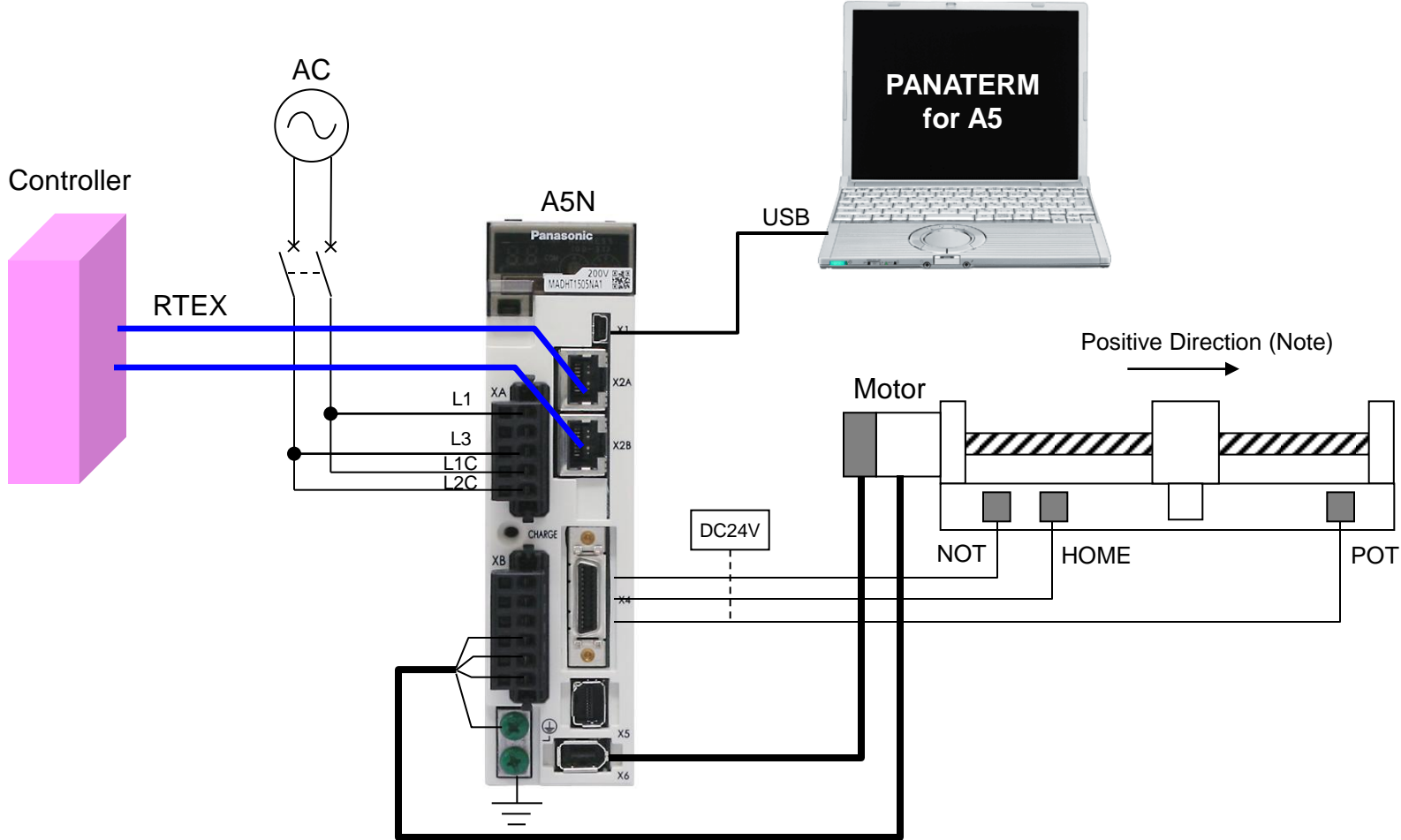
For incremental, its resolution is changed to 20bit.  
For absolute, there is no change.

Encoder Resolution [pulse/r]:

	A4 motor	A5 motor
Incremental	10,000	1,048,576 (20bit)
Absolute	131,072 (17bit)	131,072 (17bit)

# Test Operation

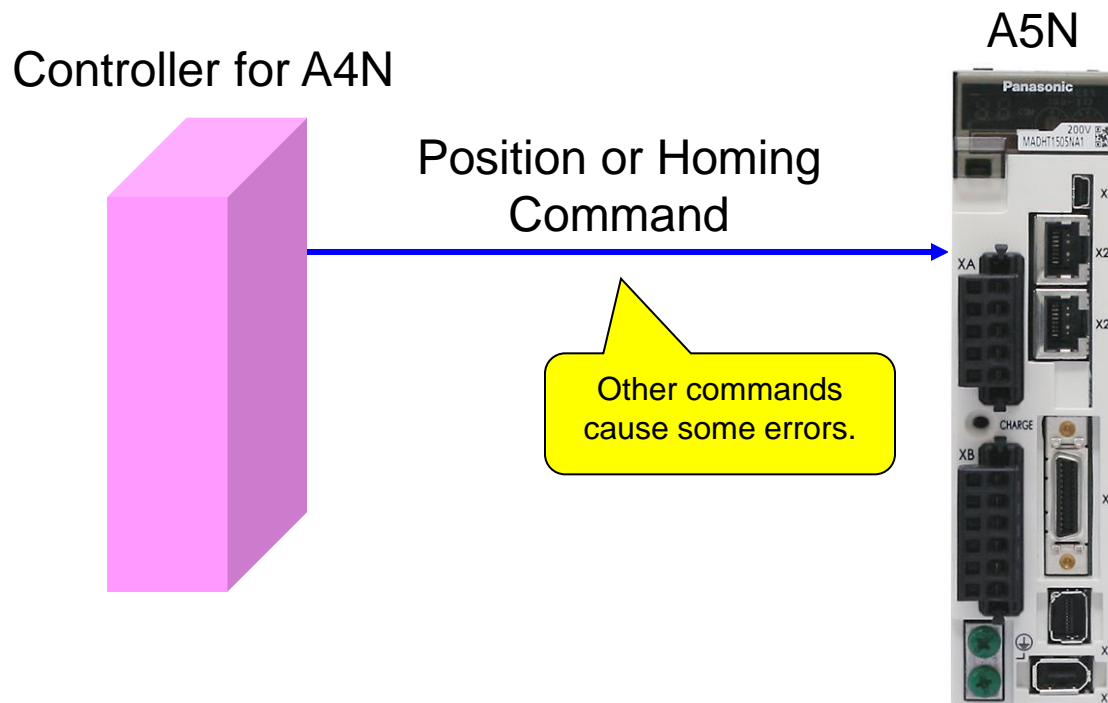
# System Example



Note: With Pr0.00, the positive direction is defined.

# Usage of A5N

For RTEX specification, although A5N 1<sup>st</sup> STEP sample is equivalent to A4N, parameter and alarm commands are based on A5, they are changed. So, if using nothing but position command (20h) and homing command (24h), the controller for A4N can work for A5N as well.



# Electronic Gear

e.g.) When commanding as 10000pulse/r (A4N incremental equivalent), then set the followings:

$$\text{Pr0.08} = 0, \text{Pr 0.09} = 0, \text{Pr 0.10} = 10000$$

Pr0.08	Pr0.09	Pr0.10	Command division/multiplication operation
0	0	0 to 1073741824	<p>Command pulse input → <math>\frac{\text{Encoder resolution}}{[\text{Pr0.10 setup value}]}</math> → Positional command</p> <p>* When Pr0.09 is set to 0, this operation is processed according to setup value of Pr0.10.</p>
	1 to 1073741824	1 to 1073741824	<p>Command pulse input → <math>\frac{[\text{Pr0.09 setting}]}{[\text{Pr0.10 setting}]}</math> → Positional command</p> <p>* When Pr0.09≠0, this operation is processed according to setup value of Pr0.09 and Pr0.10.</p>

If necessary, with adjusting position command filters (Pr2.22, Pr2.23), smooth out the position command after the electronic gear through.



# Command Update Period

According to controller specification, both command update period and communication period must be set properly.

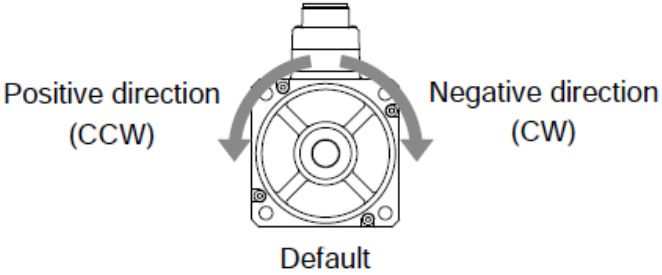
For the present, the communication period is 0.5ms only.

	Command Update 1ms	Command Update 0.5ms
Pr 7.20	3	3
Pr 7.21	2	1

	Name	Range	Description
Pr7.20	Communication Period	0 to 12	0: 0.083ms 1: 0.166ms <b>3: 0.5ms</b> 6: 1.0ms Else: Do not set. (Reserved)
Pr7.21	Ratio of Command Update Period	1 to 2	Command Update / Communication Period 1: 1 2: 2 (Com.=0.5ms case only) } <b>Select</b>

# Positive Direction

With Pr0.00, define positive direction.

Pr0.00 *	Title	Rotational direction setup			Related control mode	P	S	T	F																							
	Range	0 to 1	Unit	—	Default	1																										
<p>Setup the relationship between the direction of command and direction of motor rotation.</p> <p>0: Motor turns CW in response to positive direction command (CW when viewed from load side shaft end)</p> <p>1: Motor turns CCW in response to positive direction command (CCW when viewed from load side shaft end)</p> <div style="text-align: center;">  </div> <table border="1"> <thead> <tr> <th>Setup value</th> <th>Command direction</th> <th>Motor rotational direction</th> <th>Positive direction drive inhibit input</th> <th>Negative direction drive inhibit input</th> </tr> </thead> <tbody> <tr> <td rowspan="2">0</td> <td>Positive direction</td> <td>CW</td> <td>Valid</td> <td>—</td> </tr> <tr> <td>Negative direction</td> <td>CCW</td> <td>—</td> <td>Valid</td> </tr> <tr> <td rowspan="2">1</td> <td>Positive direction</td> <td>CCW</td> <td>Valid</td> <td>—</td> </tr> <tr> <td>Negative direction</td> <td>CW</td> <td>—</td> <td>Valid</td> </tr> </tbody> </table>										Setup value	Command direction	Motor rotational direction	Positive direction drive inhibit input	Negative direction drive inhibit input	0	Positive direction	CW	Valid	—	Negative direction	CCW	—	Valid	1	Positive direction	CCW	Valid	—	Negative direction	CW	—	Valid
Setup value	Command direction	Motor rotational direction	Positive direction drive inhibit input	Negative direction drive inhibit input																												
0	Positive direction	CW	Valid	—																												
	Negative direction	CCW	—	Valid																												
1	Positive direction	CCW	Valid	—																												
	Negative direction	CW	—	Valid																												

# IN-signals Assignment

Default settings:

	X4 Name	X4 Pin #	Setting Value (hex)	Setting Signal	Setting Logic
Pr4.00	SI1	5	00323232h	SI-MON5	Normally Open
Pr4.01	SI2	7	00818181h	POT	Normally Closed
Pr4.02	SI3	8	00828282h	NOT	Normally Closed
Pr4.03	SI4	9	002E2E2Eh	SI-MON1	Normally Open
Pr4.04	SI5	10	00222222h	HOME	Normally Open
Pr4.05	SI6	11	00212121h	EXT2	Normally Open
Pr4.06	SI7	12	002B2B2Bh	EXT3	Normally Open
Pr4.07	SI8	13	00313131h	SI-MON4	Normally Open

Note: If homing with edge of HOME, POT or NOT, the assignment must be HOME:SI5, POT:SI6 and NOT:SI7.  
If not so, alarm occurs.

# OUT-signals Assignment

Default settings:

	X4 Name	X4 Pin #	Setting Value (hex)	Setting Signal	Remark
Pr4.10	SO1+ SO1-	1 2	00030303h	BRK-OFF	If changing to EX-OUT2, set to 00111111h.
Pr4.11	SO2+ SO2-	25 26	00101010h	EX-OUT1	
Pr4.12	SO3+ SO3-	3 4	00010101h	ALM	Normally Closed

For EX-OUT1 and EX-OUT2 bit layout in RTEX command block, it is the same as A4N.

# Limit Operation

With setting Pr5.04 to 1, limit input operation by servo should be disabled because such a operation is normally done by controller.  
Even if disabled, limit inputs status can be monitored via RTEX with Pr7.23 setting.

<b>Pr5.04 *</b>	Title	<b>Over-travel inhibit input setup</b>			Related control mode	<b>P</b>	<b>S</b>	<b>T</b>	<b>F</b>
	Range	<b>0 to 2</b>	Unit	—	Default	<b>1</b>			
Set up the operation of the run-inhibition (POT, NOT) inputs.									
<b>Setup value</b>		<b>Operation</b>							
0		POT → Inhibit positive direction travel NOT → Inhibit negative direction travel							
<b>1</b>		<b>Disable POT, NOT</b>							
2		POT or NOT input activates Err38.0 Run-inhibition input protection.							

# Response byte3

Response byte3:

Byte	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
3	SI-MON5 /E-STOP	SI-MON4 /EX-SON	SI-MON3 /EXT3	SI-MON2 /EXT2	SI-MON1 /EXT1	HOME	POT /NOT	NOT /POT

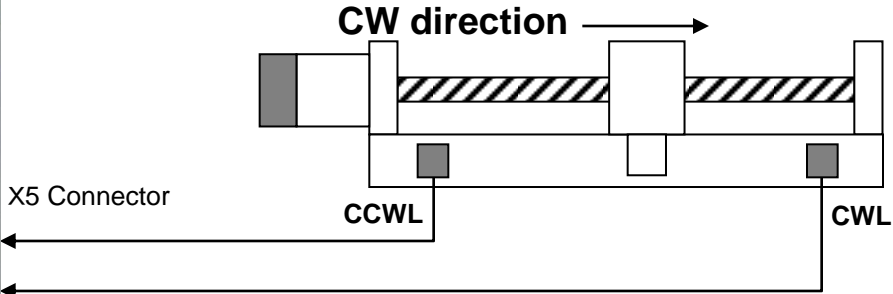
With Pr4.00 to 4.07, set the correspondence to X4 connector inputs.

	Name	Range	Description
Pr7.23	RTEX Functional Expansion 2	-32768 to 32767	<p>bit2: In POT/NOT disabled (Pr5.04=1), its status response activation.  <input type="checkbox"/> 0: Status enabled  <input type="checkbox"/> 1: Status disabled (Always 0)</p> <p>bit3: Arrangement of POT/NOT status.  <input type="checkbox"/> 0: POT is bit1, NOT is bit0  <input type="checkbox"/> 1: NOT is bit1, POT is bit0 } <b>Select according to the controller specification.</b></p> <p>bit6: Logic of POT/NOT status.  <input type="checkbox"/> 0: Positive logic, Active is 1  <input type="checkbox"/> 1: Negative logic, Active is 0</p>

# Limit Sensors Wiring

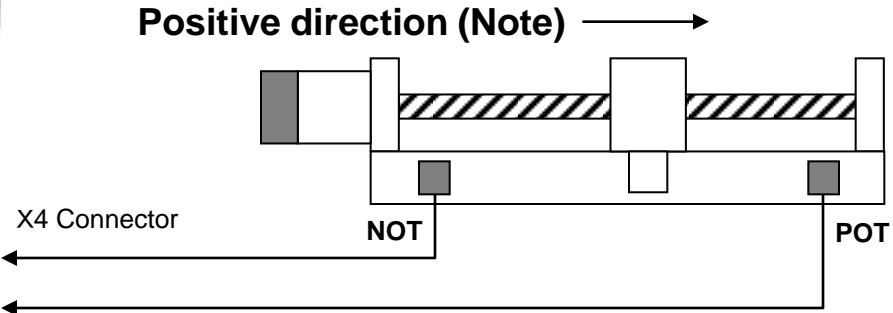
**A4N**

Regardless of parameter setting, physical layout decides wiring.



**A5N**

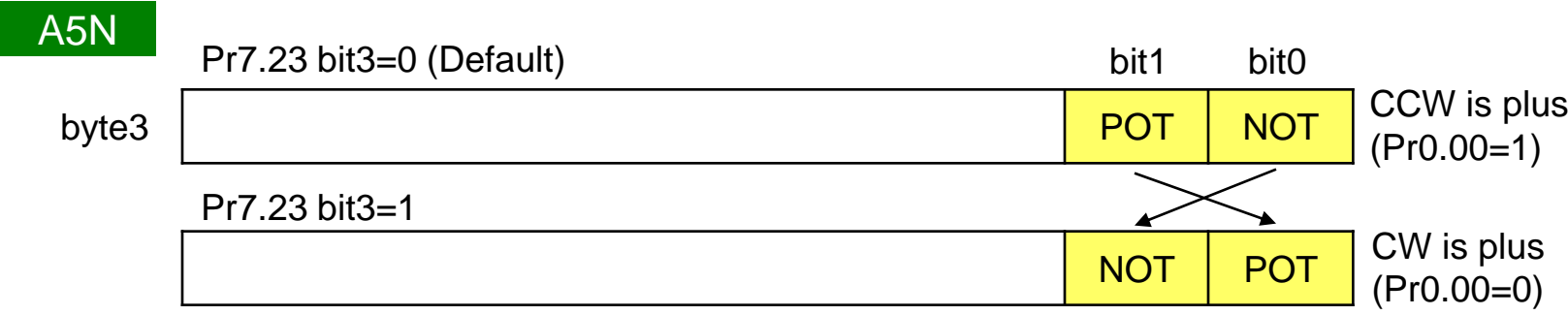
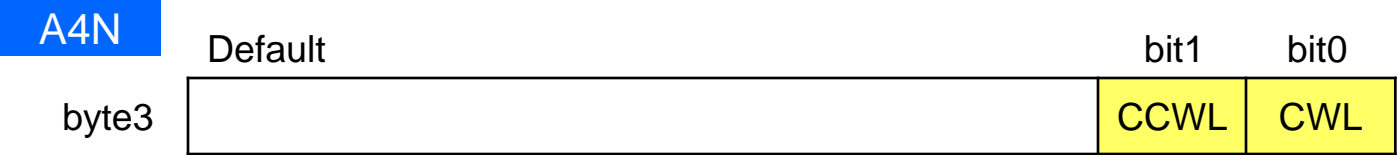
According to parameter setting, wiring is changed.



Note: Positive direction is set with Pr0.00.

# Bit Layout of Limit Flags

Even if A4N is used in default setting for bit layout of limit flags, the default parameter must be changed in A5N when using CW is plus.




**Parameters:**

	A4N	A5N
<b>Positive Direction</b>	Pr43	Pr0.00
<b>Bit layout of Limit Flags</b>	Pr43	Pr7.23, bit3



# Overview of Profile Position

# Command

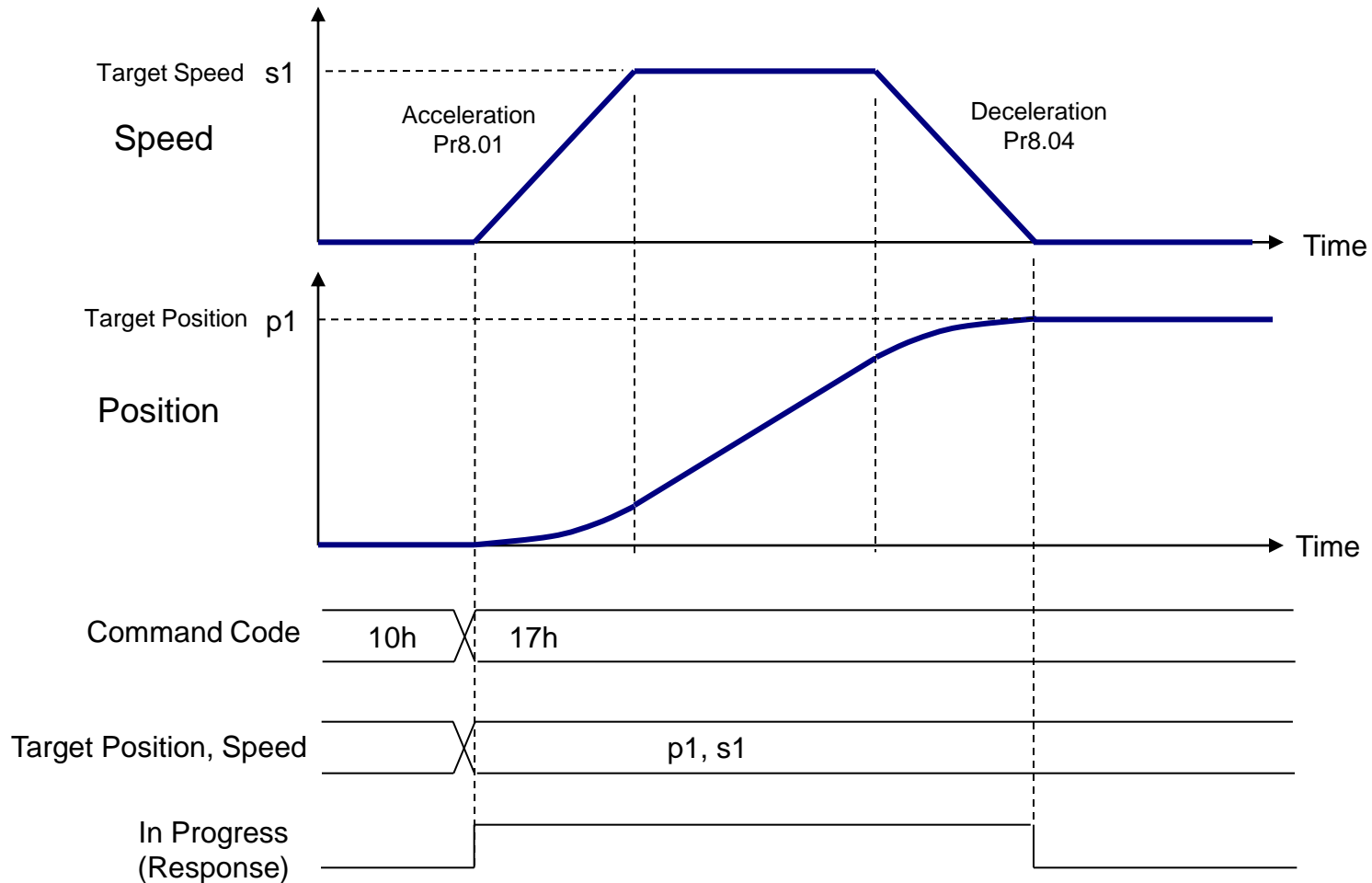
	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	C/R (0)	Update Counter		MAC-ID (0 to 31)				
Byte1	TMG CNT	<b>17h (Command Code)</b>						
Byte2	Servo On	0	0	Gain SW	TL SW	Homing Ctrl	0	0
Byte3	<b>Hard Stop</b>	<b>Smooth Stop</b>	<b>Pause</b>	0	SL SW	0	EX-OUT2	EX-OUT1
Byte4	<b>Target Position</b>							
Byte5								
Byte6								
Byte7								
Byte8	<b>Type Code</b>							
Byte9	0							
Byte10	0							
Byte11	<b>Monitor Sel</b>							
Byte12	<b>Target Speed</b>							
Byte13								
Byte14								
Byte15								

# Response

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	C/R (1)	Update Counter Echo		Actual MAC-ID (0 to 31)				
Byte1	CMD Error	<b>17h (Command Code Echo)</b>						
Byte2	Servo Active	Servo Ready	Alarm	Warning	Torque Limited	Homing Complete	<b>In Progress</b>	In Position
Byte3	SI-MON5 /E-STOP	SI-MON4 /EX-SON	SI-MON3 /EXT3	SI-MON2 /EXT2	SI-MON1 /EXT1	Home	POT /NOT	NOT /POT
Byte4	<b>Actual Position</b>							
Byte5								
Byte6								
Byte7								
Byte8	<b>Type Code Echo</b>							
Byte9	ERR	WNG	0	BUSY	<b>PSL /NSL</b>	<b>NSL /PSL</b>	<b>NEAR</b>	<b>Latch Compl</b>
Byte10	0							
Byte11	<b>Monitor Sel Echo</b>							
Byte12	<b>Monitor Data</b>							
Byte13								
Byte14								
Byte15								

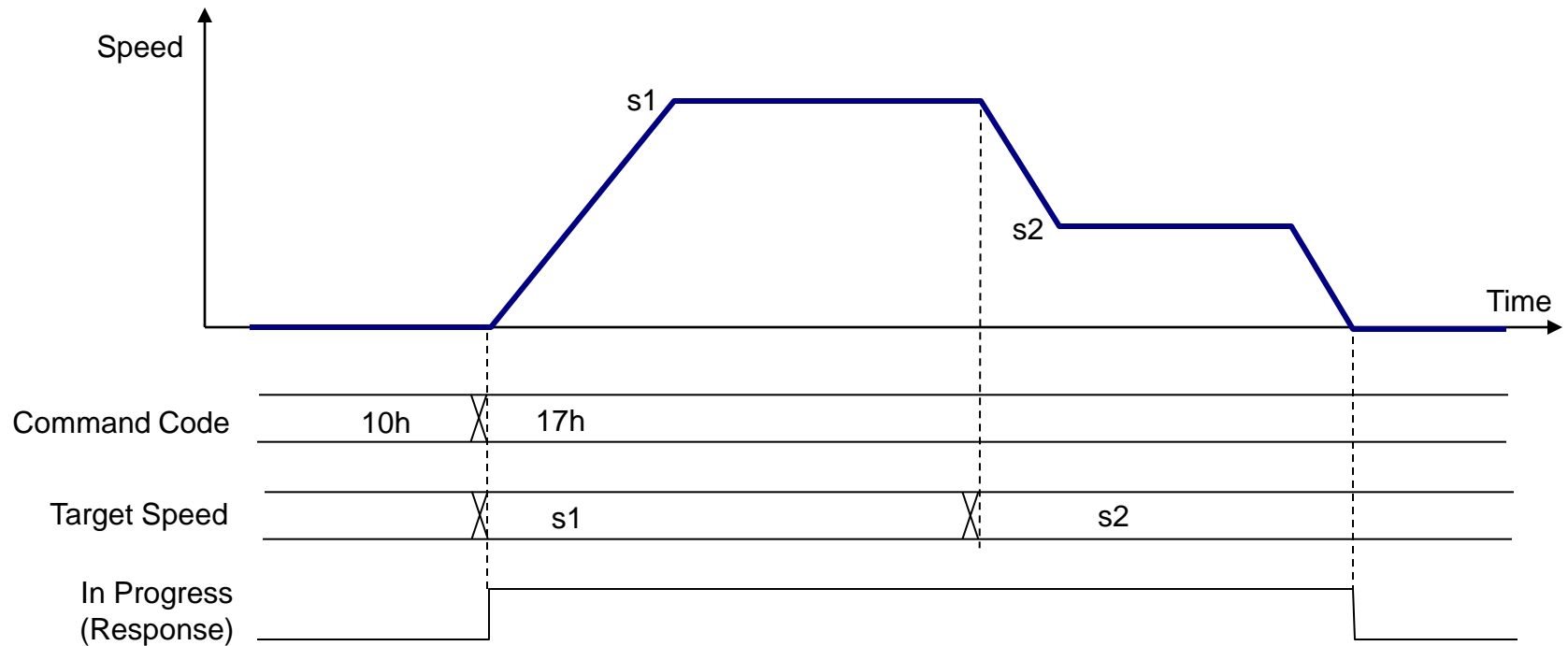
# Start

When "In Progress" = 0, a change of Command Code 10h to 17h makes servo start motion.  
Acceleration and deceleration are preset with parameter. Abs/Inc is set with Type Code at start.



# Changing T Speed in Motion

When "In Progress" = 1, target speed can be changed.  
Even if changing target speed to 0 or Pause to 1, "In Progress" keeps 1 during stop.



# PANATERM

# PANATERM Installing

## 1) PANATERM installing

From the following web site, download PANATERM for A5 and install to your PC.

<http://www.panasonic-electric-works.com/peweu/de/html/22203.php>

# USB Cable

MINI-B type USB cable with ferrite cores on the market should be provided.

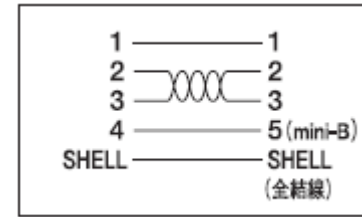


A type

MINI-B type

e.g.) U2C-MF by ELECOM

Wiring:





# Parameter Setting

When showing all parameters, select "Parameter list".

By the selecting the theme from the left above, and selecting the sub-theme from the left below, the related parameters can be displayed. To display all parameters in numerical order, please select the "Parameter list". Please double-click the sub-theme left below to refer the details of each sub-theme. Parameter value can be changed in two ways. One way to press the Enter key after the input. Another way to click <Change of set value> button.

Class	No.	Parameter name	Setup range	Set value	Unit
00	000	Rotational direction setup	0- 1	1	—
00	001	Control mode setup	0- 6	0	—
00	002	Real-time auto-gain tuning s...	0- 6	1	—
00	003	Selection of machine stiffnes...	0- 31	13	—
00	004	Inertia ratio	0- 10000	250	%
00	008	Command pulse counts per ...	0- 1048576	0	After ...
00	009	Numerator of electronic gear	0- 1073741824	1	—
00	010	Denominator of electronic ge...	1- 1073741824	1	—
00	011	Output pulse counts per one ...	1- 262144	2500	Before...
00	012	Reversal of pulse output logic	0- 3	0	—
00	013	1st torque limit	0- 500	500	%

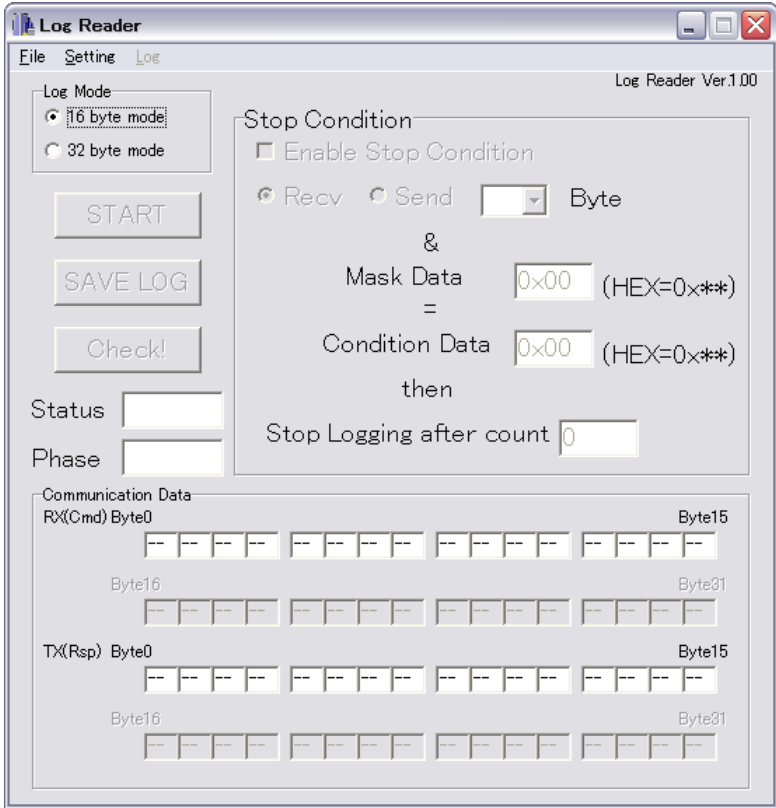
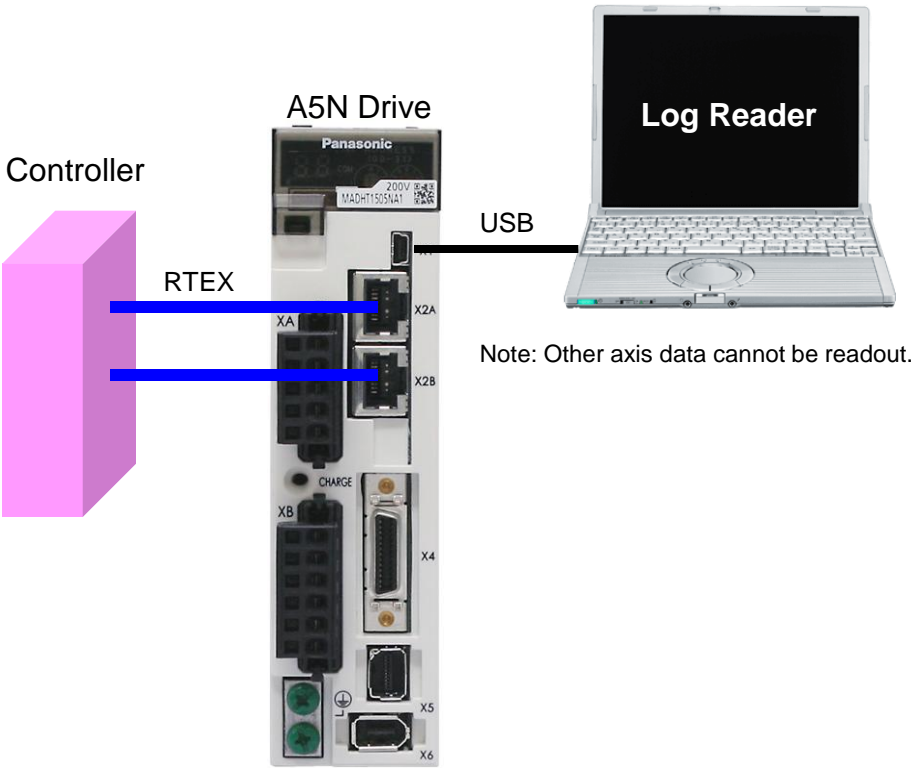
Selects CCW/CW as the plus direction.

Read Only	Not Use	Reset	<input type="checkbox"/> Can over value
System	Other	Normal	<input type="checkbox"/> Decimal point is displayed

# Communication Monitor

# Log Reader

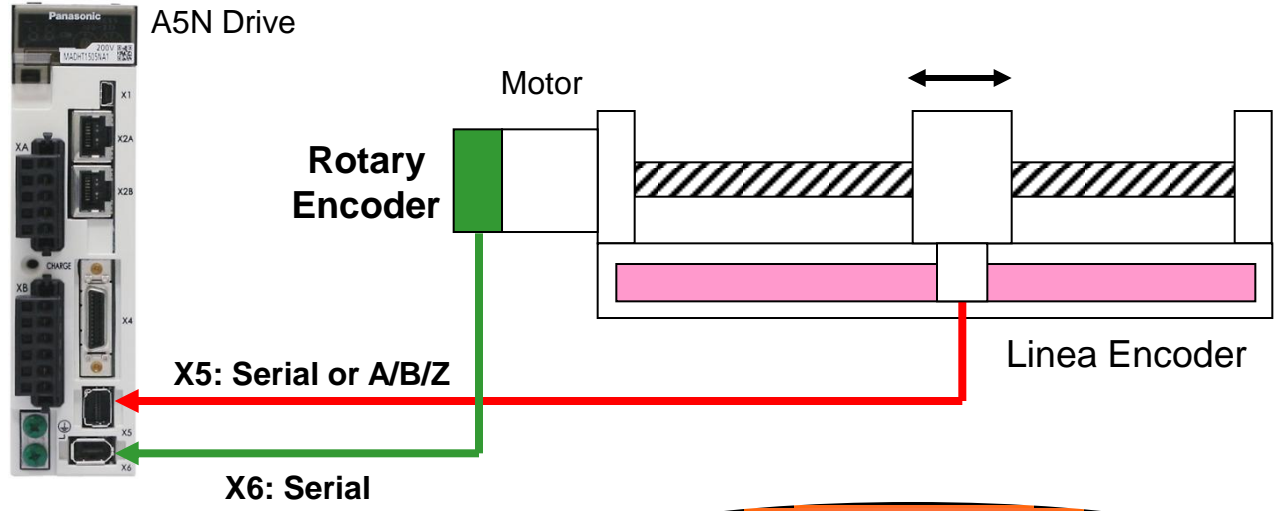
This tool is to readout own communication data logged on memory in the drive. One data is one block consisting of command 16bytes and response 16bytes, 256 log data can be readout and saved into a file.



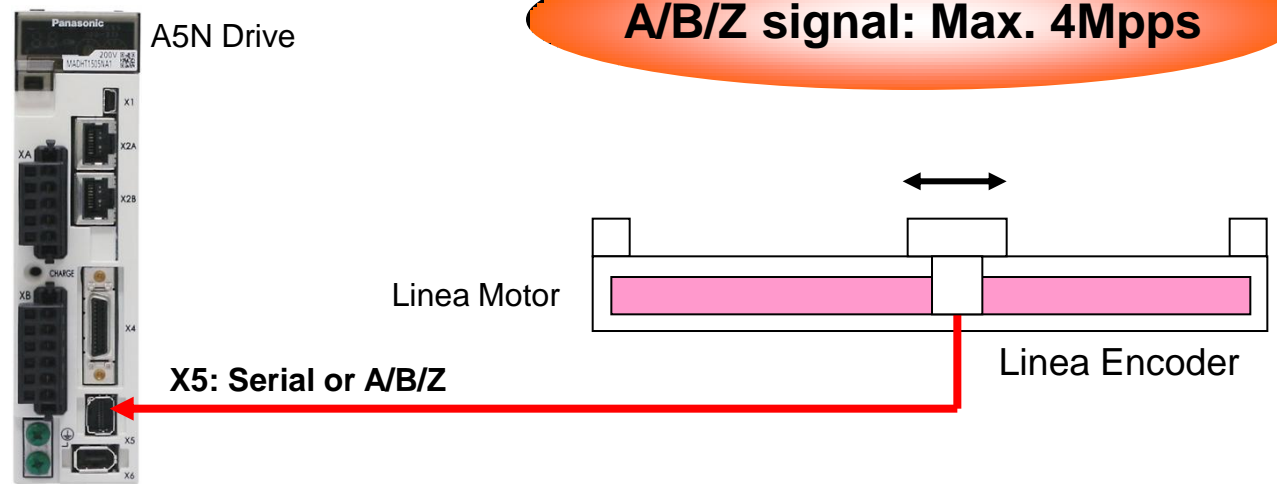
# Encoder I/F

# Encoder I/F

**Full-Closed Control**



**Linea Motor Drive (Special)**



# Serial Linear Encoder

	Manufacturer	Model	Resolution [um]	Max Speed [m/s]
Incremental	Magnescale	SR75	0.01	3.3
		SR85	0.01	3.3
		SL700+PL101-RP	0.1	10
		SL710+PL101-RP	0.1	10
	GSI Group	M II - 5000 / 6000	0.1	5
Absolute	Mitutoyo	AT573A	0.05	2
		ST771A(L)	0.5	5
		ST773A(L)	0.1	4
	Magnescale	SR77	0.01	3.3
		SR87	0.01	3.3
	Renishaw	RESOLUTE	0.001	0.4
			0.05	20
	FAGOR	SVAP	0.05	2
		SAP	0.05	2
		GAP	0.05	2

# Encoder Connector

X5: MUF-RS10DK-GKXR by JST

X6: 53460-0629 by Molex

No.	Name	Function
1	E5V	Power Supply Out
2	E0V	
3	PS	Panasonic Style Serial Data
4	/PS	
5	EXA	A-phase In
6	/EXA	
7	EXB	B-phase In
8	/EXB	
9	EXZ	Z-phase In
10	/EXZ	
Shell	FG	Frame Ground

No.	Name	Function
1	E5V	Power Supply Out
2	E0V	
3	BTP	Battery Out for Abs.
4	BTN	
5	PS	Panasonic Style Serial Data
6	/PS	
Shell	FG	Frame Ground

Note:

- "In" "Out" are based on a servo drive.
- In the special model for linear motor, commutation signals can be connected to X6.

# Safety I/F (Special Model Only)



# STO Overview

The safe torque off (STO) function is a safety function that shuts the motor current and turns off motor output torque by forcibly turning off the driving signal of the servo driver internal power transistor. For this purpose, the STO uses safety input signal and hardware (circuit).

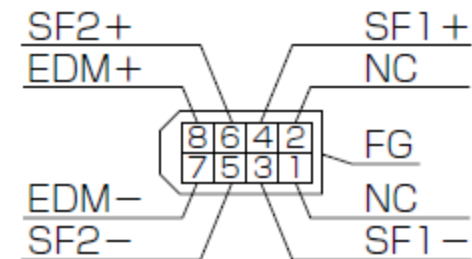
When STO function operates, the servo driver turns off the servo ready output signal (S-RDY) and enters safety state.

This is an alarm condition and the 7-seg LED on the front panel displays the error code number.

## Connector X3:

Application	Symbol	Connector Pin No.	Contents
NC	-	1	Do not connect.
	-	2	
Safety input 1	SF1-	3	These are two independent circuits that turn off the operation signal to the power module to shut off the motor current.
	SF1+	4	
Safety input 2	SF2-	5	
	SF2+	6	
EDM output	EDM-	7	This is an output for monitoring the failure of the safety function.
	EDM+	8	
Frame ground	FG	Shell	Connected with protective earth terminal in the servo driver.

Connector pinning:  
Viewed from cable side



Connector (plug): 2013595-1 (optional, available from Tyco Electronics AMP)

# Connector X3

Signal	Symbol	Pin No.	Contents
Safety input 1	SF1+	4	<ul style="list-style-type: none"> <li>• Input 1 that triggers STO function. This input turns off the upper arm drive signal of power transistor.</li> <li>• When using the function, connect this pin in a way so that the photocoupler of this input circuit turns off to activate STO function.</li> </ul>
	SF1-	3	
Safety input 2	SF2+	6	<ul style="list-style-type: none"> <li>• Input 2 that triggers STO function. This input turns off the lower arm drive signal of power transistor.</li> <li>• When using the function, connect this pin in a way so that the photocoupler of this input circuit turns off to activate STO function.</li> </ul>
	SF2-	5	
EDM output	EDM+	8	Outputs monitor signal that is used to check the safety function. <b>Caution</b> This output signal is not a safety output.
	EDM-	7	

When both safety input 1 and 2 are off, i.e. when STO function of 2 safety input channels are active, the photocoupler in EDM output circuit turns on.

Signal	Symbol	Photocoupler logic			
Safety input	SF1	ON	ON	OFF	OFF
	SF2	ON	OFF	ON	OFF
EDM output	EDM	OFF	OFF	OFF	ON

By monitoring the logics (all 4 states) of photocoupler shown in the table above, the external device can determine the status (normal or abnormal) of safety input circuit and EDM output circuit.

# Delay Time

Max. Delay from input off to function activated: 5ms

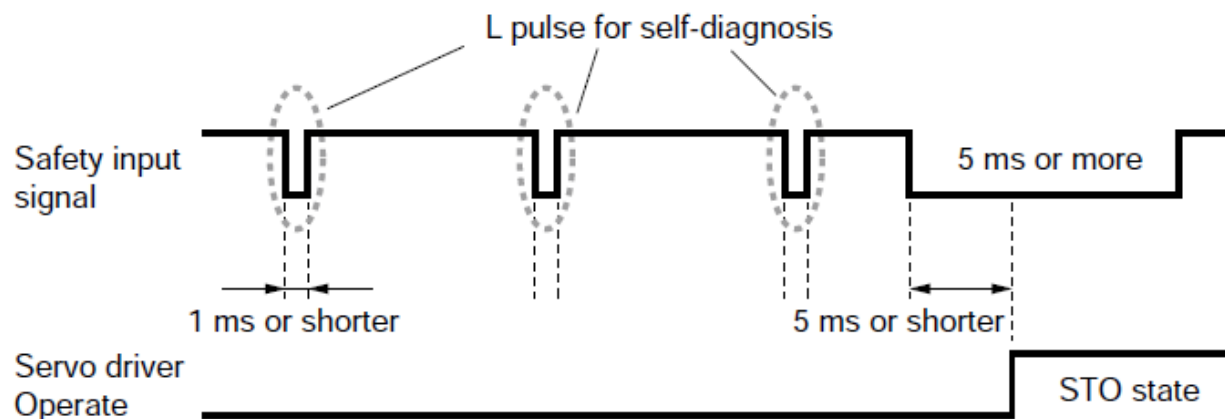
- **Safety equipment self-diagnosis L pulse**

Safety output signal from the safety controller and safety sensor may include L pulse for self-diagnosis.

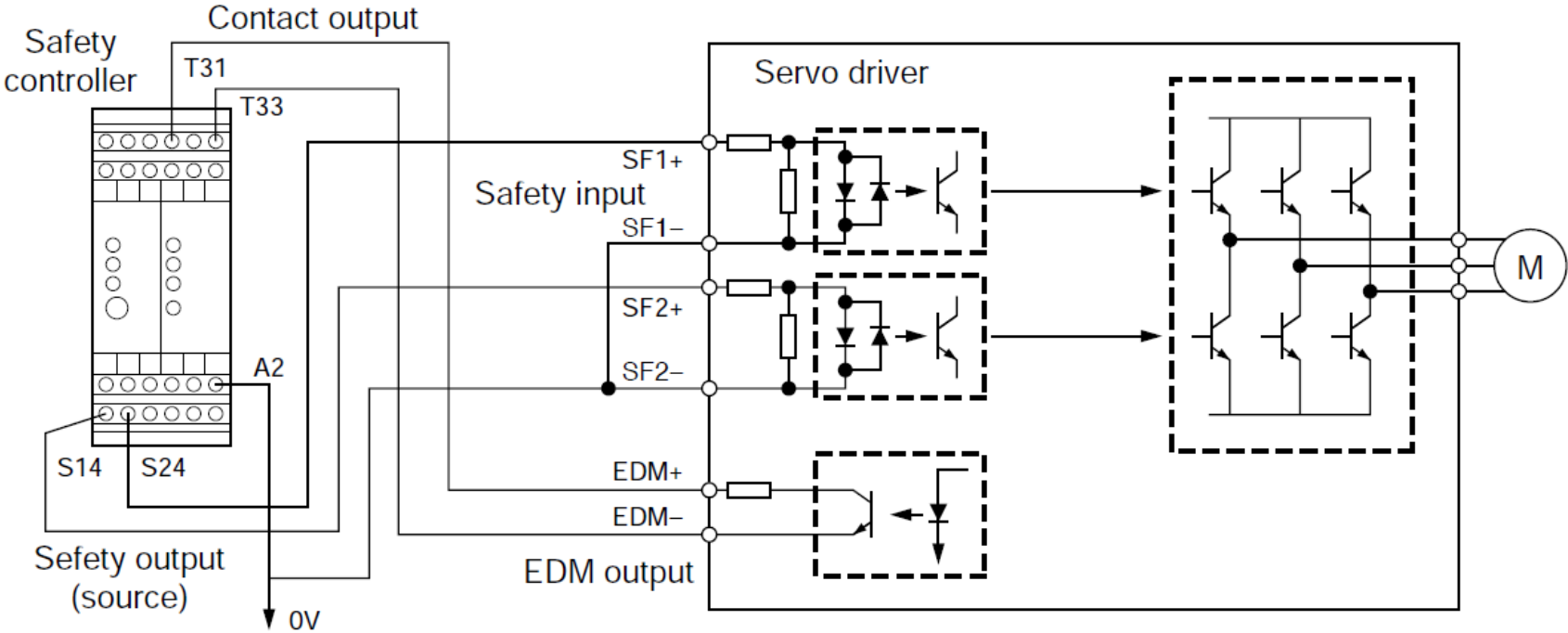
To prevent the L pulse from mis-triggering STO function, the safety input circuit has built-in filter that removes the self-diagnosis L pulse.

Therefore, if the off period of safety input signal less than 1 ms, the safety input circuit does not detect this "off" event.

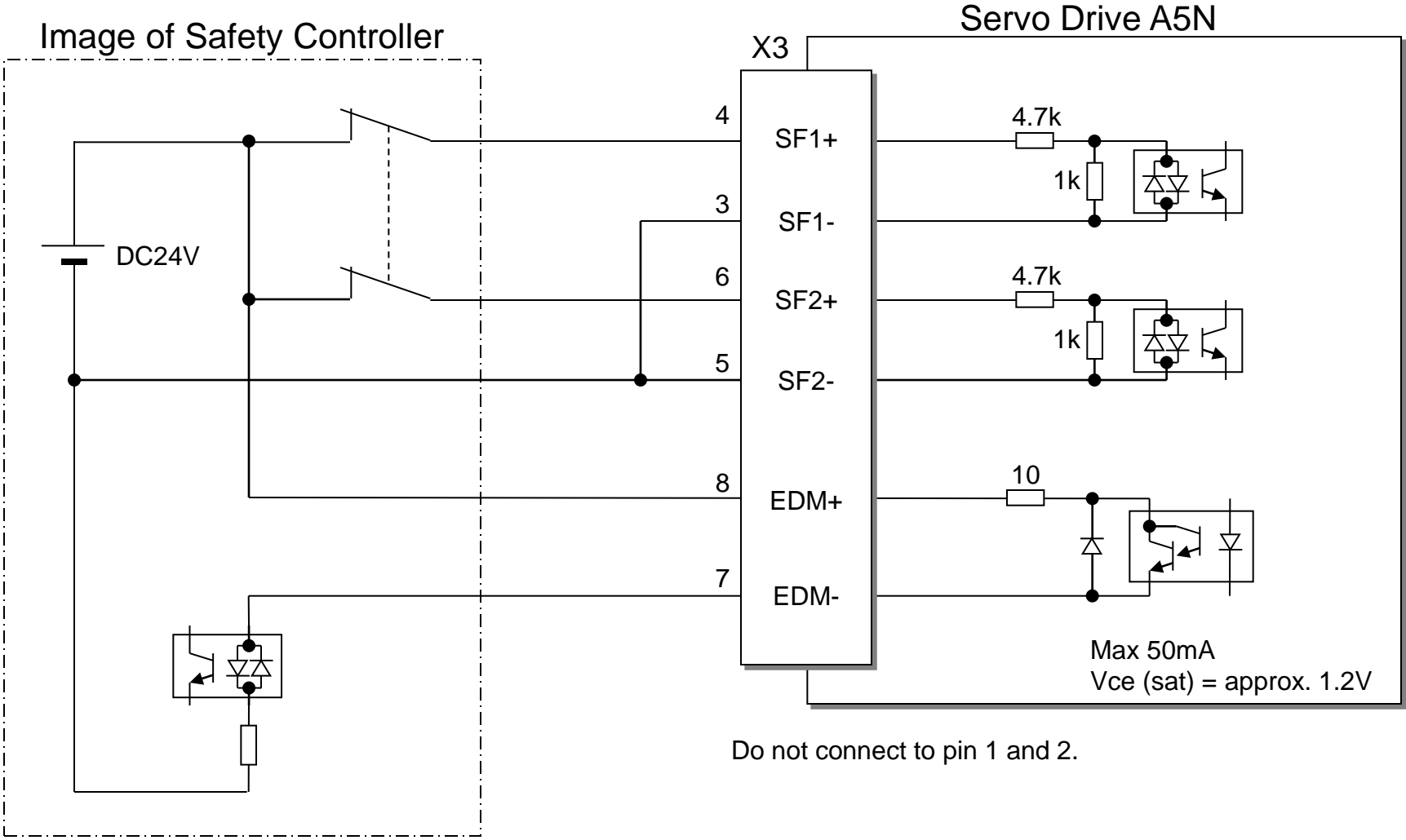
To validate this "off" period, turn off the input signal for more than 5 ms.



# Safety Controller Wiring

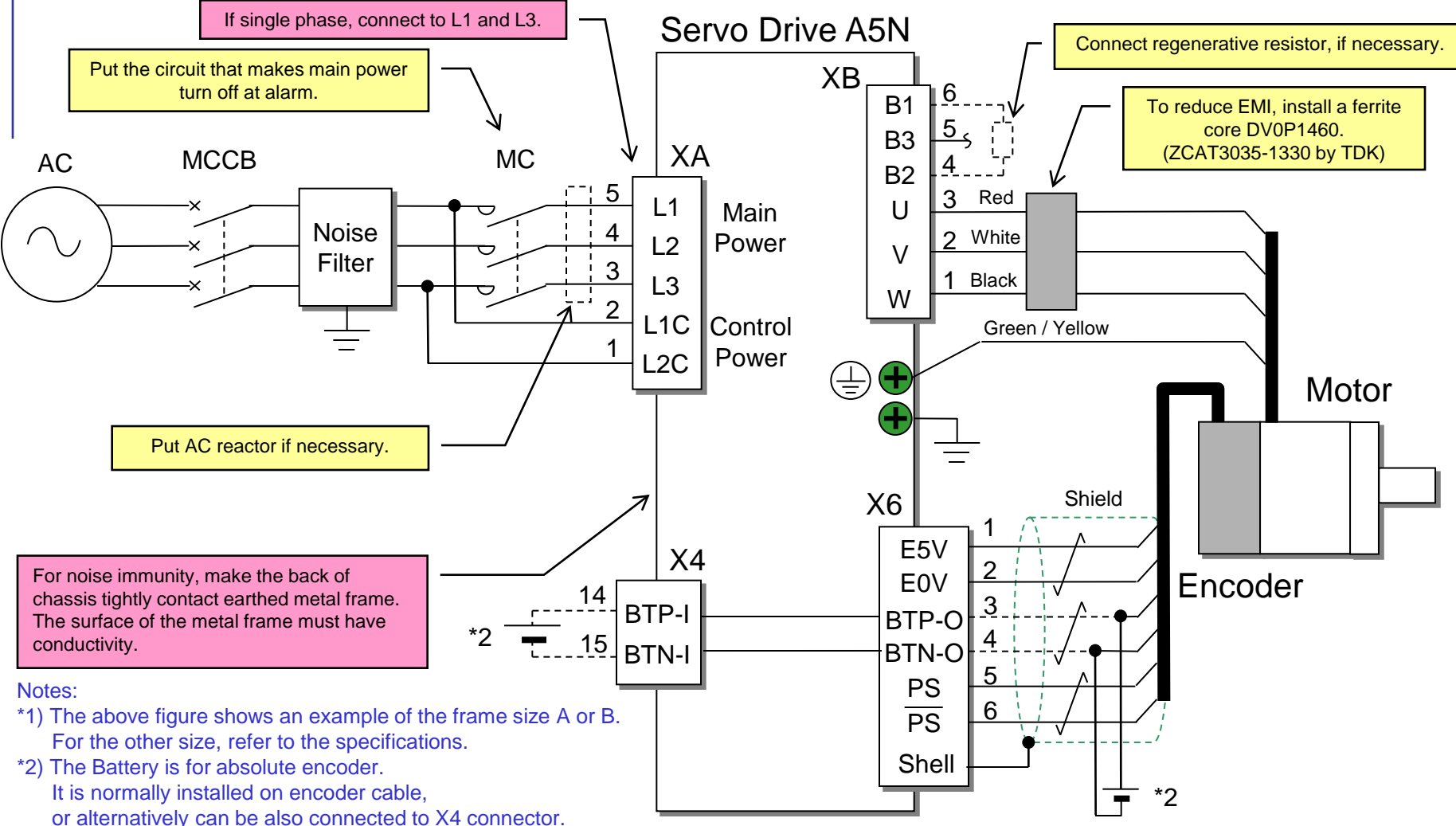


# Safety Controller Wiring (Cont.)



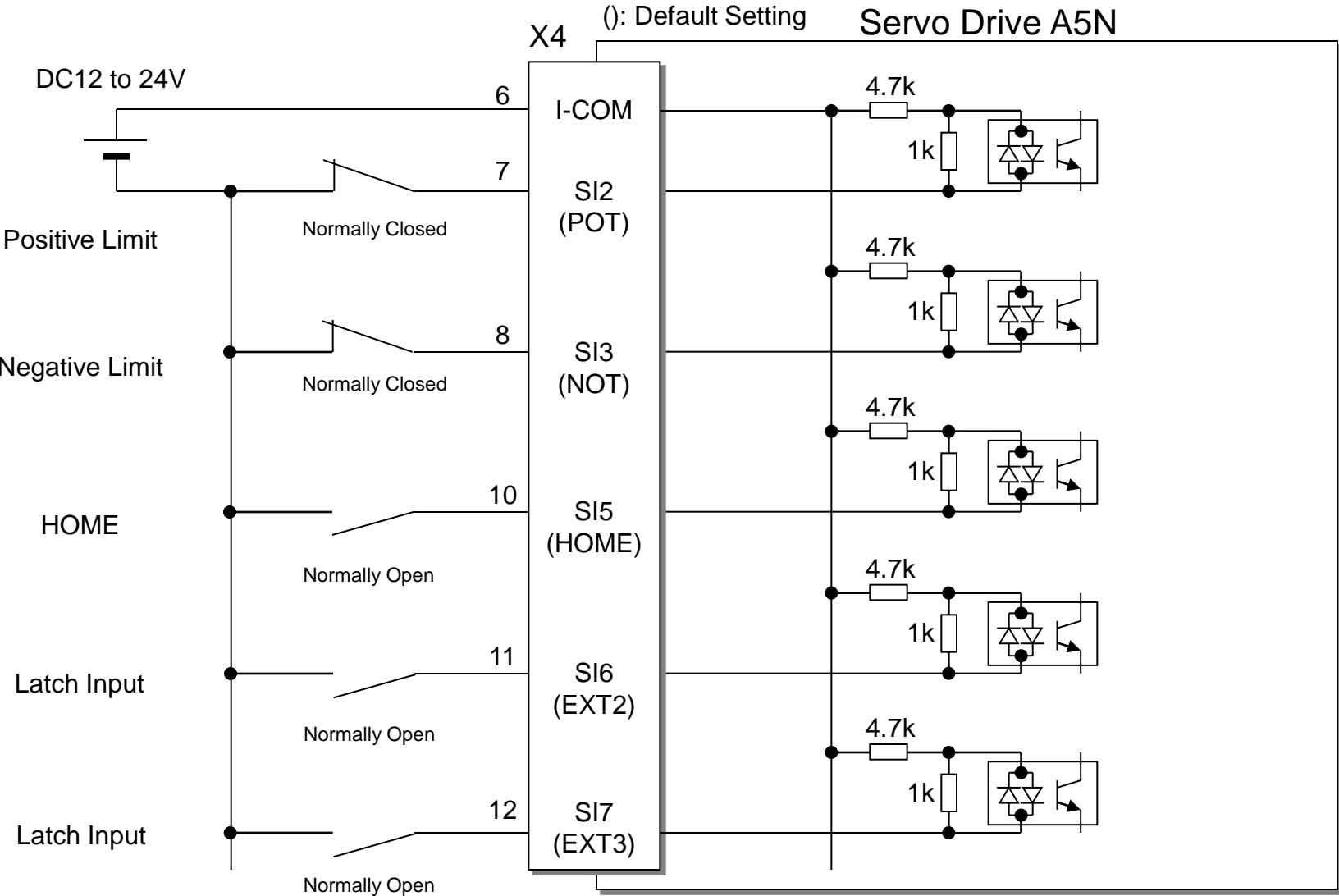
# Wiring

# Power Supply and Motor



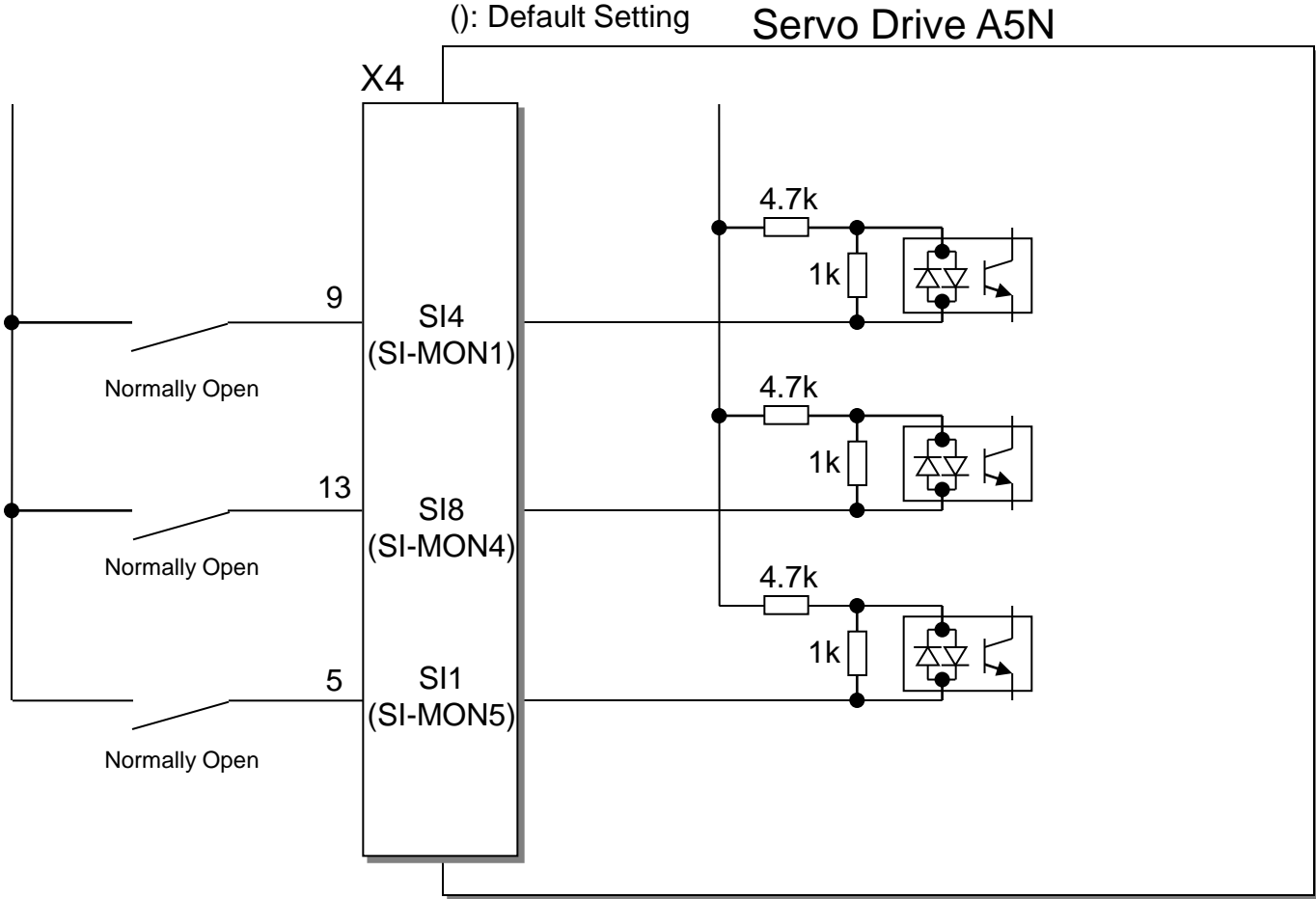
- Notes:
- \*1) The above figure shows an example of the frame size A or B. For the other size, refer to the specifications.
  - \*2) The Battery is for absolute encoder. It is normally installed on encoder cable, or alternatively can be also connected to X4 connector.

# Sensor Inputs





# General Purpose Inputs

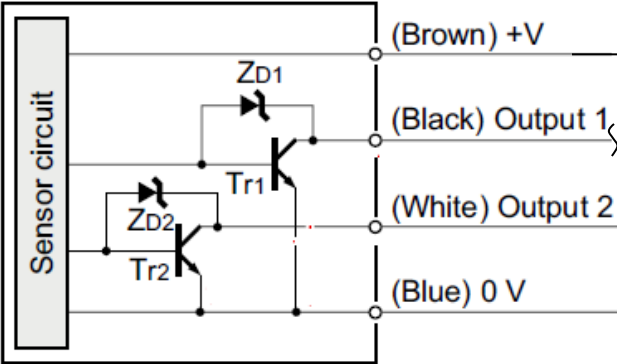


Note:  
Host controller can monitor a state of SI-MONs via RTEX.  
These inputs do not influence servo control in the drive.

# Sensor Input Example 1

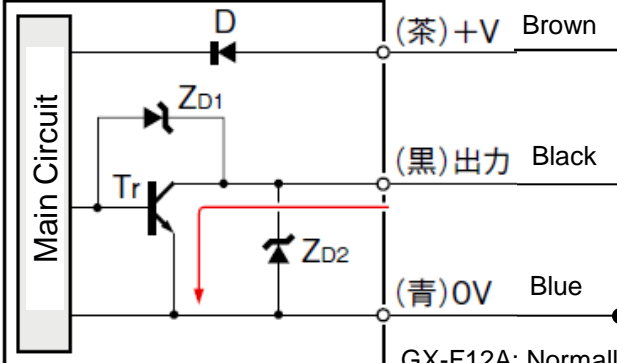
## Panasonic Electric Works SUNX

Photo-sensor PM-64 (NPN transistor output)



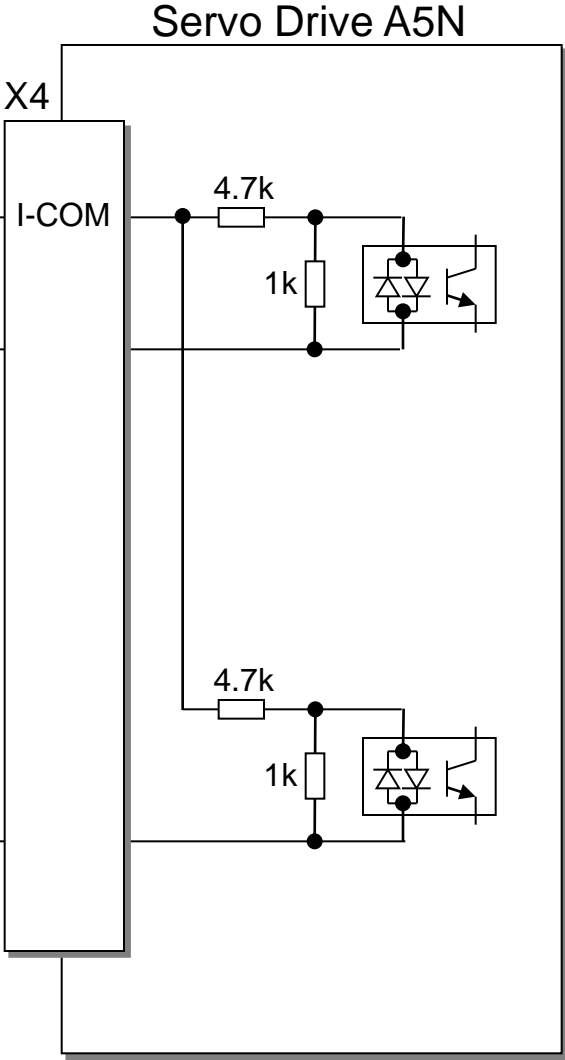
Out1: Normally Closed  
Out2: Normally Open

Proximity-sensor GX-F12 (NPN transistor output)



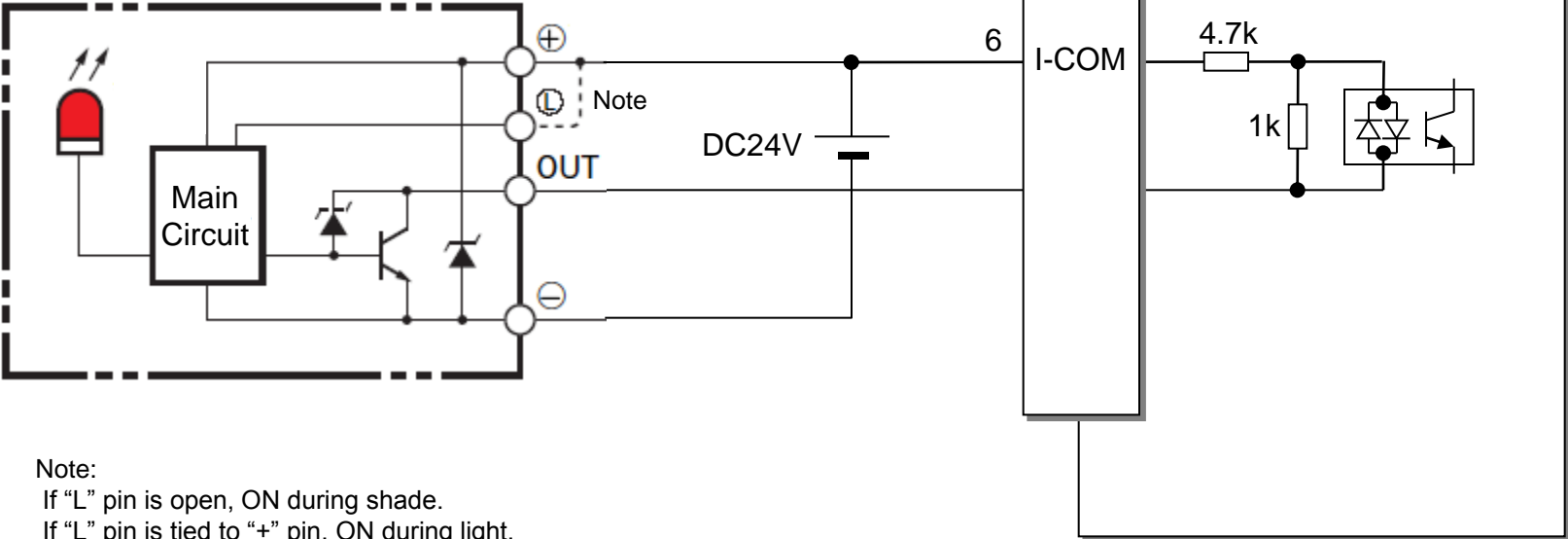
GX-F12A: Normally Open  
GX-F12B: Normally Closed

DC24V



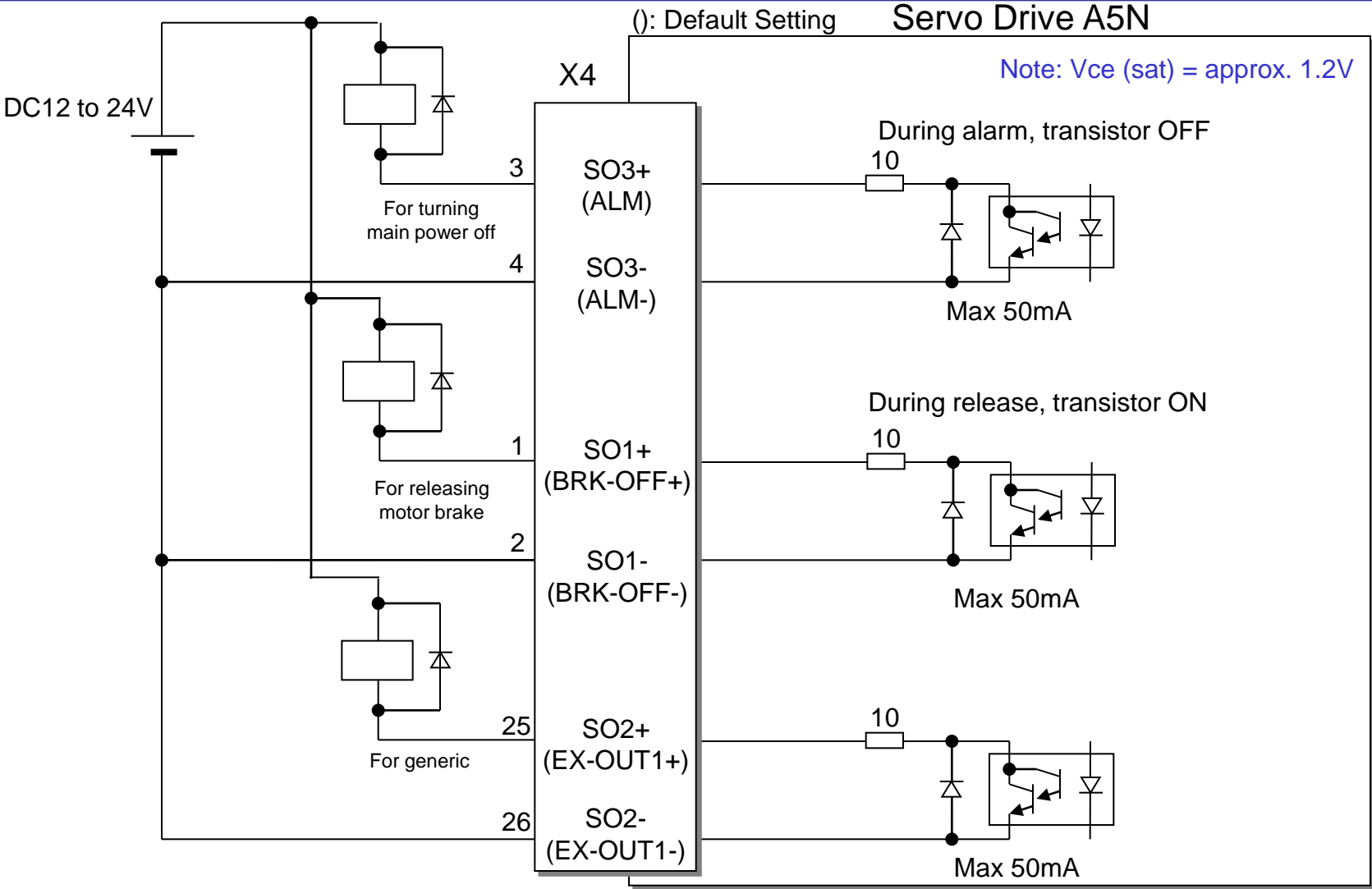
# Sensor Input Example 2

Photo-Sensor by OMRON  
EE-SX672A (NPN transistor output)

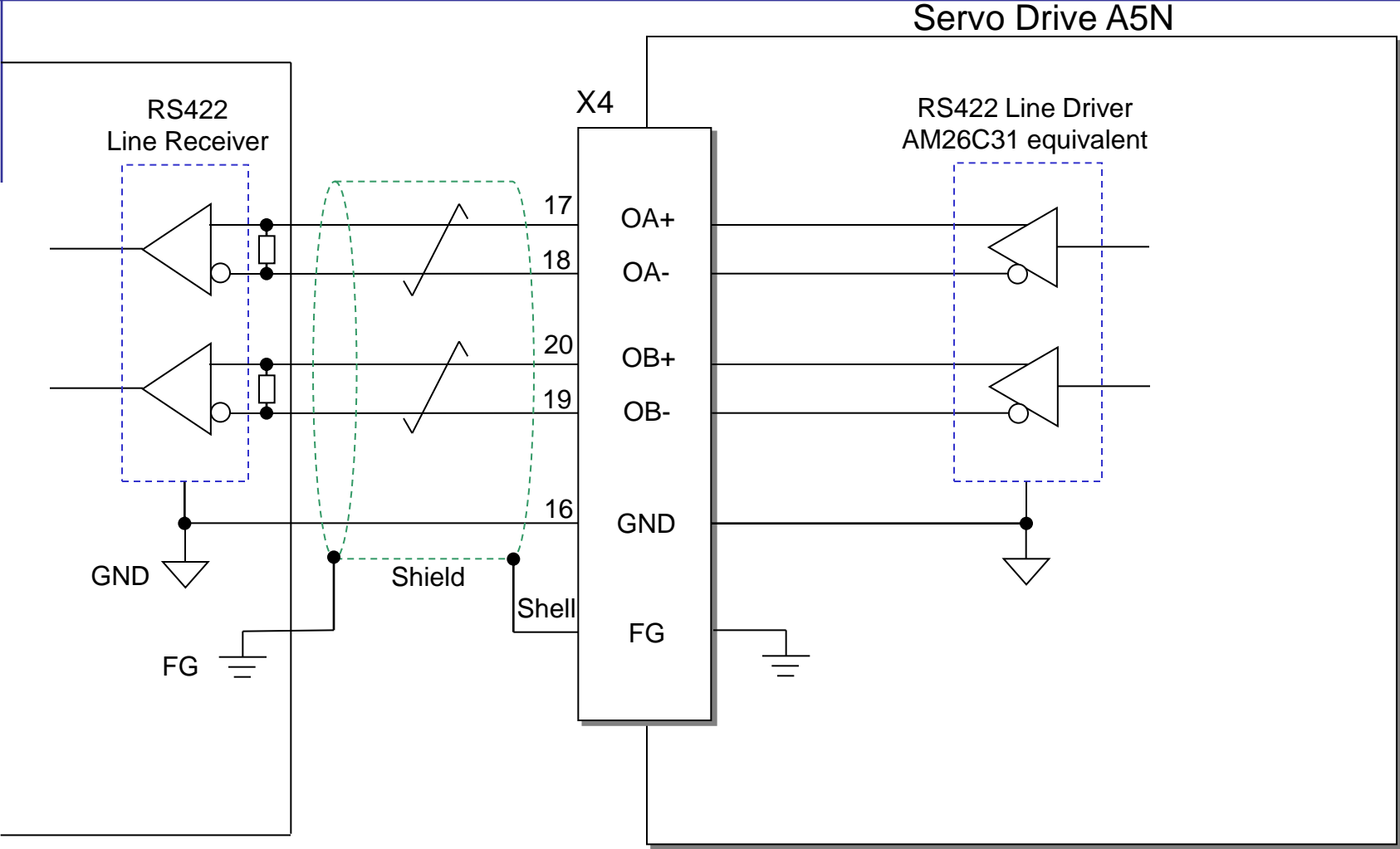


Note:  
If "L" pin is open, ON during shade.  
If "L" pin is tied to "+" pin, ON during light.

# Relay Control Outputs



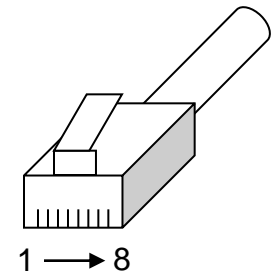
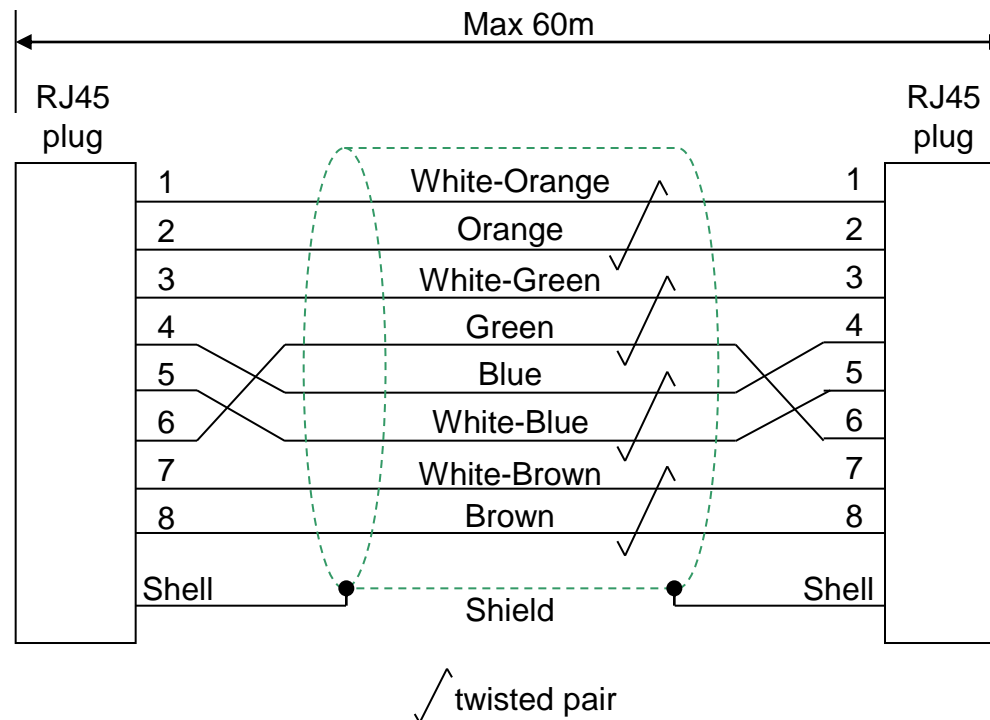
# Encoder Signals Output



Note: A termination resistor (typ. 330 Ohm) must be put between line-receiver inputs.

# Wiring of Com. Cable (4pairs)

## “Straight” Wiring

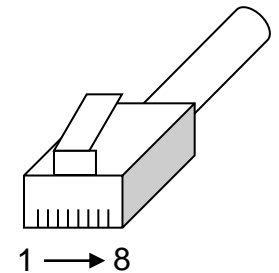
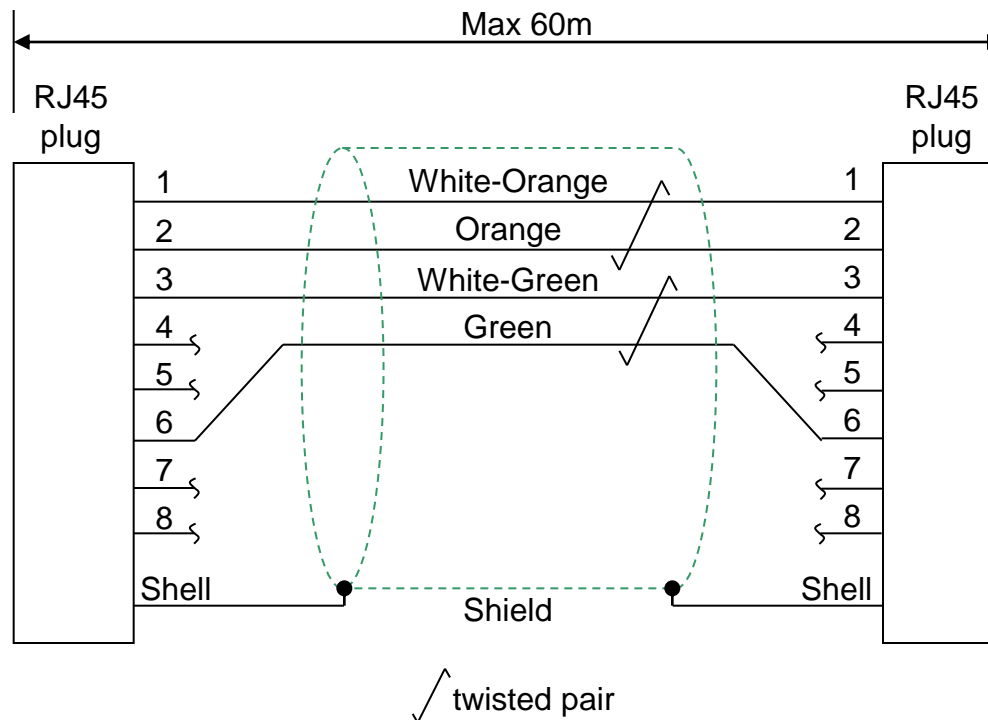


**Notes:**

- STP(Shielded Twisted Pair cable) conformed to category 5e or more must be used.
- Colors of the lead wire are defined by TIA/EIA-568B.
- A pair connected to 3-6pin is used as signal line.
- Unused 3 pairs must be also connected to 1-2, 4-5 and 7-8 as the above figure.

# Wiring of Com. Cable (2pairs)

## “Straight” Wiring



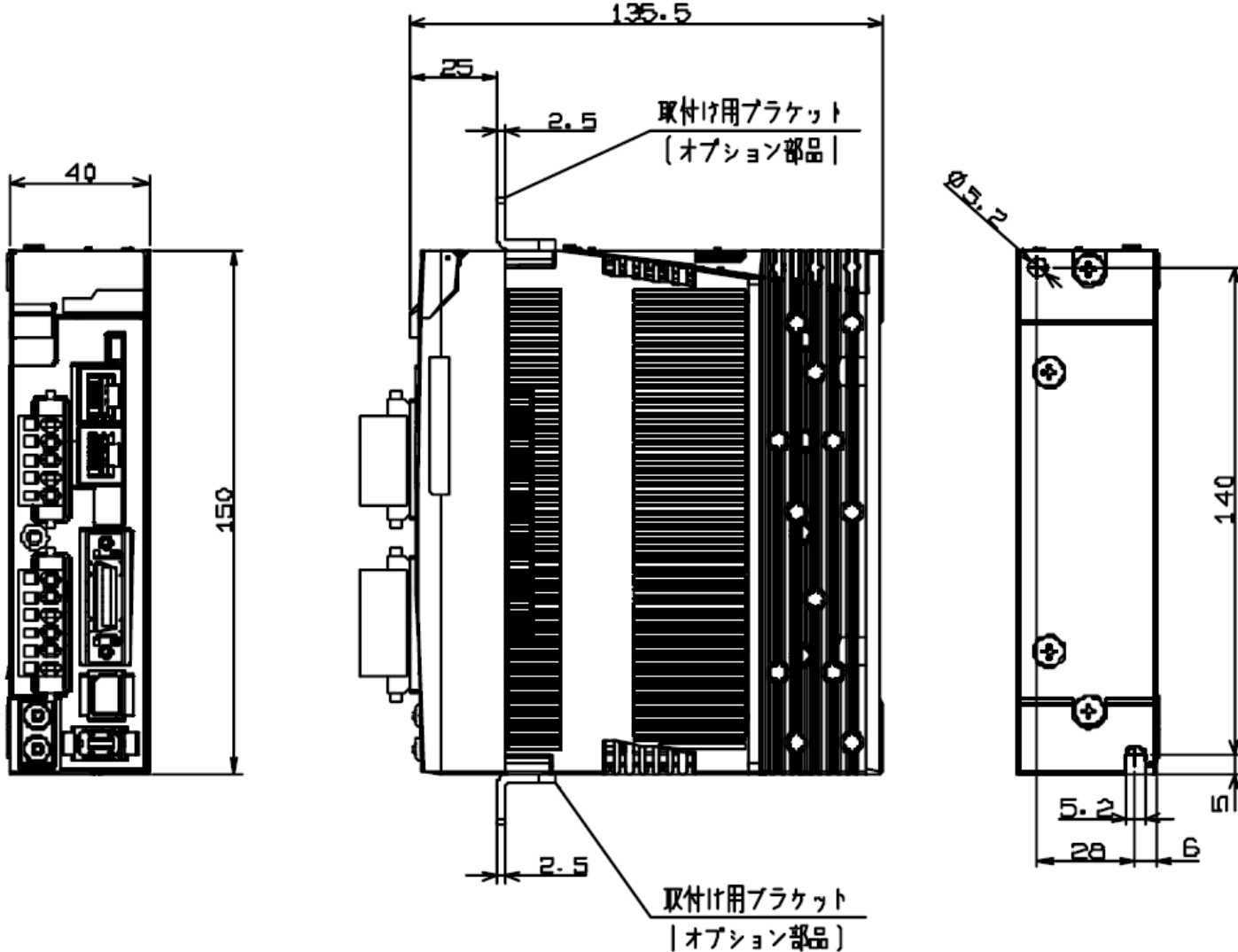
### Notes:

- STP(Shielded Twisted Pair cable) conformed to category 5e or more must be used.
- Colors of the lead wire are defined by TIA/EIA-568B.
- A pair connected to 3-6pin is used as signal line.
- Unused 3 pairs must be also connected to 1-2 as the above figure.

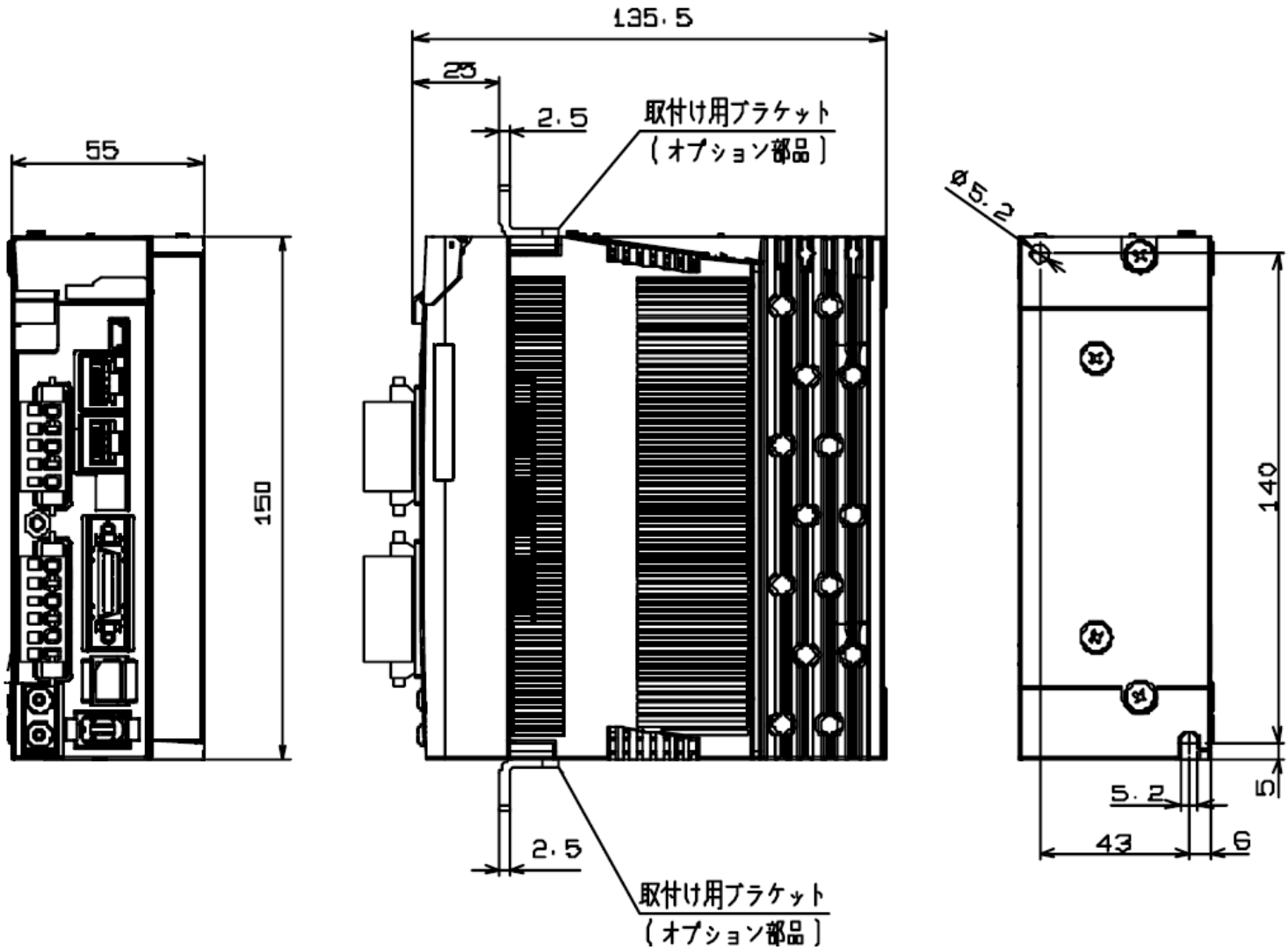
# Dimensions in mm



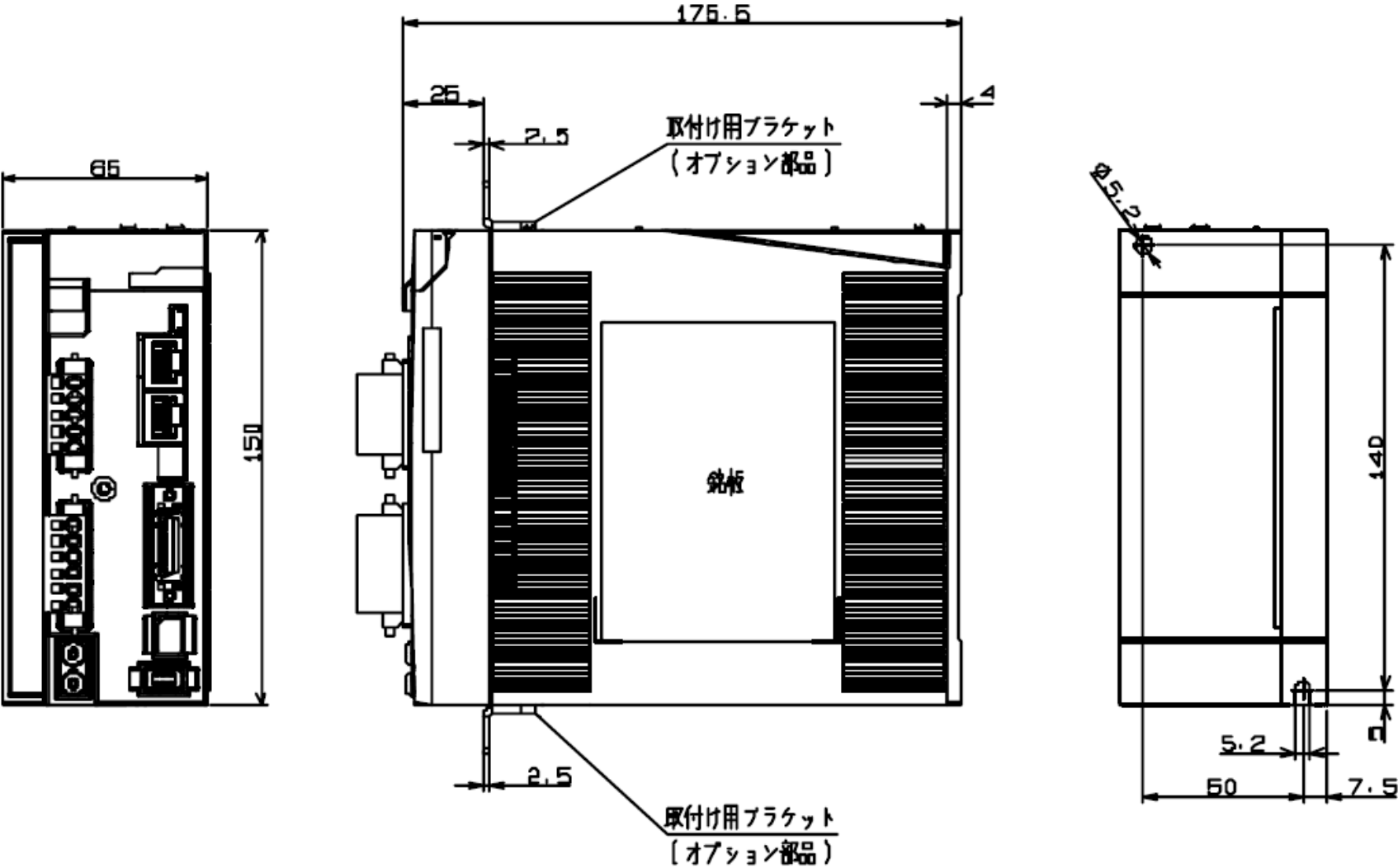
# Frame Size A



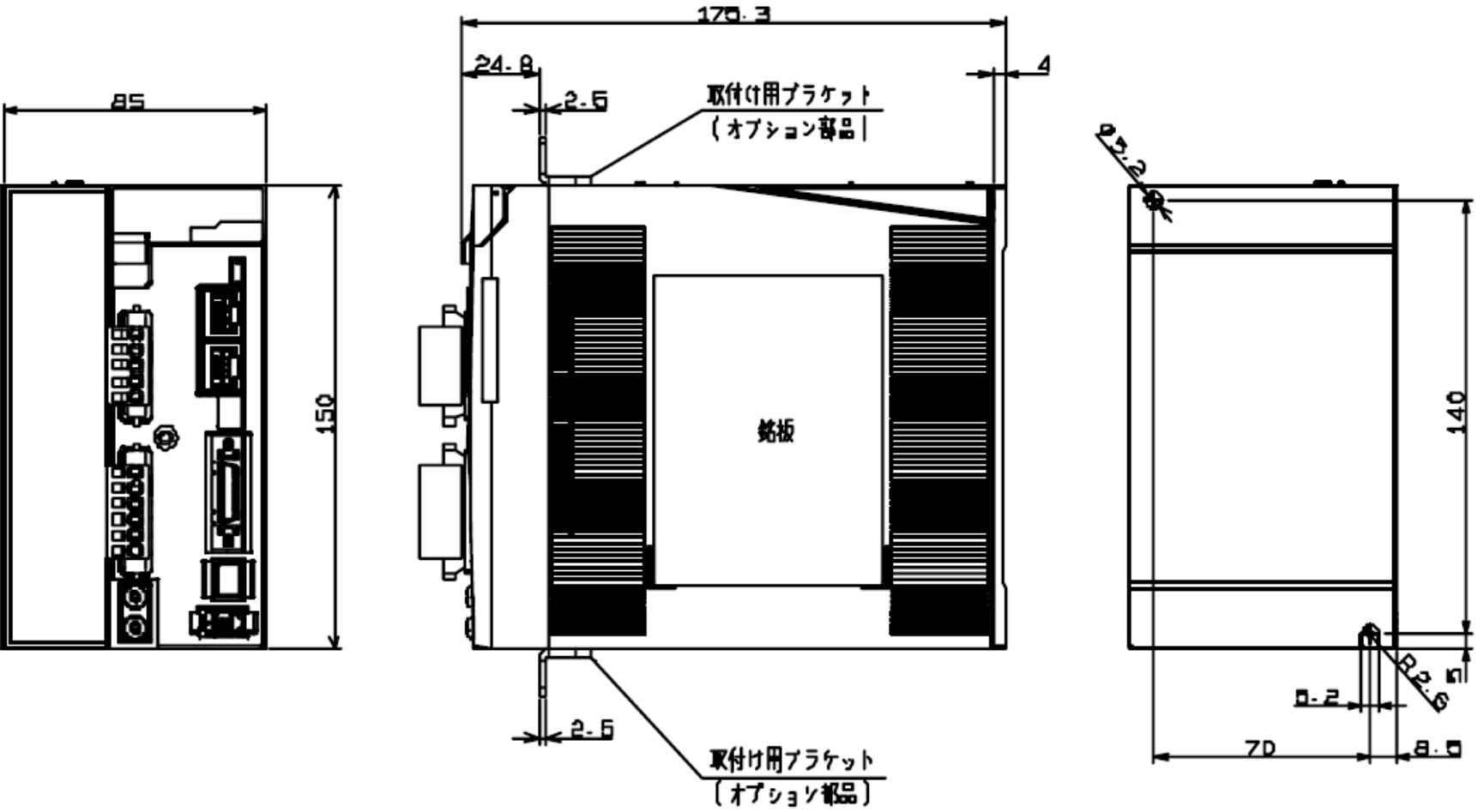
# Frame Size B



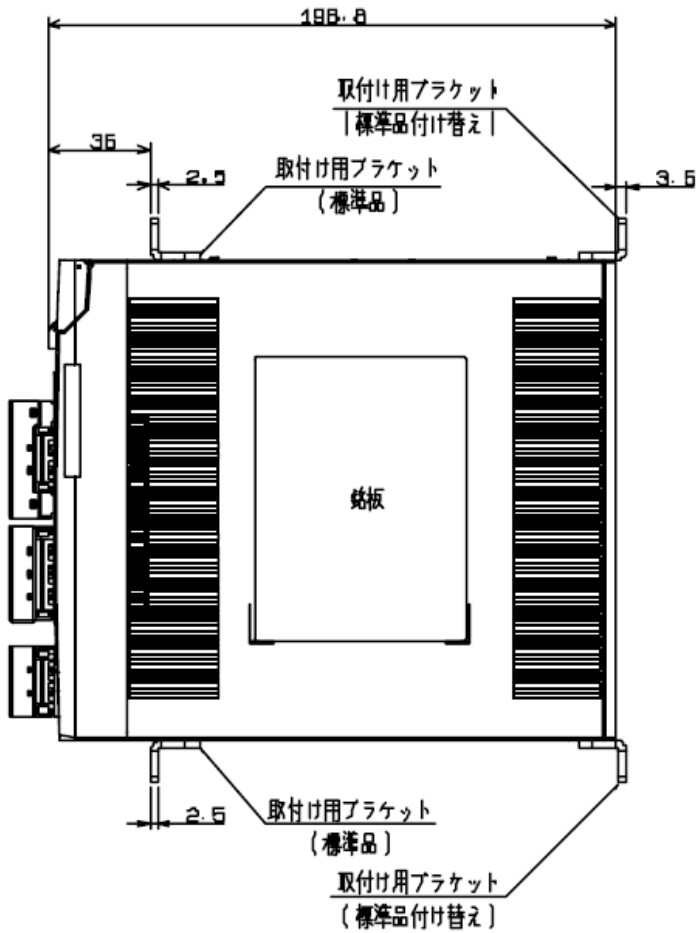
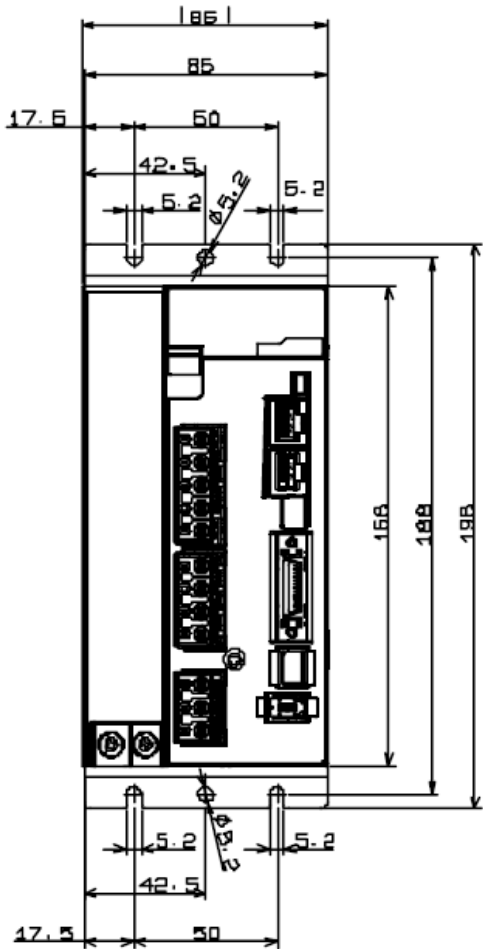
# Frame Size C



# Frame Size D

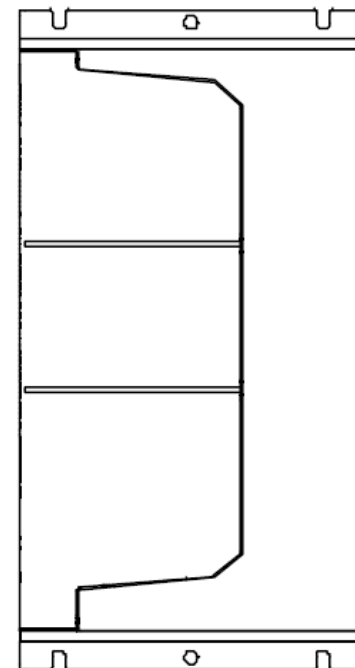
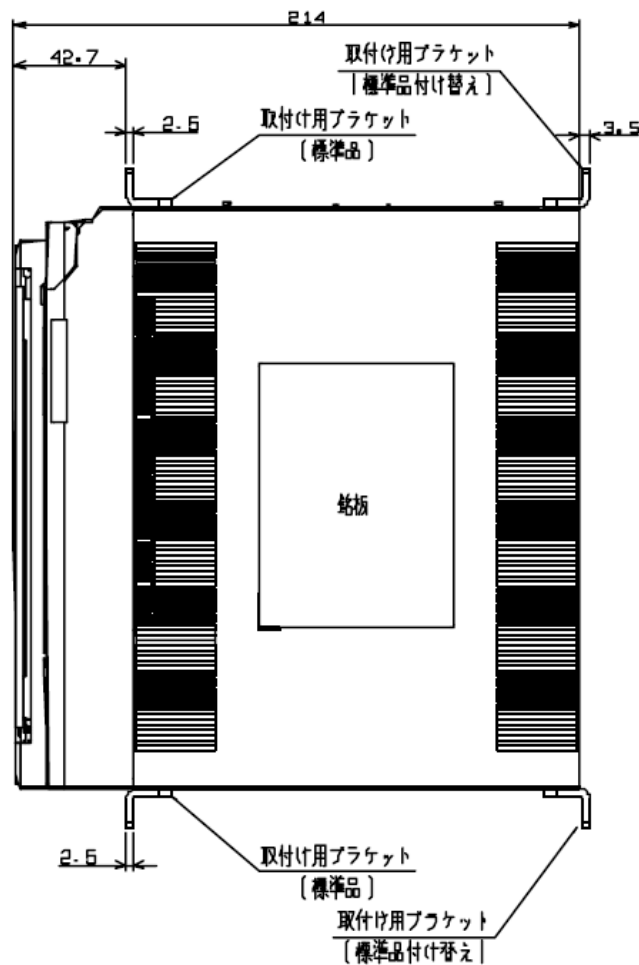
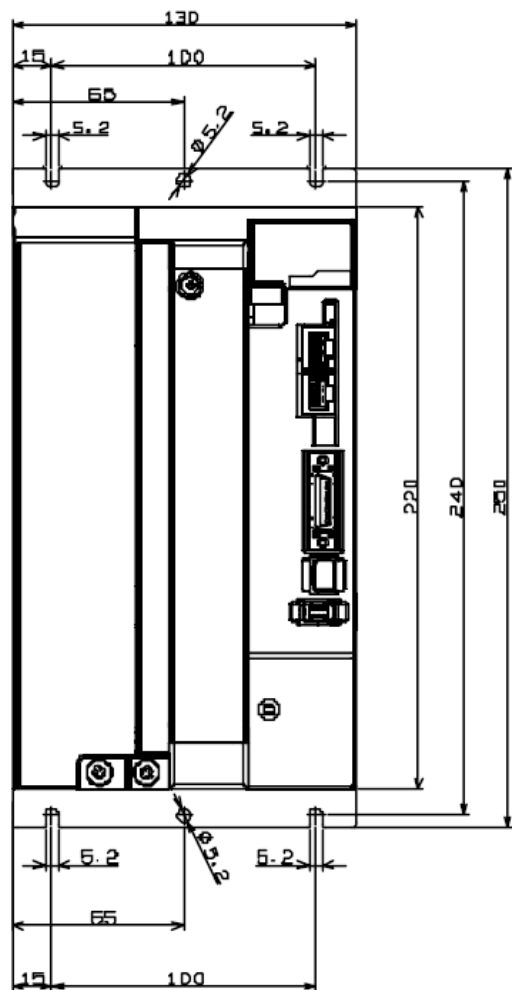


# Frame Size E



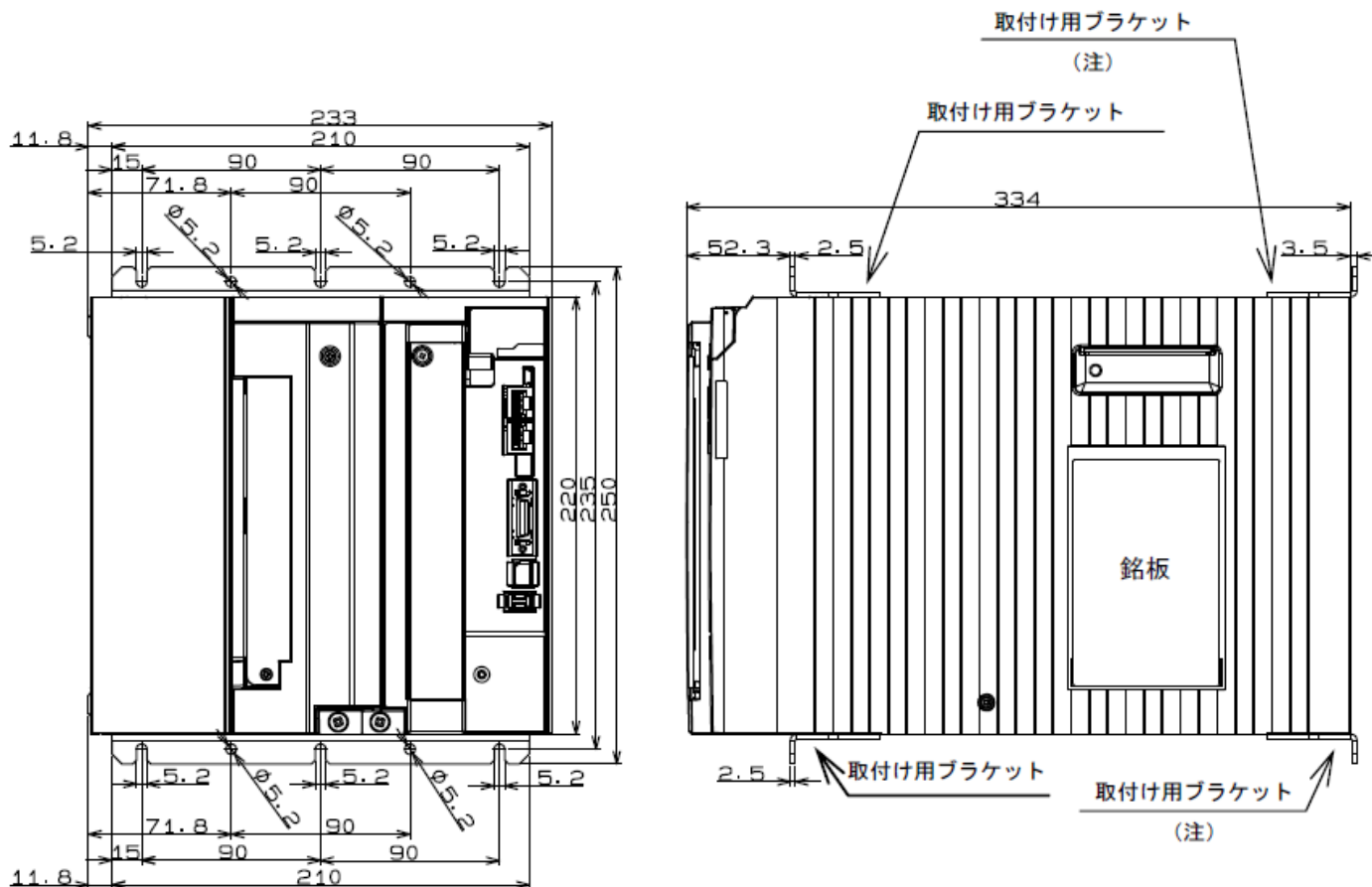
ベースマウント形  
(標準: 背面取付け)

# Frame Size F



ベースマウント形  
〔標準：背面取付け〕

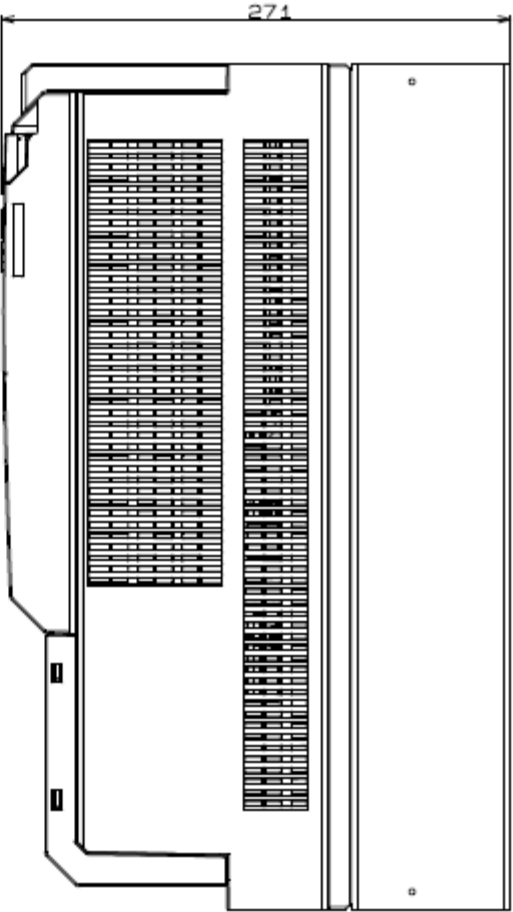
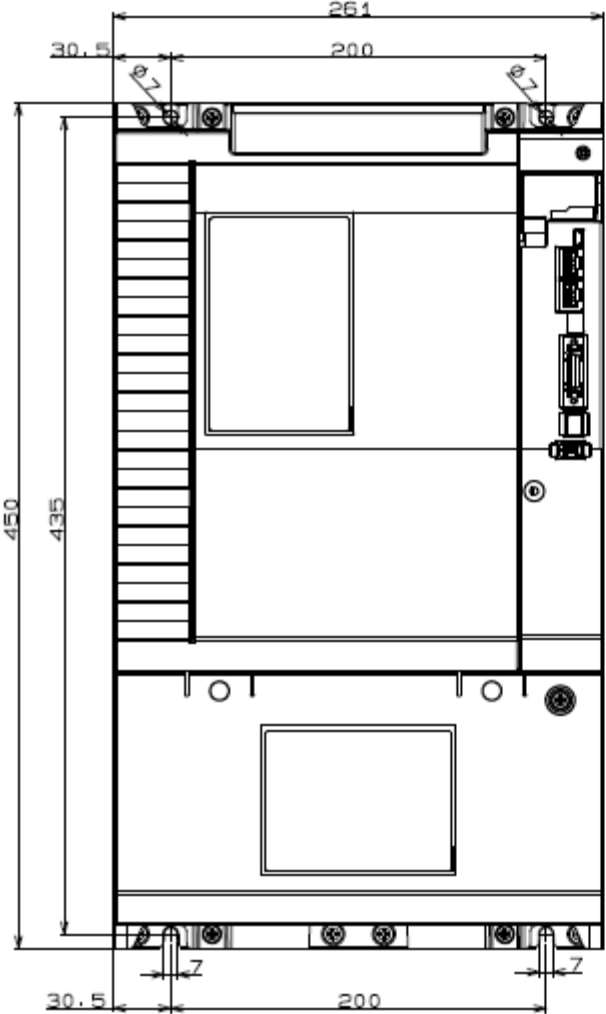
# Frame Size G



標準  
ラックマウント形  
(前面取付け)

注：ベースマウント形（背面取付け）で使用する場合は、取付け用ブラケットを背面側に付け替えてください。上図では前面と背面の両側に取付け用ブラケットを記載していますが、実際には前面側のみ（出荷時）となります。

# Frame Size H





# Options

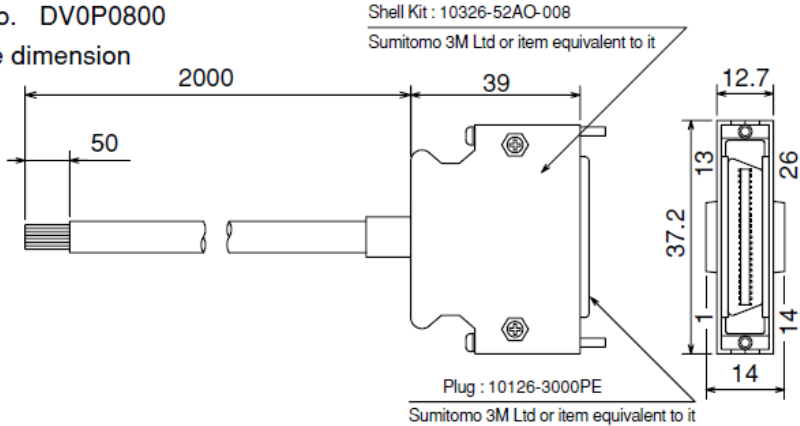
# Cable and Connector

Except for X4 connector, the options are in common with A5.  
For X4, the followings for E should be used.

## X4 Cable

(1) Part No. DV0P0800

(2) Outline dimension



(3) Table of Wiring

Pin No.	Color of Core Wire	Pin No.	Color of Core Wire	Pin No.	Color of Core Wire
1	Orange (red 1)	10	Pink (black 1)	19	Pink (red 2)
2	Orange (black 1)	11	Orange (red 2)	20	Pink (black 2)
3	Gray (red 1)	12	Orange (black 2)	21	Orange (red 3)
4	Gray (black 1)	13	Gray (red 2)	22	Gray (red 3)
5	White (red 1)	14	Gray (black 2)	23	Gray (black 3)
6	White (black 1)	15	White (red 2)	24	White (red 3)
7	Yellow (red 1)	16	White (black 2)	25	White (black 3)
8	Yellow (black 1)	17	Yellow (red 2)	26	Orange (black 3)
9	Pink (red 1)	18	Yellow (black 2)		

For example, the color of the wire, Orange (Red 1) means that the lead wire is colored in orange with one red dot mark.

## X4 Connector

(1) Part No. DV0P0770

(2) Components

Name	Manufacturer's part No.	Number	Manufacturer
Connector	10126-3000PE	1	Sumitomo 3M Ltd
Connector Cover	10326-52AO-008	1	

(viewed from the soldering side of the connector)



# X4 Pin Configurations

No.	Name (Default)
1	SO1+ (BRK-OFF+)
2	SO1- (BRK-OFF-)
3	ALM+
4	ALM-
5	SI1 (E-STOP)
6	I-COM
7	SI2 (POT)
8	SI3 (NOT)
9	SI4 (HOME)
10	SI5 (EXT1)
11	SI6 (SI-MON2)
12	SI7 (SI-MON3)
13	SI8 (SI-MON4)

No.	Name (Default)
14	BTP-I
15	BTN-I
16	GND
17	OA+
18	OA-
19	OB-
20	OB+
21	Reserved Output
22	Reserved Output
23	AIN
24	GND
25	SO2+ (EX-OUT1+)
26	SO2- (EX-OUT1-)

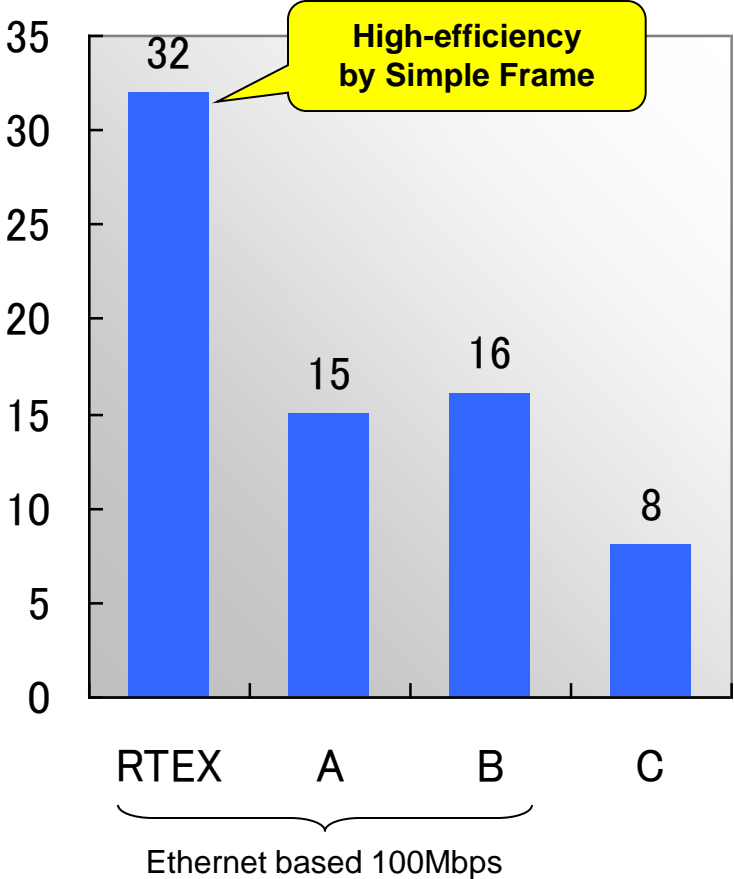
} Special model only

Note: Shield of cable should be connected to shell of the connector.

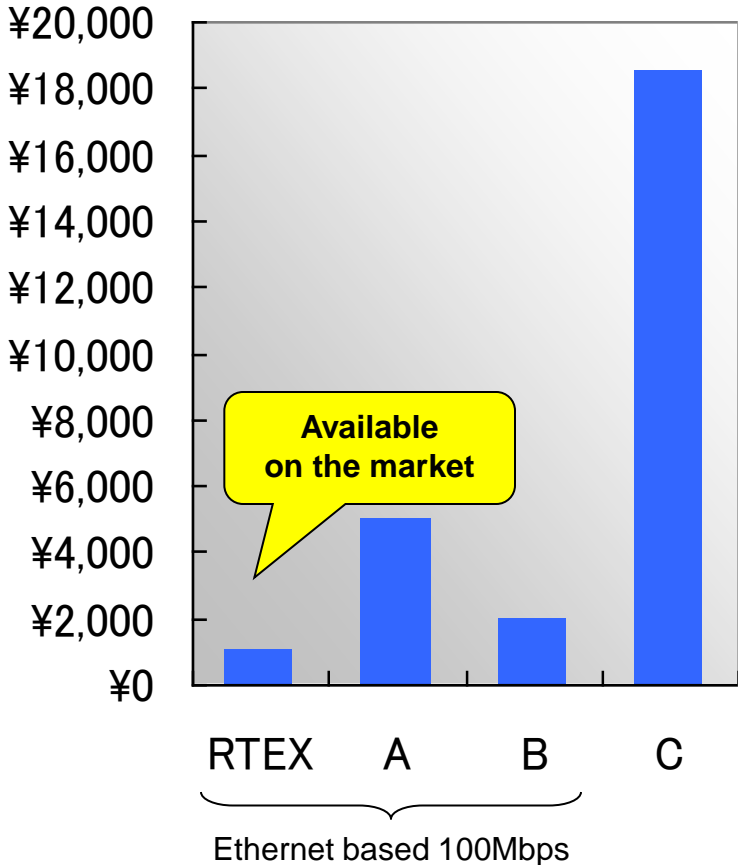
# Appendix

# Network Comparison

Max. Axes @0.5ms



Cable Cost JPY(1m)



# Sales Quantity of A4N

