Fuji Electric
Innovating Energy Technology

Alpha 5 Smart Training

Installation and Wiring

5. September, 2012

Fuji Electric Europe GmbH

Fuji Electric
Innovating Energy Technology

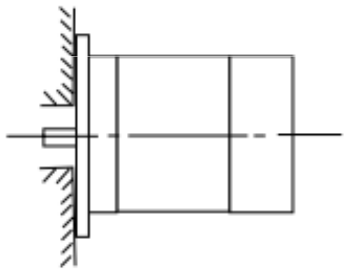
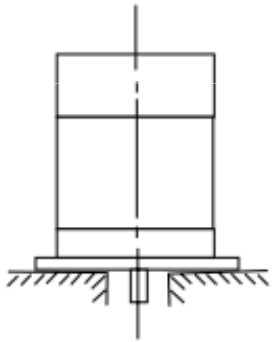
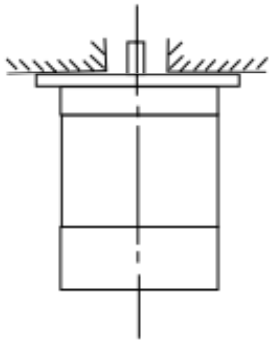
Servomotor – Operating environment

Item	Environmental condition
Ambient temperature	-10 to +40°C (no freezing allowed)
Ambient humidity	10 to 90% RH (no condensation allowed)
Location	Indoors at altitude ≤ 1000 m free from powder dust, corrosive gases and direct sunlight
Vibration	49 m/s^2 or less (3000 r/min, 0.75 kw or less) 24.5 m/s^2 or less (3000 r/min, 1 kw or more) 24.5 m/s^2 or less (1500 r/min, 2000 r/min)

Fuji Electric
Innovating Energy Technology

Servomotor – Mounting position

Flange type

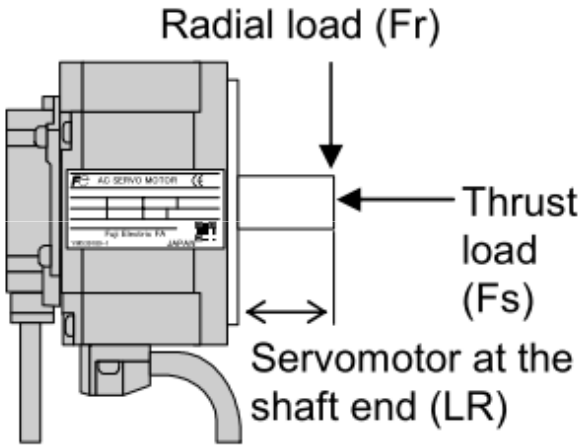
IM B5 (L51)	IM V1 (L52)	IM V3 (L53)
		

Note: In horitzontal installation cables must be below the motor

Fuji Electric
Innovating Energy Technology

Servomotor – Allowable Load

Motor model	Radial load Fr[N]	Thrust load Fs[N]	Servomotor at the shaft end LR[mm]
GYS500D5-□B2	127	19	25
GYS101D5-□B2	127	19	25
GYS201D5-□B2	264	58	30
GYS401D5-□B2	264	58	30
GYS751D5-□B2	676	147	40
GYS102D5-□B2	637	107	45
GYS152D5-□B2	637	107	45
GYC101D5-□B2	107	19	25



Fuji Electric
Innovating Energy Technology

Amplifier – Storage environment

Item	Environmental condition
Ambient temperature	-20 to +80°C (no freezing allowed)
Ambient humidity	10 to 90% RH (no condensation allowed)
Location	Indoors at altitude ≤ 1000 m free from powder dust, corrosive gases and direct sunlight
Atmospheric pressure	70 to 106 kPa
Vibration / impact	3 mm: Less than 2 to 9 Hz, 9.8 m/s^2: Less than 9 to 20 Hz, 2 m/s^2: Less than 20 to 55 Hz, 1 m/s^2: Less than 55 to 200 Hz

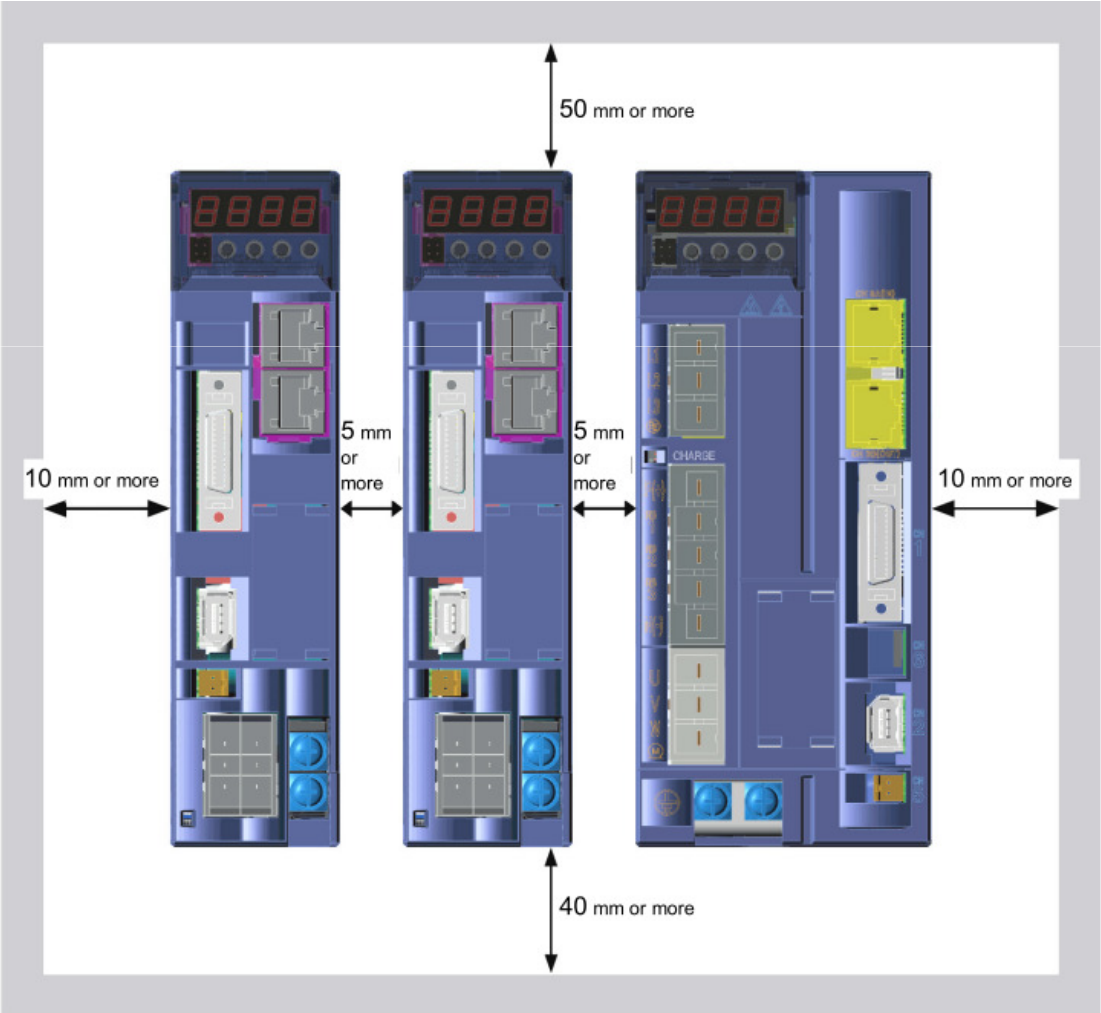
Fuji Electric
Innovating Energy Technology

Amplifier – Operating environment

Item	Environmental condition
Ambient temperature	-10 to +55°C (no freezing allowed)
Ambient humidity	10 to 90% RH (no condensation allowed)
Location	Indoors at altitude ≤ 1000 m free from powder dust, corrosive gases and direct sunlight
Vibration	3 mm: Less than 2 to 9 Hz, 9.8 m/s^2: Less than 9 to 20 Hz, 2 m/s^2: Less than 20 to 55 Hz, 1 m/s^2: Less than 55 to 200 Hz

Fuji Electric
Innovating Energy Technology

Amplifier – Clearances I



Fuji Electric
Innovating Energy Technology

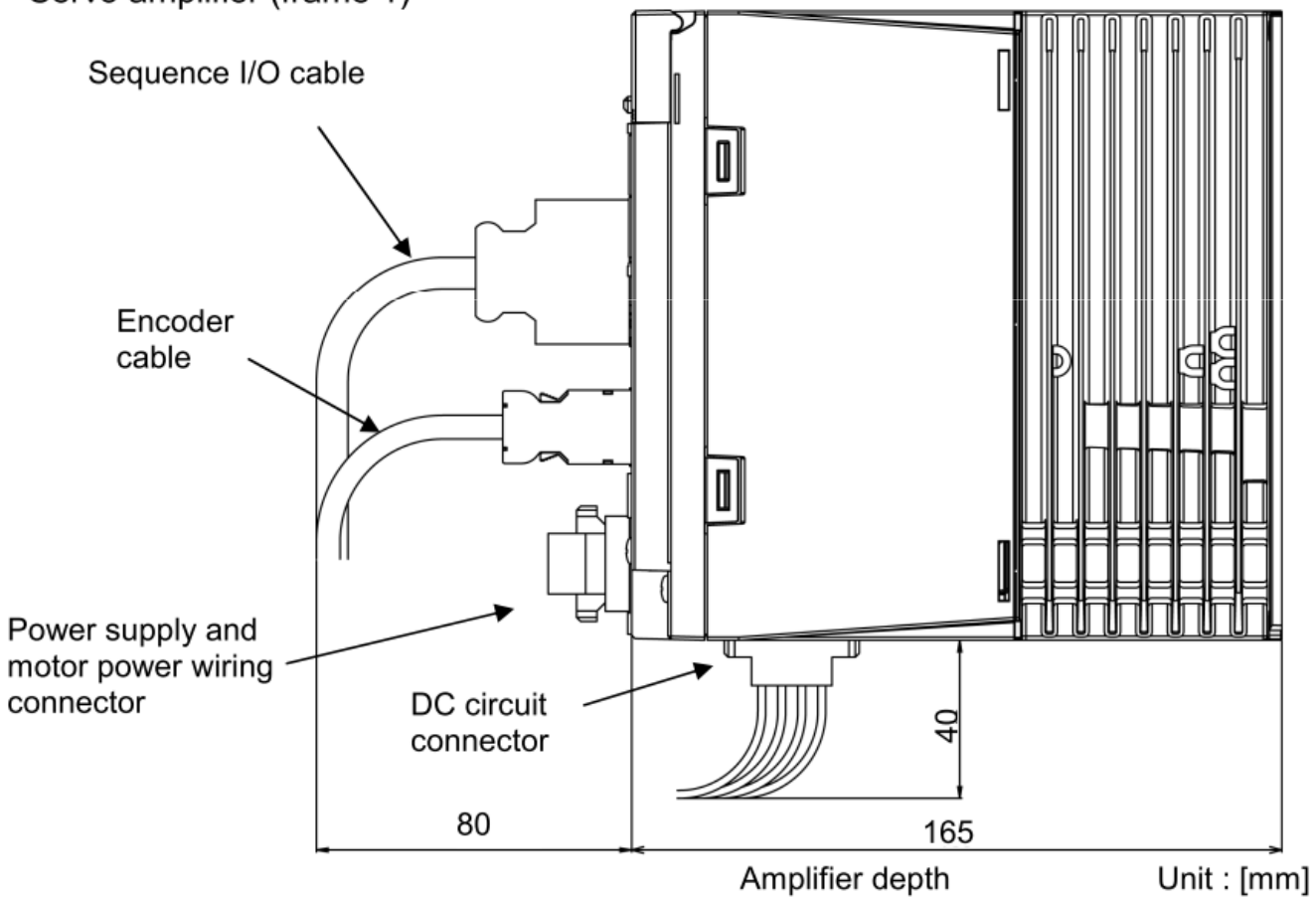
Amplifier – Clearances II

To install two or more servo amplifiers in the same control panel, the following shall be taken into consideration.
Arrange the servo amplifiers transversely in principle in order to avoid thermal affection.
This servo amplifier is permitted to be installed side by side closely. However, when installing the servo amplifiers side by side with completely contacted, operate them at the 80%ED rating. Rating of 100%ED can be achieved if the ambient temperature is 45°C or lower even in such installation state.
If clearance of 5 mm or over between adjacent servo amplifiers is provided, no limitation is imposed on the operation frequency.

Fuji Electric
Innovating Energy Technology

Amplifier – Cabinet Depth

■ Servo amplifier (frame 1)



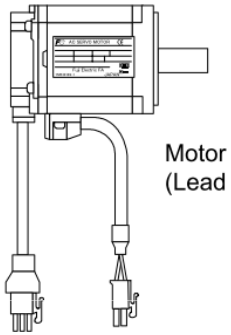
Fuji Electric
Innovating Energy Technology

Wiring (frame 1) – Part Name

■ Servomotor

GYS/GYC type 0.4 kW or less

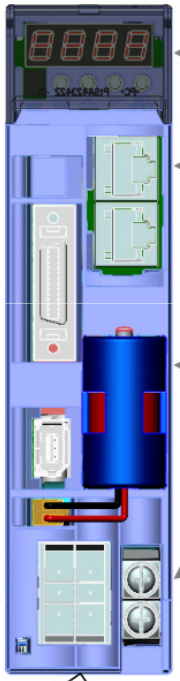
Encoder cable
(Lead length 300 mm)



Motor power cable
(Lead length 300 mm

■ Servo amplifier (frame 1)

0.4 kW or less



Analog monitor (CN4)
The analog waveform is monitored.

Keypad
4-digit 7-segment LED, 4 buttons and monitor terminals are installed.

RS485 (CN3A (IN), CN3B (OUT))
Upper side: CN3A, lower side: CN3B

Sequence I/O (CN1)

Battery and the case (option)

Encoder wiring (CN2)

Battery wiring (CN5)

Grounding terminal (2 pcs)
(Screw size : M4)

Power supply (TB1)	Motor power (TB3)
L1	U
L2	V
L3	W

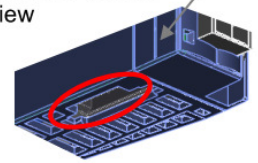
Charge LED

Main circuit (TB2)
• P-N junction
• Braking resistor

* On the bottom of the amplifier

P(+)
RB1
RB2
N(-)

Amplifier bottom view



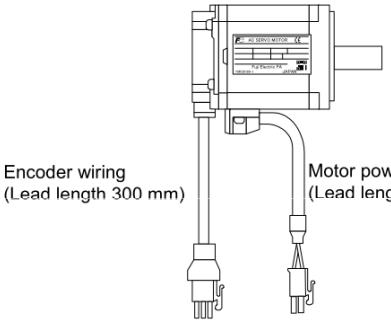
Fuji Electric
Innovating Energy Technology

Wiring (frame 2) – Part Name

■ Servomotor

Lead extraction type

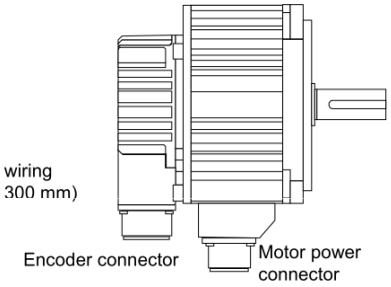
GYS/GYC type 0.75 kW



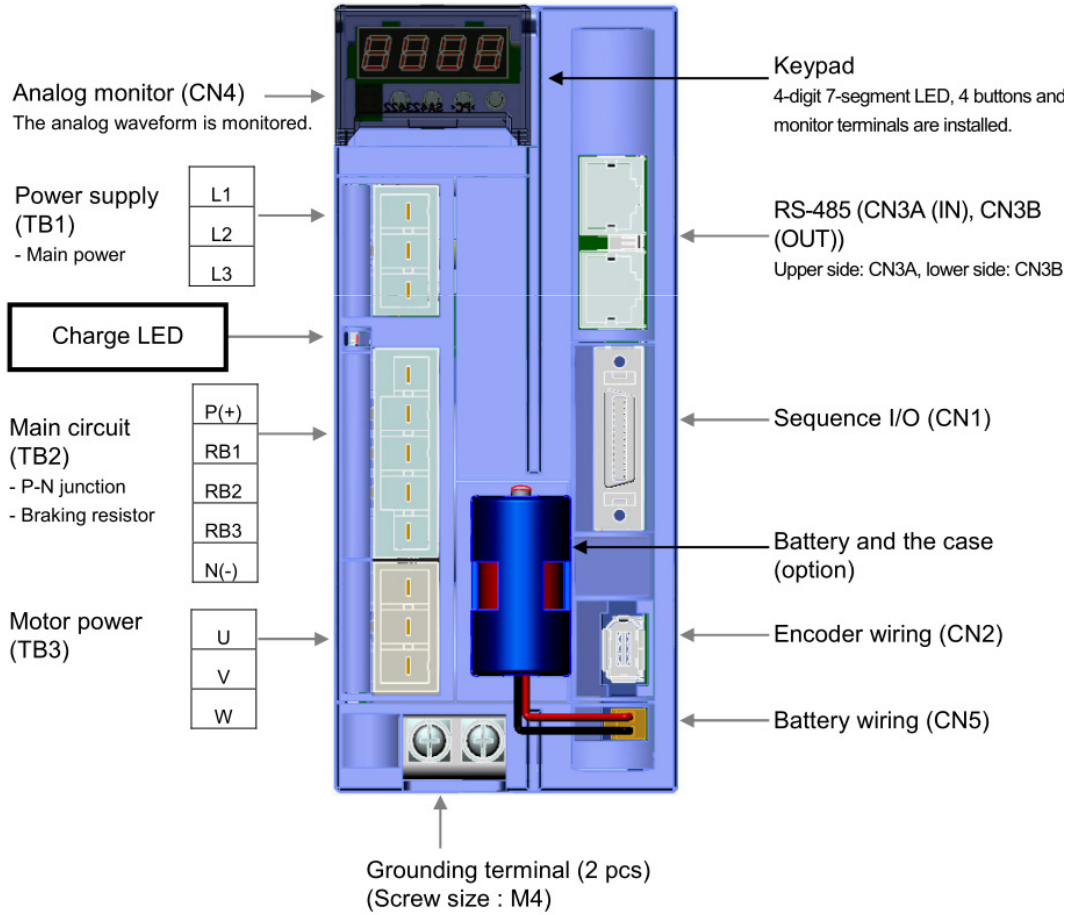
Connector type

GYS/GYC type 1 kW or more and

GYG type

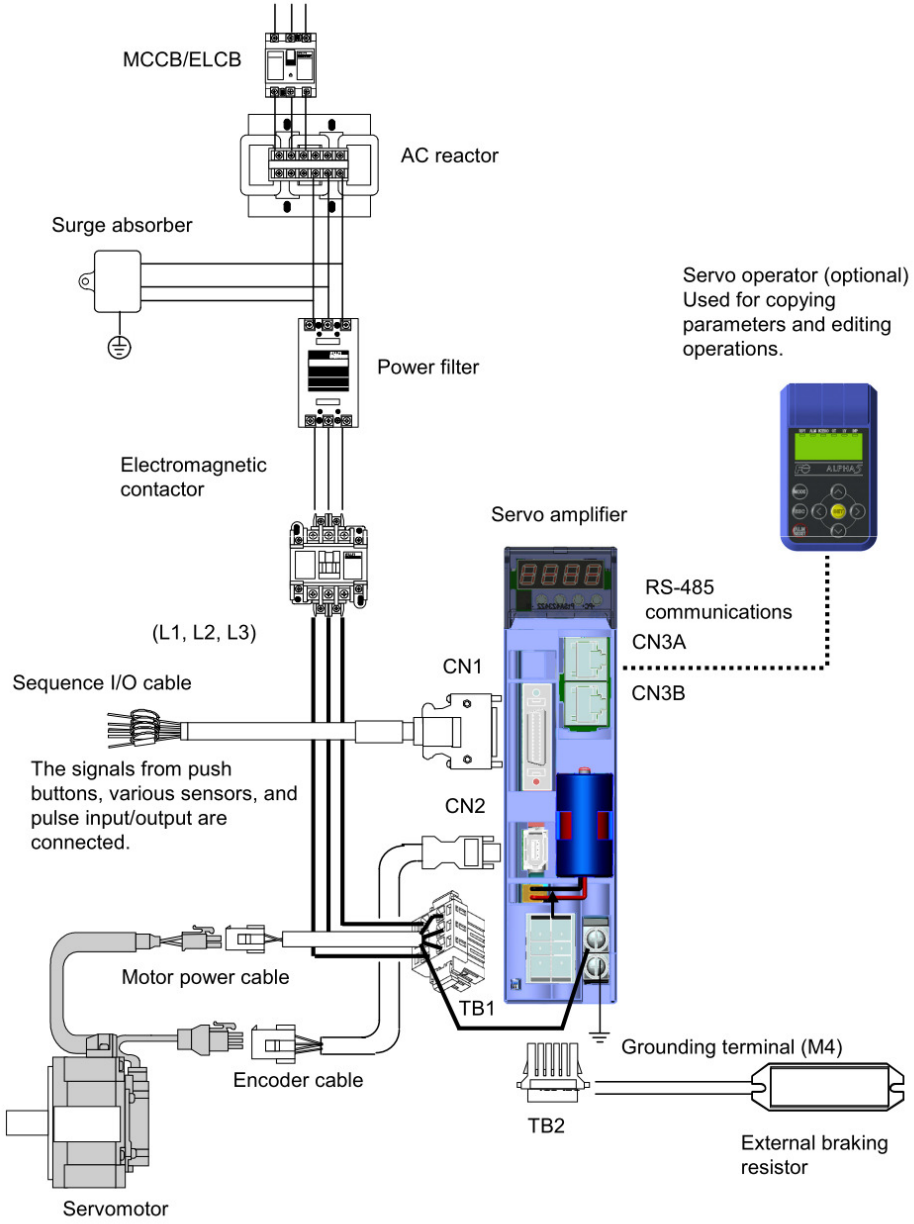


■ Servo amplifier (frame 2)



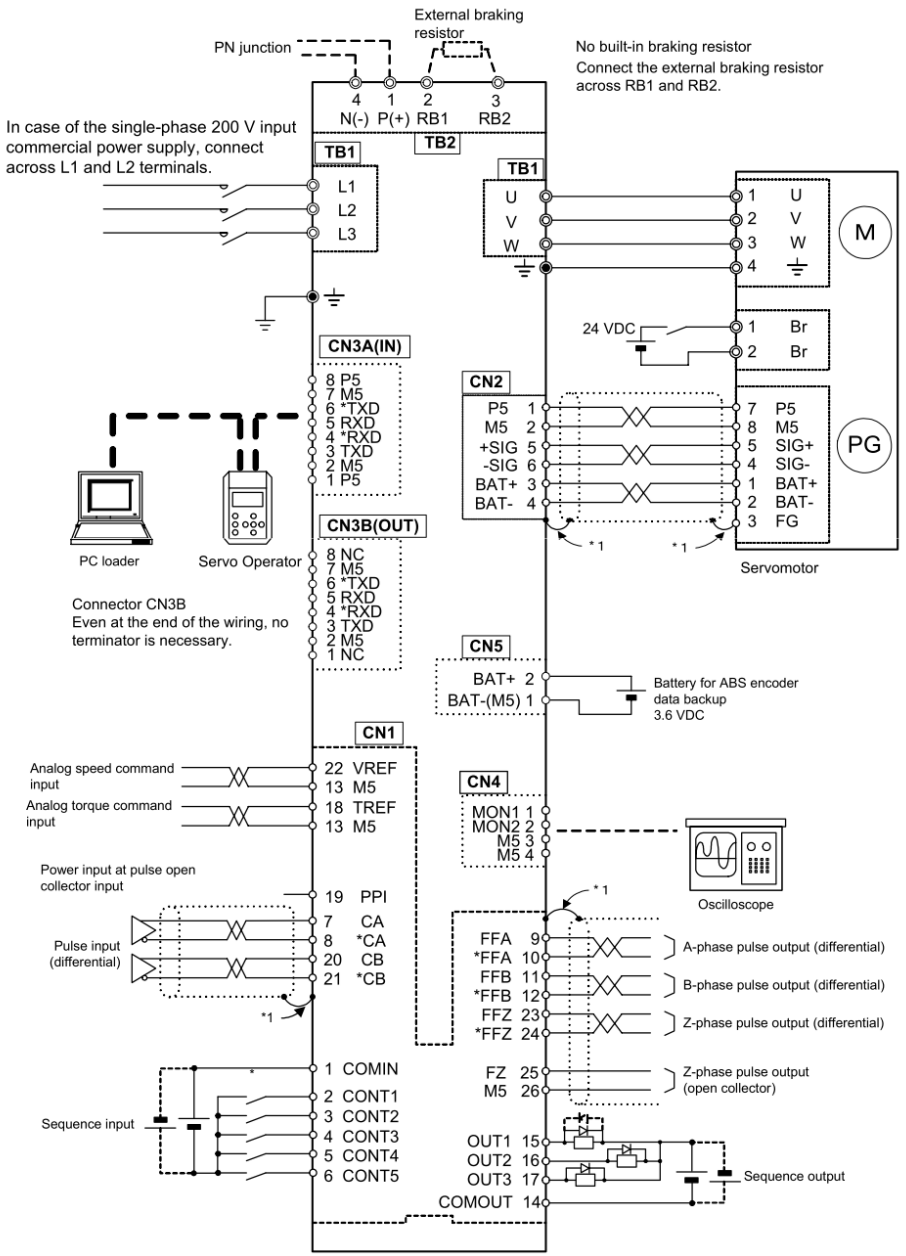
Fuji Electric
Innovating Energy Technology

Wiring (frame 1) – Example



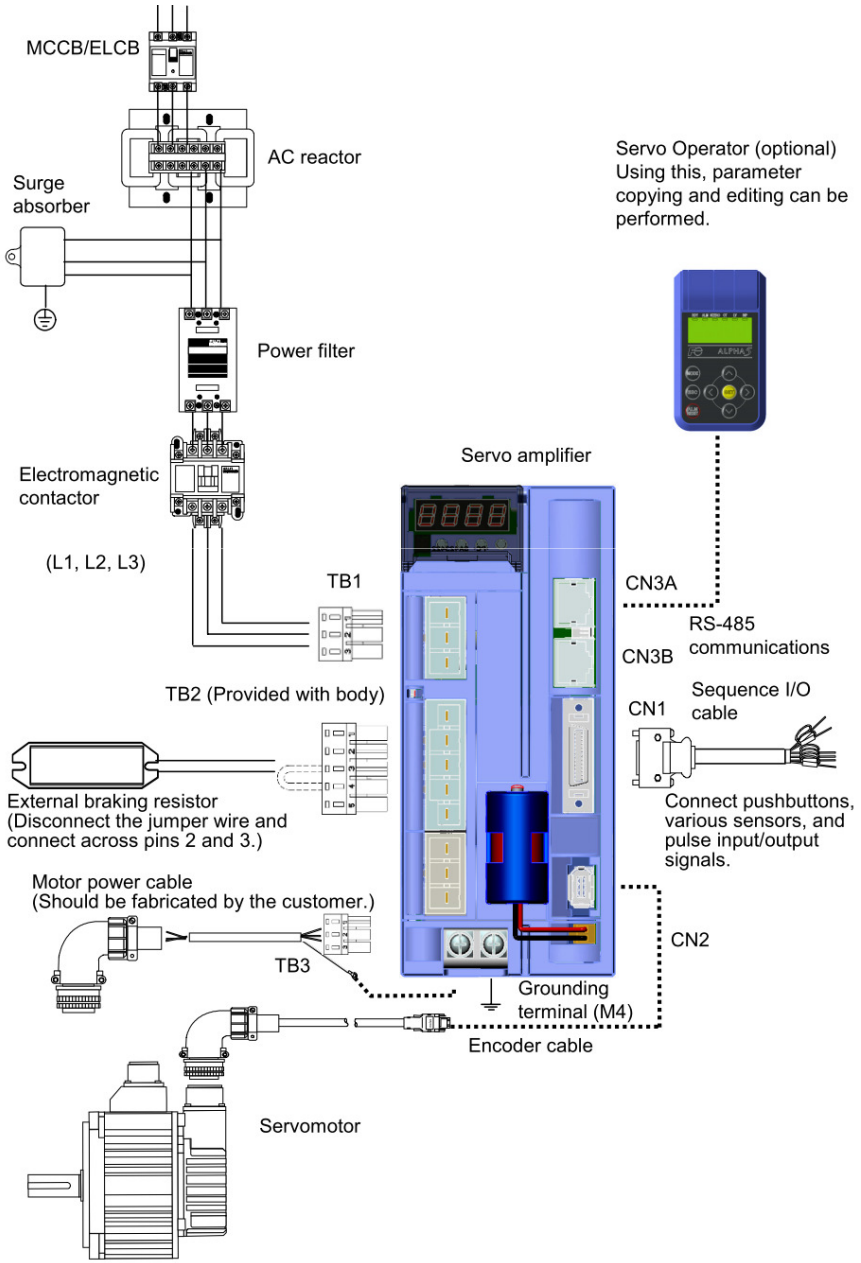
Fuji Electric
Innovating Energy Technology

Wiring (frame 1)
– Wiring Schematics



Fuji Electric
Innovating Energy Technology

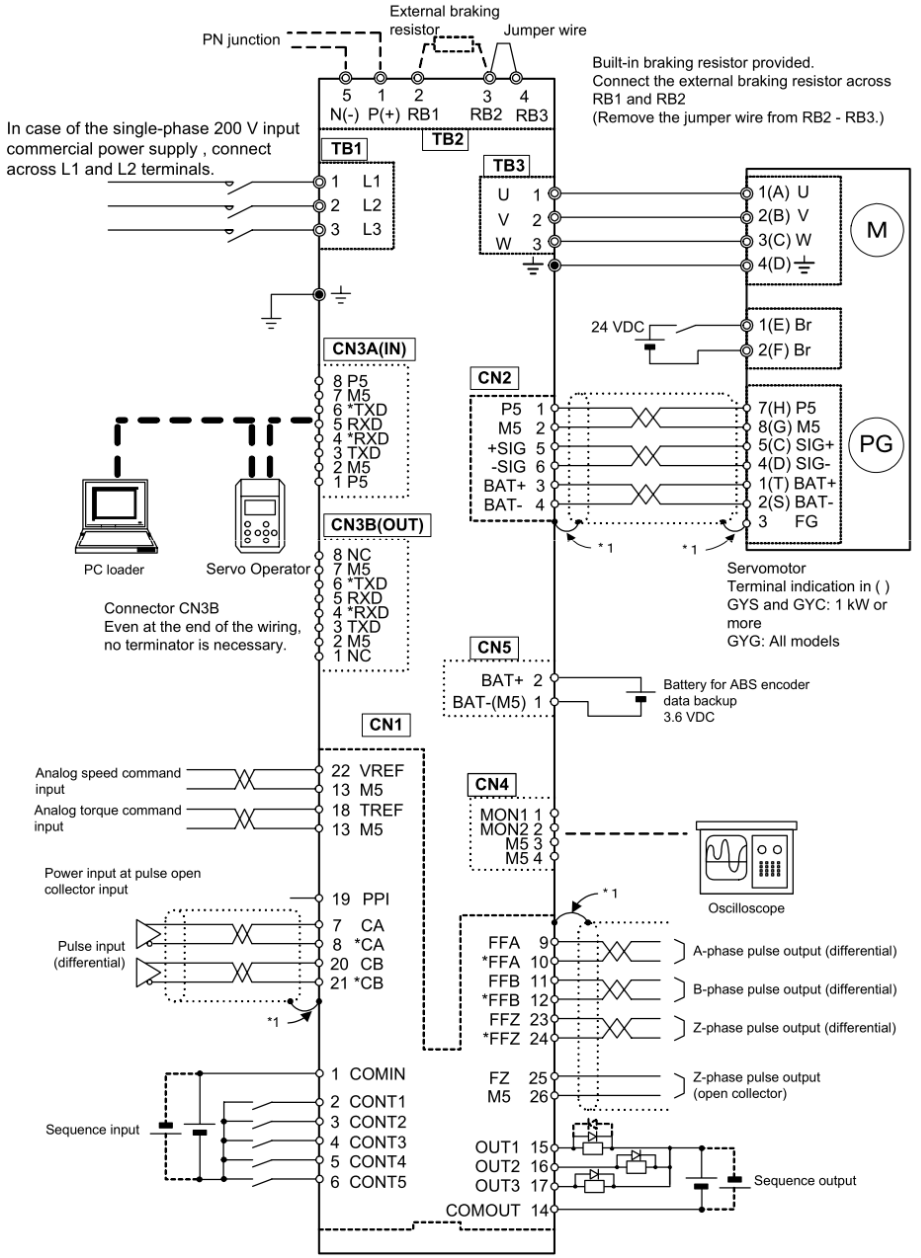
Wiring (frame 2) – Example



Installation and Wiring

Fuji Electric
Innovating Energy Technology

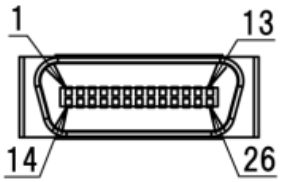
Wiring (frame 2)
– Wiring Schematics

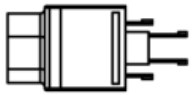


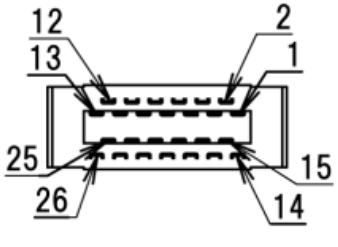
Fuji Electric
Innovating Energy Technology

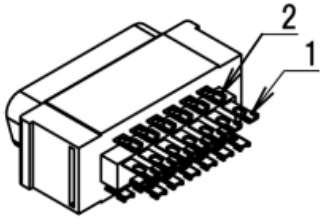
Wiring Sequence I/O:

26	M5	25	FZ	13	M5	12	*FFB
24	*FFZ	23	FFZ	11	FFB	10	*FFA
22	VREF	21	*CB	9	FFA	8	*CA
20	CB	19	PPI	7	CA	6	CONT5
18	TREF	17	OUT3	5	CONT4	4	CONT3
16	OUT2	15	OUT1	3	CONT2	2	CONT1
14	COMOUT			1	COMIN		







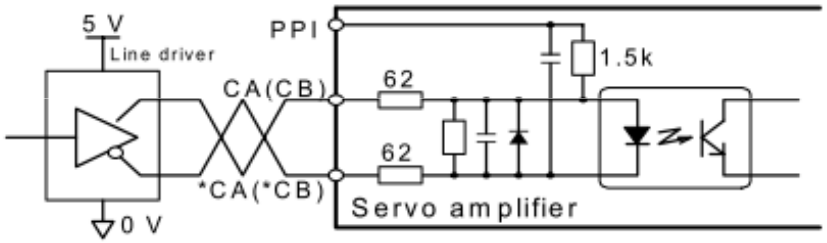


Fuji Electric
Innovating Energy Technology

Wiring Pulse Input:

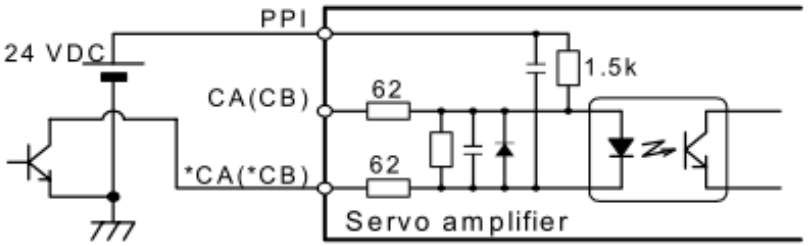
(1) Differential output

The PPI terminal is not used.



(2) Open collector (24 VDC)

The PPI terminal is used.

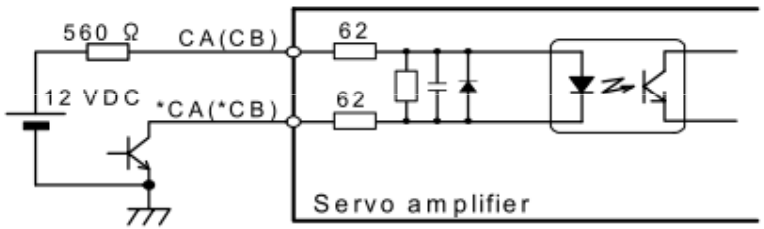


Fuji Electric
Innovating Energy Technology

Wiring Pulse Input (II):

(3) Open collector output (12 VDC)

Perform the wiring using the resistor (560 Ω, 1 W) but not using the PPI terminal as shown below.

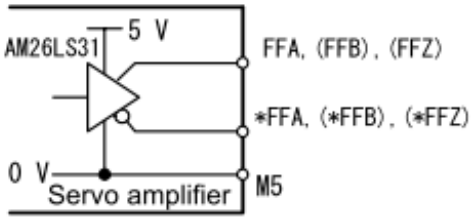


Fuji Electric
Innovating Energy Technology

Wiring Pulse Output:

The pulses proportional to the motor revolutions are output as A/B phase pulse.

- The number of output pulses per motor revolution can be specified in the parameter (PA1_08).
- The output pulse frequency is proportionate to axis revolution speed. Although the output frequency is not limited, it has to be 500 kHz or lower considering the electrical limit of the output circuit.
- The output pulse phase (A or B phase advance) to the motor revolution direction can be specified in the parameter (PA1_11).
- The FFZ and *FFZ signals output one pulse per motor revolution. The output position can be adjusted in the parameter (PA1_12).

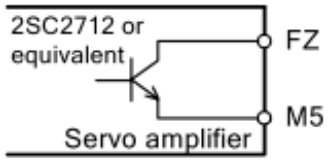


Fuji Electric
Innovating Energy Technology

Wiring Z-Phase Output:

The Z-phase output is an open collector output of the FFZ or *FFZ signal.

The current can flow up to 30 VDC/50 mA.

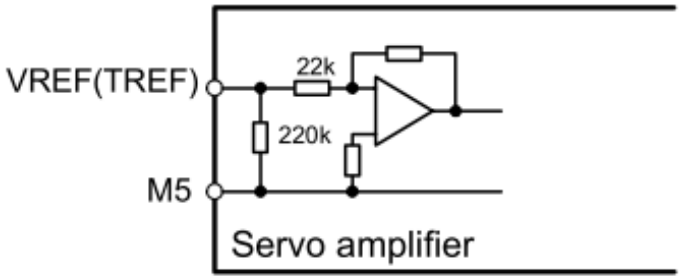


Fuji Electric
Innovating Energy Technology

Wiring Analog Inputs

The analog input is the terminal used when performing the speed/torque control by analog commands.

- Input voltage: 0 to ±10 VDC
- Variable resistor: 1 to 5 kΩ (1/2 W)
- Input impedance: 20 kΩ

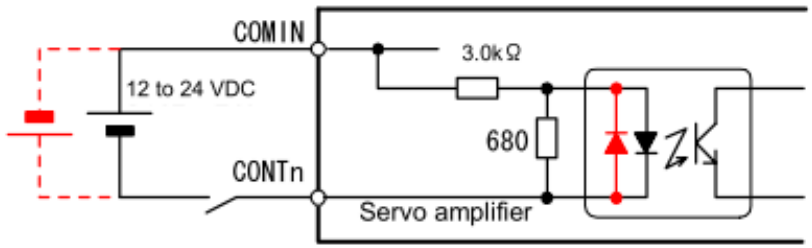


Fuji Electric
Innovating Energy Technology

Wiring Sequence Inputs

This is the input terminal for sequence control.

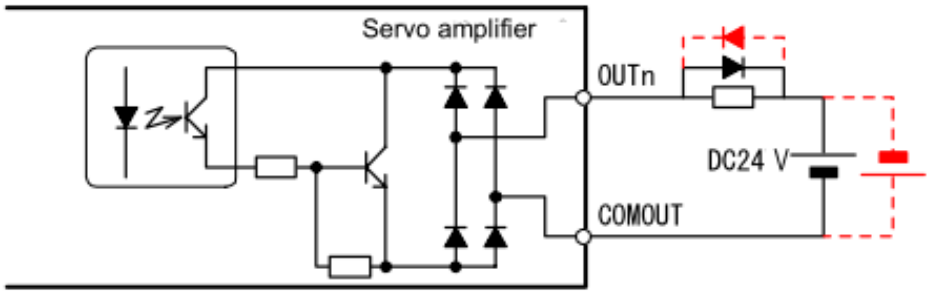
- The terminal allows sink input/source input.
- Use the terminal within the range from 12 VDC to 24 VDC.
- A current of approx. 8 mA (for 24 VDC) is consumed at each point.
- The terminal function can be changed by setting the parameter. For assignable signals, refer to page 2-20.



Wiring Sequence Outputs

This is the output terminal for sequence control.

- The terminal allows sink output/source output.
- Use the terminal within the range from 12 VDC to 24 VDC.
- A current of approx. 8 mA (for 24 VDC) is consumed at each point.
- The terminal function can be changed by setting the parameter. For assignable signals, refer to page 2-21.



Fuji Electric
Innovating Energy Technology

Wiring P-N Junction

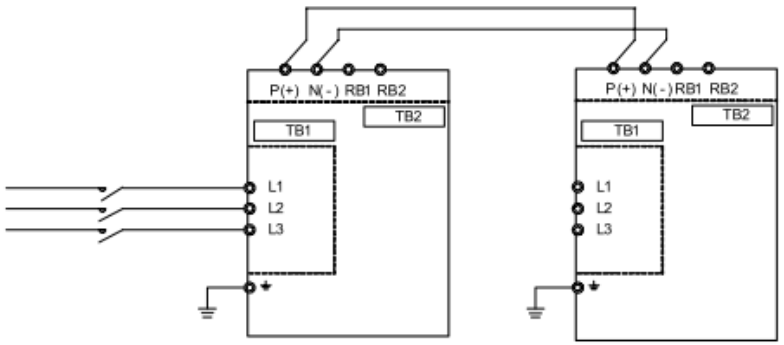
Directly connect the DC link circuit of two servo amplifiers to exchange power.

In a system having a powering (driving) shaft and regenerating (back tension) shaft such as the winder/unwinder unit, the power consumption of the entire system can be reduced. Do not supply main power to the servo amplifier on the other side of the P-N junction.

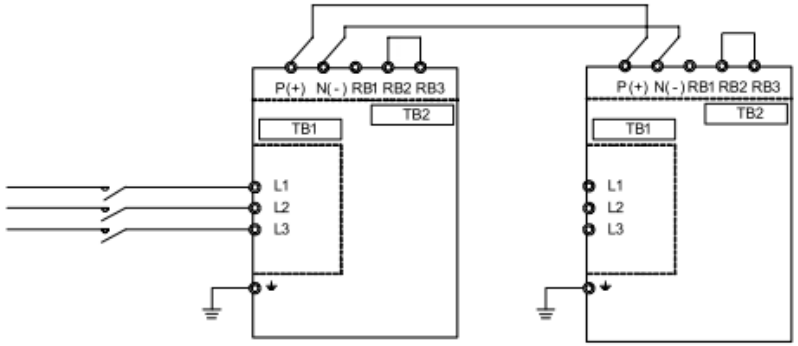
The capacity of the servo amplifier on the PN junction side must be equal to or less than that of the servo amplifier on the power supply side.

The capacity of the servo amplifier on the power supply side ≧ The capacity of the servo amplifier on the PN junction side

■Wiring example for frame 1



■Wiring example for frame 2



Fuji Electric
Innovating Energy Technology

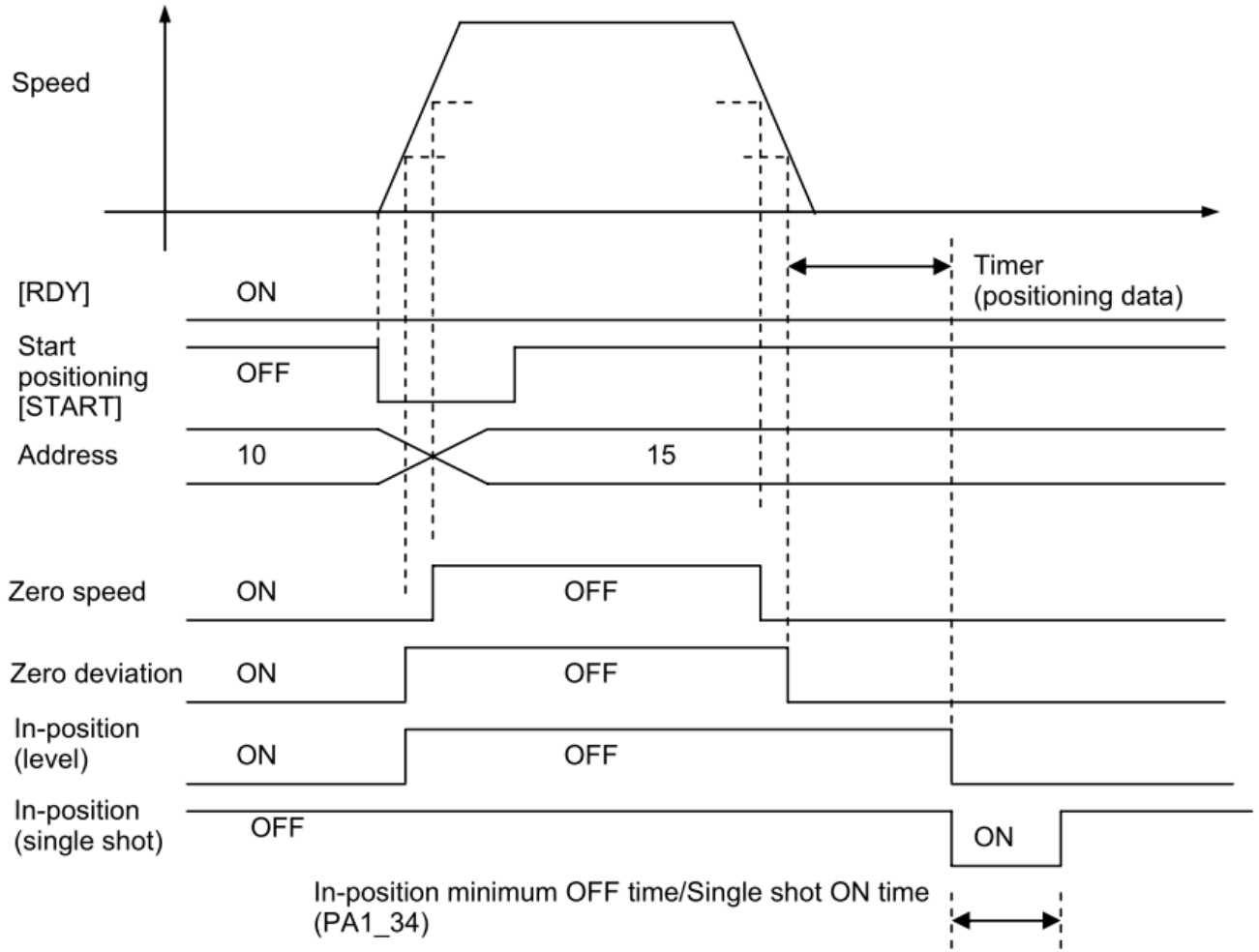
Sequence input functions:

Sequence input signal

No.	Function	No.	Function
1	Servo-on [S-ON]	34	External braking resistor overheat
2	Forward command [FWD]	35	Teaching
3	Reverse command [REV]	36	Control mode selection
4	Start positioning [START]	37	Position control
5	Homing [ORG]	38	Torque control
6	Home position LS [LS]	43	Override enable
7	+OT	44	Override 1
8	-OT	45	Override 2
10	Forced stop [EMG]	46	Override 4
11	Alarm reset [RST]	47	Override 8
14	ACC0	48	Interrupt input enable
16	Position preset	49	Interrupt input
17	Gain switch	50	Deviation clear
19	Torque limit 0	51	Multi-step speed selection 1 [X1]
20	Torque limit 1	52	Multi-step speed selection 2 [X2]
22	Immediate value continuation	53	Multi-step speed selection 3 [X3]
23	Immediate value change	54	Free-run
24	Electronic gear numerator selection 0	55	Edit permission
25	Electronic gear numerator selection 1	57	Anti resonance frequency selection 0
26	Command pulse inhibit	58	Anti resonance frequency selection 1
27	Command pulse ratio 1	60	AD0
28	Command pulse ratio 2	61	AD1
29	Proportional control	62	AD2
31	Pause	63	AD3
32	Positioning cancel	77	Positioning data selection
		78	Broadcast cancel

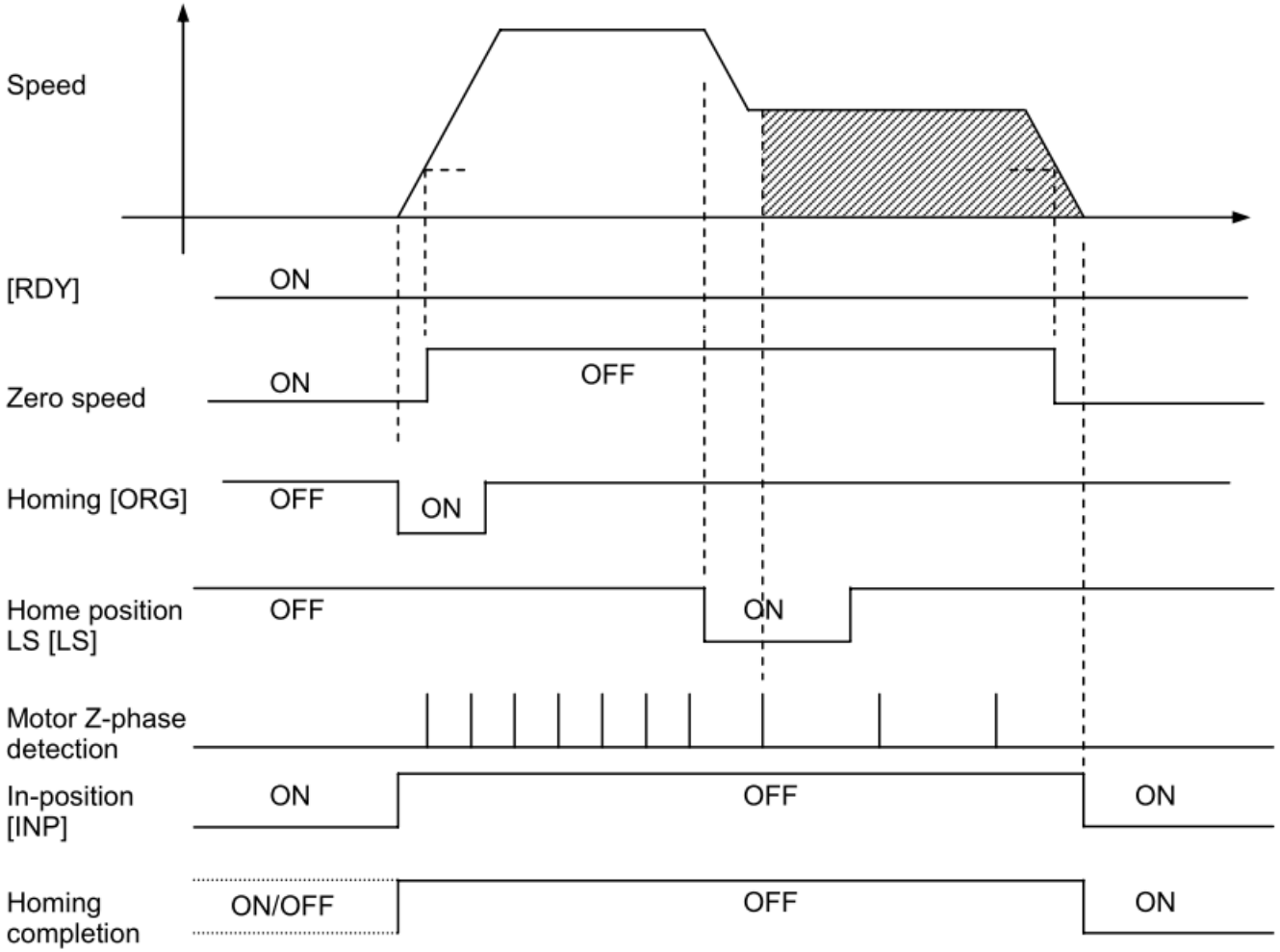
Fuji Electric
Innovating Energy Technology

Sequence input functions:



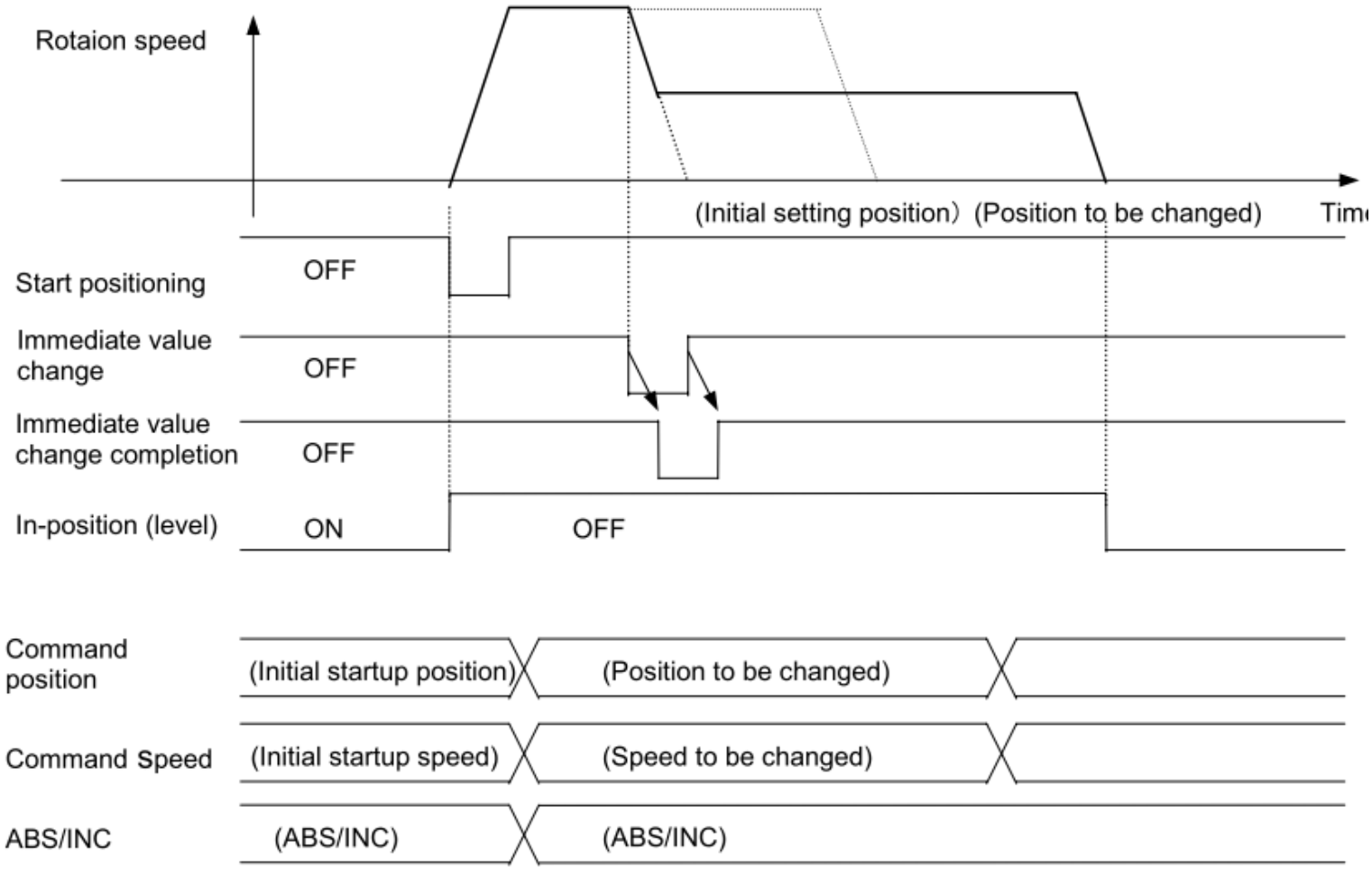
Fuji Electric
Innovating Energy Technology

Sequence input functions:



Fuji Electric
Innovating Energy Technology

Sequence input functions:



Fuji Electric
Innovating Energy Technology

Sequence input functions:

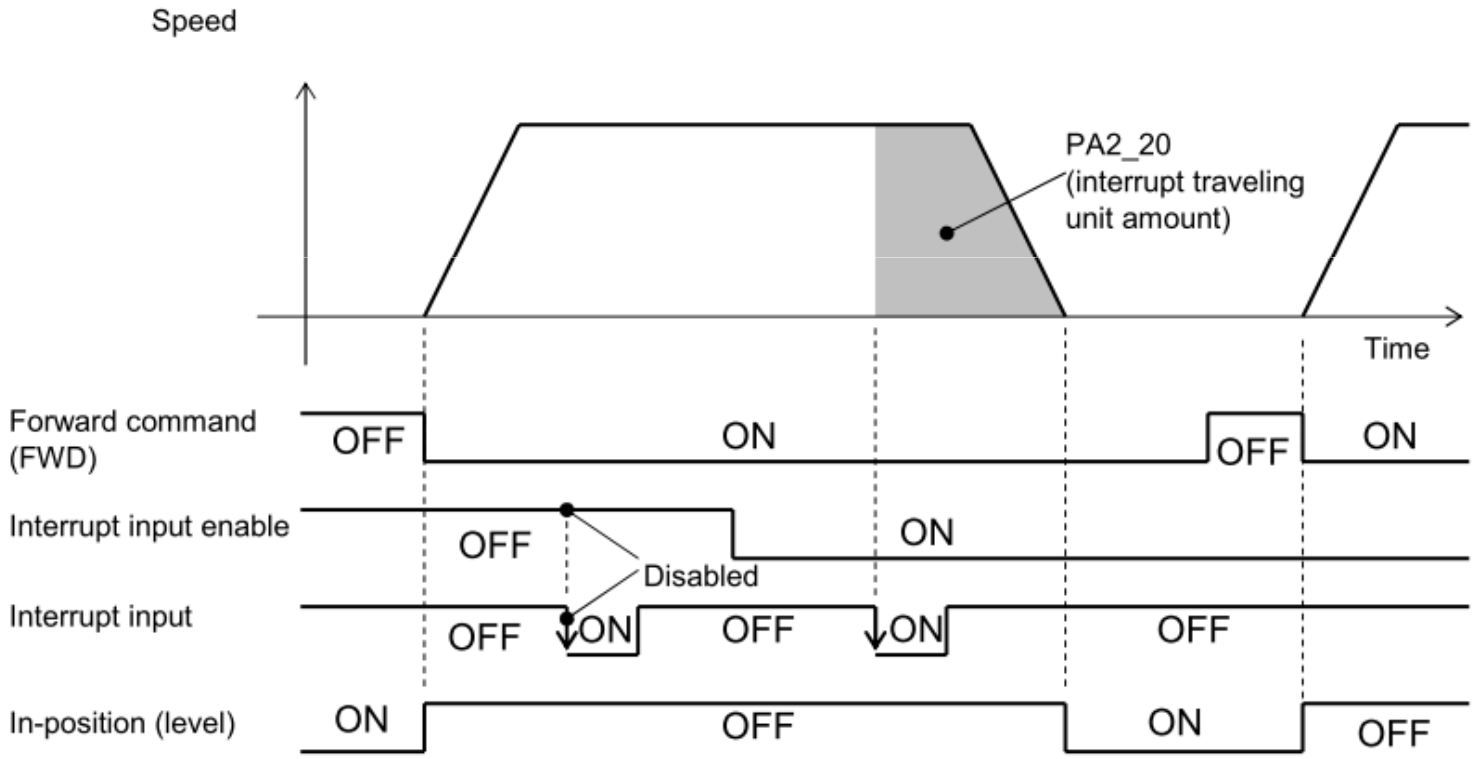
Override ratio

Override 8	Override 4	Override 2	Override 1	Traveling speed %
OFF	OFF	OFF	OFF	0
OFF	OFF	OFF	ON	10
OFF	OFF	ON	OFF	20
OFF	OFF	ON	ON	30
OFF	ON	OFF	OFF	40
OFF	ON	OFF	ON	50
OFF	ON	ON	OFF	60
OFF	ON	ON	ON	70
ON	OFF	OFF	OFF	80
ON	OFF	OFF	ON	90
ON	OFF	ON	OFF	100
ON	OFF	ON	ON	110
ON	ON	OFF	OFF	120
ON	ON	OFF	ON	130
ON	ON	ON	OFF	140
ON	ON	ON	ON	150

* If the weight of the override is the default value

Fuji Electric
Innovating Energy Technology

Sequence input functions:



Fuji Electric
Innovating Energy Technology

Sequence output functions:

No.	Function	No.	Function
1	Ready for servo-on [RDY]	39	-OT detection
2	In-position [INP]	40	Home position LS detection
11	Speed limit detection	41	Forced stop detection
13	Over write completion	45	Battery warning
14	Brake timing	46	Life warning
16	Alarm detection (Normally open contact)	60	MD0
17	Point detection, area 1	61	MD1
18	Point detection, area 2	62	MD2
19	Limiter detection	63	MD3
20	OT detection	64	MD4
21	Cycle end detection	65	MD5
22	Homing completion	66	MD6
23	Zero deviation	67	MD7
24	Zero speed	75	Position preset completion
25	Speed coincidence	76	Alarm detection (Normally closed contact)
26	Torque limit detection	79	Immediate value continuation permission
27	Overload warning	80	Immediate value continuation completion
28	Servo control ready [S-RDY]	81	Immediate value change completion
29	Edit permission response	82	Command positioning completion
30	Data error	83	Range1 of position
31	Address error	84	Range2 of position
32	Alarm code 0	85	Interrupt positioning detection
33	Alarm code 1	91	CONTa through
34	Alarm code 2	92	CONTb through
35	Alarm code 3	93	CONTc through
36	Alarm code 4	94	CONTd through
38	+OT detection	95	CONTe through