

DRIVER



CM20 Series

User Manual

Closed-loop stepper motor driver

Ver. 2023010

Contents

1. Product Specifications	1
1.1 Driver Specifications	1
1.2 Motor Specifications	2
1.3 Driver Appearance and Connectors	2
1.4 Driver Dimensions	3
2. Connectors Configuration	4
2.1 CN1(Power & Motor)	4
2.2 CN2(Encoder IN)	6
2.3 CN3(I/O)	8
2.4 CN4(IN) / CN5 (OUT) (RS485)	9
3. Input Circuit Diagram	10
3.1 Command Pulse Input Circuit (Differential Drive)	10
3.2 Command Pulse Input Circuit (Open Collector)	10
3.3 Sensor, Digital Input Circuit (Contact)	10
3.4 Sensor, Digital Input Circuit (Open Collector)	10
4. Output Circuit Diagram	11
4.1 Digital Output Circuit (Relay Connection)	11
4.2 Digital Output Circuit (Optical Coupler Connection)	11
4.3 Differential Output Circuit (Encoder Output)	11
5. Pulse/Direction Input Sequence Diagram	12
6. Indicator Light	13
6.1 Status	13
6.2 Alarm	13
7. Control Parameter	14
7.1 Basic Status of Controller (Class 00)	14
7.2. Basic Parameter (Class 01)	15
7.3 Closed-Loop Parameter (Class 03)	16
7.4 Control Parameters (Class 04)	17
7.5 Input Pin Assignments (Class 05)	20
7.6 Output Pin Assignments (Class 06)	22
7.7 Multi-section position mode	22
7.7.1 Port Configurations for Multi-section position	25
7.7.2 I/O Selection Corresponding to Multi-section Selection	25
7.7.3 Example : Writing, Verification and Saving of Multi-section Mode	26
8. Appendix	29

8.1 PLC Wiring (In Mitsubishi PLC).....	29
8.1.1 Pulse Control.....	29
8.1.2 I/O Control.....	30
8.2 PLC Communication with CM20 by Modbus (In FX5U for JOG).....	31

1.Product Specifications

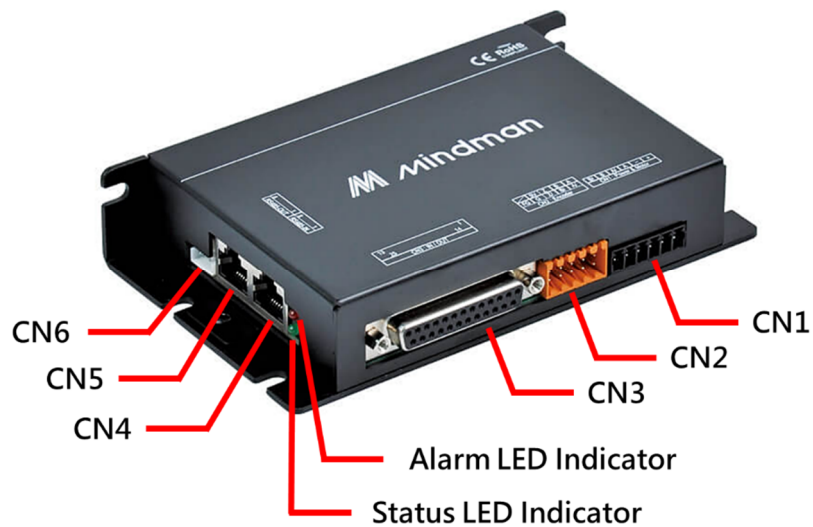
1.1 Driver Specifications

Model	CM20 Series
Input Power Voltage	24VDC ~ 48VDC
Maximum Output Current	4.5A (peak)
Suitable Motor Type	2-phase 4 wires bipolar stepper motor (with encoder)
Drive Method	PWM constant current driving
I/O Interface	Input : <ul style="list-style-type: none"> ● Pulse, direction input (Configurable as digital input) ● 5 Digital input ● Encoder input (A, B, Z) (Fixed) Output : <ul style="list-style-type: none"> ● 4 digital outputs ● Encoder input (Differential A, B, Z) (Fixed)
Detail of Digital Inputs	/SV ON (Servo On) /RESET (Alarm reset) /START (Motor start/stop) /JOG (Motor Jogging) /HOME (Homing)
Detail of Digital Outputs	/IN POTISION /ALARM
LED Indicators	Status, Alarm
Communication I/F	RS-485, up to 32 nodes MODBUS RTU protocol, Baud rate : 19200bps(default), up to 115200bps
Control Mode	Position Control (Positioning with pulse or RS-485)
Dimension (mm)	W86.6 × D145.9 × H28.4 (Connectors excluded)
Weight	About 350 g (Connectors excluded)
Operating Temperature/Humidity	0-45°C, less than 85%RH (No condensation)
Storage Temperature/Humidity	0-85°C, less than 85%RH (No condensation)
Atmosphere	Avoid the corrosive gases

1.2 Motor Specifications

Model		BM Series					
Size		□20	□25	□28	□35	□42	□56
Drive Method	-	Bi-Polar					
Number of Phases	-	2					
Current per Phase	A	0.6	1	1	1.5	2	3
Holding Torque	N·m	0.036	0.085	0.085	0.28	0.51	1.53
Rotor Inertia	g·cm ²	2.9	8	8	40	75	490
Weights	g	70	120	120	300	400	1150
Insulation Resistance	Mohm	100 MIN. (at 500VAC)					
Insulation Class	-	Class B (130°C)					
Operating Temperature	°C	0~50					
Encoder Resolution	Incremental	6,400	9,600	9,600	12,800	16,000	16,000
	Optical Encoder	PPR	PPR	PPR	PPR	PPR	PPR

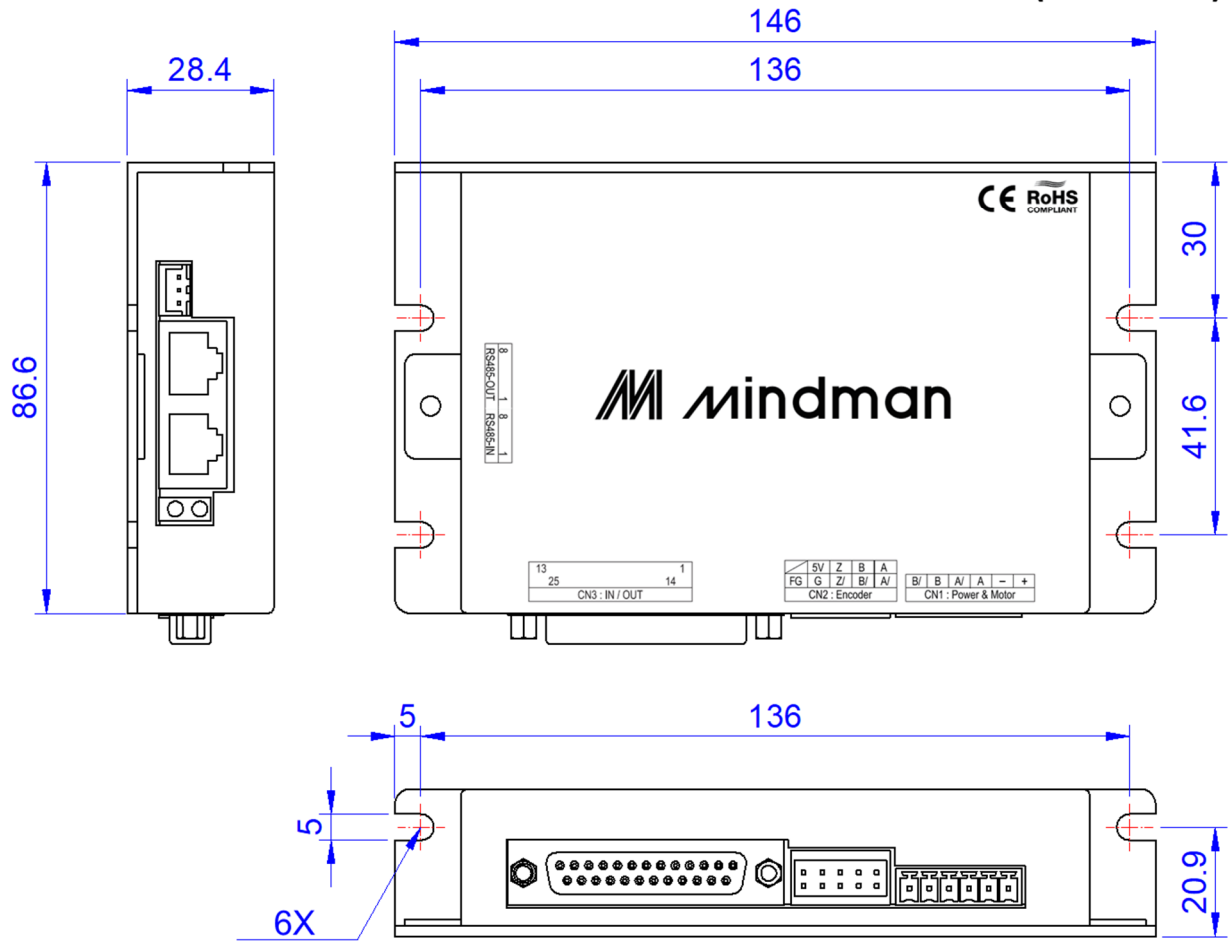
1.3 Driver Appearance and Connectors



Port No.	Usage
CN1	Power & Motor Connector
CN2	Encoder Input Connector
CN3	I/O Connector
CN4	RS485 Connector (IN)
CN5	RS485 Connector (OUT)
CN6	Reserve

1.4 Driver Dimensions

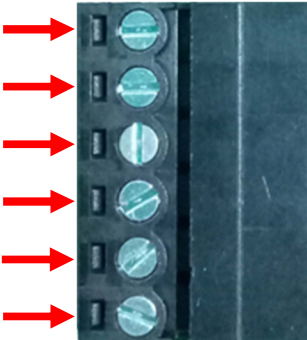
(Unit : mm)



2. Connectors Configuration

2.1 CN1(Power & Motor)

Pin	Signal Name
6	Motor B-
5	Motor B+
4	Motor A-
3	Motor A+
2	Power GND
1	Power V+ (DC24V or 48V)



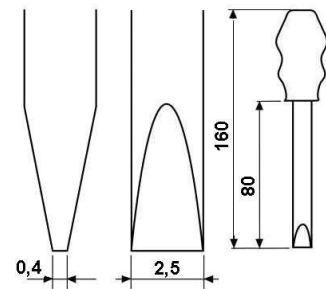
※Carefully wire the polarity of the driver power

Suitable wire size : AWG20 ~ AWG16 (multi-strand wire)

Use the special tool to screw the terminal

When screwing the terminals, please use a flathead screwdriver with a blade width of 0.4×2.5.

Example : Flathead screwdrivers from Phoenix Contact
(Product number : 1205037, model SZS 0.4×2.5)

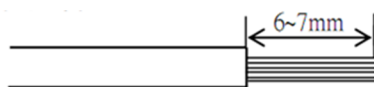


Tightening torque : 0.22 ~ 0.25N·m (2.3kgf·cm ~ 2.5kgf·cm)

Screwdriver size

Wiring :

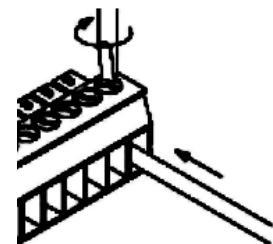
① Stripping length : 6 ~ 7mm



No soldering.
(It may cause abnormal connection)

② Insert the wire all the way and tighten the screw.

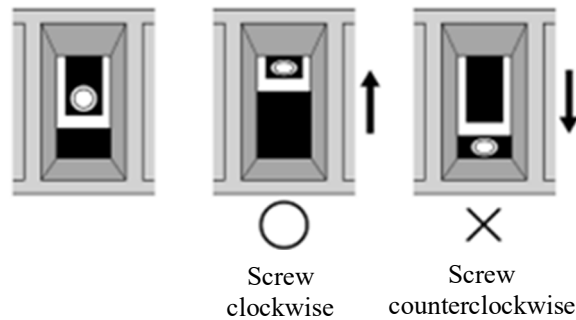
(Tightening torque : 0.22 ~ 0.25N·m(2.3kgf·cm ~ 2.5kgf·cm)



※ Notice

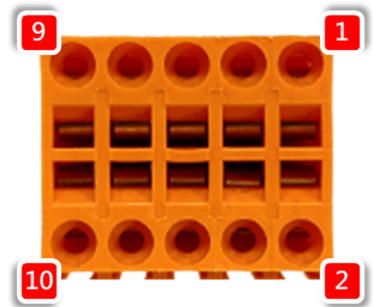
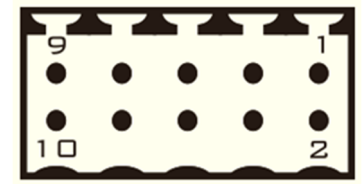
Take care the following items and be careful not to damage the wires.

- Carefully strip the wire insulation, do not damage the wire.
- Be careful not to twist the stripped wire and be exposed to avoid short circuit.
- Connect the wires directly without soldering. Otherwise, the wire may be broken due to vibration.
- Do not put any extra force or pressure to the wires.
- Due to the structure of the terminal, if the fixed wire is turned counterclockwise, it will cause poor contact. Please check the terminal slot, and rewire.



2.2 CN2(Encoder IN)

Pin	Signal Name	Pin	Signal Name
1	A+	2	A-
3	B+	4	B-
5	Z+	6	Z-
7	+5V	8	0V
9	NC	10	FG



※Carefully wire the polarity of the encoder power

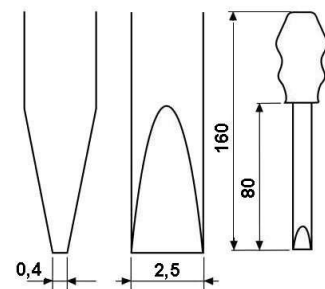
Suitable wire size : AWG28 ~ AWG18 (multi-strand wire)

The terminal is a push-in connection.

Use a special tool to screw the terminal

When screwing the terminals, please use a flathead screwdriver with a blade width of 0.4×2.5.

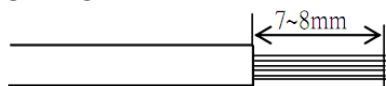
Example : Flathead screwdrivers from Phoenix Contact
(Product number : 1205037, model SZS 0.4×2.5)



Screwdriver size

Wiring :

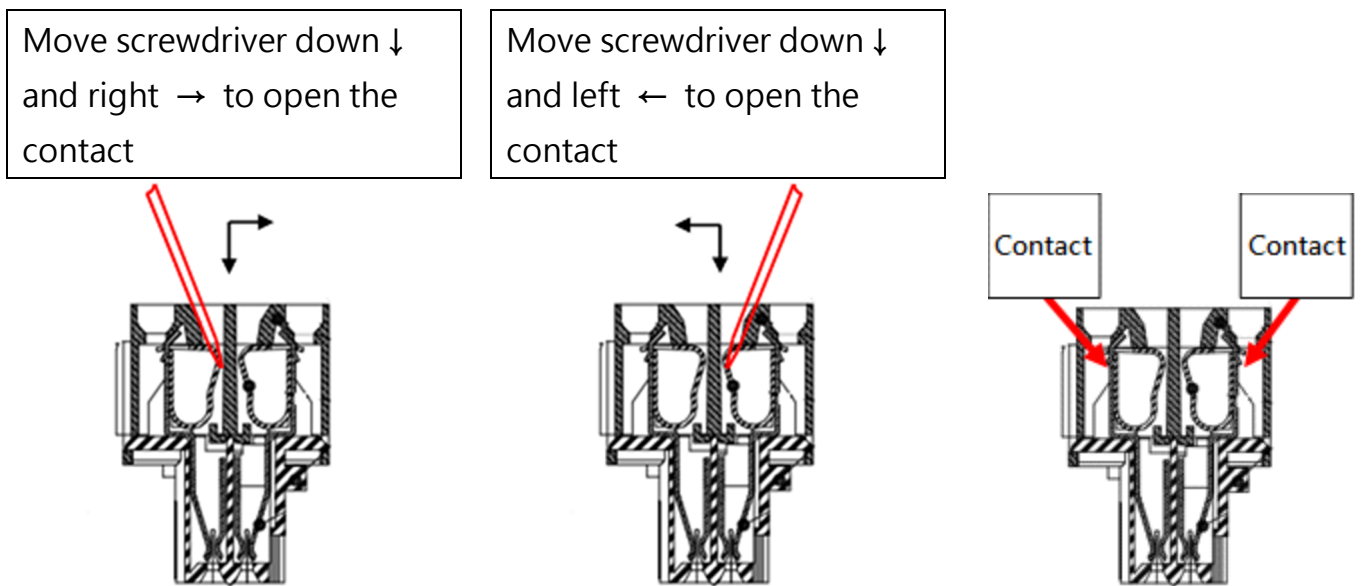
① Stripping length : 7 ~ 8mm



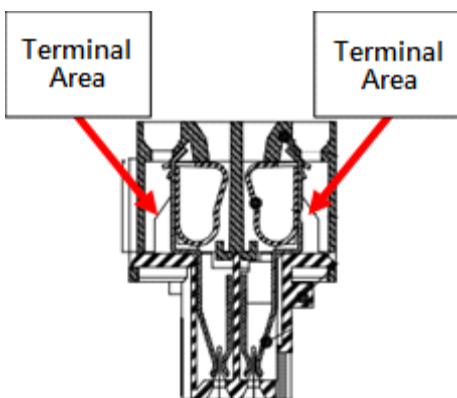
No soldering.
(It may cause abnormal connection)

The terminal is a push-in connection.

② Open the contact with a standard flathead screwdriver.



③ Insert the stripped end of each wire into the wiring area and then remove the flathead screwdriver. Wires are connected automatically.



※Notice

Take care the following items and be careful not to damage the wires.

- Carefully strip the wire insulation, do not damage it.
- Be careful not to twist the stripped wire and be exposed to avoid short circuit.
- Connect the wires directly without soldering. Otherwise, the wire may be broken due to vibration.
- Do not put any extra force or pressure on the wires.
- Must use the screwdriver of the specified size and type, or damaging the terminal spring.

2.3 CN3(I/O)



Pin	Signal Name	Color of wires	Description
1	+COM (24V)	Brown/Black	Power Input (24VDC)
2	NC	Red/Black	No Connect
3	NC	Orange/Black	No Connect
4	NC	Yellow/Black	No Connect
5	IN1	Green/Black	Single-ended Signal Input, 18 ~ 24V available, Maximum Input Frequency 1KHz, Configurable.
6	IN2	Blue/Black	
7	IN3	Purple/Black	
8	IN4	Gray/Black	
9	IN5	White/Black	
10	OUT1	White/Red	Single-ended Signal Output, Common Cathode Configuration, Maximum Output Current 50mA, Withstand Voltage 30 VDC, Configurable (Default : Alarm Output).
11	OUT2	L. Blue/Black	Single-ended Signal Output, Common Cathode Configuration, Maximum Output Current 50mA, Withstand Voltage 30 VDC, Configurable (Default : None).
12	OUT3	L. Green/Black	Single-ended Signal Output, Common Cathode Configuration, Maximum Output Current 50mA, Withstand Voltage 30 VDC, Configurable (Default : None).
13	OUT4	Pink	Single-ended Signal Output, Common Cathode Configuration, Maximum Output Current 50mA, Withstand Voltage 30 VDC, Configurable as 101 : Alarm Output with Brake.
14	IN7+	Brown	Differential Signal Input, 5 ~ 24V available, Maximum

15	IN7-	Red	Input Frequency 500KHz, Configurable. ※In Pulse Control Mode used for Pulse Signal CW / Pulse
16	IN6+	Orange	Differential Signal Input, 5 ~ 24V available, Maximum Input Frequency 500KHz, Configurable. ※In Pulse Control Mode used for Direction Signal CCW / DIR
17	IN6-	Yellow	
18	Encoder A+	Green	Encoder Output A+
19	Encoder A-	Blue	Encoder Output A-
20	Encoder B+	Purple	Encoder Output B+
21	Encoder B-	Gray	Encoder Output B-
22	Encoder Z+	White	Encoder Output Z+
23	Encoder Z-	Black	Encoder Output Z-
24	FG	L. Blue	GND
25	-COM (0V)	L. Green	Output Common Terminal (Common Cathode, 0V)

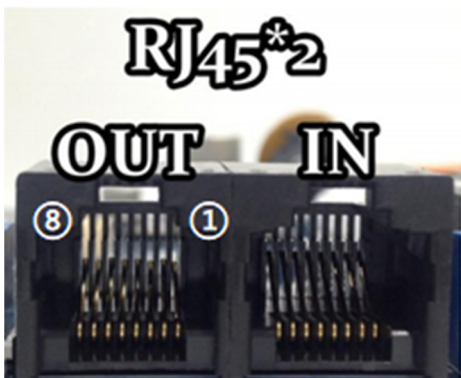
Notice : Pin 18~23 signals are differential output, not used optoelectronic isolator.

2.4 CN4(IN) / CN5 (OUT) (RS485)

Pin	Signal Name	Pin	Signal Name
1	NC	2	GND
3	A Input (RS485)	4	NC
5	NC	6	B Input (RS485)
7	For Terminal Resistor (CN5)	8	For Terminal Resistor (CN5)

Standard : RJ45 ×2

Front view of the socket

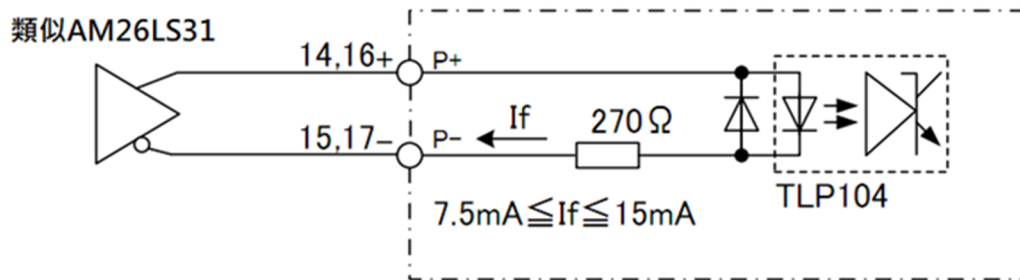


Notice :

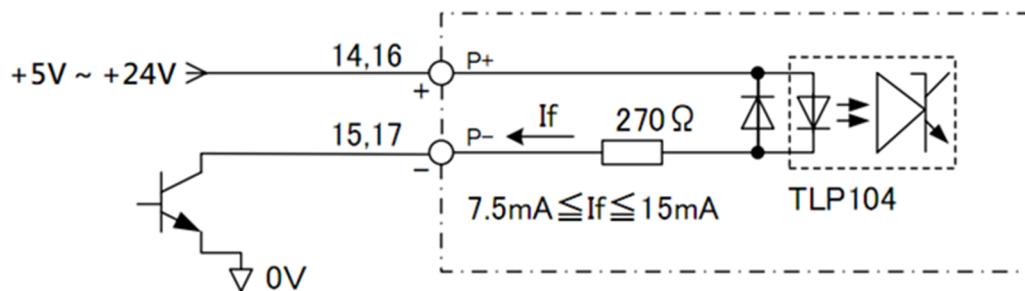
1. When connecting several drivers, please enable the terminal resistor on last driver by making short circuit between Pin3 & Pin8 and Pin6 & Pin7.
Note : Terminal resistor can't be wired on CN4.
2. The socket is not common ethernet port, RJ45 to RS-485 to USB communication cable is in need.

3. Input Circuit Diagram

3.1 Command Pulse Input Circuit (Differential Drive)



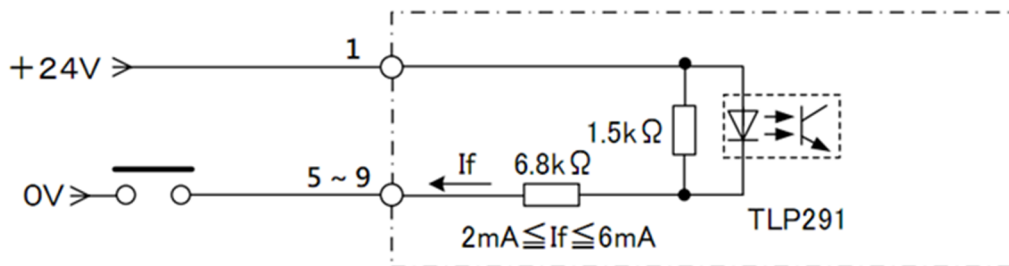
3.2 Command Pulse Input Circuit (Open Collector)



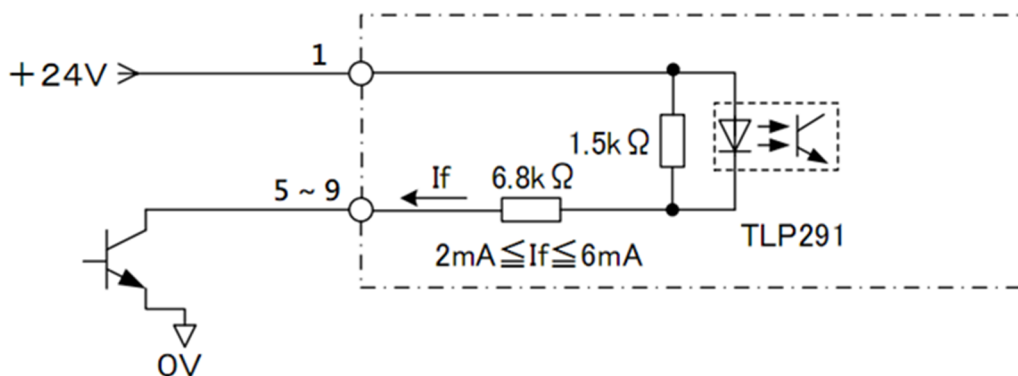
Note :

CM20 is compatible both with +5V & +24V signal, so resistor in series is not in need.

3.3 Sensor, Digital Input Circuit (Contact)

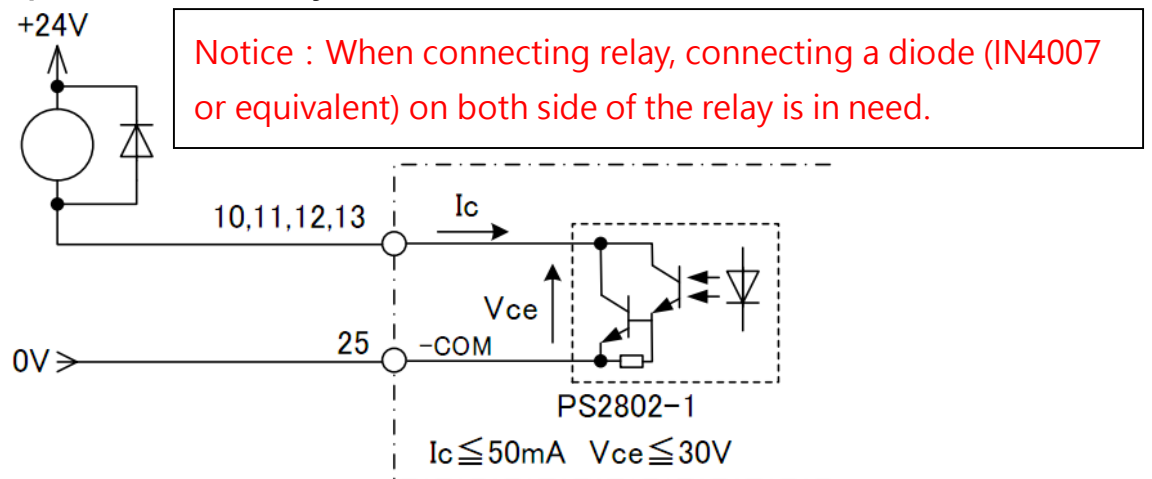


3.4 Sensor, Digital Input Circuit (Open Collector)

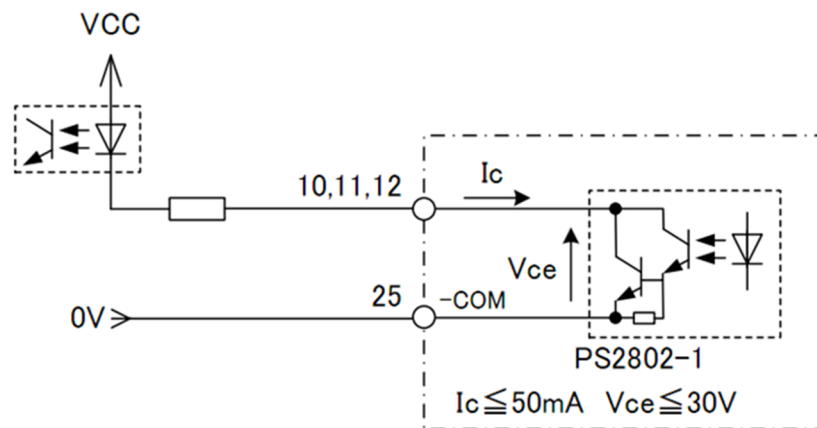


4. Output Circuit Diagram

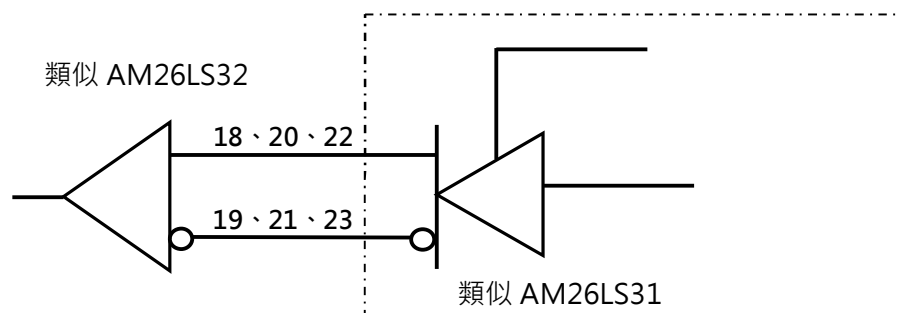
4.1 Digital Output Circuit (Relay Connection)



4.2 Digital Output Circuit (Optical Coupler Connection)



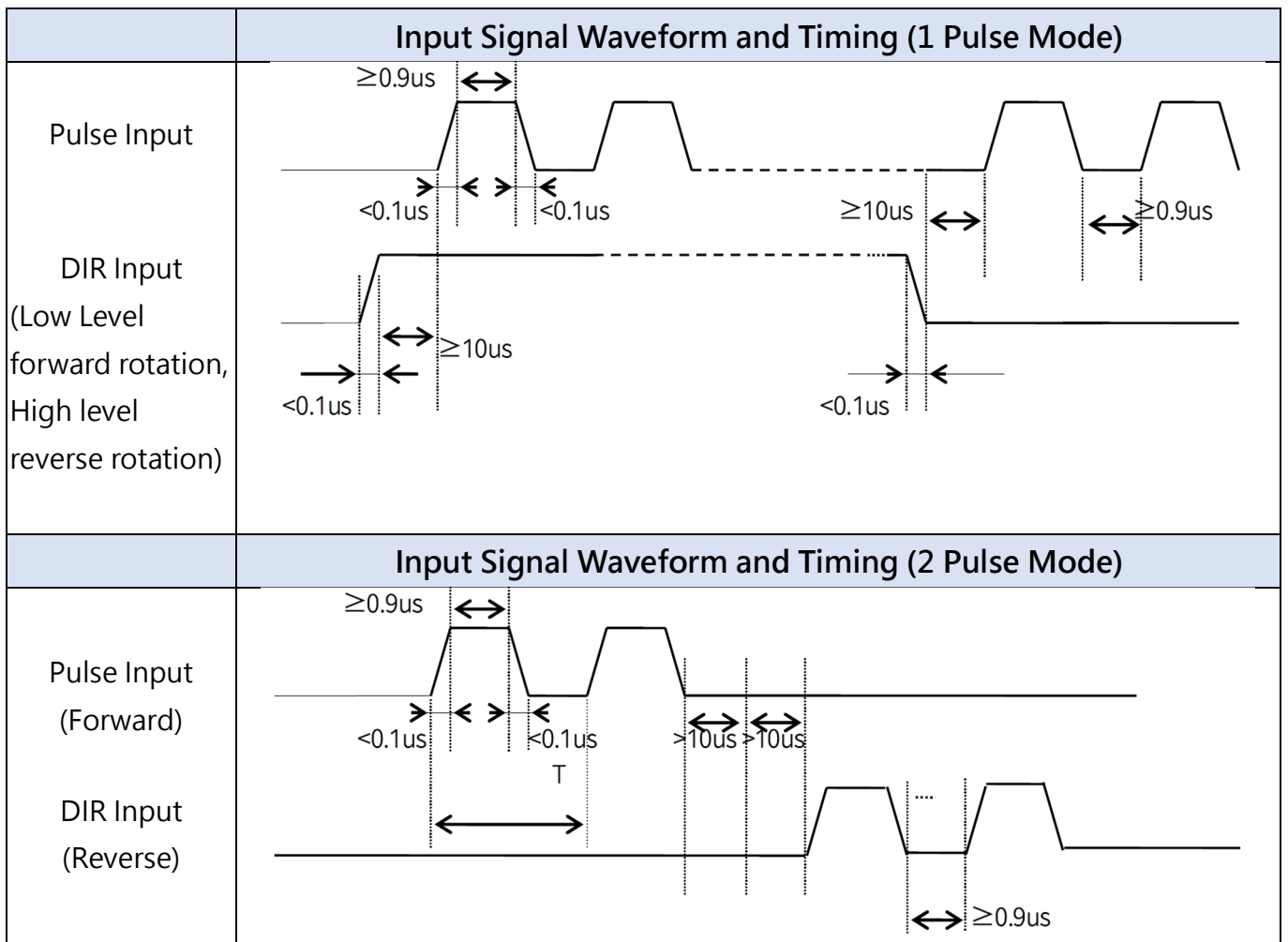
4.3 Differential Output Circuit (Encoder Output)



Caution

There is no opto-coupler isolation for encoder output. Before power on, please check whether the wiring is correct and there is short circuit. So as to avoid any damaging the upper computer and driver by introducing the 24V power supply on the CN3 port.

5. Pulse/Direction Input Sequence Diagram



6. Indicator Light

6.1 Status

To indicate the status of driver, the LED may flick (Low level for 0.5 second, High level for 0.5 second). The flickering sequence is ended by high level for 2 seconds and repeats.

Status	Green Indicator	Communication code	Description
Stopping	Flickering	2	The motor is enabled but not rotating.
Running	Steady light	3	The driver is working.
Disable	Flickering	1	The motor is disabled and in a free state.

6.2 Alarm

To indicate the status of driver, the LED may flick (Low level for 0.5 second, High level for 0.5 second). The flickering sequence is ended by high level for 2 seconds and repeats.

Alarm	Green Indicator	Communication code	説明
Overcurrent	Flashing once	10	Over current or driver failure
Phase loss	Flashing twice	11	Motor wiring is abnormal
Overvoltage	Flashing 3 times	14	Power input is greater than 60V
Undervoltage	Flashing 4 times	13	Power input is less than 18V
Position error	Flashing 5 times	25 or 26	25 : Position deviation is larger than set value. 26 : Overload, 150% motor current had been output continuously more than 2s
Other	Other	Other	

7. Control Parameter

7.1 Basic Status of Controller (Class 00)

Adr.(D)	word	Parameter	Description	Range/Unit										
0100	1	Motor current	Real-time motor current value	0.001 A										
0101	1	Input voltage	Current input voltage	0.01 V										
0104	2	Micro-step resolution	Micro-step resolution set value	ppr										
0106	1	Pulse mode	1 : pulse + direction mode 2 : is double pulse mode	1 ~ 2										
0108	1	Alarm code	Code of alarm, display "0" for no fault	-										
0109	1	Status	Drive running status.	-										
0110	1	Hardware version	Drive hardware version	-										
0111	1	Software version	Drive software version	-										
0117	2	Position	Target position	pulse										
0119	1	Actual speed	-	0.01rps										
0126	2	Actual Position	Real-time position	pulse										
0135	1	Input Status	<table border="1"> <tr> <td>data</td> <td>Bit6</td> <td>.....</td> <td>Bit1</td> <td>Bit0</td> </tr> <tr> <td>port</td> <td>IN7</td> <td>.....</td> <td>IN2</td> <td>IN1</td> </tr> </table>	data	Bit6	Bit1	Bit0	port	IN7	IN2	IN1	
data	Bit6	Bit1	Bit0										
port	IN7	IN2	IN1										
0136	1	Output Status	<table border="1"> <tr> <td>data</td> <td>Bit3</td> <td>Bit2</td> <td>Bit1</td> <td>Bit0</td> </tr> <tr> <td>port</td> <td>OUT4</td> <td>OUT3</td> <td>OUT2</td> <td>OUT1</td> </tr> </table>	data	Bit3	Bit2	Bit1	Bit0	port	OUT4	OUT3	OUT2	OUT1	
data	Bit3	Bit2	Bit1	Bit0										
port	OUT4	OUT3	OUT2	OUT1										
0174	1	Program section selection via I/O	-	-										
0176	1	Program error No.	-	-										
0178	1	Program No.	-	-										

Note: Parameters in Ch7.1 can only be read.

7.2. Basic Parameter (Class 01)

Adr.(D)	word	Parameter	Description	Range/Unit
0201	1	Motor direction	To determine motor rotating direction and encoder direction : Bit1=0, encoder direction is the same. Bit1=1, encoder direction changes. Bit0=0, rotating direction is the same Bit0=1, rotating direction changes. Default : 2 *Configured setting will be available after driver reboot.	0 ~ 3
0202	1	+ / - Pulse rising edge	To specify the activated edge of pulse Signal : 0 : Falling edge 1 : Rising edge Default : 0 *Configured setting will be available after driver reboot.	0 ~ 1
0213	1	Current reduction ratio	To specify the current applied when the motor is stopped. Default : 50 (Available in Open-loop mode)	10% ~ 100%
0224	1	Micro-step filter	The smaller the value, the smoother the motor motion, but the higher the delay.	0 ~ 700
0234	1	Digital filter	Filter coefficient of input pulse. The larger the value, the lower the input frequency response. *Configured setting will be available after driver reboot.	1 ~ 15
0241	1	Motor current (mA)	To set the motor current value.	100 ~ 4500 0.1A ~ 4.5A

0242	2	Micro-step resolution	the pulses per motor revolution	200 ~ 102400 ppr
0244	1	Pulse mode	1 : Pulse / Dir. 2 : CW / CCW.	1 ~ 2
0245	1	Time of current reduction	To specify the delay time after the motor stopped and then the current reduction starts. (Available in Open-loop mode)	1 ~ 30000 ms
0296	1	Control method	0 : External pulse 1 : Internal pulse 4 : Analog speed adjustment Default : 1 *Configured setting will be available after driver reboot.	0 ~ 4
0298	1	Device ID	Default : 1	1 ~ 250
0299	2	Baud rate	Default : 19200	4800~115200

7.3 Closed-Loop Parameter (Class 03)

Adr.(D)	word	Parameter	Description	Range/Unit
0217	1	Motor control	0 : Open-loop control 1 : Closed-loop control 2 : Positioning compensation Default : 1 *Configured setting will be available after driver reboot.	0 ~ 2
0246	1	Encoder resolution	Resolution = number of encoder wires x 4 *Configured setting will be available after driver reboot.	200 ~ 65535
0247	2	In-position range	In-position signal outputs when the motor is approaching target position	1 ~ 1000 Encoder resolution
0251	1	Velocity loop Kp	Velocity loop Kp	0 ~ 30000
0252	1	Velocity loop Ki	Velocity loop Ki	0 ~ 30000
0255	1	Position loop Kp	Position loop Kp	0 ~ 30000

0258	1	Position error	The unit is based on encoder resolution	1 ~ 30000 Encoder resolution
------	---	----------------	---	---------------------------------

7.4 Control Parameters (Class 04)

Adr.(D)	word	Parameter	Description	Range/Unit
0301	1	Starting speed	Only valid under internal pulse control. Default : 100	1~1000 0.01~10 rps
0302	1	Stopping speed	Only valid under internal pulse control. Default : 100	1~1000 0.01~10 rps
0303	1	Acceleration	Only valid under internal pulse control. Default : 50	5~10000 rps ²
0304	1	Deceleration	Only valid under internal pulse control. Default : 50	5~10000 rps ²
0305	1	ORG mode	To Specify the method when homing 0 : CW homing ; 1 : CCW homing ; 2 : Forward limit ; 3 : Reverse limit ; 8 : Forward to Z phase ; 9 : Reverse to Z phase ; 12 : CW homing + Z phase ; 15 : CCW homing + Z phase ; 16 : Forward limit + Z phase ; 17 : Reverse limit + Z phase ; Others : Invalid Default : 1	0 ~ 17
0306	1	Speed in position mode	Only valid under internal pulse control. Default : 1000	1 ~ 5000 0.01 ~ 50 rps
0307	1	Speed in speed mode	In speed mode, the motion direction is the same with the speed direction. Only valid under internal pulse control.	-5000 ~ 5000 -50 ~ 50 rps
0308	1	JOG speed	Only valid under internal pulse control.	1 ~ 5000 0.01 ~ 50 rps

0309	1	ORG speed	Only valid under internal pulse control.	1 ~ 5000 0.01 ~ 50 rps
0310	1	ORG slow speed	Moving speed after reached Home. Only valid under internal pulse control.	1 ~ 5000 0.01 ~ 50 rps
0311	2	ORG offset pulse	The origin signal offset is used as the new origin. Only valid under internal pulse control. Default : 0	- 2000000000~ 2000000000 pulse
0313	2	Moving pulse	Moving mode : Absolute : Move to specified target position Relative : Move to specified offset position based on current position Default : 0	- 2000000000~ 2000000000 pulse
0317	2	Positive software limit	Default : 100000 *It is invalid during homing	- 2000000000~ 2000000000 pulse
0319	2	Negative software limit	Default : -2000 *It is invalid during homing	- 2000000000~ 2000000000 pulse
0321	2	Set current position	Default : 0	- 2000000000~ 2000000000 pulse
0323	1	Control commands	0 : Null 1 : Perform an absolute move to specified position. The moving direction is defined by specifying + or - for moving amount, not by specifying + or - for moving speed. The target position can be changed even when the motor is in motion. 2 : Perform a relative move with a specified distance. The moving direction	0 ~ 18

			<p>is defined by specifying + or - for moving amount, not by specifying + or - for moving speed. The moving amount cannot be changed when the motor is in motion.</p> <p>3 : Speed mode 4 : JOG + 5 : JOG - 6 : Deceleration Stop 7 : Emergency Stop 8 : Set current position. Setting is only available when the motor stopped. 12 : Back to ORG 13 : Reset alarm 14 : Verify the multi-section program 15 : Save the multi-section program 16 : Start the multi-section program 17 : Pause the multi-section program 18 : End the multi-section program Default : 0</p>							
0324	1	Software limit enable	<table border="1"> <thead> <tr> <th>Byte</th> <th>Bit1</th> <th>Bit0</th> </tr> </thead> <tbody> <tr> <td>Function</td> <td>-limit</td> <td>+limit</td> </tr> </tbody> </table> <p>1 : Enable · 0 : Disable Default : 0 *Configured setting will be available after driver reboot.</p>	Byte	Bit1	Bit0	Function	-limit	+limit	0 ~ 3
Byte	Bit1	Bit0								
Function	-limit	+limit								
0325	1	EMG stop deceleration	<p>Emergency stop deceleration, is only valid under the internal pulse control. Default : 1000</p>	5 ~ 10000 rps ²						

7.5 Input Pin Assignments (Class 05)

Adr.(D)	word	Parameter	Description	Range/Unit
0400	1	IN1 function selection	0 : Invalid 1 : Absolute position : The moving direction is defined by specifying + or - for moving amount, not by specifying + or - for moving speed. The target position can be changed even when the motor is in motion. 2 : Relative position : The moving direction is defined by specifying + or - for moving amount, not by specifying + or - for moving speed. The moving amount cannot be changed when the motor is in motion. 3 : Speed mode 4 : JOG + 5 : JOG - 6 : Deceleration stops 7 : Emergency stops 8 : Set the current position, which can only be set when the motor is stopped 9 : Positive limit signal 10 : Negative limit signal 11 : ORG signal 12 : Back to ORG 13 : Reset alarm 14 : Reserve 15 : Reserve 16 : Multi-section position starts 17 : Multiple-section position pauses 18 : End of multiple-section position 19 : Reserve	0 ~ 29

			20 : Servo ON/OFF 21 : Inching + 22 : Inching - 23 : Reserve 24 : Reserve 25 : Assign Bit 1 to I/O ports for selecting multi-section position 26 : Assign Bit 1 to I/O ports for selecting multi-section position 27 : Assign Bit 2 to I/O ports for selecting multi-section position 28 : Assign Bit 3 to I/O ports for selecting multi-section position 29 : Assign Bit 4 to I/O ports for selecting multi-section position Default : 13	
0401	1	IN2 function selection	The same function list with IN1 Default : 25	0 ~ 29
0402	1	IN3 function selection	The same function list with IN1 Default : 16	0 ~ 29
0403	1	IN4 function selection	The same function list with IN1 Default : 6	0 ~ 29
0404	1	IN5 function selection	The same function list with IN1 Default : 11	0 ~ 29
0405	1	IN6 function selection	The same function list with IN1 Default : 21 (Unavailable in external pulse mode)	0 ~ 29
0406	1	IN7 function selection	The same function with IN1 Default : 20 (Unavailable in external pulse mode)	0 ~ 29

7.6 Output Pin Assignments (Class 06)

Adr.(D)	word	Parameter	Description	Range/Unit										
0420	1	OUT1 function selection	100 : General Output. 101 : Alarm output : The signal is output when there's no alarm. It won't be output when an alarm occurred. 102 : In-position signal 103 : Servo OFFT. The signal is output when Servo OFF. 104 : Moving. The signal is output when the motor runs. Default : 102	100 ~ 104										
0421	1	OUT2 function selection	The same function with OUT1 Default : 101	100 ~ 104										
0422	1	OUT3 function selection	The same function with OUT1 Default : 104	100 ~ 104										
0423	1	OUT4 function selection	The same function with OUT1 Default : 100	100 ~ 104										
0430	1	Digital output logic	Corresponding output logic <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Byte</th> <th>Bit3</th> <th>Bit2</th> <th>Bit1</th> <th>Bit0</th> </tr> </thead> <tbody> <tr> <td>Output</td> <td>OUT4</td> <td>OUT3</td> <td>OUT2</td> <td>OUT1</td> </tr> </tbody> </table>	Byte	Bit3	Bit2	Bit1	Bit0	Output	OUT4	OUT3	OUT2	OUT1	-
Byte	Bit3	Bit2	Bit1	Bit0										
Output	OUT4	OUT3	OUT2	OUT1										

7.7 Multi-section position mode

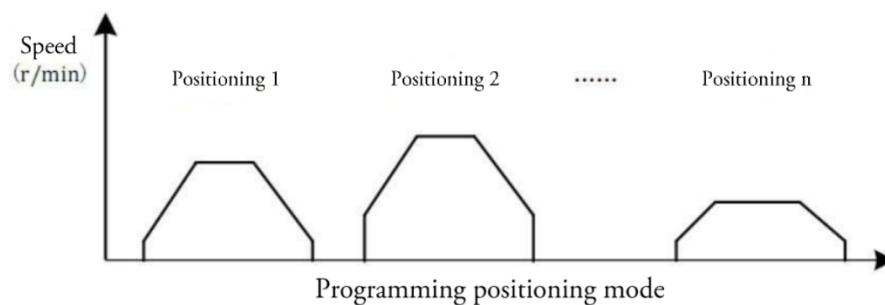
Address for Multi-section position : 1024~1536. Up to 256 data can be set.

Adr.(D)	word	Parameter	Description	Range/Unit
1	2	Absolute position	Parameter 1 : Target position Default : 0	-2147483647 ~ 2147483647 Pulse
2	2	Relative position	Parameter 1 : Moving distance Default : 0	-2147483647 ~ 2147483647

				Pulse
3	3	Moving at constant speed	Parameter 1 : Moving speed Default : 0	-5000 ~ 5000 -50 ~ 50 rps
6	0	Decelerated stop	-	-
8	2	Position setting	Parameter 1 : Set position Default : 0	-2000000000 ~ 2000000000 Pulse
12	1	Homing	Parameter 1 : Homing method Default : 1 Please refer to Ch 7.4 Parameter 305	0 ~ 17
51	1	Start speed	Default : 100	1 ~ 1000 0.01 ~ 10 rps
54	1	Position setting speed	Default : 1000	1~5000 0.01 ~ 50 rps
61	1	Acceleration	Default : 50	5 ~ 10000 rps ²
62	1	Deceleration	Default : 50	5 ~ 10000 rps ²

65	2	Awaiting the jump	<p>Parameter 3 (high 8 bits)</p> <p>Parameter 2 (low 8 bits)</p> <p>Parameter 1 (low 16 bits)</p> <p>Parameter 1 : Awaiting until the next command started to be executed. If the setting value is 0, then the device will keep awaiting until an I/O signal enabled.</p> <p>Parameter 2 : Waiting for the status to meet the running line number.</p> <p>Parameter 3 : I/O matching status</p> <table border="1"> <tr> <th>bit7</th> <th>bit6</th> <th>bit5</th> <th>bit4</th> </tr> <tr> <td>Matching status</td> <td colspan="3">Specify the input port for matching (1~7)</td> </tr> <tr> <th>bit3</th> <th>bit2</th> <th>bit1</th> <th>bit0</th> </tr> <tr> <td>Matching status</td> <td colspan="3">Specify the input port for matching (1~7)</td> </tr> </table>	bit7	bit6	bit5	bit4	Matching status	Specify the input port for matching (1~7)			bit3	bit2	bit1	bit0	Matching status	Specify the input port for matching (1~7)			-
bit7	bit6	bit5	bit4																	
Matching status	Specify the input port for matching (1~7)																			
bit3	bit2	bit1	bit0																	
Matching status	Specify the input port for matching (1~7)																			
66	2	Jump to	<p>Parameter 1 (high 16 bits)</p> <p>Parameter 2 (low 16 bits)</p> <p>Parameter 1 : Loop counts</p> <p>Parameter 2 : Jump target address</p>	-																
68	1	Common output	Parameter 1 : Output status	-																
100	0	End of the section	Adding the end code at the end of each section.	-																

The multi-section position mode is to combine multiple position sections in order, and trigger the movement through the I/O. The user can save the parameters of several position sections such as acceleration and deceleration, pulse, etc. in EEPROM in advance, and only need to trigger I/O to start the motion.



7.7.1 Port Configurations for Multi-section position

Bit4	Bit3	Bit2	Bit1	Bit0	Section
0	0	0	0	0	1
0	0	0	0	1	2
0	0	0	1	0	3
0	0	0	1	1	4
⋮	⋮	⋮	⋮	⋮	⋮
1	1	1	0	1	30
1	1	1	1	0	31
1	1	1	1	1	32

7.7.2 I/O Selection Corresponding to Multi-section Selection

- 25~29 can be used for determining a certain section : By assigning Bit0~ Bit4 to I/O ports.
By assigning 15 to input ports : for starting the multi-section.
- Port selection corresponding to multi-section

Example :

IN1 port function configure as #25 · Bit0

IN3 port function configure as #26 · Bit1

Users can configure the function of IN1 ~ IN7 by their requirement

IN3 Bit1	IN1 Bit0	Section
0	0	1
0	1	2
1	0	3
1	1	4

Note :

- “1” in the table means “Activated signal”
- The signal of section selected should be triggered and completed at least 20ms before the start signal.

7.7.3 Example : Writing, Verification and Saving of Multi-section Mode

Note : Expressed in hexadecimal

1 · Multi-section Parameters Setting

Command 1 · Current line #0 : Set constant moving speed 1000 · i.e. 10rps

<u>01</u>	<u>10</u>	<u>04 00</u>	<u>00 02</u>	<u>04</u>	<u>00 36</u>	<u>03 E8</u>	<u>21 DF</u>
①	②	③	④	⑤	⑥	⑦	⑧

- ① Slave address 0x01 ;
- ② MODBUS function : writing multiple registers 0x10 (16 in decimal) ;
- ③ Registers starting address 0x400 (1024 in decimal) ;
- ④ 2 data ;
- ⑤ 4 bytes ;
- ⑥ Data 1 · Constant moving speed command 0x0036 (54 in decimal) ;
- ⑦ Data 2 · Constant moving speed value 0x03E8 (1000 in decimal) ;
- ⑧ CRC ;

Command 2 · Current line #1 : Set relative positioning with 10000 pulses

<u>01</u>	<u>10</u>	<u>04 02</u>	<u>00 03</u>	<u>06</u>	<u>00 02</u>	<u>27 10 00 00</u>	<u>20 CB</u>
①	②	③	④	⑤	⑥	⑦	⑧

- ① Slave address 0x1 ;
- ② MODBUS writing multiple registers command 0x10 (16 in decimal) ;
- ③ Registers starting address 0x402 (1026 in decimal) ;
- ④ 3 data ;
- ⑤ 6 bytes ;
- ⑥ Data 1 · Relative positioning command 0x0002 (2 in decimal) ;
- ⑦ Data 2 · Moving pulse value 0x2710 (10000 in decimal) ;
- ⑧ CRC ;

Command 3 · Current line #2 : Waiting for 1000ms ·

<u>01</u>	<u>10</u>	<u>04 05</u>	<u>00 03</u>	<u>06</u>	<u>00 41</u>	<u>03 E8 00 03</u>	<u>1F DE</u>
①	②	③	④	⑤	⑥	⑦	⑧

- ① Slave address 0x01 ;
- ② MODBUS writing multiple registers command 0x10 (16 in decimal) ;
- ③ Registers starting address 0x405 (1029 in decimal) ;
- ④ 3 data ;
- ⑤ 6 bytes ;
- ⑥ Data 1 · Relative positioning command 0x0041 (65 in decimal) ;
- ⑦ Data 2 · Convert data 03 E8 00 03 to

<u>00</u>	<u>03</u>	<u>03 E8</u>
A	B	C

Note : 4 byte data. The lower 16 bits are in front, and the higher 16 bits are in the back.
 Parameter A : Default value is 0, do not change the setting.
 Parameter B : Waiting for jumping to line #3, current line is #2.
 Parameter C : Waiting time value 0x03E8(1000 ms in decimal) ;

- ⑧ CRC ;

Command 4 · Current line #3 : Relative positioning loop for 10 times ·

<u>01</u>	<u>10</u>	<u>04 08</u>	<u>00 03</u>	<u>06</u>	<u>00 42</u>	<u>00 01 00 0A</u>	<u>DB 92</u>
①	②	③	④	⑤	⑥	⑦	⑧

- ① Slave address 0x01 ;
- ② MODBUS writing multiple registers command 0x10 (16 in decimal) ;
- ③ Registers starting address 0x408 (1032 in decimal) ;
- ④ 3 data ;
- ⑤ 6 bytes ;
- ⑥ Data 1 · Relative positioning command 0x0042 (66 in decimal) ;
- ⑦ Data 2 · Convert data 00 01 00 0A to

<u>00 0A</u>	<u>00 01</u>
A	B

Note : 4 byte data. The lower 16 bits are in front, and the higher 16 bits are in the back.
 Parameter A : Times of jumping 0x0A (10 in decimal) ;
 Parameter B : Jump to line #1 and repeat the relative positioning ;

- ⑧ CRC ;

Command 5 · Current line #4 : End of the motion section ·

<u>01</u>	<u>06</u>	<u>04 0B</u>	<u>00 64</u>	<u>F8 D3</u>
①	②	③	④	⑤

- ① Slave address 0x01 ;
- ② MODBUS writing single register command 0x06 (6 in decimal) ;
- ③ Registers starting address 0x40B (1035 in decimal) ;
- ④ End of the data 0x0064 (100 in decimal) ;
- ⑤ CRC ;

2 · Multi-section Parameters Verification

<u>01</u>	<u>06</u>	<u>01 43</u>	<u>00 0E</u>	<u>F8 26</u>
①	②	③	④	⑤

- ① Slave address 0x01 ;
- ② MODBUS writing single register command 0x06 (6 in decimal) ;
- ③ Registers starting address 0x0143 (323 in decimal) ;
- ④ Data: Check multi-section data 0x0E (14 in decimal) ;
- ⑤ CRC ;

3 · Multi-section Parameters Saving

Note : Check the data CRC before saving, or the data may not be saved correctly.

<u>01</u>	<u>06</u>	<u>01 43</u>	<u>00 0F</u>	<u>39 E6</u>
①	②	③	④	⑤

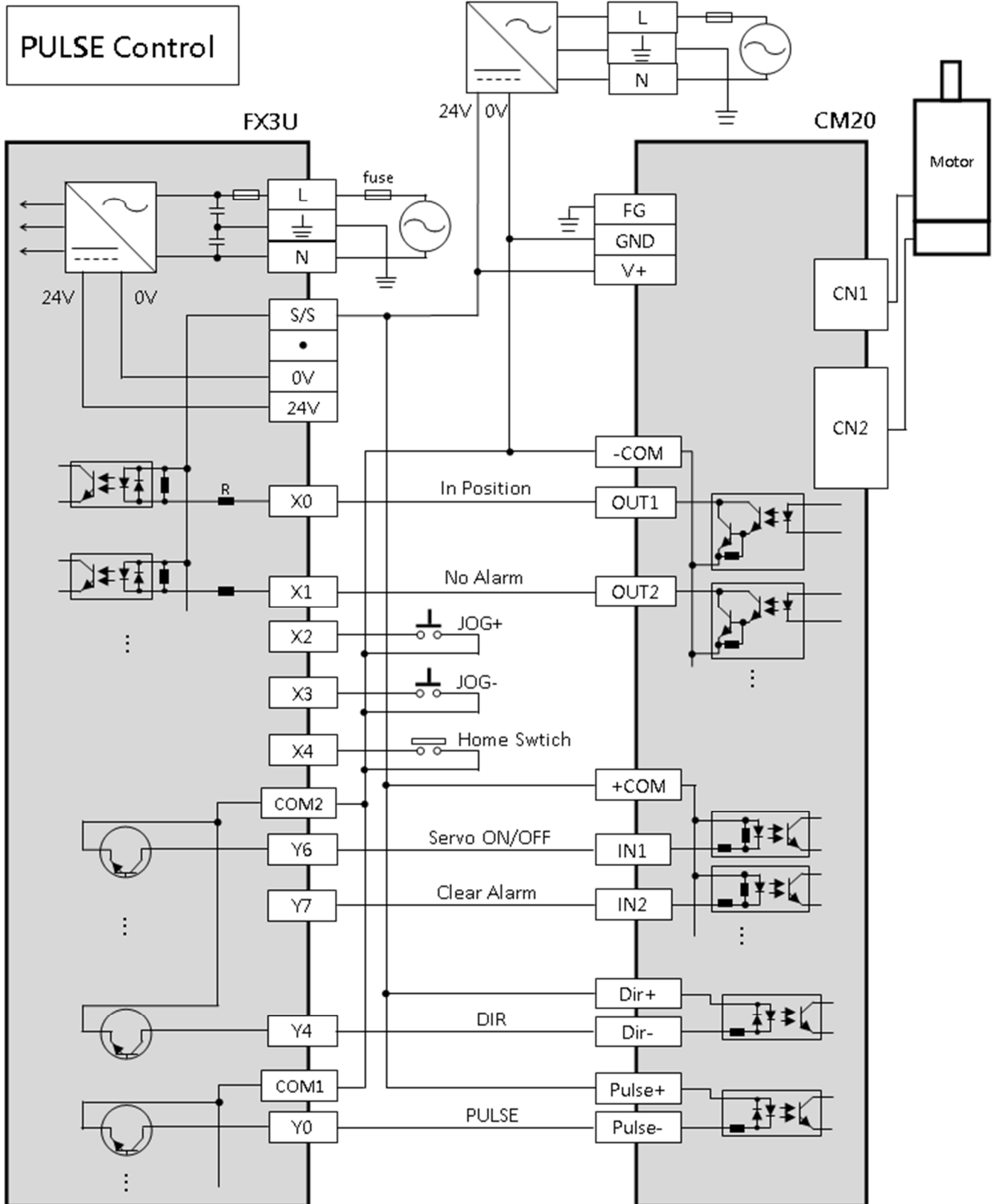
- ① Slave address 0x01 ;
- ② MODBUS writing single register command 0x06 (6 in decimal) ;
- ③ Registers starting address 0x0143 (323 in decimal) ;
- ④ Data: Check multi-section data 0x0F (15 in decimal) ;
- ⑤ CRC ;

8. Appendix

8.1 PLC Wiring (In Mitsubishi PLC)

8.1.1 Pulse Control

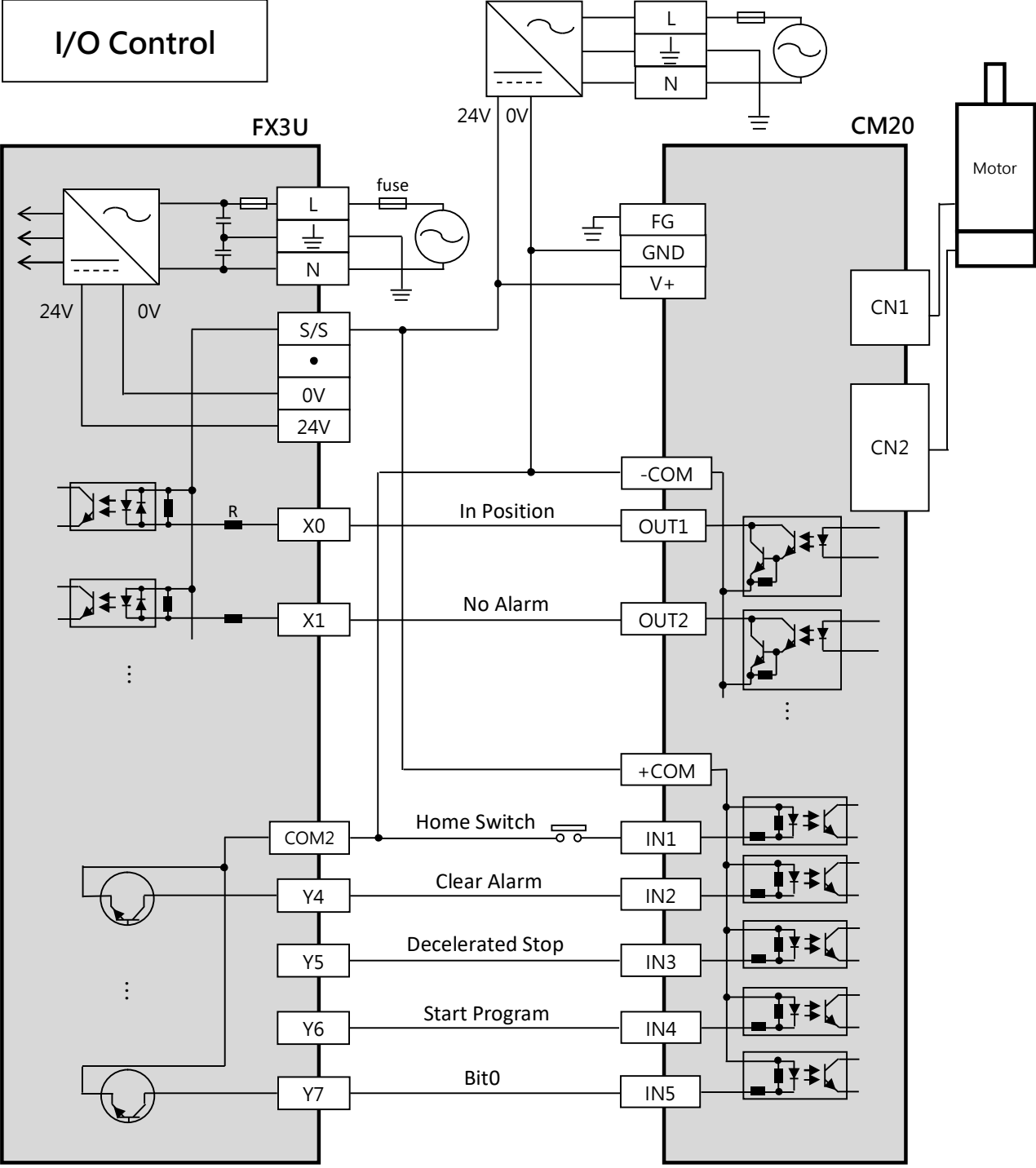
※The driver must first configure relevant parameters and I/O.



8.1.2 I/O Control

※The driver must first configure relevant parameters and I/O.

I/O Control



8.2 PLC Communication with CM20 by Modbus (In FX5U for JOG)

