1. Overview


Ver. E NEW

Description

The EV(E02) Series is a 3-phase BLDC motor drive with electromagnetic brake control and torque limit function. The EV series come with different modes including standard model for hall-sensor equipped BLDC motor speed control and incremental encoder supported model for position control. The drive can be controlled by I/O or communication through RS-485. The operation mode and several settings can be set through communication (RS-232 or RS-485). The drive is protected against over-voltage, under-voltage, over-current, over-heating and feedback signal fault.

Features

- ■ Electromagnetic Brake Control Output
- ■ Four Quadrant Regenerative Operation
- ■ Programmable I/O Function and Operation Parameters
- ■ Multi-Drive Communication Protocol
- ■ Incremental Encoder Interface (Encoder Model only)
- ■ Programmable Protect Functions (Overload, Over-voltage, Over-speed…)
- ■ RS-485 Communication
- ■ Torque Limit Function

MODES OF OPERATION

- Speed Control Mode
- Duty Control Mode
- Position Control Mode

COMMAND SOURCE

- External Analog (0 ~ 5 or 0 ~ 10 VDC)
- External Potentiometer (20 kΩ)
- Internal Potentiometer (VR)
- Digital Indexing
- RS-485/RS-232 Communication

I/O (Function Programmable)

- 4 Digital Inputs (X1 ~ X4)
- 1 High Speed Digital Input (X5)
- 2 Digital Outputs (Y1 ~ Y2)
- 1 High Speed Digital Output (YH)
- 2 Analog Inputs (A1, A2)
- 2 High Current Outputs (OUT1, OUT2)

Application

- ■ Automatic Vehicles (AGV)
- ■ General Industry and Automation

Product Line

Model	Voltage	Output Power	Max. Peak Output Current	Continuous Output Current	Function	Support Motor Part No.
EVDR-K045CQ	12 VDC	200 W	45 A	22.5 A	Standard Model (hall)	EVM5K150◇☐ EVM5K200◇☐
EVDR-K045CQE EVER-K045CQE	24 VDC	350 W			Encoder Model	EVM5K350◇☐
EVDR-N045CQ	48 VDC	750 W			Standard Model (hall)	EVM5N350◇☐ EVM5N500◇☐
EVDR-N045CQE EVER-N045CQE					Encoder Model	EVM5N750◇☐

Product Version

Ver	Mark	Description
D.00	D.00	Support RS-485 Multi-Drive Lite control protocol (Hall model). Digital on voltage decreased from 2.5VDC to 1.6VDC.
D.02	D.02	All modification from D.00. Internal bus capacitance decreased from 7500uF to 4500uF.
E.00	E.00	Improve the connector vibration resistance and to simplify the cable wiring. The Encoder model can turn off Overflow protection. Set the EBRAKE input ON, the external electromagnetic brake is locked after the motor stops. (MBRAKE Output=OFF).
F.01	F.01	Release the EMI CISPR22 Class B compatible model.

Product Number Code

EVDR - K 045 C Q E

① ② ③ ④ ⑤

①	Series	**EVDR** : **EV** Series (E02) **EVER**: **EV** Series (E02) CISPR22 Class B compatible model.
②	Power Supply Voltage	**K** : 24VDC / 12VDC **N** : 48VDC
③	Max. Output Current	**045** : 45A
④	Reserved	**-**
⑤	Feedback Model	**Blank** : Standard (hall) **E** : Incremental Encoder Supported Model

2. Specifications

Model			EVDR-K045CQ EVDR-K045CQ**E**		EVDR-N045CQ EVDR-N045CQ**E**
Item			**Value**		
Rated Output Power		W	350	200	750
Power Source	DC Supply Rated Voltage	VDC	24	12	48
	Permissible Voltage Range	-	± 15%		
	DC BUS Over Voltage Limit *1	VDC	38		62
	DC BUS Under Voltage Limit *1	VDC	18	8	30
Max. Peak Output Current *2		A	45		
Rated Continuous Output Current (rms)		A	22.5		
Low Voltage Supply Output (Control Power) *3		-	+5VDC (For I/O only)		
Internal Bus Capacitance		uF	7500 4500 D.02		4000 3000 D.02

*1. DC BUS over voltage and under voltage protect can be set between the limit range.
*2. Hardware protection limit.
*3. Only for the drive I/O.
NOTE The power specification is by the drive its self.

Control Specifications

Model		EVDR-K045CQ EVDR-N045CQ	EVDR-K045CQ**E** EVDR-N045CQ**E**
Item		**Value**	
Feedback Supported	-	Halls	Incremental encoder
Mode of Operation	-	Speed, Duty	Speed, Duty, Position

Common Specifications

Mode of Operation	**Speed / Duty**	**Position**
Item	**Value**	
Digital Inputs	Photocoupler input. Input resistance 6.2kΩ Operated by internal power supply: 5VDC (On voltage <= 0.5 VDC) Connectible external power supply: (use internal 5VDC when supply voltage is 12VDC). EVDR-K045CQ☐ : 24VDC ± 15% 50mA min. (ON voltage < 2VDC) EVDR-N045CQ☐ : 30 ~ 53VDC 50mA min. (ON voltage < 2VDC) SINK / SOURCE input: Supplied through external wiring. Only SINK input can be applied when high speed digital input is in use.	
	Programmable digital input functions for X1 ~ X4 [ ]: Default [START/STOP(FWD)]、[CCW/CW(REV)]、[FREE]、STOP-MODE、EBRAKE/ALM-RST、[ALM-RST]、M0、M1、M2、EBRAKE、STOP、EXT-ERROR	
High Speed Digital Inputs	Photocoupler input. Input resistance 6.2kΩ Operated by internal power supply: 5VDC (On voltage <= 0.5 VDC) Connectible external power supply:	

	EVDR-K045CQ☐ | 24VDC ± 15% 50mA min. (ON voltage < 2VDC) EVDR-N045CQ☐ | 30 ~ 53VDC 50mA min. (ON voltage < 2VDC) SINK only. Pulse input frequency control: 100 ~ 2kHz ; Pulse input PWM control: 100 ~ 500Hz, 1 ~ 99% duty	
	Programmable digital input functions for X5(XH) [ ]: Default [PULSE-INPUT] 、START/STOP(FWD) 、CCW/CW(REV) 、FREE 、STOP-MODE 、EBRAKE/ALM-RST 、ALM-RST 、M0 、M1 、M2 、EBRAKE 、STOP 、EXT-ERROR	Programmable digital input functions for X5(XH) [ ]: Default [NC] 、START/STOP(FWD) 、CCW/CW(REV) 、FREE 、STOP-MODE 、EBRAKE/ALM-RST 、ALM-RST 、M0 、M1 、M2 、EBRAKE 、STOP 、EXT-ERROR
Digital Outputs	Open-Collector output External power supply: 5 ~ 60 VDC 80mA max. ON voltage: 2.5VDC max (1.6VDC max D.00) SINK / SOURCE output: Supplied through external wiring.	
	Programmable digital output functions for Y1, Y2 [ ]: Default SPD-OUT 、[ALM-OUT] 、[BUSY-OUT] 、VA-OUT 、EN-OUT 、ALM-PULSE 、BUSY-ALM-PULSE 、RUN-OUT 、DIR-OUT *1 、VA-OUT2 *1 、VA-EN-OUT *1	
High Speed Digital Outputs	Open-Collector output External power supply: 5 ~ 60 VDC 80mA max. ON voltage: 0.8VDC max. SINK only.	
	Programmable digital output functions for YH (SW2-6, SW2-7 setup required) [ ]: Default [SPD-OUT] 、ALM-OUT 、BUSY-OUT 、VA-OUT 、EN-OUT 、ALM-PULSE 、BUSY-ALM-PULSE 、RUN-OUT 、DIR-OUT *1 、VA-OUT2 *1 、VA-EN-OUT *1	
Analog Inputs	The input voltage range (0 ~ 5VDC or 0 ~ 10VDC), gain and off set of A1, A2 can be set by parameter.	
High Current Outputs	Internal Power: 24VDC 2A max.	Internal Power: 48VDC 2A max.
	Programmable digital input functions for OUT1, OUT2 [ ]: Default [MBRAKE] 、[NC]	
Brake Function	Regenerative brake。(battery supply power only)	
Protect Function	Over-voltage, Under-voltage, Over-current, Overload, Main circuit overheat, Motor overheat, Feedback sensor error, Over-speed, EERPOM error, Communication error	

*1. Extended function that only support product version C.2 or later version.

RS-485 Communication Specifications

Item	Value
Communication Protocol	Modbus protocol (Modbus RTU or Modbus ASCII set by switch)
Electrical Characteristics	EIA-485. For use of Twisted-pair wire.
Transmit/Receive Method	Half-duplex communication.
Baud Rate	9600 bps 、19200 bps 、38400 bps 、57600 bps 、115200 bps
Physical Layer (default)	UART can be set by switch(Data: 8-bit 、Stop-Bit: 1-bit 、Parity: None)
Number of Connection Units	14 units max.

Speed Control Mode Specifications

Model	EVDR-K045CQ EVDR-N045CQ	EVDR-K045CQ**E** EVDR-N045CQ**E**
Item	**Value**	
Speed Control Range *1	85 ~ 3500 r/min	10 ~ 3500 r/min
Speed Regulation *2	± 0.5 %	± 0.2 %
Speed Setting Method	Select one of the following methods: [ ]: default • Analog: [External analog input A1] or internal analog VR. *3 • 8 digital indexing: Operation data No. 0 ~ 7 select by M0, M1, M2. • Pulse input frequency (50 ~ 2kHz) • Pulse input PWM (50 ~ 500Hz, 1 ~ 99% duty)	

Acceleration/Deceleration Time Setting Method	Select one of the following methods: [ ]: default • Analog: External analog input A2 or internal analog VR. • [8 digital indexing: Operation data No. 0 ~ 7 select by M0, M1, M2.]
Acceleration/Deceleration Time	0.1 ~ 10 s (3000 r/min, no load)

*1. Other speed control range can be customized.
*2. Operation condition：0 ~ rated torque, rated voltage, 25℃.
*3. The default speed setting method before product version C.2 is internal analog VR.

Position Control Mode Specifications

Item	Value
Traveling Amount Setting Range	-327,680,000 ~ +327,670,000 step
Resolution	Max. 5000 pulse per rev.
Speed Setting Range	2 ~ 3500 r/min
Operating Mode	Incremental or absolute
Position Command Source	Communication RS485 Multi-Drive
Speed Setting Method	8 digital indexing: Operation data No. 0 ~ 7 select by M0, M1, M2.
Acceleration/Deceleration Time Setting Method	8 digital indexing: Operation data No. 0 ~ 7 select by M0, M1, M2.
Acceleration/Deceleration Time	0.1 ~ 10 s (3000 r/min, no load)

Torque Limiting Function

Item	Value
Torque Limit Setting Method	Select one of the following methods: [ ]: default • Analog: External analog input A2 or internal analog VR. • [8 digital indexing: Operation data No. 0 ~ 7 select by M0, M1, M2.]
Torque Limit Setting Range	0 ~ 200% Assuming that the rated torque of the motor is 100%) default: 200%

* The torque limiting value may cause an error up to maximum of approximately ±20% between the setting value and the generated torque due to the setting speed, power supply voltage and motor cable extension length.

General Specifications

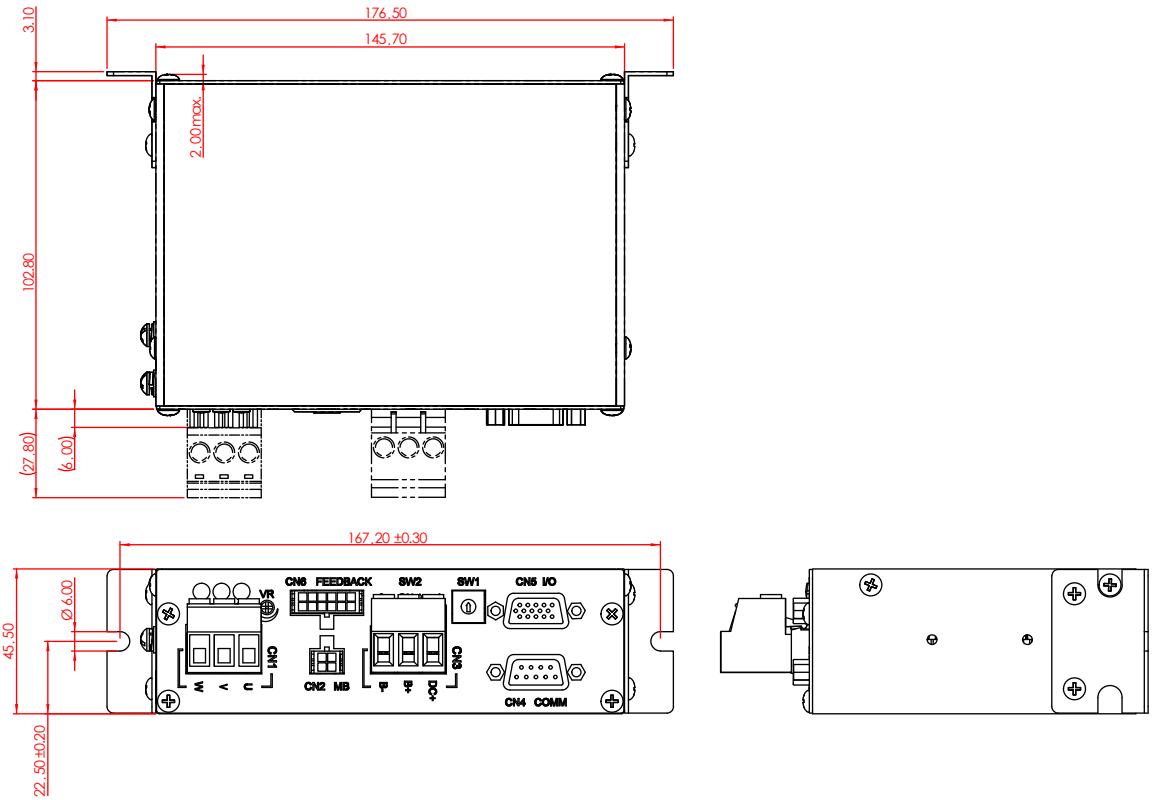
Item		Value
Operating Environment	Ambient Temperature	0℃ ~ +40℃ (*External cooling is required when the environment temperature is higher than 40℃)
	Ambient Humidity	< 85 % RH (non-condensing)

3. Mounting Dimension (Unit: mm)

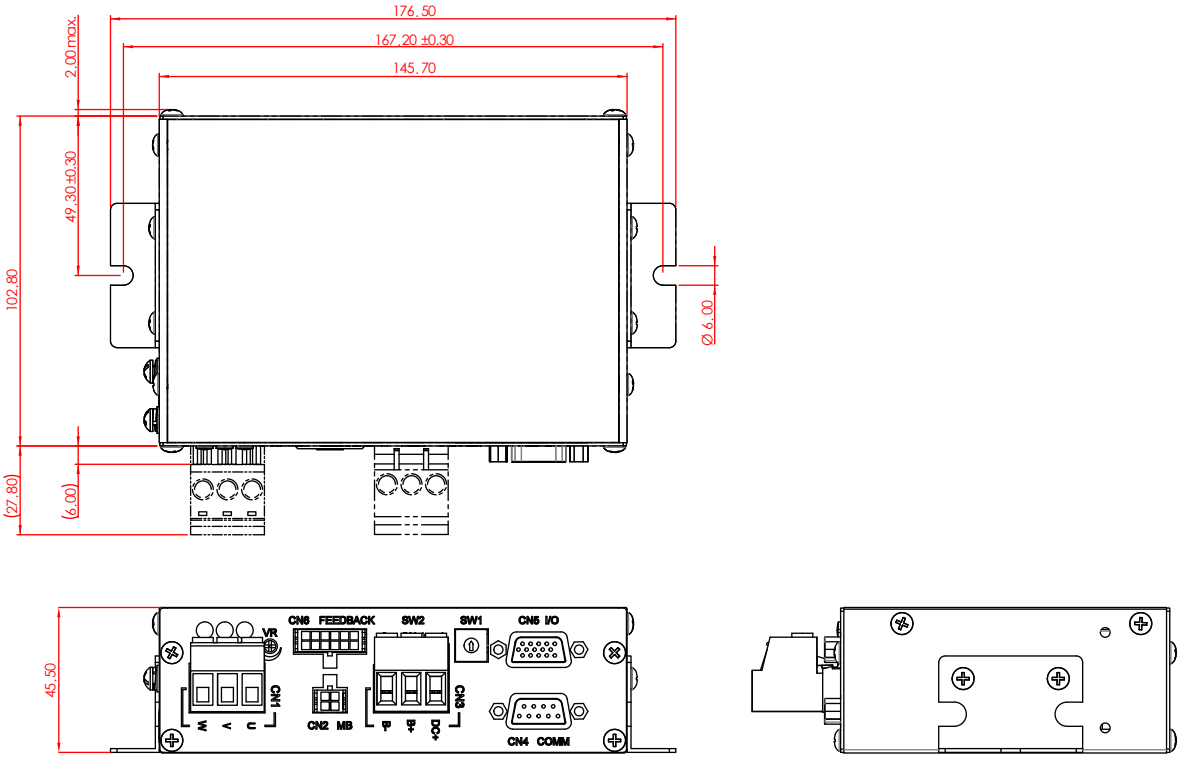
The EV series drive can be installed as “horizontal” or “vertical” by mounting the flank in different way.

Please refer to the difference description of E.00 in p.19

- Vertical Installation

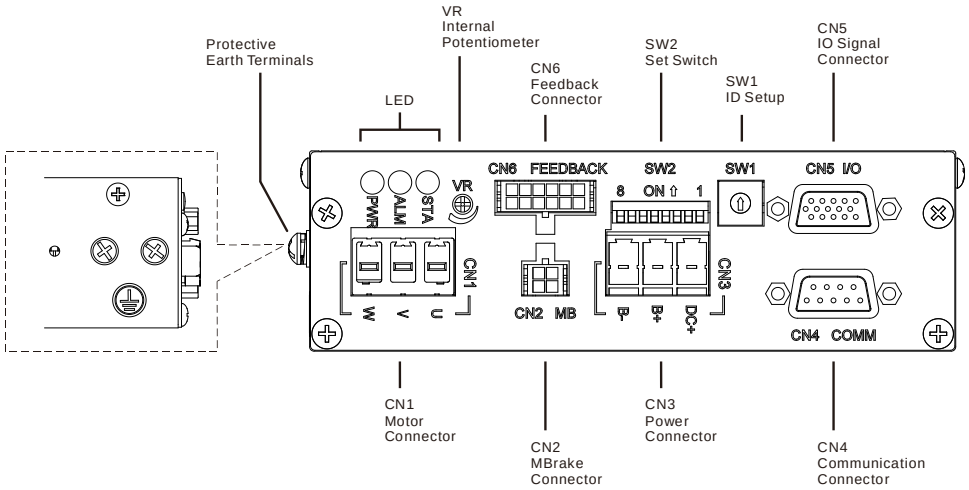


- Horizontal Installation



4. Interface

Please refer to the difference description of E.00 in p.20



SW1 RS-485 Slave ID Setup

SW1	RS-485 Salve ID
0	Broadcast
1	1
2	2
3	3

SW1	RS-485 Salve ID
4	4
5	5
6	6
7	7

SW1	RS-485 Salve ID
8	8
9	9
A	10
B	11

SW1	RS-485 Salve ID
C	12
D	13
E	14
F	15

SW2 IO and Communication Set Switch

No.	Function	Description
SW2-1 SW2-2 SW2-3	RS-485 Communication Baud-rate	RS-485 baud-rate list SW2-3 / SW2-2 / SW2-1 / RS-485 Baud-rate (bps) OFF / OFF / OFF / 9600 OFF / OFF / ON / 19200 OFF / ON / OFF / 38400 OFF / ON / ON / 57600 ON / OFF / OFF / 115200
SW2-4	RS-485 Termination Resistor (120Ω)	ON : Termination resistor enabled. OFF : Termination resistor disabled.
SW2-5	Protocol	ON : Modbus ASCII OFF : Modbus RTU
SW2-6 SW2-7	YH Output Function	YH output function list SW2-7 / SW2-6 / YH Function OFF / ON / Hall SPD-OUT (Standard Model only) ON / OFF / ENC-A Output (Encoder Model only)
SW2-8	Digital Input Power Setting	ON : Operating by Built-in 5V. (SINK) OFF : Operating by external power supply

VR Internal Potentiometer

The function of VR can be set by parameter. The default function is speed setting.

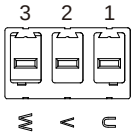
Function	CW	CCW
Operation data setting [Speed setting]	Set value increase [Speed increase]	Set value decrease [Speed decrease]

LED

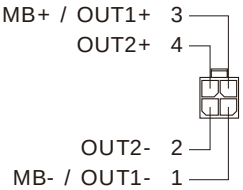
Name	Function	Description
STA	RS-485 Communication	ON: Communication normal.

(Orange)	Status	Blink: Communication error (baud-rate, protocol or other problem). OFF: No signal (not connected).
ALM (Red)	Alarm LED	ON: Drive in WAIT status or the main power (B+) is not connected. Blink: Alarm occurs. The type of alarm can be confirmed by the blink count. OFF: Normal
PWR (Green)	Power LED	ON: DC main power supply is on. OFF: DC main power supply is off.

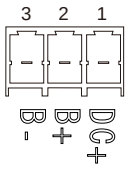
CN1 Motor Connector

Pin	Name	Description	I/O	Connector
1	U	Motor U	O	Connector Info.: 3-pin (female), 7.62mm pitch
2	V	Motor V	O	Mating Connector: 3-pin (male), 7.62mm pitch
3	W	Motor W	O	

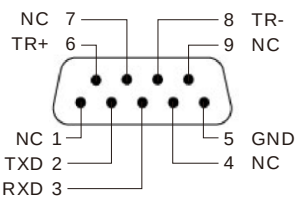
CN2 MBrake Connector

Pin	Name	Description	I/O	Connector
1	OUT1- (MB)-	High current Output 1- (Electromagnetic Brake-)	O	Connector Info.: 4-pin (male), 3.00mm pitch Mating Connector:4-pin (female), 3.00mm pitch [Optional]
2	OUT2-	High current Output 2-	O	
3	OUT1+ (MB+)	High current Output 1+ (Electromagnetic Brake+)	O	
4	OUT2+	High current Output 2+	O	

CN3 Power Connector

Pin	Name	Description	I/O	Connector
1	DC+	Control power supply input (Reference to B-)	I	Connector Info.: 3-pin (male), 7.62mm pitch Mating Connector: 3-pin (female), 7.62mm pitch
2	B+	Main power supply input (Reference to B-)	I	
3	B-	Power ground	PGND	

CN4 Communication Connector

Pin	Name	Description	I/O	Connector
1	N.C.	Reserved.	-	Connector Info.: 9-pin (female), D-sub
2	RS232_TXD	Drive RS232 RXD	O	Mating Connector: 9-pin (male), D-sub [Optional]
3	RS232_RXD	Drive RS232 TXD	I	
4	N.C.	Reserved.	-	
5	GND	Signal ground.	SGND	
6	RS485_TR+	RS-485 (+)	IO	
7	N.C.	Reserved.	-	
8	RS485_TR-	RS-485 (-)	IO	
9	N.C.	Reserved.	-	

NOTE It is recommended to use shielded twisted pair (STP) cable for noise problems.

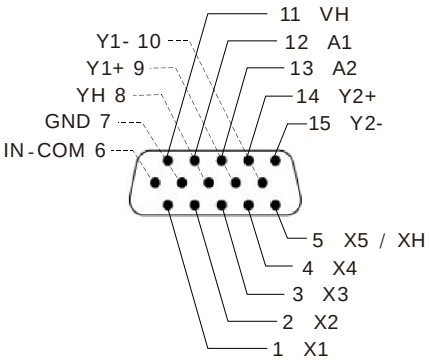
CN5 IO Signal Connector

Pin	Name	Description	I/O	Default Function
1	X1	Digital input	I	START/STOP (FWD)
2	X2		I	CCW/CW (REV)
3	X3		I	FREE
4	X4		I	ALM-RST
5	X5 (XH)	High speed digital input	I	M0
6	IN-COM	Digital input common	ICOM	-
7	GND	IO signal ground	SGND	-
8	YH	High speed digital output	O	SPD-OUT
9	Y1+	Digital output Y1	O	BUSY-OUT
10	Y1-		O	
11	VH	+5V control power (For analog input potentiometer use only)	SP	-
12	A1	Analog input A1	I	External analog speed setting. (speed control mode)
13	A2	Analog input A2	I	-
14	Y2+	Digital output Y2	O	ALM-OUT
15	Y2-		O	

Connector

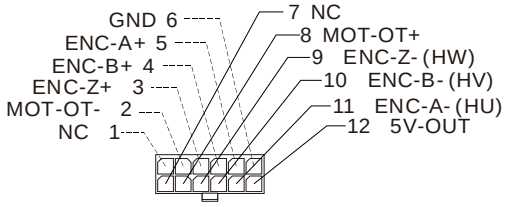
Connector Info.: 15-pin (female), high-density, D-sub

Mating Connector: 15-pin (male), high-density, D-sub [Optional]



NOTE It is recommended to use shielded twisted pair (STP) cable for noise problems.

CN6 Feedback Connector

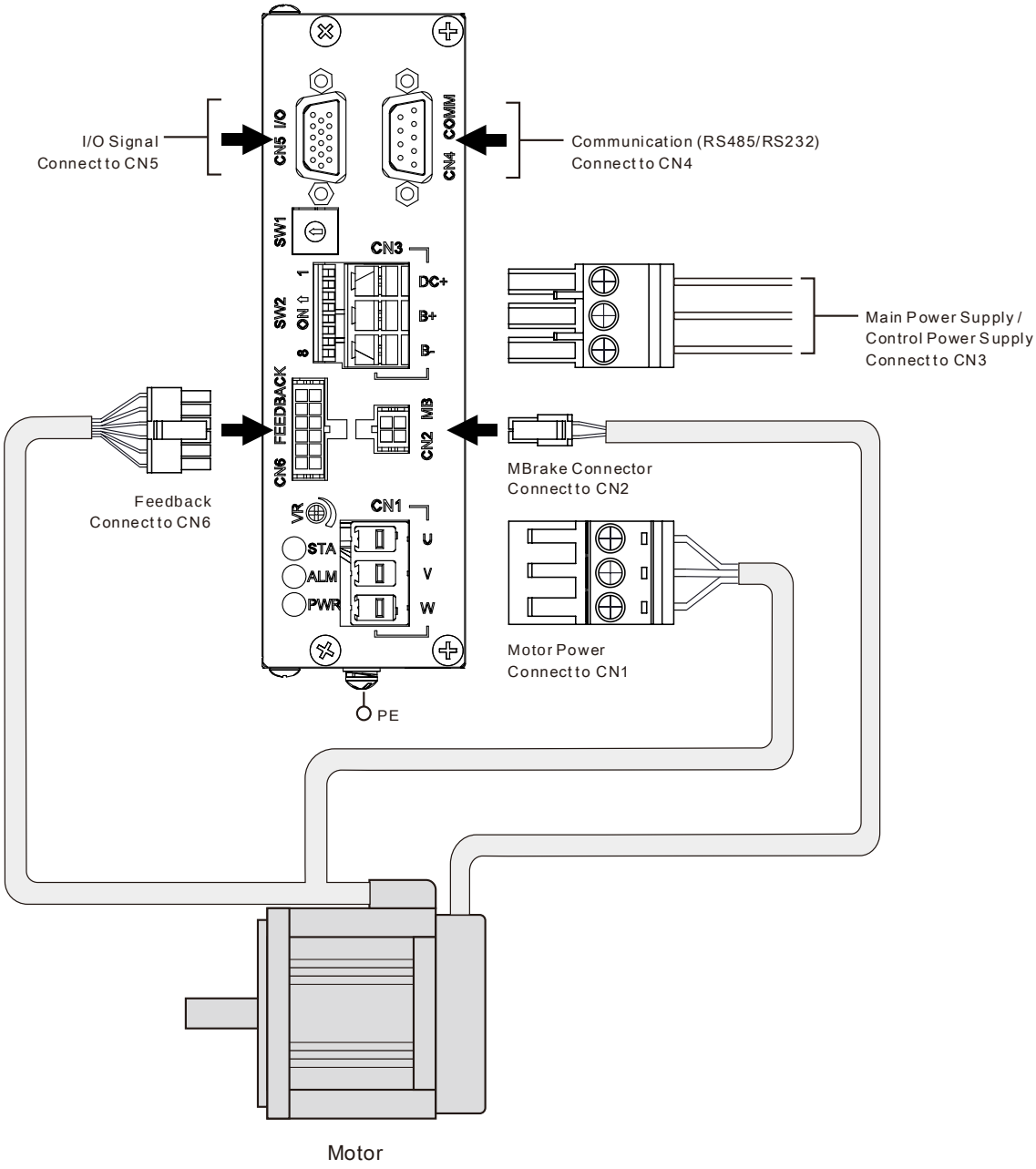
Pin	Name	Description	I/O	Connector
1	N.C.	Reserved.	-	Connector Info.: 12-pin (male), 3.00mm pitch Mating Connector: 12-pin (female), 3.00mm pitch [Optional]
2	MOT-OT-	Motor over temperature - (signal ground)	SGND	
3	ENC-Z+	Differential encoder index input Z+	I	
4	ENC-B+	Differential encoder channel B+	I	
5	ENA-A+	Differential encoder channel A+	I	
6	GND	Signal ground	SGND	
7	N.C.	Reserved.	-	
8	MOT-OT+	Motor over temperature +	I	
9	ENC-Z- / HW *1	Differential encoder index input Z- / Motor Hall W(S3)	I	
10	ENC-B- / HV *1	Differential encoder channel B- / Motor Hall V(S2)	I	
11	ENC-A- / HU *1	Differential encoder channel A- / Motor Hall U(S1)	I	
12	5V-OUT	+5V encoder/hall supply output	SP	

*1. Only EVDR-K045CQ, EVDR-N045CQ support Hall input.

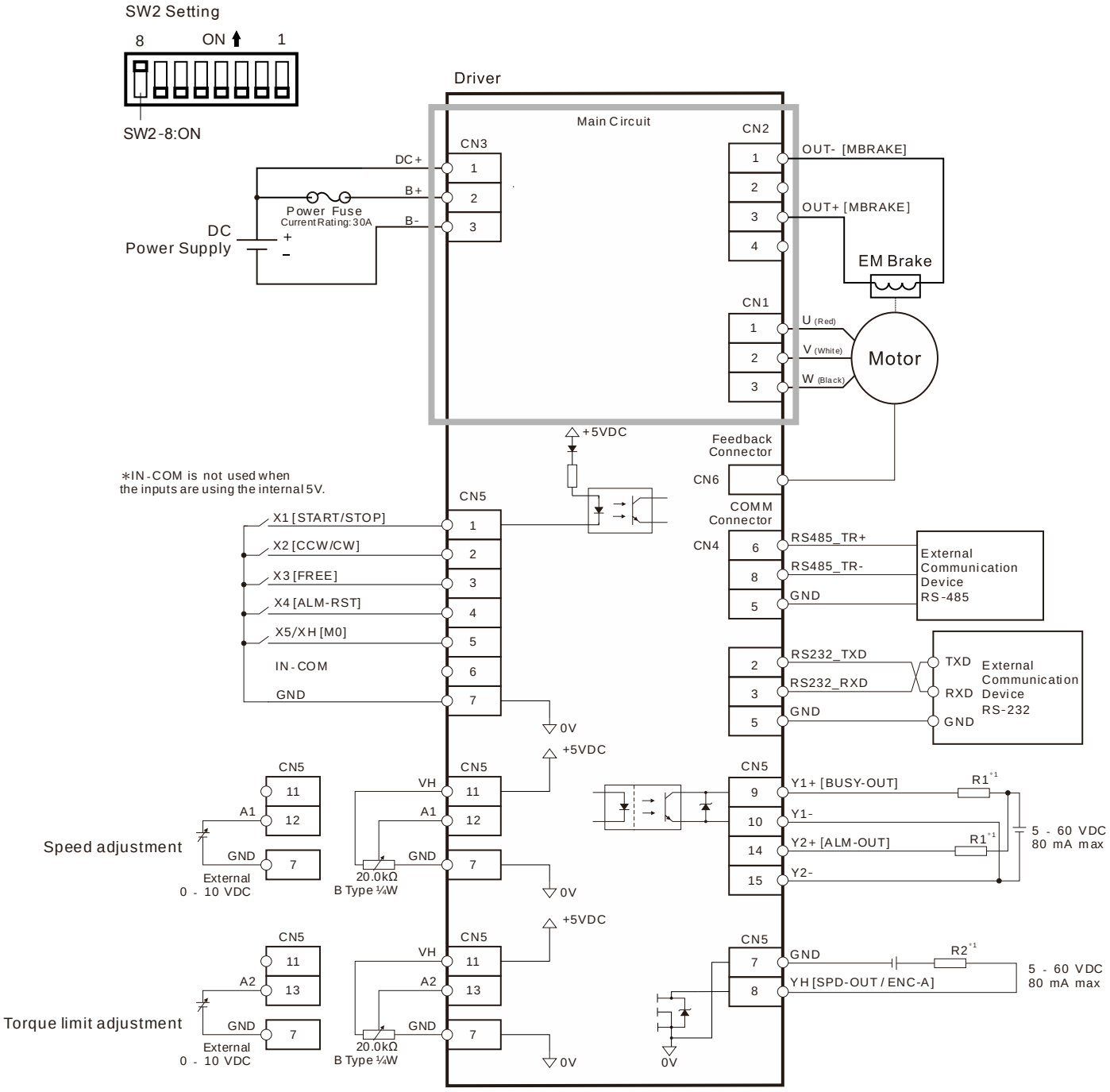
5. Connection Diagram

- Connection Example

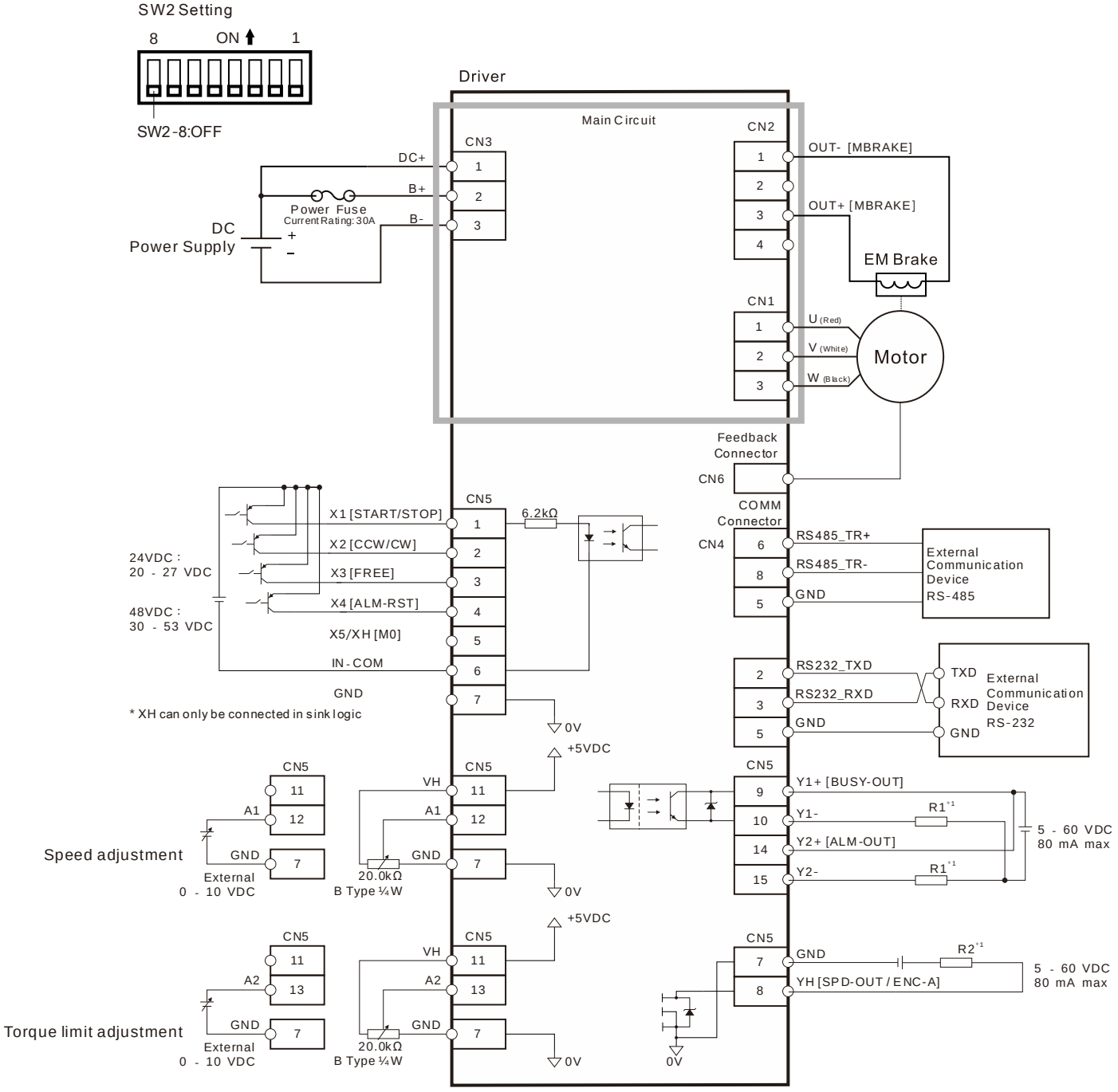
Please refer to the difference description of E.00 in p.22



- Sink logic. Digital input with built-in power (Low active)
  Please set the SW2-8 to ON.



- Source logic. Digital input with external power (Low active)
  Please set the SW2-8 to OFF.
  When using 12VDC supply please reference to Page 10, sink logic connection.



6. Functions

NOTE Reference to user manual for detailed information about position control mode and other extension functions.

Digital Input Functions

The activate logic level (ON status) of each digital input can be set to closed circuit or open circuit by parameter.

No.	Name	Description	Setting	
			ON	OFF
0	NC	Not used. Or Pulse input function of HX1.	-	-
1	START/STOP (SC Mode)	SC mode: The motor rotates in the direction set by CCW/CW input when the START/STOP input is ON. The motor stops when the START/STOP input is OFF. Select how the motor should stop by the STOP-MODE input. CC mode: The motor rotates in the CW direction when the FWD input is ON. The motor rotates in the CCW direction when the REV input is ON. If the FWD and REV inputs are turned ON simultaneously, the motor stops if the parameter 08-07 was set to 1. Select how the motor should stop by the STOP-MODE input.	Operation	Stop
	FWD (CC Mode)		CW Operation	Stop
2	CCW/CW (SC Mode)		Rotating Direction Set to CCW	Rotating Direction Set to CW
	REV (CC Mode)		CCW Operation	Stop
5	FREE	When FREE is activated the drive will cut off the power to the motor for the motor to coast to stop. The electromagnetic brake will release when FREE input is ON.	FREE activate (MBRAKE OFF)	FREE deactivate
6	STOP-MODE	Set how the motor stops: The motor stops instantaneously when STOP-MODE input is ON. The motor stops by the rate of deceleration time setting when STOP-MODE input is OFF.	Instantaneous Stop	Decelerate Stop
7	EBRAKE/ ALM-RST	The function of BRAKE/ALM-RST input is the same as EBRAKE input when the drive is in normal operation. When an alarm generates, the function of EBRAKE/ALM-RST input becomes the same as ALM-RST input.	-	-
8	ALM-RST	Resets the alarm: Turn the ALM-RST input OFF for more than 0.5 sec then turn it to ON for more than 0.5 sec then turn it OFF to reset the alarm. The alarm cannot be reset If the drive operation command is ON (etc. START/STOP input is ON).	-	-
10	M0	Operation data No. indexing select bit 0.	M0 ON	M0 OFF
11	M1	Operation data No. indexing select bit 1.	M1 ON	M1 OFF
12	M2	Operation data No. indexing select bit 2.	M2 ON	M2 OFF
13	EBRAKE	Emergency Brake: Set the EBRAKE input ON while the motor is running will make the motor stop instantaneously. When the EBRAKE input is ON, the motor operation is disabled. To start motor operation, please set the EBRAKE input OFF. E.00 Set the EBRAKE input ON, the external electromagnetic brake is locked after the motor stops. (MBRAKE Output=OFF).	Instantaneous Stop /Motor Operation Disabled	Motor Operation Normal
14	SERVO-ON	When SERVO-ON input is OFF, the drive cut off the power to the motor. The drive state become WAIT.	SERVO ON	WAIT / SERVO-OFF
17	STOP	When the STOP input is ON, the motor stops. Select how the motor should stop by the STOP-MODE input.	Stop	Motor Operation Normal
21	EXT-ERROR	When the EXT-ERROR input it ON, the External stop alarm activates.	External Stop Alarm Activates	External Stop Alarm Can Be Reset

Multi-Speed Setting (Digital Indexing)

Desired operation data No. can be selected by a combination of ON/OFF status of the M0, M1, M2 inputs.

Operation data including speed, ACC/DEC time and torque limit.

Operation data No.	M2	M1	M0
0	OFF	OFF	OFF
1	OFF	OFF	ON
2	OFF	ON	OFF
3	OFF	ON	ON
4	ON	OFF	OFF
5	ON	OFF	ON
6	ON	ON	OFF
7	ON	ON	ON

Digital Output Functions

The activate logic level (ON status) of each digital output can be set to closed circuit or open circuit by parameter.

No.	Name	Description
0	NC	Not used.
1	SPD-OUT	Motor speed pulse output. The drive sends the pulse out signal at a rate of 12 pulses per revolution for an 8 poles motor (6 pulses for a 4 poles motor and so on).
2	ALM-OUT	The ALM-OUT output is ON when an alarm has generated.
3	BUSY-OUT	The BUSY-OUT is ON while the drive is providing power to the motor even if the motor is not rotating.
4	VA-OUT	The VA-OUT is ON when the motor rotating speed is in the set value.
5	EN-OUT	The EN-OUT is ON when the motor rotating speed is over the set value.
6	ALM-PULSE	The ALM-PULSE generates pulse signals depends on the alarm code when an alarm has generated.
7	BUSY-ALM-PULSE	The function of BUSY-ALM-PULSE output is the same as BUSY-OUT output when normal operation. The function of BUSY-ALM-PULSE output is the same as ALM-PULSE when an alarm has generated.
11	RUN-OUT	The RUN-OUT is ON while the motor is in operation.
12	DIR-OUT *	The DIR-OUT is OFF while the motor is in CW operation. The DIR-OUT is ON while the motor is in CCW operation.
15	VA-OUT2 *	The VA-OUT2 is OFF when the motor is not rotating. The VA-OUT2 is ON when the motor rotating speed is in the set value.
16	VA-EN-OUT *	When motor is in operation the function of VA-EN-OUT is the same as VA-OUT. After any stop command: When the motor rotating speed is under the set value of EN-OUT speed, the VA-EN-OUT is OFF. When the motor rotating speed is over the set value of EN-OUT speed, the function of VA-EN-OUT is the same as VA-OUT.

* Extended function that only support product version C.2 or later version.

High Current Output Functions

No.	Name	Description
13	PARK-BRAKE / MBRAKE	Motor electromagnetic brake control output.

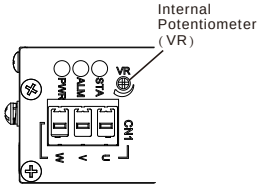
Speed Control Mode

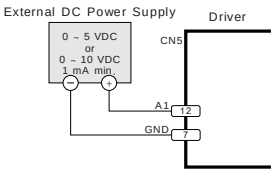
Control motor operation by direct IO or NET-IO. The operation data can be set are speed, ACC/DEC time, torque limit.

■ Motor Speed Setting

The speed setting method can be set by 「Operation Data Command Source」 parameter(02-03).

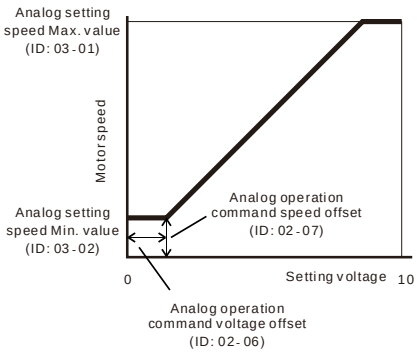
Setting Method	Operation Data Command Source (02-03)	Description
Internal Potentiometer VR (Default)	0	Turning the internal potentiometer VR by an insulated screwdrive in the clockwise direction will increase the speed. The ACC/DEC time, torque limit can be set by operation data No.



External Analog A1	4	Set the speed using the external DC voltage through external analog input A1. he ACC/DEC time, torque limit can be set by operation data No.	

When using the external analog input A1 to set the speed, the slope of the speed command or offset can be changed by setting the gain or offset parameter.

ID	Name	Description	Setting Range	Default
02-04	Analog Input Voltage	Set the voltage range of external voltage input	0: 0 ~ 5 VDC 1: 0 ~ 10 VDC	0
02-05	Analog Input Gain	Sets the speed command per 1 VDC of the input voltage by the analog input.	0 ~ 10000 r/min perV	708
02-06	Analog Input OFFSET Voltage	Set the offset of the speed command input voltage.	0 ~ 200 (1=0.01 VDC)	10
02-07	Analog Input OFFSET Speed	Set the offset of the speed command speed.	0 ~ 10000 r/min	85
03-01	Analog Speed Setting Max. Limit	Sets the maximum value of the operation speed by the analog speed setting.	100 ~ 10000 r/min	3600
03-02	Analog Speed Setting Min. Limit	Sets the minimum value of the operation speed by the analog speed setting.	1 ~ 10000 r/min ENC 60 ~ 10000 r/min Hall	85



Setting Description

$$\text{Target Speed} = (\text{Input Voltage} - \text{Analog Input OFFSET Voltage}) \times \text{Analog Input Gain} + \text{Analog Input OFFSET Speed}$$

Protect Function (Alarm)

When an alarm generates, the motor coast to stop, the ALM-OUT will turn ON and the ALM-LED blinks.

Before resetting an alarm, always remove the cause of the alarm and ensure safety, and perform one of the reset operations specified below.

- Turn the ALM-RST input OFF for more than 0.5 sec then turn it to ON for more than 0.5 sec then turn it OFF.
- Cycle the power. When cycling the power please turn the power off for at least 1 min or till the PWR LED off then turn the power on again.

NOTE Some alarms can only be reset by cycling the power.

NOTE The alarm cannot be reset If the drive operation command is ON (etc. START/STOP input is ON). Please turn all the operation command to OFF before reset the alarm.

■ **ALM LED**

When an alarm generates, the ALM LED blinks. The type of alarm can be confirmed by the blink count of ALM LED.

LED Blink	Alarm Code	Protect Function	Description
Blink 1 time	1	Over current	Excessive current has flown through the drive. Or the load exceeds the rated value has applied to the motor more than 5 sec. (the time allowed for the load exceeds the rated value could be different depends on the parameter setup.)
Blink 2 times	2	Over load	The load exceeds the rated value has applied to the motor more than 5 sec. (the time allowed for the load exceeds the rated value could be different depends on the parameter setup.)
Blink 3 times	3	Motor feedback fault	The hall sensor or encoder wiring is bad or not connected.
Blink 4 times	4	Over voltage	The input power supply voltage has exceeded the maximum Limit of the drive. Or the inertia of the load is too large.
Blink 5 times	5	Under voltage	The input power supply voltage is under the low limit.
Blink 4 times	6	Drive overheat	The drive's temperature is over its maximum limit.
Blink 7 times	7	Startup fault	The motor failed to start. The motor cable is not connected correctly.
Blink 8 times	8	EEP data error	Error in EEPROM data. (Can NOT be reset by ALM-RST input)
Blink 10 times	10	Motor overheat	The motor's temperature is too high. (The MOT-OT terminal has been set to ON state.)
Blink 12 times	12	Over speed	The speed has exceeded the maximum setup of the drive.
Blink 13 times	13	Encoder signal fault	Encoder signal error. Encoder was not connected.
Blink 14 times	14	Prevention of operation at power on	The main power supply was cycled when the FWD input or REV input was set to ON.
Blink 15 times	15	External stop	EXT-ERROR input is ON.
Blink 20 times	20	Hall sequence fault	The hall sequence was incorrect.
Blink 21 times	21	Communication error	The parameter setup value exceeds the its limit or the communication command was not supported.
Blink 22 times	22	Parameter error	The parameter setup value was incorrect.

7. Operation

Start and Stop Operation

The motor start, stop operation and operating direction can be set by digital input. There are 2 different digital input mode (SC or CC mode) can be selected by parameter (02-01) for the motor operation.

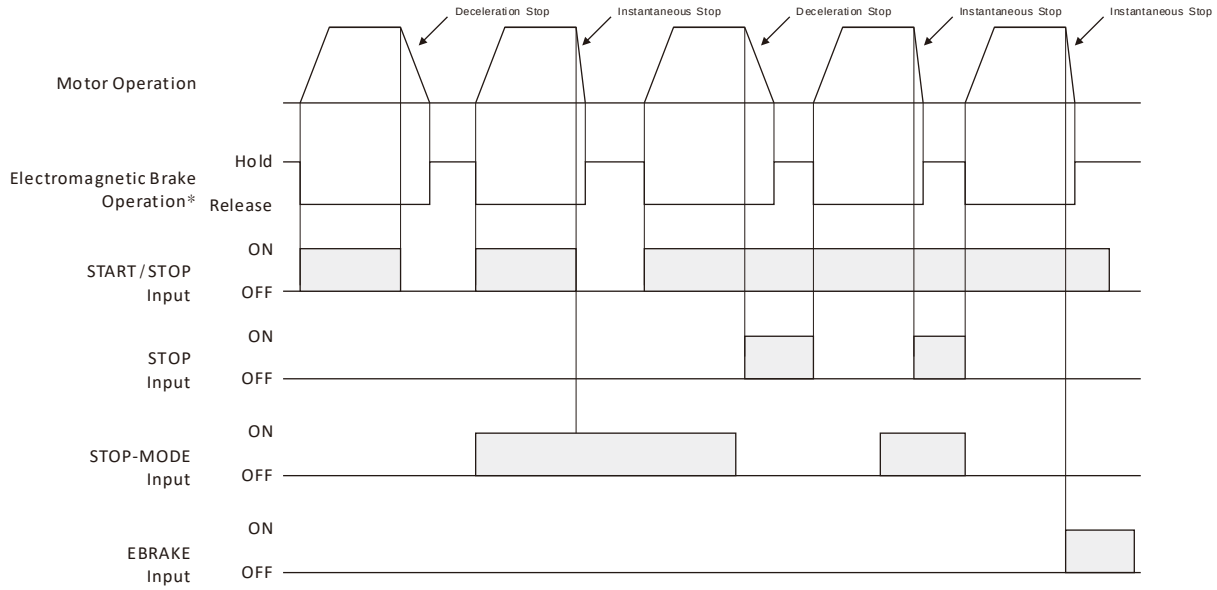
Related Parameters

ID	Name	Description	Setting Range	Default
02-01	SC/CC Mode	Set the digital input mode to SC or CC mode.	0: SC Mode 1: CC Mode	0

■ Start Operation – SC Mode

The motor start and stop operation is set by START/STOP input. The motor operating direction is set by CCW/CW input.

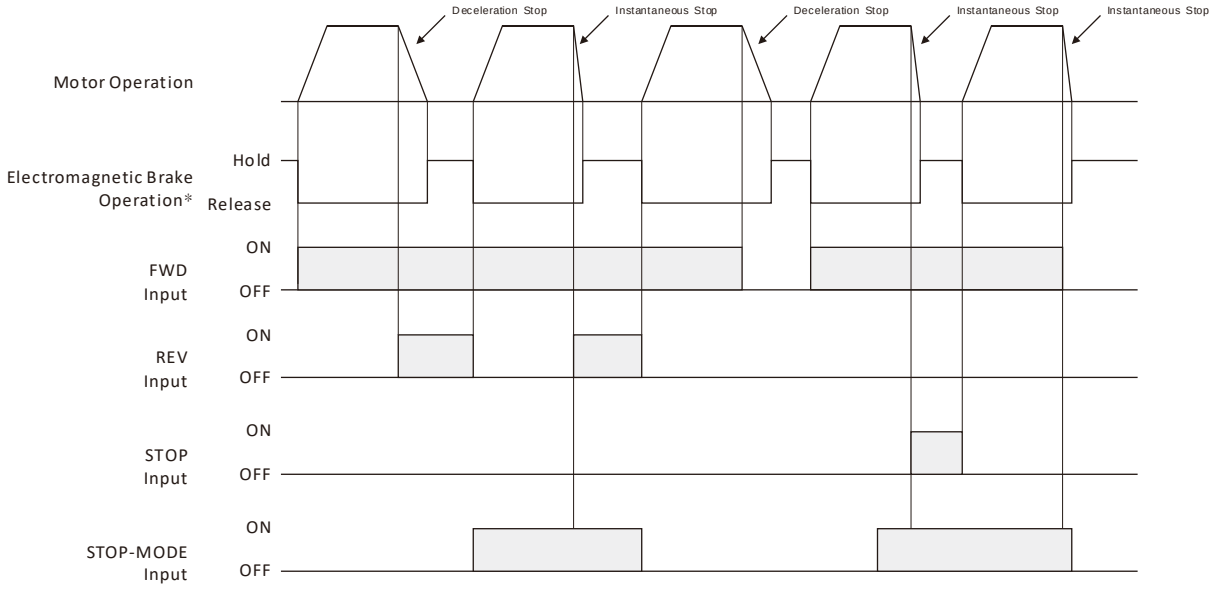
START/STOP Input	EBRAKE Input	STOP-MODE Input	Motor Operation
ON	OFF	OFF	The motor rotates in the direction set by CCW/CW input.
OFF	OFF	OFF	The motor stops by the rated of deceleration time setting.
OFF	OFF	ON	The motor stops instantaneously.
ON	ON	OFF	The motor stops instantaneously.



■ Start Operation – CC Mode

The motor start, stop operation and operating direction is set by FWD and REV inputs.

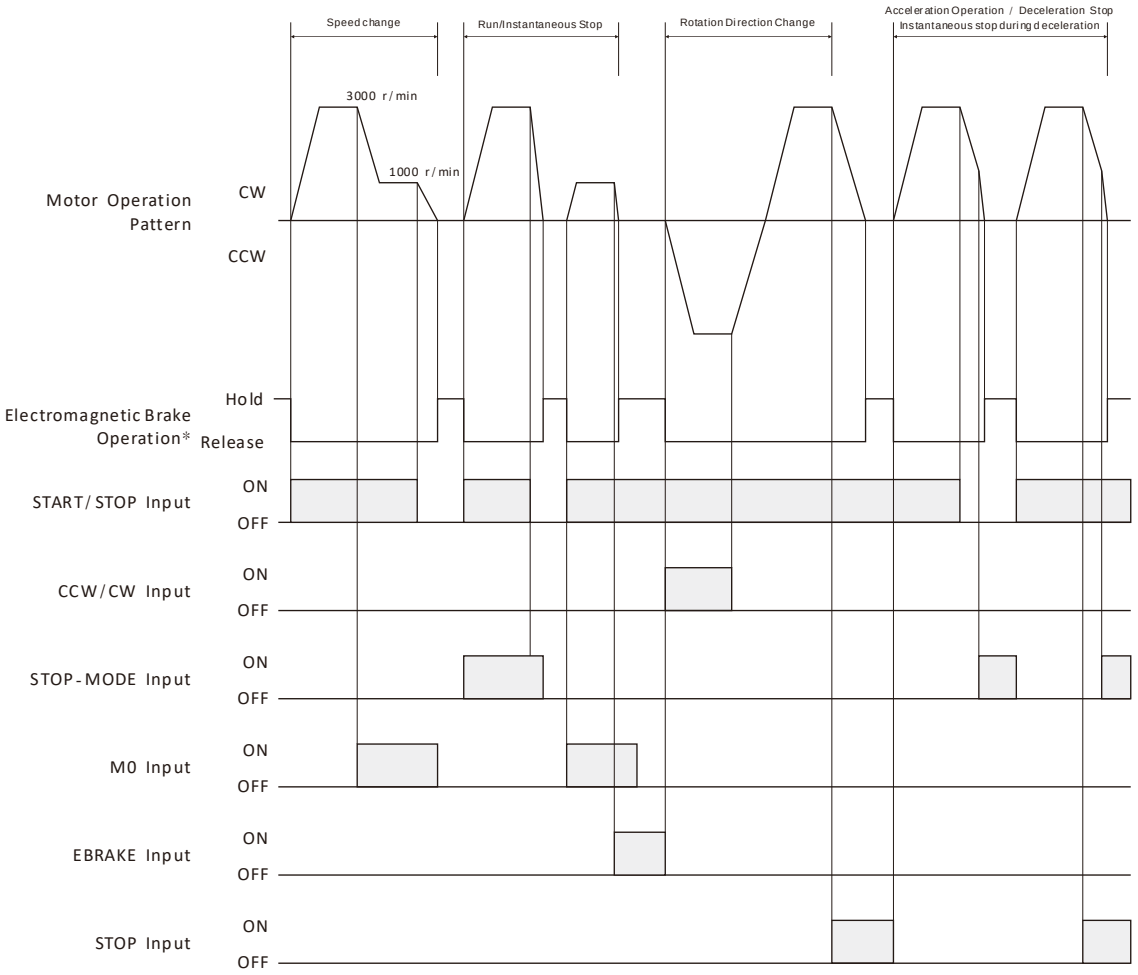
FWD Input	REV Input	EBRAKE Input	STOP-MODE Input	Motor Operation
ON	OFF	OFF	OFF	The motor rotates in the CW direction.
OFF	ON	OFF	OFF	The motor rotates in the CCW direction.
OFF	OFF	OFF	OFF	The motor stops by the rated of deceleration time setting.
OFF	OFF	OFF	ON	The motor stops instantaneously.
ON	ON	OFF	OFF	The motor stops by the rated of deceleration time setting.
ON	ON	OFF	ON	The motor stops instantaneously.
ON	OFF	ON	OFF	The motor stops instantaneously.
OFF	ON	ON	OFF	The motor stops instantaneously.



Operation Example

The chart below are examples of setting the internal potentiometer (VR) to 3000 r/min and external analog input to 1000 r/min and switching the speed between these two levels by the M0 input.

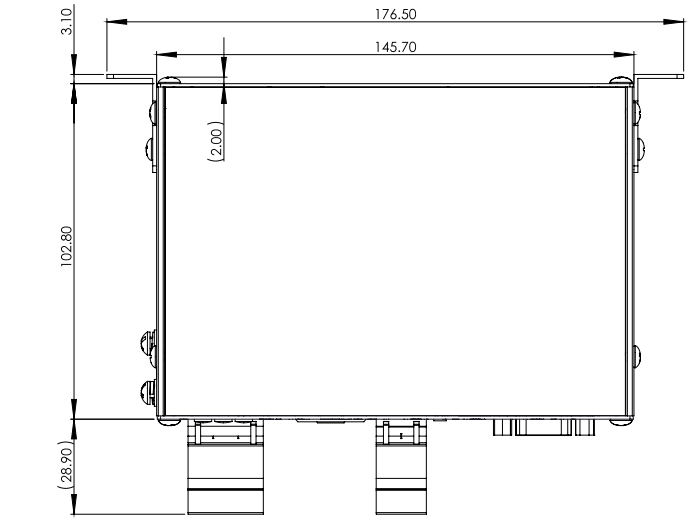
NOTE When switching the START/STOP(FWD) and CCW/CW(REV) input, provide an interval of at least 10 ms.

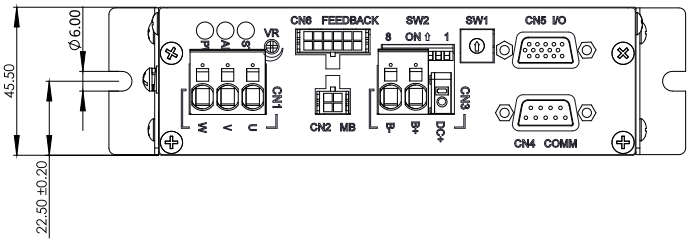


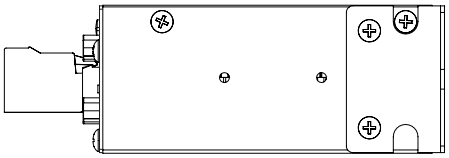
8. Appendix: Description of the difference in E.00

Mounting Dimension of E.00

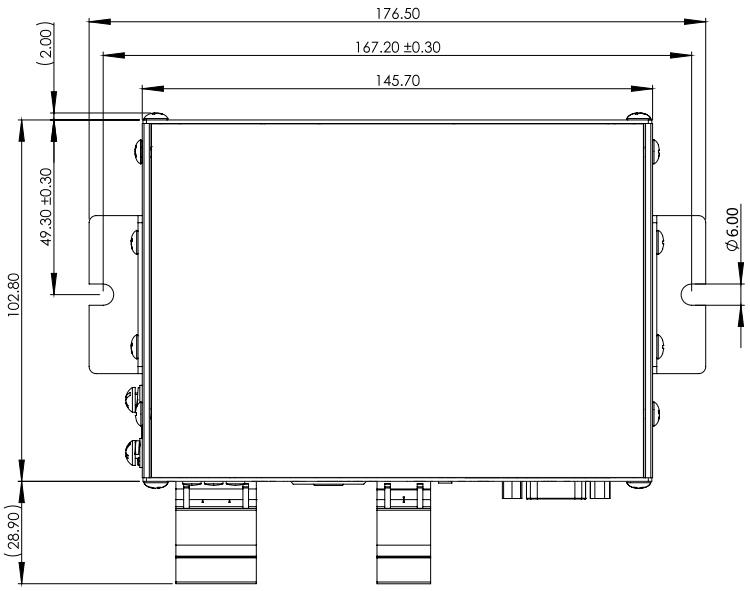
- Vertical Installation

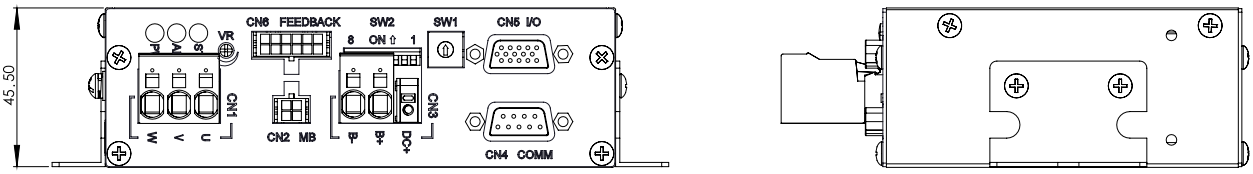




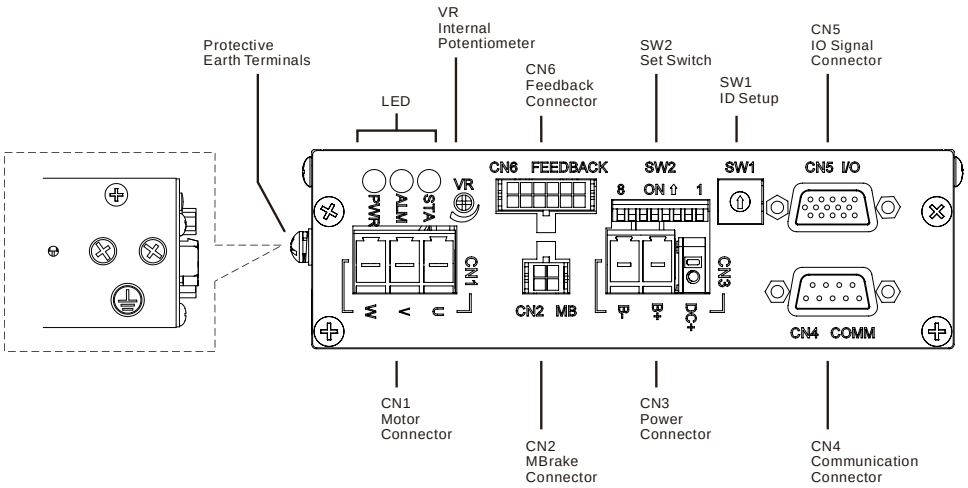


- Horizontal Installation

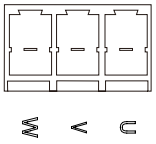




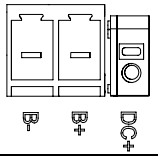
Interface of E.00



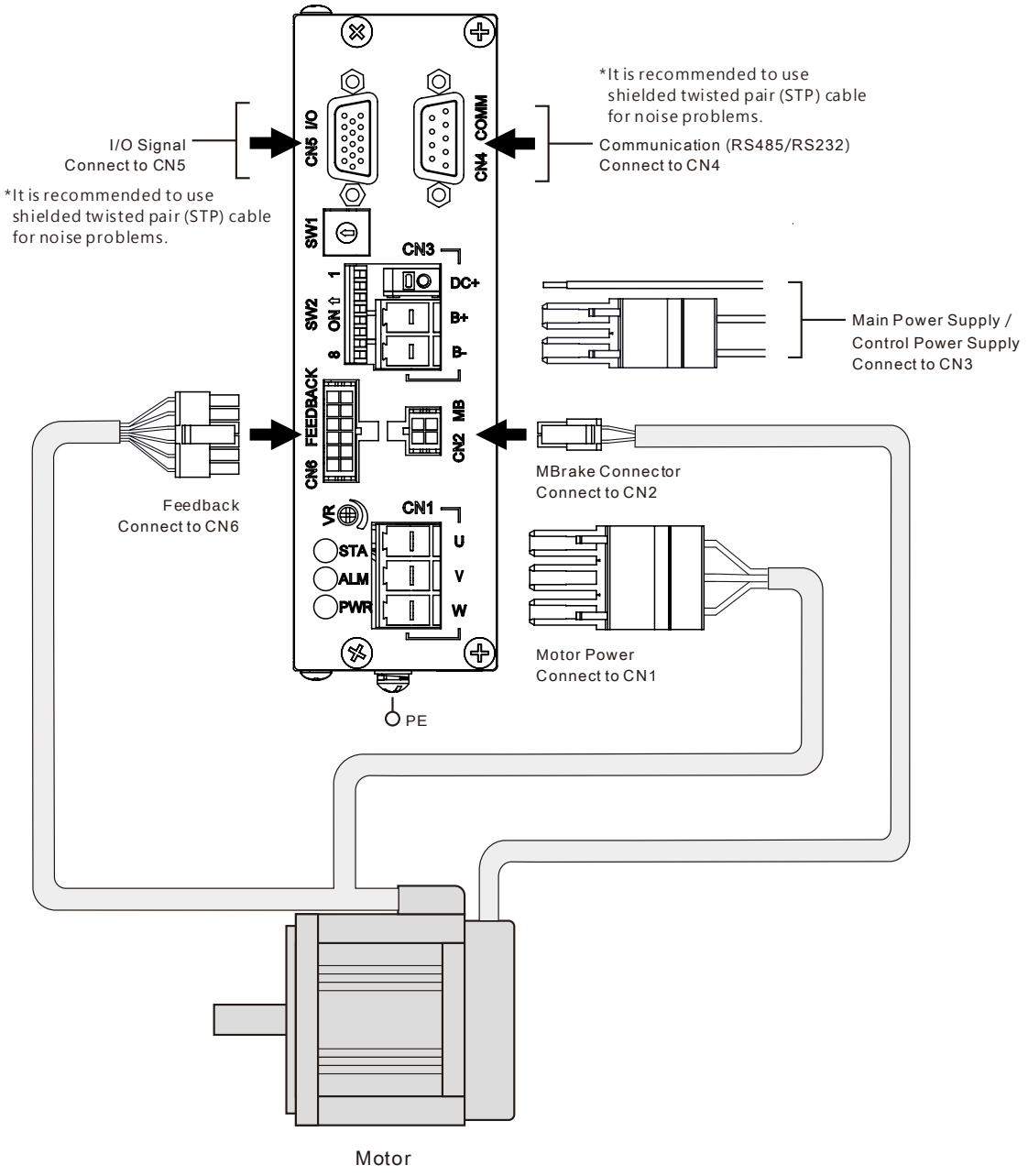
CN1 Motor Connector

Pin	Name	Description	I/O	Connector
1	U	Motor U	O	Connector Info.: 3-pin (female), 7.62mm pitch
2	V	Motor V	O	Mating Connector: 3-pin (male), 7.62mm pitch
3	W	Motor W	O	3 2 1  W V U

CN3 Power Connector

Pin	Name	Description	I/O	Connector
1	DC+	Control power supply input • DC+ can be disconnected (Control power can be provided by B+). • When the main power(B+) is cut off, if you want to keep the control power working(communication and IO signals), you can connect DC+ to the control power supply. **NOTE** B+ and DC+ are connected inside the drive. When B+ is connected, DC+ will be powered.	I	Connector Info.: DC+: 1-pin (male), 5.0mm pitch B+&B-: 2-pin (male), 7.62mm pitch Mating Connector: DC+: N/A B+&B-: 2-pin (female), 7.62mm pitch 3 2 1 
2	B+	Main power supply input	I	
3	B-	Power ground	PGND	

Connection Example of E.00



Revision History

REV	Date	Remark
1.0	20160801	1st Release.
2.0	20160801	2nd Release.
3.0	20170220	Operation Ambient Temperature modified to 0℃ ~ +40℃. The minimum frequency of HX modified to 100Hz. Modified the digital input power supply of 48V model to 30~53VDC. The default speed setting method of product version C.2 or after modified to external analog A1.
4.0	20181012	Add version description for D.00 and D.02. Add on voltage specification for digital inputs. Add internal bus capacitance specifications. Correct EBRAKE input description.
5.0	20190405	Add appendix and communication cable specification recommendations. Correct EBRAKE input description E.00. Correct the setting range of 03-02 Analog Speed Setting Min. Limit
5.1	20190910	Added 12VDC supply voltage specifications.
5.2	20230214	Release the EMI CISPR22 Class B compatible model.