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Delta Elevator Drive VFD-ED Series User Manual



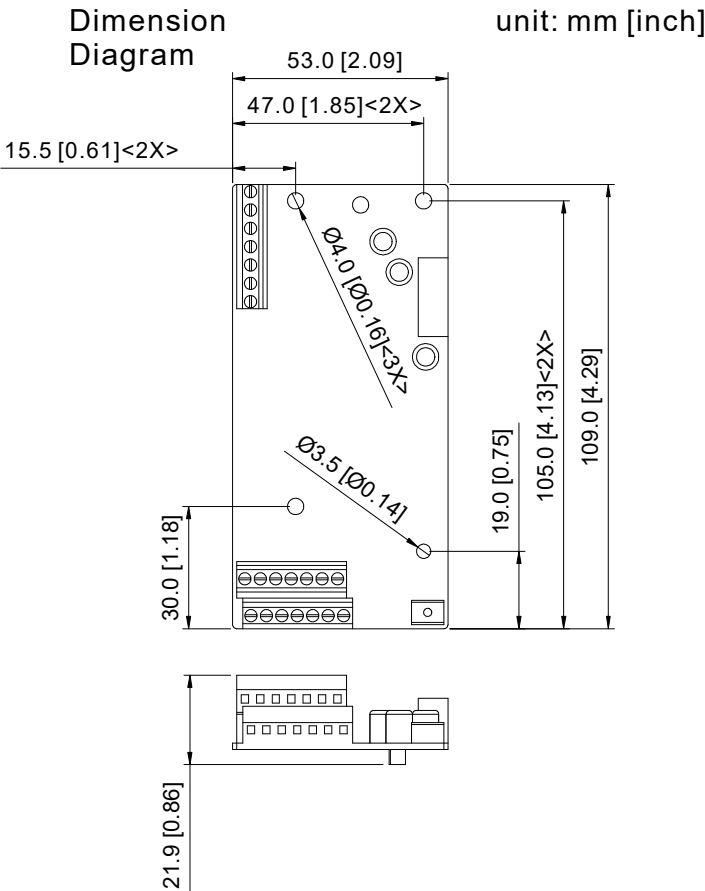
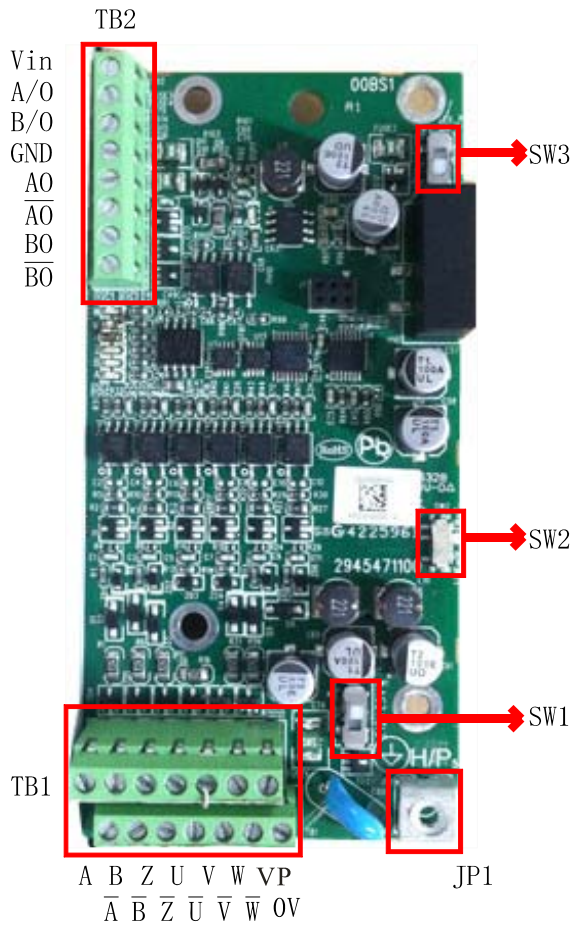
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7-1 EMED-PGABD-1

Applicable encoder: A/B/Z & U/V/W Absolute Encoders



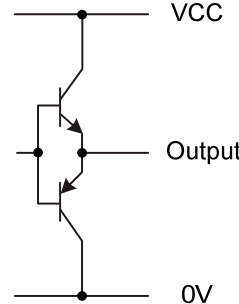
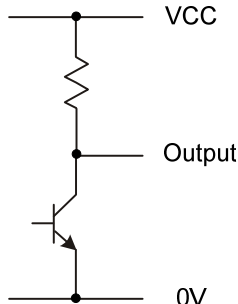
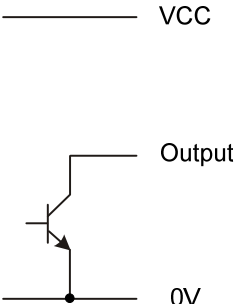
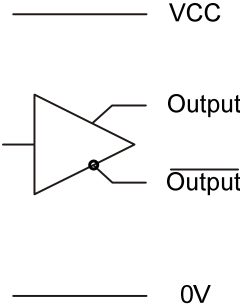
Wire Gauge	Torque
30–16 AWG	1.6 kg-cm [1.4 lb-in.]

The following table lists the terminal specifications.

Terminals		Descriptions
TB2	Vin	Voltage input, to adjust the amplitude of output voltage at terminal A/O and terminal B/O. It also provides a 5 V voltage to support line driver's signal. Vin voltage range: 8–24 V, Max: 24 V.
	A/O, B/O	Output signal for the push-pull voltage frequency division. Default: Output amplitude is about +24 V. Use SW3 to disable the internal default power. Required input power through Vin-GND port (i.e. output voltage's amplitude) Vin voltage range: 8–24 V, Max: 24 V. Push-Pull Voltage Output Max. output frequency: 100 kHz Supports frequency division output, the frequency division range: 1–31.
	GND	Common ground terminal connecting to the host controller and the motor drive.
	AO, /AO, BO, /BO	Output signal for the line driver frequency division. Line Driver RS422 Max. output frequency: 150 kHz Supports frequency division output, the frequency division range: 1–31.

TB1	VP	Power output for encoder  NOTE Use SW1 to set output voltage amplitude Voltage: +5 ± 0.5 V or +12 ± 1 V Current: 200 mA max.
	0 V	Common power terminal for encoder
	A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$	Incremental-type encoder signal input terminal Types of input signal: line driver, voltage, push-pull, open-collector  NOTE Different input signals need different wiring methods. See the user manual for wiring diagrams. Max. input frequency: 150 kHz
	U, $\overline{U}$, V, $\overline{V}$, W, $\overline{W}$	Absolute-type encoder signal input terminal Types of input signal: line driver, voltage, push-pull, open-collector  NOTE Different input signals need different wiring methods. See the user manual for wiring diagrams. Max. input frequency: 150 kHz
JP1		Ground Terminal Connect the motor drive power supply to ground. Supports PG shielding.
SW1		Switch between power for the encoder (5 V / 12 V).
SW2		Offline Detection Switch. Switch to the Line-D side to enable offline detection for the Line-D input signal. Switch to OPEN-C side to disable offline detection function for the OPEN-C input signal.
SW3		Power supply switch for frequency division. Switch to INP side to provide 24 V power for internal use. Switch to EXP side to provide 24 V power for external use (client).

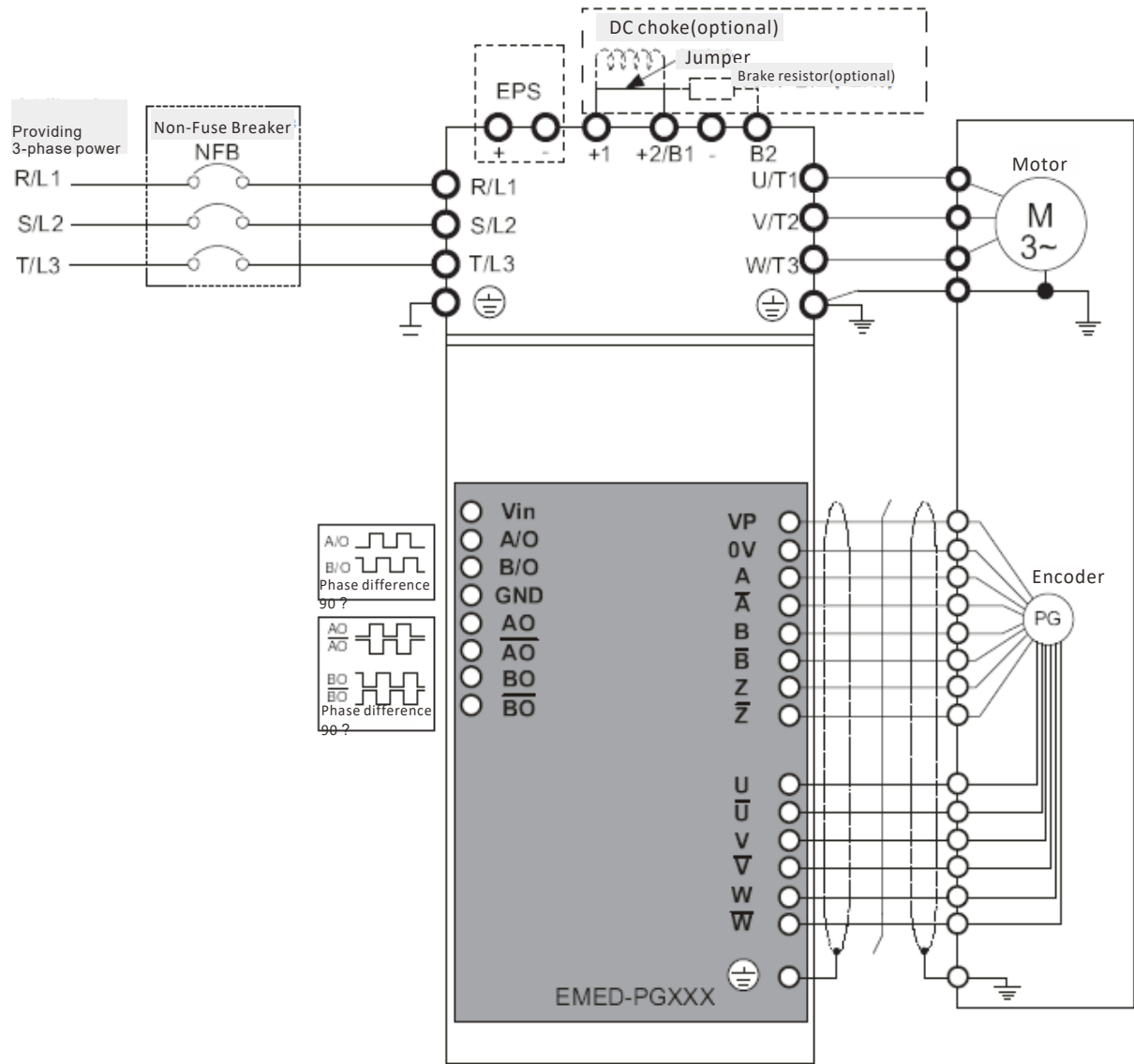
Applicable encoders:

Different Types of Encoder Output			
Push-pull	Voltage Output	Open Collector	Line Driver
			

 NOTE

- Verify that the SW1 is set to the correct output voltage before powering ON.
- Keep the motor drive wiring away from any high voltage lines to avoid interference.

Wiring Diagram



Set up the Frequency Division Signal

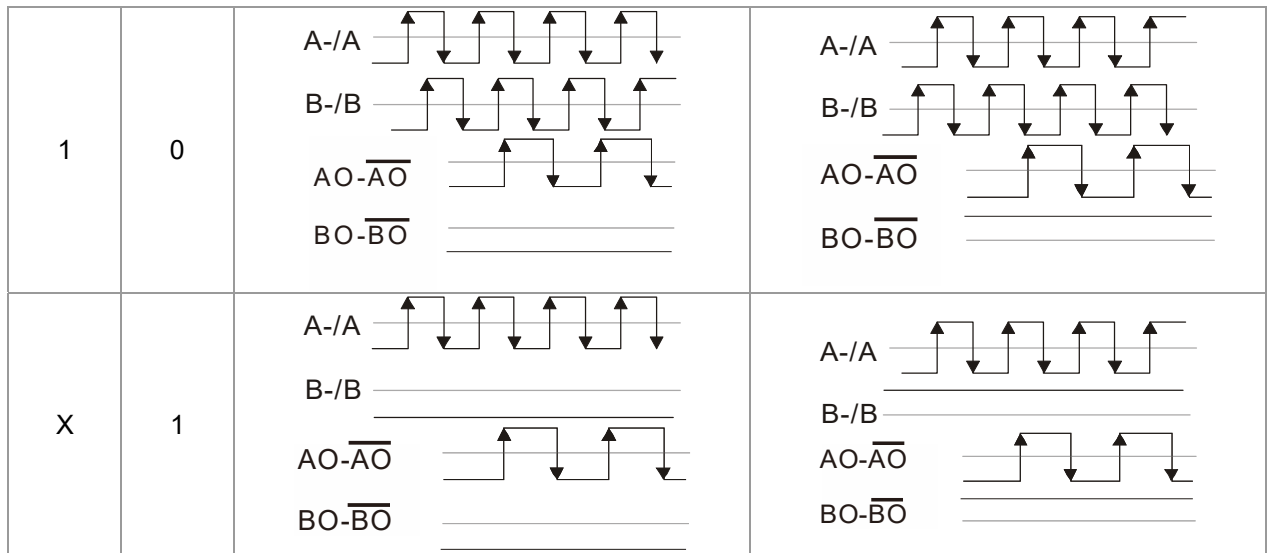
- ① After the encoder inputs a PULSE signal, there is an output signal by the division factor “n” Set the value in Pr.10-29 (PG card’s frequency division output).
- ② Set Pr.10-29 (PG card’s frequency division output):
The decimal frequency division output setting; range of the division factor “n”: 1–31.
- ③ Pr.10-30 (PG card’s frequency division output mode)

Bit3	Bit2	Bit1	Bit0
X	X	OUT/M	IN/M

OUT/M: Pulse output mode for frequency division;
IN/M: Pulse input mode for frequency division;
“X” is for backup while “0” is a value to write.

The following table lists the Input Mode (IN/M) & Output Mode (OUT/M) setting and description:

OUT/M	IN/M	Division Factor	
		A is ahead of B	B is ahead of A
0	0	A-/A	A-/A
		B-/B	B-/B
		AO-AO	AO-AO
		BO-BO	BO-BO



NOTE

- In the waveform, A-/A, B-/B are the PG card input signals; AO- $\overline{\text{AO}}$, BO- $\overline{\text{BO}}$ are the differential output frequency division signals. Use a differential probe to measure.
- Division factor "n": Set 15 to divide the input signal by 15.
- When **OUT/M**, **IN/M** set to 0 and 0, the PG card input signal A-/A, B-/B are square waves while AO- $\overline{\text{AO}}$, BO- $\overline{\text{BO}}$ are frequency division output.
- When **OUT/M**, **IN/M** are set to 1 and 0, the PG card input signal A-/A, B-/B are square waves while the BO- $\overline{\text{BO}}$ is the A and B phase indicator (for example, when BO- $\overline{\text{BO}}$ is LOW, it means A is ahead of B; when BO- $\overline{\text{BO}}$ is HIGH, it means B is ahead of A). AO- $\overline{\text{AO}}$ is frequency division output.
- When **OUT/M**, **IN/M** are set to X and 1, B-/B phase has to be the direction indication input signal (for example, when B-/B is LOW, it means A is ahead of B; when B-/B is HIGH, it means B is ahead of A). A-/A is a square wave input, BO- $\overline{\text{BO}}$ and B-/B phase are input into synchronous action; AO- $\overline{\text{AO}}$ is frequency division output.
- Take Pr.10-29 and Pr.10-30 as examples: When the frequency division value is 15, **OUT/M** =1, **IN/M** = 0. Set Pr.10-29 = 15 and Pr.10-30 = 0002h.

Set Pr.10-29 =15

Set Pr.10-30 =0002h

Bit3	Bit2	Bit1	Bit0
X	X	1	0

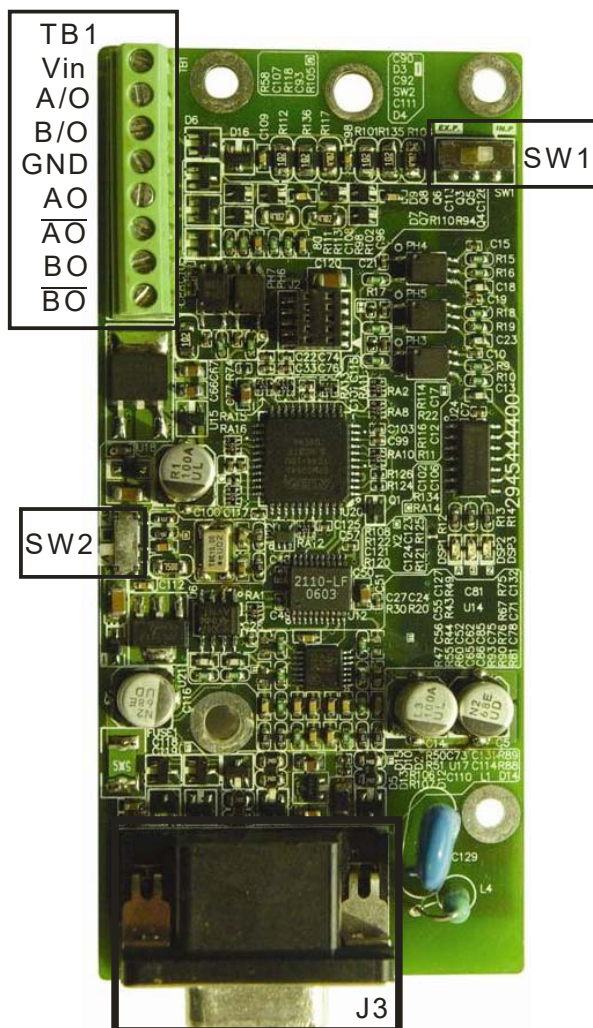
7-2 EMED-PGHSD-1

Applicable encoder:

SIN/COS: Heidenhain ERN1387

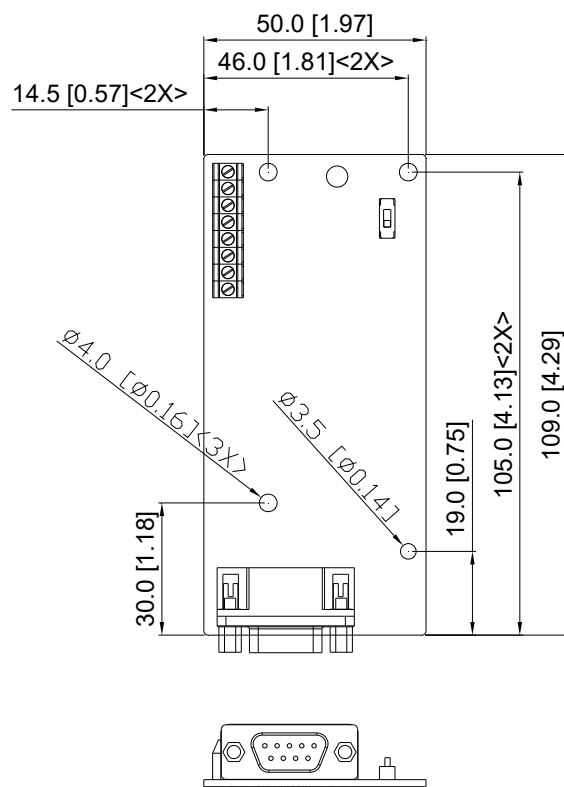
EnDat2.1/01: Heidenhain ECN413, ECN1313

SICK HIPERFACE: SRS50/60



Dimension

Unit: mm [inch]

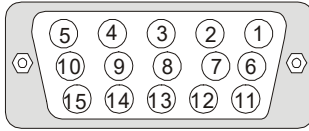


Wire Gauge	Torque
30–16 AWG	1.6 kg-cm [1.4 lb-in.]

※ Supports Heidenhain ERN1387, EnDat2.1, HIPERFACE.

Terminals		Descriptions
TB1	Vin	Voltage input: (to adjust the output voltage amplitude of the push-pull pulse) Max. input voltage: 24 V _{DC} Max. input current: 30 mA
	A/O, B/O	Push-pull pulse output signal Max. output frequency: 50 kHz
	GND	Common power input/signal output terminal
	AO, /AO, BO, /BO	Line driver RS422 Max. input frequency: 100 kHz
J3 (D-SUB female connector)		Encoder signal input terminal
SW1		Frequency division output power terminal selection INP: Power supplied by PG card EXP: Power from an external source
SW2		Encoder's voltage output terminal (Up) NOTE Modify the terminal output voltage by switching the direction of the SW2 DIP switch on the PG card. 5 V: 5 V _{DC} 8 V: 8 V _{DC}

EMED-PGHSD-1 (Terminal J3) pin definitions depend on the encoder type



Terminal#	Heidenhain ERN1387	Heidenhain ECN1313	HIPERFACE®
1	B-	B-	REFSIN
2	-	-	-
3	R+	DATA	DATA+
4	R-	/DATA	DATA-
5	A+	A+	+COS
6	A-	A-	REFCOS
7	0V	0V	GND
8	B+	B+	+SIN
9	Up	Up	Up
10	C-	-	-
11	C+	-	-
12	D+	-	-
13	D-	-	-
14	-	/CLOCK	-
15	-	CLOCK	-

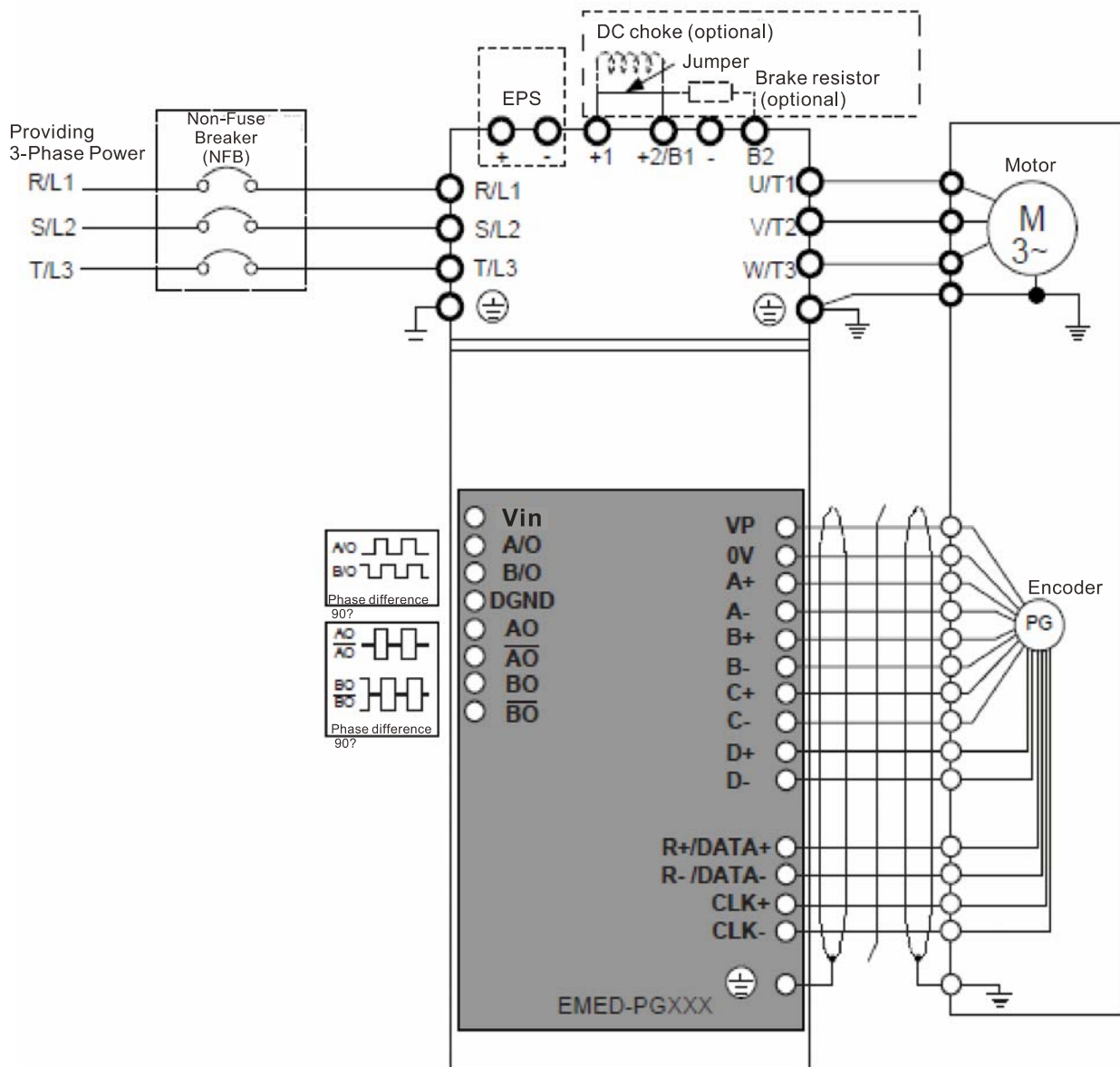
The following table lists the terminal functions.

Terminals	Descriptions	Specifications
Up (VP)	The output voltage for the encoder. Use the SW2 DIP switch to change the output voltage to +5 V or +8 V.	Voltage: +5.1 V _{DC} ± 0.3 V; +8.4 V _{DC} ± 1.5 V Current: 200 mA max.
0 V	Encoder common power terminal	Reference level for the encoder's power.
A+, A-, B+, B-, R+, R-	Encoder sine wave differential signal input (incremental signal)	Input frequency: 40 kHz max. 0.8...1.2V _{ss} (≈1V _{ss} ; Z ₀ =120 Ω) 0.2V...0.85V (≈0.5V; Z ₀ =120 Ω)
+SIN, +COS, REFSIN, REFCOS	Encoder sine wave differential signal input (incremental signal)	Input frequency: 20 kHz max. 0.9...1.1V 0.8...1.2V _{ss} (≈1V _{ss} ; Z ₀ =1k Ω)
C+, C-, D+, D-	Encoder sine wave differential signal input (absolute signal)	 0.8...1.2V _{ss} (≈1V _{ss} ; Z ₀ =1k Ω)
DATA+(DATA), DATA-(/DATA)	RS-485 communication interface	Terminal resistance is about 130 Ω
CLOCK+, CLOCK-	CLOCK differential output for ENDAT.	Line Driver RS422 level output



- Verify that the SW2 switch is set to the correct output voltage before powering on.
- Keep the motor drive wiring away from any high voltage lines to avoid interference.

Wiring Diagram



Set the Frequency Division Signal

- ① After the encoder inputs a PULSE signal, there is an output signal by the division factor "n." Set the value in Pr.10-29 (PG card's frequency division output).
- ② Set Pr.10-29 (PG card's frequency division output):
The decimal frequency division output setting; range of the division factor "n": 1–31.
- ③ Pr.10-30 (PG card's frequency division output mode)

Bit3	Bit2	Bit1	Bit0
X	X	OUT/M	IN/M

OUT/M: Pulse output mode for frequency division;
IN/M: Pulse input mode for frequency division;
 "X" is for backup while "0" is a value to write.

The following table lists the Input Mode (IN/M) & Output Mode (OUT/M) setting and description:

OUT/M	IN/M	Division Factor	
		A is ahead of B	B is ahead of A
0	0		
1	0		
X	1		

NOTE

- In the waveform, A-/A, B-/B are the PG card input signals; AO- $\overline{\text{AO}}$, BO- $\overline{\text{BO}}$ are the differential output frequency division signals. Use a differential probe to measure.
- Division factor "n": Set 15 to divide the input signal by 15.
- When **OUT/M**, **IN/M** set to 0 and 0, the PG card input signal A-/A, B-/B are square waves while AO- $\overline{\text{AO}}$, BO- $\overline{\text{BO}}$ are frequency division output.
- When **OUT/M**, **IN/M** are set to 1 and 0, the PG card input signal A-/A, B-/B are square waves while the BO- $\overline{\text{BO}}$ is the A and B phase indicator (for example, when BO- $\overline{\text{BO}}$ is LOW, it means A is ahead of B: when BO- $\overline{\text{BO}}$ is HIGH, it means B is ahead of A). AO- $\overline{\text{AO}}$ is frequency division output.
- When **OUT/M**, **IN/M** are set to X and 1, B-/B phase has to be the direction indication input signal (for example, when B-/B is LOW, it means A is ahead of B; when B-/B is HIGH, it means B is ahead of A). A-/A is a square wave input, BO- $\overline{\text{BO}}$ and B-/B phase are input into synchronous action; AO- $\overline{\text{AO}}$ is frequency division output.
- Take Pr.10-29 and Pr.10-30 as examples: When the frequency division value is 15, **OUT/M** =1, **IN/M** = 0. Set Pr.10-29 = 15 and Pr.10-30 = 0002h.

Set Pr.10-29 =15

Set Pr.10-30 =0002h

Bit3	Bit2	Bit1	Bit0
X	X	1	0

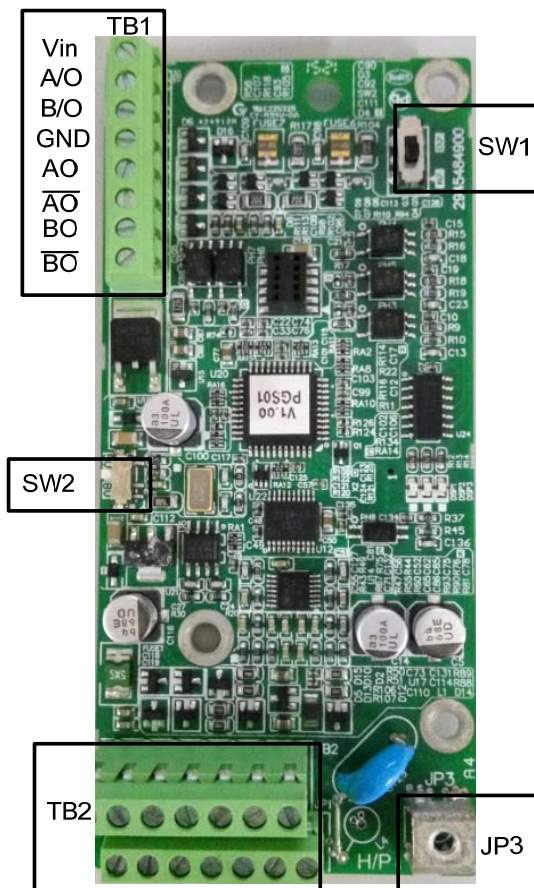
7-3 EMED-PGHSD-2

Applicable encoder:

SIN/COS: Heidenhain ERN1387

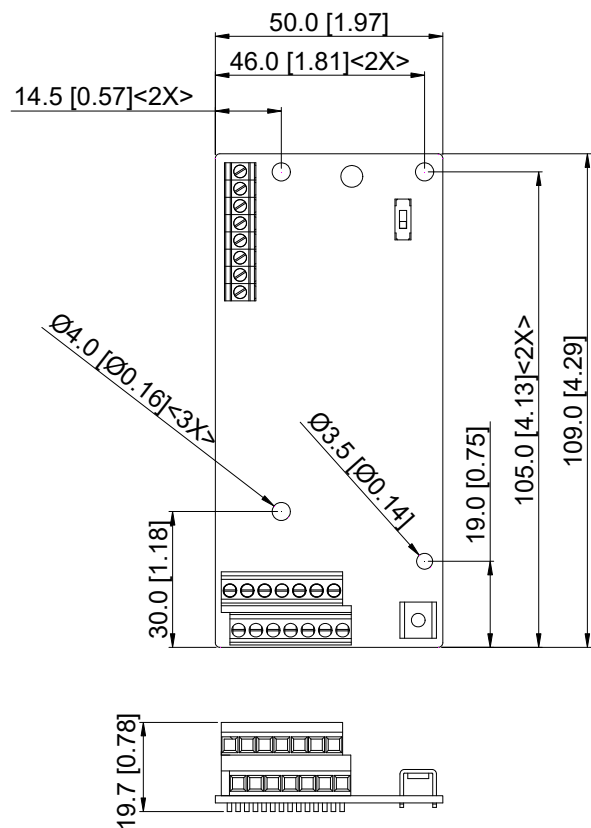
EnDat2.1/01: Heidenhain ECN413, ECN1313

SICK HIPERFACE: SRS50/60



Dimension

Unit: mm [inch]

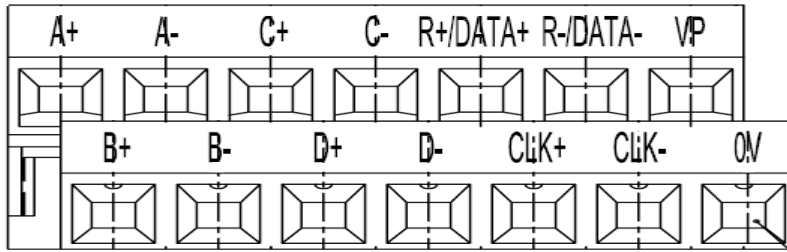


Wire Gauge	Torque
30–16 AWG	1.6 kg-cm [1.4 lb-in.]

※ Supports Heidenhain ERN1387, EnDat2.1, HIPERFACE.

Terminals		Descriptions
TB1	Vin	Voltage input: (to adjust the output voltage amplitude of the push-pull pulse) Max. input voltage: 24 V _{DC} Max. input current: 30 mA
	A/O, B/O	Push-pull pulse output signal Max. output frequency: 50 kHz
	GND	Common power input/signal output terminal
	AO, /AO, BO, /BO	Line driver RS422 Max. input frequency: 100 kHz
TB2		Encoder signal input terminal
JP3		Ground Terminal Connect the motor drive power supply to ground. Supports PG shielding.
SW1		Frequency division output power terminal selection INP: Power supplied by PG card EXP: Power from an external source
SW2		Encoder's voltage output terminal (Up)  NOTE <i>Modify the terminal output voltage by switching the direction of the SW2 DIP switch on the PG card.</i> 5 V: 5 V _{DC} 8 V: 8 V _{DC}

EMED-PGHSD-2 (Terminal TB2) pin definitions depend on the encoder type



Terminals	Heidenhain ERN1387	Heidenhain ECN1313	HIPERFACE®
A+	A+	A+	+COS
A-	A-	A-	REFCOS
C+	C+	Must set Pr.10-31=1	-
C-	C-		-
R+/DATA+	R+	DATA	DATA+
R-/DATA-	R-	/DATA	DATA-
VP	Up	Up	Up
B+	B+	B+	+SIN
B-	B-	B-	REFSIN
D+	D+	-	-
D-	D-	-	-
CLK+	-	CLOCK	-
CLK-	-	/CLOCK	-
0V	0V	0V	GND

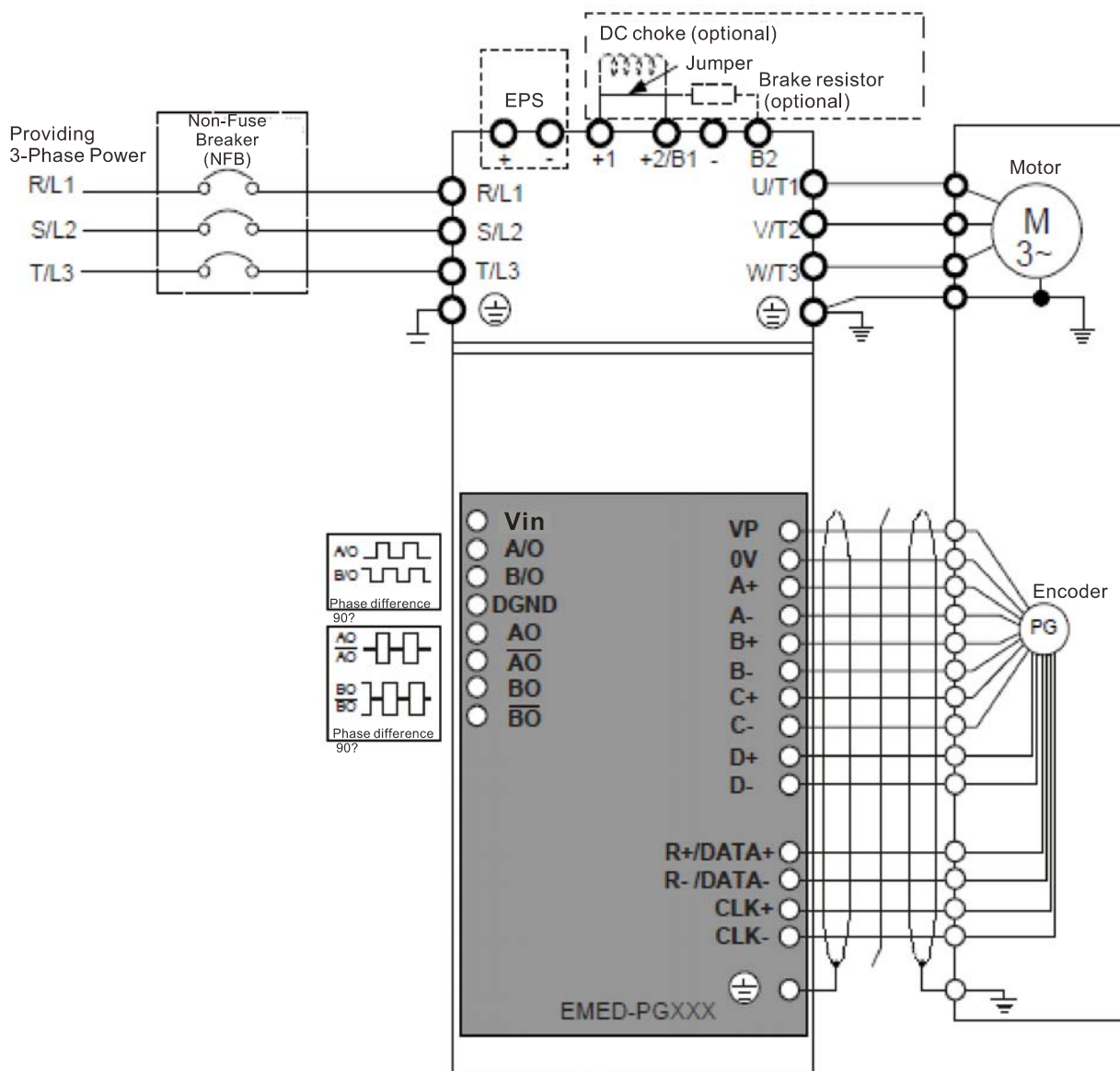
The following table lists the terminal functions.

Terminals	Descriptions	Specifications
TB2	Up (VP)	The output voltage for the encoder. Use the SW2 DIP switch to change the output voltage to +5 V or +8 V. Voltage: +5.1 V _{DC} ± 0.3 V; +8.4 V _{DC} ± 1.5 V Current: 200 mA max.
	0 V	Encoder common power terminal Reference level for the encoder's power.
	A+, A-, B+, B-, R+, R-	Encoder sine wave differential signal input (incremental signal) Input frequency: 40 kHz max.
	+SIN, +COS, REFSIN, REFCOS	Encoder sine wave differential signal input (incremental signal) Input frequency: 20 kHz max.
	C+, C-, D+, D-	Encoder sine wave differential signal input (absolute signal)

	DATA+(DATA), DATA-(/DATA)	RS-485 communication interface	Terminal resistance is about 130 Ω.
	CLOCK+, CLOCK-	CLOCK differential output for ENDAT	Line driver RS422 level output

**NOTE**

- Verify that the SW2 switch is set to the correct output voltage before powering on.
- Keep the motor drive wiring away from any high voltage lines to avoid interference.

Wiring Diagram**Set the Frequency Division Signal**

- ① After the encoder inputs a PULSE signal, there is an output signal by the division factor “n.” Set the value in Pr.10-29 (PG card’s frequency division output).
- ② Set Pr.10-29 (PG card’s frequency division output):
The decimal frequency division output setting; range of the division factor “n”: 1–31.
- ③ Pr.10-30 (PG card’s frequency division output mode)

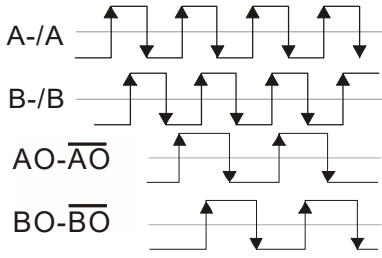
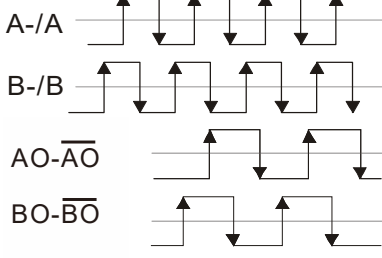
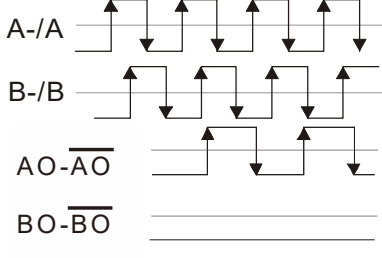
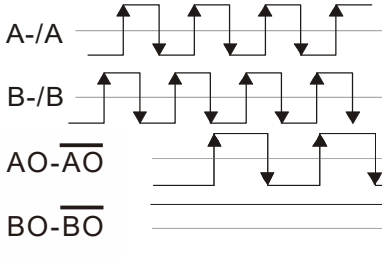
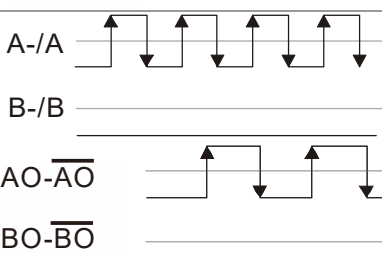
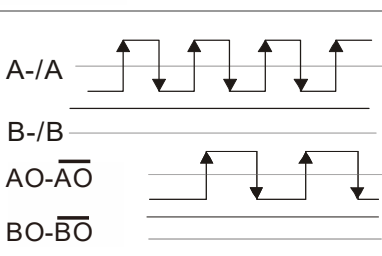
Bit3	Bit2	Bit1	Bit0
X	X	OUT/M	IN/M

OUT/M: Pulse output mode for frequency division;

IN/M: Pulse input mode for frequency division;

“X” is for backup while “0” is a value to write.

The following table lists the Input Mode (IN/M) & Output Mode (OUT/M) setting and description:

OUT/M	IN/M	Division Factor	
		A is ahead of B	B is ahead of A
0	0		
1	0		
X	1		

NOTE

- In the waveform, A-/A, B-/B are the PG card input signals; AO- $\overline{\text{AO}}$, BO- $\overline{\text{BO}}$ are the differential output frequency division signals. Use a differential probe to measure.
- Division factor “n”: Set 15 to divide the input signal by 15.
- When **OUT/M**, **IN/M** set to 0 and 0, the PG card input signal A-/A, B-/B are square waves while AO- $\overline{\text{AO}}$, BO- $\overline{\text{BO}}$ are frequency division output.
- When **OUT/M**, **IN/M** are set to 1 and 0, the PG card input signal A-/A, B-/B are square waves while the BO- $\overline{\text{BO}}$ is the A and B phase indicator (for example, when BO- $\overline{\text{BO}}$ is LOW, it means A is ahead of B: when BO- $\overline{\text{BO}}$ is HIGH, it means B is ahead of A). AO- $\overline{\text{AO}}$ is frequency division output.
- When **OUT/M**, **IN/M** are set to X and 1, B-/B phase has to be the direction indication input signal (for example, when B-/B is LOW, it means A is ahead of B; when B-/B is HIGH, it means B is ahead of A). A-/A is a square wave input, BO- $\overline{\text{BO}}$ and B-/B phase are input into synchronous action; AO- $\overline{\text{AO}}$ is frequency division output.
- Take Pr.10-29 and Pr.10-30 as examples: When the frequency division value is 15, **OUT/M** =1, **IN/M** = 0. Set Pr.10-29 = 15 and Pr.10-30 = 0002h.

Set Pr.10-29 =15

Set Pr.10-30 =0002h

Bit3	Bit2	Bit1	Bit0
X	X	1	0

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