

## EL7-EC Series AC Servo Drives - 220V

EL7-EC Series AC servo products 220V are high performance AC digital servo which is designed for position/velocity/torque high accurate control with power rating ranging up to 2kW which provides a perfect solution for different applications with easy tuning process.

EL7-EC series AC servo drives are using the latest Digital Signal Processing (DSP) chip and Intelligent Power Module (IPM) with compact components integration and great reliability. Using the best PID calculation for Pulse Width Modulation (PWM) control, our EL7-EC series products are the one to beat in this product category.

### Highlights:

- ① Easy tuning
- ② ETG COE + EtherCAT DSP402 communication protocol
- ③ Internal regenerative resistor
- ④ Equipped with notch filter, damping filter
- ⑤ Comes with Safe Torque Off (STO) SIL3
- ⑥ Motors automatically identified
- ⑦ Motors with holding brake
- ⑧ 23-bit multiturn magnetic/optical encoder



### Technical Specification

EL7-EC series	EL7-EC400F	EL7-EC750F	EL7-EC1000F	EL7-EC1500F	EL7-EC2000F
Rated power (W)	400	750	100	1500	2000
Rated Current (A)	3.5	5.5	7	Coming Soon!	
Peak Current (A)	9.2	16.6	18.7		
Size (mm)	40*175*156	50*175*156			
Main Power Supply		Single phase AC 220V, -15%~+10%, 50/60Hz			
Control Circuit Power Supply					
Drive mode		IGBT PWM sinusoidal wave drive			
Control mode		Position	Profile Position Mode (PP)		
			Cyclic Synchronous Position Mode (CSP)		
			Homing Mode (HM)		
		Velocity	Profile Velocity Mode (PV)		
			Cyclic Synchronous Velocity Mode (CSV)		
		Torque	Profile Torque Mode (PT)		
Cyclic Synchronous Torque Mode (CST)					
Encoder Feedback		RS485 protocol: 23-bit multiturn absolute magnetic/optical encoder			
I/O	Digital Input	4 Digital Inputs (Supports NPN and PNP)			
		Configurable input signals under EtherCAT mode:	1. Clear Alarm (A-CLR) 2. Positive limit switch (POT) 3. Negative limit switch (NOT) 4. Homing switch (HOME-SWITCH) 5. Emergency stop (E-Stop)		
	Digital Output	3 Digital Outputs (2 single-ended, 1 differential)			

		Configurable output signals under EtherCAT mode:	1. Alarm (ALM) 2. Servo ready (SRDY) 3. External brake off (BRK-OFF) 4. Positioning completed (INP) 5. Velocity at arrival (AT-SPEED) 6. Torque limiting command (TLC) 7. Zero speed position (ZSP) 8. Velocity coincidence (V-COIN) 9. Position command (P-CMD) 10. Velocity limit (V-LIMIT) 11. Velocity command (V-CMD) 12. Servo enabled (SRV-ST) 13. Homing done (HOME-OK)
	Encoder Output	Encoder ABZ differential pulse output	
	Probe Input	2 high speed probe inputs: EXT1+/EXT1-, EXT2+/EXT2-	
Communication Port	USB mini	Modbus USB2.0 (No need to connect driver to power supply)	
	EtherCAT	EtherCAT, Communication up to 128 axes to a host	
Software		Driver tuning through <b>Motion Studio</b> Ver. 1.4.x. Parameters tuning in current loop, position loop, velocity loop; Modify I/O signal and motor parameters; Variables(velocity, position deviation, etc.) monitoring using step diagrams	
Driver Front Panel		5 push buttons and 8-segments display	
Holding brake		Built-in (Supports external brake)	
Safety Protection		Overcurrent. Overvoltage. Undervoltage. Overheat. Overload. Overtravel. Single-Phasing. Regenerative resistor error. Position deviation error. Encoder feedback error. Excessive braking rate. EEPROM error	
Safe Torque Off (STO) function		Available for all EL7EC-F series products	
Environment	Temperature	Storage: -20-80℃ (Condensation free); Installation: 0-55℃ (Not frozen)	
	Humidity	Under 90%RH (Condensation free)	
	Altitude	Up to 1000m above sea level	
	Vibration	Less than 0.5G (4.9m/s <sup>2</sup> ) 10-60Hz (non-continuous working)	
	IP ratings	IP20	

## Servo Drive Features

Inertia ratio determination
Simple online and offline inertia ratio determination to simplify servo drive tuning.
Control mode switching
Position/Velocity/Torque mode can be switched easily by delivering an I/O signal.
Auto gain adjustment
Measure real time mechanical stiffness and set gain values automatically.
Gain switching
Automatically switch gain to suppress vibration, shorten positioning time and improve following behavior.
Feedforward gain
Reduce position deviation and increase system responsiveness. Including velocity and torque feedforward.
Vibration Suppression
Suppress mechanical resonance and mechanical end vibration by applying filters.
Model following control
Reference model to improve responsiveness to command and closed loop control to increase responsiveness towards interference.
Friction compensation
Compensate for changes in load to reduce the effect of friction on motion.

**EL7-EC Servo Drive**

# EL7-EC 750 F

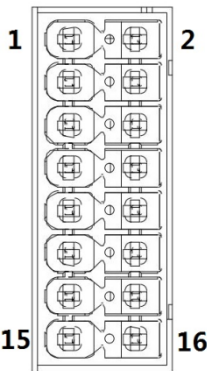
①      ②      ③      ④

No.	Description			
①	Series No.	EL7: Servo drive series		
②	Command source	P: Pulse + direction	EC: EtherCAT	
③	Power rating	400: 400W	750: 750W	1000:1000W 1500: 1500W    2000: 2000W
④	Type	F: Full functions		

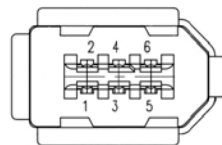
## Ports and connectors

### CN1 I/O Signal Port

CN1 connector is a 16-pin spring loaded connector.

Port	Pin	Signal	Description	Remarks
	1	EXT1+	Probe 1 positive terminal	2 high speed probe inputs function
	2	EXT2+	Probe 2 positive terminal	
	3	NC	Reserved	
	4	NC	Reserved	
	5	EXT1 -	Probe 1 negative terminal	
	6	EXT2 -	Probe 2 negative terminal	
	7	DICOM	Common DI	Double-ended common DI Configurable Recommended voltage: 12VDC - 24VDC
	9	DI1	Reserved	
	11	DI2	POT: Positive limit switch	
	13	DI3	NOT: Negative limit switch	
	15	DI4	HOME: Homing done	
	8	D01	ALM: Alarm	D01,D02: Single-ended D03: Double-ended Configurable Recommended voltage: 12Vdc - 24Vdc, max 30V Recommended current: 10mA, max 50mA
	10	D02	BRK-OFF: Holding brake activated	
	12	D03+	INP: Positioning completed	
	14	D03—		
	16	DOCOM	Common DO	

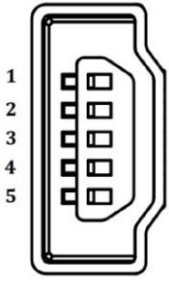
### CN2 Encoder



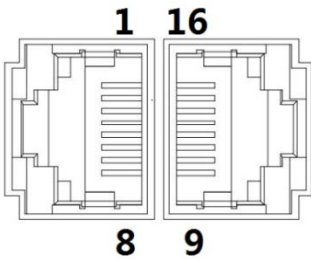
Connector	Pin	Signal	Description
CN2	1	VCC5V	Power supply 5V
	2	GND	Power supply ground
	3	BAT+	Battery positive terminal
	4	BAT-	Battery negative terminal
	5	SD+	SSI Data+
	6	SD-	SSI Data-
	Frame	PE	Shield grounding

## USB mini Communication Port

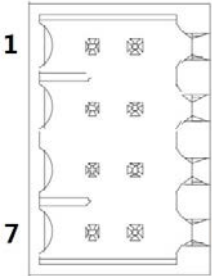
Parameters tuning on Motion Studio can be done without connecting main power supply to driver.

Connector	Port	Pin	Signal	Description
USB mini		1	VCC5V	Power supply 5V
		2	D+	USB data positive terminal
		3	D-	USB data negative terminal
		4	--	--
		5	GND	Power supply ground
		Frame	USB_GN D	Ground through capacitor

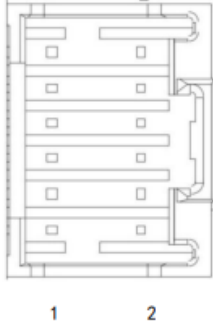
## CN3/CN4 EtherCAT Communication Port

Port	Pin	Signal	Description
	1, 9	E_TX+	EtherCAT Data sending positive terminal
	2, 10	E_TX-	EtherCAT Data sending negative terminal
	3, 11	E_RX+	EtherCAT Data receiving positive terminal
	4, 12	--	--
	5, 13	--	--
	6, 14	E_RX-	EtherCAT Data receiving negative terminal
	7, 15	--	--
	8, 16	--	--
	Frame	PE	Shielded ground

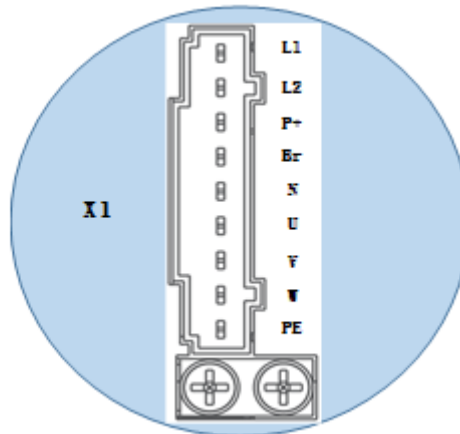
### CN6 Safe Torque Off (STO) Port

Port	Pin	Signal	Description	Remarks
	1	24V	24v power supply	Connect to SF1 and SF2 when not in use. Do not use to supply power.
	2	0V	Reference ground	
	3	SF1+	Control signal 1 positive input	When SF1 = OFF or SF2 = OFF,STO is enabled.
	4	SF1—	Control signal 1 negative input	
	5	SF2+	Control signal 2 positive input	
	6	SF2—	Control signal 2 negative input	
	7	EDM+	External monitoring device (EDM) with differential double ended output	When SF1 = OFF or SF2 = OFF,EDM = ON
	8	EDM—		

### CN5 Frequency divider pulse output port

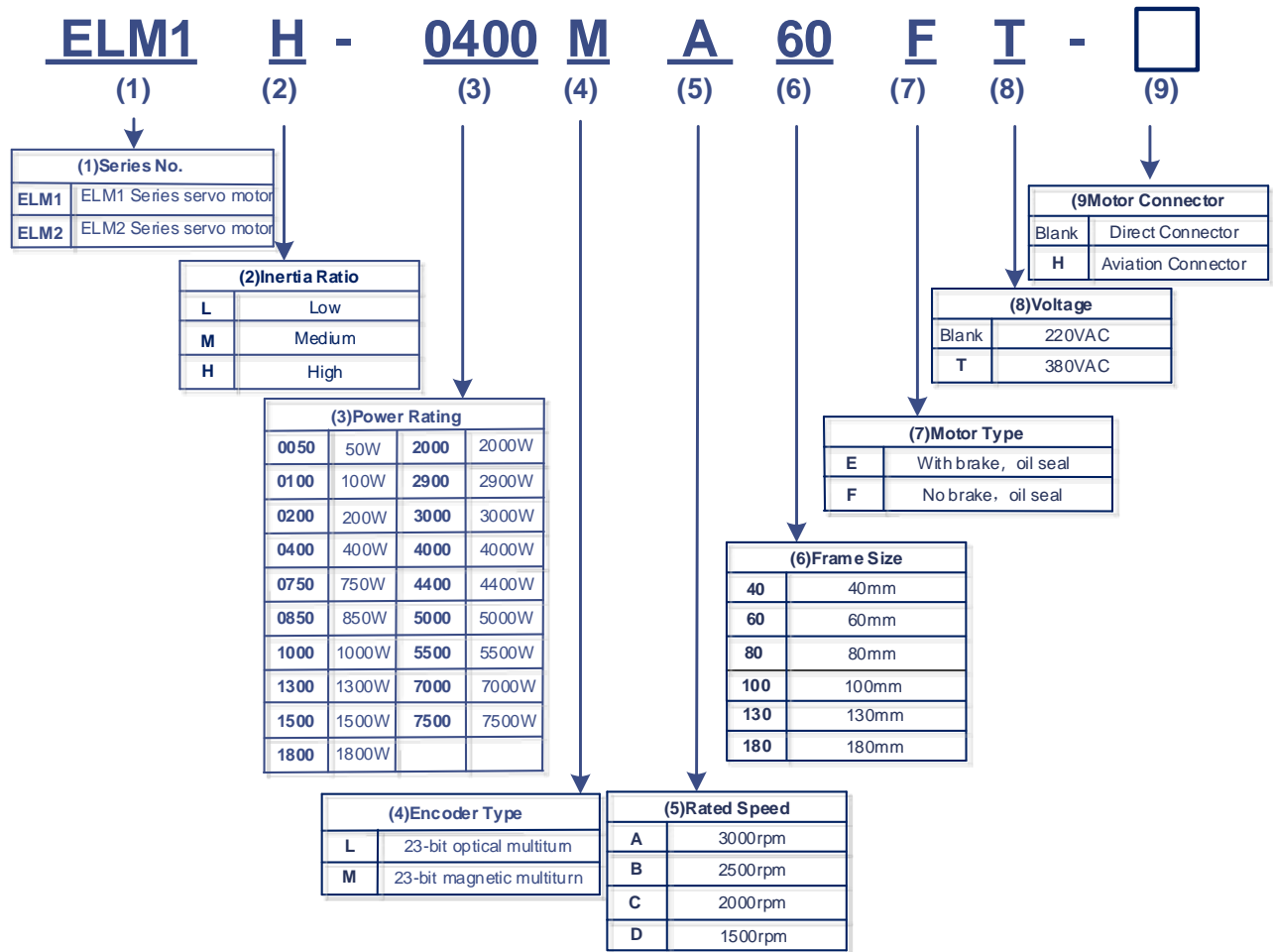
Port	Diagram	Pin	Signal	Label
CN5		11	A+	Motor encoder phase A frequency divider output
		12	A-	
		9	B+	Motor encoder phase B frequency divider output
		10	B-	
		7	Z+	Motor encoder phase Z frequency divider output
		8	Z-	
		5	OCZ	Motor encoder Z-signal OC output
		6	GND	Motor encoder Z-signal OF output reference ground
		3	/	/
		4	/	/
		1	PE	Shield grounding
		2	/	/

**X1 Main Power Supply Port**



Port	Pin	Functions	Remarks
X1	L1	Single phase 220VAC, +10 ~ -15%, 50/60Hz	① Optional isolation transformer ② Do not connect to 380VAC directly to prevent damage to driver. ③ In case of serious interference, it is recommended to connect a line filter to main power supply; <i>It is recommended to install a fuseless circuit breaker to cut off power supply in time when the driver fails.</i>
	L2		
	P +	① Internal DC bus positive terminal ② External regenerative resistor P terminal	Please refer to 2.4.1 Regenerative resistor selection and connections
	Br	External regenerative resistor terminal	
	N		Please do not connect
	U	Motor U terminal	Please ensure proper wire connection on motor.
	V	Motor V terminal	
	W	Motor W terminal	
	PE	Motor Protective Earth	Please ground PE of driver and motor together

## ELM1/ELM2 Series Servo Motor



## Motors availability

Power rating(W)		50	100	200	400	750	850	1000	1300	1500	1800	2000
Connector	Direct											
	Aviation											
Frame size (mm)	40											
	60											
	80											
	130											
Encoder 23-bit	Magnetic											
	Optical											
Rotational speed (rpm)	1500											
	2500											
	3000											

Ready soon!

\*All motor models come with optional holding brake.

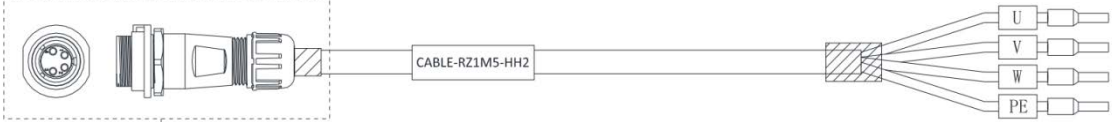
\*\*The table will be updated from time to time as we released new and updated models.



Cables

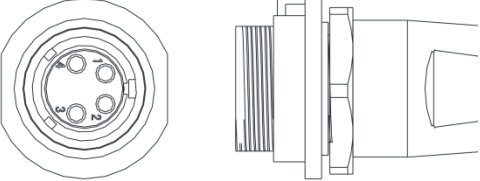
Motors without holding brake

Aviation connector (Frame size 80 or below) CABLE-RZ\*-HH2(V3.0)

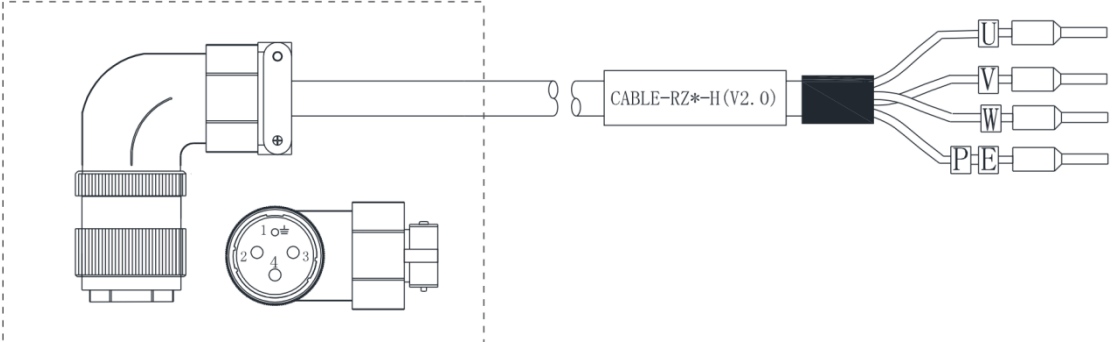


Motor side

Driver side

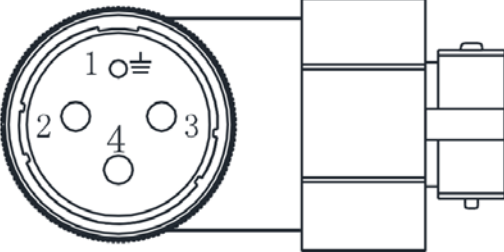
Motor cable pin	Pins															
 <p>Motor side</p>	<table><thead><tr><th>Motor</th><th>Color</th><th>Driver</th></tr></thead><tbody><tr><td>1</td><td>Blue</td><td>U</td></tr><tr><td>3</td><td>Black</td><td>V</td></tr><tr><td>2</td><td>Red</td><td>W</td></tr><tr><td>4</td><td>Yellow-green</td><td>PE</td></tr></tbody></table>	Motor	Color	Driver	1	Blue	U	3	Black	V	2	Red	W	4	Yellow-green	PE
Motor	Color	Driver														
1	Blue	U														
3	Black	V														
2	Red	W														
4	Yellow-green	PE														

Aviation connector (Frame size 130) CABLE-RZ\*H(V1.1/V2.0)

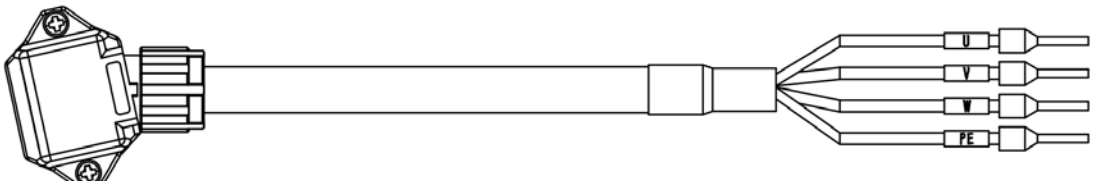


Motor side

Driver side

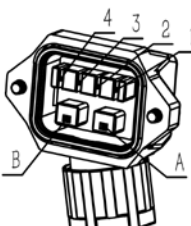
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Motor	Color	Driver														
1	Red	U														
3	Green	V														
2	Black	W														
4	Yellow	PE														

Direct connector(Frame size 80 or below) CABLE-RZH\*M\*-114-TS without holding brake



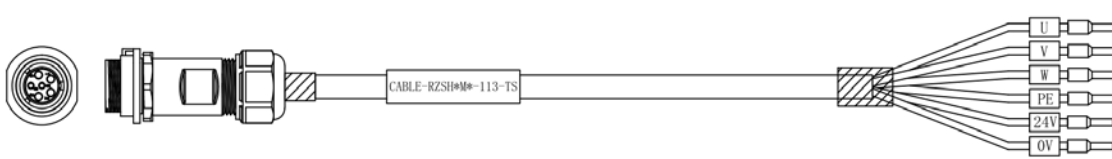
Motor side

Driver side

Driver cable pin	Pins															
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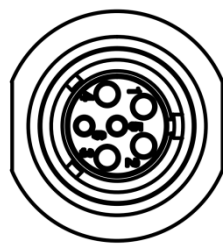
Motors with holding brake

Aviation connector (Frame size 80 or below) CABLE-RZSH\*M\*-113-TS Winding cable with holding brake

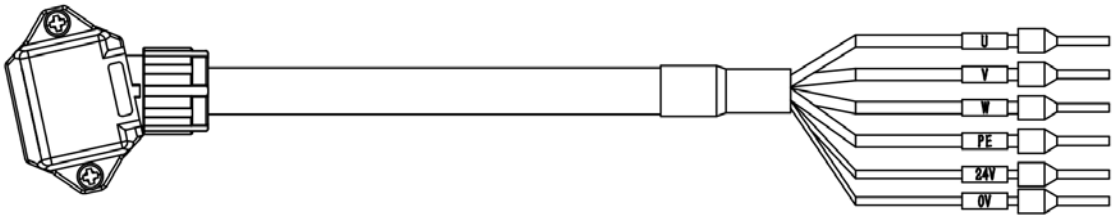


Motor side

Driver side

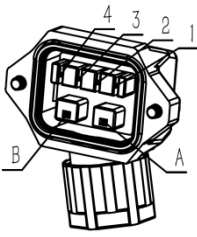
Motor cable pin	Pins																					
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3	Black	V																				
4	Yellow-green	PE																				
5	Black	0V																				
6	Red	24V																				

Direct connector CABLE-RZH\*M\*-114-TS Winding cable with holding brake



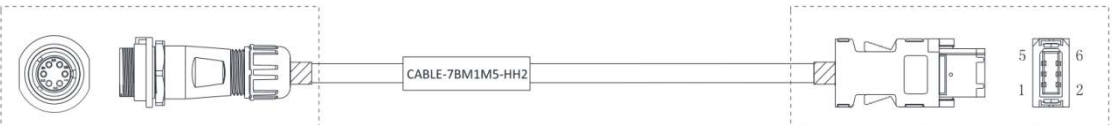
Motor side

Driver side

Motor cable pin	Pin																					
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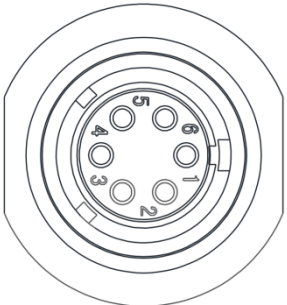
Encoder cable

Aviation connector (Frame size 80 or below) CABLE-7BM\*-HH2

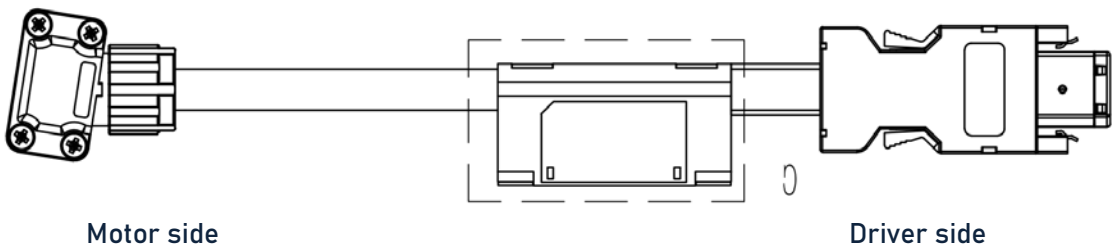


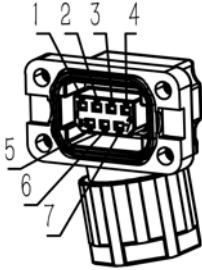
Motor side

Driver side

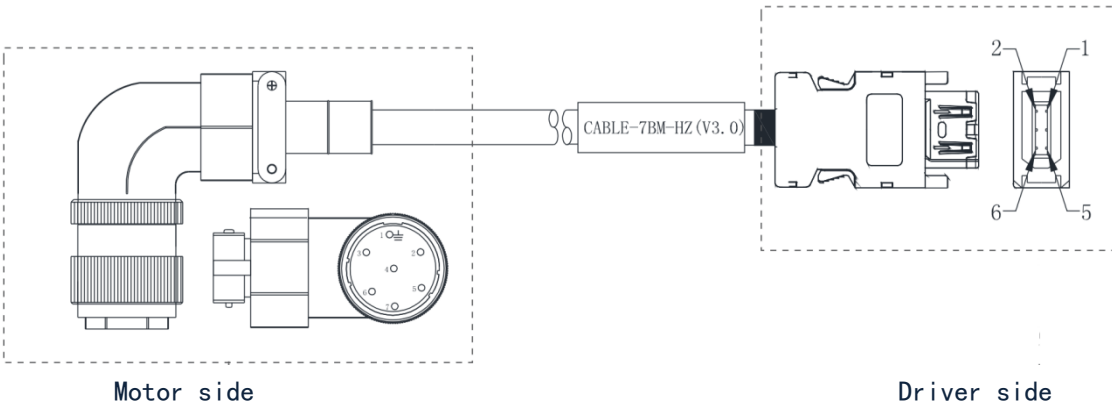
Motor cable pin	Pin																								
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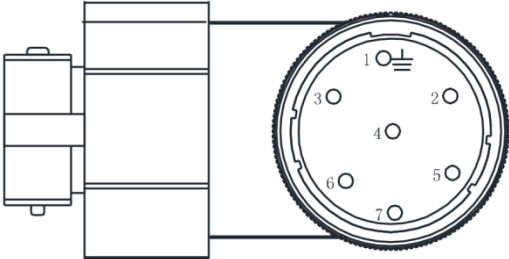
Direct connector(Frame size 80 or below ) CABLE-BMAH\*M\*-124-TS Absolute encoder



Motor cable pin	Pin		
 <p>Motor side</p>	Motor	Driver	Signal
	1	Frame	Shielded
	2	1	+5V
	3	2	0V
	4	5	SD+
	5	6	SD-
	6	3	BAT+
	7	4	BAT-

Aviation connector ( Frame size 130 ) CABLE-7BM\*HZ (V3. 0)



Motor cable pin	Pin		
 <p>Motor side</p>	Motor	Driver	Signal
	1	Frame	Shielded
	2	1	+5V
	3	2	0V
	4	5	SD+
	5	6	SD-
	6	3	BAT+
	7	4	BAT-