HIWIN®

Drives

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Note:
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Drives & Accessories

Drives

As well as linear and torque motors, the HIWIN product range includes suitable drives for the dynamic, high-precision positioning of belt and spindle axles. Drives are available in different versions for different applications.

Assembly instructions and catalogue for download

Here you can download the corresponding assembly instructions and the current catalogue as PDF files.

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Drive ED1

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- Step/direction, ±10 V, EtherCAT, PROFINET
- CE-, UL- and CSA-certified

Accessories for drive ED1

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- Cables
- Brake resistor
- Mains filter
- Excellent Smart Cube (ESC)

2. General information

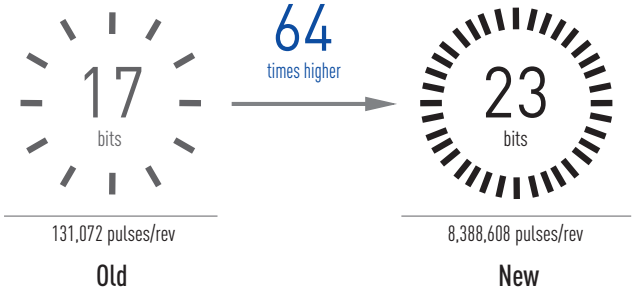
2.1 General information about HIWIN drive ED1

The HIWIN ED1 drives are specially matched to the HIWIN EM1 servomotors and HIWIN linear and torque motors. Different versions and power classes are available depending on the application.

- Power range from 400 W to 7,500 W
- Step/direction, ±10 V, EtherCAT, PROFINET
- Multi encoder interface (TTL, Analog sin/cos, EnDat 2.1/2.2., BiSS-C)
- Safety function STO (= Safe Torque Off)
- For AC servo, linear and torque motors

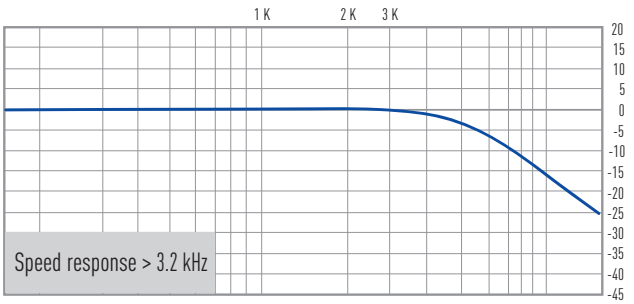
2.2 General properties of HIWIN drives ED1

- **Improved processing accuracy**



- **3.2 kHz speed response**

Higher speed response, faster settling and higher throughput.

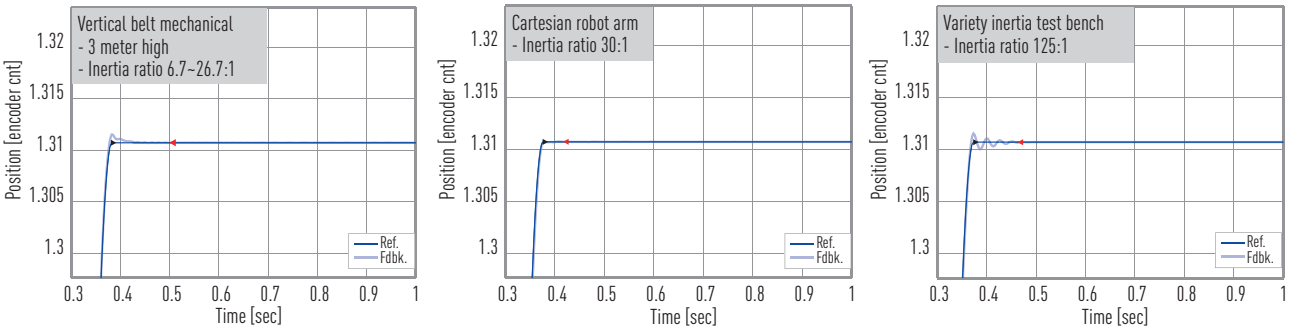


- **Support variety motors**

One drive type for linear motor, AC servo motor and direct-drive motor.

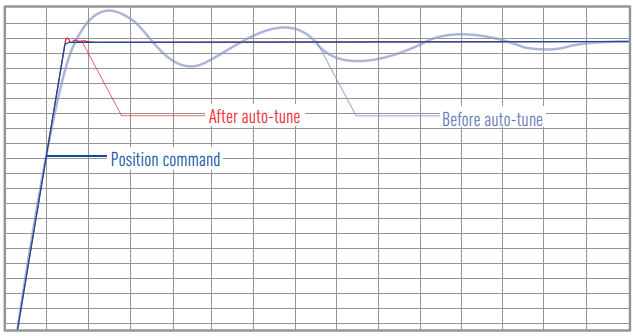
Tuneless function

Brings good performance and stable movement with inertia ratio up to 250:1. Adaptive gain tuning in accordance with load changes.



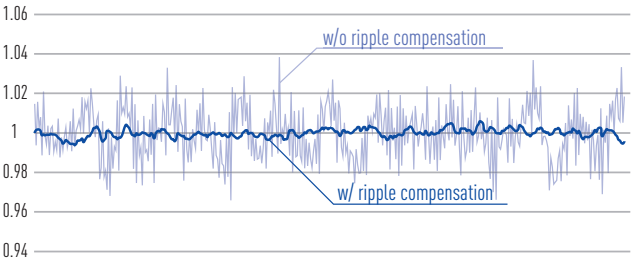
Advanced auto-tune function

Automatic gains tuning, filters adjustment, model following control activation, vibration and resonance suppression to optimize machine performance.



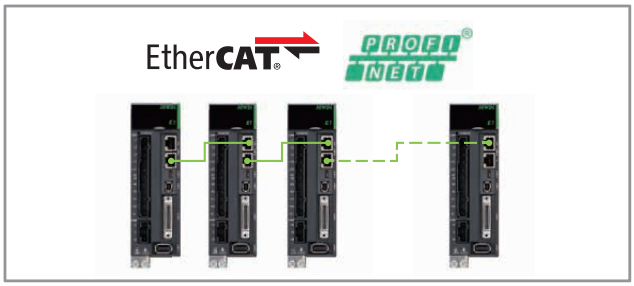
Ripple compensation

Delivers more smooth movement by reducing velocity ripple caused by motor cocking. Servo loop gains are not necessary to change.



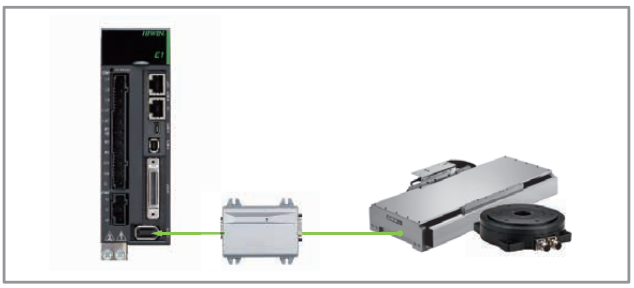
Network connectivity

Supports EtherCAT and PROFINET.

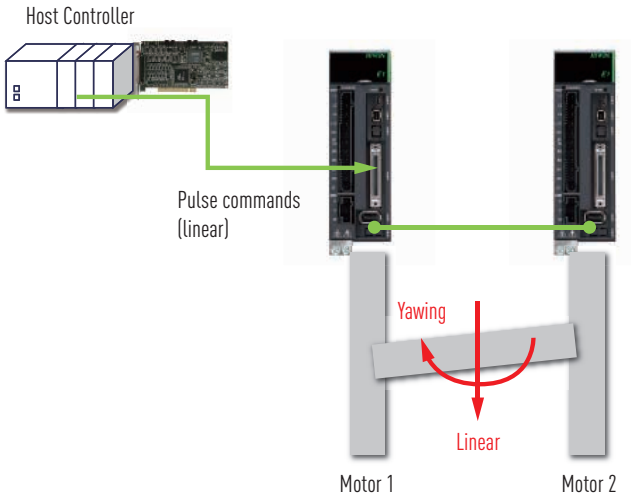


Feedback interface

Built-in digital AqB and serial encoder interface for Tamagawa encoder.
With the Excellent Smart Cube (ESC) resp. the encoder box E1 drive is able to support analogue SIN/COS, EnDat and BiSS-C encoder.



Gantry application
Combines two ED1 drives to realize gantry algorithm which contains linear and yawing control.



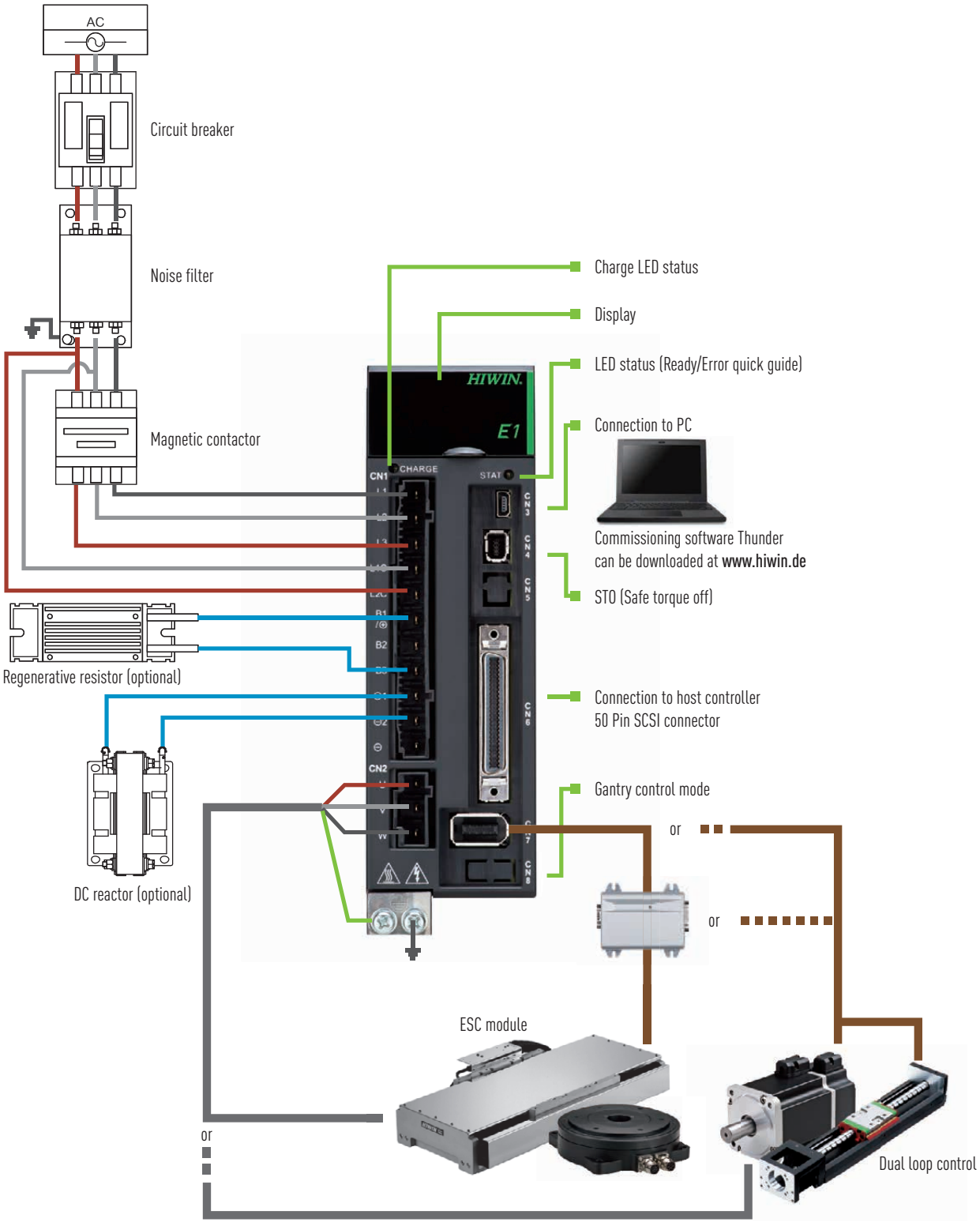
Built-in safe torque off (STO)
Motor power is cut-off when STO is activated.

3. ED1 drive

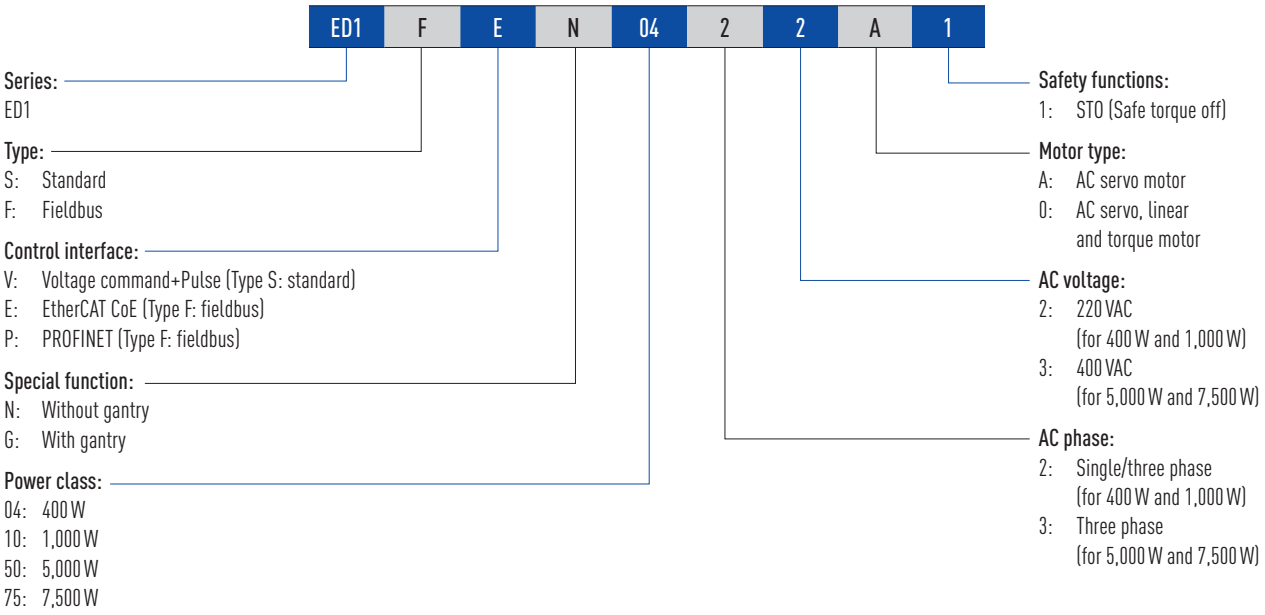
The ED1 vector-controlled, fully digital drive with STO safety function are specially adapted to the HIWIN EM1 servomotors and the HIWIN linear and torque motors. Particularly for multi-axis systems, the ED1 series offers a gantry mode function to position parallel axes dynamically, with high precision and synchronously.

This also applies to HIWIN belt and spindle axes.
Ready-made motor and encoder cables are available for easy installation and commissioning, as is the freely available HIWIN commissioning software "Thunder".

3.1 Interfaces ED1



3.2 Order code ED1



3.3 Technical data ED1

Table 3.1 **Technical data ED1**

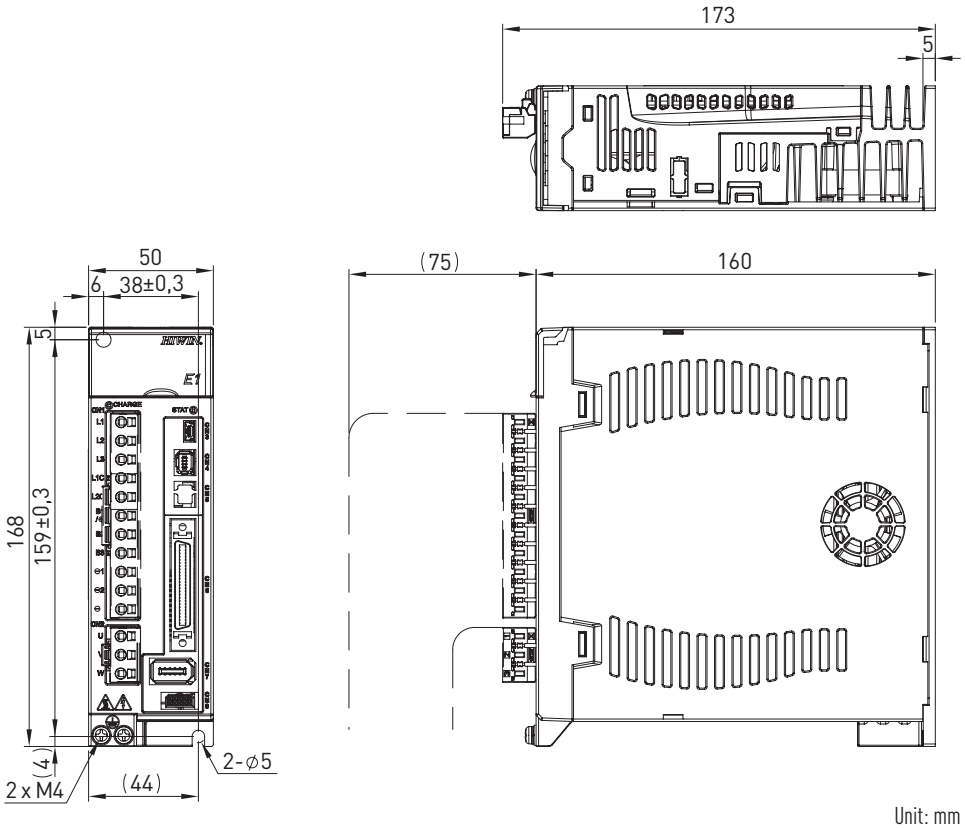
HIWIN ED1 drive	Rated output	400 W	1,000 W	5,000 W	7,500 W
Input power	**Rated voltage (line to line)**	1 Ø 100 – 120 VAC, 50 – 60 Hz 1 Ø 200 – 240 VAC, 50 – 60 Hz 3 Ø 200 – 240 VAC, 50 – 60 Hz		3 Ø AC 380 – 480 VAC, 50 – 60 Hz	
	Number of phases	1 or 3		3	
	Current	1.5 A_{eff}	5 A_{eff}	12.6 A_{eff}	17.6 A_{eff}
	Control power	1 Ø, 200 – 240 VAC, 50 – 60 Hz		DC 24 V ±15 %, 2 A	
Output power	**Phase voltage**	3 Ø, 240 VAC		3 Ø, AC 480 VAC	
	Rated power	400 W	1,000 W	5,000 W	7,500 W
	Peak current	10 A_{eff}	23.3 A_{eff}	42 A_{eff}	85 A_{eff}
	Rated current	2.5 A_{eff}	5.6 A_{eff}	16 A_{eff}	27.4 A_{eff}
	Cooling method	Fan cooling			
	Control method	IGBT PWM space vector control			
	PWM modulation frequency	16 kHz		8 kHz	
	Applicable motor	AC/DM/LM			
	STAT LED indicator	Red: error; green: servo ready			
	Built-in regenerative resistor	–	40 Ω/40 W	27 Ω/180 W	–
	Dynamic brake	Built-in dynamic brake, delay time of relay: 20 ms			
	Internal dynamic brake resistor	–	10 Ω	–	–
	Analogue output	Channel: 2, resolution: 12 bit, output voltage range: ±10 V, accuracy: ±2 %, max. output current: ±10 mA			
Control function					
Control mode	○ **Position mode** ○ **Velocity mode** ○ **Torque mode** ○ **Dual loop mode**				
Position mode	**Signal type**	Pulse/direction, CW/CCW, A/B phase			
	Max. input bandwidth	Differential: 5 Mpps, single-ended: 200 kpps			
	Electronic gear	Gear ratio: pulses/counts Pulses: 1 – 1,073,741,824 Counts: 1 – 1,073,741,824			

HIWIN ED1 drive	Rated output		400 W	1,000 W	5,000 W	7,500 W
Control function						
Velocity mode (analogue input)	Impedance		14 kΩ			
	Signal format		±10 VDC			
	Max. input bandwidth		100 Hz			
	Specification		16 bit			
Torque mode (analogue input)	Impedance		14 kΩ			
	Signal format		±10 VDC			
	Max. input bandwidth		100 Hz			
	Specification		16 bit			
Encoder feedback	Power supply		5.1 VDC ±5 %, 700 mA			
	Signal format		Serial signal – resolution: 23 bit (singleturn/multiturn absolute encoder). Bandwidth: 5 MHz Incremental signal – AqB and Z phase signals (digital differential TTL signal). The maximum input bandwidth of each phase is 5 MHz.			
	Safety function		Encoder power malfunction detection/short circuit protection/undervoltage protection/overvoltage protection			
	Position counting range		–2,147,483,648 – 2,147,483,647 (32 bit)			
	Linear motor/torque motor		Excellent smart cube (ESC) must be connected, depending on encoder type.			
Encoder output						
Emulated encoder Output	Z phase		1. Serial and digital (AqB) encoders are supported. 2. The width of output signal can be adjusted by parameter. 3. Differential signal output 4. Z phase open collector output is supported. 5. Two output methods can be selected. o Only outputs one Z phase signal for the total travel distance. o Outputs one Z phase signal per one revolution.			
	A/B phase		1. Serial and digital (AqB) encoders are supported. 2. Differential signal output. The maximum output bandwidth is 18 M counts/s. 3. The scaling of output can be adjusted. For instance, ten encoder counts = one emulated encoder count.			
	Computer communication Standard USB 2.0 (Mini USB)		Connect the drive with your computer to set parameters, monitor physical quantities and execute trial operations via Thunder.			
General purpose I/O	Input		The functions of general-purpose inputs (I1 – I10, photo coupler) can be defined by user. 24 V/5 mA (Each input pin)			
	Output		The functions of general-purpose outputs (O1 – O5, photo coupler) can be defined by user. 24 V/0.1 A (Each output pin)			
	Position trigger (PT)		The functions of general-purpose outputs (O1 – O5, photo coupler) can be defined by user. 24 V/0.1 A (Each output pin)			
Regenerative energy protection	Regenerative resistor		o Without built-in regenerative resistor o If needed, consider external regenerative resistor	o With built-in regenerative resistor o If necessary, external regenerative resistor can be extended	o With built-in regenerative resistor o If necessary, external regenerative resistor can be extended	o Without built-in regenerative resistor o If needed, consider external regenerative resistor
	AC 200 – 240 VAC	Protection of regenerative resistor enable	+HV >370 VDC	+HV >370 VDC	–	–
	AC 200 – 240 VAC	Protection of regenerative resistor disable	+HV <360 VDC	+HV <360 VDC	–	–
	AC 380 VAC	Protection of regenerative resistor enable	–	–	+HV >620 VDC	+HV >620 VDC
	AC 380 VAC	Protection of regenerative resistor disable	–	–	+HV <600 VDC	+HV <600 VDC

HIWIN ED1 drive	Rated output		400 W	1,000 W	5,000 W	7,500 W
Encoder output						
Regenerative energy protection	**AC 480 VAC**	**Protection of regenerative resistor enable**	—	—	+HV > 770 VDC	+HV > 770 VDC
	AC 480 VAC	**Protection of regenerative resistor disable**	—	—	+HV < 755 VDC	+HV <755 VDC
	Overvoltage Protection		390 VDC	390 VDC	800 VDC	800 VDC
Environment	**Insulation voltage**		1,500 VAC (1 min)			
	Operating temperature		0 °C – 45 °C		0 °C – 40 °C	
	Storage temperature		–20 °C – 65 °C			
	Humidity		Operating and storage temperature: 20 to 85 % RH (Non-condensing)			
	Altitude		Altitude 1,000 m or lower above sea level			
	Vibrating		Less than 5.88 m/s^2, 10 to 600 Hz (no continuous operation at resonant frequency)			
	IP rating		IP20			

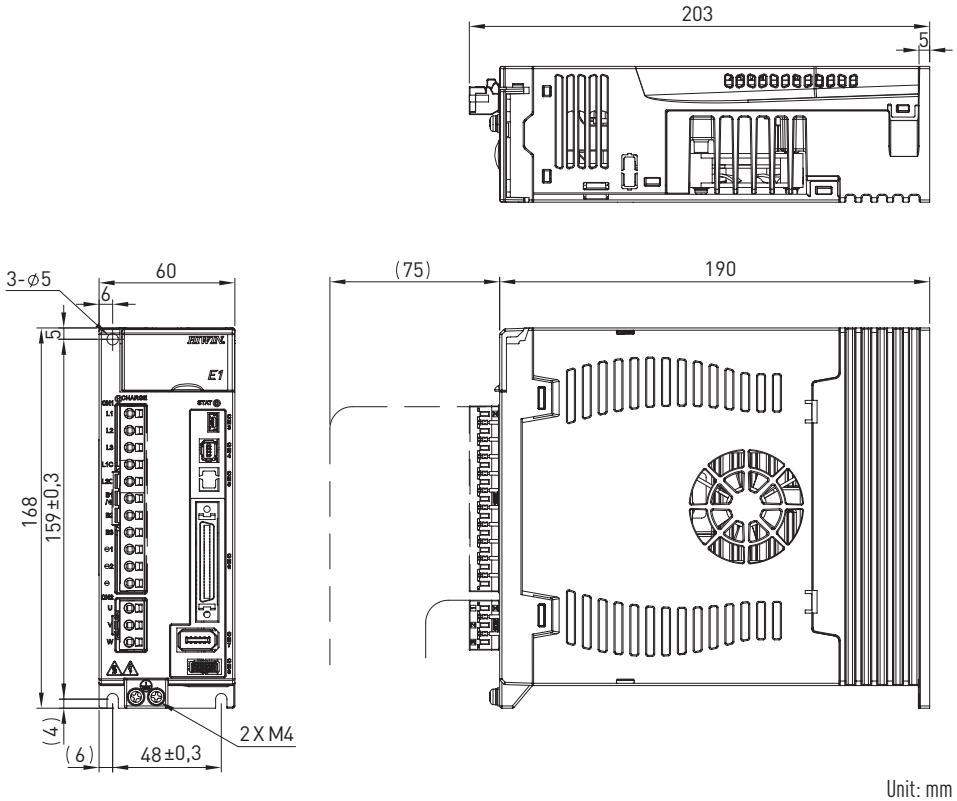
3.4 Dimensions ED1 (standard version)

- **ED1S – 400 W**



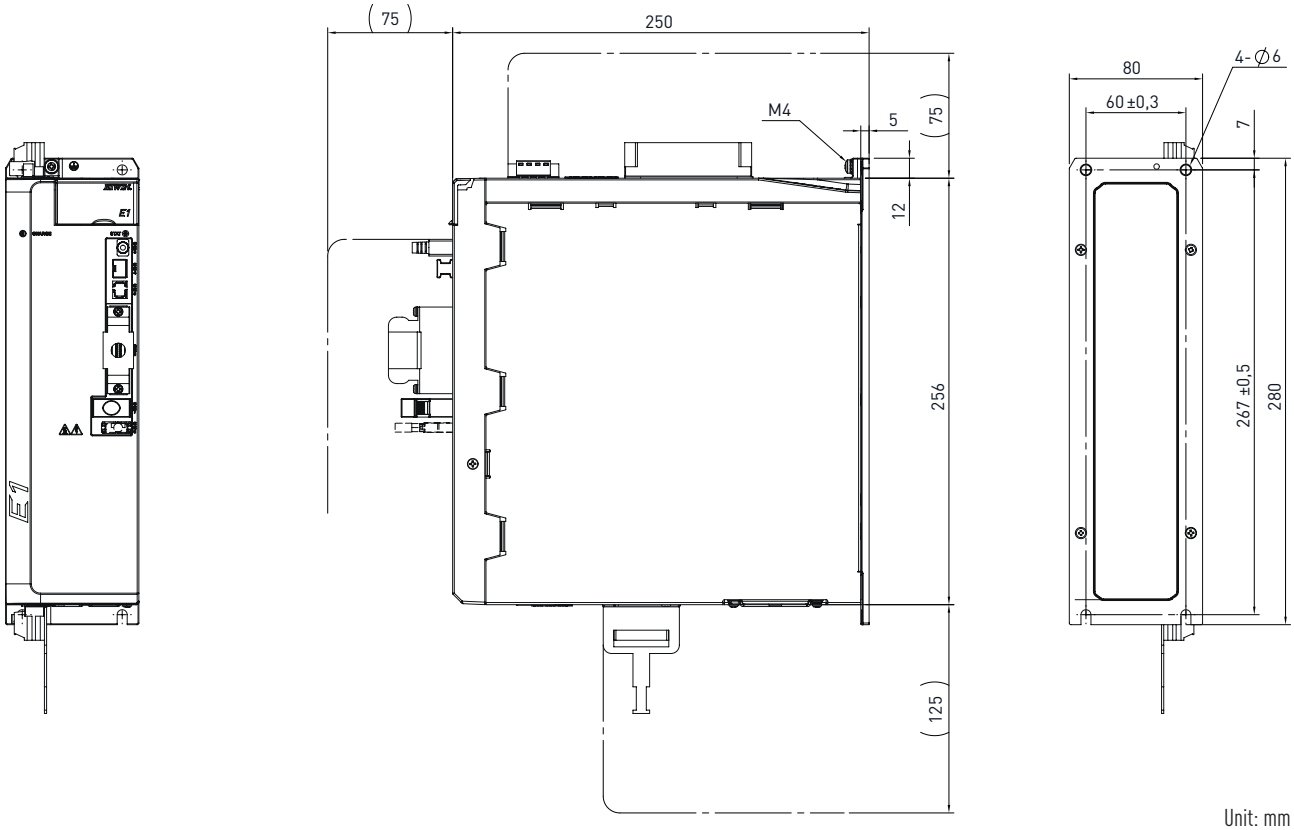
Unit: mm

- **ED1S – 1,000 W**



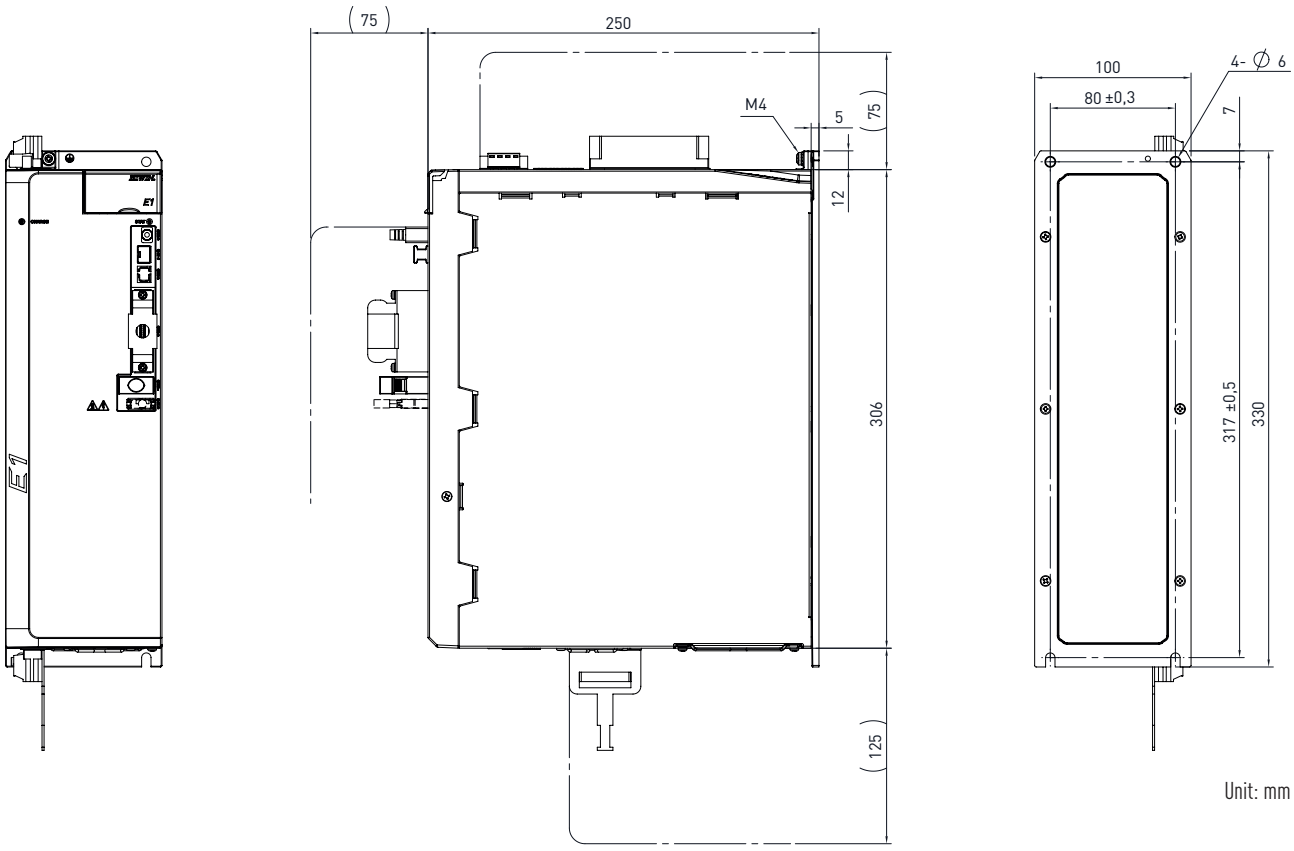
Unit: mm

ED1S – 5,000 W



Unit: mm

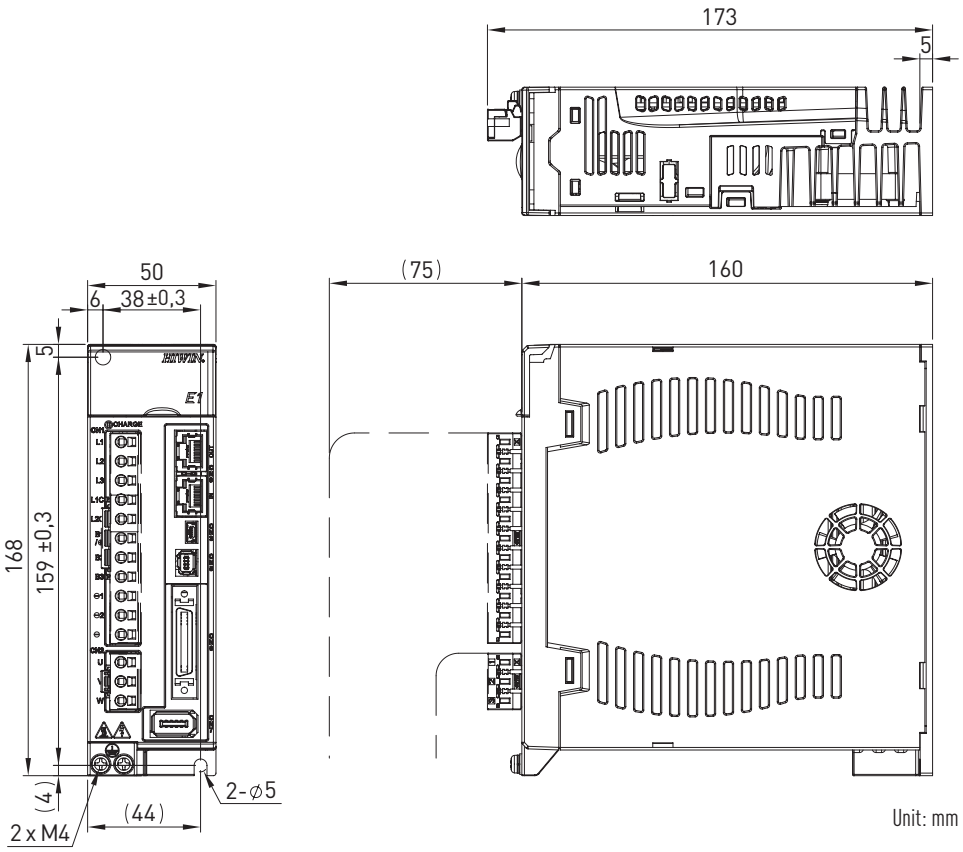
ED1S – 7,500 W



Unit: mm

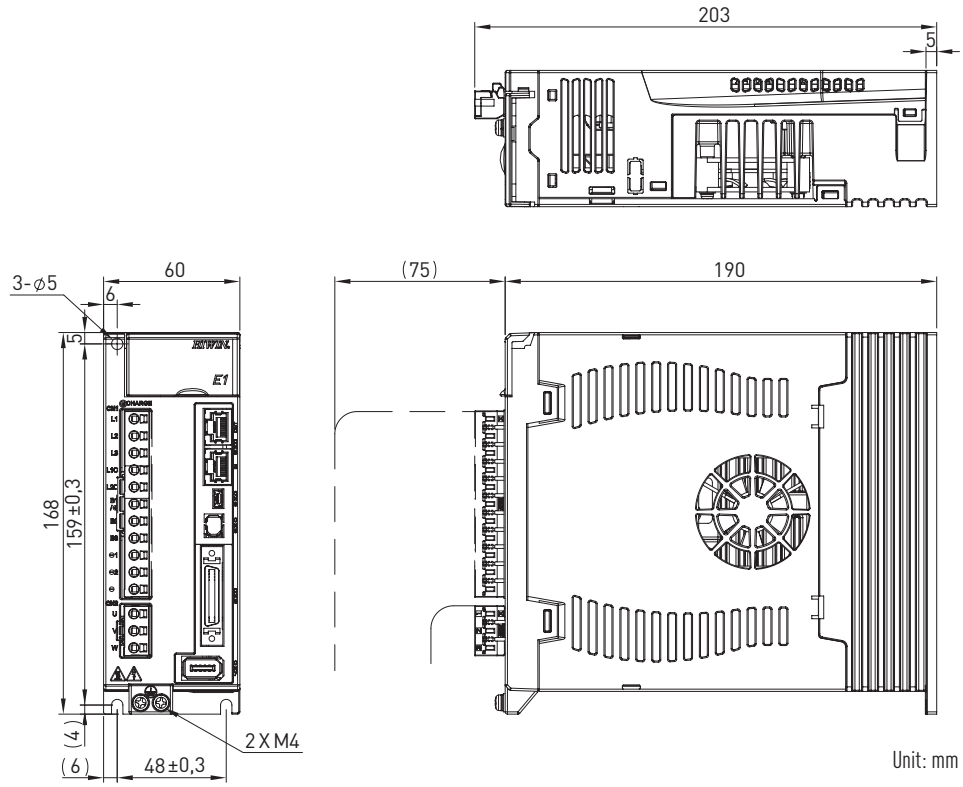
3.5 Dimensions ED1 (fieldbus)

- **ED1F – 400 W**



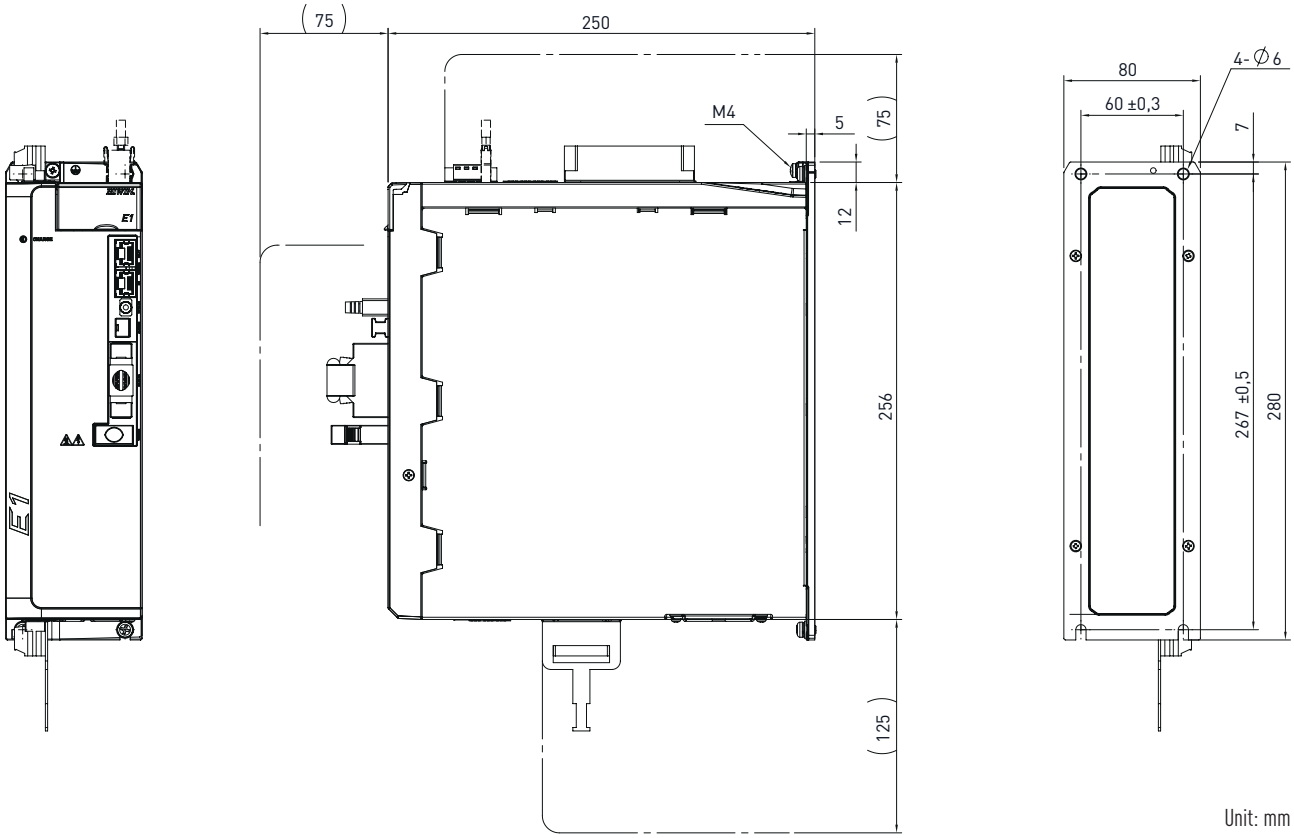
Unit: mm

- **ED1F – 1,000 W**



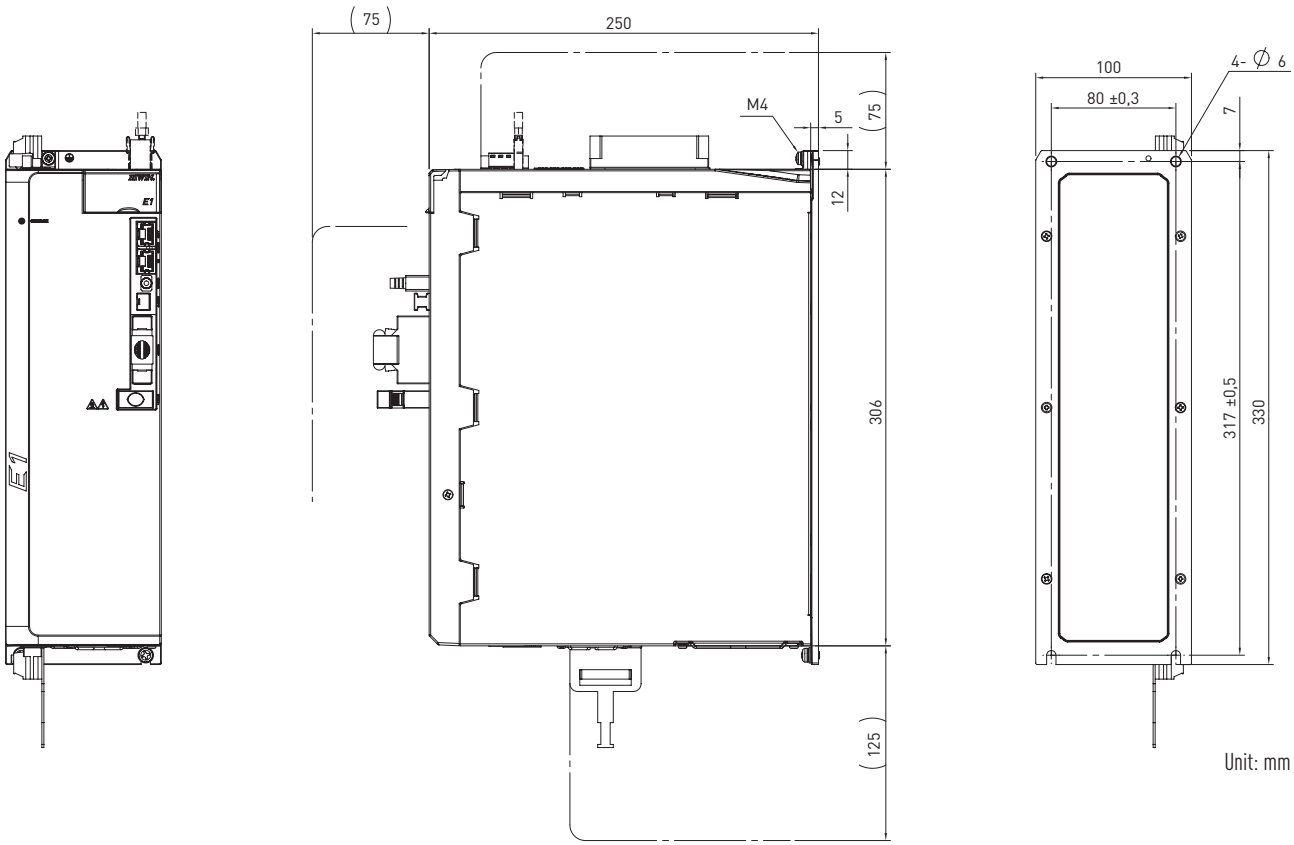
Unit: mm

ED1F – 5,000 W



Unit: mm

ED1F – 7,500 W

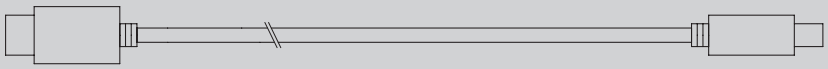
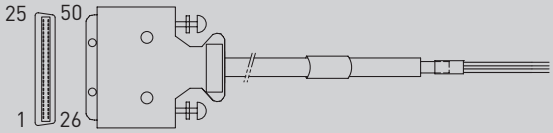
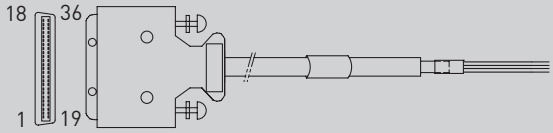


Unit: mm

3.6 Accessories ED1

3.6.1 Cables

Table 3.2 **Cables for ED1 drive**

Article number	Designation	Connector	Figure	Length
8-10-0864	USB parameterisation cable	CN3		2 m
8-10-1619	50-pin I/O cable for ED1S (standard)	CN6		3 m
8-10-1608	36-pin I/O cable for ED1F (fieldbus)	CN6		3 m

3.6.2 Brake resistor

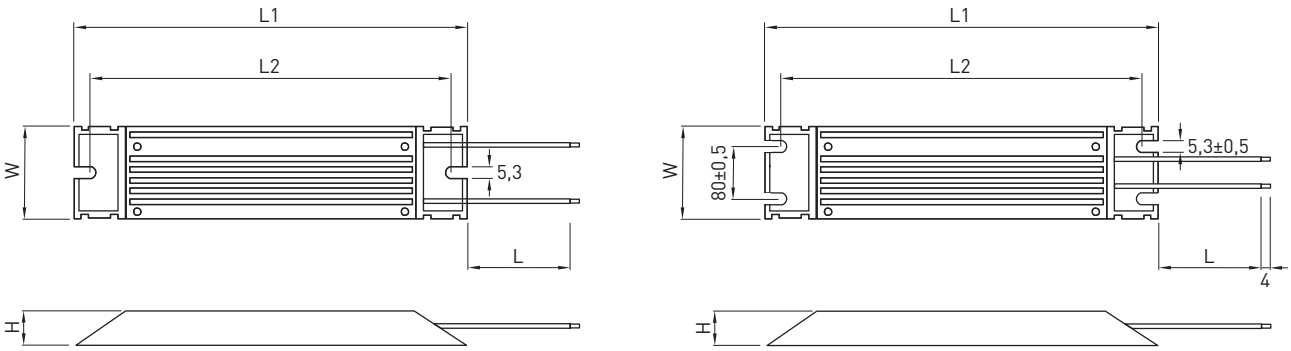


Table 3.3 **Brake resistor for ED1 drive**

Article number	Designation	Resistance [Ω]	Nominal power [W]	L [mm]	L1±2 [mm]	L2±2 [mm]	W [mm]	H [mm]
050100700001	Brake resistor	68	100	500	165	150	40 ±0,5	20 ±0,5
050100700004	Brake resistor	190	1,000	200±20	400	385	100 ±1	50 ±1

Unit: mm

3.6.3 Mains filter

Table 3.4 **Mains filter for ED1 drive**

Article number	Designation	Type	Nominal current [A]	Leakage current [mA]
8-09-0670	ED1 mains filter, 1-phase, 400 to 1,000 W	FN2090-10-06	10	0.67
80029045	ED1 mains filter, 3-phase, 5,000 W	FN3270HQ1-20-44	20	0.40
80029046	ED1 mains filter, 3-phase, 7,500 W	FN3270HQ1-35-33	35	0.40

3.6.4 Excellent Smart Cube (ESC)

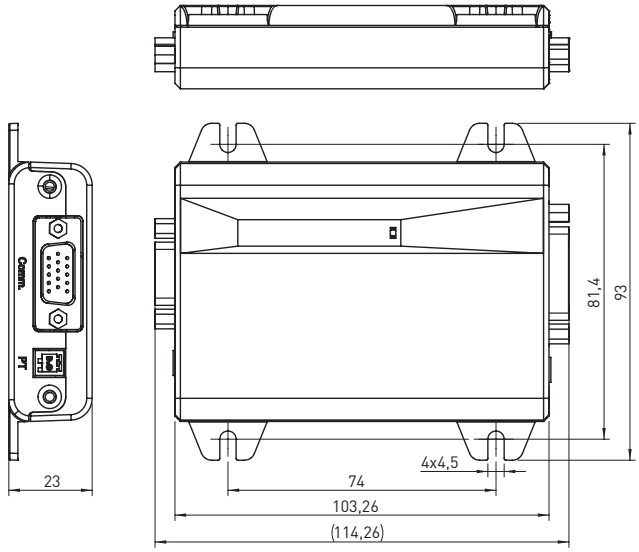
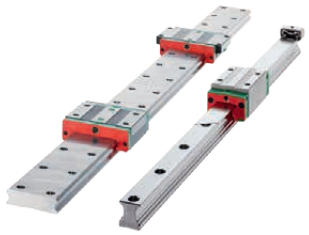


Table 3.5 **Technical data ESC**

Power supply voltage	+5 VDC ±5 %					
Max. input current	1000 mA					
Max. output current	650 mA					
	Digital halls	Incremental		Absolute		
Encoder type	Hall U/V/W	SIN/COS/reference	A/B/index	BiSS-C	EnDat 2.1 / 2.2	Tamagawa
Signal frequency	2 kHz	1 MHz	4 MHz	5 MHz	4 MHz	5 MHz
Signal resolution	—	The multiplier factor is 4096	—	32 bits (ST+MT)		
Input signal format	5 VDC CMOS/TTL	Differential (RS422)		Differential (RS485)		
Motor thermal protection	PTC					
Operating temperature	0 °C to +45 °C					
Storage temperature	–20 °C to +65 °C					
IP level	IP20					

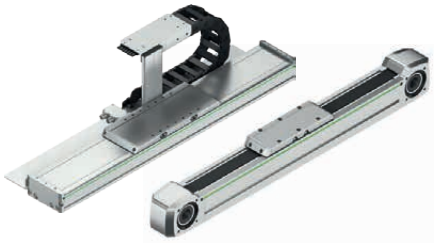
Notes

We live motion.

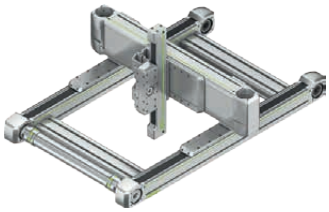


Linear Guideways

Ballscrews



Linear Axes



Linear Axis Systems

Torque Motors

Robots

Linear Motors

Rotary Tables

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