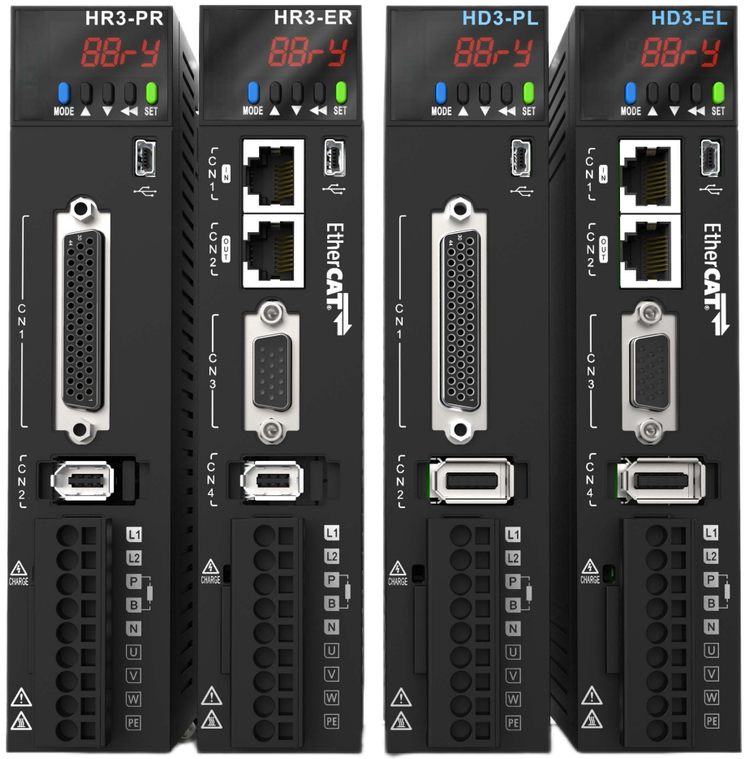


H3 Smart Drive

More flexible and competitive servo solutions!

H3

Smart Series

Smart = **S**imple **m**aster **s**tate-of-the-**a**rt

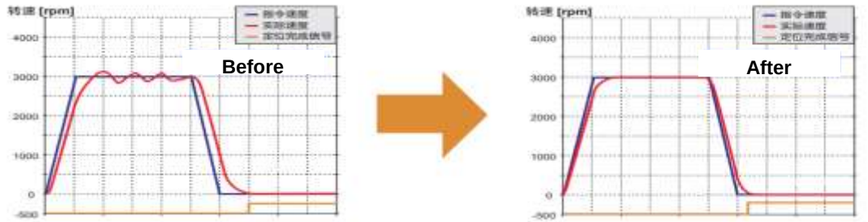
Drive

"H3 Smart Drive" , the intelligent AC servo system, has two product series including HR3 rotary servo system and HD3 direct drive servo system. With the unified technology development platform of Huachuang, H3 series inherited the excellent algorithm of H5 series, taking into account the performance and more economical structural design.

Therefore, H3 can meet the customer's demand for cost-effective servo products and excellent performance of the whole equipment, by which can help customers boost their own competitiveness! H3 can meet the application scenarios of laser, woodworking and other industries with the needs of high reliability and high stability.

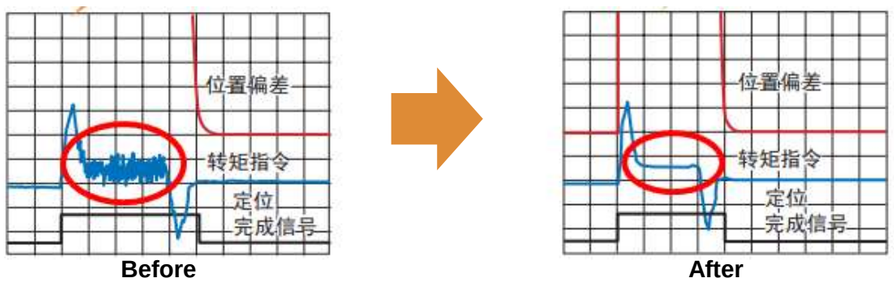
Auto-tuning by one click

- No need for the principle of servo tuning, users can save 90% of tuning time by clicking atuo-tuning, because H3 has eliminated the complex parameter tuning link.
- There are two auto-tuning loop-parameter funtions built in H3, "single parameter" and "self-adjustment", based on the driver gain parameter self-tuning algorithm. It can automatically identify the load inertia ratio and set the gain and other parameters, which greatly reduces the time of servo tuning.



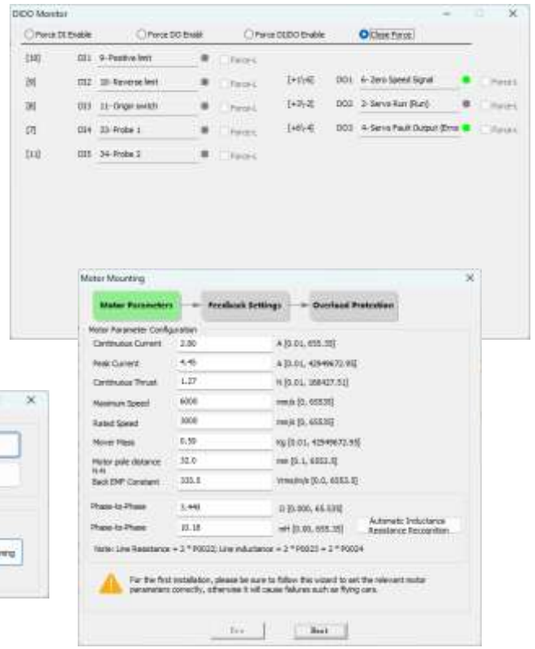
Auto Vibration Suppression

- H3 can perfectly solve the vibration problems in various frequency bands with built-in adaptive notch filters, torque low-pass filters, input shaping filters and position-instruction notch filters.
- It can effectively suppress the low frequency vibration of 100 ~ 1000Hz and the high frequency vibration of 1K-4KHz caused by the system.



User-friendly Software

- **DriverStart** is a software of servo tuning for the all Huatron servo series. This guided, visual software assistant, coupled with excellent servo self-tuning technology, can easily help the customer's technicians reach the level of tuning technology with **3 years of experience**.



- All tuning of H3 servo can be completed in just ***10min***.

从初学到精通，只需一步！

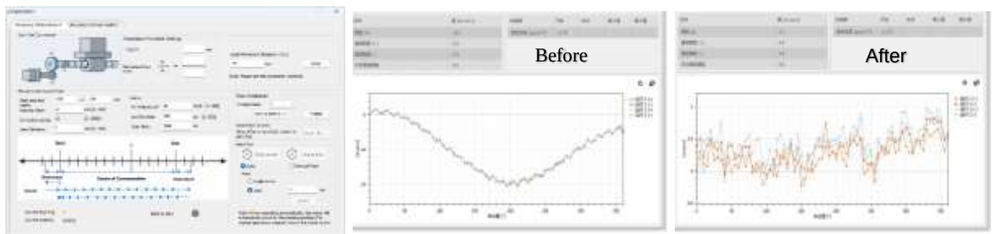
From beginner to master, just one step !

Easy Tuning by Networking

- It has FOE (File Access over Ethercat) function, and can also tune multiple servo drivers through the **DriverStart** , which is quite convenient and fast!
  - Parameter modification for multiple axes.
  - Parameter configuration preservation for multiple axes.
  - Comparison of parameters between axes
  - Interaxial parameter replication

Positioning Error Compensation

- H3 servo system, with built-in positioning error compensation function, can achieve compensation motion control through the **DriverStart** , free from the dependence on the host controller. Besides, H3 supports multiple laser interferometer files import, and the maximum compensation amount is up to 2000 points.
- This function can also eliminate the deviation between the actual position of the motor and the position message from linear encoder, thus improve the positioning accuracy of the equipment.
- In addition to the application in linear motor, this function also supports the screw lead compensation and the synchronous belt gap compensation.



state-of-the-art 前瞻

H3 Servo adopts the new FPGA architecture, the fastest hardware three-loop algorithm in China, which makes full use of the parallel processing capability of FPGA to achieve high-precision and high-response motion control of the servo system!

H3 Series Servo adopts New 16bit digital hardware current loop design, and its velocity loop response frequency is **3Khz**

This system comes standard with 17bit magnetic and 23bit optical encoder. Meanwhile the driver can match with 300%-overload-capacity servo motors, which can meet the demand of higher speed and higher torque in laser and semiconductor industries.

3KHZ
velocity loop response frequency

17BIT
magnetic encoder

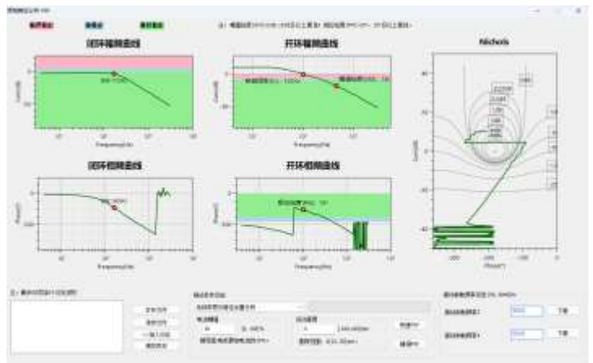
23BIT
optical encoder

6000 low power rpm
300 MAX%

4000 high power rpm
250 MAX%

- Its function of frequency respond analysis is based on Bode Diagram or Nyquist Diagram, with Bode Diagram supporting three modes of speed closed loop, speed open loop and mechanical characteristic.
- Among them, Nyquist diagram and velocity open loop can be used to judge the stability of the system and analyze the stability margin. The velocity closed-loop can be used to analyze the closed-loop bandwidth of the system, and the mechanical characteristics can automatically identify the resonance point and anti-resonance point. The function can help users design the optimal servo control gain and filtering parameters.
- Time Respond Tuning: Through advanced algorithms, users can quickly adjust parameters to achieve optimal performance, so as to achieve extreme response speed and dynamic performance.
- Frequency Respond Tuning: Through frequency respond analysis, the system is comprehensively scanned to accurately identify and optimize the performance of each frequency band to ensure the long-term reliability and stability of the system.

Tuning by two Respond



HR3 AC

Servo Drive

Naming Rule

HR3 - E R 5R5 S2

① ② ③ ④ ⑤

1	Product Series
HR3	Series

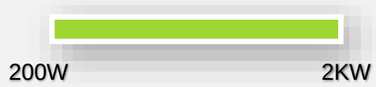
2	Command Type
P	Pulse
E	EtherCAT

3	Motor Type
R	PMSM Servo Motor

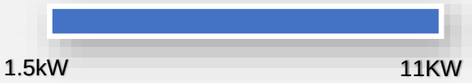
4	Rated Output Current	
S2/AC 220V		
1R6	1.6A	200W
2R8	2.8A	400W
5R5	5.5A	750W
7R6	7.6A	1KW
012	11.6A	1.5KW
014	14.0A	2KW
T3/AC 380V		
5R4	5.4A	1.5KW
8R4	8.4A	2KW
010	10.0A	3KW
017	16.5A	5KW
021	20.8A	6KW
026	26.0A	7.5KW
030	30.0A	11KW

5	Voltage Specifications
S2	Single-phase /Three-phase 220V
T3	Three-phase 380V

- **AC220V**



- **AC380V**



The power of HR3 AC servo drive ranges from 200W to 11KW.

Specification configuration

HR3 Functional Configuration	Pulse/Analog	EtherCAT
	HR3-P	HR3-E
I/O	8DI/5DO	5DI/3DO
Analog	2AI	-
Emulated Encoder Output	√	-
RS485	√	-
PCOM	in development	in development
DB	√	√
STO	-	Optional

AC 220V General Specifications

Structure Size	Size-A		Size-B		Size-C	
Driver Type: HR3*******	1R6S2	2R8S2	5R5S2	7R6S2	012S2	014S2
Rated Power	200W	400W	750W	1KW	1.5KW	2KW
Rated Output Current (Arms)	1.6	2.8	5.5	7.6	11.6	14.0
Maximum Output Current (Arms)	5.8	10.1	16.9	23.0	32.0	42.0
Rated Input Current (Arms)	Single-phase 2.3	Single-phase 4.0	Single-phase 7.9	Single-phase 9.6	Single-phase 12.8	Single-phase 16.0
					Three-phase 8.0	Three-phase 10.2
Built-in Regenerative Resistance	none		none	none	25Ω/80W	
Control Power Specification	none					
Main Power Supply	Single-phase AC200V-240V，-10%-+10%，50/60Hz				Single-phase /Three-phase AC200V-240V，-10%-+10%，50/60Hz	

AC 380V General Specifications

Structure Size	Size-C			Size-D			
Driver Type: HR3*******	5R4T3	8R4T3	010T3	017T3	021T3	026T3	030T3
Rated Power	1.5KW	2KW	3KW	5KW	6KW	7.5KW	11KW
Rated Output Current (Arms)	5.4	8.4	10.0	16.5	20.8	26.0	30
Maximum Output Current (Arms)	14.0	20.0	25.0	41.3	52.1	65.0	90
Rated Input Current(Arms)	3.6	6.6	8.0	12.0	16.0	21.0	30
Built-in Regenerative Resistance	50Ω/80W			35Ω/100W			
Control Power Specification	none			Single-phase AC380V-440V，-10%-+10%，50/60Hz			
Main Power Supply	Three-phase AC380V-440V，-10%-+10%，50/60Hz						

Items			Specifications
General Specifications	Control Mode		IGBT PWM control, sine wave current drive mode
			220V, 380V: Single-phase/Three-phase full-wave rectification
	Conditions of Usage	Usage/Storage Temperature Note 1	0～+40℃ / -20～+70℃
		Usage/Storage Humidity	below 90%RH (non-freezing)
		Vibration resistance/Shock resistance	4.9m/s^2 / 19.6m/s^2
		IP rating	IP20
		Pollution degree	PD2
		Altitude	The maximum altitude is 5000 m. ● For altitudes not higher than 1000 m, derating is not required. ● For altitudes above 1000 m, derate 1% for every additional 100m. ● For altitudes above 2000 m, contact Huarton.
Position Control Mode	Performance	Feedforward compensation	0.0% to 100.0% (resolution: 0.1%)
		Command shaping	Position instruction low-pass filtering, average filtering.
	Emulated Encoder Output	Output form	Pulse Type: Phase A/Phase B: differential output Phase Z: differential output or open collector output no emulated encoder output for HR3-ER(EC type)
		Frequency division range	The motor rotates one circle, and the frequency can be divided into any pulse in the range of 140 to 1048576.
Speed/ Torque control mode	Performance	Dynamic characteristics of current loop	Step response: 187.5μs (0-100%); Sin/cos response: -3dB amplitude attenuation bandwidth, 2000Hz (command signal: ±25%); -90° phase shift bandwidth, 3500Hz (command signal: ±25%);
		Speed control range	The speed ranges from 0 to 12000rpm. If the speed exceeds 6000rpm, contact Huatron.
		Dynamic characteristics of velocity loop	Step response: 562.5μs (0~1000rpm) Sin/cos response: -3dB amplitude attenuation bandwidth, 1000Hz (command signal: ±500rpm); -90° phase shift bandwidth, 630Hz (command signal: ±500rpm);
		Torque control precision	±2%
Input/ Output signal	Digital input (DI) signal		Functions can be configured: forward overrange switch, reverse overrange switch, origin switch, etc.
	Digital output (DO) signal		Functions can be configured: servo ready, zero speed signal, speed arrival, position arrival, warning, servo fault, etc.
Built-in functions	Electronic gear ratio		Built-in two sets of electronic gear ratio, support gear ratio switching function.
	Overtravel (OT) prevention		The drive stops immediately when P-OT or N-OT signal is activated.
	Protective functions		Including protections against overcurrent, overvoltage, undervoltage, overload, heatsink overtemperature, overspeed, encoder error, and parameter error...
	LED display		Main circuit CHARGE indicator, 5-bit LED display
	Vibration suppression		Four notches (including two adaptive notches) available, 50Hz~5000Hz.
	Usability functions		Adaptive parameter tuning, speed observer, and model tracking.
	Others		Status display, fault log, jog
	Connection device		Mini-USB

Note 1: Please install or store the servo drive within this temperature range.

HD3 Linear

Servo Drive

Naming Rule

HD3 - E L 006 S2

① ② ③ ④ ⑤

1	Product Series
HD3	Series

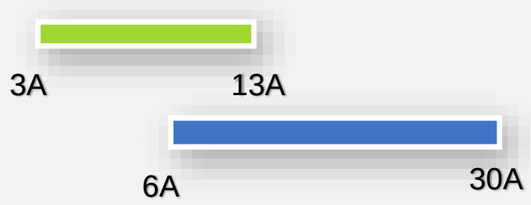
2	Command Type
P	Pulse
E	EtherCAT

3	Motor Type
L	linear motor/ torque motor

4	Rated Output Current
S2 /AC 220V	
003	3.0A
006	6.0A
010	10.0A
013	13.0A
T3 /AC 380V	
006	6.0A
010	10.0A
024	24.0A
030	30.0A

5	Voltage Specifications
S2	Single-phase /Three-phase 220V
T3	Three-phase 380V

- **AC220V**
- **AC380V**



The rated output current of HD3 linear servo drive ranges from 3A to 30A.

Specification configuration

HD3 Functional Configuration	Pulse/Analog	EtherCAT
	HD3-P	HD3-E
I/O	8DI/5DO	5DI/3DO
Analog	2AI	-
Emulated Encoder Output	√	-
PCOM	in development	√
RS485	√	-
DB	√	√
A/B/Z linear encoder	√	√
BISS-C linear encoder	√	√
Tamagawa linear encoder	√	√
Hall Detection	-	-
STO	-	Optional

AC 220V General Specifications

Structure Size	Size-A	Size-B	Size-C	
Driver Type: HD3********	003S2	006S2	010S2	013S2
Rated Output Current (Arms)	3.0	6.0	10.0	13.0
Maximum Output Current (Arms)	9.0	18.0	28.0	28.0
Rated Input Current(Arms)	Single-phase 5.0	Single-phase 10.0	Single-phase 17.2	Single-phase 22.4
	Three-phase 2.4	Three-phase 5.8	Three-phase 10.0	Three-phase 13.0
Built-in Regenerative Resistance	none	50Ω/50W	25Ω/80W	
Control Power Specification	none			
Main Power Supply	Single-phase AC200V-240V，-10%-+10%，50/60Hz		Single-phase /Three-phase AC200V-240V，-10%-+10%，50/60Hz	

AC 380V General Specifications

Structure Size	Size-C		Size-D	
Driver Type: HD3********	006T3	010T3	024T3	030T3
Rated Output Current (Arms)	6.0	10.0	24.0	30.0
Maximum Output Current (Arms)	18.0	25.0	72.0	90.0
Rated Input Current(Arms)	5.7	8	24.0	30.0
Built-in Regenerative Resistance	50Ω/80W		35Ω/100W	
Control Power Specification	none		Single-phase AC380V-440V，-10%-+10%，50/60Hz	
Main Power Supply	Three-phase AC380V-440V，-10%-+10%，50/60Hz			

Items			Specifications	
General Specifications	Control Mode		IGBT PWM control, sine wave current drive mode	
			220V, 380V: Single-phase/Three-phase full-wave rectification	
	Conditions of Usage	Usage/Storage Temperature Note 1	0～+40℃ / -20～+70℃	
		Usage/Storage Humidity	below 90%RH (non-freezing)	
		Vibration resistance/Shock resistance	4.9m/s2 / 19.6m/s2。	
		IP rating	IP20	
		Pollution degree	PD2	
		Altitude	The maximum altitude is 5000 m. ● For altitudes not higher than 1000 m, derating is not required. ● For altitudes above 1000 m, derate 1% for every additional 100m. ● For altitudes above 2000 m, contact Huarton.	
Position Control Mode	Performance	Feedforward compensation	0.0% to 100.0% (resolution: 0.1%)	
		Command shaping	Position instruction low-pass filtering, average filtering.	
	Emulated Encoder Output	Output form	Pulse Type: Phase A/Phase B: differential output Phase Z: differential output or open collector output	no emulated encoder output for HR3-ER(EC type)
		Frequency division range	DDL	The motor runs at a pole distance, which can be divided into any pulse in the range of 140 to P0105 [Pole distance pulse number (N-N)].
		Dynamic characteristics of current loop	DDR	The motor rotates one circle, and the frequency can be divided into any pulse in the range of 140 to 1048576.
Speed/ Torque control mode	Performance	Speed control range	DDL	Step response: 125μs (0-100%); Sin/cos response: -3dB amplitude attenuation bandwidth, 4000Hz (command signal: ±15%); -90°phase shift bandwidth, 8000Hz (command signal: ±15%);
		Dynamic characteristics of velocity loop	DD	Step response: 187.5μs (0-100%); Sin/cos response: -3dB amplitude attenuation bandwidth, 2000Hz (command signal: ±25%); -90°phase shift bandwidth, 3500Hz (command signal: ±25%);
		Torque control precision	DD	Step response: 10ms (0-1000mm/s); Sin/cos response: -3dB amplitude attenuation bandwidth, 1500Hz (command signal: ±50mm/s); -90°phase shift bandwidth, 8000Hz (command signal: ±50mm/s);
		Usage/Storage Humidity	DD	Step response: 562.5μs（0~1000rpm）; Frequency response: -3dB amplitude attenuation bandwidth, 2000Hz (command signal: ±500rpm); -90°phase shift bandwidth, 630Hz (command signal: ±500rpm);
		Vibration resistance/Shock resistance	±2%	
Input/ Output	Digital input (DI) signal		Functions can be configured: forward overrange switch, reverse overrange switch, origin switch, etc.	
	Digital output (DO) signal		Functions can be configured: servo ready, zero speed signal, speed arrival, position arrival, warning, servo fault, etc.	
Built-in functions	Electronic gear ratio		Built-in two sets of electronic gear ratio, support gear ratio switching function.	
	Overtravel (OT) prevention		The drive stops immediately when P-OT or N-OT signal is activated.	
	Protective functions		Including protections against overcurrent, overvoltage, undervoltage, overload, heatsink overtemperature, overspeed, encoder error, and parameter error...	
	LED display		Main circuit CHARGE indicator, 5-bit LED display	
	Vibration suppression		Four notches (including two adaptive notches) available, 50Hz~5000Hz.	
	Usability functions		Adaptive parameter tuning, speed observer, and model tracking.	
	Others		Status display, fault log, jog	
	Connection device		Mini-USB	

Note 1: Please install or store the servo drive within this temperature range.

Model selection

H3 Intelligent Servo

HR3 AC Servo Drive

Power	Current	SIZE	Voltage	Pulse type	EtherCAT
200W	1.6A	A	Single-phase 220V	HR3-PR1R6S2	HR3-ER1R6S2
400W	2.8A	A	Single-phase 220V	HR3-PR2R8S2	HR3-ER2R8S2
750W	5.5A	B	Single-phase 220V	HR3-PR5R5S2	HR3-ER5R5S2
1000W	7.6A	B	Single-phase 220V	HR3-PR7R6S2	HR3-ER7R6S2
1500W	11.6A	C	Single-phase/Three-phase 220V	HR3-PR012S2	HR3-ER012S2 Note 1
2000W	14A	C	Single-phase/Three-phase 220V	HR3-PR014S2	HR3-ER014S2 Note 1
1500W	5.4A	C	Three-phase 380V	HR3-PR5R4T3	HR3-ER5R4T3 Note 1
2000W	8.4A	C	Three-phase 380V	HR3-PR8R4T3 Note 1	HR3-ER8R4T3 Note 1
3000W	10.0A	C	Three-phase 380V	HR3-PR010T3 Note 1	HR3-ER010T3 Note 1
5000W	16.5A	D	Three-phase 380V	HR3-PR017T3 Note 1	HR3-ER017T3 Note 1
6000W	20.8A	D	Three-phase 380V	HR3-PR021T3 Note 1	HR3-ER021T3 Note 1
7500W	26A	D	Three-phase 380V	HR3-PR026T3 Note 1	HR3-ER026T3 Note 1
11000W	30A	D	Three-phase 380V	HR3-PR030T3 Note 1	HR3-ER030T3 Note 1

HD3 Linear Servo Drive

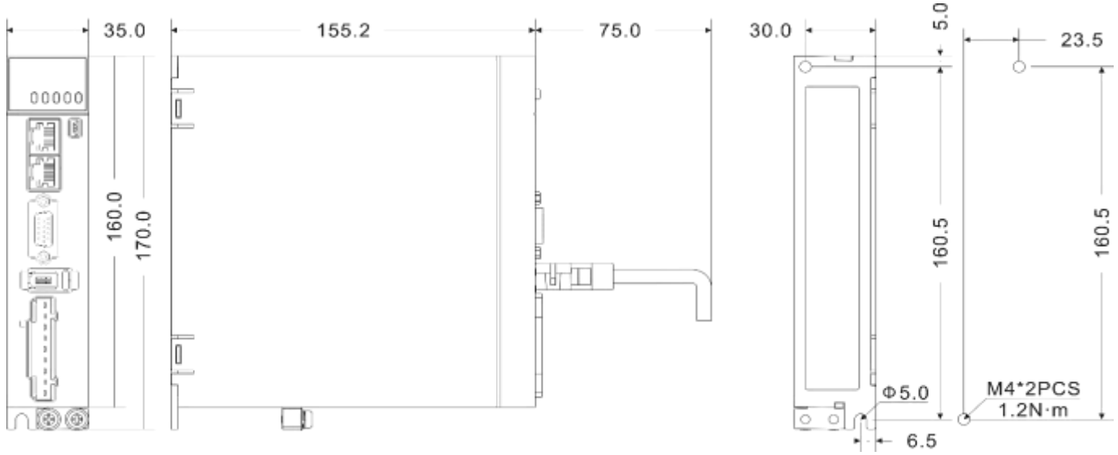
Power	Current	SIZE	Pulse type	EtherCAT
3A	A	Single-phase 220V	HD3-PL003S2	HD3-EL003S2
6A	B	Single-phase 220V	HD3-PL006S2	HD3-EL006S2
10A	C	Single-phase/Three-phase 220V	HD3-PL010S2 Note 1	HD3-EL010S2 Note 1
13A	C	Single-phase/Three-phase 220V	HD3-PL013S2 Note 1	HD3-EL013S2 Note 1
6A	C	Three-phase 380V	HD3-PL006T3 Note 1	HD3-EL006T3 Note 1
10A	C	Three-phase 380V	HD3-PL010T3 Note 1	HD3-EL010T3 Note 1
24A	D	Three-phase 380V	HD3-PL024T3 Note 1	HD3-EL024T3 Note 1
30A	D	Three-phase 380V	HD3-PL030T3 Note 1	HD3-EL030T3 Note 1

⚠ Note 1: available in Q4 2025

External Dimensions & Connector Definition

Size-A

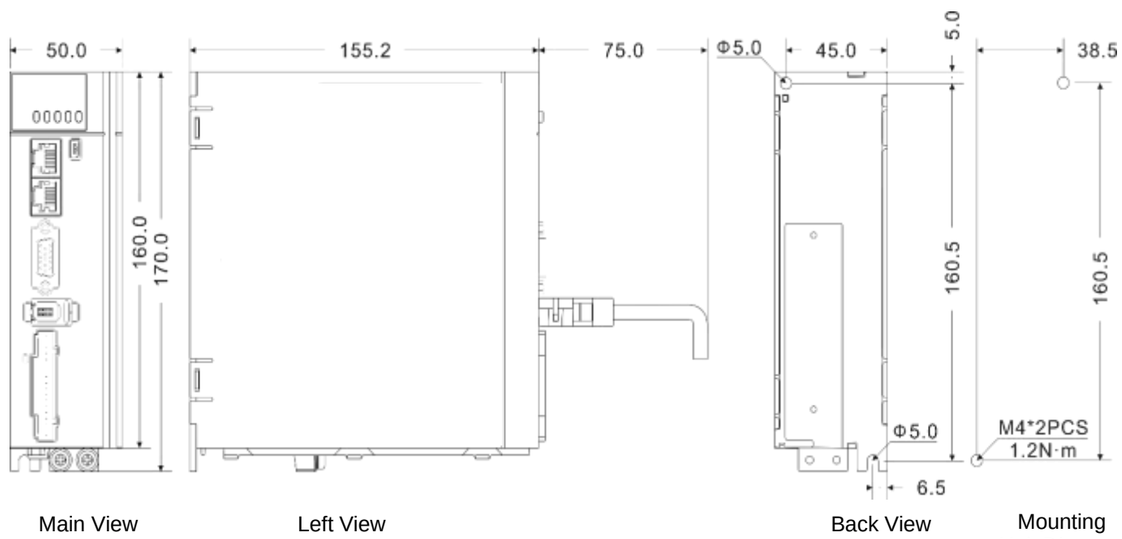
Weight 0.67 KG



Main View | Left View | Back View | Mounting HoleDiagram

Size-B

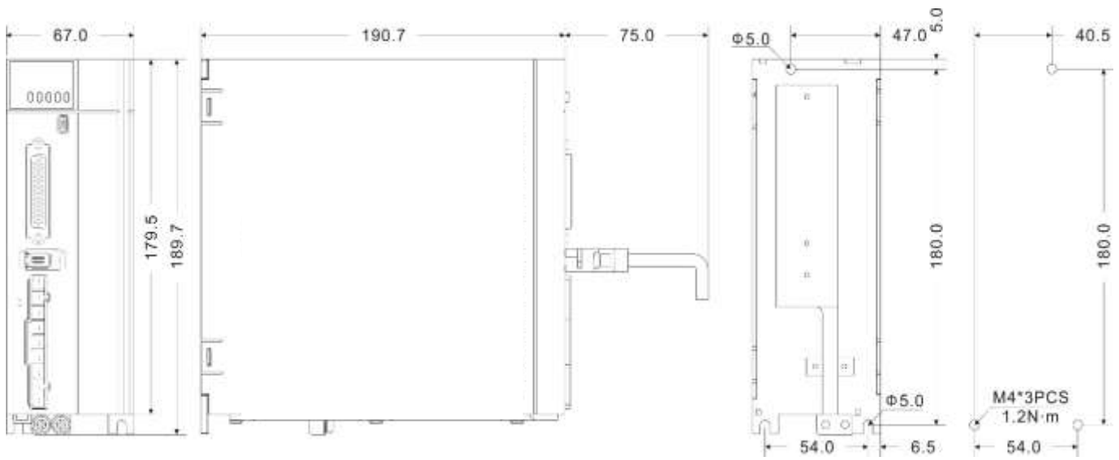
Weight 0.92KG



Main View | Left View | Back View | Mounting HoleDiagram

Size-C

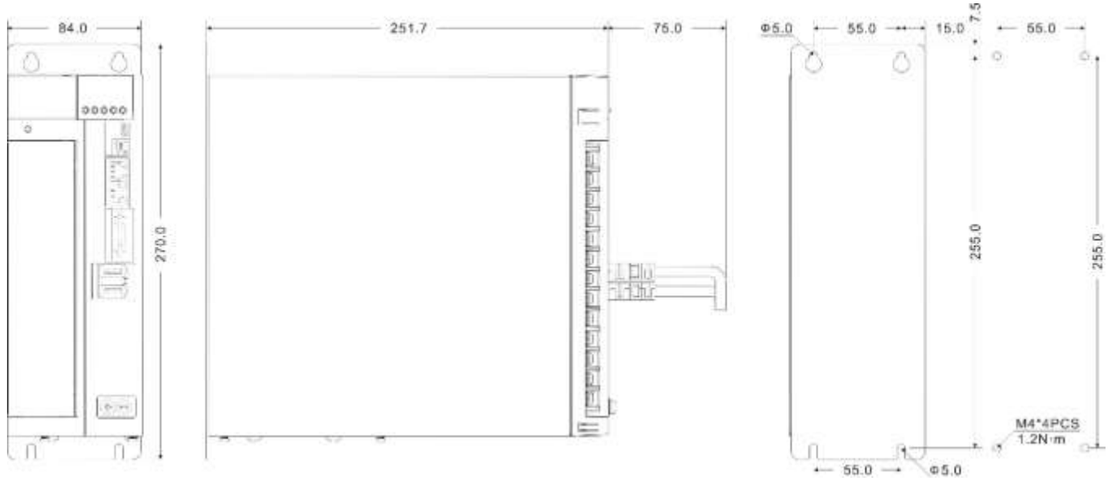
Weight 1.6KG



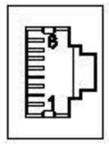
Main View | Left View | Back View | Mounting HoleDiagram

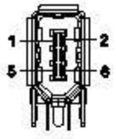
Size-D

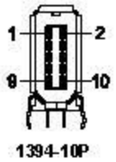
Weight 2.58KG



Main View | Left View | Back View | Mounting HoleDiagram

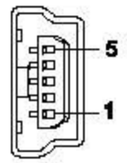
RS485 Connector	No.	Signal	No.	Signal
	CN3 (IN)		CN4(OUT)	
	1	-	1	-
	2	-	2	-
	3	-	3	-
	4	RS485+	4	RS485+
	5	RS485-	5	RS485-
	6	-	6	-
	7	-	7	-
	8	GND	8	GND

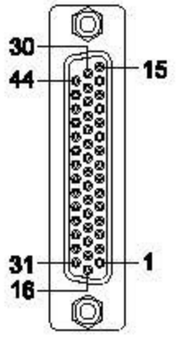
Encoder Connector (CN2)	HR3-PR	
	No.	Stadard
 1394-6P	1	5V
	2	GND
	3	-
	4	-
	5	SD+
	6	SD-

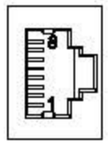
Encoder Connector (CN2)	HD3-PL Direct Servo		
	No.	ABZ	BISS
 1394-10P	1	5V	5V
	2	GND	GND
	3	A+	-
	4	A-	-
	5	B+	-
	6	B-	-
	7	Z+	CLK+
	8	Z-	CLK-
	9	-	DATA+
	10	-	DATA-

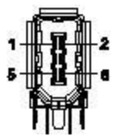
HR3-PR HD3-PL

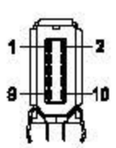
Note: The CN2 connector are different between HR3-PR and HD3-PL.

MINI USB	No.	Signal
	1	VBUS
	2	D-
	3	D+
	4	-
	5	GND

IO Connector (CN1)	No.	Signal	No.	Signal	No.	Signal
 DB44	1	DO4+	16	GND	31	DI7
	2	DO3-	17	+24V	32	DI6
	3	DO3+	18	AI2	33	DI5
	4	DO2-	19	GND	34	DI3
	5	DO2+	20	AI1	35	PULLHI
	6	DO1-	21	PAO+	36	HPULSE-
	7	DO1+	22	PAO-	37	SIGN+
	8	DI4	23	PBO-	38	HPULSE+
	9	DI1	24	PZO-	39	SIGN-
	10	DI2	25	PBO+	40	HSIGN-
	11	COM+	26	DO4-	41	PULSE+
	12	-	27	DO5-	42	HSIGN+
	13	PZO+	28	DO5+	43	PULSE-
	14	COM-	29	GND	44	OCZ
	15	-	30	DI8		

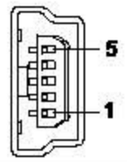
EtherCAT Connector	No.	Signal	No.	Signal
	CN1 (IN)		CN2(OUT)	
	1	TX+	1	TX+
	2	TX-	2	TX-
	3	RX+	3	RX+
	4	-	4	-
	5	-	5	-
	6	RX-	6	RX-
	7	-	7	-
	8	-	8	-

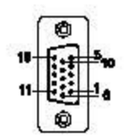
Encoder Connector (CN4)	HR3-ER	
	No.	Stadard
 1394-6P	1	5V
	2	GND
	3	-
	4	-
	5	SD+
	6	SD-

Encoder Connector (CN4)	HD3-EL HD3-PL Direct Servo		
	No.	ABZ	BISS
 1394-10P	1	5V	5V
	2	GND	GND
	3	A+	-
	4	A-	-
	5	B+	-
	6	B-	-
	7	Z+	CLK+
	8	Z-	CLK-
	9	-	DATA+
	10	-	DATA-

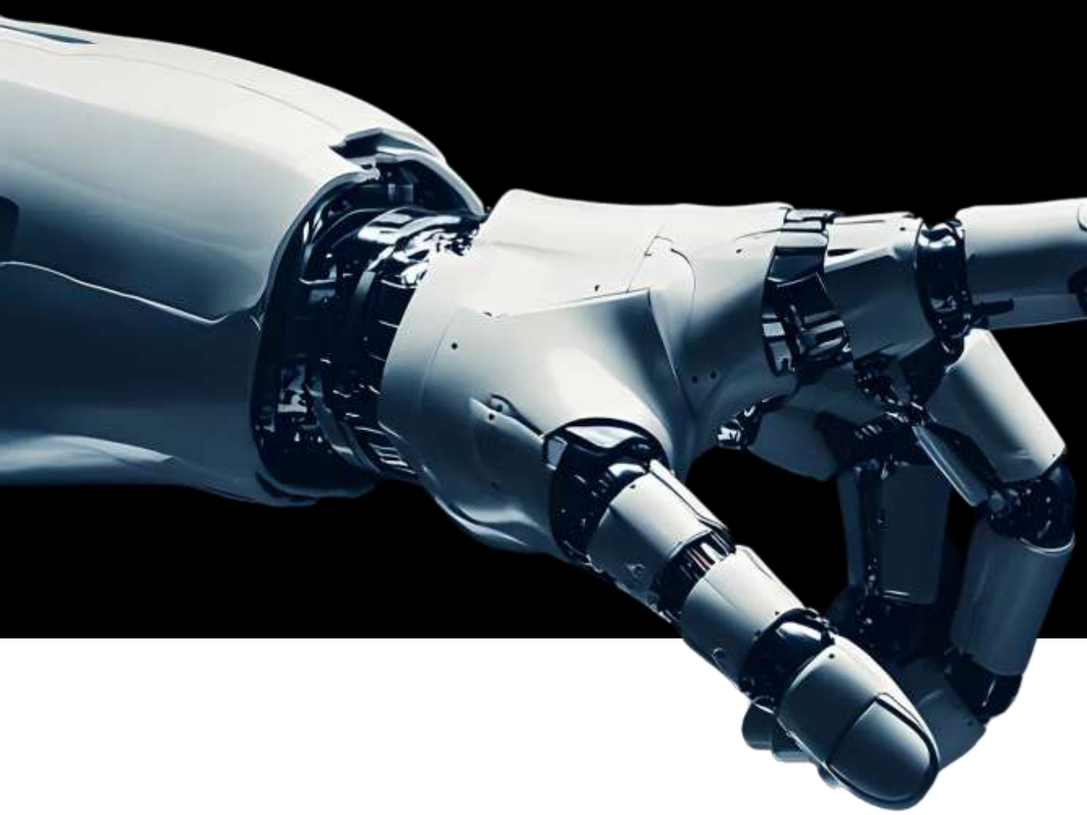
HR3-ER HD3-EL

Note: The CN4 connector are different between HR3-ER and HD3-EL.

MINI USB	No.	Signal
	1	VBUS
	2	D-
	3	D+
	4	-
	5	GND

IO Connector (CN3)	No.	Signal	No.	Signal	No.	Signal
 DB15	1	DO1+	6	DO1-	11	DI5
	2	DO2-	7	DI4	12	-
	3	DO2+	8	DI3	13	COM+
	4	DO3-	9	DI2	14	COM-
	5	DO3+	10	DI1	15	+24V

Order Type	Specification
ST-ENC-6P	encoder connector |1394-6P
	for HR3 series 
ST-ENC-10P	encoder connector |1394-10P
	for HD3 series 
ST-IO44-H3	IO connector |DB44
	only for H*3-P Pulse type 
ST-IO15-H3	IO connector |DB15
	only for H*3-E EtherCAT type 



精彩系列

HX Drive

Future

Create more possibilities with you

- Smaller size, higher Power density
- Supports EtherCAT, CANopen and other mainstream communication methods.
- Support A/B/Z increment encoder, resolver, Tamagawa absolute encoder, BISS-C encoder and other protocols type encoder.
- Applicable to robotics, AGV, medical, semiconductor industries.

HX-25A

DC14-60V/25A

HX-100A

DC400V/100A

DC100V/130A