

S6 Series High Performance Spindle Servo System

Power Solutions

- ☐ Telecom Power
- ☐ Server Power
- ☐ Electric Power
- ☐ Medical Power
- ☐ Display Power
- ☐ LED Power
- ☐ Laser Power
- ☐ OA Power
- ☐ Flat Panel Power
- ☐ Bi-directional Inverters for Portable Power
- ☐ Solar & BESS & EV Charging Solution

Industry Automation

- ☒ Servo System
- ☐ Control System
- ☐ Elevator Controller
- ☐ Linear Motors
- ☐ IOT Solution
- ☐ Encoder
- ☐ Variable Frequency Drive
- ☐ Internal Gear Pump

New Energy Solutions

- ☐ Multiplexed EV Charging System(OBC & DC-DC)
- ☐ Power Electronic Unit(2-in-1, 3-in-1)
- ☐ E-Compressor
- ☐ TV EDU
- ☐ Motor Control Unit
- ☐ Construction Machinery Controller
- ☐ Intelligent Active Hydraulic Suspension (i-AHS)
- ☐ Railway A/C Controller
- ☐ Railway VFD
- ☐ Light Electric Vehicle Controller
- ☐ Thermal Mgmt. System

Home Appliance Control Solutions

- ☐ Residential A/C Controller
- ☐ Commercial A/C Controller
- ☐ Heat Pump Controller
- ☐ Vehicle A/C Controller
- ☐ Solar A/C Controller
- ☐ Mini Compressor Controller
- ☐ Refrigerator Controller
- ☐ Washer/Dryer Controller
- ☐ Residential Microwave
- ☐ Industrial Microwave
- ☐ Smart Bidet
- ☐ RF Thawing System

Precision Connection

- ☐ FFC
- ☐ FPC
- ☐ Coaxial Cable
- ☐ CCS
- ☐ Litz Wire
- ☐ Peek Wire

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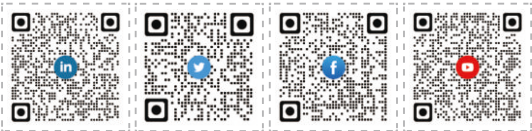
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2800 +

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10

R&D Centers



9

R&D Manufacturing Bases



7600 +

Total Employees



1990 +

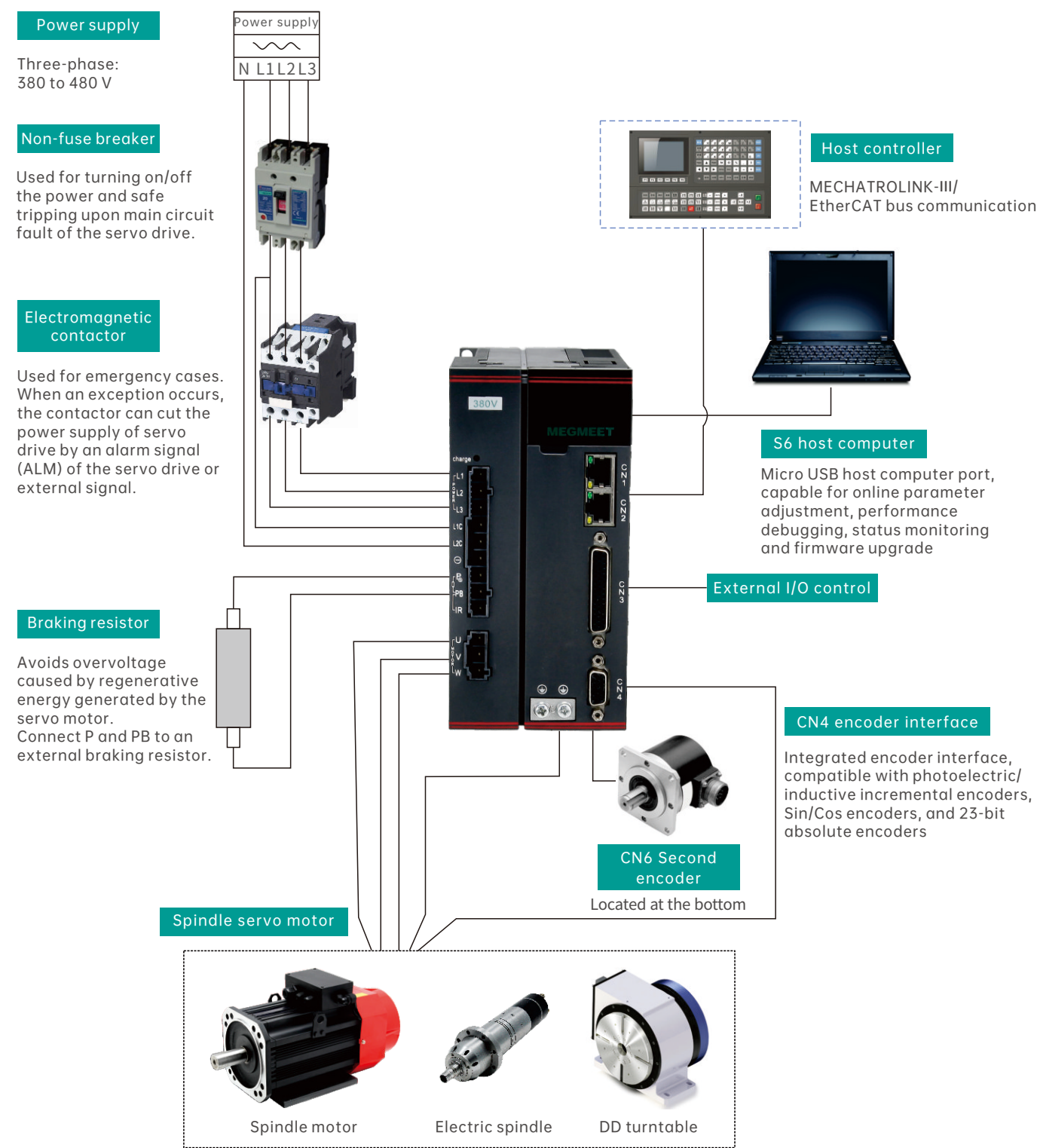
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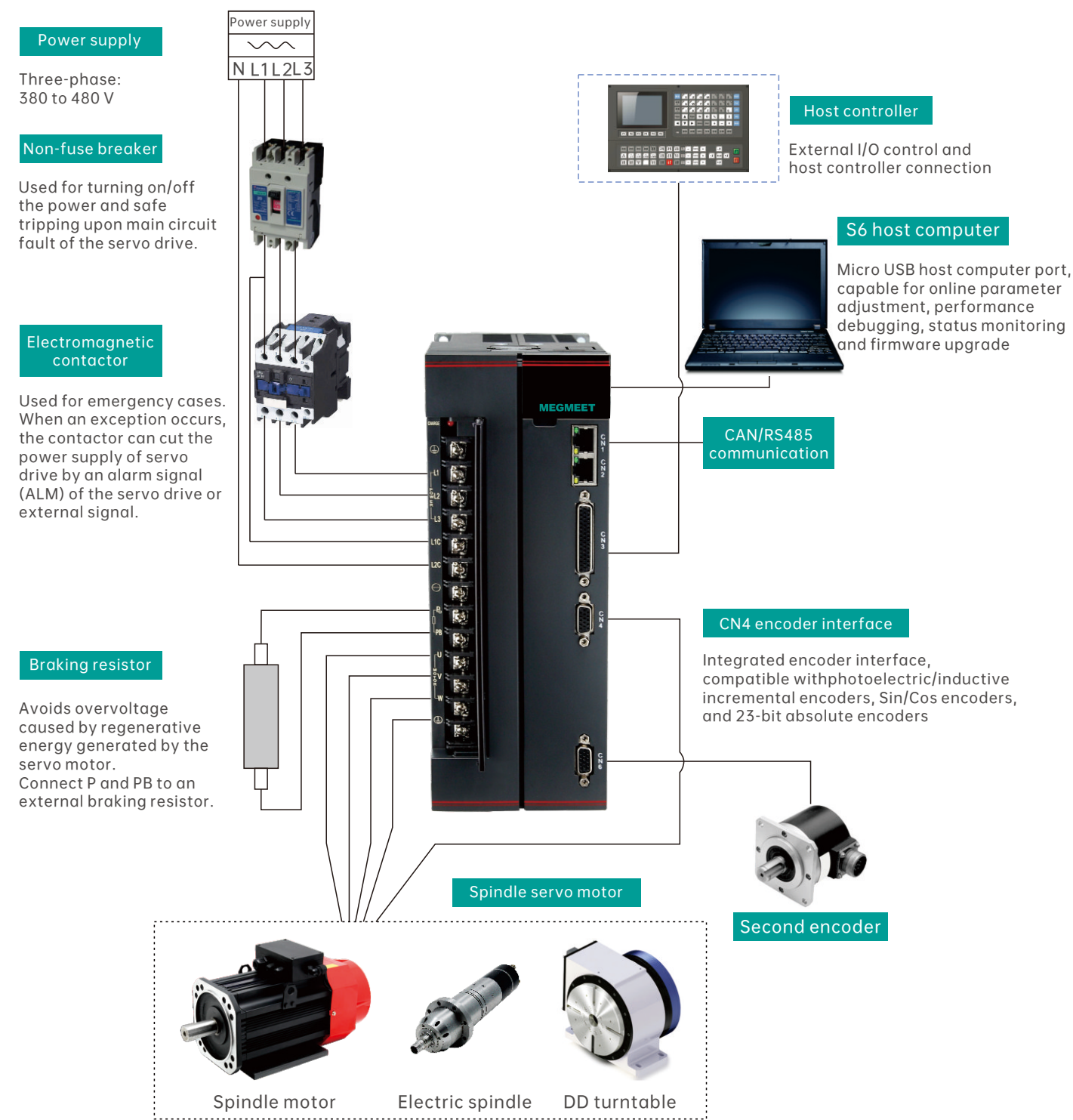
Contents

Servo System Topology	03-06
Servo Drive Model	07
Servo System Features	08
Servo Drive Dimensions	09-11
Servo System Terminal Wiring	12-16
Spindle Positioning/Homing Wiring	17
Full-Process Pulse Rigid Tapping Wiring	18
Servo Drive Specifications	19
Communication Specifications	20
Servo System Configuration	21-24

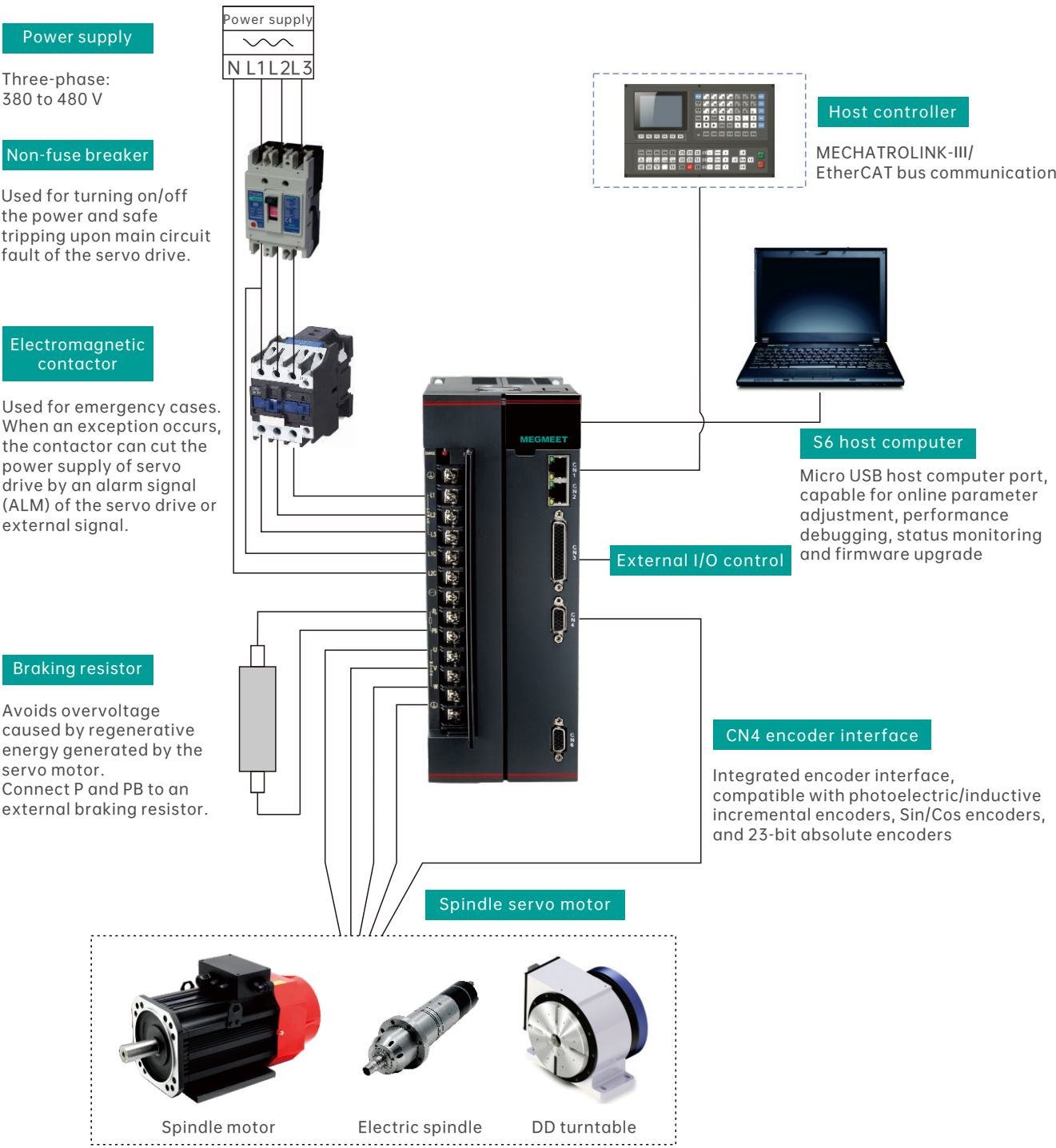
Servo System Topology (Bus Type) SIZE B



Servo System Topology (Non-Bus Type) SIZE C

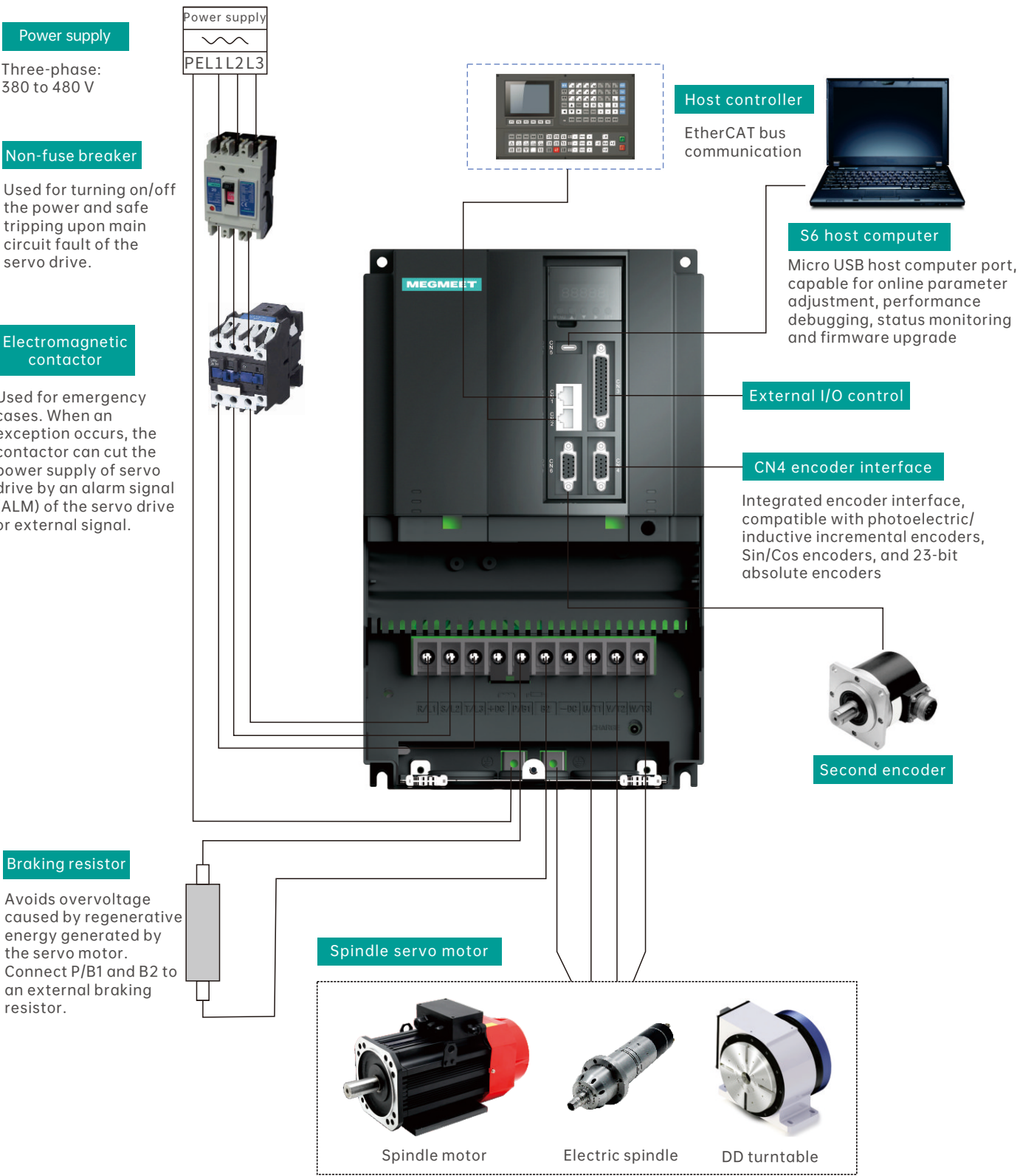


Servo System Topology (Bus Type) SIZE C



Servo System Topology (Bus Type) SIZE D/E/F

The following figure takes SIZE D as the example. SIZE E and SIZE F are similar.



Servo Drive Model

S6 - 4T 4.0 - M - T

1

2

3

4

5

1 Product series

S6 series servo

2 Voltage class

2: 220 V 4: 380 V
T: Three-phase

3 Rated power
(2.2 to 75 kW)

4.0: 4kW

4 Drive type

P: General
M: MECHATROLINK-III
N: EtherCAT-SoE
NE: EtherCAT-CoE

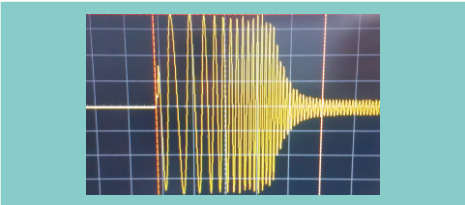
5 Drive version

T: Lathe version
M: Milling version

Model	Rated input voltage (V)	Input voltage phase	Drive rated power (kW)	Motor power	Rated input current (A)	Rated output current (A)	Max. output current (A)	Dimensions	Cooling	Min. external braking resistor
S6-4T2.2-*-*	380	3	2.2	2.2	5.8	5.5	11	SIZE B	Air cooling	35 Ω / 300 W
S6-4T3.7-*-*	380	3	3.7	3.7	10.5	8.8	17.6	SIZE B	Air cooling	35 Ω / 400 W
S6-4T4.0-*-*	380	3	4.0	3.7	11	9	18	SIZE C	Air cooling	35 Ω / 500 W
S6-4T5.5-*-*	380	3	5.5	5.5	14.5	13	26	SIZE C	Air cooling	35 Ω / 750 W
S6-4T7.5-*-*	380	3	7.5	7.5	20.5	17	34	SIZE C	Air cooling	25 Ω / 1000 W
S6-4T11-*-*	380	3	11	11	26	25	50	SIZE C	Air cooling	25 Ω / 1500 W
S6-4T15-*-*	380	3	15	15	35	32	64	SIZE D	Air cooling	20 Ω / 2000 W
S6-4T22-*-*	380	3	22	22	46.5	45	90	SIZE D	Air cooling	15 Ω / 3000 W
S6-4T30-*-*	380	3	30	30	62	60	120	SIZE D	Air cooling	15 Ω / 4000 W
S6-4T37-*-*	380	3	37	37	76	75	150	SIZE E	Air cooling	12 Ω / 4000 W
S6-4T45-*-*	380	3	45	45	92	90	180	SIZE E	Air cooling	12 Ω / 5000 W
S6-4T55-*-*	380	3	55	55	113	110	220	SIZE F	Air cooling	7 Ω / 6000 W
S6-4T75-*-*	380	3	75	75	157	152	304	SIZE F	Air cooling	7 Ω / 8000 W

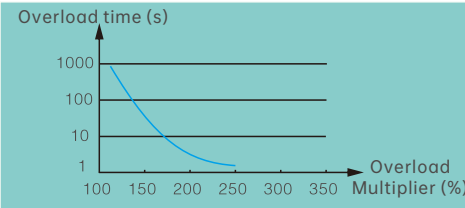
Servo System Features

- Fast dynamic response
0 to 6000 rpm, acceleration time 300 ms, deceleration time 250 ms;
0 to 36000 rpm, acceleration time 1.5 s, deceleration time 1.1 s.



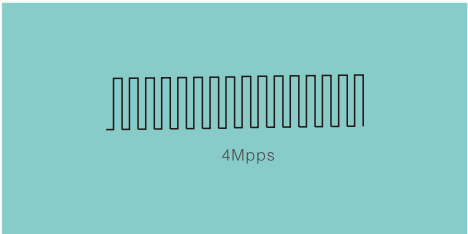
- High positioning accuracy
Incremental 50 arc seconds, Sin/Cos 5 arc seconds, absolute value 2 arc seconds.

- High overload capacity: 2.5 times

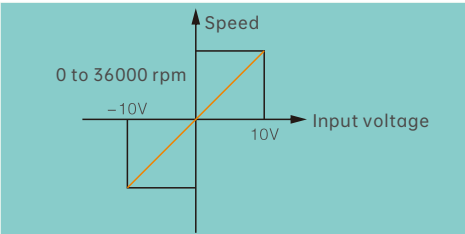


- Various interface modes

4 M bandwidth pulse



16 bit analog

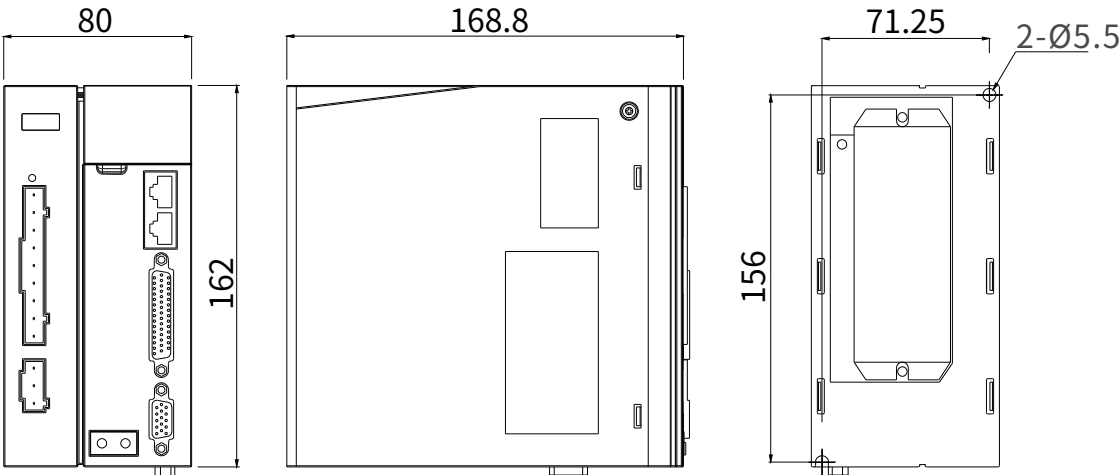


Supports Modbus、CANopen、EtherCAT(CoE/SoE)、MECHATROLINK-III and other bus interfaces

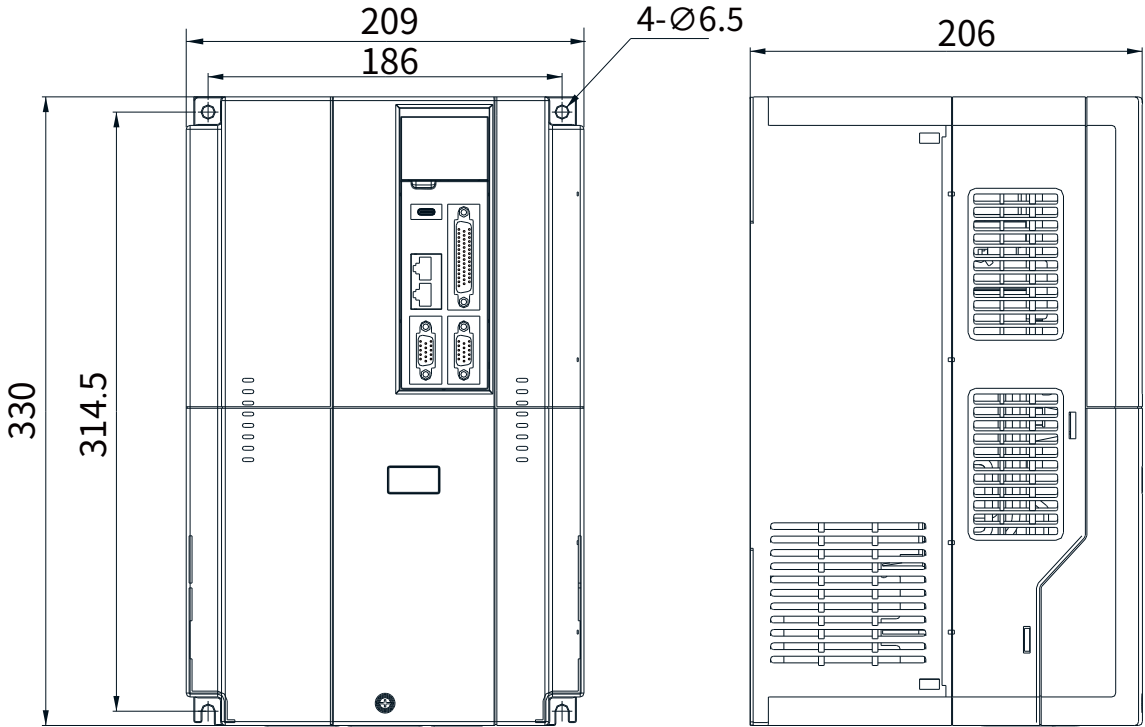
- Integrated encoder interface
No need to replace the encoder card, compatible with incremental encoders, Sin/Cos encoders, Tamagawa 23-bit absolute value encoders, and BISS-C
- Strong adaptability: Suitable for asynchronous servo motors/motorized spindles of various inertia, permanent magnet synchronous servo motors/motorized spindles, 4th axis/DDR motors/5th axis
- Inertia identification: Through offline inertia identification, the load inertia ratio can be accurately obtained to achieve the optimal control effect
- Various debugging methods: Keypad, PC (Ms dedicated host computer, TwinCAT)
- Rigidity table: Provides 32-segment rigidity table settings. By setting the rigidity level, the speed loop gain can be automatically calculated to improve the efficiency
- Fully closed-loop control: Reduces control errors caused by defects such as mechanical clearance and elasticity, and thus improves control accuracy and system rigidity
- Multifunction USB port: Micro USB port can be used as both the communication port of the host computer and the programming port for firmware upgrade

Servo Drive Dimensions

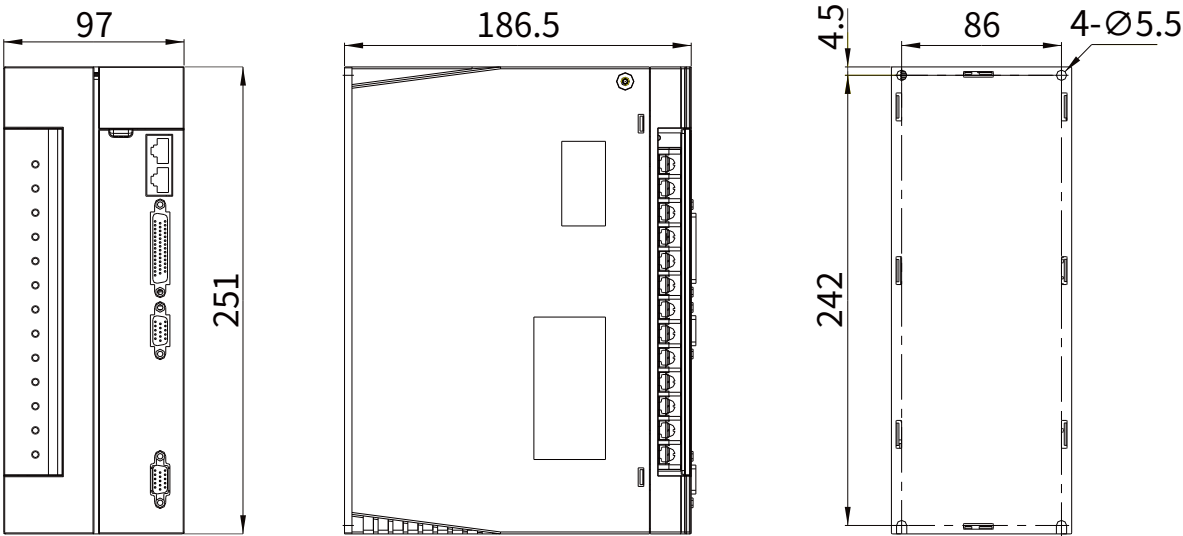
SIZE B



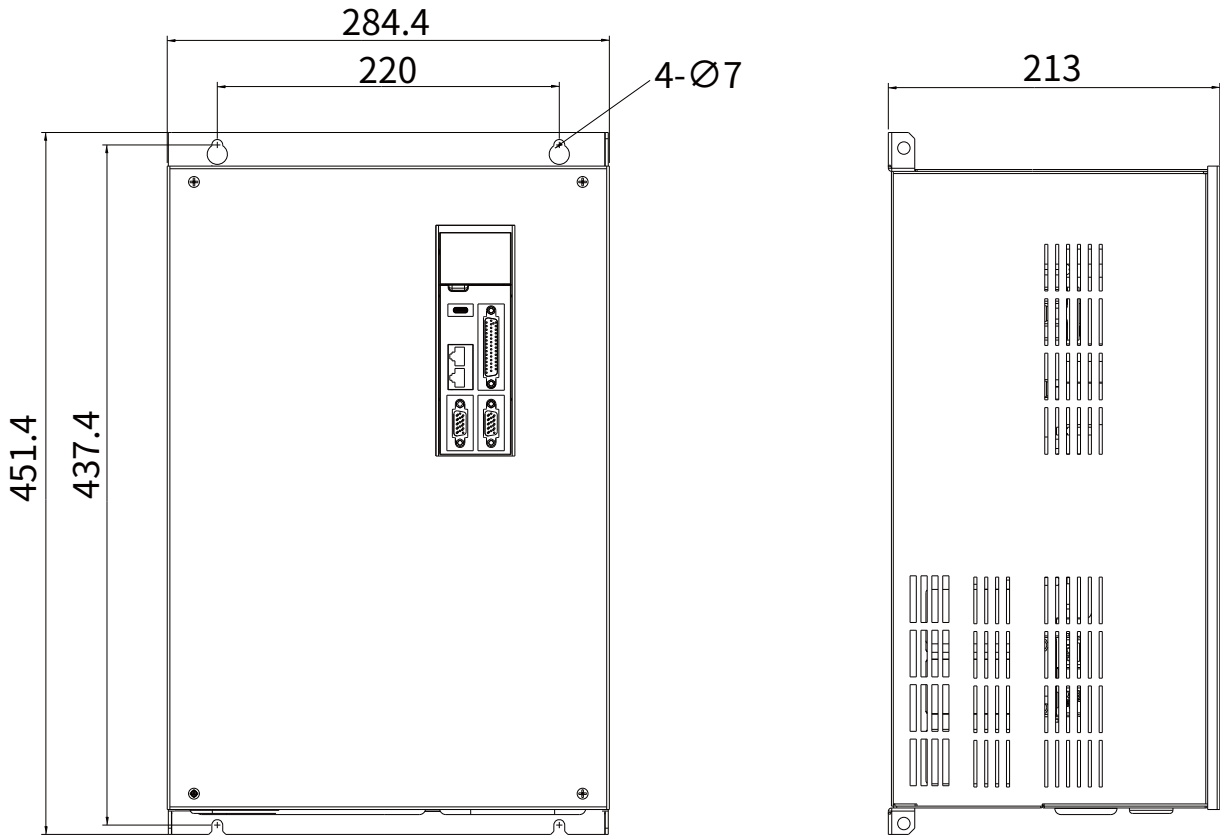
SIZE D



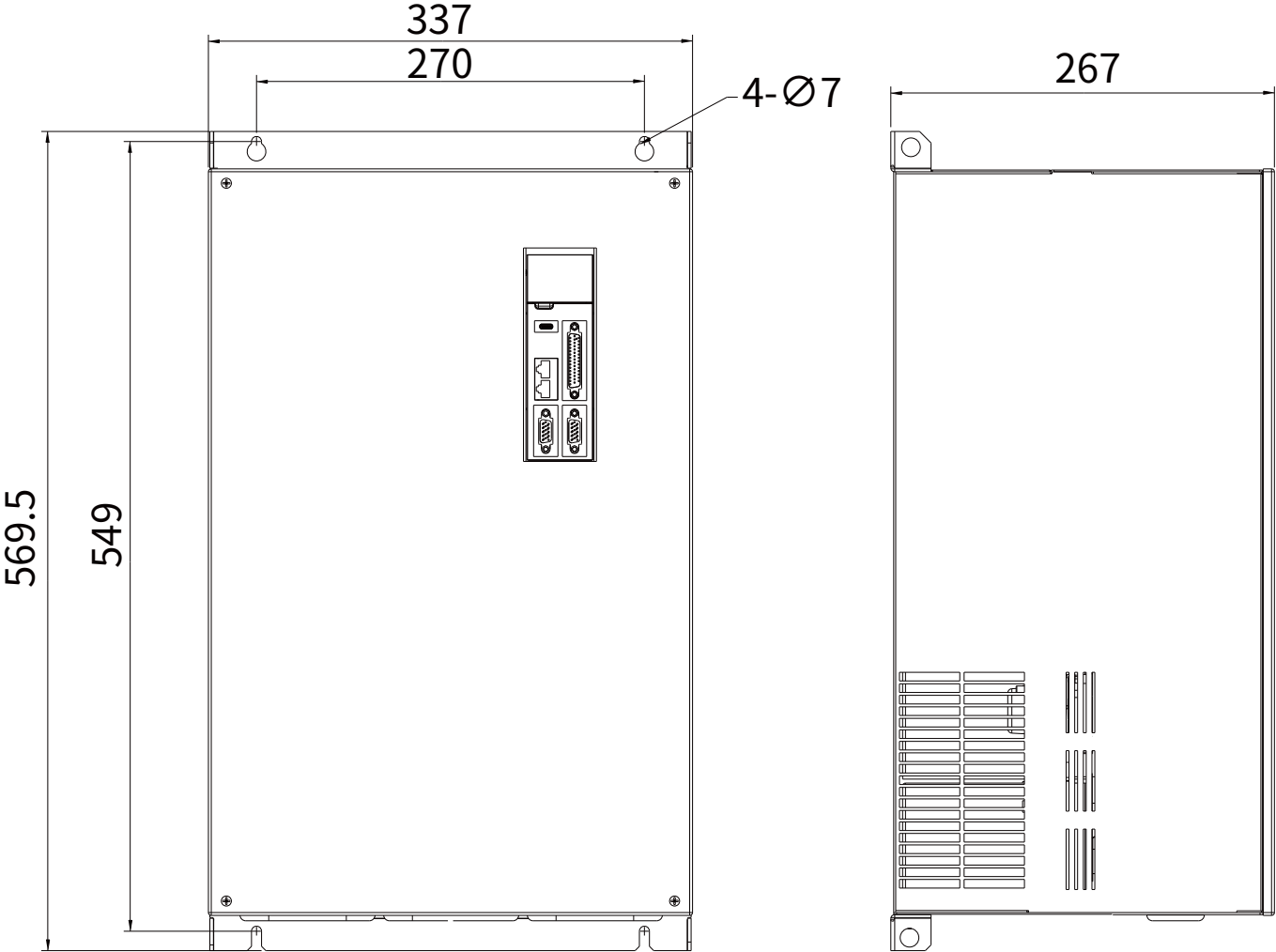
SIZE C



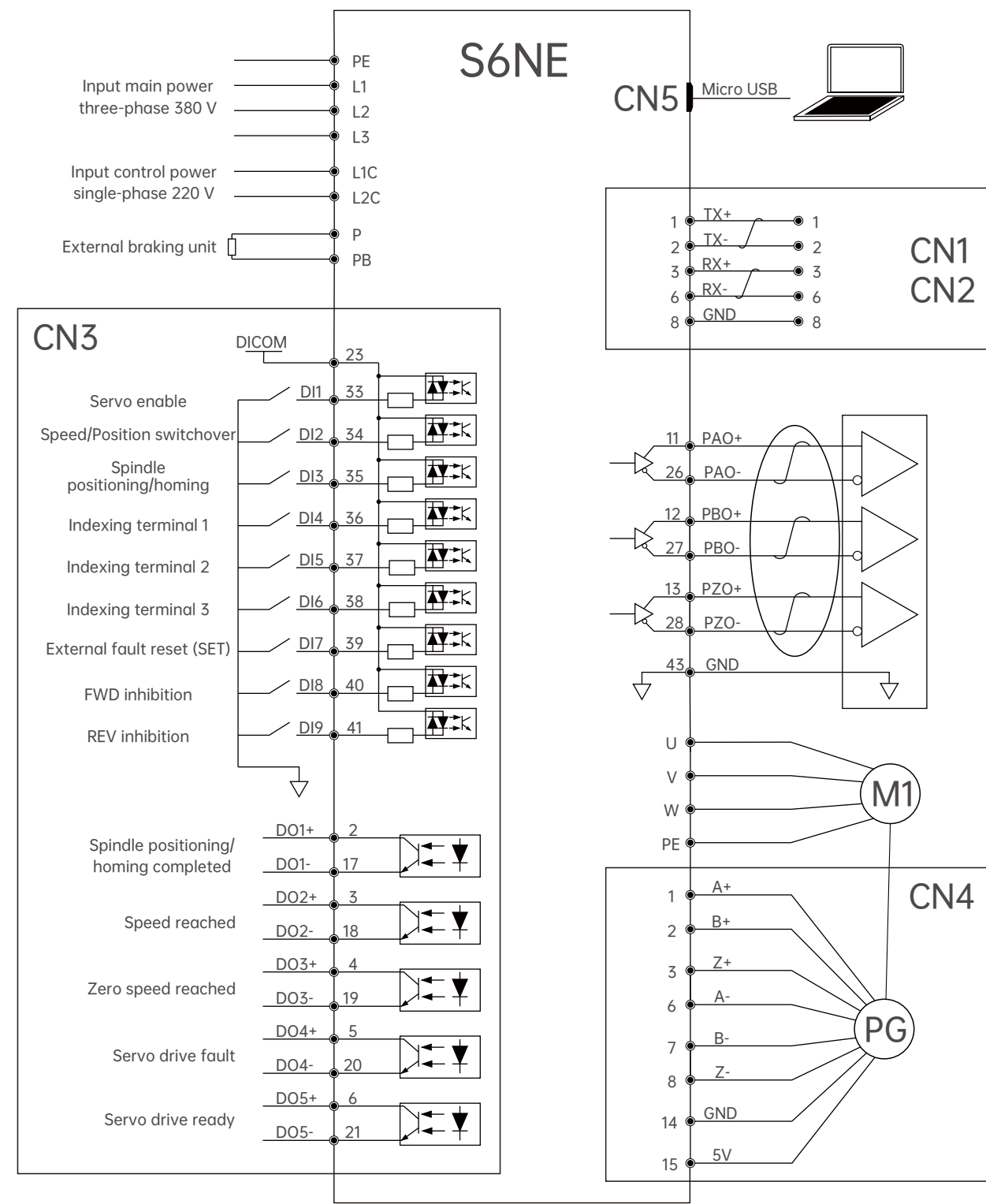
SIZE E



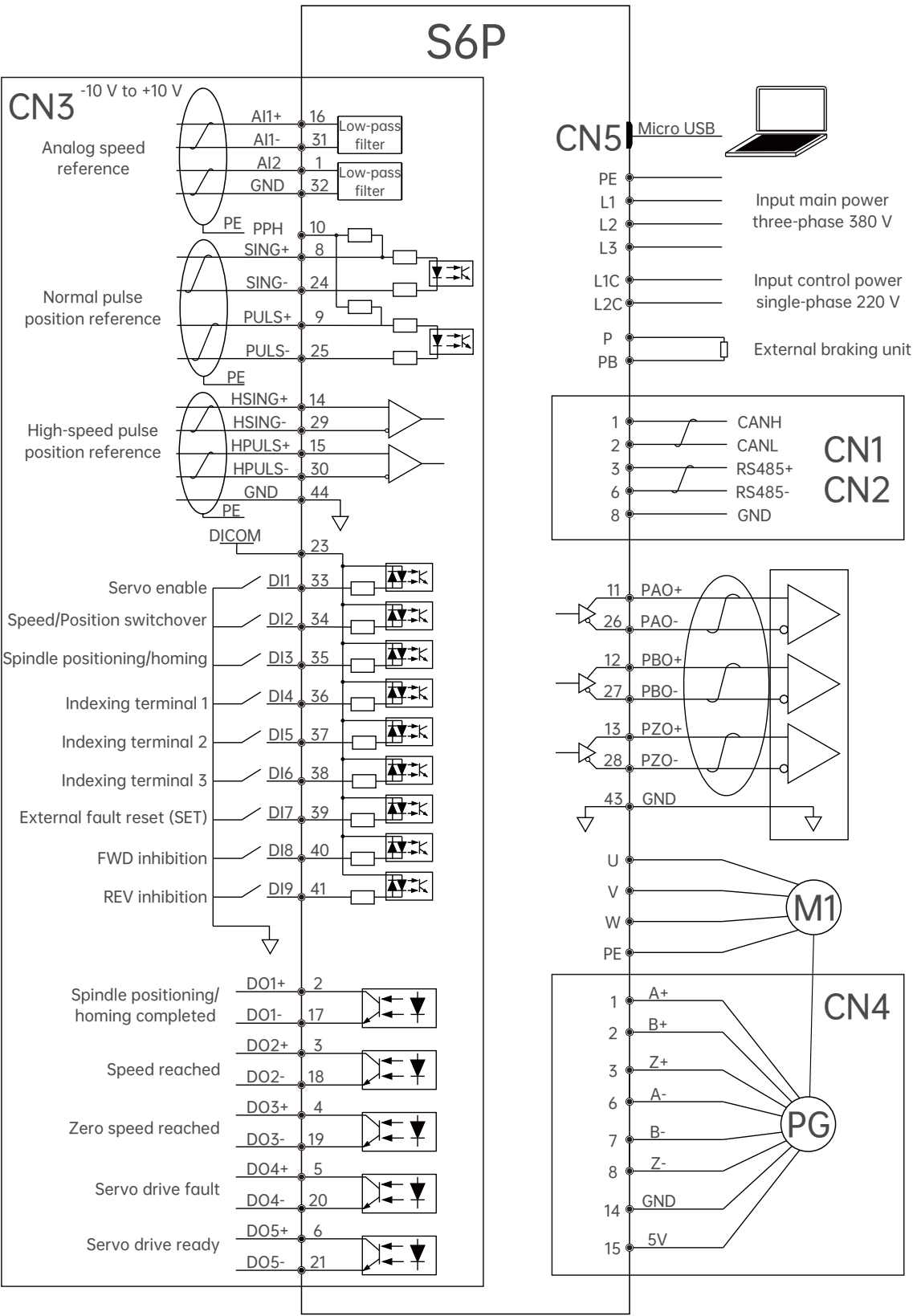
SIZE F



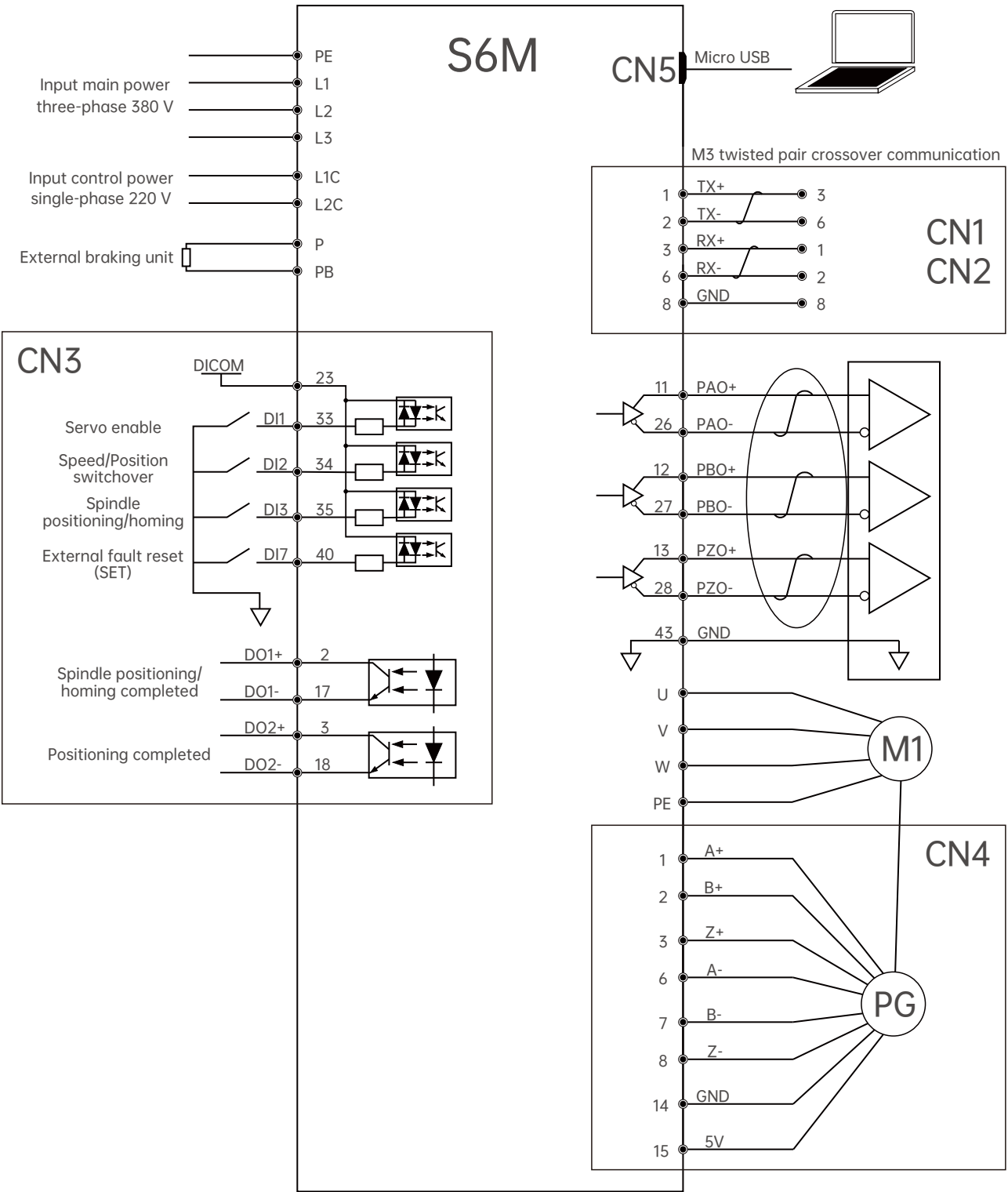
S6NE Servo System Wiring - SIZE B



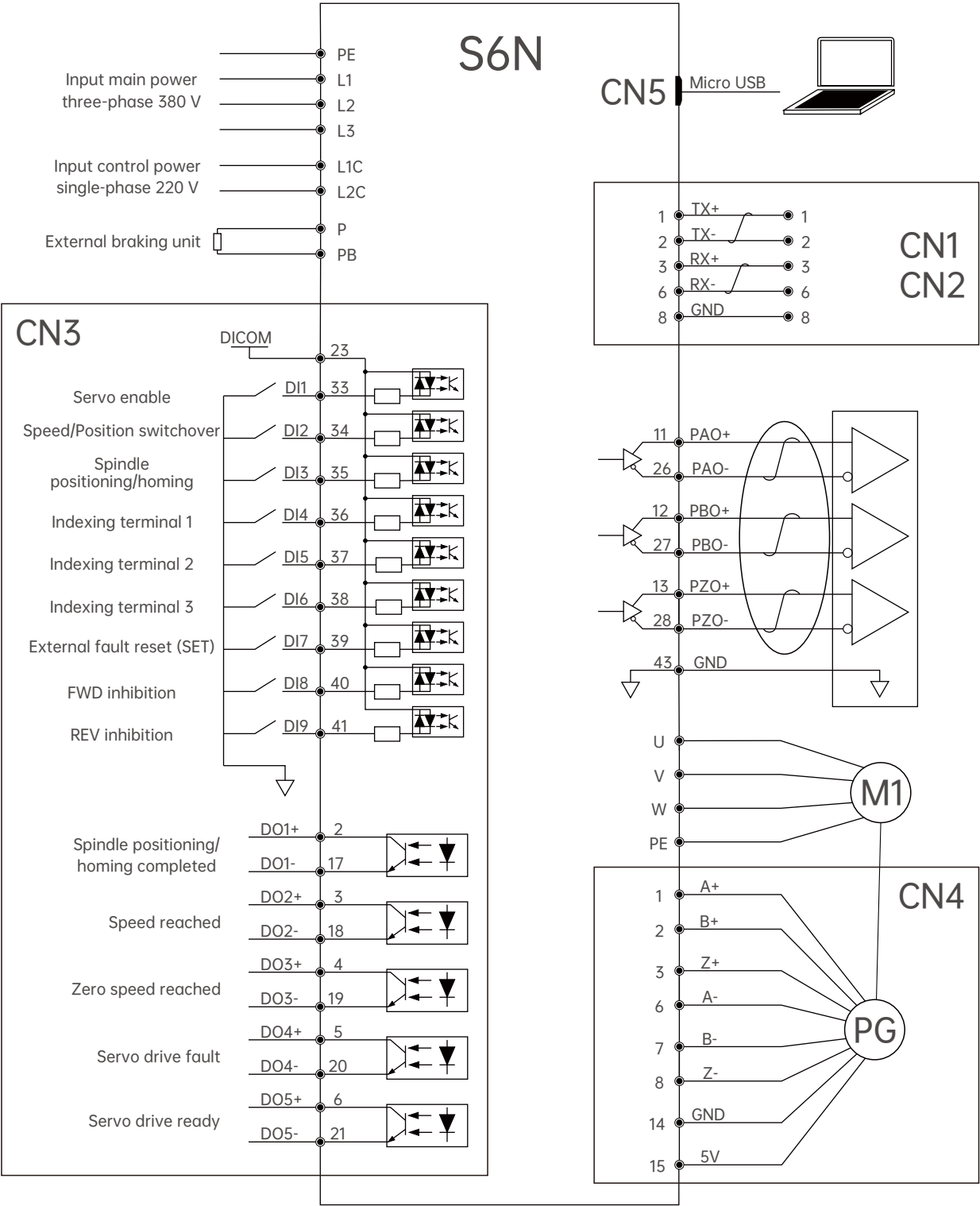
S6P Servo System Wiring - SIZE C



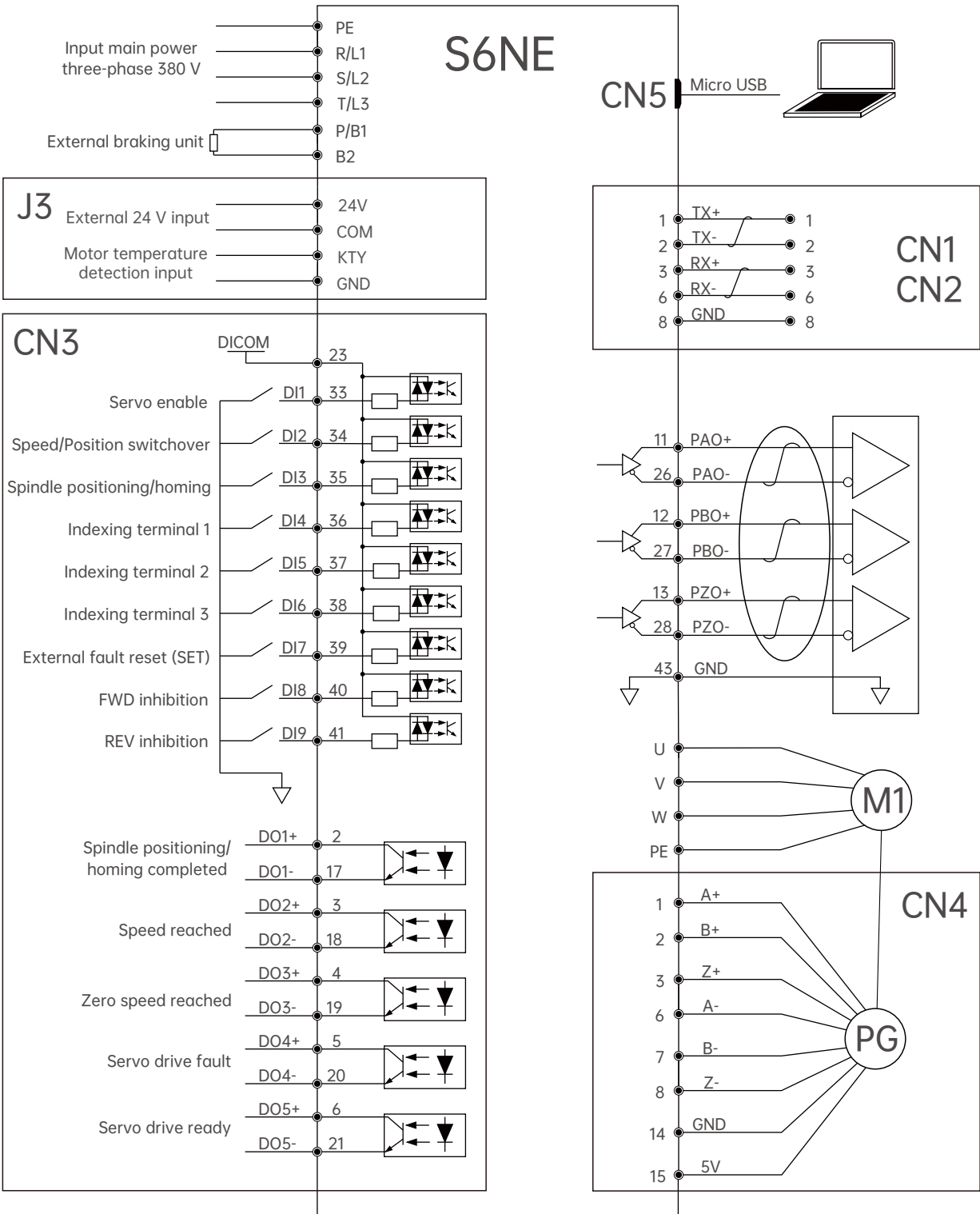
S6M Servo System Wiring - SIZE C



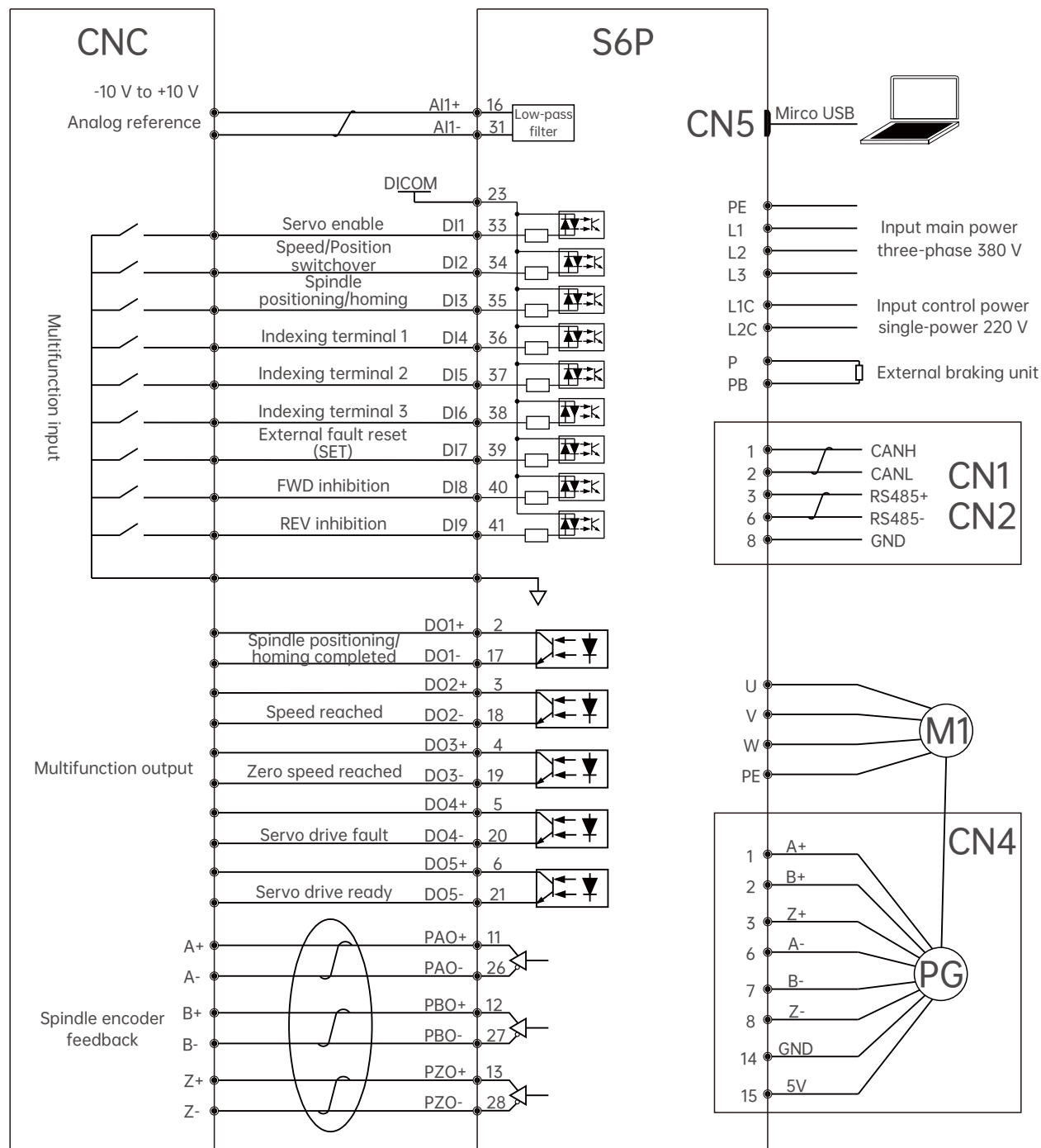
S6N Servo System Wiring - SIZE C



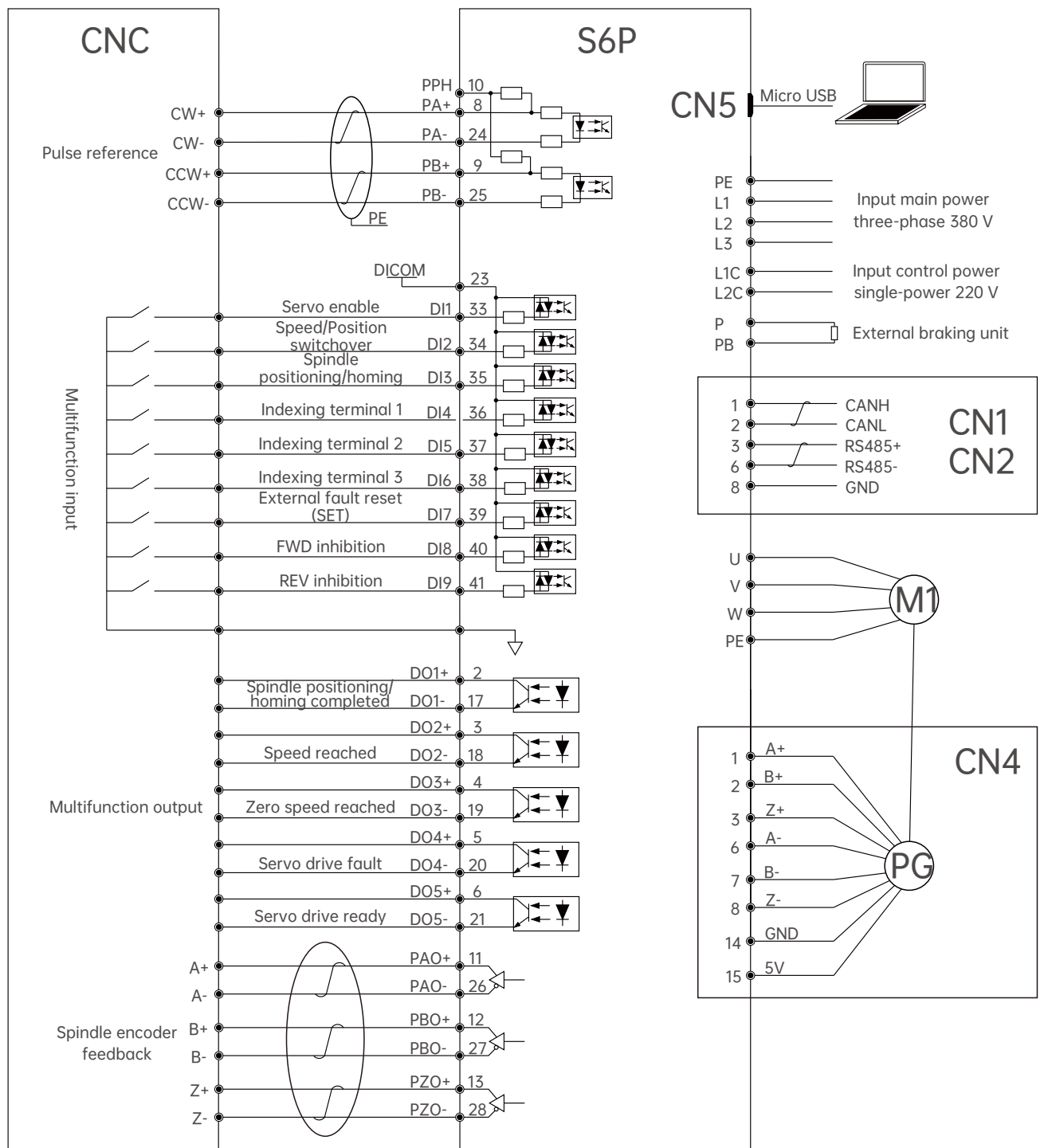
S6NE Servo System Wiring - SIZE D/E/F



Spindle Positioning/Homing Wiring Diagram - Analog Tapping



Full-Process Pulse Rigid Tapping Wiring Diagram



Drive Specifications

Basic specification		
Main circuit power	380 to 480 V, ±10%, 50/60 Hz	
Control circuit power	Single-phase 200 to 240 V, ±10%, 50/60 Hz	
Control method	IGBT, PWM control, and Sine wave current drive	
Encoder	Rotary motor:	Second encoder:
	Tamagawa 32-bit absolute encoder	Wire-saving incremental encoder
	Wire-saving incremental encoder	BISS-C encoder
	Sin/Cos encoder	
Interface		
Key	5 keys	
LED display	Five 8-segment LEDs	
Power indicator	CHARGE indicator	
STO function	General safety STO function (optional)	
Second encoder interface	Forms the fully closed-loop function	
IO		
DI (various functions defined by parameters)	9 general inputs, optocoupler isolation, NPN and PNP inputs available Input voltage range 20 to 30 V, input impedance 3.9 K	
DO (various functions defined by parameters)	5 general outputs, optocoupler isolation, NPN and PNP outputs available Maximum operating voltage 30 V, maximum current 100 mA	

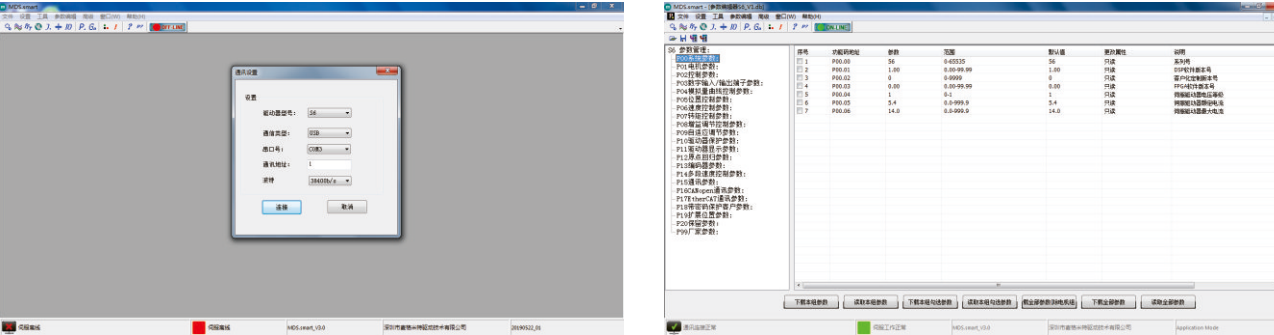
Communication	
RS485	Modbus protocol (only for the S6P series)
CAN	CANopen protocol, in compliance with CiA402 profile (only for the S6P series)
EtherCAT	CoE and SoE protocols, in compliance with CiA402 profile (only for the S6N series)
MECHATROLINK-III	MECHATROLINK-III bus protocol (only for the S6M series)
USB	Connect the computer and the servo drive for commissioning and relevant tuning
General function	

Auto-adjustment	The host computer issues an action command to run the motor, during which the load moment of inertia ratio is estimated in real time and the rigidity level is automatically set
Switchover of multiple control modes	Position mode; Speed mode; Torque mode; Position/Speed mode switchover; Speed/Torque mode switchover; Position/Torque mode switchover; Fully closed-loop control; CANopen mode; EtherCAT mode; and MECHATROLINK-III mode
Pulse frequency division	Arbitrary frequency division
Protection function	Overvoltage, undervoltage, overcurrent, overspeed, stall, overheat, overload, encoder abnormality, input phase loss, output phase loss, excessive position deviation (braking resistor detection)
High-frequency vibration suppression	5 sets of traps, suppressing the vibration from 100 Hz to 4000 Hz
Homing mode	Multiple homing modes

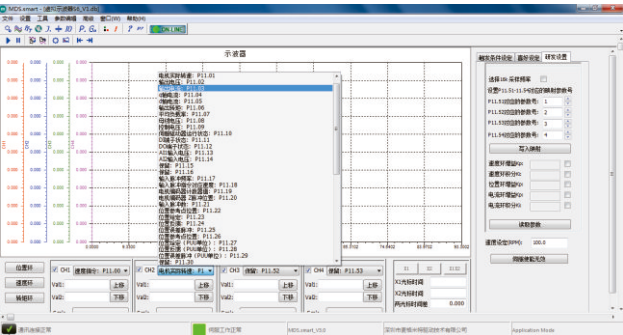
Communication Specifications

Communication standard	
IEC 61158 Type12, IEC 61800-7 CiA402 Drive Profile (CoE)	
Physical layer	
Transmission protocol	100 BASE-TX (IEEE 802.3)
Transmission distance	Less than 100 m between two nodes
Interface	CN1 (RJ45): EtherCAT Signal IN, MECHATROLINK-III Signal IN CN2 (RJ45): EtherCAT Signal OUT, MECHATROLINK-III Signal OUT
Cable	Category 5 twisted pair (EtherCAT), cross twisted pair (MECHATROLINK-III)
Application layer	
SDO	SDO request, SDO reponse
PDO	Mutable PDO mapping
CiA402 Drive Profile	Profile Position Mode Profile Velocity Mode Homing Mode Interpolated Position Mode Cyclic Synchronous Position Mode Cyclic Synchronous Velocity Mode
Sync mode	
Distributed clock (DC) mode	

Host Device Software



- Compatible with various product series and baud rates
- Upload, download and management of parameters and related files



- Oscilloscope function: Four-channel real-time monitoring, with trigger mode; automatic identification of parameter range in monitoring; waveform zoom; and 125 us time resolution

Servo System Configuration

Ordinary lathe solution

System components:

- 1) S6-4T***-T drive
- +Asynchronous servo motor
- +Belt/Gearbox
- +Mechanical spindle
- +Incremental encoder

- 2) S6-4T***-T drive
- +Asynchronous motor spindle
- +Incremental encoder

Features: Fast response, low ripple, low noise, and low interference



Machining center solution

System components:

- 1) S6-4T***-M drive
- +Asynchronous servo motor
- +Belt
- +Mechanical spindle
- +Incremental encoder

Features: Fast response, low ripple, fast and accurate oriented stop, low noise, and low interference



Turning-milling compound solution A

System components:

- 1) S6-4T***-T drive
- +Custom asynchronous/Permanent magnet synchronous servo electric spindle
- +Gear ring induction type incremental encoder

- 2) S6-4T***-T drive
- +Custom asynchronous/Permanent magnet synchronous servo electric spindle
- +Sin/Cos encoder

- 3) S6-4T***-T drive
- +Custom permanent magnet synchronous servo electric spindle
- +Gear ring induction type absolute encoder

Features: Fast response, low ripple, large lock shaft force at zero speed, fast and accurate indexing and stop, low noise, and low interference



Turning-milling compound solution B

System components:

- 1) S6-4T***-T drive
- +Asynchronous/Permanent magnet synchronous servo motor
- +Belt+Mechanical spindle+ Incremental encoder

- 2) S6-4T***-T drive
- +Asynchronous/Permanent magnet synchronous servo motor
- +Belt+Mechanical spindle+Sin/Cos encoder

- 3) S6-4T***-T drive
- +Asynchronous/Permanent magnet synchronous servo motor
- +Belt+Mechanical spindle+Absolute encoder

Features: High speed, fast response, low ripple, large lock shaft force at zero speed, fast and accurate indexing and stop, low noise, and low interference



Drilling, tapping, engraving and milling solution A

System components:

- 1) S6-4T***-M drive
- +Asynchronous servo motor
- +Directly connected mechanical spindle
- +Incremental encoder

- 2) S6-4T***-M drive
- +Asynchronous servo motor
- +Directly connected mechanical spindle
- +Sin/Cos encoder

Features: Fast response, low ripple, low noise, low interference, short acceleration and deceleration time, and high tapping efficiency



Drilling, tapping, engraving and milling solution B

System components:

- 1) S6-4T***-M drive
- +Asynchronous /Permanent magnet synchronous servo electric spindle
- +Sin/Cos encoder

Features: Fast response, low ripple, low noise, low interference, short acceleration and deceleration time, and high tapping efficiency



■ High-speed grinder solution

System components:
1) S6-4T**-*-T drive
+High-speed asynchronous/
Permanent magnet synchronous
servo motor
+Incremental encoder

Features: High speed, fast
response, low ripple, low noise,
and low interference



■ MECHATROLINK-III bus lathe solution

System components:
1) S6-4T**-*-T drive
+Asynchronous/Synchronous
servo motors
+Belt/Gearbox
+Mechanical spindle
+Incremental encoder
+Sin/Cos encoder
+Absolute encoder
+BISS-C

Features: Fast response, high precision, easy wiring, and strong anti-interference



■ EtherCAT bus lathe solution

System components:
1) S6-4T**-*-T drive
+Asynchronous/Synchronous
servo motors
+Belt/Gearbox
+Mechanical spindle
+Incremental encoder
+Sin/Cos encoder
+Absolute encoder
+BISS-C

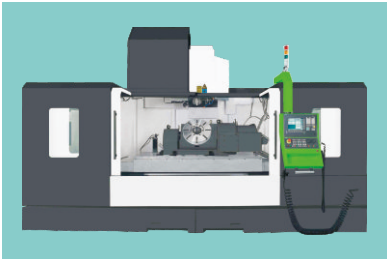
Features: Fast response, high precision, easy wiring, and strong anti-interference



■ Spindle+DDR turntable 4-axis (5-axis) machining center solution

System components:
S6-4T**-*-M spindle servo drive
S6-2T**-*-M DD turntable servo
+Vertical (Horizontal) DD motor
+Incremental encoder/
Sin/Cos encoder
+BISS-C

Features: Fast response,
10 arc seconds for positioning accuracy, 5 arc seconds for repeatability accuracy,
and large positioning torque with no vibration



■ MECHATROLINK-III bus milling machine solution

System components:
1) S6-4T**-*-M drive
+Asynchronous/Synchronous
servo motors
+Belt/Gearbox
+Mechanical spindle
+Incremental encoder/
Sin/Cos encoder
+BISS-C

Features: Fast response,
high precision, easy wiring, and strong anti-interference



■ EtherCAT bus milling machine solution

System components:
1) S6-4T**-*-M drive
+Asynchronous/Synchronous
servo motors
+Belt/Gearbox
+Mechanical spindle
+Incremental encoder/
Sin/Cos encoder
+BISS-C

Features: Fast response,
high precision, easy wiring, and strong anti-interference

