M3 Series 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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Q Megmeet

Global Leading Solution Provider In Electrical Automation

Contents

ABOUT MEGMEET

MEGMEET is a comprehensive solution provider for hardware and software R&D, production, sales, and service in the field of electrical automation. With power electronics and automation control at its core, MEGMEET's main businesses include Power Solutions, Industrial Automation, eMobility & EV Infrastructure, Intelligent Equipment, Home Appliance Control Solutions, and Precision Connection.

MEGMEET has established a robust R&D, manufacturing, marketing, and service platform, with over 7,600 employees, including more than 2,800 R&D staff worldwide. MEGMEET's global presence includes R&D Centers in China, the United States, and Germany; Manufacturing Centers in Thailand, India, the United States, and China; and Regional Offices across North America, South America, Europe, Central Asia, Northeast Asia, Southeast Asia, India, the Middle East, Oceania, and Africa.

MEGMEET is committed to creating a cleaner living environment for all human beings through more efficient energy utilization and improved manufacturing efficiency. MEGMEET aims to become the world leader in electrical automation and achieve the goal of MEGMEET EVERYWHERE.

2800+ R&D Staff

10 R&D Centers

9 R&D Manufacturing Bases

7600+ Total Employees

1990+ No. of Patents & IP Rights

R&D CAPABILITY

Sustainable R&D Investment

R&D Investment

R&D Employees
>2800

Percentage of Total Employees
36%

Percentage of Total Sales
>11%

Patents & Industry Standards

No. of Patents & IP Rights
1990+
↗ 400+ new in 2024

National & International standards
32
● 9 lead author

Industry Standards Drafted
38
● 28 lead author

R&D Investment
(in Millions of USD)

■ R&D Investment
■ Percentage of Total Sales

Year	Value
2013	9.1
2014	11.1
2015	14.4
2016	17.4
2017	26.3
2018	37.4
2019	50.2
2020	54.7
2021	68.5
2022	93.9
2023	106.5
2024 H1+Q3	96.7

Percentage of Total Sales:
13.77% 12.13% 11.93% 10.98% 11.81% 10.52% 9.42% 10.90% 11.09% 11.55% 11.41% 11.79%
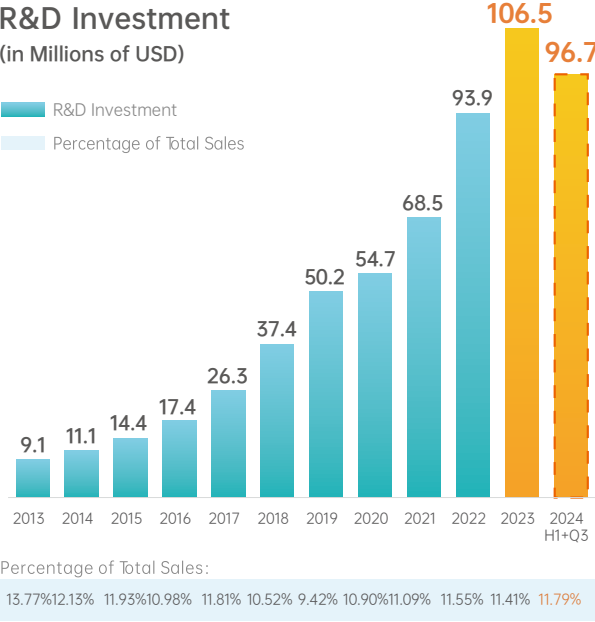
Testing Capabilities & Management System

MEGMEET's testing capabilities and management system have been certified by CNAS, TUV, UL-WTDP, & UL-CTF. MEGMEET's test results are recognized globally.

Introduction

Megmeet's new-generation M3 series servo system is featured with high response, high precision and high synchronization, and equipped with advanced functions such as online inertia identification, gain auto-tuning, vibration suppression, and quadrant compensation. Together with the intelligent Megmeet host controller, M3 is able to meet market requirements for mechanical equipment by high precision, high stability, high efficiency and ease of use.

High response

- Speed loop bandwidth 2.1 kHz
- High current loop and speed loop refresh frequency
- Faster response to commands
- High stiffness

Gain(dB)

2.1kHz

-3

■ M3

Frequency (Hz)   2100

High overload

Overload capacity up to 3 times

Overload time (s)

1000
100
10
1

100 150 200 250 300 350

Overload factor (%)

High bandwidth

- Input and output pulse up to 4 Mpps
- Supports differential and open-collector input
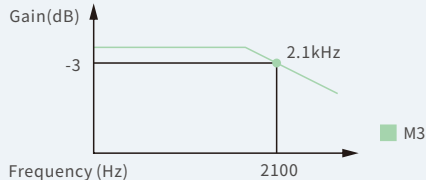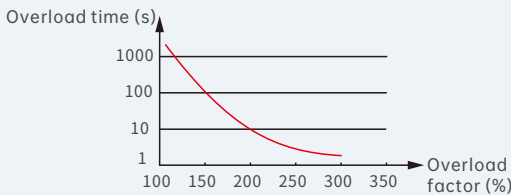- Three pulse modes: A/B quadrature, direction + pulse and CW/CCW

4 Mpps
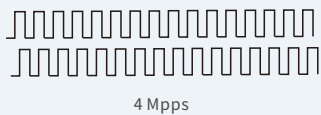
Optimized motor

- Smaller size with the same power, lowering mechanical installation requirements
- IP67 as the standard configuration, enhancing protection
- Better shock resistance of encoders
- Motors with various speeds
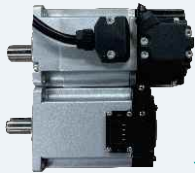
21% reduction in length

Power (W)	Motor	Frame	Length	Length (with brake)
400	SPM-SC*0604M*K-M (old)	60	112	152.5
	SPM-SC*0604M*K-ST4-L (new)	60	90.1	119.5

Increased power density of drive

- A solution with innovative design
- Smaller size, more compact structure
- Less installation space required in the electrical cabinet, facilitating installation and maintenance

18% reduction in volume

M6   M3
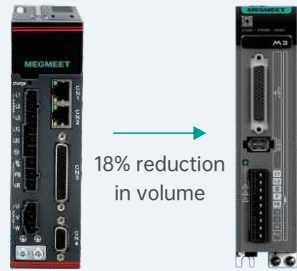
Power (W)	Drive	Dimensions (mm)	Volume (L)
400	M6	168.8*162*46	1.26
	M3	151*171*40	1.03

High precision encoder

- 17-bit multi-turn absolute magnetic encoder as the standard configuration
- The low-speed torque is more stable and the positioning is more accurate
- The motor still remains in its position after the servo unit is powered off

131072 p/r

10000 p/r

2500 lines   17-bit
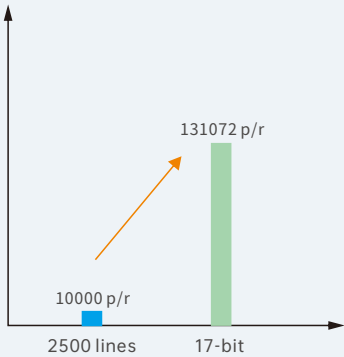
Installation of absolute encoder battery

- Easier to install/replace the battery
- Beautiful, neat, and less interference
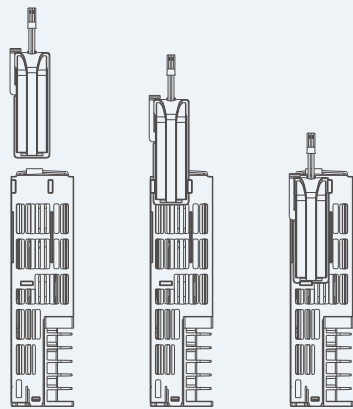
Important Function

Inertia identification

Both offline and online inertia identification can be performed. Through inertia identification, the load inertia ratio can be accurately obtained, which is helpful to complete the commissioning quickly and achieve the best control effect.

Gain adjustment

▮ Automatic gain adjustment: By selecting the stiffness level, matching gain parameters are automatically generated to meet the requirements of rapidity and stability.

▮ Manual gain adjustment: Manually fine-tune the gain to optimize the control effect.

▮ Speed feedforward: The function is used in the position control mode to reduce position following errors.

▮ Torque feedforward: In the position control mode, it can reduce the position deviation during acceleration and deceleration; and in the speed control mode, it can reduce the speed deviation when the speed is fixed.

▮ Multiple gain switchover modes

Torque disturbance observation

In a non-torque control mode, by detecting and estimating the external disturbance torque received by the system, the torque reference can be compensated to reduce the influence of external disturbance on the servo so as to reduce vibration.

High-frequency mechanical resonance suppression

Automatically search for high-frequency mechanical resonance frequency points, and reduce the gain at a specific frequency through 4 sets of notch filters, which can suppress mechanical resonance.

Low-frequency mechanical resonance suppression

For long-end mechanical loads, the low-frequency resonance suppression function can effectively reduce the end jitter caused by positioning completion or emergency stop.

Friction compensation

For loads with high friction, such as drive shafts of belts, friction compensation can shorten positioning time and reduce machining errors caused by friction.

Quadrant compensation

In the application of arc trajectory interpolation with more than 2 axes, quadrant compensation can reduce the arc distortion caused by friction non-linearity (the trajectory protrusion at the alternation of the four quadrants), and increase the accuracy of servo system control and the uniformity of motion.

Touch probe

Two high-speed touch probes.

Motor cogging torque compensation

Reduce the torque ripple caused by the cogging effect of motor, thus improving the stability of servo system.

Host Computer Software

▮ Parameter auto-tuning

▮ Friendly HMI

▮ Shared USB port for firmware upgrade and host computer communication

▮ Centralized management: parameter upload & download and firmware upgrade of multiple drives

▮ Innovative power supply, parameter output and fault check through USB
Blind matching supported for Type-C
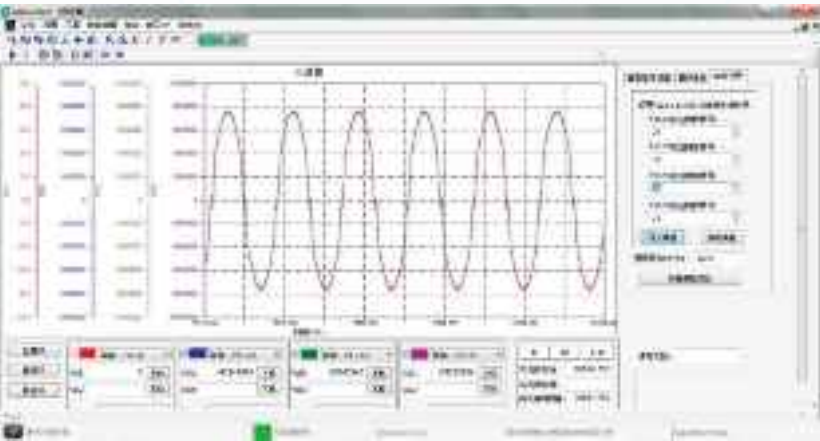
▮ Real-time online data monitoring with 32 bit * 4-channel real-time oscilloscope display and sampling frequency up to 16 K

▮ Import and export of 30 s data

System Overview

Pulse

Modbus

M3-P (Pulse)   M3-P (Modbus)

EtherCAT
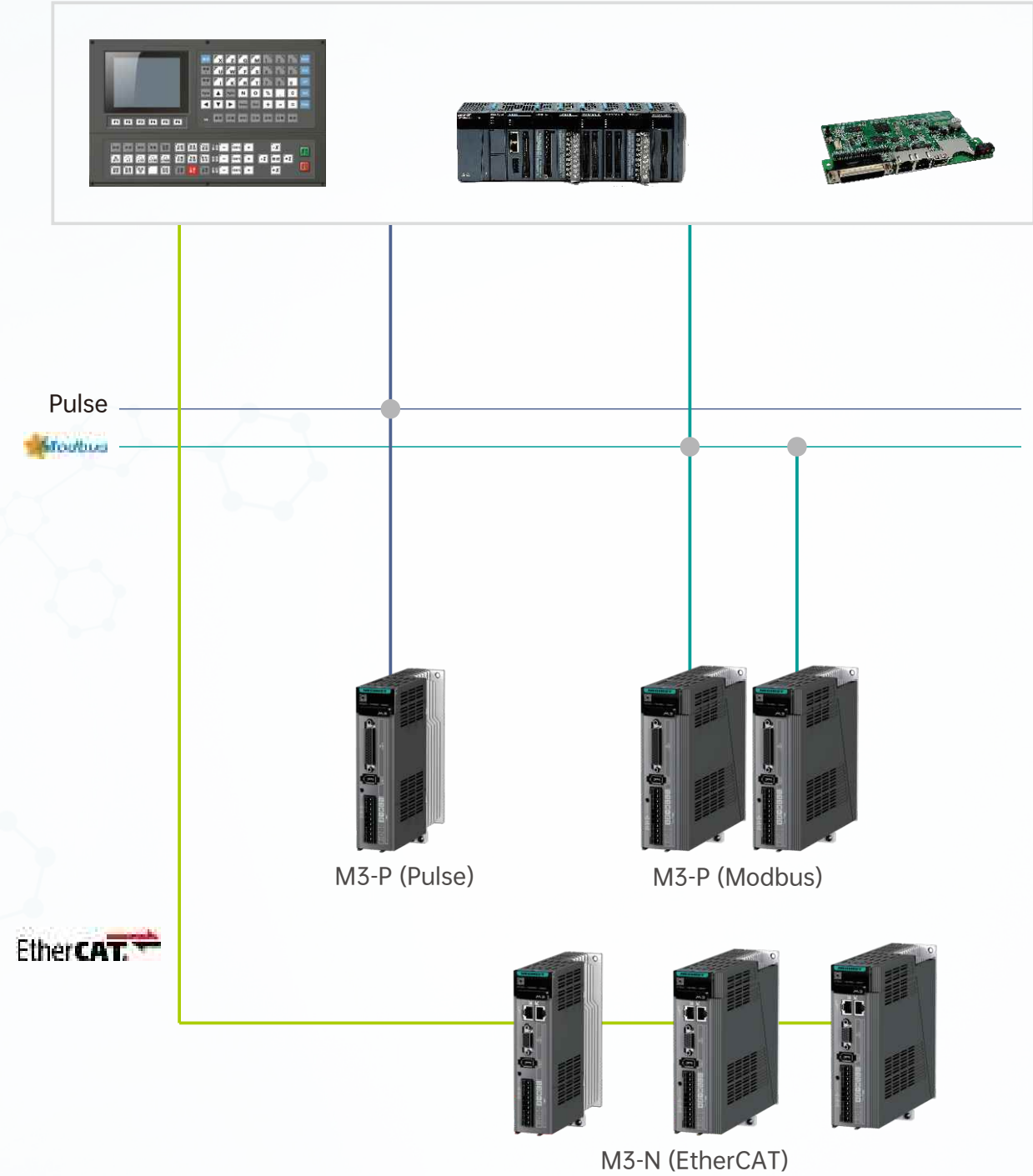
M3-N (EtherCAT)

Servo Drive Model

M3 – P S 5R5 A – XX
  ①   ② ③   ④   ⑤   ⑥

①	Product series	③	Voltage level	⑤	Structural feature
	M3 series servo		S: 220 V		A: Standard version

②	Drive type	④	Rated current	⑥	Software feature
	P: Pulse type		2R8: 2.8A		Null: Standard version
	N: EtherCAT		5R5: 5.5A		
			7R6: 7.6A		

Electrical Specifications

Voltage class	220 V		
Model	M3-*S2R8A	M3-*S5R5A	M3-*S7R6A
Power rating	400 W	750 W	1 kW
SIZE	SIZE A	SIZE B	
Phase	Single-phase	Single/Three-phase	
Rated input current (A)	4.0	7.6/3.7	9.6/5.1
Rated output current (A)	2.8	5.5	7.6
Max. output current (A)	9.3	16.9	20.0
Main circuit power	200 to 240V, -10% to +10%, 50/60 Hz		
Control circuit power	/		
Braking resistor	No built-in braking resistor		

Servo Motor Model

SPM – S C 8 06 04 M A K – ST4 – X
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪

① Product series
SPM series

② Voltage class
S: 220 V

③ Rated speed
C: 3000 rpm

④ Encoder type
8: 17-bit multi-turn absolute magnetic encoder

⑤ Motor frame
06: 60
08: 80

⑥ Power
Below 100 W:
one number and one letter
A: Power = Number * 10
Example: 5A = 5 * 10 = 50 W

100 W to 9.9 kW:
two numbers
Power = Number * 100
Example: 02 = 2 * 100 = 200 W

⑦ Inertia
M: Medium inertia

⑧ Whether with brake
A: Without brake
B: With brake

⑨ Definition
M: With keyway without oil seal
O: Round shaft with oil seal
K: With keyway and oil seal
D: D type shaft with oil seal

⑩ Motor type
ST4: Straight plug economical type

⑪ Motor design number

220 V Servo Motor Configuration

Rated speed (rpm)	Max. speed (rpm)	Power (W)	Motor model	Drive model
Straight plug economical motors 60/80 frame Medium inertia Vn = 3000 rpm Vmax = 6000/5000 rpm				
3000	6000	200	SPM-SC*0602M*K-ST4-L	M3-*S2R8A
3000	5000	400	SPM-SC*0604M*K-ST4-L	M3-*S2R8A
3000	5000	750	SPM-SC*0807M*K-ST4-L	M3-*S5R5A
3000	5000	1000	SPM-SC*0810M*K-ST4-L	M3-*S7R6A

Technical Data of Servo Motors

Motor model	Rated voltage (V)	Rated power (W)	Rated speed (rpm)	Max. speed (rpm)	Rated torque (N·m)	Peak torque (N·m)	Rated current (A)	Peak current (A)	Rotor inertia (10⁻⁴kg·m²)
Straight plug economical motors 60/80 frame Medium inertia Vn = 3000 rpm Vmax = 6000/5000 rpm									
SPM-SC*0602M*K-ST4-L	220	200	3000	6000	0.64	2.23	1.5	5.4	0.28(0.3)
SPM-SC*0604M*K-ST4-L	220	400	3000	5000	1.27	3.81	2.1	6.5	0.56(0.58)
SPM-SC*0807M*K-ST4-L	220	750	3000	5000	2.39	7.17	4.1	13.4	1.5(1.65)
SPM-SC*0810M*K-ST4-L	220	1000	3000	5000	3.19	9.56	5.7	17.7	2(2.15)

Note: The parameters in "()" belong to motors with brakes.

M3-P General Specifications

Basic specifications	
Main circuit power supply	200 to 240 V, -10% to +10%, 50/60 Hz
Control mode	IGBT, PWM control, and sine wave current drive mode
Encoder	Absolute encoder
Interface	
Key	5 keys
LED display	Five 8-segment LEDs
Power indicator	CHARGE indicator
IO	
DI (various functions defined by parameters)	8 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 communication protocol
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 stiffness 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
Pulse frequency division	Arbitrary frequency division
Protection function	Overvoltage, undervoltage, overcurrent, overspeed, stall, overheat, overload, encoder abnormality, input phase loss, and excessive position deviation
High-frequency vibration suppression	4 sets of notch filters, suppressing the vibration from 0 to 4000 Hz; 1 set of speed reference notch filter from 0 to 1000 Hz
End vibration suppression	2 sets of filters, suppressing the end low-frequency vibration from 1 Hz to 100 Hz
Homing mode	Multiple homing modes
Reverse clearance compensation	Used to improve the response delay that occurs when the traveling direction of the machine is reversed
Mechanical analyzer	Used to analyze frequency features of the mechanical system through the host computer software
Inertia identification	Offline and online system inertia identification
Torque observer	Load torque observation and compensation
Friction compensation	System friction compensation
Touch probe	Two touch probes
Motor cogging torque compensation	Supported

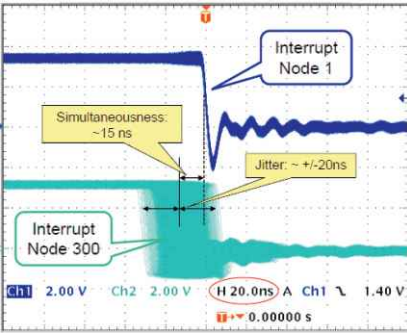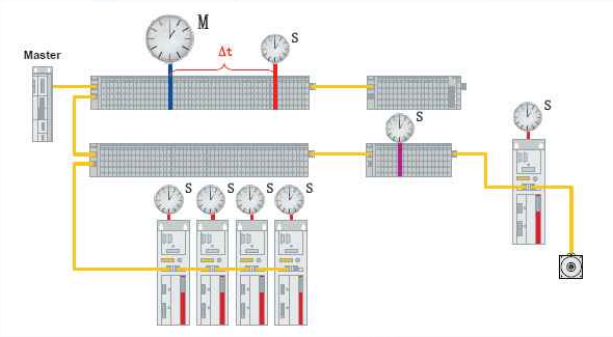# M3-N General Specifications

Basic specifications	
Main circuit power supply	200 to 240 V, -10% to +10%, 50/60 Hz
Control mode	IGBT, PWM control, and sine wave current drive mode
Encoder	Absolute encoder
Interface	
Key	5 keys
LED display	Five 8-segment LEDs
Power indicator	CHARGE indicator
IO	
DI (various functions defined by parameters)	5 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)	3 general outputs, optocoupler isolation, NPN and PNP outputs available Maximum operating voltage 30 V, maximum current 100 mA
Communication	
EtherCAT	CoE and SoE communication protocols, in compliance with CiA402 profile
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 stiffness 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; EtherCAT mode
Protection function	Overvoltage, undervoltage, overcurrent, overspeed, stall, overheat, overload, encoder abnormality, input phase loss, and excessive position deviation
High-frequency vibration suppression	4 sets of notch filters, suppressing the vibration from 0 to 4000 Hz; 1 set of speed reference notch filter from 0 to 1000 Hz
End vibration suppression	2 sets of filters, suppressing the end low-frequency vibration from 1 Hz to 100 Hz
Homing mode	Multiple homing modes
Reverse clearance compensation	Used to improve the response delay that occurs when the traveling direction of the machine is reversed
Mechanical analyzer	Used to analyze frequency features of the mechanical system through the host computer software
Inertia identification	Offline and online system inertia identification
Torque observer	Load torque observation and compensation
Friction compensation	System friction compensation
Touch probe function	Two touch probes
Motor cogging torque compensation	Supported

M3-N 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	CN3 (RJ45): EtherCAT Signal IN CN4 (RJ45): EtherCAT Signal OUT
Cable	Category 5 twisted pair
Application layer	
SDO	SDO request, SDO response
PDO	Mutable PDO mapping
CiA402 Drive Profile	Profile Position Mode Profile Velocity Mode Profile Torque Mode Homing Mode Cyclic Synchronous Position Mode Cyclic Synchronous Velocity Mode Cyclic Synchronous Torque Mode
Sync mode	
Distributed Clock (DC) mode	

Network Synchronization

- The EtherCAT network selects the first slave clock as the reference clock, and the clocks of all other devices (including master and slave) are synchronized with this reference clock.

- Through the synchronization signal (SYNC), all EtherCAT devices can use the same system clock to control the synchronous task execution of each device, and realize the synchronization of local tasks of each device with the reference clock.

- The system can achieve a jitter of 20 ns and a synchronization error of 15 ns, even though 300 nodes are between two devices with the cable length up to 120 m.

M3-P Drive Wiring

SIZE A models connected to peripheral devices

Single-phase 220 VAC

Power supply

Circuit breaker
(MCCB)

Noise filter
(NF, optional)

Magnetic contactor
(MC)

Charging
indicator
(on when the drive
is being charged)

External regenerative resistor

Servo motor cable

Grounding

◁CN1

◁CN2

◁CHARGE

◁L1
◁L2
◁P
◁PB
◁U
◁V
◁W
◁PE

Communication interface
(two RJ45 ports in parallel)
RS485

Connection with PC
Type-C USB cable
(used to install commissioning software)

Connection with the host system
DB44 female connector,
various kinds of IO cables

Host controller
(I/O, AB pulse)

Connection with the encoder
1394 female connector,
encoder connection cable

Brake cable   Brake power
DC 24 V
(prepared by users)

Encoder cable

Servo motor

SIZE B models connected to peripheral devices

Single/Three-phase
220 VAC

Power supply

Circuit breaker
(MCCB)

Noise filter
(NF, optional)

Magnetic contactor
(MC)

Charging indicator
(on when the drive
is being charged)

External regenerative resistor
Before use, the short-connected piece
between PB and IR must be removed

Servo motor cable

Grounding

◁CN1

◁CN2

◁L1
◁L2
◁L3
◁P
◁PB
◁IR
◁U
◁V
◁W
◁PE

Communication interface
(two RJ45 ports in parallel)
RS485

Connection with PC
Type-C USB cable
(used to install commissioning software)

Connection with the host system
DB44 female connector,
various kinds of IO cables

Host controller
(I/O, AB pulse)

Connection with the encoder
1394 female connector,
encoder connection cable

Brake cable   Brake power
DC 24 V
(prepared by users)

Encoder cable

Servo motor

M3-N Drive Wiring

SIZE A models connected to peripheral devices

Single-phase 220 VAC

Power supply

Circuit breaker
(MCCB)

Noise filter
(NF, optional)

Magnetic contactor
(MC)

Charging
indicator
(on when the drive
is being charged)

External regenerative resistor

Servo motor cable

Grounding

Connection with PC
Type-C USB cable
(used to install commissioning software)

CN3 IN   CN4 OUT

Communication interface
(RJ45 ports)
EtherCAT

CN1

CN2

CHARGE

L1
L2

P
PB
U
V
W
PE

Connection with the host system
DB15 female connector,
various kinds of IO cables

Host controller
(I/O)

Connection with the encoder
1394 female connector,
encoder connection cable

Brake cable   Brake power
DC 24 V
(prepared by users)

Encoder cable

Servo motor

SIZE B models connected to peripheral devices

Single/Three-phase
220 VAC

Power supply

Circuit breaker
(MCCB)

Noise filter
(NF, optional)

Magnetic contactor
(MC)

Charging indicator
(on when the drive
is being charged)

External regenerative resistor
Before use, the short-connected piece
between PB and IR must be removed

Servo motor cable

Grounding

Connection with PC
Type-C USB cable
(used to install commissioning software)

CN3 IN   CN4 OUT

Communication interface
(RJ45 ports)
EtherCAT

CN1

CN2

L1
L2
L3

P
PB
IR
U
V
W
PE

CHARGE

Connection with the host system
DB15 female connector,
various kinds of IO cables

Host controller
(I/O)

Connection with the encoder
1394 female connector,
encoder connection cable

Brake cable   Brake power
DC 24 V
(prepared by users)

Encoder cable

Servo motor

Cable Model

Power cable model

SPL – MA05 – M5 – XX – X
① ② ③ ④ ⑤

① Product series
SPL series

② Cable type
MA05: L series straight plug motor power cable, compatible with 60&80 frames, cross sectional area 0.75 mm^2

③ Applicable drive
M5: M5 series, M3 series

④ Cable length
03: 3 m
05: 5 m
.....

⑤ Flexible cable or not
Blank: Normal cable
R2: 10 million times flexible cable

Encoder cable model

SPL – E 0 3 – M5 – XX – X
① ② ③ ④ ⑤ ⑥ ⑦

① Product series
SPL series

② Cable type
E: Encoder cable

③ Encoder type
0: Absolute encoder

④ Plug type
3: Straight plug
   (with battery case)
4: Straight plug
   (without battery case)

⑤ Applicable drive
M5: M5 series, M3 series

⑥ Cable length
03: 3m
05: 5m
.....

⑦ Flexible cable or not
Blank: Normal cable
R2: 10 million times flexible cable

Combination of motors and cables

Motor model	Power cable (without brake)	Power cable (with brake)	Encoder cable (with battery case)	Encoder cable (without battery case)
Straight plug economical motors 60/80 frame Medium inertia Vn = 3000 rpm Vmax = 6000/5000 rpm				
SPM-SC*0602M*K-ST4-L	SPL-MA05-M5-XX	SPL-BMA05-M5-XX	SPL-E03-M5-XX	SPL-E04-M5-XX
SPM-SC*0604M*K-ST4-L	SPL-MA05-M5-XX	SPL-BMA05-M5-XX	SPL-E03-M5-XX	SPL-E04-M5-XX
SPM-SC*0807M*K-ST4-L	SPL-MA05-M5-XX	SPL-BMA05-M5-XX	SPL-E03-M5-XX	SPL-E04-M5-XX
SPM-SC*0810M*K-ST4-L	SPL-MA05-M5-XX	SPL-BMA05-M5-XX	SPL-E03-M5-XX	SPL-E04-M5-XX

Servo Motor Dimensions

ST4-L series motors:
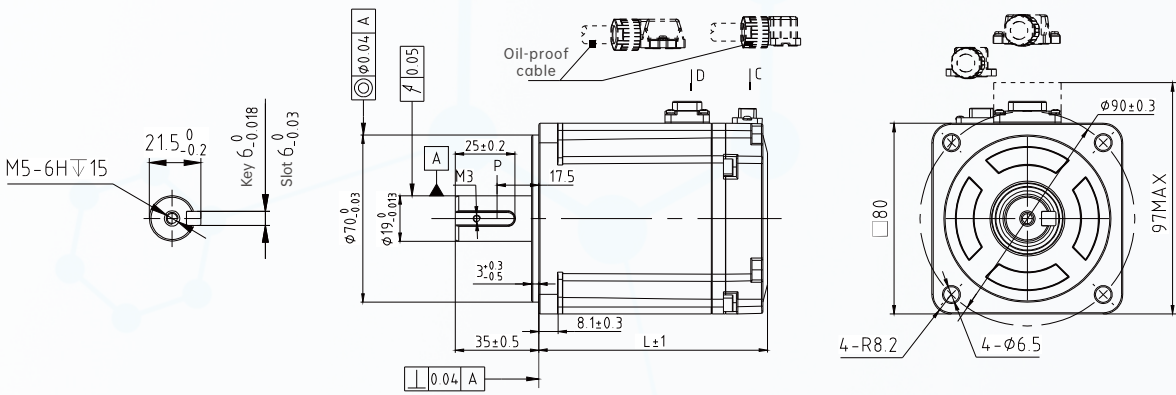60/80 frame, medium inertia, straight plug, economical type

60 frame
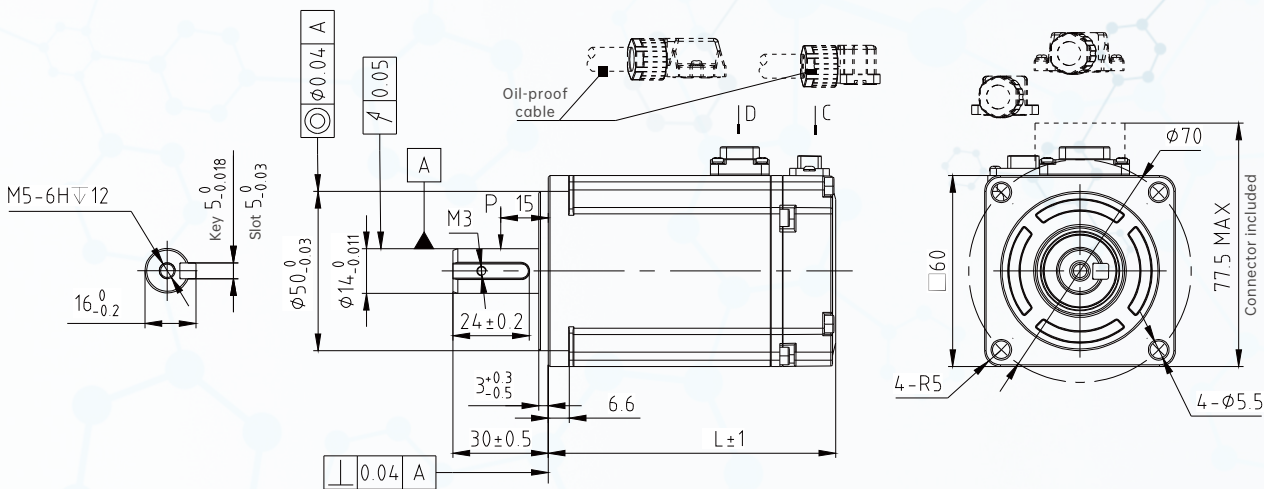
Model	L (mm)
SPM-SC*0602M*K-ST4-L	71.8 (101.2)
SPM-SC*0604M*K-ST4-L	90.1 (119.5)

Note: The parameter in "()" is the value with a brake.

80 frame
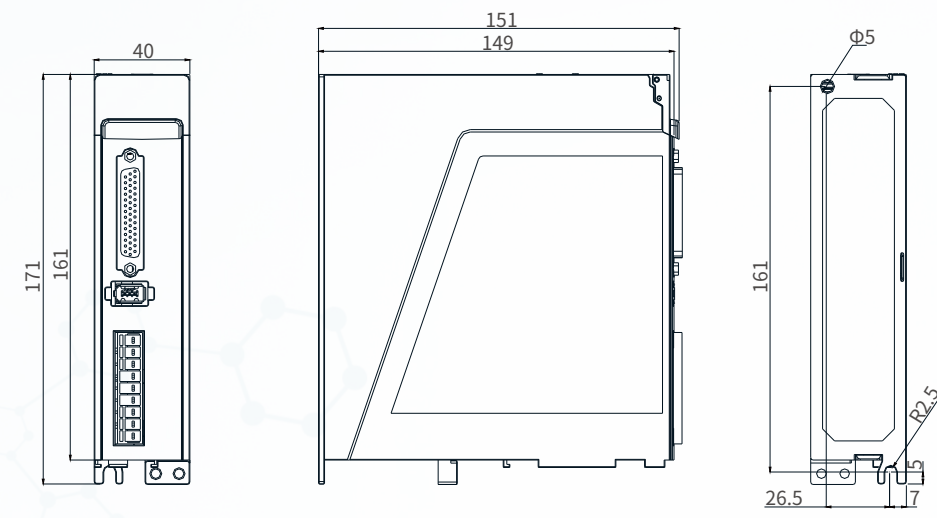

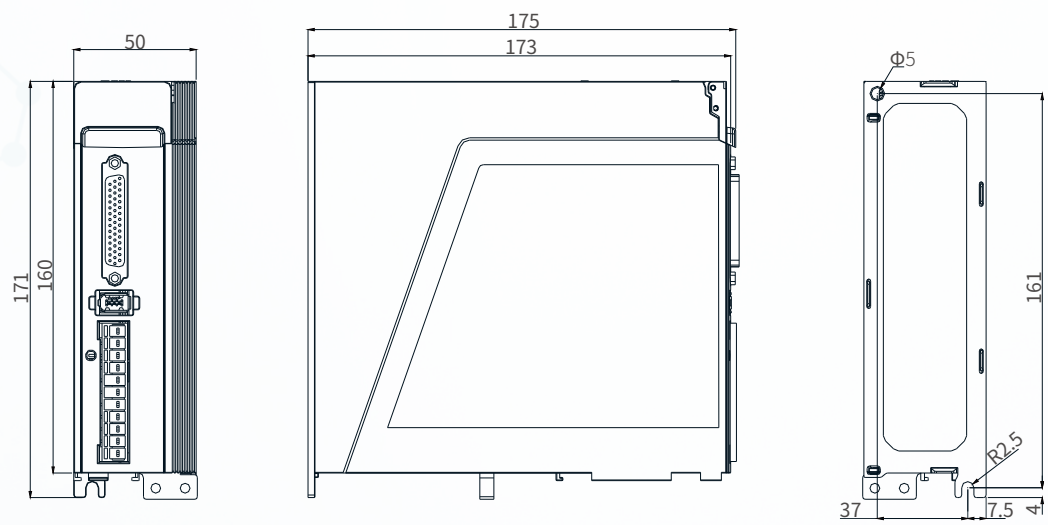| Model	L (mm)
SPM-SC*0807M*K-ST4-L	95.7 (126.7)
SPM-SC*0810M*K-ST4-L	103.9 (134.9)

Note: The parameter in "()" is the value with a brake.
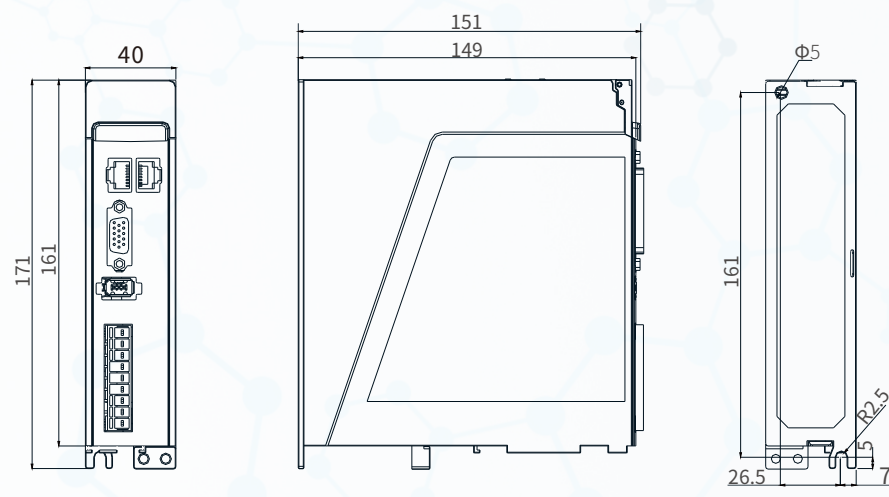
M3-P Dimensions

SIZE A

SIZE B

M3-N Dimensions

SIZE A

SIZE B