

**СНЯТО**  
С ПРОИЗВОДСТВА

## IS620 Series - Single Axis Servo

For general purpose applications

**EtherCAT**  **CANopen**

**Pulse/analog input**

**Embedded motion**



# IS620 series servos

High-performance servo system for motion control applications



## IS620 series servo drive - key features

### High performance

- Current loop bandwidth > 4 kHz
- Speed loop bandwidth: 1.2 kHz

### Wide range

- Supply voltage
  - Single-phase 220 V
  - Three-phase 220 V
  - Three-phase 380 V

- 0.1 kW to 7.5 kW

### Network compatibility

- Pulse/analog – IS620P series servo
- EtherCAT – IS620N series servo
- CANopen – IS620P-CO series servo

### Easy-to-use

- Easy commissioning with keypad
- Fine tuning with PC software (InoServoShop)

### Smart tuning

- Inertia auto-tuning (on-line/off-line)
- Automatic gain tuning
- Adaptive notch filter
- Automatic/manual damping filter for low frequency resonance

## MS1 series servo motor - key features

### High precision

- 23-bit resolution multi-turn absolute encoder

### Reliable operation

- IP67 rating (shaft opening fulfills IP65 rating with oil seal option)
- Low cogging torque – 1% of rated torque

### Wide selection

- Motor frame – 40, 60, 80, 100, 130, 180
- Rated torques from 0.16 Nm to 48.0 Nm
- Low and medium inertia selection
- Rated speed 1,500 rpm or 3,000 rpm

### Powerful performance

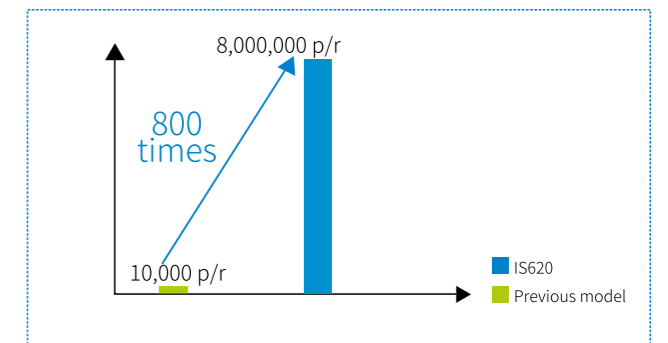
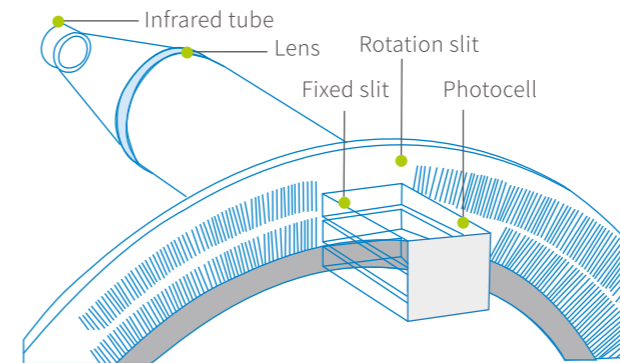
- Rated torque 350% (750 W or less MS1 motor)

# IS620 series highlights

The IS620 series is engineered to achieve the highest possible performance and reliability – enabling users to maximize the productivity of their automation systems

## High accuracy - multi-turn absolute encoder with 23 bit resolution

Proprietary Inovance algorithm

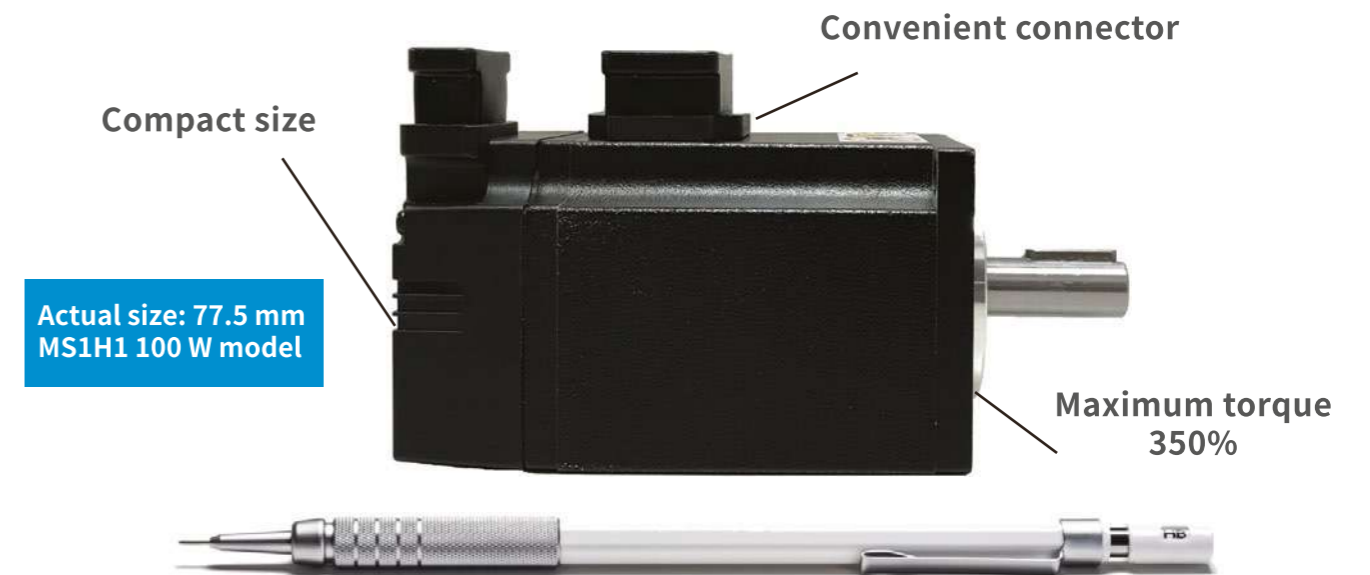


The 23-bit multi-turn absolute encoder, developed by WeTon, an Inovance subsidiary, has a resolution of 8 million pulses per revolution for extremely precise positioning applications such as industrial robots, machine tools and semiconductor manufacturing machinery.

The system's battery ensures data is backed-up at servo drive power-off and calculates the mechanical absolute position after servo drive power-on. It does not need to repeat the homing operation.

## Smaller footprint, higher performance

The built-in encoder has been developed in-house and is designed to achieve the smallest possible footprint, so the flange is kept the same all along the motor. The MS1H1 and MS1H4 motors are suitable for equipment requiring high torque (maximum torque of 350%).



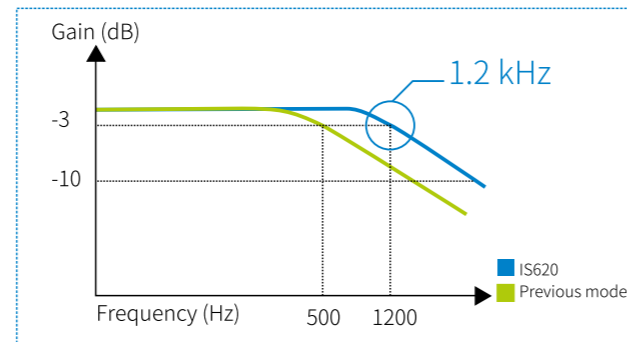
# IS620 series highlights

Engineered for performance and reliability in a compact footprint

## Improved performance – speed loop bandwidth 1.2 kHz

Speed loop bandwidth is a measure of how fast the motor can respond. High response control based on torque feed forward can reduce the settling time of machines. The settling time of IS620's position control is only 5.0-6.0 ms.

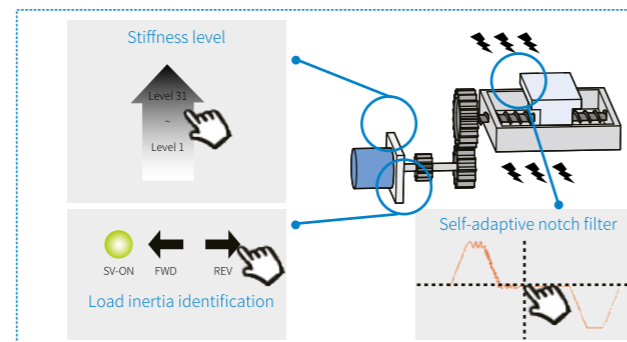
- Shorter settling time
- Reduced positioning time
- Higher throughput



## Smart tuning – easy commissioning with new tuning function

The machine can be automatically optimized using the automatic gain tuning function based on the stiffness level to achieve fast response and stability.

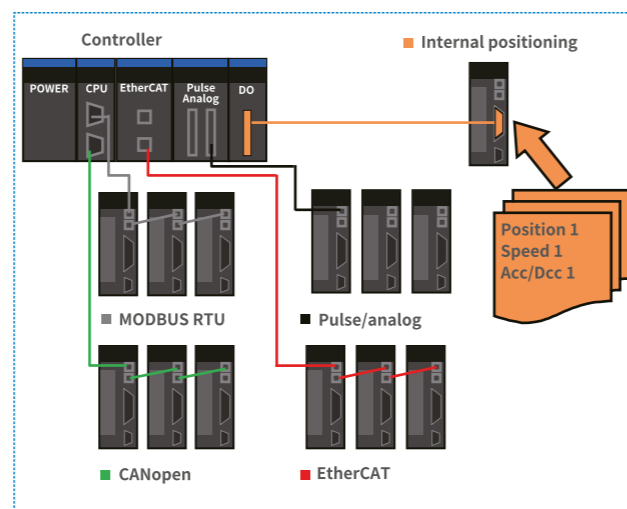
- **Load inertia identification:** on-line and off-line inertia identification
- **Automatic gain adjustment:** speed and position loop gains can be automatically adjusted by setting the stiffness level
- **Self-adaptive notch filter:** The vibration frequency can be automatically detected and the notch filter can be automatically set
- **Damping filter:** suppresses vibration from 1 to 100 Hz



## Wide protocol – pulse/analog, EtherCAT, MODBUS, CANopen

The IS620 family of servo drives support a variety of protocols for your system.

- IS620P servo drive
  - Pulse/analog input;
  - MODBUS RTU: RS232/RS485
  - Internal positioning: up to 16 positions can be stored
  - Supports point-to-point positioning using a simple digital input from the controller
- IS620N servo drive
  - EtherCAT: complies with CiA 402 drive profile
- IS620P-CO servo drive
  - CANopen: device profile specification for embedded systems



# IS620 servo drive technical data

Servo drive for position, speed, and torque control via pulse/analog, EtherCAT

## IS620 P S 5R5 I - A - INT

|  |   |  |
|--|---|--|
| ① Series<br>IS620 servo drive                    | ④ Rated output current<br>1R6: 1.6 A<br>...<br>021: 21 A<br>026: 26 A | ⑥ Customized function<br>A: 16-bit analog input<br>C: CANlink<br>CO: CANopen |
| ② Product type<br>P: pulse/analog<br>N: EtherCAT | ⑤ Installation<br>I: base mount                                       | ⑦ Version<br>INT: international  |
| ③ Voltage class<br>S: 220 Vac<br>T: 400 Vac      |   |  |

## Servo drive specifications

Single-phase 220 V

| Frame size          | SIZE-A   |            |      |
|---------------------|--|------------|------|
| Model no.           | S1R6   | S2R8       | S5R5 |
| Rated current (A)   | 1.6  | 2.8        | 5.5  |
| Maximum current (A) | 5.8  | 10.1       | 16.9 |
| Input voltage       | Single-phase 200 to 240 Vac, +10 to -15%, 50/60 Hz |            |      |
| Internal DBR        | No   | 50Ω / 50 W |      |

Three-phase 220 V

| SIZE-A  | SIZE-C     |      |
|---|------------|------|
| S5R5  | S7R6       | S012 |
| 5.5   | 7.6        | 11.6 |
| 16.9  | 17         | 28   |
| Three-phase 200 to 240 Vac, +10 to -15%, 50/60 Hz |            |      |
| 50Ω / 50 W  | 25Ω / 80 W |      |

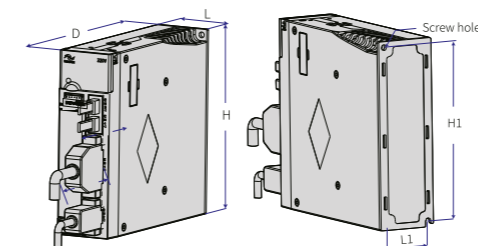
Three-phase 380 V

| Frame size          | SIZE-C  |      |            |      | SIZE-E      |      |      |
|---------------------|---|------|------------|------|-------------|------|------|
| Model no.           | T3R5  | T5R4 | T8R4       | T012 | T017        | T021 | T026 |
| Rated current (A)   | 3.5   | 5.4  | 8.4        | 11.9 | 16.5        | 20.8 | 25.7 |
| Maximum current (A) | 8.5   | 14.0 | 20.0       | 24.0 | 42.0        | 55.0 | 65.0 |
| Input voltage       | Three-phase 380 to 440 Vac, +10 to -15%, 50/60 Hz |      |            |      |             |      |      |
| Internal DBR        | 100Ω / 80 W                                       |      | 50Ω / 80 W |      | 40Ω / 100 W |      |      |

Notes: internal DBR is built-in regenerative resistor specification

Models S1R6 and S2R8 are not configured with a built-in regenerative resistor. Use an external regenerative resistor if necessary

## Servo drive dimensions

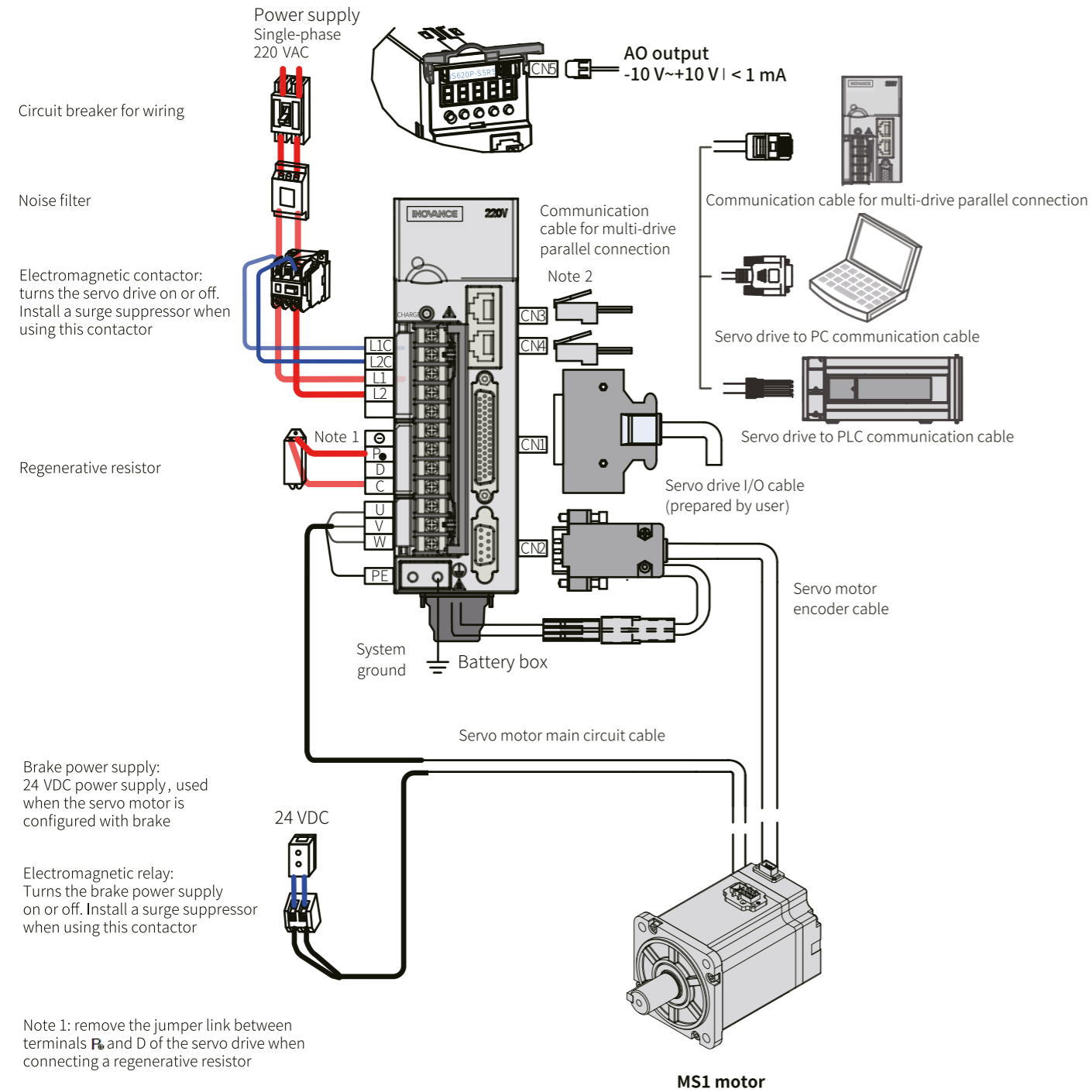


| Size | L (mm) | H (mm) | D (mm) | L1 (mm) | H1 (mm) | D1 (mm) | Screw hole | Tightening torque (Nm) |
|------|--------|--------|--------|---------|---------|---------|------------|------------------------|
| A    | 50     | 160    | 173    | 40      | 150     | 75      | 2-M4       | 0.6 to 1.2             |
| C    | 90     | 160    | 184    | 80      | 150     | 75      | 4-M4       | 0.6 to 1.2             |
| E    | 100    | 250    | 230    | 90      | 240     | 75      | 4-M4       | 0.6 to 1.2             |



# IS620P servo drive configuration

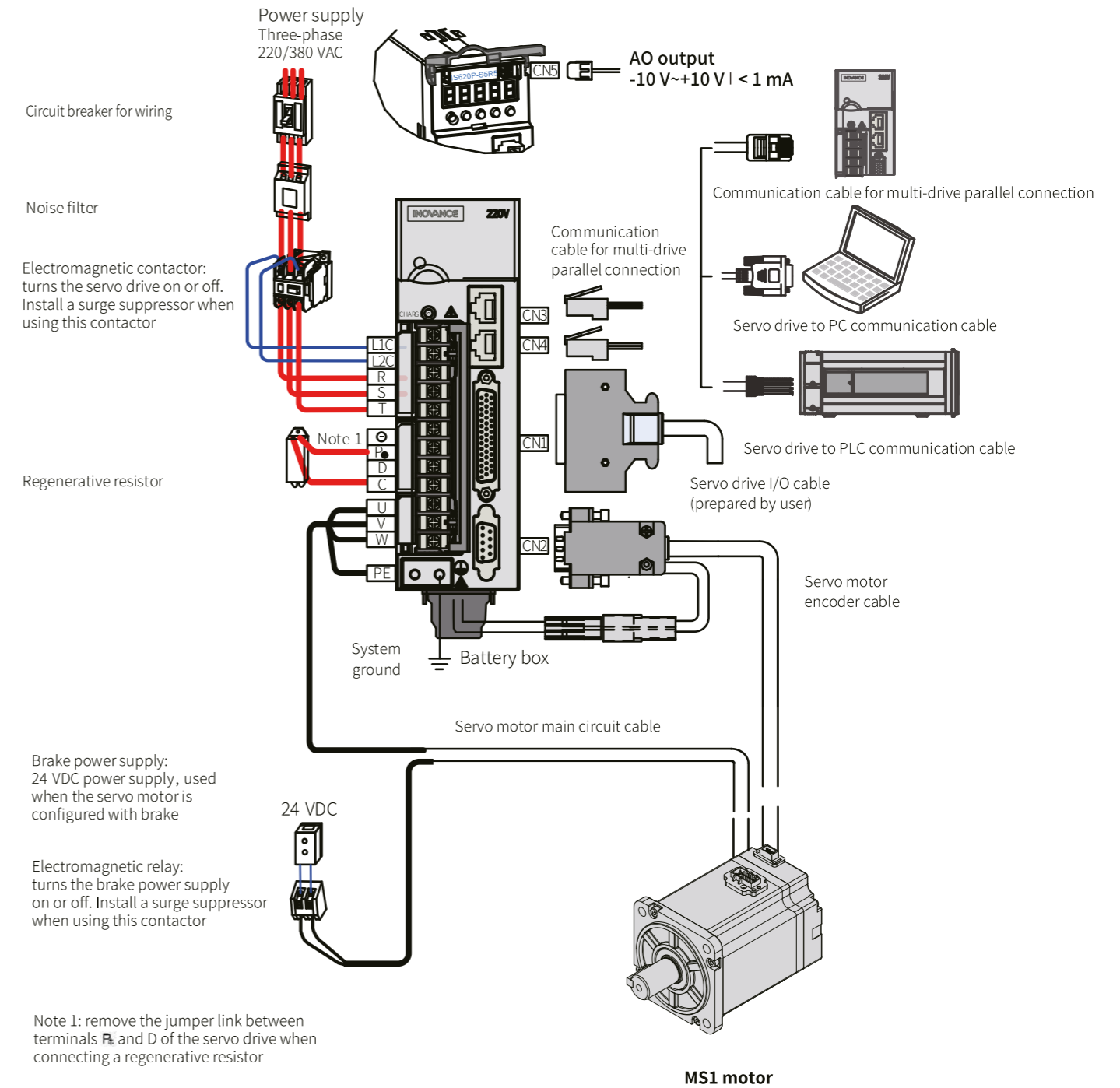
## Wiring example for single-phase 220 V system



Pulse/analog

# IS620P servo drive configuration

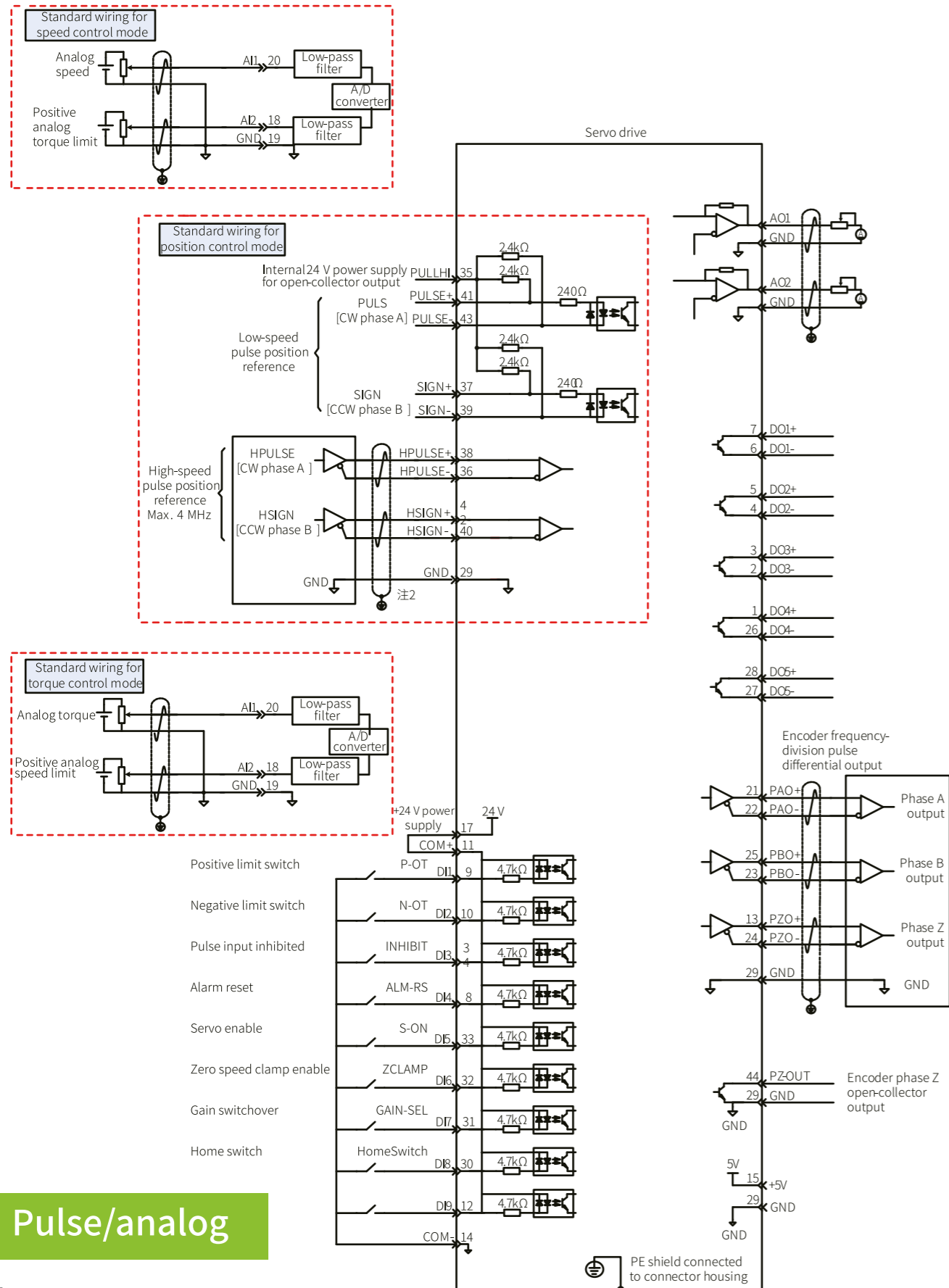
## Wiring example for three-phase 220 V/380 V system



Pulse/analog

# IS620P servo drive connection diagram

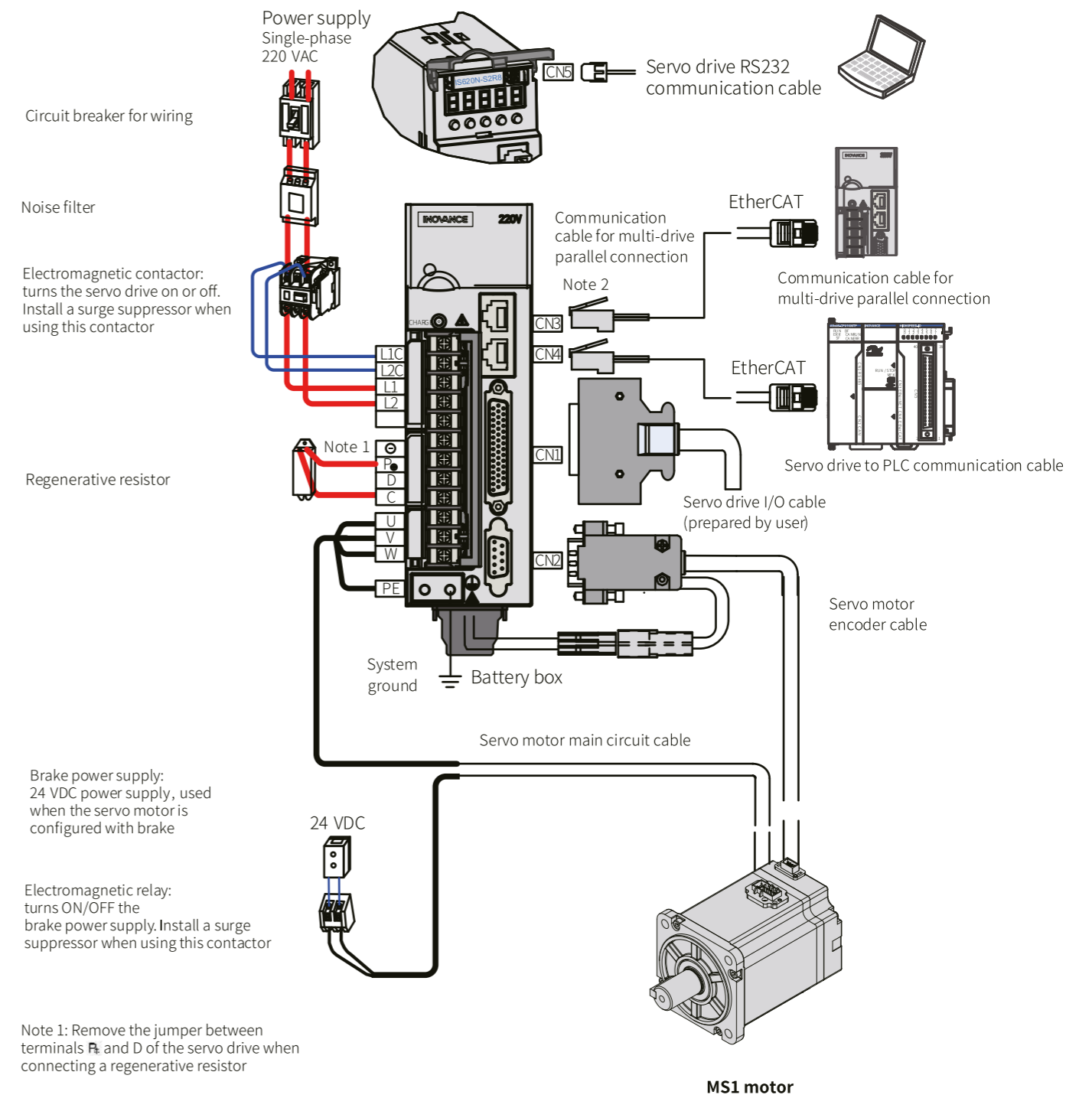
Standard wiring for pulse train input, analog input



Pulse/analog

# IS620N servo drive configuration

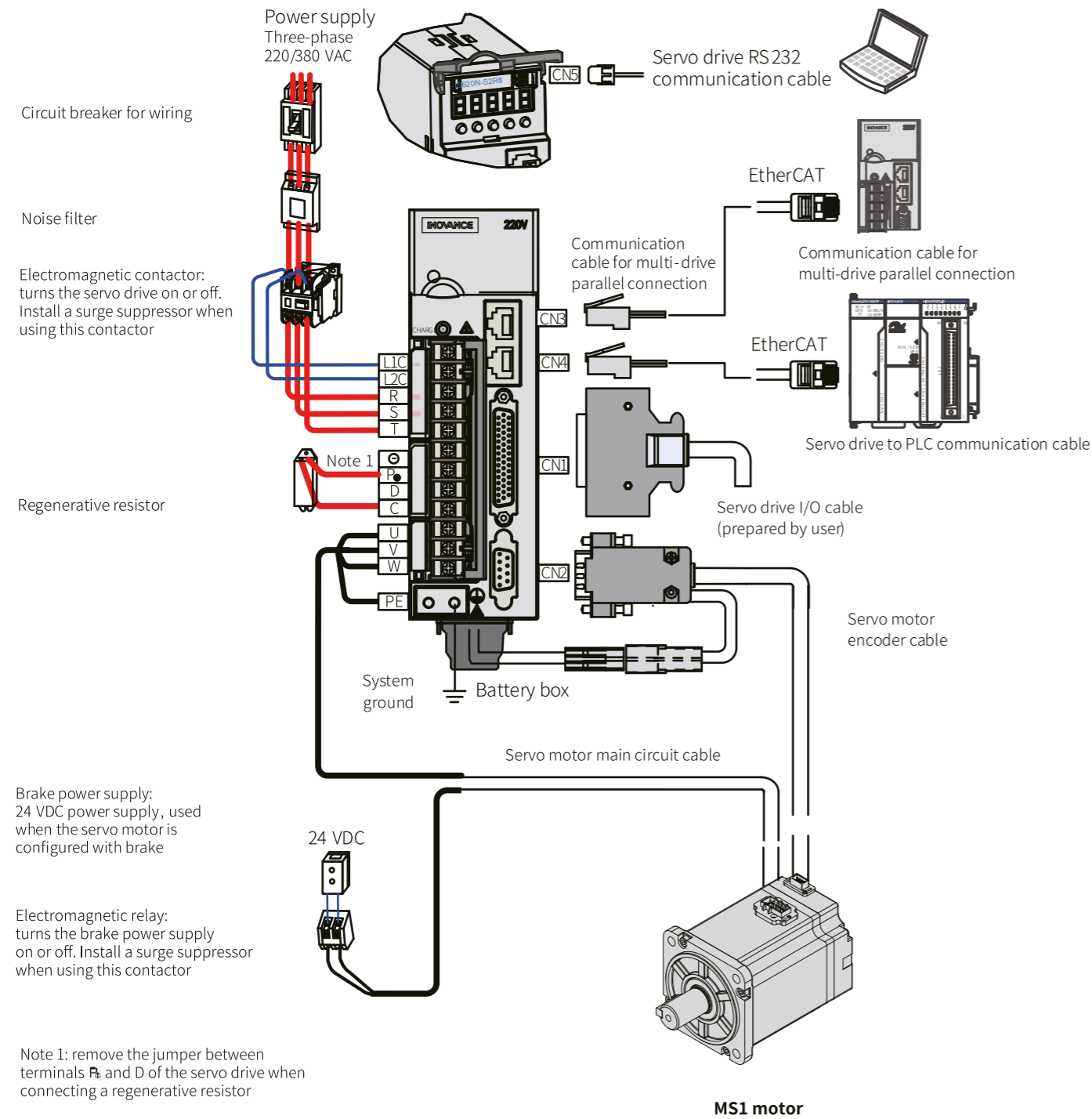
Wiring example for single-phase 220 V system with EtherCAT network



EtherCAT

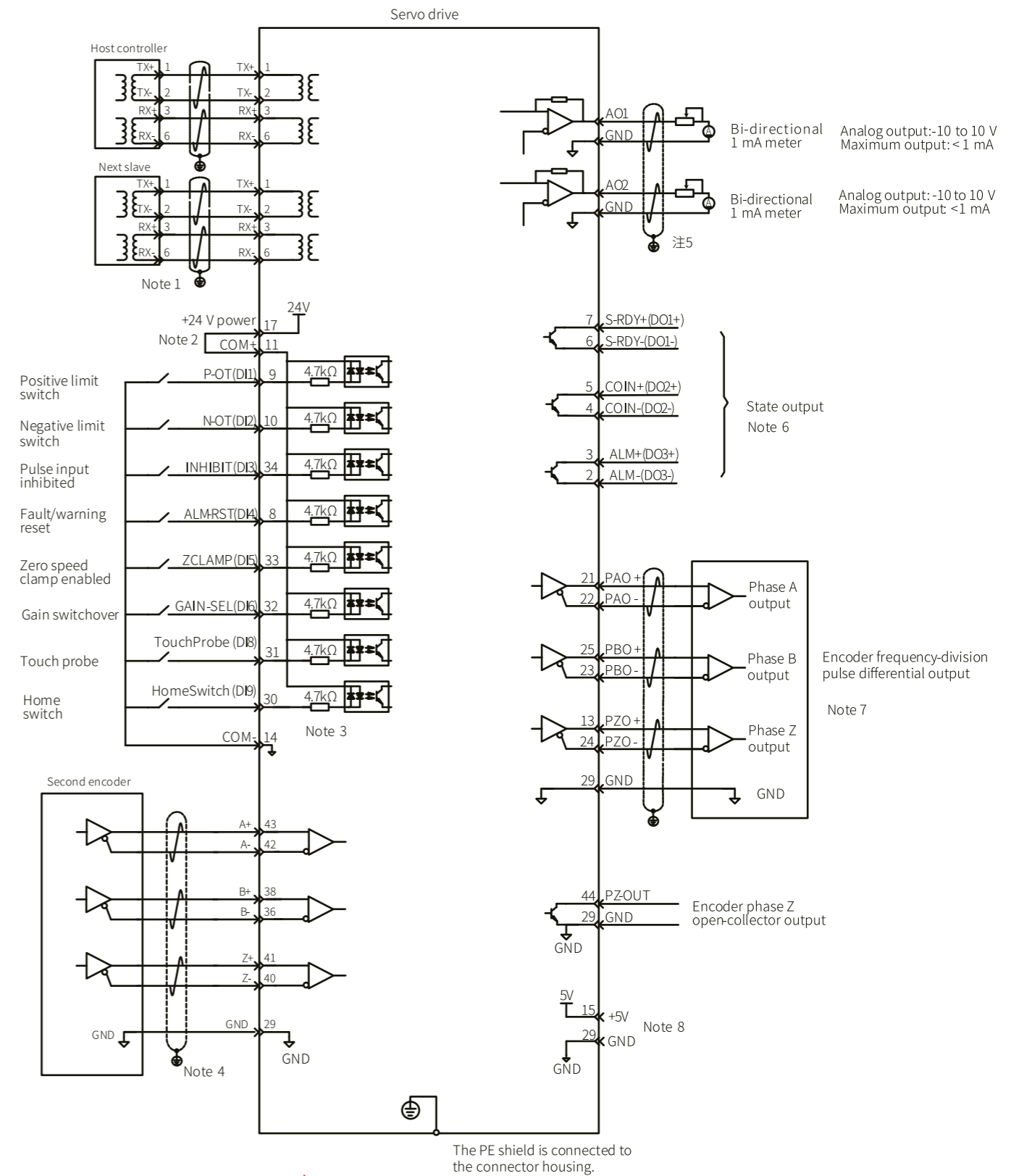
# IS620N servo drive configuration

Wiring example for three-phase 220 V/380 V system with EtherCAT network



# IS620N servo drive connection diagram

Standard wiring for EtherCAT communication



# IS620N EtherCAT overview



EtherCAT is a high performance, flexible, cost-effective technology

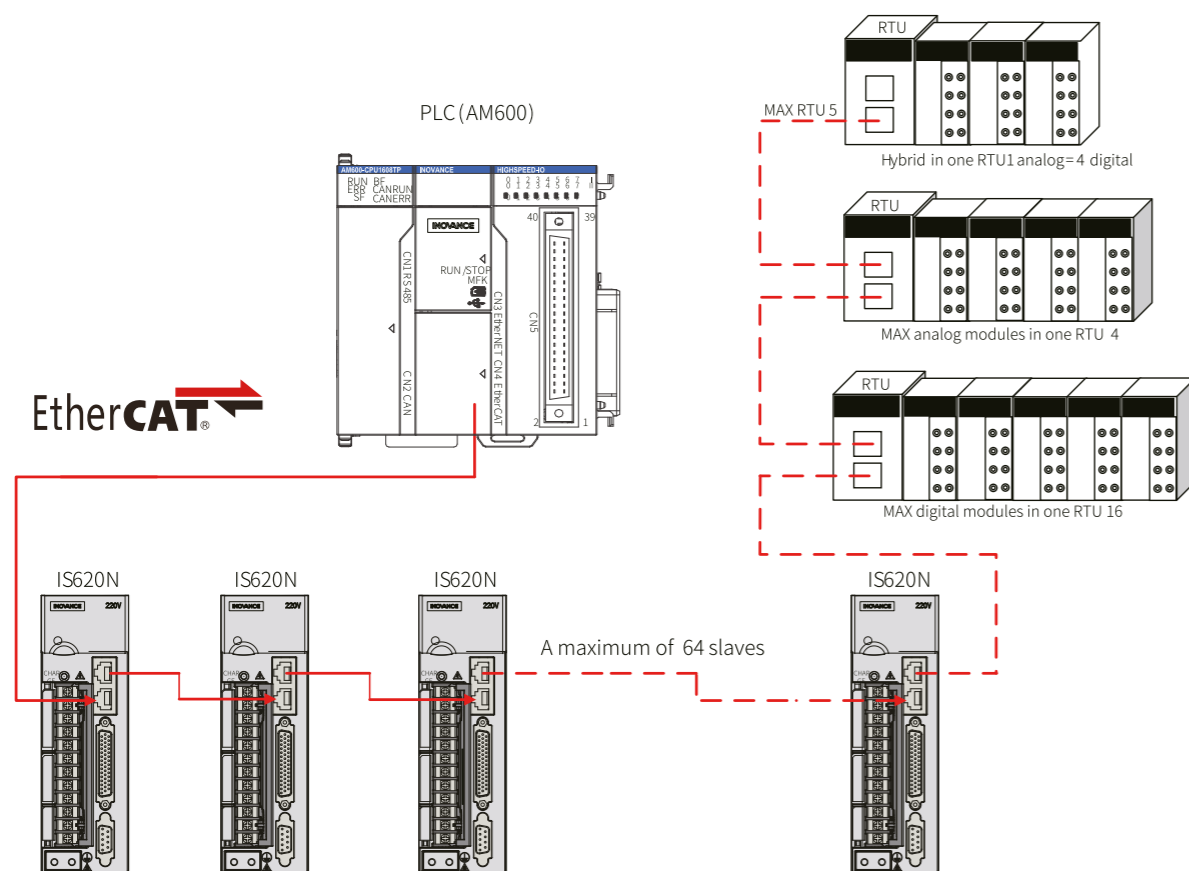
## Open technology

EtherCAT is a high-performance, easy-to-use industrial Ethernet technology with a flexible topology. CoE (CAN application protocol over EtherCAT) is the most commonly used EtherCAT communication protocol for acyclic data access. CoE also provides a mechanism to configure PDOs for cyclic data exchange.

The drive profile CiA402 (IEC61800-7-201) is mapped to EtherCAT. Our IS620N servo drive complies with the CiA 402 profile.

- CiA 402 profile type (CoE)
- Profile position mode (PP)
  - Profile velocity mode (PV)
  - Profile torque mode (PT)
  - Homing mode (HM)
  - Cyclic synchronous position mode (CSP)
  - Cyclic synchronous velocity mode (CSV)
  - Cyclic synchronous torque mode (CST)

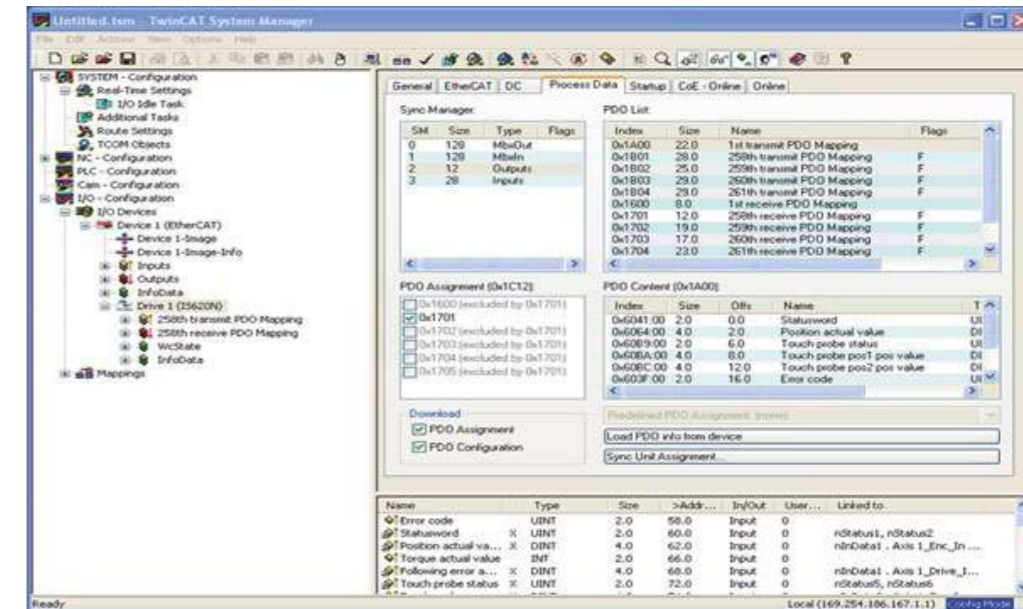
## Example of EtherCAT network system with IS620N servo drive



# IS620N EtherCAT overview

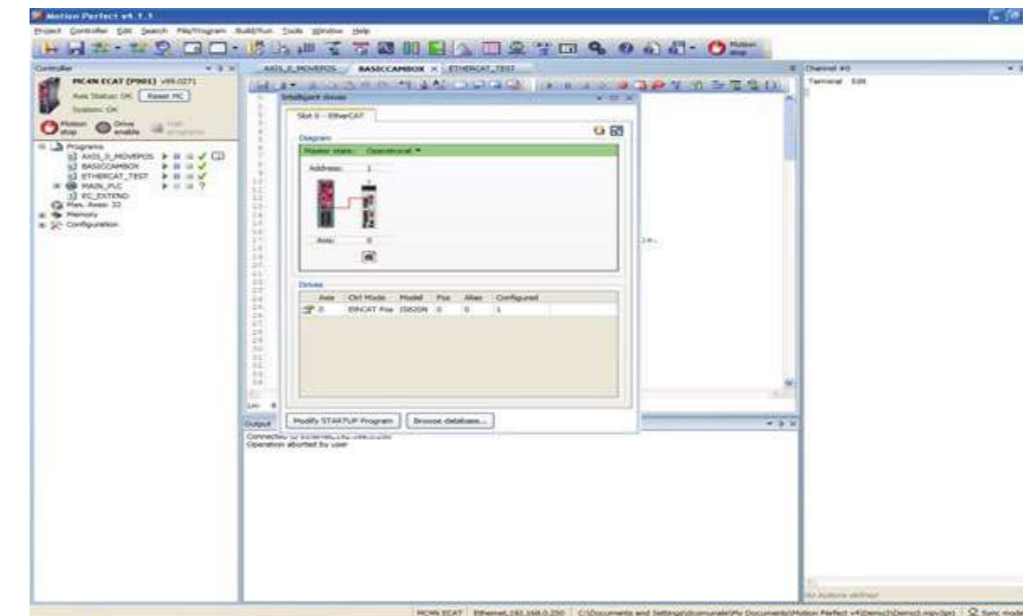


## Network configuration using TwinCAT platform with IS620N



Configuration of the IS620N drive is automatically recognized by the controller using the XML library related to the drives.

## Network configuration using third party controller platform with IS620N



Configuration of the IS620N drive is automatically recognized by the controller using the XML library related to the drives.

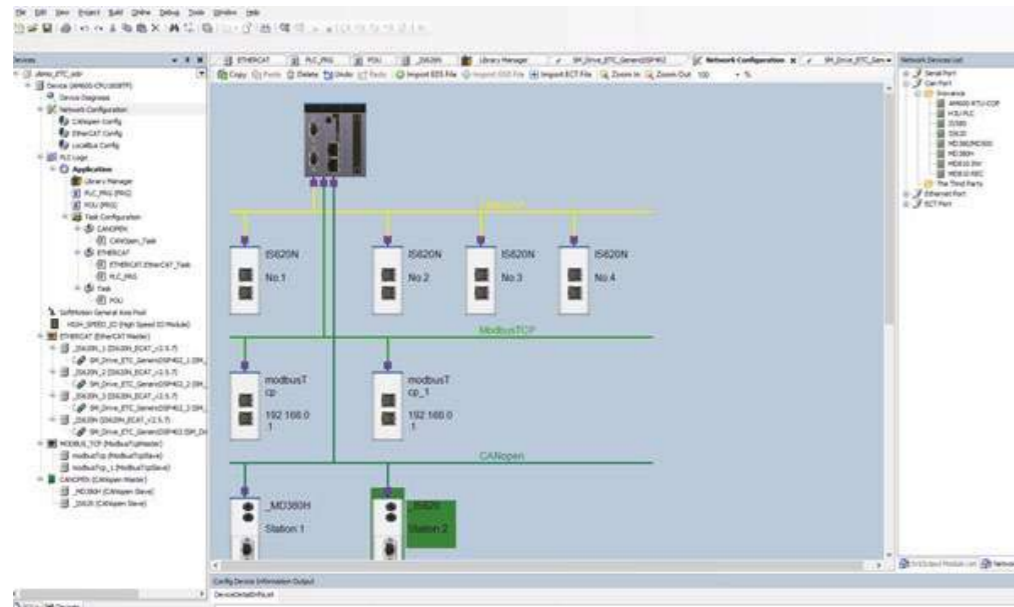


# IS620N EtherCAT overview



EtherCAT is a high performance, flexible, cost-effective technology

## Network configuration using AM600 platform with IS620N



AM600 platform example of EtherCAT configuration + CANopen module + Modbus TCP/IP for service and commissioning.

# IS620P-CO CANopen overview



CANopen networks are used in many embedded machine control systems

The internationally standardized CiA 402 device profile for drives and motion controllers (IEC 61800-7-201/301) is the most widely implemented solution.

The CiA 402 profile specifies several operation modes in detail. They are selectable by means of a command, and confirmed at the application level.

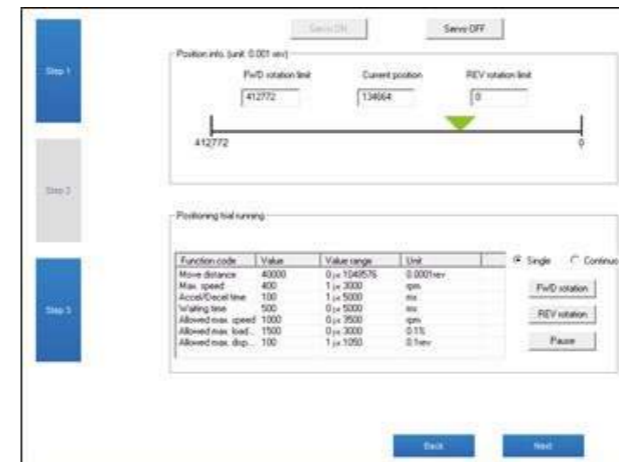
CANopen supports master/slave mode, the IS620P only supports slave mode. It supports only one master node in the network, the address of master/slave nodes is between 1 and 63, different for each node.

| CiA 402 |                                  |
|---------|----------------------------------|
| ■       | 0-Speed mode                     |
| ■       | 1-Position mode                  |
| ■       | 2-Torque mode                    |
| ■       | 3-Speed mode<->Torque mode       |
| ■       | 4-Position mode<->Speed mode     |
| ■       | 5-Position mode<->Torque mode    |
| ■       | 6-Position<->speed<->Torque mode |

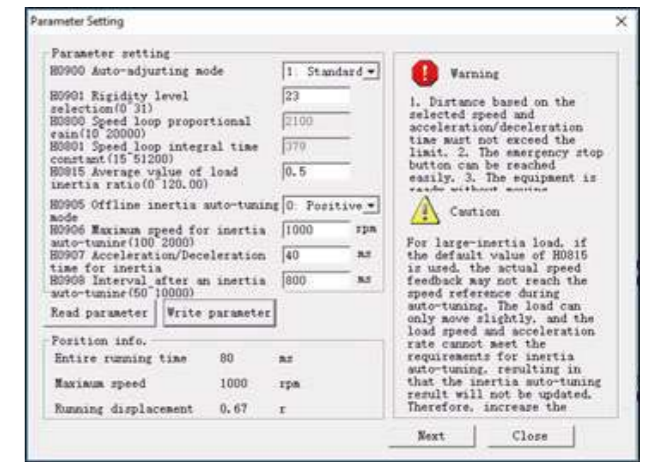
Modes 3-6 can be changed on the fly

# PC software: InoServoShop

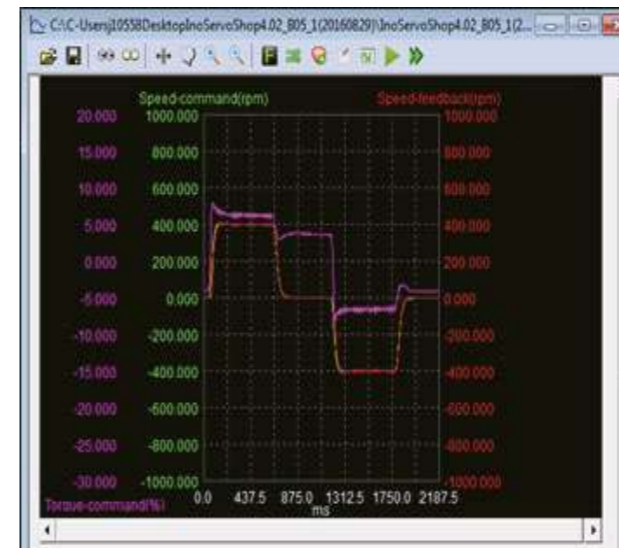
Easy to use engineering tool for commissioning and diagnostics



Easy auto-tuning using position JOG and self-adjustment



Inertia auto-tuning calculates estimated inertia of load



Oscilloscope function to monitor servo motor performance



Mechanical analysis to diagnose natural frequency of system

- Function – setting, monitoring
  - Read/write parameters
  - Real-time monitoring parameters
  - DI/DO graphic configuration
  - Oscilloscope (trace)
  - Software reset
  - JOG run
  - Automatic U-V current phase calibration

- Function – adjustment
  - Automatic gain tuning
  - Inertia auto-tuning
  - Mechanical analysis
- Advanced function
  - Electronic CAM



# MS1 servo motor technical data

Reliable operation, wide selection

## Model designation

# MS1 H1 - 75B 30C B - A3 3 1 Z - INT

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

|  |   |   |
|--|---|---|
| ① Series: MS1 series servo motor   | ④ Rated speed<br>A: x 1<br>B: x 10<br>C: x 100<br>D: x 1,000<br>E: x 10,000<br>E.g. 30C : 3,000 RPM | ⑦ Motor shaft<br>1: plain<br>2: keyed<br>3: keyed + tapped hole<br>5: tapped hole       |
| ② Inertia<br>H1: low inertia, 40/60/80 mm flange<br>H2: low inertia, 100/130 mm flange<br>H3: medium inertia 130/180 mm flange<br>H4: medium inertia 60/80 mm flange | ⑤ Voltage class<br>A: 220 V<br>D: 380 V   | ⑧ Brake, oil sealing<br>0: none<br>1: oil sealing<br>2: brake<br>4: brake + oil sealing |
| ③ Rated power<br>A: x 1<br>B: x 10<br>C: x 100<br>D: x 1,000<br>E: x 10,000<br>E.g. 75B: 750 W; 15C: 1,500 W   | ⑥ Encoder type<br>A3: 23-bit multi-turn absolute  | ⑨ Motor configuration<br>Y: 8 pole<br>Z: 10 pole  |
|  |   | ⑩ INT: international version  |

| Servo motor model   | Rated output [kW] | Rated torque [Nm] | Peak torque [Nm] | Rated current [Arms] | Peak current [Arms] | Rated speed [RPM] | Peak speed [RPM] | Torque constant [Nm/Arms] | Rotor inertia [10 <sup>-4</sup> kgm <sup>2</sup> ] | Voltage [V] |     |
|---|-------------------|-------------------|------------------|----------------------|---------------------|-------------------|------------------|---------------------------|--|-------------|-----|
| <b>MS1H1 (N<sub>rated</sub> = 3,000 RPM, N<sub>max</sub> = 6,000 RPM)</b>       |                   |                   |                  |                      |                     |                   |                  |                           |  |             |     |
| MS1H1-05B30CB-XXXXZ-INT   | 0.05              | 0.16              | 0.56             | 1.3                  | 4.7                 | 3,000             | 6,000            | 0.15                      | 0.026 (0.028)                                      | 220         |     |
| MS1H1-10B30CB-XXXXZ-INT   | 0.1               | 0.32              | 1.12             | 1.3                  | 4.7                 |                   |                  | 0.26                      | 0.041 (0.043)                                      |             |     |
| MS1H1-20B30CB-XXXXZ-INT   | 0.2               | 0.64              | 2.24             | 1.5                  | 5.8                 |                   |                  | 0.46                      | 0.207 (0.220)                                      |             |     |
| MS1H1-40B30CB-XXXXZ-INT   | 0.4               | 1.27              | 4.46             | 2.8                  | 10.1                |                   |                  | 0.53                      | 0.376 (0.390)                                      |             |     |
| MS1H1-55B30CB-XXXXZ-INT   | 0.55              | 1.75              | 6.13             | 3.8                  | 15.0                |                   |                  | 0.49                      | 1.06   |             |     |
| MS1H1-75B30CB-XXXXZ-INT   | 0.75              | 2.39              | 8.36             | 4.8                  | 16.9                |                   |                  | 0.58                      | 1.38 (1.43)  |             |     |
| MS1H1-10C30CB-XXXXZ-INT   | 1.0               | 3.18              | 11.1             | 7.6                  | 28                  |                   |                  | 0.46                      | 1.75   |             |     |
| <b>MS1H2 (N<sub>rated</sub> = 3,000 RPM, N<sub>max</sub> = 5,000/6,000 RPM)</b> |                   |                   |                  |                      |                     |                   |                  |                           |  |             |     |
| MS1H2-10C30CB-XXXXZ-INT   | 1.0               | 3.18              | 9.54             | 7.5                  | 23                  | 3,000             | 6,000            | 0.43                      | 1.87 (3.12)  | 220         |     |
| MS1H2-15C30CB-XXXXZ-INT   | 1.5               | 4.9               | 14.7             | 10.8                 | 32                  |                   | 5,000            | 0.45                      | 2.46 (3.71)  |             |     |
| MS1H2-10C30CD-XXXXZ-INT   | 1.0               | 3.18              | 9.54             | 3.65                 | 11                  |                   | 5,000            | 6,000                     | 0.87   | 1.87 (3.12) | 380 |
| MS1H2-15C30CD-XXXXZ-INT   | 1.5               | 4.9               | 14.7             | 4.5                  | 14                  |                   |                  | 1.09                      | 2.46 (3.71)  |             |     |
| MS1H2-20C30CD-XXXXZ(-S4)-INT  | 2.0               | 6.36              | 19.1             | 5.89                 | 20                  |                   |                  | 1.08                      | 3.06 (4.31)  |             |     |
| MS1H2-25C30CD-XXXXZ(-S4)-INT  | 2.5               | 7.96              | 23.9             | 7.56                 | 25                  |                   |                  | 1.05                      | 3.65 (4.9)   |             |     |
| MS1H2-30C30CD-XXXXZ(-S4)-INT  | 3.0               | 9.8               | 29.4             | 10                   | 30                  |                   |                  | 0.98                      | 7.72 (7.72)  |             |     |
| MS1H2-40C30CD-XXXXZ(-S4)-INT  | 4.0               | 12.6              | 37.8             | 13.6                 | 40.8                |                   |                  | 0.93                      | 12.1 (14.6)  |             |     |
| MS1H2-50C30CD-XXXXZ(-S4)-INT  | 5.0               | 15.8              | 47.6             | 16                   | 48                  |                   |                  | 1.07                      | 15.4 (17.9)  |             |     |
| <b>MS1H3 (N<sub>rated</sub> = 1,500 RPM, N<sub>max</sub> = 3,000 RPM)</b>       |                   |                   |                  |                      |                     |                   |                  |                           |  |             |     |
| MS1H3-85B15CB-XXXXZ-INT   | 0.85              | 5.39              | 13.5             | 6.6                  | 16.5                | 1,500             | 3,000            | 0.9                       | 13.3 (14)  | 220         |     |
| MS1H3-13C15CB-XXXXZ-INT   | 1.3               | 8.34              | 20.85            | 10                   | 25                  |                   |                  | 0.9                       | 17.8 (18.5)  |             |     |
| MS1H3-85B15CD-XXXXZ-INT   | 0.85              | 5.39              | 13.5             | 3.3                  | 8.25                |                   |                  | 1.75                      | 13.3 (14)  | 380         |     |
| MS1H3-13C15CD-XXXXZ-INT   | 1.3               | 8.34              | 20.85            | 5                    | 12.5                |                   |                  | 1.78                      | 17.8 (18.5)  |             |     |
| MS1H3-18C15CD-XXXXZ-INT   | 1.8               | 11.5              | 28.75            | 6.6                  | 16.5                |                   |                  | 1.8                       | 25 (25.7)  |             |     |
| MS1H3-29C15CD-XXXXZ-INT   | 2.9               | 18.6              | 37.2             | 11.9                 | 28                  |                   |                  | 1.7                       | 55 (57.2)  |             |     |
| MS1H3-44C15CD-XXXXZ-INT   | 4.4               | 28.4              | 71.1             | 16.5                 | 40.5                |                   |                  | 1.93                      | 88.9 (90.8)  |             |     |
| MS1H3-55C15CD-XXXXZ-INT   | 5.5               | 35                | 87.6             | 20.85                | 52                  |                   |                  | 1.8                       | 107 (109.5)  |             |     |
| MS1H3-75C15CD-XXXXZ-INT   | 7.5               | 48                | 119              | 25.7                 | 65                  |                   |                  | 1.92                      | 141 (143.1)  |             |     |
| <b>MS1H4 (N<sub>rated</sub> = 3,000 RPM, N<sub>max</sub> = 6,000 RPM)</b>       |                   |                   |                  |                      |                     |                   |                  |                           |  |             |     |
| MS1H4-40B30CB-XXXXZ-INT   | 0.4               | 1.27              | 4.46             | 2.8                  | 10.1                | 3,000             | 6,000            | 0.53                      | 0.657 (0.667)                                      | 220         |     |
| MS1H4-75B30CB-XXXXZ-INT   | 0.75              | 2.39              | 8.36             | 4.8                  | 16.9                |                   |                  | 0.58                      | 2 (2.012)  |             |     |

Notes: the brake version can only work in S4 duty, for example ISMH2-20C30CD-A334Z-S4-INT.

# Servo motor and servo drive combination

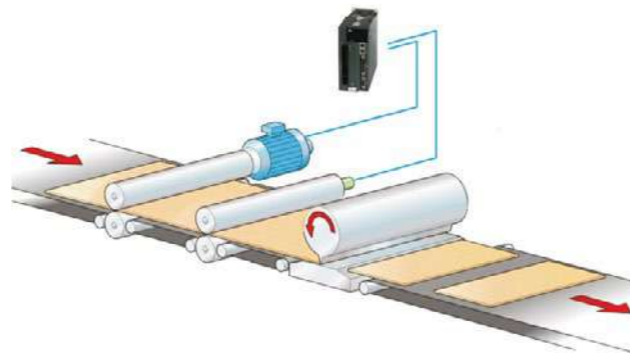
|             | 1-phase 220 V                                   |   | 1/3-phase 220 V  |  | 3-phase 220 V                                   |               |               |
|-------------|---|---|--|--|---|---------------|---------------|
| Servo drive |   |   |  |  |   |               |               |
|             | SIZE A  |   | SIZE A   |  | SIZE C  |               |               |
|             | IS620-S1R6I                                     | IS620-S2R8I                                     | IS620-S5R5I  | IS620-S7R6I  | IS620-S012I                                     |               |               |
| Servo motor |   |   |  |  |   |               |               |
|             | 50 W, 100 W, 200 W                              | 400 W   | 550 W, 750 W   | 850 W, 1.0 kW  | 1.3 kW, 1.5 kW                                  |               |               |
|             | MS1H1-05B30CB<br>MS1H1-10B30CB<br>MS1H1-20B30CB | MS1H1-40B30CB<br>MS1H4-40B30CB                  | MS1H1-55B30CB (no brake)<br>MS1H1-75B30CB<br>MS1H4-75B30CB | MS1H1-10C30CB (no brake)<br>MS1H2-10C30CB<br>MS1H3-85B15CB | MS1H3-13C15CB<br>MS1H2-15C30CB                  |               |               |
| Servo drive | 3-phase 380 V                                   |   |  |  |   |               |               |
|             |   |   |  |  |   |               |               |
|             | SIZE C  |   |  | SIZE E   |   |               |               |
|             | IS620-T3R5I                                     | IS620-T5R4I                                     | IS620-T8R4I  | IS620-T012I  | IS620-T017I                                     | IS620-T021I   |               |
| Servo motor |   |   |  |  |   |               |               |
|             | 850 W   | 1.0 kW, 1.3 kW, 1.5 kW                          | 1.8 kW, 2.0 kW, 2.5 kW                                     | 2.9 kW, 3.0 kW   | 4.0 kW, 4.4 kW, 5.0 kW                          | 5.5 kW        | 7.5 kW        |
|             | MS1H3-85B15CD                                   | MS1H3-13C15CD<br>MS1H2-10C30CD<br>MS1H2-15C30CD | MS1H3-18C15CD<br>MS1H2-20C30CD<br>MS1H2-25C30CD            | MS1H3-29C15CD<br>MS1H2-30C30CD                             | MS1H3-44C15CD<br>MS1H2-40C30CD<br>MS1H2-50C30CD | MS1H3-55C15CD | MS1H3-75C15CD |

# Application examples

## Double position loop control

The encoder on the velocity measurement roller reports material speed and position. The servo drive uses closed-loop position control to deliver materials smoothly to pre-set positions, compensating for material slippage and adjusting conveyor gaps. Algorithms in the drive offer dual-PG full closed-loop control; while the drive's filter allows adjustment of speed and position control. To ensure reliable material conveying, runaway protection kicks in when there is a large difference between internal and external loop positions.

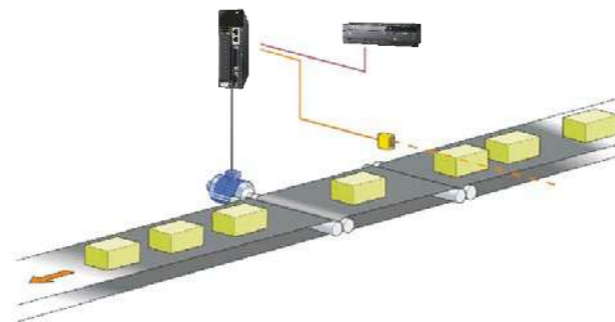
Example applications: steel plate cutting, pipe bending, wire stripping



## Changing position control on-the-fly

After an external DI interruption, the motor runs to a pre-set length at the existing speed. This function is given highest priority and, when it is triggered, the servo motor ignores all other position commands.

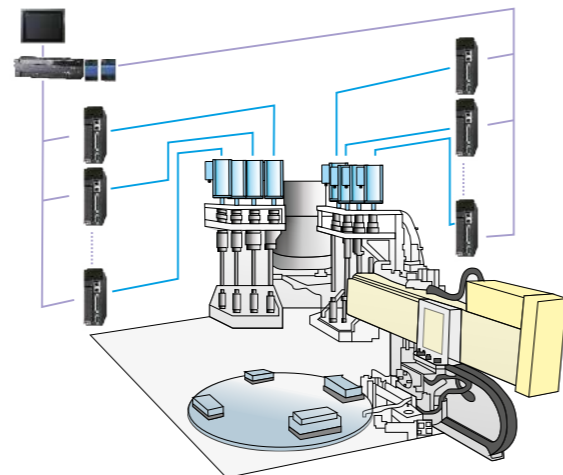
Example applications: material laying, bearing tube cutting



## CANlink communication (optional)

CANlink is an open Inovance protocol, based on CAN bus that can be used to network Inovance HMIs, PLCs and servo and AC drives. It offers simple networking and improved reliability and security, and is suitable for applications with large numbers of DIs and DOs. CANlink 3.0 uses a master/slave model with a maximum of 62 slaves and a highest communication rate of 1M. Standard CANopen is also supported.

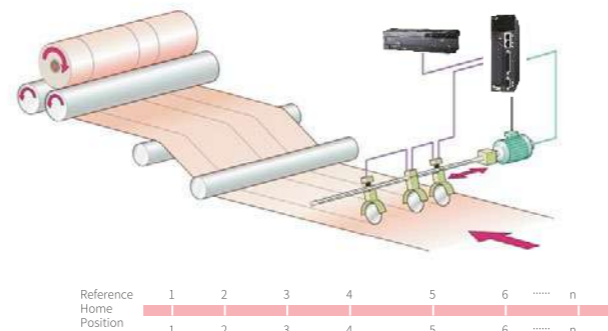
Example applications: hoop bending, film cutting, automatic screwing, stacking, plastic injection molding



## Multi-position control

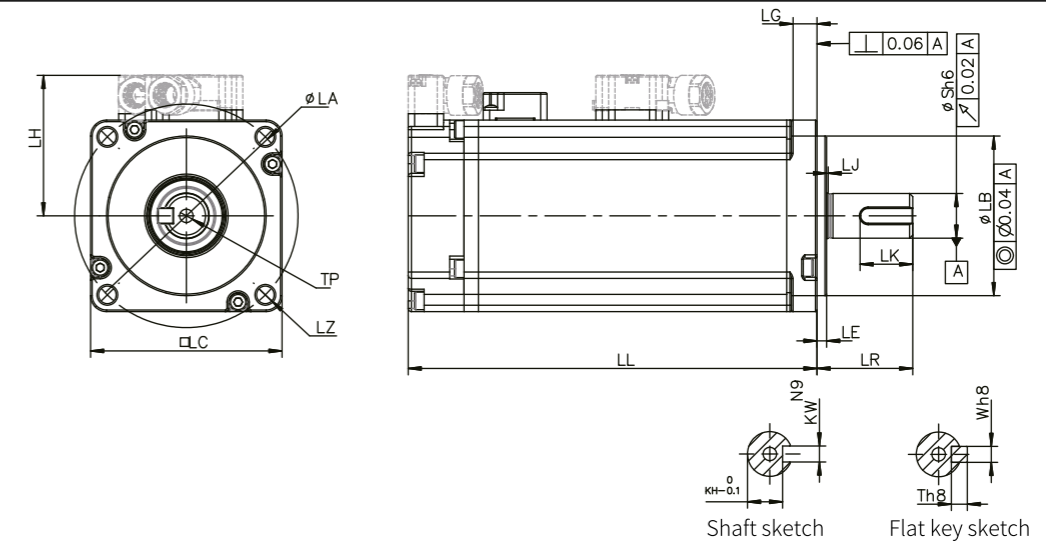
Up to 16 relative or absolute positions can be controlled via PLC or manually. This function requires a servo motor with multi-turn absolute encoder to perform the home seek operation. Position-reach signals indicate completion of each phase.

Example applications: longitudinal line cutting, multi-station switching, servo tool holder



# Servo motor dimensions and drawings

MS1H1/MS1H4 mounting dimensions ( $N_{rated} = 3,000 \text{ RPM}$ ,  $N_{max} = 6,000 \text{ RPM}$ )



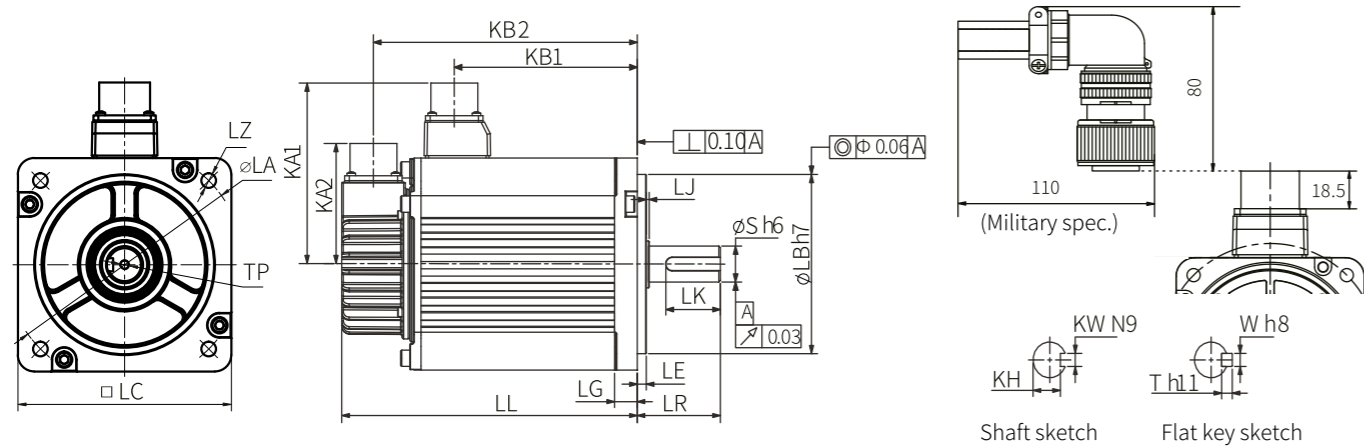
| Model                   | LC (mm) | LL (mm)        | LR (mm) | LA (mm) | LZ (mm) | LH (mm) | LG (mm) | LE (mm) | LJ (mm)  |
|-------------------------|---------|----------------|---------|---------|---------|---------|---------|---------|----------|
| MS1H1-05B30CB-XXXXZ-INT | 40      | 65 (96)*       | 25±0.5  | 46      | 2-Φ4.5  | 34      | 5       | 2.5±0.5 | 0.5±0.35 |
| MS1H1-10B30CB-XXXXZ-INT | 40      | 77.5 (109)*    | 25±0.5  | 46      | 2-Φ4.5  | 34      | 5       | 2.5±0.5 | 0.5±0.35 |
| MS1H1-20B30CB-XXXXZ-INT | 60      | 72.5 (100)*    | 30±0.5  | 70      | 4-Φ5.5  | 44      | 7.5     | 3±0.5   | 0.5±0.35 |
| MS1H1-40B30CB-XXXXZ-INT | 60      | 91 (119)*      | 30±0.5  | 70      | 4-Φ5.5  | 44      | 7.5     | 3±0.5   | 0.5±0.35 |
| MS1H1-55B30CB-XX31Z-INT | 80      | 96.2           | 35±0.5  | 90      | 4-Φ7    | 54      | 7.7     | 3±0.5   | 0.5±0.35 |
| MS1H1-75B30CB-XXXXZ-INT | 80      | 107 (140)*     | 35±0.5  | 90      | 4-Φ7    | 54      | 7.7     | 3±0.5   | 0.5±0.35 |
| MS1H1-10C30CB-XX31Z-INT | 80      | 118.2          | 35±0.5  | 90      | 4-Φ7    | 54      | 7.7     | 3±0.5   | 0.5±0.35 |
| MS1H4-40B30CB-XXXXZ-INT | 60      | 105 (128)*     | 30±0.5  | 70      | 4-Φ5.5  | 44      | 7.5     | 3±0.3   | 0.5±0.35 |
| MS1H4-75B30CB-XXXXZ-INT | 80      | 117.5 (147.5)* | 35±0.5  | 90      | 4-Φ7    | 54      | 7.7     | 3±0.3   | 0.5±0.35 |

| Model                   | LB (mm) | S (mm) | TP (mm) | LK (mm) | KH (mm) | KW (mm) | W (mm) | T (mm) | Weight (kg)  |
|-------------------------|---------|--------|---------|---------|---------|---------|--------|--------|--------------|
| MS1H1-05B30CB-XXXXZ-INT | 30      | 8      | M3×6    | 15.5    | 6.2     | 3       | 3      | 3      | 0.39 (0.50)* |
| MS1H1-10B30CB-XXXXZ-INT | 30      | 8      | M3×6    | 15.5    | 6.2     | 3       | 3      | 3      | 0.45 (0.64)* |
| MS1H1-20B30CB-XXXXZ-INT | 50      | 14     | M5×8    | 16.5    | 11      | 5       | 5      | 5      | 0.78 (1.16)* |
| MS1H1-40B30CB-XXXXZ-INT | 50      | 14     | M5×8    | 16.5    | 11      | 5       | 5      | 5      | 1.11 (1.48)* |
| MS1H1-55B30CB-XX31Z-INT | 70      | 19     | M6×20   | 25      | 15.5    | 6       | 6      | 6      | 1.85         |
| MS1H1-75B30CB-XXXXZ-INT | 70      | 19     | M6×20   | 25      | 15.5    | 6       | 6      | 6      | 2.18 (2.82)* |
| MS1H1-10C30CB-XX31Z-INT | 70      | 19     | M6×20   | 25      | 15.5    | 6       | 6      | 6      | 2.55         |
| MS1H4-40B30CB-XXXXZ-INT | 50      | 14     | M5×8    | 16.5    | 11.0    | 5       | 5      | 5      | 1.27 (1.62)* |
| MS1H4-75B30CB-XXXXZ-INT | 70      | 19     | M6×20   | 25      | 15.5    | 6       | 6      | 6      | 2.40 (3.04)* |

\*Refers to braked version of the motor

# Servo motor dimensions and drawings

MS1H2 mounting dimensions ( $N_{rated} = 3,000 \text{ RPM}$ ,  $N_{max} = 5,000/6,000 \text{ RPM}$ )



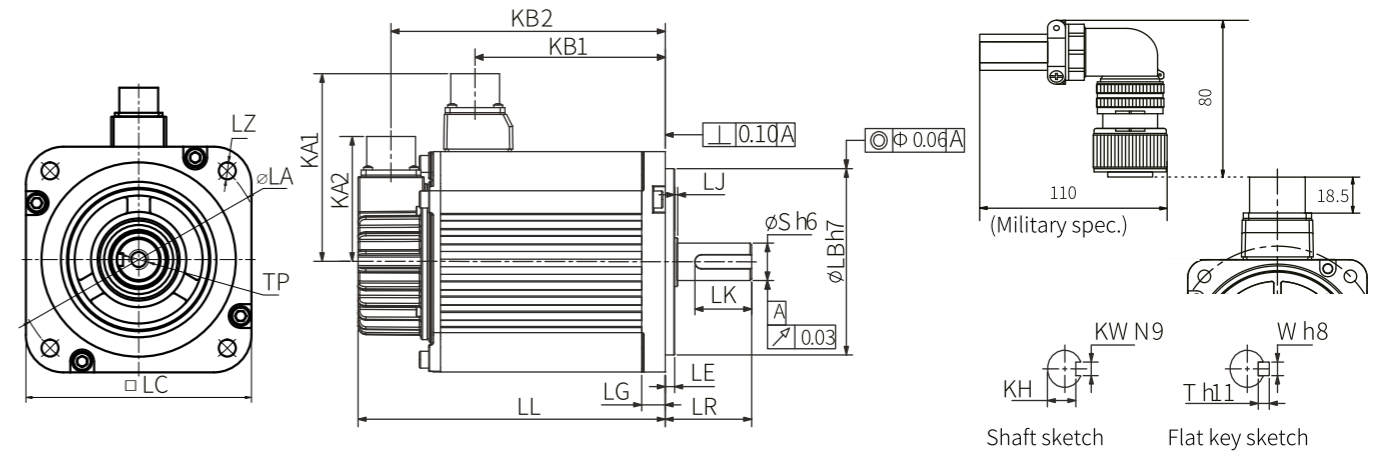
| Model                        | LC (mm) | LL (mm)        | LR (mm) | LA (mm) | LZ (mm) | KA1 (mm) | KB1 (mm)       | KA2 (mm) | KB2 (mm)       | LG (mm) | LE (mm) | LJ (mm)  | LB (mm) |
|------------------------------|---------|----------------|---------|---------|---------|----------|----------------|----------|----------------|---------|---------|----------|---------|
| MS1H2-10C30CB(D)-XXXXZ-INT   | 100     | 164 (213.5)*   | 45±1    | 115     | 4-Φ7    | 88       | 94.5 (101)*    | 74       | 143.5 (192.5)* | 10      | 5±0.3   | 2.5±0.75 | 95      |
| MS1H2-15C30CB(D)-XXXXZ-INT   | 100     | 189 (239)*     | 45±1    | 115     | 4-Φ7    | 88       | 119.5 (128)*   | 74       | 168.5 (219.5)* | 10      | 5±0.3   | 2.5±0.75 | 95      |
| MS1H2-20C30CD-XXXXZ(-S4)-INT | 100     | 214 (265)*     | 45±1    | 115     | 4-Φ7    | 88       | 144.5 (153)*   | 74       | 193.5 (244)*   | 10      | 5±0.3   | 2.5±0.75 | 95      |
| MS1H2-25C30CD-XXXXZ(-S4)-INT | 100     | 240.5 (290)*   | 45±1    | 115     | 4-Φ7    | 88       | 169.5 (178)*   | 74       | 218.5 (269)*   | 10      | 5±0.3   | 2.5±0.75 | 95      |
| MS1H2-30C30CD-XXXXZ(-S4)-INT | 130     | 209.5 (265.5)* | 63±1    | 145     | 4-Φ9    | 103      | 136 (139)*     | 74       | 188.5 (244.5)* | 14      | 6±0.3   | 0.5±0.75 | 110     |
| MS1H2-40C30CD-XXXXZ(-S4)-INT | 130     | 252 (308)*     | 63±1    | 145     | 4-Φ9    | 103      | 178.5 (181.5)* | 74       | 231 (287)*     | 14      | 6±0.3   | 0.5±0.75 | 110     |
| MS1H2-50C30CD-XXXXZ(-S4)-INT | 130     | 294.5 (350.5)* | 63±1    | 145     | 4-Φ9    | 103      | 221 (224)*     | 74       | 273.5 (329.5)* | 14      | 6±0.3   | 0.5±0.75 | 110     |

| Model                        | S (mm) | TP (mm) | LK (mm) | KH (mm)                         | KW (mm) | W (mm) | T (mm)       | Weight (kg)   | Connector     | Power side (incl. power brake side) | Encoder side            |
|------------------------------|--------|---------|---------|---------------------------------|---------|--------|--------------|---------------|---------------|-------------------------------------|-------------------------|
| MS1H2-10C30CB(D)-XXXXZ-INT   | 24     | M8×16   | 36      | 20 <sup>0</sup> <sub>-0.2</sub> | 8       | 8      | 7            | 5.11 (6.41)*  | Aviation plug | MI-DTL-5015 3102E20-18P             | MI-DTL-5015 3102E20-29P |
| MS1H2-15C30CB(D)-XXXXZ-INT   | 24     | M8×16   | 36      | 20 <sup>0</sup> <sub>-0.2</sub> | 8       | 8      | 6.22 (7.52)* |               |               |                                     |                         |
| MS1H2-20C30CD-XXXXZ(-S4)-INT | 24     | M8×16   | 36      | 20 <sup>0</sup> <sub>-0.2</sub> | 8       | 8      | 7.39 (8.7)*  |               |               |                                     |                         |
| MS1H2-25C30CD-XXXXZ(-S4)-INT | 24     | M8×16   | 36      | 20 <sup>0</sup> <sub>-0.2</sub> | 8       | 8      | 8.55 (9.8)*  |               |               |                                     |                         |
| MS1H2-30C30CD-XXXXZ(-S4)-INT | 28     | M8×20   | 54      | 24 <sup>0</sup> <sub>-0.2</sub> | 8       | 8      | 7            | 10.73 (13.2)* | Aviation plug | MI-DTL-5015 3102E20-18P             | MI-DTL-5015 3102E20-29P |
| MS1H2-40C30CD-XXXXZ(-S4)-INT | 28     | M8×20   | 54      | 24 <sup>0</sup> <sub>-0.2</sub> | 8       | 8      | 7            | 15.43 (17.9)* |               |                                     |                         |
| MS1H2-50C30CD-XXXXZ(-S4)-INT | 28     | M8×20   | 54      | 24 <sup>0</sup> <sub>-0.2</sub> | 8       | 8      | 7            | 16.2 (18.7)*  |               |                                     |                         |

\*Refers to braked version of the motor

# Servo motor dimensions and drawings

MS1H3 mounting dimensions ( $N_{rated} = 1,500 \text{ RPM}$ ,  $N_{max} = 3,000 \text{ RPM}$ )



| Model                      | LC (mm) | LL (mm)    | LR (mm) | LA (mm) | LZ (mm) | KA1 (mm) | KB1 (mm)   | KA2 (mm) | KB2 (mm)   | LG (mm) | LE (mm) | LJ (mm)  | LB (mm) |
|----------------------------|---------|------------|---------|---------|---------|----------|------------|----------|------------|---------|---------|----------|---------|
| MS1H3-85B15CB(D)-XXXXZ-INT | 130     | 146 (182)* | 55±1    | 145     | 4-Φ9    | 103      | 72.5       | 74       | 125 (161)* | 14      | 4       | 0.5±0.75 | 110     |
| MS1H3-13C15CB(D)-XXXXZ-INT | 130     | 163 (199)* | 55±1    | 145     | 4-Φ9    | 103      | 89.5       | 74       | 142 (178)* | 14      | 4       | 0.5±0.75 | 110     |
| MS1H3-18C15CD-XXXXZ-INT    | 130     | 181 (217)* | 55±1    | 145     | 4-Φ9    | 103      | 107.5      | 74       | 160 (196)* | 14      | 4       | 0.5±0.75 | 110     |
| MS1H3-29C15CD-XXXXZ-INT    | 180     | 197 (273)* | 79±1    | 200     | 4-Φ13.5 | 138      | 136 (134)* | 74       | 177 (253)* | 18      | 3.2±0.3 | 0.3±0.75 | 114.3   |
| MS1H3-44C15CD-XXXXZ-INT    | 180     | 230 (307)* | 79±1    | 200     | 4-Φ13.5 | 138      | 169 (167)* | 74       | 210 (286)* | 18      | 3.2±0.3 | 0.3±0.75 | 114.3   |
| MS1H3-55C15CD-XXXXZ-INT    | 180     | 274 (350)* | 113±1   | 200     | 4-Φ13.5 | 138      | 213 (211)* | 74       | 254 (330)* | 18      | 3.2±0.3 | 0.3±0.75 | 114.3   |
| MS1H3-75C15CD-XXXXZ-INT    | 180     | 330 (407)* | 113±1   | 200     | 4-Φ13.5 | 138      | 269 (267)* | 74       | 310 (386)* | 18      | 3.2±0.3 | 0.3±0.75 | 114.3   |

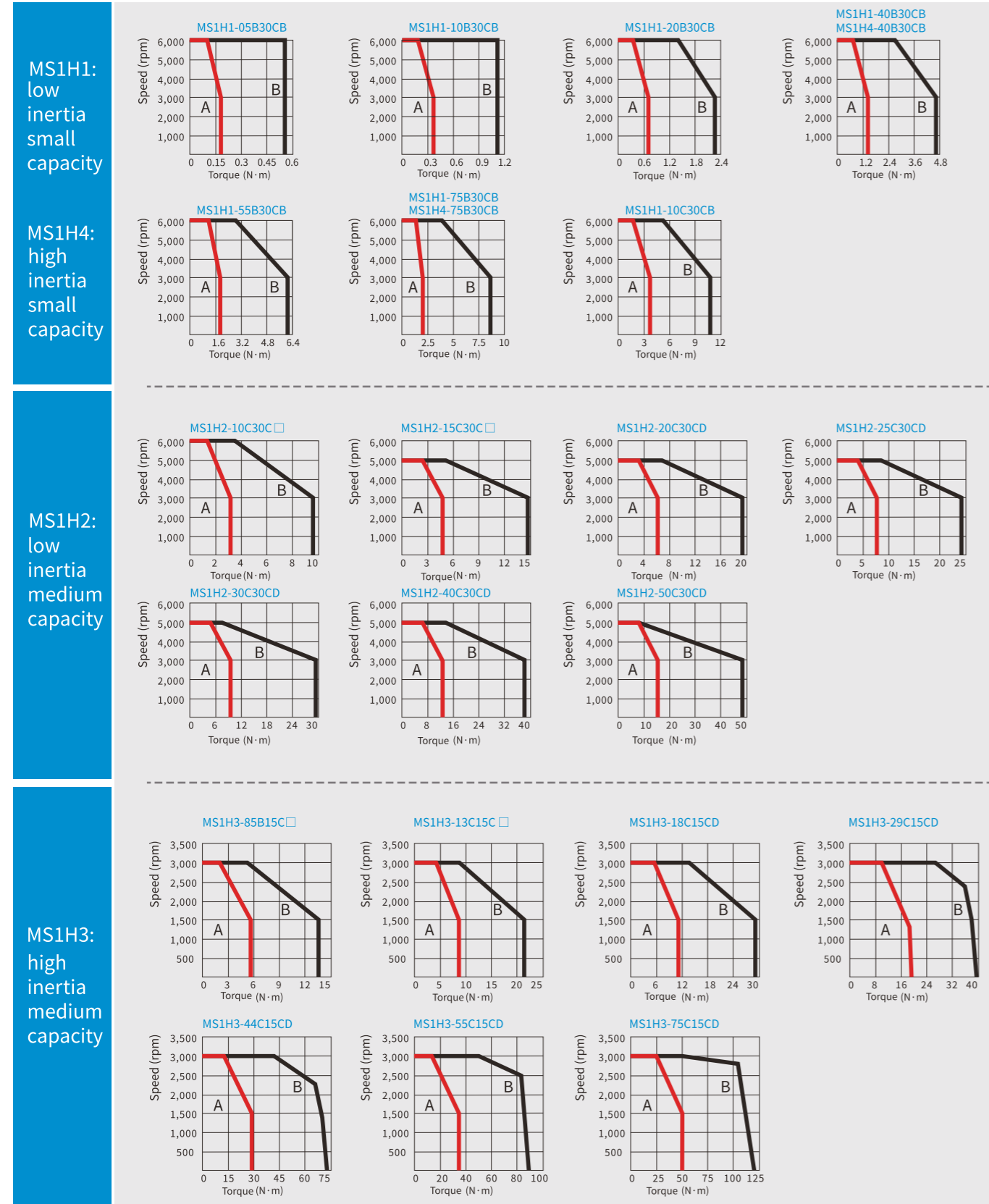
| Model                      | S (mm) | TP (mm) | LK (mm) | KH (mm)                         | KW (mm) | W (mm) | T (mm) | Weight (kg) | Connector     | Power side (incl. power brake side) | Encoder side            |
|----------------------------|--------|---------|---------|---------------------------------|---------|--------|--------|-------------|---------------|-------------------------------------|-------------------------|
| MS1H3-85B15CB(D)-XXXXZ-INT | 22     | M6×20   | 36      | 18 <sup>0</sup> <sub>-0.2</sub> | 8       | 8      | 7      | 7 (8)*      | Aviation plug | MI-DTL-5015 3102E20-18P             | MI-DTL-5015 3102E20-29P |
| MS1H3-13C15CB(D)-XXXXZ-INT | 22     | M6×20   | 36      | 18 <sup>0</sup> <sub>-0.2</sub> | 8       | 8      | 7      | 8 (9.5)*    |               |                                     |                         |
| MS1H3-18C15CD-XXXXZ-INT    | 22     | M6×20   | 36      | 18 <sup>0</sup> <sub>-0.2</sub> | 8       | 8      | 7      | 9.5 (11)*   |               |                                     |                         |
| MS1H3-29C15CD-XXXXZ-INT    | 35     | M12×25  | 65      | 30 <sup>0</sup> <sub>-0.2</sub> | 10      | 10     | 8      | 15 (25)*    |               |                                     |                         |
| MS1H3-44C15CD-XXXXZ-INT    | 35     | M12×25  | 65      | 30 <sup>0</sup> <sub>-0.2</sub> | 10      | 10     | 8      | 19.5 (30)*  | Aviation plug | MI-DTL-5015 3102E20-22P             | MI-DTL-5015 3102E20-29P |
| MS1H3-55C15CD-XXXXZ-INT    | 42     | M16×32  | 96      | 37 <sup>0</sup> <sub>-0.2</sub> | 12      | 12     | 8      | 28 (38)*    |               |                                     |                         |
| MS1H3-75C15CD-XXXXZ-INT    | 42     | M16×32  | 96      | 37 <sup>0</sup> <sub>-0.2</sub> | 12      | 12     | 8      | 32 (42)*    |               |                                     |                         |

\*Refers to braked version of the motor



# Servo motor torque VS speed graph

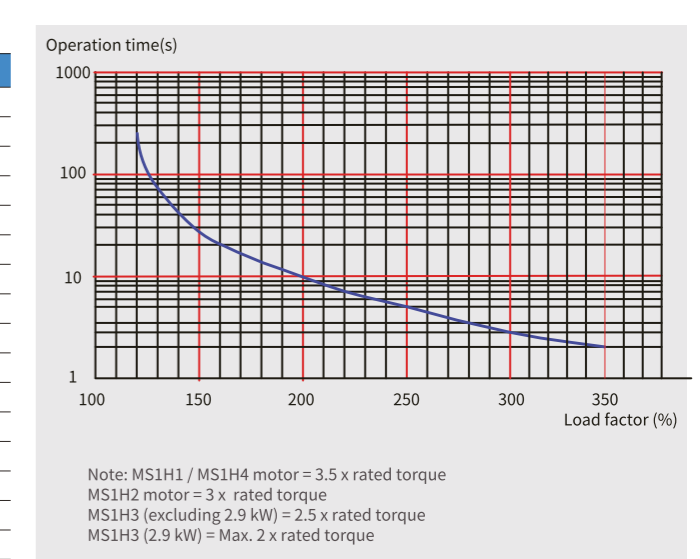
A (continuous operation area) & B (short term operation area)



# Servo motor overload characteristics graph

MS1H1/MS1H2/MS1H3/MS1H4

| Load in % | Deceleration time(s) |
|-----------|----------------------|
| 120       | 230                  |
| 130       | 80                   |
| 140       | 40                   |
| 150       | 30                   |
| 160       | 20                   |
| 170       | 17                   |
| 180       | 15                   |
| 190       | 12                   |
| 200       | 10                   |
| 210       | 8.5                  |
| 220       | 7                    |
| 230       | 6                    |
| 240       | 5.5                  |
| 250       | 5                    |
| 300       | 3                    |
| 350       | 2                    |



# Allowable radial load, axial load

| Servo motor model            | Allowable radial load (N) | Allowable axial load (N) |
|------------------------------|---------------------------|--------------------------|
| MS1H1-05B30CB-A3XXZ-INT      | 78                        | 54                       |
| MS1H1-10B30CB-A3XXZ-INT      | 78                        | 54                       |
| MS1H1-20B30CB-A3XXZ-INT      | 245                       | 74                       |
| MS1H1-40B30CB-A3XXZ-INT      | 245                       | 74                       |
| MS1H1-55B30CB-A3X1Z-INT      | 392                       | 147                      |
| MS1H1-75B30CB-A3XXZ-INT      | 392                       | 147                      |
| MS1H1-10C30CB-A3X1Z-INT      | 392                       | 147                      |
| MS1H2-10C30CX-A3X1Z-INT      | 686                       | 196                      |
| MS1H2-15C30CX-A3X1Z-INT      | 686                       | 196                      |
| MS1H2-20C30CD-A3XXZ(-S4)-INT | 686                       | 196                      |
| MS1H2-25C30CD-A3XXZ(-S4)-INT | 686                       | 196                      |
| MS1H2-30C30CD-A3XXZ(-S4)-INT | 980                       | 392                      |
| MS1H2-40C30CD-A3XXZ(-S4)-INT | 1,176                     | 392                      |
| MS1H2-50C30CD-A3XXZ(-S4)-INT | 1,176                     | 392                      |
| MS1H3-85B15CX-A3XXZ-INT      | 686                       | 196                      |
| MS1H3-13C15CX-A3XXZ-INT      | 686                       | 196                      |
| MS1H3-18C15CD-A3XXZ-INT      | 686                       | 196                      |
| MS1H3-29C15CD-A3XXZ-INT      | 1,470                     | 490                      |
| MS1H3-44C15CD-A3XXZ-INT      | 1,470                     | 490                      |
| MS1H3-55C15CD-A3XXZ-INT      | 1,764                     | 588                      |
| MS1H3-75C15CD-A3XXZ-INT      | 1,764                     | 588                      |
| MS1H4-40B30CB-A3XXZ-INT      | 245                       | 74                       |
| MS1H4-75B30CB-A3XXZ-INT      | 392                       | 147                      |

# Brake specifications

| Model                 | Holding torque (Nm) | Input voltage (V) (±10%) | Resistance (Ω) | Input current (A) (±7%) | Opening time (ms) | Closing time (ms) | Power (W) |
|-----------------------|---------------------|--------------------------|----------------|-------------------------|-------------------|-------------------|-----------|
| MS1H1-05/10B          | 0.3                 | 24                       | 96             | 0.23~0.27               | 10                | 30                | 6.1       |
| MS1H1-20B/40B         | 1.5                 |                          | 82.3           | 0.25~0.34               | 20                | 50                | 7.6       |
| MS1H1-75B             | 2.5                 |                          | 50.1           | 0.40~0.57               | 25                | 60                | 8         |
| MS1H2-10C/15C/20C/25C | 8                   |                          | 25             | 0.81~1.14               | 30                | 90                | 20        |
| MS1H2-30C/40C/50C     | 16                  |                          | 21.3           | 0.95~1.33               | 60                | 120               | 19.4      |
| MS1H3-85B/13C/18C     | 12                  |                          | 21.3           | 0.95~1.33               | 60                | 120               | 19.4      |
| MS1H3-29C/44C/55C/75C | 48                  |                          | 13.7           | 1.47~2.07               | 100               | 230               | 40        |
| MS1H4-40B             | 1.5                 |                          | 82.3           | 0.25~0.34               | 20                | 50                | 7.6       |
| MS1H4-75B             | 2.5                 |                          | 50.1           | 0.40~0.57               | 25                | 60                | 8         |

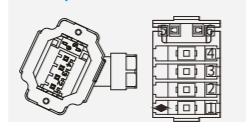
# Servo motor encoder and power wiring details

## Motor connection descriptions

-40, -60, -80 frame size motor end connector

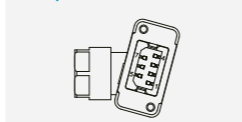


Motor end power 6-pin connector



| Pin No. | Signal              |
|---------|---------------------|
| 1       | PE                  |
| 2       | W                   |
| 3       | V                   |
| 4       | U                   |
| 5       | Brake (no polarity) |
| 6       |                     |

Motor end encoder 7-pin connector

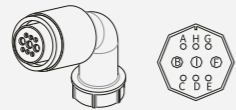


| Pin No. | Signal |
|---------|--------|
| 1       | PS+    |
| 2       | PS-    |
| 3       | DC+    |
| 4       | DC-    |
| 5       | +5V    |
| 6       | 0V     |
| 7       | PE     |

-100, -130 frame size motor end connector



Motor end power 20-18 military connector

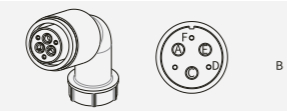


| MIL-DTL-5015 series 3108E20-18S |                     |                   |        |
|---------------------------------|---------------------|-------------------|--------|
| Y-series terminal               |                     | Z-series terminal |        |
| Pin No.                         | Signal              | Pin No.           | Signal |
| B                               | U                   | B                 | U      |
| I                               | V                   | I                 | V      |
| F                               | W                   | F                 | W      |
| G                               | PE                  | G                 | PE     |
| C                               | Brake (no polarity) |                   |        |
| E                               |                     |                   |        |

-180 frame size motor end connector



Motor end power 20-22 military connector



| MIL-DTL-5015 series 3108E20-22S |        |                   |                     |
|---------------------------------|--------|-------------------|---------------------|
| Y-series terminal               |        | Z-series terminal |                     |
| Pin No.                         | Signal | Pin No.           | Signal              |
| A                               | U      | A                 | U                   |
| C                               | V      | C                 | V                   |
| E                               | W      | E                 | W                   |
| F                               | PE     | F                 | PE                  |
|                                 |        | B                 | Brake (no polarity) |
|                                 |        | D                 |                     |

# Motor power cable item codes

| Model | Servo motor power cable (front outlet) |               |                |               |               |                |
|-------|--|---------------|----------------|---------------|---------------|----------------|
|       | Without brake                          |               |                | With brake    |               |                |
|       | L = 3.0 m                              | L = 5.0 m     | L = 10.0 m     | L = 3.0 m     | L = 5.0 m     | L = 10.0 m     |
| MS1H1 | S6-L-M007-3.0                          | S6-L-M007-5.0 | S6-L-M007-10.0 | S6-L-B007-3.0 | S6-L-B007-5.0 | S6-L-B007-10.0 |
| MS1H4 | S6-L-M007-3.0                          | S6-L-M007-5.0 | S6-L-M007-10.0 | S6-L-B007-3.0 | S6-L-B007-5.0 | S6-L-B007-10.0 |

| Model | Servo motor power cable (back outlet) |               |                |               |               |                |
|-------|---------------------------------------|---------------|----------------|---------------|---------------|----------------|
|       | Without brake                         |               |                | With brake    |               |                |
|       | L = 3.0 m                             | L = 5.0 m     | L = 10.0 m     | L = 3.0 m     | L = 5.0 m     | L = 10.0 m     |
| MS1H1 | S6-L-M008-3.0                         | S6-L-M008-5.0 | S6-L-M008-10.0 | S6-L-B008-3.0 | S6-L-B008-5.0 | S6-L-B008-10.0 |
| MS1H4 | S6-L-M008-3.0                         | S6-L-M008-5.0 | S6-L-M008-10.0 | S6-L-B008-3.0 | S6-L-B008-5.0 | S6-L-B008-10.0 |

| Model                  | Servo motor power cable |               |                |               |               |                |
|------------------------|-------------------------|---------------|----------------|---------------|---------------|----------------|
|                        | Without brake           |               |                | With brake    |               |                |
|                        | L = 3.0 m               | L = 5.0 m     | L = 10.0 m     | L = 3.0 m     | L = 5.0 m     | L = 10.0 m     |
| MS1H2                  | S6-L-M011-3.0           | S6-L-M011-5.0 | S6-L-M011-10.0 | S6-L-B011-3.0 | S6-L-B011-5.0 | S6-L-B011-10.0 |
| MS1H3 (1.8 kW & below) | S6-L-M011-3.0           | S6-L-M011-5.0 | S6-L-M011-10.0 | S6-L-B011-3.0 | S6-L-B011-5.0 | S6-L-B011-10.0 |
| MS1H3 (2.9 kW)         | S6-L-M012-3.0           | S6-L-M012-5.0 | S6-L-M012-10.0 | S6-L-B012-3.0 | S6-L-B012-5.0 | S6-L-B012-10.0 |
| MS1H3 (above 2.9 kW)   | S6-L-M022-3.0           | S6-L-M022-5.0 | S6-L-M022-10.0 | S6-L-B022-3.0 | S6-L-B022-5.0 | S6-L-B022-10.0 |

## Motor encoder cable item codes

| Model | Servo motor encoder cable (front outlet) |               |                |                             |               |                |
|-------|--|---------------|----------------|-----------------------------|---------------|----------------|
|       | 23-bit encoder (single turn)             |               |                | 23-bit encoder (multi-turn) |               |                |
|       | L = 3.0 m                                | L = 5.0 m     | L = 10.0 m     | L = 3.0 m                   | L = 5.0 m     | L = 10.0 m     |
| MS1H1 | S6-L-P014-3.0                            | S6-L-P014-5.0 | S6-L-P014-10.0 | S6-L-P024-3.0               | S6-L-P024-5.0 | S6-L-P024-10.0 |
| MS1H4 | S6-L-P014-3.0                            | S6-L-P014-5.0 | S6-L-P014-10.0 | S6-L-P024-3.0               | S6-L-P024-5.0 | S6-L-P024-10.0 |

| Model | Servo motor encoder cable (back outlet) |               |                |                             |               |                |
|-------|---|---------------|----------------|-----------------------------|---------------|----------------|
|       | 23-bit encoder (single turn)            |               |                | 23-bit encoder (multi-turn) |               |                |
|       | L = 3.0 m                               | L = 5.0 m     | L = 10.0 m     | L = 3.0 m                   | L = 5.0 m     | L = 10.0 m     |
| MS1H1 | S6-L-P015-3.0                           | S6-L-P015-5.0 | S6-L-P015-10.0 | S6-L-P025-3.0               | S6-L-P025-5.0 | S6-L-P025-10.0 |
| MS1H4 | S6-L-P015-3.0                           | S6-L-P015-5.0 | S6-L-P015-10.0 | S6-L-P025-3.0               | S6-L-P025-5.0 | S6-L-P025-10.0 |

| Model                  | Servo motor encoder cable    |               |                |                             |               |                |
|------------------------|------------------------------|---------------|----------------|-----------------------------|---------------|----------------|
|                        | 23-bit encoder (single turn) |               |                | 23-bit encoder (multi-turn) |               |                |
|                        | L = 3.0 m                    | L = 5.0 m     | L = 10.0 m     | L = 3.0 m                   | L = 5.0 m     | L = 10.0 m     |
| MS1H2                  | S6-L-P011-3.0                | S6-L-P011-5.0 | S6-L-P011-10.0 | S6-L-P021-3.0               | S6-L-P021-5.0 | S6-L-P021-10.0 |
| MS1H3 (1.8 kW & below) | S6-L-P011-3.0                | S6-L-P011-5.0 | S6-L-P011-10.0 | S6-L-P021-3.0               | S6-L-P021-5.0 | S6-L-P021-10.0 |
| MS1H3 (2.9 kW)         | S6-L-P011-3.0                | S6-L-P011-5.0 | S6-L-P011-10.0 | S6-L-P021-3.0               | S6-L-P021-5.0 | S6-L-P021-10.0 |
| MS1H3 (above 2.9 kW)   | S6-L-P011-3.0                | S6-L-P011-5.0 | S6-L-P011-10.0 | S6-L-P021-3.0               | S6-L-P021-5.0 | S6-L-P021-10.0 |

| Model                  | Connector kit  | Battery set for absolute encoder back-up |
|------------------------|--|--|
| MS1H2                  | S6-C2<br>(CN1 & CN2 terminal, 20-18 pin & 20-29 pin connector) | S6-C4 (battery & battery case)           |
| MS1H3 (1.8 kW & below) | S6-C2<br>(CN1 & CN2 terminal, 20-18 pin & 20-29 pin connector) |  |
| MS1H3 (2.9 kW)         | S6-C3<br>(CN1 & CN2 terminal, 20-22 pin & 20-29 pin connector) |  |
| MS1H3 (above 2.9 kW)   | S6-C3<br>(CN1 & CN2 terminal, 20-22 pin & 20-29 pin connector) |  |

## Appearance of cables

| Cable type  | Item code      | L (mm) | Appearance |
|---|----------------|--------|------------|
| MS1H1/H4 motor power cable without brake (front outlet) | S6-L-M007-3.0  | 3,000  |            |
|   | S6-L-M007-5.0  | 5,000  |            |
|   | S6-L-M007-10.0 | 10,000 |            |
| MS1H1/H4 motor power cable without brake (back outlet)  | S6-L-M008-3.0  | 3,000  |            |
|   | S6-L-M008-5.0  | 5,000  |            |
|   | S6-L-M008-10.0 | 10,000 |            |
| MS1H2/H3 motor power cable without brake                | S6-L-M011-3.0  | 3,000  |            |
|   | S6-L-M011-5.0  | 5,000  |            |
|   | S6-L-M011-10.0 | 10,000 |            |
| MS1H3 motor power cable without brake                   | S6-L-M012-3.0  | 3,000  |            |
|   | S6-L-M012-5.0  | 5,000  |            |
|   | S6-L-M012-10.0 | 10,000 |            |
| MS1H3 motor power cable without brake                   | S6-L-M022-3.0  | 3,000  |            |
|   | S6-L-M022-5.0  | 5,000  |            |
|   | S6-L-M022-10.0 | 10,000 |            |



# Appearance of cables

| Cable type   | Item code      | L (mm) | Appearance |
|--|----------------|--------|------------|
| MS1H1/H4 motor power cable with brake (front outlet)                         | S6-L-B007-3.0  | 3,000  |            |
|  | S6-L-B007-5.0  | 5,000  |            |
|  | S6-L-B007-10.0 | 10,000 |            |
| MS1H1/H4 motor power cable with brake (back outlet)                          | S6-L-B008-3.0  | 3,000  |            |
|  | S6-L-B008-5.0  | 5,000  |            |
|  | S6-L-B008-10.0 | 10,000 |            |
| MS1H2/H3 motor power cable with brake  | S6-L-B011-3.0  | 3,000  |            |
|  | S6-L-B011-5.0  | 5,000  |            |
|  | S6-L-B011-10.0 | 10,000 |            |
| MS1H3 motor power cable with brake   | S6-L-B012-3.0  | 3,000  |            |
|  | S6-L-B012-5.0  | 5,000  |            |
|  | S6-L-B012-10.0 | 10,000 |            |
| MS1H3 motor power cable with brake   | S6-L-B022-3.0  | 3,000  |            |
|  | S6-L-B022-5.0  | 5,000  |            |
|  | S6-L-B022-10.0 | 10,000 |            |
| MS1H1/H4 motor encoder cable (front outlet) for 23 bit encoder (single turn) | S6-L-P014-3.0  | 3,000  |            |
|  | S6-L-P014-5.0  | 5,000  |            |
|  | S6-L-P014-10.0 | 10,000 |            |
| MS1H1/H4 motor encoder cable (back outlet) for 23 bit encoder (single turn)  | S6-L-P015-3.0  | 3,000  |            |
|  | S6-L-P015-5.0  | 5,000  |            |
|  | S6-L-P015-10.0 | 10,000 |            |
| MS1H2/H3 motor encoder cable for 23 bit encoder (single turn)                | S6-L-P011-3.0  | 3,000  |            |
|  | S6-L-P011-5.0  | 5,000  |            |
|  | S6-L-P011-10.0 | 10,000 |            |
| MS1H1/H4 motor encoder cable (front outlet) for 23 bit encoder (multi-turn)  | S6-L-P024-3.0  | 3,000  |            |
|  | S6-L-P024-5.0  | 5,000  |            |
|  | S6-L-P024-10.0 | 10,000 |            |
| MS1H1/H4 motor encoder cable (back outlet) for 23 bit encoder (multi-turn)   | S6-L-P025-3.0  | 3,000  |            |
|  | S6-L-P025-5.0  | 5,000  |            |
|  | S6-L-P025-10.0 | 10,000 |            |

| Cable type   | Item code      | L (mm) | Appearance |
|--|----------------|--------|------------|
| MS1H2/H3 motor encoder cable for 23 bit encoder (multi-turn)                   | S6-L-P021-3.0  | 3,000  |            |
|  | S6-L-P021-5.0  | 5,000  |            |
|  | S6-L-P021-10.0 | 1,000  |            |
| IS620P servo drive to PC communication cable                                   | S6-L-T00-3.0   | 3,000  |            |
| IS620P servo drive CAN and RS485 multi-axis communication cable                | S6-L-T01-0.3   | 300    |            |
| PLC ↔ IS620P servo drive CAN & RS485 communication cable                       | S6-L-T02-2.0   | 2,000  |            |
| IS620P servo drive CAN & RS485 termination resistor                            | S6-L-T03-0.0   |        |            |
| IS620P servo drive analog output (CN5) cable                                   | S5-L-A01-1.0   | 1,000  |            |
| IS620N servo drive EtherCAT communication cable                                | S6-L-T04-0.3   | 300    |            |
|  | S6-L-T04-3.0   | 3,000  |            |
| IS620N servo drive to PC communication cable                                   | S6N-L-T00-3.0  | 3,000  |            |
| Absolute encoder battery   | S6-C4          |        |            |
| Switch cable when replacing old ISMH1/ISMH4 motors with new MS1H1/MS1H4 motors | S6-C23         | 500    |            |
|  |                |        |            |
| IS620 servo drive CN1 connector  | S6-C8 (DB44)   |        |            |

# IS620 servo drive and motor selection table

| Power supply voltage | Motor frame size (mm) | Motor power (W)                  | Motor rated speed (RPM) | Motor rated torque (Nm)    | Motor peak torque (Nm)     | Motor brake                | IS620 drive H x W x D (mm) | Motor model             | IS620P pulse/analog drive | IS620N EtherCAT drive   |                         |                 |                 |
|----------------------|-----------------------|----------------------------------|-------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-------------------------|---------------------------|-------------------------|-------------------------|-----------------|-----------------|
| Single-phase 220 V   | 40                    | 50                               | 3,000                   | 0.16                       | 0.56                       |                            | 160 x 50 x 173             | MS1H1-05B30CB-A330Z-INT | IS620PS1R6I-INT           | IS620NS1R6I-INT         |                         |                 |                 |
|                      |                       | 50                               |                         | 0.16                       | 0.56                       | Brake                      |                            | MS1H1-05B30CB-A332Z-INT |                           |                         |                         |                 |                 |
|                      |                       | 100                              |                         | 0.32                       | 1.12                       |                            |                            | MS1H1-10B30CB-A330Z-INT |                           |                         |                         |                 |                 |
|                      |                       | 100                              |                         | 0.32                       | 1.12                       | Brake                      |                            | MS1H1-10B30CB-A332Z-INT |                           |                         |                         |                 |                 |
|                      | 60                    | 200                              |                         | 0.64                       | 2.24                       |                            | MS1H1-20B30CB-A331Z-INT    |                         |                           |                         |                         |                 |                 |
|                      |                       | 200                              |                         | 0.64                       | 2.24                       | Brake                      | MS1H1-20B30CB-A334Z-INT    |                         |                           |                         |                         |                 |                 |
|                      |                       | 400                              |                         | 1.27                       | 4.46                       |                            | MS1H1-40B30CB-A331Z-INT    |                         |                           |                         |                         |                 |                 |
|                      |                       | 400                              |                         | 1.27                       | 4.46                       | Brake                      | MS1H1-40B30CB-A334Z-INT    |                         |                           |                         |                         |                 |                 |
|                      |                       | 400                              |                         | 1.27                       | 4.46                       |                            | MS1H4-40B30CB-A331Z-INT    |                         |                           |                         |                         |                 |                 |
|                      |                       | 400                              |                         | 1.27                       | 4.46                       | Brake                      | MS1H4-40B30CB-A334Z-INT    |                         |                           |                         |                         |                 |                 |
|                      |                       | Single-phase & Three-phase 220 V |                         | 80                         | 550                        | 3,000                      | 1.75                       | 6.13                    |                           | 160 x 50 x 173          | MS1H1-55B30CB-A331Z-INT | IS620PS5R5I-INT | IS620NS5R5I-INT |
|                      |                       |                                  |                         |                            | 750                        |                            | 2.39                       | 8.36                    |                           |                         | MS1H1-75B30CB-A331Z-INT |                 |                 |
| 750                  | 2.39                  |                                  | 8.36                    |                            | Brake                      |                            | MS1H1-75B30CB-A334Z-INT    |                         |                           |                         |                         |                 |                 |
| 750                  | 2.39                  |                                  | 8.36                    |                            |                            |                            | MS1H4-75B30CB-A331Z-INT    |                         |                           |                         |                         |                 |                 |
| 750                  | 2.39                  |                                  | 8.36                    |                            | Brake                      |                            | MS1H4-75B30CB-A334Z-INT    |                         |                           |                         |                         |                 |                 |
| Three-phase 220 V    | 130                   | 850                              | 1,500                   | 5.39                       | 13.5                       |                            | 160 x 90 x 183             | MS1H3-85B15CB-A331Z-INT | IS620PS7R6I-INT           | IS620NS7R6I-INT         |                         |                 |                 |
|                      |                       | 850                              |                         | 5.39                       | 13.5                       | Brake                      |                            | MS1H3-85B15CB-A334Z-INT |                           |                         |                         |                 |                 |
|                      |                       | 1,300                            |                         | 8.34                       | 20.85                      |                            |                            | MS1H3-13B15CB-A331Z-INT |                           |                         |                         |                 |                 |
|                      |                       | 1,300                            |                         | 8.34                       | 20.85                      | Brake                      |                            | MS1H3-13B15CB-A334Z-INT |                           |                         |                         |                 |                 |
| Three-phase 220 V    | 80                    | 1,000                            | 3,000                   | 3.18                       | 11.1                       |                            | 160 x 90 x 183             | MS1H1-10C30CB-A331Z-INT | IS620PS7R6I-INT           | IS620NS7R6I-INT         |                         |                 |                 |
|                      |                       | 1,000                            |                         | 3.18                       | 7.21                       |                            |                            | MS1H2-10C30CB-A331Z-INT |                           |                         |                         |                 |                 |
|                      | 1,000                 | 3.18                             |                         | 7.21                       | Brake                      | MS1H2-10C30CB-A334Z-INT    |                            |                         |                           |                         |                         |                 |                 |
|                      | 1,000                 | 3.18                             |                         | 9.54                       |                            | MS1H2-10C30CB-A331Z-INT    |                            |                         |                           |                         |                         |                 |                 |
|                      | 1,000                 | 3.18                             |                         | 9.54                       | Brake                      | MS1H2-10C30CB-A334Z-INT    |                            |                         |                           |                         |                         |                 |                 |
|                      | 1,500                 | 4.9                              |                         | 12.70                      |                            | MS1H2-15C30CB-A331Z-INT    |                            |                         |                           |                         |                         |                 |                 |
|                      | 1,500                 | 4.9                              |                         | 12.70                      | Brake                      | MS1H2-15C30CB-A334Z-INT    |                            |                         |                           |                         |                         |                 |                 |
|                      | Three-phase 400 V     | 100                              |                         | 1,000                      | 3,000                      | 3.18                       | 9.54                       |                         | 160 x 90 x 183            | MS1H2-10C30CD-A331Z-INT | IS620PT5R4I-INT         | IS620NT5R4I-INT |                 |
|                      |                       |                                  |                         | 1,000                      |                            | 3.18                       | 9.54                       | Brake                   |                           | MS1H2-10C30CD-A334Z-INT |                         |                 |                 |
|                      |                       |                                  |                         | 1,500                      |                            | 4.9                        | 14.7                       |                         |                           | MS1H2-15C30CD-A331Z-INT |                         |                 |                 |
| 1,500                |                       |                                  | 4.9                     | 14.7                       |                            | Brake                      | MS1H2-15C30CD-A334Z-INT    |                         |                           |                         |                         |                 |                 |
| 2,000                |                       |                                  | 6.36                    | 19.1                       |                            |                            | MS1H2-20C30CD-A331Z-INT    |                         |                           |                         |                         |                 |                 |
| 2,000                |                       | 6.36                             | 19.1                    | Brake                      |                            | MS1H2-20C30CD-A334Z-S4-INT |                            |                         |                           |                         |                         |                 |                 |
| 2,500                |                       | 7.96                             | 23.90                   |                            |                            | MS1H2-25C30CD-A331Z-INT    |                            |                         |                           |                         |                         |                 |                 |
| 2,500                |                       | 7.96                             | 23.90                   | Brake                      |                            | MS1H2-25C30CD-A334Z-S4-INT |                            |                         |                           |                         |                         |                 |                 |
| 130                  |                       | 3,000                            | 9.8                     | 29.4                       |                            |                            | MS1H2-30C30CD-A331Z-INT    |                         |                           |                         |                         |                 |                 |
|                      |                       | 3,000                            | 9.8                     | 29.4                       |                            | Brake                      | MS1H2-30C30CD-A334Z-S4-INT |                         |                           |                         |                         |                 |                 |
|                      | 4,000                 | 12.6                             | 37.8                    |                            | MS1H2-40C30CD-A331Z-INT    |                            |                            |                         |                           |                         |                         |                 |                 |
|                      | 4,000                 | 12.6                             | 37.8                    | Brake                      | MS1H2-40C30CD-A334Z-S4-INT |                            |                            |                         |                           |                         |                         |                 |                 |
|                      | 5,000                 | 15.8                             | 47.6                    |                            | MS1H2-50C30CD-A331Z-INT    |                            |                            |                         |                           |                         |                         |                 |                 |
| 5,000                | 15.8                  | 47.6                             | Brake                   | MS1H2-50C30CD-A334Z-S4-INT |                            |                            |                            |                         |                           |                         |                         |                 |                 |

| Power supply voltage | Motor frame size (mm) | Motor power (W)   | Motor rated speed (RPM) | Motor rated torque (Nm) | Motor peak torque (Nm)     | Motor brake | IS620 drive H x W x D (mm) | Motor model             | IS620P pulse/analog drive | IS620N EtherCAT drive |                         |                 |                 |
|----------------------|-----------------------|-------------------|-------------------------|-------------------------|----------------------------|-------------|----------------------------|-------------------------|---------------------------|-----------------------|-------------------------|-----------------|-----------------|
| Three-phase 400 V    | 130                   | 850               | 1,500                   | 5.39                    | 13.5                       |             | 160 x 90 x 183             | MS1H3-85B15CD-A331Z-INT | IS620PT3R5I-INT           | IS620NT3R5I-INT       |                         |                 |                 |
|                      |                       | 850               |                         | 5.39                    | 13.5                       | Brake       |                            | MS1H3-85B15CD-A334Z-INT |                           |                       |                         |                 |                 |
|                      |                       | 1,300             |                         | 8.34                    | 20.85                      |             |                            | MS1H3-13C15CD-A331Z-INT |                           |                       |                         |                 |                 |
|                      |                       | 1,300             |                         | 8.34                    | 20.85                      | Brake       |                            | MS1H3-13C15CD-A334Z-INT |                           |                       |                         |                 |                 |
|                      |                       | 1,800             |                         | 11.5                    | 28.75                      |             |                            | MS1H3-18C15CD-A331Z-INT |                           |                       |                         |                 |                 |
|                      |                       | 1,800             |                         | 11.5                    | 28.75                      | Brake       |                            | MS1H3-18C15CD-A334Z-INT |                           |                       |                         |                 |                 |
|                      | 180                   | 2,900             |                         | 18.6                    | 37.2                       |             | MS1H3-29C15CD-A331Z-INT    |                         |                           |                       |                         |                 |                 |
|                      |                       | 2,900             |                         | 18.6                    | 37.2                       | Brake       | MS1H3-29C15CD-A334Z-INT    |                         |                           |                       |                         |                 |                 |
|                      |                       | 4,400             |                         | 28.4                    | 71.1                       |             | MS1H3-44C15CD-A331Z-INT    |                         |                           |                       |                         |                 |                 |
|                      |                       | 4,400             |                         | 28.4                    | 71.1                       | Brake       | MS1H3-44C15CD-A334Z-INT    |                         |                           |                       |                         |                 |                 |
|                      |                       | 5,500             |                         | 35                      | 87.6                       |             | MS1H3-55C15CD-A331Z-INT    |                         |                           |                       |                         |                 |                 |
|                      |                       | 5,500             |                         | 35                      | 87.6                       | Brake       | MS1H3-55C15CD-A334Z-INT    |                         |                           |                       |                         |                 |                 |
|                      |                       | 7,500             |                         | 48                      | 119                        |             | MS1H3-75C15CD-A331Z-INT    |                         |                           |                       |                         |                 |                 |
|                      |                       | 7,500             |                         | 48                      | 119                        | Brake       | MS1H3-75C15CD-A334Z-INT    |                         |                           |                       |                         |                 |                 |
|                      |                       | Three-phase 400 V |                         | 100                     | 1,000                      | 3,000       | 3.18                       | 9.54                    |                           | 160 x 90 x 183        | MS1H2-10C30CD-A331Z-INT | IS620PT5R4I-INT | IS620NT5R4I-INT |
|                      |                       |                   |                         |                         | 1,000                      |             | 3.18                       | 9.54                    | Brake                     |                       | MS1H2-10C30CD-A334Z-INT |                 |                 |
|                      |                       |                   |                         |                         | 1,500                      |             | 4.9                        | 14.7                    |                           |                       | MS1H2-15C30CD-A331Z-INT |                 |                 |
|                      |                       |                   |                         |                         | 1,500                      |             | 4.9                        | 14.7                    | Brake                     |                       | MS1H2-15C30CD-A334Z-INT |                 |                 |
| 2,000                | 6.36                  |                   | 19.1                    |                         |                            |             | MS1H2-20C30CD-A331Z-INT    |                         |                           |                       |                         |                 |                 |
| 2,000                | 6.36                  |                   | 19.1                    |                         | Brake                      |             | MS1H2-20C30CD-A334Z-S4-INT |                         |                           |                       |                         |                 |                 |
| 130                  | 2,500                 |                   | 7.96                    | 23.90                   |                            |             | MS1H2-25C30CD-A331Z-INT    |                         |                           |                       |                         |                 |                 |
|                      | 2,500                 |                   | 7.96                    | 23.90                   | Brake                      |             | MS1H2-25C30CD-A334Z-S4-INT |                         |                           |                       |                         |                 |                 |
|                      | 3,000                 |                   | 9.8                     | 29.4                    |                            |             | MS1H2-30C30CD-A331Z-INT    |                         |                           |                       |                         |                 |                 |
|                      | 3,000                 |                   | 9.8                     | 29.4                    | Brake                      |             | MS1H2-30C30CD-A334Z-S4-INT |                         |                           |                       |                         |                 |                 |
|                      | 4,000                 |                   | 12.6                    | 37.8                    |                            |             | MS1H2-40C30CD-A331Z-INT    |                         |                           |                       |                         |                 |                 |
|                      | 4,000                 |                   | 12.6                    | 37.8                    | Brake                      |             | MS1H2-40C30CD-A334Z-S4-INT |                         |                           |                       |                         |                 |                 |
| 250 x 100 x 230      | 5,000                 | 15.8              | 47.6                    |                         | MS1H2-50C30CD-A331Z-INT    |             |                            |                         |                           |                       |                         |                 |                 |
|                      | 5,000                 | 15.8              | 47.6                    | Brake                   | MS1H2-50C30CD-A334Z-S4-INT |             |                            |                         |                           |                       |                         |                 |                 |

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