



FL20 Series

Parker Servo Drives & Motors for Film Line

Power Range 220V 0.2kW ~ 4.5kW
380V 1.5kW ~ 37kW



ENGINEERING YOUR SUCCESS.



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Parker Servo Drives & Motors – FL20 series

FL20 Servo Drive

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Milan, Italy



Littlehampton, UK



Filderstadt, Germany



Dijon, France

FL20 series Servo Drives for Film Line Applications

Overview

Description

FL20 Series Servo Drives is a high performance drive particularly suitable for Film Line and similar applications. It has a 1.2kHz frequency response with a full closed loop functionality. The feedback options are incremental encoder, absolute encoder and resolver.

The FL20 has in-built RS485/232 port for PC monitoring. It also has CanOpen and EtherCAT communication as options. The Parker PAC controller with its EtherCAT communication can be used as a complete solution for applications that need a controller as well as servo drives and motors.



Features

- Flexibility
- Full closed loop control or multi-position control or interrupted position control
- Gantry synchronization
- Gain switching

Faster

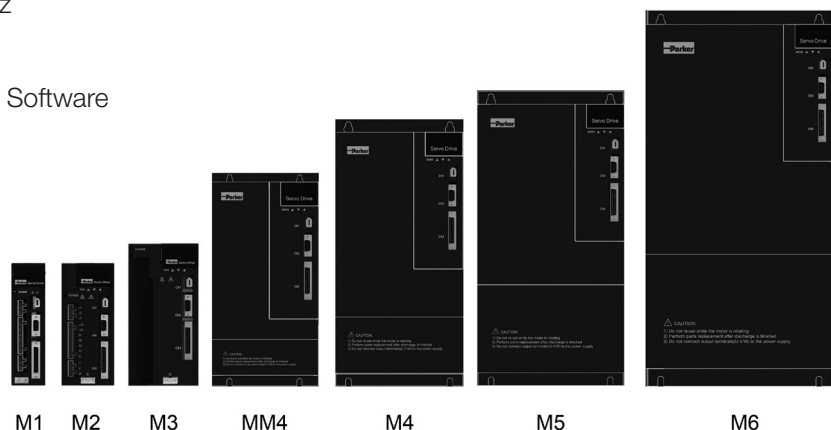
- Frequency response 1.2kHz
- Dual-core processors
- 17-bit absolute encoder

Powerful

- Built-in PLC Function
- Pulse command Frequency up to 4Mhz
- RS485/232, CANopen, EtherCAT
- RS485/232 interface connected to PC Software

Technical Characteristics

| FL20 Servo drive | |
|-----------------------|--|
| Supply voltage | 220 VAC ±10% Single / Three Phase 380 VAC ±10% Three Phas |
| Power range | Single Phase 220V 0.2kW ~ 1.8kW Three Phase 220V 0.2kW ~ 4.5kW Three Phase 380V 1.5kW ~ 37kW |
| Frequency response | PMSM : 1.2kHz |
| Operating temperature | -10 °C ~ 40 °C |
| Humidity | Below 90% |
| Altitude | 1000m or below |
| Vibration | Below 0.5G (4.9 m/s ²) |
| IP rating | IP20 |

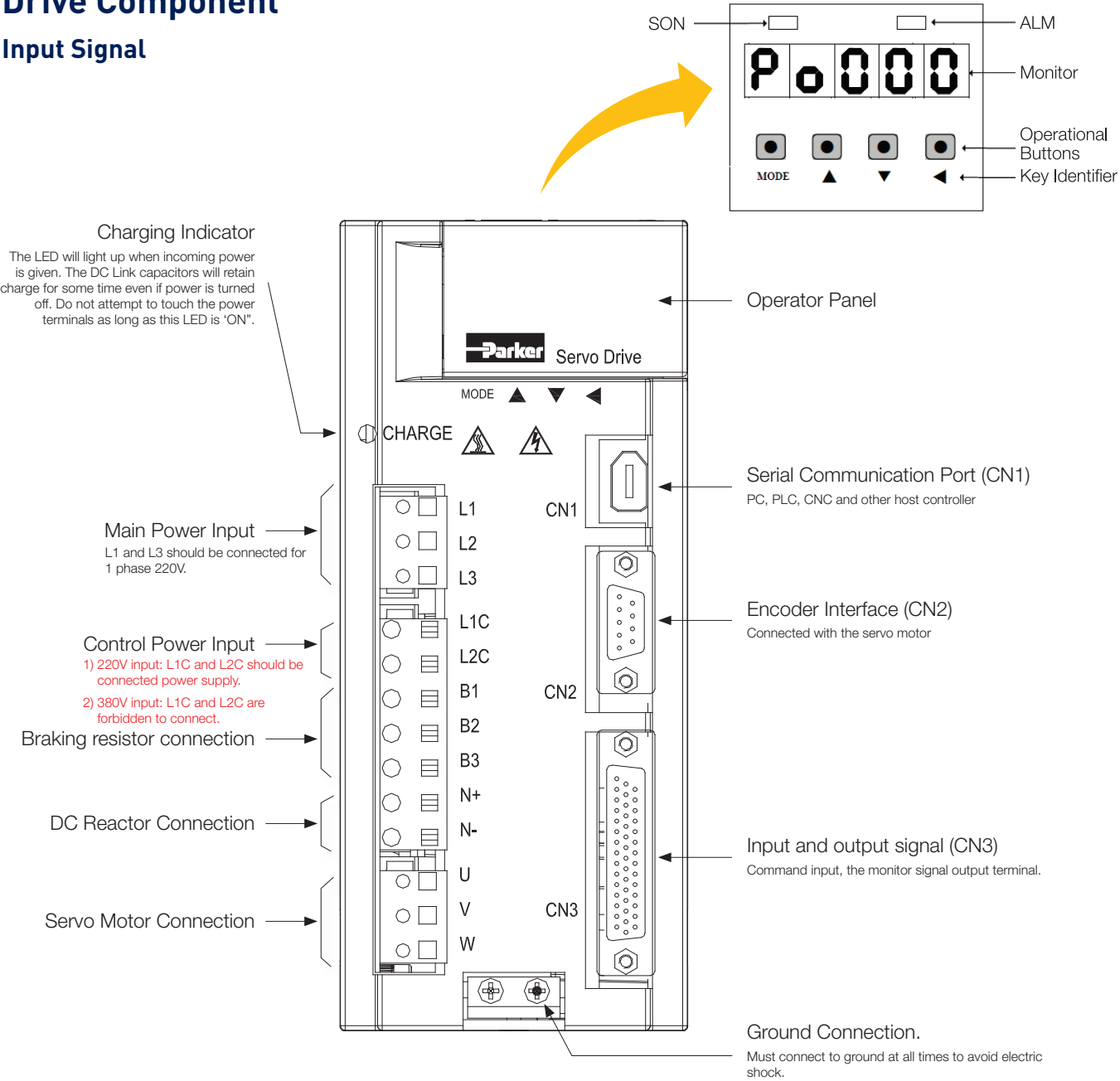


Technical Characteristics

Servo Drive Specifications

| | | |
|-------------------------|-----------------------|--|
| Input power | | 220VAC ±10% 1Phase/3Phase 50/60Hz 380VAC ±10% 3Phase 50 / 60Hz |
| Control mode | | Pt: Position pulse mode Pr: Internal register position mode |
| | | Sz: Analogue speed mode Sr: Internal register speed mode |
| | | Tz: Analog torque mode Tr: Internal register torque mode |
| | | |
| Braking | | Built-in braking unit or dynamic brake (refer to page 13) Frame size M1, MM4, M4, M5, M6: without built-in resistor (External resistor need to order separately) |
| Control | Control method | PMSM |
| | Frequency response | PMSM: 1.2kHz |
| | Speed accuracy | ± 0.01% (Load fluctuation 0~100%) |
| | Speed fluctuation | PMSM : ± 0.01% (VC, load fluctuation 0~100%) |
| | Speed ratio | 1 : 10000 |
| | Input pulse frequency | 1) 500kHz (Line drive) ; 200kHz (Open collector) 2) 4MHz (Pulse command frequency / Line drive) |
| Input | Control input | Servo on, Alarm reset, Pulse clear, Pulse prohibited, Reverse run prohibited, Emergency stop, Forward torque limit, Reverse torque limit, Internal speed selection, Internal position triggered, Searching triggered, Zero speed clamp, etc. |
| | Encoder | 1) 17 bit absolute encoder 2) Incremental encoder 1024 lines, 2500 lines, 6000 lines 3) Resolver |
| Output | Control output | Servo ready, Servo alarm activated, At position completed, At speed reached, Electromagnetic brake control, Rotation detection, At speed limit, Homing completed, At torque limit. |
| | Encoder signal | 1) Open collector output encoder Z phase 2) Encoder A, B phase signal is frequency division output. Z phase has no frequency-division output. 3) Z pulse time expansion capability |
| Position control | Input mode | 1) A phase + B phase 2) Forward pulse + Reverse pulse 3) Pulse + Direction 4) Internal register |
| | Electronic gear | $0.01 \leq B / A \leq 100$ (Setting 2 electronic gears) |
| Analog signal control | | -10V ~ +10V analog speed signal input |
| Analog torque control | | -10V ~ +10V analog torque signal input |
| Accel / Deceleration | | Accel / deceleration time 1 ~ 30000ms (0 ← → rated speed) |
| Communication | | 1) RS485 / 232 interface is connected PC, to set control parameters and monitoring 2) CANopen, EtherCAT (Optional communication card should be selected and purchased) |
| Parameter setting | Keypad | The parameters are set by keypad, which is displayed by 5 LED |
| | PC software | RS485 interface can set parameters by PC software |
| Monitoring | | Output current, PN voltage, Motor speed, Motor feedback pulse, Motor feedback rotation, given pulse, given pulse error, given speed, given torque, analog speed reference, analog torque reference, etc. |
| Protection | | Over-voltage, Under-voltage, Overload, Overcurrent, Encoder error, Over-speed, Abnormal pulse control command, Emergency stop, Servo overheat, Input power phase loss, Regenerative braking error, Over-position, Battery alarm, etc. |
| Applicable load inertia | | Lower than 5 times of servo motor inertia |

Drive Component Input Signal



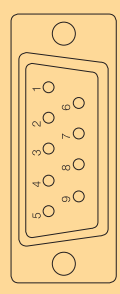
Terminal Details CN1 Terminal Definition

| Terminal No. | Symbol | Definition |
|--------------|-----------------------|-------------------------|
| CN1-1 | VCC | 5V Power supply |
| CN1-2 | RS232-RXD | RS232 Receiving end |
| CN1-3 | Differential Output - | B- |
| CN1-4 | GND | Reference terminal |
| CN1-5 | RS232-TXD | RS232 tranFLission side |
| CN1-6 | Differential output + | A+ |

Figure: CN1 terminal definition (from the wire side to drive side view)

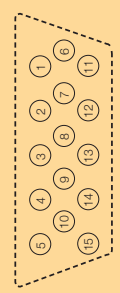
Terminal Details

CN2 Terminal Definition



| Pin No. | Definition |
|---------|------------|
| 1 | NC |
| 2 | VCC |
| 3 | PS |
| 4 | /PS |
| 5 | GND |
| 6 | |
| 7 | NC |
| 8 | NC |
| 9 | NC |
| Case | Shield |

Figure: Absolute CN2 terminal definition.
(from the wire side to drive side look)

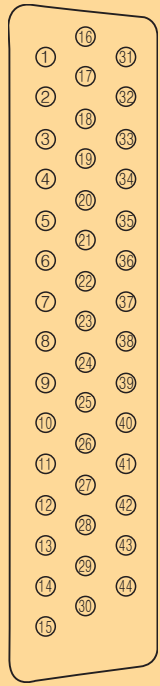


| Terminal No. | Symbol | Definition |
|--------------|---------|------------------------|
| CN2-1 | V | Encoder V-phase input |
| CN2-2 | U | Encoder U-phase input |
| CN2-3 | Z | Encoder Z-phase input |
| CN2-4 | B | Encoder B-phase input |
| CN2-5 | A | Encoder A-phase input |
| CN2-6 | /V | Encoder /V-phase input |
| CN2-7 | /U | Encoder /U-phase input |
| CN2-8 | /Z | Encoder /Z-phase input |
| CN2-9 | /B | Encoder /B-phase input |
| CN2-10 | /A | Encoder /A-phase input |
| CN2-11 | /W | Encoder /W-phase input |
| CN2-12 | W | Encoder W-phase input |
| CN2-13 | VCC | + 5V output |
| CN2-14 | GND | Ground output |
| CN2-15 | - | - |
| | HOUSING | Shield |

Figure: Incremental CN2 terminal definition.
(from the wire side to drive side view)

CN3 Terminal Definition

Input Signal



| Signal Category | Terminal No. | Symbol | Name | Input | Definition |
|------------------------------|--------------|--------|------------------------------------|---------------------------------------|---|
| Programmable Input Terminals | CN3-18 | DI1 | Digital input 1 | Switching signal | NOTE: DI1 ~DI8 are digital input terminals, input mode is ON/OFF signal |
| | CN3-19 | DI2 | Digital input 2 | | |
| | CN3-20 | DI3 | Digital input 3 | | |
| | CN3-21 | DI4 | Digital input 4 | | |
| | CN3-22 | DI5 | Digital input 5 | | |
| | CN3-38 | DI6 | Digital input 6 | | |
| | CN3-39 | DI7 | Digital input 7 | | |
| | CN3-13 | DI8 | Digital input 8 | | |
| Analog Input | CN3-23 | AS1+ | Analog speed command input | Analog | Analog speed command input to AGND to power ground |
| | CN3-25 | AS2+ | Analog speed command input | Analog signal | |
| Position | CN3-44 | PULS | Pulse command input (5V) | Differential signal or Open Collector | Receive instructions in the form of: 1. Difference; 2. Open collector It can only receive 5V command input. |
| | CN3-15 | /PULS | | | |
| Location | CN3-12 | SIGN | Pulse command input (5V) | Differential signal or Open Collector | This signal can only accept 5V quad differential pulse signal, while the reference terminal must be connected to together with CN3-24 |
| | CN3-27 | /SIGN | | | |
| | CN3-28 | PL1 | Pulse direction input (24V) | Differential signal or Open Collector | |
| | CN3-43 | PL2 | Pulse command input (24V) | Differential signal or Open Collector | |
| | CN3-4 | HPULS+ | High-speed input pulse command | | |
| | CN3-3 | HPULS- | | | |
| | CN3-5 | HSIGN+ | High-speed pulse direction command | Differential signal | |
| | CN3-6 | HSIGN- | | | |

CN3 Terminal Definition

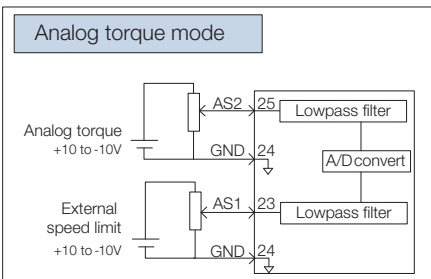
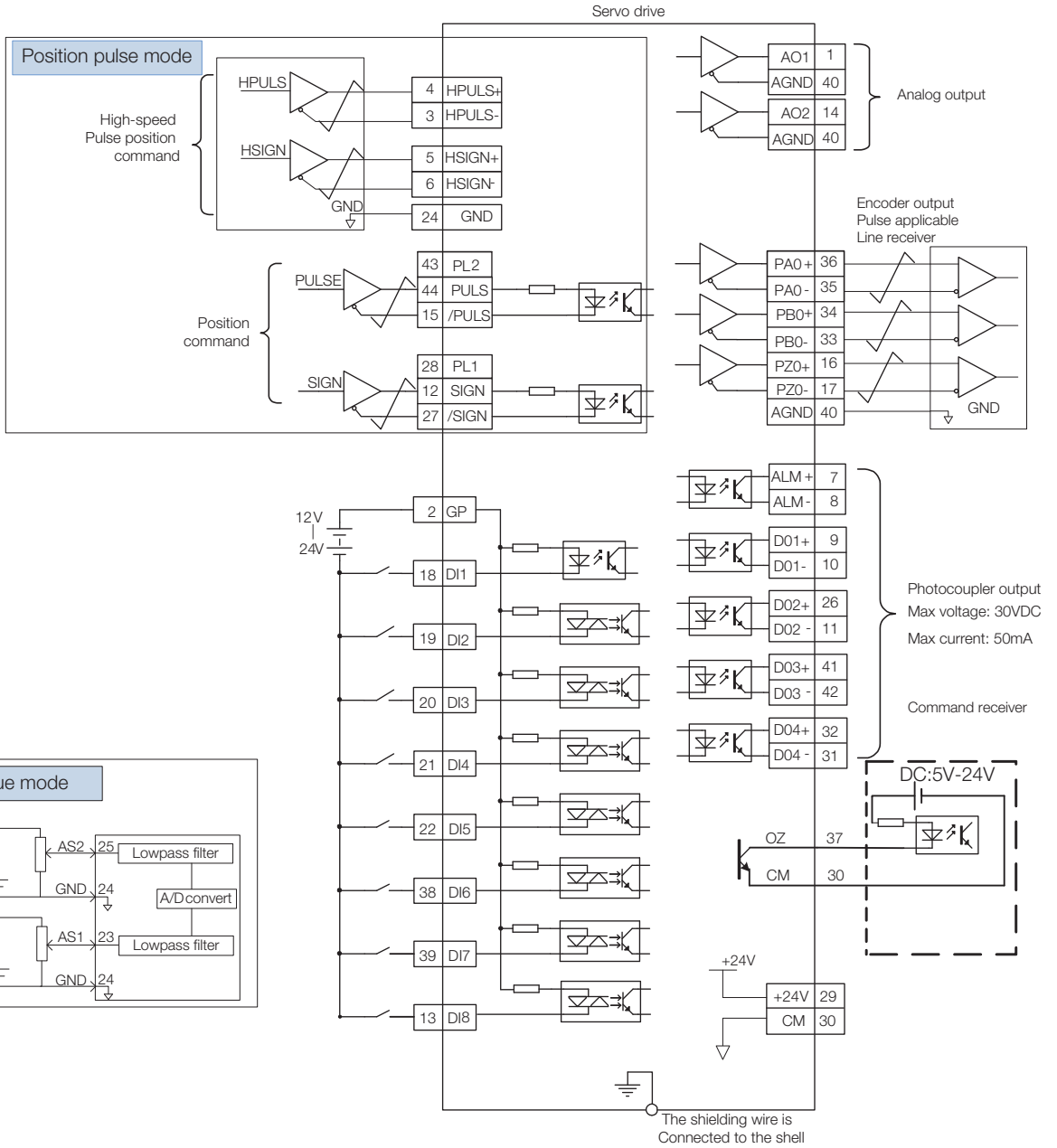
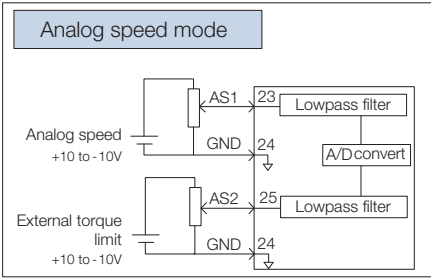
Output Signal

| | Signal Category | Terminal No. | Symbol | Name | Output | Definition |
|--|-------------------------------|------------------|--------------|------------------------------|---------------------|--|
| | Programmable Output Terminals | CN3-9 CN3-10 | DO1+ DO1- | Digital output 1 | Switching signal | |
| | | CN3-26 CN3-11 | DO2+ DO2- | Digital output 2 | | |
| | | CN3-41 CN3-42 | DO3+ DO3- | Digital output 3 | | |
| | | CN3-32 CN3-31 | DO4+ DO4- | Digital output 4 | | |
| | | CN3-7 CN3-8 | ALM+ ALM- | Servo alarm output | | |
| | Pulse output terminal | CN3-37 | OZ | Encoder ZRN signal output | Open collector | Encoder ZRN signal open collector output |
| | | CN3-34 CN3-33 | PB0+ PB0- | Encoder B-phase pulse output | Differential signal | Encoder B-phase pulse output |
| | | CN3-36 CN3-35 | PA0+ PA0- | Encoder A-phase pulse output | | Encoder A-phase pulse output |
| | | CN3-16 CN3-17 | PZ0+ PZ0- | Encoder Z-phase pulse output | | Encoder Z-phase pulse output |
| | Analog output terminal | CN3-1 | AO1 | Analog output 1 | Monitoring | 0,10V |
| | | CN3-14 | AO2 | Analog output 2 | | 0,10mA |

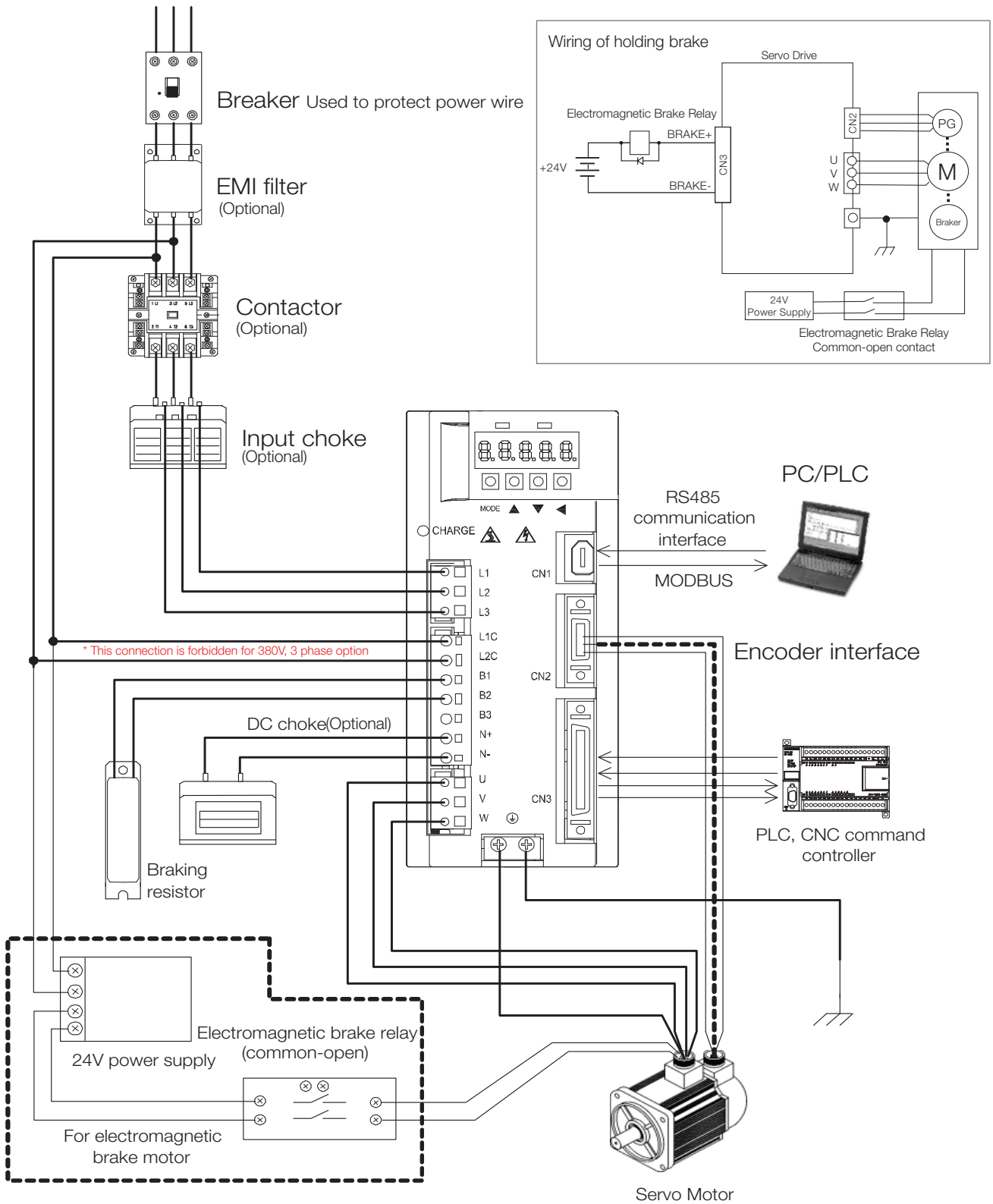
Other Signal

| Signal | Terminal No. | Symbol | Name | Output | Definition |
|--------------|------------------|--------|---------------------|---------------------|---|
| DC 24V | CN3-29 | +24V | + 24V Output | + 24V Output | 24V power supply, 100mA(Max) |
| 24V GND | CN3-30 | CM | 24V Ground | 24V Ground | Alarm code output ground; Internal 24V power supply ground |
| Input Common | CN3-2 | GP | Input Common | Common | Programmable input to common terminal |
| AI GND | CN3-24 CN3-40 | AGND | Analog Input Ground | Analog Input Ground | Analog speed command, analog torque command and analog monitor Input ground |

Wiring diagram

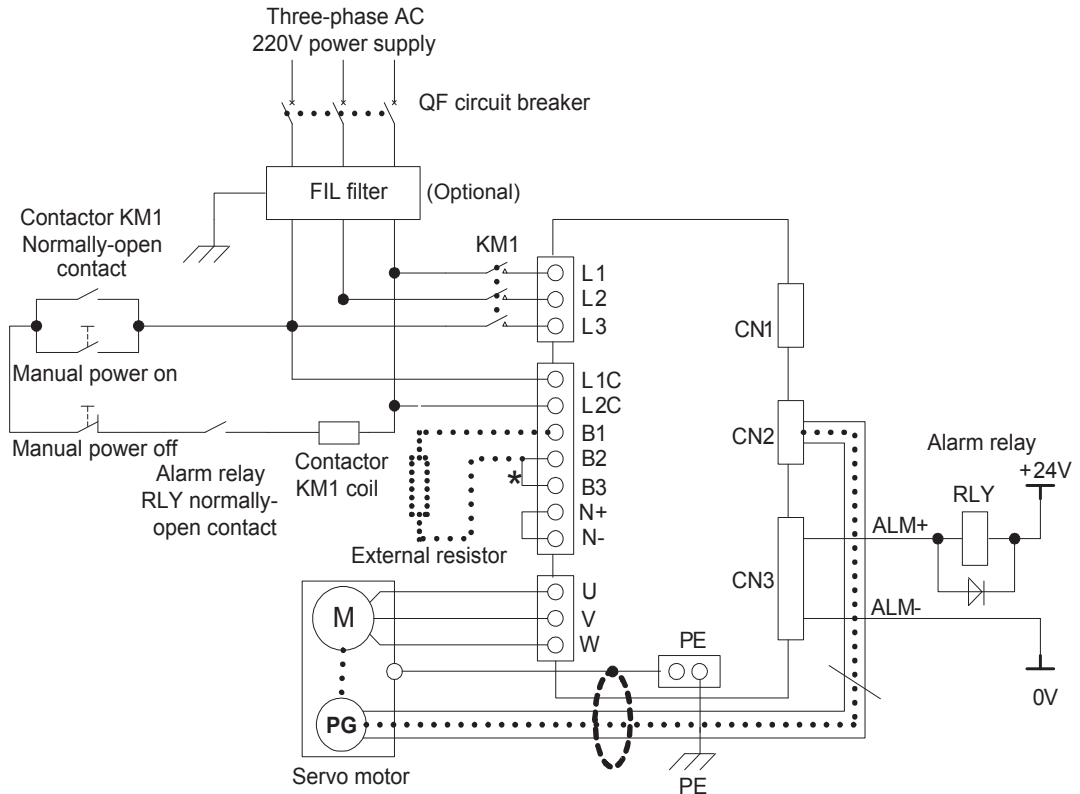


3 phase AC power
(1 phase 220V, only L1 and L3 should be connected.)



Typical main circuit wiring

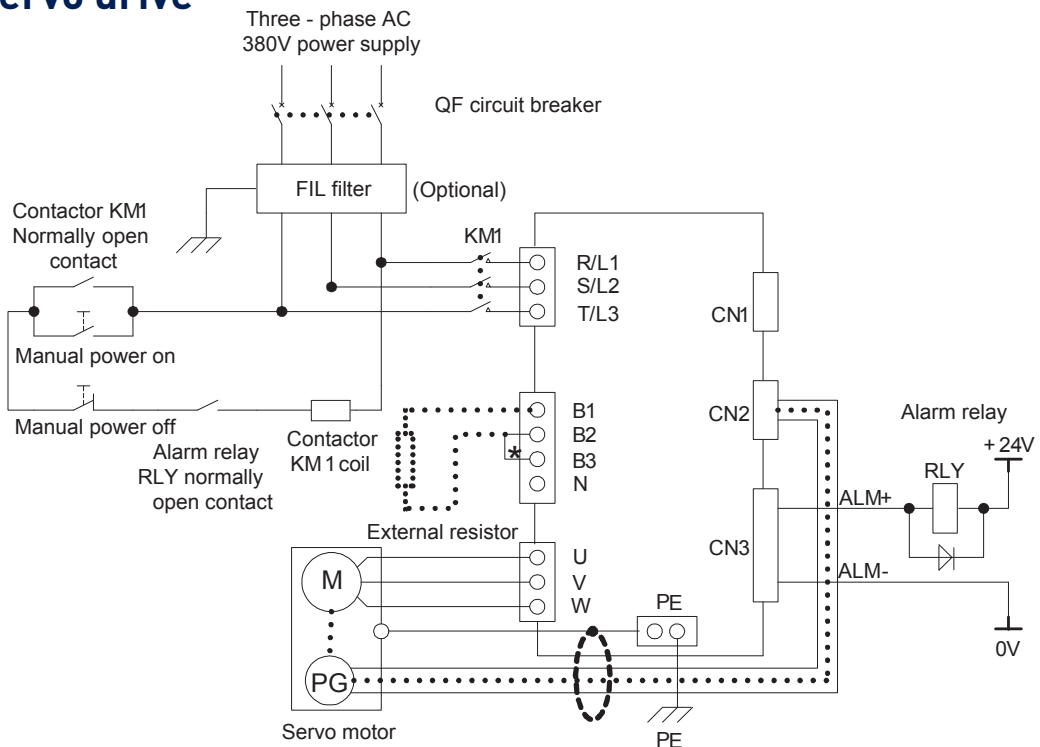
For 220V servo drive



Note)

For 220V input servo drive, L1C and L2C should be connected to power supply.
 For 220V single phase connect to L1 and L3.

For 380V servo drive



Note)

For 380V input servo drive, L1C and L2C are forbidden to connect

Ordering Code

Drive

| | | | | | | | | | |
|---------------|------|---|---|-----|----|----|-----|----|----|
| | 1 | | 2 | | 3 | | 4 | 5 | 6 |
| Order example | FL20 | - | S | 152 | T3 | M2 | F11 | D7 | B3 |

| |
|--|
| 1 Device Family |
| FL20 Servo Drive for Film line Application |

| |
|--------------------|
| 2 Function |
| S PM Servo Control |

| |
|---|
| 3 Power Rating, Voltage and Frame Size |
| 220V 1phase |

| | |
|-----------|------------------|
| 201 S2 M1 | 0.2kW, M1 Frame |
| 401 S2 M1 | 0.4kW, M1 Frame |
| 751 S2 M1 | 0.75kW, M1 Frame |
| 102 S2 M2 | 1kW, M2 Frame |
| 122 S2 M2 | 1.2kW, M2 Frame |
| 182 S2 M2 | 1.8kW, M2 Frame |

| |
|-------------|
| 220V 3phase |
|-------------|

| | |
|-----------|------------------|
| 201 T2 M1 | 0.2kW, M1 Frame |
| 401 T2 M1 | 0.4kW, M1 Frame |
| 751 T2 M1 | 0.75kW, M1 Frame |
| 102 T2 M2 | 1kW, M2 Frame |
| 122 T2 M2 | 1.2kW, M2 Frame |
| 182 T2 M2 | 1.8kW, M2 Frame |
| 302 T2 M3 | 3kW, M3 Frame |
| 452 T2 M3 | 4.5kW, M3 Frame |

| |
|-------------|
| 380V 3phase |
|-------------|

| | |
|------------|------------------|
| 152 T3 M2 | 1.5kW, M2 Frame |
| 202 T3 M3 | 2kW, M3 Frame |
| 302 T3 M3 | 3kW, M3 Frame |
| 452 T3 M3 | 4kW, M3 Frame |
| 552 T3 M3 | 5.5kW, M3 Frame |
| 752 T3 MM4 | 7.5kW, MM4 Frame |
| 113 T3 MM4 | 11kW, MM4 Frame |
| 153 T3 M4 | 15kW, M4 Frame |
| 183 T3 M5 | 18kW, M5 Frame |
| 223 T3 M5 | 22kW, M5 Frame |
| 303 T3 M6 | 30kW, M6 Frame |
| 373 T3 M6 | 37kW, M6 Frame |

| |
|---|
| 4 Communication |
| F11 Communication (Modbus, External EtherCAT, External CANopen) |

Note)

- EtherCAT and CANopen card should be ordered separately. Please see below or contact to Parker Engineers.

| |
|------------------------|
| 5 Encoder Type |
| D2 Resolver |
| D5 Incremental Encoder |
| D7 Absolute Encoder |

| |
|--|
| 6 Brake Unit |
| B1 Built in Brake Unit |
| B3 Built in Brake Unit + Dynamic Brake |

Note)

- For build in and external resistors details please see "Brake resistor" note or product manual.

| Frame | Size (WxHxD) | Supported Brake type |
|-----------|--------------|-------------------------|
| M1 | 48x175x195 | B3(no braking resistor) |
| M2 | 75x175x195 | B1, B3 |
| M3 | 100x203x218 | B1, B3 |
| M3(5.5kW) | 100x203x218 | B1 |
| MM4 | 150x336x203 | B1(no braking resistor) |
| M4 | 185x380x225 | B1(no braking resistor) |
| M5 | 210x420x234 | B1(no braking resistor) |
| M6 | 270x498x234 | B1(no braking resistor) |

Note)

- Specification subject to change without notice.



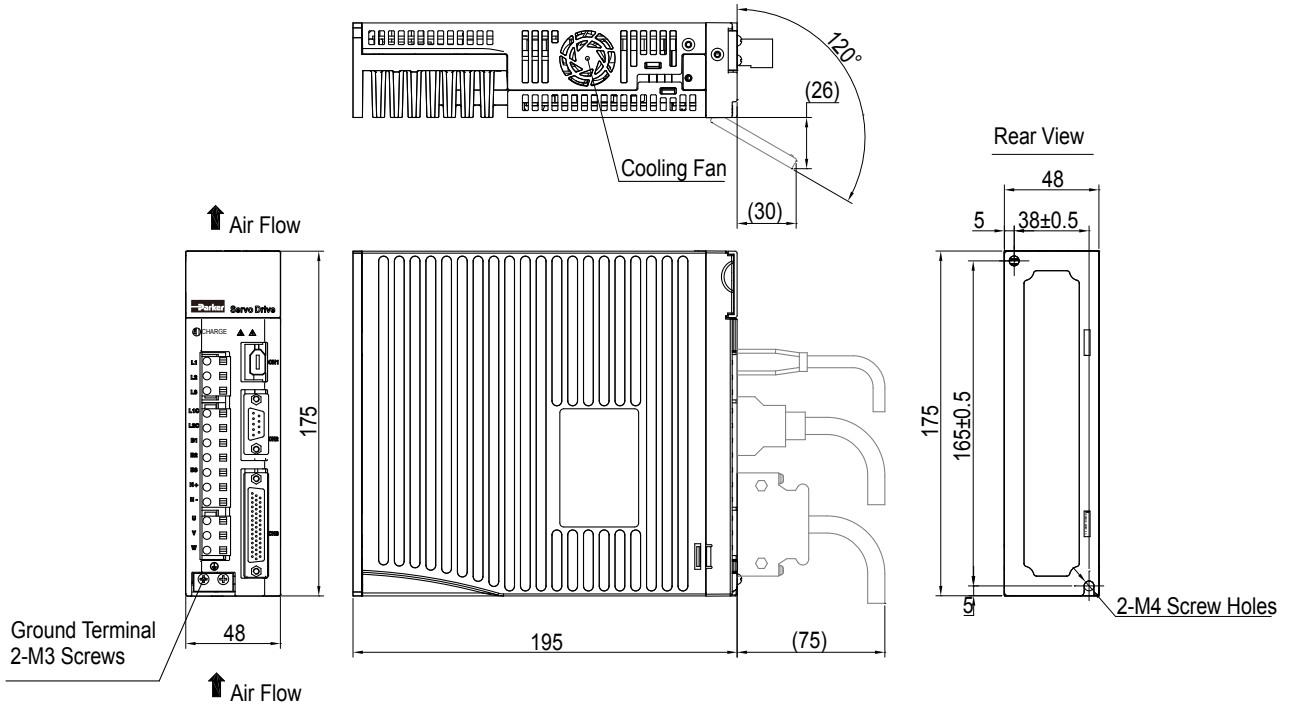
EtherCAT, CANopen communication cards

Optional Communication Card

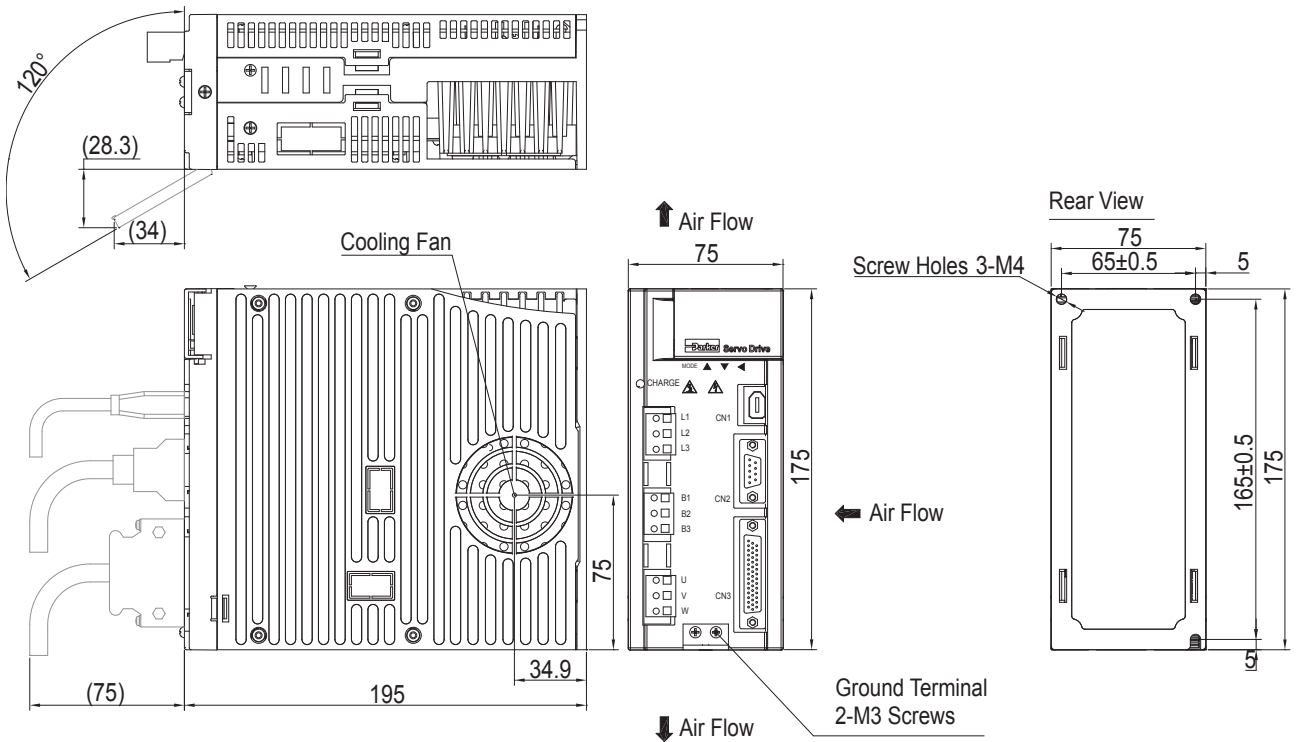
| Item | Description |
|----------|-----------------------------|
| 20S-0006 | EtherCAT Communication Card |
| 20S-0007 | CANopen Communication Card |

Drive Dimensions

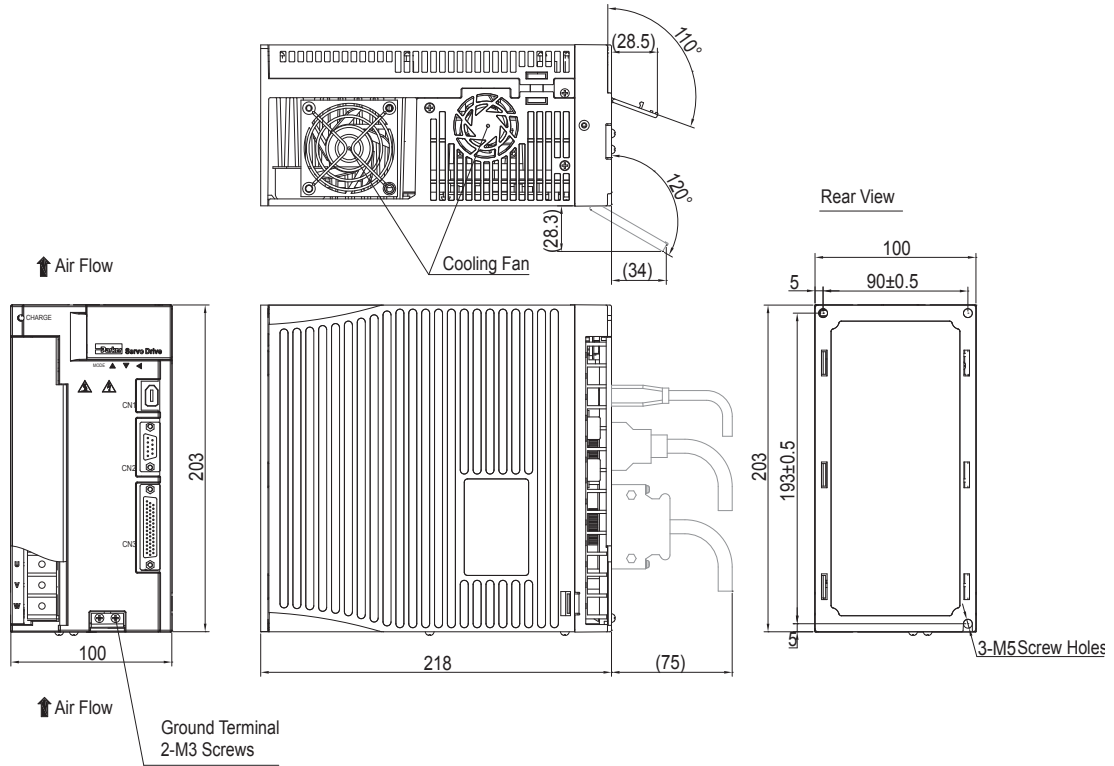
M1 Frame dimensions



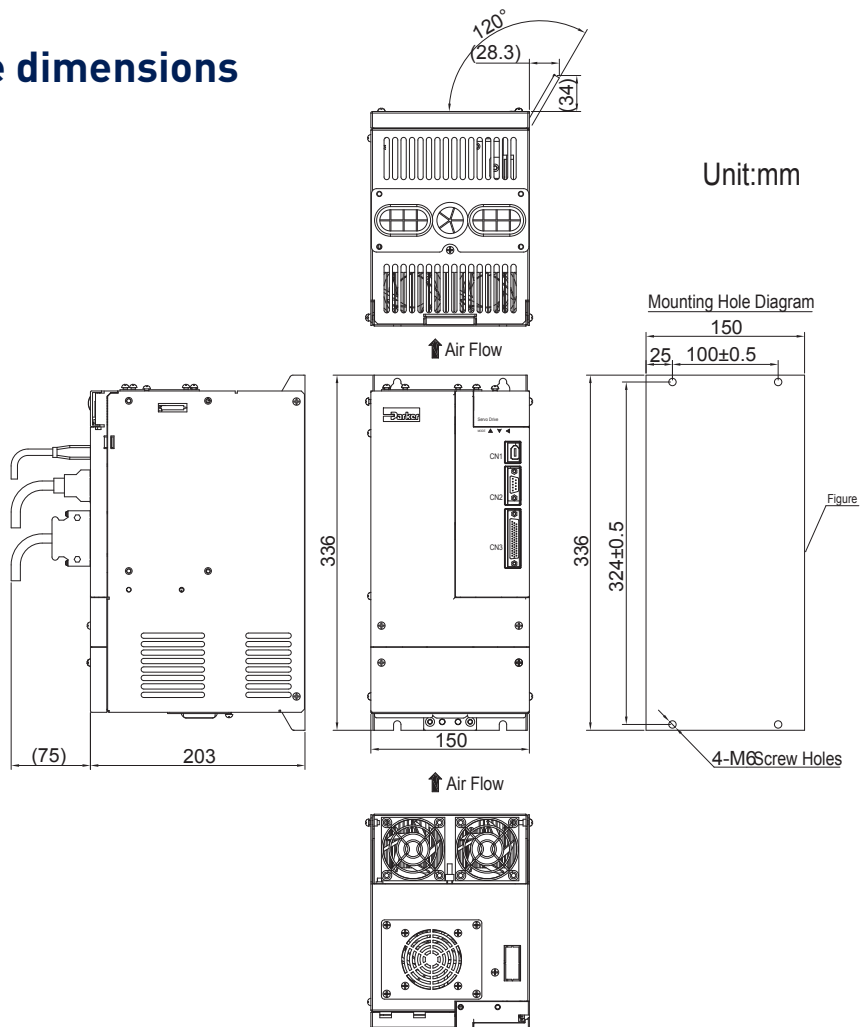
M2 Frame dimensions



M3 Frame dimensions

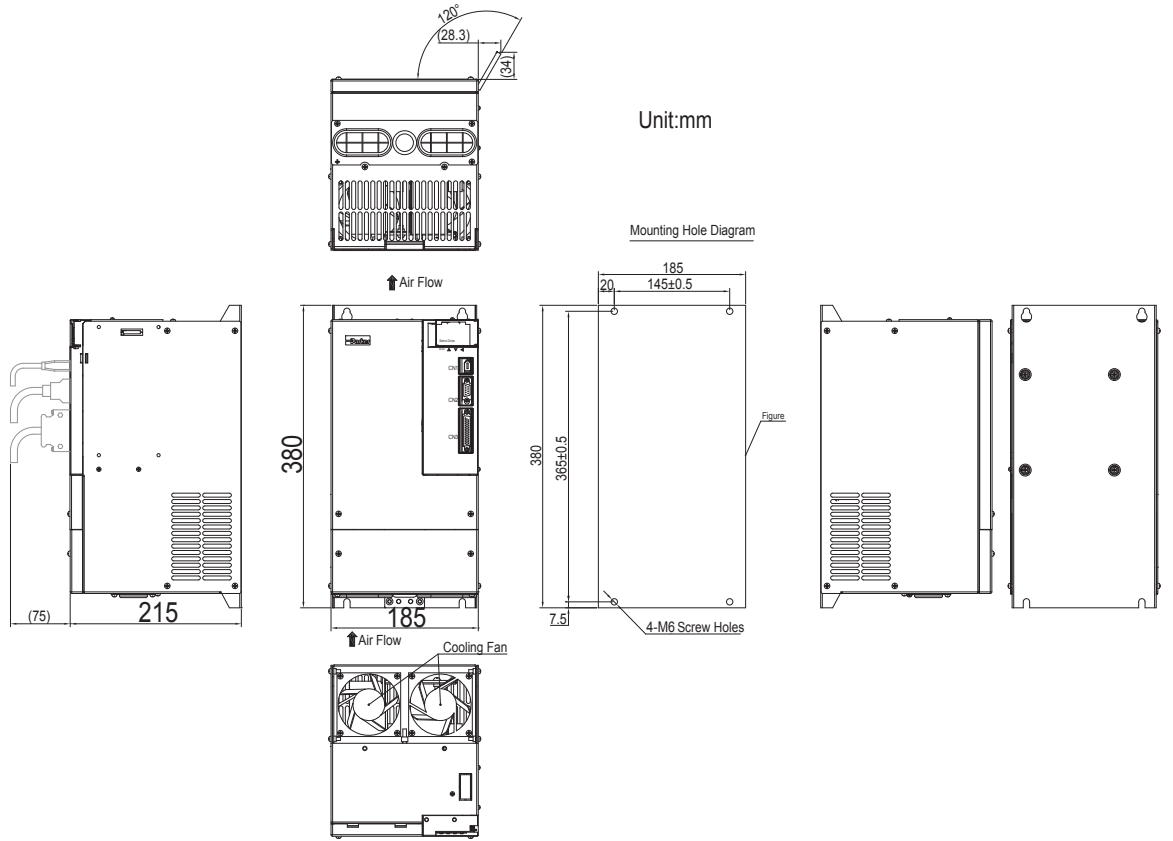


MM4 Frame dimensions

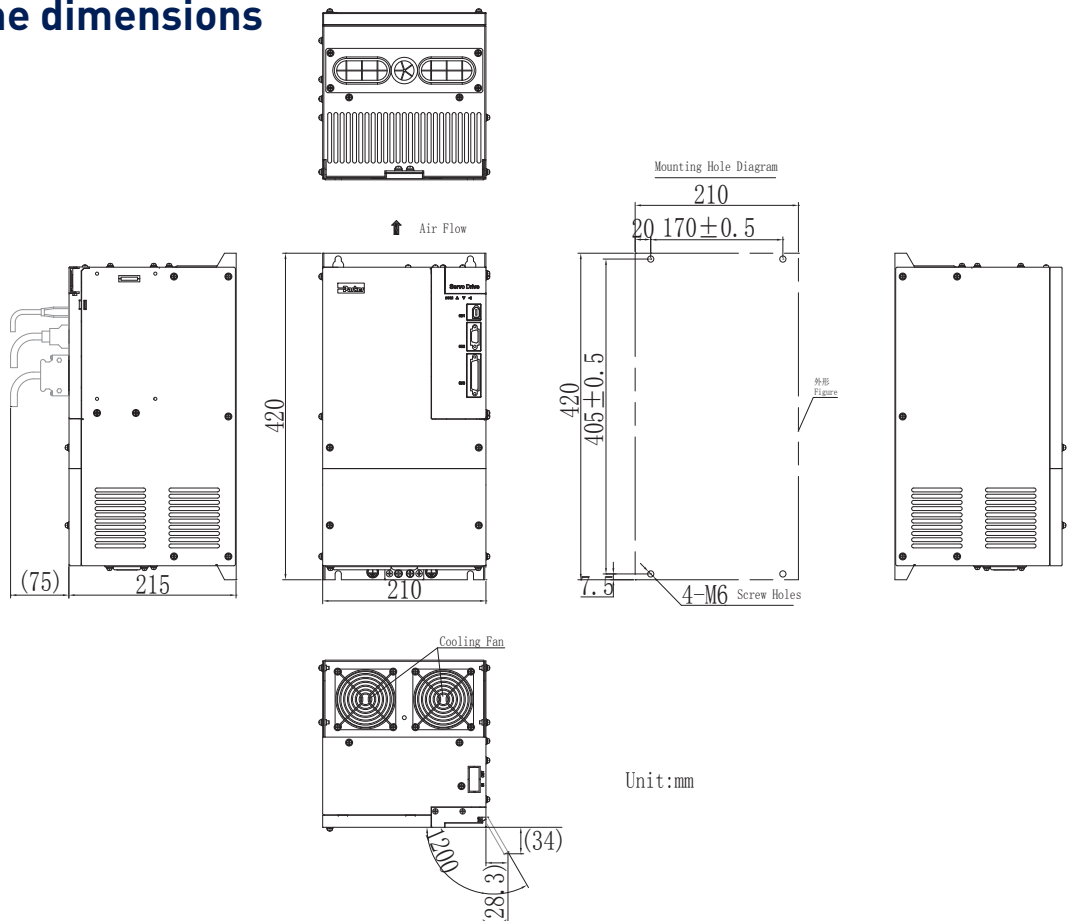


Drive Dimensions

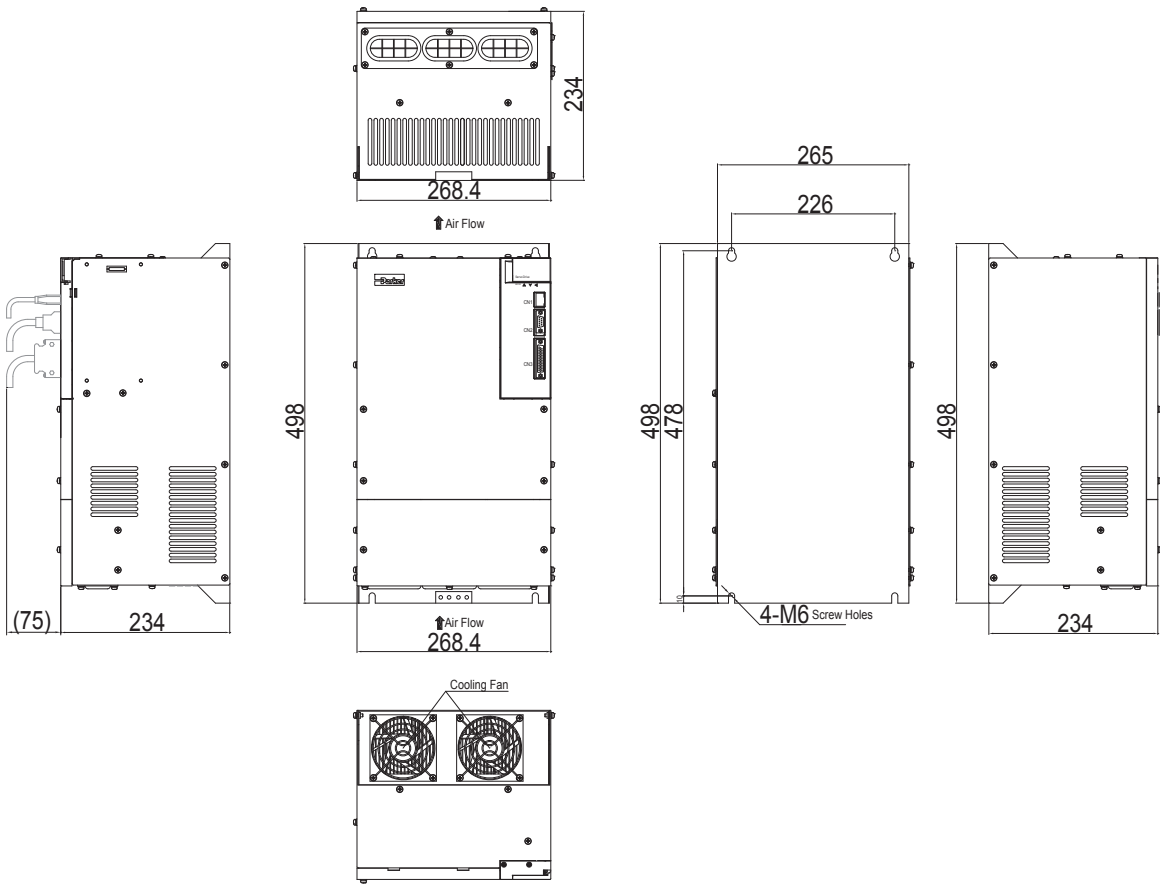
M4 Frame dimensions



M5 Frame dimensions



M6 Frame dimensions

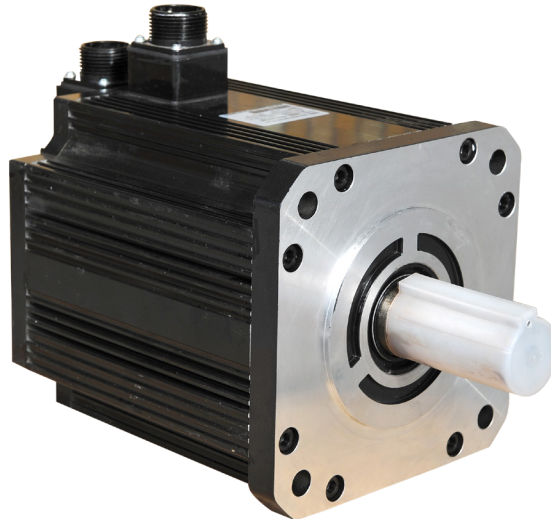


Servo motor


Overview

Description

Servo motor is the latest development of a high-performance motor to meet the customer's requirement and the needs of actual market; supports wiring flexible, cost-effective standard AC servo position system.



Servo motor nameplate

| | | |
|-------------------|--|-----------------------------------|
| | Parker Parker Hannifin Corporation | |
| Motor Model | TYPE : FMMA-102F67ED | |
| Rated Torque | $M_n = 5 \text{ Nm}$ | Rated Current $I_n = 5 \text{ A}$ |
| BEMF | $K_E = 68\text{V}/1000\text{r}/\text{min}$ | |
| Rated Speed | $n_N/n_{\text{max}} = 2000/2300\text{r}/\text{min}$ | Max. Speed |
| Installation Mode | IMB5 IP65 TH.CI .B | Insulation Grade IP Grade |
| Product No. |  MA102F67EDM74211009038 | |

| | | |
|---|-----------------------|-----------------------|
| FM17-0110R6EEDFL | | |
| Rated power : 11 kW | Rated Voltage : 380 V | Rated Torque : 64 N·M |
| Speed : 1700 r/min | Rated Current : 23 A | Fan Voltage : 220 V |
| TH.CI .F IP54 | No.: | |
| Magnetic Field Angle : | | Production Date : |
| Parker AC permanent magnetic synchronous servo motor | | |

Ordering Code

Servo Motor (for Servo Drive < 7.5kw)

| | 1 | 2 | | 3 | 4 | 5 | 6 | 7 | 8 |
|------------------------|------|--------------------------|---|-----|---|---|---|---|---|
| Order example | FM | SA | - | 201 | F | 6 | 7 | B | C |
| 1 Device Family | FM | FM Series | | | | | | | |
| 2 Rated Speed | SA | 3000 rpm | | | | | | | |
| | MA | 2000 rpm | | | | | | | |
| | MB | 1500 rpm | | | | | | | |
| | LA | 1000 rpm | | | | | | | |
| 3 Rated Power | 201 | 0.2kW | | | | | | | |
| | 401 | 0.4kW | | | | | | | |
| | 501 | 0.5kW | | | | | | | |
| | 751 | 0.75kW | | | | | | | |
| | 102 | 1kW | | | | | | | |
| | | | | | | | | | |
| 4 Encoder Type | F | Incremental encoder | | | | | | | |
| | S | Absolute encoder | | | | | | | |
| | R | Resolver | | | | | | | |
| 5 Bus Voltage | 3 | 380V | | | | | | | |
| | 6 | 600V | | | | | | | |
| 6 Flange Size | 2 | 60 Flange | | | | | | | |
| | 3 | 80 Flange | | | | | | | |
| | 5 | 110 Flange | | | | | | | |
| | 7 | 130 Flange | | | | | | | |
| | A | 180 Flange | | | | | | | |
| 7 Optional | B | With brake, without fan | | | | | | | |
| | E | Without brake and fan | | | | | | | |
| | J | With fan, without brake | | | | | | | |
| | K | With brake and fan. | | | | | | | |
| 8 Shaft Type | C | Smooth shaft with C hole | | | | | | | |
| | D | Keyway shaft with C hole | | | | | | | |

Servo Motor (for Servo Drive ≥7.5kw)

| | 1 | 2 | | 3 | 4 | 5 | 6 | 7 | 8 |
|------------------------|--------|---------------------|---|-----|---|---|---|---|---|
| Order example | FM | SA | - | 201 | F | 6 | 7 | B | C |
| 1 Device Family | FM | FM Series | | | | | | | |
| 2 Rated Speed | 15 | 1500 rpm | | | | | | | |
| | 17 | 1700 rpm | | | | | | | |
| | 20 | 2000 rpm | | | | | | | |
| 3 Rated Power | 0070 | 7kW | | | | | | | |
| | 0075 | 7.5kW | | | | | | | |
| | 0110 | 11kW | | | | | | | |
| | 0180 | 18kW | | | | | | | |
| | 0240 | 24kW | | | | | | | |
| | 0330 | 33kW | | | | | | | |
| | | | | | | | | | |
| 4 Encoder Type | F | Incremental encoder | | | | | | | |
| | S | Absolute encoder | | | | | | | |
| | R | Resolver | | | | | | | |
| 5 Bus Voltage | 6 | 600V | | | | | | | |
| 6 Flange Size | E | 200 Flange | | | | | | | |
| | F | 266 Flange | | | | | | | |
| 7 Optional | E | Without Brake | | | | | | | |
| 8 Shaft Type | C | Smooth Shaft | | | | | | | |
| | D | Keyway Shaft | | | | | | | |
| 9 Cooling Mode | F | Air Cooling Fan | | | | | | | |
| | N | Without cooling fan | | | | | | | |
| 10 Optional | S,L... | Design Code | | | | | | | |

Note)

The servo motors are used for both 220V and 380V.

Technical Characteristics

Servo Motor Specifications (220V – Incremental, Absolute Encoder and Resolver)

| Motor type | Part Number (with incremental) | Rated speed | Rated power | Rated torque | Rated current | Adaptable servo drive | |
|------------|--------------------------------|-------------|-------------|--------------|---------------|-----------------------|---------------|
| | | r/min | kW | Nm | A | 1-phase 220V | 3-phase 220V |
| FMSA | FMSA-201F32ED | 3000 | 0.2 | 0.64 | 1.2 | FL20-S201S2M1 | FL20-S201T2M1 |
| | FMSA-401F32ED | 3000 | 0.4 | 1.27 | 2.8 | FL20-S401S2M1 | FL20-S401T2M1 |
| | FMSA-751F33ED | 3000 | 0.75 | 2.39 | 3.5 | FL20-S751S2M1 | FL20-S751T2M1 |
| | FMSA-102F33ED | 3000 | 1 | 3.5 | 4.5 | FL20-S102S2M2 | FL20-S102T2M2 |
| | FMSA-122F35ED | 3000 | 1.2 | 4 | 5 | FL20-S182S2M2 | FL20-S182T2M2 |
| | FMSA-152F37ED | 3000 | 1.5 | 5 | 7.5 | | |
| | FMSA-182F35ED | 3000 | 1.8 | 6 | 8 | | |
| | FMSA-232F37ED | 3000 | 2.3 | 7.7 | 10 | — | FL20-S302T2M3 |
| | FMSA-302F37ED | 3000 | 3 | 10 | 15.5 | — | FL20-S452T2M3 |
| FMMA | FMMA-801F35ED | 2000 | 0.8 | 4 | 3.5 | FL20-S102S2M2 | FL20-S102T2M2 |
| | FMMA-851F37ED | 2000 | 0.85 | 4 | 4 | | |
| | FMMA-102F37ED | 2000 | 1 | 5 | 5 | FL20-S122S2M2 | FL20-S122T2M2 |
| | FMMA-122F35ED | 2000 | 1.2 | 6 | 5 | | |
| | FMMA-132F37ED | 2000 | 1.3 | 6 | 6 | FL20-S182S2M2 | FL20-S182T2M2 |
| | FMMA-152F37ED | 2000 | 1.5 | 7.7 | 7.5 | | |
| | FMMA-202F37ED | 2000 | 2 | 10 | 10 | — | FL20-S302T2M3 |
| | FMMA-312F37ED | 2000 | 3.1 | 15 | 14 | — | FL20-S452T2M3 |
| | FMMA-352F3AED | 2000 | 3.5 | 17.2 | 16 | — | |
| FMMB | FMMB-122F37ED | 1500 | 1.2 | 7.7 | 5 | FL20-S122S2M2 | FL20-S122T2M2 |
| | FMMB-152F37ED | 1500 | 1.5 | 10 | 6 | FL20-S182S2M2 | FL20-S182T2M2 |
| | FMMB-232F37ED | 1500 | 2.3 | 14.6 | 10 | — | FL20-S302T2M3 |
| | FMMB-272F3AED | 1500 | 2.7 | 17.2 | 11 | — | FL20-S302T2M3 |
| | FMMB-302F3AED | 1500 | 3 | 19 | 12 | — | |
| | FMMB-432F3AED | 1500 | 4.3 | 27 | 16 | — | FL20-S452T2M3 |
| FMLA | FMLA-102F37ED | 1000 | 1 | 10 | 4.5 | FL20-S102S2M2 | FL20-S102T2M2 |
| | FMLA-152F37ED | 1000 | 1.5 | 14.3 | 7 | FL20-S182S2M2 | FL20-S182T2M2 |
| | FMLA-292F3AED | 1000 | 2.9 | 27 | 12 | — | FL20-S302T2M3 |
| | FMLA-372F3AED | 1000 | 3.7 | 35 | 16 | — | FL20-S452T2M3 |

Note)

- These part numbers are based on Incremental Encoder Type.
- Three-phase AC servo motor type permanent magnet synchronous motor, natural cooling, protection class IP65, optional protection rating of IP64, IP66.
- The matched servo drive and motor can work with the most situation. But for some special situation, please contact to Parker sales team.

Servo Motor Specifications (380V – Incremental, Absolute Encoder and Resolver)

| Motor type | Part Number (with incremental) | Rated speed | Rated power | Rated torque | Rated current | Adaptable servo drive |
|---------------|-----------------------------------|-------------|-------------|--------------|----------------|-----------------------|
| | | r/min | KW | Nm | A | 3-phase 380V |
| FMSA | FMSA-751F63ED | 3000 | 0.75 | 2.39 | 2 | FL20-S152T3M2 |
| | FMSA-102F63ED | 3000 | 1 | 3.5 | 3 | |
| | FMSA-122F65ED | 3000 | 1.2 | 4 | 4 | FL20-S202T3M3 |
| | FMSA-152F67ED | 3000 | 1.5 | 5 | 5 | |
| | FMSA-182F65ED | 3000 | 1.8 | 6 | 6 | |
| | FMSA-232F67ED | 3000 | 2.3 | 7.7 | 7 | FL20-S302T3M3 |
| | FMSA-302F67ED | 3000 | 3 | 10 | 8 | |
| FMMA | FMMA-801F65ED | 2000 | 0.8 | 4 | 2.5 | FL20-S152T3M2 |
| | FMMA-851F67ED | 2000 | 0.85 | 4 | 3 | |
| | FMMA-102F67ED | 2000 | 1 | 5 | 3 | |
| | FMMA-122F65ED | 2000 | 1.2 | 6 | 3.5 | |
| | FMMA-132F67ED | 2000 | 1.3 | 6 | 3.5 | |
| | FMMA-152F67ED | 2000 | 1.5 | 7.7 | 4.5 | FL20-S202T3M3 |
| | FMMA-202F67ED | 2000 | 2 | 10 | 5.5 | FL20-S452T3M3 |
| | FMMA-312F67ED | 2000 | 3.1 | 15 | 9 | |
| | FMMA-352F6AED | 2000 | 3.5 | 17.2 | 8 | |
| | FMMA-452F6AED | 2000 | 4.5 | 21.5 | 10 | FL20-S752T3MM4 |
| | FMMA-602F6AED | 2000 | 6 | 27 | 14 | |
| | FMMA-802F6AED | 2000 | 8 | 35 | 18 | |
| | FMMA-103F6AED | 2000 | 10 | 48 | 24 | FL20-S153T3M4 |
| FMMB | FMMB-122F67ED | 1500 | 1.2 | 7.7 | 4 | FL20-S152T3M2 |
| | FMMB-152F67ED | 1500 | 1.5 | 10 | 4 | FL20-S202T3M3 |
| | FMMB-232F67ED | 1500 | 2.3 | 14.6 | 6 | |
| | FMMB-302F67ED | 1500 | 3 | 14.6 | 7.5 | FL20-S302T3M3 |
| | FMMB-272F6AED | 1500 | 2.7 | 17.2 | 8 | |
| | FMMB-302F6AED | 1500 | 3 | 19 | 8 | |
| | FMMB-432F6AED | 1500 | 4.3 | 27 | 10 | FL20-S452T3M3 |
| | FMMB-552F6AED | 1500 | 5.5 | 35 | 12.5 | FL20-S552T3M3 |
| FMMB-752F6AED | 1500 | 7.5 | 48 | 17 | FL20-S752T3MM4 | |
| FMLA | FMLA-102F67ED | 1000 | 1 | 10 | 3 | FL20-S152T3M2 |
| | FMLA-292F6AED | 1000 | 2.9 | 27 | 7 | FL20-S302T3M3 |
| | FMLA-372F6AED | 1000 | 3.7 | 35 | 9 | FL20-S452T3M3 |

Note)

- These part numbers are based on Incremental Encoder Type.
- Three-phase AC servo motor type permanent magnet synchronous motor, natural cooling, protection class IP65, optional protection rating of IP64, IP66.
- The matched servo drive and motor can work with the most situation. But for some special situation, please contact to Parker sales team.

Servo Motor Specifications (380V – Incremental, Absolute Encoder and Resolver)

| Motor type | Part Number (with incremental) | Rated speed | Rated power | Rated torque | Rated current | Adaptable servo drive |
|------------|-----------------------------------|-------------|-------------|--------------|---------------|-----------------------|
| | | r/min | kW | Nm | A | 3-phase 380V |
| FM15 | FM15-0082F6EEDFL | 1500 | 8.2 | 52 | 16.6 | FL20-S752T3MM4 |
| | FM15-0100F6EEDFL | 1500 | 10 | 64 | 20.7 | FL20-S113T3MM4 |
| | FM15-0124F6EEDFL | 1500 | 12 | 80 | 24.7 | |
| | FM15-0160F6EEDFL | 1500 | 16 | 102 | 33.5 | FL20-S183T3M5 |
| | FM15-0180F6EEDFL | 1500 | 18 | 118 | 40 | |
| | FM15-0210F6EEDFL | 1500 | 21 | 135 | 43.2 | FL20-S223T3M5 |
| | FM15-0240F6EEDFL | 1500 | 24 | 152 | 46.7 | FL20-S303T3M6 |
| | FM15-0290F6EEDFL | 1500 | 29 | 185 | 57.5 | |
| | FM15-0350F6EEDFL | 1500 | 35 | 225 | 71.7 | FL20-S373T3M6 |
| FM17 | FM17-0075F6EEDFL | 1700 | 7.5 | 42 | 13.7 | FL20-S752T3MM4 |
| | FM17-0092F6EEDFL | 1700 | 9.2 | 52 | 18 | FL20-S113T3MM4 |
| | FM17-0110F6EEDFL | 1700 | 11 | 64 | 23 | |
| | FM17-0140F6EEDFL | 1700 | 14 | 80 | 29.2 | FL20-S153T3M4 |
| | FM17-0180F6EEDFL | 1700 | 18 | 102 | 38.5 | FL20-S183T3M5 |
| | FM17-0210F6EEDFL | 1700 | 21 | 118 | 45 | FL20-S223T3M5 |
| | FM17-0240F6EEDFL | 1700 | 24 | 135 | 48.5 | FL20-S303T3M6 |
| | FM17-0270F6EEDFL | 1700 | 27 | 152 | 57.5 | |
| | FM17-0330F6EEDFL | 1700 | 33 | 185 | 68 | FL20-S373T3M6 |
| FM20 | FM20-0070F6EEDFL | 2000 | 7 | 33.6 | 14.8 | FL20-S752T3MM4 |
| | FM20-0100F6EEDFL | 2000 | 10 | 52 | 22 | FL20-S113T3MM4 |
| | FM20-0140F6EEDFL | 2000 | 14 | 64 | 30 | FL20-S153T3M4 |
| | FM20-0180F6EEDFL | 2000 | 18 | 80 | 37 | FL20-S183T3M5 |
| | FM20-0220F6EEDFL | 2000 | 22 | 102 | 43 | FL20-S223T3M5 |
| | FM20-0250F6EEDFL | 2000 | 25 | 118 | 49 | FL20-S303T3M6 |
| | FM20-0280F6EEDFL | 2000 | 28 | 135 | 56.9 | |
| | FM20-0300F6EEDFL | 2000 | 30 | 152 | 67 | FL20-S373T3M6 |
| | FM20-0360F6EEDFL | 2000 | 36 | 185 | 74 | |
| | FM20-0071F6EEDNL | 2000 | 7.1 | 34 | 14.5 | FL20-S752T3MM4 |
| | FM20-0094F6EEDNL | 2000 | 9.4 | 45 | 18.8 | |
| | FM20-0117F6EEDNL | 2000 | 11.7 | 56 | 24.4 | FL20-S113T3MM4 |
| | FM20-0140F6EEDNL | 2000 | 14 | 67 | 28.6 | FL20-S153T3M4 |

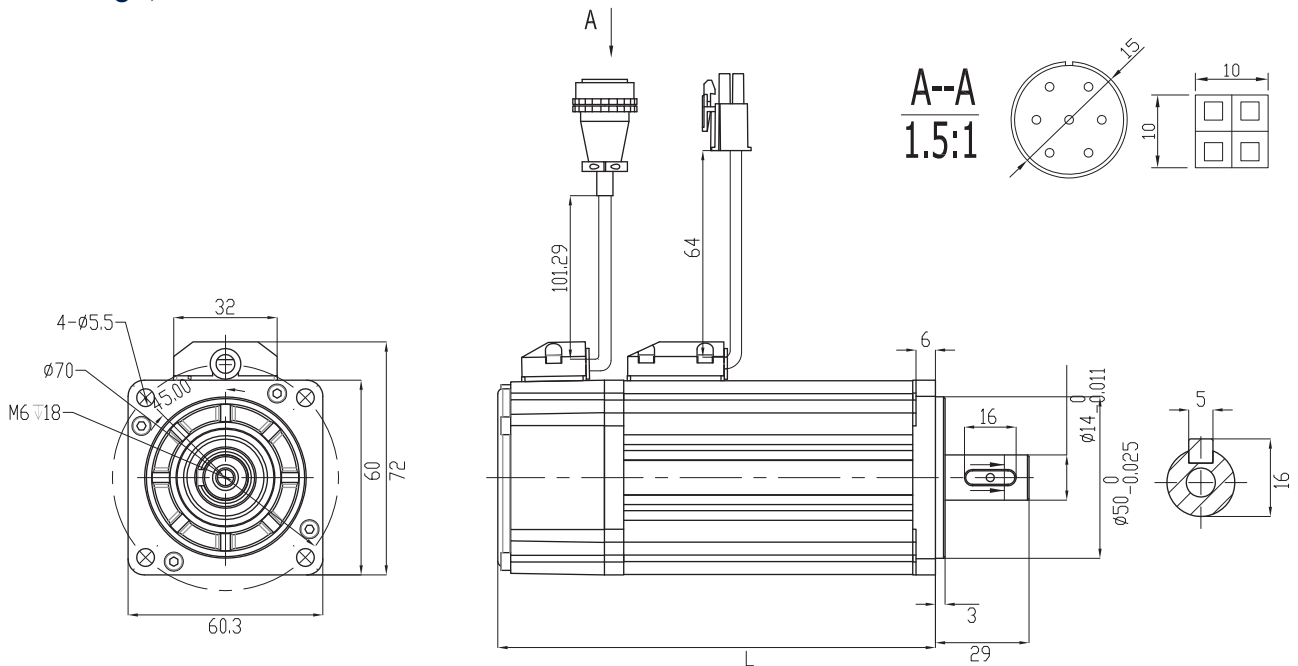
Note)

- These part numbers are based on Incremental Encoder Type.
- On behalf of the motor shaft extension brake category, please refer to [naming rules servo motor] in this manual.
- The matched servo drive and motor can work with the most situation. But for some special situation, please contact to Parker sales team.

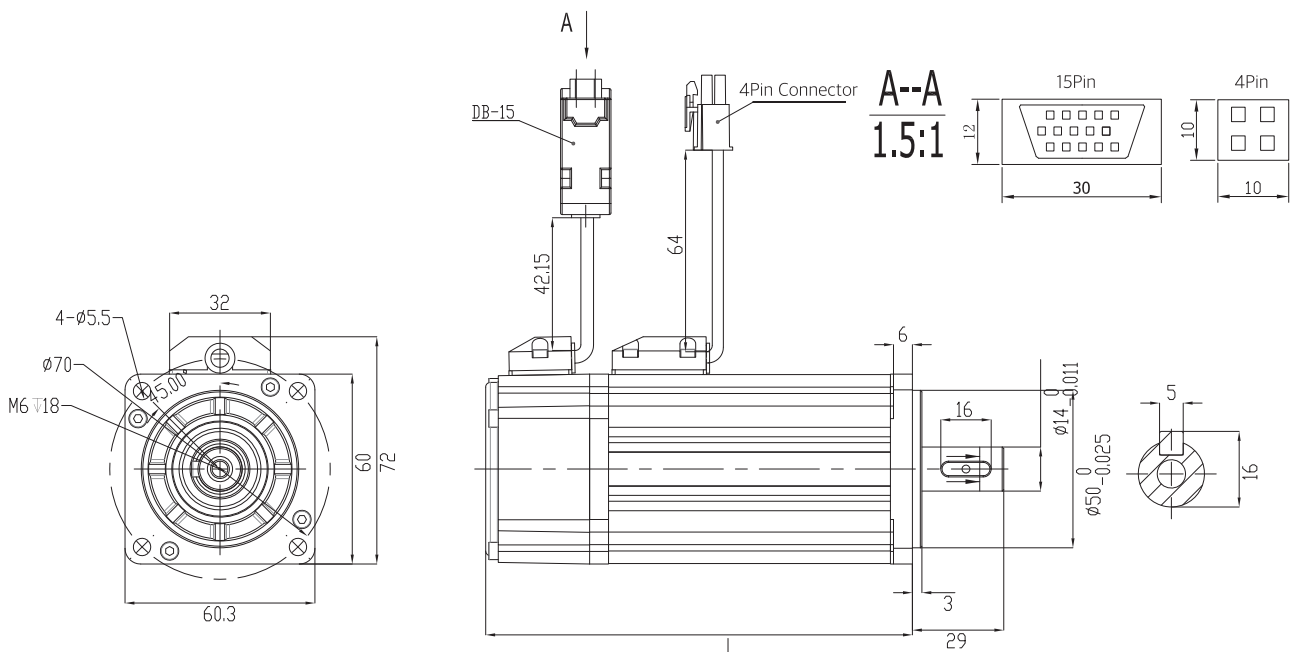
Motor Dimensions

Servo motor

60 Flange, Absolute Motor



60 Flange, Incremental Motor

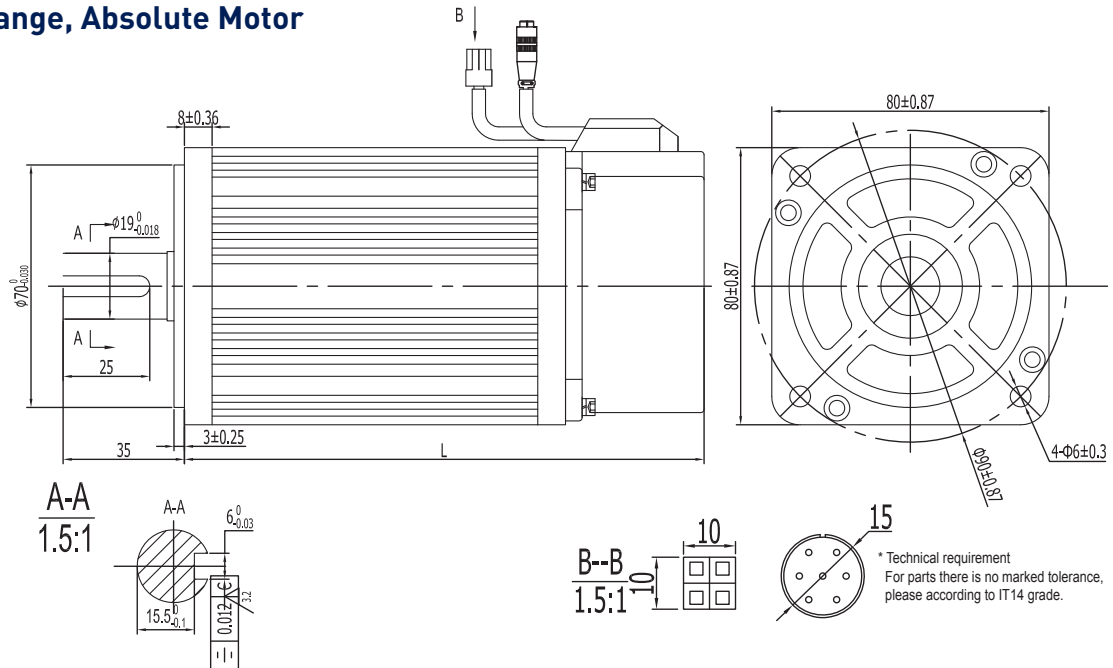


| Model | L(mm) | L(mm) with brake | Weight(kg) | Remark |
|------------------|-------|---------------------|------------|-----------------------------------|
| FMSA-201F/S32*** | 108 | 146 | 1.2 | The screw hole size is M4 x 20 |
| FMSA-401F/S32*** | 136 | 174 | 1.6 | |

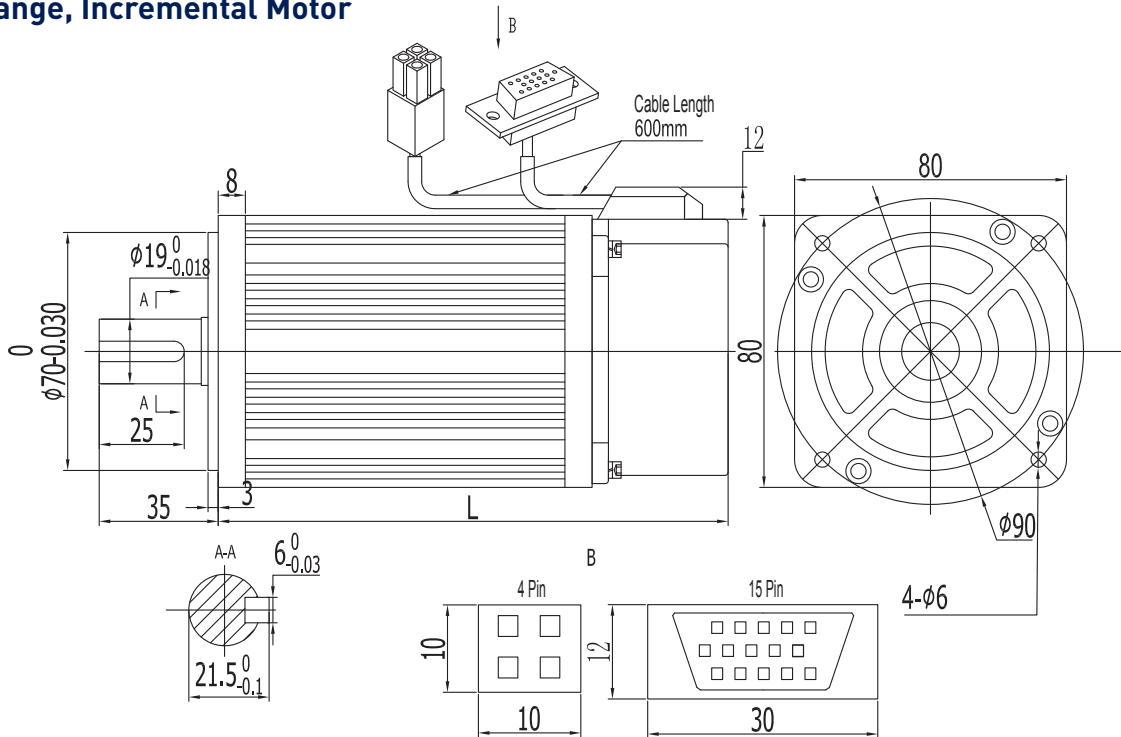
Motor Dimensions

Servo motor

80 Flange, Absolute Motor

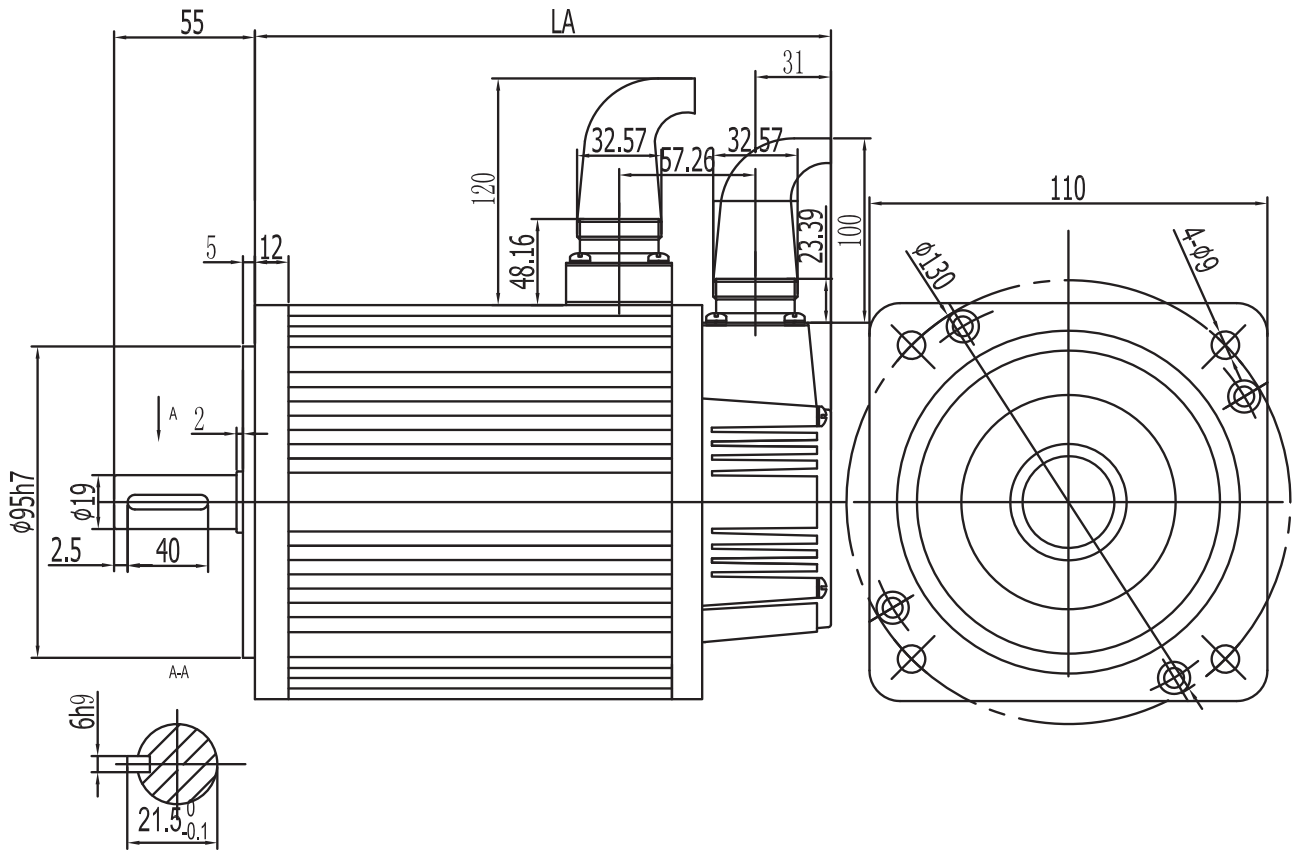


80 Flange, Incremental Motor



| Model | L(mm) | L(mm) with brake | Weight(kg) | Remark |
|----------------|-------|------------------|------------|--------------------------------|
| FMSA-751**3*** | 156 | 205 | 2.8 | The screw hole size is M5 x 22 |
| FMSA-102**3*** | 183 | 233 | 3.8 | |
| FMSB-102*33*** | | | | |

110 Flange Motor

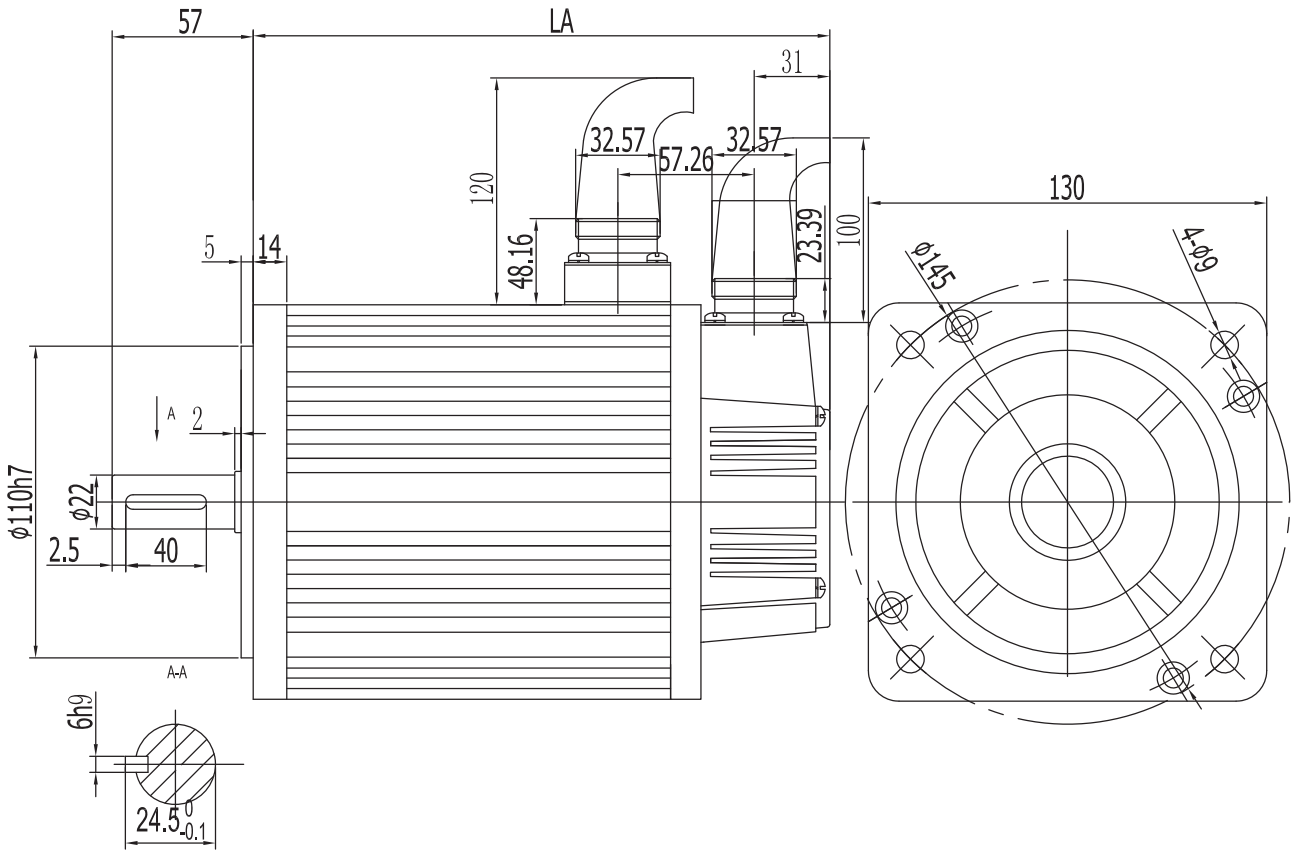


| Model | LA(mm) | LA(mm) with brake | Weight(kg) | Remark |
|----------------|--------|-------------------|------------|--------------------------------|
| FMSA-122**5*** | 195 | 271 | 6.5 | The screw hole size is M6 x 25 |
| FMMA-801**5*** | | | | |
| FMSA-182**5*** | 225 | 301 | 8 | |
| FMMA-122**5*** | | | | |

Motor Dimensions

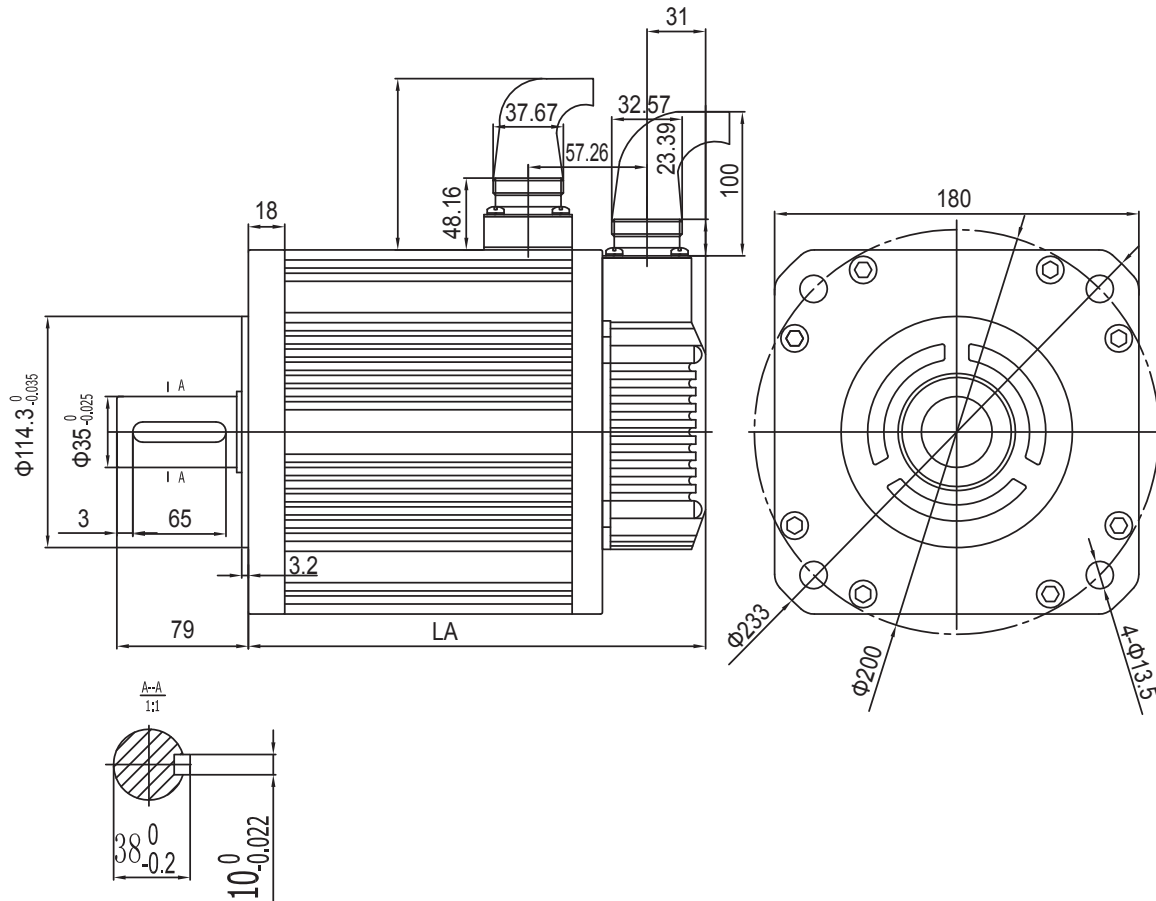
Servo motor

130 Flange Motor



| Model | LA(mm) | LA(mm) with brake | Weight(kg) | Remark |
|----------------|--------|-------------------|------------|---------------------------------|
| FMMA-851**7*** | 173 | 228 | 7 | The screw hole size is M6 x 25. |
| FMSA-152**7*** | | | | |
| FMMA-102**7*** | | | | |
| FMMA-132**7*** | 181 | 236 | 7.7 | |
| FMSA-232**7*** | 194 | 249 | 8 | |
| FMMA-152**7*** | | | | |
| FMMB-122**7*** | | | | |
| FMSA-302**7*** | 217 | 270 | 10 | |
| FMMA-202**7*** | | | | |
| FMMB-152**7*** | | | | |
| FMLA-102**7*** | 246 | 297 | 12 | |
| FMMA-312**7*** | | | | |
| FMLA-152*37*** | | | | |
| FMMB-232**7*** | | | | |
| FMMB-302*67*** | | | | |

180 Flange Motor

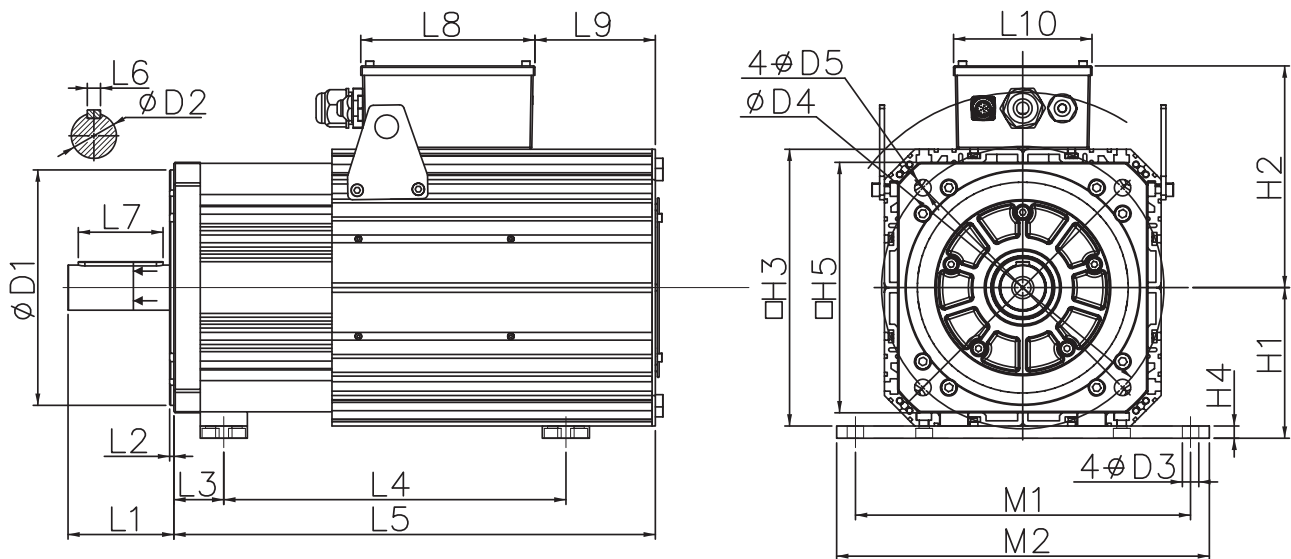


| Model | LA(mm) | LA(mm) with brake | Weight(kg) | Remark |
|----------------|--------|-------------------|------------|----------------------------------|
| FMMA-352**A*** | 218 | 283 | 18 | The screw hole size is M10 x 45. |
| FMMB-272**A*** | | | | |
| FMMA-452**A*** | 238 | 300 | 20 | |
| FMMB-302**A*** | | | | |
| FMMA-602*6A*** | 250 | 319 | 23 | |
| FMMB-432**A*** | | | | |
| FMLA-292**A*** | | | | |
| FMMA-802*6A*** | 288 | 349 | 29 | |
| FMMB-552**A*** | | | | |
| FMLA-372**A*** | | | | |
| FMMA-103*6A*** | 338 | 403 | 36 | |
| FMMB-752**A*** | | | | |

Motor Dimensions

Servo motor

FM15, FM17, FM20 series, Air-cooling



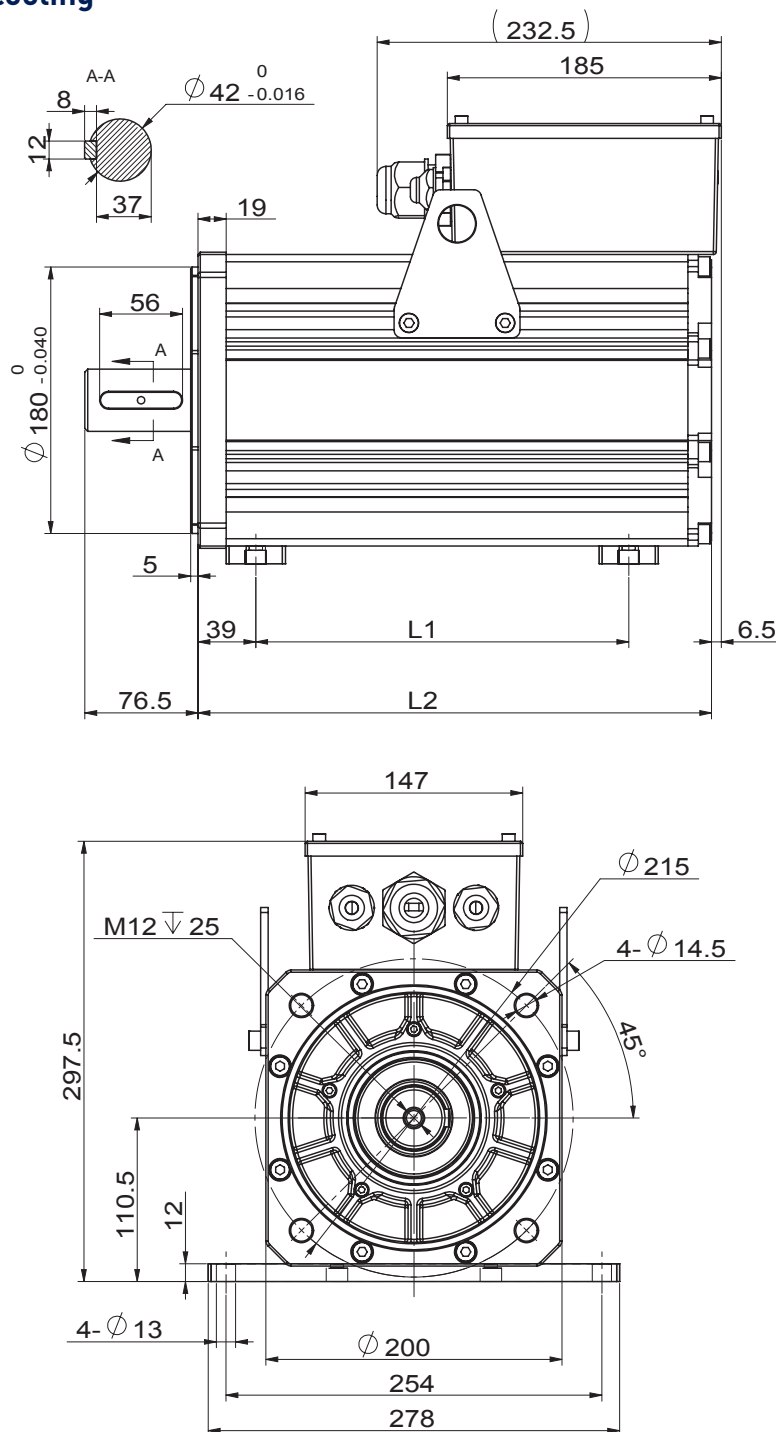
| Stand spigot | D1 | D2 | D3 | D4 | D5 | L1 | L2 | L3 | L6 | L7 | L8 | L9 | L10 | H1 | H2 | H3 | H4 | H5 | M1 | M2 |
|--------------|-----|----|----|-----|------|-----|-----|----|----|----|-----|------|-----|-----|-----|-----|----|-----|-----|-----|
| E | 180 | 42 | 14 | 215 | 14.5 | 77 | 5 | 39 | 12 | 56 | 185 | 75.5 | 147 | 124 | 200 | 224 | 12 | 200 | 254 | 278 |
| F | 250 | 48 | 18 | 300 | 17.5 | 112 | 4.5 | 53 | 14 | 90 | 185 | 128 | 147 | 160 | 236 | 294 | 13 | 266 | 356 | 390 |

| | | | | | | | | | | | | | | |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|
| Motor rated torque Nm $\Delta T=100^{\circ}\text{C}$ | 46 | 68 | 84 | 96 | 130 | 147 | 160 | 196 | 220 | 275 | 330 | 380 | 428 | 481 |
| Motor rated torque Nm $\Delta T=65^{\circ}\text{C}$ | 42 | 52 | 64 | 80 | 102 | 118 | 135 | 152 | 185 | 225 | 270 | 307 | 324 | 385 |
| Stand spigot | E | E | E | E | E | E | E | E | E | F | F | F | F | F |
| L4 (mm) | 267 | 285 | 312 | 354 | 396 | 436 | 478 | 520 | 317 | 370 | 423 | 476 | 529 | 583 |
| L5 (mm) | 345 | 397 | 429 | 471 | 513 | 555 | 597 | 619 | 511.5 | 560.5 | 609.5 | 685.5 | 707.5 | 756.5 |

Note)

- Servomotor cooling fan need additional 220V power supply.

FM20 series Self-cooling

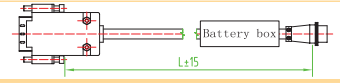

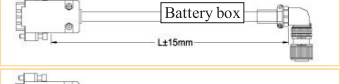





| Model | Motor rated torque Nm ($\Delta T=100^{\circ}\text{C}$) | Motor rated torque Nm ($\Delta T=65^{\circ}\text{C}$) | L1(mm) | L2(mm) |
|-----------------|---|--|--------|--------|
| FM20-0057F6EEDN | 42 | 34 | 210 | 305 |
| FM20-0086F6EEDN | 56 | 45 | 252 | 347 |
| FM20-0114F6EEDN | 70 | 56 | 294 | 389 |
| FM20-0143F6EEDN | 84 | 67 | 336 | 431 |

Accessories

Encoder Cable

* Absolute Encoder Cable (Maximum length : 30m)

| Item | Part No | Cable length(m) | Cable Assembly |
|--|-----------------------------|-----------------|---|
| Absolute encoder cable (for ≤80 flange Servo motor) | DB9-4BS02-** (with battery) | ** |  |
| | DB9-4GS02-** | ** |  |
| Absolute encoder cable (for 110, 130, 180 flange Servo motor) | DB9-4BS03-** (with battery) | ** |  |
| | DB9-4GS03-** | ** |  |
| Absolute encoder cable (for >180 flange Servo motors) | DB9-4BS01-** (with battery) | ** |  |
| | DB9-4GS01-** | ** |  |

Note)

Battery placed near motor. If you need the battery near the inverter, please contact Parker sales team for correct part number.

* Incremental Encoder Cable (Maximum length : 30m)

| Item | Part No | Cable length(m) | Cable Assembly |
|---|----------------|-----------------|---|
| Incremental encoder cable (for ≤80 flange Servo motor) | DB15-15GP02-** | ** |  |
| Incremental encoder cable (for 110, 130, 180 flange Servo motor) | DB15-15GP01-** | ** |  |
| Incremental encoder cable (for >180 flange Servo motors) | DB15-15GP03-** | ** |  |

* Resolver feedback cable (Maximum length : 30m)

| Item | Part No | Cable length(m) | Cable Assembly |
|---|--------------|-----------------|---|
| Resolver feedback cable (for ≤80 flange Servo motor) | DB9-8GR03-** | ** |  |
| Resolver feedback cable (for 110, 130, 180 flange Servo motor) | DB9-8GR01-** | ** |  |
| Resolver feedback cable (for >180 flange Servo motors) | DB9-8GR02-** | ** |  |

Control Cable

* Control cable (Maximum length : 30m)



| Item | Part No | Cable length(m) | Cable Assembly |
|----------------------------|--------------|-----------------|---|
| Position mode | DB44-15PC-** | ** |  |
| Analog speed / Torque mode | DB44-15AI-** | ** |  |

* Brake cable (Maximum length : 30m)

| Item | Part No | Cable length(m) | Cable Assembly |
|--|------------|-----------------|----------------|
| Brake cable (for ≤180 flange Servo motor) | HK3-2BR-** | ** | |

Power Cable

* Resolver feedback cable (Maximum length : 30m)

| Item | Part No | Cable length(M) | Cable Assembly |
|--|-------------|-----------------|---|
| Power cable (for ≤80 flange Servo motor) | DB4-4PO-** | ** |  |
| Power cable (for 110, 130 flange Servo motor) | HK4A-4PO-** | ** |  |
| Power cable (for 180 flange Servo motor) | HK4B-4PO-** | ** |  |
| Power cable (for >180 flange Servo motor) | ZL4-4PO-** | ** |  |

Accessories

Power Cable

(Servo motor power line form L- Plug power line (for 800W of Servo motors), Maximum length : 30m)

[220V Servo Motor Power cable for ≤ 180 Frame]

| Base speed(RPM) | Power(kW) | FM Servo motors | Power cable (** : Cable length(m)) | |
|-----------------|-----------|-----------------|---------------------------------------|-----------------|
| 3,000 | 0.2 | FMSA-201*32ED | DB4-4PO-**-0.75 | |
| | 0.4 | FMSA-401*32ED | | |
| | 0.75 | FMSA-751*33ED | | |
| | | 1 | FMSA-102*33ED | DB4-4PO-**-1.5 |
| | | 1.2 | FMSA-122*35ED | HK4A-4PO-**-1.5 |
| | | 1.5 | FMSA-152*37ED | |
| | | 1.8 | FMSA-182*35ED | |
| | | 2.3 | FMSA-232*37ED | HK4A-4PO-**-2.5 |
| | | 3 | FMSA-302*37ED | HK4A-4PO-**-4.0 |
| 2,000 | 0.8 | FMMA-801*35ED | HK4A-4PO-**-1.0 | |
| | 0.85 | FMMA-851*37ED | HK4A-4PO-**-1.5 | |
| | | 1 | FMMA-102*37ED | HK4A-4PO-**-1.0 |
| | | 1.2 | FMMA-122*35ED | |
| | | 1.3 | FMMA-132*37ED | HK4A-4PO-**-1.5 |
| | | 1.5 | FMMA-152*37ED | |
| | | 2 | FMMA-202*37ED | HK4A-4PO-**-2.5 |
| | | 3.1 | FMMA-312*37ED | HK4A-4PO-**-4.0 |
| | | 3.5 | FMMA-352*3AED | |
| 1,500 | 1.2 | FMMB-122*37ED | HK4A-4PO-**-1.5 | |
| | 1.5 | FMMB-152*37ED | | |
| | | 2.3 | FMMB-232*37ED | HK4A-4PO-**-2.5 |
| | | 2.7 | FMMB-272*3AED | HK4B-4PO-**-2.5 |
| | | 3 | FMMB-302*3AED | |
| | | 4.3 | FMMB-432*3AED | HK4B-4PO-**-4.0 |
| 1,000 | 1 | FMLA-102*37ED | HK4A-4PO-**-1.0 | |
| | 1.5 | FMLA-152*37ED | HK4A-4PO-**-1.5 | |
| | 2.9 | FMLA-292*3AED | HK4B-4PO-**-2.5 | |
| | 3.7 | FMLA-372*3AED | HK4B-4PO-**-4.0 | |

Note)

- HK4A cable is suitable for flange below 180 with aviation plug.
- HK4B is suitable for 180 flange with aviation plug.
- The unit of length is m.

[380V Servo Motor Power cable for ≤ 180 Frame]

| Base speed(RPM) | Power(kW) | FM Servo motors | Power cable (**: Cable length(m)) |
|-----------------|-----------|-----------------|-----------------------------------|
| 3,000 | 0.75 | FMSA-751*63ED | DB4-4PO-**-0.75 |
| | 1 | FMSA-102*63ED | |
| | 1.2 | FMSA-122*65ED | HK4A-4PO-**-0.75 |
| | 1.5 | FMSA-152*67ED | HK4A-4PO-**-1.0 |
| | 1.8 | FMSA-182*65ED | HK4A-4PO-**-1.5 |
| | 2.3 | FMSA-232*67ED | |
| | 3 | FMSA-302*67ED | |
| 2,000 | 0.8 | FMMA-801*65ED | HK4A-4PO-**-0.75 |
| | 0.85 | FMMA-851*67ED | |
| | 1 | FMMA-102*67ED | |
| | 1.2 | FMMA-122*65ED | |
| | 1.3 | FMMA-132*67ED | HK4A-4PO-**-1.0 |
| | 1.5 | FMMA-152*67ED | |
| | 2 | FMMA-202*67ED | HK4A-4PO-**-1.5 |
| | 3.1 | FMMA-312*67ED | HK4A-4PO-**-2.5 |
| | 3.5 | FMMA-352*6AED | HK4B-4PO-**-2.5 |
| | 4.5 | FMMA-452*6AED | |
| | 6 | FMMA-602*6AED | HK4B-4PO-**-4.0 |
| | 8 | FMMA-802*6AED | HK4B-4PO-**-6.0 |
| | 10 | FMMA-103*6AED | |
| 1,500 | 1.2 | FMMB-122*67ED | HK4A-4PO-**-0.75 |
| | 1.5 | FMMB-152*67ED | |
| | 2.3 | FMMB-232*67ED | HK4A-4PO-**-1.0 |
| | 3 | FMMB-302*67ED | HK4A-4PO-**-1.5 |
| | 2.7 | FMMB-272*6AED | HK4A-4PO-**-1.5 |
| | 3 | FMMB-302*6AED | HK4A-4PO-**-1.5 |
| | 4.3 | FMMB-432*6AED | HK4A-4PO-**-2.5 |
| | 5.5 | FMMB-552*6AED | |
| | 7.5 | FMMB-752*6AED | HK4B-4PO-**-4.0 |
| 1,000 | 1 | FMLA-102*67ED | HK4A-4PO-**-0.75 |
| | 2.9 | FMLA-292*6AED | HK4A-4PO-**-1.5 |
| | 3.7 | FMLA-372*6AED | HK4B-4PO-**-2.5 |

Note)

- HK4A cable is suitable for flange below 180 with aviation plug.
- HK4B is suitable for 180 flange with aviation plug.
- The unit of length is m.

Accessories

Power Cable

(Servo motor power line form L- Plug power line (for 800W of Servo motors), Maximum length : 30m)

[380V Servo Motor Power cable for >180Frame]

| Base Speed (RPM) | Power (kW) | FMLA-372*6AED | Power Cable (* * : Cable length(m)) |
|------------------|------------------|------------------|--|
| 1,500 | 8.2 | FM15-0082*6EEDFL | ZL4-4PO-**-6.0 |
| | 10 | FM15-0100*6EEDFL | |
| | 12 | FM15-0124*6EEDFL | |
| | 16 | FM15-0160*6EEDFL | |
| | 18 | FM15-0180*6EEDFL | ZL4-4PO-**-10.0 |
| | 21 | FM15-0210*6EEDFL | ZL4-4PO-**-16.0 |
| | 24 | FM15-0240*6EEDFL | |
| | 29 | FM15-0290*6EEDFL | |
| 35 | FM15-0350*6EEDFL | | |
| 1,700 | 7.5 | FM17-0075*6EEDFL | ZL4-4PO-**-4.0 |
| | 9.2 | FM17-0092*6EEDFL | ZL4-4PO-**-6.0 |
| | 11 | FM17-0110*6EEDFL | |
| | 14 | FM17-0140*6EEDFL | ZL4-4PO-**-10.0 |
| | 18 | FM17-0180*6EEDFL | |
| | 21 | FM17-0210*6EEDFL | ZL4-4PO-**-16.0 |
| | 24 | FM17-0240*6EEDFL | |
| | 27 | FM17-0270*6EEDFL | |
| 33 | FM17-0330*6EEDFL | | |
| 2,000 | 7 | FM20-0070*6EEDFL | ZL4-4PO-**-4.0 |
| | 10 | FM20-0100*6EEDFL | ZL4-4PO-**-6.0 |
| | 14 | FM20-0140*6EEDFL | ZL4-4PO-**-10.0 |
| | 18 | FM20-0180*6EEDFL | |
| | 22 | FM20-0220*6EEDFL | ZL4-4PO-**-16.0 |
| | 25 | FM20-0250*6EEDFL | |
| | 28 | FM20-0280*6EEDFL | |
| | 30 | FM20-0300*6EEDFL | |
| 36 | FM20-0360*6EEDFL | ZL4-4PO-**-25.0 | |

Note) The unit of length is m.

Braking Resistor

- Built-in braking resistor and min resistor value of external braking resistor for 220V servo.

| Drive Frame | Built-in resistor value and power | Min. resistor value of external braking resistor | Spec. of external braking resistor |
|-------------|-----------------------------------|--|------------------------------------|
| M1 | - | 40Ω | 60Ω/200 W |
| M2 | 50W/50Ω | 25Ω | 40Ω/400 W |
| M3 | 100W/20Ω | 15Ω | 15Ω/1000 W |

- Built-in braking resistor and min resistor value of external braking resistor for 380V servo.

| Drive Frame | Built-in resistor value and power | Min. resistor value of external braking resistor | Spec. of external braking resistor |
|-------------|-----------------------------------|--|------------------------------------|
| M2 | 50W/50Ω | 50Ω | 50Ω/1000W |
| M3 | 100W/60Ω | 50Ω | 50Ω/1000W |
| MM4/M4 | — | 40Ω | 40Ω/1000W |
| M5 | — | 40Ω | 40Ω/1000W |
| M6 | — | 30Ω | 30Ω/2200W |



Parker's Motion & Control Technologies

At Parker, we're guided by a relentless drive to help our customers become more productive and achieve higher levels of profitability by engineering the best systems for their requirements. It means looking at customer applications from many angles to find new ways to create value. Whatever the motion and control technology need, Parker has the experience, breadth of product and global reach to consistently deliver. No company knows more about motion and control technology than Parker. For further info call 00800 27 27 5374



Aerospace **Key Markets**

Aftermarket services
Commercial transports
Engines
General & business aviation
Helicopters
Launch vehicles
Military aircraft
Missiles
Power generation
Regional transports
Unmanned aerial vehicles

Key Products

Control systems & actuation products
Engine systems & components
Fluid conveyance systems & components
Fluid metering, delivery & atomization devices
Fuel systems & components
Fuel tank inerting systems
Hydraulic systems & components
Thermal management
Wheels & brakes



Climate Control **Key Markets**

Agriculture
Air conditioning
Construction Machinery
Food & beverage
Industrial machinery
Life sciences
Oil & gas
Precision cooling
Process
Refrigeration
Transportation

Key Products

Accumulators
Advanced actuators
CO₂ controls
Electronic controllers
Filter driers
Hand shut-off valves
Heat exchangers
Hose & fittings
Pressure regulating valves
Refrigerant distributors
Safety relief valves
Smart pumps
Solenoid valves
Thermostatic expansion valves



Electromechanical **Key Markets**

Aerospace
Factory automation
Life science & medical
Machine tools
Packaging machinery
Paper machinery
Plastics machinery & converting
Primary metals
Semiconductor & electronics
Textile
Wire & cable

Key Products

AC/DC drives & systems
Electric actuators, gantry robots & slides
Electrohydraulic actuation systems
Electromechanical actuation systems
Human machine interface
Linear motors
Stepper motors, servo motors, drives & controls
Structural extrusions



Filtration **Key Markets**

Aerospace
Food & beverage
Industrial plant & equipment
Life sciences
Marine
Mobile equipment
Oil & gas
Power generation & renewable energy
Process
Transportation
Water Purification

Key Products

Analytical gas generators
Compressed air filters & dryers
Engine air, coolant, fuel & oil filtration systems
Fluid condition monitoring systems
Hydraulic & lubrication filters
Hydrogen, nitrogen & zero air generators
Instrumentation filters
Membrane & fiber filters
Microfiltration
Sterile air filtration
Water desalination & purification filters & systems



Fluid & Gas Handling

Key Markets

Aerial lift
Agriculture
Bulk chemical handling
Construction machinery
Food & beverage
Fuel & gas delivery
Industrial machinery
Life sciences
Marine
Mining
Mobile
Oil & gas
Renewable energy
Transportation

Key Products

Check valves
Connectors for low pressure fluid conveyance
Deep sea umbilicals
Diagnostic equipment
Hose couplings
Industrial hose
Mooring systems & power cables
PTFE hose & tubing
Quick couplings
Rubber & thermoplastic hose
Tube fittings & adapters
Tubing & plastic fittings



Hydraulics

Key Markets

Aerial lift
Agriculture
Alternative energy
Construction machinery
Forestry
Industrial machinery
Machine tools
Marine
Material handling
Mining
Oil & gas
Power generation
Refuse vehicles
Renewable energy
Truck hydraulics
Turf equipment

Key Products

Accumulators
Cartridge valves
Electrohydraulic actuators
Human machine interfaces
Hybrid drives
Hydraulic cylinders
Hydraulic motors & pumps
Hydraulic systems
Hydraulic valves & controls
Hydrostatic steering
Integrated hydraulic circuits
Power take-offs
Power units
Rotary actuators
Sensors



Pneumatics

Key Markets

Aerospace
Conveyor & material handling
Factory automation
Life science & medical
Machine tools
Packaging machinery
Transportation & automotive

Key Products

Air preparation
Brass fittings & valves
Manifolds
Pneumatic accessories
Pneumatic actuators & grippers
Pneumatic valves & controls
Quick disconnects
Rotary actuators
Rubber & thermoplastic hose & couplings
Structural extrusions
Thermoplastic tubing & fittings
Vacuum generators, cups & sensors



Process Control

Key Markets

Alternative fuels
Biopharmaceuticals
Chemical & refining
Food & beverage
Marine & shipbuilding
Medical & dental
Microelectronics
Nuclear Power
Offshore oil exploration
Oil & gas
Pharmaceuticals
Power generation
Pulp & paper
Steel
Water/wastewater

Key Products

Analytical Instruments
Analytical sample conditioning products & systems
Chemical injection fittings & valves
Fluoropolymer chemical delivery fittings, valves & pumps
High purity gas delivery fittings, valves, regulators & digital flow controllers
Industrial mass flow meters/ controllers
Permanent no-weld tube fittings
Precision industrial regulators & flow controllers
Process control double block & bleeds
Process control fittings, valves, regulators & manifold valves



Sealing & Shielding

Key Markets

Aerospace
Chemical processing
Consumer
Fluid power
General industrial
Information technology
Life sciences
Microelectronics
Military
Oil & gas
Power generation
Renewable energy
Telecommunications
Transportation

Key Products

Dynamic seals
Elastomeric o-rings
Electro-medical instrument design & assembly
EMI shielding
Extruded & precision-cut, fabricated elastomeric seals
High temperature metal seals
Homogeneous & inserted elastomeric shapes
Medical device fabrication & assembly
Metal & plastic retained composite seals
Shielded optical windows
Silicone tubing & extrusions
Thermal management
Vibration dampening

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