

Single Phase Micro-Verter 0.2-2.2kW Jaguar CUB CM

IMO

- 5 year guarantee
- 3 preset speeds
- PID control
- Maintenance information
- IMO loader PC software



Standard specification

Single-Phase 200V Series

| Type | CUB CM *** | 40 | 75 | 150 | |
|-----------------------|------------------------------------|--|---|-------------|--------------|
| Nominal applied motor | kW | 0.4 | 0.75 | 1.5 | |
| Output ratings | Rated capacity *1) | kVA | 0.95 | 1.5 | 2.6 |
| | Rated voltage *2) | V | 3-phase, 200V/50Hz; 200, 220, 230V/60Hz | | |
| | Rated current *3) | A | 2.5 | 4.0 | 7.0 |
| | Overload capability | | 150% or rated current for 1 minute | | |
| | Output frequency | Hz | 0.1 – 120 | | |
| Input ratings | Phases, Voltage, Frequency | 1-phase, 200 to 240V, 50/60Hz | | | |
| | Voltage/frequency variations | • Voltage: +10 to -10% • Frequency: +5 to -5% | | | |
| | Momentary voltage dip capability | When the input voltage is 165V or more, the inverter can be operated continuously When the input voltage drops below 165V from rated voltage, the inverter can be operated for 15ms (less than 85% load of nominal applied motors) | | | |
| | Rated current *4) | (with DCR) (without DCR) | 3.5 6.4 | 6.5 11.4 | 11.8 19.8 |
| | Required power supply capacity *5) | kVA | 0.7 | 1.3 | 2.4 |
| Braking | Torque (standard) *6) 150% | 150% | 100% | 50% | |
| | DC injection braking | • Starting frequency: 3.0Hz (Fixed) • Braking time: 0.0 to 30.0s • Braking level: 0 to 100% of rated current | | | |
| Enclosure (IEC 60529) | | IP 20 | | | |
| Cooling method | | Natural cooling | | Fan cooling | |
| Standards | | <ul style="list-style-type: none"> • UL/cUL, Low Voltage Directive, EMC Directive • IEC 61800-2 (Rating, specifications for low voltage adjustable frequency a.c. power drive systems) • IEC 61800-3 (EMC product standard including specific test methods) | | | |
| Mass | kg | 0.7 | 0.9 | 1.6 | |

*1) Inverter output capacity (kVA) at 220V. *2) Output voltage is proportional to the power supply voltage and cannot exceed the power supply voltage. *3) Current derating may be required in case of low impedance loads such as high frequency motor. *4) This value is calculated using IMO calculation method. (Refer to Technical Information). *5) When a power-factor correcting DC REACTOR is used. *6) With a nominal applied motor, this value is average torque when the motor decelerates and stops from 60Hz. (It may change according to motor loss).

Common specification

| | Item | Explanation | |
|--------------------|--|--|----------------------------|
| Output frequency | Setting | Maximum frequency | 50 to 120Hz (in 1Hz steps) |
| | | Base frequency | 50 to 120Hz (in 1Hz steps) |
| | | Starting frequency | 1 to 6Hz (in 1Hz steps) |
| | | Carrier frequency | 0.75 to 15kHz |
| | Accuracy (Stability) | <ul style="list-style-type: none"> • Analog setting : $\pm 1.0\%$ of maximum frequency (at $25 \pm 10^\circ\text{C}$) • Digital setting : $\pm 0.01\%$ of maximum frequency (at -10 to $+50^\circ\text{C}$) | |
| Setting resolution | <ul style="list-style-type: none"> • Analog setting : 1/256 of maximum frequency ex.) 0.25Hz at 60Hz, 0.5Hz at 120Hz • Digital setting : 0.01Hz at maximum frequency of up to 99.9Hz (1Hz at maximum frequency of 100Hz and above) | | |

Single Phase Micro-Verter 0.2-2.2kW Jaguar CUB CM continued



Common specification continued

| | Item | Explanation | |
|---|--|--|---|
| Control | Control method | • Sinusoidal PWM control | |
| | Voltage/freq. (V/f) characteristic | Maximum output voltage proportional to line input voltage (without AVR control) | |
| | Torque boost | Manual: Code selection (0 to 31), including the save energy pattern for variable torque load | |
| | Starting torque | 150% (at 6Hz) (Torque boost code (F09) is 20 and above.) | |
| | Operation method | • KEYPAD operation : | key, key |
| | | • Digital input signal operation : | FWD or REV command |
| • LINK operation : | | RS485 (Option) | |
| Frequency setting | • KEYPAD operation : | or key | |
| | • Built-in potentiometer: | Potentiometer is standard equipment | |
| | • Analog input: | 0 to +10VDC (0 to +5VDC) v to 20mADC | |
| | • Multistep frequency: | 4 different frequencies can be selected by terminal (SS1) and (SS2). | |
| | • LINK operation: | RS485 (Option) | |
| Running status signal | Relay output: | Alarm output for any fault. (1SPDT) | |
| | Analog output: | Output frequency, output current, PID feedback value, DC link circuit voltage | |
| | Acceleration time | 0.0 to 60s (0.0 = 0.01s) | |
| | Deceleration time | 0.1 to 60s | |
| | Frequency limiter | High and low limiter can be preset. | |
| | Bias frequency | Bias frequency can be preset (-120 to 120Hz) | |
| | Gain for frequency setting | 100% (For 0 to +10VDC) or 200% (For 0 to +5VDC) | |
| | Jump frequency control | Jump frequency (3 points) and its common jump hysteresis width (0 to 30Hz) can be preset | |
| | Auto-restart after momentary power failure | Automatic restart is available after a momentary power failure (retry method) | |
| | PID control | This function can control flow rate pressure, etc. (with an analog feedback signal.) | |
| | | • Reference signal (F01): | <ul style="list-style-type: none"> • KEYPAD operation (key or key) • Voltage input (Terminal 12) • Current input (Terminal C1) • Analog input (Built-in Potentiometer) |
| | • Feedback signal (H21) | <ul style="list-style-type: none"> • Terminal 12 (0 to +10V DC or 1 to 5V DC) • Terminal C1 (4 to 20mA DC) | |
| Indication | Operation mode (running or stopping) | • Output frequency, output current, PID reference value, PID feedback value • Setting frequency | |
| | Program mode | Function code, data code | |
| | Trip mode | Displays trip fault code as follows | |
| | | • OC1 (Overcurrent during acceleration) | |
| | | • OC2 (Overcurrent during deceleration) | |
| • OC3 (Overcurrent running at constant speed) | | | |
| • OU1 (Overvoltage during acceleration) | | | |
| • OU2 (Overvoltage during deceleration) | | | |
| • OU3 (Overcurrent running at constant speed) | | | |
| • LU (Low voltage) | | | |
| • OH1 (Overheating at heatsink) | | | |
| • OH2 (External thermal relay tripped) | | | |
| • OL (Motor overload) | | | |
| • OLU (Inverter unit overload) | | | |
| • Er1 (Memory error) | | | |
| • Er3 (CPU error) | | | |
| • Er8 (RS485 error) | | | |
| Operation and Trip mode | Trip history (passed/4 times) | | |
| Charge lamp (Red) | When the DC link circuit voltage is higher than 50V, the charge lamp is ON | | |
| Protection | Overload | Protects the inverter by electronic thermal overload relay and detection of inverter temperature | |
| | Overvoltage detection | Detects DC link circuit voltage (400V), and stops the inverter | |
| | Undervoltage | Detects DC link circuit undervoltage (200V) and stops the inverter | |
| | Overheating | Protects the inverter by detection of inverter temperature | |
| | Short-circuit | Short-circuit protection for inverter output circuit | |
| | Ground fault | Ground fault protection for inverter output circuit (detection at starting) | |
| | Motor overload (running or stopping) | • Protects the motor after the inverter trips • Electronic thermal overload relay can be selected for standard motor or IMO inverter motor | |
| | Stall prevention | • Controls the output frequency to prevent \overline{OC} (overcurrent) trip when the output current exceeds the limit value during acceleration • Lowers the output frequency to hold almost constant torque when the output current exceeds the limit value during operation at constant speed • Controls the output frequency to prevent \overline{OU} (overvoltage) trip when the DC link circuit voltage exceeds the limit value during deceleration | |
| | Auto reset | When the inverter is tripped, it resets automatically and restart. 5-times auto reset can be selected | |
| | Condition (Installation and operation) | Installation location | Free from a dusty location, corrosive gases, oil mist and direct sunlight. Indoor use only |
| Altitude | | 1000m or less. (Applicable to 3000m with power derating: -10%/1000m) | |
| Ambient temperature | | -10° to +50°C | |
| Ambient humidity | | 5 to 95% RH (non-condensing) | |
| Vibration | | 3mm at 2 to 9Hz, 1m/s ² at 9 to 200Hz | |
| Storage conditions | • Temperature: -25° to +65°C • Humidity: 5 to 95% RH | | |

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Terminal designation continued

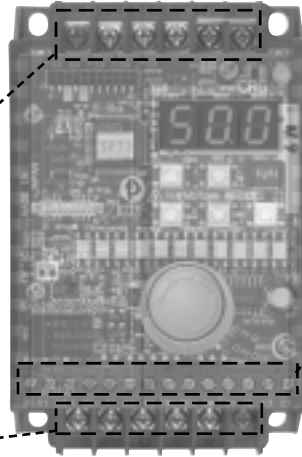
Terminal arrangement

● Main circuit terminals

Input 1-phase



Output 3-phase



● Control circuit terminals

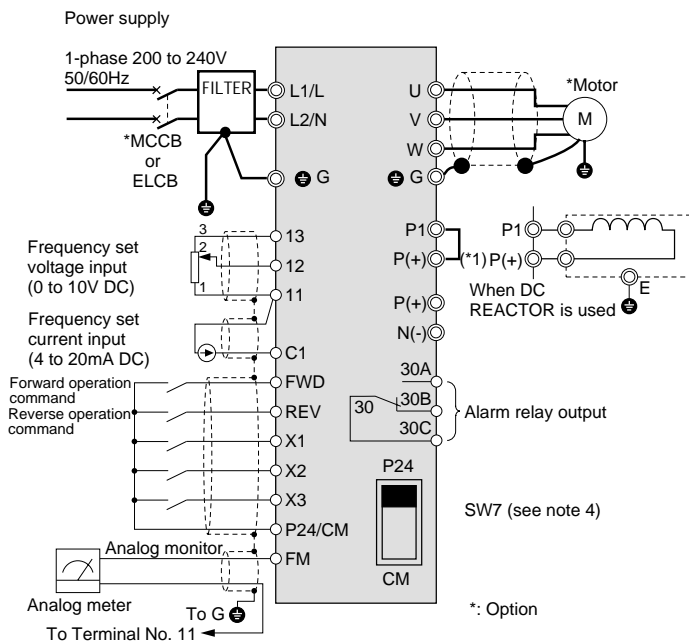


Basic electrical connections

External operation

The following diagram is for reference only.

For detailed wiring diagrams, refer to the relevant instruction manual.



Notes:

- 1) This wiring diagram shows the connection for stopping the inverter or setting frequency through external signals.
When "1" is set at F01, you can set a frequency by using input signal from 0 to 10V DC. When "2" is set at F01, you can set a frequency by using an input signal between 4 and 20mA.
In this case, set "1" at F02.
 - 2) If there is a magnetic contactor or a solenoid close to the inverter, mount a surge killer to the coil in a parallel connection. Keep the wiring length to a minimum.
 - 3) To wire the control circuit, use shielded or twisted wires. When using shielded wires, connect the shields to G.
 - 4) Control logic is selectable as sink/source by position of switch SW7 on pcb ie. SW7 = UP, inputs are referenced to onboard power supply P24 (24 VDC). SW7 = DOWN, inputs require external power supply and are referenced to zero volts at inverter CM terminal.
- *1 When connecting the optional DC reactor, remove the jumper wire from between P1 and P(+).

Warning – Inverter must be earthed.

Input wiring must be protected against short/earth faults.

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Protective functions


| Function | Description | | Digital monitor | Operation |
|-----------------------------------|---|---------------------------------|-----------------|---|
| Overcurrent protection | <ul style="list-style-type: none"> The inverter stops when a short circuit or an overcurrent due to an overload occurs on inverter output side The inverter stops when a ground fault on the output side is detected at startup | During acceleration | OC1 | <ul style="list-style-type: none"> Inverter output stops The motor coasts to a stop An alarm signal (1SPDT) is output The alarm remains until RESET command is issued*1 |
| | | During deceleration | OC2 | |
| | | While running at constant speed | OC3 | |
| Undervoltage protection | <ul style="list-style-type: none"> When the DC link circuit voltage drops below the undervoltage level, the inverter stops | | LU | <ul style="list-style-type: none"> Inverter output stops An alarm signal is output at power recovery*2 The alarm remains until RESET command is issued*1,*2 |
| Overvoltage protection | <ul style="list-style-type: none"> When the DC link circuit voltage reaches the overvoltage level, the inverter stops | During acceleration | OU1 | <ul style="list-style-type: none"> Inverter output stops The motor coasts to a stop An alarm signal (1SPDT) is output An alarm remains until RESET command is issued*1,*2 |
| | | During deceleration | OU2 | |
| | | While running at constant speed | OU3 | |
| Heat sink over-heating protection | <ul style="list-style-type: none"> When an abnormal temperature rise is detected in the heat sink, the inverter stops | | OH1 | |
| Electronic thermal overload relay | <ul style="list-style-type: none"> The inverter stops when internal electronic thermal overload detects an overload in: <ul style="list-style-type: none"> the motor (4-pole standard or 4-pole forced air cooled inverter motor) the inverter power module | | OL OLU | |
| External alarm input | <ul style="list-style-type: none"> The inverter stops on receiving external alarm signal | | OH2 | |
| Memory error | <ul style="list-style-type: none"> The inverter stops in the event of a memory error | | Er1 | |
| CPU error | <ul style="list-style-type: none"> The inverter stops in the event of a CPU error | | Er3 | |
| RS485 communication error | <ul style="list-style-type: none"> The inverter stops in the event of a RS485 communication error | | Er8 | |

NOTES:

*1 If the inverter output is held off while an internal alarm signal is being output, the alarm signal cannot be retained.

*2 No alarm signal is output when automatic restart function has been selected.

Notes:

1) To issue RESET command, press the  key on the keypad panel or connect terminals RST and P24 to clear the trip condition after removing the cause of trip

2) Fault history data is stored for the past four trips. Select  and press  key to review the data.

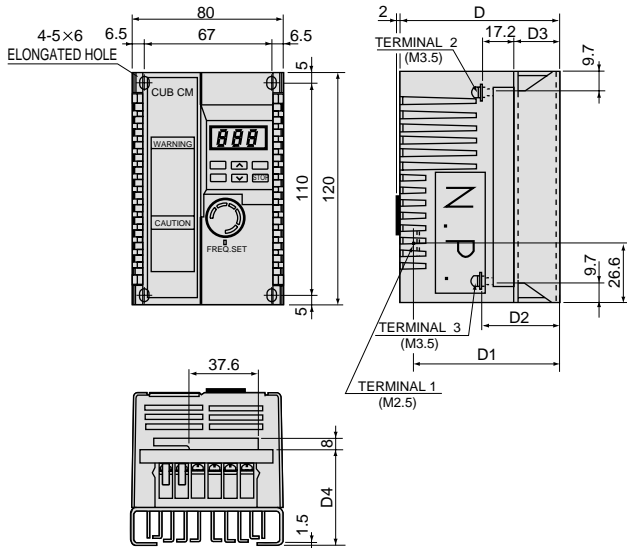
Single Phase Micro-Verter 0.2-2.2kW Jaguar CUB CM continued



External dimensions

Fig. 1

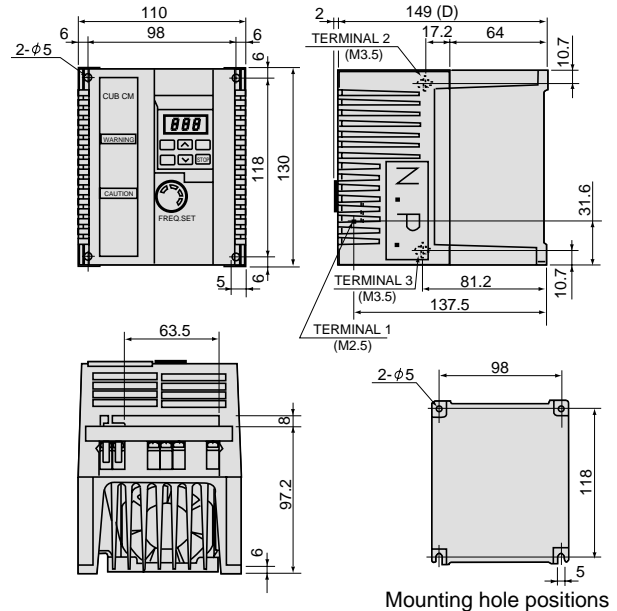
**CUB CM20
CUB CM40
CUB CM75**



| Type | Rated current (A) | External dimensions (mm) | | | | |
|----------|-------------------|--------------------------|----------------|----------------|----------------|----------------|
| | | D | D ₁ | D ₂ | D ₃ | D ₄ |
| CUB CM20 | 1.4 | 85 | 73.5 | 32.2 | 15 | 48.2 |
| CUB CM40 | 2.5 | 115 | 103.5 | 42.2 | 25 | 58.2 |
| CUB CM75 | 4.0 | 140 | 128.5 | 67.2 | 50 | 83.2 |

Fig. 2

CUB CM150



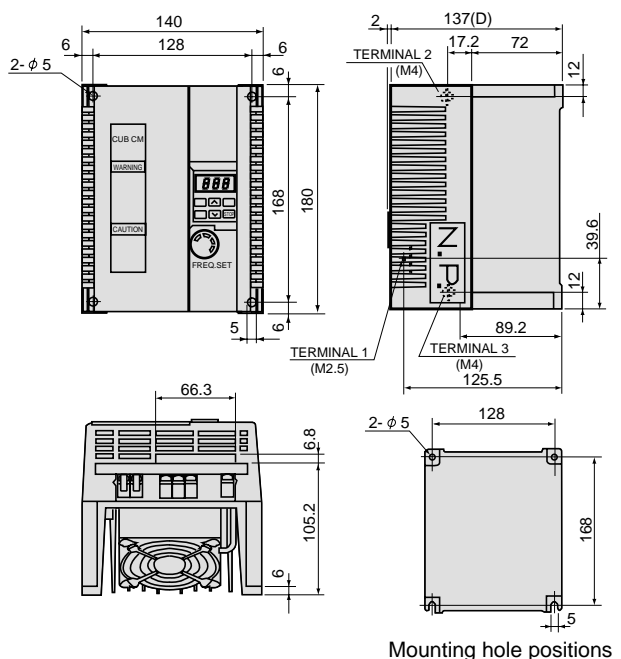
Mounting hole positions

RS Option dimension chart (Add 10 mm to 'D')

| Inverter + option | External dimensions (mm) | |
|----------------------------|--------------------------|-----|
| | | D |
| CUB CM20 + CUB CM COMMS A | | 95 |
| CUB CM40 + CUB CM COMMS A | | 125 |
| CUB CM75 + CUB CM COMMS A | | 150 |
| CUB CM150 + CUB CM COMMS B | | 159 |
| CUB CM220 + CUB CM COMMS C | | 147 |

Fig. 3

CUB CM220



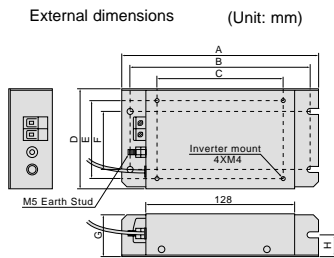
Mounting hole positions

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Accessory dimensions

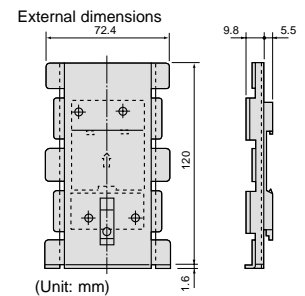
EMC filter



| Inverter Type | Filter Required | Rated Current (A) | Dimensions (mm) | | | | | | | |
|----------------|-----------------|-------------------|-----------------|-------|-----|-----|-----|-----|----|----|
| | | | A | B | C | D | E | F | G | H |
| CUB CM20 | RFI20CM | 4 | 180 | 155.5 | 110 | 86 | 67 | 60 | 38 | 19 |
| CUB CM40, CM75 | RFI75CM | 12 | 190 | 165 | 118 | 117 | 98 | 89 | 46 | 23 |
| CUB CM150 | RFI150CM | 20 | 240 | 216 | 168 | 148 | 128 | 118 | 46 | 23 |
| CUB CM220 | RFI220CM | 29 | | | | | | | | |

*Maybe subject to change, please consult IMO if required

Rail mounting base



Personal computer interface card

An optional card must be mounted on this control board.

Three types of option card: OPC-C11S-RSA, OPC-C11S-RSB, and OPC-C11S-RSC, are available depending on the applicable inverter.

The following operations are possible from personal computers, PLCs and similar host controllers through RS485 communication.

- Frequency setting, forward rotation, backward rotation, stop, free-run, alarm cancel, and other running operations
- Monitoring output frequency, output amperage, operating conditions, alarm content, etc.
- Setting function codes

Up to 31 inverters can be connected to one line and controlled by one host controller.

Easy host controller program development for transmission frames fixed at 16 bytes of character data.

Refer to the dimensions in RS Option dimension chart on page 00.

Serial transmission protocol

| Items | Specifications |
|-------------------------|---|
| Physical level | EIA RS-485 standard (Two-phase) |
| No. of linked inverters | 1 host, 31 inverters (station addresses: 1 to 31) |
| Transmission rate | 19200, 9600, 4800, 2400, 1200 BPS |
| Synchronisation | Start-stop system |
| Transmission system | Half duplex |
| Transmission protocol | Polling/selecting, broadcast |
| Character set | ASCII 7 bit |
| Character length | 8 bit, 7 bit selection possible |
| Electrical separation | Maximum 500m |
| Stop bit length | 1 bit, 2 bit selection possible |
| Frame length | Standard frame: 16 byte fixed; compressed frame: 8 or 12 byte |
| Parity | None, even, odd selection possible |
| Error check system | Checksum, parity, framing error |

Wiring equipment

| Power supply voltage | Nominal applied motor (kW) | Inverter type | MCCB or ELCB Rated current (A) | | Magnetic contactor (MC) | | | Recommended wire size (mm ²) | | | | |
|----------------------|----------------------------|---------------|--------------------------------|-----------------|-------------------------|-----------------|----------------|--|-----------------|--------------------------|------------------------|----------------|
| | | | With DCR | Without reactor | Input circuit | | Output circuit | Input circuit (R, S, T) | | Output circuit (U, V, W) | DCR circuit (P1, P(+)) | Control wiring |
| | | | | | With DCR | Without reactor | | With DCR | Without reactor | | | |
| Single phase 200V | 0.2 | CUB CM20 | 6 | 6 | MC14-S-10 | | | 1.5 | 1.5 | 1.5 | 0.75 | |
| | 0.4 | CUB CM40 | | 10 | | | | | | | | |
| | 0.75 | CUB CM75 | 10 | 16 | MC18-S-10 | | | 1.5 | 2.5 | 2.5 | | |
| | 1.5 | CUB CM150 | 16 | 20 | | | | | 2.5 | | | |
| | 2.2 | CUB CM220 | 20 | 32 | MC32-S-00 | | | 2.5 | 2.5 | 2.5 | | |

Notes:

For moulded-case circuit breakers (MCCB) and earth leakage circuit breakers (ELCB), the required frame type and series depend on the facility transformer capacity and other factors. When selecting such breakers, refer to the relevant technical data.

Also select the rated sensitive current of ELCB utilizing the technical data.

The recommended wire sizes are based on the condition that the temperature inside the panel does not exceed 50°C.

The above wires are 600V IV insulated and the wires in () are 600V cross-linked polyethylene.

The power source impedance obtained without the reactor is equivalent to 0.1% when converted into inverter capacity. The current imbalance caused by voltage imbalance is assumed to be 10%.

If ambient temperature or power voltage differs from the above table, requirements will differ.