IMO

JAGUAR VXSM

GENERAL PURPOSE AC DRIVES
SINGLE PHASE 0.4 - 2.2KW
THREE PHASE 0.4 - 7.5KW

5 Year Guarantee

Index

Caution

⚠️ This publication is only to be used as a guide. Please seek the full instruction manual before installation. If in doubt please call IMO on 020 8452 6444 or visit our website on www.imopc.com
(Please refer to inside back cover for further details)

5 Year Guarantee

Powerful, compact inverters supported by cutting-edge technology. Dynamic torque-vector control ensures optimum motor control.

- Even with a compact body size, this series has a high starting torque of 200% at 0.5Hz and motor wow in the low speed range is suppressed to approximately half that of conventional inverters.

- Equipped with intelligent functions such as automatic energy-saving, PID control, auto-tuning, and RS485 communication, and enhanced maintenance/protection functions such as inrush-current suppression and lifetime early warning.

Dynamic torque-vector control

Dynamic torque-vector control system performs high-speed calculation to determine the required motor power for the load status. This exclusive technology ensures optimal control of voltage and current vectors for maximum output torque.

High starting torque of 200% at 0.5Hz

Ideal for heavy industrial loads such as lifts, hoists and mixers. Also available for a second motor by changeover operation.

Torque characteristics
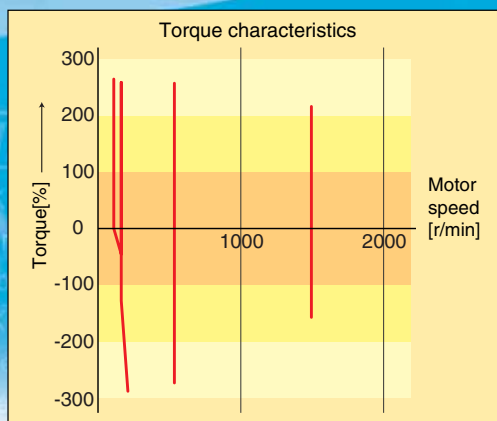
Trip-free operation

The much improved current limiting function (Automatic deceleration, stall prevention) provides continuous stable operation even for an impact load.

The above graph shows an example of torque characteristics when combining the Jaguar VXSM (in torque vector mode) with a standard three-phase, 4 pole, motor. Co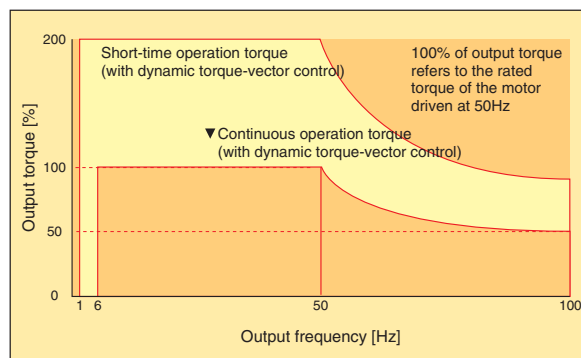ntinuous operation torque is for limits of allowable load torque when using the motor within the allowable temperature range and is not for motor output torque.
The motor output torque is shown by the short-time operation torque.

Reduced motor wow at low speed

VXSM's unique On-Delay compensation method reduces motor wow at low speed to approximately half of that of conventional inverters.
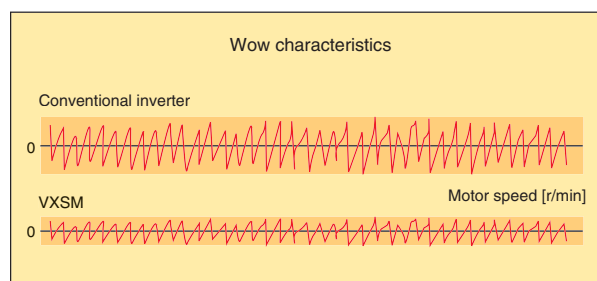
Compact

Miniaturization of minimum level in the class

Compared to the previous VXS series, the volume is reduced to approximately 50%. (single-phase 200V, 0.4kW)

Uniform height dimension

All models up to 4.0kW have a uniform height of 130mm, which makes it easy to design panels

Braking resistor connectable to all models

Due to a built-in braking transistor, an optional braking resistor can be installed to increase the regenerative braking capacity for conveyance and transportation machines that require large braking power.

Consideration for peripheral devices

Built-in inrush-current suppression circuit as standard

The capacity of peripheral devices such as magnetic contractors can be minimized.

Low noise

Reduces interference with devices such as sensors and load cells.

Equipped with terminals for connecting DC REACTOR for harmonics suppression and power factor improvement

Quiet motor when driving with higher carrier frequency settings

Selectable control meter outputs (analog/pulse changeover)

24V power source for transistor output

Advanced functions as standard

Automatic energy-saving function as standard

by forcing the motor losses to minimum, further energy-saving is achieved.
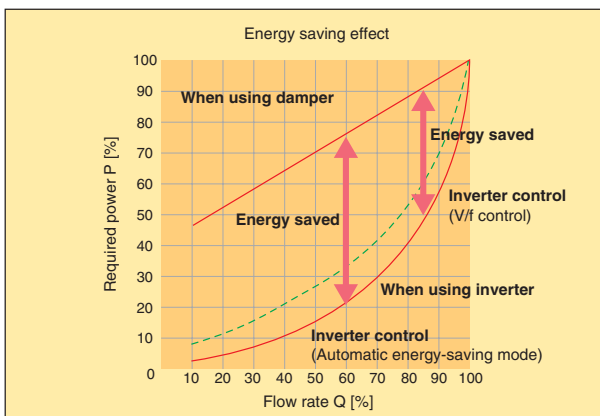
New on-line tuning system

On-line tuning to continuously check for variation of motor characteristics during running for high-precision speed control.

This tuning function also available for a second motor, which allows high-precision driving of the second motor by changeover operation between two motors
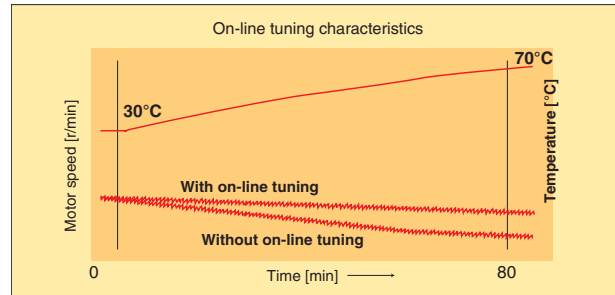
Rotating motor pick-up control

Restarts motor without any shocks, by detecting motor speed where motor is coasting after momentary power failure occurs.
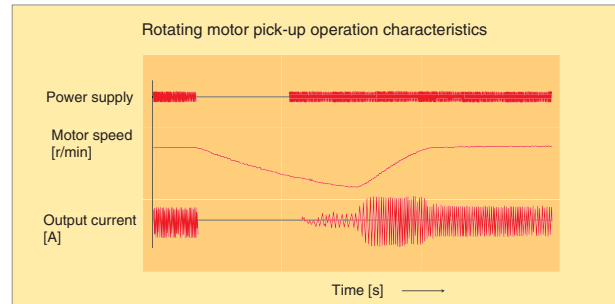
PID control function

Equipped with a PID control function which can control the flow rate of fans and pumps.

Various frequency setting methods

- Keypad operation or analog input
  (4 to 20mAdc, 0 to +5Vdc, 0 to ±10Vdc, normal/inverse)
- Multistep speeds, 16-step setting (0 to 15 steps) and UP/DOWN control etc.

Equipped with RS485 interface as standard

4

Wide variation

Range up to 7.5kW

Extensively arranged three-phase 400V series, facilitating the unification of applying inverters to machines and equipment.

Single-phase 200V series (2.2kW or smaller)

Protective functions, Maintenance

Indication of main circuit capacitor life and accumulated operation time

Automatic control of cooling fans

Overheat early warning of heat sink

Protective function of input/output phase loss

Easy operation and wiring

Simple remote control

Remote control is available by removing keypad panel and using an optional extension cable
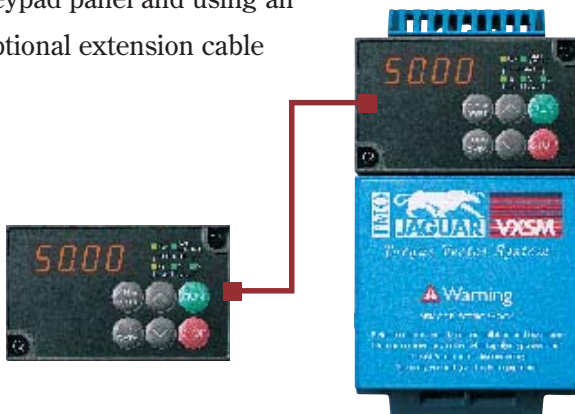
Multiple Function display

Indicates output frequency, output current, output voltage, motor speed, trip history, etc.

Simple wiring

Only requires removing covers of the main circuit and control circuit terminal blocks adopting screw terminal, without detaching the keypad panel.

Multiple drive programming by optional copy unit

The copy unit can download parameter sets into several VXSM / CubCM units quickly and easily.

Global products

Conforms to major world safety standards: UL, cUL, TÜV, CE

Complies with EMC Directive (Emissions) when connected via optional EMC filter (see pages 21/22) and a shielded motor cable is used.

Connection to fieldbus: Profibus-DP, Interbus-S, DeviceNet, Modbus Plus, CAN Open (Option)

EU region	North America/Canada
CE TÜV Rheinland BAUART GEPRÜFT TYPE APPROVED	c UL US LISTED
EU Directive (CE marking) TÜV approval	UL, cUL
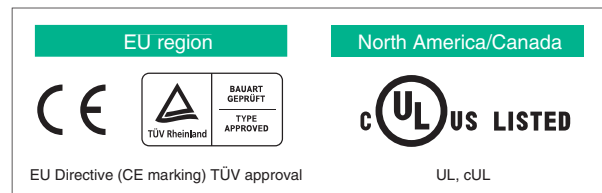
Wide range of inverters: three-phase 400V and single-phase 200V.
Water-proof (IP54) models are also available soon.

Nominal applied motors [kW]	Three-phase 400V series (IP20 model)	Single-phase 200V series (IP20 model)
0.4	VXSM40-3	VXSM40-1
0.75	VXSM75-3	VXSM75-1
1.5	VXSM150-3	VXSM150-1
2.2	VXSM220-3	VXSM220-1
4.0	VXSM400-3	
5.5	VXSM550-3	
7.5	VXSM750-3	

How to read the model number.

Family   **Type**   **Standard Rating***

JAGUAR VXSM400-3

C€ Marked

Standard Ratings
Examples
 40= 0.4kW
 75= 0.75kW
400= 4.0kW
750= 7.5kW

Code	Input power source
-3	Three-phase 400V Series
-1	Single-phase 200V Series

Application
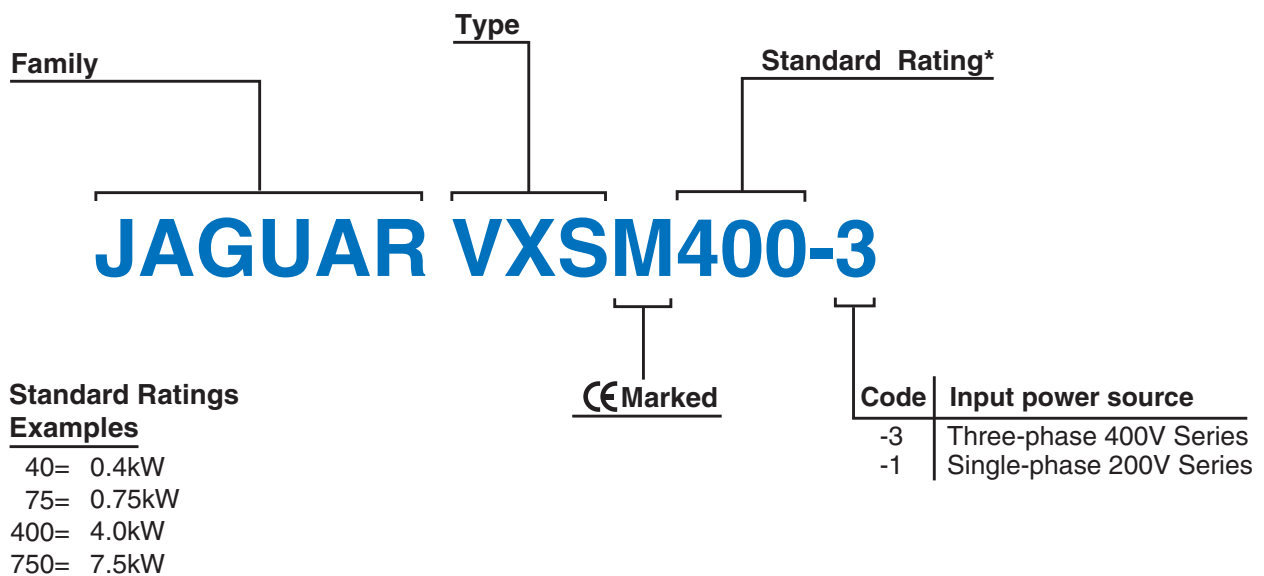
VXSM series. For almost all industrial plant and equipment areas.

Fans

- Air conditioning systems
- Dryers
- Boiler fans
- Fans for controlling furnace temperature
- Roof fans controlled as a group
- Refrigerators
- Built-in blower in a film-manufacturing machine
- Fan for separator
- Cooling-tower fans
- Ventilating fans

Electric pumps

- Tankless water-supply systems
- Submersible pumps
- Vacuum pumps
- Fountain pumps
- Cooling water pumps
- Circulating hot water pumps
- Well pumps
- Pump for agricultural water storage
- Constant-flow pumps
- Sludge pumps

Food processing machines

- Food mixers
- Food slicers
- Grain processing machines
- Tea manufacturing machines
- Rice milling machines

Textile/paper making machinery

- Spinning machines
- Knitting machines
- Textile printing machines
- Industrial sewing machines
- Slitter (Flying Shears)

Conveyance machinery

- Cranes (travelling, traversing, hoisting)
- Automated warehouses
- Conveyors (belt, chain, screw, roller)
- Lifts
- Car parking systems
- Elevator, escalators
- Automatic doors
- Shutters
- Speed changers

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Packaging machinery

- Individual packing / inner packing
- Packing machine
- Outer packing machine (shrink wrapper)
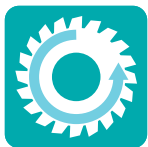
Chemical machinery/wood working machines

- Fluids mixing machines
- Centrifugal separators
- Coating machines
- Take-up rollers
- Router machines
- Sanding machines
- Planing machines

Machine tools

- Boring machines
- Winding machines
- Presses
- Turntables
- Work positioning unit
- PC board drilling machines

Other machinery

- Automated feed / medicine mixing machines
- Commercial-use washing machines
- Offset printing presses
- Bookbinding machines
- Car washing machines
- Shredders
- Dishwashers
- Test equipments
- Shaker applications
- Crushers

Three-phase 400V series

Type	VXSM-3 Series		40	75	150	220	400	550	750
Nominal applied motor		kW	0.4	0.75	1.5	2.2	4.0	5.5	7.5
Output ratings	Rated capacity *1)	kVA	1.1	1.9	2.8	4.1	6.8	9.9	13
	Rated voltage *2)	V	3-phase 380, 400, 415V/50Hz, 380, 400, 440, 460V/60Hz						
	Rated current *3)	A	1.5 (1.4)	2.5 (2.1)	3.7 (3.7)	5.5 (5.3)	9.0 (8.7)	13 (12)	18 (16)
	Overload capability		150% of rated current for 1min. 200% of rated current for 0.5s						
	Rated frequency	Hz	50, 60Hz						
Input ratings	Phases, Voltage, Frequency		3-phase 380 to 480V 50/60Hz						
	Voltage / frequency variations		Voltage: +10 to –15% (Voltage unbalance *4): 2% or less) Frequency: +5 to –5%						
	Momentary voltage dip capability *5)		When the input voltage is 300V or more, the inverter can be operated continuously. When the input voltage drops below 300V from rated voltage, the inverter can be operated for 15ms. The smooth recovery mode is selectable (by Auto-restart function).						
	Rated current *6) (with DCR)		0.82	1.5	2.9	4.2	7.1	10.0	13.5
	A (without DCR)		1.8	3.5	6.2	9.2	14.9	21.5	27.9
	Required power supply capacity *7)	kVA	0.6	1.1	2.1	3.0	5.0	7.0	9.4
Control	Starting torque		200% (with Dynamic torque-vector control selected)						
Braking	Braking torque (Standatd) *8)		70			40		20	
	Braking torque (Using options)		150						
	DC injection braking		Starting frequency: 0.0 to 60.0Hz 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/cUL -Low Voltage Directive -EMC Directive -TÜV -IEC 61800-2 (Ratings, specifications for low voltage adjustable frequency a.c. power drive systems) -IEC 61800-3 (EMC product standard including specific test methods)						
Mass		kg	1.1	1.2	1.3	1.4	1.9	4.5	4.5

Single-phase 200V series

Type	VXSM-1 Series		40	75	150	220		
Nominal applied motor		kW	0.4	0.75	1.5	2.2		
Output ratings	Rated capacity *1)	kVA	1.1	1.9	3.0	4.1		
	Rated voltage *2)	V	3-phase 200V/50Hz 200, 220, 230V/60Hz					
	Rated current *3)	A	3.0 (2.5)	5.0 (4.0)	8.0 (7.0)	11 (10)		
	Overload capability		150% of rated current for 1min. 200% of rated current for 0.5s					
	Rated frequency	Hz	50, 60Hz					
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 *5)		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. The smooth recovery mode is selectable (by Auto-restart function).					
	Rated current *6) (with DCR)		3.5	6.5	11.8	17.7		
	A (without DCR)		6.4	11.4	19.8	28.5		
	Required power supply capacity *7)	kVA	0.7	1.3	2.4	3.6		
Control	Starting torque		200% (with Dynamic torque-vector control selected)					
Braking	Braking torque (Standard) *8)		70			40		
	Braking torque (Using options)		150					
	DC injection braking		Starting frequency: 0.0 to 60.0Hz 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/cUL -Low Voltage Directive -EMC Directive -TÜV -IEC 61800-2 (Ratings, 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	1.2	1.8	1.9		

NOTES:
*1) Inverter output capacity (kVA) at 440V in 400V series, 220V in 200V series.   *2) Output voltage cannot exceed the power supply voltage.   *3) Current derating may be required in case of low impedance loads such as high frequency motor. Use the inverter at the current ( ) or below where carrier frequency setting is higher than 4kHz (F26: 4 to 15) or the amb. temp. is 40°C or higher.   *4) Refer to the IEC 61800-3 (5.2.3).   *5) Tested at standard load condition (85% load).   *6) This value is under original calculation method. (Refer to the Technical Information.)   *7) When optional power-factor correcting DC REACTOR (DCR) is used.   *8) With a nominal applied motor, this value is average torque when the motor decelerates and stops from 60 Hz. (It may change according to motor loss.)

Conformity to Low Voltage Directive
The VXSM Series conforms to the Low Voltage Directive with EN50178

Conformity to EMC Directive
• Emission requirement
• Footprint filters in compliance with EN61800-3 are provided for all models (optional)
• Immunity requirement
  The VXSM Series inverters meet EN61800-3 as standard.

Item			Explanation
Output frequency	Setting	Maximum frequency	50 to 400Hz *1)
		Base frequency	25 to 400Hz
		Starting frequency	0.1 to 60.0Hz, Holding time: 0.0 to 10.0s
		Carrier frequency *2)	0.75 to 15kHz
	Accuracy (Stability)		• Analog setting : ±0.2% of Maximum frequency (at 25±10°C) • Digital setting : ±0.01% of Maximum frequency (at –10 to +50°C)
	Setting resolution		• Analog setting : 1/3000 of Maximum frequency ex.) 0.02Hz at 60Hz, 0.04Hz at 120Hz, 0.15Hz at 400Hz • Digital setting : 0.01Hz at Maximum frequency of up to 99.99Hz (0.1Hz at Maximum frequency of 100.0Hz and above) • LINK setting : • 1/20000 of Maximum frequency ex.) 0.003Hz at 60Hz, 0.006Hz at 120Hz, 0.02Hz at 400Hz • 0.01Hz (Fixed)
Control	Control method		• V/f control (Sinusoidal PWM control) • Dynamic torque-vector control (Sinusoidal PWM control)
	Voltage / freq. (V/f) characteristic		Adjustable at base and maximum frequency, with AVR control : 160 to 480V (400V series), 80 to 240V (200V series)
	Torque boost		Selectable by load characteristics: Constant torque load (Auto/manual), Variable torque load (Manual)
	Operation method		• KEYPAD operation : [run] key, [stop] key • Digital input signal operation : FWD or REV command, Coast-to-stop command, etc. • LINK operation : RS485 (Standard) Profibus-DP, Interbus-S, DeviceNet, Modbus Plus, CAN Open (Option)
	Frequency setting (Frequency command)		• KEYPAD operation: [∧] or [∨] key • External potentiometer (*) : 1 to 5kΩ • Analog input : 0 to +10V DC (0 to +5V DC), 4 to 20mA DC (Reversible) 0 to ±10V DC (0 to ±5V DC) ....Reversible operation by polarized signal can be selected. (Inverse) +10 to 0V DC, 20 to 4mA DC......Inverse mode operation can be selected. • UP/DOWN control : Output frequency increases when UP signal is ON, and decreases when DOWN signal is ON. • Multistep frequency : Up to 16 different frequencies can be selected by digital input signal. • LINK operation : RS485 (Standard) Profibus-DP, Interbus-S, DeviceNet, Modbus Plus, CAN Open (Option)
	Running status signal		Transistor output (2 points) : RUN, FAR, FDT, OL, LU, TL, etc. Relay output (1 point) : Alarm output (for any fault) Analog (or pulse) output (1 point) : Output frequency, Output current, Output torque, etc.
	Acceleration / Deceleration time		0.01 to 3600s : • Independently adjustable acceleration and deceleration • 2 different times are selectable. Mode select : Linear, S-curve (weak), S-curve (strong), Non-linear
	Frequency limiter		High and Low limiters can be preset.
	Bias frequency		Bias frequency can be preset.
	Gain for frequency setting		Gain for frequency setting can be preset. (0.0 to 200.0%) ex.) Analog input 0 to +5V DC with 200% gain results in maximum frequency at 5V DC.
	Jump frequency control		Jump frequency (3 points) and its common jump hysteresis width (0 to 30Hz) can be preset.
	Rotating motor pick up (Flying start)		A rotating motor (including inverse rotating mode) can be smoothly picked up without stopping the motor (speed search method).
	Auto-restart after momentary power failure		Automatic restart is available without stopping motor after a momentary power failure (speed search method). When "Smooth recovery" mode is selected, the motor speed drop is held minimum. (The inverter searches the motor speed, and smoothly returns to setting frequency. Even if the motor circuit is temporarily opened, the inverter operates without a hitch.)
	Slip compensation		The inverter output frequency is controlled according to the load torque to keep motor speed constant. When the value is set at "0.00" and "Torque-vector" is set at "active", the compensation value automatically selects a standard motor. Slip compensation can be preset for the second motor.
	Droop operation		The motor speed droops in proportion to output torque (–9.9 to 0.0Hz).
	Torque limiter		• When the motor torque reaches a preset limiting level, this function automatically adjusts the output frequency to prevent the inverter from tripping due to an overcurrent. • Torque limiter 1 and 2 can be individually set, and are selectable with a digital input signal.
	PID control		This function can control flowrate, pressure, etc. (with an analog feedback signal.) • Reference signal — • KEYPAD operation ([∧] or [∨] key) : 0.0 to 100.0% • Voltage input (Terminal 12) : 0 to +10V DC • Current input (Terminal C1) : 4 to 20mA DC • Multistep frequency setting : Setting freq. / Max. freq. X 100 (%) • RS485 : Setting freq. / Max. freq. X 100 (%) • Feedback signal — • Terminal 12 (0 to +10V DC or +10 to 0V DC) • Terminal C1 (4 to 20mA DC or 20 to 4mA DC)
	Automatic deceleration		Torque limiter 1 (Braking) is set at "F41: 0" (Same as Torque limiter 2 (Braking)). • In deceleration: The deceleration time is automatically extended up to 3 times the setting time for tripless operation even if braking resistor not used. • In constant speed operation: Based on regenerative energy, the frequency is increased and tripless operation is active.
	Second motor's setting		This function is used for two motors switching operation. • The second motor's V/f characteristics (base and maximum frequency) can be preset. • The second motor's circuit parameter can be preset. Torque-vector control can be applied to both motors.
	Energy saving operation		This function minimizes inverter and motor losses at light load.
	Fan stop operation		This function is used for silent operation or extending the fan's lifetime.

NOTES: (*) Option
    *1) For application at 120Hz or above, please contact IMO Precision Controls LTD.
    *2) Inverter may automatically reduce carrier frequency, in accordance with ambient temperature or output current for protecting inverter.

| Item		Explanation	
Indication (LED monitor)	**Operation mode (Running)**	• Output frequency (Hz) • Setting frequency (Hz) • Output current (A) • Output voltage (V) • Motor synchronous speed (r/min)	• Line speed (m/min) • PID reference value • PID reference value (remote) • PID feedback value
	Stopping	Selected setting value or output value	
	Trip mode	Displays the cause of trip by codes as follows. • OC1 (Overcurrent during acceleration) • OC2 (Overcurrent during deceleration) • OC3 (Overcurrent during running at constant speed) • Lin (Input phase loss) • OU1 (Overvoltage during acceleration) • OU2 (Overvoltage during deceleration) • OU3 (Overvoltage during running at constant speed) • LU (Undervoltage) • OH1 (Overheating at heat sink) • OH2 (External thermal relay tripped)	• dBH (Overheating at DB circuit) • OL1 (Motor 1 overload) • OL2 (Motor 2 overload) • OLU (Inverter unit overload) • Er1 (Memory error) • Er2 (KEYPAD panel communication error) • Er3 (CPU error) • Er4 (Option error) • Er5 (Option error) • Er7 (Output phase loss error, impedance unbalance) • Er8 (RS485 error)
	Running or trip mode	• Trip history: Cause of trip by code (Even when main power supply is off, trip history data of the last 4 trips are retained.)	
	Charge lamp	When the DC link circuit voltage is higher than 50V, the charge lamp is ON.	
Protection	**Overload**	Protects the inverter by electronic thermal and detection of inverter temperature.	
	Overvoltage	Detects DC link circuit overvoltage,and stops the inverter. (400V series: 800V DC, 200V series: 400V DC)	
	Incoming surge	Protects the inverter against surge voltage between the main circuit power line and the ground.	
	Undervoltage	Detects DC link circuit undervoltage,and stops the inverter. (400V series: 400V DC, 200V series: 200V DC)	
	Input phase loss	Phase loss protection for power line input.	
	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 (Detecting at start)	
	Motor overload	• The inverter trips, and then protects the motor. • Electronic thermal overload relay can be selected for standard motor or inverter motor • Thermal time constant (0.5 to 10.0 minutes) can be preset for a special motor. • The second motor's electronic thermal overload relay can be preset for 2-motor changeover operation.	
	DB resistor overheating	• Prevents DB resistor overheating by internal electronic thermal overload relay. (The inverter stops electricity discharge operation to protect the DB resistor.)	
	Stall prevention	• Controls the output frequency to prevent 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 OU (overvoltage) trip when the DC link circuit voltage exceeds the limit value during deceleration.	
	Output phase loss	When the inverter executes tuning, detects each phase impedance unbalance.	
	Motor protection by PTC thermistor	When the motor temperature exceeds allowable value, the inverter trips automatically.	
	Auto reset	When the inverter is tripped, it resets automatically and restarts.	
Condition (Installation and operation)	**Installation location**	Free from corrosive gases, flammable gases, oil mist, dusts, 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 from 2 to less than 9Hz, 9.8m/s² at from 9 to less than 20Hz 2m/s² at from 20 to less than 55Hz, 1m/s² at from 55 to less than 200Hz	
Storage condition		• Temperature : −25 to +65 °C • Humidity : 5 to 95%RH (non-condensing)	

Keypad panel Operation

The following diagram is for reference only. For detailed wiring diagrams, refer to the relevant instruction manual

Operation using the factory settings
Connect the inverter to the power supply and motor. Then, turn on the power to enable variable speed operation.
[Operation method]
1. Run/Stop . . . . Press 🔘RUN or 🔘STOP key on the keypad panel.
2. setting frequency . . . Press 🔼 or 🔽 key on the keypad panel.
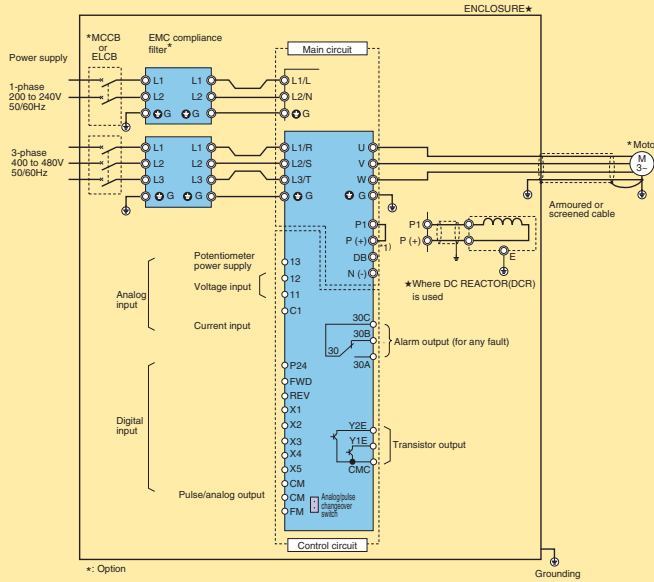
NOTES:
*1) When connecting an optional DC Reactor, remove the jumper short bar that connects the terminals [P1] and [P+].
*2) Keep the control circuit wires at least 100mm away from the main circuit wires and put them in separate ducts to prevent noise and resultant malfunctions. When control wiring crosses the main wiring, ensure that they cross each other at right angles.
*3) For the wiring of the control circuit , use shielded or twisted wires with the shortest possible length. (When using shielded wires, connect one end of the shields to the inverter ground terminal and leave the other end free.)
*4) If there is a magnetic contactor or a solenoid close to the inverter, connect a surge suppresser to the coil in parallel connection. Keep the wiring length to a minimum.
*5) Ensure motor cable is shielded, and both ends are securely earthed using short wire links with minimum c.s.a the same as the motor / supply cable, or use appropriate brass terminating gland.

External signal input Operation

The following diagram is for reference only. For detailed wiring diagrams, refer to the relevant instruction manual

Run/Stop operation and frequency setting through external signals
When "1" is set at F01 , you can set a frequency by using an input signal for 0 to 10V DV.
When "2" is set at F02 , you can set frequency by using an input signal for 4 to 20mA DC.
In both cases set "1" at F02 .
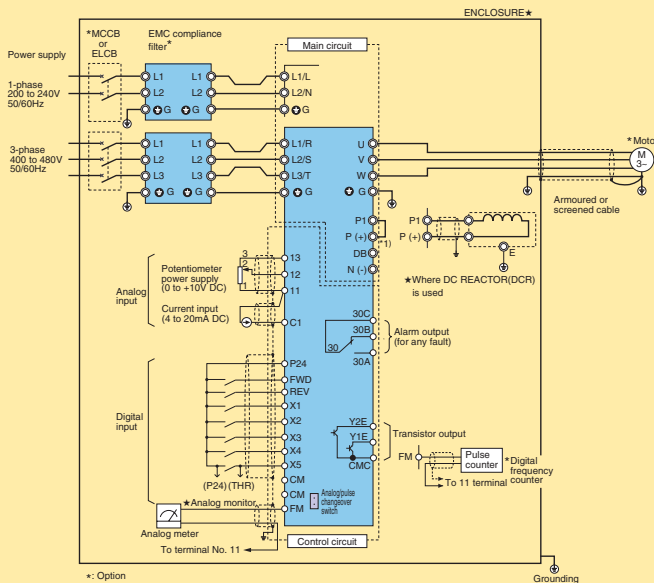
NOTES:
*1) When connecting an optional DC REACTOR, remove the jumper short bar that connects the terminals [P1] and [P+].
*2) If there is a magnetic contactor or a solenoid close to the inverter, connect a surge suppresser to the coil in parallel connection. Keep the wiring length to a minimum.
*3) For the wiring of the control circuit, use shielded or twisted wires with the shortest possible length. When using shielded wires, connect the shields to the inverter ground terminal.
*4) Ensure motor cable is shielded, and both ends are securely earthed using short wire links with minimum c.s.a the same as the motor / supply cable, or use appropriate brass terminating gland.
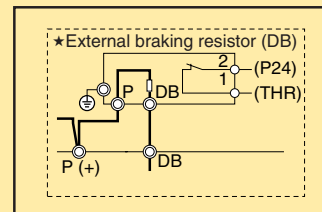
Terminal Functions

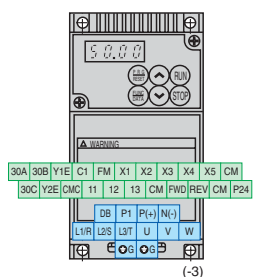|	Symbol	Terminal name	Function	Remarks	Func. code
Main circuit	L1/R, L2/S, L3/T	Power input	Connect a 3-phase power supply.		
	L1/L, L2/N	Power input	Connect a 1-phase power supply.		
	U, V, W	Inverter output	Connect a 3-phase induction motor.		
	P1, P(+)	For DC REACTOR	Connect the DC REACTOR for power-factor correcting or harmonic current reducing.	DC REACTOR: Option	
	P(+), N(-)	For DC link circuit	Used for DC bus connection system.		
	P(+), DB	For EXTERNAL BRAKING RESISTOR	Connect the EXTERNAL BRAKING RESISTOR (Option)		
	⏚ G	Grounding	Ground terminal for inverter chassis (housing).		
Analog input	13	Potentiometer power supply	+10V DC power supply for frequency setting POT (POT: 1 to 5kΩ)	• Allowable maximum output current : 10mA	
	12	Voltage input	• 0 to +10V DC/0 to 100% (0 to +5V DC/0 to 100%) • Reversible operation can be selected by function setting. 0 to ±10V DC /0 to ±100% (0 to ±5V DC/0 to ±100%)	• Input impedance: 22k • Allowable maximum input voltage: ±15V DC • If input voltage is 10 to 15V DC, the inverter estimates it to10V DC.	F01, C30
		(PID control)	Used for PID control reference signal or feedback signal.		F01, H21
	C1	Current input	• 4 to 20mA DC/0 to 100%	• Input impedance: 250Ω	F01
		(PID control)	Used for PID control reference signal or feedback signal.		F01, H21
		(PTC-thermistor input)	The PTC-thermistor (for motor protection) can be connected to terminal C1 - 11.		H26, H27
	11	Common	Common for analog signal	Isolated from terminal CME and CM.	
Digital input	FWD	Forward operation command	FWD: ON ..... The motor runs in the forward direction. FWD: OFF ..... The motor decelerates and stops.	When FWD and REV are simultaneously ON, the motor decelerates and stops.	F02
	REV	Reverse operation command	REV: ON ..... The motor runs in the reverse direction. REV: OFF ..... The motor decelerates and stops.	• The digital inputs can directly connent to source type output (PNP transistor output) circuit.	
	X1	Digital input 1	These terminals can be preset as follows.	• ON state maximum input voltage: 2V (maximum sink current : 6mA) • OFF state maximum terminal voltage: 22 to 27V (allowable maximum leakage current: 0.5mA) • The digital inputs can directly connent to source type output (PNP transistor output) circuit.	E01 to E05
	X2	Digital input 2			
	X3	Digital input 3			
	X4	Digital input 4			
	X5	Digital input 5			
	(SS1) (SS2) (SS4) (SS8)	Multistep freq. selection	(SS1) : 2 (0, 1) different frequencies are selectable. (SS1,SS2) : 4 (0 to 3) different frequencies are selectable. (SS1,SS2,SS4) : 8 (0 to 7) different frequencies are selectable. (SS1,SS2,SS4,SS8) : 16 (0 to 15) different frequencies are selectable.	Frequency 0 is set by F01 (or C30). (All signals of SS1 to SS8 are OFF)	C05 to C19
	(RT1)	ACC / DEC time selection	(RT1) : 2 (0, 1) different ACC / DEC times are selectable.	Time 0 is set by F07/F08.	F07, F08 E10, E11
	(HLD)	3-wire operation stop command	Used for 3-wire operation. (HLD): ON ..... The inverter self-holds FWD or REV signal. (HLD): OFF ..... The inverter releases self-holding.		
	(BX)	Coast-to-stop command	(BX): ON ..... Motor will coast-to-stop. (No alarm signal will be output.)	• The motor restarts from 0Hz by turning off BX with the operation command (FWD or REV) ON. • Assigned to terminal X4 at factory setting.	H11
	(RST)	Alarm reset	(RST): ON ..... Faults are reset. (This signal should be held for more than 0.1s.)	• During normal operating, this signal is ignored. • Assigned to X5 at factory setting.	
	(THR)	Trip command (External fault)	(THR): OFF ..... "OH2 trip" occurs and motor will coast-to-stop.	This alarm signal is held internally.	
	(Hz2/Hz1)	Freq. set 2 / Freq. set 1	(Hz2/Hz1): ON ..... Freq. set 2 is effective.	If this signal is changed while the inverter is running, the signal is effective only after the inverter stops.	F01 / C30
	(M2/M1)	Motor 2 / Motor 1	(M2/M1): ON ..... The motor circuit parameter and V/f characteristics are changed to the second motor's ones.	If this signal is changed while the inverter is running, the signal is effective only after the inverter stops.	P01 to P10 / A10 to A19
	(DCBRK)	DC brake command	(DCBRK): ON ..... The DC injection brake is effective. (In the inverter deceleration mode)	If the operation command(FWD/REV) is input while DC braking is effective, the operation command (FWD/REV) has priority.	F20 to F22
	(TL2/TL1)	Torque limiter 2 / Torque limiter 1	(TL2/TL1): ON ..... Torque limiter 2 is effective.		F40, F41 / E16, E17
	(UP)	UP command	(UP): ON ..... The output frequency increases.	When UP and DOWN commands are simultaneously ON, DOWN signal is effective.	F01, C30
	(DOWN)	DOWN command	(DOWN): ON ..... The output frequency decreases. • The output frequency change rate is determined by ACC / DEC time. • Restarting frequency can be selected from 0Hz or setting value at the time of stop.		
	(WE-KP)	Write enable for KEYPAD	(WE-KP): ON ..... The data is changed by KEYPAD.		
	(Hz/PID)	PID control cancel	(Hz/PID): ON ..... The PID control is canceled, and frequency setting by KEYPAD (or)is effective.		H20 to H25
	(IVS)	Inverse mode changeover	(IVS): ON ..... Inverse mode is effective in analog signal input.	If this signal is changed while the inverter is running, the signal is effective only after the inverter stops.	F01, C30
	(LE)	Link enable (RS485, Bus)	(LE): ON ..... The link opereation is effective. Used to switch operation between ordinary operation and link operation to communication.	RS485: Standard, Bus: Option	H30
	CM	Common	Common for digital signal	Isolated from CME and 11.	

Terminal Function

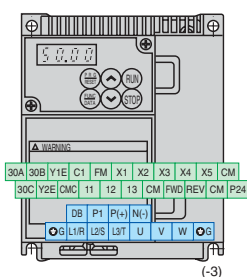|	Symbol	Terminal name	Function	Remarks	Func. code
Analog output	FM	Analog monitor	Output voltage (0 to 10V DC) is proportional to selected function's value as follows. The proportional coefficient and bias value can be preset. • Output frequency 1 (Before slip compensation)　(0 to max. frequency) • Output frequency 2 (After slip compensation)　(0 to max. frequency) • Output current　(0 to 200%) • Output voltage　(0 to 200%) • Output torque　(0 to 200%) • Load factor　(0 to 200%) • Input power　(0 to 200%) • PID feedback value　(0 to 100%) • DC link circuit voltage　(0 to 1000V)	Allowable maximum output current: 2mA	F29 F30, F31
	(11)	(Common)			
Pulse output	FM	Pulse rate monitor	• Pulse rate mode : Pulse rate is proportional to selected function's value*　(50% duty pulse) • Average voltage mode : Average voltage is proportional to selected function's value*　(2670p/s pulse width control) * Kinds of function to be output is same as those of analog output (FM).	Allowable maximum output current : 2mA	F29 F33 to F35
	(11)	(Common)			
Transistor output	P24	DC voltage supply	Power supply for transistor output load. (+24V DC, 50mA max.)	Link P24 to CMC and connect loads such as relays between Y1E, Y2E and CM.	
	Y1E	Transistor output 1	Output the selected signals from the following items.	• ON state maximum output voltage : 2V (Allowable maximum source current : 50mA) • OFF state maximum leakage current : 0.1mA (Allowable maximum voltage : 27V)	E20, E21
	Y2E	Transistor output 2			
	(RUN)	Inverter running	Outputs ON signal when the output frequency is higher than starting frequency.		
	(FAR)	Frequency equivalence signal	Outputs ON signal when the difference between output frequency and setting frequency is smaller than FAR hysteresis width.		E30
	(FDT)	Frequency level detection	Outputs ON signal by comparison of output frequency and preset value (level and hysteresis).		E31, E32
	(LU)	Undervoltage detection signal	Outputs ON signal when the inverter stops by undervoltage while the operation command is ON.		
	(B/D)	Torque polarity	Outputs ON signal in braking or stopping mode, and OFF signal in driving mode.		
	(TL)	Torque limiting	Outputs ON signal when the inverter is in torque-limiting mode.		
	(IPF)	Auto-restarting	Outputs ON signal during auto restart operation (Instantaneous power failure) mode. (including "restart time")		
	(OL)	Overload early warning	• Outputs ON signal when the electronic thermal value is higher than preset alarm level. • Outputs ON signal when the output current value is higher than preset alarm level.		E33 to E35
	CMC	Common (transistor output)	Common for transistor output signal.	Isolated from terminals CM and 11.	
Relay output	30A, 30B 30C	Alarm relay output	Outputs a contact signal when a protective function is activated. Changeable exciting mode active or non-exciting mode active by function "F36".	• Contact rating : 　250V AC, 0.3A, cosø=0.3 　48V DC, 0.5A, non-inductive (for LVD) 　42V DC, 0.5A, non-inductive (for UL/cUL)	F36
LINK		RS485 I/O terminal	Connect the RS485 link signal.		

Terminal Arrangement
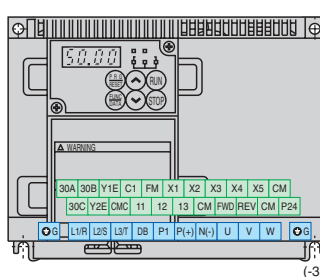

VXSM40-1

VXSM40 to 220-3
VXSM75-1

VXSM400-3
VXS150 and 220-1
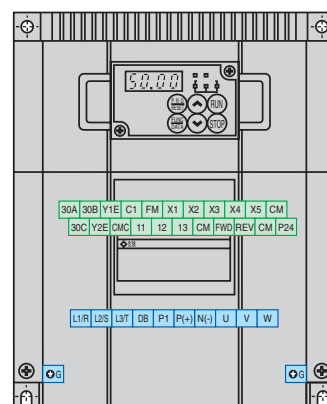
VXSM550 and 750-3

Keypad Panel 1

LED monitor

In Operation mode:
Displays the setting frequency, output current, voltage, motor speed, or line speed.
In Trip mode:
Displays code indicating the cause of trip.

Operation mode indication

□ RUN :
This LED goes on during operating.
□ PANEL CONTROL :
When Function code $F\ 02$ is set at 0, 2, or 3 (Keypad operation), this LED goes on.

Unit indication

Displays the unit of the value shown on the LED monitor.

Program/Reset key

Switches between operation mode and program mode.
When tripped:
Releases the trip-stop state and changes to operation mode.

Run key

Starts the inverter.
In Stop mode:
Invalid when the function code $F\ 02$ is set at 1 (external operation).

Function/Data select key

Changes the displayed values of LED monitor, selects and stores the function codes and data codes.

Stop key

Stops the inverter.
In Operation mode:
Invalid when the function code $F\ 02$ is set at 1 (external operation).

Up/Down keys

In Operation mode:
Increases or decreases the frequency or motor speed.
In Program mode:
Increases or decreases function code number and data set value.

Keypad panel operation

1. Turn on the power supply, press ⌃ or ⌄ key to set the output frequency. When you press the RUN key the motor will run at the set frequency and with function code/date at factory shipment. When you press the STOP key, the motor will decelerate and stops.
2. Procedure for selecting and changing function codes and data codes. The keypad operation how to select a function code and change its data code is explained below.
①. Press the PRG/RESET key to select the program mode
②. Pressing FUNC/DATA key alternates the displayed data between the function and its data.
  ($F\ 00$ ▸ 0 ▸ $F\ 01$ ▸ 0 ▸ .....)
③. With data display, press the ⌃ or ⌄ key to change the data code.
④. Press the FUNC/DATA key to update the data for the selected function code.
  *In step ② above, if the ⌃ or ⌄ key is pressed when the function code is displayed, only the function code changes sequentially (see below).
  ($F\ 00$ ▸ $F\ 01$ ▸ $F\ 02$ ▸ $F\ 03$ ▸ .....)

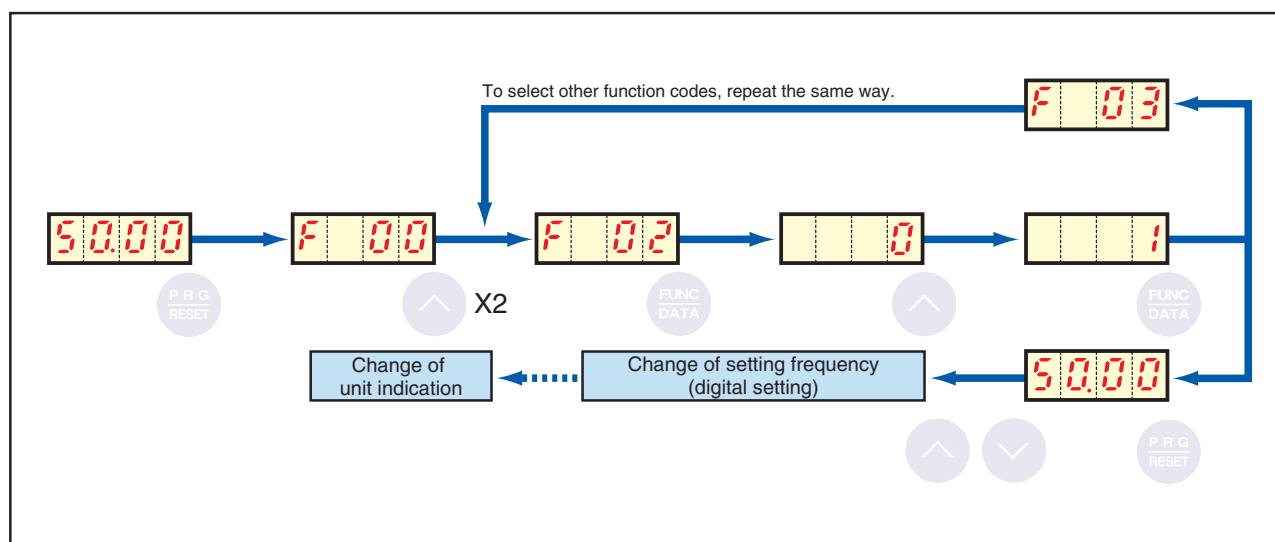## The keypad panel modes are classified in the following 5 modes

Mode / Monitor, keys		Program mode (operation stopped)	Program mode (during stopped)	Stop mode	Operation mode	Trip mode
Monitor		Display the function code or data code. (Blinking)	Display the function code or data code. (Lighting)	Display the set frequency, output current, output voltage, motor speed, line speed. (Blinking)	Display the set frequency, output current, output voltage, motor speed, line speed. (Lighting)	Display the trip content or alarm history. (Blinking or lighting)
		Indicates the PRG mode during stopping.	Indicates the PRG mode during operation.	Unit indication of the above value.	Unit indicates of the above value.	None
	PRG MODE □Hz □A □V r/min m/min	PRG MODE ■Hz ■A ■V Lighting r/min m/min	PRG MODE ■Hz ■A ■V Lighting r/min m/min	Freq.. / Current / Voltage / Motor speed / Line speed (PRG MODE unit LEDs)	Freq.. / Current / Voltage / Motor speed / Line speed (PRG MODE unit LEDs)	Not lit
	PANEL CONTROL	Indicates whether keypad panel operation or external signal operation. (On during keypad panel operation)				None (Lighting)
	Run	Indicates the operation has stopped. (□ RUN not lit)	Indicates during operation. (■ RUN lighting)	Indicates the operation has stopped. (□ RUN not lit)	Indicates during operation. (■ RUN lighting)	Indicates "stopping in trip mode". (■ RUN lighting)
Keys	PRG RESET	Switches to the stop mode.	Changes to operation mode.	Switches to "Program mode (operation stopped)".	Switches to "Program mode during operation".	Releases the trip and switches to "stop mode" or "operation mode"
	FUNC DATA	Changes the display between function code and data code, stores data code, and then updates function codes		Shifts the value on the LED monitor and the unit of the unit indication LED.		Invalid
	∧ ∨	Increases/decreases function code number and data code.	Increases/decreases the data code number and stores data temporary.	Increases/decreases the setting of frequency, motor speed, line speed.		Displays the alarm history
	RUN	Invalid	Invalid	Switches to operation mode	Invalid	Invalid
	STOP	Invalid	Switches to "stop mode" or "Program mode (operation stopped)".	Invalid	Switches to the stop mode.	Invalid

* Procedure for selecting function codes and data codes (Ex. Changing data code from `0` to `1` of function code `F 02`)

To select other function codes, repeat the same way.

`F 03`

`50.00` → `F 00` → `F 02` → `0` → `1`

PRG RESET → ∧ X2 → FUNC DATA → ∧ → FUNC DATA

Change of unit indication ◄····· Change of setting frequency (digital setting) ◄ `50.00`

∧ ∨ PRG RESET

The functions in the yellow boxes can be set while the inverter is running. Other functions must be set while the inverter is stopped.

Fundamental Functions

Function Code	Name	Setting range	Min. unit	Factory setting
Basic Functions				
F00	Data protection	0 : Data change enable 1 : Data protection	-	0
F01	Frequency command 1	0 : KEYPAD operation (○ or ○ key) 1 : Voltage input (terminal 12) (0 to +10V DC, 0 to +5V DC) 2 : Current input (terminal C1) (4 to 20mA DC) 3 : Voltage and current input (terminals 12 and C1) 4 : Reversible operation with polarity (terminal 12)(0 to ±10V DC) 5 : Inverse mode operation (terminal 12) (+10 to 0V DC) 6 : Inverse mode operation (terminal C1) (20 to 4mA DC) 7 : UP/DOWN control 1 (initial freq. = 0Hz) 8 : UP/DOWN control 2 (initial freq. = last value)	-	0
F02	Operation method	0 : KEYPAD operation (forward/reverse : by signal input) 1 : FWD or REV command signal operation 2 : KEYPAD operation (FWD) 3 : KEYPAD operation (REV)	-	2
F03	Maximum frequency 1	50 to 400Hz	1Hz	50
F04	Base frequency 1	25 to 400Hz	1Hz	50
F05	Rated voltage 1 (at Base frequency 1)	0(Free), 160 to 480V (400V class) 0(Free), 80 to 240V (200V class)	1V	400 230
F06	Maximum voltage 1 (at Maximum frequency 1)	160 to 480V (400V class) 80 to 240V (200V class)	1V	400 230
F07	Acceleration time 1	0.01 to 3600s	0.01s	6.00
F08	Deceleration time 1	0.01 to 3600s	0.01s	6.00
F09	Torque boost 1	0 : Automatic (for constant torque load) 1 : Manual (for variable torque load) 2 : Manual (for proportional torque load) 3 to 31 : Manual (for constant torque load)	1	0
F10	Electronic thermal overload relay for motor 1 (Select)	0 : Inactive 1 : Active (for 4-pole standard motor) 2 : Active (for 4-pole inverter motor)	-	1
F11	(Level)	Approx. 20 to 135% of rated current	0.01A	*1)
F12	(Thermal time constant)	0.5 to 10.0 min	0.1min	5.0
F13	Electronic thermal overload relay (for braking resistor)	0 : Inactive 1 : Active (for external braking resistor 2 : Active (for external braking resistor : Single phase only)	-	0
F14	Restart mode after momentary power failure	0 : Inactive (Trip and alarm when power failure occurs.) 1 : Inactive (Trip, and alarm when power recovers.) 2 : Inactive (Deceleration stop, and alarm.) 3 : Active (Momentarily stops and restarts at output frequency of before power failure) 4 : Active (Momentarily stops and restarts at starting frequency)	-	0
F15	Frequency (High)	0 to 400Hz	1Hz	70
F16	limiter (Low)	0 to 400Hz	1Hz	0
F17	Gain (for frequency setting signal)	0.0 to 200.0%	0.1%	100.0
F18	Bias frequency	−400 to +400Hz	1Hz	0
F20	DC brake (Starting freq.)	0.0 to 60.0Hz	0.1Hz	0.0
F21	(Braking level)	0 to 100%	1%	0
F22	(Braking time)	0.0 (DC brake inactive), 0.1 to 30.0s	0.1s	0.0
F23	Starting frequency (Freq.)	0.1 to 60.0Hz	0.1Hz	0.5
F24	(Holding time)	0.0 to 10.0s	0.1s	0.0
F25	Stop frequency	0.1 to 6.0Hz	0.1Hz	0.2
F26	Motor sound (Carrier freq.)	0.75 to 15kHz	1kHz	15
F27	(Sound tone)	0 : Level 0 2 : Level 2 1 : Level 1 3 : Level 3	-	0
F29	FMA, FMP (Select)	0 : Analog output (FMA) 1 : Pulse output (FMP)	-	0
F30	FM (Voltage adjust)	0 to 200%	1%	100
F31	(Function)	0 : Output frequency 1 (Before slip compensation) 1 : Output frequency 2 (After slip compensation) 2 : Output current 3 : Output voltage 4 : Output torque 5 : Load factor 6 : Input power 7 : PID feedback value 8 : DC link circuit voltage	-	0
F33	FM (Pulse rate)	300 to 6000 p/s (at full scale)	1p/s	1440
F34	(Voltage adjust)	0% : (Pluse rate output: 50% duty) 1 to 200% : (Voltage adjust: 2670p/s, duty adjust)	1%	0
F35	(Function)	0 : Output frequency 1 (Before slip compensation) 1 : Output frequency 2 (After slip compensation) 2 : Output current 3 : Output voltage 4 : Output torque 5 : Load factor 6 : Input power 7 : PID feedback value 8 : DC link circuit voltage	-	0
F36	30Ry operation mode	0 : The relay (30) excites on trip mode. 1 : The relay (30) excites on normal mode.	-	0
F40	Torque limiter 1 (Driving)	20 to 200, 999% (999: No limit) *2)	1%	180
F41	(Braking)	20 to 200, 999% (999: No limit) *2)	1%	150
F42	Torque-vector control 1	0 : Inactive 1 : Active	-	0

NOTES:
*1) Typical value of standard 4P motor.
*2) Percent shall be set according to FUNCTION CODE : P02 or A11, Motor capacity.

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Extension Terminal Functions

	Function Code	Name	Setting range						Min. unit	Factory setting
X1-X5 Terminal	E01	X1 terminal function	Selects from the following items.						-	0
	E02	X2 terminal function	0 : ⎫	[SS1]	10	: Motor 2 / Motor 1	[M2/M1]		-	1
	E03	X3 terminal function	1 : ⎪ Multistep freq. selection (16 steps)	[SS2]	11	: DC brake command	[DCBRK]		-	2
	E04	X4 terminal function	2 : ⎬	[SS4]	12	: Torque limiter 2 / Torque limiter 1	[TL2/TL1]		-	6
	E05	X5 terminal function	3 : ⎭	[SS8]	13	: UP command	[UP]		-	7
			4 : ACC / DEC time selection (1 step)	[RT1]	14	: DOWN command	[DOWN]			
			5 : 3-wire operation stop command	[HLD]	15	: Write enable for KEYPAD	[WE-KP]			
			6 : Coast-to-stop command	[BX]	16	: PID control cancel	[Hz/PID]			
			7 : Alarm reset	[RST]	17	: Inverse mode changeover				
			8 : Trip command (External fault)	[THR]		(terminals 12 and C1)	[IVS]			
			9 : Freq. set. 2 / Freq. set. 1	[Hz2/Hz1]	18	: Link enable (Bus,RS485)	[LE]			
ACC 2 DEC 2	E10	Acceleration time 2	0.01 to 3600s						0.01s	10.0
	E11	Deceleration time 2							0.01s	10.0
	E16	Torque limiter 2 (Driving)	20 to 200%, 999% (999: No limit) *2)						1%	180
	E17	(Braking)	0 (Automatic deceleration control), 20 to 200%, 999% (999: No limit) *2)						1%	150
Y1, Y2 Terminal	E20	Y1 terminal function	Selects from the following items.						-	0
	E21	Y2 terminal function	0 : Inverter running	[RUN]	5	: Torque limiting	[TL]		-	7
			1 : Frequency equivalence signal	[FAR]	6	: Auto-restarting	[IPF]			
			2 : Frequency level detection	[FDT]	7	: Overload early warning	[OL]			
			3 : Undervoltage detection signal	[LU]	8	: Lifetime alarm (main circuit capacitor)	[LIFE]			
			4 : Torque polarity detection (Braking/Driving)	[B/D]	9	: 2nd Freq. equivalence detection	[FAR2]			
	E29	Frequency equivalence delay	0.01 to 10.0s						0.01s	0.1
	E30	FAR function signal (Hysteresis)	0.0 to 10.0 Hz						0.1Hz	2.5
	E31	FDT function signal (Level)	0 to 400 Hz						1Hz	50
	E32	(Hysteresis)	0.0 to 30.0 Hz						0.1Hz	1.0
	E33	OL function signal (Mode select)	0 : Thermal calculation 1 : Output current						-	0
	E34	(Level)	Approx. 20 to 200% of rated current						0.01A	*1
	E35	(Timer)	0.0 to 60.0s						0.1s	10.0
LED Monitor	E40	Display coefficient A	0.00 to 200.0						0.01	0.01
	E41	Display coefficient B	0.00 to 200.0						0.01	0.00
	E42	LED Display filter	0.0 to 5.0s						0.1s	0.5

The functions in the yellow boxes can be set while the inverter is running. Other functions must be set while the inverter is stopped.

Control Functions of Frequency

	Function Code	Name	Setting range		Min. unit	Factory setting
Jump Hz Control	C01	Jump frequency (Jump freq. 1)	0 to 400Hz		1Hz	0
	C02	(Jump freq. 2)			1Hz	0
	C03	(Jump freq. 3)			1Hz	0
	C04	(Hysteresis)	0 to 30Hz		1Hz	3
Multi-Hz Control	C05	Multistep frequency setting (Freq. 1)	0.00 to 400.0Hz		0.01Hz	0.00
	C06	(Freq. 2)			0.01Hz	0.00
	C07	(Freq. 3)			0.01Hz	0.00
	C08	(Freq. 4)			0.01Hz	0.00
	C09	(Freq. 5)			0.01Hz	0.00
	C10	(Freq. 6)			0.01Hz	0.00
	C11	(Freq. 7)			0.01Hz	0.00
	C12	(Freq. 8)			0.01Hz	0.00
	C13	(Freq. 9)			0.01Hz	0.00
	C14	(Freq.10)			0.01Hz	0.00
	C15	(Freq.11)			0.01Hz	0.00
	C16	(Freq.12)			0.01Hz	0.00
	C17	(Freq.13)			0.01Hz	0.00
	C18	(Freq.14)			0.01Hz	0.00
	C19	(Freq.15)			0.01Hz	0.00
Timer Operation	C21	Timer operation	0 : Inactive 1 : Active		-	0
	C22	(Stage 1)	• Operation time: 0.00 to 3600s		0.01s	0.00
	C30	Frequency command 2	0 : KEYPAD operation (⊙ or ⊙ key) ⎫ to ⎬ Same as F01 8 : UP/DOWN control 2 (initial freq. = last value) ⎭		-	2
	C31	Offset (Terminal 12)	−5.0 to +5.0%		0.1%	0.0
	C32	(Terminal C1)	−5.0 to +5.0%		0.1%	0.0
	C33	Analog setting signal filter	0.00 to +5.00s		0.01s	0.05

The functions in the yellow boxes can be set while the inverter is running. Other functions must be set while the inverter is stopped.

Motor Parameters

	Function Code	Name	Setting range	Min. unit	Factory setting
Motor 1	P01	Number of motor 1 poles	2 to 14	2	4
	P02	Motor 1 (Capacity)	3.7kW or smaller : 0.01 to 5.50 kW 5.5kW or larger : 0.01 to 11.00 kW	0.01kW	*1)
	P03	(Rated current)	0.00 to 99.9 A	0.01A	*1)
	P04	(Tuning)	0 : Inactive 1 : Active (One time tuning of %R1 and %X (on motor stopping mode)) 2 : Active (One time tuning of %R1, %X and Io (on motor running mode))	-	0
	P05	(On-line Tuning)	0 : Inactive 1 : Active (Real time tuning of %R2)	-	0
	P06	(No-load current)	0.00 to 99.9 A	0.01A	*1)
	P07	(%R1 setting)	0.00 to 50.00 %	0.01%	*1)
	P08	(%X setting)	0.00 to 50.00 %	0.01%	*1)
	P09	(Slip compensation control 1)	0.00 to +15.00Hz	0.01Hz	0.00
	P10	(Slip compensation response time)	0.01 to 10.00s	0.01s	0.50

The functions in the yellow boxes can be set while the inverter is running. Other functions must be set while the inverter is stopped.

High Performance Functions

	Function Code	Name	Setting range	Min. unit	Factory setting
High Performance Functions	H01	Accumulated operation time	Monitoring only	1h	0
	H02	Trip history	Monitoring only	-	-
	H03	Data initializing (Data reset)	0 : Manual set value 1 : Return to factory set value	-	0
	H04	Auto-reset (Times)	0 (Inactive), 1 to 10 times	1	0
	H05	(Reset interval)	2 to 20s	1s	5
	H06	Fan stop operation	0 : Inactive 1 : Active (Fan stops at low temperature mode) for 1.5kW or larger model only	-	0
	H07	ACC/DEC (Mode select) pattern	0 : Linear 2 : S-curve (strong) 1 : S-curve (weak) 3 : Non-linear (For variable torque load)	-	0
	H08	Start mode (Rotating motor pick up)	0 : Inactive 1 : Active (Only when Auto-restart after momentary power failure mode) 2 : Active (All start modes)	-	1
	H10	Energy-saving operation	0 : Inactive 1 : Active (Only when torque boost "F09" is set at manual setting mode.)	-	0
	H11	DEC mode	0 : Normal (according to "H07" mode) 1 : Coast-to-stop	-	0
	H12	Instantaneous overcurrent limiting	0 : Inactive 1 : Active	-	1
	H13	Auto-restart (Restart time)	0.1 to 5.0s	0.1s	0.1
	H14	(Freq. fall rate)	0.00 to 100.00Hz/s	0.01Hz/s	10.00
PID Control	H20	PID control (Mode select)	0 : Inactive 1 : Active (PID output 0 to 100% / Frefuency 0 to max.) 2 : Active (Inverse operation mode : PID output 0 to 100% / Frefuency max. to 0)	-	0
	H21	(Feedback signal)	0 : Terminal 12 (0 to +10V) 2 : Terminal 12 (+10 to 0V) 1 : Terminal C1 (4 to 20mA) 3 : Terminal C1 (20 to 4mA)	-	1
	H22	(P-gain)	0.01 to 10.00	0.01	0.10
	H23	(I-gain)	0.0 : Inactive 0.1 to 3600s	0.1s	0.0
	H24	(D-gain)	0.00 : Inactive 0.01 to 10.0s	0.01s	0.00
	H25	(Feedback filter)	0.0 to 60.0s	0.1s	0.5
Y1, Y2 Terminal	H26	PTC thermistor (Mode select)	0 : Inactive 1 : Active	-	0
	H27	(Level)	0.00 to 5.00V	0.01V	1.60
	H28	Droop operation	–9.9 to 0.0Hz	0.1Hz	0.0
Serial Link	H30	Serial link (Function select)	(Code) (Monitor) (Frequency command) (Operation command) 0 : X - - X : Valid 1 : X X - - : Invalid 2 : X - X 3 : X X X	-	0
	H31	RS 485 (Address)	1 to 31	1	1
	H32	(Mode select on no response error)	0 : Trip and alarm (Er8) 1 : Operation for H33 timer, and alarm (Er8). 2 : Operation for H33 timer,and retry to communicate. * If the retry fails, then the inverter trips("Er 8"). 3 : Continuous operation	-	0
	H33	(Timer)	0 to 60.0s	0.1s	2.0
	H34	(Baud rate)	0 : 19200 bit/s 2 : 4800 4 : 1200 1 : 9600 3 : 2400	-	1
	H35	(Data length)	0 : 8 bit 1 : 7 bit	-	0
	H36	(Parity check)	0 : No checking 1 : Even parity 2 : Odd parity	-	0
	H37	(Stop bits)	0 : 1 bit 1 : 2 bit	-	0
	H38	(No response error detection time)	0 (No detection), 1 to 60s	1s	0
	H39	(Response interval)	0.00 to 1.00s	0.01s	0.01
Diagnostic	H40	Maximum temperature of heat sink	Monitoring only	°C	-
	H41	Maximum effective current	Monitoring only	A	-
	H42	Main circuit capacitor lifetime	Monitoring only	0.1%	-
	H43	Cooling fan accumulated operation time	Monitoring only	10h	-
	H44	Inverter ROM version	Monitoring only	-	-
	H45	Keypad panel ROM version	Monitoring only	-	-
	H46	Option ROM version	Monitoring only	-	-

The functions in the yellow boxes can be set while the inverter is running. Other functions must be set while the inverter is stopped.

Alternative Motor Parameters

	Function Code	Name	Setting range	Min. unit	Factory setting
Motor 2	A01	Maximum frequency 2	50 to 400Hz	1Hz	50
	A02	Base frequency 2	25 to 400Hz	1Hz	50
	A03	Rated voltage 2 (at Base frequency 2)	0 (Free), 160 to 480V (400V class) 0 (Free), 80 to 240V (200V class)	1V	400 230
	A04	Maximum voltage 2 (at Maximum frequency 2)	160 to 480V (400V class) 80 to 240V (200V class)	1V	400 230
	A05	Torque boost 2	0 : Automatic (for constant torque load) 1 : Manual (for variable torque load) 2 : Manual (for proportional torque load) 3 : Manual (for constant torque load)	-	0
	A06	Electronic thermal (Select) overload relay for motor 2	0 : Inactive 1 : Active (for 4-pole standard motor) 2 : Active (for 4-pole inverter motor)	-	1
	A07	(Level)	Approx. 20 to 135% of rated current	0.01A	*1)
	A08	(Thermal time constant)	0.5 to 10.0 min	0.1min	5.0
	A09	Torque vector control 2	0 : Inactive 1 : Active	-	0
	A10	Number of motor 2 poles	2 to 14	2	4
	A11	Motor 2 (Capacity)	0.01 to 11.00 kw	0.01kW	*1)
	A12	(Rated current)	0.00 to 99.9 A	0.01A	*1)
	A13	(Tuning)	0 : Inactive 1 : Active (One time tuning of %R1 and %X (on motor stopping mode)) 2 : Active (One time tuning of %R1, %X and Io (on motor running mode))	-	0
	A14	(On-line Tuning)	0 : Inactive 1 : Active (Real time tuning of %R1 and %X)	-	0
	A15	(No-load current)	0.00 to 99.9 A	0.01A	*1)
	A16	(%R1 setting)	0.00 to 50.00 %	0.01%	*1)
	A17	(%X setting)	0.00 to 50.00 %	0.01%	*1)
	A18	Slip compensation control 2	0.00 to +15.00 Hz	0.01Hz	0.00
	A19	(Slip compensation resnonse time)	0.01 to 10.00 s	0.01s	0.5

The functions in the yellow boxes can be set while the inverter is running. Other functions must be set while the inverter is stopped.

Protective Functions

Function	Description			LED monitor
Overcurrent protection (Short-circuit) (Ground fault)	• Stops running to protect inverter from an overcurrent resulting from overload. • Stops running to protect inverter from an overcurrent due to a short-circuit in the output circuit. • Stops running to protect inverter from an overcurrent due to a ground fault in the output circuit.		During acceleration	OC1
			During deceleration	OC2
			While running at constant speed	OC3
Overvoltage protection	• The inverter stops when it detects an overvoltage in the DC link circuit.	• 400V series : 800V DC or more 200V series : 400V DC or more • Protection is not assured if excess AC line voltage is applied inadvertently.	During acceleration	OU1
			During deceleration	OU2
			While running at constant speed	OU3
Incoming surge protection	• Protects the inverter against surge voltage between the main circuit power line and ground. • Protects the inverter against surge voltage in the main circuit power line.	• The inverter may be tripped by some other protective function.		
Undervoltage protection	• Stops the inverter when the DC link circuit voltage drops below undervoltage level.	• 400V series : 400V DC or less • 200V series : 200V DC or less		LU
Input phase loss protection	• The inverter is protected from being damaged when open-phase fault occurs.			Lin
Overheat protection	• Stops the inverter when it detects excess heat sink temperature in case of cooling fan failure or overload.			OH1
	• When the external braking resistor overheats, the inverter stops discharging and running.			dbH
Electronic thermal overload relay (Motor protection)	• This function stops the inverter by detecting an inverter overload.			OLU
	• This function stops the inverter by detecting an overload in a standard motor or inverter motor.		Motor 1 overload	OL1
			Motor 2 overload	OL2
Stall prevention (Momentary overcurrent limitation)	• When an output current exceeds the limit during acceleration, this function lowers output frequency to prevent the occurrence of an OC1 trip.	• The stall prevention function can be disabled.		
External alarm input	• The inverter stops on receiving external alarm signals.	• Use THR terminal function (digital input).		OH2
Alarm output (for any fault)	• The inverter outputs a relay contact signal when the inverter issued an alarm and stopped.	• Output terminals: 30A, 30B, and 30C • Use the RST terminal function for signal input. • Even if main power input is turned off, alarm history and trip-cause data are retained.		
Alarm reset command	• An alarm-stop state of the inverter can be cleared with the RESET key or by a digital input signal (RST).			
Alarm history memory	• Stores up to four instances of previous alarm data.			
Storage of data on cause of trip	• The inverter can store and display details of the latest alarm history data.			
Memory error	• The inverter checks memory data after power-on and when the data is written. If a memory error is detected, the inverter stops.			Er1
KEYPAD panel communication error	• If an error is detected in communication between the inverter and KEYPAD when the Keypad panel is being used, the inverter stops.	• When operated by external signals, the inverter continues running. The alarm output (for any fault) is not output. Only Er2 is displayed.		Er2
CPU error	• If the inverter detects a CPU error caused by noise or some other factor, the inverter stops.			Er3
Option communication error	• If a checksum error or disconnection is detected during communication, the inverter issues an alarm.			Er4
Option error	• If a linkage error or other option error is detected, the inverter issues an alarm.			Er5
Output phase loss error	If an unbalance of output circuits is detected during tuning, this function issues an alarm (and stops the inverter).			Er7
RS485 communication error	• If an RS485 communication error is detected, the inverter issues an alarm.			Er8

NOTES :
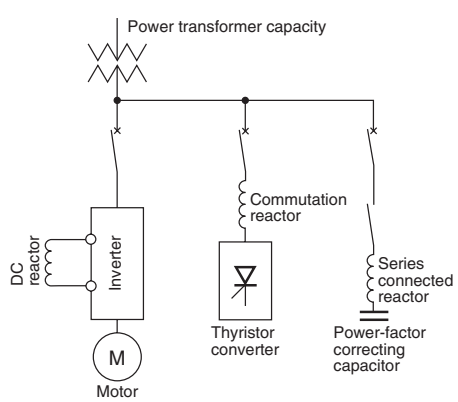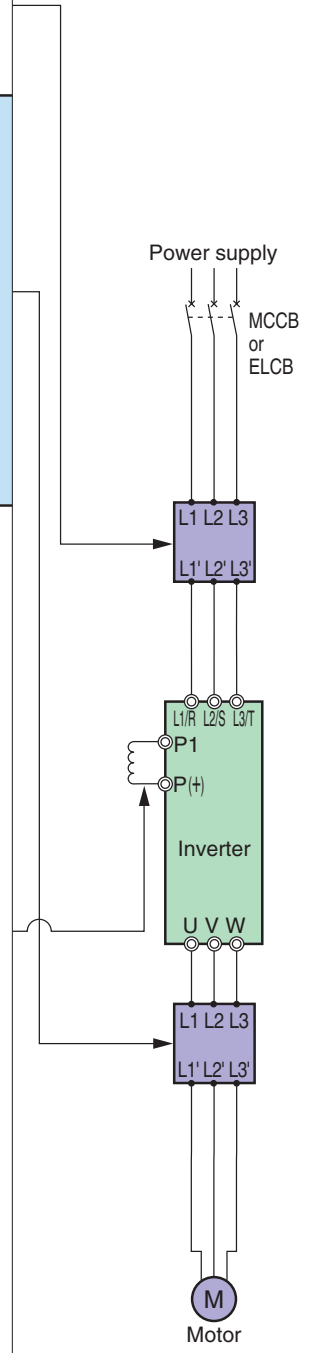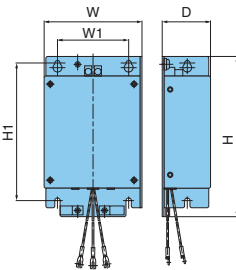1) Retaining alarm signal when auxiliary controll power supply is not used :
   If the inverter power supply is cut off while an internal alarm signal is being output, the alarm signal cannot be retained.
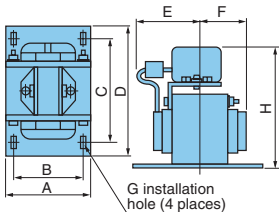2) To issue the RESET command, press the ⬤ key on the KEYPAD panel or connect terminals RST and CM once and disconnect them afterwards.
3) Fault history data is stored for the past four trips.

External Dimensions

Fig.1

VXSM40-1

Fig.2

VXSM40 to 220-3
VXSM75-1

Fig.3

VXSM400-3
VXSM150 and 220-1

Fig.4

VXSM550 and 750-3

Fig.5

Mounting hole positions

VXSM Keypad

Power supply voltage	Nominal applied motor(kW)	Type	Dimensions(mm)								Fig.
			W	H	D	D1	D2	D3	D4		
3-phase 400V	0.4	VXSM40-3	106	130	126	86	40	50.5	103		2
	0.75	VXSM75-3	106	130	150	86	64	62.5	115		2
	1.5	VXSM150-3	106	130	170	106	64	86.5	159		2
	2.2	VXSM220-3	106	130	170	106	64	86.5	159		2
	4.0	VXSM400-3	170	130	158	86	72	94.5	147		3
	5.5	VXSM550-3	180	220	158	-	-	117	146		4
	7.5	VXSM750-3	180	220	158	-	-	117	146		4
1-phase 200V	0.4	VXSM40-1	70	130	118	86	32	60.2	107		1
	0.75	VXSM75-1	106	130	126	86	40	62.5	115		2
	1.5	VXSM150-1	170	130	158	86	72	94.5	147		3
	2.2	VXSM220-1	170	130	158	86	72	94.5	147		3

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Options

Reactor, Filter, and Other Accessories

Name (Type)	Function	Mounting position
EMC compliance filter	This is a special filter which complies with the European EMC (Emission) Directive. This filter may be used together with a ferrite core, if required. *Note:* Other prerequisites must be fulfilled to ensure compliance with EMC Directives. Refer to operation manual for details.	

Output circuit filter
 	
Please contact IMO for more details of this unit, or alternative AC Reactor
	Connected to the output circuit of inverters under low-noise operation with carrier frequency from 8 to 15kHz, this filter has the following functions:
	q Suppressing fluctuation of motor terminal voltage.
	  Protects the motor insulation from being damaged by surge voltage. (400V series)
	w Suppressing leakage current from output side wiring.
	  Reduces the leakage current caused when several motors are operated in parallel or connected with long wiring.
	  * Total wiring length should be less than 400m.
	e Suppressing radial noise or inductive noise from output side wiring.
	  Effective noise suppression device for long wiring applications such as plant.	

DC REACTOR(DCR)	[Use the DCR to normalize the power supply in the following cases.] **q** The power transformer capacity is 500kVA or over and exceeds the inverter rated capacity by 10 times. **w** The inverter and a thyristor converter are connected with the same transformer. * Check if the thyristor converter uses a commutation reactor. If not, AC reactor must be connected to the power supply side. **e** Overvoltage trip occurs due to open/close of the phase-advancing capacitor for the power supply lines. **r** The voltage unbalance exceeds 2%. $$\text{Voltage unbalance (\%)} = \frac{\text{Max. voltage [V]} - \text{Min. Voltage [V]}}{\text{Three-phase average voltage [V]}} \times 67$$ (IEC 61800-3 (5.2.3)) [For improving input power-factor, reducing harmonics] • Used to reduce input harmonic current (correcting power-factor)	
Copy unit	For batch data transfer (read, store, write) between an inverter unit and the copy unit	

Name (Type)	Dimension												[Unit: mm]

EMC Compliance Filter

Power supply voltage	Nominal applied motor [kW]	JAGUAR Inverter type	EMC Filter								
			Type	Rated voltage [V] max.	Rated current [A]	Leakage current [mA]nom.	W	W1	H	H1	D
Three-phase 400V	0.4 to 2.2	VXSM40-3 to VXSM220-3	RFM220-3	480	10	1	110	80	191	165	40
	4.0	VXSM400-3	RFM400-3		15	1	174	145	191	165	40
	5.5 and 7.5	VXSM550, VXSM750	RFM750-3		30	0.9	182	145	278	252	50
Single phase 230V	0.4	VXSM40-1	RFM40-1	250	7	7	71	55	189	178	38
	0.75	VXSM75-1	RFM75-1		18	7	110	80	191	165	38
	1.5 and 2.2	VXSM150-1, VXSM220-1	RFM220-1		29	14	174	145	191	165	40

DC REACTOR

External dimensions

G installation hole (4 places)

Applicable inverter	Reactor type	Dimensions (mm)								Mass [kg]
3 phase 400V series		A	B	C	D	E	F	G	H	
VXSM40-3	VXSMLC004	66	56	72	90	60	35	5.2×8	94	1.0
VXSM75-3	VXSMLC007	66	56	72	90	65	40	5.2×8	94	1.4
VXSM150-3	VXSMLC015	66	56	72	90	65	45	5.2×8	94	1.6
VXSM220-3	VXSMLC022	86	71	80	100	65	45	6×9	110	2.0
VXSM400-3	VXSMLC040	86	71	80	100	70	50	6×9	110	2.6
VXSM550-3	VXSMLC055	86	71	80	100	70	50	6×9	110	2.6
VXSM750-3	VXSMLC075	111	95	80	100	75	60	7×11	130	4.2
1 phase 230V series										
VXSM40-1	Please Contact IMO Precision Control Ltd									
VXSM75-1										
VXSM150-1										
VXSM220-1										

NOTES :
The above data is typical only. IMO reserve the right to change product specifications as necessary.
Please contact IMO for confirmation or otherwise of specification before ordering.

Wiring equipment

Power supply voltage	Nominal applied motor [kW]	JAGUAR Inverter type	MCCB or ELCB Rated current [A]		IMO Magnetic Contactor			Recommended wire size [mm²]				
					Input circuit		Output circuit	Input circuit [L1/R, L2/S, L3/T]		Output circuit [U, V, W]	DCR circuit [P1, P(+)]	DB circuit [P(+), DB, N(-)]
			With DCR	No DCR	With DCR	No DCR		With DCR	No DCR			
Three phase 415V	0.4	VXSM40-3	6	6	K212A10	K212A10	K212A10	2.5	2.5	2.5	2.5	2.5
	0.75	VXSM75-3	6	6								
	1.5	VXSM150-3	6	10								
	2.2	VXSM220-3	6	16								
	4	VXSM400-3	10	20								
	5.5	VXSM550-3	16	32		K223A10						
	7.5	VXSM750-3	20	35		K237A10			4			
Single phase 230V	0.4	VXSM40-1	6	10	K212A10	K212A10	K212A10	2.5	2.5	2.5	2.5	2.5
	0.75	VXSM75-1	10	16								
	1.5	VXSM150-1	16	20								
	2.2	VXSM220-1	20	32		K223A10		4	6	4	4	4

NOTES :
*1 The applicable frame and series of the molded case circuit breaker (MCCB) and earth leakage circuit breaker (ELCB) vary according to the capacity of the transformer of the equipment. For details of selection, refer to the concerning technical documents.
*2 The recommended wire size for the main circuit is the case for the low voltage directive at ambient temperature 40°C.
*3 The power supply impedance without a reactor is considered to be the equivalent of 0.1% of the inverter capacity, with 10% current imbalance accompanied by the voltage imbalance.
*4 Crimp terminals up to 7.4 mm in width (including tolerance) can be used.
*5 Crimp terminals up to 9.5 mm in width (including tolerance) can be used.
*6 Use the grounding cable of a size equal to or larger than that of the input power supply cable.

Name (Type)	Functions and dimensions	[Unit: mm]

Dynamic Braking Resistors

RESISTOR IMO Part No.	DIMENSIONS (mm)					R (ohms)	P (Watts)	Tolerance +/- %R
	L	H	W	Slots	Holes			
DBR105R90W	142	62	28	12 X 5	6	105	90	5
DBR210R150W	217	62	28	12 X 5	6	210	150	5
DBR50R220W	310	62	28	12 X 5	6	50	220	5
DBR150R220W	310	62	28	12 X 5	6	150	220	5
DBR160R380W	358	90	42	14 X 6	6	160	380	5
DBR57R450W	356	94	42	14 X 6	5	57	450	10
DBR133R750W	409	125	51	17 X 6	5	133	750	10

See Fig. 1

See Fig. 2

Power supply coltage	Applicable Inverter	VXSM40-3	VXSM75-3	VXSM150-3	VXSM220-3	VXSM400-3	VXSM550-3	VXSM750-3
415V	Applied Motor kW	0.4	0.75	1.5	2.2	4	5.5	7.5
	Braking Module	Not necessary						
	Avg. braking torque (%)	150	150	150	150	150	150	150
	Total resistor capacity (kW)	0.2					0.4	
	Total ohmic value	200		160		130	80	60
	Max duty cycle (%)	22	18	10	7	5	5	5
	Continuous max braking time	45 s	45 s	45 s	30 s	20 s	20 s	10 s

Fig. 1

Resistor Type 1
DBR105R90W
DBR210R150W
DBR50R220W
DBR150R220W
DBR160R380W

2 off connection holes

Fig. 2

Resistor Type 2
DBR57R450W
DBR133R750W

3 off connection holes

2 off fixing slots

Power supply coltage	Applicable Inverter	VXSM40-1	VXSM75-1	VXSM150-1	VXSM220-1
230V	Applied Motor kW	0.4	0.75	1.5	2.2
	Braking Module	Not necessary			
	Avg. braking torque (%)	150	150	150	150
	Total resistor capacity (kW)	0.2		0.4	
	Total ohmic value	100		40	
	Max duty cycle (%)	15	12	7	7
	Continuous max braking time	60 s	60 s	30 s	30 s

Extension cable with adapter for Keypad panel (VXSM Podcable)

Cable

L=2000 ± 20mm

Adapter

IMO Jaguar Drives
5 Year Warranty

IMO JAGUAR drives are covered by a unique 5 year warranty against failure arising as a result of inferior material or workmanship.

In the event of a unit failing within 5 years of despatch from IMO, we will repair or replace the drive free of charge.

Whenever possible, in the interest of providing the fastest service to our customers, we will replace the failed drive with a new or service exchange unit at IMO's discretion. This may not be possible, however, if the failed unit is in poor condition owing to abuse or neglect. In such circumstances, the customer may elect to have the unit repaired within the warranty if viable, but physical refurbishment will be chargeable.

IMO will, upon request, provide a service exchange unit in advance of receipt of the failed unit if an order number is provided along with details of the failed unit. Replacements will be dispatched at IMO's cost and credit will be issued upon receipt of the failed unit in good physical condition. Full credit will not be given if in IMO's judgment the unit has been physically or electrically abused. A no-fault-found charge will be levied upon units returned and found not to be faulty.

The terms of warranty do not provide for on-site service although a service engineer will be provided upon receipt of an order. IMO may elect to waive any charge should the findings on site indicate that any problem found lies within the scope of the warranty.

IMO Precision Controls Limited
Technical Helpline
Tel 00 44 (0) 20 8452 6444
8am to 6pm UK time Monday to Friday

IMO Precision Controls Limited
is a registered ISO 9002 company.

Year
Guarantee

Safety Precautions

Safety at Work
It is the responsibility of the owner, installer and user to ensure that the installation of the equipment and the way in which it is operated and maintained complies with the requirements of the Health & Safety at Work Act in the United Kingdom and other applicable legislation, regulations and codes of practice in the UK or elsewhere.
Only qualified personnel should install this equipment, after first reading and understanding the information in this publication. The installation instructions should be adhered to. Any question or doubt should be referred to IMO Precision Controls Ltd.

Operational Safety
Users and operators of the equipment must take all necessary precautions to prevent damage to equipment and especially to prevent the risk of injury to personnel working on or near the motor and the driven equipment.
The stop and start inputs should not be relied upon alone to ensure the safety of personnel. If a safety hazard could arise from the unexpected starting of the motor, an interlock mechanism should be provided to prevent the motor from running except when it is safe for it to do so.

Documentation
Every effort has been made by IMO Precision Controls Ltd to ensure that this document accurately and completely represents the Jaguar VXSM range of inverters at the time of going to press. Information with respect to installation is necessarily generalised, and the supplier accepts no liability for contingencies over which he has no control in respect of the selection, installation and/or operation of equipment.

In line with IMO's policy of continuous improvement, the contents of this document are subject to change without prior notice.

This documentation is only intended as a guide to the VXSM product. For more comprehensive information see the VXSM Instruction Manual available to download from our website- www.imopc.com or by contacting IMO directly.

Full product range catalogue is also available, detailing IMO's state-of-the-art Industrial Automation and Control products.

⚠ CAUTION

Applicable to standard motors

Driving a 3 phase standard motor
When driving a standard motor with an inverter, damage may occur in the insulation of the motor. Use the output circuit filter (OFL) if necessary after confirmation with the motor manufacturer. The use of a quality Motor does not require the output circuit filter because of its reinforced insulation.

Torque characteristics and temperature rise
When the inverter is used to operate a standard motor, the temperature rises a little higher than during operation by a commercial power supply. The cooling effect decreases in the low-speed range, reducing the allowable output torque. (If a constant torque is required in the low-speed range, use inverter rated motor or a motor equipped with a separately excited ventilating fan.)

Vibration
Use of an inverter does not increase vibration of a standard motor, but when the motor is mounted to a machine, resonance may be caused by the natural frequencies including the natural frequency of the machine system.
• IMO recommend that you use rubber coupling or anti-vibration rubber.
• We also recommend that you use the inverter jump frequency control function to avoid resonance point in the motor operation.
Note that operation of a 2-pole motor at 60Hz or over may cause abnormal vibration.

Noise
When an inverter drives a standard motor, the motor noise level increases compared with driven by a commercial power supply. To reduce noise, set the inverter carrier frequency at a high level[1]. High-speed operation at 60Hz or over can result in more noise.

Installation location
Use the inverter in an ambient temperature range between -10 to 50˚C.
• When driving an inverter of 22kW or smaller at a place in a temperature of 40˚C or over, remove the ventilation covers. Install an inverter on non-flammable material. The inverter and braking resistor surfaces become hot under certain operating conditions.

Applicable to special motors

Explosion-proof motors
When driving an explosion-proof motor with an inverter, use a combination of a motor and an inverter that has been approved in advance. Such approved products are available in our special product series. Contact IMO for details.

Submersible motors and pumps
These motors have a larger rated current than standard motors. Select the inverter capacity so that these motors can run within the inverter rated current. These motors differ from standard motors in thermal characteristics. Set a small value according to the thermal time constant of motor for setting electronic thermal relay function.

Brake motors
For motors with parallel-connection brakes, obtain the brake power from the primary circuit (commercial power supply). If you connect the brake power to the inverter power output circuit by mistake, problems may occur. Do not use inverters for driving motors equipped with series-connection brakes.

Geared motors
When the power transmission mechanism uses an oil-lubricated gearbox or speed changer/reducer, continuous motor operation at low speed may cause poor lubrication.

Synchronous motors
It is necessary to use software suitable for the motor type. Contact IMO for details.

Single-phase motors
Single-phase motors are not suitable for inverter-driven variable speed operation. Use three-phase motors.
• Even if a single-phase power supply is available, use a three-phase motor, because the inverter provides three-phase output.

Combination with peripheral device

Installing an MCCB
Install a MCCB or earth-leakage circuit breaker in the primary circuit of the inverter to protect wires.

Magnetic contactor in the secondary circuit
If a magnetic contactor is mounted in the secondary circuit for switching to the motor operation by commercial power supply or for any other purposes, ensure that the inverter and the motor are stopped before you turn on or off the contactor. For switching operation from/to commercial power supply, use of newly developed "Line/inverter changeover operation" function using terminals such as SW88, SW52-2, SW52-1, SW50, is recommended.

Magnetic contactor in the primary circuit
Do not open or close the magnetic contactor in the primary circuit more than once an hour. If frequent starts or stops are required during motor operation, send FWD or REV signals to the control terminal.

Protecting the motor
When you drive a motor with an inverter, the motor can be protected with an electronic thermal relay function of the inverter. In addition to the operation level, set the motor type (standard motor, inverter motor). For high-speed motors or water-cooled motors, set a small value as the thermal time constant and protect the motor in combination with the "cooling system OFF" signal. When driving several motors with an inverter, connect a thermal relay to each motor and turn off the inverter's electronic thermal relay function. If you connect the motor thermal relay to the motor with a long cable, high-frequency current may flow into the wiring floating capacity. This may cause the relay to trip at a current lower than the set value for the thermal relay. If this happens, lower the carrier frequency or use the output circuit filter (OFL).

Power-factor correcting capacitor
Do not mount the power-factor correcting capacitor in the inverter primary circuit. (Use the DC reactor to improve the inverter power factor.) Do not use the power-factor correcting capacitor in the inverter secondary circuit. Overcurrent trip will occur, disabling motor operation.

Reducing noise
Use of filter and shielded wires are typical measures against noise that meets EMC Directives. For details, refer to the operation procedure manual.

Measures against surge current
If OU trip occurs while the inverter is stopped or operated under a light load, it is assumed that the surge current is generated by open/close of the phase-advancing capacitor in the power system.
• Connect a DC reactor to the inverter.

Megger test
When checking insulation resistance of the inverter, use a 500V megger and follow the instructions described in the instruction manual.

Wiring

Control circuit wiring length
When conducting a remote control, limit the wiring length between the inverter and operator box to 20m or less and use twisted shielded cable.

Wiring length between inverter and motor
If long wiring is used between the inverter and the motor, the inverter will overheat or trip because of overcurrent (under the influence of high-frequency current flowing into the floating capacity) in the wires connected to the phases. Ensure that the wiring is shorter than 50m for models 3.7kW or smaller, shorter than 100m for 5.5kW or larger. If these lengths must be exceeded, lower the carrier frequency or mount an output circuit filter (OFL). When wiring is longer than 50m, and Dynamic torque-vector control or vector with PG is selected, execute off-line auto-tuning.

Wiring size
Select a cable with a sufficient capacity by referring to the current value or recommended wire size.

Earthing
Securely ground the inverter using the earth terminal.

Inverter Capacity

Driving standard motor
Select an inverter from the capacity range of nominal applied motors shown in the inverter standard specifications table. When large starting torque is required or acceleration or deceleration is required in a short time, select an inverter with a capacity one class greater than the standard.

Driving special motor
Select an inverter that meets the following condition:
Inverter rated current > Motor rated current.

Transportation, storage

When transporting or storing inverters, select the procedures and places that meet the environmental conditions given in the inverter specifications. Ensure that the above environmental conditions are met also when transporting an inverter mounted to a machine.

Full instruction manual available from the IMO website: www.imopc.com or call the telephone number below for assistance.

[1] Caution – this may cause EMC problems – check with IMO first.

If in doubt contact IMO.

Contact IMO for details of our full range of Automation, Control and Panel products