

Item		Detailed specifications	Remarks
Control method		Vector control with PG (motor to be controlled: induction motor) Vector control with PG (motor to be controlled: permanent-magnet type synchronous motor) Torque vector control (open loop, controlled motor: induction motor) V/f control (Note 1)	
Adjustment	Carrier frequency	Setting: 2 to 16kHz variable Note) The carrier frequency may automatically lower depending upon the ambient temperature or the output current to protect the inverter. (The automatic lowering function can be disabled.)	
Speed control	Maximum speed	5 to 120Hz (4 poles: 150~3600r/min) converted to inverter output-frequency	
	Control range	0 to 120Hz (4 poles: 0 to 3600r/min) converted to inverter output-frequency	
	Control response	100Hz(Max)	(For vector control with PG)
	Control accuracy	Analog setting: $\pm 0.2\%$ or less of the max. speed ($25\pm 10^{\circ}\text{C}$) ($77\pm 18^{\circ}\text{F}$) Multi-speed setting/communication setting: $\pm 0.01\%$ or less of the maximum speed (-10 to $+45^{\circ}\text{C}$) (14 to 113°F)	
	Setting resolution	Analog setting: 1/1000 of the maximum speed Multi-speed setting: 0.01Hz(99.99Hz or less in inverter output-frequency conversion), 0.1Hz(100.0~120.0Hz) Communication : 0.01Hz at 1/20000 of the maximum. speed or inverter output-frequency conversion (fixed)	
Control function	Operation	External signal (digital input): Forward operation/stop command, reverse run/stop command, free run command, external alarm, error reset, etc.	
	Speed setting	Multi-speed reference : Combination of 3 external signals (digital input) (8 stages) Analog signal : $0\sim\pm 10\text{ V}$ Communication: USB (Note 2) , RS485	
	S-curve acceleration/deceleration setting	Individual setting of each point such as start, acceleration completion, deceleration start and stop (10 stages) Setting range : $0\sim 50\%$	
	Sequence Function	Forced stop, S-curve range/acceleration/deceleration time/multi-stage speed command simultaneous setting, operation command match timer, multi-stage speed command match timer, digital input logic inversion, digital output logic inversion, soft start at start, stop frequency continuation, acceleration/deceleration calculation function cancel	
	Control function	Speed controller feedforward compensation, vibration suppression observer, speed controller parameter switching motor constant tuning, customization logic, etc.	
	Torque control	Analog setting : $0\sim\pm 10\text{ V}$ Communication: RS485	
	Torque bias	Analog setting : $0\sim\pm 10\text{ V}$ Digital : Combination of two external signals (digital input) (3 levels)	
	Dedicated function	Password, unbalanced load compensation, creep press operation, battery operation, handshake function	
	Functions for Permanent Magnet Synchronous Motors	Magnetic pole position offset tuning	

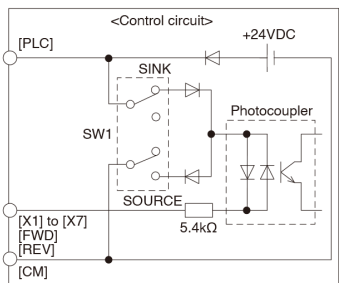
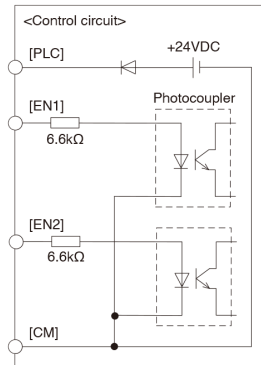
Note 1 For test operation, such as feedback check of the encoder. Do not use with elevator control.
 Note 2 Only during test run via "FRENIC Loader"

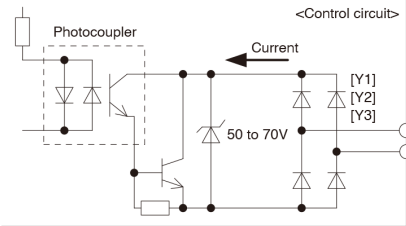
Item		Detailed specifications		Symbol (Note 1)	Alarm output (Note 2)
Protection function	Overcurrent protection	Stops the inverter to protect it from overcurrent caused by an overload.	During acceleration	0C1	○
	Short circuit protection	Stops if the inverter detects an overcurrent due to a short circuit in the output circuit.	During deceleration	0C2	○
	Ground fault protection	Stops if the inverter detects an overcurrent due to a short circuit in the output circuit. It may not be detected at powered if an inverter output is under the ground fault status.	In constant speed	0C3	○
			During acceleration	0U1	○
	Overvoltage protection	Stops the inverter if a DC link bus circuit overvoltage is detected. The inverter cannot be protected if an excessively large voltage is applied by accident.	During deceleration	0U2	○
			In constant speed(Stopped)	0U3	○
	Undervoltage error	Stops the inverter if a drop in DC link bus voltage is detected. However, undervoltage detection is canceled during battery operation (alarm output is not performed).		LU	△
	Input phase loss detection	Stops the inverter if input phase loss or input phase voltage unbalance is detected. The input phase loss protection may not work under light load or with DC reactor. It does not occur in the single-phase input type.		Lin	△
	Output phase loss detection	Stops the inverter if inverter output phase loss is detected during operation.		0PL	○
	Overheat protection	Stops the inverter if a cooling fan fault, or cooling fin overheating when an overload occurs is detected.		0H1	○
		Stops the inverter if a cooling fan fault, or inverter unit internal overheating when an overload occurs is detected.		0H3	○
	External alarm input	Stops the inverter and displays an error if a digital input signal (THR) is input.		0H2	○
	Inverterover load protection	Stops the inverter if overheating is detected by calculating the IGBT internal temperature from the output current and detected internal temperature.		0LU	○
	Electronic thermal	The inverter is stopped by the setting of the electronic thermal function to protect the motor. Protects general-purpose motor and inverter motor in the whole frequency range. Operation level and thermal time constant can be set.		0L1	○
	Memory error	When the power is turned ON, a data check is performed when writing data, and an error is displayed if a memory error is detected.		Er1	○
	CPU error	Stops the inverter and displays an error if a CPU error is detected due to noise, etc.		Er3	○
	Terminal block PCBa Communication error	Detects communication error, etc. with the standard terminal block PCBa and stops the inverter.		Er4	○
	Combination error	Detects inconsistencies between the control method (F42) and encoder selection (L01), etc., and shuts down the drive.		Er5	○
	Operation Error	If the brake check [BRKE] input does not correspond to the brake control [BRKS] state, the inverter is stopped. When the same speed setting is assigned in the speed selection (L11 to L18) of multi-speed, the inverter is stopped, etc.		Er6	○
	Tuning Error	Stops the inverter and displays an error if tuning failure or interruption is detected during motor constant tuning, or if the tuning result is a defect.		Er7	○

Item		Detailed specifications	Symbol (Note 1)	Alarm output (Note 2)
Protection function	RS485 communication error	When the connection port of the touch panel is connected to the network by RS485 communication and a communication error is detected, the inverter is stopped and an error is displayed.	Er8	○
	Data saving error during undervoltage	Stops the inverter and displays an error if unable to successfully save data when undervoltage protection is triggered.	ErF	○
	Hardware error	Stops the inverter and displays an error if an inverter internal hardware fault is detected.	ErH	○
	STO input (EN1, EN2) terminal circuit fault	Stops the inverter and displays an error if the inverter detects an EN1 or EN2 terminal circuit mismatch.	ECF	○
	PG wire break	Disconnection detection (Note 3) of sine wave input of sine wave encoder and serial encoder to stop the inverter, etc.	P9	○
	Over-speed protection	Stops the inverter if the motor speed reaches 120% or more of the maximum speed.	O5	○
	Speed mismatch or excessive speed deviation	Stops the inverter and displays an error if an excessive deviation appears between the reference speed and detected/estimated speed.	ErE	○
	Charging circuit fault	Stops the inverter and displays an error if an inverter charging circuit error is detected.	PbF	○
	Over torque current	Stops the inverter when the torque-current command has exceeded the set-level (E34) and elapsed the set-time (E35).	OT	○
	Braking transistor fault	Stops the inverter and displays an error if a braking transistor error is detected.	dbA	○
	Integrated alarm output	When the inverter stops with an alarm, an integrated alarm is output at the relay contact or transistor output. <Alarm reset> Resets the alarm stop state by a digital input signal (RST) or a command through communication.	—	○
	Retry	Even if a protective function subject to a retry is triggered, an attempt is made to automatically cancel the trip condition up to the number of set times to resume operation without outputting an integrated alarm. (The number of retries and the wait time before resetting can be set.)	—	—
	Surge protection	This function protects the inverter from a surge voltage between main circuit power lines and the ground.	—	—

Item		Detailed specifications																		
Operating environment	Installation location	Indoors																		
	Ambient temperature	-10 to +55°C [14 to 131 °F] (current derating necessary in +50 to +55 °C [122 to 131 °F] range) Horizontal close mounting (22kW or less):-10 to +40°C [14 to 104 °F]																		
	Ambient humidity	5 to 95%RH (non-condensing)																		
	Atmosphere	The inverter must not be exposed to dust, direct sunlight, corrosive or flammable gases, oil mist, vapor, water drops or vibration. (Pollution degree 2 (IEC60664-1)) The atmosphere must contain only a low level of salt. (0.01 mg/cm2 or less per year) There should be no condensation due to sudden temperature changes.																		
	Altitude	1000 m (3300 ft) or lower If used in a location with altitude of 1000 m (3300 ft) or higher, do so after reducing the output current as shown in the following table. <table><tr><th>Altitude</th><th>Output current derating factor</th></tr><tr><td>1000 m or lower (3300 ft or lower)</td><td>1.00</td></tr><tr><td>1000 to 1500 m (3300 to 4900 ft)</td><td>0.97</td></tr><tr><td>1500 to 2000 m (4,900 to 6600 ft)</td><td>0.95</td></tr><tr><td>2000 to 2500 m (6600 to 8200 ft)</td><td>0.91</td></tr><tr><td>2500 to 3000 m (8200 to 9800 ft)</td><td>0.88</td></tr></table>					Altitude	Output current derating factor	1000 m or lower (3300 ft or lower)	1.00	1000 to 1500 m (3300 to 4900 ft)	0.97	1500 to 2000 m (4,900 to 6600 ft)	0.95	2000 to 2500 m (6600 to 8200 ft)	0.91	2500 to 3000 m (8200 to 9800 ft)	0.88		
	Altitude	Output current derating factor																		
1000 m or lower (3300 ft or lower)	1.00																			
1000 to 1500 m (3300 to 4900 ft)	0.97																			
1500 to 2000 m (4,900 to 6600 ft)	0.95																			
2000 to 2500 m (6600 to 8200 ft)	0.91																			
2500 to 3000 m (8200 to 9800 ft)	0.88																			
Vibration	<table><tr><th>Type</th><th>2 to less than 9Hz</th><th>9 to less than 20Hz</th><th>Less than 20 to 55Hz</th><th>55 to 200Hz</th></tr><tr><td>FRN5.5 to 22LM3S-2J</td><td rowspan="4">3mm (maximum amplitude)</td><td rowspan="4">9.8m/s²</td><td rowspan="2">5.9m/s²</td><td rowspan="4">1m/s²</td></tr><tr><td>FRN4.0 to 22LM3S-4J</td></tr><tr><td>FRN2.2LM3S-7J</td><td colspan="2" rowspan="2">2m/s²</td></tr><tr><td>FRN30 to 55LM3S-4J</td></tr></table>					Type	2 to less than 9Hz	9 to less than 20Hz	Less than 20 to 55Hz	55 to 200Hz	FRN5.5 to 22LM3S-2J	3mm (maximum amplitude)	9.8m/s²	5.9m/s²	1m/s²	FRN4.0 to 22LM3S-4J	FRN2.2LM3S-7J	2m/s²		FRN30 to 55LM3S-4J
Type	2 to less than 9Hz	9 to less than 20Hz	Less than 20 to 55Hz	55 to 200Hz																
FRN5.5 to 22LM3S-2J	3mm (maximum amplitude)	9.8m/s²	5.9m/s²	1m/s²																
FRN4.0 to 22LM3S-4J																				
FRN2.2LM3S-7J			2m/s²																	
FRN30 to 55LM3S-4J																				
Storage environment	Storage temperature (Note 1)	-25 to +70°C (during transport) (-13 to +158°F)		Places not subjected to condensation or freezing due to sudden temperature changes																
		-25 to +65°C (during temporary storage) (-13 to +149°F)																		
		-10 to +35°C (during long-term storage) (14 to +95°F)																		
	Relative humidity (Note 2)	During temporary storage: 5 to 95% RH (there should no condensation) During long-term storage: 5 to 70% RH																		
	Atmosphere	The inverter must not be exposed to dust, direct sunlight, corrosive or flammable gases, oil mist, vapor, water drops or vibration. The atmosphere must contain only a low level of salt. (0.01 mg/cm2 or less per year)																		
	Atmospheric pressure	86 to 106 kPa (during storage) 70 to 106 kPa (during transport)																		

Class	Symbol	Terminal name	Explanation	Remarks
Main circuit	L1/R,L2/S,L3/T	Main power supply input terminals	Connect a three-phase power supply. (3-phase models only)	
			Connect a single-phase power supply. (single-phase models only)	
	R0, T0	Auxiliary control power input terminals	There is normally no need to use these terminals. If wishing to retain the integrated alarm signal issued if the protective function is triggered even when the inverter main power supply is cut off, or to constantly display the keypad, connect control power auxiliary input terminals to a power supply. If connecting a PWM converter, do not connect the power supply directly to the inverter control power auxiliary input terminals (R0, T0).	FRN0076LM3S-2□ FRN0090LM3S-2□ FRN0031LM3S-4□ FRN0039LM3S-4□
	U, V, W	Inverter output terminals	Connect three-phase motor terminals U, V, and W to match the phase sequence.	
	P1, P (+)	DC reactor connection terminals	Connect a DC reactor (DCR) (option) for power-factor improvement.	
	P (+) , N (-)	DC link bus connection terminals	Connect braking unit terminals P(+) and N(-). Furthermore, DC link bus circuit of other inverters and PWM converters can be connected.	
	P (+) , DB	Braking resistor connection terminals	Connect terminals P(+) and DB of the inverter to braking resistor terminals (option).	
	 G	Inverter grounding terminal	This is a grounding terminal for the inverter chassis (case). Be sure to ground grounding terminals to ensure safety, and as a noise countermeasure.	

Class	Symbol	Terminal name	Function																										
Analog input	[12]	Analog Set voltage input	(1) Specify the frequency based on the external voltage input. (2) Torque current command value and torque bias command other than speed setting by analog input It can be assigned and used. (3) Hardware Specifications (Note) Input impedance: 22(kΩ) Note: The maximum input is ±15 VDC, but is handled as ±10 VDC for voltages greater than ±10 VDC."																										
	[11]	Analog Common	This is a common terminal of the analog input signal (terminal [12]). This terminal is isolated from terminals [CM] and [CMY].																										
Digital input	[X1]	Digital Input 1	(1) Various signals (free-run command, external alarm, multi-speed selection, etc.) can be set for terminals E01 to E07,E98,E99 can be set. (2) The input mode and SINK/SOURCE can be switched using SW1. (3) The operating mode between each digital input terminal and terminal [CM] can be switched to "ON when shorted (active ON)" or "OFF when shorted (active OFF)". Maximum length 20 m <Digital input circuit specifications>  <table border="1" data-bbox="1153 768 1469 1039"><thead><tr><th>Item</th><th></th><th>Minimum</th><th>Maximum</th></tr></thead><tbody><tr><td rowspan="2">Operation Voltage (SINK)</td><td>ON Level</td><td>0 V</td><td>2 V</td></tr><tr><td>OFF</td><td>20 V</td><td>27 V</td></tr><tr><td rowspan="2">Operation Voltage (SOURCE)</td><td>ON Level</td><td>20 V</td><td>27 V</td></tr><tr><td>OFF</td><td>0 V</td><td>2 V</td></tr><tr><td colspan="2">Operating current when ON (when input-voltage 0 V)</td><td>2.5 mA</td><td>5 mA</td></tr><tr><td colspan="2">Permissible leakage current when OFF</td><td>—</td><td>0.5 mA</td></tr></tbody></table>	Item		Minimum	Maximum	Operation Voltage (SINK)	ON Level	0 V	2 V	OFF	20 V	27 V	Operation Voltage (SOURCE)	ON Level	20 V	27 V	OFF	0 V	2 V	Operating current when ON (when input-voltage 0 V)		2.5 mA	5 mA	Permissible leakage current when OFF		—	0.5 mA
	Item			Minimum	Maximum																								
	Operation Voltage (SINK)	ON Level		0 V	2 V																								
		OFF		20 V	27 V																								
	Operation Voltage (SOURCE)	ON Level		20 V	27 V																								
		OFF		0 V	2 V																								
	Operating current when ON (when input-voltage 0 V)			2.5 mA	5 mA																								
	Permissible leakage current when OFF		—	0.5 mA																									
	[X2]	Digital Input 2																											
	[X3]	Digital Input 3																											
	[X4]	Digital Input 4																											
	[X5]	Digital Input 5																											
[X6]	Digital Input 6																												
[X7]	Digital Input 7																												
[FWD]	Forward operation Stop command Input	(1) By opening the circuit between terminals [EN1] and [PLC], or between terminals [EN2] and [PLC], inverter output transistor operation is stopped by the IEC/EN 61800-5-2-compliant STO safety stop function. (2) The input mode for terminals [EN1] and [EN2] is fixed at SOURCE mode. (3)When this function is not used, short circuit between terminals [EN1]-[EN2]-[PLC]. <Terminal [EN1], [EN2] Circuit>  <table border="1" data-bbox="1153 1449 1469 1644"><thead><tr><th>Item</th><th></th><th>Minimum</th><th>Maximum</th></tr></thead><tbody><tr><td rowspan="2">Operating voltage (SOURCE)</td><td>ON Level</td><td>20 V</td><td>27 V</td></tr><tr><td>OFF</td><td>0 V</td><td>2 V</td></tr><tr><td colspan="2">Operating current when ON (when input voltage 27 V)</td><td>—</td><td>4.5 mA</td></tr><tr><td colspan="2">Permissible leakage current when OFF</td><td>—</td><td>0.5 mA</td></tr></tbody></table>	Item		Minimum	Maximum	Operating voltage (SOURCE)	ON Level	20 V	27 V	OFF	0 V	2 V	Operating current when ON (when input voltage 27 V)		—	4.5 mA	Permissible leakage current when OFF		—	0.5 mA								
Item			Minimum	Maximum																									
Operating voltage (SOURCE)	ON Level	20 V	27 V																										
	OFF	0 V	2 V																										
Operating current when ON (when input voltage 27 V)		—	4.5 mA																										
Permissible leakage current when OFF		—	0.5 mA																										
[EN1]	Enable Input																												
[EN2]																													
[PLC]	ProgrammableController Signal power	(1) Connect the output signal power supply for the programmable controller. (Rated voltage +24 VDC (power supply voltage fluctuation range: +20.4 to +27 VDC), maximum 100 mA DC) (2) The terminal can also be used as the power supply for loads connected to transistor outputs.																											
[CM]	Digital Common	This is a common terminal for digital input signals. The terminal is insulated from terminals [11] and [CMY]																											

Class	Symbol	Terminal name	Function									
Transistor output	[Y1]	Transistor output 1	(1) Various signals (running signals, frequency arrival signals, overload early warning signals, etc.) set with function codes E20 to E22 can be output. (2) The operating mode between transistor output terminals [Y1],[Y2],[Y3] and terminal [CMY] can be switched to "ON when signal output (active ON)" or "OFF when signal output (active OFF)". <Transistor output circuit specifications>  <table><tr><th>Item</th><th>Maximum</th></tr><tr><td rowspan="2">Operating voltage</td><td>ON Level 2 V</td></tr><tr><td>OFF 48 V</td></tr><tr><td>Max. current when ON</td><td>50 mA</td></tr><tr><td>Leakage current when OFF</td><td>0.1 mA</td></tr></table>	Item	Maximum	Operating voltage	ON Level 2 V	OFF 48 V	Max. current when ON	50 mA	Leakage current when OFF	0.1 mA
	Item	Maximum										
	Operating voltage	ON Level 2 V										
		OFF 48 V										
Max. current when ON	50 mA											
Leakage current when OFF	0.1 mA											
[Y2]	Transistor output 2											
[Y3]	Transistor output 3											
[CMY]	Transistor output common	This is a common terminal for digital input signals. The terminal is insulated from terminals [11] and [CMY].										
Contact output	[Y5A] [Y5C]	General contact output	(1) As a general contact output, various types of signals similar to the terminal [Y1] to [Y3] can be selected and output. Contact capacity: 250 VAC 0.3 A cosφ = 0.3, 48 VDC 0.5 A (2) The function code E24 selects and outputs a signal similar to that of the terminal [Y1][Y2][Y3]. (3) It is possible to switch between a "short circuit between terminals [Y5A] and [Y5C] when an ON signal is output (excitation: active ON)" or an "open circuit between terminals [Y5A] and [Y5C] when an ON signal is output (non-excitation: active OFF)".									
	[30A] [30B] [30C]	Integrated alarm output	(1) When the inverter stops with an alarm, an integrated alarm is output at the relay contact (1C). Contact capacity: 250 VAC 0.3 A cosφ = 0.3, 48 VDC 0.5 A (2) The same signals as those of terminals [Y1] to [Y3] can be selected and output. (3) It is possible to switch between a "short circuit between terminals [30A] and [30C] when an ON signal is output (excitation: active ON)" or an "open circuit between terminals [30A] and [30C] when an ON signal is output (non-excitation: active OFF)".									
Communication	RJ-45 Connector Keypad (Option only global model)	RS-485 communication Port 1 (Keypad for connection)	(1) This is used as a connector for connecting the keypad(option only global model). The keypad power is supplied from the inverter via an extension cable for remote operation. To connect the keypad remotely, the keypad relay adapter CBAD-CP is required separately. (2) This is used to connect a personal computer or programmable controller, etc. by RS-485 communication after disconnecting the keypad. Protocols can be selected from the following. - Dedicated keypad protocol (automatically selected) - Modbus RTU, dedicated Fuji inverter protocols - Start-stop synchronization, half-duplex method - Max. communication distance: 20 m (when using RS-485 communication: 500 m) - Max. communication speed: 115.2 kbps (Note) Note: The communication speed when the engineering PC tool "FRENIC Loader 4" is connected is automatically adjusted.									
	USB Connector	USB port	This is a USB connector (miniB specification) for connecting to a personal computer. Function codes can be edited, transferred, or verified, an inverter test run can be carried out, and all states can be monitored using the engineering PC tool "FRENIC Loader 4". It is possible to edit, transfer, and verify the function code of "FRENIC Loader" with USB bus power.									

Class	Symbol	Terminal name	Function
Encoder (Note 1)	[PO]	Power supply for encoder	Power supply terminal for the encoder.
	[CM]	Digital Common	Common terminal for encoder power supply. This terminal is isolated from terminals [11] and [CMY].
	[PA+] [PA-]	A phase input	A-phase input terminal for encoder. The frequency changes according to the motor speed.
	[PB+] [PB-]	B phase input	B-phase input terminal for encoder. The frequency changes according to the motor speed.
	[PB+] [PB-]	B phase input	B-phase input terminal for encoder. The frequency changes according to the motor speed.
	[PC+] [PC-]	C phase input	C-phase input terminal for encoder. The frequency changes according to the motor speed.
	[PD+] [PD-]	D phase input	D-phase input terminal for encoder. The frequency changes according to the motor speed.
	[CK+] [CK-]	Communication clock for encoder	Clock output terminal for EnDat2.1 and BiSS protocol.
	[DT+] [DT-]	Communication data for encoder	Communication data I/O terminal is supported for EnDat2.1 and BiSS protocol.
	[SD]	—	Do not connect to the shield cable of the encoder.
	[PAO] [PBO]	A/B phase Pulse output	These terminals output the same frequency as A/B phase input.
	[CM]	Digital Common	Common terminal for pulse output. This terminal is isolated from terminals [11] and [CMY].