

HITACHI

Inspire the Next

WJ-C1N Series Low Voltage Drives

Range - 0.4 kW to 15 kW



WJ-C1N

Compact high-performance inverter



Most Energy Efficient Means of Process Control

IoT match programme support for various communication protocols

Various communication protocols are supported, while network support, and external ports are available. Modbus-RTU(RS485) communication remains as standard. Following fieldbus networks are available with option boards. CC-Link, EtherCAT, PROFIBUS-DP, PROFINET.

CC-Link V2

EtherCAT
Technology Group

**PROFI
BUS**

**PROFI
NET**

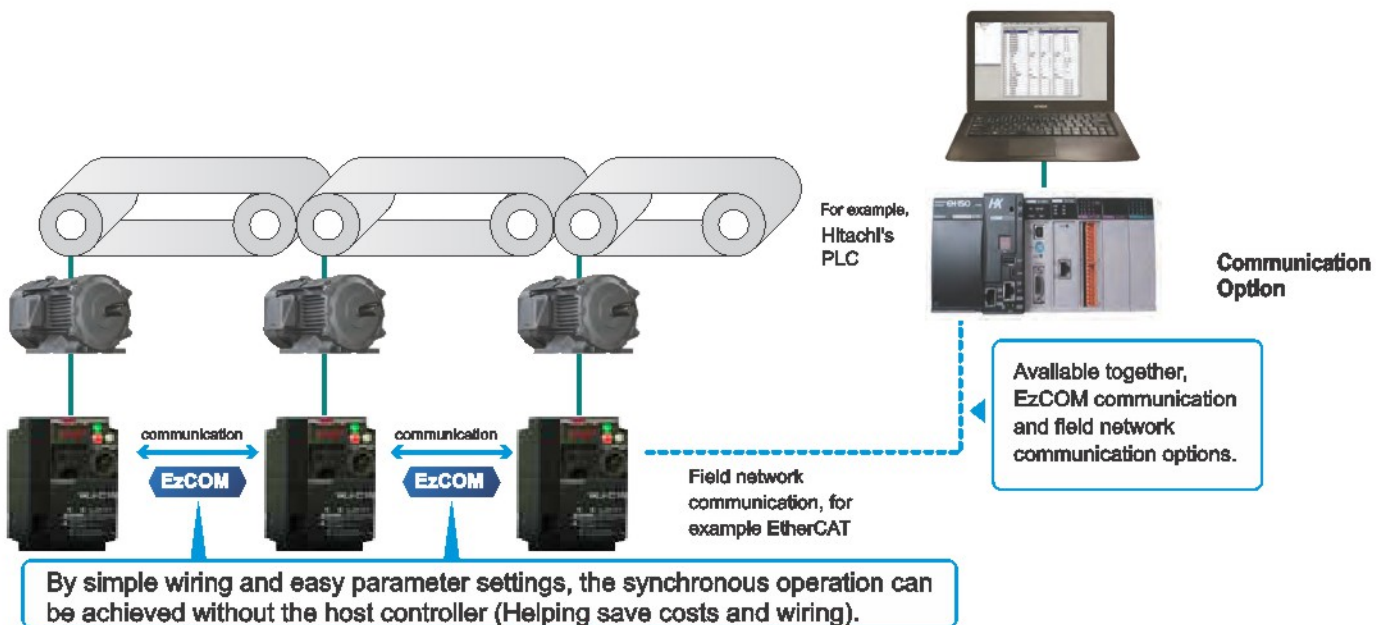
- The communication option supporting CC-Link,, Ether-CAT,, PROFIBUS-DP, PROFINET can be used only in the basic mode.

- Ether-CAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany. PROFIBUS® and PROFINET® are registered trademarks of PROFIBUS Nutzerorganisation e.V.(PNO). CC-Link® is a registered trademark of Mitsubishi Electric Corporation. Other company names and product names mentioned are the property of the respective trademarks or registered trademarks.

Inverter-to-Inverter communication

WJ series C1N enables Inverter-to-Inverter communication without a PLC or PC. [EzCOM function]

EzCOM makes it easier to build a small synchronous system between multiple WJ series C1N inverters. By using EzCOM and external communication options together, you can create complicated control systems with simple wiring.

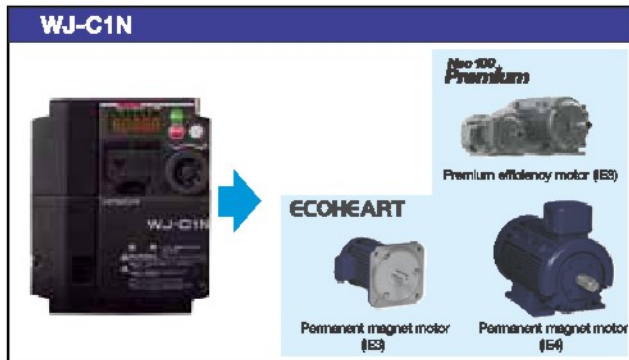


Support for cost reductions

Functions such as simple vector control and multiple PID can reduce the cost of the host device

Energy saving by PM motor

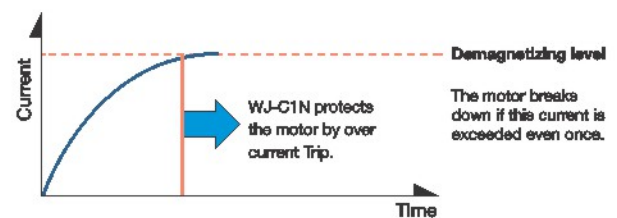
WJ-C1N is equipped with both control functions for induction motor and PM motor. The controller can be re-parametrized when replacing an Induction motor with a PM motor. In addition, the new overcurrent-level setting function prevents a demagnetizing of PM motor due to overcurrent.



*Since the operation differs from that of WJ200N such as the frequency matching function, uency matching function, It needs to be verified on the actual device.

Overcurrent level adjustment

The overcurrent trip level can be adjusted by parameters.



Simple vector control without the need for optional board

WJ-C1N can use simple vector control without an additional optional board.

It supports IM motor sensorless vector control and V/f control. The WJ-C1N can calculate and compensate the speed deviation from internally calculated speed sensor data in real time while improving torque characteristics.

Example: V/f control



Commands to the motor.



When the inverter outputs frequency and voltage commands to the motor, if a load of the motor is large, the speed will be delayed.

Example: Simple vector control



Commands to the motor.

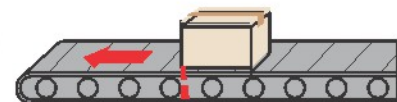
Check the operation status of the motor.

The command is output again so that the target speed is reached.



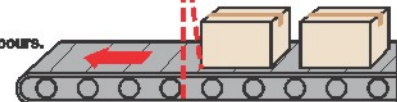
The inverter checks the operation status of the motor in simple vector control. The command is output again so that the target speed is reached, and no delay is generated.

Target speed

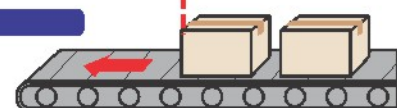


V/f control

A speed delay occurs.



Correcting
speed delay
in real time.



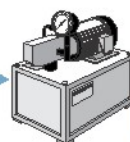
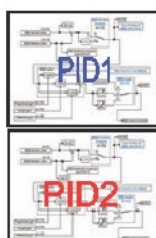
Reduction of system hardware cost by multiple PID function

WJ-C1N has two PID loop controllers. The inverter controls the operation of the motor with PID

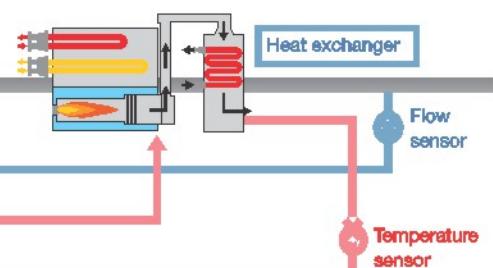
controller, and an external device can also be controlled independently with another PID controller.

Therefore, WJ-C1N can control the motor and the external device without a host device, such as a PLC.

Example: Inverter control of pump flow rate + temperature control of heater

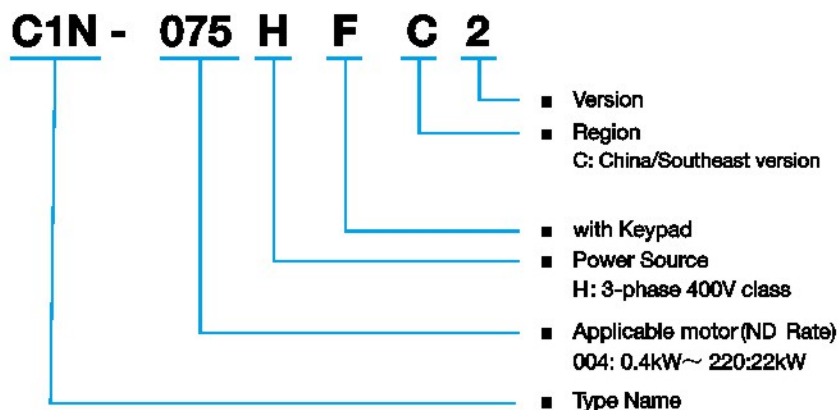


Pump



Model configuration

WJ series C1N model name indication



Lineup

Applicable motor (kW)	0.4	0.7	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22
3-phase 400 V (ND rating)	●	●	●	●	●	●	●	●	●	△	△

(Note1) The applicable motor refers to Hitachi standard 3-phase motor (4-pole). To use other motors, be sure to prevent the rated motor current from exceeding the rated output current of the Inverter.

(Note2) □Development completed □Under development

Technical Specifications

Three phases 400V class

Model Name *1(C1N-□□□HFC2)			004	007	015	022	040	055	075	110	150	-	-	
Motor *2	kW	LD	0.75	1.5	2.2	3.0	5.5	7.5	11	15	18.5	-	-	
		ND	0.4	0.75	1.5	2.2	4.0	5.5	7.5	11	15	-	-	
	HP	LD	1	2	3	4	7.5	10	15	20	25	-	-	
		ND	1/2	1	2	3	5	7.5	10	15	20	-	-	
Rated Capacity (kVA)	Basic	380V	LD	1.3	2.6	3.5	4.5	7.3	11.5	15.1	20.4	25.0	-	-
			ND	1.1	2.2	3.1	3.8	6.0	9.7	11.8	15.7	20.4	-	-
		480V	LD	1.7	3.4	4.4	5.7	9.2	14.5	19.1	25.7	31.5	-	-
			ND	1.4	2.8	3.9	4.5	7.6	12.3	14.9	19.9	25.7	-	-
	Extended	380V	LD	1.3	2.6	3.6	4.6	7.8	11.5	15.7	20.4	25	-	-
			ND	1.1	2.2	3.1	3.9	6.0	9.7	12.5	16.4	21	-	-
		480V	LD	1.7	3.4	4.5	5.9	9.8	14.5	19.9	25.7	31.5	-	-
			ND	1.4	2.8	3.9	4.9	7.6	12.3	15.7	20.7	26.6	-	-
Rated Input Voltage (V)			Three phases 380V to 480V (-15%/+10%), 50/60Hz ±5%											
Rated Output Voltage (V)*3			Three phases 380 to 480V											
Rated Output Current (A)	Basic	LD	2.1	4.1	5.4	6.9	11.1	17.5	23.0	31.0	38.0	-	-	
		ND	1.8	3.4	4.8	5.5	9.2	14.8	18.0	24.0	31.0	-	-	
	Extended	LD	2.1	4.1	5.5	7.1	11.9	17.5	24.0	31.0	38.0	-	-	
		ND	1.8	3.4	4.8	6.0	9.2	14.8	19.0	25.0	32.0	-	-	
Braking Torque	Regenerative braking		Built-in regenerative braking circuit (Separate discharge resistor)											
	Resistor (□)			180		100		70		35		-	-	
Cooling method			Self-cooling	Force ventilation										
Weight (kg)				1.8	1.8	1.8	2.0	3.5	3.5	4.5	4.5	-	-	

*1 The part of the model's name indicates an applicable motor capacity at ND rating.

*2 LD: Light Duty, ND: Normal Duty (Dual rating).

*3 Applicable motors are Hitachi's three-phase standard motors (4P). When use other manufacturer motors, be sure to not exceed a rated current of a motor the rated output current of the Inverter.

*4 The output voltage cannot exceed the actual input voltage (Main power supply voltage).

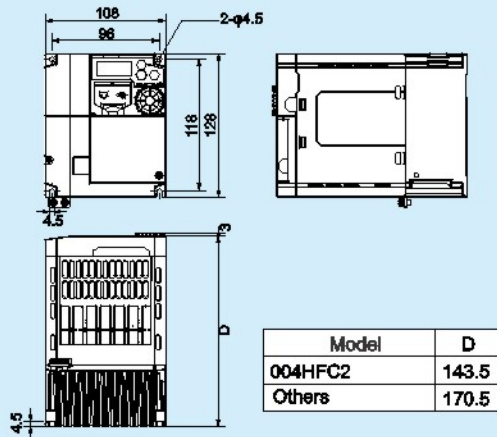
Common Specification

Item		Specifications
Control Method		PWM control
Output Frequency Range *1		0.01 to 590.00 Hz
Frequency Accuracy		For the maximum frequency, digital source $\pm 0.01\%$, analog source $\pm 0.2\%$ ($25 \pm 10^\circ\text{C}$)
Frequency Resolution		Digital source: 0.01 Hz, analog source: maximum frequency/1000
Control Mode (Frequency and voltage calculation) *2		IM V/f control (constant torque/ reduced torque/ free V/f, automatic torque boost), V/f control with encoder IM sensorless vector control IM sensorless vector control with encoder (Simple vector control)
		PM(SM/PMIM) PM sensorless vector control *3
Rated Overload Current		Dual Rating : Normal Duty (ND): 150% / 60 sec / Light Duty (LD): 120% / 60 sec
Acceleration/deceleration Time		0.00 to 3600.00 sec (linear, curve setting)
Starting Torque *4		200 % of Motor Rated Torque at 0.5 Hz (IM sensorless vector control)
Carrier Frequency Range		Normal Duty (ND) : 2 to 15kHz Light Duty (LD) : 2 to 10kHz (with derating)
Monitor function *5		Output frequency, Output current, Output torque, Trip history, I/O terminal status, Input power, DC voltage, etc.
Protective Function *6		Over Current, Over Voltage, Under Voltage, Electronic thermal, OverLoad and etc.
Other Functions		Free V/f characteristic setting, Manual torque boost, auto-tuning, Simple positioning functions, Energy saving operation, PID control, Brake control, Commercial switching function, Upper and lower speed limit, Speed jump, External start/ end, Analog output adjustment, etc.
Keypad		5 digits 7 seg, 6 status LED + 1 minus symbol LED, 4 Keys and 1 JOG dial, 1 LED for Indicating RUN command source (non-detachable)
Input	Frequency Reference	Keypad, External operator, RS485, Communication option, external analog input
	Run/stop Command	Keypad, External operator, RS485, Communication option, input terminals
	Input Terminals	Terminal [1] to [7] (NO/NC selectable, Sink(PLC-P24 Jumper)/Source(PLC-L Jumper) selectable) terminal [8] is source logic fixed
	Pulse Input	3 terminals max. 32kHz x 3 (terminal [5](when enable phase A), terminal [7](when enable phase B), terminal [8] (when enable phase Z))
	Analog Input	2 terminals (terminal [A1], [A2] for 0 to 10 VDC voltage input and 4 to 20 mA current input selectable)
	Thermistor Input	1 terminal (shared with terminal [5])(support for PTC type thermistor)
	Safety Input	2 terminals (terminal [ST1] and terminal [ST2])
Output	Output Terminals	2 terminals with open collector (NO/NC selectable, capable for Sink/Source circuit) 1 terminal for relay output (1c type)
	Sto State Monitor Output	1 terminal (shared with terminal [11]), switched to EDM by slide switch)
	Analog/pulse Output	2 terminals (terminal [Ao1] for 0 to 10 VDC voltage output / 4 to 20 mA current output selectable terminal [Ao2] for pulse output, max. 32 kHz/ 0 to 10 VDC output selectable)
Communication	Usb	Micro-B (for inverter configuration software ProDriveNext)
	Rs485	Support for Modbus-RTU *7 (RS-485 serial communication)
	External operator	RJ45 connector (Exclusive connector for remote operator)
	Option	WJ200N series field network options. WJ-ECT: for EtherCAT® communication, WJ-PB: for PROFIBUS® communication, WJ-PN: for PROFINET® communication, WJ-CGL: for CC-Link® communication.* 7 One unit can be mounted. (except WJ-FB: functional safety option is not supported)
External Control Power Supply		External 24 VDC can be input from [P24] terminal (Installation of reverse-current-prevention diode is mandatory).
Emc Noise Filter		Not built-in (optional external noise filter can be connected)
Operating Environment	Ambient temperature	ND (normal duty): -10 to 50 °C/ LD (light duty): -10 to 40 °C
	Storage temperature *8	-20 to 65 °C
	Humidity	Humidity 20 to 90 %RH (non-condensing)
	Vibration	0.075 mm amplitude for 10 to 57 Hz 9.8 m/s ² (1.0 G) for 57 to 150 Hz
	Installation site *9	Altitude: 1000 m or less, Indoors (free from corrosive gases, oil mist, dust and effect of radiation)
Structure		Protection: IP20, replaceable Fan
Other Optional Components		Noise Filter, DC link choke, AC reactor, Braking resistor, Regenerative braking unit, External operator (Basic Mode : OPE-SR/OPE-SBK/OPE-SFmini/WOP, Extended Mode: VOP), Inverter configuration software Pro Drive Next *10, etc.

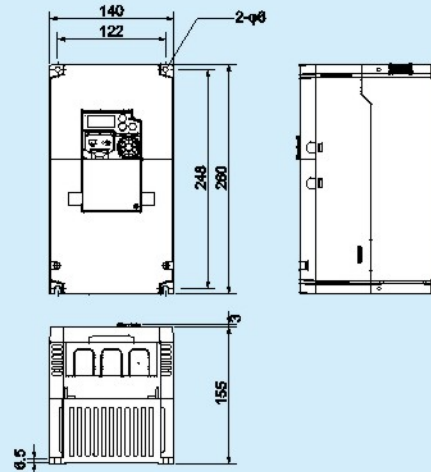
*1 The output frequency range depends on the control mode and the motor used. Consult the motor manufacturer for the maximum allowable frequency of the motor when operating beyond base frequency. *2 Motor constants might need to be adjusted depending on the control mode. *3 When using sensorless vector control for permanent magnet motor (PMM), contact your dealer. *4 The value is specified for the 4 poles Hitachi standard motor controlled by the IM sensorless vector control at ND rating. Torque characteristics may vary depending on the control mode and the motor used. *5 Monitor function is for reference only. To obtain more accurate values, apply an external device. *6 When a driver error [E030] occurs due to the protective function, it may be resulted from the short-circuit protection, as well as damaged IGBT. Depending on the operating conditions of the inverter, an overcurrent error may occur instead of a driver error. *7 Trademark -Modbus® is a registered trademark of Schneider Electric USA, Inc. -EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany. -PROFIBUS® and PROFINET® are registered trademarks of PROFIBUS Nutzerorganisation e.V. (PNO). -CC-Link® is a registered trademark of Mitsubishi Electric Corporation. *8 The storage temperature is the temperature during transportation. *9 For installation at an altitude of 1000m or more, the atmospheric pressure will decrease by approximately 1% for every 100m altitude increase. Apply 1% current derating from the rated current for every 100m altitude increase and conduct an evaluation test. When using at an altitude of 2500m or more, please contact Hitachi Inverter distributor. *10 Recognized as WJ200N in basic mode and WJ-C1N in extended mode.

Dimensions

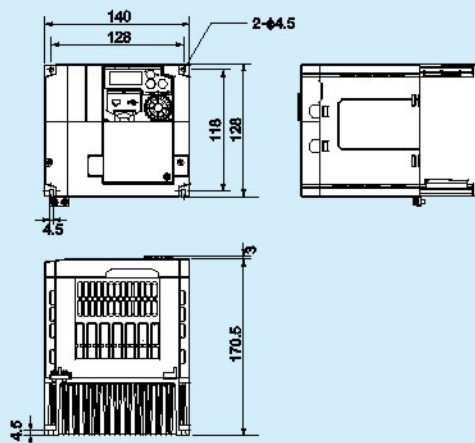
- C1N-004HFC2
- C1N-007HFC2
- C1N-015HFC2
- C1N-022HFC2



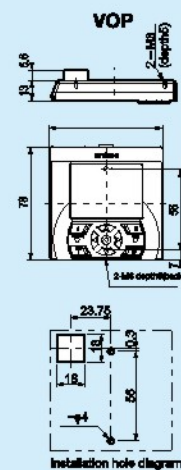
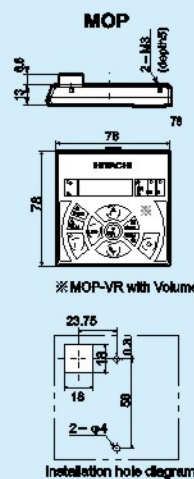
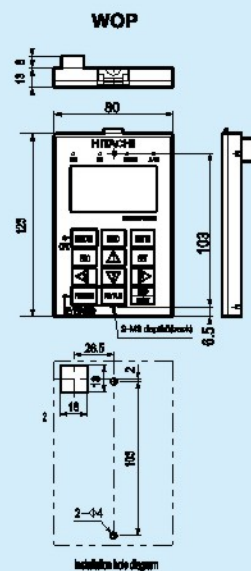
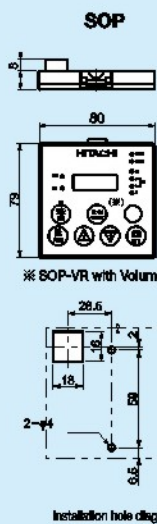
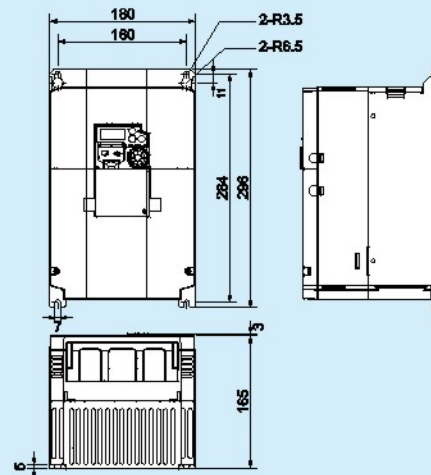
- C1N-055HFC2
- C1N-075HFC2



- C1N-040HFC2



- C1N-110HFC2
- C1N-150HFC2



Protective Functions

Name	Cause(s)	Error Code
Over current error	Shuts off the inverter output and trips, when detecting a large output current exceeding the overcurrent level. Overcurrent level can be set by Overcurrent detection level [b016d]. In factory setting, [b016d] is set to 2.2 times the rated output current at ND rating regardless of ND/LD rating setting. When a large output current exceeding the overcurrent level is detected, the inverter can perform to retry for a certain number of times without tripping by the parameter setting.	E001
Motor Overload Error	Shuts off the inverter output and trips when the electronic thermal function detects a motor overload monitoring the inverter output current. Time until motor overload error and the behavior after motor overload error is changed according to the setting of the motor rated current and the electronic thermal function.	E005
Braking Resistor Overload Error	Shuts off the inverter output and trips, when the braking resistor operation circuit (BRD) usage rate exceeds the usage rate specified in Dynamic brake use ratio [bA-53].	E008
Over Voltage Error	Shuts off the inverter output and trips, when detecting a high DC bus voltage exceeding the overvoltage level. Overvoltage level is approx. 400 VDC (200 V class) or approx. 800 VDC (400 V class). When a high DC bus voltage exceeding the overvoltage level is detected, the inverter can perform to retry for a certain number of times without tripping by the parameter setting.	E007
Memory Error	Shuts off the inverter output and trips, when the internal memory has problems. CPU error [E011] may be issued instead. The reset operation is not accepted. A power on reset is required. When the inverter recovers by a power on reset, make sure the parameter setting is correct.	E009
Undervoltage Error	Shuts off the inverter output and trips, when detecting a low DC bus voltage below the undervoltage level to prevent the temporary circuit operation. Undervoltage level is approx. 173 VDC (200 V class) or approx. 345 VDC (400 V class). When a low DC bus voltage below the undervoltage level is detected, the inverter can perform to retry for a certain number of times without tripping by the parameter setting.	E008
Current Detector Error	Shuts off the inverter output and trips, when detects abnormally on the built-in current sensor.	E010
Cpu Error	Shuts off the inverter output and trips, when the internal CPU has problems or malfunction.	E011
External Trip	Shuts off the inverter output and trips, when the inverter receive an signal from an external equipment to input terminal which is assigned External fault [EXT].	E012
Up Error	Shuts off the inverter output and trips, when the inverter power is turned on while applied an RUN command. Unattended start protection function is valid when input terminal function Unattended start protection [USP] is turned on or [USP] active selection [CA-73] is Enable (01). RUN command detection is executed for 2 seconds after the power is turned on.	E013
Ground Fault Error	The inverter instantly protects from ground-fault, when detects the ground fault between the inverter output and the motor on power up. The function does not work while inverter trips. Enable/disable of the ground fault detection can be selected by Detect ground fault selection [b-64] setting. When the external 24 VDC power supply has been turned on prior to the main power supply (R, S, T), the ground fault detection function is activated at the time the main power supply is turned on.	E014
Input Overvoltage Error	When Power supply overvoltage selection [b-61] is Error (01), the inverter trips when persist overvoltage condition for more than 100 seconds while the inverter is in stop status. Input overvoltage level can be set by Power supply overvoltage level setting [b-62].	E015
Temperature Detector Error	The inverter trips when there is a problem in the temperature detector circuit such as disconnection.	E019
Temperature Error	Shuts off the inverter output and trips, when the internal temperature is above the threshold.	E021
Cpu Communication Error	Shuts off the inverter output and trips, when occurs a communication error in an internal CPU.	E022
Input Phase Loss	Shuts off the inverter output and trips, when detects a phase loss of input side of main circuitry. Enable/disable of the input phase loss detection can be selected by input phase loss detection enable [b-66] setting. The single-phase inverters shut off the power when input phase loss. In this case, set [b-66] to Disable (00).	E024
Main Circuit Error	Shuts off the inverter output and trips, when occurs a malfunction on the main circuit board.	E025
Analog Input Level Over Error	When [AI1] input selection [Cb-06] or [AI2] input selection [Cb-18] is Current (02), the inverter trips when excessive current come into the analog input terminal [AI1]/[AI2]. Power off the inverter when occurs this error, and check the wiring connection of analog input.	E026
Driver Error	At the time of an instantaneous overcurrent from motor or external braking resistor, or the main element failure the inverter turns off the output to protect the main element.	E030
Output Phase Loss	Shuts off the inverter output and trips, when a loose connection, disconnection of output line, disconnection inside the motor, etc., are detected. Enable/disable of the output phase loss detection can be selected by Output phase loss detection enable [b-65] setting. Detection of output phase loss is executed in the section of output frequency 5Hz to 100Hz.	E034
Thermistor Error	Shuts off the inverter output and trips, when an abnormal temperature is observed with an external thermistor. When Thermistor type selection [Cb-40] is PTC (01), the input terminal [E] becomes for external PTC type thermistor. In this case, input terminal [E] function [CA-06] setting is invalid. The threshold of abnormal temperature can be set by Thermistor error level [b-70] and Thermistor gain adjustment [Cb-41]. When [Cb-40] is PTC (01), this error is occurred when the external thermistor is disconnected and re-generated after trip reset. In this case, it is required to connect the thermistor or short between [E] terminal and [L] terminal.	E035
Brake Error	Shuts off the inverter output and trips, when the inverter can not detect whether the input function Answer back from brake [BCK] is ON or OFF during Brake release wait time [AF18d] after the inverter has output a Brake release [BRK]. When [BCK] is not assigned to input terminal function [CA-01] to [CA-06], this error is not occurred.	E036
Overload Error at Low Speed	When the inverter operate lower than 0.2 Hz, shuts off the inverter output and trips when the electronic thermal function detects a motor overload monitoring the inverter output current to prevent the main element failure.	E038
Controller Overload Error	Shuts off the inverter output and trips when the thermal electronic function detects an inverter(controller) overload monitoring the inverter output current. When the controller overload error occurs, reset command can not be accepted for 10 seconds. There is no user parameter for controller (inverter) overload protection. The controller overload detection is according to the rated output current at ND rating. It is impossible to change the time until controller overload error and the behavior after controller overload error like Motor overload error [E005]. Regardless the setting of Load type selection [UB-08], ND rated derating is applied. For detail, see Current Derating.	E039
Remote Operator Disconnection Error	Shuts off the inverter output and trips, when occurs this error between optional remote operator and inverter due to noise, loose connection or disconnection. Enable/disable of the timeout detection between optional remote operator and inverter can be selected by Action selection at keypad disconnection [JA-20] setting.	E040
RS485 communication error	Shuts off the inverter output and trips, when RS485 communication timeout occurs because of a malfunction due to noise, loose wire connection, wiring disconnection, etc. Enable/disable of the RS485 communication timeout detection can be selected by RS485 communication error selection [CF-08] setting. An error may occur even if the communication settings with the connected control device do not match. In this case, the connection is not normally established and an error occurs in the host device. It is required to check the RS485 communication setting [CF-01] to [CF-06].	E041
RTC Error	Shuts off the inverter output and trips, when the RTC data incorporated in the remote operator(VOP) has returned to the initial data.	E042
Es2Q Inappropriate Command Error	Shuts off the inverter output and trips, when there is an inappropriate command in Es2Q program. This error is also occurred when the Es2Q program is executed despite it is not downloaded.	E043
Es2Q Nesting Error	Shuts off the inverter output and trips, when the nesting like subroutine, for, next, etc., exceeds 8 times in Es2Q program.	E044
Es2Q Command Execution Error	Shuts off the inverter output and trips, when command cannot be processed appropriately while Es2Q program is executed such as overflow and 0-division.	E045
Es2Q User-assigned Error 0 to 9	Shuts off the inverter output and trips, when the user-assigned trip command is executed in Es2Q program.	E060 to E069
Option Error 0 to 9	Shuts off the inverter output and trips, when the inverter detects errors in the option mounted on the option I/F.	E090 to E099
STO ShutOff Error STO Internal Error STO Path 1 Error STO Path 2 Error	Shuts off the inverter output and trips, when the inverter detects errors in the circuit related to safety function STO.	E080 to E083
Encoder Disconnection Error	Shuts off the inverter output and trips, when the inverter detect an encoder wiring disconnection.	E100
Positioning Range Error	Shuts off the inverter output and trips, when the actual position exceeds the preset position range set by Position control range setting (forward) [AE-52] and Position control range setting (reverse) [AE-54].	E104
Speed Deviation Error	When Speed deviation error mode selection [b-82] is Error (01), shuts off the inverter output and trips when the deviation between the frequency reference and the feedback speed exceeds the deviation specified in Speed deviation error detection level [b-83]. When this error is occurred, output terminal function Speed over deviation [DSB] is turned on.	E105
Excessive Speed Error	Shuts off the inverter output and trips when the motor speed rises over a preset value set by Over-speed detection level [b-80] for the time set by Overspeed detection time [b-81].	E107
Contactor Error	When output terminal function Contactor check signal [CCK] is assigned to one of Input terminal function ([CA-01] to [CA-06]), shuts off the inverter output and trips when [CCK] is not turned on/off for the time set by Contactor response check time [AF123] after operation of Contactor control [CON].	E110
PID Soft Start Error	When PID soft start error detection enable [AH-61] is Enable(Error) (01), shuts off the inverter output and trips when a PID feedback value is not achieved a threshold level within the determined time. The time until trip can be set by PID soft start time [AH-60], and the threshold level of PID feedback value can be set by PID soft start error detection level [AH-62].	E120
Abnormal Upper Detecting Error Abnormal Lower Detecting Error	When Abnormal upper level detecting action [E-06] and Abnormal lower level detecting action [E-07] are Trip (02) or Trip after deceleration stop (03), shuts off the inverter output and trips when the value displayed on monitor function specified in Abnormal detection target [E-02] exceeds or falls below the steady operation range. When the value exceeds the range, Abnormal upper detecting error [E121] is generated. When the value falls below the range, Abnormal lower detecting error [E122] is generated.	E121, E122

*1 When Electronic thermal decrease function enable [bC112] is Disable (00), the inverter does not accept a reset operation for 10 seconds. Wait for a while before performing a reset operation. When [bC112] is Enable (Linear deceleration) (01) or Enable (Time constant deceleration) (02), it can be reset immediately after error occurs. However, the overload accumulated value is not cleared and the value continue to decrease after reset operation. Therefore, when the inverter is restarted immediately after reset operation, the overload accumulated value may quickly reach 100% and the error may occur again. In this case, wait for a while before restarting.

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