

8

Monitoring operation status

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II

In [Monitor mode], the operation status of the inverter, ON/OFF information of input/output terminals, trip record, etc. are displayed.

This chapter explains the display contents of [Monitor mode].

Furthermore, display at the time of occurrence of a trip and causes and remedies are also introduced.

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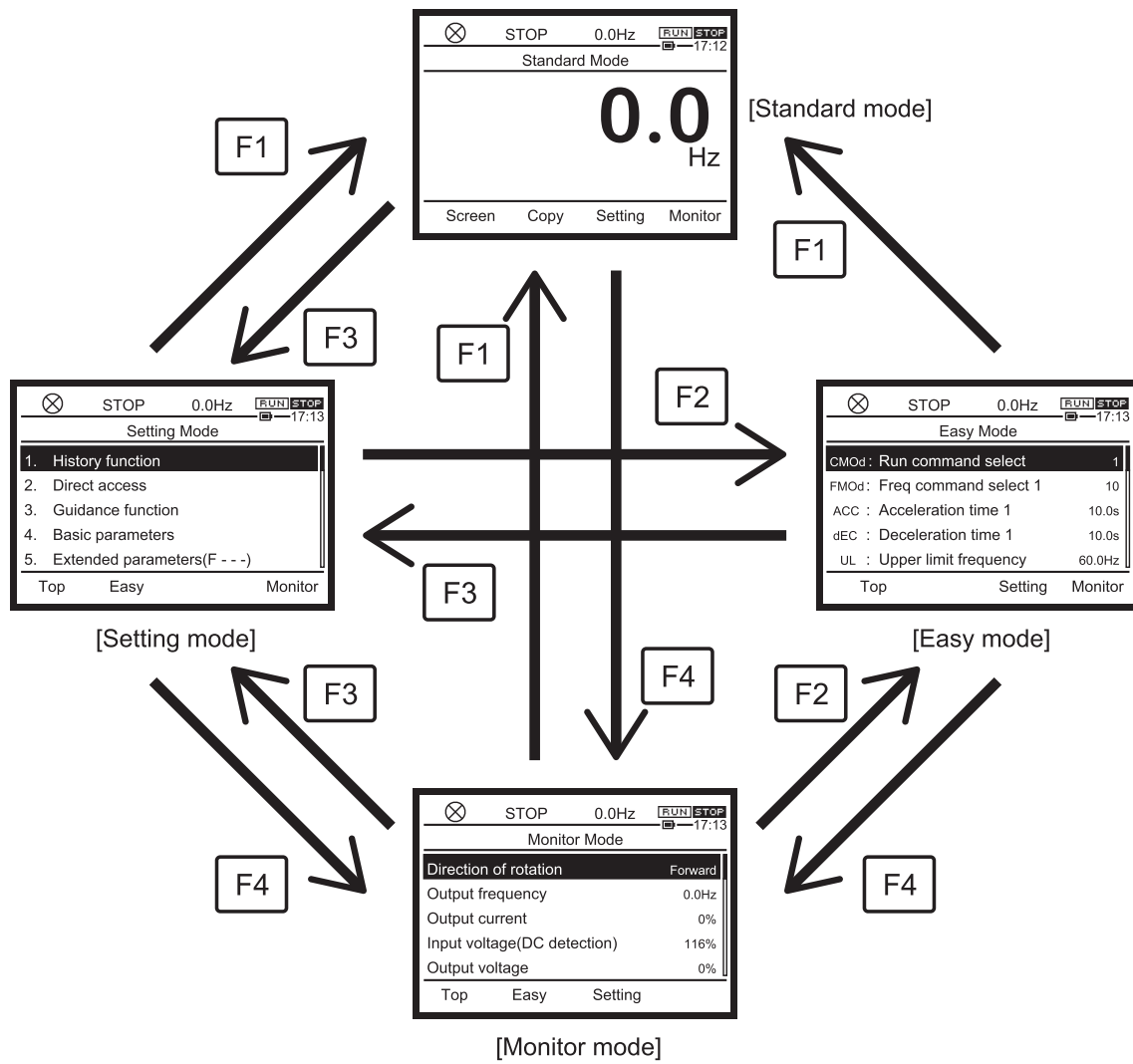
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8. 1 Screen display of [Monitor mode]

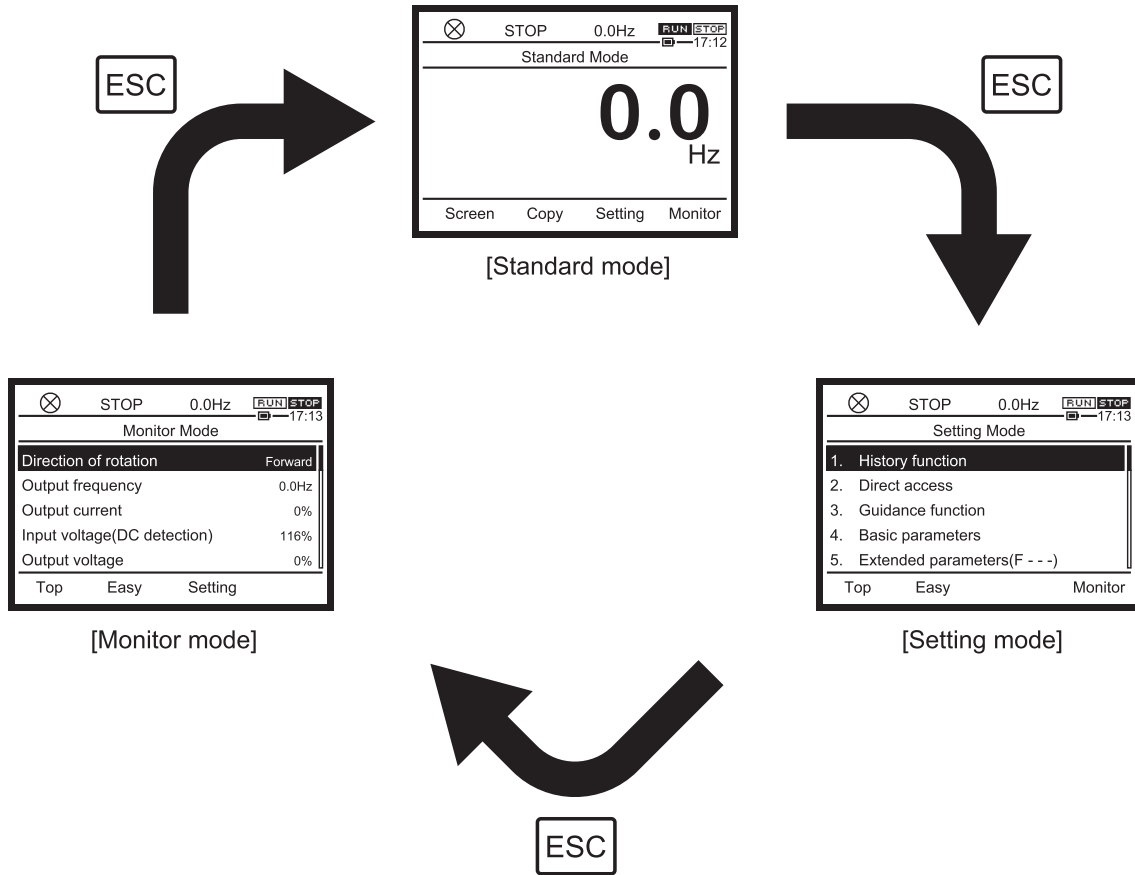
For the outline of screen display of [Monitor mode], refer to [3. 1. 2] "■Screen display of [Monitor mode]".

8. 1. 1 Operation Status monitor

When [Standard mode] is displayed on the LCD screen during run, press the [F4] key or press [ESC] key twice to switch to [Monitor mode].



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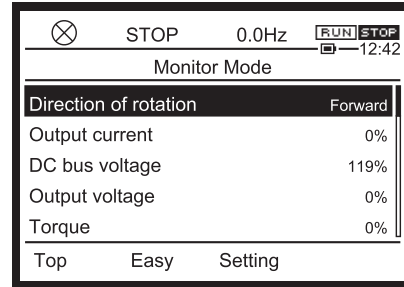
■ **Screen configuration of [Monitor mode]**

If an "OK" mark is displayed on the [F4] key when you select any of the displayed items, a details monitor is available. When you press the [F4] key or [OK] key, you can go to the details monitor. When you press the [i] key, you can check the inverter rating and the CPU version.

1) **Direction of rotation**

"Forward" or "Reverse" is displayed.

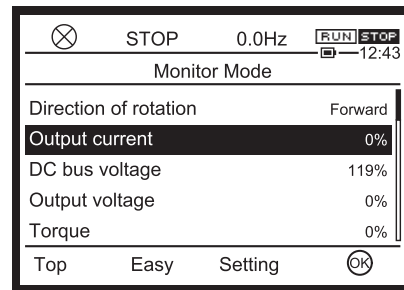
The direction of rotation of the monitor output by the inverter is displayed whether the motor is run or stopped.



2) **Selected monitor 1 to 8**

The monitor items selected with <F711: Monitor mode 1 display> to <F718: Monitor mode 8 display> are displayed. In the default setting, the following monitor items are displayed.

- Output current
- Input voltage (DC detection)
- Output voltage
- Torque
- Input power
- Output power
- Inverter load factor
- Motor load factor



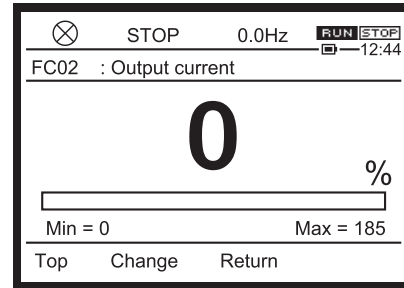
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Memo

- Output current: The current monitored is displayed in percentage. The value indicated on the nameplate is 100%. The unit can be switched to A (amperes). Set <F701: Current, voltage units select> to "1: A (ampere), V (volt)."
- Input voltage: The reference values (100% values) are 200 V (240 V class) and 400 V (480 V class). The voltage displayed is the voltage determined by converting the voltage measured in the DC section into an AC voltage. The unit can be switched to V (volts). Set <F701: Current, voltage units select> to "1: A (ampere), V (volt)."
- Output voltage: The reference values (100% values) are 200 V (240 V class) and 400 V (480 V class). The voltage displayed is the output command voltage. The unit can be switched to V (volts). Set <F701: Current, voltage units select> to "1: A (ampere), V (volt)."
- Load factor of inverter: Depending on <F300: Carrier frequency> setting and so on, the actual rated current may become smaller than the rated output current indicated on the nameplate. With the actual rated current at that time (after reduction) as 100%, the proportion of the load current to the rated current is indicated in percent. The load factor is also used to calculate the conditions for overload trip "OL1".

In the details monitor, it is indicated with a graphic bar.

When you press the [F2] key ("Change"), you can go to <F711: Monitor mode 1 display> to <F718: Monitor mode 8 display> to change settings.



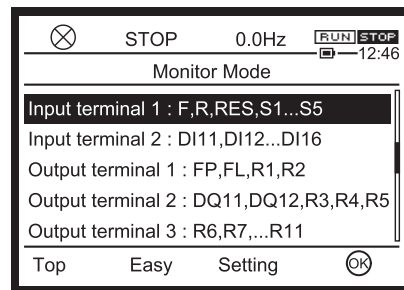
Title	Parameter name	Adjustment range	Default setting
F711	Monitor mode 1 display	0 - 162 ^{*1}	2
F712	Monitor mode 2 display	0 - 162 ^{*1}	3
F713	Monitor mode 3 display	0 - 162 ^{*1}	4
F714	Monitor mode 4 display	0 - 162 ^{*1}	8
F715	Monitor mode 5 display	0 - 162 ^{*1}	18
F716	Monitor mode 6 display	0 - 162 ^{*1}	19
F717	Monitor mode 7 display	0 - 162 ^{*1}	35
F718	Monitor mode 8 display	0 - 162 ^{*1}	34

*1 For details, refer to the table at the end of this subsection.

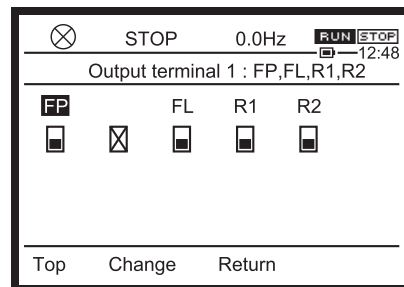
3) Input/output terminals

The details monitor displays the ON/OFF status of the following input/output terminals.

- Input terminal 1 (F, R, RES, S1...S4, S5)
- Input terminal 2 (DI11, DI12...DI16)
- Output terminal 1 (FP, FL,R1, R2)
- Output terminal 2 (DQ11, DQ12, R3, R4, R5)
- Output terminal 3 (R6, R7...R11)



If the terminal you have selected has a related parameter, the [F2] key ("Change") is displayed. When you press the [F2] key ("Change"), you can go to the screen of the related parameter to change the setting.

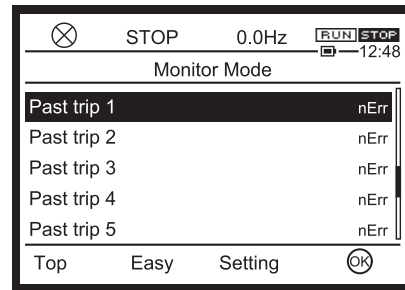


4) Past trip 1 to 8

The trip records are displayed. Past trip 1 is the record of the latest trip, and Past trip 8 is the record of the oldest trip.

If no trip information exists, "nErr" is displayed.

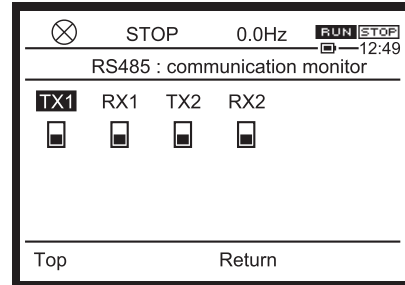
On the details monitor, you can check the details of trips. Refer to [8.1.2].



5) Communication status

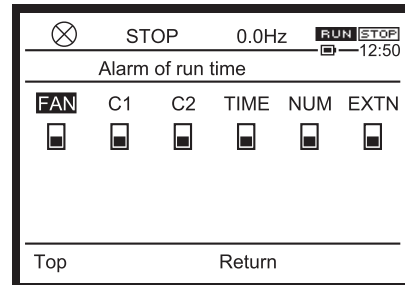
The details monitor displays the transmitting/receiving status of RS485 communication connector 1, 2.

The connector 1 signal transmitting "TX1", connector 1 signal receiving "RX1", connector 2 signal transmitting "TX2", and connector 2 signal receiving "RX2" are displayed.



6) Parts replacement alarm information

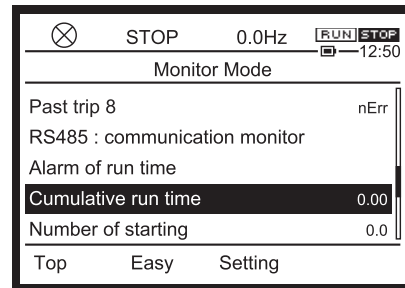
The details monitor displays replacement alarms of the cooling fan, capacitor, etc.



7) Cumulative run time

The cumulative run time of the inverter is displayed. The display unit is 100 hours, and the minimum value 0.01 is equal to 1 hour.

To clear the value, set <tyP: Default setting> to "5: Clear cumulative run time."

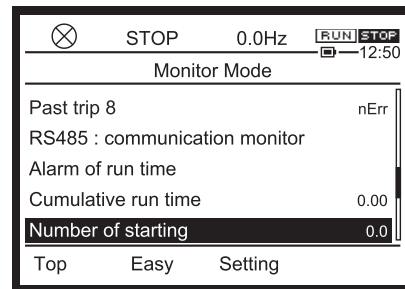


8) Number of starting

The number of starting of the inverter is displayed. The display unit is one time, and the maximum value is 9.99 million times.

(In the case of an LED display extension panel, the display unit is 10000 times, and the minimum value 0.1 is equal to 1000 times.)

To clear the value, set <tyP: Default setting> to "12: Clear cumulative run time."



■ Settings for <F711: Monitor mode 1 display> to <F718: Monitor mode 8 display>

Setting value	Function name	Display unit	Setting value	Function name	Display unit
0	Output frequency	0.1 Hz	71	Motor speed (estimated value, Max. 32700 min ⁻¹)	min ⁻¹
1	Frequency command value	0.1 Hz	72	Communication option Receiving counter	1
2	Output current	1%/<F701> setting *1	73	Communication option Abnormal counter	1
3	Input voltage (DC detection)	1%/<F701> setting *1	76	Terminal S4/S5 pulse train input value	0.10%
4	Output voltage	1%/<F701> setting *1	77	My function COUNT1	1
5	Stator frequency	0.1 Hz	78	My function COUNT2	1
6	Speed feedback frequency (real time)	0.1 Hz	79	Dancer control PID result frequency	0.1 Hz
7	Speed feedback frequency (1-second filter)	0.1 Hz	80	Embedded Ethernet Transmission counter	1
8	Torque	1% *1	81	Embedded Ethernet Receiving counter	1
9	Torque command	1% *1	82	Embedded Ethernet Abnormal counter	1
10	Output frequency during run.	Hz/free unit	83	Connected option number	1
	Frequency command value during stop.		84	My function COUNT3	1
11	Torque current	1% *1	85	My function COUNT4	1
12	Exciting current	1%	86	My function COUNT5	1
13	PID feedback value	0.1 Hz	90	Cumulative power ON time	100 hours
14	Motor overload factor (OL2 data)	1%	91	Cumulative cooling fan run time	100 hours
15	Inverter overload factor (OL1 data)	1%	92	Cumulative run time	100 hours
16	Braking resistor overload factor (OLr data)	1%	93	Cumulative overcurrent time	100 hours
17	Braking resistor load factor (%ED)	1%	95	Pump 0 run time	100 hours
18	Input power	0.1 kW *1	96	Pump 1 run time	100 hours
19	Output power	0.1 kW *1	97	Pump 2 run time	100 hours
20	Input cumulative power	<F749> setting	98	Pump 3 run time	100 hours
21	Output cumulative power	<F749> setting	99	Pump 4 run time	100 hours

Setting value	Function name	Display unit	Setting value	Function name	Display unit
22	-	-	100	Number of starting	10000 times
23	-	-	101	Number of Fwd starting	10000 times
24	Terminal RR input value	1%	102	Number of Rev starting	10000 times
25	Terminal RX input value	1%	103	External equipment counter	Time
26	Terminal II input value	1%	105	Pump 5 run time	100 hours
27	Motor speed command (max 32700 min ⁻¹)	min ⁻¹	106	Pump 6 run time	100 hours
28	Terminal FM output value	1	107	Pump 7 run time	100 hours
29	Terminal AM output value	1	108	Pump 8 run time	100 hours
30	-	-	109	Pump 9 run time	100 hours
31	Communication data output	*2	110	Number of trip	Time
32	Slot A option CPU version	-	111	Number of serious failure trip	1
33	Slot B option CPU version	-	112	Number of slight failure trip	1
34	Motor load factor	%	113	Number of specified trip 1	1
35	Inverter load factor	%	114	Number of specified trip 2	1
36	Inverter rated current	A	115	Number of specified trip 3	1
37	Inverter rated current (with carrier frequency correction)	A	120	Internal temperature 1	°C
38	Actual carrier frequency	kHz	124	Main circuit board temperature	°C
39	Slot C option CPU version	-	130	External PID3 set value	0.1 Hz
40	Embedded Ethernet CPU version	-	131	External PID3 feedback value	0.1 Hz
41	Terminal FP pulse train output value	pps	132	External PID3 result value	0.1 Hz
43	Terminal FM/AM gain setting value	-	133	External PID4 set value	0.1 Hz
44	Terminal AI4 input value	1%	134	External PID4 feedback value	0.1 Hz
45	Terminal AI5 input value	1%	135	External PID4 result value	0.1 Hz
46	My function monitor output 1	-	150	Signed output frequency	0.1 Hz
47	My function monitor output 2	-	151	Signed frequency command value	0.1 Hz
48	My function monitor output 3	-	152	Signed stator frequency	0.1 Hz
49	My function monitor output 4	-	153	Signed speed feedback frequency (real time)	0.1 Hz

Setting value	Function name	Display unit	Setting value	Function name	Display unit
62	PID result frequency	0.1 Hz	154	Signed speed feedback frequency (1-second filter)	0.1 Hz
63	PID set value	0.1 Hz	155	Signed torque	1%
64	Light-load high-speed switching load torque	1%	156	Signed torque command	1%
65	Light-load high-speed torque during constant speed run	1%	158	Signed torque current	1%
66	Pattern operation group number	0.1	159	Signed PID feedback value	0.1 Hz
67	Pattern operation remaining cycle number	1	160	Signed terminal RX input value	1%
68	Pattern operation preset speed number	1	161	Signed terminal AI4 input value	1%
69	Pattern operation remaining time	0.1	162	Signed terminal AI5 input value	1%
70	Inverter rated voltage	1 V			

*1 Filtered value.

Filter time constant can be set by <F722>.

*2 For details, refer to "RS485 Communication Function Instruction Manual" (E6582143).

8. 1. 2 Detailed display of past trip

When you press the [OK] key while Past trip 1 to 8 are displayed in [Monitor mode], more detailed information can be displayed as follows.

Unlike "Display at the time of trip" in [3. 2. 2], it can be displayed after the inverter is turned off or reset. However, the monitor value of a trip is not always recorded as the maximum value because of the time required for detection.

■Details of the past

On the detail screen of the past trip show the information of the 13 items.

The trip history number and trip name are displayed in the mode name area.

- Number of occurrences
- Output frequency
- Direction of rotation
- Frequency command value
- Output current
- Input voltage (DC detection)
- Output voltage
- Input terminal 1 (F, R, RES, S1...S4, S5)
- Output terminal 1 (FP, FL,R1, R2)
- Cumulative operation time
- Year
- Month, Date
- Hour, Minutes

⊗ STOP 10.0Hz [RUN] [STOP]	
14:16	
Past trip 1	Cooling FAN fault
Output terminal 1 : FP,FL,R1,R2	
Cumulative run time	0.00
Year	2015
Month . Day	7.13
Hour . Minute	13.06
Top	Return

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At following circumstance, the trip date (year, month, ...) are not correct.

1. LCD keypad is not attached.
2. date (year, month, ...) are not set correctly.
3. the battery of LCD keypad is empty.

8. 2 Screen display at trip occurrence

If an alarm occurs, text is displayed on the LCD screen according to the contents of the alarm.

If a trip occurs, text is displayed on the LCD screen, and the backlight turns red to indicate an error.

8. 2. 1 Display of trip information and alarm information

If the inverter trips, the contents of the trip are displayed. You can also check the status at the time of trip in [Monitor mode].

If the inverter issues an alarm, the contents of the alarm are displayed.

Refer to "Chap 13" for trip and alarm display.

8. 2. 2 Monitor display at trip

Data at the time of occurrence of the trip are retained.

Before the inverter is turned off or reset, information equivalent to "Operation Status monitor" in [8. 1. 1] can be displayed in [Monitor mode].

After power off or reset, information is stored in Past trip 1 to 8 in [Monitor mode]. For details, refer to [8. 1. 2].

9

Measures to satisfy standards

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II

This chapter explains the measures to comply with the EMC Directive, UL/CSA Standards, etc. by introducing examples.

9.1 How to deal with CE marking

CE mark is put on all products of VF-AS3 to declare that they are in conformity with the requirements of Low Voltage Directive and EMC Directive, also the products integrating the safety function are in conformity with the requirements of machine directive as safety component.

The CE mark must be put on all machines and systems with built-in inverters because such machines and systems are subject to the above directives. If they are final products, they might also be subject to the Machinery Directive.

It is the responsibility of the manufacturers of such final products to put the CE mark on each final product. In order to make machines and systems with built-in inverters comply with the EMC Directive and the Low Voltage Directive, we recommend the installation method of inverters and measures for EMC Directive described in this instruction manual.

We have tested representative models with them installed under the environment described later in this manual to check for conformity with the EMC Directive. However, we cannot check the inverters under your operating environment. EMC varies depending on the composition of the control panel with a built-in inverter(s), the relationship with other built-in electrical components, the wiring condition, the layout condition, and so on. Therefore, you need to verify yourself whether your machine and system conforms to the EMC Directive.

9.1.1 Compliance with EMC Directive

The CE mark must be put on every final product that includes an inverter(s) and a motor(s). 480V class inverters of VF-AS3 series are equipped with an EMC filter and comply with the EMC Directive if wiring is carried out correctly.

The EMC standards are broadly divided into two categories; Emission and Immunity, each of which is further categorized according to the operating environment of each individual machine as shown in the table below. We consider that the tests required for machines and systems as final products are almost the same as those required for inverters.

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Category	Subcategory	Product standards	Test standard
Emission	Radiated noise	IEC61800-3	CISPR11 (EN55011)
	Conducted noise		CISPR11 (EN55011)
Immunity	Electrostatic discharge		IEC61000-4-2
	Radio-frequency electromagnetic field		IEC61000-4-3
	Electrical fast transient/burst		IEC61000-4-4
	Surge		IEC61000-4-5
	Conducted radio-frequency common mode		IEC61000-4-6
Voltage dips, short interruptions and voltage variations	IEC61000-4-11		

(1) EMC Directive compliance of this inverter

The built-in EMC filter on the input side of this inverter (480 V class) reduces conducted noise and radiated noise from input cables. The compliance with the EMC Directive is as shown in the table below.

Inverter type	Carrier frequency <F300>	Conducted noise IEC61800-3 category C2 (EN55011 classB Group1)	Conducted noise IEC61800-3 category C3 (EN55011 classB Group1)
		Length of motor connecting cable	Length of motor connecting cable
	(kHz)	(m)	(m)
VFAS3-4004PC	4	50	150
VFAS3-4007PC	4	50	150
VFAS3-4015PC	4	50	150
VFAS3-4022PC	4	50	150
VFAS3-4037PC	4	50	150
VFAS3-4055PC	4	50	150
VFAS3-4075PC	4	50	150
VFAS3-4110PC	4	50	150
VFAS3-4150PC	4	50	150
VFAS3-4185PC	4	50	150
VFAS3-4220PC	4	50	150
VFAS3-4300PC	4	50	150
VFAS3-4370PC	4	50	150
VFAS3-4450PC	2.5	-	150
VFAS3-4550PC	2.5	-	150
VFAS3-4750PC	2.5	-	150
VFAS3-4900PC	2.5	-	150

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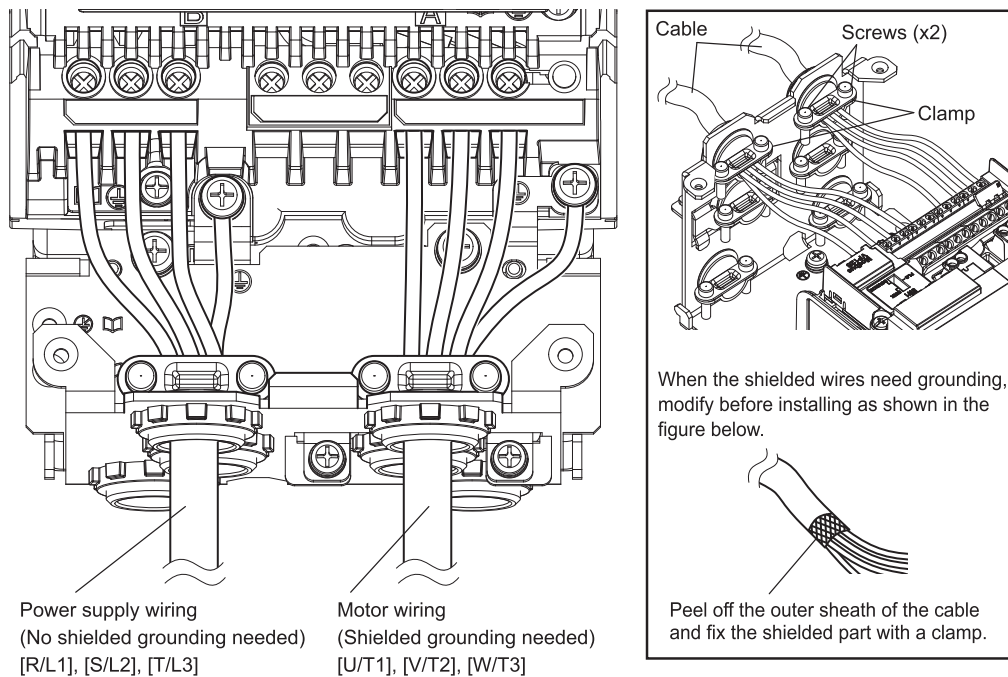
Inverter type	Carrier frequency <F300>	Conducted noise IEC61800-3 category C2 (EN55011 classB Group1)	Conducted noise IEC61800-3 category C3 (EN55011 classB Group1)
		Length of motor connecting cable	Length of motor connecting cable
	(kHz)	(m)	(m)
VFAS3-4110KPC	2.5	-	150
VFAS3-4132KPC	2.5	-	150
VFAS3-4160KPC	2.5	-	50
VFAS3-4200KPC	2.5	-	50
VFAS3-4220KPC	2.5	-	50
VFAS3-4280KPC	2.5	-	50

(2) Examples of measures to comply with EMC Directive

The following are measures to comply with the EMC Directive when you use 480V class products of VF-AS3 by installing it in other machines and systems.

- Examples of general measures
- When adding an EMC filter for further reduction of noise
- Measures for operation with external signals

The following are general EMC measures explained concretely.



Using shielded power wires and shielded control wires

- Use shielded power wires, such as inverter input/output wires, and shielded control wires.
- Route the wires and wires so as to minimize their lengths.
- Keep a distance between the power cable and the control wire and between the input and output wires of the power cable. Do not route them in parallel or bind them together. Instead, if necessary, cross at right angle.

Installing inverter in steel cabinet

- Install the inverter in a sealed steel cabinet.
- Using wires as thick and short as possible, ground the metal plate and the control panel securely with a distance kept between the grounding wire and the power wire.

Routing input and output wires apart

- Route the input and output wires apart as far as possible from each other.

Grounding of shielded wires

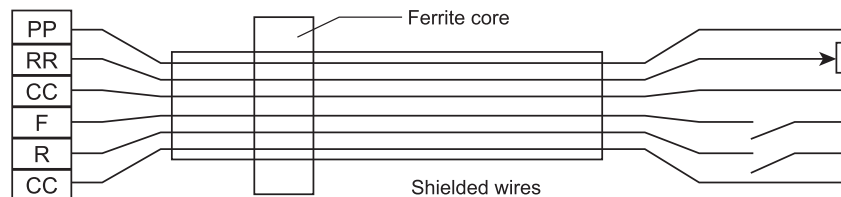
- To ground shielded wires through a metal conduit.
- To ground the shielded control wires by fixing the metal saddle of the body.
- Inserting a ferrite core in a shielded wire is even more effective in limiting the radiated noise.

Inserting zero-phase reactor and ferrite cores

- Insert a zero-phase reactor in the inverter output line.
- Insert ferrite cores in the grounding wires of the metal plate and cabinet.

(3) Measures for operation with external signals

To operate with external signals, take measures as shown in the figure below (e.g.: using a potentiometer and Fwd/Rev terminals).

**9. 1. 2 Compliance with Low Voltage Directive**

The Low Voltage Directive provides for the safety of machines and systems.

(1) Low Voltage Directive Compliance of this inverter

Inverters are CE-marked in accordance with the requirement of Low Voltage Directive, and can therefore be installed in machines or systems and exported without problem to European countries.

- Applicable standard: IEC61800-5-1
- Pollution degree: 2
- Overvoltage category: 3

(2) Example of measures to comply with Low Voltage Directive

When incorporating the inverter into a machine and system, it is necessary to take the following measures so that the inverter satisfies the Low Voltage Directive.

Installing in cabinet

- Install the inverter in a cabinet and ground the inverter enclosure.
- When doing maintenance, be extremely careful not to put your fingers into the inverter through a wiring hole and touch a charged part, which may occur depending on the model of the inverter used.

Paying attention to how to ground

- To ground shielded wires through a metal conduit.
- Connect grounding wires other than the shielded wires to the grounding terminals on the inverter.
- However, do not connect two or more grounding wires to the grounding terminals (screws) for the inverter main circuit.
- Refer to the table in [10. 1] to select a grounding wire size.

Installing protection device

- Install a fuse, an earth leakage circuit breaker (ELCB) or a molded-case circuit breaker (MCCB) on the input side of the inverter. For details, refer to [9. 2. 3] [10. 2. 2].

9.2 Compliance with UL/CSA Standards

The VF-AS3 models, that conform to the UL Standard and CSA Standard have the UL/CSA mark on the nameplate.

9.2.1 Compliance with Installation

The VF-AS3 inverter must be mounted on a wall, and used within the ambient temperature specification.

For frame size A6, A7 and A8, a UL certificate was granted on the assumption that the inverter would be installed in a cabinet. Therefore, install the inverter in a cabinet and if necessary, take measures to maintain the ambient temperature (temperature in the cabinet) within the specified temperature range.

Maximum Surrounding Air Temperature is 50°C.	
240V	0.4 - 55kW (HD), 0.75 - 75kW (ND)
480V	0.4 - 280kW (HD), 0.75 - 160kW (ND)

Maximum Surrounding Air Temperature is 45°C.	
220 - 315kW (ND)	

* Refer to [1. 2] for (HD) and (ND).

9.2.2 Compliance with Connection

Use the UL conformed cables (Rating 75°C or more, Use the copper conductors only.) to the main circuit terminals (R/L1, S/L2, T/L3, U/T1, V/T2, W/T3), UL-certified electric wire for FLA, FLB, FLC, R1A, R1C, R2A and R2C terminals.

For instruction in the United States, Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electrical Code and any additional local codes.

For instruction in the Canada, Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the Canadian Electrical Code and any additional local codes.

=> For recommended tightening torque, see [2. 3. 3]

=> For recommended electric wire sizes, see [9. 2. 3]

=> Use the electric wire of Class1 for the control circuits.

For details of wiring, terminals and the functions, refer to [2. 3. 2], [2. 3. 3], [2. 3. 4], [2. 3. 5].

9.2.3 Cautions for peripheral devices

Install a UL conformed fuse on the input side of the inverter.

For this inverter, a UL test has been conducted under the interrupting current (current that runs when interruption of power occurs) conditions in the table below. Note that the interrupting current varies depending on the applicable motor output.

Max input voltage (V)	Applicable motor output (kW @ND)	Power supply short-circuit current (A)
3-phase 240 V	0.7 - 37	Suitable For Use On A Circuit Capable Of Delivering Not More Than 5,000A rms Symmetrical Amperes, 240 Volts Maximum When Protected by J Class Fuses
	45	Suitable For Use On A Circuit Capable Of Delivering Not More Than 10,000A rms Symmetrical Amperes, 240 Volts Maximum When Protected by J Class Fuses
	55 - 75	Suitable For Use On A Circuit Capable Of Delivering Not More Than 10,000A rms Symmetrical Amperes, 240 Volts Maximum When Protected by AR Class Fuses
3-phase 480 V	0.7 - 37	Suitable For Use On A Circuit Capable Of Delivering Not More Than 5,000A rms Symmetrical Amperes, 480 Volts Maximum When Protected by J Class Fuses
	45 - 90	Suitable For Use On A Circuit Capable Of Delivering Not More Than 10,000A rms Symmetrical Amperes, 480 Volts Maximum When Protected by J Class Fuses
	110 - 132	Suitable For Use On A Circuit Capable Of Delivering Not More Than 10,000A rms Symmetrical Amperes, 480 Volts Maximum When Protected by AR Class Fuses
	160	Suitable For Use On A Circuit Capable Of Delivering Not More Than 18,000A rms Symmetrical Amperes, 480 Volts Maximum When Protected by AR Class Fuses
	220	Suitable For Use On A Circuit Capable Of Delivering Not More Than 18,000A rms Symmetrical Amperes, 480 Volts Maximum When Protected by J Class Fuses
	250 - 280	Suitable For Use On A Circuit Capable Of Delivering Not More Than 18,000A rms Symmetrical Amperes, 480 Volts Maximum When Protected by T Class Fuses
	315	Suitable For Use On A Circuit Capable Of Delivering Not More Than 30,000A rms Symmetrical Amperes, 480 Volts Maximum When Protected by T Class Fuses

For the classes, current values, and the wire sizes of fuses, refer to the following table.

9

Voltage class	Applicable motor [kW]	Inverter type	Output current *1	AIC (A) (Interrupting capacity)	Fuse class and current (A)	Power wire sizes *2	Grounding wire sizes *2
3-phase 240 V	0.75	VFAS3-2004P	4.6 <F300>="4"	AIC 5000A	J 6Amax.	AWG 14	AWG 14
	1.5	VFAS3-2007P	8.0 <F300>="4"	AIC 5000A	J 10Amax.	AWG 14	AWG 14
	2.2	VFAS3-2015P	11.2 <F300>="4"	AIC 5000A	J 15Amax.	AWG 14	AWG 14
	4.0	VFAS3-2022P	18.7 <F300>="4"	AIC 5000A	J 25A max.	AWG 10	AWG 12
	5.5	VFAS3-2037P	25.4 <F300>="4"	AIC 5000A	J 35Amax.	AWG 8	AWG 10
	7.5	VFAS3-2055P	32.7 <F300>="4"	AIC 5000A	J 45Amax.	AWG 8	AWG 10
	11	VFAS3-2075P	46.8 <F300>="4"	AIC 5000A	J 60Amax.	AWG 6	AWG 10
	15	VFAS3-2110P	63.4 <F300>="4"	AIC 5000A	J 90Amax.	AWG 4	AWG 10
	18.5	VFAS3-2150P	78.4 <F300>="4"	AIC 5000A	J 110Amax.	AWG 2	AWG 8
	22	VFAS3-2185P	92.6 <F300>="4"	AIC 5000A	J 125Amax.	AWG 1	AWG 8
	30	VFAS3-2220P	123.0 <F300>="2.5"	AIC 5000A	J 150Amax.	AWG 2/0	AWG 6
	37	VFAS3-2300P	149.0 <F300>="2.5"	AIC 5000A	J 175Amax.	AWG 3/0	AWG 6
	45	VFAS3-2370P	176.0 <F300>="2.5"	AIC 10000A	J 225Amax.	250MCM	AWG 6
	55	VFAS3-2450P	211.0 <F300>="2.5"	AIC 10000A	AR 315Amax.	AWG 2/0 × 2 *3 *4	AWG 6 *3 *4
	75	VFAS3-2550P	282.0 <F300>="2.5"	AIC 10000A	AR 350Amax.	AWG 3/0 × 2 *3 *4	AWG 4 *3 *4
3-phase 480 V	0.75	VFAS3-4004PC	2.2 <F300>="4"	AIC 5000A	J 3Amax.	AWG 14	AWG 14
	1.5	VFAS3-4007PC	4.0 <F300>="4"	AIC 5000A	J 6Amax.	AWG 14	AWG 14
	2.2	VFAS3-4015PC	5.6 <F300>="4"	AIC 5000A	J 10Amax.	AWG 14	AWG 14
	4.0	VFAS3-4022PC	9.3 <F300>="4"	AIC 5000A	J 15Amax.	AWG 14	AWG 14
	5.5	VFAS3-4037PC	12.7 <F300>="4"	AIC 5000A	J 15Amax.	AWG 12	AWG 14
	7.5	VFAS3-4055PC	16.5 <F300>="4"	AIC 5000A	J 20Amax.	AWG 10	AWG 14

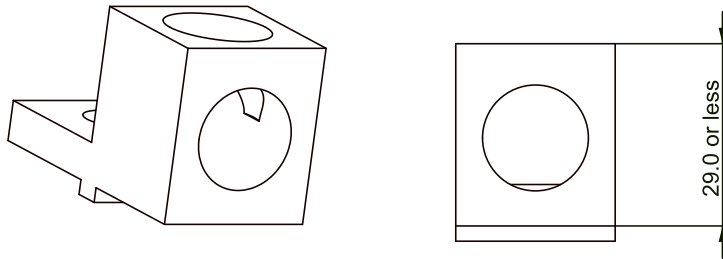
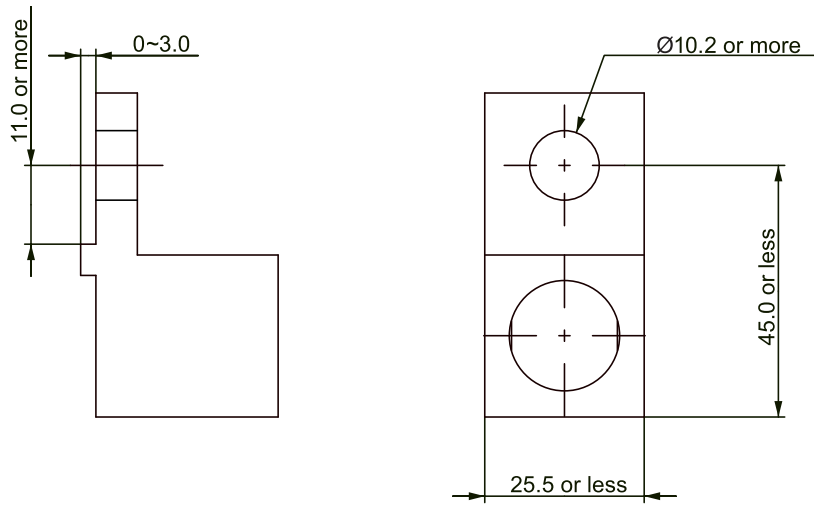
Voltage class	Applicable motor [kW]	Inverter type	Output current *1	AIC (A) (Interrupting capacity)	Fuse class and current (A)	Power wire sizes *2	Grounding wire sizes *2
3-phase 480 V	11	VFAS3-4075PC	23.5 <F300>="4"	AIC 5000A	J 30Amax.	AWG 10	AWG 10
	15	VFAS3-4110PC	31.7 <F300>="4"	AIC 5000A	J 40Amax.	AWG 8	AWG 10
	18.5	VFAS3-4150PC	39.2 <F300>="4"	AIC 5000A	J 50Amax.	AWG 8	AWG 10
	22	VFAS3-4185PC	46.3 <F300>="4"	AIC 5000A	J 60Amax.	AWG 6	AWG 10
	30	VFAS3-4220PC	61.5 <F300>="4"	AIC 5000A	J 80Amax.	AWG 4	AWG 10
	37	VFAS3-4300PC	74.5 <F300>="4"	AIC 5000A	J 100Amax.	AWG 3	AWG 8
	45	VFAS3-4370PC	88.0 <F300>="4"	AIC 10000A	J 110Amax.	AWG 1	AWG 8
	55	VFAS3-4450PC	106.0 <F300>="2.5"	AIC 10000A	J 150Amax.	AWG 1/0	AWG 6
	75	VFAS3-4550PC	145.0 <F300>="2.5"	AIC 10000A	J 200Amax.	AWG 3/0	AWG 6
	90	VFAS3-4750PC	173.0 <F300>="2.5"	AIC 10000A	J 225Amax.	250MCM	AWG 6
	110	VFAS3-4900PC	211.0 <F300>="2.5"	AIC 10000A	AR 250Amax.	AWG 1/0 × 2 *3 *4	AWG 4 *3 *4
	132	VFAS3-4110KPC	250.0 <F300>="2.5"	AIC 10000A	AR 315Amax.	AWG 2/0 × 2 *3 *4	AWG 4 *3 *4
	160	VFAS3-4132KPC	302.0 <F300>="2.5"	AIC 18000A	AR 350Amax.	AWG 4/0 × 2 *3 *4	AWG 4 *3 *4
	220	VFAS3-4160KPC	427.0 <F300>="2.5"	AIC 18000A	J 500Amax.	350MCM × 2	AWG 2/0
	250	VFAS3-4200KPC	481.0 <F300>="2.5"	AIC 18000A	J 600Amax.	250MCM × 3	AWG 2/0
	280	VFAS3-4220KPC	550.0 <F300>="2.5"	AIC 18000A	J 600Amax.	300MCM × 3	AWG 3/0
	315	VFAS3-4280KPC	616.0 <F300>="2.5"	AIC 30000A	T 800Amax.	350MCM × 3	AWG 3/0

*1 The UL rated output current is the one when the carrier frequency <F300> is the value in the table or less.

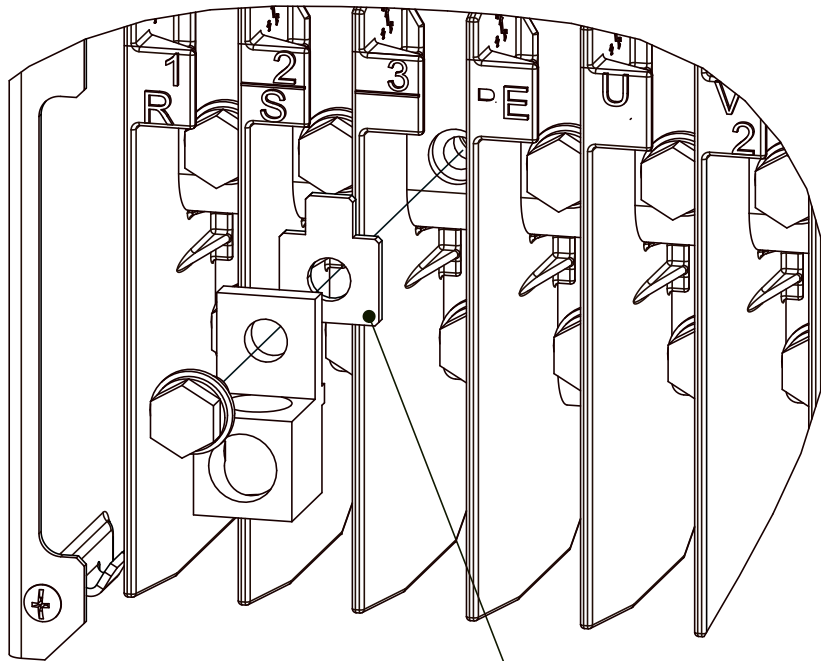
*2 The wire size is the one when 75°C is continuously allowed (ambient temperature of 40°C or less).

*3 This part shows the wiring size with using the Lug terminal.

*4 Lug terminal for Frame size A6 has some constraints. Refer to page 9-10.



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Put a sheetmetal accessory when Lug terminal has "Turn prevent" shape.

- The input withstand rating is obtained with heat calculation. If the fuse is installed to a circuit with larger input withstand rating, a reactor should be installed so that the input withstand rating should be reduced below this level.
- Output interrupt rating varies depending on the type of integral solid state short circuit. Install the fuse according to the NEC standard, local standard and type of installation.
- Use a fuse of Cooper Bussmann or Mersen.
- Be sure to use rod crimp-style terminals for the grounding terminals of the heat sink and metal plate of the inverter.

9. 2. 4 **Overload protection**

The overload protection levels are below,

HD rating: 150%-1minute, 180%-2s (Frame size A1~A6)

150%-1minute, 165%-2s (Frame size A7, A8)

ND rating: 120%-1minute, 135%-2s (All frame sizes)

For the rated current, refer to the name plate.

9. 2. 5 **Motor thermal protection**

To use the electronic thermal function of this inverter for motor thermal protection, set parameters according to the motor specifications applied. For details, refer to [5. 2. 5].

When operating multiple motors with one inverter, install overload relay for each motor.

9. 2. 6 **Motor integrated PTC thermal protection**

For details, refer to [6. 30. 19].

9. 2. 7 **Other**

Contact your Toshiba distributor or Toshiba sales representative (see the back cover of this manual), if you need the hard copy (paper) of CD-ROM.

9. 3 **Compliance with safety standards**

For details, refer to "VF-AS3 Safety function manual" (E6582068).

10 Selection and installation of peripheral devices

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II

In this chapter, the selection and installation methods of peripheral devices for this inverter are described.

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WARNING



Mandatory action

- All options to be used must be those specified by Toshiba. The use of options other than those specified by Toshiba will result in an accident.
- In using a power distribution device and options for the inverter, they must be installed in a cabinet. When they are not installed in the cabinet, this will result in electric shock.



Be sure to connect the grounding wire.

- The grounding wire must be connected securely. If the grounding wire is not securely connected, when the inverter has failure or earth leakage, this will result in electric shock or fire.

10.1 Selection of wire size

According to the voltage class and capacity of the inverter, perform wiring using appropriate wires as shown in the table below. When connecting peripheral devices to the inverter also, perform wiring according to the wire size for a wire location shown in the table below.

- The wire size is a value when using a 600 V HIV insulation wire (copper wire with the maximum allowable temperature 75 °C of an insulator) with 50 °C ambient temperature and 30 m or less the length of each wire.
- For the wire of the control circuit, use a shielded wire with 0.75 mm² or more.

■Wire size for HD rating

Voltage class	Applicable motor (kW)	Inverter type-form		Wire size (mm ²)				
				Power circuit		DC wire	Braking resistor (Optional)	Grounding wire
				Input	Output			
3-phase 240 V	0.4	VFAS3-	2004P	1.5	1.5	2.5	1.5	2.5
	0.75		2007P	1.5	1.5	2.5	1.5	2.5
	1.5		2015P	1.5	1.5	2.5	1.5	2.5
	2.2		2022P	1.5	1.5	2.5	1.5	2.5
	4.0		2037P	2.5	4	2.5	1.5	4
	5.5		2055P	4	6	4	1.5	6
	7.5		2075P	6	10	6	2.5	10
	11		2110P	10	16	10	4	16
	15		2150P	16	25	16	6	16
	18.5		2185P	25	35	25	10	16
	22		2220P	35	50	35	16	25
	30		2300P	50	70	50	25	35
	37		2370P	70	95	70	35	50
	45		2450P	95	120	95	50	70
	55		2550P	120	70x2	120	50	95
3-phase 480 V	0.4	VFAS3-	4004PC	1.5	1.5	2.5	1.5	2.5
	0.75		4007PC	1.5	1.5	2.5	1.5	2.5
	1.5		4015PC	1.5	1.5	2.5	1.5	2.5
	2.2		4022PC	1.5	1.5	2.5	1.5	2.5
	4.0		4037PC	1.5	1.5	2.5	1.5	2.5
	5.5		4055PC	1.5	2.5	2.5	1.5	2.5
	7.5		4075PC	2.5	4	2.5	1.5	2.5
	11		4110PC	4	6	4	1.5	4
	15		4150PC	6	10	6	2.5	10
	18.5		4185PC	10	10	10	2.5	10
	22		4220PC	16	16	10	4	16
	30		4300PC	25	25	16	6	16
	37		4370PC	25	35	25	10	16
	45		4450PC	35	35	35	16	16
	55		4550PC	50	50	50	16	25
	75		4750PC	95	95	70	35	50
	90		4900PC	120	120	95	35	70
	110		4110KPC	70x2	70x2	70x2	50	95
	132		4132KPC	70x2	70x2	70x2	70	95
	160		4160KPC	120x2	95x2	150x2	95	120
200	4200KPC	150x2	120x2	150x3	150	150		
220	4220KPC	150x3	120x2	150x3	150	150		
280	4280KPC	150x3	185x2	150x4	150	120x2		

■Wire size for ND rating

Voltage class	Applicable motor (kW)	Inverter type-form		Wire size (mm ²)				
				Power circuit		DC wire	Braking resistor (Optional)	Grounding wire
				Input	Output			
3-phase 240 V	0.75	VFAS3-	2004P	1.5	1.5	2.5	1.5	2.5
	1.5		2007P	1.5	1.5	2.5	1.5	2.5
	2.2		2015P	1.5	1.5	2.5	1.5	2.5
	4.0		2022P	2.5	4	2.5	1.5	4
	5.5		2037P	4	6	4	1.5	6
	7.5		2055P	6	10	6	2.5	10
	11		2075P	10	16	10	4	16
	15		2110P	16	25	16	6	16
	18.5		2150P	25	35	25	10	16
	22		2185P	35	50	35	16	25
	30		2220P	50	70	50	25	35
	37		2300P	70	95	70	35	50
	45		2370P	95	120	95	50	70
	55		2450P	70x2	70x2	50x2	50	95
	75		2550P	95x2	95x2	70x2	70	120
	3-phase 480 V		0.75	VFAS3-	4004PC	1.5	1.5	2.5
1.5		4007PC	1.5		1.5	2.5	1.5	2.5
2.2		4015PC	1.5		1.5	2.5	1.5	2.5
4.0		4022PC	1.5		1.5	2.5	1.5	2.5
5.5		4037PC	1.5		2.5	2.5	1.5	2.5
7.5		4055PC	2.5		4	2.5	1.5	2.5
11		4075PC	4		6	4	1.5	4
15		4110PC	6		10	6	2.5	10
18.5		4150PC	10		10	10	2.5	10
22		4185PC	10		16	10	4	16
30		4220PC	16		25	16	6	16
37		4300PC	25		35	25	10	16
45		4370PC	35		35	35	16	16
55		4450PC	50		50	50	16	25
75		4550PC	70		95	70	35	50
90		4750PC	95		120	95	35	70
110		4900PC	50x2		50x2	70x2	35	95
132		4110KPC	70x2		70x2	70x2	50	95
160		4132KPC	95x2		95x2	95x2	70	120
220		4160KPC	150x2		150x2	150x2	95	150
250	4200KPC	150x2	150x2	185x2	150	150		
280	4220KPC	150x3	120x3	150x3	150	120x2		
315	4280KPC	150x3	150x3	150x3	150	120x2		

10

Memo

- The wire size of this chapter comply with IEC60364-5-52 (Grounding wire: IEC60364-5-54). It does not comply with UL Standard.
- For the wire size to comply with UL Standard, refer to [9. 2. 3].

10.2 Selection of a wiring device

According to the table [10. 2. 1], select an appropriate wiring device depending on the voltage class and capacity of the inverter.

10.2.1 Selection table of a wiring device

Select a wiring device depending on the inverter type and input current in the table next.

■ Wiring devices for HD rating

Voltage class	Applicable motor (kW)	Inverter type-form		Input current (A)	Rated current (A)	
					Molded-case circuit breaker (MCCB) Earth leakage circuit breaker (ELCB)	Magnetic contactor (MC)
3-phase 240 V	0.4	VFAS3-	2004P	1.7	3	20
	0.75		2007P	3.3	5	20
	1.5		2015P	6.0	10	20
	2.2		2022P	9.0	15	20
	4.0		2037P	15.1	20	20
	5.5		2055P	20.1	30	32
	7.5		2075P	27.3	40	32
	11		2110P	40.0	50	50
	15		2150P	53.2	75	60
	18.5		2185P	64.8	100	80
	22		2220P	78.3	100	80
	30		2300P	104.7	150	150
	37		2370P	128.4	175	200
	45		2450P	157.6	200	260
55	2550P	189.0	250	260		

Voltage class	Applicable motor (kW)	Inverter type-form	Input current (A)	Rated current (A)		
				Molded-case circuit breaker (MCCB) Earth leakage circuit breaker (ELCB)	Magnetic contactor (MC)	
3-phase 480 V	0.4	VFAS3-	4004PC	0.9	3	20
	0.75		4007PC	1.8	3	20
	1.5		4015PC	3.2	5	20
	2.2		4022PC	4.9	10	20
	4.0		4037PC	8.3	10	20
	5.5		4055PC	10.9	15	20
	7.5		4075PC	14.7	20	20
	11		4110PC	21.4	30	32
	15		4150PC	28.9	40	32
	18.5		4185PC	35.4	50	50
	22		4220PC	42.1	60	50
	30		4300PC	57.1	75	60
	37		4370PC	69.9	100	80
	45		4450PC	84.8	125	100
	55		4550PC	103.3	125	135
	75		4750PC	139.8	175	200
	90		4900PC	170.2	225	260
	110		4110KPC	203.5	250	260
	132		4132KPC	240.3	300	260
	160		4160KPC	290.0	350	350
200	4200KPC	360.0	500	450		
220	4220KPC	395.0	500	450		
280	4280KPC	495.0	700	660		

■Wiring devices for ND rating

Voltage class	Applicable motor (kW)	Inverter type-form		Input current (A)	Rated current (A)	
					Molded-case circuit breaker (MCCB) Earth leakage circuit breaker (ELCB)	Magnetic contactor (MC)
3-phase 240 V	0.75	VFAS3-	2004P	3.0	5	20
	1.5		2007P	5.9	10	20
	2.2		2015P	8.5	15	20
	4.0		2022P	15.1	20	20
	5.5		2037P	20.2	30	32
	7.5		2055P	27.1	40	32
	11		2075P	39.3	50	50
	15		2110P	53.0	75	60
	18.5		2150P	65.1	100	80
	22		2185P	76.0	100	80
	30		2220P	104.7	150	150
	37		2300P	128.0	175	200
	45		2370P	154.7	200	260
	55		2450P	191.9	250	260
	75		2550P	256.0	350	350
3-phase 480 V	0.75	VFAS3-	4004PC	1.6	3	20
	1.5		4007PC	3.1	5	20
	2.2		4015PC	4.5	10	20
	4.0		4022PC	8.0	10	20
	5.5		4037PC	10.8	15	20
	7.5		4055PC	14.4	20	20
	11		4075PC	20.8	30	32
	15		4110PC	28.3	40	32
	18.5		4150PC	34.9	50	50
	22		4185PC	41.4	50	50
	30		4220PC	55.9	75	60
	37		4300PC	69.0	100	80
	45		4370PC	83.4	125	100
	55		4450PC	101.9	125	135
	75		4550PC	138.0	175	200
	90		4750PC	165.1	200	260
	110		4900PC	203.5	250	260
	132		4110KPC	240.3	300	260
	160		4132KPC	284.2	350	350
	220		4160KPC	395.0	500	450
	250		4200KPC	444.0	500	450
280	4220KPC	495.0	700	660		
315	4280KPC	555.0	1000	660		

- Install a surge absorber on the exciting coil of a magnetic contactor (MC) and relays.
- When using an auxiliary contacts 2a type magnetic contactor (MC), use the 2a contacts in parallel to increase the liability of the contacts.
- Selection is for assuming a normal power supply capacity and using a Toshiba 4-pole standard motor with input power 200 V/400 V-50 Hz.
- For the influence of the leakage current, refer to [2. 4. 3].

10. 2. 2 Installation of a molded-case circuit breaker (MCCB) and earth leakage circuit breaker (ELCB)

For protection of the wiring system, install a molded-case circuit breaker (MCCB) between the power supply and the inverter (primary side).

An earth leakage circuit breaker (ELCB) that is equipped with a function to shut off by detecting leakage current can be also installed. However, be cautious that an ELCB may operate improperly, because the leakage current becomes large due to the influence of a wiring method, a built-in noise filter, etc.

Because the short-circuit current is different with power supply capacity and wiring system conditions, select MCCB or ELCB depending on the inverter type and input current in the table [10. 2. 1].

Memo

- When complying with UL Standard and CSA Standard, a fuse needs to be installed on the primary side of the inverter. For details, refer to [9. 2. 3].

10. 2. 3 Installation of a magnetic contactor (MC)

When installing a magnetic contactor (MC) on the primary or secondary side of the inverter, select following the below.

■ Installation on the primary side

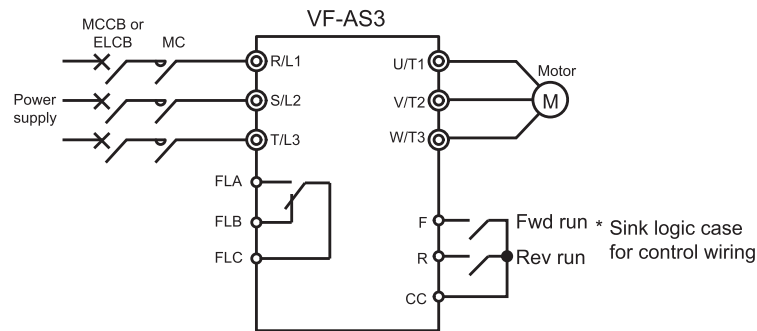
When the power side and the inverter need to be detached in the following cases, install a magnetic contactor (MC) between the power supply and the inverter (primary side).

Select a magnetic contactor (MC) depending on the inverter type and input current in the table [10. 2. 1].

- Thermal relay on the motor is activated
- Protection detection relay (FL) inside the inverter is activated
- Not to automatically restart at restoration of power after power failure
- When using the braking resistor (option), the thermal relay of the braking resistor is activated

To open the power circuit (primary side) when the protective function detection relay inside the inverter is activated, the molded-case circuit breaker (MCCB) with a power cutoff device can be installed instead of magnetic contactors (MC). Make sure the molded-case circuit breaker (MCCB) trips at the contact of protection detection relay. If earth leakage detector is not installed, earth leakage circuit breaker (ELCB) should be installed instead of MCCB.

A connection example for installing the primary-side magnetic contactor (MC) is shown next.



Important

- Do not run/stop the inverter by turning the magnetic contactor (MC) installed on the primary side ON/OFF. When run/stop the inverter, set the terminal [F] (forward) or terminal [R] (reverse) of the control terminal ON/OFF.
- Install a surge absorber on the exciting coil of a magnetic contactor (MC).

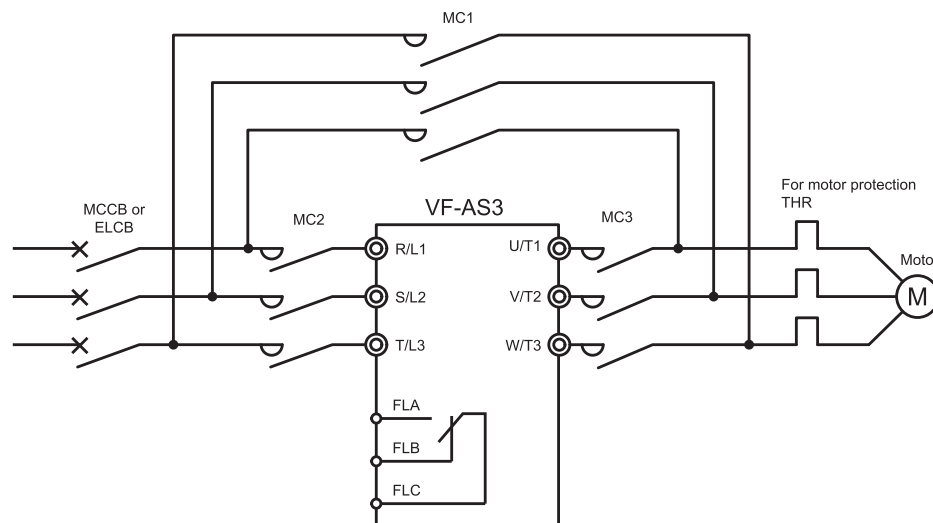
■ Installation on the secondary side

To switch the motor during the inverter is stopped, and change the motor power, a magnetic contactor (MC) can be installed between the inverter and motor (secondary side).

When operating the motor with commercial power supply by switching the circuit and not through the inverter, select a magnetic contactor (MC) with AC-3 Class and confirming to the motor rated current.

A connection example for installing the secondary-side magnetic contactor (MC) is shown next.

10





Important

- Be sure to have interlock for the commercial power supply is applied to the inverter output terminal.
- Do not turn the magnetic contactor (MC) in the secondary circuit ON/OFF during run. It can cause failure due to rush current flowing to the inverter.
- Install a surge absorber on the exciting coil of a magnetic contactor (MC).

10. 2. 4 Installation of a thermal relay (THR)

Use an electronic thermal protector of the inverter for motor overload protection. Set a motor overload protection level with a parameter according to the motor rating.

However, in the following cases, install a thermal relay (THR) between the inverter and motor (secondary side).

- Running multiple motors simultaneously with one inverter.
In this case, install a thermal relay on each motor.
- Running a motor with smaller output than applicable motor output of the standard specification
(When the motor capacity is too small to set with a parameter of the motor overload protection level).

For details on motor overload protection level, refer to [5. 3. 5].

To give sufficient protection for the motor running in a low-speed range, the use of a motor with motor winding embedded type thermal relay is recommended.

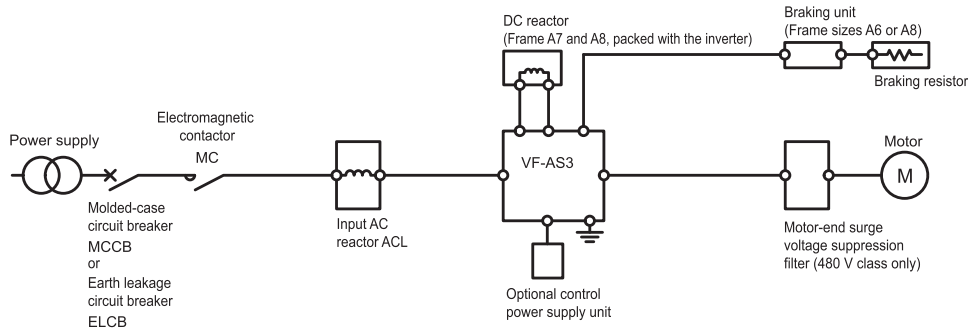


Important

- "Thermal overload relay" is recommended, install it for each motor to be protected. "Thermal relay with CT" is not available.

10.3 External options

This inverter provides external options shown in the next figure.



Functions, purposes, notes, etc. of individual external option are explained next. External options are shown in [10. 3. 9].

10.3.1 Input AC reactor, (DC reactor)

Input AC reactor is used for improving input power factor on the inverter power side (primary side), reducing harmonics or restriction of surge voltage.

It is also installed when the power supply capacity is 500 kVA or more and is 10 times or more of the inverter capacity, and when devices that cause distorted waves (a device with thyristor, etc.) and a large capacity inverter is connected on the same power distribution line. Install an input AC reactor between the power supply and the inverter (primary side).

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A DC reactor is a reactor to connect with the DC terminal, and used for improving input power factor and reducing harmonics. It has better power factor improvement effect than an input AC reactor. When a facility applying the inverter requires high reliability, it is recommended to use with an input AC reactor that has surge voltage restriction effect.

However, the frame size A1 to A6 of the inverter has a built-in DC reactor as standard, and the frame size A7 and A8 attached with a DC reactor, no option is available.

Type	Effect		
	Power factor improvement	Harmonics reduction	Surge voltage restriction
Input AC reactor	Enabled	Enabled	Enabled
DC reactor	Enabled (large)	Enabled (large)	Disabled

10. 3. 2 Braking resistor, Braking unit

It is a resistor to consume regenerative energy from a motor.

When making frequent rapid deceleration and stop, it is used to shorten deceleration time with load in large inertia.

A braking unit is necessary in addition to a braking resistor for the frame size A6 and A8.

For details on using a braking resistor, refer to [6. 15. 4].

10. 3. 3 Motor-end surge voltage suppression filter

When operating a 480 V class general purpose motor with a voltage type PWM control inverter that uses high speed switching element (IGBT, etc.), surge voltage exceeding the insulation level of motor winding is generated depending on power supply voltage, motor wire length and its laying method, and type. When the condition is repeatedly applied for a long time, it may cause deterioration of insulation on the motor.

Such measures as installation of an AC reactor, surge voltage suppression filter on the inverter output side (secondary side), and use of a high insulation strength motor are necessity.

- To be installed floor horizontal mounting.
- To be used that carrier frequency is 15kHz or less, and output frequency is 60Hz or less.

For details of carrier frequency, refer to [6. 14].

10. 3. 4 Optional control power supply

This inverter supplies control power supply from the power supply inside the inverter. When control power supply is backed up with this option, display and output signal can be maintained in case of power supply shut off.

- It is common with 240 V/480 V class.
- Type-form: CPS002Z

10. 3. 5 LED extension panel option

It is an extension panel for LED display. A specific cable is used to connect between the inverter and LED panel.

When using this panel, remove the standard operation panel, and connect to the RS485 communication connector 1.

- Panel type-form: RKP002Z
Specific cable type-form: CAB0011 (1 m), CAB0013 (3 m), CAB0015 (5 m)
- Panel type-form: RKP007Z
Specific cable type-form: CAB0071 (1 m), CAB0073 (3 m), CAB0075 (5 m)

10. 3. 6 USB communication conversion unit

It enables to set and manage parameters on a personal computer.

Connect between the RS485 communication connector 1 of the inverter and a personal computer. Use the specific cable for the inverter side, and a commercial USB cable (USB 1.1/2.0 compatible A-B connection type) for a personal computer side. Software PCM002Z for parameter management is required.

- Type-form: USB001Z
- Specific cable type-form: CAB0011 (1 m), CAB0013 (3 m), CAB0015 (5 m)

10. 3. 7 Flange mounting kit

It reduces heat rising up inside the cabinet.

10. 3. 8 Door mounting kit

It enables to mount operation panel on the cabinet door. Use the exclusive cable for interconnection between this kit and the inverter. For detail, refer to “Door mounting kit instruction manual” (E6582159).

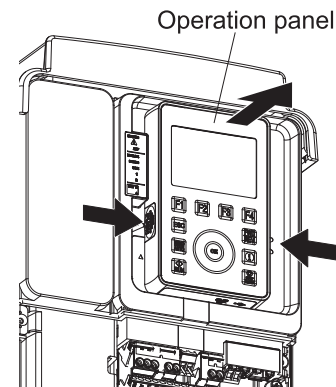
- Type-form: SBP010Z
- Specific cable type-form: CAB0071 (1 m), CAB0073 (3 m), CAB0075 (5 m) , CAB00710 (10 m)

How to remove operation panel

While pressing the PUSH part located on both right and left sides of the operation panel, pull the operation panel straight upward.

How to mount operation panel again

Push the operation panel with fixing the connector back side on RS485 communication connector 1 on control block.



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10. 3. 9 External option list

External options are shown in the next table.

Category	Product name	Specification / Ranges	Type-form	Remarks
Control option	Door mounting kit	Door mounting kit for operation panel	SBP010Z	Coming soon
	Option adapter	For Safety option & For using case of 3 options	SBP011Z	Coming soon

Category	Product name	Specification / Ranges	Type-form	Remarks
Power option	Flange mounting kit	For Frame size A1 to A5	FOT018Z to FOT022Z	
	Flange mounting kit	For Frame size A6	FOT023Z	Coming soon
	Flange mounting kit	For Frame size A7	FOT013Z	
	Flange mounting kit	For Frame size A8	FOT014Z	
	Braking unit	For Frame size A6	PB7-4132K	Coming soon
	Braking unit	For Frame size A8	PB7-4200K	
	Braking resistor	All ranges	PBR-xxx ^{*1}	
	Input reactor	All ranges	PFL-xxxS ^{*1}	
	Motor end surge suppression filter	480 V all ranges	MSF-4xxxZ ^{*1}	
Others	LED extension panel	Big LED keypad	RKP002Z	
	LED extension panel	Small LED keypad	RKP007Z	
	Control power supply unit	DC24V backup option	CPS002Z	
	USB communication conversion unit	Converter between RS485 (Inverter) and USB (PC)	USB001Z	

*1 xxx (number) varies depending on capacity.

10.4 Insert type options

This inverter is equipped with two option slots (A, B) as standard. The option adapter (option) can be mounted for an extended slot.




10.4.1 Insert type options and functions

Cassette options are available as shown in the next table.

■ Cassette options

Name	Specification	Type-form	Slot availability	Remarks
I/O extension 1	6x digital input 2x digital output 2x analog input	ETB013Z	A, B, C	Refer to E6582128
I/O extension 2	3x 1a relay	ETB014Z	A, B, C	Refer to E6582129
Digital encoder	RS422 Line receiver	VEC008Z	B	Refer to E6582140 and E6582148
Resolver	Resolver	VEC010Z	B	Coming soon
Safety module	SS1, SS2, SOS, SBC, SMS, SLS, SDI, SSM	SFT001Z	C	Coming soon
PROFINET	PROFINET interface	PNE001Z	A	
EtherCAT	EtherCAT interface	IPE003Z	A	Coming soon
PROFIBUS-DP	PROFIBUS-DP interface	PDP003Z	A	
DeveceNet	DeviceNet interface	DEV003Z	A	
CANopen	CANopen interface RJ45 D-sub Open style	CAN001Z CAN002Z CAN003Z	A	Coming soon

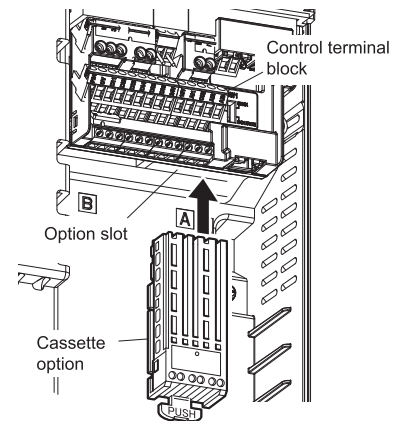
10. 4. 2 Mounting/removing insert type options

 WARNING	
 Prohibited	<ul style="list-style-type: none"> Do not connect any communication options other than supported by option slots. It can cause failure and accident.
 Mandatory action	<ul style="list-style-type: none"> Mounting/removing options should be performed 15 minutes or more after the power is shut off, and checking the charge lamp of the inverter is OFF. The inverter and options may be damaged. Do not use tools for mounting/removing options. The inverter and options may be damaged.

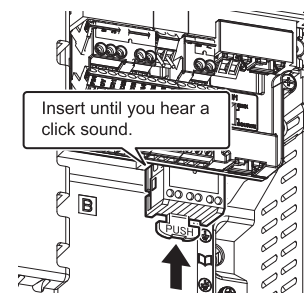
Mounting/removing methods of a cassette option to the option slot A, B are as follows. When using the option slot 3, refer to [10. 4. 3].

■ Mounting (Option slot A, B)

- Remove the front cover and other parts.
Covers to be removed at the time of wiring vary depending on the frame size.
For how to remove, refer to [2. 2].



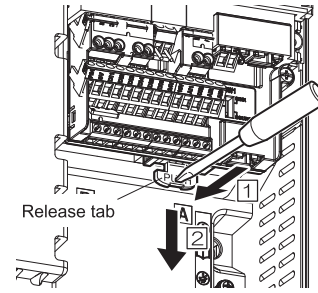
- Insert a cassette option to the option slot A, B until you hear a click sound.
- Perform wiring to the cassette option.
- When wiring is complete, mount the removed cover.
For how to mount them, refer to [2. 2].



■ Removing (Option slot A, B)

- Remove the front cover and other parts.
Covers to be removed vary depending on the frame size.
For how to remove, refer to [2. 2].
- Remove wiring to the cassette option.

- 3 While pressing the release tab down, pull the cassette option to remove from the option slot.



- 4 Mount the removed covers.
For how to mount them, refer to [2. 2].



Important

- Do not use excessive force to press a cassette option to the option slot, or the connector pin may be damaged. Along the guide, insert straight slowly.
- Depending on a cassette option, insertion to the option slot A, B may not be possible. Refer to [10. 4. 1].
- In the case of frame size A7 or A8, remove the wire-holding fitting mounted at the lower part of the option slot A, B before inserting/removing the cassette option.

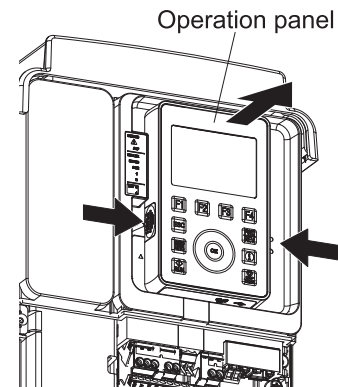
10. 4. 3 Mounting/removing the option adapter

Mounting/removing methods of the option 3 slot adapter are as follows.

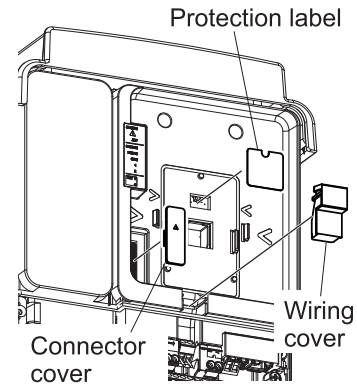
Mounting and removing methods of a cassette option is the same with option slot A, B. For details, refer to [10. 4. 2].

■ Mounting of option

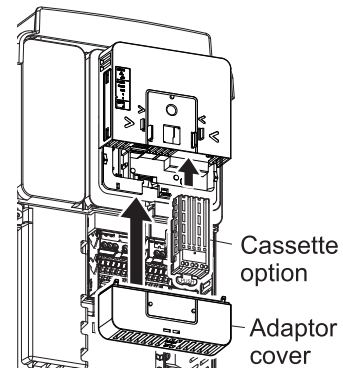
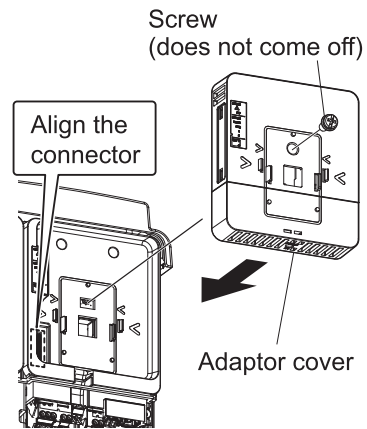
- 1 Remove the front covers and other parts in advance. Covers to be removed at the time of wiring vary depending on the frame size of inverter.
- 2 While pressing the PUSH part located on both right and left sides of the operation panel, pull the operation panel straight upward.
The operation panel is connected to the unit with the connector on the center of back side.



- 3 Remove the protection label.
- 4 Remove the connector cover.
Store the removed parts so as not to be lost.
- 5 Remove the option wiring cover.
The option wiring cover can be removed by fingers.
Store the removed parts so as not to be lost.



- 6 Match the position of the Option adaptor connector with the inverter, and mount the Option adaptor.
Store the removed parts so as not to be lost.
- 7 Tighten the screw.
This screw is used to connect ground for option.



- 8 Insert a screwdriver, etc. to the lock removal hole of the adaptor cover to push and unlock, and remove the adaptor cover upward. In this state, a cassette option can be inserted to slot C.
Using the groove of removed wiring cover, perform wiring of the cassette option before inserting the option, and fix the wiring by the attached cable tie.

- 9 After wiring is complete, mount the adaptor cover on the Option adaptor.

Be cautious that the wiring of the cassette option does not get pinched by the adaptor cover.

The removed operation panel can be installed on top surface of the Option adaptor.

- 10 Mount the removed front covers.

■ **Removing of option**

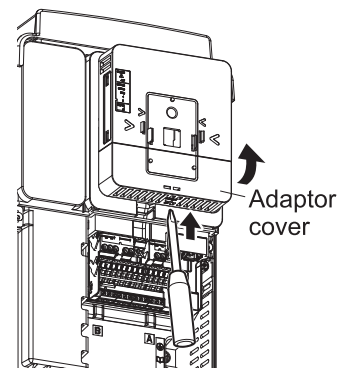
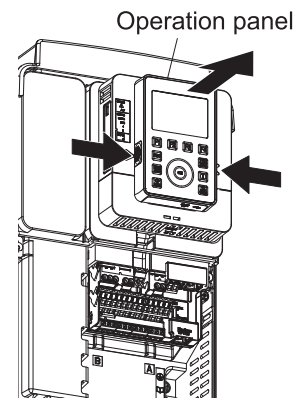
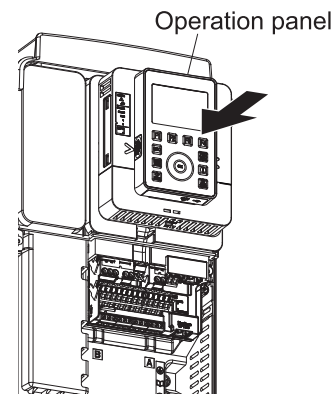
- 1 Remove the front covers and other parts in advance. Covers to be removed at the time of wiring vary depending on the frame size of inverter.

- 2 While pressing the PUSH part located on both right and left sides of the operation panel, pull the operation panel straight upward.

The operation panel is connected to the unit with the connector on the center of back side.

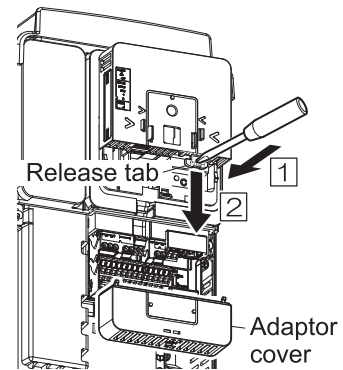
- 3 Insert a screwdriver, etc. to the lock removal hole of the Option adaptor cover to push and unlock, and remove the adaptor cover of the Option adaptor.

- 4 Remove wiring to the cassette option.

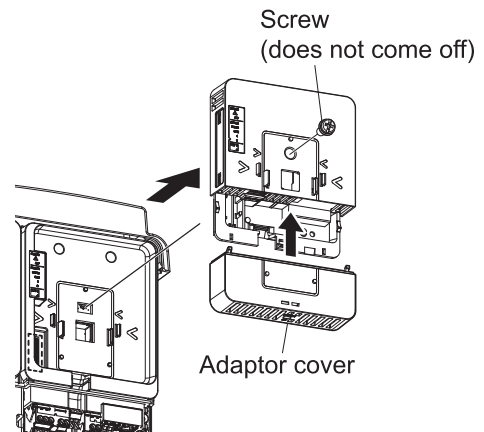


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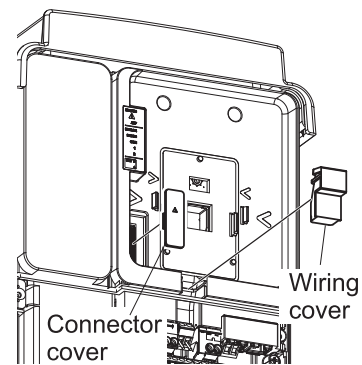
- 5 While pressing the release tab down, pull the cassette option to remove from slot C.



- 6 Remove the Option adaptor. Mount the adaptor cover removed before.



- 7 While pressing the PUSH part located on both right and left sides of the operation panel, pull the operation panel straight upward. The operation panel is connected to the unit with the connector on the center of back side.



10

11 | Table of parameters

I

II

11.1 Frequency setting parameter

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Title	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running*6	User setting	Reference
FC	Panel run frequency	LL - UL	Hz	0.1/0.01	0.0	Y		[4. 3. 1]

*1 Parameter values vary depending on the capacity. For details, refer to [11. 6].

*2 Depending on the setup menu. Refer to [11. 10].

*3 For details on the analog output and monitor output function, refer to [11. 7].

*4 Refer to section [11. 8] for details about the input terminal function.

*5 Refer to section [11. 9] for details about the output terminal function.

*6 Y: Writable N: Not writable

11.2 Basic parameter

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
AUH	-	History function	-	-	-	0	-		[4. 2. 1]
AUF	0093	Guidance function	0: - 1: Embedded Ethernet setting 2: Preset speed operation 3: Analog frequency command 4: Motor 1, 2 switching 5: Motor parameter 6: PM motor parameter	-	-	0	N		[4. 2. 1]
AUA	0090	Application easy setting	0: - 1: Initial easy setting 2: Conveyor 3: Material handling 4: Hoisting 5: Fan 6: Pump 7: Compressor	-	-	0	N		-
AUE	0032	Eco-standby power setting	0: - +1: Embedded Ethernet OFF	-	-	0	N		[5. 3. 1]
AUL	0094	Multi-rating select	0: - 1: - 2: ND rating (120%-60s) (0 after execution) 3: HD rating (150%-60s) (0 after execution) 4 - 8: -	-	-	0	N		[1. 2] [5. 3. 2]
AU1	0000	Automatic Acc/Dec	0: Disabled 1: Automatic Acc/Dec 2: Automatic Acc only	-	-	0	N		[5. 3. 3]
AU2	0001	Torque boost macro	0: Disabled 1: Automatic torque boost + offline auto-tuning 2: Vector control 1 + offline auto-tuning 3: Energy savings + offline auto-tuning	-	-	0	N		[5. 3. 4] [5. 3. 5] [6. 23. 1]
CMOd	0003	Run command select	0: Terminal 1: Operation panel, Extension panel 2: Embedded Ethernet 3: RS485 communication (connector 1) 4: RS485 communication (connector 2) 5: Communication option	-	-	0	N		[4. 3. 1] [4. 4. 1] [5. 2. 1]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
FMOd	0004	Frequency command select 1	0: - 1: Terminal RR 2: Terminal RX 3: Terminal II 4: Terminal AI4 (option) 5: Terminal AI5 (option) 6 - 9: - 10: Touch wheel 1 (power off or press OK to save) 11: Touch wheel 2 (press OK to save) 12: Sr0 13,14: - 15: Terminal Up/Down frequency 16: Pulse train 17: High resolution pulse train (option) 18,19: - 20: Embedded Ethernet 21: RS485 communication (connector 1) 22: RS485 communication (connector 2) 23: Communication option	-	-	1	N		[4. 3. 1] [4. 4. 1] [5. 2. 1] [5. 4. 1] [7. 3. 2] [7. 3. 3] [7. 3. 4]
Pt	0015	V/f Pattern	0: V/f constant 1: Variable torque 2: Automatic torque boost 3: Vector control 1 4: Energy savings 5: Dynamic energy savings (for fan and pump) 6: PM motor control 7: V/f 5-point setting 8: - 9: Vector control 2 (speed / torque) 10: PG feedback control 11: PG feedback vector control (speed / torque) 12: -	-	-	0	N		[5. 3. 4] [5. 3. 5] [6. 23. 1] [6. 23. 2]
vb	0016	Manual torque boost 1	0.00 - 30.00	%		*1	Y		[5. 3. 6]
vL	0014	Base frequency 1	15.0 - 590.0	Hz		50.0 / 60.0 *2	Y		[5. 2. 2]
vLv	0409	Base frequency voltage 1	240V class: 50-330V 480V class: 50-660V	V		*2	Y		[5. 2. 2]
FH	0011	Maximum frequency	30.0 - 590.0	Hz		*2	N		[5. 2. 3]
UL	0012	Upper limit frequency	0.0 - FH	Hz		50.0 / 60.0 *2	Y		[5. 2. 3]
LL	0013	Lower limit frequency	0.0 - UL	Hz		0.0	Y		[5. 2. 3] [6. 9]
ACC	0009	Acceleration time 1	0.0 - 6000 (600.0)	s		*1	Y		[5. 2. 4] [5. 3. 3] [6. 27. 2]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
dEC	0010	Deceleration time 1	0.0 - 6000 (600.0)	s		*1	Y		[5. 2. 4] [5. 3. 3] [6. 27. 2]
Sr0	0030	Preset speed 0	LL - UL	Hz		0.0	Y		[5. 3. 7]
Sr1	0018	Preset speed 1	LL - UL	Hz		0.0	Y		[4. 4. 3] [5. 3. 7] [6. 28]
Sr2	0019	Preset speed 2	LL - UL	Hz		0.0	Y		
Sr3	0020	Preset speed 3	LL - UL	Hz		0.0	Y		
Sr4	0021	Preset speed 4	LL - UL	Hz		0.0	Y		[5. 3. 7] [6. 28]
Sr5	0022	Preset speed 5	LL - UL	Hz		0.0	Y		
Sr6	0023	Preset speed 6	LL - UL	Hz		0.0	Y		
Sr7	0024	Preset speed 7	LL - UL	Hz		0.0	Y		
FPId	0025	PID1 set value	F368 - F367	Hz		0.0	Y		[5. 3. 8] [6. 21]
Fr	0008	Panel Fwd/Rev run select	0: Fwd run 1: Rev run 2: Fwd run (switchable F/R by panel) 3: Rev run (switchable F/R by panel)	-	-	0	Y		[4. 3. 2] [5. 3. 9]
tHrA	0031	Motor overload protection current 1	Depending on capacity *1	A		*1	Y		[5. 2. 5]
OLM	0017	Motor overload protection characteristic	0: Standard motor, OL2, No stall 1: Standard motor, OL2, Stall 2: Standard motor, No OL2 trip, No stall 3: Standard motor, No OL2 trip, Stall 4: Constant torque motor, OL2, No stall 5: Constant torque motor, OL2, Stall 6: Constant torque motor, No OL2 trip, No stall 7: Constant torque motor, No OL2 trip, Stall	-	-	0	Y		[5. 2. 5]
FMSL	0005	Terminal FM function	0 - 162 *3	-	-	0	Y		[5. 2. 6]
FM	0006	Terminal FM adjustment	-	-	-	-	Y		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
tyP	0007	Default setting	0: - 1: 50Hz setting 2: 60Hz setting 3: Default setting 1 4: Clear past trips 5: Clear cumulative run time 6: Initialize type form 7: Store user settings 8: Rewrite user settings 9: Clear cumulative fan run time 10,11: - 12: Clear number of starting 13: Default setting 2 (complete initialization) 14: Clear number of external equipment starting 15: Clear cumulative overcurrent time	-	-	0	N		[5. 2. 9]
SEt	0099	Region setting check	0: Setup menu starting 1: Japan (read only) 2: Mainly North America (read only) 3: Mainly Asia (read only) 4: Mainly Europe (read only) 5: Mainly China (read only)	-	-	0	N		[5. 3. 10]
PSEL	0050	Parameter mode select	0: Setting mode at power on 1: Easy mode at power on 2: Easy mode only	-	-	0	Y		[5. 2. 8]
F1--	-	Head of F100	-	-	-	-	-		[11. 3]
F2--	-	Head of F200	-	-	-	-	-		
F3--	-	Head of F300	-	-	-	-	-		
F4--	-	Head of F400	-	-	-	-	-		
F5--	-	Head of F500	-	-	-	-	-		
F6--	-	Head of F600	-	-	-	-	-		
F7--	-	Head of F700	-	-	-	-	-		
F8--	-	Head of F800	-	-	-	-	-		
F9--	-	Head of F900	-	-	-	-	-		
A---	-	Start of A	-	-	-	-	-		[11. 4]
C---	-	Start of C	-	-	-	-	-		[11. 5]
GrU	-	Changed parameters search & edit	-	-	-	-	-		-

*1 Parameter values vary depending on the capacity. For details, refer to [11.6].

*2 Depending on the setup menu. Refer to [11.10].

*3 For details on the analog output and monitor output function, refer to [11.7].

*4 Refer to section [11.8] for details about the input terminal function.

*5 Refer to section [11.9] for details about the output terminal function.

*6 Y: writable N: Not writable

11.3 Extended parameter

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F100	0100	Low-speed signal output frequency	0.0 - FH	Hz		0.0	Y		[2. 4. 1] [6. 1. 1]
F101	0101	Reach signal specified frequency	0.0 - FH	Hz		0.0	Y		[6. 1. 3]
F102	0102	Reach signal detection band	0.0 - FH	Hz		2.5	Y		[6. 1. 2] [6. 1. 3]
F105	0105	Fwd/Rev priority of both close	0: Reverse 1: Stop	-	-	1	N		[6. 2. 1]
F107	0107	Terminal RX input voltage select	0: 0 to +10 V 1: -10 to +10 V	-	-	0	N		[6. 2. 2] [6. 6. 2] [7. 3. 1] [7. 3. 4]
F108	0108	Terminal RR input select	1: Voltage input (0-10 V) 2: - 3: - 4: PTC input 5: PT100 (2-wire) input 6: - 7: PT1000 (2-wire) input 8: - 9: KTY84 input	-	-	1	N		[6. 2. 3] [6. 6. 2] [6. 30. 19]
F110	0110	Always active function 1	0 - 177*4	-	-	6	N		[6. 3. 1] [7. 2. 1]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F111	0111	Terminal F function 1	0 - 203*4	-	-	2	N		[7. 2. 1]
F112	0112	Terminal R function 1		-	-	4	N		
F113	0113	Terminal RES function 1		-	-	8	N		
F114	0114	Terminal S1 function 1		-	-	10	N		
F115	0115	Terminal S2 function		-	-	12	N		
F116	0116	Terminal S3 function		-	-	14	N		
F117	0117	Terminal S4 function		-	-	16	N		
F118	0118	Terminal S5 function		-	-	118	N		
F119	0119	Terminal DI11 function		-	-	0	N		
F120	0120	Terminal DI12 function		-	-	0	N		
F121	0121	Terminal DI13 function	-	-	0	N			
F122	0122	Terminal DI14 function	-	-	0	N			
F123	0123	Terminal DI15 function	-	-	0	N			
F124	0124	Terminal DI16 function	0 - 203*4	-	-	0	N		
F127	0127	Always active function 2	0 - 177*4	-	-	0	N		[6. 3. 1] [7. 2. 1]
F128	0128	Always active function 3		-	-	0	N		
F130	0130	Terminal FP function 1	0 - 255*5	-	-	6	N		[7. 2. 2]
F132	0132	Terminal FL function		-	-	10	N		
F133	0133	Terminal R1 function 1		-	-	4	N		
F134	0134	Terminal R2 function		-	-	254	N		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F135	0135	Terminal R1 delay time	0.0 - 60.0	s		0.0	N		[7. 2. 2]
F136	0136	Terminal R2 delay time	0.0 - 60.0	s		0.0	N		
F137	0137	Terminal FP function 2	0 - 255*5	-	-	255	N		
F138	0138	Terminal R1 function 2		-	-	255	N		
F139	0139	Terminal FP, R1 logic select	0: F130 and F137, F133 and F138 1: F130 and F137, F133 or F138 2: F130 or F137, F133 and F138 3: F130 or F137, F133 or F138	-	-	0	N		
F140	0140	Terminal F response time	1 - 1000	ms		1	N		[7. 2. 1]
F141	0141	Terminal R response time	1 - 1000	ms		1	N		
F142	0142	Terminal RES response time	1 - 1000	ms		1	N		
F143	0143	Terminal S1 response time	1 - 1000	ms		1	N		
F144	0144	Terminal S2-S5 response time	1 - 1000	ms		1	N		
F145	0145	Terminal DI11-DI16 response time	1 - 1000	ms		1	N		
F146	0146	Terminal S4 input select	0: Digital input. 1: Pulse train input 2: PG input	-	-	0	N		[6. 6. 4] [7. 2. 1]
F147	0147	Terminal S5 input select	0: Digital input. 1: Pulse train input 2: PG input	-	-	0	N		
F148	0148	Terminal AI4 input select	1: Voltage input (0-10 V) 2: Voltage input (-10 to +10V) 3: Current input (0-20 mA) 4: PTC input 5: PT100 (2-wire) input 6: PT100 (3-wire) input 7: PT1000 (2-wire) input 8: PT1000 (3-wire) input 9: KTY84 input	-	-	1	N		[6. 2. 4] [6. 6. 2] [6. 30. 19] [7. 2. 1]
F149	0149	Terminal AI5 input select	1: Voltage input (0-10 V) 2: Voltage input (-10 to +10V) 3: Current input (0-20 mA) 4: PTC input 5: PT100 (2-wire) input 6: PT100 (3-wire) input 7: PT1000 (2-wire) input 8: PT1000 (3-wire) input 9: KTY84 input	-	-	1	N		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F151	0151	Terminal F function 2	0 - 203*4	-	-	0	N		[7. 2. 1]
F152	0152	Terminal R function 2		-	-	0	N		
F153	0153	Terminal RES function 2		-	-	0	N		
F154	0154	Terminal S1 function 2		-	-	0	N		
F155	0155	Terminal F function 3		-	-	0	N		
F156	0156	Terminal R function 3		-	-	0	N		
F157	0157	Terminal RES function 3		-	-	0	N		
F158	0158	Terminal S1 function 3		-	-	0	N		
F159	0159	Terminal DQ11 function	0 - 255*5	-	-	254	N		[7. 2. 2]
F160	0160	Terminal DQ12 function		-	-	254	N		
F161	0161	Terminal R4 function		-	-	254	N		
F162	0162	Terminal R5 function		-	-	254	N		
F163	0163	Terminal R6 function		-	-	254	N		
F170	0170	Base frequency 2	15.0 - 590.0	Hz		50.0 / 60.0 *2	Y		[6. 4]
F171	0171	Base frequency voltage 2	240V class: 50-330V 480V class: 50-660V	V		*2	Y		
F172	0172	Manual torque boost 2	0.00 - 30.00	%		*1	Y		
F173	0173	Parameter for manufacturer	-	-	-	-	-		-
F174	0174	Base frequency 3	15.0 - 590.0	Hz		50.0/ 60.0 *2	Y		[6. 4]
F175	0175	Base frequency voltage 3	240V class: 50-330V 480V class: 50-660V	V		*2	Y		
F176	0176	Manual torque boost 3	0.00 - 30.00	%		*1	Y		
F177	0177	Parameter for manufacturer	-	-	-	-	-		-
F178	0178	Base frequency 4	15.0 - 590.0	Hz		50.0/ 60.0 *2	Y		[6. 4]
F179	0179	Base frequency voltage 4	240V class: 50-330V 480V class: 50-660V	V		*2	Y		
F180	0180	Manual torque boost 4	0.00 - 30.00	%		*1	Y		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F181	0181	Parameter for manufacturer	-	-	-	-	-		-
F182	0182	Motor overload protection current 2	Depending on capacity *1	A		*1	Y		[6. 4]
F183	0183	Motor overload protection current 3		A		*1	Y		
F184	0184	Motor overload protection current 4		A		*1	Y		
F185	0185	Stall prevention level 2	10-200 (HD) 10-160 (ND)	% (A)		150 (HD) 120 (ND)	Y		[6. 30. 2]
F190	0190	V/f 5-point VF1 frequency	0.0 - FH	Hz		0.0	N		[5. 3. 4]
F191	0191	V/f 5-point VF1 voltage	0.0 - 125.0	% (V)		0.0	N		
F192	0192	V/f 5-point VF2 frequency	0.0 - FH	Hz		0.0	N		
F193	0193	V/f 5-point VF2 voltage	0.0 - 125.0	% (V)		0.0	N		
F194	0194	V/f 5-point VF3 frequency	0.0 - FH	Hz		0.0	N		
F195	0195	V/f 5-point VF3 voltage	0.0 - 125.0	% (V)		0.0	N		
F196	0196	V/f 5-point VF4 frequency	0.0 - FH	Hz		0.0	N		
F197	0197	V/f 5-point VF4 voltage	0.0 - 125.0	% (V)		0.0	N		
F198	0198	V/f 5-point VF5 frequency	0.0 - FH	Hz		0.0	N		
F199	0199	V/f 5-point VF5 voltage	0.0 - 125.0	% (V)		0.0	N		
F200	0200	Frequency command priority select	0: FMOd/F207 (switched by TB) 1: FMOd/F207 (switched by F208)	-	-	0	Y		[5. 4. 1] [6. 6. 1]
F201	0201	RR point 1 input value	0 - 100	%		0	Y		[6. 6. 2] [7. 3. 1] [7. 3. 2]
F202	0202	RR point 1 frequency	0.0 - 590.0	Hz		0.0	Y		
F203	0203	RR point 2 input value	0 - 100	%		100	Y		
F204	0204	RR point 2 frequency	0.0 - 590.0	Hz		50.0/ 60.0 *2	Y		
F205	0205	RR point 1 rate	0 - 250	%		0	Y		[6. 6. 2]
F206	0206	RR point 2 rate	0 - 250	%		100	Y		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F207	0207	Frequency command select 2	0: - 1: Terminal RR 2: Terminal RX 3: Terminal II 4: Terminal AI4 (option) 5: Terminal AI5 (option) 6 - 9: - 10: Touch wheel 1 (power off or press OK to save) 11: Touch wheel 2 (press OK to save) 12: Sr0 13,14: - 15: Terminal Up/Down frequency 16: Pulse train 17: High resolution pulse train (option) 18,19: - 20: Embedded Ethernet 21: RS485 communication (connector 1) 22: RS485 communication (connector 2) 23: Communication option	-	-	3	N		[5. 4. 1] [6. 6. 1]
F208	0208	Frequency command switching frequency	0.1 - FH	Hz		0.1	Y		
F209	0209	Analog input filter	1: Disabled 2 - 1000	ms		1	Y		
F210	0210	RX point 1 input value	-100 to +100	%		0	Y		
F211	0211	RX point 1 frequency	0.0 - 590.0	Hz		0.0	Y		[6. 6. 2] [7. 3. 1] [7. 3. 4]
F212	0212	RX point 2 input value	-100 to +100	%		100	Y		
F213	0213	RX point 2 frequency	0.0 - 590.0	Hz		50.0/ 60.0 *2	Y		
F214	0214	RX point 1 rate	-250 to +250	%		0	Y		[6. 6. 2]
F215	0215	RX point 2 rate	-250 to +250	%		100	Y		
F216	0216	II point 1 input value	0 - 100	%		20	Y		
F217	0217	II point 1 frequency	0.0 - 590.0	Hz		0.0	Y		[6. 6. 2] [7. 3. 1] [7. 3. 3]
F218	0218	II point 2 input value	0 - 100	%		100	Y		
F219	0219	II point 2 frequency	0.0 - 590.0	Hz		50.0/ 60.0 *2	Y		
F220	0220	II point 1 rate	0 - 250	%		0	Y		[6. 6. 2]
F221	0221	II point 2 rate	0 - 250	%		100	Y		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F222	0222	AI4 point 1 input value	-100 to +100	%		0	Y		[6. 6. 2] [7. 3. 1]
F223	0223	AI4 point 1 frequency	0.0 - 590.0	Hz		0.0	Y		
F224	0224	AI4 point 2 input value	-100 to +100	%		100	Y		
F225	0225	AI4 point 2 frequency	0.0 - 590.0	Hz		50.0/ 60.0 *2	Y		
F226	0226	AI4 point 1 rate	-250 to +250	%		0	Y		[6. 6. 2]
F227	0227	AI4 point 2 rate	-250 to +250	%		100	Y		
F228	0228	AI5 point 1 input value	-100 to +100	%		0	Y		[6. 6. 2] [7. 3. 1]
F229	0229	AI5 point 1 frequency	0.0 - 590.0	Hz		0.0	Y		
F230	0230	AI5 point 2 input value	-100 to +100	%		100	Y		
F231	0231	AI5 point 2 frequency	0.0 - 590.0	Hz		50.0/ 60.0 *2	Y		
F234	0234	Pulse train input point 1 input value	0 - 100	%		0	Y		[6. 6. 4]
F235	0235	Pulse train input point 1 frequency	0.0 - 590.0	Hz		0.0	Y		
F236	0236	Pulse train input point 2 input value	0 - 100	%		100	Y		
F237	0237	Pulse train input point 2 frequency	0.0 - 590.0	Hz		50.0/ 60.0 *2	Y		
F239	0239	Parameter for manufacturer	-	-	-	-	-		-
F240	0240	Start frequency	0.0 - 10.0	Hz		0.1	Y		[6. 7. 1]
F241	0241	Run frequency	0.0 - FH	Hz		0.0	Y		[6. 7. 2]
F242	0242	Run frequency hysteresis	0.0 - FH	Hz		0.0	Y		
F243	0243	End frequency	0.0 - 30.0	Hz		0.0	Y		[6. 7. 1]
F244	0244	0 Hz dead band	0.0 - 5.0	Hz		0.0	Y		[6. 7. 3]
F249	0249	DC braking carrier frequency	1.0 - 16.0	kHz		*1	Y		[6. 8. 1]
F250	0250	DC braking frequency	0.0 - FH	Hz		0.0	Y		[6. 8. 1] [6. 8. 3]
F251	0251	DC braking current	0 - 100	%		50	Y		[6. 8. 1] [6. 30. 4]
F252	0252	DC braking time	0.0 - 25.5	s		1.0	Y		[6. 8. 1] [6. 8. 3]
F253	0253	Fwd/Rev DC braking priority	0: Disabled 1: Enabled	-	-	0	Y		[6. 8. 1]
F254	0254	Motor shaft fixing control	0: Disabled 1: Enabled	-	-	0	Y		[6. 8. 2]
F255	0255	0Hz command select at stop	0: DC braking 1: 0 Hz command	-	-	0	N		[6. 8. 3]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F256	0256	Run sleep detection time	0.0: Disabled 0.1 - 600.0	s		0.0	Y		[6. 9]
F257	0257	Parameter for manufacturer	-	-	-	-	-		-
F258	0258	Parameter for manufacturer	-	-	-	-	-		-
F259	0259	Run sleep detection time at startup	0.0: Disabled 0.1 - 600.0	s		0.0	Y		[6. 9]
F260	0260	Jog frequency	F240 - 20.0	Hz		5.0	Y		[6. 10]
F261	0261	Jog stop select	0: Deceleration stop 1: Coast stop 2: DC braking stop	-	-	0	N		
F262	0262	Panel jog run	0: Disabled 1: Enabled	-	-	0	Y		
F264	0264	Terminal Up response time	0.0 - 10.0	s		0.1	Y		[6. 6. 5]
F265	0265	Terminal Up frequency step	0.0 - FH	Hz		0.1	Y		
F266	0266	Terminal Down response time	0.0 - 10.0	s		0.1	Y		
F267	0267	Terminal Down frequency step	0.0 - FH	Hz		0.1	Y		
F268	0268	Initial Up/Down frequency	LL - UL	Hz		0.0	Y		
F269	0269	Up/Down frequency rewrite	0: F268 is not changed. 1: F268 is changed after power off.	-	-	1	Y		
F270	0270	Jump frequency 1	0.0 - FH	Hz		0.0	Y		[6. 11]
F271	0271	Jump frequency 1 band	0.0 - 30.0	Hz		0.0	Y		
F272	0272	Jump frequency 2	0.0 - FH	Hz		0.0	Y		
F273	0273	Jump frequency 2 band	0.0 - 30.0	Hz		0.0	Y		
F274	0274	Jump frequency 3	0.0 - FH	Hz		0.0	Y		
F275	0275	Jump frequency 3 band	0.0 - 30.0	Hz		0.0	Y		
F287	0287	Preset speed 8	LL - UL	Hz		0.0	Y		[5. 3. 7] [6. 28]
F288	0288	Preset speed 9	LL - UL	Hz		0.0	Y		
F289	0289	Preset speed 10	LL - UL	Hz		0.0	Y		
F290	0290	Preset speed 11	LL - UL	Hz		0.0	Y		
F291	0291	Preset speed 12	LL - UL	Hz		0.0	Y		
F292	0292	Preset speed 13	LL - UL	Hz		0.0	Y		
F293	0293	Preset speed 14	LL - UL	Hz		0.0	Y		
F294	0294	Preset speed 15 / Forced run speed	LL - UL	Hz		0.0	Y		[5. 3. 7] [6. 12. 2] [6. 28] [6. 31]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F295	0295	Bumpless	0: Disabled 1: Enabled	-	-	0	Y		[6. 13]
F297	0297	Parameter for manufacturer	-	-	-	-	-		-
F298	0298	Parameter for manufacturer	-	-	-	-	-		-
F300	0300	Carrier frequency	Depending on capacity *1	kHz		*1	Y		[2. 4. 1] [2. 4. 3] [6. 14]
F301	0301	Auto-restart	0: Disabled 1: Power failure 2: Terminal ST On/Off 3: Terminal ST On/Off or power failure 4: At startup	-	-	0	N		[5. 4. 2]
F302	0302	Regenerative power ride-through	0: Disabled 1: Regenerative power ride-through 2: Deceleration stop at power failure 3: Synchronized Acc/Dec (TB) 4: Synchronized Acc/Dec (TB + power failure)	-	-	0	N		[6. 15. 2]
F303	0303	Retry	0: Disabled 1 - 10	Times		0	Y		[6. 15. 3]
F304	0304	Dynamic braking, OLR trip	0: Disabled 1: Enabled, OLR trip 2: Enabled, No OLR trip 3: Enabled (except during ST OFF), OLR trip 4: Enabled (except during ST OFF), No OLR trip 5: Enabled (except during trip), OLR trip 6: Enabled (except during trip), No OLR trip 7: Enabled (except during trip & ST OFF), OLR trip 8: Enabled (except during trip & ST OFF), No OLR trip	-	-	0	N		[6. 15. 4]
F305	0305	Overvoltage limit operation	0: Enabled 1: Disabled 2: Enabled (quick deceleration) 3: Enabled (dynamic quick deceleration)	-	-	2	N		[6. 15. 5]
F306	0306	Parameter for manufacturer	-	-	-	-	-		-

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F307	0307	Supply voltage compensation, Output voltage limitation	0: Without supply voltage compensation, Limited output voltage 1: With supply voltage compensation, Limited output voltage 2: Without supply voltage compensation, Unlimited output voltage 3: With supply voltage compensation, Unlimited output voltage	-	-	*2	N		[6. 15. 6]
F308	0308	Braking resistance	0.5 - 1000	Ω		*1	N		[6. 15. 4]
F309	0309	Braking resistor capacity	0.01 - 600.0	kW		*1	N		
F310	0310	Dec time at power failure	0.0 - 320.0	s		2.0	N		[6. 15. 2]
F311	0311	Reverse inhibited	0: Allowed 1: Rev inhibited 2: Fwd inhibited 3: - 4: -	-	-	0	N		[6. 15. 7]
F312	0312	Random switching	0: Disabled 1: Random switching 1 2: Random switching 2 3: Random switching 3	-	-	0	N		[6. 14]
F313	0313	Ridethrough time	0.0: Continuous 0.1 - 320.0	s		2.0	N		[6. 15. 2]
F314	0314	Parameter for manufacturer	-	-	-	-	-		-
F315	0315	Parameter for manufacturer	-	-	-	-	-		-
F316	0316	Carrier frequency control	0: No decrease 1: Valid decrease 2: No decrease, 480V class 3: Valid decrease, 480V class 4: No decrease with sinusoidal filter 5: Valid decrease with sinusoidal filter	-	-	*1	N		[2. 4. 1] [6. 14]
F317	0317	Synchronized stop time	0.0 - 6000	s		2.0	Y		[6. 15. 2]
F318	0318	Synchronized reach time	0.0 - 6000	s		2.0	Y		
F319	0319	Regenerative over-flux upper limit	100 - 160	%		*2	N		[6. 15. 5]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F320	0320	Droop gain	0.0 - 100.0	%		0.0	Y		[6. 16]
F321	0321	Frequency at 0% droop gain	0.0 - 320.0	Hz		0.0	Y		
F322	0322	Frequency at F320 droop gain	0.0 - 320.0	Hz		0.0	Y		
F323	0323	Droop deadband torque	0 - 100	%		10	Y		
F324	0324	Droop output filter	0.1 - 200.0	rad/s		100.0	Y		
F325	0325	Brake release wait time	0.00 - 2.50	s		0.00	N		[6. 18. 1]
F326	0326	Brake release undercurrent threshold	0 - 100	% (A)		0	Y		
F327	0327	Parameter for manufacturer	-	-	-	-	-		-
F328	0328	Light-load high-speed operation	0: Disabled 1: Auto speed (Fwd: up) 2: Auto speed (Rev: up) 3: Speed F330 (Fwd: up) 4: Speed F330 (Rev: up)	-	-	0	N		[6. 17]
F329	0329	Light-load high-speed learning function	0: - 1: Fwd run only 2: Rev run only	-	-	0	N		
F330	0330	Light-load high-speed automatic operation frequency	30.0 - UL	Hz		50.0/ 60.0*2	N		
F331	0331	Light-load high-speed operation switching lower-limit frequency	5.0 - UL	HZ		40.0	Y		
F332	0332	Light-load high-speed operation load detection wait time	0.0 - 10.0	s		0.5	Y		
F333	0333	Light-load high-speed operation load detection time	0.0 - 10.0	s		1.0	Y		
F334	0334	Light-load high-speed operation heavy load detection time	0.0 - 10.0	s		0.5	Y		
F335	0335	Switching load torque during power running	-250 to +250	%		50	Y		
F336	0336	Heavy-load torque during power running	-250 to +250	%		100	Y		
F337	0337	Heavy-load torque during constant speed power running	-250 to +250	%		50	Y		
F338	0338	Switching load torque during regen	-250 to +250	%		50	Y		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F339	0339	Parameter for manufacturer	-	-	-	-	-		-
F340	0340	Creep time 1	0.00 - 10.00	s		0.00	N		[6. 18. 1]
F341	0341	Brake function	0: Disabled 1: Fwd hoisting 2: Rev hoisting 3: Horizontal operation	-	-	0	N		
F342	0342	Load torque input select	0: - 1: Terminal RR 2: Terminal RX 3: Terminal II 4: Terminal AI4 (option) 5 - 11: - 12: F343 13 - 19: - 20: Embedded Ethernet 21: RS485 communication (connector 1) 22: RS485 communication (connector 2) 23: Communication option	-	-	12	Y		[6. 18. 1]
F343	0343	Hoisting torque bias	-250 to +250 (F342 = "12" only)	%		100	Y		
F344	0344	Lowering torque bias rate	0 - 100	%		100	Y		
F345	0345	Brake releasing time	0.00 - 10.00	s		0.05	Y		
F346	0346	Creep frequency	F240 - 20.0	Hz		3.0	N		
F347	0347	Creep time 2	0.00 - 10.00	s		0.10	Y		
F348	0348	Brake learning	0: - 1: Enabled (0 after execution)	-	-	0	N		
F349	0349	Dwell operation	0: Disabled 1: F350-F353 setting 2: Terminal input	-	-	0	N		[6. 19]
F350	0350	Acc suspended frequency	0.0 - FH	Hz		0.0	Y		
F351	0351	Acc suspended time	0.0 - 10.0	s		0.0	Y		
F352	0352	Dec suspended frequency	0.0 - FH	Hz		0.0	Y		
F353	0353	Dec suspended time	0.0 - 10.0	s		0.0	Y		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F354	0354	Commercial power/ Inverter switching	0: Disabled 1: Switch at trip 2: Switch at F355 3: Switch at trip and at F355	-	-	0	N		[6. 20]
F355	0355	Commercial power switching frequency	0.0 - UL	Hz		50.0/ 60.0*2	Y		
F356	0356	Inverter switching wait time	0.10 - 10.00	s		*1	Y		
F357	0357	Commercial power switching wait time	0.10 - 10.00	s		0.62	Y		
F358	0358	Commercial power switching frequency continuous time	0.10 - 10.00	s		2.00	Y		
F359	0359	PID control1	0: Disabled 1: Process PID control 2: Speed PID control 3: Easy positioning PID control 4: Dancer control 5 - 10: - 11: Minus Process PID control 12: Minus Speed PID control 13: Minus Easy positioning PID control 14: Minus Dancer control	-	-	0	N		[5. 3. 8] [6. 21] [6. 22]
F360	0360	PID1 feedback input select	0: - 1: Terminal RR 2: Terminal RX 3: Terminal II 4: Terminal AI4 (option) 5: Terminal AI5 (option) 6 - 16: - 17: High resolution pulse train (option)	-	-	0	N		[5. 3. 8]
F361	0361	PID1 filter	0.0 - 25.0	s		0.0	Y		[6. 21]
F362	0362	PID1 proportional gain	0.01 - 100.0	-		0.30	Y		[5. 3. 8] [6. 21] [6. 22]
F363	0363	PID1 integral gain	0.01 - 100.0	s ⁻¹		0.20	Y		[5. 3. 8] [6. 21]
F364	0364	PID1 deviation upper-limit	LL - UL	Hz		50.0/ 60.0*2	Y		[6. 21]
F365	0365	PID1 deviation lower-limit	LL - UL	Hz		50.0/ 60.0*2	Y		
F366	0366	PID1 differential gain	0.00 - 2.55	s		0.00	Y		[5. 3. 8] [6. 21]
F367	0367	PID1 set value upper-limit	0.0 - FH	Hz		50.0/ 60.0*2	Y		
F368	0368	PID1 set value lower-limit	0.0 - F367	Hz		0.0	Y		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F369	0369	PID control start wait time	0 - 2400	s		0	Y		[5. 3. 8] [6. 21] [6. 22]
F370	0370	PID1 output upper-limit	LL - UL	Hz		50.0/ 60.0*2	Y		[6. 21]
F371	0371	PID1 output lower-limit	LL - UL	Hz		0.0	Y		
F372	0372	PID1 set value increase time	0.1-600.0 (Speed PID)	s		10.0	Y		
F373	0373	PID1 set value decrease time	0.1-600.0 (Speed PID)	s		10.0	Y		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F374	0374	PID1 set value agreement detection band	0.0 - FH	Hz		2.5	Y		[6. 21]
F375	0375	PG pulses number	1 - 9999	pulse		1000	N		[6. 22]
F376	0376	PG select	0: PTI (Command) - PTI (FB) 1: PTI (Command) - Digital option (FB) 2 - 5: - 6: Digital option (Command) - Non FB 7 - 9: - 10: PTI (Command) - PTI (FB inversion) 11: PTI (Command) - Digital option (FB inversion) 12 - 15: - 16: Digital option (Command inversion) - Non FB	-	-	0	N		[6. 6. 4] [6. 22]
F377	0377	PG option disconnection detection	0: Disabled 1: Enabled	-	-	0	N		-
F378	0378	Pulse train input pulses number	1 - 9999	pps		1000	N		[6. 6. 4]
F379	0379	PG option voltage	0: 5V 1: 12V 2: 24V	-	-	0	N		-
F381	0381	Simple positioning completion range	1 - 4000	pulse		100	Y		[6. 22]
F382	0382	Hit and stop control	0: Disabled 1: Enabled 2: -	-	-	0	Y		[6. 18. 2]
F383	0383	Hit and stop frequency	0.1 - 30.0	Hz		5.0	Y		
F384	0384	Hit and stop torque limit	0 - 100	%		100	Y		-
F385	0385	Hit and stop detection time	0.0 - 25.0	s		0.3	Y		-
F386	0386	Hit and stop continuation torque limit	0 - 100	%		50	Y		-
F388	0388	PID1 output dead band	0 - 100	%		0	Y		[6. 21]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F389	0389	PID1 set value select	0: selected by FMOd/ F207 1: Terminal RR 2: Terminal RX 3: Terminal II 4: Terminal AI4 (option) 5: Terminal AI5 (option) 6 - 11: - 12: FPId 13,14: - 15: Terminal Up/Down frequency 16: Pulse train 17: High resolution pulse train (option) 18,19: - 20: Embedded Ethernet 21: RS485 communication (connector 1) 22: RS485 communication (connector 2) 23: Communication option	-	-	0	N		[5. 3. 8] [6. 21]
F390	0390	Parameter for manufacturer	-	-	-	-	-		-
F391	0391	Sleep detection hysteresis	0.0 - UL	Hz		0.0	Y		[6. 9]
F392	0392	Wakeup deviation	0.0 - UL	Hz		0.0	Y		
F393	0393	Wakeup feedback	0.0 - UL	Hz		0.2	Y		
F394	0394	Parameter for manufacturer	-	-	-	-	-		-
F395	0395	Parameter for manufacturer	-	-	-	-	-		-
F399	0399	Parameter for manufacturer	-	-	-	-	-		-
F400	0400	Offline auto-tuning	0: - 1: Reset motor parameters (0 after execution) 2: Auto-tuning at run command (0 after execution) 3: Auto-tuning at TB ON 4: Motor parameters auto calculation (0 after execution) 5: 4+2 (0 after execution) 6: Auto-tuning at run command during TB ON 7: Auto-tuning F402 only at run command during TB ON	-	-	0	N		[6. 23. 1] [6. 23. 2]
F401	0401	Slip frequency gain	0 - 250	%		70	Y		[6. 23. 1]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F402	0402	Automatic torque boost	0.1 - 30.00	%		*1	Y		[6. 23. 1] [6. 23. 2]
F403	0403	Online auto-tuning	0: Disabled 1: Self-cooling motor auto-tuning 2: Forced air-cooling motor auto-tuning	-	-	0	N		[6. 23. 1]
F405	0405	Motor rated capacity	0.10 - 315.0	kW		*1	N		[6. 23. 1] [6. 23. 2]
F412	0412	Leakage inductance	0.0 - 25.0	%		*1	N		[6. 23. 1]
F413	0413	Exciting current coefficient	100 - 150	%		100	N		
F414	0414	Stall prevention coefficient	10 - 250	-		100	N		-
F415	0415	Motor rated current	Depending on capacity *1	A		*1	N		[6. 23. 1] [6. 23. 2]
F416	0416	Motor no load current	10 - 90	%		*1	N		[6. 23. 1]
F417	0417	Motor rated speed	100 - 64000	min ⁻¹		*2	N		[6. 23. 1] [6. 23. 2]
F418	0418	Parameter for manufacturer	-	-	-	-	-		-
F419	0419	Parameter for manufacturer	-	-	-	-	-		-
F420	0420	Torque command select	0: - 1: Terminal RR 2: Terminal RX 3: Terminal II 4: Terminal AI4 (option) 5 - 11: - 12: F725 13 - 19: - 20: Embedded Ethernet 21: RS485 communication (connector 1) 22: RS485 communication (connector 2) 23: Communication option	-	-	2	Y		[6. 25. 1]
F421	0421	Torque command filter	0 - 1000	ms		0	Y		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F423	0423	Tension control torque bias input	0: - 1: Terminal RR 2: Terminal RX 3: Terminal II 4: Terminal AI4 (option) 5 - 11: - 12: F725 13 - 19: - 20: Embedded Ethernet 21: RS485 communication connector 1 22: RS485 communication connector 2 23: Communication option	-	-	0	Y		[6. 25. 3]
F424	0424	Load sharing gain input	0: - 1: Terminal RR 2: Terminal RX 3: Terminal II 4: Terminal AI4 (option) 5 - 11: - 12: F725 13 - 19: - 20: Embedded Ethernet 21: RS485 communication connector 1 22: RS485 communication connector 2 23: Communication option	-	-	0	Y		[6. 25. 3]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F425	0425	Fwd speed limit input	0: - 1: Terminal RR 2: Terminal RX 3: Terminal II 4: Terminal AI4 (option) 5 - 11: - 12: F426	-	-	0	Y		[6. 25. 2]
F426	0426	Fwd speed limit level	0.0 - UL	Hz		50.0/ 60.0*2	Y		
F427	0427	Rev speed limit input	0: - 1: Terminal RR 2: Terminal RX 3: Terminal II 4: Terminal AI4 (option) 5 - 11: - 12: F428	-	-	0	Y		
F428	0428	Rev speed limit level	0.0 - UL	Hz		50.0/ 60.0*2	Y		
F430	0430	Speed limit center value input select	0: - 1: Terminal RR 2: Terminal RX 3: Terminal II 4: Terminal AI4 (option) 5 - 11: - 12: F431	-	-	0	Y		
F431	0431	Speed limit center value	0.0 - FH	Hz		0.0	Y		
F432	0432	Speed limit band	0.0 - FH	Hz		0.0	Y		
F435	0435	Rotation direction limit during torque control	0: Fwd/Rev permit 1: Command direction permit	-	-	0	Y		[6. 25. 1]
F440	0440	Power running torque limit input select 1	0: - 1: Terminal RR 2: Terminal RX 3: Terminal II 4: Terminal AI4 (option) 5 - 11: - 12: F441	-	-	12	Y		[6. 24. 1]
F441	0441	Power running torque limit level 1	0.0-249.9 250.0: Disabled	%		250.0	Y		[6. 24. 1] [6. 24. 3]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F442	0442	Regenerative torque limit input select 1	0: - 1: Terminal RR 2: Terminal RX 3: Terminal II 4: Terminal AI4 (option) 5 - 11: - 12: F443	-	-	12	Y		[6. 24. 1]
F443	0443	Regenerative torque limit level 1	0.0-249.9 250.0: Disabled	%		250.0	Y		
F444	0444	Power running torque limit level 2	0.0-249.9 250.0: Disabled	%		250.0	Y		
F445	0445	Regenerative torque limit level 2	0.0-249.9 250.0: Disabled	%		250.0	Y		
F446	0446	Power running torque limit level 3	0.0-249.9 250.0: Disabled	%		250.0	Y		
F447	0447	Regenerative torque limit level 3	0.0-249.9 250.0: Disabled	%		250.0	Y		
F448	0448	Power running torque limit level 4	0.0-249.9 250.0: Disabled	%		250.0	Y		
F449	0449	Regenerative torque limit level 4	0.0-249.9 250.0: Disabled	%		250.0	Y		
F451	0451	Acc/Dec operation after stall operation	0: Acc/Dec time 1: Minimum time	-	-	0	N		
F452	0452	Stall detection time during power running	0.00 - 10.00	s		0.00	Y		[6. 24. 3]
F453	0453	Stall operation during regen	0: Enabled 1: Disabled	-	-	0	Y		[6. 24. 4]
F454	0454	Torque limit in field weakening	0: Constant power limit 1: Constant torque limit	-	-	0	N		[6. 24. 1]
F455	0455	Torque command polarity at Rev	0: Regeneration at positive torque command 1: Power running at positive torque command	-	-	0	N		[6. 25. 1]
F456	0456	Exciting forcing level	20 - 150	%		*1	N		-
F457	0457	Exciting forcing control gain	5 - 75	Hz		50	N		-
F458	0458	Current control response	0 - 100	-		0	N		[6. 26. 1]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F459	0459	Load inertia ratio	0.1 - 100.0	Times		1.0	Y		[6. 23. 1] [6. 23. 2] [6. 26. 1]
F460	0460	Speed control response 1	0.0 - 25.0	-		0.0	Y		
F461	0461	Speed control stabilization coefficient 1	0.50 - 2.50	-		1.00	Y		
F462	0462	Speed reference filter coefficient 1	0 - 100	-		35	Y		
F463	0463	Speed control response 2	0.0 - 25.0	-		0.0	Y		
F464	0464	Speed control stabilization coefficient 2	0.50 - 2.50	-		1.00	Y		
F465	0465	Speed reference filter coefficient 2	0 - 100	-		35	Y		
F466	0466	Speed control response switching frequency	0.0 - FH	Hz		0.0	Y		
F467	0467	Parameter for manufacturer	-	-	-	-	-	-	-
F468	0468	Parameter for manufacturer	-	-	-	-	-	-	-
F469	0469	Parameter for manufacturer	-	-	-	-	-	-	-
F470	0470	RR input bias	0 - 255	-	1/1	128	Y		[6. 6. 3]
F471	0471	RR input gain	0 - 255	-	1/1	128	Y		
F472	0472	RX input bias	0 - 255	-	1/1	128	Y		
F473	0473	RX input gain	0 - 255	-	1/1	128	Y		
F474	0474	II input bias	0 - 255	-	1/1	128	Y		
F475	0475	II input gain	0 - 255	-	1/1	128	Y		
F476	0476	AI4 input bias	0 - 255	-	1/1	128	Y		
F477	0477	AI4 input gain	0 - 255	-	1/1	128	Y		
F478	0478	AI5 input bias	0 - 255	-	1/1	128	Y		
F479	0479	AI5 input gain	0 - 255	-	1/1	128	Y		
F480	0480	Inertia auto-tuning	0 - 1	-		0	N		-
F481	0481	Speed command at inertia auto-tuning	10 - 100	%		25	N		-
F482	0482	Speed variation width at inertia auto-tuning	0.1 - 25.0	%		5.0	N		-
F483	0483	Number of speed variation at inertia auto-tuning	5 - 50	Times		10	N		-
F490	0490	Parameter for manufacturer	-	-	-	-	-	-	-
F491	0491	Parameter for manufacturer	-	-	-	-	-	-	-

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F495	0495	Over modulation ratio	90 - 120	%		104	N		[6. 26. 2]
F498	0498	Parameter for manufacturer	-	-	-	-	-		-
F499	0499	Parameter for manufacturer	-	-	-	-	-		-
F500	0500	Acceleration time 2	0.0 - 6000 (600.0)	s		*1	Y		[6. 27. 2]
F501	0501	Deceleration time 2	0.0 - 6000 (600.0)	s		*1	Y		
F502	0502	Acc/Dec pattern 1	0: Linear 1: S-Pattern 1 2: S-Pattern 2	-	-	0	Y		[6. 27. 1] [6. 27. 2]
F503	0503	Acc/Dec pattern 2	0: Linear 1: S-Pattern 1 2: S-Pattern 2	-	-	0	Y		[6. 27. 2]
F504	0504	Panel Acc/Dec select	1: Acc/Dec 1 2: Acc/Dec 2 3: Acc/Dec 3 4: Acc/Dec 4	-	-	1	Y		
F505	0505	Acc/Dec switching frequency 1	0.0: Disabled 0.1 - UL	Hz		0.0	Y		
F506	0506	S-Pattern range at Acc start	0 - 50	%		10	Y		[6. 27. 1] [6. 27. 2]
F507	0507	S-Pattern range at Acc completion	0 - 50	%		10	Y		
F508	0508	S-Pattern range at Dec completion	0 - 50	%		10	Y		
F509	0509	S-Pattern range at Dec start	0 - 50	%		10	Y		
F510	0510	Acceleration time 3	0.0 - 6000 (600.0)	s		*1	Y		
F511	0511	Deceleration time 3	0.0 - 6000 (600.0)	s		*1	Y		[6. 27. 2]
F512	0512	Acc/Dec pattern 3	0: Linear 1: S-Pattern 1 2: S-Pattern 2	-	-	0	Y		
F513	0513	Acc/Dec switching frequency 2	0.0: Disabled 0.1 - UL	Hz		0.0	Y		
F514	0514	Acceleration time 4	0.0 - 6000 (600.0)	s		*1	Y		
F515	0515	Deceleration time 4	0.0 - 6000 (600.0)	s		*1	Y		
F516	0516	Acc/Dec pattern 4	0: Linear 1: S-Pattern 1 2: S-Pattern 2	-	-	0	Y		
F517	0517	Acc/Dec switching frequency 3	0.0: Disabled 0.1 - UL	Hz		0.0	Y		
F519	0519	Unit of Acc/Dec time	0: - 1: 0.01 s unit (0 after execution) 2: 0.1 s unit (0 after execution)	-	-	0	N		[5. 2. 4] [6. 27. 2]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F520	0520	Pattern operation	0: Disabled 1: Enabled (seconds) 2: Enabled (minutes)	-	-	0	N		[6. 28]
F521	0521	Pattern operation continue select	0: Reset after stop 1: Continue after stop	-	-	0	N		
F522	0522	Pattern 1 repeat number	1 - 254 255: Continuous	Times	1/1	1	N		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F523	0523	Pattern 1 select 1	0: Skip	-	-	0	N		[6. 28]
F524	0524	Pattern 1 select 2	1: Sr1	-	-	0	N		
F525	0525	Pattern 1 select 3	2: Sr2	-	-	0	N		
F526	0526	Pattern 1 select 4	3: Sr3	-	-	0	N		
F527	0527	Pattern 1 select 5	4: Sr4	-	-	0	N		
F528	0528	Pattern 1 select 6	5: Sr5	-	-	0	N		
F529	0529	Pattern 1 select 7	6: Sr6	-	-	0	N		
F530	0530	Pattern 1 select 8	7: Sr7	-	-	0	N		
F531	0531	Pattern 2 repeat number	8: F287	Times		1	N		
F532	0532	Pattern 2 select 1	9: F288	-	-	0	N		
F533	0533	Pattern 2 select 2	10: F289	-	-	0	N		
F534	0534	Pattern 2 select 3	11: F290	-	-	0	N		
F535	0535	Pattern 2 select 4	12: F291	-	-	0	N		
F536	0536	Pattern 2 select 5	13: F292	-	-	0	N		
F537	0537	Pattern 2 select 6	14: F293	-	-	0	N		
F538	0538	Pattern 2 select 7	15: F294	-	-	0	N		
F539	0539	Pattern 2 select 8		-	-	0	N		
F540	0540	Operation time (1-speed)		s/min	0.1/0.1	5.0	Y		
F541	0541	Operation time (2-speed)		s/min	0.1/0.1	5.0	Y		
F542	0542	Operation time (3-speed)		s/min	0.1/0.1	5.0	Y		
F543	0543	Operation time (4-speed)		s/min	0.1/0.1	5.0	Y		
F544	0544	Operation time (5-speed)		s/min	0.1/0.1	5.0	Y		
F545	0545	Operation time (6-speed)	0.1 - 5999 (Unit by F520)	s/min	0.1/0.1	5.0	Y		
F546	0546	Operation time (7-speed)	6000: Continuous	s/min	0.1/0.1	5.0	Y		
F547	0547	Operation time (8-speed)		s/min	0.1/0.1	5.0	Y		
F548	0548	Operation time (9-speed)		s/min	0.1/0.1	5.0	Y		
F549	0549	Operation time (10-speed)		s/min	0.1/0.1	5.0	Y		
F550	0550	Operation time (11-speed)		s/min	0.1/0.1	5.0	Y		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F551	0551	Operation time (12-speed)	0.1 - 5999 (Unit by F520) 6000: Continuous	s/min	0.1/0.1	5.0	Y		[6. 28]
F552	0552	Operation time (13-speed)		s/min	0.1/0.1	5.0	Y		
F553	0553	Operation time (14-speed)		s/min	0.1/0.1	5.0	Y		
F554	0554	Operation time (15-speed)		s/min	0.1/0.1	5.0	Y		
F560	0560	Preset speed operation style	0: Frequency only 1: With function	-	-	0	N		[5. 3. 7] [6. 12. 1]
F561	0561	Operation function (1-speed)	0: Fwd run +1: Rev run +2: Acc/Dec switching signal 1 +4: Acc/Dec switching signal 2 +8: V/f switching signal 1 +16: V/f switching signal 2 +32: Torque limit switching signal 1 +64: Torque limit switching signal 2	-	1/1	0	N		[5. 3. 7] [6. 12. 1] [6. 28]
F562	0562	Operation function (2-speed)		-	1/1	0	N		
F563	0563	Operation function (3-speed)		-	1/1	0	N		
F564	0564	Operation function (4-speed)		-	1/1	0	N		
F565	0565	Operation function (5-speed)		-	1/1	0	N		
F566	0566	Operation function (6-speed)		-	1/1	0	N		
F567	0567	Operation function (7-speed)		-	1/1	0	N		
F568	0568	Operation function (8-speed)		-	1/1	0	N		
F569	0569	Operation function (9-speed)		-	1/1	0	N		
F570	0570	Operation function (10-speed)		-	1/1	0	N		
F571	0571	Operation function (11-speed)		-	1/1	0	N		
F572	0572	Operation function (12-speed)		-	1/1	0	N		
F573	0573	Operation function (13-speed)		-	1/1	0	N		
F574	0574	Operation function (14-speed)		-	1/1	0	N		
F575	0575	Operation function (15-speed)		-	1/1	0	N		
F576	0576	Operation function (0-speed)		-	1/1	0	N		
F590	0590	Shock monitoring	0: Disabled 1: Current detection 2: Torque detection 3: -	-	-	0	N		[6. 29]
F591	0591	Shock monitoring trip	0: Disabled 1: Enabled	-	-	0	Y		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F592	0592	Shock monitoring detection	0: Overcurrent/ Overtorque detection 1: Undercurrent/ Undertorque detection	-	-	0	Y		[6. 29]
F593	0593	Shock monitoring detection level	0 - 250	%		150	Y		
F595	0595	Shock monitoring detection time	0.0 - 10.0	s		0.5	Y		
F596	0596	Shock monitoring detection hysteresis	0 - 100	%		10	Y		
F597	0597	Shock monitoring detection wait time	0.0 - 300.0	s		0.0	Y		
F598	0598	Shock monitoring detection condition	0: During run 1: During run (except Acc/Dec)	-	-	0	Y		
F600	0600	Parameter for manufacturer	-	-	-	-	-	-	-
F601	0601	Stall prevention level 1	10 - 200 (HD) 10 - 160 (ND)	%		150 (HD) 120 (ND)	Y		[6. 24. 3] [6. 30. 2]
F602	0602	Trip record retention	0: Clear at power off 1: Retain at power off	-	-	0	Y		[6. 30. 3]
F603	0603	Emergency off stop pattern	0: Trip 1: Trip after Deceleration stop 2: Trip after Emergency DC braking 3: Trip after deceleration stop by F515 4: Trip after Quick deceleration stop 5: Trip after Dynamic quick deceleration stop	-	-	0	N		[6. 30. 4]
F604	0604	Emergency DC braking time	0.0 - 20.0	s		1.0	Y		
F605	0605	Output phase loss detection	0: Disabled 1: At startup (only one time after power on) 2: At every startup 3: During run 4: At every startup + during run 5: Output shut off detection	-	-	0	N		[6. 30. 5]
F606	0606	Motor overload reduction frequency threshold	0.0 - 60.0	Hz		6.0	Y		[5. 2. 5] [6. 30. 1]
F607	0607	Motor overload time	10 - 2400	s		300	Y		
F608	0608	Input phase loss trip	0: Disabled 1: Enabled	-	-	1	N		[6. 30. 6]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F609	0609	Undercurrent detection hysteresis	1 - 20	%		10	Y		[6. 30. 7]
F610	0610	Undercurrent trip	0: Disabled 1: Enabled	-	-	0	Y		
F611	0611	Undercurrent detection level	0 - 150	%		0	Y		
F612	0612	Undercurrent detection time	0 - 255	s		0	Y		
F613	0613	Short circuit detection at start	0: At every startup by standard pulse 1: Only one time after power on by standard pulse 2: At every startup by F614 setting pulse 3: Only one time after power on by F614 setting pulse	-	-	0	N		[6. 30. 9]
F614	0614	Pulse width of short circuit detection at start	0: No short circuit detection at start 1 - 50	µs		25	N		
F615	0615	Overtorque trip	0: Disabled 1: Enabled	-	-	0	Y		[6. 30. 8]
F616	0616	Overtorque detection level during power running	0: Disabled 1 - 320	%		150	Y		
F617	0617	Overtorque detection level during regen	0: Disabled 1 - 320	%		150	Y		
F618	0618	Overtorque detection time	0.0 - 10.0	s		0.5	Y		
F619	0619	Overtorque detection hysteresis	0 - 100	%		10	Y		
F620	0620	Cooling fan control	0: Auto ON/OFF, No failure detection 1: Always ON, No failure detection 2: Auto ON/OFF, Failure detection 3: Always ON, Failure detection 4 - 7: -	-	-	2	Y		[6. 30. 11]
F621	0621	Cumulative run time alarm	0.0 - 999.0	100 h		876.0	Y		[6. 30. 12]
F622	0622	Abnormal speed detection time	0.01 - 100.0	s		0.01	Y		[6. 30. 13]
F623	0623	Abnormal speed increase band	0.00: Disabled 0.01 - 30.0	Hz		0.00	Y		
F624	0624	Abnormal speed decrease band	0.00: Disabled 0.01 - 30.0	Hz		0.00	Y		
F625	0625	Undervoltage detection level	50 - 79 80: Auto	%		80	N		[6. 15. 2] [6. 30. 14]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F626	0626	Overvoltage limit operation level	100 - 150	%		134	N		[6. 15. 4] [6. 15. 5]
F627	0627	Undervoltage trip	0: Disabled 1: Enabled	-	-	0	N		[6. 30. 14]
F628	0628	Undervoltage detection time	0.01 - 10.00	s		0.03	N		
F629	0629	Regenerative power ride-through level	55 - 100	%		75	N		[6. 15. 2] [6. 30. 14]
F630	0630	Brake answer wait time	0.0: Disabled 0.1 - 10.0	s		0.0	Y		[6. 18. 1] [6. 30. 15]
F631	0631	Inverter overload detection	0: 150% - 60s (HD) 120% - 60s (ND) 1: Temperature estimation	-	-	0	N		[5. 3. 5] [6. 30. 1]
F632	0632	Motor overload memory target	0: No.1 to 4 motor, memory disabled 1: No.1 to 4 motor, memory enabled 2: No.1 motor, memory disabled 3: No.1 motor, memory enabled	-	-	0	Y		
F633	0633	II analog input disconnection detection level	0: Disabled 1 - 100	%		0	Y		[6. 30. 16]
F634	0634	Annual average ambient temperature	1: -15 to +10°C 2: +11 to +20°C 3: +21 to +30°C 4: +31 to +40°C 5: +41 to +50°C 6: +51 to +60°C	-	-	3	Y		[6. 30. 17]
F635	0635	Rush current suppression relay delay time	0.0 - 2.5	s		0.0	N		[6. 30. 18]
F636	0636	Ground fault trip	0: Disabled 1: Enabled	-	-	1	N		[6. 30. 10]
F637	0637	Terminal AI4 PTC trip	0: Disabled 1: Enabled	-	-	0	N		[6. 30. 19]
F638	0638	Terminal AI5 PTC trip	0: Disabled 1: Enabled	-	-	0	N		
F639	0639	Braking resistor overload time	0.1 - 600.0	s		5.0	N		[6. 15. 4]
F640	0640	DC supply input	0: Disabled 1: Enabled	-	-	0	N		-
F643	0643	Residual voltage waiting control frequency threshold	0.0 - 60.0	Hz		10.0	N		-
F644	0644	Operation after II analog input disconnection detection	1: Continue running 2: Deceleration stop 3: Coast stop 4: Trip 5: Run by F649	-	-	4	N		[6. 30. 16]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F645	0645	Terminal RR PTC trip	0: Disabled 1: Enabled	-	-	0	Y		[6. 30. 19]
F646	0646	PTC detection resistance	100 - 9999	Ω		3000	Y		
F647	0647	Control power option failure detection	0: Alarm (no detection without option) 1: Alarm 2: Trip	-	-	0	Y		[6. 30. 20]
F648	0648	Number of starting alarm	0.0 - 999.0	10000 times		999.0	Y		[6. 30. 21]
F649	0649	Fallback frequency	LL - UL	Hz		0.0	Y		[6. 30. 16]
F650	0650	Forced run	0: Disabled 1: Enabled	-	-	0	Y		[6. 31]
F651	0651	Undertorque trip	0: Disabled 1: Enabled	-	-	0	Y		-
F652	0652	Undertorque detection level during power running	0 - 250	%		0	Y		-
F653	0653	Undertorque detection level during regen	0 - 250	%		0	Y		-
F654	0654	Undertorque detection time	0.00 - 10.00	s		0.50	Y		-
F655	0655	Undertorque detection hysteresis	0 - 100	%		10	Y		-
F656	0656	PTC detection temperature	0 - 200	°C		90	Y		[6. 30. 19]
F657	0657	Overload alarm level	10 - 100	%		50	Y		[5. 2. 5] [6. 30. 1]
F658	0658	Number of external equipment starting alarm	0.0 - 999.0	10000 times		999.0	Y		[6. 30. 21]
F659	0659	Cumulative overcurrent level	10 - 200	%		100	Y		[6. 30. 22]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F660	0660	Override adding input select	0: - 1: Terminal RR 2: Terminal RX 3: Terminal II 4: Terminal AI4 (option) 5: Terminal AI5 (option) 6 - 9: - 10: Touch wheel 1 (power off or press OK to save) 11 - 14: - 15: Terminal Up/Down frequency 16: Pulse train 17: High resolution pulse train (option) 18,19: - 20: Embedded Ethernet 21: RS485 communication (connector 1) 22: RS485 communication (connector 2) 23: Communication option	-	-	0	Y		[6. 32]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F661	0661	Override multiplying input select	0: - 1: Terminal RR 2: Terminal RX 3: Terminal II 4: Terminal AI4 (option) 5 - 11: - 12: F729 13 - 23: -	-	-	0	Y		[6. 32]
F664	0664	Specified trip 1	0 - 100	Times	1/1	0	N		[6. 30. 21]
F665	0665	Specified trip 2	0 - 100	Times	1/1	0	N		
F666	0666	Specified trip 3	0 - 100	Times	1/1	0	N		
F667	0667	Pulse output step of input cumulative power	0: 0.1kWh 1: 1kWh 2: 10kWh 3: 100kWh 4: 1000kWh 5: 10000kWh	-	-	1	Y		[6. 33. 1]
F668	0668	Pulse output width of input cumulative power	0.1 - 1.0	s		0.1	Y		
F669	0669	Terminal FP switching	0: Digital output 1: Pulse output	-	-	0	N		[6. 33. 2] [7. 2. 2]
F670	0670	Terminal AM function	0 - 162 *3	-	-	2	Y		[5. 2. 6]
F671	0671	Terminal AM adjustment	-	-	-	-	Y		
F676	0676	Terminal FP pulse train output function	0 - 149 *3	-	-	0	Y		[6. 33. 2]
F677	0677	Maximum pulse number of pulse train output	0.50 - 43.20	kpps		8.00	Y		
F678	0678	Pulse train output filter	1 - 1000	ms		64	Y		
F679	0679	Pulse train input filter	1 - 1000	ms		1	Y		[6. 6. 4]
F681	0681	Terminal FM switching	0: Meter option (0-1mA) 1: Current output (0-20mA) 2: Voltage output (0-10V)	-	-	2	N		[6. 33. 3]
F682	0682	Terminal FM inclination polarity	0: Negative inclination (downward slope) 1: Positive inclination (upward slope)	-	-	1	Y		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F683	0683	Terminal FM bias	-100.0 to +100.0	%		0.0	Y		[6. 33. 3]
F684	0684	Terminal FM filter	1 - 1000	ms		1	Y		
F685	0685	Terminal FM upper-limit level	0.0 - 100.0	%		100.0	Y		
F686	0686	Terminal AM switching	0: Meter option (0-1mA) 1: Current output (0-20mA) 2: Voltage output (0-10V)	-	-	2	N		
F687	0687	Terminal AM inclination polarity	0: Negative inclination (downward slope) 1: Positive inclination (upward slope)	-	-	1	Y		
F688	0688	Terminal AM bias	-100.0 to +100.0	%		0.0	Y		
F689	0689	Terminal AM filter	1 - 1000	ms		1	Y		
F690	0690	Terminal AM upper-limit level	0.0 - 100.0	%		100.0	Y		
F699	0699	Trip for test	0 - 100			0	Y	-	
F700	0700	Parameter reading & writing access lockout	0: Unlocked 1: Writing locked (Operation panel, Extension panel) 2: Writing locked (1+RS485) 3: Reading & Writing locked (Operation panel, Extension panel) 4: Reading & Writing locked (3+RS485)	-	-	0	Y		[6. 34. 1]
F701	0701	Current, voltage units select	0: % 1: A (ampere), V (volt)	-	-	0	Y		[5. 2. 7] [6. 34. 2]
F702	0702	Free unit multiplicaton factor	0.00: Disabled 0.01 - 200.0	Times		0.00	Y		[5. 4. 3] [6. 34. 3]
F703	0703	Target of free unit	0: All frequencies 1: PID frequencies	-	-	0	Y		
F704	0704	Reference Website	0: English (USA website) 1: English (Japan website)	-	-	*2	Y		
F705	0705	Free unit inclination polarity	0: Negative inclination (downward slope) 1: Positive inclination (upward slope)	-	-	1	Y		
F706	0706	Free unit bias	0.00 - FH	Hz		0.00	Y		
F707	0707	Step of panel setting	0.00: Disabled 0.01 - FH	Hz		0.00	Y		[6. 34. 4]
F708	0708	Step of panel display	0: Disabled 1 - 255	-	-	0	Y		
F709	0709	Hold function of standard mode	0: Real time 1: Peak hold 2: Minimum hold	-	-	0	Y		[6. 34. 7]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F710	0710	Standard mode display	0 - 162 *3	-	-	0	Y		[4. 2. 3] [5. 4. 3] [6. 34. 5]
F711	0711	Monitor mode 1 display		-	-	2	Y		[6. 34. 6] [8. 1. 1]
F712	0712	Monitor mode 2 display		-	-	3	Y		
F713	0713	Monitor mode 3 display		-	-	4	Y		
F714	0714	Monitor mode 4 display		-	-	8	Y		
F715	0715	Monitor mode 5 display		-	-	18	Y		
F716	0716	Monitor mode 6 display		-	-	19	Y		
F717	0717	Monitor mode 7 display		-	-	35	Y		
F718	0718	Monitor mode 8 display		-	-	34	Y		
F719	0719	Run command clear select	0: Clear at coast stop. Retain at MOFF and when CMOD is changed. 1: Retain run command. 2: Clear at coast stop and at MOFF. Retain when CMOD is changed. 3: Clear at coast stop, at MOFF and when CMOD is changed.	-	-	2	Y		[6. 34. 8]
F720	0720	Standard mode display of extension panel	0 - 162 *4	-	-	0	Y		[5. 4. 3] [6. 34. 5]
F721	0721	Panel stop	0: Deceleration stop 1: Coast stop	-	-	0	Y		[6. 34. 9]
F722	0722	Monitor mode filter	8 - 1000	ms		200	Y		-
F723	0723	Status area display of operation panel	0 - 162 *4	-	-	1	Y		[5. 4. 3] [6. 34. 5]
F724	0724	Frequency setting target by touch wheel	0: Panel run frequency command (FC) 1: FC + Preset speed	-	-	0	Y		[5. 3. 7]
F725	0725	Panel torque command	-250 to +250	%		0	Y		[6. 25. 1] [6. 34. 10]
F727	0727	Panel tension torque bias	-250 to +250	%		0	Y		[6. 25. 3]
F728	0728	Panel load sharing gain	0 - 250	%		100	Y		
F729	0729	Panel override multiplication gain	-100 to +100	%		0	Y		[6. 32]

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F730	0730	Panel frequency setting lockout	0: Unlocked without press OK 1: Locked 2: Unlocked after press OK	-	-	2	Y		[6. 34. 1]
F731	0731	Operation after disconnection detection during panel run	1: Continue running 2 - 3: - 4: Trip	-	-	4	Y		
F732	0732	Panel Hand/Auto function lockout	0: Unlocked 1: Locked	-	-	1	Y		
F733	0733	Panel Run lockout	0: Unlocked 1: Locked	-	-	0	Y		
F734	0734	Panel emergency off lockout	0: Unlocked 1: Locked	-	-	0	Y		
F735	0735	Panel reset lockout	0: Unlocked 1: Locked	-	-	0	Y		
F736	0736	CMOd/FMOd change lockout during run	0: Unlocked 1: Locked	-	-	1	Y		
F737	0737	Panel keys lockout	0: Unlocked 1: Locked 2: Locked only extension panel 3: Locked only operation panel	-	-	0	Y		
F738	0738	Password setting	0: Disabled 1 - 9998 9999: Password was set	-	-	0	Y		
F739	0739	Password verification	0: non-setting 1 - 9998 9999: Password was set	-	-	0	Y		
F740	0740	Trace	0: Disabled 1: At trip 2: At trigger input 3: At trip & at trigger input	-	-	1	Y		[6. 35]
F741	0741	Trace cycle	0: 4ms 1: 20ms 2: 100ms 3: 1s 4: 10s	-	-	2	Y		
F742	0742	Trace data 1	0 - 162 *3	-	-	0	Y		
F743	0743	Trace data 2		-	-	1	Y		
F744	0744	Trace data 3		-	-	2	Y		
F745	0745	Trace data 4		-	-	3	Y		
F748	0748	Cumulative power save	0: Disabled 1: Enabled	-	-	0	Y		[6. 36]
F749	0749	Cumulative power unit	0: 1.0=1 kWh 1: 1.0=10 kWh 2: 1.0=100 kWh 3: 1.0=1000 kWh 4: 1.0=10000 kWh 5: 1.0=100000 kWh	-	-	*1	Y		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F750	0750	EASY key function	0: Easy/Setting mode switching 1: Shortcut function (Extension panel only) 2: Hand/Auto switching 3: Monitor peak and minimum hold trigger	-	-	0	N		[6. 37]
F751	0751	Easy setting 1	0-2999 Set easy setting parameters by the communication number 0000-0998: Basic, F100-F998 1000-1999: A000-A999 2000-2999: C000-C999	-	-	3	Y		[5. 2. 8]
F752	0752	Easy setting 2		-	-	4	Y		
F753	0753	Easy setting 3		-	-	9	Y		
F754	0754	Easy setting 4		-	-	10	Y		
F755	0755	Easy setting 5		-	-	12	Y		
F756	0756	Easy setting 6		-	-	13	Y		
F757	0757	Easy setting 7		-	-	31	Y		
F758	0758	Easy setting 8		-	-	6	Y		
F759	0759	Easy setting 9		-	-	999	Y		
F760	0760	Easy setting 10		-	-	999	Y		
F761	0761	Easy setting 11		-	-	999	Y		
F762	0762	Easy setting 12		-	-	999	Y		
F763	0763	Easy setting 13		-	-	999	Y		
F764	0764	Easy setting 14		-	-	999	Y		
F765	0765	Easy setting 15		-	-	999	Y		
F766	0766	Easy setting 16		-	-	999	Y		
F767	0767	Easy setting 17		-	-	999	Y		
F768	0768	Easy setting 18		-	-	999	Y		
F769	0769	Easy setting 19		-	-	999	Y		
F770	0770	Easy setting 20		-	-	999	Y		
F771	0771	Easy setting 21		-	-	999	Y		
F772	0772	Easy setting 22		-	-	999	Y		
F773	0773	Easy setting 23		-	-	999	Y		
F774	0774	Easy setting 24		-	-	999	Y		
F775	0775	Easy setting 25		-	-	999	Y		
F776	0776	Easy setting 26		-	-	999	Y		
F777	0777	Easy setting 27		-	-	999	Y		
F778	0778	Easy setting 28		-	-	999	Y		
F779	0779	Easy setting 29		-	-	999	Y		
F780	0780	Easy setting 30		-	-	999	Y		
F781	0781	Easy setting 31		-	-	701	Y		
F782	0782	Easy setting 32		-	-	50	Y		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F790	0790	Panel display at power on	0: HELLO (Depending on language setting) 1: F791 - F798 2, 3: -	-	-	0	Y		[6. 34. 11]
F791	0791	1st and 2nd characters of F790	0-FFFF	Hex	-	2d2d	Y		
F792	0792	3rd and 4th characters of F790	0-FFFF	Hex	-	2d2d	Y		
F793	0793	5th and 6th characters of F790	0-FFFF	Hex	-	2d2d	Y		
F794	0794	7th and 8th characters of F790	0-FFFF	Hex	-	2d2d	Y		
F795	0795	9th and 10th characters of F790	0-FFFF	Hex	-	2d2d	Y		
F796	0796	11th and 12th characters of F790	0-FFFF	Hex	-	2d2d	Y		
F797	0797	13th and 14th characters of F790	0-FFFF	Hex	-	2d2d	Y		
F798	0798	15th and 16th characters of F790	0-FFFF	Hex	-	2d2d	Y		
F799	0799	Parameter for manufacturer	-	-	-	-	-		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F800	0800	RS485 (1) baud rate	0: 9600 bps 1: 19200 bps 2: 38400 bps 3: -	-	-	1	Y		[6. 38. 1]
F801	0801	RS485 (1) parity	0: Disabled 1: Even parity 2: Odd parity	-	-	1	Y		
F802	0802	Inverter number (RS485 common)	0 - 247	-	-	0	Y		
F803	0803	RS485 (1) time-out time	0.0: Disabled 0.1 - 100.0	s		0.0	Y		
F804	0804	RS485 (1) time-out operation	1: Continue running 2, 3: - 4: Trip 5: - 6: Trip after deceleration stop	-	-	1	Y		
F805	0805	RS485 (1) transmission wait time	0.00 - 2.00	s		0.00	Y		
F806	0806	RS485 (1) inverter to inverter communication	0: Follower (0Hz command when Leader fails) 1: Follower (continue running when Leader fails) 2: Follower (emergency off when Leader fails) 3: Leader (transmit frequency command) 4: Leader (transmit output frequency signal) 5: Leader (transmit torque command) 6: Leader (transmit output torque)	-	-	0	Y		
F807	0807	RS485 (1) protocol	0: TOSHIBA 1: MODBUS	-	-	0	Y		
F808	0808	RS485 (1) time-out detection	0: Always 1: Run command and frequency command by communication are enabled. 2: During run by communication	-	-	1	Y		
F809	0809	Operation panel connection priority	0: By the parameter setting 1: Connect to connector 1 2: Connect to connector 2	-	-	1	Y	-	

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F810	0810	Communication frequency point select	0: Disabled 1: RS485 (1) 2: RS485 (2) 3: Communication option 4: Embedded Ethernet	-	-	0	Y		
F811	0811	Communication point 1 input value	0 - 100	%		0	Y		[6. 6. 2] [6. 38. 1]
F812	0812	Communication point 1 frequency	0.0 - FH	Hz		0.0	Y		
F813	0813	Communication point 2 input value	0 - 100	%		100	Y		
F814	0814	Communication point 2 frequency	0.0 - FH	Hz		50.0/ 60.0*2	Y		
F820	0820	RS485 (2) baud rate	0: 9600 bps 1: 19200 bps 2: 38400 bps 3: -	-	-	1	Y		
F821	0821	RS485 (2) parity	0: Disabled 1: Even parity 2: Odd parity	-	-	1	Y		
F823	0823	RS485 (2) time-out time	0.0: Disabled 0.1 - 100.0	s		0.0	Y		
F824	0824	RS485 (2) time-out operation	1: Continue running 2, 3: - 4: Trip 5: - 6: Trip after deceleration stop	-	-	1	Y		
F825	0825	RS485 (2) transmission wait time	0.00 - 2.00	s		0.00	Y		
F826	0826	RS485 (2) inverter to inverter communication	0: Follower (0Hz command when Leader fails) 1: Follower (continue running when Leader fails) 2: Follower (emergency off when Leader fails) 3: Leader (transmit frequency command) 4: Leader (transmit output frequency signal) 5: Leader (transmit torque command) 6: Leader (transmit output torque command)	-	-	0	Y		[6. 38. 1]
F827	0827	RS485 (2) protocol	0: TOSHIBA 1: MODBUS	-	-	0	Y		

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F828	0828	RS485 (2) time-out detection	0: Always 1: Run command and frequency command by communication are enabled. 2: During run by communication	-	-	1	Y		[6. 38. 1]
F829	0829	RS485 (2) wiring type	0: 2-wire 1: 4-wire	-	-	0	Y		
F830	0830	MODBUS continuous address	0: Disabled 1: Enabled	-	-	1	Y		
F856	0856	Motor pole number for communication	1: 2 pole 2: 4 pole 3: 6 pole 4: 8 pole 5: 10 pole 6: 12 pole 7: 14 pole 8: 16 pole	-	-	2	Y		
F870	0870	Block write data 1	0: Disabled 1: FA00 (Communication command 1) 2: FA20 (Communication command 2)	-	-	0	Y		
F871	0871	Block write data 2	3: FA01 (Frequency command) 4: FA50 (TB output) 5: FA51 (Analog output) 6: FA13 (Speed command by communication)	-	-	0	Y		

11

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F875	0875	Block read data 1	0: Disabled	-	-	0	Y		
F876	0876	Block read data 2	1: FD01 (Status information)	-	-	0	Y		
F877	0877	Block read data 3	2: FD00 (Output frequency)	-	-	0	Y		
F878	0878	Block read data 4	3: FD03 (Output current)	-	-	0	Y		
F879	0879	Block read data 5	4: FD05 (Output voltage) 5: FC91 (Alarm information) 6: FD22 (PID feedback value) 7: FD06 (Input terminal monitor) 8: FD07 (Output terminal monitor) 9: FE35 (Terminal RR monitor) 10: FE36 (Terminal RX monitor) 11: FE37 (Terminal II monitor) 12: FD04 (Input voltage (DC detection)) 13: FD16 (Speed feedback frequency) 14: FD18 (Torque) 15: FE60 (My function output monitor 1) 16: FE61 (My function output monitor 2) 17: FE62 (My function output monitor 3) 18: FE63 (My function output monitor 4) 19: 0880 (Free memorandum) 20: FD90 (Motor speed) 21: FD29 (Input power) 22: FD30 (Output power) 23: FC90 (Trip information)	-	-	0	Y		[6. 38. 1]
F880	0880	Free memorandum	0-65535	-	1/1	0	Y		[6. 38. 3]
F896	0896	Parameter for manufacturer	-	-	-	-	-		-
F897	0897	Parameter writing	0: Storage to memory device 1: Storage to memory device except by communication	-	-	0	Y		-
F898	0898	Trip reset	0: Clear trip by request from communication option. Reset by request except from communication option. 1: Reset 2: Trip clear 3 - 5: -	-	-	0	N		-

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F899	0899	Communication option reset	0: - 1: Reset option and inverter	-	-	0	N		[6. 38. 1]
F907	0907	PM regenerative over-flux upper limit	0 - 150	%		50	N		-
F908	0908	PM no load current	0 - 100	%		0	N		-
F909	0909	PM step-out detection frequency rate	0 - 100	%		0	N		-
F910	0910	PM step-out detection current level	1 - 150	%		100	N		[6. 39]
F911	0911	PM step-out detection time	0.00: Disabled 0.01 - 2.55	s		0.00	N		
F912	0912	PM q-axis inductance	0.01 - 650.0	mH		10.00	N		[6. 23. 2]
F913	0913	PM d-axis inductance	0.01 - 650.0	mH		10.00	N		
F914	0914	Parameter for manufacturer	-	-	-	-	-		-
F915	0915	PM control method	0: Method 0 1: Method 1 2: Method 2 3: Method 3 4: Method 4	-	-	3	N		[6. 23. 2]
F916	0916	PM starting current	0 - 100	%		25	N		-
F917	0917	IPM maximum torque control	0: Disabled 1: Enabled	-		0	Y		-
F918	0918	IPM current phase adjustment	-45.0 to +45.0	°C		0.0	Y		-
F919	0919	Parameter for manufacturer	-	-	-	-	-		-
F920	0920	Parameter for manufacturer	-	-	-	-	-		-
F921	0921	SPM initial position estimation current	10 - 150	%		100	N		-
F922	0922	PM HF control speed estimation response	5 - 80	Hz		15	N		-
F923	0923	PM control switching speed	5 - 100	%		25	N		-
F924	0924	PM speed estimation filter cutoff frequency	1 - 80	Hz		30	N		-
F925	0925	PM HF control speed estimation stabilization coefficient	0.50 - 2.50			1.00	N		-
F926	0926	PM HF control harmonic frequency	100 - 1000	Hz		500	N		-

Title	Communication No.	Parameter name	Adjustment range	Unit	Minimum setting unit (Panel/Communication)	Default setting	Write during running *6	User setting	Reference
F927	0927	PM HF control current level	5 - 100	%		25	N		-
F928	0928	PM initial position estimation time	0 - 1000	ms		125	N		-
F929	0929	PM dead time compensation time	-1 to +32767	ns		0	N		-
F930	0930	Parameter for manufacturer	-	-	-	-	-		-
F964	0964	Preset speed 16	LL - UL	Hz		0.0	Y		[5. 3. 7]
F965	0965	Preset speed 17	LL - UL	Hz		0.0	Y		
F966	0966	Preset speed 18	LL - UL	Hz		0.0	Y		
F967	0967	Preset speed 19	LL - UL	Hz		0.0	Y		
F968	0968	Preset speed 20	LL - UL	Hz		0.0	Y		
F969	0969	Preset speed 21	LL - UL	Hz		0.0	Y		
F970	0970	Preset speed 22	LL - UL	Hz		0.0	Y		
F971	0971	Preset speed 23	LL - UL	Hz		0.0	Y		
F972	0972	Preset speed 24	LL - UL	Hz		0.0	Y		
F973	0973	Preset speed 25	LL - UL	Hz		0.0	Y		
F974	0974	Preset speed 26	LL - UL	Hz		0.0	Y		
F975	0975	Preset speed 27	LL - UL	Hz		0.0	Y		
F976	0976	Preset speed 28	LL - UL	Hz		0.0	Y		
F977	0977	Preset speed 29	LL - UL	Hz		0.0	Y		
F978	0978	Preset speed 30	LL - UL	Hz		0.0	Y		
F979	0979	Preset speed 31	LL - UL	Hz		0.0	Y		
F980	0980	Traverse operation	0: Disabled 1: Enabled	-	-	0	N		[6. 40]
F981	0981	Traverse Acc time	0.1 - 120.0	s		25.0	Y		
F982	0982	Traverse Dec time	0.1 - 120.0	s		25.0	Y		
F983	0983	Traverse step	0.0 - 25.0	%		10.0	Y		
F984	0984	Traverse jump step	0.0 - 50.0	%		10.0	Y	F	

*1 Parameter values vary depending on the capacity. For details, refer to [11. 6].

*2 Depending on the setup menu. Refer to [11. 10].

*3 For details on the analog output and monitor output function, refer to [11. 7].

*4 Refer to section [11. 8] for details about the input terminal function.

*5 Refer to section [11. 9] for details about the output terminal function.

*6 Y: Writable N: Not writable

11.4 Advanced parameter

Title	Function	Reference
Starting at A000	Calendar function	E6582110
Starting at A200	Pump control	E6582124
Starting at A300	Multi PID	E6582112
Starting at A800 Starting at A900	My function	E6582114

11.5 Communication parameter

Title	Function	Reference
C001 - C111	Common to communication options	*1
C152 - C157 C500 - C556	For PROFINET option	E6582051
C606 - C699	For embedded Ethernet	E6582125

*1 Refer to each Instruction Manual for option about detail specifications and common parameters.

11.6 Parameter setting range and default setting depending on capacity

■ HD rating

Voltage class	Applicable motor (kW)	Inverter type-form	vb,F172, F176,F180 (%)	ACC,dEC, F500, F501, F510, F511, F514, F515 (s)	tHrA,F182,F183, F184		F249 (kHz)	F298 (V)	
					Adjustment range	(A)			
3-phase 240 V	0.4	VFAS3-	2004P	4.80	10.0	0.33-3.30	3.30	4.0	120.0
	0.75		2007P	4.80	10.0	0.46-4.60	4.60	4.0	120.0
	1.5		2015P	4.80	10.0	0.80-8.00	8.00	4.0	120.0
	2.2		2022P	3.10	10.0	1.12-11.20	11.20	4.0	120.0
	4.0		2037P	3.10	10.0	1.87-18.70	18.70	4.0	120.0
	5.5		2055P	2.50	10.0	2.54-25.40	25.40	4.0	120.0
	7.5		2075P	2.30	10.0	3.27-32.70	32.70	4.0	120.0
	11		2110P	1.80	10.0	4.68-46.80	46.80	4.0	120.0
	15		2150P	1.60	10.0	6.34-63.40	63.40	4.0	120.0
	18.5		2185P	1.50	30.0	7.84-78.40	78.40	4.0	120.0
	22		2220P	1.70	30.0	9.3-92.6	92.6	4.0	120.0
	30		2300P	1.40	30.0	12.3-123.0	123.0	4.0	120.0
	37		2370P	0.90	30.0	14.9-149.0	149.0	4.0	120.0
	45		2450P	0.80	30.0	17.6-176.0	176.0	2.5	120.0
55	2550P	0.80	30.0	21.1-211.0	211.0	2.5	120.0		
3-phase 480 V	0.4	VFAS3-	4004PC	4.80	10.0	0.15-1.50	1.50	4.0	240.0
	0.75		4007PC	4.80	10.0	0.22-2.20	2.20	4.0	240.0
	1.5		4015PC	4.80	10.0	0.40-4.00	4.00	4.0	240.0
	2.2		4022PC	3.10	10.0	0.56-5.60	5.60	4.0	240.0
	4.0		4037PC	3.10	10.0	0.93-9.30	9.30	4.0	240.0
	5.5		4055PC	2.50	10.0	1.27-12.70	12.70	4.0	240.0
	7.5		4075PC	2.30	10.0	1.65-16.50	16.50	4.0	240.0
	11		4110PC	1.80	10.0	2.35-23.50	23.50	4.0	240.0
	15		4150PC	1.60	10.0	3.17-31.70	31.70	4.0	240.0
	18.5		4185PC	1.50	30.0	3.92-39.20	39.20	4.0	240.0
	22		4220PC	1.70	30.0	4.63-46.30	46.30	4.0	264.0
	30		4300PC	1.40	30.0	6.15-61.50	61.50	4.0	264.0
	37		4370PC	0.90	30.0	7.45-74.50	74.50	4.0	264.0
	45		4450PC	0.80	30.0	8.8-88.0	88.0	4.0	264.0
	55		4550PC	0.80	30.0	10.6-106.0	106.0	4.0	264.0
	75		4750PC	1.40	60.0	14.5-145.0	145.0	4.0	264.0
	90		4900PC	1.30	60.0	17.3-173.0	173.0	2.5	240.0
	110		4110KPC	1.00	60.0	21.1-211.0	211.0	2.5	240.0
	132		4132KPC	0.80	60.0	25.0-250.0	250.0	2.5	240.0
	160		4160KPC	0.80	60.0	31.4-314.0	314.0	2.5	240.0
220	4200KPC	0.80	60.0	38.7-387.0	387.0	2.5	240.0		
250	4220KPC	0.80	60.0	42.7-427.0	427.0	2.5	240.0		
280	4280KPC	0.80	60.0	55.0-550.0	550.0	2.5	240.0		

Voltage class	Applicable motor (kW)	Inverter type-form	F300		F308 (Ohm)	F309 (kW)	F316	F356 (s)	F402 (%)	F405		
			Adjustment range	(kHz)						<Set> = "JP" (kW)	other (kW)	
3-phase 240 V	0.4	VFAS3-	2004P	1.0-16.0	4.0	200.0	0.12	1	0.57	4.30	0.40	0.40
	0.75		2007P	1.0-16.0	4.0	200.0	0.12	1	0.57	4.30	0.75	0.75
	1.5		2015P	1.0-16.0	4.0	75.0	0.12	1	0.57	4.40	1.50	1.50
	2.2		2022P	1.0-16.0	4.0	75.0	0.12	1	0.57	2.90	2.20	2.20
	4.0		2037P	1.0-16.0	4.0	40.0	0.12	1	0.67	2.80	3.70	4.00
	5.5		2055P	1.0-16.0	4.0	20.0	0.24	1	0.87	2.30	5.50	5.50
	7.5		2075P	1.0-16.0	4.0	15.0	0.44	1	0.87	2.00	7.50	7.50
	11		2110P	1.0-16.0	4.0	10.0	0.66	1	1.07	1.60	11.00	11.00
	15		2150P	1.0-16.0	4.0	7.5	0.88	1	1.07	1.50	15.00	15.00
	18.5		2185P	1.0-16.0	4.0	7.5	0.88	1	1.37	1.40	18.50	18.50
	22		2220P	1.0-8.0	4.0	3.3	1.76	1	1.37	1.60	22.00	22.00
	30		2300P	1.0-8.0	4.0	3.3	1.76	1	1.37	1.20	30.00	30.00
	37		2370P	1.0-8.0	4.0	2.0	2.20	1	1.37	0.80	37.00	37.00
	45		2450P	1.0-8.0	2.5	2.0	2.20	1	1.37	0.70	45.00	45.00
55	2550P	1.0-8.0	2.5	2.0	2.20	1	1.37	0.80	55.00	55.00		
3-phase 480 V	0.4	VFAS3-	4004PC	1.0-16.0	4.0	200.0	0.12	3	0.57	4.30	0.40	0.40
	0.75		4007PC	1.0-16.0	4.0	200.0	0.12	3	0.57	4.30	0.75	0.75
	1.5		4015PC	1.0-16.0	4.0	200.0	0.12	3	0.57	4.40	1.50	1.50
	2.2		4022PC	1.0-16.0	4.0	200.0	0.12	3	0.57	2.90	2.20	2.20
	4.0		4037PC	1.0-16.0	4.0	160.0	0.12	3	0.67	2.80	3.70	4.00
	5.5		4055PC	1.0-16.0	4.0	80.0	0.24	3	0.87	2.30	5.50	5.50
	7.5		4075PC	1.0-16.0	4.0	60.0	0.44	3	0.87	2.00	7.50	7.50
	11		4110PC	1.0-16.0	4.0	40.0	0.66	3	1.07	1.60	11.00	11.00
	15		4150PC	1.0-16.0	4.0	30.0	0.88	3	1.07	1.50	15.00	15.00
	18.5		4185PC	1.0-16.0	4.0	30.0	0.88	3	1.37	1.40	18.50	18.50
	22		4220PC	1.0-16.0	4.0	15.0	1.76	3	1.37	1.60	22.00	22.00
	30		4300PC	1.0-16.0	4.0	15.0	1.76	3	1.37	1.20	30.00	30.00
	37		4370PC	1.0-16.0	4.0	8.0	1.76	3	1.37	0.80	37.00	37.00
	45		4450PC	1.0-8.0	4.0	8.0	1.76	3	1.37	0.70	45.00	45.00
	55		4550PC	1.0-8.0	4.0	8.0	1.76	3	1.37	0.80	55.00	55.00
	75		4750PC	1.0-8.0	4.0	8.0	1.76	3	1.37	1.30	75.00	75.00
	90		4900PC	1.0-8.0	2.5	3.7	7.40	3	1.37	1.20	90.00	90.00
	110		4110KPC	1.0-8.0	2.5	3.7	7.40	3	1.37	0.90	110.00	110.00
132	4132KPC	1.0-8.0	2.5	3.7	7.40	3	1.37	0.80	132.00	132.00		
160	4160KPC	1.0-8.0	2.5	3.7	7.40	3	1.37	0.80	160.00	160.00		
220	4200KPC	1.0-8.0	2.5	1.9	8.70	3	1.37	0.80	200.00	200.00		
250	4220KPC	1.0-8.0	2.5	1.9	8.70	3	1.37	0.80	220.00	220.00		
280	4280KPC	1.0-8.0	2.5	1.4	14.00	3	1.37	0.80	280.00	280.00		

Voltage class	Applicable motor (kW)	Inverter type-form	F412 (%)	F415		F416 (%)	F417		F456	F749	
				Adjustment range	(A)		50Hz setting	60Hz setting			
							(min-1)				
3-phase 240 V	0.4	VFAS3-	2004P	7.0	0.01-99.99	1.70	55	1440	1730	100	0
	0.75		2007P	7.0	0.01-99.99	3.40	55	1440	1730	100	0
	1.5		2015P	5.0	0.01-99.99	6.40	42	1445	1740	100	0
	2.2		2022P	5.0	0.01-99.99	9.40	50	1460	1755	100	0
	4.0		2037P	5.0	0.01-99.99	14.60	38	1460	1755	100	1
	5.5		2055P	5.0	0.01-99.99	21.40	41	1465	1760	100	1
	7.5		2075P	5.0	0.01-99.99	28.60	38	1460	1755	100	1
	11		2110P	4.0	0.01-99.99	42.00	38	1475	1770	100	1
	15		2150P	4.0	0.01-99.99	55.60	33	1470	1760	100	1
	18.5		2185P	4.0	0.01-99.99	69.00	37	1475	1770	100	1
	22		2220P	4.0	0.1-999.9	80.0	32	1470	1760	100	1
	30		2300P	4.0	0.1-999.9	108.0	33	1470	1765	100	1
	37		2370P	4.0	0.1-999.9	132.0	32	1480	1775	100	2
	45		2450P	3.0	0.1-999.9	159.0	31	1480	1775	100	2
55	2550P	3.0	0.1-999.9	192.0	28	1480	1775	100	2		
3-phase 480 V	0.4	VFAS3-	4004PC	7.0	0.01-99.99	0.85	55	1440	1730	100	0
	0.75		4007PC	7.0	0.01-99.99	1.70	55	1440	1730	100	0
	1.5		4015PC	5.0	0.01-99.99	3.20	42	1445	1740	100	0
	2.2		4022PC	5.0	0.01-99.99	4.70	50	1460	1755	100	0
	4.0		4037PC	5.0	0.01-99.99	7.30	38	1460	1755	100	1
	5.5		4055PC	5.0	0.01-99.99	10.70	41	1465	1760	100	1
	7.5		4075PC	5.0	0.01-99.99	14.30	38	1460	1755	100	1
	11		4110PC	4.0	0.01-99.99	21.00	38	1475	1770	100	1
	15		4150PC	4.0	0.01-99.99	27.80	33	1470	1760	100	1
	18.5		4185PC	4.0	0.01-99.99	34.50	37	1475	1770	100	1
	22		4220PC	4.0	0.01-99.99	40.00	32	1470	1760	100	1
	30		4300PC	4.0	0.01-99.99	54.00	33	1470	1765	95	1
	37		4370PC	4.0	0.01-99.99	66.00	32	1480	1775	100	2
	45		4450PC	3.0	0.1-999.9	79.5	31	1480	1775	100	2
	55		4550PC	3.0	0.1-999.9	96.0	28	1480	1775	100	2
	75		4750PC	3.0	0.1-999.9	129.0	28	1480	1775	95	2
	90		4900PC	3.0	0.1-999.9	154.0	26	1480	1775	100	2
	110		4110KPC	3.0	0.1-999.9	190.0	21	1480	1780	100	2
132	4132KPC	3.0	0.1-999.9	230.0	20	1485	1780	100	2		
160	4160KPC	3.0	0.1-999.9	252.0	20	1485	1785	100	2		
220	4200KPC	3.0	0.1-999.9	315.0	20	1485	1785	100	2		
250	4220KPC	3.0	0.1-999.9	345.0	20	1485	1785	100	2		
280	4280KPC	3.0	0.1-999.9	445.0	20	1485	1785	100	2		

■ **ND rating**

Voltage class	Applicable motor (kW)	Inverter type-form	vb,F172,F176,F180 (%)	ACC,dEC,F500,F501,F510,F511,F514,F515 (s)	tHrA,F182,F183,F184		F249 (kHz)	F298 (V)	
					Adjustment range	(A)			
3-phase 240 V	0.75	VFAS3-	2004P	4.80	10.0	0.46-4.60	4.60	4.0	120.0
	1.5		2007P	4.80	10.0	0.80-8.00	8.00	4.0	120.0
	2.2		2015P	3.10	10.0	1.12-11.20	11.20	4.0	120.0
	4.0		2022P	3.10	10.0	1.87-18.70	18.70	4.0	120.0
	5.5		2037P	2.50	10.0	2.54-25.40	25.40	4.0	120.0
	7.5		2055P	2.30	10.0	3.27-32.70	32.70	4.0	120.0
	11		2075P	1.80	10.0	4.68-46.80	46.80	4.0	120.0
	15		2110P	1.60	10.0	6.34-63.40	63.40	4.0	120.0
	18.5		2150P	1.50	30.0	7.84-78.40	78.40	4.0	120.0
	22		2185P	1.70	30.0	9.3-92.6	92.6	4.0	120.0
	30		2220P	1.40	30.0	12.3-123.0	123.0	4.0	120.0
	37		2300P	0.90	30.0	14.9-149.0	149.0	4.0	120.0
	45		2370P	0.80	30.0	17.6-176.0	176.0	4.0	120.0
	55		2450P	0.80	30.0	21.1-211.0	211.0	2.5	120.0
75	2550P	1.40	60.0	28.2-282.0	282.0	2.5	120.0		
3-phase 480 V	0.75	VFAS3-	4004PC	4.80	10.0	0.22-2.20	2.20	4.0	240.0
	1.5		4007PC	4.80	10.0	0.40-4.00	4.00	4.0	240.0
	2.2		4015PC	3.10	10.0	0.56-5.60	5.60	4.0	240.0
	4.0		4022PC	3.10	10.0	0.93-9.30	9.30	4.0	240.0
	5.5		4037PC	2.50	10.0	1.27-12.70	12.70	4.0	240.0
	7.5		4055PC	2.30	10.0	1.65-16.50	16.50	4.0	240.0
	11		4075PC	1.80	10.0	2.35-23.50	23.50	4.0	240.0
	15		4110PC	1.60	10.0	3.17-31.70	31.70	4.0	240.0
	18.5		4150PC	1.50	30.0	3.92-39.20	39.20	4.0	240.0
	22		4185PC	1.70	30.0	4.63-46.30	46.30	4.0	240.0
	30		4220PC	1.40	30.0	6.15-61.50	61.50	4.0	264.0
	37		4300PC	0.90	30.0	7.45-74.50	74.50	4.0	264.0
	45		4370PC	0.80	30.0	8.8-88.0	88.0	4.0	264.0
	55		4450PC	0.80	30.0	10.6-106.0	106.0	4.0	264.0
	75		4550PC	1.40	60.0	14.5-145.0	145.0	4.0	264.0
	90		4750PC	1.30	60.0	17.3-173.0	173.0	4.0	264.0
	110		4900PC	1.00	60.0	21.1-211.0	211.0	2.5	240.0
	132		4110KPC	0.80	60.0	25.0-250.0	250.0	2.5	240.0
	160		4132KPC	0.80	60.0	31.4-302.0	302.0	2.5	240.0
220	4160KPC	0.80	60.0	38.7-427.0	427.0	2.5	240.0		
250	4200KPC	0.80	60.0	42.7-481.0	481.0	2.5	240.0		
280	4220KPC	0.80	60.0	55.0-550.0	550.0	2.5	240.0		
315	4280KPC	0.60	60.0	61.6-616.0	616.0	2.5	240.0		

Voltage class	Applicable motor (kW)	Inverter type-form	F300		F308 (Ohm)	F309 (kW)	F316	F356 (s)	F402 (%)	F405		
			Adjustment range	(kHz)						<Set> = " JP" (kW)	other (kW)	
3-phase 240 V	0.75	VFAS3-	2004P	1.0-16.0	4.0	200.0	0.12	1	0.57	4.30	0.75	0.75
	1.5		2007P	1.0-16.0	4.0	75.0	0.12	1	0.57	4.40	1.50	1.50
	2.2		2015P	1.0-16.0	4.0	75.0	0.12	1	0.57	2.90	2.20	2.20
	4.0		2022P	1.0-16.0	4.0	40.0	0.12	1	0.67	2.80	3.70	4.00
	5.5		2037P	1.0-16.0	4.0	20.0	0.24	1	0.87	2.30	5.50	5.50
	7.5		2055P	1.0-16.0	4.0	15.0	0.44	1	0.87	2.00	7.50	7.50
	11		2075P	1.0-16.0	4.0	10.0	0.66	1	1.07	1.60	11.00	11.00
	15		2110P	1.0-16.0	4.0	7.5	0.88	1	1.07	1.50	15.00	15.00
	18.5		2150P	1.0-16.0	4.0	7.5	0.88	1	1.37	1.40	18.50	18.50
	22		2185P	1.0-16.0	4.0	3.3	1.76	1	1.37	1.60	22.00	22.00
	30		2220P	1.0-8.0	4.0	3.3	1.76	1	1.37	1.20	30.00	30.00
	37		2300P	1.0-8.0	4.0	2.0	2.20	1	1.37	0.80	37.00	37.00
	45		2370P	1.0-8.0	4.0	2.0	2.20	1	1.37	0.70	45.00	45.00
	55		2450P	1.0-8.0	2.5	2.0	2.20	1	1.37	0.80	55.00	55.00
75	2550P	1.0-8.0	2.5	1.7	3.40	1	1.37	1.30	75.00	75.00		
3-phase 480 V	0.75	VFAS3-	4004PC	1.0-16.0	4.0	200.0	0.12	3	0.57	4.30	0.75	0.75
	1.5		4007PC	1.0-16.0	4.0	200.0	0.12	3	0.57	4.40	1.50	1.50
	2.2		4015PC	1.0-16.0	4.0	200.0	0.12	3	0.57	2.90	2.20	2.20
	4.0		4022PC	1.0-16.0	4.0	160.0	0.12	3	0.67	2.80	3.70	4.00
	5.5		4037PC	1.0-16.0	4.0	80.0	0.24	3	0.87	2.30	5.50	5.50
	7.5		4055PC	1.0-16.0	4.0	60.0	0.44	3	0.87	2.00	7.50	7.50
	11		4075PC	1.0-16.0	4.0	40.0	0.66	3	1.07	1.60	11.00	11.00
	15		4110PC	1.0-16.0	4.0	30.0	0.88	3	1.07	1.50	15.00	15.00
	18.5		4150PC	1.0-16.0	4.0	30.0	0.88	3	1.37	1.40	18.50	18.50
	22		4185PC	1.0-16.0	4.0	15.0	1.76	3	1.37	1.60	22.00	22.00
	30		4220PC	1.0-16.0	4.0	15.0	1.76	3	1.37	1.20	30.00	30.00
	37		4300PC	1.0-16.0	4.0	8.0	1.76	3	1.37	0.80	37.00	37.00
	45		4370PC	1.0-16.0	4.0	8.0	1.76	3	1.37	0.70	45.00	45.00
	55		4450PC	1.0-8.0	4.0	8.0	1.76	3	1.37	0.80	55.00	55.00
	75		4550PC	1.0-8.0	4.0	8.0	1.76	3	1.37	1.30	75.00	75.00
	90		4750PC	1.0-8.0	4.0	3.7	7.40	3	1.37	1.20	90.00	90.00
	110		4900PC	1.0-8.0	2.5	3.7	7.40	3	1.37	0.90	110.0	110.0
	132		4110KPC	1.0-8.0	2.5	3.7	7.40	3	1.37	0.80	132.0	132.0
	160		4132KPC	1.0-8.0	2.5	3.7	7.40	3	1.37	0.80	160.0	160.0
	220		4160KPC	1.0-8.0	2.5	1.9	8.70	3	1.37	0.80	220.0	220.0
250	4200KPC	1.0-8.0	2.5	1.9	8.70	3	1.37	0.80	250.0	250.0		
280	4220KPC	1.0-8.0	2.5	1.4	14.00	3	1.37	0.80	280.0	280.0		
315	4280KPC	1.0-8.0	2.5	1.4	14.00	3	1.37	0.60	315.0	315.0		

11

Voltage class	Applicable motor (kW)	Inverter type-form	F412 (%)	F415		F416 (%)	F417		F456	F749	
				Adjustment range	(A)		50Hz setting	60Hz setting			
							(min-1)				
3-phase 240 V	0.75	VFAS3-	2004P	7.0	0.01-99.99	3.40	55	1440	1730	100	0
	1.5		2007P	5.0	0.01-99.99	6.40	42	1445	1740	100	0
	2.2		2015P	5.0	0.01-99.99	9.40	50	1460	1755	100	0
	4.0		2022P	5.0	0.01-99.99	14.60	38	1460	1755	100	0
	5.5		2037P	5.0	0.01-99.99	21.40	41	1465	1760	100	1
	7.5		2055P	5.0	0.01-99.99	28.60	38	1460	1755	100	1
	11		2075P	4.0	0.01-99.99	42.00	38	1475	1770	100	1
	15		2110P	4.0	0.01-99.99	55.60	33	1470	1760	100	1
	18.5		2150P	4.0	0.01-99.99	69.00	37	1475	1770	100	1
	22		2185P	4.0	0.1-999.9	80.0	32	1470	1760	100	1
	30		2220P	4.0	0.1-999.9	108.0	33	1470	1765	100	1
	37		2300P	4.0	0.1-999.9	132.0	32	1480	1775	100	1
	45		2370P	3.0	0.1-999.9	159.0	31	1480	1775	100	2
	55		2450P	3.0	0.1-999.9	192.0	28	1480	1775	100	2
75	2550P	3.0	0.1-999.9	264.0	28	1480	1775	100	2		
3-phase 480 V	0.75	VFAS3-	4004PC	7.0	0.01-99.99	1.70	55	1440	1730	100	0
	1.5		4007PC	5.0	0.01-99.99	3.20	42	1445	1740	100	0
	2.2		4015PC	5.0	0.01-99.99	4.70	50	1460	1755	100	0
	4.0		4022PC	5.0	0.01-99.99	7.30	38	1460	1755	100	0
	5.5		4037PC	5.0	0.01-99.99	10.70	41	1465	1760	100	1
	7.5		4055PC	5.0	0.01-99.99	14.30	38	1460	1755	100	1
	11		4075PC	4.0	0.01-99.99	21.00	38	1475	1770	100	1
	15		4110PC	4.0	0.01-99.99	27.80	33	1470	1760	100	1
	18.5		4150PC	4.0	0.01-99.99	34.50	37	1475	1770	100	1
	22		4185PC	4.0	0.01-99.99	40.00	32	1470	1760	100	1
	30		4220PC	4.0	0.01-99.99	54.00	33	1470	1765	85	1
	37		4300PC	4.0	0.01-99.99	66.00	32	1480	1775	80	1
	45		4370PC	3.0	0.1-999.9	79.5	31	1480	1775	100	2
	55		4450PC	3.0	0.1-999.9	96.0	28	1480	1775	100	2
	75		4550PC	3.0	0.1-999.9	129.0	28	1480	1775	100	2
	90		4750PC	3.0	0.1-999.9	154.0	26	1480	1775	80	2
	110		4900PC	3.0	0.1-999.9	190.0	21	1480	1780	100	2
	132		4110KPC	3.0	0.1-999.9	230.0	20	1485	1780	100	2
	160		4132KPC	3.0	0.1-999.9	252.0	20	1485	1785	100	2
	220		4160KPC	3.0	0.1-999.9	315.0	20	1485	1785	100	2
250	4200KPC	3.0	0.1-999.9	345.0	20	1485	1785	100	2		
280	4220KPC	3.0	0.1-999.9	445.0	20	1485	1785	100	2		
315	4280KPC	3.0	0.1-999.9	544.0	20	1485	1785	100	2		

11.7 Analog output/Monitor output function

Option No.	Communication No.		Function	Display unit	Unit (Communication)
	Analog output	Monitor output			
0	FD00	FE00	Output frequency	0.1Hz	0.01Hz
1	FD02	FE02	Frequency command value	0.1Hz	0.01Hz
2	FD03	FE03	Output current	1%/<F701> setting	0.01%
3	FD04	FE04	Input voltage (DC detection)	1%/<F701> setting	0.01%
4	FD05	FE05	Output voltage	1%/<F701> setting	0.01%
5	FD15	FE15	Stator frequency	0.1Hz	0.01Hz
6	FD16	FE16	Speed feedback frequency (real time)	0.1Hz	0.01Hz
7	FD17	FE17	Speed feedback frequency (1-second filter)	0.1Hz	0.01Hz
8	FD18	FE18	Torque	1%	0.01%
9	FD19	FE19	Torque command	1%	0.01%
10	FD99	FE99	Output frequency during run. Frequency command value during stop.	Hz/free unit	-
11	FD20	FE20	Torque current	1%	0.01%
12	FD21	FE21	Exciting current	1%	0.01%
13	FD22	FE22	PID feedback value	0.1Hz	0.01Hz
14	FD23	FE23	Motor overload factor (OL2 data)	1%	0.01%
15	FD24	FE24	Inverter overload factor (OL1 data)	1%	0.01%
16	FD25	FE25	Braking resistor overload factor (OLr data)	1%	1%
17	FD28	FE28	Braking resistor load factor (%ED)	1%	1%
18	DF29	FE29	Input power	0.1kW	0.01kW
19	FD30	FE30	Output power	0.1kW	0.01kW
20	FE76	FE76	Input cumulative power	<F749> setting	<F749> setting
21	FE77	FE77	Output cumulative power	<F749> setting	<F749> setting
22			Fixed output 1	-	-
23			Fixed output 2	-	-
24	FE35	FE35	Terminal RR input value	1%	0.01%
25	FE36	FE36	Terminal RX input value	1%	0.01%
26	FE37	FE37	Terminal II input value	1%	0.01%
27	FD94	FE94	Motor speed command *4	1	1
28	FE40	FE40	Terminal FM output value *1	1	0.01
29	FE41	FE41	Terminal AM output value *2	1	0.01
31	FA51	FA51	Communication data output	*3	*3
32		FE66	Slot A option CPU version	-	-
33		FE67	Slot B option CPU version	-	-
34	FD26	FE26	Motor load factor	%	-
35	FD27	FE27	Inverter load factor	%	-
36		FE70	Inverter rated current	A	-
37		FD70	Inverter rated current (with carrier frequency correction)	A	-

Option No.	Communication No.		Function	Display unit	Unit (Communication)
	Analog output	Monitor output			
38		FD81	Actual carrier frequency	kHz	-
39		FE68	Slot C option CPU version	-	-
40		FE91	Embedded Ethernet CPU version	-	-
41	FD43	FD43	Terminal FP pulse train output value	pps	-
43		FM/F671	Terminal FM/AM gain setting value	-	-
44	FE38	FE38	Terminal AI4 input value	1%	0.01%
45	FE39	FE39	Terminal AI5 input value	1%	0.01%
46	FE60	FE60	My function monitor output 1	-	-
47	FE61	FE61	My function monitor output 2	-	-
48	FE62	FE62	My function monitor output 3	-	-
49	FE63	FE63	My function monitor output 4	-	-
62	FD48	FE48	PID result frequency	0.1Hz	0.01Hz
63	FD58	FE58	PID set value	0.1Hz	0.01Hz
64	FD50	FD50	Light-load high-speed switching load torque	1%	0.01%
65	FD51	FD51	Light-load high-speed torque during constant speed run	1%	0.01%
66		FE31	Pattern operation group number	0.1	0.1
67		FE32	Pattern operation remaining cycle number	1	1
68		FE33	Pattern operation preset speed number	1	1
69		FE34	Pattern operation remaining time	0.1	0.1
70		FE71	Inverter rated voltage	1	0.1
71	FD90	FE90	Motor speed (estimated value) *4	1	1
72		FA15	Communication option Receiving counter	1	1
73		FA16	Communication option Abnormal counter	1	1
76	FE56	FE56	Terminal S4/S5 pulse train input value	0.001	0.0001
77		FD85	My function COUNT1	1	1
78		FD86	My function COUNT2	1	1
79	FD87	FD87	Dancer control PID result frequency	0.1Hz	0.01Hz
80		FA25	Embedded Ethernet Transmission counter	1	1
81		FA17	Embedded Ethernet Receiving counter	1	1
82		FA18	Embedded Ethernet Abnormal counter	1	1
83		FE81	Connected option number	1	1
84		FD91	My function COUNT3	1	1
85		FD92	My function COUNT4	1	1
86		FD93	My function COUNT5	1	1
90		FE80	Cumulative power ON time	100 hours	-
91		FD41	Cumulative cooling fan run time	100 hours	-
92		FD14	Cumulative run time	100 hours	-
93		FD31	Cumulative overcurrent time	-	-
95		E960	Pump 0 run time	100 hours	-
96		E961	Pump 1 run time	100 hours	-
97		E962	Pump 2 run time	100 hours	-

Option No.	Communication No.		Function	Display unit	Unit (Communication)
	Analog output	Monitor output			
98		E963	Pump 3 run time	100 hours	-
99		E964	Pump 4 run time	100 hours	-
100		FD32	Number of starting	10000 times	-
101		FD33	Number of Fwd starting	10000 times	-
102		FD34	Number of Rev starting	10000 times	-
103		FE59	External equipment counter	Times	-
105		E965	Pump 5 run time	100 hours	-
106		E966	Pump 6 run time	100 hours	-
107		E967	Pump 7 run time	100 hours	-
108		E968	Pump 8 run time	100 hours	-
109		E969	Pump 9 run time	100 hours	-
110		FD35	Number of trip	Times	-
111		FD36	Number of serious failure trip	Times	-
112		FD37	Number of slight failure trip	Times	-
113		FD38	Number of specified trip 1	Times	-
114		FD39	Number of specified trip 2	Times	-
115		FD40	Number of specified trip 3	Times	-
120	FD83	FE83	Internal temperature 1	-	-
124	FE78	FE78	Power circuit board temperature	-	-
130	FD96	FD96	External PID3 set value	-	-
131	FD97	FD97	External PID3 feedback value	-	-
132	FD98	FD98	External PID3 result value	-	-
133	FE96	FE96	External PID4 set value	-	-
134	FE97	FE97	External PID4 feedback value	-	-
135	FE98	FE98	External PID4 result value	-	-
150	FD00 *5	FE00	Signed output frequency	0.1Hz	0.01Hz
151	FD02 *5	FE02	Signed frequency command value	0.1Hz	0.01Hz
152	FD15 *5	FE15	Signed stator frequency	0.1Hz	0.01Hz
153	FD16 *5	FE16	Signed speed feedback frequency (real time)	0.1Hz	0.01Hz
154	FD17 *5	FE17	Signed speed feedback frequency (1-second filter)	0.1Hz	0.01Hz
155	FD18	FE18	Signed torque	1%	0.01%
156	FD19	FE19	Signed torque command	1%	0.01%
158	FD20	FE20	Signed torque current	1%	0.01%
159	FD22 *5	FE22	Signed PID feedback value	0.1Hz	0.01Hz
160	FE37	FE37	Signed terminal RX input value	1%	0.01%
161	FE38	FE38	Signed terminal AI4 input value	1%	0.01%
162	FE39	FE39	Signed terminal AI5 input value	1%	0.01%

*1 Disabled with <FMSL: Terminal FM function>.

*2 Disabled with <F670: Terminal AM function>.

*3 For details, refer to RS485 Communication Function Instruction Manual (Exxxxxx).

*4 Monitor is limited from -32700 to 32700.

*5 FD00(FE00), FD02(FE02), FD15(FE15), FD16(FE16), FD17(FE17), FD22(EF22) are unsigned value. Internal polarity is used for signed analog output or monitor.

11. 8 Input terminal function

The function No. in the following table can be assigned to parameters <F110>-<F124>, <F127>, <F128>. and <F151>-<F158>.

Function number		Symbol	Function	Action	Reference
Positive logic	Negative logic				
0	1	-	No function	Disabled	-
2	3	F	Fwd run	ON: Forward run (except deceleration stop) OFF: Deceleration stop	[7. 2. 1]
4	5	R	Rev run	ON: Reverse run (except deceleration stop) OFF: Deceleration stop	
6	7	ST	Standby	ON: Ready for operation, OFF: Coast stop (gate OFF)	[5. 4. 2] [6. 3. 1] [6. 34. 8] [6. 8. 2] [7. 2. 1]
8	9	RES1	Reset 1	ON: Acceptance of reset command, ON→OFF: Trip reset	[7. 2. 1] [13. 1]
10	11	SS1	Preset speed switching 1	Selection of 31-speed SS1 to SS5 (5 bits)	[5. 3. 7] [7. 2. 1]
12	13	SS2	Preset speed switching 2		
14	15	SS3	Preset speed switching 3		
16	17	SS4	Preset speed switching 4		
18	19	JOG	Jog run	ON: Jog run enabled	[6. 10] [7. 2. 1]
20	21	EXT	Emergency off	ON: "E" trip after <F603> operation	[6. 30. 4] [7. 2. 1]
22	23	DB	DC braking	ON: DC braking	[6. 8. 1] [6. 8. 3] [7. 2. 1]
24	25	AD1	Acc/Dec switching 1	Selection of Acc/Dec 1 - 4 AD2, AD3 (2 bits)	[7. 2. 1]
26	27	AD2	Acc/Dec switching 2		
28	29	VFSW1	V/f switching 1	Selection of V/f 1 - 4 VFSW1, VFSW2 (2 bits)	
30	31	VFSW2	V/f switching 2		
32	33	OCS2	Stall prevention switching/Torque limit switching 1	ON: <F185: Stall prevention level 2> enabled OFF: <F601: Stall prevention level 1> enabled	[6. 24. 1] [6. 27. 2] [6. 30. 2] [7. 2. 1]
34	35	TRQL2	Torque limit switching 2	Selection of Power running/Regenerative torque limit 1 - 4 OCS2, TRQL1 (2 bits)	[6. 24. 1] [6. 27. 2] [7. 2. 1]
36	37	PID	PID control OFF	ON: PID control OFF	[5. 3. 8] [7. 2. 1]
38	39	PTTN1	Pattern operation 1	ON: Pattern operation 1 enabled	[6. 28] [7. 2. 1]
40	41	PTTN2	Pattern operation 2	ON: Pattern operation 2 enabled	
42	43	PTTNC	Pattern operation continuation	ON: Pattern operation continued	
44	45	PTTNS	Pattern operation start	ON: Pattern operation start	
46	47	OH2	External thermal trip	ON: "OH2" trip	[7. 2. 1]

Function number		Symbol	Function	Action	Reference
Positive logic	Negative logic				
48	49	SCLC	Communication priority cancel	ON: Run at the setting of <CMOd: Run command select> and <FMd: Frequency command select 1> OFF: Run by communication	[6. 38. 2] [7. 2. 1]
50	51	HD	3-wire operation hold/stop	ON: Forward run (F), Reverse run (R) held, 3-wire operation OFF: Deceleration stop	[7. 2. 1]
52	53	IDC	PID differential/integral reset	ON: PID differential/integral cleared	[5. 3. 8] [7. 2. 1]
54	55	PIDSW	PID plus/minus switching	ON: Plus/minus characteristics of <F359: PID control 1> setting OFF: Characteristics of <F359: PID control 1> setting	[7. 2. 1]
56	57	FORCE	Forced run	ON: Forced run, continues in a slight failure condition (Set <F650: Forced run> = "1: Enabled". Frequency command value = <F294: Preset speed 15 / Forced run speed>.) *Stop with power off	[6. 12. 2] [6. 31] [7. 2. 1]
58	59	FIRE	Fire speed run	ON: Fire speed run (Set <F650: Fire speed run> = "1: Enabled". Frequency command value = <F294: Preset speed 15 / Forced run speed>.) *Stop with power off	
60	61	DWELL	Dwell operation	ON: Dwell operation (Stop acceleration and deceleration and run the motor at a constant speed)	[6. 19] [7. 2. 1]
62	63	KEB	Synchronized Acc/Dec	ON: Deceleration stop with synchronizing at power failure	[7. 2. 1]
64	65	MYF	My function start	ON: My function start (When <A977: My function> = "1: Enabled by permission signal")	
66	67	AUTT	Offline auto-tuning	<F400> = "3" ON: Offline auto-tuning executed <F400> = "6" ON: Offline auto-tuning executed at run command while this signal is ON. <F400> = "7" ON: Offline auto-tuning executed only for <F402> at run command while this signal is ON.	[6. 23. 1] [6. 23. 2] [7. 2. 1]
68	69	SGSW	Speed control gain switching	ON: Use F463-F465 OFF: Use F460-F462	[7. 2. 1]
70	71	SRVL	Servo lock	ON: Servo lock	
72	73	SIMP	Simple positioning	ON: Simple positioning operation	
74	75	CKWH	Cumulative power monitor clear	ON: Clear cumulative power (kWh) monitor display	[6. 36] [7. 2. 1]
76	77	TRACE	Trace trigger	ON: Trace trigger (start) signal	[7. 2. 1]
78	79	HSLL	Light-load high-speed operation inhibited	ON: Light-load high-speed operation inhibited OFF: Light-load high-speed operation permitted	
80	81	HDFP	Terminal FP output hold	ON: Terminal [FP] is held ON once turned ON	
82	83	HDR1	Terminal R1 output hold	ON: Terminal [R1] is held ON once turned ON	
84	85	HDR2	Terminal R2 output hold	ON: Terminal [R2] is held ON once turned ON	
88	89	UP	Terminal Up frequency	ON: Frequency command increased	
90	91	DOWN	Terminal Down frequency	ON: Frequency command decreased	[6. 6. 5] [7. 2. 1]
92	93	CLR	Terminal Up, Down frequency clear	OFF-> ON: Clear Terminal Up, Down frequency command	[7. 2. 1]
94	95	DANC	Dancer correction OFF	ON: Dancer correction OFF	
96	97	FRR	Coast stop	ON: Coast stop (gate OFF)	[6. 34. 8] [7. 2. 1]
98	99	FR	Fwd/Rev	ON: Forward command, OFF: Reverse command	[7. 2. 1]
100	101	RS	Run/Stop	ON: Run command, OFF: Stop command	

Function number		Symbol	Function	Action	Reference
Positive logic	Negative logic				
102	103	CPSW	Commercial power run switching	ON: Commercial power run, OFF: Inverter run	[6. 20] [7. 2. 1]
104	105	FCHG	FMOd/F207 priority switching	ON: <F207: Frequency command select 2> enabled (When <F200: Frequency command priority select> = "0") OFF: <FMOd: Frequency command select 1> enabled	[5. 4. 1] [7. 2. 1]
106	107	FMTB	Terminal II priority	ON: Frequency command of Terminal [II] enabled OFF: <FMOd: Frequency command select 1> enabled	[7. 2. 1]
108	109	CMTB	Terminal run priority	ON: Run command of terminal enabled OFF: <CMO: Run command select> enabled	[5. 2. 1] [7. 2. 1]
110	111	PWE	Parameter writing unlocked	ON: Parameter writing unlocked OFF: <F700: Parameter reading & writing access lockout> setting	[6. 34. 1] [7. 2. 1]
112	113	STSW	Speed control/Torque control switching	ON: Torque control, OFF: Speed control	[7. 2. 1]
114	115	EXCUT	External equipment counter	ON: Count the signals (Monitor number "103" can monitor the number of ON signal)	[6. 30. 21] [7. 2. 1]
116	117	PI1SW	PID 1, 2 switching	ON: PID2, OFF: PID1	[7. 2. 1]
118	119	SS5	Preset speed switching 5	Selection of 31-speed SS1 to SS5 (5 bits)	[5. 3. 7] [7. 2. 1]
120	121	FSTP1	Quick deceleration 1	ON: Dynamic quick deceleration OFF: Canceled *Operation is resumed when dynamic quick deceleration is canceled	[7. 2. 1]
122	123	FSTP2	Quick deceleration 2	ON: Quick deceleration OFF: Canceled *Operation is resumed when quick deceleration is canceled	
124	125	PREX	Preliminary excitation	ON: Preliminary excitation	
126	127	BRK	Brake	ON: Brake closed	
130	131	BRKA	Brake answerback	ON: Comparison signal with output terminal function "68: During brake release" ("E-11" trip when mismatching)	[6. 30. 15] [7. 2. 1]
134	135	TVS	Traverse operation	ON: Traverse operation permission	[7. 2. 1]
136	137	RSC	Rescue operation	ON: Rescue operation (Low voltage operation)	
138	139	PMP SW	Pump control switching	ON: Pump switching during pump control	
140	141	SLOWF	Fwd slowdown	ON: Forward run toward the setting value of <F383: Hit and stop frequency>	
142	143	STOPF	Fwd stop	ON: Stop (Forward run only)	
144	145	SLOWR	Rev slowdown	ON: Reverse run toward the setting value of <F383: Hit and stop frequency>	
146	147	STOPR	Rev stop	ON: Stop (Reverse run only)	
148	149	SLOFR	Fwd/Rev slowdown	ON: Stop (Forward/Reverse run)	
150	151	HSC	Hit and stop clear	ON: Hit and stop cleared	

Function number		Symbol	Function	Action	Reference
Positive logic	Negative logic				
152	153	MOT2	No. 2 motor switching	ON: No.2 motor setting + No.2 Acc/Dec + No.2 Stall (Torque limit) (V/f constant, <F170>, <F171>, <F172>, <F182>, <F185>, <F500>, <F501>, <F503>) <tHrA> (not <F182>) when <F632> = "2", "3" OFF: No.1 motor setting + No.1 Acc/Dec + No. 1 Stall (Torque limit) (<Pt>, <vL>, <vLv>, <vb>, <tHrA>, <ACC>, <dEC>, <F502>, <F601>)	[7. 2. 1]
154	155	PID3	External PID3 enabled	ON: External PID3 enabled	
156	157	PID4	External PID4 enabled	ON: External PID4 enabled	
158	159	RES2	Reset 2	ON: Reset accepted, ON -> OFF: Trip reset	
162	163	PID3R	External PID3 differential/integral reset	ON: External PID3 differential/integral reset	
164	165	PID3S	External PID3 plus/minus switching	ON: Plus/minus characteristics of <A340: PID control 3> setting OFF: Characteristics of <A340: PID control 3> setting	
170	171	PID4R	External PID4 differential/integral reset	ON: External PID4 differential/integral reset	
172	173	PID4S	External PID4 plus/minus switching	ON: Plus/minus characteristics of <A370: PID control 4> setting OFF: Characteristics of <A370: PID control 4> setting	
176	177	PMPR	Pump control release	ON: Pump release during pump control	
200	201	PWP	Parameter writing locked	ON: Parameter writing locked (Reading unlocked) OFF: <F700: Parameter reading & writing access lockout> setting	[6. 34. 1]
202	203	PRWP	Parameter reading locked	ON: Parameter reading & writing access lockout OFF: <F700: Parameter reading & writing access lockout> setting	[7. 2. 1]

11.9 Output terminal function

The function No. in the following table can be assigned to parameters <F130>, <F132>-<F134>, <F137>, <F138>, and <F159>-<F163>.

Function Number		Symbol	Function	Action	Reference
Positive logic	Negative logic				
0	1	LL	Lower limit frequency (LL)	ON: Output frequency over <LL: Lower limit frequency>	[7. 2. 2]
2	3	UL	Upper limit frequency (UL)	ON: Output frequency is <UL: Upper limit frequency> or more	[7. 2. 2]
4	5	LOW	Low-speed signal	ON: Output frequency is <F100: Low-speed signal output frequency> or more	[6. 1. 1] [7. 2. 2]
6	7	RCH	Acc/Dec completed	Output frequency is within command frequency \pm <F102: Reach signal detection band>	[6. 1. 2] [7. 2. 2]
8	9	RCHF	Specified frequency attainment	ON: Output frequency is within <F101: Reach signal specified frequency> \pm <F102: Reach signal detection band>	[6. 1. 3] [7. 2. 2]
10	11	FL1	Failure signal 1	ON: Tripped	[6. 30. 5] [6. 30. 6] [6. 30. 7] [6. 30. 8] [6. 30. 10] [6. 30. 14] [7. 2. 2]
12	13	FL2	Failure signal 2	ON: At trip, except "EF", "OCL", "EPHO", and "OL2"	
14	15	POC	Overcurrent (OC) pre-alarm	ON: Output current is <F601: Stall prevention level 1> or more	
16	17	POLI	Inverter overload (OL1) pre-alarm	ON: Calculated value of overload protection level is a specific level or more	
18	19	POLM	Motor overload (OL2) pre-alarm	ON: Calculated value of overload protection level is <F657: Overload alarm level> or more	[7. 2. 2]
20	21	POH	Overheat (OH) pre-alarm	ON: Approx. 95°C or more of IGBT element OFF: Under approx. 95°C of IGBT element (90°C or less after detection is turned on)	
22	23	POP	Overvoltage (OP) pre-alarm	ON: Overvoltage limit in operation	
24	25	MOFF	Power circuit undervoltage (MOFF) alarm	ON: Main circuit undervoltage (MOFF) detected	
26	27	UC	Undercurrent (UC) alarm	ON: When the output current falls below the value set by <F611: Undercurrent detection level> and remains below <F611: Undercurrent detection level>+<F609: Undercurrent detection hysteresis> for the period of time specified by <F612: Undercurrent detection time> OFF: Output current is over <F611> (<F611>+<F609> or more after detection turns on)	[6. 30. 7] [7. 2. 2]
28	29	OT	Overtorque (OT) alarm	ON: When the torque becomes <F616: Overtorque detection level during power running> or more, and remains over <F616: Overtorque detection level during power running> - <F619: Overtorque detection hysteresis> for the time specified by <F618: Overtorque detection time> OFF: Torque is under <F616> (<F616>-<F619> or less after detection turns on)	[6. 30. 8] [7. 2. 2]
30	31	POLR	Braking resistor overload (OLr) pre-alarm	ON: 50% or more of calculated value of <F309: Braking resistor capacity> set overload protection level	[6. 15. 4] [7. 2. 2]

Function Number		Symbol	Function	Action	Reference
Positive logic	Negative logic				
32	33	E	Emergency off trip	ON: During emergency off trip ("E" is displayed)	[7. 2. 2]
34	35	RETRY	During retry	ON: During retry	
36	37	PTNS	Pattern operation end	ON: All pattern operation end	[6. 28] [7. 2. 2]
38	39	PIDL	PID deviation limit	ON: Within the setting value of <F364: PID1 deviation upper-limit>, <F365: PID1 deviation lower-limit>	[7. 2. 2]
40	41	RUN	Run/Stop	ON: During run or DC braking, OFF: During stop	
42	43	HFL	Serious failure	ON: At trip *1, OFF: Other than those trip above	
44	45	LFL	Slight failure	ON: At trip ("OC1", "OC2", "OC3", "OP1", "OP2", "OP3", "OH", "OL1", "OL2", "OL3", "OLr") OFF: Other than those trip above	
46	47	CPSW1	Commercial power/ Inverter Switching 1	ON: For inverter run	
48	49	CPSW2	Commercial power/ Inverter Switching 2	ON: For commercial power run	
50	51	FAN	During cooling fan run	ON: During cooling fan run	[6. 30. 11] [7. 2. 2]
52	53	JOG	During jog run	ON: During jog run	[7. 2. 2]
54	55	JBM	During terminal run	ON: During terminal run, OFF: Other than terminal run	[6. 30. 12] [7. 2. 2]
56	57	COT	Cumulative run time alarm	ON: Cumulative operation time is <F621: Cumulative run time alarm > or more	
58	59	COMOP	Communication option communication time-out	ON: Time-out of communication option occurs (held until reset)	[7. 2. 2]
60	61	FR	Fwd/Rev run	ON: During reverse run, OFF: During forward run * Command direction or OFF during stop	
62	63	RDY1	Ready for run 1	ON: Run when frequency command is ON	
64	65	RDY2	Ready for run 2	ON: Run when ST, RUN, or frequency command is ON	
68	69	BR	During brake	ON: Brake, OFF: Break release	
70	71	PAL	During alarm or pre-alarm	ON: Alarm or pre-alarm occurring	
72	73	FSL	During Fwd speed limit	ON: <F426: Fwd speed limit level> or more (Torque control)	
74	75	RSL	During Rev speed limit	ON: <F428: Rev speed limit level> or more (Torque control)	
76	77	HLTH	Inverter healthy output	Output while switching ON and OFF over at every 1 sec. (to check inverter soundness)	
78	79	COME	RS485 communication time-out	ON:RS485 communication time-out	
92	93	DATA1	Designated data bit 0	ON: bit0 of FA50 is ON, OFF: bit0 of FA50 is OFF	[7. 2. 2]
94	95	DATA2	Designated data bit 1	ON: bit1 of FA50 is ON, OFF: bit1 of FA50 is OFF	
106	107	LLD1	Light load detection 1	ON: Under heavy load torque(<F335> to <F338>)	
108	109	HLD	Heavy load detection	ON: Heavy load torque(<F335> to <F338>)or more	
110	111	PTL	During positive torque limit	ON: During positive torque limit	
112	113	MTL	During negative torque limit	ON: During negative torque limit	
114	115	RCRY	For external relay of rush current suppression	ON: For external relay of rush current suppression	
116	117	FL4	Failure signal 4	ON: During trip (including retry wait time)	

Function Number		Symbol	Function	Action	Reference
Positive logic	Negative logic				
118	119	STPC	Stop positioning completion	ON: Stop position completion	[7. 2. 2]
120	121	LLS	During sleep	ON: During sleep	
122	123	KEB	During synchronized Acc/Dec	ON: During synchronized acceleration/deceleration	
124	125	TVS	During traverse operation	ON: During traverse operation	
126	127	TVSD	During traverse Dec	ON: During traverse deceleration	
128	129	LTA	Parts replacement alarm	ON: Any one of cooling fan, control board capacitor, or power circuit capacitor reaches parts replacement time	[6. 30. 17] [7. 2. 2]
130	131	POT	Overtorque (OT) pre-alarm	ON: Torque current is 70% of <F616: Overtorque detection level during power running> setting value or more OFF: Torque current is under <F616> x 70%-<F619: Overtorque detection hysteresis>	[7. 2. 2]
132	133	FMOD	Frequency command 1/ Frequency command 2	ON: <F207: Frequency command select 2> enabled OFF: <FMod: Frequency command select 1> enabled	
134	135	FL3	Failure signal 3	ON: During trip (except Emergency off)	
136	137	FLC	Hand/Auto	ON: Run command or panel run, OFF: Other than those at left	
138	139	FORCE	During forced run	ON: During forced run	[6. 31]
140	141	FIRE	During fire speed run	ON: During fire speed run	[7. 2. 2]
142	143	UTA	Undertorque alarm	ON: Undertorque alarm level or more	[7. 2. 2]
144	145	PIDF	PID1,2 frequency command agreement	ON: Frequency commanded by <F389: PID1 set value select > and <F360: PID1 feedback input select > are within ± <F374: PID1 set value agreement detection band>	
150	151	PTCA	PTC input pre-alarm	ON: PTC thermal input value is 60% of <F646: PTC detection resistance> or more	
152	153	STO	During Safe Torque Off (STO)	ON: Open between [STOA]-[STOB]-[PLC] OFF: Short circuit between [STOA]-[STOB]-[PLC]	[7. 2. 2]
154	155	DISK	Analog input disconnecting alarm	ON: The input value of terminal [II] is <F633: II analog input disconnection detection level> or less	
156	157	LI1	Terminal F ON/OFF	ON: Terminal [F] is ON, OFF: Terminal [F] is OFF	
158	159	LI2	Terminal R ON/OFF	ON: Terminal [R] is ON, OFF: Terminal [R] is OFF	
160	161	LTAF	Cooling fan replacement alarm	ON: Cooling fan reaches parts replacement time	[6. 30. 17] [7. 2. 2]
162	163	NSA	Number of starting alarm	ON: Number of starting is <F648: Number of starting alarm> or more	[6. 30. 21] [7. 2. 2]
164	165	LLD2	Light load detection 2	ON: Light load detection (compatible with old model)	[7. 2. 2]
166	167	DACC	During Acc	ON: During acceleration	
168	169	DDEC	During Dec	ON: During deceleration	
170	171	DRUN	During constant speed run	ON: During constant speed run	
172	173	DDC	During DC braking	ON: During DC braking	
174	175	HSTOP	During hit and stop	ON: During hit and stop	
176	177	SRVLR	During run including servo lock	ON: During run including servo lock	

Function Number		Symbol	Function	Action	Reference
Positive logic	Negative logic				
178	179	SRVL	During servo lock	ON: During servo lock	[7. 2. 2]
180	181	IPU	For input cumulative power	ON: Input cumulative power unit reach	
182	183	SMPA	Shock monitoring alarm	ON: Current / torque value reach the shock monitoring detection condition	
184	185	ENSA	Number of external equipment starting alarm	ON: Number of starting of external equipment is <F658: Number of external equipment starting alarm> or more	[6. 30. 21] [7. 2. 2]
186	187	VFS1	V/f switching status 1	ON: V/f switching status 1	[7. 2. 2]
188	189	VFS2	V/f switching status 2	ON: V/f switching status 2	
190	191	FAL	Cooling fan fault alarm	ON: Cooling fan fault	[6. 30. 11] [7. 2. 2]
192	193	ETHE	Embedded Ethernet communication time-out	ON: Embedded Ethernet communication time-out	[7. 2. 2]
194	195	CLD1	Calendar 1	ON: Calendar 1	
196	197	CLD2	Calendar 2	ON: Calendar 2	
198	199	CLD3	Calendar 3	ON: Calendar 3	
200	201	CLD4	Calendar 4	ON: Calendar 4	
202	203	PID2	During PID2 control	ON: During PID2 control	
204	205	PID3	During External PID3 control	ON: During External PID3 control	
206	207	PID3L	External PID3 deviation limit	ON: Within the setting value of <A346: PID3 deviation upper-limit>, <A347: PID3 deviation lower-limit>	
208	209	PID4	During External PID4 control	ON: During External PID4 control	
210	211	PID4L	External PID4 deviation limit	ON: Within the setting value of <A376: PID4 deviation upper-limit>, <A377: PID4 deviation lower-limit>	
212	213	PMPC	Pump control	ON: For pump operation	
222	223	MYF1	My function output 1	ON: My function output 1	
224	225	MYF2	My function output 2	ON: My function output 2	
226	227	MYF3	My function output 3	ON: My function output 3	
228	229	MYF4	My function output 4	ON: My function output 4	
230	231	MYF5	My function output 5	ON: My function output 5	
232	233	MYF6	My function output 6	ON: My function output 6	
234	235	MYF7	My function output 7	ON: My function output 7	
236	237	MYF8	My function output 8	ON: My function output 8	
238	239	MYF9	My function output 9	ON: My function output 9	
240	241	MYF10	My function output 10	ON: My function output 10	
242	243	MYF11	My function output 11	ON: My function output 11	
244	245	MYF12	My function output 12	ON: My function output 12	
246	247	MYF13	My function output 13	ON: My function output 13	
248	249	MYF14	My function output 14	ON: My function output 14	
250	251	MYF15	My function output 15	ON: My function output 15	
252	253	MYF16	My function output 16	ON: My function output 16	[7. 2. 2]
254	-	AOFF	Always OFF	Always OFF	-

Function Number		Symbol	Function	Action	Reference
Positive logic	Negative logic				
-	255	AON	Always ON	Always ON	-

*1 At trip "OCL", "OCR", "EPH1", "EPH0", "Ot", "Ot2", "OtC3", "UtC3", "OH2", "E", "EEP1"- "EEP3", "Err2"- "Err5", "UC", "UP1", "Etn", "Etn1"- "Etn3", "EF2", "PrF", "EtyP", "E-13", "E-18"- "E-21", "E-23", "E-26", "E-32", "E-37", "E-39"

11. 10 Setup menu

Parameter title	Function	Mainly North America	Mainly Asia	Mainly Europe	China	Japan
FH	Maximum frequency (Hz)	80.0	80.0	80.0	50.0	80.0
F307	Supply voltage compensation	2	2	2	2	3
F319	Regenerative over-flux upper limit (%)	120	120	120	140	140
F417	Motor rated speed (min ⁻¹)	*1	*1	*1	*1	*1
vLv, F171, F175, F179	Base frequency Voltage (V)	230	230	230	200	200
		460	400	400	380	400
vL, UL, F170, F174, F178, F204, F213, F219, F225, F231, F237, F330, F335, F364, F367, F370, F426, F428, F814, A316, A319, A322, A346, A349, A352, A376, A379, A382	Frequency (Hz)	60.0	50.0	50.0	50.0	60.0
F606, F643	Frequency (max of set value) (Hz)	60.0	50.0	50.0	50.0	60.0
F405	Motor rated Capacity (kW)	3.7	4.0	4.0	4.0	3.7
		0.4	0.4	0.4	0.4	0.37

*1 Depending on the region and the capacity. Refer to [11. 6].

11. 11 Guidance function

Embedded Ethernet setting	
<AUF>=1	
C081-C096	Device name 1-16
C610	Emb Eth. IP setting mode
C611-C614	Emb Eth. IP address setting value
C615-C618	Emb Eth. Subnet mask setting value
C619-C622	Emb Eth. Default gateway setting value
C629-C632	Emb Eth. IP address monitor
C633-C636	Emb Eth. Subnet mask monitor
C637-C640	Emb Eth. Default gateway monitor
Preset speed operation	
<AUF>=2	
CMOd	Run command select
FMOd	Frequency command select
ACC	Acceleration time 1
dEC	Deceleration time 1
FH	Maximum frequency
UL	Upper limit frequency
Sr1-Sr7	Preset speed 1-7
F111-F116	Terminal xx function
F287-F294	Preset speed 8-15
Analog frequency command	
<AUF>=3	
CMOd	Command mode selection
FMOd	Frequency mode selection
ACC	Acceleration time 1
dEC	Deceleration time 1
FH	Maximum frequency
UL	Upper limit frequency
LL	Lower limit frequency
F201	RR point 1 input value
F202	RR point 1 frequency
F203	RR point 2 input value
F204	RR point 2 frequency
F216	II point 1 input value
F217	II point 1 frequency
F218	II point 2 input value
F219	II point 2 frequency

Motor 1,2 switching	
<AUF>=4	
vL	Base frequency
vLv	Base frequency voltage 1
vb	Manual torque boost
tHrA	Motor overload protection current 1
ACC	Acceleration time 1
dEC	Deceleration time 1
F111-F116	Terminal xx function
F170	Base frequency 2
F171	Base frequency voltage 2
F172	Manual torque boost 2
F182	Motor overload protection current 2
F185	Stall prevention level 2
F415	Motor rated current
F500	Acceleration time 2
F501	Deceleration time 2
F601	Stall prevention level 1
Motor parameter	
<AUF>=5	
Pt	V/f pattern
vL	Base frequency
vLv	Base frequency voltage 1
F405	Motor rated capacity
F415	Motor rated current
F417	Motor rated speed
F400	Offline auto-tuning
PM motor parameter	
<AUF>=6	
Pt	Motor control type
vL	Motor base frequency
vLv	Motor nominal voltage
F400	Auto tuning
F402	Automatic torque boost
F405	Motor rated capacity
F415	Motor nominal current
F417	Motor nominal speed
F458	Current control P gain
F460	Speed loop P gain
F461	Speed loop I gain
F462	Load inertia
F910	Step-out detection current
F911	Step-out detection time
F912	Auto tune Lq axis
F913	Auto tune Ld axis
F914	Current stall prevention frequency
F915	Starting method
F916	Id current at starting
F917	Lq ratio at 100% load
F918	Lq ratio at 200% load
F919	Reluctance torque ratio

12 Specifications

I

II

In this chapter, the inverter's model and type, standard specification, outside dimensions, and approx. mass are described.

12.1 Model and main standard specification

- Standard specification depending on model
< 240 V class: HD rating >

Item		Specification														
Voltage class		240 V class														
Frame size		A1				A2	A3		A4			A5			A6	
Applicable motor (kW)		0.4	0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55
Applicable motor (HP)		0.5	1	2	3	5	7.5	10	15	20	25	30	40	50	60	75
Rating	Type	VFAS3-														
	Form	2004P	2007P	2015P	2022P	2037P	2055P	2075P	2110P	2150P	2185P	2220P	2300P	2370P	2450P	2550P
	Output capacity (kVA) ^{*1}	1.3	1.8	3.0	4.3	7.1	9.7	12.5	17.8	24.2	29.9	35.3	46.9	56.8	67.1	80.4
	Output current (A) ^{*2}	3.3	4.6	8.0	11.2	18.7	25.4	32.7	46.8	63.4	78.4	92.6	123	149	176	211
	Output voltage	3-phase 200 V to 240 V (The maximum output voltage is equal to the input supply voltage)														
	Overload current rating	150%-1 minute, 180%-2 s														
Electrical braking	Dynamic braking circuit	Built-in												Optional		
	Dynamic braking resistor	External braking resistor (Optional)														
Power supply	Voltage-frequency	3-phase 200 V to 240 V - 50/60 Hz														
	Allowable fluctuation	Voltage 170 V to 264 V ^{*3} , Frequency $\pm 5\%$														
	Required power supply capacity (kVA) ^{*4}	0.7	1.4	2.4	3.7	5.9	7.7	10.5	15.7	20.6	24.9	30.7	40.5	49.6	61.0	73.3
Degree of protection (IEC60529)		IP20											IP00			
Cooling method		Forced air-cooled														
Cooling fan noise (dBA) (Reference value) ^{*5}		58				54	60	64			63			70		
Color		RAL7016 / RAL7035														
EMC filter		No EMC filter														
DC reactor		Built-in														
UL type1 kit		Built-in												Optional		

*1 Capacity is calculated at 220 V for the 240 V class.

*2 Indicates rated output current when setting <F300: Carrier frequency> into 4 kHz for frame size A1 to A5, 2.5 kHz for frame size A6.

*3 Lower limit of voltage for 240 V class is 180 V when the inverter is used continuously (load of 100%).

*4 Required power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and wires).

*5 These acoustic noise values are not guaranteed because they are just reference values.

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< 240 V class: ND rating >

Item		Specification														
Voltage class		240 V class														
Frame size		A1				A2	A3		A4			A5			A6	
Applicable motor (kW)		0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Applicable motor (HP)		1	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100
Rating	Type	VFAS3-														
	Form	2004P	2007P	2015P	2022P	2037P	2055P	2075P	2110P	2150P	2185P	2220P	2300P	2370P	2450P	2550P
	Output capacity (kVA) *1	1.8	3.0	4.3	7.1	9.7	12.5	17.8	24.2	29.9	35.3	46.9	56.8	67.1	80.4	107
	Output current (A) *2	4.6	8.0	11.2	18.7	25.4	32.7	46.8	63.4	78.4	92.6	123	149	176	211	282
	Output voltage	3-phase 200 V to 240 V (The maximum output voltage is equal to the input supply voltage)														
	Overload current rating	120%-1 minute, 135%-2 s														
Electrical braking	Dynamic braking circuit	Built-in												Optional		
	Dynamic braking resistor	External braking resistor (Optional)														
Power supply	Voltage-frequency	3-phase 200 V to 240 V - 50/60 Hz														
	Allowable fluctuation	Voltage 170 V to 264 V *3, Frequency ± 5%														
	Required power supply capacity (kVA) *4	1.2	2.3	3.3	5.9	7.8	10.3	15.0	20.6	24.9	29.4	40.5	49.3	59.6	73.3	98.1
Degree of protection (IEC60529)		IP20												IP00		
Cooling method		Forced air-cooled														
Cooling fan noise (dBA) (Reference value) *5		58				54	60		64			63			70	
Color		RAL7016 / RAL7035														
EMC filter		No EMC filter														
DC reactor		Built-in														
UL type1 kit		Built-in												Optional		

*1 Capacity is calculated at 220 V for the 240 V class.

*2 Indicates rated output current when setting <F300: Carrier frequency> into 4 kHz for frame size A1 to A5, 2.5 kHz for frame size A6.

*3 Lower limit of voltage for 240 V class is 180 V when the inverter is used continuously (load of 100%).

*4 Required power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and wires).

*5 These acoustic noise values are not guaranteed because they are just reference values.

< 480 V class: HD rating >

Item		Specification												
Voltage class		480 V class												
Frame size		A1					A2		A3			A4		
Applicable motor (kW)		0.4	0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37
Applicable motor (HP)		0.5	1	2	3	5	7.5	10	15	20	25	30	40	50
Rating	Type	VFAS3-												
	Form	4004PC	4007PC	4015PC	4022PC	4037PC	4055PC	4075PC	4110PC	4150PC	4185PC	4220PC	4300PC	4370PC
	Output capacity (kVA) *1	1.1	1.7	3.0	4.3	7.1	9.7	12.6	17.9	24.2	29.9	35.3	46.9	56.8
	Output current (A) *2	1.5	2.2	4.0	5.6	9.3	12.7	16.5	23.5	31.7	39.2	46.3	61.5	74.5
	Output voltage	3-phase 380 V to 480 V (The maximum output voltage is equal to the input supply voltage)												
	Overload current rating	150%-1 minute, 180%-2 s												
Electrical braking	Dynamic braking circuit	Built-in												
	Dynamic braking resistor	External braking resistor (Optional)												
Power supply	Voltage-frequency	3-phase 380 V to 480 V - 50/60 Hz												
	Allowable fluctuation	Voltage 323V to 528V *3, Frequency ± 5%												
	Required power supply capacity (kVA) *4	0.7	1.4	2.6	3.9	6.6	8.5	11.4	16.6	22.3	27.3	32.7	44.3	53.9
Degree of protection (IEC60529)		IP20												
Cooling method		Forced air-cooled												
Cooling fan noise (dBA) (Reference value) *5		58					54		60			64		
Color		RAL7016 / RAL7035												
EMC filter		Built-in												
DC reactor		Built-in												
UL type1 kit		Built-in												

Item		Specification									
Voltage class		480 V class									
Frame size		A5			A6			A7	A8		
Applicable motor (kW)		45	55	75	90	110	132	160	200	220	280
Applicable motor (HP)		60	75	100	125	150	200	250	300	350	450
Rating	Type	VFAS3-									
	Form	4450PC	4550PC	4750PC	4900PC	4110KPC	4132KPC	4160KPC	4200KPC	4220KPC	4280KPC
	Output capacity (kVA) ^{*1}	67.1	80.8	111	132	161	191	239	295	325	419
	Output current (A) ^{*2}	88.0	106	145	173	211	250	314	387	427	550
	Output voltage	3-phase 380 V to 480 V (The maximum output voltage is equal to the input supply voltage)									
	Overload current rating	150%-1 minute, 180%-2 s						150%-1 minute, 165%-2s			
Electrical braking	Dynamic braking circuit	Built-in			Optional			Built-in	Optional		
	Dynamic braking resistor	External braking resistor (Optional)									
Power supply	Voltage-frequency	3-phase 380 V to 480 V - 50/60 Hz						3-phase 380 to 440 V - 50 Hz, 3-phase 380 to 480 V - 60 Hz			
	Allowable fluctuation	Voltage 323 V to 528 V ^{*3} , Frequency \pm 5%						Voltage 323 to 484 V - 50 Hz, 323 V to 528 V - 60 Hz ^{*3} , Frequency \pm 5%			
	Required power supply capacity (kVA) ^{*4}	65.6	79.5	108	133	155	181	225	275	308	379
Degree of protection (IEC60529)		IP20			IP00						
Cooling method		Forced air-cooled									
Cooling fan noise (dBA) (Reference value) ^{*5}		63			70			73	76		
Color		RAL7016 / RAL7035									
EMC filter		Built-in									
DC reactor		Built-in						Attached			
UL type1 kit		Built-in			Optional			-			

*1. Capacity is calculated at 440 V for the 480 V class.

*2. Indicates rated output current when setting <F300: Carrier frequency> into 4 kHz for frame size A1 to A5, 2.5 kHz for frame size A6 to A8.

*3. Lower limit of voltage for 480 V class is 342 V when the inverter is used continuously (load of 100%).

*4. Required power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and wires).

*5. These acoustic noise values are not guaranteed because they are just reference values.

< 480V class: ND rating >

Item		Specification												
Voltage class		480V class												
Frame size		A1				A2		A3			A4			
Applicable motor (kW)		0.75	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45
Applicable motor (HP)		1	2	3	5	7.5	10	15	20	25	30	40	50	60
Rating	Type	VFAS3-												
	Form	4004PC	4007PC	4015PC	4022PC	4037PC	4055PC	4075PC	4110PC	4150PC	4185PC	4220PC	4300PC	4370PC
	Output capacity (kVA) ^{*1}	1.7	3.0	4.3	7.1	9.7	12.6	17.9	24.2	29.9	35.3	46.9	56.8	67.1
	Output current (A) ^{*2}	2.2	4.0	5.6	9.3	12.7	16.5	23.5	31.7	39.2	46.3	61.5	74.5	88.0
	Output voltage	3-phase 380 V to 480 V (The maximum output voltage is equal to the input supply voltage)												
	Overload current rating	120%-1 minute, 135%-2 s												
Electrical braking	Dynamic braking circuit	Built-in												
	Dynamic braking resistor	External braking resistor (Optional)												
Power supply	Voltage-frequency	3-phase 380 V to 480 V - 50/60 Hz												
	Allowable fluctuation	Voltage 323 V to 528 V ^{*3} , Frequency \pm 5%												
	Required power supply capacity (kVA) ^{*4}	1.2	2.4	3.4	6.1	8.3	10.9	15.6	21.3	26.4	31.4	42.0	52.4	63.2
Degree of protection (IEC60529)		IP20												
Cooling method		Forced air-cooled												
Cooling fan noise (dBA) (Reference value) ^{*5}		58				54		60			64			
Color		RAL7016 / RAL7035												
EMC filter		Built-in												
DC reactor		Built-in												
UL type1 kit		Built-in												

Item		Specification									
Voltage class		480 V class									
Frame size		A5			A6			A7	A8		
Applicable motor (kW)		55	75	90	110	132	160	220	250	280	315
Applicable motor (HP)		75	100	125	150	200	250	350	400	450	500
Rating	Type	VFAS3-									
	Form	4450PC	4550PC	4750PC	4900PC	4110KPC	4132KPC	4160KPC	4200KPC	4220KPC	4280KPC
	Output capacity (kVA) *1	80.8	111	132	161	191	230	325	367	419	469
	Output current (A) *2	106	145	173	211	250	302	427	481	550	616
	Output voltage	3-phase 380 V to 480 V (The maximum output voltage is equal to the input supply voltage)									
Overload current rating		120%-1 minute, 135%-2 s									
Electrical braking	Dynamic braking circuit	Built-in			Optional			Built-in	Optional		
	Dynamic braking resistor	External braking resistor (Optional)									
Power supply	Voltage-frequency	3-phase 380 V to 480 V - 50/60 Hz						3-phase 380 to 440 V - 50 Hz, 3-phase 380 to 480 V - 60 Hz			
	Allowable fluctuation	Voltage 323 V to 528 V *3, Frequency ± 5%						Voltage 323 to 484 V - 50 Hz, 323 V to 528 V - 60 Hz *3, Frequency ± 5%			
	Required power supply capacity (kVA) *4	77.0	103	125	155	181	214	296	335	379	422
Degree of protection (IEC60529)		IP20				IP00					
Cooling method		Forced air-cooled									
Cooling fan noise (dBA) (Reference value) *5		63			70			73	76		
Color		RAL7016 / RAL7035									
EMC filter		Built-in									
DC reactor		Built-in						Attached			
UL type1 kit		Built-in			Optional			-			

*1. Capacity is calculated at 440 V for the 480 V class.

*2. Indicates rated output current when setting <F300: Carrier frequency> into 4 kHz for frame size A1 to A5, 2.5 kHz for frame size A6 to A8.

*3. Lower limit of voltage for 480 V class is 342 V when the inverter is used continuously (load of 100%).

*4. Required power supply capacity varies with the value of the power supply side inverter impedance (including those of the input reactor and wires).

*5. These acoustic noise values are not guaranteed because they are just reference values.

■ Common specification

	Item	Specification
Control specification	Control system	Sinusoidal PWM control
	Output voltage adjustment	Adjustable within the range of 50 - 330 V (240 V class) and 50 - 660 V (480 V class) by correcting the supply voltage
	Output frequency range	Setting between 0.01 - 590 Hz. Default frequency is set to 0.01-50/60 Hz. Maximum frequency adjustment (30 to 590Hz)
	Minimum setting steps of frequency	0.01 Hz: operation panel input (60 Hz base), 0.03 Hz: analog input (60 Hz base, 11 bit/0 - 10 Vdc)
	Frequency accuracy	Analog input: ±0.2% of the maximum output frequency (at 25±10°C) Digital input: ±0.01%±0.022 Hz of the output frequency
	Voltage/frequency characteristics	V/f constant, variable torque, automatic torque boost, vector control, base frequency adjustment 1, 2, 3, and 4 (15 - 590 Hz), V/f 5-point arbitrary setting, torque boost adjustment (0 - 30%), start frequency adjustment (0 - 10 Hz), stop frequency adjustment (0 - 30 Hz)
	Frequency setting signal	3 kΩ potentiometer (possible to connect to 1 - 10 kΩ-rated potentiometer) 0 - 10Vdc (input impedance Zin: 31.5 kΩ) -10 to +10 Vdc (Zin: 31.5 kΩ) 4 - 20 mAdc (Zin: 250 Ω)
	Terminal block frequency command	The characteristic can be set arbitrarily by two-point setting. Compliant with 7 types of input; analog input (RR, RX, II, AI4, AI5), and pulse input (S4, S5)
	Frequency jump	Three frequency can be set. Setting of jump frequency and width.
	Upper and lower limit frequencies	Upper limit frequency: 0 to max. frequency, lower limit frequency: 0 to upper limit frequency
	PWM carrier frequency	Frame size A1 to A4: adjustable between 1.0 - 16 kHz Frame size A5 to A8: adjustable between 2.5 - 8 kHz
	PID control	Adjustment of proportional gain, integral time, differential time and delay filter. Multi PID and external PID control.
	Torque control	Voltage command input specification: -10 - +10 Vdc
	Real time clock	Current time (Year, month, date, hour, minute), Timezone, Daylight saving time, 4 working days and 20 holidays can be set by parameters.
Operation specifications	Acceleration/deceleration time	0.01 - 6000 sec. Selectable from among acceleration/deceleration. times 1, 2, 3 and 4. Automatic acceleration/ deceleration function. S-pattern acceleration/deceleration 1 and 2 pattern adjustable.
	DC braking	Adjustment of braking start frequency (0 - <FH>Hz), braking (0 - 100%) and braking time (0 - 25.5 sec.). With emergency off braking function and motor shaft fix control function.
	Forward run/reverse run ^{*1}	Forward run with ON of the terminal [F], Reverse run with ON of the terminal [R] (Default setting). Coast stop with OFF of the terminal assigned Stad-by function. Emergency off by panel operation or terminal.
	Jog run ^{*1}	Jog run, if selected, allows jog operation from the operation panel Jog run operation by terminal block is possible by setting the parameters.
	Preset speed operation ^{*1}	By changing the combination of the terminals [S1], [S2], [S3], [S4], [S5] set frequency + 31-speed operation. Selectable between acceleration/deceleration time, torque limit and V/f by set frequency.
	Retry	Capable of restarting after a check of the power circuit elements in case the protective function is activated. Max. 10 times selectable arbitrarily. Waiting time adjustment (0 - 10 sec.)
	Soft stall	Automatic load reduction control at overloading. (Default: OFF)
	Cooling fan ON/OFF	The cooling fan will be stopped automatically to assure long life when unnecessary.
	Operation panel key operation ON/OFF control	Key lock selectable between STOP key only, MODE key only, etc. All key operations can be locked.
	Regenerative power ride-through control	Possible to keep the motor running using its regenerative energy in case of a momentary power failure. (Default: OFF)
	Auto-restart operation	Possible to restart the motor in coasting in accordance with its speed and direction. (Default: OFF)
	Simplified pattern operation	Possible to select each 8 patterns in 2 groups from 15-speed operation frequency. Max. 16 types of operation possible. Terminal operation/repeat operation possible.
	Commercial inverter switching	Possible to switch operation by commercial power supply or inverter
	Light-load high-speed operation	Increases the operating efficiency of the machine by increasing the rotational speed of the motor when it is operated under light load.
	Droop function	When two or more inverters are used to operate a single load, this function prevents load from concentrating on one inverter due to unbalance.
	Override function	External input signal adjustment is possible to the operation frequency command value.
Protective function	Protective function	Stall prevention, current limit, overcurrent, overvoltage, short circuit on the load side, ground fault on the load side ^{*5} , undervoltage, momentary power failure (15 ms or more), non-stop control at momentary power failure, overload protection, arm overload at starting, overcurrent on the load side at starting, overcurrent and overload at braking resistor, overheat, emergency off
	Electronic thermal characteristic	Switchable between standard motor/constant torque motor, adjustment of overload protection and stall prevention level.
	Reset	Reset by 1a contact closed (or 1b contact opened), or by operation panel. Or power supply OFF/ON. This function is also used to save and clear trip records.

(Continued overleaf)

(Continued)

Item		Specification	
Display function	Screen of LCD	Alarms	Stall prevention during run, overload limit, overload, undervoltage on power supply side, DC circuit undervoltage, setting error, in retry, upper limit, lower limit.
		Causes of failures	Overcurrent, overvoltage, overheat, short circuit on the load side, ground fault on the load side, inverter overload, arm overcurrent at starting, overcurrent on the load side at starting, cooling fan fault, CPU fault, EEPROM fault, RAM fault, ROM fault, communication error, (braking resistor overcurrent/overload), (emergency off), (undervoltage), (undercurrent), (overtorque), (motor overload), (input phase failure), (output phase failure) The items in the parentheses are selectable.
		Monitoring function	Output frequency, frequency command, forward run/reverse run, output current, DC voltage, output voltage, compensated frequency, terminal input/output information, CPU version, past trip history, cumulative operation time, feedback frequency, torque, torque command, torque current, exiting current, PID feedback value, motor overload factor, inverter overload factor, PBR overload factor, PBR load factor, input power, output power, peak output current, peak DC voltage, RR input, II input, RX input, AI4 input, AI5 input, FM output, AM output, expansion I/O card option CPU version, integral input power, integral output power, communication option reception counter, communication option abnormal counter.
		Free unit display	Display of optional units other than output frequency (motor speed, line speed, etc), current ampere/% switch, voltage volt/% switch
		Automatic edit function	Searches automatically parameters that are different from the default setting parameters. Easy to find changed parameters.
		User default setting	User parameter settings can be saved as default settings. Allows to reset the parameters to the user-defined parameter settings.
	LED	Charge display	Displays power circuit capacitor charging.
Input/output terminal logic function		Possible to select positive logic or negative logic with programmable input/output terminal function menu. 2 or 3 function can be assigned for some terminals. *1 *2 (Default setting: positive logic)	
Sink/source switching		Possible to switch between minus common (CC) and plus common (P24) for digital input terminal. (Default setting: external power supply)	
output signal	Failure detection signal	1c contact output (250 Vac-2 A-(cosΦ=1), 30Vac-2A(Resistive), 250Vac-1A-(cosΦ=0.4), 30Vdc-1A(L/R=7ms))	
	Relay output	2×1a contact output (250 Vac-2 A-(cosΦ=1), 30Vac-2A(Resistive), 250Vac-1A-(cosΦ=0.4), 30Vdc-1A(L/R=7ms))	
	Low speed/speed reach signal output *2	Digital output (24 Vdc, max. 50 mA)	
	Output for frequency meter/ Output for ammeter *3	Analog output for meter: 1 mA dc full-scale dc ammeter 0 - 20 mA (4 - 20 mA) output: DC ammeter (allowable load resistance: 500 Ω or less) 0 - 10 V output: DC voltmeter (allowable load resistance: 1 kΩ or more)	
	Pulse train frequency output	Pulse train output (Up to 30 kpps, duty 50%)	
Communication function		Standard equipment: Ethernet (dual port with switch, IEEE802.3/IEEE802.3u : Fast Ethernet, 10/100Mbps: Auto negotiation), RS485 (2-channel) Optional: PROFINET, DeviceNet, PROFIBUS-DP	
Environments	Use environments	Indoor use. Place not exposed to direct sunlight and free of corrosive and explosive gases.	
	Ambient temperature	-15 to 60°C *4 Frame size A1 to A5: Current reduction, remove the top cover when above 50°C Frame size A6: Current reduction when above 50°C Frame size A7 and A8: Current reduction when above 50°C(HD), above 45°C(ND)	
	Storage temperature	-25 to +70°C (Temperature applicable for a short term.)	
	Relative humidity	5 to 95% (free from condensation)	
	Altitude	4800m or less for TN/TT system (Frame size A1 to A6) 3800m or less for IT system (Frame size A1 to A6) 3000m or less for TN/TT/IT system (Frame size A7 and A8) 2000m or less for corner-earthed system (All frame size) (current reduction necessary if above 1000 m for all frame size)	
	Vibration	5.9 m/s ² {0.6G} or less (10 - 55 Hz) *6	

*1: 14 digital input terminals (of which 6 are options) are programmable digital input terminals, and they make it possible to arbitrarily select from 178 types of signals.

*2: Programmable digital/pulse train output terminal make it possible to arbitrarily select from 256 types of signals.

*3: Programmable analog output terminals make it possible to arbitrarily select from 54 types of signals.

*4: -10 to 60°C for frame size A7 and A8.

Remove operation panel of the inverter when above 50°C.

For detail of current reduction, see "Instruction manual for load reduction" (E6582116)

*5: This function protects inverters from overcurrent due to output circuit ground fault.

*6: 2.9m/s²{0.3G} or less (10-55Hz) for frame size A6 to A8.

12.2 Outside and Mass

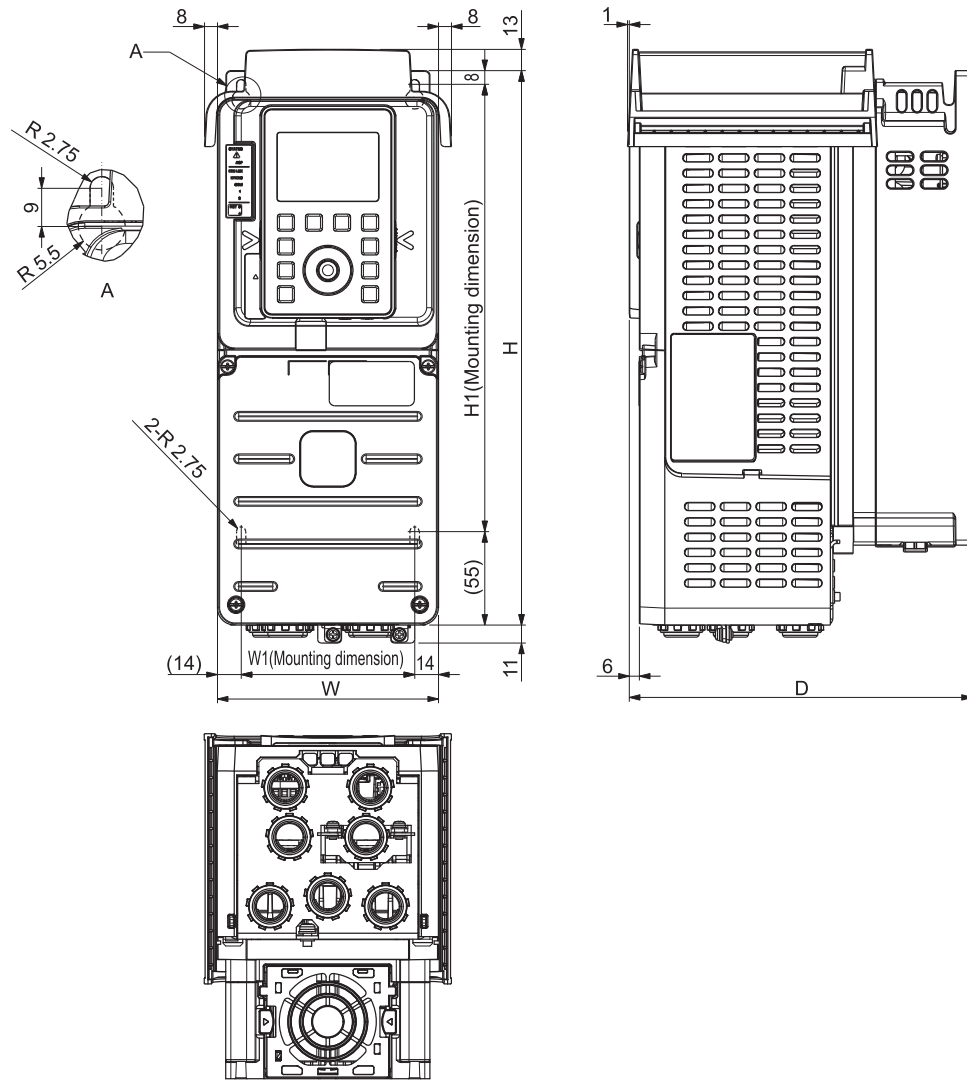
■ Outside dimensions and mass

Input voltage Class	Applicable motor capacity (kW)	Inverter type		Dimension (mm)					Frame Size	Approx. mass (kg)
				W	H	D	W1 *1	H1 *1		
3-phase 240 V	0.4	VFAS3-	2004P	130	326	202	102	263	A1	4.3
	0.75		2007P							4.3
	1.5		2015P							4.5
	2.2		2022P							4.6
	4.0		2037P	155	391.5	231	125	324	A2	7.7
	5.5		2055P	195	534.5	232	168	460	A3	13.8
	7.5		2075P							13.8
	11		2110P	210	660	268	174	570	A4	27.3
	15		2150P							27.3
	18.5		2185P							27.3
	22		2220P	265	908	313	220	718	A5	57.6
	30		2300P							57.6
	37		2370P							57.6
	45		2450P	300	850	383	255	820	A6	82
55	2550P	82								
3-phase 480 V	0.4	VFAS3-	4004PC	130	326	202	102	263	A1	4.5
	0.75		4007PC							4.5
	1.5		4015PC							4.5
	2.2		4022PC							4.6
	4.0		4037PC							4.7
	5.5		4055PC							155
	7.5		4075PC	7.7						
	11		4110PC	195	534.5	232	168	460	A3	13.6
	15		4150PC							14.2
	18.5		4185PC							14.3
	22		4220PC	210	660	268	174	570	A4	28
	30		4300PC							28.2
	37		4370PC							28.7
	45		4450PC	265	908	313	220	718	A5	57.5
	55		4550PC							59
	75		4750PC							59.5
	90		4900PC	300	850	383	255	820	A6	82
	110		4110KPC							82
	132		4132KPC							82
	160		4160KPC	430	1190	377	350	920	A7	110 (168)*2
200	4200KPC	585	1190	377	540	920	A8	138 (200)*2		
220	4220KPC							140 (210)*2		
280	4280KPC							140 (210)*2		

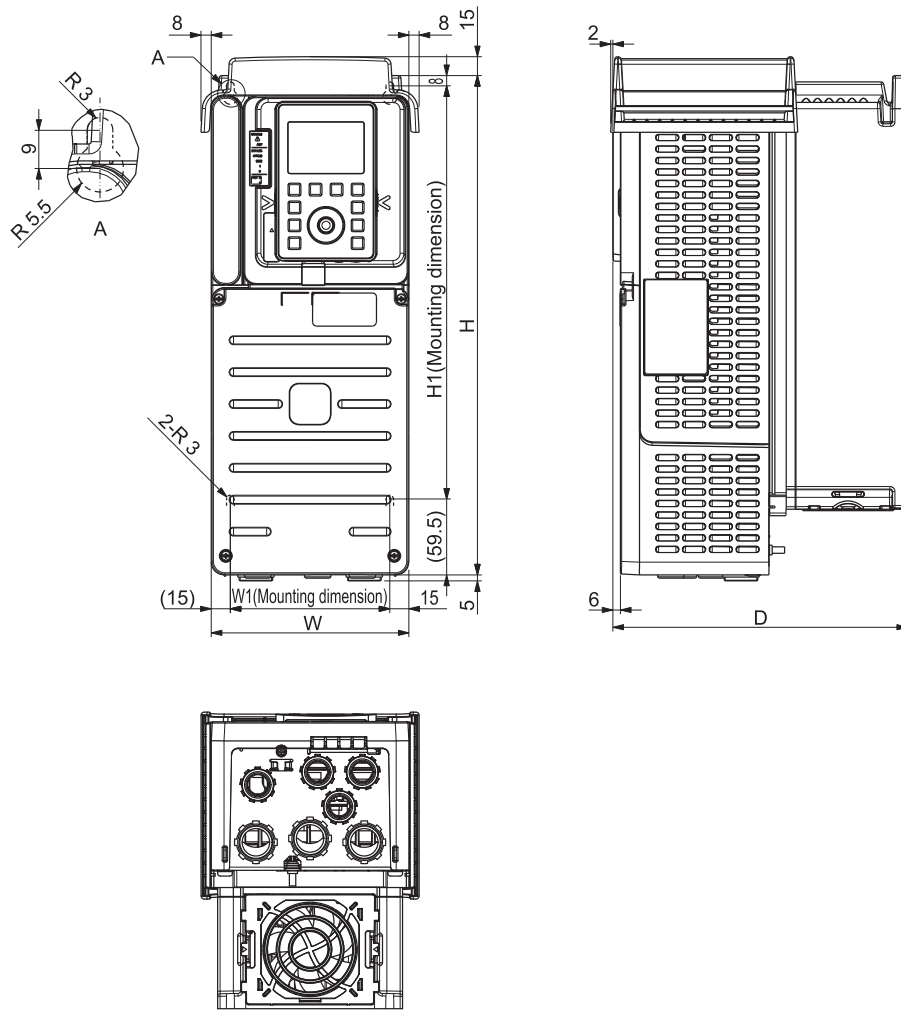
*1 W1 and H1 are the mounting dimensions of the inverter.

*2 Value in () includes attached DC reactor.

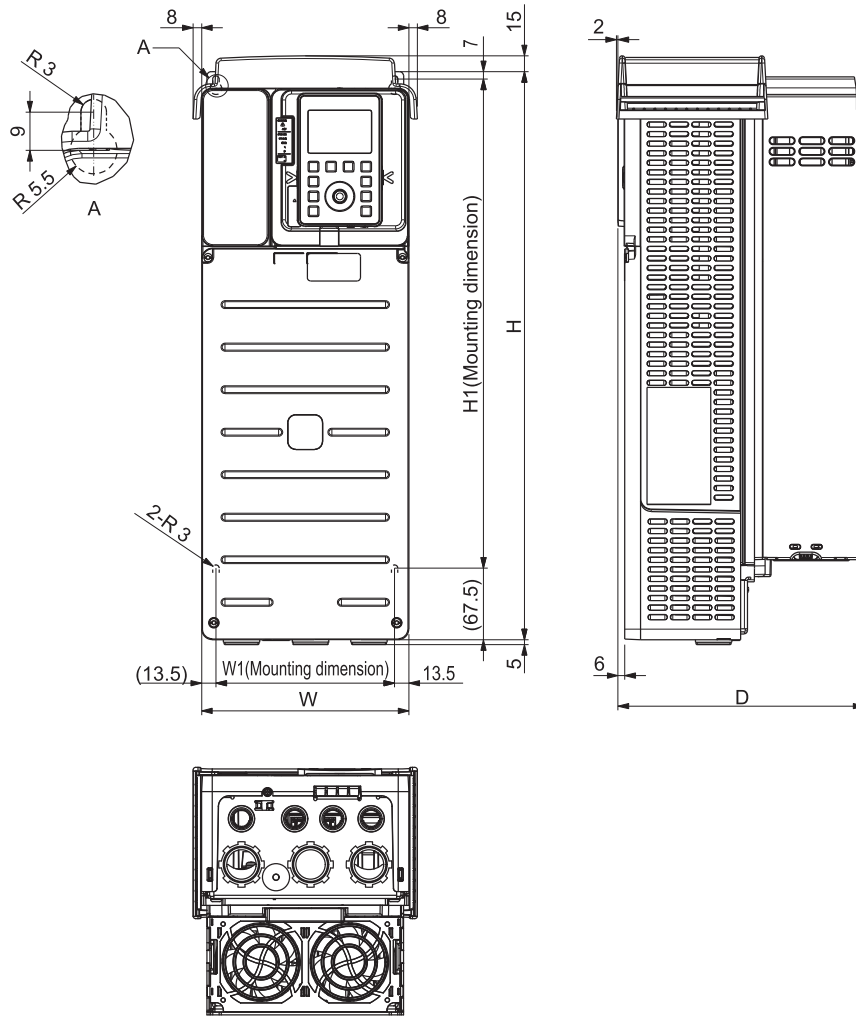
■ Outline drawing



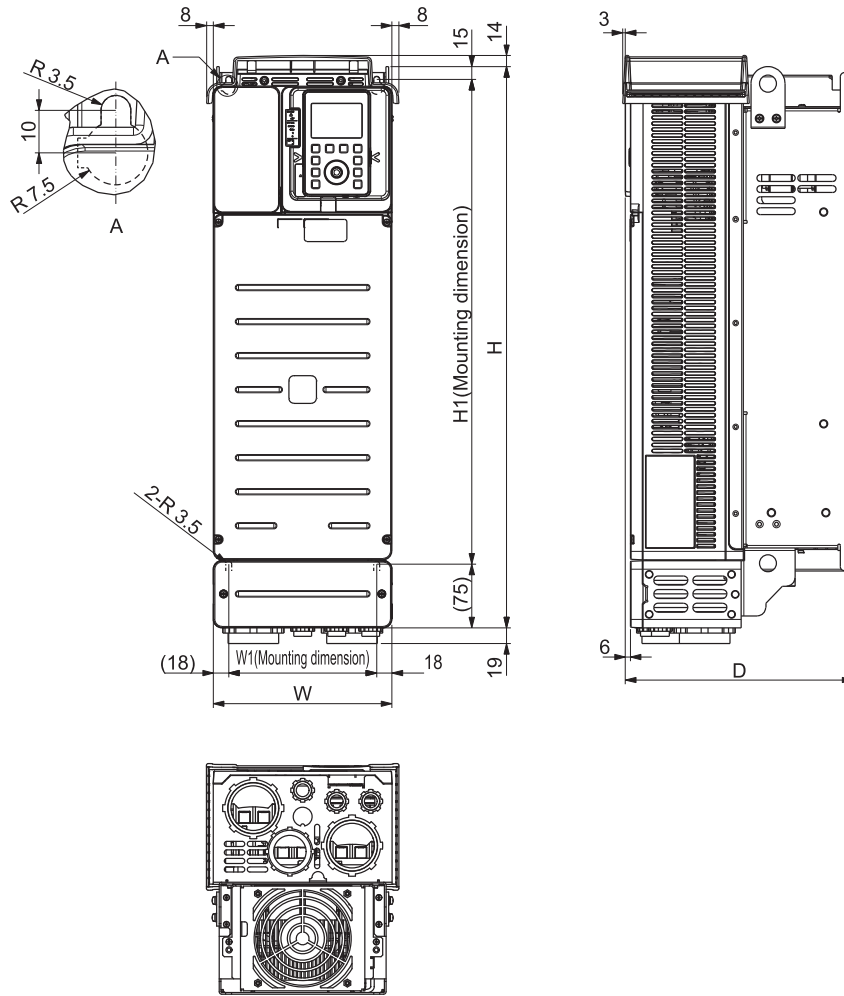
Frame size A1



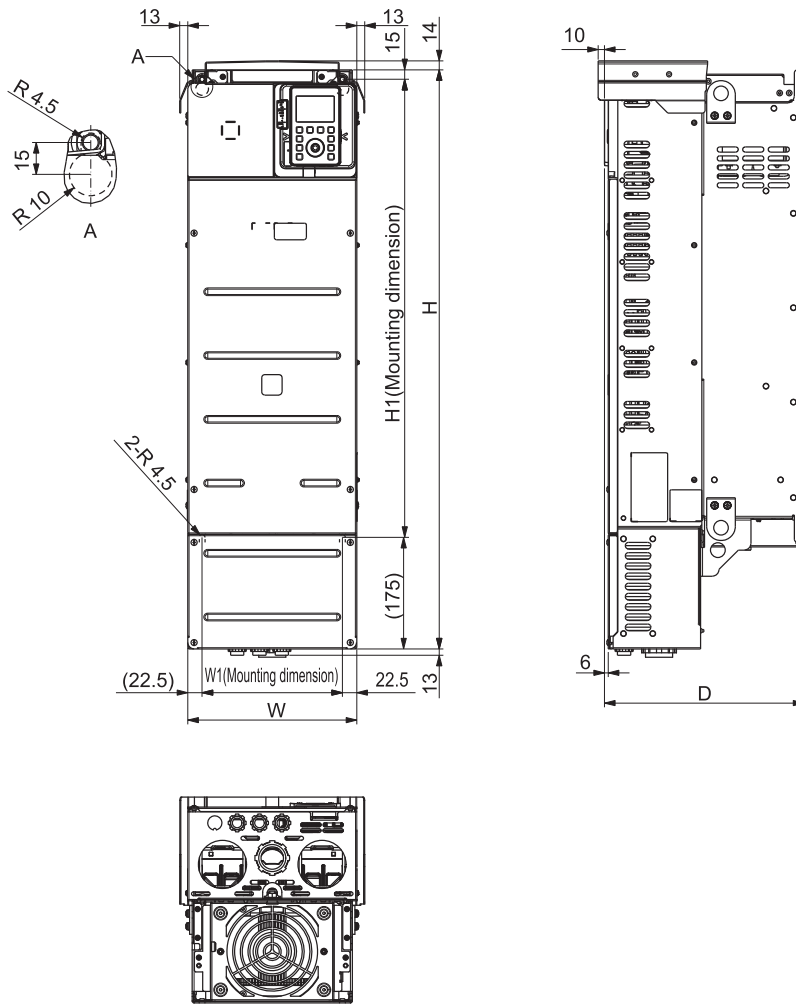
Frame size A2



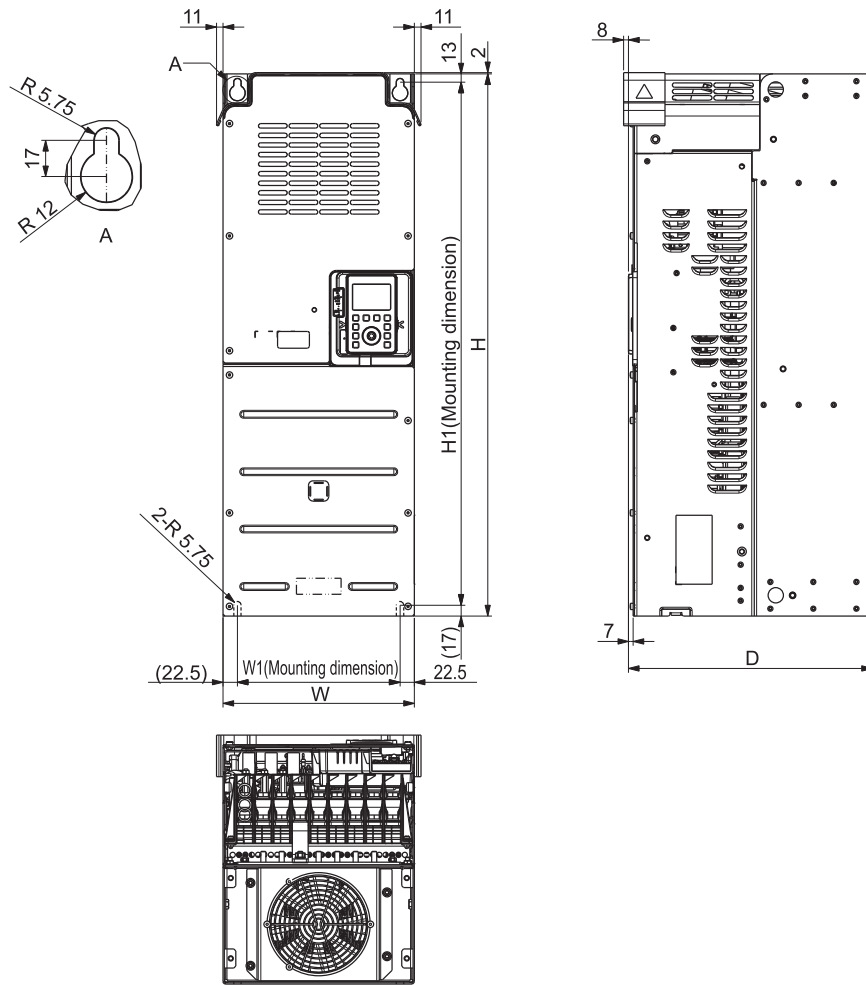
Frame size A3



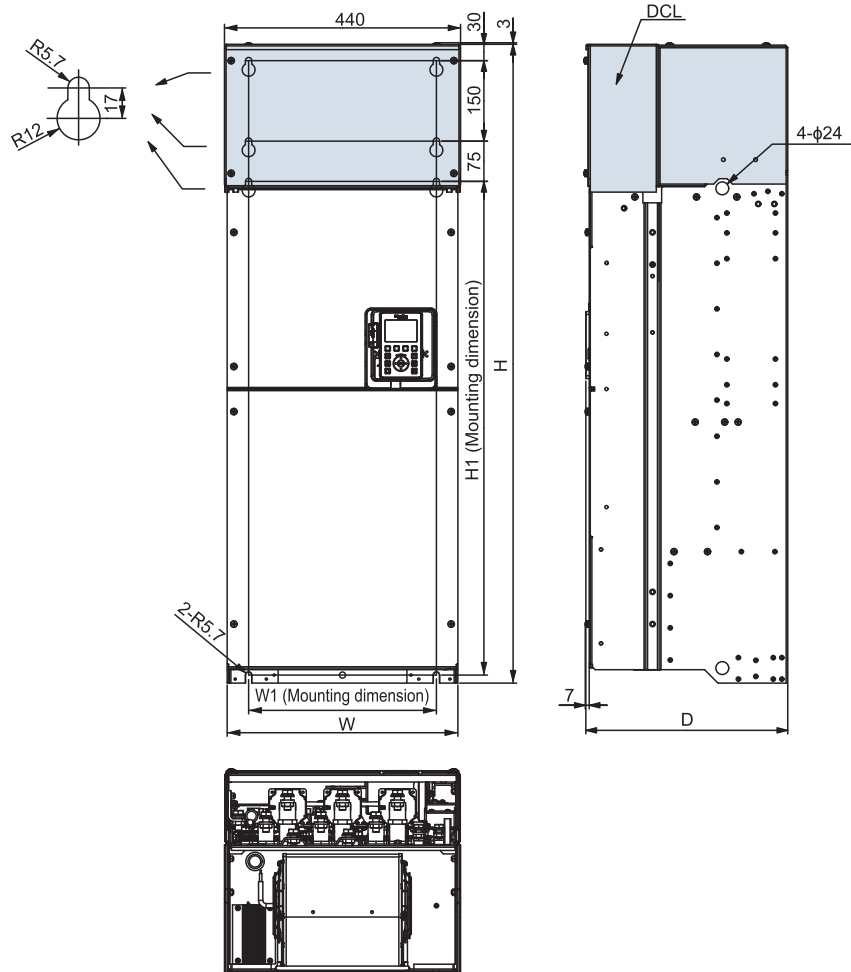
Frame size A4



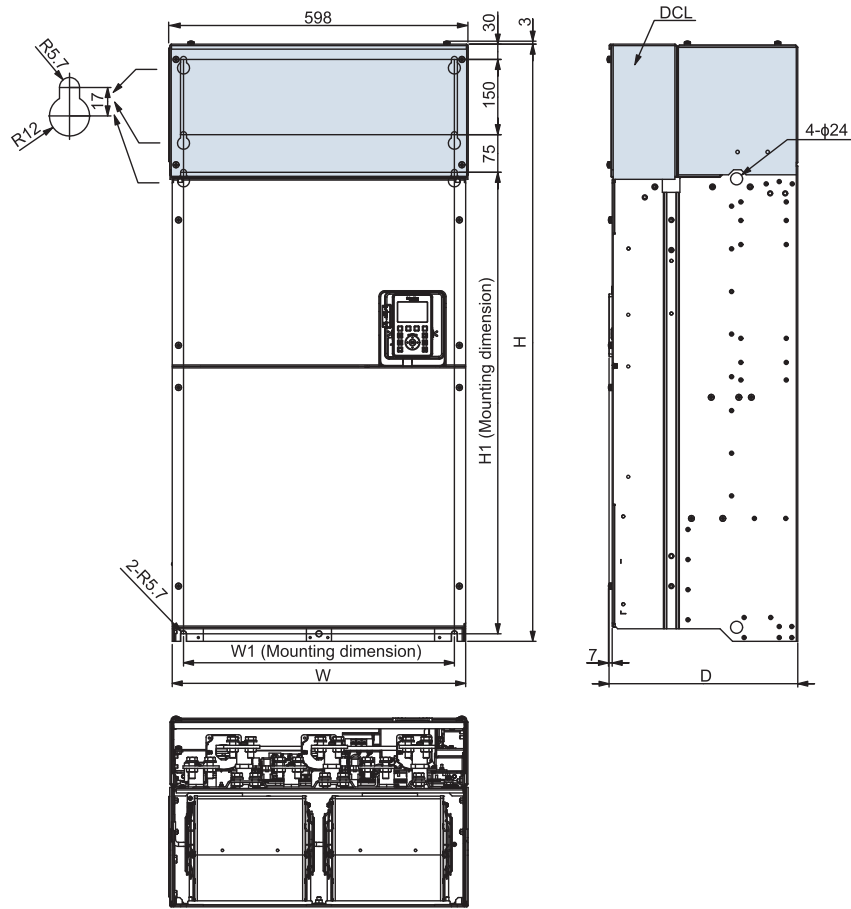
Frame size A5



Frame size A6



Frame size A7



Frame size A8

13 | Trip information and measures

I

II

13.1 Description of trip and alarm information and measures

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If a trip occurs, make failure diagnosis according to the table below before contacting your Toshiba distributor.

■ Term description

Trip	Output of the inverter is turned OFF for protection of the inverter or external equipment. A failure signal can be output if the output terminal function is assigned. (A failure signal is assigned to the terminal [FL] in the default setting).
Alarm	Indicates a condition that the inverter or external equipment may be damaged if continued. A signal can be output if the output terminal function is assigned. Under voltage, etc. are displayed with blinking on the operation panel.
Pre-alarm	A condition close to the trip level. A signal can be output when the output terminal function is assigned. "C", "P", "L", and "H" blink in the operation panel during run for overcurrent, overvoltage, overload, and overheat respectively.
Message	Informs a status of the inverter and setting error. It is not an alarm.

■ Trip information

Trip display	Failure code	Trip name	Detection factor	Measures
E	0011	Emergency off	Emergency off is input. 1) When a run command is other than the operation panel, [STOP/RESET] key was pressed twice. 2) A signal was input to the input terminal in which emergency off is assigned. 3) Emergency off is input from communication.	<ul style="list-style-type: none"> Reset after solving problems. Clear the emergency off signal.
E-11	002B	Brake answer error *	The system does not reply even after the setting time in <F630: Brake answer wait time> elapsed.	<ul style="list-style-type: none"> Check the system. Check if the <F630> setting is correct. When not used, set <F630>="0.0: Disabled".
E-12	002C	PG error	1) PG is disconnected. 2) Error exists in PG wiring. 3) PG voltage is improper.	<ul style="list-style-type: none"> Check the PG wiring. Check if the PG settings are correct. <F376: PG phases number select>, <F379: PG option voltage>

*Enable/Disable can be selected for trip with a parameter.

Trip display	Failure code	Trip name	Detection factor	Measures
E-13	002D	Abnormal speed error	<p>1) When <Pt: V/f Pattern> = "0" to "9", an over speed condition occurred. Over speed condition: In case F623≠0.0, F624≠0.0, the condition which estimated frequency is not inside of "output frequency - <F624>" to "output frequency + <F623>" continues <F622> times.</p> <p>2) When <Pt: V/f Pattern> = "10" to "11", over speed continued by PG failure, etc. Over speed condition: In case F623≠0.0, F624≠0.0, the condition which measured frequency is not inside of "output frequency - <F624>" to "output frequency + <F623>" continues <F622> times.</p> <p>3) Due to overvoltage limit operation, the output frequency exceeded <FH: Maximum frequency> +12 Hz or <FH> + <vL: Base frequency 1> x 0.1.</p>	<p>1) 3)</p> <ul style="list-style-type: none"> • Check whether a problem exists in input voltage. • When the regenerative energy is large, install a braking resistor (option). <p>2) Check the PG wiring and setting.</p>
E-18	0032	Analog input disconnecting *	The input level of the terminal [II] became the setting value or less of <F633: II analog input disconnection detection level>	<ul style="list-style-type: none"> • Check that the signal line connected to the terminal [II] is not disconnected. • Check if the <F633> setting is correct.
E-19	0033	CPU communication error	Communication error between control CPU.	Turn off the power and then turn it on again. If the error occurs again, contact your Toshiba distributor.
E-20	0034	Over torque boost	<ul style="list-style-type: none"> • The setting value of the <F402: Automatic torque boost> is very high. • Impedance on the motor is low. 	Set the motor parameters according to the motor characteristic, and perform auto-tuning. <vL: Base frequency 1>, <vLv: Base frequency voltage>, <F405: Motor rated capacity>, <F415: Motor rated current>, <F417: Motor rated speed>, <F400: Offline auto-tuning>, etc.
E-21	0035	CPU1 fault B	Control CPU fault.	Fault in internal inverter. Contact your Toshiba distributor.
E-22	0036	Embedded Ethernet fault	Fault in the embedded Ethernet.	Fault in internal inverter. Contact your Toshiba distributor.
E-23	0037	Option fault (slot A)	Fault in the option connected to slot A.	Fault in the option. Contact your Toshiba distributor.
E-24	0038	Option fault (slot B)	Fault in the option connected to slot B.	Fault in the option. Contact your Toshiba distributor.
E-25	0039	Option fault (slot C)	Fault in option 3.	Fault in the option. Contact your Toshiba distributor.
E-26	003A	CPU2 fault	Control CPU fault.	Fault in internal inverter. Contact your Toshiba distributor.

*Enable/Disable can be selected for trip with a parameter.

Trip display	Failure code	Trip name	Detection factor	Measures
E-29	003D	Control power option failure *	1) Failure on the control power supply option. 2) The setting of <F647: Control power option failure detection> is improper.	1) When input voltage of the control power supply is normal and the voltage between terminals [+SU]-[CC] is under 20 Vdc, it is a failure in the control power supply option. Contact your Toshiba distributor. 2) When the control power supply option is not used, set <F647> = "0".
E-31	003F	Rush current suppression relay fault	1) Fault on the rush current suppression relay. 2) The power was turned ON/OFF frequently.	1) Fault in internal inverter. Contact your Toshiba distributor. 2) Instead of turning ON/OFF with the power supply, turn ON/OFF with a run command.
E-32	0040	PTC failure	1) PTC protection for the motor became enabled. 2) Failure in the PTC circuit.	1) Check the motor and PTC. 2) Failure in internal inverter. Contact your Toshiba distributor.
E-37	0045	Servo lock error	1) The lock up torque or more external load is applied to the motor. 2) Setting of motor parameters is improper.	1) Reduce the load to apply the servo lock. 2) Set the motor parameters according to the motor characteristic, and perform auto-tuning. <vL: Base frequency 1>, <vLv: Base frequency voltage>, <F405: Motor rated capacity>, <F415: Motor rated current>, <F417: Motor rated speed>, <F400: Offline auto-tuning>, etc.
E-38	0046	Communication time-out of A6 Brake Unit	1) The wire linked VF-AS3 to A6 Brake Unit is disconnected. 2) The A6 Brake Unit is failed.	1) Check the wire linked VF-AS3 to A6 Brake Unit. 2) Turn off the power and then turn it on again. If the fault occurs again, contact your Toshiba distributor.
E-39	0047	PM control error	During auto-tuning or initial position, the motor current became very high.	Measure inductance with a LCR meter, etc., and set to the parameter directly.
E-42	004A	Cooling fan fault	The cooling fan failed.	The cooling fan needs to be replaced. Contact your Toshiba distributor.
E-43	004B	Communication time-out (embedded Ethernet)	Embedded Ethernet communication timed out.	Check the Ethernet communication equipment and wiring.
E-44	004C	Battery of panel failure	Calendar function is activated, and under one of these cases. 1) A battery is not in. 2) The battery level is low.	1) Put a battery. 2) Replace the battery.
E-45	004D	GD2 auto-tuning error	<ul style="list-style-type: none"> The value of F459 is not fixed. Estimated value of F459 is out of parameter range. 	1) Modify the value of F481, F482 and do the tuning again. 2) Modify F480 to 0, and set the appropriate value of F459 manually.
E-48	0050	A6 Brake Unit internal fault	An internal error occurred in A6 Brake Unit.	Turn off the power and then turn it on again. If the fault occurs again, contact your Toshiba distributor.
E-99	0058	Trip for test *	Trip for test occurred.	Reset if no problem is found.

*Enable/Disable can be selected for trip with a parameter.

Trip display	Failure code	Trip name	Detection factor	Measures
EEP1	0012	EEPROM fault 1	Fault occurred during internal data writing.	Turn off the power and then turn it on again. If the fault occurs again, contact your Toshiba distributor.
EEP2	0013	EEPROM fault 2	1) While setting <tyP: Default setting>, the power was turned OFF or momentary power failure occurred. 2) Fault occurred during internal data writing.	1) Set <tyP> again. If the fault occurs again, contact your Toshiba distributor. 2) Turn off the power and then turn it on again. If the fault occurs again, contact your Toshiba distributor.
EEP3	0014	EEPROM fault 3	Fault occurred during internal data reading.	Turn off the power and then turn it on again. If the fault occurs again, contact your Toshiba distributor.
EF2	0022	Grounding fault *	1) Grounding fault occurred in the output wiring or the motor. 2) Fault can occur depends on motor, in case of rapid acceleration/deceleration.	1) Check grounding fault in the wiring on the output side and the motor. 2) Increase the acceleration/deceleration time. <ACC/dEC acceleration/ deceleration time 1>
EPHI	0008	Input phase loss *	1) Input side phase has failed.	1) Check phase failure in the wiring on the input side.
EPHO	0009	Output phase loss *	1) Output side phase has failed. 2) Output current is quite small (less than 8%) to motor rated current.	1) Check phase failure in the wiring on the output side. 2) Set <F605> to 0
Err2	0015	RAM fault	Control RAM fault.	Fault in internal inverter. Contact your Toshiba distributor.
Err3	0016	ROM fault	Control ROM fault.	Fault in internal inverter. Contact your Toshiba distributor.
Err4	0017	CPU1 fault A	Control CPU fault.	Fault in internal inverter. Contact your Toshiba distributor.
Err5	0018	Communication time-out (RS485)	RS485 communication timed out.	Check the communication equipment and wiring on RS485 communication.
Err6	0019	Gate array fault	Fault in the gate array.	Fault in internal inverter. Contact your Toshiba distributor.
Err7	001A	Current detector fault	Fault in the output current detector.	Fault in internal inverter. Contact your Toshiba distributor.
Err8	001B	Communication time-out (option)	Communication option timed out.	Check the communication equipment and wiring on communication option.
Err9	001C	Panel disconnection during run	While running with a run command from the operation panel and extension panel, the cable connecting the inverter and panel are disconnected.	Check the connection on the inverter and panel.

*Enable/Disable can be selected for trip with a parameter.

Trip display	Failure code	Trip name	Detection factor	Measures
Etn	0028	Auto-tuning error	<ol style="list-style-type: none"> 1) The motor parameter does not match the motor characteristic. 2) Executed auto-tuning while the motor is rotating. 3) The output frequency does not increase within few minutes. 	<ol style="list-style-type: none"> 1) Set the motor parameters according to the motor characteristic. <vL: Base frequency 1>, <vLv: Base frequency voltage>, <F405: Motor rated capacity>, <F415: Motor rated current>, <F417: Motor rated speed>, etc. 2) Check that the motor is stopped, and perform auto-tuning again. 3) Check that the motor is not stopped while the output frequency is rising on the system.
Etn1	0054	Auto-tuning error 1	<ol style="list-style-type: none"> 1) The motor is not connected. 2) Something other than the motor is connected. 3) In the induction motor, an improper value, a synchronized motor speed value or a value close to it is set in <F417: Motor rated speed>. 	<ol style="list-style-type: none"> 1) and 2) Check that the motor is connected. 3) Set <F417> according to the motor rating.
Etn2	0055	Auto-tuning error 2	The motor parameter does not match the motor characteristic.	Set the motor parameters according to the motor characteristic. <vL: Base frequency 1>, <vLv: Base frequency voltage>, <F405: Motor rated capacity>, <F415: Motor rated current>, <F417: Motor rated speed>, etc.
Etn3	0056	Auto-tuning error 3	The setting on <vL: Base frequency 1> or <F417: Motor rated speed> does not match the motor rating.	Set <vL: Base frequency 1> or <F417: Motor rated speed> according to the motor rating.
EtyP	0029	Inverter type error	<ol style="list-style-type: none"> 1) Internal error exists. 2) Replaced the printed circuit board (contact your Toshiba distributor for replacing the printed circuit board). 	<ol style="list-style-type: none"> 1) Error in internal inverter. Contact your Toshiba distributor. 2) Set <tyP: Default setting> = "6: Initialize typeform".
OC1	0001	Overcurrent (during acceleration)	<ol style="list-style-type: none"> 1) The acceleration time is short. 2) <Pt: V/f Pattern> does not match the machinery. 3) Momentary power failure occurred, and tried to start the rotating motor. 4) Tried to run the special motor (impedance small). 5) Tried to run a low inductance motor like a high-speed motor. 6) When <Pt> = "11", polarity of PG is opposite. 7) When <F614: Pulse width of short circuit detection at start> = "0", and <F613>=2, or 3, inverter output short circuit. 	<ol style="list-style-type: none"> 1) Increase the acceleration time. <ACC: Acceleration time 1>, etc. 2) Set <Pt: V/f Pattern> according to the machinery. 3) Set <F301: Auto-restart>. Depending on the characteristic of machinery, <F302: Regenerative power ride-through> = "1" is also effective. 4) When <Pt> is set to "0", "1", "2", or "7", lower <vb: Manual torque boost 1>. For settings other than "0", "1", "2", or "7", perform auto-tuning with <F400: Offline auto-tuning>. <F402: Automatic torque boost> is set matching the motor. 5) Change the inverter to large capacity.
OC2	0002	Overcurrent (during deceleration)	<ol style="list-style-type: none"> 1) The deceleration time is short. 2) Tried to run a low inductance motor like a high-speed motor. 3) When <Pt> = "11", polarity of PG is opposite. 4) When <F614: Pulse width of short circuit detection at start> = "0", and <F613>=2, or 3 inverter output short circuit. 	<ol style="list-style-type: none"> 1) Increase the deceleration time. <dEC: Deceleration time 1>, etc. 2) Change the inverter to large capacity.

*Enable/Disable can be selected for trip with a parameter.

Trip display	Failure code	Trip name	Detection factor	Measures
OC3	0003	Overcurrent (during constant speed running)	<ol style="list-style-type: none"> 1) The load changed rapidly. 2) Error occurred in the machinery (something got stuck, etc.). 3) Tried to run a low inductance motor like a high-speed motor. 4) When <Pt> = "11", polarity of PG is opposite. 5) When <F614: Pulse width of short circuit detection at start> = "0", and <F613>=2, or 3 inverter output short circuit. 	<ol style="list-style-type: none"> 1) Suppress load fluctuation. 2) Check whether a problem exists in the machinery. 3) Change the inverter to large capacity.
OCA1	0005	Overcurrent (U-phase arm)	Fault on IGBT in U-phase.	Fault in internal inverter. Contact your Toshiba distributor.
OCA2	0006	Overcurrent (V-phase arm)	Fault on IGBT in V-phase.	Fault in internal inverter. Contact your Toshiba distributor.
OCA3	0007	Overcurrent (W-phase arm)	Fault on IGBT in W-phase.	Fault in internal inverter. Contact your Toshiba distributor.
OCL	0004	Overcurrent (load side at startup)	<ol style="list-style-type: none"> 1) Short circuit occurred on the output side. 2) The motor and output side wiring have defective insulation. 3) Impedance on the motor is low. 	<ol style="list-style-type: none"> 1) Check the wiring on the output side. 2) Check the insulation on the output side. 3) Set <F613: Short circuit detection at start> to "2" or "3".
OCr	0024	Overcurrent (Braking resistor)	<ol style="list-style-type: none"> 1) When "Enabled" is set in <F304: Dynamic braking, OLR trip>: <ul style="list-style-type: none"> • The braking resistor is not connected. • The braking resistor connection is disconnected. • A braking resistor with a resistance value under the minimum allowable resistance value is connected. 2) Short circuit occurred between [PB] and [PC/-]. 3) IGBT fault on the dynamic braking drive circuit control. 	<ol style="list-style-type: none"> 1) Check if an adequate braking resistor is connected. When a braking resistor is not necessary, set "Disabled" in <F304>. 2) Check for problems on impedance of the braking resistor, wiring, etc. 3) Fault in internal inverter. Contact your Toshiba distributor. <p>* This trip can not be reset. For trip clear, turn off the power and then turn it on again.</p>
OH	0010	Overheat	<ol style="list-style-type: none"> 1) The cooling fan is not working. 2) Ambient temperature is high. 3) The vent of the cooling fan is blocked. 4) Other heating units are nearby. 	<ol style="list-style-type: none"> 1) Replace if the cooling fan is not working during run. 2) Lower the ambient temperature. Reset after the inverter cools down. 3) Make sure the vent of the cooling fan is not blocked. 4) Place other heating units away from the inverter.
OH2	002E	External thermal trip *	A signal of external thermal trip is input.	Check that the motor is not overloaded.
OL1	000D	Overload (Inverter)	<ol style="list-style-type: none"> 1) Sudden acceleration occurs and the acceleration time is short. 2) <Pt: V/f Pattern> does not match the machinery. 3) Momentary power failure occurred, and tried to start the rotating motor. 4) The DC braking amount is large. 5) The load is large for the inverter capacity. 	<ol style="list-style-type: none"> 1) Increase the acceleration time. <ACC: Acceleration time 1>, etc. 2) Set <Pt: V/f Pattern> according to the machinery. 3) Set <F301: Auto-restart>. Depending on the characteristic of machinery, <F302: Regenerative power ride-through> = "1" is also effective. 4) Set <F251: DC braking current> small and <F252: DC braking time> short. 5) Change the inverter to large capacity.

*Enable/Disable can be selected for trip with a parameter.

Trip display	Failure code	Trip name	Detection factor	Measures
OL2	000E	Overload (Motor) *	1) The motor is locked up. 2) Operation continues in low-speed range. 3) The motor is overloaded. 4) The setting of the electronic thermal does not match the motor characteristic. 5) <Pt: V/f Pattern> does not match the machinery.	1) Check the machinery. 2), 3), and 4) Set the electronic thermal according to the motor. <OLM: Motor overload protection characteristic>, <tHrA: Motor overload protection current 1>, etc. 5) Set <Pt: V/f Pattern> according to the machinery.
OL3	003E	Overload (IGBT)	1) While operating the low-speed range (15 Hz or less) with high carrier frequency, overload occurred. 2) Momentary power failure occurred, and tried to start the rotating motor.	1) <ul style="list-style-type: none"> Reduce the load. Lower the carrier frequency. Or set <F316: Carrier frequency control> to "Valid decrease". Increase the output frequency. 2) Set <F301: Auto-restart>. Depending on the characteristic of machinery, <F302: Regenerative power ride-through> = "1" is also effective.
OLr	000F	Overload (Braking resistor) *	1) The braking rate is large. 2) The deceleration time is short.	<ul style="list-style-type: none"> Increase the deceleration time. <dEC: Deceleration time 1>, etc. Change the braking resistor (option) to a large capacity, and set <F309: Braking resistor capacity>.
OP1	000A	Overvoltage (during acceleration)	1) Input voltage is high and showed abnormal fluctuation. 2) Connection is made as the following system. <ul style="list-style-type: none"> Power supply capacity is 500 kVA or more. The power factor improvement capacitor was opened/closed. Equipment is connected that uses thyristor on the same system. 3) Momentary power failure occurred, and tried to start the rotating motor.	1) Use within the power supply voltage range. When no problem is found in the input voltage, install an input AC reactor (option). 2) Install an input AC reactor (option). 3) Set <F301: Auto-restart>. Depending on the characteristic of machinery, <F302: Regenerative power ride-through> = "1" is also effective.
OP2	000B	Overvoltage (during deceleration)	1) The deceleration time is short and the regenerative energy is large. 2) <F305: Overvoltage limit operation> is set to "1: Disabled". 3) Input voltage is high and showed abnormal fluctuation. 4) Connection is made as the following system. <ul style="list-style-type: none"> Power supply capacity is 500 kVA or more. The power factor improvement capacitor was opened/closed. Equipment is connected that uses thyristor on the same system. 	1) <ul style="list-style-type: none"> Increase the deceleration time. <dEC: Deceleration time 1>, etc. When the regenerative energy is large, install a braking resistor. 2) Change <F305> = "0", "2", and "3" to enable the Overvoltage limit operation. When the deceleration time is limited, install a braking resistor (option). 3) Use within the power supply voltage range. When no problem is found in the input voltage, install an input AC reactor (option). 4) Install an input AC reactor (option).

*Enable/Disable can be selected for trip with a parameter.

Trip display	Failure code	Trip name	Detection factor	Measures
OP3	000C	Overvoltage (during constant speed running)	1) Input voltage is high and showed abnormal fluctuation. 2) Connection is made as the following system. <ul style="list-style-type: none"> Power supply capacity is 500 kVA or more. The power factor improvement capacitor was opened/closed. Equipment is connected that uses thyristor on the same system. 3) The motor was rotated with the force on the load side, and it became to regenerative status.	1) Use within the power supply voltage range. When no problem is found in the input voltage, install an input AC reactor (option). 2) Install an input AC reactor (option). 3) Install a braking resistor (option).
Ot	0020	Overtorque *	The load torque reached the overtorque level during run.	<ul style="list-style-type: none"> Check the load side. Check the overtorque detection setting is correct. <F615: Overtorque trip>, <F616: Overtorque detection level during power running>, <F617: Overtorque detection level during regen>, <F618: Overtorque detection time>, etc.
Ot2	0041	Overtorque 2	1) The output current during power running reached <F601: Stall prevention level 1> or more, and the setting time in <F452: Stall detection time during power running> elapsed. 2) The power running torque during power running reached <F441: Power running torque limit level 1> or more, and the setting time in <F452: Stall detection time during power running> elapsed.	<ul style="list-style-type: none"> Reduce the load. Lower the detection level of <F601> or <F441>.
OtC3	0048	Overtorque/ Overcurrent *	Overtorque or overcurrent on the shock monitoring function was detected.	<ul style="list-style-type: none"> Check the load. When no problem is found, check if the shock monitoring function setting is correct. <F590: Shock monitoring> to <F598: Shock monitoring detection condition>
PrF	003B	STO circuit fault	Fault in the safe torque off (STO) circuit.	Fault inside the inverter. Contact your Toshiba distributor.
SOUT	002F	PM step-out *	1) The load changed rapidly. 2) Sudden acceleration/deceleration occurs. 3) The motor shaft is locked up. 4) Output side phase has failed.	1) and 2) Increase the acceleration/ deceleration time. <ACC: Acceleration time1>, <dEC: Deceleration time 1>, etc. 3) Check the motor and release the lock. 4) Check the wiring on the output side.
UC	001D	Undercurrent *	The output current declined to the undercurrent detection level during run.	<ul style="list-style-type: none"> Check the load. Check that the undercurrent detection setting is correct. <F610: Undercurrent trip>, <F611: Undercurrent detection level>, <F612: Undercurrent detection time>, etc.

*Enable/Disable can be selected for trip with a parameter.

Trip display	Failure code	Trip name	Detection factor	Measures
UP1	001E	Undervoltage (Power circuit) *	The input voltage (power circuit) declined.	<ul style="list-style-type: none"> Check the input voltage. Check that the undervoltage detection setting is correct. <F625: Undervoltage detection level>, <F627: Undervoltage trip>, etc. To avoid trip in momentary power failure, set <F627> = "0: Disabled", and set <F301: Auto-restart> and <F302: Regenerative power ride-through level> to "1".
Ut	003C	Undertorque *	The load torque reached the undertorque level during run.	<ul style="list-style-type: none"> Check the load side. Check that the undertorque detection setting is correct. <F651: Undertorque trip>, <F652: Undertorque detection level during power running>, <F653: Undertorque detection level during regen>, <F654: Undertorque detection time>, etc.
UtC3	0049	Undertorque/ Undercurrent *	Undertorque or undercurrent on the shock monitoring function was detected.	<ul style="list-style-type: none"> Check the load. When no problem is found, check if the shock monitoring function setting is correct. <F590: Shock monitoring> to <F598: Shock monitoring detection condition>

*Enable/Disable can be selected for trip with a parameter.

■ Alarm information

Alarm display	English	Detection factor	Measures
A-09	Panel disconnection alarm	The cable connecting the inverter and panel are disconnected during run with a run command from the operation panel and extension panel.	Check the connection on the inverter and panel.
A-17	Key failure alarm	<ul style="list-style-type: none"> [RUN] or [STOP/RESET] key on the operation panel is pressed and hold for 20 seconds or more. The operation panel key has failed. 	Check the operation panel. If the failure occurs again, contact your Toshiba distributor.
A-18	Analog input disconnection alarm	The input level of the terminal [II] became the setting value or less of <F633: II analog input disconnection detection level> .	<ul style="list-style-type: none"> Check that the signal line connected to the terminal [II] is not disconnected. Check that the <F633> setting is correct.
A-43	Communication alarm (embedded Ethernet)	Condition very close to the communication time out trip.	Perform the same measures with communication time out "E-43".
COFF	Control power option alarm	<ol style="list-style-type: none"> Undervoltage on the control power supply input between [+SU] and [CC]. The setting of <F647: Control power option failure detection> is improper. 	<ol style="list-style-type: none"> Check the voltage on the control power supply input between [+SU] and [CC]. 20 Vdc or more is required. When the control power supply option is not used, set <F647> = "0". <p>*When [COFF] occurs, turn the power OFF once, and reset.</p>
MOFF	Undervoltage alarm	The input voltage (power circuit) declined.	Check the input voltage. If no problem is found, internal error may be the issue. Contact your Toshiba distributor.

Alarm display	English	Detection factor	Measures
PrA	STO activated	1) Open state between [STOA]/[STOB] and [PLC] terminal. 2) 24V output terminal [PLC]/[P24] overload. 3) SW1 is set on "PLC" position and an external power is not supplied.	1) Short circuit [STOA] - [STOB] - [PLC]. (By default, short circuit is done with a shorting bar). 2) Check 24V load. 3) Check SW1 position and external power supply.
t	Communication alarm (RS485, option)	Condition very close to the communication time out trip.	Perform the same measures with communication time out "Err5" and "Err8".
tUn1	Brake learning error	1) The load is heavy. 2) Parameter setting is improper. 3) Braking operation is abnormal.	1) Perform learning with no load or light load in approx. 3 % or less rating. 2) Set the motor parameters and learning related parameters in advance. 3) Check the brake.
tUn3	Light-load high-speed learning error	Setting of the motor parameter is improper.	Set the motor parameters according to the motor.

■ **Pre-alarm information**

Pre-alarm display	English	Detection factor	Measures
C	Overcurrent pre-alarm	Condition close to the overcurrent trip.	Perform the same measures with overcurrent "OC1", "OC2", and "OC3".
H	Overheat pre-alarm	Condition close to the overheat trip.	Perform the same measures with overheat "OH".
L	Motor overload pre-alarm	Condition close to the overload trip.	Perform the same measures with overload "OL1", "OL2", and "OL3".
P	Overvoltage pre-alarm	Condition close to the overvoltage trip.	Perform the same measures with overvoltage "OP1", "OP2", and "OP3".

■ **Message information**

Message display	English	Description	Remarks
A-01	V/f 5-point setting error 1	When <Pt:V/f Pattern> = "7: V/f 5-point setting", two or more from <vL>, <F190>, <F192>, <F194>, <F196> and <F198> are set to the same value other than 0.0 Hz.	Set different value on each parameter.
A-02	V/f 5-point setting error 2	Inclination of V/f is large.	<ul style="list-style-type: none"> Set V/f 5-point and <vLv>/<vL> for the V/f inclination to be gentle. Increase the value of <vL>, or decrease the value of <vLv>.
A-05	Base frequency setting error	Tries to run in frequency over 10 times of the base frequency.	<ul style="list-style-type: none"> Check that the base frequency setting is correct. <vL: Base frequency 1>, etc. Operate in frequency within 10 times of the base frequency.
ASIA	Setting for Asia	Setting for Asia is selected in the setup menu.	-
Atn	During auto tuning	Auto-tuning in progress.	A message that indicates auto-tuning in progress. No problem if the message disappears after several seconds.

Message display	English	Description	Remarks
CHn	Setting for China	Setting for China is selected in the setup menu.	-
CLr	Reset command acceptable	The following was operated after trip is occurring. 1) Pressed [STOP] key once. 2) Set the reset terminal ON. (During trip resetting operation)	Reset is performed with the following operation. 1) Press [STOP] key again. 2) Set the reset terminal OFF.
db	During DC braking	DC braking in progress.	-
dbOn	During motor shaft fixing	Motor shaft fixing in progress.	A message indicates the motor fixing control in progress. When standby is turned OFF, the control stops.
E1	Panel display one digit overflow	The display digit on the operation panel overflowed by one digit.	-
E2	Panel display two digits overflow	The display digit on the operation panel overflowed by two digits.	-
E3	Panel display three digits overflow	The display digit on the operation panel overflowed by three digits.	-
EASy	Easy mode	Switched to [Easy mode].	-
End	Last of data	The last data item in <History function>.	-
EOff	Emergency off command acceptable	When a run command is other than the operation panel, [STOP/RESET] key was pressed once.	To apply emergency off, press [STOP] key again. If emergency off does not occur, press other keys.
Err1	Frequency point setting error	The setting on point 1 and point 2 of the frequency command is close.	Set apart point 1 and point 2 of the frequency command.
EU	Setting for Europe	Setting for Europe is selected in the setup menu.	-
FAIL	Password failure	Entered number in <F739: Password verification> does not match <F738: Password setting>.	-
FlrE	During Fire speed run/Forced run	Fire speed run/Forced run is in progress. ("FlrE" and the output frequency are alternately displayed)	A message indicates fire speed run/forced run in progress. It stops when turning the power OFF.
FJOG	Fwd JOG	Forward jog run in progress.	-
HEAd	Head of data	The first data item in <History function>.	-
HI	Upper limit of setting value	The upper limit of the setting value.	-
Init	During Initializing	<ul style="list-style-type: none"> Set <tyP: Default setting> = "3" or "13" and initialization is in progress. Region setting in progress with the setup menu. 	No problem if the display shows "0.0" after several seconds.
JP	Setting for Japan	Setting for Japan is selected in the setup menu.	-
LO	Lower limit of setting value	The lower limit of the setting value.	-
LStP	During run sleep	Run sleep in progress.	-
n---	No detailed information of past trip	While "nErr" and a value are alternately displayed, [OK] key is pressed and detailed information are read.	Normal display.

Message display	English	Description	Remarks
nErr	No error	No trip records in the past trip history on [Monitor mode].	-
OFF	Standby OFF	The input terminal with assigned standby is OFF.	-
PASS	Password coincidence	Entered number in <F739: Password verification> matched <F738: Password setting>.	-
rJOG	Rev JOG	Reverse jog run in progress.	-
rtry	During Retry/Speed search	Retry/speed search in progress.	-
SEt	Region setting acceptable	<ul style="list-style-type: none"> • Display at first power on. • Display after setting <SEt> = "0". 	Set a region to use in the setup menu.
Srvo	During servo lock	Servo lock in progress.	-
Std	Setting mode	Switched to [Setting mode].	-
StOP	During deceleration stop at power failure	Deceleration stop at power failure in progress.	A message indicates deceleration stop during power failure. The stop state is kept until the run command is turned OFF.
tUn	During learning	Learning the brake sequence or light-load high-speed operation in progress. ("tUn1" and the output frequency are alternately displayed)	-
tUn2	Light-load high-speed learning setting error	Error exists in learning operation.	Refer to Operation Manual, and perform learning operation.
U---	Waiting for search	Waiting for search condition in <Changed parameters search & edit>.	-
U--F	During forward search	Forward search in progress in <Changed parameters search & edit>.	-
Undo	All key unlocked	When "Locked" is set in <F737: Panel keys lockout>, pressed [OK] key for five seconds or more.	The key operation on the operation panel is temporarily valid.
U--r	During reverse search	Reverse search in progress in <Changed parameters search & edit>.	-
USA	Setting for North America	Setting for North America is selected in the setup menu.	-

13.2 How to reset trip



Important

- Reset the inverter that has tripped after eliminating the cause of the trip. If it is not eliminated, the inverter will trip again even after reset. Pay enough attention.

The inverter can be reset with the following four methods after a trip occurs.

(1) Panel operation

You can reset from the operation panel even if terminal run or communication run is performed when the trip occurs.

The following is the reset procedure.

- 1 Press the [STOP/RESET] key with the trip displayed.
"CLr" blinks in the main area, and "Trip reset? (STOP-Key)" is displayed on the lower side.
 - The backlight is red.
(It is white when the setting of the backlight is changed.)



- 2 When you press the [STOP/RESET] key again while "CLr" is blinking, the trip is reset. The display on the screen once disappears, and the screen immediately after power on is displayed. The backlight returns to white.

(2) Terminal input (external signal)

Short the terminal [RES] and then open.

The inverter is reset when the terminal is opened.

In the default setting, the function "8: Reset 1" is assigned to the terminal [RES].

To reset with other input terminal, assignment of the reset function is required.

(3) Communication

For details, refer to "RS485 Communication Function Instruction Manual" (E6582143).

(4) Turning off power

Turn OFF the power and then turn it ON again.

When the power is off, some contents of the monitor at the time of the trip are lost.

To retain the contents of the monitor at the time of the trip, set <F602: Trip record retention> to "1: Retain at power off." Even after the inverter is reset with power off, the stored contents of the trip are displayed.

For details, refer to [6. 30. 3].



Important

- The inverter can be reset with power off, however, note that the equipment and the motor are damaged if the power is turned off frequently.

■ **When the inverter cannot be reset immediately after the trip**

- 1) **For overload (inverter) "OL1", overload (motor) "OL2" and overload (braking resistor) "OLr", virtual cooling time is provided. During this time, the inverter cannot be reset by external signal or from the operation panel.**

The reference virtual cooling time is as follows.

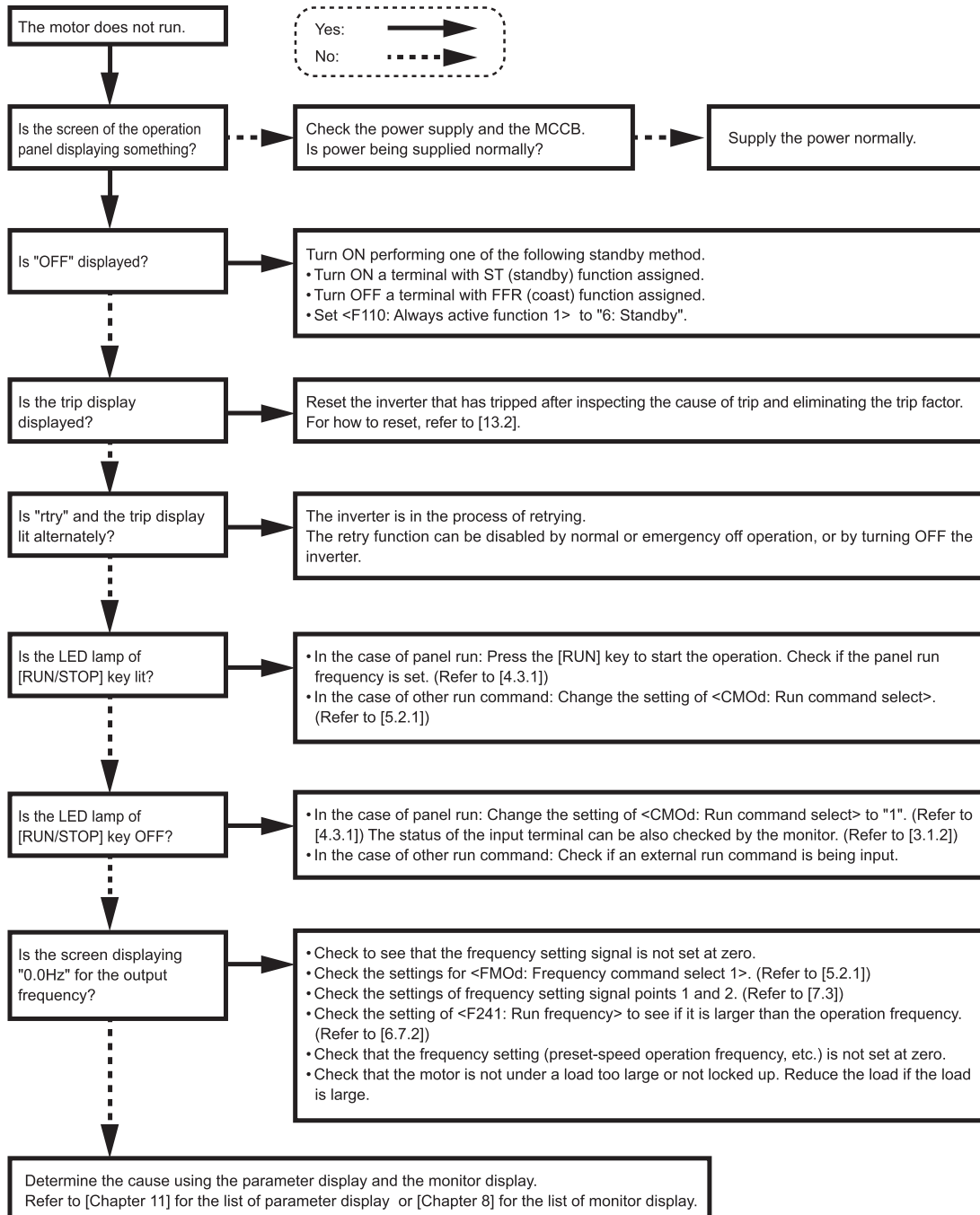
- "OL1": approximately 30 seconds after the occurrence of a trip
- "OL2": approximately 120 seconds after the occurrence of a trip
- "OLr": approximately 20 seconds after the occurrence of a trip

For overload (IGBT) "OL3", there is no virtual cooling time.

- 2) **In case of overheat "OH", the inverter checks the temperature within. Wait until the temperature in the inverter falls sufficiently before resetting the inverter.**
- 3) **In case of overvoltage "OP1", "OP2" and "OP3", wait until the power circuit voltage decrease under the setting value of <F626: Overvoltage limit operation level>.**
- 4) **The inverter cannot be reset while the emergency off signal is being input to the input terminal.**
- 5) **The inverter cannot be reset while a pre-alarm occurs.**

13.3 If motor does not run while no trip message is displayed

If the motor does not run while no trip message is displayed, follow these steps to track down the cause.



13.4 How to determine causes of other problems

The following table provides a listing of other problems, their possible causes and measures.

Problems	Causes	Measures
The motor runs in the wrong direction.	- The phase sequence of the output terminals [U/T1], [V/T2] and [W/T3] is wrong.	- Invert the phases of the output terminals [U/T1], [V/T2] and [W/T3].
	- The Fwd/Rev run signals are input inversely in terminal run.	- Invert the Fwd/Rev run signal terminals of the external input device. (Refer to [7. 2])
	- The setting of <Fr: Panel Fwd/Rev run select> is incorrect in panel run.	- Change <Fr> setting.
The motor runs but its frequency does not change.	- The load is large.	- Reduce the load.
	- The overload stall function is activated.	- Disable the overload stall function OFF in <OLM: Motor overload protection characteristic>, and reduce the load (Refer to [5. 2. 5]).
	- <FH: Maximum frequency> and <UL: Upper limit frequency> are set too low.	- Increase the setting values of these parameters.
	- The value of analog signal in the frequency command is small.	- Check the value of the signal, circuit, wiring, etc. - Check the characteristics (point 1 and point 2 setting) of the analog signal. (Refer to [7. 3])
	- If the motor runs at a low speed, the torque boost value is too large.	- Check if an overcurrent alarm or overload alarm has occurred and adjust <vb: Manual torque boost 1> and <ACC: Acceleration time 1>. (Refer to [5. 3. 6] and [5. 2. 4])
The motor does not accelerate or decelerate smoothly.	- <ACC: Acceleration time 1> or <dEC: Deceleration time 1> is set too short.	- Increase the value of each parameter.
A too large current flows into the motor.	- The load is large.	- Reduce the load.
	- If the motor runs at a low speed, the torque boost value is too large.	- Check if the value of <vb: Manual torque boost 1> is too large. (Refer to [5. 3. 6])
The motor runs at a higher or lower speed than the specified one.	- The motor has an improper voltage rating.	- Use a motor with a proper voltage rating.
	- The motor terminal voltage is too low.	- Check the setting value of <vLv: Base frequency voltage 1>. (Refer to [5. 2. 2])
		- Change the wire size to large.
	- The reduction gear ratio, etc., are not set properly.	- Adjust the reduction gear ratio, etc.
	- The frequency command is not set correctly.	- Check the value and range of the frequency command.
- Adjust <vL: Base frequency 1> to the motor. (Refer to [5. 2. 2])		

Problems	Causes	Measures
The motor speed fluctuates during run.	- The load is large or small, and load fluctuation is large.	- Reduce the load fluctuation.
	- The inverter or motor used does not have a rating large enough to drive the load.	- Change the inverter and motor to large capacity.
	- The frequency command fluctuates.	- Check if the frequency command such as the analog signal changes.
	- Vector control is not performed properly when <Pt: V/f Pattern> is set to "3" or "9".	- Check the settings and conditions of the motor parameters and vector control. (Refer to [5. 3. 4])
Parameter settings cannot be changed.	- <F700: Parameter reading&writing access lockout> is set to "1" to "4" (Locked).	- Set <F700> to "0: Unlocked".
	- The password is set with <F738: Password setting>.	- Input the password to <F739: Password verification> to clear. (Refer to [6. 34. 1])
	- Input terminal functions: "200" to "203" (Parameter writing/reading locked) are assigned to one of the digital input terminals, and the input terminal is ON.	- Turn off the applicable input terminal.
	- For reasons of safety, some parameters cannot be changed during run.	- Refer to [6. 34. 1].

The following is how to deal with parameter setting-related problems.

Problems	Measures
You forget parameters which have been reset.	- You can search for all changed parameters and set. For details, refer to "Changed parameters search & edit <GrU>" in [4. 2. 1].
You want to return all changed parameters to their respective default settings.	- You can return all parameters to default settings. For details, refer to [5. 3. 9].

14 Maintenance and inspection

I

II

! WARNING



Mandatory
action

- Perform daily inspection and periodic inspection on equipment.
If you use the inappropriate inverter, not only will the three-phase motor not rotate correctly, but it will cause serious accidents such as overheating and burning out.

- Before inspection, perform the following steps.

(1) Turn off the power to the inverter.

(2) Wait at least 15 minutes and verify that the charge lamp is no longer lit.

(3) Use a tester that can measure DC voltages (800 VDC or more), and verify that the voltage to the DC main circuits between [PA/+] and [PC/-] is 45V or less, and verify that the residual voltage of AC main circuits cable is 45V or less.

Performing inspection without carrying out these steps can lead to electric shock.

When using the PM motor, please verify that the PM motor is stopped. While the PM motor is rotating even after the power is turned off, as a high voltage is generated in the output terminals [U/T1], [V/T2] and [W/T3] on the PM motor side, touching the output terminals will result in electric shock.

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To prevent a failure due to the influence of the operating environment such as temperature, humidity, dust, or vibration, or to aging or lives of the used parts, perform daily inspection and periodical inspection.

14.1 Daily inspection and cleaning

The electronic parts are vulnerable to heat. Therefore, be sure to install the inverter in a well-ventilated, dust-free environment with low ambient temperature.

The purpose of the daily inspection is to maintain the environment and to find any sign of abnormal operation before a failure occurs by recording and comparing the operation data.

14.1.1 Checkpoints for daily inspection

Perform daily inspection according to the following items and table:

- Are any abnormalities found in the installation environment?
- Does the cooling system have any problems?
- Is unusual vibration or sound found?
- Is abnormal overheat or discoloration found?
- Is an unusual smell found?
- Is adhesion or accumulation of foreign substances (conductive substances) found?
- Is unusual vibration, sound, or overheat found in the motor?

Item to be inspected daily	Inspection procedure			Criteria and action
	Inspection item	Cycle	Check method	
Indoor environment	Dust	As required	Visual check	Eliminate any problems if any.
	Gas	As required	Smell check	
	Liquid drops such as water	As required	Visual check	Check for any trace of liquid.
	Room temperature	As required	Thermometer	Inverter ambient temperature: 60°C or less (Operation panel: 50°C or less)
Inverter unit and parts Peripheral devices	Vibration and noise	As required	Tactile check on the unit outer surface	<ul style="list-style-type: none"> • If any abnormalities are found in the inverter unit, check the cooling fans, etc. • Check the peripheral devices (transformers, reactors, magnetic contactors, thermal relays, etc.) for abnormality. Stop operation as required.
Operation data (output side)	Output current	As required	Moving-iron type AC Ammeter	<ul style="list-style-type: none"> • To be within the rating • No large difference is to be found compared to the data for normal operation.
	Output voltage *1	As required	Rectifier type AC voltmeter	
	Ambient temperature (at startup, during run, and at stop)	As required	Thermometer	

*1 The voltage value may vary depending on the measurement device used. Therefore, be sure to use the same voltmeter for inspection, and record the indicated values.

14. 1. 2 Daily cleaning

To clean the inverter, use a soft cloth to slightly wipe off the dirt or stains on the inverter surface. If the dirt or stains persist, slightly wipe it off with a cloth dampened with neutral detergent or ethanol.

14



Important

- Do not use the following chemicals and solvents. Failure to do so results in damaged inverter molded parts (unit, plastic covers, etc.) or peeled coating.
 - Acetone
 - Benzen
 - Chloroform
 - Ethylene chloride
 - Ethyl acetate
 - Glycerin
 - Tetrachloroethane
 - Trichloroethylene
 - Xylene

14. 2 Periodical inspection

Perform periodical inspection once every three to six months depending on the operating conditions.

WARNING



Mandatory action

- Before inspection, perform the following steps.
 - (1) Turn off the power to the inverter.
 - (2) Wait at least 15 minutes and verify that the charge lamp is no longer lit.
 - (3) Use a tester that can measure DC voltages (800 VDC or more), and verify that the voltage to the DC main circuits between [PA/+] and [PC/-] is 45V or less, and verify that the residual voltage of AC main circuits cable is 45V or less.
- Performing inspection without carrying out these steps can lead to electric shock. When using the PM motor, please verify that the PM motor is stopped. While the PM motor is rotating even after the power is turned off, as a high voltage is generated in the output terminals [U/T1], [V/T2] and [W/T3] on the PM motor side, touching the output terminals will result in electric shock.

14. 2. 1 Checkpoints for periodical inspection

The periodical inspection items and check methods are shown in the following table.

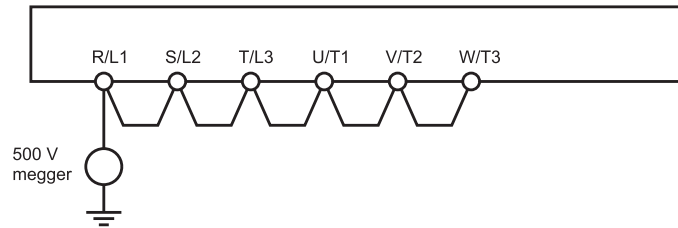
Periodical inspection item	Check method and action
Check the screw parts of the wiring terminals for looseness.	Tighten the screw parts of the wiring terminals with a screwdriver.
Check the caulked parts of the wiring terminals for any poor caulking.	Visually check the caulked parts for any trace of overheat.
Check the wiring for any damage.	Visual check
Clean dirt or dust.	Clean it with a vacuum cleaner.
Perform an insulation resistance test on the power terminal block.	Test only the power terminal block at 500 V mega to check that the insulation resistance is a few MΩ or more (the value is lower for the built-in noise filter models).
Check the input voltage and output voltage.	Periodically check the input-side voltage with a moving-iron type AC voltmeter (recommended).
	Periodically check the output-side voltage with a rectifier type AC voltmeter (recommended).
Check the ambient temperature.	Measure the ambient temperature of the inverter every time at startup, during run, and at stop.

■ Notes for periodical inspection

When you use a vacuum cleaner for cleaning, pay attention to the vents, printed circuit boards, etc. Keep in mind that adhesion of dirt or dust may result in an unexpected accident. Be sure to keep them dust free.

Perform an insulation resistance test of the power terminal block only on the inverter as shown in the following figure.

- Remove the power supply wiring connected to the power terminal block and the wiring to the motor.
- Wire each power terminal.



Also, remove the wiring of the power circuit output terminals [U/T1], [V/T2], and [W/T3], and perform an insulation resistance test only on the motor. When you perform an insulation resistance test on the peripheral circuits in the parts other than the motor, remove all the wiring connected to the inverter so that a test voltage will not be applied to the inverter.



Important

- Perform an insulation resistance test only on the power terminal block. Do not perform an insulation resistance test on the control terminals in the parts other than the power circuit, or on the circuit terminals mounted on the printed circuit board.
- Do not perform a dielectric test. Failure to do so may result in damaged internal parts.

14. 2. 2 Periodical inspection on the replacement parts

The inverter consists of a large number of electronic parts such as semiconductor devices. The following parts age because of the configurations or the physical properties. If they are left unused for a long time, the performance of the inverter will deteriorate, thus resulting in a failure. Be sure to perform periodical inspection for preventive maintenance.

For replacement of each replacement part, contact your Toshiba distributor. Do not replace the parts on your own for safety.

WARNING



Prohibited

- Do not replace parts. This will result in electric shock, fire and other injury. Please call your Toshiba distributor for repairs and replacement of expendable parts.

14



Important

- The replacement cycle of the parts are influenced by the ambient temperature and the use conditions. The replacement cycle of the parts listed here are based on the assumption that they will be used in an environment (without corrosive gas, oil mist, dust, and metal powder, etc.) at an ambient temperature within the specification.
- The design life expectancies and the standard replacement cycles do not warrant the lives.

■ Cooling fan inspection

The inspection items for the cooling fans are as follows:

- Are the cooling fans rotating stably?
- Is any unusual sound or vibration found?

The design life expectancies of the cooling fans that cool down the heat-generating parts are as follows:

VFAS3-2004P to 2550P,

VFAS3-4004PC to 4132KPC: Design life expectancy 10 years

VFAS3-4160KPC to 4280KPC: Design life expectancy 5 years (9 years for inner air fan)

* Average ambient temperature 40°C, load factor 80% or less, 24-hour operation per day

Also, replace the fans when unusual sound or vibration is found.

For replacement of the cooling fans, contact your Toshiba distributor.

■ Smoothing aluminum electrolytic capacitor inspection

The inspection items for the smoothing aluminum electrolytic capacitor are as follows:

- Is liquid leak found?
- Is the safety valve lifted?

The design life expectancy of the smoothing aluminum electrolytic capacitor is 10 years.

* Average ambient temperature 40°C, load factor 80% or less, 24-hour operation per day

For replacement of the smoothing aluminum electrolytic capacitor, contact your Toshiba distributor.

The inverter unit may need to be replaced depending on the capacity because the smoothing aluminum electrolytic capacitor is mounted on the printed circuit board.

Memo

- You can check the parts replacement alarm and output signals in [Monitor mode]. For details, refer to [8. 1. 1].
- The design life expectancy of the smoothing aluminum electrolytic capacitor becomes shorter at high ambient temperature, and becomes longer at low ambient temperature.

■ **Standard replacement cycle of the other principal parts**

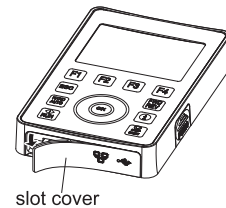
The estimated parts replacement cycles are shown in the following figure. They are based on the assumption that they will be used under normal use conditions (average ambient temperature of 40°C, load factor of 80% or less, 24-hour operation per day, with no corrosive gas, oil mist, dust, metal powder, etc. present). These replacement cycles are not the lives of the parts. They are based on the assumption that more parts will become abnormal when they are used over these cycles.

Part name	Standard replacement cycle ^{*1}	Replacement method
Relays	-	To be determined by inspection
Aluminum electrolytic capacitor on the printed circuit board	10 years ^{*2}	Replace with a new one. (To be determined by inspection)
Battery CR2032 ^{*3} (used in the operation panel)	The remaining capacity of the battery is indicated into the LCD screen with icons (see 3. 1. 2)	Replace with a new one.

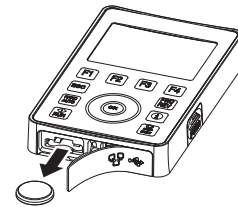
*1 The replacement cycles greatly vary depending on the operating environment.
 *2 It is based on the case where the inverter output current is 80% of the inverter rated current.
 *3 Use CR2032EC (Toshiba).

14. 2. 3 How to replace the battery

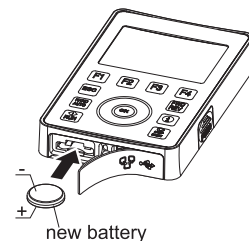
- 1 Remove the operation panel from the inverter. Refer to [10. 3. 8]
- 2 Open the slot cover at bottom (left side) of operation panel



- 3 Eject the battery by using insulated tool (to avoid short-circuit by remaining charge)
For disposal of battery, see [16]



- 4 Insert new battery, at that time take care the polarity.



- 5 Close the slot cover
Then, clock setting is needed, because the clock is not kept by replacing the battery
Refer to E6582110 for setting.

14.3 In case of a failure

Should a failure occurs, contact your Toshiba distributor. Before contact, check the information on the name plate attached on the right side of the inverter unit, and presence or absence of the optional parts to inform the distributor of them as well as inverter problems.

14.4 Cautions for storage

If you store the inverter temporarily or for a long time after purchase, follow the instructions below.

(1) Storage location

Store the inverter indoors. Avoid to be exposed to direct sunlight, corrosive, explosive or flammable gases, salt, oil mist, dust, metal powder, vapor or condensation.

Storage temperature and Relative humidity are shown in the table below.

(2) Periodical check

If no power is supplied to the inverter for a long time, the performance of its main circuit smoothing aluminum electrolytic capacitor declines.

When leaving the inverter unused for a long time, energize it for an hour or more each without load in accordance with the table below, to recover the performance of the electrolytic capacitor. Then check the function of the inverter.

	Storage temperature [°C]	Relative humidity	how to recover the performance of the electrolytic capacitor
Short-term Storage (within one month such as during transportation)	-25 to 70	within 95%	Supplying power without load is not required.
Long-term Storage (exceeding one month)	-10 to 40	within 90%	Supply power once every two years for an hour or more.

15 | Warranty

I

II

Any part of the inverter that proves defective will be repaired and adjusted free of charge under the following conditions:

(1) This warranty applies only to the inverter main unit.

(2) Any part of the inverter which fails or is damaged under normal use within twelve months from the date of delivery shall be repaired free of charge.

(3) For the following kinds of failure or damage, the repair cost shall be borne by the customer even within the warranty period.

- Failure or damage caused by improper or incorrect use or handling, or unauthorized repair or modification of the inverter
- Failure or damage caused by the inverter falling or an accident during transportation after the purchase
- Failure or damage caused by fire, salty damage, corrosive gas, earthquake, storm or flood, lightning, abnormal voltage supply, or other natural disasters
- Failure or damage caused by the use of the inverter for any purpose or application other than the intended one

(4) All expenses incurred by Toshiba for on-site services shall be charged to the customer, unless a service contract is signed beforehand between the customer and Toshiba, in which case the service contract has priority over this warranty.

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16 | Disposal

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CAUTION



Mandatory
action

- If you dispose of the inverter, have it done by a specialist in industry waste disposal.*¹
If you dispose of the inverter by yourself, this can result in explosion of capacitor or production of noxious gases, resulting in injury.
- When you dispose of the operation panel, insulate the terminals of the lithium battery by wrapping the terminals with tapes.
If the terminals contact with other metal or batteries, this will result in heat rising up, explosion, and fire.

*¹ Persons who specialize in the processing of waste and known as "industrial waste product collectors and transporters" or "industrial waste disposal persons". Please observe any applicable law, regulation, rule or ordinance for industrial waste disposal.

When you dispose of your old inverter, ask a specialist in industry waste disposal. Failure to do so results in injuries due to an explosion of the capacitor or generation of noxious gas. Also, when you dispose of the operation panel, wrap the terminals of the lithium battery with tape, etc. to insulate it. If the terminals come in contact with other metal parts or batteries, heat generation, an explosion, or firing may occur.

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TOSHIBA

TOSHIBA INDUSTRIAL PRODUCTS AND SYSTEMS CORPORATION

Motor Drive Division
580, Horikawa-cho, Saiwai-Ku, Kawasaki, Kanagawa
212-0013 Japan
TEL : +81-44-520-0828
FAX : +81-44-520-0508

TOSHIBA INTERNATIONAL CORPORATION

13131 West Little York RD., Houston
TX 77041, U.S.A
TEL:+1-713-466-0277
FAX:+1-713-466-8773

TOSHIBA AMERICADO SUL LTDA.

Avenida Ibirapuera, 2332, Torre I,
5º floor City of Sao Paulo Brasil
TEL:+55-11-4083-7900
FAX:+55-11-4083-7910

TOSHIBA INDUSTRIAL PRODUCTS AND SYSTEMS SHANGHAI CORPORATION

Room No.906, Raffles City (Office Tower), No. 268,
Xizang Middle Road, Huangpu District, Shanghai,
P.R.China
TEL:+86-21-6361-3300
FAX:+86-21-6373-1760

TOSHIBA ELECTRONIC COMPONENTS TAIWAN CORPORATION

12F, No.8, Min Sheng E. Rd. Sec. 3, Taipei 10480,
Taiwan
TEL:+886-2-2508 9988
FAX:+886-2-2508 9997

TOSHIBA ASIA PACIFIC PTE LTD

20 Pasir Panjang Road #13-27/28,
Mapletree Business City, Singapore 117439
TEL:+65-6297-0990
FAX:+65-6305-5561

TOSHIBA INTERNATIONAL CORPORATION PTY. LTD.

11 A Gibbon Road, Winston Hills, Sydney, NSW 2153,
Australia
TEL:+61-2-8867-6200
FAX:+61-2-9624-7104

TOSHIBA INDIA PRIVATE LIMITED

3RD Floor, Building No.10, Tower B, Phase-II,
DLF Cyber City, Gurgaon-12202, India
TEL:+91-124-4996600
FAX:+91-124-4996665

TOSHIBA GULF FZE

P.O.Box 61028, Jebel Ali, Free Zone, Dubai, U.A.E
TEL:+971-4-8817789
FAX:+971-4-8818985

TOSHIBA RUS LLC

Kievskaya st, 7, entrance 7, floor 12, Moscow,
121059, Russian Federation
TEL:+7-495-642-8929
FAX:+7-495-642-8908

TOSHIBA AFRICA (PTY) LTD – SOUTH AFRICA

10th Floor, Sandton Office Towers, 5th Street,
Sandton, 2196, South Africa
TEL:+27-11-305-2820
FAX:+27-11-326-6074