CARLO GAVAZZI
Automation Components

CARLO GAVAZZI

Quick Start Guide Motor Controllers AC Variable Frequency Drives Type VariFlex^3 RVFF

Switches

Contents

Preface

The RVFF product is an inverter designed to control three-phase induction and permanent magnet synchronous motors. Please read this manual carefully to ensure correct operation, safety and to become familiar with the inverter functions.

The RVFF inverter is an electrical/electronic product and must be installed and handled by qualified service personnel.

Improper handling may result in incorrect operation, shorter life cycle, or failure of this product as well as the motor.

All RVFF documentation may be subjected to change without prior notice. The latest edition of these documents can be downloaded for use from our website at http://www.productselection.net/

Available documentation:

1. RVFF Quick setup guide
2. RVFF Instruction manual

Read this instruction manual thoroughly before proceeding with installation, connections (wiring), operation, maintenance or inspection.

The RVFF requires users to have sound knowledge of the product and they have to familiarize with all the safety information and precautions before proceeding to operate the inverter.

Please pay close attention to the safety precautions indicated by the warning  and caution  symbol.

Warning	Failure to ignore the information indicated by the warning symbol may result in death or serious injury.
Caution	Failure to ignore the information indicated by the caution symbol may result in minor or moderate injury and/or substantial property damage.

Chapter 1 Safety Precautions

1.1 Before Supplying Power to the Inverter

Warning

- The main circuit must be wired correctly before operated. Input terminals (R/L1, S/L2, T/L3) must be connected with three phase supply and terminals U/T1, V/T2, W/T3 must only be used to connect the motor. Connecting the input supply to any of the U/T1, V/T2 or W/T3 terminals will cause damage to the inverter.
- This product is compliance with the standard IEC 61800-3. In a domestic environment this product may cause radio interference in which case the user may need to apply corrective measures.
- Over temperature protection function on motor is disabled.

Caution

- To avoid the front cover from disengaging or other physical damage, do not carry the inverter by its cover. Support the unit by its heat sink when transporting. Improper handling can damage the inverter or injure personnel, and should be avoided.
- To avoid the risk of fire, do not install the inverter on or near flammable objects. Install on non-flammable objects such as metal surfaces.
- If several inverters are placed inside the same control panel, provide adequate ventilation to maintain the temperature below 40°C/104°F (50°C/122°F without a dust cover) to avoid overheating or fire.
- When removing or installing the digital operator, turn off the power first, and then follow the instructions in this manual to avoid operator error or loss of display caused by faulty connections.

1.2 Wiring

Warning

- Always turn OFF the power supply before attempting inverter installation and wiring of the user terminals.
- Wiring must be performed by a qualified personnel/certified electrician.
- Make sure the inverter is properly grounded (grounding impedance shall be less than 10Ω). It is required to disconnect the ground wire in the control board to avoid the sudden surge causing damage on electronic parts if it is improperly grounded.
- Please check and test emergency stop circuits after wiring. (Installer is responsible for the correct wiring).
- Never touch any of the input or output power lines directly or allow any input or output power lines to come in contact with the inverter case.
- Do not perform a dielectric voltage withstand test (megger) on the inverter or this will result in inverter damage to the semiconductor components.

Caution

- The line voltage applied must comply with the inverter's specified input voltage. (See product nameplate section 2.1).
- Braking resistor and braking unit can only be connected to the designated terminals. (See section 3.3.5).
- Do not connect a braking resistor directly to the DC terminals P(+) and N(-), otherwise fire may result.
- Use wire gauge recommendations and torque specifications. (See wire gauge and torque specification section 3.3.1).
- Never connect input power to the inverter output terminals U/T1, V/T2, W/T3.
- Do not connect a contactor or switch in series with the inverter and the motor.
- Do not connect a power factor correction capacitor or surge suppressor to the inverter output.
- Ensure the interference generated by the inverter and motor does not affect peripheral devices.

1.3 Before Operation

Warning

- Ensure the inverter capacity matches the parameters 13-00 before supplying power.
- Reduce the carrier frequency (parameter 11-01) if the cable from the inverter to the motor is over 80 ft. (25m). A high-frequency current can be generated by stray capacitance between the cables and result in an overcurrent trip of the inverter, an increase in leakage current, or an inaccurate current readout.
- Be sure to install all covers before turning on power. Do not remove any of the covers while power to the inverter is on, otherwise electric shock may occur.
- Do not operate switches with wet hands, otherwise electric shock may result.
- Do not touch inverter terminals when energized even if inverter has stopped, otherwise electric shock may result.

1.4 Parameter Setting

Caution

- Do not connect a load to the motor while performing an auto-tune.
- Make sure the motor can freely run and there is sufficient space around the motor when performing a rotational auto-tune.

1.5 During Operation

Warning

- Ensure all covers are installed before turning on power. Do not remove any of the covers while power to the inverter is on, otherwise electric shock may occur.
- Do not connect or disconnect the motor during operation. This will cause the inverter to trip and may cause damage to the inverter.
- Operations may start suddenly if an alarm or fault is reset with a run command active. Ensure that no run command is active upon resetting the alarm or fault, otherwise accidents may occur.

- Do not operate switches with wet hands, otherwise electric shock may result.
- An external emergency stop switch is enabled when parameter 08-30 is set for the run permissive function.
- It provides an independent external hardware emergency switch, which emergently shuts down the inverter output in the case of danger.
- If automatic restart after power recovery (parameter 07-00) is enabled, the inverter will start automatically after power is restored.
- Make sure it is safe to operate the inverter and motor before performing a rotational auto-tune.
- Do not touch inverter terminals when energized even if inverter has stopped, otherwise electric shock may result.
- Do not check signals on circuit boards while the inverter is running.
- After the power is turned off, the cooling fan may continue to run for some time.

Caution

- Do not touch heat-generating components such as heat sinks and braking resistors.
- Carefully check the performance of motor or machine before operating at high speed, otherwise Injury may result.
- Note the parameter settings related to the braking unit when applicable.
- Do not use the inverter braking function for mechanical holding, otherwise injury may result.
- Do not check signals on circuit boards while the inverter is running.

1.6 Maintenance, Inspection and Replacement

Warning

- Ensure a minimum delay of 5 minutes after power has been turned OFF before starting an inspection. Also confirm that the charge light is OFF and that the DC bus voltage has dropped below 25Vdc. Ensure a minimum delay of 15 minutes while inverter is over 20HP.
- Never touch high voltage terminals in the inverter.
- Ensure that the power to the inverter is disconnected before disassembling the inverter.
- Only authorized personnel should perform maintenance, inspection, and replacement operations. (Remove any metal jewellery such as watches and rings and use insulated tools).

Caution

- The Inverter can be used in an environment with a temperature range from 14° to +104°F (-10 to +40°C) and relative humidity of 95% non-condensing.
- The inverter must be operated in a dust, gas, mist and moisture free environment.

1.7 Disposal of the Inverter

Caution

- Please dispose of this unit with care as an industrial waste and according to your required local regulations.
- The capacitors of inverter main circuit and printed circuit board are considered as hazardous waste and must not be burned.
- The plastic enclosure and parts of the inverter such as the top cover board will release harmful gases if burned.

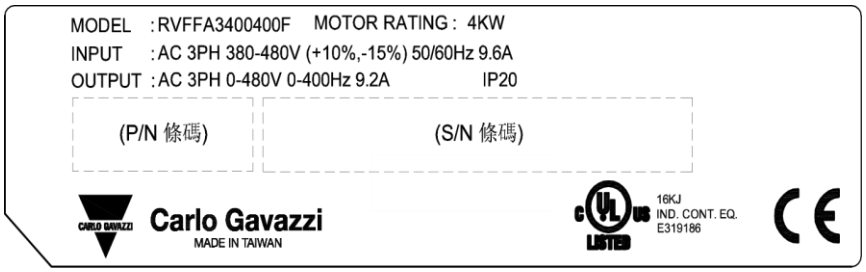
Chapter 2 Model Description

2.1 Nameplate Data

It is essential to verify the RVFF inverter nameplate and make sure that the RVFF inverter has the correct rating so it can be used in the desired application with the proper sized AC motor.

Unpack the RVFF inverter and check the following:

(1) The RVFF inverter and the quick setting guide are contained in the package.
(2) The RVFF inverter has not been damaged during transportation there should be no dents or parts missing.
(3) The RVFF inverter is the type you ordered. You can check the type and specifications on the main nameplate.
(4) Ensure that the input voltage range meets the input power requirements.
(5) Ensure that the motor HP matches the motor rating of the inverter.



2.2 Model Identification

XXXX — RVFF Inverter Series

X — Frame Size

A:	Size 1
B:	Size 2
C:	Size 3
D:	Size 4
E:	Size 5
F:	Size 6

X — AC Supply

3:	3-Phase

XX — Drive Voltage Rating

40:	400VAC

XXXX — Drive Power Rating

0400:	3.7kW
0550:	5.5kW
0750:	7.5kW
1100:	11.0kW
1500:	15.0kW
1850:	18.5kW
2200:	22.0kW
3000:	30.0kW
3700:	37.0kW
4500:	45.0kW
5500:	55.0kW
7500:	75.0kW
9000:	90.0kW
11000:	110.0kW
13200:	132.0kW
16000:	160.0kW

X — Filter

F:	Built-in EMI Filter

Inverter Models – Motor Power Rating

Input Voltage Range	RVFF Model	Horse Power Rating (HP)	Nominal Motor Power (kW)	Filter	
				with	without
Three phase: 380~480VAC (+10% to -15%), 50/60Hz	RVFFA3400400F	5	3.7	◎	
	RVFFA3400550F	7.5	5.5	◎	
	RVFFA3400750F	10	7.5	◎	
	RVFFB3401100F	15	11	◎	
	RVFFB3401500F	20	15	◎	
	RVFFC3401850F	25	18.5	◎	
	RVFFC3402200F	30	22	◎	
	RVFFC3403000F	40	30	◎	
	RVFFD3403700F	50	37	◎	
	RVFFD3404500F	60	45	◎	
	RVFFD3405500F	75	55	◎	
	RVFFE3407500	100	75		◎
	RVFFE3409000	125	90		◎
	RVFFF34011000	150	110		◎
	RVFFF34013200	175	132		◎
	RVFFF34016000	215	160		◎

Note:

- **Short Circuit Rating:** 5KA.

Chapter 3 Environment and Installation

3.1 Wiring Guidelines

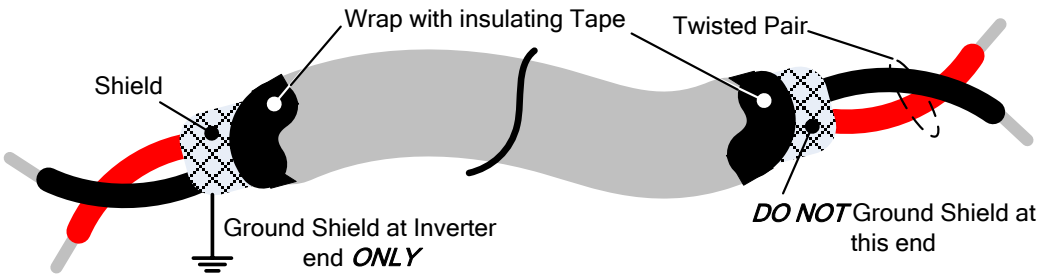
Danger	• Do **NOT** remove any protective covers or attempt any wiring while input power is applied. Connect all wiring before applying input power. When making wiring changes after power up, remove input power and wait a minimum of five minutes after power has been turned off before starting. Also confirm that the charge lamp is off and that DC voltage between terminals B1/P or (+) and (-) does not exceed 25V, otherwise **electric shock may result.** • Only authorized personnel should work on the equipment. (Take off metal jewellery such as watches and rings and use insulated tools.), otherwise **electric shock or injury may result.**

3.1.1 Wiring for main circuit

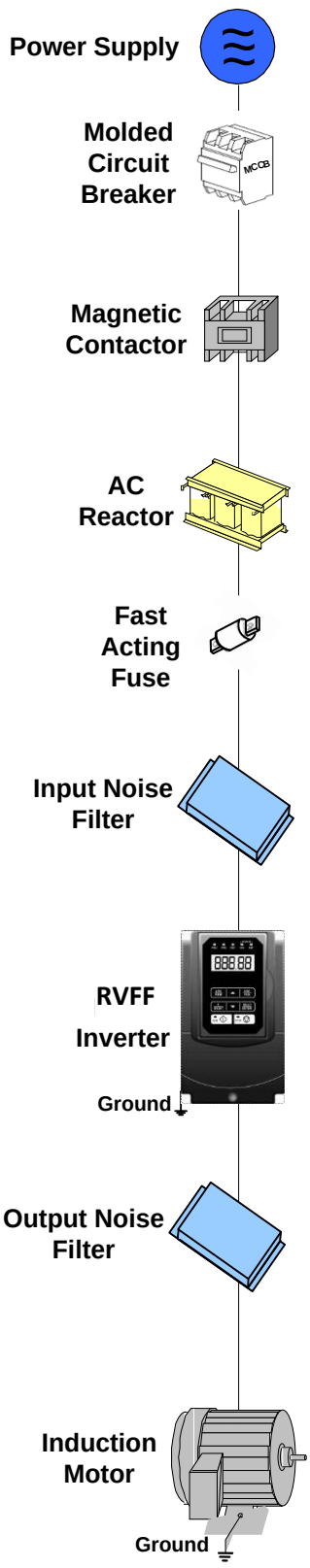
(1) The Input power supply voltage can be connected in any phase sequence to power input terminals R/L1, S/L2, or T/L3 on the terminal block.
(2) DO NOT connect the AC input power source to the output terminals U/T1, V/T2 and. W/T3.
(3) Connect the output terminals U/T1, V/T2, W/T3 to motor lead wires U/T1, V/T2, and W/T3, respectively.
(4) Check that the motor rotates forward with the forward run source. If it does not, swap any 2 of the output cables to change motor direction.
(5) DO NOT connect phase correcting capacitors or LC/RC noise filter to the output circuit.

3.1.2 Wiring for control circuit

(1) Separate the wiring for control circuit terminals from main circuit wiring for terminals (R/L1, S/L2, T/L3, U/T1, V/T2, and W/T3).
(2) Separate the wiring for control circuit terminals (R1A, R1B, R1C/R2A, R2C/R3A, R3C) from wiring for terminals S1～S6, A01, A02, GND, +10V-, AI1, AI2, and GND wiring.
(3) Use shielded twisted-pair cables (#24 - #14 AWG/0.5 -2 mm^2) for control circuits to minimize noise problems. The maximum wiring distance should not exceed 50m (165ft).



3.2 Considerations for peripheral equipment



Power supply:

- ⚠ Ensure that the correct voltage is applied to avoid damaging the inverter.

Molded-case circuit breaker (MCCB) or fused disconnect:

- A molded-case circuit breaker or fused disconnect must be installed between the AC source and the inverter that conforms to the rated voltage and current of the inverter to control the power and protect the inverter.
- ⚠ Do not use the circuit breaker as the run/stop switch for the inverter.

Ground fault detector/breaker:

- ⚠ Install a ground fault breaker to prevent problems caused by current leakage and to protect personnel. Select current range up to 200mA, and action time up to 0.1 second to prevent high frequency failure.

Magnetic contactor:

- Normal operations do not need a magnetic contactor. When performing functions such as external control and auto restart after power failure, or when using a brake controller, install a magnetic contactor.
- ⚠ Do not use the magnetic contactor as the run/stop switch for the inverter.

AC line reactor for power quality:

- When inverters are supplied by a high capacity power source (> 600KVA), an AC reactor can be installed on the input side of the inverter to improve the power factor.

Install Fast Acting Fuse:

- To protect peripheral equipment, install fast acting fuses in accordance with the specifications in section 11.4 for peripheral devices.

Input Noise filter:

- A filter must be installed when there are inductive loads affecting the inverter. The inverter meets EN55011 Class A, category C3 when the Carlo Gavazzi special filter is used. See section 11.3 for peripheral devices.

Inverter:

- Output terminals T1, T2, and T3 are connected to U, V, and W terminals of the motor. If the motor runs in reverse while the inverter is set to run forward, swap any two terminals connections for T1, T2, and T3.
- ⚠ To avoid damaging the inverter, do not connect the output terminals T1, T2, and T3 to AC input power.
- ⚠ Connect the ground terminal properly. (400V series: Rg <10Ω.)

Output Noise filter:

- An output noise filter may reduce system interference and induced noise.

Motor:

- If the inverter drives multiple motors the output rated current of the inverter must be greater than the total current of all the motors.

3.3 Specifications

3.3.1 Product Specifications

Inverter capacity (HP)		5	7.5	10	15	20	25	30	40	50	60	75	100	125	150	175	215
Output Rated	**Rated Output Capacity (KVA)**	7.0	8.4	13.3	17.5	23.6	28.9	33.5	41.1	54.8	67	78.4	110	125	158	190	225
	Rated Output Current (A)	9.2	12.1	17.5	23	31	38	44	54	73	88	103	145	168	208	250	296
	Maximum Applicable Motor *1HP (KW)	5 (4)	7.5 (5.5)	10 (7.5)	15 (11)	20 (15)	25 (18.5)	30 (22)	40 (30)	50 (37)	60 (45)	75 (55)	100 (75)	125 (90)	150 (110)	175 (132)	215 (160)
	Maximum Output Voltage (V)	3-phase 380V~480V															
	Maximum Output Frequency (Hz)	Based on parameter setting 0.1~400.0 Hz															
Power supply	**Rated Voltage, Frequency**	3-phase 380V~480V, 50/60Hz															
	Allowable Voltage Fluctuation	-15% ~ +10%															
	Allowable Frequency Fluctuation	±5%															

*1: Take standard 4-pole induction motor as the base.

*2: RVFF model is designed to be used in normal duty (ND), whose overload capability is 120% for 1 min.

*3: If it is greater than default carrier frequency, you need to adjust the load current based on the de-rating curve.

400V class	Carrier freq. default setting	Carrier freq. range
5~30HP	4KHz	2~16KHz
40HP	2KHz	2~16KHz
50~60HP	4KHz	2~12KHz (*4)
75~215HP	4KHz	2~10KHz (*4)

*4: If control mode is set to SLV mode and maximum frequency (01-02) is larger than 80 Hz, the carrier frequency range is 2~8Hz.

The following table shows the maximum output frequency for each control mode.

Control mode	Other settings	Maximum output frequency
V/F	Unlimited	400Hz
SLV	400V 5~20HP	150Hz
	400V 25HP	110Hz
	400V 30~40HP	100Hz
	400V 50~215HP, carrier (11-01) is set as 8K or below 8K.	100Hz
	400V 50~215HP, carrier (11-01) is set as above 8K.	80Hz
PMSLV	Unlimited	400Hz

3.3.2 General Specifications

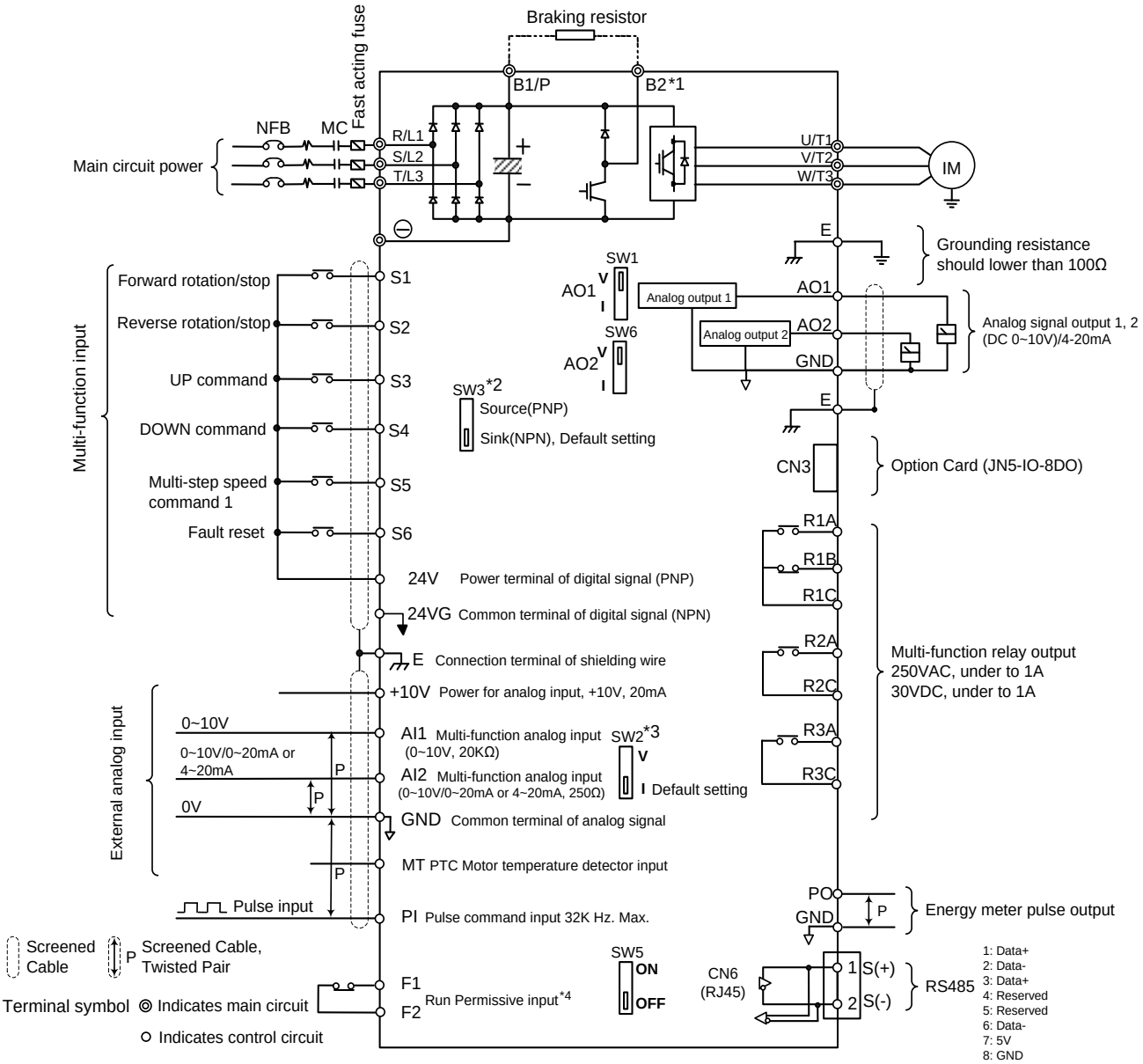
Control Characteristics	**Operation Modes**		LED keypad with seven-segment display
	Control Modes		V/F, SLV, PMSLV with space vector PWM mode
	Frequency Control Range		0.1Hz～400.0Hz
	Frequency Accuracy (Temperature change)		Digital references: ±0.01% (-10 to +40℃), analog references: ±0.1% (25℃±10℃)
	Speed Control Accuracy		±0.5% (Sensorless Vector Control Mode) *1
	Frequency Setting Resolution		Digital references: 0.01Hz, analog references: 0.06Hz/60Hz
	Output Frequency Resolution		0.01Hz
	Inverter Overload		120%/1 min
	Frequency Setting Signal		DC 0～+10V / 0~20mA or 4～20mA
	Acceleration/ Deceleration Time		0.0～6000.0 seconds (separately set acceleration and deceleration time)
	Voltage, Frequency Characteristics		Custom V/F curve based on parameters
	Braking Torque		About 20%
	Main Control Functions		Auto tuning, soft-PWM, over voltage protection, dynamic braking, speed search, restart upon momentary power loss, 2 sets of PID control, slip compensation, RS-485 communication standard, simple PLC function, 2 sets of analog outputs, safety switch
	Other Functions		Accumulated power-on/ run time, 4 sets of fault history records and latest fault record state, energy-saving function setting, phase loss protection, smart braking, DC braking, dwell，S curve acceleration and deceleration, Up/Down operation, Modbus, BACnet MS/TP and Metasys N2 communication protocol, display of multi-engineering unit, Local/ Remote switch, SINK/SOURCE input interface selection, user parameter settings
Protection Function	**Stall Prevention**		Current level can be setting (It can be set separately in acceleration or constant speed; it can be set with or without protection in deceleration)
	Instantaneous Over Current (OC) and Output Short-Circuit (SC) Protection		Inverter stops when the output current exceeds 160% of the inverter rated current
	Inverter Overload Protection (OL2)		If inverter rated current 120%/1min is exceeded, inverter stops. The factory default carrier frequency is 2~4KHZ *2
	Motor Overload Protection (OL1)		Electrical overload protection curve
	Over voltage (OV) Protection		If the main circuit DC voltage rises over 820V, the motor stops running.
	Under voltage (UV) Protection		If the main circuit DC voltage falls below 380V, the motor stops running.
	Auto-Restart after Momentary Power Loss		Power loss exceeds 15ms. Auto-restart function available after momentary power loss in 2 sec.
	Overheat(OH) Protection		Use temperature sensor for protection.
	Ground Fault (GF) Protection		Use current sensor for protection.
	DC Bus Charge Indicator		When main circuit DC voltage ≥ 50V, the CHARGE LED turns on.
	Output Phase Loss (OPL) Protection		If the OPL is detected, the motor stops automatically.
Environment Specifications	**Installation Location**		Indoor (protected from corrosive gases and dust)
	Ambient Temperature		-10℃ to +40℃ (14℉ to 104℉) without de-rating; with de-rating, its maximum operation temperature is 60℃ (140℉).
	Storage Temperature		-20℃ to +70℃ (-4℉ to +158℉)
	Humidity		95%RH or less (no condensation)
	Altitude and Vibration		Altitude of 1000m (3181ft) or below, below 5.9m/s^2 (0.6G)
Communication Function			Built-in RS-485 as standard (Modbus protocol with RJ45/BACnet/ Metasys N2)
PLC Function			Built-in
EMI Protection			The built-in noise filter complies with EN61800-3 available for inverters 400V 75HP or below
EMS Protection			in compliance with EN61800-3
Safety Certification		**CE Declaration**	in compliance with EN61800-3 (CE & RE) and EN61800-5-1 (LVD, Low-Voltage Directive)
		UL Certification	UL508C
Accessories			1 to 8 Pump card, Profibus card

***1: Speed control accuracy will be different from the installation conditions and motor types.**

***2: The factory default carrier frequency is different from models.**

3.4 General Wiring Diagram

The following is the standard wiring diagram for the RVFF inverter (◎ indicates main circuit terminals and ○ indicates control circuit terminals). Locations and symbols of the wiring terminal block might be different due to different models of RVFF.



Remark:

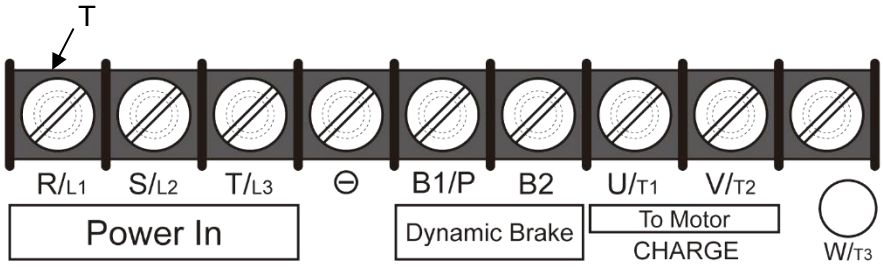
*1: Model 400V 5-40HP has a built-in braking transistor so that the braking resistor can be connected between terminal B1 and B2.
*2: The multi-function digital input terminals S1-S6 can be set to Source (PNP) or Sink (NPN) mode via SW3.
*3: The multi-function analog input 2 (AI2) can be set to the voltage command input (0-10V) or the current command input (4-20mA) via SW2.
*4: Run permissive input F1 & F2 is a normally closed input. This input should be closed to enable the inverter output. To active this input, open the link between F1 and F2.

3.5 Terminal Description

3.5.1 Main Circuit Terminals

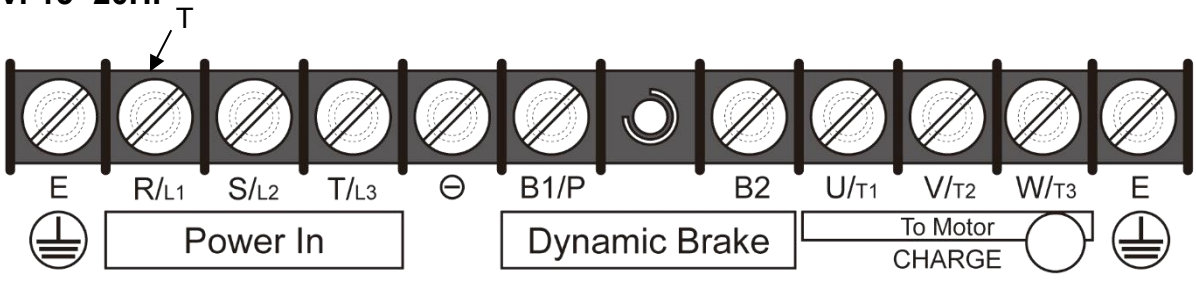
Terminal	400V：5~40HP	400V: 50~215HP
R/L1	Input power supply	
S/L2		
T/L3		
B1／P	• B1／P－⊖：DC power supply • B1／P－B2：external braking resistor	-
B2		
⊖		• ⊕ -⊖ ：DC power supply or connect braking module
⊕	-	
U/T1	Inverter output	
V/T2		
W/T3		
E	Ground terminal	

400V: 5-10HP



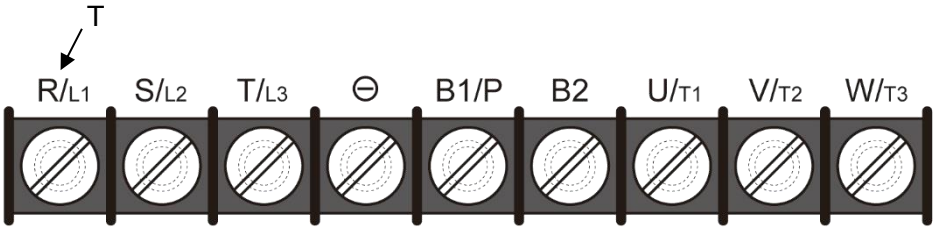
Terminal screw size	
T	⏚
M4	M4

400V: 15- 20HP



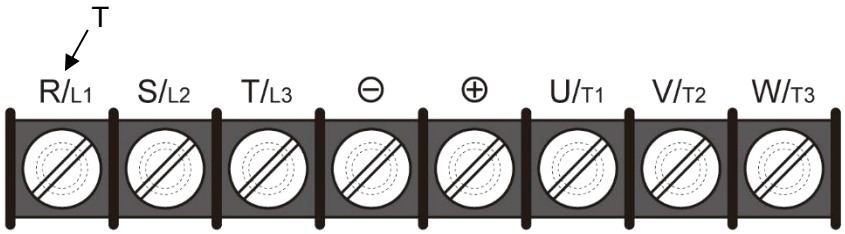
Terminal screw size	
T	⏚
M4	M4

400V: 25-40HP



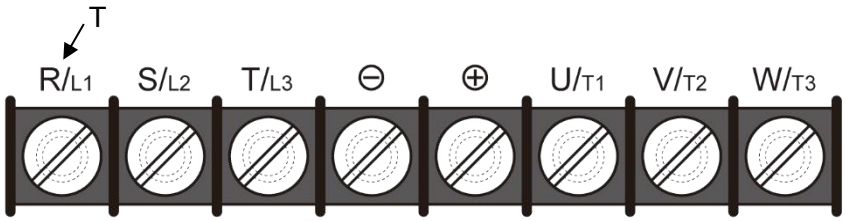
Terminal screw size	
T	⏚
M6	M6

400V: 50-75HP



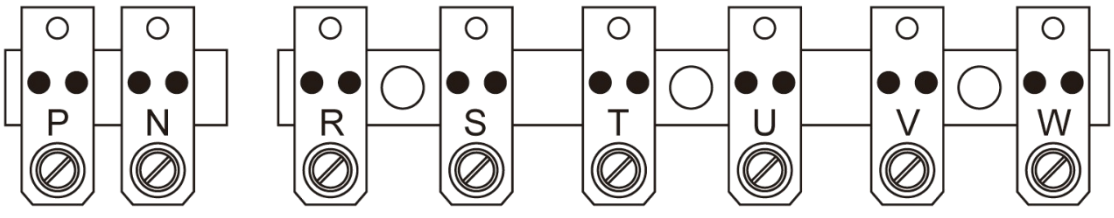
Terminal screw size	
T	⏚
M8	M8

400V: 100-125HP



Terminal screw size		
Power supply	T	⏚
400V 100HP	M8	M10
200V 60-75HP/ 400V 125HP	M10	M10

400V: 150-215HP



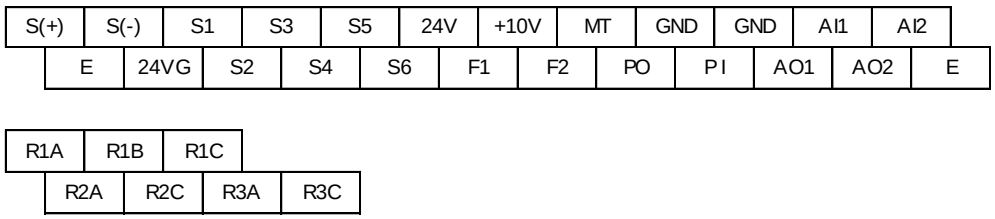
Terminal screw size	
T	⏚

M10	M10

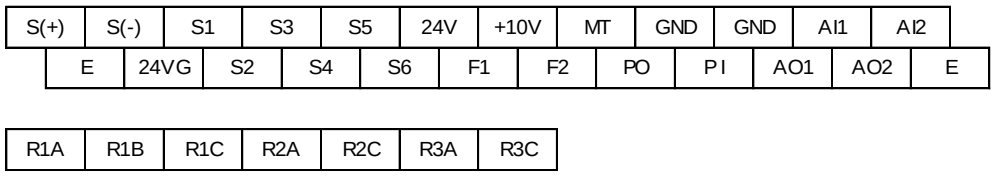
3.5.2 Control Circuit Terminals

Type	Terminal	Terminal function	Signal level/Information
Digital input signal	S1	Multi-function input terminals	Signal Level 24 VDC (opto-isolated) Maximum current: 8mA Maximum voltage: 30 VDC Input impedance: 4.22kΩ
	S2		
	S3		
	S4		
	S5		
	S6		
24V Power supply	24V	Common point of digital signal SOURCE	±15%, Max. output current: 250mA (The sum of all loads connected)
	24VG	Common terminal of digital signals Common point of digital signal SINK	
Analog input signal	+10V	Built-in power for an external speed potentiometer	±5% (Max. current: 20mA)
	MT	Motor temperature detector of externally connecting PTC	1330Ω movement, 550Ω return
	AI1	Multi-function analog input for speed reference (0-10V input)	From 0 to +10V Input impedance: 20KΩ Resolution: 12bit
	AI2	Multi-function analog input terminals, can use SW2 to switch voltage or current input (0~10V)/(4-20mA)	From 0 to +10V Input impedance: 20KΩ From 4 to 20 mA Input impedance: 250Ω Resolution: 12bit
	GND	Analog signal ground terminal	----
	E	Shielding wire's connecting terminal (Ground)	----
Analog output signal	AO1	Multi-function analog output terminals (0~10V/4-20mA output)	From 0 to 10V Max. current: 2mA From 4 to 20 mA
	AO2	Multi-function analog output terminals (0~10V/4-20mA output)	
	GND	Analog signals ground terminal	
Pulse output signal	PO	Pulse output, band width 32KHz	Max. Frequency: 32KHz Open Collector output Load: 2.2 KΩ
	GND	Analog signals ground terminal	----
Pulse input signal	PI	Pulse command input, frequency width of 32KHz	L: from 0.0 to 0.5V H: from 4.0 to 13.2V Max. Frequency: 0 - 32KHz Impedance: 3.89 KΩ
	GND	Analog signals ground terminal	----
Relay output	R1A- R1B- R1C	Relay A contact (multi-function output terminal) Relay B contact (multi-function output terminal) Relay contact common terminal	Rating: 250Vac: 10 mA~1A 30Vdc: 10 mA~1A
	R2A-R2C	With the same functions as R1A/R1B/R1C	Rating: 250Vac: 10 mA~1A 30Vdc: 10 mA~1A
	R3A-R3C	With the same functions as R1A/R1B/R1C	
Safety input	F1	On: normal operation. Off: emergency stop. (Jumper wired has to be removed to use external safety function to stop.)	24Vdc, 8mA, pull-high
	F2	Safety command common terminal	24V ground
RS-485 port	S (+)	RS485/MODBUS	Differential input and output
	S (-)		
Grounding	E (G)	Grounding to earth Shield the connecting terminal	----

400V: 5HP-75HP



400V: 100HP~215HP

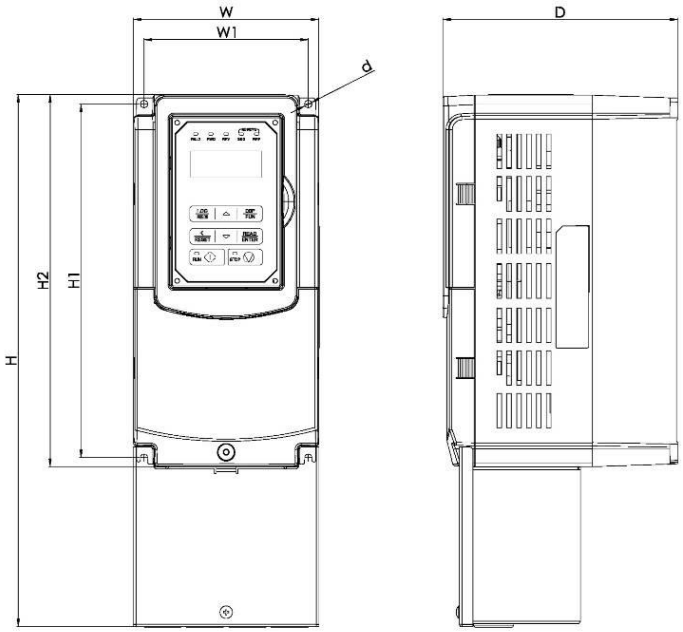


Caution

- Maximum output current capacity for terminal 10V is 20mA.
- Multi-function analog output AO1 and AO2 are for use for an analog output meter. Do not use these output for feedback control.
- Control board's 24V and 10V are to be used for internal control only. Do not use the internal power-supply to power external devices.

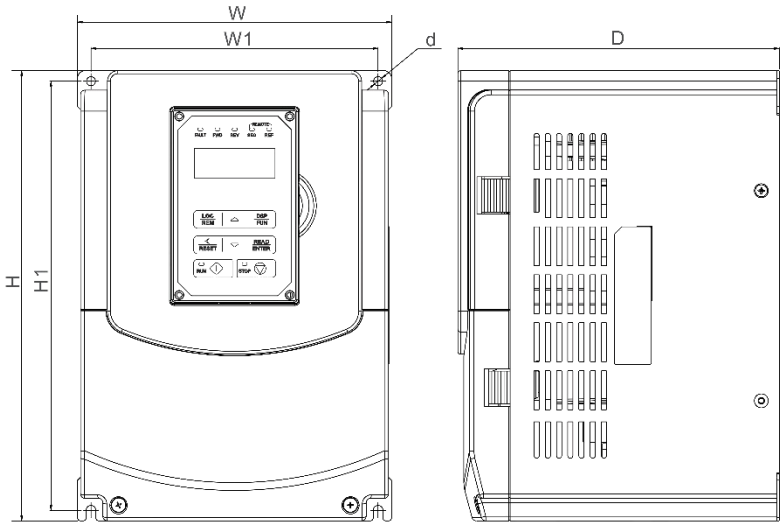
3.6 Inverter Dimension

(a) 400V 5-10HP



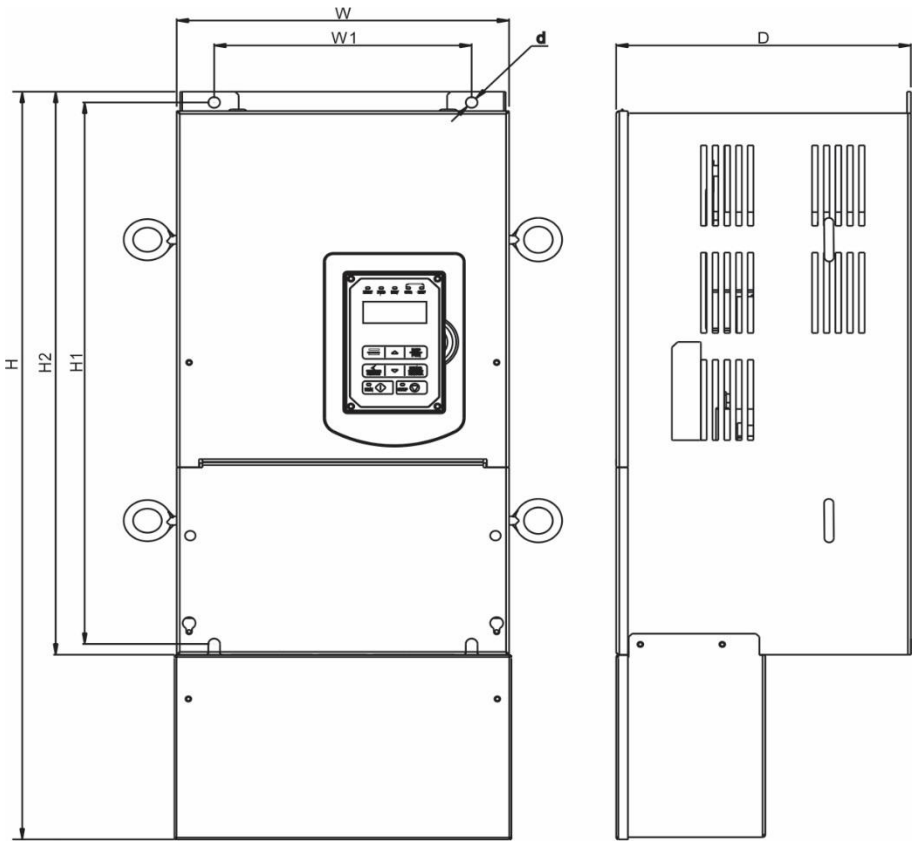
Inverter Model	Dimensions in mm (inch)								
	W	H	D	W1	H1	H2	t	d	NW in kg(lbs)
RVFFA3400400F	140 (5.51)	385 (15.16)	177 (6.97)	122 (4.80)	267 (10.51)	279 (10.98)	7 (0.28)	M6	5.5 (12.13)
RVFFA3400550F	140 (5.51)	385 (15.16)	177 (6.97)	122 (4.80)	267 (10.51)	279 (10.98)	7 (0.28)	M6	5.5 (12.13)
RVFFA3400750F	140 (5.51)	385 (15.16)	177 (6.97)	122 (4.80)	267 (10.51)	279 (10.98)	7 (0.28)	M6	5.5 (12.13)

(b) 400V: 15-40HP



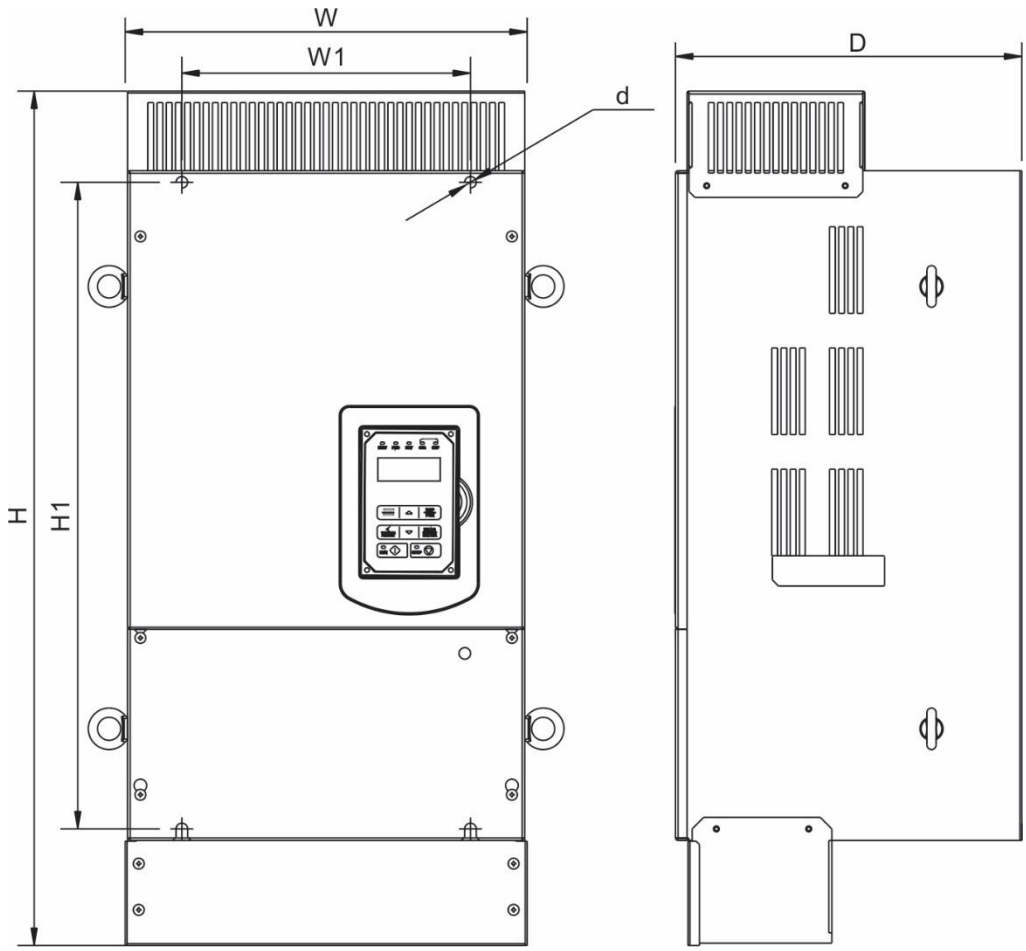
Inverter Model	Dimensions in mm (inch)								
	W	H	D	W1	H1	H2	t	d	NW in kg(lbs)
RVFFB3401100F	210 (8.27)	416.5 (16.40)	215 (8.46)	192 (7.56)	286 (11.26)	300 (11.81)	1.6 (0.06)	M6	8.0 (17.64)
RVFFB3401500F	210 (8.27)	416.5 (16.40)	215 (8.46)	192 (7.56)	286 (11.26)	300 (11.81)	1.6 (0.06)	M6	8.0 (17.64)
RVFFC3401850F	265 (10.43)	500 (19.69)	225 (8.86)	245 (9.65)	340 (13.39)	360 (14.17)	1.6 (0.06)	M8	12.5 (27.56)
RVFFC3402200F	265 (10.43)	500 (19.69)	225 (8.86)	245 (9.65)	340 (13.39)	360 (14.17)	1.6 (0.06)	M8	12.5 (27.56)
RVFFC3403000F	265 (10.43)	500 (19.69)	225 (8.86)	245 (9.65)	340 (13.39)	360 (14.17)	1.6 (0.06)	M8	12.5 (27.56)

(c) 400V: 50-75HP



Inverter Model	Dimensions in mm (inch)								
	W	H	D	W1	H1	H2	t	d	NW in kg(lbs)
RVFFD3403700F	284 (11.18)	679 (26.73)	252 (9.92)	220 (8.66)	505 (19.88)	525 (20.67)	1.6 (0.06)	M8	32.5 (71.65)
RVFFD3404500F	284 (11.18)	679 (26.73)	252 (9.92)	220 (8.66)	505 (19.88)	525 (20.67)	1.6 (0.06)	M8	32.5 (71.65)
RVFFD3405500F	284 (11.18)	679 (26.73)	252 (9.92)	220 (8.66)	505 (19.88)	525 (20.67)	1.6 (0.06)	M8	32.5 (71.65)

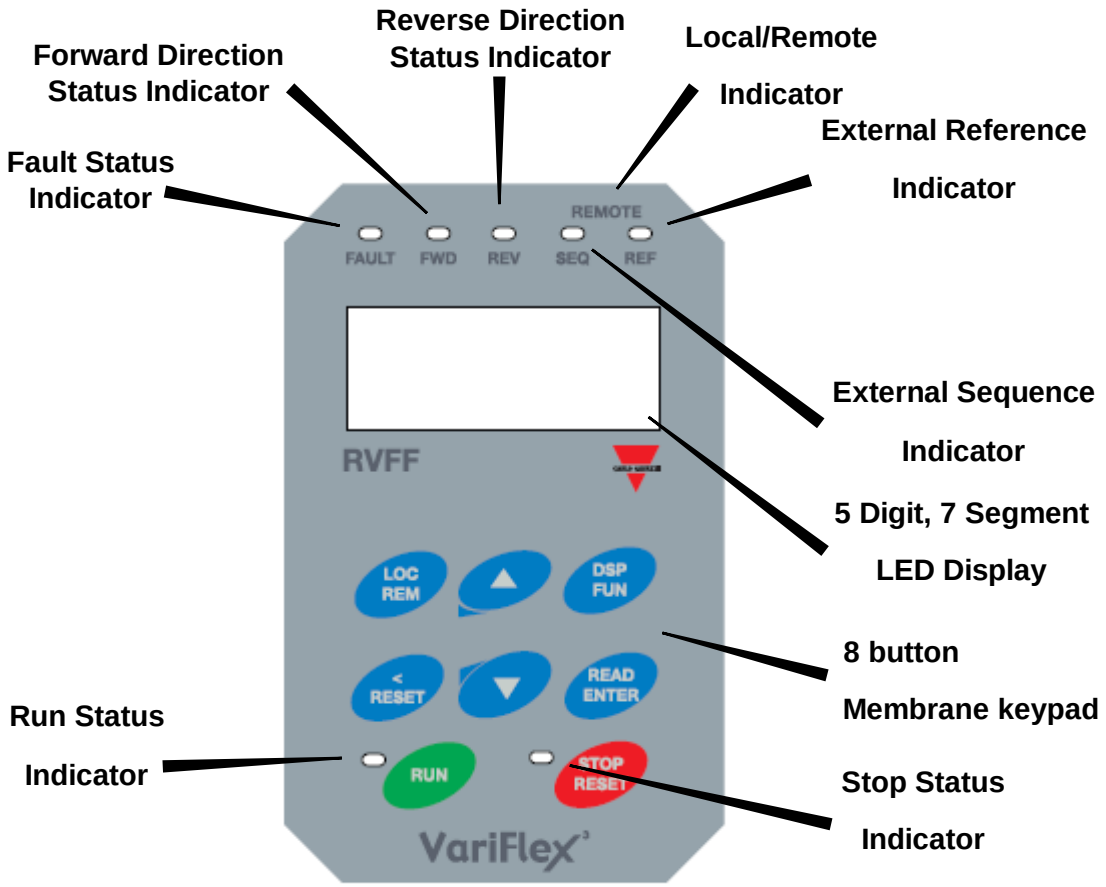
(d) 400V: 100-250HP



Inverter Model	Dimensions in mm (inch)							
	W	H	D	W1	H1	t	d	NW in kg(lbs)
RVFFE3407500	348.5 (13.72)	740 (29.13)	300 (11.81)	250 (9.84)	560 (22.05)	1.6 (0.06)	M10	44 (97.00)
RVFFE3409000	348.5 (13.72)	740 (29.13)	300 (11.81)	250 (9.84)	560 (22.05)	1.6 (0.06)	M10	44 (97.00)
RVFFF34011000	463.5 (18.25)	1105 (43.50)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	81 (178.57)
RVFFF34013200	463.5 (18.25)	1105 (43.50)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	81 (178.57)
RVFFF34016000	463.5 (18.25)	1105 (43.50)	324.5 (12.78)	320 (12.60)	760 (29.92)	1.6 (0.06)	M10	81 (178.57)

Chapter 4 Keypad and Programming Functions

4.1 LED Keypad



DISPLAY	Description
5 Digit LED Display	Monitor inverter signals, view/edit parameters, fault/alarm display.
LED INDICATORS	
FAULT	LED **ON** when a fault or alarm is active.
FWD	LED **ON** when inverter is running in forward direction, flashing when stopping.
REV	LED **On** when inverter is running in reverse direction, flashing when stopping.
SEQ	LED **ON** when RUN command is from the external control terminals or from serial communication.
REF	LED **ON** when frequency reference command is from the external control terminals or from serial communication.

KEYS (8)	Description
RUN	RUN inverter
STOP	STOP inverter
▲	Parameter navigation Up, increase parameter or reference value
▼	Parameter navigation down, decrease parameter or reference value
LOC/REM	Used to switch between local mode and remote mode REMOTE Mode: set by parameters, controlled by control circuit terminals, communication or other ways. LOCAL Mode: controlled by operator. It displays REMOTE Mode at power-up. Users can switch between LOCAL and REMOTE Mode if they press LOC/REM keys when the inverter stops. Parameter of 23-41 can determine if LOC/REM keys are enabled or not.
DSP/FUN	Used to scroll to next screen Frequency screen→Function selection→Monitor parameter
◄/RESET	Selects active seven segment digit for editing with the ▲▼ keys Used to reset fault condition.
READ/ENTER	Used to read and save the value of the active parameter.

Auto-Repeat Keys

Holding the ▲UP or ▼DOWN key for a longer period of time will initiate the auto-repeat function resulting in the value of the selected digit to automatically increase or decrease.

4.2 Programmable Parameter Groups

Parameter Group	Name
Group 00	Basic Parameters
Group 01	V/F Control Parameters
Group 02	IM Motor Parameters
Group 03	External Digital Input and Output Parameters
Group 04	External Analog Input and Output Parameters
Group 05	Multi-Speed Parameters
Group 06	Automatic Program Operation Parameters
Group 07	Start/Stop Parameters
Group 08	Protection Parameters
Group 09	Communication Parameters
Group 10	PID Parameters
Group 11	Auxiliary Parameters
Group 12	Monitoring Parameters
Group 13	Maintenance Parameters
Group 14	PLC Setting Parameters
Group 15	PLC Monitoring Parameters
Group 16	Reserved
Group 17	IM Motor Automatic Tuning Parameters
Group 18	Slip Compensation Parameters
Group 19	Reserved
Group 20	Speed Control Parameters
Group 21	Torque Control Parameters
Group 22	PM Motor Parameters
Group 23	Pump & HVAC
Group 24	1 to 8 Pump Card Function Group

Parameter Attribute	
*1	Parameters can be adjusted during running mode
*2	Cannot be modified in communication mode
*3	Does not change with factory reset
*4	Read only

Group 00 Basic Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM	
00-00	Control mode selection	0: V/F 1: Reserved 2: SLV 3~4: Reserved 5: PM SLV	0	-	O	O	O	*3
00-01	Motor's rotation direction	0: Forward 1: Reverse	0	-	O	O	O	*1
00-02	Main run command source selection	0: Keypad 1: External terminal (Control circuit) 2: Communication control (RS-485) 3: PLC 4: Reserved	0	-	O	O	O	
00-03	Alternative run command source selection	0: Keypad 1: External terminal (Control circuit) 2: Communication control (RS-485) 3: PLC 4: Reserved	2	-	O	O	O	
00-04	Reserved							
00-05	Main frequency command source selection	0: Keypad 1: External control (Analog) 2: Terminal command UP/DOWN 3: Communication control (RS-485) 4: Reserved 5: PID given 6: Reserved 7. AI2 AUX. Freq Ref	0	-	O	O	O	
00-06	Alternative frequency command source selection	0: Keypad 1: External control (Analog) 2: Terminal command UP/DOWN 3: Communication control (RS-485) 4: Reserved 5: PID 6: Reserved 7. AI2 AUX. Freq Ref	3	-	O	O	O	
00-07	Main and alternative frequency command modes	0: Main frequency 1: Main frequency + Alternative	0	-	O	O	O	
00-08	Communication frequency	0.00-400.00	0.00	Hz	O	O	O	
00-09	Frequency command memory mode	0: Do not save when power is off. 1: Save when power is off.	0	-	O	O	O	
00-10	Reserved							
00-11	PID frequency lower limit select	0: PID is restricted by 00-13 1: PID is gone down 0Hz	0	-	O	O	O	

Group 00 Basic Parameters								
Code	**Parameter Name**	**Setting Range**	**Default**	**Unit**	**Control Mode**			**Attribute**
					V/F	**SLV**	**PM**	
00-12	Frequency upper limit	0.1~109.0	100.0	%	O	O	O	
00-13	Frequency lower limit	0.0~109.0	0.0	%	O	O	O	
00-14	Acceleration time 1	0.1~6000.0	10.0	s	O	O	O	*1
00-15	Deceleration time 1	0.1~6000.0	10.0	s	O	O	O	*1
00-16	Acceleration time 2	0.1~6000.0	10.0	s	O	O	O	*1
00-17	Deceleration time 2	0.1~6000.0	10.0	s	O	O	O	*1
00-18	Jog frequency	0.00~400.00	6.00	Hz	O	O	O	*1
00-19	Jog acceleration time	0.1~600.0	10.0	s	O	O	O	*1
00-20	Jog deceleration time	0.1~600.0	10.0	s	O	O	O	*1
00-21	Acceleration time 3	0.1~6000.0	10.0	s	O	O	O	*1
00-22	Deceleration time 3	0.1~6000.0	10.0	s	O	O	O	*1
00-23	Acceleration time 4	0.1~6000.0	10.0	s	O	O	O	*1
00-24	Deceleration time 4	0.1~6000.0	10.0	s	O	O	O	*1
00-25	Switch frequency of acc/dec	0.0~400.0	0.0	Hz	O	O	O	
00-26	Emergency stop time	0.1~6000.0	5.0	s	O	O	O	
00-27	Reserved							
00-28	Master frequency command characteristic selection	0: Positive characteristic 1: Negative characteristic	0	-	O	O	O	
00-29 ~ 00-31	Reserved							
00-32	Application adjustment	0: Disable 1: Water supply pump 2: Reserved 3: Exhaust fan 4: HVAC 5: Reserved 6: Reserved 7: Reserved	0	-	O	O	O	
00-33	Modified parameters	0: Disable 1: Enable	0	-	O	O	O	
00-34 ~ 00-56	Reserved							

Group 01 V/F Control Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM	
01-00	V/F curve selection	0~FF	6	-	O	X	X	*3
01-01	Reserved							
01-02	Maximum output frequency	20.0~400.0	60.0	Hz	O	O	O	
01-03	Maximum output voltage	0.2~510.0	440.0	V	O	X	X	
01-04	Middle output frequency 2	0.0~400.0	0.0	Hz	O	X	X	
01-05	Middle output voltage 2	0.0~510.0	0.0	V	O	X	X	
01-06	Middle output frequency 1	0.0~400.0	30.0	Hz	O	X	X	
01-07	Middle output voltage 1	0.0~510.0	38.5	V	O	X	X	
01-08	Minimum output frequency	0.0~400.0	1.5	Hz	O	O	O	
01-09	Minimum output voltage	0.0~510.0	6.6	V	O	X	X	
01-10	Torque compensation gain	0.0~2.0	0.5	-	O	X	X	*1
01-11	Torque compensation mode	0: mode 0 1: mode 1	0	-	O	X	X	
01-12	Base frequency	10.0~400.0	60.0	Hz	O	O	O	
01-13	Base output voltage	0.0~510.0	440.0	V	O	X	X	
01-14	Input voltage setting	310.0~510.0	440.0	V	O	O	O	
01-15	Torque compensation time	0~10000	200	ms	O	X	X	

Group 02 IM Motor Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM	
02-00	No-Load current	0.01~600.00	2.49	A	O	X	X	
02-01	Rated current	V/F mode is 10%~200% of	6.8	A	O	O	X	
02-02	Reserved							
02-03	Rated rotation speed	0~60000	1745	Rpm	O	O	X	
02-04	Rated voltage	100.0~480.0	440.0	V	O	O	X	
02-05	Rated power	0.01~600.00	4.00	kW	O	O	X	
02-06	Rated frequency	10.0~400.0	60.0	Hz	O	O	X	
02-07	Poles	2~16 (Even)	4	-	O	O	X	
02-08	Reserved							
02-09	Excitation current	10.0~100.0	36.6	%	X	O	X	
02-10	Core saturation coefficient 1	1~100	44	%	X	O	X	
02-11	Core saturation coefficient 2	1~100	68	%	X	O	X	
02-12	Core saturation coefficient 3	80~300	192	%	X	O	X	
02-13	Core loss	0.0~15.0	5.6	%	O	X	X	
02-14	Reserved							
02-15	Resistance between wires	0.001~60.000	3.262	Ω	O	O	X	
02-16	Rotor resistance	0.001~60.000	1.014	Ω	X	O	X	
02-17	Leakage inductance	0.01~200.00	9.41	mH	X	O	X	
02-18	Mutual inductance	0.1~6553.5	228.0	mH	X	O	X	
02-19	No-Load voltage	100~480	400	V	X	O	X	

Group 02 IM Motor Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM	
02-20	Reserved							
02-33	Leakage inductance ratio	0.1~15.0	3.4	%	X	O	X	
02-34	Slip frequency	0.10~20.00	0.10	Hz	X	O	X	

Group 03 External Digital Input and Output Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM	
03-00	Multi-function terminal function setting-S1	0: 2-Wire sequence (Forward run command)	0	-	O	O	O	
		1: 2-Wire sequence (Reverse run command)		-	O	O	O	
		2: Multi-Speed setting command 1		-	O	O	O	
		3: Multi-Speed setting command 2		-	O	O	O	
		4: Multi-Speed setting command 3		-	O	O	O	
		5: Multi-Speed setting command 4		-	O	O	O	
		6: Forward jog run command		-	O	O	O	
		7: Reverse jog run command		-	O	O	O	
		8: UP frequency increasing command		-	O	O	O	
03-01	Multi-function terminal function setting-S2	9: DOWN frequency decreasing command	1	-	O	O	O	
		10: Acceleration/deceleration setting command 1		-	O	O	O	
		11: Inhibit acceleration/deceleration command		-	O	O	O	
		12: Main/Alternative run command switching		-	O	O	O	
		13: Main/Alternative run switch function		-	O	O	O	
		14: Emergency stop (Decelerate to zero and stop)		-	O	O	O	
03-02	Multi-function terminal function setting-S3	15: External baseblock command (Rotation freely to stop)	8	-	O	O	O	
		16: PID control disable		-	O	O	O	
		17: Fault reset (RESET)		-	O	O	O	
		18: Reserved		-	-	-	-	
		19: Speed search 1 (from the maximum frequency)		-	O	O	X	
		20: Manual energy saving function		-	O	X	X	
		21: PID integral reset		-	O	O	O	
		22~23: reserved		-	-	-	-	
		24: PLC input		-	O	O	O	

Group 03 External Digital Input and Output Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM	
03-03	Multi-function terminal function setting-S4	25: External fault	9	-	O	O	O	
		26: 3-Wire sequence		-	O	O	O	
		27: Local/Remote selection		-	O	O	O	
		28: Remote mode selection		-	O	O	O	
		29: Jog frequency selection		-	O	O	O	
		30: Acceleration/deceleration setting command 2		-	O	O	O	
		31: Inverter overheating warning		-	O	O	O	
		32: Reserved		-	-	-	-	
		33: DC braking		-	O	X	X	
		34: Speed search 2 (from the frequency command)		-	O	X	O	
03-04	Multi-function terminal function setting-S5		2	-				
		35: Timing function input		-	O	O	O	
		36: PID soft start disable		-				
		37~40: Reserved		-	-	-	-	
		41: PID sleep		-	O	O	O	
		42~46: reserved		-	-	-	-	
		47: Fire mode		-	O	O	O	
		48: KEB acceleration		-	O	X	X	
		49: Parameters writing allowable		-	O	O	O	
03-05	Multi-function terminal function setting-S6	50: Unattended start protection (USP)	17	-	O	O	O	
		51~52: Reserved		-	-	-	-	
		53: .B.B (Stop)		-	O	O	O	
		54: PID1/PID2 switching		-	O	O	O	
		55: Reserved		-	O	O	O	
		56: Reserved		-	O	O	O	
		57: Forced frequency operation		-	O	O	O	
		58: Safety function		-	O	O	O	
03-06 ~ 03-07	Reserved							
03-08	(S1~S6) DI scan time	0: Scan time 4ms 1: Scan time 8ms	1	-	O	O	O	
03-09	Multi-Function terminal (S1-S4 Selection)	xxx0b: S1 A contact xxx1b: S1 B contact	0000b	-	O	O	O	
		xx0xb: S2 A contact xx1xb: S2 B contact						
		x0xxb: S3 A contact x1xxb: S3 B contact						
		0xxxb: S4 A contact 1xxxb: S4 B contact						

Group 03 External Digital Input and Output Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM	
03-10	Multi-Function terminal (S5-S6 Selection)	xxx0b: S5 A contact xxx1b: S5 B contact	0000b	-	O	O	O	
		xx0xb: S6 A contact xx1xb: S6 B contact						
		x0xxb: Reserved x1xxb: Reserved						
		0xxxb: Reserved 1xxxb: Reserved						
03-11	Relay (R1A-R1C) output	0: During running	0	-	O	O	O	
		1: Fault contact output		-	O	O	O	
		2: Frequency agree		-	O	O	O	
		3: Setting frequency agree (03-13 ± 03-14)		-	O	O	O	
		4: Frequency detection 1 (> 03-13)		-	O	O	O	
		5: Frequency detection 2 (< 03-13)		-	O	O	O	
		6: Automatic restart		-	O	O	O	
		7~8: Reserved		-	-	-	-	
		9: Baseblock		-	O	O	O	
		10~11: Reserved		-	-	-	-	
		12: Over torque detected		-	O	O	O	
		13: Current agree		-				
		14: Mechanical brake control		-	O	O	O	
		15~17: Reserved		-	-	-	-	
		18: PLC status		-	O	O	O	
		19: PLC control contacts		-	O	O	O	
		20: Zero speed		-	O	O	O	
		21: Inverter ready		-	O	O	O	
		22: Undervoltage detection		-	O	O	O	
		23: Source of operation command		-	O	O	O	
03-12	Relay (R2A-R2C) output	24: Source of frequency command	0	-	O	O	O	
		25: Low torque detection		-	O	O	O	
		26: Frequency reference missing		-	O	O	O	
		27: Timing function output		-	O	O	O	
		28~31: Reserved		-	-	-	-	
		32: Communication control contacts		-	O	O	O	
		33: Reserved		-	O	O	O	
		34: Reserved		-	O	O	O	
		35: Reserved		-	O	O	O	
		36: Reserved		-	O	O	O	
		37: PID feedback loss		-	O	O	O	
		38: Brake release		-	X	O	X	
		39~41: Reserved		-	-	-	-	
		42: High PSI		-				
		43: Low PSI		-				

Group 03 External Digital Input and Output Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM	
		44: Fb PSI		-				
		45: PID sleep		-				
		46: Over GPM		-				
		47: Low GPM		-				
		48: Low Suction		-				
03-13	Frequency detection level	0.0~400.0	0.0	Hz	O	O	O	
03-14	Frequency detection width	0.1~25.5	2.0	Hz	O	O	O	
03-15	Current agree level	0.1~999.9	0.1	A	O	O	O	
03-16	Current agree detection	0.1~10.0	0.1	s	X	O	X	
03-17	Mechanical brake release	0.00~20.00	0.00	Hz				
03-18	Mechanical brake engages	0.00~20.00	0.00	Hz				
03-19	Relay (R1A-R3C) type	xxx0b: R1 A contact xxx1b: R1 B contact	0000b	-	O	O	O	
		xx0xb: R2 A contact xx1xb: R2 B contact						
		x0xxb: R3 A contact x1xxb: R3 B contact						
03-20	Reserved							
03-27	UP/DOWN Frequency hold/Adjust selection	0: Maintain UP/DOWN frequency when stopping	0	-	O	O	O	
		1: Clear UP/DOWN frequency when stopping						
		2: Allow frequency UP/DOWN when stopping						
		3: Hold UP/DOWN freq. using UP/DOWN when acceleration						
03-28 ~ 03-29	Reserved							
03-30	Pulse input selection	0: Normal mode	0	-	O	O	O	
		1: PWM mode						
03-31	Scale of pulse input	50~32000	1000	Hz	O	O	O	*1
03-32	Gain of pulse input	0.0~1000.0	100	%	O	O	O	*1
03-33	Bias voltage of pulse input	-100.0~100.0	0.0	%	O	O	O	*1
03-34	Filter time of pulse input	0.00~2.00	0.10	S	O	O	O	*1
03-35 ~ 03-36	Reserved							
03-37	Timer ON delay (DI/DO)	0.0~6000.0	0.0	s	O	O	O	
03-38	Timer OFF delay (DI/DO)	0.0~6000.0	0.0	s	O	O	O	
03-39	Relay (R3A-R3C) output	Setting range and definition are the same as those of 03-11 and 03-12.	20	-	O	O	O	
03-40	Up/Down frequency width	0.00~5.00	0.00	Hz	O	O	O	
03-41	Torque detect level	0~300	10	%	X	O	X	
03-42	Brake delay time	0.00~65.00	0.00	s	X	O	X	
03-43	UP/DOWN acc/dec select	0: Acc/Dec 1	0	-				
		1: Acc/Dec 2						

Group 04 External Analog Input and Output Parameters

Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM	
04-00	AI Input signal type	0: AI2: 0~10V/0~20mA 1: AI2: 4~20mA/2~10V	1	-	O	O	O	
04-01	AI1 Signal scanning and	0.00~2.00	0.03	s	O	O	O	
04-02	AI1 Gain	0.0~1000.0	100.0	%	O	O	O	*1
04-03	AI1 Bias	-100.0~100.0	0	%	O	O	O	*1
04-04	Reserved							
04-05	AI2 Function setting	0: Auxiliary frequency	0	-	O	O	O	
		1: Frequency reference gain			O	O	O	
		2: Frequency reference bias			O	O	O	
		3: Output voltage bias			O	X	O	
		4: Accel/Decel Time Scaling			O	O	O	
		5: DC Injection Braking current			O	O	X	
		6: Over-Torque detection level			O	O	O	
		7: Stall prevention level during running			O	X	X	
		8: Frequency reference lower bound			O	O	O	
		9: Jump frequency setting 4			O	O	O	
		10: Added to AI1			O	O	O	
		11: Positive torque limit			X	O	O	
		12: Negative torque limit			X	O	O	
		13: Regenerative torque limit			X	O	O	
		14: Positive/Negative torque limit			X	O	O	
		15: Terf/Tq Limit			-	-	-	
		16: Torque limit (in speed control)			X	O	X	
		17: Reserved			-	-	-	
04-06	AI2 Signal scanning and filtering time	0.00~2.00	0.03	s	O	O	O	
04-07	AI2 Gain	0.0~1000.0	100.0	%	O	O	O	*1
04-08	AI2 Bias	-100.0~100.0	0	%	O	O	O	*1
04-09	Reserved							
04-11	AO1 Function setting	0: Output frequency	0	-	O	O	O	
		1: Frequency command			O	O	O	
		2: Output voltage			O	O	O	
		3: DC voltage			O	O	O	
		4: Output current			O	O	O	
		5: Output power			O	O	O	
		6: Motor speed			O	O	O	
		7: Output power factor			O	O	O	
		8: AI1 Input			O	O	O	
		9: AI2 Input			O	O	O	
		10: Torque command			X	O	O	
		11: Current Iq			X	O	O	
		12: Current Id			X	O	O	
		13: Speed deviation			X	X	O	

Group 04 External Analog Input and Output Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM	
		14: Reserved			-	-	-	
		15: ASR output			X	X	O	
		16: Reserved			-	-	-	
		17: Voltage Ref Vq			X	O	O	
		18: Voltage Ref Vd			X	O	O	
		19~20: Reserved			-	-	-	
		21: PID input			O	O	O	
		22: PID output			O	O	O	
		23: PID setpoint			O	O	O	
		24: PID feedback			O	O	O	
		25: Output frequency (SFS)			O	O	O	
		26: PG feedback			-	-	-	
		27: PG compensation			-	-	-	
		28: Communication control			O	O	O	
04-12	AO1 Gain	0.0~1000.0	100.0	%	O	O	O	*1
04-13	AO1 Bias	-100.0~100.0	0	%	O	O	O	*1
04-14 ~ 04-15	Reserved							
04-16	AO2 Function setting	Setting range and definition are the same as 04-11	3	-	O	O	O	
04-17	AO2 Gain	0.0~1000.0	100.0	%	O	O	O	*1
04-18	AO2 Bias	-100.0~100.0	0	%	O	O	O	*1
04-19	AO Output signal	0: AO1:0~10V AO2:0~10V	0		O	O	O	
		1: AO1:0~10V AO2:4~20mA						
		2: AO1:4~20mA AO2:0~10V						
		3: AO1:4~20mA AO2: 4~20mA						
04-20	AO signal scanning and	0.00~0.50	0.00	s	O	O	O	*1

Group 05 Multi-Speed Function Group								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM	
05-00	Acceleration and deceleration selection of Multi-Speed	0: Acceleration and deceleration time are set by 1~4	0	-	O	O	O	
		1: Acceleration and deceleration time setting respectively						
05-01	Frequency setting of Speed-Stage 0	0.00~400.00	5.00	Hz	O	O	O	*1
05-02	Frequency setting of Speed-Stage 1	0.00~400.00	5.00	Hz	O	O	O	
05-03	Frequency setting of Speed-Stage 2	0.00~400.00	10.00	Hz	O	O	O	
05-04	Frequency setting of Speed-Stage 3	0.00~400.00	20.00	Hz	O	O	O	

Group 05 Multi-Speed Function Group								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM	
05-05	Frequency setting of Speed-Stage 4	0.00~400.00	30.00	Hz	O	O	O	
05-06	Frequency setting of Speed-Stage 5	0.00~400.00	40.00	Hz	O	O	O	
05-07	Frequency setting of Speed-Stage 6	0.00~400.00	50.00	Hz	O	O	O	
05-08	Frequency setting of Speed-Stage 7	0.00~400.00	50.00	Hz	O	O	O	
05-09	Frequency setting of Speed-Stage 8	0.00~400.00	5.00	Hz	O	O	O	
05-10	Frequency setting of Speed-Stage 9	0.00~400.00	5.00	Hz	O	O	O	
05-11	Frequency setting of Speed-Stage 10	0.00~400.00	5.00	Hz	O	O	O	
05-12	Frequency setting of Speed-Stage 11	0.00~400.00	5.00	Hz	O	O	O	
05-13	Frequency setting of Speed-Stage 12	0.00~400.00	5.00	Hz	O	O	O	
05-14	Frequency setting of Speed-Stage 13	0.00~400.00	5.00	Hz	O	O	O	
05-15	Frequency setting of Speed-Stage 14	0.00~400.00	5.00	Hz	O	O	O	
05-16	Frequency setting of Speed-Stage 15	0.00~400.00	5.00	Hz	O	O	O	
05-17	Acceleration time setting of multi speed 0	0.1~6000.0	10.0	s	O	O	O	
05-18	Deceleration time setting of multi Speed 0	0.1~6000.0	10.0	s	O	O	O	
05-19	Acceleration time setting of multi speed 1	0.1~6000.0	10.0	s	O	O	O	
05-20	Deceleration time setting of multi speed 1	0.1~6000.0	10.0	s	O	O	O	
05-21	Acceleration time setting of multi speed 2	0.1~6000.0	10.0	s	O	O	O	
05-22	Deceleration time setting of multi speed 2	0.1~6000.0	10.0	s	O	O	O	
05-23	Acceleration time setting of multi speed 3	0.1~6000.0	10.0	s	O	O	O	
05-24	Deceleration time setting of multi speed 3	0.1~6000.0	10.0	s	O	O	O	
05-25	Acceleration time setting of multi speed 4	0.1~6000.0	10.0	s	O	O	O	
05-26	Deceleration time setting of multi speed 4	0.1~6000.0	10.0	s	O	O	O	

Group 05 Multi-Speed Function Group								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM	
05-27	Acceleration time setting of multi speed 5	0.1~6000.0	10.0	s	O	O	O	
05-28	Deceleration time setting of multi speed 5	0.1~6000.0	10.0	s	O	O	O	
05-29	Acceleration time setting of multi speed 6	0.1~6000.0	10.0	s	O	O	O	
05-30	Deceleration time setting of multi speed 6	0.1~6000.0	10.0	s	O	O	O	
05-31	Acceleration time setting of multi speed 7	0.1~6000.0	10.0	s	O	O	O	
05-32	Deceleration time setting of multi speed 7	0.1~6000.0	10.0	s	O	O	O	
05-33	Acceleration time setting of multi speed 8	0.1~6000.0	10.0	s	O	O	O	
05-34	Deceleration time setting of multi speed 8	0.1~6000.0	10.0	s	O	O	O	
05-35	Acceleration Time Setting of Multi Speed 9	0.1~6000.0	10.0	s	O	O	O	
05-36	Deceleration time setting of multi speed 9	0.1~6000.0	10.0	s	O	O	O	
05-37	Acceleration time setting of multi speed 10	0.1~6000.0	10.0	s	O	O	O	
05-38	Deceleration time setting of multi speed 10	0.1~6000.0	10.0	s	O	O	O	
05-39	Acceleration time setting of multi speed 11	0.1~6000.0	10.0	s	O	O	O	
05-40	Deceleration time setting of multi speed 11	0.1~6000.0	10.0	s	O	O	O	
05-41	Acceleration time setting of multi speed 12	0.1~6000.0	10.0	s	O	O	O	
05-42	Deceleration time setting of multi speed 12	0.1~6000.0	10.0	s	O	O	O	
05-43	Acceleration time setting of multi speed 13	0.1~6000.0	10.0	s	O	O	O	
05-44	Deceleration time setting of multi speed 13	0.1~6000.0	10.0	s	O	O	O	
05-45	Acceleration time setting of Multi speed 14	0.1~6000.0	10.0	s	O	O	O	
05-46	Deceleration time setting of multi speed 14	0.1~6000.0	10.0	s	O	O	O	
05-47	Acceleration time setting of multi speed 15	0.1~6000.0	10.0	s	O	O	O	
05-48	Deceleration time setting of multi speed 15	0.1~6000.0	10.0	s	O	O	O	

Group 06 Automatic Program Operation Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM	
06-00	Automatic operation mode selection	0: Disable 1: Single cycle operation. Restart based on the previous stopped speed. 2: Continuous cycle operation. Restart based on the previous stopped speed. 3: The on-going operation based on the speed of the last stage. Restart based on the previous stopped speed. 4: Single cycle operation. Restart based on the speed of stage 1. 5: Continuous cycle operation mode. Restart based on the speed of stage 1. 6: The on-going operation based on the speed of the last stage. Restart based on the speed of stage 1.	0	-	O	O	X	
06-01	Run freq. setting of speed-stage 1	0.00~400.00	5.00	Hz	O	O	O	*1
06-02	Run freq. setting of speed-stage 2	0.00~400.00	10.00	Hz	O	O	O	*1
06-03	Run freq. setting of speed-stage 3	0.00~400.00	20.00	Hz	O	O	O	*1
06-04	Run freq. setting of speed-stage 4	0.00~400.00	30.00	Hz	O	O	O	*1
06-05	Run freq. setting of speed-stage 5	0.00~400.00	40.00	Hz	O	O	O	*1
06-06	Run freq. setting of speed-stage 6	0.00~400.00	50.00	Hz	O	O	O	*1
06-07	Run freq. setting of speed-stage 7	0.00~400.00	50.00	Hz	O	O	O	*1
06-08	Run freq. setting of speed-stage 8	0.00~400.00	5.00	Hz	O	O	O	*1
06-09	Run freq. setting of speed-stage 9	0.00~400.00	5.00	Hz	O	O	O	*1
06-10	Run freq. setting of speed-stage 10	0.00~400.00	5.00	Hz	O	O	O	*1
06-11	Run freq. setting of speed-stage 11	0.00~400.00	5.00	Hz	O	O	O	*1
06-12	Run freq. setting of speed-stage 12	0.00~400.00	5.00	Hz	O	O	O	*1

Group 06 Automatic Program Operation Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM	
06-13	Run freq. setting of speed-stage 13	0.00~400.00	5.00	Hz	O	O	O	*1
06-14	Run freq. setting of speed-stage 14	0.00~400.00	5.00	Hz	O	O	O	*1
06-15	Run freq. setting of speed-stage 15	0.00~400.00	5.00	Hz	O	O	O	*1
06-16	Operation time setting of speed-stage 0	0.0~6000.0	0.0	s	O	O	X	*1
06-17	Operation time setting of speed-stage 1	0.0~6000.0	0.0	s	O	O	X	*1
06-18	Operation time setting of speed-stage 2	0.0~6000.0	0.0	s	O	O	X	*1
06-19	Operation time setting of speed-stage 3	0.0~6000.0	0.0	s	O	O	X	*1
06-20	Operation time setting of speed-stage 4	0.0~6000.0	0.0	s	O	O	X	*1
06-21	Operation time setting of speed-stage 5	0.0~6000.0	0.0	s	O	O	X	*1
06-22	Operation time setting of speed-stage 6	0.0~6000.0	0.0	s	O	O	X	*1
06-23	Operation time setting of speed-stage 7	0.0~6000.0	0.0	s	O	O	X	*1
06-24	Operation time setting of speed-stage 8	0.0~6000.0	0.0	s	O	O	X	*1
06-25	Operation time setting of speed-stage 9	0.0~6000.0	0.0	s	O	O	X	*1
06-26	Operation time setting of speed-stage 10	0.0~6000.0	0.0	s	O	O	X	*1
06-27	Operation time setting of speed-stage 11	0.0~6000.0	0.0	s	O	O	X	*1
06-28	Operation time setting of speed-stage 12	0.0~6000.0	0.0	s	O	O	X	*1
06-29	Operation time setting of speed-stage 13	0.0~6000.0	0.0	s	O	O	X	*1
06-30	Operation time setting of speed-stage 14	0.0~6000.0	0.0	s	O	O	X	*1
06-31	Operation time setting of speed-stage 15	0.0~6000.0	0.0	s	O	O	X	*1
06-32	Operation direction selection of speed-stage 0	0: Stop 1: Forward 2: Reverse	0	-	O	O	X	
06-33	Operation direction selection of speed-stage 1	0: Stop 1: Forward 2: Reverse	0	-	O	O	X	
06-34	Operation direction selection of speed-stage 2	0: Stop 1: Forward 2: Reverse	0	-	O	O	X	

Group 06 Automatic Program Operation Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM	
06-35	Operation direction selection of speed-stage 3	0: Stop 1: Forward 2: Reverse	0	-	O	O	X	
06-36	Operation direction selection of speed-stage 4	0: Stop 1: Forward 2: Reverse	0	-	O	O	X	
06-37	Operation direction selection of speed-stage 5	0: Stop 1: Forward 2: Reverse	0	-	O	O	X	
06-38	Operation direction selection of speed-stage 6	0: Stop 1: Forward 2: Reverse	0	-	O	O	X	
06-39	Operation direction selection of speed-stage 7	0: Stop 1: Forward 2: Reverse	0	-	O	O	X	
06-40	Operation direction selection of speed-stage 8	0: Stop 1: Forward 2: Reverse	0	-	O	O	X	
06-41	Operation direction selection of speed-stage 9	0: Stop 1: Forward 2: Reverse	0	-	O	O	X	
06-42	Operation direction selection of speed-stage 10	0: Stop 1: Forward 2: Reverse	0	-	O	O	X	
06-43	Operation direction selection of speed-stage 11	0: Stop 1: Forward 2: Reverse	0	-	O	O	X	
06-44	Operation direction selection of speed-stage 12	0: Stop 1: Forward 2: Reverse	0	-	O	O	X	
06-45	Operation direction selection of speed-stage 13	0: Stop 1: Forward 2: Reverse	0	-	O	O	X	
06-46	Operation direction selection of speed-stage 14	0: Stop 1: Forward 2: Reverse	0	-	O	O	X	
06-47	Operation direction selection of speed-stage 15	0: Stop 1: Forward 2: Reverse	0	-	O	O	X	

Group 07 Start /Stop Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM	
07-00	Momentary stop and restart selection	0: Disable 1: Enable	0	-	O	O	O	
07-01	Restart time of automatic reset	0~7200	0	s	O	O	O	
07-02	Times of automatic reset	0~10	0	-	O	O	O	
07-03	Reserved							
07-04	Direct running after power up	0: Enable direct running after power up 1: Disable direct running after power up	1	-	O	O	O	
07-05	Direct starting delay-on timer after power up	1.0~300.0	1.5	S	O	O	O	
07-06	DC Injection braking starting frequency	0.0~10.0	0.5	Hz	O	O	X	

Group 07 Start /Stop Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM	
07-07	DC Injection braking current	0~100	50	%	O	O	X	
07-08	DC Injection braking time at stop	0.00~10.00	0.50	s	O	O	X	
07-09	Stop mode selection	0: Deceleration to stop 1: Coast to stop 2: DC Braking stop in all fields 3: Coast to stop with timer	0	-	O	O	O	
07-10 ~ 07-12	Reserved							
07-13	Low voltage detection level	300~600	380	V	O	O	O	
07-14	Pre-excitation time	0.00~10.00	2.00	s	X	O	X	
07-15	Pre-excitation level	100~200	100	%	X	O	X	
07-16	DC Injection braking time at start	0.00~100.00	0.00	s	O	O	X	
07-17	Reserved							
07-18	Minimum base block time	0.1~5.0	1.4	S	O	O	O	
07-19	Speed direction search operating current	0~100	50	%	O	O	X	
07-20	Speed search operating current	0~100	20	%	O	O	X	
07-21	Integral time of speed searching	0.1~10.0	2.0	S	O	O	X	
07-22	Delay time of speed searching	0.0~20.0	0.2	S	O	O	X	
07-23	Voltage recovery time	0.1~5.0	2.0	S	O	O	X	
07-24	Bidirection speed search selection	0: Disable 1: Enable	0	-	O	O	X	
07-25	Low voltage detection time	0.00~1.00	0.02	S	O	O	O	
07-26	Mechanical braking selection	0: Disable 1: Enable	0	-	X	O	X	
07-27	Start selection after fault during SLV mode	0: Start with speed search 1: Normal start	0	-	X	O	O	
07-28	Start after external base block	0: Start with speed search 1: Normal start	0	-	O	O	X	
07-29	Run command select when DC braking	0: Don't allow to start when proceeding 1: Allow to start when proceeding	0	-				

Group 08 Protection Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
08-00	Stall prevention function	xxx0b: Enable in acc. xxx1b: Disable in acc. xx0xb: Enable in dec. xx1xb: Disable in dec. x0xxb: Enable in operation x1xxb: Disable in operation 0xxxb: Dec time 1 1xxxb: Dec time 2	0000b	-	O	O	O	
08-01	Stall prevention level in acceleration	20~200	120	%	O	O	O	
08-02	Stall prevention level in deceleration	660~820	790	V	O	O	O	
08-03	Stall prevention level in operation	30~200	120	%	O	O	O	
08-04	Reserved							
08-05	Motor overload protection selection	xxx0b: Disable xxx1b: Enable xx0xb: Cold start xx1xb: Hot start x0xxb: Standard motor x1xxb: Inverter motor 0xxxb: Reserved 1xxxb: Reserved	0001b	-	O	O	O	
08-06	Start-up mode of overload protection operation	0: Stop output 1: Continuous operation	0	-	O	O	O	
08-07	Reserved							
08-08	Automatic voltage regulation (AVR)	0: Enable 1: Disable	0	-	O	O	O	
08-09	Selection of input phase loss protection	0: Disable 1: Enable	0	-	O	O	O	
08-10	Selection of output phase loss protection	0: Disable 1: Enable	0	-	O	O	O	
08-11 ~ 08-12	Reserved							
08-13	Selection of over-torque detection	0: Disable 1: Start to detect when reaching the set frequency 2: Start to detect when the operation is begun	0	-	O	O	O	
08-14	Selection of over-torque operation	0: Deceleration to stop 1: Display warning when over-torque is detected. Go on operation. 2: Coast to stop when over torque is detected	0	-	O	O	O	
08-15	Level of over-torque detection	0~300	150	%	O	O	O	
08-16	Time of over-torque detection	0.0~10.0	0.1	S	O	O	O	
08-17	Selection of low-torque detection	0: Disable 1: Start to detect when reaching the set frequency.	0	-	O	O	O	

Group 08 Protection Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
		2: Start to detect when the operation is begun.						
08-18	Selection of low-torque operation	0: Deceleration to stop 1: Display warning when low-torque is detected. Go on operation. 2: Coast to stop when low-torque is detected	0	-	O	O	O	
08-19	Level of low-torque detection	0~300	30	%	O	O	O	
08-20	Time of low-torque detection	0.0~10.0	0.1	S	O	O	O	
08-21	Limit of stall prevention in acceleration	1~100	50	%	O	O	O	
08-22	Stall prevention detection time in operation	2~100	100	ms	O	O	O	
08-23	Ground fault (GF) selection	0: Disable 1: Enable	0	-	O	O	O	
08-24	External fault operation selection	0: Deceleration to stop 1: Coast to stop 2: Continuous operation	0	-	O	O	O	
08-25	Detection selection of external fault	0: Immediately detect when the power is supplied. 1: Start to detect when the operation is started	0	-	O	O	O	
08-26 ~ 08-29	Reserved							
08-30	Safety function selection	0: Deceleration to stop 1: Coast to stop	0	-	O	O	O	
08-31 ~ 08-34	Reserved							
08-35	Motor overheat selection	0: Disable 1: Deceleration to stop 2: Coast to stop	0	-	O	O	O	
08-36	PTC input filter time	0.00~5.00	2.00	S	O	O	O	
08-37	Fan control selection	0: On when the inverter is running 1: Always on 2: On when the heatsink temperature is high*	0	-	O	O	O	
08-38	Fan delay time	0~600	60	S	O	O	O	
08-39	Motor overheat protection delay time	1~300	60	S	O	O	O	

*** Models of inverter ratings above RVFFD3403700F do not have this function.**

Group 09 Communication Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
09-00	INV communication station address	1~31	1	-	O	O	O	*2
09-01	Communication mode selection	0: MODBUS 1: BACNET 2: METASYS 3: PUMP in parallel connection 4: PROFIBUS	0	-	O	O	O	
09-02	Baud rate setting (bps)	0:1200 1:2400 2:4800 3:9600 4:19200 5:38400	3	-	O	O	O	*2
09-03	Stop bit selection	0:1 Stop bit 1: 2 Stop bit	0	-	O	O	O	*2
09-04	Parity selection	0: No parity 1: Even bit 2: Odd bit	0	-	O	O	O	*2
09-05	Data bit selection	0: 8 data bits	0	-	O	O	O	
09-06	Communication error detection time	0.0~25.5	0.0	S	O	O	O	
09-07	Fault stop selection	0: Deceleration to stop based on deceleration time 1 when communication fault occurs. 1: Coast to stop when communication fault occurs. 2: Deceleration to stop based on deceleration time 2 when communication fault occurs. 3: Keep operating when communication fault occurs.	3	-	O	O	O	
09-08	Comm. fault tolerance count	1~20	1	-	O	O	O	
09-09	Waiting time	5~65	5	ms	O	O	O	
09-10	Device instance number	1~254	0	-	O	O	O	

Group 10 PID Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
10-00	PID target value source setting	0: Keypad (for PUMP or HVAC mode) 1: AI1 2: AI2 3: Reserved 4:10-02 5: Reserved 6: Frequency command (00-05)	1	-	O	O	O	
10-01	PID feedback value source setting	1:AI1 2:AI2	2	-	O	O	O	

Group 10 PID Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
		3: Reserved						
10-02	PID Target value	0.0~100.0	0.0	%	O	O	O	
10-03	PID Control mode	xxx0b: PID Disable xxx1b: PID Enable xx0xb: PID Positive characteristic xx1xb: PID Negative characteristic x0xxb: PID Error value of D control x1xxb: PID Feedback value of D control 0xxxb: PID Output 1xxxb: PID Output + Target value	0000b	-	O	O	O	
10-04	Feedback gain	0.01~10.00	1.00	-	O	O	O	*1
10-05	Proportional gain (P)	0.00~10.00	3.00	-	O	O	O	*1
10-06	Integral time (I)	0.00~100.00	0.50	s	O	O	O	*1
10-07	Differential time (D)	0.00~10.00	0.00	s	O	O	O	*1
10-08	Reserved							
10-09	PID Bias voltage	-100.0~100.0	0	%	O	O	O	*1
10-10	PID primary delay time	0.00~10.00	0.00	s	O	O	O	*1
10-11	PID feedback loss detection selection	0: Disable 1: Alarm 2: Fault	0	-	O	O	O	
10-12	PID feedback loss detection Level	0~100	0	%	O	O	O	
10-13	PID feedback loss detection time	0.0~10.0	1.0	s	O	O	O	
10-14	PID Integral limit	0.0~100.0	100.0	%	O	O	O	*1
10-15 ~ 10-16	Reserved							
10-17	Start frequency of PID sleep	0.00~180.00	30.00	Hz	O	O	O	
10-18	Delay time of PID sleep	0.0~255.5	0.0	s	O	O	O	
10-19	Frequency of PID waking up	0.00~180.00	0.00	Hz	O	O	O	
10-20	Delay time of PID waking up	0.0~255.5	0.0	s	O	O	O	
10-21 ~ 10-22	Reserved							
10-23	PID Limit	0.00~100.0	100.0	%	O	O	O	*1
10-24	PID Output gain	0.0~25.0	1.0	-	O	O	O	
10-25	PID Reversal output selection	0: No allowing reversal output 1: Allow reversal output	0	-	O	O	O	
10-26	PID target acceleration/ deceleration time	0.0~25.5	0.0	s	O	O	O	
10-27	PID Feedback display bias	-99.99~99.99	0.00	-	O	O	O	
10-28	PID Feedback display gain	0.00~100.00	100.00	-	O	O	O	
10-29	PID Sleep selection	0: Disable 1: Enable 2: Set by DI	1	-	O	O	O	
10-30	PID target upper limit	0.0 ~ 100.0	100.0	%	O	O	O	
10-31	PID target lower limit	0.0 ~ 100.0	0.0	%	O	O	O	
10-32	PID switching selection	0: PID1 1: PID2 2: Set by DI	0		O	O	O	

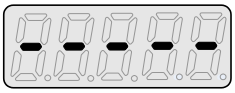
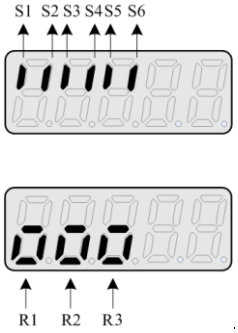
Group 10 PID Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
		3: Reserved						
10-33	PID feedback max.	1~10000	999	-	O	O	O	
10-34	PID decimal width	0~4	1	-	O	O	O	
10-35	PID Unit	0: %	21	-	O	O	O	
		1: FPM						
		2: CFM						
		3: PSI						
		4: GPH						
		5: GPM						
		6: IN						
		7: FT						
		8: /s						
		9: /m						
		10: /h						
		11: °F						
		12: W						
		13: HP						
		14: m/s						
		15: MPM						
		16: CMM						
		17: W						
		18: KW						
		19: m						
		20: °C						
		21: RPM						
		22: Bar						
		23: Pa						
10-36	PID2 Proportional gain (P)	0.00~10.00	3.00	-	O	O	O	*1
10-37	PID2 Integral time (I)	0.0~100.0	0.50	s	O	O	O	*1
10-38	PID2 Differential time (D)	0.00~10.00	0.00	s	O	O	O	*1
10-39	PID loss output frequency set	00.00~650.00	30.00	Hz	O	O	O	
10-40	PID sleep compensation frequency select	0: Disable						
		1: Enable						
10-41	PID mode switch	0: Normal PID						
		1: D Type PID						

Group 11 Auxiliary Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
11-00	Motor direction lock selection	0: Allow forward and reverse rotation	1	-	O	O	O	
		1: Only allow forward rotation						
		2: Only allow reverse rotation						
11-01	Carrier frequency	0: Carrier output frequency tuning	Inverter KVA*a	-	O	O	X	
		1: Reserved						
		2~16: 2~16KHz						

Group 11 Auxiliary Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
11-02	Soft PWM function selection	0: Disable 1: Enable	1*b	-	O	O	O	
11-03	Automatic carrier lowering selection	0: Disable 1: Enable	0	-	O	X	X	
11-04	S-curve time setting at the start of acceleration	0.00~2.50	0.20	s	O	O	O	
11-05	S-curve time setting at the end of acceleration	0.00~2.50	0.20	s	O	O	O	
11-06	S-curve time setting at the start of deceleration	0.00~2.50	0.20	s	O	O	O	
11-07	S-curve time setting at the end of deceleration	0.00~2.50	0.20	s	O	O	O	
11-08	Jump frequency 1	0.0~400.0 (according to 01-02)	0.0	Hz	O	O	O	
11-09	Jump frequency 2	0.0~400.0 (according to 01-02)	0.0	Hz	O	O	O	
11-10	Jump frequency 3	0.0~400.0 (according to 01-02)	0.0	Hz	O	O	O	
11-11	Jump frequency width	0.0~25.5	1.0	Hz	O	O	O	
11-12	Manual energy saving gain	0~100	80	%	O	X	X	
11-13	Auto back time	0~120	60	S	O	O	O	
11-14 ~ 11-17	Reserved							
11-18	Manual energy saving frequency	0.0~400.00	0.00	Hz	O	X	X	
11-19	Automatic energy saving function	0: Automatic energy saving is disabled 1: Automatic energy saving is enabled	0	-	O	X	X	
11-20	Filter time of automatic energy saving	0~200	140	ms	O	X	X	
11-21	Voltage upper limit of energy saving tuning	0~100	100	%	O	X	X	
11-22	Adjustment time of automatic energy saving	0~5000	20	ms	O	X	X	*1
11-23	Detection level of automatic energy saving	0~100	10	%	O	X	X	
11-24	Coefficient of automatic energy saving	0.00~655.35	KVA*a	-	O	X	X	
11-25 ~ 11-28	Reserved							
11-29	Auto de-rating selection	0: Disable 1: Enable	0	-	O	X	X	
11-30	Variable carrier frequency max. limit	2~16	KVA*a	KHz	O	X	X	
11-31	Variable carrier frequency min. limit	2~16	KVA*a	KHz	O	X	X	
11-32	Variable carrier frequency proportional gain	00~99	00	-	O	X	X	
11-33 ~ 11-40	Reserved							

Group 11 Auxiliary Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
11-41	Detecting the disappearance of reference frequency selection	0: Deceleration to stop when reference frequency disappears 1: Operation is set by 11-42 when reference frequency disappears	0	-	O	O	O	
11-42	Disappearance level of reference frequency	0.0~100.0	80.0	%	O	O	O	
11-43	Hold frequency at start	0.0~400.0	0.0	Hz	O	O	O	
11-44	Frequency hold time at start	0.0~10.0	0.0	s	O	O	O	
11-45	Hold frequency at stop	0.0~400.0	0.0	Hz	O	O	O	
11-46	Frequency hold time at stop	0.0~10.0	0.0	s	O	O	O	
11-47	KEB Deceleration time	0.0~25.5	0.0	s	O	X	X	*1
11-48	KEB Detection level	380~420	400	V	O	X	X	
11-49 ~ 11-50	Reserved							
11-51	Braking selection of zero speed	0: Disable 1: Enable	0	-	O	X	X	
11-52 ~ 11-53	Reserved							
11-54	Accumulate energy initialisation	0: Do not clear cumulative energy 1: Clear cumulative energy	0	-	O	O	O	*1
11-55	STOP Key selection	0: Stop key is disabled when the operation command is not provided by keypad. 1: Stop key is enabled when the operation command is not provided by keypad.	1	-	O	O	O	
11-56	UP/DOWN Selection	0: When UP/DOWN in keypad is disabled, it will be enabled if press ENTER after frequency modification. 1: When UP/DOWN in keypad is enabled, it will be enabled after frequency modification.	0	-	O	O	O	
11-57	Reserved							
11-58	Record reference frequency	0: Disable 1: Enable	0	-	O	O	O	*1
11-59	Anti_hunt gain	0.01~2.50	0.01		O	X	X	
11-60	Anti_hunt upper limit	0~100	30	%	O	X	X	
11-61	Anti_hunt time parameter	0~100	0	-	O	X	X	
11-62	Anti_hunt type select	0: Mode 1 1: Mode 2	1	-	O	X	X	
11-63	Strong magnetic select	0: Disable 1: Enable	1	-				

***a: KVA means the default value of this parameter will be changed by different capacities of inverter.**
***b: Default value is 1 only for V/F mode.**

Group 12 Monitoring Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
12-00	Display screen selection	00000~77777 From the leftmost bit, it displays the screen when press DSP key in order. 0: No display 1: Output current 2: Output voltage 3: DC Bus voltage 4: Heatsink temperature 5: PID Feedback 6: AI1 input 7: AI2 input	00000	-	O	O	O	
12-01	PID feedback display mode	0: Display the feedback value by integer (xxx) 1: Display the feedback value by the value with one decimal place (xx.x) 2: Display the feedback value by the value with two decimal places (x.xx)	0		O	O	O	
12-02	PID feedback display unit setting	0: xxxxx (no unit) 1: xxxPb (pressure) 2: xxxFL (flow)	0		O	O	O	
12-03	Line speed value	0~65535	1800	RPM	O	O	O	
12-04	Line speed display mode	0: Display inverter output frequency 1: Line speed display as integer. (xxxxx) 2: Line speed display with one decimal place. (xxxx.x) 3: Line speed display with two decimal places. (xxx.xx) 4: Line speed display with three decimal places. (xx.xxx)	0		O	O	O	
12-05	Status display of digital input terminal	LED display is shown as below no input  correspondences to input and output 	-	-	O	O	O	

Group 12 Monitoring Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
12-06 ~ 12-10	Reserved							
12-11	Output current of present fault	Display the output current of current fault	-	A	O	O	O	
12-12	Output voltage of present fault	Display the output voltage of current fault	-	V	O	O	O	
12-13	Output frequency of present fault	Display the output frequency of current fault	-	Hz	O	O	O	
12-14	DC voltage of present fault	Display the DC voltage of current fault	-	V	O	O	O	
12-15	Frequency command of present fault	Display the frequency command of current fault	-	Hz	O	O	O	
12-16	Frequency command	If LED enters this parameter, it only allows monitoring frequency command.	-	Hz	O	O	O	
12-17	Output frequency	Display the current output frequency	-	Hz	O	O	O	
12-18	Output current	Display the current output current	-	A	O	O	O	
12-19	Output voltage	Display the current output voltage	-	V	O	O	O	
12-20	DC Voltage	Display the current DC voltage	-	V	O	O	O	
12-21	Output power	Display the current output power	-	kW	O	O	O	
12-22	Motor's rotation speed	Display motor's current rotation speed in VF/SLV mode motor's rotation speed = output power x(120/motor's pole number) In PG/SV mode, motor's rotation speed is calculated by feedback frequency. Max limit is 65535	-	rpm	O	O	O	
12-23	Output power factor	Display the current output power factor	-	-	O	O	O	
12-24	Control mode	Display control mode 0 : VF 2 : SLV 5 : PM SLV	-	-	O	O	O	
12-25	AI1 Input	Display the current AI1 input (0V corresponds to 0%, 10V corresponds to 100%,)	-	%	O	O	O	
12-26	AI2 Input	Display the current AI2 input (0V or 4mA corresponds to 0%, 10V or 20mA corresponds to 100%)	-	%	O	O	O	
12-27	Torque command	Display the current torque command (100% corresponds to motor torque)	-	%	X	O	O	
12-28	Motor torque current (Iq)	Display the current q-axis current	-	%	X	O	O	
12-29	Motor excitation current (Id)	Display the current d-axis current	-	%	X	O	O	
12-30 ~ 12-35	Reserved							

Group 12 Monitoring Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
12-36	PID Input	Display input error of the PID controller (PID target value - PID feedback) (100% corresponds to the maximum frequency set by 01-02 or 01-16)	-	%	O	O	O	
12-37	PID Output	Display output of the PID controller (100% corresponds to the maximum frequency set by 01-02 or 01-16)	-	%	O	O	O	
12-38	PID Setting	Display the target value of the PID controller (100% corresponds to the maximum frequency set by 01-02 or 01-16)	-	%	O	O	O	
12-39	PID Feedback	Display the feedback value of the PID controller (100% corresponds to the maximum frequency set by 01-02 or 01-16)	-	%	O	O	O	
12-40	Reserved							
12-41	Heatsink temperature	Display the heatsink temperature of IGBT temperature.	-	℃	O	O	O	
12-42	Reserved							
12-43	Inverter status	-	-	-	O	O	O	
12-44	Reserved							
12-45	Recent fault message	Display current fault message	-	-	O	O	O	
12-46	Previous fault message	Display previous fault message	0	-	O	O	O	
12-47	Previous two fault messages	Display previous two fault messages	0	-	O	O	O	
12-48	Previous three fault messages	Display previous three fault messages	0	-	O	O	O	
12-49	Previous four fault messages	Display previous four fault messages	0	-	O	O	O	
12-50	DI/DO status of present fault	Display the DI/DO status of current fault Description is similar to 12-05	0	-	O	O	O	
12-51	Inverter status of current fault	Display the inverter status of current fault Description is similar to 12-43	-	-	O	O	O	
12-52	Trip time 1 of present fault	Display the operation time of current fault, 12-53 is the days, while 12-52 is the ephemeral hours	-	Hr	O	O	O	
12-53	Trip time 2 of present fault		-	day	O	O	O	
12-54	Frequency command of previous fault	Display frequency command of previous fault	-	Hz	O	O	O	
12-55	Output frequency of previous fault	Display output frequency of previous fault	-	Hz	O	O	O	
12-56	Output current of previous fault	Display output current of previous fault	-	A	O	O	O	
12-57	Output voltage of previous fault	Display output voltage of previous fault	-	V	O	O	O	
12-58	DC voltage of previous fault	Display DC voltage of previous fault	-	V	O	O	O	

Group 12 Monitoring Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
12-59	DI/DO status of previous fault	Display DI/DO status of previous fault description is similar to 12-05	-	-	O	O	O	
12-60	Inverter status of previous fault	Display inverter status of previous fault description is similar to 12-43	-	-	O	O	O	
12-61	Trip time 1 of last fault	Display the operation time of last time's fault, 12-62 is the days, while 12-61 is the ephemeral hours	-	Hr	O	O	O	
12-62	Trip time 2 of last fault		-	day	O	O	O	
12-63	Recent warning messages	Display the recent warning messages	-	-	O	O	O	
12-64	Previous warning message	Display the previous warning message	-	-	O	O	O	
12-65 ~ 12-66	Reserved							
12-67	Cumulative energy	0.0~999.9	0	kWHr	O	O	O	
12-68	Cumulative energy	0~60000	0	MWHr	O	O	O	
12-69	Cumulative electricity price	0~9999	0.0	$	O	O	O	
12-70	Cumulative electricity price	0~60000	0	$	O	O	O	
12-71	Flow meter feedback	1~50000	0	GPM	O	O	O	
12-72	Reserved	12.01.01~99.12.31	12.01.01		O	O	O	
12-73	Reserved	00:00~23:59	00:00		O	O	O	
12-74	PSI Target	0.01~25.50	02.00	PSI	O	X	X	
12-75	PSI Feedback	0.01 25.50	0.00	PSI	O	X	X	
12-76	No-Load voltage	0.0~600.0	1.0	V	X	O	X	
12-77	HVAC setpoint	1~50000	5000	GPM	O	O	O	
12-78	Reserved							
12-79	Pulse input percentage	0.0~100.0	0.0	%	O	O	O	

*** Models of inverter ratings above 400V 75HP (including 75HP) do not support functions of heatsink temperature display.**
*** Maximum upper limit in motor speed (rpm) of parameter 12-22 is 65535.**

Group 13 Maintenance Function Group								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
13-00	Inverter capacity selection	00H~FFH	-	-	O	O	O	*4
13-01	Software version	0.0-9.9	-	-	O	O	O	*4
13-02	Reserved							
13-03	Cumulative operation hours 1	0~23	-	hr	O	O	O	*4
13-04	Cumulative operation hours 2	0~65535	-	day	O	O	O	*4
13-05	Selection of cumulative operation time	0: Accumulative time in power on 1: Accumulative time in operation	0	-				

Group 13 Maintenance Function Group								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
13-06	Parameters locked	0: Parameters out of 13-06 are read-only. 1: Only user parameter is enabled. 2: All parameters are writable.	2	-				
13-07	Parameter password function	0~9999	0	-	O	O	O	
13-08	Restore factory setting	0: No initialization 2: 2 wire initialization (200/400V, 60Hz) 3: 3 wire initialization (200/400V, 60Hz) 4: 2 wire initialization (200/400V, 50Hz) 5: 3 wire initialization (200/400V, 50Hz) 6: 2 wire initialization (200/400V, 50Hz) 7: 3 wire initialization (200/400V, 50Hz) 8: PLC initialization 9: 2 Wire initialization (230V/460V, 60Hz) 10: 3 Wire initialization (230V/460V, 60Hz) Others: Reserved	0	-	O	O	O	
13-09	Fault history clearance function	0: Do not clear fault history 1: Clear fault history	0	-	O	O	O	*1
13-10	Password 2	0~9999	0	-	O	O	O	
13-11	C/B CPLD Ver.	0.00~9.99	0.00	-	O	O	O	
13-12	PG card Id	0~255	0	-	O	O	O	
13-13	PG card Ver.	0.00~9.99	0.00	-	O	O	O	
13-14	Fault storage select	0: Restart fault context of automatic reset doesn't save to fault history 1: Restart fault context of automatic reset save to fault history	0	-				
13-15	Model	0~20	0	-				

Group 14 PLC Setting Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
14-00	T1 Set value 1	0~9999	0	-	O	O	O	
14-01	T1 Set value 2（Mode 7）	0~9999	0	-	O	O	O	
14-02	T2 Set value 1	0~9999	0	-	O	O	O	
14-03	T2 Set value 2（Mode 7）	0~9999	0	-	O	O	O	
14-04	T3 Set value 1	0~9999	0	-	O	O	O	
14-05	T3 Set value 2（Mode 7）	0~9999	0	-	O	O	O	
14-06	T4 Set value 1	0~9999	0	-	O	O	O	
14-07	T4 Set value 2（Mode 7）	0~9999	0	-	O	O	O	

Group 14 PLC Setting Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
14-08	T5 Set value 1	0~9999	0	-	O	O	O	
14-09	T5 Set value 2（Mode 7）	0~9999	0	-	O	O	O	
14-10	T6 Set value 1	0~9999	0	-	O	O	O	
14-11	T6 Set value 2（Mode 7）	0~9999	0	-	O	O	O	
14-12	T7 Set value 1	0~9999	0	-	O	O	O	
14-13	T7 Set value 2（Mode 7）	0~9999	0	-	O	O	O	
14-14	T8 Set value 1	0~9999	0	-	O	O	O	
14-15	T8 Set value 2（Mode 7）	0~9999	0	-	O	O	O	
14-16	C1 Set value	0~65535	0	-	O	O	O	
14-17	C2 Set value	0~65535	0	-	O	O	O	
14-18	C3 Set value	0~65535	0	-	O	O	O	
14-19	C4 Set value	0~65535	0	-	O	O	O	
14-20	C5 Set value	0~65535	0	-	O	O	O	
14-21	C6 Set value	0~65535	0	-	O	O	O	
14-22	C7 Set value	0~65535	0	-	O	O	O	
14-23	C8 Set value	0~65535	0	-	O	O	O	
14-24	AS1 Set value 1	0~65535	0	-	O	O	O	
14-25	AS1 Set value 2	0~65535	0	-	O	O	O	
14-26	AS1 Set value 3	0~65535	0	-	O	O	O	
14-27	AS2 Set value 1	0~65535	0	-	O	O	O	
14-28	AS2 Set value 2	0~65535	0	-	O	O	O	
14-29	AS2 Set value 3	0~65535	0	-	O	O	O	
14-30	AS3 Set value 1	0~65535	0	-	O	O	O	
14-31	AS3 Set value 2	0~65535	0	-	O	O	O	
14-32	AS3 Set value 3	0~65535	0	-	O	O	O	
14-33	AS4 Set value 1	0~65535	0	-	O	O	O	
14-34	AS4 Set value 2	0~65535	0	-	O	O	O	
14-35	AS4 Set value 3	0~65535	0	-	O	O	O	
14-36	MD1 Set value 1	0~65535	1	-	O	O	O	
14-37	MD1 Set value 2	0~65535	1	-	O	O	O	
14-38	MD1 Set value 3	0~65535	1	-	O	O	O	
14-39	MD2 Set value 1	0~65535	1	-	O	O	O	
14-40	MD2 Set value 2	0~65535	1	-	O	O	O	
14-41	MD2 Set value 3	0~65535	1	-	O	O	O	
14-42	MD3 Set value 1	0~65535	1	-	O	O	O	
14-43	MD3 Set value 2	0~65535	1	-	O	O	O	
14-44	MD3 Set value 3	0~65535	1	-	O	O	O	
14-45	MD4 Set value 1	0~65535	1	-	O	O	O	
14-46	MD4 Set value 2	0~65535	1	-	O	O	O	
14-47	MD4 Set value 3	0~65535	1	-	O	O	O	

Group 15 PLC Monitoring Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
15-00	T1 Current value 1	0~9999	0	-	O	O	O	
15-01	T1 Current value (Mode 7)	0~9999	0	-	O	O	O	
15-02	T2 Current value 1	0~9999	0	-	O	O	O	
15-03	T2 Current value 2（Mode 7）	0~9999	0	-	O	O	O	

Group 15 PLC Monitoring Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
15-04	T3 Current value 1	0~9999	0	-	O	O	O	
15-05	T3 Current value 2（Mode 7）	0~9999	0	-	O	O	O	
15-06	T4 Current value 1	0~9999	0	-	O	O	O	
15-07	T4 Current value 2（Mode 7）	0~9999	0	-	O	O	O	
15-08	T5 Current value 1	0~9999	0	-	O	O	O	
15-09	T5 Current value 2（Mode 7）	0~9999	0	-	O	O	O	
15-10	T6 Current value 1	0~9999	0	-	O	O	O	
15-11	T6 Current value 2（Mode 7）	0~9999	0	-	O	O	O	
15-12	T7 Current value 1	0~9999	0	-	O	O	O	
15-13	T7 Current value 2（Mode 7）	0~9999	0	-	O	O	O	
15-14	T8 Current value 1	0~9999	0	-	O	O	O	
15-15	T8 Current value 2（Mode 7）	0~9999	0	-	O	O	O	
15-16	C1 Current value	0~65535	0	-	O	O	O	
15-17	C2 Current value	0~65535	0	-	O	O	O	
15-18	C3 Current value	0~65535	0	-	O	O	O	
15-19	C4 Current value	0~65535	0	-	O	O	O	
15-20	C5 Current value	0~65535	0	-	O	O	O	
15-21	C6 Current value	0~65535	0	-	O	O	O	
15-22	C7 Current value	0~65535	0	-	O	O	O	
15-23	C8 Current value	0~65535	0	-	O	O	O	
15-24	AS1 Results	0~65535	0	-	O	O	O	
15-25	AS2 Results	0~65535	0	-	O	O	O	
15-26	AS3 Results	0~65535	0	-	O	O	O	
15-27	AS4 Results	0~65535	0	-	O	O	O	
15-28	MD1 Results	0~65535	0	-	O	O	O	
15-29	MD2 Results	0~65535	0	-	O	O	O	
15-30	MD3 Results	0~65535	0	-	O	O	O	
15-31	MD4 Results	0~65535	0	-	O	O	O	
15-32	TD Current value	0~65535	0	-	O	O	O	

Group 16 Reserved

Group 17 IM Motor Automatic Tuning Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
17-00	Mode selection of automatic tuning	0: Rotation Auto-tune 1: Static Auto-tune 2: Stator resistance measurement 3: Reserved 4: Loop test 5: Rotation (loop test + autotune) 6. Static (loop test + autotune)	2*c	-	O	O	X	
17-01	Motor rated output power	0.00~600.00	-	KW	O	O	X	
17-02	Motor rated current	0.1~999.9	-	A	O	O	X	
17-03	Motor rated voltage	0.0~510.0	440	V	O	O	X	
17-04	Motor rated frequency	0.0~400.0	60.0	Hz	O	O	X	

Group 17 IM Motor Automatic Tuning Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
17-05	Motor rated speed	0~24000	KVA[*a]	rpm	O	O	X	
17-06	Pole number of motor	2~16 (Even)	4	Pole	O	O	X	
17-07	Reserved							
17-08	Motor no-load voltage	400V: 100~480	KVA[*a]	V	O	O	X	
17-09	Motor excitation current	0.01~600.00 (15%~70% motor rated current)	KVA[*a]	A	O	O	X	
17-10	Automatic tuning start	0: Disable 1: Enable	0	-	O	O	X	
17-11	Error history of automatic tuning	0: No error 1: Motor data error 2. Stator resistance tuning error 3. Leakage induction tuning error 4. Rotor resistance tuning error 5. Mutual induction tuning error 6. DT error 7. Encoder error 8. Motor's acceleration error 9. Warning	0	-	O	O	X	
17-12	Motor leakage inductance scale	0.1~15.0	3.4	%	X	O	X	
17-13	Motor slip frequency	0.10~20.00	1.00	Hz	X	O	X	
17-14	Rotational selection 1	0: VF 1: SLV						

***a: KVA means the default value of this parameter will be changed by different capacities of inverter.**
***c: Default value is 2 in V/F mode while it is 0 in SLV mode.**

Group 18: Slip Compensation Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
18-00	Slip compensation gain at low speed	0.00~2.50	0.00[*d]	-	O	O	X	*1
18-01	Slip compensation gain at high speed	-1.00~1.00	0.00	-	O	O	X	*1
18-02	Slip compensation limit	0~250	200	%	O	X	X	
18-03	Slip compensation filter	0.0~10.0	1.0	S	O	X	X	
18-04	Regenerative slip compensation selection	0: Disable 1: Enable	0	-	O	X	X	
18-05	FOC delay time	1~1000	100	ms	X	O	X	
18-06	FOC gain	0.00~2.00	0.10	-	X	O	X	

***d: Default value is 0.00 in V/F mode while it is 1.0 in SLV mode.**

Group 19 Reserved

Group 20 Speed Control Parameters*								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
20-00	ASR Gain 1	0.00~250.00	3.00	-	X	O	O	*1
20-01	ASR Integral time 1	0.001~10.000	SLV: 0.500 PMSLV :0.08,	S	X	O	O	*1
20-02	ASR Gain 2	0.00~250.00	3.00	-	X	O	O	*1
20-03	ASR Integral time 2	0.001~10.000	SLV: 0.500 PMSLV :0.08,	S	X	O	O	*1
20-04	ASR Integral time limit	0~300	200	%	X	O	O	
20-05 ~ 20-06	Reserved							
20-07	Selection of acceleration and deceleration of P/PI	0: PI speed control will be enabled only in constant speed. For accel/decel, only use P control. 1: Speed control is enabled either in constant speed or accel/decal.	1	-	X	O	X	
20-08	ASR Delay time	0.000~0.500	0.004	S	X	O	X	
20-09	Speed observer proportional (P) gain 1	0.00~2.55	0.61	-	X	O	X	*1
20-10	Speed observer integral (I) time 1	0.01~10.00	0.05	S	X	O	X	*1
20-11	Speed observer proportional (P) Gain 2	0.00~2.55	0.61	-	X	O	X	*1
20-12	Speed observer integral (I) time 2	0.01~10.00	0.06	S	X	O	X	*1
20-13	Low-pass filter time constant of speed feedback 1	1~1000	4	ms	X	O	X	
20-14	Low-pass filter time constant of speed feedback 2	1~1000	30	ms	X	O	X	
20-15	ASR Gain change frequency 1	0.0~400.0	4.0	Hz	X	O	X	
20-16	ASR Gain change frequency 2	0.0~400.0	8.0	Hz	X	O	X	
20-17	Torque compensation gain at low speed	0.00~2.50	1.00	-	X	O	X	*1
20-18	Torque compensation gain at high speed	-10~10	0	%	X	O	X	*1
20-19 ~ 20-32	Reserved							
20-33	Constant speed detection level	0.1~5.0	1.0		X	O	O	
20-34	Speed compensation gain	0~25600	0		X	O	X	
20-35	Speed compensation time	0~30000	100	ms	X	O	X	

***: This parameter group is enabled in SLV and PMSLV modes.**

Group 21 Torque Control Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
21-00 ~ 21-04	Reserved							
21-05	Positive torque limit	0~160	160	%	X	O	O	
21-06	Negative torque limit	0~160	160	%	X	O	O	
21-07	Forward regenerative torque limit	0~160	160	%	X	O	O	
21-08	Reversal regenerative torque limit	0~160	160	%	X	O	O	

Group 22 PM Motor Parameters- only available when PM Control Mode is selected								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
22-00	PM motor rated power	0.00~600.00	4.00	kW	X	X	O	
22-01	PM motor rated voltage	100.0~480.0	440.0	V	X	X	O	
22-02	PM motor rated current	0.1~999.9	7.0	A	X	X	O	
22-03	PM motor's pole number	2~96	6	poles	X	X	O	
22-04	PM motor's rotation speed	1~60000 (22-04, 22-06, only need to set one of them, the program will calculate the other.)	1500	rpm	X	X	O	
22-05	PM motor's maximum rotation speed	1~60000	1500	rpm	X	X	O	
22-06	PM motor rated frequency	0.0~400.0	75.0	Hz	X	X	O	
22-07	PM motor type	0: SPM 1: IPM	0	-				
22-08	Reserved							
22-09	PM SLV starting mode	0: Forcing start 1: Stationary start	1	-				
22-10	PM SLV starting current	0~120% Motor rated current	50	%	X	X	O	
22-11	DC current injection for PM auto-tune	0~100% Motor rated current	40	%	X	X	O	
22-12	PM SLV speed observer gain K_p	1~10000	2000	-	X	X	O	
22-13	PM SLV speed observer gain K_i	1~1024	40	-	X	X	O	
22-14	PM stator resistance	0.001~32.767	1.000	Ω	X	X	O	
22-15	PM Motor D-axis inductance	0.001~32.767	1.024	mH	X	X	O	
22-16	PM Motor Q-axis inductance	0.001~32.767	1.024	mH	X	X	O	
22-17	PM EMF constant	0.1~32.767	0.100	mV/rad/s				
22-18	Weak magnetic limit	0~100	0	%				
22-19 ~ 22-20	Reserved							
22-21	SLV PM motor tuning	0: None 1: Self sensing	0	-	X	X	O	

Group 22 PM Motor Parameters- only available when PM Control Mode is selected								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
22-22	Fault history of SLV PM motor tuning	0. No Error 1~4: Reserved 5: Circuit tuning time out. 6: Reserved 7: Other motor tuning errors 8: Reserved 9: Current abnormity occurs while loop adjustment. 10: Reserved 11: Stator resistance measurement timeout 12: Reserved	0	--	X	X	O	*4

Group 23 Pump & HVAC Function Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
23-00	Application selection	0: Disable 1: Constant pump 2: HVAC 3: Compressor	0	-	O	O	O	
23-01	Setting of single & multiple pumps and master & slave selection	0: Single pump 1: Master 2: Slave 1 3: Slave 2 4: Slave 3	0		O	X	X	
23-02	Working pressure setting	0.10~650.00	2.00	PSI	O	X	X	
23-03	Maximum pressure setting	0.10~650.00	10.00	PSI	O	X	X	
23-04	Pump pressure command source	0: Set by 23-02 1: Set by AI	0	0	O	X	X	
23-05	Display mode selection	0: Display target pressure and feedback pressure* 1: Target pressure displayed only 2: Feedback pressure displayed only	0	%	O	X	X	
23-06	Proportion gain (P)	0.00~10.00	3.00	-	O	X	X	
23-07	Integral time (I)	0.0~100.0	0.5	S	O	X	X	
23-08	Differential time (D)	0.00~10.00	0.00	S	O	X	X	
23-09	Constant voltage tolerance error range	0.10~650.00	0.50	PSI	O	X	X	
23-10	Constant voltage sleep frequency	0.00~180.00	30.00	Hz	O	X	X	
23-11	Constant voltage sleep time	0.0~255.5	0.0	S	O	X	X	
23-12	Maximum pressure limit	0.00~650.00	5.00	PSI	O	X	X	
23-13	High pressure alarm type	0.0~600.0	10.0	S	O	X	X	
23-14	High pressure stop time	0.0~600.0	20.0	S	O	X	X	

Group 23 Pump & HVAC Function Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
23-15	Minimum pressure limit	0.00~650.00	0.50	PSI	O	X	X	
23-16	Low pressure alarm type	0.0~600.0	10.0	S	O	X	X	
23-17	Low pressure stop time	0.0~600.0	20.0	S	O	X	X	
23-18	Detection time of pressure losing	0.0~600.0	0.0	S	O	X	X	
23-19	Pressure losing prevention level	0~100	0	%	O	X	X	
23-20 ~ 23-22	Reserved							
23-23	Direction of water usage	0: Upward detection 1: Downward detection	1	-	O	X X	X X	
23-24	Range of water used pressure detection	0.0~65.00	1.0	PSI	O	X	X	
23-25	Cycle of water usage detection	0.0~200.0	20.0	S	O	X	X	
23-26	Acceleration time of water usage detection	0.1~6000.0	10.0	S	O	X	X	
23-27	Deceleration time of water usage detection	0.1~6000.0	10.0	S	O	X	X	
23-28	Forced operation frequency	0.0~200	0.00	Hz-	O	X	X	
23-29	Multi pump shift time	0~240	3	Hr	O	X	X	
23-30	Multi pump launch delay time	0.0~30.0	5.0	S	O	X	X	
23-31	Multi pump synchronous setting	0: Disable 1: Target pressure value and run/stop 2: Only target pressure value 3: Only run/stop	0		O	X	X	
23-32 ~ 23-35	Reserved							
23-36	Pump units select	0: PSI 1: W 2: Bar 3: PA	0					
23-37	Water leakage detect time	0.0~100.0	0.0	S	O	X	X	
23-38	Water leaking detection restart pressure vary	0.01~65.00	0.10	PSI	O	X	X	
23-39	Water leaking detection restart inaccuracy range	0.01~65.00	0.50	PSI	O	X	X	
23-40	Reserved							
23-41	Local/Remote selection	0: Disable 1: Enable	1		O	O	O	
23-42	Energy recalculation	0: Disable (Energy accumulating) 1: Enable	0		O	O	O	
23-43	Electricity price per kWh	0.000~5.000	0.000	$	O	O	O	
23-44	Selection of accumulative electricity pulse output unit	0: Disable 1: Unit for 0.1kWh 2: Unit for 1kWh 3: Unit for 10kWh	0		O	O	O	

Group 23 Pump & HVAC Function Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
		4: Unit for 100kWh						
		5: Unit for 1000kWh						
23-45	Given modes of flow meters feedback	0: Disable 1: Analog input 2: Pulse train input	1		O	O	O	
23-46	Flow meter maximum target value	1~50000	10000	GPM	O	O	O	
23-47	Flow meter target value	1~50000	5000	GPM	O	O	O	
23-48	Maximum flow feedback value	0.01~99.00	80.00	%	O	O	O	
23-49	Maximum flow feedback alarm time	0.0~255.0	3.0	S	O	O	O	
23-50	Maximum flow feedback stop time	0.0~255.0	6.0	S	O	O	O	
23-51	Minimum flow feedback value	0.01~99.00	10.00	%	O	O	O	
23-52	Minimum flow feedback alarm time	0.0~255.0	3.0	S	O	O	O	
23-53	Minimum flow feedback stop time	0.0~255.0	6.0	S	O	O	O	
23-54	Low suction detection selection	0: Disable 1: PID Error value 2: Current 3: Current and PID error value	0		O	O	O	
23-55	Low suction detection time	0~30.0	10.0	S	O	O	O	
23-56	PID level for under suction	0~30	10	%	O	O	O	
23-57	Voltage level for under suction	0~100	10	%	O	O	O	
23-58	Under suction responding	0: Disable 1: Alarm 2: Fault 3: Fault & Restart	0	-	O	O	O	
23-59	Pump pressure command source	0: Set by 23-47/12-77 1: Set by AI	0	-	O	O	O	
23-60	HVAC units select	0: GPM 1: FPM 2: CFM 3: GPH	0	-				
23-61 ~ 23-65	Reserved							
23-66	Derating of current level	10~200	110	%	O	X	X	
23-67	Derating of delay time	1.0~20.0	10.0	S	O	X	X	
23-68	Derating of frequency gain	1~100	90	%	O	X	X	
23-69	OL4 Current level	10~200	110	%	O	X	X	
23-70	OL4 Delay time	0.0~20.0	10.0	S	O	X	X	

***Note: Setting of 23-03 needs to be lower than 9.9 PSI in the pump modes; 10-33 is lower than 1000 and 10-34=1 in the PID modes.**

Group 24 Pump Control Function Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
24-00	Selection of pump control function	0: Function of 1 to 8 pump card is disabled 1: Fixed modes of inverter pump: first on and last off; then stop all. 2: Fixed modes of inverter pump: only stop inverter pump. 3: Fixed modes of inverter pump: first on and first off; then stop all. 4: Cycle modes of inverter pump: first on and first off; then stop all. 5: Cycle modes of inverter pump: only stop inverter pump. 6: 1 to 3 relay of cycle modes of inverter pump: first on and first off; then stop all	0	-	O	O	O	
24-01	Selection of relay 2-4 function	xxx0b: Reserved xxx1b: Reserved xx0xb: Relay 2 disable xx1xb: Relay 2 enable x0xxb: Relay 3 disable x1xxb: Relay 3 enable 0xxxb: Relay 4 disable 1xxxb: Relay 4 enable	0000b		O	O	O	
24-02	Selection of relay 5-8 function	xxx0b: Relay 5 disable xxx1b: Relay 5 enable xx0xb: Relay 6 disable xx1xb: Relay 6 enable x0xxb: Relay 7 disable x1xxb: Relay 7 enable 0xxxb: Relay 8 disable 1xxxb: Relay 8 enable	0000b		O	O	O	
24-03	Duration of upper limit frequency	1.0~600.0	300.0	S	O	O	O	*1
24-04	Duration of lower limit frequency	1.0~600.0	300.0	S	O	O	O	*1
24-05	Switching time of magnetic contactor	0.1~20.0	1.00	S	O	O	O	*1
24-06	Allowable bias of pump switch	0.0~20.0	0.0	%	O	O	O	*1
24-07	Pump control source selection	0: 1 to 8 pump card 1: Control cable	0		O	O	O	
24-08	Relay swap time	0~240	0	hour				

Chapter 5 Troubleshooting and Fault Diagnostics

5.1 General

RVFF contains fault detection and early warning/self-diagnosis functions. When the inverter detects a fault, a fault message is displayed on the keypad. The fault contact output energizes and the motor will coast to stop (The stop method can be selected for specific faults).

When the inverter detects a warning/self-diagnostics error, the digital operator will display a warning or self-diagnostic code, the fault output does not energize in this case. Once the warning is removed, the system will automatically return to its original state.

5.2 Fault Detection Function

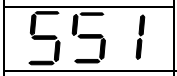
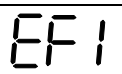
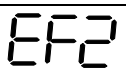
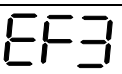
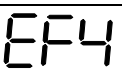
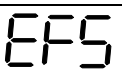
Use one of the following methods to restart:
1. Set one of multi-function digital input terminals (03-00, 03-05) to 17 (Fault reset); activate input
2. Press the reset button on the keypad and clear fault message.
3. Power down inverter wait until keypad goes blank and power-up the inverter again.

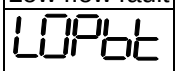
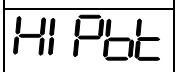
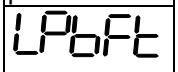
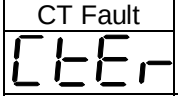
When a fault occurs, the fault message is stored in the fault history (see group 12 parameters).

LED display	Description	Cause	Possible solutions
OC over current OC	The inverter output current exceeds the overcurrent level (around 200% of the inverter rated current).	• Acceleration time is too short. • Contactor at the inverter output side. • A special motor or applicable capacity is greater than the inverter rated value. • Short circuit or ground fault.	• Extend acceleration time. • Check the motor wiring. • Disconnect motor and try running inverter.
SC short circuit SC	Inverter output short circuit or ground fault.	• Short circuit or ground fault (08-23 = 1). • Motor damaged (insulation). • Wire damage or deterioration.	• Check the motor wiring. • Disconnect motor and try running inverter.
GF Ground fault GF	The current to ground exceeds 50% of the inverter rated output current (08-23 = 1, GF function is enabled).	• Motor damaged (insulation). • Wire damage or deterioration. • Inverter DCCT sensors defect.	• Replace motor. • Check the motor wiring. • Disconnect motor and try running inverter. • Check resistance between cables and ground. • Reduce carrier frequency.
Over voltage OU	DC bus voltage exceeds the OV detection level: 820Vdc If input voltage 01-14 is set lower than 400V, the OV detection value will decrease to 730Vdc	• Deceleration time set too short, resulting in regenerative energy flowing back from motor to the inverter. • The inverter input voltage is too high. • Use of power factor correction capacitors. • Excessive braking load. • Braking transistor or resistor defective. • Speed search parameters set incorrectly.	• Increase deceleration time • Reduce input voltage to comply with the input voltage requirements or install an AC line reactor to lower the input voltage. • Remove the power factor correction capacitor. • Use dynamic braking unit. • Replace braking transistor or resistor. • Adjust speed search parameters.

LED display	Description	Cause	Possible solutions
UV Under voltage uU	DC bus voltage is lower than the UV detection level (380Vdc) or the pre-charge contactor is not active while the inverter is running. The detection value can be adjusted by 07-13.	• The input voltage is too low. • Input phase loss. • Input voltage fluctuation. • Pre-charge contactor damaged. • DC bus voltage feedback signal value not incorrect.	• Check the input voltage. • Check input wiring. • Check power source • Replace pre-charge contactor • Replace control board or complete inverter.
IPL input phase loss IPL	Phase loss at the input side of the inverter or input voltage imbalance, active when 08-09 = 1 (enabled).	• IPL occurs. • Terminal screws of R/L1, S/L2 or T/L3 are loose or lost. • Input voltage fluctuation is too big. • Input Voltage is imbalance per phase • Aging of the capacity on main circuit inside inverter	• Check if the main wiring connection is correct. • Check if the terminal screw gets loose. • Make sure having stable input voltage or turn off IPL detection function. • Replace the circuit board or inverter
OPL output phase loss OPL	Phase loss at the output side of the inverter, active when 08-10 = 1 (enabled).	• Wiring loose in inverter output terminal. • Motor rated current is less than 10% of the inverter rated current.	• Check output wiring / faster screws. • Check motor & inverter rating.
OH1 Heatsink overheat OH1	The temperature of the heat sink is too high. Note: when OH1 fault occurs three times within five minutes, it is required to wait 10 minutes before resetting the fault.	• Ambient temperature too high. • cooling fan failed • Carrier frequency set too high. • Load too heavy.	• Install fan or AC to cool surroundings. • Replace cooling fan. • Reduce carrier frequency. • Reduce load / Measure output current
OH4 Motor overheating OH4	Motor overheating: The input of PTC (Positive Temperature Coefficient) exceeds the overheat protection level	• The surrounding temperature of motor is too high. • The input of PTC (Positive Temperature Coefficient) exceeds the overheat protection level.	• Check the surrounding temperature of motor. • Check MT and GND terminal wiring be correct.
OL1 Motor overload OL1	Internal motor overload protection tripped, active when protection curve 08-05 = xxx1.	• Voltage setting V/F mode too high, resulting in over-excitation of the motor. • Motor rated current (02-01) set incorrectly. • Load too heavy.	• Check V/f curve. • Check motor rated current • Check and reduce motor load, check and operation duty cycle.

LED display	Description	Cause	Possible solutions
OL2 Inverter overload OL2	Inverter thermal overload protection tripped. If an inverter overload occurs 4 times in five minutes, it is required to wait 4 minutes before resetting the fault.	• Voltage setting V/F mode too high, resulting in over-excitation of the motor. • Inverter rating too small. • Load too heavy.	• Check V/f curve. • Replace inverter with larger rating. • Check and reduce motor load, check and operation duty cycle.
OT Over torque detection Ot	Inverter output torque is higher than 08-15 (over torque detection level) for the time specified in 08-16. Parameter 08-14 = 0 or 2 to activate.	• Load too heavy.	• Check over torque detection parameters (08-15 / 08-16). • Check and reduce motor load, check and operation duty cycle.
UT Under torque detection Ut	Inverter output torque is lower than 08-19 (under torque detection level) for the time specified in 08-20. Parameter 08-18 = 0 or 2 to activate.	• Sudden drop in load. • Belt break.	• Check under torque detection parameters (08-19/08-20). • Check load/application.
CE communication error CE	No Modbus communication received in for the time specified in 09-06 (communication error detection time). Active when 09-07(= 0 to 2).	• Connection lost or wire broken. • Host stopped communicating.	• Check connection • Check host computer/software.
FB PID feedback loss Fb	PID feedback signal falls below level specified in 10-12 (PID feedback loss detection level) for the time specified in 10-13 (Feedback loss detection time). Active when parameter (10-11 = 2).	• Feedback signal wire broken • Feedback sensor broken.	• Check feedback wiring • Replace feedback sensor.
STO Safety switch Sto	Inverter safety switches open.	• Terminal board Input F1 and F2 are not connected. • 08-30 is set to 1: Coast to stop, and digital terminal switch (58) is turned on.	• Check F1 and F2 connection • Check digital terminal (58) is turned on

LED display	Description	Cause	Possible solutions
SS1 Safety switch 	Inverter safety switches open.	• When 08-30 is set to 0: Deceleration to stop, and digital terminal switch (58) is turned on.	• Check digital terminal (58) is turned on.
EF1 External fault (S1) 	External fault (Terminal S1) Active when 03-00= 25, and Inverter external fault selection 08-24=0 or 1.	• Multifunction digital input external fault active.	• Multi-function input function set incorrectly. • Check wiring
EF2 External fault (S2) 	External fault (Terminal S2) Active when 03-01= 25, and Inverter external fault selection 08-24=0 or 1.		
EF3 External fault (S3) 	External fault (Terminal S3) Active when 03-02= 25, and Inverter external fault selection 08-24=0 or 1.		
EF4 External fault (S4) 	External fault (Terminal S4) Active when 03-03= 25, and Inverter external fault selection 08-24=0 or 1.		
EF5 External fault (S5) 	External fault (Terminal S5) Active when 03-04= 25, and Inverter external fault selection 08-24=0 or 1.		
EF6 External fault (S6) 	External fault (Terminal S6) Active when 03-05= 25, and Inverter external fault selection 08-24=0 or 1.	• Multifunction digital input external fault active.	• Multi-function input function set incorrectly. • Check wiring
CF07 Motor control fault 	Motor control fault	• SLV mode is unable to run motor.	• Perform rotational or stationary auto-tune • Increase minimum output frequency (01-08)
FU fuse open 	DC bus fuse blown DC fuse (Models 230V 50HP and above, 460V 75HP and above) open circuit.	• IGBT damaged. • Short circuit output terminals.	• Check IGBTs • Check for short circuit at inverter output. • Replace inverter.

LED display	Description	Cause	Possible solutions
LOPBT Low flow fault 	Low flow fault	• The feedback signal is not connected. • Due to HVAC feedback value is lower than limit of minimum flow.	• Check feedback signal is correct and with right connection. • Check if feedback value is lower than limit of minimum flow (23-51).
HIPBT High flow fault 	High flow fault	• Due to HVAC feedback value is lower than limit of maximum flow.	• Check feedback signal is correct. • Check if feedback value is lower than limit of maximum flow (23-48).
LPBFT Low pressure fault 	Low pressure fault	• The feedback signal is not connected. • Due to feedback value of pump pressure is lower than limit of minimum flow.	• Check feedback signal is correct and with connection. • Check if feedback value of pressure is lower than limit of minimum pressure (23-15).
OPBFT High pressure fault 	High pressure fault	• Due to feedback value of pump pressure is lower than limit of maximum flow.	• Check feedback signal is correct. • Check if feedback value of pressure is lower than limit of maximum pressure (23-12).
LSCFT Low suction fault 	Low suction fault	• Insufficient water supply of effluent channel leads to insufficient suction • PID difference is higher than its level or current is lower than output current level	• Check if water of effluent channel is enough, and water supply is regular. • Check PID difference is higher than its level or current is lower than output current level
CT Fault 	Fault occurs in voltage level of three-phase input	• Abnormal input voltage, too much noise or malfunctioning control board	• Check input voltage signal and the voltage on the control board.
Double Communication Error 	Redundant Profibus and Modbus protocol	• User may use two communication mechanisms simultaneously	• Check only one communication mechanism is used.

5.3 Warning / Self-diagnosis Detection Function

When the inverter detects a warning, the keypad displays a warning code (flash).

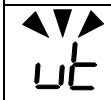
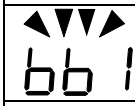
Note: The fault contact output does not energize on a warning and the inverter continues operation. When the warning is no longer active the keypad will return to its original state.

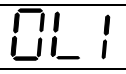
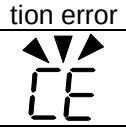
When the inverter detected a programming error (for example two parameters contradict each other of are set to an invalid setting), the keypad displays a self-diagnostics code.

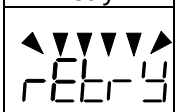
Note: The fault contact output does not energize on a self-diagnostics error. While a self-diagnostics code is active the inverter does not accept a run command until the programming error is corrected.

Note: When a warning or self- diagnostic error is active the warning or error code will flash on the keypad.

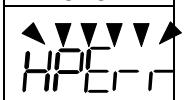
LED display	Description	Cause	Possible solutions
OV (flash) Over voltage 	DC bus voltage exceeds the OV detection level: 410Vdc If input voltage 01-14 is set lower than 400V, the OV detection value will decrease to 700Vdc	• Deceleration time set too short, resulting in regenerative energy flowing back from motor to the inverter. • The inverter input voltage is too high. • Use of power factor correction capacitors. • Excessive braking load. • Braking transistor or resistor defective. • Speed search parameters set incorrectly.	• Increase deceleration time • Reduce input voltage to comply with the input voltage requirements or install an AC line reactor to lower the input voltage. • Remove the power factor correction capacitor. • Use dynamic braking unit. • Replace braking transistor or resistor. • Adjust speed search parameters.
UV (flash) under voltage 	DC bus voltage is lower than the UV detection level (380Vdc) or the pre-charge contactor is not active while the inverter is running. The detection value can be adjusted by 07-13.	• The input voltage is too low. • Input phase loss. • Input voltage fluctuation. • Magnetic contactor damaged. • DC bus voltage feedback signal value not incorrect.	• Check the input voltage. • Check input wiring. • Check power source • Replace magnetic contactor • Replace control board or complete inverter.

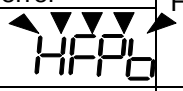
LED display	Description	Cause	Possible solutions
OH1 Heat sink overheating 	Heat sink is overheating: The temperature of the heat sink is too high. If heat sink overheating fault has occurred with three times in five minutes, it is required to wait for 10 minutes before resetting the fault.	• Ambient temperature is too high. • The cooling fan has stopped. • Carrier frequency setting is too high.	• Check the ambient temperature of the inverter. • Check the fan or dust and dirt in the heat sink. • Check the carrier frequency setting.
OH2 (flash) Inverter over heating warning 	Inverter overheat warning: Multi-function digital input set to 32. (Terminal S1 ~ S6) Active when 03-00 ~ 03-05=31.	• Multifunction digital input overheat warning active.	• Multi-function input function set incorrectly. • Check wiring
OT (flash) over torque detection 	Inverter output torque is higher than 08-15 (over torque detection level) for the time specified in 08-16. Parameter 08-14 = 0 to activate.	• Load too heavy.	• Check over torque detection parameters (08-15 / 08-16). • Check and reduce motor load, check and operation duty cycle.
UT (flash) under torque detection 	Inverter output torque is lower than 08-19 (under torque detection level) for the time specified in 08-20. Parameter 08-18 = 0 to activate.	• Sudden drop in load. • Belt break.	• Check under torque detection parameters (08-19 / 08-20). • Check load / application.
bb1 (flash) External base block 	External base block (Terminal S1)	• Multifunction digital input external base block active.	• Multi-function input function set incorrectly. • Check wiring
bb2 (flash) External base block 	External base block (Terminal S2)		

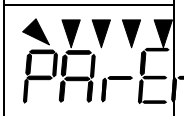
LED display	Description	Cause	Possible solutions
bb3 (flash) External base block 	External base block (Terminal S3)	• Multifunction digital input external base block active.	• Multi-function input function set incorrectly. • Check wiring
bb4 (flash) External base block 	External base block (Terminal S4)		
bb5 (flash) External base block 	External base block (Terminal S5)		
bb6 (flash) External base block 	External base block (Terminal S6)	• Multifunction digital input external base block active.	• Multi-function input function set incorrectly. • Check wiring
OL1 Motor overload 	Internal motor overload protection tripped, active when protection curve 08-05 = xxx1.	• Voltage setting V/F mode too high, resulting in over-excitation of the motor. • Motor rated current (02-01) set incorrectly. • Load too heavy. • Voltage setting V/F mode too high, resulting in over-excitation of the motor. • Inverter rating too small. • Load too heavy. •	• Check V/f curve. • Check motor rated current • Check and reduce motor load, check and operation duty cycle. • Check V/f curve. • Replace inverter with larger rating. • Check and reduce motor load, check and operation duty cycle
OL2 Inverter overload 	Inverter thermal overload protection tripped. If an inverter overload occurs 4 times in five minutes, it is required to wait 4 minutes before resetting the fault		
CE (flash) communication error 	No Modbus communication received for 2 sec. Active when 09-07=3.	• Connection lost or wire broken. • Host stopped communicating.	• Check connection • Check host computer / software.

LED display	Description	Cause	Possible solutions
CLB over current protection level B 	Inverter current reaches the current protection level B.	• Inverter current too high. • Load too heavy.	• Check load and duty cycle operation.
Retry (flash) retry 	Automatic reset has activated, and it displays before the period of 07-01 automatic reset terminates.	• The period of 07-01 automatic reset≠0. • The times of 07-02 automatic reset≠0.	• It will disappear after the period of automatic reset.
EF1 (flash) External fault (S1) 	External fault (Terminal S1) Active when 03-00= 25, and Inverter external fault selection 08-24=2.	• Multifunction digital input external fault active and parameter 08-24 = 2 for operation to continue.	• Multi-function input function set incorrectly. • Check wiring • Multi-function input function set incorrectly. • Check wiring
EF2 (flash) External fault (S2) 	External fault (Terminal S2) Active when 03-01= 25, and Inverter external fault selection 08-24=2.		
EF3 (flash) External fault (S3) 	External fault (Terminal S3) Active when 03-02= 25, and Inverter external fault selection 08-24=2.		
EF4 (flash) External fault (S4) 	External fault (Terminal S4) Active when 03-03= 25, and Inverter external fault selection 08-24=2.	• Multifunction digital input external fault active and parameter 08-24 = 2 for operation to continue.	• Multi-function input function set incorrectly. • Check wiring • Multi-function input function set incorrectly. • Check wiring
EF5 (flash) External fault (S5) 	External fault (Terminal S5) Active when 03-04= 25, and Inverter external fault selection 08-24=2.		

LED display	Description	Cause	Possible solutions
EF6 (flash) External fault (S6) 	External fault (Terminal S6) Active when 03-05= 25, and Inverter external fault selection 08-24=2.	• Multifunction digital input external fault active and parameter 08-24 = 2 for operation to continue.	• Multi-function input function set incorrectly. • Check wiring • Multi-function input function set incorrectly. • Check wiring
EF9 (flash) error of forward/reversal rotation 	Forward run and reverse run are active within 0.5 sec of each other. Stop method set by parameter 07-09.	• Forward run and reverse run active (see 2-wire control).	• Check run command wiring
SE01 Rang setting error 	Parameter setting falls outside the allowed range.	• Some parameter ranges are determined by other inverter parameters which could cause an out of range warning when the dependency parameter is adjusted. For example: 02-00>02-01, 00-12<00-13 or when 00-07 = 1, 00-05 is the same with 00-06 or 20-16 <= 20-15.	• Check parameter setting.
SE02 Digital input terminal error 	Multi-function input setting error.	• Multi-function digital input terminals (03-00 to 03-05) are set to the same function (not including ext. fault and not used.) or ①UP/DOWN commands are not set at the same time (they must be used together). ②UP/DOWN commands (08 and 09) and ACC/DEC commands (11) are set at the same time. ③Speed search 1(19，maximum frequency) and Speed search 2 (34，from the set frequency）are set at the same time.	• Check multi-function input setting.
SE03 V/f curve error 	V/f curve setting error.	• V/F curve setting error. ① 01-02 > 01-12 > 01-06 >01-08; (Fmax) (Fbase) (Fmid1) (Fmin) ②01-16 > 01-24 > 01-20 > 01-22; (Fmax2) (Fbase2) (Fmid1) (Fmin2)	• Check V/F parameters

LED display	Description	Cause	Possible solutions
SE05 PID selection error 	PID selection error.	• 10-00 and 10-01are set to 1 (AI1) or 2 (AI2) simultaneously. • When 23-05=0 and 10-33>= 1000 or 10-34≠1.	• Check the setting value of parameters 10-00 and 10-01. • Check the setting value of 10-33, 10-34 and 23-05.
HPErr Model selection error 	Inverter capacity setting error: Inverter capacity setting 13-00 does not match the rated voltage.	• Inverter capacity setting does not match voltage class (13-00).	• Check inverter capacity setting 13-00.
SE09 PI setting error 	Inverter PI setting error	• Inverter pulse input selection (03-30) selection conflicts with PID source (10-00 and 10-01).	• Check pulse input selection (03-30) and PID source (10-00 and 10-01).
FB (flash) PID feedback breaking 	PID feedback signal falls below level specified in 10-12 (PID feedback loss detection level) for the time specified in 10-13 (Feedback loss detection time). Active when parameter (10-11 = 1).	• Feedback signal wire broken • Feedback sensor broken.	• Check feedback wiring • Replace feedback sensor.
USP (flash) Unattended Start Protection 	Unattended Start Protection (USP) is enabled (enabled at power-up.)	• USP at power-up (activated by multi-function digital input) is enabled. The inverter will not accept a run command. • While the warning is active the inverter does not accept a run command. (See parameter 03-00 - 03-05 = 50).	• Remove run command or reset inverter via multi-function digital input (03-00 to 03-07 = 17) or use the RESET key on the keypad to reset inverter. • Activate USP input and re-apply the power.
LFPB Low flow error 	Low flow error	• The feedback signal is not connected. • Due to HVAC feedback value is lower than limit of minimum flow.	• Check feedback signal is correct and with right connection. • Check if feedback value is lower than limit of minimum flow.

LED display	Description	Cause	Possible solutions
HFPB High flow error 	High flow error	• Due to HVAC feedback value is lower than limit of maximum flow.	• Check feedback signal is correct. • Check if feedback value is lower than limit of maximum flow.
LPBFT Low pressure error 	Low pressure error	• The feedback signal is not connected. • Due to feedback value of pump pressure is lower than limit of minimum flow.	• Check feedback signal is correct and with connection. • Check if feedback value of pressure is lower than limit of minimum pressure.
OPBFT High pressure error 	High pressure error	• Due to feedback value of pump pressure is lower than limit of maximum flow.	• Check feedback signal is correct. • Check if feedback value of pressure is lower than limit of maximum pressure.
LSCFT Low suction error 	Inadequate suction error	• Insufficient water of supply tank leads to insufficient suction. • PID difference is higher than its level or current is lower than output current level.	• Check if water of supply tank is enough, and water supply is regular. • Check PID difference is higher than its level or current is lower than output current level
FIRE Fire override mode 	Fire override mode	• Fire override mode is active	• None • (Fire override mode is not a kind of warning).
SE10 PUMP/HVAC Setting error 	PUMP/HVAC settings of inverter error	• PUMP selection of inverter (23-02)>(23-03). • HVAC selection of inverter (23-46)>(23-47).	• Check pump selection of inverter (23-02) and (23-03) settings. • Check HVAC selection of inverter (23-02) and (23-03) settings.
COPUP PUMP communication breaking error 	Breaking error of multiple pumps communication	• Communication breaking or disconnection of pump cascade control.	• Check if it has setting issue or is not properly connected.

LED display	Description	Cause	Possible solutions
Parameter Setting Error 	Parameter setting error	• Error of Parameter setting occurs.	• Refer to the instruction manual or this parameter is selected to be disabled.
Warning of Direct Start 	When 07-04 is set to 1, the inverter cannot start directly but displays the warning signal.	• Set the digital input terminal (S1~S6) to run and simultaneously set 07-04=1.	• Check the digital input terminal and disconnect it. Then reconnect the DI terminal after the setting delay time (07-05) ends.
ADC Voltage Error 	Abnormal voltage level on the control board	• Abnormal input voltage, too much noise or malfunctioning control board.	• Check the input voltage signal and the voltage on the control board.
EEPROM Archiving Error 	EEPROM Poor archiving	• EEPROM poor peripheral circuit • It occurs in parameters check at inverter boot.	• Reconnect and if the warning signal appears again, replace the circuit board. • Contact Carlo Gavazzi for more information.
Control Board Error 	The control board is not correspondent with the program.	• The control board is not correspondent with the program.	• Replace the control board.

5.4 Auto-tuning Error

When a fault occurs during auto-tuning of a standard AC motor, the display will show the “AtErr” fault and the motor stops. The fault information is displayed in parameter 17-11.

Note: The fault contact output does not energize with an auto-tuning fault.

Error	Description	Cause	Corrective action
01	Motor data input error.	• Motor Input data error during auto-tuning. • Inverter output current does not match motor rated current.	• Check the motor tuning data (17-00 to 17-09). • Check inverter capacity
02	Motor lead to lead resistance R1 tuning error.	• Auto-tuning is not completed within the specified time • Auto-tuning results fall outside parameter setting range. • Motor rated current exceeded. • Motor was disconnected.	• Check the motor tuning data (17-00 to 17-09). • Check motor connection. • Disconnect motor load. • Check inverter current detection circuit and DCCTs. • Check motor installation.
03	Motor leakage inductance tuning error.		
04	Motor rotor resistance R2 tuning error.		
05	Motor mutual inductance Lm tuning error.		
07	Dead time compensation detection error		
08	Motor acceleration error (Rotational type auto-tuning only).	• Motor fails to accelerate in the specified time (00-14= 20sec).	• Increase acceleration time (00-14). • Disconnect motor load.
09	Other auto-tuning errors	• No load current is higher than 70% of the motor rated current. • Torque reference exceeds 100%. • Errors other than ATE01~ATE08.	• Check the motor tuning data (17-00 to 17-09). • Check motor connection.

5.5 PM Motor Auto-tuning Error

When a fault occurs during auto-tuning of a PM motor, the display will show the “IPErr” fault and the motor stops. The fault information is displayed in parameter 22-22.

Note: The fault contact output does not energize with an auto-tuning fault.

Error	Description	Cause	Corrective action
01	Magnetic pole alignment tuning failure (static).	• Inverter output current does not match motor current.	• Check the motor tuning data (22-02). • Check inverter capacity
02~04	Reserved		
05	Circuit tuning time out.	• System abnormality during circuit tuning.	• Check for active protection functions preventing auto-tuning.
06	Reserved		
07	Other motor tuning errors.	• Other tuning errors.	• Check the motor tuning data (22-02). • Check motor connection.
08	Reserved		
09	Current out of range during circuit tuning.	• Inverter output current does not match motor current.	• Check the motor tuning data (22-02). • Check inverter capacity
10	Reserved		
11	Parameter tuning and detecting time out.	• Error relationship between voltage and current.	• Check if the setting value of parameter 22-11 is too low, but its value cannot exceed 100% of the inverter. • Check motor connection.

Chapter 6 Installation Instruction with Ferrite Ring Core

(a) 4.0~7.5kW (5-10HP)

According to the requirements of EN61800-3:2004+A1:2012(PDS of Category C2). The attached ferrite core needs to be installed with inverter.

Installation position:

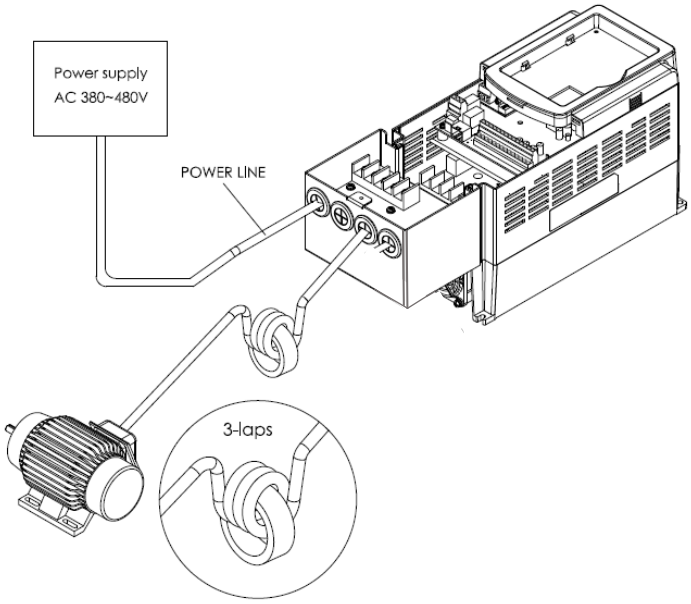
- The wiring between inverter and motor.

Installation procedure:

- The inverter output wire must pass through the ferrite ring core. Wind each wire around the core in the same direction for 3 laps, and then connect to the inverter terminals U, V, and W.

Notes:

- The length of inverter output wire must be within 10 meters per phase.



(b) 11~15kW (15-20HP)

In compliance with the requirements of EN61800-3:2004+A1:2012(PDS of Category C2), the enclosed ferrite core needs to be mounted on the configuration of inverter connected to the motor cable and remote control box wire.

Installation position:

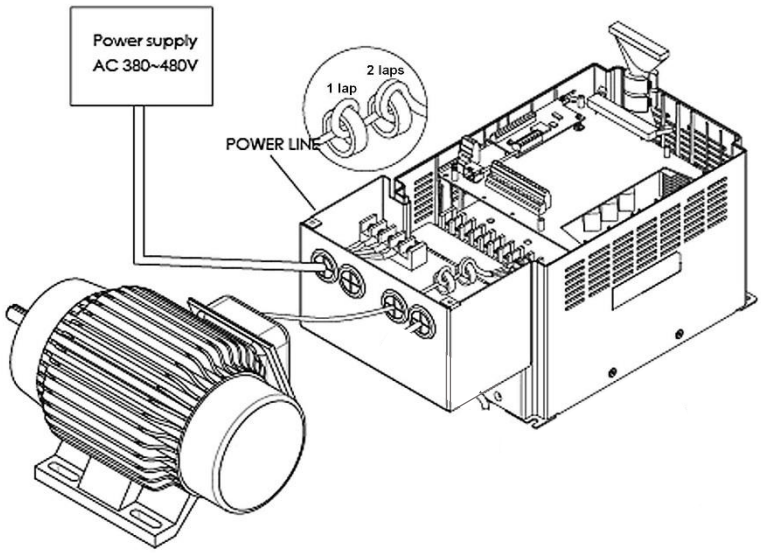
- Mounted on the inverter output terminal (U, V, and W) or motor cable.

Installation procedure:

- The motor cable is required to be passed through two ferrite ring cores, which are all placed in the filter. Motor cable is passed through 1st core (orange) around 1 lap and through 2nd core (green) around 2 laps. Then it is connected to the inverter output terminal U, V and W.

Notes:

- The length of inverter output terminal wire or motor cable is suggested to be within 10 meters per phase.



(c) 18.5~30kW (25-40HP)

According to the requirements of EN61800-3:2004+A1:2012(PDS of Category C3). The attached ferrite core needs to be installed with inverter.

Installation position:

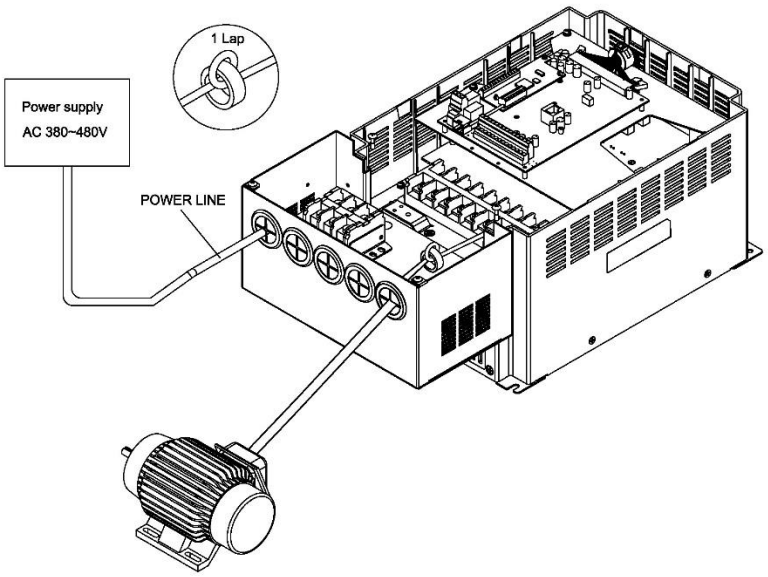
- The wire between inverter and motor.

Installation procedure:

- The inverter output wire must pass through the ring core. Wind each wire around the core in the same direction for 1 lap, and then connect to the inverter terminals U, V, and W.

Notes:

- The length of inverter output wire must be within 10 meters per phase.



(d) 37~55kW (50-75HP)

In compliance with the requirements of EN61800-3:2004+A1:2012(PDS of Category C3), the enclosed ferrite core needs to be mounted on the configuration of inverter connected to the motor cable.

Installation position:

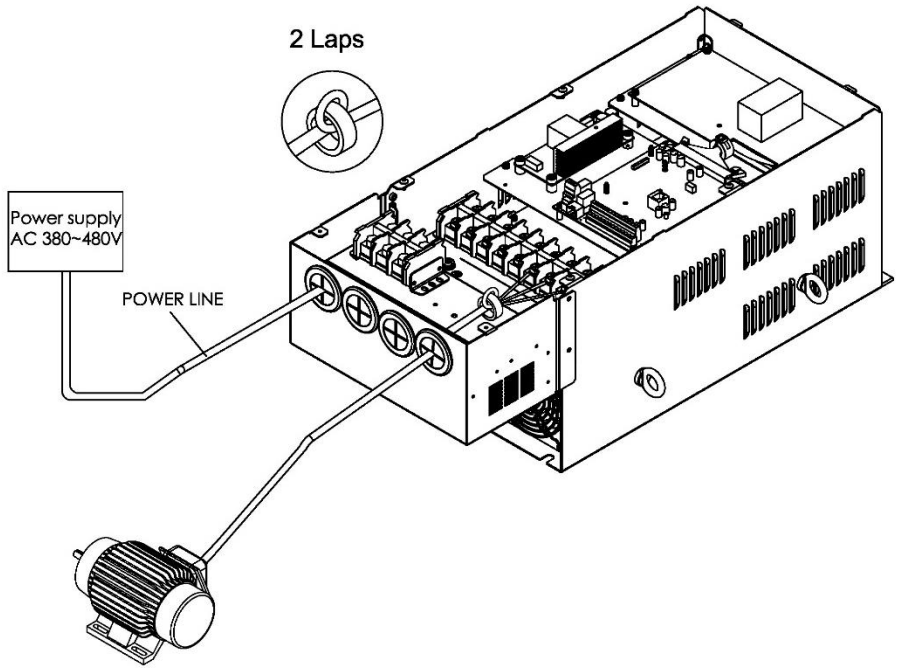
- Mounted on the inverter output terminal (U, V, and W) or motor cable

Installation procedure:

- The motor cable is required to be passed through one ferrite ring core. Motor cable is passed through core (orange) around 1 lap and then connected to the inverter output terminal U, V and W. The cores are all placed in the filter.

Notes:

- The length of inverter output terminal wire or motor cable is suggested to be within 10 meters per phase.



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