CARLO GAVAZZI
Automation Components

CARLO GAVAZZI

VariFlex^2

RVDF Series

Quick Start Guide

110V	Class 1ph	0.20~0.75kW 0.25~1.0HP
220V	Class 1ph	0.20~2.2kW 0.25~3.0HP
	Class 3ph	1.50~2.2kW 2.0~3.0HP
440V	Class 3ph	0.75~2.2kW 1.0~3.0HP

General Information

The manufacturer accepts no liability for any consequences resulting from inappropriate, negligent or incorrect installation or adjustment of the optional parameters of the equipment or from mismatching the variable speed drive with the motor.
The contents of this guide are believed to be correct at the time of printing. In the interests of commitment to a policy of continuous development and improvement, the manufacturer reserves the right to change the specification of the product or its performance, or the content of the guide without notice.

Environmental Statement

The electronic variable speed drives have the potential to save energy and (through increased machine/process efficiency) reduce raw material consumption and scrap throughout their long working lifetime. In typical applications, these positive environmental effects far outweigh the negative impacts of product manufacture and end-of-life disposal.
Nevertheless, when the products eventually reach the end of their useful life, they can very easily be dismantled into their major component parts for efficient recycling. Many parts snap together and can be separated without the use of tools, while other parts are secured with conventional screws.
Virtually all parts of the product are suitable for recycling.
Product packaging is of good quality and can be re-used. All the products come in strong cardboard cartons which themselves have a high recycled fibre content. If not re-used, these containers can be recycled. Polythene, used on the protective film and bags from wrapping product, can be recycled in the same way. Carlo Gavazzi packaging strategy favours easily recyclable materials of low environmental impact, and regular reviews identify opportunities for improvement.
When preparing to recycle or dispose of any product or packaging, please observe local legislation and best practice.

CONTENTS

Chapter 1: Introduction

1.1 Electrical Safety - general warning

The voltages used in the drive can cause severe electrical shock and/or burns, and could be lethal. Extreme care is necessary at all times when working with or adjacent to the drive. Specific warnings are given at the relevant places in this guide.

1.2 System design and safety of personnel

The drive is intended as a component for professional incorporation into complete equipment or system. If installed incorrectly, the drive may present a safety hazard.
The drive uses high voltages and currents, carries a high level of stored electrical energy, and is used to control equipment which can cause injury.
System design, installation, commissioning and maintenance must be carried out by personnel who have the necessary training and experience. They must read this safety information and this guide carefully.
The STOP and START controls or electrical inputs of the drive must not be relied upon to ensure safety of personnel. They do not isolate dangerous voltages from the output of the drive or from any external option unit. The supply must be disconnected by an approved electrical isolation device before gaining access to the electrical connections.
The drive is not intended to be used for safety-related functions.
Careful consideration must be given to the function of the drive which might result in a hazard, either through its intended behaviour or through incorrect operation due to a fault. In any application where a malfunction of the drive or its control system could lead to or allow damage, loss or injury, a risk analysis must be carried out, and where necessary, further measures taken to reduce the risk - for example, an over-speed protection device in case of failure of the speed control, or a fail-safe mechanical brake in case of loss of motor braking.

1.3 Environmental Limits

Instructions within the supplied data and information within the *VariFlex² RVDF Series Advanced User Manual* regarding transport, storage, installation and the use of the drive must be complied with, including the specified environmental limits. Drives must not be subjected to excessive physical force.

1.4 Access

Access must be restricted to authorised personnel only. Safety regulations which apply at the place of use must be complied with.
The IP (Ingress Protection) rating of the drive is installation dependant. For further information, refer to the *VariFlex² RVDF Series Advanced User Manual*.

1.5 Compliance and regulations

The installer is responsible for complying with all relevant regulations, such as national wiring regulations, accident prevention regulations and electromagnetic compatibility (EMC) regulations. Particular attention must be given to the cross-sectional areas of conductors, the selection of fuses and other protection, and protective earth (ground) connections.
The *VariFlex² RVDF Series Advanced User Manual* contains instructions for achieving compliance with specific EMC standards.
Within the European Union, all machinery in which this product is used must comply with the following directives:
98/37/EC: Safety of machinery
89/336/EEC: Electromagnetic compatibility

1.6 Motor

Ensure the motor is installed in accordance with the manufacturer's recommendations.
Ensure the motor shaft is not exposed. Standard squirrel cage induction motors are designed for single speed operation. If it is intended to use the capability of a drive to run a motor at speeds above its designed maximum, it is strongly recommended that the manufacturer is consulted first.
Low speeds may cause the motor to overheat because the cooling fan becomes less effective. The motor should be fitted with a protection thermistor. If necessary, an electric force vent fan should be used. The values of the motor parameters set in the drive affect the protection of the motor. The default values in the drive should not be relied upon. It is essential that the correct value is entered into parameter concerning the motor rated current. This affects the thermal protection of the motor.

1.7 Adjusting parameters

Some parameters have a profound effect on the operation of the drive. They must not be altered without careful consideration of the impact on the controlled system. Measures must be taken to prevent unwanted changes due to error or tampering.

1.8 Electrical installation

1.8.1 Electric shock risk

The voltages present in the following locations can cause severe electric shock and may be lethal:
- AC supply cables and connections
- DC bus, dynamic brake cables and connections
- Output cables and connections
- Many internal parts of the drive, and external option units

Unless otherwise indicated, control terminals are single insulated and must not be touched.

1.8.2 Isolation device

The AC supply must be disconnected from the drive using an approved isolation device before any cover is removed from the drive or before any servicing work is performed.

1.8.3 STOP function

The STOP function does not remove dangerous voltages from the drive, the motor or any external option units.

1.8.4 Stored charge

The drive contains capacitors that remain charged to a potentially lethal voltage after the AC supply has been disconnected. If the drive has been energised, the AC supply must be isolated at least ten minutes before work may continue.
Normally, the capacitors are discharged by an internal resistor. Under certain, unusual fault conditions, it is possible that the capacitors may fail to discharge, or be prevented from being discharged by a voltage applied to the output terminals. If the drive has failed in a manner that causes the display to go blank immediately, it is possible the capacitors
will not be discharged. In this case, consult Carlo Gavazzi or their authorised distributor.

1.8.5 Equipment supplied by plug and socket

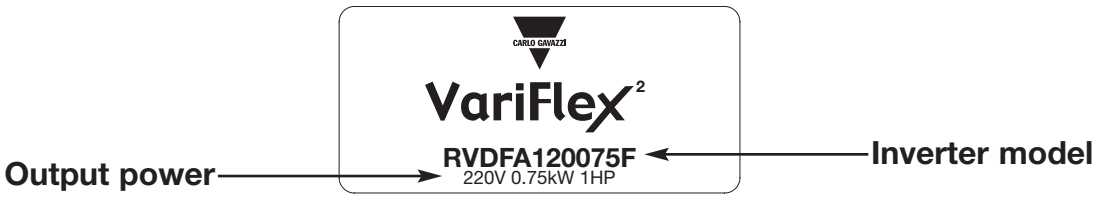
Special attention must be given if the drive is installed in equipment which is connected to the AC supply by a plug and socket. The AC supply terminals of the drive are connected to the internal capacitors through rectifier diodes which are not intended to give safety isolation. If the plug terminals can be touched when the plug is disconnected from the socket, a means of automatically isolating the plug from the drive must be used (e.g. a latching relay).

1.8.6 Ground leakage current

The drive is supplied without or with an internal EMC filter capacitor fitted. If the input voltage to the drive is supplied through an ELCB or RCD, these may trip due to the ground leakage current. Please refer to *VariFlex² RVDF Series Advanced User Manual* for further information and how to connect correctly the EMC capacitor.

Chapter 2:
Hardware Instructions and Installation

2.1 Sample Model No. Identification



Ordering Key

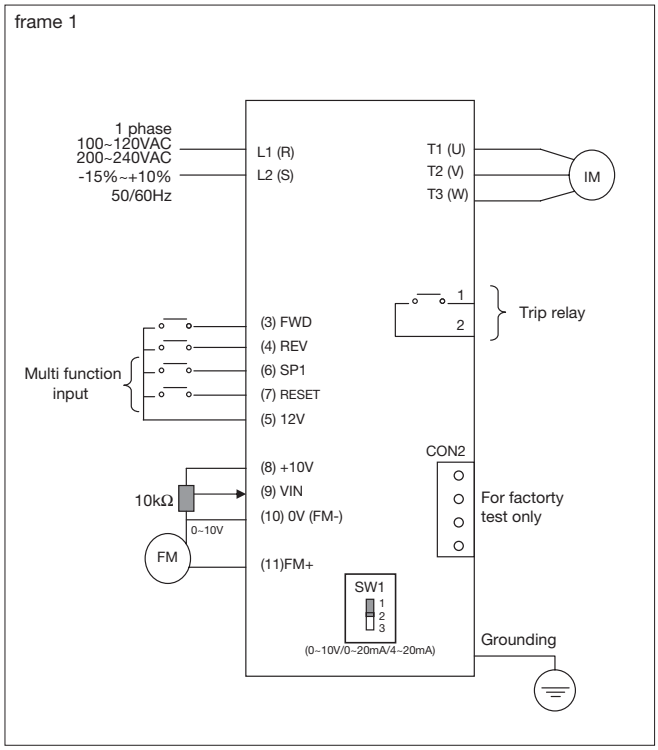
RVDF A 1 10 075 F

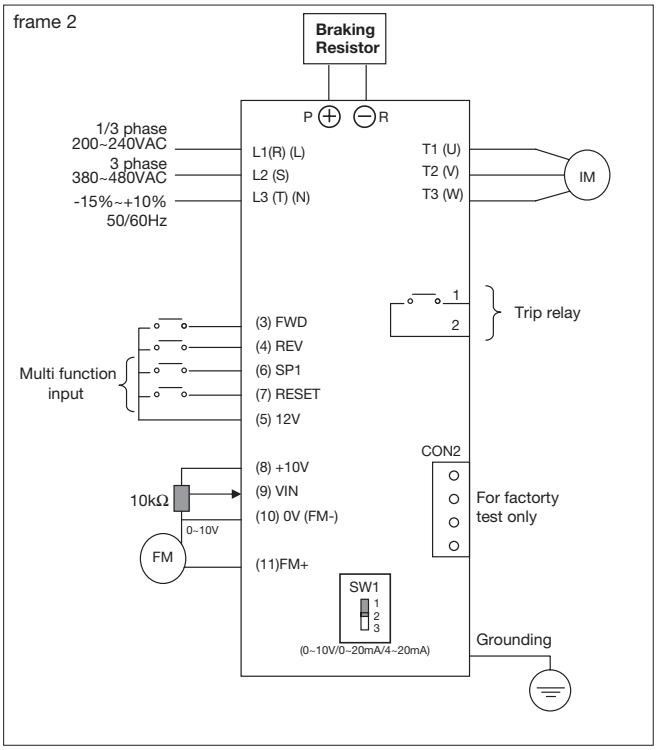
- VariFlex² AC Drive
- Frame Size
- AC Supply Phase
- Drive Voltage Rating
- Drive kW Rating
- Options

2.2 Type Selection

Frame Size	AC Supply Phase	Drive Voltage Rating	Drive kW Rating	Options
A: Size 1	1: 1-phase	10: 110VAC	020: 0.20kW, 0.25HP	Nil: No option
B: Size 2	3: 3-phase	20: 230VAC	040: 0.40kW, 0.50HP	F: Built-in filter
		40: 480VAC	075: 0.75kW, 1.0HP	ES: IP65 with water and dust proof switch
			150: 1.5kW, 2.0HP	
			220: 2.2kW, 3.0HP	

2.3 Connection Diagrams





Wire Terminations to the Inverter must be made with either UL listed field wiring lugs or UL listed crimp type ring terminals.

Note: Braking resistor only for RVDFBxxxxxx series (frame 2).

2.4 Wiring Specification and Suitable Optionals

Molded-Case Circuit Breaker / Magnetic Contact

Model Type	RVDFA110020 RVDFA110040 RVDFA120020 RVDFA120040	RVDFA110075 RVDFB120075 RVDFB120150	RVDFB120220	RVDFB340075 RVDFB340150 RVDFB240220
Molded-case circuit breaker	15A	20A	30A	15A
Primary Circuit Terminal (TM1)	Wire dimension (#14AWG) 2.0mm^2 Terminal screw M3	Wire dimension (#14AWG) 2.0mm^2 Terminal screw M3/M4	Wire dimension 3.5mm^2 Terminal screw M4	Wire dimension 3.5mm^2 Terminal screw M4
Signal Terminal (TM2) 1~11	Wire dimension 0.75mm^2 (#18 AWG), Terminal screw M3			

Warrantee does not apply to damage caused by the following situations:
(1) Damage to the inverter caused by the lack of appropriate molded-case circuit breaker or when a circuit breaker with too large of capacity is installed between the power supply and the inverter.

(2) Damage to the inverter caused by the magnetic contact, phase advancing capacitor, or surge-protector installed between the inverter and the motor.

Use copper conductors only size field wiring based on 80°C wire only.

- **Please utilize three-phase squirrel-cage induction motor with appropriate capacity.**

- **If the inverter is used to drive more than one motor, the total capacity must be smaller than the capacity of the inverter. Additional thermal overload relays must be installed in front of each motor. Use the F_18 at 1.0 times of the rated value specified on the motor nameplate at 50Hz, 1.1 times of the rated value specified on the motor nameplate at 60Hz.**

- **Do not install phase advancing capacitors, LC, or RC component between the inverter and the motor.**

Application and precautions of Peripherals

From the Power Source:
- Apply the power source at the correct rated voltage to prevent from damaging the inverter.
- A Power Disconnect or Circuit breaker must be installed between the AC power supply and the inverter.

Molded-case circuit breaker:
- Utilize an appropriate circuit breaker that's suitable for the rated voltage and current ratings of the inverter to switch ON/OFF the power supply to the inverter and as additional protection for the inverter.
- Do not operate the circuit breaker to switch ON or OFF the inverter. The circuit breaker should be used only to supply input power and should not be used for operational sequence.

Leakage circuit breaker:
- An earth leakage circuit breaker should be added to prevent false operation cause by leakage current and to ensure personnel safety.

Magnetic Contact:
- The Magnetic Contact can be omitted at ordinary operation. To utilize external control, automatic restart, or breaking controller the magnetic contact must be added at the primary side.
- Do not operate the magnetic contact to switch ON or OFF the inverter.

Power improvement AC Reactor:
- If large capacity power source is applied (over 600KVA), additional AC reactor may be added to improve power factor.

Inverter:
- Power supply input terminals L1, L2 single phase for 0.2~0.75 kW or L, N single phase for 1.5~2.2 kW) are not differentiated on phase sequence. They can be arbitrarily connected. Their connection may be interchanged.
- Output terminal T1, T2, and T3 should be connected to the U, V, and W terminals of the motor respectively. If motor turns in opposite direction of the inverter command, simply exchanging two of the three wire connections will correct this problem.
- Output terminal T1, T2, and T3 must not be connected to power source to prevent from damaging the inverter.
- Grounding terminal properly ground the grounding terminal in compliance to 200V class type three grounding. (The 400V class type is special grounding.)

2.5 Description of Inverter Terminals

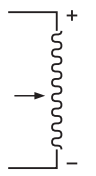
2.5.1 Descriptions of Main Circuit Terminals

Symbol	Description
L1 (R)	Main power input Single-phase: L1/L2(0.2~0.75 kW) or L/N Three-phase: L1/L2/L3
L2 (S)	
L3 (T)	
P	External braking resistor terminal (Only for RVDFBxxxxxx)
R	
T1 (U)	Inverter output to Motor
T2 (V)	
T3 (W)	

Tightening torque for TM1 is 1 LBS-FT or 12 LBS-IN (RVDFAxxxxxx).
Tightening torque for TM1 is 1.3 LBS-FT or 16 LBS-IN (RVDFBxxxxxx).
Wire voltage rating must be a minimum of :

- 300V (for 200V power supply series);
- 600V (for 400V power supply series);

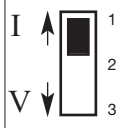
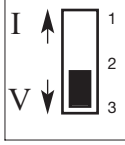
2.5.2 Control Circuitry Terminal Block (TM2) Description

Symbol		Description	
1	TRIP	Fault relay output terminal & Multi function output terminal (refer to F_21)	
2	RELAY	Connection point rated capacity 250VAC/1A (30VDC / 1A)	
3	FWD (FW)	Operation control terminals (refer to F_03)	
4	REV (RE)		
5	+12V (12)	Common point of terminal 3 / 4 / 6 / 7	
6	SP1 (SP)	Multifunction input terminals (refer to F_19)	
7	RESET (RS)		
8		+10V	Power terminal for potentiometer (Pin 3)
9		Analog input wire Wiper	Analog frequency signal input terminal (Pin 2 of potentiometer or positive terminal of 0~10V / 4~20mA / 0~20mA)
10		Analog common point	Analog signal common point (Pin 1 of potentiometer or negative terminal of 0~10V / 4~20mA / 0~20mA)
11	FM+	Analog output positive connection point	Analog frequency signal output terminal Output terminal signal is 0~10VDC/Fn6

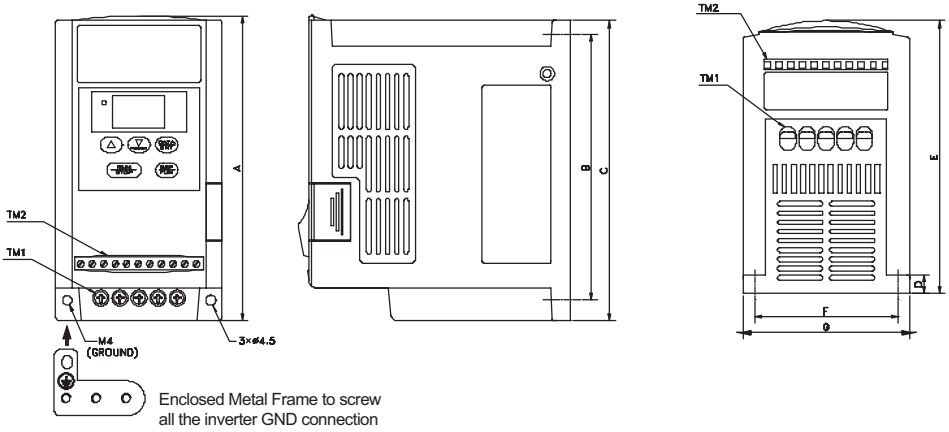
Tightening torque for TM2 is 0.42 LBS-FT or 5.03 LBS-IN.

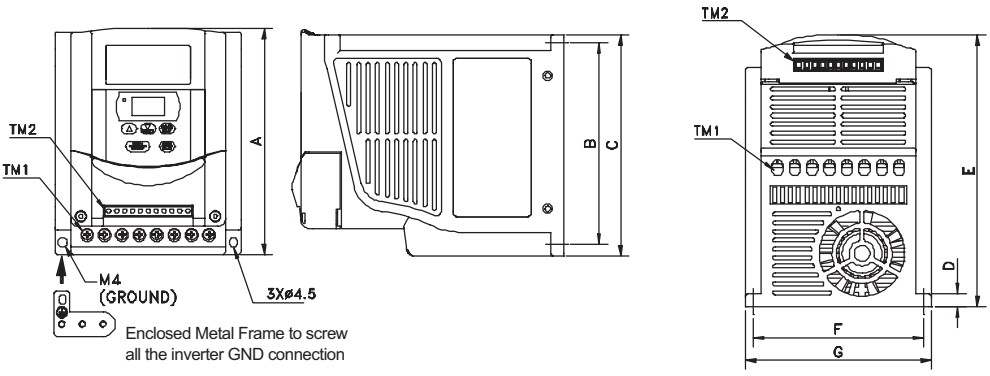
- Wire voltage rating must be a minimum of 300V
- Control wiring should not run in the same conduit or raceway with power or motor wiring
- Single Input and Output Terminals (TM2) Ratings are ALL Class 2

Descriptions of SW function

SW1	Type of external signal
	0~20mA analog signal (When F_11 is set to 1) 4~20mA analog signal (When F_11 is set to 2)
	0~10 VDC analog signal (When F_11 is set to 1)

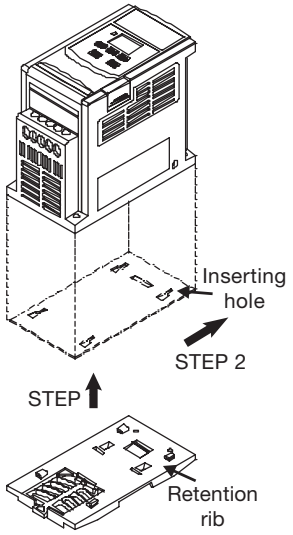
2.6 Outline Dimensions

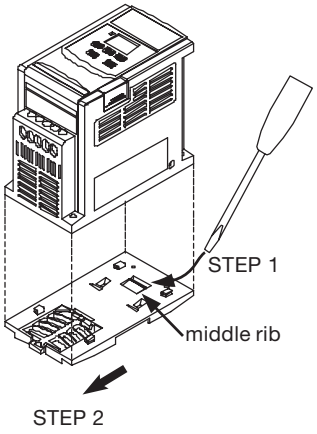




		Length mm			
		A	**B**	**C**	**D**
Model	**Frame 1**	132	116	130	8.2
	Frame 2	143	127	140	8
		E	**F**	**G**	
	Frame 1	118	61	72	
	Frame 2	171	108	118	

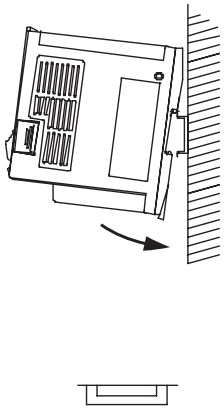
2.7 Din Rail Mounting Diagram

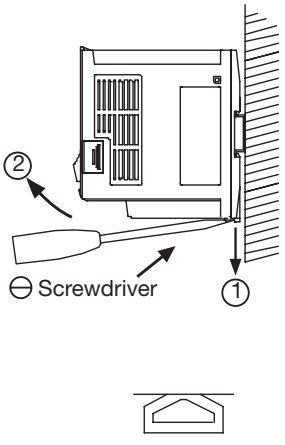
STEP 1 Aim and insert the 4 retention ribs of the DIN Rail at the 4 holes in rear panel of inverter STEP 2 Push the DIN Rail forward until the middle rib grips firmly with back panel	

STEP 1 Use a small screwdriver inserting it into the middle rib of DIN Rail and press the screwdriver in order to remove the DIN Rail from inverter	

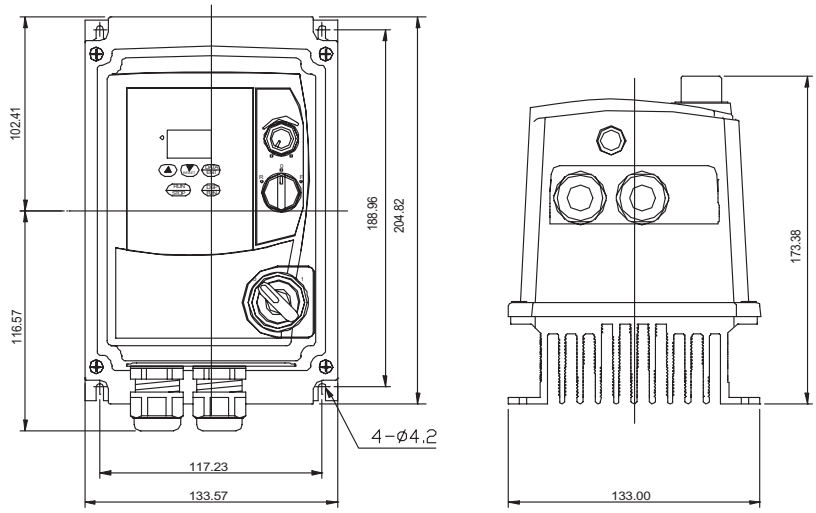
2.8 Additional DIN Rail Installation

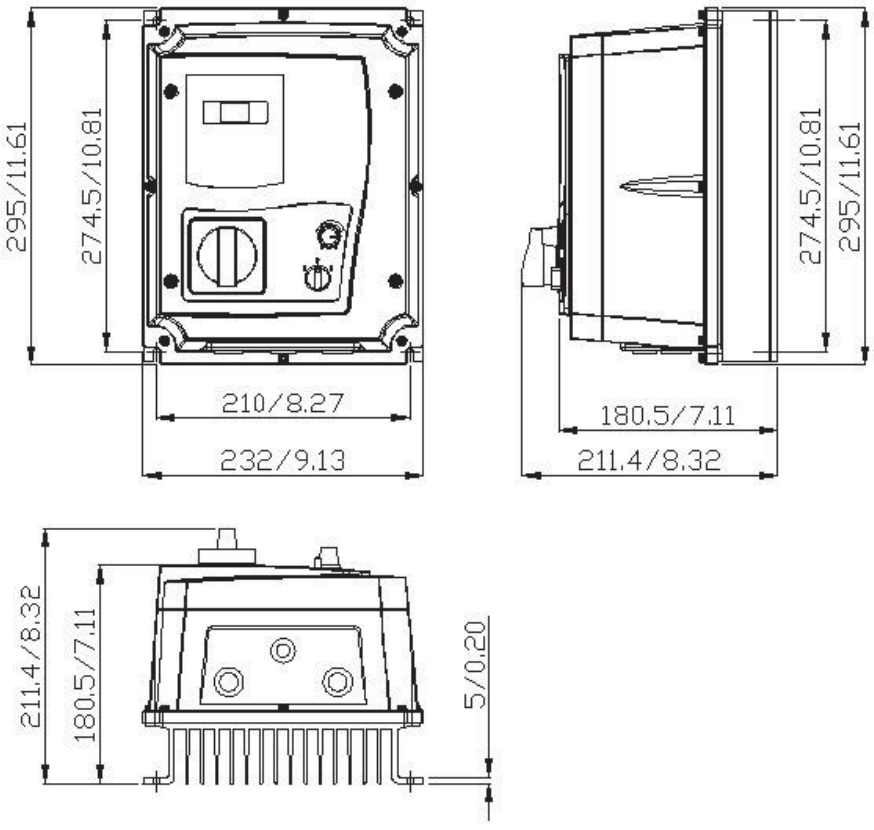
A mounting clamp and a 35mm width rail must be used to install the Drive on the rail.

Install Drive	
First place the groove on the back of module on the upper edge of din rail, and then push the module down to lock up position. Finally press the mouting plate upward into module.	

Dismounting Drive	
① Pull the mounting ptlate downward. ② Rotate the inverter module to dismount it.	

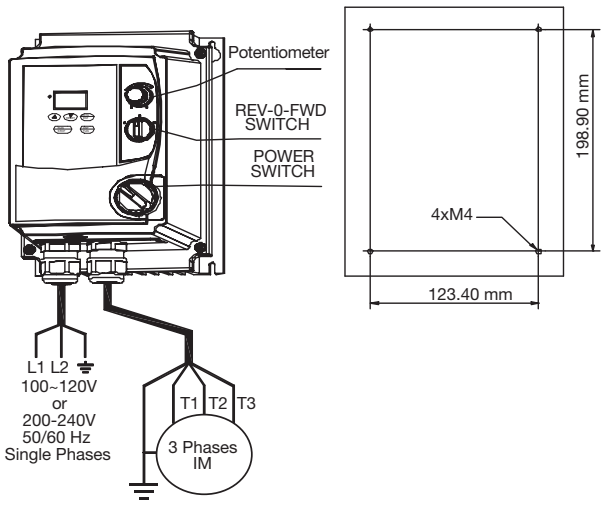
2.9 Outline Dimensions





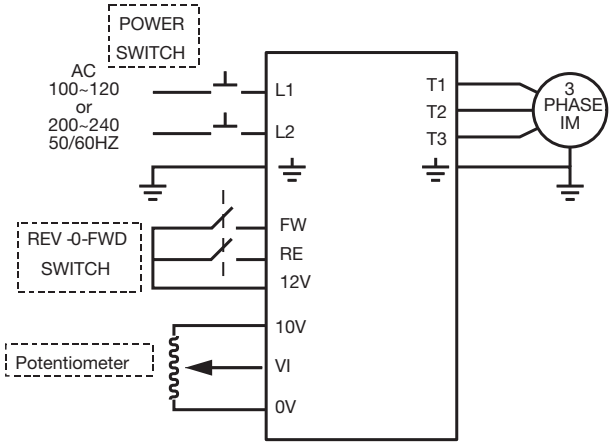
2.10 RVDF Size 1 - IP65 Type

2.10.1 Installation



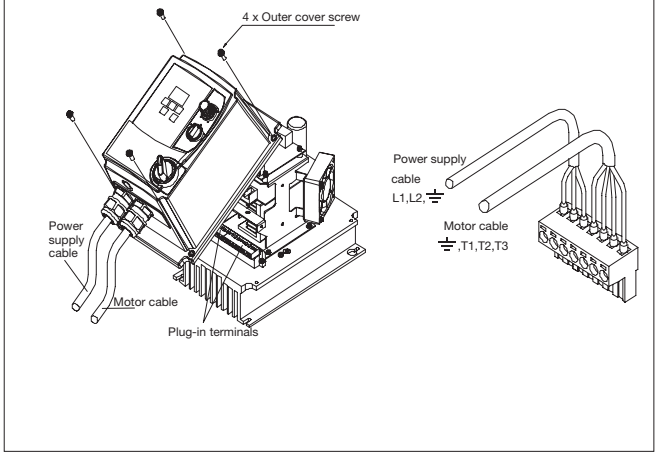
NOTE :
1. Power supply cable : #14 AGE (2.0m)
2. Motor cable : #16 AGE (1.25m)
3. Torque value of Screw :
   (1). Power/Motor cable (plug in) Therminal: 5kg-cm(4.34 in-lb)
   (2). Remote control wire: 4kg-cm(3.47in-lb)
   (3). Outer Cover (M4): 6kg-cm(5.20in-lb)

2.10.2 Circuit Diagram

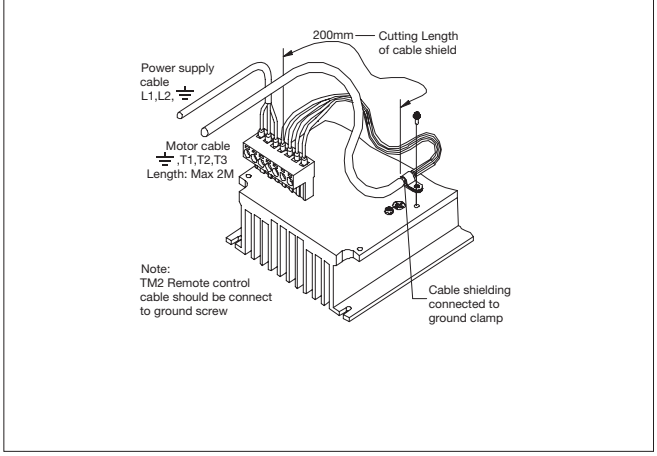


NOTE:
(1). Input source: single-phase (L1,L2, ⏚) ensuring that it is connected to a 100~120 or 200~240 supply.
(2). Output Moter: three-phase (⏚,T1,T2,T3).
Caution:
- Do not start or stop the inverter using the main circuit power.
- Please always remain REV-0-FWD switch at 0 position. In order to keep inverter has no running signal before power-on again after power supply interrupted. Otherwise, injury may result.

2.10.3 Connection

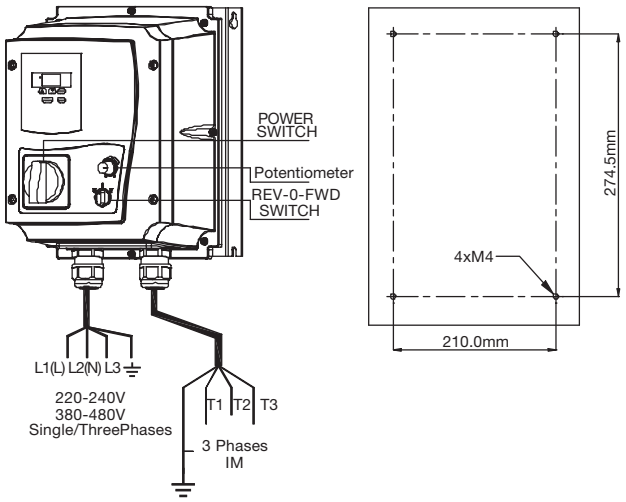


2.10.4 EMC Mounting



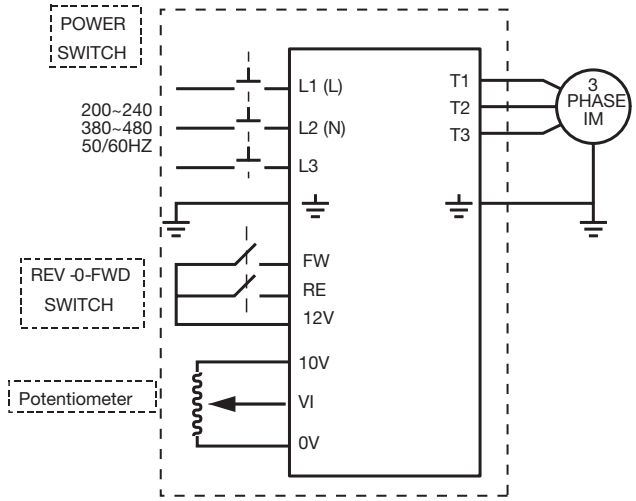
2.11 RVDF Size 2 - IP65

2.11.1 Installation



NOTE:
1. Power supply cable:
   220V #12AWG (3.5mm²)
   400V #16AWG (1.25mm²)
2. Motor cable:
   220V #14AWG (2.0mm²)
   400V #16AWG (1.25mm²)
3. Torque value of Screw:
   (1). Power/Motor cable (TM1, TM3)
   Terminal: 8 kgf-cm (6.94in-lb)
   (2). Remote control wire: 4kgf-cm (3.47in-lb)
   (3). Outer Cover (M4): 8kgf-cm(6.94 in-lb)

2.11.2 Circuit Diagram

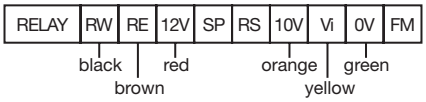


NOTE:
(1). Input source:single-phase(L1(L),L2(N), ⏚) ensuring that it is connected to a 200/240 supply or three-plase (L1 (L), L2 (N), L3,⏚) ensuring that it is connected to a 200/240, 380/480V supply.
(2). Output Motor: three-phase (⏚ , T1, T2, T3).

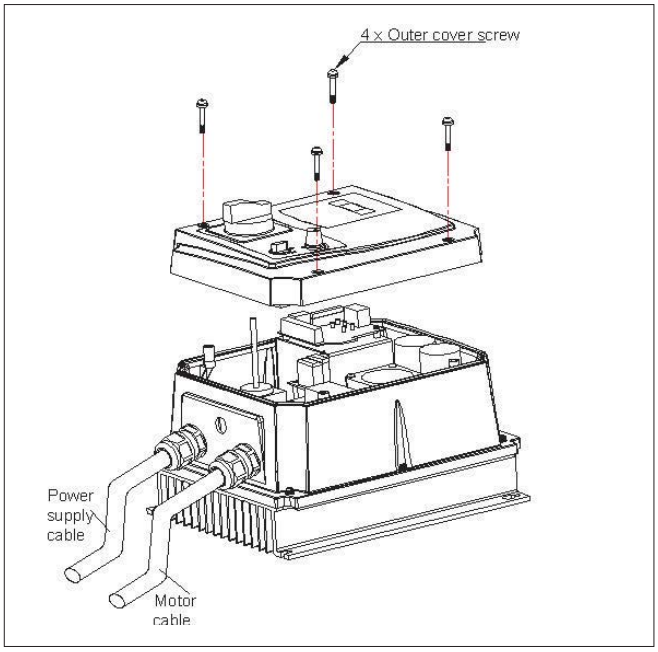
Caution:

- Do not start or stop the inverter using the main circuit power.
- Please always remain REV-0-FWD switch at 0 position. In order to keep inverter has no running signal before power-on again after power supply interrupted. Otherwise, injury may result.

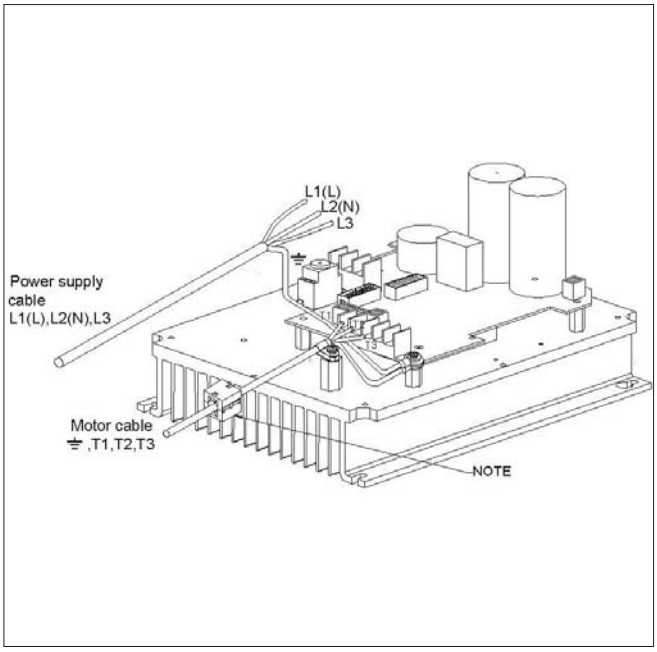
TM2



2.11.3 Connection



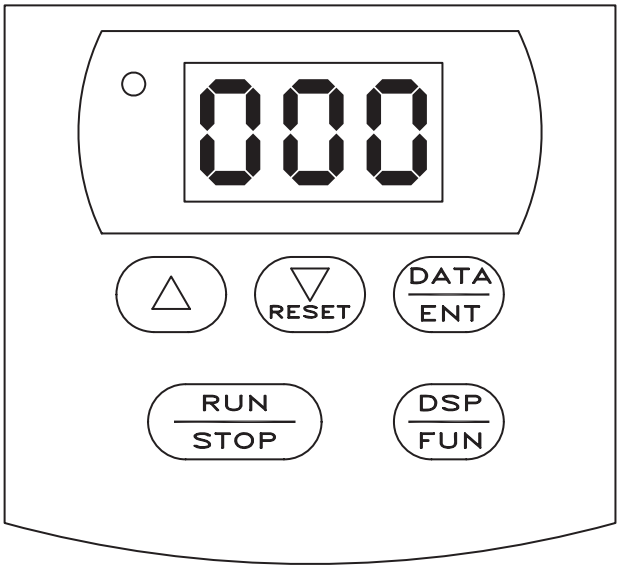
2.11.4 EMC Mounting



NOTE:
For ALL FILTER MODELS, additional items will be find inside the box including : [1] pc of EMC conformed waterproof (IP65) ferrite core; [1] pc of metal fastener; [1] pc of MF Zin 5-C screw. “CAUTION: if application use require to meet EMC regulation, you MUST first constrain the motor cables, close the ferrite core onto the motor cable outside the plastic enclosure as stated in the above diagram. Please also note the length of the Motor cable CANNOT exceed 5M under EMC regulation”

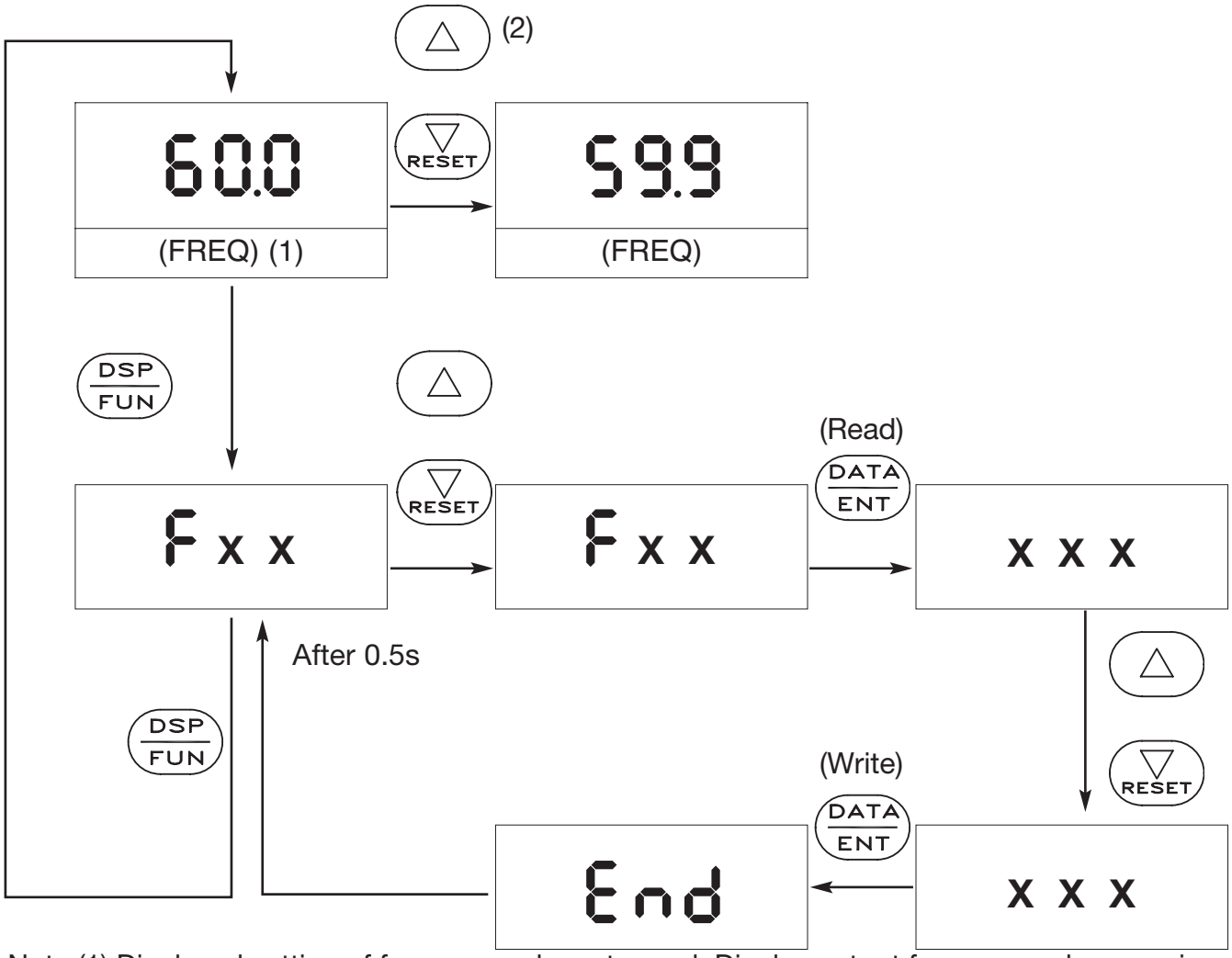
Chapter 3: Software Index

3.1 Keypad Operating Instructions



CAUTION
Do not operate keypad by screwdriver or other sharp-ended tool to avoid damaging keypad.

3.2 Brief Keypad Operation Flowchart



Note (1) Displayed setting of frequency when stopped. Display output frequency when running.
Note (2) The setting of the frequency can be modified either when stopped or when running.

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3.3 Parameter List

F_	Function	Function Description	Unit	Range	Factory setting	Note
0		Factory Adjustment			0	
1	Accel. Time	Accel. time	0.1s	0.1~999s	5.0	*1 *3
2	Decel. Time	Decel. time	0.1s	0.1~999s	5.0	*1 *3
3	Operation mode	0: Forward/Stop, Reverse/Stop 1: Run/Stop, Forward / Reverse	1	0~1	0	
4	Motor rotation direction	0: Forward 1: Reverse	1	0~1	0	*1
5	V/F Pattern	V/F Pattern setting	1	1~6	1/4	*2
6	Frequency upper/lower limit	Frequency upper limit	0.1Hz	1.0~120Hz (1~200) *4	50/60Hz	*3
7		Frequency lower limit	0.1Hz	0.0~120Hz (1~200) *4	0.0Hz	*3
8	SPI frequency	SP1 frequency	0.1Hz	1.0~120Hz (1~200) *4	10Hz	*3
9	JOG frequency	JOG frequency	0.1Hz	1.0~10.0Hz (1~200) *4	6Hz	
10	Start / Stop Control	0: Keypad 1: Terminal (TM2)	1	0~1	0	
11	Frequency Control	0: Keypad 1: Terminal (0~10v / 0~20mA) 2: Terminal (4~20mA)	1	0~2	0	
12	Carrier frequency control	Carrier Frequency Setting	1	1~5 (1~10)*4	5	
13	Torque compensation	Torque compensation gain	0.1%	0.0~10.0%	0.0%	*1
14	Stop method	0: controlled deceleration stop 1: free run to stop	1	0~1	0	
15	DC braking setting	DC braking time	0.1s	0.0~25.5s	0.5s	
16		DC braking injection frequency	0.1Hz	1~10Hz	1.5Hz	
17		DC braking level	0.1%	0.0~20.0%	8.0%	
18	Electronic thermal Overload protection	Protection base on motor rated current	1%	50 ~ 100% (0~200)*4	100%	
19	Multifunction input connection point	Multifunction input terminal 1 (SP1) function	1: Jog 2: Sp1 3: Emergency stop 4: External Base Block 5: Reset 6: SP2 *4		5	
20		Multifunction input terminal 2 (RESET) function			3	
21	Multi-function output	Multifunction output terminal	1: Operating 2: Frequency reached 3: Fault		3	
22	Reverse Lock-Out	0: REV run 1: REV run Lock-Out	1	0~1	0	
23	Momentary power loss	0: Enabled 1: Disabled	1	0~1	0	
24	Auto restart	Number of Auto-restart times	1	0~5	0	
25	Factory setting	010: Constants initialization to 50Hz system 020: Constants initialization to 60Hz system				*2
26	SP2 frequency	SP2 frequency	0.1Hz	1.0~200Hz	20	*4
27	SP3 frequency	SP3 frequency	0.1Hz	1.0~200Hz	30	*4
28	Direct start	0: Enabled 1: Disabled	1	0~1	0	*5
29	Software version	CPU program version				
30	Fault Log	Fault log for three faults				

NOTE:

*1: Indicate this parameter can be adjusted during running mode.

*2: Please refer to F_25.

*3: If the setting range is above 100, the setting unit becomes 1.

*4: New function for CPU version V1.9 and above.

*5: New function for CPU version V2.1 and above

Chapter 4: Troubleshooting

4.1 Manual Reset Inoperative Malfunctions

INDICATION	CONTENT	POSSIBLE CAUSE	COUNTERMEASURE
CPF	Program error	Outside noise interference	Place a RC surge absorber in parallel with the noise generating magnetic contact
EPR	EEPROM error	EEPROM defective	Replace EEPROM
OV	Voltage too high while not operating	1. Power source voltage too high 2. Detection circuitry defective	1. Examine the power supply 2. Return the inverter for repair
LV	Voltage too low while not operating	1. Power source voltage too low 2. Detection circuitry defective	1. Examining the power supply 2. Return the inverter for repair
OH	Inverter over heat while not operating	1. Detection circuit defective. 2. Environment over-heat or poor ventilation	1. Return the inverter for repair 2. Improve ventilation

4.2 Manual Reset Operative Malfunctions (Auto-Reset inoperative)

INDICATION	CONTENT	POSSIBLE CAUSE	COUNTERMEASURE
OC	Over-current at stop condition	Detection circuit malfunction	Return the inverter for repair
OL1	Motor over-load	1. Loading too large 2. Improper V/F model setting 3. Improper F_18 setting	1. Increase capacity of motor 2. Adjust to use a proper V/F curve setting 3. Adjust F_18 according to instruction
OL2	Inverter over-load	1. Loading too large 2. Improper V/F model setting	1. Increase capacity of inverter 2. Adjust to use a proper V/F curve setting

4.3 Manual Reset and Auto-Reset Operative Malfunctions

INDICATION	CONTENT	POSSIBLE CAUSE	COUNTERMEASURE
OCS	Transient over-current starting machine	1. Motor coil short-circuit with external casing 2. Motor connection wire short-circuit with grounding 3. Transistor module damaged	1. Examining motor 2. Examining wiring 3. Replace transistor module
OCA	Over-current at acceleration	1. Acceleration time setting too short 2. Improper V/F feature selection 3. Applied motor capacity exceeds inverter capacity	1. Adjust acceleration time to longer setting 2. Adjust to a proper V/F curve 3. Replace and install another inverter with appropriate capacity
OCC	Over-current at steady speed	1. Transient alteration of the loading 2. Transient alteration of the power supply	1. Examining the loading configuration 2. Install inductor on the power supply input side
OCd	Over-current at deceleration	Deceleration setting too short	Adjust to use a longer acceleration time
OCb	Over-current at breaking	DC Breaking frequency, breaking voltage, or breaking time setting too long	Adjust to reduce settings of F_15, F_16, or F_17
OVC	Over-voltage at operation / deceleration	1. Deceleration time setting too short or inertial loading too large 2. Power supply voltage variation too large	1. Adjust to use a longer deceleration time 2. Install a inductor on the power supply input side 3. Increase the capacity of inverter
LVC	Insufficient voltage level at operation	1. Power supply voltage too low 2. Power supply voltage variation too large	1. Improve power source quality 2. Adjust to use a longer acceleration time 3. Increase capacity of inverter 4. Install a reactor on the power supply input side
OHC	Heat-sink over heated at operation	1. Loading too heavy 2. Ambient temperature too high or poor ventilation	1. Examining the loading 2. Increase capacity of inverter 3. Improve ventilation

4.4 Special Condition Description

INDICATION	CONTENT	POSSIBLE CAUSE
SP0	Zero Speed Stopping	When F_11 = 0, F_7= 0 and frequency setting < 1 Hz When F_11 = 1, F_7<(F_6/100), and frequency setting <(F_6/100)
SP1	Fail to start directly	1. If the inverter is set to external operation (F_10 = 1) and direct start is disabled (F_28 =1), the inverter cannot be started and will flash SP1 when operation switch turned to ON after applying power (see descriptions of F_28). 2. Direct start is possible when F_28 = 0.
SP2	Keypad emergency stop	The inverter setup to external operation (F_10=1). If the STOP key in the keypad is pressed at the middle of operation, the inverter stops according the setting in F_14 and flash SP2 after stop. The RUN switch must be turned OFF than ON to restart the machine.
E.S.	External emergency stop	When the external emergency stop signal is activated through the multi-function input terminal, the inverter decelerates and stops. Inverter flashes E.S. after stops. (Refer to instruction for F_19 for detail).
b.b.	External BASE BLOCK	When the external BASE BLOCK signal is activated through the multifunction terminal, the inverter stop output immediately and flash b.b. for indication. (Refer to instruction for F_19 for detail)

4.5 Keypad Operation Error Instruction

INDICATION	CONTENT	POSSIBLE CAUSE	COUNTERMEASURE
LOC	Motor direction locked	1. Attempt to reverse direction when F_22 = 1 2. Attempt to set F_22 to 1 when F_04=1	1. Adjust F_22 to 0 2. Adjust F_04 to 0
Er1	Keypad operation error	1. Press ▲ or ▼ keys when F_11=1 or under sp1 operation 2. Attempt to modify F_29 3.Attempt to modify parameter that is not allowed to be modified during operation (refer to parameter list)	1. Use ▲ or ▼ keys to adjust frequency setting only after F_11=0 2. Do not modify F_29 3. Modify in stop mode
Er2	Parameter setting error	1. F_6≦F_7	1. F_6 > F_7

4.6 General Malfunction Examination Method

ABNORMALITY	CHECK POINT	COUNTERMEASURE
Motor Inoperative	Is the power source voltage delivered to L1, L2 terminal (is the charging indicator illuminated)?	• Check if the power source on. • Turn power source OFF and then ON again. • Reconfirm the power voltage level.
	Is there voltage output from output terminal T1, T2 and T3?	• Turn power source OFF and then ON again
	Is the motor wired correctly?	• Check motor wiring.
	Is there any abnormal condition of the inverter?	• Refer to malfunction handling instructions to examine and correct wiring.
	Is the forward or reverse instruction loaded?	
Motor Inoperative	Is the analog frequency setting loaded?	• Check to see if wiring for analog frequency input signal is correct?
	If the operation mode setting correct?	• Check if the frequency input setting voltage is correct?
Motor operate in opposite direction	Is wiring on the output terminals T1, T2 and T3 correct?	• Operate by digital?
	Is the wiring for the forward and reverse signals correct?	• Wiring should be in accordance with the U, V, W terminals of motor.

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4.6 General Malfunction Examination Method

ABNORMALITY	CHECK POINT	COUNTERMEASURE
Motor operation speed fixed	Is the wiring for analog frequency input correct?	• Examining the wiring and correct it.
	Is the operation mode setting correct?	• Examining the wiring and correct it.
	Is the loading too heavy?	• Check the Operation panel
Motor operation at speed too high or too low	Is the specification of motor (poles, voltage) correct?	• Reduce loading
	Is the gear ratio correct?	• Reconfirm motor specification.
	Is the highest output frequency setting correct?	• Reconfirm gear ratio
	Is the voltage on motor side reduced extremely?	• Reconfirm highest output frequency
Abnormal speed variation at operation	Is the loading too heavy?	• Reduce loading variation
	Is the loading variation too large?	• Increase inverter and motor capacity
	Is the input power source steady and stable?	• Install AC reactor on the power supply input side

Chapter 5: Peripherals

5.1 EMI Filter Specification

Model	Dimension (mm)	Current (A)	Inverter model
CFFB42-A10-R	133 x 51 x 44	10A	RVDFA110020 - RVDFA120020F RVDFA110040 - RVDFA120040F RVDFA110075 - RVDFA120075F
CFFB42-A20-R only for 1-phase configuration	99 x 84 x 68	20A	RVDFB120150F - RVDFB120220F
CFFB43-A10-R106	120 x 58 x 58	10A	RVDFB340075F - RVDFB340150F RVDFB340220F

5.2 Specification Input Reactor and Braking Built-In Features

Model	Braking transistor build-in	Braking resister build-in	Torque of braking	Input AC Reactor	
				Current (A)	Inductance (mH)
RVDFA120020F	✘	✘	20%	3.0	7.0
RVDFA120040F	✘	✘	20%	5.2	4.2
RVDFA120075F	✘	✘	20%	9.4	2.1
RVDFB120150F	✔	✘	20%	19	1.1
RVDFB120220F	✔	✘	20%	25	0.71
RVDFB340075F	✔	✘	20%	2.5	8.4
RVDFB340150F	✔	✘	20%	5.0	4.2
RVDFB340220F	✔	✘	20%	7.5	3.6

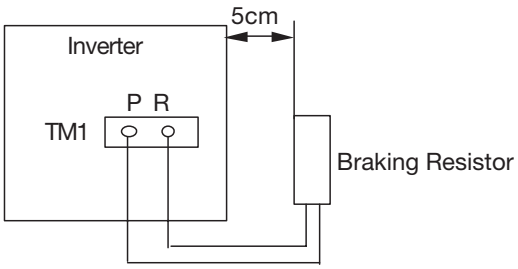
✔: Built-in ✘: Without Built-in

NOTE
1: Without transistor and resistor built-in.

5.3 Specification of Braking Resistor

Model of Inverter	Rate of Motor (kW)	Specification of Braking Resistor		Braking Resistor ED(%)	Torque of braking (%)
		(W)	(Ω)		
RVDFB120150F	1.5	150	100	10	119
RVDFB120220F	2.2	200	70	9	116
RVDFB340075F	0.75	60	750	8	125
RVDFB340150F	1.5	150	400	10	119
RVDFB340220F	2.2	200	250	8	128

NOTE:
1. Braking level: 200 V: 385 Vdc
   400 V: 770 Vdc
2. Braking resistor not admitted for RVDFAxxxxxx
3. Braking resistor mounting is below:



Chapter 6: Parameters Table

Customer				**Inverter Model**	
Using Site				**Contact Phone**	
Address					
Parameter Code	**Setting Content**	**Parameter Code**	**Setting Content**	**Parameter Code**	**Setting Content**
F-00		F-11		F-22	
F-01		F-12		F-23	
F-02		F-13		F-24	
F-03		F-14		F-25	
F-04		F-15		F-26	
F-05		F-16		F-27	
F-06		F-17		F-28	
F-07		F-18		F-29	
F-08		F-19		F-30	
F-09		F-20			
F-10		F-21			

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