

■ Additional sheet

■ VF-S15 : UL standard and CSA standard

VF-S15 that comply with UL/CSA Standard have the cULus mark on the nameplate.
This additional manual is the correction and additional information to comply with UL61800-5-1.

To comply with UL61800-5-1 and CSA 22.2 No.274, please apply this additional manual description as a priority rather than other instruction manuals, unless otherwise specified.

Confirm the safety precautions, the symbols and the indications described in the instruction manual E6582175 or E6581987 together.

cULus Mark on the nameplate



E6582384-02

1. General

 WARNING / AVERTISSEMENT	
 Electric shock	- RISK OF ELECTRIC SHOCK - DANGEROUS VOLTAGE MAY EXIST FOR _15_MINUTES AFTER REMOVING POWER - RISQUE DU CHOC ÉLECTRIQUE - UNE TENSION DANGEREUSE PEUT ÊTRE PRÉSENTÉE JUSQU'À 15 MINUTES APRÈS AVOIR COUPÉ L'ALIMENTATION

The following steps must be performed before wiring and servicing.

- (1) Turn off all input power.
- (2) Wait at least fifteen minutes and check to make sure that the charge lamp is no longer lit.
- (3) Use a tester that can measure DC voltage (1000VDC or more), and check to make sure that the voltage to the DC main circuits (across PA/+ and PC/-) is 45V or less.

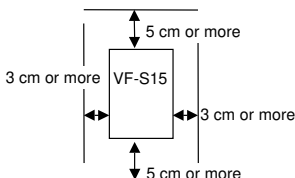
If these steps are not properly performed, the wiring will cause electric shock.

2. Compliance with Installation

A UL certificate was granted on the assumption that the inverter would be installed in an enclosure. Therefore, install the inverter in an enclosure and if necessary, take measures to maintain the inverter ambient temperature (temperature in the enclosure) within the specified temperature range.

Be sure to apply the minimum enclosure size shown in the remark under Table 3 and Table 4

Standard installation



Environments

Location of use	Indoors; not exposed to direct sunlight, corrosive gas, explosive gas, flammable gas, oil mist, or dust; and vibration of less than 5.9m/s ² (10 to 55Hz).
Elevation	1000 m or less
Ambient temperature	-10 to +40°C (50°C) Maximum Surrounding Air Temperature 40 °C (with the protective label on the top of the inverter) 50 °C (without the protective label on the top of the inverter, except 0.75 kW or less in 200/240 V class)
Storage temperature	-25 to +70°C (Temperature applicable for a short term.)
Relative humidity	5 to 95% (free from condensation and vapor).
Pollution degree	2
Overvoltage category	III

Current reduction

According to the carrier frequency F300 setting, you may need to reduce the inverter's continuous output current. Reduction rates vary depending on the capacity of the inverter.

[Single-phase 200/240V class]

Inverter model	Ambient temperature	Input voltage 200V to 240V	
		PWM carrier frequency	
		2.0k to 4.0kHz	4.1k to 12.0kHz
VFS15S-2004PL-CH	40°C or less	3.3 A	
VFS15S-2007PL-CH	40°C or less	4.8 A	
VFS15S-2015PL-CH	40°C or less	8.0 A	7.9 A
	Above 40 to 50°C	8.0 A	
VFS15S-2022PL-CH	40°C or less	11.0 A	10.0 A
	Above 40 to 50°C	11.0 A	

Note) For 0.75 kW or less in 200/240 V class, maintain the ambient temperature of 40°C or less and the PWM carrier frequency of 4kHz or less for the compliance with UL standard.

Note) For "Above 40°C to 50°C" of the ambient temperature except 0.75 kW or less in 200/240 V class, remove the protective label on the top of the inverter for the compliance with UL standard.

[Three-phase 400/500V class]

Inverter model	Ambient temperature	Input voltage 380V to 480V		Input voltage Above 480V to 500V	
		PWM carrier frequency		PWM carrier frequency	
		2.0k to 4.0kHz	4.1k to 12.0kHz	2.0k to 4.0kHz	4.1k to 12.0kHz
VFS15-4004PL1-CH	40°C or less	1.5 A	1.5 A		
	Above 40 to 50°C	1.5 A			
VFS15-4007PL1-CH	40°C or less	2.3 A	2.1 A		
	Above 40 to 50°C	2.3 A			
VFS15-4015PL1-CH	40°C or less	4.1 A	3.7 A		
	Above 40 to 50°C	4.1 A			
VFS15-4022PL1-CH	40°C or less	5.5 A	5.0 A		
	Above 40 to 50°C	5.5 A			
VFS15-4037PL1-CH	40°C or less	9.5 A	8.6 A		
	Above 40 to 50°C	9.5 A			
VFS15-4055PL-CH	40°C or less	14.3 A	13.0 A		
	Above 40 to 50°C	14.3 A			
VFS15-4075PL-CH	40°C or less	17.0 A	17.0 A		
	Above 40 to 50°C	17.0 A			
VFS15-4110PL-CH	40°C or less	27.7 A	25.0 A		
	Above 40 to 50°C	27.7 A			
VFS15-4150PL-CH	40°C or less	33.0 A	30.0 A		
	Above 40 to 50°C	33.0 A			

Note) For "Above 40°C to 50°C" of the ambient temperature, remove the protective label on the top of the inverter for the compliance with UL standard.

3. Compliance with Connection

DANGER

The opening of the branch circuit protective device may be an indication that a fault current has been interrupted. To reduce the risk of fire or electrical shock, current-carrying parts and other components of the controller should be examined and replaced if damaged. If burnout of the current element of an overload relay occurs, the complete overload relay must be replaced.

(LE DÉCLENCHEMENT DU DISPOSITIF DE PROTECTION DU CIRCUIT DE DÉRIVATION PEUT ÊTRE DÙ À UNE COUPURE QUI RÉSULTE D'UN COURANT DE DÉFAUT. POUR LIMITER LE RISQUE D'INCENDIE OU DE CHOC ÉLECTRIQUE, EXAMINER LES PIÈCES PORTEUSES DE COURANT ET LES AUTRES ÉLÉMENTS DU CONTRÔLEUR ET LES REMPLACER S'ILS SONT ENDOMMAGÉS. EN CAS DE GRILLAGE DE L'ÉLÉMENT TRAVERSÉ PAR LE COURANT DANS UN RELAIS DE SURCHARGE, LE RELAIS TOUT ENTIER DOIT ÊTRE REMPLACÉ)

Use the UL conformed cables (Rating 75 °C or more, Use the copper conductors only.) to the main circuit terminals (R/L1, S/L2, T/L3, U/T1, V/T2, W/T3).

- ⇒ For recommended tightening torque, see Table 1.
- ⇒ Use the ring terminal for the earth cables, see Table 2.
- ⇒ For recommended electric wire sizes, see Table 3.4.
- ⇒ Use the electric wire of Class1 for the control circuits.

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

For instruction in the Canada, Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the Canadian Electrical Code, Part I. .

(LA PROTECTION INTÉGRÉE CONTRE LES COURTSCIRCUITS N'ASSURE PAS LA PROTECTION DE LA DÉRIVATION. LA PROTECTION DE LA DÉRIVATION DOIT ÊTRE EXÉCUTÉE CONFORMÉMENT AU CODE CANADIEN DE L'ÉLECTRICITÉ, PREMIÈRE PARTIE.)

Table 1 Tighten the screws to specified torque

Recommended tightening torque for screws on the terminal board		
	N·m	lb·in
M3.5	1.0	8.9
M4	1.4	12.4
M5	2.4	20.8
M6	4.5	40.0
M4 (grounding terminal)	1.4	12.4
M5 (grounding terminal)	2.8	24.8

Table 2 Ring terminal sizes for earth cables

Earth Cable Sizes	M4 (grounding terminal)	M5 (grounding terminal)
AWG14	R2-4 [JIS standard]	R2-5 [JIS standard]
AWG12	R5.5-4 [JIS standard]	R5.5-5 [JIS standard]
AWG10	R5.5-4 [JIS standard]	R5.5-5 [JIS standard]

SCCR, Fuse and Wire sizes

Use the UL listed protective devices at connecting to power supply.

The VF-S15 short circuit current ratings have been obtained by shorting internal components. These ratings allow proper coordination of short circuit protection.

Suitable for use on a circuit capable of delivering not more than ___X___rms symmetrical Amperes, ___Y___ Volts maximum, when protected by ___Z1___ with a maximum rating of ___Z2___.

(CONVIENT AUX CIRCUITS NON SUSCEPTIBLES DE DÉLIVRER PLUS DE ___X___ AMPÈRES SYMÉTRIQUES EFFICACES, MAX. ___Y___ V, AVEC PROTECTION PAR ___Z1___ DE CALIBRE NOMINAL DE ___Z2___.)

Table 3 Standard SCCR condition of Fuses, Circuit breakers, line inductance and Wire sizes, with Enclosure

Inverter model	Volt -age	Branch circuit protection								(*4)	
		With Circuit breaker		With GV□P						(*1)	
		Type-Form	SC CR	(*2)(*3)		SC CR	With Fuse			Line inductance Min. value	Power circuit
				Type-Form	Rating		600V Class J	Rating	SCCR		
Marking	(V)	(kA)	(kA)	Type E	(V)	(HP)	(kA)	(A)	(kA)	mH	A
	Y	Z1, Z2	X	Z1, Z2			X	Z1, Z2	X	-	-
VFS15S-2004PL-CH	240	HGL36015	5(*5)	GV2P10	240	0.5	5(*6)	15	5(*6)	-	-
VFS15S-2007PL-CH	240	HGL36015	5(*5)	GV3P13	240	2	5(*6)	25	5(*6)	-	-
VFS15S-2015PL-CH	240	HGL36030	5(*5)	GV3P25	240	3	5(*6)	40	5(*6)	-	-
VFS15S-2022PL-CH	240	HGL36035	5(*5)	GV3P25	240	3	5(*6)	45	5(*6)	-	-
VFS15-4004PL1-CH	480	HJL36015	5	GV2P07	480Y/277	1	5	6	5	-	-
VFS15-4007PL1-CH	480	HJL36015	5	GV2P08	480Y/277	2	5	6	5	-	-
VFS15-4015PL1-CH	480	HJL36015	5	GV2P10	480Y/277	3	5	12	5	-	-
VFS15-4022PL1-CH	480	HJL36015	5	GV2P14	480Y/277	5	5	15	5	-	-
VFS15-4037PL1-CH	480	HJL36015	5	GV3P13	480Y/277	7.5	5	25	5	-	-
VFS15-4055PL-CH	480	HJL36020	22	GV3P18	480Y/277	7.5	22	40	22	-	-
VFS15-4075PL-CH	480	HJL36030	22	GV3P25	480Y/277	15	22	40	22	-	-
VFS15-4110PL-CH	480	HJL36040	22	GV3P32	480Y/277	20	22	60	22	-	-
VFS15-4150PL-CH	480	HJL36050	22	GV3P40	480Y/277	25	22	60	22	-	-

For the enclosure volume, it must be minimum 53L(Liter).

The enclosure mounting an inverter are a Type 1, 4(X) or 12 rated enclosure, only for the indoor usage.

Minimum enclosure volume allows for specified SCCR. Thermal requirements may require a larger enclosure.

The ampere rating of the short circuit protection devices in the table are maximum values.

Smaller ampere sizes can be used.

In case of using with a higher Short Circuit Current Ratings (SCCR) up to 100kA,
it is available by installing with the circuit breakers, GV□P or the fuses in the condition listed in Table 4.

Table 4 High SCCR condition of Fuses, Circuit breakers, line inductance and Wire sizes, with Enclosure

Table 4 - High Short-Circuit Conditions: Fuses, Circuit breakers, line inductance and wire sizes, with Enclosure															
Inverter model	Volt- age	Branch circuit protection									(*4)		Cable sizes		
		With Circuit breaker		With GV□ P					(*1)		Line inductance Min. value	Power circuit	Earth		
		(*2) SC Type-Form	CR	(*2)(*)3 Type-Form	Voltage Rating	Power	SC CR	600V Class J							
								Rating	SCCR						
										(A)				(kA)	
Marking	Y	Z1, Z2	X	Z1, Z2	(V)	(HP)	(kA)	X	Z1, Z2	X	-	-	A	(AWG-)	(AWG-)
VFS15S-2004PL-CH	240	HGL36015	65	GV2P10	240	0.5	65	15	100	2.5	5	14	14		
VFS15S-2007PL-CH	240	HGL36015	65	GV3P13	240	2	65	25	100	2.5	7	14	14		
VFS15S-2015PL-CH	240	HGL36030	65	GV3P25	240	3	65	40	100	1	13	10	12		
VFS15S-2022PL-CH	240	HGL36035	65	GV3P25	240	3	65	45	100	1	18	10	10		
VFS15-4004PL1-CH	480	HJL36015	65	GV2P07	480Y/277	1	65	6	100	12	1	14	14		
VFS15-4007PL1-CH	480	HJL36015	65	GV2P08	480Y/277	2	65	6	100	12	1.7	14	14		
VFS15-4015PL1-CH	480	HJL36015	65	GV2P10	480Y/277	3	65	12	100	6.8	3.2	14	14		
VFS15-4022PL1-CH	480	HJL36015	65	GV2P14	480Y/277	5	65	15	100	5	4.7	14	14		
VFS15-4037PL1-CH	480	HJL36015	65	GV3P13	480Y/277	7.5	65	25	100	3	8	12	14		
VFS15-4055PL-CH	480	HJL36020	65	GV3P18	480Y/277	7.5	65	40	100	2.5	11	10	10		
VFS15-4075PL-CH	480	HJL36030	65	GV3P25	480Y/277	15	65	40	100	1.5	15	8	10		
VFS15-4110PL-CH	480	HJL36040	65	GV3P32	480Y/277	20	65	60	100	1.2	22	8	10		
VFS15-4150PL-CH	480	HJL36050	65	GV3P40	480Y/277	25	65	60	100	0.8	29	6	10		

For the enclosure volume, it must be minimum 53L(Liter).

The enclosure mounting an inverter are a Type 1, 4(X) or 12 rated enclosure, only for the indoor usage.

Minimum enclosure volume allows for specified SCCR. Thermal requirements may require a larger enclosure.

The ampere rating of the short circuit protection devices in the table are maximum values.

Smaller ampere sizes can be used.

(*1) Use Class CC or J fast acting or time delay fuses from any manufacturer.

(*2) The manufacturer of the listed circuit breaker is "Schneider Electric".

(*3) For GV2P and GV3P use, 480 V ratings are for Wye connected electrical distribution systems.
GV2P self-protected manual combination starter must be used with GV2GH7 insulating barrier to meet Type E rating.
GV3P self-protected manual combination starter must be used with GV3G66 + GVAM11 insulating barrier and auxiliary contact to meet Type E rating. The GVAM11 provides a visual indication if the GV3P has tripped.
GV3P self-protected manual combination starter with connection by lugs that added the digit 6 to the end of reference must be used with LAD96570 (2 pieces) + GVAM11 to meet Type E rating.

UL61800-5-1 require publishing the standard Type E combination motor controller power rating since this is a basic identification marking of type E devices.

However, when applied as an input overcurrent protective device for a drive, the rated current of the Type E combination motor controller, not the rated power, is the key parameter for dimensioning.

GV□P Type E combination motor controllers are adjustable, their current range is shown on the adjustment dial and their selection is based on the input current and not the power rating of the drive.

(*4) Reactor is RLW series of "MTE corporation" or from "Schneider Electric", do not substitute.

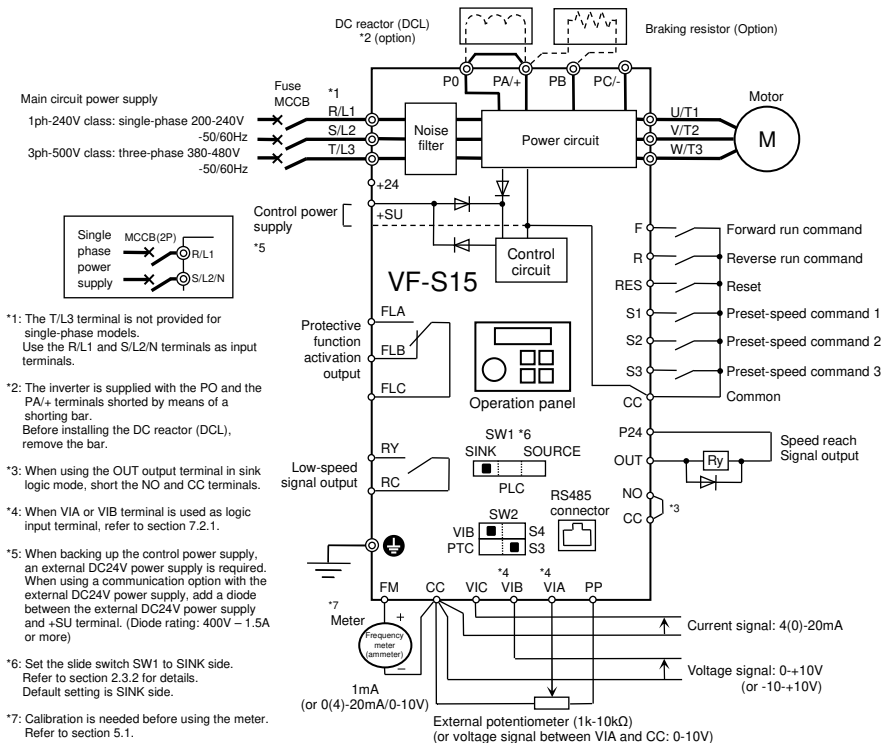
Reactor selection must be satisfied to the line inductance minimum values in the table.

(*5) Although SCCR is 5 kA, the thermal design is for 1 kA. For applying SCCR up to 5 kA, reduce the load or install the input inductance not to exceed the rated input current.

Main and control circuit terminals

This diagram shows an example of wiring of the main and control circuit (in case of sink logic).

Standard connection diagram – SINK with internal supply (Negative) (common: CC)



For sections,
refer to instruction manual E6581987 or
E6582175

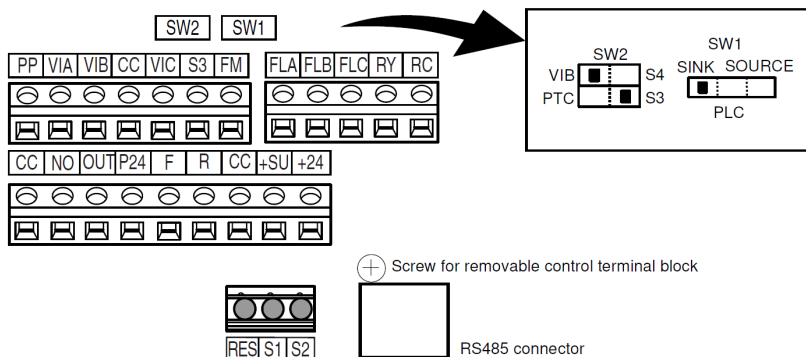
Main circuit terminals

Terminal symbol	Terminal function
	Grounding terminal for connecting inverter. There are 3 terminals in cooling fin or mounting part of EMC plate.
R/L1, S/L2, T/L3	200/240 V class Single-phase 200 to 240V-50/60Hz 400/500 V class : Three-phase 380 to 480V(UL)-50/60Hz * Single-phase inputs are R/L1 and S/L2/N terminals.
U/T1, V/T2, W/T3	Connect to three-phase motor.
PA/+, PB	Connect to braking resistors.
PA/+	This is a positive potential terminal in the internal DC main circuit. DC common power can be input between PA/+ terminal and PC/- terminal.
PC/-	This is a negative potential terminal in the internal DC main circuit. DC common power can be input between PC/- terminal and PA/+ terminal.
PO, PA/+	Terminals for connecting a DC reactor (DCL: optional external device). Shorted by a shorting bar when shipped from the factory. Before installing DCL, remove the shorting bar.

The arrangements of power circuit terminals are different from each range.

Control circuit terminals

The control circuit terminal block is common to all equipment.



Screw size	Recommended tightening torque
M3 screw	0.5 N·m 4.4 lb·in

Stripping length: 6 (mm)
Screwdriver: Small-sized flat-blade screwdriver
(Blade thickness: 0.5 mm, blade width: 3.5 mm)

Terminal symbol	Input / output	Function		Electrical specifications
F	Input	Multifunction programmable logic input	Shorting across F-CC or P24-F causes forward rotation; open causes deceleration stop. (When Standby ST is always ON) 3 different functions can be assigned.	No voltage logic input 24Vdc-5mA or less
R	Input		Shorting across R-CC or P24-R causes reverse rotation; open causes deceleration stop. (When Standby ST is always ON) 3 different functions can be assigned.	Sink/Source and PLC selectable using slide switch SW1 (Default setting is Sink side)
RES	Input		This inverter protective function is reset if RES-CC or P24-RES is connected. Shorting RES-CC or P24-RES has no effect when the inverter is in a normal condition. 2 different functions can be assigned.	Pulse train input (S2 terminal) Pulse frequency range: 10pps~2kpps Duty: 50±10%
S1	Input		Shorting across S1-CC or P24-S1 causes preset speed operation. 2 different functions can be assigned.	PTC input (S3 terminal)
S2	Input		Shorting across S2-CC or P24-S2 causes preset speed operation. By changing parameter F146 setting, this terminal can also be used as a pulse train input terminal.	
S3	Input		Shorting across S3-CC or P24-S3 causes preset speed operation. By changing slide switch SW2 and parameter F147 setting, this terminal can also be used as a PTC input terminal.	
CC	Common to Input / output	Control circuit's equipotential terminal (3 terminals)		-
PP	Output	Analog power supply output		10Vdc (permissible load current: 10mA)
V I A Note 1)	Input	Multifunction programmable analog input. Default setting: 0-10Vdc (1/1000 resolution) and 0-60Hz (0-50Hz) frequency input. By changing parameter F109, this terminal can also be used as a multifunction programmable logic input terminal.		10Vdc (internal impedance: 30kΩ)
V I B Note 1)	Input	Multifunction programmable analog input. Default setting: 0-10Vdc (1/1000 resolution) and 0-60Hz (0-50Hz) frequency input. The function can be changed to -10~+10V input (1/2000 resolution) by parameter F107 =1 setting. By switching slide switch SW2 and changing parameter F109 setting, this terminal can also be used as a multifunction programmable logic input terminal.		10Vdc (internal impedance: 30kΩ)
V I C	Input	Multifunction programmable analog input. 4-20mA (0-20mA) input.		4-20mA (internal impedance: 250Ω)
FM	Output	Multifunction programmable analog output. Default setting: output frequency. The function can be changed to meter option (0-1mA), 0-10Vdc voltage or 0-20mA (4-20mA) current output by parameter F681 setting. Resolution Max. 1/1000.		1mA full-scale ammeter. 0-20mA (4-20mA) DC ammeter Permissible load resistance: 600Ω or less 0-10V DC volt meter Permissible load resistance: 1kΩ or more

Terminal symbol	Input / output	Function	Electrical specifications
P24	Output	24Vdc power output, by changing SW1 to SINK or SOURCE side.	24Vdc-100mA
	Input	This terminal can be used as a common terminal when an external power supply is used by changing SW1 to PLC side.	-
+24	Output	24Vdc power output	24Vdc-100mA Note 2)
+SU	Input	DC power input terminal for operating the control circuit. Connect a control power backup device (option or 24Vdc power supply) between +SU and CC.	Voltage: 24Vdc $\pm$ 10% Current: 1A or more
OUT NO	Output	Multifunction programmable open collector output. Default setting detect and output speed reach signal. Multifunction output terminals to which two different functions can be assigned. The NO terminal is an equipotential terminal. It is isolated from the CC terminal. By changing parameter F669 settings, these terminals can also be used as multifunction programmable pulse train output terminals.	Open collector output 24Vdc-100mA To output pulse trains, a current of 10mA or more needs to be passed. Pulse frequency range: 10~2kpps
FLA FLB FLC Note 3) Note 4)	Output	Multifunction programmable relay contact output. Detects the operation of the inverter's protection function. Contact across FLA-FLC is closed and FLB-FLC is opened during protection function operation.	Max. switching capacity 250Vac-2A, 30Vdc-2A (cos ϕ =1) : at resistive load
RY RC Note 3) Note 4)	Output	Multifunction programmable relay contact output. Default settings detect and output low-speed signal output frequencies. Multifunction output terminals to which two different functions can be assigned.	250Vac-1A (cos ϕ =0.4) 30Vdc-1A (L/R=7ms) Min. permissible load 5Vdc-100mA 24Vdc-5mA

Note 1) When VIA terminal is used as logic input terminal, be sure to connect a resistor between P24 and VIA in case of sink logic, between VIA and CC in case of source logic. (Recommended resistance: 4.7k Ω -1/2W)
It is not needed for VIB terminal.

Note 2) 100mA is the sum of P24 and +24.

Note 3) A chattering (momentary ON/OFF of contact) is generated by external factors of the vibration and the impact, etc. In particular, please set the filter of 10ms or more, or timer for measures when connecting it directly with input unit terminal of programmable controller. Please use the OUT terminal as much as possible when the programmable controller is connected.

Note 4) OVC II: Overvoltage category II

4. Overload protection

VF-S15 has overload protection.

Over current rating: 150%-1min. 200%-0.5sec.

Refer to the nameplate for the rated current.

Refer to the instruction manual E6581987 or E6582175 for detailed information.

5. Motor thermal protection

CAUTION / ATTENTION

- Risk to damage the motor -

Motor thermal protection will not be provided by the drive if the motor's nominal current is 20% lower than that output of the drive.

In this case, find an alternative source of thermal protection.

Failure to follow these instructions can result in equipment damage.

(- Risque d'endommagement du moteur -)

(La protection thermique du moteur ne sera pas assurée par le variateur si son courant nominal est inférieur de 20 % à celui de sortie du variateur.

Dans ce cas, recherchez une autre source de protection thermique.

Le non-respect de ces instructions peut entraîner des dommages matériels.)

The devices VF-S15 are provided with integral overload protection for the motor after activation of this function by setting.

Protection at 100% of the full load motor current.

The motor thermal protection current (tHr) must be set to the rated current indicated on the motor nameplate.

VF-S15 has the motor thermal protection.

Select the electronic thermal protection characteristics that fit with the ratings and characteristics of the motor.

In case of multi motor operation with one inverter, thermal relay should be connected to each motor.

tHr	: Motor electronic-thermal protection level 1
OLM	: Electronic-thermal protection characteristic selection
F173	: Motor electronic-thermal protection level 2
F606	: Motor overload reduction frequency threshold
F607	: Motor 150% overload detection time
F631	: Inverter overload detection method
F632	: Electronic-thermal memory
F657	: Overload alarm level

• Function

This parameter allows selection of the appropriate electronic thermal protection characteristics according to the particular rating and characteristics of the motor.

[Parameter setting]

Title	Function	Adjustment range				Default setting
tHr	Motor electronic-thermal protection level 1	10 – 100 (%)				100
OLM	Electronic-thermal protection characteristic selection	Setting value	Standard motor	Overload protection	Overload stall	0
		0		valid	invalid	
		1		valid	valid	
		2		invalid	invalid	
		3		invalid	valid	
		4	VF motor (special motor)	valid	invalid	
		5		valid	valid	
		6		invalid	invalid	
7	invalid	valid				
F173	Motor electronic-thermal protection level 2	10 – 100 (%) / (A)				100
F606	Motor overload reduction frequency threshold	0.0 – 60.0 (Hz)				6.0
F607	Motor 150% overload detection time	10 – 2400 (s)				300
F631	Inverter overload detection method	0: 150%-60s 1: Temperature estimation				0
F632	Electronic-thermal memory	0: Disabled (tHr, F173) 1: Enabled (tHr, F173) 2: Disabled (tHr) 3: Enabled (tHr)				0
F657	Overload alarm level	10-100				50

Note) AUL must be set to default setting (1: Constant torque characteristic) for the compliance with UL standard.

Note) F606 is available from CPU1 version 130 (Ver.130) or later. For Ver.128 or before, F606 doesn't exist and the threshold is fixed at 6Hz.

1) **Setting the electronic thermal protection characteristics selection OLM and motor electronic thermal protection level 1 tHr, 2 F173**

The electronic thermal protection characteristics selection (OLM) is used to enable or disable the motor overload trip function (OL2) and the overload stall function.

While the inverter overload trip (OL1) will be in constantly detective operation, the motor overload trip (OL2) can be selected using the parameter OLM

Explanation of terms

Overload stall: This is an optimum function for equipment such as fans, pumps and blowers with variable torque characteristics that the load current decreases as the operating speed decreases.

When the inverter detects an overload, this function automatically lowers the output frequency before the motor overload trip (OL2) is activated. With this function, operation can be continued, without tripping, by operating using a frequency balanced by load current.

Note: Do not use the overload stall function with loads having constant torque characteristics (such as conveyor belts in which load current is fixed with no relation to speed).

[Using standard motors (other than motors intended for use with inverters)]

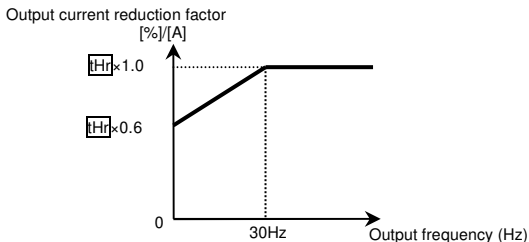
When a motor is used in the lower frequency range than the rated frequency, that will decrease the cooling effects for the motor. This speeds up the start of overload detection operations when a standard motor is used in order to prevent overheating.

■ **Setting of electronic thermal protection characteristics selection OLM**

Setting value	Overload protection	Overload stall
0	valid	invalid
1	valid	valid
2	invalid	invalid
3	invalid	valid

■ Setting of motor electronic thermal protection level 1 $\boxed{\text{tHr}}$ (Same as $\boxed{\text{F173}}$)

When the capacity of the motor in use is smaller than the capacity of the inverter, or the rated current of the motor is smaller than the rated current of the inverter, adjust thermal protection level 1 $\boxed{\text{tHr}}$ for the motor in accordance with the motor's rated current.



Note: The motor overload protection start level is fixed at 30Hz.

[Using a VF motor (motor for use with inverter)]

■ Setting of electronic thermal protection characteristics selection $\boxed{\text{OLM}}$

Setting value	Overload protection	Overload stall
4	valid	invalid
5	valid	valid
6	invalid	invalid
7	invalid	valid

■ Setting of Motor overload reduction frequency threshold $\boxed{\text{F606}}$

VF motors (motors designed for use with inverters) can be used in frequency ranges lower than those for standard motors, but an extremely low speed will cause the cooling effect of the motor to decrease.

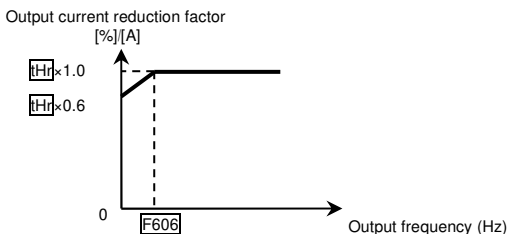
Set the value of F606 (Motor overload reduction frequency threshold) suited for the motor characteristic. We recommend that it be set to around 6 Hz (default setting) (refer to the following figure).

Note) F606 is available from CPU1 version 130 (Ver.130) or later. For Ver.128 or before, F606 doesn't exist, and the threshold is fixed at 6Hz

■ Setting of motor electronic thermal protection level 1 $\boxed{\text{tHr}}$ (Same as $\boxed{\text{F173}}$)

If the capacity of the motor is smaller than the capacity of the inverter, or the rated current of the motor is smaller than the rated current of the inverter, adjust the electronic thermal protection level 1 $\boxed{\text{tHr}}$ so that it fits the motor's rated current.

* If the indications are in percentages (%), then 100% equals the inverter's rated output current (A).



2) Motor 150%-overload detection time $\boxed{\text{F607}}$

Do not change this parameter from default setting.

3) Inverter overload detection method F631

As this function is set to protect the inverter unit, this function cannot be turned off by parameter setting.

The inverter overload detection method can be selected using parameter f631 (Inverter overload detection method).

If the inverter overload trip function (OL1) is activated frequently, this can be improved by adjusting the stall operation level F601 downward or increasing the acceleration time ACC or deceleration time DEC.

- F631=0 (150%-60s)

Protection is given uniformly regardless of temperature by the 150%-60 sec overload curve.

- F631=1 (Temperature estimation)

This parameter adjusts automatically overload protection, predicting the inverter internal temperature rise.

4) Electronic thermal memory F632

When the power is OFF, it is possible to reset or maintain the overload totaling level.

This parameter's settings are applied both to the motor's electronic thermal memory and the electronic thermal memory for inverter protection.

5) Overload alarm level F657

When the motor overload level reaches to F657 setting value (%) of overload trip (OL2) level, "I" will be displayed on the left side digit and the "I" and output frequency monitor will be blinking alternately on overload alarm status.

Overload alarm signal can be output from output terminal.

6. Motor PTC thermal protection

Set a parameter F147 and lower slide switch of SW2 to PTC side, when S3 terminal is used as PTC input terminal.

F147: Logic input / PTC input selection (S3)

F645: PTC thermal selection

F646: Resistor value for PTC detection

- Function
This function is used to protect motor from overheating using the signal of PTC built-in motor.
The trip display is "E-32".

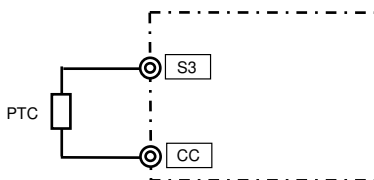
[Parameter setting]

Title	Function	Adjustment range	Default setting
F147	Logic input / PTC input selection (S3)	0: Logic input 1: PTC input	0
F645	PTC thermal selection	1: Tripping 2: Alarm only	1
F646	PTC detection resistor value	100-9999 (Ω)	3000

Note : Protecting PTC thermal, set F147=1 (PTC input) and slide switch SW2 to PTC side.

- Tripping level is defined by F646 setting. Alarm level is defined by 60% of F646 setting.
- Connect the PTC between S3 and CC terminals. Detection temperature can be set by F646 setting.

[Connection]



- Output of PTC input alarm signal
The PTC input alarm is assigned to the output terminal by setting the parameter of the output terminal selection function to 150 or 151.

7. Ground fault detection function

To comply UL61800-5-1, set ground fault detection selection (F614) to 1 "Enabled".

8. Other



WARNING / AVERTISSEMENT

Operation of this equipment requires detailed installation and operation instructions provided in the hardware manual intended for use with this product.

This information is provided included in the container this device was packaged in.

This information should be retained with this device at all times.

(L'utilisation de cet équipement nécessite des instructions d'installation et d'utilisation détaillées, fournies dans le manuel du matériel destiné à être utilisé avec ce produit.

Ces informations sont fournies dans l'emballage de l'appareil.

Elles doivent être conservées avec cet appareil en permanence.)

Instruction manual E6582175 is available via the internet at
<https://www.toshiba-tips.co.jp/en/products/inverter/standard.html>