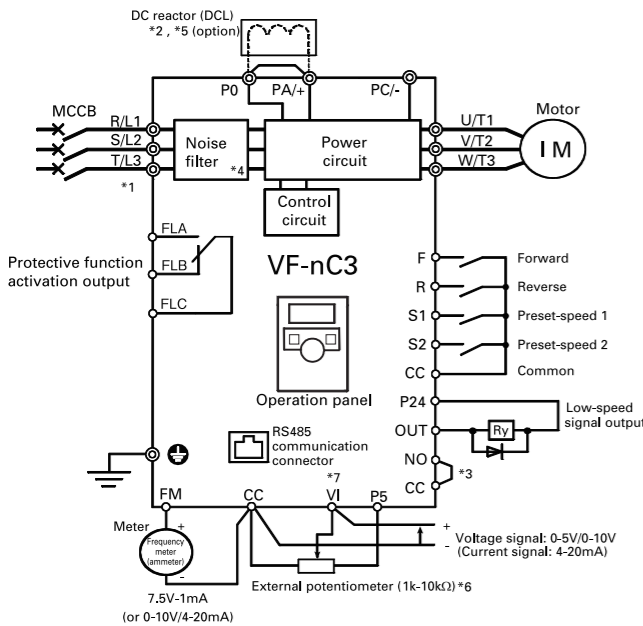


# Connection diagram and terminal functions

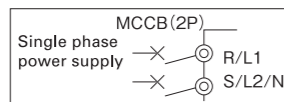
## Standard connection diagram

### Standard connection diagram-(sink logic) (Negative)(common:CC)

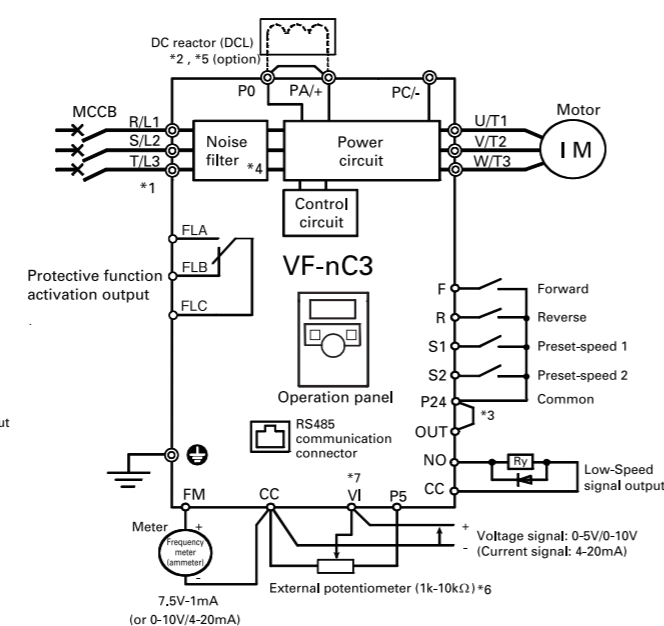


\*1: Main circuit power supply  
3ph-240V class: three-phase 200-240V-50/60Hz  
1ph-240V class: single-phase 200-240V-50/60Hz  
1ph-120V class: single-phase 100-120V-50/60Hz

The T/L3 terminal is not provided for single-phase models.  
Use the R/L1 and S/L2/N terminals as input terminals.

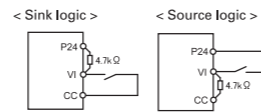


### Standard connection diagram-(source logic) (Positive)(common:P24)



\*2: The inverter is supplied with the PO and the PA+ terminals shorted by means of a shorting bar.  
Before installing the DC reactor (DCL), remove the bar.  
\*3: When using the OUT output terminal in sink logic mode, short the NO and CC terminals.  
When using the NO output terminal in source logic mode, short the P24 and OUT terminals.

\*4: 1ph-240V models have noise filter inside.  
\*5: 1ph-120V models cannot be used with DC reactors.  
\*6: When external potentiometer is connected by using P5 terminal, set the parameter  $F109=3$   
\*7: When using VI terminal as a logic input terminal, set the parameter  $F109=2$  and connect as following schematics. Be sure to connect a resistor between P24 and VI terminals in case of sink logic, between VI and CC terminals in case of source logic.  
(Recommended resistance: 4.7kΩ -1/2W)



## Main circuit terminal functions

Terminal symbol	Terminal function
	Grounding terminal for connecting inverter.
R/L1,S/L2,T/L3	1-phase 120V class: single-phase 100 to 120V-50/60Hz 1-phase 240V class: single-phase 200 to 240V-50/60Hz 3-phase 240V class: three-phase 200 to 240V-50/60Hz * Single-phase input: R/L1 and S/L2/N terminals
U/T1,V/T2,W/T3	Connect to a (three-phase induction) motor.
PC/-	This is a negative potential terminal in the internal DC main circuit. DC common power can be input across the PA terminals (positive potential). DC common power can not connect to 1-phase 120V models.
PO, PA/+	Terminals for connecting a DC reactor (DCL: optional external device). Shorted by a short bar when shipped from the factory. Before installing DCL, remove the short bar. 1-phase 120V models cannot be used with DC reactors.

## Control circuit terminal functions

Terminal symbol	Terminal function	Electrical specifications
F	Shorting across F-CC causes forward rotation; open causes slowdown and stop. (When ST is always ON)3 different functions can be assigned.	No voltage logic input 24Vdc-5mA or less * Sink/Source selectable using parameter $F127$ (Explanation in case of sink logic)
R	Shorting across R-CC causes reverse rotation; open causes slowdown and stop. (When ST is always ON)3 different functions can be assigned.	
S1	Shorting across S1-CC causes preset speed operation. 2 different functions can be assigned.	
S2	Shorting across S2-CC causes preset speed operation. 2 different functions can be assigned.	
CC	Control circuit's equipotential terminal (2 terminals)	
P5	Analog power supply output	5Vdc (permissible load current: 10mA)
VI	Multifunction programmable analog input. Factory default setting: 0-10Vdc(10 bits resolution) and 0-60Hz (0-50Hz) frequency input. The function can be changed to 4-20mA current input by parameter $F109=1$ setting and 0-5Vdc (10 bits resolution) voltage input by parameter $F109=3$ setting. By changing parameter $F109=2$ setting, this terminal can also be used as a multifunction programmable logic input terminal. Be sure to insert a resistor between P24-VI (4.7 kΩ-1/2 W) in case of sink logic, between VI-CC in case of source logic.	5V/10Vdc (internal impedance: 40kΩ) 4-20mA (internal impedance: 250Ω) Note)
FM	Multifunction programmable analog output. Standard default setting: output frequency. The function can be changed to 0-10Vdc voltage or 0-20mA current output by parameter $F581$ setting.	1mA full-scale ammeter 0-20mA (4-20mA) DC ammeter Permissible load resistance: 750Ω or less 0-10V DC volt meter
P24	24Vdc power output	24Vdc-100mA
OUT NO	Multifunction programmable open collector output. Standard default setting : low speed signal. Multifunction output terminals to which two different functions can be assigned. The NO terminal is an isoelectric output terminal. It is insulated from the CC terminal. By changing parameter 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: 38~1600pps
FLA FLB FLC	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.	250Vac-2A ( $\cos\phi=1$ ): at resistance load 30Vdc-1A, 250Vac-1A, ( $\cos\phi=0.4$ )

Note) If 4-20mA is selected, when the inverter's power is ON, the internal impedance is 250Ω, but when the power is OFF, the internal impedance increases very much to approximately 40kΩ.

## Wiring devices

Voltage class	Applicable motor (kW)	Inverter type	Input current (A)		Molded-case circuit breaker (MCCB) Earth leakage circuit breaker (ELCB) Note4)		Magnetic contactor (MC) Note1) 2) 3)		Wire size (mm <sup>2</sup> ) Note8)		
			No reactor	With DC reactor	Rated current (A)		Rated current (A)		Main circuit Note5)	DC reactor (optional)	Grounding cable Note7)
					No reactor	With DC reactor	No reactor	With DC reactor			
3-phase 240V	0.1	VFNC3-2001P	1.2	0.6	5	5	20	20	1.5(1.5)	1.5	2.5
	0.2	VFNC3-2002P	2.0	0.9	5	5	20	20	1.5(1.5)	1.5	2.5
	0.4	VFNC3-2004P	3.6	1.8	5	5	20	20	1.5(1.5)	1.5	2.5
	0.75	VFNC3-2007P	6.3	3.5	10	5	20	20	1.5(1.5)	1.5	2.5
	1.5	VFNC3-2015P	11.1	6.6	15	10	20	20	1.5(1.5)	1.5	2.5
	2.2	VFNC3-2022P	14.9	9.3	20	15	20	20	2.5(1.5)	1.5	2.5
1-phase 240V	0.1	VFNC3S-2001PL	2.0	1.2	5	5	20	20	1.5(1.5)	1.5	2.5
	0.2	VFNC3S-2002PL	3.4	2.1	5	5	20	20	1.5(1.5)	1.5	2.5
	0.4	VFNC3S-2004PL	5.9	4.1	10	5	20	20	1.5(1.5)	1.5	2.5
	0.75	VFNC3S-2007PL	10.2	7.7	15	10	20	20	1.5(1.5)	1.5	2.5
	1.5	VFNC3S-2015PL	17.8	14.8	30	20	20	20	2.5(2.5)	1.5	2.5
	2.2	VFNC3S-2022PL	24	20.3	30	30	32	32	4.0(4.0)	1.5	4.0
1-phase 120V	0.1	VFNC3S-1001P	3.5	-	5	-	20	-	1.5	-	2.5
	0.2	VFNC3S-1002P	6.0	-	10	-	20	-	1.5	-	2.5
	0.4	VFNC3S-1004P	11.4	-	15	-	20	-	2.5	-	2.5
	0.75	VFNC3S-1007P	18.9	-	30	-	20	-	4.0	-	4.0

- Note 1.** Be sure to attach a surge killer to the exciting coil of the relay and the magnetic contactor.  
**Note 2.** When using the auxiliary contacts 2a of the magnetic contactor MC for the control circuit, connect the contacts 2a in parallel to increase reliability.  
**Note 3.** When a motor is driven by commercial power supply using commercial power supply / inverter switching circuit, use a magnetic contactor appropriated AC-3 class the motor rated current.  
**Note 4.** Select an MCCB with a rated interrupting current appropriate to the capacity of the power supply, because short-circuit currents vary greatly depending on the capacity of the power supply and the condition of the wiring system. The MCCB, MC and ELCB in this table were selected, on the assumption that a power supply with a normal capacity would be used.  
**Note 5.** Sizes of the wires connected to the input terminals R/L1, S/L2 and T/L3 and the output terminals U/T1, V/T2 and W/T3 when the length of each wire does not exceed 30m.  
The numeric values in parentheses refer to the sizes of wires to be used when a DC reactor is connected.  
**Note 6.** For the control circuit, use shielded wires 0.75 mm<sup>2</sup> or more in diameter.  
**Note 7.** For grounding, use a cable with a size equal to or larger than the above.  
**Note 8.** The wire sizes specified in the above table apply to HIV wires (copper wires shielded with an insulator with a maximum allowable temperature of 75°C) used at an ambient temperature of 50°C or less.

## Multifunction programmable logic input/output

### Logic input terminal

Terminal symbol	Parameter	Function	Action	Default setting
F	$F111$	Input terminal selection 1A	Set the function number to each parameters. Two or more functions can be set to one terminal. All functions operate by the signal input	2(Forward run)
	$F151$	Input terminal selection 1B		0(No function)
	$F155$	Input terminal selection 1C		0(No function)
R	$F112$	Input terminal selection 2A		4(Reverse run)
	$F152$	Input terminal selection 2B		0(No function)
	$F156$	Input terminal selection 2C		0(No function)
S1	$F113$	Input terminal selection 3A		10(Preset-speed command 1)
	$F153$	Input terminal selection 3B		0(No function)
S2	$F114$	Input terminal selection 4A		12(Preset-speed command 2)
	$F154$	Input terminal selection 4B		0(No function)
VI	$F109$	Analog/logic input selection (VI terminal)	Set $F109=2$ (Logic input) for logic input.	0(Voltage input signal 0 to 10V)
	$F115$	Input terminal selection 5	Set the function number.	14(Preset-speed command 3)

Note) When using the VI terminal as logic input terminal, be sure to connect a resistor between P24 and VI terminals in case of sink logic, between VI and CC terminals in case of source logic.  
(Recommended resistance: 4.7kΩ -1/2W)

### Logic output terminal

Terminal symbol	Parameter	Function	Action	Default setting
OUT	$F130$	Output terminal selection 1A	Set the function number to each parameters. In case of using one function, please set $F130$ .	4(Low speed detection)
	$F137$	Output terminal selection 1B		255(Always ON)
	$F139$	Output terminal logic selection	In case of set two functions, OUT outputs by 'AND'/'OR' logic.	0(AND)
	$F559$	Logic output/pulse train output selection	Select logic or pulse train output.	0(Logic)
FL(A, B, C)	$F132$	Output terminal selection 2	Set the function number.	10(Failure signal (trip output))

Note) All of logic output terminals are turned off about 0.5 to 1 second when power-on and fault reset. Please pay attention to use negative logic outputs.