10. Peripheral devices

⚠ Warning	
Prohibited	• When supplying power from a wall socket, do not exceed the rated capacity of the socket. Otherwise, this may generate excessive heat which can start a fire.
Instruction	• When using switchgear for the inverter, it must be installed in a cabinet. Failure to do so can lead to risk of electric shock and can result in death or serious injury.
Prohibited	• Connect earth cables securely. Failure to do so can lead to risk of electric shock or fire in case of a failure or short-circuit or electric leak.

10.1 Selection of wiring materials and devices

Voltage class	Capacity of applicable motor (kW)	Inverter model	Wire size (See Note 4)					
			Power circuit (mm^2) (Note 1.)		DC reactor (optional) (mm^2)		Earth cable (mm^2)	
			IEC compliant	For Japan (JEAC800 1-2005)	IEC compliant	For Japan (JEAC800 1-2005)	IEC compliant	For Japan (JEAC800 1-2005)
Single-phase 100V class	0.1	VFNC3S-1001P	1.5	2.0	-	-	2.5	2.0
	0.2	VFNC3S-1002P	1.5	2.0	-	-	2.5	2.0
	0.4	VFNC3S-1004P	2.5	2.0	-	-	2.5	2.0
	0.75	VFNC3S-1007P	4.0	2.0	-	-	4.0	3.5
Single-phase 200V class	0.1	VFNC3S-2001PL	1.5(1.5)	2.0(2.0)	1.5	2.0	2.5	2.0
	0.2	VFNC3S-2002PL	1.5(1.5)	2.0(2.0)	1.5	2.0	2.5	2.0
	0.4	VFNC3S-2004PL	1.5(1.5)	2.0(2.0)	1.5	2.0	2.5	2.0
	0.75	VFNC3S-2007PL	1.5(1.5)	2.0(2.0)	1.5	2.0	2.5	2.0
	1.5	VFNC3S-2015PL	2.5(2.5)	2.0(2.0)	1.5	2.0	2.5	2.0
	2.2	VFNC3S-2022PL	4.0(4.0)	2.0(2.0)	1.5	2.0	4.0	3.5
Three-phase 200V class	0.1	VFNC3-2001P	1.5(1.5)	2.0(2.0)	1.5	2.0	2.5	2.0
	0.2	VFNC3-2002P	1.5(1.5)	2.0(2.0)	1.5	2.0	2.5	2.0
	0.4	VFNC3-2004P	1.5(1.5)	2.0(2.0)	1.5	2.0	2.5	2.0
	0.75	VFNC3-2007P	1.5(1.5)	2.0(2.0)	1.5	2.0	2.5	2.0
	1.5	VFNC3-2015P	1.5(1.5)	2.0(2.0)	1.5	2.0	2.5	2.0
	2.2	VFNC3-2022P	2.5(1.5)	2.0(2.0)	1.5	2.0	2.5	2.0
	4.0	VFNC3-2037P	4.0(2.5)	2.0(2.0)	4.0	2.0	4.0	3.5

Note 1: 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 2: For the control circuit, use shielded wires 0.75 mm^2 or more in diameter.

Note 3: For grounding, use a cable with a size equal to or larger than the above.

Note 4: The wire sizes specified in the above table apply to HIV wires (cupper wires shielded with an insulator with a maximum allowable temperature of 75°C) used at an ambient temperature of 50°C or less.

Note 5: If there is a need to bring the inverter into UL compliance, use wires specified in Chapter 9.

■ Selection of wiring devices

Voltage class	Applicable motor (kW)r	Input current (A)		No-fuse breaker (MCCB) Earth leakage breaker (ELCB)				Magnetic contactor (MC)				Overload relay (THR)	
				No reactor		with DCL		No reactor		with DCL		Adjustment current (A) reference value	Model
		No reactor	With DCL	Rated current (A)	MCCB type (ELCB type)	Rated current (A)	MCCB type (ELCB type)	Rated current (A)	Model	Rated current (A)	Model		
Single-phase 100V class	0.1	3.5	-	5	NJ30E (NJV30E)	-	-	13	CA13	-	-	0.7	TH13U
	0.2	6.0	-	10		-		13		-		1.3	
	0.4	11.4	-	15		-		13		-		2.3	
	0.75	18.9	-	30		-		19	CA20	-		3.6	
Single-phase 200V class	0.1	2.0	1.2	5	NJ30E (NJV30E)	5	NJ30E (NJV30E)	13	CA13	13	CA13	0.7	TH13U
	0.2	3.4	2.1	5		5		13		13		1.3	
	0.4	5.9	4.1	10		5		13		13		2.3	
	0.75	10.2	7.7	15		10		13		13		3.6	
	1.5	17.8	14.8	20		15		19	CA20	13		6.8	
	2.2	24	20.3	30		30		26	CA25	19	CA20	9.3	
Three-phase 200V class	0.1	1.2	0.6	5	NJ30E (NJV30E)	5	NJ30E (NJV30E)	13	CA13	13	CA13	0.7	TH13U
	0.2	2	0.9	5		5		13		13		1.3	
	0.4	3.6	1.8	5		5		13		13		2.3	
	0.75	6.3	3.5	10		5		13		13		3.6	
	1.5	11.1	6.6	15		10		13		13		6.8	
	2.2	14.9	9.3	20		15		13		13		9.3	
	4.0	23.8	16.1	30		30		26	CA25	19	CA20	15	TH20U

Note 1: Models made by Toshiba Industrial Products Sales Corporation are shown.

Note 2: Be sure to attach a surge killer to the exciting coil of the relay and the magnetic contactor.

Note 3: 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 4: Select an MCCB with a current breaking rating 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, THR and ELCB in this table were selected, on the assumption that a power supply with a normal capacity would be used.

10.2 Installation of a magnetic contactor

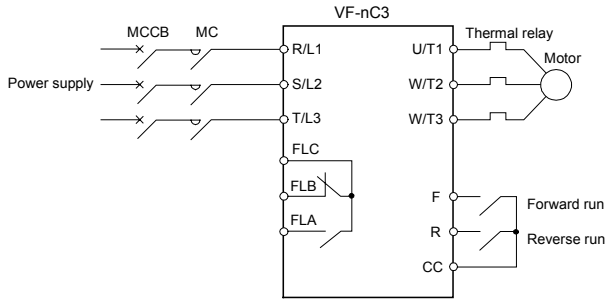
If using the inverter without installing a magnetic contactor (MC) in the primary circuit, use an MCCB (with a power cutoff device) to open the primary circuit when the inverter protective circuit is activated.
When using an optional brake module, install a magnetic contactor (MC) or non-fuse circuit breaker with a power cutoff device on the primary power supply of the inverter, so that the power circuit opens when the failure detection relay (FL) in the inverter or the externally installed overload relay is actuated.

■ Magnetic contactor in the primary circuit

To detach the inverter from the power supply in any of the following cases, insert a magnetic contactor (primary-side magnetic contactor) between the inverter and the power supply.

(1) If the motor overload relay is tripped
(2) If the protective detector (FL) built into the inverter is activated
(3) In the event of a power failure (for prevention of auto-restart)
(4) If the resistor protective relay is tripped when a braking resistor and braking module (option) are used

When using the inverter with no magnetic contactor (MC) on the primary side, install a non-fuse circuit breaker with a voltage tripping coil instead of an MC and adjust the circuit breaker so that it will be tripped if the protective relay referred to above is activated. To detect a power failure, use an undervoltage relay or the like.



Example of connection of a magnetic contactor in the primary circuit

Notes on wiring

- When frequently switching between start and stop, do not use the magnetic contactor on the primary side as an on-off switch for the inverter.
  Instead, stop and start the inverter by using terminals F and CC (forward run) or R and CC (reverse run).
- Be sure to attach a surge killer to the exciting coil of the magnetic contactor (MC).

■ Magnetic contactor in the secondary circuit

A magnetic contactor may be installed on the secondary side to switch controlled motors or supply commercial power to the load when the inverter is out of operation.

Notes on wiring

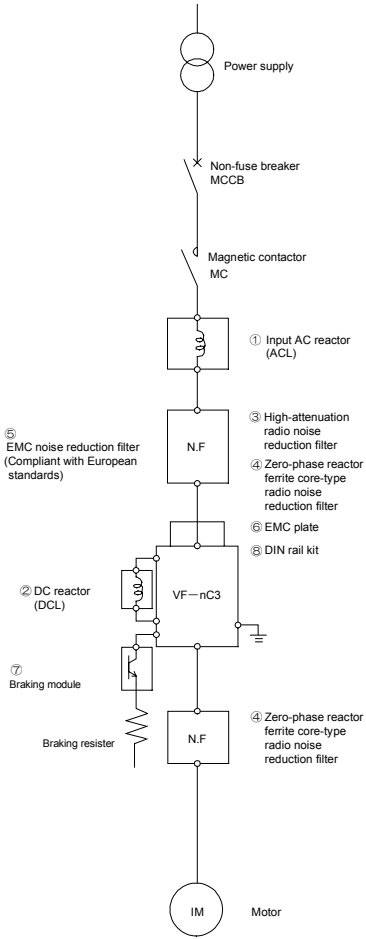
- Be sure to interlock the magnetic contactor on the secondary side with the power supply to prevent commercial power from being applied to the inverter output terminals.
- When installing a magnetic contactor (MC) between the inverter and the motor, avoid turning the magnetic contactor on or off during operation. Turning the magnetic contactor on or off during operation causes a current to rush into the inverter which could lead to malfunction.

10.3 Installation of an overload relay

1) The VF-nC3 inverter has an electronic-thermal overload protective function.
   In the following cases, however, an overload relay suitable for the adjustment of the motor electronic thermal protection level (ｔＨｒ) and appropriate to the motor used should be installed between the inverter and the motor.
   - When using a motor with a current rating different to that of the corresponding Toshiba general-purpose motor
   - When operating a single motor with an output smaller than that of the applicable standard motor or more than one motor simultaneously.
2) When using the VF-nC3 inverter to operate a constant-torque motor, such as the Toshiba VF motor, adjust the protection characteristic of the electronic thermal protection unit (ＯＬｎ) to the VF motor use.
3) It is recommended to use a motor with a thermal relay embedded in the motor coil to give sufficient protection to the motor, especially when it runs in a low-speed range.

10.4 Optional external devices

The following external devices are optionally available for the VF-nC3 series of inverters.



(9) Parameter writer
(10) Remote keypad
(11) Remote control panel
(12) Frequency meter
(13) FRH kit
(14) USB communication converter