

TOSVERT VF-AS3

Commercial power run/Inverter run switching Instruction Manual

TOSHIBA INDUSTRIAL PRODUCTS AND SYSTEMS CORPORATION

NOTICE

1. Read this manual before installing or operating the inverter. Keep it in a safe place for reference.
2. All information contained in this manual will be changed without notice.

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1. Introduction

Switching between Inverter run and Commercial power run for your machine or your system has merits below.

- When the inverter trip, switching to Commercial power run enable to continue running.
- Starting by the inverter enable to perform soft start and to reduce the output current even though your machine is operated by commercial power supply.
- There are energy saving effect by combination between commercial power run at rated operation and inverter run when you can reduce the output frequency.

VF-AS3 can output the ON/OFF signal for magnetic contactor (MC) to switch the circuit and be set parameters of switching wait time or switching frequency.

This instruction manual explains the method of switching between Inverter run and Commercial power run of VF-AS3.

Memo

- You cannot operate PM motor by a commercial power supply.

2. Setting and operation

■ Parameter setting

Title	Parameter name	Adjustment range	Unit	Default setting
F354	Commercial power/Inverter switching	0: Disabled 1: Switch at trip 2: Switch at F355 3: Switch at trip and at F355	-	0
F355	Commercial power switching frequency	0.0-UL	Hz	50.0/60.0
F356	Inverter switching wait time Note1) 2)	0.10-10.00	s	Depending on the capacity
F357	Commercial power switching wait time Note2)	0.10-10.00	s	0.62
F358	Commercial power switching frequency continuous time	0.10-10.00	s	2.00

Note 1) In order to internal processing timing, inverter switching wait time become 0.5 second longer than the set value of [F356].

Note 2) [F356] and [F357] are included the operation time of the relay and the magnetic contactor (MC). In almost all cases, it is not necessary to change these parameter settings.

1) Switching signal between Inverter run and Commercial power run (Output signal from the inverter)

The magnetic contactors (MC) are ON/OFF by the signals from the inverter. You can switch Inverter run and Commercial power run.

Example: When the signal for Inverter run is assigned to the terminal [R1] and the signal for Commercial power run is assigned to the terminal [R2].

Connection diagram is explained by the setting example.

Title	Parameter name	Adjustment range	Default setting	Setting example
F133	Terminal R1 function 1	0-255	4	46: Commercial power/Inverter Switching 1
F134	Terminal R2 function	0-255	254	48: Commercial power/Inverter Switching 2

When the inverter trip as [E: Emergency off], [EF2: Grounding fault] or [OCL: Overcurrent (load side at startup)], "Commercial power /Inverter Switching 1, 2" are both shut off to stop operation for safety.

2) Input signal for the inverter

It shows the setting example of input terminal function as switching command for commercial power run etc.

Example: When the signal for Commercial power run switching is assigned to the terminal [S1] and the signal for External thermal trip is assigned to the terminal [S2].

Connection diagram is explained by the setting example.

Title	Parameter name	Adjustment range	Default setting	Setting example
F114	Terminal S1 function 1	0-203	10	102: Commercial power run switching
F115	Terminal S2 function	0-203	12	46: External thermal trip

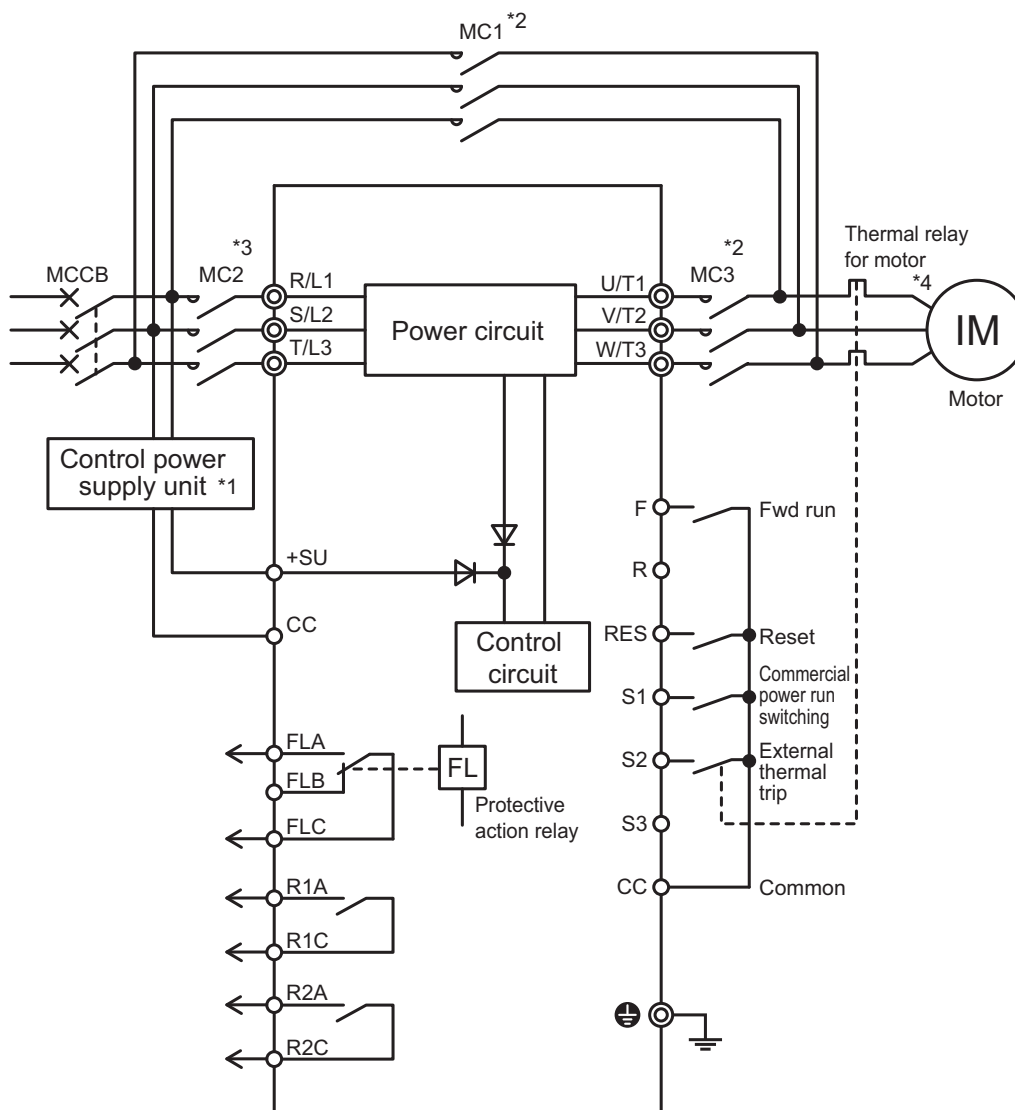
- When [F354] = "2: Switch at F355", the signal of "102: Commercial power run switching" is disabled at inverter trip. In case of switching to Commercial power run, clear the cause of the trip, reset the trip, then switch to Commercial power run by inputting the switching signal.
- It is recommended the circuit for inputting "46: External thermal trip" signal to the inverter when the thermal relay for motor activate during Commercial power run.

3) Setting otherwise

Do not set [F311: Reverse inhibited]="2: Fwd inhibited". Switching to Commercial power run cannot be made because the inverter cannot run forward.

■ Connection diagram

1) Standard connection



*1: Install the control power supply unit: CPS002Z (option).

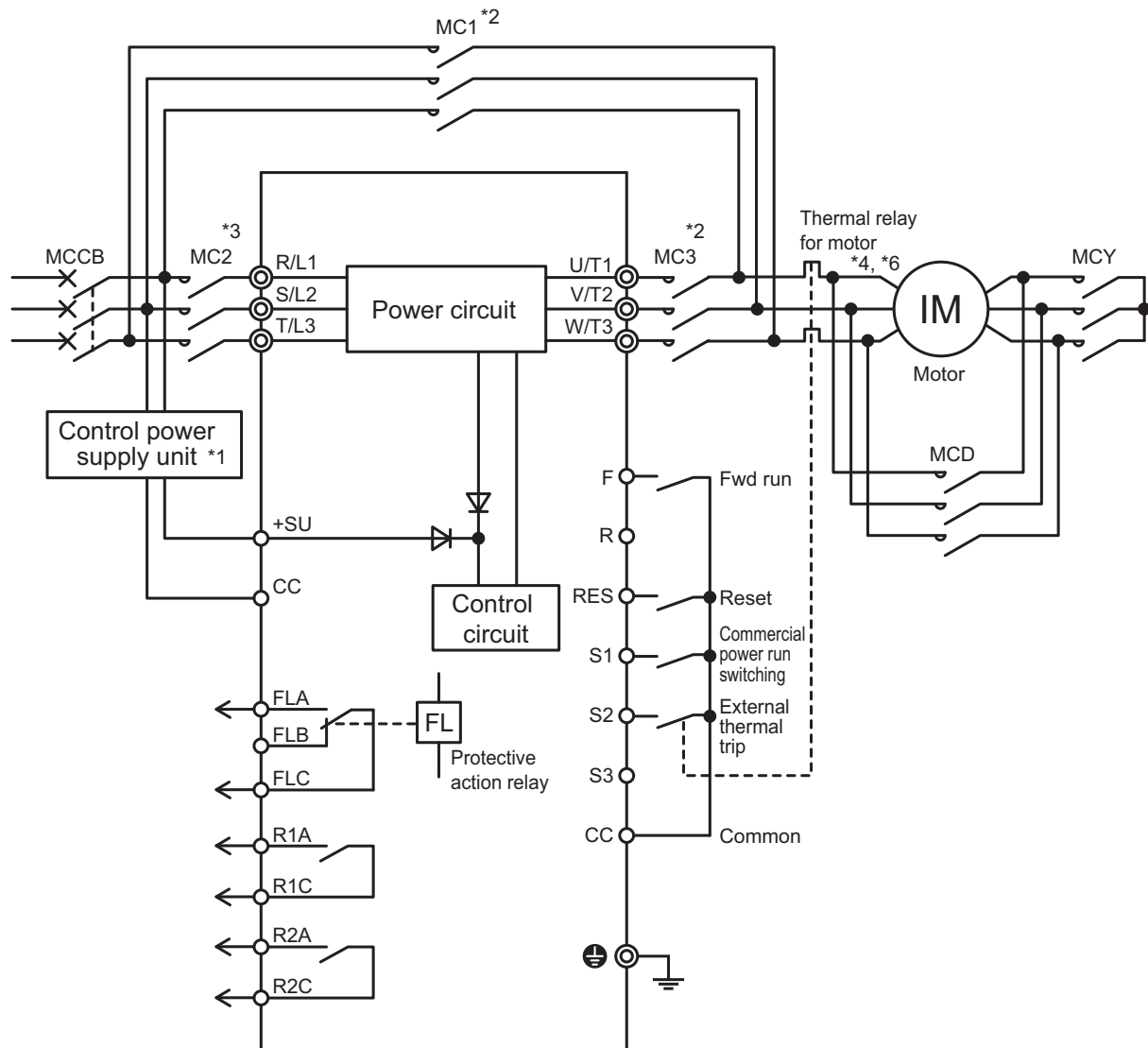
*2: Make sure to interlock the magnetic contactor (MC3) on the inverter output side with the magnetic contactor (MC1) on the commercial power supply in order not to apply a commercial power supply to the output side of the inverter.

*3: Magnetic contactor (MC2) can be omitted for normal operation, but it is recommended the installation because the MC2 is necessary to isolate the inverter circuit if the short circuit fault occurs inside of the inverter.

*4: Make sure motor rotational direction is same with the commercial power supply and with inverter.

2) Star-delta starting circuit

Star-delta starting circuit when it switches from Inverter run to Commercial power run.



*1: Install the control power supply unit: CPS002Z (option).

*2: Make sure to interlock the magnetic contactor (MC3) on the inverter output side with the magnetic contactor (MC1) on the commercial power supply in order not to apply a commercial power supply to the output side of the inverter.

*3: Magnetic contactor (MC2) can be omitted for normal operation, but it is recommended the installation because the MC2 is necessary to isolate the inverter circuit if the short circuit fault occurs inside of the inverter.

*4: Make sure motor rotational direction is same with the commercial power supply and with inverter.

*5: Select the molded-case circuit breaker (MCCB) in consideration of the peak current when start connection is switched to delta connection.

*6: Use delta connection during inverter run. Do not switch star-delta connection during inverter run.

■ Setting method 1: Switching to Commercial power run when the inverter trip

Inverter stop when the inverter trip (activate the protection) during run.

When the inverter trip, switching in a short time to Commercial power run enable to continue running.

This section explains until switching to Inverter run again.

Memo

- When the inverter trip as [E: Emergency off], [EF2: Grounding fault] or [OCL: Overcurrent (load side at startup)], "Commercial power /Inverter Switching 1, 2" are both shut off to stop operation for safety. There is the case that cannot be switched automatically when the failure occurs or above situation. Please consider the circuit to switch manually if necessary.

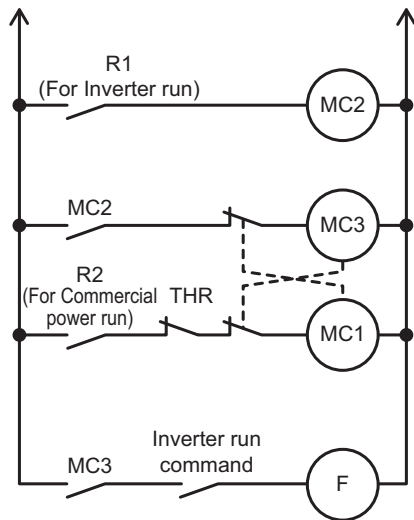
1) Parameter setting example

Title	Parameter name	Adjustment range	Unit	Default setting	Setting example
F354	Commercial power/ Inverter switching	0: Disabled 1: Switch at trip 2: Switch at F355 3: Switch at trip and at F355	-	0	1 or 3
F356	Inverter switching wait time Note1) 2)	0.10-10.00	s	Depending on the capacity	Depending on the capacity
F357	Commercial power switching wait time Note2)	0.10-10.00	s	0.62	0.62
F115	Terminal S2 function	0-203	-	12	46: External thermal trip
F133	Terminal R1 function 1	0-255	-	4	46: Commercial power/Inverter Switching 1
F134	Terminal R2 function	0-255	-	254	48: Commercial power/Inverter Switching 2

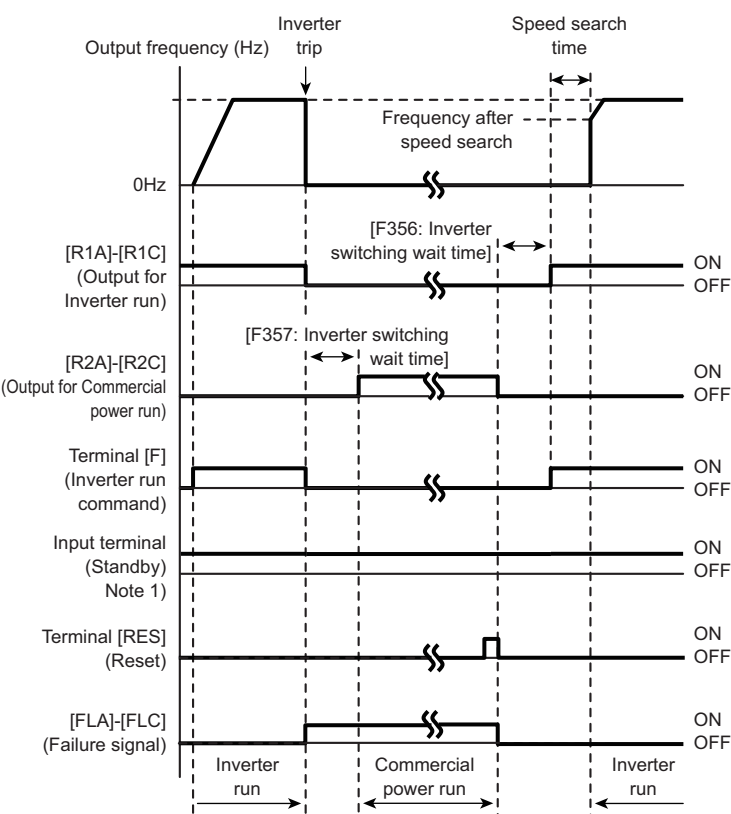
Note 1) In order to internal processing timing, inverter switching wait time become 0.5 second longer than the set value of [F356].

Note 2) [F356] and [F357] are included the operation time of the relay and the magnetic contactor (MC). In almost all cases, it is not necessary to change these parameter settings.

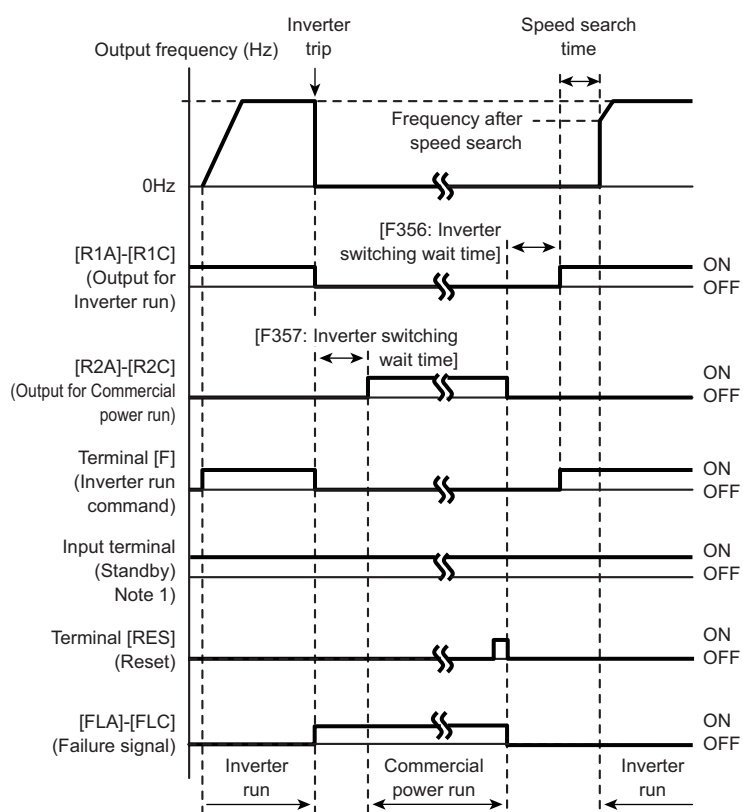
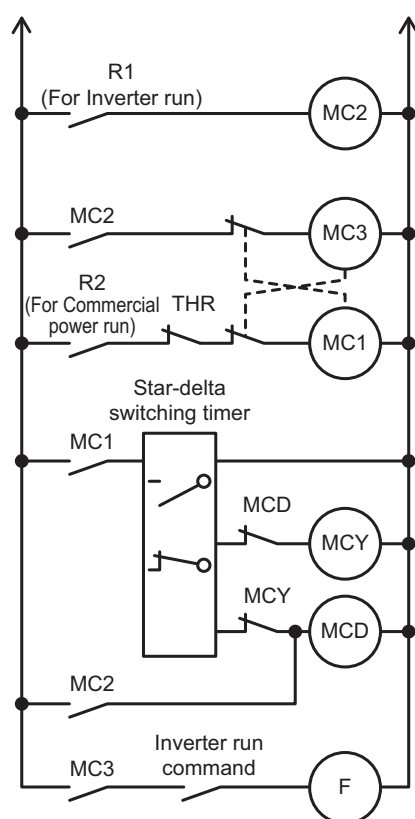
2) Circuit and operation
(1) Standard circuit



Note 1) "ST: Standby" is always ON by default setting.
When you assigned "ST: standby" to an input terminal, keep the terminal ON at switching.



(2) Star-delta starting circuit



Note 1) "ST: Standby" is always ON by default setting.
When you assigned "ST: standby" to an input terminal, keep the terminal ON at switching.

■ Setting method 2: Switching between Inverter run and Commercial power run

You can switch between Inverter run and Commercial power run by the switching signal to the inverter input terminal.

- Starting by the inverter enable soft start even though your machine is operated by commercial power supply.
- There are energy saving effect by combination between commercial power run at rated operation and inverter run when you can reduce the output frequency.

1) Parameter setting example

Title	Parameter name	Adjustment range	Unit	Default setting	Setting example
F354	Commercial power/ Inverter switching	0: Disabled 1: Switch at trip 2: Switch at F355 3: Switch at trip and at F355	-	0	2 or 3
F355	Commercial power switching frequency	0.0-UL	Hz	50.0/60.0	Frequency of a commercial power supply
F356	Inverter switching wait time Note1) 2)	0.10-10.00	s	Depending on the capacity	Depending on the capacity
F357	Commercial power switching wait time Note2)	0.10-10.00	s	0.62	0.62
F358	Commercial power switching frequency continuous time	0.10-10.00	s	2.00	2.00
F114	Terminal S1 function 1	0-203	-	10	102: Commercial power run switching
F115	Terminal S2 function	0-203	-	12	46: External thermal trip
F133	Terminal R1 function 1	0-255	-	4	46: Commercial power/Inverter Switching 1
F134	Terminal R2 function	0-255	-	254	48: Commercial power/Inverter Switching 2

Note 1) In order to internal processing timing, inverter switching wait time become 0.5 second longer than the set value of [F356].

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2) Circuit and operation

Inverter run to Commercial power run

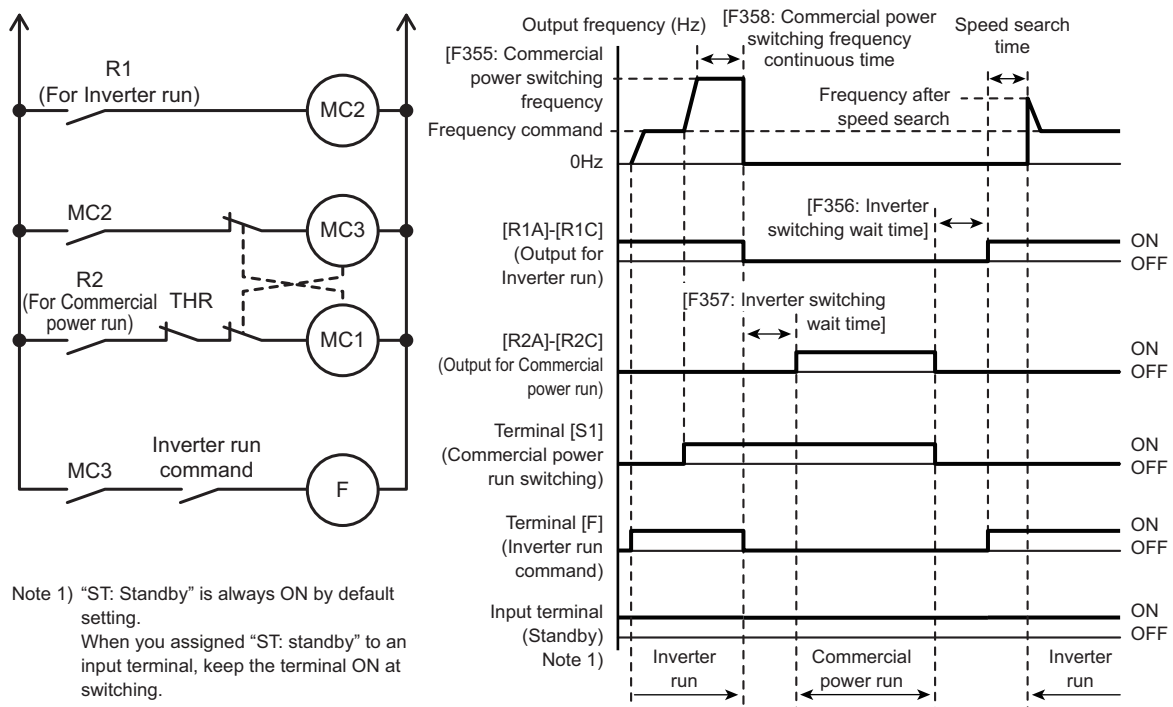
The inverter runs to the frequency set by [F355: Commercial power switching frequency] when the switching signal is ON. The output signal for MC of Inverter run is OFF after the elapse of the time set by [F358: Commercial power switching frequency continuous time]. Then the output signal for MC of Commercial power run is ON after the elapse of the time set by [F357: Commercial power switching wait time]. The machine starts operation by the commercial power supply.

Commercial power run to Inverter run

The output signal for MC of Commercial power run is OFF when the switching signal is OFF.

The output signal for MC of Inverter run is ON after the elapse of the time set by [F356: Inverter switching wait time].

The inverter executes a motor speed search and starts the running.



Note 1) "ST: Standby" is always ON by default setting.
When you assigned "ST: standby" to an input terminal, keep the terminal ON at switching.

