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TOSVERT VF-S15

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Low voltage operation Instruction Manual

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# 1. Introduction

VF-S15 is equipped with low voltage operation function which activates for back up operation using power supply from battery.

This instruction manual explains low voltage operation function of VF-S15.

# 2. Low voltage operation function

Even the case of power failure, low voltage operation enables the inverter to continue operation by switching its power supply to the battery. If power failure occurs during operation, undervoltage protecting function activates and the inverter trips.

In case of momentary power failure, the inverter continues operation or restarts smoothly by the parameters, Auto-restart control selection (*F301*) or Regenerative power ride-through control (Deceleration stop) (*F302*).

If Auto-restart control selection (*F301*) or Regenerative power ride-through control (Deceleration stop) (*F302*) is not available or if power failure continues for a longer period of time, low voltage operation enables the inverter to continue minimum range of operation by supplying power from the battery.

After undervoltage protection activates, switch the power supply to the battery by inputting low voltage operation signal from the input terminal. Next, execute the necessary operation and shut off the power supply from the battery by cancelling the low voltage operation signal. Then, the inverter returns to normal operation by inputting commercial power supply at power recovery.

When this function is activated, input phase failure detection is disabled regardless of the setting of Input phase failure detection selection (*F508*).

# 3. Related parameters

Title	Function	Arrangement range	Default setting
<i>F297</i>	Low voltage operation upper limit frequency	0.0: Disabled 0.1-30.0 (Hz)	0.0
<i>F298</i>	Low voltage operation DC voltage	*1	120

Input terminal function		ON	OFF
136 (137)	Low voltage operation signal	Low voltage operation	cancelled

Low voltage operation mode activates by turning on this signal during undervoltage protection (*NOFF*).

\*1:240V class: 4.0kW or less: 72 to 168Vdc, 5.5kW or more: 96 to 168Vdc,  
500V class: 4.0kW or less: 72 to 336Vdc, 5.5kW or more: 120 to 336Vdc.

**F297**: Low voltage operation upper limit frequency

When Low voltage operation upper limit frequency (F297) =0.0, this function is disabled. When this function is activated, set this parameter larger than 0.1Hz.

During low voltage operation, frequency set with this parameter is the upper limit frequency. Even though the frequency is set to the value lower than Lower limit frequency (LL), Low voltage operation upper limit frequency (F297) is the upper limit.

Low voltage operation upper limit frequency (F297) is calculated as follows;

$$F297 < (UL / ULU) \times (\text{Battery voltage} / \sqrt{2})$$

As battery voltage lowers by operation, leave the margin for the value of the Low voltage operation upper limit frequency. In addition, if the voltage to the motor is lower than the V/F value, current increases. Set Low voltage operation upper limit frequency using the above formula to avoid such current increase.

[Example]

In case UL =60Hz, ULU =200V, and battery voltage =DC120V

F297 < 25Hz: Set about 20Hz.

**F298**: Low voltage operation DC voltage

This is the lowest voltage for the low voltage operation. Undervoltage protection (UVF) will be cancelled for the voltage higher than the voltage set with this parameter.

$$F298 < \text{battery voltage (Vdc)}$$

In order to leave the margin, set the low value comparing to the battery voltage actually used.

[Example]

In case 200V class inverter and battery voltage = DC120V

F298 < 120V: Set about 100V.

■ Setting example of input terminal

In case of setting low voltage operation signal to Terminal S1

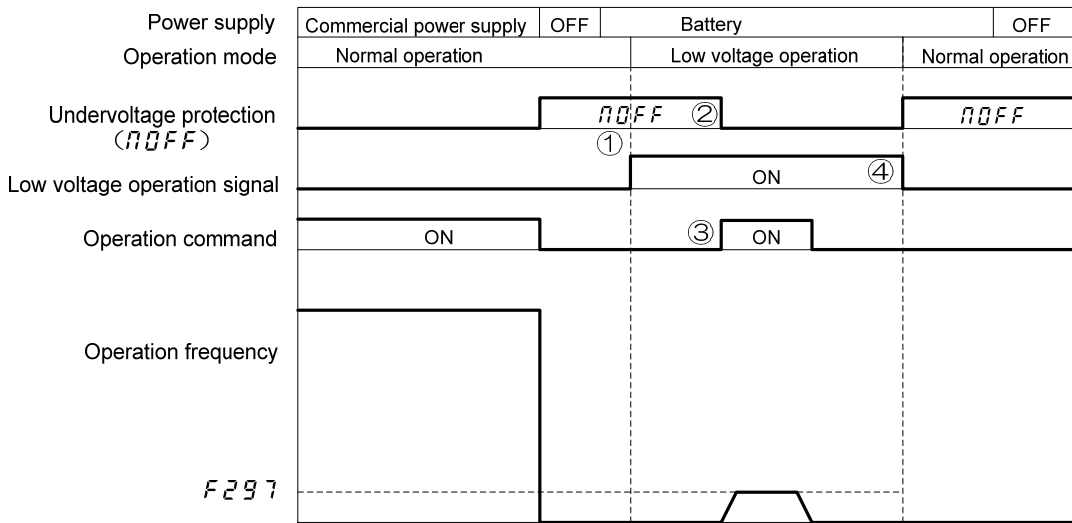
Title	Function	Arrangement range	Default setting
F114	Input terminal selection 4A (S1)	0-203	136 (Low voltage operation signal)

Set value 137 is the inversion signal.

Note 1: Low voltage operation signal is enabled only when the inverter is in undervoltage status. Turn on this signal while the inverter is in undervoltage status. If this signal is input during operation, the inverter does not recognize Low voltage operation signal.

Note 2: Normal operation is enabled during low voltage operation, but output frequency is controlled by Low voltage operation upper frequency (F297).

# 4. Example of Low voltage operation



<Example>

1. Switch to the battery
  - Undervoltage protection (NOFF) activates after power failure.
  - Be sure to turn off the power supply so that voltage is not applied to the battery when the power supply is recovered.
  - Switch to the battery. Undervoltage protection (NOFF) is still displayed.
  - Display of NOFF may disappear by power interruption after power failure and during switching to battery.
2. Input of Low voltage operation signal
  - Low voltage operation mode activates by turning on the low voltage operation signal of Terminal S1 while the inverter is in Undervoltage protection (NOFF) status.
  - Undervoltage protection (NOFF) is cancelled with the voltage more than the value set with Low voltage operation DC voltage (F298).
3. Low voltage operation
  - Low voltage operation activates by inputting the operation command.
  - If frequency command is larger than the value set with Low voltage operation upper limit frequency (F297), the frequency is up to F297.
4. Cancellation of Low voltage operation mode
  - After necessary operation is completed, Low voltage operation mode is cancelled by turning off the Low voltage operation signal of Terminal S1 while the inverter stops, and the inverter returns to normal operation.
  - Undervoltage protection (NOFF) activates.
  - Turn off the battery.
  - Normal operation is enabled by turning on the power after power supply recovery.