TOSHIBA

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TOSVERT VF-A7/P7

Up-Down Frequency Command Function Reference Manual

Toshiba Schneider Inverter Corporation

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1. INTRODUCTION

The up-down frequency command functions described in this manual can be used for the inverters having CPU version numbers of V304 or successors. For the versions preceding to V304, the up-down frequency command functions operate similarly to those existing when 0 is assigned to the F108 parameter relating to these command functions. This manual describes only frequency command data.

2. UP-DOWN FREQUENCY COMMANDS

The up-down frequency commands can be activated by assigning speed setting mode selection to the Up-Down frequency, and input terminal selection, to the Up-Down frequency independently. Up-down frequency command data can be increased, reduced, and cleared by the input terminals. Also, the selection of functions allows storage of up-down frequency command data, the selection of an upper-limit value, and the selection of a lower-limit value.

2.1. Related Parameters

Parameters related to the up-down frequencies are listed in Table 2.1.

Table 2.1 Related parameters

<table>
<tr><th>Title</th><th>Function</th><th>Adjustment range</th><th>Remarks</th></tr>
<tr><td>FMOd</td><td>Speed setting mode selection</td><td>0 to 11
10 : Up-down frequencies</td><td>Specify the speed command.</td></tr>
<tr><td>FH</td><td>Maximum frequency</td><td>0.0 to 400Hz</td><td></td></tr>
<tr><td>UL</td><td>Upper-limit frequency</td><td>0.0 to the maximum frequency</td><td></td></tr>
<tr><td>LL</td><td>Lower-limit frequency</td><td>0.0 to the upper-limit frequency</td><td></td></tr>
<tr><td>F108</td><td>Up-down frequency function selection</td><td>
<table>
<tr><th>F108</th><th>Storage</th><th>Lower limit</th><th>Upper limit</th></tr>
<tr><td>0</td><td>invalid</td><td>0Hz</td><td>UL</td></tr>
<tr><td>1</td><td>valid</td><td>0Hz</td><td>UL</td></tr>
<tr><td>2</td><td>invalid</td><td>LL</td><td>UL</td></tr>
<tr><td>3</td><td>valid</td><td>LL</td><td>UL</td></tr>
<tr><td>4</td><td>invalid</td><td>0Hz</td><td>F170</td></tr>
<tr><td>5</td><td>valid</td><td>0Hz</td><td>F170</td></tr>
<tr><td>6</td><td>invalid</td><td>LL</td><td>F170</td></tr>
<tr><td>7</td><td>valid</td><td>LL</td><td>F170</td></tr>
</table>
</td><td>Select an up-down frequency function.

Storage: See Section 2.3.
Upper limit: See Section 2.4.
Lower limit: See Section 2.5.</td></tr>
<tr><td>F110</td><td>Always active function selection</td><td rowspan="2">0 to 135
86 : Binary data writing
88 : Up-down frequency (UP)
90 : Up-down frequency (DOWN)
92 : Up-down frequency (CLEAR)</td><td rowspan="2">These parameters specify always active function selection and the input terminal function.</td></tr>
<tr><td>F111
to
F126</td><td>Input terminal function selection
Parameters F119 to F126 are optional.</td></tr>
<tr><td>F170</td><td>Base frequency #2</td><td>25 to 400Hz</td><td>When selected, this frequency functions as the upper-limit up-down frequency.</td></tr>
<tr><td>F500</td><td>Acceleration time #2</td><td>F508 to 6,000 sec</td><td>This parameter specifies the increase rate of the up-down frequency.</td></tr>
<tr><td>F501</td><td>Deceleration time #2</td><td>F508 to 6,000 sec</td><td>This parameter specifies the reduction rate of the up-down frequency.</td></tr>
<tr><td>F508</td><td>Acceleration/deceleration time lower limit</td><td>0.01 to 10.00 sec</td><td>This parameter specifies the lower setting limit for the acceleration/deceleration time.</td></tr>
</table>

2.2. Basic Usage

This section describes the basic usage of the up-down frequency commands.

2.2.1. Basic setting

The basic parameters for using up-down frequency data as speed commands are listed in Table 2.2.

Table 2.2 Basic setting

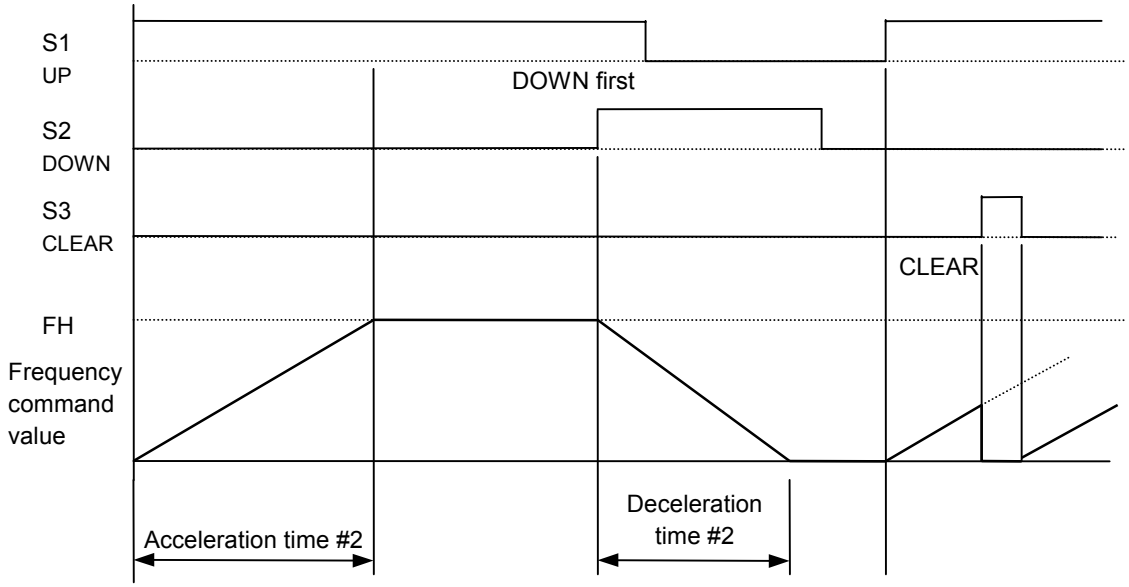
Title	Function	Adjustment range	Remarks
FMOd	Speed setting mode selection	10 : Up-down frequencies	This parameter specifies the speed command.
F108	Up-down frequency function selection	0 : Standard	
F115	Input terminal selection #5 (S1)	88 : Up-down frequency (UP)	Terminal S1
F116	Input terminal selection #6 (S2)	90 : Up-down frequency (DOWN)	Terminal S2
F117	Input terminal selection #7 (S3)	92 : Up-down frequency (CLEAR)	Terminal S3
F500	Acceleration time #2	F508 to 6,000 sec	This parameter specifies the increase rate of the up-down frequency.
F501	Deceleration time #2	F508 to 6,000 sec	This parameter specifies the reduction rate of the up-down frequency.
F508	Acceleration/deceleration time lower limit	0.01 to 10.00 sec	

The above table shows an example in which the S1 input terminal and the S2 input terminal are to be used for the frequency command UP signal and the frequency command DOWN signal, respectively.

1. Set speed setting mode selection (FMOd) to 10 : Up-down frequency.
2. Set S1 input terminal selection #5 (F115) to 88 : Up-down frequency (UP).
3. Set S2 input terminal selection #6 (F116) to 90 : Up-down frequency (DOWN).
4. Set S3 input terminal selection #7 (F117) to 92 : Up-down frequency (CLEAR).
5. Set acceleration time #2 (F500) and deceleration time #2 (F501) to the respective desired values.

2.2.2. Operation

This section describes operation based on the basic settings shown in Section 2.2.1 above.



- While terminal S1 (UP) is active, the frequency command increases according to the particular value of acceleration time #2.
- While terminal S2 (DOWN) is active, the frequency command decreases according to the particular value of deceleration time #2.
- When terminal S3 (CLEAR) is activated, the frequency command value will be cleared to 0 Hz.
- When terminal S1 (UP) and terminal S2 (DOWN) are activated at the same time, priority will be assigned to terminal S2 (DOWN).

2.3. Storage of the Frequency Data Settings

Use the frequency data storage function to store up-down frequency command data that has been adjusted during operation. The storage operation is performed by means of the binary data write function. This storage function needs to be selected for the input terminals.
When the odd-numbers (1, 3, 5, and 7) of the F108 up-down frequency function selection parameter shown in Table 2.1 are made valid (o), up-down frequency command data can be stored under the conditions listed below. Once data has been stored, even when power is turned off, the stored data can be used as up-down frequency command data by turning power back on next time. Storage occurs only one time during the stop of the inverter after operation. After the up-down frequency command data has been written, therefore, even if the data is changed during the stop, the new data will not be stored.

Conditions (data is written only once when all the following conditions are satisfied):

- When the stored up-down frequency is changed
- During the stop after operation (i.e., when the inverter is inactive)
- When the binary data write function (input terminal selection number: 86) is on

Title	Function	Adjustment range				Remarks
F108	Up-down frequency function selection	F108	Storage	Lower limit	Upper limit	Select an up-down frequency function. Storage: See Section 2.3. Upper limit: See Section 2.4. Lower limit: See Section 2.5.
		0	invalid	0Hz	UL	
		1	valid	0Hz	UL	
		2	invalid	LL	UL	
		3	valid	LL	UL	
		4	invalid	0Hz	F170	
		5	valid	0Hz	F170	
		6	invalid	LL	F170	
		7	valid	LL	F170	

Precautions

- Once data has been stored, since the up-down frequency has already been set during power-on, the motor may immediately start operating when the RUN command is entered.
- If the binary data write function (input terminal selection number: 86) is assigned to always active function selection parameter F110, when the up-down frequency command value is changed, the new command value can be automatically stored immediately after operation has stopped. In this case, however, the new up-down frequency command value is stored with each stop. The storage memory is a consumable component and its guaranteed life is 100,000 in terms of storage repeat count. Do not use the storage function more often than this guaranteed value is exceeded. If the guaranteed value is exceeded, the storage memory may fail.

2.4. Upper-Limit Frequency Selection

The use of up-down frequency function selection parameter F108 allows either the upper-limit frequency (UL : F108 = 0, 1, 2, 3) or base frequency #2 (F170: F108 = 4, 5, 6, 7) to be selected as the up-down frequency command upper-limit value. When the multi-speed command or any other speed command is used, the up-down frequency command upper-limit value can be limited.

Title	Function	Adjustment range				Remarks
UL	Upper-limit frequency	0.0 to the maximum frequency				
F108	Up-down frequency function selection	F108	Storage	Lower limit	Upper limit	Select an up-down frequency function. Storage: See Section 2.3. Upper limit: See Section 2.4. Lower limit: See Section 2.5.
		0	invalid	0Hz	UL	
		1	valid	0Hz	UL	
		2	invalid	LL	UL	
		3	valid	LL	UL	
		4	invalid	0Hz	F170	
		5	valid	0Hz	F170	
		6	invalid	LL	F170	
		7	valid	LL	F170	
F170	Base frequency #2	25 to 400Hz				When selected, this frequency functions as the upper-limit up-down frequency.

Notes:

- Even when base frequency #2 (F170) is selected as the upper-limit value, if the value of base frequency #2 (F170) is greater than the upper-limit frequency (UL), this upper-limit frequency (UL) will be registered as the upper-limit value.

2.5. Lower-Limit Frequency Selection

The use of up-down frequency function selection parameter F108 allows either 0 Hz (F108 = 0, 1, 4, 5) or the lower-limit frequency (LL : F108 = 2, 3, 6, 7) to be selected as the up-down frequency command lower-limit value. The time required for the up-down frequency command value to rise from 0 Hz to the lower-limit frequency (LL) can be suppressed to zero when the lower-limit frequency (LL) is set.

If the up-down frequency CLEAR function (input terminal selection number 92) is performed, the frequency will be cleared to this lower-limit value.

Title	Function	Adjustment range				Remarks
LL	Lower-limit frequency	0.0 to the upper-limit frequency				
F108	Up-down frequency function selection	F108	Storage	Lower limit	Upper limit	Select an up-down frequency function. Storage: See Section 2.3. Upper limit: See Section 2.4. Lower limit: See Section 2.5.
		0	invalid	0Hz	UL	
		1	valid	0Hz	UL	
		2	invalid	LL	UL	
		3	valid	LL	UL	
		4	invalid	0Hz	F170	
		5	valid	0Hz	F170	
		6	invalid	LL	F170	
		7	valid	LL	F170	

Notes:

- Even when the lower-limit value is specified by the selection of the lower-limit frequency (LL), if the value of this lower-limit frequency (LL) is greater than the upper-limit value that was selected in Section 2.4 above, the lower-limit value will be the same as the upper-limit value selected in Section 2.4.