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**TOSVERT VF-S15**

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**Explanation of Load reduction**

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**Load reduction at use condition,  
ambient temperature, and installation method**

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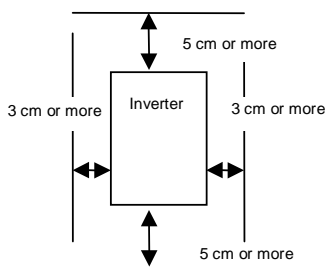
# 1. Ambient temperature environment and load reduction

VF-S15 has the maximum applied load (load reduction ratio to rated current) under each condition for the use in various kinds of environments, but please note that load reduction (current reduction) can be required other than standard condition of use, ambient temperature, and mounting environment conditions.

## Normal installation

Select an indoor location with good ventilation, and then install it upright on a flat metal plate.

When installing multiple inverters, leave at least 3 cm of space between each inverter and install them aligned horizontally. When using the inverter in locations with temperatures above 40°C, remove the caution label on the top of the inverter and use the inverter with the load reduced.



# 2. Rated current

Rated current conditions of VF-S15 are as follows;

PWM carrier frequency: 4 kHz or less,

Ambient temperature: 40°C or less,

and as described in the tables 2.1 and 2.2.

Load reduction is necessary depending on the conditions of use, mounting environment, and PWM carrier frequency settings.

Display standard of inverter current (monitor display and parameter set value) is 100%=rated current (PWM carrier frequency: 4 kHz or less, ambient temperature: 40°C or less). Current value considering load reduction (current reduction) by PWM carrier frequency can be checked with status monitor mode. Set the following items;

Monitor	Title	Function	Set value
Standard monitor	<i>F710</i>	Initial panel display selection	40: Inverter rated current (Carrier frequency corrected)
Status monitor mode	<i>F711 - F718</i>	Status monitor 1 - 8	

Note) Overload characteristic of VF-S15 can be selected to 150%-60s or 120%-60s.

[Parameters settings]

Title	Function	Adjustment range	Default setting
<i>ROL</i>	Overload characteristic selection	0: - 1: Constant torque characteristic(150%-60s) 2: Variable torque characteristic(120%-60s)	0

\*In case of *ROL* = 2 setting, be sure to install the input AC reactor (ACL) between power supply and the inverter.

Table 2.1 Load reduction by ambient temperature and PWM carrier frequency [240V class]

In case of  $FLL = 1$  (Constant torque characteristic (150%-60s)) setting.

VFS15- VFS15S-	Ambient temperature	PWM carrier frequency		
		2.0k to 4.0kHz	4.1k to 12.0kHz	12.1k to 16.0kHz
2002PL-W	40°C or less	1.5 A	1.5 A	1.5 A
	Above 40 to 50°C	1.5 A	1.2 A	1.2 A
	Above 50 to 60°C	1.2 A	1.1 A	1.1 A
2004 PM/L-W	40°C or less	3.3 A	3.3 A	3.3 A
	Above 40 to 50°C	3.3 A	2.6 A	2.6 A
	Above 50 to 60°C	2.6 A	2.5 A	2.5 A
2007 PM/L-W	40°C or less	4.8 A	4.4 A	4.2 A
	Above 40 to 50°C	4.8 A	3.5 A	3.4 A
	Above 50 to 60°C	3.8 A	3.3 A	3.2 A
2015 PM/L-W	40°C or less	8.0 A	7.9 A	7.1 A
	Above 40 to 50°C	8.0 A	7.9 A	7.1 A
	Above 50 to 60°C	7.6 A	6.3 A	5.7 A
2022 PM/L-W	40°C or less	11.0 A	10.0 A	9.1 A
	Above 40 to 50°C	11.0 A	10.0 A	9.1 A
	Above 50 to 60°C	10.5 A	8.0 A	7.3 A
2037PM-W	40°C or less	17.5 A	16.4 A	14.6 A
	Above 40 to 50°C	17.5 A	16.4 A	14.6 A
	Above 50 to 60°C	16.6 A	13.1 A	11.7 A
2055PM-W	40°C or less	27.5 A	25.0 A	25.0 A
	Above 40 to 50°C	27.5 A	25.0 A	25.0 A
	Above 50 to 60°C	26.1 A	20.0 A	20.0 A
2075PM-W	40°C or less	33.0 A	33.0 A	29.8 A
	Above 40 to 50°C	33.0 A	33.0 A	29.8 A
	Above 50 to 60°C	31.4 A	26.4 A	23.8 A
2110PM-W	40°C or less	54.0 A	49.0 A	49.0 A
	Above 40 to 50°C	54.0 A	49.0 A	49.0 A
	Above 50 to 60°C	51.3 A	39.2 A	39.2 A
2150PM-W	40°C or less	66.0 A	60.0 A	54.0 A
	Above 40 to 50°C	66.0 A	60.0 A	54.0 A
	Above 50 to 60°C	62.7 A	48.0 A	43.2 A

**□** : Rated current

Note: When using the inverter in locations with temperatures above 40°C, remove the caution label on the top of the inverter.

Each current value of the table is in condition of the normal installation and the following.

40°C or less: with the caution label on the top of the inverter

Above 40°C: without the caution label on the top of the inverter

Table 2.2 Load reduction by ambient temperature and PWM carrier frequency [500V class (480V or less)]

In case of  $PUL = 1$  (constant torque characteristic (150%-60s)) setting

VFS15-	Ambient temperature	PWM carrier frequency		
		2.0k to 4.0kHz	4.1k to 12.0kHz	12.1k to 16.0kHz
4004 PL-W	40°C or less	1.5 A	1.5 A	1.5 A
	Above 40 to 50°C	1.5 A	1.5 A	1.5 A
	Above 50 to 60°C	1.4 A	1.2 A	1.2 A
4007 PL-W	40°C or less	2.3 A	2.1 A	2.1 A
	Above 40 to 50°C	2.3 A	2.1 A	2.1 A
	Above 50 to 60°C	2.2 A	1.7 A	1.7 A
4015 PL-W	40°C or less	4.1 A	3.7 A	3.3 A
	Above 40 to 50°C	4.1 A	3.7 A	3.3 A
	Above 50 to 60°C	3.9 A	3.0 A	2.6 A
4022 PL-W	40°C or less	5.5 A	5.0 A	4.5 A
	Above 40 to 50°C	5.5 A	5.0 A	4.5 A
	Above 50 to 60°C	5.2 A	4.0 A	3.6 A
4037 PL-W	40°C or less	9.5 A	8.6 A	7.5 A
	Above 40 to 50°C	9.5 A	8.6 A	7.5 A
	Above 50 to 60°C	9.0 A	6.9 A	6.0 A
4055 PL-W	40°C or less	14.3 A	13.0 A	13.0 A
	Above 40 to 50°C	14.3 A	13.0 A	13.0 A
	Above 50 to 60°C	13.6 A	10.4 A	10.4 A
4075 PL-W	40°C or less	17.0 A	17.0 A	14.8 A
	Above 40 to 50°C	17.0 A	17.0 A	14.8 A
	Above 50 to 60°C	16.2 A	13.6 A	11.8 A
4110 PL-W	40°C or less	27.7 A	25.0 A	25.0 A
	Above 40 to 50°C	27.7 A	25.0 A	25.0 A
	Above 50 to 60°C	26.3 A	20.0 A	20.0 A
4150 PL-W	40°C or less	33.0 A	30.0 A	26.0 A
	Above 40 to 50°C	33.0 A	30.0 A	26.0 A
	Above 50 to 60°C	31.4 A	24.0 A	20.8 A

 : Rated current

Note: When using the inverter in locations with temperatures above 40°C, remove the protective label on the top of the inverter.

Each current value of the table is in condition of the normal installation and the following.

40°C or less: with the caution label on the top of the inverter

Above 40°C: without the caution label on the top of the inverter

Table 2.3 Load reduction by ambient temperature and PWM carrier frequency [500V class (over 480V)]

 In case of  $F_{UL} = 1$  (constant torque characteristic (150%-60s)) setting

VFS15-	Ambient temperature	PWM carrier frequency		
		2.0k to 4.0kHz	4.1k to 12.0kHz	12.1k to 16.0kHz
4004 PL-W	40°C or less	1.5 A	1.5 A	1.2 A
	Above 40 to 50°C	1.5 A	1.5 A	1.2 A
	Above 50 to 60°C	1.4 A	1.2 A	1.0 A
4007 PL-W	40°C or less	2.1 A	1.9 A	1.9 A
	Above 40 to 50°C	2.1 A	1.9 A	1.9 A
	Above 50 to 60°C	2.0 A	1.5 A	1.5 A
4015 PL-W	40°C or less	3.8 A	3.4 A	3.1 A
	Above 40 to 50°C	3.8 A	3.4 A	3.1 A
	Above 50 to 60°C	3.6 A	2.7 A	2.5 A
4022 PL-W	40°C or less	5.1 A	4.6 A	4.2 A
	Above 40 to 50°C	5.1 A	4.6 A	4.2 A
	Above 50 to 60°C	4.8 A	3.7 A	3.4 A
4037 PL-W	40°C or less	8.7 A	7.9 A	6.9 A
	Above 40 to 50°C	8.7 A	7.9 A	6.9 A
	Above 50 to 60°C	8.3 A	6.3 A	5.5 A
4055 PL-W	40°C or less	13.2 A	12.0 A	12.0 A
	Above 40 to 50°C	13.2 A	12.0 A	12.0 A
	Above 50 to 60°C	12.5 A	9.6 A	9.6 A
4075 PL-W	40°C or less	15.6 A	14.2 A	12.4 A
	Above 40 to 50°C	15.6 A	14.2 A	12.4 A
	Above 50 to 60°C	14.8 A	11.4 A	9.9 A
4110 PL-W	40°C or less	25.5 A	23.0 A	23.0 A
	Above 40 to 50°C	25.5 A	23.0 A	23.0 A
	Above 50 to 60°C	24.2 A	18.4 A	18.4 A
4150 PL-W	40°C or less	30.4 A	27.6 A	24.0 A
	Above 40 to 50°C	30.4 A	27.6 A	24.0 A
	Above 50 to 60°C	28.9 A	22.1 A	19.2 A

Note: When using the inverter in locations with temperatures above 40°C, remove the caution label on the top of the inverter.

Each current value of the table is in condition of the normal installation and the following.

40°C or less: with the caution label on the top of the inverter

Above 40°C: without the caution label on the top of the inverter

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## 3. Ambient temperature environment and load reduction ratio

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### 3.1. Ambient temperature environment

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Ambient temperature environment of VF-S15 is  $-10$  to  $+60^{\circ}\text{C}$ , but load reduction ratio differs according to the following conditions;

Condition 1: Voltage class, Inverter capacity

Condition 2: Installation

1. Individual mounting with top caution label
2. Individual mounting without top caution label
3. Side by side mounting without top caution label
4. Horizontal mounting without top caution label
5. DIN rail mounting without top caution label  
Rail mounting without top caution label
6. DIN rail and Side by side mounting without top caution label  
Rail and Side by side mounting without top caution label
7. Individual mounting with top caution label and side cover
8. Individual mounting with top caution label and EMC filter

Condition3: Ambient temperature

$40^{\circ}\text{C}$  or less, above  $40$  to  $50^{\circ}\text{C}$ , above  $50$  to  $60^{\circ}\text{C}$

Condition4: PWM Carrier frequency setting

$2.0$  to  $4.0$  kHz,  $4.1$  to  $12.0$  kHz,  $12.1$  to  $16.0$  kHz

Note1: For a side-by-side mounting, remove top caution label.

Note2: Rail mounting means that the inverter is installed not to contact with a flat metal plate.

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### 3.2. Load reduction ratio

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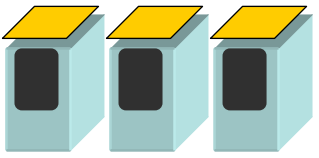


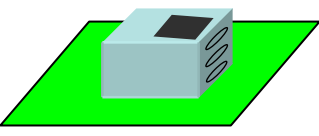
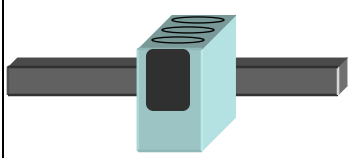
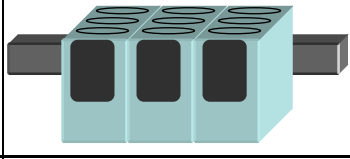
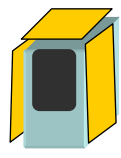

Load reduction ratio changes depending on voltage class and inverter capacity.


\* In case of *AVL* (Overload characteristic selection) = *I* (constant torque characteristic (150%-60s)) setting

**3.2.1. Three-phase 240V class models**

1) Three-phase 240V class: 0.4 to 0.75kW models

Tale 3.1 Load reduction by mounting conditions [VFS15-2004PM-W to 2007PM-W]

No.	Mounting conditions	Top caution label	Figure	Ambient temperature (°C)	PWM carrier frequency		
					2.0k to 4.0kHz	4.1k to 12.0kHz	12.1k to 16.0kHz
1	Individual mounting	With		40 or less	Refer to Table 2.1		
				Above 40 to 50	100%	95%	70%
				Above 50 to 60	70%	65%	50%
2	Individual mounting	W/O		40 or less	Refer to Table 2.1		
				Above 40 to 50			
				Above 50 to 60			
3	Side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	85%	80%
				Above 50 to 60	70%	60%	55%
4	Horizontal mounting	W/O		40 or less	95%	65%	60%
				Above 40 to 50	70%	50%	40%
				Above 50 to 60	45%	35%	—
5	DIN rail mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	95%	85%	90%
				Above 50 to 60	65%	60%	60%
6	DIN rail and side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	90%	75%	80%
				Above 50 to 60	55%	45%	50%
7	Individual mounting with side cover	With		40 or less	100%	100%	100%
				Above 40 to 50	90%	75%	70%
				Above 50 to 60	65%	40%	—
8	Individual mounting with EMC filter	With		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	100%
				Above 50 to 60	85%	70%	60%

Note 1: Load reduction ratio (%) regards the value of Table 2.1, ambient temperature: 40°C or less, each PWM carrier frequency as 100%.  means the range available with 100%.

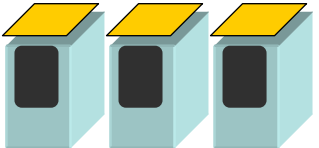
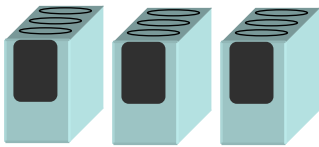

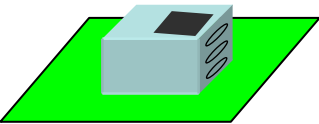
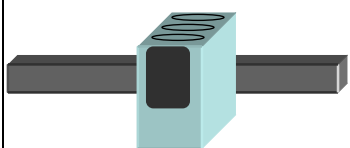
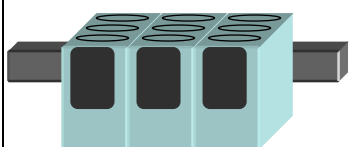
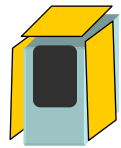
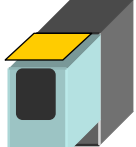
Note 2: The value of the above the table is in case of  $R_{UL} = 1$  (constant torque characteristic (150%-60s)) setting.


Note 3: In case of side by side mounting, be sure to remove the top caution label.



2) Three-phase 240V class: 1.5, 2.2kW models

Table 3.2 Load reduction depending on mounting conditions [VFS15-2015PM-W, 2022PM-W]

No.	Mounting conditions	Top caution label	Figure	Ambient temperature (°C)	PWM carrier frequency		
					2.0k to 4.0kHz	4.1k to 12.0kHz	12.1k to 16.0kHz
1	Individual mounting	With		40 or less	Refer to Table 2.1		
				Above 40 to 50	100%	100%	100%
				Above 50 to 60	90%	85%	70%
2	Individual mounting	W/O		40 or less	Refer to Table 2.1		
				Above 40 to 50			
				Above 50 to 60			
3	Side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	100%
				Above 50 to 60	75%	55%	45%
4	Horizontal mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	95%	80%	70%
				Above 50 to 60	55%	40%	30%
5	DIN rail mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	90%	90%	90%
				Above 50 to 60	90%	85%	70%
6	DIN rail and side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	90%	90%	90%
				Above 50 to 60	65%	45%	35%
7	Individual mounting with side cover	With		40 or less	100%	100%	100%
				Above 40 to 50	90%	80%	80%
				Above 50 to 60	70%	50%	40%
8	Individual mounting with EMC filter	With		40 or less	100%	100%	100%
				Above 40 to 50	90%	90%	90%
				Above 50 to 60	80%	75%	60%

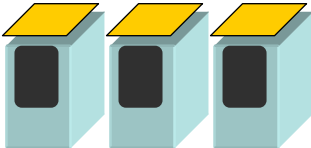
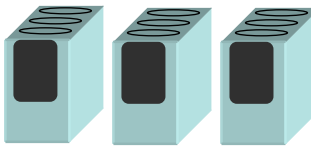

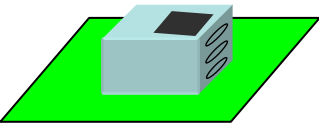
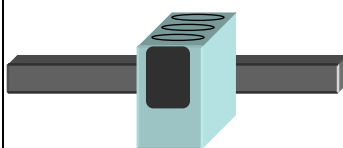
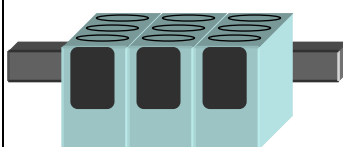
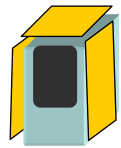

Note 1: Load reduction ratio (%) regards the value of Table 2.1, ambient temperature: 40°C or less, each PWM carrier frequency as 100%.  means the range available with 100%.


Note 2: The value of the above the table is in case of  $R_{UL} = 1$  (constant torque characteristic (150%-60s)) setting.

Note 3: In case of side by side mounting, be sure to remove the top caution label.

### 3) Three-phase 240V class: 4.0kW

Table 3.3 Load reduction depending on mounting conditions [VFS15-2037PM-W]

No.	Mounting conditions	Top caution label	Figure	Ambient temperature (°C)	PWM carrier frequency		
					2.0k to 4.0kHz	4.1k to 12.0kHz	12.1k to 16.0kHz
1	Individual mounting	With		40 or less	Refer to Table 2.1		
				Above 40 to 50	100%	100%	100%
				Above 50 to 60	90%	85%	75%
2	Individual mounting	W/O		40 or less	Refer to Table 2.1		
				Above 40 to 50			
				Above 50 to 60			
3	Side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	100%
				Above 50 to 60	100%	95%	90%
4	Horizontal mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	100%
				Above 50 to 60	—	—	—
5	Rail mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	90%	90%	90%
				Above 50 to 60	75%	75%	75%
6	Rail and side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	90%	90%	90%
				Above 50 to 60	90%	85%	80%
7	Individual mounting with side cover	With		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	95%
				Above 50 to 60	65%	60%	55%
8	Individual mounting with EMC filter	With		40 or less	100%	100%	100%
				Above 40 to 50	90%	90%	90%
				Above 50 to 60	80%	75%	65%

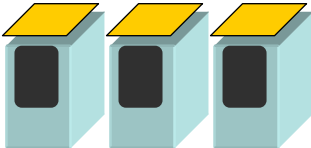
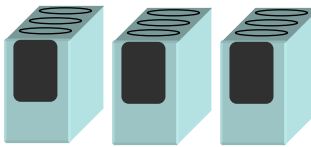

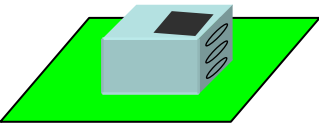
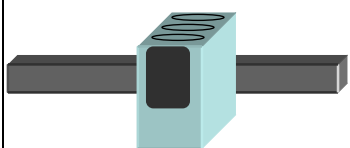
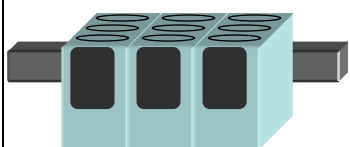
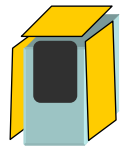

Note 1: Load reduction ratio (%) regards the value of Table 2.1, ambient temperature: 40°C or less, each PWM carrier frequency as 100%.  means the range available with 100%.


Note 2: The value of the above the table is in case of  $RUL = 1$  (constant torque characteristic (150%-60s)) setting.

Note 3: In case of side by side mounting, be sure to remove the top caution label.

4) Three-phase 240V class: 5.5, 7.5kW models

Table 3.4 Load reduction depending on mounting conditions [VFS15-2055PM-W, 2075PM-W]

No.	Mounting conditions	Top caution label	Figure	Ambient temperature (°C)	PWM carrier frequency		
					2.0k to 4.0kHz	4.1k to 12.0kHz	12.1k to 16.0kHz
1	Individual mounting	With		40 or less	Refer to Table 2.1		
				Above 40 to 50	100%	100%	70%
				Above 50 to 60	70%	45%	40%
2	Individual mounting	W/O		40 or less	Refer to Table 2.1		
				Above 40 to 50			
				Above 50 to 60			
3	Side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	90%	90%	90%
				Above 50 to 60	70%	70%	65%
4	Horizontal mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	90%	85%	85%
				Above 50 to 60	35%	35%	35%
5	Rail mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	90%
				Above 50 to 60	80%	75%	70%
6	Rail and side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	90%	90%	90%
				Above 50 to 60	70%	70%	65%
7	Individual mounting with side cover	With		40 or less	100%	100%	100%
				Above 40 to 50	85%	85%	65%
				Above 50 to 60	65%	40%	35%
8	Individual mounting with EMC filter	With		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	70%
				Above 50 to 60	70%	45%	40%

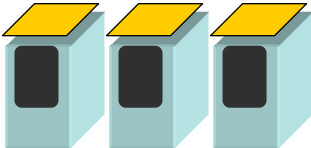
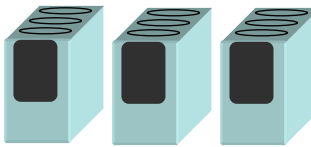

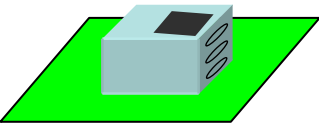
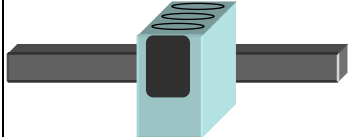

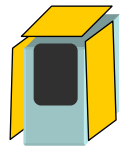

Note 1: Load reduction ratio (%) regards the value of Table 2.1, ambient temperature: 40°C or less, each PWM carrier frequency as 100%.  means the range available with 100%.


Note 2: The value of the above the table is in case of  $R_{UL} = 1$  (constant torque characteristic (150%-60s) setting).

Note 3: In case of side by side mounting, be sure to remove the top caution label.

### 5) Three-phase 240V class: 11, 15kW models

Table 3.5 Load reduction depending on mounting conditions [VFS15-2110PM-W, 2150PM-W]

No.	Mounting conditions	Top caution label	Figure	Ambient temperature (°C)	PWM carrier frequency		
					2.0k to 4.0kHz	4.1k to 12.0kHz	12.1k to 16.0kHz
1	Individual mounting	With		40 or less	Refer to Table 2.1		
				Above 40 to 50	95%	85%	75%
				Above 50 to 60	—	—	—
2	Individual mounting	W/O		40 or less	Refer to Table 2.1		
				Above 40 to 50			
				Above 50 to 60			
3	Side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	90%	80%
				Above 50 to 60	80%	70%	60%
4	Horizontal mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	80%	55%	50%
				Above 50 to 60	—	—	—
5	Rail mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	85%
				Above 50 to 60	80%	75%	65%
6	Rail and side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	90%	80%
				Above 50 to 60	80%	70%	60%
7	Individual mounting with side cover	With		40 or less	100%	100%	100%
				Above 40 to 50	90%	80%	70%
				Above 50 to 60	—	—	—
8	Individual mounting with EMC filter	With		40 or less	100%	100%	100%
				Above 40 to 50	95%	85%	75%
				Above 50 to 60	—	—	—

Note 1: Load reduction ratio (%) regards the value of Table 2.1, ambient temperature: 40°C or less, each PWM carrier frequency as 100%.  means the range available with 100%.

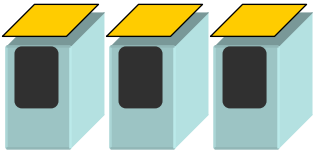
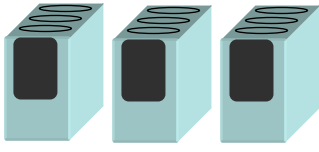

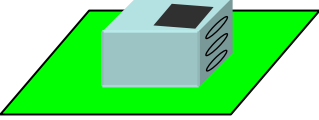
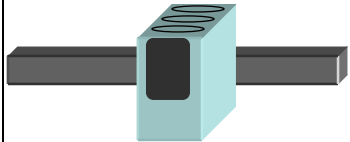
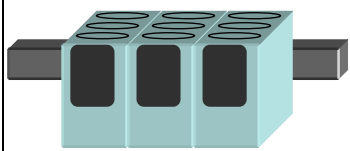
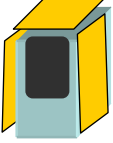

Note 2: The value of the above the table is in case of  $RUL = 1$  (constant torque characteristic (150%-60s) setting).


Note 3: In case of side by side mounting, be sure to remove the top caution label.

3.2.2 Single-phase 240V class models

1) Single-phase 240V class: 0.2 to 0.75kW models

Table 3.6 Load reduction depending on mounting conditions [VFS15S-2002PL-W to 2007PL-W]

No.	Mounting conditions	Top caution label	Figure	Ambient temperature (°C)	PWM carrier frequency		
					2.0k to 4.0kHz	4.1k to 12.0kHz	12.1k to 16.0kHz
1	Individual mounting	With		40 or less	Refer to Table 2.1		
				Above 40 to 50	100%	100%	85%
				Above 50 to 60	70%	75%	60%
2	Individual mounting	W/O		40 or less	Refer to Table 2.1		
				Above 40 to 50			
				Above 50 to 60			
3	Side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	85%	80%
				Above 50 to 60	70%	55%	45%
4	Horizontal mounting	W/O		40 or less	85%	75%	70%
				Above 40 to 50	65%	60%	55%
				Above 50 to 60	45%	40%	35%
5	DIN rail mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	90%	90%
				Above 50 to 60	80%	75%	70%
6	DIN rail and side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	85%	80%
				Above 50 to 60	70%	55%	45%
7	Individual mounting with side cover	With		40 or less	100%	95%	90%
				Above 40 to 50	85%	75%	70%
				Above 50 to 60	65%	60%	50%
8	Individual mounting with EMC filter	With		40 or less	100%	100%	100%
				Above 40 to 50	95%	90%	85%
				Above 50 to 60	75%	65%	60%

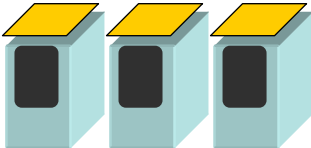
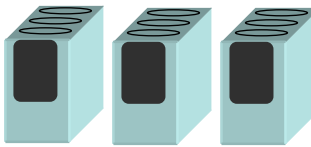

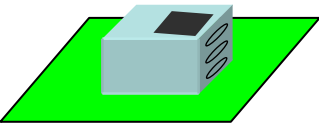
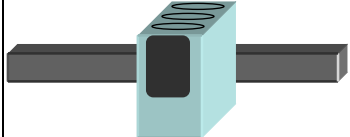

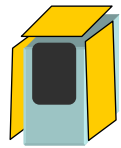

Note 1: Load reduction ratio (%) regards the value of Table 2.1, ambient temperature: 40°C or less, each PWM carrier frequency as 100%.  means the range available with 100%.


Note 2: The value of the above the table is in case of  $R_{UL} = 1$  (constant torque characteristic (150%-60s) setting).

Note 3: In case of side by side mounting, be sure to remove the top caution label.

2) Single-phase 240V class: 1.5, 2.2kW models

Table 3.7 Load reduction depending on mounting conditions [VFS15S-2015PL-W, 2022PL-W]

No.	Mounting conditions	Top caution label	Figure	Ambient temperature (°C)	PWM carrier frequency		
					2.0k to 4.0kHz	4.1k to 12.0kHz	12.1k to 16.0kHz
1	Individual mounting	With		40 or less	Refer to Table 2.1		
				Above 40 to 50	100%	100%	90%
				Above 50 to 60	85%	85%	75%
2	Individual mounting	W/O		40 or less	Refer to Table 2.1		
				Above 40 to 50			
				Above 50 to 60			
3	Side by side mounting	W/O		40 or less	100%	100%	95%
				Above 40 to 50	100%	95%	85%
				Above 50 to 60	85%	80%	75%
4	Horizontal mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	90%
				Above 50 to 60	90%	85%	75%
5	DIN rail mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	90%	90%	80%
				Above 50 to 60	75%	75%	65%
6	DIN rail and side by side mounting	W/O		40 or less	100%	100%	95%
				Above 40 to 50	90%	85%	75%
				Above 50 to 60	75%	70%	65%
7	Individual mounting with side cover	With		40 or less	100%	100%	100%
				Above 40 to 50	100%	95%	85%
				Above 50 to 60	85%	80%	75%
8	Individual mounting with EMC filter	With		40 or less	100%	100%	100%
				Above 40 to 50	90%	90%	80%
				Above 50 to 60	75%	75%	65%

Note 1: Load reduction ratio (%) regards the value of Table 2.1, ambient temperature: 40°C or less, each PWM carrier frequency as 100%.  means the range available with 100%.

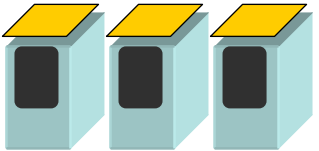
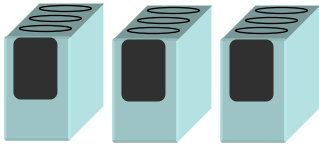

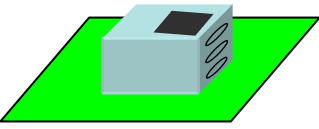
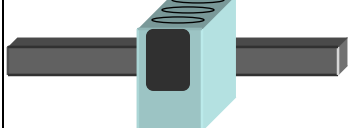
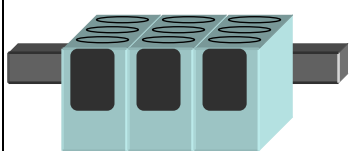
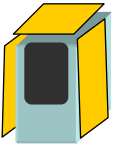
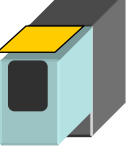
Note 2: The value of the above the table is in case of  $R_{UL} = 1$  (constant torque characteristic (150%-60s) setting).


Note 3: In case of side by side mounting, be sure to remove the top caution label.

**3.2.3 Three-phase 500V class models**

1) Three-phase 500V class: 0.4 to 1.5kW

Table 3.8 Load reduction depending on mounting conditions [VFS15-4004PL-W to 4015PL-W]

No.	Mounting conditions	Top caution label	Figure	Ambient temperature (°C)	PWM carrier frequency		
					2.0k to 4.0kHz	4.1k to 12.0kHz	12.1k to 16.0kHz
1	Individual mounting	With		40 or less	Refer to Table 2.2		
				Above 40 to 50	100%	100%	100%
				Above 50 to 60	100%	50%	45%
2	Individual mounting	W/O		40 or less	Refer to Table 2.2		
				Above 40 to 50			
				Above 50 to 60			
3	Side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	100%
				Above 50 to 60	100%	70%	65%
4	Horizontal mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	100%
				Above 50 to 60	100%	75%	70%
5	DIN rail mounting	W/O		40 or less	100%	100%	95%
				Above 40 to 50	95%	95%	90%
				Above 50 to 60	80%	75%	70%
6	DIN rail and side by side mounting	W/O		40 or less	100%	100%	95%
				Above 40 to 50	95%	90%	85%
				Above 50 to 60	60%	50%	40%
7	Individual mounting with side cover	With		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	100%
				Above 50 to 60	100%	45%	45%
8	Individual mounting with EMC filter	With		40 or less	100%	100%	100%
				Above 40 to 50	100%	90%	80%
				Above 50 to 60	80%	-	-

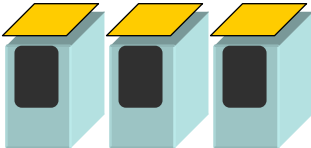
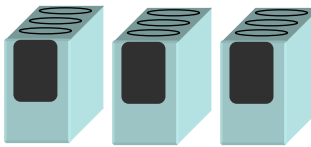

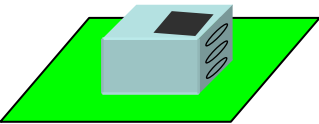
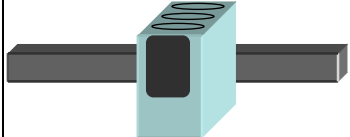

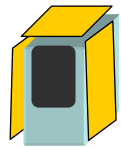

Note 1: Load reduction ratio (%) regards the value of Table 2.2, ambient temperature: 40°C or less, each PWM carrier frequency as 100%.  means the range available with 100%.


Note 2: The value of the above the table is in case of  $R_{UL} = 1$  (constant torque characteristic (150%-60s)) setting.

Note 3: In case of side by side mounting, be sure to remove the top caution label.

2) Three-phase 500V class: 2.2kW

Table 3.9 Load reduction depending on mounting conditions [VFS15-4022PL-W]

No.	Mounting conditions	Top caution label	Figure	Ambient temperature (°C)	PWM carrier frequency		
					2.0k to 4.0kHz	4.1k to 12.0kHz	12.1k to 16.0kHz
1	Individual mounting	With		40 or less	Refer to Table 2.2		
				Above 40 to 50	100%	100%	100%
				Above 50 to 60	100%	100%	60%
2	Individual mounting	W/O		40 or less	Refer to Table 2.2		
				Above 40 to 50			
				Above 50 to 60			
3	Side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	100%
				Above 50 to 60	100%	95%	60%
4	Horizontal mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	60%
				Above 50 to 60	100%	95%	55%
5	Rail mounting	W/O		40 or less	100%	100%	95%
				Above 40 to 50	95%	95%	90%
				Above 50 to 60	80%	75%	30%
6	Rail and side by side mounting	W/O		40 or less	100%	100%	95%
				Above 40 to 50	95%	90%	85%
				Above 50 to 60	60%	50%	-
7	Individual mounting with side cover	With		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	100%
				Above 50 to 60	100%	95%	60%
8	Individual mounting with EMC filter	With		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	100%
				Above 50 to 60	100%	100%	60%

Note 1: Load reduction ratio (%) regards the value of Table 2.2, ambient temperature: 40°C or less, each PWM carrier frequency as 100%.  means the range available with 100%.

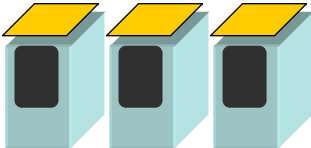
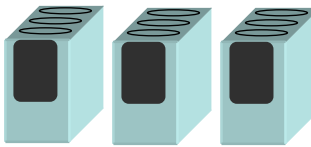

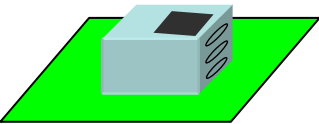
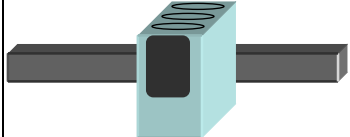

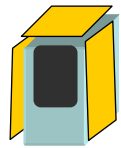
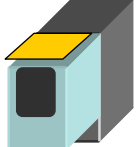
Note 2: The value of the above the table is in case of  $R_{UL} = 1$  (constant torque characteristic (150%-60s)) setting.


Note 3: In case of side by side mounting, be sure to remove the top caution label.



### 3) Three-phase 500V class:4.0kW

Table 3.10 Load reduction depending on mounting conditions [VFS15-4037PL-W]

No.	Mounting conditions	Top caution label	Figure	Ambient temperature (°C)	PWM carrier frequency		
					2.0k to 4.0kHz	4.1k to 12.0kHz	12.1k to 16.0kHz
1	Individual mounting	With		40 or less	Refer to Table 2.2		
				Above 40 to 50	100%	100%	85%
				Above 50 to 60	90%	80%	65%
2	Individual mounting	W/O		40 or less	Refer to Table 2.2		
				Above 40 to 50			
				Above 50 to 60			
3	Side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	90%
				Above 50 to 60	100%	80%	65%
4	Horizontal mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	100%
				Above 50 to 60	100%	75%	-
5	Rail mounting	W/O		40 or less	100%	100%	95%
				Above 40 to 50	95%	95%	75%
				Above 50 to 60	80%	75%	55%
6	Rail and side by side mounting	W/O		40 or less	100%	100%	95%
				Above 40 to 50	95%	90%	75%
				Above 50 to 60	60%	50%	30%
7	Individual mounting with side cover	With		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	75%
				Above 50 to 60	90%	70%	-
8	Individual mounting with EMC filter	With		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	85%
				Above 50 to 60	100%	80%	60%

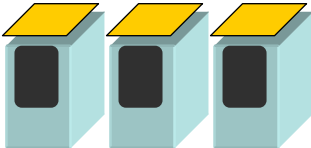
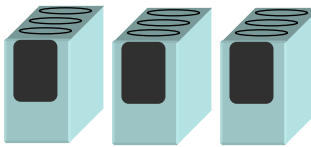

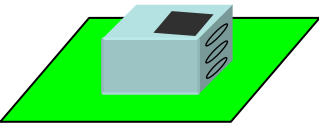
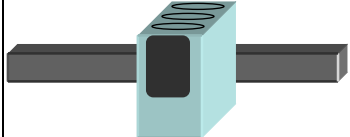

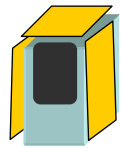
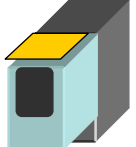
Note 1: Load reduction ratio (%) regards the value of Table 2.2, ambient temperature: 40°C or less, each PWM carrier frequency as 100%.  means the range available with 100%.


Note 2: The value of the above the table is in case of  $R_{UL} = 1$  (constant torque characteristic (150%-60s)) setting.

Note 3: In case of side by side mounting, be sure to remove the top caution label.

### 4) Three-phase 500V class: 5.5, 7.5kW

Table 3.11 Load reduction depending on mounting conditions [VFS15-4055PL-W, 4075PL-W]

No.	Mounting conditions	Top caution label	Figure	Ambient temperature (°C)	PWM carrier frequency		
					2.0k to 4.0kHz	4.1k to 12.0kHz	12.1k to 16.0kHz
1	Individual mounting	With		40 or less	Refer to Table 2.2		
				Above 40 to 50	100%	100%	95%
				Above 50 to 60	50%	40%	40%
2	Individual mounting	W/O		40 or less	Refer to Table 2.2		
				Above 40 to 50	Refer to Table 2.2		
				Above 50 to 60	Refer to Table 2.2		
3	Side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	80%
				Above 50 to 60	90%	60%	55%
4	Horizontal mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	85%
				Above 50 to 60	90%	60%	55%
5	Rail mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	85%
				Above 50 to 60	90%	75%	60%
6	Rail and side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	80%
				Above 50 to 60	90%	60%	55%
7	Individual mounting with side cover	With		40 or less	100%	100%	100%
				Above 40 to 50	100%	90%	75%
				Above 50 to 60	75%	55%	-
8	Individual mounting with EMC filter	With		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	95%
				Above 50 to 60	50%	40%	40%

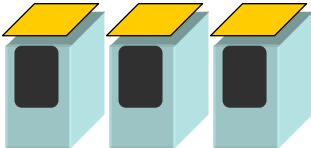
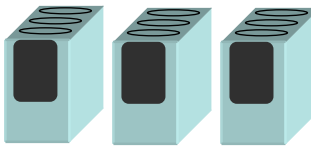

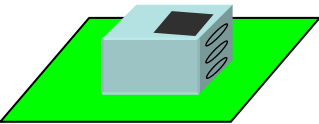
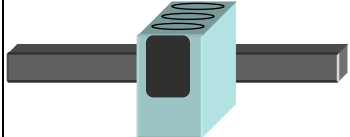

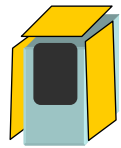

Note 1: Load reduction ratio (%) regards the value of Table 2.2, ambient temperature: 40°C or less, each PWM carrier frequency as 100%.  means the range available with 100%.


Note 2: The value of the above the table is in case of  $RUL = 1$  (constant torque characteristic (150%-60s)) setting.

Note 3: In case of side by side mounting, be sure to remove the top caution label.

### 5 Three-phase 500V class: 11, 15kW

Table 3.12 Load reduction depending on mounting conditions [VFS15-4110PL-W, 4150PL-W]

No.	Mounting conditions	Top caution label	Figure	Ambient temperature (°C)	PWM carrier frequency		
					2.0k to 4.0kHz	4.1k to 12.0kHz	12.1k to 16.0kHz
1	Individual mounting	With		40 or less	Refer to Table 2.2		
				Above 40 to 50	90%	90%	75%
				Above 50 to 60	-	-	-
2	Individual mounting	W/O		40 or less	Refer to Table 2.2		
				Above 40 to 50			
				Above 50 to 60			
3	Side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	90%	90%	75%
				Above 50 to 60	-	-	-
4	Horizontal mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	85%	85%	75%
				Above 50 to 60	40%	-	-
5	Rail mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	100%	100%	85%
				Above 50 to 60	80%	85%	60%
6	Rail and side by side mounting	W/O		40 or less	100%	100%	100%
				Above 40 to 50	90%	90%	75%
				Above 50 to 60	-	-	-
7	Individual mounting with side cover	With		40 or less	95%	95%	95%
				Above 40 to 50	80%	80%	65%
				Above 50 to 60	-	-	-
8	Individual mounting with EMC filter	With		40 or less	100%	100%	100%
				Above 40 to 50	90%	90%	75%
				Above 50 to 60	-	-	-

Note 1: Load reduction ratio (%) regards the value of Table 2.2, ambient temperature: 40°C or less, each PWM carrier frequency as 100%.  means the range available with 100%.

Note 2: The value of the above the table is in case of  $R_{UL} = 1$  (constant torque characteristic (150%-60s)) setting.

Note 3: In case of side by side mounting, be sure to remove the top caution label.

## 4. Variable torque characteristic ( $RUL = 2$ )

In case of  $RUL$  (Overload characteristic selection) = 2 (Variable torque characteristic (120% - 60s)) setting, be sure to install the input AC reactor (ACL) between power supply and the inverter and use at ambient temperature 40°C or less. Set  $F300$  to 4.0 kHz or less.

Table 4.1 Current value in case of  $RUL = 2$  [Three-phase 240V class]

VFS15-	Ambient temperature	PWM carrier frequency
		2.0k to 4.0kHz
2004 PM-W	40°C or less	3.5 A
2007 PM-W	40°C or less	6.0 A
2015 PM-W	40°C or less	9.6A
2022 PM-W	40°C or less	12.0 A
2037PM-W	40°C or less	19.6 A
2055PM-W	40°C or less	30 .0A
2075PM-W	40°C or less	38.6 A
2110PM-W	40°C or less	56.0 A
2150PM-W	40°C or less	69.0A

Table 4.2 Current value in case of  $RUL = 2$  [Single-phase 240V class]

VFS15S-	Ambient temperature	PWM carrier frequency
		2.0k to 4.0kHz
2002 PL-W	40°C or less	1.9A
2004 PL-W	40°C or less	4.1 A
2007 PL-W	40°C or less	5.5A
2015 PL-W	40°C or less	10.0 A
2022 PL-W	40°C or less	12.0A

Table 4.3 Current value in case of  $RUL = 2$  [500V class]

VFS15-	Ambient temperature	PWM carrier frequency
		2.0k to 4.0kHz
4004 PL-W	40°C or less	2.1 A
4007 PL-W	40°C or less	3.0 A
4015 PL-W	40°C or less	5.4A
4022 PL-W	40°C or less	6.9 A
4037 PL-W	40°C or less	11.1 A
4055 PL-W	40°C or less	17.0A
4075 PL-W	40°C or less	23.0 A
4110 PL-W	40°C or less	31.0A
4150 PL-W	40°C or less	38.0A