

Addendum to the Frequency Inverter Manual

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ATTENTION!

- The information contained here applies to inverters having the **N4** abbreviation in the intelligent code, for instance: CFW080073T2024PON4A1Z. In order to get more information on the intelligent code, refer to the user manual section 2.4.
- Use this guide together with the CFW-08 user manual.

1. INTRODUCTION

The frequency inverter CFW-08 Wash is an inverter dedicated to applications that require a higher protection degree. The Type 4X protection degree assures protection against dust, dirt and directed water jets.

2. INSTALLATION AND CONNECTION

2.1 Environment

The recommended environments for the CFW-08 Wash use are:

- Type 4X indoor;
- IP66;
- Nema 12 indoor.

Other considerations and specifications about the environment are identical to those for the CFW-08 IP20 (refer to the chapter 3 of the CFW-08 user manual).

2.2 Dimensions

The figures 2.1 a) and 2.1 b) present the dimensions of the CFW-08 Wash.

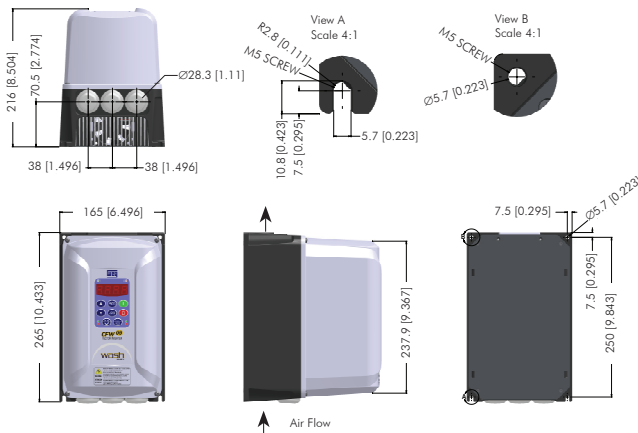


Figure 2.1 a) - CFW-08 Wash dimensions in mm [in] – Models: 7.3 – 10 – 16 A/200-240 V and 2.7 – 4.3 – 6.5 – 10 A/380-480 V

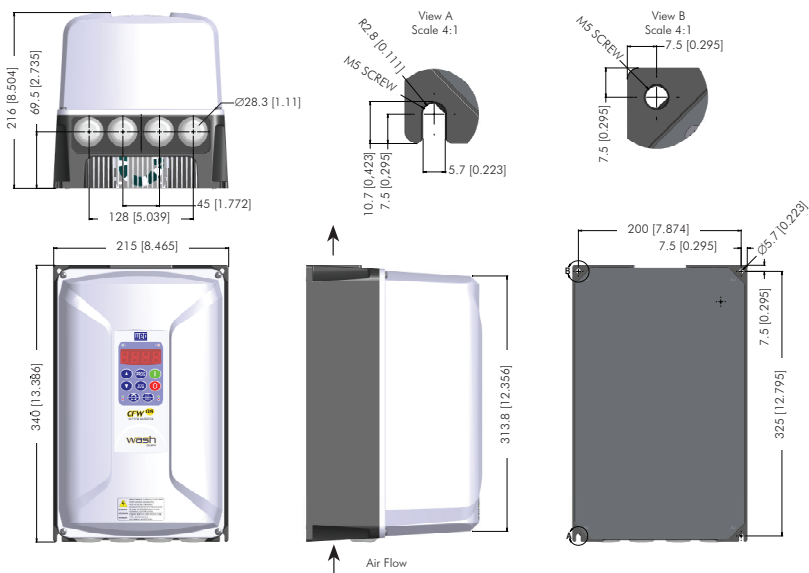


Figure 2.1 b) - CFW-08 Wash dimensions in mm [in] – Models: 22 – 28 – 33 A/200-240 V, 13 – 16 – 24 – 30 A/380-480 V and 1.7 – 3.0 – 4.3 – 7.0 – 10 – 12 A/500-600 V

NOTE!

The positioning, fixing and mounting recommendations described in the CFW-08 user manual must be considered (refer to the chapter 3).

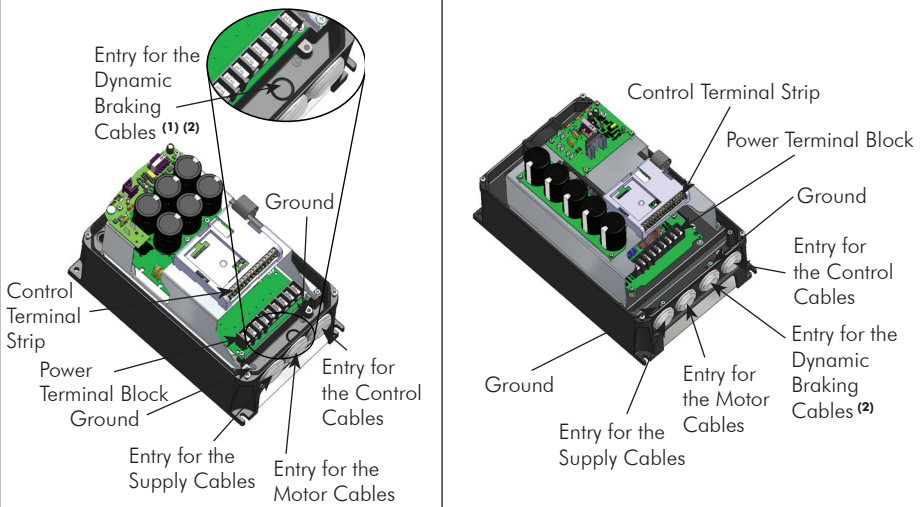
2.3 Location of the Power, Ground and Control Connections

In order to get access to the power, control and ground terminals, it is necessary to remove the inverter front cover, as indicated in the figure 2.2. Disconnect cable XC6 at the front cover.



Figure 2.2 - Procedure for the CFW-08 Wash front cover removal

The figure 2.3 presents the location of the power and control terminal strips, as well as the ground connection point.



a) Models: 7.3 – 10 – 16 A/200-240 V and 2.7 – 4.3 – 6.5 – 10 A/380-480 V

b) Models: 22 – 28 – 33 A/200-240 V, 13 – 16 – 24 – 30 A / 380-480 V and 1.7 – 3 – 4.3 – 7 – 10 – 12 A/500-600 V

- (1) - When using the dynamic braking with the 7.3 A, 10 A and 16 A/200 – 240 V and 2.7 A, 4.3 A, 6.5 A and 10 A/380 – 480 V models, it is necessary to remove the opening knockout and use appropriate Type 4X cable and cable gland.
 - Entry diameter: 16.1 mm (0.63 in).
 - Cable gland: M16 x 1.5 or PG9.
- (2) - In order to comply with UL standard, cables type S or SJ suitable for wet locations and marked with “W” should be used to assure Type 4X protection degree.

Figure 2.3 a) and b) - Location of the power, ground and control connections

NOTE!

Before performing this operation, remove the power from the inverter and wait 10 minutes for the complete discharge of the capacitors.

2.4 Electrical Installation

2.4.1 Power/Ground Connection Wiring and Circuit Breakers

Refer to the chapter 3 in the CFW-08 user manual.

NOTE!

- The use of appropriate cables is essential to assure the Type 4X protection degree. The use of multi core cables is recommended. For instance, a 4-core cable for the power supply (R, S, T) and grounding, as well as another 4-core cable for the motor connection. The figure 2.4 presents an example of a 4-core cable for the power section connections.
- In order to assure the Type 4X protection degree, it is necessary the use of cable glands with a compatible degree of protection for the application at the power and control connections.



Figure 2.4 - 4-core cable

NOTE!

Power supply line capacity: Type 4X devices are suitable for use on a circuit capable of delivering not more than 30,000 Arms symmetrical amperes, 200-600 Volts maximum, when protected by fuses rated 100 % of the drive input current. Voltage is the same as the device maximum input voltage.

2.4.2 Signal and Control Connections

The signal (analog inputs and outputs) and control (digital inputs and relay outputs) connections are made at the control board terminal strip XC1. The functions of the XC1 terminals are shown in the figure 2.5.

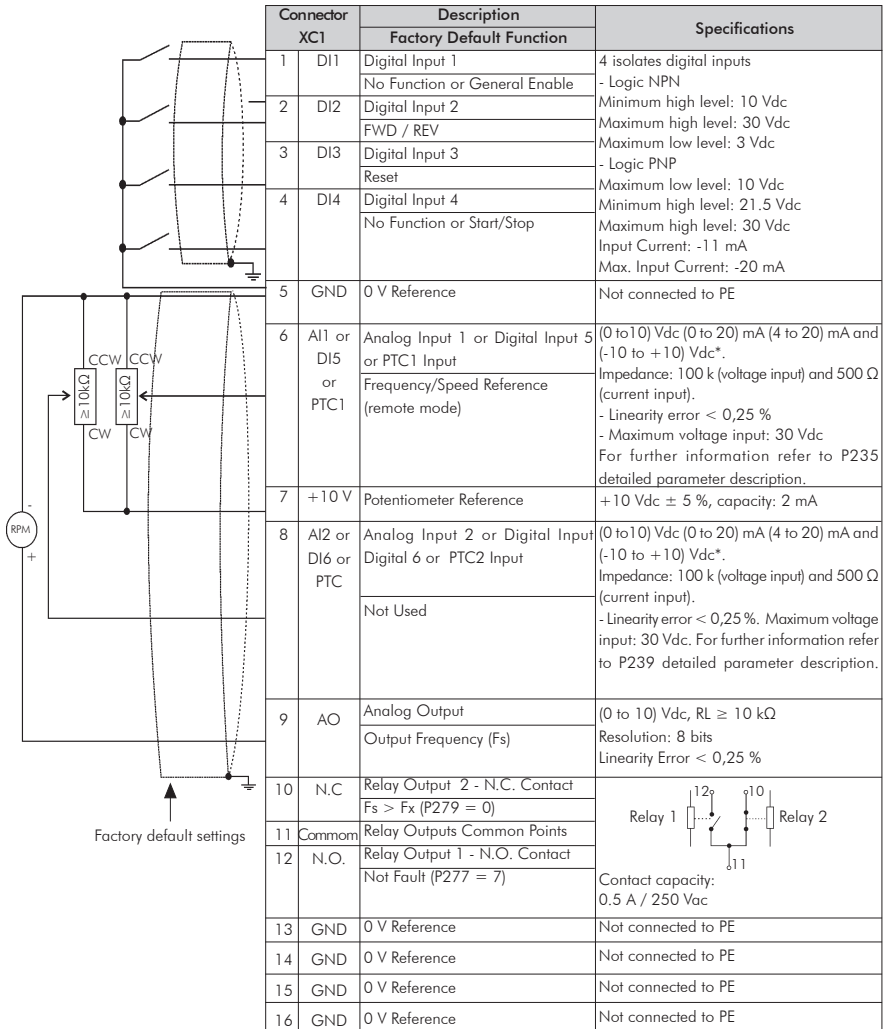


Figure 2.5 - Description of the XC1 terminal strip for the control board A1 (CFW-08 Plus), control board A2 (CFW-08 Plus with AI's -10 V to +10 V), control board A3 (CFW-08 Plus with CANopen protocol) and control board A4 (CFW-08 Plus with DeviceNet protocol)

NOTES!

- 1) Before making the connections, remove the power supply from the inverter and wait 10 minutes for the complete discharge of the capacitors.
- 2) In order to assure the Type 4X protection degree, it is necessary the use of cable glands with a compatible degree of protection for the application at the power and control connections.
- 3) If there is no electrical connections the rubber seals that come with the inverter must be kept in place.
- 4) The maximum and minimum diameter of the power and control connection cables must be according to the cable gland supplier specification, in order to assure the specified protection degree.
- 5) The CFW-08 Wash has four (4) extra GND terminals compared to the CFW-08 IP20 in order to assist with the control connections.

NOTE!

In order to get more information on the control board installation and configuration, refer to the CFW-08 user manual chapter 3.

2.5 European Electromagnetic Compatibility Directive – Proposed Filters

The frequency inverters of the CFW-08 series were projected considering all the aspects of safety and electromagnetic compatibility (EMC).

2.5.1 Inverters and Filters

The emission levels for CFW-08 Wash models are different from those for the IP20 models. The next table presents the filters and the categories for the CFW-08 Wash models according to EN61800-3, edition 2, 2004-08.

Table 2.1 - Inverter model list, filters and EMC categories

Id	Inverter Model	Input RFI Filter	Conducted Emission Level	Radiated Emission Level
1	CFW080073B2024...FAZ (single-phase input)	Built-in Filter	Category C3	Category C3
2	CFW080100B2024...FAZ (single-phase input)			
3	CFW080073B2024... (single-phase input)	FS6007-25-08 or B84142-A30-R122 (external filter)	Category C1	Category C2
4	CFW080073B2024... (three-phase input)	FN3258-16-45 or B84143-B25-R110 (external filter)		
5	CFW080100B2024... (single-phase input)	FS6007-36-08 or B84142-A30-R122 (external filter)		
6	CFW080100B2024... (three-phase input)	FN3258-16-45 or B84143-B25-R110 (external filter)		
7	CFW080160T2024...	FN3258-30-47 or B84143-B36-R110 (external filter)		
8	CFW080220T2024...	B84143-B36-R110 (external filter)		
9	CFW080280T2024...	B84143-B50-R110 (external filter)		
10	CFW080330T2024...	B84143-B50-R110 (external filter)		

Table 2.1 (cont.) - Inverter model list, filters and EMC categories

Id	Inverter Model	Input RFI Filter	Conducted Emission Level	Radiated Emission Level
11	CFW080027T3848...FAZ	Built-in Filter	Category C3	Category C3
12	CFW080043T3848...FAZ			
13	CFW080065T3848...FAZ			
14	CFW080100T3848...FAZ			
15	CFW080130T3848...FAZ			
16	CFW080160T3848...FAZ			
17	CFW080027T3848...	FN3258-7-45 or B84143-B8-R110 (external filter)	Category C1	Category C2
18	CFW080043T3848...			
19	CFW080065T3848...	FN3258-16-45 or B84143-B25-R110 (external filter)		
20	CFW080100T3848...			
21	CFW080130T3848...	FN3258-16-45 or B84143-G36-R110 (external filter)		
22	CFW080160T3848...			
23	CFW080240T3848...	FN-3258-30-47 or B84143-B50-R110 (external filter)	Category C1	Category C3
24	CFW080300T3848...			
25	CFW080240T3848...FAZ	Built-in Filter	Category C3	
26	CFW080300T3848...FAZ			

NOTES!

- 1) The inverters with conducted emission level Category C1 and the models 1 and 2, must be mounted inside a metallic cabinet so that the radiated emissions be kept inside the levels for residential environment ("first environment") and restricted distribution (refer to the chapter 3 of the CFW-08 user manual).
- 2) The maximum switching frequency is 10 kHz. Exception: 5 kHz for the models 1, 2, 11 to 16 and 23 to 26.
- 3) The maximum motor cable length is:
 - 50 m for the model 25 and 26;
 - 20 m for the models 3 to 10 and 17 to 24;
 - 15 m for the models 1 and 2;
 - 10 m for the models from 11 to 16.
- 4) For the models from 17 to 22 Common Mode choke is necessary at the filter input: TOR2-CFW08, 3 turns. Refer to the chapter 3 in the CFW-08 user manual for the installation.
- 5) For the models from 17 to 20 it is necessary to use a shielded cable between the external filter and the inverter.
- 6) Before performing this operation, remove the power supply from the inverter and wait 10 minutes for the complete discharge of the capacitors.
- 7) For more information on the conducted and radiated emission levels, refer to the chapter 3 of the CFW-08 user manual.

2.6 Closing the Inverter

The correct closing of the frequency inverter after the electrical installation is important in order to assure the Type 4X protection degree.

The next instructions guide this operation:

- After the electrical installation conclusion and the tightening of the cable glands, make sure that the cable from the control board to the HMI is connected.
- Verify if the sealing rubber is inserted in the internal channel of the front cover.
- Place the cover on the base.
- The screws must be tightened in small steps (one at a time), so that the rubber be compressed uniformly, until the complete closure. The torque required for the complete closure is of 2 Nm.

NOTE!

Opening and closing the product too many times reduces the useful life of the sealing rubber. It is not recommended to perform this procedure more than 15 times.

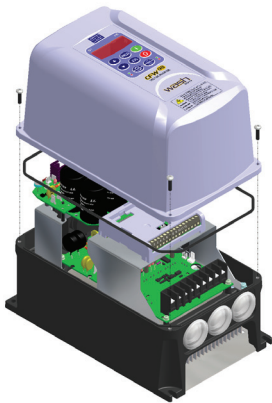


Figure 2.6 a) Closure positioning



Figure 2.6 b) Location of the closure screws

3. HUMAN MACHINE INTERFACE (HMI)

For the CFW-08 Wash, the HMI functionality is identical to the one presented in the CFW-08 user manual.

Two LEDs with the following functions have been added:

- When the CANopen Fieldbus network is used (control board A3)
 - LED1 – Run
 - LED 2 – Error
- When the DeviceNet Fieldbus network is used (control board A4)
 - LED 1 – Ns
 - LED 2 – Ms
- When the Modbus Fieldbus network is used (control board A1)
 - LED 1 – TX/Error
 - LED 2 – Power/Error
- When the standard inverter is used (control board A1)
 - LED 1 – Error
 - LED 2 – Power/Error



Figure 3.1 - CFW-08 Wash HMI

4. OPTIONAL DEVICES AND ACCESSORIES

All the optional devices and accessories presented in the chapter 8 of the CFW-08 user manual can be used with the CFW-08 Wash, with one remark:

- When the parallel remote HMI (HMI-CFW08-RP) is used, the local HMI cable must be removed from the product.

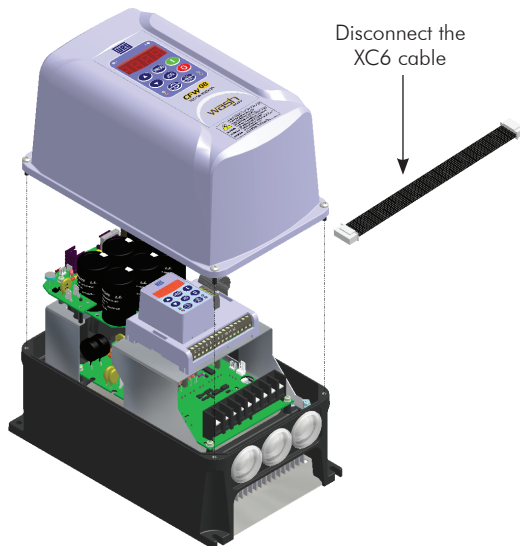


Figure 4.1 - Instructions for the XC6 interconnection cable removal

5. MODELS

The CFW-08 Wash available models are presented in the tables below.

5.1 200-240 V Line

Table 5.1 a) - Technical specification for the CFW-08 Wash
7.3 – 10 – 16 A / 200-240 V models

Model: Current (A) / Voltage (V)	7.3/200-240	10/200-240	16/200-240
Power (kVA) ⁽¹⁾	2.8	3.8	6.1
Rated output current (A) ⁽²⁾	7.3	10	16
Maximum output current (A) ⁽³⁾	11	15	24
Power supply	Single-phase or three-phase		Three-phase
Rated input current (A)	8.6/16 ⁽⁴⁾	12/22 ⁽⁴⁾	19
Switching frequency (kHz)	5	5	5
Maximum motor power ⁽⁵⁾	2 HP/1.5 kW	3 HP/2.2 kW	5 HP/3.7 kW
Dynamic braking	Yes		
Internal RFI filter	Yes (single-phase)		No
External Category C1 RFI filter (optional)	Yes		
Watt loss (W)	84	114	183
Weight (kg/lb)	5.1/11.2		5/11

Table 5.1 b) - Technical specification for the CFW-08 Wash
22 – 28 – 33 A / 200-240 V models

Model: Current (A) / Voltage (V)	22/200-240	28/200-240	33/200-240
Power (kVA) ⁽¹⁾	8.4	10.7	12.6
Rated output current (A) ⁽²⁾	22	28	33
Maximum output current (A) ⁽³⁾	33	42	49.5
Power supply	Three-phase		
Rated input current (A)	24	33.6	40
Switching frequency (kHz)	5	5	5
Maximum motor power ⁽⁵⁾	7.5 HP/5.5 kW	10 HP/7.5 kW	12.5 HP/9.2 kW
Dynamic braking	Yes		
Internal RFI filter	No		
External Category C1 RFI filter (optional)	Yes		
Watt loss (W)	274	320	380
Weight (kg/lb)	7/15.4	7.2/15.9	

5.2 380-480 V Line

Table 5.2 a) - Technical specification for the CFW-08 Wash
2.7 – 4.3 – 6.5 – 10 A / 380-480 V models

Model: Current (A) / Voltage (V)	2.7/380-480	4.3/380-480	6.5/380-480	10/380-480
Power (kVA) ⁽¹⁾	2.1	3.3	5.0	7.6
Rated output current (A) ⁽²⁾	2.7	4.3	6.5	10
Maximum output current (A) ⁽³⁾	4.1	6.5	9.8	15
Power supply	Three-phase			
Rated input current (A)	3.3	5.2	7.8	12
Switching frequency (kHz)	5	5	5	5
Maximum motor power ⁽⁵⁾	1.5 HP/1.1 kW	2 HP/1.5 kW	3 HP/2.2 kW	5 HP/3.7 kW
Dynamic braking	Yes			
Internal RFI filter				
External Category C1 RFI filter (optional)				
Watt loss (W)	45	71	109	168
Weight (kg/lb)	4.6/10.1	5.2/11.5	5.3/11.7	

Table 5.2 b) - Technical specification for the CFW-08 Wash
13 – 16 – 24 - 30 A / 380-480 V models

Model: Current (A) / Voltage (V)	13/380-480	16/380-480	24/380-480	30/380-480
Power (kVA) ⁽¹⁾	9.9	12.2	18.3	24
Rated output current (A) ⁽²⁾	13	16	24	30
Maximum output current (A) ⁽³⁾	19.5	24	36	45
Power supply	Three-phase			
Rated input current (A)	15	19	28.8	30
Switching frequency (kHz)	5	5	5	2.5
Maximum motor power ⁽⁵⁾	7.5 HP/5.6 kW	10 HP/7.5 kW	15 HP/11 kW	20 HP/15 kW
Dynamic braking	Yes			
Internal RFI filter				
External Category C1 RFI filter (optional)				
Watt loss (W)	218	268	403	500
Weight (kg/lb)	7.2/15.9		7.8/17.2	7.9/17.4

NOTE!

The 30 A/380-480 V (20 HP) model operates with a 2.5 kHz switching frequency and a minimum line impedance of 2 %. In order to get more information on the line impedance, refer to the section "Line Reactor" in the CFW-08 user manual.

5.3 500-600 V Line

Table 5.3 - Technical specification for the CFW-08 Wash
1.7 – 3.0 – 4.3 – 7.0 – 10 – 12 A/500-600 V models

Model: Current (A) / Voltage (V)	1.7/ 500-600	3.0/ 500-600	4.3/ 500-600	7.0/ 500-600	10/ 500-600	12/ 500-600
Power (kVA) ⁽¹⁾	1.7	3.0	4.3	7.0	10	12
Rated output current (A) ⁽²⁾	1.7	3.0	4.3	7.0	10	12
Maximum output current (A) ⁽³⁾	2.6	4.5	6.5	10.5	15	18
Power supply	Three-phase					
Rated input current (A)	2.1	3.7	5.2	8.5	12.2	14.6
Switching frequency (kHz)	5	5	5	5	5	5
Maximum motor power ⁽⁵⁾	1 HP/ 0.75 kW	2 HP/ 1.5 kW	3 HP/ 2.2 kW	5 HP/ 3.7 kW	4.5 HP/ 5.5 kW	10 HP/ 7.5 kW
Dynamic braking	Yes					
Internal RFI filter	No					
External Category C1 RFI filter (optional)						
Watt loss (W)	40	70	100	160	230	280
Weight (kg/lb)	6.3/13.9	7/15.4	7.1/15.6			

(1) The power in kVA is calculated by the following expression:

$$P(\text{kVA}) = \frac{\sqrt{3} \cdot \text{Voltage (Volt)} \cdot \text{Current (Amp)}}{1000}$$

The values presented in the tables were calculated considering the inverter nominal current and a 220 V voltage for the 200-240 V series, and 440 V for the 380-480 V series.

(2) The nominal current is valid in the following conditions:

- Relative Humidity: 5 % to 90 %, without condensation.
- Altitude: 1000 m (3280.83 ft) up to 4000 m (13123.32 ft) with 10 % reduction in the nominal current for each 1000 m (3280.83 ft).
- Ambient Temperature: 0 °C to 40 °C (from 40 °C to 50 °C with a 2 % reduction in the nominal current for each 1 °C).
- The nominal current values are valid for 2.5 kHz or 5 kHz switching frequencies (factory setting). For higher switching frequencies, 10 kHz and 15 kHz, consider the values presented in the parameter P297 description (refer to the CFW-08 user manual).

(3) Maximum output current:

- The inverter withstands a 50 % overload (maximum output current = 1.5 x nominal output current) during 1 minute every 10 minutes of operation.
- For higher switching frequencies, 10 kHz and 15 kHz, consider 1.5 times the value presented in the parameter P297 (refer to the CFW-08 user manual).

(4) Nominal input current for single-phase operation:

Note: the CFW080016B2024..., CFW080026B2024..., CFW080040B2024..., CFW080073B2024..., CFW080100B2024... models are able to operate with three-phase supply as well as single-phase, without power reduction.

(5) The motor powers are just orientative for 4 pole motors. The correct sizing must be done in function of the used motor nominal current.

NOTE!

The technical characteristics for those models can be found in the chapter 9 of the CFW-08 user manual.



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Document: 10000154978 / 02