CFW-11

Variable Speed Drives

CFW-11

The CFW11 is a system drive designed for the control of squirel cage induction motors. It can be used in a wide range of applications, since it is designed for running on either Normal or Heavy Duty loads. Its performance is excellent, providing increased productivity and an improvement in the quality of the process in which it is used.

1.1 to 2.2kW - 1.5 to 3HP
200-240V - Single-phase

1.1 to 55kW - 1.5 to 75HP
200-240V - Three-phase

1.5 to 370kW - 2 to 600HP
380-480V - Three-phase

New Frame Sizes F & G

Innovative and simple

The CFW-11 presents many innovations that are helpful and beneficial to customers, mainly due to the simplicity of its installation and operation. The CFW-11 was developed based on Plug-and-Play philosophy (connect and use) allowing simple and fast installation of the VSD and its accessories. The Keypad has a navigation and programming system similar to mobile phones, with soft-key buttons. It is possible to access the parameters sequentially or through groups of parameters. The Keypad also makes the Oriented Start-up function available, guiding the user through the necessary programming.

Flexibility

The CFW-11 adapts to the customer's needs through a broad range of accessories which are easily installed. Besides this, the standard product comes with a small PLC called Soft PLC that offers PLC functionalities and it allows the costumer for creation of his/her own user applications through the WLP software (programming in LADDER).

Technology - Patents

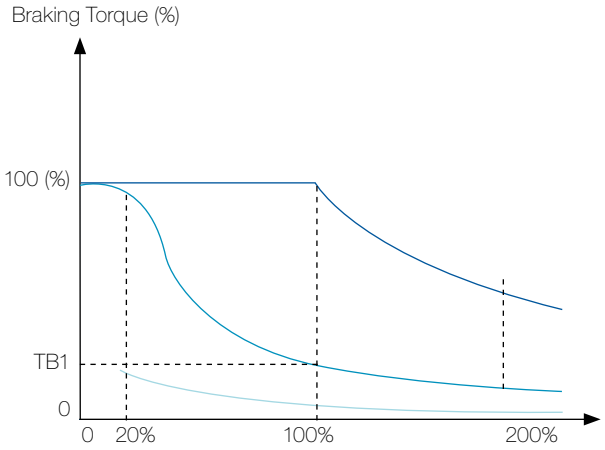
Vectrue Technology®

WEG VARIABLE SPEED DRIVE CONTROL TECHNOLOGY

- Linear and adjustable V/f, VVW (Voltage Vector WEG) and vector control are available in the same product.
- Two types of vector control: Sensorless and closed loop Vector control (Encoder Interface required).
- Sensorless vector control permits high torque and quick response in open loop, even at low speeds.
- The self-tuning function automatically matches the vector control or VVW to the motor and load used.
- Through the adjustable V/f control, it is possible, for example, to adjust a quadratic V/f curve, providing energy savings for quadratic torque loads (e.g.: centrifugal pumps and fans).

Optimal Braking®

In applications involving high inertia loads and short deceleration times is required, a large amount of energy is returned from the motor to the VSD. To handle this energy, traditional VSDs have to dissipate it as heat in power resistors. Such resistors are usually large and some installation criteria must be considered due to their heat dissipation.
As an alternative to the use of braking resistors, CFW-11 features a special braking method in vector control mode known as Optimal Braking®. This innovation delivers a high performance braking torque without requiring a braking resistor.
The following graph shows the advantages of using Optimal Braking® compared to other methods, thus ensuring an optimized and low cost solution for braking applications.



Typical Braking Torque x Speed Graph for a 10 HP / 7.5 kW motor driven by a CFW-11

- Dynamic Braking Torque Curve
- Optimal Braking® Torque Curve
- DC Braking Torque Curve

Wmagnet Drive System®

Frequency Inverter controlling permanent magnet motors. The WMagnet System (WMagnet motor + CFW11) has the hightest efficiency levels in the market.
It is a perfect match for applications where speed variation, low noise level and reduced size are required. In Sersorless mode the Wmagnet System is able to perform torque control at zero speed without the need for forced ventilation.

Main characteristics of the set CFW11 + WMagnet motor

- Voltage Range: 380V to 480Vca
- Power Rating: 11 to 160kW (15 to 220HP)
- Methods of control: Sensorless Vector and closed loop control (vector with encoder)
- WMagnet control Algorithm included on the CFW11 standard version
- Variety of communication protocols (Fieldus) is available when running WMagnet control also CFW11 communication modules are utilized.
- Fieldbus modules available: Modbus RTU,Modbus TCP, Profibus DP-V1, DeviceNet, CANopen and Ethernet / IP.

Optimal Flux®

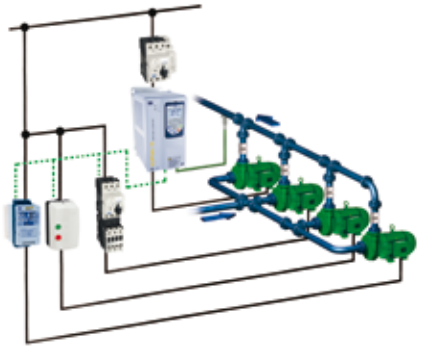
TECHNOLOGY FOR MOTORS DRIVEN BY VSDs IN APPLICATIONS WITH CONSTANT TORQUE LOADS

- Rated torque at low speeds eliminating the need for independent ventilation or motor oversizing.
- Space saving and cost reduction of the application.
- Improved performance of the package VSD and motor (an exclusive WEG solution).

The Optimal flux function works when the set High Efficiency WEG motor + CFW11/09 is used.

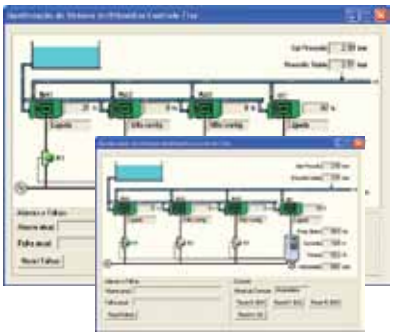
Applications

The CFW-11 can be used in both simple and sophisticated applications, due to its broad range of functions and easy configuration, installation and operation. The CFW-11, through its Vectrue Inverter technology, presents excellent static and dynamic performance, precise torque and speed control, dynamic response, positioning precision, and high overload capacity. The CFW-11 was also developed for applications where the decisive factor is safety, through several built-in protections and alarms as well as through the safety stop function in accordance with EN 954-1, category III.



Multi-Pump Control

The CFW-11 features the Multipump Control, which permits the CFW-11 to control up to 5 pumps in order to keep constant pressure regardless of the flow fluctuations. In this system, an intelligent algorithm control of pumps provided by means of a user application developed to run on CFW11 decides when to start or stop each pump based on the system demand. Besides that, the VSD also monitors the suction pressure and the tank level.
The CFW-11 also alternates the pumps according to their operating time, thus ensuring an uniform wear and tear of motors and pumps.
Two types of Multipump Control are available: fixed and floating controls. In fixed control, the VSD is able to control one of the pumps at variable speed and to start and stop another 4 pumps at fixed speed. In floating control, the VSD is able to control up to 4 pumps, all of them at variable speed.
The Multipump Control for CFW-11 is available as an user application for running on Soft PLC (see page 14) and can be downloaded from www.weg.net



Pumps and fans

- Precise control of process variables (pressure, flow, temperature, etc.) through a PID regulator superposed to the speed control.
- Optimization of power consumption through speed control with an adjustable V/f curve.
- Possibility of safety and maintenance signalling and alarms of pumps and fans.
- Availability of PID regulators to control other process accessories like valves, dumpers, other VSDs, etc.

Compressors

- Optimization of system pressurization control with energy savings and improvement of compressor efficiency.
- Reduction of motor startup current minimizing wear and tear of the mechanical system avoiding fees chardeg by the power supplier company.
- Possibility of safety and maintenance signaling and alarms of pressurization system.
- Provides startup system control of other compressor units with an increased efficiency of the pressurization system.

Applications

Paper and Cellulose / Wood

- Three monitoring parameters displayed at once on the keypad.
- USB communication port at the front of the VSD for data monitoring and parameters configuration via software Superdrive.
- Precise speed and torque control.
- Flexible hardware programming and configuration, making applications where syncronism is required easier.
- Possibility to be integrated in a variety of communication protocols commonly used in industry.
- Provided in a compact design the CFW11 Series allows the assembly directly next to one another with no derating.
- Quick and simplified programming.
- Highly reliable and robust.
- For large power ratings modular topology can be used (CFW-11M).

Cement and Mining

- Robust and large overload capacity (models sized in HD).
- Provided in a compact design the CFW11 Series allows the assembly directly next to one another with no derating.
- Possibility to be integrated in a variety of communication protocols commonly used in industry.
- Quick and simplified programming.
- Highly reliable and robust.
- For large power ratings modular topology is used (CFW-11M)

Chemical and Petrochemical

- Highly reliable and robust.
- Provided in a compact design the CFW11 Series allows the assembly directly next to one another with no derating.
- Plug-and-play system for additional modules, ensuring greater flexibility in adapting to existing systems.
- Possibility to be integrated in a variety of communication protocols commonly used in the industry.

Ironworks and Metallurgy

- Highly precise speed and torque control.
- Large overload capacity (models sized in HD).
- Flexible hardware programming and configuration.
- Possibility to be integrated in a variety of communication protocols mainly used in the industry.
- Provided in a compact design the CFW11 Series allows the assembly directly next to one another with no derating.
- For large power ratings modular topology is used (CFW-11M).

Applications

OverHead Cranes / Lifting

- SoftPLC function.
- Three modes of vector control.
- Highly compact.
- Intelligent control of ventilation system.

Cooling

- SoftPLC function built in the standard product enabling the use of two controllers simultaneously. This characteristic is for HVAC applications.
- Three monitoring parameters displayed at once on the keypad.
- USB communication port at the front of the VSD for data monitoring and parameters configuration via software Superdrive.

Sugar and Alcohol

- Modular and compact.
- 12-pulse rectifier for reduction of harmonic content.
- Regenerative rectifier for centrifuges.
- Highly robust and reliable.

Process Machines

- Built-in PLC and Real Time Clock.
- Easiness and flexibility for connecting to the most used fieldbus network.
- Fieldbus.
- Precise speed and torque in all speed ranges.
- User friendly interface and programming.


CFW-11
VECTRUE INVERTER
Run
LOC 1800rpm
rpm
100%
A
51%
Hz
100%
08:17
Menu
LOC
REM
JOG
WARNING / ATENCION / ATENÇÃO

Keypad

The CFW-11 keypad was developed for simple and fast interaction while providing excellent visibility for the user.

Easy to use Interface Tools:

- Graphic display.
- Soft-keys for easy operation.
- Backlight.
- Real time clock.
- Copy function.
- Plug-in (connection with CFW-11 turned on).
- Language selection.
- Remote Keypad.

Left soft-key: function defined by the display

FWD/REV Selection

Local / Remote Selection

Right soft-key: function defined by the display

Key for scrolling through menus and parameters and for modifying parameter content

Start key

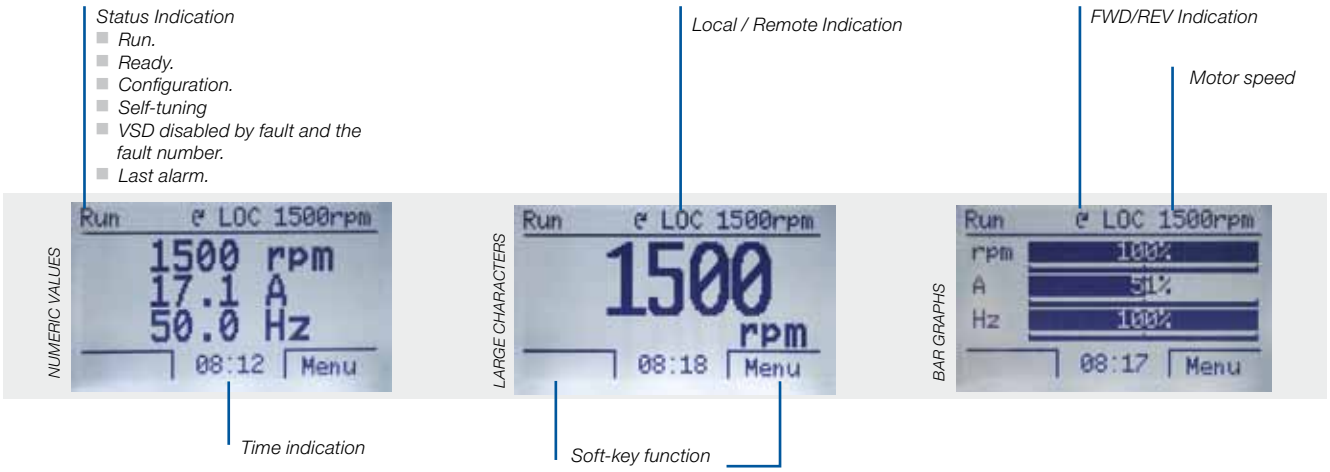
Stop key

JOG key

Remote Keypad
The Keypad can be installed on panel doors or machine consoles with a protection degree of IP56.

Monitoring Modes

The keypad can be configured to display reading parameters in three different modes.



The keypad displays parameters in a hierarchy mode organized by groups.

Oriented Start-up

For simplified Start-up, the CFW-11 guides the user through the necessary programming to adjust the VSD to the motor and power supply.

Basic Application

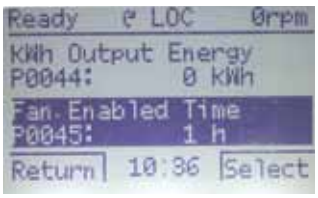
The Basic Application Group contains the basic parameters, which need to be adjusted in most applications. The CFW-11 guides the user through these parameters.

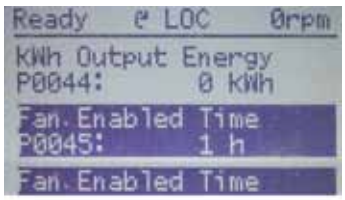
Fault History Group

It shows the parameters with the last 10 faults and the day, month, year and time when they occured.

Read Only Parameters Group

It shows reading parameters only.





Backup Parameters Group

The Backup Parameters Group allows CFW-11 parameters to be transferred to the Keypad or FLASH Memory Module (available in the standard product) and vice versa. During CFW-11 operation, the modified parameters are saved in the FLASH Memory Module automatically.

Functions Group

The keypad offers the functionality of displaying parameter groups in indvidual folders where each of them shows specific configurations. For example: I/O Configuration, Self-tuning procedure, Basic Parameters, etc.

Selectable Language

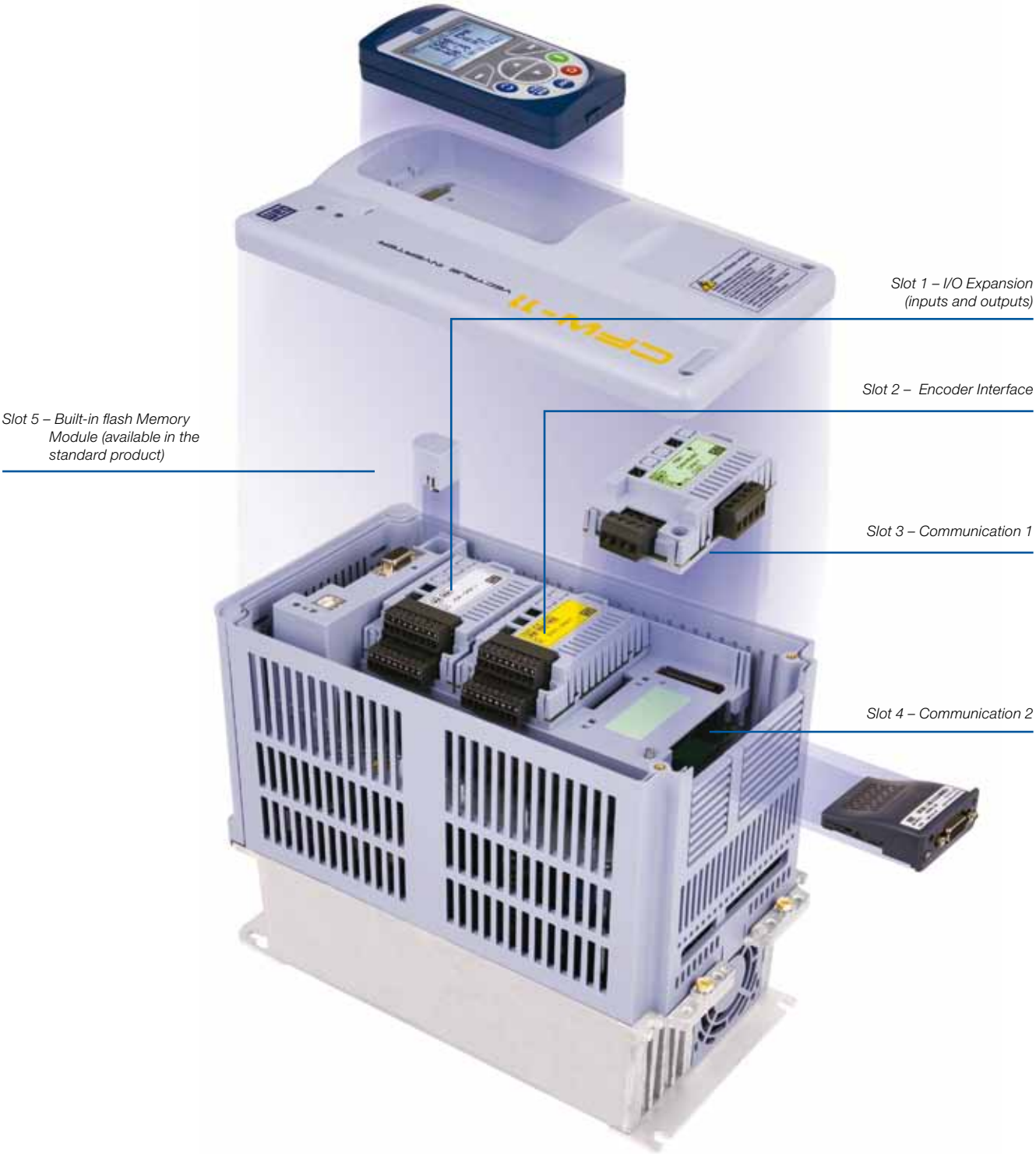
The user can choose the Keypad language: Portuguese, English, Spanish, German, etc.

Changed Parameters Group

It shows only the parameters that have been programmed differently from the factory default.

Accessories

The CFW11 was developed based on Plug and Play philosophy identifying automatically accessories plugged in as well as easy installation and safe operation with no need for extra configuration.



Accessories

	Name	Description	Slot	Appearance
I/O Expansion	IOA-01	2 14-bit analog inputs in voltage or current 2 digital inputs 2 14-bit analog outputs in voltage or current 2 open collector digital outputs	1	
	IOB-01	2 isolated 12-bit analog inputs 2 digital inputs 2 isolated 11-bit analog outputs in voltage or current 2 open collector digital outputs	1	
	IOC-01	8 Digital Inputs 4 Digital Outputs (Use with Soft PLC)	1	
	IOC-02	8 Digital Inputs 8 Open Collector Digital Outputs (Use with Soft PLC)	1	
	IOE-01	5 PTC type temperature sensor Inputs	1	
	IOE-02	5 PT100 type temperature sensor Inputs	1	
	IOE-03	5 KTY84 type temperature sensor Inputs	1	
Interface with Encoder	ENC-01	Incremental encoder module 5 to 12 Vdc (internal power supply) 100 kHz With encoder signal repeater (External power supply needed)	2	
	ENC-02	Incremental encoder module 5 to 12 Vdc (internal power supply) 100 kHz	2	
Communication	RS485-01	RS-485 Serial Communication Module (Modbus-RTU)	3	
	RS232-01	RS-232C Serial Communication Module (Modbus-RTU)	3	
	CAN/RS485-01	CAN/RS-485 Interface Module (CANopen, DeviceNet and Modbus)	3	
	CAN-01	CAN Interface Module (CANopen and DeviceNet)	3	
	PROFIBUS DP-01	Profibus DP-V1 Interface module	3	
	PROFDP-05	Profibus DP-V1 Module (Anybus)	4	
	DEVICENET-05	DeviceNet Module (Anybus)	4	

Accessories

	Name	Description	Slot	Appearance
Communication	RS232-05	RS-232 Interface Module (passive) (Modbus-RTU)	4	
	RS485-05	RS-485 Interface Module (passive) (Modbus-RTU)	4	
	MODBUS TCP-05	RS-485 Interface Module (MODBUS TCP) (Anybus)	4	
	PROFINETIO-05	Profinet IO Interface Module (Anybus)	4	
	ETHERNET/IP-05	EtherNet/IP Interface Module	4	
PLC Functions	PLC11-01	Module with PLC Functions (see page 15)	1,2 and 3	
	PLC11-02	Module with PLC Functions (see page 15)		

Accessories

Kit for power cable shielding

CFW-11 has a kit to simplify the connection of the motor cable shield to ground, providing a low-impedance connection for high frequencies.

Name	Description
PCSA-01	Kit for power cable shielding for frame size A
PCSB-01	Kit for power cable shielding for frame size B
PCSC-01	Kit for power cable shielding for frame size C
PCSD-01	Kit for power cable shielding for frame size D or 2D (IP54)
PCSE-01	Kit for power cable shielding for frame size E or 3 (IP54)
PCS1-01	Kit for power cable shielding for frame size 1 (IP54)
PCSC-02	Kit for power cable shielding for frame size 2C

Note: 1) The kit for power cable shielding PCSD-01, PCSE-01 is provided along with VSDs having factory fitted RFI filter.
Example: EU CFW11 0007 T 2 O FA Z
2) In frame sizes D and E the power cable shielding kit is factory standard, even for VSDs without internal RFI filter;
3) N/A for frame sizes F and G.

Enclosures

Standards	Ratings	Frame Sizes					
		A	B	C	D	E	F & G
IEC	IP20	-	-	-	X	X	X
	IP21	X	X	X	KIP21D-01	-	-
NEMA	TYPE 1	KN1A-01	KN1B-01	KN1C-01	X	KN1E-01 / KN1E-02	KN1F-01 / KN1G-01

(X) Standard
(-) N/A

Standard	Accessory	Composition
NEMA Type1	KN1A-01	Conduit kit frame size A
	KN1B-01	Conduit kit frame size B
	KN1C-01	Conduit kit frame size C
	KN1E-01	Top cover size E models 105 and 142
	KN1E-02	Top Cover + Conduit kit size E models 180 and 211
	KN1F-01	Conduit kit for frame size F
	KN1G-01	Conduit kit for frame size G
IEC	KIP21A-01	Top cover kit frame size A
	KIP21B-01	Top cover kit frame size B
	KIP21C-01	Top cover kit frame size C
	KIP21D-01	Top cover kit frame size D

Note: In the KN1X-01 Conduit kit (frame sizes A,B and C) power cable shielding is also provided
Kits KN1F-01 and KN1G-01 are under UL certification process

Accessories / Optionals

Safety stop in accordance with EN-954-1, category III

With the activation of the safety stop function, the PWM pulses of the IGBTs are disabled. Since no voltage is available at VSD output, no torque is applied to the motor. Thus, it is ensured that the motor remains stopped providing system safety (pending certification).

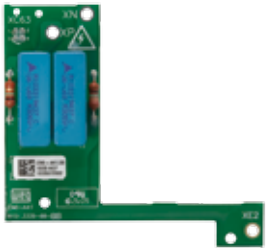
Accessories / Optionals

Blank cover – HMID - 01[1]
Blank cover to replace the standard VSD keypad when not used.

Remote keypad frame – RHMIF-01
Frame for Keypad installation on panel door or machine console.
Degree of protection IP56.

External control supply in 24 Vdc[1]
Used with communication networks (Profibus DP, DeviceNet, EtherNet/IP, etc.) so that the control circuit and the interface for the communication network continue working even if the AC supply is removed.

RFI suppressor filter[1] (for the VSD to be in accordance with EN 61800-3 and EN 55011)
CFW-11 models with built-in RFI filter, when properly installed, meet the requirements of the electromagnetic compatibility directive – "EMC Directive 2004/108/EC".
Example: EU CFW11 0007 T 2 O FA Z
For models from frame size A to D, the RFI filter is optional. But for models in frame size E, the RFI filter is included in the standard product.



[1] These optionals must be factory fitted and orders must specify on the product coding (page 25) the desired option.

CFW11 - Dynamic Braking module DBW03D
The DBW03, with its autonomous capability allows for the energy to return from regenerative cycles or even from motors when running high inertia load requiring short deceleration times to dissipate it in resistors.
This breaking unit was developed specially for VSDs with unavailability of the breaking circuit factory integrated, e.g. frame sizes F and G and Modular Drive. Its voltage ranges from 380 to 480V and its main function is to limit DC bus voltage in order to avoid the VSD from tripping due to overvoltage caused by applications where breaking is mandatory.

Maximum Output Current: 378Amps
Minimum Resistor: 1.8Ohms
External power supply for fans: 220Vca +/- 5%@250mA

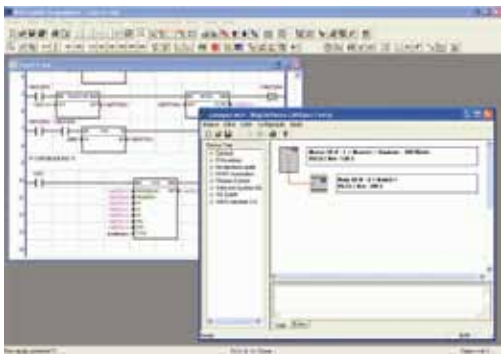
Accessories

PLC Accessory - PLC11

PLC11 accessory provides the CFW-11 with PLC functionality, speed reference generator and motion control functions. It comes in two options: PLC11-01 and PLC11-02 (see differences in the table below).
In many applications, this accessory allows the CFW-11 to replace an external PLC, reducing application costs.

Features:

- Motion control with trapezoidal “S” profiles (absolute and relative)
- Machine initial position search (homing)
- Ladder programming through WLP Software with timers, counters, coils and contacts
- RS-485 serial interface with Modbus-RTU protocol
- 100 configurable parameters available to the user via keypad or WLP
- Master/Slave function (Electronic Gearbox)
- CAN interface for CANopen and DeviceNet protocols
- CANopen Master, which allows CFW-11 to control up to 25 slave devices
- WLP/ WSCAN software: network configuration and programming software in the same environment.



Technical Specification

Inputs/Outputs

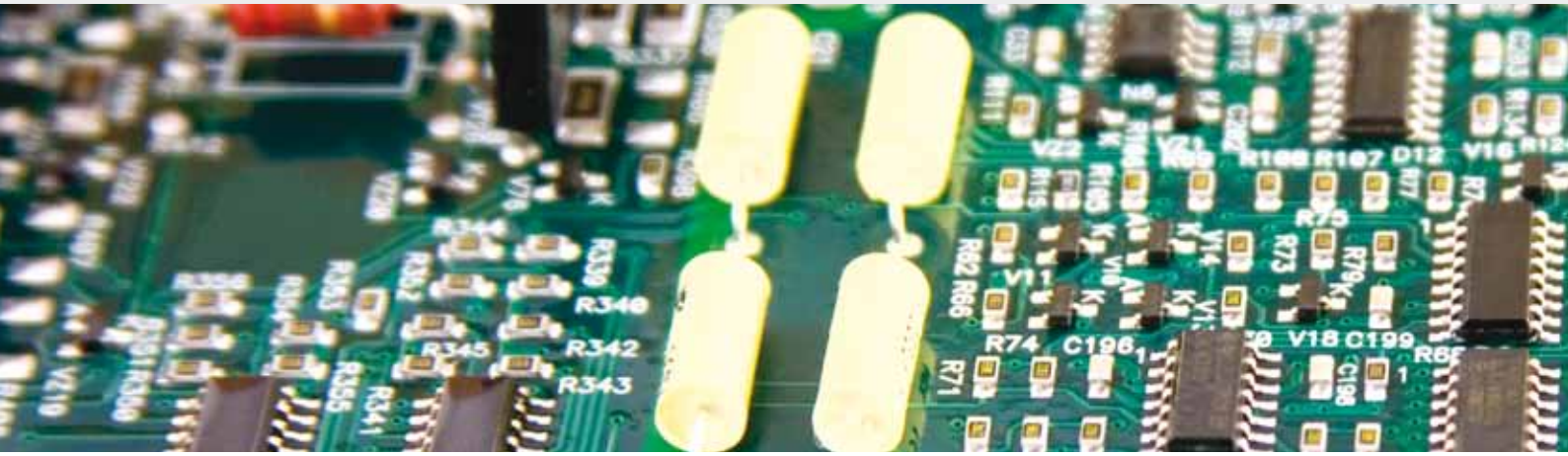
- Digital Inputs
- Digital Outputs
- Relay Outputs
- Encoder interface Inputs
- RS-485 Interface
- CANopen Interface
- Analog Outputs
- Analog Inputs

PLC11-01

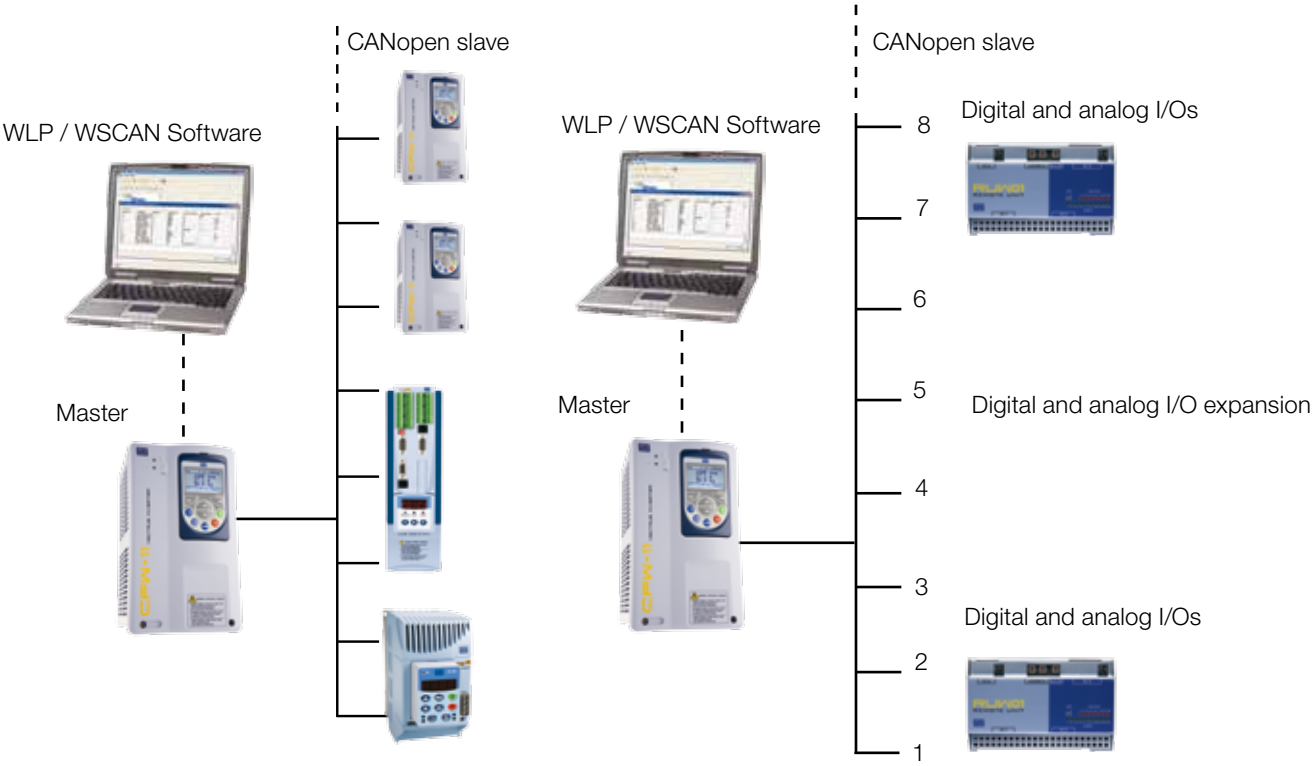
- 9 Bidirecional isolated Inputs 24V
- 3 Bidirectional isolated open-collector outputs: 24Vdc, 500mA
- 3 Outputs NO contacts: 250Vac, 3A
- 2 Incremental Encoder Inputs 5...12Vdc, 500mA (internal power supply)
- 1 RS-485 port (Modbus RTU available)
- 1 CAN port (CANopen and Devicenet available)
- 1 Differential input: -10...+10Vdc / 0...20mA, 14 bits
- 2 Analog outputs: -10...+10Vdc/ 0...20mA, 12 bits

PLC11-02

- 4 Bidirecional isolated Inputs 24V
- 3 Bidirectional isolated open-collector outputs: 24Vdc, 500mA
- 1 Outputs NO contacts: 250Vac, 3A
- 2 Incremental Encoder Inputs 5...12Vdc, 500mA (internal power supply)
- 1 RS-485 port (Modbus RTU available)
- 1 CAN port (CANopen and Devicenet available)



Example of use of PLC11-01 as CANopen network master



USB Connection

SuperDrive G2

It is a Windows-based software for CFW-11 programming, control and monitoring. The following features are available in the software:

- Automatic CFW-11 identification
- Monitoring of CFW-11 parameters
- Online changing of parameters in the CFW-11
- Offline changing of parameters in the PC
- Creation of application documents
- Trace function (see below)
- Upload of SoftPLC applicative software in the CFW-11 flash memory (see page 16)
- Online troubleshooting

This software is available free of charge at www.weg.net

Monitoring and parameterization of the list of parameters. Comparison to factory default is easy.

Integrated environment

Monitoring and command window using virtual Keypad. Start/Stop function, JOG, local / remote, Reverse and reset

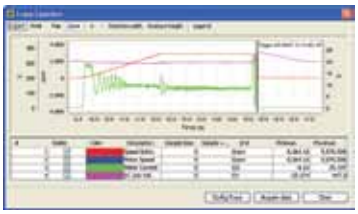
Parameter setting

Status monitoring

USB Connection

Trace Function

Trace function is used to register CFW-11 variables (like current, voltage, speed, etc.) when a given event occurs in the system (eg.: alarm / fault, overload, overvoltage, etc.).
When a given event takes place the trigger function activates data storage process.
The stored variables can be visualized in the form of graphs by using the SuperDrive G2 software. Trace function simulates a 4-channel oscilloscope.
It is a very powerful tool to be used on start-up procedures of systems and on diagoses of faults.



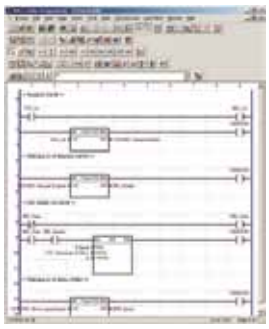
Example of graph visualization screen

Trace function configuration in the SuperDrive G2

SoftPLC Function

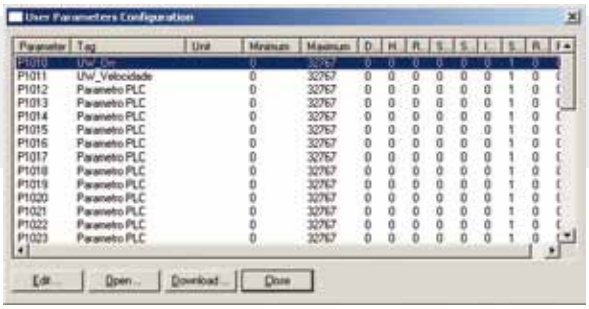
It is a resource that provides PLC features to the CFW-11 without the addition of any accessories. It provides flexibility to the product, allowing the user to create his/her own applicative software (user's program). The SoftPLC main features are:

- Ladder language programming using WLP software
- Access to all VSD parameters and I/Os
- Configurable PLC, mathematical and control blocks
- Applicative software download, upload and online monitoring via USB connection
- Storage of user application in the CFW-11 Flash Memory Module (see below)
- Memory capacity of 15kB for storage of a user aplication



Simple and practical programming environment

- 49 User parameter settings that can be individually programmed allowing tags, units, minimum and maximum values, number of decimal digits and other characteristics to be changed.



Flash Memory Module

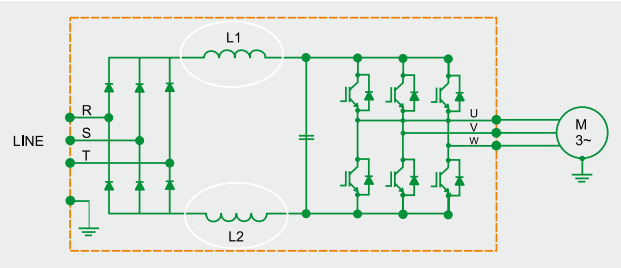
- It stores CFW-11 parameters. It ensures that the programming will not be lost as there is a backup of the parameters.
- It permits the transfer of parameters stored in the flash Memory Module to the CFW-11 and vice versa. It is an useful function for machine manufactures or in processes where parameter settings are repeated (Copy Function).
- It stores the applicative software generated by the SoftPLC function.

The Flash Memory Module comes as standard on CFW11 series.

Technical Features

Built-in DC link Reactor

- Allows the VSD to be installed in any network (there is no minimum impedance restriction).
- Typical power factor (PF) for rated condition: 0.94 for models with three-phase supply 0.70 for models with single-phase 0,70 for models with single-phase supply/three-phase supply = 0,94
- Displacement Power factor > 0,98
- Meets the 61000-3-12 standard, related to low order current harmonics in the network.

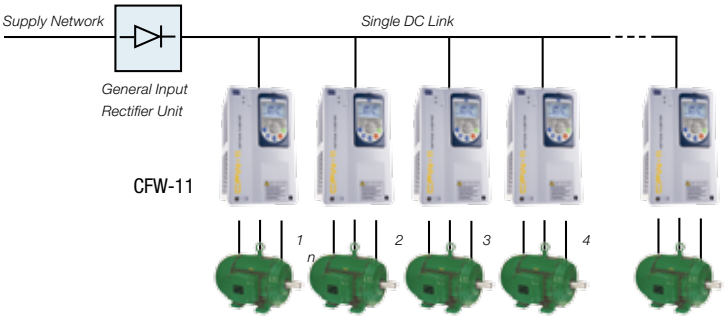


No need for external line reactor

Single DC Busbar

Usually used in multi-motor systems, common DC bus confguration is a good solution for energy savings.
In this confguration, individual VSD rectifer bridges are replaced with a common input rectifer unit. Each VSD is then directly fed from the DC bus to its DC link terminals.
This solution allows the energy in the DC bus to be shared among the VSDs connected to it, thus optimizing the power consumption in the system.
The standard CFW-11 can be connected to a DC bus system. (When required the factory should be consulted for further details)

Note: An extra pre-charge circuit must be added to each of the VSDs.



Intelligent Thermal Management

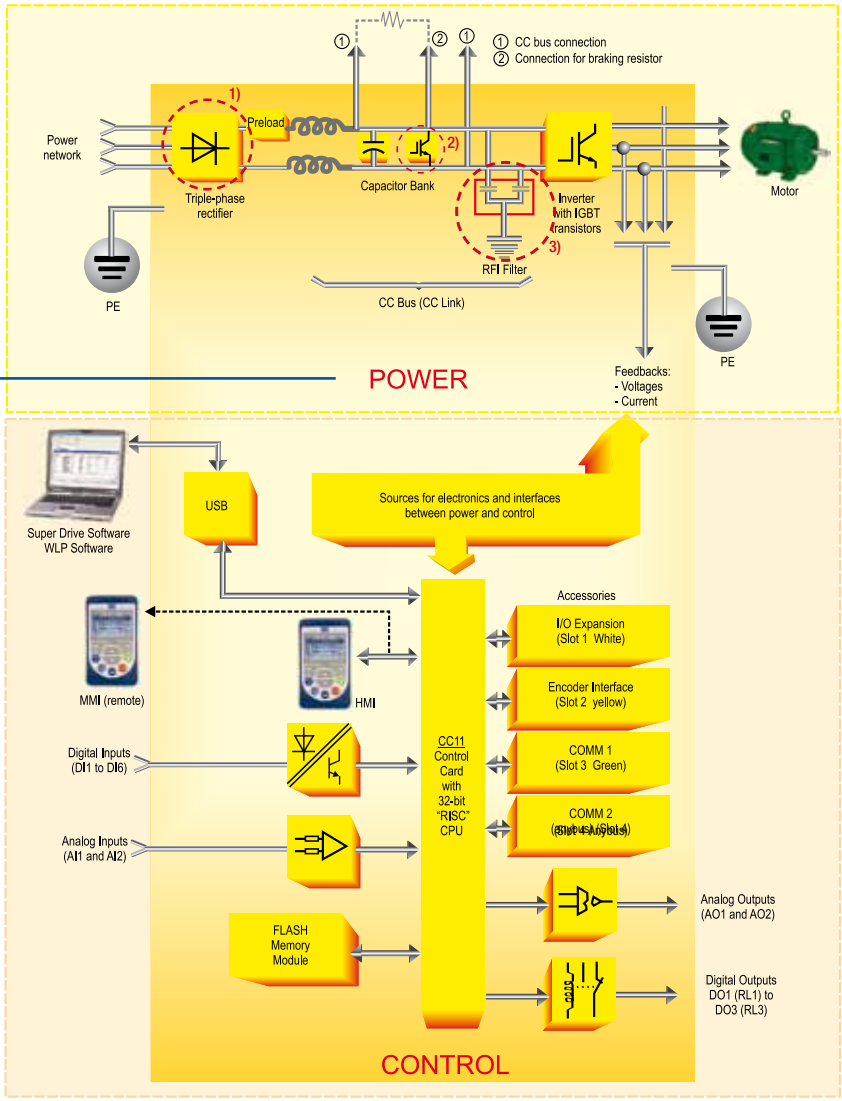
- Monitoring of the heatsink and internal air temperatures of the electronic boards providing total protection of the IGBTs and the CFW-11 as a whole.
- The heatsink fan is turned on and off automatically, depending on the temperature of the power modules.
- The speed and the number of hours of operation of the fan are monitored and indicated in corresponding parameters. Alarm or fault messages are generated related to these variables.
- The fan is easily removed for cleaning or replacement.

Functions

- Multi-speed: up to 8 pre-programmed speeds.
- PID regulator: automatic control of level, pressure, flow, weight, etc.
- Ride-Through: operation during momentary Loss of the power supply.
- Skip Frequency: rejection of critical or resonant speeds.
- S Ramp: smooth acceleration / deceleration.

- All CFW-11 models from size A to D have built-in braking IGBT in as standard;
- CFW-11 size E the braking IGBT is optional built-in;
- CFW-11 sizes F and G, Breaking IGBT is optional with the external DBW module;
- CFW-11 can monitor the temperature probes of the motor (PTC, PT100 KTY84), providing thermal protection to the motor (optional accessory is necessary);
- Operating air temperature up to 50° C (122° F) for sizes A to D, and up to 45° C (113° F) for size E, 45° C (113° F) for sizes F and G up to 601A, 40° C (104° F) for size G with 720A;
- Motor overload protection according to IEC 60497-4-2 and UL 508 C.

Technical Features



Notes:
1) Half controlled bridge rectifier for sizes F and G;
2) Standard for sizes A to D;
3) Standard RFI filter for sizes E, F and G;

Please refer to the user manual for more information.

Drive Ratings

Normal Duty (ND) Cycle:
- 110% for 60 seconds every 10 minutes
- 150% for 3 seconds every 10 minutes

Heavy Duty (HD) Cycle:
- 150% for 60 seconds every 10 minutes
- 200% for 3 seconds every 10 minutes

Sizing the drive:
The correct way to select a VSD is matching its output current with the motor rated current. However, the tables below present the expected motor power for each VSD model.
Use the motor power ratings below only as a guidance. Motor rated currents may vary with speed and manufacturer.
IEC motor powers are based on WEG 4-poles motors, NEMA motor powers are based on NEC table 430-150.

CFW-11 IP54 Drive

The CFW-11 IP54 features an IP54 enclosure that protects the drive from splashing water, corrosion and dust.
Improved cooling fans ensure perfect functionality when operating at maximum loading capacity.
Its design is suitable for wall mounting with no need for customized panels allowing for severe environments exposure.
- Chemical Industry
- Petrochemical Industry
- Food Industry

Communication Protocol such as Profibus, Devicenet, CAN open, Modbus-RTU, Ethernet IP can be added using optional cards.

Motor voltages between 220V and 230V:

Power Supply		Model	Normal Duty (ND)	IEC 50 Hz 220 V 230 V	NEMA 60 Hz 230 V	Heavy Duty (HD)	IEC 50 Hz 220 V 230 V	NEMA 60 Hz 230 V
			A	kW	HP	A	kW	HP
200-240 V	1Ø	CFW110006S2	6	1.1	1.5	5	1.1	1
		CFW110007S2	7	1.5	2	7	1.5	2
		CFW110010S2	10	2.2	3	10	2.2	3
	1/3Ø	CFW110006B2	6	1.1	1.5	5	1.1	1
		CFW110007B2	7	1.5	2	7	1.5	2
	3Ø	CFW110007T2	7	1.5	2	5.5	1.1	1
		CFW110010T2	10	2.2	3	8	1.5	2
		CFW110013T2	13	3	3	11	2.2	3
		CFW110016T2	16	4	5	13	3	3
		CFW110024T2	24	5.5	7.5	20	5.5	5
		CFW110028T2	28	7.5	10	24	5.5	7.5
		CFW110033T2	33.5	9.2	10	28	7.5	10
		CFW110045T2	45	11	15	36	9.2	10
		CFW110054T2	54	15	20	45	11	15
		CFW110070T2	70	18.5	25	56	15	20
		CFW110086T2	86	22	30	70	18.5	25
		CFW110105T2	105	30	40	86	22	30
220-230V	3Ø	CFW110142T2	142	37	50	115	30	40
		CFW110180T2	180	55	60	142	37	50
		CFW110211T2	211	55	75	180	55	60

Motor voltages between 380V and 480V:

Power Supply		Model	Normal Duty (ND)	IEC 50 Hz 380 V 415 V	IEC 60 Hz 440 V 460 V	NEMA 60 Hz 460 V	Heavy Duty (HD)	IEC 50 Hz 380 V 415 V	IEC 60 Hz 440 V 460 V	NEMA 60 Hz 460 V
			A	kW	HP	HP	A	kW	HP	HP
380-480 V	3Ø	CFW110003T4	3.6	1.5	2	2	3.6	1.5	2	2
		CFW110005T4	5	2.2	3	3	5	2.2	3	3
		CFW110007T4	7	3	4	3	5.5	2.2	3	3
		CFW110010T4	10	4	7.5	5	10	4	7.5	5
		CFW110013T4	13.5	5.5	10	7.5	11	5.5	7.5	7.5
		CFW110017T4	17	7.5	12.5	10	13.5	5.5	10	7.5
		CFW110024T4	24	11	15	15	19	9.2	12.5	10
		CFW110031T4	31	15	20	20	25	11	15	15
		CFW110038T4	38	18.5	30	25	33	15	25	20
		CFW110045T4	45	22	30	30	38	18.5	30	25
		CFW110058T4	58.5	30	40	40	47	22	30	30
		CFW110070T4	70.5	37	50	50	61	30	50	40
		CFW110088T4	88	45	75	60	73	37	60	50
		CFW110105T4	105	55	75	75	88	45	75	60
		CFW110142T4	142	75	100	100	115	55	75	75
		CFW110180T4	180	90	150	150	142	75	100	100
		CFW110211T4	211	110	175	150	180	90	150	150
		CFW110242T4	242	132	200	200	211	110	150	150
		CFW110312T4	312	160	250	250	242	132	200	200
		CFW110370T4	370	200	300	300	312	160	250	250
		CFW110477T4	477	250	400	400	370	200	300	300
		CFW110515T4	515	280	400	450	477	250	400	400
		CFW110601T4	601	315	500	500	515	280	400	450
		CFW110720T4	720	370	600	600	560	300	450	450

Motor Voltages 220Vca / 240Vca: IP54

Power Supply		Model	Normal Duty (ND)	IEC	NEMA	Heavy Duty (HD)	IEC	NEMA
				50Hz 220V 230V	60Hz 230V		50Hz 220V 230V	60Hz 230V
			A	kW	HP	A	kW	HP
200-240 Vca	10	CFW110006S2054	6	1.1	1.5	5	1.1	1
		CFW110007S2054	7	1.5	2	7	1.5	2
		CFW110010S2054	10	2.2	3	10	2.2	3
	1/30	CFW110006B2054	6	1.1	1.5	5	1.1	1
		CFW110007B2054	7	1.5	2	7	1.5	2
	30	CFW110007T2054	7	1.5	2	5.5	1.1	1
		CFW110010T2054	10	2.2	3	8	1.5	2
		CFW110013T2054	13	3	3	11	2.2	3
		CFW110016T2054	16	4	5	13	3	3
		CFW110024T2054	24	5.5	7.5	20	5.5	5
		CFW110028T2054	28	7.5	10	24	5.5	7.5
		CFW110033T2054	33.5	9.2	10	28	7.5	10
		CFW110045T2054	45	11	15	36	9.2	10
		CFW110054T2054	54	15	20	45	11	15
		CFW110070T2054	70	18.5	25	56	15	20
		CFW110086T2054	86	22	30	70	18.5	25
		CFW110105T2054	105	30	40	86	22	30
220-230 Vca	30	CFW110142T2054	142	37	50	115	30	40

Motor Voltages 380Vca / 480Vca: IP54

Power Supply		Model	Normal Duty (ND)	IEC		NEMA	Heavy Duty (HD)	IEC		NEMA
				50Hz 380V 415V	60Hz 440V 460V	60Hz 460V		50Hz 380V 415V	60Hz 440V 460V	60Hz 460V
			A	kW	HP	HP	A	kW	HP	HP
380-480 Vca	30	CFW110003T4054	3.6	1.5	2	2	3.6	1.5	2	2
		CFW110005T4054	5	2.2	3	3	5	2.2	3	3
		CFW110007T4054	7	3	4	3	5.5	2.2	3	3
		CFW110010T4054	10	4	7.5	5	10	4	7.5	5
		CFW110013T4054	13.5	5.5	10	7.5	11	4	7.5	7.5
		CFW110017T4054	17	7.5	12.5	10	13.5	5.5	10	7.5
		CFW110024T4054	24	11	15	15	19	9.2	12.5	10
		CFW110031T4054	31	15	20	20	25	11	15	15
		CFW110038T4054	38	18.5	30	25	33	15	25	20
		CFW110045T4054	45	22	30	30	38	18.5	30	25
		CFW110058T4054	58.5	30	40	40	47	22	30	30
		CFW110070T4054	70.5	37	50	50	61	30	50	40
		CFW110088T4054	88	45	75	60	73	37	60	50
		CFW110105T4054	105	55	75	75	88	45	75	60
		CFW110142T4054	142	75	100	100	115	55	75	75

Dimensions and Weight

Model	NEMA 1 / IP21					IP54					Braking IGBT
	Size	Dimensions mm (in)			Weight kg (lb)	Size	Dimensions mm (in)			Weight kg (lb)	
		High (H)	Width (W)	Depth (D)			High (H)	Width (W)	Depth (D)		
CFW110006S2	A	247 (9.73)	145 (5.71)	227 (8.94)	6.3 (13.9)	1	410 (16.14)	255 (10.04)	235 (9.25)	10 (22.0)	Standard
CFW110006B2											
CFW110007S2											
CFW110007B2											
CFW110007T2											
CFW110010S2											
CFW110010T2											
CFW110013T2											
CFW110016T2											
CFW110024T2	B	293 (11.54)	190 (7.48)	227 (8.94)	10.4 (22.9)					15 (33.1)	
CFW110028T2											
CFW110033T2											
CFW110045T2	C	378 (14.88)	220 (8.67)	293 (11.54)	20.5 (45.2)	2	625 (24.61)	350 (13.78)	298 (11.73)	36 (79.4)	
CFW110054T2											
CFW110070T2											
CFW110086T2	D	504 (19.84)	300 (11.81)	305 (12.01)	32.6 (71.8)					41 (90.4)	
CFW110105T2											
CFW110142T2	E	675 (26.58)	335 (13.19)	358 (14.09)	65 (143.3)	3	825	400	389	80	Optional
CFW110180T2						-	-	-	-	-	
CFW110211T2											
CFW110003T4	A	247 (9.73)	143 (5.63)	196 (7.72)	6.3 (13.9)	1	410 (16.14)	255 (10.04)	235 (9.25)	10 (22.0)	Standard
CFW110005T4											
CFW110007T4											
CFW110010T4											
CFW110013T4											
CFW110017T4	B	293 (11.54)	190 (7.48)	227 (8.94)	10.4 (22.9)					15 (33.1)	
CFW110024T4											
CFW110031T4											
CFW110038T4	C	378 (14.88)	220 (8.67)	293 (11.54)	20.5 (45.2)	2	625 (24.61)	350 (13.78)	298 (11.73)	36 (79.4)	
CFW110045T4											
CFW110058T4											
CFW110070T4	D	504 (19.84)	300 (11.81)	305 (12.01)	32.6 (71.8)					41 (90.4)	
CFW110088T4											
CFW110105T4	E	675 (26.58)	335 (13.19)	358 (14.09)	65 (143.3)	3	825	400	389	80	Optional
CFW110142T4											
CFW110180T4							875 (34.45)	400 (15.75)	374 (14.72)	80 (276)	
CFW110211T4											
CFW110242T4	F	1200 (47.24)	430 (16.93)	360 (14.17)	140 (308.65)	-	-	-	-	-	External DBW-03
CFW110312T4											
CFW110370T4											
CFW110477T4											
CFW110515T4	G	1225 (48.23)	535 (21.06)	426 (16.77)	215 (473.99)	-	-	-	-	-	External DBW-03
CFW110601T4											
CFW110720T4											

Mechanical Mounting

Standard Installation

Frame Size	Minimum Mounting Clearance with top cover			
	A mm (in)	B mm (in)	C mm (in)	D mm (in)
A	25 (0.98)	25 (0.98)	10 (0.39)	30 (0.39)
B	40 (1.57)	45 (1.57)	10 (0.39)	30 (0.39)
C	110 (4.33)	130 (5.12)	10 (0.39)	30 (0.39)
D	110 (4.33)	130 (5.12)	10 (0.39)	30 (0.39)
E, F and G	150 (5.91)	250 (9.84)	20 (0.78)	80 (3.15)

When one VSD is assembled above another, use the distance A+B and deflect the hot air coming from the VSD below.

Side by side Installation

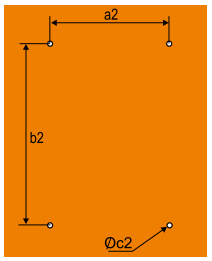
For Frame Size A, B and C: side by side assembly without lateral spacing and with the removal of the top cover.

Mechanical Installation | Panel Assembly

Surface Assembly

Frame Size	a2 mm (in)	b2 mm (in)	c2 mm (in)
A	115 (4.53)	250 (9.85)	M5
B	150 (5.91)	300 (11.82)	M5
C	150 (5.91)	375 (14.77)	M6
D	200 (7.88)	525 (20.67)	M8
E	200 (7.88)	650 (25.60)	M8
F	150 (5.91)	1200 (47.24)	M10
G	200 (7.87)	1225 (48.23)	M10

Airflow



Sizes A up to E

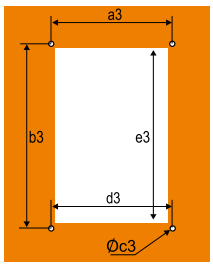
Sizes F and G

Flange Assembly (IP-54 rated when mounting the heat-sink outside the enclosure)

* From Sizes A to E the inverter area that will be outside the panel has IP 54 protection degree.
* For Sizes F and G the inverter area that will be outside the panel has only IP20 protection degree.

Frame Size	a3 mm (in)	b3 mm (in)	c3 mm (in)	d3 mm (in)	e3 mm (in)
A	130 (5.12)	240 (9.45)	M5	135 (5.32)	225 (8.86)
B	175 (6.84)	285 (11.23)	M5	179 (7.05)	271 (10.65)
C	195 (7.68)	365 (14.38)	M6	205 (8.08)	345 (13.59)
D	275 (10.83)	517 (20.36)	M8	285 (11.23)	485 (19.10)
E	275 (10.83)	635 (25.00)	M8	315 (12.40)	615 (24.21)
F	350 (13.78)	1185 (46.61)	M10	391 (15.39)	1146 (45.12)
G	400 (15.75)	1220 (48.03)	M10	495 (19.49)	1182 (46.53)

Airflow



Coding

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
EU	CFW11	–	0016	T	4	S	–	–	–	–	–	–	–	–	

1 - Market identification

It defines the language of the manual and the factory parameterization
BR = Brazil
NA = North America
MS = Mercosul
EU = Europe
SA = South Africa

2 - Line

CFW11 = WEG Frequency VSD series CFW11
Blank = Standard Stand alone unit

3 - CFW11 series model

Blank = Standard Stand alone unit
M = Modular drive

4- Rated output current for normal overload system

Supply	Single-phase (S)	Single-phase or Three-phase (B)	Three-Phase (T)		
	200 - 240 V (2)	200 - 240 V (2)	200-240 V (2)	380-480 V (4)	
Voltage	0010 = 10 A	0006 = 6 A 0007 = 7 A	0007 = 7 A 0010 = 10 A 0013 = 13 A 0016 = 16 A 0024 = 24 A 0028 = 28 A 0033 = 33 A 0045 = 45 A 0054 = 54 A 0070 = 70 A 0086 = 86 A 0105 = 105 A 0142 = 142 A 0180 = 180 A 0211 = 211 A	0003 = 3 A 0005 = 5 A 0007 = 7 A 0010 = 10 A 0013 = 13 A 0017 = 17 A 0024 = 24 A 0031 = 31 A 0038 = 38 A 0045 = 45 A 0058 = 58 A 0070 = 70 A	0088 = 88 A 0105 = 105 A 0142 = 142 A 0180 = 180 A 0211 = 211 A 0242 = 242 A 0312 = 312 A 0370 = 370 A 0477 = 477 A 0515 = 515 A 0601 = 601 A 0720 = 720 A

5 – Number of phases

S = Single-phase
B = Single-phase or three-phase
T = Three-phase

6 - Voltage

2 = 200-240 V
4 = 380-480 V
5 = 500 -600V
6 = 660-690V

7 - Optional Accessories

S = standard product
O = product with optional accessories

8 - Degree of Protection

Blank = factory standard
(Sizes A, B and C: IP21 - D: Nema 1/ IP20)
N1 = Nema 1
21 = IP21
(Sizes E,F and G - IP20)

9 - Keypad

Blank = factory standard (1)
IC = without interface (blind cover)

10 - Braking

Blank = factory standard
(Sizes A, B, C , D: built-in braking IGBT)
DB = with braking IGBT (valid for models of frame size E)
For frame sizes F and G the DBW03 has to be used.

11 - RFI Filter

Blank = factory standard
FA = Category C3 internal RFI filter
(Valid for models of frame (size E: built-in RFI filter) Size A, B, C and D)
Even though frame sizes E, F and G do not show FA in the coding they all have RF filter built-in.

12 - Safety Stop

Blank = factory standard (without safety stop function)
Y = with safety stop function according to EN-954-1 category 3

13 - External Electronic Supply 24 Vdc

Blank = factory standard
W= With external eletronic power supply 24Vdc
(Sizes A,B,C,D,E: Without external eletronic power supply 24vdc in the standard product)

14 – Special hardware

Blank = factory standard (without)
H1 = special hardware nr. 1

15 – Special Software

Blank = factory standard (without)
S1 = special software nr. 1

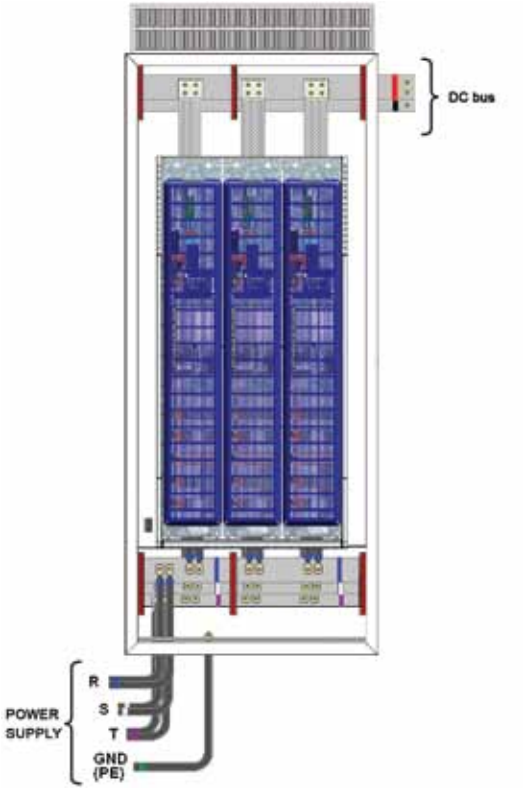
16 – End of Code indicator digit

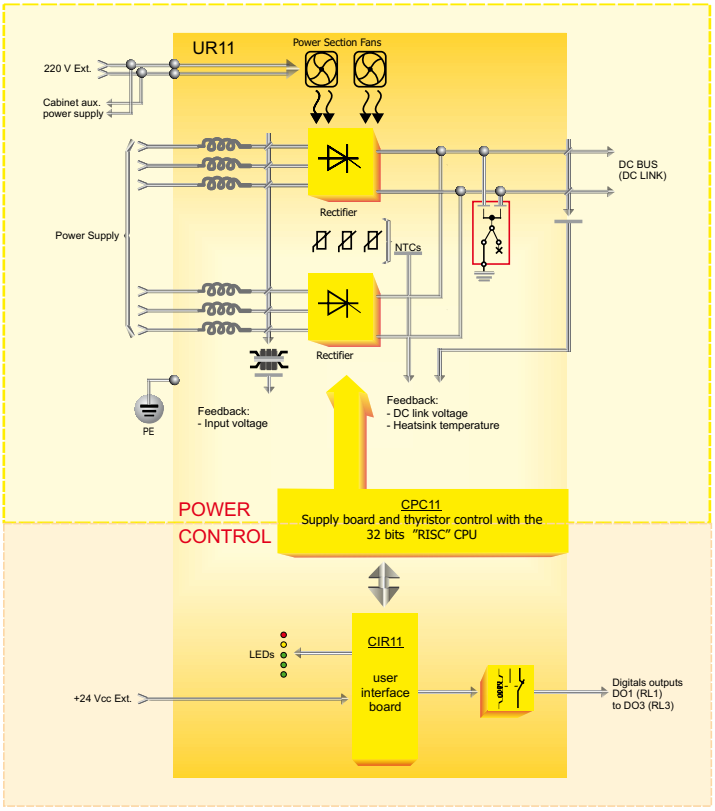
Z = end of code indicator

CFW11M - Modular Drive

The CFW11M is the new generation of WEG frequency inverters for large power ranges. It ranges from 350kW to 2000kW (350 to 2500HP) rated at 380-480V / 500-600V / 660-690V with the option for 6, 12 pulses or even regenerative(AFE).

Rectifier Unit (Books)

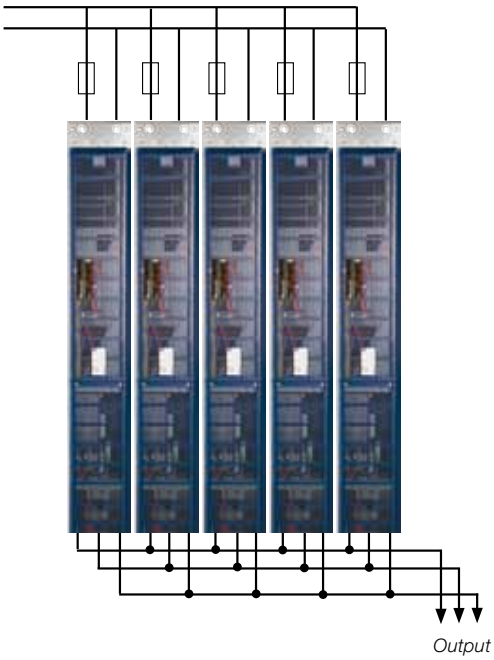




Notes: The fuses presented in the block diagram above are not included in the VSD CFW-11M, but are part of the AFW-11M drive
Maximum AFW-11M configuration with 5 power units (2500 HP)

Power Book Unit

DC Link (connected to rectifier)



Output to motor

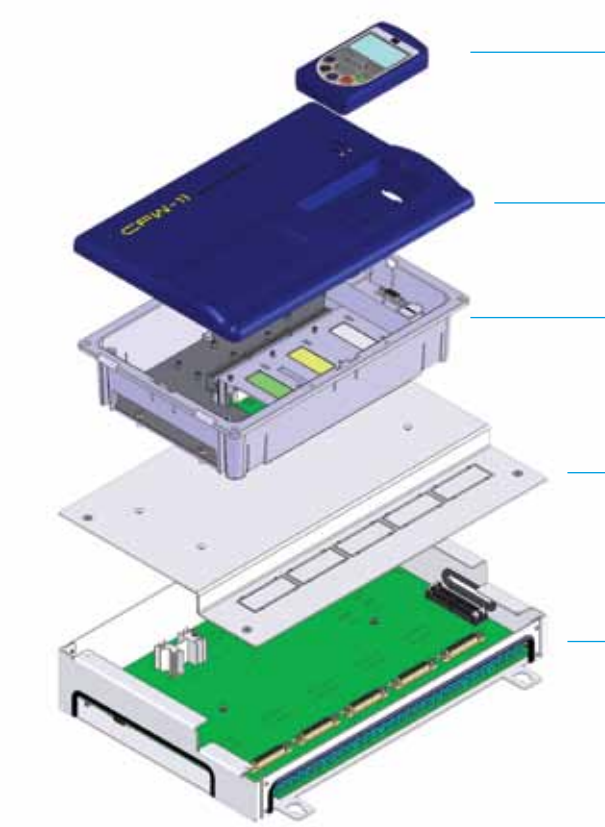
Power Units

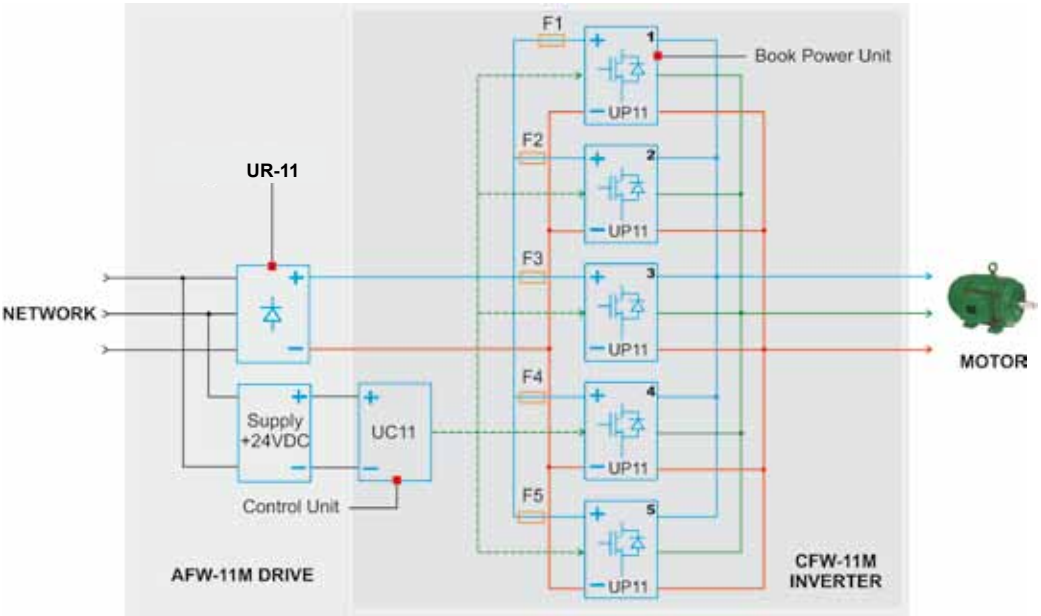
Compact modular VSD units that can be configured to the applicable motor power.

- Easy servicing.
- Configurable up to 5 power units.
- DC supplied by an input rectifier.
- Compact book format (width much smaller than the depth).

Configurable up to 5 power book units

CFW11M - Modular Drive





CFW11M - Drive Ratings

Sizing the Drive

The correct way to select a VSD is matching its output current with the motor rated current. However, the tables below present the expected motor power for each VSD model. Use the motor power ratings below only as a guidance. Motor rated currents may vary with speed and manufacturer. IEC motor powers are based on WEG 4-pole motors; NEMA motor powers are based on NEC table 430-150.

Motor Voltages between 380-480V

Power Supply		Model	Normal Duty (ND)	IEC		NEMA	Heavy Duty (HD)	IEC		NEMA
				50 Hz 380 V 415 V	60 Hz 380 V 460 V	60 Hz 460 V		50 Hz 380 V 415 V	60 Hz 380 V 460 V	60 Hz 460 V
			A	kW	HP	HP	A	kW	HP	HP
380-480 V	3Ø	CFW11M 0600T4	600	315	450	500	515	280	350	450
		CFW11M 1140T4	1140	630	850	1000	979	500	700	800
		CFW11M 1710T4	1710	900	1250	1500	1468	800	1100	1250
		CFW11M 2280T4	2280	1250	1750	2000	1957	1120	1350	1750
		CFW11M 2850T4	2850	1600	2000	2500	2446	1250	1750	2000

Motor Voltages between 500-600V

Power Supply		Model	Normal Duty (ND)	IEC		NEMA	Heavy Duty (HD)	IEC		NEMA
				50 Hz 525 V 575 V	60 Hz 575 V	60 Hz 575 V		50 Hz 525 V 575 V	60 Hz 575 V	60 Hz 575 V
			A	kW	HP	HP	A	kW	HP	HP
500-600 V	3Ø	CFW11M 0470T5	470	355	500	500	380	280	400	400
		CFW11M 0893T5	893	630	1000	1000	722	500	800	800
		CFW11M 1340T5	1340	1000	1350	1500	1083	800	1250	1100
		CFW11M 1786T5	1786	1250	1750	1750	1444	1120	1500	1350
		CFW11M 2232T5	2232	1600	2500	2500	1805	1400	2000	2000

Motor Voltages between 660-690V

Power Supply		Model	Normal Duty (ND)	IEC		Heavy Duty (HD)	IEC	
				50 Hz 660 V 690 V	60 Hz 660 V		50 Hz 660 V 690 V	60 Hz 660 V
			A	kW	HP	A	kW	HP
660-690 V	3Ø	CFW11M 0427T6	427	400	550	340	315	400
		CFW11M 0811T6	811	710	1000	646	560	800
		CFW11M 1217T6	1217	1120	1500	969	900	1250
		CFW11M 1622T6	1622	1600	2000	1292	1250	1750
		CFW11M 2028T6	2028	2000	2500	1615	1400	2000

Technical Data

Power supply and Power Range		
Voltage and power range	Sigle Phase	200-240Vac / +10% - 15% 1.5 to 3 HP (1.1 to 2.2 kW)
	Three Phases	200-240Vac / + 10% -15%: 1.5 to 75 HP (1.1 to 55 kW)
		380-480Vac / + 10% -15%: 2 to 600 HP (1.5 to 370 kW)
Frequency	50...60 Hz +/-2% (48 to 63 Hz)	
Displacement factor	Greater than 0.98	
Efficiency	Greater than 0.97	
Power factor	0.94 for three-phase input at rated condition 0.70 for single-phase input at rated condition	

Inverter Output		
Voltage range	Three Phase, 0 up to power supply voltage	
Frequency range	0 to 3.4x motor rated frequency (*)	
Switching Frequency	Standard: 5 kHz (frame sizes A, B, C, D); 2,5 kHz (frame sizes E and F); 2 kHZ (frame size G) Options available 2.5 / 5 / 10 kHz	
Overload	Normal Duty Cycle	110% for 1 min every 10min
		150% for 3 sec every 10min
	Heavy Duty Cycle	150% for 1 min every 10min
		200% for 3 sec every 10min
Time (ramps)	Acceleration	0 to 999 seconds
	Deceleration	0 to 999 seconds

Environment	
Temperature of Operation	-10 to 50°C (14 to 122°F) for frame Size A,B,C and D -10 to 45°C (14 to 113°F) for frame Size E and F -10 to 40°C (14 to 104°F) for frame Size G with 720A
	Up to 60oC with derating for frame sizes A,B,C,D. Up to 55 with derating for frame size E. Reduction of 2% for each °C above rated temperature for each frame size.
	rated value or 1.1% for each 1°F above rated value
Humidity	5 to 90% without condensation
Altitude	0 to 1000 meters
	Up to 4000 meters with current reduction (1% for every 100 meters above 1000 meters)

Protection Degree	
IP21	Standard for frame sizes A, B, C. For frame size D the top cover kit has to be added. Frame Sizes E, F and G option not available.
IP20	Standard for frame sizes D, E, F and G. Frame Sizes A, B and C the top cover has to be removed.
NEMA1	Standard for frame Size D. Optinal for frame sizes A, B, C, E, F and G.
IP54	Frame Sizes 1, 2 and 3.

Braking Methods	
Rheostatic Braking	Supply available to user (standard for frame size A, B, C and D and option for frame size E)
	External braking resistor (not provided)
Optimal Braking	Does not need braking resistor
DC Braking	Direct current applied to the motor

Performance		
Speed Control	V/f	Regulation: 1% of rated speed
		Speed variation range: 1:20
	Voltage Vector (VVW)	Regulation: 1% of rated speed
		Speed variation range: 1:30
	Sensorless Vector	Regulation: 0.5% of rated speed
		Speed variation range: 1:100
	Vector with Encoder (with accessory ENC-01 or ENC-02)	Regulation: ± 0.01% of rated speed with 14-bit analog input (IOA)
		Regulation: ± 0.01% of rated speed with digital reference (keyboard, serial fieldbus, electronic potentiometer, multispeed)
		Regulation: ± 0.05% of rated speed with 12-bit analog input
Torque Control		Range: 10 to 180%
		Regulation: ± 5% of rated torque
	Sensorless Vector	Range: 20 to 180%
		Regulation: ± 10% of rated torque (above 3 Hz)

Inputs and Outputs (I/Os) in the Standard Product		
Inputs	Digital	6 isolated inputs, 24 Vdc, programmable functions
	Analog	2 differential inputs isolated by differential amplifier, programmable functions
		Resolution: - AI1: 12 bits - AI2: 11 bits + signal
		Signals: 0 to 10Vdc, 0 to 20mA or 4 to 20mA
		Impedance: - 400 kΩ for signal 0 to 10Vdc - 500 Ω for signal 0 to 20mA or 4 to 20mA
Outputs	Relay	3 relays with NO / NC contacts, 240 Vac / 1A, programmable functions
	Analog	2 isolated outputs, programmable functions
		Resolution: 11 bits
		Load: 0 to 10 V: R_L >= 10 kΩ 0 to 20 mA or 4 to 20 mA: R_L < 500Ω
Available supply to user		24 Vdc + -20%, 500 mA

(*) This maximum value can change according to the used control mode and switching frequency. The maximum permissible speed is 18000rpm.

Technical Data

Communication	
Profibus DP	PROFIBUS DP-01 (slot 3) PROFDP-05 (slot 4)
DeviceNet	CAN/RS485-01 (slot 3)
	CAN-01 (slot 3)
	DEVICENET-05 (slot 4)
CANopen	CAN/RS485-01 (slot 3)
	CAN-01 (slot 3)
CANopen Master/Slave	PLC11-01 1, 2 and 3
Ethernet / IP	ETHERNET/IP-05 (slot 4)
Modbus TCP	Modbus TCP-05 (slot 4)
Profinet IO	PROFINETIO-05 (slot 4)
ModBus RTU (RS-485)	RS485-01 (slot 3)
	CAN/RS485-01 (slot 3)
	RS485-05 (slot 4)
ModBus RTU (RS-232)	RS232-01 and RS232-02 (slot 3)
	RS232-05 (slot 4)
USB	Built into the standard product
	Communication with SuperDrive G2 Software
	Communication with WLP Software used for programming and monitoring the SoftPLC function and the PLC11 accessories

Safety Standards
UL 508C Power conversion equipment
UL 840 Insulation coordination including clearances and creepage distances for electrical equipment
EN 61800-5-1 Safety requirements electrical, thermal and energy
EN 50178 Electronic equipment for use in power installations
EN 60204-1 Safety of machinery. Electrical equipment of machines. Part 1: General requirements. Note: In order to have a machine in conformity with this norm, the machine manufacturer is responsible for the installation of an emergency shutdown device and an equipment for network sectioning
EN 60146 (IEC 146) Semiconductor converters
EN 61800-2 Adjustable speed electrical power drive systems – Part 2: General requirements – rating specifications for low voltage adjustable frequency a.c. power drive systems

Mechanical Construction Standards
EN 60529 - Degrees of protection provided by enclosures (IP Code)
UL 50 - Enclosures for electrical equipment

Protections
Overcurrent / short circuit
Under / overvoltage in the power circuit
Phase loss
Overtemperature in the VSD (IGBTs, rectifier and internal air in the electronic cards)
Overtemperature in the motor
Overload in the braking resistor
Overload in the IGBTs
Overload in the motor
Fault / external alarm
Fault in the CPU or memory
Phase-to-ground short circuit at the output
Fault in the heatsink fan
Motor Overspeed
Incorrect connection of encoder

Electromagnetic Compatibility Standards (EMC)
EN 61800-3 - Adjustable speed electrical power drive systems Part 3: EMC product standard including specific test methods
EN 55011 - Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment
CISPR 11 - Industrial, scientific and medical (ISM)radio-frequency equipment Electromagnetic disturbance characteristics Limits and methods of measurement
EN 61000-4-2 - Electromagnetic Compatibility Standards (EMC) Part 4: Testing and measurement techniques - Section 2: Electrostatic discharge immunity test
EN 61000-4-3 - Electromagnetic Compatibility Standards (EMC) Part 4: Testing and measurement techniques - Section 3:Radiated, radiofrequency, electromagnetic field immunity test
EN 61000-4-4 - Electromagnetic Compatibility Standards (EMC) Part 4: Testing and measurement techniques - Section 4: Electrical fast transient / burst immunity test
EN 61000-4-5 - Electromagnetic Compatibility Standards (EMC) Part 4: Testing and measurement techniques - Section 5: Surge immunity test
EN 61000-4-6 - Electromagnetic Compatibility Standards (EMC) Part 4: Testing and measurement techniques - Section 6: Immunity to conducted disturbances, induced by radio-frequency fields

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