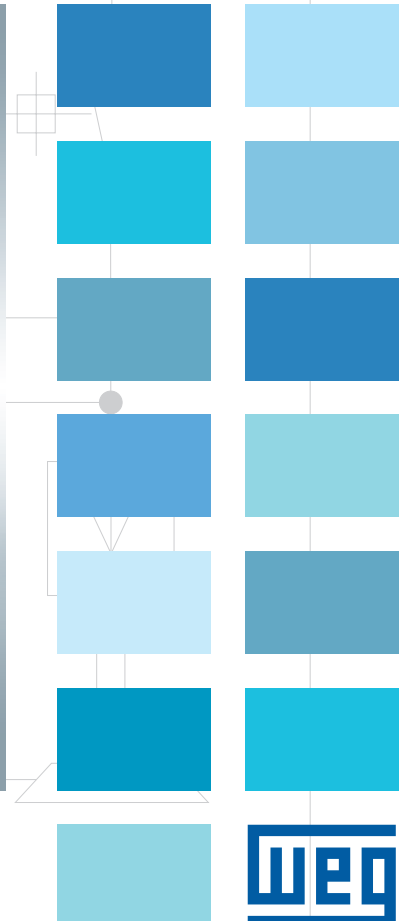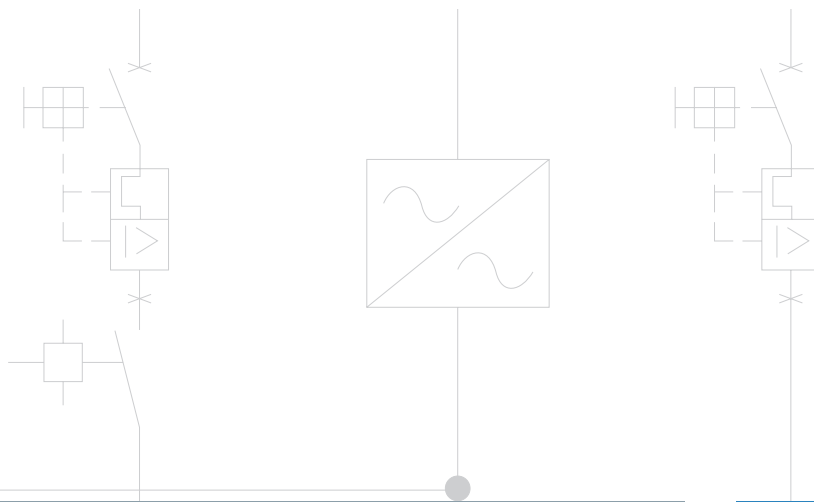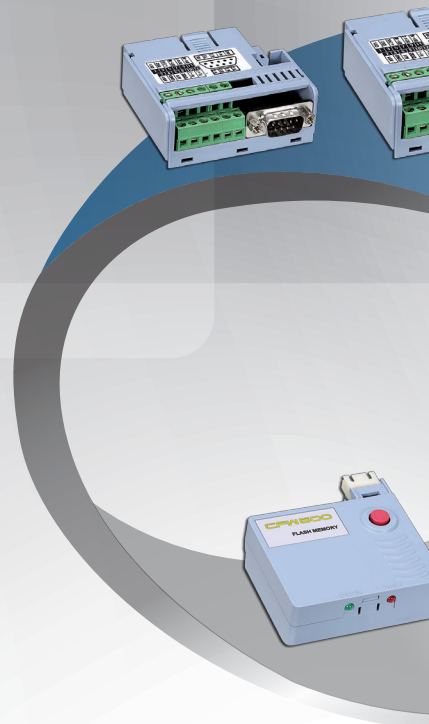# CFW500
Machinery Drives

Variable Speed Drives

CFW500

One VSD, endless possibilities

Developed for fast commissioning, the CFW500 VSD is perfect for machines. Extremely compact and cost-effective, it fulfills the needs of machine manufacturers, integrated systems, panel installers and users for a wide range of applications.

Compatible
Wide range of accessories

Flexible
Application functions

Robust
150% overload for one minute

Efficient
Streamlines operation and performance

Reliable
WEG quality

Integrable
Fieldbus networks

Characteristics

Plug-in module

Flash memory module

SoftPLC

High overload capacity

Functions to streamline operation and performance

WEG quality

Communication networks

Advantages

The optional communication network and I/O modules are fast and easily installed, allowing adapting the standard VSD to each application.

In few seconds, it is possible to download the programming from a CFW500 to others without powering them up.

Built-in PLC, enabling the VSD, motor and application to work in an interactive way. It allows the user to implement customized logics and applications.

It withstands an overload of 150% for one minute every 6 minutes, on ambient temperature of 50 °C.

PID: process control.
Sleep: disables the VSD automatically.

Flying start: allows driving the motor that is in free spinning, accelerating it from the speed at which it was running.

Ride through: keeps the VSD in operation during voltage dips.

100% of the VSDs are tested with load at the factory under rated conditions.

Protection against ground fault, short circuit, over temperature and others.

Thermal protection of IGBTs based on manufacturer curve.

All the electronic boards are conformally coated.

CANopen, DeviceNet, Profibus-DP and Modbus.

Benefits

Time saving, standardization and optimized costs according to the needs.

Fast, easy and reliable programming for manufacturers that produce machines in large quantities.

It eliminates the need of an external PLC, reducing costs, optimizing space and simplifying the system.

It does not require oversizing the VSD.

Energy saving.

It enables fast operating response of the machine and prevents occasional mechanical breakdowns.

It prevents machine stoppage and downtime.

High reliability.

It prevents damages to the inverter which can be caused by adverse situations, normally external factors.

VSD lifespan is extended: protection against dust, humidity, high temperatures and chemicals.

Full integration with process network.

Easy Configuration

- Fast commissioning
- Innovative design, compact and uniform
- Configurable cost x benefit

Plug-in Modules
Connections and interfaces at your hands.

Fan
Simple and fast removal.
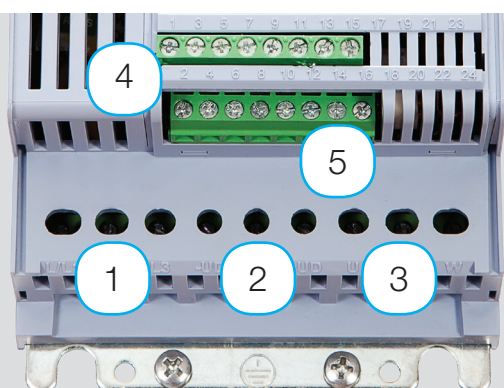
With plug-in module CFW500-IOS

1 - Power terminals
2 - Access to DC link
3 - Motor terminals
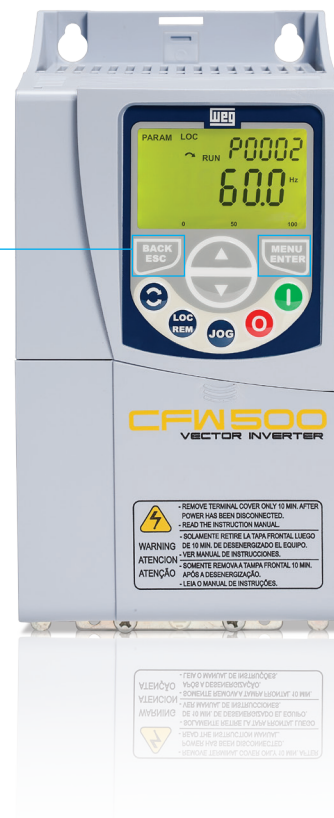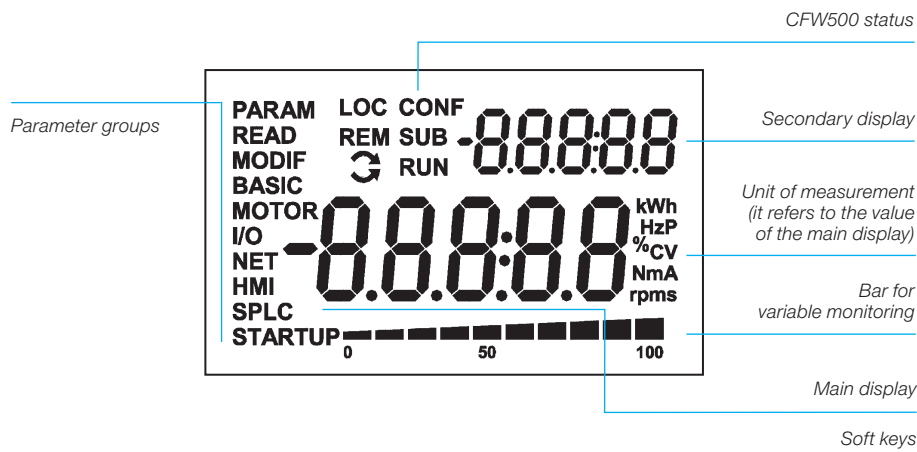4 - Control terminals (I/Os)
5 - RS485 port

Applications

- Centrifugal pumps
- Process dosing pumps
- Fans / exhausters
- Stirrers / mixer
- Compressors

- Conveyor belts
- Roller tables
- Granulators / palletizers
- Dryers
- Rotary filters

Human-Machine Interface

■ View of three parameters at the same time, selected by the user

CFW500 status

Secondary display

Parameter groups

Unit of measurement (it refers to the value of the main display)

Bar for variable monitoring

Main display

Soft keys

PARAM LOC CONF
READ REM SUB
MODIF ↻ RUN
BASIC
MOTOR
I/O
NET
HMI
SPLC
STARTUP

0   50   100

kWh
HzP
%CV
NmA
rpms

Friendly Programming

■ Oriented start-up: programming step by step
■ Soft keys: fast access to the parameters
■ Parameter group: it directs to the parameters of interest
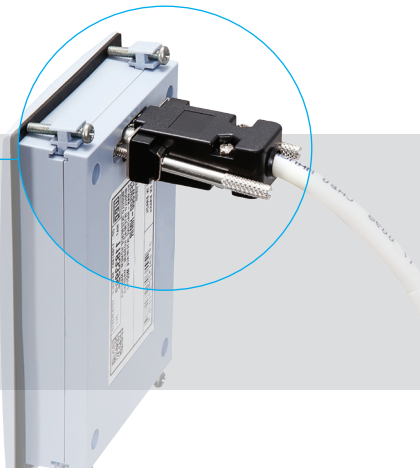
Remote HMI

Solution for panel door or machine console.

CFW500-HMIR
IP54

RS485
Included in all plug-in modules

CFW500-CCHMIRXM
X = up to 10 m

Energy Efficiency

In the industry, the electric motors are responsible for nearly 70% of all the electric energy consumption. By using VSD, is possible to reduce consumption up to 40%.

Besides being efficient in the control of electric motors, they reduce machine wear, save raw material, improve process quality and increase productivity.
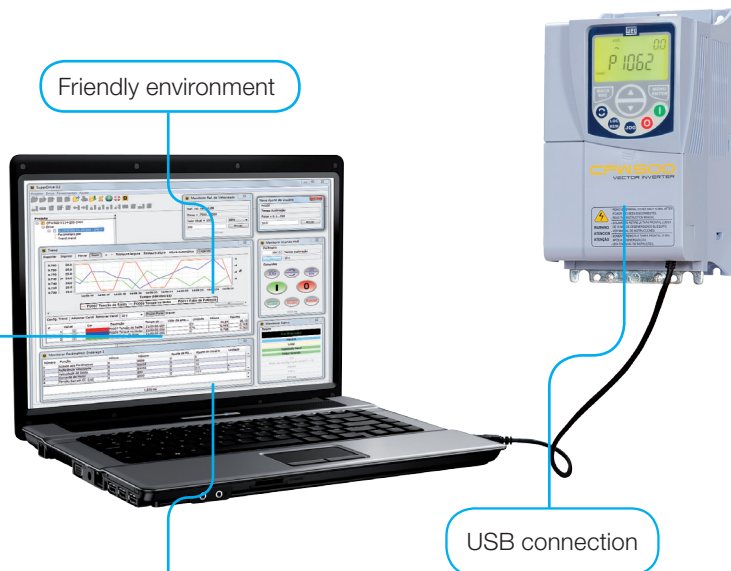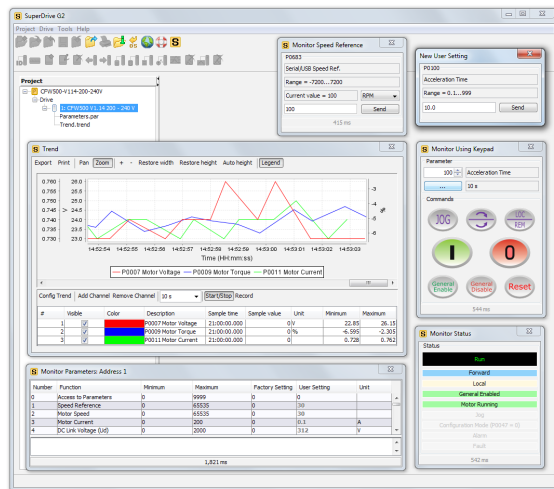
On WEG website, it is possible to calculate how much energy can be saved by using the CFW500 VSD.

Ensure energy efficiency for your equipment and machines. Save money and contribute to the conservation of the environment.

SuperDrive G2

Software application for programming, command and monitoring of WEG VSD.

Friendly environment

USB connection

Free on www.weg.net

Trace Function

- On-line graphic monitoring of parameters/variables
- Possibility to export an image with the respective graph according to the selected period

Edition and Monitoring of Parameters in List/Table

Parameter set storage in a computer file format.

| Number	Function	Minimum	Maximum	Factory Setting	User Setting	Unit
0	Access to Parameters	0	9999	0	0	
1	Speed Reference	0	65535	0	30	
2	Motor Speed	0	65535	0	30	
3	Motor Current	0	200	0	0.1	A
4	DC Link Voltage (Ud)	0	2000	0	311	V
5	Motor Frequency	0	500	0	2.5	Hz
6	VFD Status	0	7	0: Ready	1: Run	
7	Motor Voltage	0	2000	0	23	V
9	Motor Torque	-1000	1000	0	-5.2	%
11	Motor Current	-1	1	0	0.75	
12	DI8 to DI1 Status	00000000b	11111111b	00000000b	00000000b	
13	DO5 to DO1 Status	00000000b	01111111b	00000000b	00000001b	
14	AO1 Value	0	100	0	4.3	%
15	AO2 Value	0	100	0	1.4	%
16	FO % Value	0	100	0	0	%
17	FO Hz Value	0	20000	0	0	Hz
18	AI1 Value	-100	100	0	0	%
19	AI2 Value	-100	100	0	0	%
20	AI3 Value	-100	100	0	-100	%
21	FI % Value	-100	100	0	0	%
22	FI Hz Value	0	20000	0	0	Hz
23	Main SW Version	0	655.35	0	1.14	
24	Sec. SW Version	0	655.35	1.11	1	
27	Plug-In Mod. Config.	00000000b	00001001b	00000000b	00000001b	
29	Power HW Config.	00000000b	00111111b	00000000b	00000011b	
30	Heatsink Temperature	-20	150	0	25	C
37	Motor Overload Ixt	0	100	0	0	%
40	PID Process Variable	0	3000	0	0	
41	PID Setpoint Value	0	3000	0	0	
47	CONF State	0	999	0	0	
48	Present Alarm	0	999	0	0	
49	Present Fault	0	999	0	0	
50	Last Fault	0	999	0	0	
51	Current At Last Fault	0	200	0	0	A
52	DC Link At Last Fault	0	2000	0	0	V
53	Speed At Last Fault	0	500	0	0	Hz

1,085 ms

- Transfer of parameters from the PC to the CFW500 and vice versa
- Off-line edition of the parameters stored on the PC
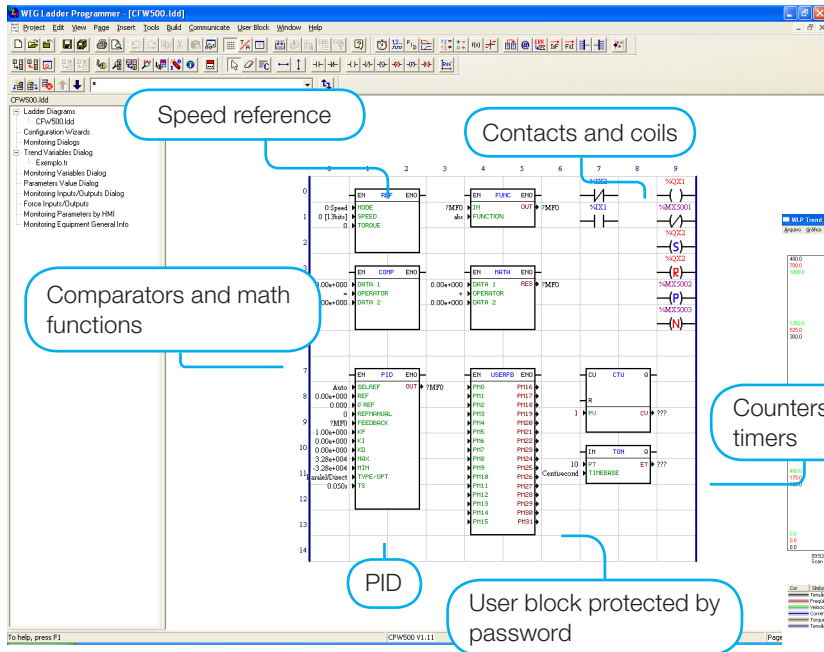
Status Monitoring
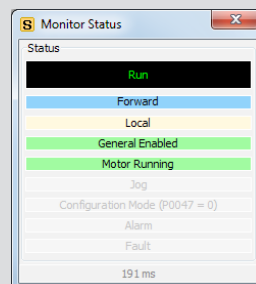
Operation with HMI

On-line parameter edition
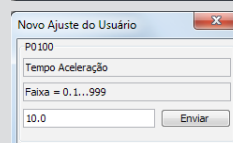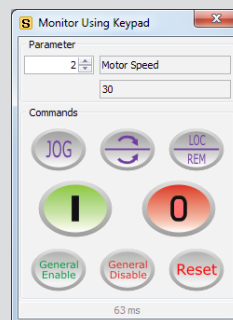
SoftPLC - Built-in on the Standard Product

It adds the functionalities of a PLC to the CFW500, allowing the creation of applications. The WLP software and the SoftPLC functionality are a smart and simple way to make your CFW500, motor and application work together.

Speed reference

Contacts and coils

Comparators and math functions
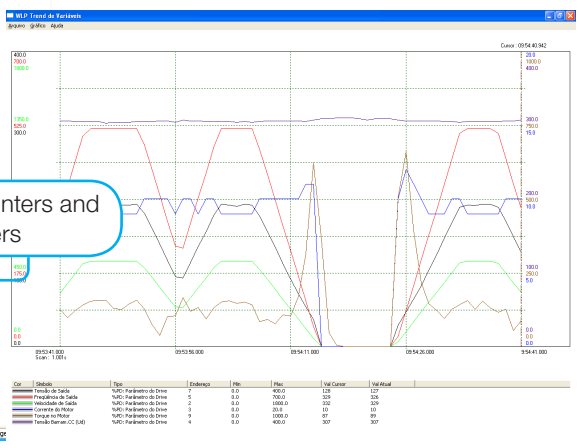
Counters and timers

PID

User block protected by password

Easy programming: Ladder

Trace Function
- On-line graphic monitoring of parameters/variables
- Configurable up to six channels

On-line Monitoring Parameters/Variables List
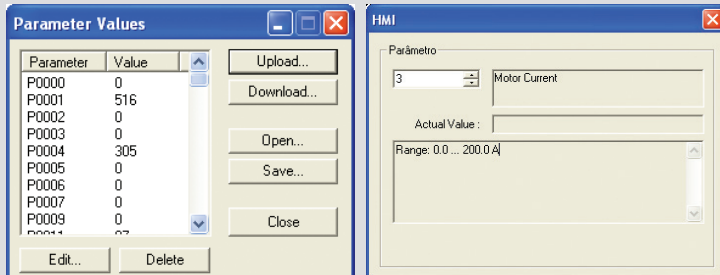
Symbol	Type	Address	Value
Motor Current	%PD: Drive Parameter	3	9
Motor Frequency	%PD: Drive Parameter	5	511
Motor Voltage	%PD: Drive Parameter	7	188
DC Link Voltage (Ud)	%PD: Drive Parameter	4	301
Analog Input AI1	%IW: Analog Input	1	32193
Digital Input DI1	%IX: Digital Input	1	0

Parameter Edition
It allows to change the parameters values.

Parameter	Value
P0000	0
P0001	516
P0002	0
P0003	0
P0004	305
P0005	0
P0006	0
P0007	0
P0009	0
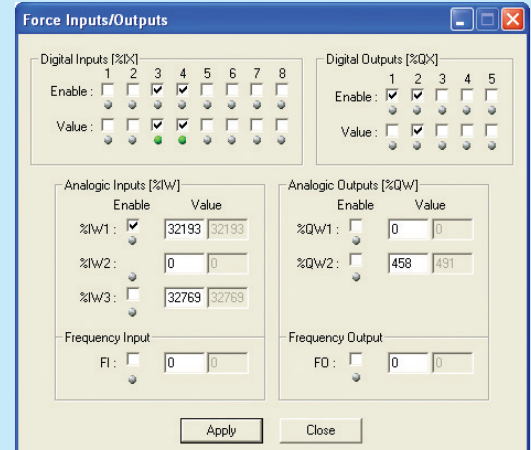
Enable/Disable I/Os
It simplifies and speeds up the validation of the application

I/Os Monitoring

Coding

The CFW500 code identifies its constructive characteristics, maximum current, voltage range and optionals. Using the smart code, it is possible to select the CFW500 necessary for your application in a simple and fast way.

Product and series	Model identification				Braking [1]	Degree of protection [1]	Conducted emission level [1]	Hardware version	Software version
	Frame size	Rated current	No. of phases	Rated voltage					
CFW500	A	03P6	T	4	NB	20	C3	H00	---
CFW500	Check table below								
	NB = without dynamic braking DB = with dynamic braking								
	20 = IP20 N1 = NEMA1 enclosure								
	Blank = with no RFI filter C2 = According to category 2 of IEC 61800-3 standard, with internal RFI flter C3 = According to category 3 of IEC 61800-3 standard, with internal RFI flter								
	H00 = without plug-in module								
	Blank = standard Sx = special software								

(1) To know what models have this options in the standard product the table below shall be checked.

Frame sizes	Output Current	Input	Power supply voltage	Braking	Degree of protection	Conducted emission level [2]
A	01P6 = 1.6 A	S = single-phase power supply	2 = 200... 240 V	NB	20 or N1	Blank or C2
	02P6 = 2.6 A					
	04P3 = 4.3 A					
	07P0 = 7.0 A					Blank or C3
A	01P6 = 1.6 A	B = single-phase or three-phase power supply		NB		Blank
	02P6 = 2.6 A					
	04P3 = 4.3 A					
B	07P3 = 7.3 A			DB		
	10P0 = 10 A					
A	07P0 = 7.0 A	T = three-phase power supply		NB		
	09P6 = 9.6 A					
B	16P0 = 16 A			DB		
C	24P0 = 24 A			DB		
A	01P0 = 1.0 A	T = three-phase power supply	4 = 380...480 V	NB		Blank or C2
	01P6 = 1.6 A					
	02P6 = 2.6 A					
	04P3 = 4.3 A					
	06P1 = 6.1 A					Blank or C3
B	02P7 = 2.7 A			DB		Blank or C2
	04P3 = 4.3 A					
	06P5 = 6.5 A					
	10P0 = 10 A					Blank or C3
C	14P0 = 14.0 A			DB		Blank or C3
	16P0 = 16.0 A					

(2) RFI filter
Categories:
Category C1: inverters with voltages below 1,000 V, for use in the First Environment.
Category C2: inverters with voltages below 1,000 V, with plugs or mobile installation, when used in the "First Environment", must be installed and started-up by a qualified professional.
Category C3: inverters with voltages below 1,000 V, developed for use in the Second Environment and not designed for use in the "First Environment".
Environments:
First Environment: environments that include household installations, such as buildings directly connected, without intermediate transformer, to a low-voltage power supply grid, which supplies buildings used for domestic purposes.
Second Environment: includes all the buildings other than those directly connected to a low-voltage power supply grid, which supplies buildings used for domestic purposes.
For the RFI filters of external installations, refer to the CFW500 user manual.

Drive Ratings

The correct way to select a VSD is matching its output current to 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 220 V and 230 V

Power supply		Model	Rated current	IEC 50 Hz 220 V 230 V	IEC 60 Hz 220 V	NEMA 60 Hz 230 V
			A	kW	HP	HP
200-240 V	10	CFW500 A 01P6 S2	1.6	0.25	0.25	1
		CFW500 A 02P6 S2	2.6	0.55	0.5	1
		CFW500 A 04P3 S2	4.3	1.1	1	1.5
		CFW500 A 07P0 S2	7	1.5	2	2
	1/30	CFW500 A 01P6 B2	1.6	0.25	0.25	1
		CFW500 A 02P6 B2	2.6	0.55	0.5	1
		CFW500 A 04P3 B2	4.3	1.1	1	1.5
		CFW500 B 07P3 B2	7.3	1.5	2	2
		CFW500 B 10P0 B2	10	2.2	3	3
	30	CFW500 A 07P0 T2	7	1.5	2	2
		CFW500 A 09P6 T2	9.6	2.2	3	3
		CFW500 B 16P0 T2	16	4	5	5
		CFW500 C 24P0 T2	24	5.5	7.5	7.5

Motor Voltages Between 380 V and 480 V

Power supply		Model	Rated current	IEC 50 Hz 380 V 415 V	IEC 60 Hz 440 V 460 V	NEMA 60 Hz 460 V
			A	kW	HP	HP
380-480 V	30	CFW500 A 01P0 T4	1	0.25	0.5	1
		CFW500 A 01P6 T4	1.6	0.75	0.75	1
		CFW500 A 02P6 T4	2.6	1.1	1.5	2
		CFW500 A 04P3 T4	4.3	1.5	3	3
		CFW500 A 06P1 T4	6.1	3	4	3
		CFW500 B 02P6 T4	2.6	1.1	1.5	2
		CFW500 B 04P3 T4	4.3	1.5	3	3
		CFW500 B 06P5 T4	6.5	3	4	5
		CFW500 B 10P0 T4	10	4	7.5	7.5
		CFW500 C 14P0 T4	14	7.5	10	10
		CFW500 C 16P0 T4	16	7.5	12.5	10

Dimensions and Weights

IP20

Frame size	H mm	W mm	D mm	Weight Kg
A	189.1	75.2	149.5	0.8
B	199.1	100.2	160.1	1.2
C	210	135.2	165.1	2

NEMA1

Frame size	H mm	W mm	D mm	Weight Kg
A	223	75.2	149.5	1.05
B	243.3	100.2	160.1	1.49
C	254.8	135.2	165.1	2.35

Accessories and Optionals

The CFW500 VSD was developed to meet the hardware configurations required by a wide range of applications. The table below presents the available options:

Option	Type [1]	Description	Optional item code [2]	Accessory model	Available
RFI filter	Optional	Used to reduce the disturbance conducted from the CFW500 to the power supply, in the high frequency band (>150 kHz), according to standards 61800-3 and EN 55011.	C2 o C3	-	Installed at the factory
Braking IGBT	Optional	Used in high-inertia applications for the fast stop of the motor by means of an external braking resistance. Resistance not included. For the calculation of the braking resistance, refer to the CFW500 user manual.	DB	-	Installed at the factory
Degree of protection NEMA1	Optional or accessory	Used for the CFW500 VSD to have degree of protection NEMA1 and/or when metallic conduits are used for the cables.	N1	CFW500-KN1A (frame size A) CFW500-KN1B (frame size B) CFW500-KN1C (frame size C)	Installed at the factory or at the application
Cable shield kit	Accessory	Used to shield the power and control cables. Important: for the version with RFI filter, this filter comes with the product.	-	CFW500-KPCSA (frame size A) CFW500-KPCSB (frame size B) CFW500-KPCSC (frame size C)	Installed at the application
I/O expansion modules (plug-in) [3]	Accessory	Used to configure the I/O points according to the needs of the application/machine.	-	CFW500-IOS CFW500-IOD CFW500-IOAD CFW500-IOR	Installed at the application
Communication module (plug-in) [3]	Accessory	Used for the communication of the CFW500 with the main networks of the market (Fieldbus).	-	CFW500-CUSB (USB) CFW500-CCAN (CANopen /DeviceNet) CFW500-CRS232 CFW500-CRS485 CFW500-CPDP (Profibus-DP)	Installed at the application
Flash memory module (plug-in) [3]	Accessory	Used to download the programming of a CFW500 to others without having to power them up.	-	CFW500-MMF	Installed at the application
Remote HMI	Accessory	Used to transfer the operation to the panel door or machine console. Maximum distance of 10m. Degree of protection IP54.	-	CFW500-HMIR	Installed at the application
Cables for remote HMI	Accessory	Used to interconnect the CFW500 to the remote HMI (CFW500-HMIR).	-	CFW500-CCHMIRXM, where cables with lengths (X) of 1, 2, 3, 5, 7,5 and 10 meters	Installed at the application

(1) Optional = hardware resources added to the CFW500 in the manufacturing process
    Accessory = hardware resource requested as a separated item.
(2) Request the product according to the code available on page 10.

Plug-in Modules Specification [3]

Plug-in module	Functions											
	Inputs		Outputs			USB Port	Fieldbus networks				Power supply	
	Digital	Analog	Analog	Digital relay	Digital transistor		CANopen/ DeviceNet	RS232	RS485	Profibus-DP	10 V	24 V
CFW500-IOS	4	1	1	1	1	-	-	-	1	-	1	1
CFW500-IOD	8	1	1	1	4	-	-	-	1	-	1	1
CFW500-IOAD	6	3	2	1	3	-	-	-	1	-	1	1
CFW500-IOR	4	1	1	4	1	-	-	-	1	-	1	1
CFW500-CUSB	4	1	1	1	1	1	-	-	1	-	1	1
CFW500-CCAN	2	1	1	1	1	-	1	-	1	-	1	1
CFW500-CRS232	2	1	1	1	1	-	-	1	1	-	-	1
CFW500-CRS485	4	2	1	2	1	-	-	-	2	-	1	1
CFW500-CPDP	2	1	1	1	1	-	-	-	1	1	-	1

(3) All models of plug-in modules have at least one RS485 port. The CFW500-CRS485 plug-in module has two RS485 ports. The CFW500 allows installing one plug-in module per unit.

Step by Step

1 - Remove cover   2 - Insert accessory   3 - Close cover   Simple!

Block Diagram

① = DC link connection
② = Braking resistor connection

POWER

CONTROL

Power supplies for electronics and for interface between power and control

Operating Interface (HMI)

CPU 32 bits "RISC"

EEPROM (memory)

Operating Interface Remote HMI

CONTROL

CFW500-IOS PLUG-IN MODULE (*)

RS485

Software WLP SuperDrive G2

Interfaces (RS232, RS485 or USB)

Modbus

Digital Inputs (DI1 to DI4)

Analog Inputs (AI1)

Plug-in Module

Power Supply 10 V

Power Supply 24 V

Analog Output (AO1)

Digital Output DO1 (RL1)

Digital Output DO2 (TR)

Accessory
Flash Memory (CFW500-MMF)

(*) The number of inputs and outputs (analog and digital), as well as other resources, may vary according to the used plug-in module. For further information, refer to the CFW500 user manual.
(**) Not available for frame size A.

Technical Data

Power supply	Voltage and power range	1-phase, 200-240 V ac (+10%-15%) 0.25 to 2 HP (0.25 to 1.5 kW)
		1-phase/3-phase, 200-240 V ac (+10%-15%) 0.25 to 3 HP (0.25 to 2.2 kW)
		3-phase, 200-240 V ac (+10%-15%) 2 to 7.5 HP (1.5 to 5.5 kW)
		3-phase, 380-480 V ac (+10%-15%) 0.5 to 12.5 HP (0.25 to 7.5 kW)
	Supply frequency	50/60 Hz (48 Hz to 62 Hz)
Motor connection	Voltage	3-phase, 0-100% of supplied voltage
	Output frequency	0 a 500 Hz
	Displacement power factor	>0.97
	Overload capacity	1.5 x In (drive) for 1 minute every 6 minutes
	Switching frequency	Default 5 kHz (selectable 2.5 to 15 kHz)
	Aceleration time	0.1 to 999s
	Desaceleration time	0.1 to 999s
Environment	Temperature	40 ºC - NEMA1
		40 ºC - IP20 side by side and/or with RFI flter
		50 ºC - IP20 without RFI filter
		2% of current derating for each ºC above the specific operating temperature, limited to an increase of 10 ºC
	Humidity	5 % to 90 % non-condensing
	Altitude	Up to 1000 m - rated conditions
		1000 m to 4000 m - 1 % of current derating for each 100 m above 1000 m of altitude
	Degree of protection	IP20 or NEMA1 (with kit NEMA1)
Performance	V/f control	Speed regulation: 1 % of the rated speed (with slip compensation)
		Speed variation range: 1:20
	Vector control (VVW)	Speed regulation: 1 % of the rated speed
		Speed variation range: 1:30
Braking methods	DC Current applied to motor dynamic braking	Available as standard for frame sizes B and C. For frame size A "DB" models has to be used. An extra resistor must be fitted in for dynamic braking capability
Safety	Protection	Overcurrent/phase-phase short circuit in the output
		Overcurrent/phase-ground short circuit in the output
		Under/overvoltage
		Overtemperature in the heatsink
		Overload in the motor
		Overload in the power module (IGBTs)
		External alarm / fault
		Setting error
Communication	Modbus-RTU	All plug-in modules for RS485 and CFW500-CRS232 for RS232
	Profbus-DP	Plug-in module CFW500-CPDP
	DeviceNet	Plug-in module CFW500-CCAN
	CANopen	Plug-in module CFW500-CCAN
Chokes (external as accessory)	AC input chokes	For reducing THD
	AC output chokes	For longer motor cables

Technical Data - Standards

Safety standards	UL 508C	Power conversion equipment.
	UL 840	Insulation coordination including clearances and creepage distances for electrical equipment.
	EN61800-5-1	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: For the machine to comply with this standard, the manufacturer of the machine is responsible for installing an emergency stop device and equipment to disconnect the input power supply.*
	EN 60146 (IEC 146)	Semiconductor converters.
	EN 61800-2	Adjustable speed electrical power drive systems - Part 2: General requirements - Rating specifcations for low voltage adjustable frequency AC power drive systems.
Electromagnetic Compatibility (EMC) Standards	EN 61800-3	Adjustable speed electrical power drive systems - Part 3: EMC product standard including specifc test methods.
	EN 55011	Limits and methods of measurement of radio disturbance characteristics of industrial, scientifc and medical (ISM) radio-frequency equipment.
	CISPR 11	Industrial, scientifc and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement.
	EN 61000-4-2	Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 2: Electrostatic discharge immunity test.
	EN 61000-4-3	Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 3: Radiated, radio-frequency, electromagnetic feld immunity test.
	EN 61000-4-4	Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 4: Electrical fast transient/burst immunity test.
	EN 61000-4-5	Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 5: Surge immunity test.
	EN 61000-4-6	Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 6: Immunity to conducted disturbances, induced by radio-frequency fields.
Mechanical construction standards	EN 60529	Degrees of protection provided by enclosures (IP code).
	UL 50	Enclosures for electrical equipment.

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The Quality Choice

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