Industrial Motors

Commercial & Appliance Motors

Automation

Digital & Systems

Energy

Transmission & Distribution

Coatings

Variable Speed Drives for HVAC-R Systems

Confiability, robustness and **energy efficiency**

Driving efficiency and sustainability

The best HVAC-R performance

The HVAC-R market deserves dedicated and fully equipped drives. With this in mind, WEG has launched a dedicated line of variable speed drives for heating, ventilation, air conditioning and refrigeration. The CFW501 were designed with features and functions required for HVAC-R systems counting on the same ***reliability, robustness and energy-efficient control*** found in the WEG industrial drives. WEG, a leading supplier of automation products now brings this new product for use in hospitals, airports, commercial buildings, hotels, shopping malls and similar facilities.

Highlights

Harmonic mitigation

- No line reactor required
- No restrictions for installation, minimum impedance is not required
- Meets the 61000-3-12 standard, related to low order current harmonics in the power supply

User friendly programming

- Oriented start-up: step by step
- Easy and intuitive operation
- Parameter groups: shortcut to the parameters of interest
- Engineering units, such as: °C, °F, bar, mbar, psi, m³, gal, kW, rpm and others

Safety stop[1)]

In accordance with EN 61800-5-2, EN ISO 13849-1, IEC 62061, IEC 61508 Parts 1-7, EN 50178, IEC 60204-1, Cat. 3/PL d. and SIL 2.

- With this optional, when the safety circuit is tripped caused by external factors the IGBT firing circuit is deactivated and the power delivered to the motor is ceased

Certifications

Product Safety Functional Safety
TÜVRheinland CERTIFIED
www.tuv.com ID 0600000000

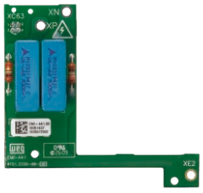
Note: 1) The CFW501 line with firmware versions higher than V3.0x (items with G2 in their smart code).

Thermal management

- Lifetime of the VFD is increased by monitoring of the heatsink and internal air temperatures
- Heatsink fans are temperature driven
- Fans easily removed for maintenance

RFI filter built-in

- Meets the requirements of electromagnetic compatibility standards



Communication protocols available in the standard product

- BACnet MS/TP
- Metasys N2
- Modbus-RTU

3C2

Conformal coating (3C2)

- VSD lifetime is extended: protection against agressive and corrosive atmospheres

PLC function built-in

Flexible programming offered by the free of charge software WLP gives the user the capability to write his own functions. Software available at www.weg.net.

Special functions

Bypass
Through one of its relay output the CFW501 allows the motor to be switched to the main power supply using additional components.

Dry pump protection
Prevents the pump from running dry.

Fire mode
This function makes the drive to inhibit its internal faults, making the motor run during adverse conditions without stopping the process.

PTC monitoring
PTC input terminals for motor temperature protection.

Broken belt detection
Monitors motor torque and prevents the drive from running with no load in case of a broken belt.

Filter maintenance alarm
Warns about the need to replace the filter.

Sleep / Wake-up mode
Prevents the operation of the motor at low speeds for a programmed period of time. Wake-up mode determines motor restart conditions.

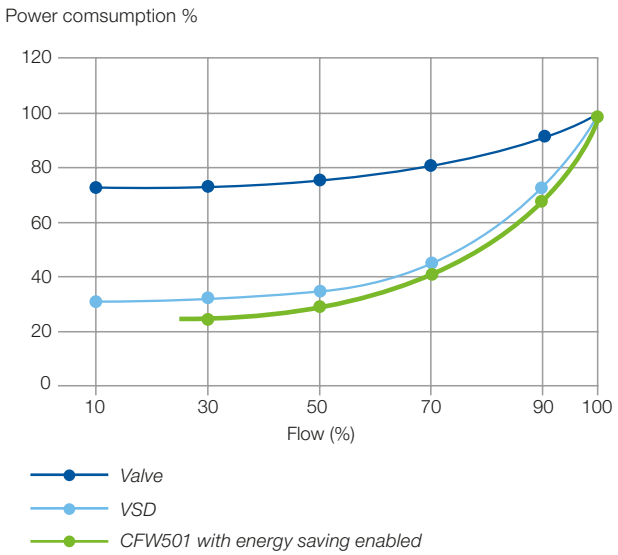
Short cycle protection
It prevents loads like compressors from sucessives cycles of ON/OFF commands.

Energy Saving
Depending on the motor speed and load conditions, flux is reduced decreasing losses and improving efficiency.

The future of our planet depends on conscious and sustainable actions and as the World's population continues to grow rapidly, modern automated solutions are required. Technology is ever present in our lives, we have to find ways to efficiently produce the energy that drives all of these innovations. What are you doing to grow sustainability?

Use energy in a conscious way

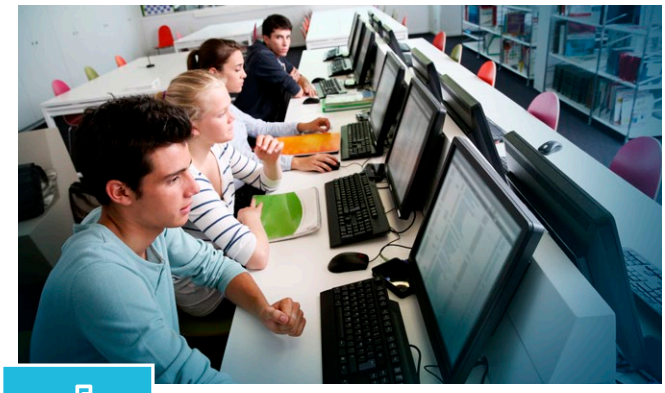
Go Green!



Applications

Shopping malls, commercial buildings

- Integrate and manage the whole HVAC-R system through VSDs with fire mode, filter maintenance alarm and SoftPLC



Offices, schools, universities

- Accurate temperature control for perfect comfort levels

Medical centers, hospitals, clean rooms

- Keep clean air with both right temperature and humitidity requirements is the key to ensure air quality in critical environments. The PID functions embedded to the VFD can be used for that achievement

Airports, conference centers

- Effective control of airflow and pressure, provide users with the right comfort

Hotels, concert halls, theaters, residential buildings

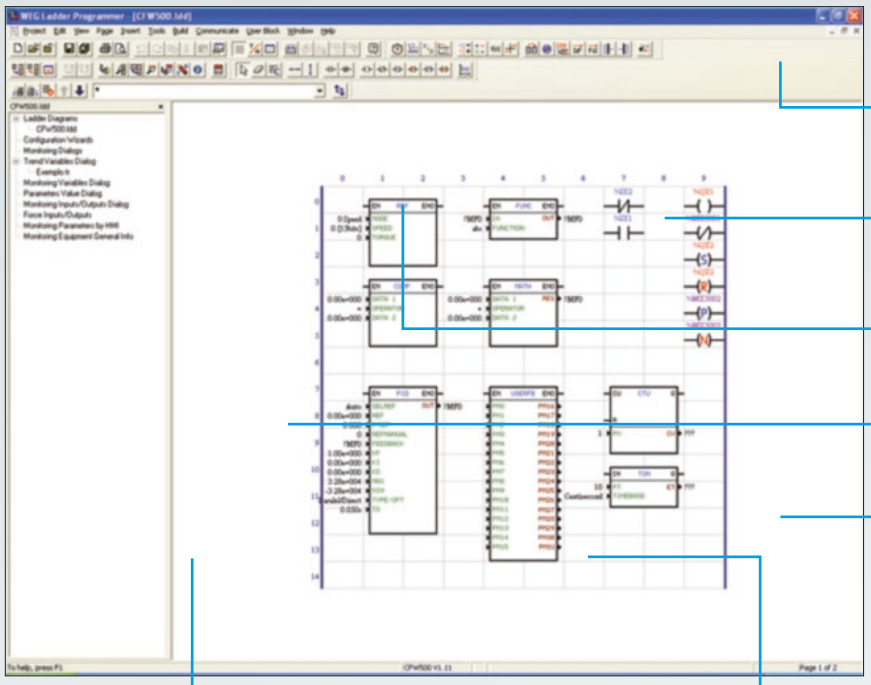
- Lifetime of pumping systems is increased due to reduction of mechanical stress and embedded protections, like dry pump and short cycle, which garantee safe operation

Stadiums, sports facilities, entertainment buildings

- The automatic energy saving fuction pursues efficient control of pumps, fans and compressors to make sure the best usage of natural and financial resources is under control

SoftPLC - Built-in the standard product

PLC funtionalities are available as standard in the WEG HVAC-R series. The SoftPLC function allows the user to customize applications through a simple, intuitive and free of charge ladder programming software named WLP.



Easy programming: Ladder

Contacts and coils

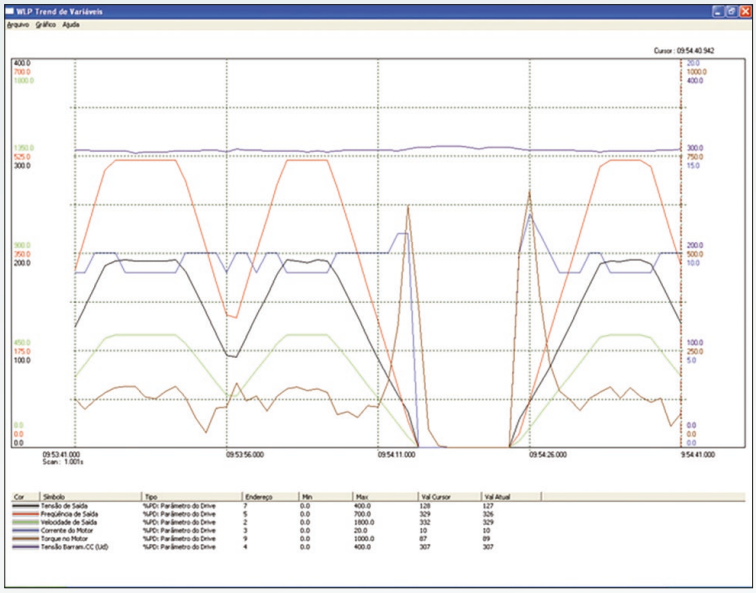
Speed reference

Comparators and math functions

Counters and timers

FREE download at *www.weg.net*

User block protected by password

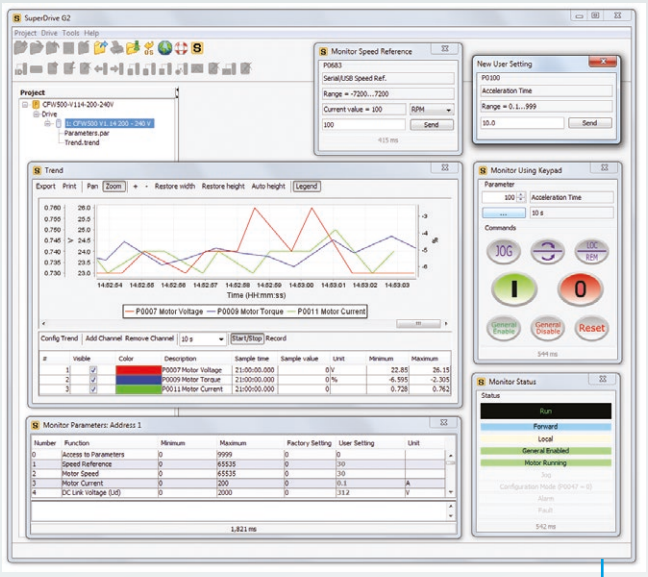


Trend function

- Online graphic monitoring of parameters/variables
- Configurable up to six channels

SuperDrive G2

Software application to program, control and monitor WEG VSDs.



Trend function

- Online graphic monitoring of parameters/variables
- Possibility to export an image with the respective graph based upon the selected period

USB connection

Friendly environment

FREE download at *www.weg.net*

CFW501

CFW501 is a compact variable speed drive designed for heating, ventilation and air conditioning applications. It offers excellent efficiency and shares the same platform as CFW500, adding features such as fire mode, bypass, dry-pump and broken belt detection. It supports the most used communication protocols in the HVAC-R industry: BACnet, Modbus-RTU and Metasys N2, available in the standard product.

Coding[1)]

The CFW501 code identifies its construction characteristics, nominal current, voltage range and optionals. Using the coding below, it is possible to select the CFW501 required for your application, simple and quickly.

Reference	Model identification				Braking IGBT	Protection degree	Conducted emission level [2)]	Hardware version	Software version
	Frame size	Output current	N° of phases	Power supply voltage					
CFW501	A	03P6	T	4	NB	20	C2	---	---
CFW501	Check table on page 9								
					NB = without dynamic braking DB = with dynamic braking [3)]				
						20 = IP20 N1 = NEMA1 enclosure [3)]			
							C2 = According to category 2 of IEC 61800-3 standard, with internal RFI filter C3 = According to category 3 of IEC 61800-3 standard, with internal RFI filter		
									Blank = with CRS485 plug-in module
									Blank = standard Sx = special software

Notes: 1) Other configurations available upon request.
2) Depending on the model, ferrite core migh be needed (check user's manual for more details).
3) Optional items are hardware features added to the CFW501 in the manufacturing process and must be ordered via the smart code.

Frame size	Output current	Nº of phases	Power supply voltage	Braking IGBT	Protetion degree	Conduced emission level
A	01P6 = 1.6 A	T = three-phase power supply	2 = 200 ... 240 V	NB	20 or N1	C3
	02P6 = 2.6 A					
	04P3 = 4.3 A					
	07P0 = 7.0 A					
	09P6 = 9.6 A					
	12P2 = 12.2 A					
B	16P0 = 16 A			DB		
	17P0 = 17 A					
	19P4 = 19.4 A					
C	24P0 = 24 A					
D	28P0 = 28 A					
	33P0 = 33 A					
	47P0 = 47 A					
E	56P0 = 56 A					
F	77P0 = 77 A					
	88P0 = 88 A					
	0105 = 105 A					
G	0145 = 145 A					
	0180 = 180 A					
	0211 = 211 A					
	0145 = 145 A			NB		
	0180 = 180 A					
	0211 = 211 A					
A	01P0 = 1.0 A		4 = 380 ... 480 V			
	01P6 = 1.6 A					
	02P6 = 2.6 A					
	04P3 = 4.3 A					
	06P1 = 6.1 A					
B	02P6 = 2.6 A			DB		
	04P3 = 4.3 A					
	06P5 = 6.5 A					
	10P0 = 10 A					
C	14P0 = 14 A					C2
	16P0 = 16 A					
D	24P0 = 24 A					C3
	31P0 = 31 A					
E	39P0 = 39 A					
	49P0 = 49 A					
F	77P0 = 77 A					
	88P0 = 88 A					
	105P0 = 105 A					
G	0142 = 142 A					
	0180 = 180 A					
	0211 = 211 A					
	0142 = 142 A			NB		
	0180 = 180 A					
	0211 = 211 A					
	0211 = 211 A					

Drive ratings

The correct way to select a VFD is matching its output current with the motor rated current. However, the tables below present the approximate motor power for each VFD model. Use the motor power ratings below only as a guidance. Motor rated currents may vary with motor characteristics and manufacturer.

CFW501 HVAC-R						Maximum application motor [1]					
Reference	Power supply (V)		Frame size	Braking IGBT	Output current (A)	IEC				UL	
						Power supply (V) 50 Hz	kW	Power supply (V) 60 Hz	HP	Power supply (V) 60 Hz	HP
CFW501A01P6T2NB20C3	Three-phase	200-240	A	N/A	1.6	230	0.25	220	0.33	230	0.33
CFW501A02P6T2NB20C3			A		2.6		0.55		0.75		0.5
CFW501A04P3T2NB20C3			A		4.3		1.1		1.5		1
CFW501A07P0T2NB20C3			A		7		1.5		2		2
CFW501A09P6T2NB20C3			A		9.6		2.2		3		3
CFW501A12P2T2NB20C3			A		12.2		3		3		3
CFW501B19P4T2DB20C3			B	Built-in	16		4		5		5
CFW501C24P0T2DB20C3			B		17		4		5		5
CFW501D47P0T2DB20C3G2			B		19.4		5.5		5		5
CFW501D33P0T2DB20C3G2			C		24		5.2		7.5		7.5
CFW501D28P0T2DB20C3G2			D		28		11		15		15
CFW501E56P0T2DB20C3G2			E		56		15		20		20
CFW501F77P0T2DB20C3G2			F		77		22		30		30
CFW501F88P0T2DB20C3G2			F		88		22		30		30
CFW501F0105T2DB20C3G2			F		105		30		40		40
CFW501G0145T2DB20C3G2			G		145		37		50		50
CFW501G0180T2DB20C3G2			G		180		45		60		60
CFW501G0211T2DB20C3G2			G		211		55		75		75
CFW501G0145T2NB20C3G2			G	N/A	145		37		50		50
CFW501G0180T2NB20C3G2			G		180		45		60		60
CFW501G0211T2NB20C3G2			G		211		55		75		75
CFW501A01P0T4NB20C3	Three-phase	380-480	A	N/A	1	415	0.37	460	0.5	460	0.33
CFW501A01P6T4NB20C3			A		1.6		0.55		0.75		0.75
CFW501A02P6T4NB20C3			A		2.6		1.1		1.5		1
CFW501A04P3T4NB20C3			A		4.3		1.5		2		2
CFW501A06P1T4NB20C3			A		6.1		2.2		3		3
CFW501B02P6T4DB20C3			B	Built-in	2.6		1.1		1.5		1
CFW501B04P3T4DB20C3			B		4.3		1.5		2		2
CFW501B06P5T4DB20C3			B		6.5		2.2		3		3
CFW501B10P0T4DB20C3			B		10		4.5		6		5
CFW501C14P0T4DB20C2			C		14		5.5		7.5		10
CFW501C16P0T4DB20C2			C		16		7.5		10		10
CFW501D24P0T4DB20C3			D		24		11		15		15
CFW501D31P0T4DB20C3			D		31		15		20		20
CFW501E39P0T4DB20C3G2			E		39		25		20		25
CFW501E49P0T4DB20C3G2			E		49		30		25		30
CFW501F77P0T4DB20C3G2			F		77		45		45		60
CFW501F88P0T4DB20C3G2			F		88		45		50		75
CFW501F0105T4DB20C3G2			F		105		55		60		75
CFW501G0142T4DB20C3G2			G		142		75		75		125
CFW501G0180T4DB20C3G2			G		180		110		100		150
CFW501G0211T4DB20C3G2			G		211		132		150		175
CFW501G0142T4NB20C3G2			G	N/A	142		75		75		125
CFW501G0180T4NB20C3G2			G		180		110		100		150
CFW501G0211T4NB20C3G2			G		211		132		150		175

Note: 1) The power rating values for maximum applicable motor shown in the table above are reference values and valid for WEG motors. IEC motor powers are based on motor WEG four-pole W22 High Efficiency IE2 three-phase induction motors. NEMA motor power are based on WEG four pole W22 Premium. Motor rated currents may vary with speed and manufacturer, use the motor power ratings below only as a guindance. The proper sizing of the CFW501 to be used must be determined as a function of the rated current of the motor used.
Motor power stated on these tables are based on IEC and NEMA standard for IV poles motor.

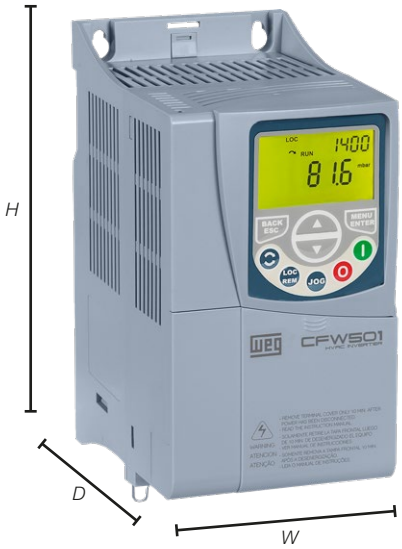
Accessories

The CFW501 VSD was developed to meet the hardware configurations required by a wide range of applications.

Reference	Description
	Functionality expansion
CFW500-CRS485-B	RS485 communication plug-in module
CFW500-SFY2[3]	Plug-in module with security function STO e SS1 (STO e SS1-t)[2]
Memory	
CFW500-MMF	Flash memory module
Interfaces	
HMI-01	Alphanumeric HMI
CFW501-RHMIF	Frame for remote HMI
CFW501-HMIR	Remote operating interface (HMI)
CFW500-CCHMIR01M	1-meter cable set for remote operating interface (HMI)
CFW500-CCHMIR02M	2-meter cable set for remote operating interface (HMI)
CFW500-CCHMIR03M	3-meter cable set for remote operating interface (HMI)
CFW500-CCHMIR05M	5-meter cable set for remote operating interface (HMI)
CFW500-CCHMIR75M	7.5-meter cable set for remote operating interface (HMI)
CFW500-CCHMIR10M	10-meter cable set for remote operating interface (HMI)
Description	
CFW501-KN1A	NEMA1 kit - size A (standard for option N1)[1]
CFW501-KN1B	NEMA1 kit - size B (standard for option N1)[1]
CFW501-KN1C	NEMA1 kit - size C (standard for option N1)[1]
CFW501-KN1D	NEMA1 kit - size D (standard for option N1)[1]
CFW501-KN1E	NEMA1 kit - size E (standard for option N1)[1]
CFW500-KN1F	NEMA1 kit - size F (standard for option N1)[1]
CFW500-KN1G	NEMA1 kit - size G (standard for option N1)[1]
CFW500-KPCSA	Shielding kit for the power cables - size A (standard for option C2 and C3)[1]
CFW500-KPCSB	Shielding kit for the power cables - size B (standard for option C2 and C3)[1]
CFW500-KPCSC	Shielding kit for the power cables - size C (standard for option C2 and C3)[1]
CFW500-KPCSD	Shielding kit for the power cables - size D (standard for option C2 and C3)[1]
CFW500-KPCSE	Shielding kit for the power cables - size E (standard for option C2 and C3)[1]
CFW500-KPCSF	Shielding kit for the power cables - size F (standard for option C3)[1]
CFW500-KPCSG	Shielding kit for the power cables - size G (standard for option C3)[1]

Notes: 1) The NEMA1 Kit and the KPCS Kit cannot be installed simultaneously on the product.
2) The CFW500-SFY2 accessory can only be used in CFW501 drives that contain G2 in the smart code.
3) Due to the different connections, when equipped with the plug-in module with the STO / SS1 safety functions, the inverter will still be able to connect another plug-in module at the user's choice.

Dimensions and weights



IP20

NEMA1

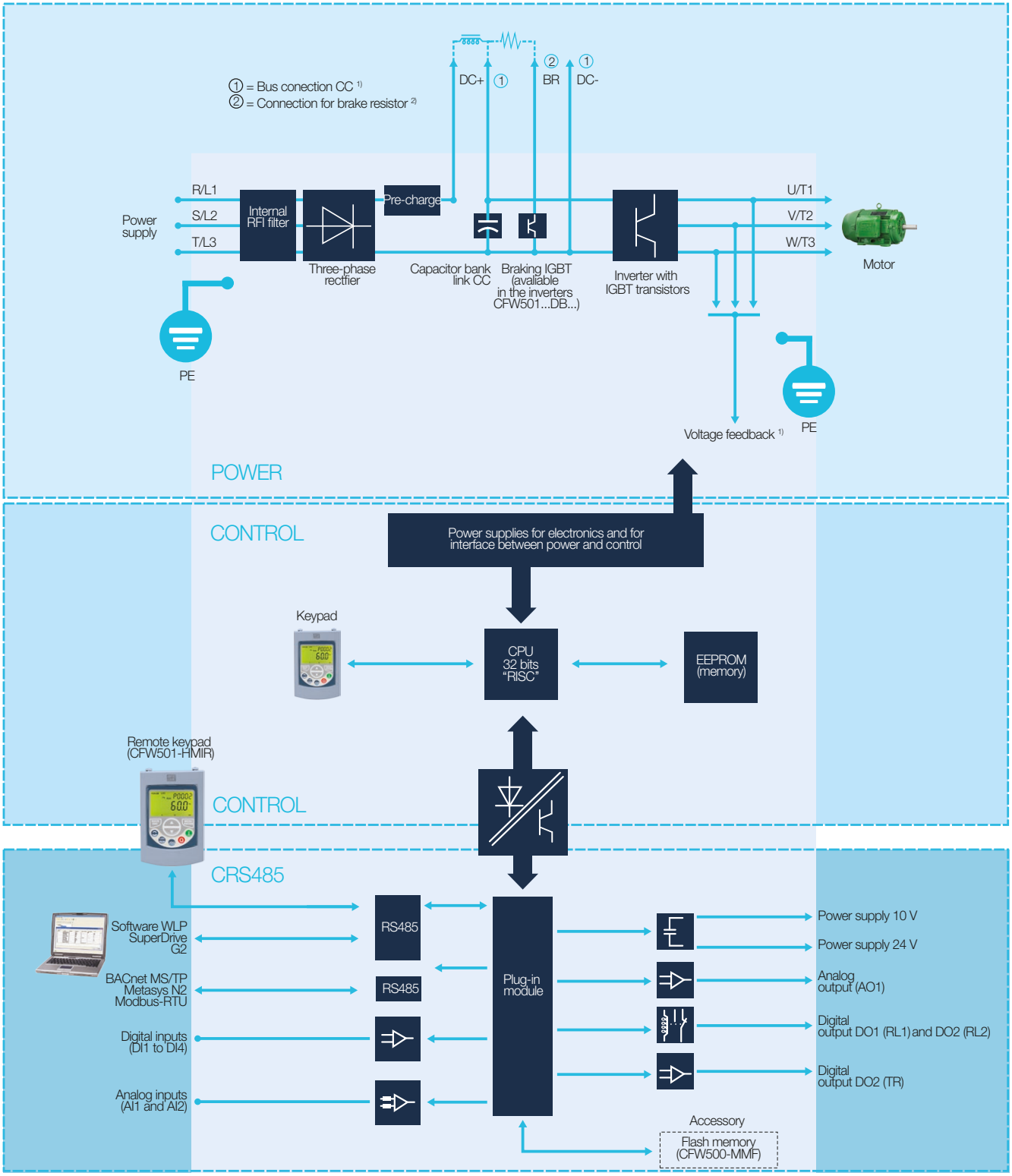
IP20

Frame size	H mm	W mm	D mm	Weight kg
A	189.1	75.0	150.0	0.8
B	199.0	100.0	160.0	1.2
C	210.0	135.2	165.0	2
D	306.6	180.0	166.5	4.3
E	350.0	220.0	191.5	10
F	550.0	300.0	254.0	26
G	675.0	335.3	314.0	52

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
D	362	180	166.5	4.8
E	405.7	220	191.5	10.8
F	691.4	300	259.2	27.8
G	920.6	335.2	313.7	67.1

Block diagram



Notes: 1) Not available for frame size A.
2) Not available for frame size A. Braking resistor is not included.

VSD Features

				CFW501
Power data	220-240 VAC (-15% / +10%)	Single-phase		✗
		Three-phase		0.18 to 5.5 kW (0.25 to 7.5 HP)
	380-480 VAC (-15% / +10%)			0.18 to 15 kW (0.25 to 20 HP)
	500-600 VAC (-15% / +10%)			✗
	Number of connections			< 10/h
	Frequency			50 to 60 Hz (48 to 62 Hz)
	Phase imbalance			≤ 3% of the rated phase-to-phase input voltage
	Typical efficiency			≥ 97%
	Built-in disconnect switch			✗
Control	Method	V/f (Scalar)		✓
		VVW		✓
		Sensorless vector		✗
	Output frequency			0 to 500 Hz, resolution of 0.015 Hz
	Switching frequency			2.5 to 15 kHz (all models)
Performance	Normal duty (ND)			110% (1min) / 6min
	Heavy duty (HD)			✗
	Aceleration time			0.1 to 999s
	Deceleration time			0.1 to 999s
HVAC-R functions	Fire mode			✓
	Bypass			✓
	Short cycle protection			✓
	Sleep / Wake-up modes			✓
	Broken belt			✓
	Dry pump			✓
	Energy saving mode			✓
	Filter maintenance alarm			✓
	PTC monitoring			✓
	Harmonic mitigation			✓
	Advanced external PID controllers			1 loop
Safe torque off	STO			✓ 1)
Braking methods	Dynamic braking capacity			✓ 2)
	Optimal braking			✗
	DC braking			✓
I/Os	Inputs	Digital	NPN / PNP	4
		Analog		2 (0-10 V, -10 to 10 V or 0 / 4-20 mA)
	Outputs	Digital	Relay NO / NC	2 (240 VAC / 0.5 A)
			Open drain	1 (24 V / 150 mA)
		Analog		2 (0-10 V or 0 / 4-20 mA) not isolated
	24 V power supply capacity			150 mA
	STO			✗
Communication	RS485	Modbus-RTU		✓
		BACnet MS/TP		✓
		Metasys N2		✓
	USB			✗
Protection degree	IP20			✓
	IP21			✗
	NEMA 1			A
	IP55			✗
Environment conditions	Inverter surrounding temperature			0 °C up to 50 °C 3)
	Humidity			from 5% to 95% non-condensing
	Altitude			0 to 1,000 m without derating
				From 1,000m up to 4,000 m with current reduction of 1% for each 100 m
				From 2,000 m to 4,000 m above sea level - maximum voltage reduction (240 V for 200...240 V models, 230 V for 220...230 V models, 480 V for 380...480 V models and 600 V for 500...600 V models) of 1.1% for each 100 m above 2,000 m
	Conducted emission level			C3 = according to category 3 (C3) of IEC 61800-3, with built-in C3 RFI filter
	Coating class of electronic boards			Protection class 3C2 - Standard coating on the internal circuits, according to IEC 60721-3-3 (standard model)
				Protection class 3C3 - Extra coating - optional, according to IEC 60721-3-3 (optional)
Certification				UL, CE, C-Tick, Iram, Ghost, BTL

✓ *Available as standard*	**A** *Available with an accessory*	✗ *Not available*

Notes: 1) The CFW500-SFY2 accessory can only be used in CFW501 drives that contain G2 in the smart code.
2) Standard for frames B, C and D.
3) The maximum ambient temperature can vary depending on the VSD model and installation. For more details, please check the User's Manual of the referred product.

Standards

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: 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.

Sustainability

Sustainability has been an integrated part of WEG's philosophy since its foundation. That is why awareness with environment protection has been a ***major concern*** in the company for the ***responsible use of natural resources.***

Half of the energy produced around the world is used to operate pumps, while one third of the world's population live in areas experiencing water shortages. It is internationally recognized that the effective use of electric power significantly reduces environmental impacts and helps to guarantee the sustainable use of natural resources for future generations.

Guarantee the lowest environmental impact of our products and manufacturing processes by:

Being in compliance with the applicable environmental legislation

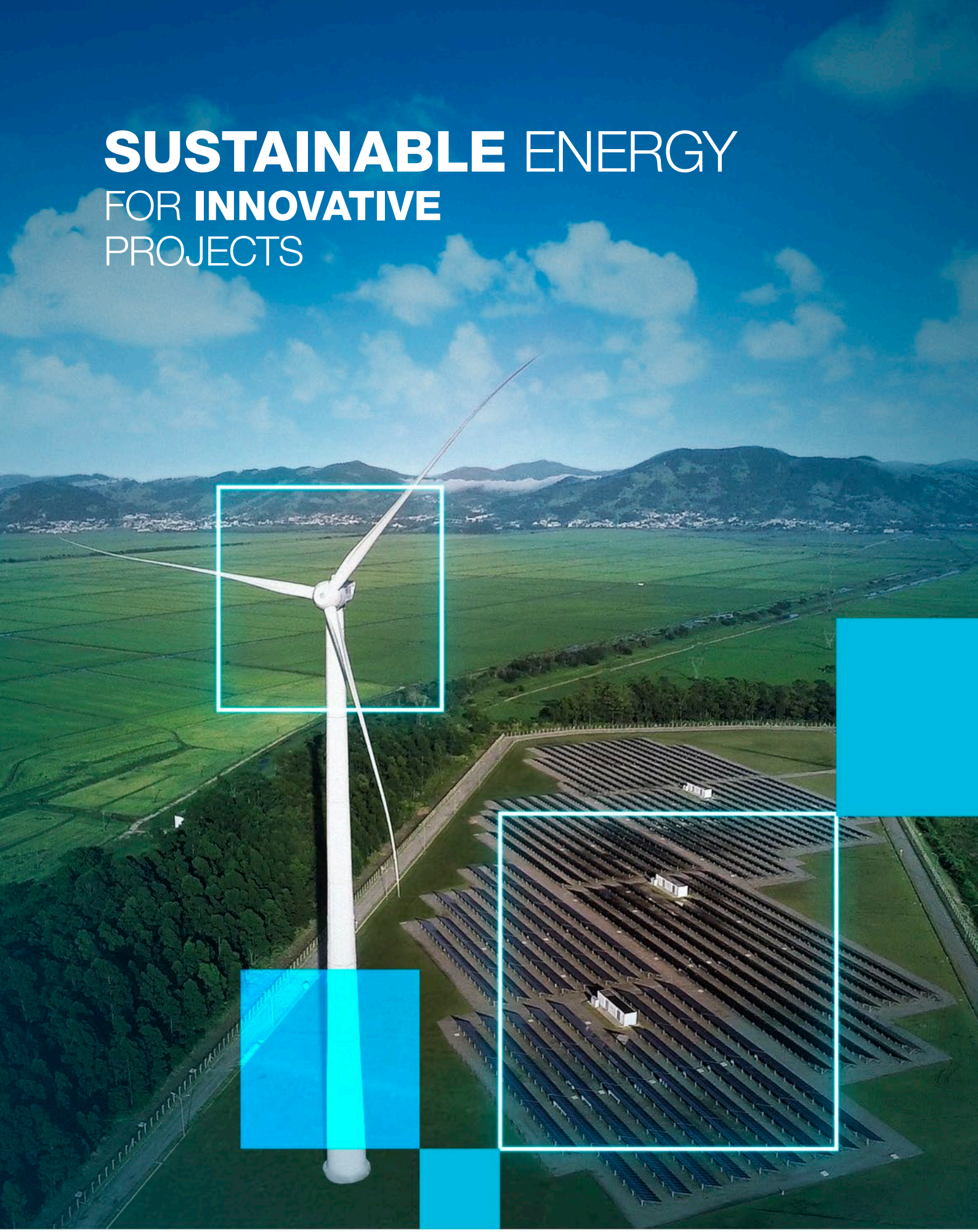
Improving continuously by establishing environmental goals and targets

Acting preventively with the aim of protecting the environment

Ecoefficient processes and products, saving natural resources

Certifications
ISO 50001:2011
ISO 14001:2014
ISO 9001:2008

SUSTAINABLE ENERGY FOR **INNOVATIVE** PROJECTS



Driving efficiency and sustainability

Global presence is essential, as much as understanding your needs.

Global Presence

With more than 40,000 employees worldwide, WEG is one of the largest electric motors, electronic equipments and systems manufacturers. We are constantly expanding our portfolio of products and services with expertise and market knowledge. We create integrated and customized solutions ranging from innovative products to complete after-sales service.

WEG's know-how guarantees our ***Variable Speed Drives for HVAC-R Systems*** are the right choice for your application and business, assuring safety, efficiency and reliability.

Availability is to have a global support network

Partnership is to create solutions that suits your needs

Competitive edge is to unite technology and inovation

Know More

High performance and reliable products to improve your production process.

Excelence is to provide a whole solution in industrial automation that improves our customers productivity.

Visit: **www.weg.net**

youtube.com/wegvideos

The scope of WEG Group solutions
is not limited to products and solutions
presented in this catalogue.
To see our portfolio, contact us.

For WEG's worldwide operations
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