

# CFW701 HVAC

## Frequency Inverter



## CFW701 HVAC - Frequency Inverter

The CFW701 HVAC is a variable-speed drive intended for use with asynchronous motors when heating, ventilation, air conditioning and refrigeration applications are to be met.

Offering excellent cost-effectiveness, the CFW701 HVAC follows the CFW700 topology with plug and play technology, accessories incorporated in the standard version and simple operation.

Grouped in 5 frame sizes A to E with accessories to meet NEMA type1 and IP21 enclosures its power availability covers 0.5 - 75 HP (0.18 - 55 kW) at 230 V or 0.5 - 150 HP (0.58 - 110 kW) at 460 volts and 575 V (under development).

The CFW701 HVAC drive is a perfect fit for fans, exhausters and pumps located in schools, universities, hospitals, commercial buildings, shopping malls and many other loads that reduction on motor speed (when allowed) causes considerable energy savings. Beyond the benefits brought by this drive motor protection is also not forgotten, by using an intelligent thermal management algorithm drive and motor have separate parameters of monitoring, thus motor and drive are safe.

Focusing in meeting both low levels of harmonic distortion and electromagnetic interference (RFI) the CFW701 HVAC drive is factory equipped with RFI filters (C3 level) and DC link chokes symmetrically connected equivalent to a 6% impedance line reactor. Low harmonic and RFI mean low losses, low losses mean less oversizing on circuitry and all of these together leads to high system efficiency. Also, the existence of DC link reactor discards the minimum impedance requirement needed to install a VFD.



*Illustrative image*

### Certifications



## Technology

### Built-in specific operating interface

It is used for controlling, viewing and setting all the parameters of the CFW701 HVAC. It has specific engineering units for HVAC applications and status indicators that simplify its configuration and operation.

It features two operating modes: monitoring and parameterization. It offers optional external mounting (up to 30 meters).

### Vectrue Technology®

#### Control technology of WEG frequency inverters

- Scalar V/F linear or adjustable - Motor speed controlled with slip compensation
- VVW - Voltage Vector WEG - Motor speed control with automatic adjustment to the load and line variations



## Energy Saving

The future depends on conscious and sustainable actions as the world grows fast and for this, modern and automated solutions are required. Technology is already present in our lives, and, in order to produce the energy that drives all the innovations, somebody has to foot the bill. What are you doing to grow sustainably?



42%

of the energy consumed worldwide today is used by industry.



68%

of the energy used in industry is consumed by electric motors.

Save even more energy by using the CFW701 HVAC Frequency Inverters together with the W22 Premium motors, which have the best efficiency of the market. This solution can help you **reduce power consumption by approximately 15%**, thus contributing to the sustainable development of the planet.



Use energy in a conscious way

# Go Green!

Calculate on the website the payback of the investment achieved by the use of frequency inverters on the website: [www.weg.net](http://www.weg.net)

## Ratings

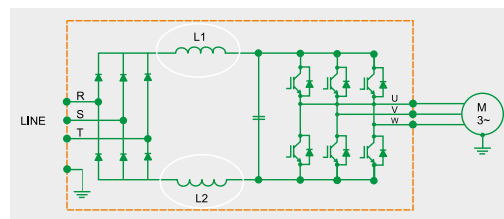
- Power supply
  - 230 V single-phase:  
Rated output current 6 to 10 A (1,5 to 3 HP - 1.5 to 3 kW).
  - 220 V three-phase:  
Rated output current of 7 to 211 A  
(0.5 to 75 HP - 0.18 to 55 kW).
  - 380-480 V three-phase:  
Rated output current of 3.6 to 211 A (0.5 to 150 HP - 0.58 to 110 kW).



- Compact structure, ideal for installation in confined spaces
- High accuracy and reliability in speed control
- Robust hardware
- Degree of protection IP20 - standard (IP21 and NEMA1 optional)

### Hardware built into the product

- RFI filter( for electromagnetic interference mitigation)
- LCD Operating interface with backlight
- Inductors in the DC Link
  - No line reactance required
  - No restrictions for installation, minimum impedance is not required
  - Meets the standard IEC61000-3-12
- Inputs and outputs (I/O):
  - 8 Isolated digital inputs
  - 3 Differential analog inputs (0-10V/4-20 mA (2) and 4-20 mA (1))
  - 5 Digital outputs (2 relays with NA contacts, 3 isolated transistors)
  - 2 Non-isolated analog outputs
  - 1 Dedicated input for PTC
- Conformal Coated:
  - Special varnish protects electronic boards ensuring better protection against dust, moisture, high temperatures and chemicals that can damage the components
  - According to DIN EN 60068-2-60
- Communication protocols through RS-485 interface: BACnet MS/TP, Metasys N2 and Modbus RTU. Available in terminals
- Intelligent cooling system:
  - Monitoring of the temperature of the Heatsink and the internal air on the electronics boards
  - Monitoring and indication of the fan speed and number of hours of operation
  - Fan is easily removable for cleaning and maintenance.



Inductors L1 and L2 built in the standard CFW701 HVAC



### Accessories and options

- Operator interface for remote assembly (up to 10 meters)
- Flash memory module (storage capacity of 1 MB)
- Safety stop module – It guarantees the blocking of firing circuit so now power is delivered to the motor. It meets EN 954-1 / EN 13849-1, category 3.

### It complies with the following standards:

- EN 61800-5-2:2007, EN ISO 13849-1:2008 + AC:2009, IEC 62061:2005, IEC 61508 Parts 1-7:2010, EN 50178:1997, IEC 60204-1:2005 (in extracts)



## Functions

### Energy Saving

Depending on the motor speed and load conditions the flux is reduced decreasing losses and therefore efficiency is improved causing energy saving.

### Fire mode

This function makes the drive to inhibit its internal faults making the motor run at adverse conditions without stopping the process.

### Bypass

Using one of its output relay the CFW 701HVAC allows the motor to be started cross the line. An external circuitry is needed for this operation.

### Short cycle protection

It prevents a compressor/motor from being switched on and off in short period of times.

### Dry pump

It prevents the pump from running with no load.

### SoftPLC function

Available in the standard product, this function provides the CFW701 HVAC with the functions of a programmable logic controller - PLC, enabling the creation of your own PLC codes, ensuring flexibility to the application.

### Characteristics

- Ladder programming language through free of charge software
- PLC, mathematical and control blocks
- Access to all parameters of the CFW701 HVAC
- 90 user parameters can be individually configured to be shown on the keypad of the CFW701 HVAC, allowing to select units, minimum and maximum values, number of decimal digits among other characteristics

### Broken belt

It monitors motor torque and prevents it from running with no load in case of a broken belt.

### Filter maintenance alarm

It warns about the need to replace the filter.

### Sleep / wake-up mode

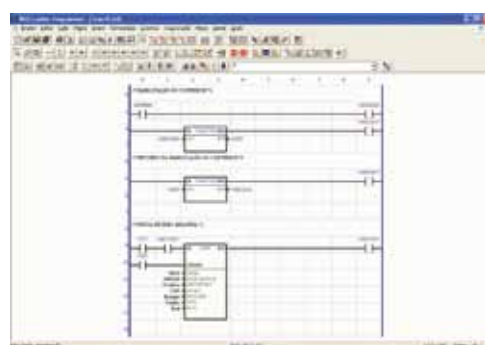
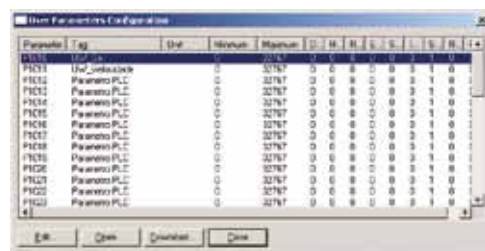
It prevents the operation of the motor at low speeds for certain amount of time to be previously programmed. Also the instant when the motor has to be restarted can be determined by using the wake-up mode.

### PTC

Possibility for monitoring PTC sensor.

### Advanced PID

Three PID control loops: One control the process by itself (the one the motor is running) and two are additional PID loops for use to control independent process variables (it might be for the control of external process not related to what the main PID loop is handling). This discards the use of an additional PID controller.



## Free of Charge Software

### WLP Software (WEG Ladder Programmer)

#### Main features

- Communication with the CFW701 HVAC via interface RS485
- Logical contacts: normally open and closed, coil, negated coil, set and reset coil, positive and negative transition coil
- PLC blocks: timer, incremental counter, comparator and arithmetic, PID and filter
- On-line help and monitoring

### Superdrive G2 software

- Communication with the CFW701 HVAC via interface RS485
- Parameterization, control and signaling
- Monitoring and on-line help



## Applications



# Hospitals

## Airports

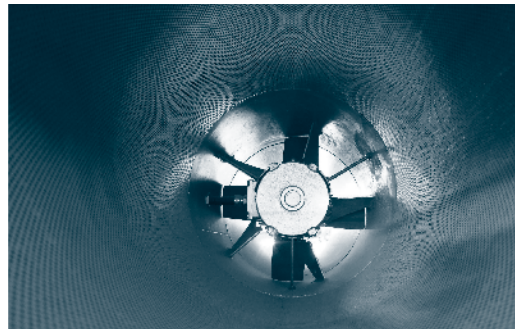
## Business buildings

# Hotels

## Shopping malls







# Clean rooms

Applications for  
Fan and Pumps

Clean Rooms



## Drive Ratings

### Normal Duty (ND) Cycle:

- 110% for 60 seconds every 10 minutes

### Sizing a VFD:

The proper way how to size a frequency inverter is by matching its output current with the motor rated current. However, tables below present the expected motor power for each VSD model.

The purpose of the table below is to be used for guidance as motor rated current may vary with number of poles and manufacturer.

*Note: Motor power stated on this table is based on IEC standard for IV poles motor.*

### Motor Voltage 220 V and 230 V

Power Supply		Model	Normal Duty (ND)	IEC 50Hz 220V 230V	NEMA 60Hz 230V
			A	kW	HP
200-240 V	10	CFW701A06POS2	6	1.1	1.5
		CFW701A07POS2	7	1.5	2
		CFW701A10POS2	10	2.2	3
	1/30	CFW701A06POB2	6	1.1	1.5
		CFW701A07POB2	7	1.5	2
		CFW701A07POT2	7	1.5	2
	30	CFW701A10POT2	10	2.2	3
		CFW701A13POT2	13	3	3
		CFW701A16POT2	16	4	5
		CFW701B24POT2	24	5.5	7.5
		CFW701B28POT2	28	7.5	10
		CFW701B33POT2	33.5	9.2	10
		CFW701C45POT2	45	11	15
		CFW701C54POT2	54	15	20
		CFW701C70POT2	70	18.5	25
		CFW701D86POT2	86	22	30
		CFW701D0105POT2	105	30	40
220-230V	30	CFW701E0142POT2	142	37	50
		CFW701E0180POT2	180	55	60
		CFW701E0211POT2	211	55	75

### Motor Voltage 380 V and 460 V

Power Supply		Model	Normal Duty (ND)	IEC		NEMA
				50Hz 380V 415V	60Hz 440V 460V	60Hz 460V
			A	kW	HP	HP
380-480 V	30	CFW701A03P6T4	3.6	1.5	2	2
		CFW701A05P0T4	5	2.2	3	3
		CFW701A07P0T4	7	3	4	3
		CFW701A10P0T4	10	4	7.5	5
		CFW701A13P5T4	13.5	5.5	10	7.5
		CFW701B17P0T4	17	7.5	12.5	10
		CFW701B24P0T4	24	11	15	15
		CFW701B31P0T4	31	15	20	20
		CFW701C38P0T4	38	18.5	30	25
		CFW701C45P0T4	45	22	30	30
		CFW701C58P5T4	58.5	30	40	40
		CFW701D70P5T4	70.5	37	50	50
		CFW701D88P0T4	88	45	75	60
		CFW701E0105T4	105	55	75	75
		CFW701E0142T4	142	75	100	100
		CFW701E0180T4	180	90	150	150
		CFW701E0211T4	211	110	175	150



## Dimensions, Weight and Temperature

		NEMA 1			IP20 / IP21			IP20	NEMA 1 / IP21	Weight kg (lb)	Braking IGBT
Model	Frame Size	Dimensions mm (in)						Maximum Surrounding Air Temperature with no derating °C (°F) _ ND			
		H	W	D	H	W	D				
CFW701A06POS2	A	305 (12.02)	145 (5.71)	227 (8.94)	247 (9.73)	145 (5.71)	227 (8.94)	50 (122)_ND	50 (122)_ND	6.3 (13.9)	Standard
CFW701A07POS2								50 (122)_ND	45 (113)_ND		
CFW701A10POS2								50 (122)_ND	50 (122)_ND		
CFW701A06POB2								50 (122)_ND	50 (122)_ND		
CFW701A07POB2								50 (122)_ND	45 (113)_ND		
CFW701A07POT2								50 (122)_ND	45 (113)_ND		
CFW701A10POT2								50 (122)_ND	50 (122)_ND		
CFW701A13POT2								45 (113)_ND	45 (113)_ND		
CFW701A16POT2								50 (122)_ND	50 (122)_ND		
CFW701B24POT2	B	351 (13.82)	190 (7.46)	227 (8.94)	293 (11.53)	190 (7.46)	227 (8.94)	45 (113)_ND	40 (104)_ND	10.4 (22.9)	
CFW701B28POT2								50 (122)_ND	50 (122)_ND		
CFW701B33POT2								50 (122)_ND	45 (113)_ND 50 (122)_HD		
CFW701C45POT2	C	448.1 (17.64)	220 (8.67)	293 (11.52)	378 (14.88)	220 (8.67)	293 (11.52)	50 (122)_ND	50 (122)_ND	20.5 (45.2)	
CFW701C54POT2								50 (122)_ND	50 (122)_ND		
CFW701C70POT2								50 (122)_ND	50 (122)_ND		
CFW701D86POT2	D	550 (21.63)	300 (11.81)	305 (12.00)	504 (19.84)	300 (11.81)	305 (12.00)	50 (122)_ND	50 (122)_ND	32.6 (71.8)	
CFW701D0105POT2								50 (122)_ND	50 (122)_ND		
CFW701E0142POT2	E	735 (28.94)	335 (13.2)	358 (14.1)	620 (24.4)	335 (13.2)	358 (14.1)	45 (113)_ND	45 (113)_ND	650 (143.3)	Optional
CFW701E0180POT2		828.9 (32.63)						45 (113)_ND	45 (113)_ND		
CFW701E0211POT2								45 (113)_ND	45 (113)_ND		
CFW701A03P6T4	A	305 (12.02)	145 (5.71)	227 (8.94)	247 (9.73)	145 (5.71)	227 (8.94)	50 (122)_ND	50 (122)_ND	6.3 (13.9)	Standard
CFW701A05POT4								50 (122)_ND	50 (122)_ND		
CFW701A07POT4								45 (113)_ND	40 (104)_ND		
CFW701A10POT4								50 (122)_HD	50 (122)_HD		
CFW701A13P5T4								45 (113)_ND	45 (113)_ND		
CFW701B17POT4	B	351 (13.82)	190 (7.46)	227 (8.94)	293 (11.53)	190 (7.46)	227 (8.94)	50 (122)_ND	50 (122)_ND	10.4 (22.9)	
CFW701B24POT4								50 (122)_ND	40 (104)_ND 45 (122)_HD		
CFW701B31POT4								50 (122)_ND	50 (122)_ND		
CFW701C38POT4	C	448.1 (17.64)	220 (8.67)	293 (11.52)	378 (14.88)	220 (8.67)	293 (11.52)	50 (122)_ND	50 (122)_ND	20.5 (45.2)	
CFW701C45POT4								50 (122)_ND	50 (122)_ND		
CFW701C58P5T4								50 (122)_ND	50 (122)_ND		
CFW701D70P5T4	D	550 (21.63)	300 (11.81)	305 (12.00)	504 (19.84)	300 (11.81)	305 (12.00)	50 (122)_ND	50 (122)_ND	32.6 (71.8)	
CFW701D88POT4								50 (122)_ND	50 (122)_ND		
CFW701E0105T4	E	735 (28.94)	335 (13.2)	358 (14.1)	620 (24.4)	335 (13.2)	358 (14.1)	45 (113)_ND	45 (113)_ND	650 (143.3)	Optional
CFW701E0142T4								45 (113)_ND	45 (113)_ND		
CFW701E0180T4		828.9 (32.63)						45 (113)_ND	45 (113)_ND		
CFW701E0211T4								45 (113)_ND	45 (113)_ND		

Note: Weight data is for the VSD as IP20 enclosure, if IP21 and NEMA1 kits are being added the total weight will change. Consult the user manual for additional information.



## Coding

Product and Series	Model Identification				Braking <sup>1</sup>	Degree of Protection <sup>1</sup>	Conducted Emission Level <sup>1</sup>	Safety Stop <sup>2</sup>	External Power Supply for control
	Frame size	Rated current	No. of phases	Rated voltage					
CFW701	A	03P6	T	4	NB	20	C3	Y1	W1
CFW701	Check table below								
	NB = Braking IGBT not available DB = Braking IGBT available								
	20 = IP20 21 = IP21 ( not available for frame size E ) N1 = Nema1 Enclosure * Check table " enclosures " at chapter " Accessories ".								
	Blank = with no RFI filter C3 = According to category 3 of IEC 61800-3 standard								
	Blank = with no STO function Y1 = with STO function according to EN 954-1 / ISO 13849-1, category 3								
	Blank = with no External Power supply board W1 = Control circuit is supplied through an external 24V power supply								

(1) All the CFW701s come equipped with RFI filter as standard.

(2) This option is not available for models frame size A with the option for Nema1.

Frame sizes	Output Current ( ND)	Input	Power Supply Voltage	Braking	Degree of protection	Conducted emission level
A	06P0 = 6.0A	B = single/three phase power supply	2 = 200...240V	DB	20, 21 or N1	Blank
	07P0 = 7.0A					
A	06P0 = 6.0A	S = single phase power supply	2 = 200...240V	DB	20, 21 or N1	C3
	07P0 = 7.0A					Blank or C3
	10P0 = 10A					
A	07P0 = 7.0A	S = three phase power supply	2 = 200...240V	DB	20, 21 or N1	Blank or C3
	10P0 = 10A					
	13P0 = 13A					
	16P0 = 16A					
B	24P0 = 24A					
	28P0 = 28A					
	33P5 = 33.5A					
C	45P0 = 45A					
	54P0 = 54A					
	70P0 = 70A					
D	86P0 = 86A					
	0105 = 105A					
E	0142 = 142A		2 = 220...230V	NB or DB	20 or N1	C3
	0180 = 180A					
	0211 = 211A					
A	06P0 = 6.0A	B = single/three phase power supply	2 = 200...240V	DB	20, 21 or N1	Blank
	07P0 = 7.0A					
A	06P0 = 6A	S = single phase power supply	2 = 200...240V	DB	20, 21 or N1	C3
	07P0 = 7.0A					Blank or C3
	10P0 = 10A					
A	3P6 = 3.6A	T = three phase power supply	4 = 380...480V	DB	20, 21 or N1	Blank or C3
	05P0 = 5.0A					
	07P0 = 7.0A					
	10P0 = 10A					
	13P5 = 13.5A					
B	17P0 = 17A					
	24P0 = 24A					
	31P0 = 31A					
C	38P0 = 38A					
	45P0 = 45A					
	58P5 = 58.5A					
D	70P5 = 70.5A					
	88P0 = 88A					
E	0105 = 105A			NB or DB	20 or N1	C3
	0142 = 142A					
	0180 = 180A					
	0211 = 211A					

## Optionals

“Optionals” mean factory installed hardware, no field installation is possible. Below are the options for hardware expansion available:

### IGBT for Dinamic Braking

CFW701 HVAC frame sizes A to D come equipped with braking IGBT in the standard product. For frame size E specific version has to be chosen, “DB” has to be part of the coding. See page 10.

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### IP21/ NEMA1 Enclosure

The CFW701 HVAC on its standard version comes IP20, optionals for IP21/NEMA1 are available. See page 10 for information of which character has to be changed for IP21/NEMA1 options.

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### Safety stop module

- It prevents accidental operation of the motor
- According to ISO13849-1 and EN954-1 / Category 3

After the activation of the safety stop function, the PWM pulses in the output of the CFW701 HVAC are blocked and the motor stops by inertia. With this function active, you cannot start the motor or create a rotating magnetic field in it, even if there is an internal fault. In order to select the safety module, insert “Y1” in position 9 of the smart code.



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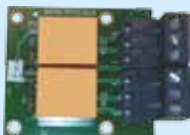
### 24 V DC External power supply for feeding control circuitry

The CFW701 HVAC with this option comes from the factory with a board on the power circuit containing a DC converter with a 24 V DC input and outputs suitable to supply voltage to the control circuit.





## Accessories

Reference	Description	Slot	
Control accessories			
USB - RS485/232	UBS / RS485/232 Converter Kit	-	
Operating interface and accessories			
HMI-03	Separate standard product operating interface	-	
RHMIF-03	Frame kit for operating interface remote mounting (degree of protection IP56)	-	
HMID-01	Blind cover	-	
HMI cable 1 m	Cable set for Serial Remote operating interface 1 m	-	-
HMI cable 2 m	Cable set for Serial Remote operating interface 2 m		
HMI cable 3 m	Cable set for Serial Remote operating interface 3 m		
HMI cable 5 m	Cable set for Serial Remote operating interface 5 m		
HMI cable 7.5 m	Cable set for Serial Remote operating interface 7.5 m		
HMI cable 10.0 m	Cable set for Serial Remote operating interface 10.0 m		
Others			
KN1A-02	NEMA conduit kit for size A	-	
KN1B-02	NEMA conduit kit for size B		
KN1C-02	NEMA conduit kit for size C		
KN1E-01	NEMA conduit kit for size E (CFW110142T2 / CFW110142T4 e CFW11105T4)		
KN1E-02	NEMA conduit kit for size E (CFW110180T2, CFW110180T4 / CFW110211T2, CFW110211T4)		
KIP21A-01	IP21 Kit for size A		
KIP21B-01	IP21 Kit for size B		
KIP21C-01	IP21 Kit for size C		
KIP21D-01	IP21 Kit for size D		
PCSA-01	Power cable shield kit for size A	-	
PCSB-01	Power cable shield kit for size B		
PCSC-01	Power cable shield kit for size C		
PCSD-01	Power cable shield kit for size D		
PCSE-01	Power cable shield kit for size E		
CCS-01	Power cable shield kit - included in the standard product	-	-
CONRA-03	Control rack with card CC701.CDE		
DBW-03	Braking module DBW030380D3848SZ		
CCK-01	Output Relay Module	-	

## Technical Specifications

Frequency Inverter CFW701 HVAC		
Control	Method	<p>Imposed Voltage Control types</p> <ul style="list-style-type: none"> <li>- V/F Scalar</li> <li>- VVV: Voltage vector control</li> </ul> <p>PWM SVM (Space Vector Modulation) Current, flux and speed controllers in software (full digital) Execution rate</p> <ul style="list-style-type: none"> <li>- Current controllers: 0.2 ms (5 KHz)</li> <li>- Flux controllers: 0.4 ms (2,5 KHz)</li> <li>- Speed controller / speed measurement: 1.2 ms</li> </ul>
	Output frequency	<p>0 to 3.4 x motor rated frequency (P0403). The motor rated frequency is adjustable from 0 Hz to 300 Hz in the V/F and VVV modes and 30 to 120 Hz in the vector mode Maximum output frequency limit considering the switching frequency</p> <ul style="list-style-type: none"> <li>- 125 Hz (Switching frequency = 1.25 KHz)</li> <li>- 200 Hz (Switching frequency = 2 KHz)</li> <li>- 250 Hz (Switching frequency = 2.5 KHz)</li> <li>- 500 Hz (Switching frequency = 5 KHz)</li> </ul>
Performance	Speed control	<p>V/F (Scalar): Control (with slip compensation): 1% of the normal speed . Speed variation range: 1:20 VVV: Control: 1% of the rated speed Speed variation range: 1:30</p>
User's power supply (CC701 board)	REF (XC1:21-24)	<p>Power supply of 10 V + 10% to be used with potentiometer in the analog inputs Maximum output current: 2 mA</p>
	+5V (XC1:1-8)	<p>Power supply of 5 V + 5% Maximum output current: 160 mA</p>
	+24 V	<p>Power supply of 24 V + 10% to be used with digital inputs and outputs Maximum output current: 500 mA</p>
Inputs (CC701 board)	Analog	<p>3 differential inputs Resolution: 11 bits + signal Input level: (0 to 10) V, (-10 to 10) V, (0 to 20) mA or (4 to 20) mA(1) Impedance: 400 kΩ for voltage input, 500 Ω for current input Maximum voltage allowed in the inputs: +15 V Programmable Functions</p>
	Digital	<p>8 isolated digital inputs 24 V DC (High level &gt; 10 V, Low level &lt; 2 V) Maximum input voltage + 30 V DC Input impedance: 2 kΩ Active high or active low input selectable by jumper (simultaneous selection for all the inputs)</p>
Outputs (CC701 board)	Analog	<p>2 non-isolated outputs Output in voltage (0 to 10 V) or current (0/4 mA to 20 mA) Maximum load: <math>R_L &gt; 10\text{ k}\Omega</math> (voltage) or <math>R_L &lt; 500\text{ }\Omega</math> (current). Resolution: 10 bits Programmable Functions</p>
	Relay	<p>2 relays with NA contacts Maximum voltage: 240 V / 30 V DC Maximum current: 0.75 A Programmable Functions</p>
	Transistor	<p>3 isolated digital outputs open sink (they use the same reference as the 24-V supply) Maximum current: 80 mA Maximum voltage: 30 V DC (2) Programmable Functions</p>
Safety	Protection	<p>Overcurrent/short-circuit in the output Power under/overvoltage Phase loss Overtemperature in the heatsink/internal air Overload on the IGBTs Overload on the motor External fault/alarm Fault on the CPU or memory Short-circuit phase-ground on the output</p>
Operating interface (HMI)	Standard	<p>9 keys: Run/Stop, Increment, Decrement, Direction of Rotation, Jog, Local/Remote, BACK, ESC and ENTER/MENU LCD Allows accessing/changing all the parameters Accurate indications:</p> <ul style="list-style-type: none"> <li>- Current: 5% of the rated current</li> <li>- Speed resolution: 1 RPM</li> </ul> <p>Can be mounted externally (remote mounting)</p>

(1) Input levels for AI3 only (0 to 20) mA and (4 to 20) mA.

(2) The transistor outputs feature an internal freewheel diode for +24 V.

## Technical Specifications

Degree of protection	IP20	Models size A, B, C without top cover and Nema1 kit Models size E without Nema1 kit
	IP20	Models size D without IP21 kit Models size E with Nema1 kit (KN1E-01 and KNE1-02)
	IP21	Models size A,B and C with top cover
	NEMA1/IP21	Models size A,B and C with top cover and Nema 1 kit Models size D with IP21 kit
	IP54	Back part of the CFW701 HVAC (external part for flange mounting)
Safety standards		UL 508C - Power conversion equipment UL 840 - Insulation coordination including clearances and creepage distances for electrical equipment EN 61800-51 - 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: General requirement <b>Nota:</b> For a machine to comply with this standard, the manufacturer of the machine is responsible for installing an emergency stop device and a device for disconnection from the power line EN 60146 (IEC) - Semiconductor converters En 61800-2 - Adjustable speed electrical power drive systems - Part 2: General requirements - Ratings specifications for low voltage adjustable frequency AC power drive systems
Electromagnetic compatibility standards		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 CISPR11 - Industrial, scientific 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 field 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



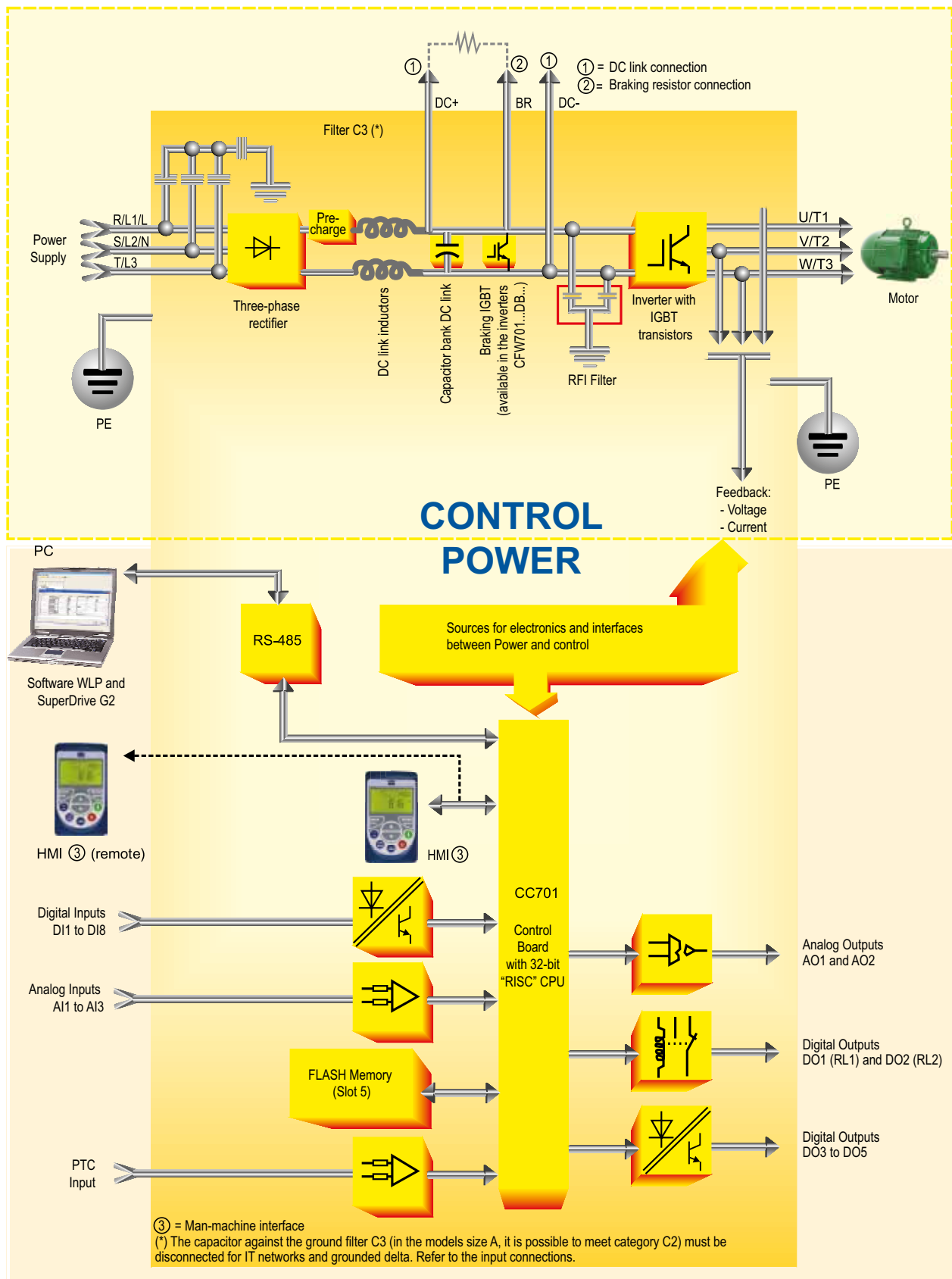
## Technical Data

Voltage and Rating Features	Voltage	Single Phase	200-220 V AC (+10 %-15 %)	
		Three Phase	200-220 V AC (+10 %-15 %)	
			380-480 V AC (+10 %-15 %)	
	Power	Single Phase	1.5 to 3 HP (1.1 to 2.2 kW)	
		Three Phase	1.5 to 75 HP (1.1 to 55 kW)	
			2 to 150 HP (1.5 to 110 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 nominal conditional 0.70 for single phase input at nominal conditional			
Control	Frequency Range	0 to 3.4x motor rated frequency (P0403). The rated frequency is programable up to 300 Hz (V/Hz) and 120 Hz (vector mode). Switching Frequency data must be observed for speed limits.		
	Switching Frequency	Standard: 5 kHz ( A,B,C D frames)		
		2.5 kHz for all 380V models frame E		
		2.5 kHz for frame E 220V models 142/180 Amps(ND)		
		2.5 kHz for frame E 220V model 211 Amps(ND/HD)		
		5 kHz for frame E 220V models 142/180 Amps(HD)		
		Available options for 2.5/5/10 kHz( check for derating)		
	Overload	Normal Duty(ND)	110% for 1min every 10 min	
	Aceleration	0 to 999 s		
	Deceleration	0 to 999 s		
Environment	Temperature	-10 to 50 °C (14 to 122 °F) for most of models. For operating temperature of each model the table " Dimensions, Weight and Temperature" shall be checked.		
		-10...60°C for frames A, B, C and D (up to 45°C without derating for models 13A and 24A/200...240V, 7 and 10A/380...480V and up to 50°C without derating for the other models) and -10...55°C for frame E (up to 45°C without derating). If derating has to be considered have 2% current reduction for each °C above the specific operating temperature.		
	Humidity	5 to 90% with no condensation		
	Altitude	0 to 1000 meters with no derating		
Braking Methods		Up to 4000 meters with current reduction of 1% for each 100 meters above 1000 meters		
	Dynamic Braking	Available as standard for frame sizes A,B,C and D. For frame size E "DB" models has to be used. An extra resistor must be fitted in for dynamic braking capability.		
	Optimal Braking	There is no need for braking resistor		
	DC Braking	DC Current applied to motor		
Performance	V/f	Speed Control	Regulation: 1% of rated speed	
	Voltage Vector VVW		Speed Variation range 1:20	
Regulation: 1% of rated speed				
Speed Variation range 1:30				
I/Os	Inputs	Digital	8 x isolated bidirectional 24V	
		Analog	2 x +/-10V, 11 bits + signal(differential) or 0/4...20 mA, 11 bits (differential) Impedance: 400 kΩ for voltage signal / 500Ω for current signal	
	Output	Relay	2 x relay NO/NC contact(240 V AC/1A)	
			4 x open drain (24V/200 mA)	
		Analog	1 x 0/4 - 20mA 11bits	
			2 x 0...10 V or 0/4...20 mA, 11 bits (not isolated from inverter ground)	
	24 V power supply capacity	500 mA (available for the user, including I/Os)		

## Technical Data

Communication	Modbus RTU	RS-485 built-in ( Available in control terminals)
	BACnet MS/TP Metasys N2	RS-485 built-in / Superdrive and WLP communication
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. In order to have a machine in conformity with this regulation, the machine builder is responsible for the installation of a emergency shutdown device and a equipment for power disconnection.	
	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 Construcccion Standards Eletromagnetic Compatibility Standards (EMC)	EN 60529 - Degrees of protection provided by enclosures (IP code).	
	UL 50 - Enclosures for electrical equipment	
	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 undustrial, scientific and medical(ISM) radio-frequency equipment.	
	CISPR 11 - Industrial, scientific and medical (ISM) radio-frequency equipment – Eletromagnetic disturbance characteristics - Limits and methods of measurement.	
	EN 61000-4-2 - Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 2: Eletrostatic 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.	
Protections	Overcurrent / Short Circuit	
	Under / Overvoltage in the power section	
	Phase Loss	
	VSD thermal Overload ( IGBTs, rectifier and in the eletronics)	
	Motor thermal overload	
	Braking resistor overload	
	IGBTs overload	
	Motor overload	
	Fault / external alarm	
	CPU failure	
	Phase-to ground short circuit at the output	
	Failure at the heatsink fan	
	Motor Overspeed	
	Wrong connection of encoder wiring	

## Block Diagram



Block diagram of the CFW701 HVAC



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