ERCFW09

PLC Function built-in

invensys
EUROTHERM

Variable Speed Drives ERCFW09
Specification Sheet

MODEL

Applications:

- **Fans/Exhaust**
- **Centrifugal pumps**
- **Metering- & Processpumps**
- **Centrifuges**
- **Mixers**
- **Compressors**
- **Extruders**
- **Injection Machines**
- **Calenders/Pullers**
- **Winders/Unwinders**
- **Cut and Welding Machines**
- **Granulators**
- **Vibratory Feeders**
- **Dynamic Separators**
- **Conveyors**
- **Washers/Driers**
- **Air Conditioning Units**
- **Rollout Tables**
- **Enamellers**
- **Commercial Elevators**
- **Chippers**
- **and much more...**

The ERCFW09 Series of Variable Speed Drives incorporate the world's most advanced technology in drives for three-phase AC induction motors. The Vectrue Technology™ represents a siginificant advancement, allowing this new generation of Eurotherm inverters to combine V/F, Sensorless Vector and Closed Loop Vector (with encoder) control techniques, all in one product.

An innovation was also introduced to simplify applications that require braking torque. A new feature named Optimal Braking™ eliminates the need for the dynamic braking resistor in some applications allowing a simpler, more compact and economic solution.

Vectrue Technology®
This technology was developped for variable speed applications with three-phase AC induction motors providing the following advantages:

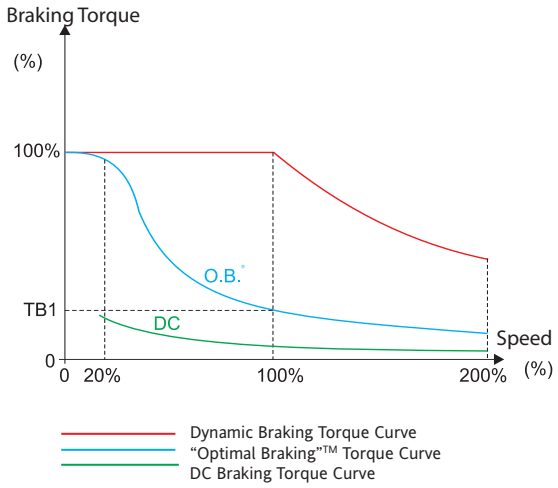
- V/ F or Vector Control modes via parameter selection;
- True Flux Vector Control in either open or closed loop vector modes;
- True Open Loop Vector Control with high torque and fast dynamic response, even at very low speeds;
- Self-tuning for automatic drive set-up to match the drive to motor and load in vector modes.

Optimal Braking ®

For applications that require reduced braking times or to stop high inertia loads, traditional inverters use a Dynamic Braking scheme, where the excessive kinetic energy regenerated to the DC Link is dissipated as heat in a dynamic braking resistor connected to the drive.

The ERCFW09 Vector Model incorporate the Optimal Braking™ feature, which allows a sufficient braking performance to handle most applications that so far needed dynamic braking.

This innovation allows high dynamic performance drive systems with braking torques of about 5 times of typical DC braking.



Other Advantages

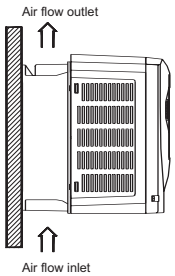
- High performance RISC 32 bit microprocessor;
- Detachable SMART keypad with dual display (LCD and LED);
- Wide power range: 1.1.. 1,100 kW;
- Variable and Constant Torque ratings;
- Degree of Protection NEMA 1 / IP 20 standard up to 132kW, IP 20 up to 330kW and NEMA 4X / IP 56 in stainless steel enclosure up to 7.5kW;
- Simplified installation and programming;
- Oriented start-up;
- Through surface mounting option;
- On/Off-line PC programming with SuperDrive software (Optional);
- DC bus connections available;
- Fieldbus network communication: Profibus DP or DeviceNet (optional). Modbus RTU (built-in) also available.
- International certifications including UL and cUL, CE, C-Tick and IRAM.
- Optional PLC Card with Ladder Programming and Function Blocks for complex applications

Mounting Configurations

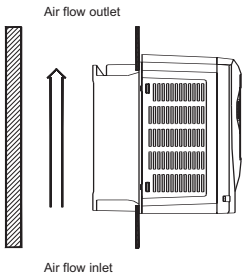
The ERCFW09 allows flexible mounting configurations. Besides the traditional Base mounting, it allows flange mounting, where the heat sink is mounted at the back of the mounting plate.

As a result, the warm air generated by the power components inside the panel is so blown out that minimizes drive overheating, which is caused by heating sources inside the panel.

Base mounting



Flange mounting



CHEMICAL AND PETROCHEMICAL

- Fans/Exhausts
- Centrifugal Pumps
- Metering/Process Pumps
- Centrifuges
- Mixers
- Compressors
- Extruders

PULP AND PAPER

- Metering Pumps
- Process Pumps
- Fan / Exhausts
- Agitators / Mixers
- Rotating Filters
- Rotating Kilns
- Scrap Conveyors
- Paper Rewinders
- Calenders

PLASTIC AND RUBBERS

- Extruders
- Injection Machines
- Mixers
- Calenders / Pullers
- Winders / Unwinders
- Cut and Welding Machines
- Granulators

MINING AND CEMENT

- Fans / Exhaust
- Pumps
- Screeners
- Vibratory Feeders
- Crushers
- Dynamic Separators
- Conveyors
- Cement Kilns

SUGAR

- Sugar Centrifuges
- Process Pumps
- Conveyors
- Bagasse Dosers

TEXTILE

- Mixers / Agitators
- Washers / Driers
- Looms
- Spinning Machines
- Carding Machines
- Warpers
- Winders

STEEL

- Fans / Exhaust
- Rollout Tables
- Winders / Unwinders
- Cranes
- Presses / Lathes / Milling Cutters
- Drillers / Grinders
- Laminators
- Cutting Lines
- Ingot Molding Lines
- Pipe Forming Machines
- Wire Drawing Machines

CERAMIC

- Fans / Exhausts
- Driers / Ovens
- Ball Mills
- Rollout Tables
- Enamellers
- Conveyors

FOOD

- Metering / Process Pumps
- Fans / Exhausts
- Mixers
- Driers / Ovens
- Palletizers
- Monorails
- Conveyors

LUMBER

- Veneer Lathes
- Chippers
- Planers
- Saws

BEVERAGE

- Metering / Process Pumps
- Bottlers
- Mixers
- Rollout Tables
- Conveyors

GLASS

- Fans / Exhausts
- Bottlers
- Rollout Tables
- Conveyors

HVAC

- Process Pumps
- Fan / Exhausts
- Air Condition Units

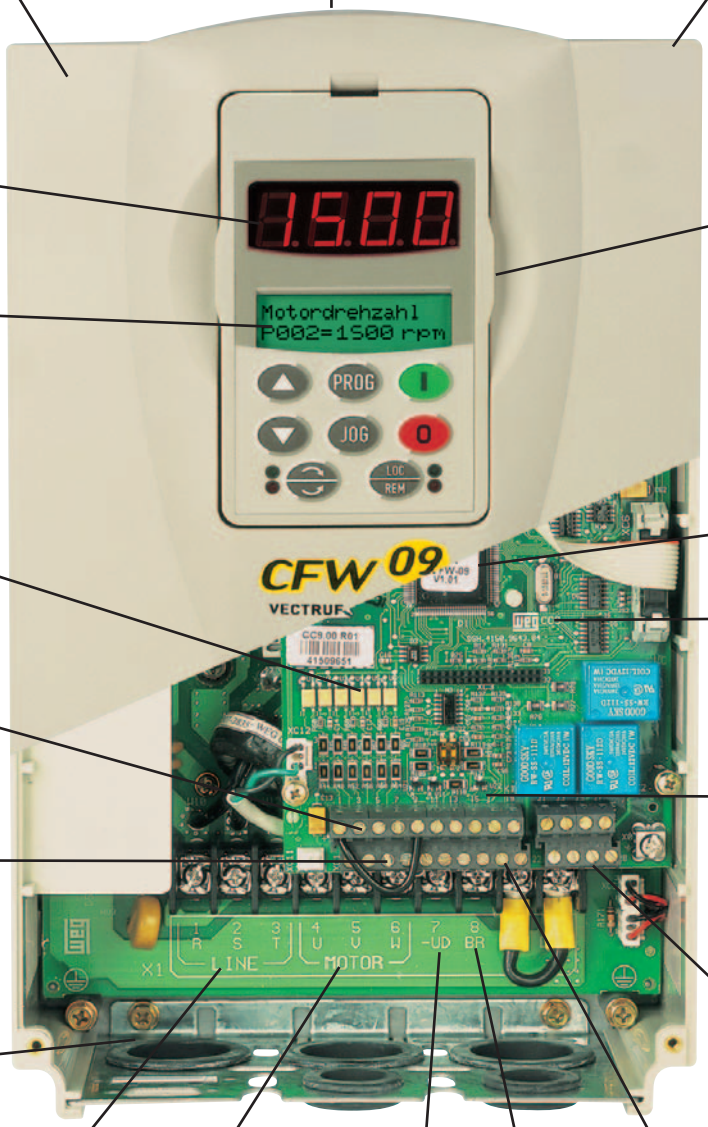
WASTE WATER

- Centrifugal Pumps
- Booster Systems

ELEVATORS

- Load Elevators
- Commercial Elevators
- Overhead Cranes
- Hoists

A Complete, Flexible and Compact Product



Optional RS-232 Interface Module for PC Communication

NEMA 1 / IP20 Enclosure

Flange for Through Surface Mounting

7 Segment LED-Display

Detacheable Keypad with Multi-language Double Display (LCD + LED) and Copy Function

2 Lines with 16 Characters LCD Display

Fieldbus Communication Network Modules for:
- Profibus DP (optional)
- DeviceNet (optional)
- DeviceNet Drive Profile (optional)
- Modbus RTU (built-in)

High Performance 32 bit RISC Microprocessor

Standard SMD Control Board for all Models

6 Programmable isolated Digital Inputs

Optional I/O Expansion Boards for:
- RS-485 Serial Interface
- Additional Inputs/Outputs
- Encoder Feedback

2 Programmable Analog Inputs

Mettalic Conduit Connection System

3 Programmable Relays Outputs

2 Programmable Analog Outputs

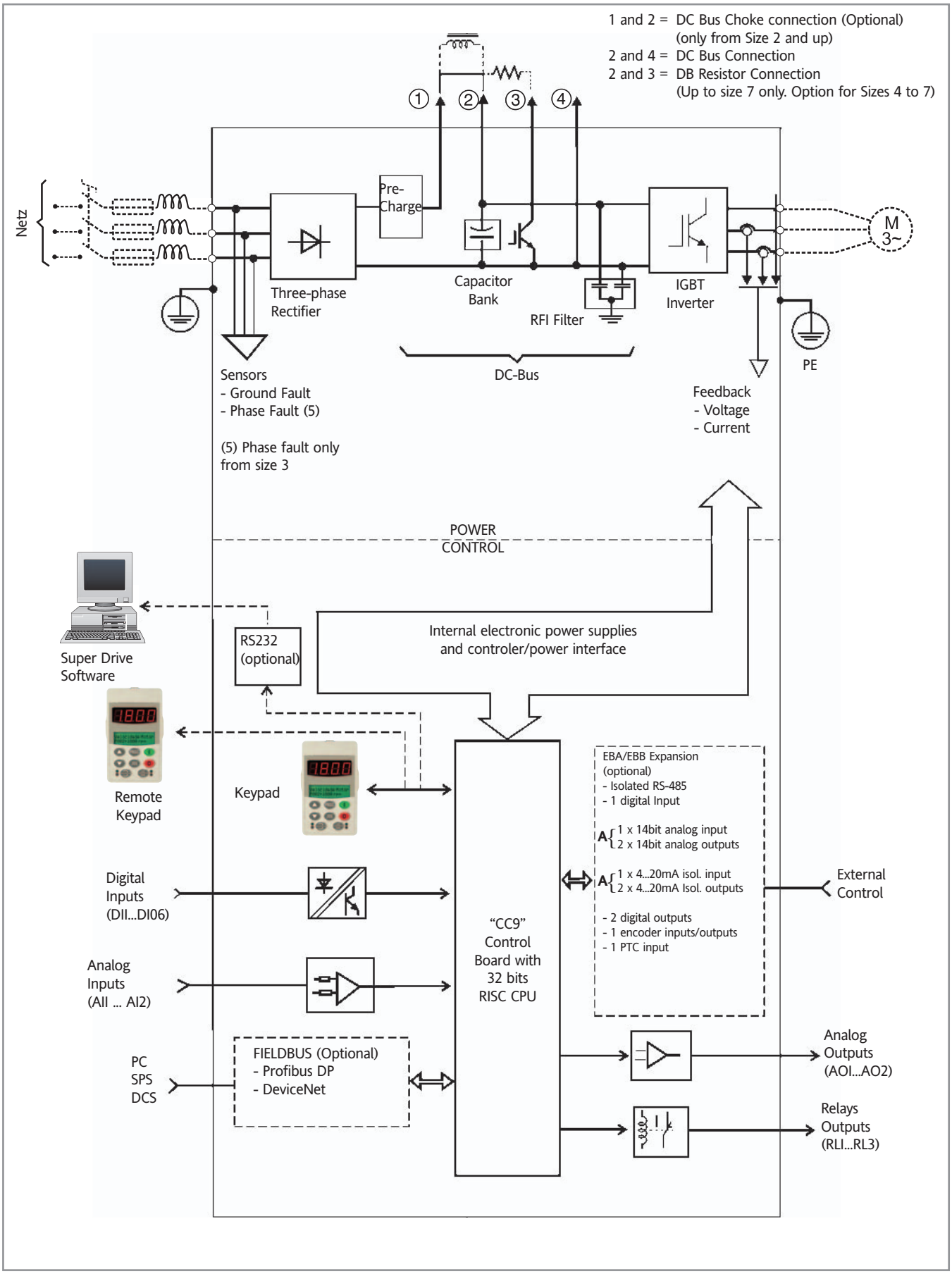
AC Supply Input

Dynamic Braking Resistors Connection

Motor Connection Output

DC Bus Connection for:
- DC Bus-Choke
- Common DC Bus Systems
- Regenerative Rectifier

Block Diagram



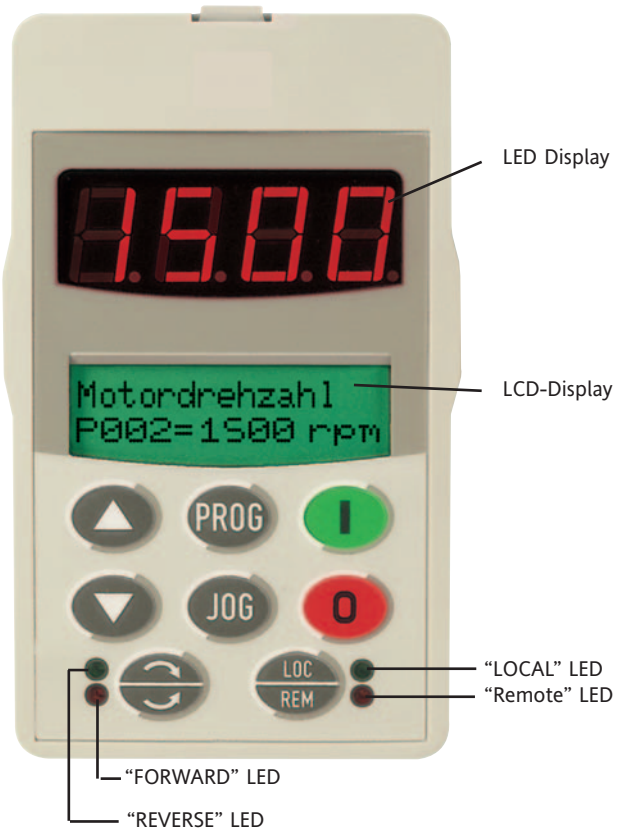
Keypad

Intelligent Keypad
Intelligent operating interface with double display, LED (7 segment) and LCD (2 lines with 16 characters), providing optimum distant viewing along with a detailed description of all parameters and messages.

Selectable Language
The language of the LCD display messages can be selected by the operator. English, Spanish and Portuguese available.

Oriented Start-up
The ERCFW09 “Oriented Start-up” feature was specially created to facilitate and expedite the start-up procedure. At the first power-up or after a reset to factory default parameters, an automatic programming routine guides the operator through a sequence of steps for the introduction of the minimum parameters necessary for a perfect adaptation between drive and motor.

COPY Function
This intelligent keypad also incorporates a “Copy Function”, which allows copying parameters from one drive to others, providing easy and reliable programming repeatability for duplicate applications.



Inverter A

Inverter B

ERCFW09 -> Keypad

Keypad -> ERCFW09

Keypad Functions

Starts the inverter via a controlled acceleration ramp.
When running switches the display indication:
➤rpm - Volts - Status - Torque - Hz - Amps

Stops the inverter via a controlled deceleration ramp.
Resets the inverter after a fault trip has occurred.

Increases the speed or parameter number/content.

Decreases the speed or parameter number/content.

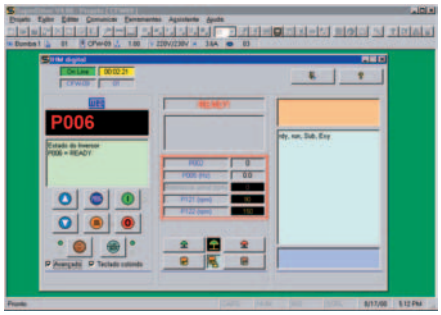
Switches the display between the parameter number and its content (position/content) for programming.

While pressed the motor is run at JOG speed.

FWD/REV key. When pressed reverses the direction of rotation.

Selects the inverter operating mode as Local or Remote.

Superdrive Programming Software

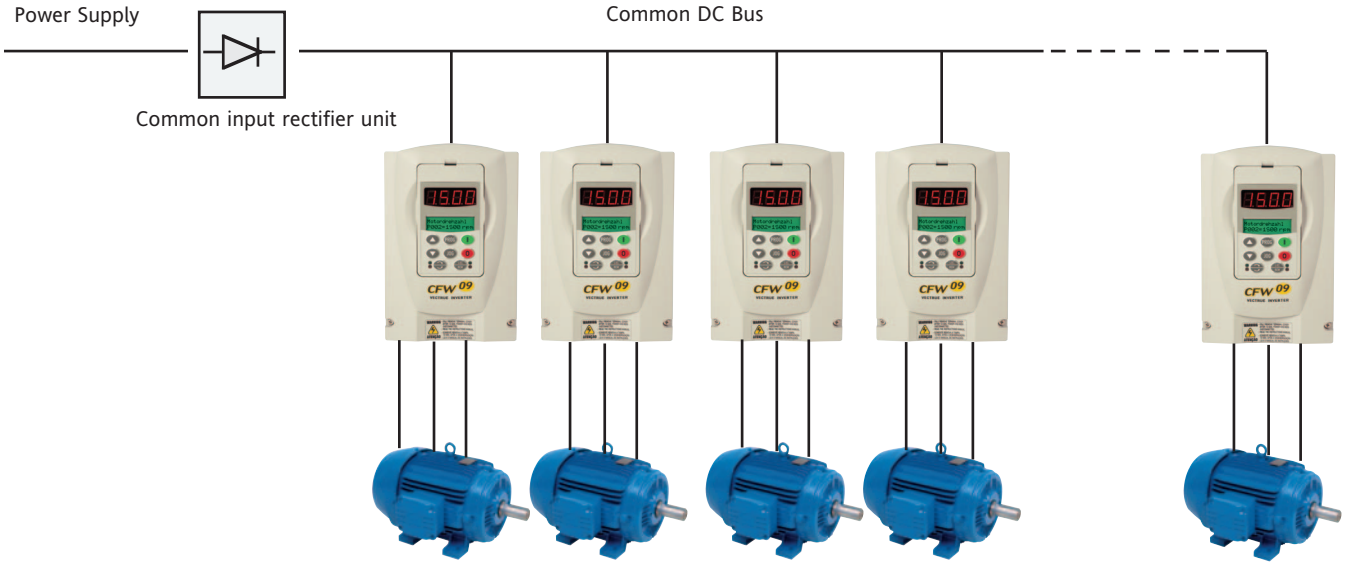


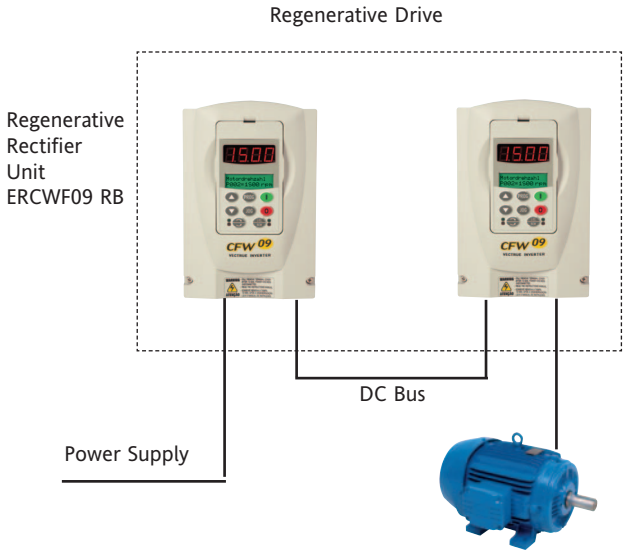
Drive Programming Software
Windows Programming software via PC, for parameterization, control and monitoring of ERCFW09 drives.
It allows editing of “on-line” parameters, directly on the drive or editing “off-line” parameter files, saved in the microcomputer.
It also allows storage of parameter files of all ERCFW09 drives available on the installation.
The software also incorporates functions to transfer the set of parameters from the PC to the drive, as well as from the drive to the PC.
The communication between drive and PC is made via serial interface RS-232 (point to point) or RS-485 for network interconnection.

Common DC Bus Configuration

The ERCFW-09 inverters have DC Bus access allowing the implementation of applications that require a Common DC Bus Configuration as well as Regenerative Systems.

Common DC Bus
Used in multi-motor drive systems where the individual rectifier bridges are replaced by a common input rectifier unit and the multiple drives are fed directly to their DC Buses in a parallel configuration.
This solution allows energy transfer between the inverter units, optimizing the power consumption from the system.





Regenerative Drive
A Regenerative Drive can be implemented connecting the DC Bus of a standard ERCFW09 to the output of a ERCFW09-RB Regenerative Rectifier Unit.
This solution provides line regenerative braking capability and input power factor near 1.0
Such a drive configuration is recommended for application with cyclic braking duty, extremely short braking times and high dynamic performance requirements, such as: Paper Re-winders, Centrifuges, Cranes, etc.
Besides the advantages mentioned above, this option eliminates harmonics at drive inlet and it is suitable for applications where current harmonic distortions on the power supply are not allowed.

Fieldbus Communication Networks

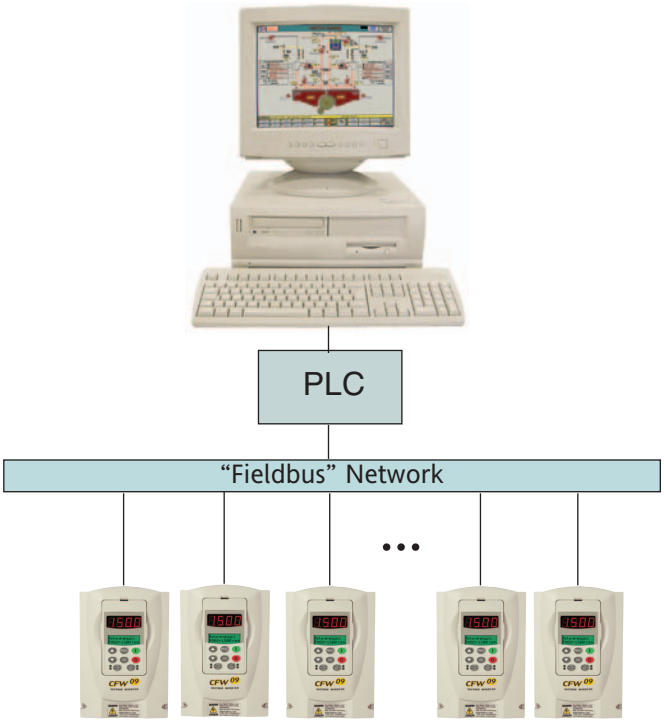
Fast Network Interconnection
The ERCFW09 drives can be interconnected in fast FieldBus communication networks, through standardized protocols mostly worldwide used such as:

FIELDBUS

- ProfiBus DP (optional)
- DeviceNet (optional)
- DeviceNet Drive Profile (optional)
- ModBus RTU (Built in)

Basically designed to integrate large industrial automation plants, the fast communication networks offer “on line” and overall supervising, monitoring and controlling advantages on drives. As a result, high operating performance and great operational flexibility are provided. These characteristics are required on applications of complex and/or integrated systems.

For FieldBus, Profibus and DeviceNet communication network interconnection, the ERCFW09 drives allow internal incorporation of network card, based on required protocol.
For interconnection of Fieldbus and Modbus RTU communication networks, the connection must be used via RS-232 interface (optional) or RS-485 interface (available on EBA or EBB cards).



Accessories and Peripherals

Intelligent Operating Interface with double display (LED and LCD), plain English messages and COPY Function. Local or remote installation.

COMPLETE KEYPAD (Standard) HMI - CFW09 - LCD

Simplified Operating Interface with LED display only. An option for reduced cost solutions. Local or remote installation.

SIMPLIFIED KEYPAD (optional) HMI - CFW09 - LED

Blank Keypad Modules to fill up clear space when the keypad is not mounted. TCL for Local (on the inverter cover/door) installation and TCR for Remote (on remote keypad frame) installation.

BLANK KEYPADS TCL - CFW09 TCR - CFW09

RS-232 Serial composed by a **Serial Interface Module** and accessories (cable, connectors and SuperDrive Software) to connect the CFW-09 to a PC or other equipment via an RS-232 Serial Link.

RS-232 SERIAL INTERFACE KIT KCS - CFW09

Frame for remote keypad mounting on panel door or operating station.
Optional up to 16 ft (5m) cable.
Maximum cable length: 33 ft (10 m)

REMOTE KEYPAD FRAME KIT KMR - CFW09

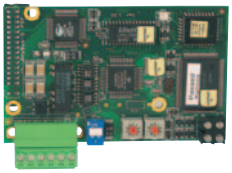
NEMA 4/IP55 remote keypad, for installation on panel door or remote operating station in harsh environments, such as splashing or hose-directed water and windblown dust. Maximum cable length: 33 ft (10 m)

IP55 REMOTE KEYPAD HMI - CFW09 - LCD - N4

Cables with lengths (X) of 3.3, 6.6, 10, 16, 25 and 33 ft (1, 2, 3, 5, 7.5 and 10 m).
Special cables available on request

REMOTE KEYPAD CABLES CAB - HMI 09 - X

Profibus DP → **KFB-PD**
DeviceNet → **KFB-DN**

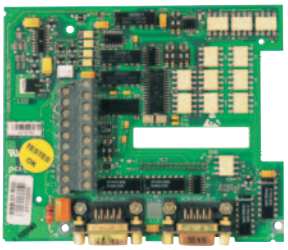


"FIELDBUS" COMMUNICATION KIT

Accessoires and Peripherals

Configuration / Functions	EBA			EBB					EBC		
	01	02	03	01	02	03	04	05	01	02	03
Encoder Input	●			●	●		●		●	●	●
Encoder Output	●			●			●				
RS-485 Serial Interface	●	●		●			●				
14bit A/D	●		●								
14bit A/D	●		●								
Isolated Analog Input				●		●	●				
Isolated Analog Output				●		●	●	●			
Digital Inputs and Outputs + Thermistor (PTC-Input)	●	●	●	●	●	●	●				

I/O Expansion Boards



EBA.0X - CFW09

EBB.0X - CFW09

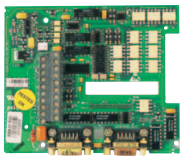
EBC.0X - CFW09

EBC.01 - External power supply is needed for encoder
EBC.02 - Power supply for encoder: 5V
EBC.03 - Power supply for encoder: 12V

The PLC1 and PLC2 cards allow the ERCFW09 drive to have PLC function, speed reference and positioning modules.

Technical features

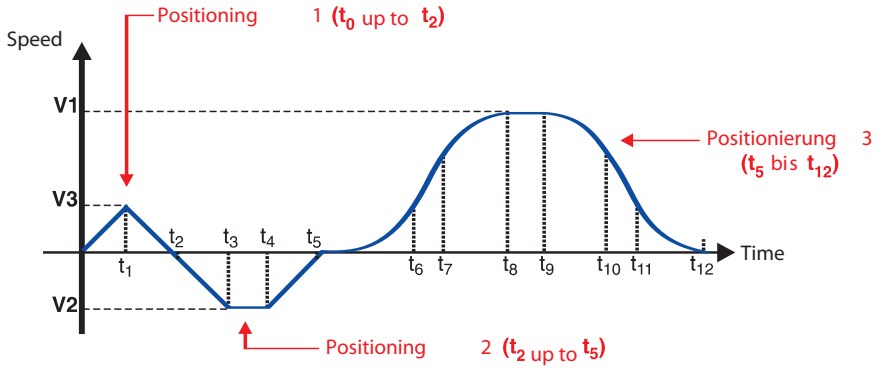
- Positioning with trapezoidal profile and “S” profile (absolute and relative)
- Zero machine search (homing)
- Ladder programming through WLP software, timers, counters, coils and contacts
- RS – 232 with ModBus RTU Protocol
- Real time clock
- Availability of 100 configuration parameters via Software or keypad
- CAN interface with CANopen and DeviceNet protocols
- Master/Slave function (ElectronicGear Box)



OPTIONAL BUILT-IN PROGRAMMABLE CONTROLLER **PLC1 AND PLC2 CARDS**

Technical Specification				
Inputs/Outputs	**PLC1**		**PLC2**	
	Quantities	**Description**	**Quantities**	**Description**
Digital inputs	9	$24V_{DC}$ bipolar	9	$24V_{DC}$ bipolar
Relay outputs	3	250VAC/3A or 250VDC/3A	3	250VAC/3A or 250VDC/3A
Transistorized outputs	3	$24V_{DC}$/500mA	3	$24V_{DC}$/500mA
Encoder power supply	1	15V	2	5 to 24V
Analog Outputs	-	-	2	12 bits (-10V to 10V or 0 to 20mA)
Analog Inputs	-	-	1	14 bits (-10V to 10V or -20 to 20mA)
Motor PTC isolated input	-	-	1	Motor PTC isolated input

Example for transient with application of PLC-01



Technical Data

POWER SUPPLY	Voltage		Three-Phase	200 - 230V: 220/230 (+10%, - 15%)
				380 - 480V: 380/400/415/440/460/480V (+10%, -15%)
				500-600V; 500/525/575/600V (+10%, -15%)
				500-690V; 500/525/575/600/690V (+10%, -15%)
	Frequency		50/60Hz +/- 2Hz (48...62Hz)	
	Phase Unbalance		Up to 3%	
	Cosφ (Displacement Power Factor)		>0,98	
ENCLOSURE	Degree of Protection		NEMA 1 / IP 20 (sizes 1...8), IP20 (sizes 9...10) and NEMA 4X / IP 56 (modules up to 10HP)	
	Finishing Color		Plastic Cover – Light Gray PANTONE 413 C (sizes 1 and 2) Metallic Cover and Sides – Light Gray RAL 7032 (sizes 3 to 10) Base – Dark Gray RAL 7022 (sizes 3 to 10)	
CONTROL	Power Supply		Switched Mode Power Supply Fed from the DC Link	
	Microprocessor		32 bit RISC Technology	
	PWM Technique		SVM Sine wave PWM (Space Vector Modulation)	
			Software Implemented Current, Flux and Speed Regulators (Full Digital)	
	Control Modes		V / F	
			Sensorless Vector (without encoder)	
			Vector with Encoder	
	Switching Frequency		1.25 / 2.5 / 5.0 / 10 kHz	
	Frequency Range		0 ... 1020 Hz for V / Hz Control	
			0 ... 408 Hz for Vector Control	
	Overload Capacity		150% for 60 seconds, every 10 minutes	
			180% for 1 second every 10 minutes	
	Efficiency		Greater than 97%	
PERFORMANCE	Speed Control	V/F Mode	Regulation (with Slip Compensation): 1% of Motor Rated Speed	
			Resolution: 1 rpm (Keypad Reference)	
			Speed Regulation Range: 1:20	
		Sensorless Vector Mode	Regulation: 0.5% of Motor Rated Speed	
			Resolution: 1 rpm (Keypad Reference)	
			Range: 1:100	
			Regulation with:	
			10 bit Analog Reference: +/- 0.1% of Motor Rated Speed	
			14 bit Analog Reference: +/- 0.01% of Motor Rated Speed	
			Digital Reference (Ex: Keypad or Serial): +/- 0.01% of Motor Rated Speed	
			Range: Down to 0 rpm	
	Torque Control		Regulation: +/- 10% of Motor Rated Torque	
			Range: 0 ... 150% of Motor Rated Torque	
CONTROL INPUTS	Analog		2 Programmable Differential Inputs (10 bit): 0...10 V, 0...20 mA or 4...20 mA	
			1 Programmable Bipolar Input (14 bit): -10 ... +10 V, 0...20 mA or 4...20 mA	
			1 Programmable Isolated Input (10 bit): 0 ... 10 V, 0...20 mA or 4...20 mA	
	Digital		6 Programmable Isolated Input: 24 Vdc	
			1 Programmable Isolated Input: 24 Vdc	
			1 Programmable Isolated Input: 24 Vdc (for Motor PTC Thermistor)	
	Encoder		1 Differential Input, with 12 Vdc Internal Isolated Power Supply (14 bit resolution)	
CONTROL OUTPUTS	Analog		2 Programmable Outputs (11 bit): 0 ... 10 V	
			2 Programmable Bipolar Outputs (14 bit): -10 ... +10 V	
			2 Programmable Isolated Outputs (11 bit): 0 ... 20 mA or 4 ... 20 mA	
	Relay		2 Programmable Outputs, Form C Contacts (NO/NC): 240 Vac, 1 A	
			1 Programmable Output , Form A Contact (NO): 240 Vac, 1 A	
COMMUNICATION	Transistor		2 Programmable Isolated Outputs (Open Collector): 24 Vdc, 50 mA	
	Encoder		1 Isolated Differential Encoder Signals Output: 5 ... 15 Vdc External Power Supply	
	Serial		RS-232 with KCS-CFW09 Kit	
			RS-485, Isolated, with EBA or EBB Board	
	Fieldbus		Profibus DP, DeviceNet with KFB kits, Modbus RTU Standard	
SAFETY	Protections		DC Link Over Voltage	Output Short Circuit
			DC Link Under Voltage	Output Ground Fault
			Inverter Over Temperature	External Fault
			Motor Over Temperature A	Self-diagnosis Fault
			Output Over Current	Programming Error
			Motor Overload (i x t)	Serial Communication Fault
			Dynamic Braking Resistor Overload	Motor or Encoder Connection Fault
			CPU / EPROM Error (Watchdog)	Power Supply Phase Fault (30 A and above models)
			Encoder Fault	Keypad Connection Fault
AMBIENT	Temperature		0 ... 104 °F (40 °C), up to 122 °F (50 °C) with 2% / °C Output Current De-rating	
	Humidity		5 ... 90% Non Condensing	
	Altitude		0 ... 3300 ft (1000 m) (up to 13100 ft (4000 m) with 10% / 1000 m Output Current De-rating	
CONFORMITIES	EMC Directive 89 / 336 /EEC		Electromagnetic Compatibility - Industrial Enviroment	
	EN 61800-3		EMC - Emission and Immunity	
	LVD 73/23/EEC		Low Voltage Directive	
	IEC 146		Semiconductor Inverters	
	UL 508 C		Power Conversion Equipment	
	EN 50178		Electronic Equipment for Use in Power Installations	
	EN 61010		Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use	
CERTIFICATIONS	UL (USA) and cUL (CANADA)		Underwriters Laboratories Inc. USA	
	CE (EUROPE)		Competent Body: Phoenix Test-Lab GmbH - Germany	
	IRAM (ARGENTINA)		Instituto Argentino de Normalización	
	C-Tick (AUSTRALIA) 2250/1132383		Australian Communications Authority	

*A Optional

Technical Data (cont.)

KEYPAD	Programming	General Inverter Functions Programming			
	Commands	Start / Stop , Increase / Decrease Speed, JOG, FWD/REV and Local/Remote			
	Monitoring	Speed Reference (rpm)	Output Current (A)		
		Motor Speed (rpm)	Output Voltage (Vac)		
		Speed Proportional Value (Ex: ft/min)	Inverter Status		
		Output Frequency (Hz)	Digital Inputs Status		
		DC Link Voltage (Vdc)	Transistor Outputs Status		
		Motor Torque (%)	Relay Outputs Status		
		Output Power (kW)	Analog Inputs Value		
		Hours Powered Up (h)	Four Last Faults		
		Hours Enabled (h)	Fault Messages		
CONTROL FEATURES AND OTPIONS	Standard	Keypad with LCD + LED displays (HMI-CFW09-LCD)			
		Password to protect inverter programming			
		LCD display language selection: English, Spanish and Portuguese			
		Control mode selection (via parameter): V / F, Sensorless Vector or Vector with Encoder			
		Fault auto-diagnosis and auto-reset			
		Parameters reset to factory or user default			
		Inverter Self-tuning to motor and load (Vector Modes)			
		Specific unit indication (Ex: l/s, t/h, %, etc.)			
		Motor slip compensation (V / F Mode)			
		Manual and automatic Torque Boost (V / F Mode)			
		Adjustable V / F Curve (V / F Mode)			
		Minimum and maximum speed limits			
		Output current limit			
		Adjustable motor overload protection			
		Digital gain and offset adjustments for the analog inputs			
		Digital gain adjustment for the analog outputs			
		JOG function			
		JOG + / JOG – Function (momentary speed increase/decrease)			
		COPY Function (Inverter ® Keypad or Keypad ® Inverter)			
		Comparison functions for the digital outputs:			
		N* > Nx; N > Nx; N < Nx ; N = 0; N = N*; Is > Ix ; Is < Ix; T > Tx and T < Tx			
		Where: N = Motor speed; N*= Speed reference; Is = Output Current and T= Motor torque			
		Linear and S independent acceleration and deceleration ramps, two sets of ramps			
		DC Braking			
		Optimal Braking (Vector Modes)			
		Built-in dynamic braking transistor – Models up to 45 A / 220-230 V and 30 A / 380-480 V			
		Multi-speed function (up to 8 preset speeds)			
		Speed Profiling function			
		Hour meter and Wattmeter			
		Overlapping PID Regulator (for automatic control of level, pressure, flow, etc.)			
		FWD / REV selection			
		Local / Remote operation selection			
		Flying Start function (restart with the motor spinning)			
		Skip Speed (critical speed rejection)			
		Ride-Through (operation during momentary power loss)			
		Built-in dynamic braking transistor:			
		Models: 6 ... 45 A / 220 - 230 V and 36 ... 30 A / 380 - 480 V			
		FieldBus communications: Modbus RTU built-in			
	Options	Simplified keypad (with LED display only)		OPTIONAL	HMI-CFW09-LED
		IP 55 Remote keypad (LED display only			HMI-CFW09-LED-N4
		IP 55 Remote keypad (LCD + LED displays)			HMI-CFW09-LCD-N4
		Remote Keypad cable (3.3, 6.6, 10, 16, 25 and 35 ft)			CAB – HMI 09 – X
		Blank Keypad for local installation			TCL – CFW09
		Blank Keypad for remote installation			TCR – CFW09
		Remote Keypad frame kit			KMR – CFW09
		I / O Expansion Boards			EBA . 0X – CFW09
					EBB . 0X – CFW09
					EBC . OX - CFW09
		FieldBus Communications kits (Mounted inside inverter)	Profibus DP		KFB - PD
			DeviceNet		KFB - DN
		VSD/PC Communication kit	Superdrive Software		KSD-CFW09
			Connector and cables		
			KCS CFW-09		
		Built-in dynamic braking module Models: 54...130A/220-230V and 38...142A/380-480V			"DB Models"
		External dynamic braking module Models: 180...600A/380-480V			"FR"
		Easy mounting kit with flange (for sizes 3...8)			KMF-CFW09
		Removable mounting kit (for sizes 9...10)			KME-CFW09
		Inductor kit for DC link (for sizes 2...8)			KIL-CFW09

Sizing Table

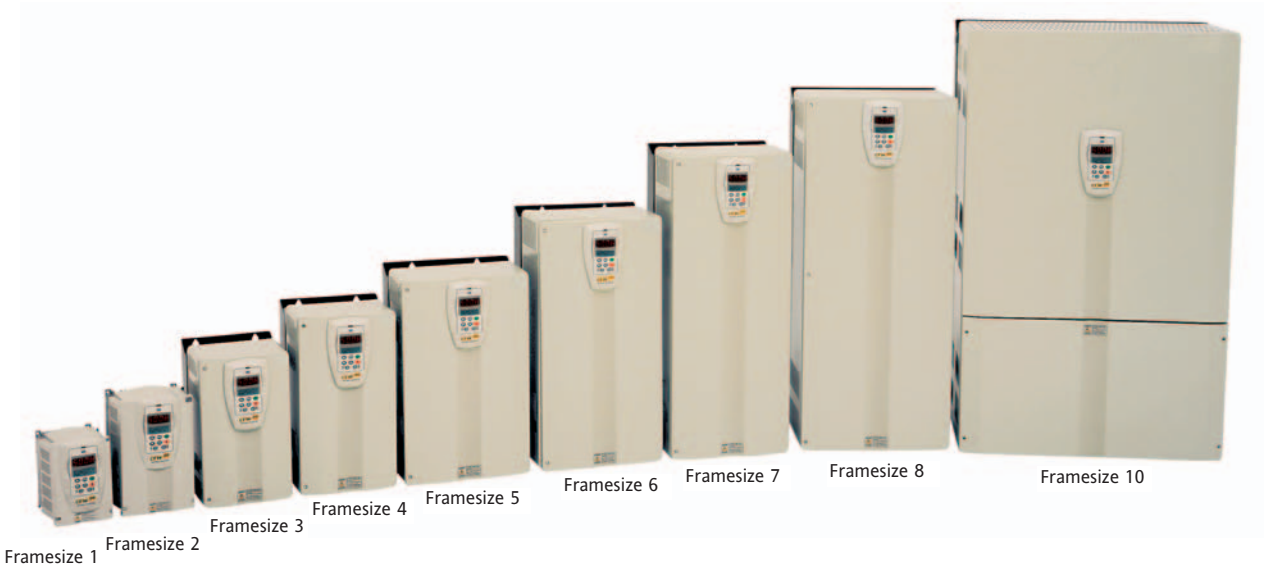
AC LINE VOLTAGE	ERCFW-09 Inverter					Max. applicable Motor				Size
	Part Number ER-CFW-09	Built in Dynamic Braking	Rated Current (A)		Voltage (V)	Constant Torque		Variable Torque		
			CT+	VT*		HP	kW	HP	kW	
220/230V	0006 T 2223 E Z	Yes	6,0*2		230	1,5	1,1	1,5	1,1	1
	0007 T 2223 E Z		7,0*2			2,0	1,5	2,0	1,5	
	0010 T 2223 E Z		10*2			3,0	2,2	3,0	2,2	
	0013 T 2223 E Z		13			4,0	3,0	4,0	3,0	
	0016 T 2223 E Z		16			6,0	4,4	6,0	4,4	2
	0024 T 2223 E Z		24			7,5	5,5	7,5	5,5	
	0028 T 2223 E Z		28			10	7,5	10	7,5	
	0045 T 2223 E Z		45			15	11	15	11	3
	0054 T 2223 E Z	Optional Built in	54	68		20	15	25	18,5	4
	0070 T 2223 E Z		70	86		25	18,5	30	22	5
	0086 T 2223 E Z		86	105		30	22	40	30	
	0105 T 2223 E Z		105	130		40	30	50	37	6
	0130 T 2223 E Z		130	150		50	37	60	45	
	0142 T 2223 E Z		142	174		50	37	75	55	7
	0180 T 2223 E Z	External Module	180			75	55	75	55	8
	0240 T 2223 E Z		240			100	75	100	75	
380/400/415/440/460/480V	0003 T 3848 E Z	Standard Optional Built in	3,6		400	1,5	1,1	1,5	1,1	1
	0004 T 3848 E Z		4,0			2,0	1,5	2,0	1,5	
	0005 T 3848 E Z		5,5			3,0	2,2	3,0	2,2	
	0009 T 3848 E Z		9,0			5,0	3,7	5,0	3,7	
	0013 T 3848 E Z		13			7,5	5,5	7,5	5,5	2
	0016 T 3848 E Z		16			10	7,5	10	7,5	
	0024 T 3848 E Z		24			15	11	15	11	
	0030 T 3848 E Z		30	36		20	15	20	15	3
	0038 T 3848 E Z		38	45		25	18,5	30	22	4
	0045 T 3848 E Z		45	54		30	22	30	22	
	0060 T 3848 E Z		60	70		40	30	50	37	5
	0070 T 3848 E Z		70	86		50	37	60	45	
	0086 T 3848 E Z		86	105		60	45	75	55	6
	0105 T 3848 E Z		105	130		75	55	75	55	
	0142 T 3848 E Z		142	174		100	75	125	92	7
	0180 T 3848 E Z	External DB Module	180			125	92	125	92	8
	0211 T 3848 E Z		211			125	92	125	92	
	0240 T 3848 E Z		240			150	110	150	110	
	0312 T 3848 E Z		312			200	150	200	150	9
	0361 T 3848 E Z		361			270	200	270	200	10
	0450 T 3848 E Z		450			300	220	300	220	
	0515 T 3848 E Z		515			350	260	350	260	
	0600 T 3848 E Z		600			400	300	400	300	Only with Cabinet
	0686 T 3848 E Z		686			500	370	500	370	
	0855 T 3848 E Z		855			600	450	600	450	
	1140 T 3848 E Z		1140			800	600	800	600	
	1283 T 3848 E Z		1283			900	660	900	660	
	1710 T 3848 E Z		1710			1300	950	1300	950	
	0003 T 3848 E Z	Standard Optional Built in	3,6		440	1,5	1,1	1,5	1,1	1
	0004 T 3848 E Z		4,0			2,0	1,5	2,0	1,5	
	0005 T 3848 E Z		5,5			3,0	2,2	3,0	2,2	
	0009 T 3848 E Z		9,0			6,0	4,4	6,0	4,4	
	0013 T 3848 E Z		13			10	7,5	10	7,5	2
	0016 T 3848 E Z		16			12,5	9,2	12,5	9,2	
	0024 T 3848 E Z		24			15	11	15	11	
	0030 T 3848 E Z		30	36		20	15	25	18,5	3
	0038 T 3848 E Z		38	45		25	18,5	30	22	4
	0045 T 3848 E Z		45	54		30	22	40	30	
	0060 T 3848 E Z		60	70		40	30	50	37	5
	0070 T 3848 E Z		70	86		50	37	60	45	
	0086 T 3848 E Z		86	105		60	45	75	55	6
	0105 T 3848 E Z		105	130		75	55	100	75	
	0142 T 3848 E Z		142	174		100	75	125	92	7
	0180 T 3848 E Z	External Module	180			150	110	150	110	8
	0240 T 3848 E Z		240			200	150	200	150	
	0361 T 3848 E Z		361			300	220	300	220	9
	0450 T 3848 E Z		450			350	260	350	260	10
	0600 T 3848 E Z		600			500	370	500	370	
	0686 T 3848 E Z		686			600	450	600	450	Only with Cabinet
	0855 T 3848 E Z		855			700	500	700	500	
	1140 T 3848 E Z		1140			900	660	900	660	
	1283 T 3848 E Z		1283			1000	730	1000	730	
	1710 T 3848 E Z		1710			1500	1100	1500	1100	

Sizing Table (cont.)

AC LINE VOLTAGE	ERCFW-09 Inverter				Max. applicable Motor				Size
	Part Number ER-CFW-09	Built-in Dynamic Braking	Rated Current (A)		Voltage (V)	Constant Torque		Variable Torque		
			CT+	VT*		HP	kW	HP	kW	
500/525/575/600V	0002 T 5060 E Z	Standard	2,9	4,2	575	2	1,5	3	2,2	2
	0004 T 5060 E Z		4,2	7		3	2,2	5	3,7	
	0007 T 5060 E Z		7	10		5	3,7	7,5	5,5	
	0010 T 5060 E Z		10	12		7,5	5,5	10	7,5	
	0012 T 5060 E Z		12	14		10	7,5	12,5	9,2	
	0014 T 5060 E Z		14	14		15	11	15	11	
	0022 T 5060 E Z	Optional Built-in	22	27		20	15	25	18,5	4
	0027 T 5060 E Z		27	32		25	18,5	30	22	
	0032 T 5060 E Z		32	32		30	22	30	22	
	0044 T 5060 E Z		44	53		40	30	50	37	
	0053 T 5060 E Z		53	63		50	37	60	45	
	0063 T 5060 E Z		63	79		60	45	75	55	
	0079 T 5060 E Z		79	99		75	55	100	75	
500/525/575/600V	0107 T 5069 E Z		107	147		100	75	150	110	8E
	0147 T 5069 E Z		147	196		150	110	200	150	
	0211 T 5069 E Z		211	211		200	150	200	150	
	0247 T 5069 E Z		247	315		250	185	300	220	10E
	0315 T 5069 E Z		315	343		300	220	350	250	
	0343 T 5069 E Z		343	318		350	250	400	300	
	0418 T 5069 E Z		418	472		400	300	500	370	
	0472 T 5069 E Z		472	555		500	370	600	450	
660/690V	0100 T 6669 E Z	External Module	100	127	690	125	90	150	110	8E
	0127 T 6669 E Z		127	179		150	110	220	160	
	0179 T 6669 E Z		179			220	160	220	160	
	0225 T 6669 E Z		225	259		275	200	350	250	10E
	0259 T 6669 E Z		259	305		350	250	370	280	
	0305 T 6669 E Z		305	340		370	280	430	315	
	0340 T 6669 E Z		340	428		430	315	500	400	
	0428 T 6669 E Z		428			500	400	500	400	

*CT = Constant Torque; VT = Variable Torque

Note: 2 - The 6, 7 and 10A/230V models can be single-phase powered without output current de-rating
Enclosure: IP20 Protected Chassis for all sizes.
3 - Special Voltages 500 / 525 / 550 / 575 / 600 available under request.



CODING

Model Nummer	Output rated current	Number of Phases	Voltage Supply	Manual	Product Version	Protection	HMI	Dynamic Braking	Expansion Board	Communi-cation Card	Special Hardware	Special Software	End of Code

Model Nummer

ERCFW09

Output rated current

200-240V		380-480V		500...600V		500...690V		660...690V	
0006	6,0A	**0003**	3,6A	**0002**	2,9A	**0107**	107A	**0100**	100A
0007	7,0A	**0004**	4,0A	**0004**	4,2A	**0147**	147A	**0127**	127A
0010	10A	**0005**	5,5A	**0007**	7,0A	**0211**	211A	**0179**	179A
0013	13A	**0009**	9,0A	**0010**	10A	**0247**	247A	**0225**	225A
0016	16A	**0013**	13A	**0012**	12A	**0315**	315A	**0259**	259A
0024	24A	**0016**	16A	**0014**	14A	**0343**	343A	**0305**	305A
0028	28A	**0024**	24A	**0022**	22A	**0418**	418A	**0340**	340A
0045	45A	**0030**	30A	**0027**	27A	**0472**	472A	**0428**	428A
0054	54A	**0038**	38A	**0029**	29A				
0070	70A	**0045**	45A	**0032**	32A				
0086	86A	**0060**	60A	**0042**	42A				
0105	105A	**0070**	70A	**0044**	44A				
0130	130A	**0086**	86A	**0053**	53A				
0142	142A	**0105**	105A	**0063**	63A				
0180	180A	**0180**	180A	**0070**	70A				
0240	240A	**0240**	240A	**0079**	79A				
		0361	361A						
		0450	450A						
		0600	600A						
		0686	686A						
		0855	855A						
		1140	1140A						
		1283	1283A						
		1710	1710A						

Number of Phases

T	3-Phase

Voltage Supply

2223	220...230V
3848	380...480V
5060	500...600V
5069	500...690V
6669	660...690V

Manual

E	English
G	German
S	Spanish
P	Portuguese

Product Version

S	Standard
O	Options

Protection

00	Standard
N1	NEMA 1

MMI

00	Standard (with HMI with LED´s and LCD)
SI	Without HMI

Dynamic Braking

00	Standard
DB	With Built in Dynamic Braking Transistor
RB	Regenative rectifying unit (models from 105A at 220V, and from 86A at 380-480V)

Expansions Board

00	Not provided
A1	EBA.01-CFW09 optional
A2	EBA.02-CFW09 optional
A3	EBA 03-CFW09 optional
B1	EBB.01-CFW09 optional
B2	EBB.02-CFW09 optional
B3	EBB.03-CFW09 optional
B4	EBB.04-CFW09 optional
B5	EBB.05-CFW09 optional
C1	EBC.01-CFW09 optional
C2	EBC.02-CFW09 optional
C3	EBC.03-CFW09 optional
P1	Optional with PLC1-Card
P2	Optional with PLC2-Card

Fieldbus Communications cards

00	Standard (not provided)
PD	KFB-PD optional (Profibus DP)
DN	KFB-DN optional (DeviceNet)

Special Hardware

00	Standard
H1...Hn	Special Hardware version-Optional
HD	Models from 105A/220V and from 86A/380-480V are power supplied via DC link
HC/HV	DC Line inductor fitted
HC	For constant torque operation
HV	For variable torque operation

Special Software

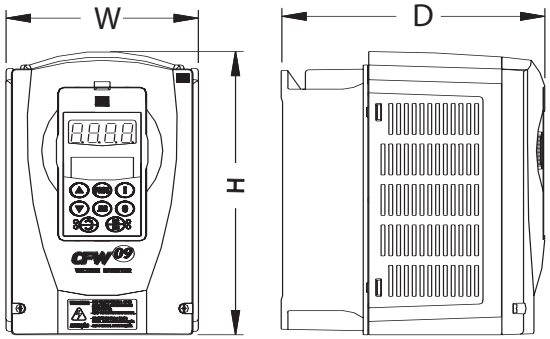
00	Standard
S1...SN	Optional with version of a special software
SF	Protocol Metasys N2
SC	Hoist Function
SN	Winder 1 with power calculation
SL	Modbus RTU

End of Code

Z	End of Code

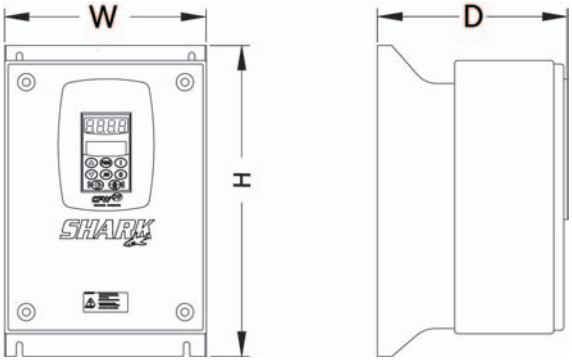
Example
ERCFW 0013 T 2223 P S Z
ERCFW 0105 T 3848 P O IL A1 PD Z
ERCFW 0086 T 3848 P O SI DB B2 MR S3 Z

Dimensions and Weight



NEMA1/IP20

Size	Width "W" (mm)	Height "H" (mm)	Depth "D" (mm)	Weight lb (kg)
1	143	210	196	3,5
2	182	290		6,0
3	223	390	274	19
4	250	475		19
5	335	550		41
6		675	300	55
7		835		70
8	410	975	370	100
8E		975		100
9	688	1020	492	240
10	700	1185		288
10E			582	310



NEMA4x/IP65

Size	Width "W" (mm)	Height "H" (mm)	Depth "D" (mm)	Weight lb (kg)
1	234	360	221	10
2	280	410		15

SHARK

NEMA 4 INOX

ERCFW09 Drives with Degree of Protection **NEMA 4X (IP 56),** designed for highly aggressive environments including:

- Pharmaceutical Industry
- Chemical industry
- Petrochemical
- Food industry
- Other applications requiring full protection to the electronic equipment.

Power Supply Voltage	ERCFW09 Inverter					Max. applicable Motor		
	Model ERCFW-09	Rheostatic Braking	Outlet rated current (A)		Voltage (V)	Power		Mechanical
			CT+	VT*		HP	kW	
220-230	0006 T 2223 E O N4 Z	Standard	6		230	1,5	1,1	1
	0007 T 2223 E O N4 Z		7			2	1,5	
	0010 T 2223 E O N4 Z		10			3	2,2	
	0016 T 2223 E O N4 Z		16			5	3,7	2
380-480	0003 T 3848 E O N4 Z	Standard	3,6		400/415	1,5	1,1	1
	0004 T 3848 E O N4 Z		4			2	1,5	
	0005 T 3848 E O N4 Z		5,5			3	2,2	
	0009 T 3848 E O N4 Z		9			5	3,7	2
	0013 T 3848 E O N4 Z		13			7,5	5,5	
	0016 T 3848 E O N4 Z		16			10	7,5	

Cabinet Solutions

10 Inverter 9A mounted in a cabinet, controlling 4kW-Motor for sugar production.

Inverter 361A, mounted in cabinet, controlling a 150kW-Motor for conveyor

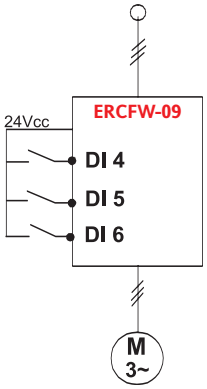
Inverter 1710 A, controlling a 1300kW-Motor.

Special Functions

Multispeed

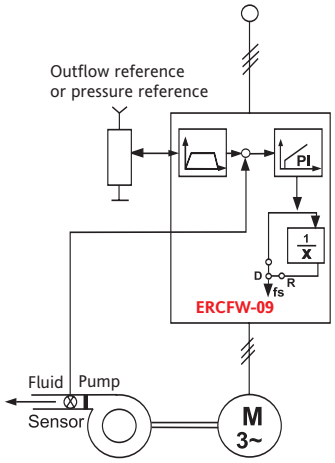
Up to eight different speeds can be programmed by the user and selected via the combination of three Digital Inputs. These Inputs can be switched by any external device such as Limit Switches, Photocells, Proximity Sensors, PLC, etc.

DI	4	5	6
n_1	0	0	0
n_2	0	0	1
n_3	0	1	0
n_4	0	1	1
n_5	1	0	0
n_6	1	0	1
n_7	1	1	0
n_8	1	1	1



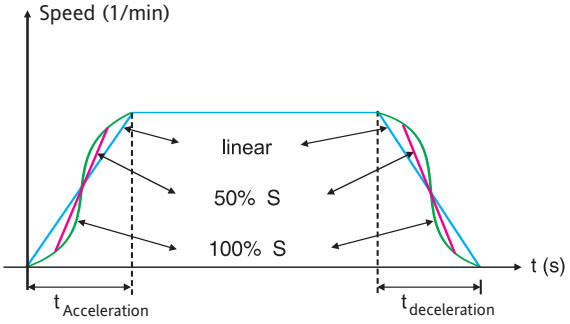
Overlapping PID-Regulator

This built-in digital PID regulator was designed for applications where a process variable (flow, pressure, level, etc.) has to be controlled by the motor speed. To implement this regulator the ERCFW-09 needs a set point and a feedback signal from the process variable sensor so that a closed loop is formed. This function eliminates the need for an external regulator to control the process reducing the solution cost.



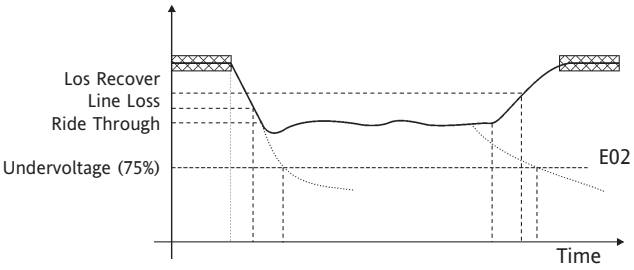
S-Ramp

This function replaces the traditional linear acceleration and deceleration ramps by Type “S” Ramps providing smoother starting, braking and approximation to the set speed curves. The practical result is the elimination of mechanical shocks, which are undesirable and some times unpractical for certain applications (elevators, etc.)



Ride-Through

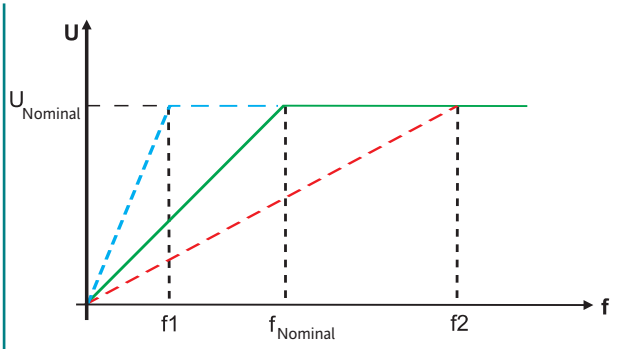
The purpose of the Ride-Through function is to ensure that the inverter maintains the motor running during the line loss, not allowing interruption or fault storing. The energy required for motor running is obtained from the kinetic energy of the motor (inertia) during its deceleration. As soon as the line is Re-established, the motor accelerates again to the speed defined by the reference.



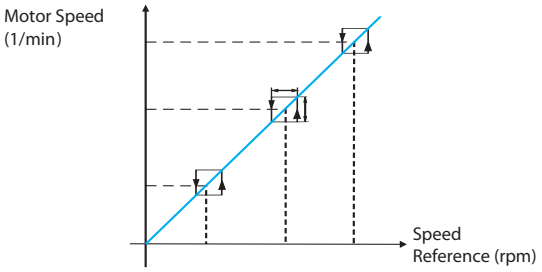
t_0 - Line loss;
t1 - Line loss detection;
t2 - Trip by Undervoltage (E02 without Ride-Through);
t3 - Line Recover;
t4 - Line Recover detection;
t5 - Trip by Undervoltage (E02 with Ride-Through);

Special Functions

Adjustable V/F Curve
The adjustment of the standard V/F curve intends to allow driving motors with rated voltage at rated frequencies different from the power supply frequency. The base frequency can be programmed to a new value, lower or higher the power supply frequency and the voltage can be set to any value lower the line voltage.



Critical Speeds Rejection
This function avoids the possibility of running the motor at critical speeds that may provoke mechanical resonance on the motor/load system causing excessive noise or vibration. Up to three speeds and a rejection band can be programmed.



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