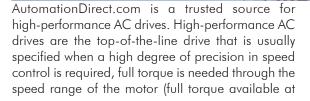


High Performance AC Variable Frequency Drives (VFDs)



High Performance Variable Frequency AC Drives. When precision is required.







very low or zero speeds) or if torque control mode is required (controlling and maintaining torque as opposed to speed).

High-performance AC drives also have a lot of features not found on lower-cost drives.

What are the benefits of high-performance AC variable frequency drives and why would I need one?

- High-precision speed control high-performance drives support very tight speed control tolerances when this is important to an application with or without encoder feedback
- Full torque throughout the motor's speed range high-performance VFDs always support some type of vector speed control. Sometimes this is sensorless vector which is an open-loop system that still allows for full torque from base speed down to very low speeds and many support closed-loop flux vector speed control which will support 100% of the drive's available torque from base speed down to zero speed
- Torque control applications such as winders and tensioners, where the motor's torque needs to be varied and controlled in lieu of motor speed require a torque control mode. High-performance AC drives off this control methodology
- High tech features high-performance VFDs offer many features not found on other classes of drives.
 Most all modern AC drives offer features such as dynamic braking and an integrated PLC as well as some communications capabilities. High-performance VFDs take this to a new level with more powerful PLCs, advanced functionality, advanced networking capabilities and safety features such as STO and SS1

Not sure that this is the right AC Drive series you need?

Click for a complete selection guide

What type of applications use high-performance AC variable frequency drives (VFDs)?

Applications, where a high-performance VFD might be used, are ones that require tighter precision, such as a brake-meter conveyor belt used for high-speed gapping of products



Winders and tensioner applications that will need to control torque during all or most of the machine cycle and sometimes switch between speed control and torque control



High-performance VFDs are also commonly used as a system drive where several drives are networked to one controller and operate as a large finely tuned machine. Some examples where a drive system may exist are in applications such as paper mills, steel mills and textile mills







Why buy drives from us?

There are several distinct advantages to purchasing a high-performance AC variable frequency drive from AutomationDirect:



Price

As with all of our product lines, our prices are often well below the list prices of traditional automation suppliers. Our direct business model allows us to operate more efficiently than other suppliers and pass the savings on to you.



Quality

All of the high-performance AC variable frequency drives we sell have a 2-year warranty and a 30-day moneyback guarantee. If for any reason you are not satisfied with your purchase, send it back and we will refund your money.



Service

We give you options for self-service but at the same time, we are there when you need us. You can place your order online or call our customer service. Have a technical question about one of our products or need help gathering up a bill of materials for one of your projects? You can call our Free Technical Support.

mHPD-2 High-Performance Drives VAUTOMATION DIRECT 1-800-633-0405 www.automationdirect.com/drives

High-Performance Drives

▼AUTOMATIONDIRECT®

DURAPULSE GS4 AC drives available up to 300hp!



Starting at only \$525.00, GS4 AC drives are loaded with features!

- V/Hz control or sensorless vector in all 8 frames sizes
- All 230V drives have single-phase input capability
- Dual rating design CT/VT ratings (light & heavy duty)
- Flexible carrier frequency to 15khz and output frequency to 600Hz
- STO Safe Torque Off (TUV Certified)
- Built-in PLC to support up to 10k steps
- 100kA short circuit current rating
- Free downloadable software for configuration and programming (\$9 for hard copy)
- Field-upgradable firmware via USB port
- Hot-pluggable LCD text-based keypad can be remotely mounted
- Embedded quick-start menus
- Control mode selection from keypad, communication input, or digital I/O

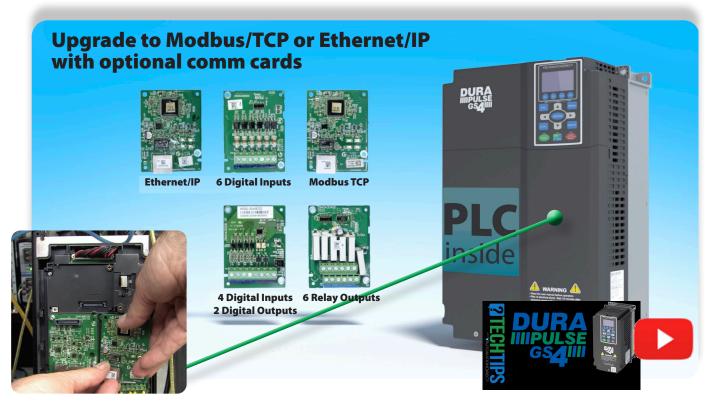
- · Display units of measure of your choice (GPM, FPM, etc.)
- Momentary power loss restarts
- Built-In DC choke (some models)
- Flange-mount capability for frame sizes A to F (1 to 215hp)
- Conduit boxes for NEMA 1 installations
- Expanded I/O capability 110V inputs, relay outputs, combo DC I/O card
- Analog I/O configurable 3 inputs and 2 outputs
- Auto speed search capability
- Multi-motor control
- Dynamic braking
- PID controller -including sleep and wake
- Password protection
- RTD and/or PTC Input Motor Protection
- Parameter organization similar to GS3 (for easy upgrades)

- Calendar function allows chronological program control (daylight savings time, etc.)
- MODBUS RTU and BACnet communication protocols built-in
- Optional communication cards for MODBUS TCP and EtherNet/IP
- · Modularized design eases maintenance and expansion
- Conformal coating on PCBs for improved environmental tolerance
- Excellent heat-sink design; operate at 50°C without derating
- Fire Mode emergency smoke removal and HVAC system pressure
- Multi-motor control: control up to 8 pumps at the same time

1 - 8 0 0 - 6 3 3 - 0 4 0 5

- Two-year warranty
- CE, TUV, UL, cUL

A built-in PLC and expanded I/O capabilites



PLC inside

A fully functional PLC is built in to the GS4 drive. Capable of up to 10k steps, it's perfect for drive-related logic requirements. Control the drive and I/O with standard ladder logic (and our FREE downloadable PLC software, GS Logic). Advanced PLC features include 32-bit math, Gray Code, drive frequency control, read/write drive parameters, real-time clock/calendar with support for daylight savings time and full drive PID control. And it's all on-board!

You have I/O choices

Perfect for drive related and PLC operations, the built-in I/O includes eight DC digital inputs, two DC digital outputs (up to 48V), 2 form-C relay outputs, as well as five analog channels (3 inputs and 2 outputs) configurable for either voltage, current or potentiometer (input). The expansion I/O slot will accept any one of three I/O option cards: the combo DC discrete card with four 24VDC input (sinking or sourcing) and two 24VDC outputs, the six-point 110VAC input card, or the sixrelay output (250VAC/30VDC) card.

High-speed communication interfaces

GS4 drives support both Modbus RTU/ASCII and BACnet (serial) protocols out-of-the-box. Modbus RTU is ubiquitous on the factory floor - all PLCs and most other equipment are compatible. Similarly, BACnet is the de facto standard for the HVAC and building automation worlds. The GS4 drives also accept an optional Ethernet card; choose from the Modbus TCP option or the EtherNet/



IP version. These economically priced option cards put your GS4 drive on a fast network at a low cost. You'll be amazed at how easily you can set up the drive to communicate with any of our PLCs (especially the newer Do-more and Productivity Series models).



High-Performance Drives

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Be safe with DURAPULSE GS4



Safe Torque Off

The Safe Torque Off (STO) function is a basic drive-integrated safety feature. Use this input signal to ensure that no torque-generating energy can flow to the motor. This function is often used in emergency stop situations and/or to prevent unintentional motor starting.



100kA SCCR rating

A 100kA Short Circuit Current Rating (SCCR) is required for personnel safety in many factory environments and to meet a host of regulatory requirements including:

- NEC Article 409
- UL508A
- NFPA70E

SCCR is defined as the maximum short circuit current a component or assembly can safely withstand when protected by a specific overcurrent protective device, or for a specified time interval. The use of high-speed class J or class T fuses on the incoming power is required for these installations.

50°C rating

The excellent heatsink design of the GS4 series provides a 50°C rating, allowing the GS4 drives to operate in harsh ambient conditions (that's 122°F!). GS1, GS2 and GS3 models are rated for 40°C, but can require additional cooling for the enclosure. Furthermore, all the GS4 drives up to 215 hp can be "flange mounted", a through-mounting method that puts the drive's heatsinks on the outside of the enclosure. This allows the use of a smaller enclosure, or reduces the need to cool the enclosure, or both!



Fire mode

Run Fire mode during emergencies for uninterrupted smoke removal and system pressure. Sometimes called "run until destruction" mode, this feature should be used as a measure of last resort; it can be useful, even life-saving in certain situations (keeping a stairwell clear of smoke, for instance). The drive will ignore all alarm inputs, and reset immediately on any trips. Use with caution, especially during any testing that is required.

Circulative control mode (multi-motor control)

The GS4 drives offer five different control modes for circulation pump control. The drive can control up to 8 motors in a cyclic or cascading fashion by using a combination of VFD control and across-the-line control. Relay outputs on the drive operate contactors that allow the VFD to control one or more motors, while additional relay outputs provide across-the-line control of other motors via separate contactors. These modes can be used to balance usage of multiple pump motors, or to provide scalability and efficiency (with vastly differing pumping volumes) with an array of smaller motors.





PID control (including sleep and wake)

The GS4 series drives support full PID control to automatically apply accurate and responsive corrections to a control function with external influences. Proportional, Integral, Derivative (PID) control is a mainstay in industrial control, bringing complex processes up to speed with little or no overshoot, or controlling pressure, force, feed rate, flow rate, position, etc. The Sleep Mode function is actuated when the frequency of the output command or the feedback signal falls below the Sleep Reference point for a specified period of time. When asleep, the drive output is off and it simply monitors Wake-up Reference point. A separate Wake-up Delay Time can be used to delay the Wake-Up routine.

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DURAPULSE GS4 AC drives are in control



Packed with thoughtful features that you'd never expect at this price point!



Clock/calendar with support for daylight savings time

The GS4 drives have a real-time clock/calendar that allows the user to program the PLC (and by extension, to control the drive) with ON/OFF control in chronological order, for certain times of day, days of the week, seasonal changes, etc. And it includes full support for daylight savings time.

Momentary power loss restart

After many power loss or brown out situations, the entire machine or process may need to go through a prescribed start-up process, but there are times when having a VFD come back online automatically and ASAP is advantageous. Enable this function and the GS4 drive will automatically restart and use "speed search" to catch the motor on the fly and continue running. The GS4 drive can also be set to automatically restart after a fault (with a limit on the number of fault restarts allowed within a given time frame).



Dual rating design— CT/VT ratings (light & heavy duty)

All the GS4 drives are rated for both Variable Torque (VT) and Constant Torque (CT) applications, making the selection process easier. VT (light duty) ratings allow up to 120% of current, and CT (heavy duty) allow up to 150% of current for brief periods. Be sure to set these limits carefully to avoid motor damage. There are certain situations in which the GS4 drives may need to be de-rated, at altitude or when using single phase line input, to name a few. See the pages on drive selection for all the derating details.

Flexible carrier frequency to 15khz

The GS4 drives have an adjustable carrier frequency, the rate at which output transistors are gated or switched on and off, from 2 to 15 kHz. Higher carrier frequencies provide better efficiency (lower harmonic losses) in the motor and lower audible noise from the motor. Lower carrier frequencies offer better efficiency in the drive, lower EMI (electrical noise), and reduced reflective wave peak voltage (reflected wave peak voltages can damage motor insulation).

As a general rule, the carrier frequency should be set as low as possible without creating unacceptable audible noise in the motor. Smaller systems can have higher carrier frequencies, but larger drives (>20 or 30 hp) should not have carrier frequencies set higher than 6kHz. Heavy duty applications typically run around 2 to 4kHz.

GS4 drives even have the optional ability to automatically change the carrier frequency based on the load (if the drive experiences a more demanding load, it will reduce the carrier frequency until the overload is gone).

mHPD-6 High-Performance Drives

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High-Performance Drives

mHPD-7



Smartly designed to be rugged, efficient and tough

Flange mounting

All GS4 drives up to 215hp can be "flange mounted", a throughmounting technique that puts the drive's heatsinks on the outside of the enclosure. This allows the use of a smaller enclosure, or reduces the need to cool the enclosure, or both! The smaller A through C frame drives have optional flange mount kits, while the D through F frame models come with the flanges already attached. The largest G frame drive isn't normally mounted in an enclosure, so it doesn't have provisions for flange mounting.



Conduit boxes

Conduit boxes allow larger GS4 drives to be mounted without an enclosure in many applications, saving considerable cost and installation time. The three smallest frame sizes (A-C) have conduit boxes built in, with conduit holes in the bottom of the drive. GS4 drives with conduit boxes are rated for IP20, UL Type 1, and NEMA 1, which generally means that they protect against intrusion by objects and personnel. They aren't protected against dust, water, oil, etc. without an enclosure, so take necessary precautions if a higher degree of protection is required.



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See our video for all the details.

All the features you need . . . for less.

Built-in dynamic braking (models below 40 hp)

When a variable frequency drive decelerates an AC motor, especially one with a large inertial load attached, the process is known as dynamic braking. While all GS4 Drives are capable of dynamic braking, the smaller sized drives (those below 40 hp) have this capability built in, while the larger drives (above 40 hp) require an optional dynamic braking unit. A thermal overload and external braking resistors are required to dissipate the energy safely. A comprehensive line of braking units, thermal overloads, and braking resistors is available; check out our video on Dynamic Braking for all the details.

Built-in DC choke (models above 40 hp)

A DC choke is used to mitigate the impact of harmonics in VFD applications. Harmonics on the power line can cause additional heating of the transformer and cabling to the VFD, as well as disrupting other connected equipment. Performing a similar function as an AC line reactor (on the line input to a drive), a DC choke is connected after the input diode in the VFD circuit. The larger GS4 drives (above 40 hp) have the DC choke built in, while the smaller drives will accept an optional DC choke if you find that one is needed for your application.

Auto speed search

Also known as "catch on the fly", this control technique allows the GS4 drive to take control of a motor that is already spinning. In some applications, such as fan control where the fan blade is located in a moving air stream, it isn't always practical or desired to stop the motor prior to bringing it under VFD control. The GS4 drives can send small current signals to the motor to detect the motor's speed, and then engage the motor in full V/Hz or sensorless vector mode within a few seconds. Very advantageous in certain circumstances!



Protect your motor from overheating

Wire a standard temperature sensor (such as an RTD) from your motor into the GS4 drive and protect that motor from overheating. It's a UL requirement in some applications, and a darn good idea ALL of the time. PTC or Positive Temperature Coefficient sensors rely on the electrical properties of certain metals whose resistance increases with temperature. The most common are RTDs (Resistance Temperature Detectors), but thermistors may also be used.







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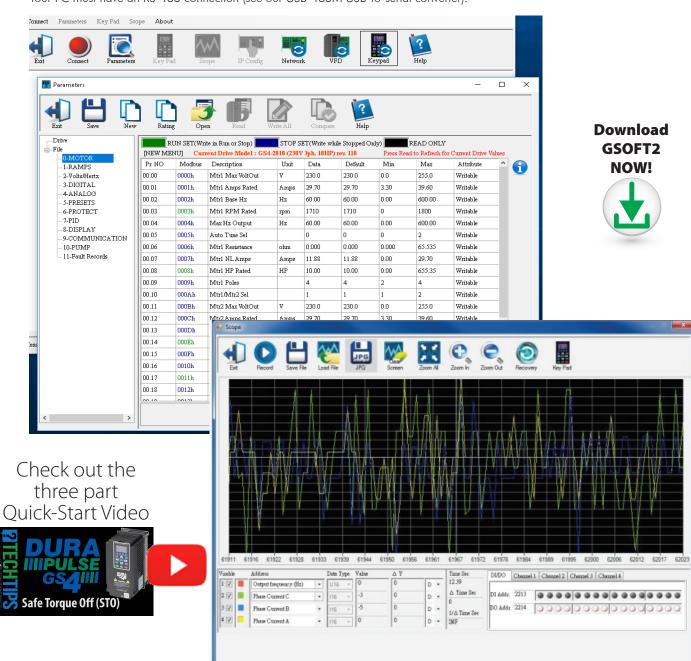
Free downloadable configuration software

GSOFT2 is the configuration software for the GS4 and GS20 family of drives. It allows you to connect a personal computer to a GS4 and GS20 drive, and perform a variety of functions:

- Create new drive configurations
- Upload/download drive configurations
- Edit drive configurations
- Archive/store multiple drive configurations on your PC
- Trend drive operation parameters
- Tune the PID loop in the drive
- · View key operating parameters in real-time
- View drive faults
- Start/Stop drive and switch directions, provided drive is set up for remote operation
- Upgrade firmware in the drive, keypad, or Ethernet comm cards.

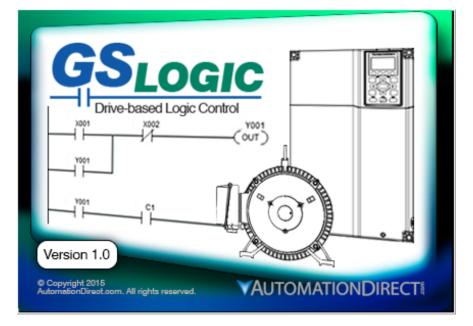
GSoft2 includes an integral help file with software instructions. GSoft2 can be downloaded for free or purchased on a USB drive from AutomationDirect.com.

Your PC must have an RS-485 connection (see our USB-485M USB-to-serial converter).



Free downloadable ladder logic software

M1026



Use the built-in PLC and our free downloadable ladder logic software (GSLogic) to take your VFD applications to new heights. Program up to 10,000 steps (2,000 for the GS20) of ladder logic to control your drive and the related machine or process. The PLC can read from or write to any parameter in the drive, and control the ample on-board and optional I/O in your GS4 or GS20/GS20X. Access the real-time clock calendar to program date-specific, or daily, weekly, or monthly routines, with full support for daylight savings time built in. Use the serial interfaces to communicate with other GS4/GS20/GS20X drives, or other equipment in your factory. There's even a special instruction that allows the PLC to monitor and adjust the drive PID loop.

The software supports all the standard Windows editing functions like cut, copy, paste, multiple windows, etc. GSLogic also allows register editing, online monitoring, and other convenience functions, such as:

- Create and edit GS4/GS20/GS20X drive-specific PLC programs
- Upload/download PLC program files to the onboard PLC
- Archive/store multiple PLC programs on your PC in the GS4/GS20/GS20X keypad
- Control the GS4/GS20/GS20X drive PID loop (FPID instruction)
- View all GS4/GS20/GS20X PLC registers in real time
- Print GS4/GS20/GS20X drive PLC program files

GSLogic includes an integral help file with explanations of all software instructions, a how-to-use GSLogic section, and a how-to-use the GS4 PLC section.

GS4 (PLC Station Address: 2)

3Wire Control[3Wire Control] - GSLogic - [Ladder Diagram

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WEG CFW500 High-Performance AC Drives

A closed-loop flux vector VFD you can buy direct

The WEG CFW500 series is a high-performance AC variable frequency drive that supports closed-loop flux vector speed control as well as torque control modes. Until now you had to wait up to several months when ordering drives with high-performance features such as these. Now you can get them shipped straight to you from AutomationDirect.

> Built-in keypad with display. Standard and advanced with fill text remote keypads are optionally available.

> > **Built-in dynamic** braking chopper. No need for an external braking unit.



Centrifugal pumps

• Conveyors (excellent for

high-speed metering and

• Roller tables

gapping belts)

Winders

Control terminals located safely away from power terminals provide room for a clean installation.

Power terminals at bottom of unit with ample room for wiring safety and routing away from low voltage signals.

High-Performance VFD Applications

Tensioners

- Fans & blowers
- Mixers
- Extruders
- Granulators

• Cutting & welding machines

- Commercial dryers
- Rotary filters

UEI CEW 500



QR Code for

to product

Cooling fans on

all models.

remote access

details (online)

230V 1-ph 230V 3-ph 460V 3-ph Frame A - HP 1/4, 1/2, 1 1/3. 3/4. 1. 2. 3 2. 3 Frame B - HP 2.3 5 1, 2, 3, 5 Frame C - HP 7.5 10 Frame D - HP 10, 15 15, 20 Frame E - HP 20 25, 30 Frame F - HP 20, 25, 30 40, 50, 60 Frame G - HP 75, 100, 150

CFW500A02P6T2DB20G2 NB = No Brake. DB = Dvnamic Brake. 20 = IP20 Enclosure. G2 = Generation 2 Supply Voltage: 2 = 200-240 Vac, 4 = 380-480 Vac Supply Phases: S = 1 Phase, B = 1 or 3 Phase, T = 3 Phase Rated Current: 01P0 = 1.0 Amps, 01P6 = 1.6 Amps, 02P6 = 2.6 Amps, 04P3 = 4.3 Amps, 06P1 = 6.1 Amps, 06P5 = 6.5 Amps, 07P3 = 7.3 Amps, 09P6 = 9.6 Amps, 10P0 = 10 Amps 14P0 = 14.0 Amps, 16P0 = 16.0 Amps, 24P0 = 24.0 Amps, 28P0 = 28.0 Amps, 31P0 = 31.0 Amps, 33P0 = 33.0 Amps, 39P0 = 39.0 Amps, 47P0 = 47.0 Amps 49P0 = 49 Amps, 56P0 = 56.0 Amps, 77P0 = 64 Amps (240 Vac), 61 Amps (48 Vac), 88P0 = 75 Amps (240 Vac), 73 Amps (480 Vac), 0105 = 105 Amps, 0142 = 142 Amps 0180 = 180 Amps, 0211 = 211 Amps Frame: A, B, C, D, E, F, G Series Name: CFW500 = WEG CFW500

Additional CFW500 Features

The CFW500 line of VFDs have the following features:

- Broad offering from 1/4 to 60 hp
- 200-240V (single-phase/3-phase and 3-phase only models) and 380-480V input voltage
- 230VAC: three-phase up to 30 hp, single phase input up to 3 hp
- 460VAC: three-phase up to 150 hp
- IP20 with NEMA 1 conduit box options
- Speed and torque control down to 0 (zero) rpm
- Precision of 0.01% for speed control
- DIN rail (35mm), A, B, and C frame, or surface mounting with screws on all frame sizes
- G-Frame and F-Frame models can be flange mounted
- Same programming as other WEG VFDs including CFW300 and CFW100
- Built-in SoftPLC
- Scalar, Vector Control (Sensorless and closed-loop with encoder feedback) & VVW PM (suitable for fan. Pump and compressor)
- 0 to 500 Hz output frequency
- 2.5 to 15 kHz adjustable switching frequency (5 kHz standard)
- PID with sleep mode
- Flying start / ride-through
- Built-in 24Vdc Power supply (max. 150 mA)

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- Built-in RS-485 (Modbus RTU) communication
- Four isolated programmable digital inputs
- One programmable relay output (1NO, 1NC, 240vac 0.5A)
- One programmable transistor output
- One isolated programmable analog input (0-10V, 0/4-20mA)
- One isolated programmable analog output (0-10V, 0/4-20mA)
- Protective features: Over current (Phase-Phase short circuit in the output or phase-ground short circuit in the output), Under/overvoltage, overtemperature in heatsink, motor overload, IGBT overload and external fault
- Control features: Linear and "S" ramp acceleration and deceleration, local/remote control, DC braking, torque boost, motor slip compensation, electronic pot, preset speeds, adjustable V/Hz profile, maximum and minimum adjustable frequency limits, two skip frequencies, adjustable output current limit, JOG, ride-thru, flying start and PID regulator
- Same keypad with backlight as of CFW500 product line with Main display line, secondary display line and bar graph display
- Ambient: 14°F (-10°C) to 104°F (40°C), 3300ft (1000m) altitude, 5-95% humidity, non-condensing
- WPS compatible

Not sure that this is the right AC Drive series you need? Click for a complete selection guide

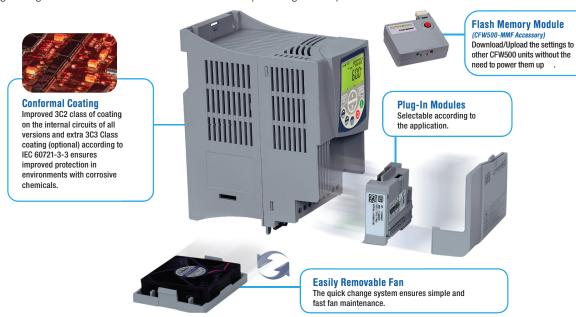
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Flexibility and Performance

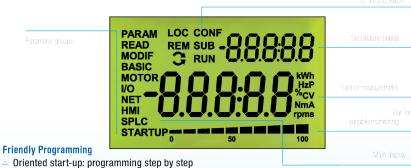
This VFD gives the user the possibility to choose the plug-in module that best fits his application, or to use the standard version, that comes with the CFW500-IOS plug-in module. All plug-in modules comes with one RS485 port as standard.

The installation of the CFW500 is simple and its configuration and operation is intuitive with the navigation menus of the operating interface (HMI) with built-in LCD display. By using the flash memory module, it is possible to download the existing setting from one CFW500 to other units without powering them up.



Human-Machine Interface (keypad)

Display up to three variables at the same time, selected by the user.



Friendly Programming

- Easy and intuitive operation, fast access to the parameters
- Parameter group: shortcut to the parameters of interest

Remote HMI (keypad)

Suitable for enclosure door or machine console, two options available.

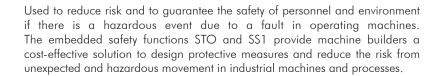


CFW500-HMIR

Advanced Text Remote Keypad







Advantages

- Safety functions integrated in the CFW500 drive, making easier to comply with the machine and application safety
- Less components, no need for additional wiring, saving space and installation costs
- Easier installation, commissioning and maintenance
- No electromechanical components, meaning faster responses and higher degree of productivity
- Due to the high safety performance level SIL3, the CFW500 with Safety module may avoid the use of external safety relays for cables and emergency pushbuttons monitoring



Safety Functions

STO (Safe Torque Off)

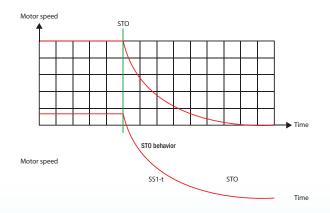
This function immediately switches off the drive output to the motor, disabling the supply of torque-generating energy. STO is also used to prevent an unexpected startup of machinery or for an emergency stop, fulfilling stop category 0 (IEC 60204-1).

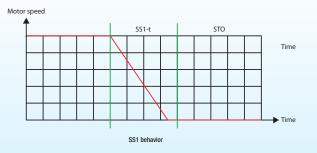
It is applicable if the motor can be brought to a standstill in a sufficiently short time by the load torque or friction or where motor coast to a stop is not relevant to safety.

SS1 (Safe Stop 1)

This function enables motor deceleration and then, after a delay time, activates the STO function. SS1 can be used to implement a controlled stop and then removal of power, fulfilling stop category 1 according to IEC 60204-1. This function is used when, in the event of a safety related fault, the drive must stop as quickly as possible and then enter the STO state. The stopping of a drive by means of SS1 function reduces the risk of danger, eliminates the need of external safety timers, increases the productivity of a machine and allows safety clearances in a machine to be reduced. The reason is the active stopping of the drive as compared with the use of the STO function only.

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Not sure that this is the right AC Drive series you need? Click for a complete selection guide



The CFW500 can be connected to the main fast industrial Fieldbus communication networks, with protocols used worldwide such as EtherNet/IP and Modbus-TCP, according to the plug-in module selected.

In addition, all plug-in modules come with serial interface RS485 Modbus-RTU built-in.

I/O expansion:
IOS (standard, included in the version with plug-in), IOD, IOAD, IOR

Functionality expansion:
Incremental encoder
USB

Fieldbus communication protocols:
RS232
RS485
EtherNet/IP

Selectable plug-in modules

Free WPS Programming-Suite Software

That's right! The WPS software is a free download. This is a fully featured software suite for drive configuration, monitoring AND for programming the built-in PLC – it's all in one easy-to-use package.



Modbus-TCP



