

Electronic Drives Catalog



 **TB Wood's**
Incorporated

An Altra Industrial Motion Company



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1. **Product Reliability:** Our products, with exceptions as noted, are sold with no express warranties, oral or written, and with no implied warranties of merchantability, fitness or any other warranties whatsoever. However, if within one or two years from the date of manufacture, depending upon the Electronic product, we determine that our product contained a defect in workmanship or material when purchased, we will, at our option, refund the purchase price or provide a replacement FOB our factory.
2. TB Wood's Incorporated will not be liable for any incidental or consequential damages, secondary charges, expenses for installation, injuries to persons, or damage to property.
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4. TB Wood's Incorporated is under no obligation to incorporate improvements or changes in products already shipped, nor will we substitute improved products for those already shipped. Changes and improvements may be made at any time.
5. Shipment promises are made in good faith. If for any reason, whether due to TB Wood's fault or otherwise, delivery is delayed, it is agreed that TB Wood's shall not be liable for any consequential or secondary damages of any nature resulting from delayed delivery.
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9. Unpaid balances remaining due 30 days after terms agreements shall bear 1.5% interest per month until paid in full.
10. If TB Wood's is required to refer this transaction to an attorney for collection, Purchaser agrees that all costs, attorney fees and expenses of said collection shall be added to the amount due TB Wood's from Purchaser.
11. Cancellation of made-to-order items when engineering time is incurred or production work has begun will be billed for time and material expense incurred by TB Wood's at the point of cancellation. If made-to-order items have been completed but not shipped, charges to Purchaser will be pursuant to the quotation or purchase order.

In accordance with our established policy to constantly improve our products, the specifications contained herein are subject to change without notice.

HOW TO USE THIS CATALOG AND TABLE OF CONTENTS



General Information

Pages 1 through 11 provide an introduction to TB Wood's and general information to help you select the appropriate electronics products to meet your specific application needs. You'll find information about agency approvals, enclosure specifications, and application formulas. This section also includes a detailed AC drive application guide by industry, as well as a product selection matrix and information about load characteristics.

AC Drives

As they say, this is "where the rubber meets the road." The line of TB Wood's AC Drives products are found on pages 12 through 39.

Support Services

Refer to page 40 to get service, repair, warranty, and conditions of sale information.

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**How to get more information regarding
TB Wood's electronic products:**

Website: www.tbwoods.com

Phone: 1-888-TBWOODS

Tech Support available 24/7.

GENERAL INFORMATION ABOUT TB WOOD'S AC DRIVE PRODUCTS

TB Wood's Incorporated has been manufacturing AC Drives since 1991 and designing and manufacturing electronic controls since 1968. Our single-source development process – from R&D to application engineering – contributes to the TB Wood's heritage of innovative products, such as the comprehensive line of AC Drives. Our customers benefit from:

- **Top Tier Manufacturing –** including integrated computer design and manufacture, complete surface-mount design and manufacture, advanced microchip wire bonding technology, and ISO 9001 manufacturing facilities.
- **Product Designs that meet World Standards** – including UL, cUL/CSA, CE Mark, and C-Tick agency approvals.
- **Drive Packaging Innovation** – including the first standard NEMA 4 AC drive.

Advantages of TB Wood's Drives

- Increased energy efficiency, reduced energy costs, and less system maintenance
- Improved processes and increased production flexibility
- Increased life of mechanical components resulting from soft starts
- Enhanced connectivity to higher-level automation and enterprise-wide systems



TB Wood's AC Drives

Energy Efficiency – AC drives provide the utmost in energy efficient speed control, especially when used with centrifugal pumps and fans, which often run at fixed speeds. Using an AC drive to electronically control motor speed, for example, facilitates fan or pump speed control, providing a desired flow rate that can result in significant energy savings and lower power costs.

Improved Production Control – Another advantage provided by AC drives is that the speed of machinery and material-handling equipment can be varied to optimize production throughput and minimize scrap. And, as solid-state devices, AC drives transmit all process control signal inputs for start/stop, speed control, and output signals through the system network to a PLC, PC or other host device for process monitoring and control.

Reduced Maintenance – AC drives vary output voltage and output frequency to control a motor's torque and speed. Controlling torque and speed results in soft starts that reduce mechanical stress on system components, including belts, sheaves, gearboxes, and couplings.



Drive Selection

When selecting an AC drive, or any electronics product, identifying primary requirements and application-specific characteristics can make the selection process easier. These include the type of load, speed requirements, and application parameters to name a few. Values of secondary variables – such as braking requirements and control schemes – may also need to be established to narrow the selection to the “Total Solution” for your needs.

These essentials are required for selecting the proper AC drive:

- 1. Line Voltage** – AC drives are normally designed for a single line (input) voltage rating. Supplying the incorrect voltage to the drive may cause damage or prevent the drive from functioning properly.
- 2. Horsepower or Kilowatt Rating** – Although AC drives are labeled in Horsepower or Kilowatt ratings, current is ultimately the deciding factor when making a choice. Selecting a drive with correct current for the application, either starting current or running current requirements, enables the drive to perform as desired.
- 3. Enclosure Rating** – When mounting an AC drive, both temperature and environmental conditions should be of major concern. Electronic devices should not be operated in hot and/or moist environments without proper protection. Both NEMA and IEC (IP) ratings are provided for each TB Wood’s AC Drive product series.
- 4. Required Speed Range** – An AC motor/drive combination is rated for a specific designed speed range, meaning the span over which the AC drive is capable of varying motor speed. To achieve the best possible performance, consider both the drive and the motor it will control, ensuring that they match. The speed range is normally specified in a ratio such as 4:1 or 60:1 to indicate that the motor/drive combination can run at either 1/4 or 1/60 of its base speed and still provide rated torque without overheating. Operating the motor above its base speed can also create problems. Consult the motor supplier and/or manufacturer to determine the applicable motor limitations within the context of the application.

- 5. Application** – Two basic torque types cover virtually every application. They are Constant Torque and Variable Torque. In Constant Torque applications, the requirement for torque is the same throughout the speed range. In Variable Torque applications, the torque varies with speed, usually in a squared (pumping) or cubed (air handling) relationship. Due to the nature of the load, some drive models in Variable Torque applications can be oversized to handle the next largest HP motor.

Additional Questions

- 1. Braking Requirements** – Depending on the nature of the load, dynamic braking may be required to handle the application. Fast stopping requirements or loads with high inertia may dictate a drive with either internal braking or the ability to add external braking. Not all AC drives have dynamic braking or the ability to add external braking.
- 2. Control Scheme** – Drive operation may also direct you to a particular series of drives. If special options such as remote keypad control or a 115 Vac interface are needed, some models may be more appropriate for your application due to their expanded functionality.
- 3. Speed Regulation** – In some applications, the need for specific speed control at precise speeds may require the addition of a feedback device. Typically, drives with advanced features have this capability and require option boards to process the feedback signal.
- 4. Duty Cycle** – The frequency of operation may also direct the selection process to a certain series-drive models appropriate for these demands. Although not a major concern, line starting can be limited in some models as well.
- 5. Special Features** – Advanced features such as serial communications and PID control are usually available as standard features on high-functional models. Some models provide these advanced functions as options while others incorporate them as standard.

TB WOOD ENCLOSURE SPECIFICATIONS

TB Wood's drive products are constructed to be environmentally versatile – whether the application is indoors, outdoors, or in extremely harsh washdown situations. Our products are packaged to meet both NEMA (National Electrical Manufacturers Association) and European IP rating enclosure systems.

The NEMA system is used primarily in North America and the IP system is used in Europe and the rest of the world. Our products are packaged in NEMA and IP enclosures to meet virtually any application.

NEMA and IP ratings are similar, but there is not a one-to-one correlation between the two systems. NEMA enclosures are classified by type (e.g., Type 1, Type 4, etc.). IP enclosures employ a two-digit system to classify enclosures. The first digit defines the degree of protection provided against contact with solid objects and the second digit defines the protection level against water (e.g., IP54). The higher the number, the more protection provided.

Specific NEMA and IP enclosure types, their applications, and their protection capabilities are listed below with a photo of a corresponding TB Wood's product.

NEMA 1 – Intended for indoor use and provides protection to personnel from incidental contact with enclosure contents and provides minimal protection against falling dirt. IP23 is the approximate European rating.

NEMA 3R – Constructed for indoor or outdoor use and provides some protection against falling dirt, rain, sleet, snow, windblown dust and external formation of ice on the enclosure. IP32 is the approximate European rating.

NEMA 4 – Appropriate for indoor or outdoor use and provides some protection against falling dirt, rain, sleet, snow, windblown dust, splashing water, and hose-directed water, as well as external formation of ice on the enclosure. IP56 is the approximate European rating.

NEMA 4X – This enclosure, appropriate for indoor and outdoor use, protects against corrosion and exposure to saltwater spray. It also protects against falling dirt, rain, sleet, snow, windblown dust and external formation of ice on the enclosure. IP56 is the approximate European rating. The X4 AC Drives and X5 UltraFlex AC Drives are rated at IP66 through 100HP. The IP66 rating greatly exceeds NEMA 4 standards.

Examples of TB Wood's NEMA Enclosures



**IP20
SE1**



**NEMA 12
SE1**



**NEMA 4X
X4**



**NEMA 12
X5**

NEMA 12 – Constructed for indoor use and provides a degree of protection against dust, falling dirt, and dripping non-corrosive liquids. IP55 is the approximate European rating.

Consult with your local TB Wood's sales representative to obtain additional information.

Agency Approvals

Many of TB Wood's electronic drive products and accessories meet CE, UL, cUL, and C-Tick standards. Products that meet specified standards are identified in this catalog.

If you have any questions regarding these agency approvals, please contact your local TB Wood's sales representative.



The European Community – The CE mark is the official marking for electronic products and equipment sold or put into service anywhere in the European Community. It signifies that the product meets all safety and environmental requirements defined under European Directives.



Underwriters Laboratories Inc. – When a product carries this mark, it means UL found that representative samples of this product met UL's safety requirements. These requirements are primarily based on UL's own published Standards of Safety.



Underwriters' Laboratories of Canada – UL introduced this new Listing Mark in early 1998. It indicates compliance with both Canadian and U.S. requirements. Products with this type of mark have been evaluated for both U.S. and Canadian safety requirements, which have somewhat different safety requirements.

Underwriters' Laboratories has a reciprocal agreement with the Canadian Standards Association where the cUL mark is considered equivalent to the CSA mark for meeting Canadian Safety Standards.

The Canadian Standards Association (CSA) – a non-government, non-profit association that operates internationally to set standards for products and services through testing, certification, and inspections for safety and performance. CSA enhances public safety and health while contributing to environmental preservation.



Australian Compliance – C-Tick is the mark of compliance with testing/evaluation standards in Australia, as developed by a number of organizations, including the Australian Communication Authority.



ELECTRICAL APPLICATION FORMULAS

ELECTRICAL FORMULAS

OHMS LAW:

$$\text{Amperes} = \text{Volts} / \text{Ohms}$$

$$\text{Ohms} = \text{Volts} / \text{Amperes}$$

$$\text{Volts} = \text{Amperes} \times \text{Ohms}$$

POWER IN DC CIRCUITS:

$$\text{Watts} = \text{Volts} \times \text{Amperes}$$

$$\text{Horsepower} = \frac{\text{Volts} \times \text{Amperes}}{746}$$

$$\text{Kilowatts} = \frac{\text{Volts} \times \text{Amperes}}{1000}$$

$$\text{Kilowatt-Hours} = \frac{\text{Volts} \times \text{Amperes} \times \text{Hours}}{1000}$$

POWER IN AC CIRCUITS:

Kilovolt-Amperes (KVA):

$$\text{KVA (Single-Phase)} = \frac{\text{Volts} \times \text{Amperes}}{1000}$$

$$\text{KVA (Three-Phase)} = \frac{\text{Volts} \times \text{Amperes} \times 1.73}{1000}$$

Kilowatt (Kw):

$$\text{Kw (Single-Phase)} = \frac{\text{Volts} \times \text{Amperes} \times \text{Power Factor}}{1000}$$

$$\text{Kw (Two-Phase)} = \frac{\text{Volts} \times \text{Amps} \times \text{Power Factor} \times 1.42}{1000}$$

$$\text{Kw (Three-Phase)} = \frac{\text{Volts} \times \text{Amps} \times \text{Power Factor} \times 1.73}{1000}$$

$$\text{Power Factor} = \frac{\text{Kilowatts}}{\text{Kilovolts} \times \text{Amperes}}$$

CONVERSION FACTORS

	MULTIPLY	BY	TO OBTAIN
Length	Meters	3.281	Feet
	Meters	39.37	Inches
	Inches	.0254	Meters
	Feet	.3048	Meters
	Millimeters	.0394	Inches
Torque	Newton-Meters	.7376	Ft-Lb
	Ft-Lb	1.3558	Newton-Meter
	In-Lb	.08333	Ft-Lb
	Ft-Lb	12.00	In-Lb
Rotation	RPM	6.00	Degrees/Sec.
	RPM	.1047	Rad./Sec.
	Degrees/Sec.	.1667	RPM
	Rad./Sec.	9.549	RPM
Moment of Inertia	Newton-Meters ²	2.42	Lb-Ft ²
	Oz-In ²	.000434	Lb-Ft ²
	Lb-In ²	.00694	Lb-Ft ²
	Slug-Ft ²	32.17	Lb-Ft ²
	Oz-In-Sec ²	.1675	Lb-Ft ²
	Lb-In-Sec ²	2.68	Lb-Ft ²
Power	Watts	.00134	HP
	Lb-Ft/Min	.0000303	HP
Temperature	Degree C - (Degree F - 32) x 5/9		
	Degree F - (Degree C x 9/5) + 32		

MECHANICAL APPLICATION FORMULAS



MECHANICAL FORMULAS

HOW TO CALCULATE TORQUE

If the horsepower and base speed of a motor are known, the full-load torque of the motor is determined by:

$$T = \frac{5250 \times \text{HP}}{N}$$

Where, T = Torque (Ft-Lb)

HP = Horsepower

N = Base Speed of Motor (RPM)

HOW TO CALCULATE HORSEPOWER

For Rotating Objects:

$$\text{HP} = \frac{TN}{63,000}$$

Where, T = Torque (In-Lb)

N = Speed (RPM)

OR:

$$\text{HP} = \frac{TN}{5250}$$

Where, T = Torque (Ft-Lb)

N = Speed (RPM)

For Objects in Linear Motion:

$$\text{HP} = \frac{FV}{396,000}$$

Where, F = Force (Lb)

V = Velocity (Inches/Minute)

OR:

$$\text{HP} = \frac{FV}{33,000}$$

Where, F = Force (Lb)

V = Velocity (FPM)

For Pumps:

$$\text{HP} = \frac{(\text{GPM}) \times (\text{Head in Feet}) \times (\text{Specific Gravity})}{3950 \times (\text{Efficiency of Pump})}$$

For Fans and Blowers:

$$\text{HP} = \frac{\text{CFM} \times (\text{Pressure in Lbs/Sq Ft})}{33,000 \times \text{Efficiency}}$$

Time for motor to reach operating speed (seconds):

$$\text{Seconds} = \frac{WK^2 \times \text{Speed Change}}{308 \times \text{Avg. Accelerating Torque}}$$

WK^2 = Inertia of Rotor + Inertia of Load. (LB-FT)²

$$\text{Average Accelerating Torque} = \frac{(\text{FLT} + \text{BDT}) + \text{BDT} + \text{LRT}}{3}$$

FLT = Full Load Torque

BDT = Breakdown Torque

LRT = Locked Rotor Torque

$$\text{Load } WK^2 \text{ (at Motor Shaft)} = \frac{WK^2 \text{ (Load)} \times \text{Load RPM}^2}{\text{Motor RPM}^2}$$

$$\text{Shaft Stress (Lbs/Sq In)} = \frac{\text{HP} \times 321,000}{\text{RPM} \times \text{Shaft Diameter}}$$

Speed:

$$\text{Synchronous RPM} = \frac{\text{Hertz} \times 120}{\text{Poles}}$$

$$\text{Percent Slip} = \frac{\text{Synchronous RPM} - \text{Full Load RPM}}{\text{Synchronous RPM}} \times 100$$

APPLICATION GUIDE BY INDUSTRY REQUIREMENTS

The chart on these pages provides requirements — such as HP range, speed range, load type and torque — when applying AC drives to industrial machinery, including pumps, fans, conveyors or extruders, to name a few, in a variety of industries. It also provides recommended control types for all listed applications: Volts per Hertz, Sensorless Vector, and Flux Vector.

	Application Requirements						Control Type		
	Typical HP Range	Speed Range	Load Type	Regen Loading (NR/RG)	Starting Torque (%)	Running Torque (%)	Volts per Hertz	Sensorless Vector	Flux Vector
Automotive Testing									
Chassis Testers	100-400	10:1	CT	RG	150	150		X	X
Conveyors	5-250	3:1	CT	NR	150	125	X	X	
Engine Testers	50-400	10:1	CT	RG	150	150		X	X
Fans	5-400	3:1	VT	NR	25	110	X	X	
Pumps	5-400	3:1	VT	NR	40	100	X	X	
Transmission Testing	5-400	10:1	CT	RG	150	150		X	X
Cement									
Conveyors/Feeders	10-150	10:1	CT	NR/RG	150	150	X	X	X
Fans	10-400	3:1	VT	NR	25	25	X	X	
Kilns	150-400	5:1	CT	NR	250	250	X	X	X
Packers/Separators	150-400	5:1	CT	NR	150	150	X	X	X
Pumps	10-500	3:1	VT	NR	150	150	X	X	X
Food									
Capper	5-100	10:1	CT	NR	50	100	X	X	X
Centrifuge	10-200	10:1	CT	RG	150	125	X	X	X
Conveyers	1-25	10:1	CT	NR	150	125	X	X	X
Extruder	5-100	10:1	CT	NR	150	125	X	X	X
Fans	10-100	3:1	VT	NR	25	110	X	X	
Kettle Cooker	10-200	10:1	CT	NR	100	110	X	X	X
Mixers	1-400	10:1	CT	NR	150	125	X	X	X
Pumps	10-100	3:1	VT	NR	40	100	X	X	
Seamer	5-50	10:1	CT	NR	40	100	X	X	X
Slicer	5-50	10:1	CT	NR	40	100	X	X	X
Glass									
Float Liners	50-250	20:1	CT	NR	150	125		X	X
Rubber Tire Gantry Cranes	20-300	20:1	CT	NR/RG	150	150			X
Quay Cranes	25-400	20:1	CT	RG	150	150			X
Metals									
Adjustment Drives	1-25	100:1	CT	RG	150	150		X	X
Coiler(s)	100-400	4:1	CT	RG	175	175		X	X
Conveyors	10-400	10:1	CT	NR	150	125	X	X	X
Crop Shear	100-400	4:1	CT	NR/RG	450	450		X	X
Fans-boilers, Oven	150-400	3:1	VT	NR	25	110	X	X	
Helper Rolls	5-25	100:1	CT	RG	100	150		X	X
Low Hp Auxiliary Drives	15-400	20:1	CT	RG	200	200		X	X
Material Handling	5-50	10:1	CT	RG	100	150		X	X
Pumps & Fans	5-300	4:1	VT	NR	100	100	X	X	
Runout Tables (multi-mtr)	100-400	20:1	CT	RG	200	200		X	X
Slitters & Trimmers	10-100	10:1	CT	RG	150	150		X	X
Table Drives	10-400	10:1	CT	NR	150	125	X	X	X
Mining									
Conveyors	100-400	10:1	CT	NR/RG	150	150	X		X
Fans	10-400	3:1	VT	NR	25	25	X	X	
Grinders, Crushers	100-400	10:1	CT	NR/RG	150	150	X	X	
Pumps	10-400	3:1	VT	NR	40	40	X	X	

APPLICATION GUIDE BY INDUSTRY REQUIREMENTS

	Application Requirements						Control Type		
	Typical HP Range	Speed Range	Load Type	Regen Loading (NR/RG)	Starting Torque (%)	Running Torque (%)	Volts per Hertz	Sensorless Vector	Flux Vector
Misc.									
Elevators	1-150	10:1	CT	RG	275	275			X
Wind Tunnels	5-400	10:1	VT	RG	50	125	X	X	
Pulp & Paper									
Boiler Fans	50-400	3:1	VT	NR	25	110	X	X	
Calenders	25-400	10:1	CT	NR	150	110	X	X	X
Dry End Paper Machine	5-400	10:1	CT	RG	100	200		X	X
Fans & Pumps	20-400	3:1	VT	NR	25	100	X	X	
Paper Converting-Transport	3-150	10:1	CT	NR/RG	150	150	X	X	X
Paper Rolls	2-25	10:1	CT	NR/RG	50	150		X	X
Pumps: Feed, Couch Pit Liquor, Water	5-400	3:1	VT	NR	40	100	X	X	
Pumps-Thickeners, Fans, Decker, Washer	5-400	3:1	CT	NR	150	125	X	X	X
Screw Conveyors	15-400	10:1	CT	NR	150	125	X	X	X
Slitters	5-50	10:1	CT	NR	25	100	X	X	X
Wet End Paper Machine	100-400	10:1	CT	NR	100	150		X	X
Winder Auxiliaries	5-100	20:1	CT	RG	50	150		X	X
Winder Drums	50-400	20:1	CT	RG	100	200		X	X
Winder/Unwind	100-400	20:1	CT	RG	100	200		X	X
Petrochemical									
Beam Pump (Pump Jack)	5-400	3:1	CT	RG	100	125	X	X	X
Compressors	50-400	3:1	VT	NR	40	100	X	X	
Progressive Cavity Pump	5-400	3:1	CT	NR	100	125	X	X	X
Rubber/Plastics									
Calenders, Mills	25-400	10:1	CT	RG	200	150		X	X
Compressors	10-400	3:1	VT	NR	40	100	X	X	
Conveyors	1-100	10:1	CT	NR	150	125	X	X	X
Extruders, Mixers	5-400	10:1	CT	NR	200	200	X	X	X
Fans	10-400	3:1	VT	NR	25	110	X	X	
Pelletizers	25-400	10:1	CT	NR	150	125	X	X	X
Process-Transport Rolls	1-400	10:1	CT	RG	50	150		X	X
Textiles									
Fans	5-400	10:1	CT	NR	25	110	X	X	X
Fiber Spinning	1-400	10:1	CT	NR	20	100	X	X	X
Processes-Coordinated									
Range Drives	50-400	10:1	CT	NR	150	150		X	X
Transport Rolls	10-400	20:1	CT	RG	150	150		X	X
Water/Wastewater									
Chemical Feed Pumps	1-150	3:1	VT	NR	40	40	X	X	
Fans	5-400	3:1	VT	NR	25	25	X	X	
Fresh Water Pumps	10-400	3:1	VT	NR	40	40	X	X	
Heating & Ventilation	5-400	3:1	VT	NR	25	25	X	X	
Lift Stations	5-400	3:1	VT	NR	40	40	X	X	
Slurry Pumps	5-400	3:1	VT	NR	150	150	X	X	
Waste Water Pumps	10-400	3:1	VT	NR	40	40	X	X	

AC DRIVE PRODUCT MATRIX

The matrix on this page lists all TB Wood's AC Drive products and provides HP ratings, available voltages and enclosure styles, as well as the key features of each product.

Product	HP-CT*	HP-VT*	Available Voltages	Enclosure Styles	Functionality	When to Sell / Key Features
SE1	0.5-1.5 0.5-3 1-5	0.5-1.5 0.5-3 1-5	115 230 460	IP20 NEMA 12	Basic	Basic Drive Small Size DIN Rail Option
SW1	0.5-1.5 0.5-7.5 1-50	0.5-1.5 0.5-7.5 1-50	115 230 460	IP20	Basic	Basic Drive Small Size Built-in DB transistor IR Port Advanced Options Available DIN Rail Option
X4	1 1-15 1-50 1-50	1 1-15 1-50 1-50	115 230 460 575	NEMA 4X/IP66 NEMA 12 / IP55 (125+ HP)	Full	NEMA 4X, NEMA 12 Applications Easy Set-up Macros SVC & V/Hz Applications Program Sequencer Programmable Display Dynamic Braking Standard High-pressure Washdown Convection Cooling Applications
X5	5-30 5-200 5-200	5-30 5-200 5-200	230 460 575	NEMA 4X /IP66 NEMA 12 / IP55 (125+ HP)	Advanced	High pressure washdown SVC & V/Hz applications Real-time clock functions Optional communications USB memory functions Advanced PLC type sequencer Optional Closed Loop speed control
WF2	1 1-30 1-150 1-150	1 1-30 1-150 1-150	115 230 460 575	NEMA 12 / IP54	Full	SVC & V/Hz applications NEMA 12 applications Full configurable terminals Serial communications Advanced Program Sequencer

*X4 Drives rated Normal Duty & Heavy Duty see page 11 for explanation

AC drive applications come in all shapes and sizes but they are grouped into one of three basic categories: Constant Torque, Variable Torque or Constant Horsepower. Each system has unique characteristics and sizing of the drive is dependent on the application type as well as the specific characteristics of the given load. A look at each type will help determine in which application category your machine resides.

Constant Torque

Constant torque applications are the most common type of load. The basic characteristic is that load demands are the same throughout the designed speed range of the machine. The drive system, consisting of the AC drive and motor, can supply constant torque because the motor can deliver the required horsepower proportional to the speed across the operating range. Matching drive and motor performance is essential to making sure you have enough power for the application. Constant torque loads are found in most industrial environments. Applications such as conveyers, positive displacement pumps, extruders, and hoists are good examples of this loading characteristic. Overloads, shock loading and high-inertia loads are also potential loading issues that are found in constant torque applications. This is where the issue of Normal Duty versus Heavy Duty comes into play.

Three basic characteristics are true for constant torque applications:

1. The same amount of torque is needed to move the load regardless of the operating speed.
2. The load usually requires more torque to break the load loose and start the load moving than to keep it moving.
3. The load has the potential to exceed the motor power rating during operation.

Variable Torque

Fans and centrifugal pumps comprise the majority of loads found in the variable torque group. In a fan application, the torque demand will vary with the square of the change in speed and the power requirement will vary as the cube of the change in speed. At full speed, the load requirement is 100% torque and power, but a 50% change in speed creates a 75% decrease in torque demand and a 88% decrease in power required. Fans will occasionally have inertia issues that must be overcome on starting.

Pumps have a similar load characteristic, but often have static pressure issues that must be overcome by the motor making them a little stubborn to start.

For this reason, AC drives are excellent solutions for control of variable torque applications and provide both energy savings and a payback on the drive cost over a short time frame. It is important to look at the load inertia of a fan or the static pressure issues of a pump to consider the overall torque requirements and the short term overload requirements of the load.

Constant Horsepower

Sizing a drive on a constant horsepower application is the most difficult of the three types of applications. In this application type, the speed and torque demands have an inverse relationship. Torque demand is high at low speeds and is low at high speeds. Typical applications, such as center winders and some machine tools, require additional care when selecting a drive/motor combination. Sizing a drive/motor combination for any application is based on the torque demand both at starting and during operating speeds. But you must also account for the designed speed range and torque capacity of the motor. All AC motors have a designed operating range in which they can develop the optimum torque capacity based on the horsepower nameplate rating. Motors operating outside this designed speed range will not develop the torque required for the application. The current demand of the motor to develop this torque is the point at which the drive must be sized. Although drives are rated in horsepower, current capacity will be the deciding factor for reliable operation.

Drive Overload Capacity

Each of the Load Characteristics list describe controlling a load from zero to the base speed of the motor. During acceleration and when extra load is momentarily applied, the demand on the motor and drive can exceed 100% of the capacity of the pair. Every drive and motor has overload capacity built into it for these occasions and the drives are self-protected to prevent damage. Drives like the X4 and X5 have a dual rating from an overload perspective. Both a Normal Duty (ND) and a Heavy Duty rating are available on each model. Repeated fast speed changes with high-inertia loads, excessive static friction, short term overloads, shock loading, or in the case of pumps, static pressure loads are potential reasons that might drive you to choose the heavy duty rating of the inverter for sizing purposes. If there are no such issues, sizing the drive based on the normal duty rating is appropriate. These ratings difference are represented as:

- Normal Duty – 120% of nominal current for 60 seconds
- Heavy Duty – 150% of nominal current for 60 seconds

TB WOOD'S AC DRIVE PRODUCTS INTRODUCTION



AC Drive Products

TB Wood's AC Drives are compact, high-performance, full-featured products. All TB Wood's Drives offer control features such as:

- Rugged protection capabilities
- Digital programming
- Manual keypad control
- Operator terminal strip
- Compact, industrial enclosures
- Dynamic braking
- Flexible interfaces

For a quick overview of the key features of each AC Drive product, see the Product Matrix on page 10.

Here is a complete TB Wood's line of AC Drives.

Drive	Pages
SE1 IP20 Micro AC Drive	14 – 17
SE1 NEMA 12 Micro AC Drive	18 – 21
SW1 IP20 Micro AC Drive	22 – 26
X4 Sensorless Vector AC Drive	28 – 31
X5 UltraFlex AC Drives	32 – 35
WF2 Sensorless Vector AC Drive	36 – 39

If you have any questions regarding these products, or about which is appropriate for your application needs, contact your local TB Wood's sales representative, check our Web site at www.tbwoods.com or call 888-TBWOODS.



PRODUCT SECTION EXAMPLES AND MODEL NUMBER EXPLANATION

How To Use This Section

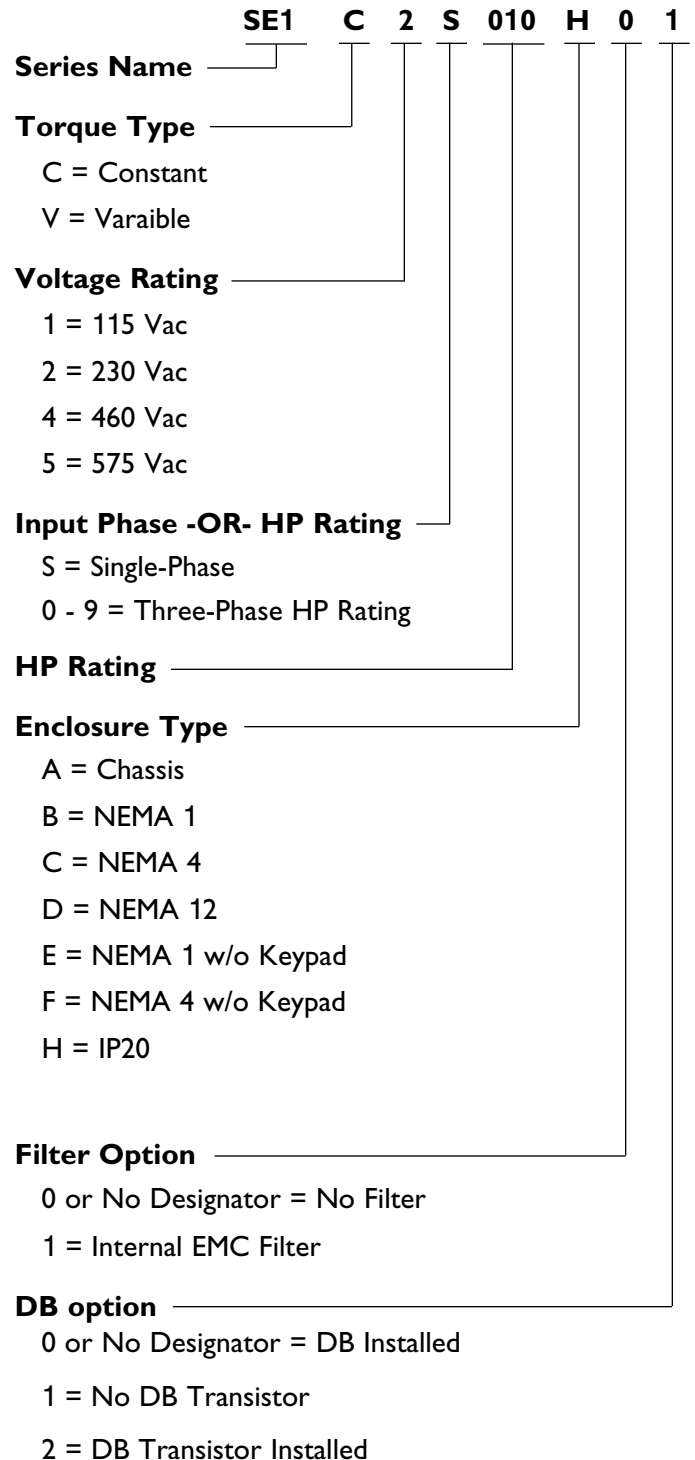
Each AC Drive product section consists of four pages that provide information about applications, features and benefits, specifications, general information such as model numbers, dimensions and options.

This easy-to-follow format prompts you **Where to Find:**

- **Application Information** – The first page of each product section summarizes appropriate applications for the drive and provides other useful information to help you determine if the drive is right for your need.
- **Features & Benefits** – The first page also includes a succinct list of the drive's key features, along with the benefit of the feature.
- **Specifications** – The second page of each product section includes environmental, electrical, and control feature specifications for the drive.
- **General Information** – The third page of each product section provides model numbers, constant and variable torque HP, kW, input and output current, dimensional data, and weight for the drive.
- **Options** – The fourth page of each product section lists options available for the drive, along with a brief explanation.

Model Number Explanation

TB Wood's AC Drive model numbers are created using an intelligent part-numbering system. Model numbers for each drive product are listed in the left column of the grid located on the third page of each product section. The following diagram is an example of how to construct an AC Drive model number.



TB WOOD SE1 IP20 MICRO AC DRIVE



HP Range	Voltage Range	Input Range
0.5 – 1.5 HP	115 Vac	1 Phase
0.5 – 3 HP	230 Vac	1 Phase
1 – 5 HP	460 Vac	3 Phase

Overload Capacity – 150% for 60 seconds and 175% for momentary overloads.



Applications

Economical SE1 Simple Economy Micro AC Drives are simple to install and use. Ideal for basic industrial applications — such as fans, pumps, conveyors and mixers — this micro drive provides improved operating efficiency with 5:1 constant torque Volts/Hertz control for single or multiple motors. Compact and reliable, SE1 AC Drives deliver cost-effective flexibility.

Features & Benefits

Simple to Operate – The SE1’s first 13 parameters meet 80% of the most common application needs. The SE1 comes with a useful Help Card to define each parameter. If additional parameters are needed, entering a password in parameter 14 provides access to a second level of 26 parameters – for a total of 40 parameters.

Benefit – The SE1 is simple to set up and use. The Help Card identifies default wiring connections.

Power – Horsepower ratings reflect the SE1’s overload capacity of 150% for one minute and up to 175% for momentary overloads in constant-torque applications.

Benefit – Exceeds expectations for basic applications and delivers more power at a lower cost.

Packaging – The SE1 includes a six-LED display and five-button keypad with tactile feel, contactor-style design and easy-access control wiring. SE1 AC Drives come in IP20 enclosures.

Benefit – The LED display and five-button keypad facilitate setup and operation. Contactor-style design allows easy access for both AC input and motor output wiring, minimizing mistakes during installation. Easy-access control wiring accommodates inspection of terminals.

Global Design – SE1 Drives meet UL, cUL, CE* and C-Tick standards.

Benefit – Ensures compliance with global systems.
* Consult with TB Wood’s about compliance with European CE standards when using SE1 AC Drives with integrated RFI filters that meet industrial standards.

SE1 IP20 MICRO AC DRIVE SPECIFICATIONS

Environmental Specifications

Operating temperature	50° C; derate output current 5% per °C above maximum ambient
Storage temperature	-40° C to +60° C
Humidity	0% to 95% non-condensing
Maximum altitude	Derate 1% per 300 feet (100 meters) above 3,300 feet (1,000 meters)
Cooling	Convection & Forced Air (HP dependent)

Electrical Specifications

Input voltage ± 10%	115 Vac; 220-240 Vac; 380-480 Vac
Line frequency	48 Hz to 62 Hz
Source kVA (maximum)	10 times the inverter's kVA rating
Control system	Volts per Hertz Pulse Width Modulation; 1 to 16 kHz
Output voltage	0% to 100% of Line Voltage
Overload capacity	150% for 1 minute; 175% for 2 seconds
Frequency range	1 to 500 Hertz
Frequency setting	By keypad, speed pot or external signal (0 to 10 Vdc; 4 to 20 mAdc)

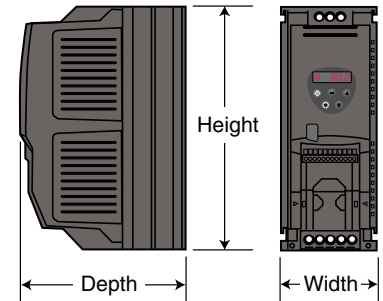
Control Feature Specifications

Analog reference input	Qty. 1; 0 to 10 Vdc; 4 to 20 mAdc
Digital inputs	Qty. 3 configurable inputs; SE1 active high
Digital supply output	10 Vdc self-sourcing
Preset frequencies	2 inputs for up to 4 preset speeds (selectable)
Digital output	1 relay output, 30 Vdc @ 5 Amps; 240 Vac @ 5 Amps
Analog output	Qty. 1; 0 to 10 Vdc; Motor Speed, Motor Current, Drive Enabled and Speed Reference selections
DC injection braking	0.1% to 20% of line voltage; 0 to 250 seconds
Current limit/Overload	150% for 1 minute, 175% for 2 seconds; Setting 25% to 100% of Drive Current Rating
Speed ramps	Qty. 1; Accel and Decel; independent 0 to 3,000 second settings
Voltage boost	0 to 25% of maximum output voltage
Voltage characteristic	Linear and Squared with user-defined volts/hertz ratio points
Protective features	15 fault codes; Overcurrent, Overload, Overvoltage, Undervoltage, Overtemp, Serial Communications Loss, Brake Resistor Overload, Brake Resistor ShortCircuit, Power Stage Fault, EPROM Fault, External Fault, and Phase Loss

SE1 IP20 MICRO AC DRIVE GENERAL INFORMATION

Dimensions

	Frame Size 1		Frame Size 2	
	Inches	mm	Inches	mm
Height	6.10	155	10.24	260
Width	3.15	80	3.94	100
Depth	5.12	130	6.89	175
Weight: lbs (kg)	2.42	1.1	5.72	2.6



Model Number*	Constant Torque HP	Variable Torque HP	kW	Max. Input Current (Amps)	Max. Output Current (Amps) 3-Phase Output ONLY	Dimensional Data		Weight (lbs)
115 Volts AC, +/- 15%, Single-Phase Input								
Model -01 Without CE Filter	Constant Torque HP	Variable Torque HP	kW	115 Vac	230 Vac	Frame	Dimensions (inches)	Weight
SE1C1S005H01	0.5	0.5	0.37	5.1	2.3	1	6.1 x 3.15 x 5.12	2.42
SE1C1S010H01	1	1	0.75	10.7	4.3	1	6.1 x 3.15 x 5.12	2.42
SE1C1S015H01	1.5	1.5	1.1	10.7	4.8	2	10.2 x 3.94 x 6.89	5.72
220 - 240 Volts AC, +/- 10%, Single-Phase Input								
Model -01 Without CE Filter	Constant Torque HP	Variable Torque HP	kW	240 Vac	240 Vac	Frame	Dimensions (inches)	Weight
SE1C2S005H01	0.5	0.5	0.37	5.1	2.3	1	6.1 x 3.15 x 5.12	2.42
SE1C2S010H01	1	1	0.75	10	4.3	1	6.1 x 3.15 x 5.12	2.42
SE1C2S020H01	2	2	1.5	16	7	2	10.24 x 3.94 x 6.89	5.72
SE1C2S030H01	3	3	2.2	22	10.5	2	10.24 x 3.94 x 6.89	5.72
380 - 480 Volts AC, +/- 10%, Three-Phase Input								
Model -01 Without CE Filter	Constant Torque HP	Variable Torque HP	kW	480 Vac	480 Vac	Frame	Dimensions (inches)	Weight
SE1C40010H01	1	1	0.75	2.3	2.2	1	6.1 x 3.15 x 5.12	2.42
SE1C40020H01	2	2	1.5	4.3	4.1	1	6.1 x 3.15 x 5.12	2.42
SE1C40030H01	3	3	2.2	6.3	5.8	2	10.24 x 3.94 x 6.89	5.72
SE1C40050H01	5	5	4	10	9.5	2	10.24 x 3.94 x 6.89	5.72

Model Number*	Constant Torque HP	Variable Torque HP	kW	Max. Input Current (Amps)	Max. Output Current (Amps) 3-Phase Output ONLY	Dimensional Data		Weight (lbs)
SE1 with RFI filter meets both Industrial and Residential European CE Standards								
220 - 240 Volts AC, +/- 10%, Single-Phase Input								
Model -11 With CE Filter	Constant Torque HP	Variable Torque HP	kW	240 Vac	240 Vac	Frame	Dimensions (in)	Weight
SE1C2S005H11	0.5	0.5	0.37	5.1	2.3	1	6.1 x 3.15 x 5.12	2.42
SE1C2S010H11	1	1	0.75	10	4.3	1	6.1 x 3.15 x 5.12	2.42
SE1C2S020H11	2	2	1.5	16	7	2	10.24 x 3.94 x 6.89	5.72
SE1C2S030H11	3	3	2.2	22	10.5	2	10.24 x 3.94 x 6.89	5.72
SE1 with RFI filter meets both Industrial and Residential European CE Standards								
380 - 480 Volts AC, +/- 10%, Three-Phase Input								
Model -11 With CE Filter	Constant Torque HP	Variable Torque HP	kW	480 Vac	480 Vac	Frame	Dimensions (in)	Weight
SE1C40010H11	1	1	0.75	2.3	2.2	1	6.1 x 3.15 x 5.12	2.42
SE1C40020H11	2	2	1.5	4.3	4.1	1	6.1 x 3.15 x 5.12	2.42
SE1C40030H11	3	3	2.2	6.3	5.8	2	10.24 x 3.94 x 6.89	5.72
SE1C40050H11	5	5	4	10	9.5	2	10.24 x 3.94 x 6.89	5.72

SE1 IP20 MICRO AC DRIVE

DIN Rail Mounting Kits

Part Number: SDIN1

(For Size 1 models)

Part Number: SDIN2

(For Size 2 models)

Mounting brackets included in these kits attach to the drive to enable standard DIN rail mounting, which provides quick and simple mechanical installation.



Dual Analog Input

Part Number: SPC01

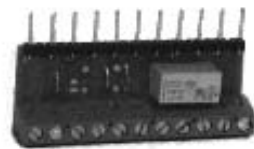
This option enables the connection of two analog signals to the SE1 Micro AC Drive. Inputs can be used simultaneously or switched between voltage and current for “Auto/Manual” modes using the D3 input. Both analog inputs have a 12-bit resolution.



Dual Relay Output

Part Number: SPC02

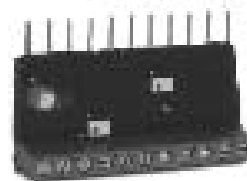
This option provides a second digital relay output from the SE1 Micro AC Drive. The analog output is converted to a Form A relay output rated for 230 Vac, 5 Amps and can be configured using parameter 18.



PI Control

Part Number: SWPC03

This option board provides a setpoint (PI) controller function to the SE1 Micro AC Drive. With adjustable P and I gain controls, the option makes it easy to configure and run basic applications. The setpoint can be from either an on-board potentiometer, or analog inputs at either 0-10 Vdc or 4-20 mA. The feedback signal can also be either 0-10 Vdc or 4-20 mA.





SE1 NEMA 12 MICRO AC DRIVE



HP Range	Voltage Range	Input Range
0.5 – 1.5 HP	115 Vac	1 Phase
0.5 – 3 HP	230 Vac	1 Phase
1 – 5 HP	460 Vac	3 Phase

Overload Capacity – 150% for 60 seconds and 175% for momentary overloads.



Applications

In the Wood's tradition, our newest AC drives are simple to operate, economical to use and better protected.

The SE1 NEMA 12, in its tough enclosure for stand-alone jobs, still has the same basic programming and operation that have made our SE1 IP20 models a popular choice for panel mount applications.

The SE1 NEMA 12 offering gives the user a choice. For

most stand alone applications, the stock keypad-operation version will give the most economical solution to the user. A Switched version offers a manual speed control potentiometer, Forward/Stop/Reverse switch and a full-rated, lockable input power disconnect switch, plus our standard keypad — no need for additional controls! The Switched version is available by special order only, consult factory.

Features & Benefits

Simple to Operate – The SE1's first 13 parameters meet 80% of the most common application needs. If additional parameters are needed, entering a password in parameter 14 provides access to a second level of 26 parameters – for a total of 40 parameters.

Benefit – The SE1 NEMA 12 models are simple to set up and use. The six-digit display and standard keypad speed setup and operation. The optionally available switched model adds an FWD/Stop/REV switch, manual speed control and a full-rated input power disconnect to make the drive truly "stand alone."

Power – Horsepower ratings reflect the SE1's overload capacity of 150% for one minute and up to 175% for momentary overloads in constant-torque applications.

Benefit – Exceeds expectations for basic applications and delivers more power at a lower cost.

Packaging – The SE1 includes a six-LED display and five-button keypad with tactile feel, contactor-style design and easy-access control wiring. SE1 NEMA 12 AC Drives features our rugged NEMA 12/IP55 enclosure.

Benefit – The LED display and five-button keypad facilitate setup and operation. Contactor-style design allows easy access for both AC input and motor output wiring, minimizing mistakes during installation. Easy-access control wiring accommodates inspection of terminals.

Global Design – SE1 NEMA12/IP55 Drives meet UL, cUL, CE* and C-Tick standards.

Benefit – Ensures compliance with global systems.
* Consult with TB Wood's about compliance with European CE standards when using SE1 AC Drives with integrated RFI filters that meet industrial standards.

SE1 NEMA 12 MICRO AC DRIVE SPECIFICATIONS

Environmental Specifications

Operating temperature	40°C
Storage temperature	-40° C to +60° C
Humidity	0% to 95% non-condensing
Maximum altitude	Derate 1% per 300 feet (100 meters) above 3,300 feet (1,000 meters)
Cooling	Convection

Electrical Specifications

Input voltage ± 10%	115 Vac; 220-240 Vac; 380-480 Vac
Line frequency	48 Hz to 62 Hz
Source kVA (maximum)	10 times the inverter's KVA rating Max
Control system	Voltage Vector PWM
Output voltage	0% to 100% of Line Voltage (0-230 Vac for 115 Vac drives)
Overload capacity	150% for 1 minute; 175% for 2 seconds
Frequency range	1 to 500 Hertz
Frequency setting	By keypad or external signal

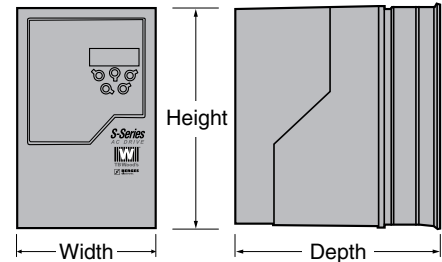
Control Feature Specifications

Analog reference input	Qty. 1; 0-10 or 10-0 Vdc; 0/4-20 or 20-4 mAdc
Digital inputs	Qty. 3 configurable inputs active high
Digital supply output	10 Vdc 30 mA max.
Preset frequencies	2 inputs for up to 4 preset speeds
Digital output	1 NO relay output, 30 Vdc @ 5 Amps; 240 Vac @ 6 Amps
Analog output	Qty. 1; 0 to 10 Vdc; 4 Selections
Speed ramps	Qty. 1; Accel and Decel; 0 to 3,000 Sec.
Voltage characteristic	User-defined Linear and Squared
Protective features	15 fault codes; Overcurrent, Overload, Overvoltage, Undervoltage, Overtemp, Serial Communications Loss, Brake Resistor Overload, Brake Resistor ShortCircuit, Power Stage Fault, EPROM Fault, External Fault, and Phase Loss

SE1 NEMA 12 MICRO AC DRIVE GENERAL INFORMATION

Dimensions

	Frame Size 1		Frame Size 2	
	Inches	mm	Inches	mm
Height	7.87	200.0	12.20	310.0
Width	5.51	140.0	6.49	164.8
Depth	6.38	162.0	6.83	176.0
Weight: lbs (kg)	5.06	2.3	9.90	4.50



Model Number* (1)	Constant Torque HP	Variable Torque HP	kW	Max. Input Current (Amps)	Max. Output Current (Amps) 3-Phase Output ONLY	Dimensional Data		Weight (lbs)
115 Volts AC, +/- 15%, Single-Phase Input								
	Constant Torque HP	Variable Torque HP	kW	115 Vac	230 Vac	Frame	Dimensions (inches)	Weight
SE1C1S005D01	0.5	0.5	0.37	5.1	2.3	1	7.87 x 5.51 x 6.68	5.06
SE1C1S010D01	1	1	0.75	10.7	4.3	1	7.87 x 5.51 x 6.68	5.06
SE1C1S015D01	1.5	1.5	1.1	10.7	5.8	2	12.20 x 6.49 x 6.83	9.90
220 - 240 Volts AC, +/- 10%, Single-Phase Input								
	Constant Torque HP	Variable Torque HP	kW	240 Vac	240 Vac	Frame	Dimensions (inches)	Weight
SE1C2S005D01	0.5	0.5	0.37	5.1	2.3	1	7.87 x 5.51 x 6.68	5.06
SE1C2S010D01	1	1	0.75	10	4.3	1	7.87 x 5.51 x 6.68	5.06
SE1C2S020D01	2	2	1.5	16	7	1	7.87 x 5.51 x 6.68	5.06
SE1C2S030D01	3	3	2.2	22	10.5	2	12.20 x 6.49 x 6.83	9.90
380 - 480 Volts AC, +/- 10%, Three-Phase Input								
	Constant Torque HP	Variable Torque HP	kW	480 Vac	480 Vac	Frame	Dimensions (inches)	Weight
SE1C40010D01	1	1	0.75	2.3	2.2	1	7.87 x 5.51 x 6.68	5.06
SE1C40020D01	2	2	1.5	4.3	4.1	1	7.87 x 5.51 x 6.68	5.06
SE1C40030D01	3	3	2.2	6.3	5.8	2	12.20 x 6.49 x 6.83	9.90
SE1C40050D01	5	5	4	10	9.5	2	12.20 x 6.49 x 6.83	9.90

* See page 13 for complete explanation of model number designations.

(1) All models are available with a Line Power Disconnect Switch, Forward/Stop/Reverse Switch and Manual Speed Potentiometer in addition to the standard keypad. These models are designated by the addition of an 'S' to the part number. For example, a "Switched" version of a 1 HP 460 Vac SE1 (SE1C40010D01) would be SE1C40010D01S. These are available by special order only.

SE1 NEMA 12 MICRO AC DRIVE

Dual Analog Input

Part Number: SPC01

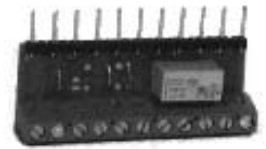
This option enables the connection of two analog signals to the SE1 Micro AC Drive. Inputs can be used simultaneously or switched between voltage and current for “Auto/Manual” modes using the D3 input. Both analog inputs have a 12-bit resolution.



Dual Relay Output

Part Number: SPC02

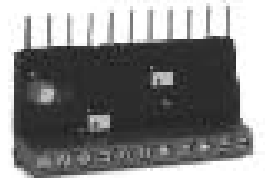
This option provides a second digital relay output from the SE1 Micro AC Drive. The analog output is converted to a Form A relay output rated for 230 Vac, 5 Amps and can be configured using parameter 18.



PI Control

Part Number: SWPC03

This option board provides a setpoint (PI) controller function to the SE1 Micro AC Drive. With adjustable P and I gain controls, the option makes it easy to configure and run basic applications. The setpoint can be from either an on-board potentiometer, or analog inputs at either 0-10 Vdc or 4-20 mA. The feedback signal can also be either 0-10 Vdc or 4-20 mA.





SW1 IP20 MICRO AC DRIVE



HP Range	Voltage Range	Input Range
0.5 – 1.5 HP	115 Vac	1 Phase
0.5 – 2 HP	230 Vac	1 Phase
3 – 7.5 HP	230 Vac	3 Phase
1 – 50 HP	460 Vac	3 Phase

Overload Capacity – 150% for 60 seconds and 175% for momentary overloads.



Applications

Economical SW1 Simple Wireless Micro AC Drives are simple to install and use, with the added bonus of wireless data transfer capabilities. SW1 Micro AC Drives are designed for easy integration into control panels and systems. Ideal for basic industrial applications — such as fans, pumps, conveyors and mixers — this

micro drive provides improved operating efficiency with 10:1 constant torque Volts/Hertz control for single or multiple motors. Compact and reliable, SW1 Micro AC Drives deliver cost-effective flexibility.

Features & Benefits

Simple to Operate – The SW1’s first 13 parameters meet 80% of the most common application needs. The SW1 comes with a useful Help Card to define each parameter. If additional parameters are needed, entering a password in parameter 14 provides access to a second level of 26 parameters — for a total of 40 parameters.

Benefit – The SW1 is simple to set up and use. The Help Card identifies default wiring connections.

Wireless Optical Interface – Enables wireless data transfer of SW1 Drive settings by using PDA-trAC® software for Pocket PC and Palm OS.

Benefit – Users can upload, download, edit and save drive parameters accurately, quickly, and conveniently without cables or special adaptors.

Power – Horsepower ratings reflect the SW1’s overload capacity of 150% for one minute and up to 175% for momentary overloads in constant-torque applications.

Benefit – Exceeds expectations for basic applications and delivers more power at a lower cost.

Packaging – The SW1 includes a six-LED display and five-button keypad with tactile feel, contactor-style design and easy-access control wiring. TB Wood's SW1 Micro AC Drives come with finger-safe IP20 enclosures for panel mounting.

Benefit – The LED display and five-button keypad facilitates setup and operation. Contactor-style design allows easy access for both AC input and motor output wiring, minimizing mistakes during installation. Easy-access control wiring accommodates inspection of terminals.

Global Design – SW1 AC Drives meet UL, cUL, CE* and C-Tick standards.

Benefit – Ensures compliance with global systems. * Consult with TB Wood’s about compliance with European CE standards when selecting the SW1 option of externally mounted RFI filters that meet both industrial and residential standards.

SW1 IP20 MICRO AC DRIVE SPECIFICATIONS

Environmental Specifications

Operating temperature	50° C; derate output current 5% per °C above maximum ambient
Storage temperature	-40° C to +60° C
Humidity	0% to 95% non-condensing
Maximum altitude	Derate 1% per 300 feet (100 meters) above 3300 feet (1,000 meters)
Cooling	Convection & Forced Air (HP dependent)

Electrical Specifications

Input voltage ± 10%	115 Vac; 220-240 Vac; 380-480 Vac
Line frequency	48 Hertz to 62 Hertz
Source kVA (maximum)	10 times the inverter's kVA rating
Control system	Volts per Hertz Pulse Width Modulation; 1 to 16 kHz
Output voltage	0% to 100% of Line Voltage
Overload capacity	150% for 1 minute; 175% for 2 seconds
Frequency range	1 to 500 Hertz
Frequency setting	By keypad, speed pot or external signal (0 to 10 Vdc; 4 to mAdc)

Control Feature Specifications

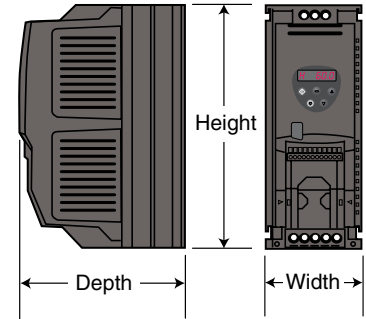
Analog reference signal	Qty 1; 0 to 10 Vdc, 0/4 to 20 mAdc, +/-10 10 Vdc, +/-20 mAdc
Digital inputs	Qty 3 configurable inputs; SW1 active high or low
Digital supply output	10 Vdc self-sourcing
Preset frequencies	2 inputs for up to 4 preset speeds (selectable)
Digital output	1 relay output, 30 Vdc @ 5 Amps; 240 Vac @ 5 Amps
Analog output	Qty 1; 0 to 10 Vdc; Motor Speed, Motor Current, Drive Enabled and Speed Reference selections
DC injection braking	0.1% to 20% of line voltage; 0 to 250 seconds
Current limit/Overload	150% for 1 minute, 175% for 2 seconds; Setting 25% to 100% of Drive Current Rating
Speed ramps	Qty 1; Accel and Decel; independent 0 to 3,000 second settings
Voltage boost	0% to 25% of maximum output voltage
Voltage characteristic	Linear and Squared with user-defined volts/hertz ratio points
Protective features	15 fault codes; Overcurrent, Overload, Overvoltage, Undervoltage, Overtemp, Serial Communications Loss, Brake Resistor Overload, Brake Resistor Short Circuit, Power Stage Fault, EPROM Fault, External Fault, and Phase Loss



SW1 IP20 MICRO AC DRIVE GENERAL INFORMATION

Dimensions

	Frame Size 1		Frame Size 2		Frame Size 3		Frame Size 4	
	Inches	mm	Inches	mm	Inches	mm	Inches	mm
Height	6.10	155	10.24	260	10.24	260	20.5	521
Width	3.15	80	3.94	100	6.73	171	13.4	340
Depth	5.12	130	6.89	175	6.89	175	8.66	220
Weight: lbs (kg)	2.42	1.1	5.72	2.6	11.66	5.3	66	29.9



Model Number*	Constant Torque HP	Variable Torque HP	kW	Max. Input Current (Amps)		Max. Output Current (Amps) Three-Phase Output ONLY		Dimensional Data	Weight (lbs)	
				Single-phase	Three-phase	CT Amps	VT Amps			
115 Volts AC, +/- 15%, Single-Phase Input										
Model Number*	Constant Torque HP	Variable Torque HP	kW	115 Vac		230 Vac	230 Vac	Frame	Dimensions (in)	Weight
SW1C1S005H01	0.5	0.5	0.37	5.1	-	2.3	2.3	1	6.1 x 3.15 x 5.12	2.42
SW1C1S010H01	1	1	0.75	10.7	-	4.3	4.3	1	6.1 x 3.15 x 5.12	2.42
SW1C1S015H02	1.5	1.5	1.1	10.7	-	4.8	4.8	2	10.24 x 3.94 x 6.89	5.72
220 - 240 Volts AC, +/- 10%, Single-Phase Input										
Model Number*	Constant Torque HP	Variable Torque HP	kW	240 Vac		240 Vac	240 Vac	Frame	Dimensions (in)	Weight
SW1C2S005H01	0.5	0.5	0.37	10	-	2.3	2.3	1	6.1 x 3.15 x 5.12	2.42
SW1C2S010H01	1	1	0.75	10	-	4.3	4.3	1	6.1 x 3.15 x 5.12	2.42
SW1C2S020H01	2	2	1.5	16	-	7	7	1	6.1 x 3.15 x 5.12	2.42
220 - 240 Volts AC, +/- 10%, Three-Phase Input										
Model Number*	Constant Torque HP	Variable Torque HP	kW	240 Vac	240 Vac	240 Vac	240 Vac	Frame	Dimensions (in)	Weight
SW1C20020H02	2	2	1.5	16	7.5	7	7	2	10.24 x 3.94 x 6.89	5.72
SW1C20030H02	3	3	2.2	22	11	10.5	10.5	2	10.24 x 3.94 x 6.89	5.72
SW1C20050H02	5 §	7.5	4	40	20	18	25	3	10.24 x 6.73 x 6.89	11.66
SW1C20075H02	7.5 §	10	5.5	52	26	25	29.5	3	10.24 x 6.73 x 6.89	11.66
380 - 480 Volts AC, +/- 10%, Three-Phase Input										
Model Number*	Constant Torque HP	Variable Torque HP	kW		480 Vac	480 Vac	480 Vac	Frame	Dimensions (in)	Weight
SW1C40010H01	1	1	0.75	-	2.3	2.2	2.2	1	6.1 x 3.15 x 5.12	2.3
SW1C40010H02	1	1	0.75	-	2.3	2.2	2.2	1	6.1 x 3.15 x 5.12	2.3
SW1C40020H01	2	2	1.5	-	4.3	4.1	4.1	1	6.1 x 3.15 x 5.12	2.3
SW1C40020H02	2	2	1.5	-	4.3	4.1	4.1	2	10.24 x 3.94 x 6.89	5.72
SW1C40030H02	3	3	2.2	-	6.3	5.8	5.8	2	10.24 x 3.94 x 6.89	5.72
SW1C40050H02	5	7.5	4	-	10.1	9.5	9.5	2	10.24 x 3.94 x 6.89	5.72
SW1C40075H02	7.5	10	5.5	-	15	14	18	3	10.24 x 6.73 x 6.89	11.66
SW1C40100H02	10	15	7.5	-	19.2	18	25	3	10.24 x 6.73 x 6.89	11.66
SW1C40150H02	15	20	11	-	26.8	25	29.5	3	10.24 x 6.73 x 6.89	11.66
SW1C40200H02	20	20	15	-	31.2	29.5	29.5	3	10.24 x 6.73 x 6.89	11.66
SW1C40250H12	25	30	18.5	-	47	39	46	4	20.5" x 13.4" x 8.66"	62
SW1C40300H12	30	40	22	-	54	46	61	4	20.5" x 13.4" x 8.66"	62
SW1C40400H12	40	50	30	-	70	61	72	4	20.5" x 13.4" x 8.66"	62
SW1C40500H12	50	60	37	-	77	72	89	4	20.5" x 13.4" x 8.66"	62

SW1 IP20 MICRO AC DRIVE

DIN Rail Mounting Kits

Part Number: SDIN1

(For Size 1 models)

Part Number: SDIN2

(For Size 2 models)

Mounting brackets included in these kits attach to the drive to enable standard DIN rail mounting, which provides quick and simple mechanical installation.



Dynamic Braking Resistor

Part Number: SW1RES01

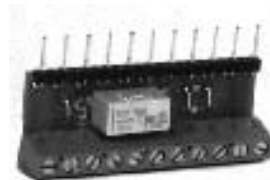


For use on SW1 drives with DB transistor installed. Using supplied hardware, the resistor can be mounted to the side of the heatsink. The resistor is designed to provide 200 W continuous braking through its 50 Ohms resistance. If additional braking is required, a second resistor can be added to maximize the braking capacity of the drive.

Dual Analog Input

Part Number: SPC01

This option enables the connection of two analog signals to the SW1 AC Drive. Inputs can be used simultaneously or switched between “In” and “Auto/Manual” modes using the D3 input. Both analog inputs have a 12-bit resolution.



Remote Keypad

Part Number: SWRP01

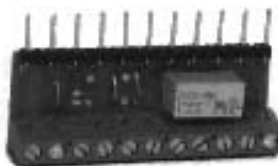
Remote keypad for connection to SW1 series controls. For use with customer-supplied 24 Vdc power supply.



Dual Relay Output

Part Number: SPC02

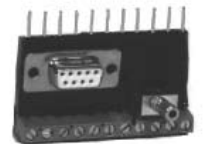
This option provides a second digital relay output from the SW1 AC Drive. The analog output is a converter to a Form A relay output rated for 230 Vac, 5 Amps and can be configured using parameter 18.



RS232 Option Board

Part Number: SWRS232

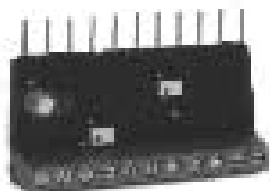
A PC board used to allow the interface of a PC to the SW1 Drive. The board includes a 9-pin D shell connector for connection to the PC with PDA-trAC Supervisor and an IrDA kit to connect the board to the IR port on the drive. The 11-pin terminals are straight through connections and have no effect on the serial port. Multiple drives can be connected via this board using the SWLINK kit (listed below).



PI Control

Part Number: SWPC03

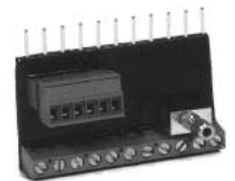
This option board provides a setpoint (PI) controller function to the SW1 AC Drive. With adjustable P and I gain controls, the option makes it easy to configure and run basic applications. The setpoint can be from either an on-board potentiometer, or analog inputs at either 0-10 Vdc or 4-20 mA. The feedback signal can also be either 0-10 Vdc or 4-20 mA.



RS485 Option Board

Part Number: SWRS485

A PC board used to allow the interface of a PC or PLC to the SW1 drive. The board includes a 6-pin terminal strip for connection of either 2 or 4 wire RS485. An IrDA kit to connect the board to the IR port on the drive is also included. The 11-pin terminals are straight-through connections and have no effect on the serial port. Multiple drives can be connected via this board using the SWLINK kit (listed below).



TBWOODS SW1 IP20 MICRO AC DRIVE OPTIONS

PDA-trAC® For Pocket PC

The wireless optical interface on the SW1 allows data transfer for SW1 AC Drive settings, using PDA-trAC® to upload, download, edit and save drive parameters easily and conveniently. This software can be downloaded from TB Wood's Web site at www.tbwoods.com or contact your TB Wood's sales representative.



Remote Keypad Kit with IP54/NEMA 12 Mounting

Part Number: SWPORT



The connection can be made through a fiber-optic link or by using the IrDA port. The keypad adds PI control, one analog input, and one relay output. A 24 Vac-power supply for powering the keypad is also included. Typical mounting is a maximum of 1 meter from the drive.

Master/Follower Connections to SW1 Drives

Part Number: SWLINK



The kit includes adapters for replacing the standard IrDA window on each drive: one for the Master (single connector) and one for the Follower (a 2-connector window). One kit facilitates one Master and one Follower. For multiple Followers, multiple SWLINK kits are required.

X4 AC DRIVE



Applications

X4 AC Drives are designed to do more than run a motor in ideal conditions. They're built tough from the ground up to survive in hostile environments. In fact, the X4 can handle just about anything you throw at it including misconnections and human error. IP66-rated contamination-proof enclosures exceed NEMA 1, 12 and 4X standards, allowing the X4 to be installed almost anywhere.

Features & Benefits

Packaging – The standard X4 enclosure is an IP66-rated, contamination-proof design that stops even high-pressure water from getting into the drive. Our standard dust tight, washdown enclosures feature sturdy cast alloy frames with rugged polycarbonate covers.

Benefit – Our tough formed covers are tightly matched to their mating enclosures to prevent direct exposure to washdowns, protecting the integral rubber seal.. The result is a longer lasting, leak-free product.

Simple to Operate – TB Wood's traditional user-friendly keypad combined with built in application macros, takes the hassle out of set up for all common applications. Wireless programming with a Pocket PC and TB Wood's free PDA-trAC® X4 allows you to program, point, click and go.

Benefit – The familiar design is easy to understand and use, yet offers a wide range of functionality. With a few simple touch commands, operators have access to parameters for configuration, start-up, operation and troubleshooting.

HP Range	Voltage Range	Input Range
1 HP	115 Vac	1 Phase
1 – 15 HP	230 Vac	3 Phase
1 – 200 HP	460 Vac	3 Phase
1 – 200 HP	575 Vac	3 Phase

Overload Capacity – 120% of nominal current for 60 seconds using normal duty ratings, 150% of nominal current for 60 seconds using heavy duty ratings



No expensive enclosures are needed or extra protection required to keep dirt, oil, water and other contaminants out of this drive. Designed to fit your application with minimal set up and maintenance, the X4 offers extra programming features and fault protection that provide the versatility and dependability you expect from TB Wood's.

Dynamic Braking Resistors – Built-in dynamic braking dissipates high-voltage transients from AC line or motor regeneration for application flexibility and adaptability.

Benefit – Eliminates nuisance trips and provides reliable, fault-free operation.

Power Ratings – The TB Wood's standard and simple part-numbering system reflect the X4's horsepower rating and overload capacity in Normal Duty applications. Normal Duty rating allows overloading the drive to 120% for one minute and up to 150% for momentary overloads in either constant or variable torque configurations.

Benefit – Compared to other drives, the X4 delivers more power at a lower cost and provides better performance, robustness, and trip-free operation. Additionally, all X4 drives are designed for Heavy Duty operation which gives 150% overload capacity, with derating, for the most demanding jobs.

X4 AC DRIVE SPECIFICATIONS

Environmental Specifications

Operating temperature	0°C to +40°C (32°F to 104°F)
Storage temperature	-20°C to 65°C (-4°F to 149°F)
Humidity	0% to 95% non-condensing
Altitude	1,000 m (3,300 ft) without derating
Maximum Vibration	Per EN50178
Acoustic noise	80 dba sound power at 1 m (3 ft)
Cooling	1 to 5 HP models: Natural convection 7.5 and higher: Forced air (temperature controlled external fan)

Electrical Specifications

Input voltage	X4C1Sx models: 115 Vac 1 phase, +/- 10% 1 HP X4C2x models: 200-230 Vac, 3 phase, +/- 15% 1-30 HP X4C4x models: 380-460 Vac, 3 phase, +/- 15% 1-200 HP X4C5x models: 575 Vac, 3 phase, +/- 15% 1-200 HP			
Line frequency	50 / 60 Hz +/- 2 Hz			
Source kVA (maximum)	10 times the unit rated kVA (65kA maximum)			
DC bus voltage for:	115 Vac models	230 Vac models	460 Vac models	575 Vac models
Overvoltage trip	406 Vdc	406 Vdc	814 Vdc	1017 Vdc
Dynamic brake activation	388 Vdc	388 Vdc	776 Vdc	970 Vdc
Normal undervoltage (UV) trip	199 Vdc	199 Vdc	397 Vdc	497 Vdc
Control system	V/Hz or Sensorless Vector Control (SVC) Carrier frequency = 1 to 16 kHz programmable			
Output voltage	0 to 100% of line voltage, 3 phase			
Overload capacity	120% of rated RMS current for 60 seconds (Normal Duty rating) 150% of rated RMS current for 60 seconds (Heavy Duty rating)			
Frequency range	0.1 to 400 Hz			
Frequency stability	0.1 Hz (digital), 0.1% (analog) over 24 hours +/- 10 C			
Frequency setting	By keypad, or by external signal (0 to 5 Vdc, 0 to 10 Vdc, 0/4 to 20 mA), or by pulse train up to 100 kHz			

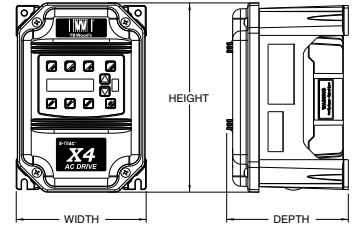
Control Features Specifications

Vin1 reference input	0-5/10 Vdc, 0/4-20 mAdc (250 ohm), 6FS pulse train input, 0-1/10/100 kHz pulse input, Inverted function, 0-5-10 bipolar input, broken wire detection. Span and offset adjustment.
Vin2 reference input	0-5/10 Vdc, 0-5-10 bipolar input, inverted function, broken wire detection. Span and offset adjustment. Programmable for frequency reference or current limit input.
Cin reference input	0/4-20 mAdc (50 ohm), inverted function, span and offset adjustment. Programmable for frequency reference or current limit input.
Reference voltage	10 Vdc (10 mAdc maximum)
Digital inputs – 10	Off = 0 to 3 Vdc, On = 10 to 32 Vdc (pull-up logic), selectable between pull-up and pull-down logic
Digital supply voltage	24 Vdc (150 mAdc maximum)
Preset frequencies	3 inputs for 8 preset frequencies (selectable)
Digital outputs	2 SPDT relay output — 130 Vac, 1 Amp/250 Vac, 0.5 Amp 2 open collector outputs 50 mA per device
Vmet Analog output	0 to 10 Vdc (5 mAdc maximum)
Imet Analog output	0/4-20 mAdc output into a 500 ohm load
DC holding/injection braking	At start, stop, by frequency with adjustable current level and time or continuous DC injection by digital input
Current limit	Four-quadrant adjustable from 5 to 150%
Speed ramps	Primary and alternate adjustable from 0.1 to 3200.0 seconds
Voltage boost	Adjustable fixed boost or adjustable auto boost
Voltage characteristic (V/Hz)	Linear, pump, fan or 2-piece linear
Timed overload	Adjustable inverse time trip (shear pin, 30 sec, 60 sec, 5 minutes) for standard or inverter-duty motors
Protective features	Overcurrent, Overvoltage fault, ground fault, short circuit, Dynamic Brake overload, drive temperature, power wiring fault. Drive-timed overload, input voltage quality, overvoltage ride-through
Program Sequence Controller	9-step, PLC-type functionality that can control speed, direction and ramps based on time, analog input, digital input, or pulse input.

X4 AC DRIVE GENERAL INFORMATION

Dimensions

	Frame Size 1		Frame Size 2		Frame Size 3		Frame Size 4		Frame Size 5	
	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm
Height	12.01	306	17.38	442	20.19	513	29.35	745	51.02	1296
Width	8.72	221	10.75	273	11.19	286	12.84	326	16.31	414
Depth	6.51	166	7.88	201	11.73	314	13.80	351	16.88	429
Weight: lbs (kg)	14.00	6.35	29.50	13.38	50.00	22.68	95.00	43.10	305	138.35



Model Number*	Normal Duty HP	Heavy Duty HP	kW	Max. Input Current (Amps)		Max. Output Current (Amps) 3-Phase Output ONLY		Dimensional Data		Weight
115 Volts AC, +/- 10%, Single-Phase Input										
					115 Vac		230 Vac	Frame	Dimensions (in)	Weight
X4C1S010C	1	0.5	0.75	-	15	-	4.2	0	9.47 x 6.50 x 6.08	8.5
200-230 Volts AC, +/- 15%, Three-Phase Input										
	Normal Duty	Heavy Duty	kW	200 Vac	230 Vac	200 Vac	230 Vac	Frame	Dimensions (in)	Weight
X4C20010C	1	0.5	0.5	5.6	4.8	4.8	4.2	0	9.47 x 6.50 x 6.08	8.5
X4C20020C	2	1.5	1.5	9	7.8	7.8	6.8	0	9.47 x 6.50 x 6.08	8.5
X4C20030C	3	2	2.2	12.7	11	11	9.6	0	9.47 x 6.50 x 6.08	8.5
X4C20050C	5	3	4	20.2	17.5	17.5	15.2	1	12.01 x 8.72 x 6.51	14
X4C20075C	7.5	5	5.5	29.2	25.3	25.3	22	1	12.01 x 8.72 x 6.51	14
X4C20100C	10	7.5	7.5	37.2	32.2	37.2	28	2	17.38 x 10.75 x 7.88	29.5
X4C20150C	15	10	11	52.1	46.4	48.3	42.0	2	17.38 x 10.75 x 7.88	29.5
X4C20200C	20	15	15.5	68.3	57.4	62.1	54.0	3	20.19 x 11.19 x 11.73	50.0
X4C20250C	25	20	18.5	82.3	73.8	78.2	68.0	3	20.19 x 11.19 x 11.73	50.0
X4C20300C	30	25	22	96.0	84.0	92.0	80.0	3	20.19 x 11.19 x 11.73	50.0
380-460 Volts AC, +/- 15%, Three-Phase Input										
	Normal Duty	Heavy Duty	kW	380 Vac	460 Vac	380 Vac	460 Vac	Frame	Dimensions (in)	Weight
X4C40010C	1	0.5	0.75	3	2.4	2.4	2.1	0	9.47 x 6.50 x 6.08	8.5
X4C40020C	2	1	1.5	5.2	3.9	3.8	3.4	0	9.47 x 6.50 x 6.08	8.5
X4C40030C	3	2	2.2	7.2	5.6	5.1	4.8	0	9.47 x 6.50 x 6.08	8.5
X4C40050C	5	3	4	12	8.8	8.9	7.6	1	12.01 x 8.72 x 6.51	14
X4C40075C	7.5	5	5.5	15	12.8	12	11	1	12.01 x 8.72 x 6.51	14
X4C40100C	10	7.5	7.5	19.7	16.3	15.6	14	1	12.01 x 8.72 x 6.51	14
X4C40150C	15	10	11	30.9	25.8	23.0	21.0	2	17.38 x 10.75 x 7.88	29.5
X4C40200C	20	15	15	40.0	33.3	31.0	27.0	2	17.38 x 10.75 x 7.88	29.5
X4C40250C	25	20	18	46.3	40.0	37.0	34.0	2	17.38 x 10.75 x 7.88	29.5
X4C40300C	30	25	22	57.5	47.8	43.0	40.0	2	17.38 x 10.75 x 7.88	29.5
X4C40400C	40	30	30	73.2	62.4	61.0	52.0	3	20.19 x 11.19 x 11.73	50.0
X4C40500C	50	40	37	82.0	78.0	71.0	65.0	3	20.19 x 11.19 x 11.73	50.0
X4C40600C	60	50	45	94	80	86	77	4	29.35 x 12.84 x 13.80	95.0
X4C40750C	75	60	55	114	99	105	96	4	29.35 x 12.84 x 13.80	95.0
X4C41000C	100	75	75	149	129	140	124	4	29.35 x 12.84 x 13.80	95.0
X4C41250D	125	100	90	168	156	168	156	5	51.02 x 16.31 x 16.88	305
X4C41500D	150	125	110	205	180	205	180	5	51.02 x 16.31 x 16.88	305
X4C42000D	200	150	132	240	240	240	240	5	51.02 x 16.31 x 16.88	305
575 Volts AC, +/- 15%, Three-Phase Input										
	Normal Duty	Heavy Duty	kW		575 Vac		575 Vac	Frame	Dimensions (in)	Weight
X4C50010C	1	0.5	0.75	-	2	-	1.7	1	12.01 x 8.72 x 6.51	14
X4C50020C	2	1	1.5	-	3.6	-	2.7	1	12.01 x 8.72 x 6.51	14
X4C50030C	3	2	2.2	-	5	-	3.9	1	12.01 x 8.72 x 6.51	14
X4C50050C	5	3	4	-	7.6	-	6.1	1	12.01 x 8.72 x 6.51	14
X4C50075C	7.5	5	5.5	-	10.4	-	9	1	12.01 x 8.72 x 6.51	14
X4C50100C	10	7.5	7.5	-	14.1	-	11	1	12.01 x 8.72 x 6.51	14
X4C50150C	15	10	11	-	23.0	-	17.0	2	17.38 x 10.75 x 7.88	29.5
X4C50200C	20	15	15	-	31.0	-	22.0	2	17.38 x 10.75 x 7.88	29.5
X4C50250C	25	20	18	-	39.0	-	27.0	2	17.38 x 10.75 x 7.88	29.5
X4C50300C	30	25	22	-	39.5	-	32.0	2	17.38 x 10.75 x 7.88	29.5
X4C50400C	40	30	30	-	49.0	-	41.0	3	20.19 x 11.19 x 11.73	50.0
X4C50500C	50	40	37	-	58.0	-	52.0	3	20.19 x 11.19 x 11.73	50.0
X4C50600C	60	50	45	-	68	-	62	4	29.35 x 12.84 x 13.80	95.0
X4C50750C	75	60	55	-	82	-	77	4	29.35 x 12.84 x 13.80	95.0
X4C51000C	100	75	75	-	107	-	99	4	29.35 x 12.84 x 13.80	95.0
X4C51250D	125	100	90	-	125	-	125	5	51.02 x 16.31 x 16.88	305
X4C51500D	150	125	110	-	144	-	144	5	51.02 x 16.31 x 16.88	305
X4C52000D	200	150	132	-	192	-	192	5	51.02 x 16.31 x 16.88	305

X4 AC DRIVES

PDA-trAC+® For Pocket PC

The wireless optical interface on the X4 allows data transfer for X4 AC Drive settings, using PDA-trAC+® to upload, download, edit and save drive parameters easily and conveniently.

This software can be down-loaded from TB Wood's Web site at www.tbwoods.com or contact your TB Wood's sales representative.



Remote Keypad for X4 when used as a panel mounted drive (sizes 1 and 2)

Part Number: X4RKPM

This Remote Keypad kit is intended to be used when a size 1 or 2 X4 is mounted inside a host enclosure and programming and operation needs to be on the front of that enclosure.

The kit comes with a keypad assembly and an adapter assembly which replaces the standard keypad on the drive. The option is supplied with a standard 12 foot ribbon cable. When installed properly, the remote keypad will meet NEMA 4X/IP66 standards and the drive rating will become IP20.

WIN-trAC® & WIN-trAC PRO® Drive Supervisor

This Windows®-based software program provides a simple and unique way to configure, monitor, diagnose, control and manage drive applications. WIN-trAC®, for single drive, point-to-point applications is provided free of charge with the SIOC03. WIN-trAC PRO®, configured for multi-drive applications, must be registered for use.



Remote Keypad for X4 when used as a wall mounted drive (sizes 1 and 2)

Part Number: X4RKWM

This Remote Keypad kit is intended to be used when a size 1 or 2 X4 is mounted in a stand-alone configuration and operation and programming needs to be in another location. The kit comes with a keypad assembly and an adapter assembly which replaces the standard keypad on the drive.

Serial Communications Adapter

Part Number: SIOC03

The adaptor is required when connecting a PC. It converts the RS232 serial output on the PC to RS485 accepted by the drive. Cables and our WIN-trAC® software package are bundled with this option.



The Remote Keypad can be mounted up to 100 feet from the drive and requires a 15-conductor shielded cable to be supplied by the user. When installed properly, both the remote keypad and drive will meet NEMA 4X/IP66 standards.

Remote Keypad Mounting Kit for X4 (sizes 3 through 5)

Part Number: X4RKMK

This Remote Keypad kit is intended to be used with a size 3, 4 or 5 X4 to allow the keypad to be mounted in another location. The kit comes with an adapter assembly to allow the existing keypad to be remotely mounted.

The Remote Keypad can be mounted up to 100 feet from the drive and requires a 15-conductor shielded cable to be supplied by the user. When installed properly, both the remote keypad and drive will meet the units core enclosure standards, whether they are NEMA 4X/IP66 or NEMA 12/IP55.

X5 ULTRAFLEX AC DRIVE



HP Range	Voltage Range	Input Range
5 – 30 HP	230 Vac	3 Phase
5 – 200 HP	460 Vac	3 Phase
5 – 200 HP	575 Vac	3 Phase

Overload Capacity – 120% of nominal current for 60 seconds using normal duty ratings, 150% of nominal current for 60 seconds using heavy duty ratings



Applications

X5 UltraFlex AC Drives are designed to do more than run a motor under ideal conditions. They're built tough from the ground up to survive in hostile stand alone environments. The X5 is ready to integrate into sophisticated automation systems based on Modbus, Modbus TCP/IP, Ethernet IP or DeviceNet communications networks. The real time clock can help make machine maintenance easier with

reminders, data logging and controlled operation beyond anything you've seen in a general purpose drive! A 115Vac interface is provided for additional flexibility in interfacing with existing equipment. Designed to fit your application with Wood's tradition of being easy to use, the X5 offers extra programming features and fault protection that provide the versatility and dependability you expect from TB Wood's.

Features & Benefits

Packaging – The standard X5 enclosure is an IP66-rated, contamination-proof design that stops even high-pressure water from getting into the drive. Supplementing that, is standard conformal coating for all electronic assemblies.

Benefit – The X5 will survive in applications and environments where other AC drives fail.

Communication – The X5 can communicate on sophisticated networks including Modbus, Modbus TCP/IP, Ethernet IP, DeviceNet and soon Profibus. Also, the drive can be cloned with the use of a simple USB flash memory stick! The normal infrared PDA-trAC® Plus programming interface made popular with the X4 is also available.

Benefit – The X5 can integrate with almost any industrial communications system allowing it to be the one choice for every application.

Real Time Clock – X5 includes a real time clock (hour, minute, day, week, month & year). This functionality allows controlled enabling of the drive, maintenance reminders, data logging and vastly empowers the Programmable Sequence Controller.

Benefit – Allows a much higher level of system integration and intelligence than ever seen before in an AC drive. The X5 provides the flexibility to be used in long term unattended operation than anything that has come before it!

115Vac Interface – Each of the option cards offered for the X5 includes the option of controlling up to four (4) digital inputs from 115Vac control power.

Benefit – This allows for greater distances, without noise immunity concerns, in the communication of digital commands to the X5.

X5 ULTRAFLEX AC DRIVE SPECIFICATIONS



Environmental

Operating temperature	0° C to +40° C (32° F to 104° F)
Storage temperature	-20° C to 65° C (-4° F to 149° F)
Humidity	0% to 95% non-condensing
Altitude	1,000 m (3,300 ft) without derating
Maximum Vibration	Per EN50178
Acoustic noise	80 dba sound power at 1 m (3 ft)
Cooling	5 HP models: Natural convection 7.5 to 200 HP: Forced air (temperature controlled external fan)

Electrical

Input voltage	X5C2x models: 200-230 Vac, 3 phase, +/- 15% X5C4x models: 380-460 Vac, 3 phase, +/- 15% X5C5x models: 575 Vac, 3 phase, +/- 15%	5-30 HP 5-200 HP 5-200 HP
Line frequency	50 / 60 Hz +/-2 Hz	
Source kVA (maximum)	10 times the unit rated kVA (65kA maximum)	
DC bus voltage for:	230 Vac models	460 Vac models
Overvoltage trip	406 Vdc	814 Vdc
Dynamic brake activation	388 Vdc	776 Vdc
Normal undervoltage (UV) trip	199 Vdc	397 Vdc
Control system	V/Hz or Sensorless Vector Control (SVC) Carrier frequency = 1 to 16 kHz programmable	
Output voltage	0 to 100% of line voltage, 3 phase	
Overload capacity	120% of rated RMS current for 60 seconds (Normal Duty rating) 150% of rated RMS current for 60 seconds (Heavy Duty rating)	
Frequency range	0.1 to 400 Hz	
Frequency stability	0.1 Hz (digital), 0.1% (analog) over 24 hours +/- 10°C	
Frequency setting	By keypad, or by external signal (0 to 5 Vdc, 0 to 10 Vdc, 0/4 to 20 mA), or by pulse train up to 100 kHz	

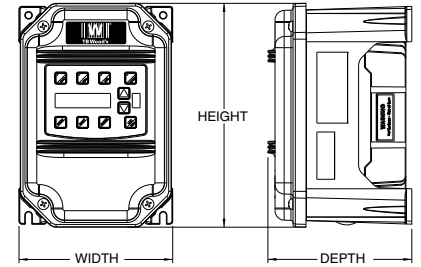
Control Features

Vin1 reference input	0-5/10 Vdc, 0/4-20 mAdc (250 ohm), 6FS pulse train input, 0-1/10/100 kHz pulse input, Inverted function, 0-5-10 bipolar input, broken wire detection. Span and offset adjustment.
Vin2 reference input	0-5/10 Vdc, 0-5-10 bipolar input, inverted function, broken wire detection. Span and offset adjustment. Programmable for frequency reference or current limit input.
Cin reference input	0/4-20 mAdc (50 ohm), inverted function, span and offset adjustment. Programmable for frequency reference or current limit input.
Reference voltage	10 Vdc (10 mAdc maximum)
Digital inputs – 10	Off = 0 to 3 Vdc, On = 10 to 32 Vdc (pull-up logic), selectable between pull-up and pull-down logic
Digital supply voltage	24 Vdc (150 mAdc maximum)
Preset frequencies	16 preset frequencies
Digital outputs	2 SPDT relay output — 130 Vac, 1 Amp/250 Vac, 0.5 Amp 2 open collector outputs 50 mA per device
Vmet Analog output	0 to 10 Vdc (5 mAdc maximum)
Imet Analog output	0/4-20 mAdc output into a 500 ohm load
DC holding/injection braking	At start, stop, by frequency with adjustable current level and time or continuous DC injection by digital input
Current limit	Four-quadrant adjustable from 5 to 150%
Speed ramps	Primary and alternate adjustable from 0.1 to 3200.0 seconds
Voltage boost	Adjustable fixed boost or adjustable auto boost
Voltage characteristic (V/Hz)	V/Hz - Linear, pump, fan or 2-piece linear, also Sensorless Vector
Timed overload	Adjustable inverse time trip (shear pin, 30 sec, 60 sec, 5 minutes) for standard or inverter-duty motors
Protective features	Overcurrent, Overvoltage fault, ground fault, short circuit, Dynamic Brake overload, drive temperature, power wiring fault. Drive-timed overload, input voltage quality, overvoltage ridethrough
Program Sequence Controller	25-step, PLC-type functionality that can control speed, direction and ramps based on time, analog input, digital input, or pulse input. Conditional branching, addressable outputs and real time operations possible.
PID Feedback	Process control available with the use of a customer supplied transducer, either 0-10Vdc, 4-20mA or optical encoder input to the drive. Includes an optional sleep mode, activated when the loop is satisfied.

X5 ULTRAFLEX AC DRIVE GENERAL INFORMATION

Dimensions

	Frame Size 1		Frame Size 2		Frame Size 3		Frame Size 4		Frame Size 5	
	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm
Height	12.01	306	17.38	442	20.19	513	29.35	745	51.02	1296
Width	8.72	221	10.75	273	11.19	286	12.84	326	16.31	414
Depth	6.51	166	7.88	201	11.73	314	13.80	351	16.88	429
Weight: lbs (kg)	14.00	6.35	29.50	13.38	50.00	22.68	95.00	43.10	305	138.35



Model Number*	Normal Duty HP	Heavy Duty HP	kW	Max. Input Current (Amps)		Max. Output Current (Amps) 3-Phase Output ONLY		Dimensional Data		Weight
200-230 Volts AC, +/- 15%, Three-Phase Input										
	Normal Duty	Heavy Duty	kW	200 Vac	230 Vac	200 Vac	230 Vac	Frame	Dimensions (in)	Weight
X5C20050C	5	3	4	20.2	17.5	17.5	15.2	1	12.01 x 8.72 x 8.49	17.5
X5C20075C	7.5	5	5.5	29.2	25.3	25.3	22	1	12.01 x 8.72 x 8.49	17.5
X5C20100C	10	7.5	7.5	37.2	32.2	37.2	28	2	17.38 x 10.75 x 9.89	31.5
X5C20150C	15	10	11	52.1	46.4	48.3	42	2	17.38 x 10.75 x 9.89	31.5
X5C20200C	20	15	15	68.3	57.4	62.1	54	3	20.19 x 11.25 x 11.73	50.0
X5C20250C	25	20	18.5	82.3	73.8	78.2	68	3	20.19 x 11.25 x 11.73	50.0
X5C20300C	30	25	18.5	96	84	92	80	3	20.19 x 11.25 x 11.73	50.0
380-460 Volts AC, +/- 15%, Three-Phase Input										
	Normal Duty	Heavy Duty	kW	380 Vac	460 Vac	380 Vac	460 Vac	Frame	Dimensions (in)	Weight
X5C40050C	5	3	4	12	8.8	8.9	7.6	1	12.01 x 8.72 x 8.49	17.5
X5C40075C	7.5	5	5.5	15	12.8	12	11	1	12.01 x 8.72 x 8.49	17.5
X5C40100C	10	7.5	7.5	19.7	16.3	15.6	14	1	12.01 x 8.72 x 8.49	17.5
X5C40150C	15	10	11	30.9	25.8	23	21	2	17.38 x 10.75 x 9.89	31.5
X5C40200C	20	15	15	40	33.3	31	27	2	17.38 x 10.75 x 9.89	31.5
X5C40250C	25	20	18	46.3	40	37	34	2	17.38 x 10.75 x 9.89	31.5
X5C40300C	30	25	22	57.5	47.8	43	40	2	17.38 x 10.75 x 9.89	31.5
X5C40400C	40	30	30	73.2	62.4	61	52	3	20.19 x 11.25 x 11.73	50.0
X5C40500C	50	40	37	82	78	71	65	3	20.19 x 11.25 x 11.73	50.0
X5C40600C	60	50	45	94	80	86	77	4	29.35 x 12.84 x 13.80	95.0
X5C40750C	75	60	55	114	99	105	96	4	29.35 x 12.84 x 13.80	95.0
X5C41000C	100	75	75	149	129	140	124	4	29.35 x 12.84 x 13.80	95.0
X5C41250D	125	100	90	168	156	168	156	5	51.02 x 16.31 x 16.88	305
X5C41500D	150	125	110	205	180	205	180	5	51.02 x 16.31 x 16.88	305
X5C42000D	200	150	132	240	240	240	240	5	51.02 x 16.31 x 16.88	305
575 Volts AC, +/- 15%, Three-Phase Input										
	Normal Duty	Heavy Duty	kW		575 Vac		575 Vac	Frame	Dimensions (in)	Weight
X5C50050C	5	3	4	-	7.6	-	6.1	1	12.01 x 8.72 x 8.49	17.5
X5C50075C	7.5	5	5.5	-	10.4	-	9	1	12.01 x 8.72 x 8.49	17.5
X5C50100C	10	7.5	7.5	-	14.1	-	11	1	12.01 x 8.72 x 8.49	17.5
X5C50150C	15	10	11	-	23	-	17	2	17.38 x 10.75 x 9.89	31.5
X5C50200C	20	15	15	-	31	-	22	2	17.38 x 10.75 x 9.89	31.5
X5C50250C	25	20	18	-	37	-	27	2	17.38 x 10.75 x 9.89	31.5
X5C50300C	30	25	22	-	39.5	-	32	2	17.38 x 10.75 x 9.89	31.5
X5C50400C	40	30	30	-	49	-	41	3	20.19 x 11.25 x 11.73	50.0
X5C50500C	50	40	37	-	58	-	52	3	20.19 x 11.25 x 11.73	50.0
X5C50600C	60	50	45	-	68	-	62	4	29.35 x 12.84 x 13.80	95.0
X5C50750C	75	60	55	-	82	-	77	4	29.35 x 12.84 x 13.80	95.0
X5C51000C	100	75	75	-	107	-	99	4	29.35 x 12.84 x 13.80	95.0
X5C51250D	125	100	90	-	125	-	125	5	51.02 x 16.31 x 16.88	305
X5C51500D	150	125	110	-	144	-	144	5	51.02 x 16.31 x 16.88	305
X5C52000D	200	150	132	-	192	-	192	5	51.02 x 16.31 x 16.88	305

* See page 13 for complete explanation of model number designations.

X5 ULTRAFLEX AC DRIVE

PDA-trAC+® For Pocket PC

The wireless optical interface on the X4 allows data transfer for X5 AC Drive settings, using PDA-trAC+® to upload, download, edit and save drive parameters easily and conveniently.

This software can be downloaded from TB Wood's Web site at www.tbwoods.com or contact your TB Wood's sales representative.



Remote Keypad for X5 when used as a panel mounted drive (sizes 1 and 2)

Part Number: X5RKPM

This Remote Keypad kit is intended to be used when a size 1 or 2 X5 is mounted inside a host enclosure and programming and operation needs to be on the front of that enclosure.

The kit comes with a keypad assembly and an adapter assembly which replaces the standard keypad on the drive. The option is supplied with a standard 12 foot ribbon cable. When installed properly, the remote keypad will meet NEMA 4X/IP66 standards and the drive rating will become IP20.

WIN-trAC® & WIN-trAC PRO® Drive Supervisor

This Windows®-based software program provides a simple and unique way to configure, monitor, diagnose, control and manage drive applications. WIN-trAC®, for single drive, point-to-point applications is provided free of charge. WIN-trAC PRO®, configured for multi-drive applications, must be registered for use.



Remote Keypad for X5 when used as a wall mounted drive (sizes 1 and 2)

Part Number: X5RKWM

This Remote Keypad kit is intended to be used when a size 1 or 2 X5 is mounted in a stand-alone configuration and operation and programming needs to be in another location. The kit comes with a keypad assembly and an adapter assembly which replaces the standard keypad on the drive.

Options for Serial Communications and 115Vac Interface

Part Number: X5DNET01

Part Number: X5EIP01

Part Number: X5MBTCP01

Part Number: X5OPT01

These options afford the X5 with the opportunity to communicate on powerful serial communication networks like DeviceNet, Ethernet IP and Modbus TCP/IP. The final option affords the opportunity to interface a shaft mounted optical encoder the to the X5 for improved performance. All options include four (4) channels of 115Vac control.



The Remote Keypad can be mounted up to 100 feet from the drive and requires a 15-conductor shielded cable to be supplied by the user. When installed properly, both the remote keypad and drive will meet NEMA 4X/IP66 standards.

Remote Keypad Mounting Kit for X5 (sizes 3 through 5)

Part Number: X5RKMK

This Remote Keypad kit is intended to be used with a size 3, 4 or 5 X5 to allow the keypad to be mounted in another location. The kit comes with an adapter assembly to allow the existing keypad to be remotely mounted.

The Remote Keypad can be mounted up to 100 feet from the drive and requires a 15-conductor shielded cable to be supplied by the user. When installed properly, both the remote keypad and drive will meet the units core enclosure standards, whether they are NEMA 4X/IP66 or NEMA 12/IP55.



WF2 SENSORLESS VECTOR AC DRIVE



HP Range	Voltage Range	Input Range
1 HP	115 Vac	1 Phase
1 – 3 HP	200 – 230 Vac	1 Phase
1 – 30 HP	200 – 230 Vac	3 Phase
1 – 150 HP	380 – 460 Vac	3 Phase
1 – 150 HP	575 Vac	3 Phase

Overload Capacity – 110% continuous and 150% for 60 seconds.



Applications

WF2 Sensorless Vector AC Drives are designed for rugged, constant-torque applications. The drive’s sensorless vector software helps the motor develop full-torque capacity over the largest speed range. WF2 drives provide high-performance operation that allows 150% torque down to 0.5 Hz.

With an array of features and options, WF2 drives can be custom tailored to fit virtually any application – from simple fan or pump operation to high-performance web processing systems that require both speed and torque control. Variable-torque ratings are also available to extend the capacity of most models.

Features & Benefits

Power – Horsepower ratings reflect true overload capacity of 150% for one minute and up to 250% for momentary overloads in constant-torque applications. WF2s have a horsepower dual rating of 110% for variable-torque applications and provide four-quadrant torque limit in constant-torque applications.

Benefit – Compared to other drives, the WF2 delivers more power at a lower cost and provides better performance, robustness, and trip-free operation.

Simple to Operate – Keypad screens display drive status, direction, the speed reference or actual speed and the percentage of load being experienced. English, German, Spanish and Italian language settings are available.

Benefit – Users receive a wealth of information without navigating numerous monitoring menus. Easy-to-read Status Indicators provide intuitive information about the drive’s operation, including potential application problems.

Dynamic Braking Resistors – Dissipate high voltage transients from AC line or motor regeneration.



Benefit – Eliminates nuisance trips and provides reliable, fault-free operation.

Functionality – Ideal for stand-alone or system integration platforms. With up to 66% more standard I/O than our competitors and a built in PSLC (Programmable Sequence Logic Controller), the WF2 offers application-specific design and control flexibility.

Benefit – Eliminates purchasing additional I/O and a PLC, saving time, reducing hardware and labor costs.

OEM Application Layer – WF2 application layer can be tailored to provide functionality and features to match OEM drive product needs. Flash memory allows in-the-field upgrades to drive firmware without removing boards or memory chips.

Benefit – Simplifies support and ease of use, as well as protecting OEMs with proprietary solutions for their customers.

Packaging – WF2 enclosures are rated at IP55, which exceeds NEMA 12 ratings. These dirt-, dust- and oil-proof enclosures are standard up to 150 HP.

Benefit – NEMA 12 and IP55 enclosure rating, at the same price as NEMA 1, increases WF2’s environmental versatility.

WF2 SENSORLESS VECTOR AC DRIVE SPECIFICATIONS



Environmental Specifications

Operating temperature	0° C to + 40° C (32° F to 104° F)
Storage temperature	-20° C to + 65° C (-4° F to 149° F)
Humidity	0% to 95% non-condensing
Altitude	1000 m (3300 ft) without derating
Maximum vibration	5.9 m/s ² (19.2 ft/s ²) [0.6G]
Acoustic noise	80 dba sound power at 1 m (3 ft)
Cooling	1 and 2 HP models: Natural convection 3 through 150 HP models: Forced air

Electrical Specifications

Input voltage	WF2C1x models: 115 Vac, 1 Phase, ±10% WF2C2S models: 200 to 230 Vac, 1 Phase, ±15% WF2C2x models: 200 to 230 Vac, 3 Phase, ±15% WF2C4x models: 380 to 460 Vac, 3 Phase, ±15% WF2C5x models: 575 Vac, 3 Phase ± 15%			
Line frequency	50 / 60 Hz ±2 Hz			
Source kVA (maximum)	10 times the unit rated kVA (65 kA maximum)			
DC bus voltage for:	WF2C1x models	WF2C2x Models	WF2C4x Models	WF2C5x Models
Overvoltage trip	402 Vdc	402 Vdc	805 Vdc	1017 Vdc
Dynamic brake activation	390 Vdc	390 Vdc	780 Vdc	973 Vdc
Nominal undervoltage (UV) trip	202 Vdc	202 Vdc	404 Vdc	505 Vdc
Control system	Voltage Vector pulse width modulation (PWM) Carrier frequency = 1 to 16 kHz in 1 kHz steps			
Output voltage	0% to 100% of line voltage, 3 Phase			
Overload capacity	150% of rated rms for 60 seconds			
Frequency range	0.1 to 320.00 Hz			
Frequency stability	0.01 Hz (digital), 0.1% (analog) over 24 hours ±10 °C			
Frequency setting	By keypad, speed pot or by external signal (0 to 5 Vdc, 0 to 10 Vdc, 0 to 20 mAdc, 4 to 20 mAdc, or ± 10 Vdc) or up to 100 kHz pulse train			

Control Features Specifications

A1 reference input	0 to 5 Vdc, 0 to 10 Vdc, ±10 Vdc, 0/4 to 20 mAdc (50 Ω or 250 Ω load)
A2 input	0 to 5 Vdc, 0 to 10 Vdc, 0/4 to 20 mAdc (250 Ω load) or up to 100 kHz pulse train
Reference voltage	10 Vdc (10 mAdc Maximum)
Digital inputs	Off = 0 to 3 Vdc, On = 10 to 40 Vdc (in active high mode)
Digital supply output	24 Vdc (100 mAdc maximum)
Preset frequencies	3 inputs for seven preset frequencies (selectable)
Digital outputs	2 SPDT relay outputs - 130 Vac, 1A/250 Vac, 0.5A (programmable) 3 open collector outputs (programmable) -90 mA per device
Analog outputs	1 pulse train output (six-times output frequency programmable)
Analog feedback	PID feedback conditioning provided to facilitate process control
Meter output	1 voltage 0 to 10 Vdc (2 mAdc maximum) 1 current 0/4 to 20 mAdc FS Software adjustable (programmable function)
DC holding/injection braking	Off or On with adjustable current (0% to 150%) adjustable time (0 to 60 sec) or continuous, activation by terminal strip or by frequency (0 to maximum frequency)
Current limit	Adjustable from 5 to 150%
Speed ramps	Primary, alternate(2), and jog - 0.12 to 3200 s
Voltage boost	Adjustable 0% to 30% or auto-boost
Voltage characteristic	Linear, quadratic, 2 piece linear, 5 piece linear
Timed overload	Off or On adjustable inverse time trip, 15% to 110% of rated output for 10:1 or 2:1 speed range motors
Non-defeatable protective features	Overcurrent, overvoltage, ground fault, short circuit, Dynamic Brake overload
Program Sequence Logic Controller-PSLC	10 step PLC like functionality that can control speed, direction and ramps based on time, analog input or digital input status



WF2 SENSORLESS VECTOR AC DRIVE

GENERAL INFORMATION

Model Number*	Constant Torque HP	Variable Torque HP	kW	Max. Input Current (Amps)	Max. Output Current (Amps) 3-Phase Output ONLY	Dimensional Data	Weight (lbs)			
115 Volts AC, +/- 10%, Single-Phase Input										
Model Number*	Con. Torq HP	Var. Torq. HP	kW	115 Vac	230 Vac	Frame	Dimensions	Wt. (lbs)		
WF2C1S010D	1	1	0.7	-	15	-	4.2	1	12.36 x 6.13 x 7.75	9.5
200 - 230 Volts AC, +/-15%, Single-Phase Input										
Model Number*	Con. Torq HP	Var. Torq. HP	kW	115 Vac	200 Vac	230 Vac	Frame	Dimensions	Wt. (lbs)	
WF2C2S010D	1	1	0.7	-	8.9	4.8	4.2	0	12.36 x 6.13 x 6.2	9.5
WF2C2S020D	2	2	1.5	-	16.2	7.8	6.8	0	12.36 x 6.13 x 6.2	11
WF2C2S030D	3	3	2.2	-	23.1	11	9.6	1	12.36 x 6.13 x 7.75	11
200 - 230 Volts AC, +/-15%, Three-Phase Input										
Model Number*	Con. Torq HP	Var. Torq. HP	kW	200 Vac	230 Vac	200 Vac	230 Vac	Frame	Dimensions	Wt. (lbs)
WF2C20010D	1	1.5	0.7	5.6	4.8	4.8	4.2	0	12.36 x 6.13 x 6.2	9.5
WF2C20020D	2	2	1.5	9	7.8	7.8	6.8	0	12.36 x 6.13 x 6.2	11
WF2C20030D	3	5	2.2	12.7	11	11	9.6	1	12.36 x 6.13 x 7.75	11
WF2C20050D	5	7.5	3.7	20.2	17.5	17.5	15.2	1	12.36 x 6.13 x 7.75	11
WF2C20075D	7.5	10	5.5	29.2	25.3	25.3	22	2	12.36 x 9.2 x 8.4	14.5
WF2C20100D	10	10	7.5	37.2	32.2	32.2	28	2	12.36 x 9.2 x 8.4	15
WF2C20150D	15	20	11	52.1	46.4	48.3	42	3	20.19 x 11.25 x 11.73	28
WF2C20200D	20	25	15	62.1	54.0	62.1	54	3	20.19 x 11.25 x 11.73	60
WF2C20250D	25	30	18.6	78.2	68.0	78.2	68	4	31.37 x 12.5 x 14	100
WF2C20300D	30	40	22	92.0	80.0	92	80	4	31.37 x 12.5 x 14	100
380 - 460 Volts AC, +/-15%, Three-Phase Input										
Model Number*	Con. Torq HP	Var. Torq. HP	kW	380 Vac	460 Vac	380 Vac	460 Vac	Frame	Dimensions	Wt. (lbs)
WF2C40010D	1	1.5	0.7	3.4	2.4	2.4	2.1	0	12.36 x 6.13 x 6.2	9.5
WF2C40020D	2	2	1.5	5.2	3.9	3.8	3.4	0	12.36 x 6.13 x 6.2	11
WF2C40030D	3	5	2.2	7.2	5.6	5.7	4.8	1	12.36 x 6.13 x 7.75	11
WF2C40050D	5	7.5	3.7	12	8.8	8.9	7.6	1	12.36 x 6.13 x 7.75	11
WF2C40075D	7.5	10	5.5	15	12.8	12	11	2	12.36 x 9.2 x 8.4	14.5
WF2C40100D	10	10	7.5	19.7	16.3	15.6	14	2	12.36 x 9.2 x 8.4	15
WF2C40150D	15	20	11	30.9	25.8	23	21	3	17.44 x 9.2 x 10.3	28
WF2C40200D	20	20	15	40	33.3	31	27	3	17.44 x 9.2 x 10.3	60
WF2C40250D	25	30	18.6	49.2	40	37	34	4	20.19 x 11.25 x 11.73	100
WF2C40300D	30	40	22	57.5	47.8	43	40	4	20.19 x 11.25 x 11.73	100
WF2C40400D	40	50	30	62.8	53.3	61	52	4	20.19 x 11.25 x 11.73	100
WF2C40500D	50	60	37	71	65	71	65	5	31.37 x 12.5 x 14.0	100
WF2C40600D	60	75	45	86	77	86	77	5	31.37 x 12.5 x 14.0	100
WF2C40750D	75	100	55	105	96	105	96	5	31.37 x 12.5 x 14.0	100
WF2C41000D	100	125	75	140	124	140	124	6	50.54 x 16.46 x 17.8	304
WF2C41250D	125	150	90	168	156	168	156	6	50.54 x 16.46 x 17.8	304
WF2C41500D	150	200	110	205	180	205	180	6	50.54 x 16.46 x 17.8	304
575 Volts AC, +/-15%, Three-Phase Input										
Model Number*	Con. Torq HP	Var. Torq. HP	kW	575 Vac	575 Vac	575 Vac	575 Vac	Frame	Dimensions	Wt. (lbs)
WF2C50010D	1	1.5	0.7	-	2	-	1.7	0	12.36 x 6.13 x 6.2	9.5
WF2C50020D	2	2	1.5	-	3.6	-	2.7	0	12.36 x 6.13 x 6.2	11
WF2C50030D	3	5	2.2	-	5	-	3.9	1	12.36 x 6.13 x 7.75	11
WF2C50050D	5	5	3.7	-	7.6	-	6.1	1	12.36 x 6.13 x 7.75	11
WF2C50075D	7.5	10	5.5	-	10.4	-	9	2	12.36 x 9.2 x 8.4	14.5
WF2C50100D	10	10	7.5	-	14.1	-	11	2	12.36 x 9.2 x 8.4	15
WF2C50150D	15	20	10	-	20.8	-	17	3	17.44 x 9.2 x 10.3	28
WF2C50200D	20	25	15	-	27.8	-	22	3	17.44 x 9.2 x 10.3	60
WF2C50250D	25	30	18.6	-	33.4	-	27	4	20.19 x 11.25 x 11.73	100
WF2C50300D	30	30	22	-	39.1	-	32	4	20.19 x 11.25 x 11.73	100
WF2C50400D	40	50	30	-	45	-	41	4	20.19 x 11.25 x 11.73	100
WF2C50500D	50	60	37	-	52	-	52	5	31.37 x 12.5 x 14.0	100
WF2C50600D	60	75	45	-	62	-	62	5	31.37 x 12.5 x 14.0	100
WF2C50750D	75	100	55	-	77	-	77	5	31.37 x 12.5 x 14.0	100
WF2C51000D	100	125	75	-	99	-	99	6	50.54 x 16.46 x 17.8	304
WF2C51250D	125	150	90	-	125	-	125	6	50.54 x 16.46 x 17.8	304
WF2C51500D	150	200	110	-	144	-	144	6	50.54 x 16.46 x 17.8	304

* See page 13 for complete explanation of model number designations.

WF2 SENSORLESS VECTOR AC DRIVE

OPTIONS

Enhanced Keypad

EKP White – Part Number: EKPW-01

EKP Gray – Part Number: EKPG-01

For additional WF2 drive flexibility and power upgrade from the standard Simple Keypad (SKP) to the Enhanced Keypad (EKP). The EKP mounts directly on WF2 frames 3 and above for increased local functionality, or can be used remotely with any model.



EKPW-01

The EKP is standard with NEMA 4X models. With the NEMA 12 model, the EKP can be used as a remote operator station, allowing simultaneous use of both the SKP and EKP. When used as a handheld programmer, the EKP can be used to copy and save parameters from one drive to another.

WIN-trAC® & WIN-trAC PRO® Drive Supervisor

This Windows®-based software program provides a simple and unique way to configure, monitor, diagnose, control and manage drive applications. WIN-trAC®, for single drive, point-to-point applications is provided free of charge with the SIOC03 adapter for WF2 drives. WIN-trAC PRO®, configured for multi-drive applications, must be registered for use.



Serial Communications Adapter

Part Number: SIOC03

The adaptor is required when connecting a PC to a WF2 AC Drive. It converts the RS232 serial output on the PC to RS485 accepted by the drive. Cables and our WIN-trAC® software package are bundled with this option.



SIOC03

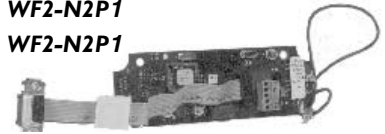
Serial Communications

DeviceNet® – Part Number: WF2-DN01

Siemens PI – Part Number: WF2-N2P1

Metasys N2 – Part Number: WF2-N2P1

DeviceNet WF2-DN01

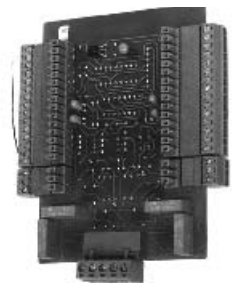


The standard RS485 MODBUS® port provides control for supervisory systems and data acquisition.

115 Vac to 24 Vdc Logic Interface

Part Number: WF2INT115V

This Logic Interface option permits existing 115 Vac control wiring (Start, Stop, Run, Jog, etc.) to be interfaced with the WF2 Drive by converting high-voltage control signals to 24 Vdc control signals. The Logic Interface is designed to mount inside the WF2 Drive and comes ready to connect.



WF2INT115V

I/O Expansion Board

Part Number: WF2AIO-01

Significantly expands the capabilities of the WF2 Sensorless Vector Drive. It provides three additional analog input channels, two additional analog output channels, and two additional relays.



WF2AIO-01

External Dynamic Braking Assembly

These external dynamic braking options are self-contained brake packages with both the sensing circuit and the power components for 10HP braking with a 10% duty cycle. These units can be paralleled for greater capacity.

Part Number: WDB211

WDB211 is for 230 Vac drive models.

Part Number: WDB411

WDB411 is for 460 Vac drive models.



The units can be paralleled for greater capacity.

TB Wood's Hassle Free Warranty Procedures

TB Wood's Warranty offers Hassle Free support when our customers have a problem with one of our electronic products. The following details our policy and procedures for standard products. All transactions must be handled by an Authorized TB Wood's Distributor.

AC Drive Products (X4, X5, WF2, XFC, X2C, EF1, SE1, SW1); Controllers; Accessories and Options

Warranty Claims:

- The warranty period is two (2) years from the date of manufacture as defined by the product serial number. The period of warranty for the X4 and X5 AC Drive is three (3) years from the date of manufacture or two (2) years of service, whichever comes first.
- The customer must contact TB Wood's (1-888-TBWOODS) with the nature of the problem and the unit's serial number to request an RGA (Returned Goods Authorization).
- If TB Wood's believes that this is a valid warranty claim, the customer will be given a choice of returning the unit for repair and return or being shipped a replacement unit within one working day.

Note: If the unit has been altered or modified in any way (holes drilled, painted, etc.) the only option available will be repair and return.

The customer will also be quoted the fixed cost of the repair that will apply if, after receipt and inspection, the returned unit is deemed not to qualify for warranty consideration.

- A valid purchase order for the value of the selected option must be received before the RGA is issued. No credits will be issued until after the returned unit has been inspected and determined to be a true warranty failure.

• Replacement Unit Option

- 1) Credit will be applied to the open invoice after the returned unit is inspected and determined to be a valid warranty claim.
- 2) If the returned unit is found not to be covered by warranty the customer will be liable for the full cost of the replacement unit and the returned unit will be returned as is.
- 3) Replacement drives are not supplied for ratings greater than 75 HP (CT). The customer must return the drive for inspection and repair. On-site repairs are at TB Wood's discretion but the customer will be liable for all costs if the failure is determined to be non warranty. In all cases, travel and expenses for a repair technician will be the responsibility of the customer.
- 4) If the failed unit is not returned within 30 days from the shipment of the replacement unit, the original purchase order will be due in full.

• Repair and Return Option

- 1) If it is determined that the failure is not covered under warranty, the customer will be billed the previously quoted cost of repair.
 - 2) Accessories and Options must be returned for repair.
 - 3) The failed unit must be received at TB Wood's within 30 days or the RGA will be cancelled.
- The customer is responsible for all freight charges for shipments to TB Wood's. TB Wood's will pay ground shipment for the replacement unit or the repaired unit.

Non Warranty Repairs and Replacements:

- For units that are beyond the warranty period, but less than five (5) years from the date of manufacture, the customer will be quoted a fixed cost of repair.
- A purchase order, valid for one month, must be issued for the quoted value before the RGA is issued.
 - 1) When the failed unit is received at TB Wood's, it will be repaired within ten (10) working days and the customer invoiced for the quoted amount.
 - 2) If the unit is not received at TB Wood's within one month, the RGA will be cancelled. If the unit is received after the one month period, a new RGA must be issued or the unit will be returned, as is, at the customer's expense.
 - 3) Units returned that are found to have no problems will be thoroughly tested and returned to the customer. A minimum fee will apply.
 - 4) If TB Wood's determines that the returned unit is not economically repairable, the customer will be notified and the unit returned. A minimum fee will apply.
 - 5) Units that are five (5) years or older will be quoted a minimum inspection fee and will be serviced on a time and material basis as parts availability will allow. TB Wood's does not guarantee that these units can be repaired.
- All repaired units carry a one (1) year warranty.
- Same day repairs will be billed at an additional \$300.00.
- 3 Day turn repairs will be billed an additional \$150.00.

Note: Expedited service times do not include shipping time.

- The customer is responsible for all freight charges for shipments to and from TB Wood's.

Warner Electric

Electromagnetic Clutches and Brakes - USA

South Beloit, IL
815-389-3771

For application assistance:
1-800-825-9050

Electromagnetic Clutches and Brakes - Europe

St Barthelemy d'Anjou, France
+33 (0)2 41 21 24 24

For sales office:
+33 (0)2 41 21 24 76

Precision Electric Coils and Electromagnetic Clutches and Brakes - USA

Columbia City, IN
260-244-6183

Inertia Dynamics

Spring Set Brakes; Power On and Wrap Spring Clutch/Brakes

Torrington, CT
860-482-4444

Matrix International

Electromagnetic Clutches and Brakes, Pressure Operated Clutches and Brakes

Brechin, Scotland
+44 (0) 1356 602000

U.S.
815-389-3771

Warner Linear

Linear Actuators and Guideways - USA

Belvidere, IL
815-547-1106

For application assistance:
1-800-825-9050

TB Wood's

V-Belt Drives, Synchronous Drives, Flexible Couplings, Variable Frequency AC Drives

Chambersburg, PA
717-264-7161

For assistance:
1-888-829-6637

Press #5 – Customer Service
Press #7 – Mechanical Applications
Press #8 – Electronic Applications

Wichita Clutch and Industrial Clutch

Pneumatic and Oil Immersed Clutches and Brakes - USA

Wichita Falls, TX
940-723-3400

Pneumatic Clutches and Brakes - Europe

Bedford, England
+44 (0)1234 350311

Twiflex Limited

Caliper Brakes and Thrusters

Twickenham, England
+44 (0) 20 8894 1161

Formsprag Clutch

Overrunning Clutches and Holdbacks

Warren, MI
586-758-5000

For application assistance:
1-800-927-3262

Marland Clutch

Roller Ramp and Sprag Type Overrunning Clutches and Backstops

Burr Ridge, IL
630-455-1752

Stieber Clutch

Overrunning Clutches and Holdbacks

Heidelberg, Germany
+49 (0)6221 30 47 0

Boston Gear

Enclosed and Open Gearing, Electrical and Mechanical P.T. Components

Charlotte, NC
704-688-7300
For customer service:
1-800-825-6544

For application assistance:
1-800-816-5608

Huco Dynatork

Precision Couplings and Air Motors

Hertford, England
+44 (0) 1992 501900
U.S.
800-825-6544

Ameridrives Couplings

Gear Couplings, Mill Spindles, Universal Joints

Erie, PA
814-480-5000

Bibby Transmissions

Disc, Gear, Grid Couplings, Overload Clutches

Dewsbury, England
+44 (0) 1924 460801

Nuttall Gear and Delroyd Worm Gear

Worm Gear and Helical Speed Reducers

Niagara Falls, NY
716-298-4100

Saftek Friction

Non-asbestos Brake and Clutch Materials

Telford, England
+44 (0) 1952 581122

Altra Industrial Motion - Asia Pacific and Africa

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Singapore	65 6487 4464
Thailand	66 2 322 5527
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S. Africa	27 11 918 4270



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