AFS Advanced Feature Set

- BiSS-C Absolute Encoder
- 32-bit Floating Point Filters
- Multiple Advanced Filters
- Frequency Analysis Tools

Control Modes

- Cyclic Synchronous Position-Velocity-Torque (CSP, CSV, CST)
- Cyclic Synchronous Torque with Commutation Angle (CSTCA)
- Profile Position-Velocity-Torque, Interpolated Position (PVT), Homing
- CVM: Indexer GUI, Programming Language CPL
- Camming, Gearing

Command Interface

- EtherCAT® (CoE) CANopen over Ethernet
- ASCII Serial Binary and Discrete I/O
- ±10V Position/Velocity/Torque Command
- PWM Position/Velocity/Torque Command
- Master Encoder (Gearing/Camming)

Communications

- EtherCAT DS402
- RS232

Feedback

Primary Encoder

- Incremental Differential Quad A/B/X Encoder
- BiSS-C & SSI Absolute Encoders
- CSR Resolver
- Analog Sin/Cos

Secondary

- Emulated Encoder Out
- Incremental Differential Quad A/B/X

Tertiary

- Single Ended A/B

Dual Feedback

- Digital Halls

I/O - Digital

- 12 Inputs, 4 Outputs

Accessories

- External Regen Resistors
- External Edge Filter

Dimensions: in [mm]

- 7.6 x 5.6 x 2.6 [192 x 142 x 65]

EtherCAT®

Model	Vac	Ic	Ip
XES-230-18	100 - 240	6	18
XES-230-36	100 - 240	12	36
XES-230-40	100 - 240	20	40

DESCRIPTION

The Xenus Panel XES provides 100% digital control of brushless or brush motors in an off-line powered package. It can operate from single or three-phase mains with continuous power output to 4 kW.

Xenus operates as a Motion Control Device under the DSP-402 protocol of the CANopen over EtherCAT (CoE). The DSP-402 mode supports the following protocols:

- Profile Position
- Profile Velocity
- Homing
- Profile Torque
- Interpolated Position (PVT)

The Profile Position mode does a complete motion index on command with S-curve acceleration and deceleration, top speed, and distance programmable. In PVT mode, the drive uses cubic polynomial interpolation to "connect the dots" such that the motor reaches each point (Position) at the specified velocity (Velocity) at the prescribed time (Time). Cyclic Synchronous Position (CSP) mode.

Drive commissioning is fast and simple using CME software operating under Windows® communicating with Xenus via EtherCAT or an RS-232 link. Address Alies selection is used by a rotary switch. Additional address bits needed can originate from programmable inputs, or they can be set in flash memory.

Three programmable logic outputs are used for reporting a drive fault or other status indications. A fourth optically-isolated output can drive a motor brake from the external +24 Vdc power supply or can be programmed as a logic output.

In addition to EtherCAT motion commands, Xenus can operate as a stand-alone drive. Current and velocity modes accept ±10 Vdc analog, digital 50% PWM or PWM/polarity inputs. In Position mode, inputs can be incremental position commands from step-motor controllers in Pulse/Direction or CW/CCW format, ±10 Vdc analog, or they can be A/B quadrature commands from a master-encoder. Pulse to position ratio is programmable for electronic gearing.

The power output of the drive varies with the input power which can range from 100 to 240 Vac, and from 47 to 63 Hz. Either single or three phase mains can be used giving Xenus the ability to work in the widest possible range of industrial settings. Signal and control circuits are isolated from the high-voltage power supply and inverter stage that connect to the mains. The +24 Vdc input powers control circuits for keep-alive operation permitting the drive power stage to be completely powered down without losing position information or communications with the control system.

GENERAL SPECIFICATIONS

Test conditions: Wye connected load: 2 mH line-line. Ambient temperature = 25 °C. Power input = 230 Vac, 60 Hz, 1 Ø

MODEL	XES-230-18	XES-230-36	XES-230-40	Units
OUTPUT CURRENT				
Peak Current	18 (12.7)	36 (25.5)	40 (28.3)	ADC (Arms, sinusoidal)
Peak Time	1	1	1	s
Continuous Current (Note 1)	6 (4.24)	12 (8.5)	20 (14.1)	ADC (Arms, sinusoidal)
INPUT POWER				
Mains Voltage, Phase, Frequency	100~240	100~240	100~240	Vac, ±10%, 1 Ø or 3 Ø, 47~63 Hz
Maximum Mains Current, 1Ø (Note 3)	10.1	20.0	20.0	Arms
Maximum Mains Current, 3Ø (Note 3)	6.4	10.4	15.4	Arms
+24 Vdc Control Power		+20 to +32 Vdc, 500 mA max.		Required for operation

DIGITAL CONTROL		
Digital Control Loops	Current, Velocity, Position, 100% digital loop control Dual loop position control using secondary encoder input	
Sampling Rate (Time)	Current loop: 16 kHz (62.5 µs), Velocity & Position loops: 4 kHz (250 µs)	
Commutation	Sinusoidal field-oriented control or trapezoidal for brushless motors.	
Bandwidth	Current loop: 2.5 kHz typical, bandwidth will vary with tuning & load inductance.	
Bus Voltage Compensation	Changes in bus or mains voltage do not affect bandwidth.	
Minimum Load Inductance	200 µH line-line	
COMMAND INPUTS (NOTE: DIGITAL INPUT FUNCTIONS ARE PROGRAMMABLE)		
Distributed Control Modes		
EtherCAT	Position, Velocity, Torque, Homing, Profile, and Interpolated profile modes	
ASCII	Multiple drives accessible from a single RS-232 port	
Stand-alone Mode		
Analog Torque, Velocity, Position Reference	±10 Vdc, 12 bit resolution	Dedicated differential analog input
Input Impedance	74.8 kΩ	Between Ref(+), Ref(-)
Digital Position Reference	Pulse/Direction, CW/CCW	Stepper Commands (2 MHz maximum rate)
	Quad A/B Encoder	2 M line/sec, 8 Mcount/sec (after quadrature)
Digital Torque & Velocity Reference	PWM, Polarity	PWM = 0% - 100%, Polarity = 1/0
	PWM 50%	PWM = 50% ±50%, No polarity signal required.
	PWM Frequency Range	1 kHz minimum, 100 kHz maximum
	PWM minimum pulse width	220 ns
Indexing	Up to 32 programs can be launched from inputs or ASCII commands. Each program can consist of moves, I/O commands, time delays, and other programmable operations.	
Camming	Master quadrature encoder provides the position as index to the cam table. Digital inputs initiate cam functions.	
DIGITAL INPUTS		
Number	12	
Inputs [IN1~5,11,12]	74HC14 Schmitt trigger, 330 µs RC filter, Vin-LO < 1.35 Vdc, Vin-HI >3.65 Vdc, +24 Vdc max. [IN1] dedicated to drive enable function, other inputs are programmable.	
Input [IN6]	74HC14 Schmitt trigger, 100 ns RC filter, Vin-LO < 1.35 Vdc, Vin-HI >3.65 Vdc, +12 Vdc max.	
Inputs [IN7~10]	Single-ended:Comparator with 2.5 Vdc reference, 100 ns RC filter, Vin-LO <2.3 Vdc, Vin-HI>2.45 Vdc	
Differential:	RS-485 line receiver on input pairs [IN9-7], and [IN10-8], 100 ns RC filters, +12 Vdc max.	
All Inputs	10 kΩ pull-up to +5 Vdc or pull-down to ground, selectable in groups, active level programmable	
DIGITAL OUTPUTS (NOTE 2)		
Number	4	
[OUT1], [OUT2], [OUT3]	Current-sinking MOSFET with 1 kΩ pullup to +5 Vdc through diode	
Current Rating	1 Adc max., +40 Vdc max. Functions programmable External flyback diode required if driving inductive loads.	
Brake [OUT4]	Opto-isolated, current-sinking with flyback diode to +24 Vdc, 1 Adc max.	
MULTI-MODE ENCODER PORT		
As Input	Secondary digital quadrature encoder (A, /A, B, /B, X, /X), 121 Ω terminating resistors 18 M-counts/sec, post-quadrature (4.5 M-lines/sec) Primary incremental encoder for Sin/Cos signals as analog Halls	
As Output	Quadrature encoder emulation with programmable resolution to 4096 lines (65,536 counts) per rev from analog Sin/Cos encoders. Buffered signals from Digital Quad A/B/X Primary Encoder. A, /A, B, /B, X, /X, from 26C31 differential line driver	
RS-232 PORT		
Signals	RxD, TxD, Gnd in 6-position, 4-contact SER-USB-RJ11 style modular connector	
Mode	Full-duplex, DTE serial communication port for drive setup and control, 9,600 to 115,200 baud	
Protocol	Binary and ASCII formats	
ETHERCAT PORTS		
Format	Dual RJ-45 receptacles, 100BASE-TX	
Protocol	EtherCAT® (CoE) CANopen® over Ethernet	

Notes:
1. Heatsinking and/or forced-air cooling is required for continuous output power rating.
2. Brake [OUT4] is programmable as a motor brake or as a general purpose digital output.
3. The actual Mains Current is dependent on the mains voltage, the number of phases, and the motor load and operating conditions. The maximum Mains Currents shown above occur when the drive is operating from the maximum input voltage and is producing the rated continuous output current at the maximum output voltage.

GENERAL SPECIFICATIONS (CONT'D.)

INDICATORS

NET Status	RUN:	Green shows the state of the EtherCAT State Machine.
	ERR:	Red shows that an error condition exists.
	L/A:	Green shows the state of the network on each port.
Drive Status	Status:	Green shows the drive status. Red shows the fault condition. Bicolor LEDs operate independently.

REGENERATION

Operation	Internal solid-state switch drives external regen resistor (see Ordering Guide for types).	
Cut-In Voltage	+HV > 390 Vdc	Regen output is On, (optional external) regen resistor is dissipating energy.
Drop-Out Voltage	+HV < 380 Vdc	Regen output is Off, (optional external) regen resistor not dissipating energy.
Tolerance	±2 Vdc	For either Cut-In or Drop-Out voltage

PROTECTIONS

HV Overvoltage	+HV > 400 Vdc	Drive PWM outputs turn Off until +HV is less than overvoltage.
HV Undervoltage	+HV < 60 Vdc	Drive PWM outputs turn Off until +HV is greater than undervoltage.
Drive Over Temperature	IGBT > 80 °C ±3 °C	Drive PWM outputs turn Off until IGBT temperature is below threshold.
Short Circuits	Output to output, output to ground, internal PWM bridge faults	
I^2T Current Limiting	Programmable: continuous current, peak current, peak time	
Motor Over Temperature	Drive shuts down when the motor over-temperature switch changes to high-resistance state, or opens.	
Encoder Power Loss	A Feedback Error fault occurs if encoder+5V output is <4.55 Vdc.	

MECHANICAL & ENVIRONMENTAL

Size	7.55 in X 5.57 in X 2.55 in [191.7 X 141.5 X 64.8 mm]
Weight	3.0 lb (1.36 kg) for drive without heatsink 1.9 lb (0.86 kg) for XES-HS heatsink, 1.26 lb (0.57 kg) for XES-HL heatsink
Ambient Temperature	0 to +45 °C operating, -40 to +85 °C storage
Humidity	0% to 95%, non-condensing
Vibration	2 *g* peak, 10~500 Hz (sine), IEC 60068-2-6
Shock	10 *g*, 10 ms, half-sine pulse, IEC 60068-2-27
Contaminants	Pollution Degree 2
Environment	IEC 60068-2
Cooling	Heat sink and/or forced air cooling required for continuous power output.

AGENCY STANDARDS CONFORMANCE

In accordance with EC Directive 2014/30/EU (EMC Directive)

EN 55011	CISPR 11:2009/A1:2010 Industrial, Scientific, and Medical (ISM) Radio Frequency Equipment – Electromagnetic Disturbance Characteristics – Limits and Methods of Measurement Group 1, Class A
EN 61000-6-1	Electromagnetic Compatibility (EMC) – Part 6-1: Generic Standards – Immunity for residential, Commercial and Light-industrial Environments

In accordance with EC Directive 2014/35/EU (Low Voltage Directive)

IEC 61010-1 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use

Underwriters Laboratory Standards

UL 61010-1, 3rd Ed., UL File Number E168959

Restriction of the Use of Certain Hazardous Substances (RoHS)

Directive 2011/65/EU (RoHS II)

FIRMWARE

File Name: ARM_ECAT_x.xx.cff

The latest version of the firmware can be downloaded from www.copleycontrols.com.

DIGITAL QUAD A/B/X ENCODER

Type	Quadrature, differential line driver outputs
Signals	A, /A, B, /B, (X, /X, index signals optional)
Frequency	5 MHz line frequency, 20 MHz quadrature count frequency

ABSOLUTE ENCODER

BiSS C Unidirectional	MA+, MA- (X, /X), SL+, SL- (A, /A) signals, 4-wire, clock output from XES, data returned from encoder

ANALOG ENCODER

Type	Sin/Cos, differential line driver outputs, 0.5 Vpeak-peak (1.0 Vpeak-peak differential) centered about 2.5 Vdc typical. Common-mode voltage 0.25 to 3.75 Vdc
Signals	Sin(+), Sin(-), Cos(+), Cos(-)
Frequency	230 kHz maximum line (cycle) frequency
Interpolation	12 bits/cycle (4096 counts/cycle)

DIGITAL HALLS

Type	Digital, single-ended, 120° electrical phase difference
Signals	U, V, W
Frequency	Consult factory for speeds >10,000 RPM

ANALOG HALLS

Type	HA/HB, differential line driver outputs, 0.5 Vpeak-peak (1.0 Vpeak-peak differential) centered about 2.5 Vdc typical. Common-mode voltage 0.25 to 3.75 Vdc
Signals	HA(+), HA(-), HB(+), HB(-) Use Multi-mode port as the primary incremental encoder input for position feedback.

ENCODER POWER SUPPLY

Power Supply	+5 Vdc @ 400 mA to power encoders & Halls
Protection	Current-limited to 750 mA @ 1 Vdc if overloaded Encoder power developed from +24 Vdc so position information is not lost when AC mains power is removed.

MOTOR CONNECTIONS

Phase U, V, W	PWM outputs to 3-phase ungrounded Wye or delta connected brushless motors
Hall U, V, W	Hall signals
Digital Encoder	A, /A, B, /B, X, /X, on standard models
Analog Encoder	Sin(+), Sin(-), Cos(+), Cos(-), X, /X, (X & /X index signals are digital)
Hall & Encoder Power	+5 Vdc @ 400 mA maximum
Motemp [IN5]	Motor overtemperature sensor input, 4.99 kΩ to +5 Vdc or ground
Signal Ground	Return for encoder, Halls, and temperature sensor
Brake [OUT4]	Current-sinking motor brake driver
+24 Vdc	From drive +24 Vdc power supply to power motor brake
Frame Ground	For motor cable shield

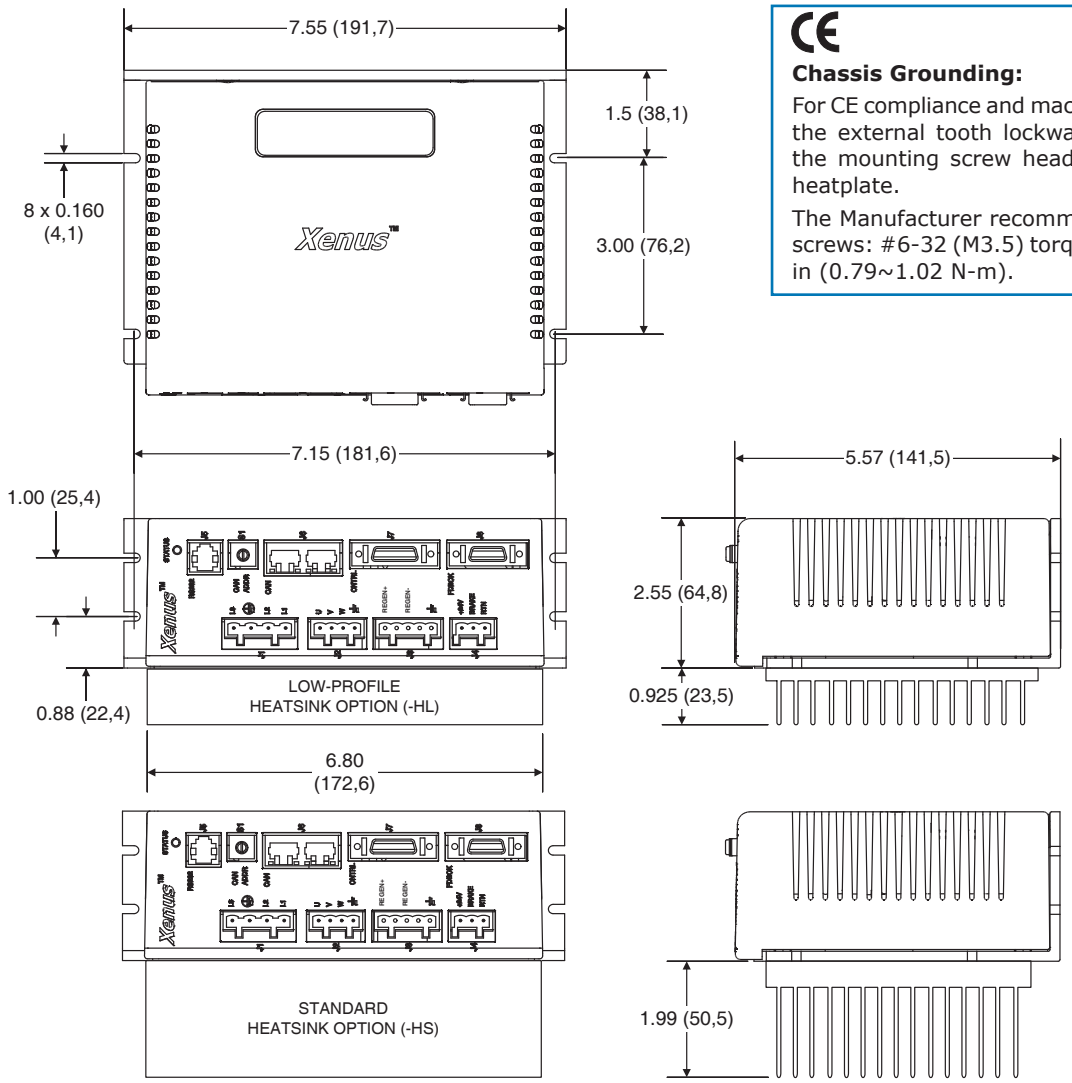
GENERAL SPECIFICATIONS (CONT'D.)

ENCODER EMULATION

Resolution	Programmable to 16,384 counts/rev (4096 line encoder equivalent)
Buffered Encoder Outputs	26C31 differential line driver

DIMENSIONS

Inches (mm)



XES Dimensions Diagram

CE

Chassis Grounding:

For CE compliance and machine safety, use the external tooth lockwashers between the mounting screw head and the drive heatplate.

The Manufacturer recommends using the screws: #6-32 (M3.5) torqued to 8~10 lb. in (0.79~1.02 N-m).

COMMUNICATIONS

CME SOFTWARE

Drive setup is fast and easy using the CME software communicating via either the RS-232 or over the EtherCAT bus. All the operations needed to configure the drive are accessible through this powerful and automatic program. Auto-phasing of brushless motor Hall sensors and phase wires eliminate "wire and try". Connections are made once and CME does the rest thereafter. Encoder wire swapping to establish the direction of positive motion is eliminated. Motor data can be saved as .ccm files. Drive data is saved as .ccx files that contain all the drive settings plus the motor data. This process eases the system management as files can be cross-referenced to drives.

Once a drive configuration is completed, the systems can be easily replicated with the same setup and performance.

- When operating as a stand-alone drive that takes command inputs from an external controller, use CME software for configuration.
- When operated as an EtherCAT node (EtherCAT (CoE) CANopen over Ethernet), use the CME software to program before and after the installation in an EtherCAT network.

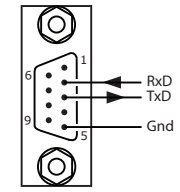
Xenus can also be controlled via the CME software, while it is in place as an EtherCAT node. During this process, the drive operation as an EtherCAT node is suspended. When the adjustments are complete, CME software is programmed to relinquish control of the drive and return it to the EtherCAT node state.

RS-232

Xenus operates as a DTE device from a three-wire, full-duplex RS-232 port at 9,600 to 115,200 Baud, 8 bits, no parity, and one stop bit.

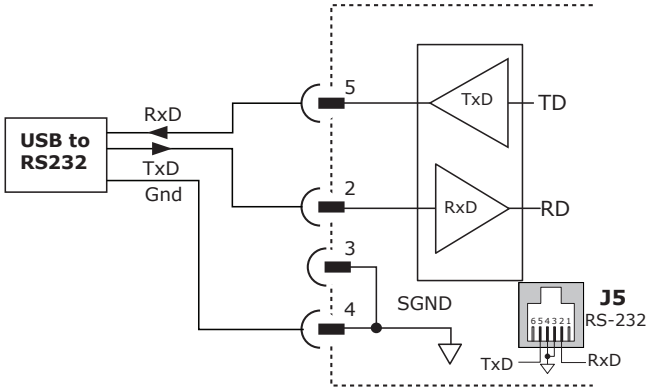
The SER-USB-RJ11 Serial Cable Kit provides an adapter that connects to the COMM port of a PC (a 9 position, male D-Sub connector) and accepts a modular cable with RJ-11 connectors for the connection to the Xenus RS-232 port (J5).

PC COMM PORT SIGNALS

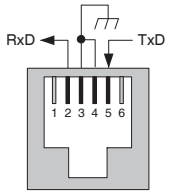


D-Sub 9M
(DTE)

SER-USB-RJ11 ADAPTER CONNECTIONS



J5 SIGNALS



RJ-11
(DTE)

SER-USB-RJ11

This device provides connectivity between a USB connector and the RJ-11 connector J5 on the DEV board.

Note: The Serial Interface Cable USB to RJ11 (SER-USB-RJ11) can be used to plug-into either a customer-designed board with an RJ11 or a Copley R3-EZ-xxx board. When you order either type of board, the Manufacturer recommends you order the Serial Interface Cable USB to RJ11 (SER-USB-RJ11).

ASCII COMMUNICATIONS

The Copley ASCII Interface is a set of ASCII format commands that can be used to operate and monitor Copley Controls Accelnet, Stepnet, and Xenus series drives over an RS-232 serial connection.

For example, after the basic drive configuration values are programmed using the CME software, a control program can use the ASCII Interface to do the following:

- Enable the drive in Programmed Position mode.
- Home the axis.
- Issue a series of move commands while monitoring the position, velocity, and other run-time variables.

For additional information, refer to the ASCII Programmers Guide (Part Number: 16-01196) on the Copley website: https://www.copleycontrols.com

COMMUNICATIONS (CONTINUED)

ETHERCAT COMMUNICATION

EtherCAT is the open, real-time Ethernet network developed by Beckhoff based on the widely used 100BASE-TX cabling system. EtherCAT enables high-speed control of multiple axes while maintaining tight synchronization of clocks in the nodes.

Data protocol is CAN application layer over EtherCAT (CoE) based on DSP-402 for motion control devices. For more information on the EtherCAT, refer to the website: http://ethercat.org.
For information on the CANopen Programmer's Manual (Part Number: 16-01195) refer to the website: https://www.copleycontrols.com

ETHERCAT CONNECTORS

Dual RJ-45 sockets accept standard Ethernet cables. The IN port connects to a master, or connects to the OUT port of a device that is 'upstream,' between the XES and the master. The OUT port connects to 'downstream' nodes.

If the XES is the last node on a network, only the IN port is used. No terminator is required on the OUT port.

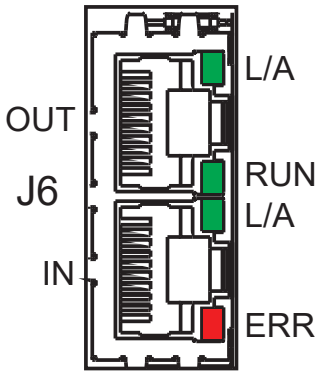
ETHERCAT LEDS (ON RJ-45 CONNECTORS)

L/A - A Green LED indicates the state of the EtherCAT network.			
LED	**Link**	**Activity**	**Condition**
On	Yes	No	Port Open
Flickering	Yes	Yes	Port open with activity
Off	No	(N/A)	Port Closed
RUN - Green: Shows the sate of the ESM (EtherCAT State Machine).			
LED	**Description**		
Off	= INIT		
Blinking	= Pre-operational		
Single Flash	= Safe-operational		
On	= Operational		
ERR - Red: Shows errors such as watchdog timeouts and unsolicited state changes in the XES due to the local errors.			
LED	**Description**		
Off	= EtherCAT communications are working correctly.		
Blinking	= Invalid configuration, general configuration error.		
Single Flash	= Local error, slave has changed EtherCAT state autonomously.		
Double Flash	= PDO or EtherCAT watchdog timeout, or an application watchdog timeout has occurred.		

J6: ETHERCAT PORTS

RJ-45 receptacles,
8 position, 4 contact

Pin	Signal
1	TX+
2	TX-
3	RX+
6	RX-



EtherCAT DEVICE ID

In an EtherCAT network, slaves are automatically assigned fixed addresses based on their position on the bus. When a device must have a positive identification that is independent of cabling, a Device ID is needed.

In the XES, this Device ID is provided by one 16-position rotary switch with hexadecimal encoding. The switch can set the Device ID of the drive from 0X01~0X0F(1~15 decimal). The table shows the decimal values of the hex settings of the switch.

SW1

x1

EtherCAT Device ID Switch, Decimal Values

	SW1
HEX	**DEC**
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
A	10
B	11
C	12
D	13
E	14
F	15

COMMUNICATIONS (CONTINUED)

DRIVE STATUS LED

A single bi-color LED displays the state of the drive by changing color, blinking, or remaining solid.
The following table includes the possible color and blink combinations.

LED	Description
Green/Solid	Drive OK and enabled. Will run in response to the reference inputs or the CANopen commands.
Green/Slow-Blinking	Drive OK, but NOT-enabled. Will run when enabled.
Green/Fast-Blinking	Positive or Negative limit switch active. Drive will only move in the direction not inhibited by limit switch.
Red/Solid	Transient fault condition. Drive will resume operation when the fault is removed.
Red/Blinking	Latching fault. Operation will not resume until the drive is Reset.

Drive Fault Conditions:

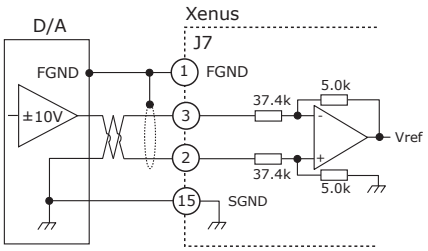
- Over or under-voltage
- Motor over-temperature
- Encoder +5 Vdc fault
- Short-circuits from output to output
- Short-circuits from output to ground
- Internal short circuits
- Drive over-temperature

Faults are programmable to be either transient or latching.

COMMAND INPUTS

ANALOG REFERENCE INPUT

A single ±10 Vdc differential input takes inputs from controllers that use PID or similar compensators, and outputs a current command to the drive. Drive output current or velocity versus reference input voltage is programmable.

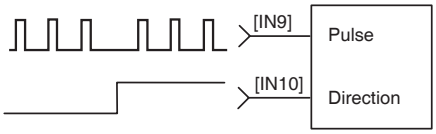


COMMAND INPUTS (CONTINUED)

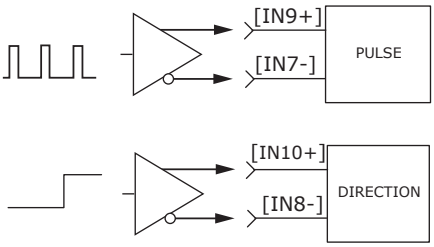
DIGITAL POSITION

Digital position commands can be set in either single-ended or differential format. Single-ended signals should be sourced from devices with active pull-up and pull-down to take advantage of the high-speed inputs. Differential inputs have 121 Ω line-terminators.

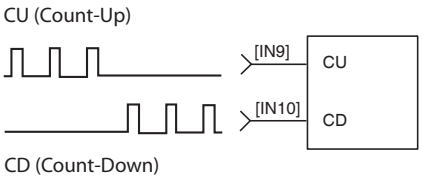
SINGLE-ENDED PULSE & DIRECTION



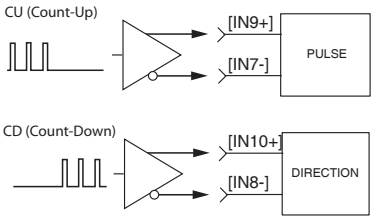
DIFFERENTIAL PULSE & DIRECTION



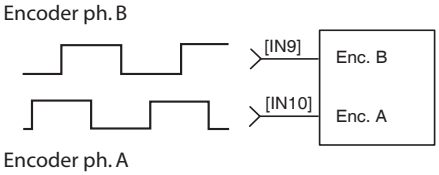
SINGLE-ENDED CU/CD



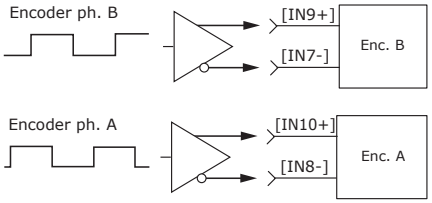
DIFFERENTIAL CU/CD



QUAD A/B ENCODER SINGLE-ENDED



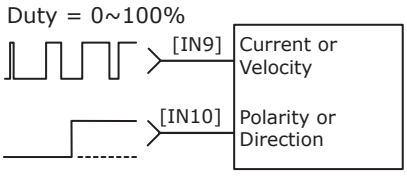
QUAD A/B ENCODER DIFFERENTIAL



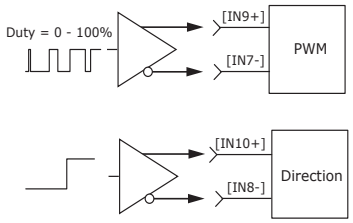
DIGITAL TORQUE, VELOCITY

Digital torque or velocity commands can be set in either single-ended or differential format. Single-ended signals must be sourced from devices with active pull-up and pull-down to take advantage of the high-speed inputs.

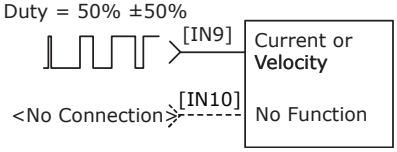
SINGLE-ENDED PWM & DIRECTION



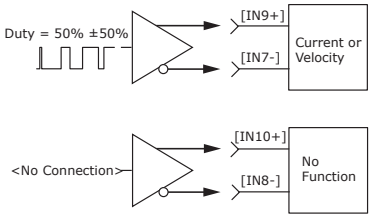
DIFFERENTIAL PWM & DIRECTION



SINGLE-ENDED 50% PWM



DIFFERENTIAL 50% PWM



COMMAND INPUTS (CONTINUED)
DIGITAL INPUTS

Xenus has twelve digital inputs, eleven of which have programmable functions. Input [IN1] is dedicated to the drive Enable function. This is done to prevent accidental programming of the input in such a way that the controller could not shut it down. There are two types of RC filters used:

- GP (General Purpose)
  Inputs with the GP filters are used for general purpose logic functions, limit switches, and the motor temperature sensor.
- HS (High Speed)
  Input functions such as Pulse/Dir, CW/CCW, Quad A/B are wired to inputs using the HS filters.

Programmable functions of the digital inputs include the following:

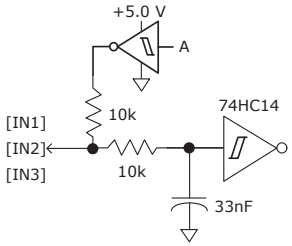
- Positive Limit Switch
- Negative Limit Switch
- Home Switch
- Drive Reset
- PWM Current or Velocity
- Commands
- CAN Address Bits
- Step & Direction, or CU/CD step motor position commands
- Quad A/B Master Encoder position commands
- Motor Over-temperature
- Motion Profile Abort

PULL-UP/PULL-DOWN CONTROL

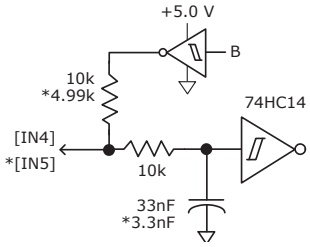
In addition to the active level and function for each programmable input, the input resistors are programmable in four groups to either pull up to +5 Vdc or down to ground. Grounded inputs with HI active levels interface to PLCs that have PNP outputs that source current from +24 Vdc sources. Inputs pulled up to +5 Vdc work with open-collector, or NPN drivers that sink current to ground. The table below shows the PU/PD groups and the inputs they control.

Group	Inputs
A	1,2,3
B	4,5
C	6,7,8
D	9,10,11,12

DIGITAL INPUT CIRCUITS 24VDC MAX



24VDC MAX



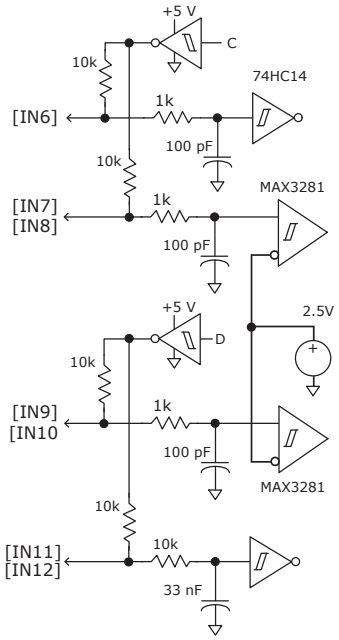
HS (HIGH SPEED) DIGITAL INPUTS

The inputs include all the programmable functions of the GP inputs plus the additional functions on [IN8] & [IN9] which can be configured as single-ended or differential:

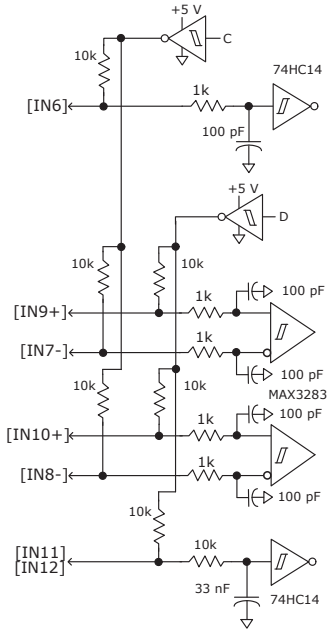
- PWM 50%, PWM & Direction for Velocity or Current modes
- Pulse/Direction, CU/CD, or A/B Quad Encoder inputs for Position or Camming modes

[IN6~10] 12 VDC MAX, [IN11~12] 24 VDC MAX

SINGLE-ENDED



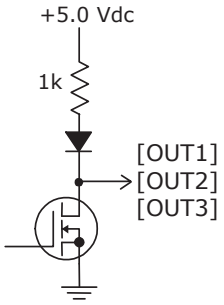
DIFFERENTIAL



OUTPUTS

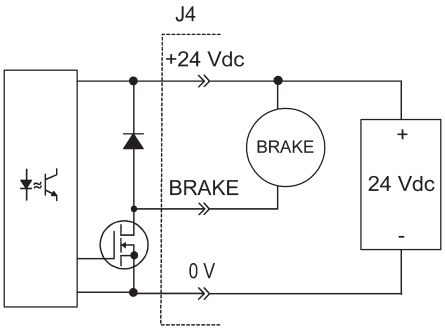
DIGITAL OUTPUTS

The digital outputs are open-drain MOSFETs with 1 kΩ pull-up resistors in series with a diode to +5 Vdc. They can sink up to 1 Adc from external loads operating from the power supplies to +30 Vdc. The output functions are programmable. The active state of the outputs is programmable to be On or Off.
When driving the inductive loads such as a relay, an external fly-back diode is required. The internal diode in the output is used for driving PLC inputs that are opto-isolated and connected to +24 Vdc. The diode prevents conduction from +24 Vdc through the 1 kΩ resistor to +5 Vdc in the drive. This could turn the PLC input On, giving a false indication of the drive output state.



BRAKE OUTPUT [OUT4]

This output is an open-drain MOSFET with an internal flyback diode connected to the +24 Vdc input. It can sink up to 1A from a motor brake connected to the +24 Vdc supply. Use the CME software to program the operation of the brake. It can also be programmed as a general-purpose digital output.



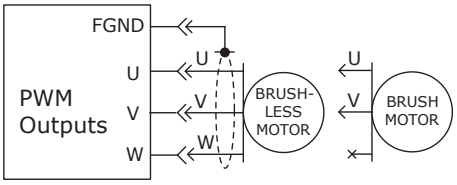
MOTOR CONNECTIONS

Motor connections include the following three types:

- Phase - The phase connections carry the drive output currents that drive the motor to produce motion.
- Feedback - Feedback can be Digital Quad A/B Encoder, Analog Sin/Cos Encoder, or Digital Halls.
- Thermal Sensor - A thermal sensor that indicates motor overtemperature is used to shut down the drive to protect the motor.

MOTOR PHASE CONNECTIONS

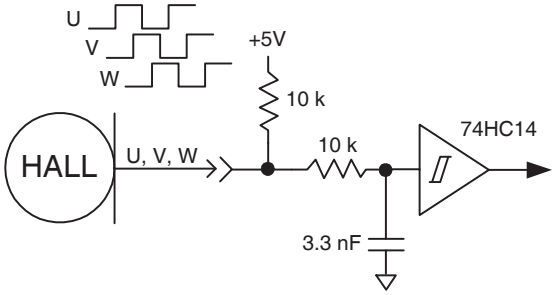
The drive output is a three-phase PWM inverter that converts the DC buss voltage (+HV) into three sinusoidal voltage waveforms that drive the motor phase-coils. Cable should be sized for the continuous current rating of the motor. Motor cabling should use twisted, shielded conductors for CE compliance, and to minimize PWM noise coupling into other circuits. The motor cable shield should connect to motor frame and the drive frame ground terminal (J2-1) for best results.



DIGITAL HALL SIGNALS

Hall signals are single-ended signals that provide absolute feedback within one electrical cycle of the motor. There are three signals (U, V, & W). They may be sourced by magnetic sensors in the motor, or by encoders that have Hall tracks as part of the encoder disc. Typically, they operate at much lower frequencies than the motor encoder signals. They are used for the following operations:

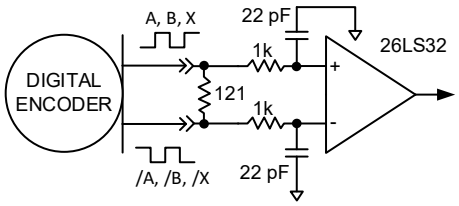
- commutation-initialization after startup
- checking the motor phasing after the drive has switched to sinusoidal commutation



MOTOR CONNECTIONS (CONTINUED)

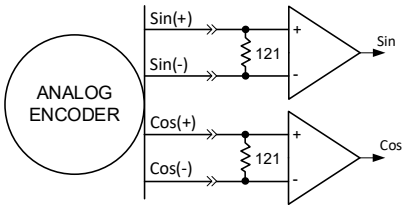
DIGITAL INCREMENTAL ENCODERS

The Quad A/B Encoder interface is a differential line-receiver with R-C filtering on the inputs. Encoders with differential outputs are required because they are less susceptible to noise that can degrade single-ended outputs. Encoder cables should use twisted-pairs for each signal pair: A & /A, B & /B, X & /X. An overall shield should be used. For longer cables, use shields for individual pairs if necessary to guarantee signal integrity.



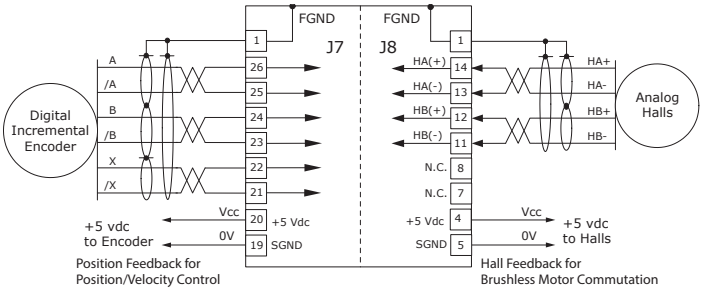
ANALOG ENCODER

Xenus supports analog encoder signals for position feedback. The Sin and Cos inputs are differential with 121 Ω terminating resistors and accept 1.0 Vp-p signals in the A/B format used by encoders with analog outputs such as Heidenhain, Stegman, and Renishaw.



ANALOG HALLS + DIGITAL ENCODER

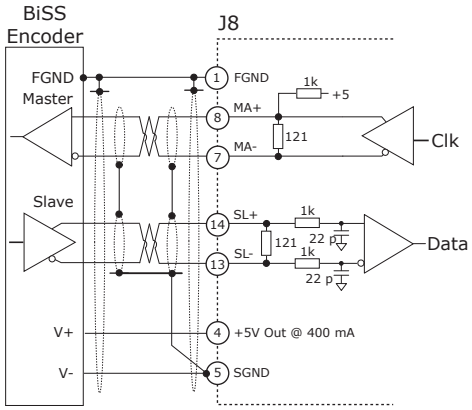
For position feedback with higher resolution than is possible by interpolating analog Halls, a digital incremental encoder is connected to the multi-mode port. The Halls are then used for commutation and the multi-mode port is programmed as a differential input for the Secondary Incremental motor encoder.



BiSS ABSOLUTE ENCODER

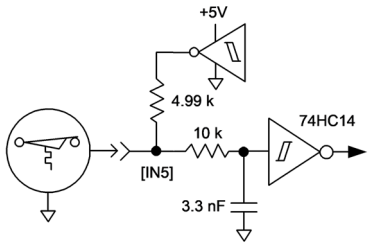
BiSS is an - Open Source - digital interface used for sensors and actuators. BiSS refers to principles of well known industrial standards used for Serial Synchronous Interfaces like SSI, AS-Interface® and Interbus® with additional options.

- Serial Synchronous Data Communication
- Cyclic at high speed
- 2 Unidirectional lines Clock and Data
  - -Line delay compensation for high speed data transfer
  - -Request for data generation at slaves
  - -Safety capable: CRC, Errors, Warnings
  - -Bus capability incl. Actuators
- Bidirectional
  - -BiSS B-protocol: Mode choice at each cycle start
  - -BiSS C-protocol: Continuous mode



MOTOR TEMPERATURE SENSOR

Digital input [IN5] is for use with a motor overtemperature switch. The input should be programmed as a pull-up to +5 Vdc if the motor switch is grounded when cold, and open or high-impedance when over-heating.



MOTOR CONNECTIONS (CONTINUED)

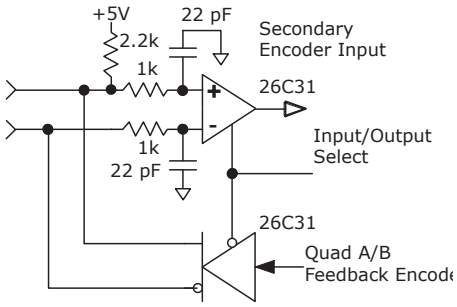
MULTI-MODE ENCODER PORT

This port consists of three differential input/output channels that take their functions from the Basic Setup of the drive. On drives with Quad A/B Encoder Feedback, the port works as an output buffering the signals from the encoder. With Sin/Cos encoder signals, the feedback is converted to Quad A/B signals with programmable resolution.

These signals can then be fed back to an external motion controller that closes the position or velocity loops. As an input, the port can take Quad A/B signals to produce a dual-loop position control system or use the signals as the master-encoder feedback in camming mode. In addition, the port can take stepper command signals (CU/CD or Pulse/Direction) in differential format.

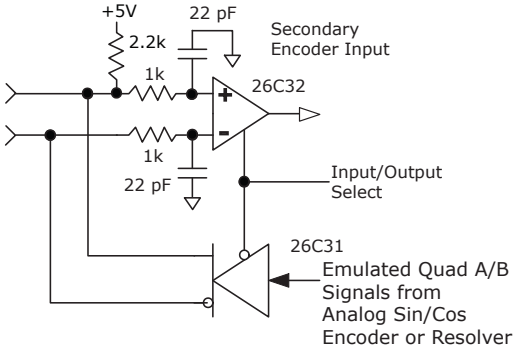
AS BUFFERED OUTPUTS FROM A DIGITAL QUADRATURE FEEDBACK ENCODER

When using a Digital Quadrature Feedback Encoder, the A/B/X signals drive the multi-mode port output buffers directly. This feature is useful in systems that use external controllers that also need the motor feedback encoder signals because these now come from J7, the Control connector. In addition to eliminating "Y" cabling, where the motor feedback cable has to split to connect to both controller and motor, the buffered outputs reduce loading on the feedback cable that could occur if the motor encoder had to drive two differential inputs in parallel, each with its' own 121 ohm terminating resistor.



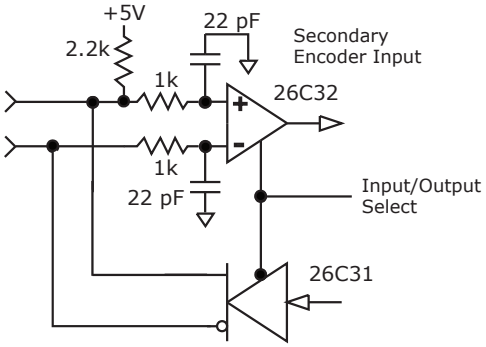
AS EMULATED QUAD A/B/X ENCODER OUTPUTS FROM AN ANALOG SIN/COS FEEDBACK ENCODER

Analog Sin/Cos signals are interpolated in the drive with programmable resolution. The incremental position data is then converted back into digital quadrature format which drives the multi-mode port output buffers. Some analog encoders also produce a digital index pulse which is connected directly to the port's output buffer. The result is digital quadrature A/B/X signals that can be used as feedback to an external control system.



AS A MASTER OR CAMMING ENCODER INPUT FROM A DIGITAL QUADRATURE ENCODER

When operating in position mode, the multi-mode port can accept digital command signals from the external encoders. These can be used to drive cam tables, or function as the master-encoder signals when operating in a master/slave configuration.

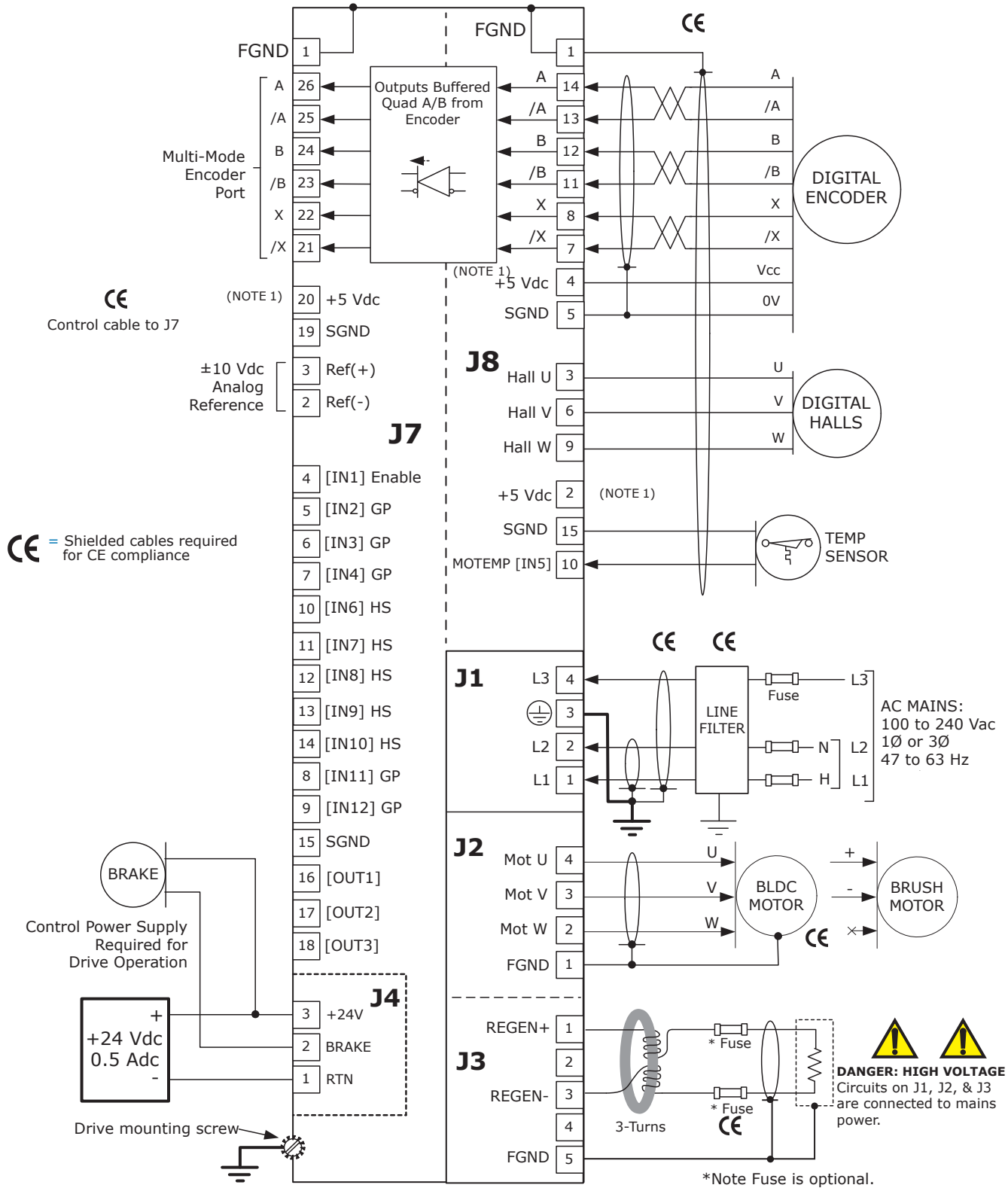


AS DIGITAL COMMAND INPUTS IN PULSE/DIRECTION, PULSE-UP/PULSE-DOWN, OR DIGITAL QUADRATURE ENCODER FORMAT

The multi-mode port can also be used when digital command signals are in a differential format. These are the signals that typically go to [IN9] and [IN10] when they are single-ended. But, at higher frequencies, these signals are likely to be differential signals in which case the multi-mode port can be used.

MOTOR CONNECTIONS (CONTINUED)

The following diagram shows the Quad A/B Encoder connections.



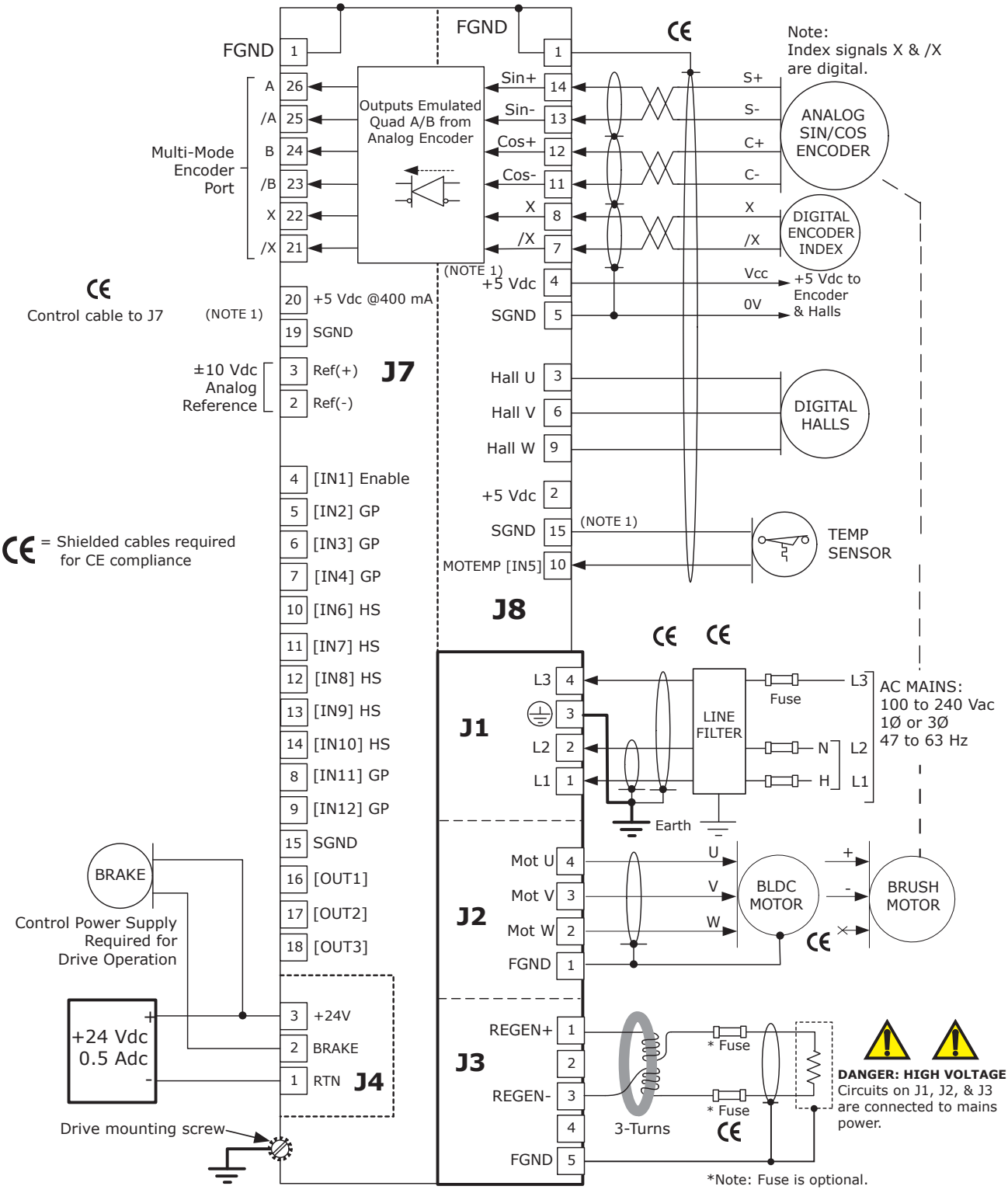
Quad A/B Encoder Motor Connections Diagram

Notes:

1) The total output current from the +5 Vdc supply to J7-20, J8-2, and J8-4 cannot exceed 400 mAdc.
2) Line filter is required for CE.

MOTOR CONNECTIONS (CONTINUED)

The following diagram shows the Sin/Cos Encoder connections.



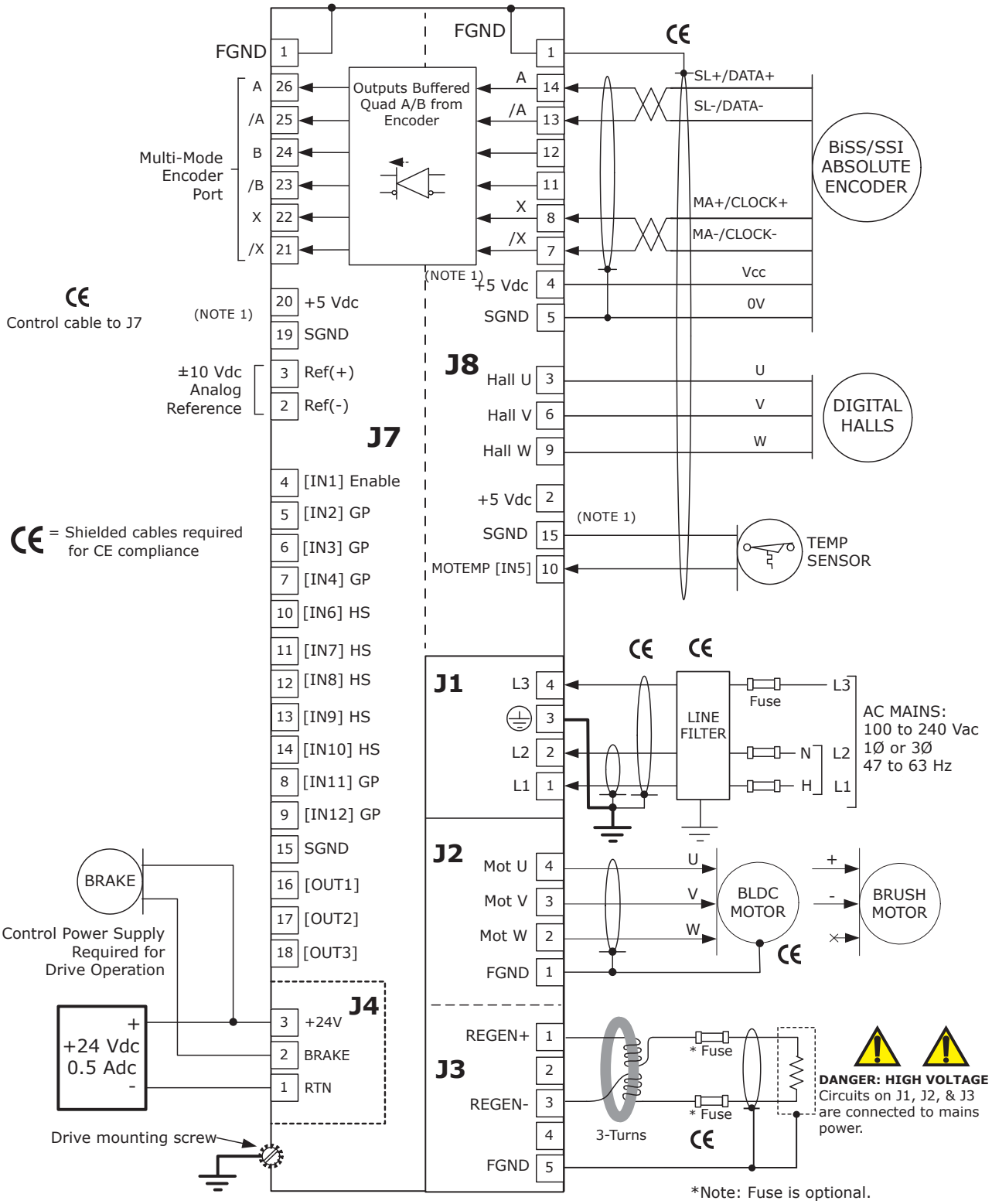
Sin/Cos Encoder Motor Connections Diagram

Notes:

1) The total output current from the +5 Vdc supply to J7-20, J8-2, and J8-4 cannot exceed 400 mAdc.
2) Line filter is required for CE.
3) Page 11 shows connections for analog Hall commutation with digital incremental position feedback.

MOTOR CONNECTIONS (CONTINUED)

The following diagram shows the Absolute Encoder connections.



Absolute Encoder Motor Connections Diagram

DRIVE POWER SOURCES

The drive power sources require an external +24 Vdc power supply. It powers an internal DC/DC converter that supplies all the control voltages for drive operation. Using an external supply enables the CAN communication with the drive when the mains power is removed.

Power distribution in Xenus is divided into four sections: +24 Vdc, CAN, signal, and high-voltage. Each section is isolated from the other and all sections are isolated from the chassis.

EXTERNAL +24 VDC

The primary side of the DC/DC converter operates directly from the external +24 Vdc supply and it is isolated from the other drive power sections. The Brake output [OUT4] operates in this section and it is referenced to the +24 Vdc return (0V). It sinks the current from an external load connected to the external +24 Vdc power source.

INTERNAL SIGNAL POWER

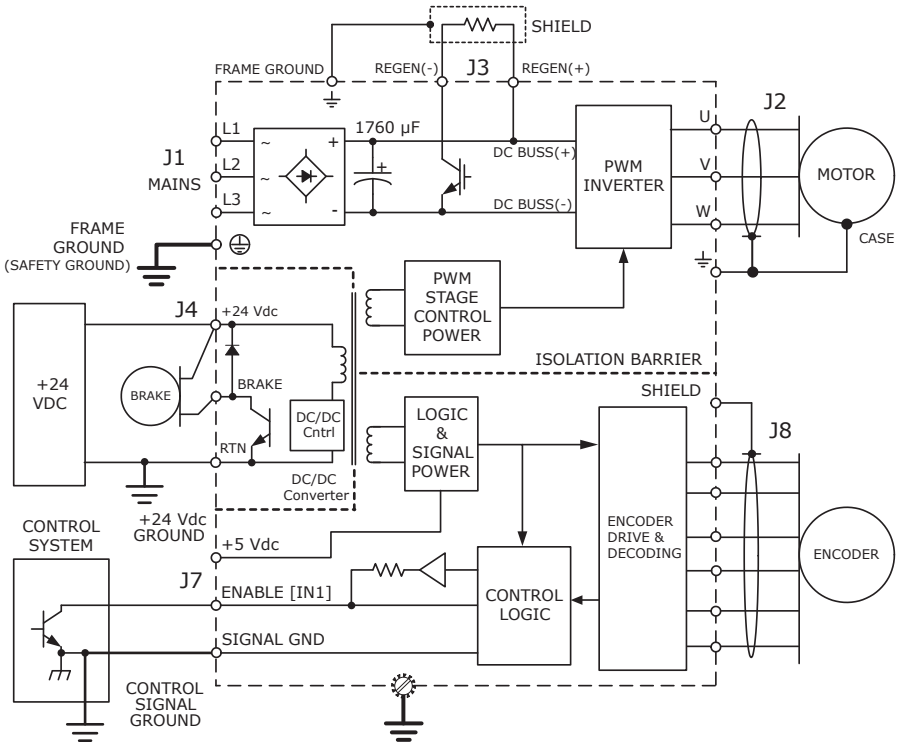
The signal power section supplies power for the DSP controller as well as the logic inputs and outputs. Motor feedback signals such as Halls, encoder, and temperature sensor operate from this power source. All signal circuits are referenced to signal ground. This ground should connect to the control system circuit ground or common so that the drive and controller inputs and output voltage levels work properly with each other.

MAINS POWER

Mains power drives the high-voltage section. It is rectified and capacitor-filtered to produce +HV which the PWM stage converts into voltages that drive either three phase brushless or DC brush motors. An internal solid-state switch, combined with an external power resistor, provides dissipation during regeneration when the mechanical energy of the motor is converted back into electrical energy that must be dissipated before it charges the internal capacitors to an overvoltage condition. All the circuits in this section are "hot", that is, they connect directly to the mains and must be considered high-voltages and a shock hazard which require proper insulation techniques during the installation.

GROUNDING

A grounding system has three primary functions: safety, voltage-reference, and shielding. As a safety measure, the primary ground at J1-3 will carry fault-currents from the mains in the case of an internal failure or short-circuit of electronic components. Wiring to this is typically done with the green conductor with a yellow stripe using the same gauge wire as that used for the mains. The pin on the drive at J1-3 is longer than the other pins on J1 giving it a first-make, last-break action so that the drive chassis is never ungrounded when the mains power is connected. This wire is a 'bonding' conductor that should connect to an earthed ground point and must not pass through any circuit interrupting devices.



Connections Diagram

GROUNDING (CONTINUED)

All the circuits on J1, J2, and J3 are mains-connected and must never be grounded. The ground terminals at J1-3, J2-1, and J3-5 all connect to the drive chassis and are isolated from all drive internal circuits.

Signal grounding references the drive control circuits to those of the control system. These controls circuits typically have their own earth connection at some point. To eliminate ground-loops, it is recommended that the drive signal ground be connected to the control system circuit ground. When this is done, the drive signal voltages will be referenced to the same 0 V level as the circuits in the control system.

Small currents flow between the controller and the drive when the inputs and the outputs interact. The signal ground is the path for these currents to return to their power sources in both controller and drive.

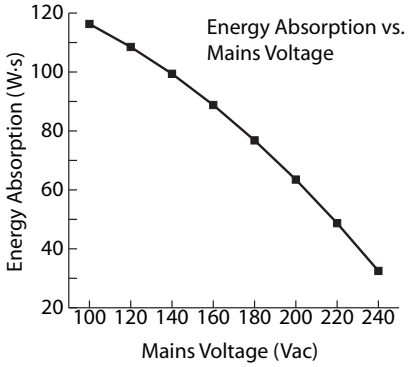
Shields on cables reduce emissions from the drive for CE compliance and protect internal circuits from interference due to external sources of electrical noise. Because of their smaller wire gauge, these should not be used as part of a safety-ground system.

Motor cases can be safety-grounded either at the motor by earthing the frame, or by using a grounding conductor in the motor cable that connects to J2-1. This cable should be of the same gauge as the other motor phase cables.

For CE compliance and operator safety, the drive should be earthed by using external tooth lockwashers under the mounting screws. These will make contact with the aluminum chassis through the anodized finish to connect the chassis to the equipment frame ground.

REGENERATION

The chart below shows the energy absorption in W·s for a Xenus drive operating at some typical mains voltages. When the load mechanical energy is greater than these values, an external regen resistor is available as an accessory.



GROUNDING & SHIELDING FOR CE

Grounding and shielding are the means of controlling the emission of radio frequency energy from the drive so that it does not interfere with the other electronic equipment. The use of shielded cables to connect the drive to motors and feedback devices is a way of extending the chassis of the drive out to these devices, so that the conductors carrying noise generated by the drive are completely enclosed by a conductive shield.

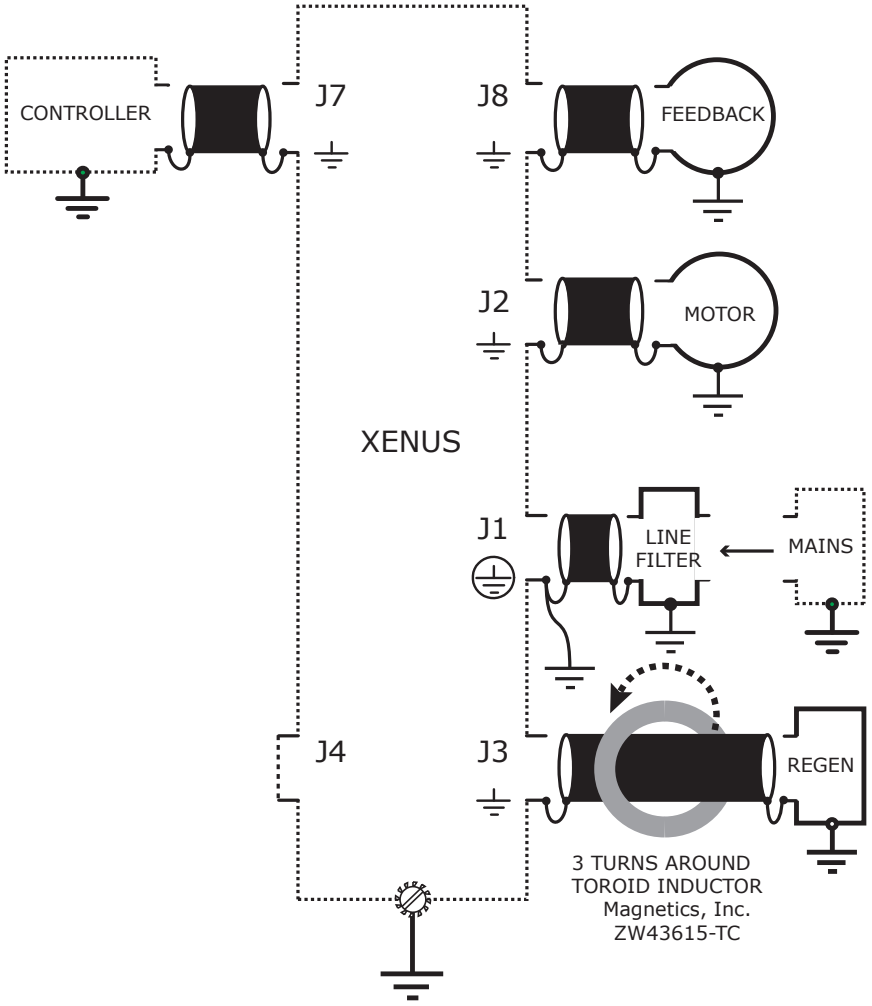
The process begins at the mains connector of the drive, J1. The ground terminal symbol has a circle indicating that this is the safety or "bonding" ground connection. This should be connected with wire that is the same gauge as that used for the mains.

In case there is a short-circuit in the drive, the function of this ground connection is to carry the fault current to earth ground until the safety device (fuse or circuit breakers) disconnects the drive from the mains. This connection ensures that the heatplate of the drive remains at earth potential and eliminates a shock hazard that could occur if the chassis were allowed to float to the potential of the mains.

While this connection keeps the heatplate at earth potential, the high frequency noise, generated by switching circuits in the drive, can radiate from the wire used for the safety ground connection. In order to keep the path between the heatplate and earth as short as possible, it's also recommended to mount the drive to the equipment panel using external-toothed lock washers. These washers will penetrate the anodized finish of the heatplate (which is an electrical insulator) and they generate electrical contact with the aluminum plate. Grounding the heatplate in this way shortens the path from the drive to earth ground and further reduces emissions. The heatplate also connects directly to the frame ground terminals on the motor, feedback, and regen connectors.

Note: The ground symbols for these washers do not have a circle which indicates that these are used for shielding and not used for safety grounding.

Motors and their feedback devices (which are typically in the motor case) should be grounded by mounting to equipment that is grounded as a safety ground. By connecting the shields for these devices at the drive and at the device, the connection is continuous and provides a return path for radio-frequency energy to the drive.



CE Grounding/Shielding Diagram

Notes:

1) Shielded cables required for CE are shown in the above diagram.

2) Line filter is required for CE.

3) Ferrite core (Magnetics ZW43615-TC, 3-turns) is required for shielded cable to regen resistor which must be in the shielded enclosure.

WARNING: Hazardous voltages exist on connections to J1, J2, & J3 when the power is applied. After the power is removed, the hazardous voltages remain for up to 30 seconds.

J1 CABLE CONNECTOR:
Wago: 721-204/026-045
Euro-style 7,5 mm pluggable female terminal block with preceding ground receptacle
Cable: AWG 12, 600 V recommended for XES-230-36 and XES-230-40 models, AWG 14, 600V for XES-230-18
Shielded cable required for CE compliance.

J2 CABLE CONNECTOR:
Wago: 721-104/026-047
Euro-style 5,0 mm pluggable female terminal block
Cable: AWG 12, 600 V recommended for XES-230-36 and XES-230-40 models, AWG 14, 600V for XES-230-18
Shielded cable required for CE compliance.

J3 CABLE CONNECTOR:
Wago: 721-605/000-044
Euro-style 5,0 mm pluggable male terminal block
Cable: AWG 12, 600 V recommended for XES-230-36 and XES-230-40 models, AWG 14, 600V for XES-230-18
Shielded cable required for CE compliance.

WIRE INSERTION/EXTRACTION TOOL:
Used on J1, J2, J3, & J4
Wago: 231-131

J1 MAINS CONNECTIONS

Signal	Pin
Mains Input L3	4
Protective Ground	3
Mains Input L2	2
Mains Input L1	1

J2 MOTOR OUTPUTS

Signal	Pin
Motor Phase U	4
Motor Phase V	3
Motor Phase W	2
Cable Shield	1

J3 REGEN RESISTOR

Signal	Pin
Regen Resistor	1
No Connection	2
Regen Resistor	3
No Connection	4
Cable Shield	5

ISOLATED CIRCUIT

NOTE: AN EXTERNAL +24 VDC POWER SUPPLY IS REQUIRED FOR OPERATION.

J4 CABLE CONNECTOR:
Wago: 721-103/026-047
Euro-style 5,0 mm pluggable terminal block

J4 +24 VDC & BRAKE

Signal	Pin
+24 Vdc Control Power	3
Brake Output [OUT4]	2
0V (+24 Vdc Return)	1

ISOLATED CIRCUIT

J5 RS-232 (DTE)

Pin	Signal
6	No Connection
5	TxD Output
4	Ground
3	Ground
2	RxD Input
1	No Connection

J5 CABLE CONNECTOR:

RJ-11 style, male, 6 position
Cable: 6-conductor modular type, straight-through

Note: J5 RS-232

1. J5 signals are referenced to Signal Ground.

J7 CONTROL SIGNALS

Pin	Signal	Pin	Signal	Pin	Signal
1	FGND	10	[IN6] HS	19	SGND
2	Ref(-)	11	[IN7] HS	20	+5 Vdc (Note 1)
3	Ref(+)	12	[IN8] HS	21	Multi Encoder /X
4	[IN1] Enable	13	[IN9] HS	22	Multi Encoder X
5	[IN2] GP	14	[IN10] HS	23	Multi Encoder /B
6	[IN3] GP	15	SGND	24	Multi Encoder B
7	[IN4] GP	16	[OUT1]	25	Multi Encoder /A
8	[IN11] GP	17	[OUT2]	26	Multi Encoder A
9	[IN12] GP	18	[OUT3]		

J7 CABLE CONNECTOR:

High-Density D-Sub, 26 Position, Male

J8 MOTOR FEEDBACK

Pin	Signal	Pin	Signal	Pin	Signal
1	FGND	6	Hall V	11	Encoder /B
2	+5 Vdc (Note 1)	7	Encoder /X	12	Encoder B
3	Hall U	8	Encoder X	13	Encoder /A
4	+5 Vdc (Note 1)	9	Hall W	14	Encoder A
5	SGND	10	[IN5] MOTEMP	15	SGND

J8 CABLE CONNECTOR:

High-Density D-Sub, 15 Position, Male

Notes:

1. The total current drawn from the +5 Vdc outputs cannot exceed 400 mA.

WARNING: Hazardous voltages exist on connections to J1, J2, & J3 when the power is applied. After the power is removed, the hazardous voltages remain for up to 30 seconds.

J1 CABLE CONNECTOR:

Wago: 721-204/026-045

Euro-style 7,5 mm pluggable female terminal block with preceding ground receptacle

Cable:
- For models: XES-230-36 and XES-230-40, recommend using AWG 12, 600 V.
- For model: XES-230-18 with shielded cable required for CE compliance, use AWG 14, 600V.

J1 MAINS CONNECTIONS

Signal	Pin
Mains Input L3	4
Protective Ground	3
Mains Input L2	2
Mains Input L1	1

J2 CABLE CONNECTOR:

Wago: 721-104/026-047

Euro-style 5,0 mm pluggable female terminal block

Cable:
- For models: XES-230-36 and XES-230-40, recommend using AWG 12, 600 V.
- For model: XES-230-18 with shielded cable required for CE compliance, use AWG 14, 600V.

J2 MOTOR OUTPUTS

Signal	Pin
Motor Phase U	4
Motor Phase V	3
Motor Phase W	2
Cable Shield	1

J3 CABLE CONNECTOR:

Wago: 721-605/000-043

Euro-style 5,0 mm pluggable male terminal block

Cable: For models: XES-230-36 and XES-230-40, recommend using AWG 12, 600 V.
For model: XES-230-18 with shielded cable required for CE compliance, use AWG 14, 600V.

WIRE INSERTION/EXTRACTION TOOL:

Wago: Used on J1, J2, J3, & J4
Wago 231-131

J3 REGEN RESISTOR

Signal	Pin
Regen Resistor	1
No Connection	2
Regen Resistor	3
No Connection	4
Cable Shield	5

ISOLATED CIRCUIT

NOTE: AN EXTERNAL +24 VDC POWER SUPPLY IS REQUIRED FOR OPERATION.

J4 CABLE CONNECTOR:

Wago: 721-103/026-047

Euro-style 5.0 mm pluggable terminal block.

J4 +24 VDC & BRAKE

Signal	Pin
+24 Vdc Control Power	3
Brake Output [OUT4]	2
0V (+24 Vdc Return)	1

ISOLATED CIRCUIT

J5 RS-232 (DTE)

Pin	Signal
6	No Connection
5	TxD Output
4	Ground
3	Ground
2	RxD Input
1	No Connection

Note: J5 RS-232

1. J5 signals are referenced to Signal Ground.

J5 CABLE CONNECTOR:

RJ-11 style, male, 6 position
Cable: 6-conductor modular type, straight-through

J7 CONTROL SIGNALS

Pin	Signal	Pin	Signal	Pin	Signal
1	FGND	10	[IN6] HS	19	SGND
2	Ref(-)	11	[IN7] HS	20	+5 Vdc (Note 1)
3	Ref(+)	12	[IN8] HS	21	Multi Encoder /X
4	[IN1] Enable	13	[IN9] HS	22	Multi Encoder X
5	[IN2] GP	14	[IN10] HS	23	Multi Encoder /B
6	[IN3] GP	15	SGND	24	Multi Encoder B
7	[IN4] GP	16	[OUT1]	25	Multi Encoder /A
8	[IN11] GP	17	[OUT2]	26	Multi Encoder A
9	[IN12] GP	18	[OUT3]		

J7 CABLE CONNECTOR:

High-Density D-Sub, 26 Position, Male

J8 MOTOR FEEDBACK

Pin	Signal	Pin	Signal	Pin	Signal
1	FGND	6	Hall V	11	Encoder Cos(-)
2	+5 Vdc (Note 1)	7	Encoder /X	12	Encoder Cos(+)
3	Hall U	8	Encoder X	13	Encoder Sin(-)
4	+5 Vdc (Note 1)	9	Hall W	14	Encoder Sin(+)
5	SGND	10	[IN5] MOTEMP	15	SGND

J8 CABLE CONNECTOR:

High-Density D-Sub, 15 Position, Male

Note:

1. The total current drawn from the +5 Vdc outputs cannot exceed 400 mA.

WARNING: Hazardous voltages exist on connections to J1, J2, & J3 when the power is applied. After the power is removed, the hazardous voltages remain for up to 30 seconds.

J1 CABLE CONNECTOR:

Wago: 721-204/026-045

Euro-style 7,5 mm pluggable female terminal block with preceding ground receptacle

Cable:
- For models: XES-230-36 and XES-230-40, recommend using AWG 12, 600 V.
- For model: XES-230-18 with shielded cable required for CE compliance, use AWG 14, 600V.

J1 MAINS CONNECTIONS

Signal	Pin
Mains Input L3	4
Protective Ground	3
Mains Input L2	2
Mains Input L1	1

J2 CABLE CONNECTOR:

Wago: 721-104/026-047

Euro-style 5,0 mm pluggable female terminal block

Cable:
- For models: XES-230-36 and XES-230-40, recommend using AWG 12, 600 V.
- For model: XES-230-18 with shielded cable required for CE compliance, use AWG 14, 600V.

J2 MOTOR OUTPUTS

Signal	Pin
Motor Phase U	4
Motor Phase V	3
Motor Phase W	2
Cable Shield	1

J3 CABLE CONNECTOR:

Wago: 721-605/000-043

Euro-style 5,0 mm pluggable male terminal block

Cable: For models: XES-230-36 and XES-230-40, recommend using AWG 12, 600 V.
For model: XES-230-18 with shielded cable required for CE compliance, use AWG 14, 600V.

J3 REGEN RESISTOR

Signal	Pin
Regen Resistor	1
No Connection	2
Regen Resistor	3
No Connection	4
Cable Shield	5

WIRE INSERTION/EXTRACTION TOOL:

Wago: Used on J1, J2, J3, & J4
Wago 231-131

ISOLATED CIRCUIT

J4 CABLE CONNECTOR:

Wago: 721-103/026-047

Euro-style 5.0 mm pluggable terminal block.

J4 +24 VDC & BRAKE

Signal	Pin
+24 Vdc Control Power	3
Brake Output [OUT4]	2
0V (+24 Vdc Return)	1

ISOLATED CIRCUIT

J5 RS-232 (DTE)

Pin	Signal
6	No Connection
5	TxD Output
4	Ground
3	Ground
2	RxD Input
1	No Connection

Note: J5 RS-232

1. J5 signals are referenced to Signal Ground.

J5 CABLE CONNECTOR:

RJ-11 style, male, 6 position
Cable: 6-conductor modular type, straight-through

J7 CONTROL SIGNALS

Pin	Signal	Pin	Signal	Pin	Signal
1	FGND	10	[IN6] HS	19	SGND
2	Ref(-)	11	[IN7] HS	20	+5 Vdc (Note 1)
3	Ref(+)	12	[IN8] HS	21	Multi Encoder /X
4	[IN1] Enable	13	[IN9] HS	22	Multi Encoder X
5	[IN2] GP	14	[IN10] HS	23	Multi Encoder /B
6	[IN3] GP	15	SGND	24	Multi Encoder B
7	[IN4] GP	16	[OUT1]	25	Multi Encoder /A
8	[IN11] GP	17	[OUT2]	26	Multi Encoder A
9	[IN12] GP	18	[OUT3]		

J7 CABLE CONNECTOR:

High-Density D-Sub, 26 Position, Male

J8 MOTOR FEEDBACK

Pin	Signal	Pin	Signal	Pin	Signal
1	FGND	6	Hall V	11	No Connection
2	+5 Vdc (Note 1)	7	MA-/CLOCK-	12	No Connection
3	Hall U	8	MA+/CLOCK+	13	SL-/DATA-
4	+5 Vdc (Note 1)	9	Hall W	14	SL+/DATA+
5	SGND	10	[IN5] MOTEMP	15	SGND

J8 CABLE CONNECTOR:

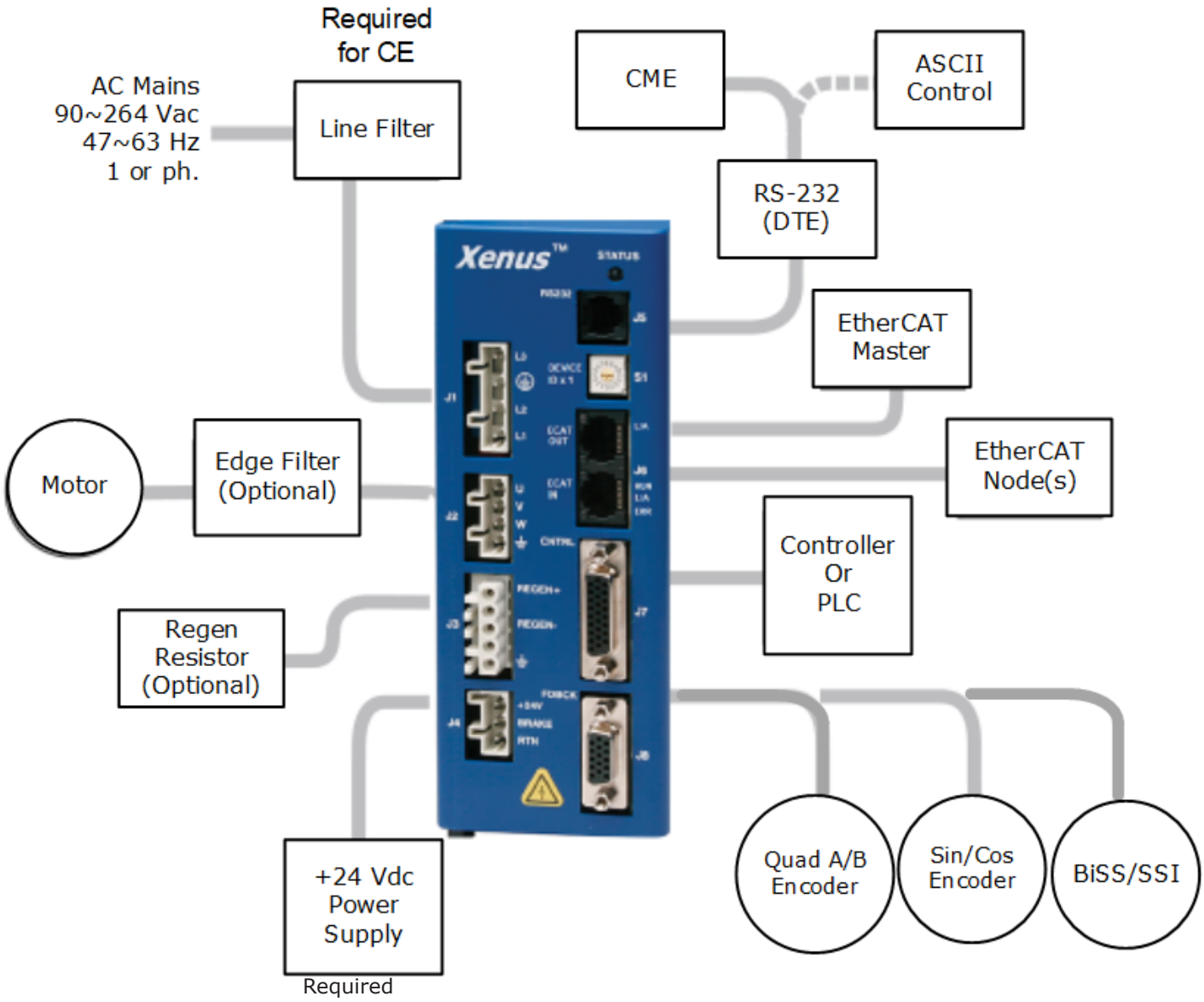
High-Density D-Sub, 15 Position, Male

Note:

1. The total current drawn from the +5 Vdc outputs cannot exceed 400 mA.

INSTALLATION

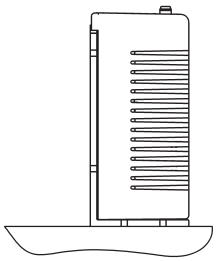
The following diagram shows the XES and components installation.



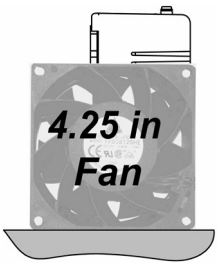
XES Installation Diagram

HEATSINK & FAN CONFIGURATIONS

The following diagrams show the Heatsink and Fan configuration options.

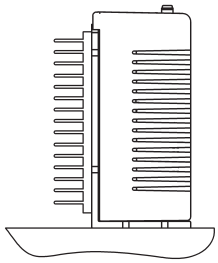


NO HEATSINK
NO FAN

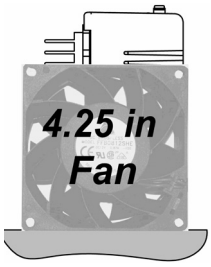


NO HEATSINK
WITH FAN

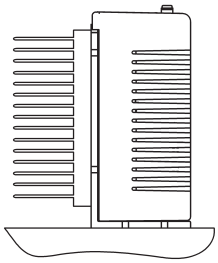
Note: The fans are not included with heatsinks or heatsink kits.



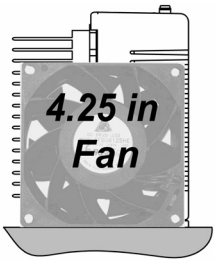
LOW-PROFILE
HEATSINK
NO FAN



LOW PROFILE HEATSINK
WITH FAN



STANDARD HEATSINK
NO FAN



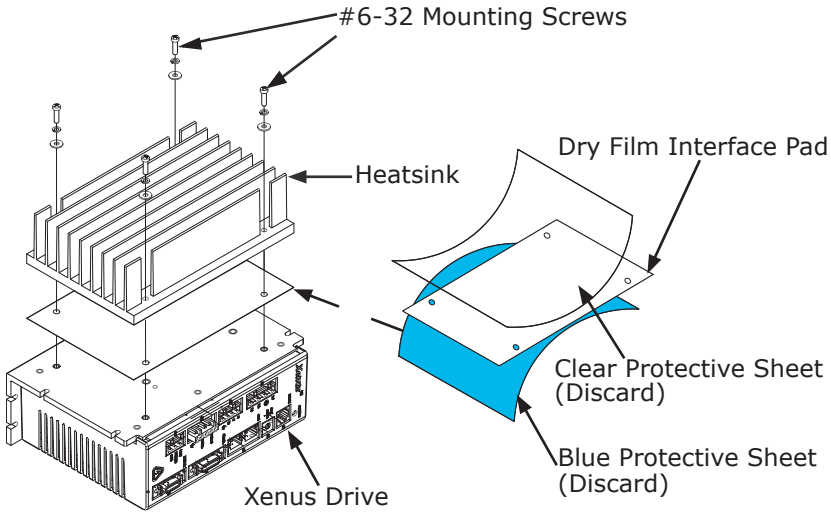
STANDARD HEATSINK
WITH FAN

HEATSINK MOUNTING

A dry-film interface pad is used in place of thermal grease. The pad is die-cut to shape and has holes for the heat sink mounting screws. There are two protective sheets, blue on one side and clear on the other side. Remove both sheets when the interface pad is installed.

HEATSINK INSTALLATION

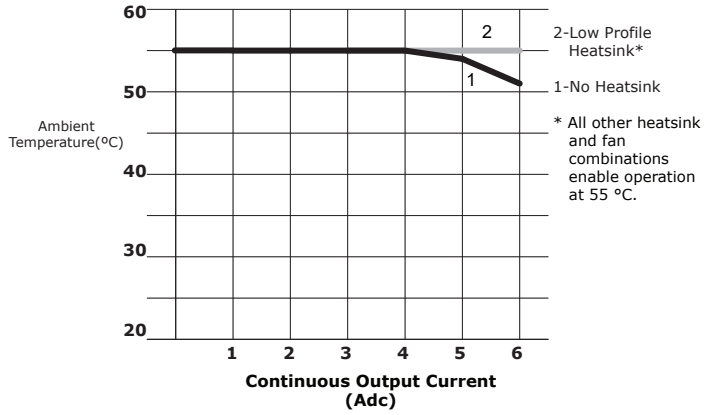
1. Remove the blue protective sheet from one side of the pad and place the pad on the drive.
   Be sure the holes in the pad align with the holes on the drive.
2. Remove the clear protective sheet from the pad.
3. Mount the heatsink onto the drive and align the holes in the heatsink, pad, and drive so they line up.
4. Torque the #6-32 mounting screws to 8~10 lb-in (0.9~1.13 N·m).



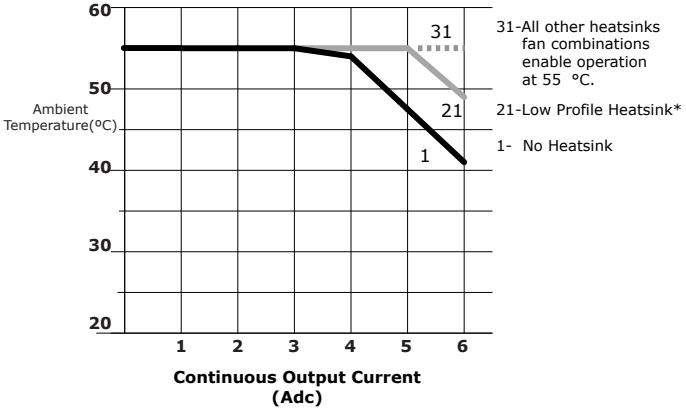
MAXIMUM OPERATING TEMPERATURE VS HEATSINK TYPE & AIR CIRCULATION

The following charts show the maximum ambient temperature vs. the continuous output current for the Xenus models. The cooling options are no heatsink, standard heatsink, and low-profile heatsink. For each of these cooling options, the drive can be operated with convection or forced-air cooling.

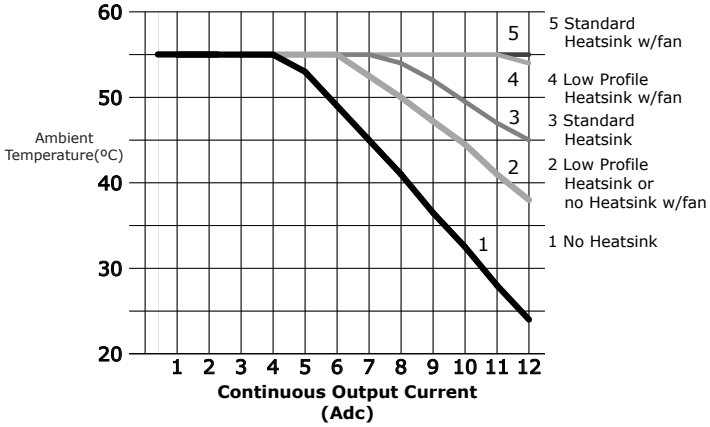
Model: XES-230-18
Mains: 120 Vac



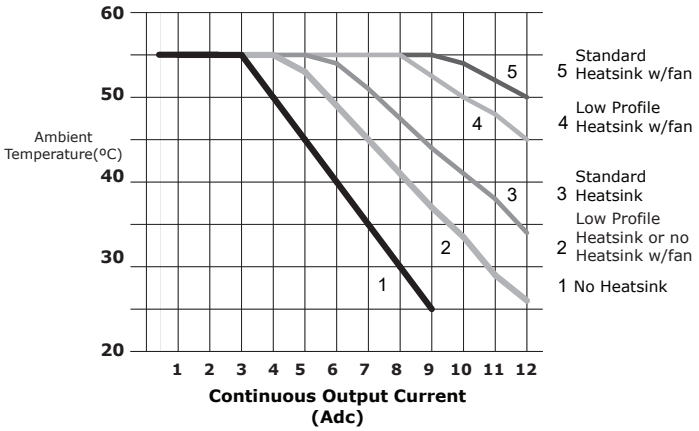
Model: XES-230-18
Mains: 240 Vac



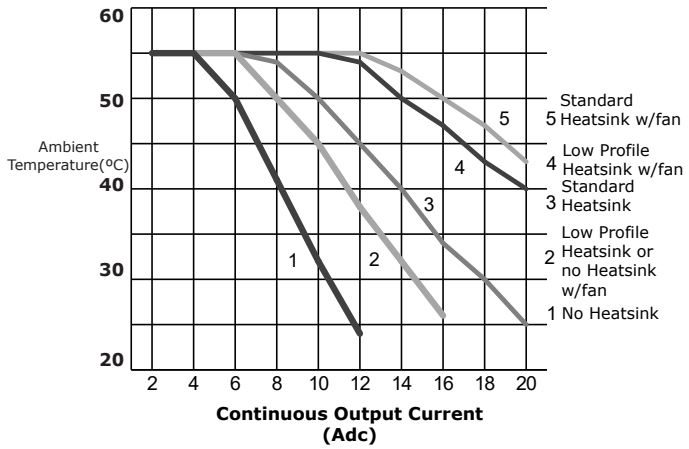
Model: XES-230-36
Mains: 120 Vac



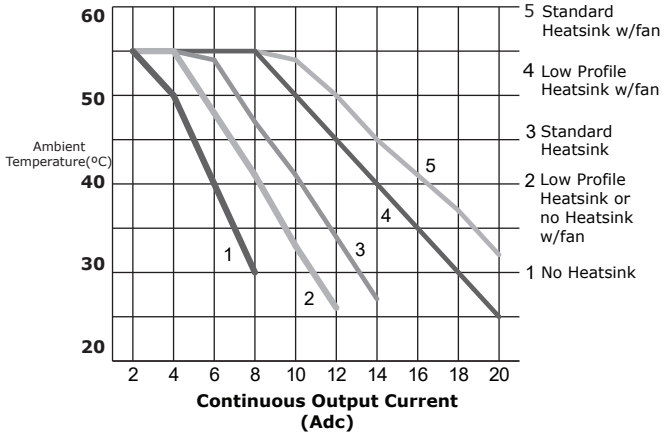
Model: XES-230-36
Mains: 240 Vac



Model: XES-230-40
Mains: 120 Vac



Model: XES-230-40
Mains: 240 Vac



ORDERING GUIDE

Part Number	Description
XES-230-18	Xenus Panel XES Servo Drive 6/18 Adc
XES-230-36	Xenus Panel XES Servo Drive 12/36 Adc
XES-230-40	Xenus Panel XES Servo Drive 20/40 Adc

Example: Order one Xenus Panel XES drive, 6/18 A with Solder-cup Connector Kit, and Serial Cable Kit.

Qty	Item	Comments
1	XES-230-18	Xenus Panel XES Servo Drive
1	XES-CK	Connector Kit
1	SER-USB-RJ11	Serial Cable Kit

For fitting a heatsink to a drive in the field, the XES-HS and XES-HL Kits are available. These kits contain the heatsink, mounting hardware, and dry-film interface.

ACCESSORIES

Model	Qty	Ref	Description	Manufacturers Part Number
XES-CK Connector Kit with Solder Cup Connectors for J7 & J8	1	J1	Plug, 4 position, 7.5 mm, female	Wago: 721-204/026-045
	1	J2	Plug, 4 position, 5.0 mm, female	Wago: 721-104/026-047
	1	J3	Plug, 5 position, 5.0 mm, male	Wago: 721-605/000-044
	1	J4	Plug, 3 position, 5.0 mm, female	Wago: 721-103/026-047
	4	J1~4	Tool, wire insertion & extraction (for J1~4)	Wago: 231-131
	1	J7	Connector, 26 position, male, solder-cup	Norcomp: 180-026-103L001
	1		Back shell, for 26 position connector	Norcomp: 979-015-020R121
	1	J8	Connector, 15 position, male, solder cup	Norcomp: 180-015-103L001
	1		Back shell, for 15 position connector	Norcomp: 979-009-020R121
SER-USB-RJ11	1	J5	Serial Interface Cable: USB to RJ11 Cable, 2.5 meter, RS-232 Cable Kit	
Heatsink Kits for Field Installation (Optional)				
XES-HL Heatsink Kit Low-Profile	1		Heatsink, Low-profile	
	1		Heatsink Thermal Material	
	4		Heatsink Hardware	
XES-HS Heatsink Kit Standard	1		Heatsink, Standard	
	1		Heatsink Thermal Material	
	4		Heatsink Hardware	
Regeneration Resistors (Optional)				
XTL-RA-03			Regeneration Resistor Assembly (for XES-230-18), 30 Ω	
XTL-RA-04			Regeneration Resistor Assembly (for XES-230-36 & XES-230-40 models), 15 Ω	
Edge Filter (Optional)				
XTL-FA-01			Edge Filter	
Edge Filter Connector Kit XTL-FK	1		Plug, 4 position, 5.0 mm, female	Wago: 721-104/026-047
	1		Plug, 5 position, 5.0 mm, male	Wago: 721-105/026-047
	2		Tool, wire insertion & extraction (for J1~4)	Wago: 231-131

Note: Specifications are subject to change without notice.

16-136563 Document Revision History

Revision	Date	Remarks
00	February 28, 2024	Initial Released version