

# FXE060-25-EM

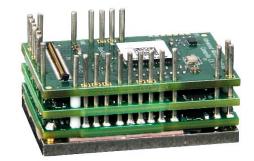
FlexPro® Series

**Product Status:** Active

### **SPECIFICATIONS**

Current Peak 50 A
Current Continuous 25 A

DC Supply Voltage 10 – 55 VDC Network Communication EtherCAT



The **FXE060-25-EM** is a FlexPro<sup>®</sup> series Extended Environment servo drive with IMPACT<sup>TM</sup> architecture.

The **FXE060-25-EM** offers full tuning control of all servo loops and is designed to drive brushed and brushless servo motors, stepper motors, and AC induction motors. The drive accepts a variety of external command signals, or can use the built-in Motion Engine, an internal motion controller used with Sequencing and Indexing commands. Programmable digital and analog I/O are included to enhance interfacing with external controllers and devices.

The **FXE060-25-EM** features an EtherCAT® interface for network communication using CANopen over EtherCAT (CoE) and USB connectivity for drive configuration and setup. All drive and motor parameters are stored in non-volatile memory.

IMPACT<sup>TM</sup> (Integrated Motion Platform And Control Technology combines exceptional processing capability and high-current components to create powerful, compact, feature-loaded servo solutions. IMPACT<sup>TM</sup> is used in all FlexPro<sup>®</sup> drives and is available in custom products as well.

The **FXE060-25-EM** conforms to the following specifications and is designed to the Environmental Engineering Considerations as defined in MIL-STD-810F.

### **Extended Environment Performance**

Ambient Operating Temperature Range -40°C to +95°C (-40°F to +203°F)

Thermal Shock -40°C to +95°C (-40°F to +203°F) within 3 min.

Relative Humidity 0 to 95%, Non-Condensing
Vibration 25 Grms for 5 min. in 3 axes
Altitude -400m to +25000m

Altitude -400m to +25000m

Contaminants Pollution Degree 2

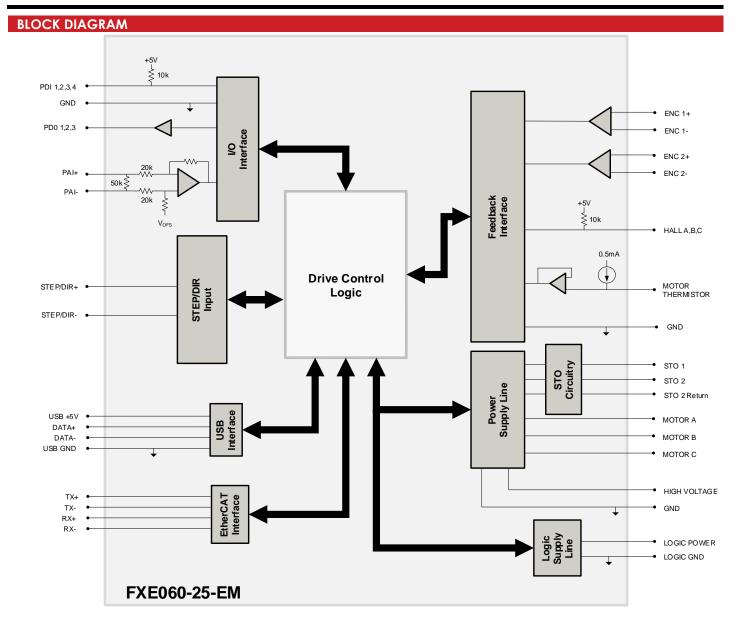
### **FEATURES**

- CoE Based on DSP-402 Device Profile for Drives and Motion Control
- Synchronization using Distributed Clocks
- Position Cycle Times down to 100μs
- Four Quadrant Regenerative Operation
- Programmable Gain Settings
- PIDF Velocity Loop

- Extended Environmental Ratings
- Compact Size, High Power Density
- On-the-Fly Mode Switching
- On-the-Fly Gain Set Switching
- Dedicated Safe Torque Off (STO) Inputs
- Space Vector Modulation (SVM) Technology

Feedback Supported	• Hall 3013013	Motors Supported	<ul><li>Three Phase</li><li>Single Phase</li><li>Stepper</li><li>AC Induction</li></ul>	Modes of Operation	<ul><li>Profile Modes</li><li>Cyclic Synchronous Modes</li><li>Current</li><li>Velocity</li><li>Position</li></ul>
Command Sources	• Indexing	Inputs / Outputs	<ul> <li>4 Programmable Digital Inputs</li> <li>3 Programmable Digital Outputs</li> <li>1 Programmable Analog Input</li> </ul>	Agency Approvals	ROHS MIL-STD-810F (as stated) MIL-STD-1275D (optional) MIL-STD-461E (optional) MIL-STD-704F (optional) MIL-HDBK-217 (optional) UL (Pending) CE (Pending) TUV Rheinland (STO) (Pending)





## **INFORMATION ON APPROVALS AND COMPLIANCES**

RoHS Compliant

The RoHS Directive restricts the use of certain substances including lead, mercury, cadmium, hexavalent chromium and halogenated flame retardants PBB and PBDE in electronic equipment.

MIL-STD-810F Environmental Engineering Considerations and Laboratory Tests – (as stated)

MIL-STD-1275D Characteristics of 28 Volt DC Electrical Systems in Military Vehicles – (optional)

MIL-STD-461E Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment – (optional)

MIL-STD-704F Aircraft Electric Power Characteristics – (optional)

MIL-HDBK-217 Reliability Prediction of Electronic Equipment (MTBF) – (optional)



Description   Units   Volue	SPECIFICATIONS		
Description         Units         Vocume           DC Supply Indervollage         VDC         8           DC Supply Windervollage         VDC         8           Logic Supply Input Range (optional)         VDC         10-55           Sofe Torque Off Vollage (Defortal)         VDC         5           Sofe Torque Off Vollage (Defortal)         VDC         5           Maximum Required External Bus Capacitance         µF         500           Maximum Peak Current Output?         A (Arms)         25 (25)           Efficiency of Ratea Power         %         79           Maximum Power Dissipation at Ratea Power         W         134           Maximum Power Dissipation of Ratea Power         W         14           Maximum Oribut PWM Duty Cycle         %         8           Bescription         µH         150 (@48VDC supply); 75 (@24VDC supply); 40 (@12VDC supply)           Commandation Interfaces*         -         EtherCA1@ (USB for configuration)           Commanutation Interfaces*         -         Etherca1@ (USB for configurati		Electric	al Specifications
DC Supply Indervoltage         VDC         8 B           DC Supply Covervoltage         VDC         88           Logic Supply Input Range (politonal)         VDC         5 S           Logic Supply Input Range (politonal)         VDC         15 S           Softe Torque Off Voltage (Default)         VDC         5           Marimum Required External Bus Capacitionse         μF         500           Maximum Pook Current Cultput!         A (Arms)         52 (25)           Maximum Rangired Roternal Cultural         A (Arms)         52 (25)           Efficiency at Rated Power         %         99           Maximum Continuous Output Power         W         1361           Maximum Continuous Output Power         W         1361           Maximum Dodd Inductance (line-to-line)³         μH         150 (@ 48VDC suppty); 75 (@24VDC supply); 40 (@ 12VDC supply)           Switching Frequency         kB±         20           Maximum Output PWM Duty Cycle         %         8         8           Communication Interfaces*         -         *         *         *           Communication Interfaces*         -         *         *         *         *         *         *         *         *         *         *         *	Description		
DC Supply Undervoltage         VDC         8           Logic Supply Input Range (optional)         VDC         10 – 55           Sofe Torque Off Voltage (Default)         VDC         10 – 55           Sofe Torque Off Voltage (Default)         VDC         50           Maximum Peak Current Output¹         A (Arms)         50 (36.3)           Maximum Peak Current Output²         A (Arms)         25 (25)           Efficiency at Rated Power         W         134           Maximum Power Dissipation at Rated Power         W         14           Maximum Power Dissipation at Rated Power         W         14           Maining Frequency         Btb.         20           Maximum Onthing Power         W         14           Maximum Onthing Power         Btb.         20           Maximum Onthing Prequency         Btb.         20           Maximum Onthing Prequency         Btb.         20           Maximum Onthing Description         Control Specifications         Value           Communication Interfaces*         E         Ebrecifications           Communication Interfaces*         2         Ebrecifications           Communication Methods         2         A Should Femoder (BSS C-Mode), Hall Sensors, Incremental Encoder, A Discounting (BSS C-Mode), H		VDC	
DC Supply Overvoltage   VDC   S8   Clogic Supply   pub Range (optional)   VDC   10 - 55		VDC	8
Logic Supply Input Ronge (potional)         VDC         10 – 55           Safe Indruge Off Vollage (Edealt)         VDC         5           Maximum Required External Bus Capacitance         μF         500           Maximum Chrithous Current Output <sup>12</sup> A (Arms)         52 (25)           Efficiency at Rated Power         %         99           Maximum Power Dissipation at Rated Power         W         134           Minimum Load Inductance (line-to-line) <sup>2</sup> μH         150 (a 84VDC supply); 75 (@24VDC supply); 40 (@12VDC supply)           Switching Frequency         kHz         20           Maximum Output PWM Duty Cycle         %         85           Communication Interfaces*         -         EnterCaffe (USB for configuration)           Communication Interfaces*         -         ±10 V Analogo, Over the Network. Sequencing, Indexing, Jogging, 5tep           Communication Interfaces*         -         ±10 V Analogo, Over the Network. Sequencing, Indexing, Jogging, 5tep           Communication Interfaces*         -         ±10 V Analogo, Over the Network. Sequencing, Indexing, Jogging, 5tep           Communication Interfaces*         -         ±10 V Analogo, Over the Network. Sequencing, Indexing, Jogging, 5tep           Communication Interfaces*         -         ±10 V Analogo, Over the Network. Sequencing, Indexing, Jogging, 5tep		VDC	58
Safe Torque Off Voltage (Default)         VDC         5           Minimum Required External Bus Capacitance         μF         500           Maximum Peak Current Output*         A (Arms)         50 (35.3)           Maximum Continuous Current Output*         A (Arms)         25 (25)           Efficiency at Rated Power         %         99           Maximum Continuous Output Power         W         1361           Maximum Load Inductance (line-to-line)*         µH         150 (@ 48VDC supply); 75 (@24VDC supply); 40 (@12VDC supply)           Witching Frequency         kHz         20           Maximum Output PWM Duty Cycle         %         85           Communication Interfaces*         -         EnterCA16® (USB for configuration)           Communication Interfaces*         -         8 Directifon.         Value           Communication Interfaces*         -         8 Direction. Encoder Following.         10 Vanolog. Over the Nelwork. Sequencing. Indexing. Jogging. Step & Direction. Encoder Following.           Feedback Supported         -         Absolute Encoder (BSS C-Mode). Hall Sensors, incremental Encoder. Auxiliary Incremental Encoder. Hall Sensors, incremental Encoder.           Modes of Operation         -         Profile Modes. Cyclic Synchronous Modes. Current. Velocity. Position. Technometer (£10V)           Motors Supported*         - <td></td> <td>VDC</td> <td>10 – 55</td>		VDC	10 – 55
Minimum Required External Bus Capacitance         μF         500           Maximum Peak Current Outpul*         A (Arms)         25 (25)           Efficiency of Rated Power         %         99           Maximum Continuous Outpul Power         W         136           Maximum Power Dissipation at Rated Power         W         14           Minimum Load Inductance (ine-to-line)³         μH         150 (@ 48VDC supply); 75 (@24VDC supply); 40 (@12VDC supply)           Switching Frequency         kHz         20           Maximum Output PWM Duty Cycle         %         85            Value           Commonication Interfaces*         -         EtherCAT® (USB for configuration)           Commond Sources         -         2 10 V Analogo, Over the Network, Sequencing, Indexing, Jogging, Step & Discription           Commond Sources         -         2 10 V Analogo, Over the Network, Sequencing, Indexing, Jogging, Step & Discription (Indexing)           Feedback Supported         -         Absolute Encoder (BISS C-Mode), Hall Sensors, Incremental Encoder, Abusing Incremental Encoder, 12 VOLD Position, Encoder (E10V)           Commutation Methods         -         Absolute Encoder (BISS C-Mode), Hall Sensors, Incremental Encoder, Position, Encoder (E10V)           Moters Supporteds*         -         Profile Modes, Cyclic Incoder, 12 Vol. Constitution,		VDC	5
Maximum Reak Current Output*   A (Arms)   50 (35.3)   Maximum Continuous Current Output*   X (Arms)   25 (25)   Efficiency or Rated Power   X   99   Maximum Continuous Output Power   W   1361   Maximum Power Dissipation or Rated Power   W   1361   Maximum Load Inductance (line-to-line)*   μH   150 (@ 48VPC supply); 75 (@24VPC supply); 40 (@12VPC supply)   Minimum Load Inductance (line-to-line)*   μH   150 (@ 48VPC supply); 75 (@24VPC supply); 40 (@12VPC supply)   Minimum Load Inductance (line-to-line)*   μH   150 (@ 48VPC supply); 75 (@24VPC supply); 40 (@12VPC supply)   Minimum Load Inductance (line-to-line)*   μH   150 (@ 48VPC supply); 75 (@24VPC supply); 40 (@12VPC supply)   Maximum Output PWM Duty Cycle   % 8 85   85    Communication Interfaces*   -	· • • · · · · · · · · · · · · · · · · ·	μF	500
Maximum Continuous Current Output?   A (Arms)   25 (25)			50 (35.3)
Efficiency at Rated Power         %         99           Maximum Continuous Output Power         W         1361           Maximum Power Dissipation at Rated Power         W         14           Minimum Load Inductance (line-to-line)³         µH         150 (@ 48VDC supply); 75 (@24VDC supply); 40 (@12VDC supply)           Switching Frequency         kHz         20           Control Specifications           Communication Interfaces*         -         EtherCAT@ (USB for configuration)           Command Sources         2 EtherCAT@ (USB for configuration)           Feedback Supported         -         EtherCAT@ (USB for configuration)           Feedback Supported         -         Absolute Encoder (BBS C-Mode), Hall Sensors, Incremental Encoder, Auxiliary Incremental Encoder, ±10 VDC Position, Tachameter (±10V)           Communitation Methods         -         -         Auxiliary Incremental Encoder, ±10 VDC Position, Tachameter (±10V)           Modes of Operation         -         Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motors Supported³         -         Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motor Supported³         -         -         Representation         -         -         -         -         -         -         -         <	Maximum Continuous Current Output <sup>2</sup>		
Moximum Continuous Output Power         W         1361           Maximum Power Dissipation at Rated Power         W         14           Maximum Load Inductance (line-to-line)³         µH         150 (@ 48VDC supply); 75 (@24VDC supply); 40 (@12VDC supply)           Switching Frequency         kHz         20           Maximum Output PWM Duty Cycle         %         8.5           Control Specifications           Communication Interfaces*         -         Ether CAT® (USB for configuration)           Communication Interfaces*         -         Ether CAT® (USB for configuration)           Command Sources         -         Ether CAT® (USB for configuration)           Eedback Supported         -         Ether CAT® (USB for configuration)           Feedback Supported         -         Absolute Encoder (BisS G-Mode), Hall Sensors, Incremental Encoder, a bis of configuration of the North Category (Posterion)           Commutation Methods         -         Absolute Encoder (BisS G-Mode), Hall Sensors, Incremental Encoder, a bis of configuration of the North Category (Posterion)           Motors Supported         -         Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motors Supporteds         -         Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Hardware Protection         4         44 Configurable Fun			
Moximum Power Dissipation at Rated Power         W         14           Minimum Load Inductance (line-10-line)*         μH         150 (@ 48VDC supply); 75 (@24VDC supply); 40 (@ 12VDC supply)           Waximum Output PWM Duty Cycle         %         85           Control Specifications           Communication Interfaces*         -         EtherCAT® (USB for configuration)           Command Sources         -         EtherCAT® (USB for configuration)           Feedback Supported         -         Absolute Encoder (BiSS C-Mode), Hall Sensors, Incremental Encoder, Auxiliary Incremental Encoder, Holving (Incremental Encoder, Ela VYC Position, Tachameter (£10V)           Communitation Methods         -         Sinusoidal, Trapezoidal           Modes of Operation         -         Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position (Closed Loop) Servo), Single Phase (Brushled Servo, Voice Coil, Induction (Closed Loop) Servo), Single Phase (Brushled Servo, Voice Coil, Induction (Closed Loop) Servo), Single Phase (Brushled Servo, Voice Coil, Under Vollage           Hardware Protection         40+ Configurable Functions, Over Current, Over Temperature (Drive & Motor), Over Vollage, Short Circuit (Phase-Phase & Phase-Ground), Under Vollage           Programmable Digital Inputs/Outputs         -         4/3           Programmable Analog Inputs/Outputs         -         1/0           Primary I/O Logic Level         -         5 VDC, not isolated	<u>_</u>		1361
Minimum Load Inductance (line-to-line)³         μH         150 (@ 48VDC supply); 75 (@24VDC supply); 40 (@12VDC supply)           Switching Frequency         kHz         20           Maximum Output PWM Duty Cycle         %         85           Commol Specifications           Units         Value           Communication Interfaces4         -         Ether CAT® (USB for configuration)           Command Sources         -         2 Ether CAT® (USB for configuration)           Feedback Supported         -         Absolute Encoder (BISS C-Mode), Hall Sensors, Incremental Encoder, Auxiliary Incremental Encoder, 4.10 VDC Position, Tachameter (±10V)           Commutation Methods         -         Sinusoidal, Trapezoidal           Modes of Operation         -         Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motors Supported³         -         Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Marchamer Protection         -         Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Hardware Protection         -         40 + Configurable Functions, Over Current, Over Temperature (Drive & Moder, Over Voltage, Short Circuit (Phase-Phase & Phase-Ground), Under Voltage           Programmable Digital Inputs/Outputs         -         4/3           Programmable Analog Inputs/Outputs         -         1/0 <td>·</td> <td>_</td> <td></td>	·	_	
Switching Frequency Maximum Output PWM Duty Cycle  Maximum Output PWM Duty Cycle  Description  Common Specifications Units  Control Specifications Units  Common Succes  Common Succes  Ether CAT® (USB for configuration)  Ether CAT® (USB for configuration)  Line Supported  Absolute Encoder Following Absolute Encoder Following Feedback Supported  Absolute Encoder (BSS C-Mode), Hall Sensors, Incremental Encoder, Auxiliary Incremental Encoder, 110 VDC Position, Tachometer (±10V)  Commutation Methods  Absolute Encoder, 110 VDC Position, Tachometer (±10V)  Commutation Methods  Absolute Encoder, 110 VDC Position, Tachometer (±10V)  Modes of Operation  Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position  Three Phase (Brushless Servo), Single Phase (Brushed Servo, Voice Coil, Inductive Load), Stepper (2 or 3-Phase Closed Loop), Act Inductive Load), Stepper (2 or 3-Phase Closed Loop), Act Inductive Load), Stepper (2 or 3-Phase Closed Loop), Act Inductive Load), Stepper (2 or 3-Phase Closed Loop), Act Inductive Load), Stepper (2 or 3-Phase Closed Loop), Act Inductive Load), Stepper (2 or 3-Phase Closed Loop), Act Inductive Load), Stepper (2 or 3-Phase Closed Loop), Act Inductive Load), Stepper (2 or 3-Phase Closed Loop), Act Inductive Load), Stepper (2 or 3-Phase Closed Loop), Act Inductive Load), Stepper (2 or 3-Phase Closed Loop), Act Inductive Load), Stepper (2 or 3-Phase Closed Loop), Act Inductive Load), Stepper (2 or 3-Phase Closed Loop), Act Inductive Load), Stepper (2 or 3-Phase Closed Loop), Act Inductive Load), Stepper (2 or 3-Phase Closed Loop), Act Inductive Load), Stepper (2 or 3-Phase Closed Loop), Act Inductive Load), Stepper (2 or 3-Phase Closed Loop), Act Inductive Load), Stepper (2 or 3-Phase Closed Loop), Act Inductive Load), Stepper (3 or 3-Phase Closed Loop), Act Inductive Load), Stepper (3 or 3-Phase Closed Loop), Act Inductive Load), Stepper (3 or 3-Phase Closed Loop), Act Inductive Load), Stepper (3 or 3-Phase Closed Loop), Act Inductive Load), Stepper (3 or 3-Phase Closed Loop), Ac	· · · · · · · · · · · · · · · · · · ·		
Maximum Output PWM Duty Cycle         %         85           Control Specifications           Communication Interfaces*         -         EtherCAT® (USB for configuration)           Command Sources         -         ± 10 V Analog, Over the Network, Sequencing, Indexing, Jogging, Step & Direction, Encoder Following           Feedback Supported         -         ± 10 V Analog, Over the Network, Sequencing, Indexing, Jogging, Step & Direction, Encoder Following           Feedback Supported         -         ± Absolute Encoder (BISS C-Mode), Hall Sensors, Incremental Encoder, 4 Auxiliary Incremental Encoder, ±10 VDC Position, Tachometer (±10V)           Commutation Methods         -         Sinusoidal, Trapezoidal           Modes of Operation         -         Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motors Supported <sup>5</sup> -         Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motors Supported <sup>5</sup> -         Three Phase (Brushless Serva), Single Phase (Brushled Serva, Voice Coil, Inductive Load), Stepper (2- or 3-Phase Closed Loop), Ac Inductive Load), Stepper (2- or 3-Phase Closed Loop), Ac Inductive Load), Stepper (2- or 3-Phase Closed Loop), Ac Inductive Load, Stepper (2- or 3-Phase Phase & Phase-Ground), Under Voltage           Programmable Analog Inputs/Outputs         -         40+ Configurable Functions, Over Current, Over Temperature (Drive & Motor), Over Voltage, Short Circuit (Phase-Phase & Phase-Ground), Under Voltage           P		<del></del>	
Description         Units         Value           Communication Interfaces*         - EtherCAT® (USB for configuration)           Command Sources         - EtherCAT® (USB for configuration)           Command Sources         - ±10 V Analog, Over the Network, Sequencing, Indexing, Jogging, Step & Direction, Encoder Following           Feedback Supported         - Absolute Encoder (BISS C-Mode), Hall Sensors, Incremental Encoder, Auxiliary Incremental Encoder, ±10 VDC Position, Tachometer (±10V)           Commutation Methods         - Sinusoidal, Trapezoidal           Modes of Operation         - Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motors Supported*         - Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motors Supported*         - Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motors Supported*         - Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Hardware Protection         - Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Hardware Protection         - 40 + Configurable Functions, Over Current, Over Temperature (Drive & Motor), Over Voltage, Short Circuit (Phase-Phase & Phase-Ground), Under Voltage, Short Circuit (Phase-Phase & Phase			
Obscription         Units         Callus           Communication Interfaces⁴         -         EtherCAT® (USB for configuration)           Command Sources         -         ±10 V Analog, Over the Network, Sequencing, Indexing, Jogging, Step & Direction, Encoder Following           Feedback Supported         -         Absolute Encoder (BisS C-Mode), Hall Sensors, Incremental Encoder, ±10 VDC Position, Tachometer (±10V)           Commutation Methods         -         Sinusoidal, Trapezoidal           Modes of Operation         -         Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motors Supported³         -         Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motors Supported³         -         Three Phase (Brushless Servo), Single Phase (Brushed Servo, Voice Coil, Inductive Load), Stepper (2- or 3-Phase Closed Loop), AC Induction (Closed Loop Vector)           Motors Supported³         -         40+ Configurable Functions, Over Current, Over Temperature (Drive & Motor), Over Voltage, Short Circuit (Phase-Phase & Phase-Ground), Under Voltage, Short Circuit (Phase-Phase & State Serve), Short Serve, Short Serve, Short Serve, Short Serve, Short Serve, Shor	Maximom Corport Will Dory Cycle		
Communication Interfaces4         -         EtherCAT® (USB for configuration)           Command Sources         1 ±10 V Analog, Over the Network, Sequencing, Indexing, Jogging, Step & Direction, Encoder Following           Feedback Supported         - Absolute Encoder (BiSS C-Mode), Hall Sensors, Incremental Encoder, #10 VDC Position, Tachometer (±10 V)           Commutation Methods         - Sinusoidal, Trapezoidal           Modes of Operation         - Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motors Supporteds         - Inter Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motors Supporteds         - Inter Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motory Supporteds         - Interpretation           Hardware Protection         - Motory, Over College, Stryol, Single Phase (Brushes Serva), Single Phase (Brushes Serva), Voice Coil, Inductive Load), Stepper (2- or 3-Phase Closed Loop), AC Induction (Closed Loop Vector)           Hardware Protection         - Motory), Over Voltage, Short Circuit (Phase-Phase & Phase-Ground), Under Voltage,	Description		
Command Sources         ±10 V Analog, Over the Network, Sequencing, Indexing, Jogging, Step & Direction, Encoder Following           Feedback Supported         - Absolute Encoder (BSSS C-Mode), Hall Sensors, Incremental Encoder, Auxiliary Incremental Encoder, ±10 VDC Position, Tachometer (±10V)           Commutation Methods         - Sinusoidal, Trapezoidal           Modes of Operation         - Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motors Supporteds         - Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motors, Operation         - Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motors, Operation         - Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motors, Operation         - Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motors, Operation         - Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Hardware Protection         - Motori, Operation, Step (2 or 3-Phase Closed Loop), AC Induction (Closed Loop Vector)           Programmable Digital Inputs/Outputs         - 4/3           Programmable Digital Inputs/Outputs         - 1/0           Primary I/O Logic Level         - 5 VDC, not isolated           Current Loop Sample Time         µs         100           Mostinut Loop Sample Time         µs         100           Motorious Loop Sample Time			
Feedback Supported  - A Direction, Encoder Following - Absolute Encoder (BiSS C-Mode), Hall Sensors, Incremental Encoder, Auxiliary Incremental Encoder, 210 VDC Position, Tacchometer (±10V)  Commutation Methods - Sinusoidal, Trapezoidal  Modes of Operation - Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position Three Phase (Brushless Servo), Single Phase (Brushless	0 10		
Commutation Methods	Commana Sources	-	
Commutation Methods	F		Absolute Encoder (BiSS C-Mode), Hall Sensors, Incremental Encoder,
Modes of Operation         -         Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position           Motors Supported <sup>5</sup> -         Inductive Load), Stepper (2- or 3-Phase (Brushed Servo, Voice Coil, Inductive Load), Stepper (2- or 3-Phase Closed Loop), AC Induction (Closed Loop Vector)           Hardware Protection         -         40+ Configurable Functions, Over Current, Over Temperature (Drive & Motor), Over Voltage, Short Circuit (Phase-Phase & Phase-Ground), Under Voltage           Programmable Digital Inputs/Outputs         -         4/3           Programmable Analog Inputs/Outputs         -         1/0           Primary I/O Logic Level         -         5 VDC, not isolated           Current Loop Sample Time         μs         50           Velocity Loop Sample Time         μs         100           Position Loop Sample Time         μs         100           Maximum Encoder Frequency         MHz         20 (5 pre-quadrature)           Mechanical Specifications         Value           Size (H x W x D)         mm (in)         38.1 x 25.4 x 15.8 (1.50 x 1.00 x 0.60)           Weight         g (oz)         1BD           Ambient Operating Temperature Range <sup>6</sup> °C (°F)         -40 – 95 (-40 – 203)           Storage Temperature Range         °C (°F)         -40 – 95 (-40 – 203) within 3 min           Relative Humidity	гееараск зирропеа	-	
Motors Supporteds     Three Phase (Brushless Servo), Single Phase (Brushed Servo, Voice Coil, Inductive Load), Stepper (2- or 3-Phase Closed Loop), AC Induction (Closed Loop Vector)       Hardware Protection     40+ Configurable Functions, Over Current, Over Temperature (Drive & Motor), Over Voltage, Short Circuit (Phase-Phase & Phase-Ground), Under Voltage       Programmable Digital Inputs/Outputs     - 4/3       Programmable Analog Inputs/Outputs     - 1/0       Primary I/O Logic Level     - 5 VDC, not isolated       Current Loop Sample Time     µs     100       Velocity Loop Sample Time     µs     100       Maximum Encoder Frequency     MHz     20 (5 pre-quadrature)       Mechanical Specifications     Weight     38.1 x 25.4 x 15.8 (1.50 x 1.00 x 0.60)       Size (H x W x D)     mm (in)     38.1 x 25.4 x 15.8 (1.50 x 1.00 x 0.60)       Weight     g (oz)     IBD       Ambient Operating Temperature Range4     °C (°F)     -40 – 95 (-40 – 203)       Storage Temperature Range     °C (°F)     -50 – 100 (-58 – 212)       Thermal Shock     °C (°F)     -40 – 95 (-40 – 203) within 3 min       Relative Humidity     - 9.795, non-condensing       Vibration     Grms     25 for 5 minutes in 3 axes       Allitude     m     -400 – 25000       Contaminants     -     POllution Degree 2       Form Factor     -     PC BM Ounted	Commutation Methods	-	Sinusoidal, Trapezoidal
Motors Supporteds     Three Phase (Brushless Servo), Single Phase (Brushed Servo, Voice Coil, Inductive Load), Stepper (2- or 3-Phase Closed Loop), AC Induction (Closed Loop Vector)       Hardware Protection     40+ Configurable Functions, Over Current, Over Temperature (Drive & Motor), Over Voltage, Short Circuit (Phase-Phase & Phase-Ground), Under Voltage       Programmable Digital Inputs/Outputs     - 4/3       Programmable Analog Inputs/Outputs     - 1/0       Primary I/O Logic Level     - 5 VDC, not isolated       Current Loop Sample Time     µs     100       Velocity Loop Sample Time     µs     100       Maximum Encoder Frequency     MHz     20 (5 pre-quadrature)       Mechanical Specifications     Weight     38.1 x 25.4 x 15.8 (1.50 x 1.00 x 0.60)       Size (H x W x D)     mm (in)     38.1 x 25.4 x 15.8 (1.50 x 1.00 x 0.60)       Weight     g (oz)     IBD       Ambient Operating Temperature Range4     °C (°F)     -40 – 95 (-40 – 203)       Storage Temperature Range     °C (°F)     -50 – 100 (-58 – 212)       Thermal Shock     °C (°F)     -40 – 95 (-40 – 203) within 3 min       Relative Humidity     - 9.795, non-condensing       Vibration     Grms     25 for 5 minutes in 3 axes       Allitude     m     -400 – 25000       Contaminants     -     POllution Degree 2       Form Factor     -     PC BM Ounted	Modes of Operation	-	Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position
Hardware Protection40+ Configurable Functions, Over Current, Over Temperature (Drive & Motor), Over Voltage, Short Circuit (Phase-Phase & Phase-Ground), Under VoltageProgrammable Digital Inputs/Outputs-4/3Programmable Analog Inputs/Outputs-1/0Primary I/O Logic Level-5 VDC, not isolatedCurrent Loop Sample Timeμs50Velocity Loop Sample Timeμs100Position Loop Sample Timeμs100Maximum Encoder FrequencyMHz20 (5 pre-quadrature)Mechanical SpecificationsValueSize (H x W x D)mm (in)38.1 x 25.4 x 15.8 (1.50 x 1.00 x 0.60)Weightg (oz)1BDAmbient Operating Temperature Range <sup>6</sup> °C (°F)-40 - 95 (-40 - 203)Storage Temperature Range°C (°F)-40 - 95 (-40 - 203) within 3 minRelative Humidity-0-95%, non-condensingVibrationGrms25 for 5 minutes in 3 axesAltitudem-400 - 25000Contaminants-POLlution Degree 2Form Factor-PC B MountedP1 SIGNAL CONNECTOR-PC B Mounted	Motors Supported <sup>5</sup>	-	Inductive Load), Stepper (2- or 3-Phase Closed Loop), AC Induction
Programmable Digital Inputs/Outputs       -       4/3         Programmable Analog Inputs/Outputs       -       1/0         Primary I/O Logic Level       -       5 VDC, not isolated         Current Loop Sample Time       μs       50         Velocity Loop Sample Time       μs       100         Position Loop Sample Time       μs       100         Maximum Encoder Frequency       MHz       20 (5 pre-quadrature)         Mechanical Specifications         Units       Value         Size (H x W x D)       mm (in)       38.1 x 25.4 x 15.8 (1.50 x 1.00 x 0.60)         Weight       g (oz)       TBD         Ambient Operating Temperature Range <sup>4</sup> °C (°F)       -40 - 95 (-40 - 203)         Storage Temperature Range       °C (°F)       -40 - 95 (-40 - 203) within 3 min         Storage Temperature Range       °C (°F)       -40 - 95 (-40 - 203) within 3 min         Relative Humidity       -       0-95%, non-condensing         Vibration       Grms       25 for 5 minutes in 3 axes         Altitude       m       -400 - 25000         Contaminants       -       Pollution Degree 2         Form Factor       -       PCB Mounted         P1 SIGNAL CO	Hardware Protection	-	40+ Configurable Functions, Over Current, Over Temperature (Drive & Motor), Over Voltage, Short Circuit (Phase-Phase & Phase-Ground),
Programmable Analog Inputs/Outputs         -         1/0           Primary I/O Logic Level         -         5 VDC, not isolated           Current Loop Sample Time         μs         50           Velocity Loop Sample Time         μs         100           Position Loop Sample Time         μs         100           Maximum Encoder Frequency         MHz         20 (5 pre-quadrature)           Mechanical Specifications           Value         Value           Size (H x W x D)         mm (in)         38.1 x 25.4 x 15.8 (1.50 x 1.00 x 0.60)           Weight         g (oz)         TBD           Ambient Operating Temperature Range <sup>6</sup> °C (°F)         -40 - 95 (-40 - 203)           Storage Temperature Range         °C (°F)         -50 - 100 (-58 - 212)           Thermal Shock         °C (°F)         -40 - 95 (-40 - 203) within 3 min           Relative Humidity         -         0-95%, non-condensing           Vibration         Grms         25 for 5 minutes in 3 axes           Altitude         m         -400 - 25000           Contaminants         -         Pollution Degree 2           Form Factor         -         PCB Mounted           P1 SIGNAL CONNECTOR         -         80-pin 0.4mm spaced connector     <	Programmable Digital Inputs/Outputs	-	
Primary I/O Logic Level         -         5 VDC, not isolated           Current Loop Sample Time         μs         50           Velocity Loop Sample Time         μs         100           Position Loop Sample Time         μs         100           Maximum Encoder Frequency         MHZ         20 (5 pre-quadrature)           Mechanical Specifications           Units         Value           Size (H x W x D)         mm (in)         38.1 x 25.4 x 15.8 (1.50 x 1.00 x 0.60)           Weight         g (oz)         TBD           Ambient Operating Temperature Rangeé         °C (°F)         -40 - 95 (-40 - 203)           Storage Temperature Range         °C (°F)         -50 - 100 (-58 - 212)           Thermal Shock         °C (°F)         -40 - 95 (-40 - 203) within 3 min           Relative Humidity         -         -0-95%, non-condensing           Vibration         Grms         25 for 5 minutes in 3 axes           Altitude         m         -400 - 25000           Contaminants         -         Pollution Degree 2           Form Factor         -         PCB Mounted           P1 SIGNAL CONNECTOR         -         80-pin 0.4mm spaced connector		-	
Current Loop Sample Time		-	
Velocity Loop Sample Time         μs         100           Position Loop Sample Time         μs         100           Maximum Encoder Frequency         MHz         20 (5 pre-quadrature)           Mechanical Specifications           Units         Value           Size (H x W x D)         mm (in)         38.1 x 25.4 x 15.8 (1.50 x 1.00 x 0.60)           Weight         g (oz)         TBD           Ambient Operating Temperature Range <sup>4</sup> °C (°F)         -40 – 95 (-40 – 203)           Storage Temperature Range         °C (°F)         -50 – 100 (-58 – 212)           Thermal Shock         °C (°F)         -40 – 95 (-40 – 203) within 3 min           Relative Humidity         -         0-95%, non-condensing           Vibration         Grms         25 for 5 minutes in 3 axes           Altitude         m         -400 – 25000           Contaminants         -         Pollution Degree 2           Form Factor         -         PCB Mounted           P1 SIGNAL CONNECTOR         -         80-pin 0.4mm spaced connector		μS	50
Position Loop Sample Time         μs         100           Maximum Encoder Frequency         MHz         20 (5 pre-quadrature)           Mechanical Specifications           Description         Units         Value           Size (H x W x D)         mm (in)         38.1 x 25.4 x 15.8 (1.50 x 1.00 x 0.60)           Weight         g (oz)         TBD           Ambient Operating Temperature Rangee         °C (°F)         -40 - 95 (-40 - 203)           Storage Temperature Range         °C (°F)         -50 - 100 (-58 - 212)           Thermal Shock         °C (°F)         -40 - 95 (-40 - 203) within 3 min           Relative Humidity         -         0-95%, non-condensing           Vibration         Grms         25 for 5 minutes in 3 axes           Altitude         m         -400 - 25000           Contaminants         -         Pollution Degree 2           Form Factor         -         PCB Mounted           P1 SIGNAL CONNECTOR         -         80-pin 0.4mm spaced connector			100
Maximum Encoder Frequency         MHz         20 (5 pre-quadrature)           Mechanical Specifications           Units         Value           Size (H x W x D)         mm (in)         38.1 x 25.4 x 15.8 (1.50 x 1.00 x 0.60)           Weight         g (oz)         TBD           Ambient Operating Temperature Range <sup>6</sup> °C (°F)         -40 - 95 (-40 - 203)           Storage Temperature Range         °C (°F)         -50 - 100 (-58 - 212)           Thermal Shock         °C (°F)         -40 - 95 (-40 - 203) within 3 min           Relative Humidity         -         0-95%, non-condensing           Vibration         Grms         25 for 5 minutes in 3 axes           Altitude         m         -400 - 25000           Contaminants         -         Pollution Degree 2           Form Factor         -         PCB Mounted           P1 SIGNAL CONNECTOR         -         80-pin 0.4mm spaced connector			
Mechanical Specifications           Description         Units         Value           Size (H x W x D)         mm (in)         38.1 x 25.4 x 15.8 (1.50 x 1.00 x 0.60)           Weight         g (oz)         TBD           Ambient Operating Temperature Rangeé         °C (°F)         -40 − 95 (-40 − 203)           Storage Temperature Range         °C (°F)         -50 − 100 (-58 − 212)           Thermal Shock         °C (°F)         -40 − 95 (-40 − 203) within 3 min           Relative Humidity         -         0-95%, non-condensing           Vibration         Grms         25 for 5 minutes in 3 axes           Altitude         m         -400 − 25000           Contaminants         -         Pollution Degree 2           Form Factor         -         PCB Mounted           P1 SIGNAL CONNECTOR         -         80-pin 0.4mm spaced connector			20 (5 pre-auadrature)
Description         Units         Value           Size (H x W x D)         mm (in)         38.1 x 25.4 x 15.8 (1.50 x 1.00 x 0.60)           Weight         g (oz)         TBD           Ambient Operating Temperature Rangeé         °C (°F)         -40 - 95 (-40 - 203)           Storage Temperature Range         °C (°F)         -50 - 100 (-58 - 212)           Thermal Shock         °C (°F)         -40 - 95 (-40 - 203) within 3 min           Relative Humidity         -         0-95%, non-condensing           Vibration         Grms         25 for 5 minutes in 3 axes           Altitude         m         -400 - 25000           Contaminants         -         Pollution Degree 2           Form Factor         -         PCB Mounted           P1 SIGNAL CONNECTOR         -         80-pin 0.4mm spaced connector			
Weight         g (oz)         TBD           Ambient Operating Temperature Rangeé         °C (°F)         -40 – 95 (-40 – 203)           Storage Temperature Range         °C (°F)         -50 – 100 (-58 – 212)           Thermal Shock         °C (°F)         -40 – 95 (-40 – 203) within 3 min           Relative Humidity         -         0-95%, non-condensing           Vibration         Grms         25 for 5 minutes in 3 axes           Altitude         m         -400 – 25000           Contaminants         -         Pollution Degree 2           Form Factor         -         PCB Mounted           P1 SIGNAL CONNECTOR         -         80-pin 0.4mm spaced connector	Description		
Ambient Operating Temperature Range         °C (°F)         -40 - 95 (-40 - 203)           Storage Temperature Range         °C (°F)         -50 - 100 (-58 - 212)           Thermal Shock         °C (°F)         -40 - 95 (-40 - 203) within 3 min           Relative Humidity         -         0-95%, non-condensing           Vibration         Grms         25 for 5 minutes in 3 axes           Altitude         m         -400 - 25000           Contaminants         -         Pollution Degree 2           Form Factor         -         PCB Mounted           P1 SIGNAL CONNECTOR         -         80-pin 0.4mm spaced connector	Size (H x W x D)	mm (in)	38.1 x 25.4 x 15.8 (1.50 x 1.00 x 0.60)
Ambient Operating Temperature Range         °C (°F)         -40 - 95 (-40 - 203)           Storage Temperature Range         °C (°F)         -50 - 100 (-58 - 212)           Thermal Shock         °C (°F)         -40 - 95 (-40 - 203) within 3 min           Relative Humidity         -         0-95%, non-condensing           Vibration         Grms         25 for 5 minutes in 3 axes           Altitude         m         -400 - 25000           Contaminants         -         Pollution Degree 2           Form Factor         -         PCB Mounted           P1 SIGNAL CONNECTOR         -         80-pin 0.4mm spaced connector	Weight	g (oz)	TBD
Storage Temperature Range         °C (°F)         -50 - 100 (-58 - 212)           Thermal Shock         °C (°F)         -40 - 95 (-40 - 203) within 3 min           Relative Humidity         -         0-95%, non-condensing           Vibration         Grms         25 for 5 minutes in 3 axes           Altitude         m         -400 - 25000           Contaminants         -         Pollution Degree 2           Form Factor         -         PCB Mounted           P1 SIGNAL CONNECTOR         -         80-pin 0.4mm spaced connector	Ambient Operating Temperature Range <sup>6</sup>		-40 – 95 (-40 – 203)
Thermal Shock         °C (°F)         -40 − 95 (-40 − 203) within 3 min           Relative Humidity         - 0-95%, non-condensing           Vibration         Grms         25 for 5 minutes in 3 axes           Altitude         m -400 − 25000           Contaminants         - Pollution Degree 2           Form Factor         - PCB Mounted           P1 SIGNAL CONNECTOR         - 80-pin 0.4mm spaced connector			-50 - 100 (-58 - 212)
Relative Humidity         -         0-95%, non-condensing           Vibration         Grms         25 for 5 minutes in 3 axes           Altitude         m         -400 - 25000           Contaminants         -         Pollution Degree 2           Form Factor         -         PCB Mounted           P1 SIGNAL CONNECTOR         -         80-pin 0.4mm spaced connector			
Vibration         Grms         25 for 5 minutes in 3 axes           Altitude         m         -400 – 25000           Contaminants         -         Pollution Degree 2           Form Factor         -         PCB Mounted           P1 SIGNAL CONNECTOR         -         80-pin 0.4mm spaced connector		- '	
Altitude m -400 - 25000  Contaminants - Pollution Degree 2  Form Factor - PCB Mounted  P1 SIGNAL CONNECTOR - 80-pin 0.4mm spaced connector	·	Grms	
Contaminants     -     Pollution Degree 2       Form Factor     -     PCB Mounted       P1 SIGNAL CONNECTOR     -     80-pin 0.4mm spaced connector			
Form Factor - PCB Mounted P1 SIGNAL CONNECTOR - 80-pin 0.4mm spaced connector			
P1 SIGNAL CONNECTOR - 80-pin 0.4mm spaced connector		1 -	
		<del> </del> -	

- Capable of supplying drive rated peak current for 2 seconds with 10 second foldback to continuous value. Longer times are possible with lower current limits.
   Continuous A<sub>rms</sub> value attainable when RMS Charge-Based Limiting is used.
   Lower inductance is acceptable for bus voltages well below maximum. Use external inductance to meet requirements.
   EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

- Maximum motor speed for stepper motors is 600 RPM. Consult the hardware installation manual for 2-phase stepper wiring configuration.
  Additional cooling and/or heatsink may be required to achieve rated performance.



### **PIN FUNCTIONS** P1 – Signal Connector GROUND Ground GND GROUND GND Ground PAI-1+ Differential Programmable Analog Input or DATA+ USB 1/0 **USB** Data Channel PAI-1-Reference Signal Input (12-bit Resolution) 6 DATA- USB 1/0 THERMISTOR Motor Thermal Protection 8 GROUND Ground GND I<sup>2</sup>C Data Signals for Addressing, Network 9 GROUND GND 10 SCLA 0 Error LED, and Bridge Status LED, See Differential Data Line for Absolute Encoders 11 ENC 1 DATA+ / A+ 1/0 12 SDAA 1/0 Hardware Manual for more info. (BiSS: SLO+/-) or Differential Incremental 13 ENC 1 DATA- / A-1/0 14 HALL A 1 Fncoder A Differential Clock Line for Absolute 15 ENC 1 CLK+ / B+ I/O 16 HALL B Single-ended Commutation Sensor Inputs 1 Encoders (BiSS: MA+/-) or Differential 17 ENC 1 CLK- / B-1/0 18 HALL C Incremental Encoder B. 19 GND 20 GROUND GND GROUND 21 ENC 1 REF+ / I+ Differential Reference Mark for Absolute 22 ENC 2 A+ 1 Encoders (Leave open for BiSS) or Differential Incremental Encoder A. 23 ENC 1 REF- / I-Differential Incremental Encoder Index. 1 24 ENC 2 A-1 25 RESERVED Reserved. Do not connect. 26 ENC 2 B+ Differential Incremental Encoder B 27 RESERVED Reserved. Do not connect. ENC 2 B-28 29 RESERVED Reserved. Do not connect. 30 ENC 2 I+ Differential Incremental Encoder Index 31 PDI-1 Programmable Digital Input 32 ENC 2 I-Programmable Digital Output (TTL/8mA) 33 PDI-2 Programmable Digital Input PDO-1 0 PDO-2 35 PDI-3 Programmable Digital Input 36 Programmable Digital Output (TTL/8mA) 0 37 PDI-4 Programmable Digital Input 38 PDO-3 Programmable Digital Output (TTL/8mA) 39 GROUND GND 40 GROUND GND 41 TX- OUT TX- IN 42 Transmit Line OUT (100 Base TX) Transmit Line IN (100 Base TX) 43 TX+ IN 44 TX+ OUT 0 45 RX- IN 46 RX- OUT Receive Line IN (100 Base TX) Receive Line OUT (100 Base TX) 47 RX+ IN 48 RX+ OUT 0 +3V Supply for Transformer/Magnetics Bias 49 +3V OUT 0 +3V OUT +3V Supply for Transformer/Magnetics Bias 50 Link and Activity Indicator for IN port. Link and Activity Indicator for OUT port. 51 LINK/ACT IN Function based on protocol specification. 1/0 52 LINK/ACT OUT Function based on protocol specification. 1/0 See Hardware Information below See Hardware Information below Run State Indicator for Network. Function 53 STATUS based on protocol specification. See 1/0 RESERVED Reserved. Do not connect. Hardware Information below. 55 RESERVED Reserved. Do not connect 56 RESERVED Reserved. Do not connect. 57 RESERVED Reserved. Do not connect. 58 RESERVED Reserved. Do not connect. 59 GROUND Ground GND 60 GROUND Ground GND 61 RESERVED Reserved. Do not connect. RESERVED Reserved. Do not connect. 62 63 RESERVED Reserved. Do not connect RESERVED Reserved. Do not connect. 64 65 RESERVED Reserved. Do not connect 66 RESERVED Reserved. Do not connect. 67 RESERVED Reserved. Do not connect. 68 STEP Step Input. 69 RESERVED Reserved. Do not connect 70 DIR Direction Input. 71 RESERVED Reserved. Do not connect. 72 RESERVED Reserved. Do not connect. +5VDC unprotected supply 73 +5V\_OUT 0 74 RESERVED Reserved. Do not connect. (See Note 1) +5V USER +3V3 OUT +3.3VDC Supply Output for local logic 75 +5VDC User Supply for feedback and local 76 logic (See Note 1) +5V USFR 0 78 +3V3 OUT signals (100 mA max) 0 79 GROUND Ground GND 80 GROUND Ground GND • 0 6 DATA- USB +3V3 OUT 76 80-pin, 0.4mm spaced DATA+ USB **Connector Information** +3V3 OUT 78 æ connector GROUND 80 2 GROUND **Mating Connector Details** PANASONIC: P/N AXT380224 Mating Connector Included with Drive No GROUND 79 -- 1 GROUND +5V USER 77 -- 3 PAI-1+ +5V USER 75 5 PAI-1-

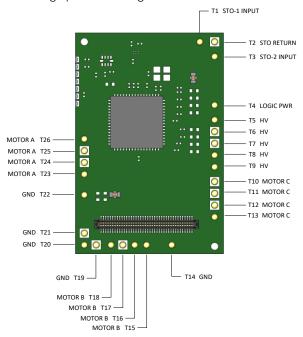
Notes

1. Total current through pins P1-73/75/77 should not exceed 300mA, while no single pin should be loaded more than 150mA.



### **TERMINAL PIN LOCATIONS**

The 26 Terminal Pins provide connection to the high power drive signals. Terminal Pins must be soldered to an interface board.



Pin	Name	Description / Notes	I/O
T1	STO-1 INPUT	Safe Torque Off – Input 1	I
T2	STO RETURN	Safe Torque Off Return	STORET
T3	STO-2 INPUT	Safe Torque Off – Input 2	I
T4	LOGIC PWR	Logic Supply Input (10 – 55VDC) (optional)	I
T5	HV		I
T6	HV	DC Supply Input (10-55VDC), Minimum 500μF external capacitance required between HV and POWER GND.	I
T7	HV		I
T8	HV		I
Т9	HV		I
T10	MOTOR C		0
T11	MOTOR C	Motor Phase C. All provided motor phase output pins must be used.	0
T12	MOTOR C		0
T13	MOTOR C		0
T14	POWER GND	Ground.	GND
T15	MOTOR B	Motor Phase B. All provided motor phase output pins must be used.	0
T16	MOTOR B		0
T17	MOTOR B		0
T18	MOTOR B	1	
T19	POWER GND		GND
T20	POWER GND	Ground.	GND
T21	POWER GND		GND
T22	POWER GND		
T23	MOTOR A		0
T24	MOTOR A	1 Mater Phase A. All and ideal and to all and to all and to all and all all all and all all all all all all all all all al	0
T25	MOTOR A	Motor Phase A. All provided motor phase output pins must be used.	
T26	MOTOR A		

### **Terminal Pin Details**

### Safe Torque Off (STO) Inputs

The Safe Torque Off (STO) inputs are dedicated +5VDC sinking single-ended inputs. For applications not using STO functionality, disabling of the STO feature is required for proper drive operation. STO may be disabled by following the STO Disable wiring instructions as given in the hardware installation manual. Consult the hardware installation manual for more information.

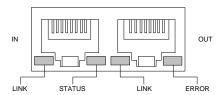


### HARDWARE INFORMATION

### **LED Functionality**

LINK/ACT IN (P1-51); LINK/ACT OUT (P1-52); STATUS (P1-53);

The LINK/ACT IN, LINK/ACT OUT, and STATUS pins serve as EtherCAT network indicators. On a standard RJ-45 connector used with EtherCAT network topology, the typical EtherCAT network indicator LED locations are as shown in the below diagrams. Note that the drive features signals for connection to LEDs on an RJ-45 connector, but the connector itself is not included on the drive. The Development Card assembly FD060-25-EM features a built-in RJ-45 connector with LEDs for this purpose.



LINK/ACT IN and LINK/ACT OUT are used to drive the corresponding LINK IN and LINK OUT LEDs on a typical RJ-45 connector. The STATUS pin is used to drive the Status LED. The ERROR LED is driven by the I<sup>2</sup>C Data signals (P1-10/12). Consult the hardware installation manual for recommended wiring connections. The LED Function Protocol tables below describe typical LED functionality.

	LINK/ACT LEDS		
LED State	LED State Description		
Green – On	Valid Link - No Activity		
Green – Flickering	Valid Link - Network Activity		
Off	Invalid Link		
	STATUS LED		
LED State	Description		
Green – On	The device is in the state OPERATIONAL		
Green – Blinking (2.5Hz – 200ms on and 200ms off)	The device is in the state PRE-OPERATIONAL		
Green – Single Flash (200ms flash followed by 1000ms off)	The device is in state SAFE-OPERATIONAL		
Green – Flickering (10Hz – 50ms on and 50ms off)	The device is booting and has not yet entered the INIT state, or The device is in state BOOTSTRAP, or Firmware download operation in progress		
Off	The device is in state INIT		
	ERROR LED		
LED State	Description	Example	
Red – On	A PDI Watchdog timeout has occurred.	Application controller is not responding anymore.	
Red – Blinking (2.5Hz – 200ms on and 200ms off)	General Configuration Error.	State change commanded by master is impossible due to register or object settings.	
Red – Flickering (10Hz – 50ms on and	Booting Error was detected. INIT state reached, but	Charles For it Floring	

LED State	Description	Example
Red – On	A PDI Watchdog timeout has occurred.	Application controller is not responding anymore.
Red – Blinking (2.5Hz – 200ms on and 200ms off)	General Configuration Error.	State change commanded by master is impossible due to register or object settings.
Red – Flickering (10Hz – 50ms on and 50ms off)	Booting Error was detected. INIT state reached, but parameter "Change" in the AL status register is set to 0x01:change/error	Checksum Error in Flash Memory.
Red – Single Flash (200ms flash followed by 1000ms off)	The slave device application has changed the EtherCAT state autonomously: Parameter "Change" in the AL status register is set to 0x01:change/error.	Synchronization error; device enters SAFE- OPERATIONAL automatically
Red – Double Flash (Two 200ms flashes separated by 200ms off, followed by 1000ms off)	An application Watchdog timeout has occurred.	Sync Manager Watchdog timeout.



# **MOUNTING DIMENSIONS** -4-40 UNC-2B THRU, 2 PLCS Ø 1 TYP-38.1 [1.50] 36.3 [1.43] 36.6[1.44] 1.8[.07] 23.6 [.93] 25.4 [1.00] 2.5[.10] 14.6[.57] 15.8[.62] 19.5[.77] ADVANCED MOTION CONTROLS NOTES: MOUNTING DIMENSIONS; FXE060-25-EM X = ±.5 X = ±.25 XX = ±.127 1. SEE SOLID MODEL FILE FOR ADDITIONAL PINOUT DETAIL. MD\_FXE060-25-EMA

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# PART NUMBERING AND CUSTOMIZATION INFORMATION F X E 060 - 25 - E M Prive Series F FlexPro® Environment X EXtended Environment Form Factor E FlexPro® Embedded

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060 60 VDC

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- ✓ Integrated System I/O

- Tailored Project File
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- ▲ Increased Current Limits
- ▲ Increased Voltage Range
- ▲ Conformal Coating
- ▲ Multi-Axis Configurations
- Reduced Profile Size and Weight

5

10

25

**Continuous Current** 

**5**A

**10**A

**25**A

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