



**ADLINK**  
TECHNOLOGY INC.

# **EPS Series**

## **EtherCAT Slave System**

### **User's Manual**



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**Advance Technologies; Automate the World.**

# Revision History

Revision	Release Date	Description of Change(s)
2.00	2015/10/2	Initial Release

# Preface

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## Conventions

Take note of the following conventions used throughout this manual to make sure that users perform certain tasks and instructions properly.



NOTE:

Additional information, aids, and tips that help users perform tasks.

---



CAUTION:

Information to prevent **minor** physical injury, component damage, data loss, and/or program corruption when trying to complete a task.

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WARNING:

Information to prevent **serious** physical injury, component damage, data loss, and/or program corruption when trying to complete a specific task.

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# Table of Contents

<b>Preface</b> .....	<b>iii</b>
<b>List of Figures</b> .....	<b>ix</b>
<b>List of Tables</b> .....	<b>xi</b>
<b>1 Introduction</b> .....	<b>1</b>
1.1 Features .....	2
1.2 Specifications .....	3
1.2.1 EPS-9905 Chassis .....	3
1.2.2 EPS-1132 Module .....	4
1.2.3 EPS-2032 Module .....	4
1.2.4 EPS-2132 Module .....	5
1.2.5 EPS-2308 Module .....	6
1.2.6 EPS-3032 Module .....	6
1.2.7 EPS-3216 Module .....	7
1.2.8 EPS-3504 Module .....	7
1.2.9 EPS-4008 Module .....	8
1.2.10 EPS-6000 Module .....	8
1.2.11 EPS-7002 Module .....	9
1.3 Schematics .....	10
1.4 EPS Slave System Composition .....	13
<b>2 Getting Started</b> .....	<b>15</b>
2.1 Package Contents .....	15
2.2 Cooling Considerations .....	16
2.3 Hardware Installation .....	17
2.3.1 Installing the Bus Coupler Module .....	17
2.3.2 Installing Peripheral Modules .....	17
2.4 Rack Mounting .....	18
2.4.1 Powering Up the System .....	18

<b>3</b>	<b>EPS System Modules</b>	<b>19</b>
3.1	EPS-1132	20
3.1.1	Connector and Wiring	22
3.1.2	LED Indicators	23
3.1.3	Signal Connection	23
3.1.4	Object Dictionary	24
3.2	EPS-2032	24
3.2.1	Connector and Wiring	26
3.2.2	LED Indicators	27
3.2.3	Signal Connection	27
3.2.4	Object Dictionary	27
3.3	EPS-2132	28
3.3.1	Connector and Wiring	30
3.3.2	LED Indicators	31
3.3.3	Signal Connection	31
3.3.4	Object Dictionary	31
3.4	EPS-2308	32
3.4.1	Connector and Wiring	34
3.4.2	Signal Connection	35
3.4.3	Object Dictionary	35
3.5	EPS-3032	36
3.5.1	Connector and Wiring	38
3.5.2	LED Indicators	39
3.5.3	Signal Connection	39
3.5.4	Object Dictionary	39
3.6	EPS-3216	42
3.6.1	Connector and Wiring	44
3.6.2	LED Indicators	45
3.6.3	Signal Connection	45
3.6.4	Object Dictionary	46
3.7	EPS-3504	47
3.7.1	Connector and Wiring	49

3.7.2	LED Indicators .....	50
3.7.3	Signal Connection .....	50
3.7.4	Object Dictionary .....	51
3.8	EPS-4008 .....	51
3.8.1	Connector and Wiring .....	54
3.8.2	LED Indicators .....	55
3.8.3	Signal Connection .....	55
3.8.4	Object Dictionary .....	56
3.9	EPS-6000 .....	56
3.9.1	Connector and Wiring .....	60
3.9.2	LED Indicators .....	61
3.9.3	Object Dictionary .....	62
3.10	EPS-7002 .....	62
3.10.1	LED Indicators .....	67
3.10.2	Signal Connection .....	67
3.10.3	Object Dictionary .....	67
<b>A</b>	<b>Appendix: LinkMasterPro™ .....</b>	<b>69</b>
A.1	Interface .....	71
A.2	Installation .....	72
A.3	Controls and Function .....	74
A.3.1	Selecting MAC Address .....	74
A.3.2	Scanning for Devices .....	75
A.3.3	Exporting ESI .....	76
A.3.4	Device Tree View .....	79
A.3.5	Error Logging and History .....	85
A.3.6	FOE (File Over EtherCAT) .....	86
A.3.7	Getting OD Info .....	88
A.3.8	Module I/O Panels .....	89
A.3.9	Exporting Log Messages .....	100
A.3.10	Version Information .....	100



**Important Safety Instructions..... 101**

**Getting Service ..... 103**



# List of Figures

Figure 1-1:	Front View (slots vacant) .....	10
Figure 1-2:	Front View (EPS-6000 EtherCAT bus coupler module installed) .....	11
Figure 1-3:	(Left) Side View .....	12
Figure 1-4:	Top View .....	13
Figure 1-5:	EPS System w/ Modules Installed .....	14
Figure 3-1:	EPS-1132 Specifications .....	20
Figure 3-2:	EPS-1132 Schematic .....	22
Figure 3-3:	EPS-2032 Schematic .....	26
Figure 3-4:	EPS-2132 Schematic .....	30
Figure 3-5:	EPS-2308 Schematic .....	34
Figure 3-6:	EPS-3032 Schematic .....	38
Figure 3-7:	EPS-3216 Schematic .....	44
Figure 3-8:	EPS-3504 Schematic .....	49
Figure 3-9:	EPS-4008 Schematic .....	54
Figure 3-10:	EPS-6000 Schematic .....	60
Figure 3-11:	EPS-7002 Schematic .....	66
Figure A-1:	LinkMasterPro™ Operational Overview .....	70
Figure A-2:	LinkMasterPro™ Interface .....	71
Figure A-3:	LinkMasterPro™ Folder .....	74
Figure A-4:	Scan Failure Notification .....	75
Figure A-5:	EPS Slave System in Tree View .....	76
Figure A-6:	Save ESI Path Selection .....	77
Figure A-7:	ESI Export Progress Display .....	78
Figure A-8:	Export Successful Display .....	79
Figure A-9:	EPS Slave System Panel .....	80
Figure A-10:	EPS-6000 Product Page (default Slot 1 installation) .....	82
Figure A-11:	EPS-2032 Product Page (exemplary Slot 2 installation) .....	83
Figure A-12:	DC Dialog Page .....	84
Figure A-13:	DC Parameters Page .....	85
Figure A-14:	Error Log Page (w/ Index 0 selected) .....	86
Figure A-15:	Binary File Selection .....	87
Figure A-16:	Binary File Download Success Notification .....	88
Figure A-17:	OD List .....	89
Figure A-18:	Module Selection .....	90

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## List of Tables

Table 3-1: EPS Peripheral Modules.....	19
Table 3-2: EPS-1132 Pin Assignment .....	21
Table 3-3: LED Indicator Legend .....	23
Table 3-4: EPS-2032 Specifications .....	24
Table 3-5: EPS-2032 Pin Assignment .....	25
Table 3-6: LED Indicator Legend .....	27
Table 3-7: EPS-2132 Specifications .....	28
Table 3-8: EPS-2132 Pin Assignment .....	29
Table 3-9: LED Indicator Legend .....	31
Table 3-10: EPS-2308 Specifications .....	32
Table 3-11: EPS-2308 Pin Assignment .....	33
Table 3-12: EPS-3032 Specifications .....	36
Table 3-13: EPS-3032 Pin Assignment .....	37
Table 3-14: LED Indicator Legend .....	39
Table 3-15: EPS-3216 Specifications .....	42
Table 3-16: EPS-3216 Pin Assignment .....	43
Table 3-17: LED Indicator Legend .....	45
Table 3-18: EPS-3504 Specifications .....	47
Table 3-19: EPS-3504 Pin Assignment .....	48
Table 3-20: LED Indicator Legend .....	50
Table 3-21: EPS-4008 Specifications .....	52
Table 3-22: EPS-4008 Pin Assignment .....	53
Table 3-23: LED Indicator Legend .....	55
Table 3-24: EPS-6000 Specifications .....	57
Table 3-25: EPS-6000 Pin Assignment .....	59
Table 3-26: LED Indicator Legend .....	61
Table 3-27: EPS-7002 Specifications .....	63
Table 3-28: EPS-7002 Pin Assignment .....	65
Table 3-29: LED Indicator Legend .....	67
Table A-1: LinkMasterPro™ Interface Legend .....	71
Table A-2: EPS Slave System Panel Operations.....	81

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# 1 Introduction

The ADLINK complete EtherCAT solution, from hardware to middleware to software, with every element tailored for dedicated EtherCAT functionality, includes Talos master controllers, EPS slave systems, and remote monitoring and control providers. As well, ADLINK's Softmotion one-stop control kernel delivers flexible and easy-to-use intelligent platforms for driving next-generation modern Smart Factories.

ADLINK's EPS slave system brings the power the flexibility to EtherCAT environments. State-of-the-art modular construction allows the EtherCAT slave to be configured to fulfill the needs of both small local applications and expansive distributed platforms. The EPS system monitors and controls nearly any type of I/O device and sensor as well as motors, with comprehensive and high-density I/O modules that include DI/O, AI/O, and thermal as well as pulse-chain motion modules. Leveraging ARM and FPGA technologies, the EPS slave is able to monitor and report system integrity via EtherCAT communication, while relay module lifecycle and signal integrity of analog output are monitored cyclically, and hot swappability reduces downtime significantly.

Uniquely designed for full operability in conditions from -20°C to 60°C, the EPS slave system is also fully compliant with the EN 60068-2 standard for shock and vibration and EN 61000-6 for heavy industrial EMC protection, as well as emission certification.

Corresponding ESI files for each EPS system can be generated thru ADLINK's Windows-based EtherCAT slave utility, LinkMaster-Pro™.

## 1.1 Features

- ▶ Compatible with certified 3rd party EtherCAT masters
- ▶ Comprehensive slave modules include high-density digital I/O, analog I/O, thermal measurement, and motion control
- ▶ EtherCAT COE, FOE protocol support
- ▶ Compliance with industrial IEC standard
- ▶ Automatic Detection System by LinkMasterPro™ application detects and generates corresponding ESI files automatically
- ▶ Intelligent status monitoring for EPS modules
- ▶ Hot-swappable to reduce MTTR
- ▶ Operable in environments from -20°C to 60°C



NOTE:

The EPS slave system is fully capable of cooperation with not only ADLINK's Talos master controller but also 3rd party EtherCAT master controllers, by importing corresponding ESI file for each individual module.

---

## 1.2 Specifications

### 1.2.1 EPS-9905 Chassis

<b>System Level</b>		
Processor	Xilinx Zynq SoC	
Memory	RAM	512 MB DDR3
	Retain Memory #1	16MB Flash on Bus Coupler
	Retain Memory #2	128KB FRAM on every EPS module
<b>Connectivity</b>		
EtherCAT	2 EtherCAT ports	
Motion Protocol	Compliant with CiA402	
<b>Miscellaneous Function</b>		
Monitored Parameters	Relay lifecycle Analog output signal integrity System power integrity Module Status	
<b>Power Supply</b>		
DC Input	Built-in 9-30 VDC wide-range DC input 3P pluggable connectors with latch (GND, V-, V+)	
AC Input	Optional 40 W external AC-DC adapter for AC input	
<b>Mechanical</b>		
Dimensions	130 (W) x 110 (D) x 105 (H) mm	
Weight	950 g (net weight of EPS-9905)	
Mounting	DIN rail	
<b>Environmental</b>		
Operating Temperature	-20°C to 60°C	
Storage Temperature	-40°C to 85°C (excl. HDD/SDD/CFAST)	
Humidity	Approx. °C (non-condensing)	

Vibration	EN 60068-2-6 certification Operating, 5 Grms, 5-500 Hz, 3 axes
ESD	Contact +/-4 kV and Air +/-8 kV
Shock	EN 60068-2-27 certification Operating, 100 G half sine 11 ms duration (w/ mSATA)
EMC	EN 61000-2 / EN 61000-4 certification CE and FCC Class A
Safety	UL, CB

### 1.2.2 EPS-1132 Module

Channels	32
Input Type	Sinking
EVCC Input	24V $\pm$ 10%
OFF State Input Voltage	<5V (IEC61131-2 Type1/3)
OFF State Input Current	<2.3mA
ON State Input Voltage	10V to 30V (IEC61131-2 Type1/3)
ON State Input Current	2.3mA (typ.)
IO Protection Input Voltage	Up to 30V
IO Protection Reverse Voltage	Up to -30V
IO Protection Current limit	< 2.3mA (typ.)
Response Time	150 $\mu$ s to 3ms
Power Consumption from Chassis	< 600mW (max.)
Thermal Dissipation (at max temp.)	< 2.55W (max.) @ EVCC=24V $\pm$ 10%
Isolation (Channel-to-DGND)	2kV (DC)

### 1.2.3 EPS-2032 Module

Channels	32
Output Type	Sourcing
EVCC Input	12 to 24V $\pm$ 10%
Output Impedance (Rout)	200 $\Omega$



Output Current (Iout)	300mA per CH 800mA per 4-CH
Output Voltage (Vout)	EVCC – (Iout x Rout)
IO Protection Reverse Voltage	None
IO Protection Current limit	1.2A for 4CH
IO Protection Short Circuit	None
Power On State	Off
Response Time	4kHz
Power Consumption: Chassis	< 400mW (max.)
Thermal Dissipation (at max temp.)	< 2.55W (max.) @ EVCC=24V+10%
Isolation (Channel-to-DGND)	2kV (DC)

### 1.2.4 EPS-2132 Module

Channels	32
Output Type	Sinking
EVCC Input	12 to 24V ±10%
Output Impedance (Rout)	250Ω
Output Current (Iout)	300mA per CH 800mA per 4-CH
Output Voltage (Vout)	Iout x Rout
IO Protection Reverse Voltage	None
IO Protection Current limit	1.2A for 4CH
IO Protection Short Circuit	None
Power On State	Off
Response Time	4kHz
Power Consumption from Chassis	< 450mW (max.)
Thermal Dissipation (at max temp.)	< 2.55W (max.) @ EVCC=24V+10%
Isolation (Channel-to-DGND)	2kV (DC)
Isolation (Channel-to-Chassis)	2kV (DC)

## 1.2.5 EPS-2308 Module

Channels	8
Type	SPST (Single pole single throw)
Maximum switched voltage and current	30V/2A, 240V/0.5A
Output Impedance (Rout)	50mΩ (Typ.)
IO Protection Reverse Voltage	Yes
Power On State	OFF
Response Time	Operate 10ms & release 5ms (Typ.)
Power Consumption from Chassis	< 600mW (max.)
Thermal Dissipation (at max temp.)	< 2.55W (max.) @ EVCC=24V+10%
Isolation (Channel-to-DGND)	DC 2kV 1min.
Isolation (Channel-to-Chassis)	DC 2kV 1min.
Isolation (Channel-to-Channel) adjacent relay	250Vrms 1min.
Isolation (Channel-to-Channel) adjacent pin within a single relay	250Vrms 1min.

## 1.2.6 EPS-3032 Module

Channels	32 Single-ended 16 Differential
Input Range	±10V
Resolution	16 bit
Offset Error	±1mV
Offset Drift	0.0004% of range per °C
Gain Error	±0.05% of FSR
Gain Drift	0.002%FSR per °C
Voltage Protection	Power On @ ±24V
Sampling Rate	100kHz
Power Consumption from Chassis	< 450mW (max.)

Thermal Dissipation (at max temp.)	< 2.55W (max.) @ EVCC=24V+10%
Operating Temperature	-20 to 60°C
Isolation (Channel-to-DGND)	2kV (DC)
Isolation (Channel-to-Chassis)	2kV (DC)

### 1.2.7 EPS-3216 Module

Channels	16 Single-ended
Input Range	0-20mA
Resolution	16 bit
Offset Error	0.5μA
Offset Drift	0.0005% of range per °C
Gain Error	±0.05% of FSR
Gain Drift	0.0008%FSR per °C
Voltage Protection	Power On @ ±24V
Sampling Rate	100kHz
Power Consumption from Chassis	< 450mW (max.)
Thermal Dissipation (at max temp.)	< 2.55W (max.) @ EVCC=24V+10%
Operating Temperature	-20 to 60°C
Isolation (Channel-to-DGND)	2kV (DC)
Isolation (Channel-to-Chassis)	2kV (DC)

### 1.2.8 EPS-3504 Module

Channels	4 RTD
Sensor Type	PT100, PT500, PT1000
Technology	2/3/4-Wire
Resolution	24 bit
Sampling Rate	5 to 20Hz
Temperature Range	-200°C to +850°C
Path Resistance	18 to 3900Ω

Accuracy (DC)	$\pm 0.007\%$ of FSR
Accuracy (Temperature)	$\pm 0.5^{\circ}\text{C}$
Excitation Current (Max.)	500 $\mu\text{A}$
Power Consumption from Chassis	< 450mW (max.)
Thermal Dissipation (at max temp.)	< 2.55W (max.) @ EVCC=24V+10%
Operating Temperature	-20 to 60 $^{\circ}\text{C}$
Isolation (Channel-to-DGND)	2kV (DC)
Isolation (Channel-to-Chassis)	2kV (DC)

### 1.2.9 EPS-4008 Module

Channels	8 Single-ended
Output Range	$\pm 10\text{V}$
Resolution	16 bit
Sampling Rate	100kHz
Offset Error	$\pm 0.2\text{mV}$
Gain Error	$\pm 0.05\%$ of FSR
Offset Drift	$\pm 0.0075\text{mV}/^{\circ}\text{C}$
Gain Drift	$\pm 0.00025\%/^{\circ}\text{C}$ of FSR
Output Current Capacity	5 mA
Power On State	Relay off
Voltage Protection	$\pm 24\text{V}$ / Relay off when error voltage occurs
Power Consumption from Chassis	< 450mW (max.)
Thermal Dissipation (at max temp.)	< 2.55W (max.) @ EVCC=24V+10%
Operating Temperature	-20 to 60 $^{\circ}\text{C}$
Isolation (Channel-to-DGND)	2kV (DC)
Isolation (Channel-to-Chassis)	2kV (DC)

### 1.2.10 EPS-6000 Module

EPS Module Support (slots)	4 (Max.)
Field Bus Connectivity	EtherCAT
Data Transmission Rate	100 Mbaud
Bus Interface	2 x RJ45
Cable for EtherCAT Connectivity	CAT5 / CAT5e (recommended)
Inner Bus Synchronization	> 0.1 $\mu$ s
Supply Voltage	24VDC ( $\pm$ 10%)
Thermal Dissipation (at max temp.)	< 6.6W (max.) @ EVCC=24V+10%
Operating Temperature	-20 to 60°C
Isolation (Channel-to-DGND)	2kV (DC)
Isolation (Channel-to-Chassis)	2kV (DC)

### 1.2.11 EPS-7002 Module

Channels	2
Output Frequency	4MHz
Output Modes	CW/CCW, OUT/DIR
Encoder Input Channels	2
Encoder Input Frequency	20MHz @ 4xAB
Encoder Input Modes	CW/CCW, 1/2/4x AB Phase
Encoder Input Type	TTL, Incremental
Motion I/O Interface	PEL, MEL, ORG
Servo I/O Interface	ALM, INP, RDY, SVON, ERC, RST
Input Type	Sinking
Input Current	IEC 61131-2, Type 1/3
Output Current (Single Node) (Sinking / Sourcing)	50mA
Power Consumption from Chassis	< 450mW (max.)
Thermal Dissipation (at max temp.)	< 2.55W (max.) @ EVCC=24V+10%
Operating Temperature	-20 to 60°C
Isolation (Channel-to-DGND)	2kV (DC)

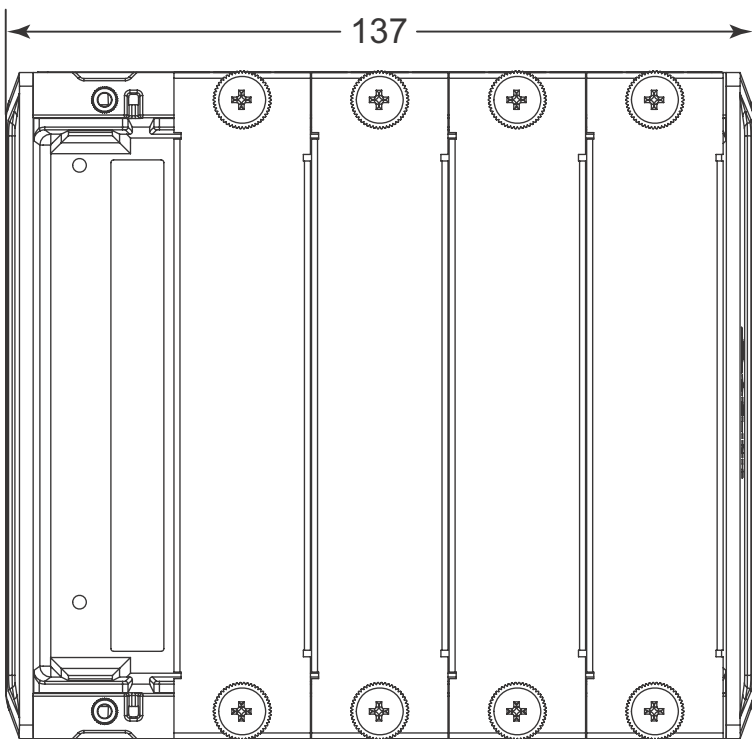
Isolation (Channel-to-Chassis)	2kV (DC)
--------------------------------	----------

### 1.3 Schematics

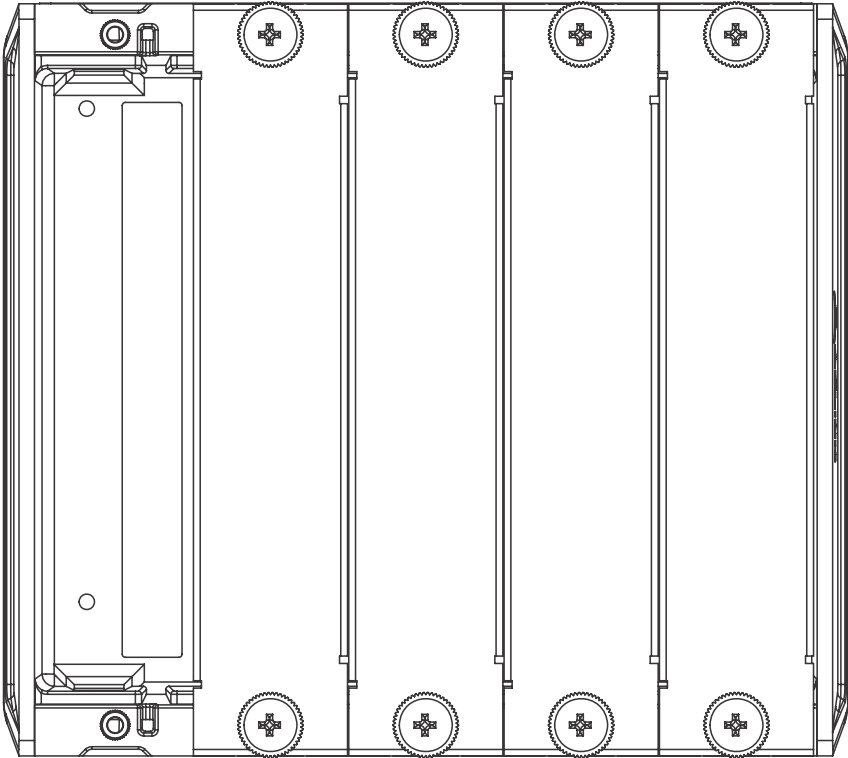


All dimensions are shown in mm (millimeters)

NOTE:

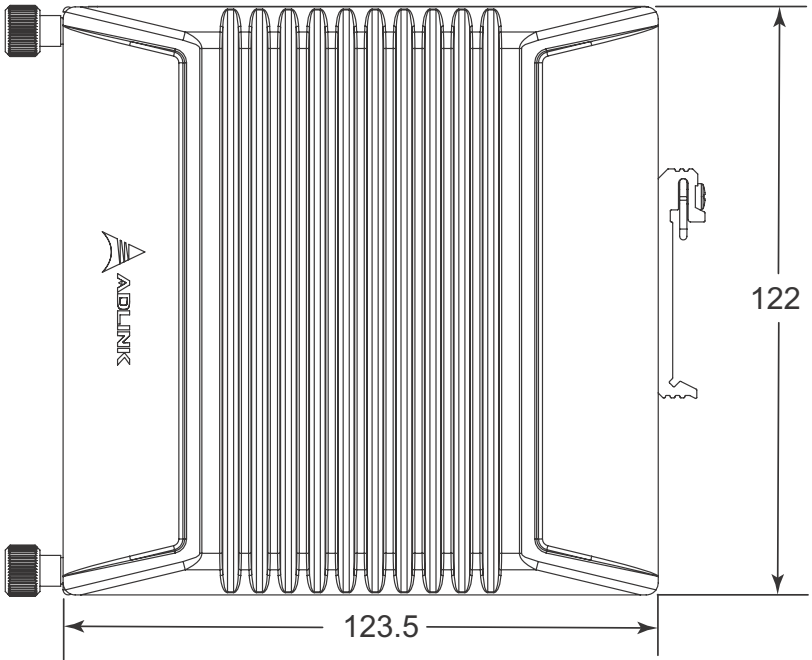


**Figure 1-1: Front View (slots vacant)**

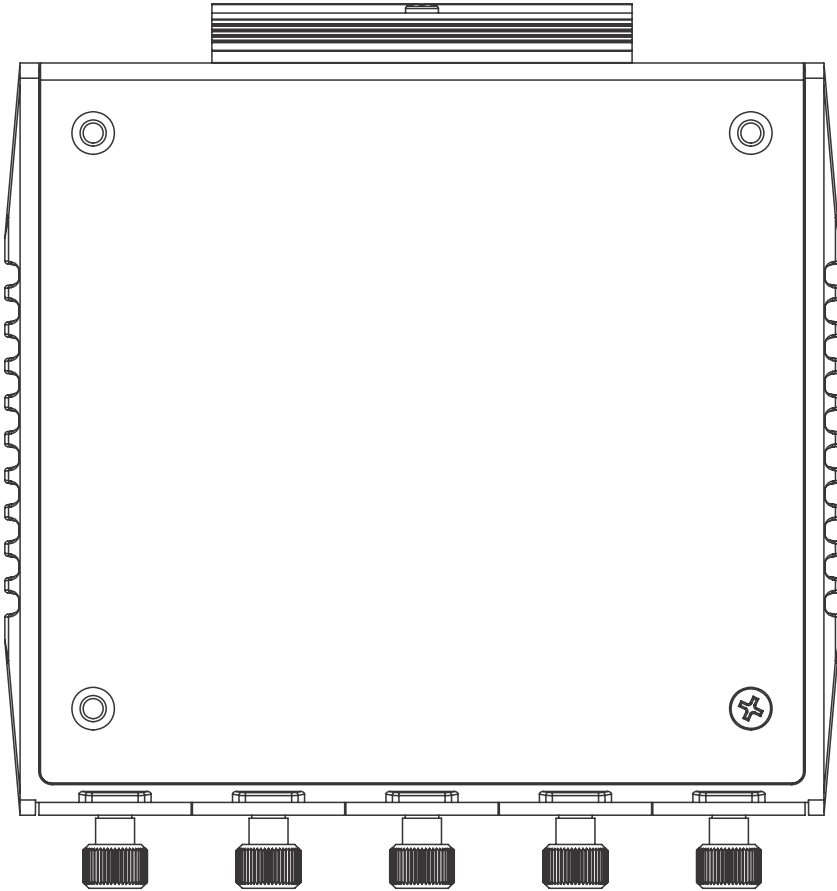


**Figure 1-2: Front View (EPS-6000 EtherCAT bus coupler module installed)**





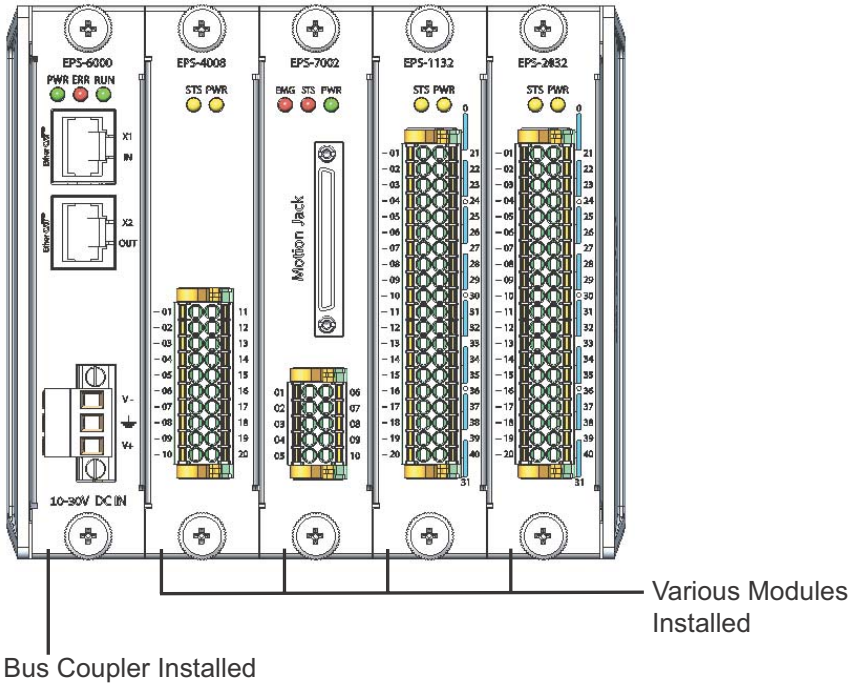
**Figure 1-3: (Left) Side View**



**Figure 1-4: Top View**

## **1.4 EPS Slave System Composition**

Each EPS slave system provides 5 slots total, with the far left reserved for bus coupler installation. The remaining slots flexibly support a variety of EPS slave modules. For individual module details, please see Chapter 3: EPS System Modules.



**Figure 1-5: EPS System w/ Modules Installed**

## 2 Getting Started

As mentioned previously, each EPS slave system can support up to 4 peripheral modules, installed to support the application. Supported EPS peripheral modules are as follows, and provide digital input, digital output, relay output, analog input, analog output, and thermal input with RTD sensor support, as well as pulse-train motion modules. All EPS peripheral modules are hot-swappable, allowing replacement with no interruption of EPS power..



NOTE:

Diagrams and illustrated equipment are for reference only. Actual system configuration and specifications may vary.

---

### 2.1 Package Contents

Before unpacking, check the shipping carton for any damage. If the shipping carton and/or contents are damaged, inform your dealer immediately. Retain the shipping carton and packing materials for inspection. Obtain authorization from your dealer before returning any product to ADLINK.

Please ensure that the following items are included in the package.

- ▶ EPS-9905 chassis with DIN rail kit
- ▶ EPS-6000 bus coupler (optional)
- ▶ 3p power connector
- ▶ Quick Start Guide for EPS slave system

If any of these items are missing or damaged, contact the dealer from whom you purchased the product. Save the shipping materials and carton in case you want to ship or store the product in the future.



Do not install or apply power to equipment that is damaged or missing components. Retain the shipping carton and packing materials for inspection. Please contact your ADLINK dealer/vendor immediately for assistance and obtain authorization before returning any product.

---

## 2.2 Cooling Considerations

Heat generated by the EPS system is conducted to the chassis on both sides. To maximize heat dissipation, maintain a minimum 2 inches (5 cm) clearance on the top of the EPS-9905 & 1 inch on either side..

---



NOTE:

Internal thermal status is monitored by onboard thermal sensors and reported to the Host automatically to ensure prompt action in the event of temperature overages.

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## 2.3 Hardware Installation

### 2.3.1 Installing the Bus Coupler Module

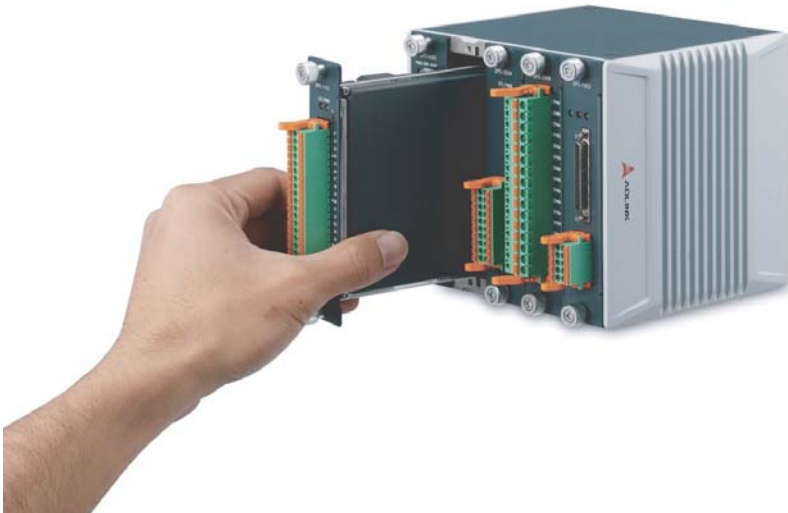
The EPS Series incorporates a system controller slot supporting a PXI Express system controller of up to 4 slot width.

1. Align the module with the slot guide in the chassis and carefully slide the module into the slot until seated.
2. Fasten the screws on the front panel and connect corresponding interfaces..

### 2.3.2 Installing Peripheral Modules

The EPS system supports up to 4 peripheral modules.

1. Select an available peripheral slot
2. Carefully slide the peripheral module into the chassis until seated.



3. Fasten the screws of all modules.



NOTE:

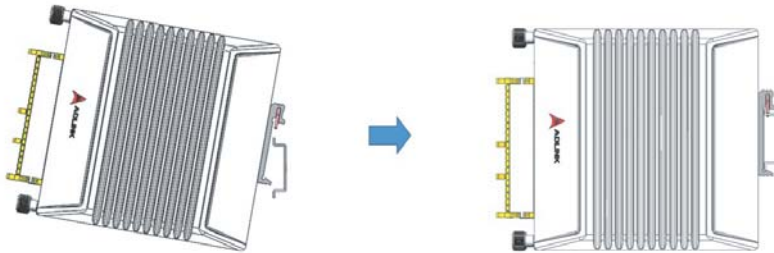
To improve efficiency of heat dissipation, install filler plates for any unused slots.

---

## 2.4 Rack Mounting

The EPS slave system is shipped with DIN rail mounting brackets and accessory screws pre-installed. If the installation appears incomplete, contact ADLINK technical support.

1. Insert the top of the DIN rail kit into the slots on the DIN rail attachment plate.
2. Snap the DIN rail kit into place as shown



### 2.4.1 Powering Up the System



Before providing DC power to the EPS slave system, ensure the voltage and polarity provided are compatible with the DC input. Improper input voltage and/or polarity can be responsible for system damage.

The DC power input connector of the EPS slave system utilizes V+, V-, and chassis ground pins.

1. Connect DC power cables.
2. Fix the DC connector using the 2 screws.

### 3 EPS System Modules

The EPS Series chassis provides advanced system monitoring and control. Chassis conditions, including internal temperature, fan speed, and DC voltage can all be monitored on the system controller or remote PC.

The EPS Series provides software configurable trigger bus bridges, whereby the user can set the status of each trigger bus line. The EPS Series backplane can also be configured between 4-link x 4 lanes or 2-link x 8 lanes by the configurable PCIe switch fabric.

Communication with the chassis monitoring control unit is available using an embedded controller, such as the ADLINK PXIe-3975, to access the SMBus located on the system slot (1st slot), or, alternatively, using a remote PC to communicate via the RS-232 serial port (D-SUB9 connector on the rear panel).

Please note that the RS-232 serial port can only monitor chassis status, but does not provide the capability to change the trigger bus bridges and PCIe switch fabric settings. Function comparison between the SMBus interface and RS-232 serial port is as follows.

Module	Description
EPS-1132	32CH, sourcing, digital input
EPS-2032	32CH, sinking, digital output
EPS-2132	32CH, sourcing, digital output
EPS-2308	8CH, SPST, relay output
EPS-3032	32CH, $\pm 10V$ , 16-bit analog input
EPS-3216	16CH, 0-20mA, 16-bit analog input
EPS-3504	4CH, thermal input, RTD PT100, PT500, PT1000
EPS-4008	8CH, $\pm 10V$ , 16-bit analog output
EPS-6000	EtherCAT bus coupler
EPS-7002	2CH, pulse-train motion

**Table 3-1: EPS Peripheral Modules**





Unregistered EPS peripheral modules cannot be installed in slots configured and registered to a different EPS peripheral module type. EPS modules can only be swapped out for another of the same type, or the new module must be registered and the ESI file regenerated, to reconfigure the entire EtherCAT system.

### 3.1 EPS-1132

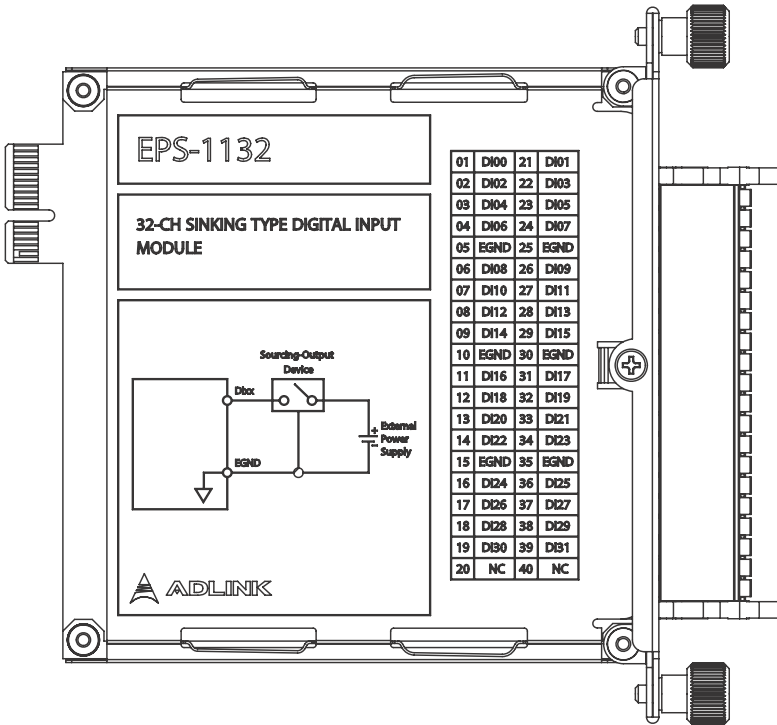
The EPS-1132 high density 32CH sourcing type digital input module operates in environments from -20°C to 60°C and provides high isolation protection and hot-swappability.

<b>Channels</b>	32
<b>Input Type</b>	Sinking
<b>EVCC Input</b>	24V ±10%
<b>OFF State Input Voltage</b>	<5V (IEC61131-2 Type1/3)
<b>OFF State Input Current</b>	<2.3mA
<b>ON State Input Voltage</b>	10V to 30V (IEC61131-2 Type1/3)
<b>ON State Input Current</b>	2.3mA (typ.)
<b>IO Protection Input Voltage</b>	Up to 30V
<b>IO Protection Reverse Voltage</b>	Up to -30V
<b>IO Protection Current limit</b>	< 2.3mA (typ.)
<b>Response Time</b>	150µs to 3ms
<b>Power Consumption from Chassis</b>	< 600mW (max.)
<b>Thermal Dissipation (at max temp.)</b>	< 2.55W (max.) @ EVCC=24V±10%
<b>Isolation (Channel-to-DGND)</b>	2kV (DC)

Figure 3-1: EPS-1132 Specifications

1	DI00	21	DI01
2	DI02	22	DI03
3	DI04	23	DI05
4	DI06	24	DI07
5	EGND	25	EGND
6	DI08	26	DI09
7	DI10	27	DI11
8	DI12	28	DI13
9	DI14	29	DI15
10	EGND	30	EGND
11	DI16	31	DI17
12	DI18	32	DI19
13	DI20	33	DI21
14	DI22	34	DI23
15	EGND	35	EGND
16	DI24	36	DI25
17	DI26	37	DI27
18	DI28	38	DI29
19	DI30	39	DI31
20	N/C	40	N/C

**Table 3-2: EPS-1132 Pin Assignment**



**Figure 3-2: EPS-1132 Schematic**

### 3.1.1 Connector and Wiring

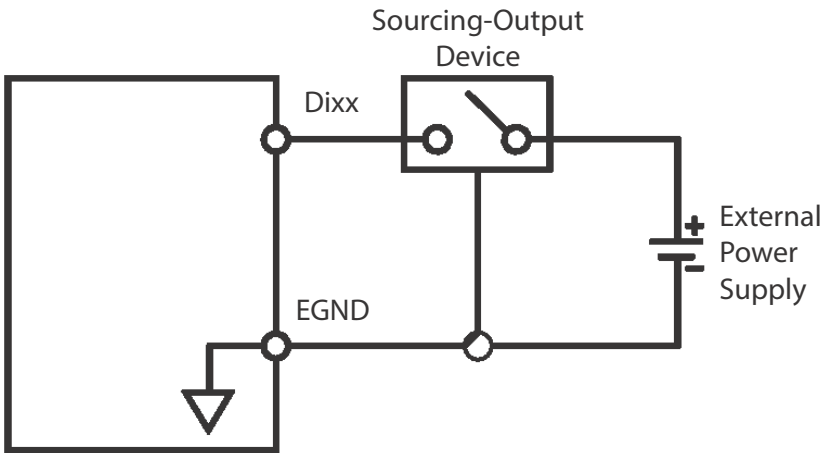
- ▶ Connector: Phoenix Contact, DFMC series, 1787195
- ▶ Pitch=3.5mm
- ▶ 2x20pin
- ▶ AWG 16-24 gauge

### 3.1.2 LED Indicators

LED	Action	Status
STS	Blinking	Over temperature protection Module present
PWR	Lit	Module power status
Channel (0-3, 4-7, 8-11, 12-15, 16-19, 20-23, 24-27, 28-31)	Lit	Channel active

Table 3-3: LED Indicator Legend

### 3.1.3 Signal Connection



### 3.1.4 Object Dictionary

<b>Index</b>	0x3000
<b>Sub</b>	N/A
<b>Type</b>	U32
<b>R/W</b>	R
<b>Name</b>	Read digital input 32 bit
<b>Description</b>	Digital input channels 1 to 32

## 3.2 EPS-2032

The EPS-2032 high density 32CH sinking type digital output module operates in environments from -20°C to 60°C and provides high isolation protection and hot-swappability.

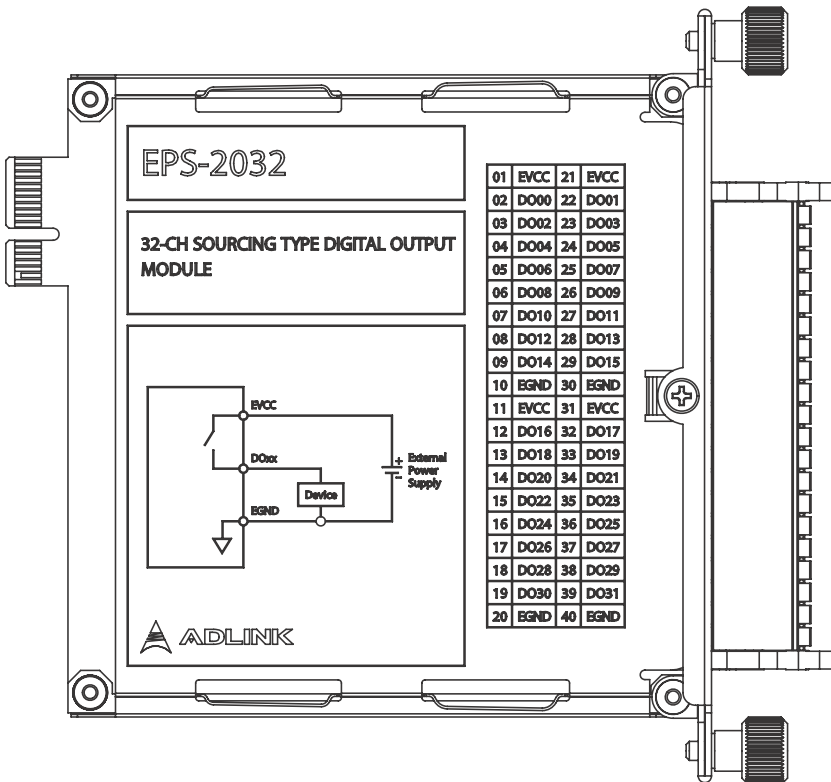
<b>Channels</b>	32
<b>Output Type</b>	Sourcing
<b>EVCC Input</b>	12V to 24V $\pm$ 10%
<b>Output Impedance (Rout)</b>	200 $\Omega$
<b>Output Current (Iout)</b>	300mA per CH 800mA per 4CH
<b>Output Voltage (Vout)</b>	EVCC – (Iout x Rout)
<b>IO Protection_Reverse Voltage</b>	None
<b>IO Protection_Current limit</b>	1.2A for 4CH
<b>IO Protection_Short Circuit</b>	None
<b>Power On State</b>	Off
<b>Response Time</b>	4kHz
<b>Power Consumption from Chassis</b>	< 400mW (max.)
<b>Thermal Dissipation (at max temp.)</b>	< 2.55W (max.) @ EVCC=24V+10%
<b>Isolation (Channel-to-DGND)</b>	2kV (DC)
<b>Isolation (Channel-to-Chassis)</b>	2kV (DC)

**Table 3-4: EPS-2032 Specifications**

1	EVCC	21	EVCC
2	CH00	22	CH01
3	CH02	23	CH03
4	CH04	24	CH05
5	CH06	25	CH07
6	CH08	26	CH09
7	CH10	27	CH11
8	CH12	28	CH13
9	CH14	29	CH15
10	EGND	30	EGND
11	EVCC	31	EVCC
12	CH16	32	CH17
13	CH18	33	CH19
14	CH20	34	CH21
15	CH22	35	CH23
16	CH24	36	CH25
17	CH26	37	CH27
18	CH28	38	CH29
19	CH30	39	CH31
20	EGND	40	EGND

The diagram shows a 40-pin connector with two rows of pins. The top row is labeled with pin numbers 01 through 20, and the bottom row is labeled with pin numbers 21 through 40. The pins are arranged in a 2x20 grid. The top two pins are labeled 'STS PWR'. The pins are grouped into channels: CH00-CH05, CH06-CH11, CH12-CH15, CH16-CH19, CH20-CH25, CH26-CH29, and CH30-CH31. The pins are also labeled with 'EVCC' and 'EGND' at specific positions.

**Table 3-5: EPS-2032 Pin Assignment**



**Figure 3-3: EPS-2032 Schematic**

### 3.2.1 Connector and Wiring

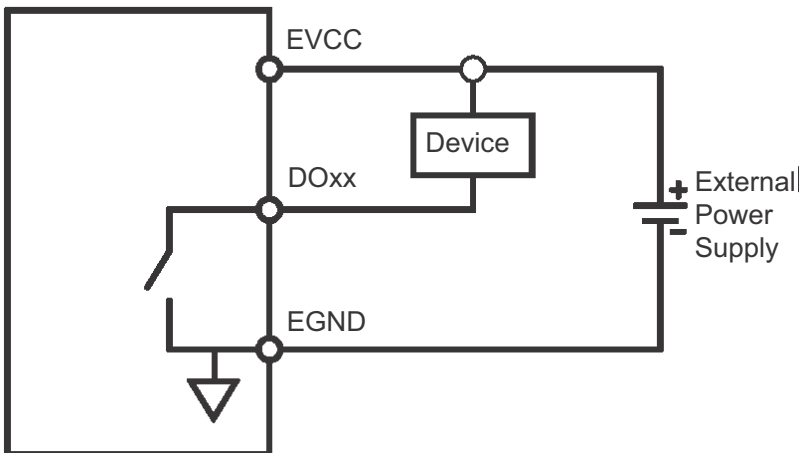
- ▶ Connector: Phoenix Contact, DFMC series, 1787195
- ▶ Pitch=3.5mm
- ▶ 2x20pin
- ▶ AWG 16-24 gauge

### 3.2.2 LED Indicators

LED	Action	Status
STS	Blinking	Over temperature protection Module present
PWR	Lit	Module power status
Channel (0-3, 4-7, 8-11, 12-15, 16-19, 20-23, 24-27, 28-31)	Lit	Channel active

Table 3-6: LED Indicator Legend

### 3.2.3 Signal Connection



### 3.2.4 Object Dictionary

<b>Index</b>	0x4000
<b>Sub</b>	N/A
<b>Type</b>	U32
<b>R/W</b>	RW



<b>Name</b>	Write digital input 32 bit
<b>Description</b>	Digital input channels 1 to 32

### 3.3 EPS-2132

The EPS-2132 high density 32CH sourcing type digital output module operates in environments from -20°C to 60°C and provides high isolation protection and hot-swappability.

<b>Channels</b>	32
<b>Output Type</b>	Sinking
<b>EVCC Input</b>	12V to 24V $\pm$ 10%
<b>Output Impedance (Rout)</b>	250 $\Omega$
<b>Output Current (Iout)</b>	300mA per CH 800mA per 4CH
<b>Output Voltage (Vout)</b>	Iout x Rout
<b>IO Protection_Reverse Voltage</b>	None
<b>IO Protection_Current limit</b>	1.2A for 4CH
<b>IO Protection_Short Circuit</b>	None
<b>Power On State</b>	Off
<b>Response Time</b>	4kHz
<b>Power Consumption from Chassis</b>	< 450mW (max.)
<b>Thermal Dissipation (at max temp.)</b>	< 2.55W (max.) @ EVCC=24V+10%
<b>Isolation (Channel-to-DGND)</b>	2kV (DC)
<b>Isolation (Channel-to-Chassis)</b>	2kV (DC)

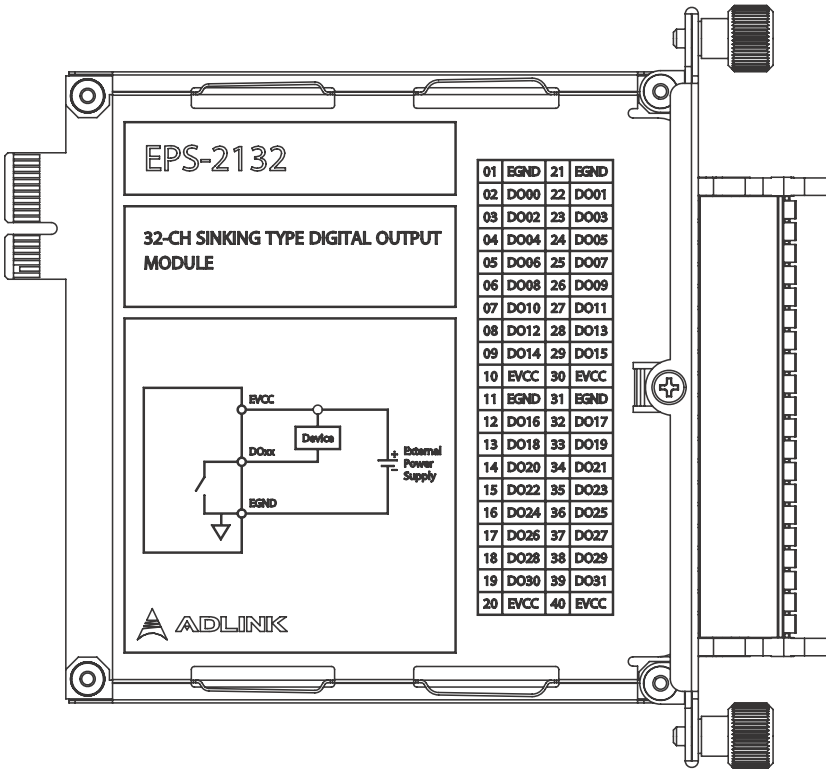
**Table 3-7: EPS-2132 Specifications**

1	EGND	21	EGND
2	CH00	22	CH01
3	CH02	23	CH03
4	CH04	24	CH05
5	CH06	25	CH07
6	CH08	26	CH09
7	CH10	27	CH11
8	CH12	28	CH13
9	CH14	29	CH15
10	EVCC	30	EVCC
11	EGND	31	EGND
12	CH16	32	CH17
13	CH18	33	CH19
14	CH20	34	CH21
15	CH22	35	CH23
16	CH24	36	CH25
17	CH26	37	CH27
18	CH28	38	CH29
19	CH30	39	CH31
20	EVCC	40	EVCC

The diagram shows a 40-pin connector with the following labels and positions:

- STS PWR: Two pins at the top, labeled 0 and 1.
- Pin 21: EGND
- Pins 22-31: CH00-CH15
- Pins 32-40: CH16-CH31, EVCC, EVCC

**Table 3-8: EPS-2132 Pin Assignment**



**Figure 3-4: EPS-2132 Schematic**

### 3.3.1 Connector and Wiring

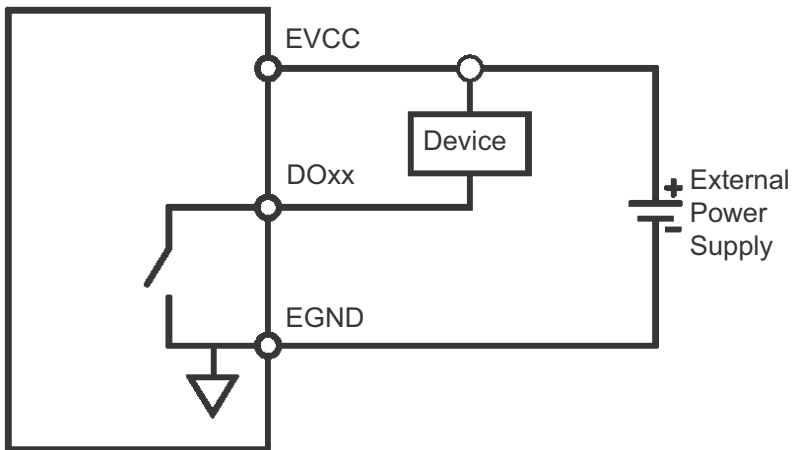
- ▶ Connector: Phoenix Contact, DFMC series, 1787195
- ▶ Pitch=3.5mm
- ▶ 2x20pin
- ▶ AWG 16-24 gauge

### 3.3.2 LED Indicators

LED	Action	Status
STS	Blinking	Over temperature protection Module present
PWR	Lit	Module power status
Channel (0-3, 4-7, 8-11, 12-15, 16-19, 20-23, 24-27, 28-31)	Lit	Channel active

Table 3-9: LED Indicator Legend

### 3.3.3 Signal Connection



### 3.3.4 Object Dictionary

Index	0x4000
Sub	N/A
Type	U32
R/W	RW

<b>Name</b>	Write digital output 32 bit
<b>Description</b>	Digital output channels 1 to 32

### 3.4 EPS-2308

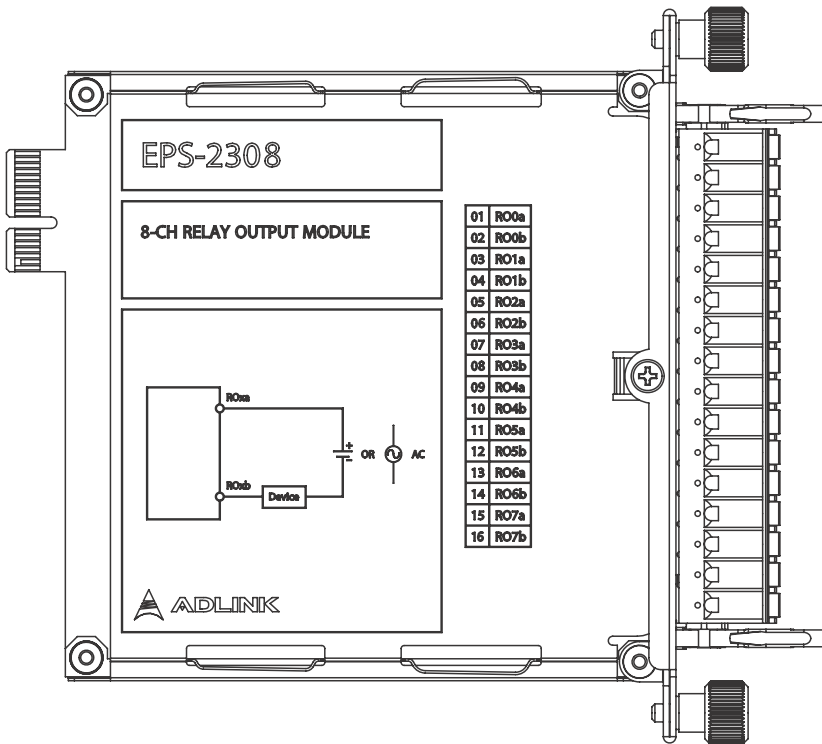
The EPS-2308 8CH SPST relay output module operates in environments from -20°C to 60°C and provides high isolation protection and hot-swappability.

<b>Channels</b>	8
<b>Output Type</b>	SPST (single pole single throw)
<b>Maximum switched voltage and current</b>	30V/2A, 240V/0.5A
<b>Output Impedance (Rout)</b>	50mΩ (Typ.)
<b>IO Protection_Reverse Voltage</b>	Yes
<b>Power On State</b>	Off
<b>Response Time</b>	Operate 10ms & release 5ms (Typ.)
<b>Power Consumption from Chassis</b>	< 600mW (max.)
<b>Thermal Dissipation (at max temp.)</b>	< 2.55W (max.) @ EVCC=24V+10%
<b>Isolation (Channel-to-DGND)</b>	DC 2kV 1 min.
<b>Isolation (Channel-to-Chassis)</b>	DC 2kV 1 min.
<b>Isolation (Channel-to-Channel) adjacent relay</b>	250Vrms 1min.
<b>Isolation (Channel-to-Channel) adjacent pin within a single relay</b>	250Vrms 1min.

**Table 3-10: EPS-2308 Specifications**

1	RO0a	<p>The diagram shows a vertical connector strip labeled 'EPS-2308'. It features 16 rows of connectors, each with two pins. The rows are labeled as follows: Row 1: RO0a; Row 2: RO0b; Row 3: RO1a; Row 4: RO1b; Row 5: RO2a; Row 6: RO2b; Row 7: RO3a; Row 8: RO3b; Row 9: RO4a; Row 10: RO4b; Row 11: RO5a; Row 12: RO5b; Row 13: RO6a; Row 14: RO6b; Row 15: RO7a; Row 16: RO7b. The connectors are arranged in a central column, with two pins per row. The top and bottom of the strip are marked with a cross symbol.</p>
2	RO0b	
3	RO1a	
4	RO1b	
5	RO2a	
6	RO2b	
7	RO3a	
8	RO3b	
9	RO4a	
10	RO4b	
11	RO5a	
12	RO5b	
13	RO6a	
14	RO6b	
15	RO7a	
16	RO7b	

**Table 3-11: EPS-2308 Pin Assignment**

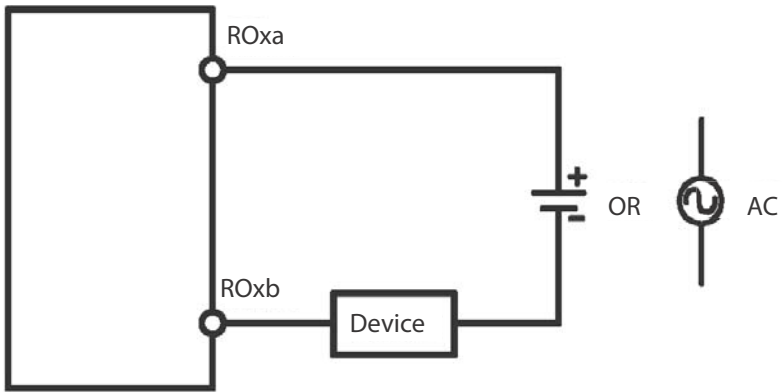


**Figure 3-5: EPS-2308 Schematic**

### 3.4.1 Connector and Wiring

- ▶ Connector: Weidmuller, OMNIMATE Signal series BL/SL 5.08, 10145300000
- ▶ Pitch= 5.08mm
- ▶ 1x16 pin
- ▶ AWG 12-26 gauge

### 3.4.2 Signal Connection



### 3.4.3 Object Dictionary

<b>Index</b>	0x4000
<b>Sub</b>	N/A
<b>Type</b>	U32
<b>R/W</b>	RW
<b>Name</b>	Write RO data
<b>Description</b>	RO Output Bits 0 to 7, Bits 8 to 31 are reserved



### 3.5 EPS-3032

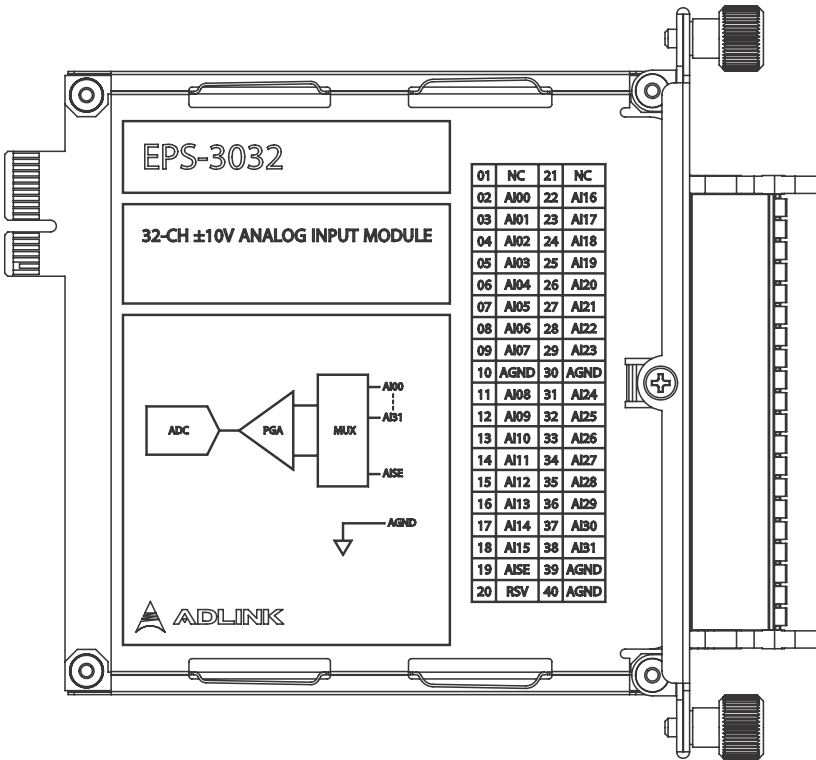
The EPS-3032 high density 32CH  $\pm 10V$  @ 16-bit, analog input module operates in environments from  $-20^{\circ}C$  to  $60^{\circ}C$  and provides high isolation protection and hot-swappability.

<b>Channels</b>	32 single-ended 16 differential
<b>Input Range</b>	$\pm 10V$
<b>Resolution</b>	16 bit
<b>Offset Error</b>	$\pm 1mV$
<b>Offset Drift</b>	0.0004% of range per $^{\circ}C$
<b>Gain Error</b>	$\pm 0.05\%$ of FSR
<b>Gain Drift</b>	0.002%FSR per $^{\circ}C$
<b>Voltage Protection</b>	Power On @ $\pm 24V$
<b>Sampling Rate</b>	100kHz
<b>Power Consumption from Chassis</b>	< 450mW (max.)
<b>Thermal Dissipation (at max temp.)</b>	< 2.55W (max.) @ EVCC=24V+10%
<b>Operating Temperature</b>	$-20 - 60^{\circ}C$
<b>Isolation (Channel-to-DGND)</b>	2kV (DC)
<b>Isolation (Channel-to-Chassis)</b>	2kV (DC)

**Table 3-12: EPS-3032 Specifications**

1	N/C	21	N/C
2	AI00	22	AI16
3	AI01	23	AI17
4	AI02	24	AI18
5	AI03	25	AI19
6	AI04	26	AI20
7	AI05	27	AI21
8	AI06	28	AI22
9	AI07	29	AI23
10	AGND	30	AGND
11	AI08	31	AI24
12	AI09	32	AI25
13	AI10	33	AI26
14	AI11	34	AI27
15	AI12	35	AI28
16	AI13	36	AI29
17	AI14	37	AI30
18	AI15	38	AI31
19	AISE	39	AGND
20	RSV	40	AGND

**Table 3-13: EPS-3032 Pin Assignment**



**Figure 3-6: EPS-3032 Schematic**

### 3.5.1 Connector and Wiring

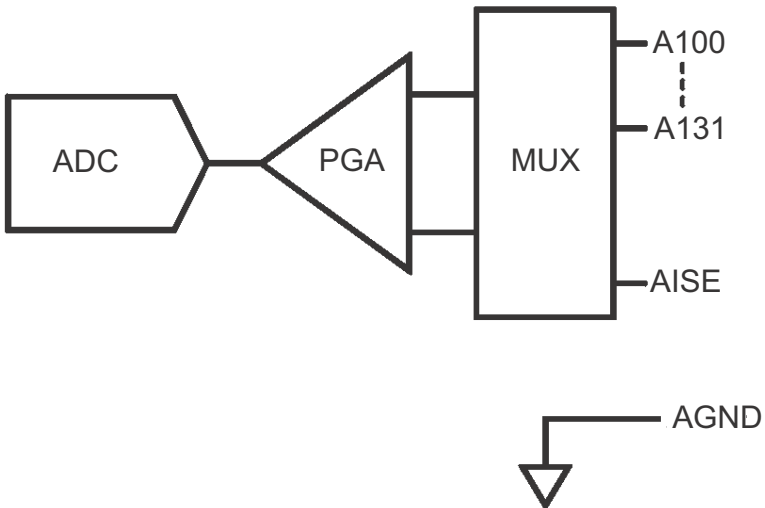
- ▶ Connector: Phoenix Contact, DFMC series, 1787195
- ▶ Pitch=3.5mm
- ▶ 2x20pin
- ▶ AWG 16-24 gauge

### 3.5.2 LED Indicators

LED	Action	Status
STS	Blinking	Over temperature protection Module present
PWR	Lit	Module power status

Table 3-14: LED Indicator Legend

### 3.5.3 Signal Connection



### 3.5.4 Object Dictionary

Index	Sub	Type	RW	Name	Description
0x3000	0	U8	R	Read Analog Input 16 Bit	
	1	U16	R	Read Analog Input 16 Bit	Analog Input Channel 0

Index	Sub	Type	RW	Name	Description
	2	U16	R	Read Analog Input 16 Bit	Analog Input Channel 1
	3	U16	R	Read Analog Input 16 Bit	Analog Input Channel 2
	4	U16	R	Read Analog Input 16 Bit	Analog Input Channel 3
	5	U16	R	Read Analog Input 16 Bit	Analog Input Channel 4
	6	U16	R	Read Analog Input 16 Bit	Analog Input Channel 5
	7	U16	R	Read Analog Input 16 Bit	Analog Input Channel 6
	8	U16	R	Read Analog Input 16 Bit	Analog Input Channel 7
	9	U16	R	Read Analog Input 16 Bit	Analog Input Channel 8
	10	U16	R	Read Analog Input 16 Bit	Analog Input Channel 9
	11	U16	R	Read Analog Input 16 Bit	Analog Input Channel 10
	12	U16	R	Read Analog Input 16 Bit	Analog Input Channel 11
	13	U16	R	Read Analog Input 16 Bit	Analog Input Channel 12
	14	U16	R	Read Analog Input 16 Bit	Analog Input Channel 13
	15	U16	R	Read Analog Input 16 Bit	Analog Input Channel 14
	16	U16	R	Read Analog Input 16 Bit	Analog Input Channel 15
	17	U16	R	Read Analog Input 16 Bit	Analog Input Channel 16
	18	U16	R	Read Analog Input 16 Bit	Analog Input Channel 17
	19	U16	R	Read Analog Input 16 Bit	Analog Input Channel 18

Index	Sub	Type	RW	Name	Description
	20	U16	R	Read Analog Input 16 Bit	Analog Input Channel 19
	21	U16	R	Read Analog Input 16 Bit	Analog Input Channel 20
	22	U16	R	Read Analog Input 16 Bit	Analog Input Channel 21
	23	U16	R	Read Analog Input 16 Bit	Analog Input Channel 22
	24	U16	R	Read Analog Input 16 Bit	Analog Input Channel 23
	25	U16	R	Read Analog Input 16 Bit	Analog Input Channel 24
	26	U16	R	Read Analog Input 16 Bit	Analog Input Channel 25
	27	U16	R	Read Analog Input 16 Bit	Analog Input Channel 26
	28	U16	R	Read Analog Input 16 Bit	Analog Input Channel 27
	29	U16	R	Read Analog Input 16 Bit	Analog Input Channel 28
	30	U16	R	Read Analog Input 16 Bit	Analog Input Channel 29
	31	U16	R	Read Analog Input 16 Bit	Analog Input Channel 30
	32	U16	R	Read Analog Input 16 Bit	Analog Input Channel 31

### 3.6 EPS-3216

The EPS-3216 high density 16CH 0-20mA @ 16-bit, analog input module operates in environments from -20°C to 60°C and provides high isolation protection and hot-swappability.

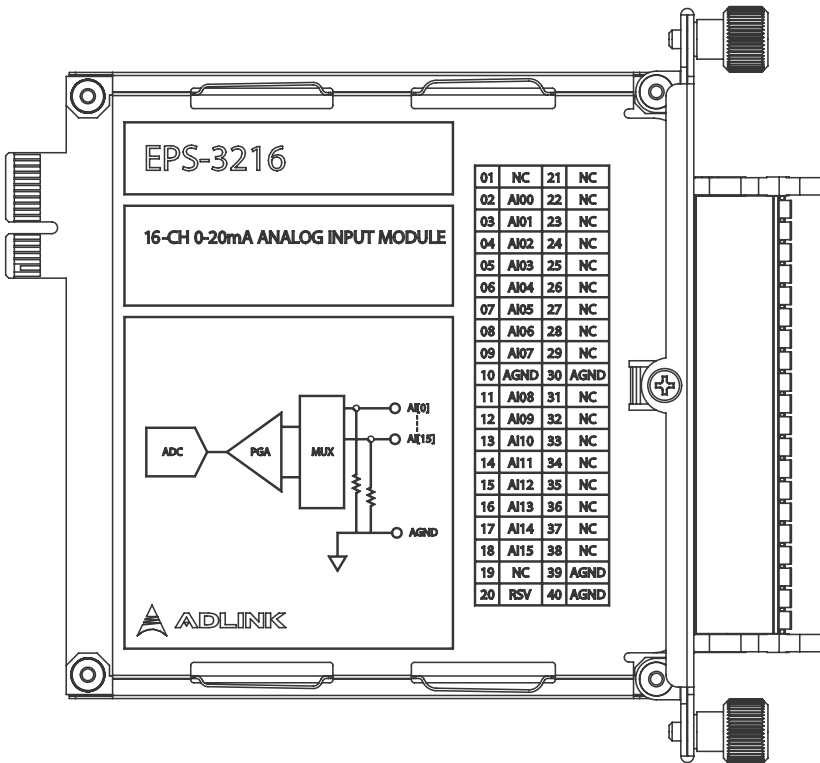
<b>Channels</b>	16 single-ended
<b>Input Range</b>	0-20mA
<b>Resolution</b>	16 bit
<b>Offset Error</b>	0.5 $\mu$ A
<b>Offset Drift</b>	0.0005% of range per °C
<b>Gain Error</b>	$\pm$ 0.05% of FSR
<b>Gain Drift</b>	0.0008%FSR per °C
<b>Voltage Protection</b>	Power On @ $\pm$ 24V
<b>Sampling Rate</b>	100kHz
<b>Power Consumption from Chassis</b>	< 450mW (max.)
<b>Thermal Dissipation (at max temp.)</b>	< 2.55W (max.) @ EVCC=24V+10%
<b>Operating Temperature</b>	-20 - 60°C
<b>Isolation (Channel-to-DGND)</b>	2kV (DC)
<b>Isolation (Channel-to-Chassis)</b>	2kV (DC)

**Table 3-15: EPS-3216 Specifications**

1	N/C	21	N/C
2	AI00	22	N/C
3	AI01	23	N/C
4	AI02	24	N/C
5	AI03	25	N/C
6	AI04	26	N/C
7	AI05	27	N/C
8	AI06	28	N/C
9	AI07	29	N/C
10	AGND	30	AGND
11	AI08	31	N/C
12	AI09	32	N/C
13	AI10	33	N/C
14	AI11	34	N/C
15	AI12	35	N/C
16	AI13	36	N/C
17	AI14	37	N/C
18	AI15	38	N/C
19	N/C	39	AGND
20	RSV	40	AGND

**Table 3-16: EPS-3216 Pin Assignment**





**Figure 3-7: EPS-3216 Schematic**

### 3.6.1 Connector and Wiring

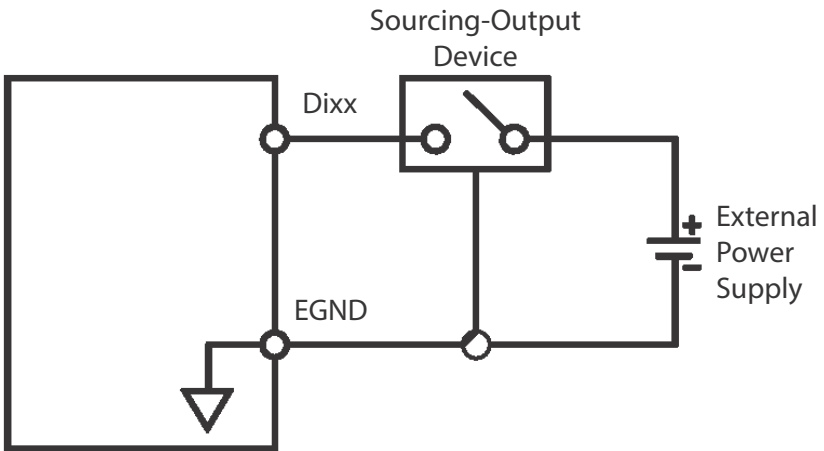
- ▶ Connector: Phoenix Contact, DFMC series, 1787195
- ▶ Pitch=3.5mm
- ▶ 2x20pin
- ▶ AWG 16-24 gauge

### 3.6.2 LED Indicators

LED	Action	Status
STS	Blinking	Over temperature protection Module present
PWR	Lit	Module power status

Table 3-17: LED Indicator Legend

### 3.6.3 Signal Connection



### 3.6.4 Object Dictionary

Index	Sub	Type	RW	Name	Description
0x3000	0	U8	R	Read Analog Input 16 Bit	
	1	U16	R	Read Analog Input 16 Bit	Analog Input Channel 0
	2	U16	R	Read Analog Input 16 Bit	Analog Input Channel 1
	3	U16	R	Read Analog Input 16 Bit	Analog Input Channel 2
	4	U16	R	Read Analog Input 16 Bit	Analog Input Channel 3
	5	U16	R	Read Analog Input 16 Bit	Analog Input Channel 4
	6	U16	R	Read Analog Input 16 Bit	Analog Input Channel 5
	7	U16	R	Read Analog Input 16 Bit	Analog Input Channel 6
	8	U16	R	Read Analog Input 16 Bit	Analog Input Channel 7
	9	U16	R	Read Analog Input 16 Bit	Analog Input Channel 8
	10	U16	R	Read Analog Input 16 Bit	Analog Input Channel 9
	11	U16	R	Read Analog Input 16 Bit	Analog Input Channel 10
	12	U16	R	Read Analog Input 16 Bit	Analog Input Channel 11
	13	U16	R	Read Analog Input 16 Bit	Analog Input Channel 12
	14	U16	R	Read Analog Input 16 Bit	Analog Input Channel 13
	15	U16	R	Read Analog Input 16 Bit	Analog Input Channel 14
	16	U16	R	Read Analog Input 16 Bit	Analog Input Channel 15

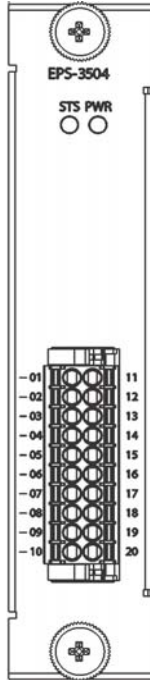
### 3.7 EPS-3504

The EPS-3504 4CH 24-bit, RTD thermal input module supports PT100, PT500 and PT1000 sensors, operates in environments from -20°C to 60°C, and provides high isolation protection and hot-swappability.

<b>Channels</b>	4 RTD
<b>Sensor Type</b>	PT100, PT500, PT1000
<b>Technology</b>	2-/3-/4-Wire
<b>Resolution</b>	24 bit
<b>Sampling Rate</b>	5-20Hz
<b>Temperature Range</b>	-200°C to +850°C
<b>Path Resistance</b>	18 – 3900Ω
<b>Accuracy (DC)</b>	± 0.007% of FSR
<b>Accuracy (Temperature)</b>	± 0.5°C
<b>Excitation Current (Max.)</b>	500µA
<b>Power Consumption from Chassis</b>	< 450mW (max.)
<b>Thermal Dissipation (at max temp.)</b>	< 2.55W (max.) @ EVCC=24V+10%
<b>Operating Temperature</b>	-20 - 60°C
<b>Isolation (Channel-to-DGND)</b>	2kV (DC)

**Table 3-18: EPS-3504 Specifications**

1	AGND
2	EX0+
3	SI0+
4	EX1+
5	SI1+
6	EX2+
7	SI2+
8	EX3+
9	SI3+
10	AGND
11	AGND
12	EX0-
13	SI0-
14	EX1+
15	SI1+
16	EX2+
17	SI2+
18	EX3+
19	SI3+
20	AGND



The diagram illustrates the physical layout of the EPS-3504 connector. It features a central ground pin (pin 11) and two power pins (pins 12 and 19). The diagram includes labels for 'EPS-3504', 'STS PWR', and 'AGND'.

**Table 3-19: EPS-3504 Pin Assignment**

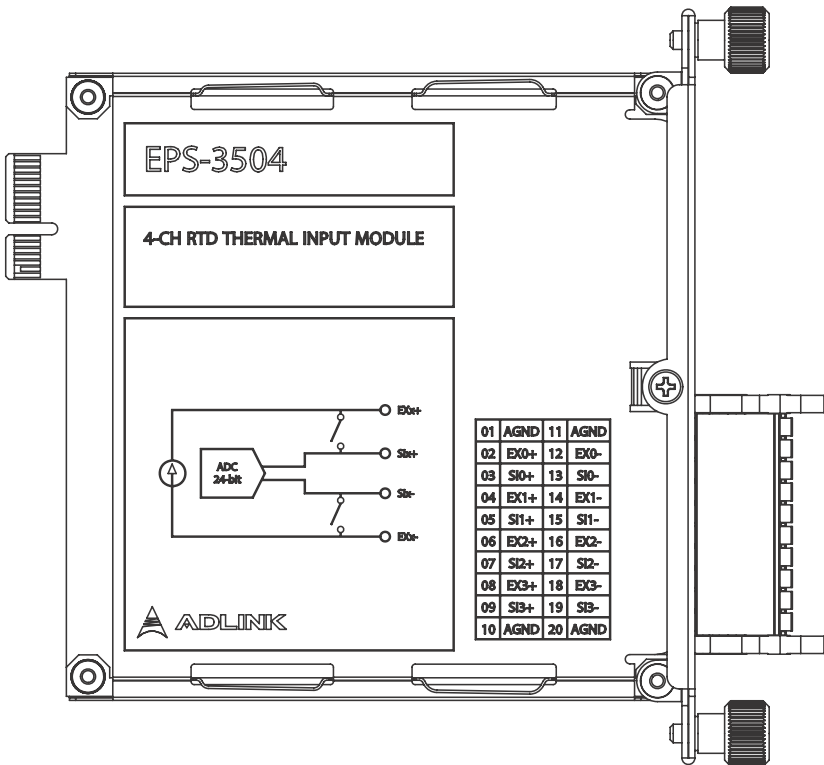


Figure 3-8: EPS-3504 Schematic

### 3.7.1 Connector and Wiring

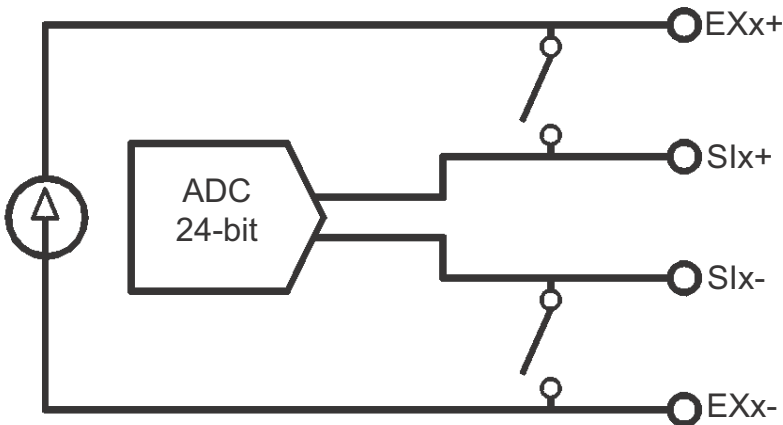
- ▶ Connector: Phoenix Contact, DFMC series, 1787195
- ▶ Pitch=3.5mm
- ▶ 1x20pin
- ▶ AWG 16-24 gauge

### 3.7.2 LED Indicators

LED	Action	Status
STS	Blinking	Over temperature protection Module present
PWR	Lit	Module power status

Table 3-20: LED Indicator Legend

### 3.7.3 Signal Connection



### 3.7.4 Object Dictionary

Index	Sub	Type	RW	Name	Description
0x3000	0	U8	R	RTD Data	
	1	U32	R	Ch-0	Channel 0 Data
	2	U32	R	Ch-1	Channel 1 Data
	3	U32	R	Ch-2	Channel 2 Data
	4	U32	R	Ch-3	Channel 3 Data

## 3.8 EPS-4008

The EPS-4008 8CH  $\pm 10V$  @ 16-bit, analog output module operates in environments from  $-20^{\circ}\text{C}$  to  $60^{\circ}\text{C}$ , and provides high isolation protection and hot-swappability. The EPS-4008 also offers onboard loopback circuitry ensuring integrity of analog output signals.

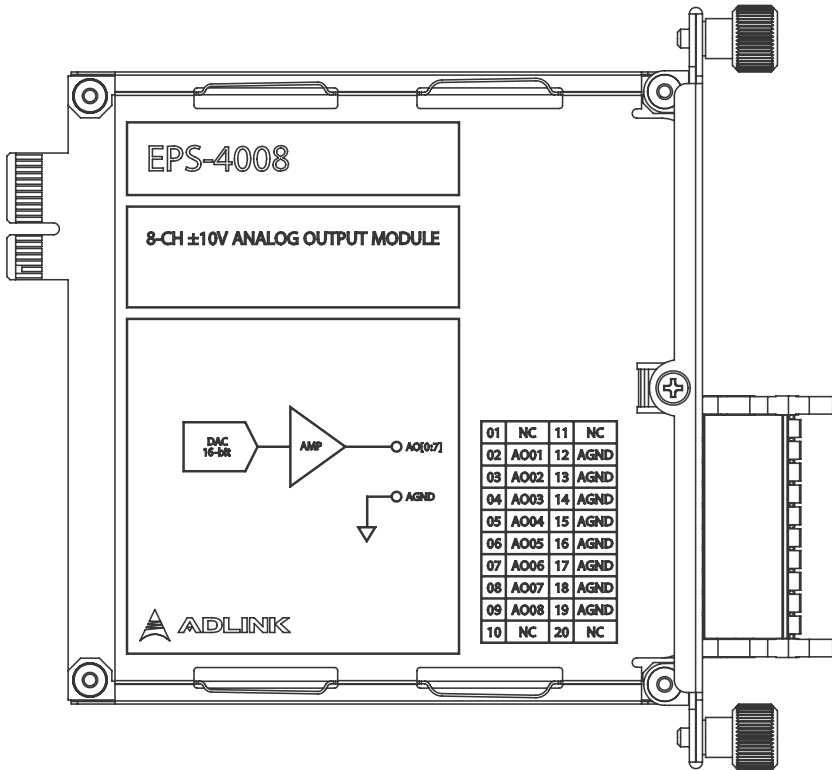


<b>Channels</b>	8CH Single-ended
<b>Output Range</b>	±10V
<b>Resolution</b>	16 bit
<b>Sampling Rate</b>	100kHz
<b>Offset Error</b>	± 0.2mV
<b>Gain Error</b>	± 0.05% of FSR
<b>Offset Drift</b>	± 0.0075mV /°C
<b>Gain Drift</b>	± 0.00025% /°C of FSR
<b>Output Current Capacity</b>	5 mA
<b>Power On State</b>	Relay off
<b>Voltage Protection</b>	± 24V / Relay off when error voltage occurs
<b>Power Consumption from Chassis</b>	< 450mW (max.)
<b>Thermal Dissipation (at max temp.)</b>	< 2.55W (max.) @ EVCC=24V+10%
<b>Operating Temperature</b>	-20 - 60°C
<b>Isolation (Channel-to-DGND)</b>	2kV (DC)
<b>Isolation (Channel-to-Chassis)</b>	2kV (DC)

**Table 3-21: EPS-4008 Specifications**

1	N/C	<p>The diagram shows a vertical rectangular module. At the top, there is a circular component with a cross symbol, labeled 'EPS-4008'. Below it are two small circles labeled 'STS PWR'. In the center, there is a 20-pin connector with pins numbered 01 to 20 on the left side. At the bottom, there is another circular component with a cross symbol.</p>
2	AO01	
3	AO02	
4	AO03	
5	AO04	
6	AO05	
7	AO06	
8	AO07	
9	AO08	
10	N/C	
11	N/C	
12	AGND	
13	AGND	
14	AGND	
15	AGND	
16	AGND	
17	AGND	
18	AGND	
19	AGND	
20	N/C	

**Table 3-22: EPS-4008 Pin Assignment**



**Figure 3-9: EPS-4008 Schematic**

### 3.8.1 Connector and Wiring

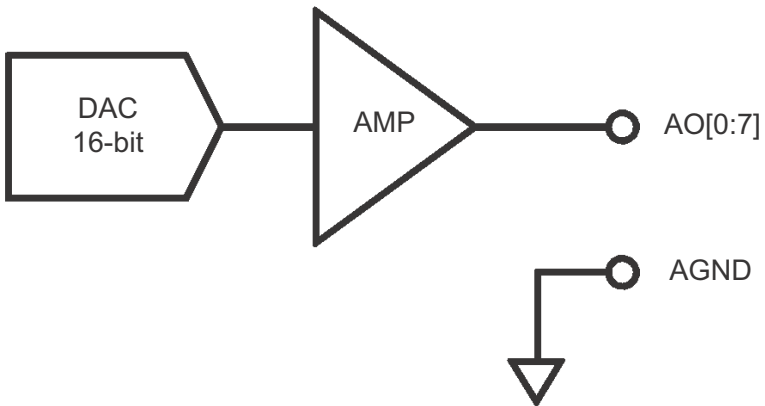
- ▶ Connector: Phoenix Contact, DFMC series, 1787195
- ▶ Pitch=3.5mm
- ▶ 1x20pin
- ▶ AWG 16-24 gauge

### 3.8.2 LED Indicators

LED	Action	Status
STS	Blinking	Over temperature protection Module present
PWR	Lit	Module power status

Table 3-23: LED Indicator Legend

### 3.8.3 Signal Connection



### 3.8.4 Object Dictionary

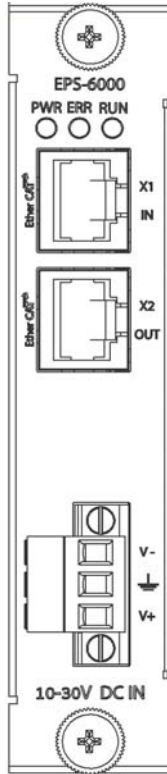
Index	Sub	Type	RW	Name	Description
0x3000	0	U8	RW	Write Analog Output 16 Bit	
	1	U16	RW	Write Analog Output 16 Bit	Analog Output Channel 0
	2	U16	RW	Write Analog Output 16 Bit	Analog Output Channel 1
	3	U16	RW	Write Analog Output 16 Bit	Analog Output Channel 2
	4	U16	RW	Write Analog Output 16 Bit	Analog Output Channel 3
	5	U16	RW	Write Analog Output 16 Bit	Analog Output Channel 4
	6	U16	RW	Write Analog Output 16 Bit	Analog Output Channel 5
	7	U16	RW	Write Analog Output 16 Bit	Analog Output Channel 6
	8	U16	RW	Write Analog Output 16 Bit	Analog Output Channel 7

### 3.9 EPS-6000

The EPS-6000 EtherCAT bus coupler module, powered by Xilinx Zynq SoC, supports not only EtherCAT transmission but also EPS peripheral module control and measurement functions. The EPS-6000 sustains DC power to the entire EPS slave system and grounds the system to reduce radiation noise, operating in environments from -20°C to 60°C and providing high isolation protection and hot-swappability

<b>EPS Module Support</b>	Up to 4 (slots)
<b>Ethernet Connectivity</b>	N/A
<b>Field Bus Connectivity</b>	EtherCAT
<b>Data Transmission Rate</b>	100 Mbaud
<b>Bus Interface</b>	2 x RJ45
<b>Cable for EtherCAT Connection</b>	CAT5 / CAT5e (recommended)
<b>Inner Bus Synchronization</b>	> 0.1 $\mu$ s
<b>Supply Voltage</b>	24V DC ( $\pm$ 10%)
<b>Thermal Dissipation (at max temp.)</b>	< 6.6W (max.) @ EVCC=24V+10%
<b>Operating Temperature</b>	-20 to 60°C
<b>Isolation (Channel-to-DGND)</b>	2kV (DC)
<b>Isolation (Channel-to-Chassis)</b>	2kV (DC)

**Table 3-24: EPS-6000 Specifications**



X1 & X2

Pin	Description
08	Termination
07	Termination
06	TX-
05	Termination
04	Termination
03	TX+
02	RX-

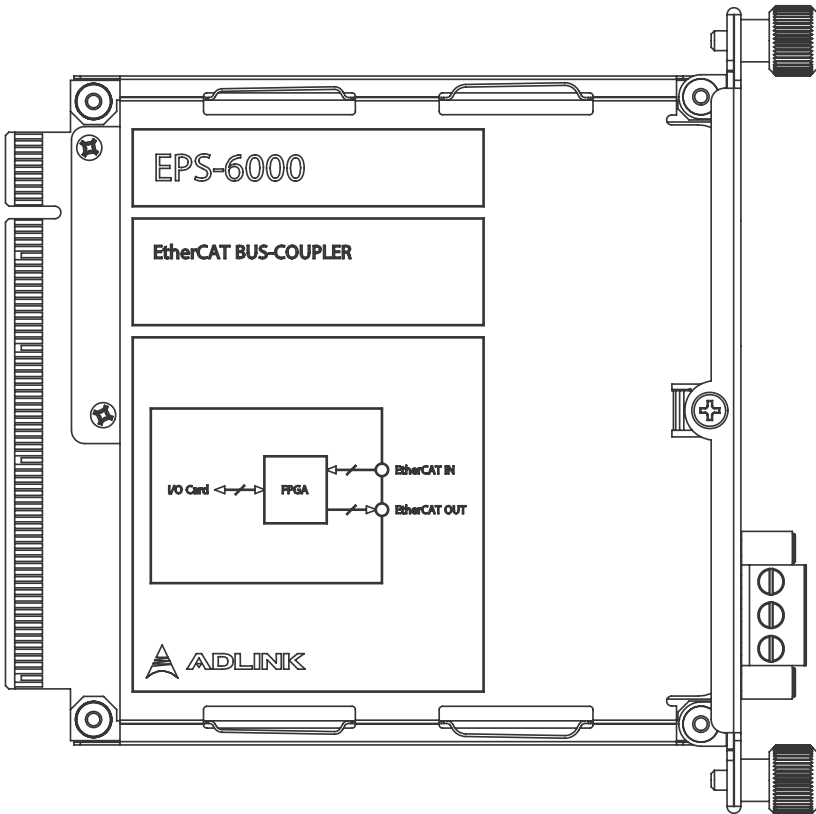
Power

Pin	Description
01	RX+

Pin	Description
01	External Ground
02	Shielding Ground
03	External Power Input

**Table 3-25: EPS-6000 Pin Assignment**





**Figure 3-10: EPS-6000 Schematic**

### **3.9.1 Connector and Wiring**

Connector: Phoenix Contact, DFMC series, 1787195, pitch=3.5mm, 2x5 pin, AWG 16-24 gauge

SCSI VHDCI 68p: Y cable accessory (for servo connection)

### 3.9.2 LED Indicators

LED	Display	Function	Description
PWR	Lit	System Power Status	Power ON
	Off		Power OFF / Power level below 20V
ERR	Lit	System Error Handling	Error
	Blinking		Warning (XXXX for details)
	Off		No warning and error
RUN	Lit	EtherCAT Communication Status	Normal operation
	Off		No power Under configuration Watchdog counter expired (1 sec)

**Table 3-26: LED Indicator Legend**

### 3.9.3 Object Dictionary

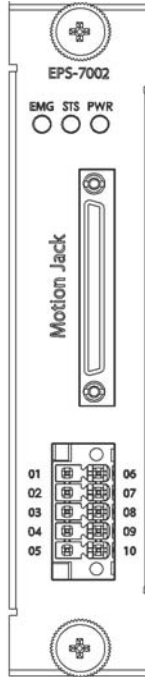
Index	Sub	Type	RW	Name	Description
0x4000	0	U8	RW	Write Analog Output 16 Bit	
	1	U16	RW	Write Analog Output 16 Bit	Analog Output Channel 0
	2	U16	RW	Write Analog Output 16 Bit	Analog Output Channel 1
	3	U16	RW	Write Analog Output 16 Bit	Analog Output Channel 2
	4	U16	RW	Write Analog Output 16 Bit	Analog Output Channel 3
	5	U16	RW	Write Analog Output 16 Bit	Analog Output Channel 4
	6	U16	RW	Write Analog Output 16 Bit	Analog Output Channel 5
	7	U16	RW	Write Analog Output 16 Bit	Analog Output Channel 6
	8	U16	RW	Write Analog Output 16 Bit	Analog Output Channel 7

### 3.10 EPS-7002

The EPS-7002 2CH pulse-train motion module supports up to 4MHz pulse output frequency, 20MHz encoder input speed (@ 4xAB phase mode), and dedicated motion and servo I/O interface, and complies with the CiA402 standard. Operating in environments from -20°C to 60°C, it provides high isolation protection and hot-swappability.

<b>Channels</b>	2
<b>Output Frequency</b>	4MHz
<b>Output Modes</b>	CW/CCW, OUT/DIR
<b>Encoder Input Channels</b>	2
<b>Encoder Input Frequency</b>	20MHz @ 4xAB
<b>Encoder Input Modes</b>	CW/CCW, 1x/2x/4x AB Phase
<b>Encoder Input Type</b>	TTL, Incremental
<b>Motion I/O Interface</b>	PEL, MEL, ORG
<b>Servo I/O Interface</b>	ALM, INP, RDY, SVON, ERC, RST
<b>Input Type</b>	Sinking
<b>Input Current</b>	IEC 61131-2, Type 1/3
<b>Output Current (Single Node) (Sinking / Sourcing)</b>	50mA
<b>Power Consumption from Chassis</b>	< 450mW (max)
<b>Thermal Dissipation (at max temp)</b>	< 2.55W (max) @ EVCC=24V+10%
<b>Operating Temperature</b>	-20 - 60°C
<b>Isolation (Channel-to-DGND)</b>	2kV (DC)
<b>Isolation (Channel-to-Chassis)</b>	2kV (DC)

**Table 3-27: EPS-7002 Specifications**



## Motion I/O

Pin	Description
01	GND
02	MEL1
03	PEL2
04	MEL2
05	GND
06	PEL1
07	ORG1
08	COM
09	ORG2
10	EMG

## D-SUB26P

#	Name	I/O	Function
1	SVON	O	Servo On signal
2	INP	I	In-position signal
3	ERC	O	Dev ctr, clr. Signal
4	RDY	I	servo ready signal
5	OUT-	O	Pulse signal (-)
6	OUT+	O	Pulse signal (+)
7	EA-	I	Encoder A-phase(-)
8	EA+	I	Encoder A-phase(+)
9	Rsv	-	Reserved
10	RST	O	Reset driver signal
11	ALM	I	Servo alarm signal
12	COM	-	Ext. power supply, +24V
13	GND	-	Ext. power ground
14	Rsv	-	Reserved
15	GND	-	Ext. power ground
16	EB-	I	Encoder B-phase(-)
17	EB+	I	Encoder B-phase(+)
18	GND	-	Ext. power ground
19	EMG	O	Emergency signal
20	GND	-	Ext. power ground
21	GND	-	Ext. power ground
22	GND	-	Ext. power ground
23	DIR-	O	Dir. Signal(-)
24	DIR+	O	Dir. Signal(+)
25	EZ-	I	Encoder Z-phase(-)
26	EZ+	I	Encoder Z-phase(+)

Table 3-28: EPS-7002 Pin Assignment



NOTE:

It is recommended to connect signal to specific servo drives with dedicated cables. Docking connector is DSUB-26p.

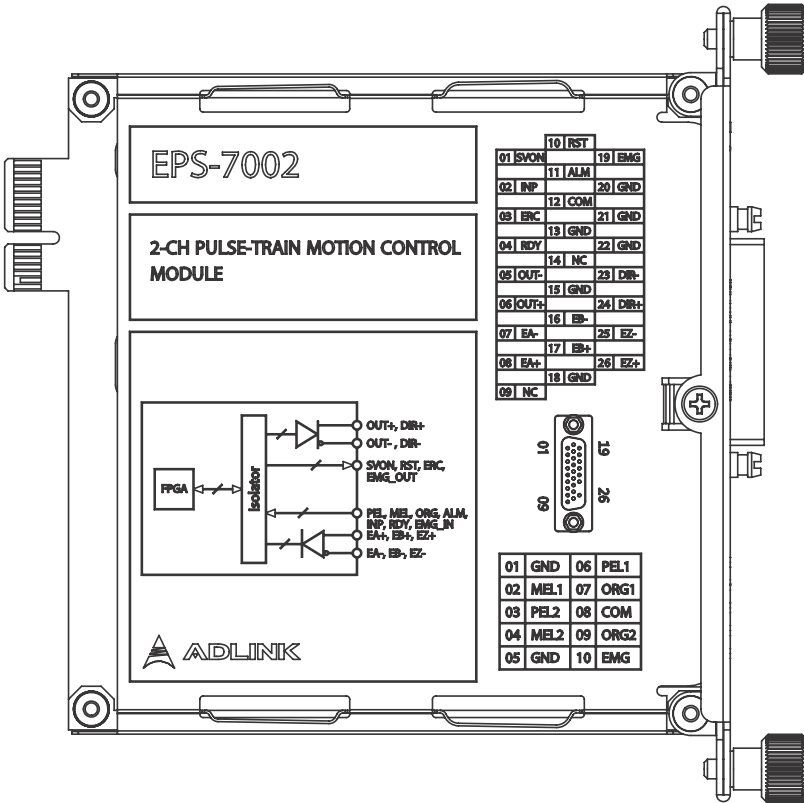


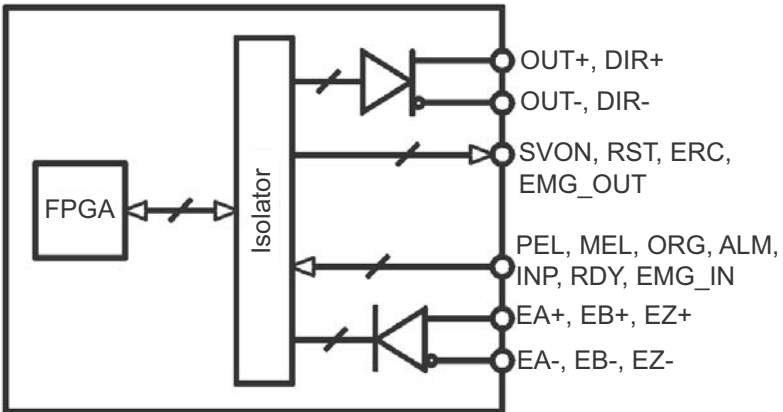
Figure 3-11: EPS-7002 Schematic

### 3.10.1 LED Indicators

LED	Status	Function
EMG	Lit	Emergency Stop Input
STS	Blinking	Over Temperature Protection Module Present
PWR	Lit	Module Power Status

Table 3-29: LED Indicator Legend

### 3.10.2 Signal Connection



### 3.10.3 Object Dictionary

Index	Sub	Type	RW	Name
0x6040		U16	RW	Control Word
0x6041		U32	R	Status Word
0x6064		U32	R	Position Actual Value
0x607A		U32	RW	Target Position
0x60B8		U16	RW	Touch Probe Ctrl
0x60B9		U16	R	Touch Probe Response



Index	Sub	Type	RW	Name
0x60BA		U32	R	Touch Probe 0 Positive Edge Value
0x60BB		U32	R	Touch Probe 1 Positive Edge Value
0x60BC		U32	R	Touch Probe 0 Negative Edge Value
0x60BD		U32	R	Touch Probe 1 Negative Edge Value
0x60FD		U32	RW	Axis 0 Motion Output
0x60FE		U32	R	Axis 0 Motion Input
0x6840		U16	RW	Control Word
0x6841		U32	R	Status Word
0x6864		U32	R	Position Actual Value
0x687A		U32	RW	Target Position
0x68B8		U16	RW	Touch Probe Ctrl
0x68B9		U16	R	Touch Probe Response
0x68BA		U32	R	Touch Probe 0 Positive Edge Value
0x68BB		U32	R	Touch Probe 1 Positive Edge Value
0x68BC		U32	R	Touch Probe 0 Negative Edge Value
0x68BD		U32	R	Touch Probe 1 Negative Edge Value
0x68FD		U32	RW	Axis 1 Motion Output
0x68FE		U32	R	Axis 1 Motion Input

## Appendix A - LinkMasterPro™

LinkMasterPro™, ADLINK's EtherCAT utility, enables configuration of EPS slave systems and generation of corresponding ESI files for EtherCAT master controllers.

LinkMasterPro™ further provides intuitive I/O control dialogues to assess the integrity of each EPS peripheral module's wiring.



Ensure that all hardware setup and wiring is complete before executing LinkMasterPro™.

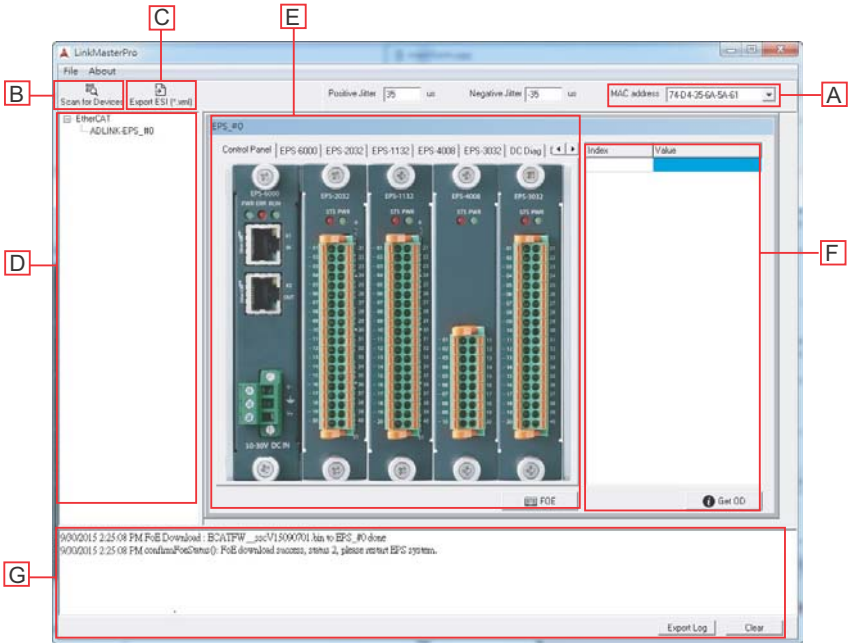
---

LinkMasterPro™ enables:

- ▶ Identification of all EPS elements in the EtherCAT system
- ▶ Export of ESI (EtherCAT Slave Information) files and conversion of content to EEPROM
- ▶ Complete EtherCAT communication
- ▶ CAN application protocol over EtherCAT (COE)
- ▶ File access over EtherCAT (FOE)
- ▶ Direct access to general purpose I/O



## A.1 Interface



**Figure A-2: LinkMasterPro™ Interface**

A	MAC Address Selection
B	Scan for Devices Button
C	Export ESI (*.xml) Button
D	Tree View Window
E	Device Window
F	Object Dictionary Window
G	Message Window

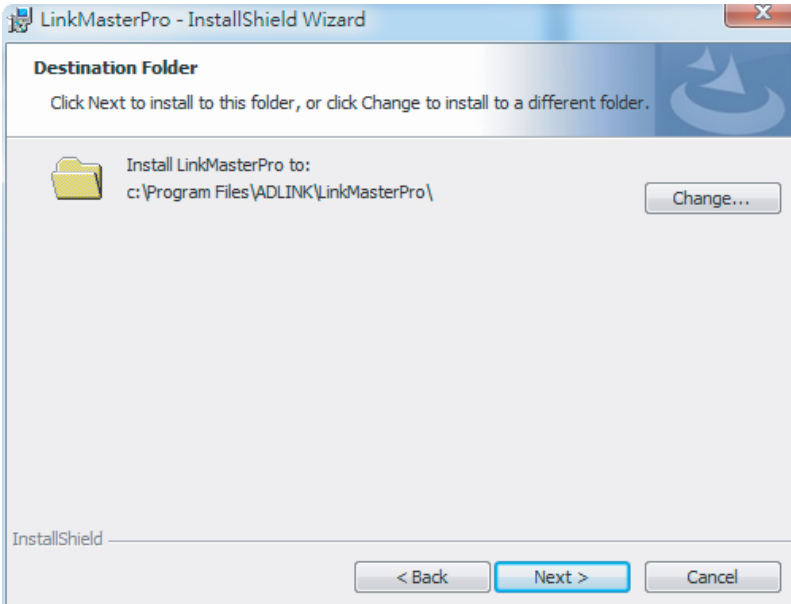
**Table A-1: LinkMasterPro™ Interface Legend**

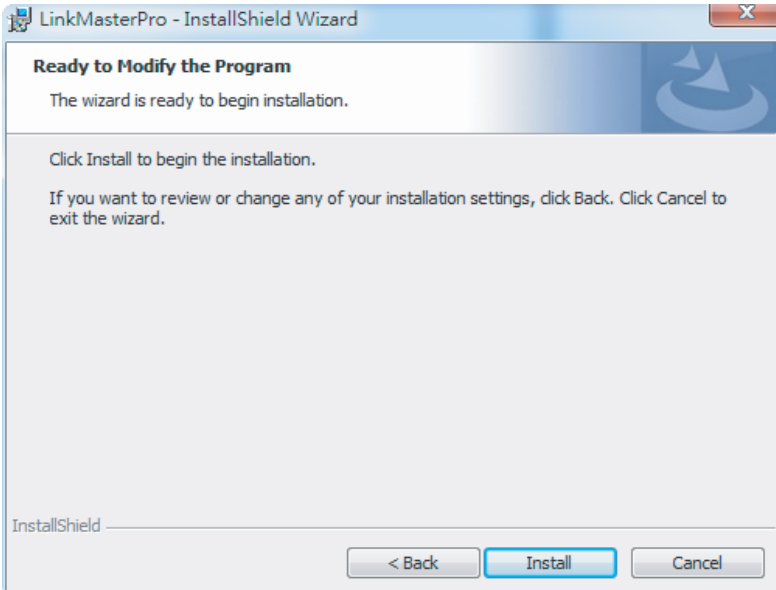
## A.2 Installation

Install the LinkMasterPro\_v1.0.exe SDK to the suggested path

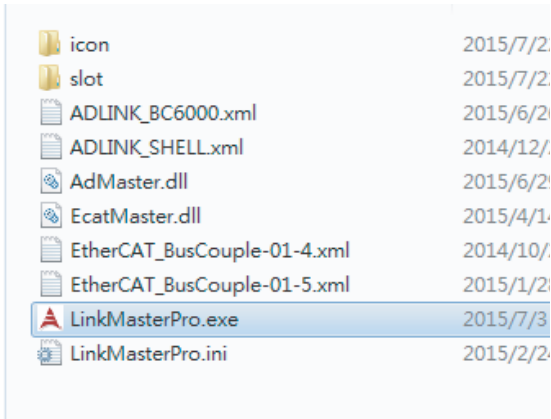
C:\Program Files\ADLINK\LinkMasterPro

Click Next and Install through until installation is complete.





Once installation is complete, the application can be launched by following Start>All Programs>ADLINK>LinkMasterPro or by going to C:\Program Files\ADLINK\LinkMasterPro and executing LinkMasterPro.exe.

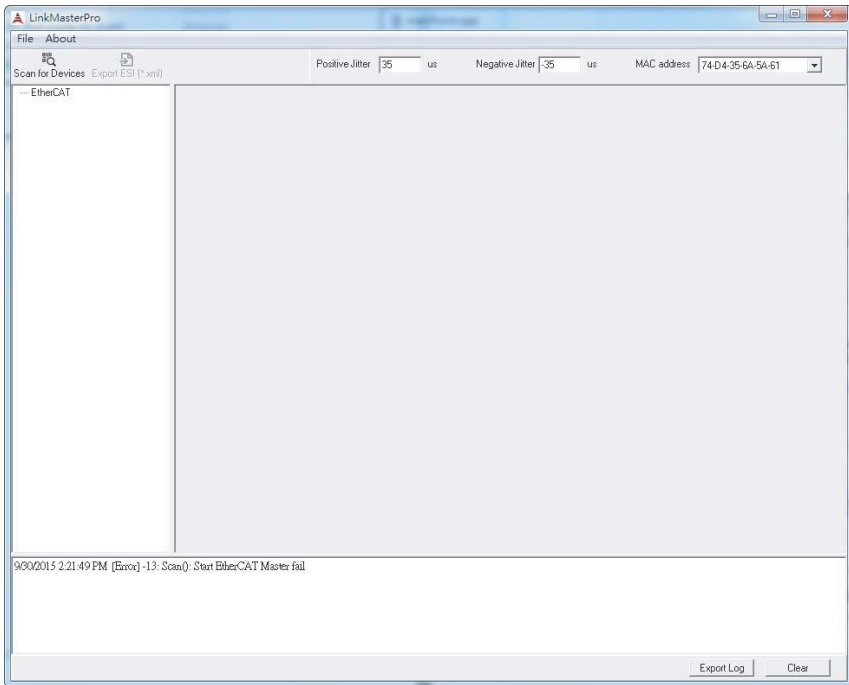


**Figure A-3: LinkMasterPro™ Folder**

## **A.3 Controls and Function**

### **A.3.1 Selecting MAC Address**

To begin with LinkMasterPro™, the physical MAC address on the master must be entered, or the application is unable to scan the EtherCAT device properly. If the incorrect MAC is entered, an error message appears as shown.



**Figure A-4: Scan Failure Notification**



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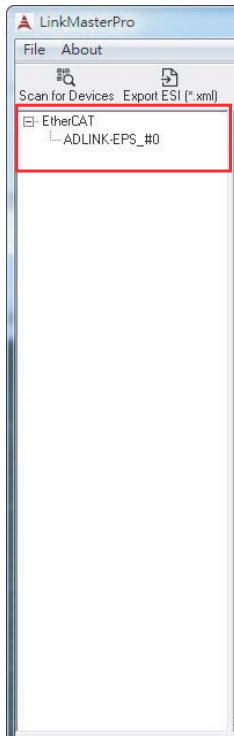
Before operating any controls, ensure all slave modules are properly connected and no other fieldbus devices or applications are in use.

---

### **A.3.2 Scanning for Devices**

When the Scan for Devices button is activated, the EPS slave system is displayed in the device tree view as shown.

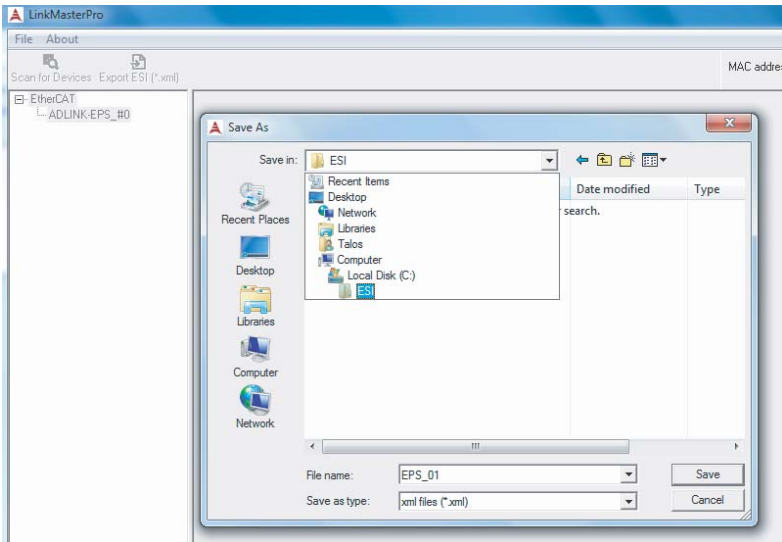




**Figure A-5: EPS Slave System in Tree View**

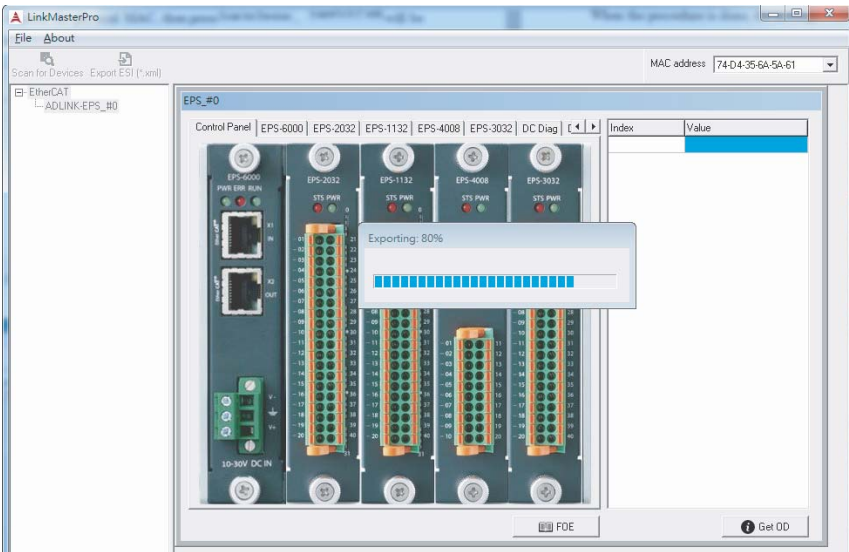
### **A.3.3 Exporting ESI**

When the Export ESI button is activated, the ESI file (\*.xml) is saved to disk and the EPS system simultaneously, with the Save path selected as shown.



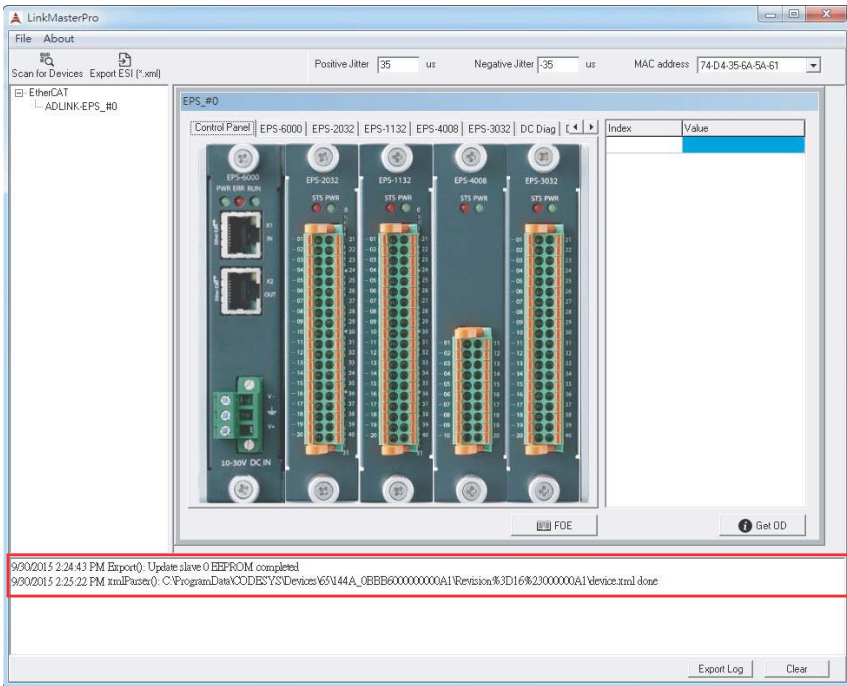
**Figure A-6: Save ESI Path Selection**

The ESI (EtherCAT slave information) file includes product code, vendor ID, TxPDO/RxPDO, and other slave data. It recognizes peripheral module types and locates memory space required to control the I/O on the EPS peripheral modules thru EtherCAT. When ESI export begins, a progress bar appears as shown.



**Figure A-7: ESI Export Progress Display**

The action also programs the content to EEPROM on the individual EPS slave system. When ESI generation is complete a notification appears as shown.



**Figure A-8: Export Successful Display**

The ESI file can further be used for CoDeSys, configuring EtherCAT for integration into the IEC 61131-3 Development System. To save time, LinkMasterPro automatically copies the ESI file of EPS system to the specific CoDeSys path, named device.xml.

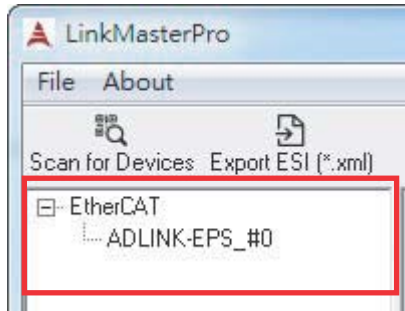


NOTE:

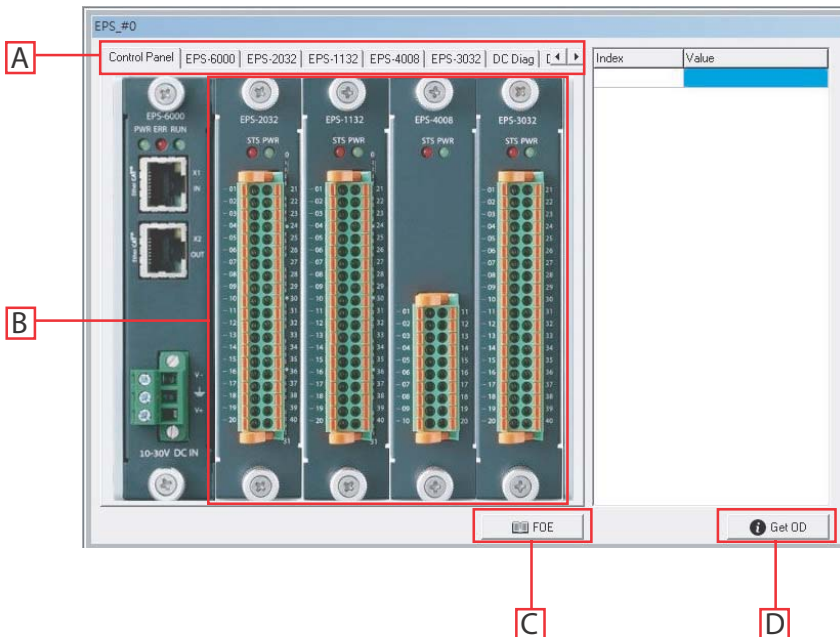
The CoDeSys environment must be properly installed and functional before exporting ESI files.

### A.3.4 Device Tree View

The device tree view displays the entire installed EPS slave system in the EtherCAT line.



Corresponding EPS module dialogue appears when the specific slave system is selected.

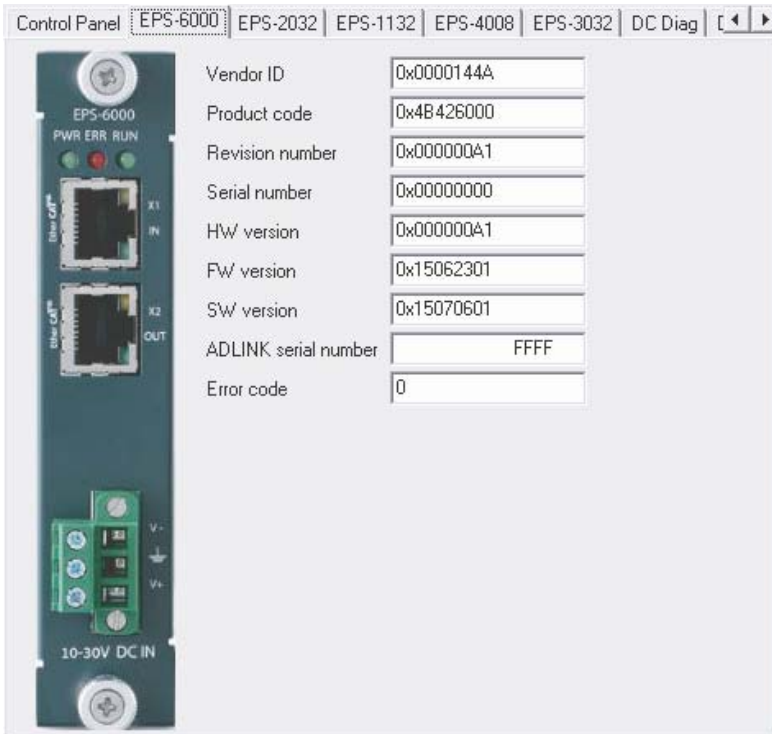


**Figure A-9: EPS Slave System Panel**

	Item	Function
<b>A</b>	Module Tab Panel	Switching tab panel displays individual module information
<b>B</b>	I/O Panel	Opens I/O display
<b>C</b>	FOE (File Over EtherCAT) Button	Transfers files over EtherCAT (write *.bin file over EtherCAT)
<b>D</b>	OD Info Button	Displays OD info <index: value> above list

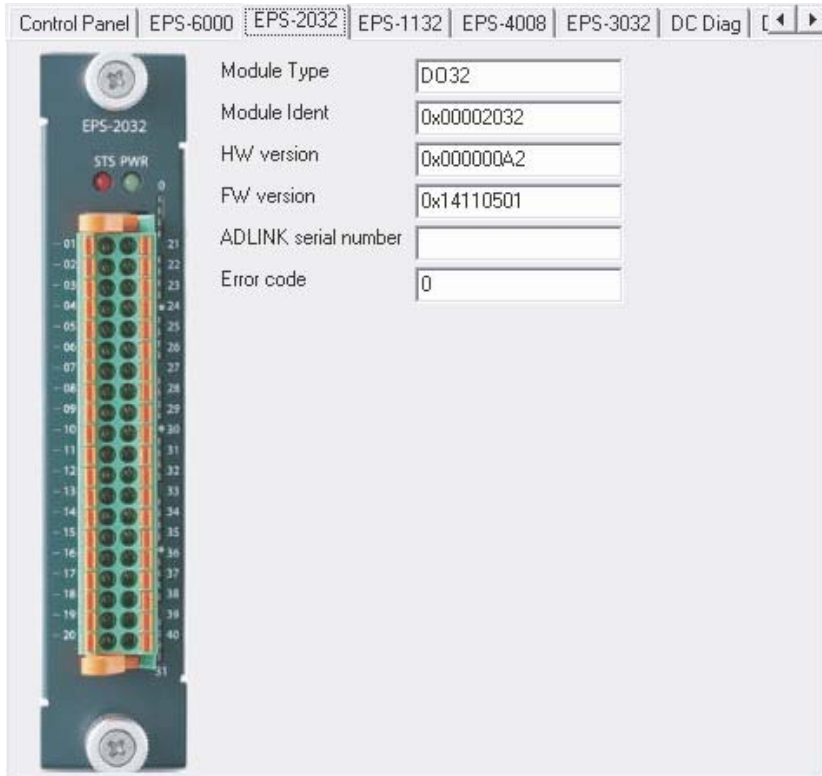
**Table A-2: EPS Slave System Panel Operations**

When the tab is switched, information for the specific module is displayed. If the EPS-6000 bus coupler module (the default installation in Slot 1) tab is opened, the configuration page that appears includes vendor ID, product code, revision number, serial number, HW version, FW version, SW version, and ADLINK serial number, as well as error code, as shown.



**Figure A-10: EPS-6000 Product Page (default Slot 1 installation)**

Generally, individual EPS module pages display the module type, module identification, HW version, SW version, and ADLINK serial number, as well as error code. The page for the EPS-2032 module (installed here in Slot 2) is shown as an example.



**Figure A-11: EPS-2032 Product Page (exemplary Slot 2 installation)**

To optimize data transmission between the EtherCAT master and EPS slave system, time offset can be adjusted via the Distribute Clock (DC) tab, as shown.



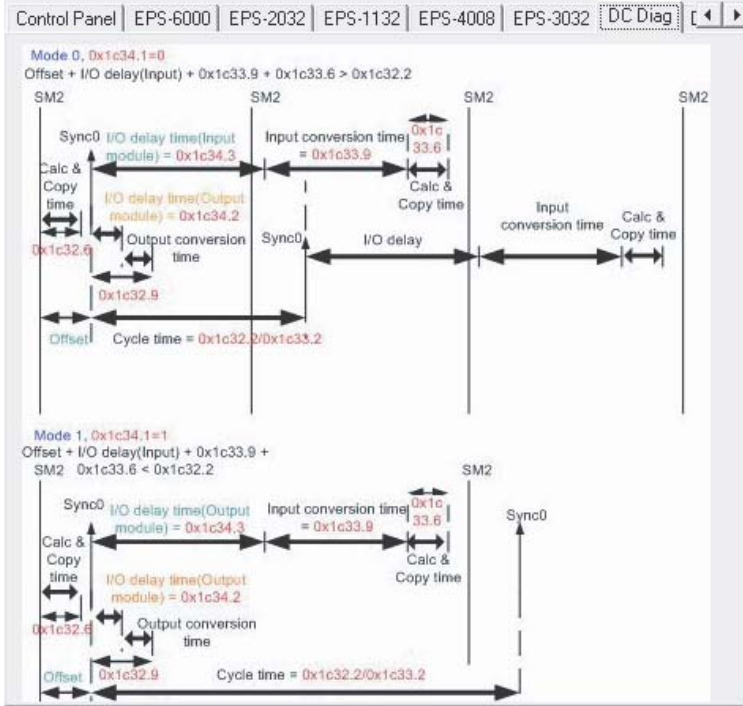


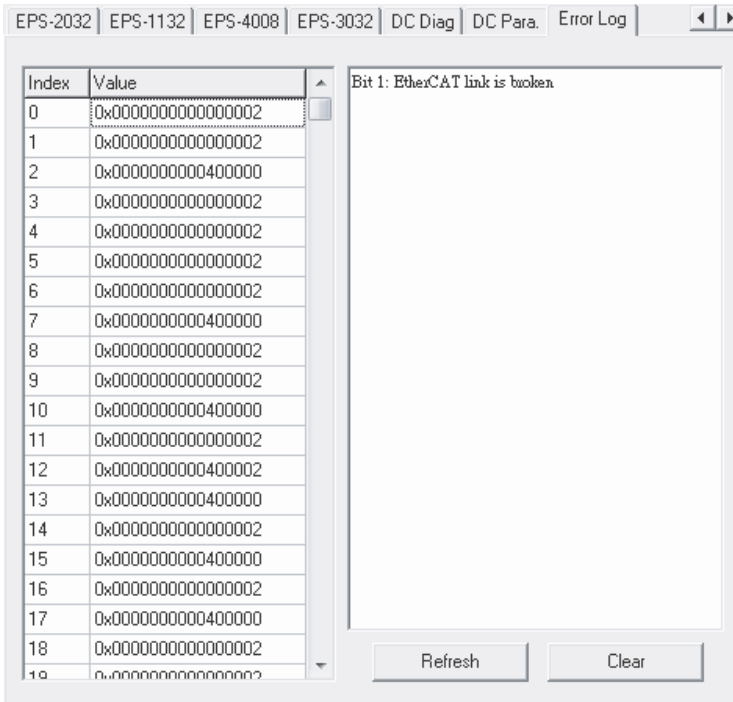
Figure A-12: DC Dialog Page

	Rx PDO	Tx PDO
Synchronization Type	0x0000	0x0000
Cycle Time	0x00000000	0x00000000
Synchronization Types supported	0x401E	0x401E
Minimum Cycle Time	0x000186A0	0x000186A0
Calc and Copy Time	0x000061A8	0x00009C40
Get Cycle Time	0x0000	0x0000
Delay Time	0x00000000	0x00000000
Sync0 Cycle Time	0x00000000	0x00000000
SM-Event Missed	0x0000	0x0000
Cycle Time Too Small	0x0000	0x0000
Sync error	0x00	0x00
DC Parameter Setting		
Cyclic mode	0x03	
Output delay	0x01	
Input delay	0x00000000	
	0x00000000	

Figure A-13: DC Parameters Page

### A.3.5 Error Logging and History

Error logging provides error history saved in the EPS-6000's onboard flash memory. Capacity in the memory is 256 error codes. Refresh displays the error data and corresponding description in the Information Panel (right side) when each value is selected. Clear removes data from both the display and flash memory.



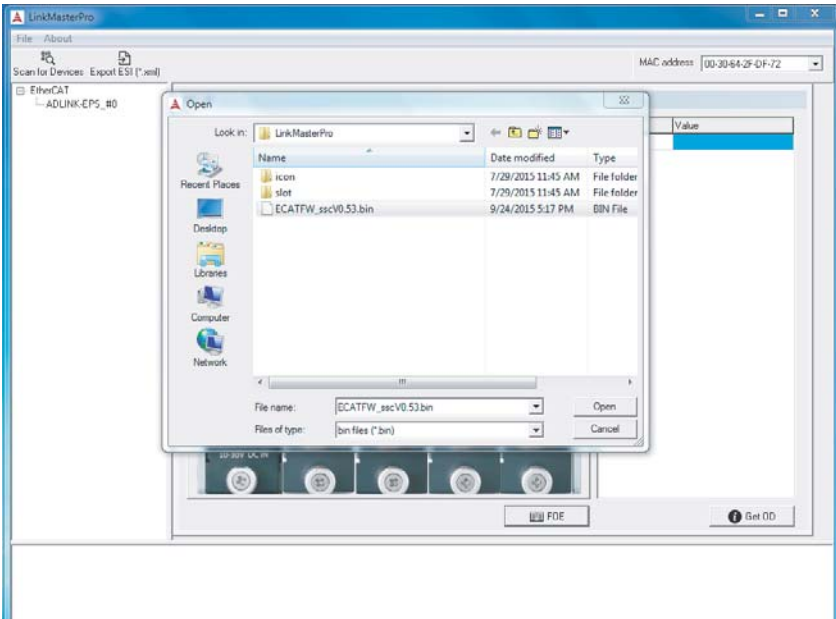
**Figure A-14: Error Log Page (w/ Index 0 selected)**

### A.3.6 FOE (File Over EtherCAT)

Slave functions can be reprogrammed dynamically by updating slave code (\*.bin). The FOE button opens the binary file listing and enables download to the EEPROM of the EPS slave system.

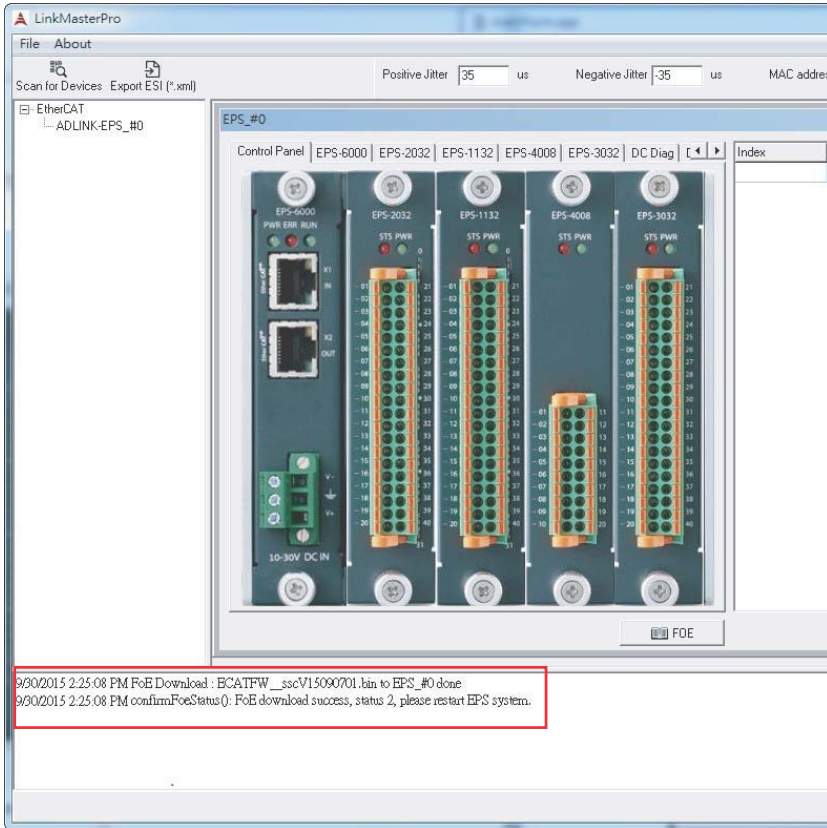


Ensure that no other LinkMasterPro™ operations are active during the procedure.



**Figure A-15: Binary File Selection**

When the procedure is complete, a notification appears, as shown.



**Figure A-16: Binary File Download Success Notification**

Restart the EPS system to activate the functions. If the procedure fails, the slave code may need to be downloaded again. If failure persists, please contact ADLINK technical support.

### A.3.7 Getting OD Info

The Get OD button displays values corresponding to each index/sub-index in the table for review.

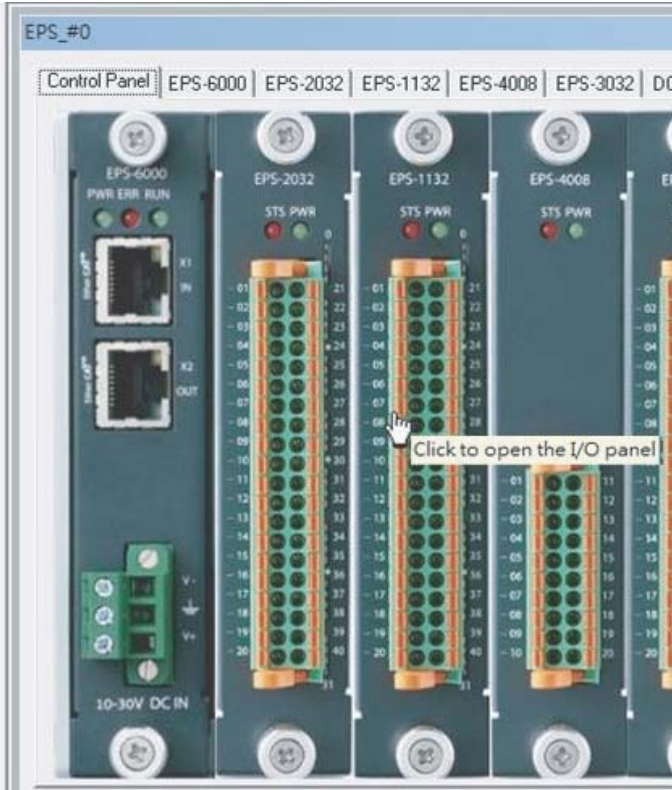
Index	Value
0x1C34:00	0x03
0x1C34:01	0x00
0x1C34:02	0x00000000
0x1C34:03	0x00000000
0x3FFF:00	0x00000000
0x4FFF:00	0x00000000
0xF000:00	0x02
0xF000:01	0x0010
0xF000:02	0x0004
0x1600:00	0x01
0x1600:01	0x40000020
0x4000:00	0x00000000
0xC000:02	D032
0xC000:03	EPS-2032
0xC000:04	0x00C81389
0xC000:05	0x0000144A
0xC000:06	0x144A2032
0xC000:07	0x000000C3
0xC000:08	0x00000000
0xC000:09	0x0001
0xC000:0A	0x00002032
0xC000:0B	0x0000
0xC000:0C	0x0000

Get OD

**Figure A-17: OD List**

### A.3.8 Module I/O Panels

Selecting a module in the Device Window opens the I/O panel for that module.



**Figure A-18: Module Selection**

Each module's I/O panel displays its I/O information, as shown.

## EPS-2032



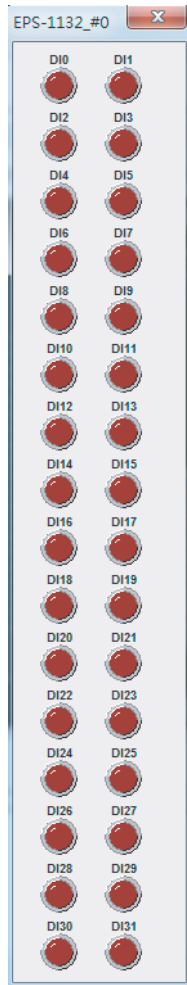
Indicator represents 1 bit, clicking allows status to be changed.



## EPS-2132



Indicator represents 1 bit, clicking allows status to be changed.

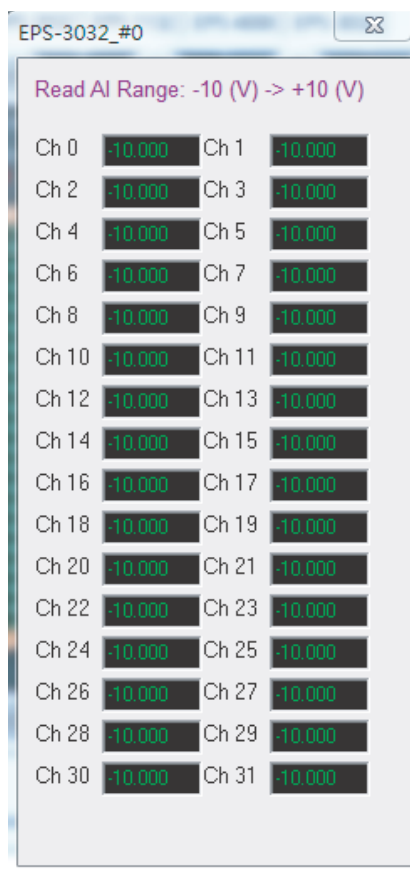
**EPS-1132**

Indicator represents 1 bit, and is read-only.

## EPS-4008

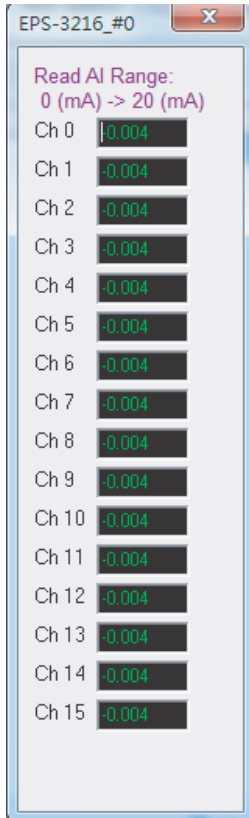


Enables voltage to be changed, with current value displayed on the right. Apply implements changes, and Reset rolls values back to 0.

**EPS-3032**

Displays voltage data, and is read-only.

## EPS-3216



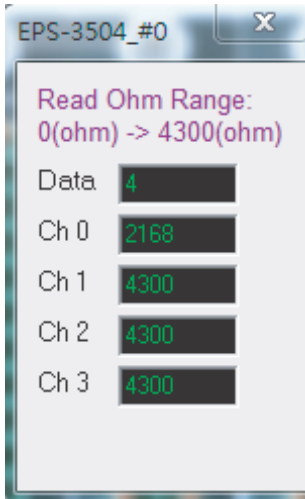
Displays current data, and is read-only.

## EPS-2308



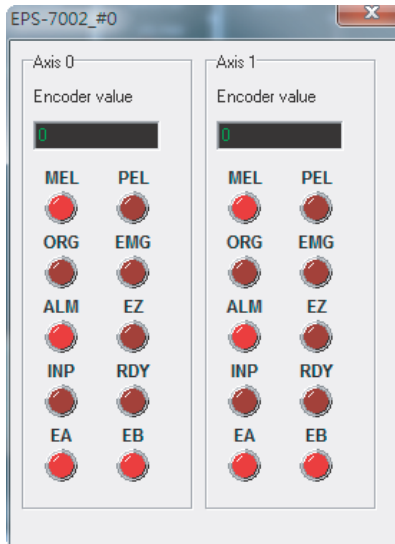
Enables status to be switched on and off.

## EPS-3504



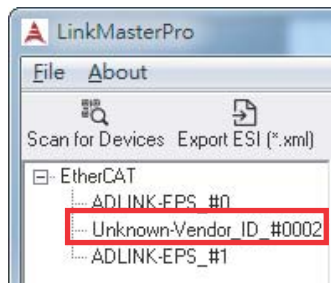
Displays channel data in ohms ( $\Omega$ ).

## EPS-7002



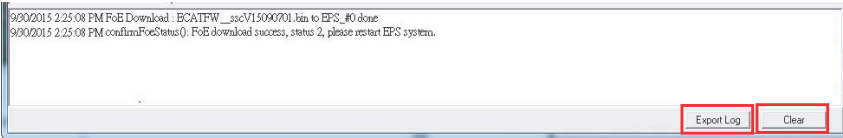
Displays Softmotion encoder data and status.

3rd party EtherCAT devices installed in the same line merely show vendor ID in the tree view.



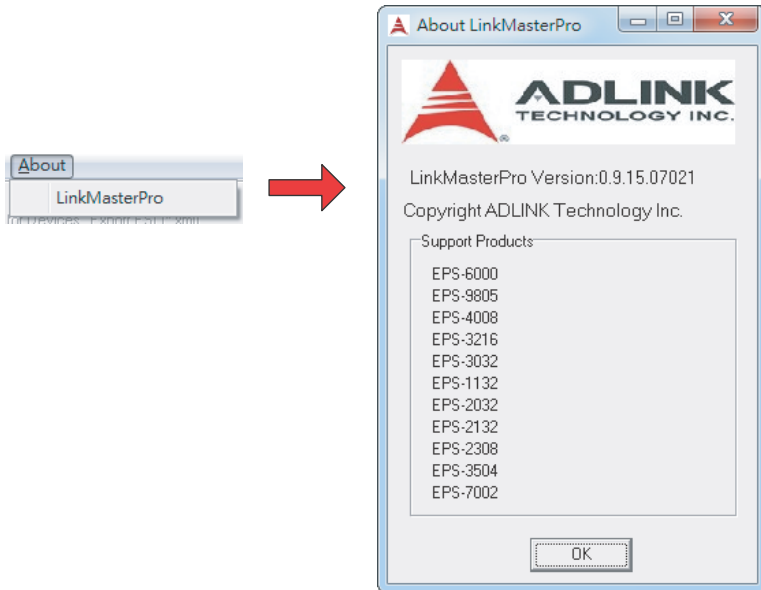


### A.3.9 Exporting Log Messages



All currently displayed messages can be exported by clicking Export Log. Log filenames follow a “Log\_year-month-date\_hour-min-sec.txt” format. Files are saved in the LinkMasterPro™ directory. All current messages can be cleared by clicking Clear.

### A.3.10 Version Information



LinkMasterPro™ version information, as well as that of supported modules is displayed when About is selected from the toolbar.

# Important Safety Instructions

For user safety, please read and follow all **instructions**, **WARNINGS**, **CAUTIONS**, and **NOTES** marked in this manual and on the associated equipment before handling/operating the equipment.

- ▶ Read these safety instructions carefully.
- ▶ Keep this user's manual for future reference.
- ▶ Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- ▶ When installing/mounting or uninstalling/removing equipment:
  - ▷ Turn off power and unplug any power cords/cables.
- ▶ To avoid electrical shock and/or damage to equipment:
  - ▷ Keep equipment away from water or liquid sources;
  - ▷ Keep equipment away from high heat or high humidity;
  - ▷ Keep equipment properly ventilated (do not block or cover ventilation openings);
  - ▷ Make sure to use recommended voltage and power source settings;
  - ▷ Always install and operate equipment near an easily accessible electrical socket-outlet;
  - ▷ Secure the power cord (do not place any object on/over the power cord);
  - ▷ Only install/attach and operate equipment on stable surfaces and/or recommended mountings; and,
  - ▷ If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.

- ▶ Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.
  - ▶ A Lithium-type battery may be provided for uninterrupted, backup or emergency power.
- 



Risk of explosion if battery is replaced with an incorrect type; please dispose of used batteries appropriately.

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- ▶ Equipment must be serviced by authorized technicians when:
  - ▷ The power cord or plug is damaged;
  - ▷ Liquid has penetrated the equipment;
  - ▷ It has been exposed to high humidity/moisture;
  - ▷ It is not functioning or does not function according to the user's manual;
  - ▷ It has been dropped and/or damaged; and/or,
  - ▷ It has an obvious sign of breakage.

# Getting Service

Contact us should you require any service or assistance.

## **ADLINK Technology, Inc.**

Address: 9F, No.166 Jian Yi Road, Zhonghe District  
New Taipei City 235, Taiwan  
新北市中和區建一路 166 號 9 樓  
Tel: +886-2-8226-5877  
Fax: +886-2-8226-5717  
Email: service@adlinktech.com

## **Ampro ADLINK Technology, Inc.**

Address: 5215 Hellyer Avenue, #110  
San Jose, CA 95138, USA  
Tel: +1-408-360-0200  
Toll Free: +1-800-966-5200 (USA only)  
Fax: +1-408-360-0222  
Email: info@adlinktech.com

## **ADLINK Technology (China) Co., Ltd.**

Address: 上海市浦东新区张江高科技园区芳春路 300 号 (201203)  
300 Fang Chun Rd., Zhangjiang Hi-Tech Park  
Pudong New Area, Shanghai, 201203 China  
Tel: +86-21-5132-8988  
Fax: +86-21-5132-3588  
Email: market@adlinktech.com

## **ADLINK Technology Beijing**

Address: 北京市海淀区上地东路 1 号盈创动力大厦 E 座 801 室(100085)  
Rm. 801, Power Creative E, No. 1 Shang Di East Rd.  
Beijing, 100085 China  
Tel: +86-10-5885-8666  
Fax: +86-10-5885-8626  
Email: market@adlinktech.com

## **ADLINK Technology Shenzhen**

Address: 深圳市南山区科技园南区高新南七道 数字技术园  
A1 栋 2 楼 C 区 (518057)  
2F, C Block, Bldg. A1, Cyber-Tech Zone, Gao Xin Ave. Sec. 7  
High-Tech Industrial Park S., Shenzhen, 518054 China  
Tel: +86-755-2643-4858  
Fax: +86-755-2664-6353  
Email: market@adlinktech.com

## **LiPPERT ADLINK Technology GmbH**

Address: Hans-Thoma-Strasse 11, D-68163  
Mannheim, Germany  
Tel: +49-621-43214-0  
Fax: +49-621 43214-30  
Email: emea@adlinktech.com

**ADLINK Technology, Inc. (French Liaison Office)**

Address: 6 allée de Londres, Immeuble Ceylan  
91940 Les Ulis, France  
Tel: +33 (0) 1 60 12 35 66  
Fax: +33 (0) 1 60 12 35 66  
Email: france@adlinktech.com

**ADLINK Technology Japan Corporation**

Address: 〒101-0045 東京都千代田区神田鍛冶町 3-7-4  
神田 374 ビル 4F  
KANDA374 Bldg. 4F, 3-7-4 Kanda Kajicho,  
Chiyoda-ku, Tokyo 101-0045, Japan  
Tel: +81-3-4455-3722  
Fax: +81-3-5209-6013  
Email: japan@adlinktech.com

**ADLINK Technology, Inc. (Korean Liaison Office)**

Address: 137-881 서울시 서초구 서초대로 326, 802 (서초동, 모인터빌딩)  
802, Mointer B/D, 326 Seocho-daero, Seocho-Gu,  
Seoul 137-881, Korea  
Tel: +82-2-2057-0565  
Fax: +82-2-2057-0563  
Email: korea@adlinktech.com

**ADLINK Technology Singapore Pte. Ltd.**

Address: 84 Genting Lane #07-02A, Cityneon Design Centre  
Singapore 349584  
Tel: +65-6844-2261  
Fax: +65-6844-2263  
Email: singapore@adlinktech.com

**ADLINK Technology Singapore Pte. Ltd. (Indian Liaison Office)**

Address: #50-56, First Floor, Spearhead Towers  
Margosa Main Road (between 16th/17th Cross)  
Malleswaram, Bangalore - 560 055, India  
Tel: +91-80-65605817, +91-80-42246107  
Fax: +91-80-23464606  
Email: india@adlinktech.com

**ADLINK Technology, Inc. (Israeli Liaison Office)**

Address: 27 Maskit St., Corex Building  
PO Box 12777  
Herzliya 4673300, Israel  
Tel: +972-54-632-5251  
Fax: +972-77-208-0230  
Email: israel@adlinktech.com

**ADLINK Technology, Inc. (UK Liaison Office)**

Tel: +44 774 010 59 65  
Email: UK@adlinktech.com