

Platinum Lion Network Motion Controller Installation Guide

For Harsh Environments

(-40°C to +70°C, Vibrations up to 14GRMS)



April 2024 (Ver. 1.007)

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Catalog Number

P-LION1N

Platinum Line

Hardware Option:

-IEC Application Licensed:

1 = Platinum Lion with extended I/O

N = No IEC license

I = IEC licensed

CBL-PLIONKIT01	Cable kit with Power, LAN and USB cables + ECAT and IO's µD-type connectors only
CBL-PLIONKIT02	Full Cable kit

Revision History

Version	Date	Details
Ver. 1.000	Mar 2017	Initial Release
Ver. 1.001	Aug 2017	Update to /O2 Connector details in Section 7.7, 7.71, and RTC (Real Time Clock) functionality in Section 3.5 General.
Ver. 1.002	Dec 2017	Change of format of Part Number
Ver. 1.003	Jan 2018	Correction to Part Number
Ver. 1.004	May 2018	Correction to section 3.7 Environmental Conditions
Ver. 1.005	Nov 2019	Replaced document safety and text symbols (icons)
Ver. 1.006	Apr 2021	Changed banner and logo
Ver. 1.007	Apr 2024	Minor text changes

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Chapter 1: Safety Information

In order to achieve the optimum, safe operation of the Platinum Lion Multi-Axis Controller, it is imperative that you implement the safety procedures included in this installation guide. This information is provided to protect you and to keep your work area safe when operating the Platinum Lion and accompanying equipment.

Please read this chapter carefully before you begin the installation process.

Before you start, ensure that all system components are connected to earth ground. Electrical safety is provided through a low-resistance earth connection.

The following safety symbols are used in this and all Elmo Motion Control manuals:



Warning:

This information is needed to avoid a safety hazard, which might cause bodily injury or death as a result of incorrect operation.



Caution:

This information is necessary to prevent bodily injury, damage to the product or to other equipment.



Important:

Identifies information that is critical for successful application and understanding of the product.

The following symbols are used in this document:



Note:

Information critical to the understanding and/or operating the feature.



Tip:

Information that helps understanding a feature, is good practice or a possible different way of action.

1.1 Cautions

- The Platinum Lion must be connected to an approved 24 VDC power supply through a line that is separated from hazardous line voltages using reinforced or double insulation in accordance with approved safety standards.
- Before switching on the Platinum Lion, verify that all safety precautions have been observed and that the installation procedures in this manual have been followed.

1.2 Directives and Standards

The Platinum Lion conforms to the following industry standards:

Standard	Item
In compliance with EN 60204-1	Low Voltage Directive 73/23/EEC
In compliance with CE 2006/95/EC	Low-Voltage Directive 2006/95/EC

The Platinum Lion has been developed, produced, tested and documented in accordance with the relevant standards. Elmo Motion Control is not responsible for any deviation from the configuration and installation described in this documentation. Furthermore, Elmo is not responsible for the performance of new measurements or ensuring that regulatory requirements are met.

1.3 Warranty Information

The products covered in this manual are warranted to be free of defects in material and workmanship and conform to the specifications stated either within this document or in the product catalog description. The Platinum Lion is warranted for a period of 12 months from the date of shipment. No other warranties, expressed or implied – and including a warranty of merchantability and fitness for a particular purpose – extend beyond this warranty.

Chapter 2: Product Description

This specification describes the Platinum Lion Network Motion Controller.

2.1 Description

The Platinum Lion is Elmo's latest rugged network motion controller, designed to operate at extreme environmental conditions such -40C to +70C and vibrations up to 14GRMS, functioning in a network based system in conjunction with Elmo's intelligent servo drives to provide a total multi-axis motion control system solution in extreme environmental conditions.

The Platinum Lion is designed to support both the existing Gold and SimplIQ drives, based on standard CAN network architecture, as well as the Gold Line, adding EtherCAT networking.

The Platinum Lion Motion Controller incorporates an integral high-level computational dual-core system (2 x 1.5 GHz) with memory, and onboard additional hardware peripherals.

The Platinum Lion shares the motion processing workload with Elmo's SimplIQ and Gold Line drives, forming a distributed motion control system. The best servo and system performance is achieved by combining the Gold Family drives, and the new real-time motion control capabilities of the Platinum Lion controller.

The Platinum Lion provides:

- Self-sufficient machine motion control – No reliance on connection with PC server
- Time deterministic control over motion, I/Os and processes in the system
- Complete compatibility with recognized networking and communications protocols
- Full, real-time, multi-axis motion synchronization
- Advanced user programming capabilities based on the leading standards
- Unified development platform that streamlines motion control solutions for novice and expert programmers alike

The Platinum Lion offers real-time motion control support for full multi-axis system synchronization, using the well-known industry interface PLCopen for Motion Control standard.

Various programming capabilities, such as the IEC-61131-3 standard languages, as well as native C and C++ programming support, dramatically accelerate user-level program execution. Standard solutions are selected for ease of use.

Low-level communication with drives and I/O devices over the device network uses the CAN industry standard (DS 301, DS 401 for I/O devices, and DS 402 for drives and motion device profiles). These are used over standard CAN networks, as well as with the new EtherCAT CoE (CAN over EtherCAT) protocols.

Host interfaces are implemented using industry standard communications protocols, such as Ethernet TCP/IP and higher level protocols such as Ethernet/IP and Modbus.

Standardization in protocols, definitions, and APIs allows users rapid system level integration and opens the system to third party devices on the device network.

Chapter 3: Technical Specifications

3.1 Processor System

Feature	Details
Processor	Computational core system based on Dual Core (2×1.5 GHz)
Flash	4 GByte
RAM	DDR-3, 4 GByte, 64 bit bus width, (Operational at Full Core Rate)

3.2 Communications

Specification	Details
LAN	1 Ethernet port 1000 base-T Automatically detected 10/100/1000Mbps Phoenix Socket 8pin connector UDP, Telnet, TCP
EtherCAT Field bus	2 Ethernet port 100 base-T for EtherCAT Baud Rate: 100 Mbit/sec CAT5e Cable CoE, EoE, FoE EtherCAT with Full redundancy support
CAN for device network	1 Port 1Mbps, with Isolation Maximum Baud Rate of 1 Mbits/sec. CAN Profile: DS 301 Device Profile (drive and motion control): CAN device profiles, e.g., DS301, DS505, DS402, DS401 (for I/O)
USB Host	High-Speed (HS 480Mbps) USB 2.0 or Super-Speed (SS 5Gbps) USB 3.0
RS232	RS232 communication using the I/O1 Connector port
Rear Maintenance Window (closed by default)	
USB Device	High-Speed (HS 480Mbps) USB 2.0
SD Card	MicroSD™ Memory Card (Push-push Type) SCHA

3.3 Power Supply

Feature	Details
Supply input voltage	Single power supply, 10.8V to 55V
External power @ 5V for Encoders, USB etc.	5V @ 2A
Power consumption without external load	9W (need to be checked)

3.4 Physical Specifications

Feature	Details
Weight	287 g (10.12 oz)
Dimensions	139.7 mm x 83.9 mm x 27.2 mm (5.5" x 3.30" x 1.07")
Mounting Method (with adapter)	Wall Mount ("Bookshelf")

3.5 General

Feature	Details
RTC	<p>The Real Time Clock maintains the real time date and hour using an automatically rechargeable internal voltage source without the necessity to replace the source.</p> <p>When the Platinum Lion is connected to a power source for at least 12 hours continuously, after the power is shutdown, the Platinum Lion will maintain the real time date and time for a minimum of 20 days at 25°C.</p>
Internal System BIT	The Platinum Lion supports internal hardware BIT (Built-in-tests) procedures to check the system integrity level on each power up
Status LEDs	EtherCAT and Ethernet activity

3.6 IO

Feature	Details
5 Channels	Bi-Directional RS485
3 Channels	Isolated PLC Digital Input (Sink or Source)
4 Channels	Isolated PLC Digital Outputs (Sink or Source)
4 Channels	Low Speed TTL Outputs
4 Channels	High Speed TTL Inputs
4 Channels	Analog Inputs 16bit

3.7 Environmental Conditions

Feature	Operation Conditions	Range
Ambient Temperature Range	Non-operating conditions	-50 °C to +100 °C (-58 °F to 212 °F)
	Operating conditions	-40 °C to +70 °C (-40 °F to 160 °F)
Temperature Shock	Non-operating conditions	-40 °C to +70 °C (-40 °F to 160 °F) within 3 min
Altitude	Non-operating conditions	Unlimited
	Operating conditions	-400 m to 12,000 m (-1312 to 39370 feet)
Maximum Humidity	Non-operating conditions	Up to 95% relative humidity non-condensing at 35 °C (95 °F)
	Operating conditions	Up to 95% relative humidity non-condensing at 25 °C (77 °F), up to 90% relative humidity non-condensing at 42 °C (108 °F)
Vibration	Operating conditions	20 Hz to 2,000 Hz, 14.6 GRMS
Mechanical Shock	Non-operating conditions	±40g; Half sine, 11 msec
	Operating conditions	±20g; Half sine, 11 msec
Protection level		IP32

Chapter 4: Platinum Lion Software Specifications

4.1 Operating System

Feature	Details
Linux Operating System	With Elmo's RT extension for real-time motion control support
Motion Programming and Debugging	Native C Programming, running on the target CPU. Compiling and debugging via the Eclipse IDE using GCC under Cygwin.
	IEC 61131-3 with PLCopen Motion Library extension, using Elmo IDE. The following languages are supported:
	<p>Structured text (ST), textual</p> <p>Function block diagram (FBD), graphical</p> <p>Ladder diagram (LD), graphical</p> <p>Sequential function chart (SFC), has elements to organize programs for sequential and parallel control processing.</p>

4.2 Axes

Feature	Details
Axes	Up to 96 axes, allowing mixed single axis, multiple axis and coordinated axes motions
Axis Types	<p>Intelligent Servo Drives (Elmo), supporting both the SimplIQ and Gold lines</p> <p>Operation of Maestro Profiler (real-time master synchronization) as well as non-Maestro profiler modes</p> <p>DS 402 CoE for EtherCAT and standard DS 402 drives for CANopen</p>
Control System Update Rate	<p>EtherCAT:</p> <p>Cycle Simultaneous Update Rates:</p> <p>≥ 250 µs for up to 16 axes</p> <p>500 µs for 32 axes</p> <p>1 mSec. for 64 axes</p> <p>Cycle Jitter: < 1 µs, based on Master DC (Distributed Clock) support, for the full network</p> <p>CAN:</p> <p>Cycle Update Rate ≥ 1 mSec. (CAN physical network limitations only)</p> <p>Cycle Jitter: < 100 µs for CAN Sync message initiation (actual jitter dependent on the CAN network's physical limitations)</p>

4.3 Motion Modes and Interfaces

Feature	Details
The Platinum Lion motion interfaces use PLCopen Standard	<p>64 bit, real-time, double precision profile calculations, allowing full on-the-fly control over speed, acceleration, deceleration and jerk</p> <p>Complex motion schemes, including look-ahead optimizing of trajectory speed calculations, for complex vector motions</p> <p>Cyclic buffer for 1,000 function blocks (a buffer for 1,000 motion segments). The cyclical buffer removes any practical limit on the number of function blocks</p>
Communication Protocols	<p>Host:</p> <p>Ethernet TCP-IP/UDP for operational modes</p> <p>Telnet communication for setup and configuration</p> <p>USB: Using binary protocol (maintenance)</p> <p>Application level: Ethernet-IP/Modbus</p> <p>Device Network:</p> <p>EtherCAT: CoE/EoE/FoE, supports distributed clock master</p> <p>CAN: CANopen device profiles, e.g., DS 301, DS 305, DS 402, DS 401 (I/O device profile)</p>
Host and Internal Software Interface	<p>TCP/IP interface from Host Computer. Software Library is provided for easy TCP/IP communication interface.</p> <p>This version will also support Ethernet-IP and Modbus over the TCP-IP.</p> <p>Internal Software libraries, for "C" user programs are provided, to write user code running on the Platinum Lion target processor (native mode).</p>
Data Recording	<p>8 MB data recording</p> <p>Up to 64 vectors can be recorded simultaneously.</p> <p>Supports more than 10 advanced triggering options and real-time scope capabilities</p> <p>Very fast data upload using Ethernet</p>
Upload/Download Support	<p>Firmware update support (Platinum Lion and drives)</p> <p>System resource files</p> <p>Axis parameter files</p>

4.4 Drive Communication Bridge Support

Feature	Details
Communication	The Platinum Lion supports full communication with any specific drive (EtherCAT and CAN) for the purpose of simple tuning or configuration at the drive level, i.e. there is no need for direct communication with the drive.
Spatial Position-Based Pulse Generation	The Platinum Lion supports spatial (along the path) position-based pulse generation. This is a unique feature, required for the generation of position-based events in 3D scanning systems. The Platinum Lion system, with Elmo's intelligent Gold servo drives, can support single axis and spatial enhanced position-based compare functions, resulting in trigger output signals accurate to 1 encoder count along the trajectory path.

4.5 General

Feature	Details
Network Encoders	Supports master based motion on network encoders
Position Error Mapping	Supports 1-D, 2-D, and 3-D position-based error mapping compensation

4.6 Communication Options

The Platinum Lion can communicate with a host PC either via a standard Ethernet port or through USB using a binary protocol for maintenance.

The Platinum Lion communicates with its network devices using either EtherCAT or CAN networks.

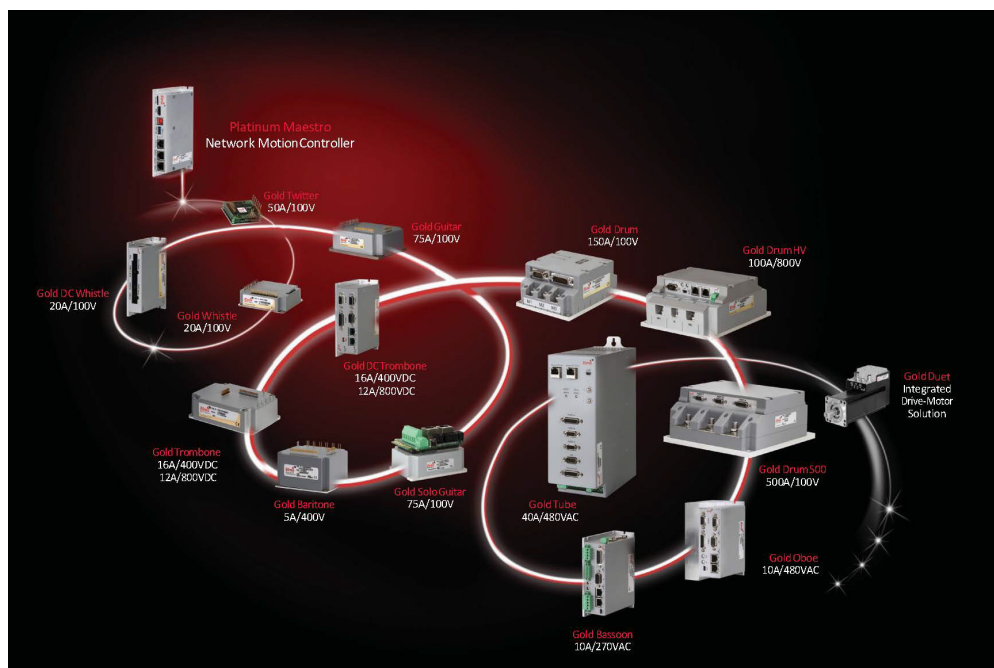


Table 1: The Platinum Lion Network Connections

Chapter 5: How to Use this Guide

This manual is part of a documentation set that can be used to set up and program the motion of any machine whose motors are controlled by Elmo's SimplIQ or Gold Line servo drives. When used in conjunction with the Platinum Lion Mounting Application Note and Maestro Software Manual which describe everything needed to get the Platinum Lion up and running. Please read the safety instructions in the first chapter of the Maestro Software Manual before starting.

After you have successfully mounted and installed the Platinum Lion we suggest that you read the Maestro Software Manual completely. If you have not already done so, follow the instructions in the Installation Guide that arrived with your servo drive, and install a drive. At least one drive needs to be connected to the Platinum Lion in order for it to function as a motion controller.

Chapter 6: Installation

6.1 Environmental Conditions

You can guarantee the safe operation of the Platinum Lion by ensuring that it is installed in an appropriate environment.



Caution:

The Platinum Lion dissipates its heat by convection. The maximum ambient operating temperature of 70 °C (160 °F) must not be exceeded.

The Platinum Lion servo drive has been developed, produced, tested and documented in accordance with the relevant standards. Elmo Motion Control is not responsible for any deviation from the configuration and installation described in this documentation. Furthermore, Elmo is not responsible for the performance of new measurements or ensuring that regulatory requirements are met.

6.2 Unpacking the Components

Before you begin working with the Platinum Lion system, verify that you have all of its components, as follows:

- The Platinum Lion multi-axis controller
- Platinum Lion software which may be downloaded from www.elmomc.com

The Platinum Lion is shipped in a cardboard box with Styrofoam protection.

To unpack the Platinum Lion:

1. Carefully remove the Platinum Lion from the box.
2. Check the Platinum Lion to ensure that there is no visible damage to the instrument. If any damage has occurred, report it immediately to the carrier that delivered your controller.
3. To ensure that the Platinum Lion you have unpacked is the appropriate type for your requirements, locate the part number sticker on the side of the Platinum Lion as shown below.



PLION005A

The part number at the top gives the type designation as follows:

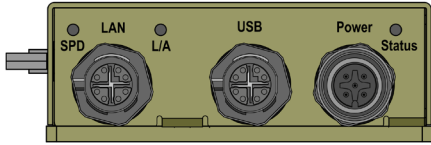
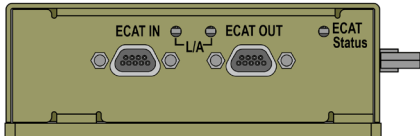
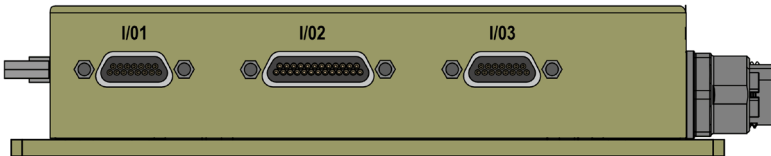
P-LION

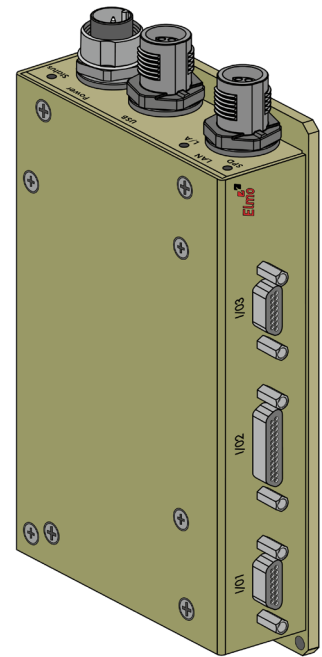
4. Verify that the Platinum Lion type is the one that you ordered.

6.3 Connectors

6.3.1 Connector Types

The Platinum Lion has the following connectors:

Pins	Type	Function
Top Connectors		
 <p>P-LION-006B</p>		
5	SACC-CI-MS-5CON-L90/M12 NUT	Power
8	SACC-CI-FSX-8CON-L90/M12 NUT	LAN
8	SACC-CI-FSX-8CON-L90/M12 NUT	USB
Bottom Connectors		
 <p>P-LION-008B</p>		
9	MICRO MDSM Conn D-Subminiature PIN 9 POS 1.27mm Contact SKT Crimp MDSST	ECAT1/CAN IN
9	MICRO MDSM Conn D-Subminiature PIN 9 POS 1.27mm Contact SKT Crimp MDSST	ECAT2/CAN OUT
Front Connectors		
 <p>P-LION-007B</p>		
15	MICRO MDSM Conn D-Subminiature PIN 15 POS 1.27mm Contact SKT Crimp MDSST	I/O1



P-LION-032B

Pins	Type	Function
25	MICRO MDSM Conn D-Subminiature PIN 25 POS 1.27mm Contact SKT Crimp MDSST	I/O2
15	MICRO MDSM Conn D-Subminiature PIN 15 POS 1.27mm Contact SKT Crimp MDSST	I/O3

Table 2: Connector Types

6.3.2 Status Indicator

Table 3 shows the position of the red/green dual LED, which is used for immediate indication of the Initiation and Working states.

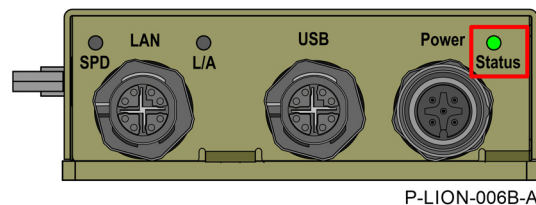


Table 3: Platinum Lion Status Indicator

The red/green dual LED is used for immediate indication of the following states:

- **Initiation state:** In this state the LED indicates whether the Platinum Lion is in the boot state (blinking red) or in the operational state (steady green).
- **Error state:** In this state the LED indicates whether the motion controller is in error state (blinking green).

6.3.3 Cable Kit

There are two optional cable kits for the Platinum Lion, and their catalog numbers are:

CBL-PLIONKIT01	Cable kit with Power, LAN and USB cables + ECAT and IO's μ D-type connectors only
CBL-PLIONKIT02	Full Cable kit

For details of the two optional cable kits refer to the MAN-P-LION-CBLKIT.pdf.

Chapter 7: Connector Pinouts

7.1 Power Connector

Pin	Signal	Function
1	VL+	VL related to Return Consumption (from pin 1 & 2 together): 6.7W to 21.7W including user 5V load (up to 2A)
2	VL+	
3	VL-	Return (GND)
4	VL-	
5	PE	PE (Earth)

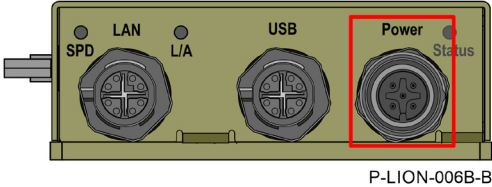
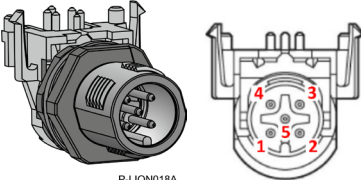
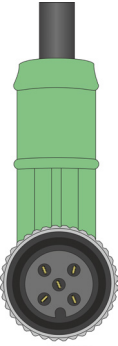
Pin Positions
 <p>P-LION-006B-B</p>  <p>P-LION018A</p> <p>5-pin M12 Male Connector</p>  <p>P-LION017A</p> <p>5-pin M12 Female Connector</p>

Table 4: Platinum Lion Power Connector

To connect the power supply:

- Use 28 AWG twisted pair shielded cable. The shield should have copper braid.
- Before applying power, first verify the polarity of the connection (protected).

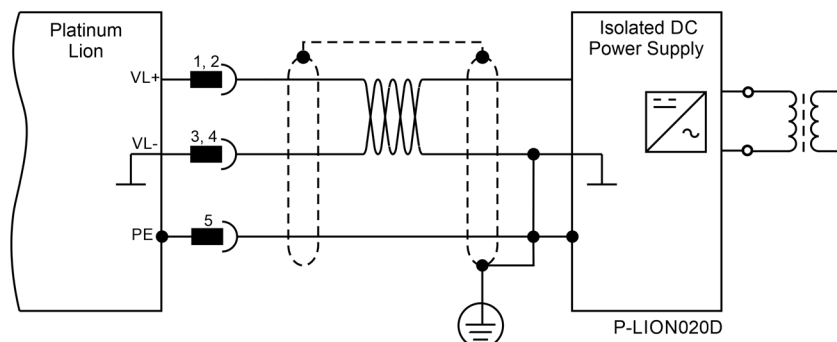


Table 5: Power Supply Connection Diagram

7.2 LAN

The Platinum Lion supports Ethernet 1000Base-T to communicate with the host computer using a standard CAT5e or CAT6 cable (example shown in Table 6) and 8-pin M12 Male connector at one end. The Platinum Lion uses auto negotiation protocol to determine the appropriate communication speed (1Gbit, 100Mbps or 1Mbps) between the Platinum Lion and the Host. For further details refer to the section 7.2.2.

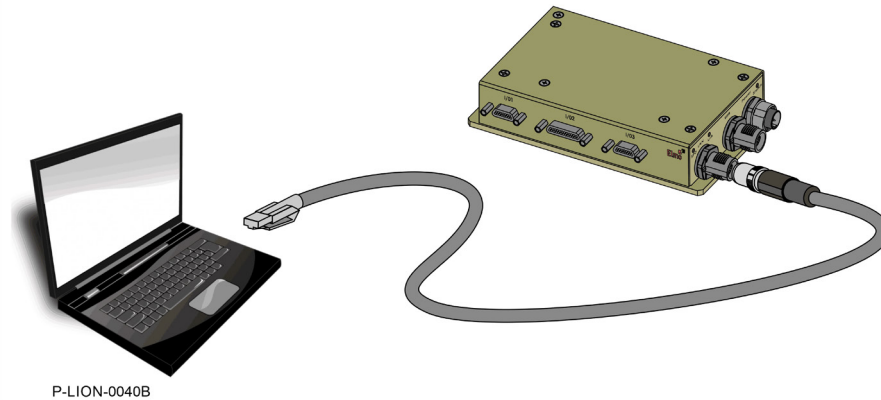
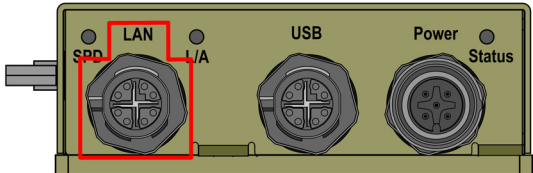


Table 6: Example of the Platinum Lion Connected to a PC

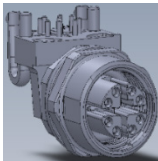
7.2.1 Connectors

Pin	Signal	Function
1	TRD0+	LAN_TRD 0
2	TRD0-	
3	TRD1+	LAN_TRD 1
4	TRD1-	
5	TRD3+	LAN_TRD 3
6	TRD3-	
7	TRD2-	LAN_TRD 2
8	TRD2+	

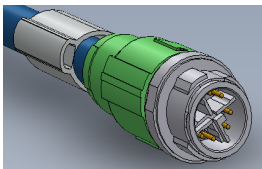
Pin Positions



P-LION-006B-C



8-pin M12 Female Connector



8-pin M12 Male Connector

Table 7: Platinum Lion LAN Connector

7.2.2 Ethernet Status Indicators

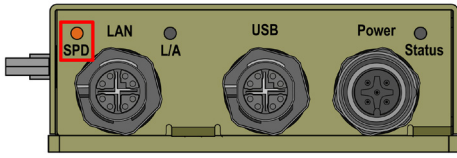
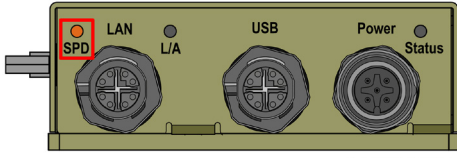
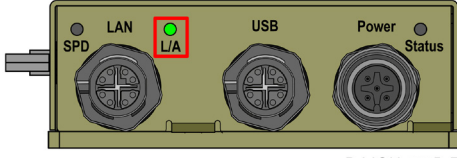
LAN Speed Status LED @ 1 Gbps	 <p>P-LION-006B-E</p>
LAN Speed Status LED @ 100 Mbps	 <p>P-LION-006B-E</p>
LAN Link/Activity Status LED	 <p>P-LION-006B-F</p>

Table 8: Ethernet Status Indicators

The green LED is the link/activity indicator (Table 8). It shows the state of the applicable physical link and the activity on that link.

The green or amber LED is the speed indicator (Table 8). It shows the speed of the connection on the Ethernet line. The possible states of these LEDs are summarized in Table 9.

LED	State	Meaning
Link /Activity	Off	No link is established
	On	A link is established
	Blinking	There is data transmission activity
Speed	Auto GREEN or AMBER On	The host connected to the Platinum Lion is set to <i>Auto</i> . Both Host and Platinum Lion mutually provide optimal Speed which may be 1 Gbps or 100 Mbps.
	GREEN On	The host connection speed is set to 1 Gbps The speed of the EtherCAT line must be 1 Gbps. Otherwise, there is no Ethernet data transmission
	AMBER On	The host connection speed is set to 100 Mbps The speed of the EtherCAT line must be 100 Mbps. Otherwise, there is no Ethernet data transmission
	Off	The connection speed is 10 Mbps

Table 9: LED States

7.3 USB

The Platinum Lion supports USB 2.0 (Host mode) in communication speed of Low-Speed (1.5Mbps), Full-Speed (12Mbps), and High-Speed (480Mbps). Within the near future, the Platinum Lion will support USB 3.0 with communication speed of super high speed (5 Gbit/s).

Pin	Signal	Type	Function
1	USB Return		Supply
2	USB VBUS	USB VBUS 5V (900mA max, up to a total of 2A including I/O2 Connector)	
7	USB_D+	USB_P line	USB_D
8	USB_D-	USB_N line	

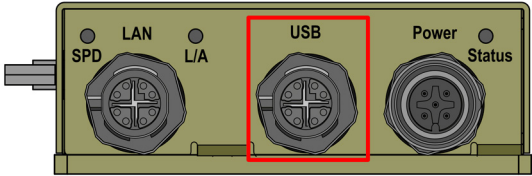
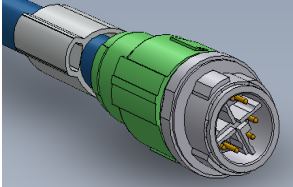
Pin Positions	
 <p>P-LION-006B-G</p> <p>8-pin M12 Female Connector</p>	
 <p>8-pin M12 Male Connector</p>	

Table 10: Platinum Lion USB Connector

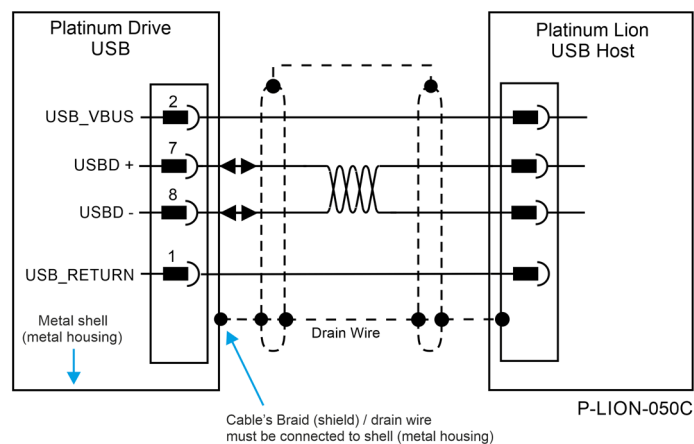


Table 11: USB Network Diagram

USB communication cable:

- Make sure to connect the cable shield to the ground of the host (PC). Usually, this connection is soldered internally inside the connector at the PC end. You can use the drain wire to facilitate connection.
- Note that the maximum length for USB 2.0 is 5 meter.

7.4 EtherCAT

The Platinum Lion is the master in the EtherCAT network.

7.4.1 EtherCAT OUT

The EtherCAT OUT port is the main EtherCAT communication port. Cable connection from this port should be connected to the EtherCAT In port of the first device in the network.

Pin	Signal	Function
1	ECAT_OUT_TX+	EtherCAT2 transmit+
6	ECAT_OUT_TX-	EtherCAT2 transmit-
9	ECAT_OUT_RX+	EtherCAT2 receive+
5	ECAT_OUT_RX-	EtherCAT2 receive-

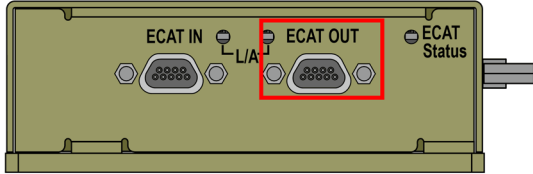
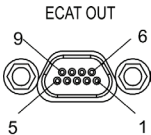
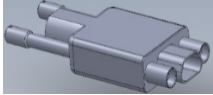
Pin Positions	
 <p>P-LION-008B-A</p>  <p>P-LION005A</p> <p>9-Pin Female MicroD-Type</p>	 <p>9-Pin Male D-Type</p>

Table 12: EtherCAT Pin Assignments

7.4.2 EtherCAT IN

The EtherCAT IN port is used for redundancy.

Pin	Signal	Function
1	ECAT_IN_TX+	EtherCAT1 transmit+
6	ECAT_IN_TX-	EtherCAT1 transmit-
9	ECAT_IN_RX+	EtherCAT1 receive+
5	ECAT_IN_RX-	EtherCAT1 receive-

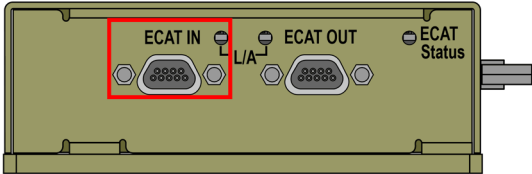
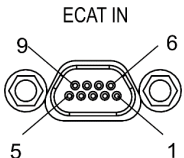
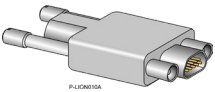
Pin Positions	
 <p>P-LION-008B-B</p>  <p>P-LION003A</p> <p>9-Pin Female MicroD-Type</p>	 <p>9-Pin Male D-Type</p>

Table 13: EtherCAT Pin Assignments

7.4.3 EtherCAT Indicators

EtherCAT Status Indicator

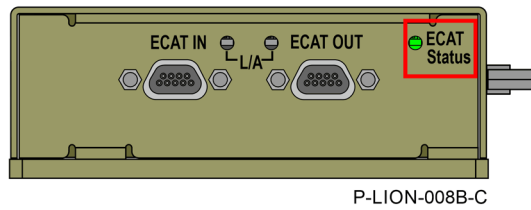


Table 14: EtherCAT Status LED

EtherCAT Activity Indicators

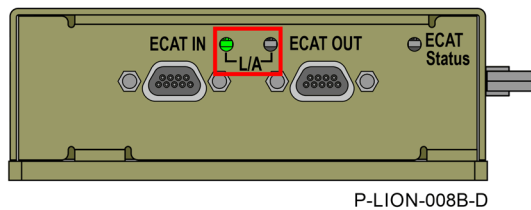


Table 15: EtherCAT Status LEDs

The green LED is the link/activity indicator (Table 15). It shows the state of the applicable physical link and the activity on that link.

The possible states of these LEDs are summarized in Table 16.

LED	State	Meaning
Link /Activity	Off	No link is established
	On	A link is established
	Blinking	There is data transmission activity

Table 16: LED States

7.4.4 EtherCAT Network

The Platinum Lion is the master of the EtherCAT network and must always be the first device in the line.

The EtherCAT OUT port of the Platinum Lion should be connected to the EtherCAT In port of the next device down the line.



Note:

When connecting the EtherCAT communication cable it is recommended to use CAT5e cable.

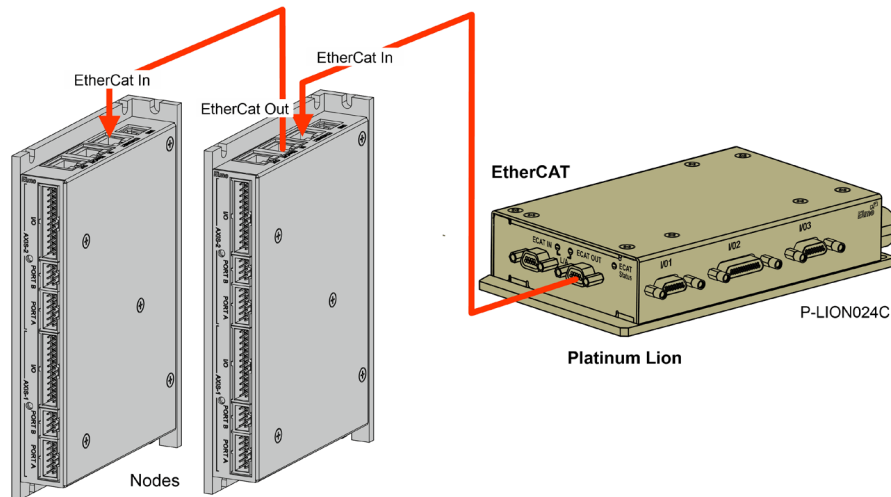


Table 17: EtherCAT Network with no Redundancy

7.5 CAN

The Platinum Lion supports one channel of CAN, but supports two connectors i.e. CAN in the EtherCAT IN and CAN in the EtherCAT OUT. One connector can be used to connect the network while the other may be used for termination.

7.5.1 CAN at the EtherCAT IN Connector

Pin	Signal	Function
2	CANL	CAN_L bus line (dominant low)
7	CANH	CAN_H bus line (dominant high)
3	CAN Return	CAN Communication Return

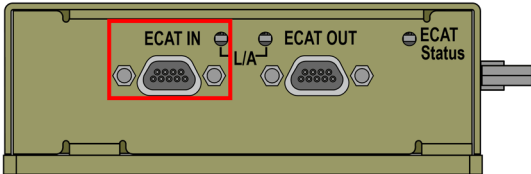
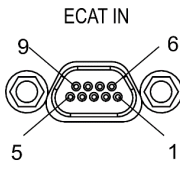
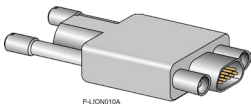
Pin Positions		
 <p>P-LION-008B-B</p>		 <p>P-LION003A</p> <p>9-Pin Female MicroD-Type</p>
		 <p>P-LION010A</p> <p>9-Pin Male MicroD-Type</p>

Table 18: CAN Pin Assignments

7.5.2 CAN at the EtherCAT OUT Connector

Pin	Signal	Function
2	CANL	CAN_L bus line (dominant low)
7	CANH	CAN_H bus line (dominant high)
3	CAN Return	CAN Communication Return

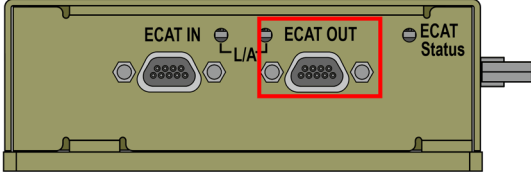
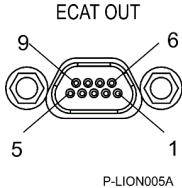
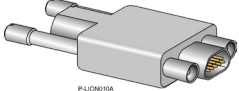
Pin Positions	
 <p>P-LION-008B-A</p>	 <p>P-LION005A</p> <p>9-Pin Female MicroD-Type</p>
	 <p>P-LION010A</p> <p>9-Pin Male MicroD-Type</p>

Table 19: CAN Pin Assignments

To connect the CAN communication cable:

- Use 26 or 28 AWG twisted pair shielded cables. For best results, the shield should have aluminum foil and be covered by copper braid with a drain.
- Connect the shield to the ground of the host (PC). Usually, this connection is soldered internally inside the connector at the PC end. You can use the drain wire to facilitate connection.
- Ensure that the shield of the cable is connected to the shield of the D-Type and RJ plugs. The drain wire can be used to facilitate the connection.
- Connect a 120 Ω termination resistor to each end of the network cable. (The Platinum Lion does not have an internal terminal.)
- Use the CAN termination dongle supplied as a second “device end”. Simply insert the termination resistor into the CAN connector of the second end device on the bus. This is only possible if there are two CAN connectors.

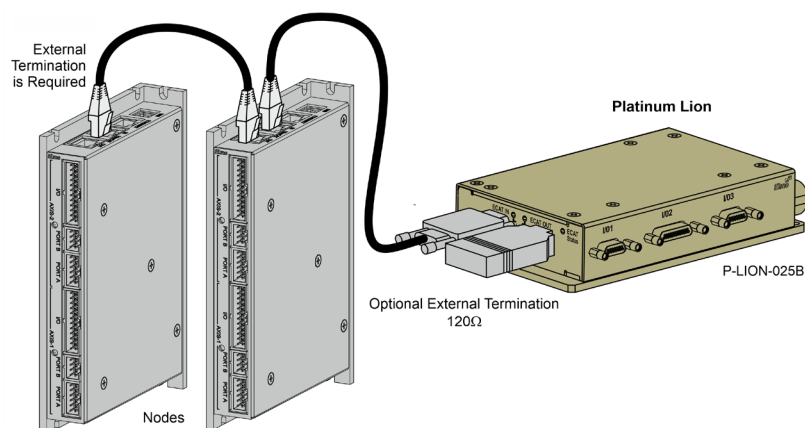


Table 20: Connecting a 120 Ω Termination Resistor to Each End of the Network Cable

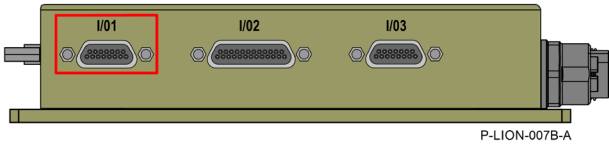
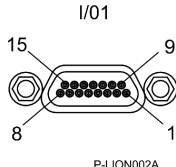
7.6 I/O1 Connector

This 15 Pin MicroD-Type connector consist of:

- 1x Bi-Directional RS485
- 3x Isolated PLC Digital Input
- 1x RS232 communication

According to the following pinouts

Pin	Signal	Function
1	IO9+	Bi-Directional RS485
2	IO9-	
3	IN1+	Isolated PLC Digital Input (1)
4	IN1-	
5	IN2+	Isolated PLC Digital Input (2)
6	IN2-	
7	IN3+	Isolated PLC Digital Input (3)
8	IN3-	
9	Return	
10	Reserved	
11	Reserved	Reserved
12	Reserved	
13	RS232_RX	
14	RS232_TX	RS232 communication
15	RS232 Return	

Pin Positions	
 <p>P-LION-007B-A</p>	 <p>P-LION002A</p>

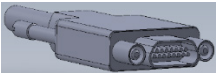
 <p>15-Pin Male MicroD-Type</p>

Table 21: I/O1 Pin Assignments

7.6.1 Bi-Directional Differential IO

Specification	Details
Physical layer	Bi-Directional RS-485
Termination	120 Ohm (refer to the figure below) It is required to connect termination of 120 ohm in the user side
Sample Rate	Max 50MHz

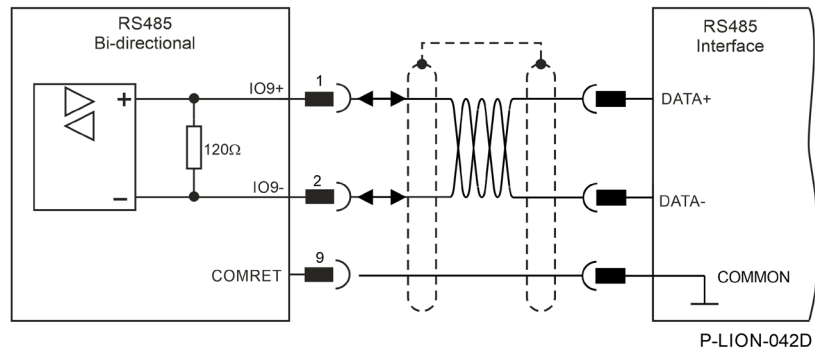


Table 22: Bi-Directional RS-485 Connection Diagram for Differential IO9

7.6.2 PLC Digital Input

Feature	Details
Standard	Isolated PLC source
Input current	$I_{in} = (INx - 7.4) / 2.5 \text{ Kohm}$ $I_{in} = 2 \text{ mA} @ INx = 12 \text{ V}$ $I_{in} = 9 \text{ mA} @ INx = 30 \text{ V}$
High-level input voltage (ON State)	$11 \text{ V} < INx+ - INx- < 30 \text{ V}$
Low-level input voltage (OFF State)	$-3 \text{ V} < INx+ - INx- < 5 \text{ V}$

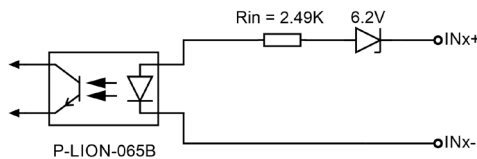


Table 23: Digital Input Schematic

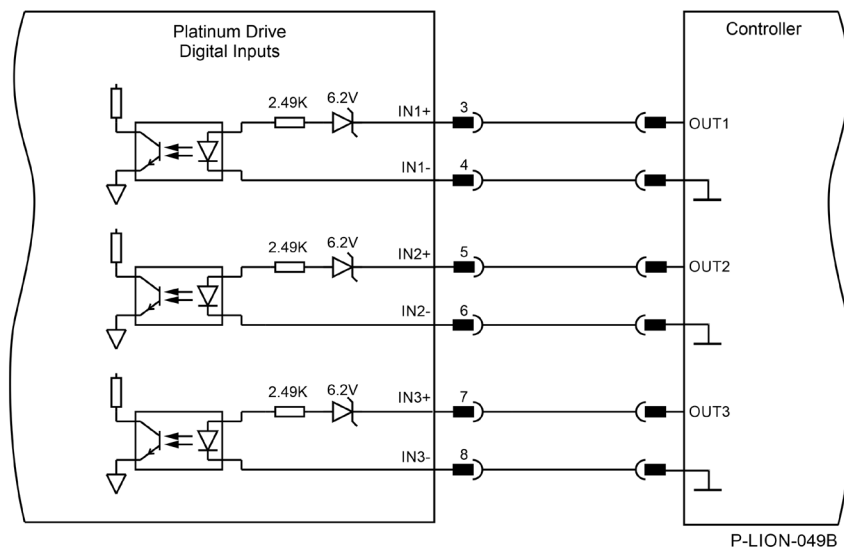


Table 24: PLC Digital Input Connection Diagram

7.6.3 RS232 Communication

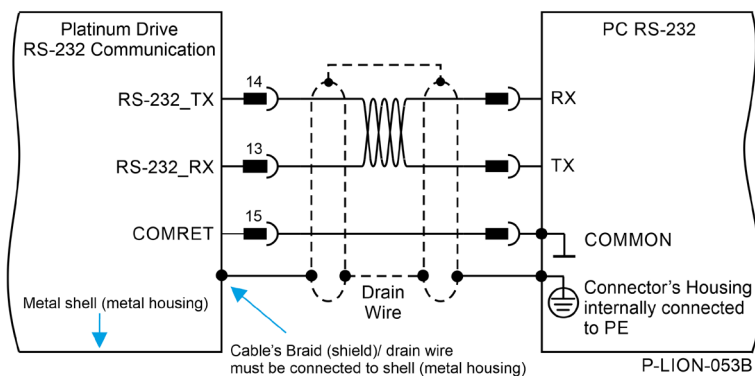


Table 25: RS232 Connection Diagram

7.7 I/O2 Connector

This 25 Pin MicroD-Type connector consist of:

- 4x Bi-Directional RS485
- 4x TTL Output, 4x TTL Input
- 4x 5V Supply (400mA per pin max, up to a total of 2A including USB)
- 5x 5V Return

According to the following pinouts:

Pin	Signal	Function
1	Return (1)	
14	IO1+	Bi-Directional RS485
2	IO1-	
15	IO5_IN	High Speed TTL Input
3	EXT_OUT5	Low Speed TTL Output
16	5V Supply	5V supply, 400mA (per pin max)
4	Return	
17	IO2+	Bi-Directional RS485
5	IO2-	
18	IO6_IN	High Speed TTL Input
6	EXT_OUT6	Low Speed TTL Output
19	5V Supply	5V supply, 400mA (per pin max)
7	Return	
20	IO10+	Bi-Directional RS485
8	IO10-	
21	IO7_IN	High Speed TTL Input
9	EXT_OUT7	Low Speed TTL Output
22	5V Supply	5V supply, 400mA (per pin max)
10	Return	
23	IO4+	Bi-Directional RS485
11	IO4-	
24	IO8_IN	High Speed TTL Input
12	EXT_OUT8	Low Speed TTL Output
25	5V Supply	5V supply, 400mA (per pin max)
13	Return	

Pin Positions

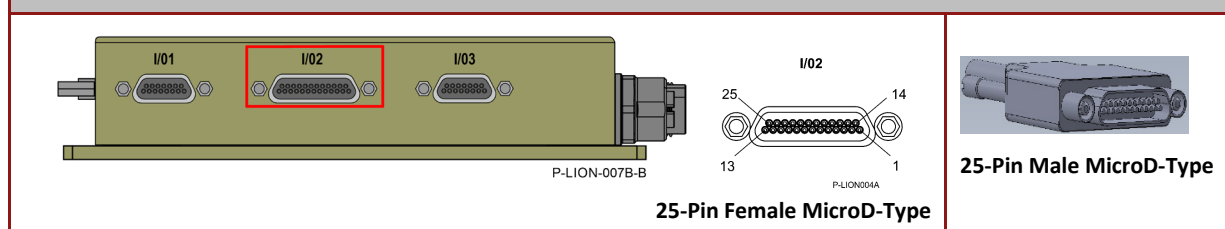


Table 26: IMU Pin Assignments

7.7.1 Bi-Directional Differential IO

Specification	Details
Physical layer	Bi-Directional RS-485
Termination	120 Ohm (refer to the figure below) It is required to connect termination of 120 ohm in the user side
Sample Rate	Max 50MHz

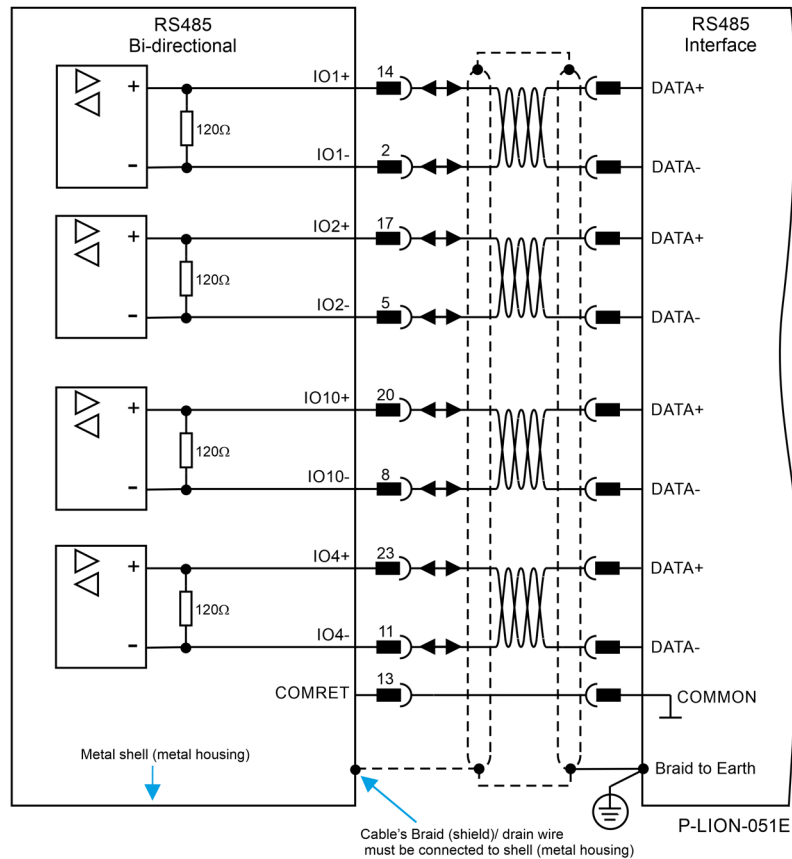


Table 27: Bi-Directional RS485 Connection Diagram for Differential IOs

7.7.2 High Speed TTL Inputs

Feature	Details
Type of input	TTL
Input current	Up to 100µA
High-level input voltage	2 V < V _{in} < 5.5 V
Low-level input voltage	0 V < V _{in} < 0.8 V
Sample Rate	up to 50MHz

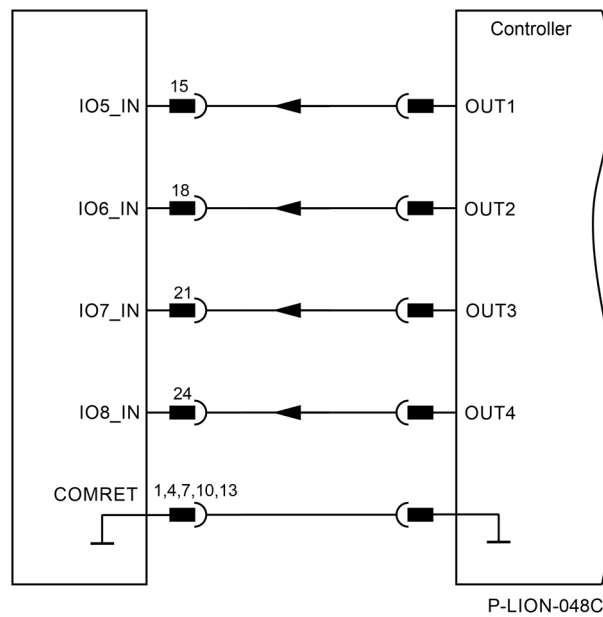


Table 28: TTL level Inputs Connection Diagram

7.7.3 Low Speed TTL Outputs

Feature	Details
Type of output	Single-ended
High-level output voltage	$3.8\text{ V} < V_{in} < 5\text{ V}$
Low-level output voltage	$0\text{ V} < V_{in} < 0.44\text{ V}$
Maximum output current $I_{out} (\text{max}) (V_{out} = \text{Low})$	5 mA
Update Time	up to $250\mu\text{s}$

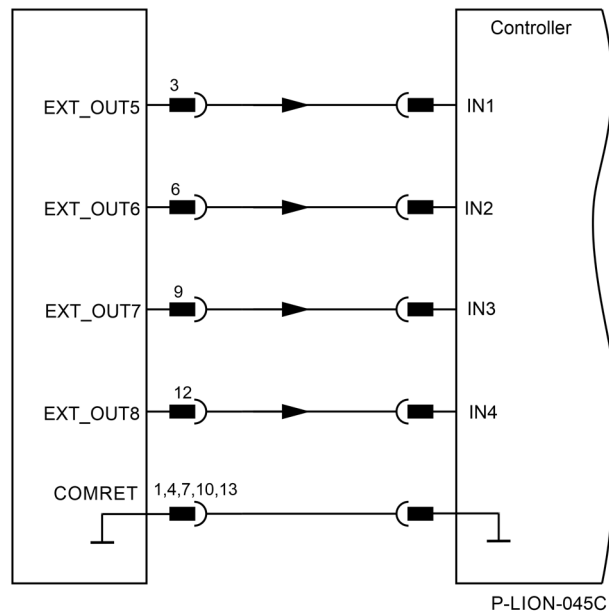


Table 29: TTL Outputs Connection Diagram

7.8 I/O3 Connector

This 15 Pin MicroD-Type connector consist of:

- 4x Analog Inputs 16bit
- 4x Isolated PLC Outputs (Sink or Source)

According to the following pinouts

Pin	Signal	Function
1	Ain2-	Analog In (2)
2	Ain2+	
3	Ain1+	Analog In (1)
4	Ain1-	
5	Return	Return (Ground)
6	OUT1	Isolated PLC Output (Sink or Source)
7	OUT3	Isolated PLC Output (Sink or Source)
8	VDD RET	Digital Outputs supply return
9	Ain4-	Analog In (4)
10	Ain4+	
11	Ain3+	Analog In (3)
12	Ain3-	
13	VDD	Digital Outputs supply
14	OUT2	Isolated PLC Output (Sink or Source)
15	OUT4	Isolated PLC Output (Sink or Source)

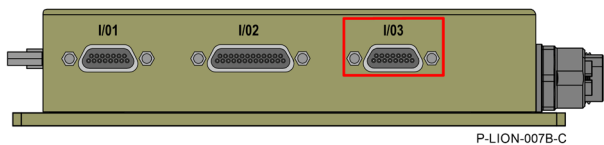
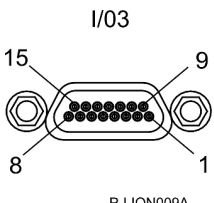
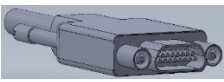
Pin Positions	
 <p>P-LION-007B-C</p>	 <p>I/O3</p> <p>P-LION009A</p> <p>15-Pin Female MicroD-Type</p>
	 <p>15-Pin Male MicroD-Type</p>

Table 30: IMU Pin Assignments

7.8.1 Differential Analog

Feature	Details
Maximum operating differential voltage	± 10 V
Maximum absolute differential input voltage	± 11 V
Differential input resistance	100 k Ω
Analog input command resolution	16-bit

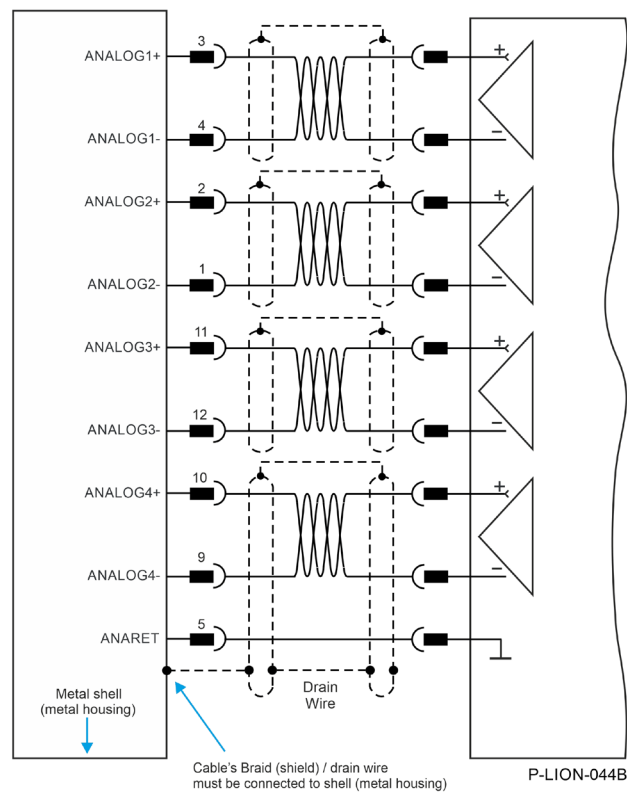
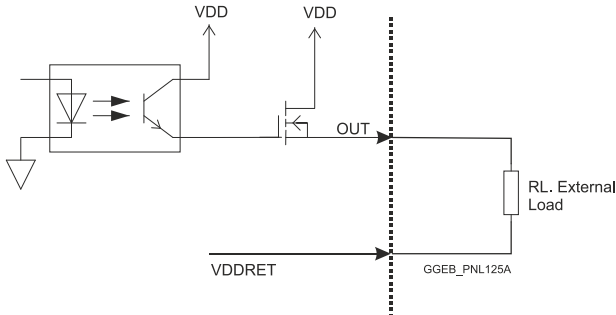


Table 31: Differential Analog Input Connection Diagram

7.8.2 PLC Digital Isolated Output

There are 4 PLC Digital Isolated output. Each output can be software configured to SINK or SOURCE

Source

Feature	Details
Type of output	Optically isolated PLC source
Supply output (VDD)	12 V to 30 V
Max. output current $I_{out} (max) (V_{out} = High)$	$I_{out} (max) \leq 500 \text{ mA}$ for Output 1 $I_{out} (max) \leq 250 \text{ mA}$ for Outputs 2 up to 4
Total Output Current	Two digital outputs may be connected together in order to achieve higher output current, e.g. for Brakes. The total current of the four digital outputs must not exceed 1250 mA, and the maximum current per output must not exceed 500mA. For example, it is possible to connect OUTS#1+OUT#2 together to pull up to a maximum of 1000 mA, while OUT#3 and OUT#4 can still be used as General Purpose outputs, limited in this case to 125 mA each.
R_L	The external R_L must be selected to limit output current to no more than 500 mA (Output 1) or 250 mA (Outputs 2 to 4). $R_L = \frac{VDD - VOL}{I_{out}(max)}$
Executable time	$0 < T < 250 \mu\text{sec}$
 <p>Table 32: Digital Output Schematic – Source Mode PLC Level</p>	

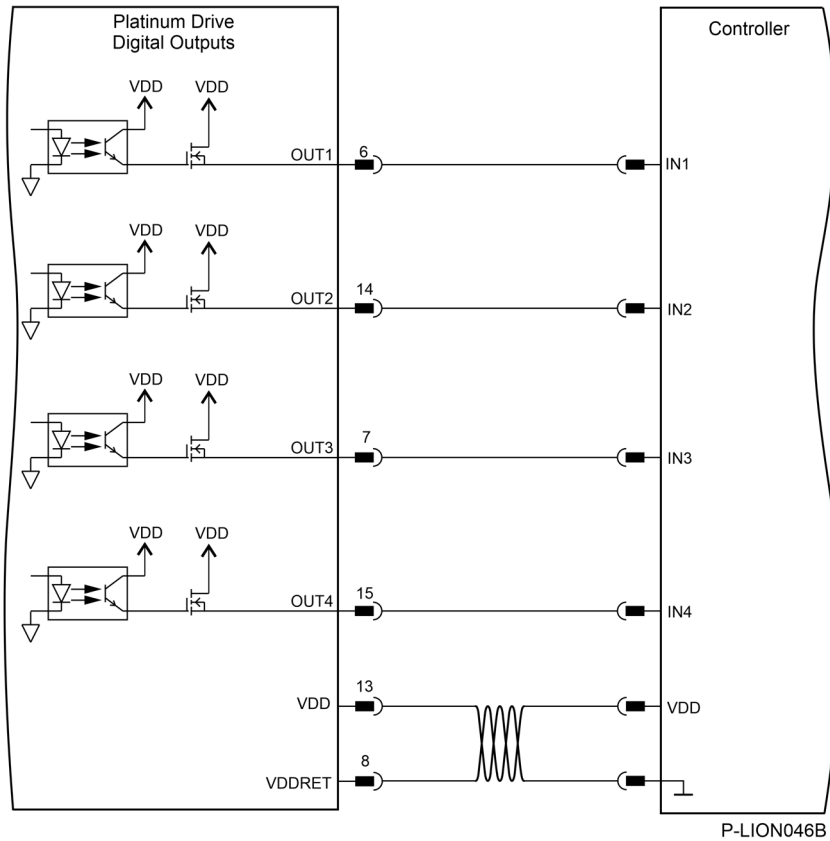


Table 33: Digital Output Connection Diagram – Source PLC Option

Sink

Feature	Details
Type of output	Isolated PLC Sink
Supply output (VDD)	12 V to 30 V
Max. output current $I_{out} (max) (V_{out} = Low)$	$I_{out} (max) \leq 300 \text{ mA}$ for Output 1 $I_{out} (max) \leq 150 \text{ mA}$ for Outputs 2 to 4
Total Output Current	Two digital outputs may be connected together in order to achieve higher output current, e.g. for Brakes. The total current of the four digital outputs must not exceed 750 mA, and the maximum current per output must not exceed 300mA. For example, it is possible to connect OUTS#1+OUT#2 together to pull up to a maximum of 600mA, while OUT#3 and OUT#4 can still be used as General Purpose outputs, limited in this case to 75 mA each.
R_L	The external R_L must be selected to limit output current to no more than 300 mA (Output 1) or 150 mA (Outputs 2 to 4). $R_L = \frac{VDD - VOL}{I_{out}(max)}$
Executable time	$0 < T < 250 \mu\text{sec}$

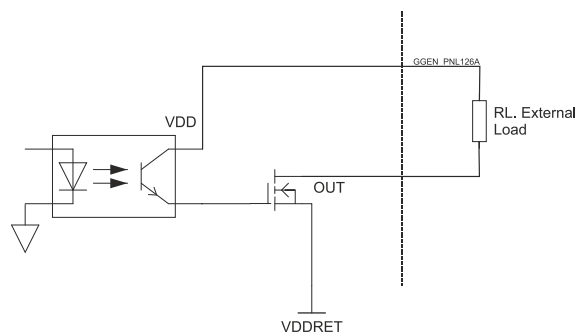


Table 34: Digital Output Schematic for Sink – PLC level

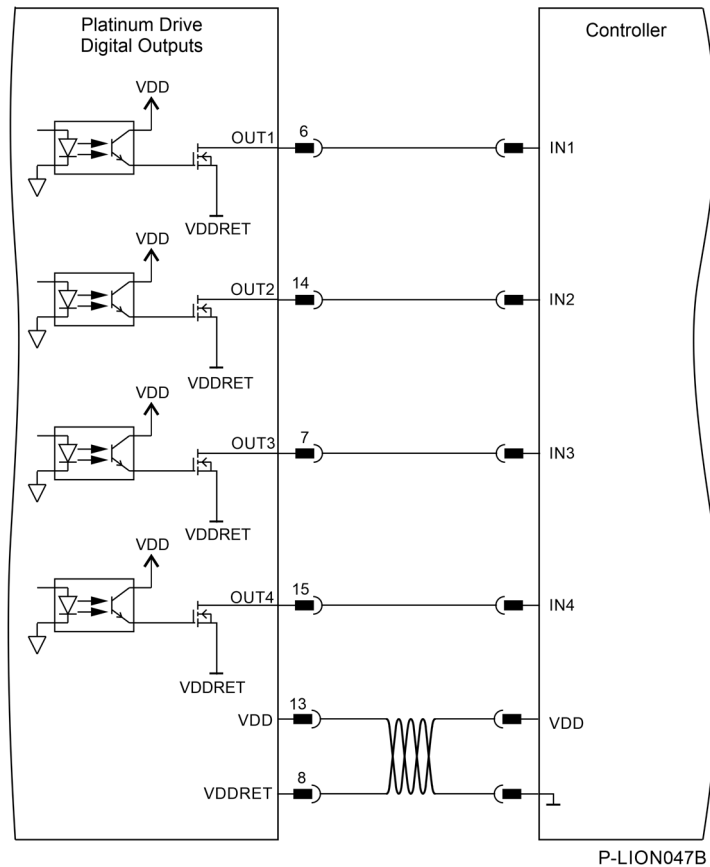


Table 35: Digital Output Connection Diagram – Sink PLC Option

Chapter 8: Mounting the Platinum Lion

The Platinum Lion should be surface mounted.

8.1.1 Surface Mount

Use four M3 x (length as required) round head screws, one through each opening in the heat sink surface to install the Platinum Lion to a chassis.

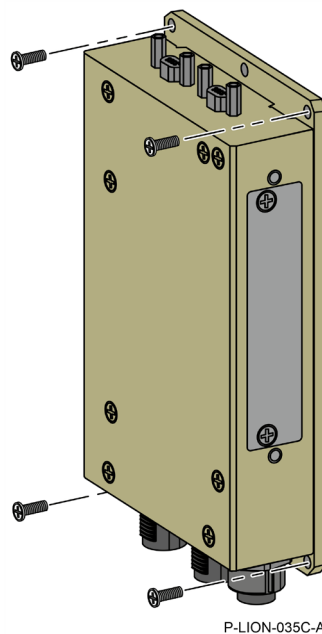
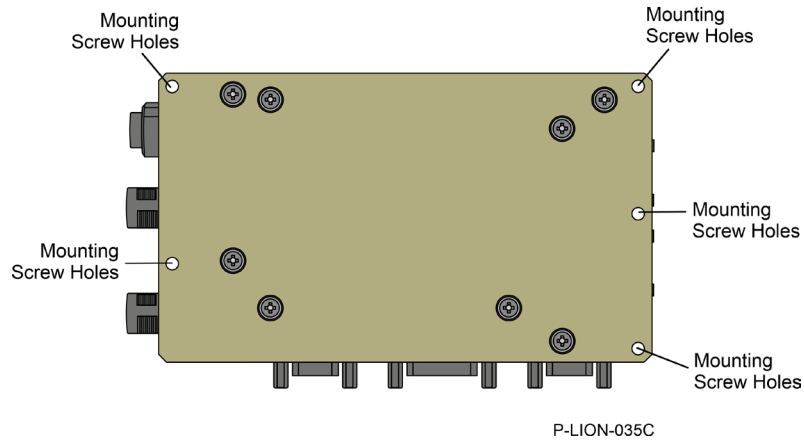


Table 36: Surface Mounting the Platinum Lion

8.2 Powering Up

After the Platinum Lion has been mounted, check that the cables are intact. The Platinum Lion is then ready to be powered up.

8.3 Initializing the System

After the Platinum Lion has been connected and mounted, the system must be set up and initialized. The minimum system requirements for a setup are:

- Platinum Lion (and power supply)
- PC with the required Elmo EASII software
- At least one servo drive and motor
- EtherCAT cables or a terminated CAN network
- A servo drive connected through an EtherCAT cable or a CAN cable (the terminated CAN network)

Users of SimplIQ servo drives:

Setting up the drives and motors is described in the Installation Guide for each servo drive and in the Elmo Application Studio User Guide. Advanced features are described in the SimplIQ Software Manual, Interlude API User Guide, and SimplIQ Command Reference with the SimplIQ CAN Implementation Guide.

Users of Gold Line servo drives:

Setting up the drives and motors is described in the Gold Line Servo Drive Installation Guide and Elmo Application Studio Users Guide. Advanced features are described in the Gold Line Software Manual, Gold Line Command Reference and Gold CAN Implementation Guide.

Chapter 9: Platinum Lion Dimensions

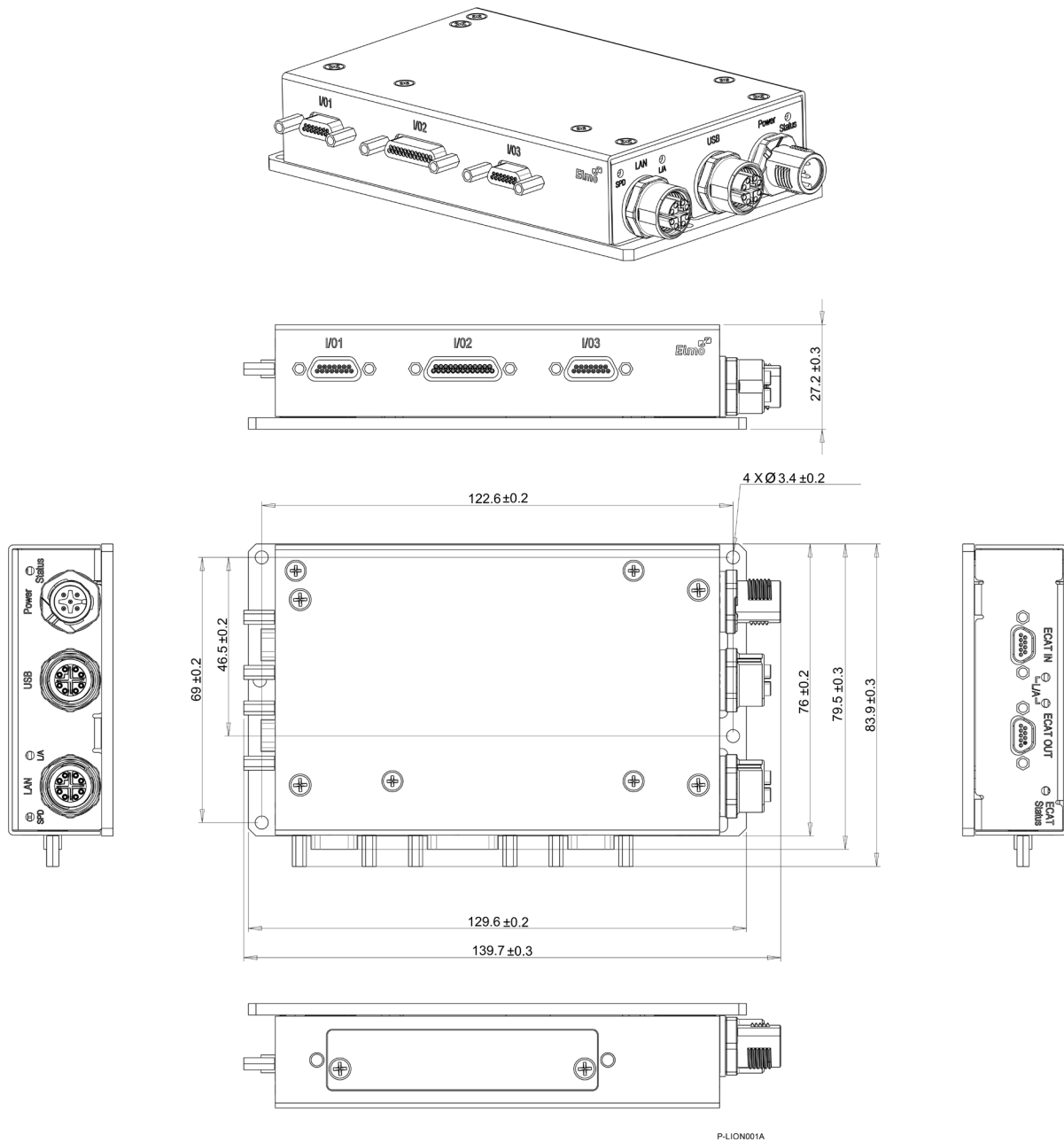


Table 37: Platinum Lion Dimensions


Chapter 10: Compliance with Standards

The Platinum Lion network motion controller has been developed, produced, tested and documented in accordance with the relevant standards. Elmo Motion Control is not responsible for any deviation from the configuration and installation described in this documentation. Furthermore, Elmo is not responsible for the performance of new measurements or ensuring that regulatory requirements are met.

10.1 Low Voltage Directive

Specification	Details
<p>The related standards below apply to the performance of the servo drives as stated in the environmental conditions paragraph 6.1 Environmental Conditions.</p> <p>The Platinum Lion is not recognized by UL standards, as its maximum voltage is greater than 32 VDC.</p>	
In compliance with EN 60204-1	Low Voltage Directive 73/23/EEC
In compliance with CE 2006/95/EC	Low-Voltage Directive 2006/95/EC

10.2 Other Compliant Standards

Quality Assurance	
ISO 9001:2008	Quality Management
Design	
<ul style="list-style-type: none"> • IPC-D-275 • IPC-SM-782 • IPC-CM-770 	Printed wiring for electronic equipment (clearance, creepage, spacing, conductors sizing, etc.)
Reliability	
MIL-HDBK- 217F	Reliability prediction of electronic equipment (rating, de-rating, stress, etc.)
Workmanship	
In compliance with IPC-A-610 , level 3	Acceptability of electronic assemblies
PCB	
In compliance with IPC-A-600 , level 3	Acceptability of printed circuit boards
Packing	
In compliance with EN 100015	Protection of electrostatic sensitive devices
Environmental	
In compliance with 2002/96/EC	Waste Electrical and Electronic Equipment regulations (WEEE)
	 Note: Out-of-service Elmo drives should be sent to the nearest Elmo sales office.
In compliance with 2002/95/EC (effective July 2006)	Restrictions on Application of Hazardous Substances in Electric and Electronic Equipment (RoHS)

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