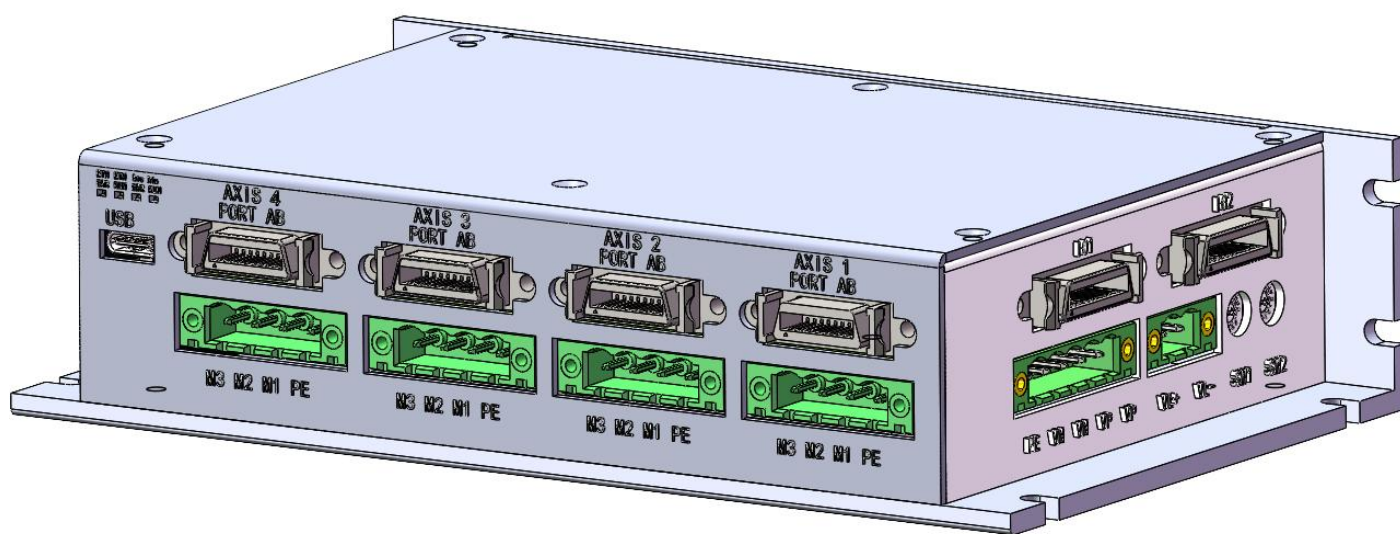


Platinum DB Quad Digital Servo Drive Installation Guide



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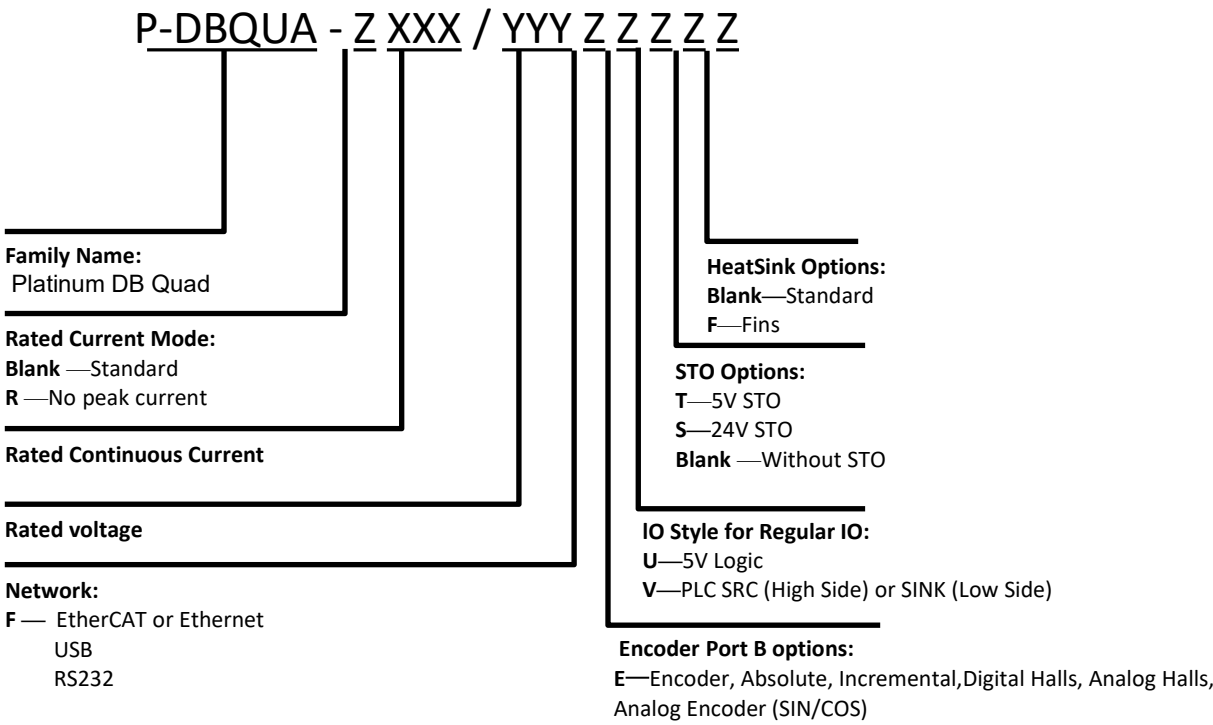


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Catalog Number



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chapter1: This Installation Guide

This installation Guide details the technical data, pinouts, and power connectivity of the Platinum DB Quad . **For a comprehensive specification and detailed description of the functions, refer to the Platinum Safety Drive Manual.**

chapter2: Functional Safety

In order to achieve the optimum, safe operation of the Platinum DB Quad , 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 DB Quad 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.

Only qualified personnel may install, adjust, maintain, and repair the servo drive. A qualified person has the knowledge and authorization to perform tasks such as transporting, assembling, installing, commissioning and operating motors.

The Platinum DB Quad contains electrostatic-sensitive components that can be damaged if handled incorrectly. To prevent any electrostatic damage, avoid contact with highly insulating materials, such as plastic film and synthetic fabrics. Place the product on a conductive surface and ground yourself in order to discharge any possible static electricity build-up.

To avoid any potential hazards that may cause severe personal injury or damage to the product during operation, keep all covers and cabinet doors shut.

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.



Hot Surface Warning:

To alert against surfaces that may reach high temperatures. The heatsink and wires may reach high temperatures.



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.

2.1 Warnings

- To avoid electric arcing and hazards to personnel and electrical contacts, never connect/disconnect the servo drive while the power source is on.
- Power cables can carry a high voltage, even when the motor is not in motion. Disconnect the Platinum DB Quad from all voltage sources before servicing.

- The high voltage products within the Platinum Line range contain grounding conduits for electric current protection. Any disruption to these conduits may cause the instrument to become hot (live) and dangerous.



Capacitance Discharge

After shutting off the power and removing the power source from your equipment, wait at least 5 seconds before touching or disconnecting parts of the equipment that are normally loaded with electrical charges (such as capacitors or contacts). Measuring the electrical contact points with a meter, before touching the equipment, is recommended.

2.2 Cautions

- The maximum DC power source connected to the instrument must comply with the parameters outlined in this guide.
- When connecting the Platinum DB Quad to an approved control supply, connect it through a line that is separated from hazardous live voltages using reinforced or double insulation in accordance with approved safety standards.
- Before switching on the Platinum DB Quad, verify that all safety precautions have been observed and that the installation procedures in this manual have been followed.
- Make sure that the Safe Torque Off is operational.

2.3 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. All Elmo drives are 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.

Chapter3: Product Description

The Platinum DB Quad is an integrated solution delivering up to 5500W per axis and 10400W in total of continuous power in a compact package 183.5*113.5*42.9mm (7.22" x 4.47" x 1.67"), designed to simply and efficiently connect Elmo's Platinum DB Quad servo drive directly to the application.

This advanced, high power density servo drive provides top performance, Functional Safety, advanced networking as well as a fully featured motion controller and local intelligence.

The Platinum DB Quad is provided as a servo drive with STO Only (Safety Capability "O"). The servo drive configuration supports only STO.

The Power to the drives is provided by a DC power source (not included with the Platinum DB Quad). The power stage is fully isolated from the control stage; hence the DC rectifier can be fed directly from the mains.

A 24 VDC control power supply is required as the Platinum DB Quad does not operate without one. In addition, the 24 VDC control power supply also powers the cooling fan. This smart fan is activated only "when required", significantly prolonging the fan's lifetime. The 24 VDC control power supply also serves as a backup functionality.



Note: The 24 VDC control power supply must operate from an isolated voltage source within the range of 18 to 30 VDC for the L-shape model and 24 ±10% VDC for the Fins+Fan model.

The drive can operate as a stand-alone device or as part of a multi-axis system in a distributed configuration on a real-time network.

The Platinum DB Quad drive is easily set up and tuned using Elmo Application Studio (EASII) software tools now available in both 32bit and 64bit versions. As part of the Platinum product line, it is fully programmable with the Elmo motion control language. For more about software tools refer to the Elmo Application Studio Inline-Help.

3.1 Accessories

The following cable kit may be ordered Catalog number: CBL-PDBQUAKIT01

Chapter4: Technical Information

4.1 Physical Specifications

Feature	Units	All Types
L-shape model Weight	g (oz.)	~685g (~24.13 oz)
L-shape model Dimension	mm (in)	183.5*113.5*42.9mm (7.22" x 4.47" x 1.67")
Mounting method		Bookshelf

4.2 Technical Data

4.2.1 100V Models

Feature	Units	1/100	3/100	10/100	25/100
Minimum supply voltage	VDC	10			
Nominal supply voltage	VDC	85			
Maximum supply voltage	VDC	95			
Maximum continuous power output	W	70	220	735	2000
Efficiency at rated power (at nominal conditions)	%	>99			
Maximum output voltage		Up to 96% of DC bus voltage			
Amplitude sinusoidal/DC continuous current	A	1	3	10	25
Sinusoidal continuous RMS current limit (Ic)	A	0.7	2.1	7.1	17.7
Peak current limit	A	2xIc			
Peak Time	Secs	Standard 3secs			Up to 30secs

Table 1: Technical Data

4.2.2 200V Models

Feature	Units	10/200	R35/200
Minimum supply voltage	VDC	20	
Nominal supply voltage	VDC	170	
Maximum supply voltage	VDC	195	
Maximum continuous power output	W	1450	*5100
Efficiency at rated power (at nominal conditions)	%	>99	
Maximum output voltage		> 96% of DC bus voltage at f = 22 kHz	
Amplitude sinusoidal/DC continuous current	A	10	35
Sinusoidal continuous RMS current limit (Ic)	A	7.1	24.8
Peak current limit	A	2x Ic	Ic

Table 2: Power Rating for 200V Models



Note (on current ratings):

The current ratings of the Platinum MOL Quad are given in units of DC amperes (ratings that are used for trapezoidal commutation or DC motors). The RMS (sinusoidal commutation) value is the DC value divided by 1.41.

Note (*): Total output power allowed for all axes up to 8000W

4.2.3 Control Supply

Feature		Unit	Details
Control supply input voltage		V	Isolated DC source: 14 to 95
24V Control supply input power consumption	Without encoder	W	≤4
	With 4 x 300mA encoders (1.2A@5VE)	W	≤11.5

4.2.4 4-Axis & 6-Axis Motor Phase Connections

For the 4-Axis Motor connections, four Brushless motors can be connected. Each motor uses 3-Phases.

For the 6-Axis Motor connections, six DC Brush motors can be connected. Each motor uses 2-Phases. The following table describes the basic motor connections.

PQUA_Phases	4-Axis Motors	6-Axis Motors
Axis1_M1	✓	Motor 1
Axis1_M2	✓	
Axis1_M3	✓	Motor 2
Axis2_M1	✓	
Axis2_M2	✓	Motor 3
Axis2_M3	✓	
Axis3_M1	✓	Motor 4
Axis3_M2	✓	
Axis3_M3	✓	Motor 5
Axis4_M1	✓	
Axis4_M2	✓	Motor 6
Axis4_M3	✓	

4.2.5 Encoder Supply

Feature	Details
5V supply	5V ±5% Up to 1.2A

4.2.6 Product Features

4.2.6.1 General Product Features

Main Feature	Details	Presence and No.
Feedback	Standard Ports A and B feedbacks Supports Incremental encoder, Absolute serial and analog encoders	4 Axes x Standard Ports A and B feedbacks

Communication Option	USB	✓
	EtherCAT with Address Switches option	✓
	LAN	✓
Analog Input	Differential $\pm 10V$ or Single Ended	✓ one per axis

4.2.6.2 STO

Main Feature	Details	Presence and No.
STO	5V Logic, Opto Isolated, for IO TYPE = U	✓
	PLC source, Opto Isolated, for IO TYPE = V	

4.2.7 Regular IO Features: IO TYPE = U, V

4.2.7.1 IO TYPE = U

Feature	Details	Max. Values	Presence / No.
Digital Input	5V logic (IN1, IN2, IN3, IN4)		4 per axis
Digital Output	5V logic (OUT1, OUT2)	Maximum 15 mA	2 per axis
VDD	Power supply for Outputs	4V to 30V	✓

4.2.7.2 IO TYPE = V

Feature	Details	Max. Values	Presence / No.
Digital Input	IN1, IN2, IN3, IN4 PLC Source or Sink, Isolated		4 per axis
Digital Output	OUT1, OUT2 PLC Source or Sink, Isolated	The total current of the two digital outputs must not exceed 750 mA, and the maximum current per output must not exceed 500mA.	2 per axis
VDD	Power supply for Outputs	19.6V to 30V	✓

4.3 Environmental Conditions

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



Warning: During operation the Platinum DB Quad becomes hot to the touch (the heatsink and wires may heat up to 85 °C). Care should be taken when handling it.

Feature	Details
Operating ambient temperature	0 °C to 55 °C (32 °F to 131 °F)  Remark: Functional Safety is applicable to the above operating temperature.
Storage temperature	-40 °C to +85 °C (-40 °F to +185 °F)
Maximum non-condensing humidity according to IEC60068-2-78	95%
Maximum Operating Altitude	2,000 m (6562 feet) It should be noted that servo drives capable of higher operating altitudes are available on request.
Mechanical Shock according to IEC60068-2-27	15g / 11ms Half Sine
Vibration according to IEC60068-2-6	5 Hz ≤ f ≤ 10 Hz: ±10mm 10 Hz ≤ f ≤ 57 Hz: 4G 57 Hz ≤ f ≤ 500 Hz: 5G

4.4 Standards and Certifications

The following table describes the Main Standards of the Platinum DB Quad servo drive. For further details refer to Chapter 14 in the Platinum Quad Drive Hardware Manual.

4.4.1 Functional Safety

Standard	Item
In compliance with IEC 61800-5-2:2017	Adjustable speed electrical power drive systems Safety requirements Functional
In compliance with EN ISO 13849-1:2015	Safety of machinery Safety-related parts of control systems.
In compliance with EN 61508-1:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems
In compliance with EN 61508-2:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems
In compliance with EN 61508-3:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems
In compliance with IEC 61784-3:2016	Functional Safety Filed Bus - FSOE

4.4.2 Electrical Safety

Specification	Details
IEC/EN 61800-5-1:2007	Adjustable speed electrical power drive systems Part 5-1: Safety requirements Electrical, thermal and energy
UL 61800-5-1	Adjustable speed electrical power drive systems: Safety requirements Electrical, thermal and energy
CSA C22.2 NO. 274-17	Adjustable speed drives

4.4.3 Electromagnetic Compatibility

Specification	Details
EN 61800-3:2004/A1:2011	Adjustable speed electrical power drive systems Part 3: EMC requirements and specific test methods
EN 61800-5-2: 2017 Annex E	Adjustable speed electrical power drive systems Part 5-2: Safety requirements Functional

4.4.4 Environmental

Specification	Details
IEC60068-2-78	Damp heat, steady state
IEC60068-2-6	Vibration (sinusoidal)
IEC60068-2-2	Dry heat
IEC60068-2-27	Shock
IEC60068-2-1	Cold Test

4.4.5 Other Compliant Standards

For other compliant standards refer to the

Platinum Quad Drive Hardware Manual chapter 14.5, or refer to the Elmo website:

<https://www.elmomc.com/capabilities/standards-compliance/platinum-family/>

4.4.6 Dual Use

No export license is required for the Platinum Line products signified with the suffix Q in the Part Number.

The operating frequency of the Platinum Line products is “factory limited” to ≤ 599 Hz, and therefore complies with the EU Dual Use Regulation 428/2009, 3A225, and the US Dual Use regulation EAR ECCN# 3A225.

This statement applies to all identical specimens and will become invalid if a change is made in the firmware.

Chapter5: Installation

The Platinum DB Quad must be installed in a suitable environment and properly connected to its voltage supplies and the motor.

5.1 Unpacking the Drive Components

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

- The Platinum DB Quad servo drive
- The Elmo Application Studio (EASII) software

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

To unpack the Platinum DB Quad :

1. Carefully remove the servo drive from the box and the Styrofoam.
2. Check the drive 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 drive.
3. To ensure that the Platinum DB Quad you have unpacked is the appropriate type for your requirements, locate the part number sticker on the side of the Platinum DB Quad. It looks like this:

P/N:P-DBQUA 6/100FEUT



S/N: M26080582



Made In Israel

4. Verify that the Platinum DB Quad type is the one that you ordered and ensure that the voltage meets your specific requirements.
5. The part number at the top provides the type designation. Refer to the appropriate part number in the section Catalog Number at the beginning of the installation guide.

5.2 Over-Current and Short-Circuit Protection

A serial fuse or circuit breaker should be installed Rated for drive s continuous power.

PQUA-Mz-zXXX/YYYzzzQ XXX = rated continues current [A]	Fuse	Circuit Breaker
1, 6, , 25 / 100V	Fast Acting Class J	DC Medium
10, R35 / 200V	Fast Acting Class J	DC Medium
Rated short - circuit breaking capacity 5kA		

PL/CL protection: Peak and Continues Limitation

The peak current of servo drive limit for a given application is programmed to the parameter **PL[1]** amperes. **PL[1]**: Value for peak current limit protection. Please refer to the “Platinum Administrative Guide”.

5.3 Motor Overload Protection

The Platinum Quad supports Electronic Motor Overload protection as required by IEC-61800-5-1 with the exception of thermal memory retention and speed sensitivity.

5.4 Mounting the Platinum DB Quad

The Platinum DB Quad has been designed for two standard mounting options:

- Wall Mount along the back (can also be mounted horizontally on a metal surface)
- Book Shelf along the side

M4 round head screws, one through each opening in the heat sink, are used to mount the Platinum DB Quad (see the diagram below).

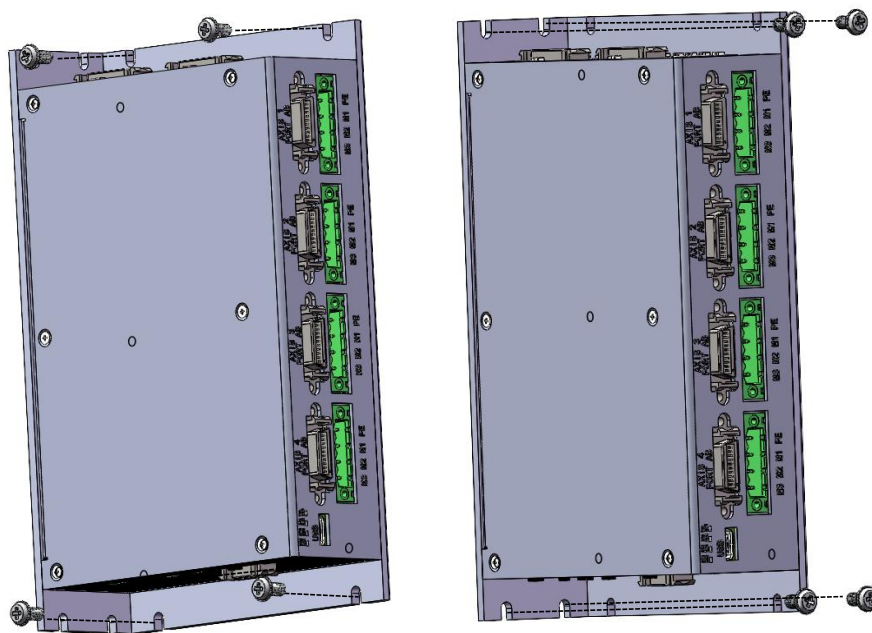


Figure 1: Mounting the Platinum DBQUA

When the Platinum DB Quad is not connected to a metal chassis, the application's thermal profile may require a solution for heat dissipation due to insufficient air convection. In this case, we recommend that you connect an external heat sink. Elmo has an external heat sink (Catalog number: Fin-DBQUA) that can be ordered for this purpose (see figure at side).

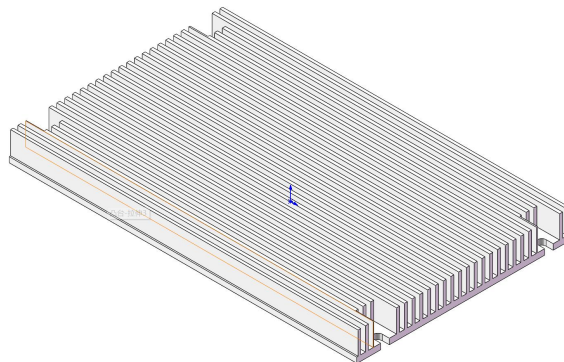
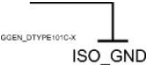
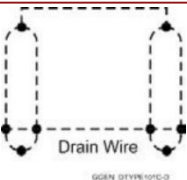
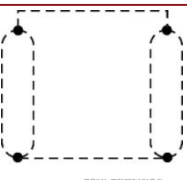
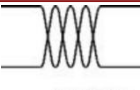
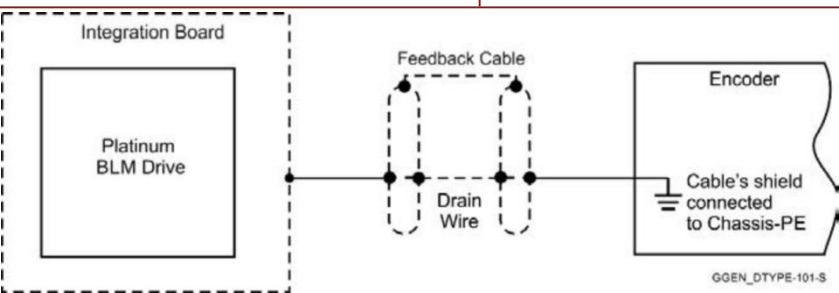


Figure 2: Platinum DB Quad External Heat-sink

Chapter6: Wiring

6.1 Wiring Legend

Wiring Symbol	Description
	Earth connection (PE)
	User Side: This symbol signifies that any type of grounding may be used on the user side
	VDD Return
	Isolated Ground
	Power Return
	COMRET Common at the Drive
	Shielded cable with drain wire. The drain wire is a non-insulated wire that is in direct contact with the braid (shielding). Shielded cable with drain wire significantly simplifies the wiring and earthing.
	Shielded cable braid only, without drain wire.
	Twisted-pair wires
 Encoder Earthing. The cable's shield is connected to the chassis (PE) in the connector. The servo drive shield is connected to Earth.	

6.2 The Platinum DB Quad Connection Diagram

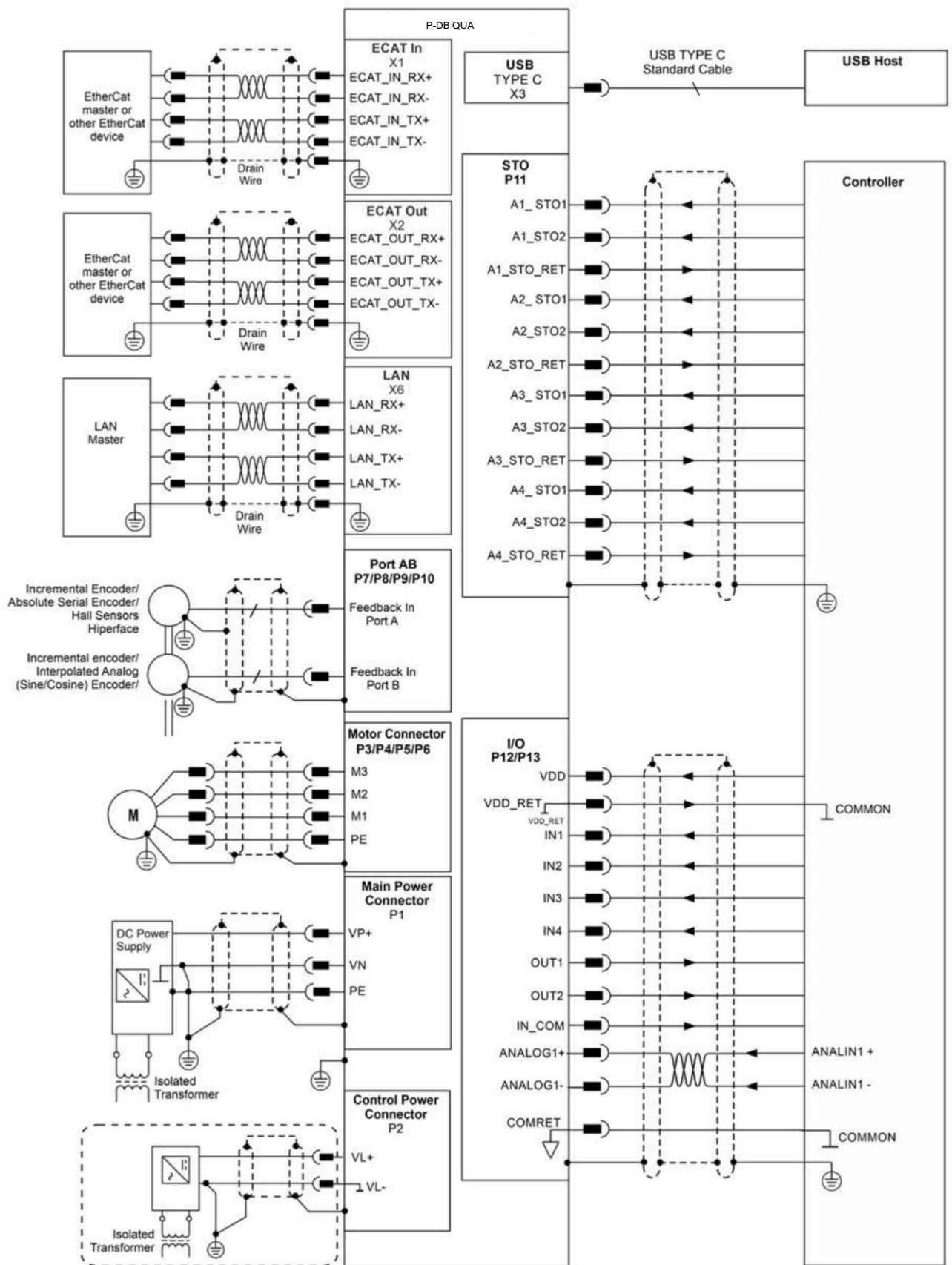


Figure 3: The Platinum DBQUA Connection Diagram – EtherCA

Chapter 7: Connector Types, Pinouts, and LEDs

Throughout this document, all Ax connections refer to the specific axis “x”, numbered from 1...4.

7.1 Connectors

The Platinum DB Quad has seventeen connectors.

Port	No Pins	Type	Function
P3 (M1) M1, M2, M3, PE	4	Pheonix 5.08 mm pitch	Motor A1 phases
P4 (M2) M1, M2, M3, PE	4	Pheonix 5.08 mm pitch	Motor A2 phases
P5 (M3) M1, M2, M3, PE	4	Pheonix 5.08 mm pitch	Motor A3 phases
P6 (M4) M1, M2, M3, PE	4	Pheonix 5.08 mm pitch	Motor A4 phases
P1 Main Power	5	Pheonix 5.08 mm pitch	Power
P2 VL+, VL-	2	Pheonix 3.81 mm pitch	Control Power
P7	20	MDR 1.27 mm pitch	Feedback Port A/B A1
P8	20	MDR 1.27 mm pitch	Feedback Port A/B A2
P9	20	MDR 1.27 mm pitch	Feedback Port A/B A3
P10	20	MDR 1.27 mm pitch	Feedback Port A/B A4
P11	14	MDR 1.27 mm pitch	STO
P12	26	MDR 1.27 mm pitch	I/O1 connector for Port A1 and A2
P13	26	MDR 1.27 mm pitch	I/O2 connector for Port A3 and A4
X3	14	USB Device Type-C	USB
X6	8	RJ45	LAN Communication
EtherCAT / CAN Version			
X1	8	RJ45	EtherCAT in
X2	8	RJ45	EtherCAT out

7.2 Mating Connectors

Connector	No pins	Mating Connector Type
Main Power		
P1 Main Power	5	Phoenix 5.08 mm pitch terminal 5-pin plug 1912210
Motor Power		
P3/M1, P4/M2, P5/M3, P6/M4 Motor Phases	4 (each)	Phoenix 5.08 mm pitch terminal 4-pin plug 1912207
P2 Control Power	2	Phoenix 3.81 mm pitch terminal 2-pin plug 1748354
Other		
P11 STO	14	SUNCHU 1.27 mm pitch 14 pin PN SC-14-3
P7, P8, P9, P10 Feedback Port A/B	20 (each)	SUNCHU 1.27 mm pitch 20 pin PN SC-20-3
P12, P13 I/O	26 (each)	SUNCHU 1.27 mm pitch 26 pin PN SC-26-3
X3 USB	14	Standard Type C cable
X1, X2 IN/OUT EtherCAT Communication	8 (each)	RJ45
X6 LAN communication	8	RJ45

7.3 Connector Locations

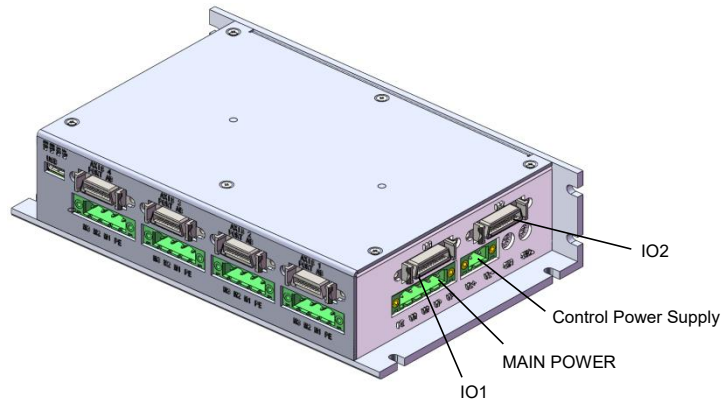


Figure 4: IO, Power, Control Power Connector Locations

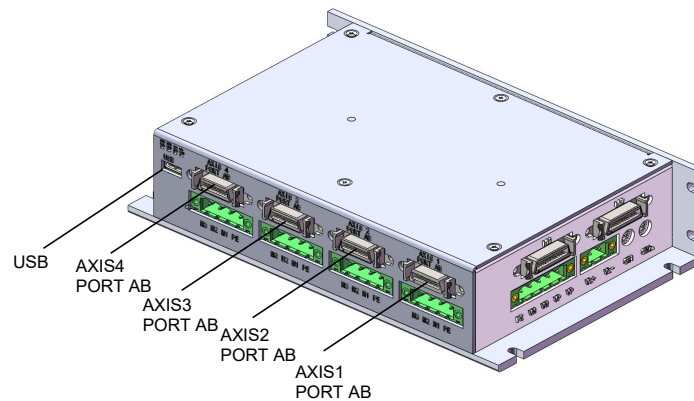


Figure 5: Feedback, USB Connector Locations

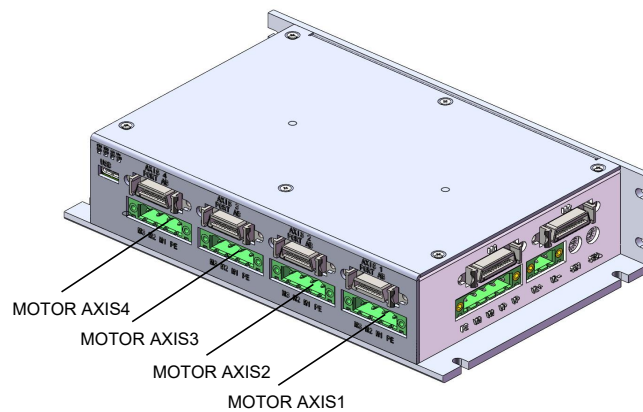


Figure 6: Motor Power Connector Locations

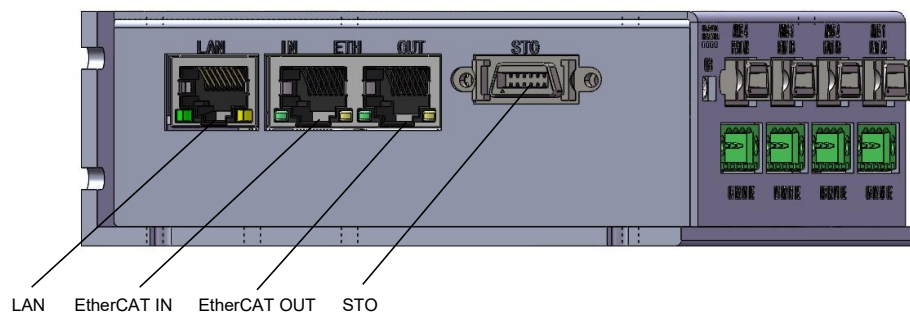


Figure 7: ECAT, LAN, STO Locations

7.4 Motor Power Connector Pinouts (P3, P4, P5, P6)

The following table describes the pinouts for the Motor Power connectors P3 (Motor M1), P4 (Motor M2), P5 (Motor M3), and P6 (Motor M4).

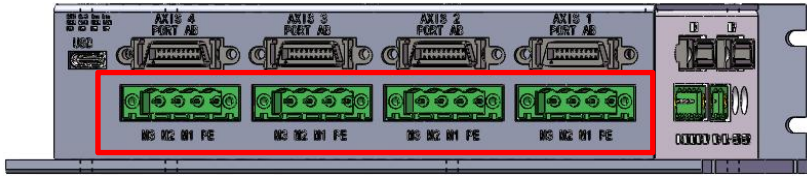
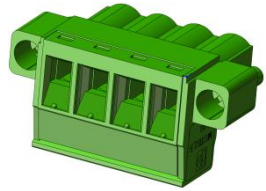
P3/P4/P5/P6	Pin Signal	Function	Cable – Wires	
			Brushless Motor	Brushed DC Motor
1	PE	Shield	Motor PE	Motor PE
2	M1	Motor phase	Motor	No Connection
3	M2	Motor phase	Motor	Motor
4	M3	Motor phase	Motor	Motor
Pin Positions			Connector	
				

Table 3: Main Power and Motor Connections

For Motor connections to 4 axes, use the following connection diagrams and procedure, depending on the motor type.

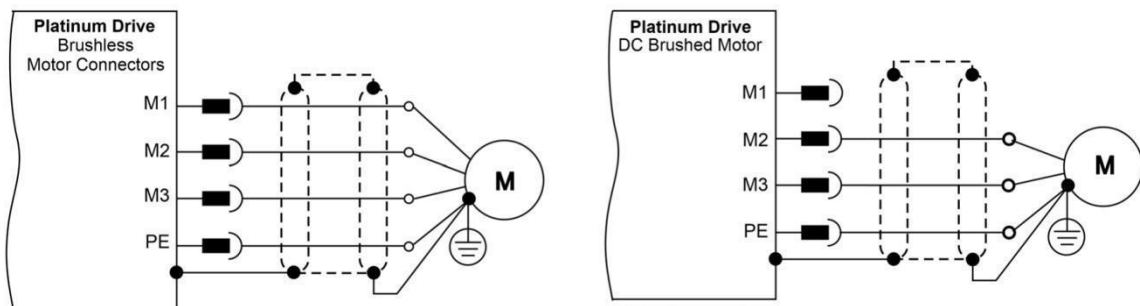


Figure 8: Brushless and Brushed Motor Power Connections Diagrams

To connect the motor power:

- 1.Ensure that the motor chassis is properly earthed.
- 2.Connect the appropriate wire from the Motor Power cables to the M1, M2, M3, and PE terminals on the Platinum DB Quad .Make sure not to bundle the wires.
3. The phase connection is arbitrary as Elmo Application Studio (EAS II) will establish the proper commutation automatically during setup. When tuning a number of drives, you can copy the

setup file to the other drives and thus avoid tuning each drive separately. In this case the motor-phase order must be the same as on the first drive.

4. For high EMI environment, it is highly recommended to use a 4-wire shielded (not twisted) cable for the motor connection. The gauge is determined by the actual RMS current consumption of the motor.

5. Connect the cable shield to the closest ground connection at the motor end.

For better EMI performance, the shield should be connected to Earth Connection. (Connect to the mounting holes that are not anodized.)

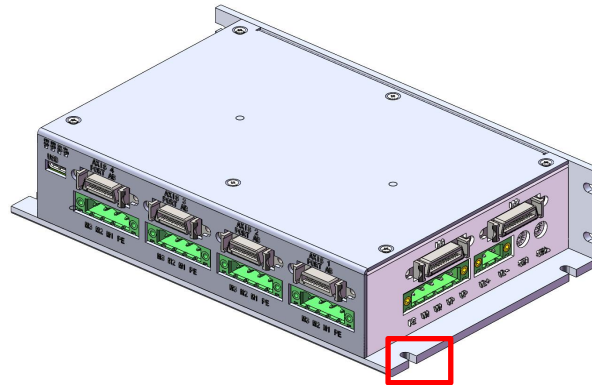


Figure 9: L-Shape model has two non-anodized mounting holes

7.5 Main Power(P1) & Control Power Connector Pinouts(P2)

Pin (P1) No	Signal	Function	Cable
1	VP+	DC Power Supply input	DC Power
2	VP+	DC Power Supply input	DC Power
3	VN	Power Supply Return	DC Power
4	VN	Power Supply Return	DC Power
5	PE	SHIELD	DC Power

Pin Positions	Connector

Table 4: Main Power and Motor Connections

Pin (P2)	Signal	Function
----------	--------	----------

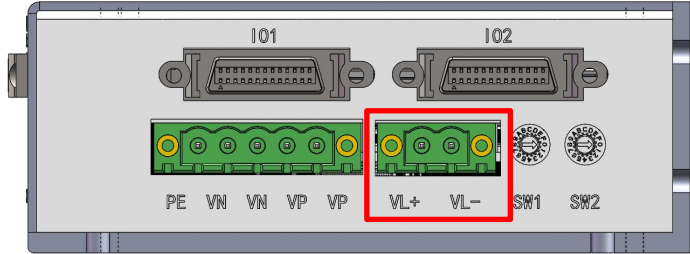
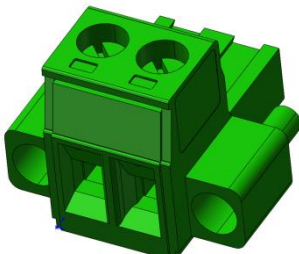
1	VL+	Control Supply Logic Input +24VDC
2	VL-	Control Supply Logic Input Return
Pin Positions		Cable Connector
		

Table 5: Control Supply Pins

7.5.1 Main Supply

The Platinum DB Quad receives power from Main and Control supplies and delivers power to the motor.

There are two possible power ratings for the Platinum MOL Quad:

- 100V is for the 10 to 95 VDC
- 200V is for the 20 to 195 VDC

For power rating of 100V

Only a single DC Power source of 10 to 95 VDC isolated from the Mains, is required for the main power and also for the control power. However, a control power supply can be added for the logic.

For power rating 200V

Two DC power sources are required, a DC power source of 20 to 195 VDC isolated from the Mains, and a control supply 14 to 95 VDC (isolated from the Mains) for the logic.



Note: Both the 10 to 95 VDC and 20 to 195 VDC power sources must be isolated from the Mains. *Connect the DC power source cable to the VP+ and PR terminals on the main power connector.*

To connect the main power:

1. The DC power supply source must be isolated from the Mains.
2. For best immunity, it is highly recommended to use twisted and shielded cables for the DC power source. A 3-wire shielded cable should be used. The gauge is determined by the actual current consumption of the motor.
3. Connect the cable shield to the closest earth connection near the power supply.
4. Connect the PE to the closest earth connection near the power supply.
5. Connect the PR to the closest earth connection near the power supply.
6. Before applying power, first verify the polarity of the connection.

7.5.4 Power Supply for 100V Power Rating

A single DC Power Supply can supply the power for logic as well as the main power. If separation between the main DC power source and a control supply is required, then a control supply (isolated from the Mains) can be connected by implementing "diode coupling" (Figure 16).

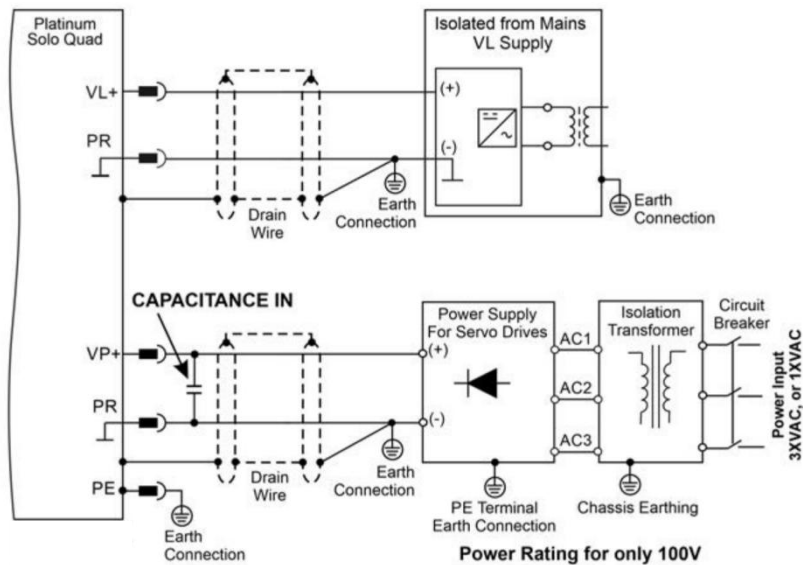


Figure 10: Shared Optional Power Supply Connection Diagram



Note: Make sure to connect the VN to the closest earth connection near the power supply.

7.5.3 Power Supply for 200V Power Rating

For Power Rating 200V, two DC power sources are required; a main power 20 to 195 VDC power source isolated from the Mains, and a control supply 14V to 95V (isolated from the Mains) for the logic. The following figure describes the connection of main power and control.

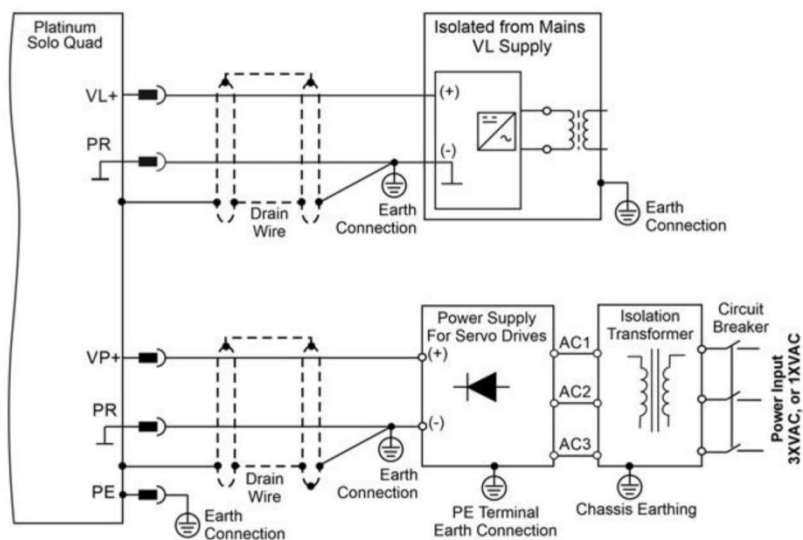


Figure 11: Power Supply Connection Diagram for Power Rating 200V



Note: Make sure to connect the VN to the closest earth connection near the power supply.

7.5.2 Control Supply

For power rating 200V, The Control supply 14V to 95V is required.

For power rating 100V The Control supply 14V to 95V can be added for the 100V power rating.



Note: The source of the Control Supply must be isolated from the Mains. Connect the VL+ and VL- terminal to the control Connector.

To connect your integration board to the control supply:

1. The source of the control supply must be isolated from the Mains.
2. For safety reasons, connect the return (common) of the control supply source to the closest earth connection near the control supply source.
3. Connect the cable shield to the closest earth connection near the control supply source.
4. Before applying power, verify the polarity of the connection.

7.6 STO Connector Pinouts (P11)

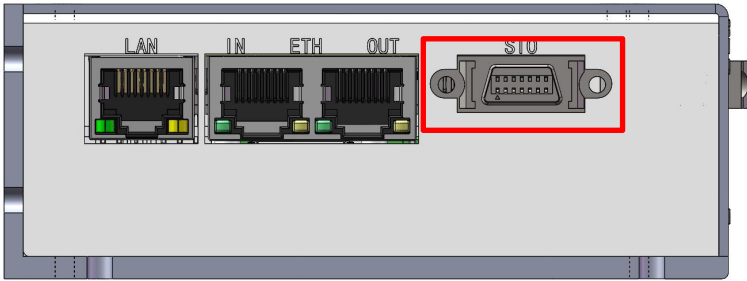
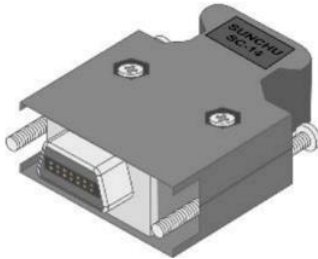
Pin (P11)	Signal	Function
1	1A	A1_STO1 Input Opto Isolated
2	2A	A1_STO2 Input Opto Isolated
3	3A	A1_STO return
4	4A	A2_STO1 Input Opto Isolated
5	5A	A2_STO2 Input Opto Isolated
6	6A	A2_STO return
7	7A	VL+
	5V	Output 5V in TTL model as user bypass
8	1B	A3_STO1 Input Opto Isolated
9	2B	A3_STO2 Input Opto Isolated
10	3B	A3_STO return
11	4B	A4_STO1 Input Opto Isolated
12	5B	A4_STO2 Input Opto Isolated
13	6B	A4_STO return
14	7B	COMRET
Pin Positions		Cable Connector
		

Table 6: STO Pins

7.6.1 Source Mode – PLC Voltage Level(STO Type: S)

Refer to the diagrams below for the PLC Source option connection.

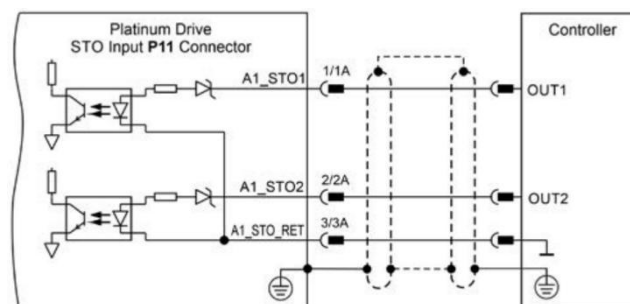


Figure 12: STO Input Connection – PLC Source Option for Axis A1-A4

7.6.2 TTL Mode — TTL Voltage Level(STO Type: T)

Refer to the diagrams below for TTL option connection.

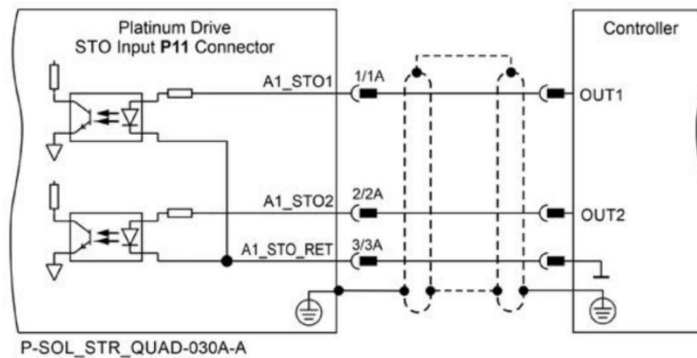


Figure 13: STO Input Connection – TTL Option for Axis A1-A4

7.7 Feedback Port A and Port B Connector Pinouts (P7, P8, P9, P10)

The following tables describe the pinouts for the Port A and B Feedbacks P7 (AB1), P8 (AB2), P9 (AB3), and P10 (AB4). The Port A and Port B signals are similar for each of the connector pinouts, and are labelled Px = P7, P8, P9, or P10, where x=7, 8, 9, 10 axis in the connection diagrams in section 7.6 Feedbacks (P7, P8, P9, P10).

P7/P8/P9/P10		Signal	Incremental Encoder	Absolute Serial Encoder
			Function	
1A	1	+11VE	+11VE supply	
2A	2	COMRET	Common return	
1B	11	+5VE	+5VE supply	
2B	12	COMRET	Common return	
10B	20	COMRET	Common return	
3A	3	PORTA_A+ / CLK+	Channel A +	Absolute encoder clock+
4A	4	PORTA_A- / CLK-	Channel A -	Absolute encoder clock-
5A	5	PORTA_B+ / DATA+	Channel B +	Absolute encoder data +
6A	6	PORTA_B- / DATA-	Channel B -	Absolute encoder data -
7A	7	PORTA_Index+	Channel Index+	
8A	8	PORTA_Index-	Channel Index-	
3B	13	PORTB_A+ / SIN+	Channel A+	Sine+
4B	14	PORTB_A- / SIN-	Channel A-	Sine-
5B	15	PORTB_B+ / COS+	Channel B+	Cosine+
6B	16	PORTB_B- / COS-	Channel B-	Cosine-

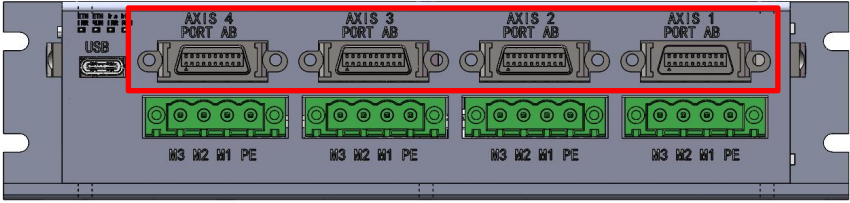
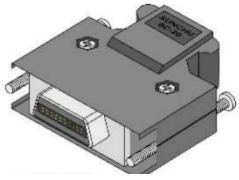
7B	17	PORTB_Index+	Channel Index+	Analog Index+
8B	18	PORTB_Index-	Channel Index-	Analog Index-
9A	9	HA	Hall sensor A	
10A	10	HC	Hall sensor C	
9B	19	HB	Hall sensor B	
Pin Positions				Cable Connector
				

Table 7: Port A and Port B Pin Positions

7.7.1 Feedback Port A

Port A supports the following sensor inputs:

- Incremental Encoder or absolute serial Encoder
- Differential pulse-width modulation (PWM) signal input
- Differential Pulse & Direction signal inputs

7.7.1.1 Incremental Encoder

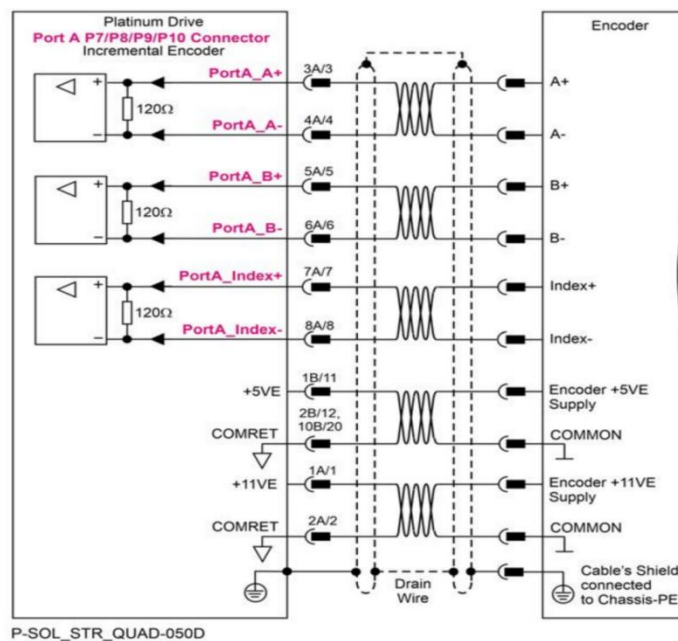


Figure 14: Port A Incremental Encoder Input – Recommended Connection Diagram

7.7.1.2 Absolute Serial Encoder

The following Absolute Encoder types are supported:

- EnDat 2.2
- Biss C and Biss B
- SSI
- Hiperface

The following is the diagram connection of the EnDat, Biss, SSI:

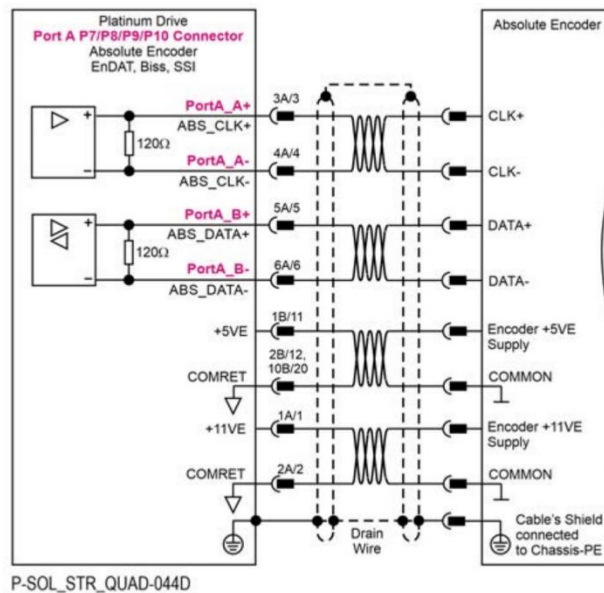


Figure 15: Absolute Serial Encoder – Recommended Connection Diagram for EnDat, Biss, SSI

7.7.1.3 Hiperface

Hiperface that requires power of 7-12V can be used with external power supply for non-safety application. The following figure describes the connection diagram.

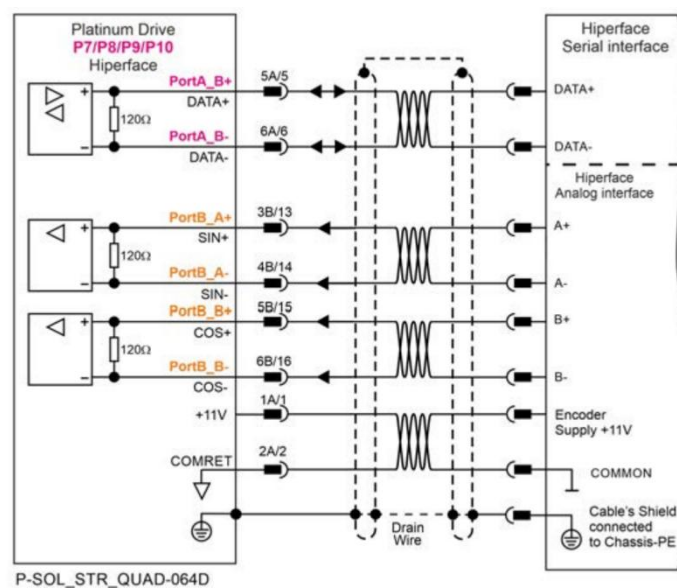


Figure 16: Absolute Serial Encoder – Recommended Connection Diagram for Hiperface

7.7.2 Feedback Port B

Port B supports any of the following sensors:

- Incremental Encoder
- Interpolated Analog Encoder
- Analog Hall Sensors

Differential PWM signal input can be connected to Port B

7.7.2.1 Incremental Encoder

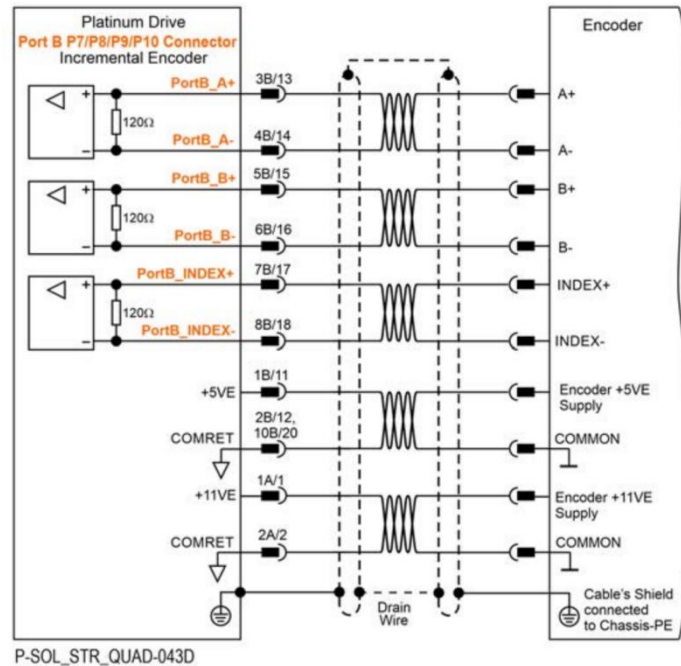


Figure 17: Port B Incremental Encoder Input – Recommended Connection Diagram

7.7.2.2 Interpolated Analog (Sine/Cosine) Encoder

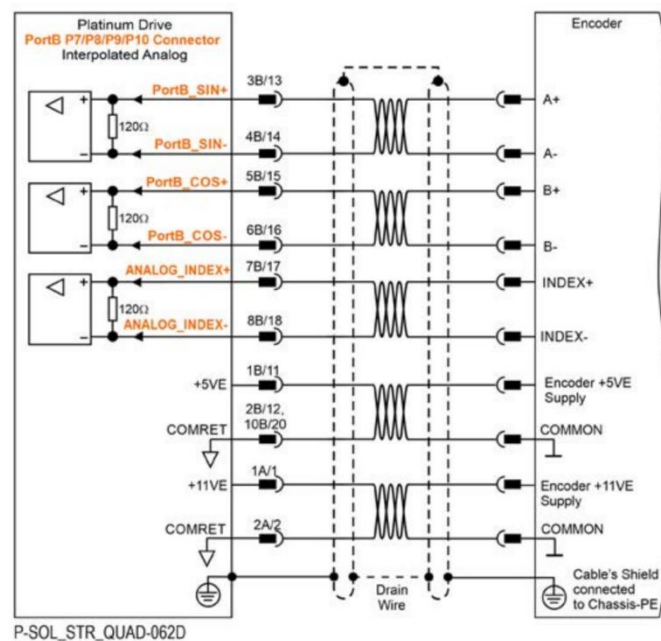


Figure 18: Port B - Interpolated Analog Encoder Connection Diagram

7.7.3 Feedback - Hall Sensors

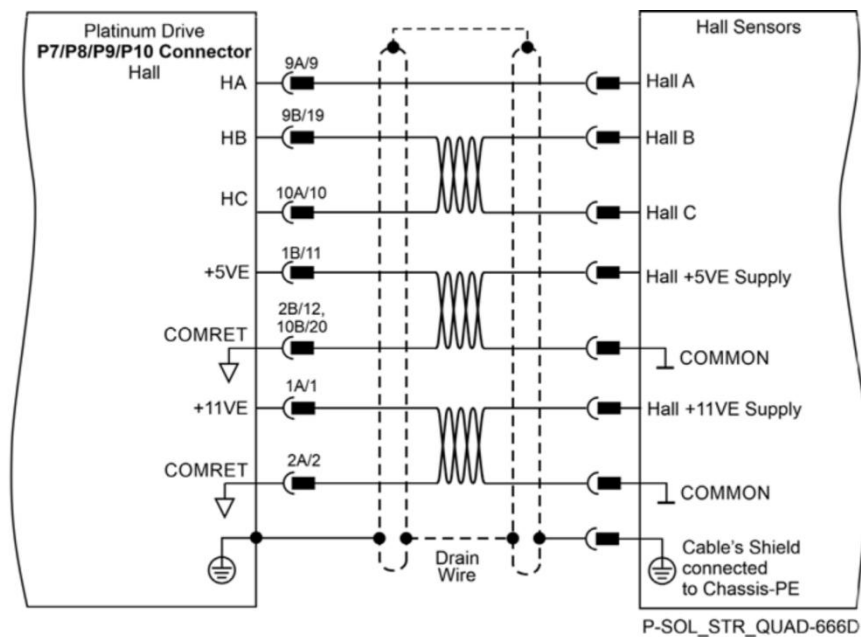


Figure 19: Hall Sensors Connection Diagram

7.8 Digital I/Os & Analog Inputs Connector Pinouts (P12, P13)

The Digital I/Os and Analog Inputs connector includes the following functions:

The Digital I/O and Analog Input signals are similar for each of the connector pinouts, and are labelled P12 and P13, in the connection diagrams in section 7.7 Digital I/Os (P12, P13).

I/O1 Connector for Port 3 and 4 (P12)

Pin (P12)	Signal	Function
1A	1	ANALOG_RET
2A	2	Analog+ A1
3A	3	Analog- A1
4A	4	IN_COM A1
5A	5	IN1_A1
6A	6	IN2_A1
7A	7	IN3_A1
8A	8	IN4_A1
9A	9	OUT1_A1
10A	10	OUT2_A1 (BRK_OUT)
11A	11	VDD
12A	12	VDD

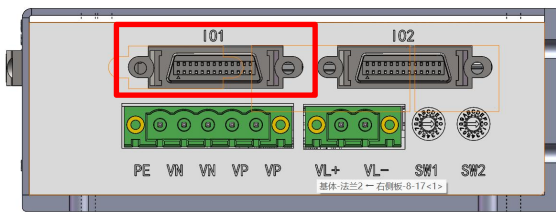
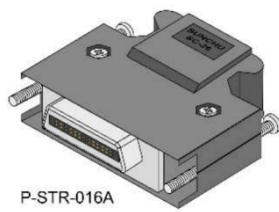
13A	13	VDD	VDD Supply for Digital Output
1B	14	ANALOG_RET	Analog input Return
2B	15	Analog+ A2	Differential Analog input A2, $\pm 10V$
3B	16	Analog- A2	Differential Analog input A2 complement, $\pm 10V$
4B	17	IN_COM A2	Inputs Common A2 and PLC Select A2
5B	18	IN1_A2	Digital input 1 Isolated A2
6B	19	IN2_A2	Digital input 2 Isolated A2
7B	20	IN3_A2	Digital input 3 Isolated A2
8B	21	IN4_A2	Digital input 4 Isolated A2
9B	22	OUT1_A2	Digital output 1 Isolated A2, $I_{max}=250mA$
10B	23	OUT2_A2 (BRK_OUT)	Digital output 2 Isolated A2, $I_{max}=500mA$
11B	24	VDD_RET	VDD Supply return for digital outputs
12B	25	VDD_RET	VDD Supply return for digital outputs
13B	26	VDD_RET	VDD Supply return for digital outputs
Pin Positions			Cable Connector
			 P-STR-016A

Table 8: I/O 1 Connector for Port 1 and 2 - Pin Assignments

I/O2 Connector for Port 3 and 4 (P13)

Pin (P13)		Signal	Function
1A	1	ANALOG_RET	Analog input Return
2A	2	Analog+ A3	Differential Analog input A3, $\pm 10V$
3A	3	Analog- A3	Differential Analog input A3 complement, $\pm 10V$
4A	4	IN_COM A3	Inputs Common A3 and PLC Select A3
5A	5	IN1_A3	Digital input 1 Isolated A3
6A	6	IN2_A3	Digital input 2 Isolated A3
7A	7	IN3_A3	Digital input 3 Isolated A3
8A	8	IN4_A3	Digital input 4 Isolated A3
9A	9	OUT1_A3	Digital output 1 Isolated A3, $I_{max}=250mA$

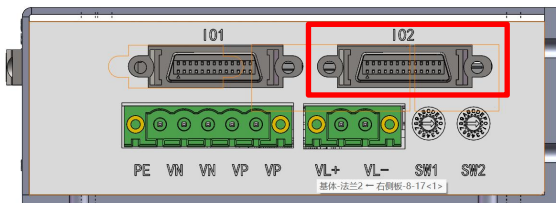
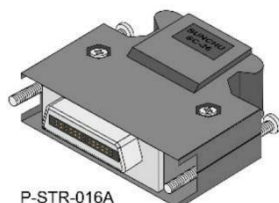
10A	10	OUT2_A3 (BRK_OUT)	Digital output 2 Isolated A3, I _{max} =500mA
11A	11	VDD	VDD Supply for Digital Output
12A	12	VDD	VDD Supply for Digital Output
13A	13	VDD	VDD Supply for Digital Output
1B	14	ANALOG_RET	Analog input Return
2B	15	Analog+ A4	Differential Analog input A4, ±10V
3B	16	Analog- A4	Differential Analog input A4 complement, ±10V
4B	17	IN_COM A4	Inputs Common A4 and PLC Select A4
5B	18	IN1_A4	Digital input 1 Isolated A4
6B	19	IN2_A4	Digital input 2 Isolated A4
7B	20	IN3_A4	Digital input 3 Isolated A4
8B	21	IN4_A4	Digital input 4 Isolated A4
9B	22	OUT1_A4	Digital output 1 IsolatedA4, I _{max} =250mA
10B	23	OUT2_A4 (BRK_OUT)	Digital output 2 IsolatedA4, I _{max} =500mA
11B	24	VDD_RET	VDD Supply return for digital outputs
12B	25	VDD_RET	VDD Supply return for digital outputs
13B	26	VDD_RET	VDD Supply return for digital outputs
Pin Positions			Cable Connector
			 P-STR-016A

Table 9: I/O 2 Connector for Port 3 and 4 - Pin Assignments

7.8.1 Digital Input and Output PLC Source Mode(IO Type: V)

The following figures describe the connections at the I/O Port for the Digital Input and Output PLC Source Mode for A1、A2、A3、A4.

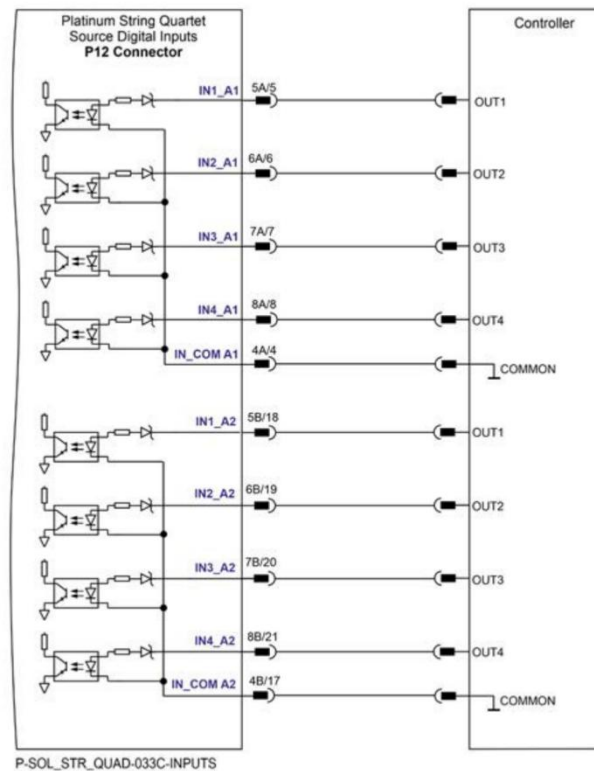


Figure 20: Digital Inputs Connection Diagram for A1、A2、A3、A4 – Source Option PLC

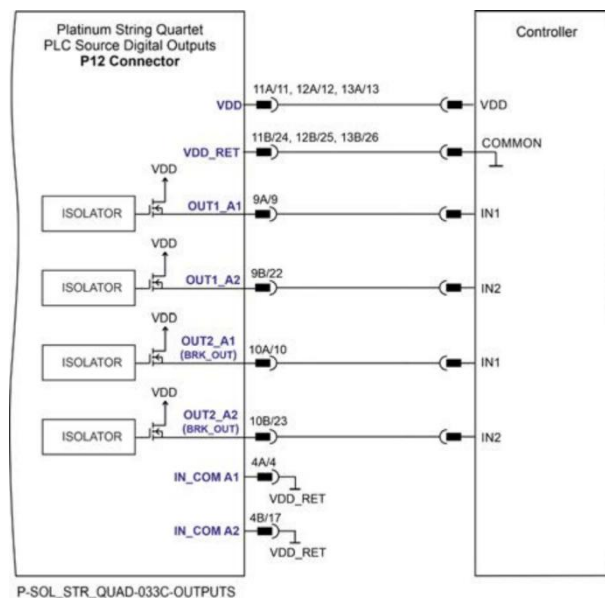


Figure 21: Digital Outputs Connection Diagram for A1、A2、A3、A4 – Source Option PLC

7.8.2 Digital Input and Output PLC Sink Mode

The following figures describe the connections at the I/O Port for the Digital Input and Output PLC Sink Mode for A1、A2、A3、A4.

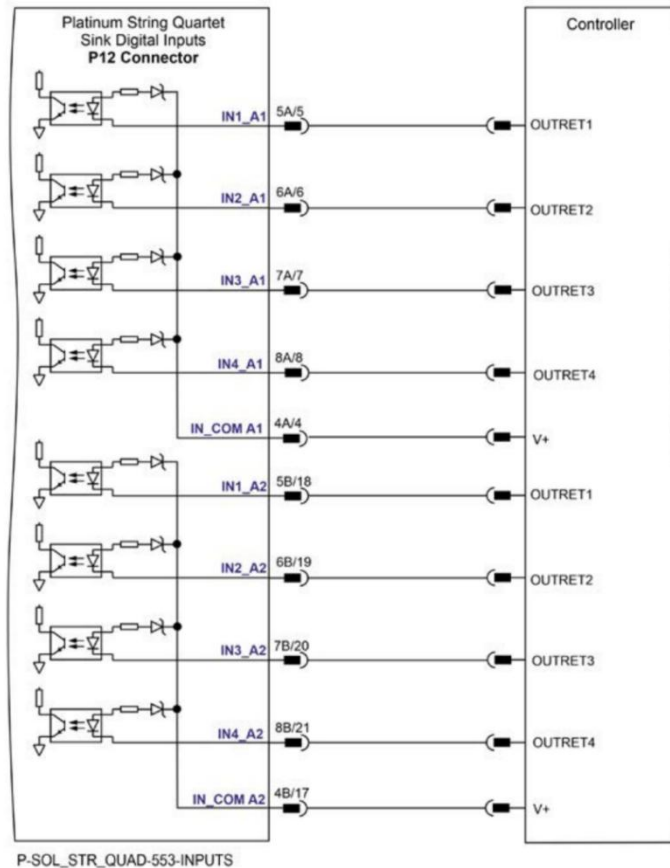


Figure 22: Digital Inputs Connection for A1、A2、A3、A4 – PLC Sink Option

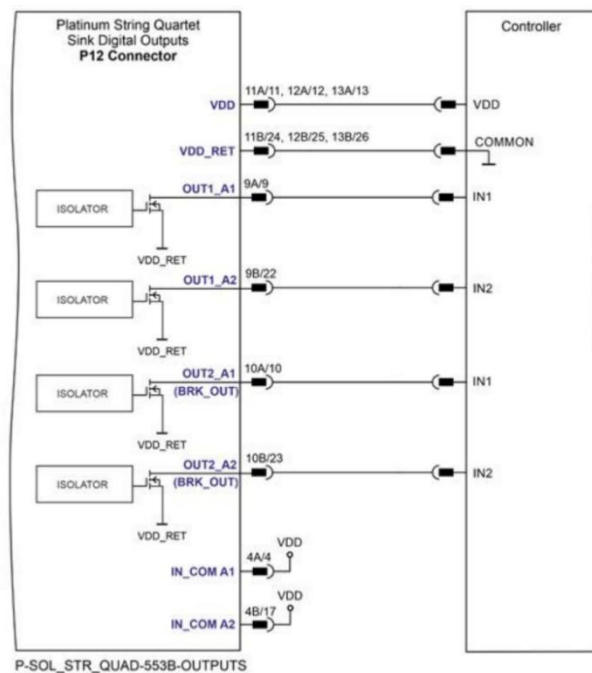


Figure 23: Digital Outputs Connection Diagram for A1、A2、A3、A4 – PLC Sink Option

7.8.3 Digital IO 5V Logic (IO Type: U)

The following figures describe the connections at the I/O Port for the Digital Input and Output 5V Logic Mode for A1、A2、A3、A4.

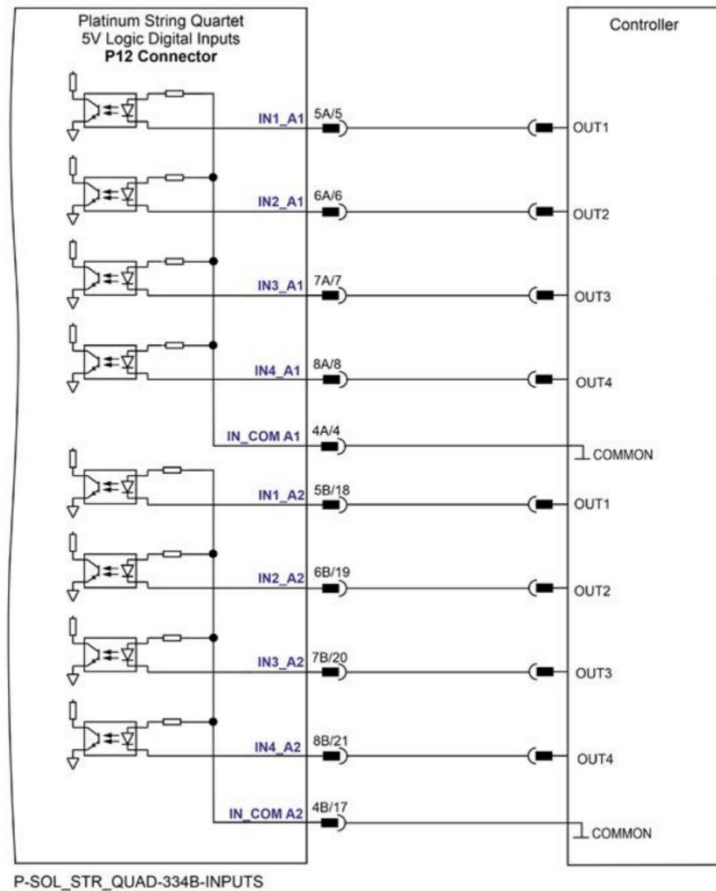


Figure 24: Regular Digital Inputs 5V Logic Mode Connection Diagram - P12、P13 Connector

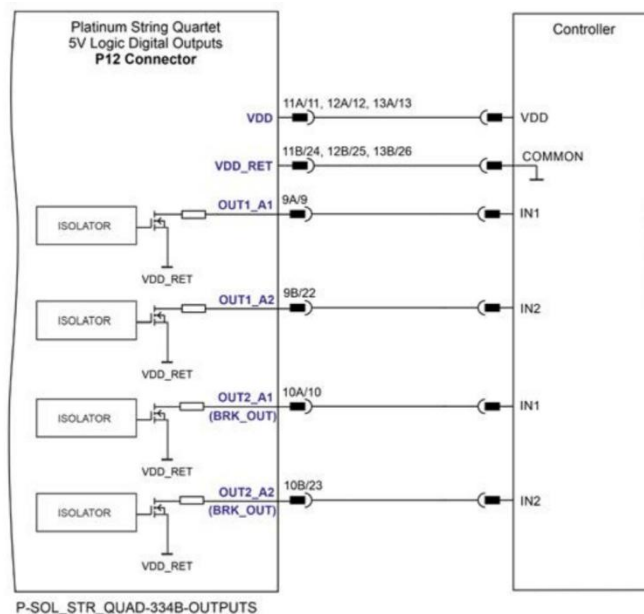


Figure 25: Regular Digital Outputs 5V Logic Mode Connection Diagram - P12、P13 Connector

7.8.4 Analog Input - Differential (P12, P13)

The following circuit describes the internal interface of the Analog input for Ports 1、2、3、4

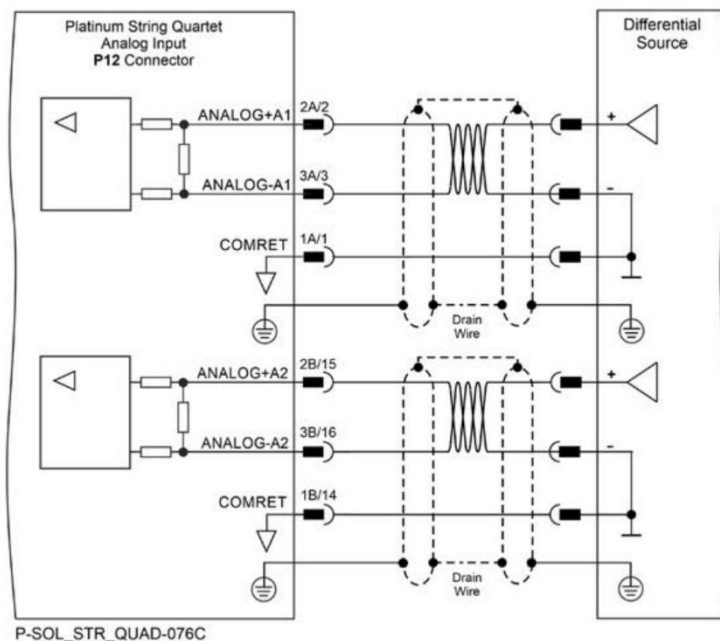


Figure 26: Differential Analog Input for A1、A2、A3、A4

7.9 USB Connector Pinouts (X3)

Use a standard USB Type C cable and connector to connect the USB.

Pin (X3)	Signal	Function
A1	COMRET	Common return
A4	USB_VBUS	USB VBUS 5 V
A5	Not Connected	
A6	USBD+	USB_P line
A7	USBD-	USB_N line
A9	USB_VBUS	USB VBUS 5 V
A12	COMRET	Common return
B1	COMRET	Common return
B4	USB_VBUS	USB VBUS 5 V
B5	Not Connected	
B6	USBD+	USB_P line
B7	USBD-	USB_N line
B9	USB_VBUS	USB VBUS 5 V
B12	COMRET	Common return
Pin Positions		Cable Connector

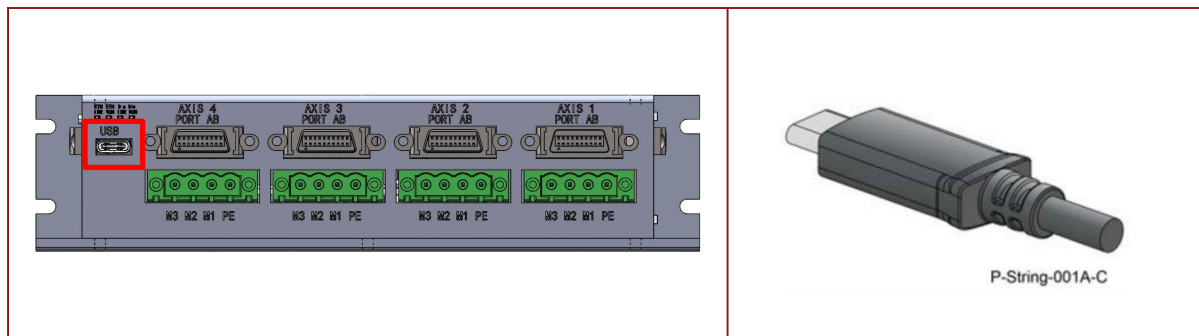


Table 10: USB Device Type C - Pin Assignments

7.10 EtherCAT and LAN Pinouts (X1, X2, X6)

Fieldbus communications are industrial network protocols for real-time distributed control that allows connection of servo drives. The Platinum DB Quad supports the EtherCAT fieldbus type industrial network protocol.

EtherCAT IN Connector Pinouts (X1)

Pin (X1)	Signal	Function
1	ECAT_IN_TX+	EtherCAT in Transmit+
2	ECAT_IN_TX-	EtherCAT in Transmit-
3	Not Connected	
4	Not Connected	
5	Not Connected	
6	ECAT_IN_RX+	EtherCAT in Receive+
7	ECAT_IN_RX-	EtherCAT in Receive-
8	Not Connected	
9	Not Connected	
10	Not Connected	
Pin Positions		Cable Connector
The diagram shows the rear panel of the servo drive with the LAN, IN, ETH, and OUT ports highlighted by a red box. The IN port is the first of the four ports in the highlighted group.		The diagram shows a cable connector labeled HAR0085A. It has a grey cable and a white plastic housing with a red latch. A red arrow points to the top of the connector, labeled with the number 1.

Table 11: EtherCAT IN Pin Assignments

EtherCAT OUT Connector Pinouts (X2)

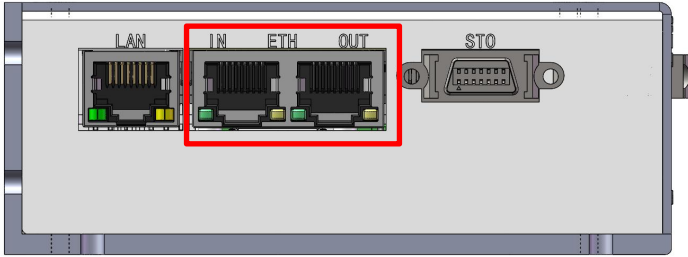
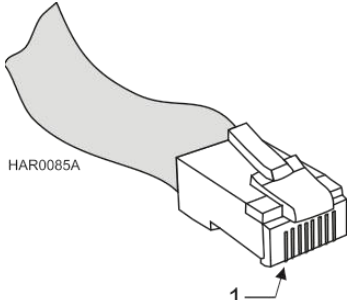
Pin (X2)	Signal	Function
1	EtherCAT_OUT_TX+	EtherCAT out transmit +
2	EtherCAT_OUT_TX-	EtherCAT out transmit -
3	Not Connected	
4	Not Connected	
5	Not Connected	
6	EtherCAT_OUT_RX+	EtherCAT out receive +
7	EtherCAT_OUT_RX-	EtherCAT out receive -
8	Not Connected	
9	Not Connected	
10	Not Connected	
Pin Positions		Cable Connector
		

Table 12: EtherCAT OUT Pin Assignments

7.10.1 EtherCAT Connection

The Platinum DB Quad can serve as an EtherCAT slave device. For this purpose it has two Ports X1 and X2, which are designated as EtherCAT IN and EtherCAT OUT.

The following drawing describes the EtherCAT communication, and the pinout drawing of the connector.

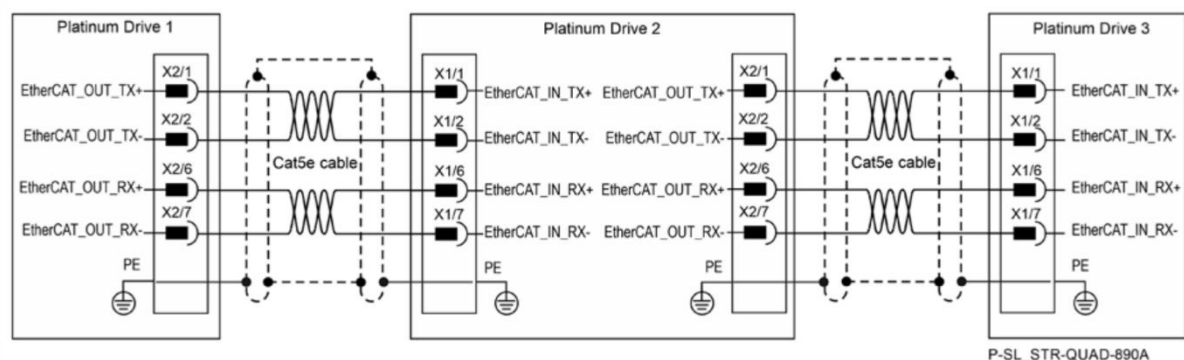


Figure 27: EtherCAT Schematic Diagram for Platinum-to-Platinum drive connections



Note: Always use CAT6e cables.

7.10.2 EtherCAT Status Indicator

The EtherCAT status indicator is a single red/green dual bi-colored LED that combines the green RUN indicator and the red ERROR indicator of the EtherCAT state machine.

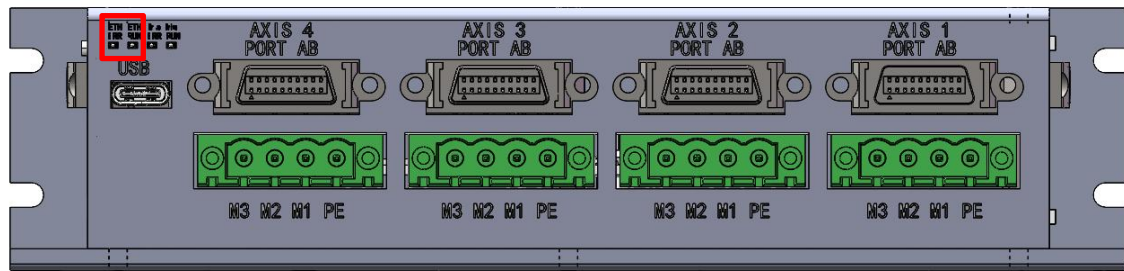
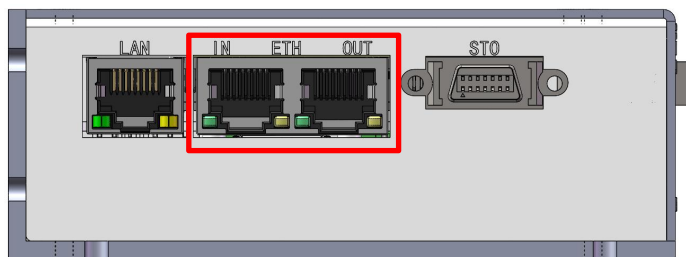


Figure 28: EtherCAT Status LED Indicator

7.10.3 EtherCAT Link Indicators

The Platinum DBQUA can serve as an EtherCAT slave device. For this purpose it has two RJ-45 connectors, which are designated as EtherCAT In and EtherCAT Out. Each of these RJ-45 connectors has two status LEDs, which are shown in Figure 36.

The green LED is the link/activity indicator. It shows the state of the applicable physical link and the activity on that link. The amber LED is the speed indicator. It shows the speed of the connection on the Ethernet line.



7.10.4 EtherCAT Address Switches

The EtherCAT address (of each axis), is specified by two switches. Using a screwdriver, you can set the low and the high bytes of the EtherCAT address.

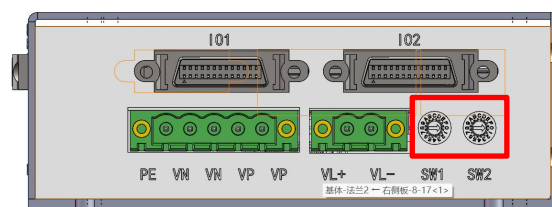


Figure 29: EtherCAT Address Switches

7.11 LAN Connector Pinouts (X6)

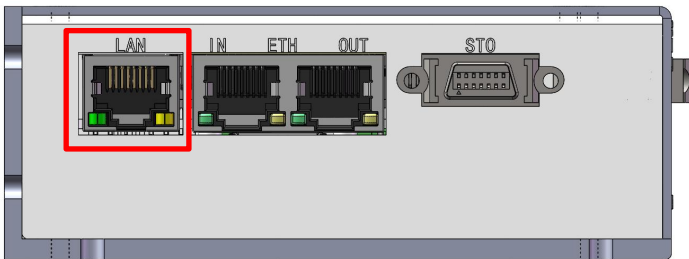
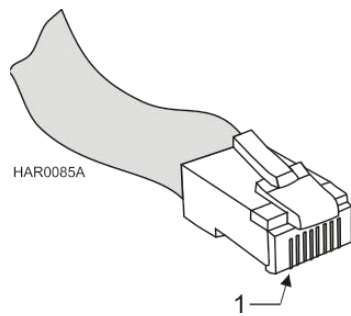
Pin (X6)	Signal	Function
1	LAN_TX+	Ethernet Transmit+
2	LAN_TX-	Ethernet Transmit-
3	Not Connected	
4	Not Connected	
5	Not Connected	
6	LAN_RX+	Ethernet Receive+
7	LAN_RX-	Ethernet Receive-
8	Not Connected	
9	Not Connected	
10	Not Connected	
Pin Positions		Cable Connector
		

Table 13: LAN Pin Assignments

7.11.1 LAN (X6)

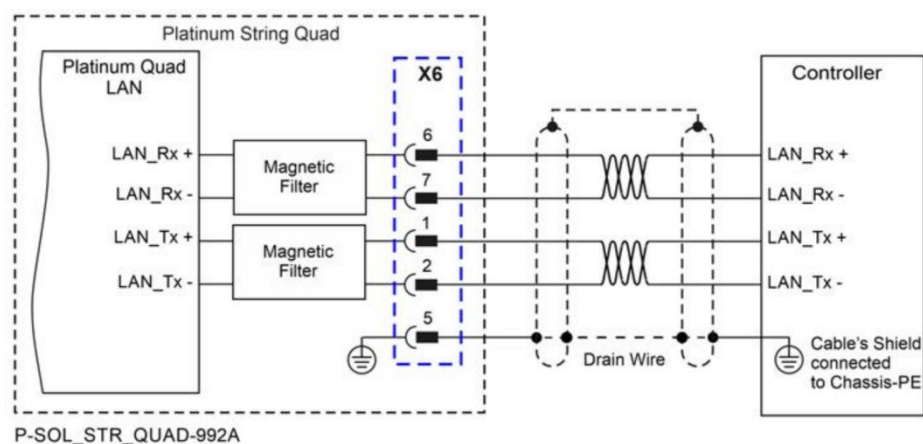


Figure 30: LAN Connection Schematic Diagram



Note: Always use CAT6e cables.

7.11.2 LAN Activity Indicator

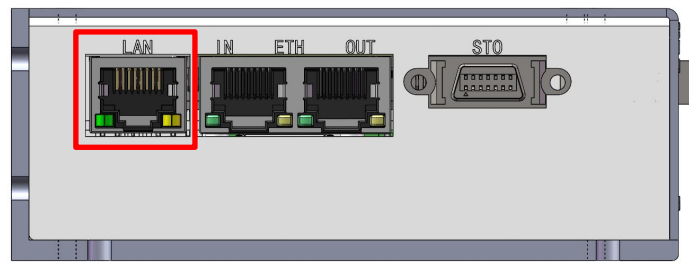


Figure 31: LAN Link Active Indicator

Chapter8: Powering Up



After the Platinum DB Quad is connected to its device, it is ready to be powered up.

Caution:

Before applying power, ensure that the DC supply is within the specified range and that the proper plus- minus connections are in order.

8.1 Initializing the System

After the Platinum DB Quad has been connected and mounted, the system must be set up and initialized. This is accomplished using the *EASII*, Elmo's Windows-based software application. Install the application and then perform setup and initialization according to the directions in the *EASII* User Manual.

8.2 Heat Dissipation

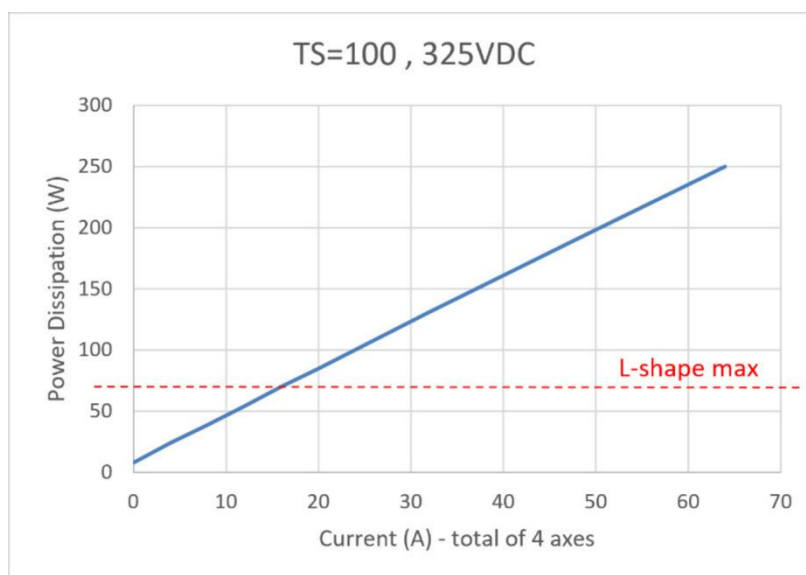
The best way to dissipate heat from the Platinum DB Quad is to mount it so that its heat-sink is attached to the machine chassis. If mounted with its heat-sink suspended, then for best results mount the servo drive faced upwards and leave approximately 10 mm of space between the Platinum DB Quad's heat-sink and any other assembly.

8.3 Heat Dissipation Data

Heat dissipation is shown graphically below and the information is for Ambient of 25°C:

It should be noted that:

- The Heat Sink of the PN model PSTR-Lz-zXX/400-zzzQ can dissipate up to 70W.
- The Heat Sink of the PN model PSTR-Bz-zXX/400-zzzQ can dissipate itself without an additional heat sin



8.4 How to Use the Charts

The chart above is based upon the theoretical worst-case scenario. The actual test results display a 20% -30% lower power dissipation.

The above chart indicates the net power conversion losses and exclude the power control losses.

To determine if your application heat dissipation requires a heat sink:

1. Determine the power dissipation according to the motor type support, "continuous current", and the DC bus voltage curve.

If the DC bus is not as the curve above, estimate the dissipation by interpolation. The estimation error is not critical.

2. The chart is calculated for continuous current operation. If the actual operation is pulsed current, add 25% to 30% to the power dissipation of the average (RMS) current.

3. When the Heat-Sink temperature reaches $\approx 85^{\circ}\text{C}$, the Platinum DB Quad will shut down.

Design the system for continuous operation so that the maximum Heat Sink temperature is no higher than between 80°C and 82°C .

4. When an external Heat-Sink is required, calculate the thermal resistance of the heat sink according to:

$$\theta_{\text{C/W}} = \frac{80^{\circ}\text{C} - T_{\text{Ambient}}}{\text{Heat Dissipation}}$$

Chapter9: Dimensions

This chapter provides detailed technical dimensions regarding the Platinum DB Quad .

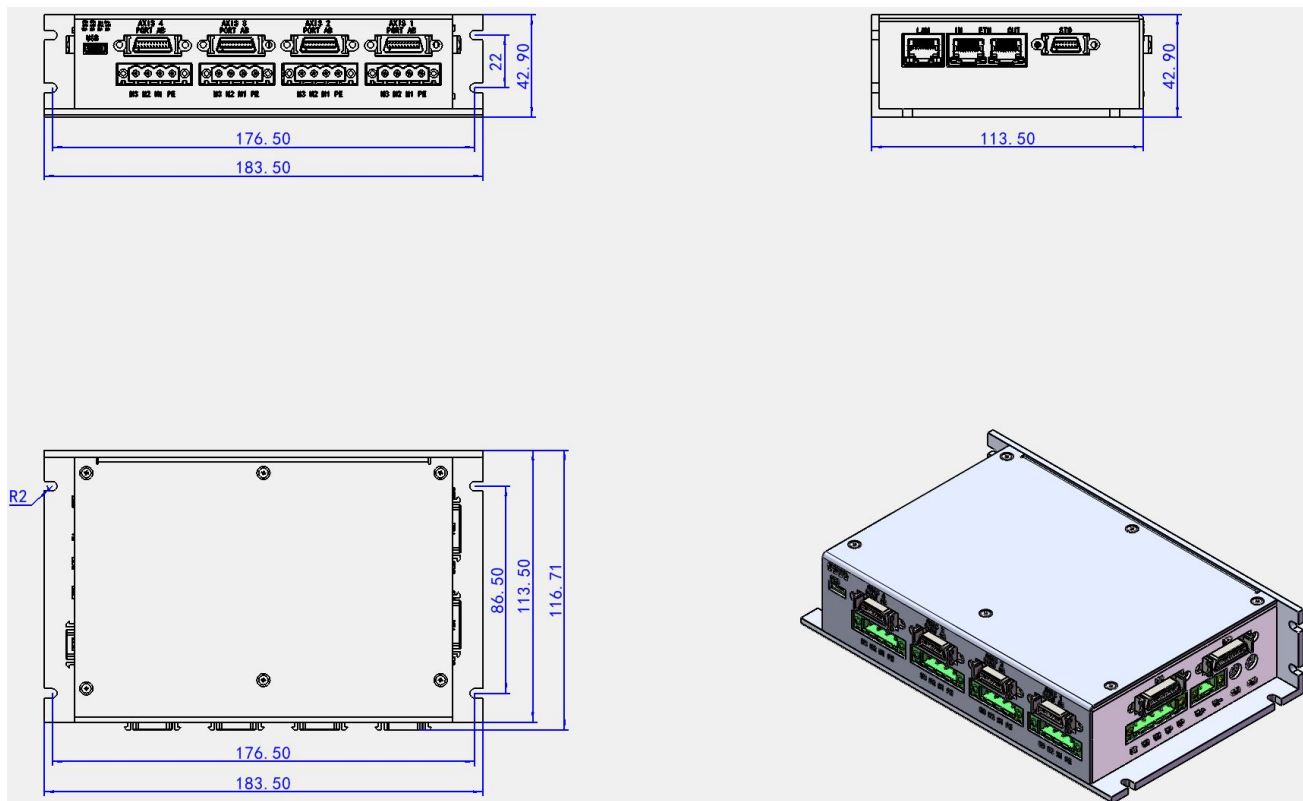


Figure 32: Platinum DBQUA

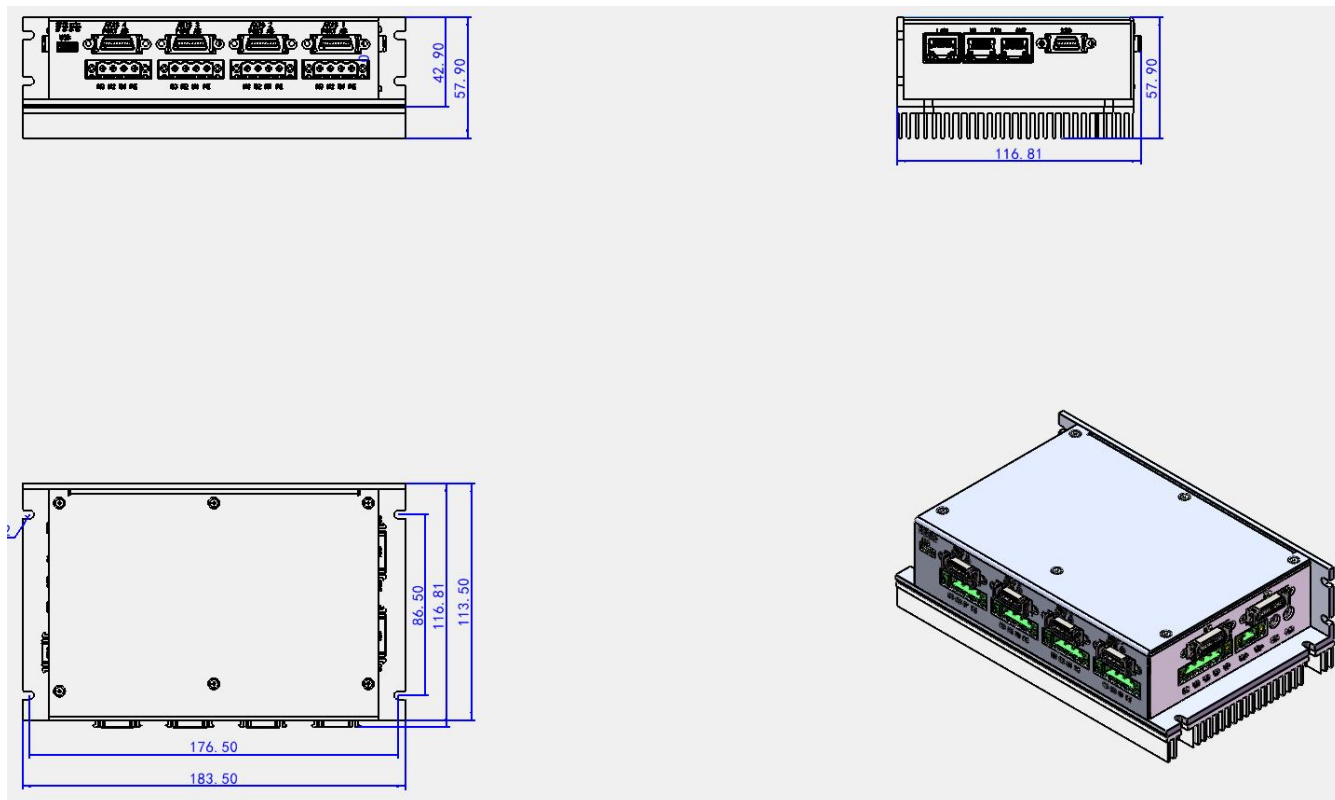


Figure 33: Platinum DBQUA with Fins Heat-Sink

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