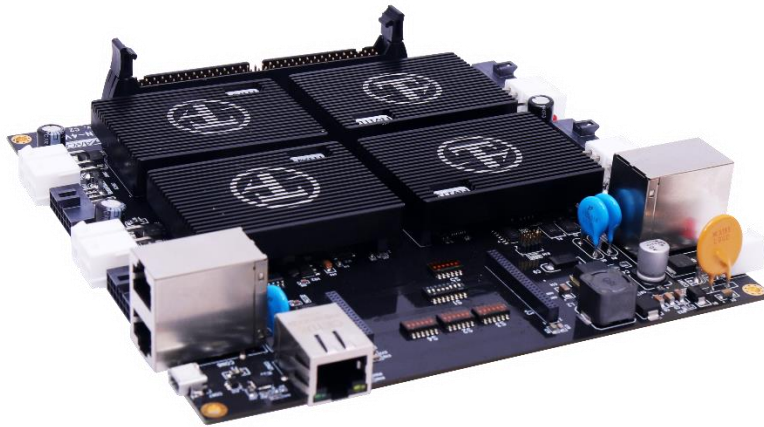


# TITAN-4VX

MULTI-AXIS UNIVERSAL SERVO MOTOR DRIVER/CONTROLLER



## USER MANUAL

Revision 4.0

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First Edition, Jan 2019

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## 1. Introduction

The TITAN-4VX is a single-board multi-axis closed loop servo driver/controllers with RS485 communication port and USB communication port.

The TITAN-4VX uses multiple TITAN-CRX servo core units on a single board to provide a cost-effective multi-axis driver-controller solution.

As with other TITAN servo driver-controller products, the TITAN-4VX can handle and servo control various types of commonly used motors in the automation industry, including:

- 2 Phase Stepper Motors
- 3 Phase Brushless Rotary Servo Motors
- 3 Phase Brushless Linear Servo Motors
- DC Motors
- Voice Coil Motors

Also, the TITAN-4VX has many advanced control features such as force control, joystick control, dynamic gains, A-Script programming, multi-thread standalone programming, auto performance-tuning, optimal gain-tuning, and many more.

Additionally, the TITAN-4VX has built-in 2ndSight motion analytics technology for the Industry 4.0 Smart Factory initiative. Each TITAN-CRX core is enabled with 2ndSight ports for plug-and-play connection with Arcus Servo Q-Nodes for seamless wireless connection to wireless controller and to the cloud.

## 1.1. Technical Features

- One RS485 communication ports using dual RJ45 connectors.
- USB 2.0 communication (Virtual COM Port)
- Communication Protocol supported:
  - TITAN-ASCII
  - TITAN-ASCII with CRC
  - MODBUS-ASCII
  - MODBUS-RTU
  - MODBUS-TCP
- Standalone programmable using Arcus A-SCRIPT language with support of 3 multi-thread programs
- Dual Power Input Specifications:
  - Motor Power: 24-48 VDC / 8.0A max rated / 16A peak current
  - Logic Power: 24-24VDC
- Multiple types of motor support:
  - 2 Phase Bipolar Stepper Motors
  - 3 Phase Brushless Rotary Servo Motors
  - 3 Phase Brushless Linear Servo Motors
  - DC Motors
  - Voice Coil Motors
- Opto-isolated Digital IO:
  - 32 TTL digital inputs
  - 12 digital outputs
  - 4 analog inputs
- Differential ABZ encoder inputs
- UVW Hall sensor digital inputs – single-ended

## 2. Electrical and Thermal Specifications

Parameter	Min	Max	Units
Motor Power Input <sup>1</sup>	+24	+48	V
	-	8	A
Control Power Input	+24	+48	V
		1	A
Operating Temperature <sup>2</sup>	-20	+80	°C
Storage Temperature <sup>2</sup>	-55	+150	°C

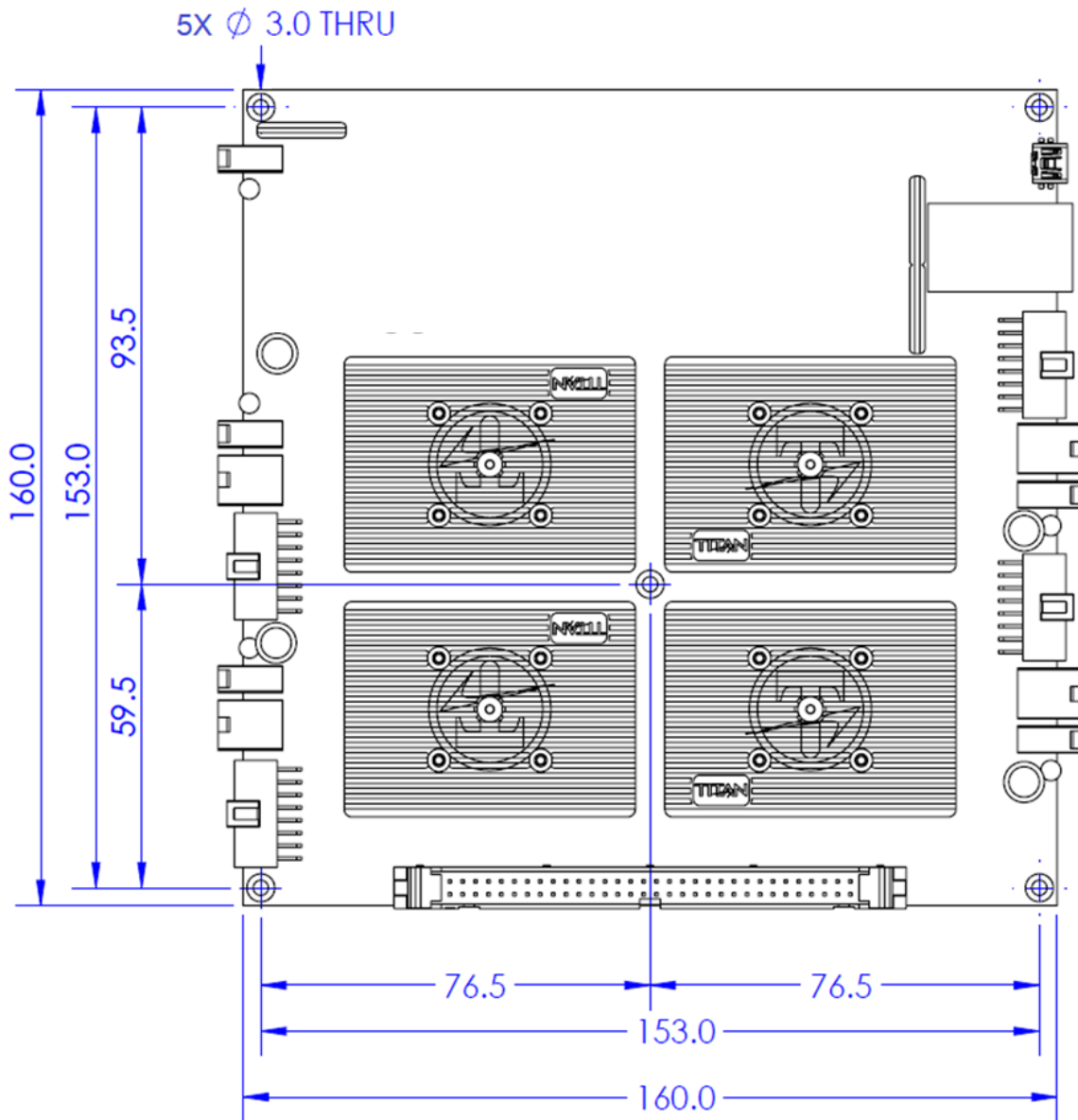
Table 1.0

<sup>1</sup>One power input per axis. The supply current should match the driver's current setting.

<sup>2</sup>Based on component ratings.

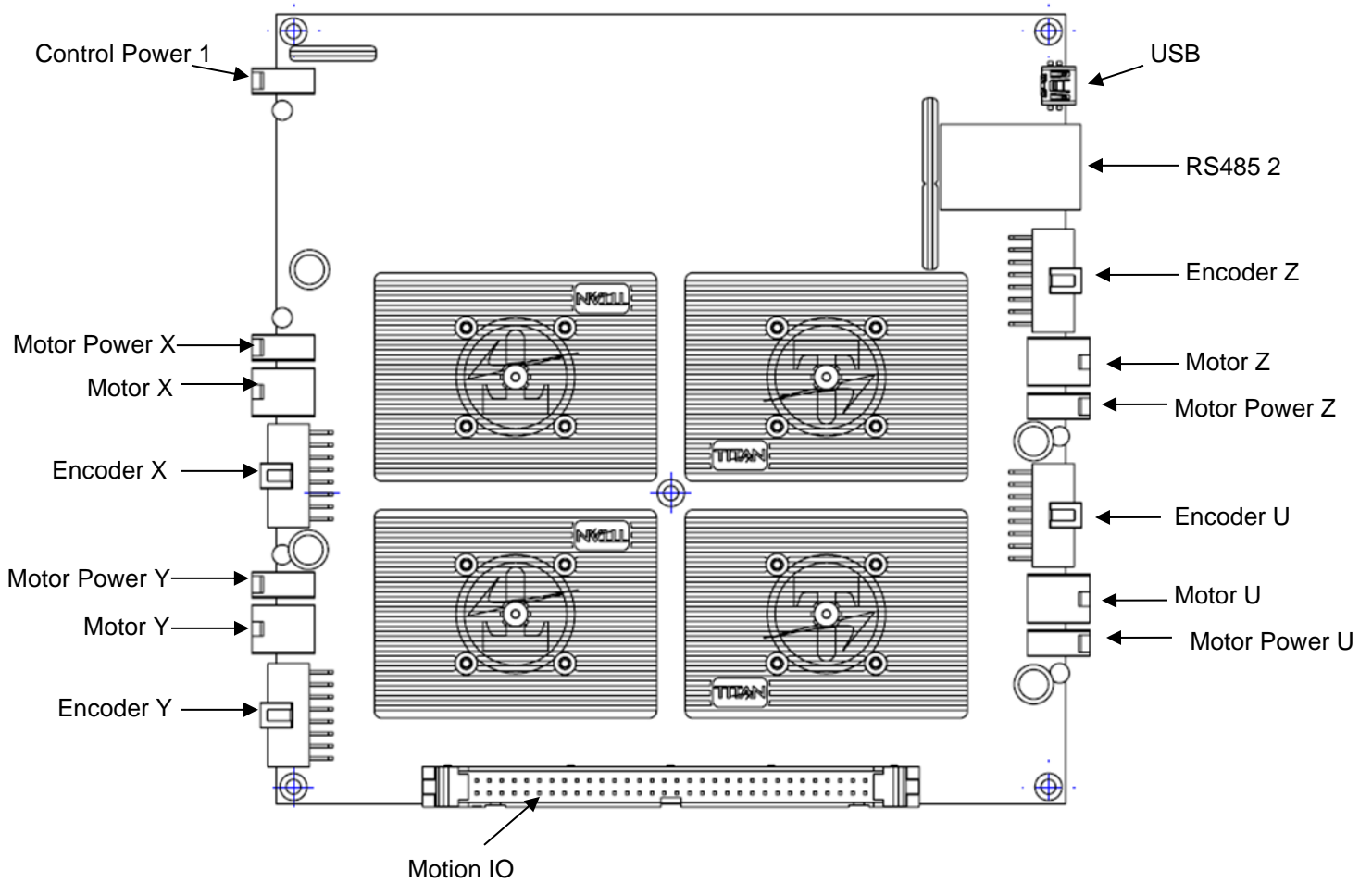
### 3. Dimensions

#### TITAN-4VX



## 4. Connectivity

### TITAN-4VX





## 4.1. Motor Power Connectors

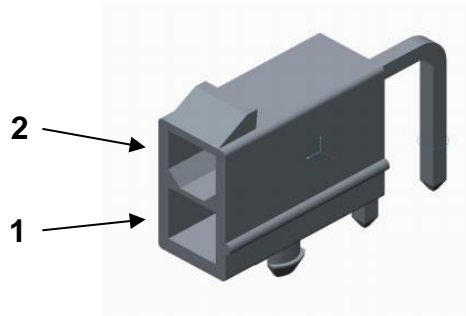


Figure 2.0

Pin #	Name	Description
1	V+	Power Input +24 to +48 VDC
2	G	Power Supply Ground

Table 2.0

Mating Connector Description: 2-pin Mini Fit Jr connector  
 Mating Connector Manufacturer: Molex  
 Mating Connector Manufacturer Part: † 39-01-2025

† Other compatible connectors can be used.

Motor Power is used to power the FET circuit for controlling the power to the motor.

Motor Power is separate from Control Power, which is used to power the logic circuit.

The Motor Power voltage range must be between +24V and +48V DC. For typical motion applications, a +24V power supply is recommended. For high-speed applications, a +48V power supply is recommended, but note that higher voltage and high-speed applications will generate more heat.

The Motor Power current must be enough to meet the current requirement of the motor. For example, if the motor current is set for a maximum of 3A, confirm that the Motor Power supply has enough current to support the max motor current requirement.

Motor Power has built-in reverse voltage protection to disable voltage input if the polarity is reversed.

An LED located next to the Motor Power connector lights up when voltage is supplied.

## 4.2. Control Power Connectors

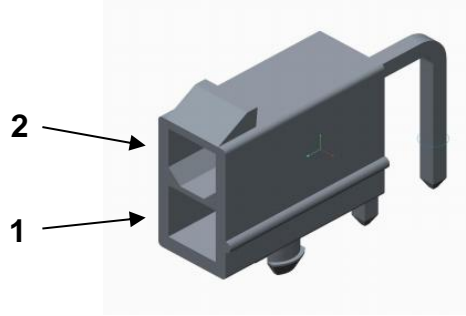


Figure 2.1

Pin #	Name	Description
1	V+	Power Input +24 to +36 VDC
2	G	Power Supply Ground

Table 2.1

Mating Connector Description: 2-pin Mini Fit Jr connector  
 Mating Connector Manufacturer: Molex  
 Mating Connector Manufacturer Part: †39-01-2025

† Other compatible connectors can be used.

Control Power is used to power the logic circuits of the TITAN-CORE units.

Control Power is separate from Motor Power which is used to power the motor FET's.

The Control Power voltage range must be between +24V and +48V DC. Clean, steady +24V power is recommended for Control Power.

Control Power is recommended to be separate from Motor Power since Motor Power may induce back EMF and voltage fluctuations.

Control Power has built-in reverse voltage protection to disable voltage input if the polarity is reversed.

An LED located next to the Control Power connector lights up when voltage is supplied.

### 4.3. Motor Connectors

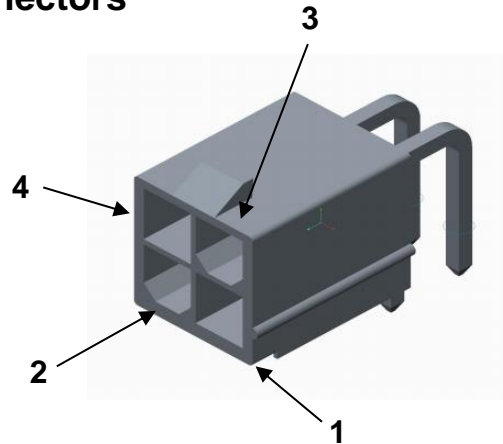


Figure 2.2

Depending on the type of motor, follow the motor connection shown below.

3 Phase BLDC/PMSM Motor (Rotary and Linear)		
Pin #	Name	Description
1	V	Motor V
2	U	Motor U
3	W	Motor W
4	NC	No Connection

Voice Coil		
Pin #	Name	Description
1	+	Motor +
2	-	Motor -
3	NC	No Connection
4	NC	No Connection

2 Phase Bi-Polar Stepper Motor		
Pin #	Name	Description
1	A	Motor A
2	B	Motor B
3	/A	Motor /A
4	/B	Motor /B

Table 2.2

Mating Connector Description: 4 pin Mini Fit Jr connector  
 Mating Connector Manufacturer: Molex  
 Mating Connector Manufacturer Part: † 39-01-2045

† Other compatible connectors can be used.

## Important Note



Do **NOT** disconnect the motor wires or motor connector while the motor is enabled or when the motor is moving.

Make sure to turn off the power or make sure that the motor is disabled when disconnecting the motor from the driver.

Plugging or unplugging the motor while the motor is enabled may damage the motor and/or the electronics.

## 4.4. Encoder/Hall Sensor Connector

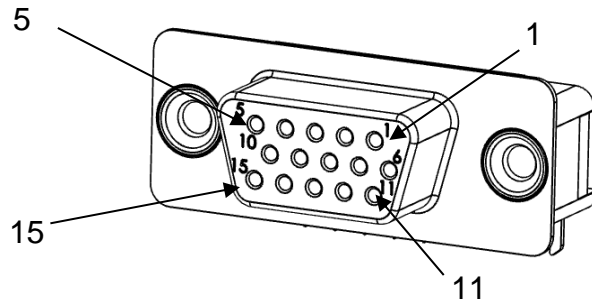


Figure 2.3

Pin #	In/Out	Name	Description
1	I	EA+	Differential Encoder A+ Signal Input
2	I	EA-	Differential Encoder A- Signal Input
3	I	EB+	Differential Encoder B+ Signal Input
4	I	EB-	Differential Encoder B- Signal Input
5	I	EZ+	Differential Encoder Z+ Signal Input
6	I	EZ-	Differential Encoder Z- Signal Input
7	O	+5V	+5V Output for Encoder and Hall Power
8	O	GND	GND for Encoder and Hall Power
9	NC	NC	No connection
10	NC	NC	No connection
11	NC	NC	No connection
12	I	HU	Hall Sensor U Input
13	I	HV	Hall Sensor V Input
14	I	HW	Hall Sensor W Input
15	NC	NC	No connection

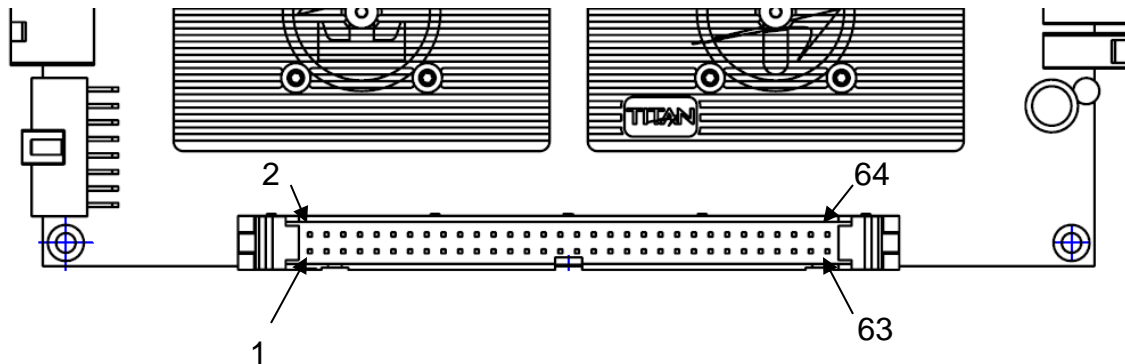
Table 2.3

Mating Connector Description: 15-pin DSUB15 HD Male  
Mating Connector Manufacturer: Molex  
Mating Connector Manufacturer Part: † 1731130058

† Other compatible connectors can be used.

- Both single ended and differential quadrature incremental encoder inputs are accepted. The maximum encoder input frequency is 8MHz.
- When using single-ended encoders, use the A-, B-, and Z- inputs.
- +5V can be used to power the encoder and the hall sensors. The maximum current allowed for the +5V is 500mA. If more than 500mA is required, use an external +5V power supply.

## 4.5. Motion I/O Connector



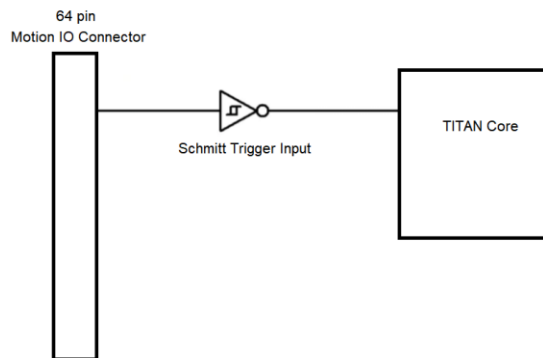
Description	I/O	Pin	I/O	Description
+5V	O	1	2	O +5V
PUL / Digital Input 1 [X]	I	3	4	I DIR / Digital Input 2 [X]
ENA / Digital Input 3 [X]	I	5	6	I CLR / Digital Input 4 [X]
RST / Digital Input 5 [X]	I	7	8	I +LIM / Digital Input 6 [X]
Home / Digital Input 7 [X]	I	9	10	I -LIM / Digital Input 8 [X]
In Pos / Digital Output 3 [X]	O	11	12	O Alarm / Digital Output 1 [X]
Digital Output 2 [X]	O	13	14	I Analog Input [X]
No Connection	NC	15	16	NC No Connection
No Connection	NC	17	18	NC No Connection
PUL / Digital Input 1 [Y]	I	19	20	I DIR / Digital Input 2 [Y]
ENA / Digital Input 3 [Y]	I	21	22	I CLR / Digital Input 4 [Y]
RST / Digital Input 5 [Y]	I	23	24	I +LIM / Digital Input 6 [Y]
Home / Digital Input 7 [Y]	I	25	26	I -LIM / Digital Input 8 [Y]
In Pos / Digital Output 3 [Y]	O	27	28	O Alarm / Digital Output 1 [Y]
Digital Output 2 [Y]	O	29	30	I Analog Input [Y]
No Connection	NC	31	32	NC No Connection
No Connection	NC	33	34	NC No Connection
PUL / Digital Input 1 [Z]	I	35	36	I DIR / Digital Input 2 [Z]
ENA / Digital Input 3 [Z]	I	37	38	I CLR / Digital Input 4 [Z]
RST / Digital Input 5 [Z]	I	39	40	I +LIM / Digital Input 6 [Z]
Home / Digital Input 7 [Z]	I	41	42	I -LIM / Digital Input 8 [Z]
In Pos / Digital Output 3 [Z]	O	43	44	O Alarm / Digital Output 1 [Z]
Digital Output 2 [Z]	O	45	46	I Analog Input [Z]
No Connection	NC	47	48	NC No Connection

No Connection	NC	49	50	NC	No Connection
PUL / Digital Input 1 [U]	I	51	52	I	DIR / Digital Input 2 [U]
ENA / Digital Input 3 [U]	I	53	54	I	CLR / Digital Input 4 [U]
RST / Digital Input 5 [U]	I	55	56	I	+LIM / Digital Input 6 [U]
Home / Digital Input 7 [U]	I	57	58	I	-LIM / Digital Input 8 [U]
In Pos / Digital Output 3 [U]	O	59	60	O	Alarm / Digital Output 1 [U]
Digital Output 2 [U]	O	61	62	I	Analog Input [U]
Ground	O	63	64	O	Ground

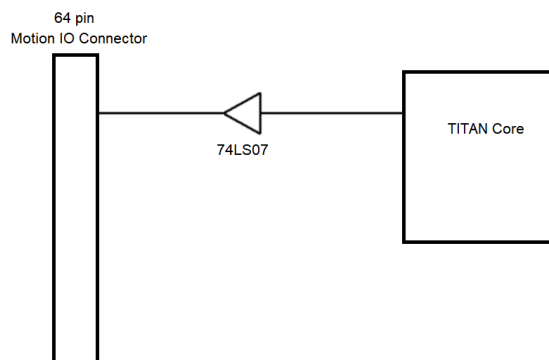
Table 2.4

Connector Part Number: XG4A-6431  
 Mating Connector Description: 64-Pin IDC Connector  
 Mating Connector Manufacturer: Omron  
 Mating Connector Manufacturer Part: XG4M-6430-T

Digital inputs from the Motion IO connector are internally buffered through the 74LS14 Schmitt Trigger IC before the signal is connected to the TITAN-CRX inputs.

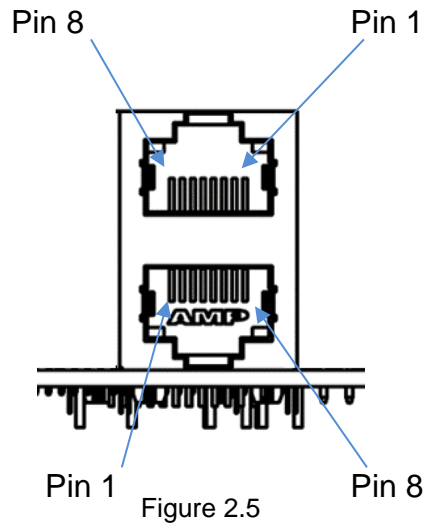


Digital outputs from the TITAN-CRX are buffered through 74LS07 IC before the signals are output to the Motion IO connector.



A total of 4 analog inputs (12-bit) are available with a voltage input range of 0 to 5V.

## 4.6. RS485 Communication



Pin #	In/Out	Name	Description
1	O	GND	Ground
2	O	GND	Ground
3	I	485+	RS485+ signal
4	O	GND	Ground
5	O	GND	Ground
6	I	485-	RS485- signal
7	O	GND	Ground
8	O	GND	Ground

Table 2.5

There is one RS-485 communication port available. RS485 communication port has two RJ45 connectors for easy multi-drop networking.

The following are the communication settings for both RS-485 and USB connections:

Parameter	Setting
Baud Rate	115,200
Byte Size	8 bits
Parity	None
Flow Control	None
Stop Bit	1



## **4.7. USB Communication**

A USB communication port is available on the TITAN-4VX.

USB communication uses virtual COM port chip CP2102 for easy interface with Windows, Linux, and Mac OS.

The USB communication settings are the same as the RS485 communication settings.

## **4.8. Ethernet Communication (To be released)**

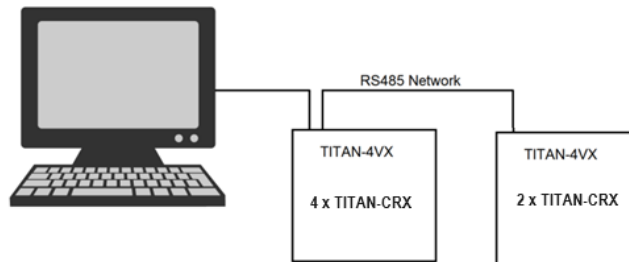
Optional Ethernet communication is available for TITAN-4VX.

## 5. Multi-Axis Networking

The TITAN-4VX is able to perform 4-axis control through RS485 or USB.

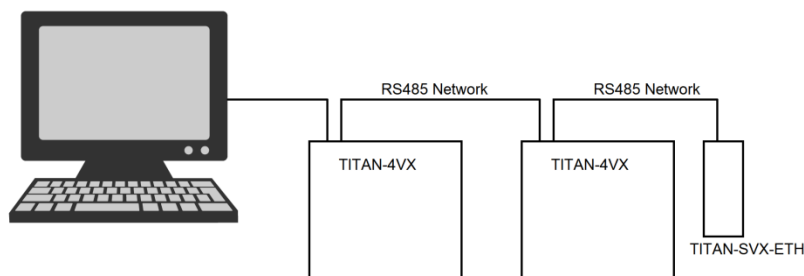
If more axis control is required, RS485 communication can be used to network multiple TITAN-4VX using network ID assignments.

The following is an example of a 6-axis control system using two TITAN-4VX with first TITAN-4VX with 4xTITAN-CRX and second TITAN-4VX with 2 x TITAN-CRX.



Other TITAN products, such as TITAN-SVX-ETH, TITAN-SVX-SC2, TITAN-NXS-SC2, and TITAN-IMX-23, can also be on the RS485 network.

The following is an example of a 9-axis system using two TITAN-4VX (each with 4xTITAN-CRX) and one TITAN-SVX-ETH on an RS485 network.



## **Contact Information**

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