MDXK

Integrated Servo Manual

Hardware Manual

Applied Motion Products, Inc.

Contents

MDX Models Available:

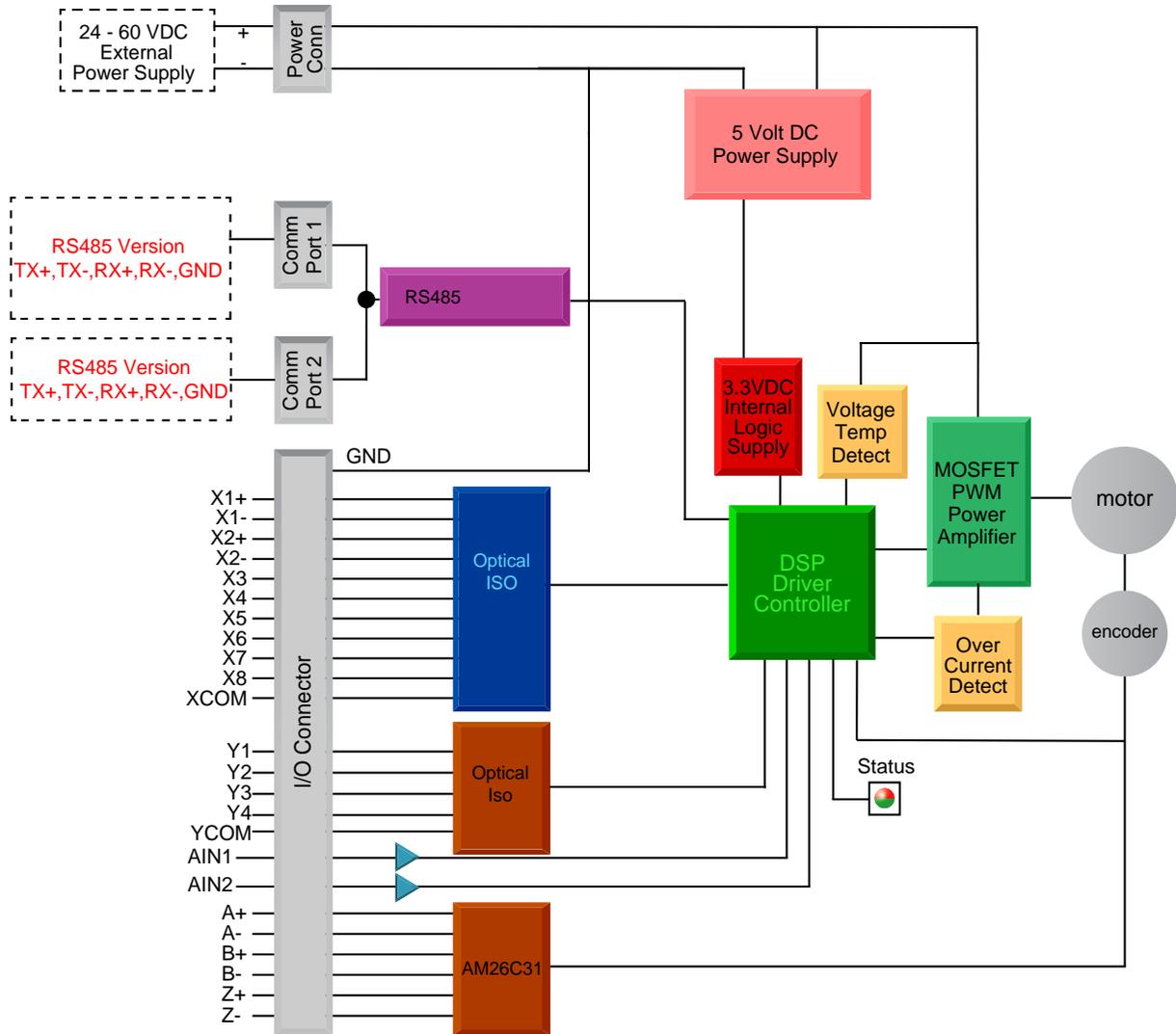| Model	Communication	
	RS-485	CANopen
MDXK61GN3RB000	✓	
MDXK62GN3RB000	✓	
MDXK61GN3CB000		✓
MDXK62GN3CB000		✓

1 Introduction

Thank you for selecting Applied Motion Products' MDX Integrated Servo Motor. The MDX Integrated Servo Motors combine the high torque-density, low rotor-inertia design of J Series Servo Motors with the all-digital servo drive technology of the SV200 Servo Drives. The result is an integrated, all-in-one servo motor where feedback, servo drive and servo controller are housed in the same package as the motor.
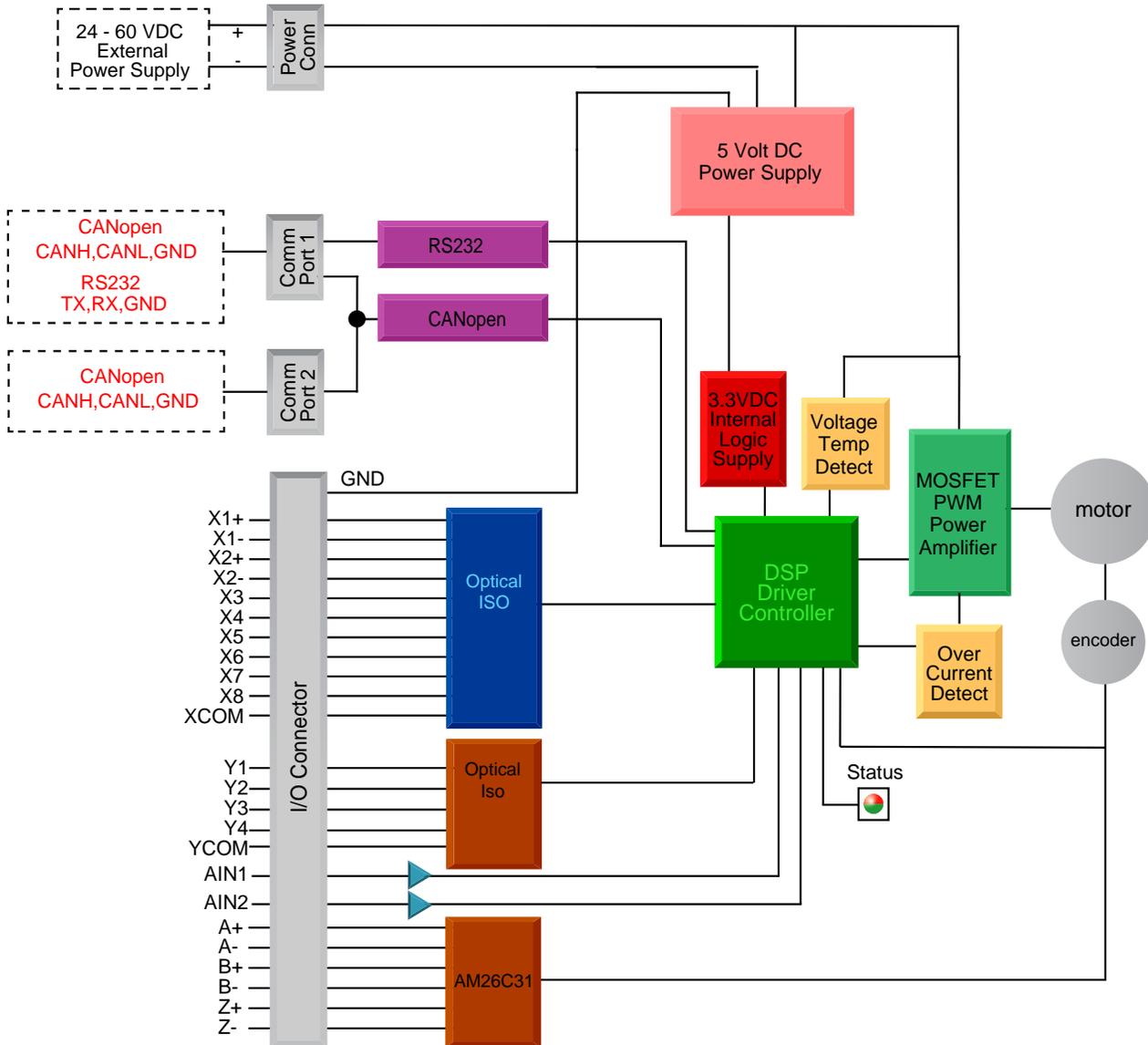
1.2 Features

- Programmable, digital servo driver and motor in an integrated package
- Operates from a 24 to 60 volt DC power supply
- Control modes:
    Torque control

        Analog Torque
        SCL commanded
    Velocity control

        Fixed velocity
        Analog velocity
        SCL commanded

    Position control

        Digital signal type Step & Direction, CW & CCW pulse, A/B Quadrature
        Analog Position
        CW/CCW
        SCL commanded
    Communication control
        RS485 (support Modbus), CANopen

- Q Programming
    Stand alone operation

- Communications

    RS-485
    CANopen
- Encoder feedback
- Power output
    MDXK61:   200 Watt rating
    MDXK62:   400 Watt rating
- Input/Output
    8 optically isolated digital inputs, with adjustable bandwidth digital noise rejection filter, 5 to 24 volts
    4 optically isolated digital outputs, 30V/100 mA max
    2 analog input for speed and position, torque control
    Encoder output A/B/Z (16384 counts/rev)

- Technological advances

    Full servo control, Closed loop
    Efficient, Accurate, Fast, Smooth
    Intelligent, Compact

1.3 Block Diagrams

MDX-IP20   RS485   Block Diagram

MDX-IP20   CANopen   Block Diagram

24 - 60 VDC External Power Supply

+

-

Power Conn

5 Volt DC Power Supply

CANopen
CANH,CANL,GND

RS232
TX,RX,GND

Comm Port 1

RS232

CANopen

CANH,CANL,GND

Comm Port 2

CANopen

3.3VDC Internal Logic Supply

Voltage Temp Detect

MOSFET PWM Power Amplifier

motor

I/O Connector

GND

X1+
X1-
X2+
X2-
X3
X4
X5
X6
X7
X8
XCOM

Optical ISO

DSP Driver Controller

encoder

Over Current Detect

Y1
Y2
Y3
Y4
YCOM
AIN1
AIN2

Optical Iso

Status

A+
A-
B+
B-
Z+
Z-

AM26C31

1.4 Safety Instructions

Only qualified personnel should transport, assemble, install, operate, or maintain this equipment. Properly qualified personnel are persons who are familiar with the transport, assembly, installation, operation, and maintenance of motors, and who meet the appropriate qualifications for their jobs.

To minimize the risk of potential safety problems, all applicable local and national codes regulating the installation and operation of equipment should be followed. These codes may vary from area to area and it is the responsibility of the operating personnel to determine which codes should be followed, and to verify that the equipment, installation, and operation are in compliance with the latest revision of these codes.

Equipment damage or serious injury to personnel can result from the failure to follow all applicable codes and standards. Applied Motion Products' does not guarantee the products described in this publication are suitable for a particular application, nor do they assume any responsibility for product design, installation, or operation

- Read all available documentation before assembly and operation. Incorrect handling of the products referenced in this manual can result in injury and damage to persons and machinery. All technical information concerning the installation requirements must be strictly adhered to.

- It is vital to ensure that all system components are connected to earth ground. Electrical safety is impossible without a low-resistance earth connection.

- This product contains electrostatically sensitive components that can be damaged by incorrect handling. Follow qualified anti-static procedures before touching the product.

- During operation keep all covers and cabinet doors shut to avoid any hazards that could possibly cause severe damage to the product or personal health.

- During operation, the product may have components that are live or have hot surfaces.

- Never plug in or unplug the Integrated Motor while the system is live. The possibility of electric arcing can cause damage.

Be alert to the potential for personal injury. Follow recommended precautions and safe operating practices emphasized with alert symbols. Safety notices in this manual provide important information. Read and be familiar with these instructions before attempting installation, operation, or maintenance. The purpose of this section is to alert users to the possible safety hazards associated with this equipment and the precautions necessary to reduce the risk of personal injury and damage to equipment. Failure to observe these precautions could result in serious bodily injury, damage to the equipment, or operational difficulty.

2 Gettting Started

The following items are needed:

- a 24 - 60 Volt DC power supply, see the section below entitled "Choosing a Power Supply" for help in choosing the right one

- a flat blade screwdriver (included)

- a PC running Microsoft Windows XP (SP3), or Windows 7, 8, or 10 with an RS-232 serial communication port, otherwise a USB to RS-232 serial port converter is needed. For CANopen drives, CANopen communication tool is required.

- A power cable, I/O cable (optional), and communication cable.

2.1 Installing Software

Before utilizing the MDX Integrated Servo Motor and MDX Servo Suite Software in an application, the following steps are necessary:

- Install the MDX Servo Suite software from Applied Motion Products' website

- Connect the drive to the PC using the programming cable. When using RS-485, it is best to be setup in a 4-Wire configuration (see Section 3.2.2 "Connecting to a host using RS-485".)

- Connect the drive to the power supply. See instructions below.

- Launch the software by clicking Start...Programs...Applied Motion Products.

2.2 Mounting the Hardware

As with any servo motor, the MDX must be mounted so as to provide maximum heat sinking and airflow. Keep enough space around the Integrated Motor to allow for the airflow.

- Never use the drive where there is no airflow or where other maximum heat sinking and surrounding air to be more than 40°C (104°F).
- Never put drive where it can get wet.
- Never use the drive where metal or other electrically conductive particles can infiltrate the drive.

2.3 Choosing a Power Supply

The main considerations when choosing a power supply are the voltage and current requirements for the application.

2.3.1 Supply Voltage

The MDX is designed to give optimum performance at 48 Volts DC. Choosing the voltage depends on the performance needed and motor/drive heating that is acceptable and/or does not cause a drive over-temperature. Higher voltages will give higher speed performance but will cause the MDX to produce higher temperatures. Using power supplies with voltage outputs that are near the drive's maximum may significantly reduce the operational duty-cycle.

The extended range of operation can be as low as 18VDC minimum to as high as 60VDC maximum. When operating below 24VDC, the power supply input may require larger capacitance to prevent under-voltage and internal-supply alarms. Current spikes may make supply readings erratic. The supply input cannot go below 18VDC for reliable operation. Absolute minimum power supply input is 18VDC. If the input supply drops below 15VDC the low voltage fault will be triggered. This will disable the drive.

Absolute maximum power supply input is 80VDC at which point an over-voltage alarm and fault will occur. When using a power supply that is regulated and is near the drive maximum voltage of 60VDC, a voltage clamp may be required to prevent over-voltage when regeneration occurs. When using an unregulated power supply, make sure the no-load voltage of the supply does not exceed the drive's maximum input voltage of 60VDC.

2.3.2 Regeneration Clamp

If a regulated power supply is being used, there may be a problem with regeneration. When a load decelerates rapidly from a high speed, some of the kinetic energy of the load is transferred back to the power supply, possibly tripping the over-voltage protection of a regulated power supply, causing it to shut down. This problem can be solved with the use of a Applied Motion Products RC880 Regeneration Clamp. It is recommended that an RC880 initially be installed in an application. If the "regen" LED on the RC880 never flashes, the clamp is not necessary.

RC880 Regen Clamp

2.3.3 Supply Current

The maximum supply currents required by the MDX are shown in the charts below at different power supply voltage inputs. It is important to note that the current draw is significantly different at higher speeds depending on the torque load to the motor. Estimating how much current is necessary may require a good analysis of the load the motor will encounter.
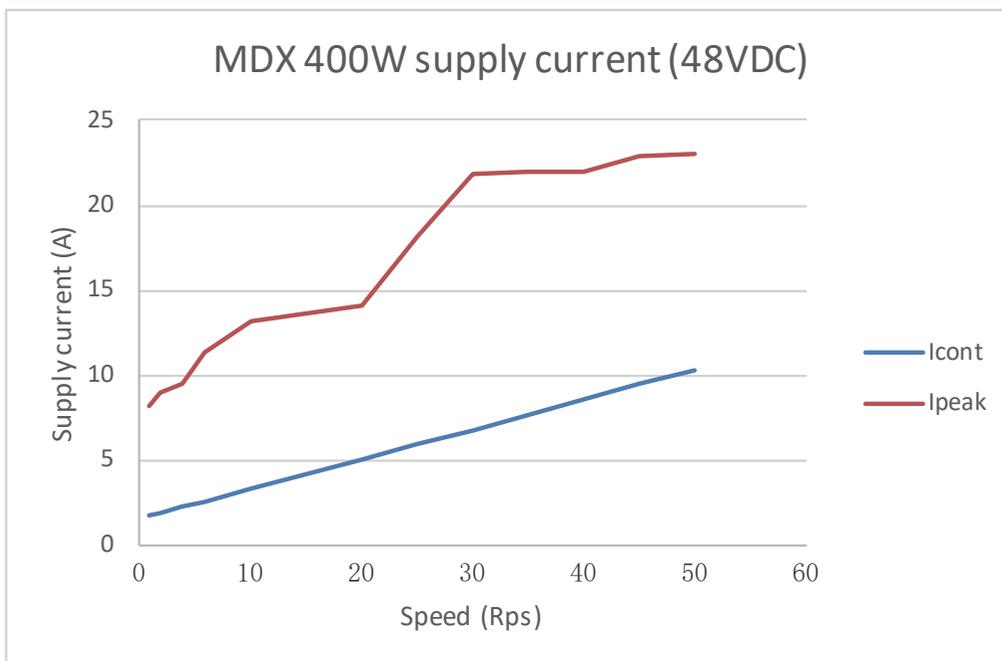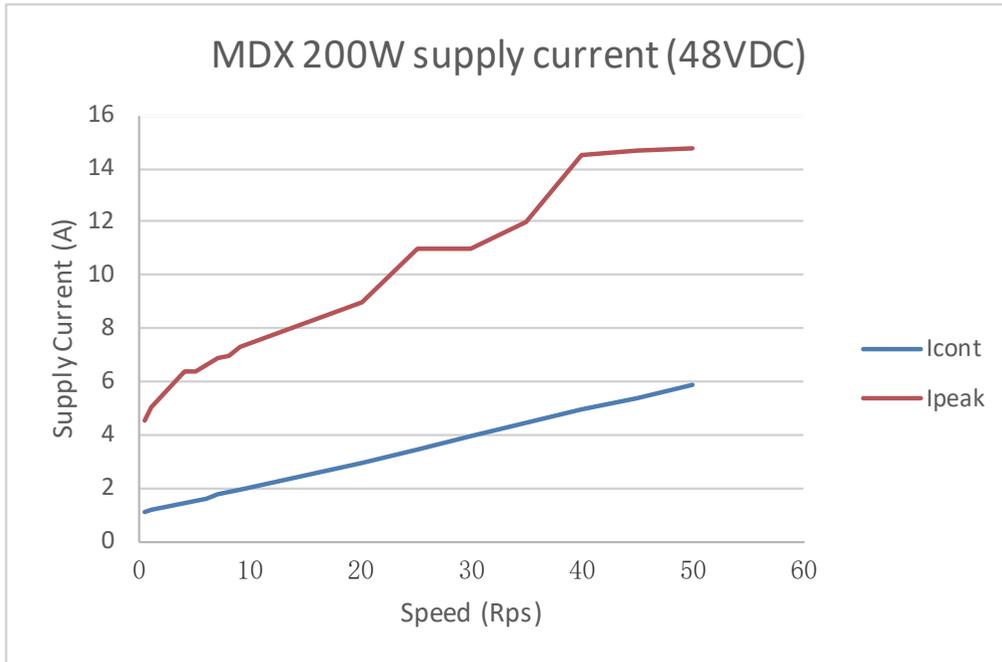
3 Connections

3.1 Connecting the Power Supply

The MDX contains an internal fuse connected to the "+" terminal that is not user replaceable. If a user serviceable fuse is desired, install a fast acting fuse in line with the "+" power supply lead.

3.1.1 Connect Main Power Supply

MDX needs 24 to 60VDC for the main power supply.

Be Careful not to reverse the wires. Reversing the connection may open the intneral fuse on the drive and void the warranty.

3.2 Connecting the MDX Communications

The MDX is available with 2 different communications types, RS-485 /422, CANopen . Each type requires a different hardware connection for interface to a PC or other Host system.

Part of the communication mating cables are NOT included and must be purchased separately. The following describes in detail how several communication modes of MDX are connected to PC respectively.

3.2.1 Connecting to a Host using RS-485

RS-485 communication allows connection of more than one drive to a single host PC, PLC, HMI or other computer. It also allows the communication cable to be long (more than 30 meters or 100 feet). A shielded cable is recommended.

The MDX can be used with either Two-Wire or Four-Wire RS-485 implementation. The connection can be point-to-point (i.e. one drive and one host) or a multi-drop network (one host and up to 32 drives).

NOTE: To use the MDX RS-485 version with the MDX Servo Suite software, it is better to be connected in the Four-Wire configuration (see below)
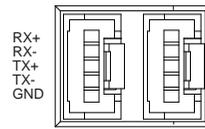

RS-485 Connector Diagram

Four-Wire Configuration

Four-Wire Systems utilize separate transmit and receive wires. One pair of wires must connect the host's transmit signals to each drive's RX+ and RX- terminals. The other pair connects the drive's TX+ and TX- terminals to the host's receive signals. A logic ground terminal is provided on each drive and can be used to keep all drives at the same ground potential.

Because the host in a four-wire system never needs to disable its transmitter, software is simplified. Some converters make this process very difficult to implement and can delay communications.
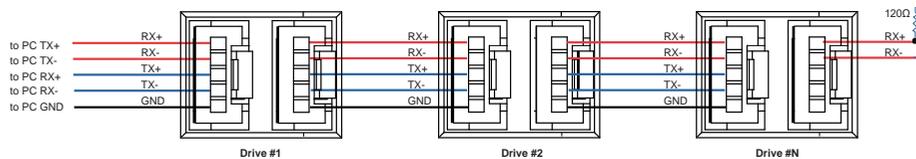
NOTE: If the PC does not have an RS-485 serial port, a converter is required . You can contact Applied Motion Products to buy a USB to RS-485 converter.

Two-Wire Configuration

In a 2-wire system, the host must disable its transmitter before it can receive data. This must be done quickly before a drive begins to answer a query. The MDX includes a transmit delay parameter that can be adjusted to compensate for a host that is slow to disable its transmitter. This adjustment can be made over the network using the TD command, or it can be set using the MDX Servo Suite software. It is not necessary to set the transmit delay in a four wire system.
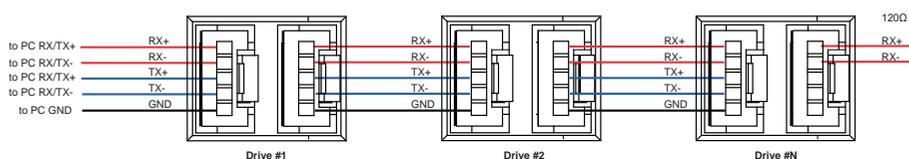
NOTE: If the PC does not have an RS-485 serial port, a converter is required . You can contact Applied Motion Products to buy a USB to RS-485 converter.

Assigning Addresses

Before the entire system is wired, each drive will need to connect individually to the host computer so that it can be assigned a unique address.

Once the drive has been connected to the PC as described above, launch the MDX Servo Suite software. select a right COM port and the apply power to the drive. If a drive has already been configured, click the Upload button so that the MDX Servo Suite settings match those of the drive. When operating the drive in SCL mode it will need to be assigned an address. This is done on the Drive Configuration tab where a list of address options can be seen. The numerals 0..9 or the special characters ! " #$ % & ' ( ) * + , - . / : ; < = > ? @ may be used as addresses. Make sure each drive on the network has a unique address. On a 2-wire network, the Transmit Delay may also need to be set. Most adapters work well with 10 milliseconds. Once the address has been assigned, click Download to save the settings to the drive.
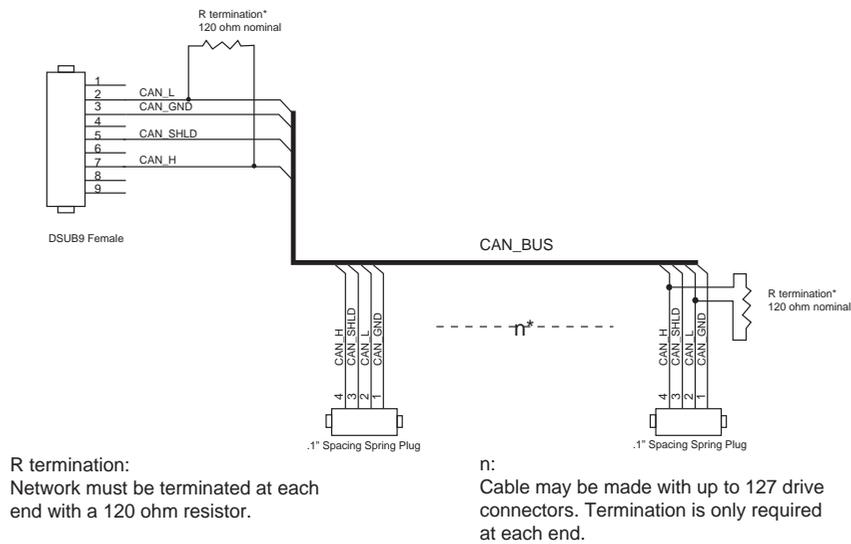
3.2.2 Connecting to a Host using CANopen

Two standard 5-pin disconnectable crimp style connectors are used for the communications interface of MDX CANopen version. Only COM1 can be used to configure the MDX CANopen version by RS-232 serial interface.
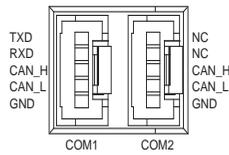
CANopen Connector Diagram

The RS-232 interface is used for configuration, tuning, node ID setting and Q program downloading. The CANopen network should be connected in a daisy-chain fashion, with a 120 ohm terminating resistor at each end of network.

R termination:
Network must be terminated at each end with a 120 ohm resistor.

n:
Cable may be made with up to 127 drive connectors. Termination is only required at each end.

NOTE: If the PC does not have an RS-485 serial port, a converter is required . You can contact Applied Motion Products to buy a USB to RS-485 converter.

The RS-232 Circuitry does not have any extra electrical "hardening" and care should be taken when connecting to the RS-232 port as hot plugging could result in circuit failure.

3.2.2.1 Node ID

Each node on a CANopen network must have a unique Node ID. The Node ID is configured by using MDX Servo Suite. The range of the CANopen Node IDs is 1 - 127. Any changes to the NOD require either a power cycle or a CANopen reset command to take effect.
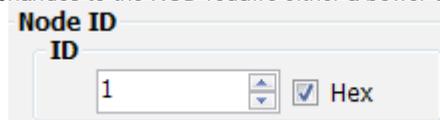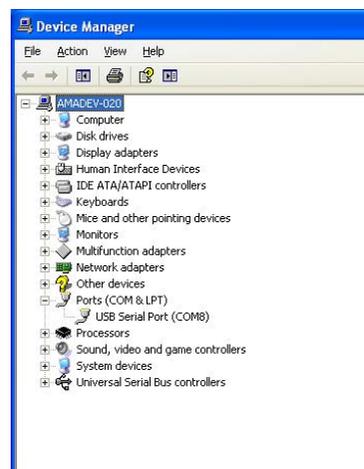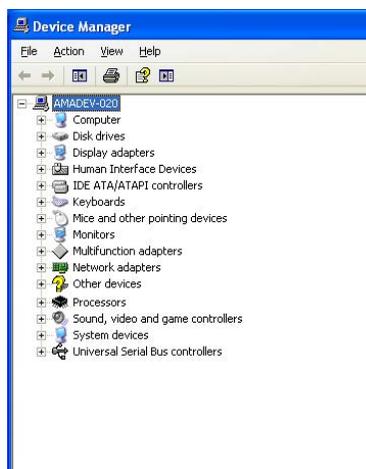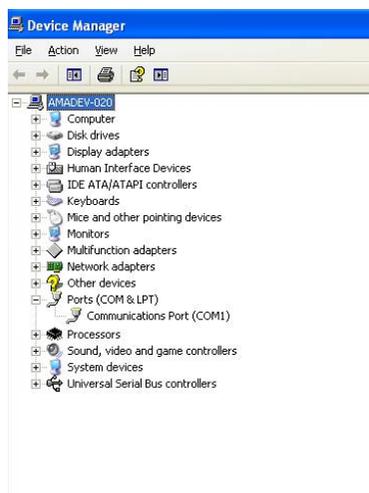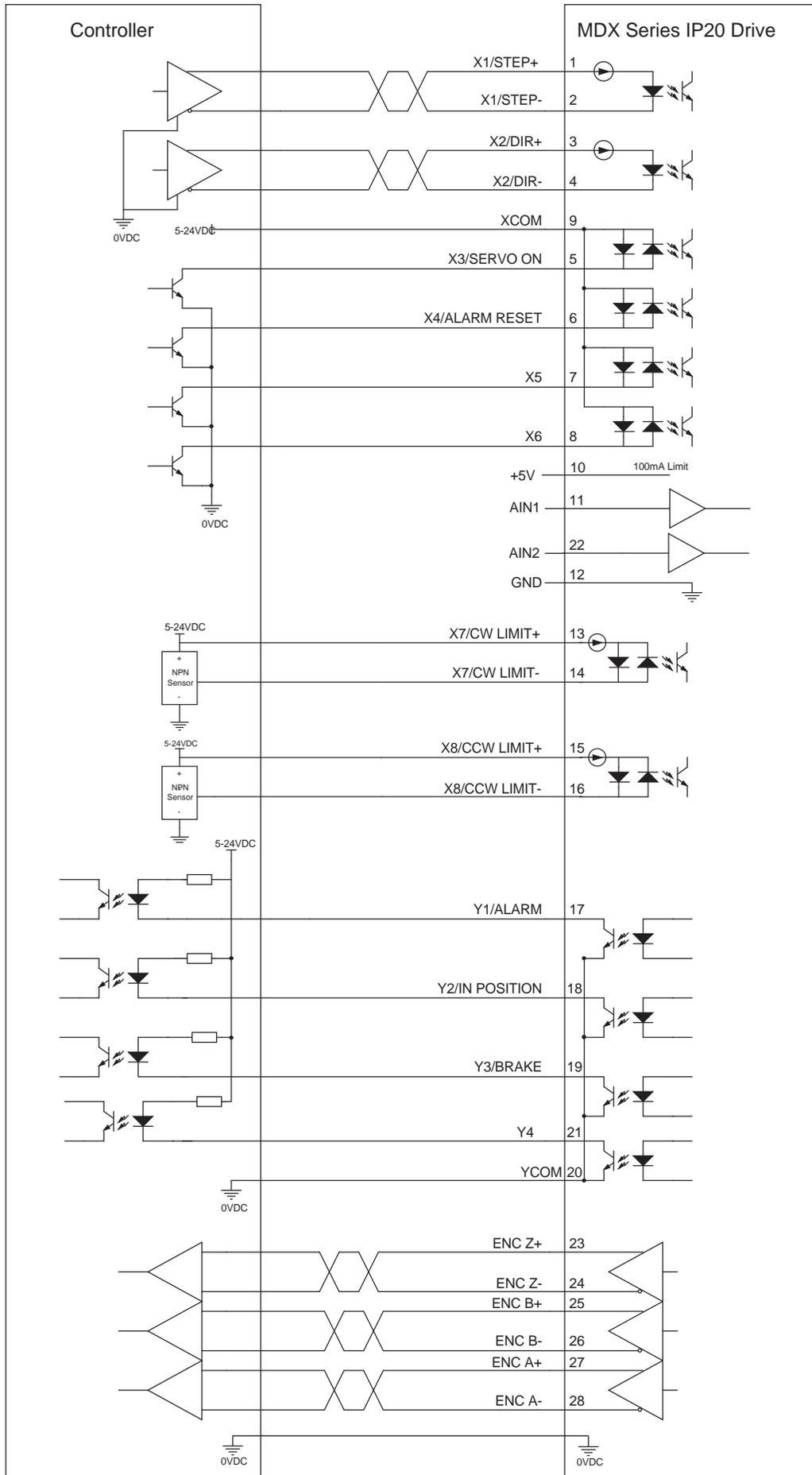
3.2.2.2 Setting the Baud rate

The CANopen network baud rate is set by using MDX Servo Suite software. The baud rate must be the same for all nodes on the CANopen network. Any changes to the baud rate require either a power cycle or a CANopen reset command to take effect.
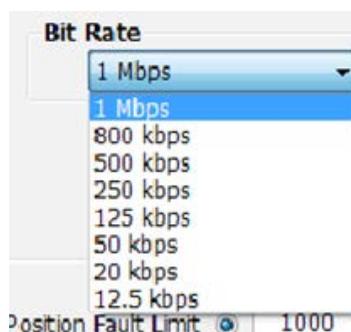
3.2.3 Choosing the Right COM Port

1. Open the "Device Manager" on the PC. If the PC has an built-in RS-232 serial port, "Port (COM & LPT)" (1) will be displayed. Connect the PC and drive with the included RS-232 communication cable. Choose the connected COM(n) port in the MDX Servo Suite software.

2. If the PC does not have an RS-232 serial port, or has one but in using. An USB to RS-232 serial port adapter will be needed. Open the "Device Manager" on the PC. There may or may not be a "Port" selection. (2) Connect the adapter to the PC, this USB adapter COM port should then be displayed. (3) Choose this new COM(n) port in the MDX Servo Suite software.

Controller

MDX Series IP20 Drive

Signal	Pin
X1/STEP+	1
X1/STEP-	2
X2/DIR+	3
X2/DIR-	4
XCOM	9
X3/SERVO ON	5
X4/ALARM RESET	6
X5	7
X6	8
+5V	10
AIN1	11
AIN2	22
GND	12
X7/CW LIMIT+	13
X7/CW LIMIT-	14
X8/CCW LIMIT+	15
X8/CCW LIMIT-	16
Y1/ALARM	17
Y2/IN POSITION	18
Y3/BRAKE	19
Y4	21
YCOM	20
ENC Z+	23
ENC Z-	24
ENC B+	25
ENC B-	26
ENC A+	27
ENC A-	28

0VDC
5-24VDC
0VDC
5-24VDC
NPN Sensor
5-24VDC
NPN Sensor
5-24VDC
0VDC
0VDC
0VDC
100mA Limit

The MDX has three types of inputs:

- High speed digital inputs: step & direction signal or encoder following, 5 to 24 volt logic
- Low speed digital inputs: enable, alarm clearing signal (or other function configured by software), 5 to 24 volt logic
- Analog input for analog speed and positioning modes

All drives include 8 digital inputs and 2 analog inputs:

- X1/STEP & X2/DIR are high-speed digital inputs for commanding position. Quadrature signals from encoders can also be used. When not being used for the Step & Direction function these inputs can be used for CW & CCW step, (start/stop)/ direction (oscillator mode), or general purpose input.

- X3/X4/X5/X6/X7/X8 are low speed software programmable inputs and can be used for Motor Enable/ Disable and Alarm/ Fault Reset function, CW/CCW Limit, or general purpose input.

- AIN1 and AIN2 are two single-ended analog inputs for analog command input signals. They can accept 0~+10 volts and the gain, filtering, offset and dead-band can be set.These two analog inputs also can be configured to one -10~+10V differential analog input.

3.3.1 Connectors Pin Diagram

Pin no.	Assignment	Description	Pin no.	Assignment	Description
1	X1+/STEP+	High Speed Digital Input 1	15	X8+	X8 Digital Input
2	X1-/STEP-		16	X8-	
3	X2+/DIR+	High Speed Digital Input 2	17	Y1	Y1 Digital Output
4	X2-/DIR-		18	Y2	Y2 Digital Output
5	X3	X3 Digital Input	19	Y3	Y3 Digital Output
6	X4	X4 Digital Input	20	YCOM	Digital Output COM
7	X5	X5 Digital Input	21	Y4+	Y4 Digital Output
8	X6	X6 Digital Input	22	AIN2	Analog Input 2
9	XCOM	Digital Input COM	23	Z+	Encoder Output Z
10	+5	+5V OUT 100mA max.	24	Z-	
11	AIN1	Analog Input 1	25	B+	Encoder Output B
12	GND	Aanlog Ground	26	B-	
13	X7+	X7 Digital Input	27	A+	Encoder Output A
14	X7-		28	A-	
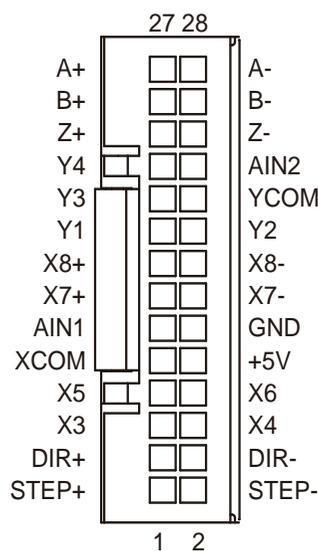
### 3.3.2 STEP & DIR Digital Inputs

The MDX drives include two high-speed inputs: X1/STEP and X2/DIR. They accept 5 to 24 volt single-ended or differential signals, up to 2 MHz. Typically these inputs connect to an external controller that provides step & direction command signals.

The functions for X1/STEP and X2/DIR can be configured by MDX Servo Suite software as following:

X1/STEP: Step signal; CW pulse signal; Quadrature signal A, start/stop signal below torque and velocity control mode or general purpose inputs.

X2/DIR : Direction signal; CCW pulse signal; Quadrature signal B, direction signal below torque and velocity control mode or general purpose inputs.
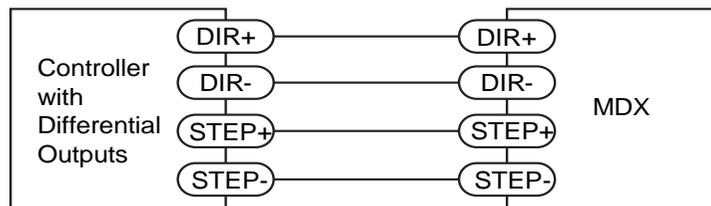
The diagrams below show how to connect the STEP & DIR inputs to various commonly used devices.
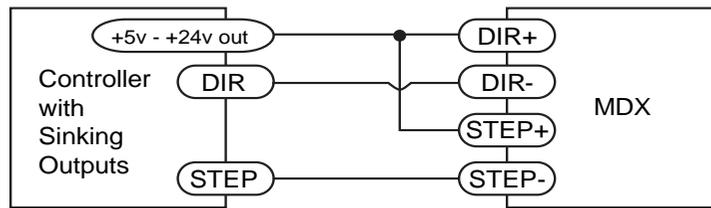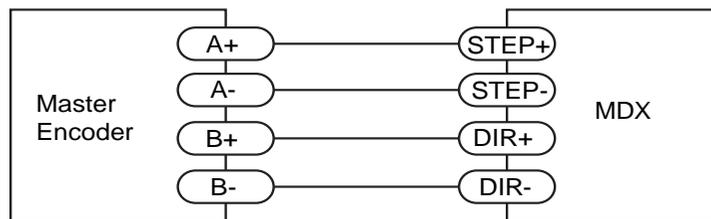

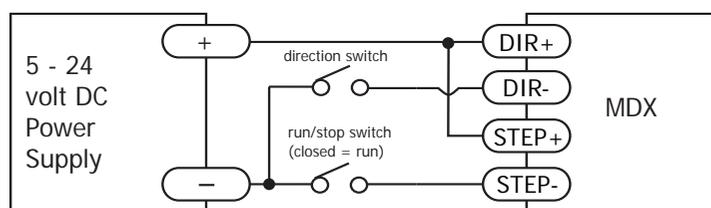Connecting to Controller with Sinking Outputs
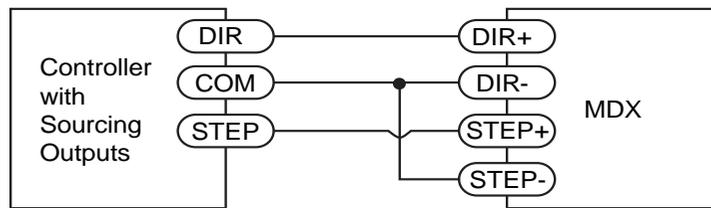
Connecting to Controller with Sourcing Outputs

Connecting to Controller with Differential Outputs
Many high-speed indexers have differential outputs

Wiring for Encoder Following

Using Mechanical Switches

3.3.3 X3/X4/X5/X6 Digital Input

X3/X4/X5/X6 input are optically Isolated Single-ended input. They can be used with sourcing or sinking signals, 5 to 24 volts. This allows connection to PLCs, sensors, relays and mechanical switches. Because the input circuits are isolated, they require a source of power. If you are connecting to a PLC, you should be able to get power from the PLC power supply. If you are using relays or mechanical switches, you will need a 5-24 V power supply.

What is COM?

"Common" is an electronics term for an electrical connection to a common voltage. Sometimes "common" means the same thing as "ground", but not always. In the case of the MDX drives, if you are using sourcing (PNP) input signals, then you will want to connect COM to ground (power supply -). If you are using sinking (NPN) signals, then COM must connect to power supply +.

Note: If current is flowing into or out of an input, the logic state of that input is low or closed. If no current is flowing, or the input is not connected, the logic state is high or open.

The diagrams below show how to connect X3/X4/X5/X6 input to various commonly used devices.
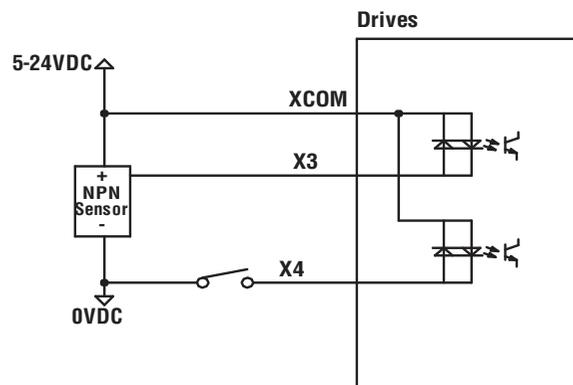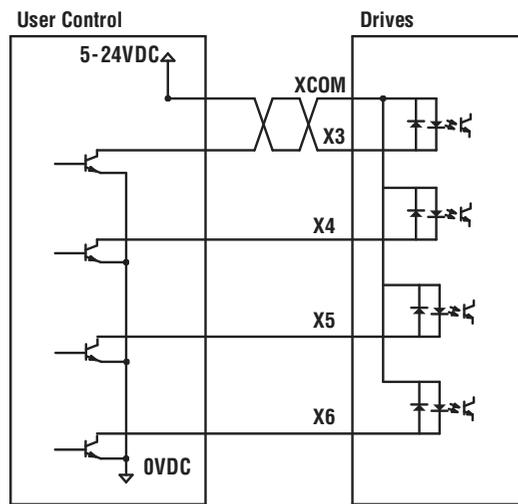
Connect an NPN type proximity sensor to an Input
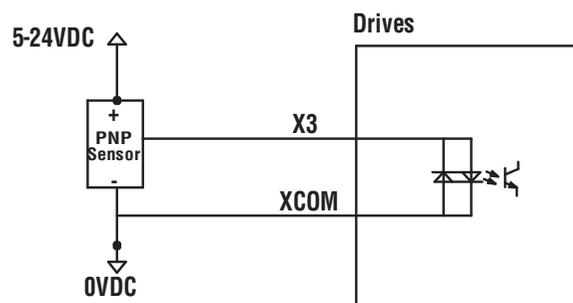
Connect an PNP type proximity sensor to an Input

3.3.4 X7/X8 Digital Input

The X7/X8 input are optically Isolated differential input. They are normally used for end of travel limit switches.The diagrams below show how to connect the X7/X8 Inputs to various commonly used devices.
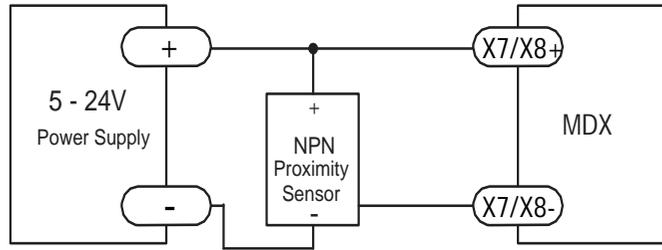
Connecting an NPN type Proximity Sensor to an Input
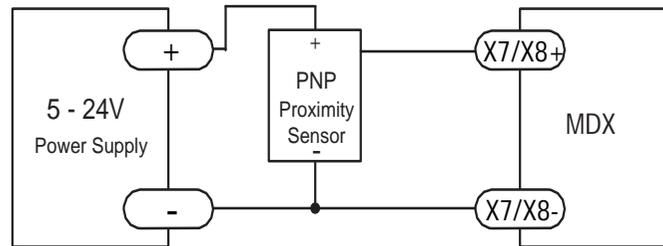(when prox sensor activates, input goes low)

Connecting a PNP type Proximity Sensor to an Input
(when prox sensor activates, input goes high)

3.3.5 Programmable Output Y1/Y2/Y3/Y4

MDX series integrated motors feature four optically isolated digital outputs (Y1/Y2/Y3/Y4) with common ground.
They can be configured by MDX Servo Suite software.

- Y1 can be set to indicate a fault output or general purpose output.
- Y2 can be set to servo on status, torque reach or general purpose output.
- Y3 can be set to indicate dynamic in position, velocity reach or general purpose output.
- Y4 can be set to static in position, or general purpose output.

The output can be used to drive LEDs, relays and the inputs of other electronic devices like PLCs and counters. Diagrams of various connection types follow.
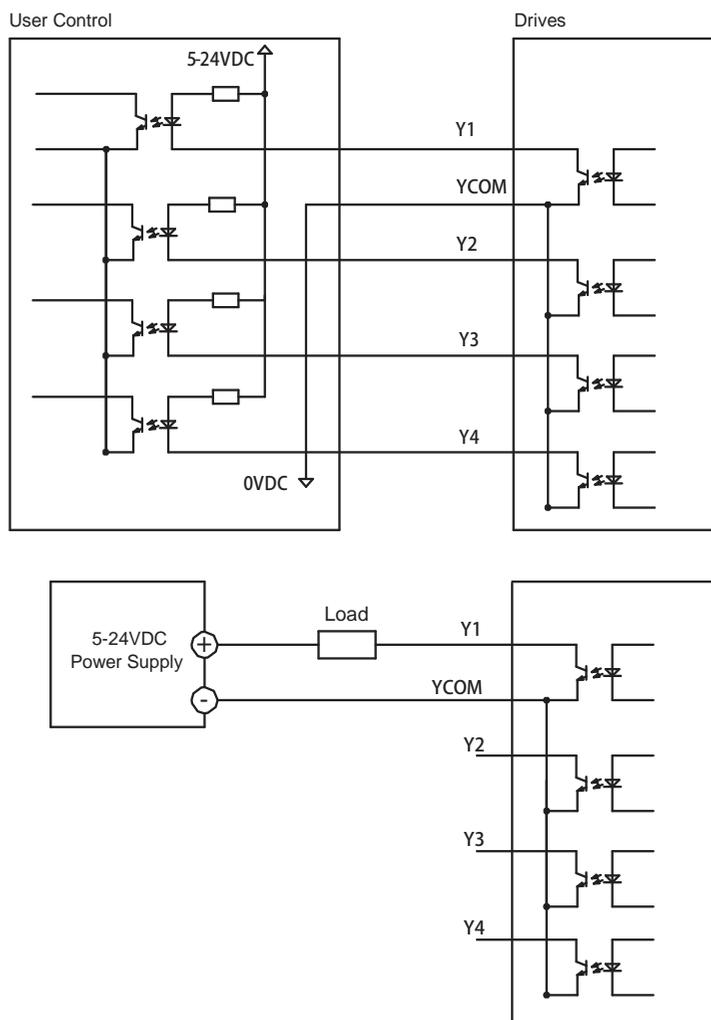
NOTE: Do not connect the output to more than 30 volts. The current through the output terminal must not exceed 100mA.

3.3.6 Analog Input

The MDX drives have two single-ended analog inputs (AIN) which can accept a signal range of 0 to +10 volts. The drive can be configured to operate at a speed or position that is proportional to the analog signal. Use the MDX Servo Suite software to set the signal range, offset, dead-band and filter frequency.
AIN1 is used for Analog Position Control or Analog Velocity Control.
AIN2 is used for Analog Torque Control.
These two single-ended analog inputs can be configured to a differential analog input with the range of -10~+10vdc.

Single−ended analog input

0~10VDC   ANA1/AIN2   +
                       -
          DGND

Controller   Diferential analog input

D/A Output   AIN1   +
                     -

             AIN2   +
                     -

DGND   DGND
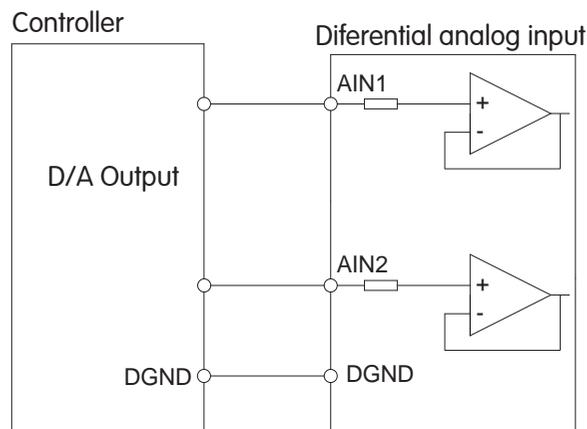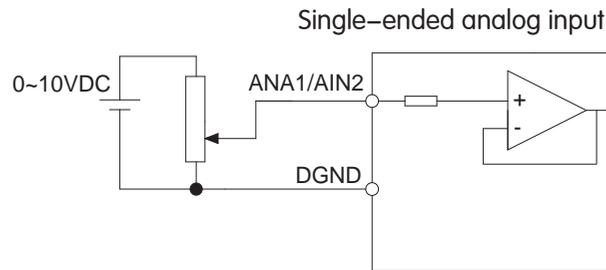
4 Troubleshooting

4.1 Status (STAT) LED Error Codes

The MDX uses a bi-color LED to indicate status. When the motor is enabled, the LED slowly flashes green. When the LED is solid green, the motor is disabled. Errors are indicated by combinations of red and green flashes as shown below.

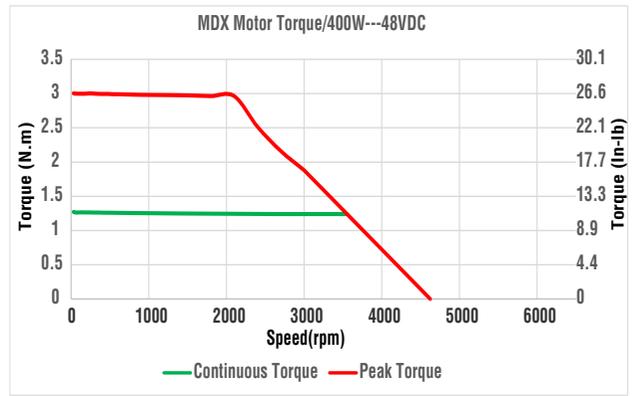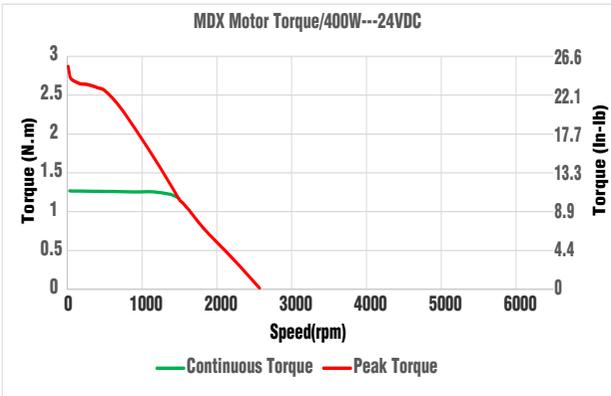| Code		Error
🟢	Solid green	No alarm, motor disabled
🟢🟢	Flashing green	No alarm, motor enabled
🔴🟢	1 red, 1 green	**Position limit**
🔴🟢🟢	1 red, 2 green	Move while disabled
🔴🔴🟢	2 red, 1 green	CCW limit
🔴🔴🟢🟢	2 red, 2 green	CW limit
🔴🔴🔴🟢	3 red, 1 green	**Drive over temperature**
🔴🔴🔴🟢🟢	3 red, 2 green	**Internal voltage out of range**
🔴🔴🔴🔴🟢	4 red, 1 green	**Power supply overvoltage**
🔴🔴🔴🔴🟢🟢	4 red, 2 green	**Power supply Too Low**
🔴🔴🔴🔴🟢🟢🟢	4 red, 3 green	**Blank Q Segment**
🔴🔴🔴🔴🟢🟢🟢🟢	4 red, 4 green	Power supply Under Voltage
🔴🔴🔴🔴🔴🟢	5 red, 1 green	**Over current**
🔴🔴🔴🔴🔴🟢🟢	5 red, 2 green	Current limit
🔴🔴🔴🔴🔴🟢🟢🟢	5 red, 3 green	**Over speed**
🔴🔴🔴🔴🔴🔴🟢	7 red, 1 green	communication error
🔴🔴🔴🔴🔴🔴🔴🟢🟢	7 red, 2 green	flash memory error

NOTE: Items in bold, represent drive faults, which automatically disable the motor.

5 Reference Materials

5.1 Torque-Speed Curves

MDX Motor Torque/200W---24VDC

MDX Motor Torque/200W---48VDC

MDX Motor Torque/400W---24VDC

MDX Motor Torque/400W---48VDC
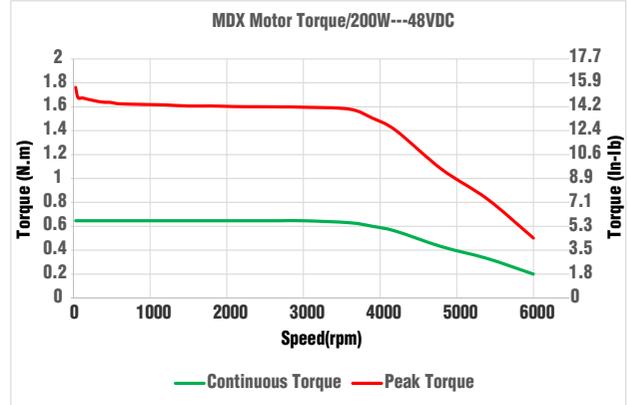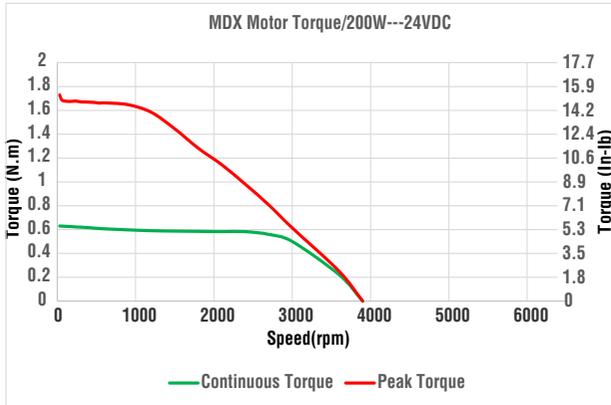
5.2 Output Power Rating vs Temperature

MDX Output Power Rating vs Temperature
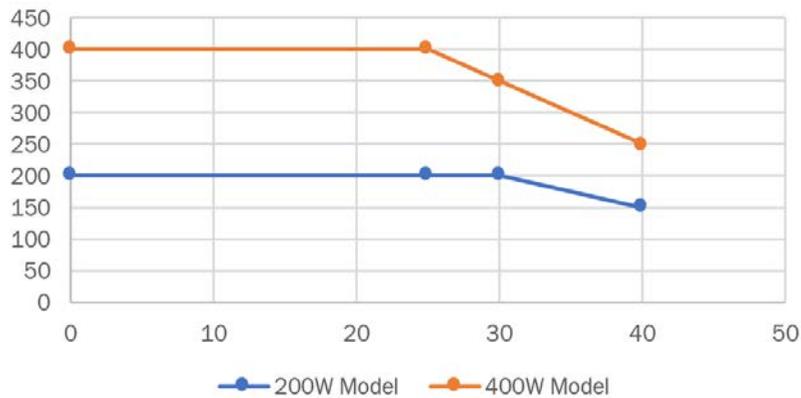
5.1 Mechanical Outlines (Unit: mm)

MDX IP20 200W

MDX IP20 400W

5.3 Technical Specifications

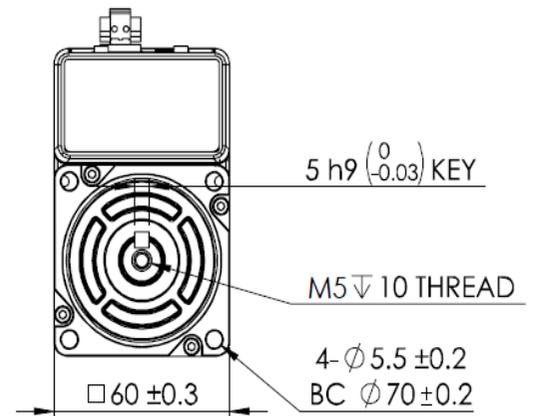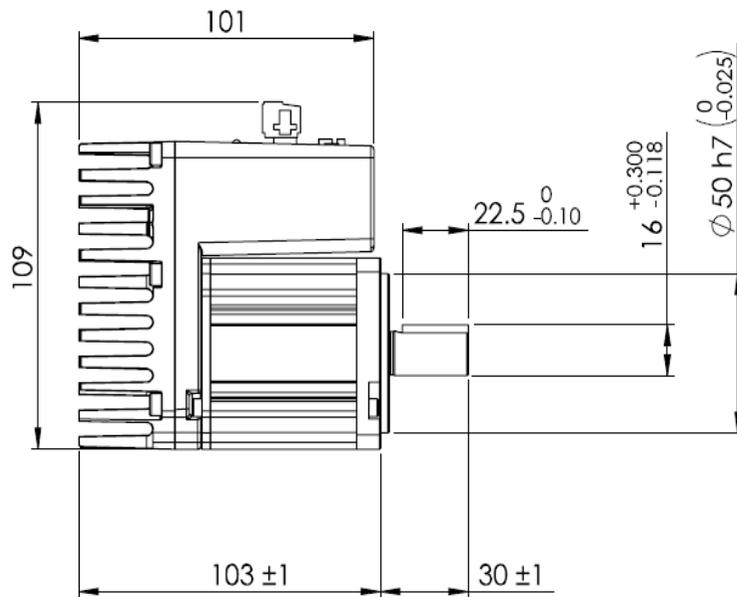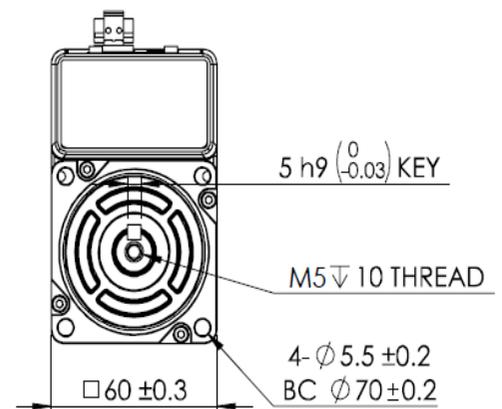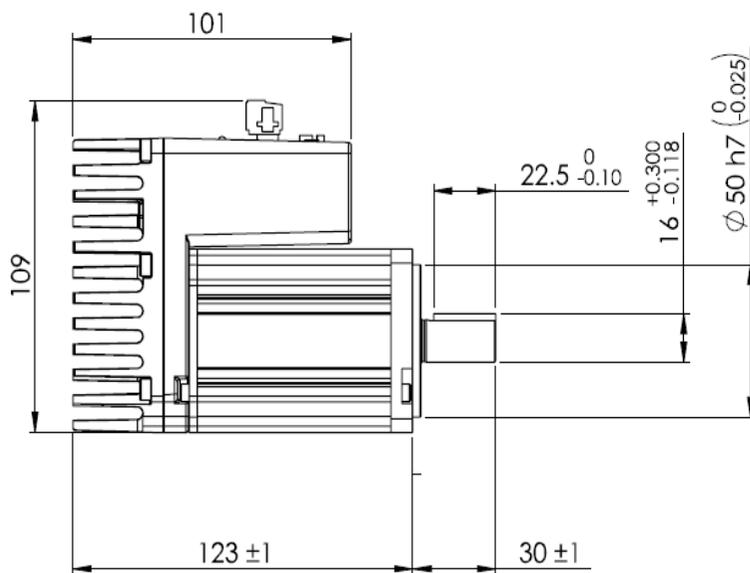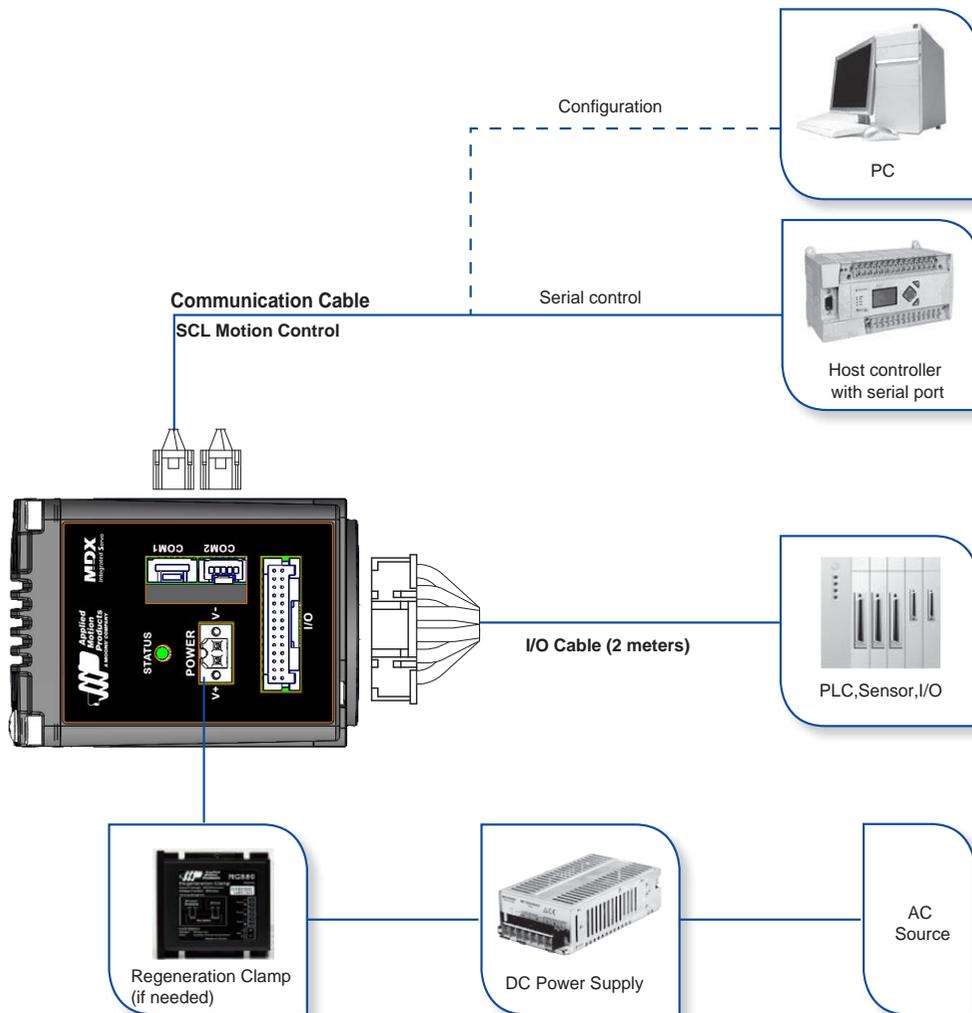| Specifications			
Output Power	MDXK61: 200W MDXK62: 400W		
Power Supply	External 24 - 60 VDC main power supply		
Protection	Over-voltage, under-voltage, over-current, over-temp		
Controller			
Encoder Feedback	16 bit magnetic incremental encoder		
Filters	Digital input noise filter, Analog input noise filter, Smoothing filter, PID filter, Notch filter		
Modes of Operation	Torque control: Analog Torque, SCL commanded Velocity control: Fixed velocity, Analog velocity,SCL commanded Position control: Digital signal type Step & Direction, CW & CCW pulse, A/B Quadrature, Analog position, SCL commanded position Communication control: RS485 (support Modbus), CANopen mode control , Q Programming		

Digital Inputs	X1/X2: Optically isolated, 5-24 volt, max. pulse frequency = 2 MHz
	    Function: Pulse/Direction, CW/CCW Pulse, A/B quadrature (encoder following), (start/stop)/direction(torque and velocity mode), or general purpose input
	X3/X4/X5: Optically isolated, 5-24 volt, max. pulse frequency = 5 KHz
	    Function: Servo on/off, Alarm/Fault Reset, CW/CCW Limit, or general purpose input		

Digital Outputs	Y1/Y2/Y3/Y4: Optically isolated, 30V/100mA max Open Collector Output. Function: Alarm/Fault, In Position (dynamic/static), servo on status, torqur reached, velocity reached or general purpose output Encoder outputs A+, A-, B+, B-, Z+, Z- (16384 counts/rev)		
Analog Input	Two single-ended analog inputs 0 to 10VDC. Resolution 12 bits(They can be configured to a -10 to 10VDC differential analong input.)		
Communication Interface	CB000: CANopen (CiA301, CiA402) RB000: Serial Command Language (SCL), Modbus RTU		
Motor Data			
Model number	MDXK61		MDXK62	
Power Rating	200W		400W	
Winding Type	48VDC		48VDC	
Nomainal Supply Voltage	24VDC	48VDC	24VDC	48VDC
Rated Speed	2000rpm	3000rpm	1600rpm	3000rpm
Motor Continuous Torque	0.64N-m		1.27N-m	
Motor Peak Torque	1.6N-m		3N-m	
Rotor Inertia	165 g•cm^2		272 g•cm^2	
Ambient Temperature	0 to 40°C , see above for rating details			
Humidity	Working and storage : 10-85% Max., non-condensing			
Insulation Class	Class B			

5.4 Optional Accessories

Regeneration Clamp

Configuration

PC

Communication Cable

SCL Motion Control

Serial control

Host controller
with serial port

I/O Cable (2 meters)

PLC,Sensor,I/O

Regeneration Clamp
(if needed)

DC Power Supply

AC
Source

Regeneration Clamp

P/N: RC880

When using a regulated power supply you may encounter a problem with regeneration. The kinetic energy caused by regeneration is transferred back to the power supply. This can trip the overvoltage protection of switching power supply, causing it to shut down. Applied Motion Products offers the RC880 "regeneration clamp" to solve this problem. If in doubt, use an RC880 for the first installation. If the "regen" LED on the RC880 never flashes, you don't need the clamp.
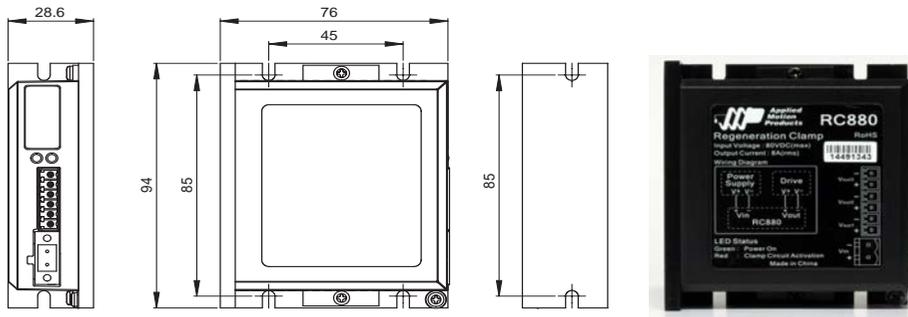
USB Serial Adapter   P/N: 8500-003

Cables

I/O P/N: 3004-318-2M
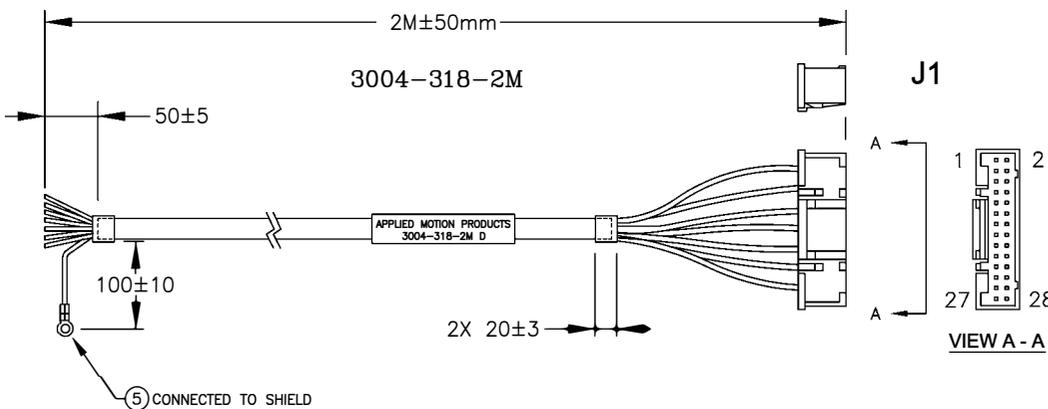
J1		
PIN NO:	SIGNAL	WIRE COLOR
1	X1+	BLUE/WHITE
2	X1−	BLUE/BLACK
3	X2+	GREEN/WHITE
4	X2−	GREEN/BLACK
5	X3	BLUE
6	X4	VIOLET
7	X5	YELLOW
8	X6	GREEN
9	XCOM	ORANGE
10	+5V	RED
11	AIN	WHITE
12	GND	BLACK
13	X7+	BROWN/WHITE
14	X7−	BROWN/BLACK
15	X8+	GREY/WHITE
16	X8−	GREY/BLACK
17	Y1	BROWN
18	Y2	GREY
19	Y3	PINK
20	YCOM	YELLOW/GREEN
21	Y4+	VIOLET/WHITE
22	Y4−	VIOLET/BLACK
23	Z+	YELLOW/WHITE
24	Z−	N/C
25	B+	ORANGE/WHITE
26	B−	N/C
27	A+	RED/WHITE
28	A−	N/C

RS-485 and CANopen P/N: 3004-313-1M

3004-313-1M

CONNECTOR CONNECTION/SIGNAL CHART			
J1	RS-485	WIRE COLOR	CANOpen
1	RX+	BLK	RS-232_TXD
2	RX-	BRN	RS-232_RXD
3	TX+	RED	CAN_H
4	TX-	ORN	CAN_L
5	GND	YEL	GND
GND LUGS	SHIELD	SHIELD	SHIELD
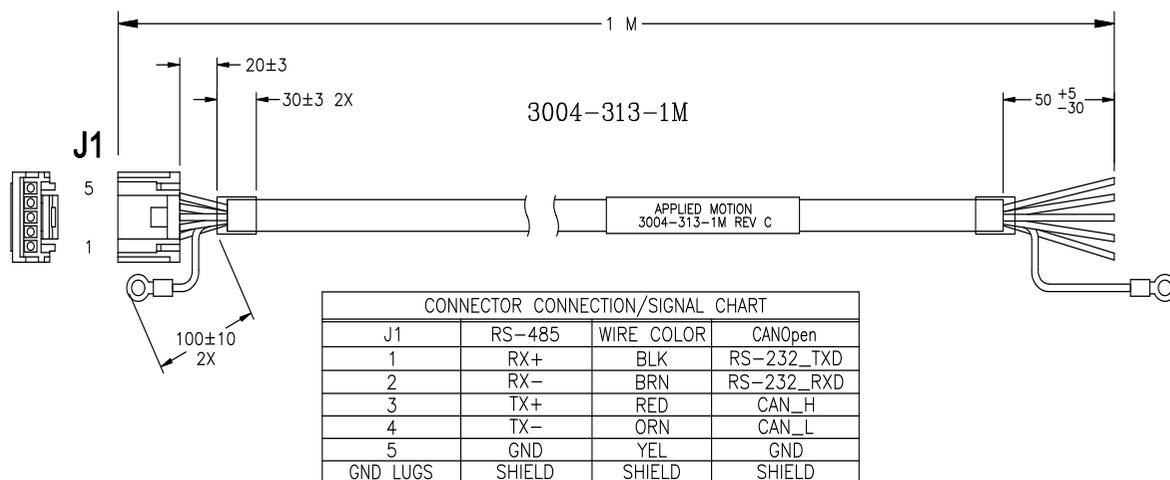
CANopen RS-232 programming cable 3004-317:

CONNECTION CHART		
J1	SIGNAL	J2
5	GROUND	5
1	TX	2
2	RX	3

DB 9PIN
END VIEW
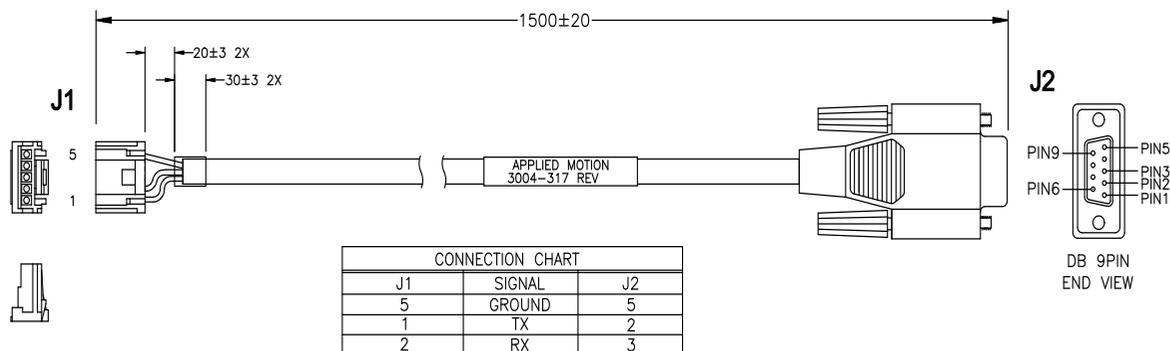
CANopen daisy chain cable 3004-311-1M

'L'
SEE CABLE LENGTH TABLE
SEE CONNECTION TABLE

J1

20±3 2X
30±3 2X

5

1

APPLIED MOTION
3004−311−1M REV

J2

1

5

100±10
2X

CONNECTOR CONNECTION CHART		
J1 AND J2	SIGNAL	WIRE COLOR
1	N/C	−
2	N/C	−
3	CAN_H	RED
4	CAN_L	ORN
5	GND	YEL
GND LUGS	SHIELD	SHIELD

CABLE LENGTH TABLE FINISHED LENGTH ± 2% TOTAL	
MARK PART NO	'L'
3004−311−1M	39.4 INCHES (1M)
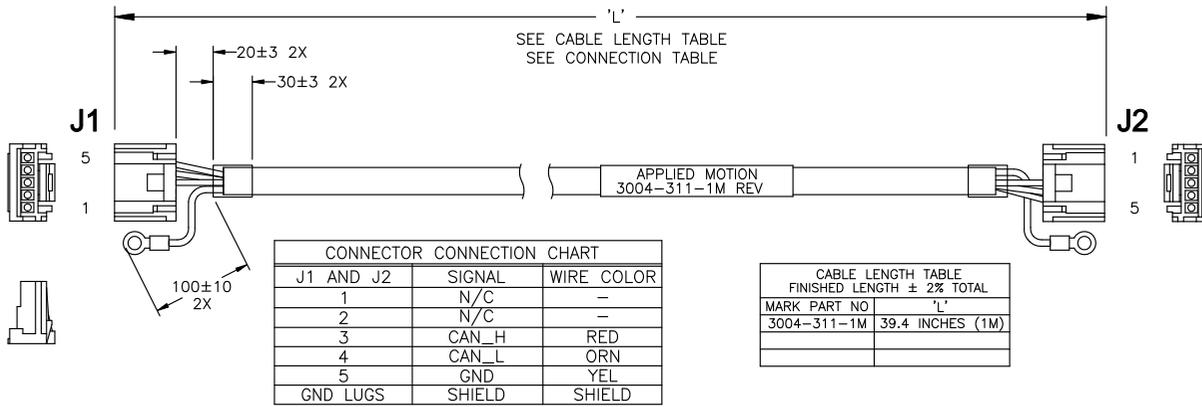
RS-485 daisy chain cable 3004-310-1M

'L'
SEE CABLE LENGTH TABLE
SEE CONNECTION TABLE

J1

20±3 2X
30±3 2X

5

1

APPLIED MOTION
3004−310−1M REV B

2X 5
QTY 5 2X 6

J2

1

5

100±10
2X

CONNECTOR CONNECTION CHART		
J1 AND J2	SIGNAL	WIRE COLOR
1	RX+	BLK
2	RX−	BRN
3	TX+	RED
4	TX−	ORN
5	GND	YEL
GND LUGS	SHIELD	SHIELD

CABLE LENGTH TABLE FINISHED LENGTH ± 2% TOTAL	
MARK PART NO	'L'
3004−310−1M	39.4 INCHES (1M)
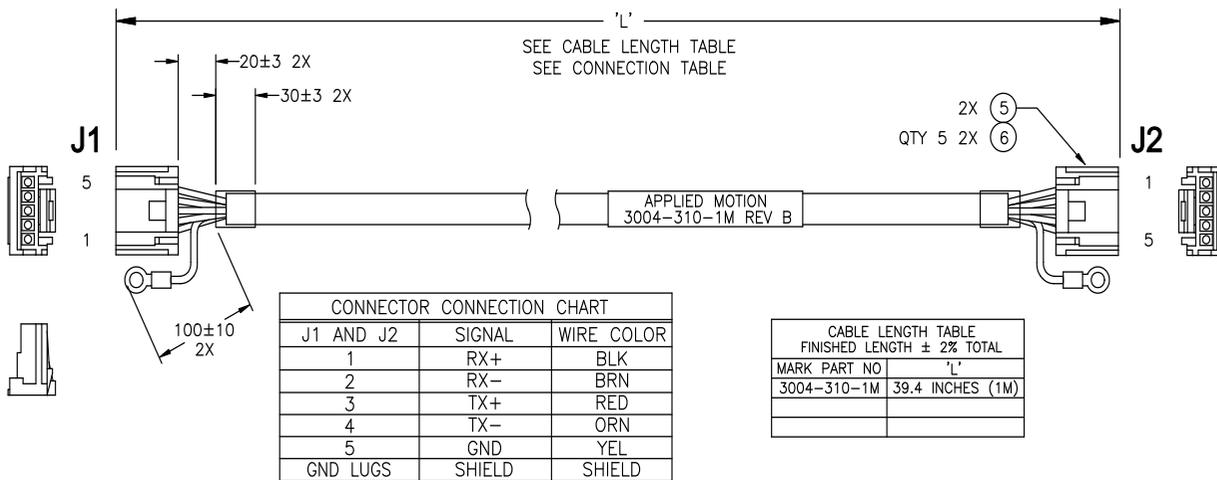
Mating Connectors:

Description	Model	Supplier	Description	Model	Supplier
Power			RS232		
Connector	1615780000	Weidmuller	Housing	ZER-04V-S	JST
I/O			Pin, Connector	SZE-002T-P0.3	JST
Housing	PUDP-28V-S	JST	RS-485 & CANopen		
Pin, Connector	SPUD-001T-P0.5	GND	Housing	ZER-05V-S	JST
			Pin, Connector	SZE-002T-P0.3	JST

6 Contacting Applied Motion Products

Applied Motion Products
A MOONS' COMPANY

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1-800-525-1609

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