VT-50 Series

Translation Stage Reference Manual

(Open and Closed Loop Versions)

micronix USA
PRECISION MOTION SOLUTIONS

VT-50L

Linear Stage

Reference Manual

Rev 2.0

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1. Introduction

1.1 Product Description

The low cost VT-50 linear stage excels in applications with limited space due to its compact design. The stage utilizes a 2-phase stepper motor and is equipped with two mechanical limit switches. The VT-50 is available with an optional linear encoder with 50 nm resolution. VT-50 stages can be mounted XY without any adapters, and a Z-axis can be added with the use of a standard mounting bracket. For elevation travel ranges of 10 mm or less the VT-50 can be combined with the ES-50 elevation stage without the use of adapter plates. Versions capable of operation in vacuum (10^{-6} mbar) are available. The VT-50 is compatible with the MMC-200 and the NanoDrive controller.

Features:

- Travel range of 47 to 298 mm (longer travel available on request up to 498 mm)
- 50 nm closed loop encoder resolution
- Load capacity up to 20 kg (horizontal orientation)
- Recirculating ball bearing
- Integrated mechanical limit switches
- Vacuum versions available

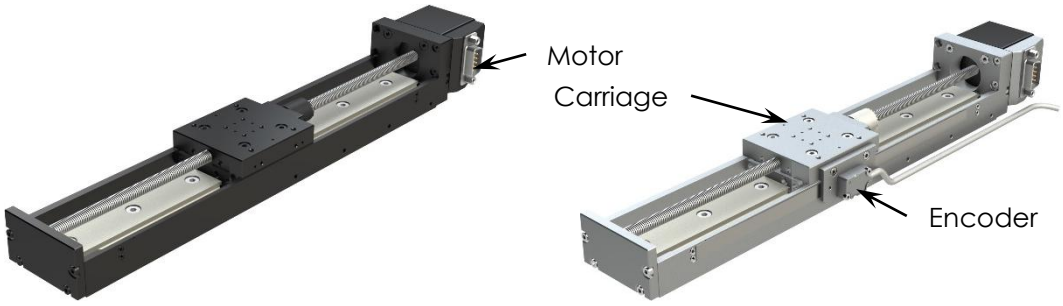


Figure 1-A. VT-50L, Open Loop Version (Left), Closed Loop Version (Right)

1.2 Recommended Controllers

The following controllers are available from MICRONIX USA:

- MMC-200
- NanoDrive

1.3 Technical Data and Ordering Information

Detailed specifications and ordering information can be found on the VT-50L product page on the MICRONIX USA website.

2. Preparing to Install the VT-50L Stage

2.1 Installation Preparation

When mounting the stage, it is important to consider the flatness of the mounting surface, as the stage will conform to the shape of that surface. The stage's performance and structural integrity are impacted by the mounting flatness. It is required to have a mounting surface with flatness less than the overall specified flatness on the product datasheet.

The stage specification is tested at a temperature of 20°C ± 5°C unless otherwise specified. Assure to use the stage under the following conditions:

- Mount to a clean surface which is free of debris, burrs or dings with a flatness to be less than the flatness of the base as specified on the product datasheet.
- An indoor atmosphere free of corrosive gases, excessive dust, and condensation.
- Operating temperature range of 5-40°C.
- Relative humidity between 20-80%.
- Locate away from water, heat, and electrical noise.

Important: Do not touch or manually turn the leadscrew, as this will contaminate the lubrication and jeopardize the longevity of the stage.

2.2 Package Contents

If the product is damaged or there are missing components, contact MICRONIX USA immediately. Do not discard product packaging in case of return shipment.

Package Should Contain:

- VT-50L Linear Stage
- Reference Manual
- Any other previously agreed upon components such as a controller.

3. Installing the VT-50L Stage

Refer to Section 3.1.1 for general mounting, 3.1.2 for XY mounting. Additional brackets and screws may be required for custom applications, see Section 5 for stacking configuration examples.

3.1 VT-50L Installation

3.1.1 Base Mounting

General mounting pattern sample can be found in Section 4.2.

1. Align the stage to the mounting surface using at least two M1.5 x 6 mm dowel pins.
2. Secure the stage to the mounting surface using four M3 socket head cap screws at 0.5 Nm recommended torque.

Important: The stepper motor must be driven by a controller to reposition the carriage. Do not touch or manually turn the leadscrew, as this will contaminate the lubrication and jeopardize the longevity of the stage.

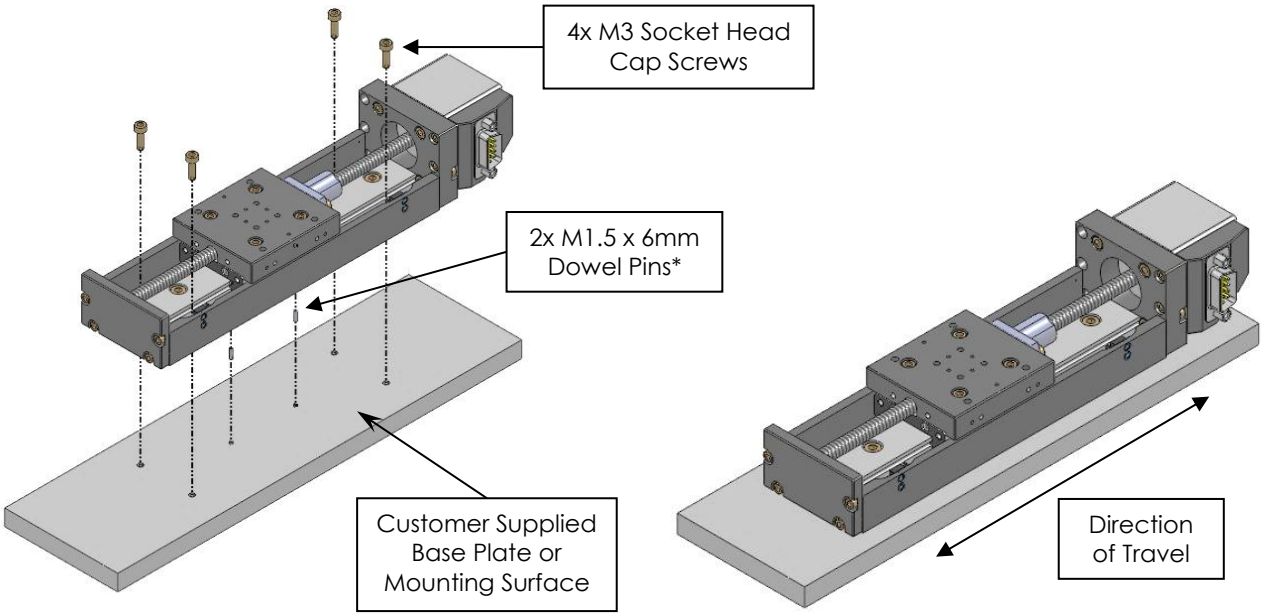


Figure 3-A. VT-50L General Mounting Installation

*Assure the dowel pin holes on the mounting plate are not over-constraining the stage, i.e. one of the two holes needs to be a slot, see section 4.2 for reference.

3.1.2 X-Y Mounting

1. Install the bottom stage to the mounting surface as shown in Section 3.1.1.
2. Align the top stage to the bottom stage carriage using two M1.5 x 6 mm dowel pins.
3. Move the top stage carriage to access the mounting holes. Secure the stage using four M3 x 8 mm Socket Head Cap Screws at 0.22 Nm recommended torque.

Note: Do not use screws longer than specified to avoid damage to the bearings.

Important: The stepper motor must be driven by a controller to reposition the carriage. Do not touch or manually turn the leadscrew, as this will contaminate the lubrication and jeopardize the longevity of the stage.

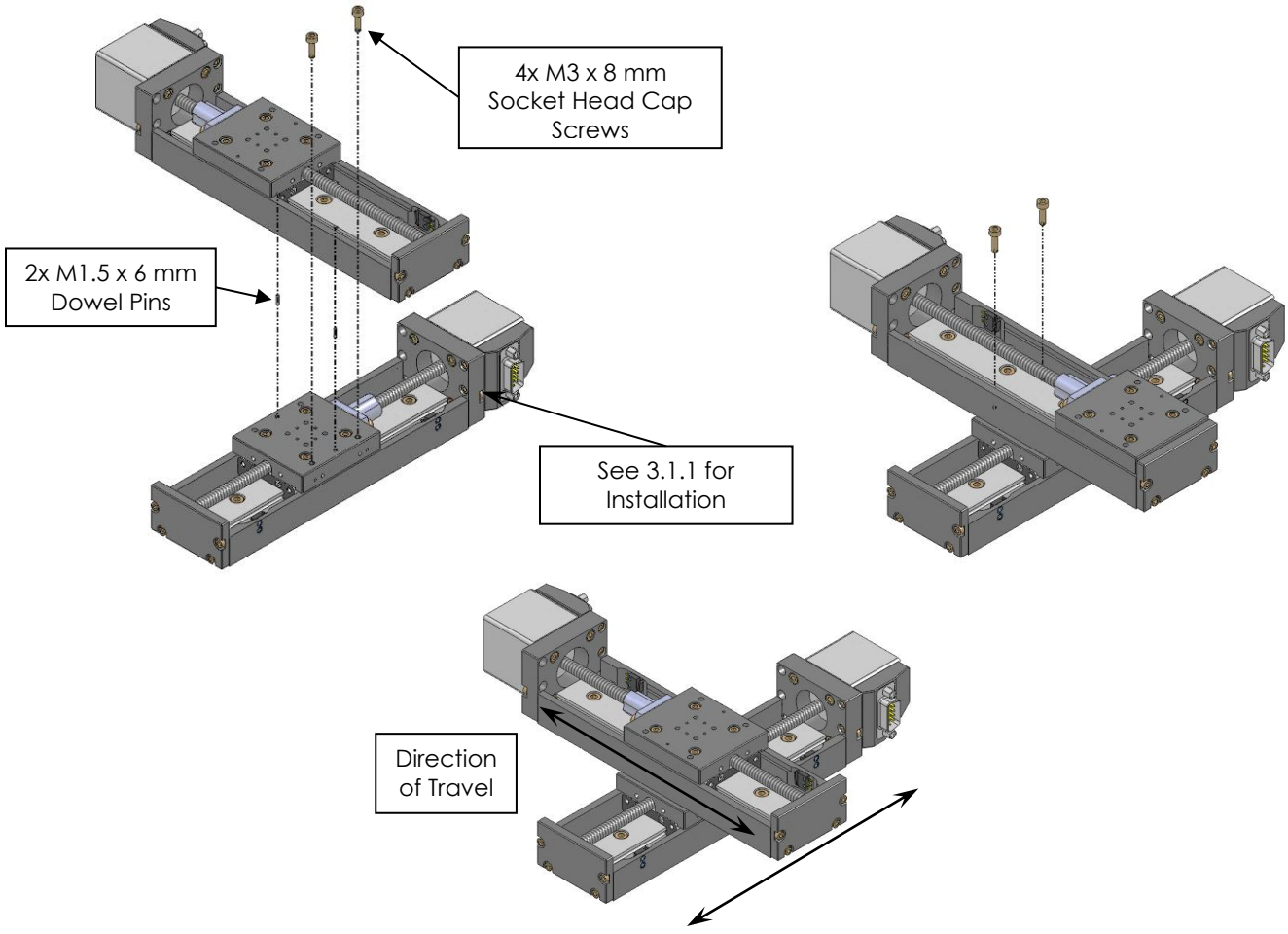
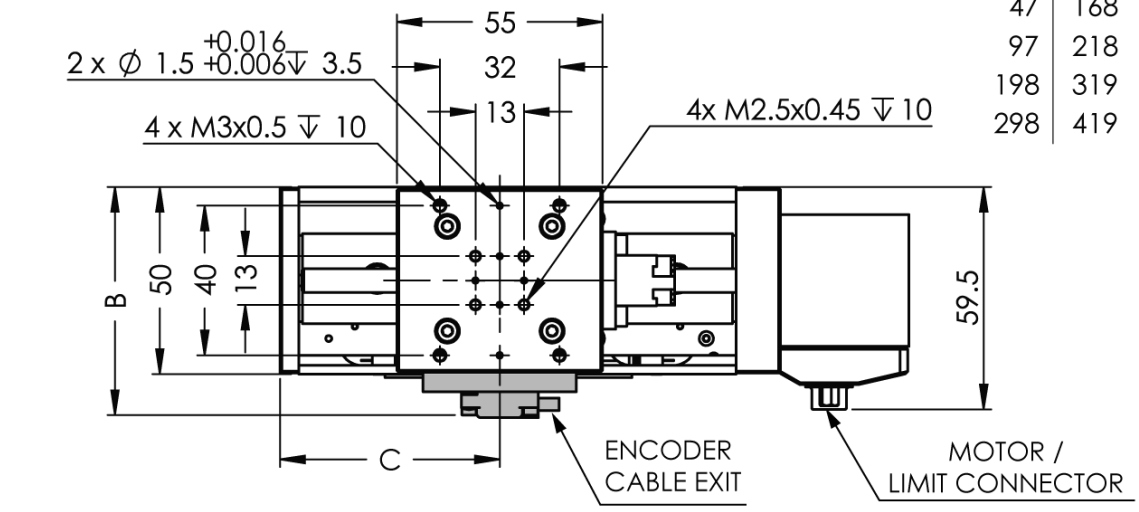


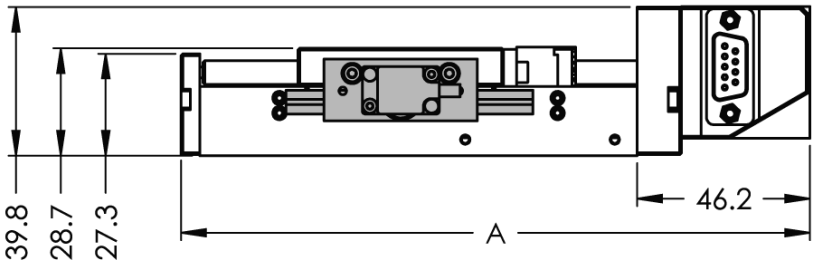
Figure 3-B. VT-50L XY Mounting Installation

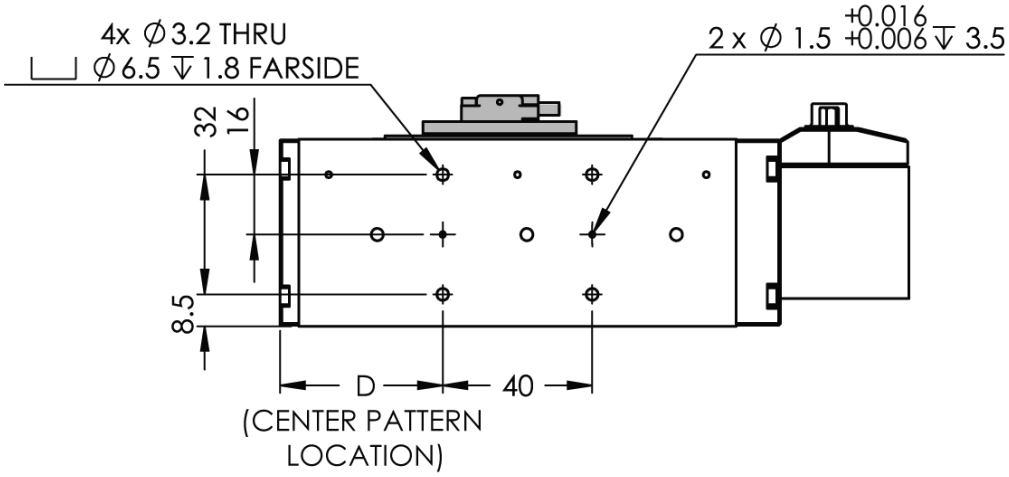
4. Dimensions

4.1 VT-50L Standard Dimensions

Travel	A	B	C	D
47	168	61.7	58.95	43.5
97	218	61.7	83.95	68.5
198	319	63.3	134.45	119
298	419	63.3	184.45	169

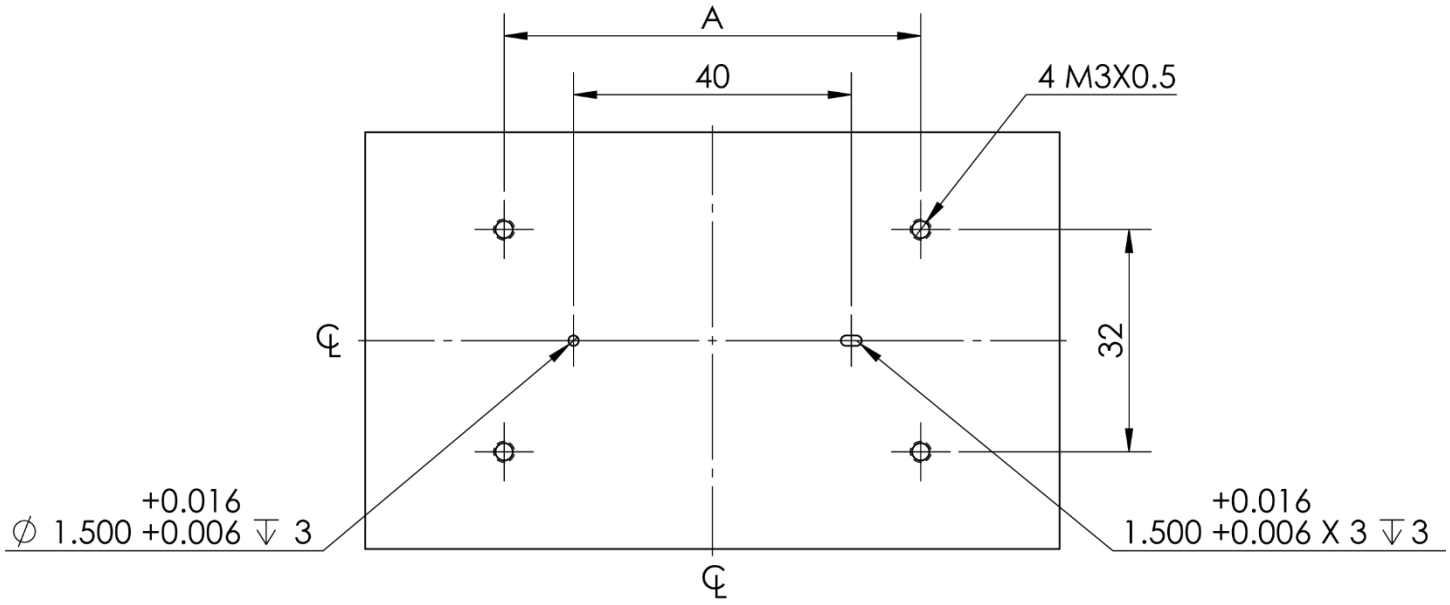






*grey parts for closed loop version only

4.2 General Mounting Pattern



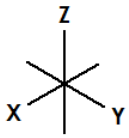
Outer Most Screw Distance	
Travel	*A [mm]*
47mm	*40*
97mm	*120*
198mm	*228*
298mm	*328*

*Ensure the dowel pin holes on the mounting plate are not over-constraining the stage, i.e. one of the two holes needs to be a slot.

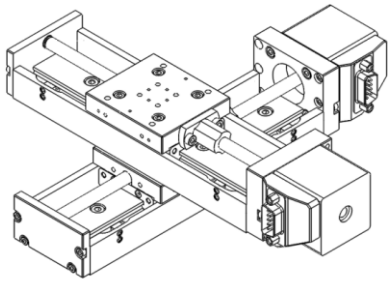
5. Stacking Configurations

5.1 Configuration Examples (additional configurations available upon request)

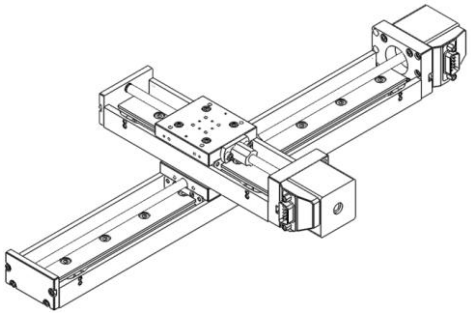
- Additional configurations available upon request
- Positioning according to:



No Adapters

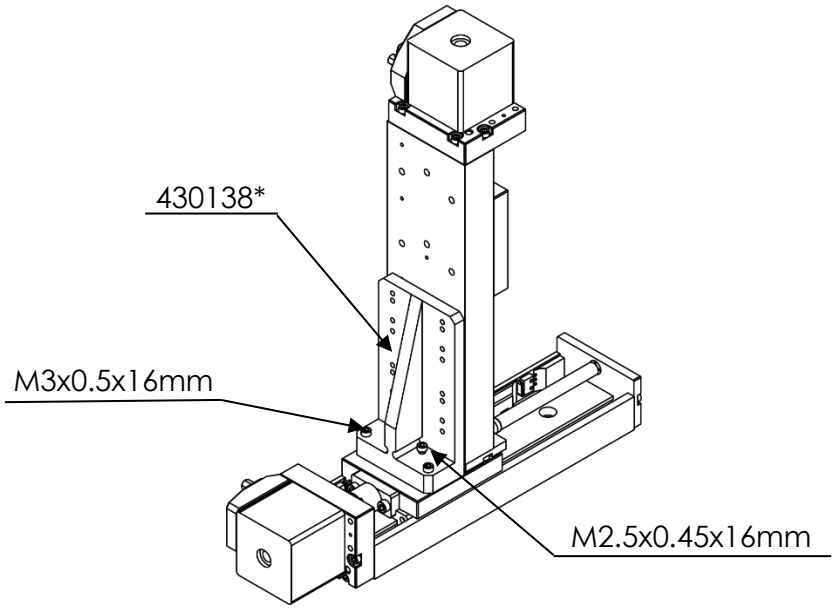


X-Y 100x100mm



X-Y 300x100mm

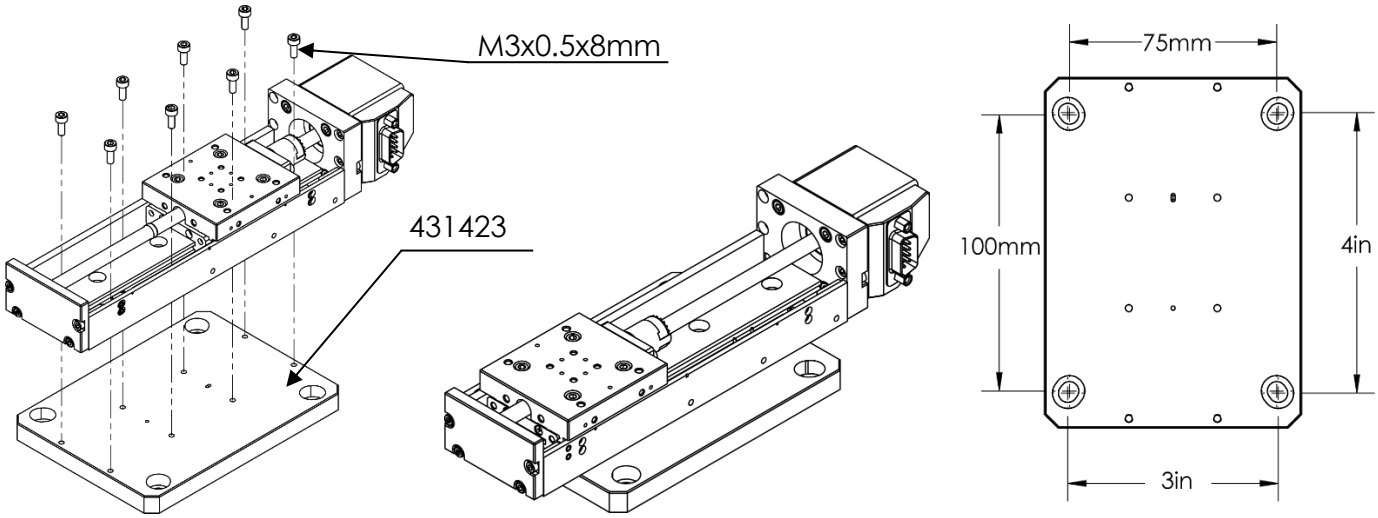
Using XZ Bracket (P/N: 430138)



X-Z 100x100mm*

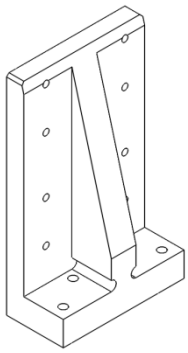
*Custom length z-brackets are available for longer travel stages. 430138 is recommended for z-travel up to 100mm.

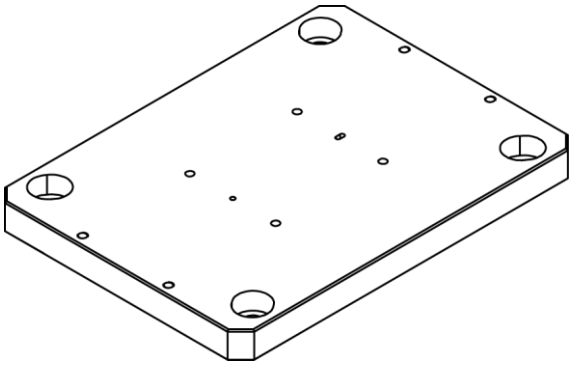
Using Optical Table Mounting Plate (P/N: 431423)



Metric/English Optical Table Mounting Plate for VT-50L Series

5.2 Accessories

430138 XZ-Bracket Adapter Plate

Used to adapt the VT-50L series to a perpendicular assembly for XZ mounting configurations (up to 100mm travel).

431423 Optical Table Mounting Plate

Used to adapt the VT-50L series to an English or Metric optical table.

6. Connecting the VT-50L Stage

6.1 Atmospheric Environments

6.1.1 Open Loop, Atmospheric Wiring Diagram

Connecting the VT-50L linear stage in an open loop configuration only requires that the D-sub 9 Pin Motor Cable be connected to a compatible controller. No other cables or components are required.

Cable Descriptions:

A. Motor Cable (Female Dsub9 Pin, 1.5m Outsourced Cable)

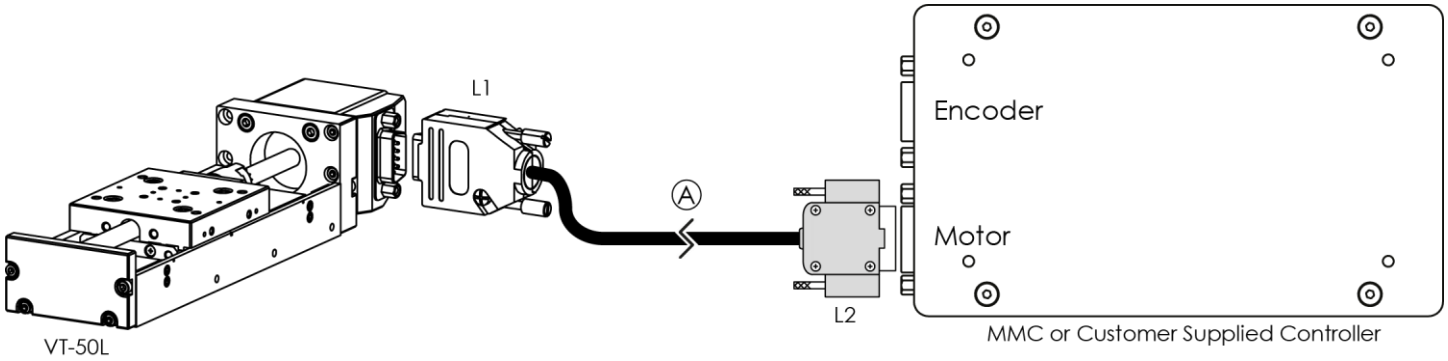
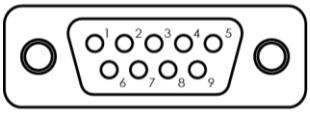


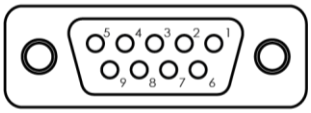
Figure 6-A. VT-50L, Open Loop, Atmospheric Wiring Diagram

6.1.1.1 Stepper Motor Atmospheric Open Loop Pinout

			Cable A	
	Pinout for VT-50L-1X010		Dsub9F	Dsub9M
	Description	**Color**	**L1**	**L2**
Motor	Motor Phase A+	OUTSOURCED 1 TO 1 CABLE	1	1
	Motor Phase A-		2	2
	Motor Phase B+		3	3
	Motor Phase B-		4	4
Limit Switch	Limit Ground		5	5
	Limit Switch -		6	6
	Limit Switch +		7	7



Dsub9M - Front View
9 Pin Male Connector



Dsub9F - Front View
9 Pin Female Connector

6.1.2 Closed Loop (Encoder), Atmospheric Wiring Diagram

Using the VT-50L stage with an encoder requires a closed loop controller that recognizes the proper type of encoder feedback. Connect the stage as shown below.

Cable Descriptions:

A. Motor Cable (Female Dsub9 Pin to Male Dsub9 Pin, 1.5m Outsourced Cable)
B. Encoder Cable (Female Dsub9 Pin Module, 1.5m PVC Black Cable)

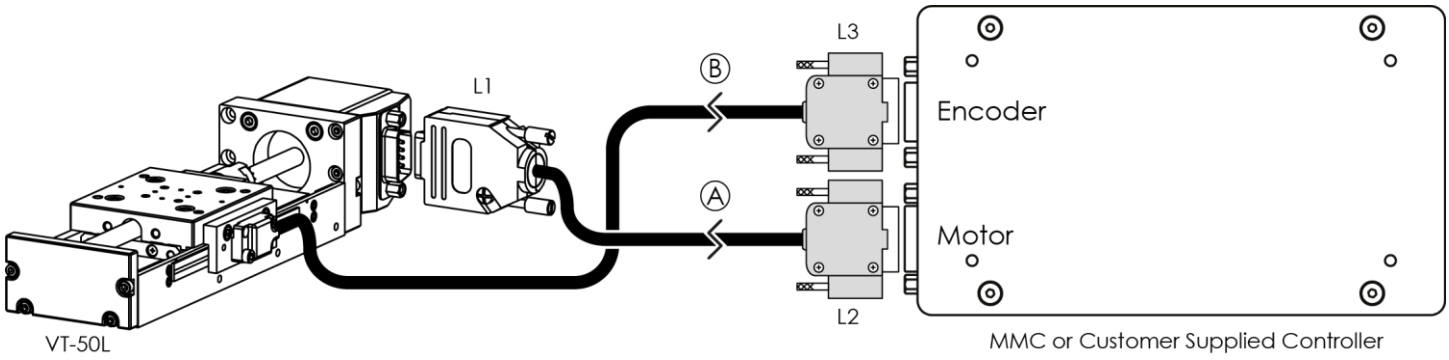
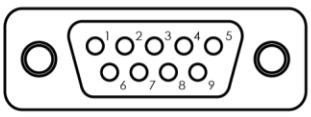


Figure 6-B. VT-50L, Closed Loop, Atmospheric Wiring Diagram

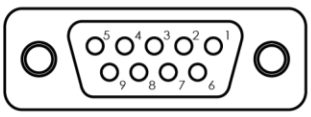
6.1.2.2 Stepper Motor Atmospheric Analog Encoder Pinout

	Pinout for VT-50L-1X210		Cable A Dsub9F L1	Cable A Dsub9M L2
	Description	**Color**	**L1**	**L2**
Motor A	Motor Phase A+	OUTSOURCED 1 TO 1 CABLE	1	1
	Motor Phase A-		2	2
	Motor Phase B+		3	3
	Motor Phase B-		4	4
Limit Switch	Limit Ground		5	5
	Limit Switch -		6	6
	Limit Switch +		7	7

	Pinout for VT-50L-1X210		Cable B Dsub9F L3
	Description	**Color**	**L3**
Encoder B	Cos+	Brown	1
	Sin+	Blue	2
	Index+	Violet	3
	GND	Grey	4
	+5VDC	White (Grey TP)	5
	Cos-	White (Brown TP)	6
	Sin-	White (Blue TP)	7
	Index-	White (Violet TP)	8
	Shield	-	Casing



Dsub9M - Front View
9 Pin Male Connector

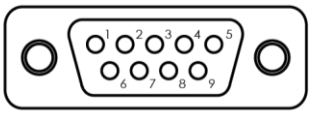


Dsub9F - Front View
9 Pin Female Connector

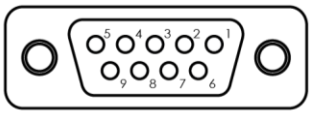
6.1.2.3 Stepper Motor Atmospheric Digital Encoder Pinout

			Cable A	
Pinout for VT-50L-1X310			Dsub9F	Dsub9M
	Description	Color	L1	L2
Motor A	Motor Phase A+	OUTSOURCED 1 TO 1 CABLE	1	1
	Motor Phase A-		2	2
	Motor Phase B+		3	3
	Motor Phase B-		4	4
Limit Switch	Limit Ground		5	5
	Limit Switch -		6	6
	Limit Switch +		7	7

			Cable B
Pinout for VT-50L-1X310			Dsub9F
	Description	Color	L3
Encoder B	A+	Brown	1
	B+	Blue	2
	Index+	Violet	3
	GND	Grey	4
	+5VDC	White (Grey TP)	5
	A-	White (Brown TP)	6
	B-	White (Blue TP)	7
	Index-	White (Violet TP)	8
	Shield	-	Casing



Dsub9M - Front View
9 Pin Male Connector



Dsub9F - Front View
9 Pin Female Connector

6.2 *Vacuum Environments*

6.2.1 Handling and Preparation

When handling the stage for vacuum environments, take the necessary precautions, such as wearing clean latex gloves, clean room clothing, etc. Avoid any contaminants. Maximum bake-out temperature is 100°C. MICRONIX USA optionally supplies the stage with vacuum compatible connectors, see chart below.

Connector Description	Connector Material	Contacts	Backshell
High Vacuum Glass- filled Dyiathilate D-Subminiature	DAP	T2 Female Crimps, Gold Pins (Accuglass P/N: 111652)	Nickle-plated Zinc Backshell Strain Relief
Ultra High Vacuum D-Subminiature	PEEK	T1 Female Crimps, Gold Pins (Accuglass P/N: 100180)	PEEK UHV Strain Relief

Environment	Open Loop	Closed Loop
High Vacuum (10^{-6} mbar)	9 Pin Female DAP	15 Pin Female DAP
Ultra-High Vacuum (10^{-9} mbar)	9 Pin Female PEEK	15/25 Pin Female PEEK

Connecting an open loop VT-50L in a vacuum chamber requires the use of a feed through connector at the vacuum chamber wall.

The vacuum compatible VT-50L will be supplied with wiring for a straight through feed through not a cross over gender changer. MICRONIX USA supplies test connectors that simulate the vacuum feed through to allow for functionality testing prior to installation in a vacuum chamber, see Appendix A.1 for feedthrough pins.

6.2.2 Open Loop, Vacuum Wiring Diagram

Cable Descriptions:

A. Motor Cable (Female Dsub9 Pin PEEK or DAP, 1.5m Silver Braided Cable)
B. Atmospheric Motor Cable (Female Dsub9 Pin to Male Dsub9 Pin, 1.5m PVC Black Cable)

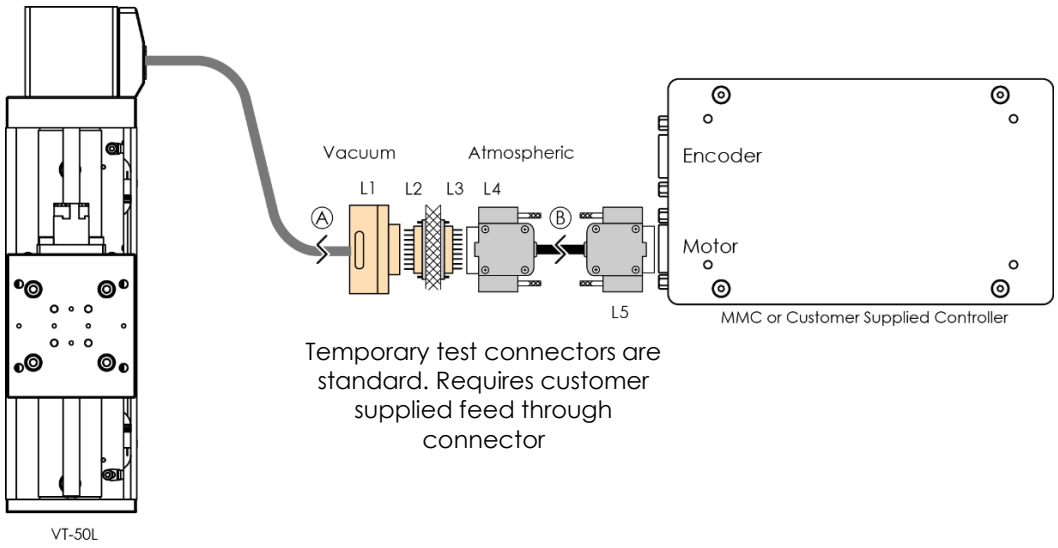
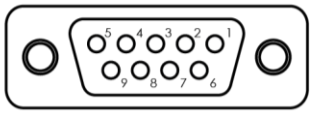


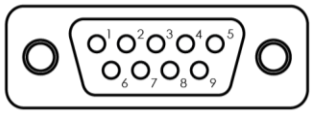
Figure 6-C. VT-50L, Open Loop, Vacuum Wiring Diagram

6.2.2.4 *Stepper Motor Vacuum Open Loop Pinout*

	Pinout for VT-50L-1X006/1X009		Cable A Dsub9F	Feedthrough Dsub9M			Cable B Dsub9F	Cable B Dsub9M
	Description	**Color**	**L1**	**L2**	**L3**	**Color**	**L4**	**L5**
Motor	Motor Phase A+	Green	5	5	1	Green	1	1
	Motor Phase A-	Green/White	4	4	2	White (Green TP)	2	2
	Motor Phase B+	Red/White	3	3	3	Black	3	3
	Motor Phase B-	Red	2	2	4	Red	4	4
Limit Switch	Limit Ground	Brown	1	1	5	Brown	5	5
	Limit Switch -	White	9	9	6	White (Violet TP)	6	6
	Limit Switch +	Violet	8	8	7	Violet	7	7
	Shield	-	6	6	9	-	9	Casing



Dsub9F - Front View
9 Pin Female Connector



Dsub9M - Front View
9 Pin Male Connector

6.2.3 Closed Loop (Encoder), Vacuum Wiring Diagram

Cable Descriptions:

A. Motor Vacuum Cable (Female Dsub 15 Pin Peek or DAP, 1.5m Silver Braided Cable)
B. Encoder Vacuum Cable (Female Dsub 15 Pin Peek or DAP, 1.5m Silver Braided Cable)
C. Motor Breakout Cable (Female Dsub 15 Pin to Male Dsub 9 Pin, 1.5m PVC Black Cable)
D. Encoder Breakout Cable (Female Dsub 15 Pin to Female Dsub 9 Pin, 1.5m PVC Black Cable)

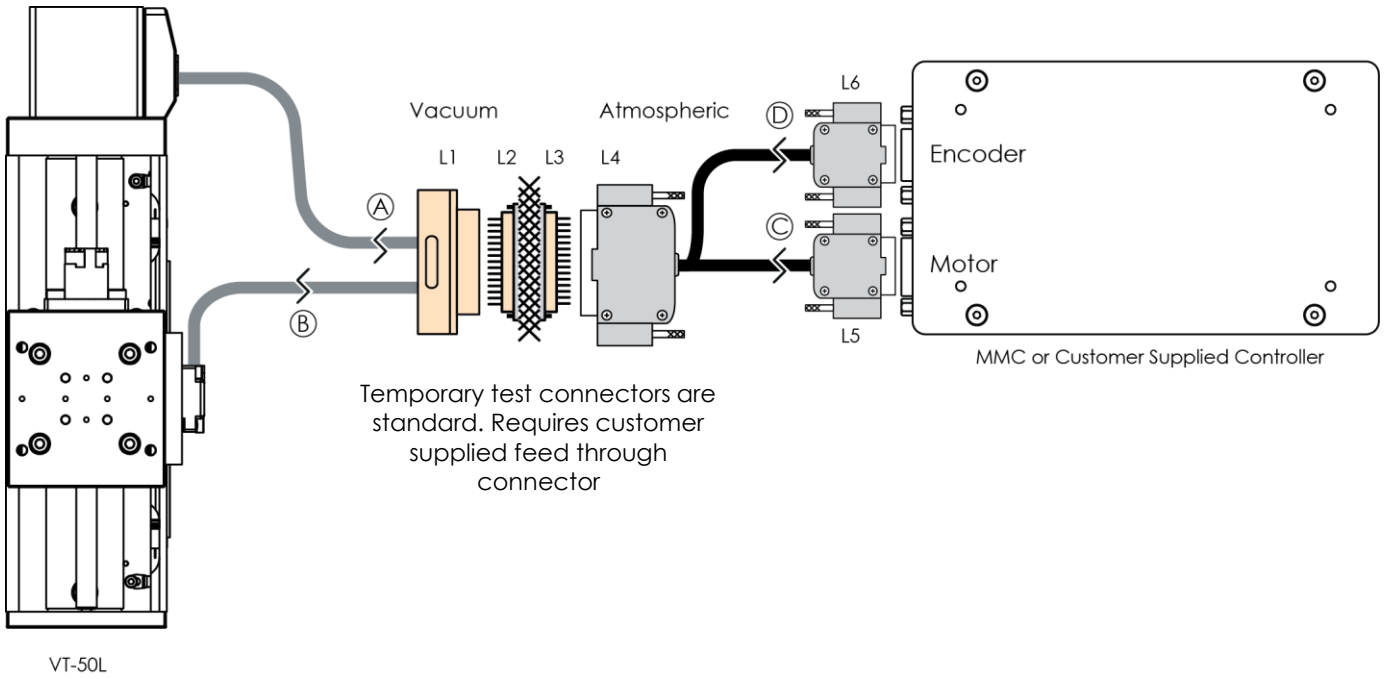
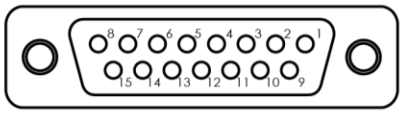


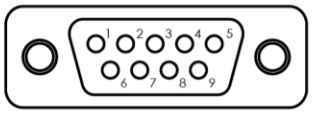
Figure 6-D. VT-50L, Closed Loop, Vacuum Wiring Diagram

6.2.3.5 Stepper Motor Vacuum Analog Encoder Pinout

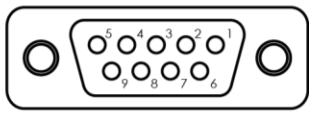
	Pinout for VT-50L-1X216/1X219		Cable A&B Dsub15F	Feedthrough Dsub15M			Dsub15F	Cable C Dsub9M	Cable D Dsub9F
	Description	**Color**	**L1**	**L2**	**L3**	**Color**	**L4**	**L5**	**L6**
Motor A&C	Motor Phase A+	Green	1	1	8	Brown/White (Brown TP)	8	1	-
	Motor Phase A-	Green/White	9	9	15	Green/White (Green TP)	15	2	-
	Motor Phase B+	Red/White	2	2	7	Violet/White (Violet TP)	7	3	-
	Motor Phase B-	Red	10	10	14	Grey/White (Grey TP)	14	4	-
	Ground	Brown	12	12	12	Black	12	5	-
	Limit Switch -	White	3	3	6	Blue	6	6	-
	Limit Switch +	Violet	11	11	13	White (Blue TP)	13	7	-
Encoder B&D	Encoder Shield	-	4	4	5	-	5	-	Casing
	Cos+	Brown	7	7	2	Brown	2	-	1
	Sin+	Blue	15	15	9	Blue	9	-	2
	Index+	Violet	6	6	3	Violet	3	-	3
	GND	Grey	12	12	12	Grey	12	-	4
	+5V	White (Grey TP)	5	5	4	White (Grey TP)	4	-	5
	Cos-	White (Brown TP)	14	14	10	White (Brown TP)	10	-	6
	Sin-	White (Blue TP)	8	8	1	White (Blue TP)	1	-	7
	Index-	White (Violet TP)	13	13	11	White (Violet TP)	11	-	8



Dsub15F - Front View
15 Pin Female Connector



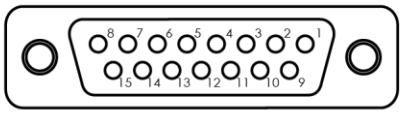
Dsub9M - Front View
9 Pin Male Connector



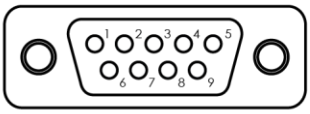
Dsub9F - Front View
9 Pin Female Connector

6.2.3.6 Stepper Motor Vacuum Digital Encoder Pinout

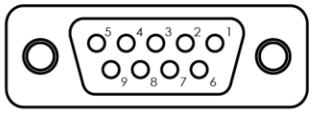
	Pinout for VT-50L-1X316/1X319		Cable A&B Dsub15F	Feedthrough Dsub15M			Dsub15F	Cable C Dsub9M	Cable D Dsub9F
	Description	**Color**	**L1**	**L2**	**L3**	**Color**	**L4**	**L5**	**L6**
Motor A&C	Motor Phase A+	Green	1	1	8	Brown/White (Brown TP)	8	1	-
	Motor Phase A-	Green/White	9	9	15	Green/White (Green TP)	15	2	-
	Motor Phase B+	Red/White	2	2	7	Violet/White (Violet TP)	7	3	-
	Motor Phase B-	Red	10	10	14	Grey/White (Grey TP)	14	4	-
	Ground	Brown	12	12	12	Black	12	5	-
	Limit Switch -	White	3	3	6	Blue	6	6	-
	Limit Switch +	Violet	11	11	13	White (Blue TP)	13	7	-
Encoder B&D	A+	Brown	7	7	2	Brown	2	-	1
	B+	Blue	15	15	9	Blue	9	-	2
	Index+	Violet	6	6	3	Violet	3	-	3
	GND	Grey	12	12	12	Grey	12	-	4
	+5V	White (Grey TP)	5	5	4	White (Grey TP)	4	-	5
	A-	White (Brown TP)	14	14	10	White (Brown TP)	10	-	6
	B-	White (Blue TP)	8	8	1	White (Blue TP)	1	-	7
	Index-	White (Violet TP)	13	13	11	White (Violet TP)	11	-	8
	Shield	-	4	4	5	-	5	-	Casing



Dsub15F - Front View
15 Pin Female Connector



Dsub9M - Front View
9 Pin Male Connector



Dsub9F - Front View
9 Pin Female Connector

7. Supplementary Information

7.1 Maintenance

- The VT-50L linear stage is a precision mechanical device and should be handled with care. Do not drop or mishandle the stage.
- Keep hands clear of all moving parts while the stage is in motion to avoid personal injury.
- Do not touch or manually turn the leadscrew, as this will contaminate the lubrication and jeopardize the longevity of the stage.
- Use proper cable management to ensure a clean and safe operating environment.
- Properly wire the feedback to the controller before powering on the stage. Failure to do so can result in damage to the stage.
- Allow for easy access to the stage in case of servicing.

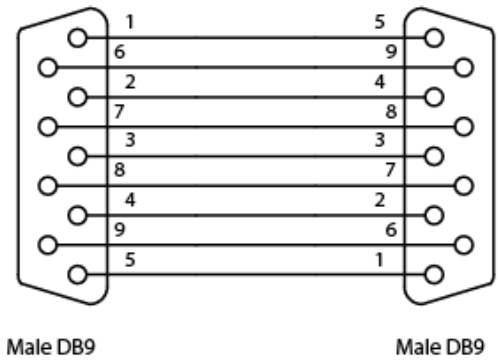
7.2 Units and Conventions

All measurements in this document are in the metric system of units.

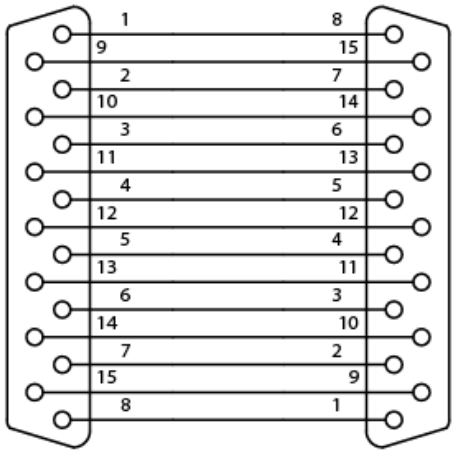
Metric Unit	English Unit
1 millimeter	0.0394 inches
1 micron	0.0000394 inches
1 Newton	0.2248 lbs.
1 Newton-meter	8.85 in-lbs.

A. Appendix

A.1 Feedthrough



Male DB9 Male DB9



Male DB15 Male DB15

A.2 Technical Specifications

A.2.1 Electrical Connections

A.2.1.1 Stepper Motor Specifications

Motor Type	2 Phase Bipolar
Phase Current	0.57 A(rms)*
Step Angle	1.8 °
Steps	200
Coil-Resistance	8.8 Ohms
Coil-Inductance	13 mH
Pitch	1.0 mm/rev
Resolution/Full step	5 µm

*If a third party controller is used it is essential to make sure the current is set properly to assure specifications.

A.2.2 Limit Switches

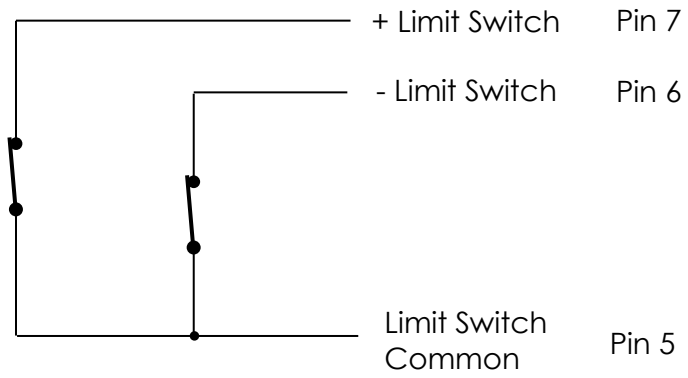
The limit switches are normally closed (when not activated) and should be connected to a compatible controller that recognizes these settings. A hard stop is designed into the VT-50L body which will prevent the carriage from running away should the limit switches fail.

The limit switches are factory calibrated to ensure advertised travel length and cannot be adjusted by the customer. For custom travel lengths, please contact MICRONIX USA.

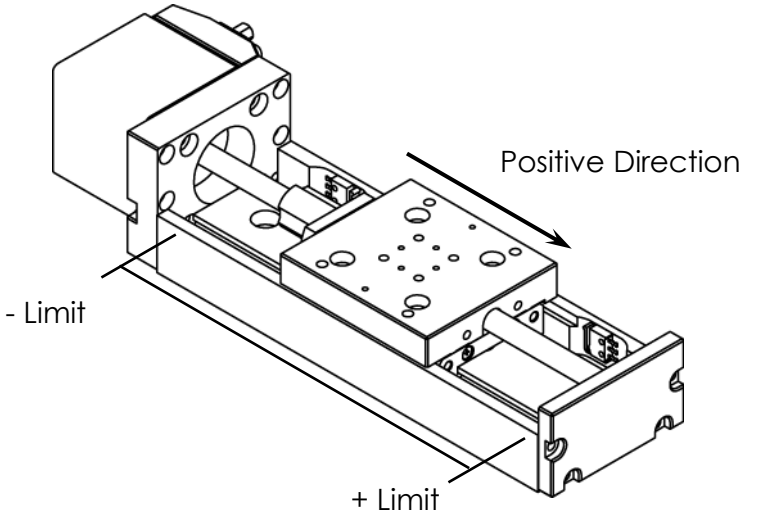
A.2.2.1 Mechanical Limit Switches

Contact Rating	100 mA @ 30 V
Contact Type	Normally Closed

A.2.2.2 Limit Switch Schematic



A.2.2.3 Direction of Motion



VT-50L Shown in center position

A.3 Using an Analog Encoder

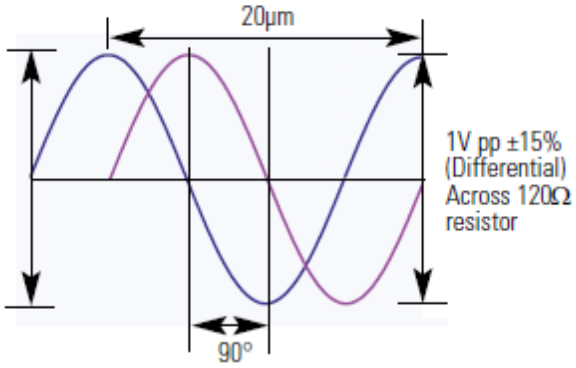
A.3.1 Analog Encoder Overview

A VT-50L with Analog encoder will need to be paired with an appropriate controller. The VT-50L vacuum configurations with an internal analog encoder will be supplied with a 15-pin vacuum connector that incorporates both motor and encoder signals, along with an atmospheric cable splitting the signals into separate 9-pin connectors (motor connector and encoder connector).

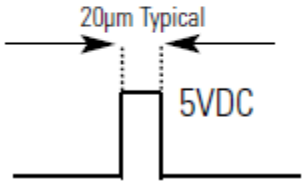
A.3.2 Operating and Electrical Specifications

Power Supply	5VDC ±10% (< 50mA for sensor)

A.3.3 Analog Output (Pins 1,2,6, and 7)



A.3.4 Index Window (Pins 3)



A.3.5 Resolution

All closed loop stages are supplied with 20µm scales. The interpolation is done in the MMC-200 to the resolution specified in the order. With an analog encoder the MMC-200 has an achievable resolution of 50nm.

A.4 Using the Digital Encoder

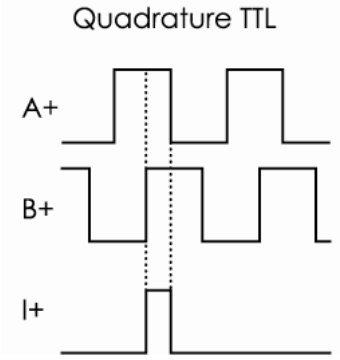
A.4.1 Encoder Overview

The VT-50L with Digital Encoder will need to be paired with an appropriate controller. The VT-50L with an digital encoder will be supplied with a 9-pin connector that incorporates these encoder signals.

A.4.1 Operating and Electrical Specifications

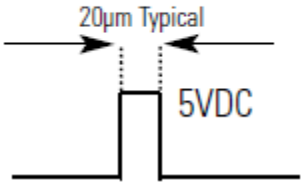
Power Supply	5VDC ±10% @ < 35mA (No outputs terminated) @ < 85mA (A, B, I, and both limits terminated); 50mA at the sensor

A.4.1 Output Signals



***Note:** The index pulse may be aligned with A- or B- at some interpolation values.

A.4.1 Index Window



A.4.2 Resolution

All closed loop stages are supplied with 20µm scales. With a digital encoder an MMC controller has an achievable resolution of 50nm.

A.5 Legacy

A.5.1 Legacy MTE Encoder Pinout

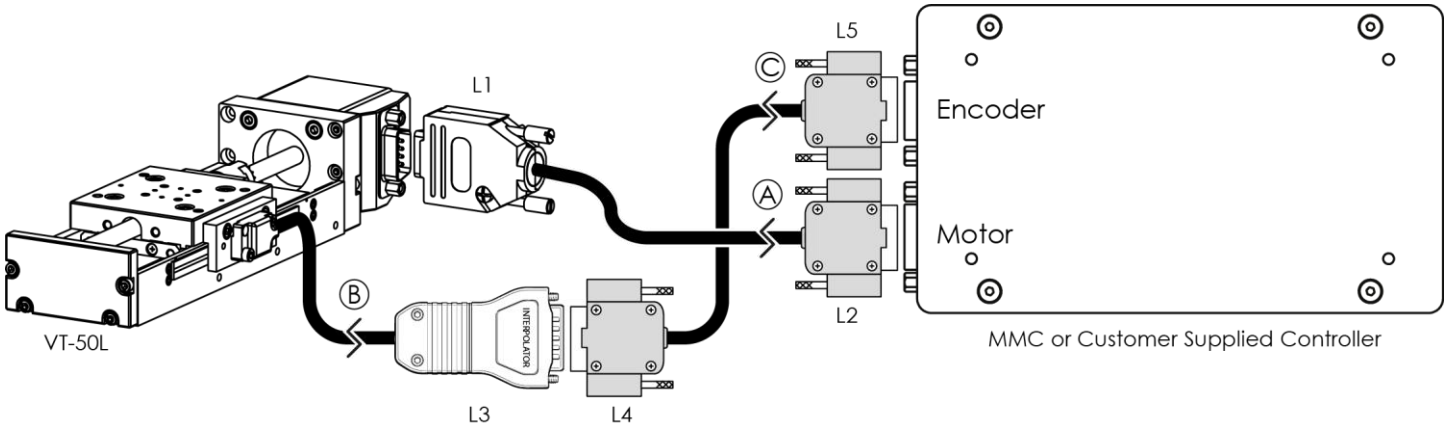
Pin	*Function*	Low Cost Digital
1	*A+/Cos+*	Brown
2	*B+/Sin+*	Grey
3	*Index+*	Violet
4	*GND*	Black & Inside shield
5	*+5V*	Red
6	A-/Cos-	Orange
7	B-/Sin-	White
8	Index-	Blue
9	N/A	N/A
Shield	GND	Outside Shield

A.5.2 Legacy Atmospheric, Digital Encoder with Interpolator Module Wiring Diagram

Standard Cable Descriptions:

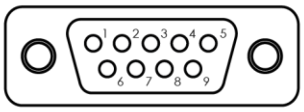
A. Motor Cable (Female Dsub9 Pin to Male Dsub9 Pin, 1.5m PVC Black Cable)
B. Encoder Cable (Male Dsub15 Pin Module, 1m PVC Black Cable)
C. Encode Module Adapter Cable (Female Dsub 15 Pin to Female Dsub 9 Pin, 0.5m PVC Black Cable)

Wiring Diagram:

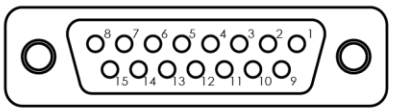


			Cable A	
Pinout for VT-50L-1X310			Dsub9F	Dsub9M
	Description	Color	L1	L2
Motor A	Motor Phase A+	OUTSOURCED 1 TO 1 CABLE	1	1
	Motor Phase A-		2	2
	Motor Phase B+		3	3
	Motor Phase B-		4	4
Limit Switch	Limit Ground		5	5
	Limit Switch -		6	6
	Limit Switch +		7	7

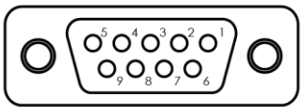
			Interpolator	Cable C	
Pinout for VT-50L-1X310			Dsub15M	Dsub15F	Dsub9F
	Description	Color	L3	L4	L5
Encoder B & C	A+	Brown	14	14	1
	B+	Blue	13	13	2
	Index+	Violet	12	12	3
	GND	Grey	2	2	4
	+5V	White (Grey TP)	7	7	5
	A-	White (Brown TP)	6	6	6
	B-	White (Blue TP)	5	5	7
	Index-	White (Violet TP)	4	4	8
	Shield	-	Casing	Casing	Casing



Dsub9M - Front View
9 Pin Male Connector



Dsub15F - Front View
15 Pin Female Connector



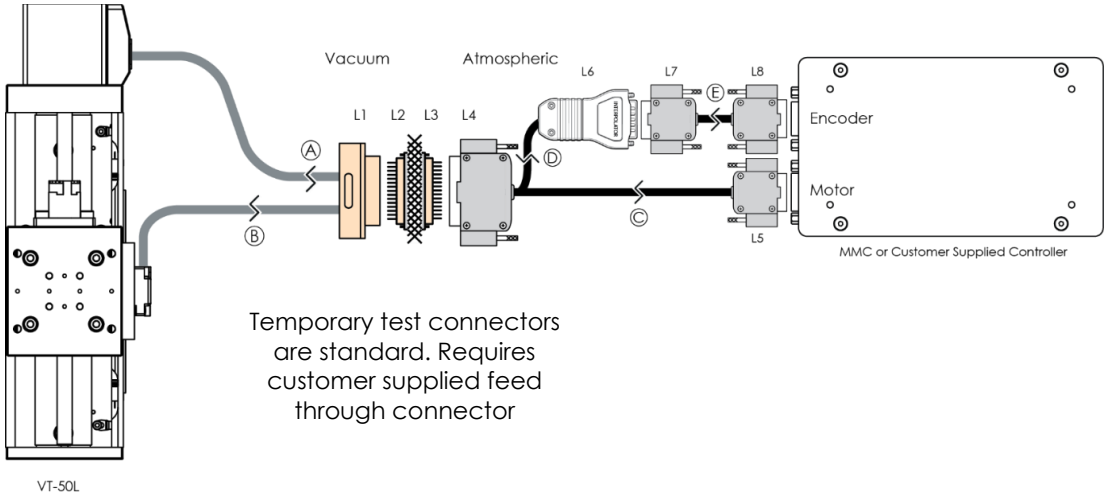
Dsub9F - Front View
9 Pin Female Connector

A.5.3 Legacy Vacuum, Digital Encoder with Interpolator Module Wiring Diagram

Standard Cable Descriptions:

A. Motor Vacuum Cable (Female Dsub 15 Pin DAP, 1.5m Silver Braided Cable)
B. Encoder Vacuum Cable (Female Dsub 15 Pin DAP, 1.5m Silver Braided Cable)
C. Motor Breakout Cable (Female Dsub 15 Pin to Male Dsub 9 Pin, 1.5m PVC Black Cable)
D. Encoder Module Breakout Cable (Female Dsub 15 Pin to Interpolator Module, 1m PVC Black Cable)
E. Encoder Module Adapter Cable (Female Dsub 15 Pin to Female Dsub 9 Pin, 0.5m PVC Black Cable)

Wiring Diagram:



	Pinout for VT-50L-1X316/1X319		Cable A&B Dsub15F	Feedthrough Dsub15M			Dsub15F	Cable C Dsub9M	Cable D Dsub15M
	Description	**Color**	**L1**	**L2**	**L3**	**Color**	**L4**	**L5**	**L6**
Motor A & C	Motor Phase A+	Green	1	1	8	Brown/White (Brown TP)	8	1	-
	Motor Phase A-	Green/White	9	9	15	Green/White (Green TP)	15	2	-
	Motor Phase B+	Red/White	2	2	7	Violet/White (Violet TP)	7	3	-
	Motor Phase B-	Red	10	10	14	Grey/White (Grey TP)	14	4	-
	Limit Ground	Brown	12	12	12	Black	12	5	-
	Limit Switch -	White	3	3	6	Blue	6	6	-
	Limit Switch +	Violet	11	11	13	White (Blue TP)	13	7	-
Encoder	Shield	-	4	4	5	-	5	-	*To Interpolator L6 (Cable D)*
	+5V	White (Grey TP)	5	5	4	White (Grey TP)	4	-	
	GND	Grey	15	15	9	Grey	9	-	
	Index+	Violet	6	6	3	Violet	3	-	
	Index-	White (Violet)	13	13	11	White (Violet TP)	11	-	
	Cos+	Brown	12	12	12	Brown	12	-	
	Cos-	White (Brown TP)	14	14	10	White (Brown TP)	10	-	
	Sin+	Blue	15	15	9	Blue	9	-	
	Sin -	White (Blue TP)	8	8	1	White (Blue TP)	1	-	

	Pinout for VT-50L-1X316/1X319		Interpolator Dsub15M	Cable E Dsub15F	Cable E Dsub9F
	Description	**Color**	**L6**	**L7**	**L8**
Encoder E	A+	Brown	14	14	1
	B+	Blue	13	13	2
	Index+	Violet	12	12	3
	GND	Grey	2	2	4
	+5V	White (Grey TP)	7	7	5
	A-	White (Brown TP)	6	6	6
	B-	White (Blue TP)	5	5	7
	Index-	White (Violet TP)	4	4	8
	Shield	-	Grey	Casing	Casing

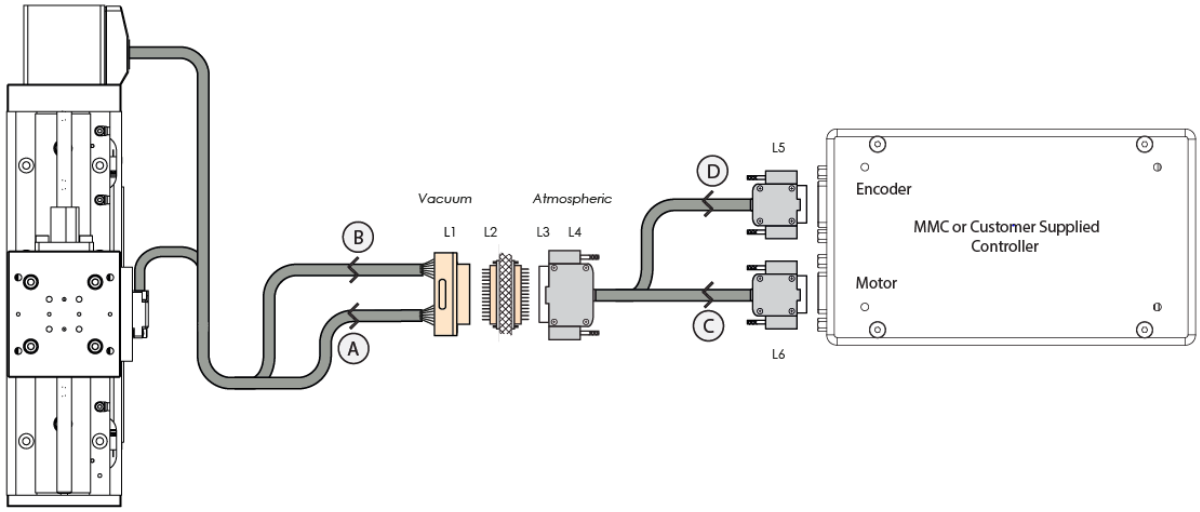
A.5.4 Legacy Analog Encoder Wiring Diagram

Standard Cable Descriptions:

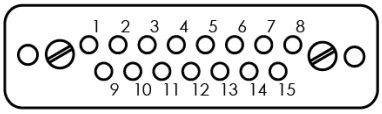
A. VT-50L Motor Cable - Vacuum Side
B. VT-50L Encoder Cable - Vacuum Side
> (Female Dsub 15 Pin Peek Connector)

C. Atmospheric Motor Connector (Female Dsub 15 Pin to Male Dsub9)
D. Atmospheric Encoder Module (Female Dsub 15 Pin to Female Dsub9)

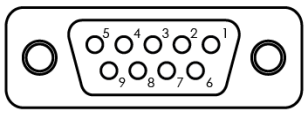
Wiring Diagram:



	Pinout for VT-50L-1X316/1X319		Cable A&B Dsub15F	Feedthrough Dsub15M		Dsub15F		Cable D Dsub9M	Cable C Dsub9F
	Description	**Color**	**L1**	**L2**	**L3**	**L4**	**Color**	**L5**	**L6**
Motor A&C	Motor Phase A+	Green	1	1	8	8	Brown/White (Brown TP)	-	1
	Motor Phase A-	Green/White	9	9	15	15	Green/White (Green TP)	-	2
	Motor Phase B+	Red/White	2	2	7	7	Violet/White (Violet TP)	-	3
	Motor Phase B-	Red	10	10	14	14	Grey/White (Grey TP)	-	4
	Ground	Brown	12	12	12	12	Black	-	5
	Limit Switch -	White	3	3	6	6	Blue	-	6
	Limit Switch +	Violet	11	11	13	13	White (Blue TP)	-	7
Encoder B&D	Cos+	Brown	7	7	2	2	Brown	1	-
	Sin+	Blue	15	15	9	9	Blue	2	-
	Index+	Violet	6	6	3	3	Violet	3	-
	GND	Grey	12	12	12	12	Grey	4	-
	+5V	White (Grey TP)	5	5	4	4	White (Grey TP)	5	-
	Cos-	White (Brown TP)	14	14	10	10	White (Brown TP)	6	-
	Sin-	White (Blue TP)	8	8	1	1	White (Blue TP)	7	-
	Index-	White (Violet TP)	13	13	11	11	White (Violet TP)	8	-
	Shield	-	4	4	5	5	-	Casing	-



Female Dsub15 Connector - Rear View



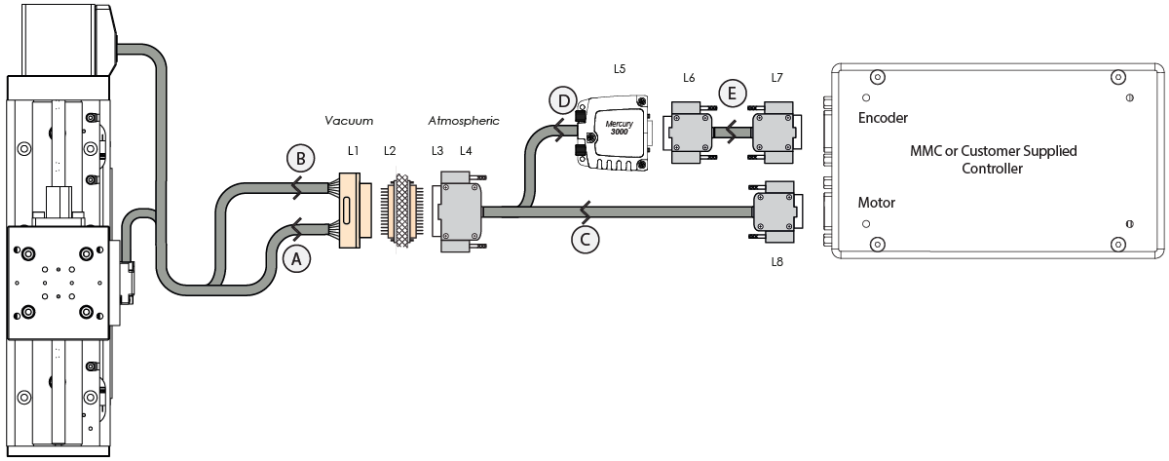
Male Dsub9 Connector - Rear View

A.5.5 Legacy Digital Encoder Wiring Diagram

Standard Cable Descriptions:

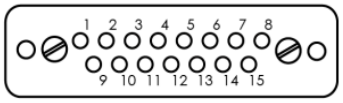
A. VT-50L Motor Cable - Vacuum Side
B. VT-50L Encoder Cable - Vacuum Side > (Female Dsub 15 Pin Peek Connector)
C. Atmospheric Motor Cable (Female Dsub 15 Pin to Male Dsub9)
D. Atmospheric Encoder Module Cable (Female Dsub 15 Pin to Mercury 3000 Interpolator Module)
E. Encoder Module Adapter Cable (Female Dsub 15 to Female Dsub 9)

Wiring Diagram:

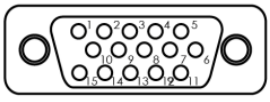


	Pinout for VT-50L-1X316/1X319		Cable A&B Dsub15F	Feedthrough Dsub15M		Dsub15F		Cable C Dsub9M
	Description	**Color**	**L1**	**L2**	**L3**	**L4**	**Color**	**L8**
Motor A & C	Motor Phase A+	Green	1	1	8	8	Brown/White (Brown TP)	1
	Motor Phase A-	Green/White	9	9	15	15	Green/White (White TP)	2
	Motor Phase B+	Red/White	2	2	7	7	Violet/White (White TP)	3
	Motor Phase B-	Red	10	10	14	14	Yellow/White (White TP)	4
	Ground	Black/Brown	12	12	12	12	Black	5
	Limit Switch -	White	3	3	6	6	Blue	6
	Limit Switch +	Violet	11	11	13	13	White (Blue TP)	7
Encoder B & D	Cos+	Brown	7	7	2	2	Brown	-
	Sin+	Yellow	15	15	9	9	Yellow	-
	Index+	Violet	6	6	3	3	Violet	-
	+5V	Red	5	5	4	4	Red	-
	Cos-	Orange	14	14	10	10	Orange	-
	Sin-	Green	8	8	1	1	Green	-
	Index-	Blue	13	13	11	11	Blue	-
	Shield	-	4	4	5	5	-	-

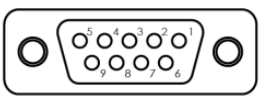
- ***Note:*** *For the pinout of cable E, refer to the appropriate MMC manual.*



Female Dsub15 Connector - Rear View



Male High Density DB15 Connector - Rear View

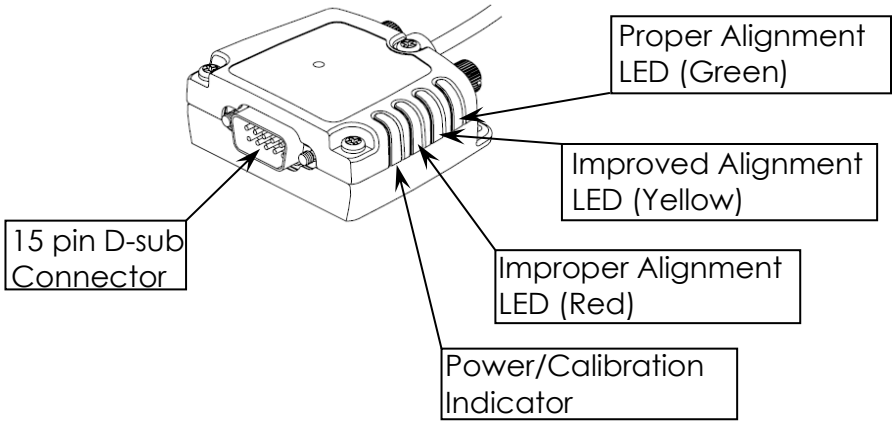


Male Dsub9 Connector - Rear View

A.5.6 Legacy Using the Mercury 3000 Encoder Module

When connected, the Encoder Module should display two green LED's indicating a power source and proper encoder alignment. A Red or Yellow LED indicates misalignment of the Encoder Head, if this occurs contact MICRONIX USA. Do not manually adjust the Encoder Head or scale. For more information refer to MicroE Systems Mercury Encoders

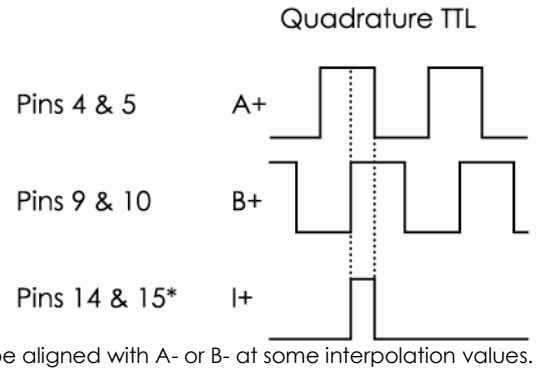
A.5.6.1 Legacy Encoder Module Overview



A.5.6.2 Legacy Operating and Electrical Specifications

Power Supply	5VDC ±5% @ 330mA (30mA for sensor)

A.5.6.3 Legacy Output Signals



*Note: The index pulse may be aligned with A- or B- at some interpolation values.