ETS·LINDGREN®
An ESCO Technologies Company

3-Axis Positioner

50.8 cm, USB

User Manual

PN: 1742218

March, 2022

Rev B

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Revision Record
MANUAL, 3-Axis Positioner | Part #1742218 Rev B

Revision	Description	Date
A	Initial Release	June, 2021
B	Added homing information and belt tension maintenance	March, 2022

TABLE OF CONTENTS

NOTES, CAUTIONS AND WARNINGS

	**Note:** Denotes helpful information intended to provide tips for better use of the product.
CAUTION	**CAUTION:** Denotes a hazard. Failure to follow instructions could result in minor personal injury and/or property damage. Included text gives proper procedures.
WARNING	**WARNING:** Denotes a hazard. Failure to follow instructions could result in **SEVERE** personal injury and/or property damage. Included text gives proper procedures.

*All notes, cautions, and warnings will be located on the left column area of the page.

See the ETS-Lindgren **Product Information Bulletin** for safety, regulatory, and other product marking information

SAFETY INFORMATION

	See the ETS-Lindgren *Product Information Bulletin* for safety, regulatory, and other product marking information.
	**Refer to Manual:** When product is marked with this symbol, see the instruction manual for additional information. Manuals are available for download at ets-lindgren.com, or contact ETS-Lindgren Technical Support.
	**High Voltage:** Indicates presence of hazardous voltage. Unsafe practice could result in severe personal injury or death.
	**Only qualified personnel** should operate (or service) this equipment. The electrical installation of this product should be accomplished by an individual who is authorized to so do by the appropriate local authority. The installation should be in compliance with local electrical safety codes.
	**Heavy Object:** Unassisted lifting can cause injury. Mechanical assistance is required.
	**Stay clear** of moving components during operation of equipment.
	Moving and/or falling equipment can cause serious injury.
	**Keep hands clear:** Moving parts can crush and cut.
	**Pinch Points:** Keep hands clear during operation.
	**Moving Gears:** Do not stick hand in or near machine during operation.
	**Do not make any modifications to this unit without consulting the factory directly.** **Before servicing:** Contact ETS-Lindgren. Servicing (or modifying) the unit by yourself may void your warranty. If you attempt to service the unit by yourself, disconnect all electrical power before starting. There are voltages at many points in the instrument which could, if contacted, cause personal injury. Only trained service personnel should perform adjustments and/or service procedures upon this instrument. Capacitors inside this instrument may still be charged even when instrument is disconnected from its power source.
	**Protective Earth Ground (Safety Ground):** Indicates protective earth terminal. You should provide uninterruptible safety earth ground from the main power source to the product input wiring terminals, power cord, or supplied power cord set. Before power is applied to this instrument, ground it properly through the protective conductor of the AC power cable to a power source provided with the protective earth contact. Any interruption of the protective (grounding) conductor, inside or outside the instrument, or disconnection of the protective earth terminal could result in personal injury.

INTRODUCTION

Note:
See the ETS-Lindgren *Product Information Bulletin* for safety, regulatory, and other product marking information.

Note:
ETS-Lindgren may substitute a similar part or new part number with the same functionality for another part number. Contact ETS-Lindgren for questions about part numbers and ordering parts.

Only qualified personnel should operate (or service) this equipment. If you have any questions concerning maintenance, contact ETS-Lindgren Technical Support. Warranty may be voided if housing is opened.

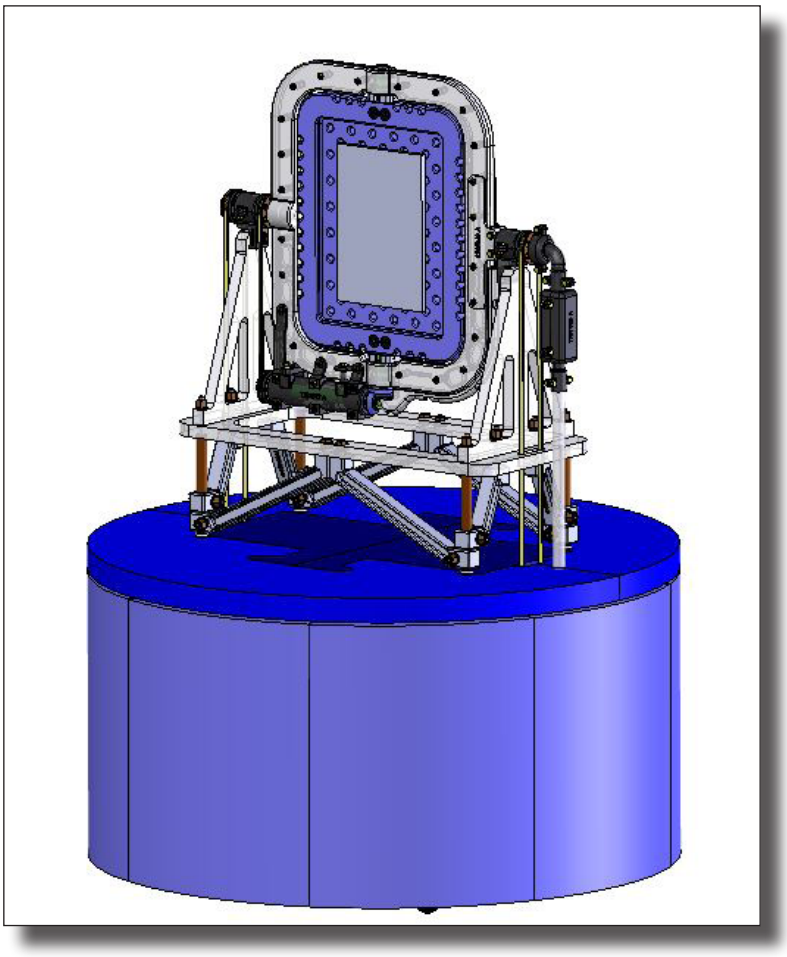
The ETS-Lindgren 3-Axis Positioner, constructed of primarily low-dielectric materials, is designed to perform automated 3-dimensional pattern measurements. The positioner includes vertical support columns that will accommodate equipment under test (EUT) up to 2.27 kg (5 lbs).

The positioner is equipped powered by 240 VAC/50-60 Hz single phase motor. An IEC receptacle is the standard power input. Current draw is fused at 10 A maximum. The motor drive, in conjunction with the provided command set, controls the movement of the unit. The positioner is controlled over Ethernet software installed on a control computer. Fiber optic is converted to Ethernet via the supplied converter (PN 708043).

Control lines may be routed using any of the following:

- Fiber optic cable - 10 M (32.8 ft)
- Fiber optic to Ethernet converter
- CAT-5 cable

The EUT, held in place with supplied rubber band, is plugged into the provided USB-C cable. The USB-C is then converted to Ethernet in the housing, passes through the motor base, and can be accessed at the base of the unit.



Standard Configuration

3-Axis Positioner Assembly

- Single-phase electric drive (240 VAC 50/60 Hz)
- Variable-speed drive
- USB-C Extension Cable (PN 1737853)
- Ethernet to USB-C Adapter (PN 1737854)
- Cables and Ethernet-fiber optic converter (PN 708043)
- Tablet Mini-stand
- Absorber
- Rubber Band Pack
- Lift Rods (2)

ETS-Lindgren Product Information Bulletin

See the ETS-Lindgren *Product Information Bulletin* included with your shipment for the following:

- Safety, regulatory, and other product marking information
- Steps to receive your shipment
- Steps to return a component for service
- ETS-Lindgren calibration service
- ETS-Lindgren contact information

Note:
See the ETS-Lindgren *Product Information Bulletin* for safety, regulatory, and other product marking information.

MAINTENANCE

Routine maintenance should be conducted prior to each use of the turntable. For assistance, contact ETS-Lindgren Technical Support.

CAUTION

Before performing any maintenance, read the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

WARNING

Before assembling, installing, or connecting any components, follow the safety information in the ETS-Lindgren Product Information Bulletin included with your shipment.

WARNING

High Voltage:
Unsafe practice could result in severe personal injury or death.

CAUTION

Disconnect the power before proceeding with recommended maintenance. Do not perform maintenance while the positioner is operating.

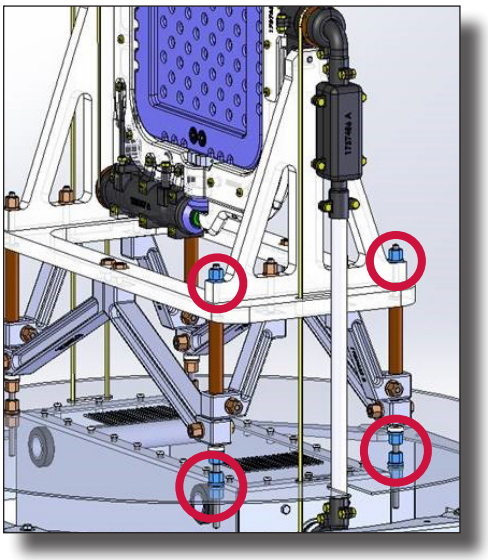
Routine Maintenance

- **Check absorber for damage.** Contact ETS-Lindgren to replace any damaged absorber.
- **Be aware of excessive rotational backlash.** It may indicate that drive components have shifted.
- **Listen for excessive noise.** Listen for excessive or unusual noise during turntable operation.
- **Check cables for wear.** Ensure they are clear of potential damage from moving parts.
- **Check belt tension.** If belt tension needs adjusting, follow the instructions in *As-Needed Maintenance*.

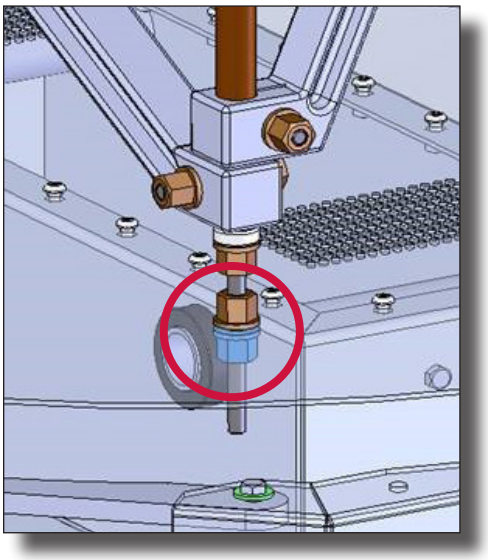
As-Needed Maintenance

Adjust Outer Belt Tension

1. Loosen hardware (highlighted).
2. Tighten or loosen lower nut to adjust the belt tension.



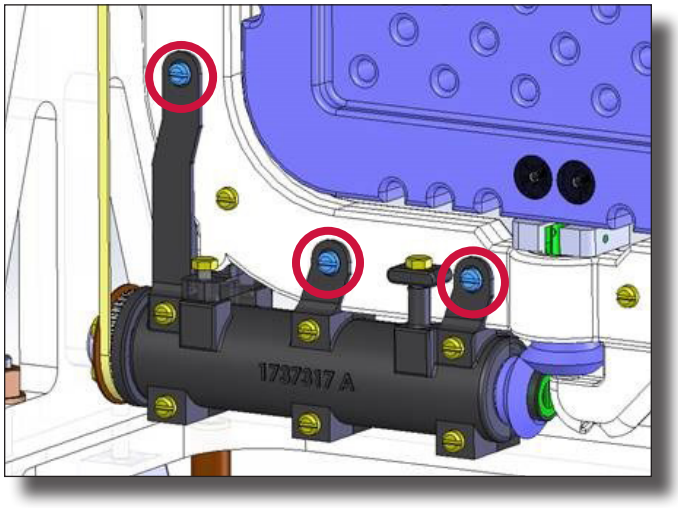
3. To prevent slipping, ensure the belt is snug on each pulley.
4. Tighten all the remaining loose hardware to set belt tension.



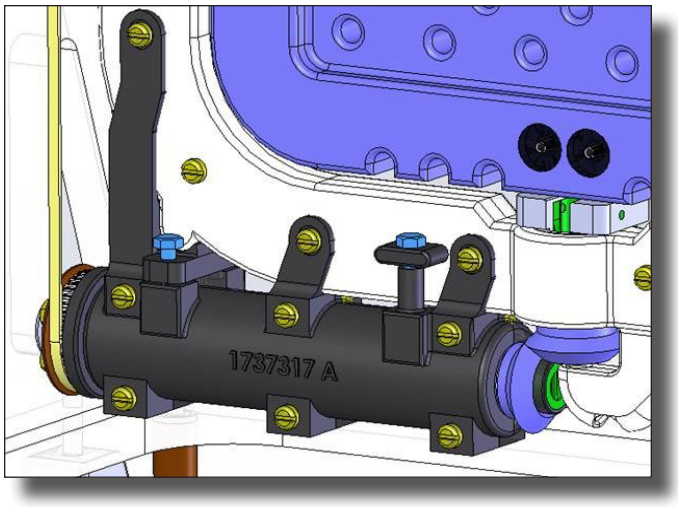
Only qualified personnel should operate (or service) this equipment. If you have any questions concerning maintenance, contact ETS-Lindgren Technical Support. Warranty may be voided if housing is opened.

Adjust Inner Belt Tension

1. Loosen highlighted hardware.
2. Adjust screws (highlighted) so that the belt is tensioned and the miter gear is engaged.



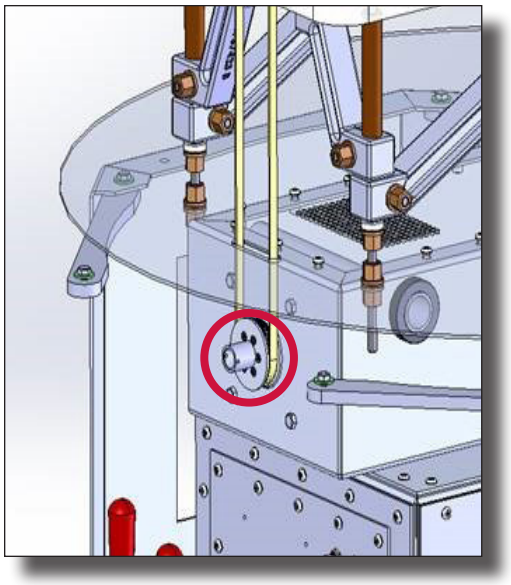
3. To prevent slipping, ensure that the belt is snug on each pulley.



Only qualified personnel should operate (or service) this equipment. If you have any questions concerning maintenance, contact ETS-Lindgren Technical Support. Warranty may be voided if housing is opened.

Adjust Home Position

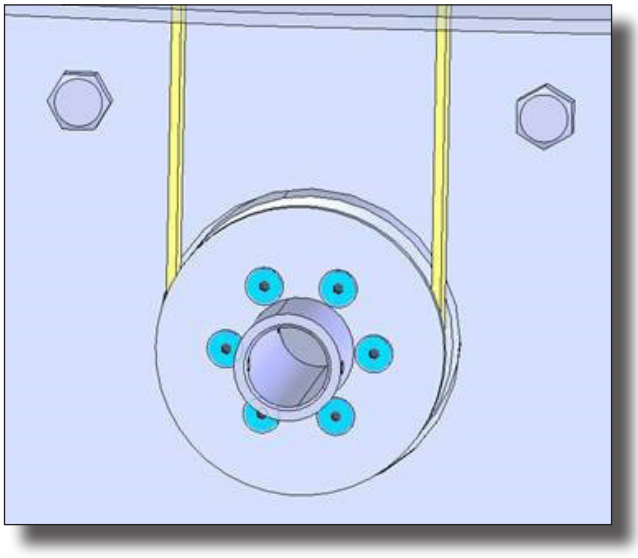
1. Send position to "Home." starting Axis 2, following with Axis 3.
2. Loosen the six screws clamping the lower pulley. Repeat on both sides of each axis.



Axis 2 *must* be homed prior to homing Axis 3. Axis 1 functions independently, but Axis 3 is mechanically dependent upon Axis 2.

"Home" is not necessarily 0°. "Home" is the location of the home sensor and not necessarily 0°. Factory configuration has "Home" set to 0° but "Home" is an arbitrary position and may be set at any degree. See the "CP" command for information on how to set a position.

3. Adjust Axis 2 to the desired home position. Repeat for Axis 3.
4. Tighten the loosened hardware. Be careful not to over tighten the hardware.



Note:
Contact ETS-Lindgren Technical Support for assistance with replacement parts.

Stay clear of all moving components.

Keep hands clear:
Moving parts can crush and cut.

Pinch Points:
Keep hands clear during operation.

Moving Gears:
Do not stick hand in or near machine during operation.

CAUTION

Damaged or crimped AC cords:
Using damaged or crimped AC cords may damage the equipment and/or cause physical injury.

Replacement Parts

The following items are the part numbers for ordering replacement parts.

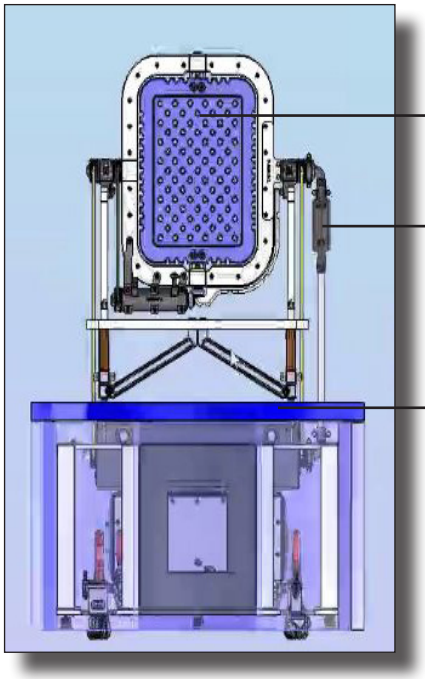
Part Description	Part Number
Absorber (Base)	1737685
Absorber (Top)	1737686
Absorber (Top Center)	1737687
USB-C Extension Cable (6 ft)	1737853
Ethernet to USB-C Adapter	1737854
Fiber Optic to Ethernet Converter	708043
Lift Rod	119561
Rubber Band Pack	891631

Safety Precautions

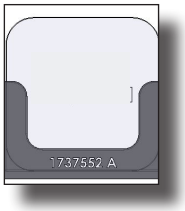
- Other than belt tension and home position adjustments, there are no user serviceable parts in this positioner. Contact ETS-LIndgren Technical Support for service. Attempting to open housings, etc. may void warranty.
- Do not use damaged or crimped AC power cords.
- Leveling feet must be secured or the equipment may move. Attempting to move without deploying casters may damage the unit.

Service Procedures

For the steps to return a system or system component to ETS-Lindgren for service, see the *Product Information Bulletin* included with your shipment or contact ETS-Lindgren Technical Support.



Shown with Absorber Transparent



Tablet Mini Stand (included)

SPECIFICATIONS

WARNING

Heavy Object:
Unassisted lifting can cause injury. Mechanical assistance is required.

WARNING

High Voltage:
Unsafe practice could result in severe personal injury or death.

WARNING

Electrical installation must be performed by a qualified electrician, and in accordance with local and national electrical standards.

WARNING

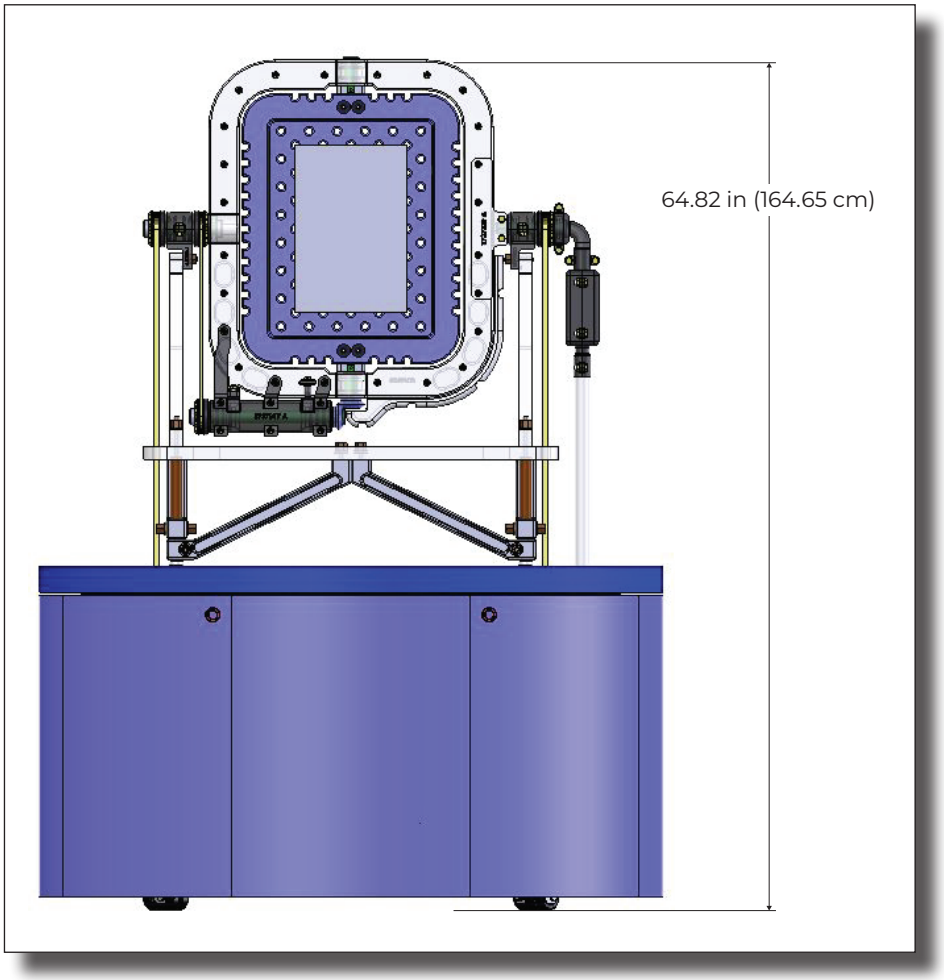
Before assembling, installing, or connecting any components, follow the safety information in the ETS-Lindgren Product Information Bulletin included with your shipment.

Physical Specifications

Height:	64.82 in (164.65 cm)
Turntable Diameter:	47.30 in (120.14 cm)
Overall Weight:	265 lbs (120.20 kg)
Maximum Load Capacity:	5 lbs (2.27 kg)

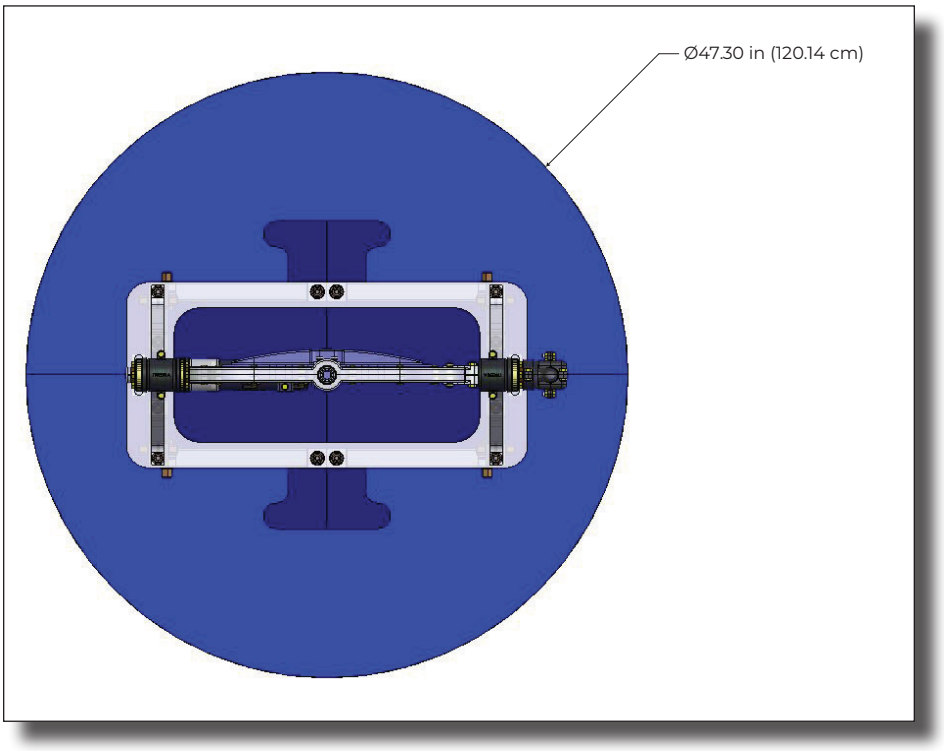
Electrical Specifications

Phase:	1
Voltage:	220
Amperage:	10



WARNING

Heavy Object:
Unassisted lifting can cause injury. Mechanical assistance is required.



Top View

INSTALLATION

WARNING

Before assembling, installing, or connecting any components, follow the safety information in the ETS-Lindgren Product Information Bulletin included with your shipment.

WARNING

Heavy Object:
Unassisted lifting can cause injury. Mechanical assistance is required.

WARNING

Moving and/or falling equipment can cause serious injury.

Keep hands clear:
Moving parts can crush and cut.

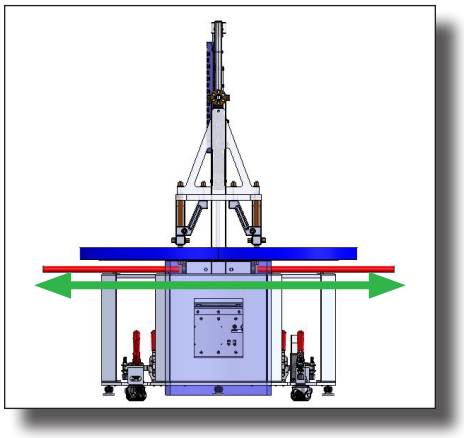
Pinch Points:
Keep hands clear during operation.

The positioner will be assembled by ETS-Lindgren. Following are instructions for preparing the positioner for use.

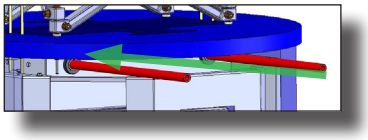
Locating the Positioner

The positioner is heavy (265 pounds) and must be lifted by 4 people. Use caution handling the lift rods. (If re-locating positioner, remove absorber first.)

5. To lift casters, use handles which deploy all 4 clamps.
6. Insert lift rods (PN 119561) into the tube (PN 1737449) that holds the rod one at a time. Make sure to thread them both all the way through evenly.
7. Move the positioner it to its appropriate location.
8. Carefully remove each lift rod.

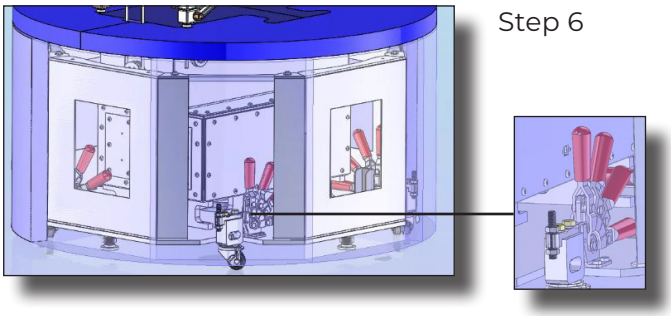


Step 2



Angled view of insertion of lift rod (119561) into tube (1737449)

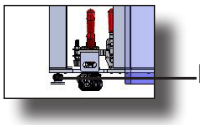
9. Retract the casters in place. Absorber will not fit unless the casters are retracted.
10. Use the leveling feet to ensure that the positioner is not leaning



Step 6

Toggle clamp for deploying casters

Optional: In order to secure a permanent location for your positioner, separate the leveling pads (PN 1737485) from the leveling feet and secure the pads into the floor of the permanent location.



Leveling Pad

WARNING

Electrical installation must be performed by a qualified electrician, and in accordance with local and national electrical standards.

Only qualified personnel should operate (or service) this equipment. If you have any questions concerning maintenance, contact ETS-Lindgren Technical Support. Warranty may be voided if housing is opened.

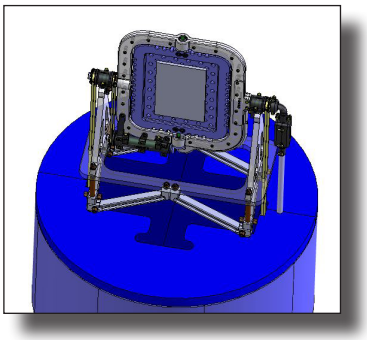
CAUTION

Other than during installation, do not touch absorber. Skin oils and other debris can damage and discolor the foam.

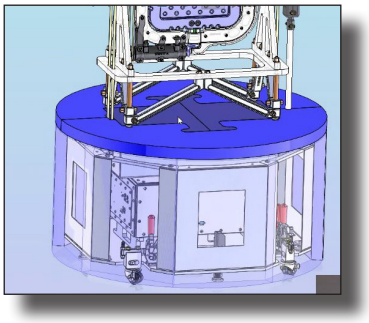
Attaching Absorber

Absorber should be attached to the exterior of the turntable. The absorber on the top, flat surface fits together and cannot be interchanged. The absorber is vented to allow cooling.

1. Using the hook and loop side, attach the base absorber (PN 1737685) along the bottom of the positioner.
2. Place the exterior top pieces of absorber (PN 1737686) on the turntable.
3. Place the center top pieces of absorber (PN 1737687) on the turntable.



Top Absorber (1737686 and 17376687)

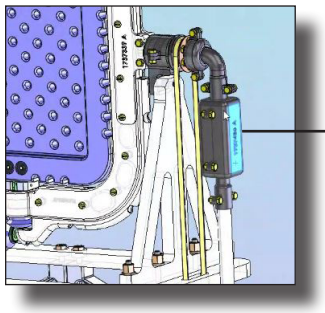


Absorber is vented to let heat out.

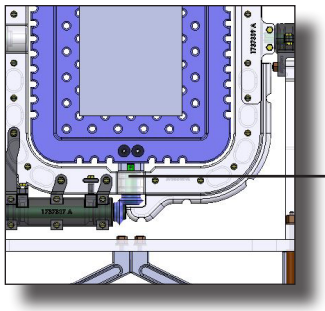
Connecting and Converting Ethernet to USB-C

Ethernet is converted to USB-C inside the highlighted enclosure and connected to the tertiary axis platen via a tube.

Thread the USB-C cable to the platen.



Ethernet to USB-C Converter (1737854

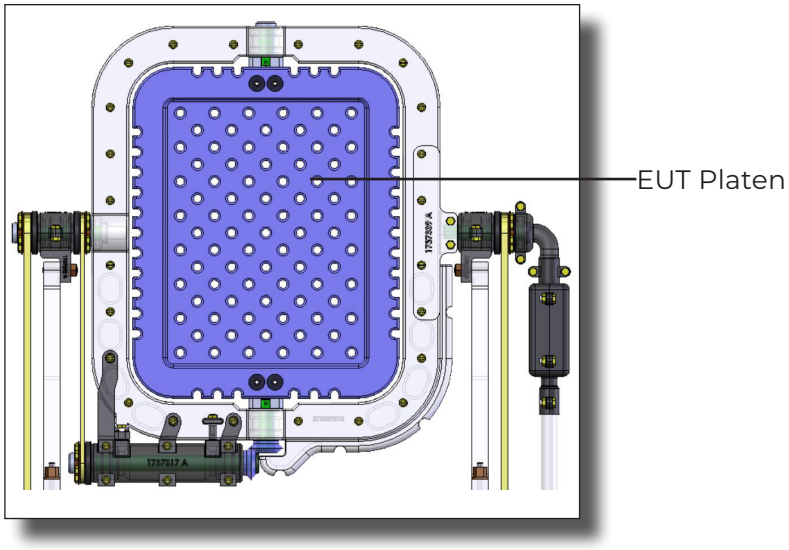


USB-C into Platen

CONNECTING THE EUT

Rubber bands (PN 891631) for securing the EUT are included with the assembly.

1. Strap the EUT to the platen using the rubber bands.
2. Connect EUT to USB-C cable connector.
3. After testing, ensure USB-C is disconnected before removing EUT from platen.



Only qualified personnel should operate (or service) this equipment. If you have any questions concerning maintenance, contact ETS-Lindgren Technical Support. Warranty may be voided if housing is opened.

WARNING

High Voltage:
Unsafe practice could result in severe personal injury or death.

CAUTION

Damaged or crimped AC cords:
Using damaged or crimped AC cords may damage the equipment and/or cause physical injury.

OPERATION

The turntable is unlimited in its rotation. The other two axes are limited to ±180°. A tablet mini stand is also included. Firmware is installed in the positioner, and it is controlled by PC.

WARNING

High Voltage:
Unsafe practice could result in severe personal injury or death.

Stay clear of all moving components.

Keep hands clear:
Moving parts can crush and cut.

Pinch Points:
Keep hands clear during operation.

Moving Gears:
Do not stick hand in or near machine during operation.

CAUTION

Damaged or crimped AC cords:
Using damaged or crimped AC cords may damage the equipment and/or cause physical injury.

CAUTION

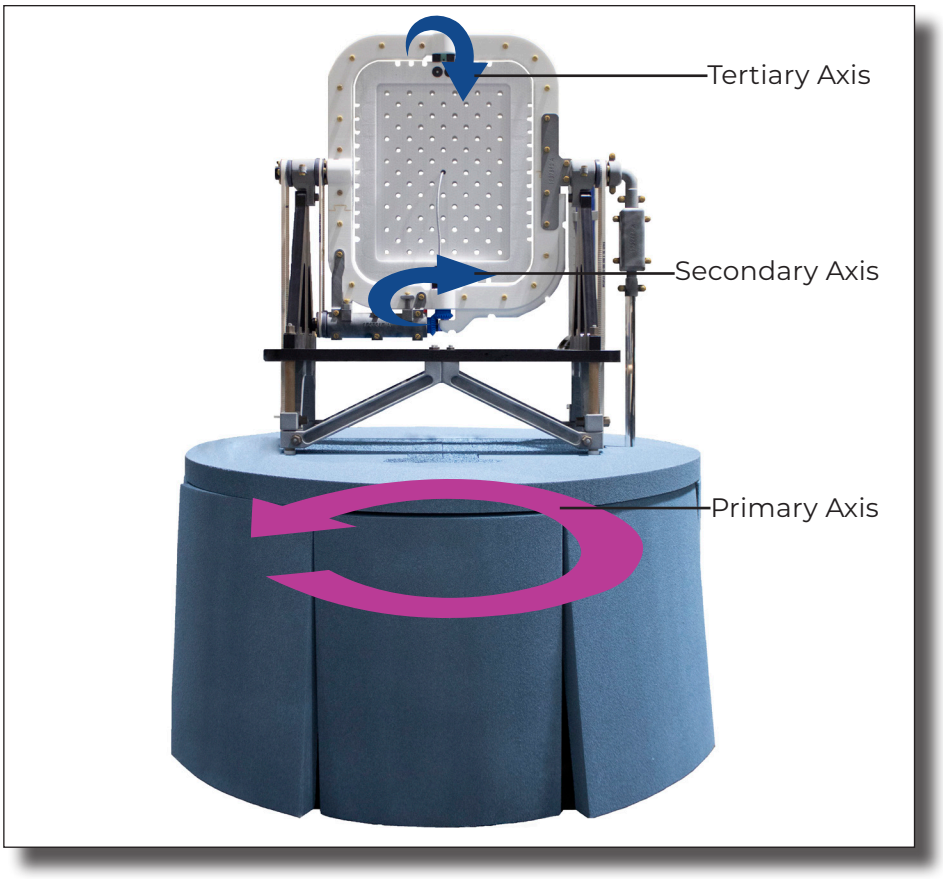
Read this manual completely before operating. Before and during operation, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

WARNING

Ensure the current travel limit settings will not cause damage to existing cables.

WARNING

Do not operate the 3-Axis Positioner in a stalled condition. Doing so can cause damage to the drive unit and will void the warranty. Ensure the positioner will continue to rotate under load at all speeds.



3-Axis Positioner Command Set

The turntable is unlimited in its rotation. The other two axes are limited to ±180°.

3-Axis Positioner Speeds (for all 3 axes)

Min Speed: 0.5 RPM

Max Speed: 16 RPM

Default speed settings

S	RPM
1	1.0
2	2.0
3	3.0
4	4.0
5	5.0
6	6.0
7	8.0
8	12.0

General Command Structure

The following command set is general and includes commands that may not apply to your specific positioner. Speeds listed in this generic list are representative only.

Most of the following commands use this general structure:

[AXIS<n[-m]>:]COMMAND <argument_n>[,<argument_m>]

Where:

[ ]	Indicates optional.
< >	Indicates required.
COMMAND	The backwards compatible Model 2090 Multi Device Controller command. When used by itself, controls the first device in a multi axis system, and, when arguments are required, supports only a single argument.
The command prefix in optional brackets [ ] **[AXIS<n[-m]>:] COMMAND <argument_ n>[,<argument_m>]**	Required to access a specific axis or multiple axes at a time. Selects the desired axis or axes to control. A single index specifies a single axis (e.g. AXIS1 or AXIS2) with a single argument, while a range (e.g. AXIS1-2) specifies a range of axes with a corresponding range of arguments. Note that some commands only support single axis control.
<argument_n>	The single argument required for a single axis command.
[,<argument_m>]	Represents the additional arguments required for an optional multi-axis command (e.g. AXIS1-2:COMMAND 1,2).

Homing the Axes

Axis 1 functions independently, but Axis 3 is mechanically dependent upon Axis 2. Axis 2 must be homed prior to Axis 3.

"Home" is the location of the home sensor and not necessarily 0°. Factory configuration has "Home" set to 0° but "Home" is an arbitrary position and may be set at any degree. See the "CP" command for information on how to set a position.

Axis 2 *must* be homed prior to homing Axis 3.

System Commands

Device Identification Query	
Command:	*IDN?
Description:	Identification query. Determines the nature of device located at a given address on the network. The string returned ("ETS-Lindgren Inc.,2303 Precision Positioner,<Module Name>,PCA120518 FW N.NN") identifies this device as a 2303 Precision Positioner. The <Module Name> parameter is a place holder to identify a specific module. The N.NN parameter is a place holder for the firmware version identification.
Query:	*IDN?
Returns:	ETS-Lindgren Inc.,2303 Precision Positioner,<Module Name>,PCA120518 FW n.nn
Example:	*IDN? ETS-Lindgren Inc.,2303 Precision Positioner,Comm,PCA120518 FW 4.14

Module IP Address	
Command:	MOD:IP <nnn.nnn.nnn.nnn>
Description:	The device default IP address and subnet mask is 192.168.0.100, 255.255.255.0. The default address and subnet mask are assigned to the device by ETS-Lindgren and do not change even if your computer reboots. The IP address can be changed using the MOD:IP command. The port number is 1206.
Query:	MOD:IP?
Returns:	nnn.nnn.nnn.nnn
Example:	MOD:IP 192.168.0.55

Module Name	
Command:	MOD:NAME <Module Name>
Description:	The <Module Name> parameter in the *IDN? query response is a place holder to identify a specific device in a network. If you have more than one device you might want to identify them with different module names. For instance, “EMC LAB1” and “EMC CHAMBER”.
Query:	MOD:NAME?
Example:	MOD:NAME EMC LAB1

Module Subnet Mask	
Command:	MOD:NETMASK <nnn.nnn.nnn.nnn>
Description:	The device default IP address and subnet mask is 192.168.0.100, 255.255.255.0. This address and mask are assigned to the device by ETS-Lindgren and does not change even if your computer reboots. The subnet mask can be changed using the MOD:NETMASK command. The new subnet mask will not change even if your computer reboots.
Query:	MOD:NETMASK?
Returns:	nnn.nnn.nnn.nnn
Example:	MOD:NETMASK 255.255.0.0

Control Commands

Acceleration in Milliseconds	
Command:	A <nnnn>
Description:	Acceleration setting for variable speed devices. The number nnnn represents the time in milliseconds for the positioner to reach max speed. For high inertial loads, a longer acceleration time might be required.
Query:	A?
Returns:	The time in milliseconds for the positioner to reach max speed.
Example:	AXIS1:A 1000

Acceleration in Seconds	
Command:	ACC nn.n
Description:	Acceleration setting for variable speed devices. The number N.N represents the time in seconds for the positioner to reach max speed. For high inertial loads, a longer acceleration time might be required.
Query:	ACC?
Returns:	The time in seconds for the positioner to reach max speed.
Example:	AXIS2:ACC .5

Command Complete Query	
Command:	*OPC?
Description:	Informs if a seek or home command have been completed. Please see home command for an example of how to use the *OPC query.
Query:	*OPC?
Returns:	1 if a seek or home command have been completed, 0 otherwise.
Example:	AXIS3:*OPC?

Current Position	
Command:	CP nn.n
Description:	Changes the current position of the device. When editing limits or the current position setting, the software will not allow the current position to be set outside the software limits, nor can the upper or lower limits be adjusted below or above, respectively, the current position or each other.
Example:	AXIS1:CP 90
Query:	CP?
Returns:	Axis current position The value returned is either in XXX.X or XXX.XX format. Negative values are preceded by a "-" minus sign. Linear positioners return current position in centimeters, turntables return it in degrees..
Example:	AXIS1-3:CP? Response 10.5, -90.0, 70.0

Error Query	
Command:	ERR?
Description:	Queries the axis error register. The error register is cleared on read.
Query:	ERR?
Returns:	An error code (See list at the end of command set.)
Example:	AXIS3:ERR?

Homing Procedure	
Command:	HOME
Description:	The device has a mechanical home sensor. Every time the positioner is turned on, a home procedure must be performed so the current position is known by the firmware. To home the positioner, send the following commands: HOME *OPC? Keep querying the positioner by sending the *OPC? until it returns 1. *OPC? Will return 0 if the turntable is still being homed. *OPC? will return 1 if the home procedure is done. After *OPC returns 1, send the query HOME? to confirm that the positioner found the mechanical home sensor. HOME? returns 0 if the home procedure was not successful; result of a faulty sensor.
Query:	HOME?
Returns:	1 if the AXIS1 has been homed, 0 otherwise
Example:	AXIS1:HOME

Lower Limit	
Command:	LL nnn.n
Description:	Sets the lower/counterclockwise limit of the device. The specified value nnn.n must be less than the upper/clockwise limit.
Query:	LL?
Returns:	Lower or counterclockwise limit of the device in degrees.
Example:	AXIS1-2:LL 0,-10

Motion Direction	
Command:	DIR?
Description:	Queries the motion direction for the device.
Query:	DIR?
Returns:	<direction> Value indicating the current motion of the queried device. +1 Device is moving up/clockwise. 0 Device is stopped. -1 Device is moving down/counterclockwise
Example:	AXIS1-2:DIR? Response: 0,+1

Move Clockwise	
Command:	CW
Description:	Instructs the positioner to move in the clockwise direction. In non-continuous mode this movement is limited by the clockwise (upper) limit.
Example:	AXIS1-2:CW

Move Counterclockwise	
Command:	CCW
Description:	Instructs the positioner to move in the counterclockwise direction. This movement is limited by the counterclockwise (lower) limit.
Example:	AXIS2:CCW

Scan	
Command:	SCAN
Description:	Instructs the positioner to begin scanning between preset lower and upper limits.
Example:	AXIS1:SCAN

Seek Negative	
Command:	SKN <nnn.n>
Description:	Instructs the device to begin seeking the specified target value in the negative (down/ counterclockwise) direction only. This command primarily supports continuous rotation mode. It allows forcing seeking a position from a particular direction. Thus, a SKN from 180.0 to 181.0 will rotate counterclockwise to reach the target value. In non-continuous rotation mode if the target is up/clockwise from the current position, no motion occurs. The target must be located between the current upper/clockwise and lower/counterclockwise limits.
Example:	AXIS1:SKN 30

Seek Position	
Command:	SK nnn.n
Description:	Instructs the device to begin seeking for a target position. In continuous rotation mode, the device will seek the target value by the shortest possible path. Thus, a seek from 350.0 to 10.0 will rotate clockwise, not direction.
Example:	AXIS1-2:SK 90,30

Seek Positive	
Command:	SKP <nnn.n>
Description:	Instructs the device to begin seeking the specified target value in the position (up/ clockwise) direction only. This command is provided primarily to support continuous rotation mode. It allows forcing seeking a position from a particular direction. Thus, a SKP from 181.0 to 180.0 will rotate clockwise to reach the target value. In non-continuous rotation mode if the target is down/ counterclockwise from the current position, no motion occurs. The target must be located between the current upper/ clockwise and lower/counterclockwise limits.
Example:	AXIS2:SKP 90

Seek Relative	
Command:	SKR [+|-]nnn.n
Description:	Instructs the device to begin seeking the specified target value relative to the current position. The specified value is added to the current position to obtain the target position. Thus, a positive value will cause up/clockwise motion and a negative value will cause down/counterclockwise motion.
Example:	AXIS1-2:SKR -10,10

Speed	
Command:	Sn Where n is a number between 1 and 8. The factory speed settings configuration is: Setting Deg/s 1 - 0.35 2 - 0.70 3 - 1.05 4 - 1.22 5 - 1.40 6 - 1.56 7 - 1.74 8 - 2.10
Description:	Changes the device speed
Query:	S?
Returns:	A number between 1 and 8
Example:	S3 Set AXIS1 current speed to 1.05 deg/s

Speed Preset	
Command:	SS<n> <speed>
Description:	Assigns a preset speed setting 0-255 to n, where n is a number 1-8. **Warning:** There can be no white space between the command and the register number. However, there must be white space between the register number and the speed value.
<speed>	Value from 0-255 representing the desired speed setting for the specified speed selection. A value of 0 represents the minimum available speed of the device. A value of 255 represents the maximum speed of the device. The actual speed of the device is given approximately by the formula: Actual Speed = (MaxSpeed – MinSpeed) / 255 + MinSpeed For Axis 1, 2, and 3: Min Speed = .18 deg/s Max Speed = 2.45 deg/s
Query:	SS#?
Returns:	Value between 0 (minimum) and 255 (maximum) speed.
Example:	SS2 127 Set speed 2 to half speed SS5 63 Set speed 5 to quarter speed

Stop Motion	
Command:	ST
Description:	Causes device motion to stop.
Example:	AXIS1-2:ST

Trigger Configuration	
Command:	TRIGGER (<ON|OFF>, <step size>,<reference>,<pre trigger delay>, <pulse length>,<post trigger delay>,<polarity>)
Description:	Use this command to configure the trigger. Where step size is the angular distance between trigger pulses in degrees, reference position is one of the positions where a trigger should occur (not necessarily a starting position), pre-trigger delay is the time between reaching the target encoder position and producing a trigger pulse, trigger pulse length is the active period of the trigger pulse, post trigger delay is the minimum inactive period after the trigger pulse before another trigger event can occur, and High/Low sets the polarity of the trigger signal. Time unit is milliseconds.
Query:	TRIGGER?
Returns:	Trigger configuration
Example:	TRIGGER (ON,15.00,0.00,0.10,1.00,0.00,LOW)

Upper Limit	
Command:	UL nnn.n
Description:	Sets the upper/clockwise limit of the device. The specified value nnn.n must be greater than the lower/counterclockwise limit.
Query:	UL?
Returns:	Upper or clockwise limit of the device in degrees.
Example:	AXIS2:UL 90

Error Codes

1 – Controller board Flash memory malfunction

2 – Axis not moving

3 – Motor not stopping

4 – Motor moving on wrong direction

5 – Hardware Limit hit

6 – Polarization limit violation

7 – Lost communication

9 – Encoder failure

10 – Trigger failure

11 – Motor overheat

12 – Relay failure,

13 – Position out of bounds

14 – Trying to move a locked axis

32 – Motor driver fault

100-399 – Command syntax error

400-499 – Home procedure failure

500-599 – Trigger command malformed

1000- – Firmware upgrade failure

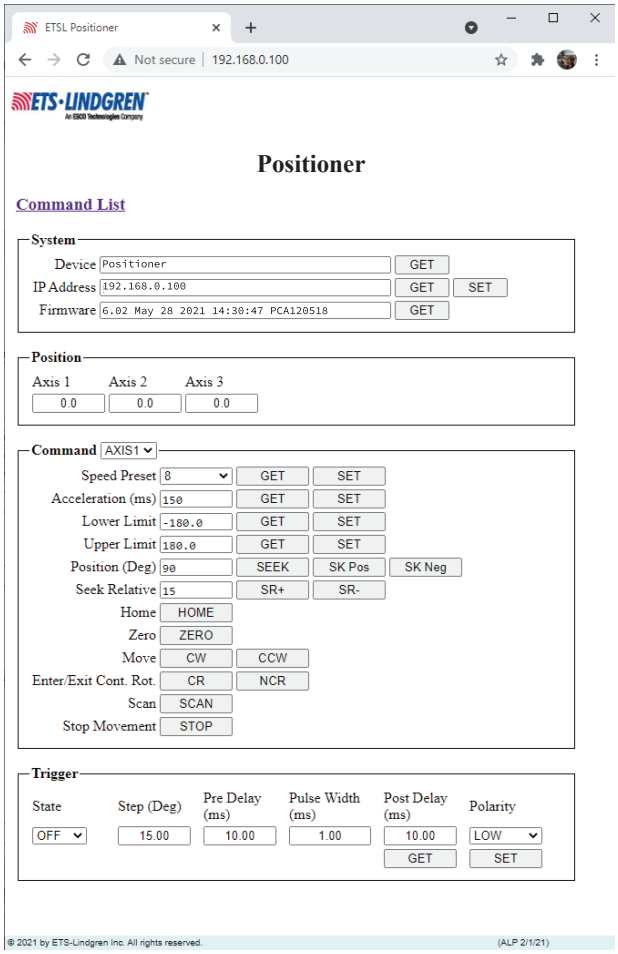
Network Factory Configuration

- IP Address.....: 192.168.0.100
- Net Mask.....: 255.255.255.0
- Gateway.....: 192.168.0.1
- Command Port...: 1206

Changing the Positioner IP Address

In a Local Area Network (LAN), there cannot be more than one device using the same IP address. The IP address of the device will need to be changed if more than one device is in the same (LAN). To change the IP address of an ETS-Lindgren Ethernet device, use its embedded web page.

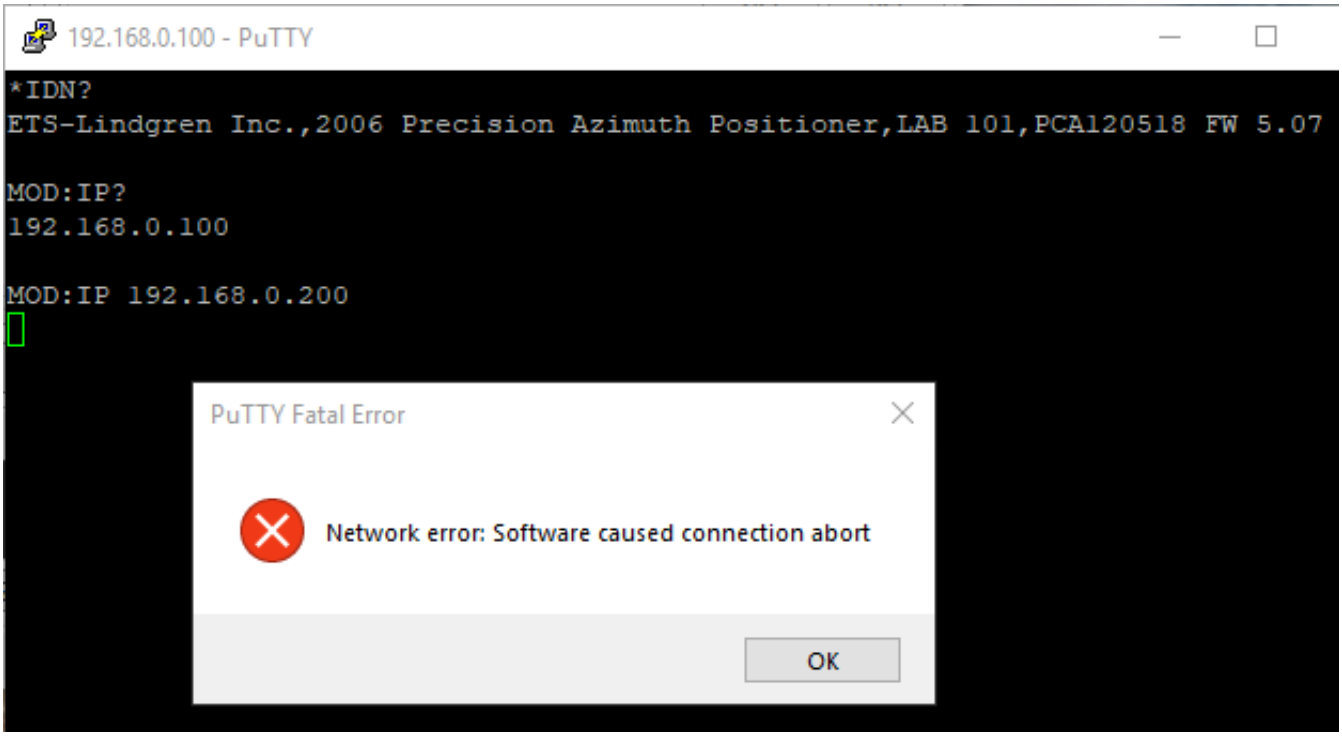
1. Point your browser to 192.168.0.100 or the address you have previously set your device to.
2. Type the new IP address as highlighted below and click 'SET'.



A second method for reseting the IP configuration of the device is to connect to the device using any TCP/IP capable terminal application, and sending commands to it. PuTTY is a terminal emulator available for use. PuTTY is a free (MIT licensed) Windows Telnet and SSH client and can be downloaded from https://www.putty.org/.

Run PuTTY, and point it to Host 192.168.0.100 Port 1206. Then set Connection type to Raw and click Open.

Ensure the connection is working by typing *IDN? then pressing the Enter key on the keyboard. The device will respond with an identification string such as the one shown below.



The IP address can be changed using the **MOD:IP** command. To check the current IP address by typing ***MOD:IP***?

To change the IP address to 192.168.0.200, type ***MOD:IP 192.168.0.200*** and press the Enter key on the keyboard. The device will set the new address and reset the connection.

Reset to Factory Default

To reset configuration, press the reset button for at least 6 seconds. It will reset the IP address back to factory configurations, 192.168.0.100, Mask = 255.255.255.0.

If your positioner does not have a reset button, please follow these instructions to reset the network configuration,

Start with the device powered off for at least 5 seconds

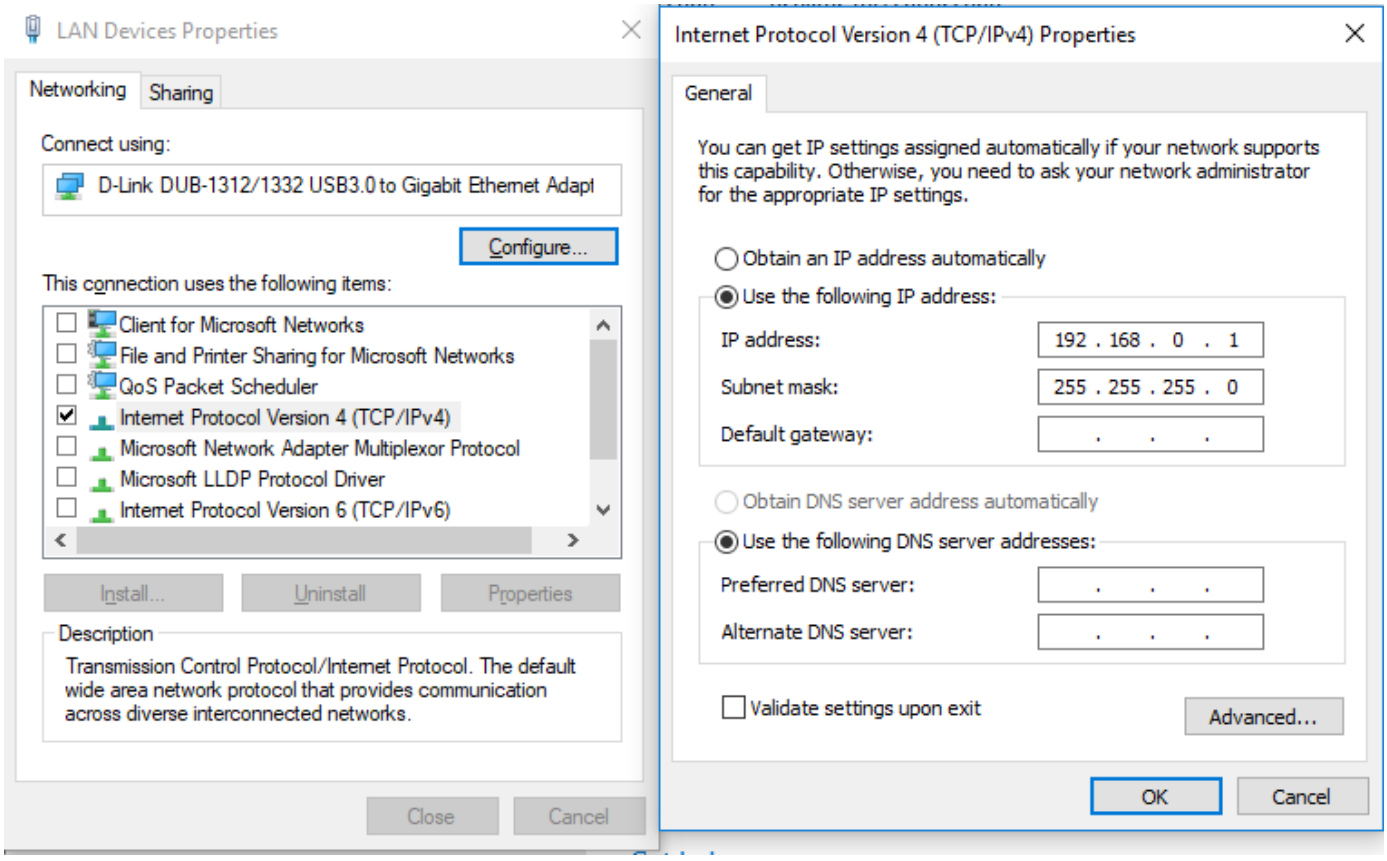
1. Turn the device ON for 5 seconds
2. Turn the device OFF for 5 seconds
3. Repeat steps 1 and 2 four more times for a total of five ON/OFF cycles.

Make sure you wait 5 seconds between power cycles.

This reset procedure only works on devices running on firmware version 5.7 or later

Computer Network Configuration

Connect to an ETS-Lindgren Ethernet by setting the computer Ethernet interface to the selections shown below.

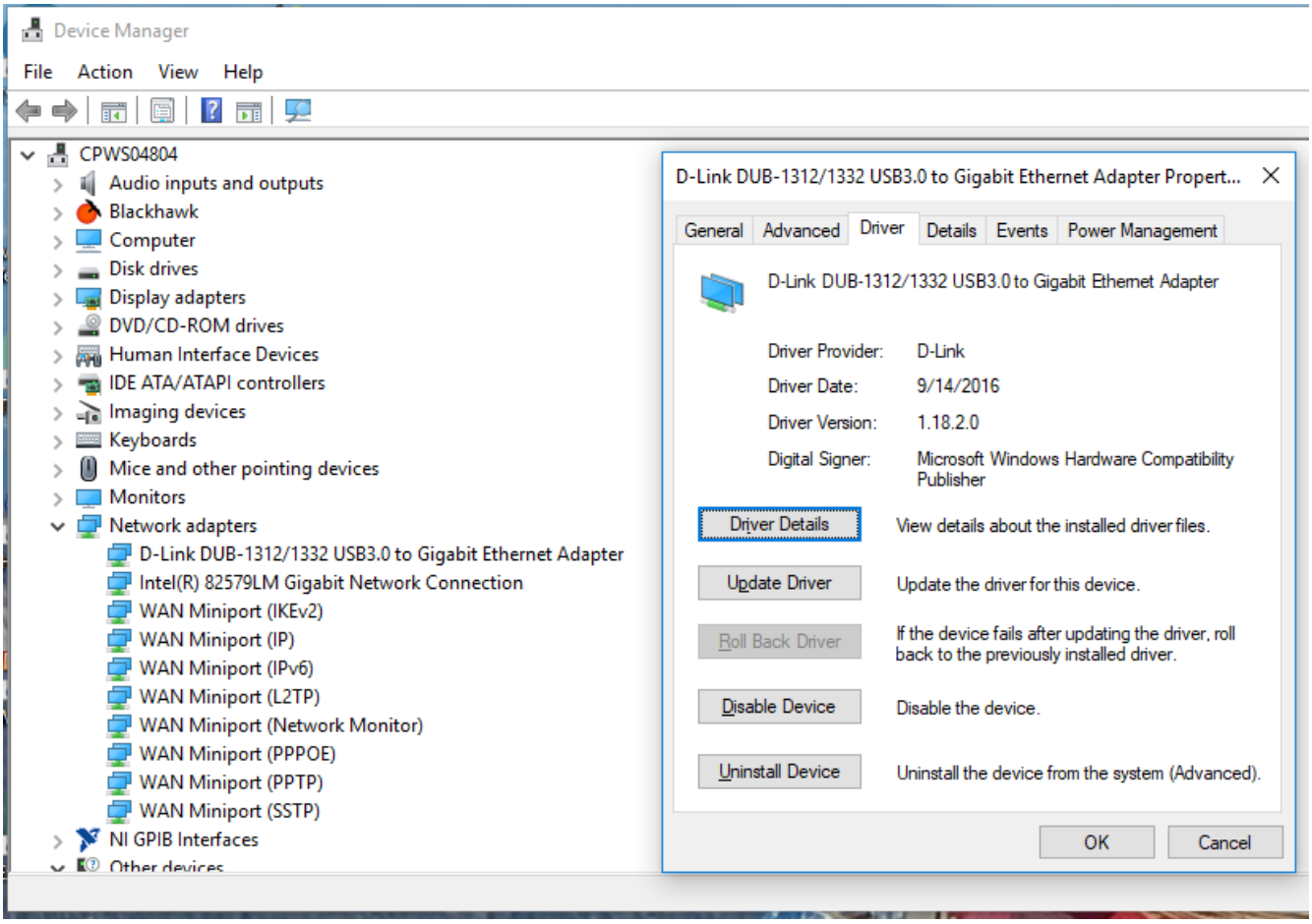


Background Information

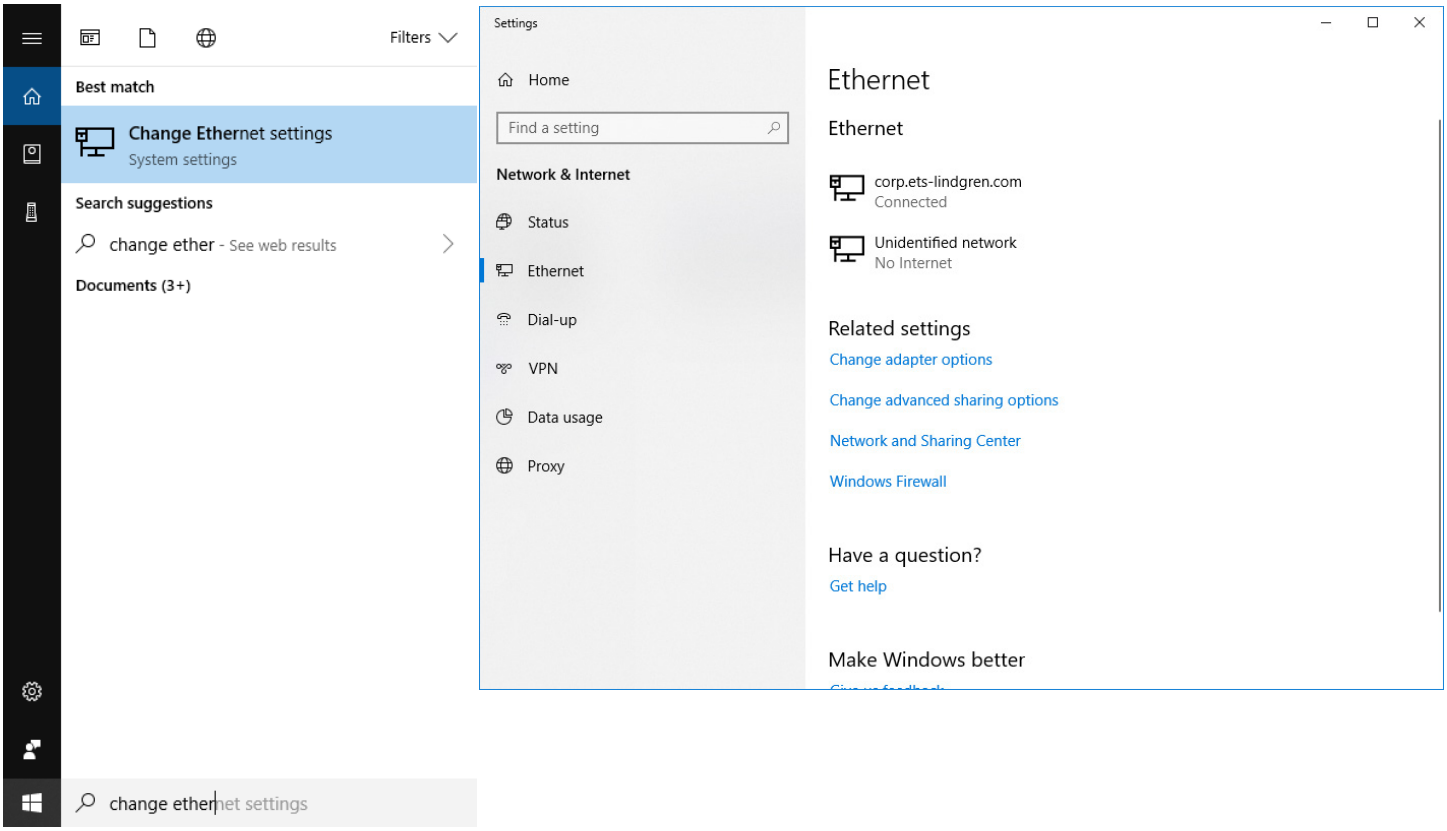
Preparing a computer for connection is relatively simple if you have an Ethernet adapter installed. An Ethernet adapter, also called a network card, network interface card, or network interface controller, provides a physical port for networking mediums such as Ethernet cables. It also communicates with the computer and allows it to access a network device.

Follow these steps on a Windows 10 PC to configure the Ethernet adapter.

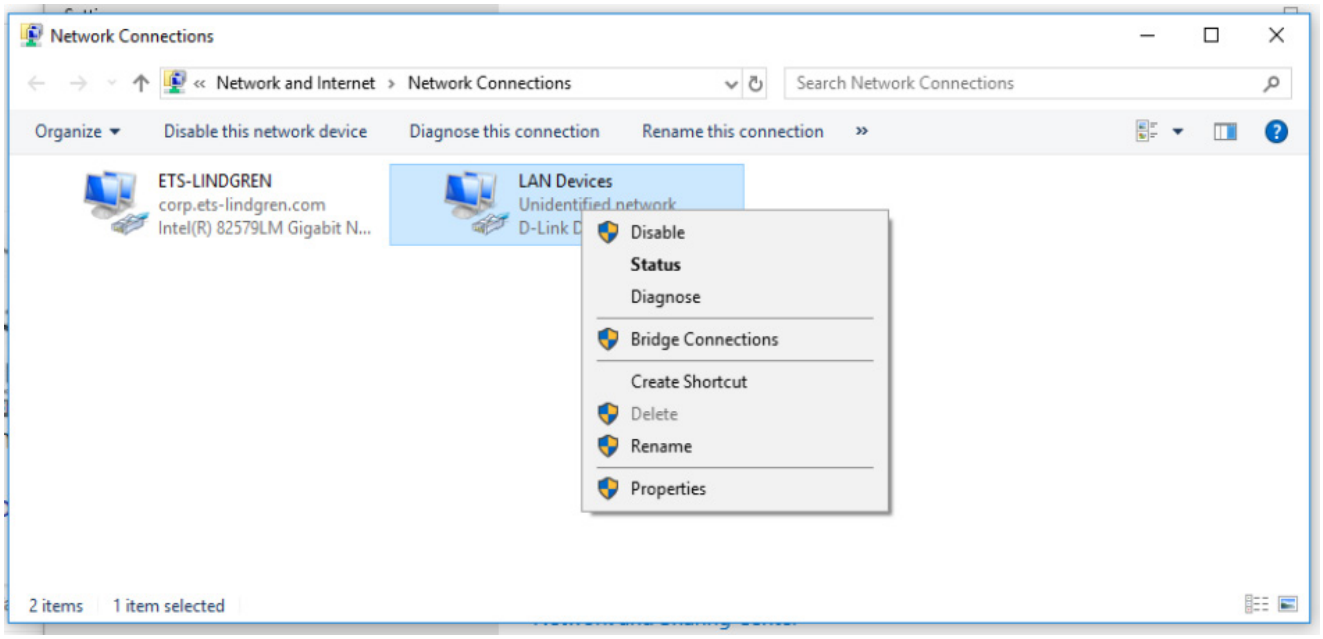
1. Verify that the Ethernet adapter is installed:
    a. Open Device Manager.
    b. Select "Network adapters."
    c. Right-click the network adapter.
    d. Click "Properties." The information in the "Properties" window will indicate whether or not your Ethernet adapter is installed and working.



2. Configure the Ethernet Adapter
    a. In Windows, click into the Start toolbar.
    b. Type “change Ethernet settings.”
    c. In the search results, click “change Ethernet settings.”
    d. In the Settings window, click “Change adapter options.”



e. Right click on the Ethernet adapter you intend to configure, and select “Properties.” (Ensure you are logged into an administrator account to change the configuration.)



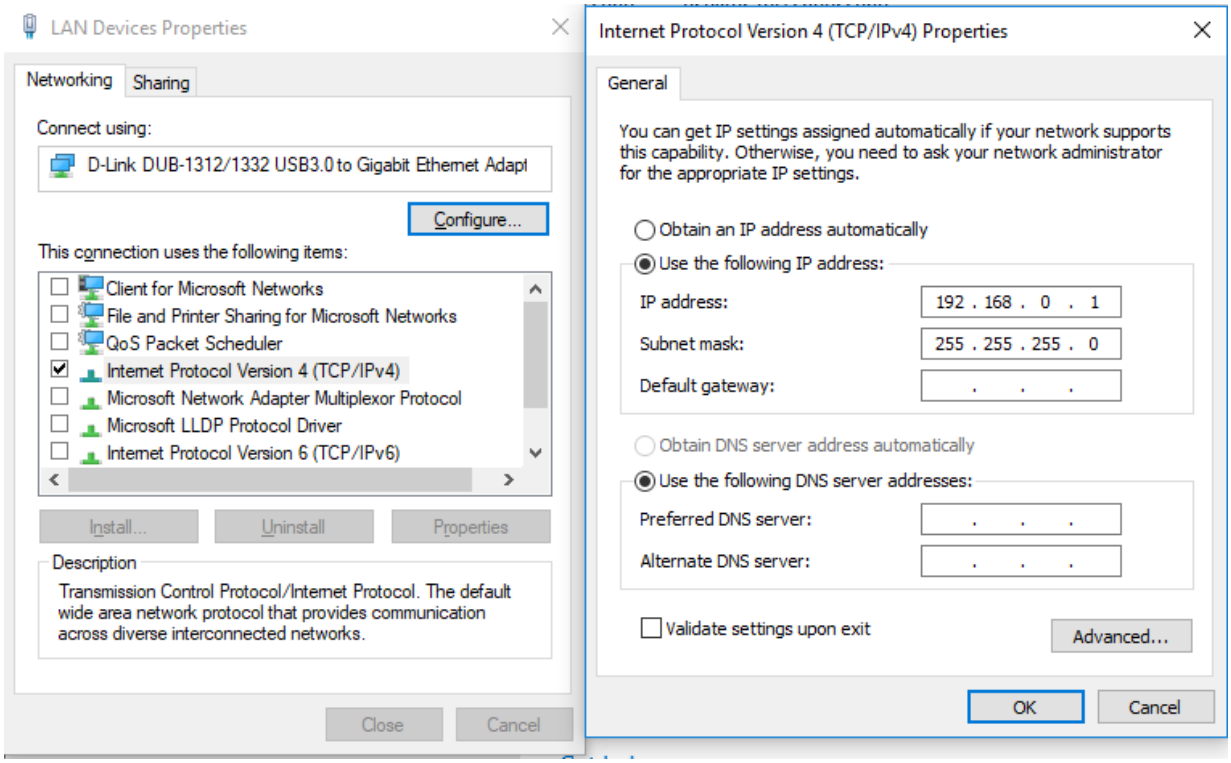
f. Select “Internet Protocol Version 4 (TCP/IPv4)", then click “Properties”. Select “Use the following IP address”, then enter the addresses as follows:
IP address: 192.168.0.1

Subnet mask: 255.255.255.0

Default gateway: blank

g. Select “Use the following DNS server addresses” and leave Preferred and Alternate DNS server fields blank.

h. Click OK.



Information about subnet mask can be found online at the following two locations:

https://www.iplocation.net/subnet-mask

https://searchnetworking.techtarget.com/definition/subnet

Multiple Devices in a LAN

When using more than one positioner, there is no need for a separate server for each positioner. An Ethernet switch can be used to connect as many devices as necessary to a single computer. Such a configuration requires each device have a unique IP address. If using more than one positioner in a LAN, change the device's IP address. Point your browser to the device (192.168.0.100) and set a new IP address.

Multiple Device LAN