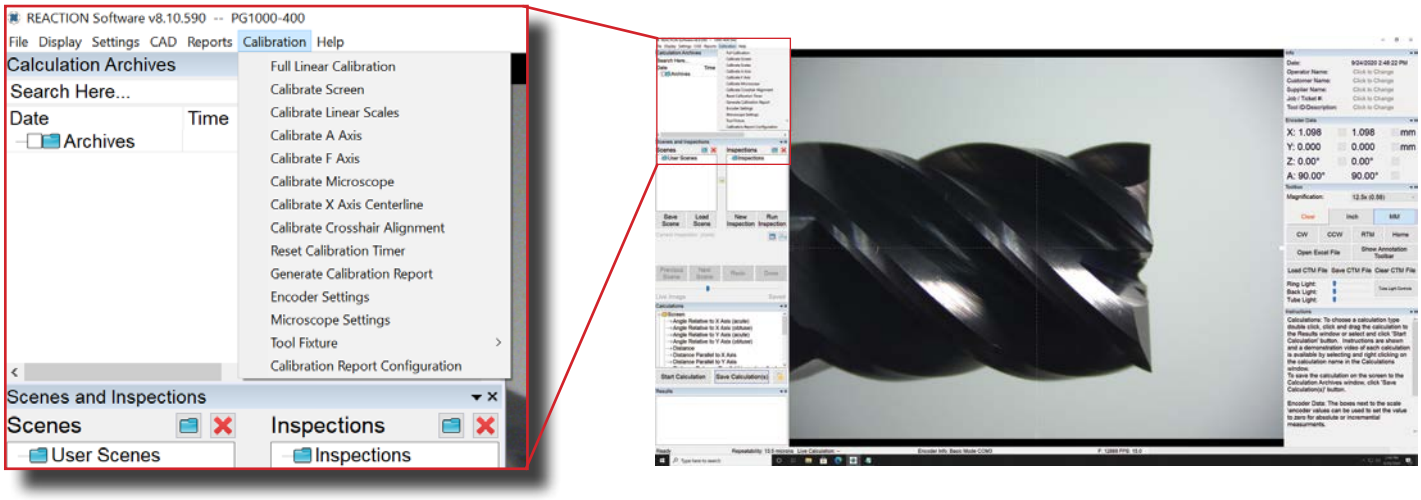
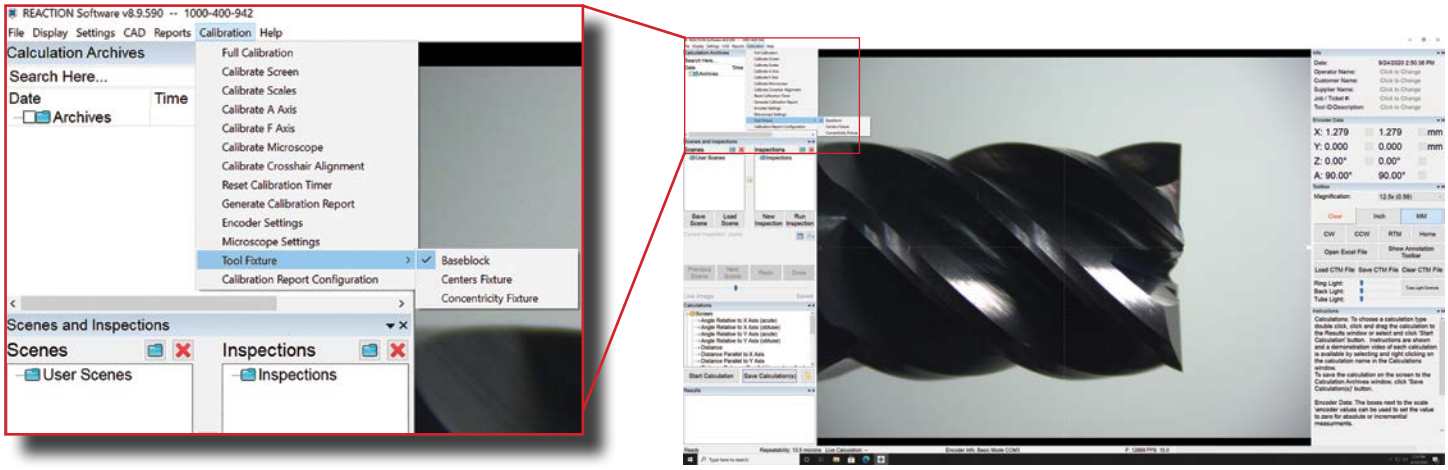
Menu Bar - Calibration

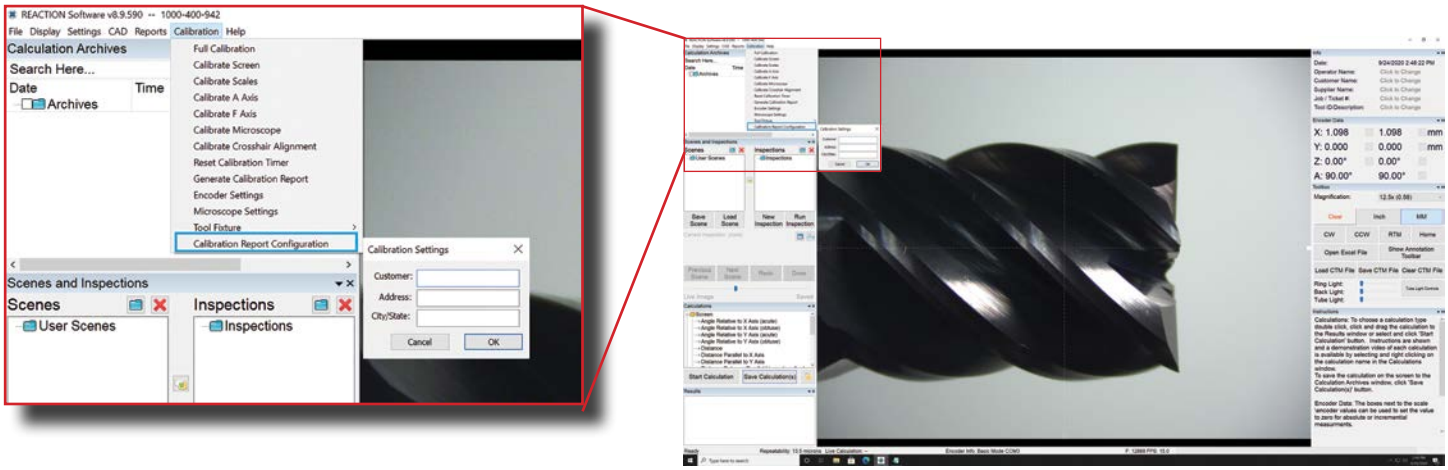


- **Full Calibration / Full Linear Calibration:** Allows the user to start the full calibration process. Calibration reticle required. This is the only calibration which will generate a calibration report.
- **Calibrate Screen:** Allows the user to calibrate only the screen. Use if screen calculation sizing is incorrect.
- **Calibrate Scales / Calibrate Linear Scales:** Allows the user to calibrate only the scales. Use if scale calculation sizing is incorrect.
- **Calibrate A axis:** (only on 400 model) Sets the displayed position of the A axis to 90 degrees in the software. The base block should be perpendicular to the microscope at 90 degrees.
- **Calibrate F axis:** (only on 400 model) Records the working distance from the microscope to the calibration view plain.
- **Calibrate Microscope:** (only on 400 model) Syncs the physical magnification level of the microscope to the displayed value shown in the software. Use if detent(s) not aligned and the 'Microscope Mag Wheel Seated Improperly' message is displayed.
- **Calibrate X axis Center Line:** (only on 400 model) Displays a line that is used to mark the center of rotation of the A axis.
- **Calibrate Crosshair Alignment:** Used during assembly of unit to set alignment of scope (0 -180 degrees) to flatness of granite.
- **Reset Calibration Timer:** Allows the user to reset calibration timer (annually).
- **Generate Calibration Report:** Allows the user to regenerate the calibration report, however the report can only be regenerated within 48 hours from the completion of the Full Calibration.
- **Encoder Settings:** Data stored regarding calculation offsets.
- **Microscope Settings:** Data stored regarding calculation offsets.
- **Tool Fixture:** Allows the user to select different fixtures for A axis calibration.



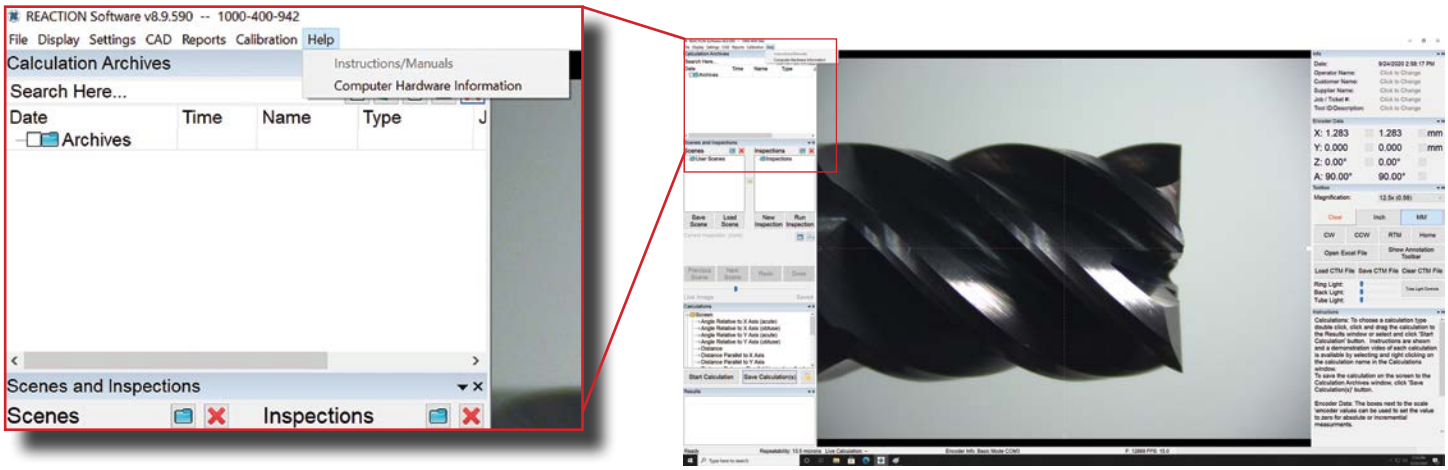
Menu Bar - Calibration

- **Calibration Report Configuration:** Allows the user to display desired information on calibration reports.



Menu Bar - Help

- **Instructions/Manuals:** Electronic copy of PG1000 manual documentation.

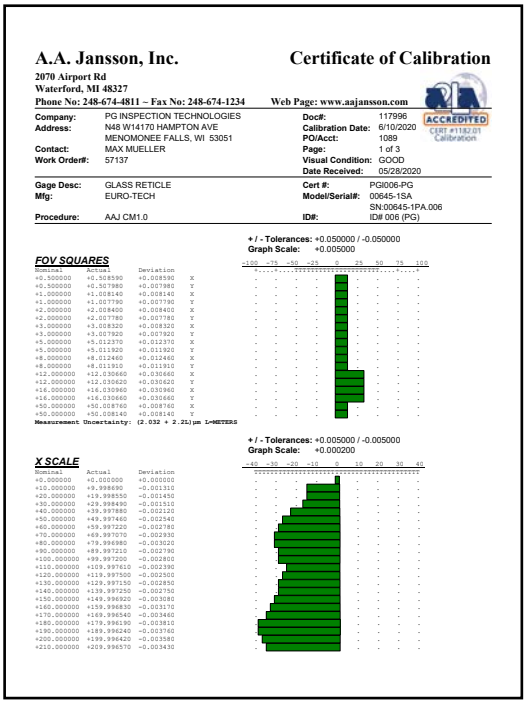


- **Computer Hardware Information:** Allows the user to quickly reference the current computer's hardware specifications.

Calibrations

The PG1000 calibration process utilizes a combination of screen, magnification and scale offsets that are applied simultaneously through our software to give the user the most accurate and repeatable measurements available. **A calibration can only be performed by using a certified PG1000 reticle.**

The PG1000 reticles have been certified for accuracy down to the micron level. The results and techniques can be traced to NIST and ANSI. We utilize certified equipment so that our results have a **traceable validity to their accuracy.**



A.A. Jansson, Inc. **Certificate of Calibration**

2070 Airport Rd
Waterford, MI 48327
Phone No: 248-674-4811 – Fax No: 248-674-1234 Web Page: www.aajansson.com

ACCREDITED CERT #1182.01 Calibration

Company:	PG INSPECTION TECHNOLOGIES	**Doc#:**	117996
Address:	N48 W14170 HAMPTON AVE MENOMONEE FALLS, WI 53051	**Calibration Date:**	6/10/2020
		PO/Acct:	1089
Contact:	MAX MUELLER	**Page:**	1 of 3
Work Order#:	57137	**Visual Condition:**	GOOD
		Date Received:	05/28/2020
Gage Desc:	GLASS RETICLE	**Cert #:**	PGI006-PG
Mfg:	EURO-TECH	**Model/Serial#:**	00645-1SA SN:00645-1PA.006
Procedure:	AAJ CM1.0	**ID#:**	ID# 006 (PG)

FOV SQUARES

+ / - Tolerances: +0.050000 / -0.050000
Graph Scale: +0.005000

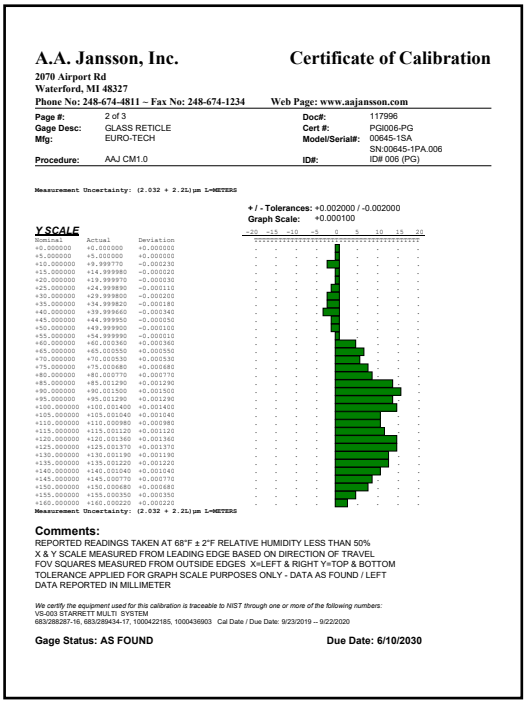
Nominal	Actual	Deviation	
+0.500000	+0.508590	+0.008590	X
+0.500000	+0.507980	+0.007980	Y
+1.000000	+1.008140	+0.008140	X
+1.000000	+1.007790	+0.007790	Y
+2.000000	+2.008400	+0.008400	X
+2.000000	+2.007780	+0.007780	Y
+3.000000	+3.008320	+0.008320	X
+3.000000	+3.007920	+0.007920	Y
+5.000000	+5.012370	+0.012370	X
+5.000000	+5.011920	+0.011920	Y
+8.000000	+8.012460	+0.012460	X
+8.000000	+8.011910	+0.011910	Y
+12.000000	+12.030660	+0.030660	X
+12.000000	+12.030620	+0.030620	Y
+16.000000	+16.030960	+0.030960	X
+16.000000	+16.030660	+0.030660	Y
+50.000000	+50.008760	+0.008760	X
+50.000000	+50.008140	+0.008140	Y

Measurement Uncertainty: (2.032 + 2.25)µm L=METERS

X SCALE

+ / - Tolerances: +0.005000 / -0.005000
Graph Scale: +0.000200

Nominal	Actual	Deviation
+0.000000	+0.000000	+0.000000
+10.000000	+9.998690	-0.001310
+20.000000	+19.998550	-0.001450
+30.000000	+29.998490	-0.001510
+40.000000	+39.997880	-0.002120
+50.000000	+49.997460	-0.002540
+60.000000	+59.997220	-0.002780
+70.000000	+69.997070	-0.002930
+80.000000	+79.996980	-0.003020
+90.000000	+89.997210	-0.002790
+100.000000	+99.997200	-0.002800
+110.000000	+109.997610	-0.002390
+120.000000	+119.997500	-0.002500
+130.000000	+129.997150	-0.002850
+140.000000	+139.997250	-0.002750
+150.000000	+149.996920	-0.003080
+160.000000	+159.996830	-0.003170
+170.000000	+169.996540	-0.003460
+180.000000	+179.996190	-0.003810
+190.000000	+189.996240	-0.003760
+200.000000	+199.996420	-0.003580
+210.000000	+209.996570	-0.003430



A.A. Jansson, Inc. **Certificate of Calibration**

2070 Airport Rd
Waterford, MI 48327
Phone No: 248-674-4811 – Fax No: 248-674-1234 Web Page: www.aajansson.com

Page #:	2 of 3	**Doc#:**	117996
Gage Desc:	GLASS RETICLE	**Cert #:**	PGI006-PG
Mfg:	EURO-TECH	**Model/Serial#:**	00645-1SA SN:00645-1PA.006
Procedure:	AAJ CM1.0	**ID#:**	ID# 006 (PG)

Measurement Uncertainty: (2.032 + 2.25)µm L=METERS

+ / - Tolerances: +0.002000 / -0.002000
Graph Scale: +0.000100

Y SCALE

Nominal	Actual	Deviation
+0.000000	+0.000000	+0.000000
+5.000000	+5.000000	+0.000000
+10.000000	+9.999770	-0.000230
+15.000000	+14.999980	-0.000020
+20.000000	+19.999970	-0.000030
+25.000000	+24.999890	-0.000110
+30.000000	+29.999800	-0.000200
+35.000000	+34.999820	-0.000180
+40.000000	+39.999660	-0.000340
+45.000000	+44.999950	-0.000050
+50.000000	+49.999900	-0.000100
+55.000000	+54.999990	-0.000010
+60.000000	+60.000360	+0.000360
+65.000000	+65.000550	+0.000550
+70.000000	+70.000530	+0.000530
+75.000000	+75.000680	+0.000680
+80.000000	+80.000770	+0.000770
+85.000000	+85.001290	+0.001290
+90.000000	+90.001500	+0.001500
+95.000000	+95.001290	+0.001290
+100.000000	+100.001400	+0.001400
+105.000000	+105.001040	+0.001040
+110.000000	+110.000980	+0.000980
+115.000000	+115.001120	+0.001120
+120.000000	+120.001360	+0.001360
+125.000000	+125.001370	+0.001370
+130.000000	+130.001190	+0.001190
+135.000000	+135.001220	+0.001220
+140.000000	+140.001040	+0.001040
+145.000000	+145.000770	+0.000770
+150.000000	+150.000680	+0.000680
+155.000000	+155.000350	+0.000350
+160.000000	+160.000220	+0.000220

Measurement Uncertainty: (2.032 + 2.25)µm L=METERS

Comments:
REPORTED READINGS TAKEN AT 68°F ± 2°F RELATIVE HUMIDITY LESS THAN 50%
X & Y SCALE MEASURED FROM LEADING EDGE BASED ON DIRECTION OF TRAVEL
FOV SQUARES MEASURED FROM OUTSIDE EDGES X=LEFT & RIGHT Y=TOP & BOTTOM
TOLERANCE APPLIED FOR GRAPH SCALE PURPOSES ONLY - DATA AS FOUND / LEFT
DATA REPORTED IN MILLIMETER

We certify the equipment used for this calibration is traceable to NIST through one or more of the following numbers:
VS-003 STARRETT MULTI SYSTEM
683/288287-16, 683/289434-17, 1000422185, 1000436903 Cal Date / Due Date: 9/23/2019 – 9/22/2020

Gage Status: AS FOUND **Due Date: 6/10/2030**

A.A. Jansson, Inc. **Certificate of Calibration**

2070 Airport Rd
Waterford, MI 48327
Phone No: 248-674-4811 – Fax No: 248-674-1234 Web Page: www.aajansson.com

Page #:	3 of 3	**Doc#:**	117996
Gage Desc:	GLASS RETICLE	**Cert #:**	PGI006-PG
Mfg:	EURO-TECH	**Model/Serial#:**	00645-1SA SN:00645-1PA.006
Procedure:	AAJ CM1.0	**ID#:**	ID# 006 (PG)

Reported readings taken at 68°F ± 4° F Relative humidity less than 50% unless otherwise noted in comments. Data is "AS FOUND" and item is "USED" unless otherwise noted in comments. Calibration complies to ISO/IEC 17025:2005 unless otherwise noted in comments. Reported Measurement uncertainities are based upon a 95% confidence level, k=2. This report shall not be reproduced, except in full, without written permission by A.A. Jansson, Inc. Any number of factors may cause the subject of this calibration to drift out of calibration before the recommended interval has expired. A.A. Jansson will not be held responsible for the calibration status of an item whose calibration interval exceeds the actual validity of the calibration. Measurement uncertainty is not taken into account when determining In/Out of tolerance condition. Calibrations performed in accordance with the A.A.Jansson, Inc. Quality Assurance Manual Revision 9, Dated June 3, 2013 which meets the requirements of ISO-17025:2005. We certify the equipment used for this calibration is traceable to the International System of Units (SI) via standards traceable to NIST or other National Metrology Institutes (NMI)

Report Issued: 06/11/2020
Certified By: Brian Lemon Signature: Eric Lundquist

Eric Lundquist President

This certificate is not valid unless all 3 page(s) are present.
Results of this certificate relate only to the item mentioned in document header.
END OF DOCUMENT

Calibrations - Full Calibration

To generate a calibration report for the PG1000, the user must select the full calibration process.

PG Inspection Technologies
N48 W14170 Hampton Rd
Menomonee Falls, WI 53051 USA
Ph. (262) 946-5420
www.pg1000.com

PG INSPECTION TECHNOLOGIES

Certificate of Calibration

Company:	Tool inspection systems	**Mfg.:**	PG Inspection Technologies
Address:		**Model No.:**	REACTION Software
City, State Zip:		**Serial No.:**	1000-400-942
Cal Date:	10/09/2020	**Condition:**	Good
Next Cal:	On or before 10/09/2021	**Operator:**	KJB
Previous Cal:	08/10/2020		

All measurements in:	mm	**Reticle Serial No.:**	00443-1P.140
Ambient Temp.:	70 Fahrenheit	**Reticle Recal Date:**	03/27/2025
Ambient Humidity:	50%	**Reticle Certification:**	PGI140
Calibration Type:	Basic Reticle	**Tolerance Complies with:**	Manufacturer's Spec

Screen Certification — **Tolerance: 0.0050**

Mag	Nominal X	Nominal Y	Actual X	Actual Y	Deviation X	Deviation Y	Pass/Fail
12.5x	15.9996	16.0001	15.9998	16.0013	0.0002	0.0011	**Pass**
70x (Before)	3.0002	3.0006	2.9994	3.0002	0.0008	0.0004	**Pass**
145x	1.0005	1.0004	1.0009	1.0003	0.0004	0.0001	**Pass**
12.5x (After)	15.9996	16.0001	15.9952	15.9981	0.0044	0.0021	**Pass**
70x (After)	3.0002	3.0006	3.0002	3.0001	0.0000	0.0004	**Pass**
145x (After)	1.0005	1.0004	1.0007	1.0003	0.0002	0.0001	**Pass**
145x (After)	1.0005	1.0004	1.0004	1.0004	0.0001	0.0001	**Pass**

X Scale Certification — **Mag: 145.0x** **Tolerance: 0.0050**

Section	Nominal	Actual	Deviation	Pass/Fail
0-50mm (Before)	49.9981	49.9420	0.0561	**Fail**
0-50mm (Before)	49.9981	49.9410	0.0571	**Fail**
0-50mm (Before)	49.9981	49.9420	0.0561	**Fail**
0-50mm (After)	49.9981	49.9970	0.0011	**Pass**
0-50mm (After)	49.9981	49.9970	0.0011	**Pass**
0-50mm (After)	49.9981	49.9970	0.0011	**Pass**

Y Scale Certification — **Mag: 145.0x** **Tolerance: 0.0050**

Section	Nominal	Actual	Deviation	Pass/Fail
0-50mm (Before)	49.9986	49.9890	0.0096	**Fail**
0-50mm (Before)	49.9986	49.9940	0.0046	**Pass**
0-50mm (Before)	49.9986	49.9950	0.0036	**Pass**
0-50mm (After)	49.9986	49.9980	0.0006	**Pass**
0-50mm (After)	49.9986	49.9980	0.0006	**Pass**
0-50mm (After)	49.9986	49.9990	0.0004	**Pass**

Comment No. 1:

Comment No. 2:

This machine has been calibrated using measurement instruments traceable to the National institute of Standards and Technology (NIST) or to NIST acceptable intrinsic standards of measurement or derived by the ratio type of self-calibration techniques.
This system is considered in serviceable condition unless otherwise stated on this certification.
PG Inspection Technologies will not be held responsible for the calibration status of the system due to excessive use, mishandling, environmental conditions or other factors which may cause the calibrated item to fall out of calibration before scheduled recalibration date.

Inspected By:	KJB	Customer:	Tool inspection systems mmmmmm

Page 1 of 2 - Calibration of 1000-400-942 on 10/09/2020

Screen Calibration Factors

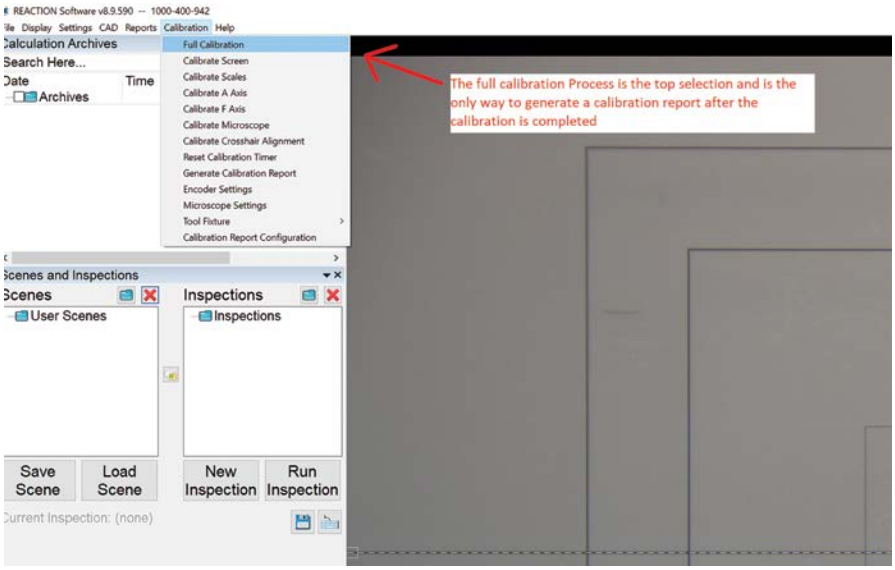
Mag	X /px	Y /px	Mag	X /px	Y /px	Mag	X /px	Y /px
145.0x	0.85949	0.86021	90.0x	1.32275	1.32477	40.0x	2.97097	2.97466
130.0x	0.92292	0.92291	80.0x	1.48588	1.48839	30.0x	4.21598	4.21620
125.0x	0.99646	0.99744	70.0x	1.69887	1.70099	20.0x	5.95965	5.96708
120.0x	1.08578	1.08717	60.0x	1.97903	1.98187	12.5x	10.21683	10.21720
110.0x	1.19190	1.19427	50.0x	2.42343	2.42567			

X Scale Factor: 1.000276
Y Scale Factor: 0.999113

Page 2 of 2 - Calibration of 1000-400-942 on 10/09/2020

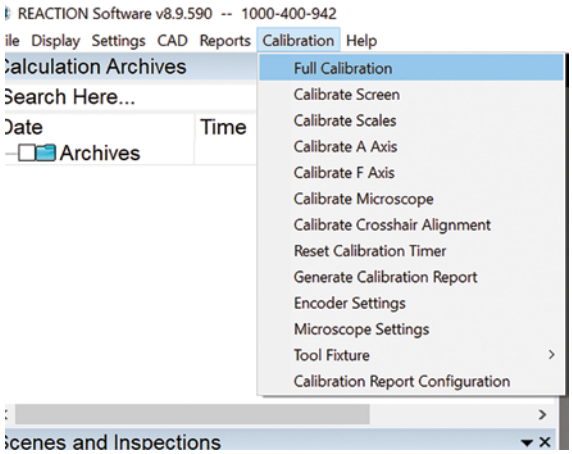
Calibration report

Only doing a partial calibration will not generate a calibration report.

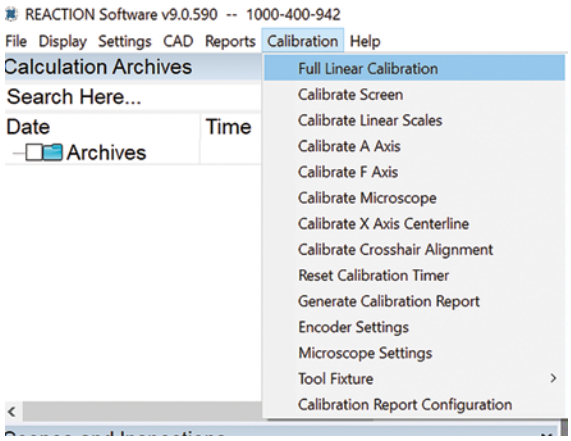


Calibrations - Full Calibration

There are two different calibration processes that are used for the PG1000 unit. Depending on the intentional usage and customers' requests, we can set the software up to do either calibration process, but only one style can be utilized in the software at a time. To start the calibration process, select the calibration tab and then select the full calibration (standard practice) or a full linear calibration (advanced calibration).

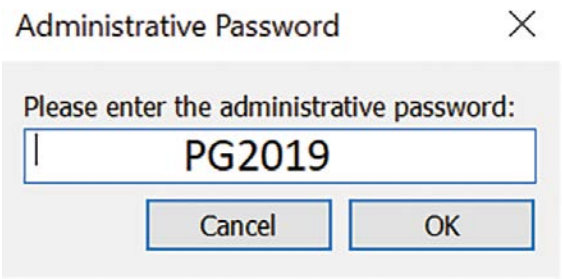


Full Calibration



Full Linear Calibration

The calibration process is password-protected, as this is the backbone of our accuracy and should not be attempted by someone who is not familiar with REACTION Software. The password for the calibration is PG2019 (if older software MJPPSK).



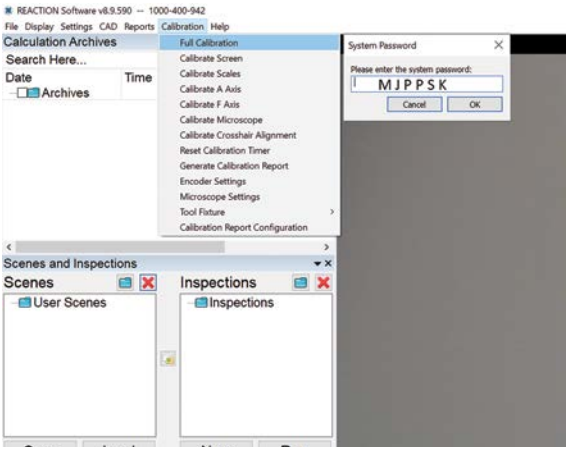
Once the calibration has been started, there is a high-level of repetition required from the user in order to verify that the calibration is accurate and the unit is repeatable in its accuracy. There is a three-step process to the screen and scale calibration portions, which consist of a pre-verification, calibration and a verification that will collect the calibration data and then display it on the calibration report, which will show the accuracy before and after calibration. Once the calibration process has started, there are step-by-step instructions that guide the user through the process. The following are explanations of the instructions that will help guide the user through our calibration process and will help the user understand the two different types of calibrations and the process each entails.

Calibrations - Full Calibration

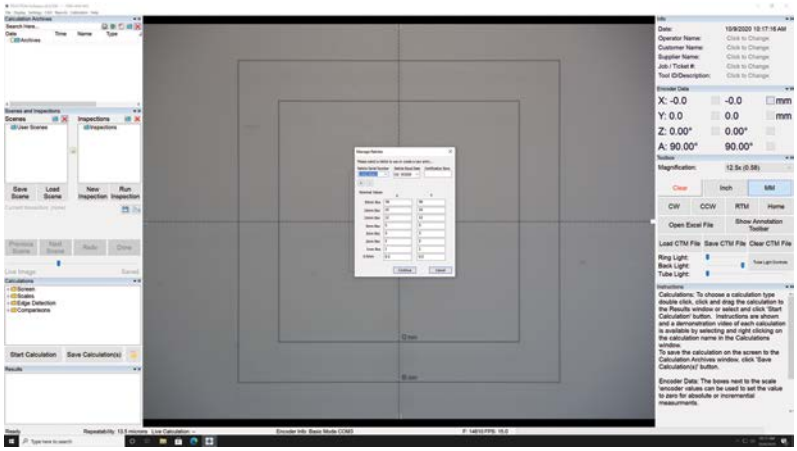
Process for the 2 Types of calibration:

1. Full Calibration

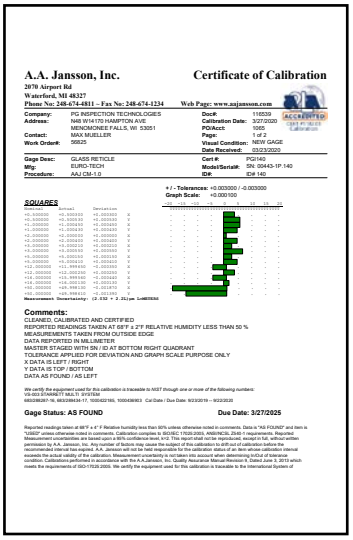
- **Select Calibration** (password PG2019 older software MJPPSK).



- **Manage Reticle Data and Verify**



The reticle certification holds all of the information required by the reticle manager that the user must manually enter in the corresponding text boxes.



A.A. Jansson, Inc.
2070 Airport Rd
Waterford, MI 48327
Phone No: 248-674-4811 – Fax No: 248-674-1234
Web Page: www.aajansson.com

Certificate of Calibration

Company: PG INSPECTION TECHNOLOGIES
Address: N48 W14170 HAMPTON AVE
MENOMONEE FALLS, WI 53051
Contact: MAX MUELLER
Work Order#: 56625

Doc#: 116539
Calibration Date: 3/27/2020
PO/Acct: 1045
Page: 1 of 2
Visual Condition: NEW GAGE
Date Received: 03/23/2020

Gage Desc: GLASS RETICLE
Mfg: EURO-TECH
Procedure: AAJ CM-1.0

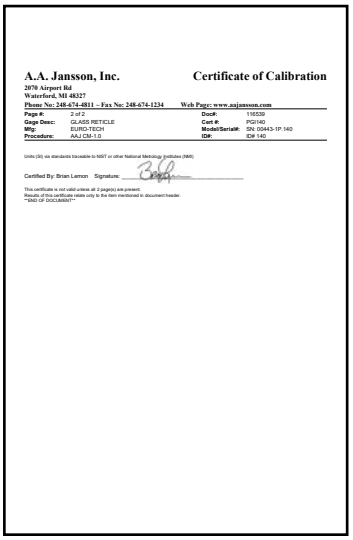
Cert #: PG140
Model/Serial#: SN: 00443-1P.140
ID#: ID# 140

+ / - Tolerances: +0.003000 / -0.003000
Graph Scale: +0.000100

SQUARES

Comments:
CLEANED, CALIBRATED AND CERTIFIED
REPORTED READINGS TAKEN AT 68°F ± 2°F RELATIVE HUMIDITY LESS THAN 50 %
MEASUREMENTS TAKEN FROM OUTSIDE EDGE
DATA REPORTED IN MILLIMETER
MASTER STAGED WITH SN / ID AT BOTTOM RIGHT QUADRANT
TOLERANCE APPLIED FOR DEVIATION AND GRAPH SCALE PURPOSE ONLY
X DATA IS LEFT / RIGHT
Y DATA IS TOP / BOTTOM
DATA AS FOUND / AS LEFT

Gage Status: AS FOUND
Due Date: 3/27/2025



A.A. Jansson, Inc.
2070 Airport Rd
Waterford, MI 48327
Phone No: 248-674-4811 – Fax No: 248-674-1234
Web Page: www.aajansson.com

Certificate of Calibration

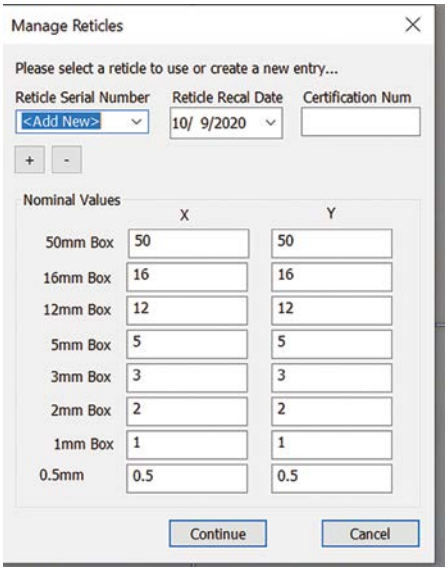
Page #: 2 of 2
Gage Desc: GLASS RETICLE
Mfg: EURO-TECH
Procedure: AAJ CM-1.0

Doc#: 116539
Cert #: PG140
Model/Serial#: SN: 00443-1P.140
ID#: ID# 140

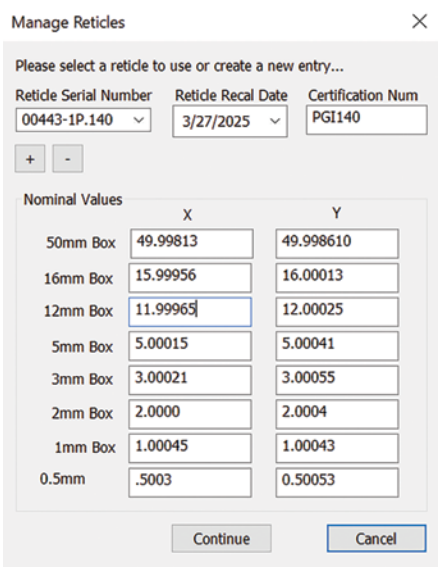
Certified By: Brian Lemon Signature:

Calibrations - Full Calibration

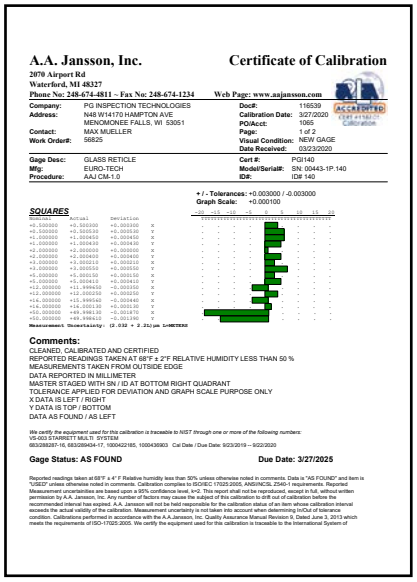
The reticle manager has default data in the fields (or previous calibration data), but must be updated to reflect the current reticle's data.



Blank Reticle Manager



Reticle Manager Filled Out



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Certificate of Calibration

Company: PGI INSPECTION TECHNOLOGIES
Address: N48 W14170 HAMPTON AVE MENOMONEE FALLS, WI 53051
Contact: MAX MUELLER
Work Order#: 56825

Doc#: 116539
Calibration Date: 3/27/2020
PO/Acct: 1065
Page: 1 of 2
Visual Condition: NEW GAGE
Date Received: 03/23/2020

Gage Desc: GLASS RETICLE
Mfg: EURO-TECH
Procedure: AAJ CM-1.0

Cert #: PGI140
Model/Serial#: SN: 00443-1P.140
ID#: ID# 140

+ / - Tolerances: +0.003000 / -0.003000
Graph Scale: +0.000100

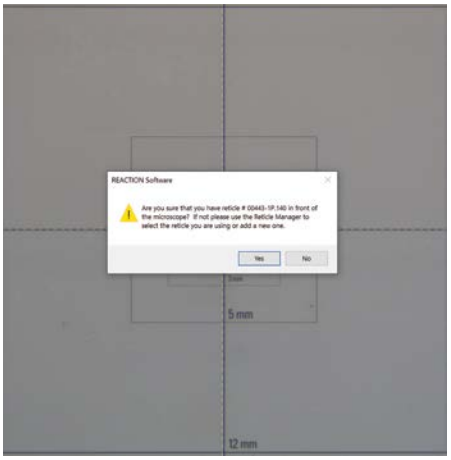
SQUARES

Comments:
CLEANED, CALIBRATED AND CERTIFIED
REPORTED READINGS TAKEN AT 68°F ± 2°F RELATIVE HUMIDITY LESS THAN 50 %
MEASUREMENTS TAKEN FROM OUTSIDE EDGE
DATA REPORTED IN MILLIMETER
MASTER STAGED WITH SN / ID AT BOTTOM RIGHT QUADRANT
TOLERANCE APPLIED FOR DEVIATION AND GRAPH SCALE PURPOSE ONLY
X DATA IS LEFT / RIGHT
Y DATA IS TOP / BOTTOM
DATA AS FOUND / AS LEFT

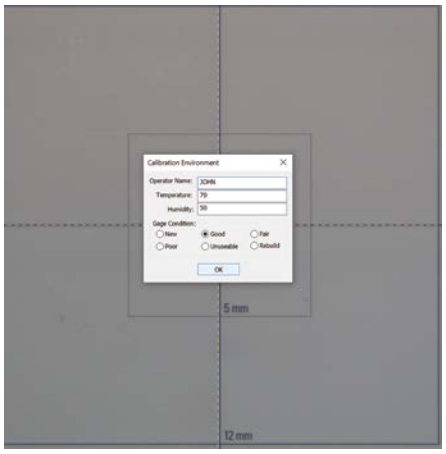
Gage Status: AS FOUND Due Date: 3/27/2025

Certificate Matches Reticle Manager

After the information is completed, the software will ask to verify that the serial numbers match.

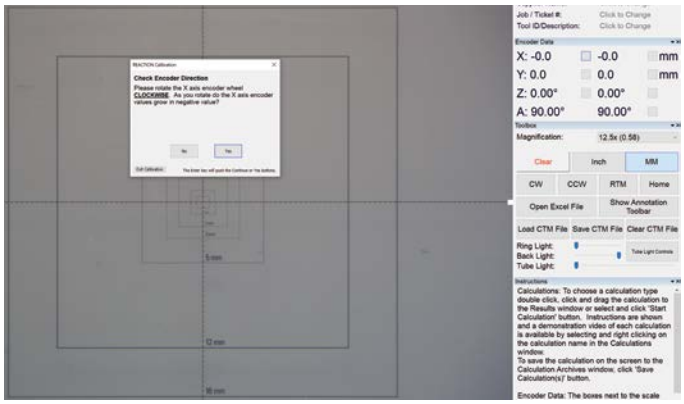


- **Environmental Data:** The environmental data is recorded because extreme temperatures can shrink or relax materials which can influence sizing when micron level accuracy is expected. This data is collected and displayed on the Calibration Report.

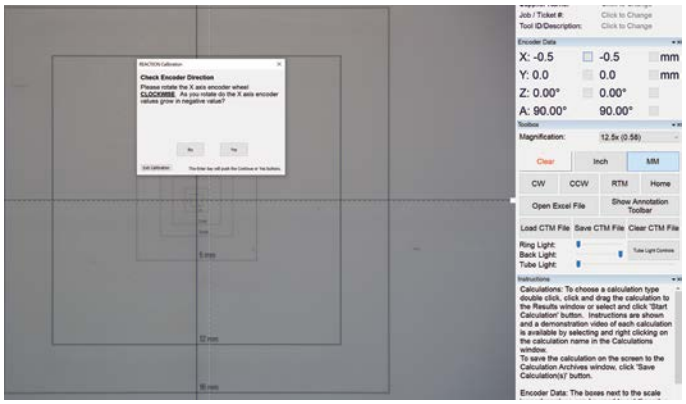


Calibrations - Full Calibration

- **Checking Encoder Direction:** The X and Y linear scale direction needs to be recorded so that accurate offset data can be collected. The X axis should read negative when the handwheel is turned clockwise.

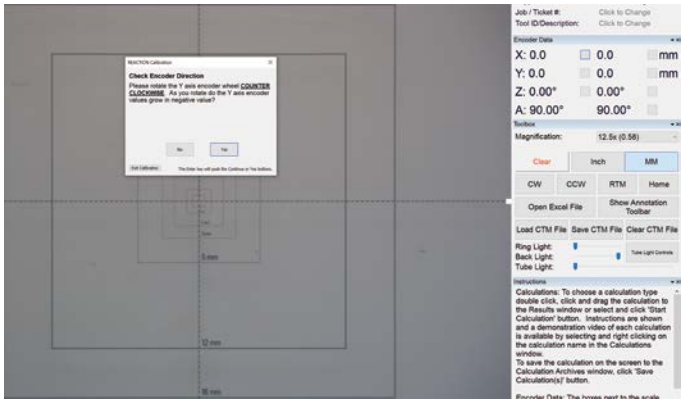


X axis zeroed out

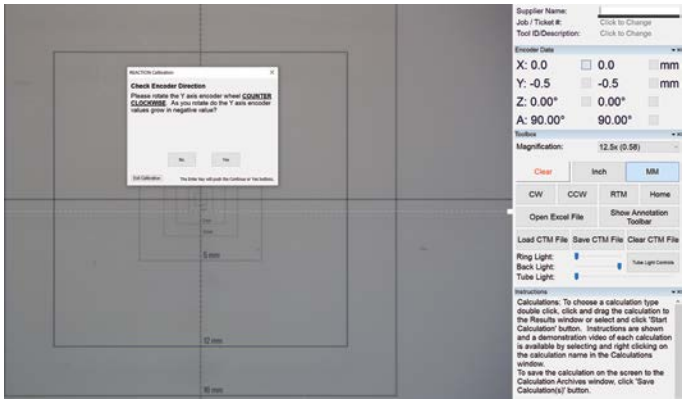


X axis reads negative

The Y axis should read negative when the handwheel is turned counterclockwise.

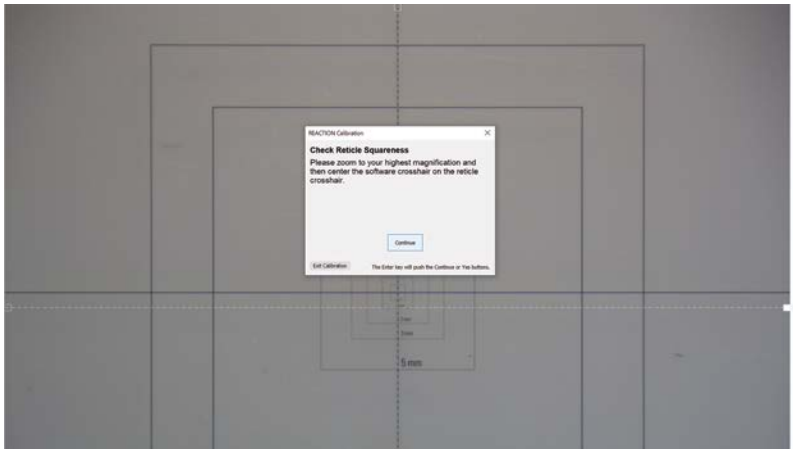


Y axis zeroed out



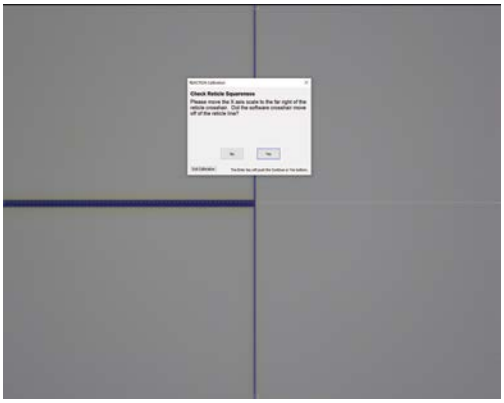
Y axis reads negative

- **Check Reticle Squareness:** The on-screen instructions in the software will walk the user through the alignment process.

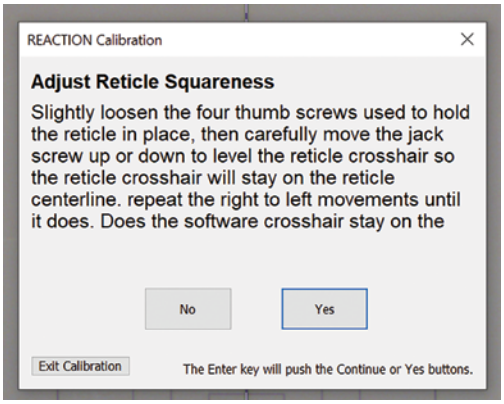


Calibrations - Full Calibration

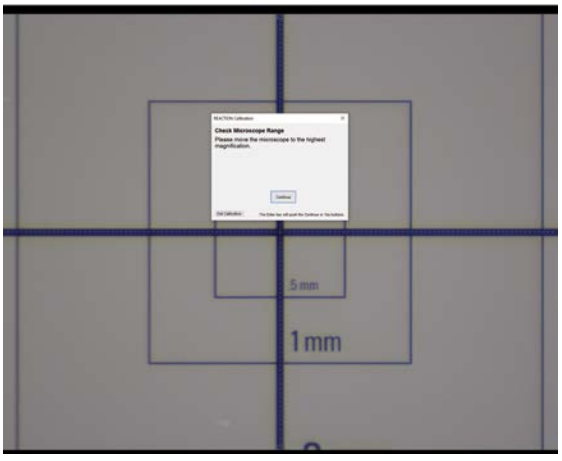
The user must go from the right side to the left side of the 50 mm line running through the middle of the concentric boxes.



The reticle glass needs to be positioned correctly so that the calibration process can be done accurately. If it is determined that the reticle glass needs to be adjusted, follow the on-screen instructions to reposition the glass. If unable to position the glass correctly, consult PG1000 support for further details.

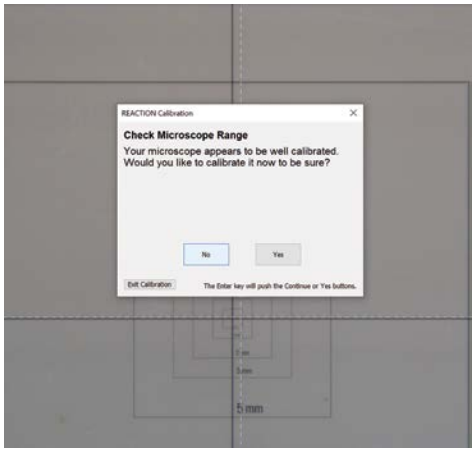


- **Checking Magnification Range (if 400 model):** This option is only applied to the PG1000-400 models. The calibration requires the user to go to the highest magnification level, select continue and then go to the lowest magnification level and select continue.

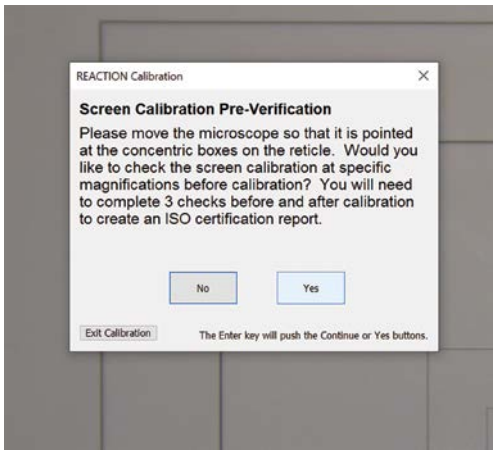


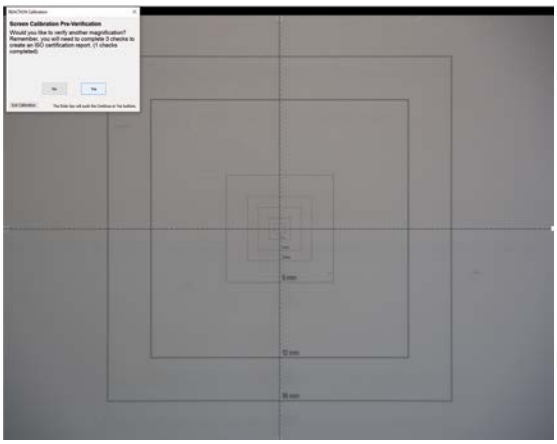
Calibrations - Full Calibration

If the data is correct for the magnification range, the user may select "No" to recalibrating the microscope. If the microscope range fails, contact PG1000 support for further details.

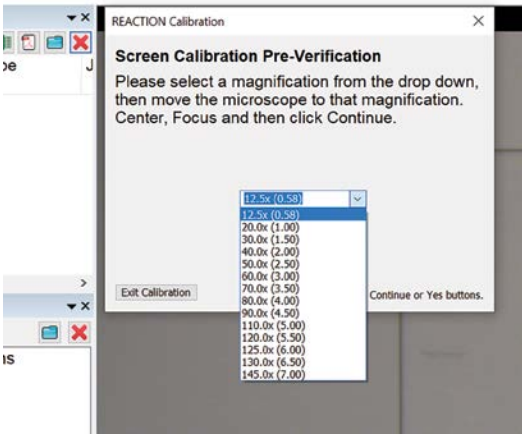


- **Screen Calibration: 3-step process including Pre-Verification, Screen Calibration and Verification**
  - The **Pre-Verification** is used to establish a baseline for screen accuracy prior to calibrating. The user must select three different magnification levels to test the accuracy of the unit. The calibration on-screen-instructions will guide the user through the process.

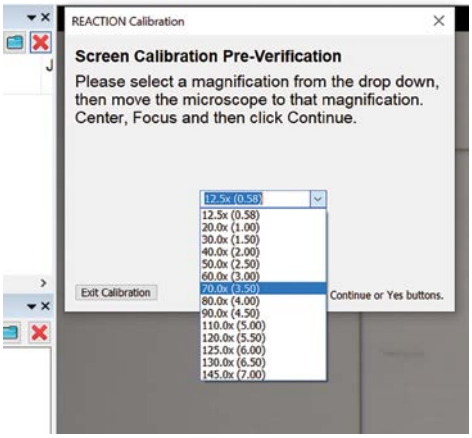




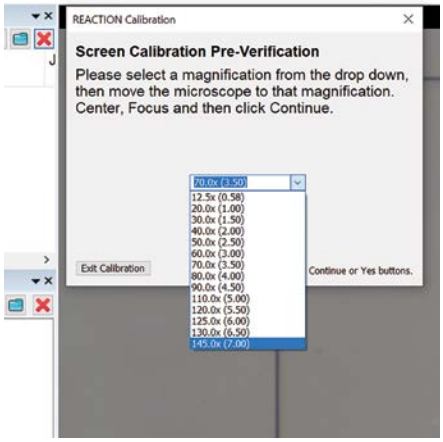
If the user frequently uses three magnification levels, we suggest using those for pre-checks. If that info is unknown, we suggest using low, medium and high magnifications.



Low magnification



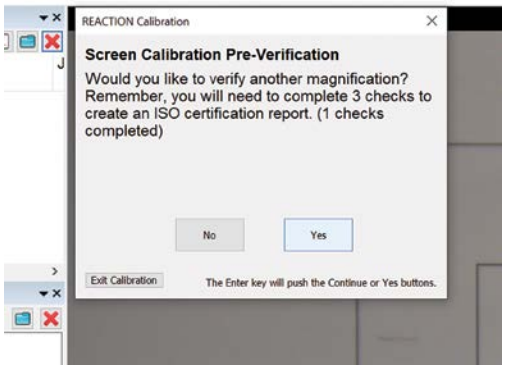
Medium magnification



High magnification

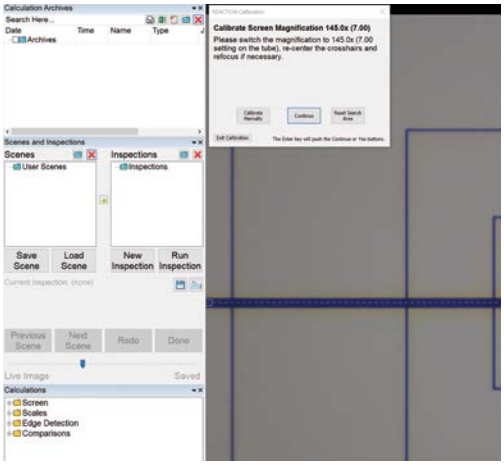
Calibrations - Full Calibration

After each magnification check, the pop-up box will ask the user if they want to do another check and also reminds the user how many checks have been completed.

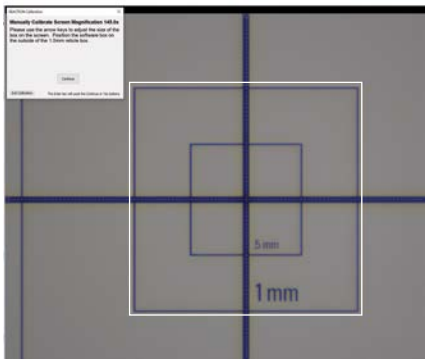


When preforming the pre-check test and if a message pops-up stating the screen check failed, it is OK and the user should select continue.

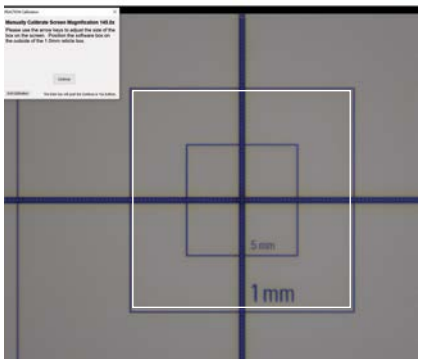
- **Screen Calibration:** A screen calibration teaches the system size at every magnification. The user will start at the highest magnification and work their way down to the lowest magnification. When performing the screen calibration, it is crucial that the user repeats the positioning of the software calibration box accurately on the reticle boxes at every magnification level.



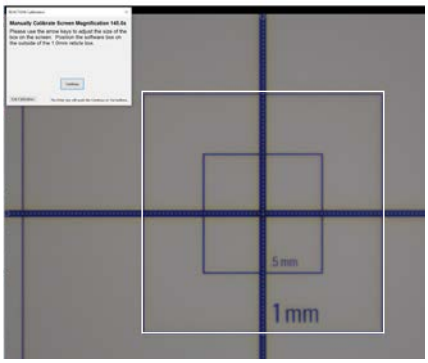
The following images depict the calibration box (white lines) and the reticle concentric boxes (black lines). Pay close attention to the fit of the boxes, as it is crucial that the calibration box just butts up to the reticle box.



Too big



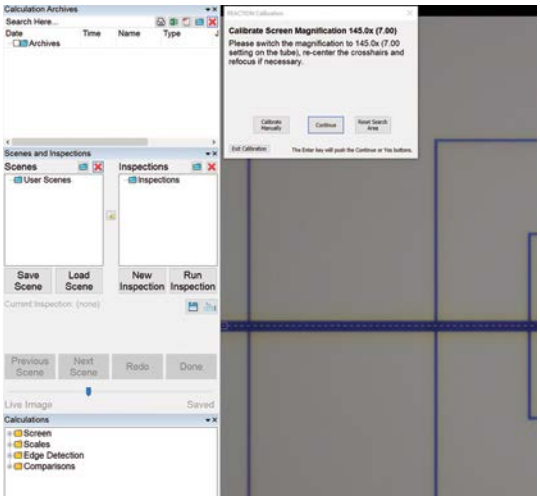
Too small



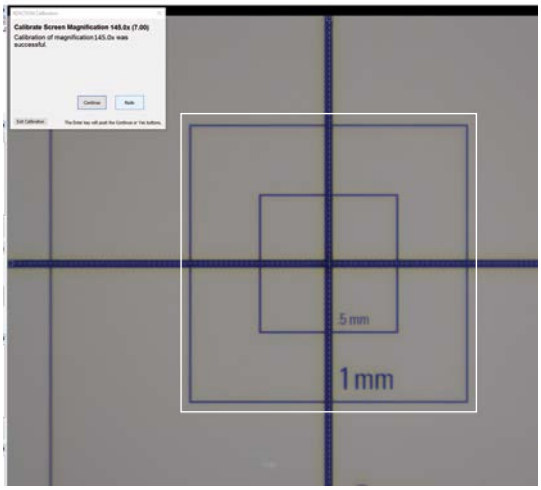
Correct alignment

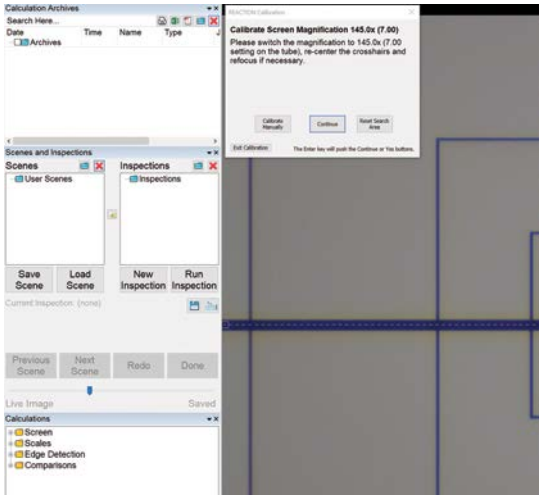
Calibrations - Full Calibration

To start the calibration select continue.



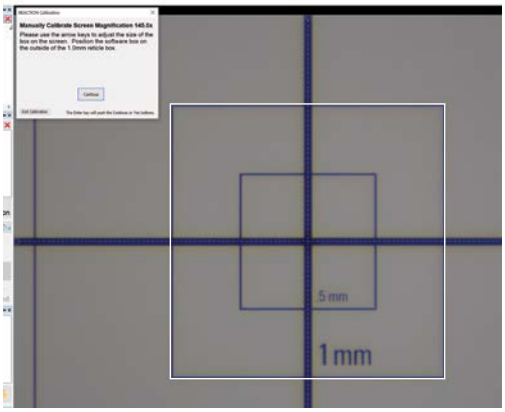
If the box size is correct, the user will select continue and move onto the next magnification level. If the box size is not properly aligned, the user must select the **redo** button and do this manually.

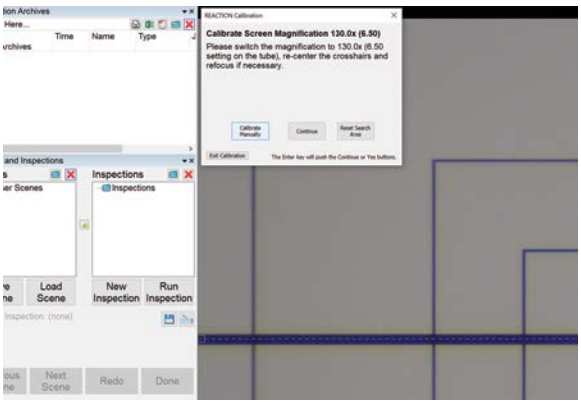




Too big

Once manual mode is selected, the user must adjust the calibration box to fit properly on the reticle box by using the keyboard arrows. Up and down arrows move the vertical spacing and left and right move the horizontal spacing. Once the calibration box is fitted properly, select continue and progress to the next magnification level.

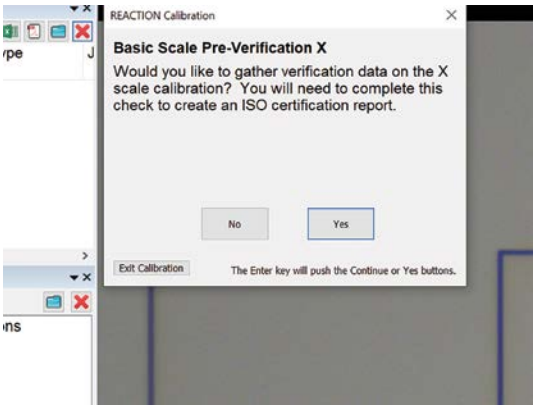




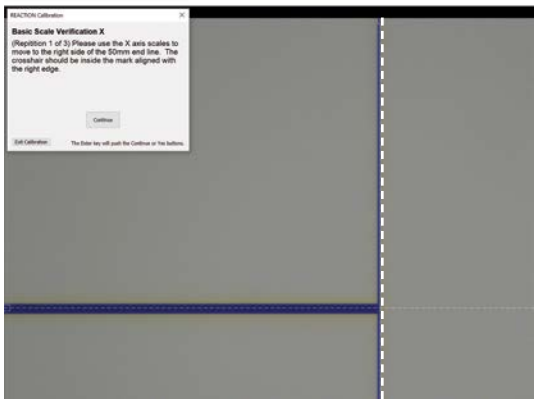
Correct alignment

- **Screen Verification:** The verification process will guide the user through the three magnification levels that were selected during the screen pre-check. If the calibration was done properly, the calibration box sizing will align to the reticle box sizing. If failure occurs, the screen calibration process must be repeated.

- **X axis Scale Calibration:** All Scale calibrations should be completed at the highest magnification level. The full calibration process utilizes the 50mm horizontal line located through the center of the concentric boxes on the reticle. The 50mm line has a certified length from the outside edge of the line to the outside edge. It is important that the user accurately place the crosshairs to get the correct results. The following are the three stages of the X scale calibration process and the alignment of the crosshairs on the reticle.



- **Pre-Verification:** The user must turn the X axis handwheel to move the crosshairs to the far right of the horizontal line, which is 25 mm from the center of the concentric boxes. Note the alignment of the crosshairs relative to the reticle. Different than Figure 1B (next page).



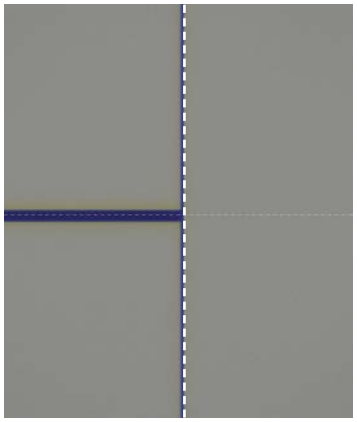
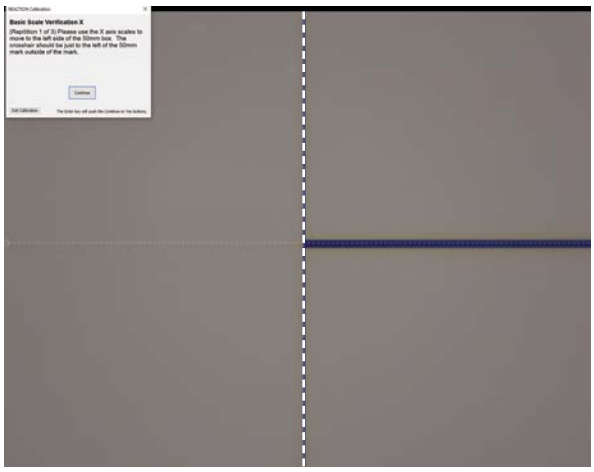


Figure 1A - Note alignment

After the correct placement is made, the user must select continue and move the crosshairs 50mm to the left. Note the alignment of the crosshairs is different on this location. The placement of the crosshair is crucial to achieve accurate results. This process must be repeated two more times to finish the pre-verification stage.



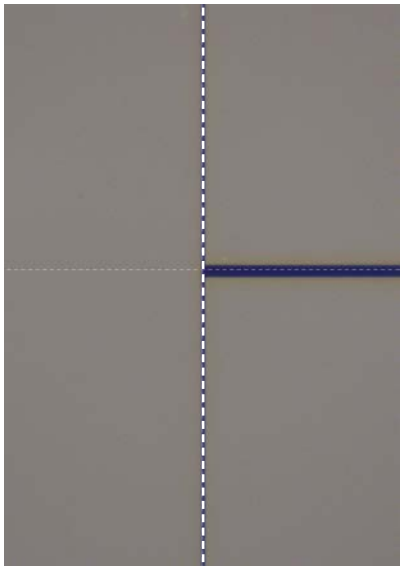
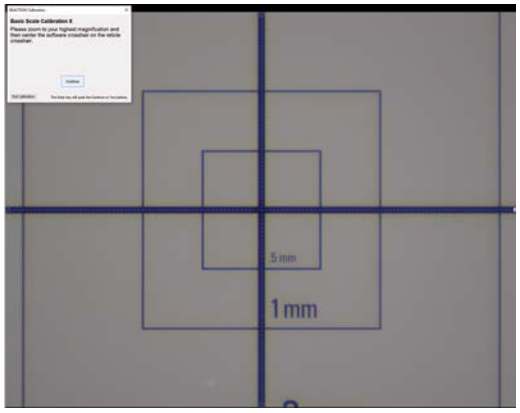
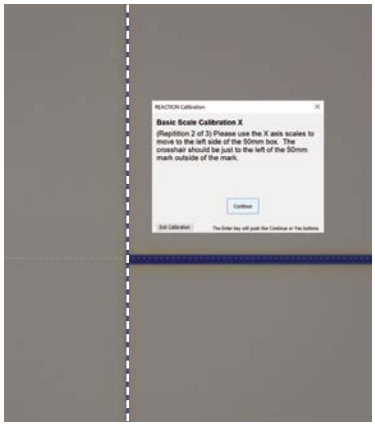


Figure 1B - Note alignment which is different than Figure 1A.

- **Calibration:** The scale calibration process is performed the exact same way as the pre-verification.

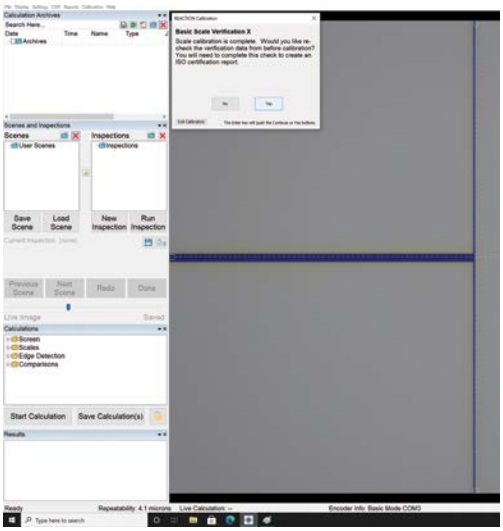


The on-screen calibration instructions will guide the user through each movement right side and left side. It is crucial that the user places the crosshair in the exact same position on the reticle. This process must be repeated two more times to finish the calibration stage.

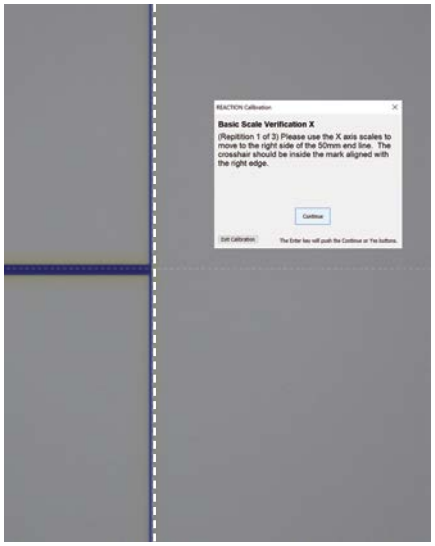


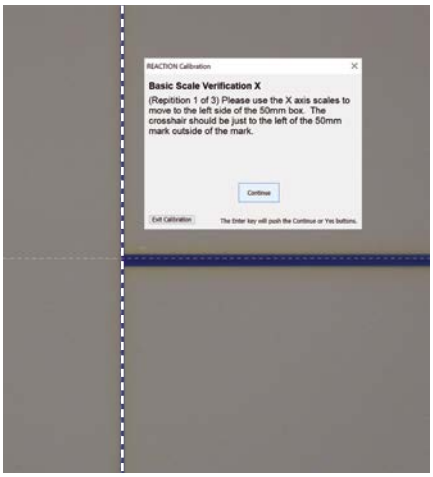
Two different alignment locations

- **Verification:** The Verification process has the exact same procedures as the calibration and pre-verification.

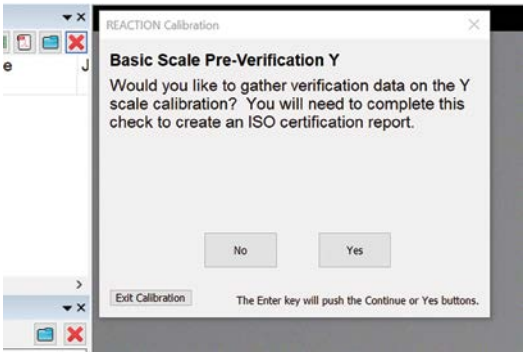


The on-screen calibration instructions will guide the user through the process-right side and left side. It is once again crucial that the user places the crosshairs in the exact same location as done previously.

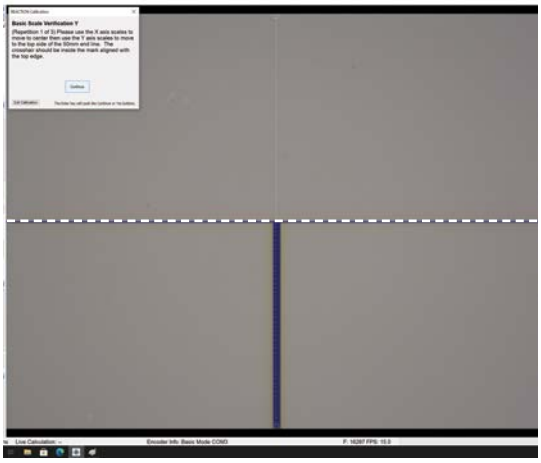


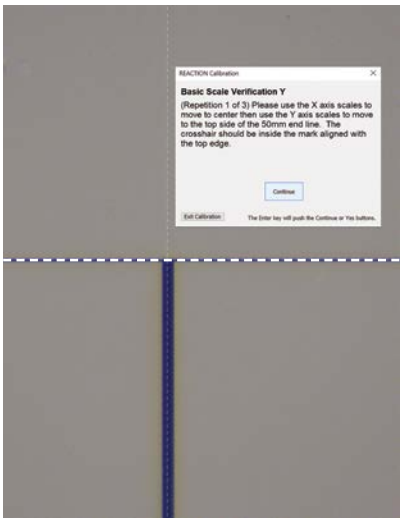


- **Y axis Scale Calibration:** All scale calibrations should be completed at the highest magnification level. The full calibration process utilizes the 50mm vertical line located through the center of the concentric boxes on the reticle. The 50mm line has a certified length from the outside edge of the line to the outside edge. It is important that the user accurately place the crosshairs to get the correct results. The following are the three stages of the X scale calibration process and the alignment of the crosshairs on the reticle.

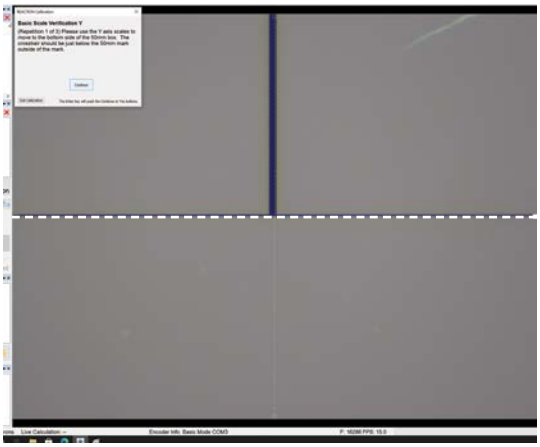


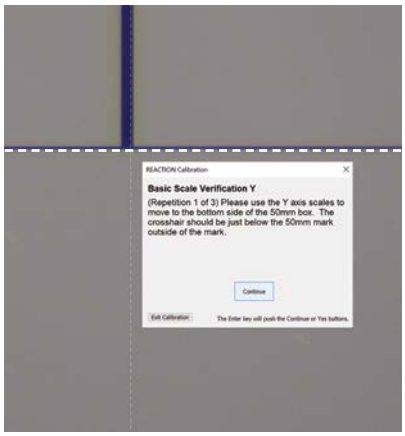
- **Pre-Verification:** The user must turn the Y axis handwheel to move the crosshairs to the top of the vertical line, which is 25 mm from the center of the concentric boxes. Note the alignment of the crosshairs relative to the reticle.



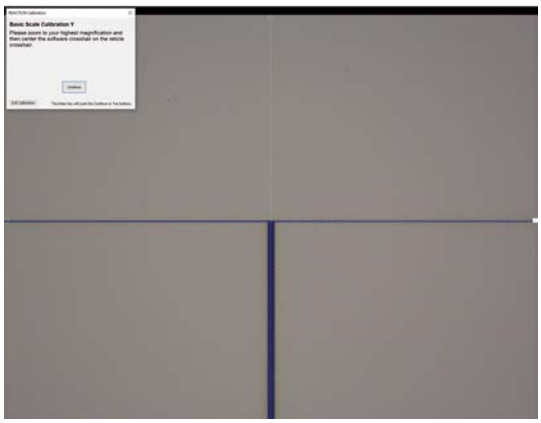


After the correct placement is made, the user must select continue and move the crosshairs down 50mm. Note the alignment of the crosshairs is different in this location. The placement of the crosshair is crucial to achieve accurate results. This process must be repeated 2 more times to finish the Pre-Verification stage.



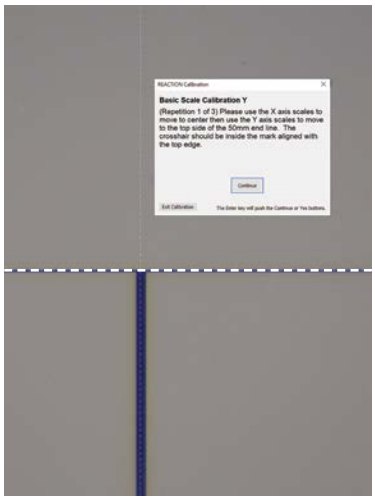


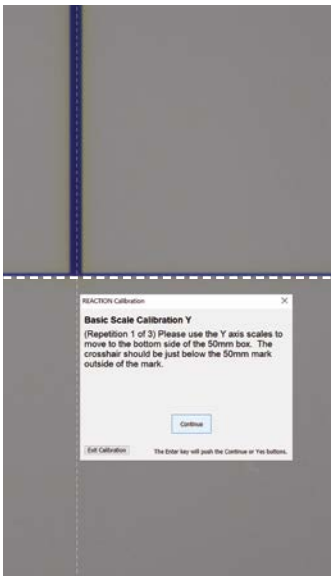
- **Calibration:** The scale calibration process is performed the exact same way as the pre-verification.



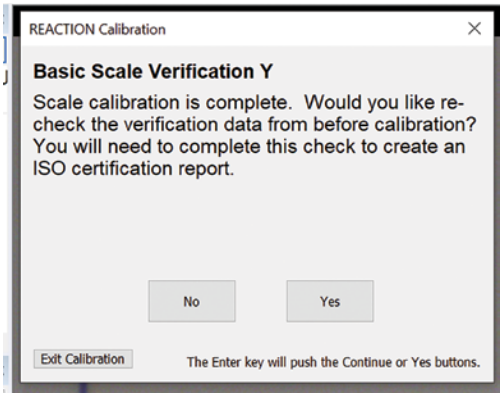
Calibrations - Full Calibration

The on-screen calibration instructions will guide the user through each movement top side and bottom side. It is crucial that the user places the crosshair in the exact same position on the reticle. This process must be repeated two more times to finish the calibration stage.

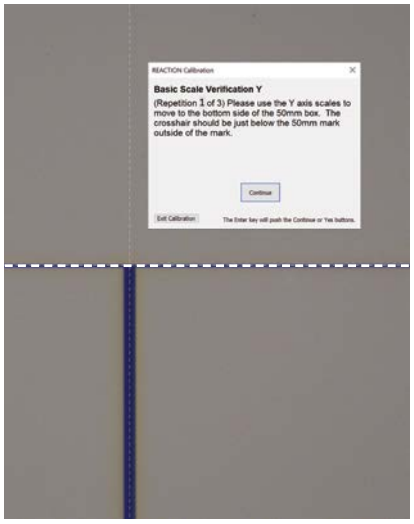


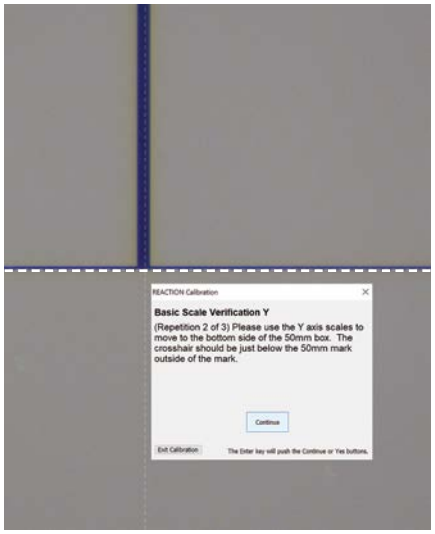


- **Verification:** The Verification process has the exact same procedures as the calibration and pre-verification.



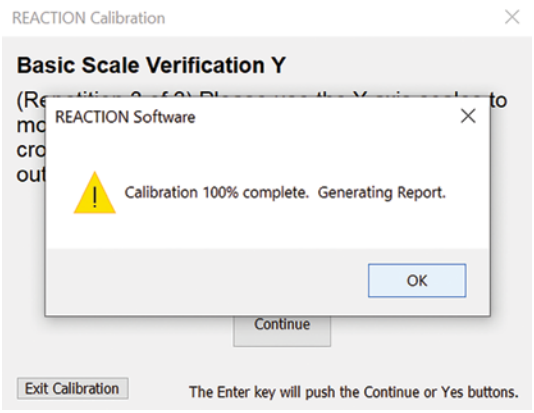
The on-screen calibration instructions will guide the user through the process-top side and bottom side. It is once again crucial that the user places the crosshairs in the same exact location as done previously.

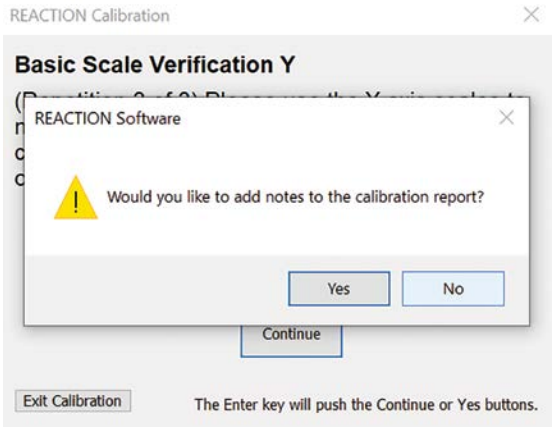




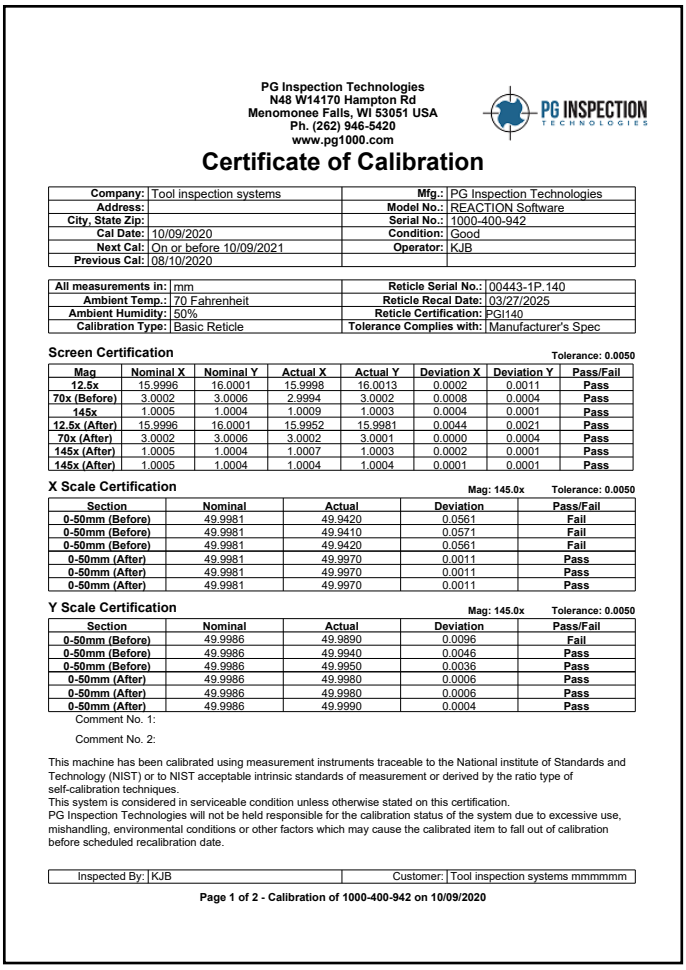
Calibrations - Full Calibration

Once the calibration is complete, the user will be asked if they want to generate a report and then asked if they want to add any notes to the report.





The calibration report will then be displayed in a PDF format and is capable of being saved for future reference.



PG Inspection Technologies
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Menomonee Falls, WI 53051 USA
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PG INSPECTION TECHNOLOGIES

Certificate of Calibration

Company:	Tool inspection systems	**Mfg.:**	PG Inspection Technologies
Address:		**Model No.:**	REACTION Software
City, State Zip:		**Serial No.:**	1000-400-942
Cal Date:	10/09/2020	**Condition:**	Good
Next Cal:	On or before 10/09/2021	**Operator:**	KJB
Previous Cal:	08/10/2020		

All measurements in:	mm	**Reticle Serial No.:**	00443-1P.140
Ambient Temp.:	70 Fahrenheit	**Reticle Recal Date:**	03/27/2025
Ambient Humidity:	50%	**Reticle Certification:**	PGI140
Calibration Type:	Basic Reticle	**Tolerance Complies with:**	Manufacturer's Spec

Screen Certification — **Tolerance: 0.0050**

Mag	Nominal X	Nominal Y	Actual X	Actual Y	Deviation X	Deviation Y	Pass/Fail
12.5x	15.9996	16.0001	15.9998	16.0013	0.0002	0.0011	**Pass**
70x (Before)	3.0002	3.0006	2.9994	3.0002	0.0008	0.0004	**Pass**
145x	1.0005	1.0004	1.0009	1.0003	0.0004	0.0001	**Pass**
12.5x (After)	15.9996	16.0001	15.9952	15.9981	0.0044	0.0021	**Pass**
70x (After)	3.0002	3.0006	3.0002	3.0001	0.0000	0.0004	**Pass**
145x (After)	1.0005	1.0004	1.0007	1.0003	0.0002	0.0001	**Pass**
145x (After)	1.0005	1.0004	1.0004	1.0004	0.0001	0.0001	**Pass**

X Scale Certification — **Mag: 145.0x** **Tolerance: 0.0050**

Section	Nominal	Actual	Deviation	Pass/Fail
0-50mm (Before)	49.9981	49.9420	0.0561	**Fail**
0-50mm (Before)	49.9981	49.9410	0.0571	**Fail**
0-50mm (Before)	49.9981	49.9420	0.0561	**Fail**
0-50mm (After)	49.9981	49.9970	0.0011	**Pass**
0-50mm (After)	49.9981	49.9970	0.0011	**Pass**
0-50mm (After)	49.9981	49.9970	0.0011	**Pass**

Y Scale Certification — **Mag: 145.0x** **Tolerance: 0.0050**

Section	Nominal	Actual	Deviation	Pass/Fail
0-50mm (Before)	49.9986	49.9890	0.0096	**Fail**
0-50mm (Before)	49.9986	49.9940	0.0046	**Pass**
0-50mm (Before)	49.9986	49.9950	0.0036	**Pass**
0-50mm (After)	49.9986	49.9980	0.0006	**Pass**
0-50mm (After)	49.9986	49.9980	0.0006	**Pass**
0-50mm (After)	49.9986	49.9990	0.0004	**Pass**

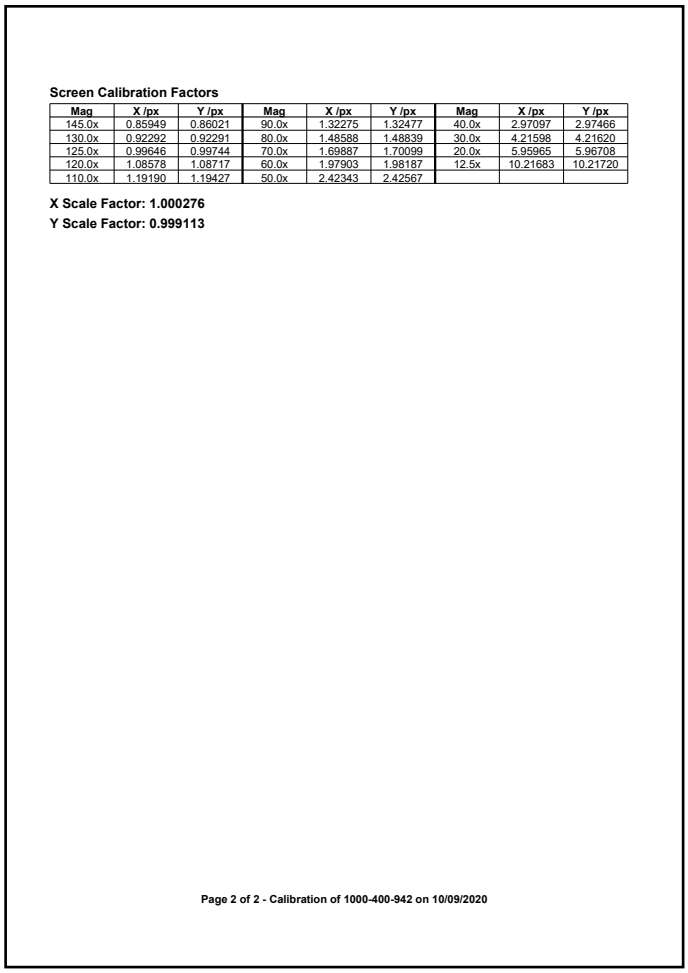
Comment No. 1:

Comment No. 2:

This machine has been calibrated using measurement instruments traceable to the National institute of Standards and Technology (NIST) or to NIST acceptable intrinsic standards of measurement or derived by the ratio type of self-calibration techniques.
This system is considered in serviceable condition unless otherwise stated on this certification.
PG Inspection Technologies will not be held responsible for the calibration status of the system due to excessive use, mishandling, environmental conditions or other factors which may cause the calibrated item to fall out of calibration before scheduled recalibration date.

Inspected By:	KJB	Customer:	Tool inspection systems mmmmmm

Page 1 of 2 - Calibration of 1000-400-942 on 10/09/2020



Screen Calibration Factors

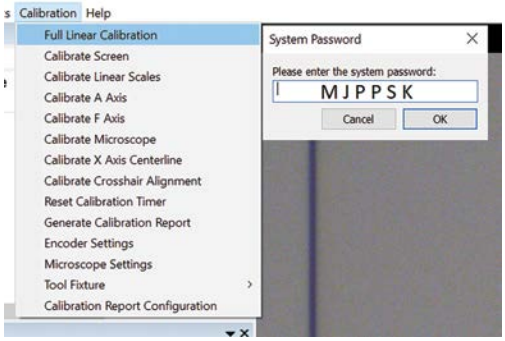
Mag	X /px	Y /px	Mag	X /px	Y /px	Mag	X /px	Y /px
145.0x	0.85949	0.86021	90.0x	1.32275	1.32477	40.0x	2.97097	2.97466
130.0x	0.92292	0.92291	80.0x	1.48588	1.48839	30.0x	4.21598	4.21620
125.0x	0.99646	0.99744	70.0x	1.69887	1.70099	20.0x	5.95965	5.96708
120.0x	1.08578	1.08717	60.0x	1.97903	1.98187	12.5x	10.21683	10.21720
110.0x	1.19190	1.19427	50.0x	2.42343	2.42567			

X Scale Factor: 1.000276
Y Scale Factor: 0.999113

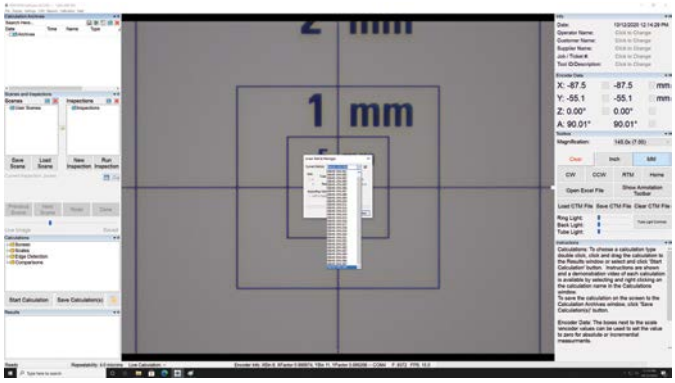
Page 2 of 2 - Calibration of 1000-400-942 on 10/09/2020

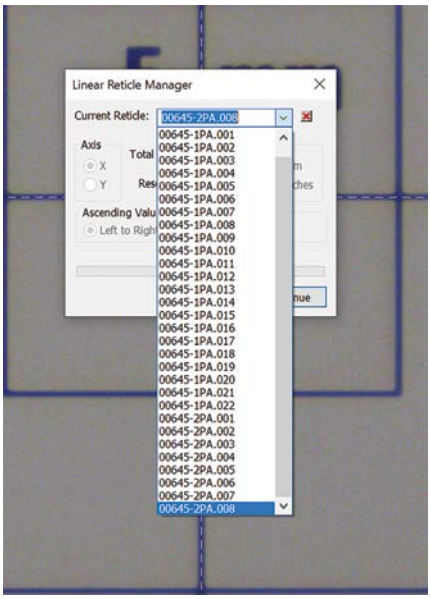
2. Full Linear Calibration

- **Select Calibration** (password PG2019 older software MJPPSK).

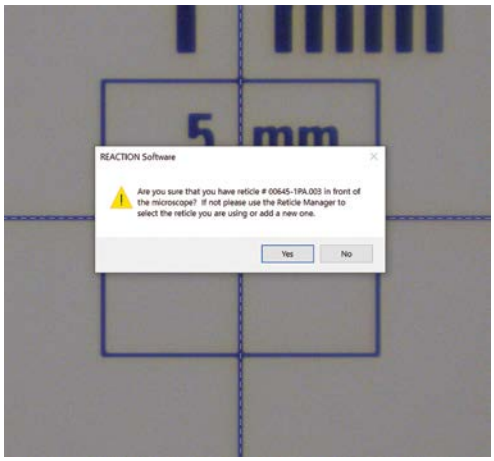


- **Manage Reticle Data and Verify:** Locate the reticle serial number that is going to be used for the calibration in the drop-down box. Contact PG1000 if serial number is not listed.

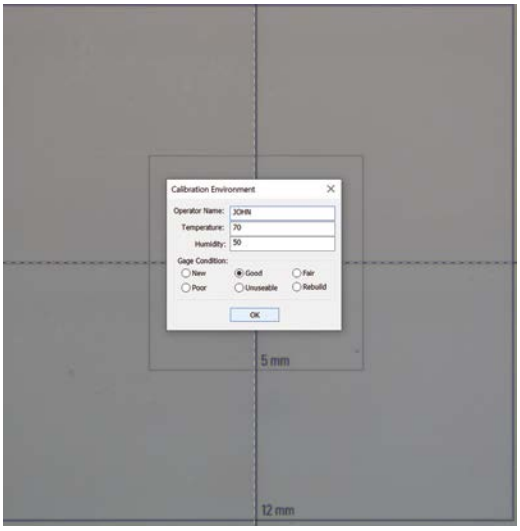




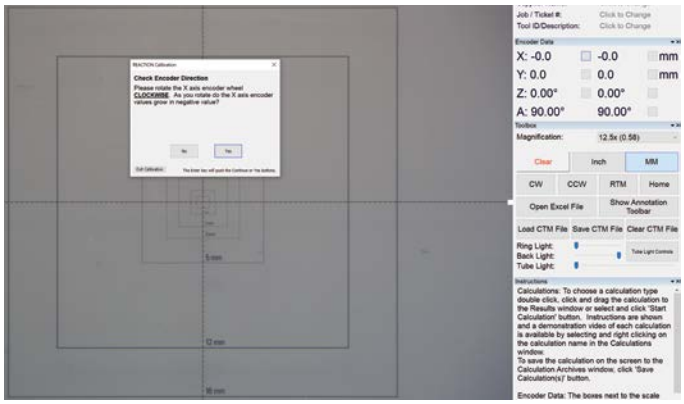
- Double check to make sure you have selected the correct serial number for your reticle. The serial number can be found on the reticle glass.



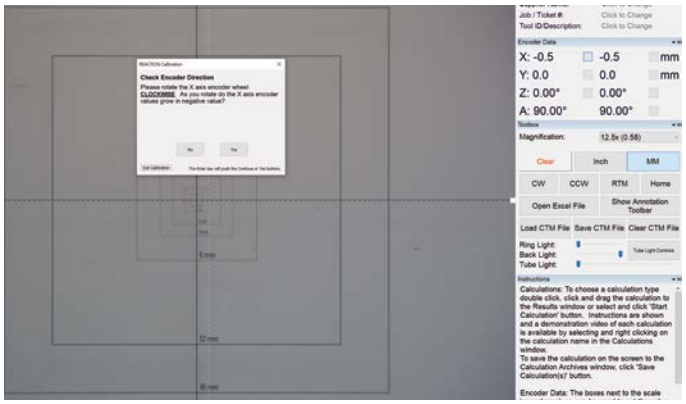
- **Environmental Data:** The environmental data is recorded because extreme temperatures can shrink or relax materials, which can influence sizing when micron level accuracy is expected. This data is collected and displayed on the Calibration Report.



- **Checking Encoder Direction:** The X and Y linear scale direction needs to be recorded so that accurate offset data can be collected. The X axis should read negative when the handwheel is turned clockwise.

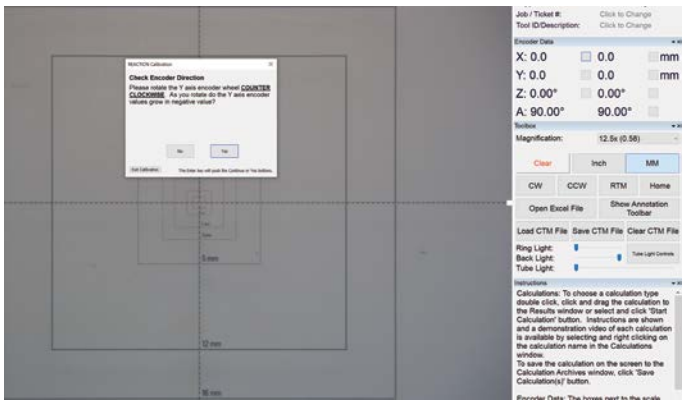


X axis zeroed out

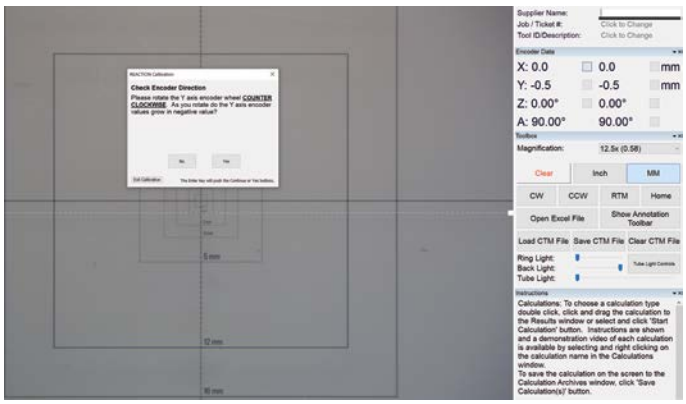


X axis reads negative

The Y axis should read negative when the handwheel is turned counterclockwise.



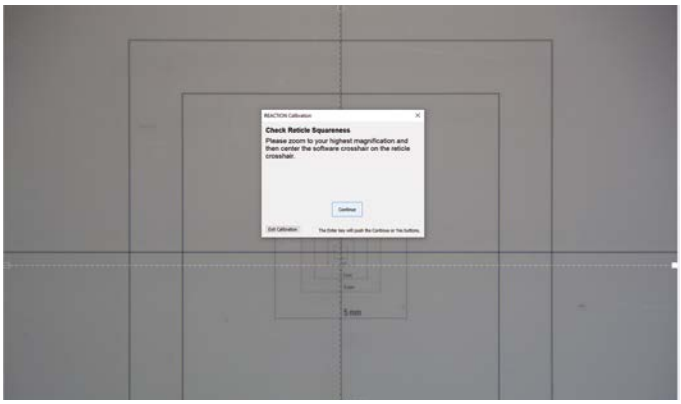
Y axis zeroed out



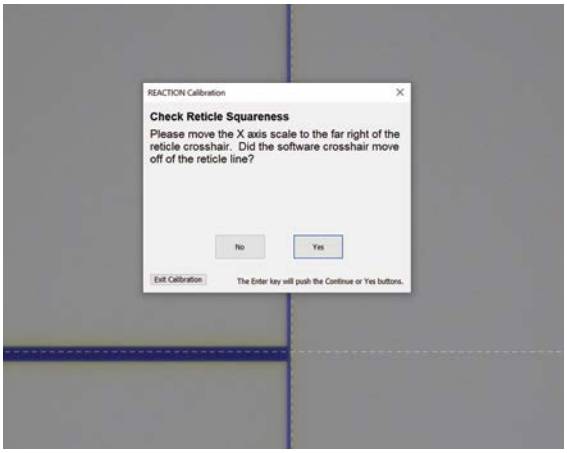
Y axis reads negative

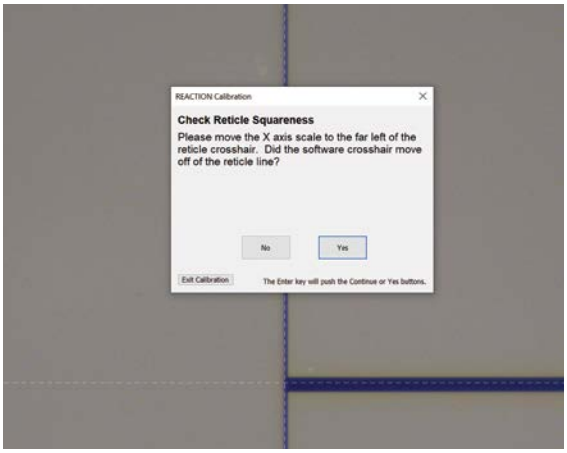
Calibrations - Full Linear Calibration

- **Check Reticle Squareness:** The on-screen instructions in the software will walk the user through the alignment process.

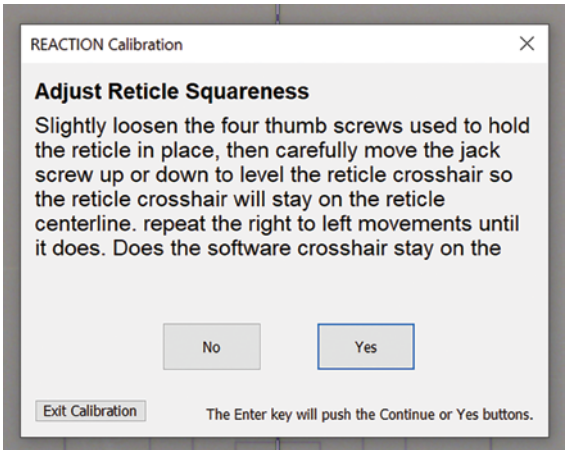


The user must go from the right side to the left side of the 50 mm line running through the middle of the concentric boxes. The reticle glass needs to be positioned correctly, so that the calibration process can be done accurately.





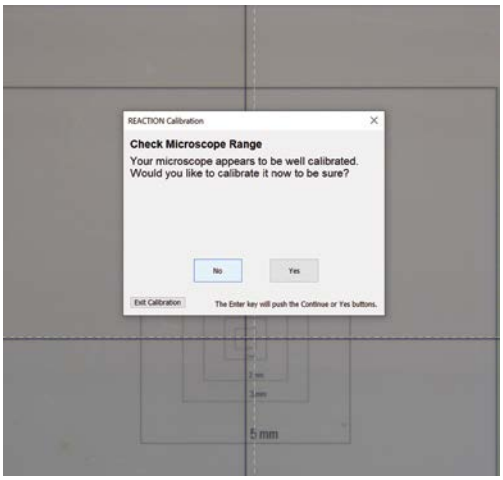
If it is determined that the reticle glass needs to be adjusted, follow the on-screen instructions to reposition the glass. If unable to position the glass correctly, consult PG1000 support for further details.



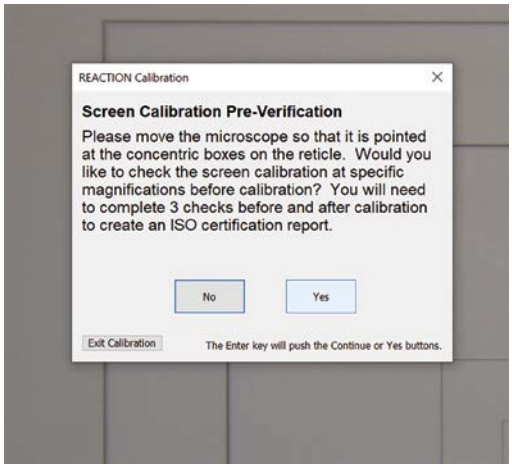
Calibrations - Full Linear Calibration

- **Checking Magnification Range (if 400 model):** This option is only applied to the PG1000-400 models. The calibration requires the user to go to the highest magnification level, select continue and then go to the lowest magnification level and select continue.

If the data is correct for the magnification range, the user may select "No" to recalibrating the microscope. If the microscope range fails, contact PG1000 support for further details.

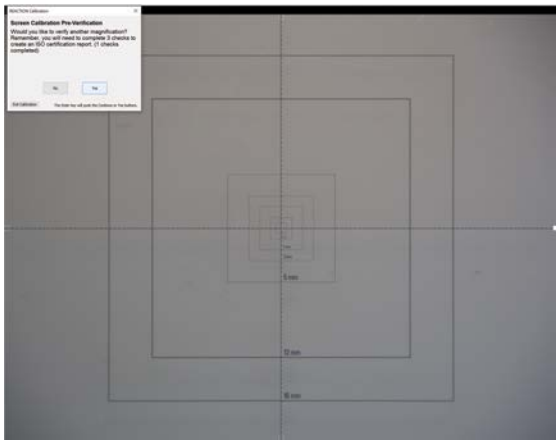


- **Screen Calibration: 3-step process including Pre-Verification, Sceen Calibration and Verification**

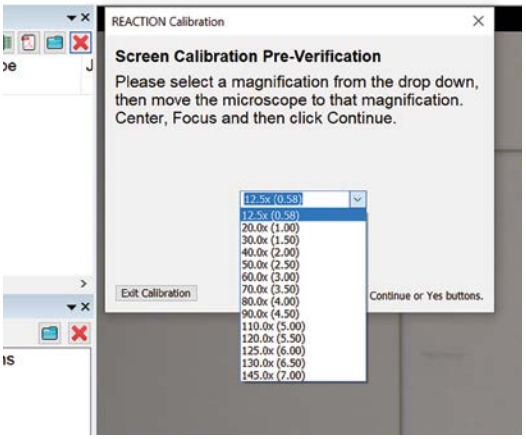


Calibrations - Full Linear Calibration

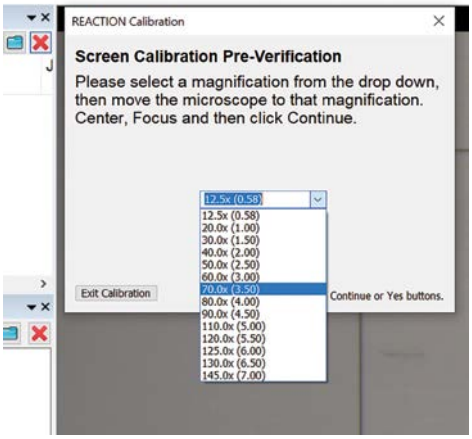
- **Screen Pre-Check:** The pre-check is used to establish a baseline for the screen accuracy prior to calibrating. The user must select three different magnification levels to test the accuracy of the unit. The calibration on-screen-instructions will guide the user through the process.



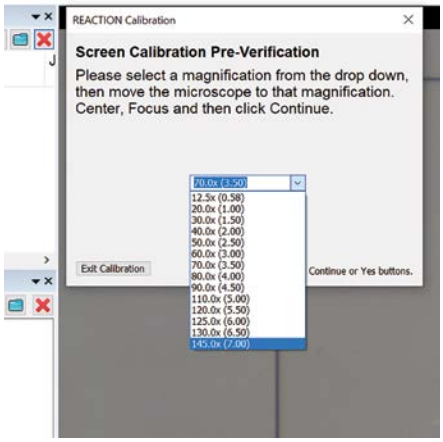
If the user frequently uses three magnification levels, we suggest using those for pre-checks. If that info is unknown, we suggest using low, medium and high magnifications.



Low magnification

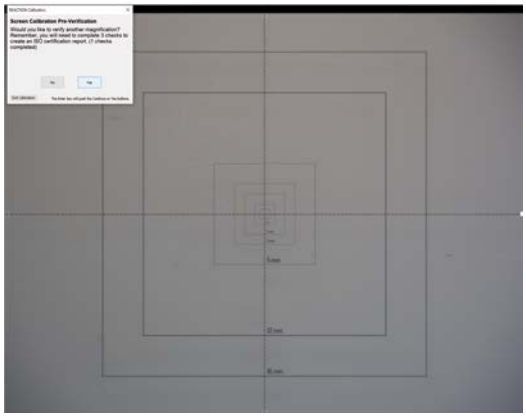


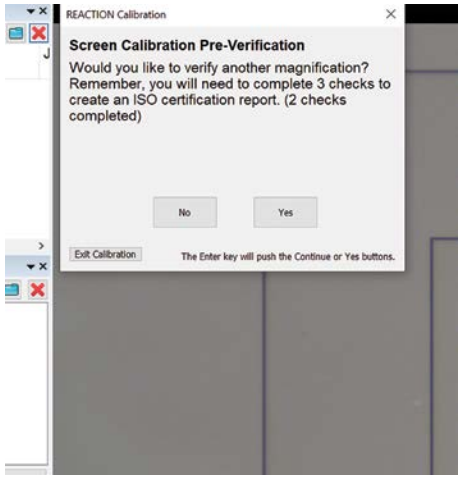
Medium magnification



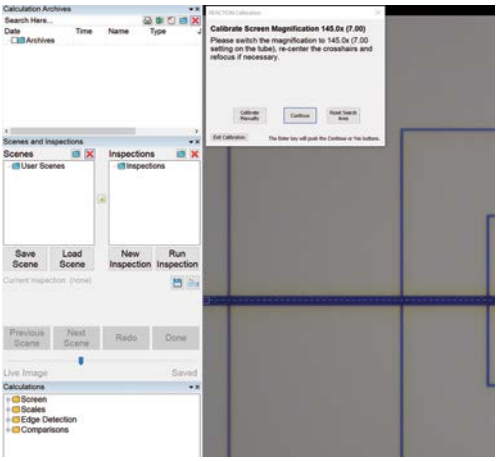
High magnification

After each magnification check, the pop-up box will ask the user if they want to do another check and also reminds the user how many checks have been completed. When performing the pre-check test, if a message pops-up stating the screen check failed, it is OK. The user should select continue.

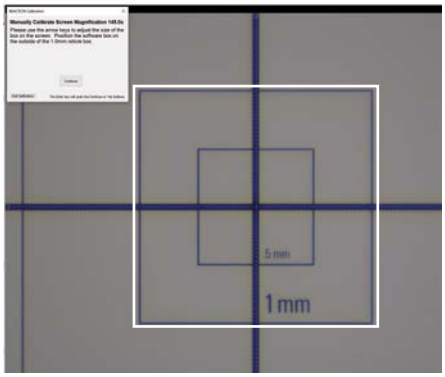




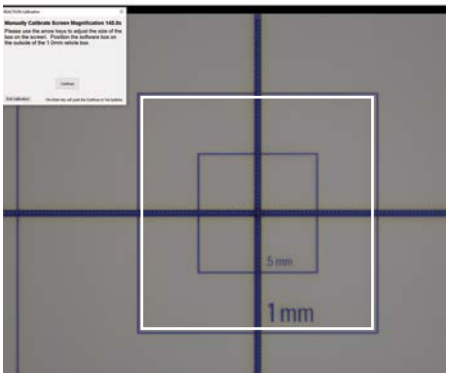
- **Screen Calibration:** A screen calibration teaches the system size at every magnification. The user will start at the highest magnification and work their way down to the lowest magnification. When performing the screen calibration, it is crucial that the user repeats the positioning of the software calibration box accurately on the reticle boxes at every magnification level.



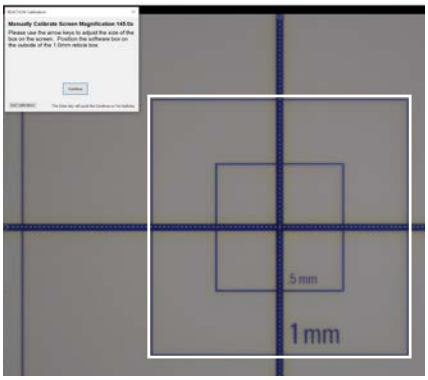
The following images depict the calibration box (white lines) and the reticle concentric boxes (black lines). Pay close attention to the fit of the boxes, as it is crucial that the calibration box just butts up to the reticle box.



Too big

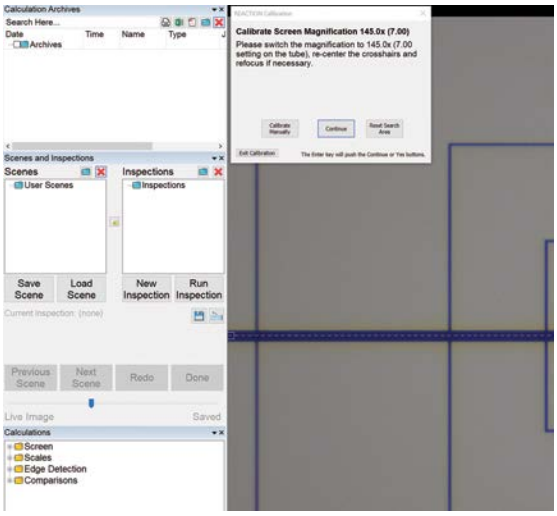


Too small



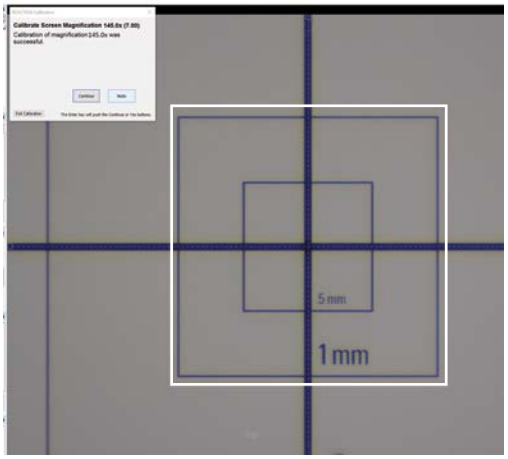
Correct alignment

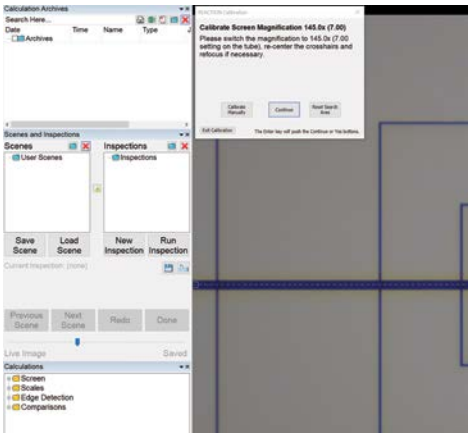
To start the calibration, select continue. If the box size is correct, the user will select continue and move onto the next magnification level.



Calibrations - Full Linear Calibration

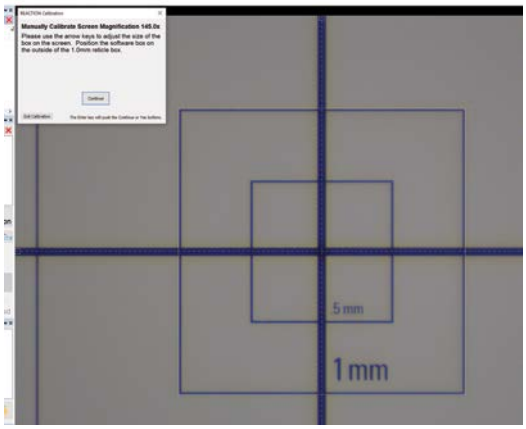
If the box size is not properly aligned, the user must select the **redo** button and do this manually.



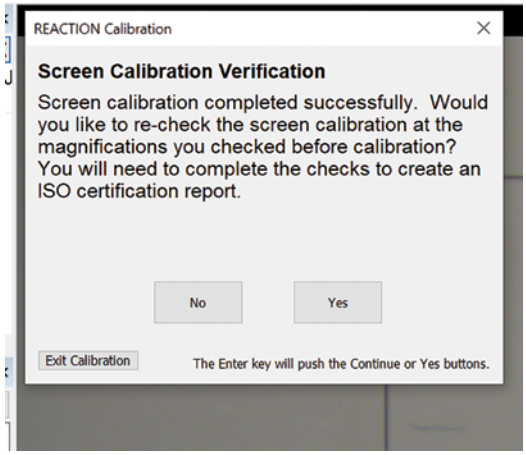


Too big

Once manual mode is selected, the user must adjust the calibration box to fit properly on the reticle box by using the keyboard arrows. Up and down arrows move the vertical spacing and left and right move the horizontal spacing. Once the calibration box is fitted properly, select continue and progress to the next magnification level.

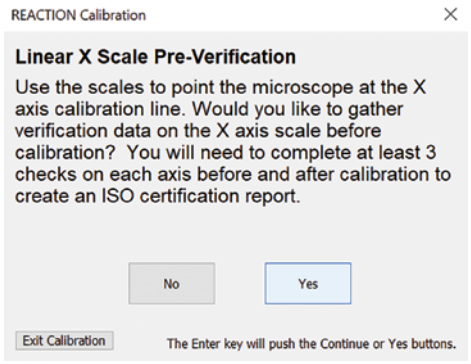


- **Screen Verification:** The verification process will guide the user through the three magnification levels that were selected during the screen pre-check. If the calibration was done properly, the calibration box sizing will align to the reticle box sizing. If failure occurs, the screen calibration process must be repeated.



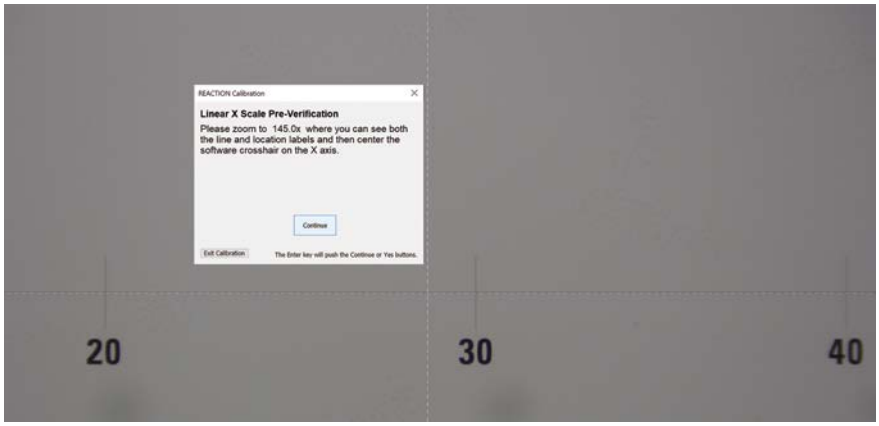
Calibrations - Full Linear Calibration

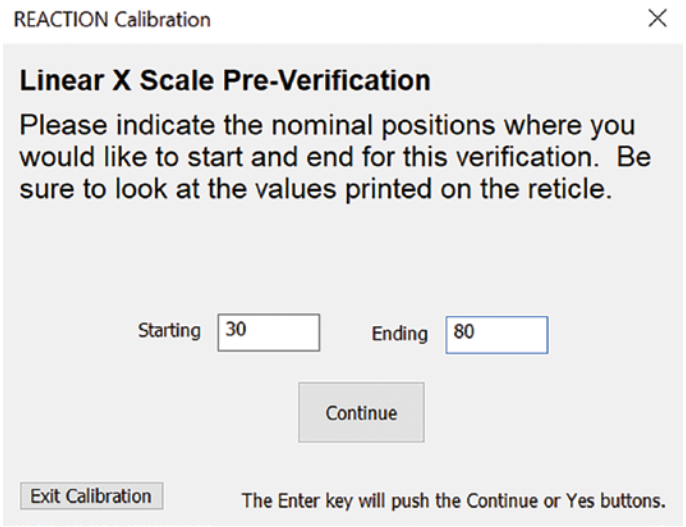
- **X axis Scale Calibration**



All Scale calibrations should be completed at the highest magnification level. The user must be careful and attentive so that the placement of the crosshair on each reticle hash mark is the same. The full linear calibration utilizes the horizontal number line ranging 0 to 210 MM located 28.6 MM below the center of the concentric boxes on the reticle. The full linear calibration requires the user to do the scale calibration in three steps.

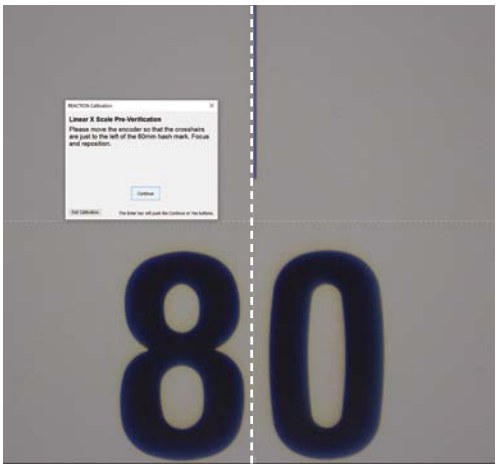
- **Pre-Verification:** The user will be asked for data input for the distance desired for the first pre-check. The user must enter the data into the calibration pop-up.



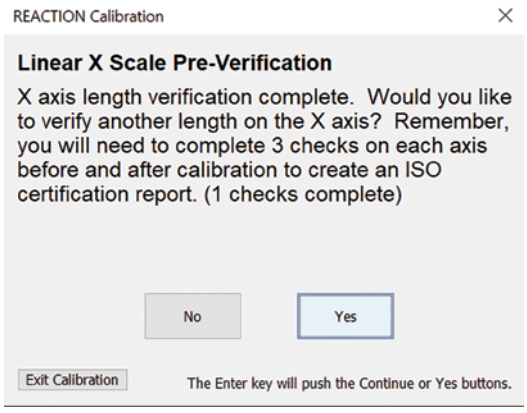


After this data is entered, the user must physically move the crosshairs by turning the handwheels so that they can see the first number that was entered and the hash mark associated with it.

The user must pay attention to the positioning of the crosshairs on the hash mark on the reticle and must repeat this location on every hash mark. Once correct position is achieved, select enter and then move to the second number and hash mark that was entered into the pop-up and make sure that the positioning is correct.

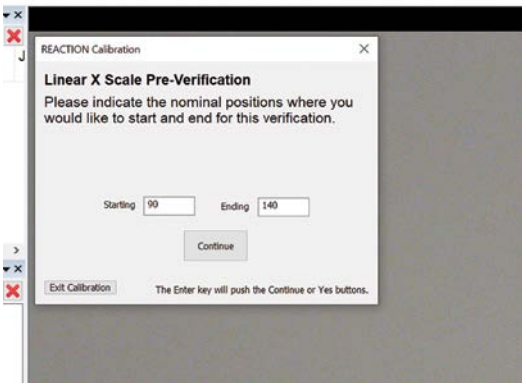


This process must be completed two more times so that the integer intervals are in sequential order. The calibration on-screen instructions will help guide the user through this process.



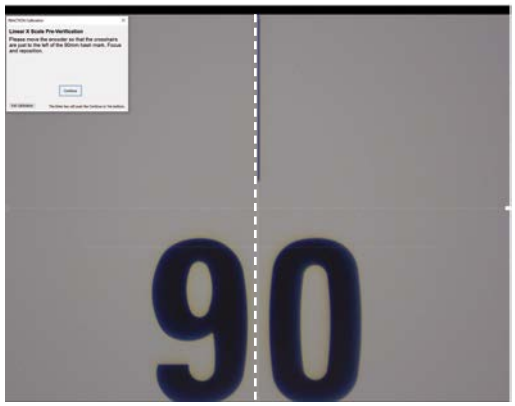
Calibrations - Full Linear Calibration

An example of this process would be the following:



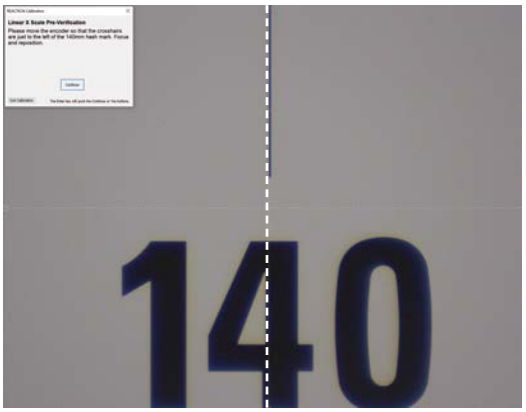
1.

90mm-140mm Data Input Second Check



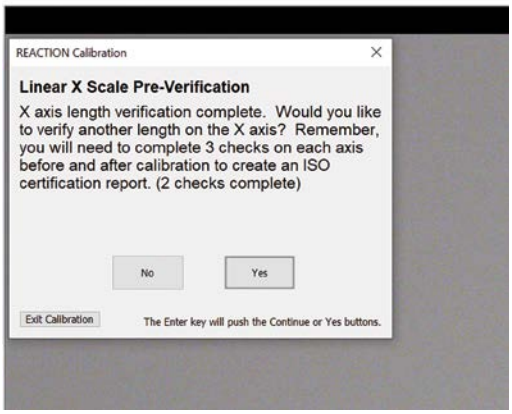
2.

Showing 90MM Crosshair Placement



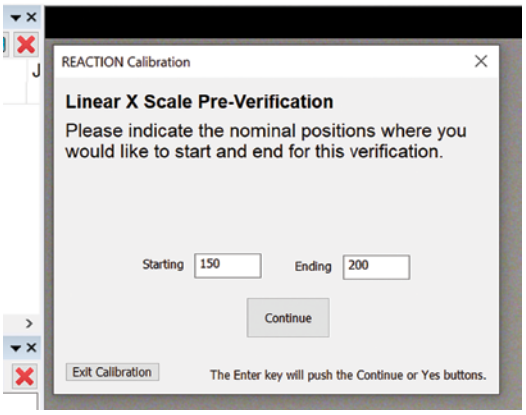
3.

Showing 140mm Crosshair Placement



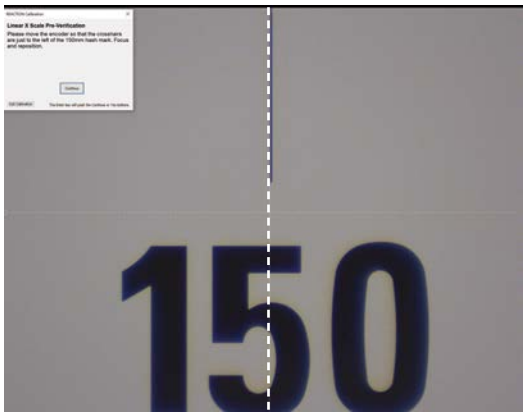
4.

End Second Check



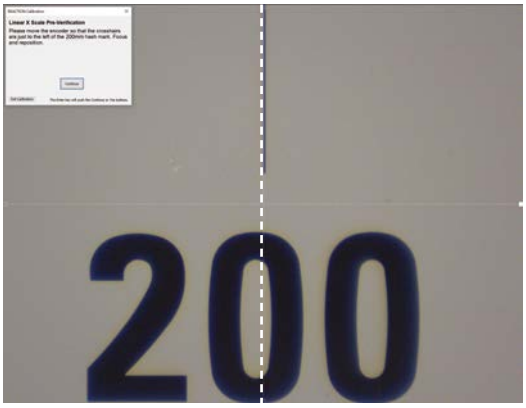
5.

150mm-200mm Data Input Third Check



6.

Showing 150mm Crosshair Placement



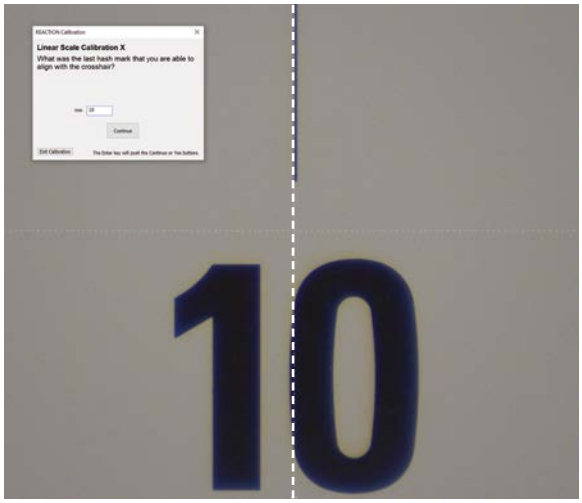
7.

Showing 200mm Crosshair Placement

Calibrations - Full Linear Calibration

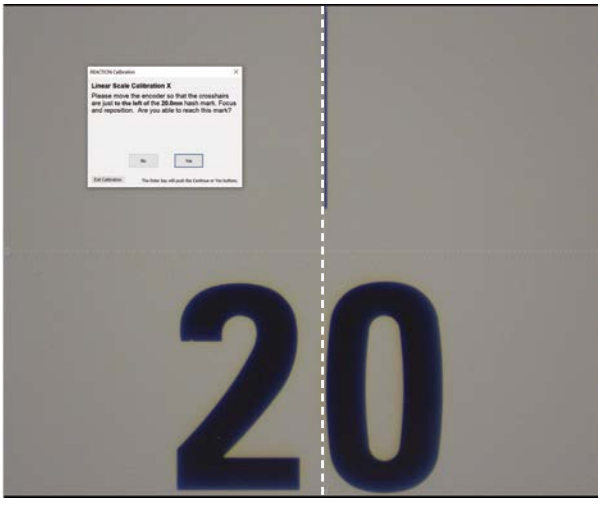
- **Calibration:**

The X axis calibration is performed at every 10mm starting from the 10MM hash mark. Please verify that your unit can reach the 10MM mark before entering this data.



The on-screen instructions will guide the user to every 10MM interval until it reaches 210MM, which is the end of the x axis travel.

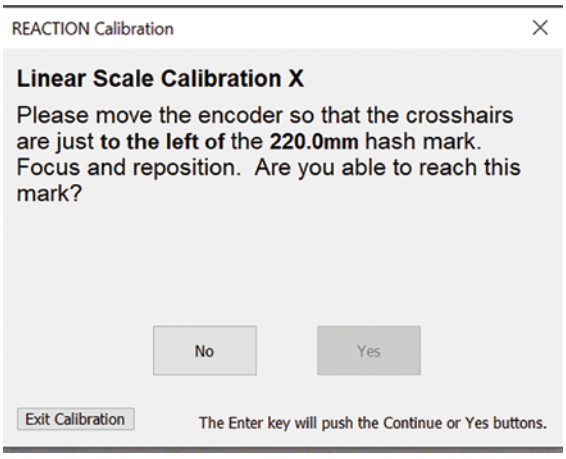
Initial start



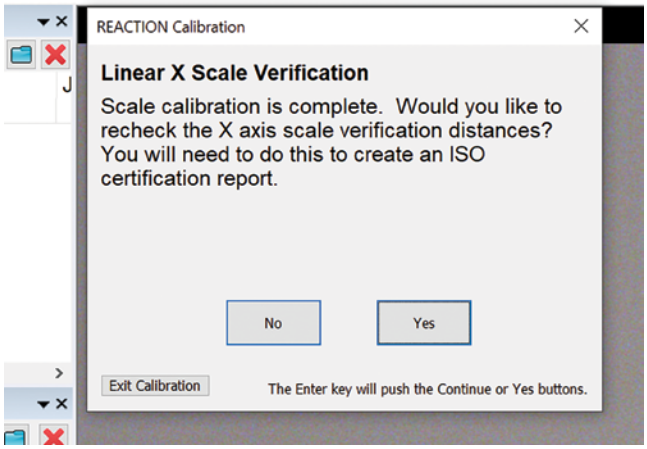
Increments of 10MM

Calibrations - Full Linear Calibration

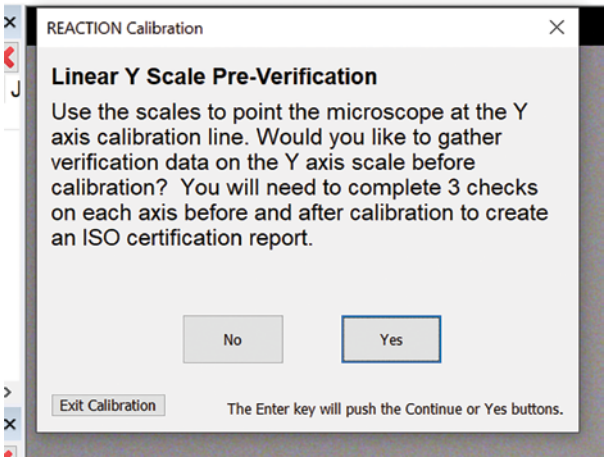
The calibration software will ask the user if they can reach the 220mm and the user will select "No." It is extremely important that the user does not force the handwheels to reach the end points. If there is resistance to the handwheels, the user has reached travel limit. **Do not force the handwheels to reach a number.**



- **Verification:** The user will be asked to repeat the pre-check process to verify that the calibration was successful. The user must complete this process or the calibration report will not be generated. The on-screen instructions in the software will guide the user to each hash mark that was selected in the pre-verification process.

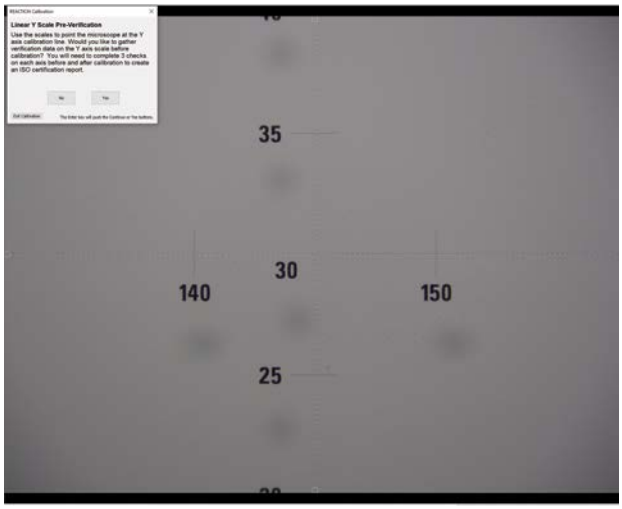


- **Y axis Scale Calibration:** All scale calibrations should be completed at the highest magnification level. The user must be careful and attentive so that the placement of the crosshair on each reticle hash mark is the same.

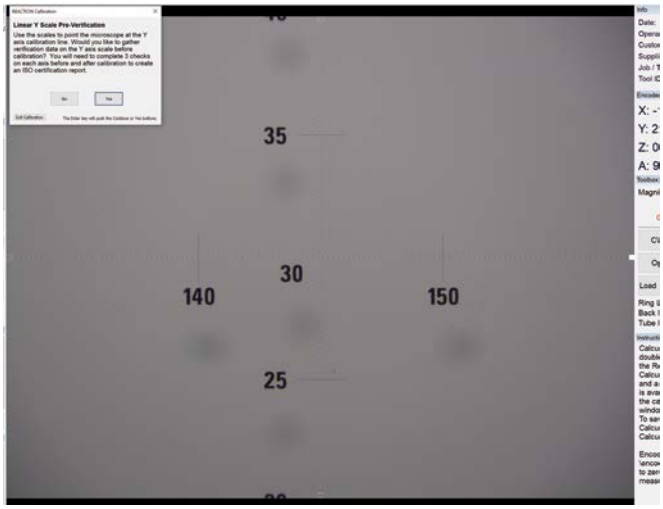


Calibrations - Full Linear Calibration

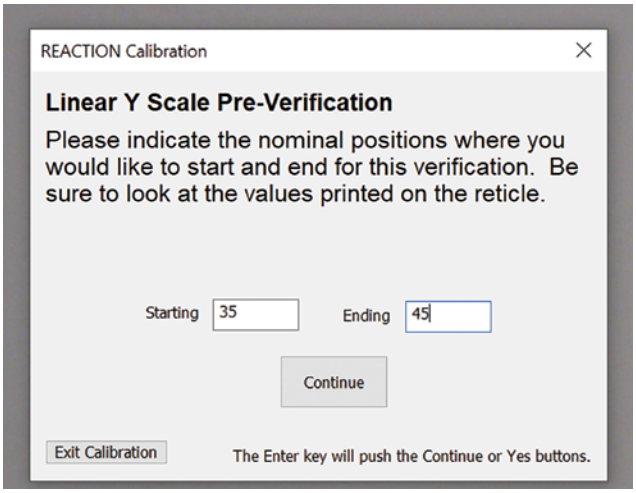
The full linear calibration utilizes the horizontal number line ranging 0 to 155 MM located between the horizontal 140 and the 150 mm marks. The full linear calibration requires the user to do the scale calibration in three steps.



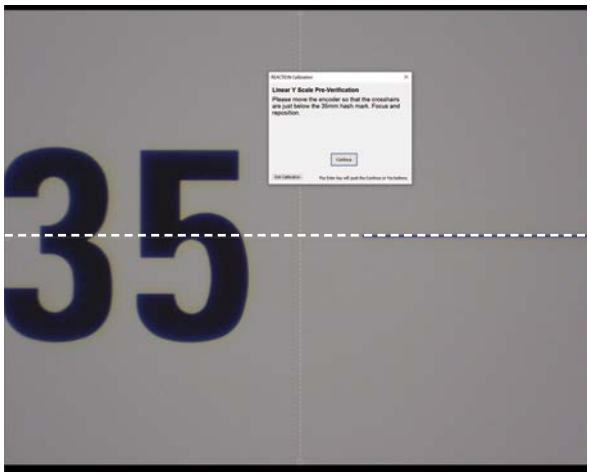
- **Pre-Verification:** The user will be asked for data input for the distance desired for the first pre-check.



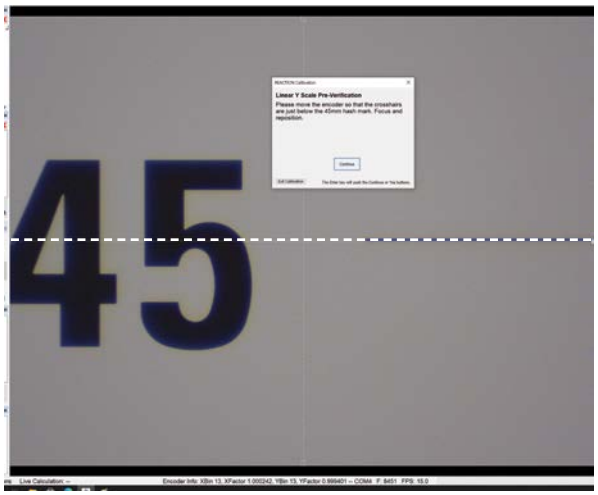
The user must enter the data into the calibration pop-up.



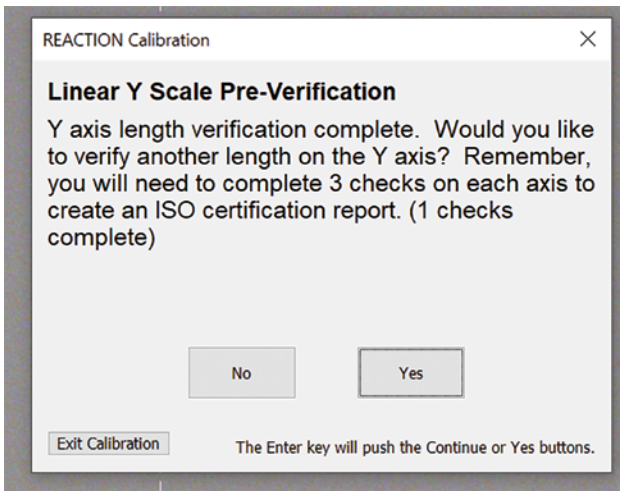
After this data is entered, the user must physically move the crosshairs by turning the handwheels so that they can see the first number that was entered and the hash mark associated with it.



The user must pay attention to the positioning of the crosshairs on the hash mark on the reticle and must repeat this location on every hash mark. Once correct positioning is achieved, select enter and then move to the second number and hashmark that was entered into the pop-up and make sure the positioning is correct.

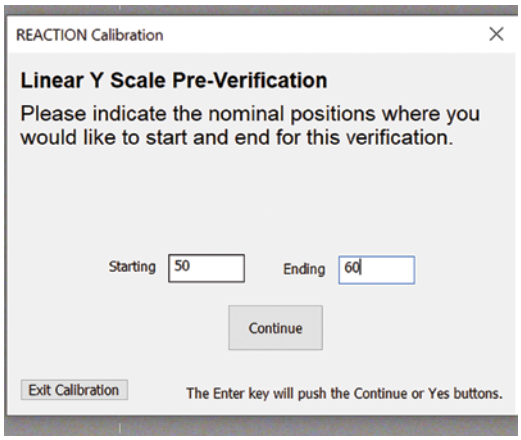


This process must be completed two more times so that the integer intervals are in sequential order. The calibration on-screen instructions will help guide the user through this process.



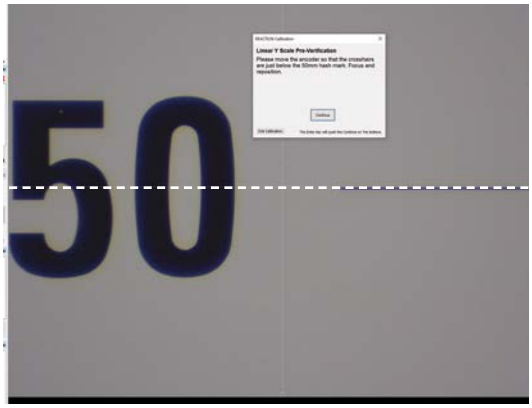
Calibrations - Full Linear Calibration

An example of this process would be the following:



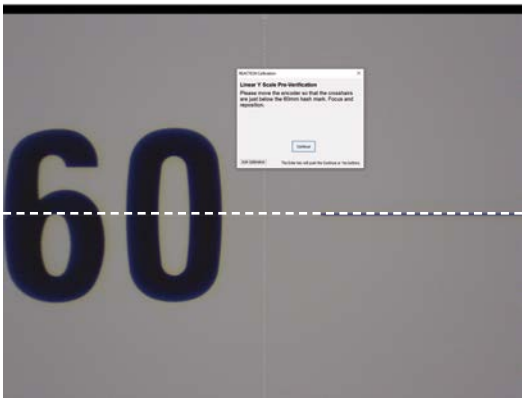
1.

50mm- 60mm Data Input Second Check



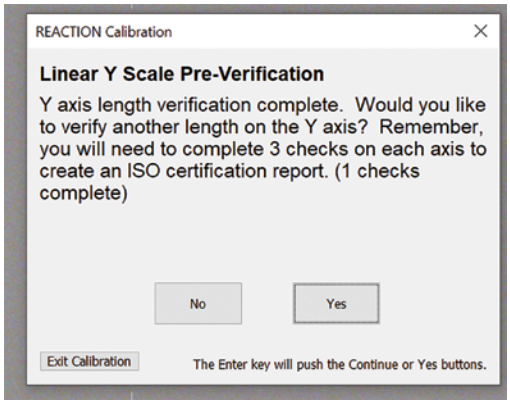
2.

Showing 50MM Crosshair Placement



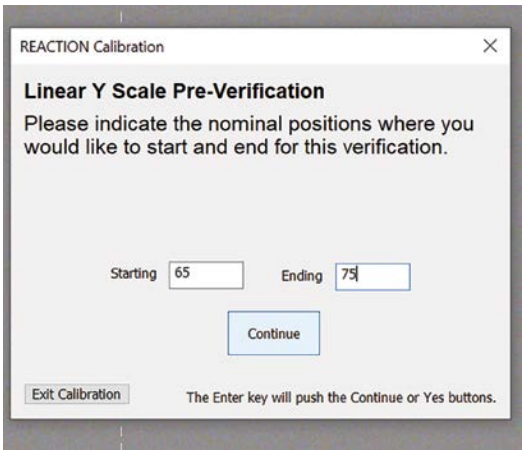
3.

Showing 60mm Crosshair Placement



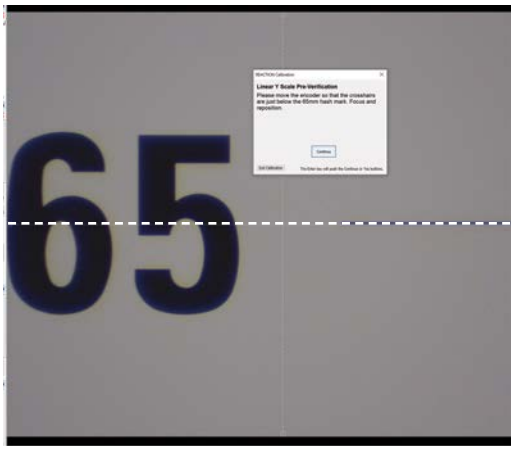
4.

End Second Check



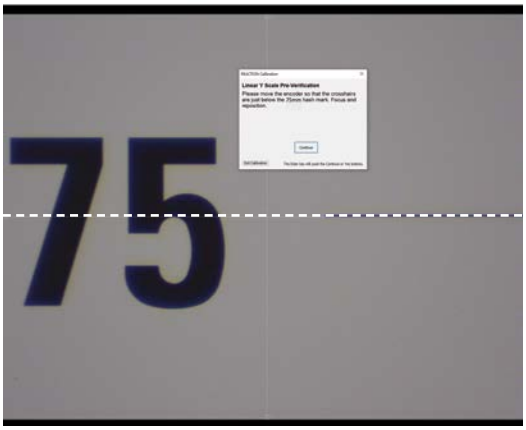
5.

65mm-75mm Data Input Third Check



6.

Showing 65mm Crosshair Placement

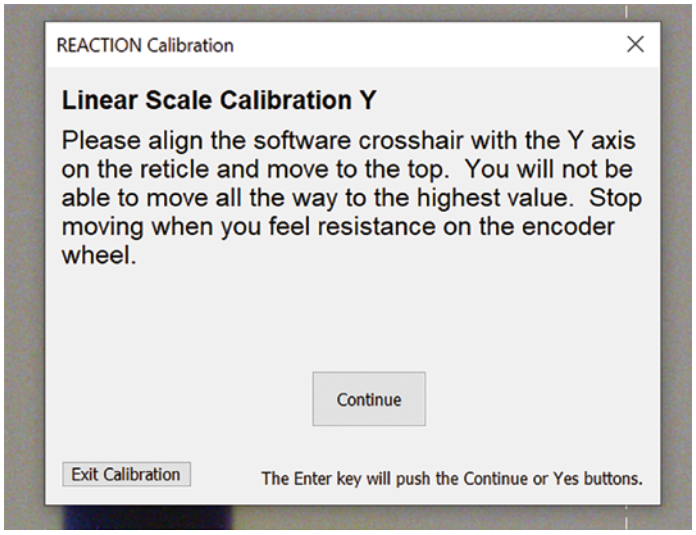


7.

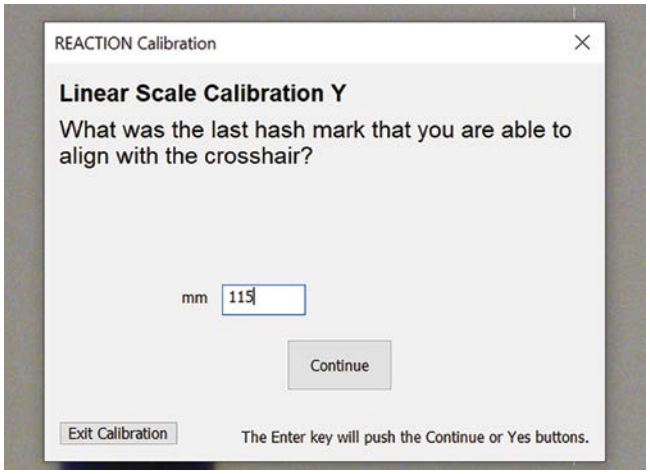
Showing 75mm Crosshair Placement.

Calibrations - Full Linear Calibration

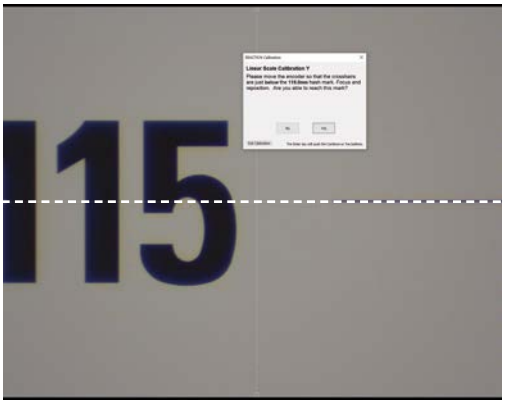
- **Calibration:** The Y axis calibration is performed at every 5mm starting from the highest number reachable on the reticle and then moving down until the lowest number is reached.



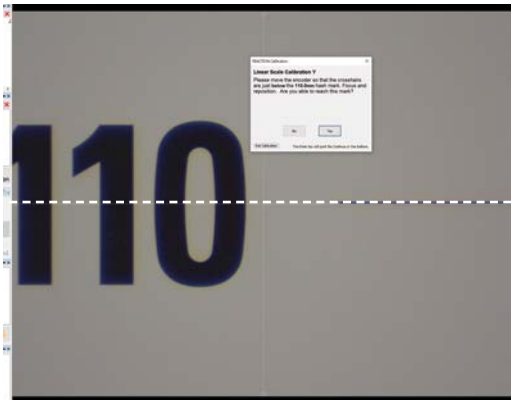
The 200 models can start at the 95MM mark and the 400 models can start at the 115MM.



Please verify that your unit can reach the value that is being inserted to the pop-up box before entering this data. The on-screen instructions will guide the user to every 5MM interval until it reaches the lowest hash mark possible or the end of the Y axis travel.



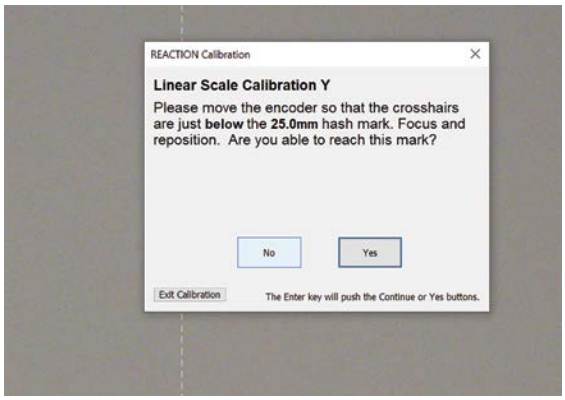
Initial start



Increments of 5MM

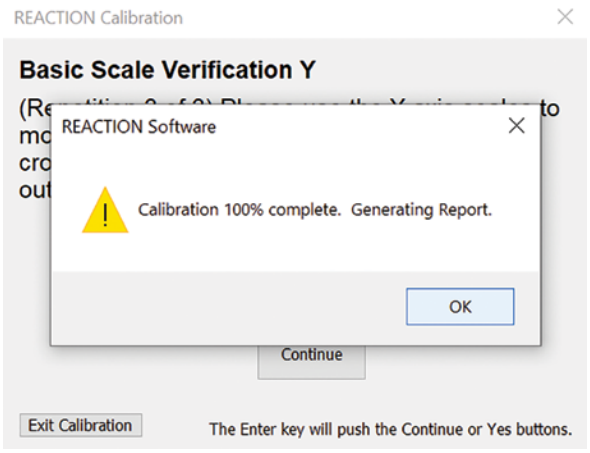
Calibrations - Full Linear Calibration

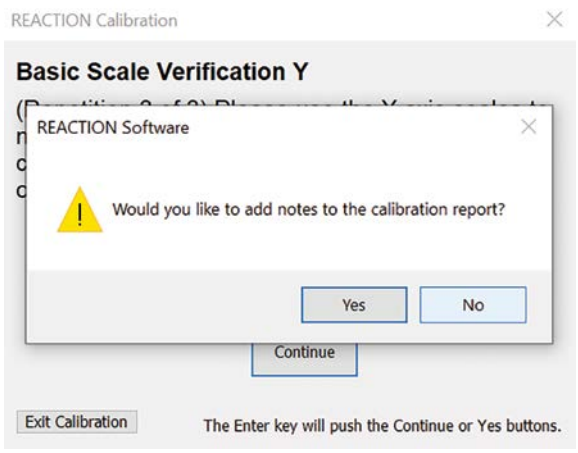
The on-screen calibration instructions will ask the user if they can reach the 25mm hash mark and the user will select "No." It is extremely important that the user does not force the handwheels to reach the end points. If there is resistance to the handwheels, you have reached travel limit. **Do not force the handwheels to reach a number.**



- **Verification:** The user will be asked to repeat the pre-check process to verify the calibration was successful. The user must complete this process or the calibration report will not be generated. The on-screen instructions in the software will guide the user to each hash mark that was selected in the pre-verification process.

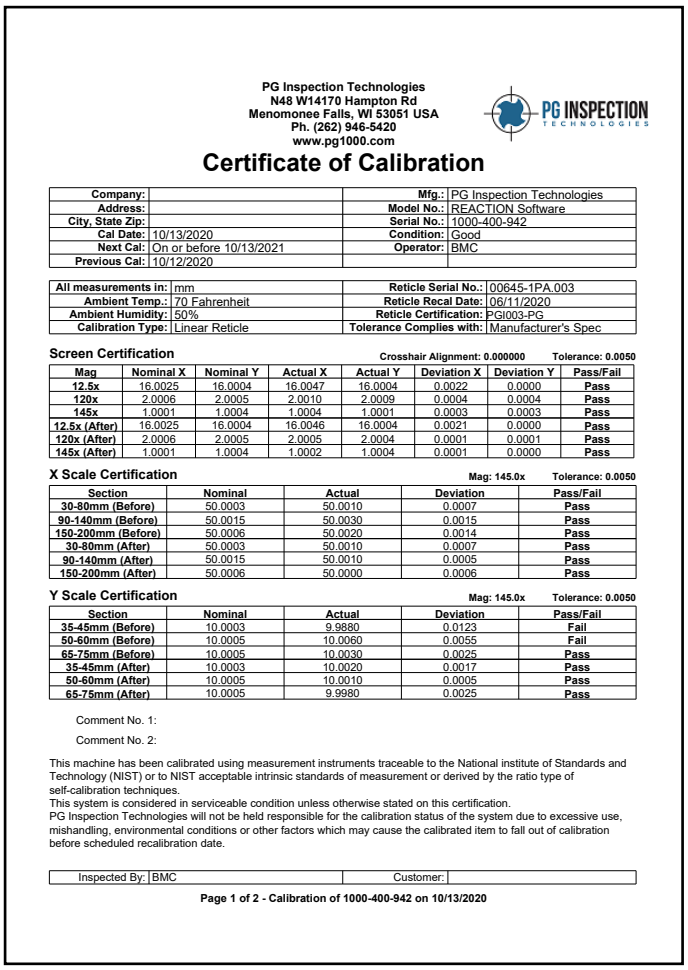
Once the calibration is complete, the user will be asked if they want to generate a report and then asked if they want to add any notes to the report.





Calibrations - Full Linear Calibration

The calibration report will then be displayed in a PDF format and is capable of being saved for future reference.



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N48 W14170 Hampton Rd
Menomonee Falls, WI 53051 USA
Ph. (262) 946-5420
www.pg1000.com

PG INSPECTION TECHNOLOGIES

Certificate of Calibration

Company:		Mfg.:	PG Inspection Technologies
Address:		Model No.:	REACTION Software
City, State Zip:		Serial No.:	1000-400-942
Cal Date:	10/13/2020	Condition:	Good
Next Cal:	On or before 10/13/2021	Operator:	BMC
Previous Cal:	10/12/2020		

All measurements in:	mm	Reticle Serial No.:	00645-1PA.003
Ambient Temp.:	70 Fahrenheit	Reticle Recal Date:	06/11/2020
Ambient Humidity:	50%	Reticle Certification:	PGI003-PG
Calibration Type:	Linear Reticle	Tolerance Complies with:	Manufacturer's Spec

Screen Certification — Crosshair Alignment: 0.000000 — Tolerance: 0.0050

Mag	Nominal X	Nominal Y	Actual X	Actual Y	Deviation X	Deviation Y	Pass/Fail
12.5x	16.0025	16.0004	16.0047	16.0004	0.0022	0.0000	Pass
120x	2.0006	2.0005	2.0010	2.0009	0.0004	0.0004	Pass
145x	1.0001	1.0004	1.0004	1.0001	0.0003	0.0003	Pass
12.5x (After)	16.0025	16.0004	16.0046	16.0004	0.0021	0.0000	Pass
120x (After)	2.0006	2.0005	2.0005	2.0004	0.0001	0.0001	Pass
145x (After)	1.0001	1.0004	1.0002	1.0004	0.0001	0.0000	Pass

X Scale Certification — Mag: 145.0x — Tolerance: 0.0050

Section	Nominal	Actual	Deviation	Pass/Fail
30-80mm (Before)	50.0003	50.0010	0.0007	Pass
90-140mm (Before)	50.0015	50.0030	0.0015	Pass
150-200mm (Before)	50.0006	50.0020	0.0014	Pass
30-80mm (After)	50.0003	50.0010	0.0007	Pass
90-140mm (After)	50.0015	50.0010	0.0005	Pass
150-200mm (After)	50.0006	50.0000	0.0006	Pass

Y Scale Certification — Mag: 145.0x — Tolerance: 0.0050

Section	Nominal	Actual	Deviation	Pass/Fail
35-45mm (Before)	10.0003	9.9880	0.0123	Fail
50-60mm (Before)	10.0005	10.0060	0.0055	Fail
65-75mm (Before)	10.0005	10.0030	0.0025	Pass
35-45mm (After)	10.0003	10.0020	0.0017	Pass
50-60mm (After)	10.0005	10.0010	0.0005	Pass
65-75mm (After)	10.0005	9.9980	0.0025	Pass

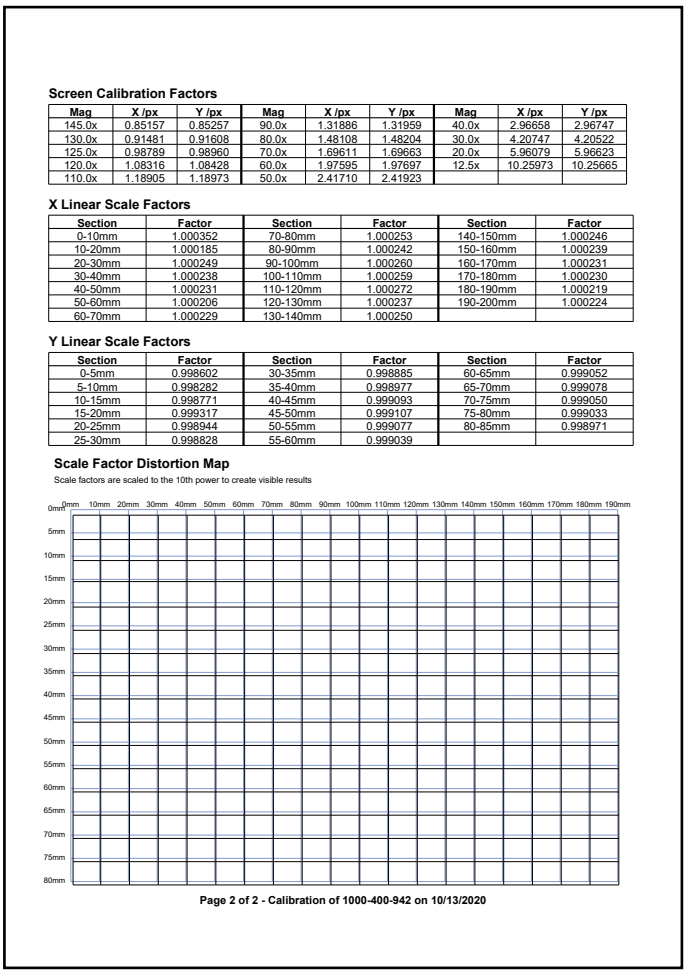
Comment No. 1:

Comment No. 2:

This machine has been calibrated using measurement instruments traceable to the National institute of Standards and Technology (NIST) or to NIST acceptable intrinsic standards of measurement or derived by the ratio type of self-calibration techniques.
This system is considered in serviceable condition unless otherwise stated on this certification.
PG Inspection Technologies will not be held responsible for the calibration status of the system due to excessive use, mishandling, environmental conditions or other factors which may cause the calibrated item to fall out of calibration before scheduled recalibration date.

Inspected By:	BMC	Customer:	

Page 1 of 2 - Calibration of 1000-400-942 on 10/13/2020



Screen Calibration Factors

Mag	X /px	Y /px	Mag	X /px	Y /px	Mag	X /px	Y /px
145.0x	0.85157	0.85257	90.0x	1.31886	1.31959	40.0x	2.96658	2.96747
130.0x	0.91481	0.91608	80.0x	1.48108	1.48204	30.0x	4.20747	4.20522
125.0x	0.98789	0.98960	70.0x	1.69611	1.69663	20.0x	5.96079	5.96623
120.0x	1.08316	1.08428	60.0x	1.97595	1.97697	12.5x	10.25973	10.25665
110.0x	1.18905	1.18973	50.0x	2.41710	2.41923			

X Linear Scale Factors

Section	Factor	Section	Factor	Section	Factor
0-10mm	1.000352	70-80mm	1.000253	140-150mm	1.000246
10-20mm	1.000185	80-90mm	1.000242	150-160mm	1.000239
20-30mm	1.000249	90-100mm	1.000260	160-170mm	1.000231
30-40mm	1.000238	100-110mm	1.000259	170-180mm	1.000230
40-50mm	1.000231	110-120mm	1.000272	180-190mm	1.000219
50-60mm	1.000206	120-130mm	1.000237	190-200mm	1.000224
60-70mm	1.000229	130-140mm	1.000250		

Y Linear Scale Factors

Section	Factor	Section	Factor	Section	Factor
0-5mm	0.998602	30-35mm	0.998885	60-65mm	0.999052
5-10mm	0.998282	35-40mm	0.998977	65-70mm	0.999078
10-15mm	0.998771	40-45mm	0.999093	70-75mm	0.999050
15-20mm	0.999317	45-50mm	0.999107	75-80mm	0.999033
20-25mm	0.998944	50-55mm	0.999077	80-85mm	0.998971
25-30mm	0.998828	55-60mm	0.999039		

Scale Factor Distortion Map

Scale factors are scaled to the 10th power to create visible results

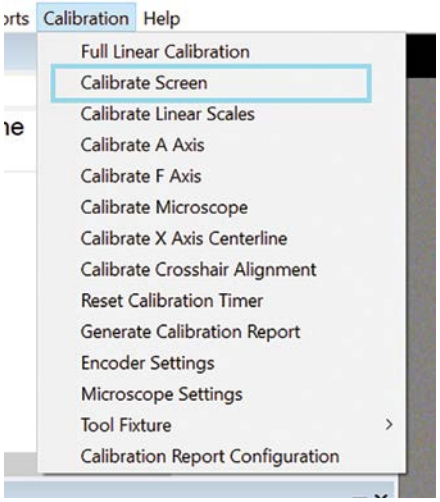
Page 2 of 2 - Calibration of 1000-400-942 on 10/13/2020

Calibrations - Individual Calibration

The PG1000 can also do individual calibration on everything, but this will only be a calibration omitting the three-step process that the full calibration goes through. **If the user does elect to do an individual calibration, the system will not generate a report at the end of the process.**

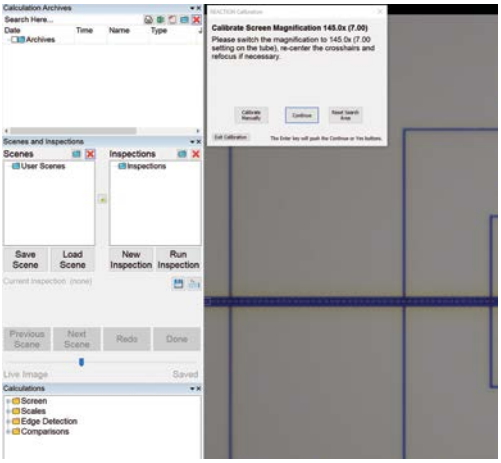
The following are the individual calibration selections that the PG utilizes that will require the PG2019 Password.

- **Calibrate Screen:**

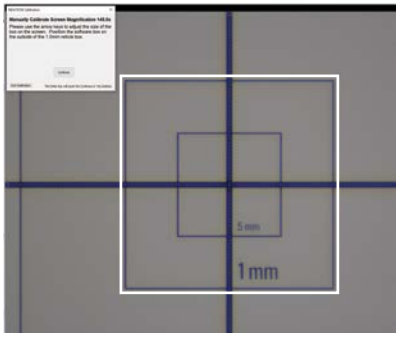


Calibrations - Individual Calibration

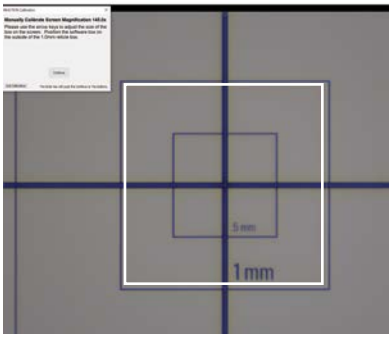
- **Screen Calibration:** A screen calibration teaches the system size at every magnification. The user will start at the highest magnification and work their way down to the lowest magnification. When performing the screen calibration, it is crucial that the user repeats the positioning of the software calibration box accurately on the reticle boxes at every magnification level.



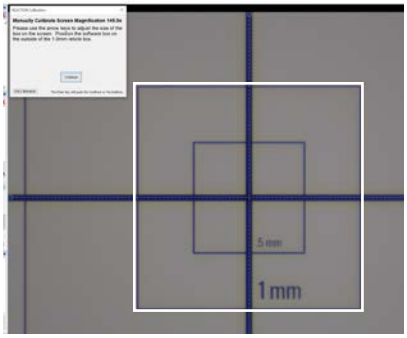
The following images depict the calibration box (white lines) and the reticle concentric boxes (black lines). Pay close attention to the fit of the boxes, as it is crucial that the calibration box just butts up to the reticle box.



Too big

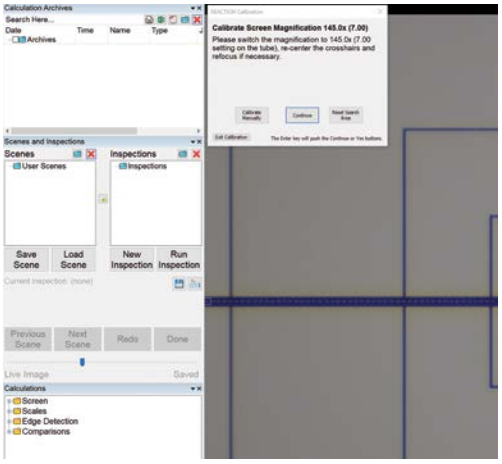


Too small



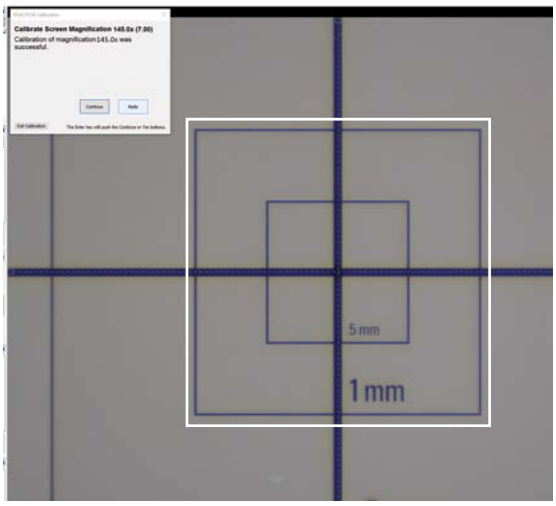
Correct alignment

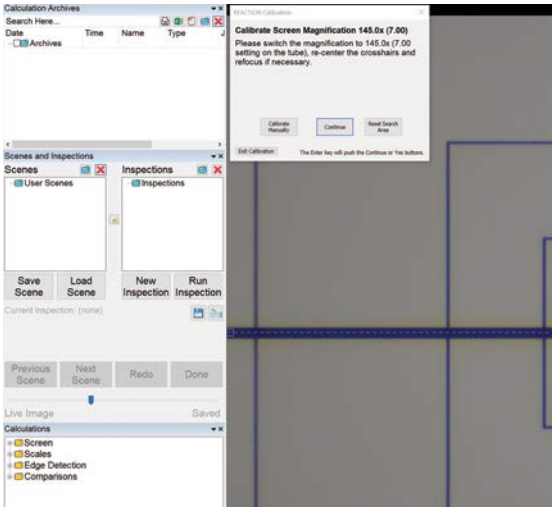
To start the calibration select continue. If the box size is correct, the user will select continue and move onto the next magnification level.



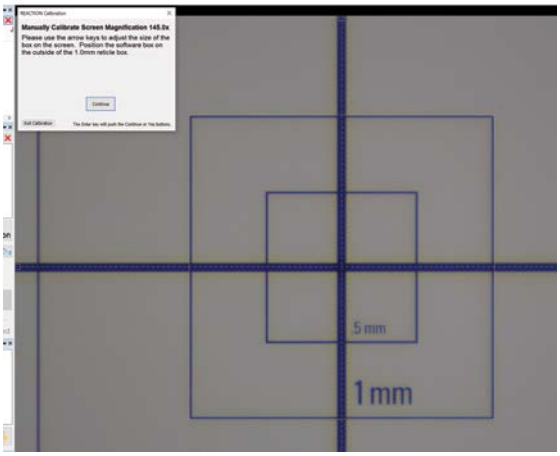
Calibrations - Individual Calibration

If the box size is not properly aligned, the user must select the **redo** button and do this manually.

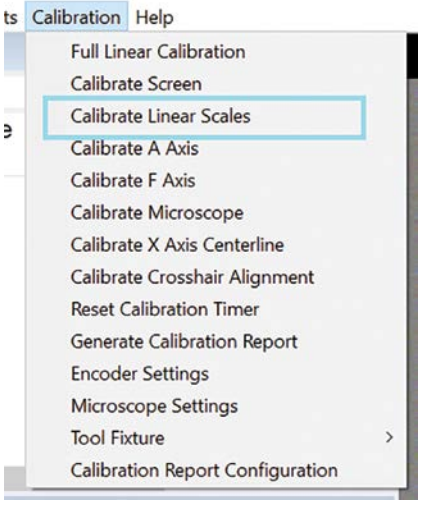




Once manual mode is selected, the user must adjust the calibration box to fit properly on the reticle box by using the keyboard arrows. Up and down arrows move the vertical spacing and left and right move the horizontal spacing. Once the calibration box is fitted properly, select continue and progress to the next magnification level.



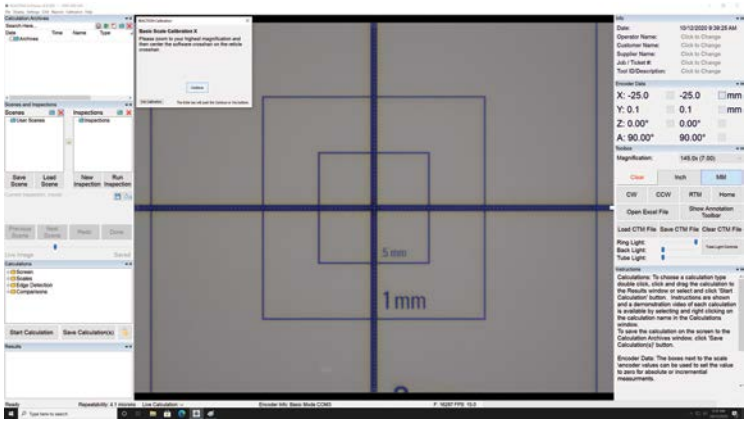
- **Calibrate Scales:**



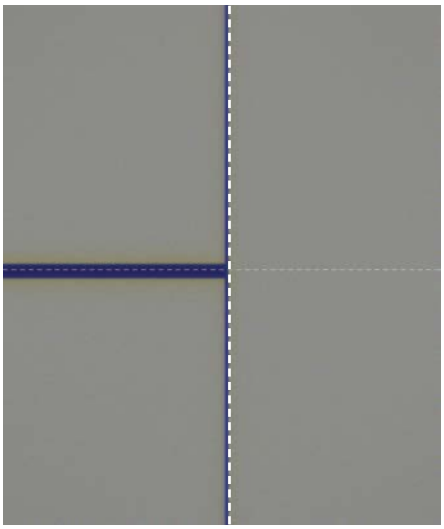
1. Full Calibration Method

- **X axis Scale Calibration:** All scale calibrations should be completed at the highest magnification level. The full calibration process utilizes the 50mm horizontal line located through the center of the concentric boxes on the reticle. The 50mm line has a certified length from the outside edge of the line to the outside edge. It is important that the user accurately place the crosshairs to get the correct results. The following describes the X scale calibration process and the alignment of the crosshairs on the reticle.

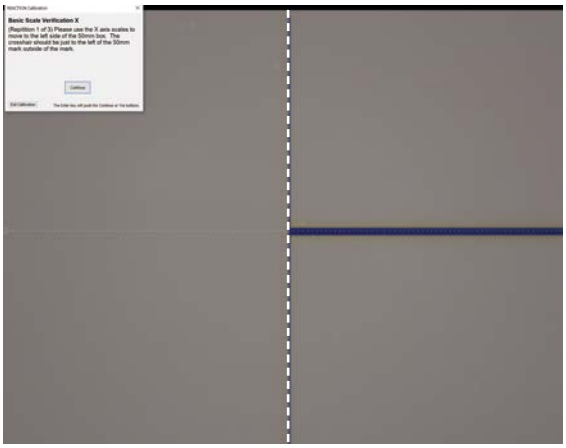
  - **Calibration:** The user must turn the X axis handwheel to move the crosshairs to the far right of the horizontal line which is 25 mm from the center of the concentric boxes.



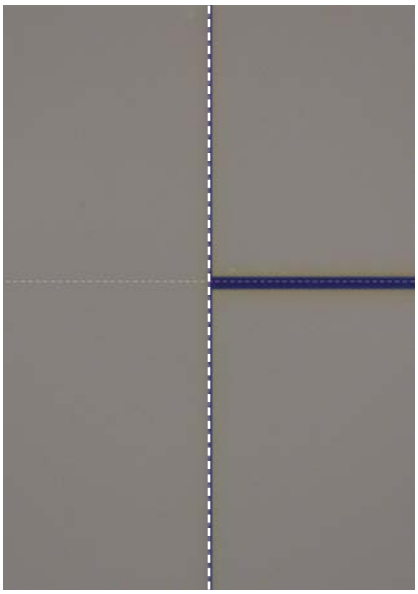
Note the alignment of the crosshairs relative to the reticle.



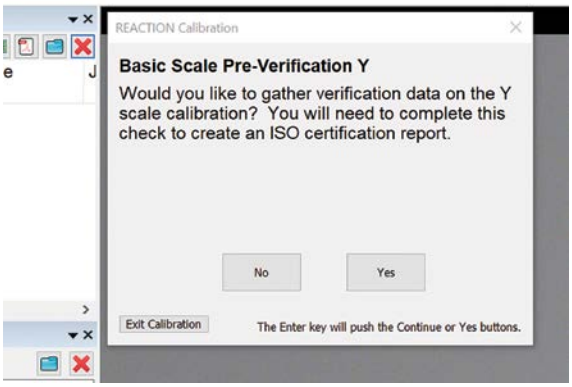
After the correct placement is made, the user must select continue and move the crosshairs 50mm to the left.



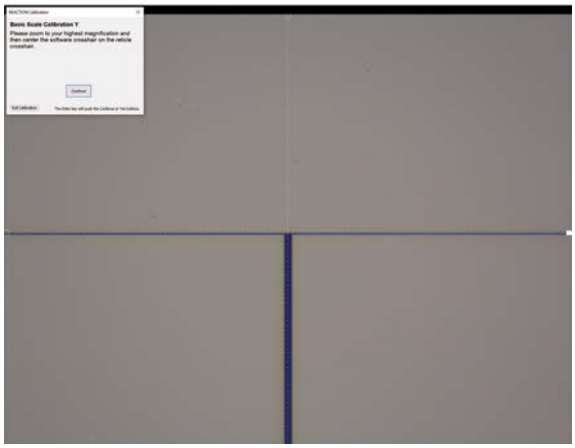
Note the alignment of the crosshairs is different on this location. The placement of the crosshair is crucial to achieve accurate results.



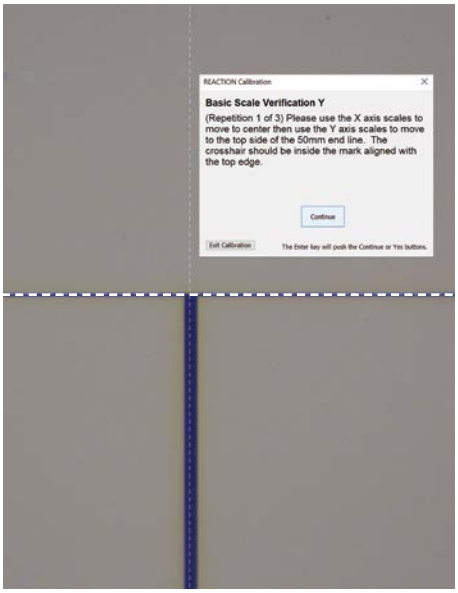
- **Y axis Scale Calibration:** All Scale calibrations should be completed at the highest magnification level. The full calibration process utilizes the 50mm vertical line located through the center of the concentric boxes on the reticle. The 50mm line has a certified length from the outside edge of the line to the outside edge. It is important that the user accurately place the crosshairs to get the correct results. The following are the three stages of the X scale calibration process and the alignment of the crosshairs on the reticle.



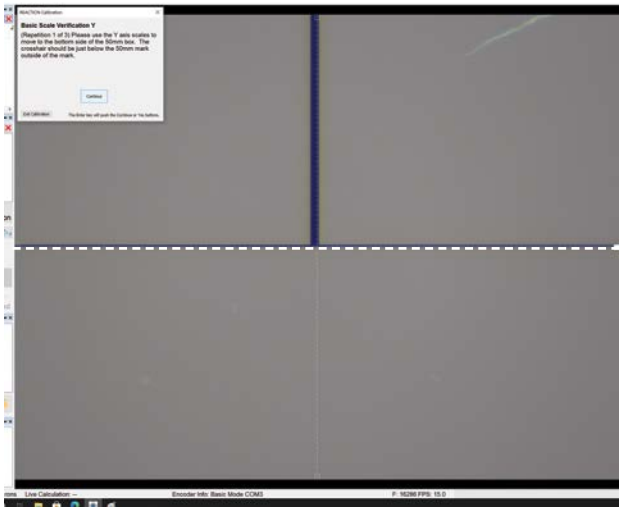
- **Calibration:** The user must turn the Y axis handwheel to move the crosshairs to the top of the vertical line, which is 25 mm from center of the concentric boxes.



Note the alignment of the crosshairs relative to the reticle.

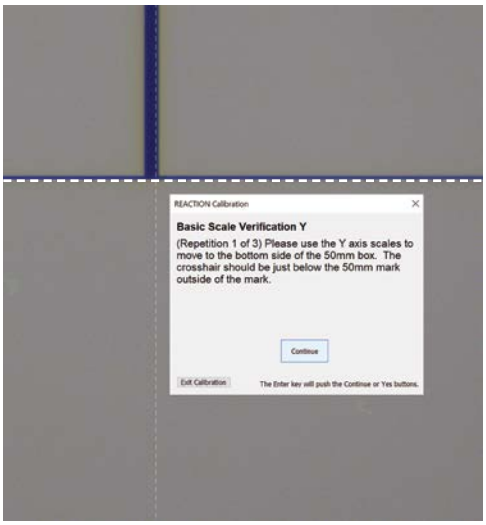


After the correct placement is made, the user must select continue and move the crosshairs down 50mm.

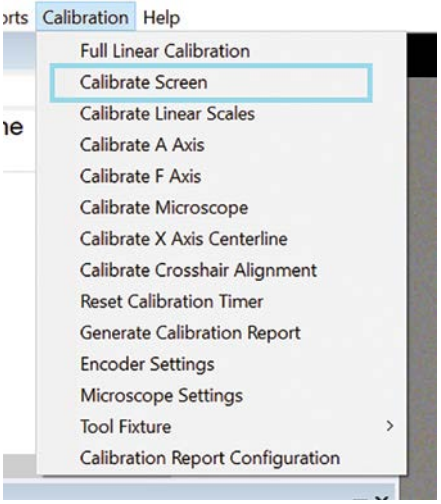


Calibrations - Individual Calibration

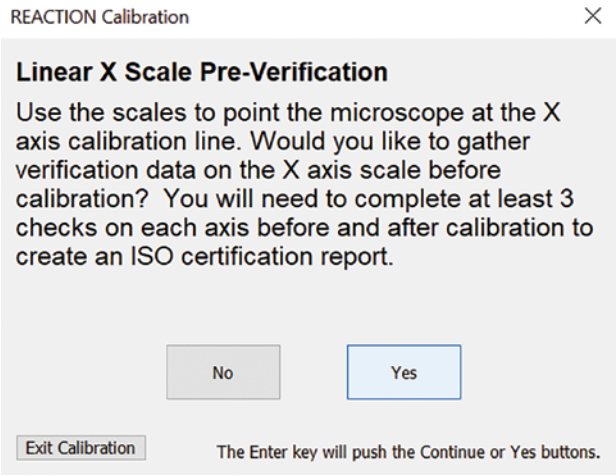
Note the alignment of the crosshairs is different on this location. The placement of the crosshair is crucial to achieve accurate results. This process must be repeated two more times to finish the calibration.



2. Full Linear Calibration Method



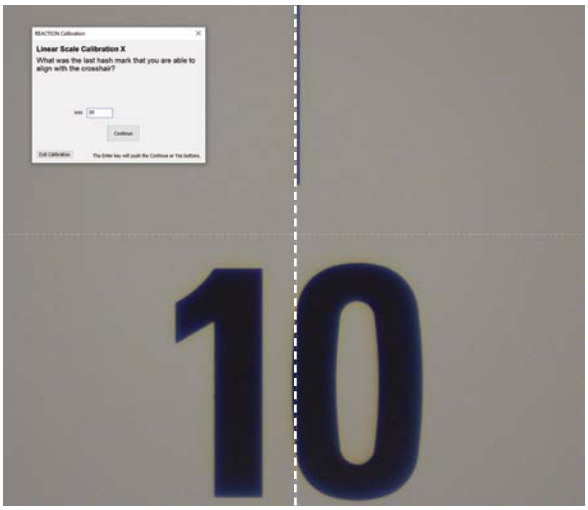
- **X axis Scale Calibration:** All scale calibrations should be completed at the highest magnification level. The user must be careful and attentive so that the placement of the crosshair on each reticle hash mark is the same. The full linear calibration utilizes the horizontal number line ranging 0 to 210 MM located 28.6 MM below the center of the concentric boxes on the reticle.



Calibrations - Individual Calibration

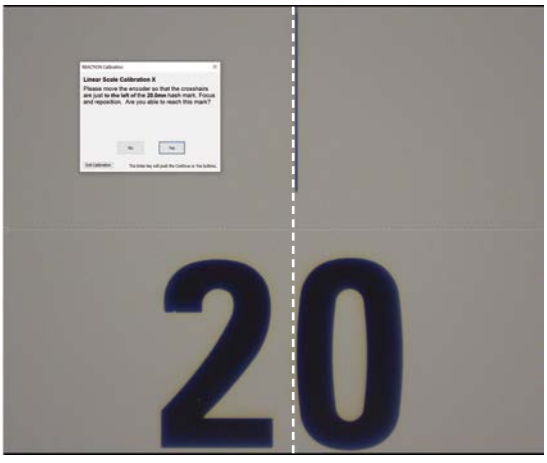
- **Calibration:**

The X axis calibration is performed at every 10mm starting from the 10MM hash mark.



Please verify that your unit can reach the 10MM mark before entering this data. The on-screen instructions will guide the user to every 10MM interval until it reaches 210MM which is the end of the x axis travel.

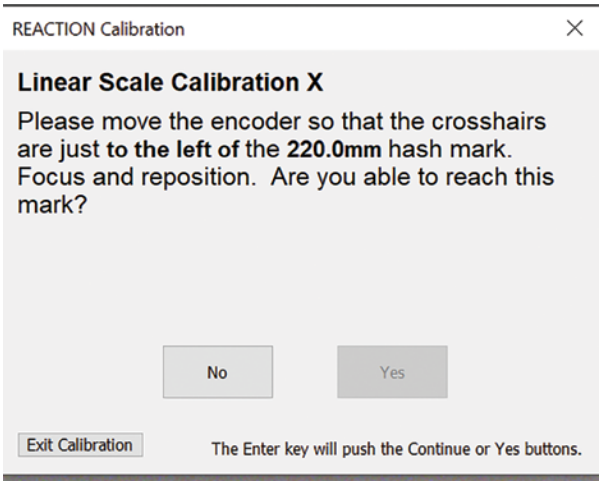
Initial start



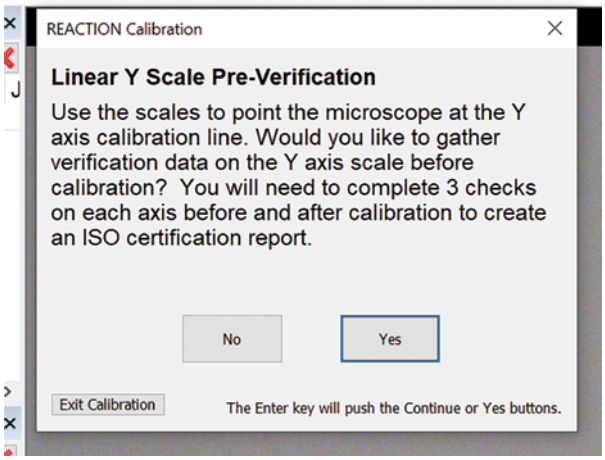
Increments of 10MM

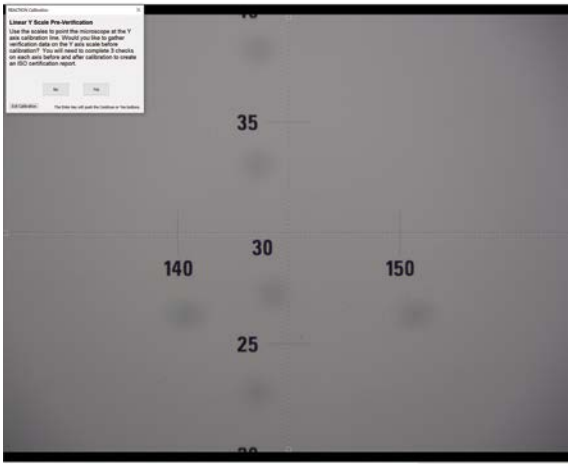
Calibrations - Individual Calibration

The calibration software will ask the user if they can reach the 220mm and the user will select "No." It is extremely important that the user does not force the handwheels to reach the end points. If there is resistance to the handwheels, the user has reached the travel limit. **Do not force the handwheels to reach a number.**

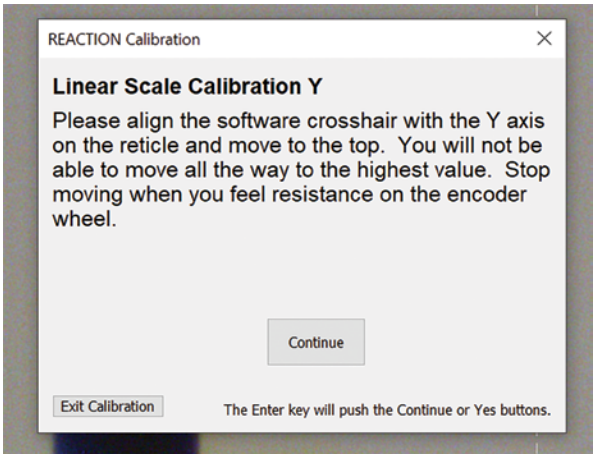


- **Y axis Scale Calibration:** All scale calibrations should be completed at the highest magnification level. The user must be careful and attentive so that the placement of the crosshair on each reticle hash mark is the same. The full linear calibration utilizes the horizontal number line ranging 0 to155 MM located between the horizontal 140 and the 150 mm hash marks.



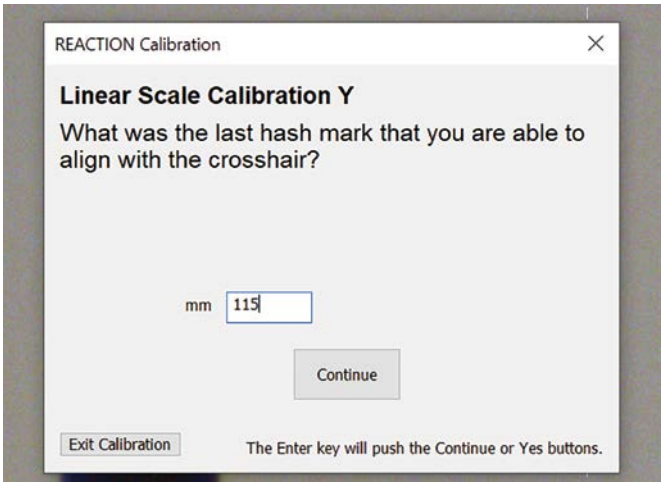


  - **Calibration:**

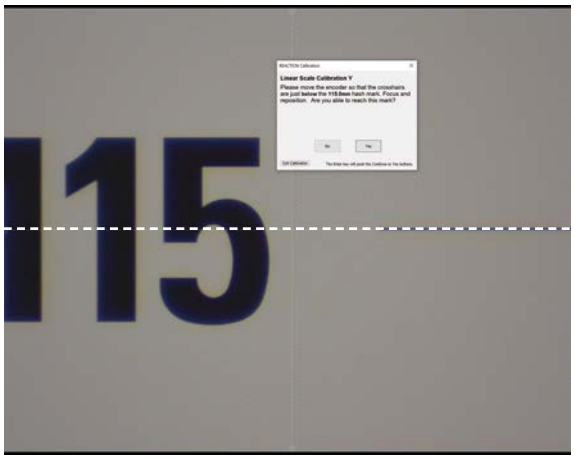


Calibrations - Individual Calibration

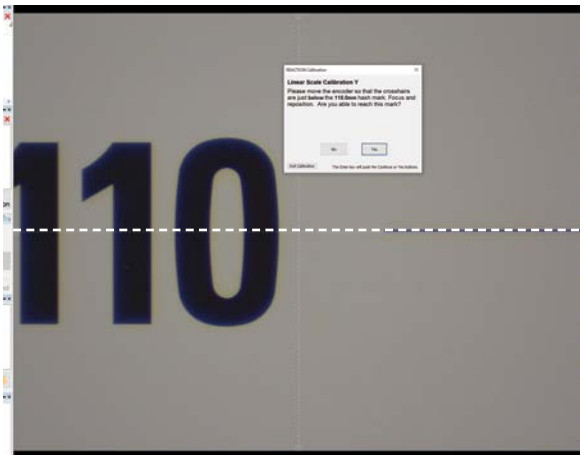
The Y axis calibration is performed at every 5mm starting from the highest number reachable on the reticle and then moving down until the lowest number is reached. The 200 models can start at the 95MM mark and the 400 models can start at the 115MM.



Please verify that your unit can reach the value that is being inserted to the pop-up box before entering this data. The on-screen instructions will guide the user to every 5MM interval, until it reaches the lowest hash mark possible or the end of the Y axis travel.

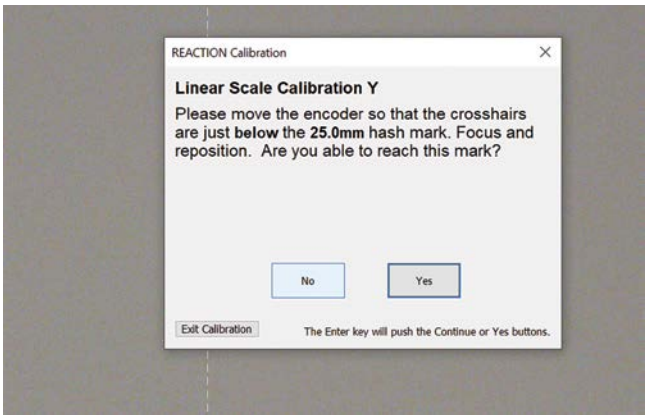


Initial start



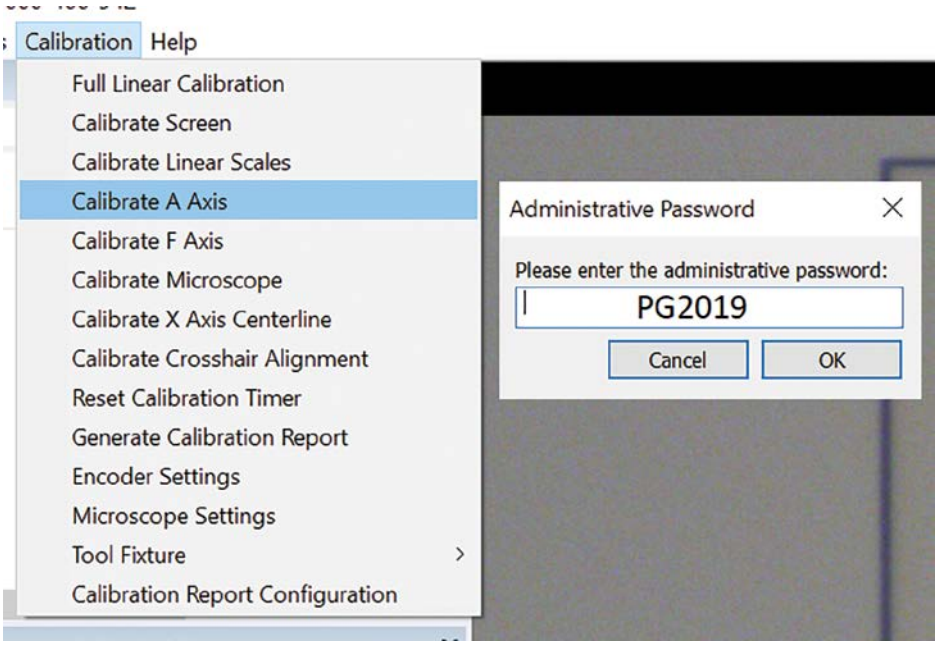
Increments of 5MM

The on-screen calibration instructions will ask the user if they can reach the 25mm hash mark and the user will select "No." It is extremely important that the user does not force the handwheels to reach the end points. If there is resistance to the handwheels, the user has reached the travel limit. **Do not force the handwheels to reach a number.**

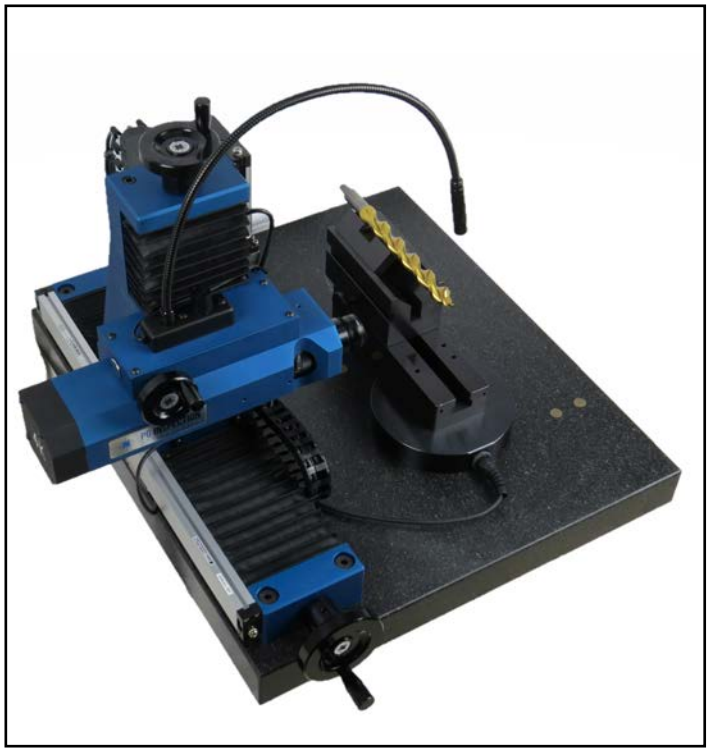


Calibrations - Individual Calibration

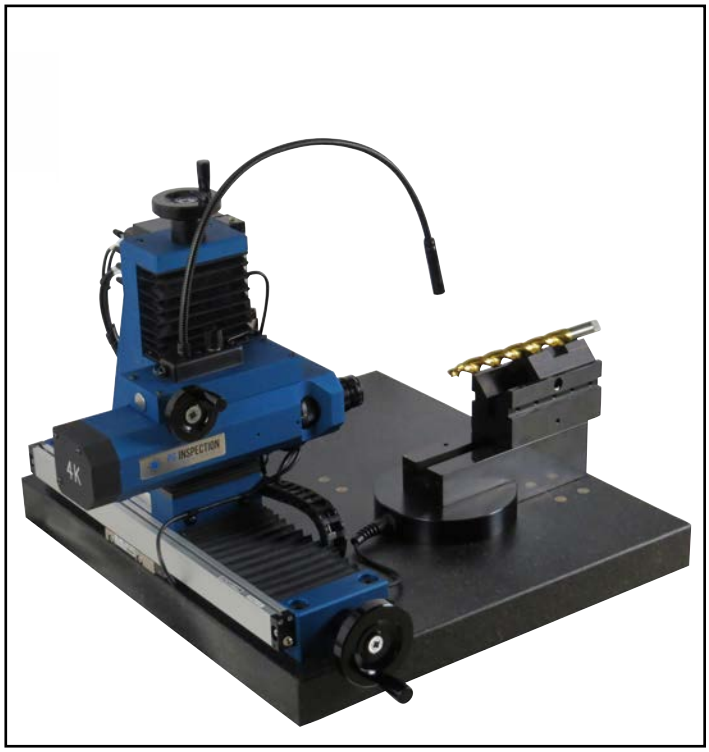
- **Calibrate A Axis (only PG1000-400 model):**



The "A" axis is the tool rotation relative to the microscope position. 90 degrees is perpendicular to the scope and 0 degrees is parallel to the scope.



A axis at 90 degrees

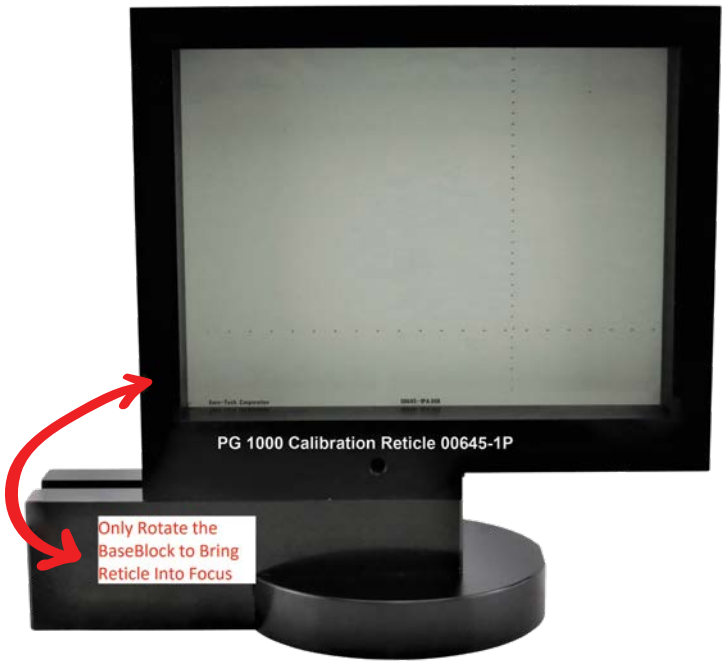


A axis at 0 degrees

Calibrations - Individual Calibration

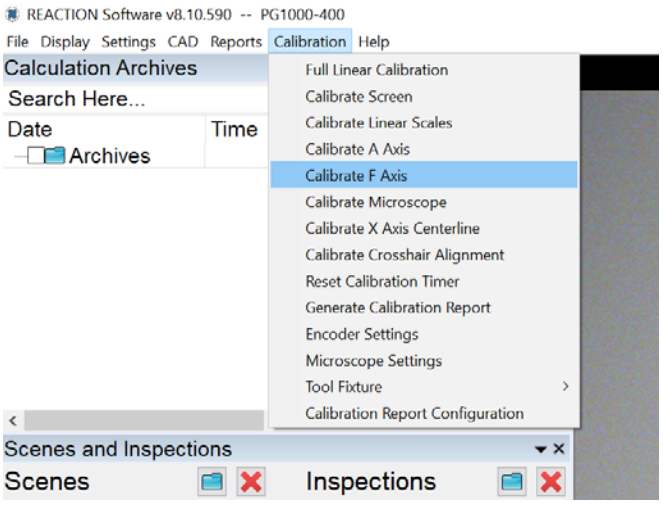
The calibration is performed at 90 degrees and needs to be executed on high magnification. To correctly calibrate the "A" axis, the user must set the reticle position so that the center of the concentric boxes is positioned over the center of rotation on the base block.

Once this achieved, the user must focus to the best image possible with only using the focus handwheel. After optimal focus is found, the user must turn the X and Y axis handwheel so that the number line can visually be followed moving toward the 10mm mark on the highest magnification. The user must rotate the base block so that the focus on the image is as clear as possible. It is important that all adjustments are made by physically turning the base block and not using the focus handwheel when aligning the base block. The user may need to repeat this process several times until optimal perpendicularity is achieved.

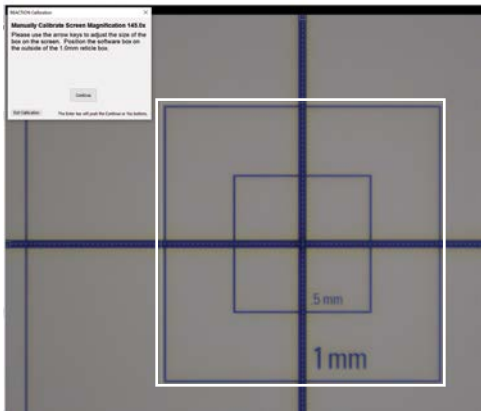


Calibrations - Individual Calibration

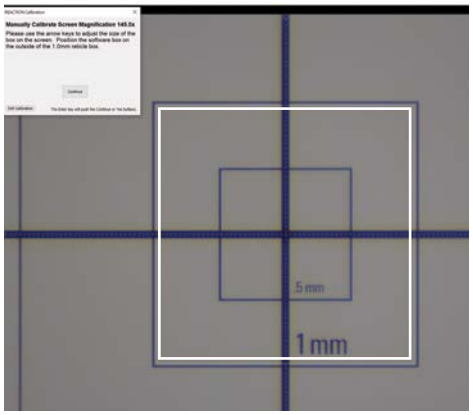
- **Calibrate F Axis (only PG1000-400 model):**



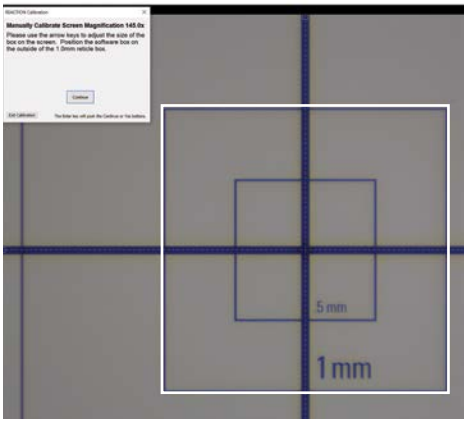
A focus calibration requires the user to teach the system focal depth for sizing at every magnification. The user will start at the highest magnification and work their way down to the lowest magnification. When performing the focus calibration, it is crucial that the user repeats positioning of the software calibration box accurately on the reticle box at every magnification level.



Too big

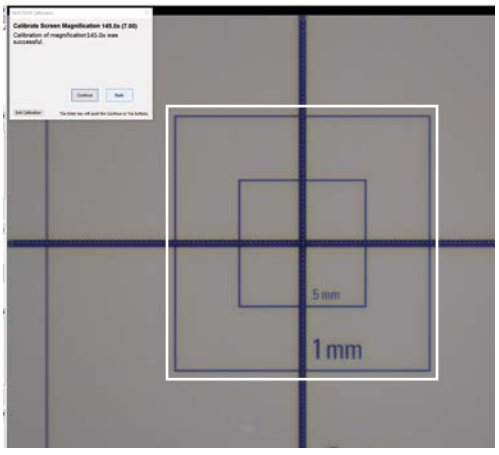


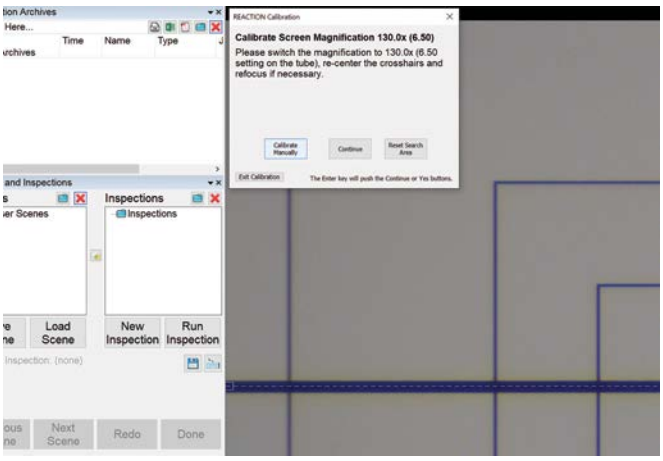
Too small



Correct alignment

To start, select continue. If the box size is not properly aligned, the user must select the **redo** button and do this manually.

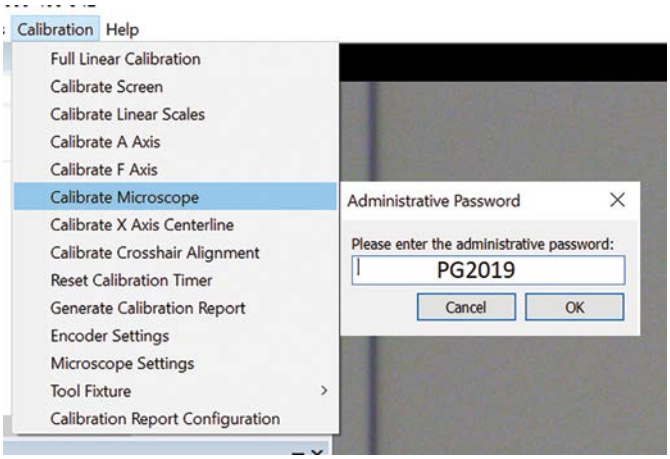




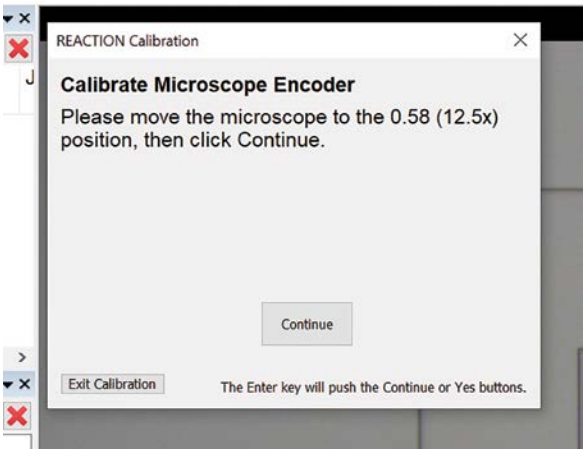
Calibrations - Individual Calibration

Once manual mode is selected, the user must adjust the calibration box to properly fit on the reticle box by using the keyboard arrows. Up and down arrows move the vertical spacing and left and right move the horizontal spacing. This process must be completed at every magnification level.

- **Calibrate Microscope (only PG1000-400 model):**



This calibration requires the user to turn the magnification thumbwheel on the microscope to the lowest magnification level and select continue.



The user must do this process at every magnification level, ensuring that the on-screen instruction match the physical magnification level on the scope. The instructions will guide the user through every magnification level until the calibration is complete.