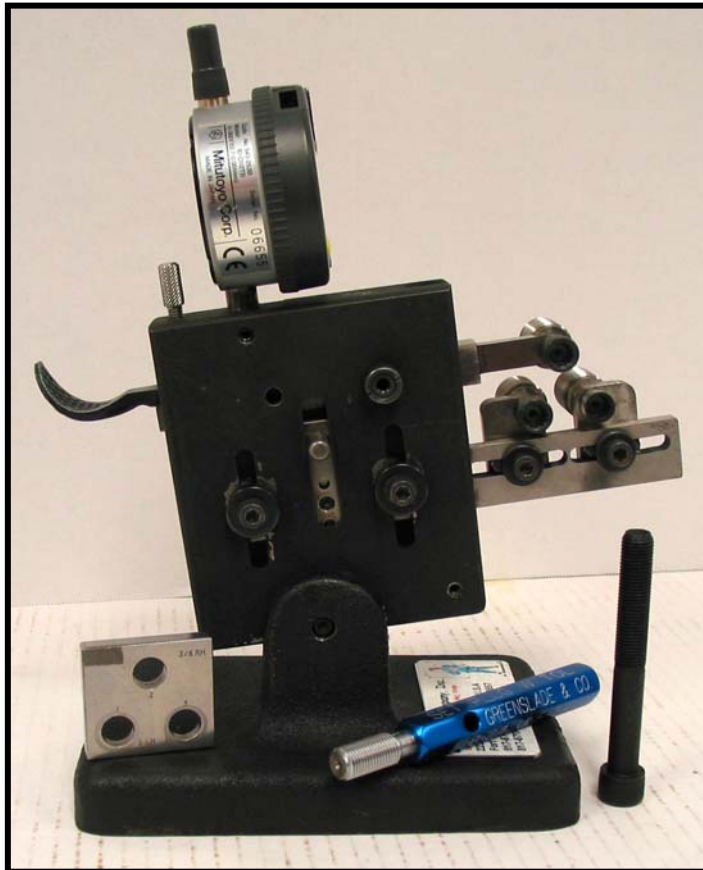




# X-120<sup>®</sup> External Thread Gage Set-up Procedure

(Patent #4,974,327)



***X120<sup>®</sup> Thread Gage, Template, and Set Plug***

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## **Step 1: Indicator Power**

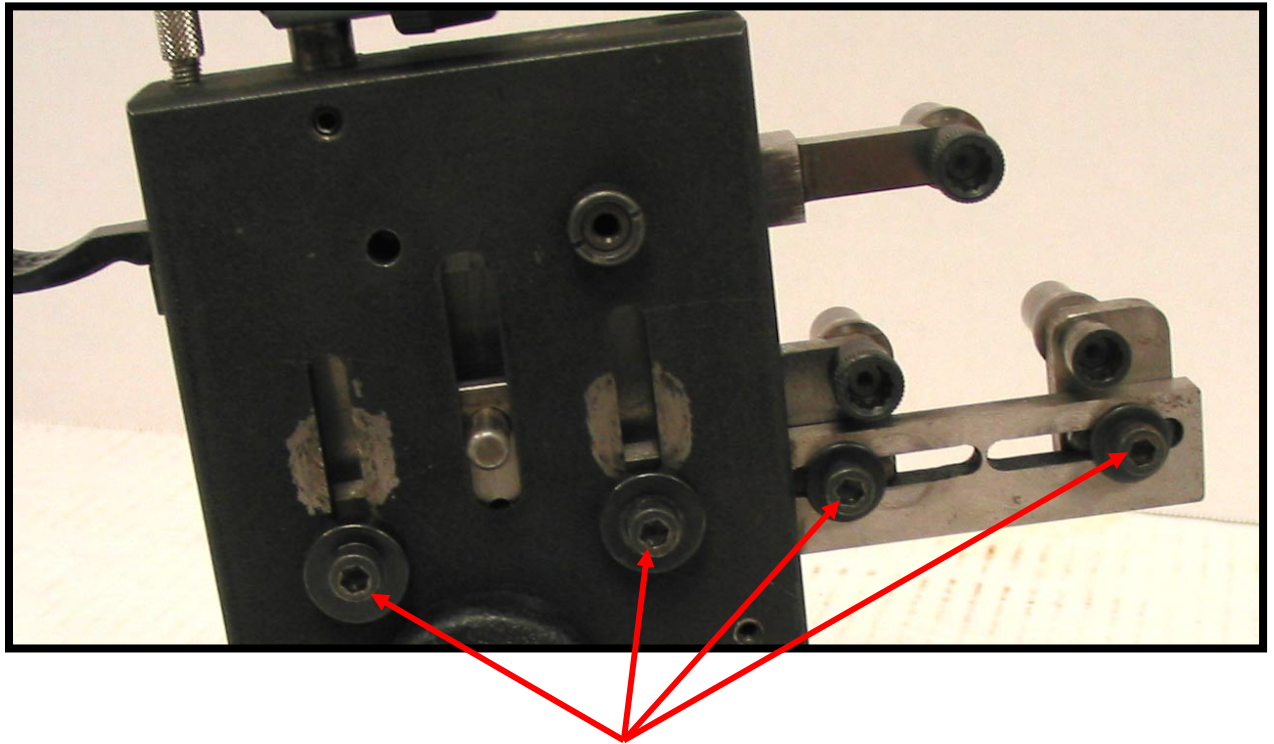
Your X120 Gage indicator is powered by one size “SR44” batteries (1.5 or 1.55 volts). If the digits on your display start to fade or your display does not come on when you press the *ON* button, you need to replace the batteries.

Remove the battery cover on the top of the face of the indicator by engaging the slot and rotating it counter-clockwise. Replace the battery with the marked side of the battery facing outward and replace the cover.

These batteries are available at most drug stores and grocery stores.

## **Step 2: Adjusting the X-120 Gage for the measurement of different screw sizes.**

- A. Before starting to adjust the X-120 Gage select the correct type of rolls having the correct number of “threads per inch” and the correct screw diameter setting template.
- B. Remove rolls if they are on the frame and loosen the four (4) screws on the back side of the gage which hold the arm in its horizontal position and the two (2) screws which hold the axis blocks in position which go through the arm.

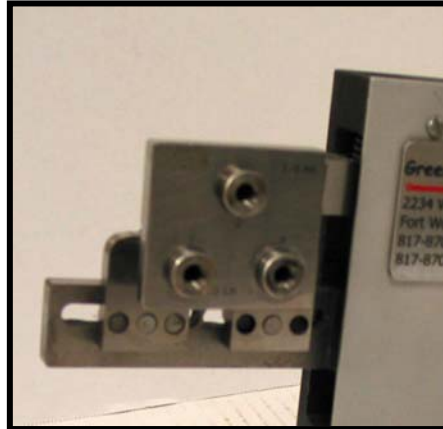


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- C. Slide the correct template onto the three (3) axis pins engaging the top pin on the arm first, and moving the two (2) lower pins and the arm until they slide into the template.



- D. Press the template firmly back against the pin and simultaneously pull the arm up firmly to stabilize the arm and pins in the proper position in the template. Tighten the two (2) screws which hold the arm in its horizontal position and then tighten the screws which hold the axis pin holders in their correct position. Be sure to hold the template in firm position while doing this to insure the proper positioning of the pins.



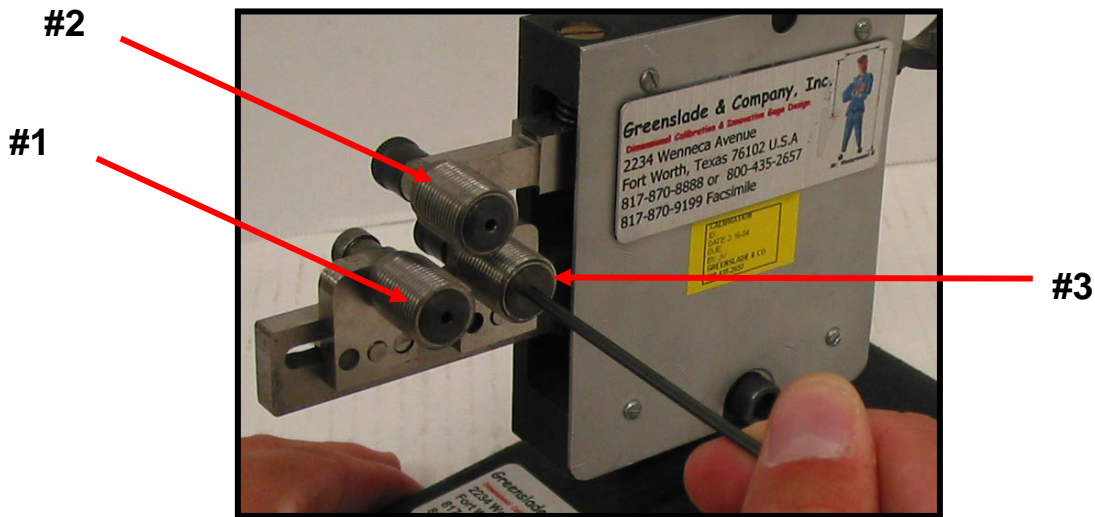
If the pins seem to bind in the template, loosen the four (4) screws and again press the template firmly on the pins and hold the arm firmly up while tightening the four (4) screws.

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E. Slide the rolls onto the axis pins being careful to place the correct roll on each pin. Roll II will always be on the upper arm. For gaging right hand threads Roll I will be in the front position and Roll III in the back position on the lower arm. Reverse Rolls I and III for the gaging of left hand threads. Screw the axis pin screws onto the axis pins and tighten them firmly. Make sure that all three (3) rolls will rotate freely after the screws are installed.



Note: **Small screw measuring** - For measuring screw sizes smaller than #10 (M5) the three axis pins that support the rolls must be changed on the two axis pin holders and the upper arm. Using the appropriate hex key loosen the nuts holding the pins on the pads and arm. Insert the set of small adaptor pins and tighten them firmly into position. The gaging rolls and templates used with the small adaptor pins for measuring the small screw sizes are smaller than the standard rolls and templates

### ***Step 3: Setting the X-120 Gage for Measuring***

After properly selecting and mounting the gaging rolls on the frame, press down on the thumb lever at the back of the gage which lifts the II roll. Insert the proper setting plug between the rolls by passing between Roll I and Roll II; release the thumb lever. Rotate the setting plug approximately 1/4 turn counterclockwise to assure that the setting plug is properly seated between the rolls.

The top roll should apply firm pressure on the setting plug to press it snugly between all three rolls. If it is loose, adjust the knurled brass slotted screw in front of the indicator until the desired pressure is achieved.

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When the upper arm is at rest the top roll should be close to, but should not contact the other two rolls. If the rolls are too far apart to clamp the set plug or if the rolls contact one another adjust the *STOP SCREW* behind the indicator.

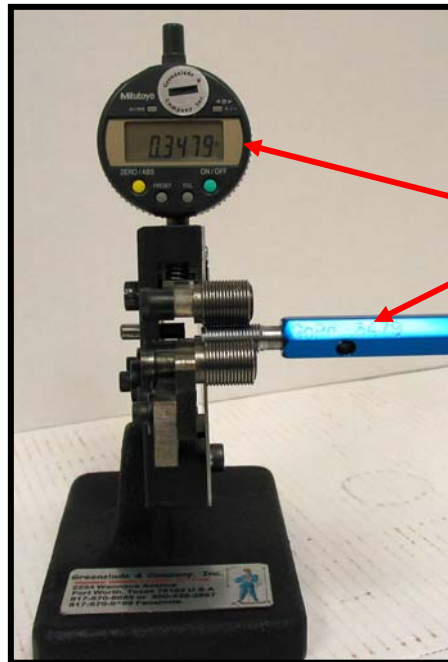
Press the *ON* button on the indicator. If the indicator is already on, press the *ZERO* button. The display should read all zeros. Determine if you want to measure in inches or millimeters and press the *IN/MM* button to select the increments you wish to measure in.

**CRITICAL NOTES:**

Make absolutely sure that when you depress the thumb lever that the indicator number becomes *LARGER*>. If it becomes smaller or reads “-” as the thumb lever is pressed, you must press the “+/-” button on the indicator.

This check should be made every time the indicator is turned on. Failure to do so will result in incorrect indications.

Now you should look at the certified size for your set plug which is indicated on your Gage Certification. This size should now be input into the indicator by using the *PRESET* mode as explained in the following paragraphs:



Press the button marked *PRESET* . A flashing “P” and zeros will appear on the display. The first digit will be blinking. Press the *PRESET* button again and hold it in. The digit to the right will begin to blink. Release the button when the digit you wish to set begins to blink. Now press and release the *PRESET* button. Each time you do this the digit advances one number, i.e., 1, 2, 3, 4 etc.

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If you go past the number you want, continue to press and release. You will go to 0, then start 1, 2, 3, 4, etc. again.

When you reach the number you want, which matches the number and position on your setting plug, hold the *PRESET* button in. After setting the digit to the far right, the “P” will start to blink. Press *PRESET* once more and release. The “P” will disappear and the digits will stop blinking.

Press the thumb lever in the back to raise the top roll. Remove the setting plug and release the lever. Your X120 gage is ready to measure parts.

## **Step 4: Measuring Parts**

Press down on the thumb lever, raising the top roll, and insert the part to be measured between the rolls by inserting it through the front of the gage, passing it between Rolls I and II. Rotate the part approximately 1/4 turn counterclockwise to assure the part is properly seated between the rolls. The number indicated on the display is the exact pitch of the part you are measuring.



Note that measurement of the same part on functional rolls will always be slightly larger than those on pitch diameter rolls. This is because the latter rolls only measure the pitch diameter on one thread whereas the functional rolls measure the pitch diameter over several threads which takes into account any slight error present in lead and/or thread angle.

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You may measure the thread pitch diameter at more than one position down the length of the part by simply pressing the thumb lever and moving the part inward or outward between the rolls. Remember to rotate the part about 1/4 turn counterclockwise each time you release the thumb lever. The pitch diameter may vary along the length of the part because of the way it was manufactured. A part is rejected if its thread is out of tolerance at any point.

When measuring with both functional and pitch diameter gaging rolls, the pitch diameter readings with both types of rolls must be within the designated pitch diameter tolerance to be acceptable.

### **Step 5: Recording Results Electronically.**

If you wish to record your results electronically, you can connect your Tri-Roll gage to a printer/processor (DP-264501) with the correct connecting cable (CC-905388). If you wish to do this also recommend the use of a foot switch (FS-937179) hooked to the printer/processor so that you can record results while keeping both hands free for measuring parts.

If you only wish to record your results and do not want to indicate the limits on your recording tape, simply turn your processor on and set the mode switch to "Position 2". Press *CLEAR*. Start measuring parts. After placing each part between the gaging rolls, either press the *DATA* button or press the foot switch to record data. When you have completed your sample, press *STAT* and the processor will provide you with a printout along with statistical data.

If you wish to enter the pitch diameter limits on your tape, you do so by setting the mode switch to "Position 1" and then by pressing *TOL*. Then using the *PRE* button on your indicator display the low limit of the tolerance you are to meet and press *DATA* on the processor. This will be labeled "Tolerance Limit 1" on your tape. Now change the display on your indicator to the high limit of the tolerance you are inspecting to and press *DATA* again. This will be labeled "Tolerance Limit 2" on your tape. Press *TOL* again and your processor is ready for recording.

#### **IMPORTANT:**

At this point preset your indicator as described previously by using your setting plug before starting to actually measure parts.

#### **NOTE:**

Refer to the operation manuals for your indicator, processor, and/or foot switch. If you need further explanation of their use, call Greenslade & Company/Fastener Inspection Products for assistance.

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# **X-120<sup>®</sup> Gage**

## ***VARIMINOR Gaging Rolls***

### ***Set-up Procedure for Measuring Screw Minor Diameter***

(Patent #4,974,327)

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1. Loosen 4 socket head screws on back side of gage body which control the position of the axis pins.
2. Insert the locking pin in the upper pivot arm to secure its proper position.
3. Slide the correct screw diameter template on to the axis pins. While pulling the template firmly up and back on the axis pins tighten the 4 socket head screws on the back side of the gage to secure the axis pins in the proper location.
4. Slide 1 pair of rolls on each of the 3 axis pins with the thicker roll on the inside and the thinner on the outside. Insert and tighten the axis screws to retain the *VARIMINOR* Rolls on the axis pins.
5. Remove the locking pin from the upper arm and insert the proper diameter master pin between the rolls and preset the indicator to the master pin value. If the rolls do not hold the master pin tightly, screw the stop screw behind the indicator out to allow the upper rolls to drop down further. If the rolls strike together, screw the stop screw in until the rolls stay slightly away from each other when the upper arm is at rest.
6. Remove the master pin and pull all 6 roll segments outward against the axis pin screws.
7. Raise the upper arm and place the screw to be measured between the rolls. Gently release the arm and rotate the screw about 180 degrees. While the screw is rotated the rolls will slide on the axis pins to match the pitch of the thread. Remove the screw and re-insert it once or twice to assure the proper spacing of the rolls.
8. You are ready to start measuring the minor diameter of the screws you wish to inspect. You may measure screws having the same basic major diameter but different pitches by simply going through step 7 again. As an example after setting the *X-120* Gage with the #10 template you can measure the minor diameter of 10-32, 10-24, 10-12, and 10-16 screws.

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# **Appendix I: Calibration Procedure for X120 Gaging System**

## **Calibrating the threaded setting plugs:**

1. The primary calibration control of a X120 gaging system is calibration of the threaded setting master plugs. The gages are calibrated by the transfer method each time the gages are set to the threaded master.
2. It is recommended that the threaded setting masters be calibrated on an annual basis. The calibration procedure should be the “three wire” method according to that described in the appendix of ASME B1.2.

## **Calibrating the gaging rolls:**

1. When X120 gages are properly set up all three rolls rotate when the setting plug or inspection piece are rotated between the gaging rolls. Therefore, it is highly unlikely that any flank wear will occur as long as the rolls rotate freely. The purpose of the calibration procedure is to detect worn spots in the rolls that may have occurred due to the rolls being inadvertently locked in place to prevent rotation.
2. Place the gaging rolls on the gage and place the proper setting plug between the rolls. Rotate the plug 1/4 turn and zero the indicator.
3. Mark all three rolls with a pencil or marker at the 12 o'clock position.
4. Rotate the setting plug slowly, stopping approximately every 1/4 turn of the plug. Release the plug and observe the indicator reading. Continue this until all three rolls have rotated a full 360 degrees.
5. The rolls are considered to be within calibration if no observed indicator reading (when the plug is released) is greater than +/- .0002.

## **Calibrating the complete X120 gage assembly and indicator:**

1. Install a set of functional diameter rolls (Type 3) on the gage.
2. Place the appropriate threaded setting plug between the rolls. Turn it 1/4 turn. Press the zero button on the indicator.
3. Place a number of calibrated cylindrical gage pins between the gaging rolls until the one is found that will make the indicator read within +/- .001”. Press the zero button on the indicator.

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4. Remove that pin and place a another pin that is smaller than the original pin by the amount of the pitch diameter tolerance of the thread size applicable to the gaging rolls mounted on the gage. .
5. If the indicator reading is within +/- .0001 of the size difference between the original pin and the second pin the X120 Gage and its indicator are properly calibrated.

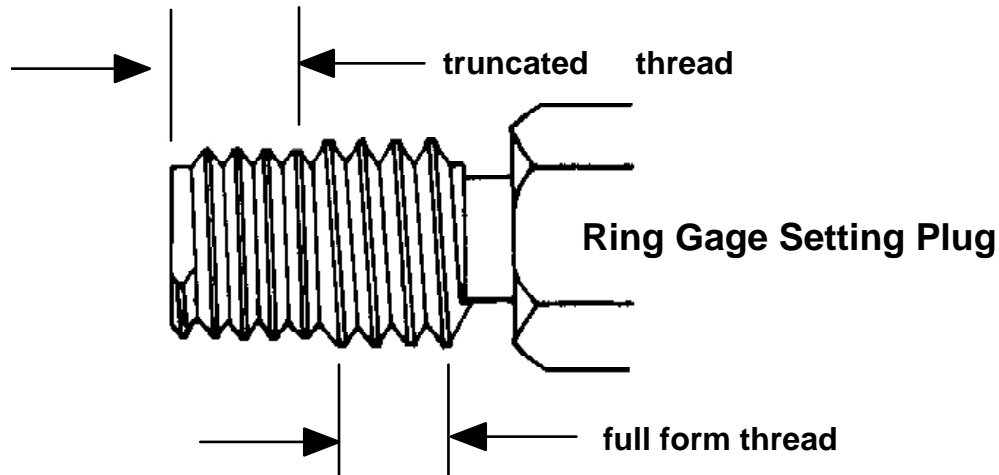
**NOTE:** This procedure needs to be performed on only one thread size within the capability range of the given frame size because the total indicator travel required for all thread sizes within the frame's range are similar.

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**Appendix II:  
Setting “X120” Gages Using a Ring Gage Setting Plug**



**IMPORTANT!** Use the “full form” portion of the setting plug only when setting a variable thread gage with a ring gage setting plug. Setting a variable gage using the truncated portion of the setting plug may result in erroneous measurement results.

A standard truncated ring gage setting plug can be used to set a variable external thread gage. The GO or NOGO end for any class of thread can be used as long as the variable gage is set to the pitch diameter size of the setting plug end being used.

To obtain the most accurate measurement results set the variable gage to the setting plug’s size indicated on its calibration certificate instead of the size listed on the handle.

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