749.1 Electronic Depth Micrometer

User Guide

749.1BZ-12RL

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Table of Contents

Section 1 General Information

1.0 Caution

- Avoid extreme temperatures, direct sunlight or below freezing for extended periods.
- Avoid dropping the Depth Micrometer. Avoid shocks to the Rod. Frequently clean the face using a dry cloth or a chamois.
- Isopropyl alcohol may be used to remove gummy deposits on metallic parts, but do not use strong solvents.
- Do not apply any type of lubricant to the Rod.
- Do not use aggressive solvents to clean the plastic components.
- Avoid any disassembly or modification of the Depth Micrometer other than changing the Rods .
- Avoid using anything that might damage the buttons when pressing the buttons.
- It is important to wipe the Depth Micrometer with a lint-free cloth after exposure to moisture.
- Do not mark the tool with an electric marking pen as this may damage the tool.

1.1 Basic Operating Instructions

- Turn on your tool by either pressing one of the buttons or moving the thimble.
- Lightly clean the contact point.
- If applicable, pick the unit of measure, inch or millimeter by pressing the **IN/mm** button.
- Zero Sequence: When you press the **Zero / ABS** button the display will show a dashed line as seen in (*Fig.1A*). The dashed line will incrementally disappear from left to right (*Fig.1B*); Make sure not to move the thimble during this time. This is a visual reminder to wait for the tool to zero out. This will happen each time the tool is zeroed, and takes less than a second.

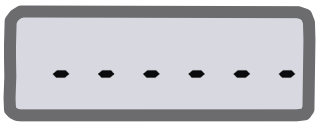


Fig.1A

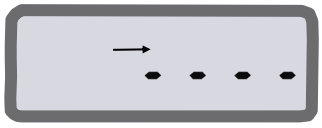


Fig.1B

- Move the Micrometer head all the way out to zero and then zero the tool with a quick press on the **Zero / ABS** Button.
- Check the rod, a (0"-1") rod will be flush with the base when the micrometer head is moved to zero. A (1"-2") rod will extend 1" from the base at zero. Check the rod length from the base with a gage block on a surface plate.
  Example: When using a 2"-3" rod, a 2" gage block would be used.
- The Micrometer will automatically enter sleep mode in 20 minutes, if left unattended.

1.2 Components

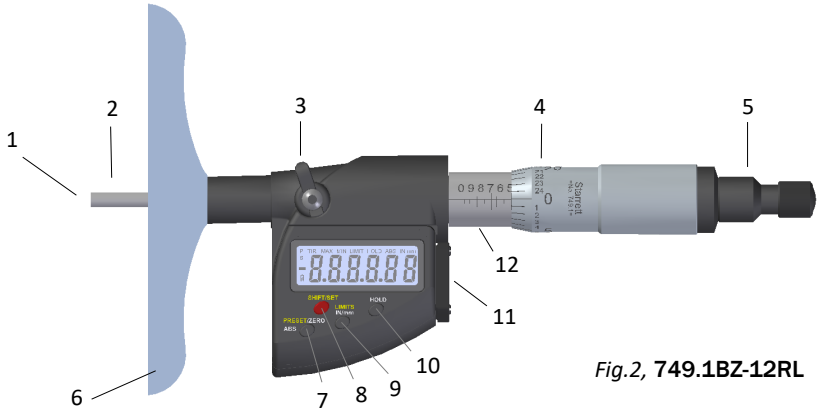


Fig.2, **749.1BZ-12RL**

1. Measuring face	**5**. Ratchet (Friction Thimble)	**9.** Limits - Inch/mm Button
2. Rod	**6**. Base	**10.** Hold Button
3. Spindle lock	**7**. Preset/Zero-ABS Button	**11.** Data Port
4. Graduated Thimble	**8**. Shift/Set Button	**12.** Graduated Sleeve

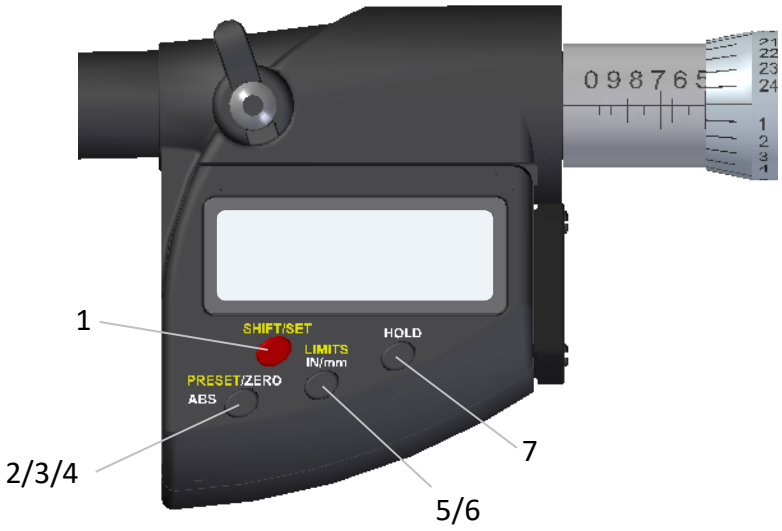


Fig.3

1.3 Button Descriptions and Functions

The functions printed in yellow; LIMITS and PRESET, are used in conjunction with the SHIFT/SET button also printed in yellow. To enable these functions press the SHIFT/SET button first. The SET (S) icon will appear in the top left corner of the display, and then press the button for the required function. To Power on the tool move the thimble or press any button. The tool will turn off automatically after 20 minutes if not being used.

1	*SHIFT/SET*	Dual function button used to enable the, Preset and the Limits function. When enabled the SET (S) icon will be displayed on the top left corner of the display.
2	*PRESET*	Press the **SHIFT/SET** button and then press the **PRESET** button to enable the PRESET function. Refer to the section “Setting PRESET” on pg.6.
3	*ZERO*	Press and release the **ZERO** button and the display will zero. The spindle must not be moved until the Zero Sequence has elapsed. See “**Zero Sequence”** on pg.3.
4	*ABS*	Press and hold the button for 2 seconds enables ABS mode. Press and hold for 2 more seconds to exit the ABS mode.
5	*LIMITS*	Press the **SHIFT/SET** button then press the **LIMITS** button to enable the function. Refer to the section, “Setting the Limits” on pg.7.
6	*IN/mm*	Toggles the display between English or Metric units.
7	*Hold*	Press and hold the button for a second will freeze the display and the word “HOLD” will appear. A second press and the display will update to the current position reading.

1.4 Data Output and Connections

- The 795.1 micrometer comes with an output connection that allows data transmission to a variety of peripherals, either through a traditional wire; 795.1 Smart Cables, or wirelessly by connecting to a PC using the Starrett DataSure® Advanced 4.0 Wireless Data Collection System. Each of these methods allows for analysis, data collection, and hard copy documentation as needed.
- A DataSure Advanced 4.0 system is comprised of;
  An EndNode that is attached to the tool to transmit the data to a Gateway.
  A 1401 USB Gateway requests and receives the data at the computer directly from a wireless tool.
  A 1402B Bridge Extender requests and receives the data at the computer from the remote gateway.
  A 1404 Remote Gateway extends the range of the bridge extender
  An optional 1402R Repeater Extender is used to extend the range of the system when needed.
- There are three 795.1 Smart cables that allow you to connect to a computer via a USB port.
  795.1SCU connects through a USB port on your computer, and is used with data collection software.
  795.1SCKB connects to a USB port on your computer, but is “plug & play” like a Key Board. You can send data to a number of windows programs like a spreadsheets/databases programs.
  795.1SCM connects to a 4 port Mux, our 7612 or 7613 Data Multiplexers. You can have up to four tools connected at a time with each of these multiplexers.
- The output format is 4800 BAUD, 8 data bits, no parity, 1 stop bit, and ASCII data. Transmission is exactly 16 characters, followed by a carriage return and a line feed.

1. *Fig.4A*, remove the three screws, output cover and output gasket from the tool. Put the parts aside, you will need them to cover the output hole when you are not using the data cable.
2. *Fig.4B*, Use the three screws that came with the data cable to attach the cable to the tool. The output gasket should not be used, because the cable connection is made of a material that acts as a gasket. Notice, the data cable screws are longer due to the thickness of the connector.

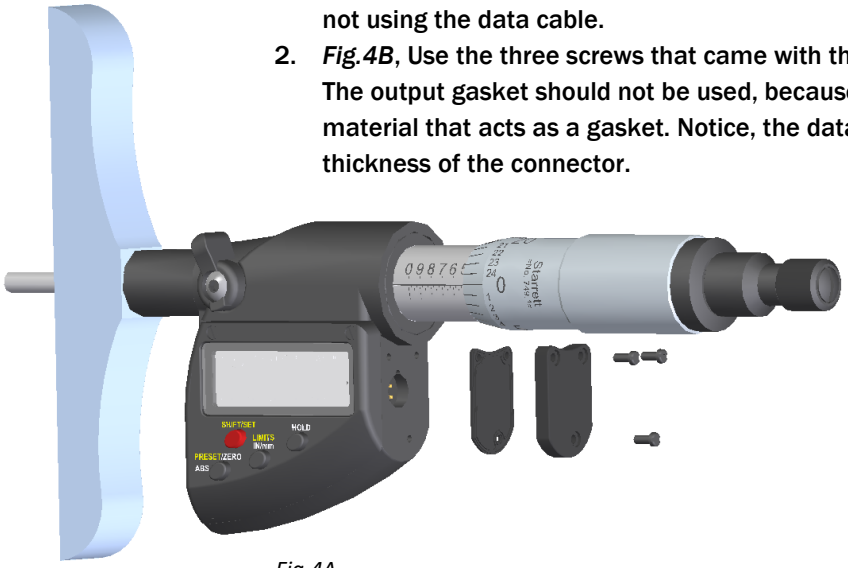


Fig.4A

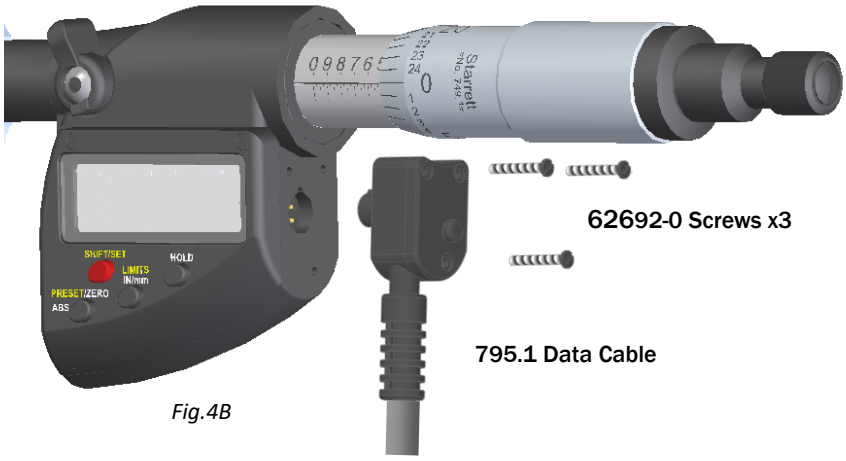


Fig.4B

Section 2 Functions

2.0 Setting PRESET

The Preset button allows you to program any reading into the display at any position of the spindle. It is used to establish the correct zero point of tools that exceed one inch or 25 mm range.
For example: In a 8-9" rod setup, the number 8.00000 would be added in the Preset.

To install a preset value:

1. First; move the thimble to zero the tool, and then use the Spindle lock to keep it from moving. Press the **ZERO** button to zero the electronics.
2. Push the **SHIFT/SET** button to get into the secondary button functions, an "S" will show on the top left of the display, Fig.5.
3. Press the **PRESET** button and a "P" will appear above the "S", and it will be blinking. "ABS" will be displayed as well.
4. There maybe a previous preset number displayed or "0.00000".
5. The negative sign will be blinking. Press the **PRESET** button to toggle the negative sign to positive (no sign) or vise versa, Fig.6.
6. Press the **SET** button to move to the first digit position, which will start flashing, Fig.6.
7. Press the **PRESET** button to change the number in the position that is flashing. Each press advances the number from 0-9. Stop when the number is correct, Fig.7.
8. Press the **SET** button to move to the next position, and press the **PRESET** button to install a number In the that position if needed.
9. Continue to use the **SET** button to advance from position to position,Fig.7.
10. After all the numbers are installed, Press the SET button again and the display will flash between "Shift" and "Preset".
11. Press the PRESET button to install the new preset number and the "S" and "P" will not be shown on the display, Fig.8. The preset number and ABS will be displayed. The preset number is connected with ABS mode.
12. When you need to use the preset number again; zero the tool (See no. 1. above) then press and hold the **ABS** button for 2 seconds to enable ABS mode. The preset number will be displayed.

Fig.5

Fig.6

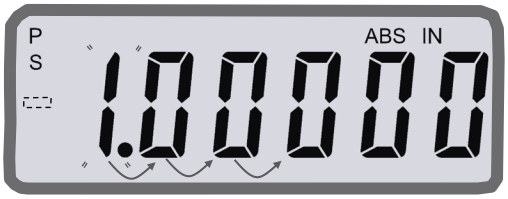


Fig.7

Fig.8

2.1 Setting the Limits (Tolerance)

1. Select the units to be displayed.
2. *Push the* **SHIFT/SET** *button to get into the secondary button functions, an "S" will show on the top Left of the display, Fig.9.*
3. Press the **LIMITS** button. The MIN LIMIT icon (MIN LIM) will appear in the upper middle of the display, *Fig.10*.
4. Press the ***SHIFT/SET*** button. The LIMIT icon will flash on/off.
5. Adjust the tool using a gage block or reference surface to the desired minimum value or tolerance.
6. Press the ***SHIFT/SET*** button to capture the minimum value. The LIMIT icon will stop flashing.
7. Press the **LIMITS** button. The MAX LIMIT icon will appear in the top middle of the display, see *Fig.11*.
8. Press the ***SHIFT/SET*** button. The LIMIT icon will flash on/off.
9. Adjust the tool using a gage block or reference surface to the desired maximum value or tolerance.
10. Press the ***SHIFT/SET*** button to capture the maximum value. The LIMIT icon will stop flashing.
11. Press the **LIMITS** button to use the function. The display will flash unless the reading is within the range that you set your limits to. The SET icon will remain on. The MAX and MIN icons will stay off as long as the reading is within the set limits. If the measurement is beyond the set limits, the display will flash and the MIN or MAX LIMIT icon will indicate the direction the limit has been exceeded. To exit Press the **LIMITS** button.

Fig.9

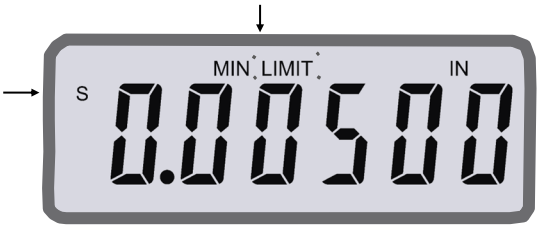


Fig.10

Fig.11

Section 3 How to Read a Depth Micrometer

3.0 Depth Micrometer Head, English

- The Depth Micrometer scale reads from right to left.
- *Fig.12B,* The Reading line on the Sleeve is graduated to 25 thousandths (0.025"). Every fourth line which is longer than the others, designates a hundred thousandths.
  For example: the line marked "3" represents 3 hundred thousandths (.300") etc.
- *Fig.12C,* The Thimble is divided into 25 equal parts, each line represents 1 thousandth (.001") and it is numbered consecutively.
- Each revolution of the thimble (0.000" to 0.000"(0.025")) is equal to the distance from line to line graduated on the Sleeve (0.025").

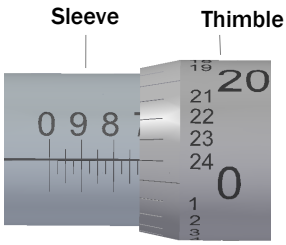


Fig.12A

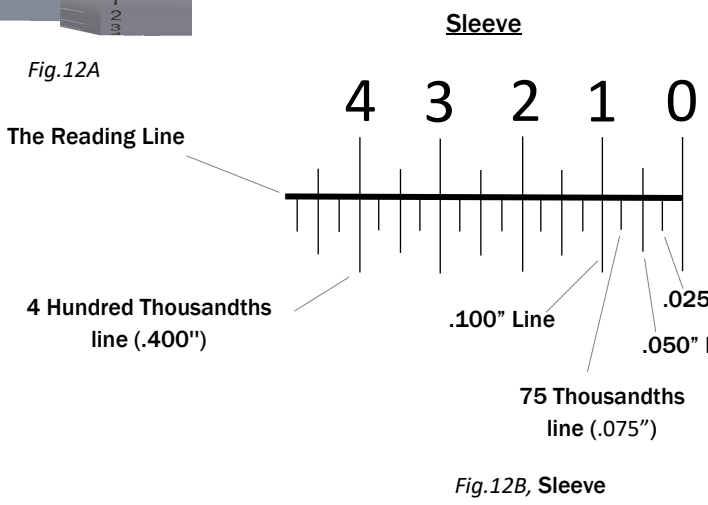


Fig.12B, **Sleeve**

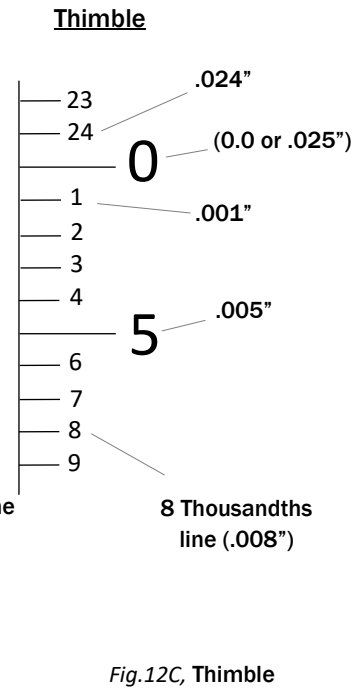


Fig.12C, **Thimble**

3.1 Examples: Graduated in Thousandths of an Inch (.001")

- The Depth Micrometer scale reads from right to left. The measurement is made by comparing what you can see with what you cannot.
- Most of the time the thimble edge will be obscuring the hundred thousandths (.100") line number.

Example 1

1. Fig.13A, If the 8 (.800”) line is showing and the 7 (.700”) line is not then the measurement is greater then >.700”.
2. Fig.13B, Which of the smaller thousandths (.025”) lines are showing on the sleeve below the 8 line? If the .775”, .750” and .725” lines are showing then the measurement is greater then >.700” but less then <.725”.
3. Where the reading line on the sleeve coincides with a line on the thimble, this is how much the measurement is greater then >.700”.
4. Fig.13B, the line on the thimble reads “24” (.024”). The measurement is; .700” + .024” = .724”

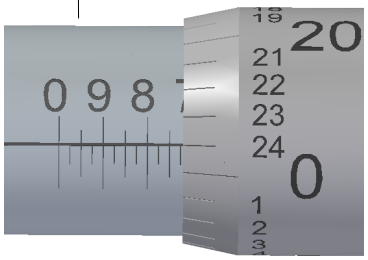


Fig.13A

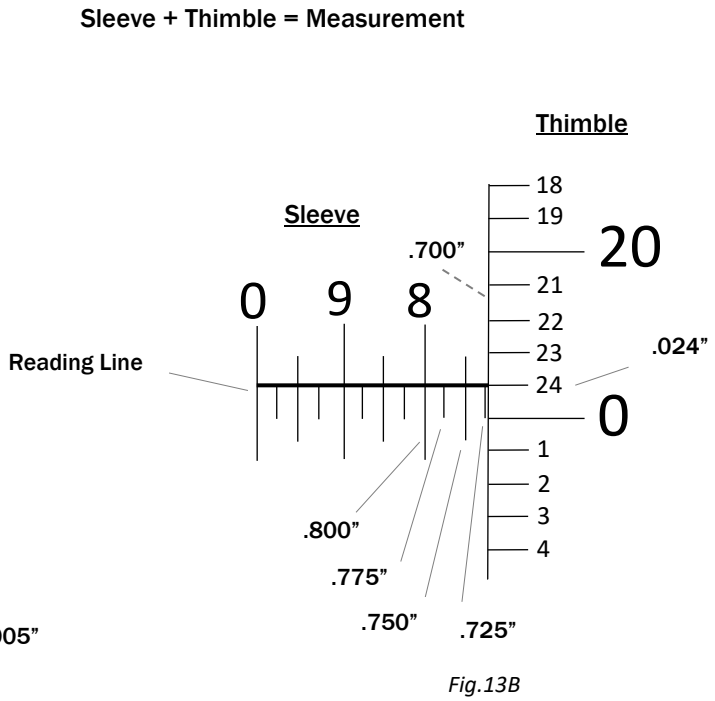


Fig.13B

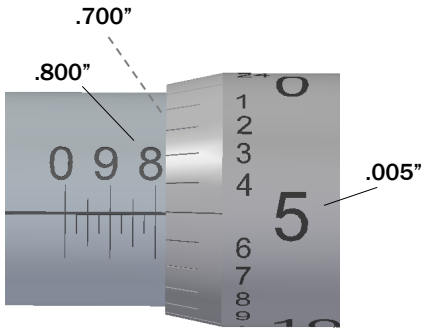


Fig.14

Example 2

1. *Fig.14,* Line "8" on the sleeve is visible, but Line "7" is not so the measurement is greater than >.700".
2. There is no .775” line showing so the measurement is greater than > .775”.
3. The thimble reads 5 so the measurement is greater than >.775” by +.005”.
4. The measurement is; .775” + .005” = .780”.

3.2 MEASURING ROD BASICS

1. With the use of different sized Measuring Rods, you can measure larger features, deeper holes and slots etc.
2. Fig.14A, Shows a 1”-2” rod, notice at zero the rod is 1” past the base. The measurement starts at 1” and ends at 2 inches. In this case you will add 1” to the reading on the Micrometer head.
3. Fig.14B, Shows a 2”-3” rod, In this case you will add 2” to the reading on the Micrometer head.

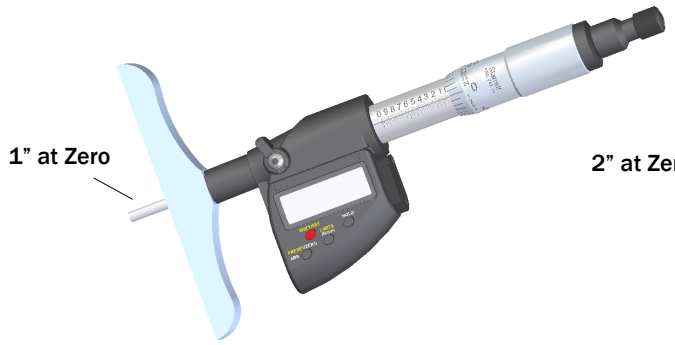


Fig.14A, **749.1BZ 1”-2” Rod**

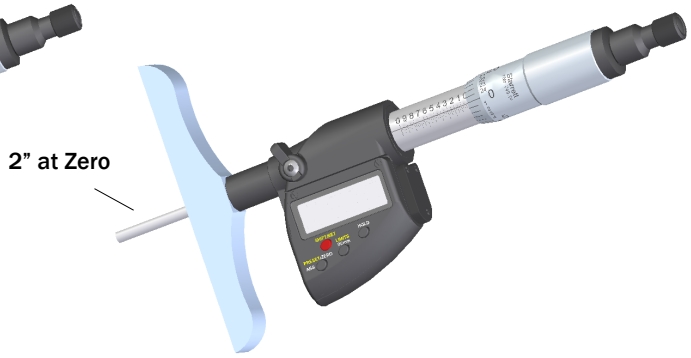


Fig.14B, **749.1BZ 2”-3” Rod**

3.3 HOW TO CHANGE A MEASURING ROD

1. Fig.15A, Hold the thimble from moving and then unscrew the ratchet (friction thimble) counter clockwise to remove it.
2. Fig.15B, Carefully pull the rod out of the micrometer head and place it back into the case for storage.
3. Fig.15C/D, Slide the replacement rod into the micrometer head, and screw in the ratchet finger tight.
4. To check the new rod, move the spindle to zero, and then check the distance the spindle is from the base with a gage block on a surface plate. In the example below Fig.15C, using a 1”-2” rod, a 1” gage block would be used.

Fig.15A, **749.1BZ 0”-1” Rod**

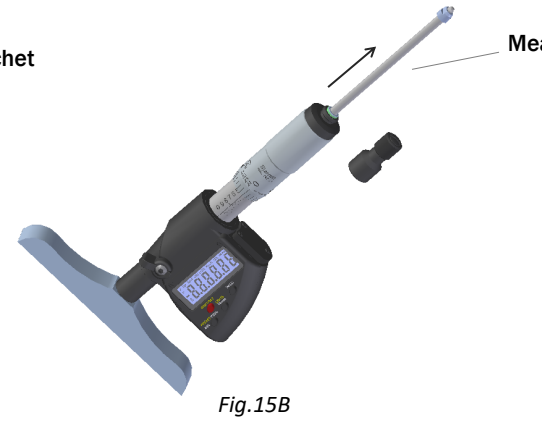


Fig.15B

Fig.15D

Fig.15C, **749.1BZ 1”-2” Rod**

3.4 HOW TO ADJUST A MEASURING ROD NUT

1. Was the rod subject to extreme temperatures? Make sure to let the rod come back to room temperature and check it again before making any adjustments. If the rod is from a different set it will be calibrated to the micrometer head in that set. Clean the area where the rod enters the tool and the bottom of the nut, look for debris that would interfere with the rod seating in the tool. Roll the rod on a flat surface (plate) to make sure it is completely straight. When all other avenues have been explored, proceed to number two.
2. The Nut is made in such a way that when the rod is calibrated to your micrometer head it is not meant to move again. This means it will take some force to adjust it. You will notice the nut is split down one side, we will use this to help keep track of how much you have turned the nut.
3. Clamp the rod into a small vise with soft jaws, so the rod will not rotate or bend when adjusting the nut. You do not want to damage the rod or mar it.
4. Was the rod short or long? If short move the nut (counterclockwise), if long (clockwise).
5. How much is the rod off by? You will be moving the nut the same distance on the rod, 1 for 1. With a very small adjustment the nut may only need to rotate less than a quarter turn.
6. Make a temporary mark where the split in the nut meets the shaft of the rod. Use a fine marker or something similar, a small mark or dot is all that's needed. This will be the 0° position of the nut.
7. Back off the rod adjusting nut one-half turn before turning to a new position, then turn it back to the 0° position mark you made in No.6.
8. The Process; Fig.16A, use the spanner wrench to make small adjustments, and then check the rod in the tool. In the example Fig.16B, the nut is rotated and an angle or clock time is used as a reference to help dial it in. When you re-check the rod note the difference from your last measurement and compare it to how much the nut was rotated. Hopefully, overtime you will be able to see a correlation between the rotation of the nut to the change in the rod measurement.

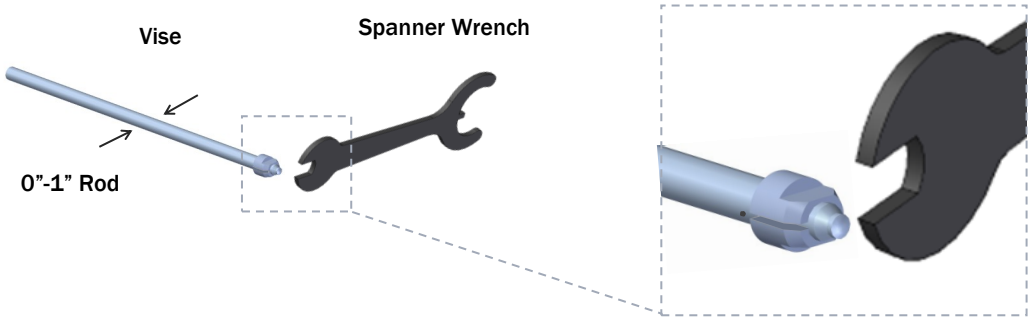
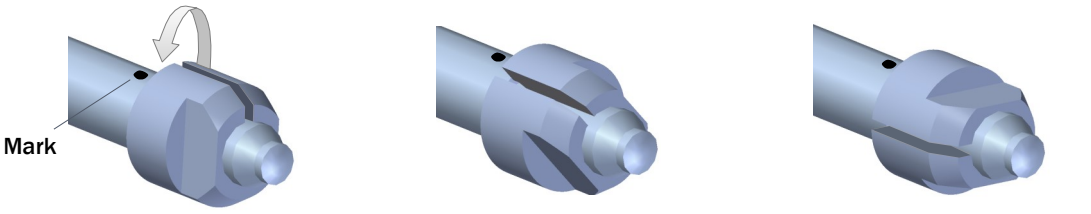


Fig.16A

<u>Example, the Rod is Short</u>



Start 0° , 12:00 *-45° , 10:30* *-90° , 9:00 Quarter Turn*

Fig.16B

Section 4 New battery, Startup Sequence

4.0 Battery Replacement

- The micrometer comes with two CR2032 lithium (coin cell) batteries, not installed. The battery cover can be removed using a coin (quarter), or a large flat headed screwdriver, turn the cover counter clockwise to remove.
- Fig.17C, Remove the battery cover and then Install the first battery with negative side down; install the second battery with the positive side down, Fig.17B. Replace the battery cover; making sure the rubber gasket is positioned correctly on the cover and secure.
- See: “Startup Sequence and Calibration” on page 13 for further instructions.
- NOTE: Fig.17A, When the battery is getting weak the display will get dim and show a battery icon in the bottom left side of the display. Make sure you replace the batteries with two type CR2032 batteries.

Battery Icon symbol

Fig.17A

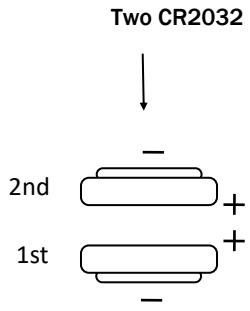


Fig.17B

NOTE: Inside the battery tray, there is instructions indicating the type of battery and orientation.

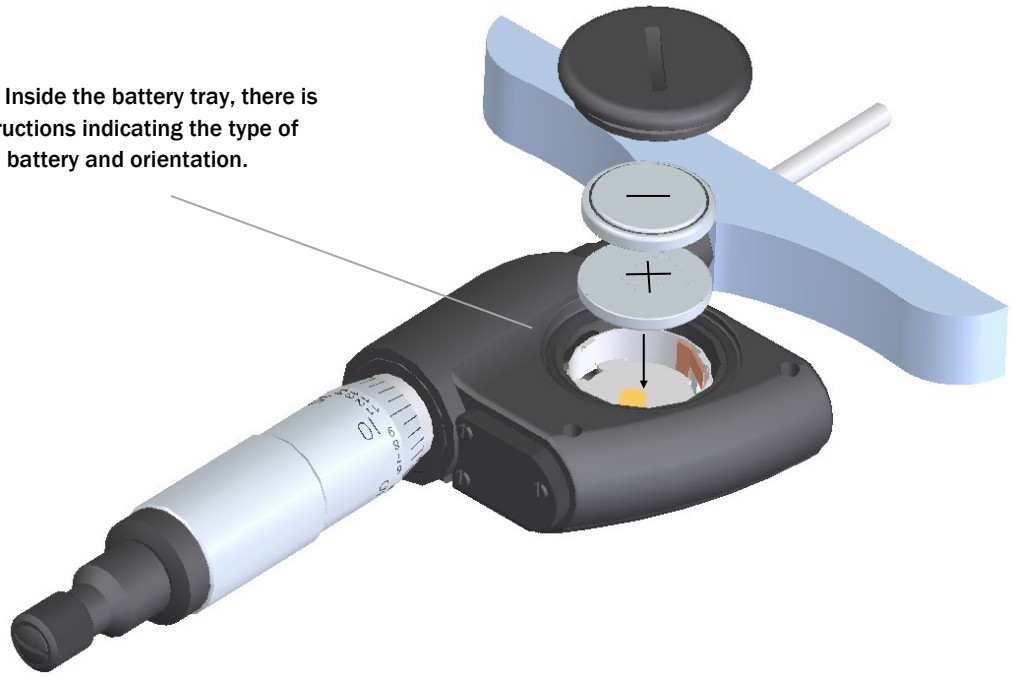


Fig.17C

4.1 Startup Sequence and Calibration

1. Each time you change the battery (Pg.12), the micrometer will go through a startup sequence. When the depth micrometer turns on, the display will go through a series of changes as shown in *Figs.18-20*. At the end of the sequence you will see "CAL" displayed, Fig.21.
2. To initialize the measurement system you need to rotate the thimble slowly until numbers are displayed.
3. If you don't move the thimble, "Cal" will stay on the display for about 10 seconds and the display will go blank.
4. To return to "Cal" mode, move the thimble or quickly press a button.
5. If you move the thimble too fast it will take longer for the tool to initialize.

Fig.18, Full Lamp, shows all characters.

Fig.19, Example: Configuration Number

Fig.20, Example: Firmware Version

Fig.21, Calibrate the Tool

Note: The information displayed above will change depending on the Depth Micrometer you are using and is only intended to serve as an example.

Section 5 Specifications and Accessories

5.0 Specifications

Resolution:	0.00005" and 0.001mm.
Accuracy (in)	Mic head +/-.0001"; Rods +/-.0002"
Accuracy (mm)	Mic head +/-.003mm; Rods +/-.005mm
Rod Range	0-12"/0-300MM
RS232 Output	4800 BAUD, 8 data bits, no parity, 1 stop bit, and ASCII data
Base Length	4"
Rod Diameter	5/32"
Battery:	CR2032 3 volt lithium coin-cell
EC Directives, CE Mark:	These micrometers conform to the following 89/336/EEC EMC Directive, Standards: EN55011 - Radiated and Conducted Emissions Requirements EN61000-6-2 — Generic Heavy Industrial

5.1 Accessories, Rods

Inch Grads			Metric Grads		
Cat. No.	EDP No.	Range	Cat. No.	EDP	Range
Pt99601	72765	0-1"	Pt99613	72881	0-25mm
Pt99602	72870	1-2"	Pt99614	72882	25-50mm
Pt99603	72871	2-3"	Pt99615	72883	50-75mm
Pt99604	72872	3-4"	Pt99616	72884	75-100mm
Pt99605	72873	4-5"	Pt99617	72885	100-125mm
Pt99606	72874	5-6"	Pt99618	72886	125-150mm
Pt99607	72875	6-7"	Pt99619	72887	150-175mm
Pt99608	72876	7-8"	Pt99620	72888	175-200mm
Pt99609	72877	8-9"	Pt99621	72889	200-225mm
Pt99610	72878	9-10"	Pt99622	72890	225-250mm
Pt99611	72879	10-11"	Pt99623	72891	250-275mm
Pt99612	72880	11-12"	Pt99624	72892	275-300mm

5.2 Cables and Accessories

Part No.	EDP No.	Description
795.1SCM	01124	Smart Cable to multiplexer
795.1SCKB	01125	Smart Cable with USB keyboard output
795.1SCU	01126	USB Cable to PC (In focused window)
PT99492	65650	Two 3-Volt Batteries, CR2032