

# Starrett®

## ENGLISH AND METRIC ELECTRONIC DIGITAL MICROMETER SERIES



733.1XFL-1 ELECTRONIC MICROMETER 1"

This manual covers the following electronic series:

714.1 Interchangeable Anvils, 733.1 XFLZ, MEXFLZ and MXRL Micrometer, 749.1 Depth Gage, 756.1 Disc Mic, 760.1 Screw Thread Mic, 762.1 Mic Head, 764.1 Sheet Metal Mic, 769.1 Tube Mic, 777.1 Bench Mic, 786.1 Blade Mic, 788.1 Rounded Anvil Mic, 790.1 Multi-Anvil Mic

## USER MANUAL

## INTRODUCTION

Starrett Electronic Digital Micrometers are designed for easy use and allow output to SPC (Statistical Process Control) printers, processors, and computers.

Resolution is .00005" or 0.001mm in both the regular and "ME" series, except it is .0001" in both the regular and "ME" No. 733.1 series over 4"

Accuracy is  $\pm .0001$  or  $\pm 0.003$  mm in the 0-1" (0-25 mm) range and as good as setting to a gage above that because the mechanical and electronic components are the same in all ranges.

### Installation of Battery

Before you install the battery that comes with the Micrometer see "New battery, Startup Sequence" page 4 and then

"Battery Replacement" on page 7.

## Cautions on Use

- Avoid dropping the micrometer.
- Avoid extreme temperatures, direct sunlight or below freezing for extended periods.
- To prevent sluggish or sticky movement clean the spindle.
- Avoid shocks to the spindle faces. Frequently clean the spindle faces using a dry cloth or a chamois.
- Isopropyl alcohol may be used to remove gummy deposits on metallic parts.
- Do not apply any type of lubricant to the spindle and do not use solvents.
- Avoid using anything that might damage the buttons when pressing the buttons.
- It is important to wipe the micrometer with a lint-free cloth after exposure to moisture.
- Do not use aggressive solvents to clean the plastic components.
- Do not store the instrument in areas of extreme temperature.
- The spindle is designed not to be removed from the tool and should not be rotated more than one revolution past the limits of its measuring range as this may result in damage to the tool.
- Do not mark the tool with an electric marking pen as this may damage the tool.

## Automatic OFF

The micrometer will turn off (the display will go blank) after 20 minutes of no spindle movement. Any movement of the spindle will activate the display with no loss of position reading.

## HOLD Button

One button push will freeze the display and the word "HOLD" will appear. A second push will update the display to the current position reading.

## SHIFT/SET Button

This is the button that gives great versatility to this tool. Pressing this button will change the function of this button to **SET** — it will change the function of the **ZERO/ABS** button to **PRESET**, and it will change the function of the **IN/mm** button to **LIMITS**.

## ZERO/ABSOLUTE/PRESET Button

One short push (less than one second) of this button will zero the display at any point (some call this the “incremental mode”). A long push (more than one second) of this button will return the display to the original reading (some call this the “absolute mode”) and the letters “ABS” will appear. Press the **Shift/Set** button, shift will be displayed and then press the **Preset, Zero/Abs** button to get to Preset Mode.

## PRESET Button

This button allows you to install any reading into the display at any position of the spindle. It is used most often 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 installed into the display.

### To install a preset value:

First, zero the tool using the thimble.

Push the **SHIFT/SET** button to get into the secondary button functions and “S” will show on the display .

Press the **PRESET** button and a “P” will appear on the top left of the display, and it will be blinking. “ABS” will be displayed as well.

Press the **SET** button to set up the preset number. (0.00000 or a previous preset number will be displayed)

Press the **PRESET** button to change the preset to a negative number “-” or back to positive (no sign).

Press the **SET** button to move to the first digit position, which will start flashing.

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.

Press the **SET** button to move to the next position, and press the preset button to install a number from 0-9.

Continue to install a number from 0-9 in every position.

After all the numbers are installed, Press the **SET** button again and the display will flash between “Shift” and “Preset”.

Press the **PRESET** button to install the new preset number and the “Shift and “Preset” will stop flashing. Finally, double check to see that the numbers are correct and the spindle is in the proper position.

## IN/mm LIMITS Button

The micrometer can be changed from inch mode to millimeter mode, or the reverse, with one push. The secondary function is LIMITS and will only become active after the **SHIFT** button has been pushed. LIMITS are used to enter the minimum and maximum limits of a tolerance.

NOTE: 733.1MXRL (metric only) series, there is no English conversion.

### To Install Limits

Push the **SHIFT/SET** button to get into the secondary button functions and “S” will show on the display . Press the **LIMITS** button to get into the LIMITS mode. “MIN LIMIT” will appear on the display. Press the **SET** button to allow the new minimum limit to be installed. On the display “MIN LIMIT” will flash . Move the spindle to the new minimum limit value to be installed, and press the **SET** button to install the new Min limit.

Now press the **LIMITS** button again to change the display to “MAX LIMIT”. Press the **SET** button to allow the new maximum limit to be installed. On the display “MAX LIMIT” will flash. Move the spindle to the new maximum limit reading and press the **SET** button to install the reading. The display stops flashing and shows “MAX LIMIT”. Press the **LIMITS** button to use the limits mode.

**NOTE:** After installation, limits mode will show “out of tolerance” by a flashing the measured value and either “MIN LIMIT” (to small) or “MAX LIMIT” (to big) on the display. To get out of the limits mode, press the LIMITS button once. This will return you to the normal measuring mode.

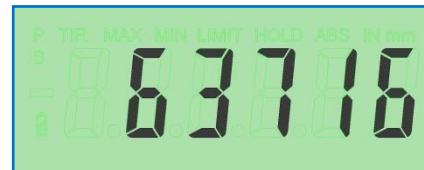
## 4.0 New battery, Startup Sequence

- Each time you change the battery(Pg.7), the micrometer will go through a startup sequence. At the end of the sequence you will need to move the spindle to initialize the measurement system. When the micrometer comes on the display will go through a series of changes as shown in Fig.1-5.



Full Lamp Display

Fig.1



Example: Configuration Number

Fig.2



Example: Firmware Version

Fig.3



Calibrate the Tool

Fig.4

- When “CAL” is displayed, Move the thimble very slowly in one direction, at a rate of .25 (1/4th) of an inch of movement over the span of 2 -3 seconds, until the display changes to show measurement readings. This movement will initialize the accuracy tuning function and calibrate the indicator.
- This feature will happen each time the batteries are changed.
- If you don't move the spindle, “CAL” will stay on the display. If you move the spindle to fast it will take longer for the tool to initialize.

## 5.0 Zero Sequence

- After “CAL” mode is completed press the **ZERO/ABS** button and the display will show a dashed line as seen in Fig.6A below. The line will incrementally disappear from left to right Fig.6B; this is a visual clue to show how long you should wait for the tool to zero out. Make sure not to move the spindle during that time. This will happen each time the tool is zeroed, and takes less than a second to complete.

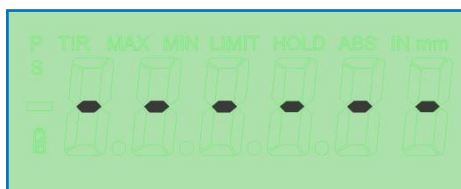


Fig.6A

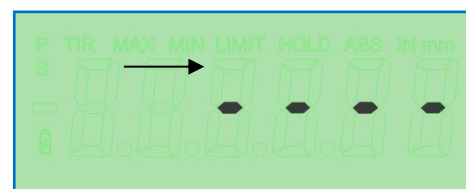


Fig.6B

## ***Quick Reference, Button Functions***

1	<b>LIMITS IN/mm</b>	Toggles the display between English or Metric values. Changes to Limits Mode after pressing the <b>Shift/Set</b> button.
2	<b>PRESET ZERO/ABS</b>	<p>Multi-Function button, zero's the display, enables ABS mode and, changes to Preset mode after pressing the Shift/Set button.</p> <p>To zero the display press and release the <b>Zero/Abs</b> button, the spindle must not be moved until the Zero Sequence has elapsed.</p> <p>See "New Zero Sequence" on page 5.</p> <p>Press and hold for 2 seconds to activate the ABS mode.</p> <p>Press and hold again for 2 seconds more to exit the ABS mode.</p> <p>Press the <b>Shift/Set</b> button, shift will be displayed and then press the <b>Preset, Zero/Abs</b> button to get to Preset Mode.</p>
3	<b>SHIFT/SET</b>	Press this button to access Limits and Preset modes.
4	<b>HOLD</b>	Press and release the <b>HOLD</b> button and the display will not change. Press and release the <b>HOLD</b> button again to turn off hold.

## Data Output (733.1 series)

The 733.1 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® Wireless Data Collection System**. Each of these methods allows for analysis, data collection, and hard copy documentation as needed.

A DataSure system is comprised of;

An **EndNode** that is attached to the tool to transmit the data.

A **Gateway** requests and receives the data at the computer.

An optional **Router** 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.



Fig.6A



Fig.6B

## 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.

Remove the battery cover and then Install the first battery with negative side down; install the second battery with the positive side down. Replace the battery cover; making sure the rubber gasket is positioned correctly on the cover and secure. The display will flash until the **DATUM** button is depressed.

**See:** “New battery, Startup Sequence” on page X for further instructions.

**NOTE:** When the battery is getting weak the display will get dim and show a battery icon in the bottom left side as seen below Fig.7A. Make sure you replace the batteries with two type CR2032 batteries.



Fig.7A

Battery Icon



Two CR2032 Batteries

Fig.7B

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

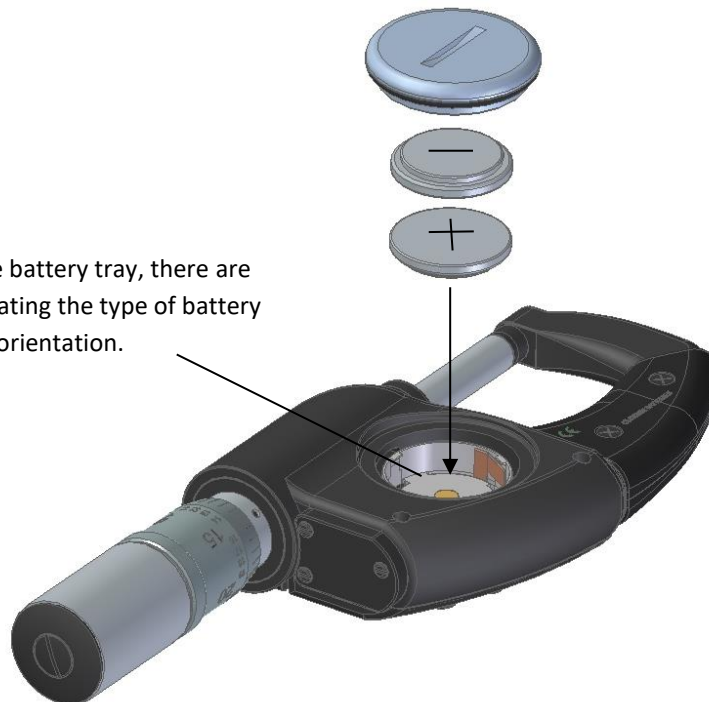


Fig.7C

# Specifications

**Resolution:** 0.00005" and 0.001mm in both the regular and "MX" series, 0.001mm for the metric only series.

## Accuracies for Micrometers with English Threads

0-3" -  $\pm 0.00010$   
4-6" -  $\pm 0.00015$   
7"-9" -  $\pm 0.00020$   
10"-12" -  $\pm 0.00025$   
13"-18" -  $\pm 0.00035$   
19"-24" -  $\pm 0.00045$

## Accuracies for Micrometers with Metric Threads

0-25mm - (0.002mm)  
50-75mm - (0.003mm)  
100mm-150mm - (0.004mm)  
175mm-225mm - (0.005mm)  
250mm-300mm - (0.007mm)  
325mm-400mm - (0.008mm)  
425mm-500mm - (0.009mm)  
525mm-600mm - (0.010mm)

**Battery:** Two (2) Lithium coin cell 3V  
No.CR2032 or equivalent

**Battery Life:** Greater than one year with normal use.

**Serial Data:** 4800 BAUD, 8 bits, No Parity, 1 stop bit ASCII data. Transmission is exactly 16 characters, followed by a carriage return and a line feed.

**Dust/Water Protection:** IP67 according to IEC60529 (0-4" and 0-100mm ONLY)  
"6", The first number, identifies protection against complete ingress of dust.

"7", The second number, identifies protection against the effects of immersion in water under stated conditions of pressure and time.

**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