



Wireless Electronic Indicator User Guide

The L.S. Starrett Company

121 Crescent Street

Athol, MA 01331

<https://www.starrett.com>

Table of Contents	Page
<i>Section 1 General Information</i>	
1.0 Caution	<u>3</u>
1.1 Basic Operating Instructions	<u>3</u>
1.2 Button Descriptions and Functions	<u>4</u>
<i>Section 2 Functions</i>	
2.0 Setting PRESET	<u>5</u>
2.1 Setting the Limits (Go/No Go Function)	<u>6</u>
2.2 Setting the MIN/MAX/TIR Function	<u>8</u>
2.3 Resolution Selection	<u>9</u>
2.4 Lock Mode	<u>10</u>
<i>Section 3 Wireless Overview</i>	
3.0 Wireless Functions	<u>11</u>
3.1 Communicating with your Wireless Tool	<u>12</u>
3.1.1 Establishing First Communications	<u>12</u>
3.1.2 Moving Tools Between Gateways	<u>12</u>
- 3.1.2.1 Resetting a Wireless Tools Security Key:	<u>12</u>
- 3.1.2.2 Moving to Another Gateway(1):	<u>12</u>
<i>Section 4 Rechargeable Battery</i>	
4.0 Rechargeable Battery Care and Maintenance	<u>13</u>
4.1 Startup Sequence	<u>14</u>
4.2 Calibrate	<u>14</u>
4.3 Environmental Consideration	<u>14</u>

Section 1 General Information

1.0 Caution



- Remember, only charge your Indicator when the battery symbol is shown on the display, (Fig.1A) see page [13](#).
- Avoid extreme temperatures, direct sunlight or below freezing for extended periods. Allow the tool to return to the ambient temperature of the area you are working in, before using the tool.
- Avoid dropping the Indicator. Avoid shocks to the contact point and spindle. Do not apply any radial force to the spindle.
- If the indicator is stem-mounted, protect the indicator from being struck or bumped to prevent stem/case mechanical alignment damage.
- Do not over-tighten the mounting mechanism and use clamp mounting rather than set screws, if possible, to prevent damage to the spindle.
- Frequently clean the spindle using a dry cloth or a chamois to prevent sluggish or sticky movement. 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 any disassembly or modification of the tool.
- Avoid damaging the buttons by using anything other than your finger to press them.
- Use the appropriate gage stand or indicator holder for the job intended.

1.1 Basic Operating Instructions

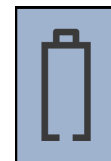


Fig.1A

1. Turn on your tool, check the upper left of the display to see if the battery symbol is showing. If the battery symbol is showing (Fig.1A) then go to the “Rechargeable Battery Care and Maintenance” section, on page [13](#). If there is no battery symbol visible then the battery is charged.
2. Lightly clean the contact point.
3. Fasten the indicator into the appropriate holding device.
4. You can turn the indicator on by either pressing the **ON/OFF** button or moving the spindle.
5. If applicable, pick the unit of measure, inch or millimeter by pressing the **IN/mm** button. **Note:** standard metric indicators do not have this function available.
6. Place the indicator perpendicular to the reference surface being measured. Allow enough movement to be able to take a higher or lower measurement. **Note:** This is one of many possible ways to use the tool.
7. **Zero Sequence:** Zero the tool by pressing the **ZERO** Button. When you press the **ZERO** button the display will show a dashed line as seen in (Fig.1B). The dashed line will incrementally disappear from left to right (Fig.1C); Make sure not to move the spindle 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 to complete.

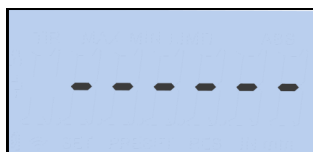


Fig.1B

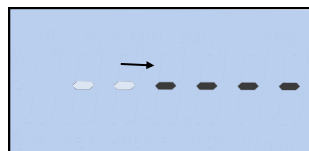


Fig.1C

8. Lift the spindle to remove the reference surface, and carefully place the piece to be measured under the spindle making contact with the surface. The value measured on the display will be the difference between the reference and the measured piece.
9. The indicator can be turned off by pressing and holding the **ON/OFF** button for 3 seconds.

Note: the unit will automatically enter sleep mode in 30 minutes, if left unattended.

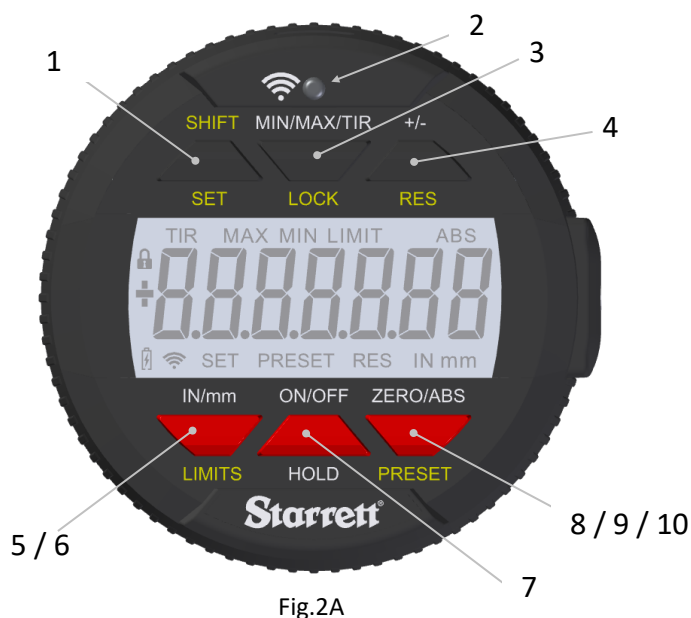


Fig.2A

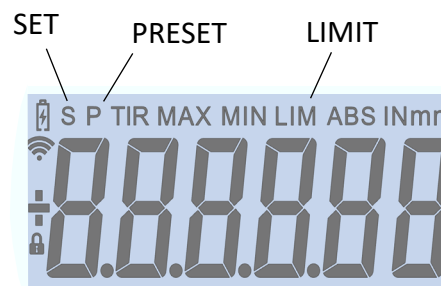


Fig.2B, This display is used in some of the indicators. The different icons are pointed out above.

The functions printed in yellow; LOCK, RES, LIMITS and PRESET, are used in conjunction with the SHIFT button. To enable these functions press the SHIFT button first. The SET/S icon will appear on the display, then press the button for the required function.

1	SHIFT/SET	Dual function button used to enable the, Preset and the Limits function. When enabled the SET/S icon will be shown on the display.
2	Wireless Button	Press and hold for 2 seconds to turn ON/OFF the Wireless function. A quick push sends a reading over the wireless network. See "Section 3 Wireless Functions" pg. 11 .
3	MIN/MAX/TIR	Displays the minimum or maximum values captured during the movement of the spindle while in the min/max limits operation. The TIR function displays the difference of the two readings. See "Setting the Min/Max/TIR" on page 8 .
4	+/-	Plus/Minus sets the direction (polarity) of the reading.
5	IN/mm	Toggles the display between English or Metric units.
6	LIMITS	Press the SHIFT/SET button then press the LIMITS button to enable the function. Refer to the section, "Setting the Limits" on page 6 .
7	ON/OFF	Power button. Press and release to turn on, and Press and hold for 3 seconds to turn off.
8	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 page 3 , instruction #7.
9	ABS	Enables the ABS mode. Press and hold for 2 seconds to activate the ABS mode, Press and hold for 2 seconds to exit the ABS mode.
10	PRESET	Press the SHIFT/SET button then press the PRESET button to enable the function. Refer to the section "Setting Preset" on page 5 .
11	HOLD	Press the HOLD button momentarily to capture a reading. The captured reading will flash on and off. To disable press the HOLD button again.
12	LOCK	The Lock mode prevents, intended or unintended, operator modifications to the Settings. Press SHIFT/SET button followed by pressing and holding the LOCK button to lock the indicator after setting the other functions. Refer to "Lock Function Activation" page 10 for further instructions.
13	RES	Resolution selection. Select the Unit (English or Metric). Press the SHIFT/SET then the RES (Plus/Minus) button. Press the RES button to scroll through choices Press the SHIFT/SET to make the selection. Refer to "Resolution Selection" page 9 below for instructions.

Section 2 Advanced Functions

2.0 Setting Preset

Note: This function is available with some of the 6 button indicators. To set the value, follow the steps below:

1. The values can be set to: +/-9.99999 inches or +/- 9999.99 mm.
2. Press and hold the **ZERO/ABS** button for 2 seconds to activate the ABS mode. The ABS icon will appear in the upper right corner of the LCD, Fig.3.
3. Press the **SHIFT/SET** followed by the **PRESET** button. The SET and PRESET icons will appear in the bottom left hand side of the LCD. The PRESET icon should be flashing, Fig.4A. Fig.4B shows an alternative display where the (S)ET and (P)RESET icons appear in the top left side of the LCD.
4. Press the **SHIFT/SET** button to cycle thru the plus/minus sign, and each digit place. The flashing item indicates that the item is ready to be SET/Changed, Fig.5.
5. Press the **PRESET** button to increment the digit value from 1-9. Press the **SHIFT/SET** button to set the digit and move to next digit.
6. To set a negative value press the **PRESET** button when the plus/minus sign icon is flashing. Fig.5.
7. Repeat steps 4 and 5 until all the digits are SET.
8. Use the **SHIFT/SET** button to cycle through the digits back to the PRESET icon.
9. To exit the PRESET function, Press the **PRESET** button when the PRESET icon is flashing. The SET value will remain displayed.
10. Press and hold the **ZERO/ABS** button to exit the Preset function.

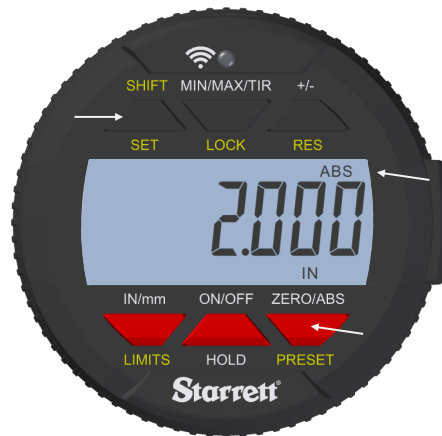


Fig.3



Fig.4A

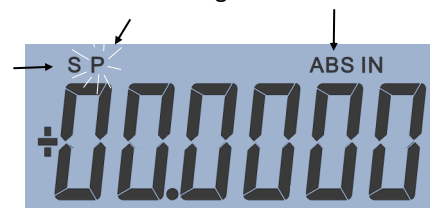


Fig.4B



Fig.5

1 - To enter into Preset mode;

Press  Then 

2 - To cycle from digit to digit and back to preset;

Press 

3 - To increment the value of the digit or the plus/minus sign;

Pres 

4 - To exit the Preset function;

Pres  When Preset is flashing;

2.1 Setting the Limits (Go/No Go Function)

Note: This function is available with the 6 button indicators.

1. Select the units to be displayed with the **IN/mm** button.
2. Press the **SHIFT/SET** button. The SET icon will appear in the bottom left corner Fig.6A. Fig.6C shows an alternative display where the (S)ET icon appears in the top left side of the LCD.
3. Press the **LIMITS** button. The MIN LIMIT (MIN LIM Fig.6C) icon will appear in the upper middle of the display Fig.6B/C.
4. Press the **SHIFT/SET** button. The LIMIT/LIM icon will flash on/off.
5. Adjust the gauge using a reference surface to the desired minimum value.
6. Press the **SHIFT/SET** button to capture the minimum value.
The LIMIT/LIM icon will stop flashing. Continued on next page...

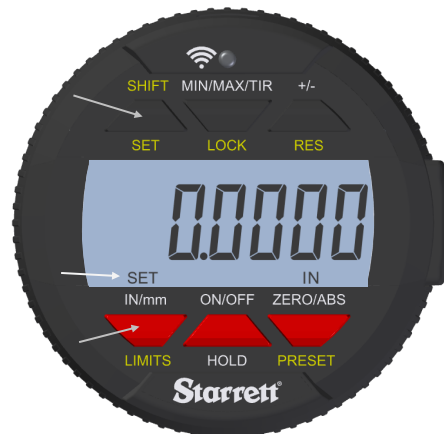


Fig.6A

1 - To enter Min Limit mode.

Press  Then 

2 - To enter the Min value.

Press 

The LIMIT/LIM icon will start flashing.

Adjust the gauge using a reference surface to the desired minimum value.

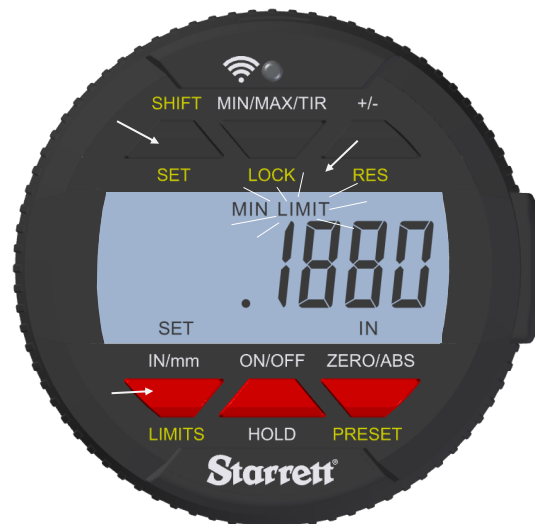


Fig.6B

3 - To capture the minimum value

Press  The LIMIT icon will stop flashing



Fig.6C

8. Press the **LIMITS** button. The MAX LIMIT icon will appear in the top middle of the display, see Fig.7A. "MAX LIM" will show on the alternative display Fig.7B.
9. Press the **SHIFT/SET** button. The LIMIT/LIM icon will flash on/off.
10. Adjust the gauge using a reference surface (gage block) to the desired maximum value.
11. Press the **SHIFT/SET** button to capture the maximum value. The LIMIT/LIM icon will stop flashing.
12. Press the **LIMITS** button to use the go/no go 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/LIM icon will indicate the direction the limit has been exceeded. To exit Press the **LIMITS** button.

1 - To enter MAX LIMIT mode.

Press  The MAX LIMIT icon will appear.

2 - To enter the Max value.

Press  The LIMIT icon will start flashing.

Adjust the gauge using a reference surface (gage block) to the desired maximum value.

3 - To capture the maximum value;

Press  The LIMIT icon will stop flashing

Press  The Indicator is now set up with a maximum and minimum limit range.

Press  To exit Limit mode when you have completed your measurements

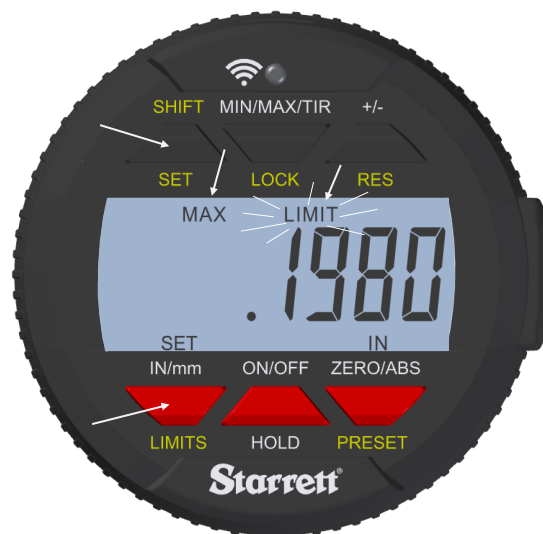


Fig.7A



Fig.7B

2.2 Setting the MIN/MAX/TIR Function

The Min/Max/TIR (Total Indicator Reading or Run-out) function measures the minimum and the maximum values of a surface (usually rotating) and then calculates the difference between them. (TIR),

Note: This function is only available with the advanced indicators.

1. Select the units to be displayed.
2. Bring the indicator down to the part being measured, to a point that is around half the travel of the indicator.
3. Lock in the indicator at this height.

Note: Care must be taken; to make sure the difference between the high and low measurements are not outside of the travel of the indicator at setup. Either your low measurement will be wrong or your high measurement might jam the spindle and damage your indicator.

4. Press the **MIN/MAX/TIR** button. The **MIN** icon will appear on the display.
5. Press the **ZERO/ABS** button to measure the part.
6. Move the part under the indicator to find the low spot.

You will know because the value will not change.

7. Press the **MIN/MAX/TIR** button. The **MAX** icon will appear on the display.
8. Press the **ZERO/ABS** button to measure the part.
9. Move the part under the indicator to find the high spot.

You will know because the value will not change.

10. Press the **MIN/MAX/TIR** button. The **TIR** icon will appear on the display, and the display will show the value of the TIR. If recording this value, do not allow the spindle to move until you have written or sent the value by pressing the **Wireless** button, Fig.8B. Press the **MIN/MAX/TIR** button to reset the indicator and remove the TIR icon from the display.

11. Replace the part being measured, and repeat the sequence starting at step two above.



Fig.8A

1 - To start measuring in Min mode;

Press



Then



2 - Next, to start measuring in Max mode;

Press



Then



3 - To display the TIR value;

Press



4 - To send a reading, press the wireless button Fig.8C



Fig.8B



Fig.8C

2.3 Resolution Selection

Enter the Resolution mode by pressing the **SET/SHIFT** button followed by the **RES** button. The choices are displayed sequentially from high to low resolution with the associated units. The round off accommodates the range of values in the table below.

Round Off Condition	English In Mode	Metric mm Mode
Round Off Enabled	000.00005	0000.001
Round Off Disabled	000.0001	0000.001
Round Off Enabled	00.0005	0000.01
Round Off Disabled	000.001	0000.01

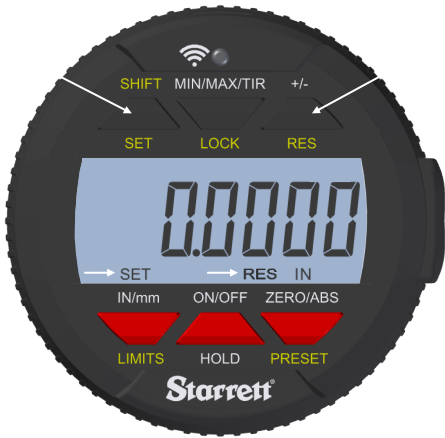


Fig.8B

Press the **SET/SHIFT** button after selecting the resolution to exit resolution mode. The resolution selection is presented in the units set when the mode is entered. If units are set to English then the resolution selection is displayed in inches. If the units are set to metric then the resolution selection is displayed in mm. Pressing the **IN/mm** button will toggle the selection to the appropriate units. This function is not available with the basic type indicators.

1 - To enter into Resolution mode;



2 - To cycle through the Resolutions;



3 - To pick the resolution and exit resolution mode;



2.4 Lock Mode

The Lock mode will prevent intended or unintended operator modifications to the settings. This function is not available with the basic type indicators.

Lock Function Activation:

Before the Lock function is activated, the functions must pre-set to the desired settings: Plus/Minus for spindle direction, ABS mode, PRESET Reading, Units, Limits setting, and MIN/MAX/TIR settings. These values are stored in memory.

To lock these settings the user must Press the following sequence of buttons:

1. Press the **SHIFT/SET** button then press and hold the **LOCK** button until the lock icon turns on.
2. The Lock icon will turn on and stay on Fig.8C. Once the lock mode has been activated, the operator will not be able to change ABS/Normal Mode, Limits, Units, PRESET, or MAX/MIN/TIR. The operator will have access to the zero function and viewing of the MIN/MAX/TIR readings.
3. To deactivate the lock mode repeat the process used to enter the mode. Press the **SHIFT/SET** button then press and hold the **LOCK** button until the lock icon turns off.

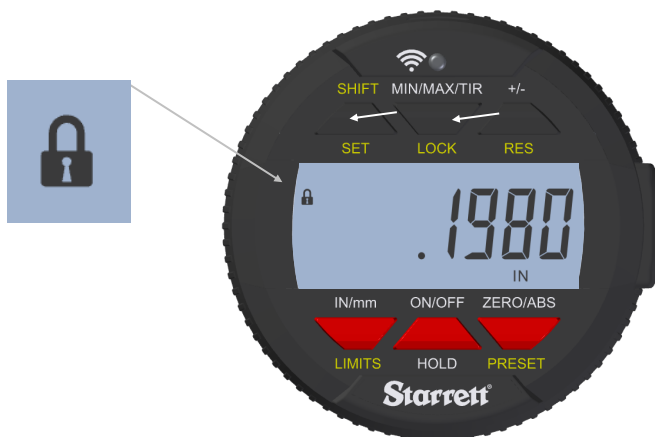


Fig. 8C

1 - To activate the Lock function;

Press  Then 

2 - To deactivate the Lock function;

Press  Then 

Section 3 Wireless Overview

3.0 Wireless Functions

The new Wireless button (Fig.11A) on the 2900 Indicator is used for three functions; turn the wireless on/off, sending a reading, and to change/reset a function in profile mode.

1. You can turn the wireless “DS On” or “DS Off” by pressing and holding the Wireless Radio Button for more than two seconds. The display will show the current wireless state either “DS On” or “DS Off” (Fig.9A-B). When you release the button, the new state, either “DS on” or “DS off” will be shown on the display. The tool will display the new state for two seconds, and then the tool will revert back to the current reading. You can tell that the wireless is on by the wireless symbol being visible on the bottom left of the display, Fig.11B.



Fig.9A

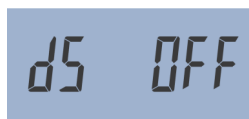


Fig.9B

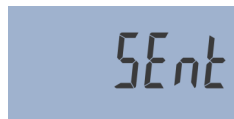


Fig.10A



Fig.10B

2. When the radio is active, a short press on the radio button will transmit a reading. The display will show either “Sent” or “Held”, Fig.10A-B.

- **Sent**, means the data has been successfully sent to the data collection device.
- **Held**, means the data is stored in the tool. This will happen when the tool is not able to transfer the data due to; being out of range, or in a bad reception area. The data will be sent when the connection is restored.

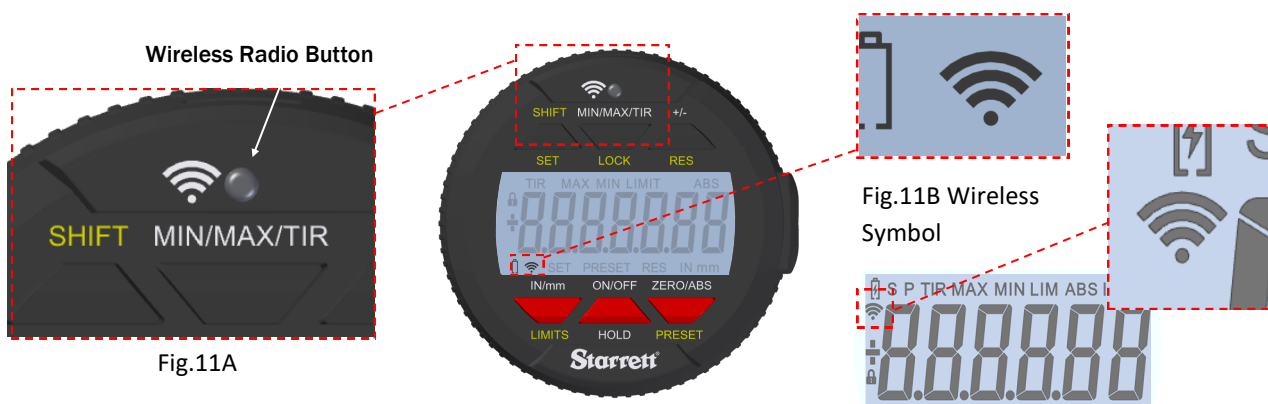


Fig.11A

Fig.11B Wireless Symbol

3. If you press and hold the **Wireless** button, you will go into the functions mode and be able to change between the three functions. The tool will display either “On” or “Off” and then the current function. If you continue to hold the **Wireless** button, and then press the **In/mm** button, the tool will cycle through the functions one at a time. When the desired function is displayed release the **Wireless** button to select the function.

Functions	Description	Display
DSA	The tool is ready to communicate with DataSure® Advanced 4.0	
RESET	Reset is used to delete the Security Key used by DataSure® Advanced 4.0 when setting up a wireless tool to communicate with a Gateway. This is explained on the next page, “Communicating with your Wireless Tool” pg.12	
OTA	(Over the Air) Update: In this profile, the firmware of the tool can be updated wirelessly with a PC or Smart Phone.	

3.1 Communicating with your Wireless Tool

Starrett Wireless Tools communicate with a DSA 4.0 Gateway using encryption. This prevents outsiders from 'listening in' to the data being sent. The first time a wireless tool talks to a Gateway they establish a set of security keys. Both sides remember the key and use it to reestablish communications. This can occur when the tool is turned off or is moved out of radio range. Once the tool is within range and turned on, the Wireless Tool and the Gateway will use the security keys to automatically resume communicating.

3.1.1 Establishing First Communications

Make sure your DSA 4.0 system is on and communicating with the Gateway (1). Activate the wireless radio by pressing and holding the wireless button until you see "dS on". After a little while the tool will appear in the DSA 4.0 application on the Gateway Tab, match the UID number on the tool with the one in DSA 4.0. The Permissions column will be Red and labeled "Blocked". Click on the Blocked Button. The Button will immediately turn Gray and display "Updating". After a slight delay the button will turn green and display Allowed. At this time the wireless tool has a blank security key, and after a slight delay the Connection Status column will change to Online and show Green. This means that they have exchanged keys and successfully established a secure link.

3.1.2 Moving Tools Between Gateways

If a Wireless Tool has established a secure link with a Gateway (1) and you want to move the tool to a new Gateway(2), the tool's security key needs to be reset.

3.1.2.1 Resetting a Wireless Tools Security Key:

1. First Turn off the Tool, and then block it on the Gateway tab of the Gateway(1) in DSA 4.0.
2. Wait for DSA 4.0 to report the tool is offline.
3. Turn on the tool.
4. Press and hold the Wireless Radio button.
5. The Display will then show "dSA".
6. Press the In/mm button once to see "rESet." on the display.
7. Release the Radio Button. The security Key has been erased.
8. Move within range of the new Gateway(2) and follow "Establishing First Communications" above.

3.1.2.2 Moving to Another Gateway(1):

If you move the Wireless Tool to a Gateway(1) that has already exchanged security keys with the wireless tool, then the security keys for both the wireless tool and gateway need to be erased.

Follow " Resetting a Wireless Tools Security Key:" above steps 1-11.. Keep the Wireless Tool on, and then go to the DSA 4.0 application and navigate to the Gateways tab.

- Note the UID number label on the Wireless Tool and select that UID number in the Device Selection drop down box.
- Press the "Reset Security Key" button below the drop down. The tool should change to Online, and a secure link has been established.

For more information about the DSA 4.0 software please consult the DataSure® Advanced 4.0 User Guide.

Section 4 Rechargeable Battery

4.0 Rechargeable Battery Care and Maintenance

The rechargeable battery in your tool will last longer when maintained properly. When the charge on the battery is getting low, a battery symbol will be visible on the display (Fig.13C). When you see this icon, charge the battery at the next opportunity. Fig.12 shows where to attach the USB Micro B side of the cable into the tool. The USB cable is keyed to plug in only one way, check the orientation of the cable end and the USB port before plugging in the cable. The tool may be used while it is plugged in. See Fig.13A-E for information about the changes to the battery icon and what they mean.

If you wait too long to recharge the battery, the tool will automatically shut down completely to conserve the remaining charge on the battery. The battery must have a minimum charge to be recharged. If the tool will not turn on with the on/off button, then you must charge the tool. When the tool is plugged in after being completely shutdown, the tool will go through an initialization startup phase, See "Startup Sequence", Pg. 14. We recommend that the tool only be charged when the battery icon is visible to help prolong battery life. Depending on use, the time between charges could be weekly under heavy use or monthly under light use.



Fig.12

The USB Micro B side of the charging cable plugs into the USB port at the top of the Indicator as shown. The other side of the USB cable plugs into the power supply.



Fig.13A



Fig.13B

No Symbol, The Battery has a Normal Charge

NOTE: The tool may be used while charging.



Battery Charge is Low

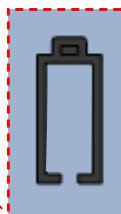


Fig.13C

Battery is Charging



Fig.13D

Blinking

Battery is Charged, and the USB cable is still attached

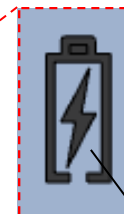


Fig.13E

Stops Blinking

4.1 Startup Sequence

1. After the tool has completely shut down , you have to plug it in to charge the battery. The tool will flash a sequence of information on the display, see the examples below (Fig's.14-17). This is normal for the indicator and a brief description of the screens is shown below.
2. At the end of the sequence you will see “CAL” on the display, See 4.2 Calibrate below for instructions.

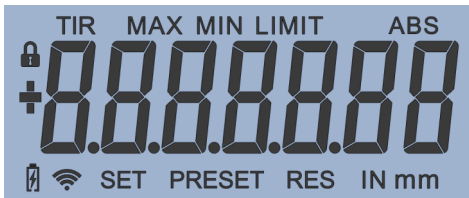


Fig.14 Full Lamp, shows all characters.



Fig.15 Indicator Number



Fig.16 Indicator Version

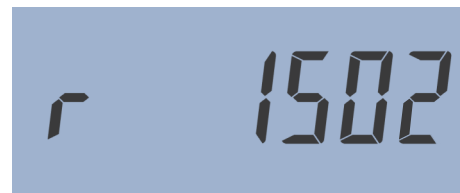


Fig.17 Firmware Version

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

4.2 Calibrate

3. Fig.18, When “CAL” is displayed, move the spindle slowly in and out, until the display starts to show measurements. This movement will calibrate the indicator.
4. If you don't move the spindle, “Cal” will stay on the display for about 10 seconds and the display will go blank.
5. To return to “Cal” mode, move the spindle or quickly press the on/off button.
6. If you move the spindle too fast it will take longer for the tool to initialize.



Fig.18 Calibrate the Indicator

4.3 Environmental Consideration

Temperature		10-30 °C, 50-86 °F
Humidity		30-85%RH (no condensation)
Atmosphere		Non-corrosive, Nonflammable
IP67 Rating		Ingress Protection
6	Dust Tight	No ingress of dust, complete protection against dust.
7	Immersion up to 1 Meter	Up to 1m of submersion for up to 30 minutes