Starrett®

TRUST IS IN THE NAME

PKG08803- UM2900

User Manual

READ THIS MANUAL BEFORE USING THE INSTRUMENT

**ANTES DE UTILIZAR EL INSTRUMENTO,
LEA ATENTAMENTE ESTE MANUAL**

LIRE CE MANUEL AVANT D'UTILISER L'INSTRUMENT

**LEIA ATENTAMENTE ESTE MANUAL ANTES
DE UTILIZAR O INSTRUMENTO**

使用仪器前请阅读本操作手册

**DIESES HANDBUCH VOR DER VERWENDUNG
DES MESSGERÄTS LESEN**

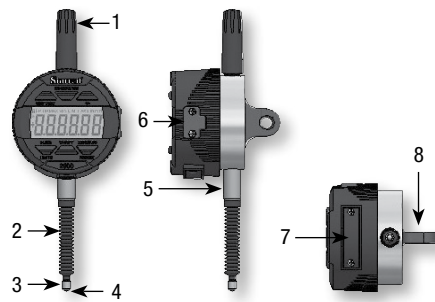**LEGGERE ATTENTAMENTE QUESTO MANUALE PRIMA
DI UTILIZZARE QUESTO STRUMENTO**

Starrett®

2900 INDICATOR CAPACITIVE SERIES

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2900 INDICATOR CAPACITIVE SERIES

IP67

THIS IS A STARRETT USER GUIDE FOR THE 2900 INDICATOR CAPACITIVE SERIES.

ALL SPECIFICATIONS IN THIS DOCUMENT ARE CORRECT AT TIME OF PRODUCTION AND ARE SUBJECT TO CHANGE. PLEASE CONTACT STARRETT FOR FURTHER INFORMATION.

CAUTIONS ON USE

1. Avoid dropping the Indicator.

2. Avoid extreme temperatures, direct sunlight or below freezing for extended periods.

3. Avoid shocks to the contact point and spindle. Do not apply any radial force to the spindle.

4. If the indicator is stem-mounted, protect the indicator from being struck or bumped to prevent stem/case mechanical alignment damage.

5. Do not over-tighten the mounting mechanism and use clamp mounting rather then set screws, if possible, to prevent damage to the spindle.

6. 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 indicator, other than what is outlined in "Accessories" on page 27

7. Avoid using anything that might damage the buttons when pressing the buttons.

8. Use the appropriate gage stand or indicator holder for the job intended.

OPERATING INSTRUCTIONS

1. First read the "New battery, Startup Sequence" section below, and the "Zero Sequence" on the next page 11.

2. Install the batteries that came with the indicator. Refer to "Battery Drawer Removal" and "Battery Replacement" on pages 25, 26.

3. Lightly clean the contact point.

4. Fasten the indicator onto the appropriate holding device.

5. You can turn the indicator on by either pressing the ON/OFF button or moving the spindle.

6. 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, however this will be available on the ME series of indicators.

7. Place the indicator perpendicular to the reference surface being measured. Allow enough movement to be able to take a higher or lower measurement.

8. Reset the display by pressing the ZERO Button.

9. 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.

10. 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.

NEW BATTERY, STARTUP SEQUENCE

1. Each time you put in a new set of batteries, the indicator will go through a startup sequence. See "Battery Installation and Replacement" on pages 25, 26. At the end of the sequence you will need to move the spindle to initialize the measurement system.

2. When the indicator comes on after the batteries have been changed, the display will go through a series of changes Fig.1-5.

Note: The information displayed here will change depending on the indicator you are using and is shown, to give you an idea of what to expect when changing the battery.

Full Lamp   Fig. 1

Catalog Number   Fig. 2

Version   Fig. 3

Firmware Version   Fig. 4

Calibrate the Indicator   Fig. 5

3. When "Cal" is displayed, move the plunger slowly in and out, until the display changes to show the indicator measuring. This movement will calibrate the indicator.

4. This feature will happen each time the battery is replaced.

5. If you don't move the spindle, "Cal" will stay on the display for only 10 seconds and the display will go blank. To return to "Cal" mode move the spindle or quickly press the on/off button.

6. If you move the spindle to fast it will take longer for the tool to initialize.

NEW ZERO SEQUENCE

7. After speed mode is completed press the ZERO/ABS button and the display will show a dashed line as seen in Fig.6 below. The line will incrementally disappear from left to right Fig.7; this is a visual clue on 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, takes about a second to complete.

8. Fig.7 shows a representation of how the display will look when the sequence is completed.
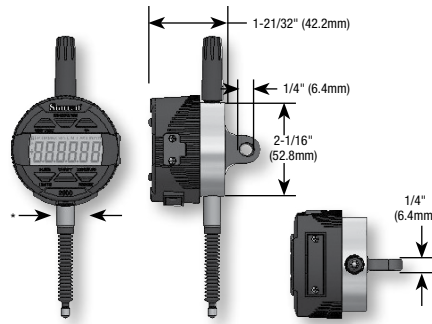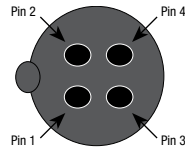

Fig. 6   Fig. 7

ENGLISH

1-21/32" (42.2mm)

1/4" (6.4mm)

2-1/16" (52.8mm)

1/4" (6.4mm)

	CATALOG NO.	RESOLUTION	RANGE	STEM DIA*
Standard Features	2900-3-1	.0005"/.01mm	1"/25 mm	.375"
	2900-3M-25	.01mm	25 mm	8 mm
Advanced Features	2900-5-1	.0005"/ .01mm	1"/25 mm	.375"
	2900-5M-25	.01mm	25 mm	8 mm
ME Series	2900-3ME-25	.01mm /.0005"	25 mm / 1"	8 mm
	2900-5ME-25	.01mm /.0005"	25 mm / 1"	8 mm

POWER REQUIREMENTS AND CURRENT CONSUMPTION	
Battery	2 – CR2032 Lithium Coin Cells
	Capacity 240 mAh
Automatic Sleep Time	30 minutes of non-use

SPC SERIAL OUTPUT	
18 ASCII Characters	1 Space Character 2 Status characters indicating the operating mode • BLANK - Normal mode • OL - Displacement outside Lower Limit • OU - Displacement is outside the Upper Limit • MN - Displacement is minimum peak displacement stored • MX - Displacement is minimum peak displacement stored • TR - Displacement is the T.I.R. stored • LL - Displacement is the lower or minimum limit setting • LU - Displacement is the upper or maximum limit setting • HL - Displacement is a held displacement 1 Sign Character (minus but no plus) 1 Space Character (IN mode only) 6 Digits 1 Decimal point 2 Spaces 2 Character strings to indicate units "IN" or "mm" 1 Carriage Return 1 Line Feed

COMMUNICATION PROTOCOL	
Baud Rate	4800
Data Bits	8
Parity	None
Stop Bits	2
Flow Control	None
Data Request and Response Timing	Receive High to Low Momentary
	Response Time Delay 120 ms
	Transmit Time 45 ms

SERIAL OUTPUT CONNECTOR	
Pin 1	GND signal return
Pin 2	Serial Receive Data Input (RX/RQST)
Pin 3	Serial Transmit Data Output (TX/DATA)
Pin 4	Remote Zero – Special Order Only
	State Change High to Low

Pin 2   Pin 4
Pin 1   Pin 3

SERIAL INPUT VOLTAGE LEVEL SPECIFICATION		
Logic "0"	Vin < 1.30 Volts	
Logic "1"	Vin > 1.98 Volts	
SERIAL OUTPUT VOLTAGE LEVEL SPECIFICATION		
	MINIMUM	**MAXIMUM**
Low Level	Vss	Vss + 0.25 @ -1.5mA Load
High Level	Vdd – 0.25 @ 1.25 mA Load	Vdd

Note: Vss = 0 Volts, Vdd = 2.7 to 3.6 Volts

ENVIRONMENTAL CONSIDERATION	
Temperature	10-30 °C,
Humidity	30-85%RH (no condensation)
Atmosphere	Non-corrosive, Nonflammable

IP67 IP67 RATING (INGRESS PROTECTION RATING)*		
6	Dust Tight	No ingress of dust, complete protection against contact
7	Immersion up to 1m	Up to 1m of submersion for up to 30 minutes

NOTE: Remember, to ensure the specified IP67 performance, the following items will need to be intact and assembled onto the indicator.

- Spindle bellows
- Back lug with gasket
- Stem cap
- Data output cover or data cable with gasket
- Battery door with gasket

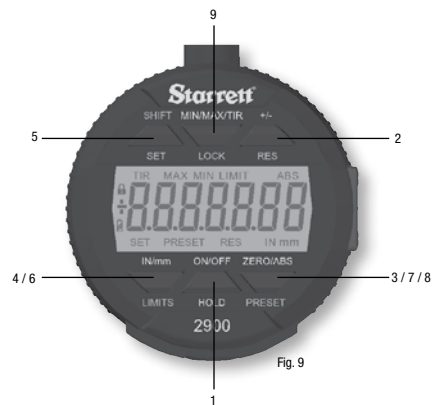All items that have screws will need to be secured tightly.

Fig. 9

DESCRIPTION OF THE BUTTON 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, and then press the button for the required function.

1. **ON/OFF** - Power button. Press and release to turn on, and Press and hold for 3 seconds to turn off.

2. **+/-** - Plus/Minus sets the direction (polarity) of the reading

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 "New Zero Sequence" on page 11.

**DESCRIPTION OF THE BUTTON FUNCTIONS
(CONTINUED)**

4. **IN/mm** - Toggles the display between English or Metric values.

5. **SHIFT/SET** - Dual function button used to enable the, Preset and the Limits (Go/No Go) function. When enabled the SET (S) icon will be displayed on the top left corner of the display.

6. **LIMITS** - Press the SHIFT/SET button then press the LIMITS button to enable the Go/No Go function. Sets the Min and Max values for the Go/No Go function. Refer to the section, "Setting the Limits" page 19.

7. **PRESET** - Press the SHIFT/SET button then press the PRESET button to enable the PRESET function. Refer to the section "Setting PRESETS" page 17.

8. **ZERO/ABS** - Dual Function button Zero's the display or enables the ABS mode. Press and hold for 2 seconds to activate the ABS mode then Press and hold for 2 more seconds to exit the ABS mode. To zero the display, refer to step 3 above.

9. **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" page 22.

SETTING PRESETS

This function is not available with the basic type indicators. To set the value, follow the steps below:

1. Press and hold the ZERO/ABS button until the ABS icon appears in the upper right corner of the LCD Fig. 9.

2. The values can be set to: ±99.9999 inches or ±9999.99mm.

3. Press the SHIFT/SET followed by the PRESET button. The SET and PRESET icons will appear in the upper left hand corner of the LCD. The PRESET icon should be flashing Fig. 10.

Fig. 10

SETTING PRESETS (CONTINUED)

4. To move from the PRESET (P) icon to a digit, Press the SHIFT/SET button. The flashing digit indicates that the digit is ready to be SET Fig. 11. Press the PRESET button to increment the value. To set the digit, Press the SHIFT/SET button.

Fig. 11

5. To move to the next digit Press the SHIFT/SET button again and repeat step 4.

6. Repeat steps 3 and 4 until all the digits are SET.

7. To set a negative value Press the PRESET button when the plus/minus sign icon is flashing. Fig. 11

8. To exit the PRESET function, Press the PRESET button when the PRESET icon is flashing. The SET value will remain displayed.

9. Press and hold the ZERO/ABS button to exit the Preset function.

Press *SHIFT / SET BUTTON* then *PRESET BUTTON* to enter into PRESET mode.

Press *SHIFT / SET BUTTON* to cycle from digit and back to preset.

Press *PRESET BUTTON* to increment the value of the digit or the plus/minus sign.

SETTING THE LIMITS (GO/NO GO FUNCTION)

This function is only available with the advanced type indicators.

1. Select the units to be displayed.

2. Press the SHIFT/SET button. The SET icon will appear in the upper left corner Fig. 12.

Fig. 12

3. Press the LIMITS button. The MIN LIMIT icon will appear in the upper middle of the display Fig. 13.

Fig. 13

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SETTING THE LIMITS (GO/NO GO FUNCTION)
(CONTINUED)

4. Press the SHIFT/SET button. The LIMIT icon will flash on/off.

5. Adjust the spindle to the desired minimum value.

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 Fig. 14 next page.

8. Press the SHIFT/SET button. The LIMIT icon will flash on/off.

9. Adjust the spindle to the desired maximum value.

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 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 icon will indicate the direction the limit has been exceeded. To exit Press the LIMITS button.

SETTING THE LIMITS (GO/NO GO FUNCTION)
(CONTINUED)

Press [SHIFT / SET BUTTON] then [LIMITS BUTTON] to enter into MIN. LIMIT mode.

Press [SHIFT / SET BUTTON] the LIMIT icon will flash on/off

Adjust the spindle to the value you want →

2.3920

Fig. 14

→ Then press [SHIFT / SET BUTTON] to capture the minimum value. The LIMIT icon will stop flashing.

Press [LIMITS BUTTON] the MAX. LIMIT icon will appear.

Press [SHIFT / SET BUTTON] the LIMIT icon will flash on/off.

Adjust the spindle to the value you want. →

0.1880

Fig. 15

→ Then press [SHIFT / SET BUTTON] to capture the maximum value. the LIMIT icon will stop flashing.

Press [LIMITS BUTTON] the indicator is now set up wtih a maximum and minimum limit range.

Press [LIMITS BUTTON] To exit LIMIT mode when you have completed your measurements.

SETTING THE MIN/MAX/TIR FUNCTION

The Min/Max/TIR function measures the maximum and the minimum measurement values and displays the difference or the range of deviation in the part you are measuring.

NOTE: This function is only available with the advanced type 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 is not outside of the full travel of the indicator. 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 in the display.
5. Press the ZERO/ABS button. The tool is now ready 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 in the display.
8. Press the ZERO/ABS button. The tool is now ready 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 in 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 taken the information.

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

Press [MIN / MAX / TIR] then [ZERO / ABS] to start measuring in MIN. mode.

Press [MIN / MAX / TIR] then [ZERO / ABS] to start measuring in MAX. mode.

Press [MIN / MAX / TIR] to display the TIR value.

DATA OUTPUT

Fig. 16
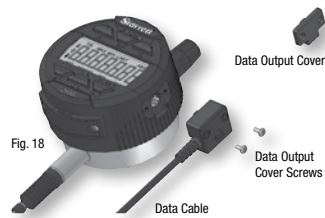
Data Output
Cover Location

DATA COVER REMOVAL

The data cover can be removed using a small Phillips head screwdriver. When using a data cable, place the data cover somewhere you can easily find it. When you are done using the data cable, make sure you replace the data cover to protect the electronics from dust and liquids.

Data Output Cover

Fig. 17

DATA CABLE ATTACHMENT

Plug in and secure the cable using the Phillips head screws taken from the data cover. The orientation of the data cable plug can only be placed as shown in Fig. 18.
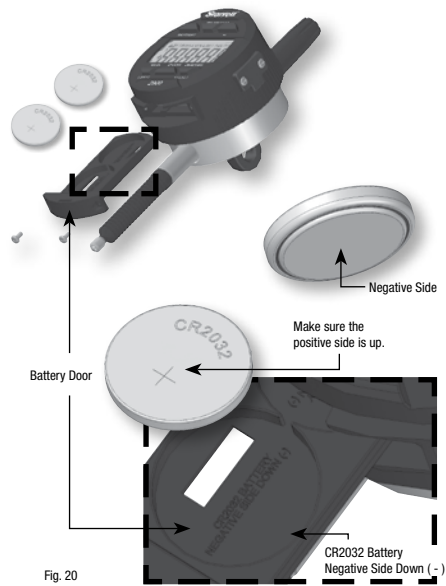
Data Output Cover

Fig. 18

Data Output Cover Screws

Data Cable

BATTERY DRAWER REMOVAL

The screws in the battery drawer can be removed using a small Phillips head screwdriver.

Battery Drawer

Fig. 19

BATTERY INSTALLATION AND REPLACEMENT

Remove the battery drawer then replace the two batteries with two-type CR2032 batteries negative side down. Slide the tray carefully into the indicator and secure with the two screws. Inside the tray, there is a reminder of the type of battery and their orientation.

Negative Side

Make sure the positive side is up.

CR2032

Battery Door

CR2032 Battery Negative Side Down (-)

Fig. 20

ACCESSORIES

The 2900 comes standard with a Lug-On-Center back. The back is easily removed by unscrewing the four back screws as shown in Fig. 20.

Do not touch any of the inner workings of the indicator, and protect them from liquids, dust, and any other foreign matter. Replace the back-lug as soon as possible. Some examples of the different backs are listed below.

The Contact Point is another one of the parts on your indicator that is interchangeable. Caution: When removing the contact from an electronic indicator, two pairs of pliers need to be used, one having soft jaws so as not to damage the spindle and the second to loosen the contact. Caution must be made not to twist the tools spindle during this operation. The contact point can be removed by carefully holding the spindle firmly with the soft jawed pliers and then unscrewing it counter-clockwise with your other pliers. Replace the contact point the same way, turning the tip on clockwise. Excessive radial rotation of the spindle shaft may cause your indicator to stop functioning properly. Special contact points are listed on the next page.

These backs, contact points and all of the available indicator accessories can be found in your **Starrett catalog** .

Back Screws x4   Stem Cap

Back - Lug

Spindle   Fig. 21

Spindle Bellows

Contact Point

AGD DIAL INDICATOR BACKS

PART NUMBER	EDP	DESCRIPTION
PT06608-1	70770	Lug off center, #25
PT06608M	70776	Adjustable bracket, #25
PT24076	72483	Screw-type lug back 1/4-20 thread
PT06608E	70772	Screw-type lug back 3/8-24 thread
PT24075	72487	Screw-type lug back 1/4-28 thread
PT06608F	70773	Post-type lug back, #25
PT06608J	70774	Flat back, #25
PT26160	67405	Flat back PLASTIC, #25

AGD DIAL INDICATOR SPECIAL CONTACT POINTS

PART NUMBER	EDP	DESCRIPTION	
PT06632-2	70790	Contact Point , #2	
PT06632-3	70791	Contact Point, #3	
PT06632-4	70792	Contact Point, #4	
PT06632-5	70793	Contact Point, #5	
PT06632-6	70794	Contact Point, #6	
PT06632-7	70795	Contact Point, #7	
PT06632-8	70796	Contact Point, #8	
PT06632-9	70797	Contact Point, #9	

AGD DIAL INDICATOR SPECIAL CONTACT POINTS			
PART NUMBER	EDP	DESCRIPTION	
PT06632-10	70798	Contact Point, #10	
PT06632-11	70799	Contact Point, #11	
PT06632-12	70800	Contact Point, #12	
PT06632-13	70801	Contact Point, #13	
PT06632-14	70802	Contact Point, #14	
PT06632-15	70803	Contact Point, #15	
25W	53916	Roller Contact Point	
25R	50153	Contact Point Set of 14 Points	
PT24728	64963	Contact Point Adaptor, mm to inch	
PT24729	64964	Contact Point Adaptor, inch to mm	

AGD DIAL INDICATOR SPECIAL CONTACT POINTS			
PART NUMBER	EDP	DESCRIPTION	
PT21697-1/2	64632	Contact Point Extension, 1/2"	
PT21697-1	64633	Contact Point Extension, 1"	
PT21697-2	64634	Contact Point Extension, 2"	
PT21697-3	64635	Contact Point Extension, 3"	
PT21697-4	64636	Contact Point Extension, 4"	