

FEDERAL

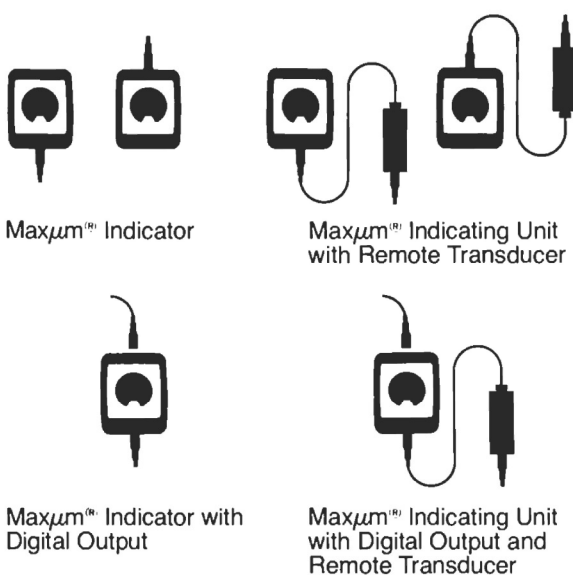
MAXUM

Digital Electronic Indicator
Setup & Operating Instructions



Max μ m® Models

These instructions apply to the following Max μ m® Indicators and Indicating Units:



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Precautions and General Information

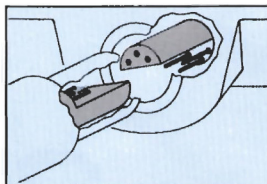
All Max μ m® Models: To conserve battery life, make sure the Indicator or Indicating Unit is left in its "Power Down" mode when not in use.

Max μ m® units are ruggedly built to withstand hard use, and their gasketed case, crystal and stem assemblies resist encroachment by most fluids. However, Max μ m® Indicators, Indicating Units and Remote Transducers should never be immersed. Regularly inspect all seals and spindle boots to guard against fluid penetration.

Digital Output Models: The configuration of the internal battery board assembly prevents digital output models from being supplied with or converted to the "12 o'clock" stem or transducer connector orientation.

To prevent contaminants from entering the 6-pin digital output connector, the dust cap should **always** be firmly in place whenever an output cable is not connected.

Remote Transducers: Any Max μ m® Indicating Unit can be used with any Max μ m® Remote Transducer. Make sure the transducer connector is properly aligned with the indicator connector before connecting them.



To disconnect the Remote Transducer, pull the connector straight out; **do not twist or unscrew the connector**. Also, **do not severely bend, twist or strain the transducer cable**.

If the Indicating Unit is in its operating mode when its Remote Transducer is disconnected, the display will remain on. However, the unit is **not** consuming any more energy than if it were in its "Power Down" mode.

Controls



True Spindle Position

To show the actual position of the spindle in the Indicator's measuring range. When True Spindle Position is activated, the Indicator's analog display changes to the alternate mode, i.e. a normal "Fan" display changes to a "Single Element" display and vice versa.



Left Tolerance Limit

To set the left arrow at desired limit.



Display Switches

To index the digital readout and analog display clockwise (right-hand switch) or counterclockwise (left-hand switch). The display switches will function only when the Indicator or Indicating Unit is in the "Auto-Zero" mode.



Right Tolerance Limit

To set the right arrow at desired limit.



Auto-Zero

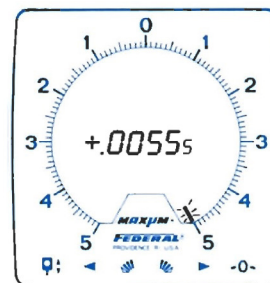
To electronically set both the analog display and digital readout to zero.

Inspection

The Max μ m® Indicator or Indicating Unit is shipped with its battery installed. There is no power switch; the Indicator or Indicating Unit is always "on". However, when the Spindle is fully extended ("at rest") or fully depressed, the Indicator or Indicating Unit is in its "Power Down" mode, and only the "+" or "-" sign will show on the display.

Fully depress the Spindle once, and hold. The opposite sign will appear. This assures that the Max μ m® Indicator or Indicating Unit is operational.

Range Signal



Whenever the digital range exceeds the analog display range, the last, single analog display graduation will blink. This signals that the remaining digital range is still operational. When the digital range is exceeded, the Indicator or Indicating Unit enters the "Power Down" mode.

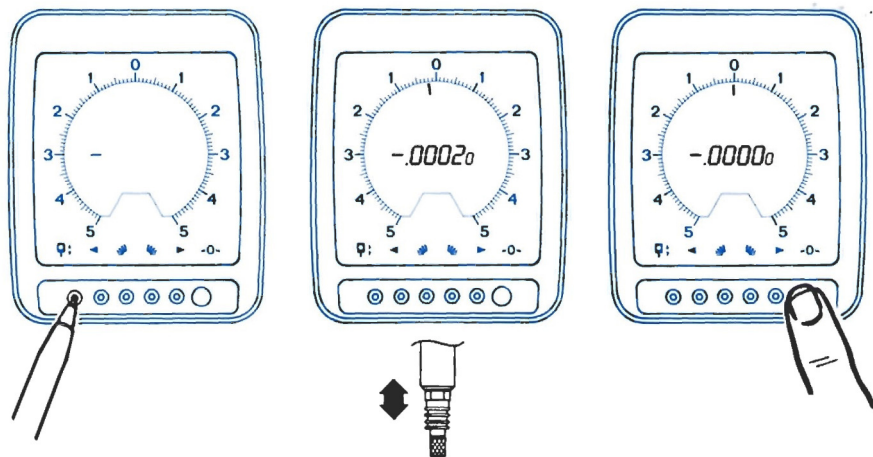
Setup

Use a ball-point pen or similar pointed instrument to activate switches. Do **not** use a pencil; graphite dust may affect switches.

A Max μ m[®] Indicator can be mounted in a gage or fixture using an optionally available back. Or, the Indicator can be stem-mounted.

A Remote Transducer **must** be mounted by its stem only. **Do not mount the Transducer by its 1.00"/25.4mm diameter barrel.**

Mounting brackets and racks are available to hold Remote Transducers and Indicating Units for use with fixture gages.



1. Press and release True Spindle Position Switch.
2. Mount the Indicator or Remote Transducer in the gage.

3. Place the master in the gage.
4. Mechanically adjust the gage, Indicator or Remote Transducer until reading is at or near zero.

5. Securely lock the Indicator or Remote Transducer in position.
6. Press and release Auto-Zero for final zero setting.

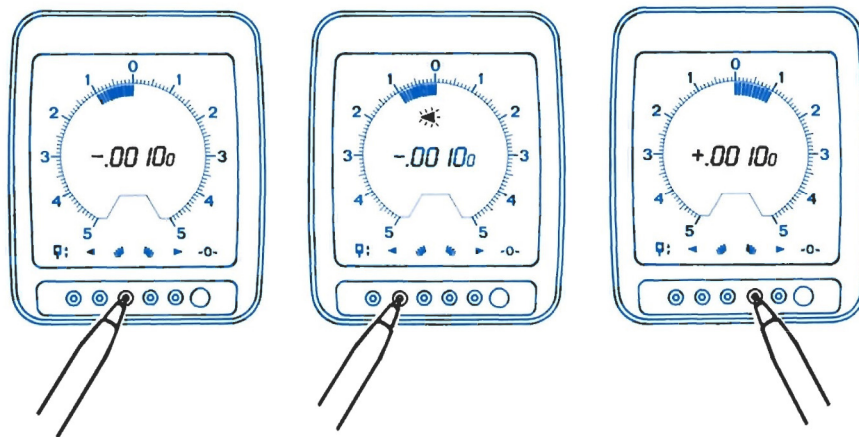
Note: Some Federal Products' gages are furnished with separate instructions covering their use with Max μ m[®] Indicators. Refer to those instructions for specific steps for setup and operation.

Note: To save battery life, the gage setup must permit the Indicator or Indicating Unit with Remote Transducer to return to its "Power Down" mode when not in use.

Setting Upper and Lower Limits

Limits may be set to the resolution of the least digit anywhere within each model's analog range. Both limits cannot be set on the same side of zero. Any convenient method, such as a height stand or a bench comparator, may be used to set limits. Once set, limits are retained in memory, even when the Indicator or Indicating Unit is in its "Power Down" mode, and remain set until changed. If no limits are needed, move them outside the normally used portion of the measuring range.

Note: To set limits, the measuring spindle must be positioned within the analog range of the display. To use Display Switches, the Indicator or Indicating Unit must be in the "Auto-Zero" mode.



1. Depress the spindle or press appropriate Display Switch to index the digital readout to the desired lower limit (–) set point.

2. Press and release Left Tolerance Limit Switch. A blinking left arrow will appear.

3. Depress the spindle or press appropriate Display Switch to index the digital readout to the desired upper limit (+) set point.

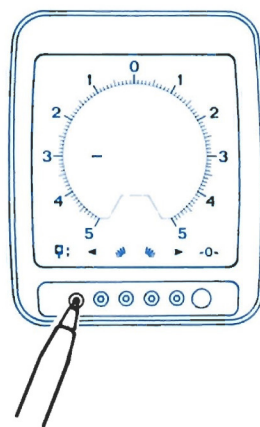
4. Press and release Right Tolerance Limit Switch. A blinking right arrow will appear.

Note: To check limit settings, use Display Switches to index the digital display thru the limit set points. Reset limits if necessary.

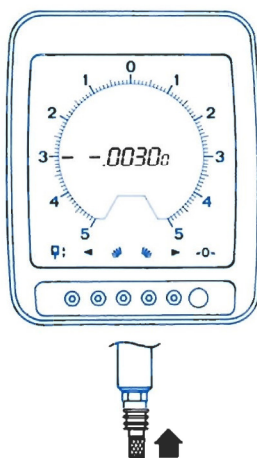
Reapportioning Measuring Range

For most comparative measurements, the measuring range is apportioned equally on both sides of zero. However, for certain applications, the range may be offset partially or completely to either side of zero.

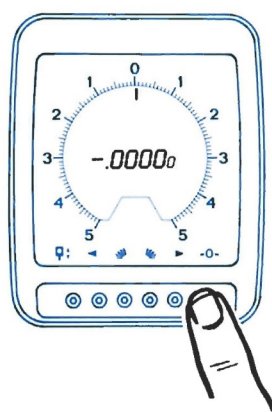
Note: Measuring range cannot be reapportioned on Maxum[®] Indicator or Indicating Unit models DEI-4___ (±.199mm digital range).



1. Press and release True Spindle Position Switch.



2. Depress the Indicator or Transducer spindle until display shows the desired mid-range point.



3. Press and release Auto-Zero.

Contact Points

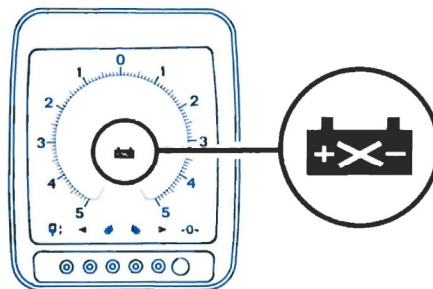


Max μ m[®] Indicator and Remote Transducer models having a .375"/9,5mm diameter stem can use any regular 4-48 threaded indicator contact point.

Metric Max μ m[®] Indicator and Remote Transducer models having an 8mm/.315" diameter stem use an M2.5 threaded contact point.

Many alternate contact points are available; refer to Max μ m[®] Digital Electronic Indicator Price List A-250.

Battery Signal

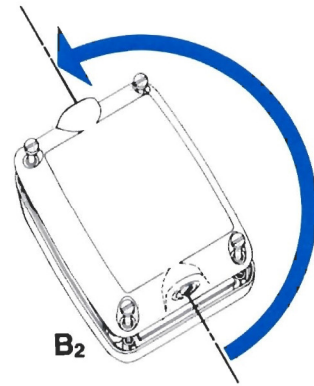
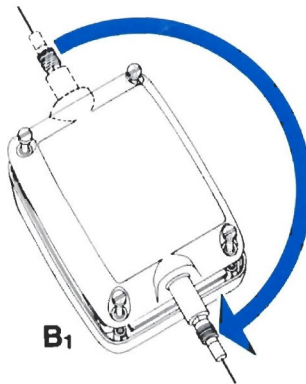
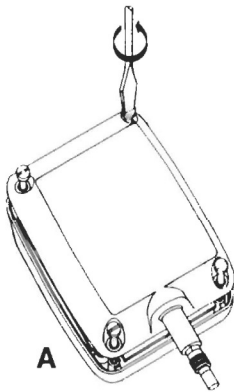


When the Battery Signal appears on the display, it indicates that battery power is too low for dependable readings; the Indicator or Indicating Unit display will no longer operate.

This feature assures that inaccurate readings will not occur due to insufficient power.

Refer to "Replacement Parts" section of this instruction booklet for replacement battery numbers and ordering information.

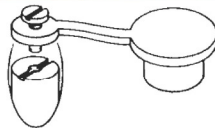
Changing the Battery



Disassembly

1. Place Indicator or Indicating Unit face down on a clean, soft cloth. If applicable, disconnect Remote Transducer and/or output accessory cable. Loosen four screws at the corners of the case. Screws are held captive to prevent loss; do not remove screws completely from back half of case.

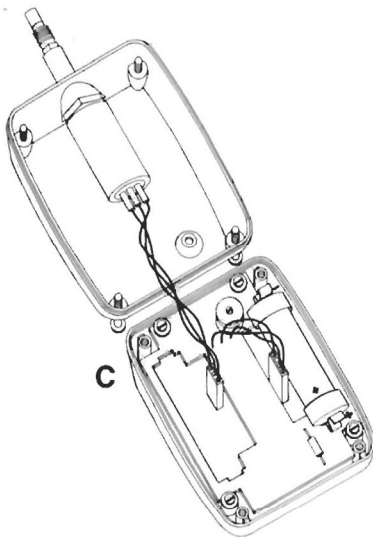
Note: For Output models, remove small screw holding captured dust cap and dust cap itself. Set aside.



2. Carefully lift the back half of the case and open it as specified below:

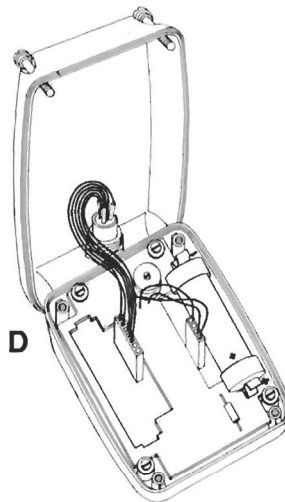
- Regular Indicator (w/6 o'clock stem) — **C**
- Regular Indicator (w/12 o'clock stem) — **B₁** and **C**
- Indicating Unit (for Remote Transducer; w/6 o'clock connector) — **B₂** and **D**
- Indicating Unit (for Remote Transducer; w/12 o'clock connector) — **D**
- Indicator with Digital Output — **E**
- Indicating Unit (for Remote Transducer) w/Output — **B₂** and **E**

B₁ and **B₂**: Rotate the back half of the case 180° before opening completely.



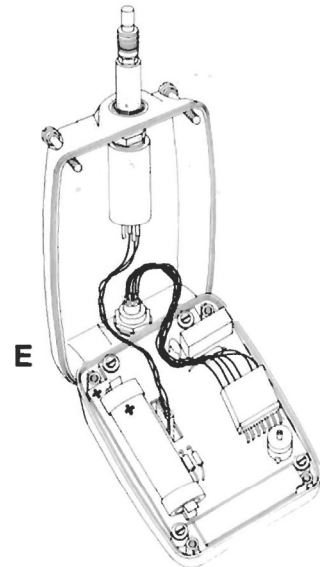
3. Carefully remove large "O" ring seal.

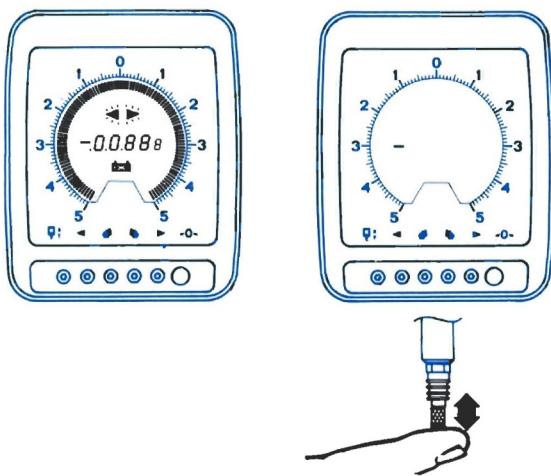
Note: All Maxum® Indicators and Indicating Units use a 3.4 volt lithium battery. A single 4.5 volt alkaline battery can be substituted for the 3.4 volt lithium battery, but operating life will be shorter. See "Replacement Parts" section of these instructions for battery part numbers and ordering information.



4. Carefully remove battery and replace with new battery, observing polarity symbols.

When changing the battery, save the two plastic end caps from the old battery and place them on the new battery. If larger 4.5 V alkaline battery is being substituted for the 3.4 V lithium battery, the end caps are not needed.





Reassembly

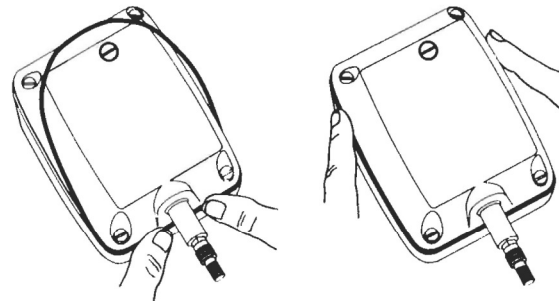
5. Close the case. For Indicating Units, reconnect the Remote Transducer. Pick up Indicator or Indicating Unit and observe display; some or all of the display elements will be "on". Because this condition will drain battery power, **immediately** depress and slowly release measuring spindle to return the Indicator or Indicating Unit to its "Power Down" mode.

Note: Whenever the battery is removed and replaced, the Indicator or Indicating Unit will lose its previous zero and limit settings.

6. Place the Indicator or Indicating Unit face down on cloth. Make sure that the four screws align with their threaded holes. Also make certain the wires are not pinched between the battery and the back of the case.

Note: Make certain that both halves of the case have been aligned correctly before closing.

7. Tighten the four screws at the corners of the case. Then, back off each screw one complete rotation.



8. Slip the "O" ring seal over the stem and into its slot between the two halves of the case. Gently press it into the slot all the way around the case. Be careful not to stretch or crease the "O" ring seal.

9. Retighten the screws. **Do not overtighten.**

Note: For Output versions, reinstall the dust cap.

Checking Accuracy

Accuracy is checked at zero, both ends of the digital range, and approx. halfway between zero and both ends of the digital range. Use a heavy-duty comparator stand with fine adjustment and five gage blocks as listed in Table A.

1. Mount the Indicator (or Remote Transducer) securely on the comparator stand and place the "Zero" gage block under the measuring spindle.

2. Press and release True Spindle Position Switch.

3. Adjust the stand until the digital readout reads exactly zero. **Do not use Auto-Zero.**

4. Remove the "Zero" block and place each of the other gage blocks under the measuring spindle. Observe the digital reading for each. Each reading should be within the allowable variation listed in Table A. If not, refer to "Resetting Gain" procedure.

TABLE A

Max μ m* Model	Digital Range	Gage Blocks to use	Reading should be*	Allowable Variation in Digital Reading
DEI-1---	$\pm .01000''$	.100''	-.01000	$\pm .00010$
		.105''	-.00500	
		.110''	.00000	
		.115''	+.00500	
		.120''	+.01000	
DEI-2---	$\pm .0200''$	.100''	-.0200	$\pm .0002$
		.110''	-.0100	
		.120''	.0000	
		.130''	+.0100	
		.140''	+.0200	
DEI-3---	$\pm .0400''$	.100''	-.0400	$\pm .0008$
		.120''	-.0200	
		.140''	.0000	
		.100''**	.0000**	
		.120''	+.0200	
DEI-4---	$\pm .199\text{mm}$	1.12mm or 2.12mm	-.190	$\pm .002$
		1.21mm or 2.21mm	-.100	
		1.31mm or 2.31mm	.000	
		1.41mm or 2.41mm	+.100	
		1.50mm or 2.50mm	+.190	
DEI-5---	$\pm 1.000\text{mm}$	4.0mm	-1.000	$\pm .020$
		4.5mm	-0.500	
		5.0mm	0.000	
		5.5mm	+0.500	
		6.0mm	+1.000	

*See Note, page 12.

**Re-zero with .100" block.

Resetting Gain

Use a heavy-duty comparator stand with fine adjustment and two gage blocks as listed in Table B.

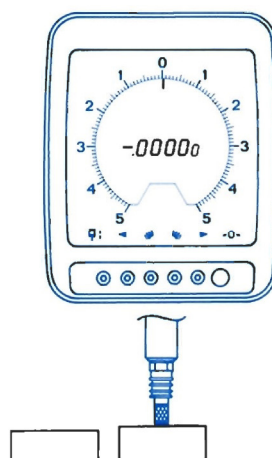


1. Remove the Calibration Control Access Screw on the back of the Indicator or Indicating Unit. Mount the Indicator (or Remote Transducer) on stand.
2. Adjust position of Indicator or Indicating Unit to allow access to the Calibration Control with a jeweler's screwdriver.
3. Press and release True Spindle Position Switch.

4. Place the "Zero" size gage block under the measuring spindle and adjust comparator stand until the digital readout reads exactly zero.

Do not use Auto-Zero.

5. Remove the "Zero" gage block and replace it with the second gage block. Observe the digital readout. If necessary, adjust the Calibration Control until the digital readout agrees exactly with the reading listed in Table B.



6. Remove the second gage block and replace it with the "Zero" block. The digital readout should read exactly zero. If not, repeat steps 4 through 6.

7. After setting gain, replace Access Screw. Be sure "O" ring seal is in place.

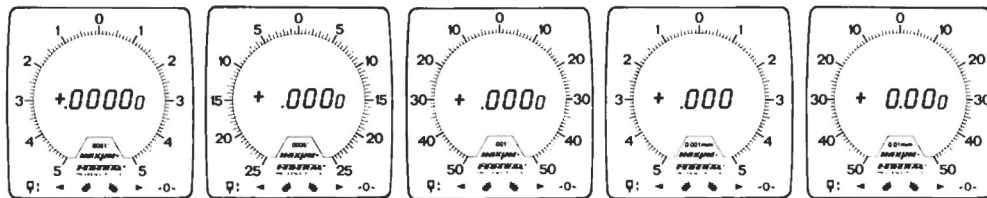
Note: For Indicators or Indicating Units having counterclockwise display direction, readings will have opposite signs.

TABLE B

Max μ m® Model	Digital Range	"Zero" Gage Block	Reading with "Zero" Block should be:	Second Gage Block	Reading with Second Block should be exactly:*
DEI-1____	$\pm .01000''$	.110"	.00000	.100"	-.01000
DEI-2____	$\pm .0200''$	.120"	.0000	.100"	-.0200
DEI-3____	$\pm .0400''$	.130"	.0000	.100"	-.0300
DEI-4____	$\pm .199\text{mm}$	1.20mm	.000	1.005mm	-.195
DEI-5____	$\pm 1.000\text{mm}$	2.0mm	0.000	1.25mm	-0.750

*See Note above

Models and Specifications



Analog Min. Grad.	.0001"	.0005"	.001"	0.001mm	0.01mm
Analog Range	±.005"	±.020"	±.040"	±0.05mm	±0.50mm
Digital Min. Value	.00005"	.0001"	.0001"	.001mm	0.001mm
Digital Range	±.01000"	±.0200"	±.0400"	±.199mm	±1.000mm
Pretravel	.040"	.030"	.010"	1.1mm	0.3mm
Overtravel	.060"	.050"	.030"	1.6mm	0.8mm
Accuracy (% of Digital Range)	0.5%	0.5%	1.0%	0.5%	1.0%
Notes (see below)	1, 2	3, 4	3, 4	1	1, 5

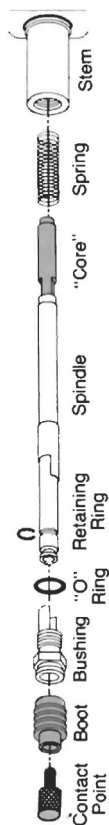
Total range of spindle travel 120"/3,05mm

Gaging force 3 oz./85 grams, preloaded

Operation Temperature 50° to 130°F/10° to 55°C

Storage Temperature -4° to 149°F/-20° to 65°C

1. Digital range is greater than analog range.
2. Small size digit reads "5" or "0", representing a half or a full analog graduation respectively.
3. Small size digit reads "0" thru "9", representing "tenths" (.0001").
4. Dial has more graduations than total analog range.
5. Small size digit reads "0" thru "9", representing thousandths of a millimeter (0.001mm).



Cleaning the Spindle

If the measuring spindle does not move freely, it may require cleaning.

1. Unscrew the Contact Point. Use soft jaw pliers, or protect the Contact Point with a soft cloth.
2. Carefully remove Boot.
3. Using a $\frac{9}{32}$ " or adjustable wrench, unscrew the threaded Bushing from the end of the Stem.

Caution: The black ferrite "Core" is fragile. **Handle with care.** Do not remove the "Core" from the end of the Spindle unless it is damaged and requires replacement.

4. Carefully remove Retaining Ring from Spindle.
5. Clean all metal parts and flush out spindle cavity with a suitable solvent.
6. Clean the Boot and "O" Ring separately, using a suitable cleaning agent. If either is worn or damaged, replace it.
7. When components are clean and dry, reassemble the Spindle to the Indicator or Remote Transducer. Use new Retaining Ring; do not reuse the old one.

Do not lubricate Spindle assembly.

Parts and Service

Maxum® Indicator parts and service are available from Federal Products Co., Providence, RI, U.S.A. Contact your Federal Products representative or Federal's Gaging Products Group, in Providence.

Carefully pack items to prevent damage in shipment.

Include a brief description of the problem and the name, address and telephone number of a person to contact if we have any questions.

Send correspondence to:

Federal Products Co.
Gaging Products Group
1144 Eddy Street, P.O. Box 9400
Providence, Rhode Island 02940-9400 U.S.A

Send shipments to:

Federal Products Co.
Repair Department
1139 Eddy Street
Providence, Rhode Island 02905 U.S.A

Replacement Parts

EAS-01843	"Core" for Spindle
EBU-01349	Replacement Bushing, threaded
ECS-01197	Dust Cap for Output Connector
EGU-01022	Boot for Spindle
ERG-01042	"O" Ring for Spindle Bushing
ERG-01044	"O" Ring for Case Screw
ERG-01045	"O" Ring for Cal. Control Access Screw
ERG-01046	"O" Ring seal for Indicator Case
ERG-01049	Retaining Ring
ESP-01112	Spring for Spindle Assembly
ESW-01244	Cal. Control Access Screw
ESW-01252	Screw for Dust Cap

Replacement Spindles for .375"/9,5mm dia. stem:

EAS-01840-W1	Spindle for .670"/17mm stem length
EAS-01840-W2	Spindle for 1½"/38mm stem length
EAS-01840-W3	Spindle for 2"/50mm stem length
EAS-01840-W4	Spindle for 3"/75mm stem length
EAS-01906	Spindle for Indicators supplied without Boot for certain Maxµm [®] gages
EBU-01246-W1	Spacer for 1½"/38mm stem length
EBU-01246-W2	Spacer for 2"/50mm stem length
EBU-01246-W3	Spacer for 3"/76mm stem length

Note: For models with 8mm/.315" dia. stem, and other Maxµm[®] parts not listed here, refer to Maxµm[®] Digital Electronic Indicator Parts List A-252.

Batteries

EBY-01011	3.4V lithium battery, Tadiran #15-51-03-210-000 or equivalent
ECS-01196	Battery Cap, for 3.4V lithium battery — 2 required
EBY-01007	4.5V alkaline battery, Eveready #523 or equivalent, can be substituted for normally furnished lithium battery — commercially available from camera and electronic stores

Caution: If the battery voltage exceeds 4.6V, a significant loss in performance will result.

Alternate sources for battery:

Manufacturer	Model#
SAFT	LS6-BA
TADIRAN	TL-2100/S
MAXELL	ER6C #5TC

Contact Points

Most Maxµm[®] Indicators and Remote Transducers are furnished with one of the following Contact Points:

OPT-00223	For .375" dia. stem — ¼" long, radiused tip, 4-48 thread
OPT-00563	For .375" dia. stem — radiused tip, 4-48 thread — for use with Lifting Lever
EPT-01037-W1	For 8mm dia. stem — 6mm long, radiused tip, M2.5 thread
EPT-01037-W2	For 8mm dia. stem — radiused tip, M2.5 thread — for use with Lifting Lever

Many alternate Contact Points are available. Refer to Maxµm[®] Digital Electronic Indicator Parts List A-250.



FEDERAL

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