

# K-METRON

*(FW 2.1.5 & FW2.2.2)*

493K THICKNESS MEASUREMENT GAUGE

WITH RADIO LINK UP AND SOFTWARE RECORDING

USER MANUAL (Doc v2.3.0)

RELATING TO FIRMWARE VERSION (FW 2.1.5 & FW 2.2.2)

*(as displayed on boot-up of the K-METRON)*

**IMPORTANT**

**Read all instructions before use**

**Observe safety precautions**

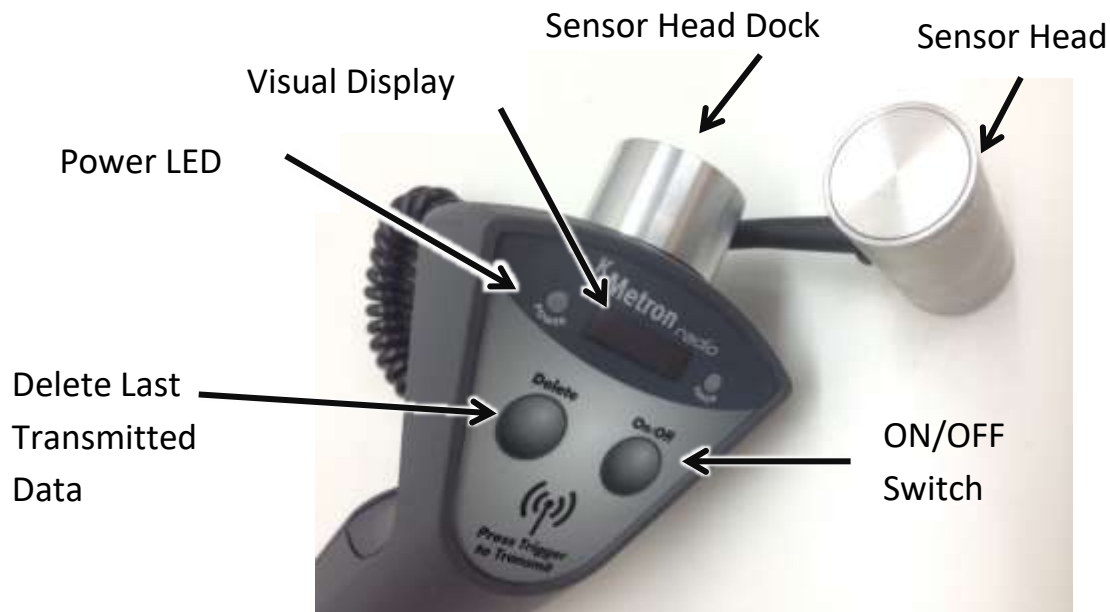


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## **Operational Use**

### ***Turning the unit ON & OFF***

To turn on the unit momentarily press the ON/OFF switch on the face of the K-METRON until the POWER LED illuminates. (If it does not then change the battery). Battery level will be checked each time the unit is turned on, and a low battery condition will be indicated. To turn the unit off press the ON/OFF switch on the face of the K-METRON unit the POWER LED goes off.



### ***Coupling the Sensor Head with the Calibrated Magnet.***

Place the Sensor Head on one face of the product that is to be measured. On first use place the factory calibrated 10mm cube magnet on the opposite face of the material being measured. (note that the unit needs to be re-calibrated if the 10mm spherical magnet is used). The magnet and sensor head will now be magnetically coupled.

Hollow objects can be measured by inserting the calibrated magnet through a small opening in the product. The magnet should immediately be coupled with the sensor head positioned on the outside of the product and adjacent to the aperture.

### ***Loss of Magnetic Coupling.***

When magnetic couple of the cube magnet is lost it can be retrieved by retaining the end of the attached cord and fishing the magnet out of the opening. If the spherical magnet loses coupling then it must be retrieved by turning the moulding upside down and allowing the magnet to fall out or by using a telescopic metal pointer to grab it.

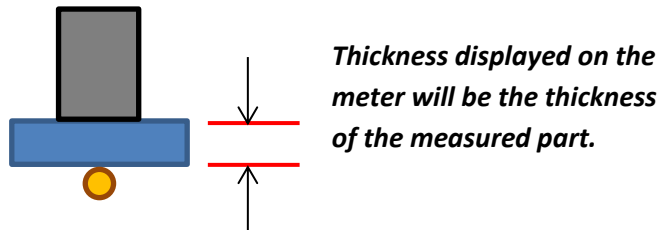
### ***Tracking the Sensor Head to the Point of Measurement.***

The calibrated magnet will automatically couple, orientate and centre itself over the Sensor Head. Once coupled track the Sensor Head to the point on the part which you wish to

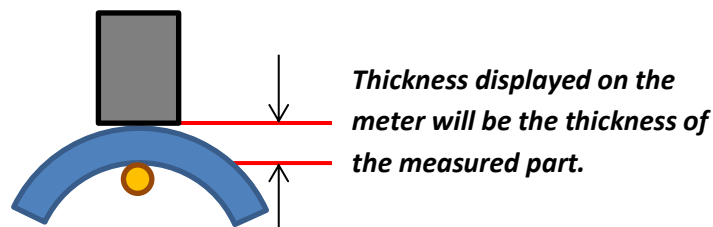
measure, taking care not to remove the sensor head from the face of the work piece. This may result in the loss of the magnetic coupling. The calibrated magnet will follow the Sensor Head to the desired point of measurement.

### ***Ensure Correct Sensor Head Orientation***

When measuring flat parts ensure that the sensor head is perpendicular to the surface.

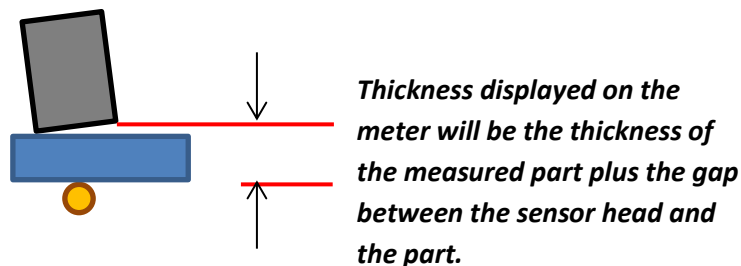


When measuring external radii it is important to ensure that the sensor head is perpendicular to the surface of the part being measured.

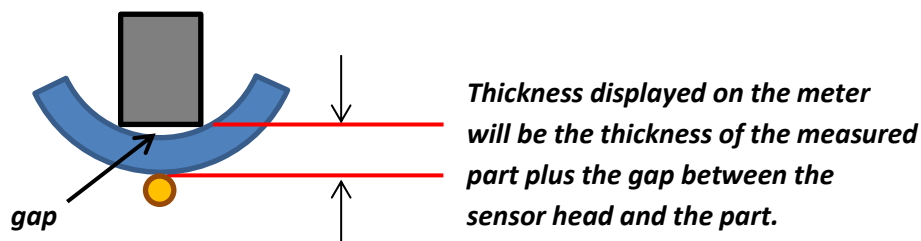


### ***Incorrect Sensor Head Orientation***

A non-perpendicular orientation will result in an erroneous measurement.

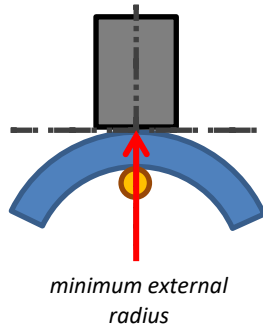


An internal radii will return a value for which compensation must be made.



### Measuring an External Radius with K-METRON.

It is straight forward to measure external radii down to 5mm. Place the sensor head on the surface of the part located at external radius to be measured. Ensure that the sensor head is perpendicular to the tangent of the radius to make an accurate reading.

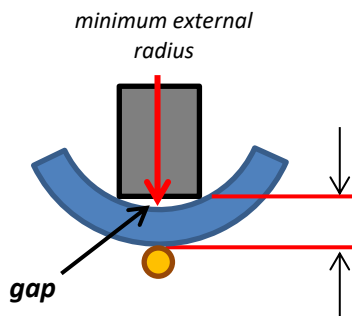


**A minimum external radius of 5mm (3/16") can be measured using the supplied 10mm diameter magnetic sphere.**

**A minimum external radius of 3.3mm (0.1229") can be measured using a 6.6mm diameter magnetic sphere (contact for supply).**

### Measuring an Internal Radius with K-METRON.

It is straight forward to measure external radius down to 5mm. At radii less than this the main difficulty is with access to the surface. When measuring thickness of internal radii, the correct measurement often requires compensation for the gap distance as shown below.



**A minimum internal radius of 25mm (1") can be measured before it becomes impractical and difficult to compensate for gap distances. Radii less than 25mm also tend to allow the magnetic force to pull the magnet to the side of the part.**

### The Sensor Head Dimensions.

The sensor head is a cylinder of size 27mm diameter x 55mm length.



### ***Measuring the Thickness.***

When the sensor head is at the desired measuring point **pull and hold the orange trigger** and make small **figure of eight** movements of the Sensor Head to ensure that Transducer Magnet is centrally located on the Sensor Head. Centring of the calibrated magnet will easily occur on materials up to 20mm (0.78") thick but will also depend on the surface finish of the material being measured.

On releasing the trigger the unit will display and transmit the **minimum value** measured to the receiver. The data that are sent to the PC are the Mould Identification number, the Mould Position number and the thickness reading.

***If the receiver is not connected to the PC, a 'TX Error' will be displayed after holding down and releasing the trigger. The unit is still operational and can be used to display on-screen readings without the receiver being connected to the PC, however users should be aware that a 'TX Error' indicates that the reading is not saved on the PC.***

### ***Deleting a Thickness Measurement.***

If an erroneous thickness measurement has been made and transmitted to the PC then it can be remotely deleted from the PC. To do this press the delete button; the display signals confirmation. The Position Number on the PC will then be reduced by '1'.

### ***Indexing Mould ID.***

After the thickness measurements on a particular mould are completed the user has the option to increment the Mould Identification number. This number is used as a guide to indicate which moulds are being measured and recorded.

To increment the Mould Index number complete the following two steps:

*Step 1. Move the magnet away from the sensor head so that O/R ('out of range') is displayed on-screen;*

*Step 2: Hold the trigger down for 7 seconds.*

The on-screen indication will now show that the Mould Index number has been increased by '1' unit.

(During the calibration of a spherical or cube magnet the unit will determine at which thickness the sensor magnets become out of range, "O/R" and then will display O/R for 'out of range' when appropriate. The O/R limit is reached whenever the effect of the magnet on the sensor head is too small to provide a useful measurement or when no magnet is present.)

### **Choosing which Magnet Type to use.**

The unit comes with two different types of magnet, a cube and a sphere. The desired range of measurement will be the major factor which determined whether to use the cube or spherical magnet. The 10mm x 10mm x 10mm cube magnet is best for thick walled parts. The 10mm spherical magnet is best for thinner parts when tight radii are to be measured. The measurement specifications for each of the magnets are shown in the Table below.

#### **MEASUREMENT SPECIFICATIONS FOR CUBE AND SPHERICAL MAGNETS**

METRIC	Part thickness	Accuracy	
10mm cube magnet	4mm – 20mm	4mm-17mm: +/- 0.2mm of reading 17mm+: +/- 1.0mm of reading	Factory Set
10mm sphere magnet	2mm-20mm	2mm-13mm: +/- 0.2mm of reading 13mm: +/- 1.0mm of reading	

IMPERIAL	Part thickness	Accuracy	
0.39" cube magnet	0.157" – 0.787"	0.157" -0.669": +/- 0.008" of reading 0.669": +/- 0.039" of reading	Factory Set
0.39" sphere magnet	0.079" – 0.787"	0.079-0.512": +/- 0.008" of reading 0.512": +/- 0.039" of reading	

### **Measured Units**

The unit can be changed between IMPERIAL and METRIC units. To do this hold down the DELETE button and the trigger button while switching the unit on. While continuing to hold down the DELETE button and the trigger button, after a short delay IMPERIAL and METRIC will alternate on the screen. Release the DELETE and trigger buttons when the chosen unit type is displayed – this choice will be confirmed on-screen and saved.

## **Transmitting, Receiving and Recording the Thickness Data.**

### ***Connecting the K-METRON to the PC & Installing the Communications Driver.***

Connect the K-METRON receiver unit to the PC using the attached USB flying lead. Allow Windows to automatically connect to the internet for the latest communication driver. It will do this automatically upon plugging in the USB flying lead.



### ***Downloading the K-METRON Software.***

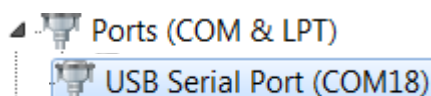
Download and install the K-METRON software from the link supplied by 493K. If you do not have this link please contact [office@493k.com](mailto:office@493k.com) requesting the latest K-METRON software.

### ***Setting the Correct Communications Port.***

Ensure that the K-METRON software is set to look at the correct communications port that has been assigned by Windows (when the radio receiver was connected and the driver installed Windows will have auto-assigned this number).

To determine the communication port number that Windows has assigned go to:

- Windows Control Panel
- Device Manager
- Under Ports (COM & LPT) the USB Serial Port will show the COM number that has been allocated by Windows e.g.



(in this case Windows has assigned the COM number 18)

To assign the COM number withing the K-METRON software:





## **Replacing the Battery in K-METRON**

K-METRON is designed for use with a single Lithium PP3 9-volt battery. Using a non-lithium variant of a PP3 9-volt battery, such as an alkaline, will significantly reduce battery life. An equivalent rechargeable battery may also be used.

To replace the battery, remove the cover screw. Carefully unclip the spent battery from the battery cover lid and unclip the battery terminals from the flying power lead. Attach the terminals on the new battery and ensure they clip on securely. Insert the charged battery into the clip and remount the cover. Make sure the battery cable is not trapped by the cover.



## **CALIBRATION INSTRUCTIONS**

The K-METRON's accuracy improves upon more careful, precise magnetic coupling and angle of sensor head to measured face. Measurement accuracy ranges from +/- 0.2mm at the lower end of the readings and +/- 1mm at the upper end of measurement. This will depend on whether the spherical magnet or the cube is used.

Although the units are calibrated before leaving 493K re-calibration may be necessary within your plant.

Select a location that is at least 1 metre away from any steel or ironwork which will affect accuracy of calibration.

### ***Entering Calibration Mode.***

With the unit turned OFF hold down the DELETE button. While still holding the DELETE button down (in one hand) turn the unit on with the other. On switch on, when the display lights up, release the ON/OFF button but continue to hold down the DELETE button until 'CALIBRATE' is displayed then immediately release the DELETE button.

### ***Calibrating the K-METRON.***

The display should now request Position 21 – no magnet (NM). With no magnets (spherical or cubed) near the sensor head, the trigger should be depressed and released.

After successfully acknowledging 'position 21 – no magnet' the unit will then request the 20mm position. The magnet should be placed on the 20mm step and the trigger pulled. Confirmation of step calibration will be provided and then the next step thickness requested, i.e. 19mm. Slide the magnet onto the next step ensuring that it does not snap down. The next position will be requested, i.e. 18mm, and so on.

The magnet should be placed on each step so that it is in the centre of the step and is not interfering with the step edge. The sensor head should be centred on the magnet. Ensure that the magnet is not moving when calibrating as this will affect the calibration values.

The more accurately you can teach the K-METRON the thickness that it is measuring during calibration, the greater the accuracy of the part thickness measurement in the field.

Continue this step by step calibration down to the 'Zero' thickness with the magnet directly on the sensor surface.

If you make a mistake during the calibration sequence, switch the unit off and re-enter the calibration mode as above.

**THE CUBE AND SPHERICAL MAGNETS ARE NOT INTERCHANGEABLE AND DOING SO WILL RESULT IN INACCURATE READINGS. THE K-METRON MUST BE RE-CALIBRATED WHEN CHANGING THE MAGNETS. IT IS ADVISED THAT THE MAGNET NOT BEING USED IS STORED IN THE BOX TO AVOID ERRONEOUS MEASUREMENTS FROM BEING MADE.**

***Validating Calibration.***

After calibration is complete the units measured data should be validated. To do this position the calibrated magnet once more down each step and ensure the K-METRON measured value is that of the actual step thickness (note the measurement tolerances as per the table above apply). Note that re-calibration is not required for use with differing materials.

***Measuring Non-ferrous Metal Parts.***

When measuring the thickness of non-ferrous metal parts ensure that there is ***no movement*** of the magnet during the measurement. ***The figure of 8 movement for these materials should be made to centre the magnet to the sensor head but should be stopped once centred and before the measurement is taken.***

**Sensor Head Care**

Non-ferrous materials of any density will return an accurate reading within the limits of the device.

**DO NOT ALLOW THE TRANSDUCER MAGNET TO 'SNAP' TO THE FACE OF THE SENSOR – SEVERE DAMAGE MAY OCCUR TO THE DEVICE SENSOR AND MAGNET.**

Keep the Sensor Head and magnet away from computer displays or any product which is sensitive to strong magnetic fields. Permanent damage may occur to such devices.

The Sensor is highly sensitive to magnetic fields and temperature. High temperature environments may also affect the accuracy of readings.

The instrument has been factory calibrated to accuracies shown in the table above.

Regular checks should be made to ensure the instrument is operating within its capabilities and it is recommended that the unit is returned to 493K Limited for an annual recalibration to ensure its continued performance is maintained. 493K offer a return carriage paid service, calibration and inspection.

**What Materials can be Measured?**

No calibration is required for use with differing materials. This equipment will measure materials of a thickness between 2mm to 20mm where access can be achieved to both sides of the product being measured.

Materials that can be measured include all non-magnetic materials such as:

- *Plastics of any density or composition*
- *Foamed materials*
- *Laminates*
- *Fibreglass*
- *Carbon Composites*
- *Glass*
- *Aluminium*
- *Brass and copper*

## **What is included with K-METRON**

The system comprises:

1. A portable display unit containing the measurement electronics;
2. A Lithium PP3 9volt battery;
3. Sensor Head with lead attached to the display unit;
4. 2 x spherical 10mm magnets & 1 x 10mm cube magnet with retrieval cord;
5. 1mm - 20mm Calibration Steps;
6. Instruction Manual;
7. K-METRON Software (downloaded via link supplied);
8. 493K carry bag.

## **DISCLAIMER**

Use of this instrument is at the operators' risk and 493K Limited will not be held liable for any claims for damage to other equipment occasioned by its use or any consequential claims related to the instruments accuracy. See also limitations as to use.

## **SPECIFICATIONS**

Range:	2 to 20mm (magnet dependent)
Resolution:	0.1mm
Accuracy:	+/- 0.2mm or +/- 1mm depending on calibration type
Range error:	Better than +/- 0.3mm
Temperature:	5°C to 35°C (41°F to 95°F)
Calibration:	@ 20°C (68°F)
Minimum radius measured:	(10mm Cube): 20mm (10mm Spherical): 5mm
Power Supply:	1 x lithium PP3 9 volt battery (alternative alkaline)

# **DECLARATION OF CONFORMITY**

We the manufacturer **493K Limited**  
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**United Kingdom**

declare under our sole responsibility that the product :-

**K-METRON, Model No. 2.0**

to which this declaration relates is in conformity with the following standard(s) or other normative document(s) :-

**EN55022 : 1988 Class B**  
**EN50082-1**  
**IEC 801-2 : 1991**  
**IEC 801-3 : 1984**  
**IEC 801-4 : 1988**

following the provisions of :-

**EC EMC 2004/108/EC.**

Place of issue **493K Limited**  
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**United Kingdom**

Date of issue **30 Nov 2016**

Signature 

Name **Dr Gareth W. G. McDowell**  
Position **Managing Director**