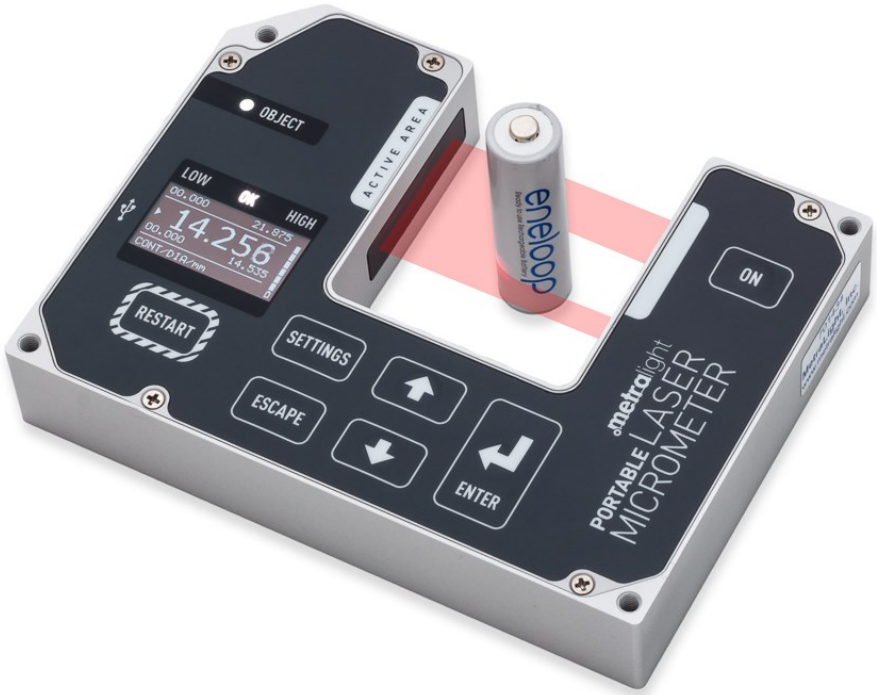


metralight

PORTABLE LASER MICROMETER

September 2013, rev.A

FEATURES

- **Handheld and Mountable, Non-Contact measurement for size and position up to 28mm**
  Edge, Gap, Diameter, Position, Thickness, Height, Profile, Vibration
- **Battery Powered :** Li-Ion battery - up to 10 hours, with USB charging port and Cable
- **Ultra Portable:** Size: 131 x 97 x 23mm, Weight: 330g
- **Fast Measurement and High Accuracy:** 2,500 measurements/s, Resolution: 0.4375 µm
  Non-Linearity <5µm (Edge)
- **Intuitive User Interface:** 128x64 OLED Display, 7 buttons, 4 LEDs, USB 2.0
- **Laser device:** Laser Diode 670nm, Class I
- **Standard Measuring Modes included. Plus Custom Modes are available on request.**
  Centering, Minimum, Maximum, Thickness, Range of Tolerances

MEASUREMENT	
Object Range	140µm (0.006 in) up to 28 mm (1.10 in)
Resolution (Pixel size)	0.4375 µm
Repeatability	3 µm (Edge position, calibrated distance)
Response Time	0.391 ms
Non-Linearity	<10 µm (Edge position, calibrated distance)
Measuring Modes	Edge1, Edge2, Diameter, Gap, Center, Solid
Measuring Trigger	Infinity Loop, Button (Start/Stop)
Custom Modes	*Call MetraLight for additional custom modes*

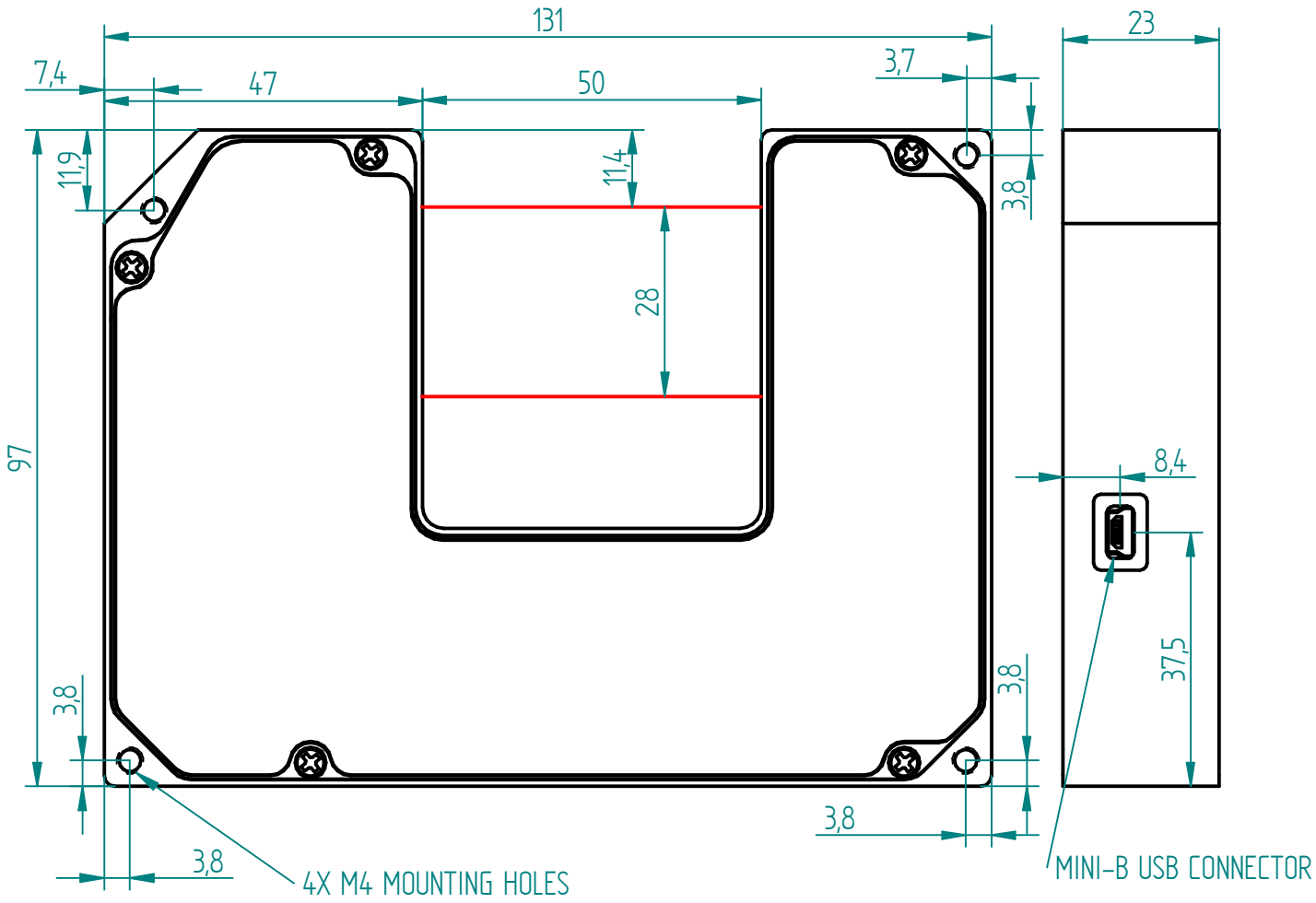
INTERFACE	
Display/buttons	OLED Display(128x64) | Membrane/touch keyboard | 4 LEDs
Host Interface (I/O)	USB 2.0, MINI-B USB connector

DATA FORMAT	
Display Units	Inch, mm, pixels
Data Output	3 byte-length string for each measurement (2 byte data, 1 info byte)

POWER	
Batteries	Internal Li-Ion battery (up to 10h running), charged via USB
External USB	Sensor run and automatic charging

GENERAL	
Detection Method	Laser (670nm Class I Laser Diode) through-beam with CMOS element
Overall Dimension	131 x 97 x 23 mm
Mounting holes	4x M4
Weight	326g (11.4oz)
Operating Temp.	0°C to 50°C (32°F to 122°F)
Storage Temp.	-20°C to 70°C (-4°F to 158°F)

Table 1: Specification



All dimensions in mm

For detailed dimensions, please download 2D drawing or 3D model from http://www.metralight.com or email at: info@metralight.com

Portable laser micrometer can measure edge position of an object (EDGE1, EDGE2 modes), diameter (DIA mode), center position (CENTER mode), gap between more objects (GAP mode) and edge position of solid object (SOLID mode). Other custom measuring modes. e.g. number of objects, vibration, etc. are available upon customer request. Measuring mode can be set via sensor buttons or from HOST PC via USB.

For higher measurement stability sensor averages several readings. Number of averaged data can be set with AVG command (see Command Set section). For fast transitions events, number of averaged data should be set to 1.

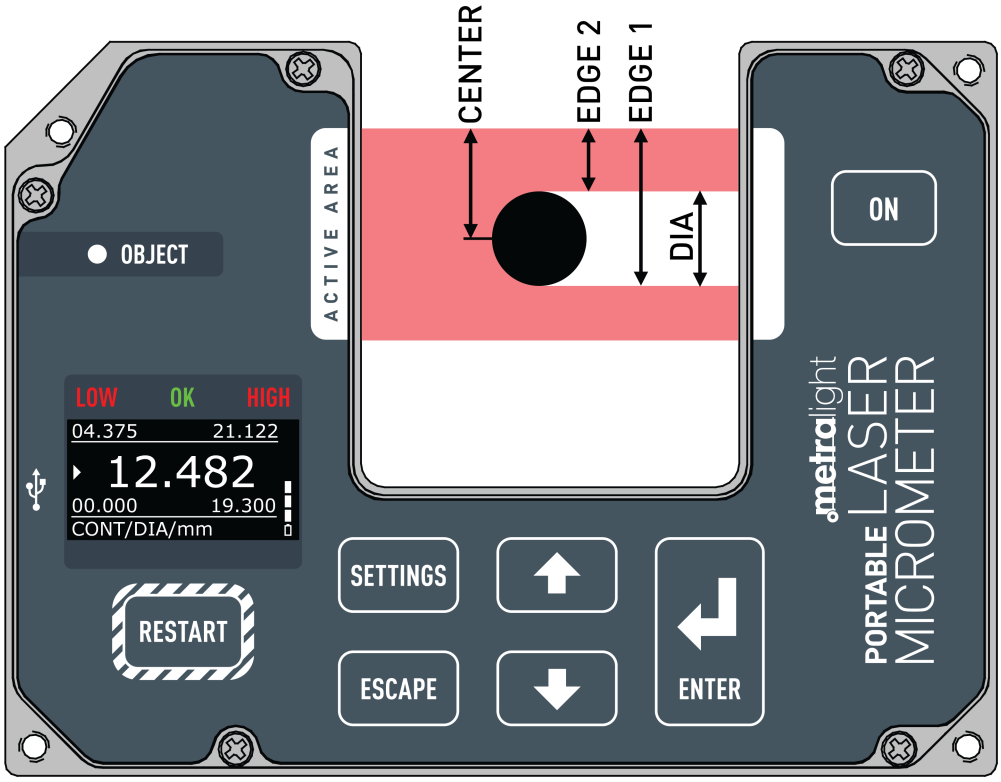


Fig.1: Basic measuring modes

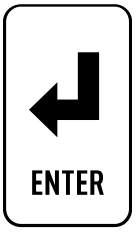
SEE APPENDIX A FOR DETAILED MODE SPECIFICATION.

5.1 BUTTONS

Switches ON/OFF the sensor. If sensor is plugged to USB port, then it takes power from USB, otherwise from batteries. When sensor is plugged to USB Li-Ion batteries are automatically charged.

Switches between MAIN (measuring) screen and SETTINGS screen.

For Navigating in SETTINGS and Editing values (increase, decrease) in the list (MIN, MAX, OFFSET).



Confirms current selection

Returns to previous screen.

In Continuous mode RESTART button resets recorded MIN, MAX and status of LIMITS LEDs.
In Start/Stop mode RESTART button start/stop measurement and resets recorded MIN, MAX and status of LIMITS LEDs (same as Continuous mode).
In Sample Measuring mode after pressing RESTART button, sensor takes one measurement and sets LIMITS LEDS accordingly to this measurement ONLY. Recorded MIN, MAX is not reset.
Resetting can be done by pressing the SETTINGS button twice.

2.2 LEDS

LOW OK HIGH

LOW/HIGH LED turns ON if measurement was lower/higher than preset limit. LOW/HIGH LIMITs is set by user in SETTINGS/MINIMUM/MAXIMUM (See Menu Tree). This event can be reset via Restart button.
OK LED: Measurement is between LOW and HIGH LIMIT.

Indicates presence of object in scanning line

5.2 DISPLAY & LEDS

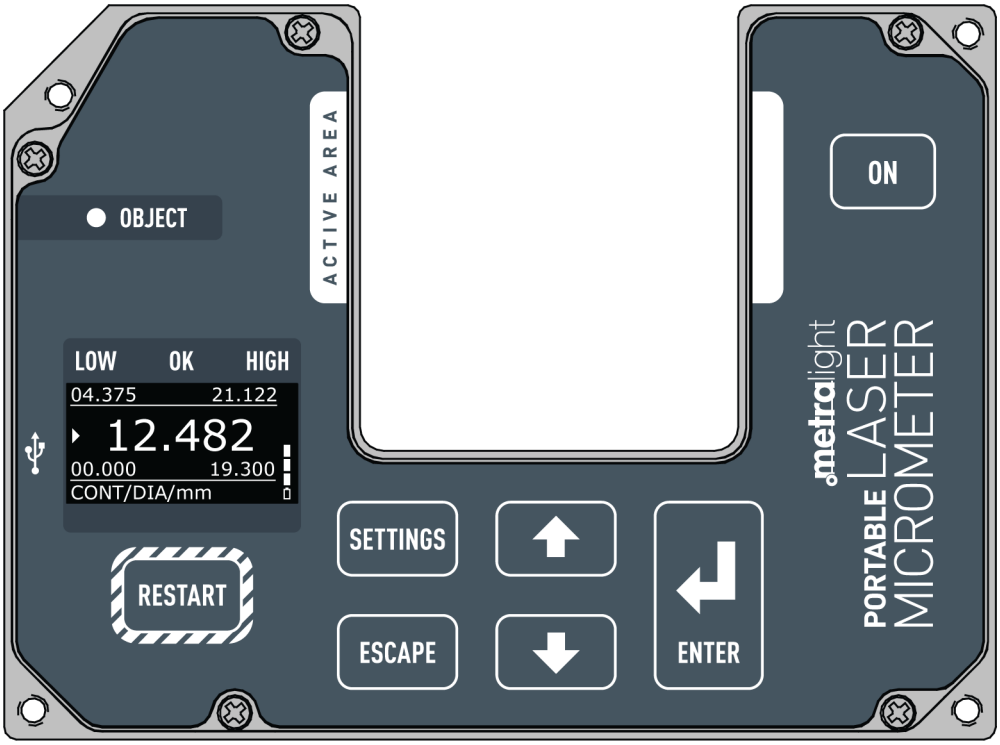


Fig.2: Portable sensor controls

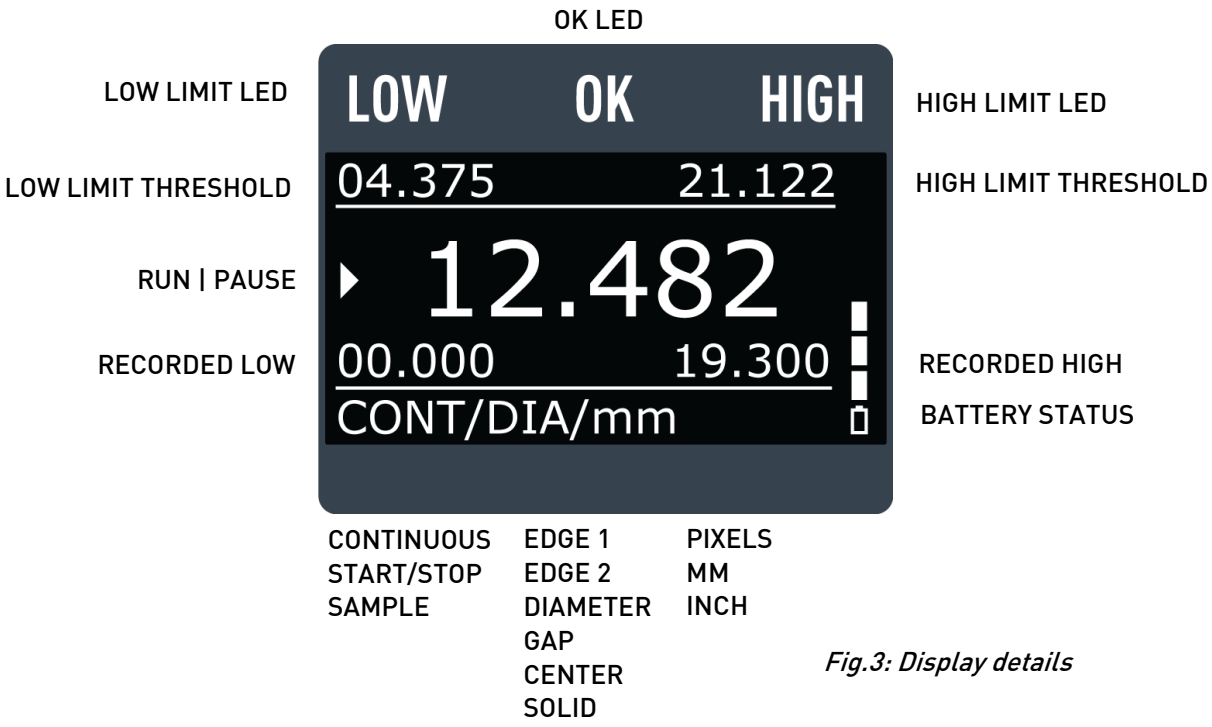
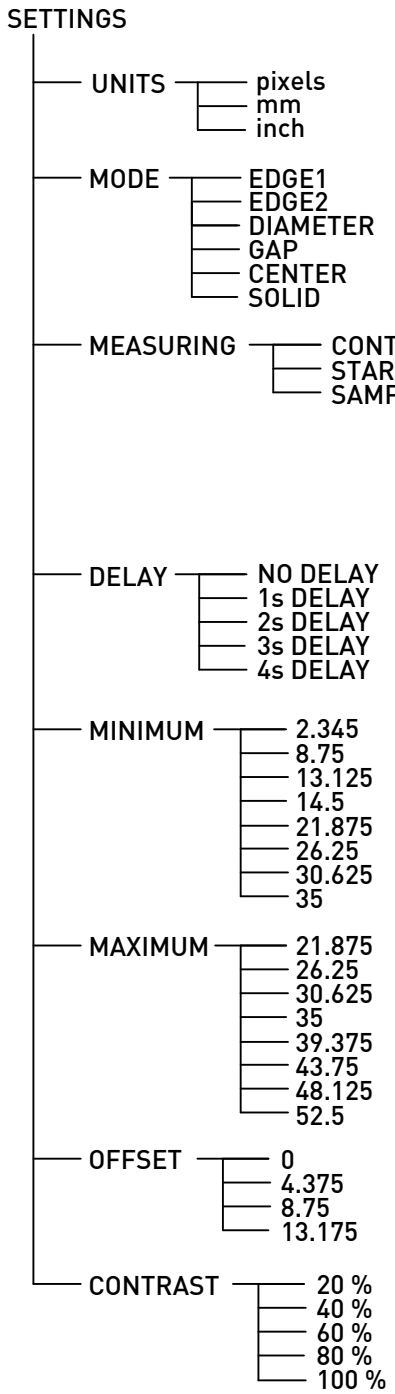


Fig.3: Display details

5.3 DISPLAY MENU



pixels, milimeters or inches units.
1 pixel = 0.4375 µm = 0.0000172244".

See Appendix A for modes definition.

CONTINUOS MEASURING measures continuously until SETTINGS or OFF is pressed.
START/STOP is started/ended via RESTART button.
SAMPLE takes only one sample measurement on each pressed RESTART .

Up to 4 sec delay to start measurement (Valid for START/STOP and SAMPLE type measurement). This function helps to stabilize measuring conditions before taking any measurement(s).

List of MIN/MAX values are user editable. Values can be higher than measuring range of sensor, this is useful when OFFSET is >0. Range: 0 to (Sensor range + Offset range)
If MIN/MAX value is reached „LOW" or „HIGH" indicator turns ON. To reset this event press RESTART button.

OFFSET is added to measured value. For metering bigger objects or to referencial point. Editable List. Range: 0 to 70mm (0 to 2.756").

Display contrast level: 20%, 40%, 60%, 80% and 100%. 40% is recommended value. Caution: OLED displays have a burn-in effect.

This Portable Sensor is a USB 2.0 compatible device. To connect , a USB Mini-B to A cable is needed (included with the sensor). Software is available on www.metralight.com for download.
A USB Driver for the sensor (USB Device) is included in MS Windows or can be downloaded from www.ftdichip.com. The USB driver creates a Virtual Com Port (VCP) whenever sensor is connected.
For custom SW please see Command Sets.
Metralight recommends that a terminal SW (like I/O Ninja from www.tibbo.com or RealTerm) can be tried as first steps.
For any SW to work, it is necessary to know the assigned Com Port (see Device Manager in MS Windows).
For communication with the sensor via VCP please use following setting:
BaudRate: 115200 b/s | Databits: 8 | Parity: None | Stop Bits: 1 | Flow Control: None

7. COMMAND SET (1/2)

DATA command

Hex: <0x1X> , where X specifies amount of requested consecutive datas.
Sensor response: 2^X x DATA, multiple of 3bytes packet, min 3 bytes.
3 BYTE PACKET FORMAT: <HIGH BYTE> <LOW BYTE> <INFO BYTE>
INFO BYTE FORMAT (8 bits):|OBJECT_IN|0|#AVG_VALID|0|0|M2|M1|M0|

OBJECT_IN bit: indicates presence of an Object
#AVG_VALID: for higher stability sensor averages several readings, when measuring mode is changed, old reading in the buffer would make false result
M2|M1|M0|: measuring mode, see MODEs table on next page

Example 1:

PC request: <0x10> //request for 1 data
Sensor response: <0xA4> <0xB7> <82> //high byte, low byte, info byte
// Data=0xA4B7=42167, this is diameter in pixels
// 1 pixel=0.4375µm. Data(mm)=42167*0.4375=18.448
// Status byte: Object present, averaging is valid and mode=diameter

Example 2:

PC request: <0x14> (request for 16 consecutive datas)
Sensor response: Sixteen 3 bytes packet (for conversion see above)

DATA_STREAM_start

Hex: <0x21>, continuous DATA stream start, Sensor response: data stream of 3 bytes packets, see DATA command

DATA_STREAM_stop

Hex: <0x20>, continuous DATA stream stop, Sensor response: no response

MODE command

Hex: <0x3X> , where X specifies the measurement mode.
Sensor response (1 byte): <0x3X> //echo back

This parameter is not stored in the sensor after power OFF. It needs to be set after power ON event. Alternatively, if mode is set via Buttons on the sensor, it's stored internally.

X	0000b	0001b	0010b	0011b	0100b	0101b	0110b	0111b
Mode	Edge 1	Edge 2	Dia	Gap	Center	Solid Edge	Custom	Custom

Table 2: Mode Table

See Measurement Modes section or Appendix "A" for detailed mode specification.

AVG command

Hex: <0xCX> , where X specifies amount of averaged datas.
X is in range: 0 to 7, so max. number of averaged datas=128
Sensor response (1 byte): <0xCX> //echo back
This parameter is not stored in the sensor after power OFF. It needs to be set after power ON event.
Default number of averaged datas in internally set to 32.

FIRMWARE command

Hex: <0xF0>, reads firmware version, Sensor response: two bytes

LASER_ON/OFF command

Hex: <0x91> for Laser ON, <0x90> for Laser OFF, Sensor response: command echo

Service commands

Portable sensor has other service commands, like reading of RAW image data. This can be useful for troubleshooting. Contact Metralight for details.

7.1 Code example (VB.NET)

```
Dim buffer(0) As Byte = 16              '1 data command in Byte format
Dim mValue as Integer                   'Measured value
Dim mObject as Boolean                  'Object in
SerialPort.ReadExisting()               'Clear buffer
SerialPort.Write(buffer, 0, 1)          'Writes data command
mValue = (256 * SerialPort.ReadByte() + SerialPort.ReadByte())    'Reads MSB and LSB
If SerialPort.ReadByte() > 127 Then mObject = True Else mObject = False          'Check Object In
```

USE APPROPRIATE MOUNTING SCREWS (SEE MECHANICAL DRAWING)

AVOID Direct Sunlight! and ALL other light sources with a WAVELENGTH CLOSE TO 670nm (see Optical filter transmittance on figure below).

ALWAYS keep optical windows CLEAN, FREE from Dust and Fingerprints, AVOID Scratches on the OPTICAL WINDOWS.

USE CORRECT VOLTAGE - SEE ELECTRICAL SPECIFICATION

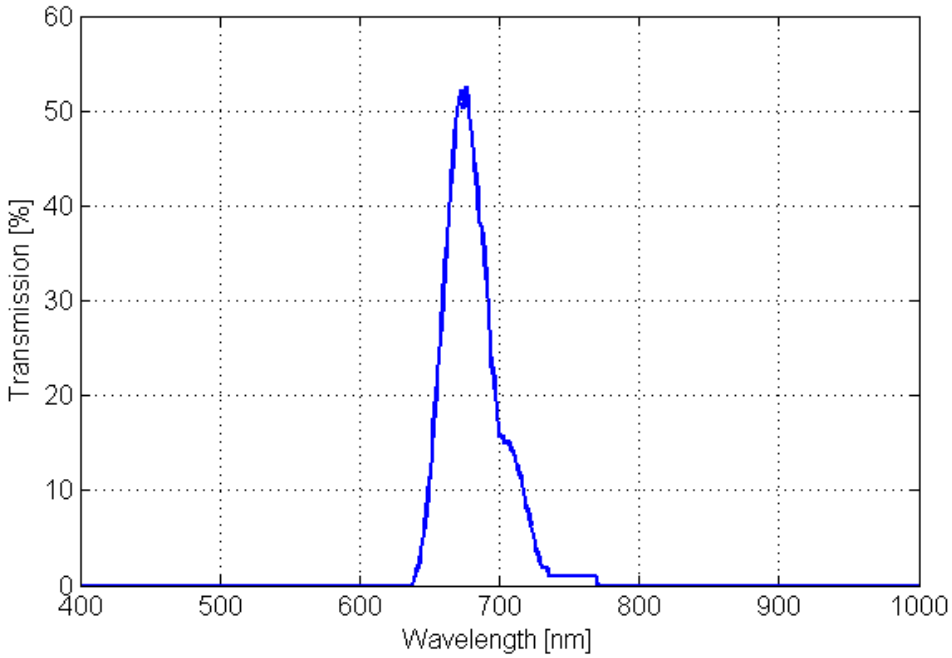


Fig. 4: Ambient light optical filter

8.1 Laser Safety

Portable Sensor is classified as Class 1 Laser device (Laser power < 0.05mW according to IEC 60825-1 or ANSI Z136.1). **Class 1 laser is safe for all conditions of use.**

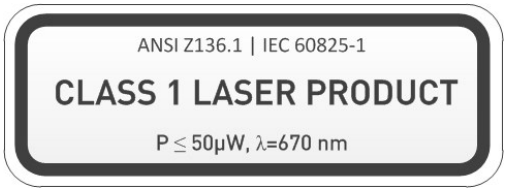


Figure: Class 1 Laser safety label

Metralight, Inc. provides sample applications with included source codes for custom modifications.
Please contact Metralight for any SW modification/development.
Metralight can provide a complete solution HW+SW and mechanical for your specific application.

9.1 Microstudio

Microstudio demonstrates capabilities of the sensor and brings features like averaging, export to EXCEL, etc.). Microstudio runs under Windows XP and later.

Fig. 5: Microstudio screenshot

9.2 Microstudio Touch

Microstudio Touch is optimized (but can be easily controlled with keyboard and mouse) for Touch operations (e.g. on Tablet PCs), it runs in full screen mode. It has the popular MS EXCEL export feature. Microstudio Touch runs under Windows XP and later.

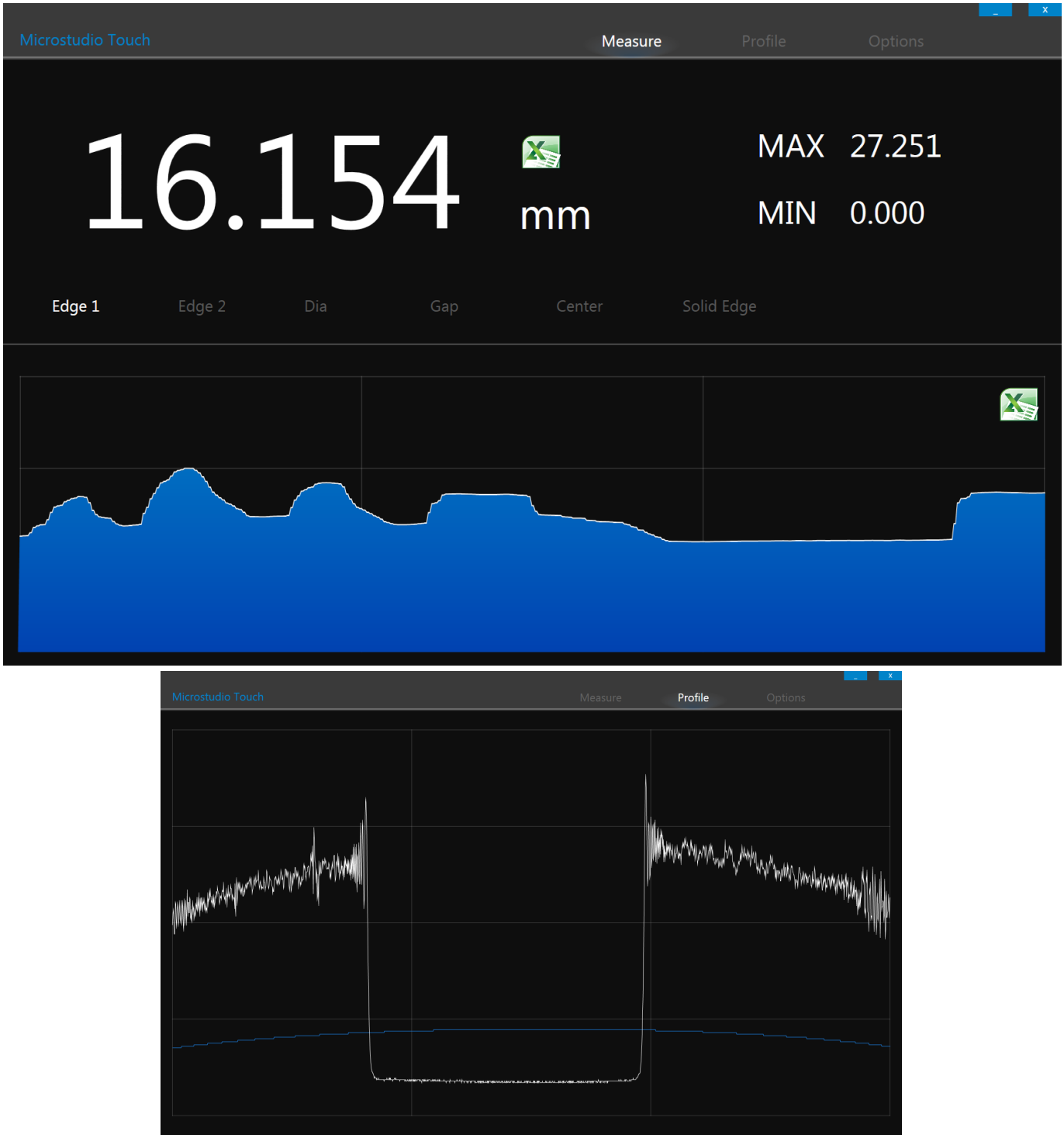


Fig. 6: Microstudio Touch screenshot

10.1 PACKAGE

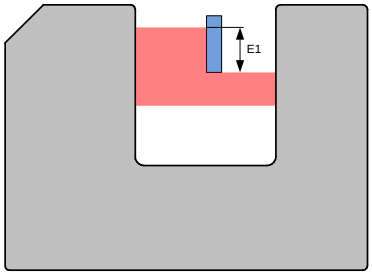
- 1x Portable sensor
- 1x USB cable
- Plastic box

10.2 WARRANTY

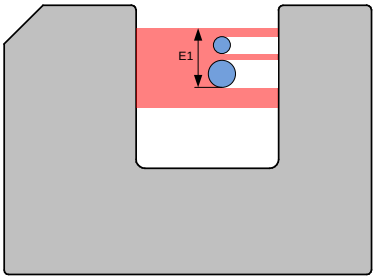
METRALIGHT provides a **ONE YEAR** manufacturer's limited warranty against defective materials and workmanship. Please do not attempt to open the unit, as this will void all warranties.

10.2 CONTACTS

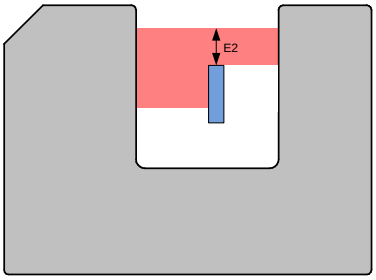
METRALIGHT, Inc.
1670 S. Amphlett Blvd., Unit # 214-M
Mailstop # 1008
San Mateo, CA 94402
phone: (650) 581 3088
fax: (650) 808 9830
email: sales@metralight.com
technical support: support@metralight.com
web site: http://www.metralight.com



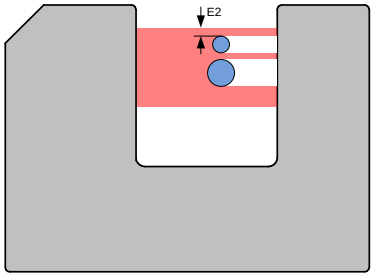
EDGE1 MODE
LEADING EDGE



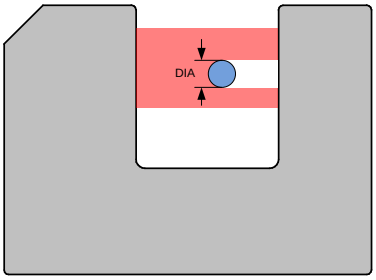
EDGE1 MODE
MULTIPLE OBJECTS



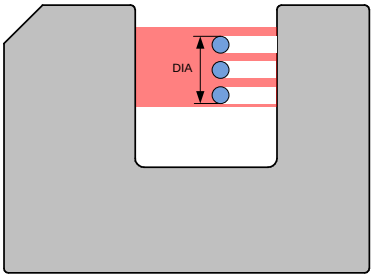
EDGE2 MODE
TRAILING EDGE



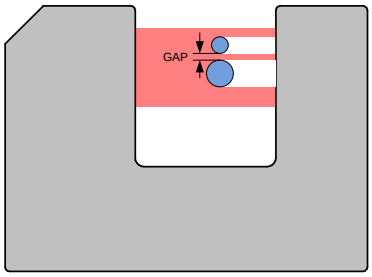
EDGE2 MODE
MULTIPLE OBJECTS



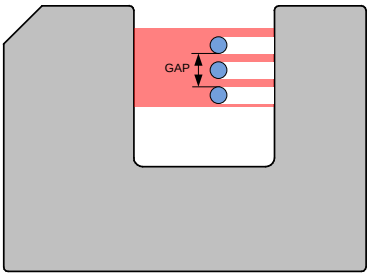
DIA MODE



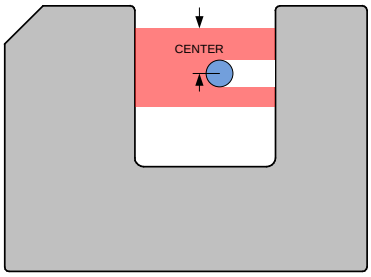
DIA MODE
MULTIPLE OBJECTS



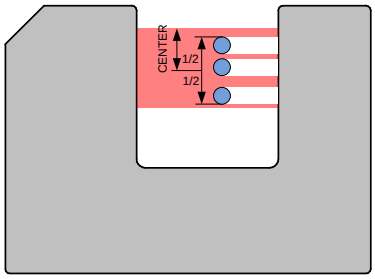
GAP MODE



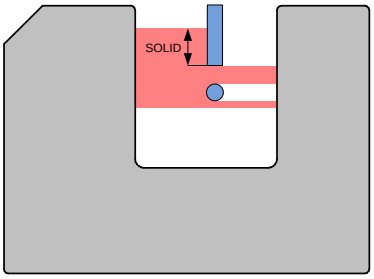
GAP MODE
MULTIPLE OBJECTS



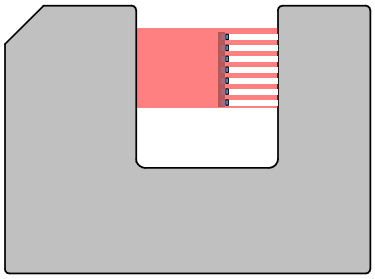
CENTER MODE



CENTER MODE
MULTIPLE OBJECTS



SOLID MODE
MULTIPLE OBJECTS



CUSTOM MODE
For Example IC LEADS Di-mension measurement, OR Detects BENT, Missing leads