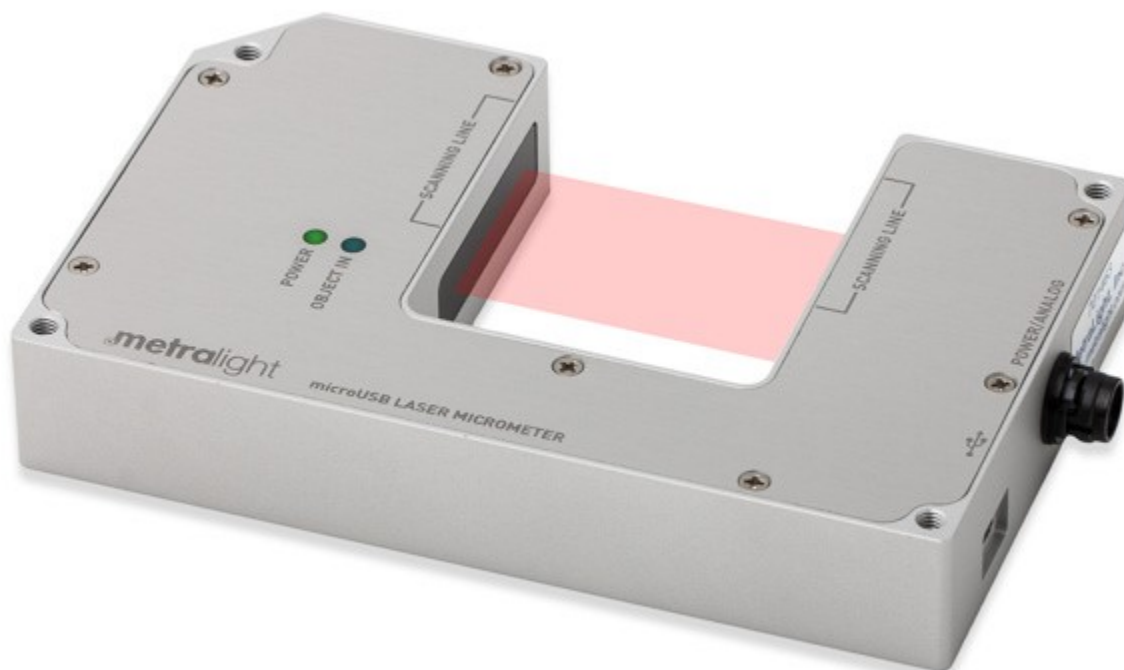


Features

- Compact size
- Measurement Range: 0 to 28mm
- Resolution of 0.4375 μm
- 2500 measurements/second
- USB, RS232, Analog output
- Laser diode 670nm Class I
- Robust construction: Aluminum body with locking connectors
- Integrated OLED display (* option)

USER'S GUIDE



Custom Options

- Parallel, SPI, Ethernet or other serial interface (RS422, RS485)
- Custom Modes available: Centering, Minimum measurement, Maximum measurement, Thickness, Range of Tolerances
- Custom Sensor Size and Package available
- Custom Applications

Typical Applications

- Measurement of various types of materials in a wide range of industries (metal ,plastic, glass, ceramics, wood and others)
- Measurement of Edge, Gap, Diameter, Position, Thickness, Height, Profile, and Vibration of objects.
- Diameter measurement of tube/pipe (in process or sampling)
- Precise and fast online/offline non-contact measurement
- Semiconductor atmospheric/vacuum prealigner

The microU Laser Micrometer is a precise, non-contact measurement instrument, for use in various industries. With an sub-micron resolution of 0.4375 μm , coupled with a fast measurement rate of over 2500 measurements/second, the microU is above the competition. In addition, there are no moving mechanical parts in this laser micrometer to adjust or recalibrate (solid-state electronics only).

The microU is certainly well suited for use in fast moving production lines (online measurement) or offline measurement. All Metralight sensors are well known for its simplicity in operation and ease of system integration.

The microU has standard USB, RS232 and Analog output. Custom interfaces like Ethernet (excellent for multiple sensor integration), Parallel (for PLC) or SPI interfaces are available too.

For easy SW development, Metralight Inc. offers sample software with source code (.NET, Excel macro, Javascript).

The microU sensor has 6 standard modes (EDGE1, EDGE2, DIAMETER, CENTER, GAP, SOLID EDGE). This can be customized to measure Center, Minimum and Maximum , Gap between objects, range of tolerances. (see Application section for more information)

OLED display as an option can be integrated in MicroU sensor. MODE button allows quick manual measuring mode change. RESET button resets recorded minimum and maximum values.

Specification

2

Measurement

Sensor Range	140µm (0.006 in) up to 28 mm (1.1 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
Custom Modes	<i>Call Metralight for additional custom modes</i>

Interface

User Interface	Two White LEDs (Power, Object In), (*option: Display, two buttons)
I/O connectors	MINI-B USB, HIROSE HR30-6R-6P
Interface (I/O)	USB, Serial (RS232), Analog
Power supply	12 to 24 VDC / 80mA

General

Detection Method	670nm Class I Laser Diode through-beam with linear CMOS
Overall Dimension	130 x 80 x 22 mm (5.12" x 3.15" x 0.87")
Mounting holes	4x M4 thruhole
Weight	472g (16oz)
Operating Temp.	0°C to 50°C (32°F to 122°F)
Storage Temp.	-20°C to 70°C (-4°F to 158°F)

Principle of operation

3

MicroU Laser Micrometer uses a parallel beam to measure position or size of objects. An object is simply placed in the detection line, and the measured edge (in case of diameter - both edges) must be in the active area. The position and size of the shadow is measured via the CMOS detector. Gap and Center can also be measured (see picture below).

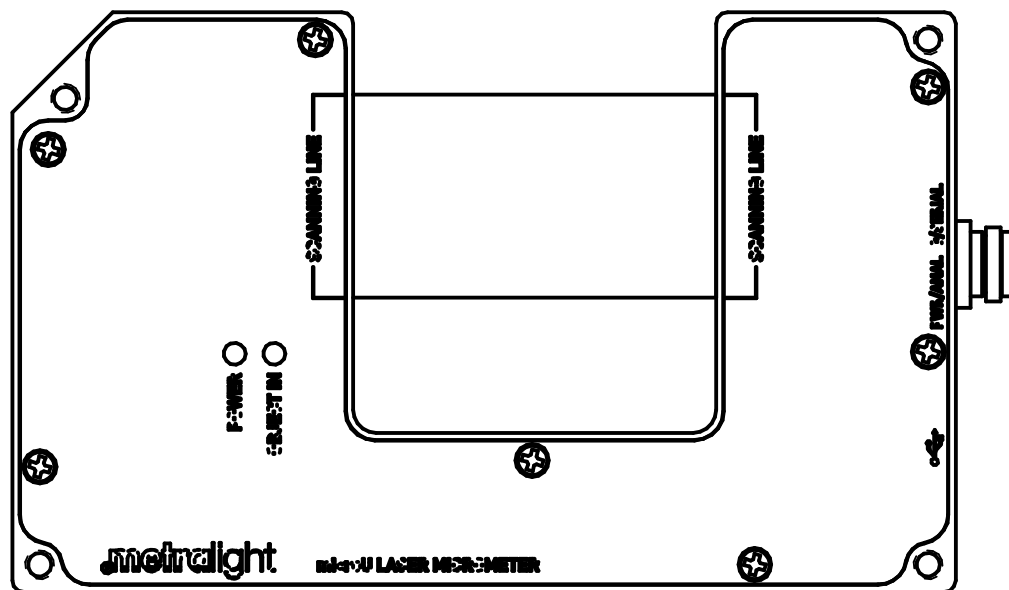
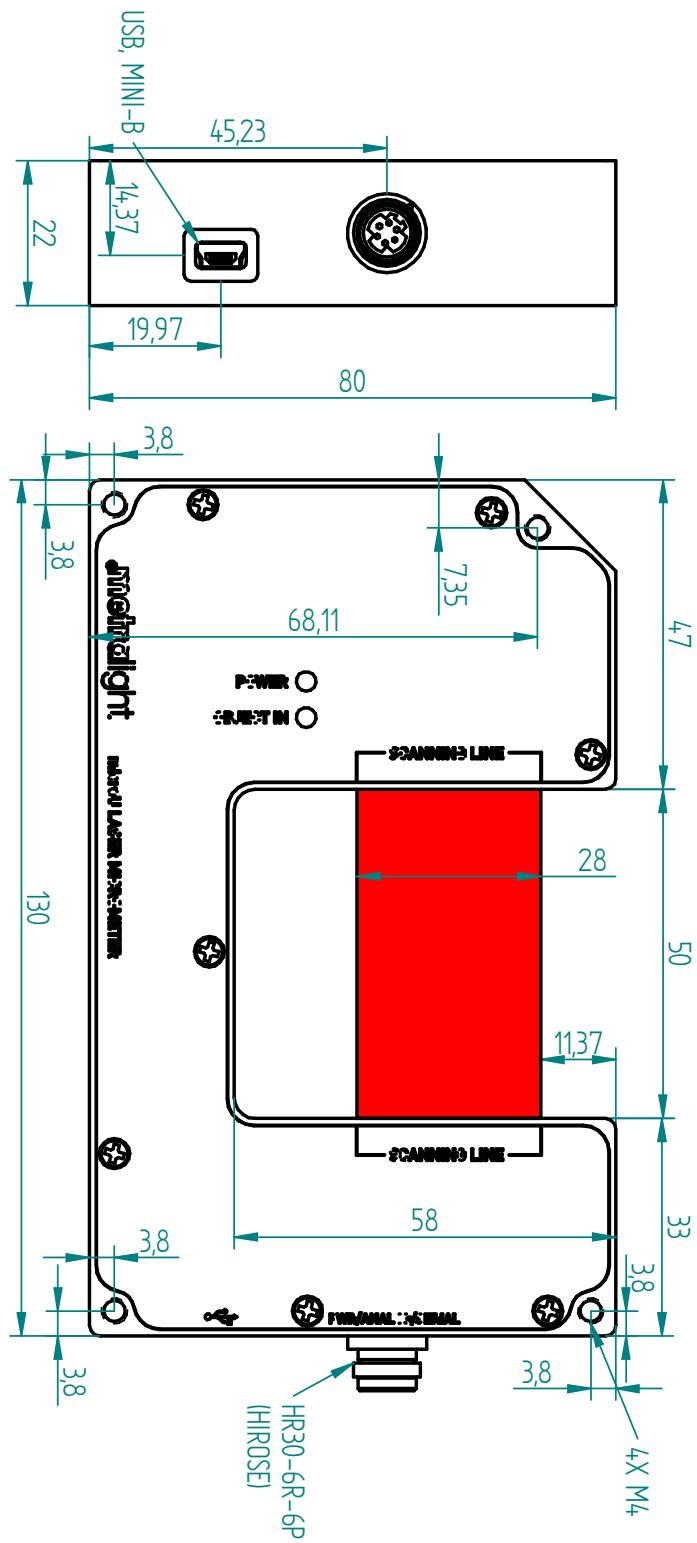


Figure 1: Parallel beam and shadow of an object

Sensor processes image data and outputs measurement in a binary pixel format representing position/size of object(s). Sensor processing can also be customized upon customer request, to include maximum/minimum, average values, etc. Data on display are shown in either mm or inches or pixels units.

Dimensions



For detailed dimensions, please download 2D drawing or 3D model from <http://www.metralight.com>

MicroU Laser Micrometer accommodates USB, RS232 and Analog output.

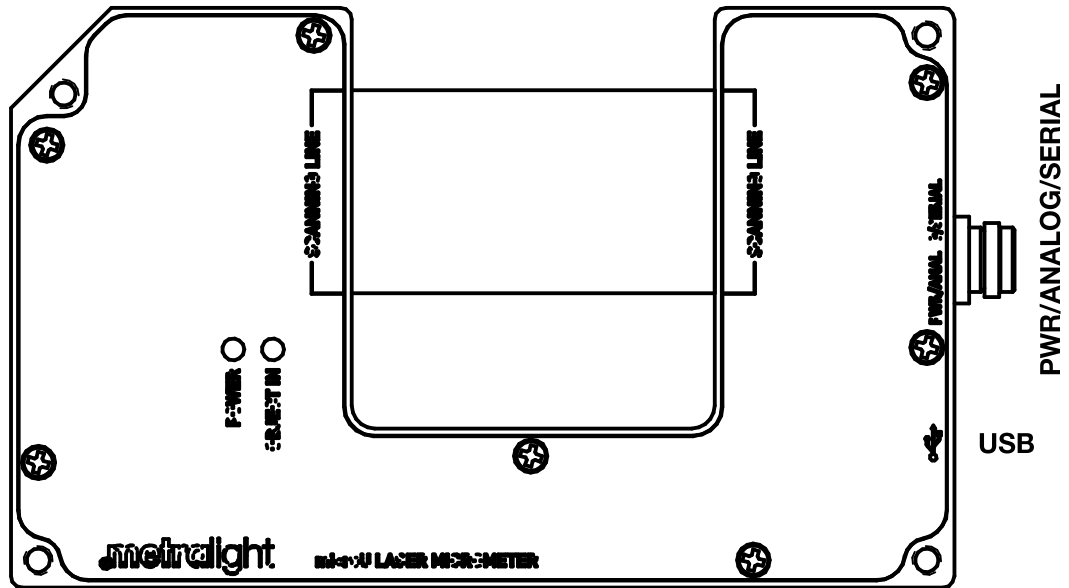


Figure 2: Interface

For USB connection please use Mini-B cable. For Power, Analog or serial use circular HR30 Hirose connector.

USB cable also powers ON the sensor. However for analog interface it's necessary to use external POWER.

Note: If Analog interface is not used leave GREEN and BROWN wire unconnected.

USB Interface

MicroU sensor uses FT230XS (see www.ftdichip.com) chip for USB interface. Driver creates Virtual Com Port for SW communication.

COM PORT Settings:

BaudRate: 115200 b/s

Databits: 8

Parity: None

Stop Bits: 1

Flow Control: None

Power and Analog Interface

For Analog interface connect POWER/ANALOG cable (cable with pigtail wires on the end) only. See figure below for detailed connection.

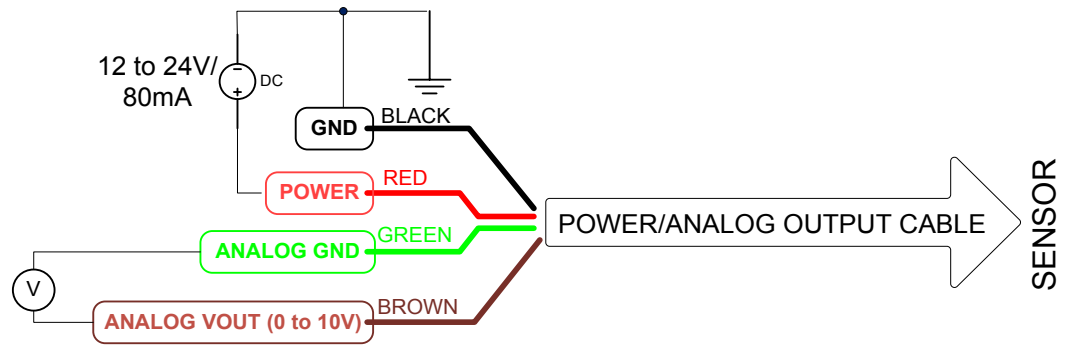


Figure 3: Power/Analog cable connection.

Command Set

6

For the microU Laser Micrometer there are 3 basic commands: DATA, STREAM and MODE. There is always 1 byte command being sent from PC to micrometer. Sensor's response varies in length for different commands. For DATA command there are 3 bytes for each data request (or multiple of three if more datas are requested). STREAM START command triggers sensor to send 3-byte length data packets until STREAM STOP is issued. There is no response for STREAM STOP command. MODE command has 1 byte response (echoes back MODE command). Command's byte high nibble determines command type and low nibble represents parameter

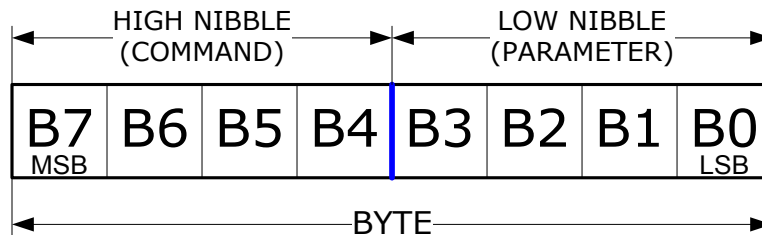


Figure 4: Command with parameter structure

When data are requested (DATA command or STREAM START), micrometer responds with 3 byte-length packets (2 bytes for data and 1 info byte).

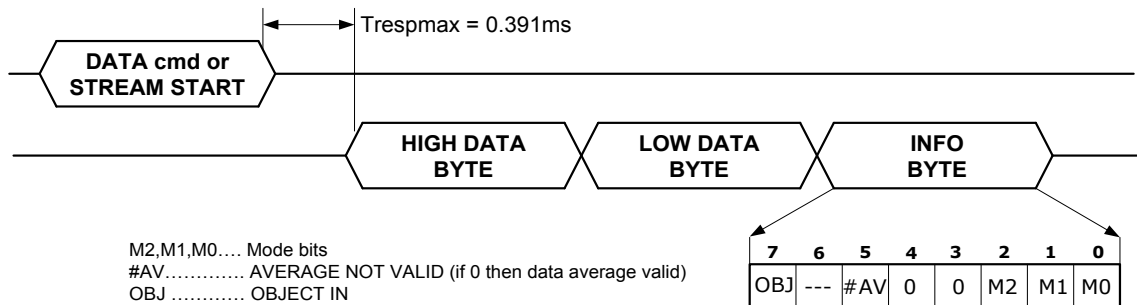


Figure 5: 1 Data Packet (3 bytes)

If more data is requested then response is multiplier of 3 bytes. E.g. PC requests 4 data (via DATA command) then micrometer returns 12 bytes. If STREAM START command is issued then Micrometer continuously sends 3 byte packets until STREAM STOP command is sent. Typical PC cannot read data in full speed mode (2500 readings/s) when 1 data only is requested and sensor triggered again. For high speed applications more data should be requested per one command (DATA command with parameter for more than 1 data or STREAM command). This method allows constant data sampling frequency. This constant frequency is also maximum data frequency.

DATA command

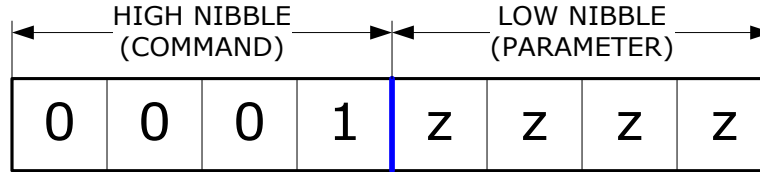


Figure 6: Command with parameter structure

Command: **DATA**

Parameter: **zzzz** represent number of data (2^{zzzz}) being requested

Response: $2^{zzzz}\{\text{data}\}$, where {data} is 3 byte-length packet response

Response length (bytes): $3 * 2^{zzzz}$

Example 1: This command serves as basic Get Data command. Let's say we need to read size of object, just once:

PC sends: 00010000 (0x10)

Micrometer response: 10100100 10110111 10000010

Description: First two (data) bytes = 10100100 10110111 = 0xA4B7 = 42167, this is diameter in pixels. 1 pixel measures 0.4375 μ m, then diameter = 42167 * 0.4375 = 18.448mm

Last (info) byte = 10000010. Bit OBJ=1 (object present), #AV=0 (average valid), MODE=010 (Diameter mode)

Example 2: User request 16 continuous datas:

PC sends: 00010100 (0x14)

Micrometer response: Sixteen 3 bytes packets

STREAM command

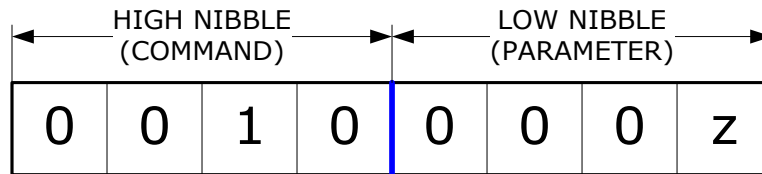


Figure 7: Command with parameter structure

Command: **STREAM**

Parameter: **z=1 for STREAM START, z=0 for STREAM STOP**

Response: {data}{data_{n+1}}{data_{n+2}}{data_{n+...}}, where {data} is 3 byte-length packet response

Response length (bytes): finite number (multiplier of 3) starting with STREAM START and ends with STREAM STOP.

Example 1: Start of data stream.

PC sends: 00100001 (0x21)

Micrometer response: {data}{data_{n+1}}{data_{n+2}}{data_{n+3}}{data_{n+...}}...

Example 2: Stop of data stream

PC sends: 00100000 (0x20)

Micrometer response: No response

MODE command

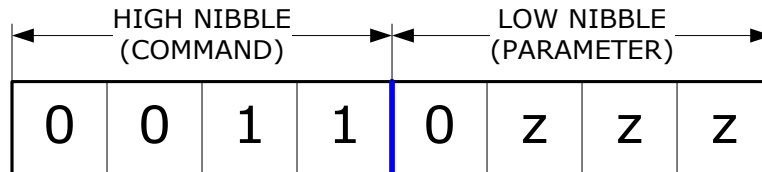


Figure 8: Command with parameter structure

Command: **MODE**

Parameter: **zzz=000 to 111** (see mode table and MODES DEFINITION)

Response: echoes back sent byte

Response length (bytes): 1

Example 1: Set Diameter Mode

PC sends: 00110010 (0x32)

Micrometer response: 00110010 (0x32)

zzz	000b	001b	010b	011b	100b	101b	110b	111b
Mode	Edge 1	Edge 2	Dia	Gap	Center	Solid Edge	Custom	Custom

Figure 9: Mode table

Code Example

7



Code example USB/RS232 interface (Microsoft VB.NET)

```
Dim buffer(0) As Byte = 16           '1 data command in Byte format
Dim Value As Single                  'Measured value in µm
Dim Object As Boolean                 'Object in
SerialPort.ReadExisting()            'Clear buffer
SerialPort.Write(buffer, 0, 1)        'Writes data command
Value = 0.4375*(256 * SerialPort.ReadByte() + SerialPort.ReadByte()) 'Reads high and low byte
If SerialPort.ReadByte() > 127 Then   'Checks Object
    Object = True                     'Is Object
Else :
    Object = False                    'Is no Object
End If
```

Metralight, Inc. provides sample application (MicroStudio, see below), this is a demonstration application which reads and display/save data (and export to Excel). Source code is included for custom modification. Please contact Metralight for any SW modification/development. Metralight provides a complete solution HW+SW and mechanical.

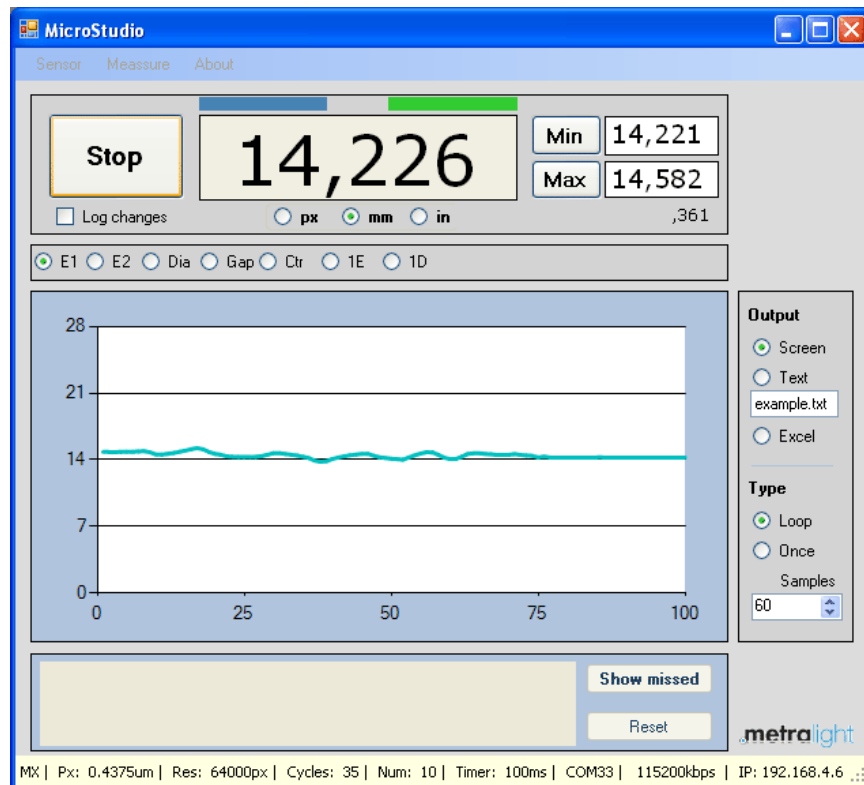


Figure 10: MicroStudio

Installation notes



- USE APPROPRIATE MOUNTING SCREWS (SEE MECHANICAL DRAWING)
- AVOID DIRECT SUNLIGHT !!! AND ALL OTHER LIGHT SOURCES WITH 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.
- APPLY CORRECT VOLTAGE - SEE ELECTRICAL SPECIFICATION

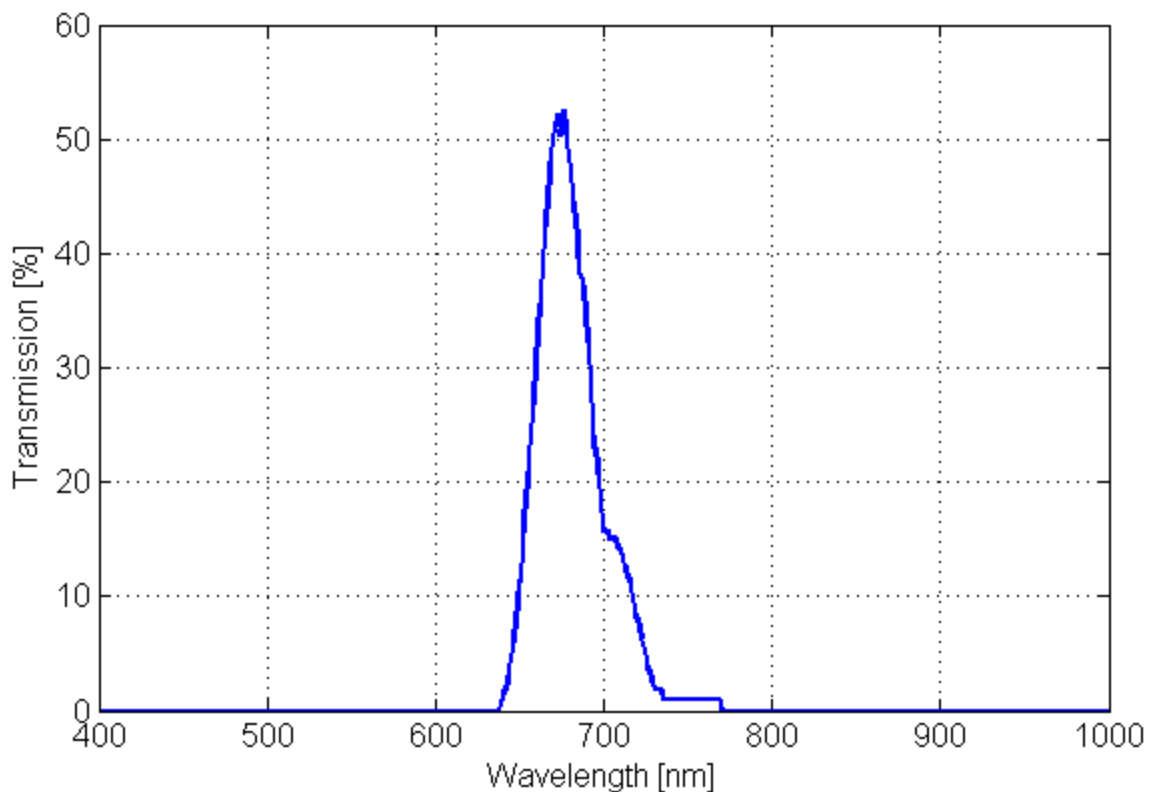


Figure 11: Ambient light optical filter

Package, Warranty, Contacts

9

Package components

- Sensor unit
- Power/Analog cable
- USB cable

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.

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>

Appendix A - Modes Definition 1/2

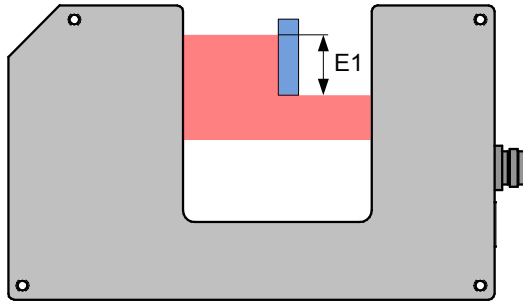


Figure: **EDGE1 MODE**, LEADING EDGE

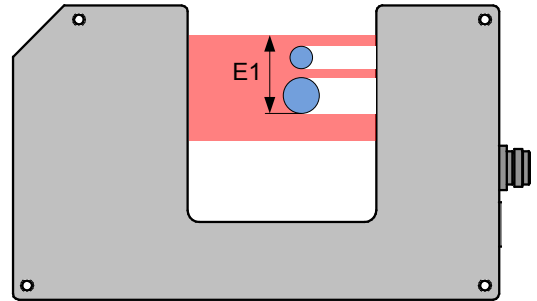


Figure: **EDGE1 MODE**, MULTIPLE OBJECTS

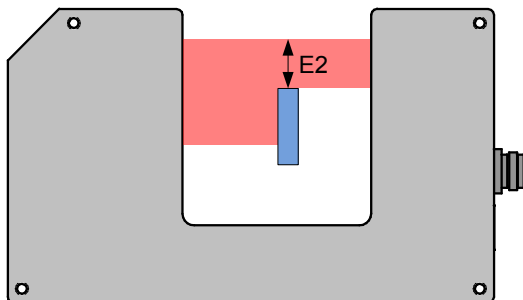


Figure: **EDGE2 MODE**, TRAILING EDGE

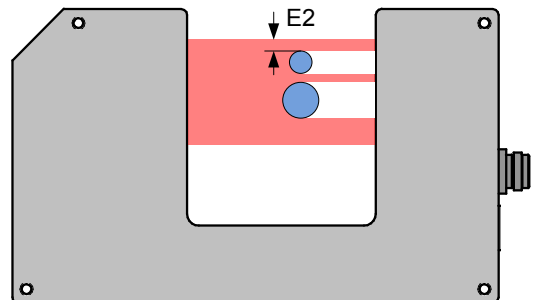


Figure: **EDGE2 MODE**, MULTIPLE OBJECTS

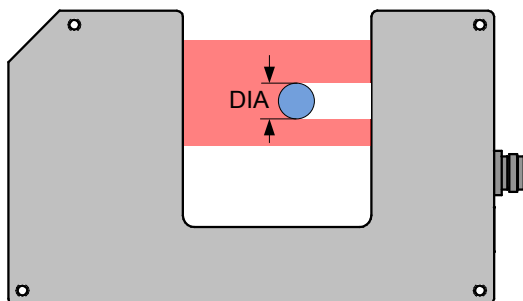


Figure: **DIA MODE**

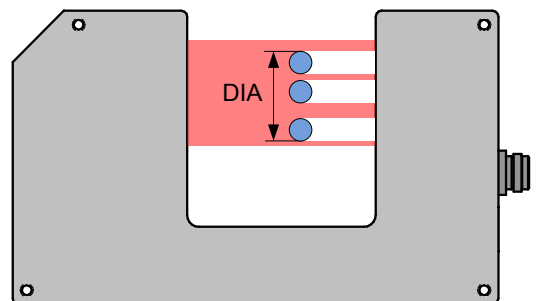


Figure: **DIA MODE**, MULTIPLE OBJECTS

Appendix A - Modes Definition 2/2

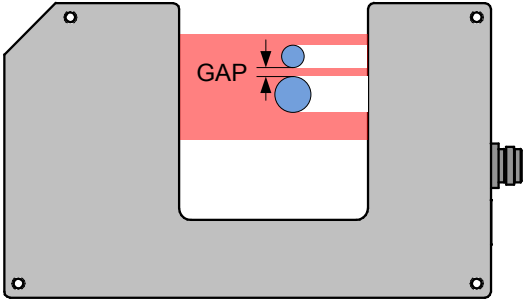


Figure: **GAP MODE**

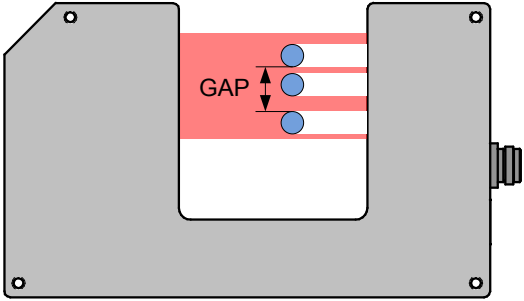


Figure: **GAP MODE, MULTIPLE OB-**

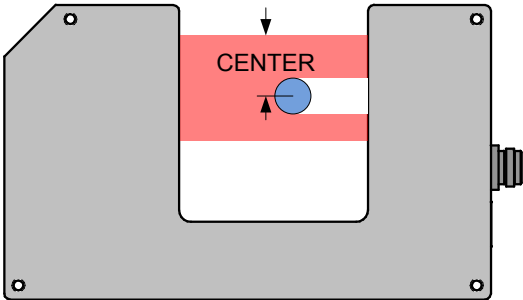


Figure: **CENTER MODE**

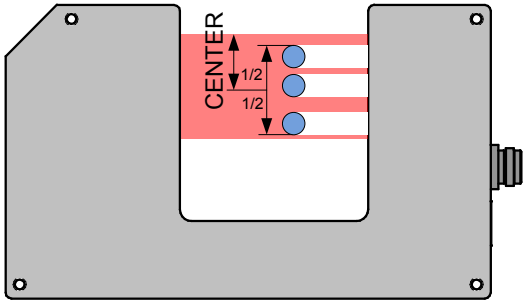


Figure: **CENTER MODE, MULTIPLE OBJECTS**

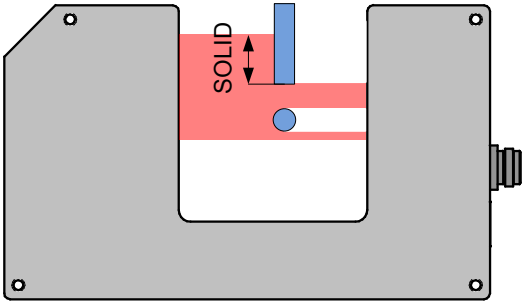


Figure: **SOLID MODE, MULTIPLE OBJECTS**

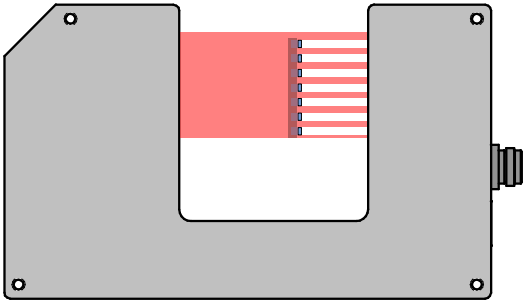


Figure: **CUSTOM MODE**, For Example IC LEADS
Dimension measurement OR Detects BENT Leads
or Missing Leads.