.metralight

Portable laser micrometer Gen. 3 (2021)

Technical specification (rev.A, July 2021)



Table of contents

1. Introduction	5
2. Specification	6
3. Description	7
3.1 Dimensions	7
3.2 Interface	7
4. Driver installation	8
5. Display screens	12
5.1 Measuring	12
5.2 Pixel profile	13
5.3 Status screen	13
5.4 Settings	14
6. Integrated web application	15
6.1 Main application screen	15
6.2 Recorded files	16
6.3 Pixel profile	16
6.4 Modes	17
6.5 Settings	18
6.6 Notes	19
6.7 Documentation	19
7. Communication APIs	15
7.1 Request	20
7.2 Response	20
7.3 Examples	20
7.4 API call via http	21
8. Measuring modes	23
9. Installation	24
10. Package, warranty, contacts	25

List of figures

Image 1: Portable sensor dimensions (mm)	7
Image 2: Measuring screen	
Image 3: Pixel profile and threshold	
Image 4: Pixel profile and threshold	
Image 5: Main web application screen	0
Image 6: Recorded files screen	0
Image 7: Pixel profile screen	0
Image 8: Modes screen	0
Image 9: Settings screen	0
Image 10: Notes screen	0
Image 11: Documentation screen	0
Image 12: Ambient light optical filter transmittance	
Image 13: Class 1 Laser safety label	
Image 14: Measuring mode: diameter	
Image 15: Measuring mode: center	
Image 16: Measuring mode: edge 1	
Image 17: Measuring mode: edge 2	
Image 18: Measuring mode: gap	
Image 19: Measuring mode: solid	

List of tables

Table 1: Sensor specification	6
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1. Introduction

- Handheld Inovation in Non-Contact Measurement
- Battery Powered (runs from internal Li-Ion battery up to 10 hours)
- Communication and battery charging over USB or Ethernet (active POE)
- Wi-Fi (802.11b/g)
- Embedded LINUX OS including web server, SSH access
- Integrated web measuring application remote access using mobile phone available (using Wi-Fi)
- 4GB memory
- 3900 measurements per second
- High resolution color OLED Display
- Membrane/capacitive Keyboard
- Laser Device (Laser Diode 670 nm Class I)
- Custom Modes Available: Centering, Minimum Measurement, Maximum Measurement, Thickness, Range of Tolerances

2. Specification

Measurement Range	28 mm (1.10″)
Resolution	0.4375 μm
Repeatability	3 μm (Edge Position, Calibrated Distance)
Response Time	0.333 ms
Non-Linearity	< 10 µm (Edge Position, Calibrated Distance)
Measuring Modes	Edge1, Edge2, Diameter, Gap, Center, Solid
Power	USB Powered (5 V/150 mA) / Internal Li-Ion (up to 10 h running)
Wired Connection/Interface	Micro USB B connector / Ethernet
Communication protocol	Modbus TCP (measured values only) or full featured custom protocol
Wireless	Wi-Fi 802.11b/g
Display	OLED, 320 x 320
Memory	4GB
Overall Dimension	131 x 97 x 23 mm (5.16" x 3.82" x 0.9")
Weight	280 g (9.88 oz)

Table 1: Sensor specification

3. Description

3.1 Dimensions



Image 1: Portable sensor dimensions (mm)

3.2 Interface

Sensor offers multiple connection options. Each of provided interfaces can be used to communicate with sensor using tcp/web api or to use integrated measuring web application. Sensor also supports Modbus TCP (measured values and min/max only). Detailed specification of modbus registers is documented in documentation page of integrated web application.

3.2.1 USB 2.0

Communication with the sensor and charging is provided by USB Micro B connector. Driver installation may be needed for network over USB usage (see chapter <u>Driver installation (page 8)</u> for details).

3.2.2 Ethernet

Ethernet interface can be used both for communication and charging using active POE.

3.2.3 Wi-Fi

Wi-Fi to be either in AP mode or client mode (see chapter <u>Settings (page 14)</u> for details). When in AP mode, sensor creates own wireless network. When in Client mode, the sensor can connect to any available wireless network in the area.

4. Driver installation

If the RNDIS driver installs automatically then USB network will work. If it installs as USB Serial Device (as in Windows 10 for example) then continue using following steps:

- 1. Click here to <u>download</u> the RNDIS Driver. Extract the downloaded zip files.
- 2. Open Device Manager. Portable is detected as USB Serial Device at COM port under the PORTS & LPT. Right click on it and select "Update Driver Software"

🛔 Device Manager			_	×
File Action View Help				
♦ ♦ 🗊 🗊 😨 🖬 💯 Ⅰ	X 🖲			
V 🛃 DESKTOP-9V4O46S				
> 4 Audio inputs and outputs				
> 🦢 Batteries				
> 🚯 Bluetooth				
> 💻 Computer				
> 👝 Disk drives				
> 🏣 Display adapters				
> 📹 IDE ATA/ATAPI controllers				
> 🚡 Imaging devices				
> 🔤 Keyboards				
> Memory technology devices				
> II Mice and other pointing device	ces			
> 🛄 Monitors				
> 🚽 Network adapters				
V Ports (COM & LPT)				
USB Serial Device (COM36)	L		
> 📇 Print queues	Update Driver Software			
> Processors	Disable			
Software devices	Uninstall			
> iii Sound, video and game co				
> Storage controllers	Scan for hardware changes			
> 🏣 System devices	Properties			
> Universal Serial Bus contro	Toperties	J		
Launches the Update Driver Software Wize	ard for the selected device.			

3. Select "Browse my computer for driver software".



4. Choose the location where you extracted the driver files on your PC.

÷	Update Driver Software - USB Serial Device (COM36)	^
	Browse for driver software on your computer	
	Search for driver software in this location:	
	C:\Users\Sharath\Downloads\Compressed\mod-duo-rndis V Browse	
	 Let me pick from a list of device drivers on my computer This list will show installed driver software compatible with the device, and all driver software in the same category as the device. 	
	Next Canc	el

5. Select the Extracted driver folder which is mod-duo-rndis. Click ok and click Next. This will install the driver.

Browse For Folder	>	<
Select the folder that contains drivers for your l	hardware.	
> mod-duo-rndis	Extracted File Location	
Folder: mod-duo-rndis	OK Cancel	
	Cancer	

		×
~	Update Driver Software - USB Ethernet/RNDIS Gadget	
	Windows has successfully updated your driver software	
	Windows has finished installing the driver software for this device:	
	USB Ethernet/RNDIS Gadget	
		_
	Close	

6. Now you can able to see the RNDIS in Network adapters.

🛃 Device Manager	_	\times
File Action View Help		
⇐ ➡ ☶ 📴 🗾 💷 🖳 🗶 🏵		
> 🍃 Batteries		^
> 🚯 Bluetooth		
> 💻 Computer		- 10
> 👝 Disk drives		- 8
> 🔙 Display adapters		- 8
> 📹 IDE ATA/ATAPI controllers		- 8
> 🚡 Imaging devices		- 8
> 🔤 Keyboards		- 8
> 🥅 Memory technology devices		- 8
> III Mice and other pointing devices		- 8
> 🛄 Monitors		- 8
🗸 🚍 Network adapters		- 8
🚍 Ralink RT3290 802.11bgn Wi-Fi Adapter		- 8
🚍 Realtek PCIe FE Family Controller		- 8
🚽 TP-LINK Wireless USB Adapter		
🚽 USB Ethernet/RNDIS Gadget \prec		
🚽 WAN Miniport (IKEv2)		- 8
🚽 WAN Miniport (IP)		- 8
🚽 WAN Miniport (IΡν6)		- 8
🚽 WAN Miniport (L2TP)		- 8
🚍 WAN Miniport (Network Monitor)		
🚽 WAN Miniport (PPPOE)		
🚽 WAN Miniport (PPTP)		
🚍 WAN Miniport (SSTP)		
> 🚍 Print queues		
		~

5. Display screens

Display screen can be changed using LEFT/RIGHT arrows.

5.1 Measuring

Main screen contains:

- Battery status: Indicates current battery level.
- Charging status: Displayed only when battery is charging.
- Wifi status: Displayed only when wifi is either in AP or client mode.
- Min, Max: Minimum and maximum measured values. RESTART button resets stored MIN&MAX.
- Current value: Display currently measured value.
- Units: measuring units.
- Mode: Measuring mode. ENTER button changes the Mode.
- Object-in status: Displays number of detected objects in measuring zone
- Min/max limit: limits used to compare agains measured value, if outside limits measured value color changes to red and flag is set in data read using api. Limits are set per measuring mode.



Image 2: Measuring screen

5.2 Pixel profile

Display sensor pixels profile and threshold.



Image 3: Pixel profile and threshold

5.3 Status screen

Display stream settings and IP addresses.

Rate Rec	2000 Stopped
SSID	Portable
WiFi	192.168.177.1
Eth	192.168.1.36
Usb	192.168.188.1
Debug	On

Image 4: Pixel profile and threshold

5.4 Settings

Sensor parameters settings screen:

- Mode select measuring mode
- Units
- mm
- inch
- Average select number of samples for value averaging
- Wi-Fi
- WiFi configures mode of operation:
 - On-client (connects to existing WiFi network)
 - On-AP (creates own network)
 - Off
- SSID list of available networks
- AP name configure network name
- AP password configure network password
- AP channel configure channel
- Status shows current status and IP address
- Date Set date and time
- Normalize performs user normalization
- Normalization normalization type is selected:
 - user (normalization made using previous menu option or by command via USB)
 - default (factory)
- System info system information: version, CPU temperature, etc.

6. Integrated web application

Sensor provides integrated web application for making measurements, saving data streams and sensor settings. Web application is responsive and optimized for mobile phones and tablets.

6.1 Main application screen

Main application screen shows, similarly to main sensor screen, currently measured value including measured min/max, measured mode, object-in indicator and min/max limits. Stream recording can be configured and started.



Image 5: Main web application screen

6.2 Recorded files

Screen is used to manage recorded stream files.

	Portable	Main Recorded files	Pixel profile Mode	Settings	Notes	Documentation		
		F	Recorded file	S				
Name			Date			Siz	e	Action
fileUSB10Sec	Bin	Download	Jun-17 202	21 06:18 am	ı	440	0000	Delete
file1	Bin	Download	Jun-17 202	21 05:42 am	ı	220)	Delete

Image 6: Recorded files screen

6.3 Pixel profile

Shows pixel profile measured by the sensor. Type of displayed profile can be changed.



Image 7: Pixel profile screen

6.4 Modes

Modes tab contains visualization of measured mode. Modes can be switched by click on mode image. Limits can be set for displayed mode.

Portable Main Recorded files Pixel profile Mode Settings Notes Documentation Mode DIAMETER
I.553 9.412 8.498 I.500 I.500 REC RESET Imetralight Imetralight Imetra
Low OFF High 0.0079

Image 8: Modes screen

6.5 Settings

Various sensor settings can be changed using this screen.

Portable Main Recorded files Pixel profile Mode Settings Notes Documentation General DIAMETER Mode Units inch 10 minutes Screen saver interval Normalization User Normalize Run Rate Normal (2000 Hz) Date and time 2021-07-28 11:09:32 Average of the number of measurements 1 Object filter 0.0040 [inch] Api enabled On Reset settings Disable www interface Disable Recording file1 File name File mode Overwrite Record mode Continuous Duration 10



6.6 Notes

Screen is used to save custom text notes inside sensor.

Portable	Main Recorded files	Pixel profile	Mode Settings	Notes Docume	ntation	
		Note	S			
Save Cancel Syntax markdown						
User notes						
User notes						

Image 10: Notes screen

6.7 Documentation

Screen contains information about sensor usage - api, error codes, modbus configuration, etc. Api commands can be tested using api tester.



Image 11: Documentation screen

7. Communication APIs

Sensor can communicate with external applications using TCP or http api. Both can be turned ON/OFF using sensor settings menu.

TCP api server is running on port 4477. Http api is available on address /api/cmd or /api/cmdmulti, see details below.

Commands and responses are always escaped using newline (\n). All commands are documented and can be tested using api tester on documentation page of integrated web application.

7.1 Request

Starts with a "+" sign. The specific api command may or may not implement set/get command - some only work as get, some as set.

7.1.1 Get

Get call is used mainly for reading (does not change the internal state of the server)

```
+get cmd [parameters]\n
```

7.1.2 Set

The call set usually changes the state, they perform actions that change something

+set cmd [= parameters]\n

7.2 Response

First character defines the type of response.

- Character "+" means reponse ok, response body follow "+" character
- Character "-" means error, error message follow "-" character

7.3 Examples

7.3.1 Get / Ok

Request: +get api.po1.battery.percentage\n

Response: +99\n

7.3.2 Set / Error

Request: +set api.po1.battery.percentage=12\n

Response: -not allowed\n

7.4 API call via http

The call only forwards command(s) to and sends the response from the server back to the client. Two options are available:

- Single command call /api/cmd
- multiple commands in one http request /api/cmdmulti

7.4.1 Single command

Send to /api/cmd using POST method.

Call example:

```
curl -X POST -H "Content-Type: application/json" \
-d '{
    "cmd":"get api.pol.battery.charging",
}
' \
http://localhost:80/api/cmd
```

Response:

```
{
    "data": "+0,77,0,1;0,2.802,4.123,0.477;1,6.565,4.926,6.280;2,0.075,0.875,
    4.906;3,1.865,0.238,4.301;4,4.193,3.383,3.845;5,0.127,0.793,0.269\n"
}
```

7.4.2 Multiple command

Send to /api/cmdmulti using POST method.

Call example:

```
curl -X POST -H "Content-Type: application/json" \
-d '{
    "bat_ch":"+get api.po1.battery.charging",
    "bat_proc":"+get api.po1.battery.percentage",
    "unitset":"+set db.save.cfg.units=1",
    "meas":"+get api.po1.measure.data 0 0"
    }
    ' \
http://localhost:80/api/cmdmulti
```

Response:

{		
	"data":	: {
		"bat_ch": "+1\n",
		"bat_proc": "+3\n",
		"meas": "+0,77,0,1;0,2.351,5.554,3.173;1,3.086,5.851,2.998;2,0.773,
		2.178,2.456;3,3.527,5.376,1.877;4,5.833,5.943,0.502;5,0.920,4.304,2.551\n",
		"unitset": "+ok\n"
	}	
}		

8. Measuring modes

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.

See appendix <u>Measuring modes (page 26)</u> for details.

9. Installation

USE APPROPRIATE MOUNTING SCREWS (SEE MECHANICAL DRAWING)

AVOID ESPECIALLY 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.



Image 12: Ambient light optical filter transmittance

Laser Safety

Portable sensor is classified as Class 1 Laser device. A Class 1 laser is safe for all conditions of use.

/	
	ANSI Z136.1 IEC 60825-1
	CLASS 1 LASER PRODUCT
	P ≤50μW, λ=670 nm
1	

Image 13: Class 1 Laser safety label

10. Package, warranty, contacts

Package components:

- 1x Portable laser micrometer
- Transport plastic case
- 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. 533 Airport Blvd. Suite # 400 Burlingame, CA 94010 phone: (650) 581 3088 fax: (650) 808 9830 email: <u>sales@metralight.com</u> technical support: <u>support@metralight.com</u> web site: <u>http://www.metralight.com</u>

Appendix A. Measuring modes



Image 14: Measuring mode: diameter



Image 15: Measuring mode: center



Image 16: Measuring mode: edge 1



Image 17: Measuring mode: edge 2



Image 18: Measuring mode: gap



Image 19: Measuring mode: solid