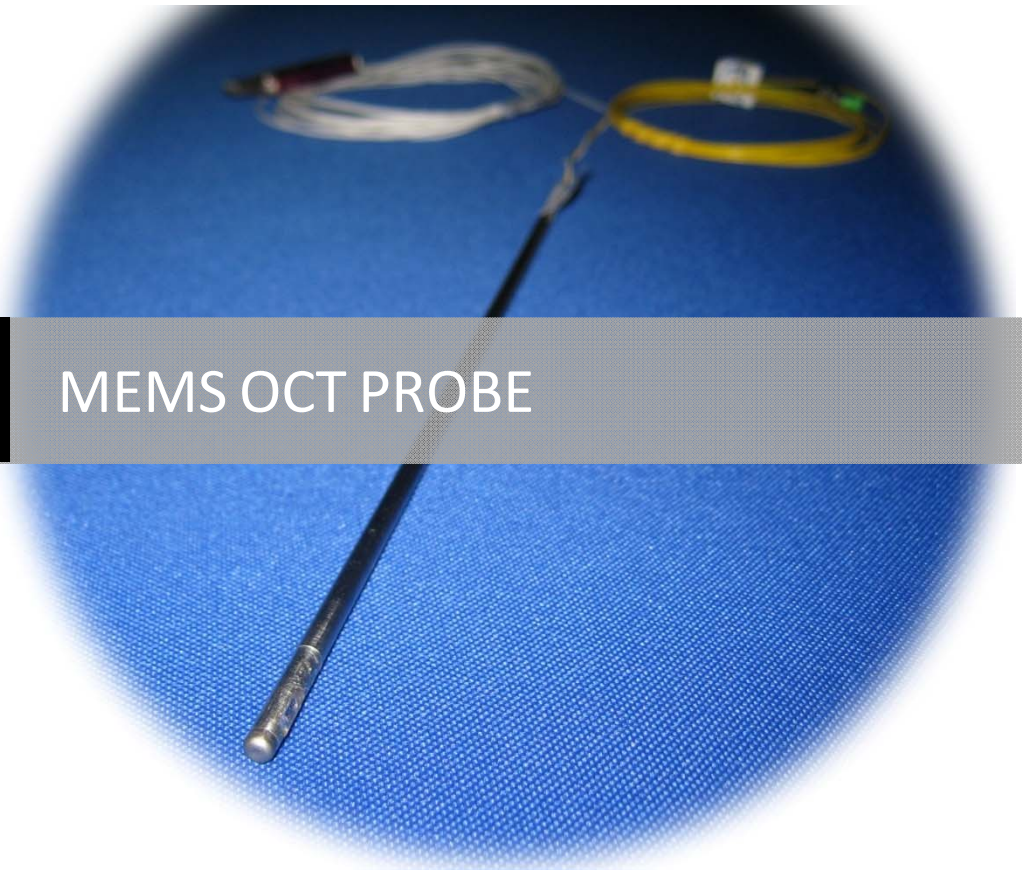

MEMS OCT PROBE

User's manual

Version 1.0(2012)

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Wuxi WiO Technology Co., Ltd

Table of Content

1- SAFETY INSTRUCTIONS

Caution: Before using your MEMS OCT probe, please read this Safety Instructions section carefully. All these safety measures assume a good knowledge of MEMS driving control and optical fiber protection, and the more specific knowledge regarding the use of the MEMS OCT probe contained in this Manual.

1) This unit must be used in strict conformity with the instruction contained in this manual. The manufacturer rejects all liability if these rules are not followed or if the unit is used for any other applications.

2) Any impact, collision, bumping or shock to a rigid object is a hazard to the unit. The unit must be held carefully when it is delivered from one place to another place.

3) Before the output voltage signals from the driving circuit board are applied to the unit, the signals must be checked by an oscilloscope. Make sure the signals match the parameters listed in Table 1.

Table 1 Signals of the four channels

Item	**Voltage (V)**			**Frequency（Hz）**			**Phase (°)**	**Duty Ratio**
	Min	Typ	Max	Min	Typ	Max		
In 1/Out 1	0	3.5	4	0	0.5	0.8	0	90:10
In 2/Out 2	0	3.5	4	0	50	80	0	50:50
In 3/Out 3	0	3.5	4	0	0.5	0.8	180	10:90
In 4/Out 4	0	3.5	4	0	50	80	180	50:50

4) The voltage signal must be controlled from 0.8V to 3.5V, which is the safe voltage range for the normal operation of the MEMS device.

5) Both visible and near infrared light can be fed into the optical fiber of the unit. Visible light can be used to check the scan pattern and the location of the illumination spot.

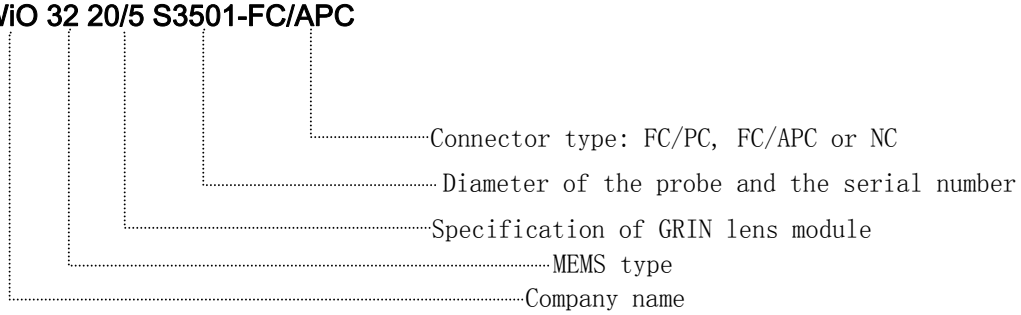
6) Keep the optical window of the probe clean and scratch-free. The window surface may be wiped with cotton swab gently if the window becomes dirty.

7) Keep the fiber interface clean, and the cover for the fiber end must be put on whenever the unit is not in use.

8) Only the unit manufacturer or dealer is qualified to carry out repairing.

2- Order NO.

WiO 32 20/5 S3501-FC/APC



3- ITEMS INCLUDED

The MEMS OCT probe is a 2-axis optical scanning probe for imaging and measuring. After checking the package (please keep it) for damage, open the box and you should find the following items:

- One MEMS OCT probe
- One driving circuit board
- One adapter (DC 12V)
- One 850nm laser pen (with FC interface) (Optional for order)

4- PRODUCT DESCRIPTION

WiO's MEMS 2-axis optical scanning probe employs a 2-axis MEMS mirror with low drive voltage, large range and high fill factor. The outer tube is made of robust and biocompatible stainless steel. The probe outer diameter can be made as small as 2.4 mm. Such a small probe can be inserted into the biopsy channel of a soft or rigid endoscope for in vivo diagnosis of internal organs. It can also be used separately for real-time imaging during surgical operation. This probe can be widely applied to optical coherence tomography (OCT), confocal microscopy, diffuse optical tomography (DOT), and nonlinear optical microscopy.

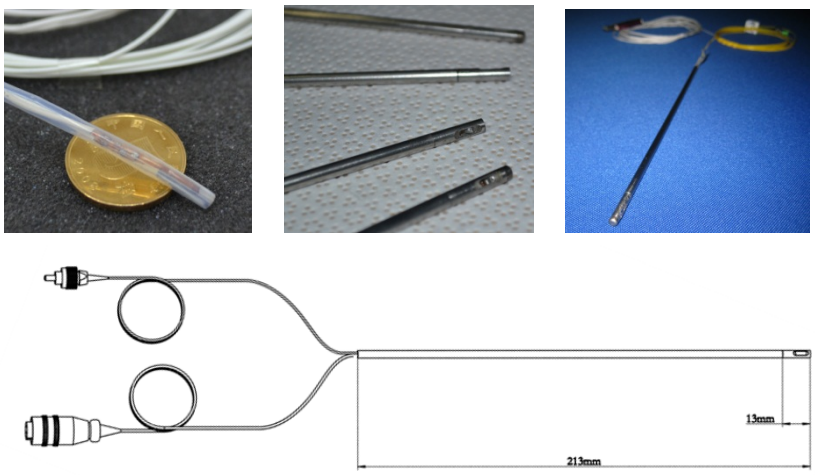


Fig. 1 MOPS1 (MEMS OCT probe)

Unique Features:

- Large scan angle
- High scan speed
- Low driving voltage
- High fill factor
- Custom design
- Low cost

Applications:

- Microendoscopic imaging
- Optical Coherence Tomography
- Diffuse optical tomography
- Photoacoustic imaging
- Nonlinear optical imaging

5- HOW TO USE IT?

1) Before using the probe, check the electrical resistances of the four terminals (A1/A2/A3/A4), as shown in Fig. 2, ensuring that the electrical resistances are all in the normal range (100Ω-500Ω). A digital multimeter can be used. Note that the terminal linked to the brown line is Ground. The resistance should be measured between one of A1-A4 terminals and Ground.

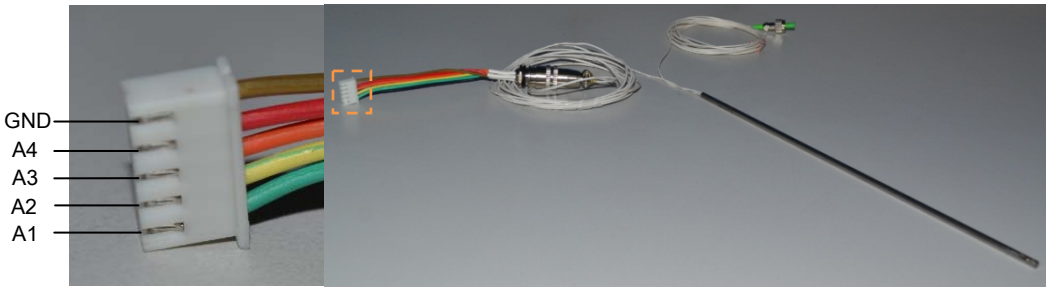


Fig. 2 Electrical interface of the probe

2) At first, you need to generate four triangle or sine voltage waveforms, as shown in Fig. 3 and Fig. 4. This can be done either by a function generator or a data acquisition card. If you have any questions, please contact the technical support of WiO.

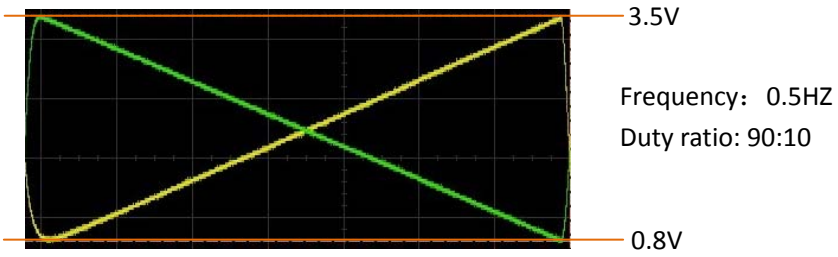


Fig. 3 Standard waveforms of A1 and A3 (A1and A3 are out of phase)

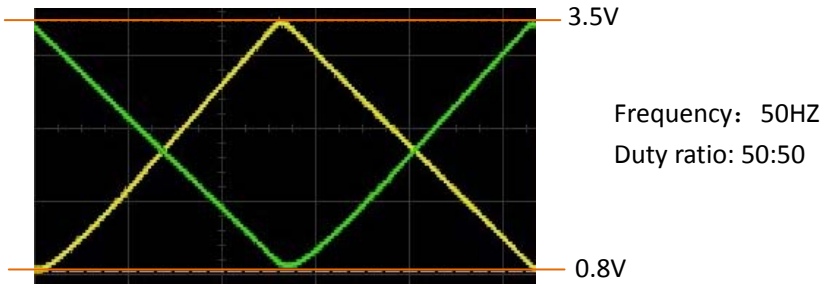


Fig. 4 Standard waveforms of A2 and A4 (A2 and A4 are 180° out of phase)

3) Here you have two choices. If you just want to check how the probe works, please skip step 4) and step 5), and directly connect the signals generate in step 2) to the probe. Please pay attention to the order of the signal lines. A1 and A3 should be connected to the voltage waveforms shown in Fig. 3, and A2 and A4 to the waveforms shown in Fig. 4.

4) If you want to connect this probe to an OCT system (as shown in Fig. 5), you can connect the four voltage waveforms to the ports IN 1-4 on the driving circuit board (as shown is Fig. 6). The functions of the driving circuit board include filtering, protection, voltage regulation, and gain control. Then connect the power adapter to the power port on the circuit board, and push down the On/Off button (it's on when the green light on the circuit board turns red). Check the output voltage waveforms from the ports OUT1-4 on the circuit board. The voltage waveforms of OUT1 and OUT3 should be the same as the ones shown in Fig. 3, and the voltage waveforms of OUT2 and OUT4 the same as in Fig. 4.

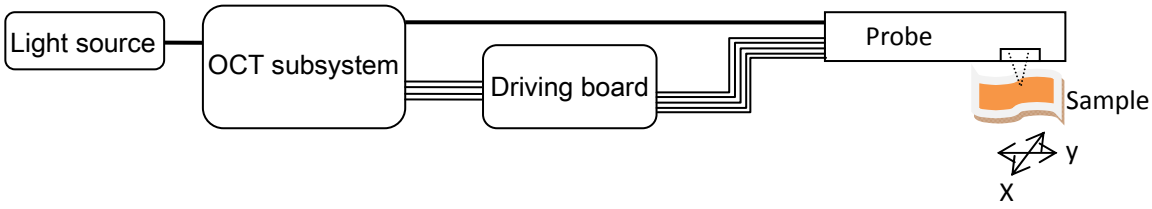


Fig. 5 The use of the probe in an OCT system

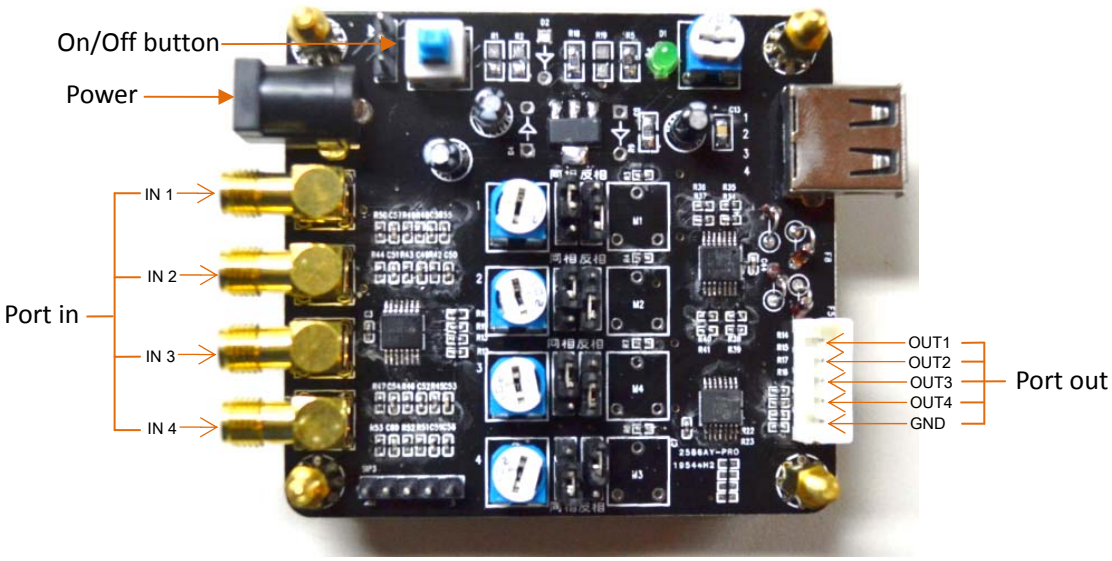


Fig. 6 Driving control circuit board

5) Push down the power button to turn off the power, and connect the electrical interface of the probe to the Port Out on the circuit board. A1, A2, A3 and A4 should be connected to OUT1, OUT2, OUT3 and OUT4, respectively.

6) Then connect the fiber interface to the light source.

7) Turn on the power. The probe should start to scan and an optical grating should be generated. If a NIR or IR light source is used, an IR card is needed to see the optical grating.

6- SPECIFICATIONS

Product number	MOPS1
Operating wavelength	Visible - NIR
Working distance	1.0 ± 0.5mm
Fast-axis scan frequency	up to 200 Hz
MEMS resonant frequency	> 300Hz
Maximum image area	3 × 3mm^2
Maximum optical scan angle	±23°
Number of MEMS actuators	4 (*x* and *y* differential actuation)
MEMS actuator control voltage	< 5V
Probe outer diameter(distal)	3.5 mm
Probe length (rigid portion)	213mm
Fiber type	SMF-28
Fiber length	3,000 ± 10 mm
Operating temperature	0 ~ 60°C
Storage temperature	25°C

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