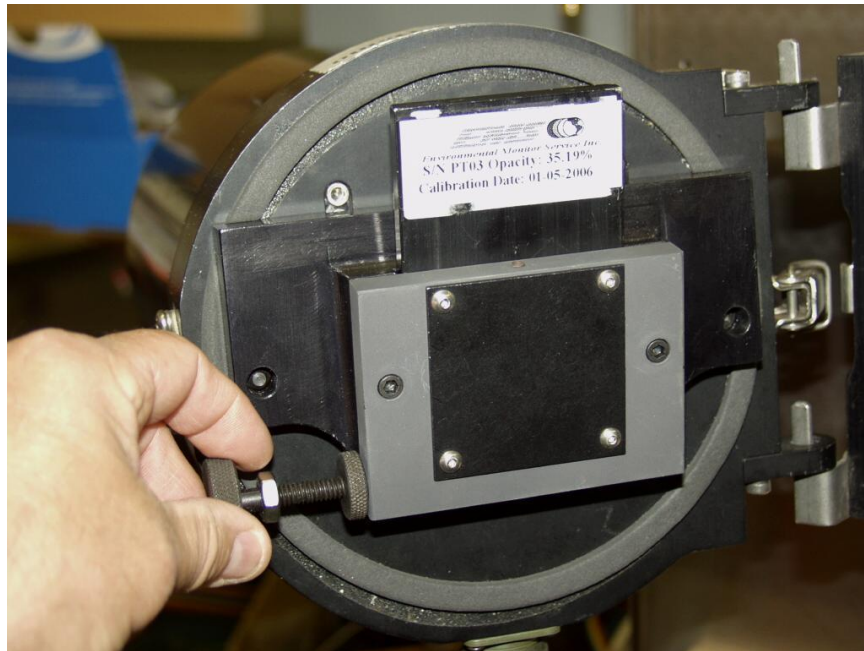




EMS Audit Device Operation Manual

Microturn 200



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Using the Optional Online Zero Reflector

The Microturn 200 online test and audit system, P/N 1232, may be used for:

- Opacity audits
- Linearity checks and adjustments
- System zero and accuracy verification
- Service online or off-stack

The system includes a test reflector, three neutral density filters, filter certification certificates, and a carrying case. The Microturn 200 online test reflector fits over the transceiver lens.

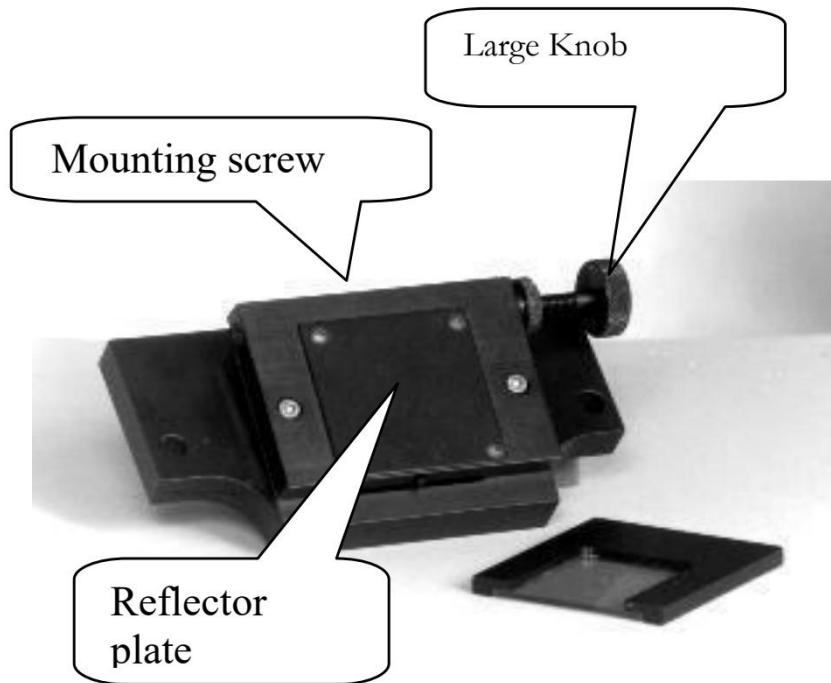


Figure 1. Microturn 200

Operating Procedure

The supplied filters are marked in single-pass opacity. This is the same as double-pass opacity when the optical path length ratio (OPLR), or correlation factor, is 0.50. For other OPLR values, see Filter Correction to calculate the expected filter reading.

1. Hold the Microturn 200 so that you can see the reflector. Turn the fine-adjustment knob (large knob) to open the iris and expose more of the reflector. Opening the iris lowers the indicated opacity; turning the knob in the opposite direction closes the iris and raises the indicated opacity.
2. Loosen the transceiver clamps and swing the transceiver open. Clean the lens with alcohol and clean, lint-free paper, leaving no film on the lens.
3. Place the Microturn 200 on the two alignment pins, with its reflector facing the transmissometer and away from the stack. Secure the device to the transceiver with the mounting screw.
4. Use the fine-adjustment knob to raise the opacity reading above zero. Slowly turn the knob in the opposite direction until the reading just reaches zero. If you cannot reach zero or raise the reading above zero, see Coarse Adjustments.
5. Insert the EMS neutral density slide into the slot on top of the device, just behind the mounting screw. The system should read the value shown on the slide label within $\pm 2\%$ or better.

Filter Correction

If the instrument OPLR is other than 0.5, the slides will produce different readings. Use the following formula to calculate the expected reading at another OPLR:

$$\left[1 - \left(1 - \frac{OP_1}{100} \right)^{\frac{M_2}{0.5}} \right] \times 100 = OP_2$$

Variable	Definition
OP1	Standard filter value, in percent
M2	OPLR for your instrument
OP2	Standard filter value at your OPLR, in percent

Example

A standard filter has a value of 23.1%. At an OPLR of 1.5, the expected reading is 54.5%:

$$\left[1 - \left(1 - \frac{23.1}{100} \right)^{\frac{1.5}{0.5}} \right] \times 100 = 54.5\%$$

Filter Recalibration

EMS recommends filter calibration at least annually. However, local regulations may require more frequent calibration. Check with the issuer of the air permit. EMS can also calibrate filters from other manufacturers; contact EMS for pricing. Filters are tested in accordance with 40 CFR 60, Appendix B, Performance Specification 1, Section 7.1.3, Attenuation Calibration.

Coarse Adjustments

Opacity Below Zero

Use the following procedure if opacity is below zero and you cannot reach zero after turning the adjustment knob as far as it will go into the Microturn housing:

1. Hold the Microturn 200 so that you can see the iris and retroreflector. Turn the fine-adjustment knob until the iris is closed as far as it will go. CAUTION: Do not force the knob. Stop at the first sign of binding.
2. Loosen the coarse-adjustment set screw.
3. Turn the fine-adjustment knob in the opposite direction as far as it will go. Then tighten the Allen set screw on the bottom of the COM block. Do not tighten it more than 1/16 of a turn, to avoid damaging the iris ring.
4. After tightening the set screw, try to reach zero again. Repeat if necessary.

Opacity Above Zero

Opacity is above zero and you can not bring it up after you have turned the adjustment knob as far as it will go into the Micro-turn housing perform the following procedure:

1. Hold the Microturn 200 so that you can see the iris and retroreflector. Turn the adjustment knob until the iris is open as far as it will go. CAUTION: Do not force the knob. Stop at the first sign of binding.
2. Loosen the coarse-adjustment set screw.
3. Turn the fine-adjustment knob in the opposite direction as far as it will go. Then tighten the Allen set screw on the bottom of the COM block. Do not tighten it more than 1/16 of a turn, to avoid damaging the iris ring.
4. After tightening the set screw, try to reach zero again. Repeat if necessary.

If you have tried these procedures and still cannot reach zero, or if zero is unstable, contact the factory for assistance.

Microturn 200 Parts List

Part Number	Description
1395	2-inch square neutral density filter, certified and traceable to NIST
1626	Iris, 49 × 34 mm
1163	1/4-20 × 2 1/2-inch adjustment knob
1164	Lock nut

Filter Certification

EMS recommends filter calibration and QA/QC testing at least annually. However, local regulations may require more frequent calibration. Check with the air permit issuer. EMS offers filter certification, replacement filters, and additional neutral density filters.

EMS neutral density filters for the Microturn 200 are calibrated using a Perkin-Elmer Lambda Series 6 / PECSS spectrophotometer in accordance with Federal Environmental Protection Agency specifications. These specifications are contained in 40 CFR 60, Appendix B, Performance Specification 1, Attenuator Calibration.

The filters are scanned across the visible region from 380 to 780 nanometers in one-nanometer steps. Each resulting transmittance value is multiplied by its associated response factor to weight it to the Source C Human Eye Response. The corrected transmittance values are converted to percent opacity, and the value is recorded on the filter and its associated chart.