

EMS 510

Set-up, Alignment, Maintenance Off Stack Volume 3, Rev 1.3



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LIMITED WARRANTY

EMS warranty is found in the CD supplied with monitor shipment. If you cannot find it or you have misplaced it contact EMS at sales@emsct.com and request the current Limited Warranty document.

WARNINGS AND SAFETY GUIDELINES

GUIDELINES FOR USER SAFETY AND EQUIPMENT PROTECTION

This manual is intended to aid trained and competent personnel in the installation of this equipment. Only a technician or engineer trained in the local and national electrical standards should perform tasks associated with the electrical wiring of this device.

WARNINGS

- Under no circumstances will Environmental Monitor Service, Inc. be liable or responsible for any consequential damage that may arise as a result of installation or use of this equipment.
- All examples and diagrams shown in the manual are intended to aid understanding. They do not guarantee operation.
- Environmental Monitor Service, Inc. accepts no responsibility for actual use of this product based on these examples.
- Due to the great variety of possible applications for this equipment, the user must assess the suitability of this product for specific applications.
- Make sure to have safety procedures in place to stop any connected equipment in a safe manner if the controller should malfunction or become damaged for any reason.
- Do not replace electrical parts or try to repair this product in any way.
- Only qualified factory trained service personnel trained in its operation should open the device's housing or carry out repairs.
- The manufacturer is not responsible for problems resulting from improper or irresponsible use of this device.
- You may cause an electric shock, fire or damage the equipment if you ignore any of these safety precautions.

Before you ship equipment to our factory please call or email our Service Response Center at 1-800-864-2814 ext 14. When you call in, our Customer Service Representative will determine a course of action.

E-mail: service@emsct.com

CLAIMS FOR DAMAGED SHIPMENTS

Inspect all instruments thoroughly on receipt. Check material in the container (s) against the enclosed packing list. If the contents are damaged and/or the instrument fails to operate properly, notify the carrier and Environmental Monitor Service immediately.

The following documents are necessary to support claims:

Original freight bill and bill of lading

Original invoice or photocopy of original invoice

Copy of packing list

Photographs of damaged equipment and container

You may want to keep a copy of these documents for your records also.

Refer to the instrument name/EMS number, serial number, sales order number, and your purchase order number on all claims.

Upon receipt of a claim, we will advise you of the disposition of your equipment for repair or replacement.

SHIPPING DISCREPANCIES

Check all containers against the packing list immediately on receipt. If a shortage or other discrepancy is found, notify the carrier and Environmental Monitor Service immediately. WE will not be responsible for shortages against the packing list unless they are reported promptly.

EMS will not be responsible for shortages against the packing list unless they are reported within 3 days of receiving of your shipment.

SECTION 1 SYSTEM DESCRIPTION

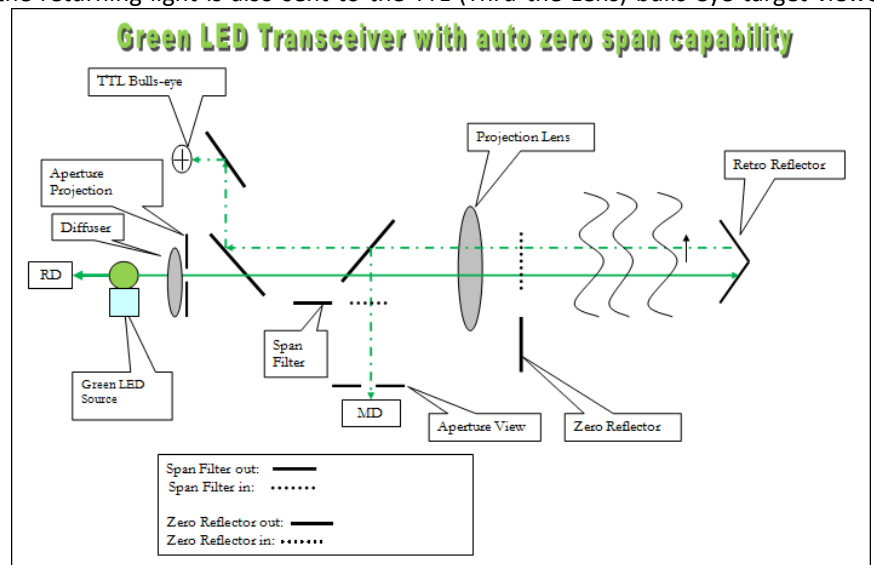
Transmissometer /retro reflector

The EMS412 is a precision, double-pass, dual beam Transmissometer that consists of a transceiver (transmitter/receiver) mounted on one side of a stack or duct and a passive reflector mounted on the opposite side. The LED source, photo detectors, and all measurement/reference optics used in opacity measurement are housed in the transceiver.

NORMAL MODE OF OPERATION

The Dual beam measurement system has a stack mounted Transmissometer sensor system consists of an optical transceiver mounted on one side of the stack and a retro reflector mounted on the other. To avoid errors due to ambient light, the narrow beam LED (See Drawing) is electronically modulated and projects a collimated beam of light, which is split into a reference beam, and a measurement beam by an optical **Beam splitter**. The reference beam is directed to the reference detector, **RD**. The measurement beam is projected across the stack to a **Retro reflector** that returns the beam back across the stack to a beam splitter and directs the measurement beam to the measurement detector, **MD**. A portion of the returning light is also sent to the TTL (Thru the Lens) bulls-eye target viewed through a window provided at the rear of the Transmissometer. The bulls-eye is used to correct changes in alignment and is unique in that no moving parts are used!

The ratio of the measurement and reference detectors is used to provide Transmittance 2 (T^2) signal. Because the same light source is used for both detectors, and a Measurement / Reference ratio is used throughout for the calculations, the monitor is insensitive to variations in light intensity. Since all measurements are made on a ratio basis, all resulting computations are independent of the absolute intensity of the LED source or contamination of the optics associated



with the collection and focusing of the energy from the LED. The (T^2) signal is converted to a current format and sent to the control unit for processing. At the control unit the signal is processed to read 0-100% Opacity, provide alarms and outputs.

INTERNAL CALIBRATION SYSTEM, ZERO MODE

Zero and span calibration checks can be initiated manually, automatically or by a PLC or computer. During the zero calibration mode a calibrated **zero reflector** is placed in front of the transceiver optical package testing all optical surfaces and electronic components to assure zero point has not changed.

INTERNAL CALIBRATION SYSTEM, SPAN MODE

In the span mode a **Span filter** of known Neutral Density is placed in the measurement path and produces a specific upscale reading in accordance with the latest E.P.A. requirements. The zero and span cycle provides a continuous check of all the optical components and surfaces, the main lamp, the detector, interconnecting wiring, control unit and computation analysis.

REMOTE CONTROL UNIT (RCU)

The RCU provides instrument control functions, opacity readings, alarms, analog outputs, communications, system information and more. The RCU can be DIN rail mounted or panel mounted (3.7x3.7" – 93x93mm) in a control room environment and is rated NEMA 4X/IP65 when panel mounted. Battery backup for all memory is typically 7 years.

The control unit should be mounted in a control room environment i.e., clean, temperature with max/min of +0° to +50° C (+32° to + 122° F). The Ems770 control unit provides instrument control functions, opacity readings, alarm and fault indicators, analog outputs, and diagnostics with contact closures.



OPTIONAL AIR PURGE WEATHER COVER SYSTEM

The transceiver and reflector may be mounted in weather covers. The weather covers are fairly compact to allow movement around them even on a three-foot walkway or platform. They protect the stack-mounted components from dirt, moisture; stack temperatures within the specified ambient temperatures limits, and errant air currents around the stack.

The air purge system constantly circulates air past the optical window. The air flow is directed through the hose to an air plenum on the stack side of the optical window. The air flow in the air plenum area results in reduced pressure and increased velocity. This venturi effect tends to continually draw the air around the optical window into the purge air stream, thereby keeping the lens clean for long periods.



ALIGNMENT SYSTEM

The EMS510 includes a built-in through-the-lens alignment system. The alignment target can be viewed through a window on the transceiver. Adjustments to changes in alignment are provided by a 3-point alignment system, which is integral to the air plenum.

CABLING TO SMART SERVICE MODULE

Port 2, 6-pin R J25 connector Pin 1 (+), Pin 6 (-). RS-485 cabling may be up to 2000 feet in length. Belden P/N 3106A cable is recommended. **Note: Cable drawing and pin out at the end of drawing section.**

EMS510 SPECIFICATIONS:

Transceiver/ Reflector:	
Enclosure	NEMA 4 watertight enclosure. Power 120/240VAC, 50/60Hz. +/- 10%, Transceiver 65va, Service Module 60va.
Path Length	Standard 2 to 15 feet, 0.6 to 4.6 meters. (Optional - Up to 50Ft based on application)
Optical System	Double Pass
Reflector	Distance dependent
Light Source Aging Compensation	Automatic
Light Source Life	62,000 hours (> 7 years) Field replaceable without removal
Ambient Temperature Limits	-40 to +130° F (-40 to +54° C) (Cold weather option available).
Process Gas	Up to 750° F (400 ° C),
Alignment Verification	Built-in through-the-lens system standard
Mounting Flanges	3 inch IPS, 150# flange. Others available.
Ambient Light Immunity	Solid-state modulation (Meets ASTM D6216)

Design and performance:	Meet or exceeds 40 CFR 60 appendix B, PS-1 and ASTM D 6216
Spectral Response	Peak 500 to 600nm, less than 10% of peak response outside 400 to 700 nm.
Angle of View/Angle of Projection	AV <4°, AP <4°.
Calibration Error/accuracy	+/- 1% of full scale
Response time	< 10 second
24 Hour Zero/ Calibration Drift	< 0.5% / < 0.5%
Operational Period	In excess of PS-1 required 336 Hrs.
Zero/Span Calibration	Manual or automatic with zero mirror and neutral density filter
Process gas	Up to 750 ° F (400 ° C) standard, higher available-contact factory.

Severe Weather Cover:	
Material	308 Stainless Steel
Quick release pins	2 for bottom and 2 for top release.
Mounting	3 inch IPS, 150# flange. Others available.
Standard Blower	Single phase, 110/220VAC 50/60Hz
Max stack pressure	+/- 5 inch WC, with the proper installation of purge blowers.
Wind Speed	< 60 mph
Ambient temperature limits	-40°F to 130°F (-4°C to 54°C)
Protection for	Transceiver and Retro-reflector components; purge blowers.

SECTION 2 INSTALLATION CONSIDERATIONS

BEFORE START UP

You must complete the following before start up is attempted.

Measure and record flange -to-flange distance to verify it is the same as final check out sheet.

If you are using a recorder, DAS, etc., DO NOT CONNECT THEM NOW. Outputs and inputs from other sources should be left off until system has been completely checked according to the following instructions. After system operation has been verified connect and test external connections.

Read the instructions first to familiarize yourself with the instrument before attempting start up.

The air purge and Weather cover system, Transceiver, Retro reflector, Service module must be installed and power applied.

Control unit must be installed and wired to the service module and customers equipment as applicable.

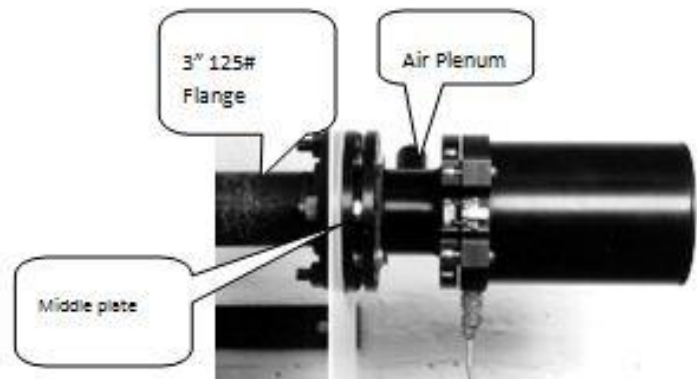
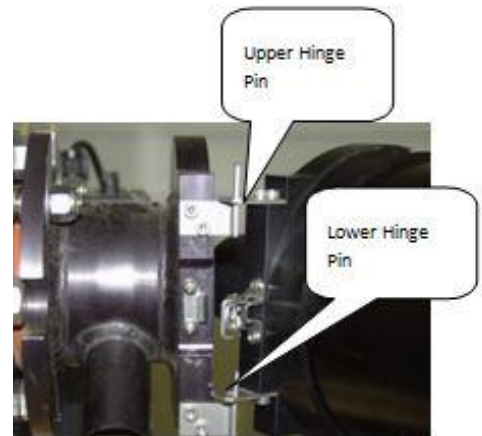
All wiring and mechanical installations must be complete per drawings provided in this manual. All wiring must be checked and power applied to both the control unit and the stack maintenance module.

Beam Alignment procedure has been completed.

WARNING! CONTROL UNIT, TRANSCEIVER & RETRO SERIAL NUMBERS MUST MATCH.

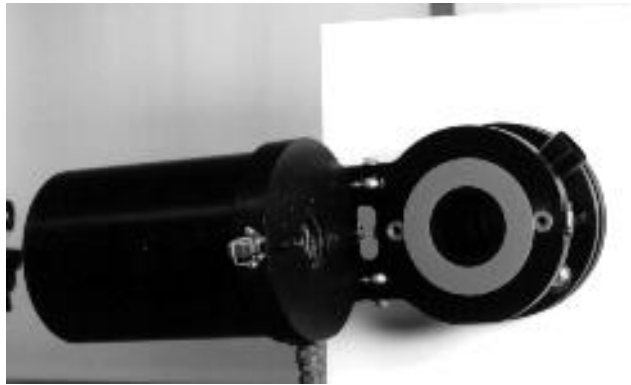
After the installation site has been selected and the platform requirements have been met, the mounting flanges should be installed and aligned as described on Drawings EMS - 1001 and EMS - 1002. Flanges should be installed with the mounting faces on the vertical plane.

- 1) Before installing the Transceiver, Retro reflector or any type of weather cover remove the air plenum from both the Transceiver and retro reflector. Removal will make the installation easier and less chance of damage while mechanical attachment of the air plenums and optional weather covers when provided.
- 2) If the transceiver and retro reflector have been shipped from the factory with the air plenum attached, un-clip both hold down latches, swing open and lift up & off the hinge pins. Place the Transceiver and retro in a safe place.
- 3) The air plenum is attached to the customer supplied 3" pipe flange by four 2 1/2" long 5/8-11 bolts. Working from the 3" flange the correct assembly is; gasket then air plenum.
- 4) If you have weather covers remove the two (2)-weather cover hood hinge pins located on the upper right and left hand corner of the hood. The air plenum and weather cover are attached to the 3" pipe flange by four (4) 2 1/2" long 5/8-11 bolts. Working from the 3" flange the correct assembly is; gasket, weather cover mounting plate, gasket, mating flange & air plenum. Place the 5/8-11 bolt through the top hole of the middle plate. Place a flat washer between the middle plate and mating flange and pass the bolt through. Slip a split lock washer over the bolt and secure with a nut. Repeat for the remaining three mounting bolts.
- 5) Any wiring or air hoses can be connected now.



TRANSCEIVER AND RETRO REFLECTOR ASSEMBLY

- 6) Attach the Transceiver and Retro reflector to the air plenum assembly by placing them on the hinge pins.
- 7) Close transceiver & retro and secure in place with the two hold down latches.
- 8) The air-purge blowers should be powered up at this time to prevent stack particulate from accumulating in the nipple and air-purge housing.



Caution: If installed location has a positive pressure the air-purge system must be used continuously during installation to prevent process gases from contaminating optical surfaces or over heating instrument electronics. If the system is shut off for more than momentary interruptions, the instrument may be damaged. Failure to provide continuous air-purge may void the warranty.

All wiring from the control unit to the transceiver should be completed at this time.

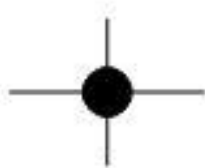
NOTE: THE AIR PLENUM ASSEMBLY FOR BOTH TRANSCEIVER AND RETRO MUST BE INSTALLED AS BELOW, I.E. THE PINS ON THE LEFT SIDE POINTING UP!



BEAM ALIGNMENT PROCEDURE

Note: Alignment cannot be done unless the power is applied to the stack mounted service module. The control unit does not have to be connected or powered. For alignment accuracy, the stack should be at normal temperature.

- 1) If not already on, turn on the power to all air purge systems and service module.
- 2) Align the Reflector mating flange so it is plumb and parallel to the 3" 150# mounting flange. Use the 3 adjusting nuts on the air purge plenum flange until this is accomplished. The adjusting nuts have nylon locking inserts to prevent loosening by vibration.
- 3) Move to the Transceiver, and determine monitor alignment by looking through the viewing port located on the rear of the transceiver and observing whether the beam image is in the center of the cross hair (bulls-eye).



AIR FLOW SWITCH

If you have an airflow alarm when the system is powered check the airflow switch. With the blower running and the source under normal conditions disconnect the leads of the switch and place an ohmmeter across them. The switch should be closed, less than 2 ohms, if flow is enough to overcome stack pressure and blower inlet is clear. Cover the air cleaner inlet and verify the switch opens. Replace the leads the test is complete.

FAULT PAGE



Pressing F2 will bring up the Fault information page.



ABOUT PAGES

When power is first applied press ESC to display the screen for the operator to select the function of interest by pushing the Up or the Down Arrow to select the function desired, press the return/enter button



By pushing UP or the DOWN arrow you can select the EMS510 Display, Setup or About pages. Use the return/enter button to enter the page (screen) you desire.



To get to the About page scroll down to About and press the right arrow button to enter the 1st page of the about page. This will display the Model & s/n, Date of manufacture and Flange to Flange.

About page 2 displays Modbus network, Stack exit I.D., Path length I.D. and OPLR (Optical Path Length Ratio).



START UP VERIFYING INSTRUMENT OPERATION AND CONFIGURATION

ZERO/SPAN CHECK

Environmental Monitor Service, Inc. is available to assist you, call our service department at (203) 935-0102 ext 14 or fax (203) 634-6663 or email service@emsct.com for details and to schedule start up.

Alignment procedure must be completed as outlined in Section 2.


Power applied to both the control unit and the sensors for a minimum of 30 Minutes before any adjustments are attempted.

The zero calibration has been set at the factory by placing the instrument on an optical bench using the flange-to-flange dimensions specified by the customer and recorded in the customers final test report. This zero value is critical as it can offset smoke measurement plus or minus if not correctly set. The measurement reflector contains an aperture that is chosen during the factory calibration and is fixed. The Transceiver is aligned with the beam centered on the retro reflector and the electronics is adjusted to produce a zero opacity value.


The calibration zero reflector is adjusted and recorded to provide a low value typically 1-2% and the span filter upscale value (not adjustable) is recorded and entered in the set up page as well under "Cal zero/Span setup" When the system enters a manual or auto cal check cycle the current zero and span values are checked against the stored values. If either the zero or span current value exceeds the stored value by +/- 2% opacity the fault system will energize.

Initiate a Z/S check by pressing the F1 button. The next screen will ask you for a selection; press Enter to choose "Yes". The screen will return to the Display and the Right column will show In Cal icon. When the zero check "Instant value" stabilizes (@15 seconds) record the zero value. The Zero check will remain for 3 minutes, next will be Span and will last for another 3 minutes. When Span is stabilized record the span upscale value. The system will automatically return to monitoring the process at the 6 minute point from cal start. You will know this because the In Cal icon will turn off.



Check to see if the controller has the same values by pressing ESC and scroll down to the Setup and press return/enter button  you will be at the password page. Enter 1234 from key pad and press the return/enter button.



Scroll to **CAL Z/S VALUE SETUP** and press the return/enter button . The true span check will be blinking. If zero and span values are the same as you recorded +/- 0.5% opacity do nothing just press the ESC button. Should the displayed values be greater than +/- 1.0% but less than 3% from your recorded values enter the recorded values. Press the



right arrow to highlight the value to change. Press the return/enter button and use the key pad to enter your value. Press the +/- dot button above the return/enter button for decimal point. When correction is made press the return/enter button to save (it will stop blinking and move to the next value).



The Fault squelch timer should be left at 1 Min.


The fault timer is that time from fault detection to initiation of the fault alarm and should be not less than 10 seconds.

The (-ve) negative opacity fault Yes= on, NO= Off.

When you are finished press the ESC to exit.

NOTE: If the Zero or Span value stored is +/- 3% Opacity from your recorded value contact our service department because it may indicate other adjustments are required. Environmental Monitor Service, Inc. is available to assist you, call our service department at (203) 935-0102 ext 14 or fax (203) 634-6663 or email service@emsct.com

SCROLLING MULTIPLE MAIN DISPLAY PAGES

Pressing ESC will get you back to the selection page, scroll to EMS510 Display and press return/enter button  the process opacity display page will be displayed:

Upper line; Next cal in HH:MM:SS

Middle line; Instant opacity %

Bottom line; 6 Minute average opacity %

Pressing the up or down arrow you can scroll to the 3 display pages that is best for your application.

Page 1 is a split screen with instant and average opacity. **NOTE: IF INPUT GOES NEGATIVE A 4TH SCREEN WILL APPEAR, WHEN SIGNAL GOES POSITIVE IT WILL RETURN TO PAGE 1 THE DEFAULT PAGE.**

Page 2 is average opacity only.

Page 3 is Instant opacity only.



PASSWORD PROTECTED PARAMETERS

PASSWORD 1234 - From any screen press ESC until the Main, setup and about screen is visible. Scroll to Setup and press the return/enter button. The password is 1234.



ALARM SET POINT - return/enter button and set the alarm set point from 0-99% and the alarm delay – In seconds. Press enter to set, ESC to exit.



CALIBRATION CYCLE SETUP – Press return/enter button and set the frequency you want the cal cycle to initiate. EPA regulations call for 24hr. The EMS412 will initiate the cal cycle if Cal trigger is "Internal". To use an external command scroll down to cal trigger and choose external by pressing key pad #2 then press return/enter button to set. Input momentary ground to I3.



Note: No input to I3 and External selected the system will not go into cal cycle, however you can still use the F1 button to force an manual cal cycle.

ALARM AUTO/MANUAL SETUP – Press return/enter button to enter. Choose between 1- auto or 2- manual.

Auto means when the high opacity alarm has been activated and when the level of smoke drops below the alarm point the alarm contacts 02 & 04 and icon will reset automatically.

Manual reset means when the high opacity alarm has been activated, pushing the return/enter button 13(high audible) contact will de-energize but 12(early warning) and 8(high alarm) will remain energized. When the level of smoke drops below the alarm point the return/enter button is pushed and both 12 & 8 will be de-energized.

*NOTE: In order for the audible alarm contact to energize again, the EW and High opacity need to be cleared after smoke drops below alarm point.



OUTPUT TYPE SETUP – Press return/enter button to enter. “Output type” refers to the 4-20mA outputs.

Ins – instant opacity, z/s outputted during cal cycle.

Avg – 6 minute opacity average z/s outputted during cal cycle.

Last - instant opacity, last value is held during cal cycle.

Note: Last should be used if you are using the output for process control signal.



OUTPUT SCALING SETUP – Press return/enter button to enter. 4ma represent minimum opacity and 20mA to represent maximum opacity.

The ranges are set at the factory 4mA to -5% and 20mA: 99.9%



SECTION 3 MODBUS

MODBUS SETUP

MODBUS I.D. – Press return/enter button to enter and input the node number (1 to 32) desired press Press return/enter button to set then ESC to exit.



EMS510 Opacity Modbus Map

MB = Modbus Poll Read Discrete inputs (100001....20000)

MI = Modbus Poll Read Holding (40000...50000)

Read:		
Instantaneous opacity	MI76	xx.x
Average Opacity	MI98	
OPLR Calculated	MI81	Read
Opacity High alarm	MB48	
Boiler shut off or Audible relay w/reset	MB46	
No Air flow	MB45	OK =0, Not OK =1
In maintenance	MB 49	In Maint. =0, Not In Maint. =1
Power status	MB50	Lost power to SM (service module) =0, Power OK =1
T2 Signal lost/Low	MB 34	Signal OK =0, Lost signal =1
Negative zero	MB 37	Positive opacity =0, Negative Opacity =1
Fault	MB 47	No fault =0. Fault =1
Zero DAS and/or in Cal	MB 43	Zero, <u>not cal</u> = 0, in cal =1
Span DAS	MB 44	Span, <u>not cal</u> = 0, in cal =1
Zero Cal Fail	MB38	
Span Cal Fail	MB39	
Write:		
Remote Cal. Initiate	MB 51	Initiate cal =1

RS/485 COMMUNICATIONS AND CONNECTION

Port 2, 6-pin R J25 connector Pin 1 (+), Pin 6 (-). RS-485 cabling may be up to 2000 feet in length. Belden P/N 3106A cable is recommended.

If not specified in the original order default is as follows. NOTE: The following communication parameters cannot be changed in the field the controller must be returned to the factory.

Baud Rate 9600

Data Bits 8

Parity None

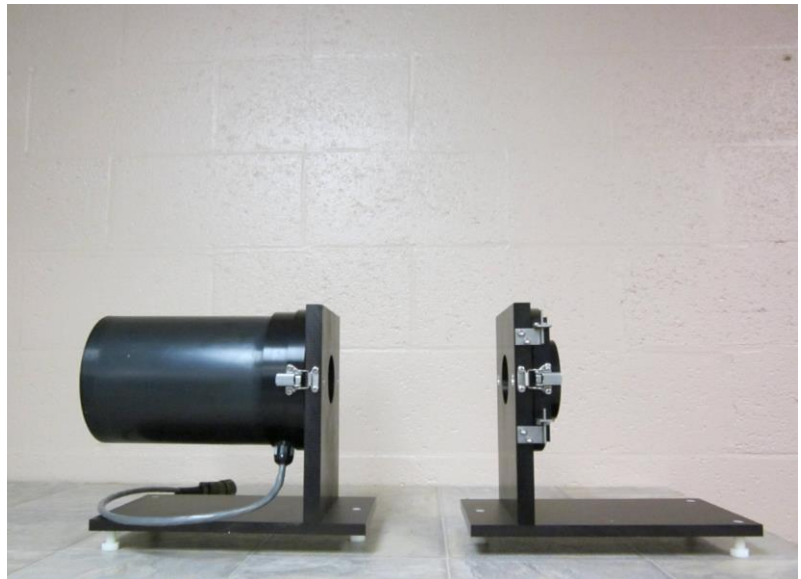
Flow Ctrl None

Timeout 0.2 seconds.







SECTION 4 OFFSTACK CALIBRATION

This procedure may be used if: A clear stack condition is not possible and the zero appears to be incorrect or if the flange to flange distance on site are different than the original factory set up.

1. Remove the transceiver and retro reflector from the hinge pins, remove the service module and install the system on E.M.S. Opacity portable off stack test stands (**p/n 2788**) and at the correct flange to flange distance plus 11 inches. The additional 11 inches compensates for air plenum spacing, as the air plenums are not used for the off stack zero calibration.
2. Clean transceiver and retro windows.
3. Connect the control unit with the control to service module test cable kit (p/n 1469) and apply power to the system.
4. The retro reflector must be level.
5. Follow instruction for "Routine clear stack calibration"
6. If "routine Clear stack calibration" had to be performed proceed to cal zero reflector adjustment.



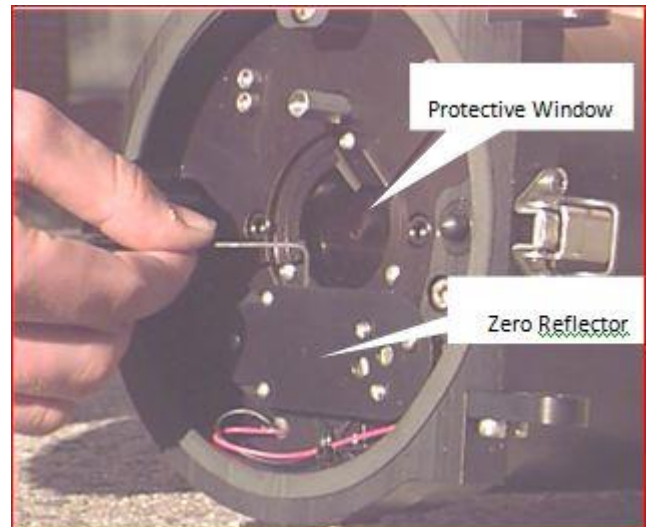
ROUTINE CLEAR PATH ADJUSTMENT

<ul style="list-style-type: none"> • clear condition across the monitor path length is needed before adjustments can be made. • Navigate to the setup screen, when asked for password enter 5566 	 <p>The screen displays the 'Smart Service Module' menu with options: Displays, About, and Setup (highlighted with a blue arrow). The left side shows function keys F1 and F2. The bottom features a numeric keypad and a directional pad.</p>
<ul style="list-style-type: none"> • Scroll down to "clear value, span value page" and press  to input clear value percentage. • Once desired clear stack value is entered, press  to store value. 	 <p>The screen shows 'Clear Value: 0.00' and 'Span Value: 74.61'. Below the values, instructions read: 'Enter Clear Value and Press F1 to Store', 'Enter Span Value and Press F2 to Store', and 'Press ESC to Exit'. The left side shows function keys F1 and F2.</p>
<ul style="list-style-type: none"> • Clear stack procedure is now complete • press  to return to main display screen • Note: it is common to have to adjust cal zero iris after clear stack procedure is performed. Refer to zero reflector adjustment procedure. EMS Vol. 4 section 6 	 <p>The screen displays 'Next Cal: 00:18:04' and '99.9 % Opacity'. It also shows 'RCU OFF OK' and 'F1 to Initiate Cal Seq'. The left side shows function keys F1 and F2.</p>

ZERO REFLECTOR ADJUSTMENT

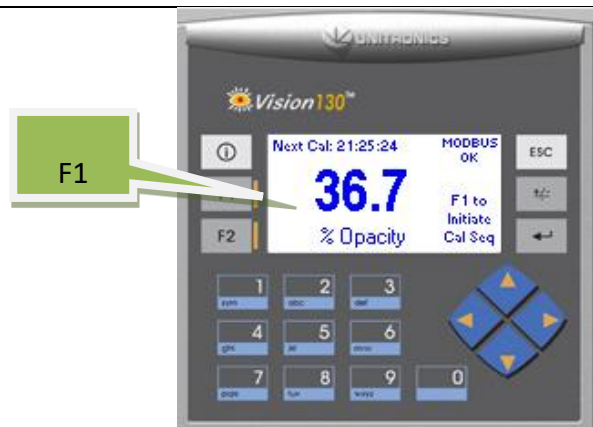
After a clear or off stack zero has been performed the zero reflector needs to be adjusted.

1. Find and record the zero offset value found in the Tech Setup, Tech Setup Screen 1, "Zero Cal Value".
2. On the SSM observe the correlated opacity on the digital display.
3. Swing open the transceiver.
4. Initiate a zero with the F1 button on the SSM to raise the zero reflector into place. Observe and record the zero value after 30 seconds. Press the F1 button until the zero reflector returns to its resting position.
5. If required, insert a 1/16" Allen wrench into the adjustment set screw located on the top of the zero reflector. Turn the set screw clock-wise 1/8 turn.
6. Remove the Allen wrench and initiate a zero (step 4) and after 15 seconds observe the reading is moving toward the desired value. (If value is away from desired repeat step 4 turn set screw C.C.W.)
7. Repeat steps 4 -6 each time making small 1/8-turn increments until the desired value is reached. Cycle 2-3 times more waiting 15 to 20 seconds between cycles to assure unit repeats desired value +/- 0.5% Opacity. Swing transceiver into operate position and secure in place. Record the zero final value.



SPAN FILTER VALUE

1. With the F1 button press until the F1 display is in span. Span is not adjustable, final value is a function of filter value, transceiver calibration and OPLR. Record the final value.
2. Return to normal by pressing the F1 button until F1 to Initiate is displayed or just leave it, the time out will always return the system to normal mode.



RECORD THE ZERO/SPAN VALUES

1. To record the final values you will need to enter the Tech Setup menu and input them in the "zero/span cal setup value Screen" press the raised button for zero and add the recorded zero value. Do the same for Span. This completes the calibration.

SECTION 5 MICRO-TURN AUDIT KIT

USING THE ON LINE ZERO REFLECTOR (OPTION)

The "Micro-turn" 200 on - line test and audit system P/N 1232 may be used for:

- Opacity audit
- Linearity checks and adjustments
- System accuracy verification
- Service on line or off stack

The "Micro-turn" 200 on - line test and audit system P/N 1232 contains a test reflector, three neutral density filters, filter certification certificates and carrying case. The Micro-turn 200 on-line test reflector is inserted over the transceiver lens.



FILTER CERTIFICATION

QA/QC testing by EMS of the filters at an interval of not more than 6 months is recommended. Filter certification, replacement or additional Neutral Density Filters are available from EMS.

EMS Neutral Density Filters for Micro-turn 200 are calibrated on a Perkin-Elmer Lambda Series 6 / PECSS Spectrophotometer per Federal Environmental Protection Agency specifications. These specifications are contained in the Code of Federal Regulations 40 CFR 60, Appendix B, Performance Specification 1, Attenuator Calibration. The filters are scanned over the visible region from 380 to 780 nanometers in one nanometer steps and the resulting transmittances of the filter are weighted to the Source C Human Eye Response by multiplying each value by its associated response factor. The corrected values of transmittance are converted to % Opacity and the value is recorded on the filter and associated chart.

SECTION 6 PREVENTIVE/CORRECTIVE MAINTENANCE

PREVENTIVE/CORRECTIVE MAINTENANCE SCHEDULE

Daily:

Check Zero/Span marks are within specification (+/- 2%)

Check for fault conditions

Monthly or as required:

Clean transceiver and retro windows

Check alignment, correct if necessary

Check air filters replace if necessary

Quarterly:

All daily and monthly checks

Perform COM Audit per EPA regulation 40 CFR, 60 App. B, PS-1.

Replace air filters

Check all air hoses and clamps for tightness and wear, correct as necessary

Check weather cover gaskets for leakage

Check all bolts for tightness

Check all electrical connections are secure

Check air blower for excessive noise

Assure that airflow switch is operating properly

Yearly:

Clear stack or off stack zero

All quarterly checks

Remove transceiver and retro, clean air plenum

Replace any worn hoses and gaskets

Clean inner optics if necessary

Check all system operations

General

Corrective and preventive maintenance schedules should be adjusted according to site specific conditions to ensure the maximum availability of accurate measurement data. Routine checks should be implemented to:

Observe and correct the operation of the air-purge system giving particular attention to keeping the optical path within the mounting flanges clear of dirt build-up.

Observe and correct the operation of peripheral accessory equipment such as recorders, computers, etc.

Observe and correct the stack zero measurement whenever a clear stack condition exists. Care should be exercised to ensure that both transmittance and opacity measurements are at their prescribed values.

Verify that instrument operating manuals are available and that maintenance logs are properly maintained and reviewed.

Every 3-5 Years:

EMS recommends periodical, depending on the severity of the sensor locations 3-5 years between overhaul of our opacity system to keep them working at their optimal level. Overhauls become necessary do to the fact that over time dust, out gassing of electronic parts, removing protective covers, etc., manifest itself as overall optics degradation causing more frequent adjustments and poor performance of the opacity monitor.

To schedule call EMS service department 203.935.0102 ext 14 or email; service@emsct.com