

PRODUCT BULLETIN

4 THE ONGUARD ENVIRONMENTAL REACTIVITY MONITOR FOR MUSEUMS AND ARCHIVES




THE PURAFIL ONGUARD ENVIRONMENTAL REACTIVITY MONITOR (ERM) measures in real-time the overall reactivity level of Airborne Molecular Contaminants (AMC) present in the local environment and transmits this data directly to the building management system via a 4-20 mA output signal. Reactivity monitoring is an accurate and reliable method of evaluating the quality of ventilation and recirculation air, characterizing the museum or archive environment, and evaluating the effectiveness of chemical filters.



PRODUCT APPLICATIONS STANDARD FEATURES:

- Provides continuous monitoring of molecular contaminants at levels ≤ 1 ppb
- Monitors the performance of chemical filtration systems in ventilation and makeup air handling units
- Allows for the tracking of AMC episodes in sensitive process areas
- 4-20 mA output signal
- Patented technology specific to air quality monitoring
- Accurate within $\pm 0.5 - 1\%$ of full span

PRINCIPLE OF OPERATION

The OnGuard ERM is the first reactivity monitor to provide real-time data on the level of AMC present in the local environment. A quartz crystal microbalance sensor (QCM) is plated with copper or silver and used to measure the mass accumulation of the corrosive film that results from the reaction of contaminants with the metals. The mass increase is described in terms of the corrosion film thickness measured in Angstroms (\AA). This highly sensitive method of measurement will indicate the reactivity level of an environment with contaminant levels at or less than one part per billion (1 ppb).

Since 1989, Purafil has been working with a number of institutions to develop and refine techniques with which conservators may accurately gauge the destructive potential of their environments towards those artifacts and materials trusted to their care. This led to the formulation of a classification scheme that would allow conservators to determine if their environments were "preservation environments" or whether contaminants control measures were indicated.

INSTALLATION AND OPERATION INSTRUCTIONS

MAINTENANCE

The only maintenance necessary of the OnGuard ERM is the replacement of the sensor(s), which is required at 4000 angstroms of cumulative corrosion growth, or if the sensor(s) has been damaged, causing the Red LED to blink. A copper sensor in a C2 environment will last 26 months; a silver sensor will last 40 months.

INSTALLATION

Location: Select a clean, dry location free of excess vibration where the temperature will be between -10 and 75°C (14° and 167°F) and the relative humidity will be between 10% and 95% non-condensing.

PLACEMENT

When installing the OnGuard ERM special care should be given to its placement. It should be mechanically affixed to a structure at eye level within the protected space.

RECOMMENDED AIR QUALITY CONTROL:

Based on Purafil's environmental research with museums, archives and libraries worldwide, Purafil recommends that a Class 1 or Class 2 be maintained in areas with unrestricted public access and areas with restricted access to authorized personnel but where material are removed and replaced frequently. Environmental Class 1 is recommended in areas with highly restricted access where materials will be removed and replaced infrequently.

COPPER CORROSION			SILVER CORROSION		
CLASS	AIR QUALITY CLASSIFICATION	REACTIVITY RATE*	CLASS	AIR QUALITY CLASSIFICATION	REACTIVITY RATE*
C1	Extremely Pure	$<90 \text{ \AA}/30$ days	S1	Extremely Pure	$<40 \text{ \AA}/30$ days
C2	Pure	$<150 \text{ \AA}/30$ days	S2	Pure	$<100 \text{ \AA}/30$ days
C3	Clean	$<250 \text{ \AA}/30$ days	S3	Clean	$<200 \text{ \AA}/30$ days
C4	Slightly Contaminated	$<350 \text{ \AA}/30$ days	S4	Slightly Contaminated	$<300 \text{ \AA}/30$ days
C5	Polluted	$>350 \text{ \AA}/30$ days	S5	Polluted	$>300 \text{ \AA}/30$ days

* \AA = angstroms

ONGUARD ERM

TABLE 2

RS-232 Data Output in Angstroms

MINUTES ON	COPPER CUMULATIVE	COPPER INCREMENTAL	SILVER CUMULATIVE	SILVER INCREMENTAL
0000, 0001,	0002, 0002,	0002, 0002,	0004, 0004,	0004 0004

SPECIFICATIONS

Two-channel copper and silver transmitter

Available outputs:

- Factory Default: Cumulative
0-4000 = 4-20 mA (Fig. 1), switch selectable
- Dip Switch Selectable: Incremental
0-127 = 4-20 mA (Fig. 2)

ELECTRICAL

Power Supply: 18 to 30VDC, unregulated
 Output Signal: Two 4-20 mA DC channels, two wire
 Current Consumption: <50mA locally powered
 Analog Output Interval: 60 seconds, 4-20 mA
 Digital Output Interval: 60 seconds, RS-232
 LED-Red Blink: Sensor failure
 LED-Green-Fast Blink:* 2 Hours - Sensor Initialization
 LED-Green-Slow Blink:** 24 Hours - Incremental Data Collection
 LED-Green-No Blink: Unit operating normally

- * One blink every 2 seconds.
- ** One blink every 4 seconds.

CONNECTIONS (Fig. 3)

Power & Current Output (18-20 Gauge):

- TB1 - Pin 1 - V - (GND)
- TB1 - Pin 2 - Current Output + (Channel #1 Copper)
- TB1 - Pin 3 - Current Output - (Channel #1 Copper)
- TB1 - Pin 4 - Current Output + (Channel #2 Silver)
- TB1 - Pin 5 - Current Output - (Channel #2 Silver)
- TB1 - Pin 6 - V+

OPERATIONS:

Output at zero: 4 mA
 Output at full span: 20 mA
 Accuracy: ± 0.5-1% of full span

MECHANICAL:

Dimensions (LxWxH): 3.25 x 4.24 x 1.37 in
 (8.20 x 10.80 x 3.50 cm)
 Weight: 0.3 lb (150 grams)
 Housing: Black Thermoplastic

The OnGuard ERM can be read locally with a Palm™ handheld or laptop computer for direct output, verification, and troubleshooting. This can be done using a Communications Program, such as Terminal™ or Online™, set at 9600 baud. Simply plug the digital RS-232 cable into the OnGuard ERM's local RS-232 port to obtain cumulative and incremental corrosion data. Cables are available for laptop computers or Palm handhelds through Purafil.

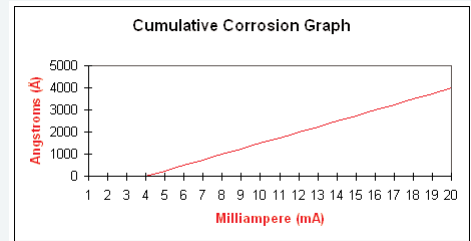


Figure 1: Cumulative: 0-4000 = 4-20 mA

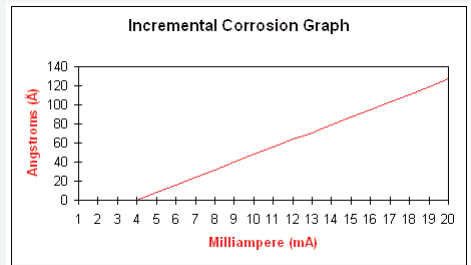


Figure 2: Incremental: 0-127 = 4-20 mA

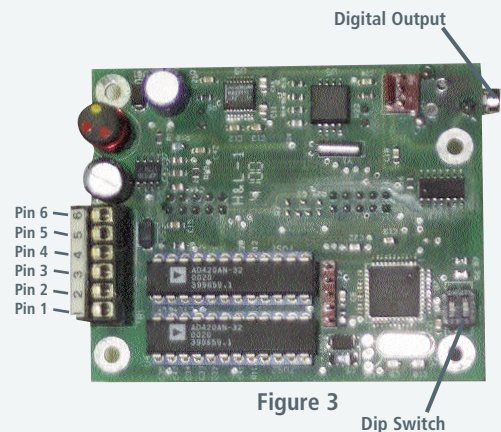


Figure 3

Dip Switch