THE WORLD LEADER IN CLEAN AIR SOLUTIONS

SAAFShield®

Detecting Unit (DU), Reading Unit (RU), Communications Module (CM)

REAL-TIME REACTIVITY MONITORING TECHNOLOGY

- Prevent electronics and sensitive materials from damage due to corrosive gases
- Avoid costly downtime and lost production time
- Easily deploy and monitor up to 500 SAAFShield Detecting Units with one SAAFShield Reading Unit, or easily integrate into instrumentation network with 4-20 mA output from SAAFShield Communications Module
- Determine causes of corrosion events by trending data over time
- Detailed reports available through Internet-based or Building Management Systems software*
- Reporting includes cumulative corrosion thickness, incremental corrosion rates, temperature, and relative humidity rates
- Patent pending hardware and method of corrosion measurement

SAAFSHIELD®

*SAAFShield Internet reporting site is available at saafshield.aafintl.com

SAAFShield reactivity monitoring technology is a powerful system that allows users to monitor corrosion in real-time or on a periodic basis to determine equipment or material vulnerability to corrosion. The cost of downtime is the most significant consequence of electronic equipment corrosion. In manufacturing, corrosion of electronic control equipment can lead to shutdown of the process – lost production time. In other industries, corrosion of server components means data center downtime; transactions stop, software applications for logistics cannot run and data cannot be stored. In preservation markets, such as museums, corrosion can destroy valuable artifacts.

The SAAFShield Detecting Unit works together with either the SAAFShield Reading Unit or the SAAFShield Communications Module to display and trend corrosion data over time. The data can be used to evaluate operational procedures, environmental factors, or other items that occur at specific times for their impact on producing a corrosive environment. The SAAFShield real-time reactivity monitors let you take immediate action to protect your expensive electronics.

The Detecting Unit is the sensing side of the technology. The Detecting Unit is non-powered, providing a low cost option that can be easily deployed at multiple locations and read periodically with the Reading Unit. Alternatively, constant trending of corrosion rates is possible when connected with a Reading Unit or Communications Module. The Reading Unit can log data on a USB drive to be graphed through the SAAFShield website. The Communications Module transmits data to building management software through a 4-20 mA signal, allowing for facility-wide monitoring.

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SAAFShield® Reactivity Monitoring Technology

Data Center Control Room

Applications

SAAFShield real-time reactivity monitoring technology is ideal to monitor air reactivity for sites housing electronic control equipment or other reactive materials. These applications include the following:

Commercial Facilities

- Museums and Archives
- Data Centers

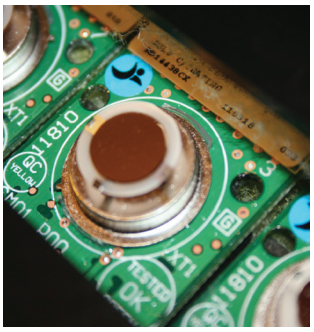
Industrial Plants

- Pulp & Paper Mills
- Petrochemical Refineries
- Geothermal Power Plants
- Chemical and Industrial Plants
- Tire Manufacturing Plants
- Rubber Manufacturing Plants

Quartz Crystal Microbalance Technology

The SAAFShield Detecting Unit utilizes quartz crystal microbalances to measure the corrosion of metal due to reactions with the environment. As the metal-coated quartz crystal corrodes, the frequency of oscillation changes. Other factors, such as particulate matter in the air, temperature, and humidity can also change the oscillation frequency of the quartz crystal.

The Detecting Unit removes the effects of these non-corrosive environmental factors to provide more accurate and stable frequency readings and resulting reactivity detection.

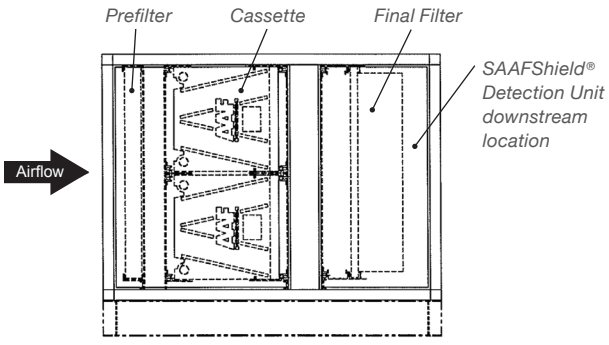


Quartz Crystal

Detecting Unit Placement Locations

When determining the reactivity of a room or space within a building, the SAAFShield Detecting Unit should be placed in a location representative of the air that contacts the electronics or materials being protected. If the protected items are spread out within the space, then an approach similar to a thermostat should be used. If the protected items are concentrated in one area inside the space, then a location as close as possible to them is preferred.

When determining the condition downstream of a gas-phase filter or scrubber to evaluate media performance and life, the Detecting Unit should be placed after the final particulate filter (see below diagram). This will protect it from the majority of particulates and allow it to monitor the condition of the outlet air. When the rate of corrosion begins increasing beyond what is normal, it is time to change the media.



Detecting Unit Specifications

CORROSION SENSORS

Operation & Material:
6 MHz, AT cut crystal, 4000Å silver or copper coating on titanium base

Service life:
Up to 4000 Å of cumulative corrosion

Compliance (as supplied)
ROHS Compliant Components

ELECTRICAL PROPERTIES

Communications:
Industrial grade, 26-pin ribbon connector cable with corrosion-resistant, redundant gold-coated pins and positive locking system for mounting – Reading Unit or Communications Module.

DIMENSIONS AND MATERIALS

L x W x D (inches):
7.87 x 4.93 x 1.6

Material:
Black thermoplastic enclosure.

Reading Unit Specifications

SENSOR OPERATIONAL PARAMETERS

Temperature sensor:
-50 to 150ºC, +/- 0.6˚C accuracy

Relative Humidity sensor:
0-100% RH, non-condensing, +/- 2% accuracy

INTERFACE

128x64 pixel dot matrix on unit display with backlight.

Alphanumeric keypad.

Universal serial bus (USB) adaptor for data storage.

Data storage via USB drive, compatible up to 16 GB.

OUTPUT VALUES

Copper and Silver cumulative corrosion thickness, in Angstroms. Copper and Silver incremental corrosion rates, in Angstroms/ 30 days. Corrosion classification as per reporting standard. Raw data files available for off-line analysis, in CSV format. On-screen graphing capability of cumulative corrosion thickness and incremental corrosion rates under stand-alone mode.

COMMUNICATIONS CAPABILITIES

Industrial grade, 26-pin ribbon connector cable with redundant gold-coated pins for communication between Reading and Detecting Units.

REPORTING STANDARDS

Default reporting of corrosion class based on ISA-71.04-1985 standard.

OPERATIONAL MODES

Distributed mode: A single Reading Unit links with multiple Detecting Units within a user-defined location.

Stand-alone mode: A single Reading Unit and Detecting Unit are coupled together to continuously log readings at user-defined time intervals.

POWER

Supplied 12V power adapter with universal mounting pins.

Backup on-board power via high energy density 9V battery and coin-cell battery.

Option for powering the system via USB port connected to a power source.

Input AC: 100~240V, 50/60Hz

DIMENSIONS AND MATERIALS

L x W x D (inches):
9.23 x 5.12 x 1.21

Material:
Black thermoplastic enclosure.

Communications Module Specifications

SENSOR OPERATIONAL PARAMETERS

Temperature Sensor: -55 to 125ºC, +/- 0.5ºC accuracy

Relative Humidity Sensor: 0-100% RH, non-condensing, +/- 3% accuracy

INTERFACE

LCD: 2 lines, 16 characters per line.

OUTPUT VALUES

- Copper cumulative in angstroms
- Silver cumulative in angstroms
- Copper incremental in angstroms/30 days
- Silver incremental in angstroms/30 days
- Temperature
- Relative Humidity

COMMUNICATIONS CAPABILITIES

Industrial grade, 26-pin ribbon connector cable with redundant gold-coated pins for communication between Detecting Unit and Communications Module.

REPORTING STANDARDS

Reporting customized based on ISA 71.04-1985, ASHRAE TC 9.9, or Museum standard.

OPERATIONAL MODES

Stand-alone Mode: A single Reading Unit and Communications Module are coupled together to continuously log readings at user-defined time intervals.

POWER

Input: 18-30 VDC, 50/60 Hz

Output: 4-20 mA signal

DIMENSIONS AND MATERIALS

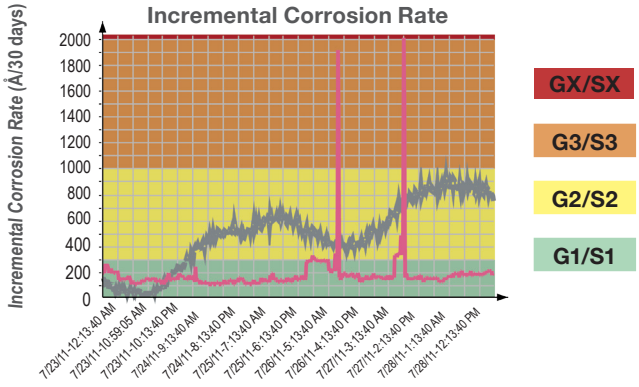
L x W x D (inches): 7 x 4.75 x 1.5

Material: Aluminum with powder-coated, flat black, textured finish.

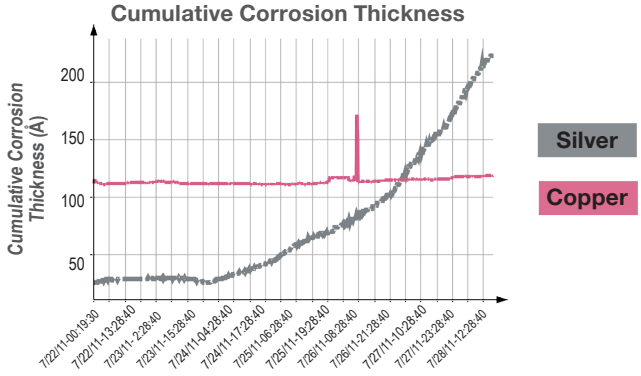
	Part Numbers	
SAAFShield Detecting Unit	**392-803-002**	
SAAFShield Reading Unit	**392-803-001**	
SAAFShield Communications Module	**392-803-510** **392-803-520** **392-803-530**	Legacy Electronics RoHS Electronics Museums and Archives

SAAFShield® Reactivity Monitoring Technology

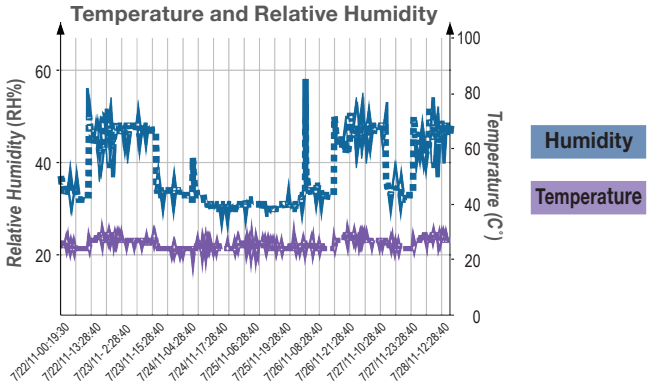
Reporting Data Example



Incremental Corrosion Rate is the amount of corrosion that has occurred in 24 hours normalized to angstroms per 30 days as correlated to ISA standard 71.04-1985.



Cumulative Corrosion Thickness is the amount of corrosion accumulated on the copper or silver sensors over the life of the sensor. Sensor lifetime thickness is 4000 angstroms.



Temperature and Relative Humidity readings are measured Celsius and percentage.

Applicable Standards

Traditional Corrosion Control (ISA 71.04-1985)
Applications: Paper Mills, Refineries, Industrial Plants, Wastewater Plants, Telecommunication Sites

Protected Equipment: Non-RoHS compliant circuitry in control rooms, motor control centers, or other such areas.

Class	Copper Å/ 30 days	Reliability Statement
G1 (Mild)	< 300	Sufficiently controlled such that corrosion is not a factor
G2 (Moderate)	< 1000	The effects of corrosion are measurable
G3 (Harsh)	< 2000	There is a high probability that corrosive attack will occur
GX (Severe)	< 2000	Only specially designed and packaged equipment would be expected to survive

RoHS Compliant Corrosion Control (ASHRAE TC 9.9 Guideline* and ISA 71.04-2013)
Applications: Data Centers, Tire Manufacture Facilities, Rubber Manufacture Facilities, Paper Mills, Refineries

Protected Equipment: RoHS compliant circuitry in control rooms, motor control centers, or other such areas.

Class	Copper Å/ 30 days	Silver Å/ 30 days	Reliability Statement
G1 (Mild)	< 300	< 200	Acceptible
G2 (Moderate)	< 1000	< 1000	Not acceptable – corrosive attack may occur
G3 (Harsh)	< 2000	< 2000	
GX (Severe)	< 2000	< 2000	

Archive or Museum Environments
Applications: Archives, Metal Collections, Libraries, Museums, Museum Storage, Historic Houses

Protected Material: Archival material, rare books, or other material stored in application areas

Class	Copper Å/ 30 days	Silver Å/ 30 days	Applicable Areas and Acceptability
Exrtremely Pure	< 90	< 40	Archives, Metal Collections, Rare Books
Pure	< 150	< 100	Libraries, Museums, Museum Storage
Clean	< 250	< 200	Historic Houses
Slightly Contaminated	< 350	< 300	Short Term Acceptable
Polluted	> 350	> 300	Not Acceptable

**2011 Gaseous and Particulate Contamination Guidelines for Data Centers.*

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