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AmericanAirFilter®

SAAFSHIELD®

Communications Module
Real-time Reactivity Monitor

Installation, Operation, and Maintenance Instructions

Read and Save These Instructions!

NOTE:
1. Read and understand all operating instructions before using the SAAFShield Communications Module.
2. Save this manual for future reference.

This instruction manual provides important information on the installation and operation of the AAF International SAAFShield Communications Module. These instructions must be carefully followed in order to operate the unit safely and correctly. If there are any questions regarding the use or care of this unit, please contact AAF at 888.AAF.2003 or by email at SAAFShield@aafintl.com for assistance.

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1.0 Principles of Operation

The SAAFShield Communications Module in combination with the Detecting Unit is part of the system that allows users to monitor atmospheric corrosion in real time. This monitoring can be used to display and trend corrosion data over time allowing users to evaluate operational procedures, environmental factors, or other items that occur at specific times and their impact on producing a corrosive environment.The SAAFShield system utilizes Quartz Crystal Microbalance (QCM) technology to measure metal corrosion due to reactions with the environment.

2.0 Components and Hardware

- Graphic LCD
- Integrated temperature sensor and humidity sensor
- 18-30 VDC power input
- Real time G-class and S-class monitoring
- Built in real time clock and calendar chip
- 4-20 mA output for Programmable Logic Controller (PLC) interfacing
- 3-inch ribbon cable

The SAAFShield Communications Module and its main components are shown in Figure 1.

Further details on packaging and physical specifications can be found in the specification.

The Communications Module portion of the SAAFShield device is used to read, compute, and transmit corrosion, temperature and relative humidity data.

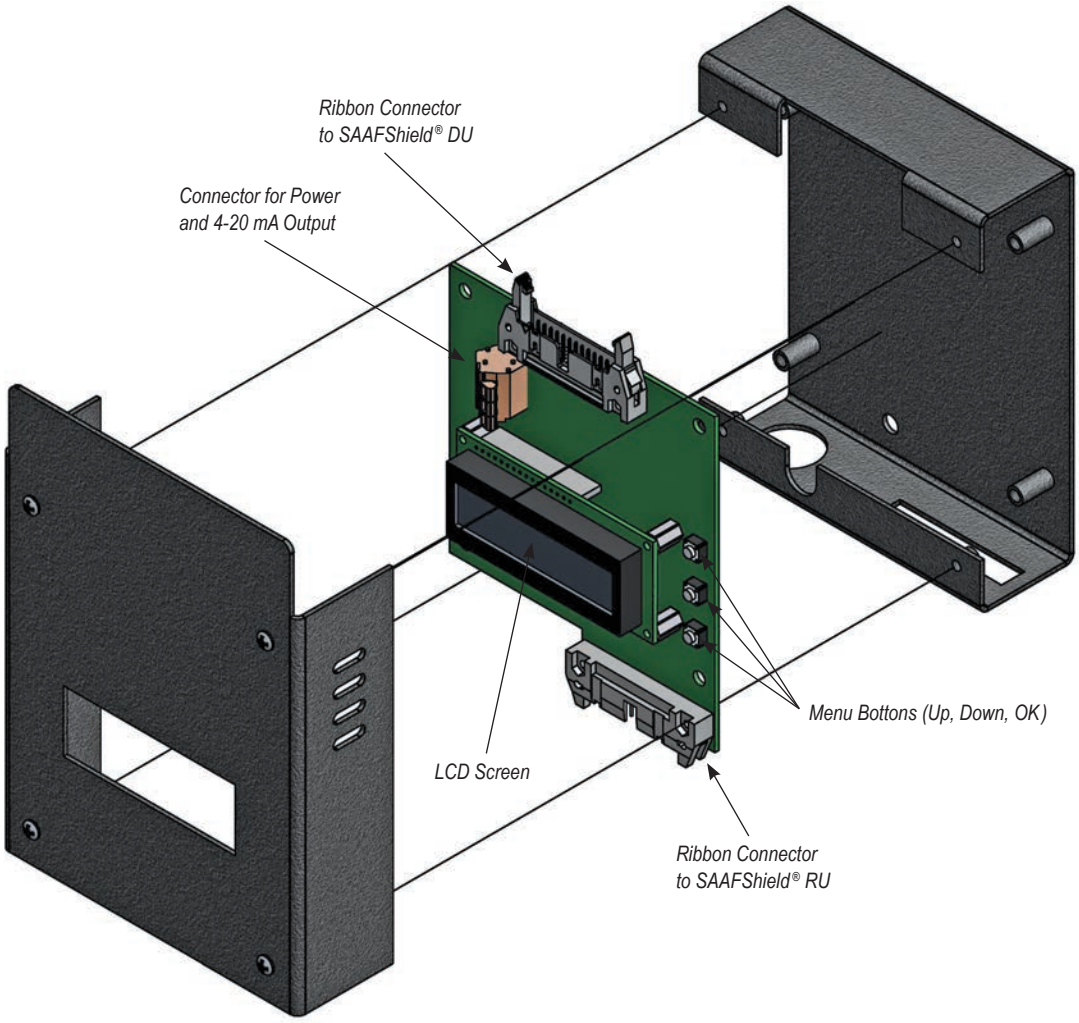


Figure 1. Major components of the SAAFShield® Communications Module.

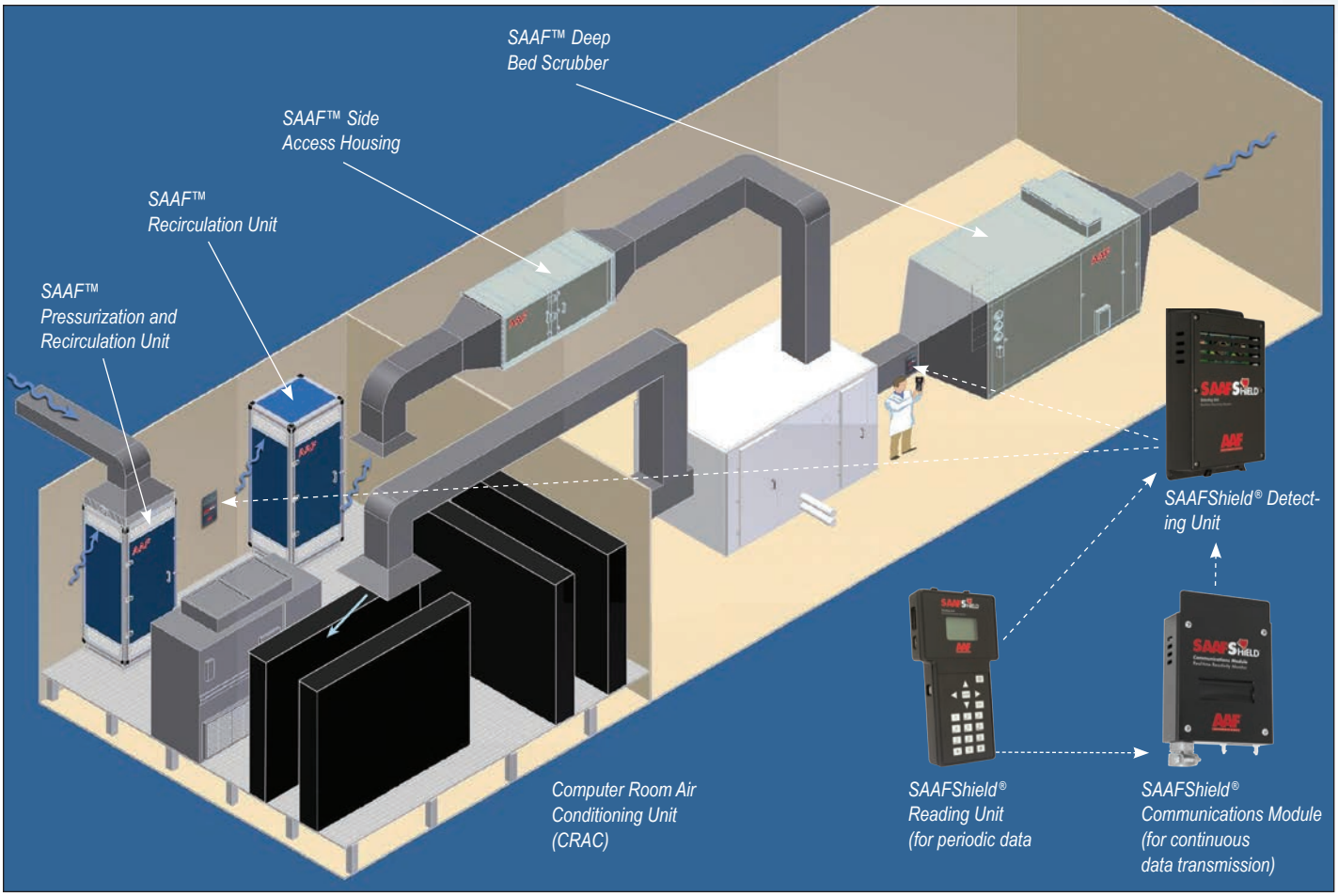


Figure 2. Typical placement for SAAFShield units.

3.0 Placement of SAAFShield Monitors

When determining the reactivity of a room or space within a building, the SAAFShield 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 SAAFShield should be placed after the final particulate filter. 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 or filter.

4.0 Connecting to SAAFShield Detecting Unit

The SAAFShield Detecting Unit and Communications Module come equipped with 26-pin ribbon cable connectors. To connect the CM to the DU, first remove the CM cover and locate the ribbon cable connector at the top of the CM circuit board. (Figure 3)

Figure 3.

5.0 Connecting to 4-20 mA Output

The unit connects to the host control/monitoring system via a standard "3-wire" analog loop.

There are three terminals for this connection labeled as follows:

- +24V Positive 24 VDC
- GND 24 VDC common
- 4-20mA Signal to the analog input of the host system.

The 24 VDC power for the unit must be connected to the same source as the host control/monitoring system, and in particular the 24 VDC common (GND) must be the same as is used for reference by the analog input module in the host control/monitoring system. (Figure 4)

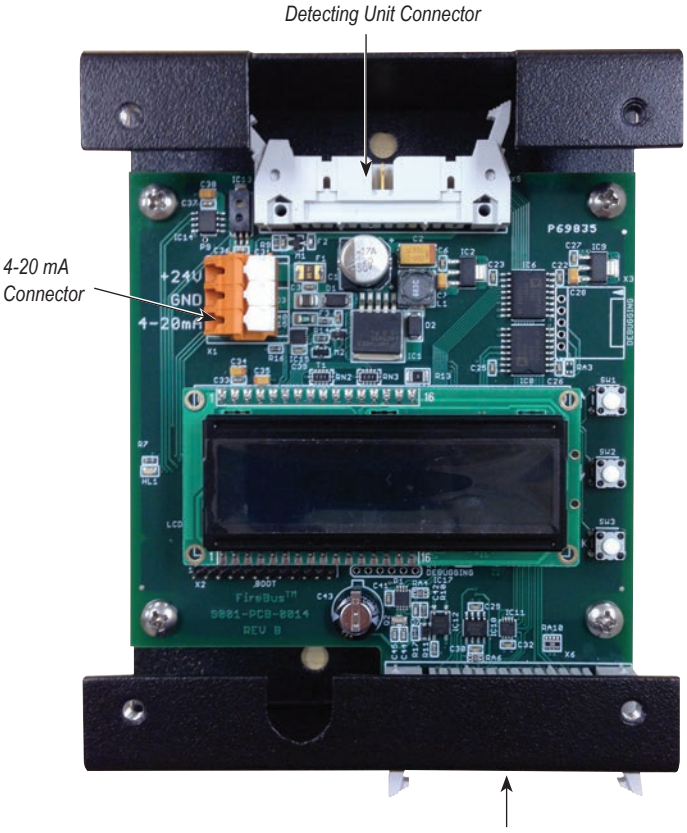


Figure 4.

6.0 Menu System

The SAAFShield Communications Module has three push buttons to the right of the LCD display (Figure 5). Press any button to enter the menu.

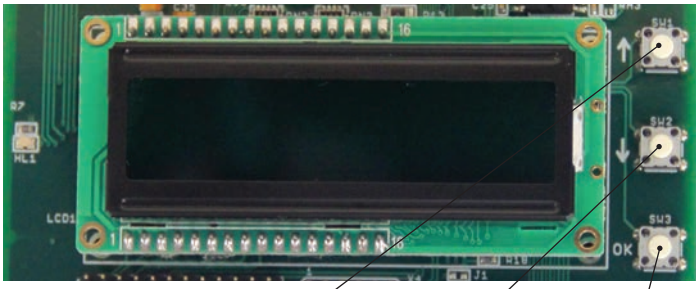


Figure 5. *Up Button* *Down Button* *OK Button*

1. The Communications Module will not enter the menu system if data is being transmitted. Transmitting notice will be shown on the LCD display.
2. Press any of the three buttons to enter the menu system. If the unit is not transmitting data, you will enter the menu system immediately. If the unit is transmitting data, you will enter the menu system once the transmitting procedure is complete.
3. When the Communications Module is in the menu, the selected field will blink.
4. Use the UP and DOWN buttons to increase /decrease the setting of that field.
5. Use the OK button to select the value and scroll to the next field.
6. If Exit (EXT) field is reached using the OK button, press either UP or DOWN to exit from menu system back into main mode.
7. After setting the time and date, it is recommended to initialize the sensors. Once you leave the time/ date setup menu, the device will ask if the sensors should be initialized. Press the UP button to initialize the sensors or press DOWN to exit the menu system.

Note: The Communications Module will conduct the next data transmission when the scheduled time comes though the LCD display will NOT change to show this transmission. The red LED on the left of the LCD display will blink at a faster rate when the transmission is taking place.

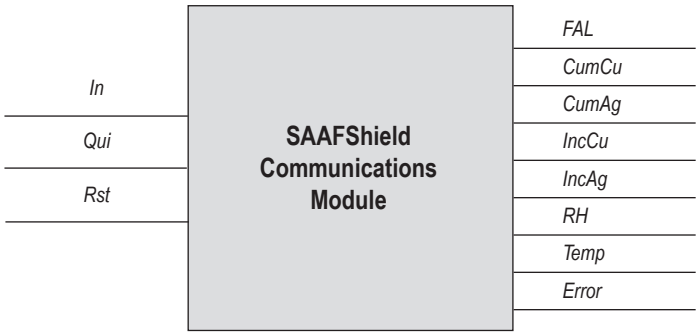
7.0 Programming Instructions

When programming your building management software to receive the 4-20 mA signal from the SAAFShield CM, you can utilize three different languages: structured text, ladder logic, and function block diagram. Please refer to AAF document SAAFShield Appendix GPF-3-118, "Detailed Programming Instructions for SAAFShield Communications Module."

8.0 Data Input and Output

The SAAFShield Detecting Unit control logic interface block interprets the 4-20 mA signal originating in the SAAFShield Communications Module and produces a set of data consisting of each piece of data collected by the SAAFShield detecting unit. The block also has some failure detection capabilities. If a failure is detected the Fail bit is set and a fail code is populated.

Block Diagram



Inputs

Parameter Name	Type	Description
In	DINT	Physical IO Tag
Qui	Boolean	Signal Quality
Rst	Boolean	Initialize output to starting values

Details

Parameter Name	Type	Description
FAL	Boolean	True if QUI is False
CumCu	DINT	Cumulative Copper reading in angstroms
CumAg	DINT	Cumulative Silver reading in angstroms
IncCu	DINT	Incremental Copper reading in angstroms
IncAg	DINT	Incremental Silver reading in angstroms
RH	Real	Relative Humidity reading
Temp	Real	Temperature reading
Error	Real	Error Code

Notes:
The range and unit of measure for all metal readings is 0 – 4000 angstroms.
- Relative Humidity is measured 0 – 100%.
- Temperature is measured -50 – 150° C

Pulse Codes

Variable	Number of Pulses	Pulse Level (raw value)	Length of Time
Start Signal	1	6.28 mA or 16486	3 seconds
Inter-data Pulse	2	8.58 mA or 22486	1 second each
Data Transfer	1	N/A	5 seconds

Cycle

Every 15 minutes the SAAFShield Communications Module sends data to the analog input (SigIn). It sends the start signal for 3 seconds, waits 2 seconds, and then begins data transmission. Each measurement is transmitted for 5 seconds. There is a two second wait followed by two inter-data pulses. Then the next measurement sequence is transmitted. The chart below (Figure 6) shows an example sequence. Note that all data transmitted is set high. When the Communications Module has sent all pieces of data, it waits for 15 minutes before beginning the cycle.

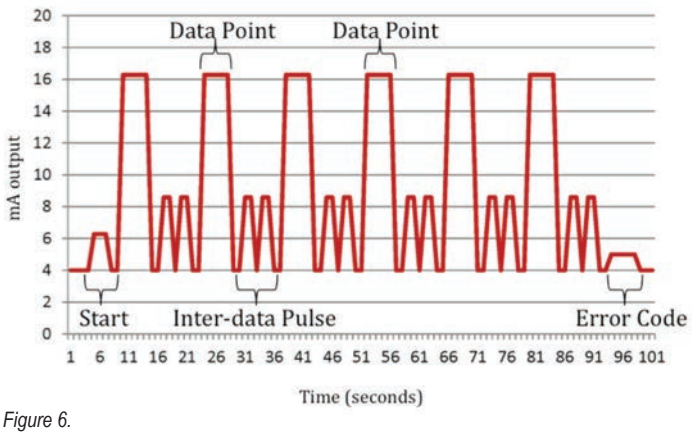


Figure 6.

Steps

1. Send one 6.28 mA pulses of 3 seconds.
2. Wait 2 seconds.
3. Transmit Cumulative copper data in the range of 4-20mA for 5 seconds.
4. Wait 2 seconds.
5. Send two 8.58 mA pulses of 1 second each with inter-pulse pause of 1 second (set loop to 4mA during pause)
6. Wait 2 seconds.
7. Transmit Cumulative silver data in the range of 4-20mA for 5 seconds.
8. Wait 2 seconds.
9. Send two 8.58 mA pulses of 1 second each with inter-pulse pause of 1 second (set loop to 4mA during pause)
10. Wait 2 seconds.
11. Transmit incremental copper measurement in the range of 4-20mA for 5 seconds.
12. Wait 2 seconds.
13. Send two 8.58 mA pulses of 1 second each with inter-pulse pause of 1 second (set loop to 4mA during pause)
14. Wait 2 seconds.
15. Transmit incremental silver measurement in the range of 4-20mA for 5 seconds.
16. Wait 2 seconds.
17. Send two 8.58 mA pulses of 1 second each with inter-pulse pause of 1 second (set loop to 4mA during pause)
18. Wait 2 seconds.

19. Transmit Relative Humidity measurement in the range of 4-20mA for 5 seconds.
20. Wait 2 seconds.
21. Send two 8.58 mA pulses of 1 second each with inter-pulse pause of 1 second (set loop to 4mA during pause)
22. Wait 2 seconds.
23. Transmit Temperature measurement in the range of 4-20mA for 5 seconds.
24. Wait 2 seconds.
25. Send two 8.58 mA pulses of 1 second each with inter-pulse pause of 1 second (set loop to 4mA during pause)
26. Wait 2 seconds.
27. Transmit the fault data for 5 seconds.

6 to 8 mA:	Power supply out of tolerance
8 to 10 mA:	Copper out of range
10 to 12 mA:	Silver out of range
12 to 14 mA:	Gold out of range
14 to 16 mA:	Self diagnostic failed, replace board
16 to 18 mA:	Invalid time/date
18 to 20 mA:	Other errors

9.0 Local Readout

The LCD on the front of the Communications Module has six (6) screens.

1. The standard the device is currently configured to. The Communications Module standard is set by the factory to the standard of your choice. The choices in the standards are:
   - Legacy Corrosion Control (ISA 71.04-1985)
   - RoHS Corrosion Control (ASHRAE TC 9.9)
   - or Museum & Archive

   ***Display charts of each standard, those on last page of SAAFShield brochure GPF-1-140.*

2. Temperature (ºC) and Relative Humidity (%)

3. Copper Corrosion Classification for the past 24 hours and the past 30 days

4. Silver Corrosion Classification for the past 24 hours and the past 30 days

5. Summary of the Environment's Classification. This will report the harshest of the classifications for the standard used

6. Transmitting

10.0 Troubleshooting

Error Codes

When a detectable failure occurs, the fail bit is set and the failure code is populated. The failure codes have the following meaning:

Code Number	Meaning
0-5 mA	No failure
6-8 mA	Power Supply out of Tolerance
8-10 mA	Copper out of Range
10-12 mA	Silver out of Range
12-14 mA	Gold out of Range
14-16 mA	Self diagnostic, failed replace board
16-18 mA	Invalid time/date
18-20 mA	Other errors

11.0 SAAFShield Parts List

It is recommended that the following spare parts be stored at the installation site for replacement purposes. Consult with your AAF representative to determine actual quantities required.

Description	Part Number
Detecting Unit (DU)	392-803-101
Silver Sensor	392-803-010
Gold Sensor	392-803-011
Copper Sensor	392-803-012
Reading Unit (RU)	392-803-001
Connection Cable (DU-RU)	392-803-003
12V Adaptor	392-803-000
Communications Module (CM)	
- configured for Legacy	392-803-510
- configured for RoHS	392-803-520
- configured for Museum	392-803-530
Connection Cable (DU-CM)	392-803-004

To order replacement parts call: **1-800-AAF-2003.**

AmericanAirFilter

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