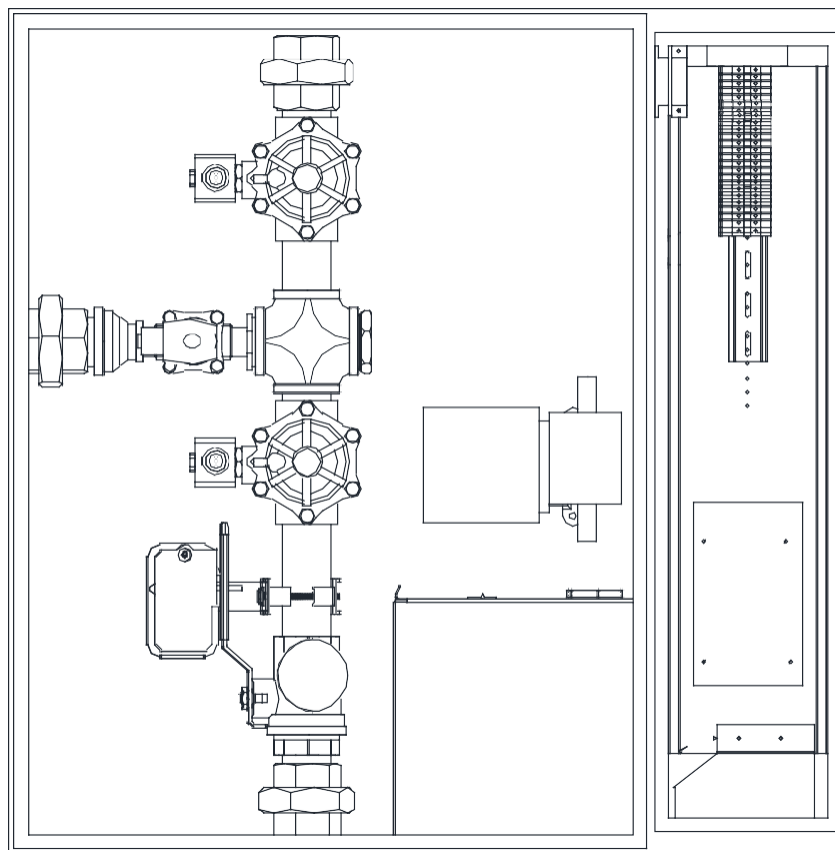


CORE Protection Fire System for Pollution Control Unit Installation, Operation, and Maintenance Manual



RECEIVING AND INSPECTION

Upon receiving unit, check for any interior and exterior damage. Report any damage found immediately to the carrier. Check that all accessory items are accounted for and free of damage.

WARNING!!

Installation of this package should only be performed by a qualified Fire System Technician who has read and understands these instructions and is familiar with proper safety precautions. Improper installation poses serious risk of injury due to electric shock and other potential hazards. Read this manual thoroughly before installing or servicing this equipment. **ALWAYS** disconnect power prior to working on equipment.

**ONLY CORE CERTIFIED PERSONNEL MAY INSTALL, PERFORM
MAINTENANCE AND REPAIRS ON CORE SYSTEMS.**

Save these instructions: This document is the property of the owner of this equipment and is required for future maintenance. Leave this document with the owner when installation or service is complete.

WARNING!

Read and Understand the Operator's Manual before servicing this unit. This Quick Start Guide is for Trained and Qualified Fire System Technicians.

HMI, ECPM03, and CORE Board

The HMI provides access to change settings, view operating information, and displays faults (Figure 1) for the electrical package, exhaust fan, and fire system. The HMI has 4 buttons; the function is displayed adjacent to each button on the screen. For more information on menu navigation, refer to the Demand Control Ventilation (DCV) Manual.

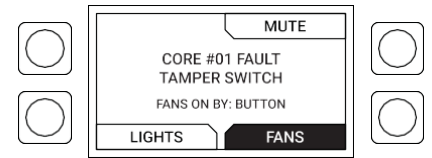


Figure 1 (HMI Screen Example)

The ECPM03 also provides access to fire system information. You can view Faults and Last Fire Info. You may also view if the fire system was activated by Firestat or MAD (Manual Activation Device). The Board has 4 buttons; the function is displayed below each button near the LCD screen (Figure 2). For more information on the ECPM03 Board, refer to the DCV Manual.

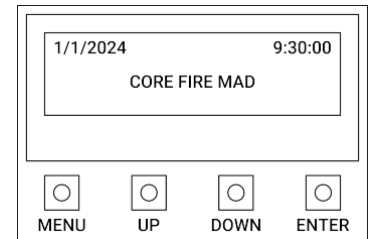


Figure 2 (ECPM03 LCD Example)

The CORE Board uses LEDs (Figure 3) for alerts. The LED lamp meanings are:

- A is for Alarm Alerts
- B is for Fire System and/or Supervision Codes
- C is for Surfactant Low
- D is for Gas Shut Down (Gas is off when the light is on).

Maintenance

WARNING: When servicing or cleaning ductwork, all Hood CORE, PCU CORE, and interlocked fire systems must be placed in test mode to prevent accidental discharge.

- Verify that the system design and installation are adequate to protect the hazard area and conform to the instructions in the Operation, Installation, and Maintenance (OIM) Manual.
- Hood filters must be maintained on a daily basis to ensure proper airflow and grease extraction. Clean filters per the recommendations in the Hood Installation, Operation, and Maintenance Manual.
- All water connections must be verified for tightness and leak-free operation. If the "Add Surfactant" light is illuminated, add surfactant. Surfactant is used to guarantee proper cleaning of the hood, duct, and plenum during wash cycles and aids with fire suppression. Refer to the PCU CORE Maintenance section for 6-Month Inspection Procedure.
- Every two years, you must replace the batteries and inspect all electrical wiring and plumbing.
- If it should become necessary to disconnect the PCU CORE system from AC power for an extended period of time (more than two days), the batteries should be disconnected to prevent them from being damaged due to complete discharge.
- After a fire; Inspect and/or replace all nozzles, Inspect all piping connections for tightness, Inspect all hood lights for proper seal and security, Inspect all wiring and Hood insulation to ensure all are in good condition.

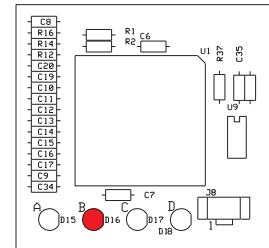


Figure 3 (CORE Board Example)

NOTE: See PCU CORE Operation, Installation, and Maintenance Manual for detailed procedures.

Failure to properly maintain equipment will void warranty.

To order Surfactant,
Scan the QR Code:



To order Batteries,
Scan the QR Code:



CORE Board Faults

When there are no faults in the fire system, Lamp B will stay solid (An LED indicator is also on the control package). When a fault exists, the LED will flash with a short break. Count the flashes then wait for a short break to determine the fault. For packages with HMIs, refer to the fault displayed on the screen.

NOTE: CORE Boards with software versions 1.68 and prior will use one brief flash every 3-seconds to indicate there is no fault.

Test Mode allows the system to be tested with operational appliances without discharging the system. If the system is left in test mode for 15 minutes, the gas valve will be locked out until test mode is deactivated.

Flashes	Fault Condition	Corrective Action
Catastrophic Faults		
1	Invalid Activation*	Check for external voltage being applied at J3-7 and J3-10.
2	CORE Drain Solenoid*	Check solenoid and wiring to solenoid, replace as needed.
3	CORE Appliance Solenoid*	Check and wiring to , replace as needed.
4	Auxiliary Fault*	Check supervised Pressure Regulating Valves (optional) and Pressure Switches (optional).
5	Microcontroller Fault*	Replace CORE printed circuit board.
Critical Faults		
6	CORE Surfactant Pump	Check surfactant pump motor and wiring to the motor, replace as needed.
7	Supervised Loop Fault*	Check the installation of the wiring to all the manual actuation devices (push stations) and firestats. Verify connections are secure and tight. Check for open/short circuits in the wiring. Repair or replace wiring as needed.
Important Faults		
8	Ground Fault	Check the installation of the wiring to all the manual actuation devices (push stations) and firestats. Verify connections are secure and tight. Check for open/short circuits in the wiring. Repair or replace wiring as needed.
9	Surfactant Low	Add surfactant. Check/replace float switch.
10	Battery Voltage Low	The voltage is below the battery threshold. Wait for batteries to recharge if there was a power failure. Replace if the batteries will not hold a charge.
11	AC Power Failure*	The voltage is below the power supply (PS-02) threshold; approximately 27.18V DC. Check breakers, call power company.
12	Door Tamper Switch	Close cabinet door.
13	Test Mode*	Place switch in armed position when testing is complete.
14	CORE Interlock	Check Dip Switches on all boards and RS-485 network wires connecting boards.
15	Fault on Hood in Network	Check all hoods in CORE network for faults.
16	Fault on PCU in Network	Check all PCUs in CORE network for faults.

NOTE: When a Supervised Loop fault is present for 24 hours, cooking operations will shut down.

Faults marked with (*) will shut down Gas/Shunt. During an AC power failure or loss of building power, all 120V AC gas valves/electrical appliances will shut down immediately. For 24V DC gas valves, the valve will stay powered for a few minutes depending on battery voltage (when both an AC Power Failure and Battery Voltage Low fault are present, the valve will shut down).



PCU CORE Fire Protection: Inspection Report

Start-up and checks must be performed after install. Warranty will be void without completion of forms.

Job Information:

Start Date/Time		Type of Inspection: (check mark one)	Commissioning	Semi-Annual
Business Name:				
Business Address:			Startup after Decommissioning (For systems shutdown for over 2-days)	
Business Phone:				

Module Configuration: Inlet to Outlet

--

Name Plate and Hood Information					
Fire System #	PCU Model #	Job #	Volts	Hertz	Phase

PCU CORE Plumbing Verification

Verify all nozzles are secure		Verify Surfactant line is connected	
Open all water valves to the manifold		Verify Surfactant pump is primed and operates	
Check field piping is complete with approved materials		Check for leaks in the manifold	
Check for shut off valves in the CORE water line. Verify all shut off valves are supervised		Check for leaks throughout modules	
CORE water line is connected to the Building Wet Sprinkler System or Dedicated Water Supply		Verify gas valve strainer is installed (if applicable). Clean out strainer (Gas must be shut off)	
Record CORE water pipe size: Pipe size must be 1-1/2"		Clean out Wye strainer located in plumbing manifold (Water must be shut off)	
Verify all drains are piped to building grease interceptor or an approved drain		Record CORE operating water pressure: Max water pressure = 70 PSI	
Panel drain pipe must be sloped 1/4" per one (1) foot away from the PCU Core panel		Record CORE max static water pressure (125 PSI Max)	
PCU drains must be sloped 1/4" per one (1) foot away from the PCU		Verify Water Pressure (20 psi) min. @ PCU	
Check Surfactant tank is full		Verify Water Pressure (30 psi) min. @ Panel	

Service Notes:



PCU CORE Fire Protection: Inspection Report

Electrical		Low Voltage Wiring		Fire System	
CORE Control Panel power wired		All Firestats are wired		Record Battery Date Code (Replace if 2-years or older)	
Power Supply (PS-02) is connected to AC power		Remote Push Station is wired (if applicable)		Record CORE Board Revision #	
Verify all fans are wired to control panel and operate		Supervised loop is run through metallic conduit and not with high voltage wiring. Exterior conduit must be liquid tight		Main water line supply is supervised	
Shunt Trip Breaker wired (if required)		Supervised loop connections secured in terminal blocks, j-boxes, and push-station(s)		Record Power Supply (PS-02) output (Reading = 27.5 +/- 0.1V DC)	
UDS Appliance Kill Switch (if equipped) wired		Building alarm and trouble relay wired (if required)		Verify all CORE interlocks are connected (CA, CB, CC)	
When equipped, Gas valve wired (if 120V AC) = Terminals GAS and N1		Battery connected at connector J1		Push station cover and tamper seal installed (if applicable)	
		When equipped, Gas valve wired (if 24V DC) = Terminals LGV and N1D			
		CORE Appliance solenoid valve wired (Wall Mounted Control cabinet only)			

Fire System Activation Method	
Manual Activation Device (MAD)	
Firestat (360°F / 600°F) Activation Time (sec)	
120V AC Only	
Battery Backup Only	
Test Mode	
"Push to Reset" operates	

Fire Mode	
Appliance solenoid opens and water sprays	
All gas and electric appliances shutdown	
Fire system light activates	
Audible alarm sounds	
Constant Surfactant injection	

ALL SYSTEMS MUST BE ARMED AND NO FAULTS SHOULD BE PRESENT BEFORE LEAVING THE SITE.

Service Contact Information:

End Date/Time	
Service Company:	
Company Address:	
Company Phone:	
Contact Name (Printed):	
Contact Name (Signed):	

Service Notes:

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WARRANTY

This equipment is warranted to be free from defects in materials and workmanship, under normal use and service, for a period of 5-years from date of shipment. This warranty shall not apply if:

1. The equipment is not installed by a certified CORE installer per the MANUFACTURER'S installation instructions shipped with the product.
2. The equipment is not installed in accordance with Federal, State, and Local codes and regulations.
3. The equipment is misused, neglected, or not maintained per the MANUFACTURER'S maintenance instructions.
4. The equipment is not installed and operated within the limitations set forth in this manual.
5. The invoice is not paid within the terms of the sales agreement.

The MANUFACTURER shall not be liable for incidental and consequential losses and damages potentially attributable to malfunctioning equipment. Should any part of the equipment prove to be defective in material or workmanship within the 5-year warranty period, upon examination by the MANUFACTURER, such part will be repaired or replaced by MANUFACTURER at no charge. The BUYER shall pay all labor costs incurred in connection with such repair or replacement. Equipment shall not be returned without MANUFACTURER'S prior authorization, and all returned equipment shall be shipped by the BUYER, freight prepaid to a destination determined by the MANUFACTURER.

GENERAL INFORMATION

Listing

The CORE Fire Protection System is acceptable for use in New York City and approved per FDNY COA #5877.

INSTALLATION

Refer to project blueprints for proper plumbing and electrical connections located on the inside of the panel door.

It is imperative that this unit is installed and operated with the designed airflow and electrical supply in accordance with this manual. For warranty and technical support, refer to “**Technical Support Information**” on page 40 for contact information.

CAUTION: Do not apply power before plumbing and electrical installation is complete on the panel.

Ensure there is 36 inches of service clearance to the front of the panel. The panel should be located in an accessible area where the audible and visual alarms can be heard and seen. System should be installed indoors or in a weather tight enclosure, maintained between 32° and 130° F, this enclosure is to be provided by others.

WARNING: DO NOT RAISE UNIT BY THE DOORS, FILTER FRAMES, OR UTILITY CABINET. USE ALL LIFTING LUGS PROVIDED WITH A SPREADER BAR OR SLING UNDER THE UNIT.

When the PCU is installed above or near a finished space, the installing contractor should protect the finished space, especially when sensitive equipment is below the unit.

Mechanical

Site Preparation

1. Provide clearance around installation site to safely install equipment into its final position.
2. Consider general service and installation space when locating unit.

Assembly

1. Locate where the panel will mount on the wall or recessed in the wall. The panel must be mounted a minimum of 3'-6" (42") from the finished floor to the bottom of the cabinet.
2. Open the cabinet and verify proper pipe size for the water connections.
3. Route and connect the water supply piping to the manifold connection located at the bottom of the cabinet. If piping is run to the same nozzles, insert a check valve.
4. Connect to the wash manifold connection on the hood.
5. Prime the surfactant pump, refer to “**CORE Protection Fire System Option - Start Up**” on page 19.

Plumbing

WARNING: APPLY THE APPROPRIATE WATER PRESSURE AND TEMPERATURE TO ALL FITTINGS TO PREVENT LEAKAGE AND COMPONENT FAILURE.

Ensure there is 36" of service clearance to the front of the panel. The panel should be located in an accessible area where the audible and visual alarms can be heard and seen. System should be installed indoors or in a weather tight enclosure, maintained between 32° and 130° F, this enclosure is to be provided by others.

Plumbing Connections

Several field plumbing connections are required for proper Pollution Control Unit CORE operation. It is recommended that all plumbing connections be sealed with pipe dope. Use care not to contaminate the interior surfaces of the water lines when plumbing the unit, as small particulate can clog the orifices of the spray nozzles.

1. Incoming plumbing connections are connected via 1-1/2" NPT pipe, or equivalent copper tubing, at the bottom of the control cabinet. A strainer is to be installed upstream of all solenoid valves, located at the bottom of the control cabinet. This connection must be able to provide at least 30 psi at the panel gauge plus the pressure drop of the PCU and pipe leading to the PCU. The maximum operating pressure at the control package is 70 psi, with the maximum static pressure being 125 psi. This must be connected to a water supply line immediately downstream from the building's main shut-off valve or a fire sprinkler system. This main valve must be continuously supervised. If the CORE water supply is connected to the building sprinkler system, it is preferred that the connection be from the main sprinkler riser, or a branch line as long as the CORE system is calculated in the overall sprinkler system capacity. For domestic water supply, if other appliances are connected to the CORE water supply line, those appliances must be operated during the CORE system testing and taken into consideration when calculating the size of the waterline pipe.
2. The connection to the Pollution Control Unit is made via 1-1/2" NPT pipe, or equivalent copper tubing, from the top of the cabinet to the Pollution Control Unit. **This line must be sloped back to the CORE panel to ensure the lines drain 1/4" per one (1) foot. Stainless Steel, Copper, or Steel Pipe Only.**
3. There is an 1-1/2" drain connection that must be piped from the control package to the building's drain line. **The pipe must be sloped 1/4" per one (1) foot away from the PCU Core panel. Stainless Steel, Copper, or Steel Pipe Only.**
4. Once all supply and drain lines are connected, remove one of the nozzles and flush the lines.
5. The drains on the Pollution Control Unit should be connected back to the building grease interceptor or an approved drain. If PCU assembly has multiple modules, the drain line must be 2-1/2" NPT pipe minimum. **This must be sloped away from the PCU 1/4" per one (1) foot and sized to handle the fire system water volume. Stainless Steel, Copper, or Steel Pipe Only.**
6. Unions must be field installed before and after the PCU CORE control cabinet.

NOTE: Water pressure may not drop below 20 psi at the inlet to the nozzles, and a minimum of 15 psi at the last nozzle while the Pollution Control Unit is spraying. Operating pressure may not rise above 70 psi in the control cabinet when the Pollution Control Unit is spraying. If the operating pressure is greater than 70 psi, a water regulator must be connected. Max water static pressure is 125 psi.

IMPORTANT!!

CORE Protection water connection requires a supervised supply line. This must be connected immediately downstream from the building main shut-off valve. A minimum water pressure of 20 psi (while the Pollution Control Unit is spraying) must be achieved at the PCU. Use the chart below to determine the pipe pressure loss between the CORE package and the PCU.

Piping Loss Calculation for Wall Mount CORE Protection Fire System

To ensure proper operation of the CORE Protection Fire System, a minimum of 30 psi water pressure during spraying must be achieved at the Pollution Control Unit panel with a minimum of 20 psi at the PCU inlet. For this to occur, proper sizing of the water line is required. Use the following steps to calculate the piping minimum size.

1. Refer to **Table 4 on page 12** to determine CORE water flow rate.
2. Minimum PCU inlet operating pressure is 20 psi, with the PCU-CORE minimum gauge pressure of 30 psi. Subtract the minimum panel pressure of 30 psi from the available PSI at the panel pressure gauge. Maximum panel operating pressure is 70 psi. This will be your maximum allowable pressure drop for field-installed pipes between the panel and the PCU.
3. Most fittings add an equivalent pipe length to the total run. Use **Table 1** to calculate the equivalent pipe length for installed fittings. If you have multiple fittings of one type, simply multiply the number below by the total number of the fitting and add to the total run length.
4. To calculate the total flowing pressure drop between the panel and the PCU, take the total equivalent length found in step 3 and add the total linear field-installed pipe length. Multiply this number by the value found in **Table 2**, (Gallons per minute is determined in step 1). This will be the friction pressure drop between the PCU and the panel.
5. Add in the pressure drop due to gravity. This must be evaluated to overcome any rise in pipe elevation between the panel and the PCU. There is 0.43 psi/ft of vertical rise of pressure drop.
6. Now, compare the maximum allowable pressure drop from step 2 to the calculated pressure drop from step 3-5. If the calculated pressure drop exceeds the maximum allowable pressure drop, increase the pipe size, and recalculate steps 2 and 5. Continue this step until the calculated pressure drop is below the maximum allowable.
7. The panel contains (2) 1-1/2" solenoids, one normally open, and one normally closed, each with a Cv Flow Factor of 22.5. To calculate the pressure drop in psi through the panel, use this formula: **Panel Pressure Drop = Flowrate² / 253.125**, where flowrate is in gallons per minute. The pressure drop in the panel, downstream of the gauge is half of the calculated entire panel pressure drop.

Table 1 - Equivalent Pipe Length for Various Pipe Fittings

Pipe Size Inches	45° Elbow	90° Elbow	Tee Thru Run	Tee Thru Branch
3/4"	0.97	2.10	1.40	4.10
1"	1.23	2.60	1.80	5.30
1-1/2"	1.90	4.00	2.70	8.00
2"	2.40	5.20	3.50	10.40

Table 2 - Pressure Drop (PSI) per Equivalent Foot of Waterline

Gallons per Minute	Waterline Pipe Size (PSI per foot of pipe)			
	3/4"	1"	1-1/2"	2"
5	0.028	0.008	0.001	0.000
10	0.102	0.029	0.004	0.001
15	0.216	0.062	0.008	0.001
20	0.368	0.105	0.014	0.002
25	0.556	0.159	0.022	0.003
30	0.779	0.223	0.030	0.004
35	1.036	0.296	0.040	0.006
40	1.327	0.379	0.052	0.008
45	1.650	0.472	0.064	0.009
50	2.005	0.573	0.078	0.011
55	2.391	0.684	0.093	0.014
60	2.809	0.803	0.110	0.016
65	3.257	0.931	0.127	0.019
70	3.736	1.068	0.146	0.021
75	4.244	1.213	0.166	0.024
80	4.782	1.367	0.187	0.027
85	5.350	1.529	0.209	0.030
90	5.946	1.700	0.232	0.034
95	6.572	1.879	0.256	0.037
100	7.226	2.066	0.282	0.041
105	7.909	2.261	0.309	0.045

Discharge Coefficient for PCU

The discharge coefficient, or “K Factor,” is used to calculate the actual GPM through the system when the incoming pressure is different than what is specified in **Table 3**. This K factor can be applied to the completed Pollution Control Unit assembly. The formula below will provide the Gallons per Minute discharge rate of the PCU fire system.

$$\text{Total Flowrate} = \text{K Factor} * \text{Pressure}^{0.44}$$

$$\text{Individual Valve Pressure Drop} = F^2/Cv^2$$

(Cv Value for a single valve is 22.5)

Table 3 - Fire System Discharge Coefficient (K-Factor)

PCU Size	1 Module	2 Modules	3 Modules	4 Modules	5 Modules
1	2.2	3.6	5.1	6.5	8.0
2	2.9	4.4	5.8	7.3	8.7
3	3.3	5.1	6.9	8.7	10.5
4	3.6	5.8	8.0	10.2	12.3
5	4.0	6.5	9.1	11.6	14.2
6	4.7	7.3	9.8	12.3	14.9
7	6.2	10.2	14.2	18.2	22.1

Table 4 - Fire System Water Consumption (Based on PCU Size in GPM)

PCU Size	1 Module	2 Modules	3 Modules	4 Modules	5 Modules
1	8.1	14	19	24	30
2	11	16	22	27	33
3	12	19	26	33	39
4	14	22	30	38	46
5	15	24	34	43	53
6	18	27	37	46	56
7	23	38	53	68	83

Field Pipe Pressure Drop Calculation Example:

Wall mount panel installed with 30 feet of 3/4" linear pipe between panel and unit. There are two 90 degree elbows installed in the pipe run, and the pipe run has a vertical rise of 15 feet. A size 6 PF-HE-HE-OC-OC Pollution Control Unit is attached to the package.

Size 6 PCU-PF-HE-HE-OC-OC (5 modules) = 56 gpm

Operating pressure required at PCU = 20 psi.

Operating pressure at panel gauge = 50 psi.

Allowable pressure drop between panel gauge and unit: 50 psi – 20 psi = **30 psi**

Equivalent length of pipe = 30 + 2 * 2.10 = 34.20 feet

Friction Pressure Drop through pipe = 34.20 * 2.809 = 96.07 psi

Gravitational Pressure = 0.43 psi/ft * 15 feet = 6.45 psi

Panel pressure drop downstream of gauge = $(56 \text{ gpm}^2 / 253.125) / 2 = 6.19 \text{ psi}$

Total Pressure Drop in Field Pipe between panel gauge and unit = 96.07 + 6.45 + 6.19 = **108.71 psi**

Allowable pressure drop = 30 psi

Field Pipe Pressure Drop Calculation Example:

Wall mount panel installed with 30 feet of 3/4" linear pipe between panel and unit. There are two 90 degree elbows installed in the pipe run, and the pipe run has a vertical rise of 15 feet. A size 6 PF-HE-HE-OC-OC Pollution Control Unit is attached to the package. Refer to **Figure 1** for pressure loss examples.

Size 6 PCU-PF-HE-HE-OC-OC (5 modules) = 56 gpm

Operating pressure required at PCU = 20 psi.

Operating pressure at panel gauge = 50 psi.

Allowable pressure drop between panel gauge and unit: 50 psi – 20 psi = **30 psi**

Equivalent length of pipe = 30 + 2 * 2.10 = 34.20 feet

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Gravitational Pressure = 0.43 psi/ft * 15 feet = 6.45 psi

Panel pressure drop downstream of gauge = $(56 \text{ gpm}^2 / 253.125) / 2 = 6.19 \text{ psi}$

Total Pressure Drop in Field Pipe between panel gauge and unit = 96.07 + 6.45 + 6.19 = **108.71 psi**

Allowable pressure drop = 30 psi

This system will not work correctly because calculated pressure drop is greater than allowable pressure drop. Pipe size will need to be change to 1-1/2 inch diameter.

Re-calculate with 1 1/2 inch pipe instead of 3/4" pipe:

Equivalent length of pipe = 30 + 2 * 4.00 = 38.00 feet

Friction Pressure Drop through pipe = 38.00 * 0.110 = 4.18 psi

Gravitational Pressure = 0.43 psi/ft * 15 feet = 6.45 psi

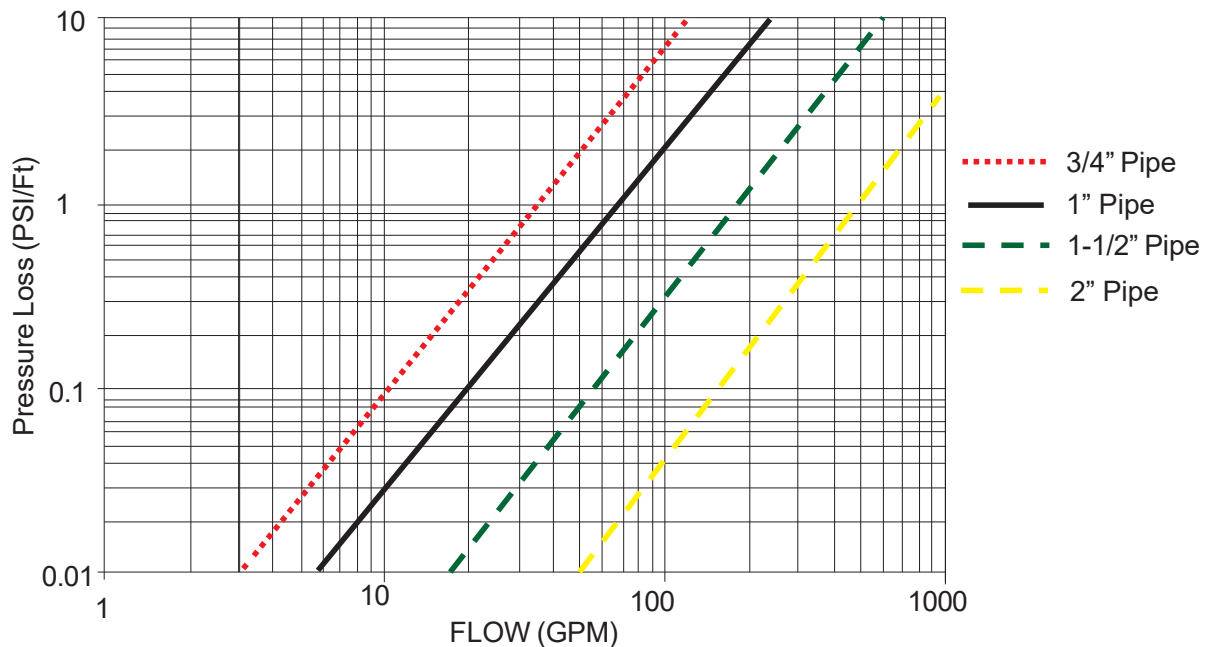
Panel pressure drop downstream of gauge = $(56 \text{ gpm}^2 / 253.125) / 2 = 6.19 \text{ psi}$

Total Pressure Drop in Field Pipe between panel gauge and unit = 4.18 + 6.45 + 6.19 = **16.82 psi**

Allowable pressure drop = 30 psi

This system will work correctly because calculated pressure drop is less than allowable pressure drop.

Figure 1 - Pressure Loss through Typical Water Pipe



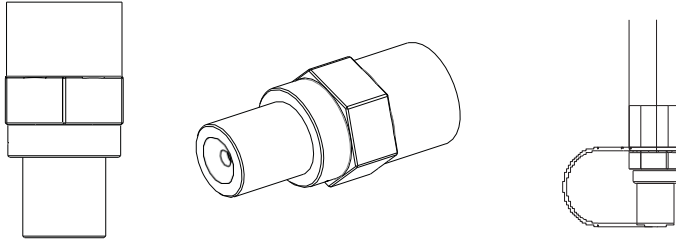
PCU Fire System Nozzles

The Overlapping Male Nozzle(s) (p/n OL-M) are used to protect the PCU.

The nozzles include a cap (p/n 3074-1-1).

Refer to **Figure 2**. The cap prevents contamination from entering the pipe network and is designed to pop-off upon system discharge, allowing the fire system to flow to the protected hazard area.

Figure 2 - Fire System Nozzle



Nozzle P/N: OL-M

Previously P/N: 3070-3/8HH-10-SS

Table 5 provides details on PCU size, modules, and nozzle quantity per unit.

Table 5 - PCU Fire System Chart

PCU Size	Unit Nozzle Count (OL-M)					Duct Nozzle Count (OL-M) Last Module Only
	1 Module	2 Modules	3 Modules	4 Modules	5 Modules	
1	4	8	12	16	20	2
2	4	8	12	16	20	4
3	5	10	15	20	25	4
4	6	12	18	24	30	4
5	7	14	21	28	35	4
6	7	14	21	28	35	6
7	11	22	33	44	55	6

Example:

Model - PCU-PF-HE-ESP-OC-CPFS-5
 Modules Fire System PCU Size

Number of Modules - 4

PCU Size - 5

Number of OL-M Unit Nozzles - 28

Number of OL-M Duct Nozzles - 4

Total Nozzles - 32

Electrical

WARNING!

Disconnect power before installing or servicing control. High voltage electrical input is needed for this equipment. A qualified electrician should perform this work.

Before connecting power to the control package, read and understand the entire section of this document. As-built wiring diagrams are furnished with each control package from the factory and are either attached to the door of the unit or provided with the paperwork packet.

Electrical wiring and connections must be made in accordance with local ordinances and the National Electric Code, ANSI/NFPA70. Verify the voltage and phase of the power supply, and the wire amperage capacity is in accordance with the unit's nameplate.

ATTENTION: LOW-VOLTAGE DC OR SIGNALING WIRE SHOULD BE ROUTED IN SEPARATE CONDUIT FROM ALL AC VOLTAGE SOURCES.

1. Always **disconnect power** before working on or near this equipment. Lock and tag the disconnect switch or breaker to prevent accidental power-up.
2. **There are multiple electrical connections** required for this control. **120V AC** should be wired to terminals **H1** and **N1**. If the hood is equipped with a separate light circuit, **120V AC** should power this circuit per the as-built schematic. **H1** and **N1** should not be connected to a shunt trip breaker.
3. The maximum distance between the CORE Protection System, PCU CORE Protection System, and a Hood CORE Protection System is 1000 feet. Shielded twisted pair cable must be used for this connection.
4. Verify that the power source is compatible with the requirements of your equipment. The system wiring schematic identifies the **proper phase and voltage** of the equipment.
5. Before connecting the control package to a power source, verify power source wiring is de-energized.
6. Secure the power cable to prevent contact with sharp objects.
7. Do not kink power cable and never allow the cable to come in contact with oil, grease, hot surfaces, or chemicals. Solenoid cables **must not** come in contact with hood surfaces.
8. **The supervised loop must be run through metallic conduit.** Do not run wiring with high voltage wires. Verify all supervised loop wires are free from damage/stress. All supervised loop wires must be terminated in terminal blocks, junction boxes, and push-stations.
9. If the system contains additional firestats, they must be wired into the supervised loop.
10. If the control package is a **wall-mount system**, a duct mounted temperature sensor will need to be wired. The temperature sensor must be wired to terminal blocks, as indicated on the wiring schematic.
11. If the control package is a **wall-mount system**, the hood lights wiring will need to be wired to terminals "B" and "W." Verify connections on wiring schematic.
12. Before powering up the system, make sure that the interior of the control package is free of loose debris or shipping materials.
13. The battery must be plugged in at connector J1 on the electrical board (PCBCORE) after wiring is complete.
14. All gas appliances under the hood must shut down in the event of an AC power loss. All electric appliances will shut down on building power loss.
15. If any original internal wire supplied with the system must be replaced, use type THHN wire or equivalent.
16. All field-supplied wire for the firestat must be high temp wire rated for **842°F** minimum (#441601C6.FE9 White and #441601C6.FE0 Black) for on hood connections.
17. Use Belden #6320UL, 18 Gauge, plenum-rated wire or similar, for the supervised loop that does not come in contact with the hood.
18. Use Belden #88760 or similar for the fire system interlock network and CAT-5 for Modbus communications.
19. All exterior wiring connections to the PCU must be run inside liquid tight conduit. This includes the supervised loop and airflow switch wiring.

IMPORTANT!: The battery backup for the fire protection system produces output power even when main power is disconnected from system. When performing major electrical service to the control, the battery backup must be disconnected then reconnected before commissioning.

Wire Ampacity Rating

The load current rating and the over-current protection for conductor types shall not exceed 15 amperes for 14 AWG, 20 amperes for 12 AWG, and 30 amperes for 10 AWG aluminum and copper-clad aluminum after any correction factors for ambient temperature and number of conductors have been applied. Refer to **Table 6**.

Table 6 - Copper Wire Ampacity @ 75°C

Wire Size AWG	Maximum Amps
14	15
12	20
10	30
8	50
6	65
4	85

Distance Limitations

Wiring connections to remote fire protection system(s) must use shielded twisted pair wire. The maximum length of this connection is 1000 feet.

Wire size is an important consideration when making the connections between the fire protection system control package and a gas valve. Refer to **Table 7** for maximum wiring distance between the system and remote gas valve.

Table 7 - Wiring Maximum Distance

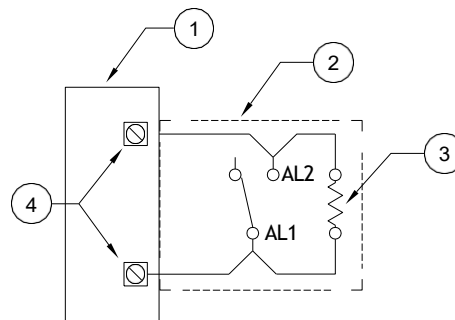
Wire Gauge	Distance (Feet)
12	1049
14	660
16	414
18	260
20	164
22	103
24	64

Fire Alarm Contacts

The fire protection system is equipped with optional normally open contacts (terminals **AL1** and **AL2**) for building applications that connect to the premise Fire Alarm Control Panel (FACP). Refer to **Figure 3** for wiring reference. During a fire condition, the contacts will close and trigger the premise FACP to initiate a general fire alarm.

Figure 3 - Fire Alarm Reference

1. Building Fire Alarm
2. Control Panel Fire Alarm Contact
3. End of Line Device
4. Alarm Input



Fire Group

Fire Groups are for the purpose of using multiple CORE controlled fire systems and grouping specific fire systems together. This will allow the user the ability to assign different zones for independent activation.

In order to set a fire group, you will need to set the CORE board DIP switches as shown in **Table 8**.

Table 8 - Fire Group DIP Switch Position

6	7	Fire Group Number
Off	Off	1
On	Off	2
Off	On	3
On	On	4

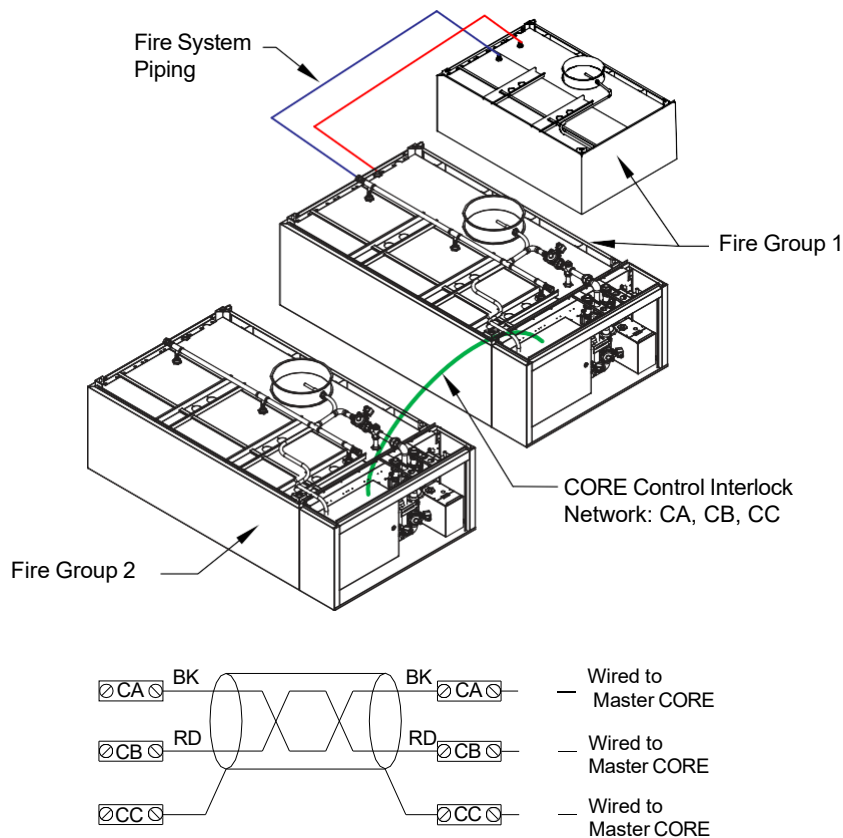
Note: Every panel with matching fire group settings (DIP switches 6 and 7) will activate simultaneously in a fire condition.

Figure 4 shows an example of different zones on separate fire groups, but still connected via the interlock network. In the example, when 2 Fire groups (01 and 02) are assigned on the CORE boards, and if a fire condition exists in any one group, it will NOT activate the other fire group. However, both are connected to the same interlock network.

- Fire Group 01 CORE board DIP switch setting will be set to: Switch 6 Off and Switch 7 Off.
- Fire Group 02 CORE board DIP switch setting will be set to: Switch 6 On and Switch 7 Off.

Refer to “**DIP Switch Settings**” on page 27 for setting multiple CORE controlled fire systems.

Figure 4 - Fire Group Reference



OPERATION - PCU CORE PROTECTION FIRE SYSTEM

Before starting up or operating the system, check all fasteners for tightness. Verify that the wiring is installed properly, and that all nozzles and panels are installed.

CORE Protection Fire System (CPFS)

In the event of a Pollution Control Unit fire or a fire leading to the Pollution Control unit, CORE Protection Fire System is activated.

If the Pollution Control Unit Firestat senses a temperature hotter than its internal setpoint, an electric signal is sent to the CORE Fire System Cabinet. An electric water solenoid is energized, allowing the flow of water to the Pollution Control Unit mounted manifold. At the same time, surfactant is continually injected into the water stream to help suppress the fire.

Once the fire system is activated, a "Fire System Activated" light is illuminated on the CORE Fire System Cabinet and an audible alarm sounds. A timer is also energized upon fire system activation. The timer is factory set for 15 minutes and keeps the water spray system running for a minimum of 15 minutes. This is necessary to help extinguish all remaining duct fire potential.

The fire system is electrically operated and thus requires a battery backup system. The battery backup will automatically energize upon a loss of power. The battery backup will monitor the fire system circuit for a minimum of 24 hours and be able to operate the fire system circuit for a minimum of 30 minutes. Once power is restored, the battery will automatically recharge.

CORE Protection Test Mode Overview

The CORE Protection System has an integrated option for testing. This test mode, when active, will shut down the PCU coverage solenoid and prevent water from spraying on the filters. It will allow activation of the fire system, including the discharge of water through the drain solenoid, audible alarm, shunt trip breaker (if applicable), and shutdown of appliances via gas valve reset relay. This mode will also activate any additional CORE package attached to the system, including any hood-mounted CORE Protection systems and other Pollution Control Unit CORE Protection systems.

Please note that the appliances must be started before test mode is entered on any CORE Protection package for proper demonstration of this function.

CORE Protection Reset Overview

There are multiple actions required to reset the fire system. First, the duct Firestat must be cooled to below its internal set point. Once the firestats reset, the timer will automatically stop the fire system once its time duration has ended. An alternative method to bypassing the timer is to press the fire system reset button. This will de-energize the timer and reset the system.

NOTE: The Firestat must be cool, and the remote manual actuation device (push/pull station) must be reset for this button to work.

After a fire, full inspection by a certified professional must be conducted prior to restarting the fire system.

CORE Protection Fire System Option - Start Up

Special Tools Required

- AC Voltage Meter
- Standard Hand Tools
- Hand-held
- Heat Source
- Silicone Lubricant, Danco 88693
- Surfactant (Part Number WWDETER for 4 Gallons, WWDETER-1G for 1 Gallon)
- Supervised Loop Wire (Belden Part Number 6320UL or similar)

Jobsite Qualifications - Pre-Installation CPFS

1. Verify the source for the CORE water supply (domestic or sprinkler), and determine the pressure drop from the connection at the source to the connection at the CORE manifold inlet.
2. Verify the proper amount of water pressure and flowrate is available for CORE Protection. Should the operating and static pressures exceed our maximum listing, correctly identify and size a pressure reducing valve.
3. Verify if a shutoff valve will be required on the CORE supply line.

Start Up Procedure - CPFS

1. Check all nozzles to make sure they are installed and tight.
2. Open the water valve to the control package.
3. Fill surfactant tank with surfactant. The "Add Surfactant" light should not be on. Prime the surfactant pump with the push-button on the face of the control package.
4. The CORE Protection water connection must be a minimum 1-1/2" pipe and must be supervised. This must be connected to a water supply line immediately downstream from the building's main shut-off valve or a water fire system. This main valve must be continuously supervised. If other appliances are connected to the CORE water supply line, those appliances must be operated during the CORE system testing and taken into consideration when calculating the size of the waterline pipe. Supply lines must be equipped with a strainer upstream of all CORE solenoid valves.
5. The fire system must be tested to ensure proper operation in the event of a fire.
6. Verify CORE Protection nozzle caps are easily removed. If nozzle caps stick on the nozzles during a fire system discharge, apply silicone lubricant to the O-ring. Use Danco 88693 lubricant.
7. Ensure there are no supervision faults being reported by the "Fire System Activated" light and that the light flashes one brief flash every 3 seconds, indicating the CORE system is armed and ready.
8. Ensure that the maximum water static pressure on the panel is less than 125 psi.
9. Verify the exterior conduit is liquid-tight.

NOTE: Activating a PCU CORE system will also activate any other CORE, PCU, or HOOD fire system that is connected to the same fire group. Ensure that all other systems are ready to be tested by placing the system panels in the test mode and ensuring hood filters and drains are in place.

Start Up Procedure - Battery Back Up

1. Place the PCU CORE panel in "Test Mode." Place any other CORE system in "Test Mode," if applicable.
2. Remove **120V AC** to the CORE Fire Protection control panel by shutting down the circuit breaker to the panel. After a few seconds, the "Fire System Activated" light will flash a power failure supervision fault code (11 flashes followed by a pause).
3. Heat the Firestat with a hand-held heat source. The use of a torch or flame is strictly prohibited.
4. Verify that the operating panel pressure is **30 psi** minimum plus piping pressure drop, and **70 psi** maximum.
5. Verify that surfactant is constantly being injected into the water stream.
6. If all of the above is confirmed, reset the fire system by pressing the button on the face of the CORE Fire Protection control package.
7. Reset the circuit breaker applying power to the PCU panel.
8. Place the PCU CORE panel in "Armed Mode." The "Fire System Activated" light will begin flashing one brief flash every **3 seconds**, indicating the CORE system is armed and ready.

Start Up Procedure - Final

1. Refill surfactant tank in CORE Fire Protection control package.
2. Verify that the "Fire System Activated" light is flashing one brief flash every 3 seconds, indicating the CORE system is armed and ready.

Reset Procedure - CORE Protection Fire System

1. Fully inspect system to make sure fire is extinguished.
2. If fire is out, Firestat should be cool.
3. Once the Firestat is cool, the CORE system will automatically reset once fire system timer expires after **15 minutes**. Alternatively, the fire system reset button in the control package can be pressed to reset system.
4. Refill surfactant tank in CORE Fire Protection control package.

CORE Protection System Start-up Checklist

Action	Completed (Yes/No)	Result
Main Water line 1-1/2" or Larger, with Strainer Installed		
Main Water Line from Supervised Supply		
"Fire System Activated" light is illuminated. Verify there are no fault lights/messages active.		
Test Firestat System Activation		
Verify Water Pressure (20 psi) min. @ PCU		
Verify Water Pressure (30 psi) min, @ panel gauge		
Verify Max Water Operating Pressure (70 psi)		
Verify Max Water Static Pressure (125 psi)		
Verify Constant Surfactant Injection		
Fire System Activated Light Illuminates		
Audible Alarm Sounds		
Verify CORE Timer Works Correctly		
Verify Reset Button Works Correctly		
System Activates on Battery Backup		
Verify Surfactant Tank is Full		
Verify Exterior Conduit is Liquid Tight		

CORE Protection System Reset Checklist

Action	Completed (Yes/No)	Result
Ensure Fire is Extinguished		
Press The CORE Reset Button		
Verify Surfactant Tank is Full		

Component Description

The following section lists the major controls and components used in the Pollution Control Unit CORE Protection fire system.

Water Manifold

The Pollution Control Unit CORE Fire Protection System package consists of two normally open valves and one normally closed valve. A strainer is to be installed upstream of all solenoid valves. Refer to **Figure 5** and **Table 9** on page 23 for component descriptions and part numbers.

1. All fittings and piping will be brass except for drain components.
2. Length and width of manifold must match measurements listed on this page.
3. All pipe nipples are closed unless otherwise noted.
4. Valves can be rotated for best fit inside cabinet.
5. Optional slow-close solenoid part # SC8221G011-24DC may be used as an alternative.
6. Strainer to be shipped loose, installed in field upstream of solenoids.

Figure 5 - Water Manifold Components

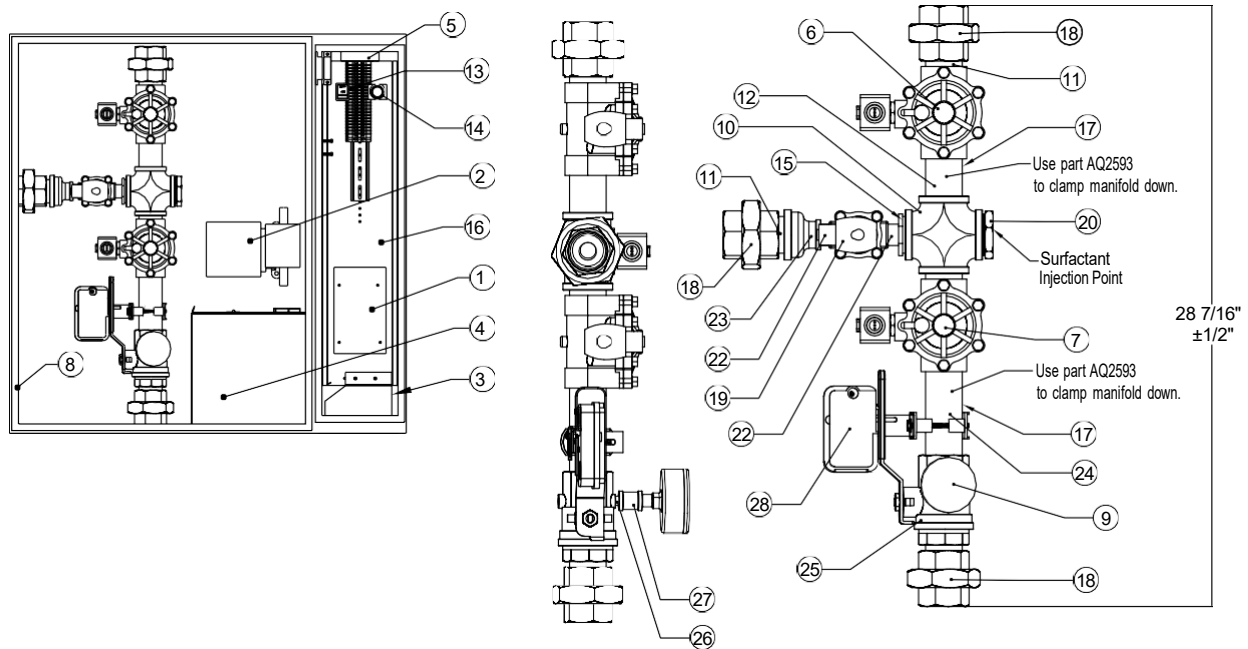


Table 9 - Water Manifold Parts List

Item Number	Quantity	Part Number	Description
1	1	PCBCORE	CORE Board
2	1	50001-572	24V Detergent Pump
3	2	PS-1270-F2	Battery
4	1	WWSC TANK2.0	Detergent Tank
5	1	1606-XPL	24V Power Supply
6	1	SC8210D032	1 1/2" NPT Normally Open Solenoid valve
7	1	SC8210G022	1 1/2" NPT Normally Closed Solenoid Valve
8	1	AQ5005	30" x 30" x 7" Stainless Cabinet
9	1	AQ2516	Temperature and Pressure Gauge
10	1	4429K357	1 1/2" Brass Cross Fitting
11	3	AQ2520	1 1/2" Brass Close Nipple
12	1	AQ2521	1 1/2" Brass 3" Nipple
13	1	RB24GD1100	Test / Arm Switch
14	1	ZB4BA2/ZB4BZ1015	Prime / Reset Push Button
15	1	AQ2573	1 1/2" to 3/4" Brass Bushing
16	1	CCPPECBK	Electrical Back Plate
17	2	AQ2593	1 1/2" Pipe Clamps
18	3	1BR125UJ	1 1/2" Brass Union
19	1	SC8210G035	3/4" NPT Normally Open Solenoid Valve
20	1	AQ2571	1 1/2" x 1/4" Brass Bushing
21	1	AQ2572	1 1/2" to 1/2" Brass Bushing
22	1	29990600	3/4" Brass Close Nipple
23	1	4429K746	1 1/2" to 3/4" Brass Bell Reducer
24	1	4568K266	1 1/2" Brass 4" Nipple
25	1	4085T25	1 1/2" Ball Valve with Gauge Port
26	1	VARIABLES	1/4" Brass Nipple
27	1	4429K111	1/4" Brass Straight Connector
28	1	PL-RVBS	Ball Valve Supervision Switch
Not Shown	1	4417K67	1 1/2" Strainer
Not Shown	4	AQ5012	Lift off Hinges
Not Shown	2	62-40-201-3	Compression Latches
Not Shown	1	WMSC-PCUCORE	Electrical Side Door

All Pipe Nipples Are Close, Unless Otherwise Noted.

Fire Protection System Printed Circuit Board

The CORE Fire System printed circuit board (**Figure 6**) is a microprocessor-based controller that provides all the necessary monitoring, timing, and supervision functions required for the reliable operation of the CORE Protection Fire System.

Under normal conditions, the “Fire System Activated” light is on. This indicates the CORE system is armed and active. If a fault is detected anywhere in the CORE system, the audible alarm will periodically sound, and the “Fire System Activated” light will flash a fault code to indicate the fault that was detected.

NOTE: CORE Boards with software version 1.68 and prior will use one brief flash every 3-seconds to indicate there are no faults in the fire system.

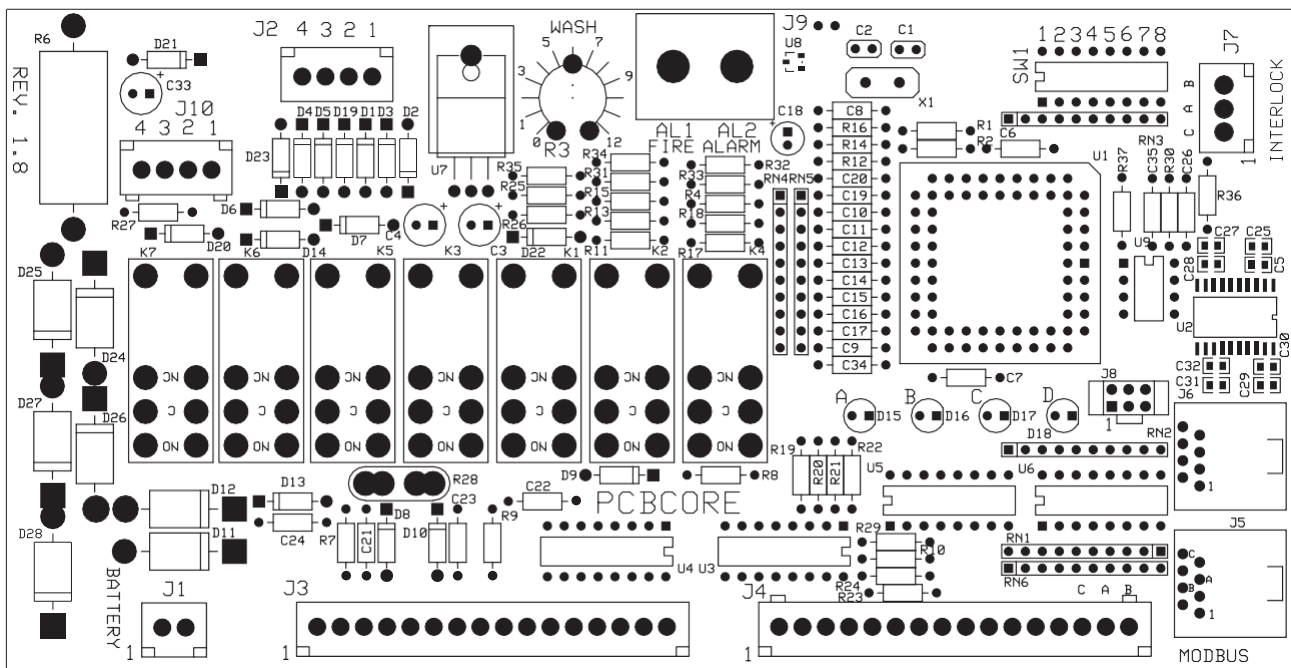
Fault codes consist of a series of flashes followed by a pause. Count the number of flashes between the pauses and refer to **“CORE Board Faults” on page 35**. Any fault is extremely important and must be dealt with and rectified immediately to ensure continued CORE protection.

The connections for building fire panels are located at AL1 and AL2 as dry contacts.

For remote mounted Ansul Automans, use terminals AU1 and AU2. This will provide a dry contact connection point to provide power for activating the Ansul Automan.

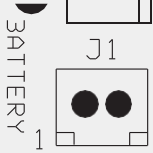
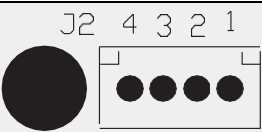
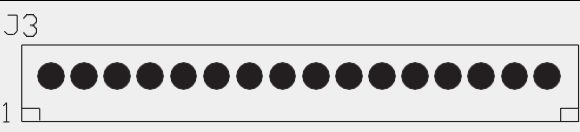
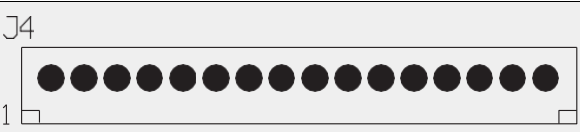
NOTE: When a CORE board is connected to an ECPM03 board, if a fire condition happens, the “Last Fire Info” will be stored on the ECPM03 screen. “Last Fire Info” will be available on CASLINK as well.

Figure 6 - Printed Circuit Board

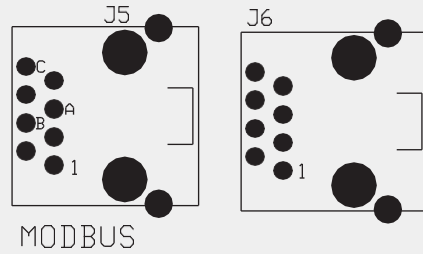


Connector Descriptions

Note: Some connections may not be used dependent on system configurations.

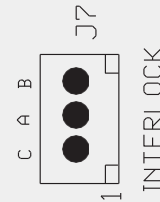
<p>Connector J1 contains battery pack connections for battery charging and monitoring.</p>	
<p>Pin 1 – Battery Positive</p>	<p>Pin 2 – Battery Negative</p>
<p>Connector J2 contains Supervised Sensor Loop connections</p>	
<p>Pin 1 – Start Positive Loop Pin 2 – Start Negative Loop</p>	<p>Pin 3 – Finish Negative Loop Pin 4 – Finish Positive Loop</p>
<p>Connector J3 contains Power Supply and Device connections</p>	
<p>Pin 1 and Pin 2 – Positive Input, Power Supply Pin 3 and Pin 4 – Negative Input, Power Supply Pin 5 – Positive Output, Gas Valve Solenoid Pin 6 – Positive Output, Surfactant Pump Pin 7 – Positive Output, Release Valve Solenoid Pin 8 and Pin 9 – 24V DC Input, Shutoff Valve Supervision</p>	<p>Pin 10 – Positive Output, CORE Appliance Water Valve Solenoid Pin 11 – Drive Output, Fire Relay Pin 12 – Drive Output, 100% Relay Pin 13 – Drive Output, Trouble Relay Pin 14 – Drive Output, Wash Relay Pin 15 – Drive Output, Spare Relay Pin 16 – Drive Output, Auto-Man Relay</p>
<p>Connector J4 contains Power Supply and Device connections</p>	
<p>Pin 1 – Positive Input, Power Supply Pin 2 – Output, Panel Mounted Audible Alarm Pin 3 – Output, Panel Mounted LED Fire/Fault Indicator Pin 4 – Output, Panel Mounted LED Surfactant Low Indicator Pin 5 – Drive Output, Cooking Equipment Disable Relay Pin 6 – Negative Input, Power Supply Pin 7 – Input, Surfactant Level Float Switch</p>	<p>Pin 8 – Input, Pump Prime/Reset Push Button Pin 9 – Input, Test Switch Pin 10 – Input, Fan Switch Pin 11 – Input, Gas Valve Reset Push Button Pin 12 – Input, Door/Tamper Switch Pin 13 – Input, Override Push Button Pin 14 – Modbus Network, Common Signal (C) Pin 15 – Modbus Network, Negative Signal (A) Pin 16 – Modbus Network, Positive Signal (B)</p>

Connector J5 and J6 is for RJ-45 connections



These two connections are for the Modbus Network. This network may be used by non-fire system related equipment to monitor operating conditions of the electrical (PCBCORE) board.

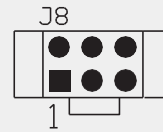
Connector J7 Interlock Network connections



Pin 1 – Interlock Network, Common Signal (C)
Pin 2 – Interlock Network, Negative Signal (A)

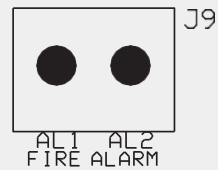
Pin 3 – Interlock Network, Positive Signal (B)

Connector J8 Interlock Network connections



Factory Use Only

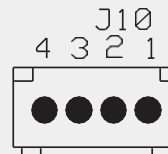
Connector J9 Building Fire Alarm connections for a set of normally open dry contacts. These are provided for signaling a building fire alarm panel if a fire condition is present.



Pin 1 – Dry Contact Closure

Pin 2 – Dry Contact Closure

Connector J10 contains Supervised Sensor Loop connections



Pin 1 – Start Positive Loop
Pin 2 – Start Negative Loop

Pin 3 – Finish Negative Loop
Pin 4 – Finish Positive Loop

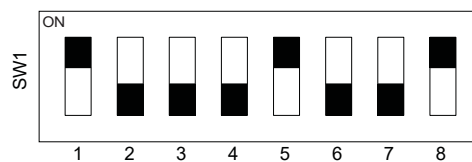
DIP Switch Settings

When set from the factory (**Figure 7**), switches 1, 5, and 8 are in the On (Closed) positions. Switch 2, 3, 4, 6, 7 are in the Off (Open) position. This should be considered the default positions and should not be changed.

Table 10 - DIP Switch Settings

DIP Switch #	Description				
1 through 4	DIP Switch Position				Interlock Network Address
	1	2	3	4	
	On	Off	Off	Off	1
	Off	On	Off	Off	2
	On	On	Off	Off	3
	Off	Off	On	Off	4
	On	Off	On	Off	5
	Off	On	On	Off	6
	On	On	On	Off	7
	Off	Off	Off	On	8
	On	Off	Off	On	9
	Off	On	Off	On	10
	On	On	Off	On	11
	Off	Off	On	On	12
	On	Off	On	On	13
Off	On	On	On	14	
On	On	On	On	15	
Off	Off	Off	Off	This unit is not part of an interlock network	
5	Set this switch to On (Closed) if this unit has the highest address on the interlock network. Otherwise, this switch must be Off (Open)				
6 and 7 Fire Group	6	7		Fire Group Number	
	Off	Off		1	
	On	Off		2	
	Off	Open		3	
On	On		4		
8	Setting switch 8 to its On (Closed) position connects a 120 Ohm terminating resistor to the interlock network. This switch must be On if this unit is at either physical end of the interlock network cable. Otherwise, it must be Off (Open).				

Figure 7 - DIP Switch



- Each unit has a unique address based on the DIP switch 1-4 settings, 15 units max on a network.
- If address is 0 (all switches off), the unit will not accept or send any network traffic.
- The unit that has switch 5 set to on will be the “master” and will be in charge of polling all the units below it and waiting for a reply. The lack of 3 replies in a row will cause an “interlock network supervision fault.” All units will be polled in a burst every 3 seconds.
- For all non-master units, the lack of being polled for 10 seconds will cause an “interlock network supervision fault.”
- Any unit detecting a fire condition will broadcast the notification once every second for as long as the condition persists.
- When the Fire condition is cleared, 10 notifications will be sent, one every second.
- Any unit detecting a supervisory fault will broadcast the notification every 2 seconds until the condition is cleared.
- When the supervisory fault condition is cleared, 10 notifications will be sent, one every 2 seconds.

Typical DIP Switch Arrangement

Only One Fire Protection System Panel on the network:

Core Board #	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	DIP 8
#1 (Hood Master)	On	Off	Off	Off	On	Off	Off	On

Two Fire Protection System (or CORE) Panels on the network:

Core Board #	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	DIP 8
#1 (2nd Hood Slave)	On	Off	Off	Off	Off	Off	Off	On
#2 (Hood Master)	Off	On	Off	Off	On	Off	Off	On

Two Fire Protection System (or CORE) Panels on the network:

Core Board #	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	DIP 8
#1 (PCU Slave)	On	Off	Off	Off	Off	Off	Off	On
#2 (Hood Master)	Off	On	Off	Off	On	Off	Off	On

Three Fire Protection System (or CORE) Panels on the network:

Core Board #	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	DIP 8
#1 (2nd Hood Slave)	On	Off	Off	Off	Off	Off	Off	On
#2 (PCU Slave)	Off	On	Off	Off	Off	Off	Off	Off
#3 (Hood Master)	On	On	Off	Off	On	Off	Off	On

Four Fire Protection System (or CORE) Panels on the network:

Core Board #	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	DIP 7	DIP 8
#1 (2nd Hood Slave)	On	Off	Off	Off	Off	Off	Off	On
#2 (PCU Slave)	Off	On	Off	Off	Off	Off	Off	Off
#3 (2nd PCU Slave)	On	On	Off	Off	Off	Off	Off	Off
#4 (Hood Master)	Off	Off	On	Off	On	Off	Off	On

For additional configurations, refer to **Table 10** for the electrical board (PCBCORE) DIP switch settings.

The configurations above are shown with all electrical boards (PCBCORE) in the same Fire Group and may be configured differently, even if the control panels are on the same network. Every panel with matching fire group settings (DIP switches 6 and 7) will activate simultaneously in a fire condition.

Fire Protection System Firestat

A Firestat is a device that measures temperature, the standard temperature setting is 360°F. Firestats are installed on the PCU CORE modules (**Figure 8**), and may be found installed in the riser of the hood or duct.

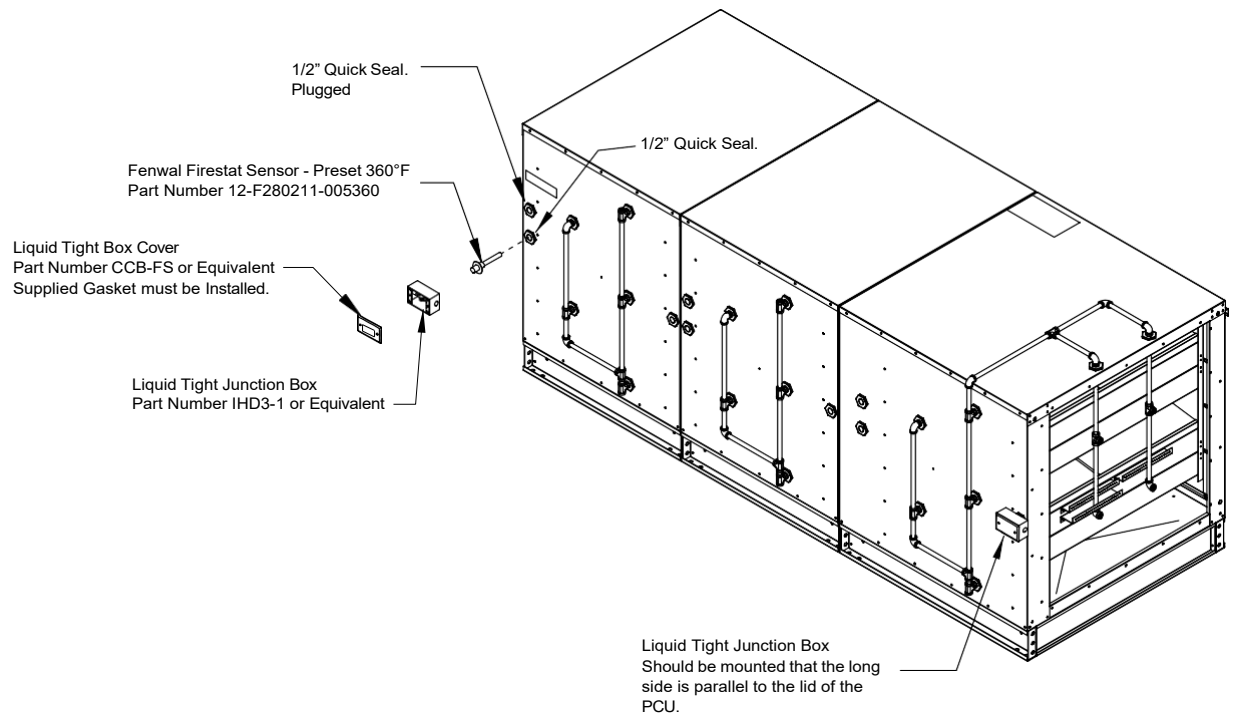
Depending on heat produced by an appliance, a higher rated temperature Firestat will be required. If a temperature higher than the setpoint is sensed, the Firestat contacts (**Figure 27 on page 44**) will close and energize the electrical control board. The fire system will activate, the system will run for a minimum of 15 minutes and then recheck the temperature. If the temperature is still higher than the setpoint, the process restarts immediately.

The Firestat has 2 black wires and 2 white wires. These wires must be connected to the supervised loop. Use high-temperature wiring when installing Firestat components. Wago connectors (part number: 221-412) must be used.

Multiple sensors are wired in parallel in the supervised loop. The Firestat may be installed on the opposite side of the quick seal for access in the duct.

NOTE: When additional Firestats are required, install in an accessible location near an access door, hood riser, or fan. The door will provide access to install, clean, and replace the Firestat when needed. If a PCU is equipped with electronic detection, PCU Firestats can serve as downstream detectors, if present. The temperature rating of the Firestat in the duct must always match the temperature rating of the Firestat in the riser.

Figure 8 - PCU Core Firestat Details



Supervised Loop Electrical Details

NOTE: Place the panel in test mode when checking the supervised loop circuit.

Before checking the supervised loop circuit (**Figure 9**), verify all CORE power supplies (PS-02) are set to 27.5V +/- 0.1V DC. Check all supervised loop connections. Verify wiring is properly connected and secure. If any of the readings in **Table 11** are out of range or other faults are present, there is an issue with that loop or associated components/wiring. Refer to **page 37** for troubleshooting.

Figure 9 - Wiring for Supervised Loop

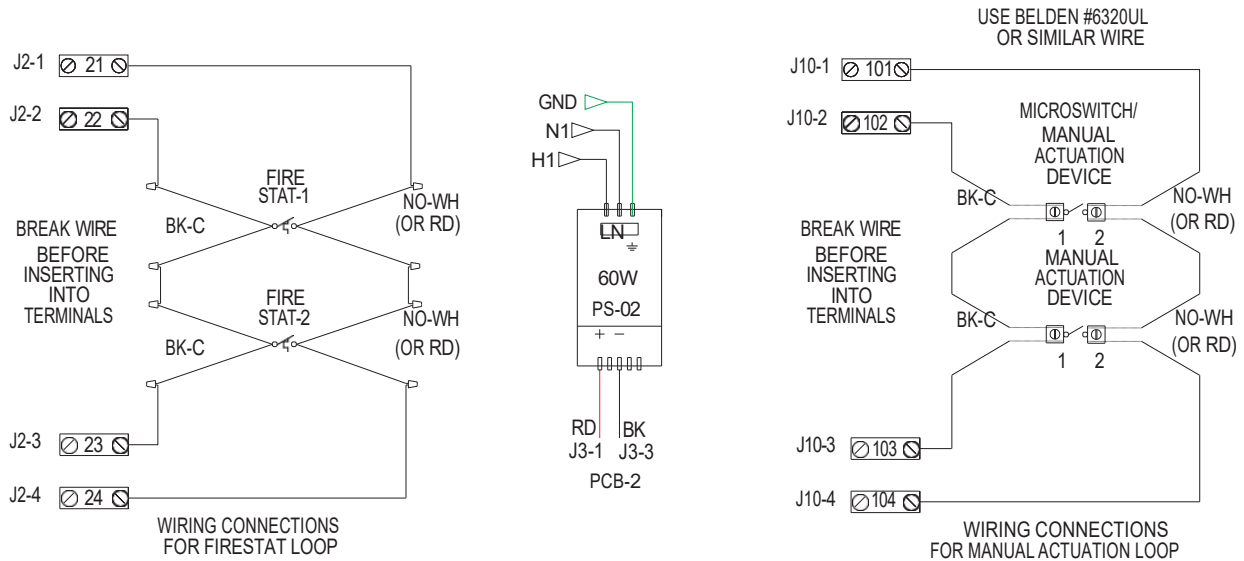


Table 11 - Supervised Loop Circuit Readings

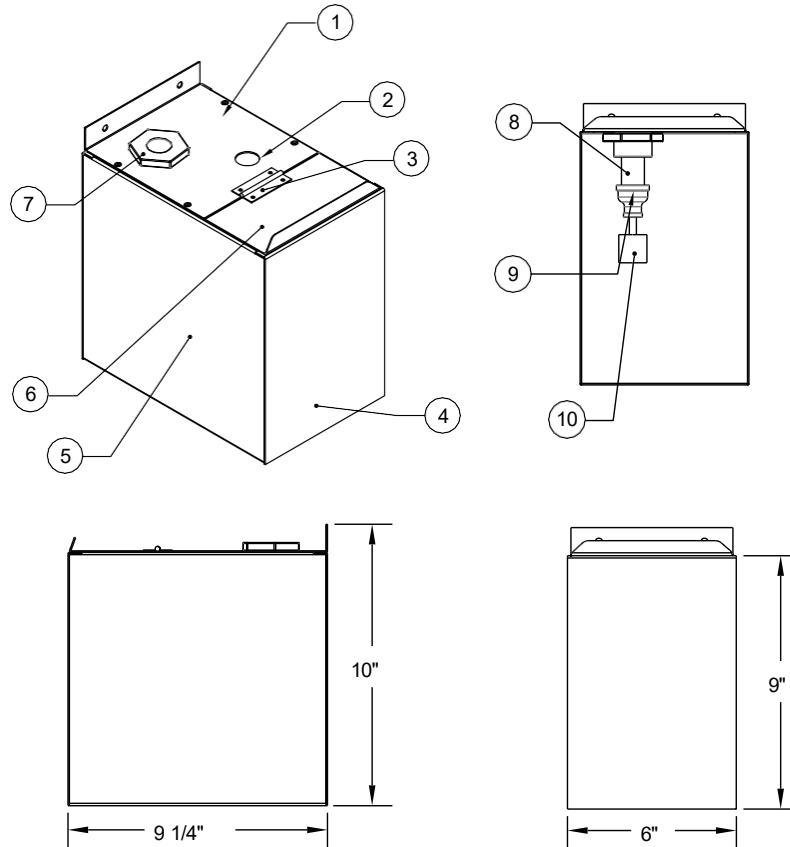
Component Check	Procedure: Check for continuity between terminals. Place the breaker off. Disconnect the batteries at connector J1	Expected Readings
Firestat(s)	Terminals 21 and 24; Terminals 22 and 23	Continuity
	Terminals 21 and 22; Terminals 21 and 23 Terminals 24 and 23; Terminals 24 and 22	No Continuity
Manual Activation Device (MAD)	Terminals 101 and 104; 102 and 103	Continuity
	Terminals 101 and 102; Terminals 101 and 103 Terminals 104 and 103; Terminals 104 and 102	No Continuity
Component Check	Procedure: Measure voltage between terminals. Place the breaker on. Reconnect the batteries at connector J1	Expected Readings
Power Supply	PS-02 (DC+) and PS-02 (DC-)	27.5 +/- 0.1V DC
Firestat(s)	PS-02 (DC-) and Terminal 21; PS-02 (DC-) and Terminal 24 Terminal 21 and Terminal 22; Terminal 23 and Terminal 24	26.5 +/- 0.2V DC
	PS-02 (DC-) and Terminal 22; PS-02 (DC-) and Terminal 23	0 +/- 0.2V DC
	Terminal 24 and Chassis Ground	1.8 +/- 0.2V DC
Manual Activation Device (MAD)	PS-02 (DC-) and Terminal 101; PS-02 (DC-) and Terminal 104 Terminal 101 and Terminal 102; Terminal 103 and Terminal 104	26.5 +/- 0.2V DC
	PS-02 (DC-) and Terminal 102; PS-02 (DC-) and Terminal 103	0 +/- 0.2V DC
	Terminal 104 and Chassis Ground	1.8 +/- 0.2V DC

Surfactant Tank

The CORE Protection Fire System utilizes a two-gallon surfactant tank (**Figure 10**). For this package, the low-level control is located at the 1-gallon mark. In the event of a fire, surfactant is continuously injected into the water spray to help suppress the fire. One gallon of surfactant will last for approximately 15 minutes of fire protection. In the event that the low-level sensor is activated, an “Add Surfactant” light will illuminate on the control panel. To reset light, simply fill the surfactant tank with surfactant. To order surfactant, refer to “**MAINTENANCE**” on page 38.

NOTE: SC-5 surfactant from 20/10 Products Incorporated must be used. Lift the front lid to fill the tank, fill to top.

Figure 10 - Surfactant Tank Details



Callout	Description	Part Number
1	Rear Lid	WWSTRLID
2	7/8" Grommet	N/A
3	Spring Hinge	531944-0104
4	Tank Side	WWSTSIDE
5	Tank Body	WWSTBODY
6	Front Lid	WWSTFLID
7	1/2" Quick Seal	32-00002
8	2" x 1/2" Brass Nipple	4568K173
9	1/2" to 1/8" Reducing Coupling	4429K733
10	Level Switch	AQ5510

Battery Backup

Important!

The battery backup system requires that the batteries be changed every 2 years, from the date of fire system commissioning, maximum. Failure to do this will result in a void in product reliability and may cause severe damage to facility due to loss of fire protection.

The fire protection system contains a battery backup. During a power loss, the “Fire System Activated” light will flash 11 times between pauses indicating the power loss.

The batteries must be replaced every 2 years, from the date of fire system commissioning. Part number PS-1270-F2, two are required. Although the batteries are hot-swappable, which means they can be replaced while there is input power to the control, **for your safety, all sources of power must be removed from the control before replacing the batteries.** To replace the batteries, unplug the battery cable from the J1 connector on the electrical board (PCBCORE). Then remove the retaining strap holding the batteries in place. Remove the batteries from the cabinet. Transfer the fuse and cable set from the old batteries to the new batteries being extremely careful to observe the RED and BLACK lead and terminal colors. Reinstall the batteries in the cabinet and reconnect the battery plug to J1. The batteries are lead-acid type and are recyclable; **please dispose of the old batteries properly.**

During extended periods of inactivity where the fire protection system will be without AC power for more than 2 days, such as a shutdown or natural disaster, it is best to decommission the fire system by disconnecting the batteries. This will prevent any damage to the batteries through complete discharge. When the system becomes active again, commission the system by reconnecting the batteries and allow the batteries to charge for 48 hours.

The fire protection system is supplied with 14-amp hours of backup battery capacity. Per NFPA 72 10.5.6.3, the system requires 1.66 amp hours of battery capacity.

Power Supply Adjustment

To properly charge the batteries, the power supply must be adjusted to output 27.5V DC. This can be checked with an accurate digital voltmeter placed across Terminals H1D and N1D. To adjust the output voltage, place a small flat-bladed screwdriver into the yellow dial. Turn the dial clockwise, this will increase the voltage.

Figure 11 - Battery Backup

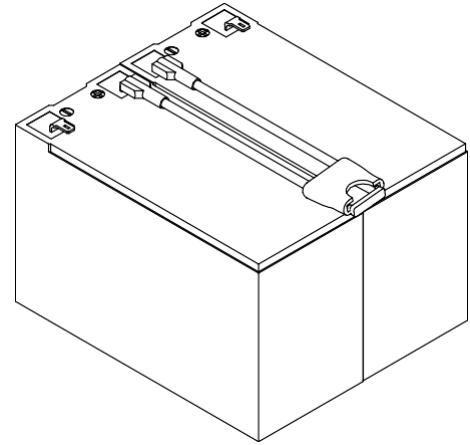
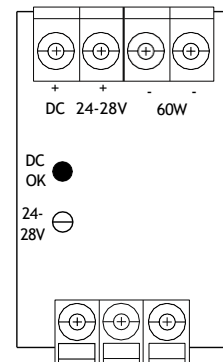


Figure 12 - Power Supply

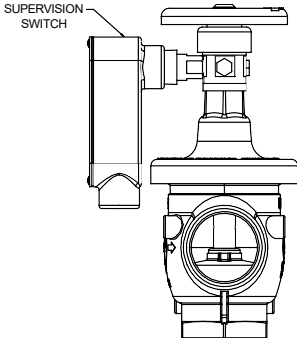


CORE Protection Waterline Supervision

The CORE Total Flood manifold is listed for use with water pressures up to and including 70 psi (operating pressure) and 125 psi (static pressure). When the inlet connection to the manifold exceeds the max listed pressures, a pressure reducing valve must be installed (**Figure 13**). The valve is capable of reducing the wet pipe sprinkler line supply pressure and flow rate down to the CORE control package requirements. The valve is capable of shutting down the water flow, therefore it must be monitored to ensure the valve is open. The pressure reducing valve is an Elkhart Brass UR series and includes a supervision switch. The valve is available in 1-1/2" NPT (UR-30-Series) and in 2-1/2" NPT (URFA-Series). Refer to **Table 12** for pressure reducing valve ratings.

The optional Pressure Supervision Switch (PL-PS402), is used to verify incoming water pressure. This switch is preset at 40 psi, but is adjustable up to 60 psi, to account for different hood system lengths.

Figure 13 - Pressure Valve



UR Valve	Outlet Pressure Pct (%)	Max Pressure (PSI)	Supervision Switch
UR-30-XN	31%	300	98409211
UR-30-ZN	54%		
URFA-20-S	Variable	400	98409011

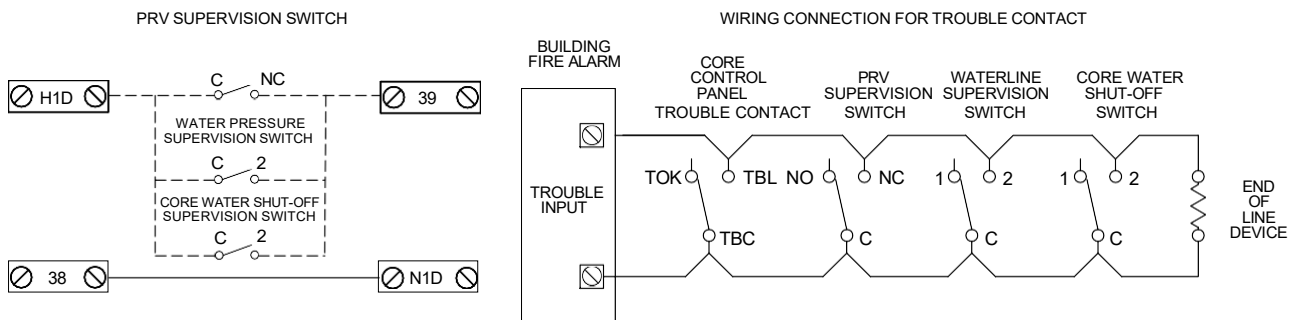
Table 12 - Pressure Valve Specifications

Valve Type	Incoming Pressure (psi)												
	50	60	70	80	90	100	110	120	130	140	150	160	170
UR-30-XN (Outlet Pressure psi)	15.5	18.6	21.7	24.8	27.9	31	34.1	37.2	40.3	43.4	46.5	49.6	52.7
UR-30-ZN (Outlet Pressure psi)	27	32.4	37.8	43.2	48.6	54	59.4	64.8	70.2	75.6	81	86.4	91.8
URFA-20-S (Outlet Pressure psi)	Variable												

The CORE panel contains two isolated inputs for auxiliary supervision of pressure reducing valves and pressure switches. The supervision switch that comes with the UR valves has one single-pole, single-throw switch with a pair of redundant wires. The optional pressure supervision switch has two single-pole, double-throw switches. Either switch may be wired in parallel to the CORE panel terminals H1D and 39. When a fault is detected, the CORE board will shut down the gas valve and shunt trip, trigger a local trouble signal, and alert all attached CORE packages.

Alternatively, the switches from each device could be connected to the trouble input of the building fire alarm panel to indicate a trouble condition. Refer to **Figure 14** for connections.

Figure 14 - CORE Control Connections



TROUBLESHOOTING

Table 13 lists out causes and corrective actions for possible problems with the system. Review this list prior to consulting the manufacturer.

Table 13 - Fire Protection System Troubleshooting

Problem	Potential Cause	Corrective Action
Exhaust Fan is On and Supply Fan will not Start	Broken supply fan belt	Replace fan belt.
	Fire system not armed	Fire system distributor must arm fire system.
Fire System Activated Light On	Fire system is activated	Verify fire is out and reset fire system.
Audible Alarm is On	Fire system is activated	Verify fire is out and reset fire system.
A fault code is flashing on the "Fire System Activated" light	A fault has been detected in the Fire Protection System	Count the flashes and refer to "Appliance Shutdown in Fault Conditions" on page 36.
Gas Valve does not Close	Debris on gas valve seal	Fully clean gas valve and strainer.
Fire System will not Turn Off	Duct sensor is hot	Heat has activated the duct sensor. Remove heat source or let the system extinguish the fire. Once heat source or problem is resolved, press reset button on the face of the electrical control package.
	Remote Manual Actuation Device has been pushed	Reset remote push station once fire is out and press reset button on the face of the electrical control package. Reset remote push station by twisting clockwise until reset.
	Fire system is running on a timer	Make sure the duct sensor is cool and push station is reset, then press reset button on the face of the electrical control package.
Add Surfactant Light is On	Surfactant level is low	Add surfactant.

CORE Board Faults

When there are no faults in the fire system, Lamp B will stay solid (An LED indicator is also on the control package). When a fault exists, the LED will flash with a short break. Count the flashes then wait for a short break to determine the fault. For packages with HMIs, refer to the fault displayed on the screen. For fault operation in shut down, refer to **“Appliance Shutdown in Fault Conditions” on page 36.**

NOTE: CORE Boards with software versions 1.68 and prior will use one brief flash every 3-seconds to indicate there is no fault.

Test Mode allows the system to be tested with operational appliances without discharging the system. If the system is left in test mode for 15 minutes, the gas valve will be locked out until test mode is deactivated.

Flashes	Fault Condition	Corrective Action
Catastrophic Faults		
1	Invalid Activation*	Check for external voltage being applied at J3-7 and J3-10.
2	Solenoid*	Check solenoid and wiring to solenoid, replace as needed.
3	*	Check and wiring to , replace as needed.
4		
5	Microcontroller Fault*	Replace CORE printed circuit board.
Critical Faults		
6		
7	Supervised Loop Fault*	Check the installation of the wiring to all the manual actuation devices (push stations) and firestats. Verify connections are secure and tight. Check for open/short circuits in the wiring. Repair or replace wiring as needed.
Important Faults		
8	Ground Fault	Check the installation of the wiring to all the manual actuation devices (push stations) and firestats. Verify connections are secure and tight. Check for open/short circuits in the wiring. Repair or replace wiring as needed.
9		
10	Battery Voltage Low	The voltage is below the battery threshold. Wait for batteries to recharge if there was a power failure. Replace if the batteries will not hold a charge.
11	AC Power Failure*	The voltage is below the power supply (PS-02) threshold; approximately 27.18V DC. Check breakers, call power company.
12	Door Tamper Switch	Close cabinet door.
13	Test Mode*	Place switch in armed position when testing is complete.
14	CORE Interlock	Check Dip Switches on all boards and RS-485 network wires connecting boards.
15	Fault on Hood in Network	Check all hoods in CORE network for faults.
16	Fault on PCU in Network	Check all PCUs in CORE network for faults.

NOTE:

Faults marked with (*) will shut down Gas/Shunt. During an AC power failure or loss of building power, all 120V AC gas valves/electrical appliances will shut down immediately. For 24V DC gas valves, the valve will stay powered for a few minutes depending on battery voltage (when both an AC Power Failure and Battery Voltage Low fault are present, the valve will shut down).

Appliance Shutdown in Fault Conditions

The system is equipped to shut down the appliances if a fault condition is present. **Table 14** displays fault conditions that affect the appliances' fuel and power sources, alarm muting, and local trouble relay.

NOTE: CORE Boards with software version 1.68 and prior will use one brief flash every 3-seconds to indicate there are no faults in the fire system.

Table 14 - Appliance Fault Conditions

Number of Flashes	Fault Condition	Gas Valve Shutdown		Shutdown Shunt Trip Breaker and UDS Kill Switch		Mute Local Alarm 4 Hour Reset	Local Trouble Relay
		Local System	Networked System	Local System	Networked System		
Catastrophic Faults							
1	Invalid Activation*	X	X	X	X		X
2	CORE Water Solenoid*	X	X	X	X		X
3	Drain Solenoid	X	X	X	X		X
4							
5	Microcontroller Fault*	X	X	X	X		
Critical Faults							
6	CORE Surfactant Pump					X	X
7	Supervised Loop Fault	X	X	X	X		X
Important Faults							
8	Ground Fault					X	
9	Surfactant Low					X	
10	Battery Voltage Low					X	X
11	AC Power Failure*	X	X	X	X		X
12	Door Tamper Switch					X	
13	Test Mode*	X	X	X	X		
14	CORE Interlock					X	
15	Fault on Hood in Network					X	
16	Fault on PCU in Network					X	

NOTE:

Faults marked with (*) will shut down Gas/Shunt. During an AC power failure or loss of building power, all 120V AC gas valves/electrical appliances will shut down immediately. For 24V DC gas valves, the valve will stay powered for a few minutes depending on battery voltage (when both an AC Power Failure and Battery Voltage Low fault are present, the valve will shut down).

Local Alarm Muting

Pressing the fire system reset button can mute the local alarm. This will disable the sounder for 4 hours under specific conditions. **Table 14** shows which faults can be muted. It should be noted that the fault will not clear until the fault condition is corrected.

Test Mode

Test Mode allows the system to be tested with operational appliances without discharging the system on the appliances. Once the appliances are started, test mode can be entered without the appliances shutting down for 15 minutes. However, once the fire system is activated, the shunt trip (electric appliances) and the gas valve will be locked out until test mode is deactivated.

Supervised Loop/Power Supply Troubleshooting

NOTE: Place the panel in test mode during diagnostic testing.

Before troubleshooting, verify all power supplies (PS-02) are set to 27.5V DC. Verify all circuit checks from “**Supervised Loop Electrical Details**” on page 30. If any readings are not in range, there is an issue with that loop or associated components/wiring. Refer to **Table 15** for troubleshooting.

Table 15 - Common Wiring Troubleshooting Chart

Problem	Potential Cause	Expected Results +/- 0.2	Corrective Action
Supervised Loop Fault	Open Supervised Loop between Terminals 21 and 24.	<ul style="list-style-type: none"> Terminal 21 to PS-02 (DC-) = 26.5V DC Terminal 21 to Terminal 22 = 26.5V DC Terminal 24 to PS-02 (DC-) = 26.5V DC Terminal 24 to Ground = 1.8V DC 	Locate and repair faulty wiring in the 21-24 supervised loop.
	Open Supervised Loop between Terminals 22 and 23.	<ul style="list-style-type: none"> Terminal 22 to PS-02 (DC-) = 0V DC Terminal 23 to PS-02 (DC-) = 0V DC Terminal 23 to Terminal 24 = 26.5V DC 	Locate and repair faulty wiring in the 22-23 supervised loop.
	Open Supervised Loop Push-Station (Terminals 101 and 104)	<ul style="list-style-type: none"> Terminal 101 to PS-02 (DC-) = 26.5V DC Terminal 101 to Terminal 102 = 26.5V DC Terminal 104 to PS-02 (DC-) = 26.5V DC Terminal 104 to Ground = 1.8V DC 	Locate and repair faulty wiring in the 101-104 supervised loop.
	Open Supervised Loop Push-Station (Terminals 102 and 103)	<ul style="list-style-type: none"> Terminal 102 to PS-02 (DC-) = 0V DC Terminal 103 to PS-02 (DC-) = 0V DC Terminal 103 to Terminal 104 = 26.5V DC 	Locate and repair faulty wiring in the 102-103 supervised loop.
Ground Fault	Terminals 22 or 23 are shorted to chassis ground. *24V DC PS-02 (DC-) Wiring or Components.	Chassis Ground to PS-02 (DC-) = 24.4V DC	Locate and repair shorted wiring between 22-23 supervised loop and ground.
	Terminals 21 or 24 are shorted to chassis ground. **24V DC PS-02 (DC+) Wiring or Components.	Chassis Ground to PS-02 (DC+) = 2.7V DC	Locate and repair shorted wiring between 21-24 supervised loop and ground.
	Interlock Network Issue	Check battery voltage and supervised loop wiring with other packages that are interlocked in the network.	Locate and repair faulty wiring in the circuit. Replace batteries.
AC Power Failure	120V AC Input Power Supply Interrupted.	H1 to N1 = 110V to 125V AC	Verify constant input power between H1 and N1. Check wiring to L/N terminals on PS-02. Locate and repair faulty wiring in the circuit.
Battery Voltage Low	Faulty Battery or Power Supply (PS-02).	J1-1 to J1-2 = 23.5V to 24.5V DC	Verify there is 12V DC to each battery connection. Locate and repair faulty wiring in the circuit. Replace batteries.
	Interlock Network Issue.	Check battery voltage and supervised loop wiring with other packages that are interlocked in the network.	Locate and repair faulty wiring in the circuit. Replace batteries.

*** Components that may cause this fault are: Gas Valve, Surfactant Pump, Water Solenoid(s), Release Solenoid(s).**

**** Components that may cause this fault are: 24V Relays, Trouble Relay (when energized), 24V LED Lights.**

NOTE: If an abnormal reading is present, disconnect potential components/wiring one at a time, while continuing to take readings, to locate the source of the ground fault.

MAINTENANCE

To guarantee trouble-free operation of this system, the manufacturer suggests following these guidelines. Most problems associated with unit failures are directly related to poor service and maintenance. Record any maintenance or service performed on this equipment in the documentation section located at the end of this manual.

General Maintenance

1. Hood filters must be maintained on a daily basis to ensure proper airflow and grease extraction. **Refer to the Hood Installation, Operation, and Maintenance Manual.**
2. For Pollution Control Units (PCUs), the modules must be maintained per the Maintenance requirements stated in the **Pollution Control Unit (PCU) Installation, Operation, and Maintenance Manual.**
3. All water connections must be verified for tightness and leak-free operation.
4. The “Add Surfactant” indicating light will illuminate when the surfactant tank is 1/2 empty. Surfactant must be added immediately to guarantee proper cleaning of the hood duct and plenum and proper fire protection.

To order Surfactant,
Scan the QR Code:



To order Batteries,
Scan the QR Code:



ATTENTION: When servicing or cleaning ductwork, all Hood CORE, PCU CORE, and interlocked fire systems must be placed in test mode to prevent accidental discharge.

Every 6 months

1. Clean all duct sensors in hood duct connections (if equipped), inspect the hood duct and plenum areas for excess buildup of grease/creosote.
2. Clean all duct sensors in Pollution Control Units (if equipped), inspect the modules, duct, and exhaust fan for excess buildup of grease/creosote.
3. The mainline strainers in the manifold must be cleaned.
4. Verify proper system activation via the supervised loops. This includes all firestats, push stations, and any other activation points in the supervised loop.
5. Verify the battery backup is operating properly.
6. Check all nozzles for proper and evenly distributed water flow. If nozzles are clogged, clean or replace.
7. Check drain(s) on hood to verify there is no blockage. Improper drainage could cause hood leaks or water to back up into trough and overflow onto appliances.
8. Check the PCU drain pan to verify there is no blockage. Improper drainage could cause hood/PCU leaks or water to back up into trough and overflow onto appliances.
9. Inspect the surfactant pump and surfactant for proper operation and ensure liquid level sensor in the surfactant tank is operational. Test by manually lowering the sensor to verify if the “Add Surfactant” light illuminates.
10. Verify the system has proper water pressure and temperature per the labels on the unit.
11. Check gas valve (if applicable) operation to ensure the gas valve fully closes during system activation. Also, clean the strainer upstream of gas valve.
12. Fill surfactant tank with surfactant.

Every 2 Years

1. Replace batteries for the CORE Protection Systems. The replacement battery part number is PS-1270-F2; two are required. Once the battery is disconnected, the connected equipment is not protected from power outages. The new battery must be installed immediately. Refer to the replacement battery installation guide for more details.
2. Inspect the condition of all wires and plumbing. Plumbing should be free of corrosion, and wire insulation must be in good condition.

Decommissioning

If it should become necessary to disconnect the CORE system from AC power for an extended period of time (more than 2 days), the batteries should be disconnected to prevent them from being damaged due to complete discharge.

After A Fire

1. Inspect and/or Replace all nozzles.
2. Inspect all piping connections for tightness.
3. Inspect all hood lights for proper seals and security.
4. Inspect all wiring and Hood insulation to ensure all are in good condition.

