application.

This MSDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

SECTION 16: OTHER INFORMATION

NFPA Hazard Classification
Health: 3 **Flammability:** 0 **Reactivity:** 1 **Special Hazards:** None

National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on the inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.

HMIS Hazard Classification
Health: 0 **Flammability:** 0 **Reactivity:** 1 **Protection:** X - See PPE section.

Hazardous Material Identification System (HMIS(r)) hazard ratings are designed to inform employees of chemical hazards in the workplace. These ratings are based on the inherent properties of the material under expected conditions of normal use and are not intended for use in emergency situations. HMIS(r) ratings are to be used with a fully implemented HMIS(r) program. HMIS(r) is a registered mark of the National Paint and Coatings Association (NPCA).

Revision Changes:
Section 1: Product use information was modified.
Copyright was modified.
Section 14: ID Number(s) was modified.

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Material Safety Data Sheet

NOTES:

3M™ NOVEC™ 1230 FIRE PROTECTION FLUID

General Information

3M™ Novec™ 1230 Fire Protection Fluid has been developed as an alternative to Halon 1301, production of which has ceased at the end of 1993, under the agreed adjustments made to the Montreal Protocol in Nov. 1992.

Novec 1230 contains no Bromine or Chlorine and has no ozone depleting potential.

Novec 1230 systems utilize one or more storage containers arranged to provide the protected area with a pre-determined quantity of agent.

Novec 1230 storage container are designed to hold Novec 1230 in liquid form. Nitrogen is used to super-pressurize the container to 360 psi (24.8 bar) at 70 °F (21 °C).

Handling and installation of Novec 1230 equipment should only be conducted by persons trained in dealing with this type of equipment.

Under normal conditions Novec 1230 is a colorless and low odor fluid with a density around 11 times greater than air. It has negligible vapor pressure and is super-pressurized with nitrogen to 360 psi (24.8 bar) when used in fire suppression applications.

It contains no particulates or oily residues and is produced under ISO 9001 guidelines to strict manufacturing specifications ensuring product purity.

Present understanding of Novec 1230 is that fire suppression is through heat absorption and chemical means.

Novec 1230 decomposes at temperatures in excess of 932 °F (500°C) and it is therefore important to avoid applications involving hazards where continuously hot surfaces are involved. Upon exposure to the flame, Novec 1230 will decompose to form halogen acids. Their presence will be readily detected by a sharp, pungent odor before maximum hazardous exposure levels are reached.

Storage and Handling Recommendations

The unique properties of Novec 1230 fluid necessitate the user to follow certain handling and storage guidelines. Failure to follow these recommendations may result in contamination of the agent and potential failure of the system in which it is used. Contact with water or solvents either polar or hydrocarbon could render Novec 1230 fluid ineffective. Novec 1230 fluid should not be mixed with other extinguishing agents (liquid, powder, or foam) without consulting ANSUL to determine compatibility.

Novec 1230 fluid should be stored indoors, out of direct sunlight at temperatures below 104 °F (40 °C). If container must be stored outdoors, confirm that all openings are fully closed. Protect container from direct sunlight and precipitation to every extent possible, and fully dry the exterior of the container prior to opening.

Based on the results of accelerated aging studies, Novec 1230 fluid is expected to have a shelf life and perform as a clean agent for at least 30 years in a properly designed, maintained, and operating fire suppression system, provided the agent has been stored and handled in accordance with the information provided in this manual.

Novec 1230 fluid is a liquid at room temperature allowing it to be transferred using conventional pumping or gravity transfer through a closed system. Novec 1230 fluid has a viscosity similar to water. Consequently, it can be transferred using any pump that would be used to transport a low viscosity, nonflammable liquid. A gravity feed method may also be used to fill the system tanks, in lieu of pumping. If using a pump, it is recommended that an inline filter (equal to or less than 20 microns) be used when filling container.

Standards used by the fire protection industry typically specify that clean agents meet certain standards of quality. In order to maintain the low water content of the original Novec 1230 fluid, procedures must be used to prevent the entry of moist, ambient air into the storage containers. When transferring fluid, the receiving containers should be free of water and purged with dry nitrogen prior to filling with Novec 1230 fluid to remove moisture-laden air. The end of the fluid dispensing pipe must extend into the receiving container. The dispensing container should be fitted with a vent drier or nitrogen purge to prevent the influx of moist air as Novec 1230 fluid is withdrawn. Vent driers employing disposable or refillable desiccant cartridges are available from vendors such as W.A. Hammond Drierite Co. Ltd. Alternatively, a nitrogen purge can be set up by installing a "tee" onto the vent bung of the dispensing container and establishing flow of dry nitrogen at a volumetric flow rate that is in excess of the rate of withdrawal of Novec 1230 fluid from the container.

Good industrial hygiene practices should be followed when handling Novec 1230 fluid. Novec 1230 fluid must be used in a well-ventilated area. Provide local exhaust ventilation at transfer points. If adequate ventilation cannot be accomplished to maintain air concentrations below the recommended exposure guideline, use respiratory protection. The use of vented goggles for eye protection is required when handling Novec 1230 fluid. Always wear gloves when handling Novec 1230 fluid. Gloves made from butyl rubber are recommended. For more specific information regarding the use of Novec 1230 fluid, refer to the Material Safety Data Sheet.

Disposal Recommendations

Novec 1230 fluid may be disposed using an approved industrial or commercial incinerator. Since Novec 1230 fluid is nonflammable, it must be burned in the presence of a combustible material. Refer to the Material Safety Data Sheet, Section II, for additional details.

General Information

3M™ NOVEC™ 1230 FIRE PROTECTION FLUID (Continued)

Health and Safety

A proper designed and installed suppression system should not present any significant health or safety problems. However, there are basic precautions to be taken to avoid accidents, and aspects of the system operation that should be understood.

Reference should be made to NFPA 2001 for the toxic and asphyxiating hazards of clean agent replacement.

Novec 1230 agent has acceptable toxicity for use in occupied spaces when used as specified in the United States Environmental Protection Agency (EPA) proposed Significant New Alternative Policy (SNAP) program rules and NFPA 2001, "Clean Agent Fire Extinguishing Systems."

Novec 1230 fluid extinguishes fires via its cooling effect, not by displacement of oxygen as is the extinguishment mechanism of CO_2, thus providing the ability to utilize Novec 1230 fluid in occupied areas.

Therefore, exposure to Novec 1230 at the design concentration of up to 10.0% is not a hazard to health. Exposure to higher concentrations is permissible for limited periods. Refer to NFPA 2001 for exposure requirements. As with halons, the EPA and the National Fire Protection Association (NFPA) recommend that unnecessary exposure to any agent be avoided and that personnel evacuate protected areas as quickly as possible to avoid the decomposition products of the fire.

Novec 1230 can decompose at high temperatures to form acids. If so, their presence is readily detected as a sharp, pungent odor long before hazardous maximum exposure levels are reached.

The noise created by the Novec 1230 agent discharging can be loud enough to startle people in the vicinity, but is unlikely to cause any permanent injury. Turbulence caused by the high velocity discharge can dislodge substantial objects directly in its path, and cause general turbulence within the protected area to move paper and light objects.

Direct contact with the vaporizing liquid discharged from a Novec 1230 nozzle has a chilling effect on objects and in extreme cases can cause frostbite to the skin. The liquid phase vaporizes rapidly when mixed with air and therefore limits the risk to the immediate vicinity of the nozzle. Reduction in visibility will occur due to the condensation of water vapor.

⚠ CAUTION

The discharge of clean agent systems to extinguish a fire can result in a potential hazard to personnel from the natural form of the clean agent or from the products of combustion that result from exposure of the agent to the fire or hot surfaces. Unnecessary exposure of personnel either to the products of decomposition shall be avoided.

DESCRIPTION OF SAPPHIRE SYSTEMS

SAPPHIRE systems are designed to suppress fires in Class A, B, and C hazards.

Novec 1230 suppress fires by a combination of physical and chemical means. It does not significantly deplete the oxygen content in the room.

A system comprises one or more containers connected to a system of piping and nozzles. Novec 1230 is liquid under pressure and is stored in steel containers, each of which is fitted with a valve specially designed to allow the contents of the container to discharge within 10 seconds. When the valve opens, Novec 1230 flows into the distribution piping to the discharge nozzles where it is rapidly dispersed as a vapor.

Discharged Novec 1230 gives the appearance of a fog which may reduce visibility. This normally clears rapidly and should not obstruct the ability of personnel to safely exit the protected area.

SAPPHIRE Engineered Fire Suppression Systems are particularly valuable in extinguishing fires in enclosures containing hazards or equipment where a clean, electrically non-conductive medium is essential or where the cleaning up of foam, water or dry chemical would be a problem.

APPROVALS

The SAPPHIRE Fire Suppression System has been tested and listed by Underwriters Laboratories, Inc. (EX-4510) and Underwriters Laboratories of Canada (CEX1151) as well as Factory Mutual (FM) as an engineered system for Class A, B, and C fire suppression, at temperatures between 32 °F to 130 °F (0 °C to 55 °C).

General Information

TYPE OF SYSTEM

Total flooding is the approved type of system available. A total flooding system normally consists of a fixed supply of Novec 1230 agent connected to piping with nozzles to direct the agent into an enclosed hazard space. In a total flooding system, the enclosure around the hazard must be tight enough to hold the required percentage of Novec 1230 agent concentration for a period of time to extinguish the fire.

TYPES OF ACTUATION

There are three basic types of actuation for the SAPPHIRE systems: pneumatic, mechanical, and electric.

Electrical

Automatic electric actuation of the cylinder valve, through an approved control panel, can be accomplished by using an electric actuator. The actuator is energized by an electric signal from the detection/control panel. When using the electric actuator, a mechanical actuating device can be attached as a secondary means of actuation. When using electric actuation, a means of manual release must also be provided.

Mechanical

Mechanical actuation is accomplished by means of a local manual actuator mounted on top of the tank valve or on top of the electric actuator. The tank is actuated by removing the safety pin on the actuator and depressing the strike knob. The pin in the actuator opens the tank valve, allowing the tank to discharge the agent.

Pneumatic

Pneumatic actuation utilizes nitrogen gas pressure from a cartridge located in a releasing device such as an ANSUL AUTOMAN II-C release. The gas pressure forces the pneumatic actuator, located on the tank valve, down, which in turn forces the cylinder valve open, releasing the Novec 1230 agent from the tank, through the piping and out the nozzles.

TYPES OF DETECTION

There are two approved types of detection available for the SAPPHIRE system: electronic control panel and electric releasing device.

Electronic Control Panel

Electric actuation of the SAPPHIRE system is obtained through the use of electronic control systems that monitor and control various system functions. All detection equipment must be installed according to NFPA 70 and NFPA 72. detection devices available are: ionization smoke detectors, photoelectric smoke detectors, flame detectors, and rate compensated heat detectors. Note: When designing the system, make certain the type of detector used is appropriate for the type of hazard so proper response is attained in a fire situation. When a detector senses a fire, a signal is sent to the control panel. The panel in turn sends an electrical signal to the actuator located on the master tank valve. The actuator opens the master valve, actuating that tank and causing pneumatic actuation of the remaining tanks from the pressure of the master tank.

Electric Release Device

The ANSUL AUTOMAN II-C electric releasing device uses approved thermal detectors and actuates the SAPPHIRE tanks pneumatically, utilizing high-pressure nitrogen to open the tank valve.

SYSTEM LIMITATIONS

SAPPHIRE engineered systems are based on a Hydraulic Flow Program developed by Hughes Associates Inc. The program predicts the two-phase flow of Novec 1230 agent and nitrogen through a pipe network. Information detailing the enclosure is entered and the program calculates the required pipe sizes, nozzle drill sizes, average nozzle pressures and discharge time.

As system design calculations are critical to the success of the suppression system, only ANSUL or ANSUL trained personnel are authorized to perform system calculations.

NOTICE

The calculation method has been designed for specific types of fittings, pipe, and pipe I.D. When these limitations are not maintained, there is a risk that the system will not supply the required quantity of extinguishing agent.

General Information

SYSTEM LIMITATIONS (Continued)

Design/Flow Calculation Limitations

- System Operating Temperature: 32 °F to 130 °F (0 °C to 54 °C)
- Minimum Design Concentration: Class A, 4.2% – Class B, contact Ansul Technical Services for specific fuel design concentrations
- Fill Density: Maximum 75 lb/ft³ (34.0 kg/m³), Minimum 31.0 lb/ft³ (14.1 kg/m³)
- Discharge Time: Maximum 10 seconds, Minimum 6 seconds
- Maximum Arrival Imbalance: 1 second
- Maximum Runout Imbalance: 2 seconds
- Maximum Pipe Volume to Cylinder Liquid Volume: 80%

  Minimum Pipe Volume Ratio Before First Tee: 10%

  Nozzle Area Ratio:

Maximum All Size Nozzles	Minimum 1/2 in. Nozzle	All Other Sizes
80%	10%	20%

- Minimum Nozzle Pressure: 73 psi (5.0 bar)
- Flow Rate Limit:

Pipe Diameter	Minimum Flow Rate lb/s	(kg/s)	Maximum Flow Rate lb/s	(kg/s)
1/2 in.	1.0	(0.5)	3.0	(1.4)
3/4 in.	2.0	(0.9)	5.5	(2.5)
1 in.	3.5	(1.6)	8.5	(3.9)
1 1/4 in.	6.0	(2.7)	12.5	(5.7)
1 1/2 in.	9.0	(4.1)	20.0	(9.1)
2 in.	14.0	(6.4)	30.0	(13.6)
2 1/2 in.	20.0	(9.1)	55.0	(24.9)
3 in.	30.0	(13.6)	90.0	(40.8)
4 in.	55.0	(24.9)	125.0	(56.7)
5 in.	90.0	(40.8)	200.0	(90.7)
6 in.	120.0	(54.4)	300.0	(136.1)

- Maximum Allowed Split Through a Tee:

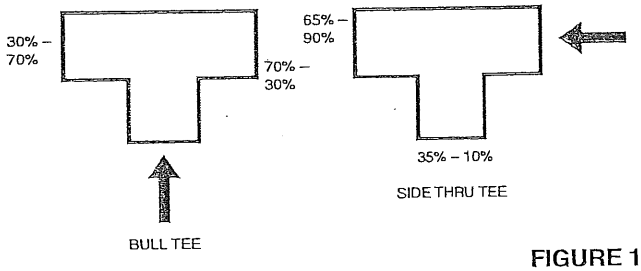


FIGURE 1
002201

- Maximum nozzle height above floor level for a single row of nozzles is 14 ft (4.3 m). For ceiling heights over 14 ft (4.3 m), additional rows of nozzles may be added.
- Nozzles to be located a maximum of 12 in. (30.5 cm) down from the ceiling, positioned vertically (either up or down). Exception: Sub-floor nozzles may be positioned either vertically down from the top of the sub-floor or vertically up from the bottom of the sub-floor.
- Maximum Area Nozzle Coverage: 1800 ft² (167.2 m²)
- Minimum Ceiling Height: 12 in. (30.5 cm)
- Piping/Tee Orientation:

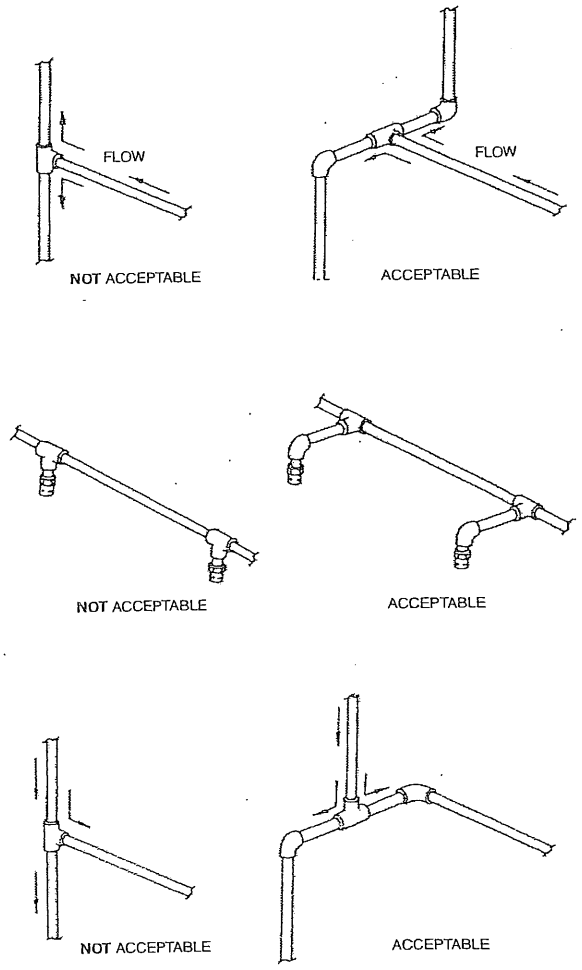


FIGURE 2
006903

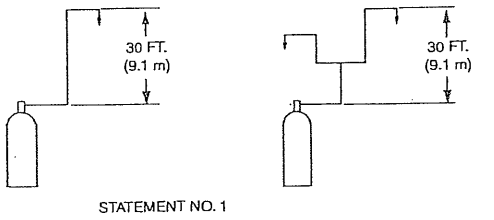
- Critical Pipe Length Before and After a Tee Split: Minimum of 10 pipe diameters

General Information

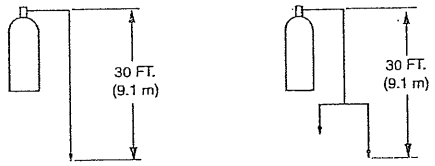
SYSTEM LIMITATIONS (Continued)

Design/Flow Calculation Limitations (Continued)

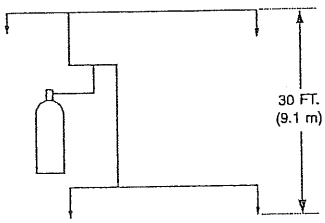
- Maximum Elevation Difference in Pipe Runs:
  - Statement No. 1. If nozzles are only located **above** the tank outlet, then the maximum elevation difference between the tank outlet and the furthest horizontal pipe run or discharge nozzle (whichever is furthest) shall not exceed 30 ft. (9.1 m). See Figure 3.
  - Statement No. 2. If nozzles are only located **below** the tank outlet, then the maximum elevation difference between the tank outlet and the furthest horizontal pipe run or discharge nozzle (whichever is furthest) shall not exceed 30 ft. (9.1 m). See Figure 3.
  - Statement No. 3. If nozzles are located both **above and below** the tank outlet, then the maximum elevation difference between the furthest horizontal pipe runs or discharge nozzles (whichever is furthest) shall not exceed 30 ft. (9.1 m). See Figure 3.



STATEMENT NO. 1



STATEMENT NO. 2



STATEMENT NO. 3

FIGURE 3
005050

- Manifolding: All tanks on the same manifold must be the same size and fill weight.
- The calculation method has been designed for specific types of fittings, pipe, and pipe inside diameter. When these limitations are not maintained, there is a risk that the system will not supply the required quantity of extinguishing agent.
- Minimum Class A design concentration: 4.2%
- Maximum design concentration for occupied spaces: 10%
- The SAPPHIRE Designer Program is designed for a +70 °F (+21 °C) tank operating/storage temperature. Therefore, the tank operating/storage temperature must be in the range of +60 °F to +80 °F (+15.5 °C to 26.7 °C) for a single system protecting two or more separate hazards. If the tank operating/storage temperature is outside this range, an insufficient or excessive quantity of agent may be discharged from one or more discharge nozzles. If tanks cannot be stored within this range, then each hazard must be protected with its own individual system.

Inspection

Inspection is a "quick check" that a system is operable. It is intended to give reasonable assurance that the system is fully charged and will operate. This is done by seeing that the system has not been tampered with and there is no obvious physical damage, or condition, to prevent operation. The value of an inspection lies in the frequency, and thoroughness, with which it is conducted. Systems should be inspected at regular monthly intervals, or at more frequent intervals when circumstances require.

The following visual checks should be performed during a SAPPHIRE system inspection:

- Visually inspect the hazard area to verify that it has not changed. Look for different fuels, new equipment, blocked open doors or dampers.
- Check detectors to make certain they are in place, not damaged or coated with dirt, grease, paint, or any contaminating substance.
- Check all manual pull stations to assure they have not been tampered with and are not blocked from use.
- Check all alarm devices for damage, dirt, corrosion, etc.
- Check that the piping is secure and nozzles are in place. Make certain the nozzles are not covered with dirt, grease, or paint and that there is nothing structural blocking the discharge.
- Visually inspect all components for signs of damage, such as disconnected or loose parts, corrosion, twisted or dented components, etc.
- Check each SAPPHIRE tank gauge to determine that tank pressure is in the operable range.
- Visually verify that the control panel and/or releasing device is functioning properly.
- Perform any other checks that may be required by the authority having jurisdiction.
- Record that the system has been inspected and inform the proper personnel.

ANNUAL MAINTENANCE EXAMINATION

Systems shall be maintained at regular intervals, not more than one year apart, or when specifically indicated by an inspection. **Exception:** Tank pressure and agent quantity shall be checked every six months per NFPA 2001.

Maintenance is a "thorough check" of the system. It is intended to give maximum assurance that a system will operate effectively and safely. It includes a thorough examination and any necessary repair, recharge, or replacement. It will reveal if there is a need for hydrostatic testing of the tank. The procedures listed in this section are the minimum that are necessary to maintain a system. If circumstances warrant them, a more thorough procedure should be followed to assure system performance. Make certain that all people affected by the maintenance are informed before you start. This may include the owner, security personnel, the local Fire Department, and possibly local workers that may be affected by equipment shutdown or start up.

NOTICE

If the system includes an ANSUL AUTOMAN II-C releasing device, before proceeding with annual maintenance examination, insert lock pin in ANSUL AUTOMAN II-C release and remove nitrogen cartridge. Install safety shipping cap on cartridge.

1. Survey the hazard to make certain it has not changed from what the system was designed to protect. While surveying the hazard, look for different fuels, loss of hazard integrity, new hazards, etc.
2. Check all nozzles to make certain they are in place. Check the condition of the nozzle for corrosion or damage and make certain it is not obstructed internally or externally.
3. Check the condition of the piping to make certain that it is properly secured in the hangers and that all fittings are connected tightly.
4. Check all warning nameplates (signs) throughout the area. Make certain they are in place, mounted securely, readable, and are not damaged.
5. Check all tank bracketing. Make certain all tanks are secured in the brackets. Check for corrosion, damage, or missing components.
6. Check the condition of all tanks. Look for signs of damage or corrosion, and check the tank's last hydro date. (NFPA 2001 states "Cylinders continuously in service without discharging shall be given a complete external visual inspection every five years or more frequently if required. The visual inspection shall be in accordance with Compressed Gas Association Pamphlet C-6, Section 3; except that the cylinders need not be emptied or stamped while under pressure.") Refer to NFPA 2001, Chapter 4 Inspection, Maintenance, Testing, and Training, for hydro requirements.
7. Check condition of all tank discharge hoses. Look for signs of structural problems like abrasions or weather checking. Make certain all hoses are connected properly. All hoses must be tested every 5 years. Refer to NFPA 2001, Chapter 4 Inspection, Maintenance, Testing, and Training, for detailed testing requirements.
8. Check condition of all actuators by completing the following:
   - Remove all actuators from the tank valves (electric, manual, and pneumatic) and leave them off until the final step in Maintenance Section.
   - For pneumatic actuators, check the condition of each actuator to make certain they operate freely. When finished, reset the pin in the up position. **Do not install on tank valves.**
   - For electric actuators, make certain all wires are properly connected. **Do not install on tank valves.**

NOTICE

Before proceeding with Step No. 9, make certain all electric actuators have been removed from all valves and that the nitrogen cartridge has been removed from the ANSUL AUTOMAN II-C release and that the locking pin in the release mechanism has also been removed.

Maintenance

ANNUAL MAINTENANCE EXAMINATION (Continued)

9. Tank Weighing – Option 1

Tanks must be weighed (without liquid level indicator) to determine agent quantity. The weighing procedure is as follows:

- Remove all manual controls, actuators and actuation pipe or tubing and flexible electrical connectors.
- Disconnect and remove discharge piping/discharge hoses from tank valves.
- Install Safety Outlet Caps onto tank valves.
- Remove tanks from bracketing and weigh tanks. Any tank showing more than the maximum allowable weight loss must be recharged by a qualified recharge agent.
- Record weight of tank on record tag.
- Replace tanks in bracketing and remove Safety Outlet Caps.
- Reconnect discharge piping/discharge hoses and all control heads, pressure actuators, pressure actuation pipe or tubing and flexible electric connectors.

9a. Tank Weighing – Option 2

Determine agent quantity using liquid level indicator. The liquid level indicator is used to determine the liquid level in 280, 390, 450 and 850 lb. tanks. During a maintenance examination, the indicator will enable a service representative to convert a linear measurement to agent weight in order to determine if the tank has any weight loss. This measurement is accomplished without removing the tank from the fire suppression system.

To measure the liquid agent level:

a. Remove the protective cap from the measuring device housing.

b. Lift the measuring tape to the end (or approximately 3 in. above the expected level). Slowly lower the tape until a magnetic interlock is felt. See Figure 1.

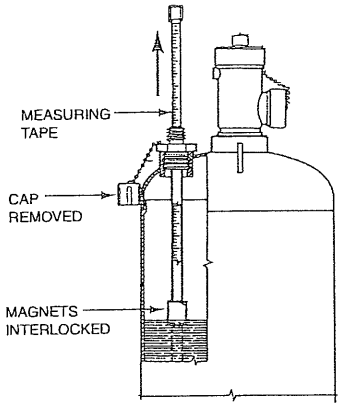


FIGURE 1
006255

c. Read the measurement on the tape directly at the top of the plastic sleeve in the measuring device housing (see Figure 2). Record this measurement and note the temperature of the tank module.

NOTICE

The tank module temperature can be determined by measuring the ambient temperature at the tank location. The tank must be stored at this temperature for at least 24 hours to obtain an accurate liquid level reading.

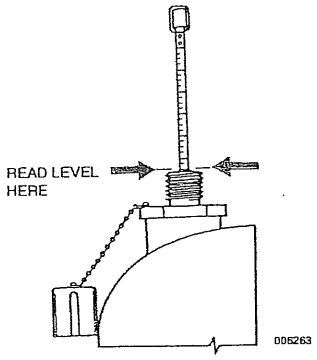


FIGURE 2
006263

d. To reinstall tape, quickly pull on the tape to disengage the magnetic interlock. Then slide the tape into the housing and replace the protective cap.

ANNUAL MAINTENANCE EXAMINATION (Continued)

e. Using the Agent Quantity Table(s) located in this section, determine the weight of charge as follows:
   - Find the liquid level reading along the left hand vertical line of the table.
   - From that point, follow the horizontal line to the point where it intersects with the temperature column (using the tank temperature noted in Step c).
   - Read the weight of Novec 1230 agent at the level/temperature column intersection.

f. Compare the weight from the table to the weight of charge stamped on the tank nameplate. If the measurement shows a net weight loss of more than 5%, the tank must be weighed to verify the liquid level measurement. If the weight loss still exceeds 5% of the weight of charge, the tank requires recharging.

10. Check condition of control panel for tampering, corrosion, or damage. Test panel at this point by referring to the appropriate AUTOPULSE Control System manual. Note: If system includes an ANSUL AUTOMAN II-C release, make certain cartridge is removed, release is cocked, and locking pin is not in place before each test.
11. Check all detectors. Make certain they are in place, clean, and not damaged. If required, check the sensitivity of each per the instructions of the detector manufacturer. See appropriate AUTOPULSE Control System manual for detailed instructions.
12. Check all pull stations. Make certain they are in place, that they are not blocked or damaged. Operate each pull station to make certain that they operate the control panel. Reset each pull station.
13. While checking the detectors and electric pull stations, inspect each alarm device. Check the alarm's condition and verify that they operate properly when energized. Reset the alarm circuit after each test.
14. If the system includes an ANSUL AUTOMAN, check release by completing the following:
    - Make certain locking pin is not in place, and manually test release by operating the "STRIKE" button on the release mechanism.
    - Cock ANSUL AUTOMAN II-C release using cocking lever, Part No. 26310, and install locking pin.
    - Remove gasket from cartridge receiver in ANSUL AUTOMAN II-C release mechanism. Check gasket for elasticity or cuts and replace if necessary. Clean and coat gasket lightly with a good grade of extreme temperature grease such as Dow Corning No. 4. Reinstall gasket into cartridge receiver. **Do not install cartridge at this time.**
15. When all tests are complete, reset control panel and all accessory electrical equipment.
16. Make certain all electric and pneumatic actuators are reset.
17. Install all electric and pneumatic actuators on tank valves. Hand tighten.
18. Install nitrogen cartridge in ANSUL AUTOMAN II-C release by completing the following:
    - Make certain release mechanism is cocked and locking bar is in place.
    - Remove shipping cap and weigh nitrogen cartridge. Replace if weight is 1/2 oz. (14.2 g), or more, below the weight stamped on the cartridge.
    - Screw cartridge into release mechanism, hand tighten.
    - Remove locking pin.
    - Close cover on enclosure, install locking pin through "STRIKE" button, and secure with visual seal, Part No. 197.
19. Record annual maintenance date on tag attached to unit and/or in a permanent file.
20. Inform proper personnel that the system is back in service.

280 POUND M[illegible] TANK AGENT QUANTITY TABLES

Liquid Level Inches	Temperature Degrees F (Degrees C)													
	0 (-17.8)	10 (-12.2)	20 (-6.7)	30 (-1.1)	40 (4.4)	50 (10)	60 (15.6)	70 (21.1)	80 (26.7)	90 (32.2)	100 (37.8)	110 (43.3)	120 (48.9)	130 (54.4)
6	110.7	109.1	107.5	105.9	104.3	102.8	101.2	99.6	98.0	96.3	94.7	93.0	91.4	89.8
6.25	113.3	111.8	110.2	108.6	107.0	105.5	103.9	102.3	100.7	99.0	97.4	95.7	94.0	92.4
6.5	116.0	114.4	112.9	111.3	109.8	108.2	106.6	105.1	103.4	101.7	100.0	98.4	96.7	95.0
6.75	118.7	117.1	115.6	114.0	112.5	110.9	109.4	107.8	106.1	104.4	102.7	101.0	99.3	97.6
7	121.3	119.8	118.2	116.7	115.2	113.6	112.1	110.5	108.8	107.1	105.4	103.7	102.0	100.3
7.25	124.0	122.5	120.9	119.4	117.9	116.3	114.8	113.3	111.5	109.8	108.1	106.3	104.6	102.9
7.5	126.7	125.1	123.6	122.1	120.6	119.0	117.5	116.0	114.2	112.5	110.8	109.0	107.3	105.5
7.75	129.3	127.8	126.3	124.8	123.3	121.8	120.2	118.7	117.0	115.2	113.4	111.7	109.9	108.1
8	132.0	130.5	129.0	127.5	126.0	124.5	123.0	121.5	119.7	117.9	116.1	114.3	112.5	110.8
8.25	134.7	133.2	131.7	130.2	128.7	127.2	125.7	124.2	122.4	120.6	118.8	117.0	115.2	113.4
8.5	137.3	135.8	134.4	132.9	131.4	129.9	128.4	126.9	125.1	123.3	121.5	119.6	117.8	116.0
8.75	140.0	138.5	137.0	135.6	134.1	132.6	131.1	129.7	127.8	126.0	124.1	122.3	120.5	118.6
9	142.7	141.2	139.7	138.3	136.8	135.3	133.9	132.4	130.5	128.7	126.8	125.0	123.1	121.2
9.25	145.3	143.9	142.4	141.0	139.5	138.0	136.6	135.1	133.3	131.4	129.5	127.6	125.7	123.9
9.5	148.0	146.6	145.1	143.7	142.2	140.8	139.3	137.9	136.0	134.1	132.2	130.3	128.4	126.5
9.75	150.7	149.2	147.8	146.4	144.9	143.5	142.0	140.6	138.7	136.8	134.9	132.9	131.0	129.1
10	153.3	151.9	150.5	149.0	147.6	146.2	144.8	143.3	141.4	139.5	137.5	135.6	133.7	131.7
10.25	156.0	154.6	153.2	151.7	150.3	148.9	147.5	146.1	144.1	142.2	140.2	138.3	136.3	134.4
10.5	158.7	157.3	155.8	154.4	153.0	151.6	150.2	148.8	146.8	144.9	142.9	140.9	139.0	137.0
10.75	161.3	159.9	158.5	157.1	155.7	154.3	152.9	151.5	149.5	147.6	145.6	143.6	141.6	139.6
11	164.0	162.6	161.2	159.8	158.4	157.0	155.7	154.3	152.3	150.3	148.3	146.2	144.2	142.2
11.25	166.7	165.3	163.9	162.5	161.1	159.8	158.4	157.0	155.0	153.0	150.9	148.9	146.9	144.9
11.5	169.3	168.0	166.6	165.2	163.8	162.5	161.1	159.7	157.7	155.6	153.6	151.6	149.5	147.5
11.75	172.0	170.6	169.3	167.9	166.6	165.2	163.8	162.5	160.4	158.3	156.3	154.2	152.2	150.1
12	174.7	173.3	172.0	170.6	169.3	167.9	166.5	165.2	163.1	161.0	159.0	156.9	154.8	152.7
12.25	177.3	176.0	174.6	173.3	172.0	170.6	169.3	167.9	165.8	163.7	161.6	159.5	157.5	155.4
12.5	180.0	178.7	177.3	176.0	174.7	173.3	172.0	170.7	168.5	166.4	164.3	162.2	160.1	158.0
12.75	182.7	181.3	180.0	178.7	177.4	176.0	174.7	173.4	171.3	169.1	167.0	164.9	162.7	160.6
13	185.3	184.0	182.7	181.4	180.1	178.8	177.4	176.1	174.0	171.8	169.7	167.5	165.4	163.2
13.25	188.0	186.7	185.4	184.1	182.8	181.5	180.2	178.9	176.7	174.5	172.4	170.2	168.0	165.9
13.5	190.7	189.4	188.1	186.8	185.5	184.2	182.9	181.6	179.4	177.2	175.0	172.9	170.7	168.5
13.75	193.3	192.1	190.8	189.5	188.2	186.9	185.6	184.3	182.1	179.9	177.7	175.5	173.3	171.1
14	196.0	194.7	193.4	192.2	190.9	189.6	188.3	187.1	184.8	182.6	180.4	178.2	176.0	173.7

280 POUND NOVEC TANK AGENT QUANTITY TABLES (Continued)

Liquid Level Inches	Temperature Degrees F (Degrees C)													
	0 (-17.8)	10 (-12.2)	20 (-6.7)	30 (-1.1)	40 (4.4)	50 (10)	60 (15.6)	70 (21.1)	80 (26.7)	90 (32.2)	100 (37.8)	110 (43.3)	120 (48.9)	130 (54.4)
14.25	198.7	197.4	196.1	194.9	193.6	192.3	191.1	189.8	187.6	185.3	183.1	180.8	178.6	176.4
14.5	201.3	200.1	198.8	197.6	196.3	195.0	193.8	192.5	190.3	188.0	185.8	183.5	181.2	179.0
14.75	204.0	202.8	201.5	200.3	199.0	197.8	196.5	195.3	193.0	190.7	188.4	186.2	183.9	181.6
15	206.7	205.4	204.2	203.0	201.7	200.5	199.2	198.0	195.7	193.4	191.1	188.8	186.5	184.2
15.25	209.3	208.1	206.9	205.6	204.4	203.2	202.0	200.7	198.4	196.1	193.8	191.5	189.2	186.8
15.5	212.0	210.8	209.6	208.3	207.1	205.9	204.7	203.5	201.1	198.8	196.5	194.1	191.8	189.5
15.75	214.7	213.5	212.3	211.0	209.8	208.6	207.4	206.2	203.8	201.5	199.1	196.8	194.4	192.1
16	217.3	216.1	214.9	213.7	212.5	211.3	210.1	208.9	206.6	204.2	201.8	199.5	197.1	194.7
16.25	220.0	218.8	217.6	216.4	215.2	214.0	212.9	211.7	209.3	206.9	204.5	202.1	199.7	197.3
16.5	222.7	221.5	220.3	219.1	217.9	216.8	215.6	214.4	212.0	209.6	207.2	204.8	202.4	200.0
16.75	225.3	224.2	223.0	221.8	220.6	219.5	218.3	217.1	214.7	212.3	209.9	207.4	205.0	202.6
17	228.0	226.8	225.7	224.5	223.4	222.2	221.0	219.9	217.4	215.0	212.5	210.1	207.7	205.2
17.25	230.7	229.5	228.4	227.2	226.1	224.9	223.7	222.6	220.1	217.7	215.2	212.8	210.3	207.8
17.5	233.3	232.2	231.1	229.9	228.8	227.6	226.5	225.3	222.9	220.4	217.9	215.4	212.9	210.5
17.75	236.0	234.9	233.7	232.6	231.5	230.3	229.2	228.1	225.6	223.1	220.6	218.1	215.6	213.1
18	238.7	237.5	236.4	235.3	234.2	233.0	231.9	230.8	228.3	225.8	223.3	220.7	218.2	215.7
18.25	241.3	240.2	239.1	238.0	236.9	235.8	234.6	233.5	231.0	228.5	225.9	223.4	220.9	218.3
18.5	244.0	242.9	241.8	240.7	239.6	238.5	237.4	236.3	233.7	231.2	228.6	226.1	223.5	221.0
18.75	246.7	245.6	244.5	243.4	242.3	241.2	240.1	239.0	236.4	233.9	231.3	228.7	226.2	223.6
19	249.3	248.3	247.2	246.1	245.0	243.9	242.8	241.7	239.1	236.6	234.0	231.4	228.8	226.2
19.25	252.0	250.9	249.9	248.8	247.7	246.6	245.5	244.5	241.9	239.3	236.6	234.0	231.4	228.8
19.5	254.7	253.6	252.5	251.5	250.4	249.3	248.3	247.2	244.6	241.9	239.3	236.7	234.1	231.5
19.75	257.3	256.3	255.2	254.2	253.1	252.0	251.0	249.9	247.3	244.6	242.0	239.4	236.7	234.1
20	260.0	259.0	257.9	256.9	255.8	254.8	253.7	252.7	250.0	247.3	244.7	242.0	239.4	236.7
20.25	262.7	261.6	260.6	259.6	258.5	257.5	256.4	255.4	252.7	250.0	247.4	244.7	242.0	239.3
20.5	265.3	264.3	263.3	262.2	261.2	260.2	259.2	258.1	255.4	252.7	250.0	247.3	244.6	242.0
20.75	268.0	267.0	266.0	264.9	263.9	262.9	261.9	260.9	258.1	255.4	252.7	250.0	247.3	244.6
21	270.7	269.7	268.7	267.6	266.6	265.6	264.6	263.6	260.9	258.1	255.4	252.7	249.9	247.2
21.25	273.3	272.3	271.3	270.3	269.3	268.3	267.3	266.3	263.6	260.8	258.1	255.3	252.6	249.8
21.5	276.0	275.0	274.0	273.0	272.0	271.0	270.1	269.1	266.3	263.5	260.8	258.0	255.2	252.4
21.75	278.7	277.7	276.7	275.7	274.7	273.8	272.8	271.8	269.0	266.2	263.4	260.6	257.9	255.1
22	281.3	280.4	279.4	278.4	277.4	276.5	275.5	274.5	271.7	268.9	266.1	263.3	260.5	257.7
22.25	284.0	283.0	282.1	281.1	280.2	279.2	278.2	277.3	274.4	271.6	268.8	266.0	263.1	260.3

280 POUND NOVEL TANK AGENT QUANTITY TABLES

Liquid Level Inches	Temperature Degrees F (Degrees C)													
	0 (-17.8)	10 (-12.2)	20 (-6.7)	30 (-1.1)	40 (4.4)	50 (10)	60 (15.6)	70 (21.1)	80 (26.7)	90 (32.2)	100 (37.8)	110 (43.3)	120 (48.9)	130 (54.4)
22.5	286.7	285.7	284.8	283.8	282.9	281.9	280.9	280.0	277.2	274.3	271.5	268.6	265.8	262.9
22.75	289.3	288.4	287.5	286.5	285.6	284.6	283.7	282.7	279.9	277.0	274.1	271.3	268.4	265.6
23	292.0	291.1	290.1	289.2	288.3	287.3	286.4	285.5	282.6	279.7	276.8	273.9	271.1	268.2
23.25	294.7	293.7	292.8	291.9	291.0	290.0	289.1	288.2	285.3	282.4	279.5	276.6	273.7	270.8
23.5	297.3	296.4	295.5	294.6	293.7	292.8	291.8	290.9	288.0	285.1	282.2	279.3	276.4	273.4
23.75	300.0	299.1	298.2	297.3	296.4	295.5	294.6	293.7	290.7	287.8	284.9	281.9	279.0	276.1
24	302.7	301.8	300.9	300.0	299.1	298.2	297.3	296.4	293.4	290.5	287.5	284.6	281.6	278.7
24.25	305.3	304.5	303.6	302.7	301.8	300.9	300.0	299.1	296.2	293.2	290.2	287.2	284.3	281.3
24.5	308.0	307.1	306.3	305.4	304.5	303.6	302.7	301.9	298.9	295.9	292.9	289.9	286.9	283.9
24.75	310.7	309.8	308.9	308.1	307.2	306.3	305.5	304.6	301.6	298.6	295.6	292.6	289.6	286.6
25	313.3	312.5	311.6	310.8	309.9	309.0	308.2	307.3	304.3	301.3	298.3	295.2	292.2	289.2
25.25	316.0	315.2	314.3	313.5	312.6	311.8	310.9	310.1	307.0	304.0	300.9	297.9	294.8	291.8
25.5	318.7	317.8	317.0	316.2	315.3	314.5	313.6	312.8	309.7	306.7	303.6	300.6	297.5	294.4
25.75	321.3	320.5	319.7	318.8	318.0	317.2	316.4	315.5	312.4	309.4	306.3	303.2	300.1	297.1
26	324.0	323.2	322.4	321.5	320.7	319.9	319.1	318.3	315.2	312.1	309.0	305.9	302.8	299.7

390 POUND NOVEC TANK AGENT QUANTITY TABLES

Liquid Level Inches	Temperature Degrees F (Degrees C)													
	0 (-17.8)	10 (-12.2)	20 (-6.7)	30 (-1.1)	40 (4.4)	50 (10)	60 (15.6)	70 (21.1)	80 (26.7)	90 (32.2)	100 (37.8)	110 (43.3)	120 (48.9)	130 (54.4)
7	147.8	146.0	144.2	142.5	140.7	138.9	137.1	135.4	134.5	133.7	132.8	132.0	131.1	130.3
7.25	150.7	148.9	147.1	145.3	143.5	141.7	139.9	138.1	137.2	136.3	135.4	134.6	133.7	132.8
7.5	153.6	151.8	150.0	148.1	146.3	144.4	142.6	140.8	139.9	139.0	138.1	137.2	136.3	135.4
7.75	156.6	154.7	152.8	151.0	149.1	147.2	145.3	143.5	142.5	141.6	140.7	139.8	138.9	137.9
8	159.5	157.6	155.7	153.8	151.9	150.0	148.1	146.2	145.2	144.3	143.3	142.4	141.4	140.5
8.25	162.5	160.5	158.6	156.6	154.7	152.7	150.8	148.9	147.9	146.9	146.0	145.0	144.0	143.1
8.5	165.4	163.4	161.5	159.5	157.5	155.5	153.5	151.6	150.6	149.6	148.6	147.6	146.6	145.6
8.75	168.4	166.3	164.3	162.3	160.3	158.3	156.3	154.3	153.2	152.2	151.2	150.2	149.2	148.2
9	171.3	169.2	167.2	165.2	163.1	161.1	159.0	157.0	155.9	154.9	153.9	152.8	151.8	150.8
9.25	174.2	172.2	170.1	168.0	165.9	163.8	161.7	159.7	158.6	157.5	156.5	155.4	154.4	153.3
9.5	177.2	175.1	172.9	170.8	168.7	166.6	164.5	162.4	161.3	160.2	159.1	158.0	157.0	155.9
9.75	180.1	178.0	175.8	173.7	171.5	169.4	167.2	165.0	163.9	162.8	161.7	160.6	159.5	158.4
10	183.1	180.9	178.7	176.5	174.3	172.1	169.9	167.7	166.6	165.5	164.4	163.2	162.1	161.0
10.25	186.0	183.8	181.6	179.3	177.1	174.9	172.7	170.4	169.3	168.2	167.0	165.9	164.7	163.6
10.5	189.0	186.7	184.4	182.2	179.9	177.7	175.4	173.1	172.0	170.8	169.6	168.5	167.3	166.1
10.75	191.9	189.6	187.3	185.0	182.7	180.4	178.1	175.8	174.6	173.5	172.3	171.1	169.9	168.7
11	194.8	192.5	190.2	187.9	185.5	183.2	180.9	178.5	177.3	176.1	174.9	173.7	172.5	171.2
11.25	197.8	195.4	193.1	190.7	188.3	186.0	183.6	181.2	180.0	178.8	177.5	176.3	175.0	173.8
11.5	200.7	198.3	195.9	193.5	191.1	188.7	186.3	183.9	182.7	181.4	180.2	178.9	177.6	176.4
11.75	203.7	201.2	198.8	196.4	193.9	191.5	189.1	186.6	185.4	184.1	182.8	181.5	180.2	178.9
12	206.6	204.1	201.7	199.2	196.7	194.3	191.8	189.3	188.0	186.7	185.4	184.1	182.8	181.5
12.25	209.5	207.0	204.5	202.0	199.5	197.0	194.5	192.0	190.7	189.4	188.0	186.7	185.4	184.1
12.5	212.5	210.0	207.4	204.9	202.3	199.8	197.3	194.7	193.4	192.0	190.7	189.3	188.0	186.6
12.75	215.4	212.9	210.3	207.7	205.1	202.6	200.0	197.4	196.1	194.7	193.3	191.9	190.6	189.2
13	218.4	215.8	213.2	210.6	207.9	205.3	202.7	200.1	198.7	197.3	195.9	194.5	193.1	191.7
13.25	221.3	218.7	216.0	213.4	210.7	208.1	205.5	202.8	201.4	200.0	198.6	197.1	195.7	194.3
13.5	224.3	221.6	218.9	216.2	213.6	210.9	208.2	205.5	204.1	202.6	201.2	199.7	198.3	196.9
13.75	227.2	224.5	221.8	219.1	216.4	213.6	210.9	208.2	206.8	205.3	203.8	202.4	200.9	199.4
14	230.1	227.4	224.6	221.9	219.2	216.4	213.7	210.9	209.4	207.9	206.5	205.0	203.5	202.0
14.25	233.1	230.3	227.5	224.7	222.0	219.2	216.4	213.6	212.1	210.6	209.1	207.6	206.1	204.5
14.5	236.0	233.2	230.4	227.6	224.8	221.9	219.1	216.3	214.8	213.2	211.7	210.2	208.6	207.1
14.75	239.0	236.1	233.3	230.4	227.6	224.7	221.9	219.0	217.5	215.9	214.3	212.8	211.2	209.7
15	241.9	239.0	236.1	233.3	230.4	227.5	224.6	221.7	220.1	218.6	217.0	215.4	213.8	212.2

390 POUND NOVEL TANK AGENT QUANTITY TABLES

Liquid Level Inches	Temperature Degrees F (Degrees C)													
	0 (-17.8)	10 (-12.2)	20 (-6.7)	30 (-1.1)	40 (4.4)	50 (10)	60 (15.6)	70 (21.1)	80 (26.7)	90 (32.2)	100 (37.8)	110 (43.3)	120 (48.9)	130 (54.4)
15.25	244.8	241.9	239.0	236.1	233.2	230.2	227.3	224.4	222.8	221.2	219.6	218.0	216.4	214.8
15.5	247.8	244.8	241.9	238.9	236.0	233.0	230.1	227.1	225.5	223.9	222.2	220.6	219.0	217.4
15.75	250.7	247.7	244.8	241.8	238.8	235.8	232.8	229.8	228.2	226.5	224.9	223.2	221.6	219.9
16	253.7	250.7	247.6	244.6	241.6	238.6	235.5	232.5	230.8	229.2	227.5	225.8	224.2	222.5
16.25	256.6	253.6	250.5	247.4	244.4	241.3	238.3	235.2	233.5	231.8	230.1	228.4	226.7	225.0
16.5	259.6	256.5	253.4	250.3	247.2	244.1	241.0	237.9	236.2	234.5	232.8	231.0	229.3	227.6
16.75	262.5	259.4	256.2	253.1	250.0	246.9	243.7	240.6	238.9	237.1	235.4	233.6	231.9	230.2
17	265.4	262.3	259.1	256.0	252.8	249.6	246.5	243.3	241.5	239.8	238.0	236.3	234.5	232.7
17.25	268.4	265.2	262.0	258.8	255.6	252.4	249.2	246.0	244.2	242.4	240.6	238.9	237.1	235.3
17.5	271.3	268.1	264.9	261.6	258.4	255.2	251.9	248.7	246.9	245.1	243.3	241.5	239.7	237.9
17.75	274.3	271.0	267.7	264.5	261.2	257.9	254.7	251.4	249.6	247.7	245.9	244.1	242.2	240.4
18	277.2	273.9	270.6	267.3	264.0	260.7	257.4	254.1	252.2	250.4	248.5	246.7	244.8	243.0
18.25	280.2	276.8	273.5	270.1	266.8	263.5	260.1	256.8	254.9	253.0	251.2	249.3	247.4	245.5
18.5	283.1	279.7	276.4	273.0	269.6	266.2	262.9	259.5	257.6	255.7	253.8	251.9	250.0	248.1
18.75	286.0	282.6	279.2	275.8	272.4	269.0	265.6	262.2	260.3	258.3	256.4	254.5	252.6	250.7
19	289.0	285.5	282.1	278.7	275.2	271.8	268.3	264.9	262.9	261.0	259.1	257.1	255.2	253.2
19.25	291.9	288.4	285.0	281.5	278.0	274.5	271.1	267.6	265.6	263.6	261.7	259.7	257.7	255.8
19.5	294.9	291.4	287.8	284.3	280.8	277.3	273.8	270.3	268.3	266.3	264.3	262.3	260.3	258.3
19.75	297.8	294.3	290.7	287.2	283.6	280.1	276.5	273.0	271.0	269.0	266.9	264.9	262.9	260.9
20	300.7	297.2	293.6	290.0	286.4	282.8	279.3	275.7	273.6	271.6	269.6	267.5	265.5	263.5
20.25	303.7	300.1	296.5	292.8	289.2	285.6	282.0	278.4	276.3	274.3	272.2	270.1	268.1	266.0
20.5	306.6	303.0	299.3	295.7	292.0	288.4	284.7	281.1	279.0	276.9	274.8	272.8	270.7	268.6
20.75	309.6	305.9	302.2	298.5	294.8	291.1	287.5	283.8	281.7	279.6	277.5	275.4	273.3	271.2
21	312.5	308.8	305.1	301.4	297.6	293.9	290.2	286.5	284.3	282.2	280.1	278.0	275.8	273.7
21.25	315.5	311.7	307.9	304.2	300.4	296.7	292.9	289.2	287.0	284.9	282.7	280.6	278.4	276.3
21.5	318.4	314.6	310.8	307.0	303.2	299.4	295.7	291.9	289.7	287.5	285.4	283.2	281.0	278.8
21.75	321.3	317.5	313.7	309.9	306.0	302.2	298.4	294.6	292.4	290.2	288.0	285.8	283.6	281.4
22	324.3	320.4	316.6	312.7	308.8	305.0	301.1	297.3	295.0	292.8	290.6	288.4	286.2	284.0
22.25	327.2	323.3	319.4	315.5	311.6	307.8	303.9	300.0	297.7	295.5	293.2	291.0	288.8	286.5
22.5	330.2	326.2	322.3	318.4	314.4	310.5	306.6	302.7	300.4	298.1	295.9	293.6	291.3	289.1
22.75	333.1	329.1	325.2	321.2	317.3	313.3	309.3	305.4	303.1	300.8	298.5	296.2	293.9	291.6
23	336.1	332.1	328.1	324.1	320.1	316.1	312.1	308.1	305.7	303.4	301.1	298.8	296.5	294.2
23.25	339.0	335.0	330.9	326.9	322.9	318.8	314.8	310.8	308.4	306.1	303.8	301.4	299.1	296.8

390 POUND NOVEC TANK AGENT QUANTITY TABLES

Liquid Level Inches	Temperature Degrees F (Degrees C)													
	0 (-17.8)	10 (-12.2)	20 (-6.7)	30 (-1.1)	40 (4.4)	50 (10)	60 (15.6)	70 (21.1)	80 (26.7)	90 (32.2)	100 (37.8)	110 (43.3)	120 (48.9)	130 (54.4)
23.5	341.9	337.9	333.8	329.7	325.7	321.6	317.5	313.5	311.1	308.7	306.4	304.0	301.7	299.3
23.75	344.9	340.8	336.7	332.6	328.5	324.4	320.3	316.2	313.8	311.4	309.0	306.6	304.3	301.9
24	347.8	343.7	339.5	335.4	331.3	327.1	323.0	318.8	316.5	314.1	311.7	309.3	306.9	304.5
24.25	350.8	346.6	342.4	338.2	334.1	329.9	325.7	321.5	319.1	316.7	314.3	311.9	309.4	307.0
24.5	353.7	349.5	345.3	341.1	336.9	332.7	328.5	324.2	321.8	319.4	316.9	314.5	312.0	309.6
24.75	356.6	352.4	348.2	343.9	339.7	335.4	331.2	326.9	324.5	322.0	319.5	317.1	314.6	312.1
25	359.6	355.3	351.0	346.8	342.5	338.2	333.9	329.6	327.2	324.7	322.2	319.7	317.2	314.7
25.25	362.5	358.2	353.9	349.6	345.3	341.0	336.7	332.3	329.8	327.3	324.8	322.3	319.8	317.3
25.5	365.5	361.1	356.8	352.4	348.1	343.7	339.4	335.0	332.5	330.0	327.4	324.9	322.4	319.8
25.75	368.4	364.0	359.6	355.3	350.9	346.5	342.1	337.7	335.2	332.6	330.1	327.5	324.9	322.4
26	371.4	366.9	362.5	358.1	353.7	349.3	344.9	340.4	337.9	335.3	332.7	330.1	327.5	325.0
26.25	374.3	369.8	365.4	360.9	356.5	352.0	347.6	343.1	340.5	337.9	335.3	332.7	330.1	327.5
26.5	377.2	372.8	368.3	363.8	359.3	354.8	350.3	345.8	343.2	340.6	338.0	335.3	332.7	330.1
26.75	380.2	375.7	371.1	366.6	362.1	357.6	353.1	348.5	345.9	343.2	340.6	337.9	335.3	332.6
27	383.1	378.6	374.0	369.5	364.9	360.3	355.8	351.2	348.6	345.9	343.2	340.5	337.9	335.2
27.25	386.1	381.5	376.9	372.3	367.7	363.1	358.5	353.9	351.2	348.5	345.8	343.1	340.5	337.8
27.5	389.0	384.4	379.8	375.1	370.5	365.9	361.3	356.6	353.9	351.2	348.5	345.8	343.0	340.3
27.75	391.9	387.3	382.6	378.0	373.3	368.6	364.0	359.3	356.6	353.8	351.1	348.4	345.6	342.9
28	394.9	390.2	385.5	380.8	376.1	371.4	366.7	362.0	359.3	356.5	353.7	351.0	348.2	345.4
28.25	397.8	393.1	388.4	383.6	378.9	374.2	369.4	364.7	361.9	359.1	356.4	353.6	350.8	348.0
28.5	400.8	396.0	391.2	386.5	381.7	376.9	372.2	367.4	364.6	361.8	359.0	356.2	353.4	350.6
28.75	403.7	398.9	394.1	389.3	384.5	379.7	374.9	370.1	367.3	364.5	361.6	358.8	356.0	353.1
29	406.7	401.8	397.0	392.2	387.3	382.5	377.6	372.8	370.0	367.1	364.3	361.4	358.5	355.7
29.25	409.6	404.7	399.9	395.0	390.1	385.3	380.4	375.5	372.6	369.8	366.9	364.0	361.1	358.3
29.5	412.5	407.6	402.7	397.8	392.9	388.0	383.1	378.2	375.3	372.4	369.5	366.6	363.7	360.8
29.75	415.5	410.5	405.6	400.7	395.7	390.8	385.8	380.9	378.0	375.1	372.1	369.2	366.3	363.4
30	418.4	413.5	408.5	403.5	398.5	393.6	388.6	383.6	380.7	377.7	374.8	371.8	368.9	365.9
30.25	421.4	416.4	411.4	406.3	401.3	396.3	391.3	386.3	383.3	380.4	377.4	374.4	371.5	368.5
30.5	424.3	419.3	414.2	409.2	404.1	399.1	394.0	389.0	386.0	383.0	380.0	377.0	374.1	371.1
30.75	427.3	422.2	417.1	412.0	406.9	401.9	396.8	391.7	388.7	385.7	382.7	379.6	376.6	373.6
31	430.2	425.1	420.0	414.9	409.7	404.6	399.5	394.4	391.4	388.3	385.3	382.3	379.2	376.2
31.25	433.1	428.0	422.8	417.7	412.5	407.4	402.2	397.1	394.0	391.0	387.9	384.9	381.8	378.7
31.5	436.1	430.9	425.7	420.5	415.3	410.2	405.0	399.8	396.7	393.6	390.6	387.5	384.4	381.3

390 POUND NOV_ _ TANK AGENT QUANTITY TABLES

Liquid Level Inches	Temperature Degrees F (Degrees C)													
	0 (-17.8)	10 (-12.2)	20 (-6.7)	30 (-1.1)	40 (4.4)	50 (10)	60 (15.6)	70 (21.1)	80 (26.7)	90 (32.2)	100 (37.8)	110 (43.3)	120 (48.9)	130 (54.4)
31.75	439.0	433.8	428.6	423.4	418.1	412.9	407.7	402.5	399.4	396.3	393.2	390.1	387.0	383.9
32	442.0	436.7	431.5	426.2	421.0	415.7	410.4	405.2	402.1	398.9	395.8	392.7	389.6	386.4
32.25	444.9	439.6	434.3	429.0	423.8	418.5	413.2	407.9	404.7	401.6	398.4	395.3	392.1	389.0
32.5	447.8	442.5	437.2	431.9	426.6	421.2	415.9	410.6	407.4	404.2	401.1	397.9	394.7	391.6
32.75	450.8	445.4	440.1	434.7	429.4	424.0	418.6	413.3	410.1	406.9	403.7	400.5	397.3	394.1
33	453.7	448.3	442.9	437.6	432.2	426.8	421.4	416.0	412.8	409.6	406.3	403.1	399.9	396.7
33.25	456.7	451.2	445.8	440.4	435.0	429.5	424.1	418.7	415.4	412.2	409.0	405.7	402.5	399.2
33.5	459.6	454.2	448.7	443.2	437.8	432.3	426.8	421.4	418.1	414.9	411.6	408.3	405.1	401.8
33.75	462.6	457.1	451.6	446.1	440.6	435.1	429.6	424.1	420.8	417.5	414.2	410.9	407.7	404.4
34	465.5	460.0	454.4	448.9	443.4	437.8	432.3	426.8	423.5	420.2	416.9	413.5	410.2	406.9

450 POUND NOVEC TANK AGENT QUANTITY TABLES

Liquid Level Inches	Temperature Degrees F (Degrees C)													
	0 (-17.8)	10 (-12.2)	20 (-6.7)	30 (-1.1)	40 (4.4)	50 (10)	60 (15.6)	70 (21.1)	80 (26.7)	90 (32.2)	100 (37.8)	110 (43.3)	120 (48.9)	130 (54.4)
10	179.2	177.5	175.8	174.1	172.4	170.6	168.9	167.2	165.3	163.3	161.3	159.4	157.4	155.4
10.25	182.1	180.4	178.7	177.0	175.2	173.5	171.8	170.0	168.1	166.1	164.1	162.1	160.1	158.1
10.5	185.1	183.4	181.6	179.9	178.1	176.4	174.6	172.9	170.8	168.8	166.8	164.8	162.8	160.7
10.75	188.1	186.3	184.5	182.8	181.0	179.2	177.5	175.7	173.6	171.6	169.5	167.5	165.5	163.4
11	191.0	189.2	187.5	185.7	183.9	182.1	180.3	178.5	176.4	174.4	172.3	170.2	168.1	166.1
11.25	194.0	192.2	190.4	188.6	186.8	184.9	183.1	181.3	179.2	177.1	175.0	172.9	170.8	168.7
11.5	197.0	195.1	193.3	191.5	189.6	187.8	186.0	184.1	182.0	179.9	177.8	175.6	173.5	171.4
11.75	199.9	198.1	196.2	194.4	192.5	190.7	188.8	187.0	184.8	182.7	180.5	178.4	176.2	174.0
12	202.9	201.0	199.1	197.3	195.4	193.5	191.6	189.8	187.6	185.4	183.2	181.1	178.9	176.7
12.25	205.9	204.0	202.1	200.2	198.3	196.4	194.5	192.6	190.4	188.2	186.0	183.8	181.6	179.4
12.5	208.8	206.9	205.0	203.1	201.2	199.2	197.3	195.4	193.2	190.9	188.7	186.5	184.3	182.0
12.75	211.8	209.8	207.9	206.0	204.0	202.1	200.2	198.2	196.0	193.7	191.5	189.2	186.9	184.7
13	214.7	212.8	210.8	208.9	206.9	205.0	203.0	201.0	198.8	196.5	194.2	191.9	189.6	187.4
13.25	217.7	215.7	213.8	211.8	209.8	207.8	205.8	203.9	201.6	199.2	196.9	194.6	192.3	190.0
13.5	220.7	218.7	216.7	214.7	212.7	210.7	208.7	206.7	204.3	202.0	199.7	197.3	195.0	192.7
13.75	223.6	221.6	219.6	217.6	215.6	213.5	211.5	209.5	207.1	204.8	202.4	200.1	197.7	195.3
14	226.6	224.6	222.5	220.5	218.4	216.4	214.4	212.3	209.9	207.5	205.2	202.8	200.4	198.0
14.25	229.6	227.5	225.4	223.4	221.3	219.3	217.2	215.1	212.7	210.3	207.9	205.5	203.1	200.7
14.5	232.5	230.4	228.4	226.3	224.2	222.1	220.0	218.0	215.5	213.1	210.6	208.2	205.8	203.3
14.75	235.5	233.4	231.3	229.2	227.1	225.0	222.9	220.8	218.3	215.8	213.4	210.9	208.4	206.0
15	238.5	236.3	234.2	232.1	230.0	227.8	225.7	223.6	221.1	218.6	216.1	213.6	211.1	208.6
15.25	241.4	239.3	237.1	235.0	232.8	230.7	228.5	226.4	223.9	221.4	218.9	216.3	213.8	211.3
15.5	244.4	242.2	240.1	237.9	235.7	233.6	231.4	229.2	226.7	224.1	221.6	219.0	216.5	214.0
15.75	247.3	245.2	243.0	240.8	238.6	236.4	234.2	232.0	229.5	226.9	224.3	221.8	219.2	216.6
16	250.3	248.1	245.9	243.7	241.5	239.3	237.1	234.9	232.3	229.7	227.1	224.5	221.9	219.3
16.25	253.3	251.0	248.8	246.6	244.4	242.1	239.9	237.7	235.1	232.4	229.8	227.2	224.6	221.9
16.5	256.2	254.0	251.7	249.5	247.2	245.0	242.7	240.5	237.8	235.2	232.5	229.9	227.2	224.6
16.75	259.2	256.9	254.7	252.4	250.1	247.9	245.6	243.3	240.6	238.0	235.3	232.6	229.9	227.3
17	262.2	259.9	257.6	255.3	253.0	250.7	248.4	246.1	243.4	240.7	238.0	235.3	232.6	229.9
17.25	265.1	262.8	260.5	258.2	255.9	253.6	251.3	248.9	246.2	243.5	240.8	238.0	235.3	232.6
17.5	268.1	265.8	263.4	261.1	258.8	256.4	254.1	251.8	249.0	246.3	243.5	240.7	238.0	235.2
17.75	271.1	268.7	266.4	264.0	261.6	259.3	256.9	254.6	251.8	249.0	246.2	243.5	240.7	237.9
18	274.0	271.6	269.3	266.9	264.5	262.1	259.8	257.4	254.6	251.8	249.0	246.2	243.4	240.6

450 POUND NOV[illegible] TANK AGENT QUANTITY TABLES

Liquid Level Inches	Temperature Degrees F (Degrees C)													
	0 (-17.8)	10 (-12.2)	20 (-6.7)	30 (-1.1)	40 (4.4)	50 (10)	60 (15.6)	70 (21.1)	80 (26.7)	90 (32.2)	100 (37.8)	110 (43.3)	120 (48.9)	130 (54.4)
18.25	277.0	274.6	272.2	269.8	267.4	265.0	262.6	260.2	257.4	254.6	251.7	248.9	246.1	243.2
18.5	279.9	277.5	275.1	272.7	270.3	267.9	265.5	263.0	260.2	257.3	254.5	251.6	248.7	245.9
18.75	282.9	280.5	278.0	275.6	273.2	270.7	268.3	265.9	263.0	260.1	257.2	254.3	251.4	248.5
19	285.9	283.4	281.0	278.5	276.0	273.6	271.1	268.7	265.8	262.8	259.9	257.0	254.1	251.2
19.25	288.8	286.4	283.9	281.4	278.9	276.4	274.0	271.5	268.6	265.6	262.7	259.7	256.8	253.9
19.5	291.8	289.3	286.8	284.3	281.8	279.3	276.8	274.3	271.3	268.4	265.4	262.5	259.5	256.5
19.75	294.8	292.2	289.7	287.2	284.7	282.2	279.6	277.1	274.1	271.1	268.2	265.2	262.2	259.2
20	297.7	295.2	292.6	290.1	287.6	285.0	282.5	279.9	276.9	273.9	270.9	267.9	264.9	261.8
20.25	300.7	298.1	295.6	293.0	290.4	287.9	285.3	282.8	279.7	276.7	273.6	270.6	267.5	264.5
20.5	303.7	301.1	298.5	295.9	293.3	290.7	288.2	285.6	282.5	279.4	276.4	273.3	270.2	267.2
20.75	306.6	304.0	301.4	298.8	296.2	293.6	291.0	288.4	285.3	282.2	279.1	276.0	272.9	269.8
21	309.6	307.0	304.3	301.7	299.1	296.5	293.8	291.2	288.1	285.0	281.9	278.7	275.6	272.5
21.25	312.6	309.9	307.3	304.6	302.0	299.3	296.7	294.0	290.9	287.7	284.6	281.4	278.3	275.1
21.5	315.5	312.8	310.2	307.5	304.8	302.2	299.5	296.8	293.7	290.5	287.3	284.2	281.0	277.8
21.75	318.5	315.8	313.1	310.4	307.7	305.0	302.4	299.7	296.5	293.3	290.1	286.9	283.7	280.5
22	321.4	318.7	316.0	313.3	310.6	307.9	305.2	302.5	299.3	296.0	292.8	289.6	286.4	283.1
22.25	324.4	321.7	318.9	316.2	313.5	310.8	308.0	305.3	302.0	298.8	295.5	292.3	289.0	285.8
22.5	327.4	324.6	321.9	319.1	316.4	313.6	310.9	308.1	304.8	301.6	298.3	295.0	291.7	288.5
22.75	330.3	327.6	324.8	322.0	319.2	316.5	313.7	310.9	307.6	304.3	301.0	297.7	294.4	291.1
23	333.3	330.5	327.7	324.9	322.1	319.3	316.5	313.8	310.4	307.1	303.8	300.4	297.1	293.8
23.25	336.3	333.4	330.6	327.8	325.0	322.2	319.4	316.6	313.2	309.9	306.5	303.1	299.8	296.4
23.5	339.2	336.4	333.6	330.7	327.9	325.1	322.2	319.4	316.0	312.6	309.2	305.9	302.5	299.1
23.75	342.2	339.3	336.5	333.6	330.8	327.9	325.1	322.2	318.8	315.4	312.0	308.6	305.2	301.8
24	345.2	342.3	339.4	336.5	333.7	330.8	327.9	325.0	321.6	318.2	314.7	311.3	307.8	304.4
24.25	348.1	345.2	342.3	339.4	336.5	333.6	330.7	327.8	324.4	320.9	317.5	314.0	310.5	307.1
24.5	351.1	348.2	345.2	342.3	339.4	336.5	333.6	330.7	327.2	323.7	320.2	316.7	313.2	309.7
24.75	354.0	351.1	348.2	345.2	342.3	339.4	336.4	333.5	330.0	326.5	322.9	319.4	315.9	312.4
25	357.0	354.0	351.1	348.1	345.2	342.2	339.3	336.3	332.8	329.2	325.7	322.1	318.6	315.1
25.25	360.0	357.0	354.0	351.0	348.1	345.1	342.1	339.1	335.5	332.0	328.4	324.8	321.3	317.7
25.5	362.9	359.9	356.9	353.9	350.9	347.9	344.9	341.9	338.3	334.7	331.2	327.6	324.0	320.4
25.75	365.9	362.9	359.9	356.8	353.8	350.8	347.8	344.8	341.1	337.5	333.9	330.3	326.7	323.0
26	368.9	365.8	362.8	359.7	356.7	353.7	350.6	347.6	343.9	340.3	336.6	333.0	329.3	325.7
26.25	371.8	368.8	365.7	362.6	359.6	356.5	353.4	350.4	346.7	343.0	339.4	335.7	332.0	328.4

450 POUND NOVEC TANK AGENT QUANTITY TABLES

Liquid Level Inches	Temperature Degrees F (Degrees C) 0 (-17.8)	10 (-12.2)	20 (-6.7)	30 (-1.1)	40 (4.4)	50 (10)	60 (15.6)	70 (21.1)	80 (26.7)	90 (32.2)	100 (37.8)	110 (43.3)	120 (48.9)	130 (54.4)
26.5	374.8	371.7	368.6	365.5	362.5	359.4	356.3	353.2	349.5	345.8	342.1	338.4	334.7	331.0
26.75	377.8	374.6	371.5	368.4	365.3	362.2	359.1	356.0	352.3	348.6	344.8	341.1	337.4	333.7
27	380.7	377.6	374.5	371.3	368.2	365.1	362.0	358.8	355.1	351.3	347.6	343.8	340.1	336.3
27.25	383.7	380.5	377.4	374.2	371.1	367.9	364.8	361.7	357.9	354.1	350.3	346.6	342.8	339.0
27.5	386.6	383.5	380.3	377.1	374.0	370.8	367.6	364.5	360.7	356.9	353.1	349.3	345.5	341.7
27.75	389.6	386.4	383.2	380.0	376.9	373.7	370.5	367.3	363.5	359.6	355.8	352.0	348.1	344.3
28	392.6	389.4	386.2	382.9	379.7	376.5	373.3	370.1	366.3	362.4	358.5	354.7	350.8	347.0
28.25	395.5	392.3	389.1	385.8	382.6	379.4	376.2	372.9	369.0	365.2	361.3	357.4	353.5	349.6
28.5	398.5	395.2	392.0	388.7	385.5	382.2	379.0	375.7	371.8	367.9	364.0	360.1	356.2	352.3
28.75	401.5	398.2	394.9	391.6	388.4	385.1	381.8	378.6	374.6	370.7	366.8	362.8	358.9	355.0
29	404.4	401.1	397.8	394.6	391.3	388.0	384.7	381.4	377.4	373.5	369.5	365.5	361.6	357.6
29.25	407.4	404.1	400.8	397.5	394.1	390.8	387.5	384.2	380.2	376.2	372.2	368.3	364.3	360.3
29.5	410.4	407.0	403.7	400.4	397.0	393.7	390.4	387.0	383.0	379.0	375.0	371.0	367.0	362.9
29.75	413.3	410.0	406.6	403.3	399.9	396.5	393.2	389.8	385.8	381.8	377.7	373.7	369.6	365.6
30	416.3	412.9	409.5	406.2	402.8	399.4	396.0	392.7	388.6	384.5	380.5	376.4	372.3	368.3
30.25	419.2	415.8	412.5	409.1	405.7	402.3	398.9	395.5	391.4	387.3	383.2	379.1	375.0	370.9
30.5	422.2	418.8	415.4	412.0	408.5	405.1	401.7	398.3	394.2	390.1	385.9	381.8	377.7	373.6
30.75	425.2	421.7	418.3	414.9	411.4	408.0	404.5	401.1	397.0	392.8	388.7	384.5	380.4	376.2
31	428.1	424.7	421.2	417.8	414.3	410.8	407.4	403.9	399.8	395.6	391.4	387.2	383.1	378.9
31.25	431.1	427.6	424.1	420.7	417.2	413.7	410.2	406.7	402.5	398.3	394.2	390.0	385.8	381.6
31.5	434.1	430.6	427.1	423.6	420.1	416.6	413.1	409.6	405.3	401.1	396.9	392.7	388.4	384.2
31.75	437.0	433.5	430.0	426.5	422.9	419.4	415.9	412.4	408.1	403.9	399.6	395.4	391.1	386.9
32	440.0	436.4	432.9	429.4	425.8	422.3	418.7	415.2	410.9	406.6	402.4	398.1	393.8	389.5
32.25	443.0	439.4	435.8	432.3	428.7	425.1	421.6	418.0	413.7	409.4	405.1	400.8	396.5	392.2
32.5	445.9	442.3	438.8	435.2	431.6	428.0	424.4	420.8	416.5	412.2	407.8	403.5	399.2	394.9
32.75	448.9	445.3	441.7	438.1	434.5	430.9	427.3	423.6	419.3	414.9	410.6	406.2	401.9	397.5
33	451.8	448.2	444.6	441.0	437.3	433.7	430.1	426.5	422.1	417.7	413.3	408.9	404.6	400.2
33.25	454.8	451.2	447.5	443.9	440.2	436.6	432.9	429.3	424.9	420.5	416.1	411.7	407.3	402.9
33.5	457.8	454.1	450.4	446.8	443.1	439.4	435.8	432.1	427.7	423.2	418.8	414.4	409.9	405.5
33.75	460.7	457.0	453.4	449.7	446.0	442.3	438.6	434.9	430.5	426.0	421.5	417.1	412.6	408.2
34	463.7	460.0	456.3	452.6	448.9	445.2	441.4	437.7	433.3	428.8	424.3	419.8	415.3	410.8
34.25	466.7	462.9	459.2	455.5	451.7	448.0	444.3	440.6	436.0	431.5	427.0	422.5	418.0	413.5
34.5	469.6	465.9	462.1	458.4	454.6	450.9	447.1	443.4	438.8	434.3	429.8	425.2	420.7	416.2

450 POUND NOV. TANK AGENT QUANTITY TABLES

Liquid Level Inches	Temperature Degrees F (Degrees C)													
	0 (-17.8)	10 (-12.2)	20 (-6.7)	30 (-1.1)	40 (4.4)	50 (10)	60 (15.6)	70 (21.1)	80 (26.7)	90 (32.2)	100 (37.8)	110 (43.3)	120 (48.9)	130 (54.4)
34.75	472.6	468.8	465.0	461.3	457.5	453.7	450.0	446.2	441.6	437.1	432.5	427.9	423.4	418.8
35	475.6	471.8	468.0	464.2	460.4	456.6	452.8	449.0	444.4	439.8	435.2	430.7	426.1	421.5
35.25	478.5	474.7	470.9	467.1	463.3	459.5	455.6	451.8	447.2	442.6	438.0	433.4	428.8	424.1
35.5	481.5	477.6	473.8	470.0	466.1	462.3	458.5	454.6	450.0	445.4	440.7	436.1	431.4	426.8
35.75	484.4	480.6	476.7	472.9	469.0	465.2	461.3	457.5	452.8	448.1	443.5	438.8	434.1	429.5
36	487.4	483.5	479.7	475.8	471.9	468.0	464.2	460.3	455.6	450.9	446.2	441.5	436.8	432.1
36.25	490.4	486.5	482.6	478.7	474.8	470.9	467.0	463.1	458.4	453.7	448.9	444.2	439.5	434.8
36.5	493.3	489.4	485.5	481.6	477.7	473.7	469.8	465.9	461.2	456.4	451.7	446.9	442.2	437.4
36.75	496.3	492.4	488.4	484.5	480.5	476.6	472.7	468.7	464.0	459.2	454.4	449.6	444.9	440.1
37	499.3	495.3	491.3	487.4	483.4	479.5	475.5	471.5	466.8	462.0	457.2	452.4	447.6	442.8
37.25	502.2	498.3	494.3	490.3	486.3	482.3	478.3	474.4	469.5	464.7	459.9	455.1	450.2	445.4
37.5	505.2	501.2	497.2	493.2	489.2	485.2	481.2	477.2	472.3	467.5	462.6	457.8	452.9	448.1
37.75	508.2	504.1	500.1	496.1	492.1	488.0	484.0	480.0	475.1	470.2	465.4	460.5	455.6	450.7
38	511.1	507.1	503.0	499.0	494.9	490.9	486.9	482.8	477.9	473.0	468.1	463.2	458.3	453.4
38.25	514.1	510.0	506.0	501.9	497.8	493.8	489.7	485.6	480.7	475.8	470.8	465.9	461.0	456.1
38.5	517.0	513.0	508.9	504.8	500.7	496.6	492.5	488.5	483.5	478.5	473.6	468.6	463.7	458.7
38.75	520.0	515.9	511.8	507.7	503.6	499.5	495.4	491.3	486.3	481.3	476.3	471.3	466.4	461.4
39	523.0	518.9	514.7	510.6	506.5	502.3	498.2	494.1	489.1	484.1	479.1	474.1	469.1	464.0
39.25	525.9	521.8	517.6	513.5	509.4	505.2	501.1	496.9	491.9	486.8	481.8	476.8	471.7	466.7
39.5	528.9	524.7	520.6	516.4	512.2	508.1	503.9	499.7	494.7	489.6	484.5	479.5	474.4	469.4
39.75	531.9	527.7	523.5	519.3	515.1	510.9	506.7	502.5	497.5	492.4	487.3	482.2	477.1	472.0
40	534.8	530.6	526.4	522.2	518.0	513.8	509.6	505.4	500.2	495.1	490.0	484.9	479.8	474.7
40.25	537.8	533.6	529.3	525.1	520.9	516.6	512.4	508.2	503.0	497.9	492.8	487.6	482.5	477.3
40.5	540.8	536.5	532.3	528.0	523.8	519.5	515.2	511.0	505.8	500.7	495.5	490.3	485.2	480.0
40.75	543.7	539.5	535.2	530.9	526.6	522.4	518.1	513.8	508.6	503.4	498.2	493.0	487.9	482.7
41	546.7	542.4	538.1	533.8	529.5	525.2	520.9	516.6	511.4	506.2	501.0	495.8	490.5	485.3
41.25	549.7	545.3	541.0	536.7	532.4	528.1	523.8	519.5	514.2	509.0	503.7	498.5	493.2	488.0
41.5	552.6	548.3	543.9	539.6	535.3	530.9	526.6	522.3	517.0	511.7	506.5	501.2	495.9	490.6
41.75	555.6	551.2	546.9	542.5	538.2	533.8	529.4	525.1	519.8	514.5	509.2	503.9	498.6	493.3
42	558.5	554.2	549.8	545.4	541.0	536.7	532.3	527.9	522.6	517.3	511.9	506.6	501.3	496.0

850 POUND NOVEC TANK AGENT QUANTITY TABLES

Liquid Level Inches	Temperature Degrees F (Degrees C)													
	0 (-17.8)	10 (-12.2)	20 (-6.7)	30 (-1.1)	40 (4.4)	50 (10)	60 (15.6)	70 (21.1)	80 (26.7)	90 (32.2)	100 (37.8)	110 (43.3)	120 (48.9)	130 (54.4)
5	362.1	358.7	355.3	352.0	348.6	345.3	341.9	338.6	335.6	332.5	329.5	326.5	323.5	320.5
5.25	368.5	365.1	361.7	358.3	354.9	351.5	348.1	344.7	341.6	338.5	335.4	332.4	329.3	326.2
5.5	375.0	371.5	368.1	364.6	361.1	357.7	354.2	350.7	347.6	344.5	341.3	338.2	335.1	331.9
5.75	381.5	378.0	374.4	370.9	367.4	363.8	360.3	356.8	353.6	350.4	347.2	344.1	340.9	337.7
6	388.0	384.4	380.8	377.2	373.6	370.0	366.4	362.9	359.6	356.4	353.1	349.9	346.7	343.4
6.25	394.4	390.8	387.1	383.5	379.9	376.2	372.6	368.9	365.6	362.3	359.0	355.8	352.5	349.2
6.5	400.9	397.2	393.5	389.8	386.1	382.4	378.7	375.0	371.7	368.3	365.0	361.6	358.3	354.9
6.75	407.4	403.6	399.9	396.1	392.3	388.6	384.8	381.1	377.7	374.3	370.9	367.5	364.0	360.6
7	413.9	410.0	406.2	402.4	398.6	394.8	391.0	387.1	383.7	380.2	376.8	373.3	369.8	366.4
7.25	420.3	416.5	412.6	408.7	404.8	401.0	397.1	393.2	389.7	386.2	382.7	379.2	375.6	372.1
7.5	426.8	422.9	418.9	415.0	411.1	407.1	403.2	399.3	395.7	392.1	388.6	385.0	381.4	377.9
7.75	433.3	429.3	425.3	421.3	417.3	413.3	409.3	405.3	401.7	398.1	394.5	390.9	387.2	383.6
8	439.8	435.7	431.7	427.6	423.6	419.5	415.5	411.4	407.7	404.1	400.4	396.7	393.0	389.3
8.25	446.2	442.1	438.0	433.9	429.8	425.7	421.6	417.5	413.7	410.0	406.3	402.6	398.8	395.1
8.5	452.7	448.5	444.4	440.2	436.0	431.9	427.7	423.5	419.8	416.0	412.2	408.4	404.6	400.8
8.75	459.2	455.0	450.7	446.5	442.3	438.1	433.8	429.6	425.8	421.9	418.1	414.3	410.4	406.6
9	465.7	461.4	457.1	452.8	448.5	444.2	440.0	435.7	431.8	427.9	424.0	420.1	416.2	412.3
9.25	472.1	467.8	463.5	459.1	454.8	450.4	446.1	441.8	437.8	433.9	429.9	426.0	422.0	418.0
9.5	478.6	474.2	469.8	465.4	461.0	456.6	452.2	447.8	443.8	439.8	435.8	431.8	427.8	423.8
9.75	485.1	480.6	476.2	471.7	467.3	462.8	458.3	453.9	449.8	445.8	441.7	437.7	433.6	429.5
10	491.6	487.0	482.5	478.0	473.5	469.0	464.5	460.0	455.8	451.7	447.6	443.5	439.4	435.3
10.25	498.0	493.5	488.9	484.3	479.7	475.2	470.6	466.0	461.9	457.7	453.5	449.3	445.2	441.0
10.5	504.5	499.9	495.2	490.6	486.0	481.4	476.7	472.1	467.9	463.6	459.4	455.2	451.0	446.8
10.75	511.0	506.3	501.6	496.9	492.2	487.5	482.9	478.2	473.9	469.6	465.3	461.0	456.8	452.5
11	517.5	512.7	508.0	503.2	498.5	493.7	489.0	484.2	479.9	475.6	471.2	466.9	462.6	458.2
11.25	523.9	519.1	514.3	509.5	504.7	499.9	495.1	490.3	485.9	481.5	477.1	472.7	468.4	464.0
11.5	530.4	525.5	520.7	515.8	511.0	506.1	501.2	496.4	491.9	487.5	483.0	478.6	474.2	469.7
11.75	536.9	532.0	527.0	522.1	517.2	512.3	507.4	502.4	497.9	493.4	488.9	484.4	480.0	475.5
12	543.4	538.4	533.4	528.4	523.4	518.5	513.5	508.5	504.0	499.4	494.9	490.3	485.7	481.2
12.25	549.8	544.8	539.8	534.7	529.7	524.7	519.6	514.6	510.0	505.4	500.8	496.1	491.5	486.9
12.5	556.3	551.2	546.1	541.0	535.9	530.8	525.7	520.6	516.0	511.3	506.7	502.0	497.3	492.7
12.75	562.8	557.6	552.5	547.3	542.2	537.0	531.9	526.7	522.0	517.3	512.6	507.8	503.1	498.4
13	569.3	564.1	558.8	553.6	548.4	543.2	538.0	532.8	528.0	523.2	518.5	513.7	508.9	504.2

850 POUND NOVEL TANK AGENT QUANTITY TABLES

Liquid Level Inches	Temperature Degrees F (Degrees C)													
	0 (-17.8)	10 (-12.2)	20 (-6.7)	30 (-1.1)	40 (4.4)	50 (10)	60 (15.6)	70 (21.1)	80 (26.7)	90 (32.2)	100 (37.8)	110 (43.3)	120 (48.9)	130 (54.4)
13.25	575.7	570.5	565.2	559.9	554.7	549.4	544.1	538.9	534.0	529.2	524.4	519.5	514.7	509.9
13.5	582.2	576.9	571.6	566.2	560.9	555.6	550.2	544.9	540.0	535.2	530.3	525.4	520.5	515.6
13.75	588.7	583.3	577.9	572.5	567.1	561.8	556.4	551.0	546.1	541.1	536.2	531.2	526.3	521.4
14	595.2	589.7	584.3	578.8	573.4	567.9	562.5	557.1	552.1	547.1	542.1	537.1	532.1	527.1
14.25	601.6	596.1	590.6	585.1	579.6	574.1	568.6	563.1	558.1	553.0	548.0	542.9	537.9	532.9
14.5	608.1	602.6	597.0	591.4	585.9	580.3	574.8	569.2	564.1	559.0	553.9	548.8	543.7	538.6
14.75	614.6	609.0	603.4	597.7	592.1	586.5	580.9	575.3	570.1	565.0	559.8	554.6	549.5	544.3
15	621.1	615.4	609.7	604.0	598.4	592.7	587.0	581.3	576.1	570.9	565.7	560.5	555.3	550.1
15.25	627.5	621.8	616.1	610.3	604.6	598.9	593.1	587.4	582.1	576.9	571.6	566.3	561.1	555.8
15.5	634.0	628.2	622.4	616.6	610.8	605.1	599.3	593.5	588.1	582.8	577.5	572.2	566.9	561.6
15.75	640.5	634.6	628.8	622.9	617.1	611.2	605.4	599.5	594.2	588.8	583.4	578.0	572.7	567.3
16	647.0	641.1	635.2	629.2	623.3	617.4	611.5	605.6	600.2	594.8	589.3	583.9	578.5	573.0
16.25	653.4	647.5	641.5	635.5	629.6	623.6	617.6	611.7	606.2	600.7	595.2	589.7	584.3	578.8
16.5	659.9	653.9	647.9	641.8	635.8	629.8	623.8	617.7	612.2	606.7	601.1	595.6	590.1	584.5
16.75	666.4	660.3	654.2	648.1	642.1	636.0	629.9	623.8	618.2	612.6	607.0	601.4	595.9	590.3
17	672.9	666.7	660.6	654.4	648.3	642.2	636.0	629.9	624.2	618.6	612.9	607.3	601.6	596.0
17.25	679.3	673.1	666.9	660.7	654.5	648.3	642.1	635.9	630.2	624.5	618.8	613.1	607.4	601.7
17.5	685.8	679.6	673.3	667.0	660.8	654.5	648.3	642.0	636.3	630.5	624.8	619.0	613.2	607.5
17.75	692.3	686.0	679.7	673.4	667.0	660.7	654.4	648.1	642.3	636.5	630.7	624.8	619.0	613.2
18	698.8	692.4	686.0	679.7	673.3	666.9	660.5	654.2	648.3	642.4	636.6	630.7	624.8	619.0
18.25	705.3	698.8	692.4	686.0	679.5	673.1	666.7	660.2	654.3	648.4	642.5	636.5	630.6	624.7
18.5	711.7	705.2	698.7	692.3	685.8	679.3	672.8	666.3	660.3	654.3	648.4	642.4	636.4	630.4
18.75	718.2	711.7	705.1	698.6	692.0	685.5	678.9	672.4	666.3	660.3	654.3	648.2	642.2	636.2
19	724.7	718.1	711.5	704.9	698.2	691.6	685.0	678.4	672.3	666.3	660.2	654.1	648.0	641.9
19.25	731.2	724.5	717.8	711.2	704.5	697.8	691.2	684.5	678.4	672.2	666.1	659.9	653.8	647.7
19.5	737.6	730.9	724.2	717.5	710.7	704.0	697.3	690.6	684.4	678.2	672.0	665.8	659.6	653.4
19.75	744.1	737.3	730.5	723.8	717.0	710.2	703.4	696.6	690.4	684.1	677.9	671.6	665.4	659.1
20	750.6	743.7	736.9	730.1	723.2	716.4	709.5	702.7	696.4	690.1	683.8	677.5	671.2	664.9
20.25	757.1	750.2	743.3	736.4	729.5	722.6	715.7	708.8	702.4	696.1	689.7	683.3	677.0	670.6
20.5	763.5	756.6	749.6	742.7	735.7	728.7	721.8	714.8	708.4	702.0	695.6	689.2	682.8	676.4
20.75	770.0	763.0	756.0	749.0	741.9	734.9	727.9	720.9	714.4	708.0	701.5	695.0	688.6	682.1
21	776.5	769.4	762.3	755.3	748.2	741.1	734.0	727.0	720.5	713.9	707.4	700.9	694.4	687.9
21.25	783.0	775.8	768.7	761.6	754.4	747.3	740.2	733.0	726.5	719.9	713.3	706.7	700.2	693.6

850 POUND NOVEC TANK AGENT QUANTITY TABLES

Liquid Level Inches	Temperature Degrees F (Degrees C)													
	0 (-17.8)	10 (-12.2)	20 (-6.7)	30 (-1.1)	40 (4.4)	50 (10)	60 (15.6)	70 (21.1)	80 (26.7)	90 (32.2)	100 (37.8)	110 (43.3)	120 (48.9)	130 (54.4)
21.5	789.4	782.2	775.1	767.9	760.7	753.5	746.3	739.1	732.5	725.9	719.2	712.6	706.0	699.3
21.75	795.9	788.7	781.4	774.2	766.9	759.7	752.4	745.2	738.5	731.8	725.1	718.4	711.8	705.1
22	802.4	795.1	787.8	780.5	773.2	765.9	758.6	751.2	744.5	737.8	731.0	724.3	717.6	710.8
22.25	808.9	801.5	794.1	786.8	779.4	772.0	764.7	757.3	750.5	743.7	736.9	730.1	723.3	716.6
22.5	815.3	807.9	800.5	793.1	785.6	778.2	770.8	763.4	756.5	749.7	742.8	736.0	729.1	722.3
22.75	821.8	814.3	806.9	799.4	791.9	784.4	776.9	769.5	762.6	755.6	748.7	741.8	734.9	728.0
23	828.3	820.7	813.2	805.7	798.1	790.6	783.1	775.5	768.6	761.6	754.6	747.7	740.7	733.8
23.25	834.8	827.2	819.6	812.0	804.4	796.8	789.2	781.6	774.6	767.6	760.6	753.5	746.5	739.5
23.5	841.2	833.6	825.9	818.3	810.6	803.0	795.3	787.7	780.6	773.5	766.5	759.4	752.3	745.3
23.75	847.7	840.0	832.3	824.6	816.9	809.2	801.4	793.7	786.6	779.5	772.4	765.2	758.1	751.0
24	854.2	846.4	838.6	830.9	823.1	815.3	807.6	799.8	792.6	785.4	778.3	771.1	763.9	756.7
24.25	860.7	852.8	845.0	837.2	829.3	821.5	813.7	805.9	798.6	791.4	784.2	776.9	769.7	762.5
24.5	867.1	859.3	851.4	843.5	835.6	827.7	819.8	811.9	804.6	797.4	790.1	782.8	775.5	768.2
24.75	873.6	865.7	857.7	849.8	841.8	833.9	825.9	818.0	810.7	803.3	796.0	788.6	781.3	774.0
25	880.1	872.1	864.1	856.1	848.1	840.1	832.1	824.1	816.7	809.3	801.9	794.5	787.1	779.7
25.25	886.6	878.5	870.4	862.4	854.3	846.3	838.2	830.1	822.7	815.2	807.8	800.3	792.9	785.4
25.5	893.0	884.9	876.8	868.7	860.6	852.4	844.3	836.2	828.7	821.2	813.7	806.2	798.7	791.2
25.75	899.5	891.3	883.2	875.0	866.8	858.6	850.5	842.3	834.7	827.2	819.6	812.0	804.5	796.9
26	906.0	897.8	889.5	881.3	873.1	864.8	856.6	848.3	840.7	833.1	825.5	817.9	810.3	802.7
26.25	912.5	904.2	895.9	887.6	879.3	871.0	862.7	854.4	846.7	839.1	831.4	823.7	816.1	808.4
26.5	918.9	910.6	902.2	893.9	885.5	877.2	868.8	860.5	852.8	845.0	837.3	829.6	821.9	814.1
26.75	925.4	917.0	908.6	900.2	891.8	883.4	875.0	866.5	858.8	851.0	843.2	835.4	827.7	819.9
27	931.9	923.4	915.0	906.5	898.0	889.6	881.1	872.6	864.8	857.0	849.1	841.3	833.5	825.6
27.25	938.4	929.8	921.3	912.8	904.3	895.7	887.2	878.7	870.8	862.9	855.0	847.1	839.3	831.4
27.5	944.8	936.3	927.7	919.1	910.5	901.9	893.3	884.8	876.8	868.9	860.9	853.0	845.0	837.1
27.75	951.3	942.7	934.0	925.4	916.8	908.1	899.5	890.8	882.8	874.8	866.8	858.8	850.8	842.8
28	957.8	949.1	940.4	931.7	923.0	914.3	905.6	896.9	888.8	880.8	872.7	864.7	856.6	848.6
28.25	964.3	955.5	946.8	938.0	929.2	920.5	911.7	903.0	894.9	886.7	878.6	870.5	862.4	854.3
28.5	970.7	961.9	953.1	944.3	935.5	926.7	917.8	909.0	900.9	892.7	884.5	876.4	868.2	860.1
28.75	977.2	968.3	959.5	950.6	941.7	932.8	924.0	915.1	906.9	898.7	890.5	882.2	874.0	865.8
29	983.7	974.8	965.8	956.9	948.0	939.0	930.1	921.2	912.9	904.6	896.4	888.1	879.8	871.5
29.25	990.2	981.2	972.2	963.2	954.2	945.2	936.2	927.2	918.9	910.6	902.3	893.9	885.6	877.3
29.5	996.6	987.6	978.6	969.5	960.5	951.4	942.4	933.3	924.9	916.5	908.2	899.8	891.4	883.0

850 POUND NOVEL TANK AGENT QUANTITY TABLES

Liquid Level Inches	Temperature Degrees F (Degrees C)													
	0 (-17.8)	10 (-12.2)	20 (-6.7)	30 (-1.1)	40 (4.4)	50 (10)	60 (15.6)	70 (21.1)	80 (26.7)	90 (32.2)	100 (37.8)	110 (43.3)	120 (48.9)	130 (54.4)
29.75	1003.1	994.0	984.9	975.8	966.7	957.6	948.5	939.4	930.9	922.5	914.1	905.6	897.2	888.8
30	1009.6	1000.4	991.3	982.1	972.9	963.8	954.6	945.4	937.0	928.5	920.0	911.5	903.0	894.5
30.25	1016.1	1006.9	997.6	988.4	979.2	970.0	960.7	951.5	943.0	934.4	925.9	917.3	908.8	900.3
30.5	1022.6	1013.3	1004.0	994.7	985.4	976.1	966.9	957.6	949.0	940.4	931.8	923.2	914.6	906.0
30.75	1029.0	1019.7	1010.3	1001.0	991.7	982.3	973.0	963.6	955.0	946.3	937.7	929.0	920.4	911.7
31	1035.5	1026.1	1016.7	1007.3	997.9	988.5	979.1	969.7	961.0	952.3	943.6	934.9	926.2	917.5

CLEARING ELECTRICAL EQUIPMENT

Refer to AUTOPULSE Installation, Operation, and Maintenance manuals for detailed instructions on resetting the electric detection system.

NOTICE

If AUTOPULSE Control System is utilizing an ANSUL AUTOMAN II-C releasing device for pneumatic actuation, AUTOPULSE panel will remain in trouble condition until ANSUL AUTOMAN II-C release is cocked.

CHECK MECHANICAL AND ELECTRICAL EQUIPMENT

Piping and Nozzles

A fire condition could cause damage to the piping and nozzles and possibly support members. Check all rigid pipe supports and all fitting connections. Take the nozzles off the piping, inspect for damage, corrosion, or obstructions, clean and re-install.

Electric Detection System

ANSUL AUTOMAN II-C RELEASING DEVICE – For complete resetting instructions, refer to Installation, Operation, and Maintenance manuals, Part No. 17788 and 31496. **Note: Before resetting release mechanism, bleed pressure from actuation piping by pulling ring on safety relief valve located on actuation piping.**

AUTOPULSE Control System – For complete resetting instructions, refer to the appropriate installation, operation, and maintenance manual.

RECHARGING

⚠ CAUTION

Make certain tanks contain no pressure before removing valves. If tank contains pressure, removing valve could cause violent tank movement, causing personnel injury or property damage.

Valve Teardown

Note: In order to maintain Factory Mutual approval, factory filled SAPPHIRE tanks must be used.

1. Remove empty SAPPHIRE tanks by removing the actuators (either electric or pneumatic).
2. Remove piping and discharge hose from valve outlet and remove empty tanks from brackets.
3. Tank valves must be rebuilt and all O-rings replaced prior to tanks being recharged. Follow instructions listed in Step No. 4 and 4a.
4. **1 in and 2 in. Valves** – Valve cleaning/O-ring replacement instructions. Refer to Figure 1 for component descriptions.

   The following components are required for valve rebuilding:

   - Bonnet assembly, Part No. 570543 for 1 in., Part No. 570541 for 2 in.
   - Piston assembly, Part No. 570551 for 1 in., Part No. 570552 for 2 in.
   - O-ring kit, Part No. 570559 for 1 in., Part No. 570584 for 2 in.
   - If necessary, recoil cap assembly, Part No. 570553 for 1 in., Part No. 570554 for 2 in.

   a. Remove the valve from the tank.

   b. Remove the siphon tube locking screw to allow removal of the siphon tube from the valve.

   c. Remove the socket head cap screw that holds the recoil cap chain to the valve body.

   d. Remove bonnet locking screw from the same port as socket head cap screw mentioned in Step "c" and unscrew the bonnet assembly, using the spanner wrench, Part No. 570574. Remove and discard O-ring from bonnet assembly.

   e. Remove the piston assembly by pushing up on it from the bottom of the valve. Discard complete piston assembly.

   f. Remove collar O-ring, and siphon tube O-ring. Discard both.

   g. Clean all internal valve surfaces. Use caution not to cause any scratching to surfaces.

   h. Use O-ring kit, Part No. 570559 for 1 in. or Part No. 570584 for 2 in., to replace with all new O-rings. Apply Dow Corning No. 4 lube to all O-rings before installing on components.

   i. Push in new piston assembly.

   j. Screw in bonnet assembly, including new O-ring. Tighten with spanner wrench.

   k. Thread in bonnet locking screw followed by washer, chain and socket head cap screw. The cap screw holds the recoil cap chain to the tank valve body.

   l. Install collar and siphon tube O-ring. Before installing, coat with Dow Corning No. 4 lube.

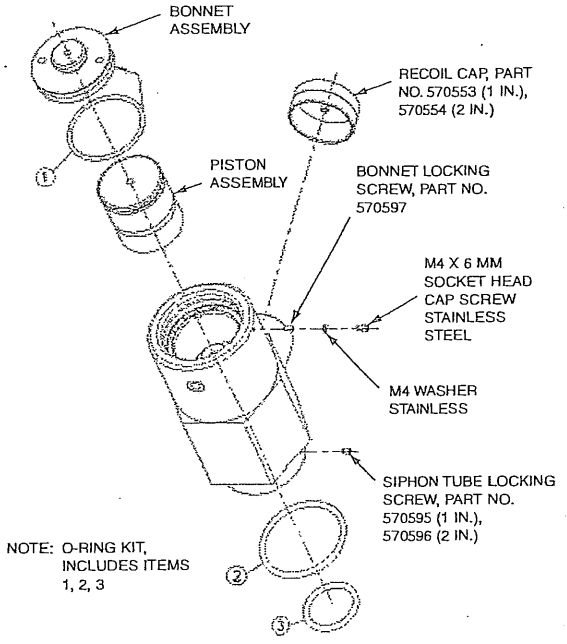
Resetting and Recharge

RECHARGING (Continued)

Valve Teardown (Continued)

m. Push siphon tube into base of valve and rotate until locking screw hole in the siphon tube is aligned with the siphon tube locking screw hole in the valve base. Install siphon tube locking screw.

n. Do not install valve into tank until Step "1g" in "Filling Instructions."



1 IN. AND 2 IN. VALVE COMPONENTS

FIGURE 1
006768

4a. **3 in. Valve** – Valve cleaning/O-ring replacement instructions. Refer to Figure 2 for component descriptions.

The following components are required for valve rebuilding:

- Top cap assembly, Part No. 570598
- Piston assembly, Part No. 570601
- O-ring kit, Part No. 570599
- If necessary, recoil cap assembly, Part No. 570600

a. Remove valve from tank. Note: Siphon tube for 3 in. valve stays in the tank collar.

b. Unscrew top cap.

c. Remove body and collar O-rings. Replace with new O-rings in a later Step.

d. Remove the piston from the valve body and discard.

e. Clean inside surfaces of valve body. Be careful not to scratch surface. Spray a small quantity of PTFE silicone into the inside of the valve.

f. Lubricate top cap O-ring with PTFE silicone and install into upper groove on valve body.

g. Lubricate collar O-ring with PTFE silicone and install on valve collar threads.

h. Lubricate piston O-rings with PTFE silicone and install piston in valve body.

i. Install top cap on valve body. Hand tighten.

j. Valve assembly is now ready to be leak tested. See Testing Section.

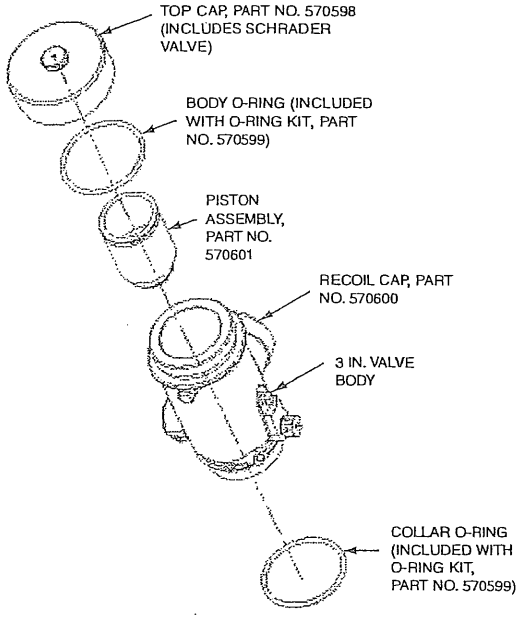


FIGURE 2
006904

TESTING

On completion of the valve tear down, the valve assembly requires two tests – Leak Test and Pre-Dome Test (Pre-Dome Test is required only if burst disc had been changed).

The tests must be conducted using a nitrogen source, a test bottom cap, close down adaptor, and an outlet filling adaptor. See Figure 3 for Test Station Component Layout.

Valve Size	Bottom Test Cap Part No.	Top Closing Adaptor Part No.	Outlet Filling Adaptor Part No.
1 in.	570272	570579	570576
2 in.	570276	570579	570592
3 in.	570374	570579	69891

Resetting and Recharge

TESTING (Continued)

1. The valve assembly is assembled to the test bottom cap. The outlet adaptor is assembled to the valve outlet. Attach the nitrogen line and make certain the vent valve on the outlet adaptor is closed.
2. Burst Disc Pre-Dome Procedure – Open the nitrogen regulator to 580 psi (40 bar) and slowly allow pressure to the valve through the bottom test cap. This is to pre-dome the burst disc. Hold this pressure for 1 minute to ensure that there is no drop in pressure indicted by the rest gauge on the nitrogen test set-up.
3. Pour water/soap solution into the top cap Schrader valve and apply leak detection spray to all ports on the valve. If no leaks are detected, the pressure to the valve must be reduced to 363 psi (25 bar) and the close down adaptor must be attached. To close the valve piston, increase the nitrogen pressure to the close down adaptor to 580 psi (40 bar).
4. Check for leaks.
5. Slowly release the gas pressure from the nitrogen test set-up, vent the close down adaptor, and make certain that the outlet filling adaptor is opened before removing the adaptors.
6. If a leak had been detected, it must be rectified and retested. If the leak persists, the valve assembly must be rejected.

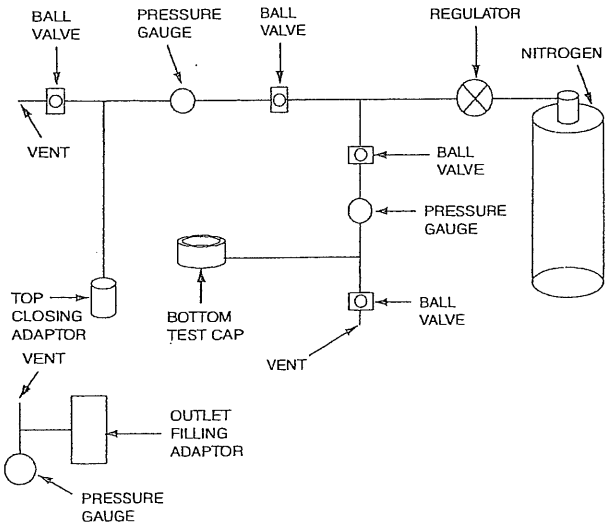


FIGURE 3
004977

FILLING INSTRUCTIONS

1. Recharging Instructions:
   a. See Figure 4 for a typical recharge station configuration.
   b. Install a drier (such as a Hammond DRIERITE filter) in a threaded port on the Novec 1230 agent container. A drier is required because humid air may cause the agent to convert to an acid.
   c. The outlet of the container requires an inline (20 micron or smaller) filter.
   d. The agent can either be pumped or gravity fed to the tank.
   e. Tank must be visually inspected and clean inside. **IMPORTANT – No moisture is allowed in the tank. It must be completely dried. Water mixed with agent will cause acid.**
   f. Rebuild valve. See "Valve Rebuild Instructions," Step 4 and 4a.
   g. Reinstall valve and siphon tube assembly into tank. Tighten securely.
   h. Purge tank by pressurizing through a Outlet Fill Adaptor Assembly (see chart on Page 9-2) to 100 psi (6.9 bar) with dry nitrogen, then vent pressure. This process will remove humid air from the tank.
   i. Fill tank with correct amount of agent by weight. See nameplate for this information.
   j. Set regulator to 20 psi (1.4 bar) lower than the required tank pressure based on ambient temperature. Refer to pressure vs. temperature chart in this section. Pressurize tank. Agitate tank while pressurizing.
   k. After correct pressure is reached, close valve near tank valve outlet.
   l. Close tank valve by using Top Adaptor Assembly, Part No. 570579, as follows. Set regulator to 450 psi (31.0 bar). Pressure Top Adaptor Assembly. Open and close the valve rapidly to prevent over-pressurizing of tank.
   m. Vent pressure from tank valve outlet.
   n. Remove Fill Adaptor Assembly and install recoil cap on valve outlet.
   o. Agitate tank by rolling or inverting so that the agent can absorb the nitrogen.

Resetting and Recharge

FILLING INSTRUCTIONS (Continued)

p. Add more nitrogen through the Top Adaptor Assembly. Using the pressure vs. temperature chart at ambient temperature, set the regulated pressure at the corresponding pressure plus 8 psi (0.6 bar). It takes 8 psi (0.6 bar) to overcome the spring force in the valve core. **Note:** Do not use gauge on valve to determine recharge pressure.

q. Repeat Steps "o" and "q" until the agent has fully absorbed the nitrogen.

r. Let tank assembly sit for 3 hours.

s. Check the tank valve for leaks by using soap and water solution.

t. Check tank gauge pressure based on pressure vs. temperature chart.

u. Repeat Step "o."

v. Recheck gauge pressure. If gauge reading decreased, repeat Step "p."

w. Once tank pressure is correct, remove from fill station.

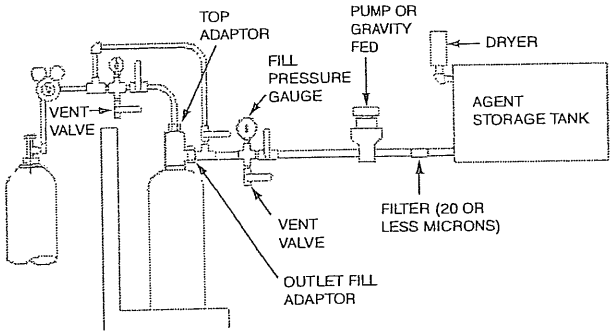
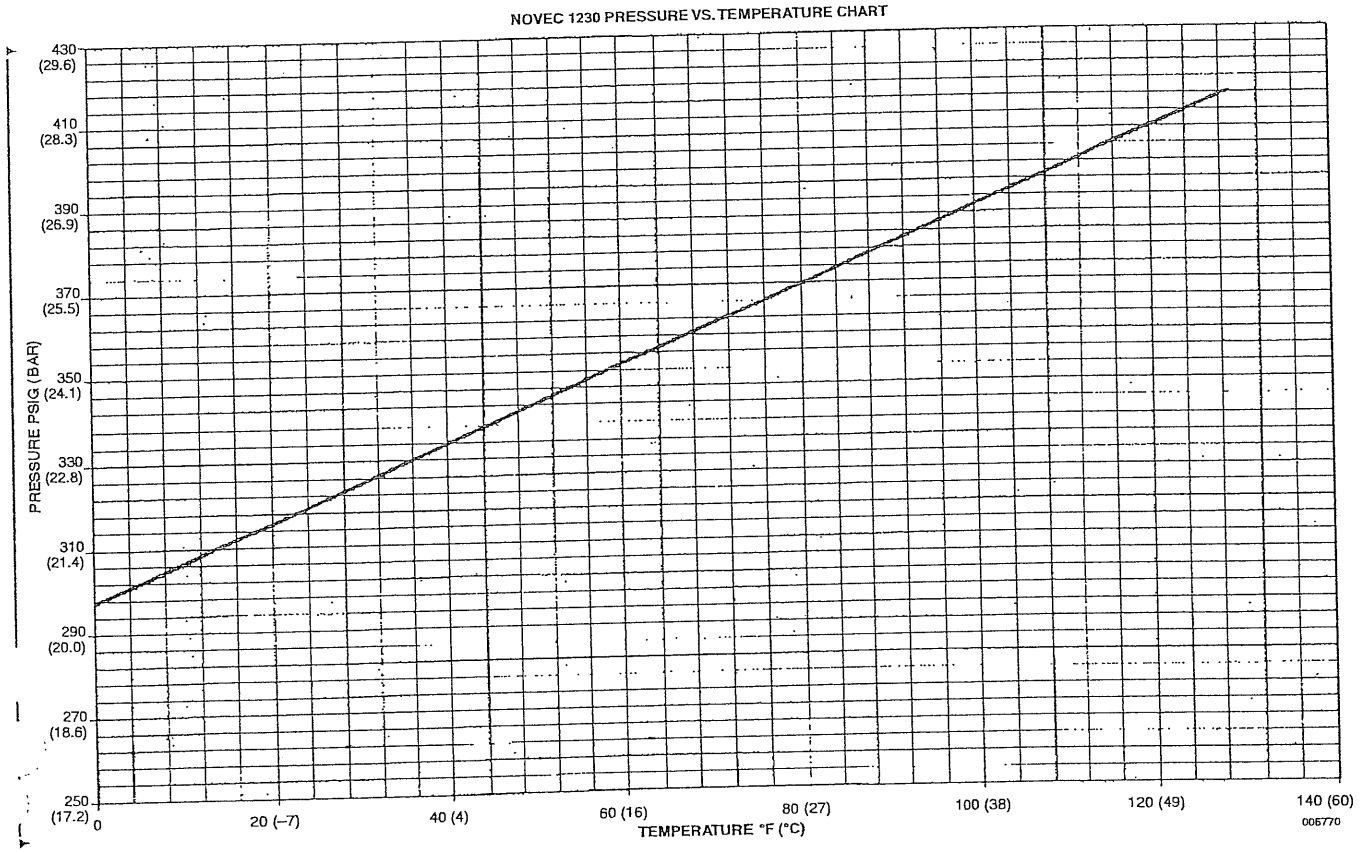


FIGURE 4
006767

2. Replace recharged tanks in bracket and follow "Installation" procedures to put system back in service.
3. Inform proper personnel that the system is back in service.



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HARDWARE WARRANTY

1) SIMPLEXGRINNELL WARRANTY STATEMENT:

   a) SIMPLEXGRINNELL WARRANTS TO THE PURCHASER OF NEW SIMPLEXGRINNELL PRODUCT(S) THAT THE PRODUCTS SHALL BE FREE FROM DEFECTS IN WORKMANSHIP AND MATERIAL.

2) WARRANTY PERIOD:

   a) THE WARRANTY PERIOD WILL TERMINATE IMMEDIATELY FOLLOWING THE EARLIEST OCCURRENCE OF EITHER OF THE FOLLOWING:

      i) 18 MONTHS HAVE ELAPSED FOLLOWING SHIPMENT OF ANY SYSTEM OR SUB-SYSTEM FROM SIMPLEXGRINNELL TO THE CUSTOMER, OR

      ii) 12 MONTHS HAVE ELAPSED FOLLOWING THE FINAL CONNECTION OPERATION AND BENEFICIAL USE OF ALL OR ANY PART OF THE SYSTEM.

      iii) AS STATED IN THE SPECIFICATIONS AND/OR CONTRACT DRAWINGS

3) SIMPLEXGRINNELL OBLIGATION UNDER THE TERMS OF THE WARRANTY:

   a) SIMPLEXGRINNELL'S SOLE RESPONSIBILITY SHALL BE TO REPAIR, ADJUST OR REPLACE, AT ITS OPTION, ANY SIMPLEXGRINNELL PRODUCT WHICH FAILS DURING THIS PERIOD PROVIDING PURCHASER HAS PROMPTLY REPORTED SUCH FAILURE TO SIMPLEXGRINNELL IN WRITING. REPLACEMENT PARTS WILL BE WARRANTED ONLY FOR THE BALANCE OF THE EQUIPMENT WARRANTY. SIMPLEXGRINNELL AGREES TO CONTINUE TO HONOR ALL OF THE UNEXPIRED EXPRESSED WARRANTIES SPECIFIED ABOVE ON DEFECTIVE EQUIPMENT AFTER TRANSFER OF THE EQUIPMENT TO PURCHASER'S CUSTOMER, PROVIDED PURCHASER'S CUSTOMER ASSUMES THE PURCHASER'S OBLIGATIONS SPECIFIED BELOW.

   b) EXCEPT FOR THE EXPRESSED WARRANTIES STATED HEREIN, SIMPLEXGRINNELL DISCLAIMS ALL WARRANTIES ON PRODUCTS FURNISHED HEREUNDER, INCLUDING WITHOUT LIMITATION, ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND THE STATED WARRANTIES ARE IN LIEU OF ALL OBLIGATIONS OR LIABILITIES ON THE PART OF THE SIMPLEXGRINNELL ARISING OUT OF OR IN CONNECTION WITH THE PERFORMANCE OF THE PRODUCTS. THE SELLER SHALL NOT BE LIABLE FOR ANY DIRECT, INCIDENTAL OR CONSEQUENTIAL LOSS OR DAMAGE TO THE PRUCHASER OR USER OF THIS EQUIPMENT ARISING OUT OF THE FAILURE OF THE EQUIPMENT TO OPERATE IN EXCESS OF THE PURCHASE PRICE OF SAID EQUIPMENT.

   c) SIMPLEXGRINNELL MAKES NO WARRANTY AND NO WARRANTY SHALL BE DEEMED TO EXIST, THAT PURCHASER HOLDS THE GOODS FREE OF THE CLAIM OF ANY THIRD PERSON BYWAY OF PATENT INFRINGEMENT OR THE LIKE.

4) PURCHASER'S OBLIGATIONS UNDER THE TERMS OF THE WARRANTY.

   a) THIS WARRANTY IS CONTINGENT UPON THE PROPER INSTALLATION AND USE OF THE PRODUCT(S). SUCH WARRANTY SHALL NOT APPLY IF THE PRODUCT FAILURE IS THE RESULT OF ACCIDENT, UNUSUAL PHYSICAL, ELECTRICAL OR ELECTROMECHANICAL STRESS, NEGLECT, MISUSE, USER PROGRAMMING ERRORS, FAILURE OF ELECTRICAL POWER, AIR CONDITIONING OR HUMIDITY CONTROL, CONSTRUCTION DUST, DAMAGING FOREIGN SUBSTANCES, TRANSPORTATION OR CAUSES OTHER THAN MANUFACTURING DEFECT. PURCHASER AGREES TO PROVIDE FULL AND FREE ACCESS TO AUTHORIZED SIMPLEXGRINNELL EMPLOYEES.

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5) WARRANTY SERVICE HOURS:

a) SERVICES PROVIDED UNDER THIS WARRANTY WILL BE PERFORMED DURING THE HOURS OF 8:00A.M. TO 5:00P.M., MONDAY THROUGH FRIDAY, EXCLUDING LOCALLY OBSERVED SIMPLEXGRINNELL HOLIDAYS. OFF HOURS RESPONSE IS AVAILABLE AS AN EXTRA COST SERVICE OPTION.

6) WARRANTY EXCLUSIONS:

a) LABOR, TRAVEL, AND MILEAGE FOR:

i) SERVICE OUTSIDE OF SIMPLEXGRINNELL NORMAL BUSINESS HOURS.
ii) PROGRAMMING AND/OR LABEL CHANGES.
iii) FAILURE DUE TO EXTERNAL CAUSES (LIGHTNING SURGES, CONSTRUCTION DUST, ETC.) OTHER THAN MANUFACTURING DEFECT.

b) ELECTRICAL WORK EXTERNAL TO THE EQUIPMENT SUPPLIED BY SIMPLEXGRINNELL OR MAINTENANCE OF ACCESSORIES, ALTERATIONS, ATTACHMENTS OR OTHER DEVICES NOT FURNISHED BY SIMPLEXGRINNELL.

c) BATTERIES

d) COVERAGE OF EQUIPMENT CLASSED AS A WATER FLOW MONITORING/CONTROL DEVICES INSTALLED IN OR ON WATER PIPING.

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MANUFACTURER'S RECOMMENDATION

1. CONTRACTOR IS EXPECTED TO PULL AND TERMINATE ALL CONDUCTORS AND INSTALL ALL DEVICES FOR A COMPLETE AND OPERATING SYSTEM.

2. WHERE FAN SHUTDOWN, ELEVATOR RECALL OR SPECIAL AUXILIARY FUNCTIONS ARE REQUIRED, CONTRACTOR IS TO VERIFY WIRING REQUIREMENTS WITH THE SIMPLEXGRINNELL FACTORY TECHNICIAN ASSIGNED TO THE PROJECT (IN MANY CASES, SPECIAL WIRING WILL NOT BE SHOWN ON THE DRAWINGS).

3. WHERE POSSIBLE, THE CONTRACTOR IS TO USE COLOR CODE FOR ALL WIRING.

4. SMOKE DETECTORS ARE NOT TO BE MOUNTED WITHIN 3 FEET OF AIR OUTLETS.

5. CONTRACTOR MUST NOT INSTALL SMOKE DETECTOR HEADS IN BASES OR DUCT HOUSING UNTIL FINAL CHECKOUT TIME TO INSURE THAT DIRT OR DUST DOES NOT CONTAMINATE THE UNITS. DIRTY DETECTORS ARE NOT COVERED BY WARRANTY.

6. DO NOT POWER-UP SYSTEM UNTIL SIMPLEXGRINNELL FACTORY TECHNICIAN IS PRESENT.
7. A SEPARATE GROUND (ISOLATION FROM CONDUIT GROUND) MUST BE PULLED TO ALL CABINETS.
8. LOADS GREATER THAN 10 AMPS (FOR AUXILIARY FUNCTIONS) ARE NOT ALLOWED IN THE SAME CONDUIT AS FIRE ALARM.

9. CONTRACTOR IS TO ENSURE THAT ALL WIRING AND SHIELDS ARE FREE OF SHORTS, GROUNDS AND OPENS.

10. UNDERGROUND WIRING MUST MAINTAIN ONE MEGAOHM, 20F RESISTANCE TO GROUND.

11. ANY MANUFACTURER'S RECOMMENDATION IN CONFLICT WITH ENGINEERING DRAWINGS OR SPECIFICATIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION. CONTRACTOR SHALL ADVISE SIMPLEXGRINNELL OF ANY CHANGES.
12. PROTECTIVE COVERS ON SMOKE DETECTORS ARE NOT TO BE REMOVED UNTIL OWNERS ACCEPTANCE OF THE SYSTEM. (PREVENTS CONTAMINATION OF SMOKE CHAMBER).

13. IT IS THE CONTRACTOR'S RESPONSIBILITY TO REQUEST THE STATE OR LOCAL FIRE MARSHAL TO BE ON SITE FOR FINAL ACCEPTANCE AND CHECK OUT IF REQUIRED.

14. IT IS THE CONTRACTOR'S RESPONSIBILITY TO INVENTORY ALL EQUIPMENT RECEIVED FROM SIMPLEXGRINNELL AGAINST THE CONTRACT DOCUMENTS AND REPORT ANY DISCREPANCIES WITHIN THIRTY (30) DAYS OR SIMPLEXGRINNELL WILL ASSUME THE ORDER TO BE ACCURATE AND COMPLETE.

    a. *NOTE: IN THE EVENT OF DISCREPANCIES IN THE NUMBER OF DEVICES SUPPLIED, THE FOLLOWING SIMPLEXGRINNELL POLICY WILL APPLY:

        i. TOO FEW DEVICES: IF THE DEVICE IS SHOWN ON THE CONTRACT DOCUMENTS AND HAS NOT BEEN ADDED AS A RESULT OF A POST BID ADDITION OR CHANGE ORDER, SIMPLEXGRINNELL WILL SUPPLY THE DEVICE AT NO CHARGE TO THE CONTRACTOR OR END USER PER SIMPLEXGRINNELL'S CONTRACT OBLIGATIONS.

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ii. TOO MANY DEVICES: IF THE DEVICE SHOWN IS EXTRA, DUE TO A POST BID ADDITION OR CHANGE ORDER; IT REMAINS THE PROPERTY OF THE CONTRACTOR OR END USER. IF THE DEVICE IS EXTRA DUE TO AN ERROR IN QUANTITIES SUPPLIED, THE DEVICE MUST BE RETURNED TO SIMPLEXGRINNELL. NO CREDIT WILL BE ISSUED FOR THE RETURN OF EXTRA EQUIPMENT ABOVE THE QUANTITIES GIVEN IN THE CONTRACT DOCUMENTS.

15. OWNERS PRESENCE FOR FINAL DEMONSTRATION AND ACCEPTANCE.

SPECIAL INSTRUCTIONS-SIMPLEXGRINNELL

1. SIMPLEXGRINNELL WILL PROVIDE WIRING INSTRUCTIONS FOR INSTALLATION OF SIMPLEXGRINNELL EQUIPMENT.

2. SIMPLEXGRINNELL WILL PROVIDE A FACTORY TRAINED TECHNICIAN TO ASSIST IN TRAINING:
   a. OPERATION OF THE CONTROL PANEL AND FUNCTIONS
   b. ALARM TEST OF ALL SIMPLEXGRINNELL PERIPHERAL DEVICES (SMOKE DETECTOR, MANUAL PULL STATION, ETC.)
   c. SUPERVISE TEST OF ALL INITIATING, SIGNALING, AND CONTROL CIRCUITS.

3. SIMPLEXGRINNELL WILL PROVIDE (1) INSTRUCTION AT FINAL TEST OF THE SYSTEM TO:
   a. OWNER REPRESENTATIVE
   b. FIRE INSPECTOR AND ELECTRICAL INSPECTOR
   c. ARCHITECT AND ENGINEER

4. UPON COMPLETION OF FINAL TEST, SIMPLEXGRINNELL WILL PROVIDE:
   a. TEST REPORT
   b. CERTIFICATION (IF REQUIRED)
   c. ONE YEAR WARRANTY

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TESTING PROCEDURE FOR DEVICES

GENERAL:
FOR ALL DEVICES (SUPPLIED BY SIMPLEXGRINNELL) VISUALLY VERIFY PROPER LOCATION AND INSTALLATION.

SMOKE DETECTOR:
ACTIVATE THE DEVICE USING A SMOKE GENERATOR AND VERIFY ALARM CONDITION ON PANEL. RESET PANEL AND VERIFY RESET OF SMOKE DETECTOR AND PANEL. TEST FOR ALARM VERIFICATION IF APPROPRIATE.

HEAT DETECTOR:
FIXED TEMPERATURE REPLACEMENT ELEMENT - REMOVE ELEMENT ON HEAT DETECTOR TO INITIATE ALARM AND VERIFY ALARM CONDITION AT PANEL. REINSTALL ELEMENT, RESET SYSTEM, AND VERIFY.

NON-REPLACEABLE ELEMENT - NON-REPLACEABLE ELEMENT HEAT DETECTORS CAN ONLY BE TESTED FOR CONTINUITY.

RATE-OF-RISE DETECTORS - RATE OF RISE DETECTORS ARE TESTED WITH A HEATER OR BLOW DRYER UNTIL THEY INITIATE ALARM, THEN ALLOWED TO COOL. RESET PANEL AND VERIFY.

PULL STATIONS:
ACTIVATE STATION WITH THE T-HANDLE, VERIFY ALARM AND LABEL FOR LOCATION, RESET STATION, RESET PANEL.

DUCT DETECTOR:
(PROVIDED BY SIMPLEXGRINNELL) REMOVE DUCT DETECTOR HOUSING COVER AND ACTIVATE DEVICE WITH SMOKE, VERIFY ALARM, TEST ALL INDICATORS OR MANUAL TEST SWITCHES, RESET DETECTOR, RESET PANEL, TEST SAMPLE AND REFERENCE TUBE FOR POSITIVE AIR FLOW. (IF NOT PROVIDED BY SIMPLEXGRINNELL) VERIFY THAT ZONE CIRCUIT IS PRESENT AT THE DEVICE.

AUDIBLES AND VISIBLES:
ACTIVATE ALARM AND CONFIRM THAT ALL INDICATING APPLIANCES, AUDIBLES AND VISIBLES, ARE OPERATING.

DOOR HOLDERS:
VERIFY THAT DOORS CLOSE ON ALARM.

VALVE SUPERVISORY SWITCHES (TAMPER):
(IF PROVIDED BY SIMPLEXGRINNELL) ACTIVATE SWITCH BY MOVING VALVE OFF NORMAL, VERIFY STATUS CHANGE, RESET SWITCH, RESET PANEL. (IF NOT PROVIDED BY SIMPLEXGRINNELL) VERIFY THAT ZONE CIRCUIT IS PRESENT AT THE SWITCH.

FLOW SWITCHES AND PRESSURE SWITCHES:
(IF PROVIDED BY SIMPLEXGRINNELL) ACTIVATE SWITCH (WITH SPRINKLER CONTRACTOR PRESENT) BY A FLOW OF WATER, VERIFY STATUS CHANGE, RESET SWITCHES, RESET PANEL. (IF NOT PROVIDED BY SIMPLEXGRINNELL) VERIFY THAT ZONE CIRCUIT IS PRESENT AND SUPERVISED AT THE SWITCH.

FAN/DAMPER CONTROL CIRCUITS:
VERIFY (WITH HVAC CONTRACTOR PRESENT) THAT THE CONTROL CIRCUIT IS OPERATING AND THE DEVICES IS BEING CONTROLLED IN ACCORDANCE WITH THE SPECIFIED SEQUENCE OF OPERATION.

ELEVATOR CONTROL CIRCUITS:
VERIFY (WITH ELEVATOR CONTRACTOR PRESENT) THAT THE ELEVATOR IS BEING CONTROLLED IN ACCORDANCE WITH THE SPECIFIED SEQUENCE OF OPERATION.

TRAINING:
SIMPLEXGRINNELL SHALL PROVIDE A ONE TRAINING SESSION TO THE CUSTOMER.

WARRANTY:
THE SYSTEM SHALL BE PROVIDED WITH A ONE YEAR HARDWARE WARRANTY.

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Baffinland Mines

Fire Alarm System

SimplexGrinnell
1485 Lindsey Place
Delta, B.C. V3M 6V1
Phone: 604.515.8872
Fax: 604.519.1477
www.SimplexGrinnell.com

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Installation Checklist

SimplexGrinnell is committed to providing the highest quality service available. As part of this service we want to ensure that the installation results in a trouble-free system. Please review the Checklist below and ensure each item is complete prior to our site visit.

A Technician will be dispatched only after the below checklist items have been completed. If these items are not completed prior to the visit by our technician, you may incur additional charges not covered by our quotation. Please feel free to contact our office if you have any questions.

- O Fire Alarm Panel(s) have been mounted and all wiring (power, IDNet, signal, door-holders, etc.) pulled into panel(s).
- O All wiring pulled into panel(s) or junction boxes have been permanently marked with wire markers and can easily be identified by a SimplexGrinnell Technician.
- O System Power is supplied and on a dedicated circuit (Do Not Energize prior to Technician visit).
- O All peripheral devices have been mounted (Smoke Detectors still covered).
- O All end-of-line resistors have been installed.
- O All alarm initiating circuits (smoke detectors, pull stations, etc.) have been checked for shorts, opens and grounds.
- O All alarm notification circuits (speakers, horns, strobes, etc.) have been checked for shorts, opens and grounds.
- O All remaining wiring (door-holders, FACP 24VDC, etc.) has been checked.
- O Flows, Tampers, and Pressure Switches installed, properly wired and adjusted.
- O All devices are properly protected against construction dust and contamination.
- O Contact us immediately if there is no digital dialer or system monitoring provisions already in place. The dialer, phone lines and service will be required for system testing.
- O There are no missing parts or equipment.

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Equipment List & Equipment Datasheets

Fire Alarm System

Product ID	Product Description
	4010ES FIRE ALARM - INDEX
4010-9403	4010ES Fire Alarm Control Panel
4010-9908	4 Point Aux Relay Module
4010-9911	Alarm Relay Module
2081-9275	18Ah Battery
	FIRE ALARM - INDEX
XAL-53	Explosion-Proof Pull Station
CR-135-EWT	Rate of Rise & Fixed Temp 135°F Explosion Proof Heat Detector
4099-9001	Addressable Manual Station
4098-9754	Multi-Sensor Photoelectric and Heat Sensing
4098-9797	CO Base
4090-9001	Supervised IAM
4090-9807	Trim Plate
4090-9810	Mounting Bracket
4906-9143	TrueAlert Weatherproof Multi-Candela Notification Appliance
4905-9828	W.P. Backbox (No Data Sheet)
4010-9830	Suppression Release Appliqué
2081-9046	Coil Supervision Module
4090-9006	Suppression Release Peripheral
2080-9057	Abort Switch
2080-9060	Maintenance Switch
2190-9123C	EOL Resistor 10K, Plastic

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4010ES OPERATING INSTRUCTIONS
FOLLOWING AN ALARM, SUPERVISORY, OR TROUBLE CONDITION

YOUR SAFETY AND THE SAFETY OF THOSE AROUND YOU ALWAYS COMES FIRST.
Actions taken during a fire depend upon local practices. Be sure you know what to do.

Systems Using Individual Acknowledge

ALARM
RED LED FLASHES AND TONE ALERT PULSES

Acknowledging Alarms

1. Unlock and open the panel door. The appearance of the alphanumeric display depends on whether the Display 1st Alarm Option is enabled or not.
   - **If Display 1st Alarm Option is enabled.** The display alternates between two screens similar to Screen 1 and Screen 2 below.
   - **If Display 1st Alarm Option is not enabled.** Only a screen similar to Screen 1 appears, indicating the total number of alarm conditions present on the system.

Screen 1

```
**FIRE**                    Press (ACK) to review.
FIRE = 1    PRI2=0      SUPV=0      TRBL=0
```

Screen 2

```
FIRST FLOOR EAST WING     ROOM 31
PULL STATION
```

2. Press the <FIRE ALARM ACK> key under the flashing red LED. Read and follow the instructions on the alphanumeric display. Repeat this procedure until all alarms are acknowledged. When all alarms are acknowledged, the tone-alert silences and the ALARMS LEDS change from flashing to ON steady.

Silencing the Signals

Press the ALARM SILENCE key and read the display. The alphanumeric display reads "ALARM SILENCE IN PROGRESS" and the ALARM SILENCED LED turns on steady.

Resetting the System With Active Alarms

1. Press the SYSTEM RESET key. The alphanumeric display reads "SYSTEM RESET IN PROGRESS".
2. If all zones or devices in alarm reset, the ALARMS LEDs flash. Press the FIRE ALARM ACK or the PRIORITY 2 ACK key, or both. The message "SYSTEM IS NORMAL" appears.
3. If a zone or a device remains in alarm and fails to reset, the message "ALARM PRESENT, SYSTEM RESET ABORTED" appears.
4. Read the display to determine the type and the location of the device(s) in alarm. Follow local procedures to investigate the area of the building in alarm. Look for devices in the alarm state, for example, pull stations with the handle down, or smoke detectors with the LED lit.

Performing a Hardware Reset

To perform a hardware reset, press the SYSTEM RESET key when no alarms are present.

SUPERVISORY/TROUBLE
YELLOW LED FLASHES AND TONE ALERT ON STEADY

Acknowledging Supervisory or Trouble Conditions

1. Unlock and open the panel door. The alphanumeric display shows the number of abnormal conditions. (This example describes managing a Trouble condition. A Supervisory condition is handled similarly.)

```
**TROUBLE**              Press (ACK) to review.
FIRE = 0    PRI2=0      SUPV=0      TRBL=1
```

2. Press the <TROUBLE ACK> key under the flashing yellow LED. Read and follow instructions on the alphanumeric display. The display shows the area and type of problem.

```
  FIRST FLOOR EAST WING          ROOM 31
    Press ACK key to acknowledge
FIRE MONITOR ZONE OPEN CKT TROUBLE
```

3. Investigate the problem to determine its cause.
4. If a Trouble condition exists, restore or replace the defective equipment (switch, wire, device, etc.) in accordance with the equipment's instructions.

   Note: When the abnormal condition causing the trouble clears, the yellow LED flashes and the tone-alert sounds steadily.

5. Press the <TROUBLE ACK> key under the flashing yellow LED. The alphanumeric display shows the system status.
6. Press the <TROUBLE ACK> key again. After a delay the system shows the following:

```
          SYSTEM IS NORMAL
      9:27:40    TUE 29 NOV 00
```

If the Trouble Does Not Clear

1. If the trouble is a Style D initiating device circuit trouble, a City Circuit trouble, or a 24 Point I/O trouble, press the SYSTEM RESET key.
2. If the trouble does not clear or toggles and reappears, you may choose to disconnect the device or disable the point.

Note: A disabled point does not report alarm conditions or other status changes. Appropriate steps must be taken to provide alternate means of protecting the area covered by the disabled point. Repair or replace the failed device or circuit as soon as possible and reenable the point.

In case of trouble, notify:

Name: _____

Address _____

Phone # _____

FRAME AND MOUNT THESE INSTRUCTIONS ADJACENT TO THE PANEL.
SEE OPERATOR'S MANUAL FOR DETAILED OPERATION.

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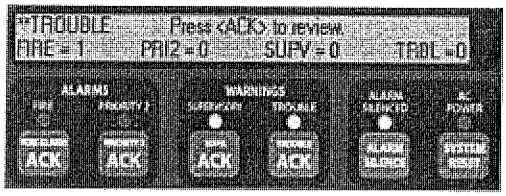
4010ES OPERATING INSTRUCTIONS
FOLLOWING AN ALARM, SUPERVISORY, OR TROUBLE CONDITION

YOUR SAFETY AND THE SAFETY OF THOSE AROUND YOU ALWAYS COMES FIRST.
Actions taken during a fire depend upon local practices. Be sure you know what to do.

Systems Using Global Acknowledge

ALARM
RED LED FLASHES AND TONE ALERT PULSES



Acknowledging Alarms

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   - **If Display 1st Alarm Option is enabled.** The display alternates between two screens similar to Screen 1 and Screen 2 below.
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Screen 1

```
**FIRE**                    Press (ACK) to review.
FIRE = 1    PRI2=0          SUPV=0      TRBL=0
```

Screen 2

```
FIRST FLOOR EAST WING      ROOM 31
PULL STATION
```

2. Press the <FIRE ALARM ACK> key under the flashing red LED. Read and follow the instructions on the alphanumeric display. The tone-alert silences and the ALARMS LED changes from flashing to ON steady.

Silencing the Signals

Press the ALARM SILENCE key and read the display. The alphanumeric display reads "ALARM SILENCE IN PROGRESS" and the ALARM SILENCED LED turns on steady.

Resetting the System With Active Alarms

1. Press the SYSTEM RESET key. The alphanumeric display reads "SYSTEM RESET IN PROGRESS".
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4. Read the display to determine the type and the location of the device(s) in alarm. Follow local procedures to investigate the area of the building in alarm. Look for devices in the alarm state, for example, pull stations with the handle down, or smoke detectors with the LED lit.

Performing a Hardware Reset

To perform a hardware reset, press the SYSTEM RESET key when no alarms are present.

SUPERVISORY/TROUBLE
YELLOW LED FLASHES AND TONE ALERT ON STEADY

Acknowledging Supervisory or Trouble Conditions

1. Unlock and open the panel door. The alphanumeric display shows the number of abnormal conditions. (This example describes managing a Trouble condition. A Supervisory condition is handled similarly.

```
**TROUBLE**                 Press (ACK) to review.
FIRE = 0    PRI2=0          SUPV=0      TRBL=1
```

2. Press the <TROUBLE ACK> key under the flashing yellow LED. The display shows the area and type of problem. The tone alert silences and the yellow LED turns on steady.
3. Read the alphanumeric display to determine the cause of the trouble.
4. If a Trouble condition exists, restore or replace the defective equipment (switch, wire, device, etc.) in accordance with the equipment's instructions.

   The Trouble condition automatically clears when the problem has been corrected.

   After a short delay, the system returns to normal and displays the following.

```
            SYSTEM IS NORMAL
         9:27:40    FRI 15 SEP 00
```

If the Trouble Does Not Clear

1. If the trouble is a Style D initiating device circuit trouble, a City Circuit trouble, or a 24 Point I/O trouble, press the SYSTEM RESET key.
2. If the trouble does not clear or toggles and reappears, you may choose to disconnect the device or disable the point.

Note: A disabled point does not report alarm conditions or other status changes. Appropriate steps must be taken to provide alternate means of protecting the area covered by the disabled point. Repair or replace the failed device or circuit as soon as possible and reenable the point.

In case of trouble, notify:

Name: _____

Address _____

Phone # _____

FRAME AND MOUNT THESE INSTRUCTIONS ADJACENT TO THE PANEL.
SEE OPERATOR'S MANUAL FOR DETAILED OPERATION.

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UL, ULC, CSFM Listed;
*FM, NYC Fire Dept Approved**

4010ES Fire Control Panels

Addressable Fire Detection and Control Basic Panel Modules and Accessories

Features

Basic system includes:

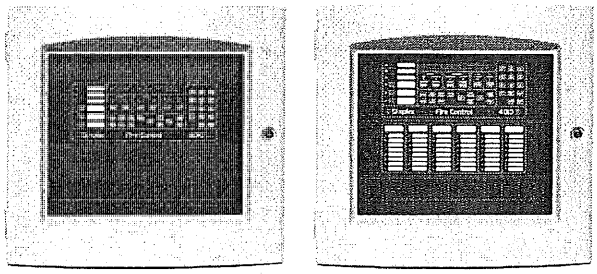
- Capacity for up to 248 addressable devices, up to 127 VESDA SLI points, up to 2000 points of Annunciation and up to 20 internal and external card addresses
- Color-coded operator interface with membrane keypad includes 2 x 40 Super-twist LCD display, 3 programmable control keys and 6 programmable LEDs
- CPU assembly includes dedicated compact flash memory for on-site system information storage and convenient Ethernet service port access
- 8 A power supply with up to 2 A of Auxiliary power and battery charger capacity for up to 110 Ah batteries (UL) or up to 50 Ah batteries (ULC) (33 Ah max in control panel cabinet)
- 4 on-board Class A or B, 3 A NACs and one programmable auxiliary relay output rated for 2 A @ 32 VDC
- Class A or B Two-loop Isolated IDNet Communications (IDNet+) supports up to 248 addressable and analog sensing devices on non-twisted, non-shielded wiring
- Remote annunciator module support via RUI (Remote Unit Interface) communications port, supports either Class B (Style 4) or X (Style 7) Pathway operation
- 48 LED panel mount annunciation provides 40 Red and 8 Yellow pluggable LEDs (select models, meets ULC requirements), optional LED kits are available for custom LED configurations

Optional Main System Supply and door mounted modules include:

- City Connect (with or without disconnect switches)
- Alarm Relay Module
- TrueInsight Remote Gateway

Optional block space modules include:

- Fire Alarm Network Interface Card for 4120/4100 Peer-to-Peer network communications, supports either Class B or X (Style 7) Pathway operation
- Ethernet connectivity options include Building Network Interface Module (BNIC), SafeLINC Internet Interface, and BACpac Ethernet Portal
- Dual RS-232 Module (for printer, PC annunciator or third party interface)
- VESDA Air Aspiration High Level Interface
- Serial DACT
- 8 Zone IDC Modules Class A or B
- 4 Point Auxiliary Relay Module
- Physical Bridge Network Modules



4010ES Fire Alarm Control Panels are available standard (left) or with LED Annunciation (right)

Compatible with Simplex® remotely located:

- 4098-9757 QuickConnect 2 and legacy 4098-9710 QuickConnect TrueAlarm smoke sensors
- 4003EC Small Voice Panels
- 4009 IDNet NAC Extenders (4009A)
- 4081 Series, 110Ah Battery Chargers
- 4100-7400 Series Graphic Annunciators
- 4190 Series PC Annunciator
- 4190 Series Fiber Modems and Physical Bridges
- 4606-9102 Remote LCD Annunciator, 4100-9400 Series Remote InfoAlarm Command Centers, and 4602 Series Status Command Units (SCU) and Remote Command Units (RCU) Annunciators
- IP communicator compatibility

4010ES Agency listings:

- UL Std. 864, Fire Detection and Control (UOJZ), and Smoke Control Service (UUKL), and Releasing Service (SYZV)
- UL Std. 2017, Process Management Equipment (QVAX)
- UL Std. 1076, Proprietary Alarm Units-Burglar (APOU)
- UL Std. 1730, Smoke Detector Monitor (UULH)
- ULC Std. S527-99, Fire Detection and Control (UOJZC)
- ULC Std. S559-04, Supervising Station (DAYRC)

* See pages 5 and 6 for additional listing information. This product has been approved by the California State Fire Marshal (CSFM) pursuant to Section 13144.1 of the California Health and Safety Code. See CSFM Listing 7165-0026:0369 for allowable values and/or conditions concerning material presented in this document. It is subject to re-examination, revision, and possible cancellation. NYC Fire Dept COA #6095. Additional listings may be applicable; contact your local Simplex product supplier for the latest status. Listings and approvals under Simplex Time Recorder Co. are the property of Tyco Fire Protection Products.

Introduction

4010ES Series Fire Detection and Control Panels provide leading edge installation, operator, and service features for customer applications in the mid-range addressable fire alarm systems market. An on-board Ethernet port provides fast external system communications to expedite installation and service activity. Dedicated compact flash memory archiving provides secure on-site system information storage of electronic job configuration files to meet NFPA 72 (*National Fire Alarm and Signaling Code*) requirements.

Modular design. A variety of functional modules are available to meet specific system requirements. Selections allow panels to be configured for either Stand-Alone or Networked fire control operation.

Panel Hardware

The Master Controller and Main System Supply are mounted in the upper section of the 4010ES cabinet.

Panel Hardware *(Continued)*

4010ES Block Space Option Cards mount to the left of the 4010ES Main System Supply. There are 3 available 4" x 5" blocks for mounting 4010ES hardware options.

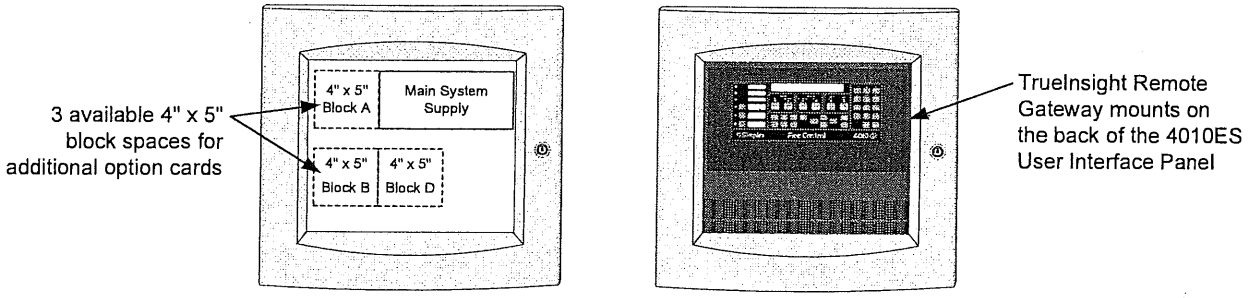
Other 4010ES Options: The 4010ES City Connect module or the optional Alarm Relay module mount directly to the Main System Supply. These options are mutually exclusive.

Network Media modules mount directly to the 4010ES Network Interface Card.

The TrueInsight Remote Gateway mounts on the back side of the 4010ES User Interface Panel.

The Battery Compartment located in the bottom of the 4010ES cabinet accepts two batteries, up to 33 Ah, without interfering with expansion module space.

The illustrations below identify mounting locations available for optional 4010ES modules.



Mounting Locations for Optional Modules

Mechanical Description

- Mounting box provides convenient stud markers for drywall thickness and nail-hole knockouts for quicker mounting
- Smooth box surfaces are provided for locally cutting conduit entrance holes exactly where required
- The hinged User Interface panel easily opens for internal access
- Modules are power-limited (except as noted, such as relay modules)
- Doors include tempered glass inserts, boxes and doors are available in platinum or red
- Box and door/retainer assemblies are included with Basic Panel assemblies

Software Feature Summary

- TrueAlarm individual analog sensing with front panel information and selection access
- "Dirty" TrueAlarm sensor maintenance alerts, service and status reports including "almost dirty"
- TrueAlarm magnet test indication appears as distinct "test abnormal" message on display when in test mode
- TrueAlarm sensor peak value performance report
- **"Install Mode"** allows grouping of multiple troubles for uninstalled modules and devices into a single trouble condition (typical with future phased expansion); with future equipment and devices grouped into a single trouble, operators can more clearly identify events from the commissioned and occupied areas
- Module level ground fault searching assists installation and service by locating and isolating modules with grounded wiring
- **"Recurring Trouble Filtering"** allows the panel to recognize, process, and log recurring intermittent troubles (such as external wiring ground faults), but only sends a single outbound system trouble to avoid nuisance communications
- WALKTEST silent or audible system test performs an automatic self-resetting test cycle

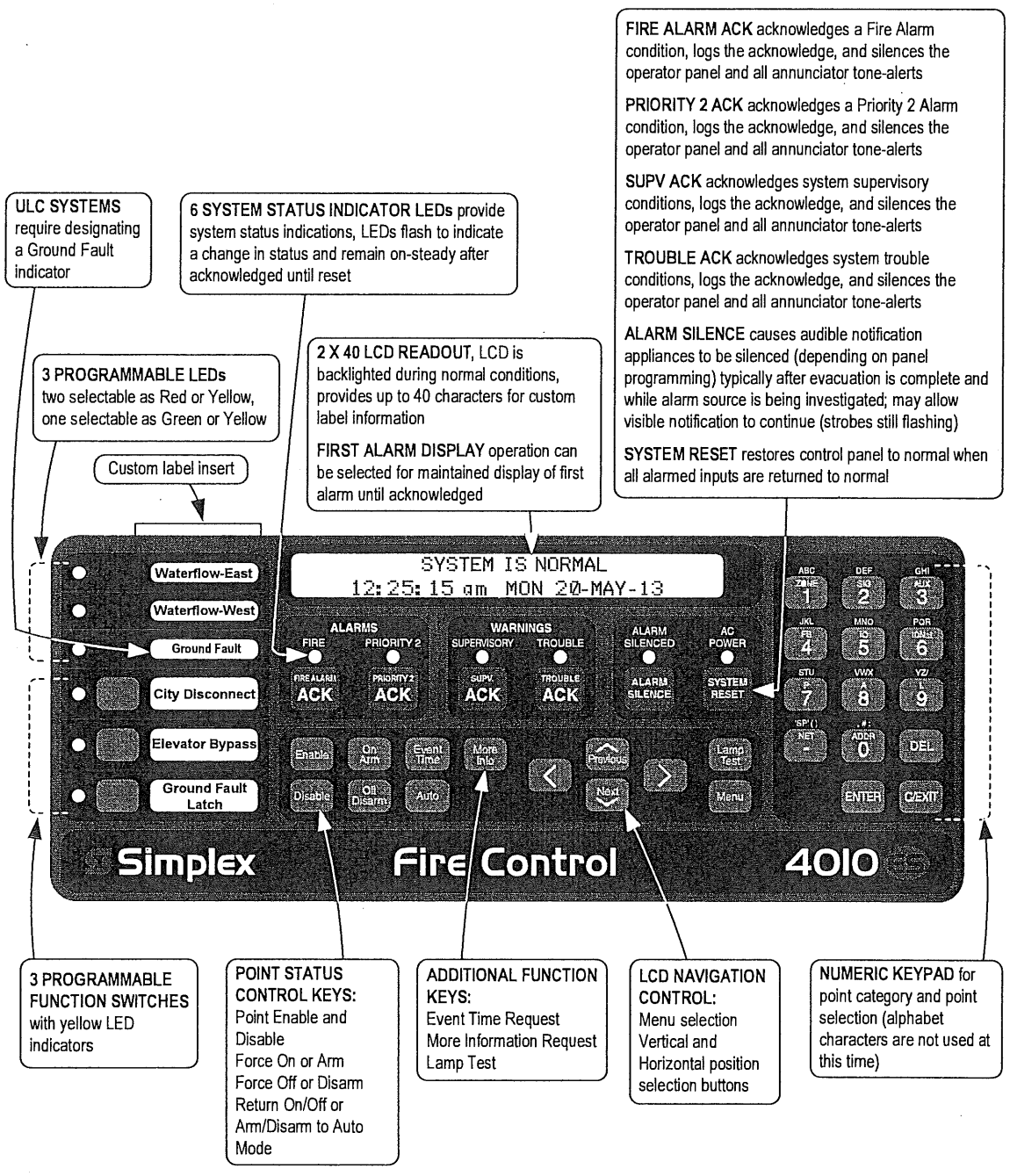
Operator Interface Features

- Convenient and extensive operator information is provided using a logical, menu-driven display
- Multiple automatic and manual diagnostics for maintenance reduction
- Convenient PC programmer label editing
- Password access control
- Alarm and Trouble History Logs (up to 2000 total events) are available for viewing from the LCD, or capable of being printed to a connected printer, or downloaded to a service computer

Convenient Status Information. With the locking door closed, the glass window allows viewing of the display, status LEDs, and available operator switches. Features include a two-line by 40-character, wide viewing angle (super-twist) LCD with status LEDs and switches as shown in the illustration below.

LED indicators describe the general category of activity being displayed with the LCD providing more detail. For the authorized user, unlocking the door provides access to the control switches and allows further inquiry by scrolling the display for additional detail.

The following illustration identifies the primary functions of the operator interface.



Compatible Peripheral Devices

The 4010ES is compatible with an extensive list of remote peripheral devices including printers, PC Annunciators and both conventional and addressable devices including TrueAlarm analog sensors.

Addressable Device Control

Overview. The 4010ES provides standard addressable device communications for IDNet compatible devices. Using a two wire communications circuit, individual devices such as manual fire alarm stations, TrueAlarm sensors, conventional IDC zones, and sprinkler waterflow switches can be interfaced to the addressable controller to communicate their identity and status.

Addressability allows the location and condition of the connected device to be displayed on the operator interface LCD and on remote system annunciators. Additionally, control circuits (fans, dampers, etc.) may be individually controlled and monitored with addressable devices.

Addressable Operation. Each addressable device on the communication channel is continuously interrogated for status condition such as: normal, off-normal, alarm, supervisory, or trouble. Both Class B and Class A pathway operation are available. Sophisticated poll and response communication techniques ensure supervision integrity and allow for "T-tapping" of the circuit for Class B operation. Devices with LEDs pulse the LED to indicate receipt of a communications poll and can be turned on steady from the panel.

IDNet+ Channel Capacity. The Main System Supply provides an IDNet+ signaling line circuit (SLC) that supports up to 248 addressable monitor and control devices intermixed on the same pair of wires.

IDNet+ Communications wiring specifications. IDNet+ circuits may be run on NEC 760 untwisted pair, twisted pair, or shielded twisted pair conductors.

IDNet+ Wiring Specifications

Size		18 AWG (0.82 mm²)
Type		NEC 760 Wire (untwisted, twisted, or shielded twisted pair)
Farthest Distance from Control Panel per Device load	126-248	Up to 2500 feet (762 m)
	up to 125	Up to 4000 ft (1219 m)
Total Wire Length Allowed Class A or Class B, including "T-taps" for Class B wiring (total for both isolated circuits combined)		Up to 12,500 ft (3.8 km) Note: The sum of line-to-line capacitance plus the capacitance of either line-to-shield (if shield is present) = 0.6 µF maximum (total for both isolated circuits combined)

* Other circuits may require shielded wiring. Review your system with your local Simplex product supplier.

TrueAlarm System Operation

Addressable device communications include operation of TrueAlarm smoke and temperature sensors. Smoke sensors transmit an output value based on their smoke chamber condition and the CPU maintains a current value, peak value, and an average value for each sensor. Status is determined by comparing the current sensor value to its average value. Tracking this average value as a continuously shifting reference point filters out environmental factors that cause shifts in sensitivity.

Programmable sensitivity of each sensor can be selected at the control panel for different levels of smoke obscuration (shown directly in percent) or for specific heat detection levels. To evaluate whether the sensitivity should be revised, the peak value is stored in memory and can be easily read and compared to the alarm threshold directly in percent.

CO sensor bases combine an electrolytic CO sensing module with a TrueAlarm analog sensor to provide a single multiple sensing assembly using one system address. The CO sensor can be enabled/disabled, used in LED/Switch modes and custom control, and can be made public for communication across a fire alarm Network. (refer to data sheet S4098-0041 for details)

TrueAlarm heat sensors can be selected for fixed temperature detection, with or without rate-of-rise detection. Utility temperature sensing is also available, typically to provide freeze warnings or alert to HVAC system problems. Readings can be selected as either Fahrenheit or Celsius.

TrueSense Early Fire Detection. Multi-sensor 4098-9754 provides photoelectric and heat sensor data using a single 4010ES IDNet address. The panel evaluates smoke activity, heat activity, ***and their combination***, to provide TrueSense early detection. For more details on this operation, refer to data sheet S4098-0024.

Diagnostics and Default Device Type

Sensor Status. TrueAlarm operation allows the control panel to automatically indicate when a sensor is almost dirty, dirty, and excessively dirty. The NFPA 72 requirement for a test of the sensitivity range of the sensors is fulfilled by the ability of TrueAlarm operation to maintain the sensitivity level of each sensor. CO Sensors track their 5 year active life status providing indicators to assist with service planning. Indicators occur at: 1 year, 6 months, and when end of life is reached.

Modular TrueAlarm sensors use the same base and different sensor types (smoke or heat sensor) and can be easily interchanged to meet specific location requirements. This allows intentional sensor substitution during building construction when conditions are temporarily dusty. Instead of covering smoke sensors (causing them to be disabled), heat sensors may be installed without reprogramming the control panel. The control panel will indicate an incorrect sensor type, but the heat sensor will operate at a default sensitivity to provide heat detection for building protection at that location.

Master Controller (CPU)

- The 4010ES Master Controller includes dedicated 2GB compact flash Mass Storage memory for on-site system information storage and convenient Ethernet service port access
- Convenient front panel accessed Ethernet port for quick and easy ***download*** of site-specific programming
- ***AND***, firmware enhancements are made via software downloads to the on-board flash memory
- Every downloaded job is automatically stored to Compact flash without overwriting earlier versions providing a means for recovering previous configurations
- Downtime is reduced because the system stays running during download
- Modifications can be ***uploaded*** as well as downloaded for greater service flexibility
- Mass Storage allows job specific files to be store in the control panel such as test and inspection reports, record drawings, specifications, and more...
- Ethernet connectivity options include Building Network Interface Module (BNIC) and SafeLINC Internet Interface
- RUI (Remote Unit Interface) communications port supports either Class B or X Pathway operation for remote annunciation equipment

Basic Panel Description

4010ES panels include: an Operator Interface, Master Controller with 2GB Compact Flash, Class A or B Two-loop Isolated IDNet Communications (IDNet+) supporting up to 248 addressable and analog sensing devices, 8 A power supply with up to 2 A of auxiliary power, 110 Ah (UL) / 50 Ah (ULC) battery charger (33 Ah maximum in the control panel cabinet), 4 Class A or Class B NACs rated @ 3 A each for Special Application and 2 A for Regulated 24 DC operation, 1 programmable auxiliary relay rated for 2 A @ 32 VDC, 1 RUI Class B or X communications port for remote annunciation devices, cabinet, and door.

Support is for up to 20 internal and external card addresses. Other standard options may be provided depending on model (see basic panel model selection below for additional details on specific models).

Main System Supply

The Main System Supply provides the power source and the Input/Output connections for the basic 4010ES panel. The main features are listed in the Basic Panel description below.

Basic Panel Model Selection

Note: Supervisory and Alarm current specifications are for determining battery standby requirements. Current specifications include an active RUI channel and alarm currents include 20 IDNet device LEDs activated. Actual IDNet channel device current is not included, refer to page 6 for details. For models with 48 LED Annunciation, alarm also includes 24 LEDs activated.

Model*	Panel Color	Language & Voltage	Listings	Features	Supv. Current	Alarm Current	Available Option Blocks
4010-9401(BA)	Red	English 120 VAC	UL, CSFM, FM, NYC Fire Dept	Basic panel with 2x40 LCD Operator Interface and (1) Two-loop Isolated IDNet+ Channel, Class A or B, with support for up to 248 addressable devices	316 mA	430 mA	3 4"x5" blocks
4010-9402(BA)	Platinum						
4010-9403(BA)	Red	English 120 VAC	UL, ULC, CSFM, FM, NYC Fire Dept	Same features as above with 48 LED annunciation	336 mA	495 mA	
4010-9404(BA)	Platinum						
4010-9405	Red	French 120 VAC	ULC, CSFM, FM				
4010-9406	Platinum						

* Models with (BA) are available as assembled in the USA by adding the suffix "BA".

Addressable Device Load Specifications for Battery Standby

Addressable Channel	Device Load	Supervisory Current	Alarm Current
Main System Supply IDNet+ Channel Output (does not include device LEDs in alarm)	With 248 Devices, Add	199 mA	248 mA
	With 125 Devices, Add	100 mA	125 mA
	With 50 Devices, Add	40 mA	50 mA

Block Space Option Card Selection

Note: Refer to diagram on page 2 for Option Module availability. Supervisory and Alarm current specifications are for determining battery standby requirements.

Single Block Option Modules, Select Three (3) Maximum if No Dual Block Module is Selected; Select One (1) Maximum if a Dual Block Module or the Module Bracket is Selected

Model	Features	Option Block Usage	Supervisory Current	Alarm Current
4010-9912	Serial DACT	1 Block (must mount in block D under main system supply)	30 mA	40 mA
4010-9908	4 Point Aux Relay Module	1 Block	15 mA	60 mA
4010-9916	Voltage Regulator Module, 22.8 to 26.4 VDC (25 VDC nominal); isolated and resettable output; includes earth detection circuit and trouble relay for status monitoring	1 Block	3 A maximum with 2.5 A load	4.9 A maximum with 4 A load
4010-9918	Dual RS-232 Module	1 Block	60 mA	60 mA
4010-9915	BACpac Ethernet Portal Module; requires 4010-9918 RS-232 Module (no address required)	1 Block	123 mA	123 mA
4010-9901	VESDA HLI	1 Block	60 mA	60 mA

Dual Vertical Block (Flat) Modules, Select One, or Two with 4010-9928 Bracket Kit (except for Media Cards)

Model	Features	Option Block Usage	Supervisory Current	Alarm Current
4010-9928	Dual Vertical Block Card Mounting Kit, allows selecting two, dual Vertical Block (flat) modules from the list below	2 Vertical Blocks	NA	NA
4010-9922	Modular Network Interface Card (requires two media modules, see below)	2 Vertical Blocks	30 mA	30 mA
4010-9818	Network Media Card Wired	N/A (mounts to 4010-9922)	55 mA	55 mA
4010-9819	Network Media Card Fiber Optic		25 mA	25 mA
4010-9914	Building Network Interface Card	2 Vertical Blocks	236 mA	236 mA
4010-9923*	SafeLINC Internet Interface	2 Vertical Blocks	115 mA	115 mA
4010-9924*	Modem Physical Bridge Class B (Style 4)	Requires one of the 2 Vertical Block spaces on the 4010-9928 Mounting Kit	193 mA	193 mA
4010-9925*	Modem Physical Bridge Class X (Style 7)		246 mA	246 mA
4010-9926**	TCP/IP Physical Bridge Class B (Style 4)	3 Block "L" Shape, requires one of the 2 Vertical Block spaces on the 4010-9928 Mounting Kit, **plus** Block D	196 mA	196 mA
4010-9927**	TCP/IP Physical Bridge Class X (Style 7)		236 mA	236 mA

Dual Vertical Block (Slot) Modules, Select One if no Dual Vertical (Flat) Modules from Above are Selected

Model	Features	Option Block Usage	Supervisory Current	Alarm Current
4010-9920	8 Zone Initiating Device Circuit - Class B	2 Vertical Blocks (mother/daughter card)	75 mA	195 mA
4010-9921	8 Zone Initiating Device Circuit - Class A			

*UL, ULC, and CSFM listed.

** FM Approved only.

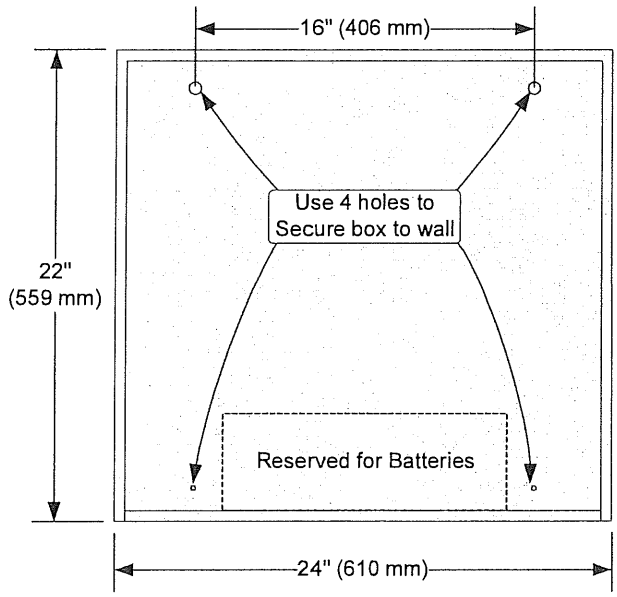
Additional Panel Option Selection (block space is not used)

Model	Features	Supervisory Current	Alarm Current	Mounting Requirements
4010-9909	City Connect Module w/ disconnect switches	20 mA	36 mA	Select one maximum, mounts on Main System Supply
4010-9910	City Connect Module	20 mA	36 mA	
(4010-9911)	Alarm Relay Module	15 mA	37 mA	
4190-6104*	TrueInsight Remote Gateway	62 mA	62 mA	Mounts on Front Door
4100-5128	Battery Distribution Terminal Block, mounts to side of box, required when battery connection leaves the 4010ES box (also used in the 4100ES fire alarm control panel)			

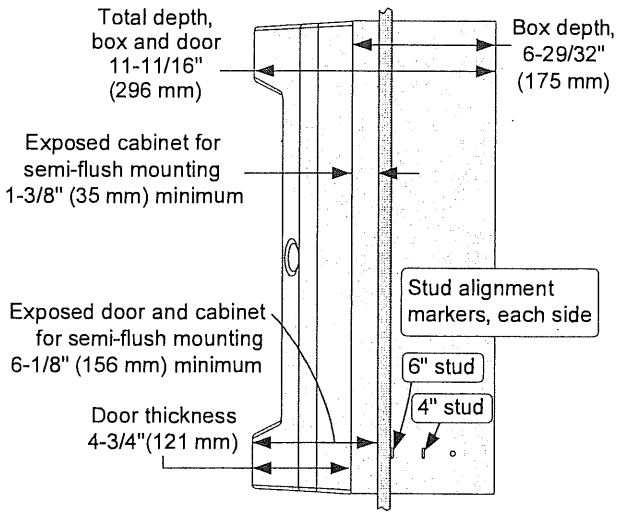
* Refer to data sheet S4100-0063 and contact your local Simplex product representative for more details.

Cabinet Dimension Reference

Front view, cabinet outline without door



Side view with door attached



Miscellaneous Accessories

LED Kits

Model	Description
4100-9843	8 Yellow LED Kit
4100-9844	8 Green LED Kit
4100-9845	8 Red LED Kit
4100-9855	8 Blue LED Kit

End User Programming Tools

Model	Description
4100-8802	End User Programming Unit Software
4100-0292	Custom Label Editing (USB Dongle)
4100-0295	Port Vectoring Setup and Control (USB Dongle)
4100-0296	User Group / Passcode Editing (USB Dongle)
4100-0298	WalkTest Configuration Setup and Control (USB Dongle)

4010ES Factory Programming

Model	Description
4010-8810	4010ES Factory Programming
4010-0831	Custom Label and Panel Programming

4010ES Card Address Allocation

The 4010ES has a maximum Internal and External Card Address Limit of 20 Card Addresses. Use the Table below to calculate 4010ES card address allocation.

INSTRUCTIONS: Below is a list of 4010ES equipment and the quantity of card addresses they consume

1. For the applicable control panel, write in the Card Address Consumption value in the Card Address Allocation column. (Note: Only select 1 control panel)
2. For the option cards to be installed on the 4010ES, write in the Card Address Consumption value in the Card Address Allocation column.
3. Total the Card Address Allocation column (total must not exceed 20).

Model	Description		Card Address Consumption	Card Address Allocation	Notes
	Control Panels (Select One)				
4010-9401 4010-9402	2x40 Display, Single IDNet Channel, Single Bay Box		2		
4010-9403 4010-9404 4010-9405 4010-9406	2x40 Display, Single IDNet Channel, 48 Pluggable LED Module		3		4010-9405 & 4010-9406 are for Canada
	Panel Option Cards (Select As Required)				
4010-9901	Flat VESDA HLI Card		1		
4010-9922	Flat Network Card		1		
4010-9908	4 Point Flat Aux Relay Module		1		
4010-9912	Serial DACT		1		
4010-9923	SafeLINC Internet Interface Card		1		
4010-9914	Building Network Interface Card		1		
4010-9918	Dual RS-232 Module		1		
4010-9920	8 Zone Initiating Device Circuit - Class B		1		
4010-9921	8 Zone Initiating Device Circuit - Class A		1		
	Remote Annunciation (Select As Required)				
4100-9401	Remote InfoAlarm Command Center	Red Cabinet, English	2		
4100-9403		Platinum Cabinet, English	2		
4100-9421		Red Cabinet, French	2		for Canada
4100-9423		Platinum Cabinet, French	2		for Canada
4100-9441		Red Cabinet, with blank inserts for key labels	2		
4100-9443		Platinum Cabinet, with blank inserts for key labels	2		
4606-9102	4010ES RUI LCD Annunciator, English		1		
4606-9102BA	4010ES RUI LCD Annunciator, English		1		
4606-9102CF	4010ES RUI LCD Annunciator, French		1		for Canada
4602-9101	Status Command Unit (SCU) LED Annunciator		1		
4602-9102	Remote Command Unit (RCU) LED Annunciator w/control		1		
4602-9150	Graphic I/O RCU/SCU Assembly for custom annunciator panels		1		
4602-7101	Graphic I/O RCU/SCU Assembly for custom annunciator panels		1		
4602-7001	RCU for cabinet mount		1		
4602-6001	SCU for cabinet mount		1		
4100-7401	24 Point I/O Graphic Module for custom annunciator panels		1		
4100-7402	64/64 LED Switch Controller for custom annunciator panels		1		
4100-7403	32 Point LED Driver Module for custom annunciator panels		1		
4100-7404	32 Point Switch Input Module for custom annunciator panels		1		
	Total Card Addresses (Not to Exceed 20)		TOTAL		

General Specifications

AC Input Current	4 A maximum, 120 VAC @ 60 Hz nominal		
Power Supply Output Ratings (nominal 28 VDC on AC, 24 VDC on battery backup)	Total Power Supply Output Rating	**Including module currents and auxiliary power outputs; 8** A total for "Special Application" appliances; **4 A** total for "Regulated 24 DC" power (see below for details)	Output switches to battery backup during mains AC failure or brownout conditions
	Auxiliary Power Tap	2 A maximum, rated 19.1 to 31.1 VDC	
Special Application Appliances, maximum of 70 appliances per NAC	Simplex 4901, 4903, 4904, and 4906 Series horns, strobes, and combination horn/strobes and speaker/strobes (contact your Simplex product representative for compatible appliances)		
Regulated 24 DC Appliances	Power for other UL listed appliances; use associated external synchronization modules where required		
Battery Charger Rating (sealed lead acid batteries)	Battery capacity range	UL listed for battery charging of 6.2 Ah up to 110 Ah; ULC listed for charging up to 50 Ah batteries; batteries above 33 Ah require separate cabinet	
	Charger characteristics and performance	Temperature compensated, dual rate, recharges depleted batteries within 48 hours per UL Standard 864; to 70% capacity in 12 hours per ULC Standard S527	
Environmental	Operating Temperature	32° to 120°F (0° to 49° C)	
	Operating Humidity	Up to 93% RH, non-condensing @ 90° F (32° C) maximum	
Additional Technical Reference	Installation Instructions	579-989	
	Operating Instructions	579-969	

Additional Compatible Equipment and Reference

Subject	Data Sheet	Subject	Data Sheet
4010ES Agent Release Applications and Accessories	S4010-0005	Network Communications	S4100-0056
Agent Release Accessories	S2080-0010	Multi-Signal Fiber Optics	S4100-0049
Building Network Interface	S4100-0061	4602 Series SCU/RCU	S4602-0001
SafeLINC Internet Interface	S4100-0062	PC Annunciator	S4190-0013
Interface to VESDA Air Aspiration Detection Systems	S4100-0026	Addressable Device Compatibility, IDNet Communication Sensors and Devices	S4090-0011
Serial DACT (SDACT)	S2080-0009	4009 IDNet NAC Extender	S4009-0002
Fire Alarm Network Overview	S4100-0055	4003EC Voice Control Panel	S4003-0002
TrueInsight Remote Service	S4100-0063	120 VAC Desktop Remote Printer	S4190-0011
4606-9102 Remote LCD Annunciator	S4606-0002	110 Ah Batteries and Cabinets	S2081-0012
Graphic I/O Modules	S4100-0005	Remote 110 Ah Battery Chargers and Cabinets	S4081-0002
Remote InfoAlarm Command Center	S4010-0008	BACpac Ethernet Portal Module	S4100-0051
PC Annunciator	S4190-0013	Network Physical Bridge	S4100-0057
TCP/IP Physical Bridge	S4100-0029		

Simplex

Fire Alarm Control Panel Accessories

*Listings**

System Batteries, Sealed Lead-Acid; with Applications Reference for Battery Cabinets, and Battery Cabinets with Charger

Features

Rechargeable, sealed lead-acid batteries:

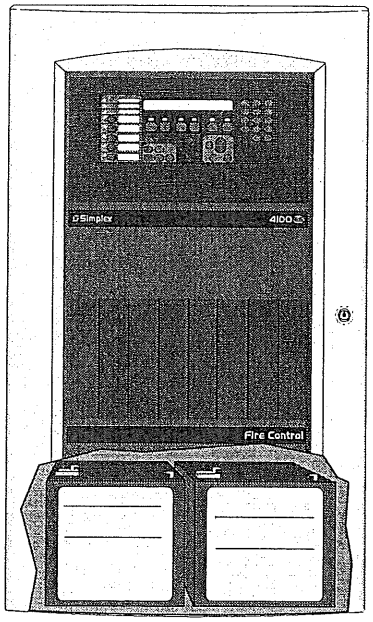
- Lead-calcium grid structure with immobilized electrolyte in absorbent separator
- Low maintenance with no need to add water
- Low self-discharge characteristics
- One-piece, high impact polystyrene cell cover with high reliability dual seal construction
- UL 924 recognized pressure relief valves

Available in a variety of capacities:

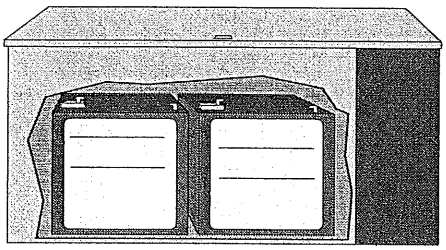
- Batteries for internal mounting range from 6.2 Ah up to 50 Ah, depending on control panel cabinet size
- Larger batteries, up to 110 Ah, mount in external battery cabinets with models available with internal chargers

Battery cabinets with chargers:

- Battery cabinets with charger communicate with their connected fire alarm control panel and are available for 4100ES/4010ES/4100U Series and 4010 Series panels



Compatible Sealed Lead-Acid Batteries can be Installed Inside Fire Alarm Control Panel Cabinets



Remote Battery Cabinets are Available for Larger Battery Requirements

Description

Simplex® rechargeable sealed-lead acid batteries provide reliable and repeatable discharge and recharge characteristics for use in fire alarm and other systems applications. They are designed with immobilized electrolyte in an absorbent separator, allowing them to provide rated capacity on the first cycle.

Because of their sealed construction, packaging is allowed within the system electronics enclosure (see illustration on page 2). When this is applicable, the quantity of system cabinets and the battery wiring distances are both minimized. Where required, external battery cabinets can be close-nippled to the control panel to house larger batteries with battery chargers available in some battery cabinet sizes.

Battery Details

Charging. These batteries are intended to be used with compatible Simplex battery chargers.

Series Connections. These batteries are required to be connected in series to produce 24 V system voltage. Battery sets must be of identical voltage, model number, appearance, and approximately the same date of manufacture for proper operation.

Testing. Battery capacity testing is recommended to be performed by using a sealed lead-acid battery tester designed to withdraw a minimum of battery charge. The preferred tester applies a variety of amplitude and duration controlled test pulses that compares terminal voltage against those predicted for the specific battery size. (Testing is available through your local Simplex product supplier.)

Battery Details *(Continued)*

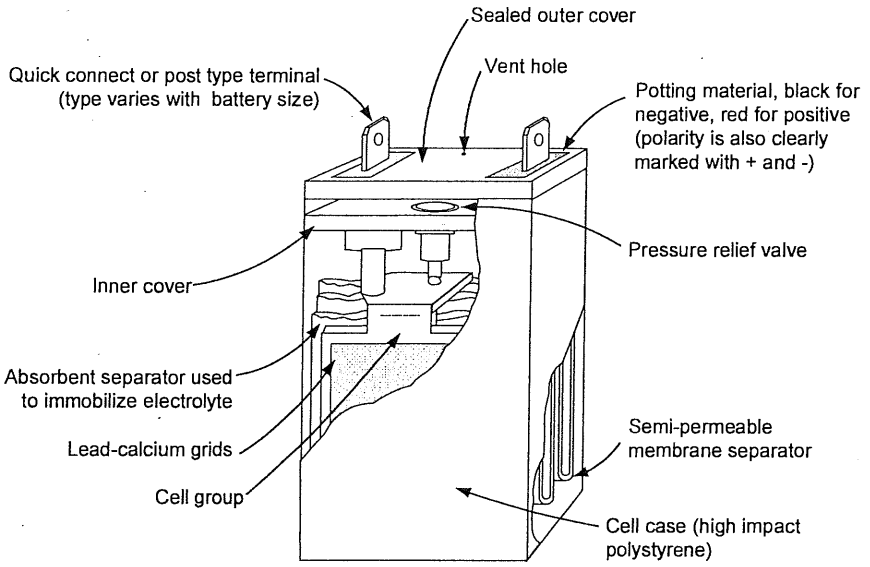
Shipping. Sealed lead-acid batteries are shipped via ground or sea transportation only. They are not shipped via air.

Disposal. Battery chemicals and materials can be recycled. Refer to information shipped with the battery or on its case. Return to the battery manufacturer or to a similarly qualified battery processing facility for proper disposal.

* Refer to details on page 4 and to the referenced individual product data sheets for agency listing status of battery cabinets and chargers. The batteries detailed in this document meet the requirements of UL, ULC, and Factory Mutual for use with respective equipment battery chargers as listed on page 3. Contact your local Simplex product supplier for proper battery selection per system requirements. Listings and approvals under Simplex Time Recorder Co. are the property of Tyco Fire Protection Products.

Battery Construction Reference

Actual appearance will vary with battery size.



Battery Size Specifications

Battery Model	Capacity @ 20 Hour Discharge Rate	Width*	Depth*	Height with Terminals	Approximate Weight*
2081-9272	**6.2 Ah**	6-1/8" (156 mm)	2-5/8" (67 mm)	4" (102 mm)	5.75 lbs (2.6 kg)
2081-9274	**10 Ah**	6" (153 mm)	4-1/16" (103 mm)	4" (102 mm)	9.2 lbs (4.2 kg)
2081-9288	**12.7 Ah**	6" (153 mm)	4" (102 mm)	4" (102 mm)	9 lbs (4.1 kg)
2081-9275	**18 Ah**	7-1/4" (184 mm)	3-3/8" (86 mm)	6-5/8" (168 mm)	14.3 lbs (6.5 kg)
2081-9287	**25 Ah**	6-5/8" (168 mm)	5" (127 mm)	7" (178 mm)	19.4 lbs (8.8 kg)
2081-9271 (rectangular case, typically for service)	**33 Ah**	12-1/2" (318 mm)	3-3/8" (86 mm)	7-1/16" (179 mm)	26.6 lbs (12.1 kg)
2081-9276 ("square" case, use for new)	**33 Ah**	7-3/4" (197 mm)	5-1/4" (133 mm)	6-3/4" (171 mm)	26.5 lbs (12 kg)
2081-9296	**50 Ah**	9" (229 mm)	5-1/2" (140 mm)	8-7/8" (225 mm)	41.8 lbs (19 kg)
2081-9279	**110 Ah**	11-3/16" (284 mm)	10-1/2" (267 mm)	9" (230 mm)	82 Lbs (37 kg)

* Dimensions and weight are per battery and are for reference only. Exact size may vary. Refer to the tables on page 3 for mounting compatibility. These batteries are 12 V each and series connected for 24 V system use.

NOTE: **When wired in series for 24 V output, these batteries are to be of identical voltage, appearance, model number, and approximately the same date of manufacture.**

General Battery Specifications

Nominal Voltage Rating	12 Volts per battery
Discharge Rating	20 Hour Rate
Typical Charge/Discharge Cycles	100 to 150
Preferred Charge Temperature Range	60° F to 90° F (15.6°C to 32.2° C)

Battery Compatibility for Fire Alarm Control Panel Mounting

NOTE: Refer to individual fire alarm control panel product data sheets for additional battery application information

Battery Model	Capacity	Simplex Control Panel Model Series (see legend and notes below)									
		4003EC	4004R	4005	4006 & 4008	4009 (all models)	4010	4010ES	4100ES/ 4100U	4100 & 4120 (2, 4 or 6-Unit)	4020 (2, 4 or 6-Unit)
2081-9272	6.2 Ah	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2081-9274	10 Ah	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2081-9288	12.7 Ah	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2081-9275	18 Ah	Ext	Note 3	✓	Ext	Ext	Note 2	✓	✓	✓	✓
2081-9287	25 Ah	Ext	Note 3	Ext	Ext	NA	✓	✓	✓	✓	Ext
2081-9271 rectangular	33 Ah	Ext	Note 3	Ext	NA	NA	Note 3	✓	✓	Ext	Note 4
2081-9276 "square"	33 Ah	Ext	Note 3	Ext	NA	NA	Note 3	✓	✓	✓	Ext
2081-9296	50 Ah	NA	Note 3	NA	NA	NA	Note 3	Note 6	2 or 3 bay	Ext	Ext
2081-9279	110 Ah	Requires external battery cabinet, compatible with 4100ES, 4010ES, 4100, and 4120 Series only									

✓ = Can be placed in the respective equipment cabinet

Ext = External battery cabinet is required, refer to selection chart on page 4

NA = Not applicable/not compatible

NOTES:

1. These batteries meet the requirements of UL, ULC, and Factory Mutual for use with respective equipment battery chargers listed above. Contact your local Simplex product supplier for proper battery selection per system requirements.
2. 4010 Cabinets will accommodate 2081-9275, 18 Ah batteries, but will not allow bottom entry conduit.
3. Use 4081 series companion cabinet and charger, refer to page 4.
4. 4020 Cabinets will accommodate 2081-9271, 33 Ah batteries, but will not allow bottom entry conduit.
5. Some control panel models are listed for battery replacement reference only.
6. For 2 bay international applications only, 50 Ah batteries will fit in the cabinet.

External Battery Cabinet Compatibility Reference

Battery Cabinets without Chargers (connects to charger in panel)

Cabinet	Panel Compatibility	Battery					
		2081-9275 18 Ah*	2081-9287 25 Ah	2081-9271 Rectangular 33 Ah	2081-9276 Square 33 Ah	2081-9296 50 Ah	2081-9279 110 Ah
2081-9280	4100ES, 4010ES, 4100U, and 4100+	NA	NA	NA	NA	NA	✓
2081-9281 2081-9282	multiple	✓	✓	✓	✓	✓	NA
4009-9801	multiple	✓	✓**	NA	NA	NA	NA
4009-9802	multiple	✓	NA	✓	NA	NA	NA

Battery Cabinets with Chargers

Cabinet	Panel Compatibility	2081-9275 18 Ah*	2081-9287 25 Ah	2081-9271 Rectangular 33 Ah	2081-9276 Square 33 Ah	2081-9296 50 Ah	2081-9279 110 Ah
4081-9301 4081-9302	4004R and 4010	✓	✓	✓	✓	✓	NA
4081-9306 4081-9308	4100ES, 4010ES, and 4100U	NA	NA	NA	NA	✓	✓

* Batteries smaller than those listed are normally mounted in the product cabinet

** 25 Ah capacity was effective as of 7/2005.

✓ = Can be placed in the respective equipment cabinet

NA = Not applicable/not compatible

External Battery Cabinet Specification Reference

Battery Cabinets Without Chargers; Shallow Design with Front Door

Model	Color	Listings	Description		Dimensions
2081-9281	Beige	UL and FM	2-Unit, 4100 style cabinet **without** charger; with locking solid door and battery shelf, primarily for use with 50 Ah batteries		25-3/4" W x 20-3/4" H x 6-3/4" D (654 mm x 527 mm x 171 mm)
2081-9282	Red				
4003-9860	Beige	Multiple	Intended for use with 4003EC systems, for up to 33 Ah batteries (refer to 4003EC data sheet S4003-0002)		9-1/2" H x 24" W x 9" D (241 mm x 610 mm x 229 mm)
4009-9801*	Beige	UL and FM	For up to 25 Ah batteries*	External battery cabinet **without** charger, with locking solid door and battery harness; for close-nippled mounting to fire alarm control panel cabinet	16-1/4" W x 13-1/2" H x 5-3/4" D (413 mm x 343 mm x 146 mm)*
4009-9802	Beige	UL	For up to 33 Ah batteries		25-3/4" W x 20-3/4" H x 4-1/8" D (654 mm x 527 mm x 105 mm)

* Depth increased for 25 Ah batteries effective 7/2005.

Chargers for use with 4010 Fire Alarm Control Panels and 4004R Suppression Release Systems

(refer to data sheet S4081-0001)

Model	Color	Input Voltage	Description	Dimensions
4081-9301	Beige	120 VAC	Battery cabinet **with** charger for the 4010 and 4004R fire alarm control panel; **for up to 50 Ah batteries**; with front door *Listings include: UL, ULC, FM, CSFM, and MEA (NYC), see data sheet for details*	22-1/2" W x16-3/4" H x 8-3/8" D (572 mm x 425 mm x 213 mm)
4081-9302	Red			

Battery Cabinet Without Charger for 110 Ah Batteries; for use with compatible panel mounted chargers

(refer to data sheet S2081-0012)

Model & Listings	Color	Cabinet Description	Compatible Chargers	Charger Description	Dimensions
2081-9280 *Listings include: UL and CSFM*	Red	Battery cabinet for 2081-9279, 110 Ah batteries; includes 80 A battery fuse, terminals and battery connection cables; see data sheet for details	4010-9xxx Series	4010ES Main System Supply (MSS)	26-1/2" W x 12" H x 12" D (673 mm x 305 mm x 305 mm)
			4100-9xxx Series	4100ES/4100U System Power Supplies (SPS)	
			4100-5111 4100-5112 4100-5113	4100ES/4100U Additional SPS	
			4100-5125 4100-5126 4100-5127	4100ES/4100U Remote Power Supply (RPS)	
			4100-5120 4100-5121 4100-5122	4100ES/4100U TrueAlert Addressable Power Supply (TPS)	
			4100-0104 4100-0114 4100-0124	4100 Legacy power supplies	

4100ES/4010ES/4100U Compatible Battery Cabinet With Charger for 110 Ah Batteries (for ULC listed systems and for other applications unable to use panel mounted power supply charger; *refer to data sheet S4081-0002*)

Model	Color	Input Voltage	Description	Dimensions
4081-9306	Red	120 VAC	Battery cabinet with charger for up to 110 Ah batteries; **NOTE:** Required for ULC listed charging of 110 Ah batteries; *Listings include: UL, ULC, FM, CSFM, and MEA (NYC), see data sheet for details*	27-7/8" W x 13-1/2" H x 14-5/8" D (708 mm x 343 mm x 371 mm)
4081-9308	Red	220/230/240 VAC, multi-tapped		
4100-9837	Green LED Power-on Indicator Kit, **required for ULC listing,** mounts above access panel using knockout provided			

XAL-53

Hazardous Location Pull Station

NOTIFIER® by Honeywell

Conventional Initiating Devices

Applications

KILLARK® fire alarm stations are suitable for:

- Hazardous areas due to the presence of flammable gases or vapors, combustible dusts or easily ignitable fibers or flyings.
- Installation at petroleum refineries, chemical and petrochemical plants, storage areas, and other processing facilities where hazardous substances are handled and stored.
- Areas where emergency control of fire alarm or signal circuits is required.

Features

- Enclosure is made of copper-free aluminum alloy.
- Conduit openings are 3/4" (19.05 mm) NPT feed-through.
- Red, textured powder epoxy paint finish is standard on box and cover and provides high visibility for alarm station.
- Universal (1) normally open and (1) normally closed contact furnished standard.
- Bilingual nameplates included per CSA requirement.
- Internal ground screw is standard.
- Wiring range is #12 AWG through #24 AWG, solid or stranded.

Operation

The alarm station is activated by lifting the front cover and pulling down ring. This quick, easy-to-use two-step process prevents unintentional operation. Operator is reset by depressing shaft and returning plate to original position.

Hazardous Area Classifications

- Class I, Divison 1 and 2, Groups C and D.
- Class I, Zones 1 and 2, Groups IIB, IIA.
- Class II, Division 1 and 2, Group E, F, and G.
- Class III, Hazardous Locations.
- NEMA 7CD, 9EFG.

Operational Data

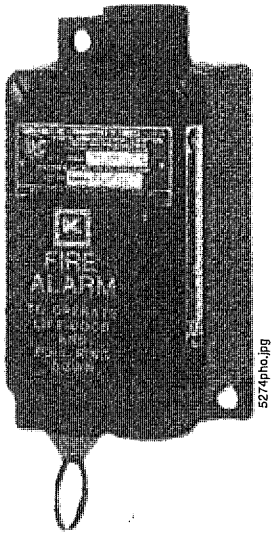
This enclosure is made of cast, copper-free aluminum alloy. It is suitable for: Class I, Groups C and D; Class II, Groups E, F, and G; and Class III hazardous locations. All installations must comply with applicable local and/or National Electrical Code.

Like all electromechanical devices, these control stations require occasional maintenance. Parts may wear out or become defective due to adverse environmental conditions. See Maintenance Data below.

Maintenance Data

***CAUTION:** Disconnect this device from the supplying circuit before removing the cover.*

1. To prevent corrosion, lubricant should be occasionally applied, as follows:
   - Killark® "LUBG" lubricant to box/cover flanges.
   - Dow Corning Molykote™ 33 Grease, light consistency, to operator shaft.
2. Keep all flanges clean and free of scratches.
3. Some internal service parts are available. Consult the Killark factory for parts breakdowns.



XAL-53
Explosion-Proof Pull Station with Pull Ring

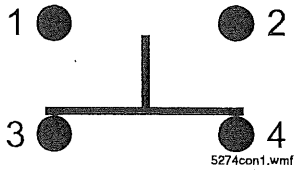
Agency Listings and Approvals

These listings and approvals apply to the modules specified in this document. In some cases, certain modules or applications may not be listed by certain approval agencies, or listing may be in process. Consult factory for latest listing status.

- **UL Listed:** E50498
- **ULC Listed:** E50498
- **CSA:** LR31085
- **CSFM:** 7150-1439:100

Contact Arrangement

Not Activated Position



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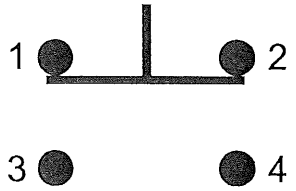
Activated Position



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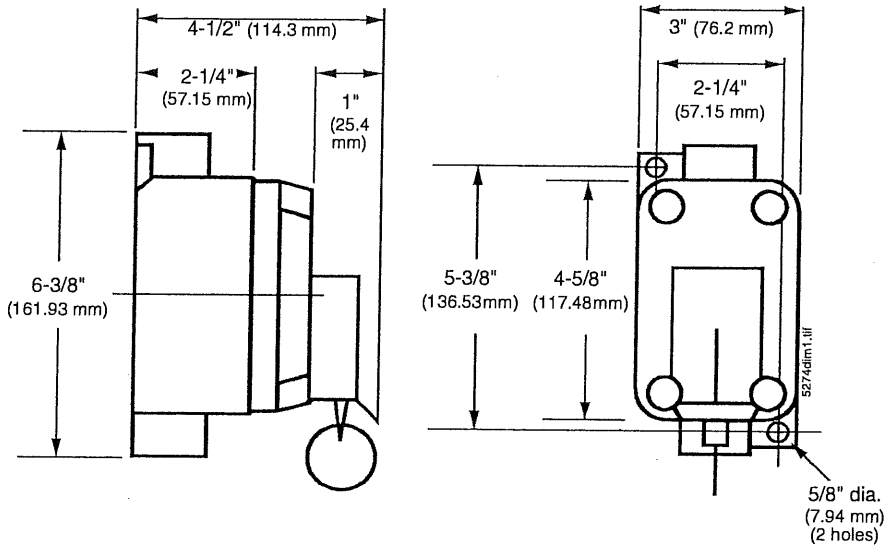
Contact Block Rating

AC						DC		
Volts	Make Amperes	VA	Break Amperes	VA	Continuous Carrying Amperes	Volts	Make Break	Continuous Carrying Amperes
120	60	7200	6.0	720	10	125	1.10	10
240	30	7200	3.0	720	10	250	0.55	10
480	15	7200	1.5	720	10	600	0.20	10
600	12	7200	1.2	720	10			



Product Line Information

XAL-53: Explosion-proof, N/O and N/C Contacts.

ISO 9001 CERTIFIED ENGINEERING & MANUFACTURING QUALITY SYSTEMS

This document is not intended to be used for installation purposes.
We try to keep our product information up-to-date and accurate.
We cannot cover all specific applications or anticipate all requirements.
All specifications are subject to change without notice.

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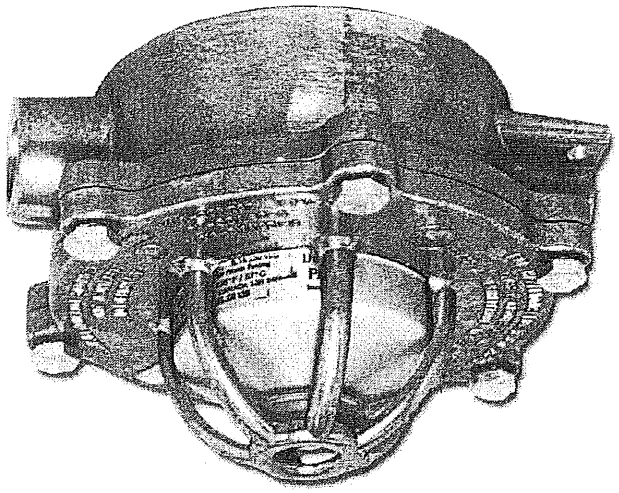
EXPLOSION PROOF HEAT DETECTORS CR/CF-EWT SERIES



Standard Features

- Class I Groups C & D
- Class II Groups E, F & G
- Class III
- Weatherproof, Water-Tight & Dust-Tight
- Special Purpose Enclosure - III, IV, V
- Wire Leads/Sealed Connection
- Rate-Of-Rise and/or Fixed Temperature
- Single Pole - Normally Open Contact
- Low Profile

Description

The CR/CF-EWT series of fire alarm Heat Detectors provide reliable fire detection in areas which are classified as hazardous. They are ULC listed for hazardous location Class I, Groups C and D; Class II, Groups E, F and G; Class III Weatherproof, Watertight and Dust-tight applications covered by Special Purpose Enclosures III, IV and V.

All heat detectors in the CR/CF-EWT series are single pole with normally open contacts. The body with its explosion proof cover is made from cast aluminium and houses a thermostat with colour-coded wire leads and sealed terminals. The finish is natural aluminium. Threaded outlets for ½" rigid conduit connections are provided.

Two combination rate-of-rise and fixed temperature models are available.
Model CR-135-EWT is rated for 135°F (57°C).
Model CR-200-EWT is rated for 200°F (93°).
Maximum spacing for both models is 50 feet (15.2m).

Two fixed temperature only models are available.
Model CF-135-EWT is rated for 135°F (57°C).
Model CF-200-EWT is rated for 200°F (93°C).
Maximum spacing for these models is 30 feet (9.1m).

Operation

CR-135-EWT and CR-200-EWT Rate-of-Rise Models:
A temperature increase at the detector of 15°F (9°C) or more per minute activates the rate-of-rise feature. This closes the contacts in the detector to transmits the alarm condition to the fire alarm control panel. When the rate-of- rise element alone has been activated, the detector is self-restoring.

CF-135-EWT and CF-200-EWTFixed Temperature Models:
If the temperature of the centre disk rises to the detector's rated temperature, the fixed temperature element activates. This closes contacts in the detector and transmit the alarm condition to the fire alarm control panel. The fixed temperature element is non-restorable and when activated, the detector must be replaced. The need for replacement is indicated when the centre disk has fallen free from the detector

CATALOG NUMBER 5121

Specifications

Catalogue Number	CR135EWT	CR200EWT	CF135EWT	CF200EWT	CF285EWT
ULC Temperature Rating	135°F (57 °C)	200°F (93 °C)	135°F (57 °C)	200°F (93 °C)	285°F (140 °C)
ULC Maximum Ambient Temperature at Ceiling	100°F (38 °C)	150°F (66 °C)	100°F (38 °C)	150°F (66 °C)	224°F (107 °C)
Detector Operation	Fixed Temperature and Rate-of-Rise		Fixed Temperature Only		
ULC Recommended Coverage - see note A	2500 ft2 (232m2)		900ft2 (83m2)		
ULC Recommended Spacing	50 ft (15.2m)		30ft (9.1m)		
ULC Maximum Distance from Wall - see note B	25 ft (7.6m)		15 ft (4.6m)		
ULC Approvals	Listed for Hazardous Location Class I, Groups C and D; Class II, Groups E, F and G; Class III Weatherproof, Water-tight and Dust-tight Applications covered by Special Purpose Enclosures III, IV and V				
Other Approvals	C.S.A.; UL				
Contacts	Single Pole Normally Open - Rated at: 3.0 amps at 6 to 125V ac; 1.0 amps at 6 to 28V dc; 0.3 amps at 125V do; 0.1 amp at 250V dc				

Note A - Maximum detector coverage has been determined by ULC to provide detection time equal to sprinkler devices spaced at 10 ft. (3m) intervals on a smooth ceiling 15 ft 9 in. (4.8m) high. Higher ceilings can adversely affect detection time. In some Instances. earlier detection time may be obtained by reducing the spacing between the detectors. Refer to the latest edition of CAN/ULC-S524. Standard for the Installation of Fire Alarm Systems, section on Heat Detectors.

Note B - Maximum distance shown is from any wall partition or ceiling projection extending down more than 12 inches (305mm).

Typical Wiring

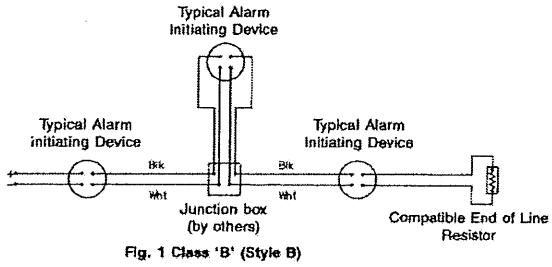


Fig. 1 Class 'B' (Style B)

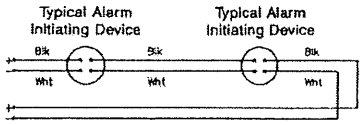
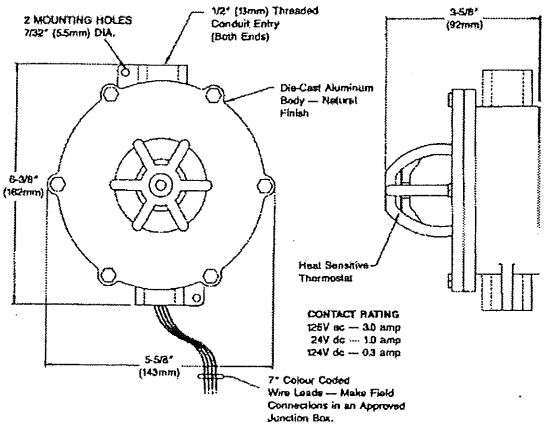


Fig. 2 Class 'A' (Style D)



Ordering Information

Model	Description
CR-135-EWT	Rate of Rise & Fixed Temperature 135°F Explosion Proof Heat Detector
CR-200-EWT	Rate of Rise & Fixed Temperature 200°F Explosion Proof Heat Detector
CF-135-EWT	Fixed Temperature 135°F Explosion Proof Heat Detector
CF-200-EWT	Fixed Temperature 200°F Explosion Proof Heat Detector

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Simplex®

Multi-Application Peripherals

UL, ULC, CSFM Listed; FM Approved;
*MEA (NYC) Acceptance**

IDNet or MAPNET II Communicating Devices
Addressable Manual Stations

Features

Individually addressable manual fire alarm stations with:

- Power and data supplied via IDNet or MAPNET II addressable communications using a single wire pair
- Operation that complies with ADA requirements
- The NO GRIP Single Action Station and Retrofit Kit are available with a more easily operated pull lever for applications where anticipated users may find the standard station lever difficult to activate
- Pull lever that protrudes when alarmed
- Break-rod supplied (use is optional)
- Models are available with single or double action (breakglass or push) operation
- UL listed to Standard 38

Compatible with the following Simplex® control panels:

- Model Series 4100ES, 4010ES, 4008, 4010, 4100U, 4020, 4100, and 4120 fire alarm control panels equipped with either IDNet or MAPNET II communications
- Model Series 2120 Communicating Device Transponders (CDTs) equipped with MAPNET II communications

Compact construction:

- Electronics module enclosure minimizes dust infiltration
- Allows mounting in standard electrical boxes
- Screw terminals for wiring connections

Tamper resistant reset key lock (keyed same as Simplex fire alarm cabinets)

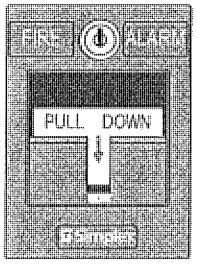
Multiple mounting options:

- Surface or semi-flush with standard boxes or matching Simplex boxes
- Flush mount adapter kit
- Adapters are available for retrofitting to commonly available existing boxes

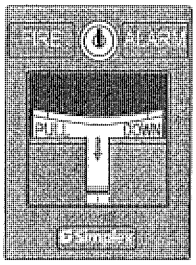
Description

The Simplex addressable manual station combines the familiar Simplex manual station housing with a compact communication module that is easily installed to satisfy demanding applications. Its integral individual addressable module (IAM) constantly monitors status and communicates changes to the connected control panel via IDNet or MAPNET II communications wiring.

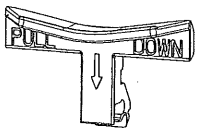
* Refer to page 2 for specific model listings. This product has been approved by the California State Fire Marshal (CSFM) pursuant to Section 13144.1 of the California Health and Safety Code. See CSFM Listing 7150-0026:224 for allowable values and/or conditions concerning material presented in this document. It is subject to re-examination, revision, and possible cancellation. Accepted for use – City of New York Department of Buildings – MEA35-93E. Additional listings may be applicable; contact your local Simplex product supplier for the latest status. Listings and approvals under Simplex Time Recorder Co. are the property of Tyco Fire Protection Products.



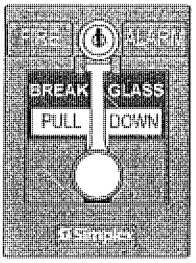
4099-9001
Single action



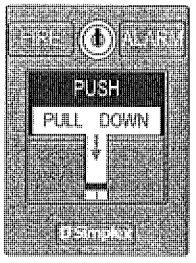
4099-9020
NO GRIP
Single action



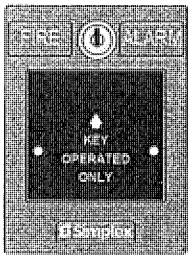
4099-9805
NO GRIP
Retrofit kit



4099-9002
Breakglass



4099-9003
Push



With 2099-9828
Institutional
Cover kit

Operation

Activation of the 4099-9001 single action manual station requires a firm downward pull to activate the alarm switch. Completing the action breaks an internal plastic break-rod (visible below the pull lever, use is optional). The use of a break-rod can be a deterrent to vandalism without interfering with the minimum pull requirements needed for easy activation. The pull lever latches into the alarm position and remains extended out of the housing to provide a visible indication.

Single Action NO GRIP Station 4099-9020. For applications such as California Building Code, Title 24, which requires "Controls and operating mechanisms shall be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist" the model 4099-9020 station provides a more easily operated pull lever compared to standard stations. Retrofit of existing stations is available using the 4099-9805 Retrofit kit.

Double Action Stations (Breakglass) require the operator to strike the front mounted hammer to break the glass and expose the recessed pull lever. The pull lever then operates as a single action station.

Double Action Stations (Push Type) require that a spring loaded interference plate (marked PUSH) be pushed back to access the pull lever of the single action station.

Station reset requires the use of a key to reset the manual station lever and deactivate the alarm switch. (If the break-rod is used, it must be replaced.)

Station testing is performed by physical activation of the pull lever. Electrical testing can be also performed by unlocking the station housing to activate the alarm switch.

Addressable Manual Station Product Selection

Addressable Manual Stations, Red Housing with White Letters and White Pull Lever

Model	Description	Housing	Pull Lever	Listings
4099-9001	Single action, English	FIRE ALARM	PULL DOWN	UL, ULC, FM, CSFM, MEA
4099-9001CB	Single action, Bilingual English and French	FEU FIRE	TIREZ PULL	ULC, FM
4099-9001CF	Single action, French	ALARME FEU	ABAISSEZ	
4099-9002	Double action, Breakglass operation, English	FIRE ALARM	PULL DOWN	UL, ULC, FM, CSFM, MEA
4099-9003	Double action, Push operation, English			
4099-9020	Single action NO GRIP operation, English	FIRE ALARM	PULL DOWN	UL, ULC, FM, CSFM

Accessories

Model	Description	
2975-9178	Surface mount steel box, red	Refer to page 3 for dimensions
2975-9022	Cast aluminum surface mount box, red	
2099-9813	Semi-flush trim plate for double gang switch box, red	Typically for retrofit, refer to page 4
2099-9814	Surface trim plate for Wiremold box V5744-2, red	
2099-9819	Flush mount adapter kit, black	Refer to page 4 for details
2099-9820	Flush mount adapter kit, beige	
2099-9803	Replacement breakglass	
2099-9804	Replacement break-rod	
2099-9828	Institutional cover kit for field installation on 4099-9001	
4099-9805	Retrofit Kit for field conversion of a single action station to a NO GRIP station; refer to Installation Instructions 579-1007 for details	

Specifications (refer to Installation Instructions 574-332 for additional information)

Power and Communications	IDNet or MAPNET II communications, 1 address per station
Address Means	DIP switch, 8 position
Wire Connections	Screw terminal for in/out wiring, for 18 to 14 AWG wire
UL Listed Temperature Range	32° to 120° F (0° to 49° C) intended for indoor operation
Humidity Range	Up to 93% RH at 100° F (38° F)
Housing Color	Red with white raised lettering
Material	Housing and pull lever are Lexan polycarbonate or equal
Pull Lever Color	White with red raised lettering
Housing Dimensions	5" H x 3-3/4" W x 1" D (127 mm x 95 mm x 25 mm)

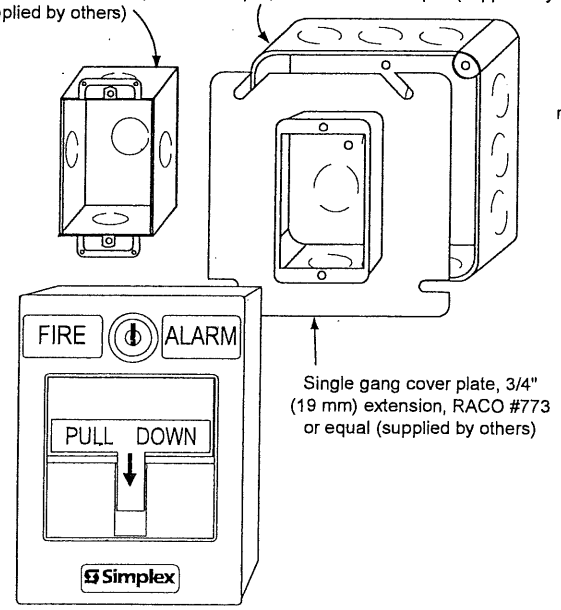
Addressable Manual Station Semi-Flush Mounting

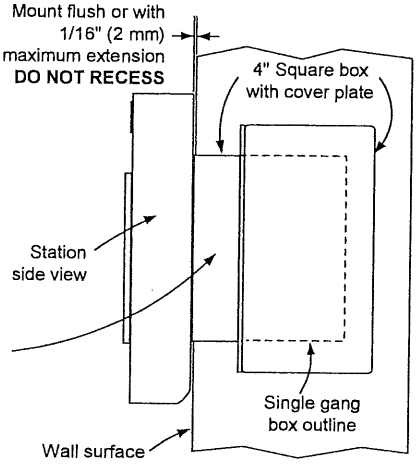
Single Gang Box Mount

Single gang box, 2-1/2" deep (64 mm), RACO #500 or equal (supplied by others)

4" Square Box Mount

4" (102 mm) square box, 2-1/8" (54 mm) minimum depth, RACO #231 or equal (supplied by others)



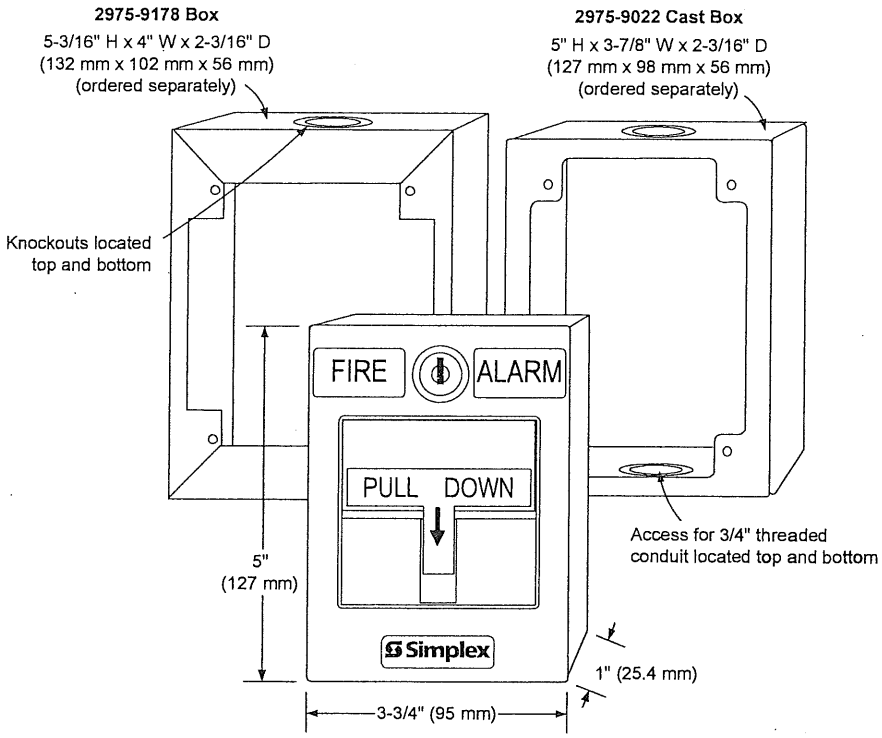


Semi-Flush Mount Side View

Addressable Manual Stations Surface Mounting

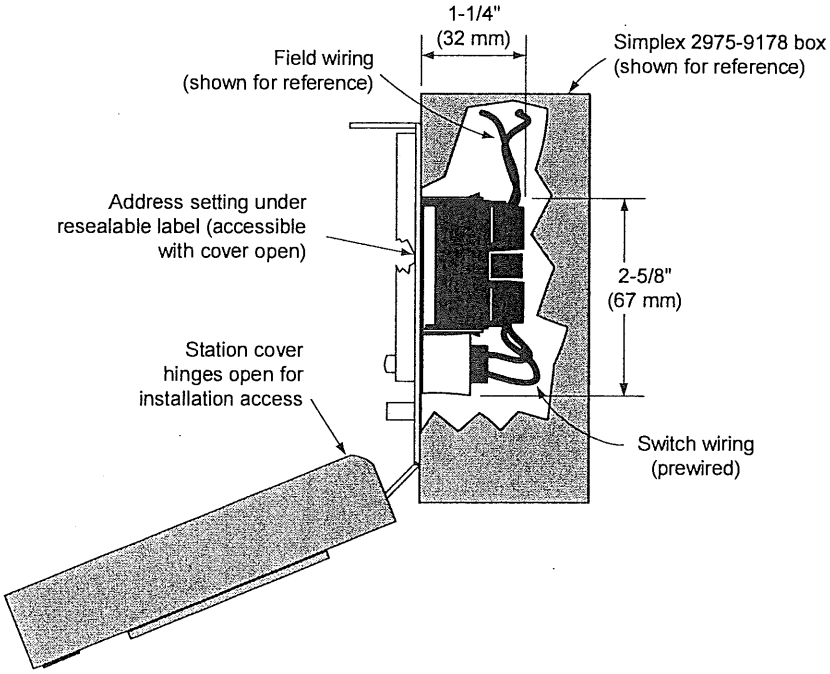
Preferred Mounting. For surface mounting of these addressable manual stations, the preferred electrical boxes are shown in the illustration to the right.

Additional Mounting Reference. Refer to page 4 for Wiremold box mounting compatibility.



4099 Series Addressable Manual Station

Surface Mount Side View with Internal Detail



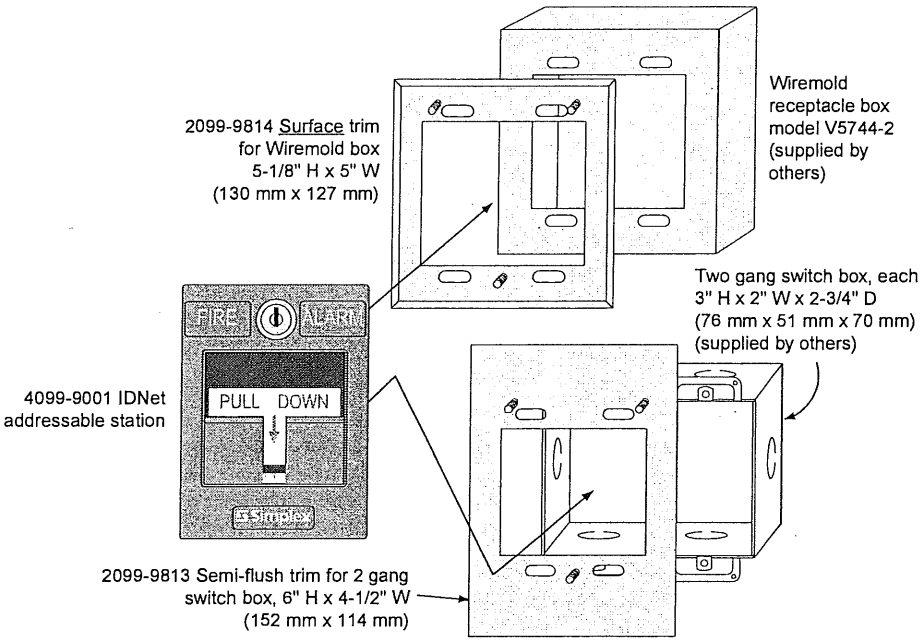
Application Reference

Refer to NFPA 72, the *National Fire Alarm and Signaling Code*, and all applicable local codes for complete requirements for manual stations. The following summarizes the basic requirements.

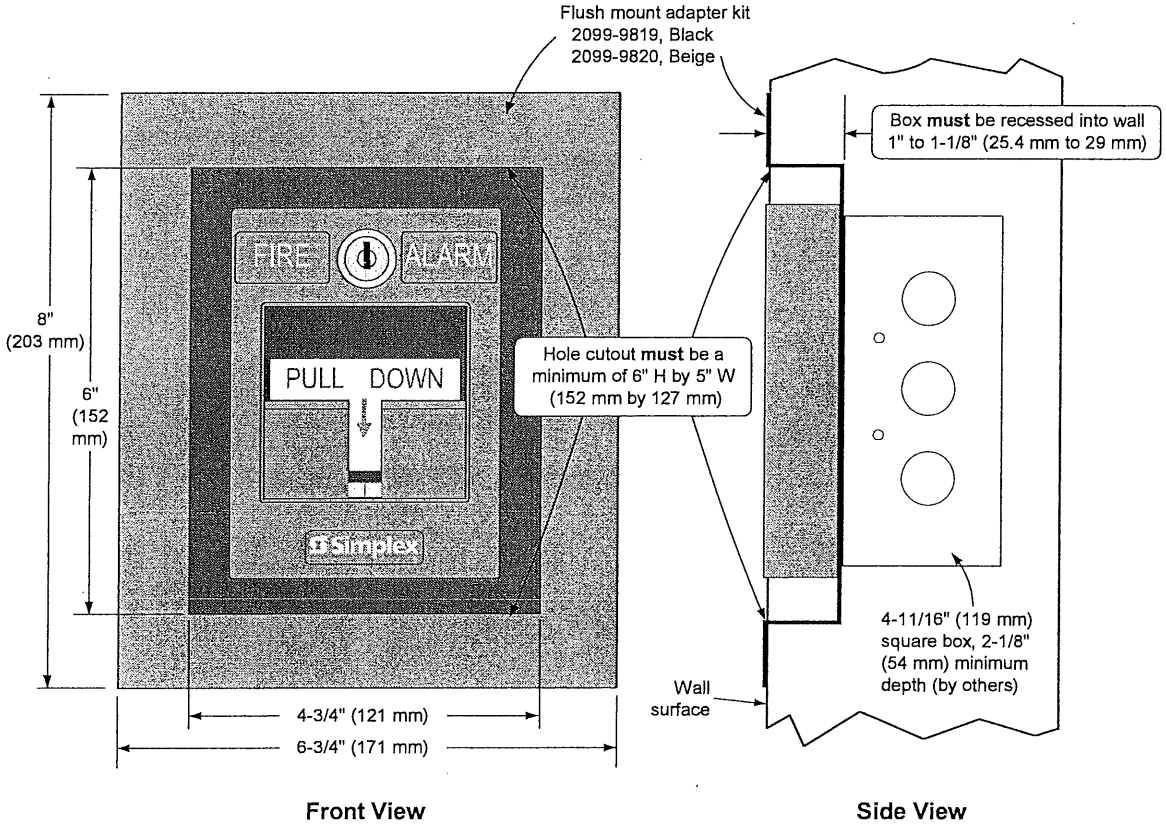
1. Stations shall be located in the normal path of exit and distributed in the protected area such that they are unobstructed and readily accessible.
2. Mounting shall be with the operable part not less than 42 in (1.07 m) and not more than 48 in (1.22 m) above floor level.
3. At least one station shall be provided on each floor. Additional stations shall be provided to obtain a travel distance not more than 200 ft (61 m) to the nearest station from any point in the building.
4. When manual station coverage appears limited in any way, additional stations should be installed.

Addressable Manual Station, Additional Mounting Information

For retrofit and new installations, additional compatible mounting boxes and the required adapter plates are shown in the illustration to the right.



Addressable Manual Station, Flush Mounting Information



Simplex

UL, ULC, CSFM Listed;
*FM Approved**

Multi-Point Peripherals

TrueAlarm CO Sensor Bases for Smoke, Heat, and Photo/Heat Sensors using IDNet Communications

Features

TrueAlarm addressable CO sensor bases contain a carbon monoxide (CO) sensing module providing both CO toxic gas monitoring *and* enhanced fire detection:

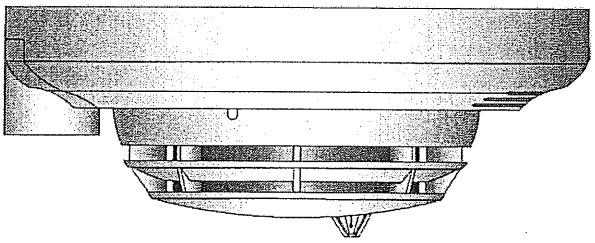
- For use with 4100ES, 4010ES, or 4100U fire alarm control panels (4100U requires software revision 12.05 or higher)
- CO sensor bases support (and require) a TrueAlarm photoelectric, photo/heat or heat sensor (ordered separately)
- Model 4098-9797 provides standard features, model 4098-9798 also provides a piezoelectric sounder
- CO sensor bases are multi-point devices, consume only one IDNet address, and receive both communications and sensor power from the IDNet channel (the sounder base requires separate 24 VDC system power or NAC connection)
- Listed to UL 268, *Smoke Detectors for Fire Alarm Signaling Systems* and UL 2075, *Gas and Vapor Detectors and Sensors*; allowing systems to be listed to Standard 2034, *Single and Multiple Station Carbon Monoxide Alarms*
- Listed by ULC to CSA 6.19-01 *Residential Carbon Monoxide Alarming Devices*
- Three types of CO influenced operation are available; UL 2034 CO alarm detection; UL 2075 CO (OSHA) level monitoring for ventilation control; and multi-criteria fire sensor analysis with algorithms that combines optical and CO gas monitoring information

Operation of a CO sensor base with a photoelectric or a photo/heat sensor allows:

- Independent sensor operation ***or*** selectable multi-sensor modes of *False Alarm Reduction **or** Faster Detection*
- **False Alarm Reduction** analyzes CO and photoelectric sensor information together to provide a sophisticated rejection of non-fire conditions normally troublesome as false alarms (steam, dust, aerosols, etc.)
- **Faster Detection** (increased sensitivity) algorithm analyzes CO and photoelectric sensor information to allow the presence of CO to implement an increased photoelectric sensitivity for high value locations (museums, electrical equipment rooms, etc.)

Sounder base operation details:

- When connected to a panel NAC through the 4905-9835 Temporal Code Module, the sounder base can provide temporal code 3 (TC3) for fire, or temporal code 4 (TC4) for toxic carbon monoxide alarms
- 4905-9835 module may also be used to code other (non-fire) dedicated carbon monoxide notification appliances (refer to data sheet S4905-0006)
- Sounder can be manually activated from the panel
- Sounder operation is also listed to UL 464 as an audible notification appliance



TrueAlarm CO Sensor Base with Sounder
(shown with 4098-9754 Photo/Heat Sensor)

Features *(Continued)*

4100ES/4100U/4010ES Control Panel operation summary:

- CO sensor data is stored and analyzed at the panel; a new CO Service Report provides easy information access (see sample on page 3)
- Five (5) year end of life status indication with CO sensor expiration notices occurring within 12 months and within 6 months, allowing service replacement planning
- Analog sensor information is digitally transmitted to the host control panel via IDNet communications for processing to evaluate and track status
- Carbon monoxide concentration in ppm (parts per million) is available for viewing from the panel user interface
- For OSHA compliant CO gas sensing, CO condition level may be programmed by concentration (must be above 30 ppm)
- 4100ES Audio Control Panels can provide a CO Relocation Message with Temporal Code 4 tone and Voice Evacuation (reference UCSET1393, see S4100-0034)

General features:

- Operation of a CO sensor base with heat sensor provides dual independent sensor operation
- New CO test mode allows functional testing of each sensor technology including the CO sensor
- Optional accessories include remote alarm LED, alarm relay, and mounting adapter plate
- Designed for EMI compatibility
- Provides magnetic test

CO sensor element is easily replaced when end of service life is reached:

- Access to CO sensor replacement cartridge (CORC, 4098-9746) requires removal of interchangeable sensor head providing tamper monitoring (sensor removal causes a trouble condition)

* This product has been approved by the California State Fire Marshal (CSFM) pursuant to Section 13144.1 of the California Health and Safety Code. See CSFM Listing 7300-0026:330 for allowable values and/or conditions concerning material presented in this document. Listings and approvals under Simplex Time Recorder Co. are the property of SimplexGrinnell LP, Westminster.

CO Sensor Base Description

Carbon monoxide (CO) is an odorless, colorless, tasteless gas produced by the incomplete combustion of heating fuels such as wood, coal, heating oil, and natural gas. CO is also a byproduct of many materials experiencing unintentional fire or even incipient fire conditions. Monitoring of CO levels can warn of physically harmful concentrations, however, sensing of CO levels below the harmful level can also provide improved understanding of incipient fire conditions when evaluated in combination with photoelectric fire sensor information from the same location.

Simplex® CO sensor bases combine an electrolytic CO sensing module with a TrueAlarm analog sensor to provide a single multiple sensing assembly using one system address. The CO sensor can be enabled/disabled, used in LED/Switch modes and custom control, and can be made public for communication across a fire alarm Network.

CO sensor operation is similar to other TrueAlarm sensors (photoelectric or heat). It provides current analog values, average analog value, "No Answer" troubles, "Wrong Device" troubles, over threshold, concentration in ppm, and monitors for the presence of the CO sensor. Base mounted address selection allows the address to remain with its location when the sensor is removed for service or type change. Address access is from the front, under the removable sensor. An integral red LED indicates power-on by pulsing, or alarm or trouble when steady on, and also provides test mode status (see page 3). Detailed status is available at the fire alarm control panel.

CO Sensing, Detailed Operation

Toxic Gas Sensing, UL 2034/UL 2075. For CO toxic gas detection, the bases provide toxic gas sensing to the UL 2034 and UL 2075 standards. Toxic gas sensing may be selected at the same time as any of the combined CO photo fire detection modes are selected.

Toxic Gas Sensing, OSHA Compliant. For OSHA compliant gas sensing, the desired threshold level (above 30 ppm) is selected at the control panel as required for the application, typically for ventilation control. Refer to page 3 for additional OSHA CO monitoring information.

Enhanced Fire Sensing. Each sensor provides an analog measurement digitally communicated to the control panel for analysis. At the panel, these analog values are used separately, or combined, to evaluate for conditions indicative of fire, incipient fire, excessive heat, and freeze warning. For fire, the addition of a CO sensor provides two new selectable modes of operation: *Nuisance Alarm Reduction Mode* and *Faster Fire Detection*. These two modes were developed using the results of extensive testing of actual fires performed under a wide variety of conditions. (Refer to page 4 for additional operation mode options.)

Nuisance Alarm Reduction Mode allows the host control panel to combine photoelectric sensor input and CO sensor level input to reduce false alarms caused by non-fire conditions. Non-fire conditions can be steam from bathroom showers, particles from dusty environments, aerosols from personal care products, tobacco smoke, cooking smoke, or other similar conditions.

CO Sensing, Detailed Operation *(Continued)*

Nuisance Alarm Reduction Details. For applications of anticipated nuisance alarm conditions, photoelectric sensitivity is normally selected for 3.7%/ft smoke obscuration. However, the addition of CO sensing allows the host control panel to apply software verification similar to the timed alarm verification feature often used with conventional smoke detection.

Faster Fire Detection. For applications where faster response to incipient or slow building fires is desired and environment appropriate, the Faster Fire Detection mode correlates the outputs of the CO sensor and the photoelectric sensor to provide increased sensitivity. This mode provides earlier detection compared to a standard sensitive photoelectric sensor setting, and also provides more false alarm reduction compared to using a sensitive setting in an area not normally considered appropriate.

Faster Fire Detection Details. TrueAlarm photoelectric sensors can be selected to be as sensitive as 0.2%/ft obscuration for applications evaluated as appropriate to that level. However, if the environment is not suitable for that sensitivity level, the Faster Fire Detection mode allows the photoelectric sensor to be selected as a "standard" 2.5%/ft obscuration, but with the presence of a significant level of CO, the combination of CO and photo sensing input can allow an equivalent sensitivity approaching 0.5%/ft obscuration. The host control panel tracks two photoelectric sensitivities, the one selected for photoelectric operation only (typically 2.5%), and the CO correlation sensitivity that it adjusts depending on the amount of CO present.

Control Panel Operations

Smoke sensor features include: sensitivity monitoring satisfying NFPA 72 sensitivity testing requirements, automatic individual sensor calibration checking to verify sensor integrity, automatic environmental compensation, available multi-stage alarm operation, display of sensitivity directly in percent per foot, monitoring of peak activity per sensor, alarm set point, and time of day or multi-stage alarm selection.

Sensor Alarm and Trouble LED Indications. The sensor base LED pulses to indicate communications with the panel. If a sensor is in alarm, or has a trouble condition, the status is annunciated at the control panel and that base LED will turn on steady. During a system alarm, the panel will control LEDs such that a trouble indication will return to pulsing to help identify the sensors in alarm.

Reported CO Sensor troubles are: Disabled, Almost Expired 12 Months, Almost Expired 6 Months, Expired (End of Life), Short, and Sensor Missing/Failed.

Trouble Details. "Almost Expired" is similar to the "Almost Dirty" trouble for a photoelectric sensor. "Expired" trouble is similar to the "Dirty" trouble for a TrueAlarm photoelectric sensor. CO sensor technology does not support automatic sensitivity testing and drift compensation as is available with a photoelectric sensor. End of useful CO sensor life is based upon a set 5 year operational lifetime, tracked by date code built into the CO sensor module electronics. Although the CO sensor will continue to function after the 5 year expired trouble is indicated, replacement is required to ensure proper detection accuracy.

Control Panel Operations *(Continued)*

Panel Test Mode. To facilitate functional testing of the CO sensor, a new test mode is available in the host control panel. In this mode, the CO sensor, and installed heat or smoke sensor can be easily ***functionally*** tested.

Panel Test Mode Details. When in the CO test mode, the internal multiple sensor analysis algorithms are disabled allowing each sensor to be quickly tested either individually or simultaneously, depending on the test equipment used. CO testing can be performed using a Solo Model 332 aerosol dispenser (or equal). (Testing is available through your local authorized Simplex product supplier.) The base LED will display steady ON when individual sensors are activated during test. Refer to the Application Reference section for more information.

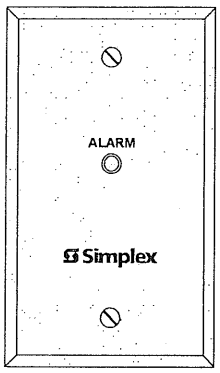
OSHA CO monitoring. For OSHA compliant gas sensing, control panel software supports custom programming based upon CO concentration levels. For example, turn on ventilation if the CO level is above X ppm and then turn off ventilation when the level drops below Y ppm (or select either value as a range if desired). This is separate from alarm set points.

Multi-Point Allocation. 4100ES and 4010ES control panels require only one (1) point at the host panel per CO sensor base. For 4100U control panels, the requirement is three (3) points at the host panel per CO sensor base with the 4098-9754 multi-sensor, and two (2) points for the other sensors. Depending on CO sensor base and sensor choice, up to seven (7) points can be made public to a connected Simplex Fire Alarm Network. Each CO sensor base uses a single address with "sub-points" layered underneath (such as 1-1-0, 1-1-1, 1-1-2, ...1-1-6). (Additional multi-point allocation detail is described in reference data sheet S4090-0011.)

CO Sensor Base Power Requirements. Power for the standard CO sensor base is provided by IDNet communications. *No additional wiring is required for upgrading of existing installed TrueAlarm sensor bases.* CO sensor sounder bases do require system supplied separate 24 VDC (or NAC) wiring, the same as the standard sounder base.

Accessories

2098-9808, Remote red LED Alarm Indicator mounts on a single gang box to provide status indications where the sensor location may not be readily visible. (See illustration to right.)



4098-9822, LED Annunciation Relay activates when base LED is on steady, indicating a local alarm or trouble. Contacts are DPDT, rated 2 A @ 30 VDC; 1/2 A @ 120 VAC for transient suppressed loads (requires external 24 VDC coil power).

Application Reference

Determine sensor locations after careful consideration of the physical layout and contents of the area to be protected.

For fire alarm applications:

- Refer to NFPA 72, the *National Fire Alarm and Signaling Code*
- On smooth ceilings, smoke sensor spacing of 30 ft (9.1 m) may be used as a guide.

For detailed application information:

- Refer to *4098 Detectors, Sensors, and Bases Application Manual*, Part Number 574-709.

For toxic gas sensor placement and mounting:

- Refer to NFPA 720, *Standard for the Installation of Carbon Monoxide (CO) Warning Equipment in Dwelling Units*
- Sensors may be either wall or ceiling mounted
- Per NFPA 720, Section 5.1 (2005 edition):
  5.1.1 A carbon monoxide alarm or detector shall be centrally located outside of each separate sleeping area in the immediate vicinity of the bedrooms.
  5.1.2 Each alarm or detector shall be located on the wall, ceiling, or other location as specified in the installation instructions that accompany the unit.

TrueAlarm CO Service Reports

TrueAlarm CO Service Reports (sample below) contain information on the CO sensors programmed in the panel displaying pertinent data such as current concentration value in ppm, End of Life date, and current state. This report allows determination of which sensors will require attention.

```
Service Port                                                        Page 1

REPORT 6 : TrueAlarm CO Report                  12:34:56am     FRI     31-MAY-13

Channel 1 (M1)

Zone                                                Current    End of
Name       CUSTOM LABEL                              Value    Life Date  State
M1-1-2     Conference Room 17 CO Toxic Gas          457PPM   01-APR-18  PRI
M1-2-2     Boiler Room CO Toxic Gas                  0PPM    01-APR-18  NOR
TRUE ALARM CO REPORT COMPLETED
         Press RETURN for next Screen OR CTRL-X to abort
```

TrueAlarm Analog Sensing Product Selection Chart

TrueAlarm CO Sensor Base

Model	Description	
4098-9797	CO Base, Standard operation	Select TrueAlarm sensor from list below
4098-9798	CO Base with Sounder	

TrueAlarm Sensors, select one per CO Sensor Base

Model	Description	
4098-9714	Photoelectric Smoke Sensor	Refer to selection table below for available operation modes
4098-9754	Multi-Sensor Photoelectric and Heat Sensing	
4098-9733	Heat Sensor	

CO Base Replacement CO Cartridge and Accessories (ordered separately as required)

Model	Description		
4098-9746	CO Replacement Cartridge (CORC)		
Solo 332	Aerosol Dispenser, suitable for larger diameter detectors; can be used for CO or smoke testing		
Solo C3	CO Aerosol Canister (case of 12)		
Model	**Description**		**Mounting Requirements**
4098-9832	Adapter Plate, **required** for surface mounted 4" electrical boxes		Refer to page 6, mounting reference
2098-9808	Choose **one** if required	Remote red LED Alarm Indicator on single gang stainless steel plate	Single gang box, 1-1/2" minimum depth
4098-9822		Relay, tracks base LED status (unsupervised, to be mounted only in base electrical box)	Mounts in base electrical box (requires 1-1/2" extension on 4" square or octagonal box)

CO Sensor Base Operation Options with Sensor Choice

Sensor Choice	Mode	Operational Mode Choices* (✓ = operation selected)								
		False Alarm Reduction	Faster Detection	TrueSense Photo/Heat	Photo Fire	Heat Fire**	Utility Temp.	Ion Fire	CO Toxic Gas†	CO Fire††
Photoelectric Smoke Sensor 4098-9714	1	✓	—	—	—	—	—	—	option	option
	2	—	✓	—	option	—	—	—	option	option
Photo/Heat Multi-Sensor 4098-9754	3	✓	—	—	—	option	option	—	option	option
	4	—	✓	—	option	option	option	—	option	option
	5	—	—	✓	option	option	option	—	option	option
Heat Sensor 4098-9733	6	—	—	—	—	✓	option	—	option	—
	7	—	—	—	—	option	✓	—	option	—

* **NOTE:** Duct detection modes are not applicable and are not available. Refer to the Multi-Point Allocation discussion on page 3 for panel point requirement information.

** Heat Fire Mode is 135° F or 155° F, fixed or rate-of-rise.

† CO Toxic Gas operation is selectable as: Supervisory (which is NOT recommended if communicated off-site), Priority 2 (preferred if communicated off-site), or Utility.

†† CO fire detection mode can be selected only when used with a photoelectric smoke detection sensor set for fire detection mode.

TrueAlarm Analog Sensor Features

Sealed against rear air flow entry

Electronics are EMI/RFI shielded

Heat sensing:

- Selectable rate compensated, fixed temperature sensing with or without rate-of-rise operation
- Rated spacing distance between sensors:

Fixed Temp. Setting	UL& ULC Spacing	FM Spacing, Either Fixed Temperature Setting
135° F (57.2° C)	60 ft x 60 ft (18.3 m)	20 ft x 20 ft (6.1 m) for fixed temperature only; **RTI = Quick**
155° F (68° C)	40 ft x 40 ft (12.2 m)	50 ft x 50 ft (15.2 m) for fixed temperature with either rate-of-rise selection; **RTI = Ultra Fast**

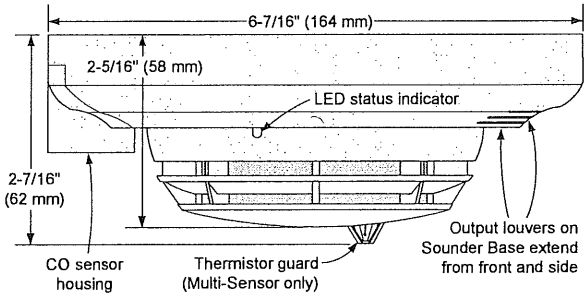
Smoke Sensors:

- Photoelectric technology sensing
- 360° smoke entry for optimum response
- Built-in insect screens

4098-9714 Photoelectric Sensor

TrueAlarm photoelectric sensors use a stable, pulsed infrared LED light source and a silicon photodiode receiver to provide consistent and accurate low power smoke sensing. Seven levels of sensitivity are available for each individual sensor, ranging from 0.2% to 3.7% per foot of smoke obscuration. Sensitivities of 0.2%, 0.5%, and 1% are for special applications in clean areas. Standard sensitivities are 1.5%, 2.0%, 2.5%, and 3.7%. Sensitivity is selected and monitored at the fire alarm control panel. (For detailed application information about sensitivity selection, refer to Installation Instructions 574-709.)

The sensor head design provides 360° smoke entry for optimum smoke response. Due to its photoelectric operation, air velocity is not normally a factor, except for impact on area smoke flow.



Dimension and Feature Reference, Photoelectric or Multi-Sensor on CO Sensor Base

4098-9754 Multi-Sensor

TrueAlarm multi-sensors combines the performances of TrueAlarm photoelectric smoke sensing with TrueAlarm thermal sensing to provide both features in a single assembly. Each sensing element provides data for evaluation at the fire alarm control panel where the following four independent detection modes are evaluated:

- Fixed temperature heat detection
- Rate-of-rise heat detection
- TrueAlarm photoelectric smoke detection
- And TrueSense correlation detection

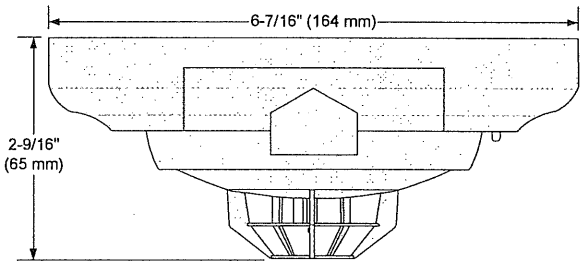
TrueSense analysis correlates both thermal activity *and* smoke activity at a single multi-sensor location using an extensively tested covariance relationship. As a result, TrueSense detection improves response to conditions indicative of faster acting, hot flaming fires when compared to the response of either photoelectric smoke activity or thermal activity alone.

4098-9733 Heat Sensor

TrueAlarm heat sensors are self-restoring and provide rate compensated, fixed temperature sensing, selectable with or without rate-of-rise temperature sensing. Due to its small thermal mass, the sensor accurately and quickly measures the local temperature for analysis at the fire alarm control panel.

Rate-of-rise temperature detection is selectable at the control panel for either 15° F (8.3° C) or 20° F (11.1° C) per minute. Fixed temperature sensing is independent of rate-of-rise sensing and programmable to operate at 135° F (57.2° C) or 155° F (68° C). In a slow developing fire, the temperature may not increase rapidly enough to operate the rate-of-rise feature. However, an alarm will be initiated when the temperature reaches its rated fixed temperature setting.

TrueAlarm heat sensors can be programmed as a utility device to monitor for temperature extremes in the range from 32° F to 155° F (0° C to 68° C). This feature can provide freeze warnings or alert to HVAC system problems.



4098-9733 Heat Sensor with CO Sensor Base (with CO Sensor Housing facing forward)

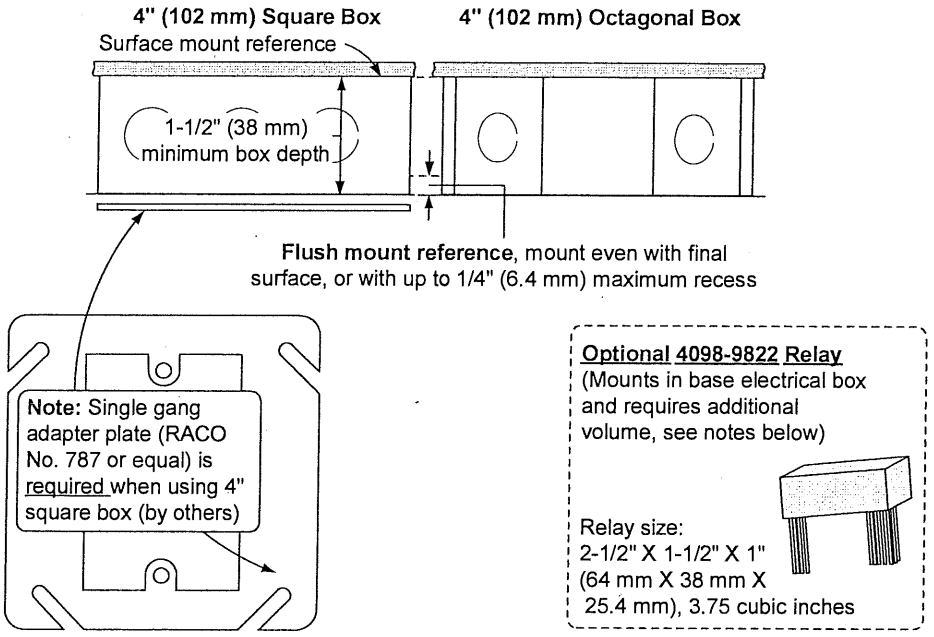
WARNING: In most fires, hazardous levels of smoke and toxic gas can build up before a heat detection device would initiate an alarm. In cases where Life Safety is a factor, the use of smoke detection is highly recommended.

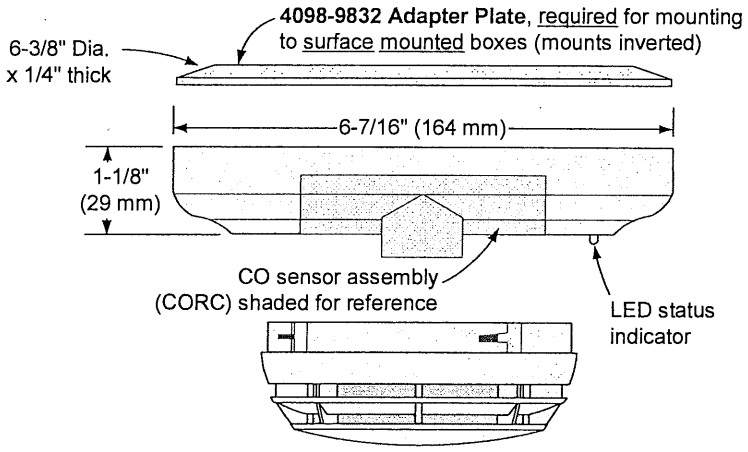
Installation Reference

Electrical Box Requirements: (boxes are by others)

Without relay: 4" octagonal or 4" square, 1-1/2" deep; single gang, 2" deep

With relay : 4" octagonal or 4" square, 1-1/2" deep, with 1-1/2" extension ring





(Photoelectric sensor shown for reference)

NOTES:

1. Review actual wire size, wire count, box type, and whether 4098-9822 relay is used before determining box size.
2. Mounting to flush mounted box also fits single gang handy box, 2-1/8" (51 mm) deep if wiring allows. (Not applicable if 4098-9822 relay is used.)
3. For surface mounted boxes, use 4" square box with single gang adapter plate (RACO No. 787 or equal, by others) or 4" octagonal box, both require 4098-9832 Adapter Plate.
4. When 4098-9822 relay is used, mount relay in electrical box and use 1-1/2" extension ring (by others) on 4" square or octagonal box of 1-1/2" or 2-1/8" depth as required.
5. Refer to sensor base Installation Instructions 574-707 for additional information.
6. Refer to CORC Replacement Instructions 579-791 for CO cartridge installation and replacement.

Specifications

General Operating Specifications

IDNet Communications and Sensor Supervisory Power		24-40 VDC w/data, 400 μA typical, 1 address per base, supplied by control panel
Communications and Sounder Power Connections		Screw terminals for in/out wiring, 18 to 14 AWG (0.82 mm^2 to 2.08 mm^2)
Remote LED Alarm Indicator	Current	1 mA typical supplied from communications, no impact to alarm current
	LED Connections	Color coded wire leads, 18 AWG (0.82 mm^2)
UL Listed Temperature Range		32° F to 100° F (0° C to 38° C)
Operating Temperature Range	with 4098-9733	32° F to 122° F (0° C to 50° C)
	with 4098-9714 or 4098-9754	15° F to 122° F (-9° C to 50° C)
Humidity Range		15 to 95% RH
CO Sensor Base Air Velocity Ratings per Sensor	Photoelectric Sensor 4098-9714 and Multi-Sensor 4098-9754	Air velocity = 0-1000 ft/min (0-305 m/min)
Housing Color		Frost White

Sounder Operation

Sounder Voltage		18 to 32 VDC from steady external source or from NAC
Alarm Current (Sounder On)		17 mA @ 24 VDC, 24 mA maximum @ 32 VDC
Sounder Output		88 dBA minimum @ 10 ft (3 m) per UL Standard 464, *Audible Signaling Appliance*; UL Standard 268, *Smoke Detectors for Fire Protective Signaling Systems* and CSA 6.19-01
Sounder Power Supervision (Selectable)	Supervised	Select for continuous 24 VDC power, loss of power is communicated to panel
	Unsupervised	Select when connected to NAC for sounder power, NAC provides supervision
NAC Powered Operation		When in alarm, will sound when NAC is in alarm, allowing synchronized pattern (Temporal or March Time, etc.) controlled by the NAC control

Reference for CO Monitoring

		Concentration	Alarm Window
Requirements Reference for UL 2034 and CSA 6.19-01	Response Time	70 ±5 ppm	60 to 240 minutes
		150 ±5 ppm	10 to 50 minutes
		400 ±10 ppm	4 to 15 minutes
	False Alarm Resistance	30 ±3 ppm	No Alarm for 30 days
		70 ±5 ppm	No Alarm for 60 minutes

Additional UL 2034 CO Sensor Toxic Gas Monitoring Details	1. For CO levels above 40 ppm, the CO alarm level per sensor is determined by calculations performed at the panel based on the time integrated CO levels measured at the sensor. (Levels below 40 ppm are not tracked.) 2. While tracking levels above 40 ppm, if the concentration dips below 40 ppm for periods of time, the time to alarm is extended accordingly.
UL 2075 Reference, Commercial OSHA Type Operation; Utility Point Mode	With custom control at the fire alarm control panel, Utility Point operations can be performed at lower CO concentration levels than those of UL 2034 **Example:** Start ventilation after 5 minutes at 25 to 35 ppm and also alarm at a reading higher than that range, but lower than UL 2034 allows

4098-9822 Unsupervised Relay Option

Externally Supplied Relay Voltage	18-32 VDC, steady source recommended (wires to remote LED leads)
Alarm Current	13 mA from separate 24 VDC supply
Contact Ratings, DPDT contacts for resistive/suppressed loads	Power limited rating: 2 A @ 30 VDC
	Non-power limited rating: 1/2 A @ 120 VAC
Relay Operation	Tracks base LED status, relay is on with trouble or alarm at the base

Additional Information Reference

Product	Data Sheet	Product	Data Sheet
Temporal Code 4 Module	S4905-0006	4100ES Control Panels with EPS Power Supplies	S4100-0100
Standard Bases	S4098-0019		
Isolator Bases	S4098-0025	4100ES Audio Control Reference	S4100-0034
Standard Sounder Base	S4098-0028	4100ES Standard Control Panels	S4100-0031
TrueSense Multi-Sensor	S4098-0024	4010ES Control Panels	S4010-0004

Simplex

Multi-Application Peripherals

*UL, ULC, CSFM Listed; FM Approved; MEA (NYC) Acceptance**

IDNet™ and MAPNET II® Communicating Devices, Individual Addressable Modules (IAMs)

Features

IDNet or MAPNET II addressable communications supply both data and power over a single wire pair to provide:**

- Supervised Class B monitoring of normally open, dry contacts
- Total wiring distance from IAM to supervision resistor(s) of up to 500 ft (152 m)
- Monitored connection is compatible with Simplex® 2081-9044 Overvoltage Protectors for outdoor wiring or electrically noisy applications
- For use in indoor locations up to 158° F (70° C) such as attic spaces or similar applications

For use with following Simplex control panels:

- Model Series 4008, 4010, 4010ES, 4100U and 4100ES fire alarm control panels for IDNet communications
- Model Series 4100/4100U/4100ES, 4120, 4020, and 2120 Communicating Device Transponders (CDTs) equipped with MAPNET II communications

Model 4090-9001:

- Enclosed design minimizes dust infiltration
- Mounts in standard single gang electrical box
- Screw terminals for wiring connections
- Visible LED flashes to indicate communications
- Optional covers are available to allow LED to be viewed after installation (requires mounting bracket, ordered separately)

Model 4090-9051:

- Encapsulated design for extended exposure to high humidity (LED is not present on this model)
- Color coded 18 AWG leads for wiring

IDNet communications provides current limited monitoring:

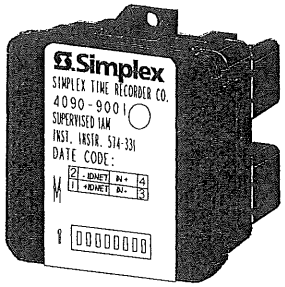
- Provides monitoring of tamper switch (supervisory) and waterflow switch (alarm) on same circuit using one point
- Available with IDNet communications only

Multiple operation modes are available and are selectable at the control panel:

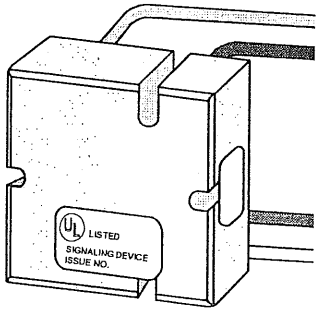
- Contact closure status can be tracked
- Momentary contact closure conditions can be selected at the panel to be latched or tracked (not available with the 2120 CDT)

UL listed to Standard 864

* These products have been approved by the California State Fire Marshal (CSFM) pursuant to Section 13144.1 of the California Health and Safety Code. See CSFM Listing 7300-0026:223 for allowable values and/or conditions concerning material presented in this document. It is subject to re-examination, revision, and possible cancellation. Accepted for use – City of New York Department of Buildings – MEA35-93E. Additional listings may be applicable; contact your local Simplex product supplier for the latest status. Listings and approvals under Simplex Time Recorder Co. are the property of Tyco Safety Products Westminster.



4090-9001 Supervised IAM
(shown approximately 3/4 size)



4090-9051 Supervised IAM
(shown approximately 3/4 size)

Description

Individual addressable modules (IAMs) receive both power and communications from a two-wire MAPNET II or IDNet circuit. They provide location specific addressability to a single initiating device (such as single station smoke detector alarm contacts or heat detector contacts) or multiple devices at the same location by monitoring normally open dry contacts and the wiring to an end-of-line resistor.

Model 4090-9001 is packaged in a thermoplastic housing and provides screw terminal connections and a status indicating LED.

Model 4090-9051 is an encapsulated package with wire leads. It does not provide a status indicating LED.

Operation

Contact Closure. Closure of the monitored contact(s) initiates an alarm or other response as programmed at the fire alarm control panel. An open in the monitored circuit wiring will cause a trouble to be reported.

Panel Selections. Selections can be made at the control panel to maintain the alarm condition if the initiating device contacts are momentary, such as from a rate-of-rise heat detector, or to track the device contact status (not available with the 2120 CDT).

Current Limited Operation Applications

For use with IDNet communications only, these IAMs can provide quad-state sensing of normal, open circuit, short circuit, and current limited conditions. (Program type is "T-sense.") With the proper end-of-line and current limiting resistors, dual functions such as tamper switch and waterflow switch monitoring can be determined and communicated by a single addressable point.

IAM Product Selection

Model	Description
4090-9001	Supervised IAM, mounted in thermoplastic housing with screw terminals; see applicable options below
4090-9051	Supervised IAM, encapsulated with wire leads

Optional Trim Plates and Mounting Bracket for Model 4090-9001

Model	Description	
4090-9806	For semi-flush mounted box	Trim plate with LED viewing window, requires 4090-9810 mounting bracket, includes mounting screws; galvanized steel
4090-9807	For surface mounted box	
4090-9810	Mounting bracket, mounts IAM to electrical box and provides screw holes for trim plate, **required for optional trim plates**	

End-of-Line Resistor Harnesses (ordered separately as required)

Model	Reference No.	Description	
4081-9004	733-886	6.8 kΩ, 1/2 W; Standard end-of-line resistor harness for N.O. contact supervision	
4081-9003	733-896	4.7 kΩ, 1/2 W	Use for current limited monitoring applications
4081-9005	733-984	1.8 kΩ, 1/2 W	

Specifications

Electrical

Power and Communications		MAPNET II or IDNet, auto selected, 1 address per IAM
Input Requirements		Normally open, dry contacts
Wire Connections	4090-9001	Screw terminals for in/out wiring, 18 to 14 AWG wire (0.82 mm^2 to 2.08 mm^2)
	4090-9051	Color coded wire leads, 18 AWG (0.82 mm^2), 8" long (203 mm)
Reference Documents	Installation Instructions	574-331 for 4090-9001; 579-572 for 4090-9151
	Field Wiring Diagrams	842-073 for IDNet operation; 841-804 for MAPNET II operation

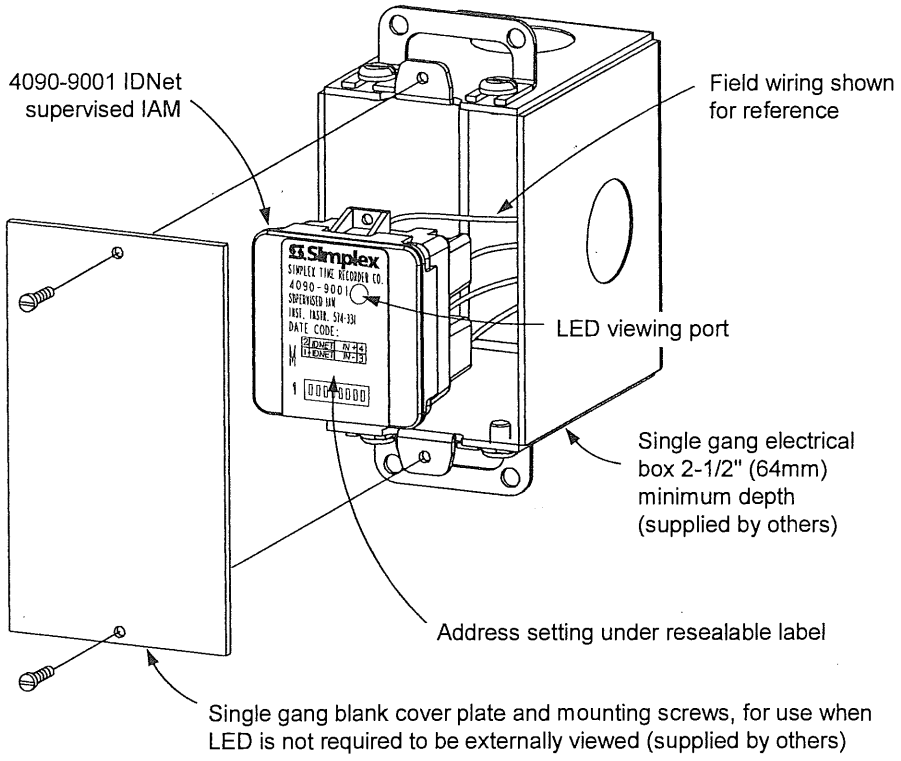
Wiring Distances

Distance from IAM to Contacts	500 ft (152 m) maximum without protectors
	400 ft (122 m) maximum with 2081-9044 Overvoltage Protectors
Wiring Distance Reference per channel, MAPNET II or IDNet Communications	2500 ft (762 m) maximum from fire alarm control panel
	10,000 ft (3048 m) maximum total wiring distance (including T-Taps)

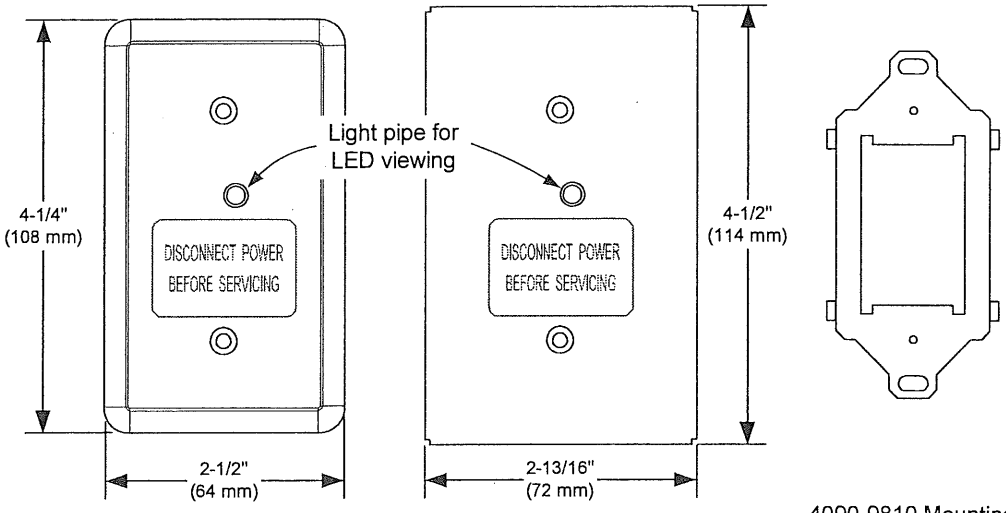
Mechanical

Dimensions	4090-9001	1-9/16" W x 1-3/4" H x 1-1/4" D (40 mm x 44 mm x 32 mm)
	4090-9051	1-9/16" W x 1-9/16" H x 9/16" D (40 mm x 40 mm x 14 mm)
Housing Material, 4090-9001		Black thermoplastic
Encapsulation Material, 4090-9051		Epoxy, beige
Temperature Range		32° to 158° F (0° to 70° C); intended for indoor operation
Humidity Range		Up to 93% RH at 100° F (38° C)

Mounting Information



Mounting Reference, Single Gang Blank Cover Plate



4090-9806, Trim plate for semi-flush mounted box

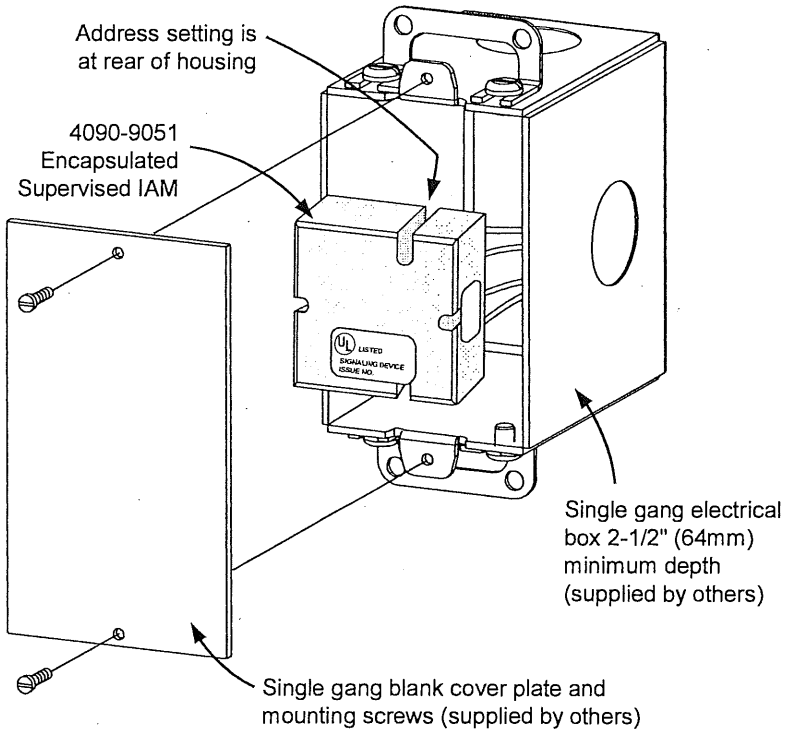
4090-9807, Trim plate for surface mounted box

4090-9810 Mounting bracket, ordered separately

NOTE: These mounting plates require mounting bracket 4090-9810.

Optional Trim Plates and Mounting Bracket for Visible LED

4090-9051 Mounting Information



Simplex

TrueAlert Multi-Candela Notification Appliances

UL, ULC, CSFM Listed;
*FM Approved**

Weatherproof Notification Appliances (non-addressable)
Wall Mount Visible Only (V/O) and Audible/Visible (A/V)

Features

Weatherproof 24 VDC notification appliances for extended temperature and extended humidity operation:

- NEMA 3R rated enclosure with ratings for indoor or outdoor applications
- Rugged, high impact, flame retardant thermoplastic housings are available in red or white with clear lens
- Red housings are for indoor or outdoor applications and provide UV light stable color
- White housings are for indoor applications with limited UV light exposure
- Mounting is to matching weatherproof boxes (required), ordered separately
- Wiring terminals are accessible from the front of the housing providing easy access for installation, inspection, and testing

Agency listings reference:

- UL listed to Standard 1638 for outdoor applications with strobe rated at 75 cd (WP75)
- UL listed to Standard 1971 for indoor applications with strobe intensity selectable as 15, 60, or 75 candela; indoor applications are compatible with ADA requirements (refer to important installation information on page 4)
- Separate models are ULC listed to Standard S526 (strobes) and S525 (horns) for outdoor applications with strobe intensity selectable as 5, 20, or 30 candela (available in red only)

Operation details:

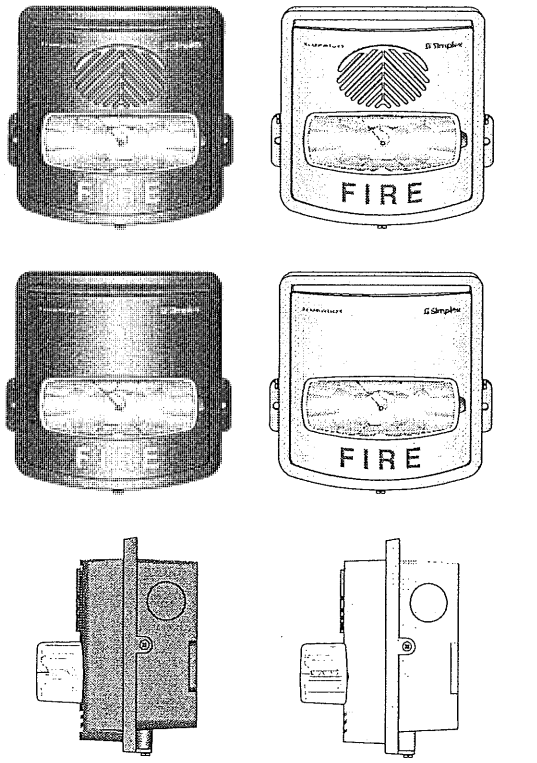
- A visible intensity selection jumper is secured behind the strobe housing
- Polarized input allows connection to compatible reverse polarity, supervised notification appliance circuit (NAC)
- Regulated circuit design ensures consistent flash output and provides controlled inrush current
- A/V appliances have an efficient electronic horn

Synchronized strobe compatibility:

- Simplex® fire alarm control panels and NAC Extenders when selected to provide strobe synchronization or SmartSync two-wire control
- Separate strobe Synchronization Modules or SmartSync Control Modules (SCMs) that convert conventional NAC inputs to a Smartsync output

SmartSync two-wire operation provides:

- Horns controlled separately from strobes on the same two-wire circuit, activated as Temporal pattern, March Time pattern (at 60 BPM), or on continuously



Weatherproof A/V (top) and Strobe (middle), side view of A/V on Weatherproof Mounting Boxes (bottom)

Description

Weatherproof multi-candela TrueAlert appliances provide V/O and A/V SmartSync operation for indoor and outdoor, extended temperature and extended humidity applications. The enclosures are impact and vandal resistant and provide a convenient strobe intensity selection. Since each model can be selected for intensity output, on-site model inventory is minimized and changes encountered during construction can be easily accommodated.

Strobe Intensity Selection

During installation, a selection plug at the back of the housing determines the desired strobe intensity. An attached flag with black letters on a yellow background allows the selected intensity to be seen at the side of the strobe lens.

* This product has been approved by the California State Fire Marshal (CSFM) pursuant to Section 13144.1 of the California Health and Safety Code. See CSFM Listing 7125-0026:331 for allowable values and/or conditions concerning material presented in this document. Additional listings may be applicable; contact your local Simplex product supplier for the latest status. Listings and approvals under Simplex Time Recorder Co. are the property of Tyco Safety Products Westminster.

Strobe Application Reference

Proper selection of weatherproof notification is dependent on occupancy, location, local codes, and proper applications of: the *National Fire Alarm and Signaling Code* (NFPA 72), ANSI A117.1; the appropriate model building code: BOCA, ICBO, or SBCCI; and the application guidelines of the Americans with Disabilities Act (ADA). Requirements may differ from indoor appliance applications, contact your local authority having jurisdiction (AHJ) to assist in determining requirements.

SmartSync Two-Wire Control

SmartSync operation mode allows a two-wire circuit to provide the ability to activate both the horn and strobe on the same NAC and then allow the horn to be silenced while the strobe remains flashing. The horn operates as "on-until-silenced" while the strobe operation is "on-until-reset."

SmartSync Control Sources

SmartSync two-wire control is available from:

- 4006, 4008, 4100ES, 4010ES, 4100U, and 4010 Fire Alarm Control Panels (refer to individual product data sheets for more information)
- 4009 IDNet NAC Extenders (refer to data sheet S4009-0002)
- SmartSync Control Module (SCM) Model 4905-9938 (refer to data sheet S4905-0003)
- Additional SmartSync compatible notification appliances include separate horns and combination horn/strobe notification appliances.

Product Selection

UL Listed TrueAlert Weatherproof Multi-Candela Notification Appliances

Model	Type	Housing	"FIRE" Lettering	Description	UL 1971 Intensity Rating	UL 1638 Intensity Rating
4906-9105	Strobe (V/O)	Red	White	UL listed weatherproof appliance with multi-candela strobe; requires weatherproof box below	15, 60, or 75 cd	75 cd (setting WP75)
4906-9106		White	Red			
4906-9131	Horn/Strobe (A/V)	Red	White			
4906-9132		White	Red			

ULC Listed TrueAlert Weatherproof Multi-Candela Notification Appliances

Model	Type	Housing	"FIRE" Lettering	Description	ULC Intensity Ratings
4906-9113	Strobe (V/O)	Red	White	ULC listed weatherproof appliance with multi-candela strobe; requires weatherproof box below	5, 20, or 30 cd
4906-9143	Horn/Strobe (A/V)				

Wall Mount Weatherproof Boxes (Required)

Model	Description		Dimensions
49WPBB-AVVOWR	Red	Surface Mount Weatherproof Mounting boxes	5 ½" H x 6 ⅛" W x 1 ⅝" D (140 mm x 156 mm x 41 mm)
4905-9829	White		

Aftermarket Red Bilingual (French/English) Covers (for field installation)

Model	Description	
4905-9832	Red strobe (V/O) cover	White "FEU/FIRE" lettering
4905-9833	Red horn/strobe (A/V) cover	

Synchronization Module Reference (refer to data sheet S4905-0003 for additional information)

Model	Description		Dimensions
4905-9914	Class B	Synchronized Flash Module; epoxy encapsulated with in/out 18 AWG (0.82 mm^2) wire leads, rated for 2 A NAC, requires 10 mA for power	1 ⅜" x 2 $^{7}/_{16}$" x $^{13}/_{16}$" (35 mm x 62 mm x 20 mm)
4905-9922	Class A		
4905-9938	SmartSync Control Module with Class B or Class A output; mounts in 4" (102 mm) square box		4" x 4 ⅛" x 1 ¼" D (102 mm x 105 mm x 32 mm)

Specifications

Rated Voltage Range		Regulated 24 VDC; see Note 1 below
Flash Rate		1 Hz; Up to 24 synchronized strobes maximum per NAC
Temperature Range	UL 1971 Listed Rating	32° to 122° F (0° to 50° C); selectable 15/30/75 cd
	UL 1638 Listed Rating	-31°F to 150°F (-35° C to 66°C); 75 cd rating
	ULC S526 & S525 Listed Rating	-40°F to 150°F (-40° C to 66°C); 5/20/30 cd rating
Humidity Range	UL 1971 Listed Rating	10% to 93%, at 100° F (38° C)
	UL 1638, ULC S526, & ULC S525	up to 98%, at 104 °F (40° C)
Wiring Connections		Terminal blocks for 18 AWG to 12 AWG (0.82 mm^2 to 3.31 mm^2); two wires per terminal for in/out wiring

Horn Output; Models 4906-9131, 4906-9132, & 4906-9143; UL & ULC Ratings as noted

Output Sound Characteristics		2400 to 3700 Hz sweep, modulated at 120 Hz rate					
Horn Output Ratings @ 10 ft (3 m) (see Note 2)	Voltage	**16 VDC**		**24 VDC**		**33 VDC**	
	Sound Type (see Note 2)	**Steady**	**Coded**	**Steady**	**Coded**	**Steady**	**Coded**
	UL 464 Reverberant Chamber	80 dBA	76 dBA	83 dBA	79 dBA	86 dBA	81 dBA
	ULC S525 Anechoic Chamber	96 dBA	96 dBA	99 dBA	99 dBA	101 dBA	101 dBA

Maximum RMS Current Ratings (see Note 3 below)

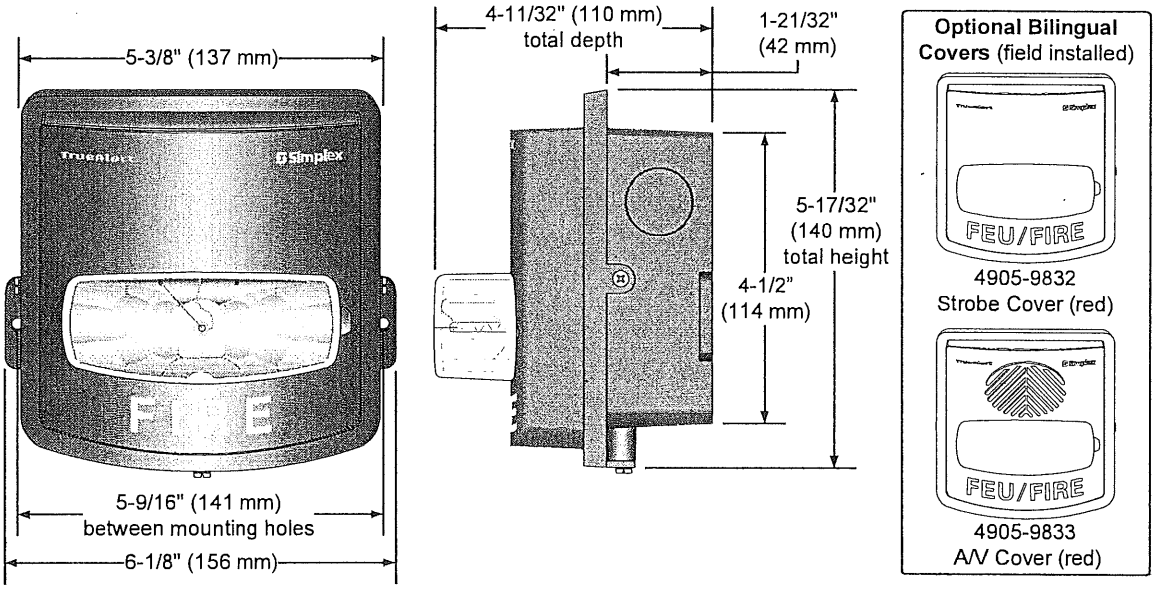
		UL 1971 Ratings (32° F to 122° F)			**UL 1638 Ratings** 75 cd (WP75)	
Model	**Intensity Selection/Temperature**	**15 cd**	**60 cd**	**75 cd**	**32° F to 150°F** (0° C to 66°C)	**-31° F to below 32°F** (-35° C to 0° C)
V/O Models 4906-9105 & 4906-9106		77 mA	192 mA	231 mA	189 mA	273 mA
A/V Models 4906-9131 & 4906-9132		91 mA	204 mA	249 mA	205 mA	277 mA

	ULC S526/S525 Ratings per Intensity Selection		
Model	**5 cd**	**20 cd**	**30 cd**
V/O Model 4906-9113	115 mA	270 mA	295 mA
A/V Model 4906-9143	125 mA	275 mA	322 mA

NOTES:

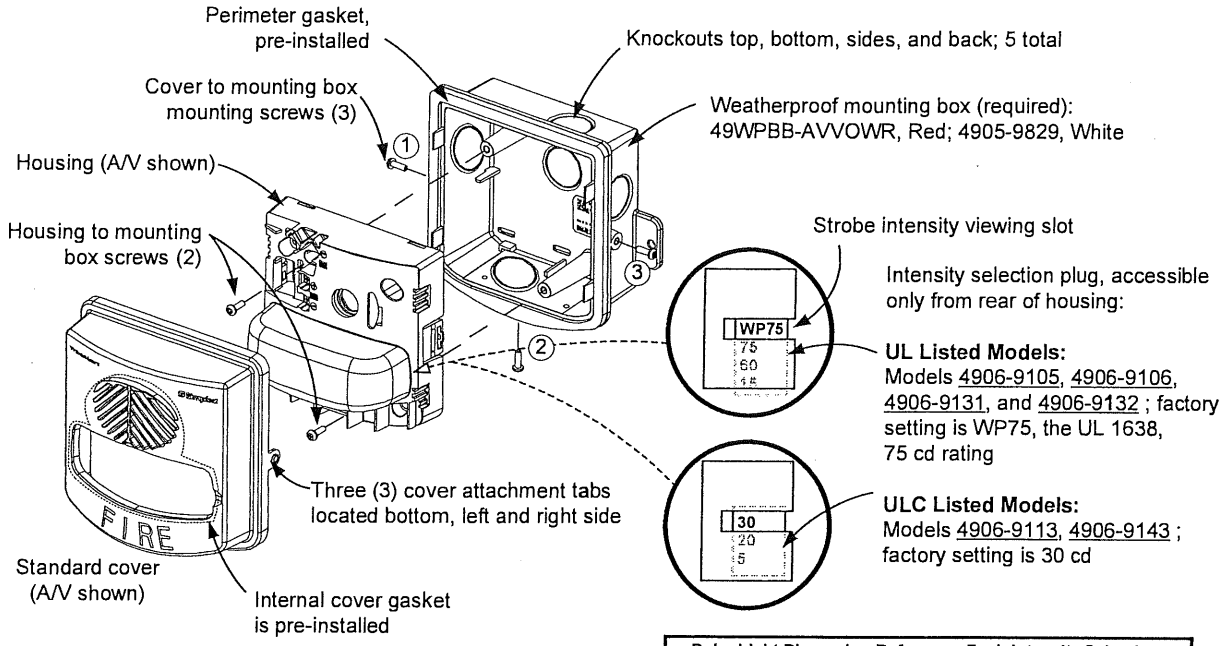
1. "Regulated 24 VDC" refers to the voltage range of 16 to 33 VDC per UL 1971 and UL 1638. This voltage range is the absolute operating range. Operation outside of this range may cause permanent damage to the strobe. Please note that 16 VDC is the lowest operating voltage that is allowed at the last appliance on the NAC under worst case conditions.
2. Coded values are typical of the output measured with a Temporal coded or a March Time coded pulse and with a sound level meter reading on a "fast" setting. Under the same test conditions, coded horn output "peak" sound level readings are typically 4 dBA higher. Anechoic horn output ratings are typically more representative of actual installed sound output
3. Currents of A/Vs are with horn on steady. The maximum RMS current listed is the device nameplate rating. Strobe designs are constant wattage and the maximum RMS current rating occurs at the lowest allowable operating voltage. (RMS is root mean square and refers to the effective value of a varying current waveform.)

Dimension and Optional Cover Reference

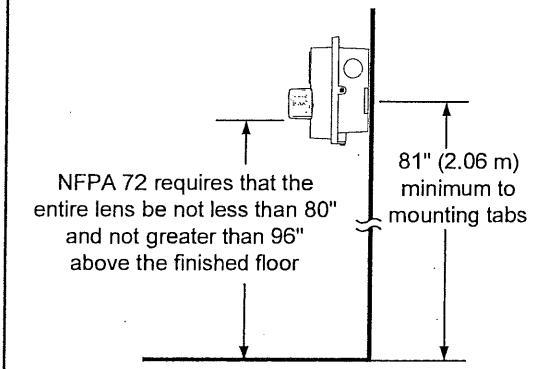


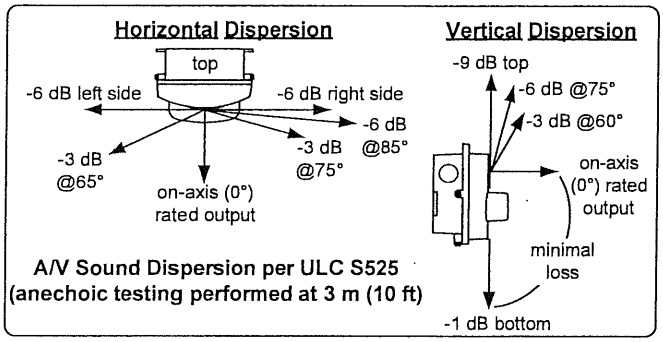
Weatherproof Appliance Installation Reference

NOTE: For detailed installation information, refer to Installation Instructions 579-857 for UL listed products, and Installation Instructions 579-885 for ULC listed products.



IMPORTANT! INDOOR WALL MOUNT INSTALLATION HEIGHT REFERENCE





A/V Sound Dispersion per ULC S525 (anechoic testing performed at 3 m (10 ft)

Polar Light Dispersion Reference, Each Intensity Selection; Percent of Rated Light Output at 77° F (25° C)					
Vertical Dispersion			Horizontal Dispersion		
Angle Below Axis	UL 1971 Minimum	Typical Output	Angle from Axis	UL 1971 Minimum	Typical Output
0	100%	322%	0	100%	320%
5	90%	217%	±5	90%	214%
10	90%	168%	±10	90%	177%
15	90%	179%	±15	90%	175%
20	90%	210%	±20	90%	174%
25	90%	184%	±25	90%	170%
30	90%	149%	±30	75%	169%
35	65%	172%	±35	75%	157%
40	46%	189%	±40	75%	151%
45	34%	203%	±45	75%	138%
50	27%	152%	±50	55%	130%
55	22%	166%	±55	45%	121%
60	18%	166%	±60	40%	117%
65	16%	164%	±65	35%	109%
70	15%	163%	±70	35%	105%
75	13%	159%	±75	30%	98%
80	12%	138%	±80	30%	90%
85	12%	113%	±85	25%	78%
90	12%	88%	±90	25%	67%

WP75 Intensity Selection Light Output Reference					
Angle	On-Axis	Vertical, Below Axis		Horizontal, Left/Right of Axis	
	0°	45°	90°	45°	90°
UL 1638 Minimum Candela Rating (over temperature range)	75	35	10	32	15
Typical Candela at 77° F (25° C)	215	103	24	94	39

Simplex

TrueAlarm Fire Alarm Controls

*UL, ULC, CSFM Listed; FM Approved; MEA (NYC) Acceptance**

Model 4010 Fire Alarm Control Panel for TrueAlarm Analog Sensors and IDNet Addressable Devices

Features

Standard features include:

- Up to 250 addressable TrueAlarm sensor or addressable device points using IDNet communications that operate *with either shielded or unshielded* twisted pair wiring
- Four, 2 A notification appliance circuits (NACs) with solid state current protection
- Power supply/battery charger with 4 A available for NACs and auxiliary power
- Internal event reporting DACT module (standard on models 4010-9101, 4010-9102, & 4010-9150)
- UL listed to Standard 864

Installation convenience features:

- Power-limited design provides electronic modules on a one-piece chassis with up-front terminal blocks for wiring access
- Compact NEMA 1 rated cabinet is available in beige or red and can be pre-shipped for early installation

Setup, programming, and maintenance features:

- Device level ground fault search, locate, and isolate
- *Auto Program* for general alarm operation
- TrueAlarm individual analog sensing with front panel information and selection access
- "Dirty" TrueAlarm sensor maintenance alerts, service and status reports including "almost dirty"
- Default TrueAlarm sensor device type operation
- TrueAlarm sensor peak value performance report
- Duplicate address error detection
- Front panel or PC programming
- WALKTEST silent or audible system test
- Software verification simulation mode

Supports the following IDNet devices:

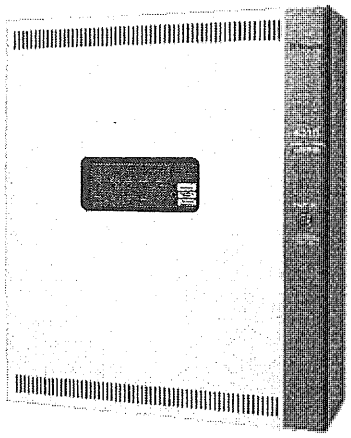
- Addressable manual stations; TrueAlarm sensor bases, duct housings, and isolator bases
- Quad-state zone adapter modules (ZAMs) for initiating device monitoring
- Quad-state line powered individual addressable modules (IAMs) for initiating device monitoring and relay control
- 4009 IDNet NAC Extenders and accessories

Available option modules include:

- Door mounted 24 LED annunciator (std. on ULC models)
- Network connection, or Point Reporting DACT
- Class A, NAC adapter module
- RS-232 ports for printer and maintenance PC
- Expansion power supply; Auxiliary Relay Module or City Interface
- Equipment for Suppression Release Applications (refer to data sheet S4010-0003)

Compatible with Simplex® auxiliary panels:

- 4003 Voice Control Panel
- 4081 Battery Cabinet with charger for 50 Ah batteries



4010 Fire Alarm Control Panel (with standard door)

Description

TrueAlarm fire alarm control panels have the ability to provide location accuracy for monitoring and control. When equipped with TrueAlarm analog sensing for smoke and heat detection, the processing power of the control panel also has the ability to analyze conditions at each location to provide accurate detection with significantly reduced maintenance costs.

The 4010 TrueAlarm Fire Alarm Control Panel has been specifically designed to provide addressable operation and analog detection in a cost-effective package for application sizes that previously were considered only appropriate for conventional zoned monitoring.

Installation and Service Ease. The 4010 mounts on a single chassis for quick installation and removal. Terminal blocks are large and up-front for easy access and inspection. Optional modules are easily and quickly installed, and programmed as required.

The 4010 cabinet provides convenient stud markers for drywall thickness and nail-hole knockouts for quicker mounting. Smooth cabinet surfaces are provided for locally cutting conduit entrance holes exactly where required. 4010 cabinets and electronics can be ordered separately, allowing early cabinet installation.

Ground Fault Assistance. Ground fault problems often occur during installation. The 4010 provides isolating circuitry, control of isolator bases, and software-controlled sequencing to isolate ground faults to specific identified locations. This assistance helps the installer to accurately locate the wiring problem for quicker repair.

* Refer to page 6 for listing details. This product has been approved by the California State Fire Marshal (CSFM) pursuant to Section 13144.1 of the California Health and Safety Code. See CSFM Listing 7170-0026:226 for allowable values and/or conditions concerning material presented in this document. Accepted for use – City of New York Department of Buildings – MEA35-93E. Additional listings may be applicable; contact your local Simplex product supplier for the latest status. Listings and approvals under Simplex Time Recorder Co. are the property of Tyco Safety Products Westminster.

4010 Operator Control Summary

Extensive Feature List. The 4010 Fire Alarm Control Panel provides access to an extensive feature list that includes:

- Providing easy and powerful operator information with a logical, menu-driven display
- Extensive and automatic diagnostics for maintenance reduction
- History Logs available from the LCD or capable of (optionally) being printed
- Software Verification, allowing detailed logic programming simulation to be conducted without activating connected outputs
- Control Panel (or service PC) label editing
- Password access control
- Auto Program Quick Configuration (Quick-CFIG) of connected modules and IDNet devices for general alarm operation to quickly get the system up and running

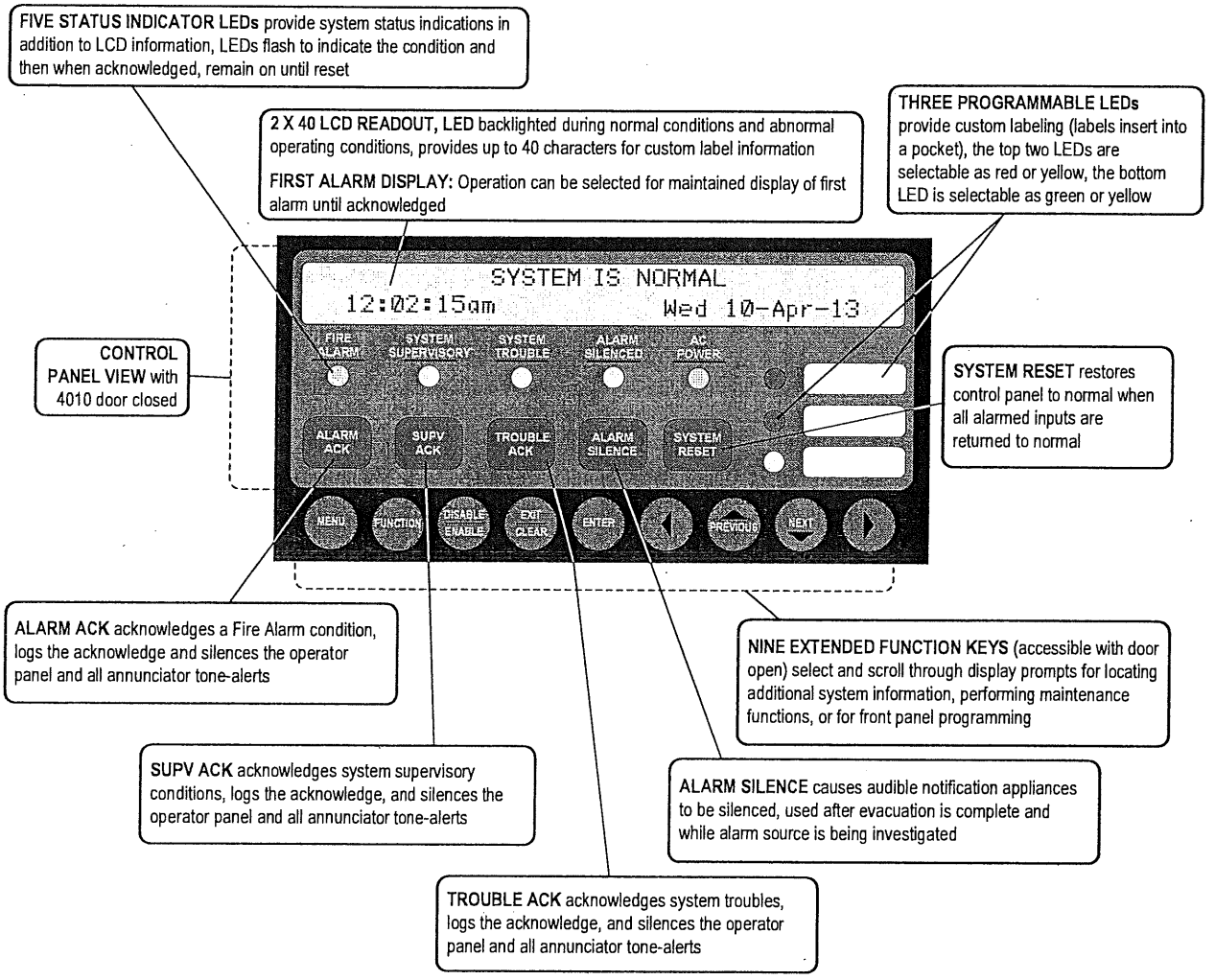
4010 Display Panel and Diagnostic Mode

Convenient Status Information. With the locking door closed, a window allows viewing of the status display. The 4010 status panel provides a two line by 40 character, super-twist LCD information display and eight status LED indicators as shown in the illustration below.

From this display, the LED indicators will describe the general category of activity being displayed with the LCD providing more detail. For the authorized user, unlocking the door will provide access to the control switches and allow further inquiry by scrolling the display for additional detail. (Refer to control panel functional illustration below.)

WALKTEST Diagnostic Operation Mode. The WALKTEST process allows a single person to perform system test. The system records test inputs such as intentional alarms or trouble and either logs the response (silent WALKTEST operation) or outputs a brief, recognizable audible notification signal (audible WALKTEST operation).

Extended Operator Control Panel Functions



IDNet Addressable Interface

Overview. The 4010 provides IDNet addressable device communications. Using a two-wire circuit, individual devices such as manual fire alarm stations, TrueAlarm sensors, and sprinkler waterflow switches can be directly connected (or interfaced) to the IDNet controller to communicate their identity and status. This addressability allows the location and condition of the connected device to be displayed on the 4010 panel LCD and on system annunciators. Additionally, control circuits (fans, dampers, etc.) may be individually controlled by using a relay IAM (individual addressable module). The 4009 IDNet NAC Extender can be controlled for local or remote notification appliance expansion. (Refer to compatible device lists on document S4090-0011 and to individual device documentation for further details.)

Capacity. A total of 250 addressable monitor and control points may be intermixed on the same pair of wires. By using Zone Adaptor Modules (ZAMs) or Individual Addressable Modules (IAMs), conventional initiating devices can be connected to the IDNet circuit.

IDNet Addressable Operation. The IDNet controller continuously interrogates each addressable device on the communication channel for status condition such as: normal, off-normal, alarm, supervisory, or trouble. Sophisticated poll and response communication techniques ensure supervision integrity and allow for "T-tapping" of the circuit for Class B operation.

Wiring Requirements. Refer to the specifications chart below. Distances are for shielded or unshielded wire. Shielded wire may provide protection from unexpected sources of interference and may be required for some applications.

Wiring Specifications

Size		18 AWG (0.82 mm²)
Wire	Preferred	Shielded twisted pair (STP)
	Acceptable	Unshielded twisted pair (UTP)
Farthest Distance from Control Panel to Device		Up to 2500 feet (762 m)
Total Wire Length Allowed With "T" Taps for Class B Wiring		Up to 10,000 ft (3 km).

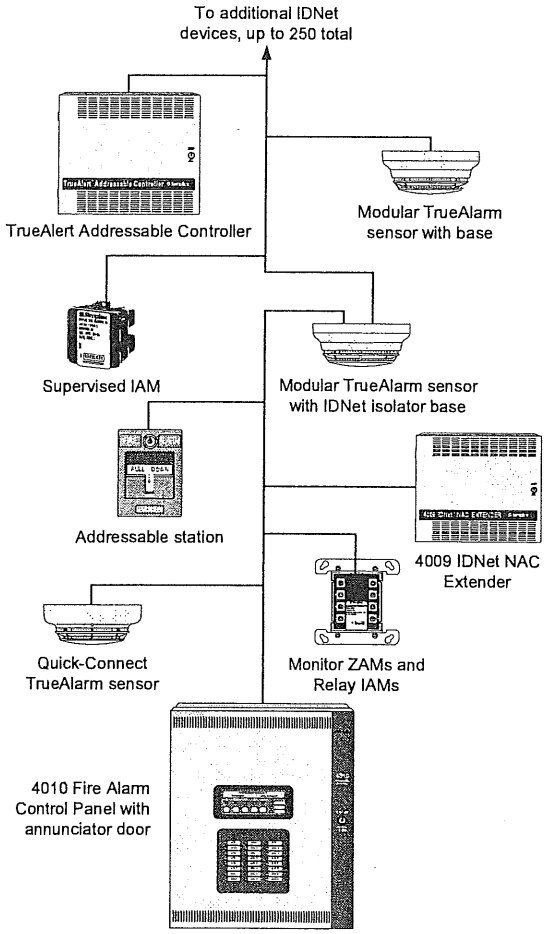
TrueAlarm Analog Sensors

TrueAlarm System Operation. IDNet communications are used for TrueAlarm smoke and temperature sensors. Every four seconds, smoke sensors transmit an output value based on their smoke chamber condition. The 4010 CPU maintains a current value, peak value, and an average value of each sensor's output. Status is determined by comparing the current sensor value to its average value. Tracking this average value as a continuously shifting reference point filters out environmental factors that cause shifts in sensitivity.

Programmable Sensitivity. The sensitivity of each sensor can be field programmed at the 4010 Control Panel for different levels of smoke obscuration (in percent) or for specific heat detection levels. In order to evaluate whether the sensitivity should be revised, the peak value is stored in memory and can be easily read and compared to the alarm threshold directly in percent.

TrueAlarm Analog Sensors *(Continued)*

TrueAlarm heat sensors can be selected for rate-of-rise detection as either 15° F (8.3° C) or 20° F (11.1° C) per minute with an independent fixed limit of 135° F (57° C) or 155° F (68° C). TrueAlarm heat sensors can also be programmed as a utility device to monitor for temperature extremes in the range from 32° F to 155° F (0° C to 68° C). This feature can provide freeze warnings or alert to HVAC system problems.



4010 Control Panel with Typical IDNet Devices

Diagnostics and Default Device Type

TrueAlarm operation gives the 4010 system the ability to automatically indicate when a sensor is almost dirty, dirty, and excessively dirty. The NFPA 72 (*National Fire Alarm and Signaling Code*) requirement for a test of the sensitivity range of the sensors is fulfilled by the TrueAlarm ability to maintain the sensitivity level of each sensor.

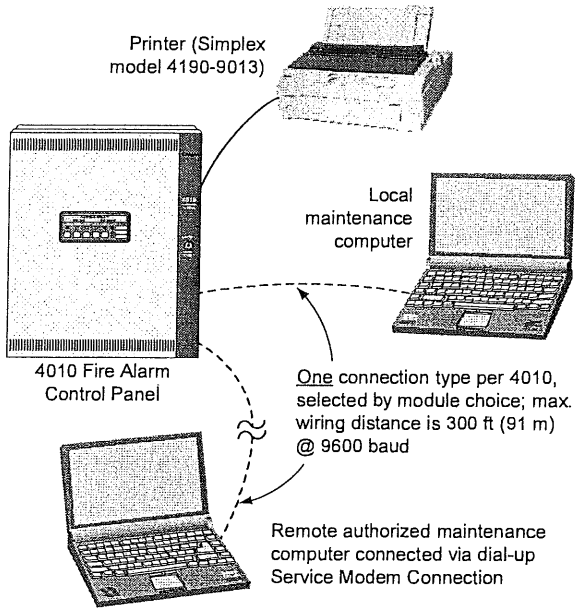
Modular TrueAlarm sensors use the same base and different sensor types (photoelectric smoke sensor, or heat sensor) can be easily interchanged to meet specific location requirements. This feature also allows intentional sensor substitution during building construction. When conditions are temporarily dusty, instead of covering the smoke sensors (causing them to be disabled), heat sensors may be installed without reprogramming the control panel. Although the control panel will indicate an incorrect sensor type, the heat sensor will operate at a default sensitivity to provide heat detection for building protection at that location.

TrueAlarm Information Details

True Alarm sensor data can be displayed on the system LCD, on a remote maintenance PC, or printed on a remote printer. With the proper operator access, a TrueAlarm Service Report can be generated to list the specific details of each TrueAlarm device. This report, as well as the Status Report can either be displayed on the remote maintenance PC or captured permanently by using a remote 80 character printer.

Status and Service Reports. The report samples below illustrate the format provided on either the remote maintenance PC or a printer. This information is available at the system LCD by identifying the specific point of interest and reading one point at a time.

Compatible Printer. Model 4190-9013 is a UL Standard 864 listed 80 column, 24 pin dot matrix printer (refer to data sheet S4190-0011).



RS-232 Connection Options
(refer to module selection on page 6)

TrueAlarm Status and Service Report Samples

```
Simplex 4010 Fire Alarm System                                        Page 1
REPORT 3 : TrueAlarm Status Report                  2:43:03 pm Mon 20-May-13


Zone                                                 Sensi-                  Almost
Name      Custom Label                               tivity   Device Status  Dirty
M1-1      ANALOG PHOTO     CLEAN ROOM                0.5 %    NORMAL
M1-2      ANALOG ION       CLEAN ROOM                1.3 %    NORMAL
M1-3      ANALOG PHOTO     MAIN LOBBY                2.5 %    NORMAL         *YES*
M1-4      ANALOG PHOTO     CONFERENCE ROOM 1         2.5 %    NORMAL
M1-10     HEAT DETECTOR    GARAGE                    135 F    NORMAL
M1-11     ANALOG PHOTO     KITCHEN                   3.7 %    NORMAL         *YES*

END OF REPORT
```

Typical TrueAlarm Status Report Information Printout and/or Maintenance PC Screen

```
Simplex 4010 Fire Alarm System                                        Page 1
REPORT 4 : TrueAlarm Service Report                 2:56:09 pm Mon 20-May-13


Dev                                          Alarm     Avg     Current/    Peak/    State
Num   Custom Label                            at:       val     % alarm     % alarm
1     ANALOG PHOTO - CLEAN ROOM              0.5/ 83    67     68/ 1%      72/ 10%   NOR
2     ANALOG ION - CLEAN ROOM                1.3/209    94     97/ 2%     101/  1%   NOR
3     ANALOG PHOTO - MAIN LOBBY              2.5/185   117    117/ 0%     125/ 42%   NOR
4     ANALOG PHOTO - CONFERENCE ROOM 1       2.5/161    93     93/ 0%      93/  0%   NOR
10    HEAT DETECTOR - GARAGE                135F/253    ---    63/-67F     66/ 69F   NOR
11    ANALOG PHOTO - KITCHEN                 3.7/216   116    116/ 1%     110/ 36%   NOR

END OF REPORT
```

Typical TrueAlarm Service Report Information Printout and/or Maintenance PC Screen

Standard Panel Features

N2 Communications for Serial Annunciator Control. Control for up to 6 remote Simplex Annunciator products including 24 Point I/O Module, and LCD Annunciator. Includes extensive troubleshooting diagnostics. (See list in next column for compatible devices.)

Access Port. RS-232 service port for connecting PC tools for service diagnostics and for programming the CPU Flash EPROM memory.

IDNet Addressable Communications Channel. Addressable channel provides communications for up to 250 remote addressable devices, including TrueAlarm analog sensors and isolator bases (see details on page 3).

Four NACs. Class B output is standard, rated for 2 A @ 24 VDC nominal, with solid state current protection. Class A operation is optional with the addition of an adapter module.

NAC operation can be selected for "on-until-Silence" or "on-until-Reset," and can be Continuous, Temporal pattern, or March Time pattern. ***(March Time is selectable for 20 bpm or 120 bpm for conventional appliances; or 60 bpm for SmartSync appliances.)*** NACs are individually selectable to control Simplex synchronized strobes or for Simplex SmartSync control that provides separate horn and synchronized strobe control using a 2-wire circuit.

Two Auxiliary Output Circuits. Operation is programmable for trouble, alarm, supervisory, or other fire response functions. Output is one Form "C" dry contact each, rated 2 A @ 24 VDC. An optional relay kit is available for switching up to 0.5 A at 120 VAC.

Standard Power Supply. Output is rated 4 A for "Special Application" appliances and for "Regulated 24 DC" appliance power. ***(Special Application appliances include Simplex 4901, 4903, 4904, and 4906 Series horns, strobes, horn/strobes, and speaker/strobes. See page 7 for additional information.)*** Internal system power is provided separately, allowing the 4 A to be available for NAC and auxiliary power tap functions. Over-current protection is solid state and self-resetting.

Auxiliary Power Tap. Provides up to 0.5 A of the standard power supply voltage, over-current protected. Compatible uses include power for: remote LCD annunciators, 24 Point I/O modules, sensor bases and duct housings that require external power, and addressable devices requiring external power.

Battery Charger. Capable of charging up to 25 Ah sealed lead-acid batteries (4010 cabinet mounted). A recharge time of 24 hours is typical with stable 120 VAC input. For applications requiring larger batteries, external charger/cabinet assemblies are available.

A depleted battery cutout feature is programmable to advise and/or to reduce current when battery voltage is low.

Optional Expansion Slot Modules

(The 4010 is available with a Simplex Network Interface. 4010 points can be declared "public.")

Network Interface, Modular Media. Available for wired connections or fiber optic. Require separate media modules. May be both wired, both fiber optic, or one of each.

Optional Expansion Slot Modules *(Cont'd)*

Network Interface, Fixed Media. Available for wired applications.

DACT, Point Reporting Module. Provides serial output information that can send location details to a remote receiving station.

DACT, Event Reporting Module. For applications where simple event status information is required (Alarm, Trouble, Supervisory, and AC power failure).

Dual RS-232 Module. Available for interfacing to a printer and a maintenance PC.

Single RS-232 Module with Service Modem Connection. Provides one port dedicated for connection to a printer, and a second port dedicated for dial-in from a service computer, typically located off-site. With an off-site computer, programming changes and system diagnostics can be performed remotely, reducing service time for repair or reprogram. Security is maintained by password protection.

Optional Chassis Mount Modules

4 A Expansion Power Supply provides two taps of 2 A each, 28 VDC, filtered, non-regulated. Output rating is 4 A for auxiliary power, 4 A for "Special Application" appliances and 2 A for "Regulated 24 DC" appliance power.

Battery Meter Module provides panel mounted ammeter and voltmeter for power supply monitoring.

Dual Circuit Class A NAC Adapter Module mounts on the main 4010 printed circuit assembly and provides the additional circuitry needed for Class A operation.

Dual Circuit City Connect Module provides the interface required for direct wired reporting to conventional city connection circuits. (Available with or without disconnect switches.)

Expansion Power Distribution Module provides two additional termination points for the 0.5 A auxiliary power output, or for one tap of the expansion power supply.

Relay Option Module provides three relays, one each for Alarm, Supervisory, and Trouble. Relay contacts are selectable for normally open or normally closed and are rated 2 A @ 32 VDC maximum.

N2 Communications Modules

Up to six of the following modules may be connected to the Simplex N2 serial communications bus.

4606-9101 LCD Annunciators provide remote acknowledge, reset, and alphanumeric status display. First Alarm display will work same as for the panel when selected (see page 2). (Refer to data sheet S4606-0001.)

24 LED Annunciator Doors are standard on ULC listed models and are available as door-only assemblies for electronics only packages or other aftermarket applications. This option uses the 24 Point I/O module with all points pre-assembled as LED outputs, with individual labels and each LED is selectable as red or yellow.

4605 Series 24 Point I/O Modules are available for remote mounting and provide 24 points that can be programmed as either general purpose switch inputs or system controlled outputs. Typical applications are for remote annunciators and monitoring and control of other related processes. (Refer to data sheet S4010-0002.)

4010 Fire Alarm Control Selection Chart and Module Location Rules (refer to diagrams on page 8)

Category	Model	Description	Voltage	Color
Control Panel Assembly (select one)	4010-9101	**UL Listed 4010 Fire Alarm Control Panel** with: door, cabinet, power supply/battery charger, IDNet interface, 4 NACs, 2 programmable auxiliary relays, and external N2 communications interface; 4010-9101 and 4010-9102 include internal common event reporting DACT	120 VAC	Beige
	4010-9102			Red
	4010-9201		240 VAC	Beige
	4010-9202			Red
	4010-9101C	English **ULC Listed 4010 Fire Alarm Control Panel**; same as above except: with 24 LED Annunciator door; and without DACT	120 VAC	Beige
	4010-9101CF	French		
	4010-9150	UL Listed **4010 Fire Alarm Control Panel, Electronics Only;** for pre-shipped cabinets, requires door and cabinet ordered separately; 120 VAC input; 4010-9150 has event reporting DACT; C & CF suffix models delete DACT		
	4010-9150C	ULC Listed English		
	4010-9150CF	ULC Listed French		

Optional Expansion Slot Features (two slots are available, select modules as required)

Category	Model	Description
Reporting and Network Modules (select one)	4010-9810	DACT Module (Common Event Reporting) — Includes two, 7 ft (2.1 m) long RJ45 cables
	4010-9816	DACT Module (Point Reporting)
	4010-9821	Network Interface Module with fixed, wired connections
	4010-9817	Network Interface Module, Modular; requires 2 (In/Out) media modules (see below)
Media Modules	4010-9818	Network Wired Media Module — Media modules mount on the 4010-9817 module without impact to slot allocation space.
	4010-9819	Network Fiber Optic Media Module
RS-232 Communications (select one)	4010-9811	Dual RS-232 Interface Module
	4010-9812	Single RS-232 Interface Module with Service Modem connection

Chassis Mounted Expansion Modules (select as required)

Category	Model	Description
Expansion Power Supply (select one)	4010-9813	120 VAC input — 4 A Expansion Power Supply; rated 4 A for "Special Application" appliances; rated 2 A for "Regulated 24 DC" appliance power
	4010-9823	240 VAC input
Optional Features (select one)	4010-9820	Battery Meter Module (ammeter and voltmeter)
	4010-9825	24 VDC Expansion Power Distribution Module, provides two additional termination points for an expansion power supply tap or the auxiliary power output
Optional Features (select as indicated)	4010-9806	Dual Circuit Class A NAC Adapter Module, **two maximum**
	4010-9809	Dual Circuit City Connect Module — **Select one maximum**
	4010-9829*	Dual Circuit City Connect Module w/o disconnect switches
	4010-9803	Relay Option Module

Accessories

Category	Model	Description
Optional Features	4010-9826	120 VAC Auxiliary Relay Kit, allows **one** auxiliary relay to control up to 0.5 A @120 VAC, select as required; **2 maximum**
	4010-9830 (CAF)	Suppression Release Appliqué, required for suppression release applications; suffix CAF selects a French appliqué
	2975-9801	Semi-flush trim, beige, 1 7/16" (37 mm) wide
	2975-9802	Semi-flush trim, red, 1 7/16" (37 mm) wide
Batteries (required if batteries are internal; select one size; **two batteries are required**)	2081-9272	6.2 Ah Battery, 12 VDC
	2081-9274	10.0 Ah Battery, 12 VDC
	2081-9288	12.7 Ah Battery, 12 VDC
	2081-9275	18 Ah Battery, 12 VDC; **NOTE: This battery size will not allow bottom entry conduit**
	2081-9287	25 Ah Battery, 12 VDC
Cabinets (select one if pre-shipped)	2975-9215	Red Cabinet — Dimensions: 22" H x 18" W x 5 5/8" D (559 mm x 457 mm x 137 mm)
	2975-9214(CF)	Beige Cabinet; CF suffix has French labels
Doors (select one if pre-shipped or for use with 4010-9150)	4010-9858	Red Door with dress panel — Dimensions: 22" H x 18" W x 5/8" D (559 mm x 457 mm x 16 mm)
	4010-9857(CF)	Beige Door with dress panel; CF has French labels
	4010-9860*	Beige Door with 24 LED Annunciator and dress panel — Dimensions: 22" H x 18" W x 1 23/32"D (559 mm x 457 mm x 44 mm) [see also S4010-0002]
	4010-9861*	Red Door with 24 LED Annunciator and dress panel

* As of document revision date: 4010-9829 is not ULC listed;
4010-9860 and 4010-9861 are listed by UL, ULC, and CSFM; and FM approved;

4010 Operating Specifications

Input Power Requirements	Voltage Range	Frequency	Maximum Current
AC Input, 120 VAC base models	102 to 132 VAC	60 Hz	2 A
AC Input, 240 VAC base models	204 to 264 VAC	50/60 Hz	1 A
AC Input with 120 VAC expansion power supply	102 to 132 VAC	60 Hz	4 A
AC Input with 240 VAC expansion power supply	204 to 264 VAC	50/60 Hz	2 A

Environmental	
Operating Temperature Range	32° to 120°F (0° to 49° C)
Operating Humidity Range	up to 93% RH, non-condensing @ 100.4° F (38° C) maximum

Output Ratings		
Standard Power Supply Output		Rated 4 A for "Special Application" appliances and for "Regulated 24 DC" appliance power; Battery charger for up to 25 Ah sealed lead-acid batteries
Notification Appliance Reference	Special Application	Simplex 4901, 4903, 4904, and 4906 Series horns, strobes, and combination horn/strobes and speaker/strobes (contact your Simplex product representative for compatible appliances)
	Regulated 24 DC	Power for other UL listed appliances; use associated external synchronization modules where required
Auxiliary Power Output Tap from Standard Power Supply		Rated 0.5 A maximum @ 19.4 to 32 VDC; subtract current used from standard power supply output
Expansion Power Supply Output		Rated 4 A for "Special Application" appliances and auxiliary power; Rated 2 A for "Regulated 24 DC" appliance power; Two output taps of 2 A each are provided
NAC Ratings		2 A each maximum; up to 33 synchronized strobes maximum per NAC

Current Ratings for Optional Modules and Remote LCD Annunciator

Model	Module	Supervisory Current	Alarm Current
4010-9810	DACT (Common Event Reporting)	40 mA	40 mA
4010-9816	DACT (Point Reporting)	40 mA	40 mA
4010-9821	Network, wired communications	125 mA	125 mA
4010-9817	Network Modular, add media cards separately	24 mA	24 mA
4010-9818	Network Wired Media	47 mA	47 mA
4010-9819	Network Fiber Optic Media	36 mA	36 mA
4010-9811	Dual RS-232	75 mA	75 mA
4010-9812	Single RS-232 with Service Modem	100 mA	100 mA
4010-9806	Dual Class A NAC Adapter	0 mA	0 mA
4010-9809	Dual Circuit City Connect	20 mA	36 mA
4010-9829	Dual Circuit City Connect w/o disconnect switches	20 mA	36 mA
4010-9803	Relay Option Module	10 mA	37 mA
4010-9860 4010-9861 & ULC 4010s	24 LED Annunciator door	60 mA	83 mA (all LEDs on)
4606-9101	Remote LCD Annunciator (refer to data sheet S4606-0001)	65 mA	140 mA

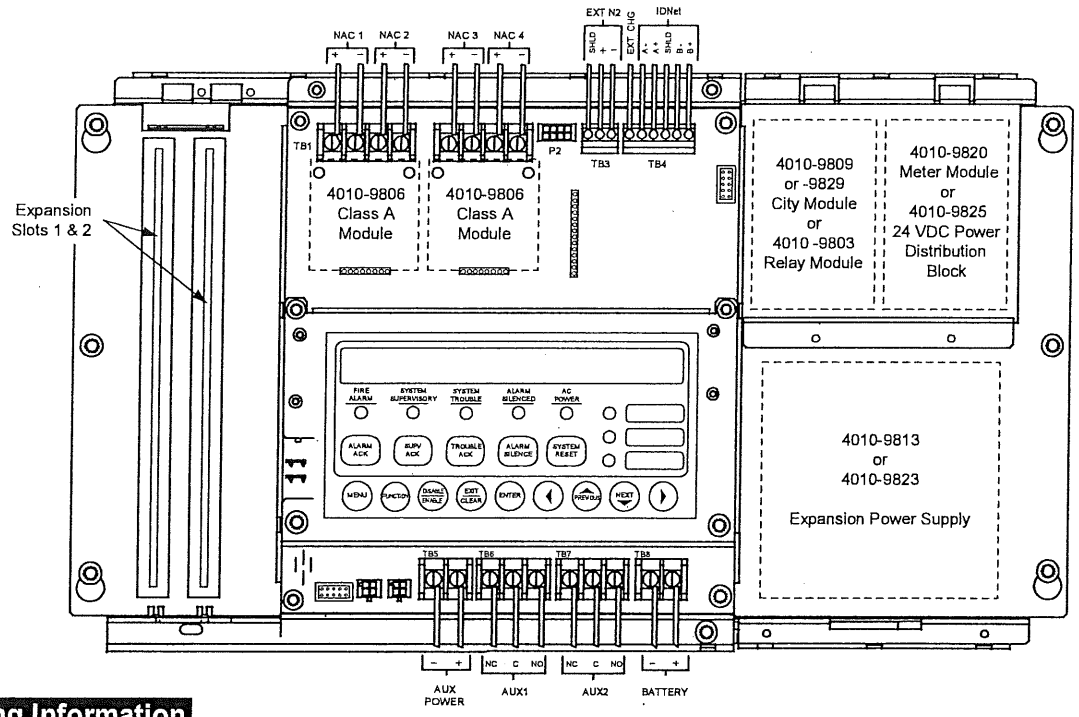
System Current (supplied separate from power supply output)

Base System with:	Supervisory Current**	Alarm Current**
no IDNet devices	195 mA	295 mA
50 IDNet devices	230 mA	330 mA
100 IDNet devices	265 mA	365 mA
150 IDNet devices	300 mA	400 mA
200 IDNet devices	335 mA	435 mA
250 IDNet devices	370 mA	470 mA

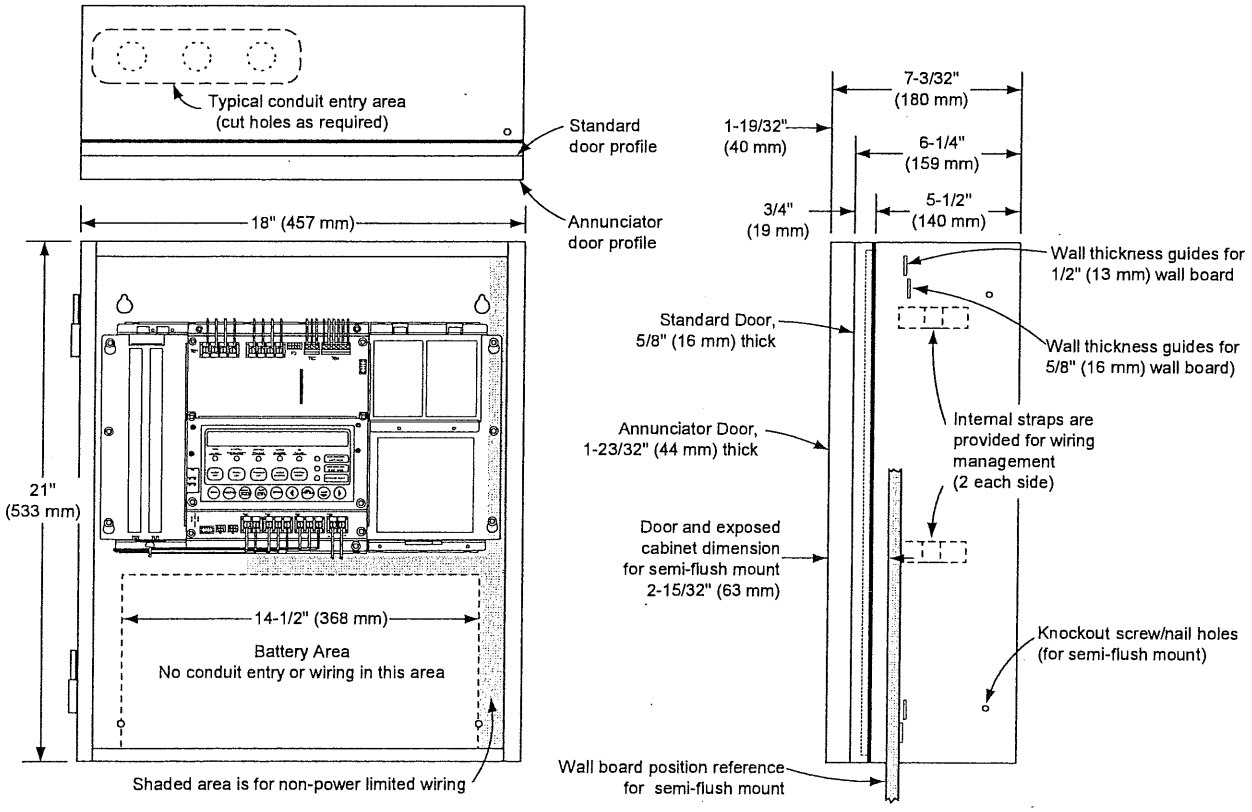
** **Current Calculation Information:**

1. To determine total supervisory current, add currents of modules in panel to base system value **and** all auxiliary loads.
2. To determine total alarm current, add currents of modules in panel to base system alarm current **and** add all panel NAC loads **and** all auxiliary loads.

4010 Module Layout Reference



Mounting Information



Simplex

4010ES Fire Control Panels

UL, ULC, CSFM Listed;
*FM, NYC Fire Dept Approved**

Automatic Extinguishing, Deluge and Preaction Sprinkler System Releasing Control

Features

Releasing control using the Simplex® 4010ES Fire Alarm Control Panel to provide:

- Coverage for multiple areas of Automatic Extinguishing Release and/or Deluge and Preaction Sprinkler System Release including audible escalation of events
- Control of compatible Listed/Approved 24 VDC automatic control actuators, one per circuit; or two 12 VDC actuators in series per circuit
- Releasing appliance circuits (RACs) by connecting Notification appliance circuits (NACs) to Suppression Release Peripherals for actuator supervision and control
- Four, 3 Amp Notification Appliance Circuits (NACs) in the panel for use with Suppression Release Peripherals (SRP) and required notification appliances
- Additional actuator circuit control and additional NACs are available using 4009 IDNet Addressable NAC Extenders and Suppression Release Peripherals

Audible Escalation of Events:

- Temporal or 20 bpm March Time pattern for first cross-zone alarm
- 120 bpm March Time pattern indicates releasing timer active
- On steady indicates releasing timer expired and actuator is activated
- NOTE: Requires NACs dedicated to conventional horn control (not SmartSync operation) with strobes controlled on separate NACs

4009 IDNet NAC Extenders provide:

- Up to eight NACs for notification requirements and for NAC input to Suppression Release Peripherals
- Control is via IDNet addressable communications

4090-9005/-9006 Suppression Release Peripheral (SRP) with Dual Command Control:

- ***Dual*** command control requires that ***both*** IDNet communications commands ***and*** an activated NAC are present to initiate the desired release
- NAC provides wiring supervision to the actuator including monitoring of coil continuity and short circuit supervision to the coil supervision module

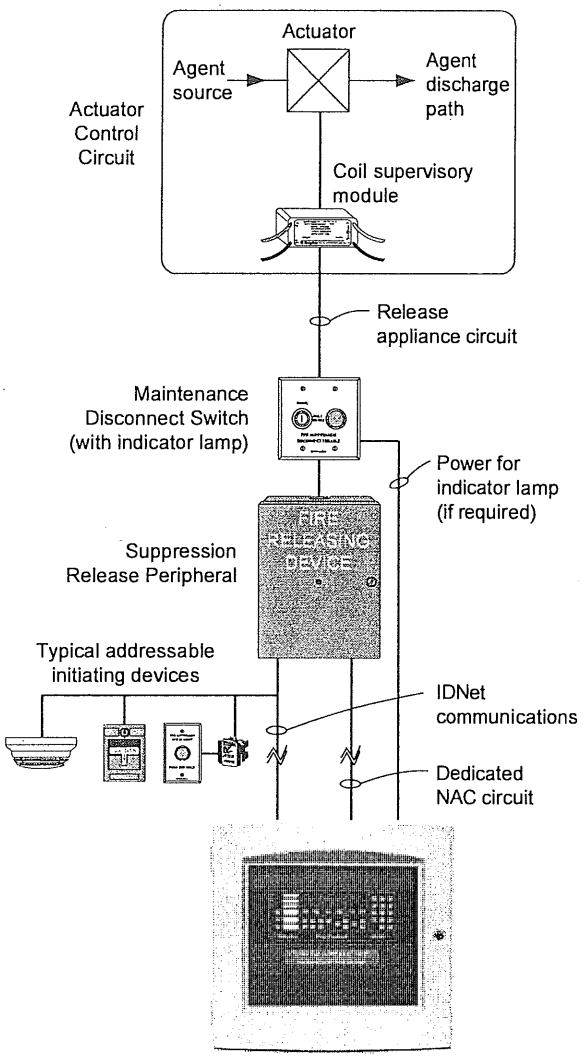
Suppression Release Peripheral control features:

- An on-board DC-DC regulator compensates for voltage drops to the peripheral and ensures proper control circuit voltage over a wide operating range
- Provides a single RAC for control of actuators for up to 2 A using a 3 A NAC input (1 A using a 2 A NAC input)

Related system components:

- 4010ES Series control panel with Releasing Appliqué
- Dedicated NAC output from 4010ES (or compatible NAC Extender)
- Coil supervision module, one per RAC
- Maintenance Switch, one per RAC
- Abort Switch connected via an addressable interface module

UL listed to Standard 864



4010ES Control Panel with Suppression Release Appliqué

4010ES Release Control Simplified Block Diagram

Introduction

When combined with Suppression Release Peripherals, the 4010ES series fire alarm control panel provides actuator supervision and control for use in automatic extinguishing, and deluge or preaction releasing systems. Hazard area initiating and notification devices are controlled using either conventional or addressable circuits per standard 4010ES capabilities. The necessary releasing system logic is implemented within the 4010ES control panel as required for the local application.

* This product has been approved by the California State Fire Marshal (CSFM) pursuant to Section 13144.1 of the California Health and Safety Code. See CSFM Listings 7165-0026:0369 and 7300-0026:313 (SRP) for allowable values and/or conditions concerning material presented in this document. NYC Fire Dept COA #6095. Additional listings may be applicable; contact your local Simplex product supplier for the latest status. Listings and approvals under Simplex Time Recorder Co. are the property of Tyco Fire Protection Products.

Automatic Extinguishing Release Systems

These systems automatically activate electrically controlled actuators for the release of a fire extinguishing agent (such as dry chemical, water spray, foam, CO_2, or clean agent) in response to fire detection device inputs as determined by programming of the host fire alarm control panel.

Automatic Extinguishing Release System Panels are required to have a minimum of 24 hours of standby power. Initiating devices must be Listed/Approved for the application, and may be wired either Class A or B. Control actuators must be electrically compatible with the control panel circuits and power supplies, and are wired Class B to provide coil supervision.

Deluge or Preaction Sprinkler Systems

These systems automatically activate water control actuators in response to fire detection device inputs.

Deluge Sprinkler Systems employ open sprinkler heads and provide water flow when the fire detection system activates a common automatic water control actuator. They are used to deliver water simultaneously through all of the system sprinkler heads. This type of system is applicable where the immediate application of large quantities of water over large areas is the proper fire response.

Preaction Sprinkler Systems are similar to deluge systems except that normally closed sprinkler heads are used and supervisory air pressure is maintained in the pipe. Operation requires both an activated sprinkler head and an activated fire alarm initiating device with specific programming determined at the host fire alarm control panel.

Releasing System Requirements

1. **Releasing actuators** are controlled from a Suppression Release Peripheral (4090-9005 or 4090-9006). Connections are 2-wire, Class B releasing circuits **with only one 24 VDC actuator per circuit.** Where applicable, two, 12 VDC actuators in series, or one 12 VDC actuator with manufacturer supplied resistor may be used.
2. **Coil Supervision Module 2081-9046** must be wired electrically before the actuator and located in the actuator wiring junction box. (Refer to diagram on page 5.) The connected RAC provides continuity supervision of the actuator coil and wiring and provides short circuit supervision to the coil supervision module.
3. **Cross-zoning or other alarm initiation logic** per system requirements, is to be implemented by programming at the fire alarm control panel.
4. **UL Listed Automatic Extinguishing Releasing operation** requires that: battery standby must be a minimum of 24 hours with 5 minutes of alarm and that listed actuators are used, refer to list on page 6.

Releasing System Requirements *(Continued)*

5. **FM Approved Automatic Extinguishing Release** requires secondary standby to be a minimum of 24 hours with 5 minutes of alarm. Actuators must be electrically compatible.
6. **FM Approved Deluge and Preaction Sprinkler operation** requires that: initiating device circuits be Class A and wired to Listed/Approved devices; standby power capacity must be a minimum of 90 hours with 10 minutes of alarm; and that compatible Automatic Water Control Valves must be used. (Refer to actuator list on page 7.)
7. **Maintenance Switches**, one per RAC, are required per NFPA 72, the *National Fire Alarm and Signaling Code* to allow the system to be tested or serviced without actuating the fire suppression systems. *Their use may not be allowed in some jurisdictions, always confirm local requirements.* When used, Simplex Maintenance Switches are required to ensure that operation initiates a supervisory condition.
8. **Abort Switches** are available when abort operation is required. When used, connect to an addressable Supervised IAM model 4090-9001 or similar addressable adapter module. The Simplex abort switch and the IAM mount in a single gang box, 2-1/2" minimum depth.
9. **Addressable Manual Releasing Stations** are used to initiate activation of the releasing actuators with the appropriate time delay implemented by the fire alarm control panel.
10. **Notification Requirements.** Each hazard area typically requires general audible and visible fire alarm notification and additional dedicated NACs for area releasing status notification. Suppression releasing is compatible with conventional panel mounted NAC modules as well as for use with the 4009 IDNet NAC Extender.
11. **Additional Suppression Release Peripheral Reference.** Refer to Installation Instructions 579-385.

Additional Releasing Systems Reference

For additional information, refer to Factory Mutual Research Corporation (FMRC) "FMRC Approval Guide," FM Approval standard "Deluge Systems and Preaction Systems."

Please note that proper operation of releasing control systems requires that the system design, installation, and maintenance be performed correctly and in accordance with all applicable local and national codes, and equipment manufacturer's instructions. No liability for total system operation is assumed or implied.

Product Selection

4010ES Releasing Control System Modules

Model	Description		Reference
2081-9046	Coil Supervision Module		**Required**, one per RAC, mounts in the releasing actuator wiring junction box; see specifications section for details
2080-Series*	Maintenance Switches		One per RAC; flush or surface mount; indicator lamp models require separate 24 VDC wiring
2080-9056*	Flush mount	Abort Switch	As required, connects via an IDNet addressable interface module; mounted on a single gang stainless steel plate; installation requires a single gang box, 2-1/2" (64 mm) minimum depth
2080-9057*	Surface mount		

* Refer to data sheet S2080-0010 for Abort and Maintenance switch details.

Releasing Appliqués, Required for 4010ES Suppression Releasing Applications

Model	Description	
4010-9830	English	Suppression Releasing Appliqué; field applied (same appliqué as is used on the Simplex model 4010 Suppression Release Panel)
4010-9830CAF	French	

Suppression Release Peripheral and Accessories

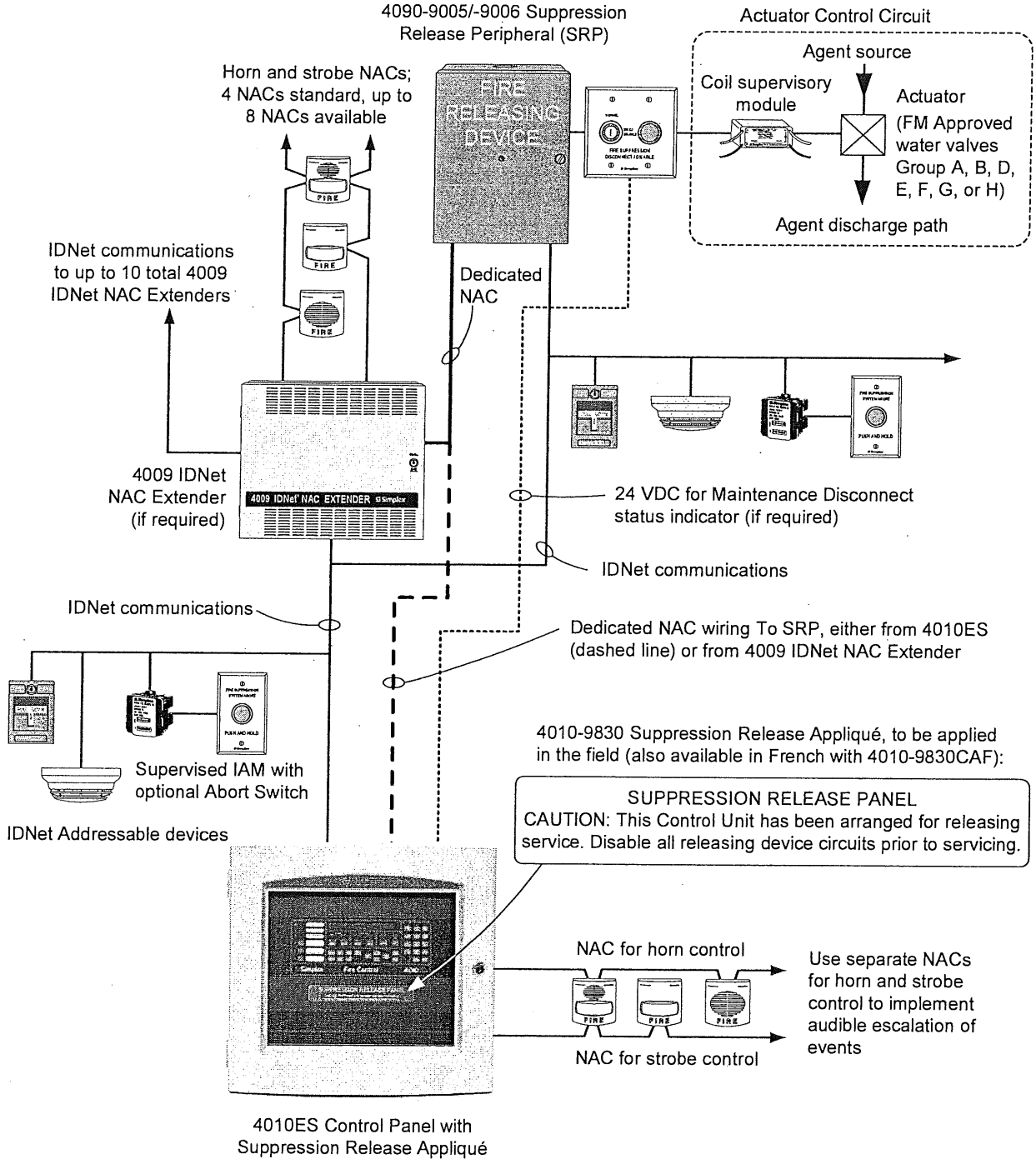
Model	Description	Reference
4090-9005	Basic Suppression Release Peripheral on mounting plate	**Requires** mounting box 2975-9227, ordered separately
4090-9006	Suppression Release Peripheral mounted in red box; **required** for ULC listing	Includes LED indicator on front of door
2975-9227	Red mounting box; **required** for 4090-9005	These items are included with model 4090-9006
4090-9812	Red LED IDNet communications indicator option kit; mounts on door of 2975-9227 box	

Additional Product Data Sheet Reference

Subject	Data Sheet	Subject	Data Sheet
Releasing System Abort and Maintenance Switches	S2080-0010	Addressable Zone Adapter Modules	S4090-0003
Addressable Manual Stations for Releasing Applications	S4099-0002	TrueAlarm Sensors and Bases	S4098-0019
Addressable Manual Stations for Standard Applications	S4099-0001	TrueAlert Electronic Horns	S4901-0010
4010ES Basic Control Panels	S4010-0004	TrueAlert Non-Addressable Strobes (V/O)	S4906-0001
Supervised IAM	S4090-0001	TrueAlert Non-Addressable 4-Wire Horn/Strobes (A/V)	S4903-0011

Contact your local Simplex product supplier for additional information on compatible IDNet addressable devices and TrueAlert notification appliances.

4010ES Releasing System One-Line Connection Reference with 4009 IDNet NAC Extenders

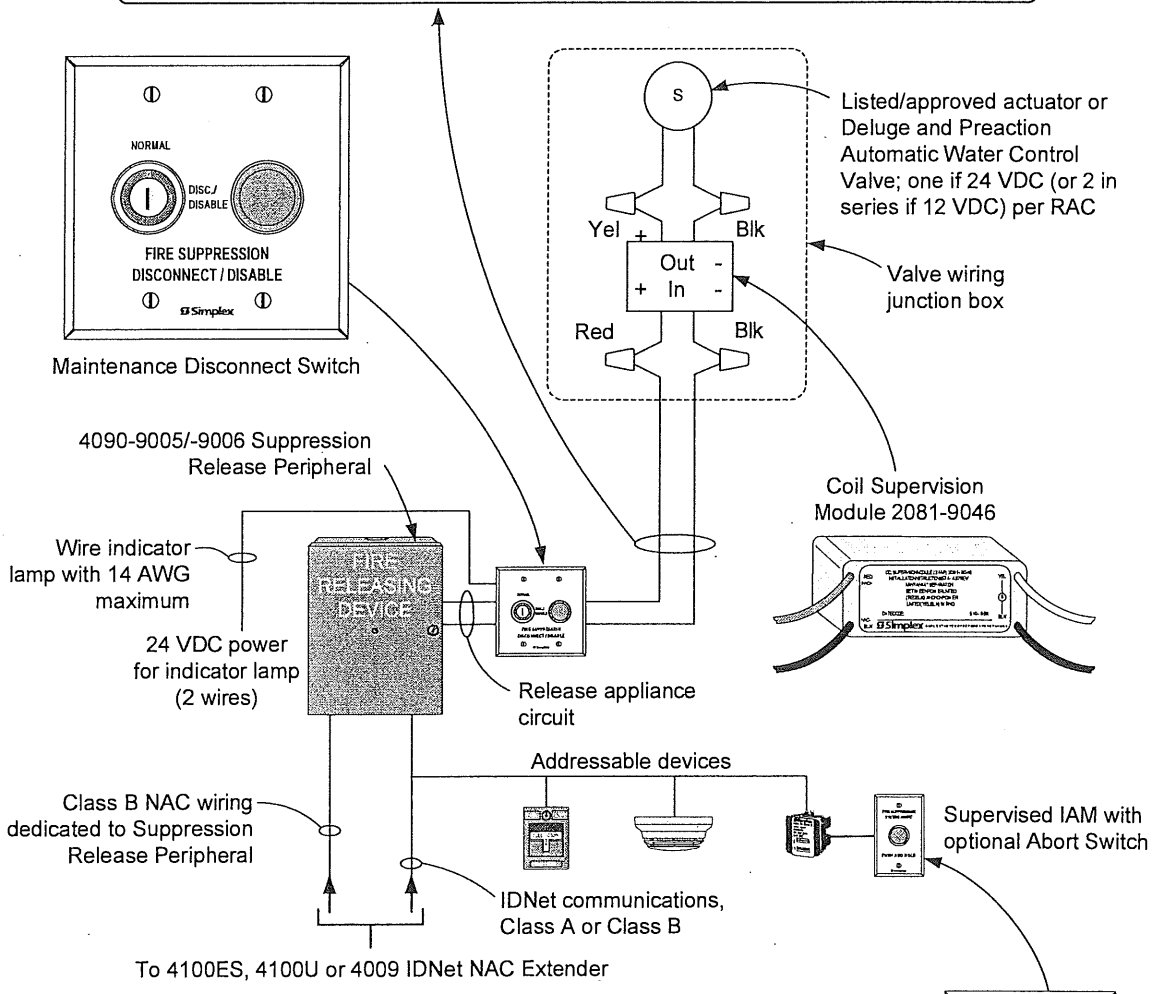


Suppression Release Peripheral Wiring Reference

Maximum Release Appliance Circuit (RAC) Wiring Distances from Suppression Release Peripheral to the Valve Solenoid (based on a total drop of 0.6 V)

RAC Output Current (refer to solenoid rating)	Distance								Total Line Resistance
	18 AWG		16 AWG		14 AWG		12 AWG		
0.50 A	74 ft	23 m	118 ft	36 m	188 ft	57 m	300 ft	91 m	1.06 Ω
0.75 A	50 ft	15 m	79 ft	24 m	126 ft	38 m	200 ft	61 m	0.71 Ω
1.00 A	37 ft	11 m	59 ft	18 m	94 ft	29 m	150 ft	46 m	0.53 Ω
1.25 A	30 ft	9 m	47 ft	14 m	75 ft	23 m	120 ft	36.6 m	1.06 Ω
1.5 A	25 ft	7.6 m	39 ft	12 m	63 ft	19 m	100 ft	30.5 m	0.71 Ω
1.75 A	21 ft	6.4 m	34 ft	10 m	54 ft	16 m	85 ft	26 m	0.53 Ω
2.00 A	19 ft	5.8 m	30 ft	9 m	47 ft	14 m	75 ft	23 m	0.53 Ω

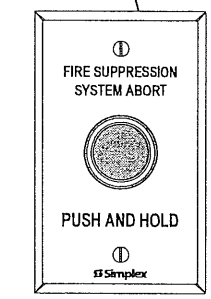
Metric wire equivalents: 18 AWG = 0.82 mm^2; 16 AWG = 1.31 mm^2; 14 AWG = 2.08 mm^2; 12 AWG = 3.31 mm^2



Maximum Notification Appliance Circuit (NAC) Wiring Distances to a Suppression Release Peripheral (0.5 A to 1.75 A drop is based on a total drop of 3.4V; 2 A drop is based upon a total drop of 1.2 V)

RAC Output Current (refer to solenoid rating)	Distance								Total Line Resistance
	18 AWG		16 AWG		14 AWG		12 AWG		
0.50 A	250 ft	76 m	399 ft	122 m	635 ft	194 m	1010 ft	308 m	3.58 Ω
0.75 A	167 ft	51 m	266 ft	81 m	423 ft	129 m	673 ft	205 m	2.39 Ω
1.00 A	125 ft	38 m	199 ft	61 m	317 ft	97 m	505 ft	154 m	1.79 Ω
1.25 A	100 ft	30 m	159 ft	48 m	254 ft	77 m	404 ft	123 m	1.43 Ω
1.5 A	84 ft	26 m	133 ft	41 m	212 ft	65 m	337 ft	103 m	1.19 Ω
1.75 A	72 ft	22 m	114 ft	35 m	181 ft	55 m	289 ft	88 m	1.02 Ω
2.00 A	25 ft	7.6 m	39 ft	12 m	63 ft	19 m	100 ft	30 m	0.36 Ω

Metric wire equivalents: 18 AWG = 0.82 mm^2; 16 AWG = 1.31 mm^2; 14 AWG = 2.08 mm^2; 12 AWG = 3.31 mm^2



2080-9056/-9057 Abort Switch (as required)

Specifications

Suppression Release Peripheral 4090-9005 and 4090-9006

Communications		IDNet, one address			
RAC Output Rating	with 4010ES	2 A maximum	At nominal 24 VDC, regulated; refer to NAC Power Requirements for more detail		
	with 4009 IDNet NAC Extender	1 A maximum			
NAC Power Requirements **NOTE:** 4010ES NACs are rated at 3 A; 4009 IDNet NAC Extender NACs are rated at 2 A, Extender expansion NACs are rated 1.5 A	Voltage	16 to 32 VDC (nominal 24 VDC)			
	Supervisory Current	No additional current required, circuit appears as standard end-of-line (EOL) NAC loading			
	Alarm Current Reference (RAC current = actuator current)	**RAC Current**	**NAC Current**	**RAC Current**	**NAC Current**
		0.5 A	0.845 A	1.25 A	2.14 A
		0.75 A	1.28 A	1.5 A	2.56 A
		0.87 A	1.5 A	1.75	3 A
		1 A	1.71 A	2 A	
Wire Connections		Screw terminals for input and output wiring, 18 to 12 AWG wire (0.82 mm^2 to 3.31 mm^2)			
IDNet Wiring Distance Reference		Up to 2500 ft (762 m) from the IDNet source module			
		Up to 10,000 ft (3048 m) total Class B wiring distance including T-Taps			
		Compatible with Simplex 2081-9044 Overvoltage Protectors			
Dimensions		See installation reference on page 8			
Operating Temperature		32° to 120° F (0° to 49° C) indoor operation only			
Operating Humidity Range		10 to 90% RH at 90° F (32° C)			

Coil Supervision Module 2081-9046

Construction	Epoxy encapsulated
Dimensions	1-3/8" W x 2-7/16" L x 1-1/16" H (34 mm x 62 mm x 27 mm)
Wiring	18 AWG (0.82 mm^2) wire leads, color coded
Current Rating	2 A Maximum; internally fused at 3 A, non-replaceable

Compatible UL Listed Valves and Actuators

MFG.	Model Number	Coil Details
ANSUL	*AUTOMAN II-C Assembly; solenoid 17728; coil 25924	12 VDC, 458 mA
	AUTOMAN II-C Explosion-Proof Releasing Device; solenoid 31492; coil 31438	24 VDC, 467 mA
	*AUTOMAN II-C Assembly; solenoid 68739; coil 25924,	12 VDC, 458 mA
	Solenoid Electric Actuator; solenoid 73111; coil 73097	24 VDC, 1 A
	*CV90 HF Electric Actuator 73327; may use 73606 in-line resistor for 12 VDC	9 VDC max, 450 mA
	LP CO2 w/ASCO solenoid 422934,	24 VDC, 442 mA
	LP CO2 double action solenoid 430948	24 VDC, 438 mA
	LP CO2 3-way selector valve solenoid 433419	24 VDC, 438 mA
	Electric Actuator 24 VDC solenoid 570537	24 VDC, 250 mA
LPG	Solenoid 26114002 for Solenoid Coupling Assemblies: 21006401 & 21006402; & LPG128/145/190/230-50/55 FM-200 valves; and LPG128-90UL iFLOW & FM-200 valves	24 VDC, 542 mA

MFG.	Model Number
ASCO	8210A107 (097617-005D coil) 1/2" NPS, 5/8" orifice, 24 VDC
	8210G207 (238310 coil) 1/2" NPS, 1/2" orifice
	8211A107 (097617-005D coil) 24VDC
	HV2628571 (23810 coil) N.C. 1/2" NPS, 1/2" orifice
	HV2648581 (23810 coil) N.O. 1/2" NPS, 1/2" orifice
	R8210A107 (097617-005D coil) 1/2" NPS, 5/8" orifice
	T8210A107 (097617-005D coil) 1/2" NPS, 5/8" orifice
Pyro-Chem	ECH Electrical Control Head (551201)
	Explosion-Proof Electric Actuator (570147)
	Removable Electric Actuator (570209) 0.2 A

Skinner	71395SN2ENJ1NOH111C2 (Skinner coil H111C2) 1/4", NPS, 1/16"
	73212BN4TN00NOC111C2 (Skinner coil C111C2) 1/2", 5-300 psi
	73212BN4TNLVNOC322C2 (Skinner coil C322C2) 1/2", NPS, 0.92 A, 250 psi
	73218BN4UNLVNOH111C2 (Skinner coil H111C2)
	73218BN4UNLVNOC111C2 (Skinner coil C111C2) 1/2", NPS, 5/8 in. orifice

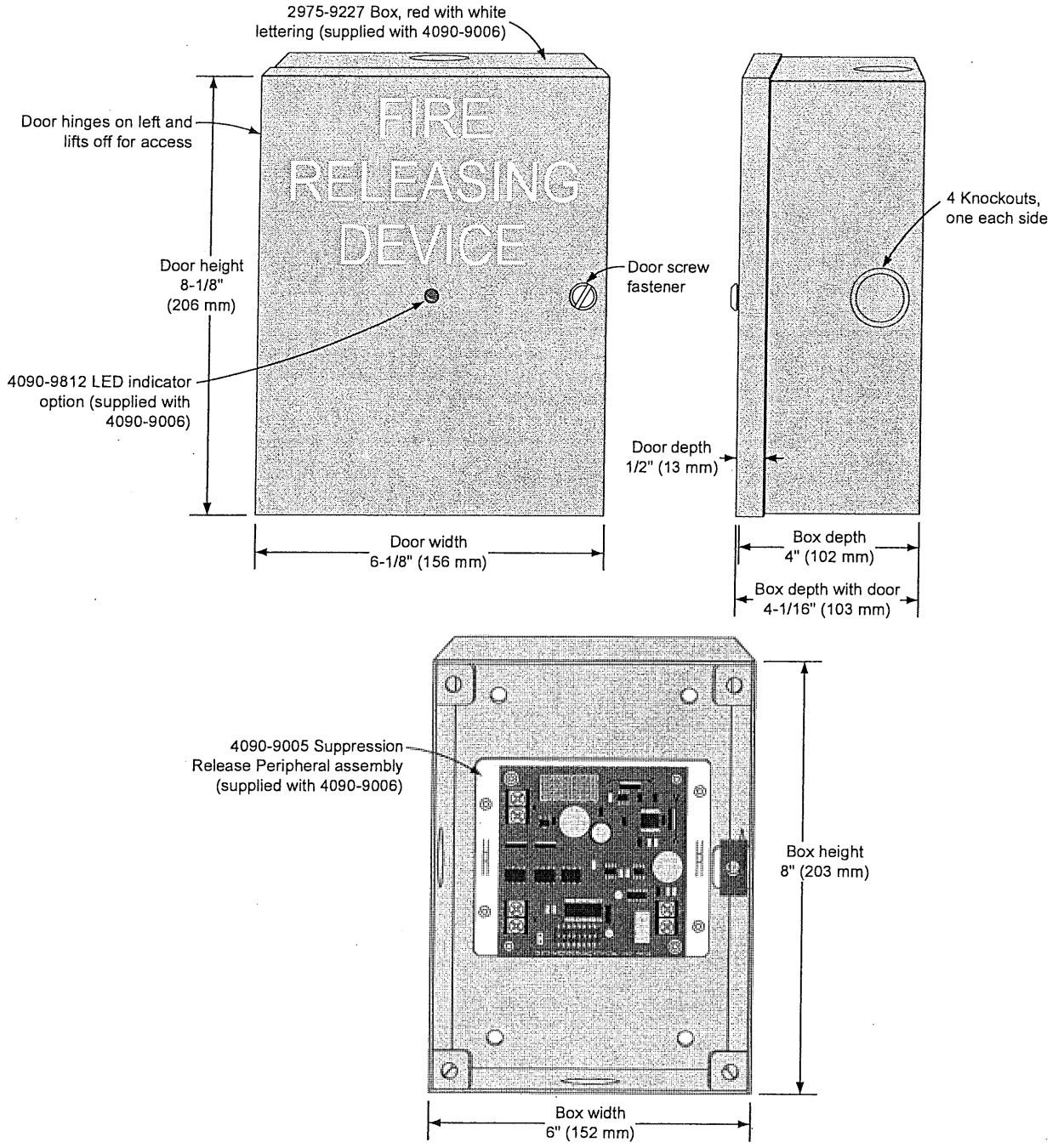
* 12 VDC coils, either wire two in series for 24 VDC activation, or, if available from manufacturer, use series resistor

FM Approved Water Control Valves

FM Group	Manufacturer	Model Number	Details
A	Skinner	LV2LBX25*	24 VDC, 11 W, 458 mA, 1/2 inch NPS, 1/2 inch orifice
B	ASCO	T8210A107	24 VDC, 16.8 W, 700 mA, 1/2 inch NPS, 5/8 inch orifice
		R8210A107	
		8210A107	
D	ASCO	8210G207	24 VDC, 10.6 W, 440 mA, 1/2 inch NPS, 1/2 inch orifice
E	Skinner	73218BN4UNLVNOC111C2*	24 VDC, 10 W, 420 mA, 1/2 inch NPS, 5/8 inch orifice
		73212BN4TN00N0C111C2	24 VDC, 10 W, 420 mA, 1/2 inch NPS, 5/8 inch orifice; 5-300 psi rated working pressure
F	Skinner	73212BN4TNLVNOC322C2	24 VDC, 22 W, 1/2 inch NPS, 920 mA, 250 psi (1725 kPa), 1/2 inch orifice
G	Skinner	71395SN2ENJ1NOH111C2	24 VDC, 10 W, 420 mA, 1/4 inch NPS, 1/16 inch orifice, 250 psi (1725 kPa) rated working pressure
I	Victaulic	Series 753-E solenoid valve	24 VDC, 8.7 W, 1/2 inch NPS, 364 mA, 300 psi (2069 kPa), 1/2 inch orifice
J	Viking	11591 and 11592	Normally closed (NC) — Explosion proof solenoid valves, 24 VDC, 10 W, 1/2 inch NPS, 300 psi (2069 kPa), 4.1 Cv
		11595 and 11596	Normally open (NO)
K	Viking	11601 and 11602	NC solenoid valve, 24 VDC, 9 W, 1/2 inch NPS, 250 psi (1725 kPa), 6.2 Cv

* For new applications, LV2LBX25 has been replaced by model number 73218BN4UNLVNOC111C2.

Suppression Release Peripheral Installation Reference Diagram



Simplex

UL, ULC, CSFM Listed;
*MEA (NYC) Acceptance**

Releasing System Peripherals

Fire Suppression System Abort Switches and Releasing Appliance Circuit (RAC) Maintenance Switches

Features

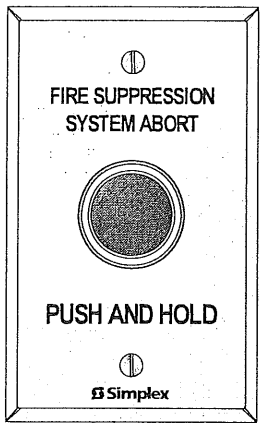
Abort switches provide a manual Fire Suppression System release abort request:

- Pushbutton momentary switch is mounted on a stainless steel single-gang plate
- A protruding collar protects the switch from accidental contact (collar is removable if required)
- Available flush or surface mount
- Flush mounting requires standard single-gang box
- Surface mounting includes a red mounting box
- Models are available with internal 1.2 kΩ resistor for current limited operation

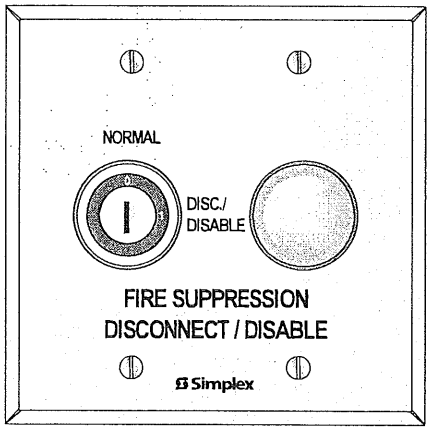
Maintenance switches provide a secure and visible disconnect means for servicing Fire Suppression System Releasing Appliance Circuits (RACs):

- Maintained position keyswitch is mounted on a stainless steel double-gang plate
- Key is removable only in the normal position
- Disabled position opens connection to output circuit and places a 16.2 kΩ resistor across the input circuit to initiate a supervisory condition at the host panel
- Disconnect indicator lamp is a bright incandescent bulb with red lens, powered from separate 24 VDC
- Available for flush or surface mount
- Flush mounting requires a standard double-gang box
- Surface mount models includes a red mounting box

UL listed to Standard 864



Abort Switch
(shown 1/2 size)



Maintenance Switch with Disconnect Indicator Lamp
(shown 1/2 size)

Description

Releasing systems typically require maintenance disconnect switches and often require abort switches. These abort and maintenance switches are clearly labeled and combine easy operation with rugged construction for high integrity operation.

* Refer to page 2 for specific product listings. **NOTE:** MEA is not applicable to Maintenance Switches. FM is not applicable to Abort Switches.

As indicated on page 2, these products have been approved by the California State Fire Marshal (CSFM) pursuant to Section 13144.1 of the California Health and Safety Code. See CSFM Listing 7300-0026:313 for allowable values and/or conditions concerning material presented in this document. Abort switches are accepted for use -- City of New York Department of Buildings – MEA35-93E. Maintenance switches were not approved by FM as of document revision date. Additional listings may be applicable, contact your local Simplex® product supplier for the latest status. Listings and approvals under Simplex Time Recorder Co. are the property of Tyco Fire Protection Products.

Product Selection (see page 3 for specifications)

Abort Switches

Model	Description	Listing Status	Details
2080-9056	Flush mount	UL, ULC, & CSFM listed; MEA (NYC) Acceptance	Single-gang size; includes 3 position contact block housing with one contact block installed
2080-9057	Surface mount; includes red mounting box		

Abort Switches for 4004R Series Suppression Release Panel Current Limited Operation

Model	Description	Listing Status	Details
2080-9067	Flush mount	UL, ULC, & CSFM listed; MEA (NYC) Acceptance	Single-gang size; includes 1.2 kΩ, 1W resistor for current limited operation and 3 position contact block housing with one contact block installed
2080-9068	Surface mount; includes red mounting box		

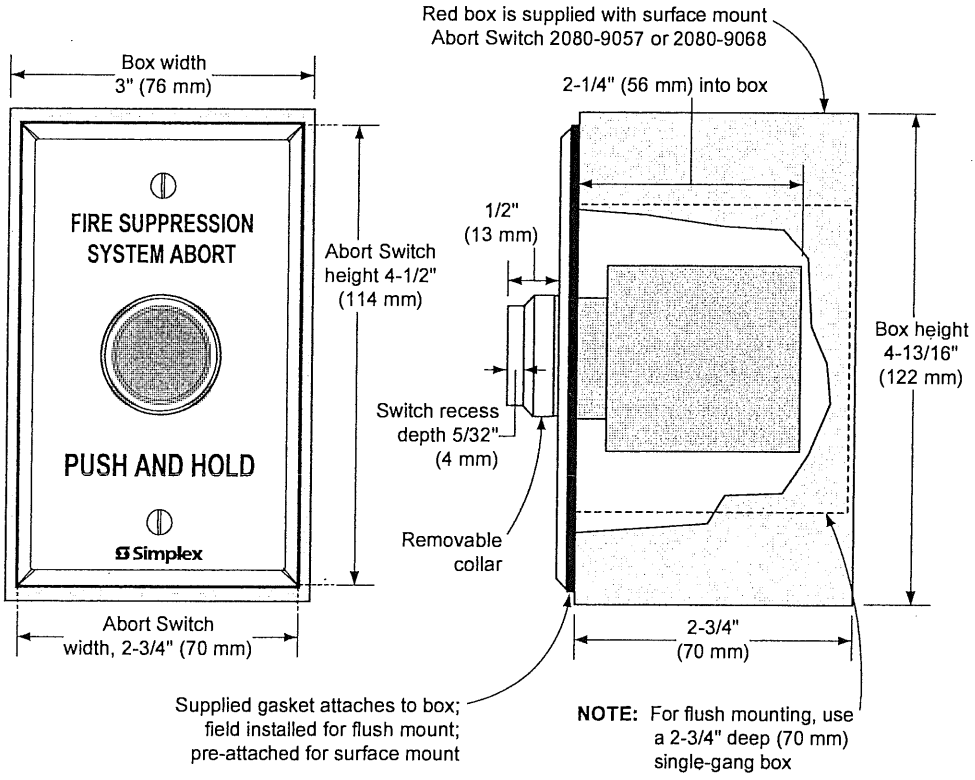
Maintenance Switches with Disconnect Indicator Lamp

Model	Description	Listing Status	Details
2080-9059	Flush mount	UL, ULC, & CSFM listed	Double-gang size; includes 3 position contact block housing with 2 contact blocks installed; disabled position opens connection to output and places a 16.2 kΩ resistor across the input circuit; resistor is removable if required for retrofit
2080-9060	Surface mount; includes red mounting box		

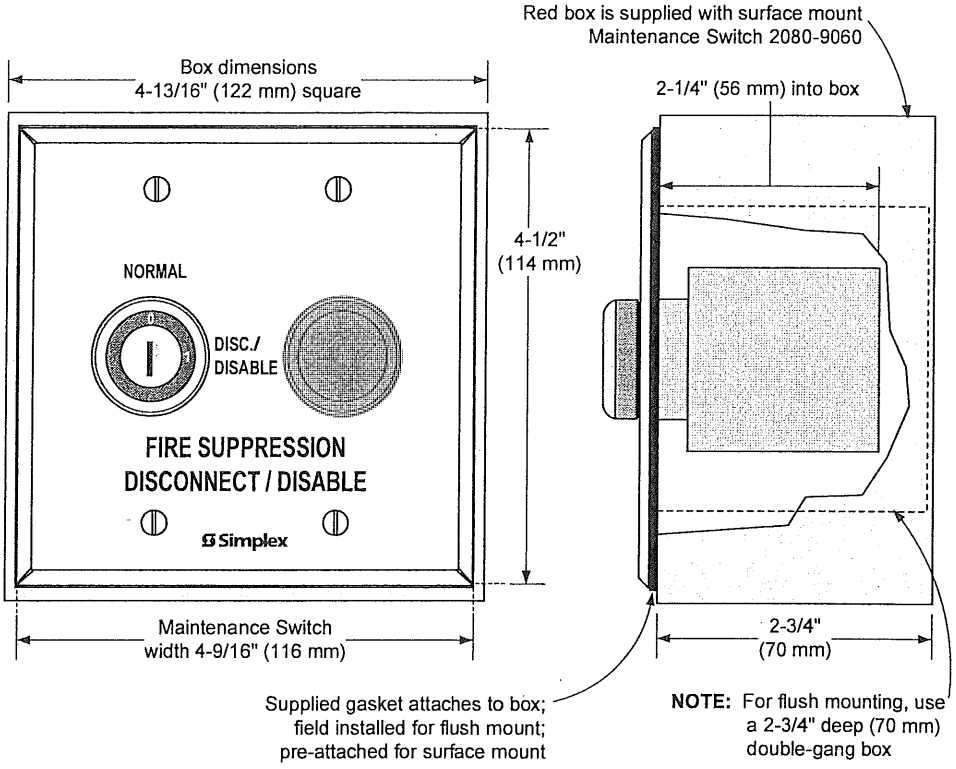
Accessories for Field Installation

Model	Description
2080-9061	Additional Contact Block for Abort or Maintenance Switch; 1 Form C contact; UL recognized component for use with these switches; listings and approvals are not applicable

Abort Switch Installation Reference



Maintenance Switch Installation Reference



Specifications

Electrical Ratings	
Abort Switch; One Contact block	Silver contacts; 1 N.O. & 1 N.C.; rated 2 A resistive @ 30 VDC
Maintenance Switch with Lamp; Two Contact blocks	Circuit control: Silver contacts; 1 N.O. & 1 N.C.; rated 2 A resistive @ 30 VDC
	Lamp control: Silver contacts; 1 Form C; rated 2 A resistive @ 30 VDC
Maintenance Switch Indicator Light (models 2080-9059 and 2080-9060)	Replaceable 2 W incandescent bulb; 24 to 30 VDC typical; 83 mA @ 24 VDC; requires separate 24 VDC
Wiring Connections	
Abort Switch	Terminal blocks for in/out wiring; 18 to 14 AWG wire (0.82 mm^2 to 2.08 mm^2)
Abort Switch with Current Limited Resistor	Terminal blocks for first wire connection; 18 to 14 AWG wire (0.82 mm^2 to 2.08 mm^2); 18 AWG wire lead for second wire connection
Maintenance Switch	18 AWG (0.82 mm^2) color coded wire leads for suppression circuit; terminal blocks for lamp wiring; 18 to 14 AWG wire (0.82 mm^2 to 2.08 mm^2)
Additional Information	579-416, Installation Instructions
Environmental Ratings	
Temperature Range	32° F to 120° F (0° C to 49° C)
Humidity Range	Up to 93% at 90°F (32° C)

Simplex

Multi-Application Peripherals and Accessories

ULC Listed

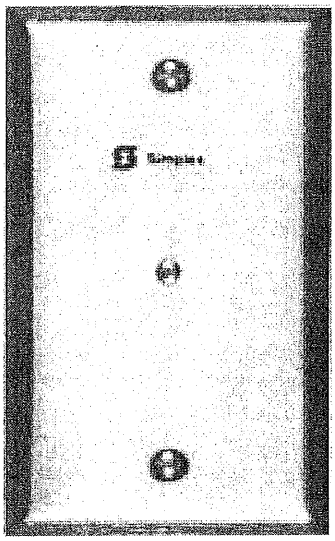
Miscellaneous
2081 Series
E.O.L. Resistors

DESCRIPTION :

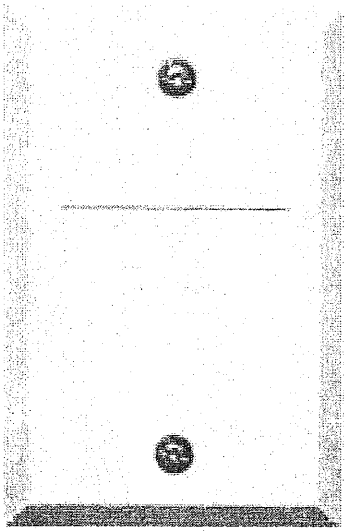
E.O.L. resistors are used with various Simplex fire alarm products as part of the wiring supervision circuit. Mounted on a single gang plate, the resistors are readily accessible for installation and service.

Resistor values vary with different types of circuits. Refer to the specific circuit information to determine the proper value.

Type 2081
Galvanised Steel



Type 2081
Stainless Steel Surface



Type 2081
Almond Flush

END-OF-LINE APPLICATION CHART

Circuit Type		Resistor Value
Signal –	Bell, Horn, Strobe, Speaker, Siren, etc.	10,000 ohm, 1/2 Watt Brown/Black/Orange
Monitor Zone –	Pull Station, Heat Detector, Smoke Detector, etc.	3300 ohm, 1 Watt Orange/Orange/Red
IAM Monitor Zone		1,000,000 ohm, 1/2 Watt Brown/Black/Yellow

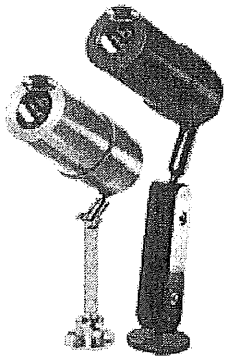
Product Identification	Single Gang Plate	Resistor Value
2081-9010C	Almond Flush	3.3k
2190-9123C	Almond Flush	10k
2081-9018	Stainless Steel Flush	3.3k
12081-0002	Stainless Steel Flush	10k
2081-9037C	Galvanised Surface	3.3k
2081-9038C	Galvanised Surface	10k
2081-9039C*	Almond Flush	Order Separately
2081-9040C*	Stainless Steel Flush	Order Separately
2081-9041C*	Galvanised Surface	Order Separately

* Any resistor listed below may be ordered on this plate by ordering as an other line item and relating the lines.

378-017	3.3k, 1W
378-022	100k, 1/2W
378-030	10k, 1/2W
378-045	47k, 1/2W
378-046	5.6k, 1/2W
378-054	15k, 1/2W
378-058	6.8k, 1/2W
378-069	12k, 1/2W
378-073	22k, 1/2W
378-090	8.2k, 1/2W
378-105	18k, 1/2W
378-107	1.8k, 1/2W

UV/IRS Flame Detector

Ultraviolet and Infrared Optical Sensors



Net Safety's UV/IRS (Ultra-violet/Infrared) flame detector delivers exceptional performance with many distinct functions and features. Two precise spectrums of radiation must be recognized and confirmed by highly tuned sensors for the UV/IRS to initiate a fire condition. This accurate and reliable flame monitoring technology combined with immunity to arc welding, hot body radiation, lightning and sunlight greatly reduces costly false alarms while providing critical safety performance to your site and personnel.

- **Two Radiation Wavelengths Necessary For Alarm— Minimize False Alarm Events**
- **Lowest Power Consumption of Any Flame Detector On the Market**
- **Manual and Automatic Testing of Optical Surfaces — Constantly Monitors Internal Electronics**
- **Designed for Extreme Conditions, Operational From -50°C — +75°C**
- **Global Certifications and Approvals**
- **Wide Voltage Range Allows For Greater Stability and System Compatibility**
- **Field-selectable Sensitivity and Delay Settings Allows Operators To Fine Tune At Installation Site**
- **Wide Area Coverage, Extended Range with Fast Response Times**
- **Analog, Relay, RS 485 Digital Modbus, and HART Outputs Available**
- **3 Year Warranty Electronics / 2 Years on Sensors**

Enclosed in a rugged, explosion-proof housing, the Net Safety UV/IRS flame detector uses the latest in modular microprocessor and Ultraviolet/Infrared sensor technology — delivering accurate and reliable monitoring for hydrocarbon based fires. It's capable of stand-alone operation or can be connected to a variety of networked safety systems to create a dependable fire monitoring system.

The UV/IRS Flame Detector has many unique features which make it one of the industries best: an extra wide field of view — up to 120 degrees; user defined sensitivity and time delay settings can be completed in the field with no special tools required; one of the lowest power consumption levels and widest voltage range available on the market; plus the option of a separated HART communication interface at ground level.

Net Safety has engineered a superior UV/IR flame detector that is simple to operate and maintain while delivering all the security and performance required for high-risk, industrial installations!

NET SAFETY MONITORING INC.

EMERSON. Process Management

UV/IRS Flame Detector

Specifications

	ANALOG	RELAY	HART
Operating Voltage Range	10 to 32 Vdc		
Power Consumption at 24 Vdc *with Heater	Nom 45 mA / 1.1 W Max 115 mA / 2.76 W *Nom 90 mA / 2.16 W Max 165 mA / 3.96 W	Nom 45 mA / 1.1 W Max 115 mA / 2.76 W *Nom 90 mA / 2.16 W Max 165 mA / 3.96 W	Nom 71 mA / 1.7 W Max 173 mA / 3.36 W *Nom 106 mA / 2.22 W Max 223 mA / 5.36 W
Power Consumption at 32 Vdc *with Heater	Nom 35 mA / 1.12 W Max 105 mA / 3.36 W *Nom 70 mA / 2.24 W Max 145 mA / 4.64 W	Nom 35 mA / 1.12 W Max 105 mA / 3.36 W *Nom 70 mA / 2.24 W Max 145 mA / 4.64 W	Nom 57 mA / 1.72W Max 158 mA / 5.06 W *Nom 92 mA / 2.84 W Max 198 mA / 6.34 W
Temperature Range	Certified -40°C to +75°C (-40°F to +167°F) / Operational -50°C to +75°C (-58°F to +167°F)		
Field of View	120 degrees horizontal / 95 degrees vertical		
Spectral Range	UV Radiation 185 to 260 nanometres (1850 to 2600 angstroms) | IR Radiation in the 4.4 micron range		
Time Delay	Dip switch selectable to 0, 3, 5, 7 seconds		
Sensitivity Settings	DIP switch selectable to 8, 16, 24 or 32 counts per second		
Response Time	<6 seconds [depending on fuel source, fire size and distance]		
Enclosure Material	Red powdercoat with clear anodizing, copper-free aluminum (optional stainless steel), factory sealed housing		
Humidity Range	0 to 95% RH, non-condensing		
Weight (with swivel)	2.1 Kg/4.5 lb (Stainless Steel option 3.4 Kg/7.5 lb) - does not include junction boxes		
Outputs	0 to 20 mA - Into a maximum loop impedance of 800 Ohms at 32 V dc or 150 Ohms at 11.0 V dc. Non-isolated loop supply	Form C contacts rated 1 Amp at 30 Vdc, 0.5 Amp at 125 Vac. Selectable energized/de-energized, latching/non-latching Fire relay Fault relay factory set as energized/non-latching, cannot be modified	HART Communication Protocol
Certifications/Approvals	CSA - Class I, Division 1, Groups B, C and D - Temperature code T5 - CANADA: Class 1, Zone 1, Ex d IIB + H2 T5 ANSI/UL - Class I, Division 1, Groups B, C and D - Temperature code T5 - UNITED STATES: Class 1, Zone 1, AEx d IIB + H2 T5 ATEX/IECEx - Ⓔx II 2 G Ex d II B+H2 T5 Gb GOST-R - 1Ex d II BT5/H2 INMETRO - BR-Ex d II B+H2 T5 Factory Mutual (FM) 3260 SIL2 by exida® ABS Marine NEMA Type 4X • IP66 - Enclosure ratings		
Warranty	3 Years Electronics / 2 Years Sensors		

ORDERING INFORMATION

UV/IRS-A	4-20mA Analog Output
UV/IRS-AR	4-20mA Analog output with a Fire and Fault alarm relay (JB-MPR-A/S included)
UV/IRS-AH	4-20mA Analog Output and HART Communication Protocol (JB-MPHF-A/S included)
UV/IRS-AHR	4-20mA Analog Output and Fire and Fault Alarm Relays and HART Communication Protocol (JB-MPHFR-A/S included)

ADDITIONAL APPROVALS : —X (ATEX/IECEx)
ENCLOSURE MATERIAL: Stainless Steel (—SS) [Aluminum is Standard]
ADDITIONAL FEATURES : —H (Heated Optics)

Ordering Matrix Example:
UV/IRS-AHR-X-SS-H
(Detector - Output - Additional Approval - Enclosure Material - Optional Features)

NET SAFETY MONITORING INC.

EMERSON. Process Management

UV/IRS Flame Detector

Specifications con't - Termination Boxes - Accessories

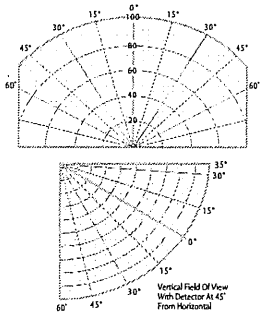
Summary of Distances

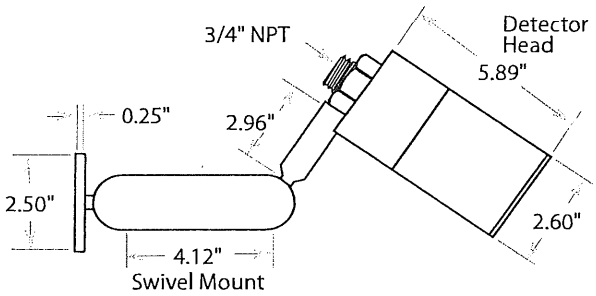
Fuel	Fire Size	Typical Response
n-heptane	1' x 1'	< 11sec @ 140 ft.
gasoline	1' x 1'	< 6sec @ 120 ft. (< 3sec @ 50 ft.)
methane	30" plume	< 6sec @ 100 ft.

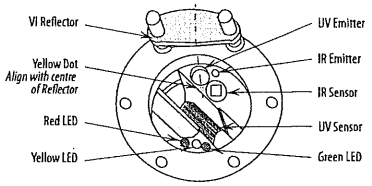
Immunity False Alarm Stimuli

Stimuli	Immunity Range
Direct/Indirect Sunlight	total
1500W Heater	10 ft
Halogen, Incandescent Light	3 ft
Florescent Light	10 ft
Arc Welding	30 ft

Example Field of View - Methane
32" plume - indicated in feet - consult factory for other flame types







TERMINATION BOXES

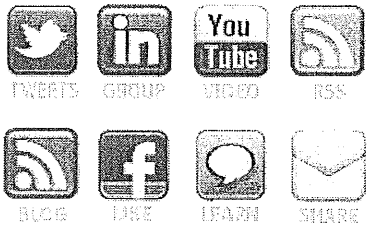
Class 1, Division 1, Groups BCD - Class 1, Zone 1 – Enclosure rated NEMA 4X, IP67 (See man-0081 for full specifications)

JB-MPS-A/S	Termination box - Analog Output - Switch (for remote MVI testing) & Test Jacks - Aluminum or Stainless Steel
JB-HRTCOM-A/S	Separated HART Communication Input Kit (JB-MPH-A with installed HPT-001) - Aluminum or Stainless Steel

ACCESSORIES

LAT-120	Laser alignment tool assembly - used to define area of coverage for all NSM flame detectors
AIR-SHIELD	Air Shield assembly (aluminum), supplied clean instrument air keeps lens clear in areas with heavy airbourne particulate
HPT-001	HART Communicator port - Instrincially Safe connection mounts to connected JB-MPHF & JB-MPHFR
FH-SHROUD	Field of View Restrictor Anodized (Red) for "S" series fire detectors (aluminum)
UN-MK-41	1" Pipe Mounting kit - Stainless steel
UN-MK-42	2" Pipe Mounting kit - Stainless steel
UN-MK-43	3" Pipe Mounting kit - Stainless steel
SSK-4	Sun shade kit/rain guard for "S" series flame, stainless steel - mounts directly to flame detector
SSK-1	Sun shade kit for "S" series flame, stainless steel - mounts directly to flame detector
TL-MP-KIT	Universal test lamp kit - certified rechargeable hand-held unit - produces accurate fire simulation (UV and IR sources)
TL-MP-KIT-X	Universal test lamp kit [ATEX] - certified rechargeable hand-held unit - produces accurate fire simulation (UV and IR sources)

HEADQUARTERS:
FLAME AND GAS DETECTION
Emerson Process Management
Net Safety Monitoring Inc.
2721 Hopewell Place NE
Calgary, Alberta, Canada T1Y 7J7
T +1 (403) 219 0688
T 1 866 FIREGAS
F +1 (403) 219 0694
www.net-safety.com



NET SAFETY MONITORING INC.

EMERSON.
Process Management

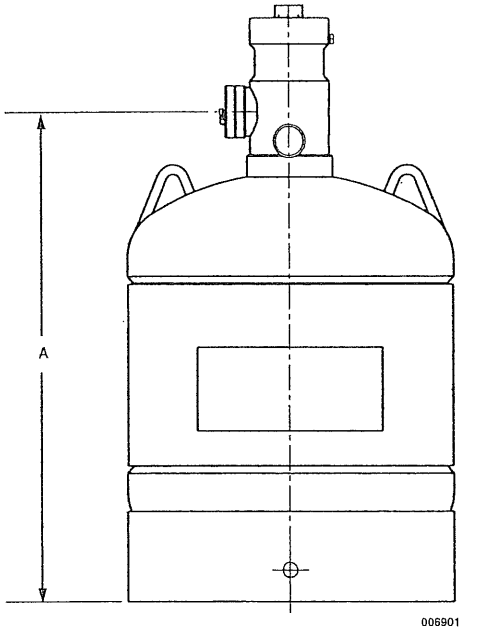
SAPPHIRE SUPPRESSION SYSTEMS

Agent Tank Shipping Assembly

The agent tank assemblies are manufactured in accordance with DOT 4BW450 and consist of a tank fitted with a valve and internal siphon tube. Eight partial filled tank sizes are available. A nameplate is adhered to the tank displaying the agent weight and gross weight. Tanks are superpressurized with dry nitrogen to 360 psi (25 bar) at 70 °F (21 °C). All tanks are available in multiple fill increments.

Note: Quantity of agent will have to be specified on customer P.O. when ordering factory filled tank shipping assemblies.

Also, when low pressure switch and liquid level indicator installed options are required, they must be specified when ordering.



Component	Material	Approvals
Tank	Steel	DOT4BW450
Valve	Brass	
Valve/Tank Assembly		UL Listed ULC Listed FM Approved

Shipping Assembly Part No./TC	Nominal Tank Size lbs.	(kg)	Agent Quantity lbs.	(kg)	Approximate Empty Weight lbs.	(kg)	Dimension "A" in.	(cm)	Diameter in.	(cm)	Valve Size
570635	20	(9.1)	10 to 21	(4.5 to 9.5)	33	(15)	12	(30.4)	10	(25.4)	1 in.
570633	50	(22.7)	20 to 46	(9.1 to 21)	41	(18.6)	19.8	(50.2)	10	(25.4)	1 in.
570634	90	(40.8)	37 to 88	(17 to 40)	57.5	(26)	32.8	(83.3)	10	(25.4)	1 in.
570638	140	(63.5)	58 to 138	(26 to 62.6)	108	(49)	23.5	(59.6)	16	(40.6)	2 in.
570639/570657	280	(127)	116 to 280	(52.6 to 127)	158	(71.7)	40.2	(102)	16	(40.6)	2 in.
570640/570652	390	(177)	161 to 388	(73 to 176)	198	(90)	53.3	(135)	16	(40.6)	2 in.
570641/570653	450	(204)	194 to 459	(88 to 204)	233	(106)	64.3	(163)	16	(40.6)	2 in.
570586/570654	850	(386)	375 to 851	(170 to 386)	456	(207)	57.7	(146.6)	24	(61)	3 in.

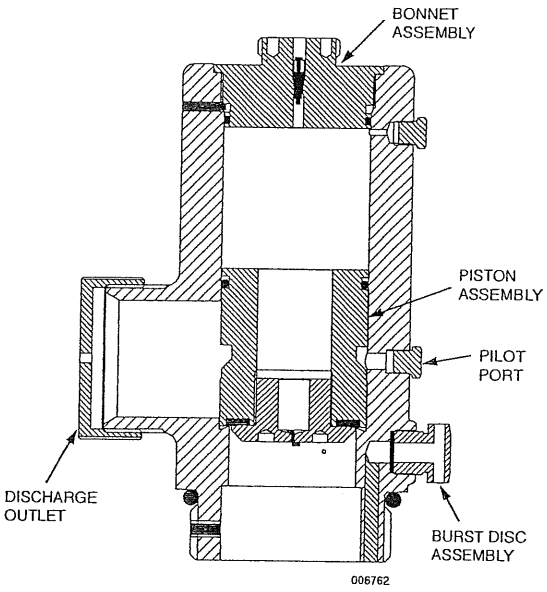
SAPPHIRE™
SUPPRESSION SYSTEMS

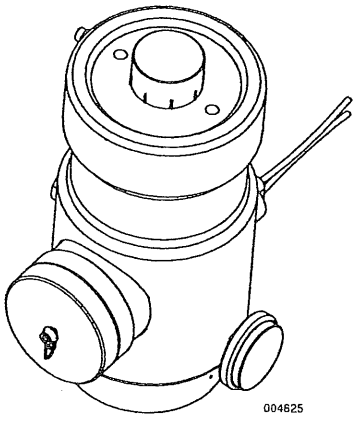
Discharge Valve Assembly

The replacement valve assembly is available for field replacement. The valve is fully assembled, with internal components, gauge, and burst disc assembly. The replacement valve is 100% leak tested before it leaves the factory.

Component	Material	Approvals
Valve	Brass	UL Listed ULC Listed FM Approved

Shipping Assembly Part No.	Description
570535	1 in. Valve Shipping Assembly
570536	2 in. Valve Shipping Assembly
570588	3 in. Valve Shipping Assembly





SAPPHIRE™ SUPPRESSION SYSTEMS

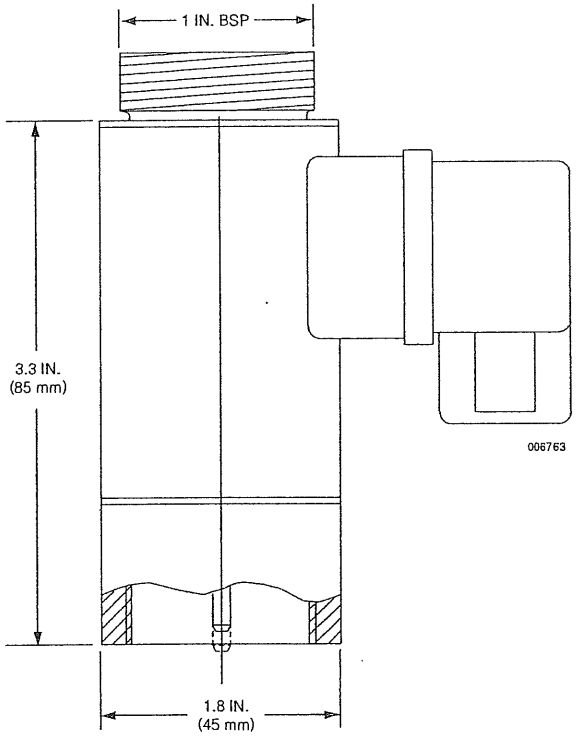
Electric Actuator – 24 VDC

The 24 VDC electric actuator is required to electrically actuate the tank valve. An electric signal is required from the AUTOPULSE Control panel which operates the solenoid in the actuator. This causes the actuator to open the tank valve and discharge the agent. On multiple tank systems, only one actuator is required, on the master valve. The remaining tanks will be actuated pneumatically through 1/4 in. stainless steel hose and a pneumatic actuator installed on the top of each tank valve.

The actuator draw is 0.2A.

Note: Composite cap attached to actuator is used as the reset tool. To reset actuator, put cap in place and turn knurled swivel coupling until cap threads are completely engaged. A small "click" will be heard while resetting.

▸ **Note:** Actuator has a 10-year shelf life.



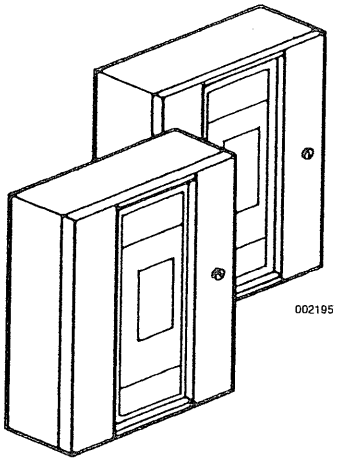
Component	Material	Thread Type	Approvals
Electric Actuator	Body: Steel Swivel Nut: Brass Actuation Pin: Stainless Steel	1 in. BSPP	UL Listed ULC Listed FM Approved

Shipping Assembly Part No.	Description
570537	Electric Actuator

SAPPHIRE™
SUPPRESSION SYSTEMS

AUTOPULSE Control System

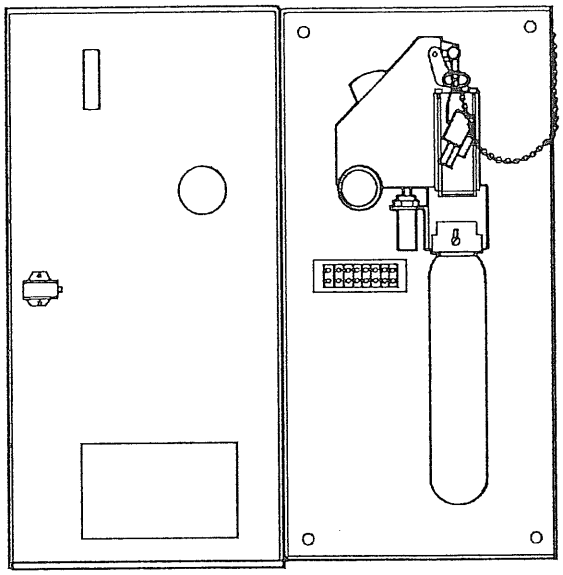
The AUTOPULSE Control System is designed to monitor fixed fire hazards. The control system can automatically actuate the fire suppression system after receiving an input signal from one or more initiating devices, i.e., manual pull station or detector. The control system incorporates an internal power supply, on-line emergency batteries, and solid state electronics. Refer to Detection and Control manual for additional information.



ANSUL AUTOMAN II-C Releasing Device (For Pneumatic Actuation)

The ANSUL AUTOMAN II-C Releasing Device consists of a metal enclosure which contains a spring-loaded puncture pin release mechanism, an actuation cartridge, electrical circuitry, and an input/output terminal strip for making electrical connections. The ANSUL AUTOMAN II-C releasing device provides automatic pneumatic actuation of the SAPPHIRE System. When wired to an AUTOPULSE Control system, it will provide supervised electric detection and release. It also provides manual actuation using the strike button on the release. When an AUTOPULSE Control System is used, manual actuation is accomplished using an electric manual pull station.

The ANSUL AUTOMAN II-C releasing device requires an ▸ LT-30-R nitrogen cartridge for system actuation. Cartridge must be ordered separately.



Component	Approvals
ANSUL AUTOMAN II-C Releasing Device	UL Listed ULC Listed FM Approved

Shipping Assembly Part No.	Description
▸ 17728	ANSUL AUTOMAN II-C Releasing Device
▸ 5373	LT-30-R Nitrogen Cartridge (order separately)
26310	Cocking Lever (order separately)

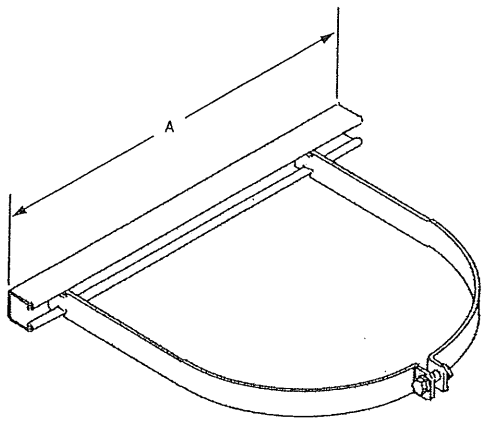
SAPPHIRE™
SUPPRESSION SYSTEMS

Mounting Bracket Assembly

The mounting bracket assembly consists of a nut, bolt, and two bracket straps (back channel must be supplied by others). Approved type of Unistrut Channel is series P1000T, 1.6 in. x 1.6 in. (41 mm x 41 mm).

Each strap is notched for insertion into the channel, allowing the tank to be properly aligned. The bracket assembly is designed to be mounted to a rigid vertical surface with the tank assembly resting fully on the floor or vertical surface.

A single bracket assembly is required for 20, 50, 90, 140, 280, 390, and 450 lb. tank sizes. Two bracket assemblies are required for the 850 lb. size tank.



Component	Material	Approvals
Mounting Bracket	Steel	UL Listed ULC Listed FM Approved

Shipping Assembly Part No.	Description	"A" Dimension in. (cm)
570085	Bracket Assembly for 20, 50, and 90 lb. tanks (10 in. diameter)	15.7 (40)
570092	Bracket Assembly for 140, 280, 390, and 450 lb. tanks (16 in. diameter)	23.6 (60)
570336	Bracket Assembly for 850 lb. tank (24 in. diameter)	27.3 (69)

Flexible Discharge Hose

The flexible discharge hose is used to connect the tank valve outlet to rigid distribution piping. On single tank systems, a check valve is not required. Three sizes of flexible discharge hoses are available: 1 in. (for 20, 50, and 90 lb. tank sizes), 2 in. (for 140, 280, 390, and 450 lb. tank sizes), and 3 in. (for 850 lb. tank sizes).

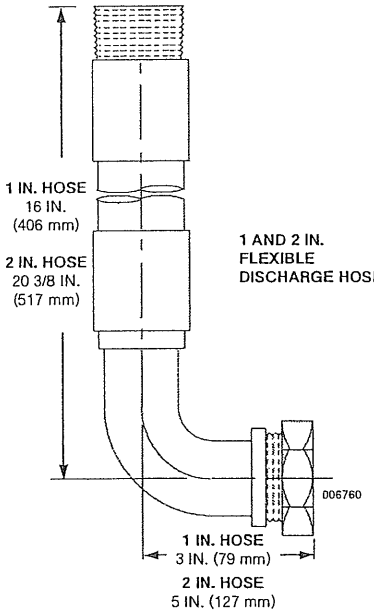
The 1 in. flexible hose or the adaptor, Part No. 570557, can be used to connect the valve outlet to rigid pipe.

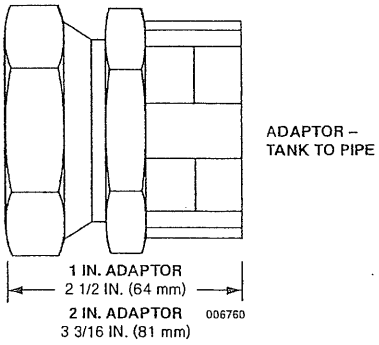
The 2 in. flexible hose or the adaptor, Part No. 570558, can be used to connect the valve outlet to rigid pipe.

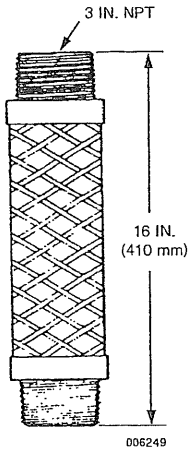
When using a 3 in. flexible discharge hose (without a manifold), three single tank swivel adaptors are available for connection from the valve outlet to the flexible discharge hose.

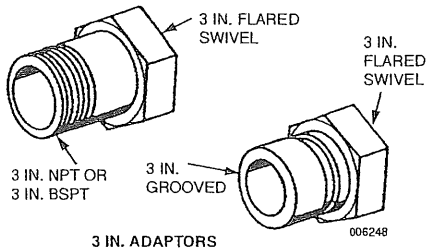
Component	Material	Approvals
1, 2, 3 in. Flexible Discharge Hose	Stainless Steel Tubing with Stainless Steel Braid Cover	UL Listed ULC Listed FM Approved

Shipping Assembly Part No.	Description
570539	1 in. Flexible Discharge Hose
570538	2 in. Flexible Discharge Hose
69990	3 in. Flexible Discharge Hose
570557	1 in. Single Tank Swivel Adaptor
570558	2 in. Single Tank Swivel Adaptor
69470	3 in. Flared to 3 in. NPT Single Tank Swivel Adaptor
69471	3 in. Flared to 3 in. Grooved Single Tank Swivel Adaptor
570363	3 in. Flared to 3 in. BSPT Single Tank Swivel Adaptor







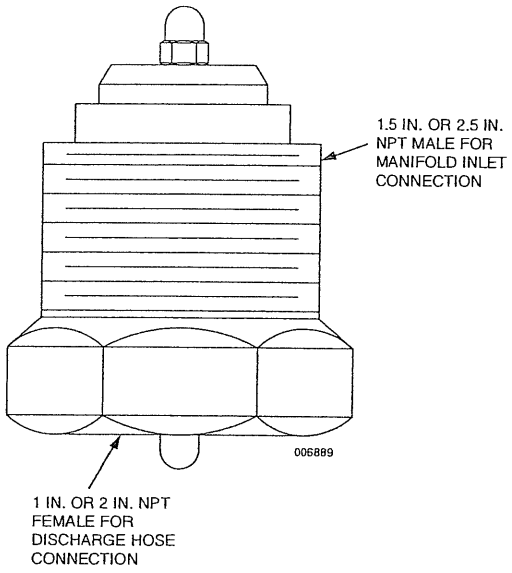


Manifold Check Valves

The manifold check valve is designed to prevent a loss of agent during a discharge in the event that a tank has been removed from the system. The check valve is a "mushroom" type, which lifts into the manifold as discharge occurs.

Two sizes of manifold check valves are available: 1 in. and 2 in.

Manifold are constructed of standard Schedule 40 pipe and 300 lb. fittings. The check valves assemble directly into the fittings.



Component	Material	Approvals
Check Valve	Body: Brass Stem and Seal: Stainless Steel	UL Listed ULC Listed FM Approved

Shipping Assembly Part No.	Description
570566	1 in. Manifold Check Valve
570568	2 in. Manifold Check Valve

uses a 1½" fee
uses a 2½ fee

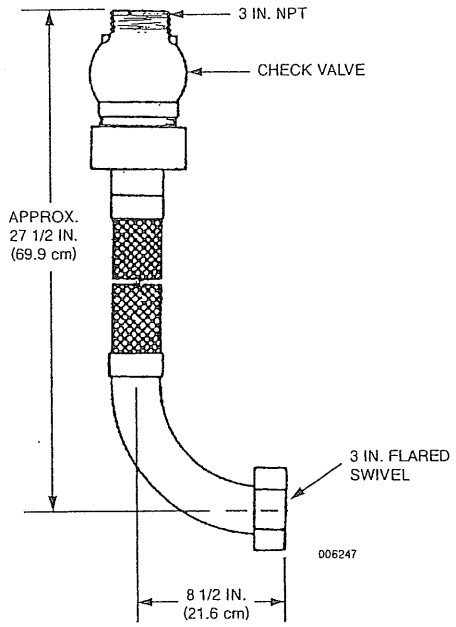
SAPPHIRE SUPPRESSION SYSTEMS

3 In. Discharge Hose/ Check Valve Assembly

The 3 in. discharge hose/check valve assembly combines the elbow, hose, check valve, and swivel coupling for connection to the valve discharge outlet and the discharge manifold. The check valve provides a 1 1/2 in. (3.8 cm) height adjustment.

Component	Material	Approvals
3 in. Discharge Hose/Check Valve	Hose: Double Braided Stainless Steel Elbow: Stainless Steel Valve Swivel Nut: Stainless Steel Check Valve Body: Cadmium Plated Mild Steel Check Valve Seal and Seat: Brass Spring: Stainless Steel	UL Listed ULC Listed FM Approved

Shipping Assembly Part No.	Description
69841	3 in. Discharge Hose/ Check Valve Assembly



SAPPHIRE™
SUPPRESSION SYSTEMS

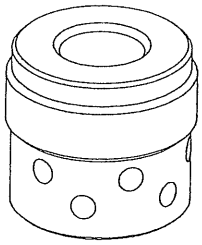
Discharge Nozzles

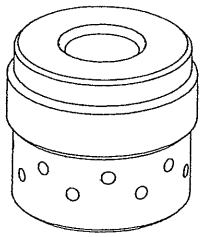
The discharge nozzles are available in a 180° and 360° pattern and are designed to uniformly distribute the Novec™ 1230 agent throughout the hazard area.

The 180° nozzle has seven ports and the 360° nozzle has sixteen ports. Six sizes of nozzles are available, 1/2 through 2 in.

The hydraulic flow program will determine the nozzle size and orifice size required.

Note: When ordering nozzles, orifice size must be specified when ordered.


004824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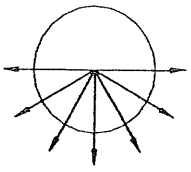
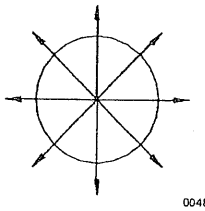
Component	Material	Threads	Approvals
1/2 in. Nozzle 3/4 in. Nozzle 1 in. Nozzle 1 1/4 in. Nozzle 1 1/2 in. Nozzle 2 in. Nozzle	Brass	1/2 in. NPT 3/4 in. NPT 1 in. NPT 1 1/4 in. NPT 1 1/2 in. NPT 2 in. NPT	UL Listed ULC Listed FM Approved

Shipping Assembly Part No.	Description
570515	1/2 in Nozzle – 180°
570516	3/4 in. Nozzle – 180°
570517	1 in. Nozzle – 180°
570518	1 1/4 in. Nozzle – 180°
570519	1 1/2 in. Nozzle – 180°
570520	2 in. Nozzle – 180°
570602	1/2 in. Nozzle – 360°
570603	3/4 in. Nozzle – 360°
570604	1 in. Nozzle – 360°
570605	1 1/4 in. Nozzle – 360°
570606	1 1/2 in. Nozzle – 360°
570607	2 in. Nozzle – 360°


180° NOZZLE PATTERN

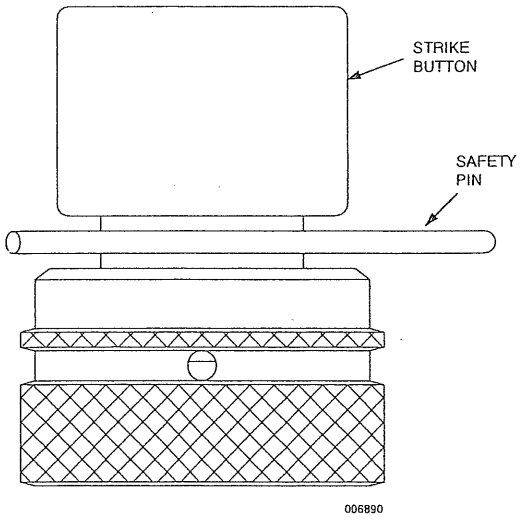

004840
360° NOZZLE PATTERN

SAPPHIRE SUPPRESSION SYSTEMS

Local Manual Actuator

The local manual actuator is used to mechanically operate the tank. To prevent accidental actuation, the actuator contains a steel safety pin. The pin must be removed to operate the actuator. The actuator is operated by depressing the strike button.

The actuator can be mounted either on the top port of the tank valve or on top of the electric solenoid valve.



Component	Material	Approvals
Local Manual Actuator	Body: Brass Safety Pin: Steel Actuation Pin: Stainless Steel	UL Listed ULC Listed FM Approved

Shipping Assembly Part No.	Description
570549	Local Manual Actuator