Real People
Make Up Life Safety

Every Action has a Preaction:

Releasing Systems 101

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Director of Technical Services
Potter

Preaction Sprinkler Systems

Definition

NFPA 13 – A sprinkler system employing automatic sprinklers that are attached to a piping system that contains air that might or might not be under pressure, with a supplemental detection system installed in the same areas as the sprinklers.

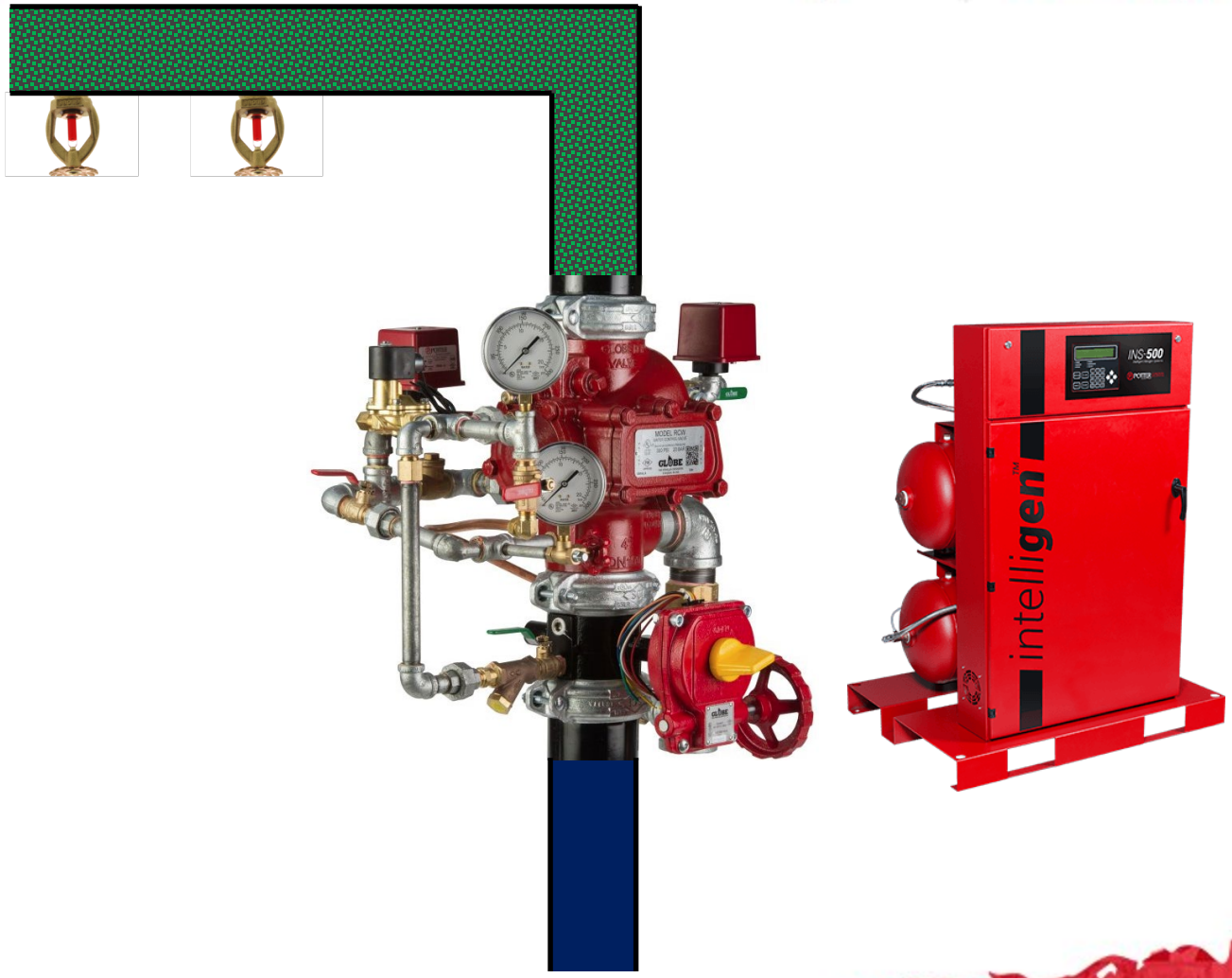
Applications

Locations where accidental water damage due to leaking pipe or damaged sprinklers is a great concern.

- Computer Rooms
- Museums / Art Gallery
- Freezer Storage Warehouse

Preaction Sprinkler Configuration

- Water Control Valve
- Water stops at valve during normal operation.
- Piping to closed sprinklers filled with air or nitrogen.
- Air/Nitrogen supervisory pressure switch
- Alarm pressure switch
- Electric Solenoid



Supervisory Pressure Switch

NFPA 13, 8.3.2.4.1, 2019 Edition

Sprinkler piping and fire detection devices shall be automatically supervised where more than 20 sprinklers are on the system.

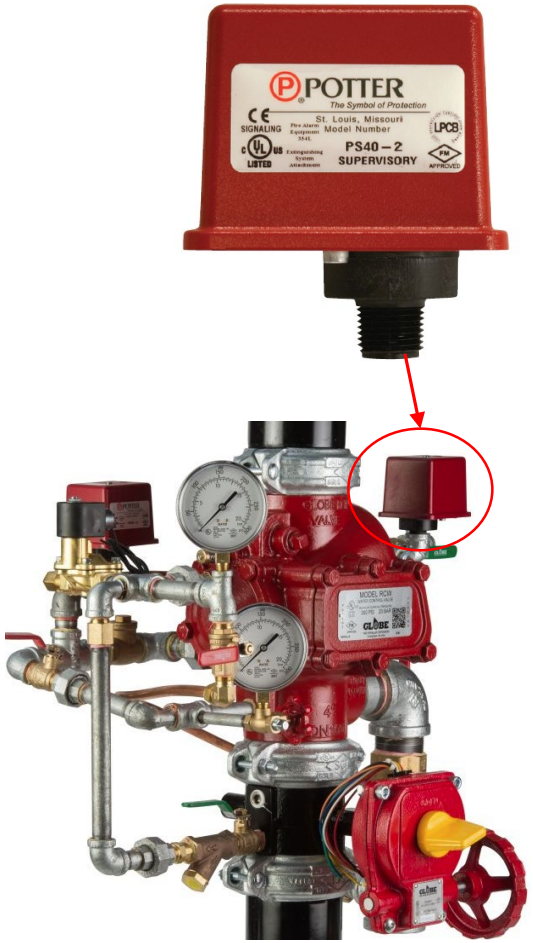
NFPA 13, 8.3.2.4.3, 2019 Edition

All preaction systems shall maintain a minimum supervising air or nitrogen pressure of 7 psi

NFPA 72, 17.17.2.1, 2019 Edition

Two separate and distinct signals shall be initiated, one indicating that the required pressure has increased or decreased (off-normal), and the other indicating restoration of the pressure to its normal value.

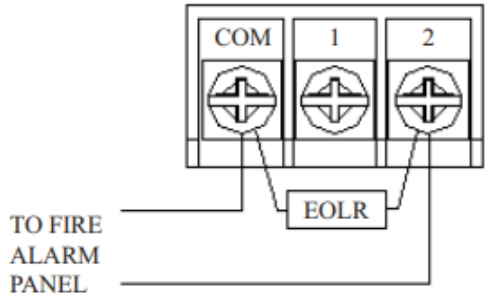
Potter -PS40-2



Supervisory Pressure Switch

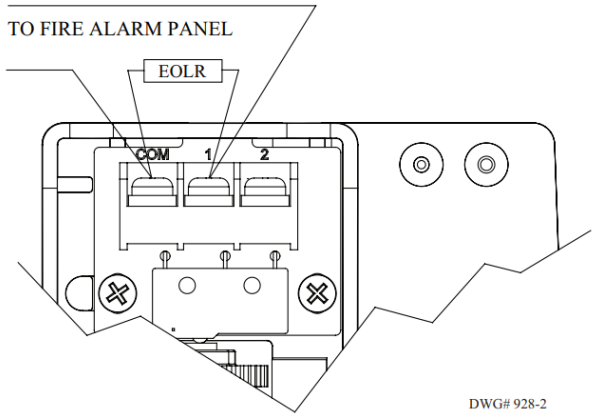
- During normal operation switch is pressurized (air/nitrogen)
- Switch changes states when pressure drops below set point. Factory set to operate on pressure decrease at 30 PSI and is adjustable between 10-60 PSI
- Initiates a low-pressure supervisory condition on the releasing detection and control panel.

Potter -PS40-2

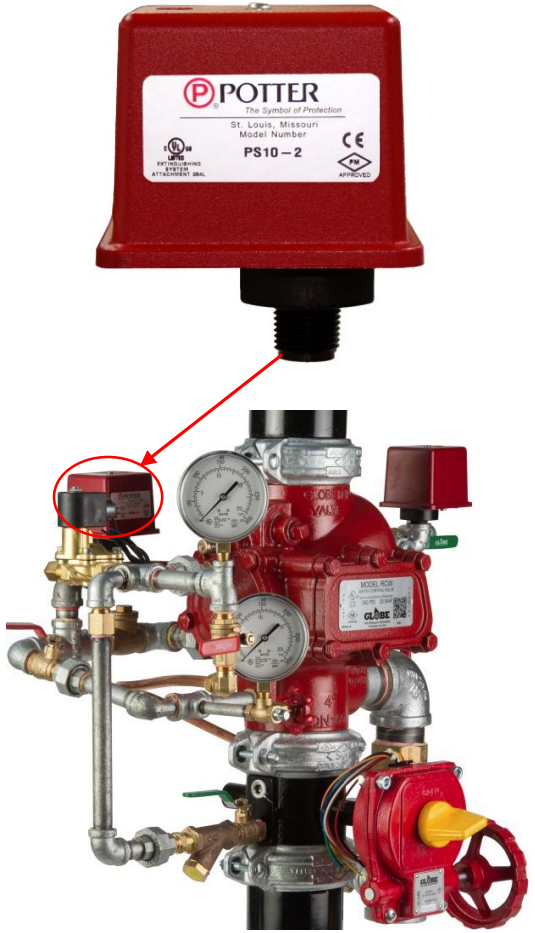


ALARM PRESSURE SWITCH

- During normal operation, switch is not pressurized.
- Switch activates when pre-action valve opens, and water pressure is applied.
- Initiates an alarm (waterflow) condition on the releasing detection and control system.
- Factory set between 4-8 PSI and is adjustable between 4 -15 PSI



Potter –PS10-2



24VDC Solenoid Valve

NFPA 72, 23.11.1, 2019 Edition

Releasing service fire alarm control unit is required to be listed for releasing service.

NFPA 72, 23.11.2, 2019 Edition

Releasing devices shall be listed for use with releasing service control units.

NFPA 72, 23.11.5, 2019 Edition

Releasing service fire alarm systems used for fire suppression –releasing service shall be provided with a disconnect switch to allow the system to be tested without actuating the fire suppression systems.

NFPA 72, 23.11.5.1, 2019 Edition

Operation of a disconnect switch shall cause a supervisory signal at the releasing service fire alarm control unit.

Potter –RCDS

24VDC Solenoid Valve

- Typically a normally closed valve that opens when the release circuit is activated, and solenoid is energized.
- Potter releasing panels require a diode/resistor assembly for release circuit supervision.

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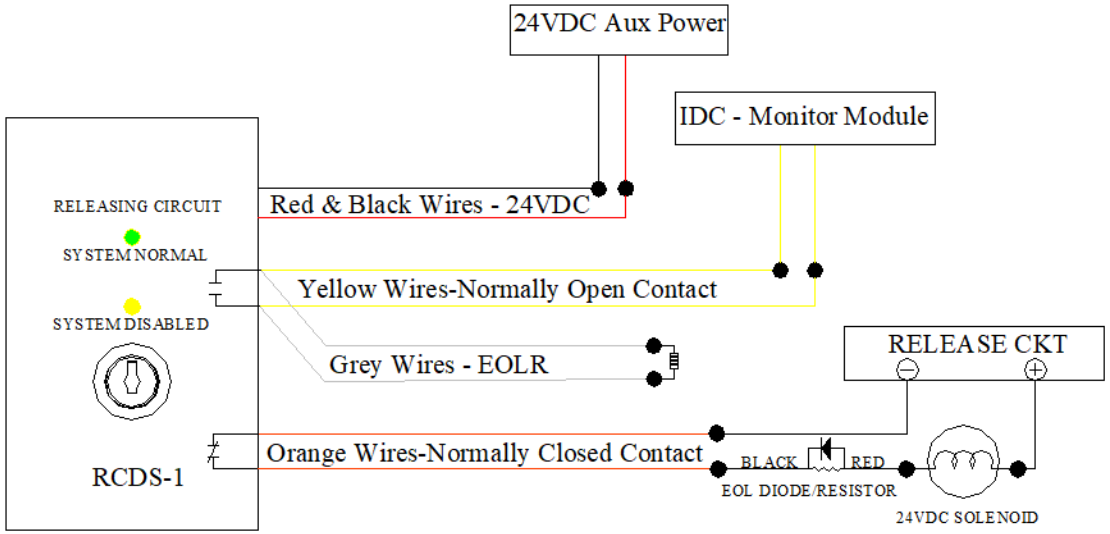
NFPA 13, 2019 Edition Actuator Supervision – NEW

Effective January 1, 2021, removal of electric actuator from the preaction valve shall result in an audible and visual system impairment at the system releasing control panel.



Preaction Sprinkler System Types

NFPA 13 lists three (3) types of preaction systems.

- **Single Interlock** – Admits water to sprinkler piping upon operation of detection devices.
- **Double Interlock –** Admits water to sprinkler piping upon operation of both detection devices and automatic sprinklers.
- **Non Interlock** – Admits water to sprinkler piping upon operation of detection devices or automatic sprinklers.

Preaction Sprinkler Single Interlock

Detection Schemes

- Single Detector
- Counting Zone Detection – Two (2) Smokes
- Cross Zone Detection – Heat & Smoke

Smoke Detector

Heat Detector

NFPA 13, 2019 Edition

- **8.3.1.6.2** - The release system shall serve all areas that the preaction system protects.
- **8.3.1.6.3** - Where thermal activation is utilized, the activation temperature of the release system shall be lower than the activation temperature of the sprinkler.

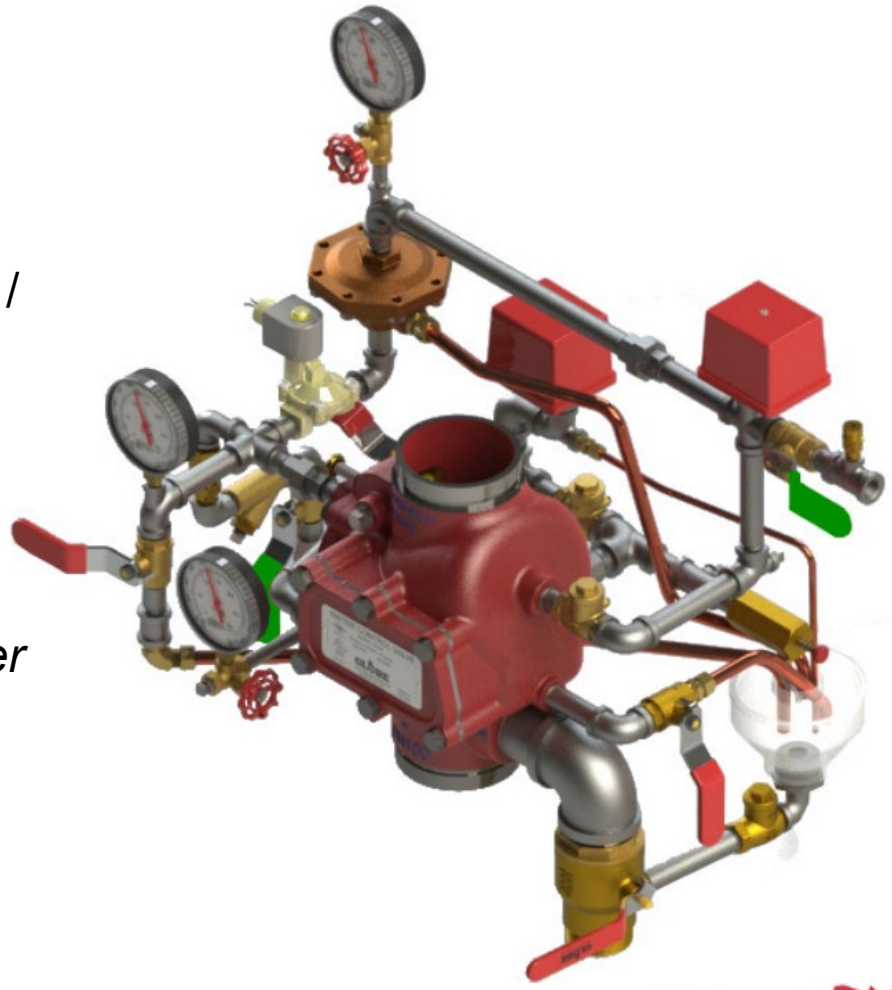
Combo Smoke Heat Detector

Preaction Sprinkler Double Interlock

Interlock Schemes

- Detector & low air pressure switch both activated simultaneously. (Electric / Electric)

- Detector & dry pilot actuator both activated simultaneously. (Electric / Pneumatic)



Notes from NFPA 13 “Designers Corner”

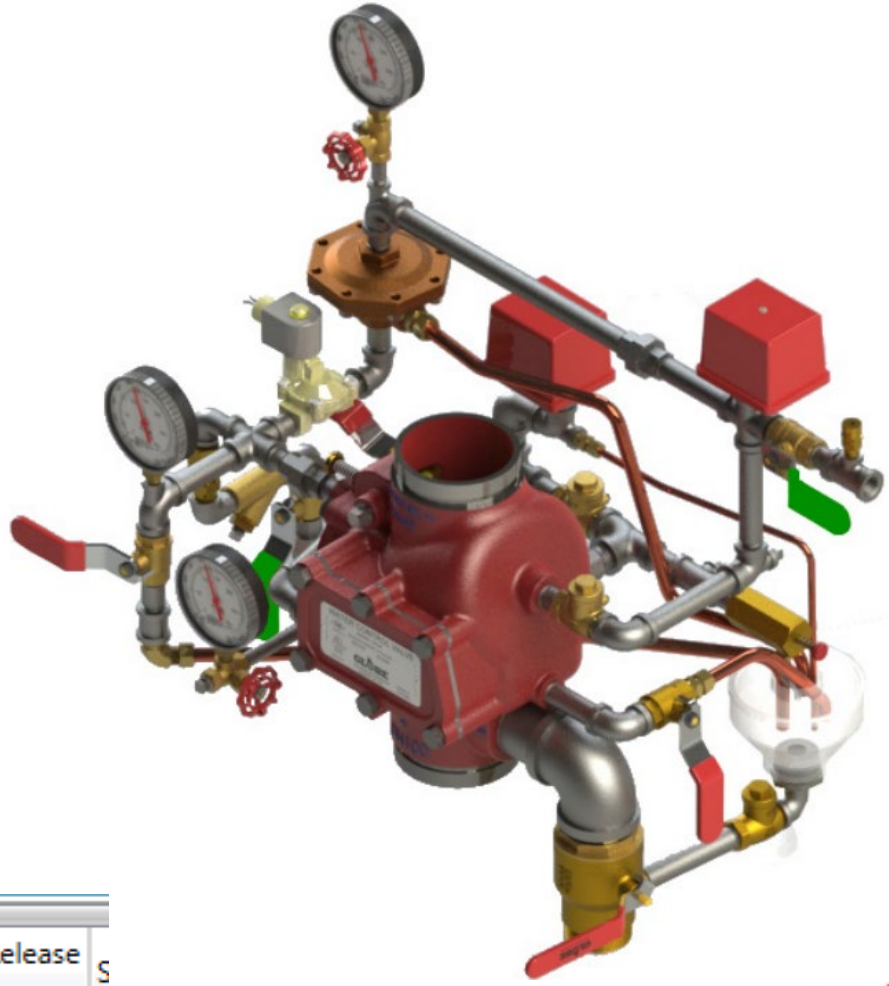
Double interlock preaction system were designed to be used in freezer storage warehouse conditions where the consequences of getting water into the piping are severe. The consequences of getting water in the pipe for computer rooms, museums and other places sensitive to the discharge of water aren’t severe. The water remains in the piping and doesn’t discharge until a sprinkler opens.

Double interlock systems delay the application of water during a real fire event. The fire is allowed to intensify – and do more damage – before water discharges.

PREACTION SPRINKLER SYSTEMS

Not Recognized for Use on Preaction Systems

- Abort Switches



- Time delays before activation

on	Abort Type	Pre Release Timer	Pre-Release Pattern	Manual Release Timer	Man-Release Abort Allowed	S T
) sec	ULI	60 sec	Constant	30 sec	☐	

PREACTION RELEASING PANELS

IPA Addressable Panel Series (Authorized ESD)

- IPA-4000 – 10 NAC/Releasing Outputs
- IPA-100 & IPA-60 – 4 NAC/Releasing Outputs

AFC/ARC Addressable Panel Series

- AFC-1000 – 10 NAC/Releasing Outputs
- AFC/ARC-100 & AFC-50 – 4 NAC/Releasing Outputs

PSN-1000/E Intelligent Power Supply – 6 NAC/Releasing Outputs
PAD100-NAC Addressable Module –Releasing or NAC Output

PFC-4410RC Conventional Panel

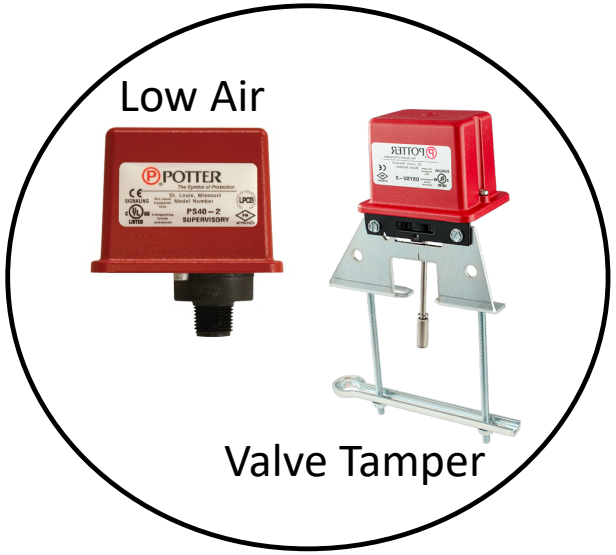
- 4 NAC/Releasing Outputs

Preaction System Programming

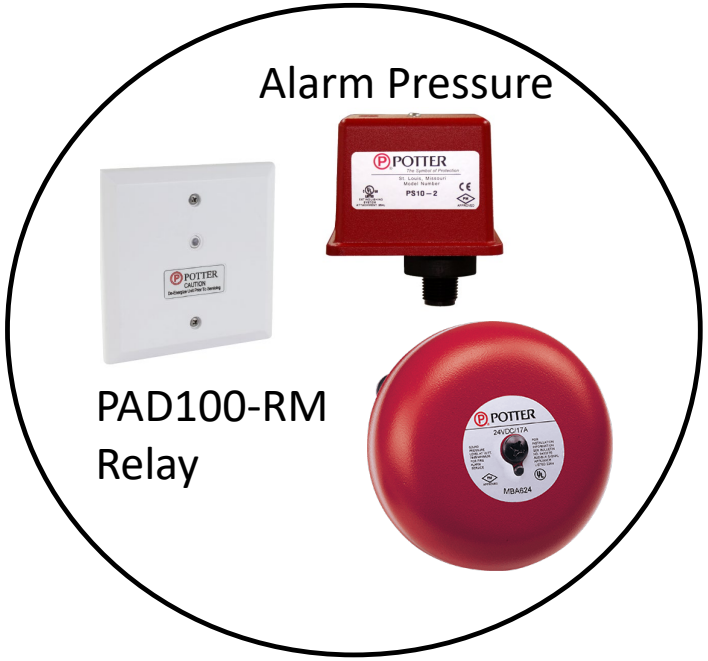
Single Interlock – One Detector or Pull Station Activates Solenoid

Releasing Style Software Zone

Supervisory Style Software Zone



Alarm Style Software Zone



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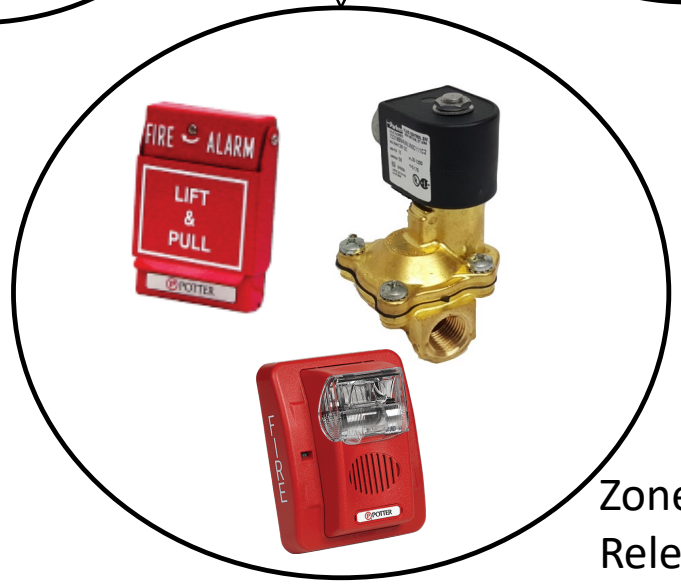
PREACTION SYSTEM PROGRAMMING

Double Interlock – Electric / Electric - Detector & Low Air or Pull Station Activates Solenoid

Alarm Style Software Zone 1

Supervisory Style Software Zone 2

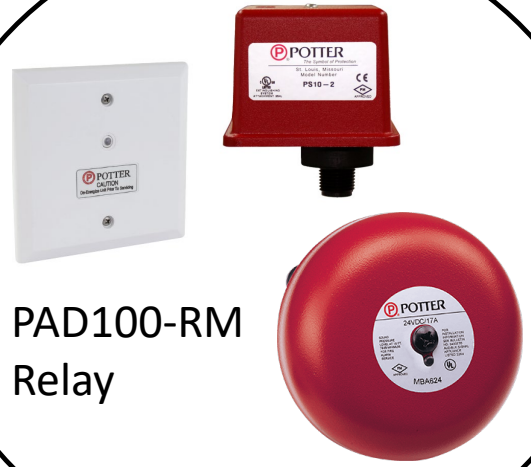
Low Air



Zone 1 & Zone 2 “Cross Zoned” to Releasing Style Software Zone 3

Alarm Style Software Zone 4

Alarm Pressure



PAD100-RM Relay

Supervisory Style Software Zone 5

Valve Tamper

POTTER
The Symbol of Protection

Detection & Control

Agent Suppression Systems

Applications

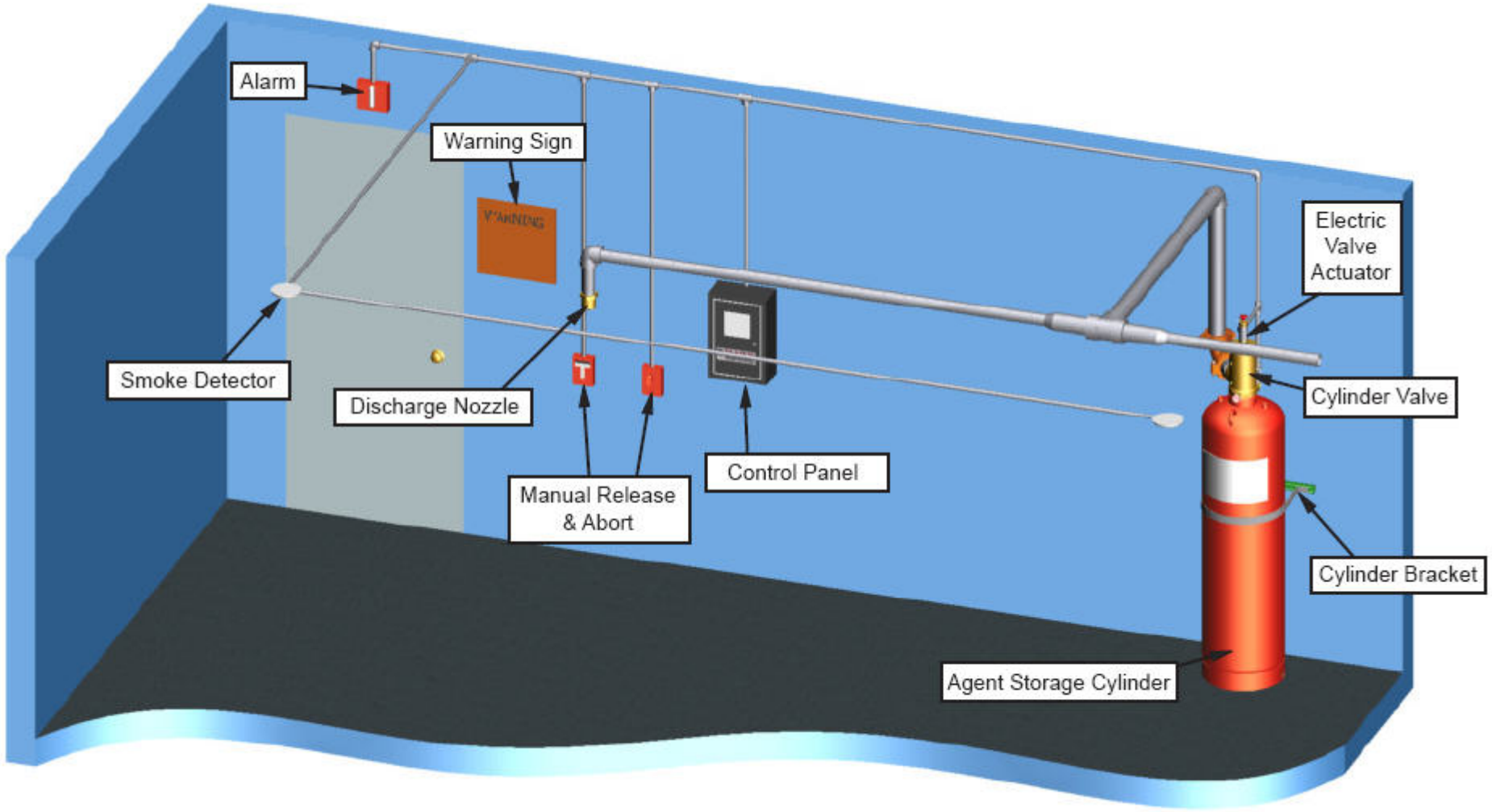
Agent suppression systems are typically used to protect assets/contents and not considered building protection.

- Computer Rooms
- Telecommunication systems
- File Storage
- Industrial / Manufacturing

NFPA Standards

- **NFPA 2001** – Standard on Clean Agent Fire Extinguishing Systems
- **NFPA 12** – Standard on Carbon Dioxide Extinguishing Systems
- **NFPA 2001** – Standard on Clean Agent Fire Extinguishing Systems
- **NFPA 17** – Standard for Dry Chemical Extinguishing Systems

Clean Agent Suppression Systems



Typical Clean Agent System Layout

Automatic Detection

Detection Schemes

- Cross Zone Detection – Air Sampling & Smoke Detector.
- Counting Zone Detection – Two (2) Smokes

Smoke Detector

Heat Detector

Combo Smoke Heat Detector

NFPA 2001 4.3.1.3, 2018 Edition

Initiating and releasing circuit wiring shall be installed in raceway

MANUAL RELEASE

4.3.3.6.1, NFPA 2001, 2018 Edition

The manual control(s) shall be of distinct appearance and clearly recognized for the purpose intended.

4.3.3.6.2, NFPA 2001, 2018 Edition

Operation of any manual control shall cause the complete system to operate as designed.

4.3.3.10, NFPA 2001, 2018 Edition

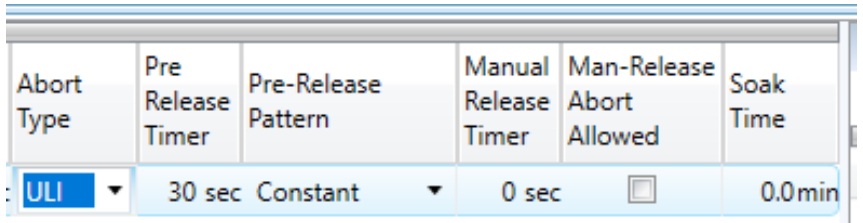
All manual operating devices shall be identified as to the hazard they protect.

Potter Custom Application Pull Station

Time Delays

4.3.5.6.1 NFPA 2001, 2018 Edition

For clean agent extinguishing systems, a pre-discharge alarm and time delay, sufficient to allow personnel evacuation prior to discharge, shall be provided.



Abort Type	Pre Release Timer	Pre-Release Pattern	Manual Release Timer	Man-Release Abort Allowed	Soak Time
ULI	30 sec	Constant	0 sec	☐	0.0 min

Potter programmer releasing zone settings

4.3.5.6.1 & 4.3.5.6.3 NFPA 2001, 2018 Edition

Time delays shall be used only for personnel evacuation or to prepare the hazard area for discharge. Time delays shall not be used as a means of confirming operation of a detection device before automatic actuation occurs.

Typical stages of operation:

- **General Alarm** – One detector activated
- **Pre-discharge** – Two detectors activated, starts pre-discharge time delay
- **Release** – System discharges after pre-discharge time delay expires

Abort Switch

Abort - Definition – NFPA 2001

A system control that, when operated during the releasing panel's release delay countdown, extends the delay in accordance with a predetermined effect.

Potter Abort Switch

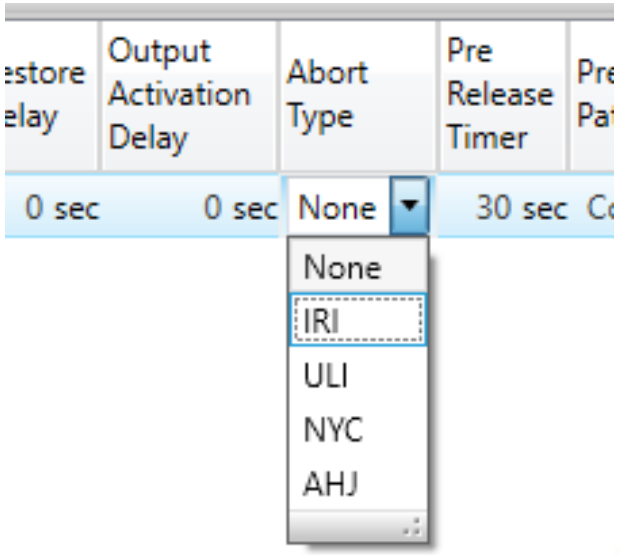
4.3.5.3, NFPA 2001, 2018 Edition

- Where provided, shall be located within the protected area and shall be located near the means of egress.
- Shall be a type that requires constant pressure to cause abort.
- The manual control shall override the abort function.
- Shall be clearly recognizable for the purpose intended.
- **A.4.3.5.3** – A telephone should be located near the abort switch

ABORT SWITCH

Abort Modes of Operation:

- **IRI** – Abort switch must be pressed before pre-discharge time delay starts (before 2nd detector activates). Holds timer at 10 seconds and can only be used one time.
- **ULI** – Abort switch is pressed during pre-discharge time delay holds timer at 10 seconds. If less than 10 seconds remain resets timer to 10 seconds and holds. Abort sequence can be repeated as many times as desired.
- **NYC** – Abort switch pressed during the pre-discharge time delay adds 90 seconds to the remaining time and can only be used one time.
- **AHJ –** Operates like ULI, except the time is set to 30 seconds when pressed. Abort sequence can be repeated as many times as desired.



ALARM SIGNALING

4.3.5.2, NFPA 2001, 2018 Edition

Audible and visual pre-discharge alarms shall be provided within the protected area of occupiable spaces to give positive warning of impending discharge. The operation of the warning devices shall be continued after agent discharge.

Agent Bezel & Potter Horn Strobe

Typical signaling scenarios:

(Requires 4-wire horn/strobes)

- **General Alarm** – Slow pulse tone/strobe (60 bpm)
- **Pre-discharge** – Fast pulse tone/strobe (120 bpm)
- **Release** – Steady tone/strobe

- **General Alarm** – Bell/strobe
- **Pre-discharge** – Pulsing horn tone/strobe
- **Release** – Steady tone/strobe

Releasing Device

NFPA 2001, 2018 Edition

4.3.4.1

The control equipment shall be specifically listed for the number and type of actuating devices utilized, and their compatibility shall have been listed.

Potter –RCDS

4.3.4.2

Removal of an electric actuator from the agent storage container discharge valve that it controls shall result in an audible and visual indication of system impairment at the system releasing control panel. (Effective January 1, 2016)

4.3.6.1

To avoid unwanted discharge of an electrically actuated clean agent system, a supervised disconnect switch shall be provided.
Must be physical disconnect, software disable not acceptable

Agent Releasing Panels

IPA Addressable Panel Series (Authorized ESD)

- IPA-4000 – 10 NAC/Releasing Outputs
- IPA-100 & IPA-60 – 4 NAC/Releasing Outputs

ARC Addressable Panel

- ARC-100 – 4 NAC/Releasing Outputs

PSN-1000/E Intelligent Power Supply – 6 NAC/Releasing Outputs
PAD100-NAC Addressable Module –Releasing or NAC Output

PFC-4410RC Conventional Panel

- 4 NAC/Releasing Outputs

AGENT RELEASING PROGRAMMING

Counting zone detection scheme can be accomplished with two (2) software zones

Alarm Style Zone 1

4-wire
Horn/Strobe

Horn = General NAC
Strobe = Sync NAC

	Name	Style	Alarm Count	Silence -able	Silent Alert	Latching	Local	Output Pattern
1	General Alarm	Alarm	1	☑	☐	☑	☐	March Code

- Any 1 detector activates horn and strobe
- General purpose NAC (Horn) follows the march code pattern
- Synchronized strobe NAC ignores the pulsing march code pattern

General alarm zone – Any one (1) detector activates horn/strobe (slow pulse horn)

AGENT RELEASING PROGRAMMING

Counting zone detection scheme - two detectors activated simultaneously start pre-discharge timer

Releasing Style Zone 2

Name	Style	Alarm Count	Silence -able	Silent Alert	Latching	Local	Output Pattern
Agent Release	Releasing	2	☑	☐	☑	☐	Constant

Abort Type	Pre Release Timer	Pre-Release Pattern	Manual Release Timer	Man-Release Abort Allowed	Soak Time
ULI	30 sec	Double Time	10 sec	☐	0.0 min

- Two detectors start 30 second pre-discharge timer.
- General purpose NAC (Horn) follows pre-release pattern. (double time)
- At discharge general purpose NAC follows output pattern. (constant)
- Abort follows ULI operation & activation of manual release activates 10 second discharge timer.