

EQUIPMENT, DESIGN & SERVICE MANUAL



FIRE EXTINGUISHING SYSTEM

W/ IG-55 AGENT

200 AND 300 BAR CYLINDERS

**UNIVERSAL VALVE OPERATOR (UVO) OR
UNIVERSAL ENERGETIC ACTUATOR (UEA)**

UL / ULC LISTINGS

FM APPROVAL

NFPA 2001 STANDARD



**U.S. & Foreign Patents
Doc. P/N 06-625
Rev. 9 / January, 2019**

Fike®

SOLUTIONS

- / Fire Protection
- / Explosion Protection
- / Overpressure Protection
- / Pressure Activation

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1. INTRODUCTION

The information presented in this manual represents the most up-to-date information available for Fike's ProInert suppression system. This manual also provides the information necessary to properly design, install and maintain the ProInert system in accordance with the requirements of NFPA Standard 2001, Underwriters Laboratories Inc. and FM Approvals.

Enough information is provided in this manual to allow those responsible for designing a Fike ProInert Clean Agent Fire suppression system to properly do so, and for the parties responsible for verifying the system design to determine if the design parameters have in deed been met.

Fike ProInert systems may be UL, ULC and/or FM Approvals Approved depending on where and how the system cylinders where filled. Special codes following the cylinder part number designate which approval your system has, but the governing indicator is whether the system cylinder labels bear the agency's official markings.



Systems bearing the UL and ULC mark have been designed, tested and filled per UL 2127, Inert Gas Extinguishing System Units.



Systems bearing the FM Approved mark have been designed, tested and filled to meet FM 5600, Approval Standard for Clean Agent Extinguishing Systems.

If any of these marks are absent from the cylinder label, the system cylinders, while still designed and tested per relevant UL and FM standards, were not filled at a UL and/or FM Approved fill location.

Any questions concerning the information presented in this manual should be addressed to:



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2. SYSTEM COMPONENTS

This section covers the hardware utilized by Fike ProInert Systems, including the optional items that are available. All of the information contained herein is believed to be accurate and up-to-date. However, it should be noted that all dimensions shown are approximate and Fike reserves the right to make adjustments as necessary.

2.1. IG-55 Extinguishing Clean Agent

IG-55 is an odorless, colorless, electrically non-conductive compressed gas with a density approximately the same as air. See Physical Properties for additional information. It is stored as a pressurized gas within a cylinder assembly at pressures of 200 bar and 300 bar (2900 psi and 4351 psi). When discharged into a protected space, IG-55 is clear and does not obscure vision. It leaves no residue and has zero ozone depleting potential and zero global warming potential.

Features and Benefits

- Natural gas present in the atmosphere
- Suitable for occupied areas
- No toxic or corrosive decomposition products
- Colorless, odorless compressed gas
- Stored as a gas
- Fogging does not occur when agent is discharged
- Electrically non-conductive
- No residue to clean up after discharge
- Zero ozone depleting potential
- Zero global warming potential
- U.S. EPA Significant New Alternative Policy (SNAP) Listed

Extinguishing Method

IG-55 extinguishes a fire by reducing the residual oxygen concentration to a level that will no longer support combustion.

Approvals

Approvals include, but are not limited to:

- Factory Mutual Approvals Approved (FM)
- Underwriters Laboratories Inc. (UL) / Underwriters Laboratories of Canada (ULC) Recognized Component

Use and Limitations

IG-55 shall be used on the following class of hazards:

- Class A & C hazards including electrical and electronic hazards, telecommunication facilities and high value assets where the associated down-time would be costly
- Class B hazards containing flammable liquids and gases

IG-55 shall **NOT** be used on fire involving the following materials:

- Chemicals or mixtures of chemicals capable of rapid oxidation in the absence of air, such as cellulose nitrate and gunpowder
- Reactive metals such as lithium, sodium, potassium, magnesium, titanium, zirconium, uranium and plutonium
- Metal hydrides such as sodium hydride and lithium aluminum hydride
- Chemicals capable of undergoing auto-thermal decomposition, such as organic peroxides, pyrophoric materials, and hydrazine

Exposure Limitations

The discharge of clean agent systems to extinguish a fire can result in 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 natural agent or to the products of decomposition shall be avoided. Means shall be provided to limit exposure to no longer than 5 minutes. Unprotected personnel shall not enter the protected space during or after discharge. The following additional exposure limitations shall apply:

Hazard Type	Design Concentration (Corresponding Oxygen Concentration at Sea Level)	Maximum Human Expose Time
Normally Occupied Space	Up to 43% (12%)	5 minutes
	43% to 52% (12% to 10%)	3 minutes
Normally Un-Occupied Space (See important note below.)	52% to 62% (10% to 8%)	30 seconds
	Above 62% (8% or lower)	0 seconds (Personnel CANNOT be exposed)

IMPORTANT NOTE: EN 15005, ISO 14520 and NFPA 2001 standards do not allow clean agent systems to be used in un-occupiable spaces where the design concentration is above 52% unless the system is provided with a supervised system lockout valve, pneumatic pre-discharge alarm, pneumatic time delay and warning signs. Not all of these safety items are available for use with Fike's ProInert system; therefore, the system cannot be used to protect normally un-occupied spaces where the design concentration is above 52%.

Physical Properties of IG-55

Chemical Name	N ₂ /Ar
Molecular Weight	33.95
Boiling Point at 760 mm Hg	-310.2°F (-190.1°C)
Critical Pressure	602 psia (4,150 kPa)
Critical Temperature	-210.5°F (-134.7°C)
Relative Density compared to air	1.18

2.2. ProInert Cylinder and Valve

Fike ProInert cylinders are 80 liter steel pressure vessels designed to hold the IG-55 agent under pressure until it is discharged. Each cylinder is fitted with a self-regulating ProInert discharge valve assembly. The valve can be actuated electrically, pneumatically, and/or manually with approved valve actuation components ordered separately.

All cylinders are shipped from the factory with a protective shipping cap. The cap entirely encloses and protects the valve during shipment and handling. Once removed, the cap should be stored in a suitable area for future use.

The cylinders may be utilized in single or multiple cylinder applications as needed and are linked together through a common discharge manifold. The cylinders shall be secured using a suitable racking arrangement.

Specifications

Cylinder Size (Water Capacity)	80 Liter
Cylinder Specification	EN ISO 9809-2 (UN) and TPED 1999/36/EC
Color	Signal Red
Height (approx.)	67.60 in (1717.0 mm)
Diameter (approx.)	11.25 in (285.8 mm)
Cylinder Part Number	IG71-103-200-55 (200 bar)
	IG71-103-300-55 (300 bar)
Pressurization	2,900 psi @ 60°F (200 bar @ 15°C)
	4,351 psi @ 60°F (300 bar @ 15°C)
Storage Temperature	-4°F to +120°F (-20°C to +49°C)
Agent Capacity	572.3 ft ³ (16.2 m ³), 200 bar
	823.0 ft ³ (23.3 m ³), 300 bar
Cylinder Actuation Methods	Electric – UVO (Input from Control Panel)
	Manual – UVO (Push Button)
	Pneumatic – Relay Actuator or Pneumatic Actuator
Tare Weight	250.0 lbs (113.4 kg) approximate
Gross Weight	300 lbs (136.2 kg) approximate, (200 bar)
	322 lbs (146.2 kg) approximate, (300 bar)

Refer to Fike ProInert Recharge/Refill Manual, P/N 06-806, for cylinder refill instructions and procedures.



Figure 1 – ProInert 80 Liter Cylinder

The Prolnert discharge valve assembly is a self-regulating valve that allows the extinguishing agent to be released from the cylinder at a constant outlet pressure of 645 psi (44.5 bar) with a free flow area of 0.47 inches (12 mm) in diameter. The valve assembly is available in a 2,900 psi (200 bar) model and a 4,351 psi (300 bar) model. The valve has a forged brass body and is equipped with a safety relief disc that will rupture if the internal cylinder pressure exceeds 6,207 psi (428 bar). All threads comply with ANSI B2.1, ISO 7-1 and ISO 228-1. The valve meets the requirements for UL/ULC Listing and FM Approval.

NOTE: The Fike system does NOT require a pressure reducing orifice plate.



ORDERING FORMAT FOR CYLINDER ASSEMBLY

IG71 - 103 - XXX - 55

System Pressure (200/300 bar)

For an 80L Cylinder at 300 bar with IG-55 Agent, order P/N is IG71-103-**300**-55.

2.3. Discharge Valve Completer Kits

A completer kit must be ordered for each Prolnert cylinder discharge valve. Each kit includes the components necessary to connect the cylinder to the discharge manifold, activate the cylinder valve and monitor the cylinder pressure. Completer kits must be ordered to match the cylinder pressure (200 bar or 300 bar) and with the appropriate discharge hose assembly (NPT or BSP) to facilitate connection to the discharge piping or manifold.

- Primary completer kits provide a means to activate the Prolnert system electrically or manually. A minimum of one cylinder must be fitted with a primary completer kit for system activation. Pressure from the 'Primary' cylinder can be used to activate up to 60 'Secondary' cylinders.
- Relay completer kits provide a means to pneumatically activate an additional 60 'Secondary' Prolnert cylinders using the discharge pressure from the cylinder it is connected to. The relay actuator is pneumatically activated using the discharge pressure from the 'Primary' cylinder.
- Secondary completer kits provide a means to pneumatically activate the Prolnert cylinder using the discharge pressure from a cylinder equipped with a Primary or Relay completer kit or from a nitrogen actuator assembly.

2.3.1. UVO Primary Completer Kit

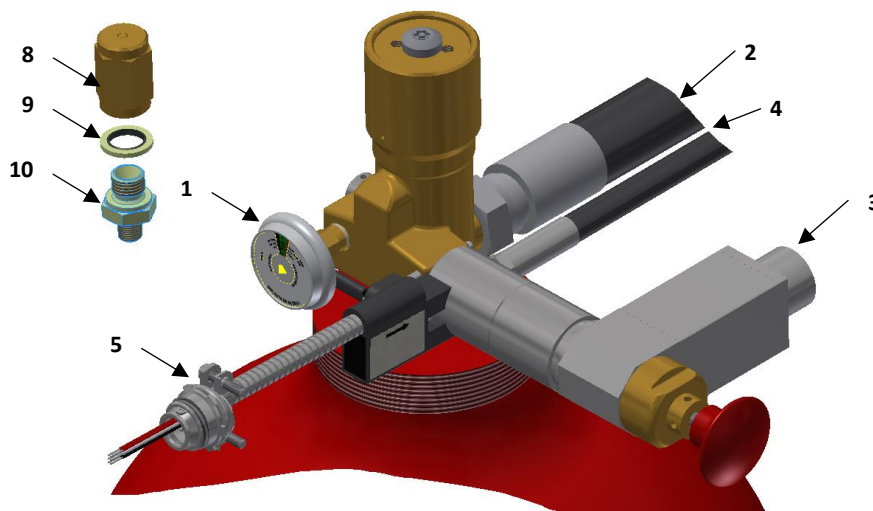


Figure 3 – Prolnert Cylinder with UVO Primary Completer Kit

NPT Completer Kit		
200 BAR IG-55 – P/N IG71-236-200-55-PE		
300 BAR IG-55 – P/N IG71-236-300-55-PE		
Item	Part Number	Description
1	02-13131	Pressure Gauge with Switch Assembly for 200 bar
	02-14066	Pressure Gauge with Switch Assembly for 300 bar
2	IG71-123	Discharge Hose Assembly, 1 inch NPT
3	02-13571	Universal Valve Operator (UVO)
4	02-13713	Actuation Hose
5	02-14627	Universal Valve Operator Supervisor (UVOS)
6	02-14802	Molykote Lubricant
7	02-2213	Security Tie
8	IG71-026	Vent Valve Assembly
9	02-10926	Sealing Washer
10	02-10797	G1/4 x R1/8 Adaptor

BSP Completer Kit 200 BAR IG-55 – P/N IG71-112-200-55-PE 300 BAR IG-55 – P/N IG71-112-300-55-PE		
Item	Part Number	Description
1	02-13131	Pressure Gauge with Switch Assembly for 200 bar
	02-14066	Pressure Gauge with Switch Assembly for 300 bar
2	IG71-003	Discharge Hose Assembly, 1 inch BSP
3	02-13571	Universal Valve Operator (UVO)
4	02-13713	Actuation Hose
5	02-14627	Universal Valve Operator Supervisor (UVOS)
6	02-14802	Molykote Lubricant
7	02-2213	Security Tie
8	IG71-026	Vent Valve Assembly
9	02-10926	Sealing Washer
10	02-10797	G1/4 x R1/8 Adaptor

2.3.2. UEA Primary Completer Kit

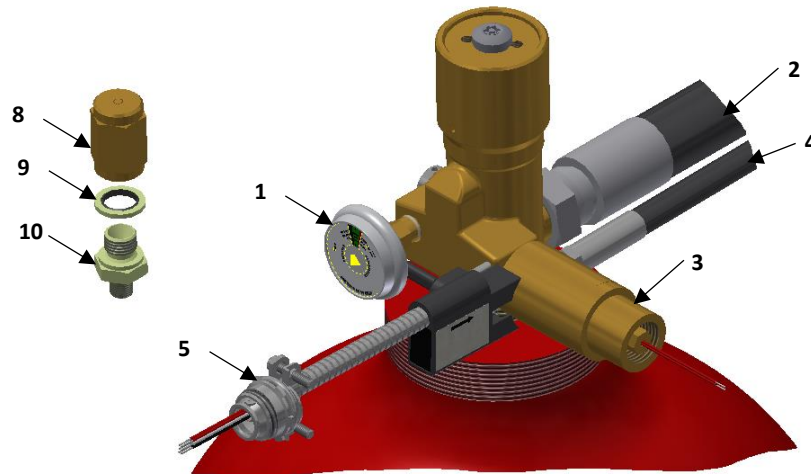


Figure 4 – ProInert Cylinder with UEA Primary Completer Kit

NPT Completer Kit 200 BAR IG-55 – P/N IG71-236-200-55-PM 300 BAR IG-55 – P/N IG71-236-300-55-PM		
Item	Part Number	Description
1	02-13131	Pressure Gauge with Switch Assembly for 200 bar
	02-14066	Pressure Gauge with Switch Assembly for 300 bar
2	IG71-123	Discharge Hose Assembly, 1 inch NPT
3	IG71-247	Universal Energetic Actuator (UEA)
4	02-13713	Actuation Hose
5	02-14627	Universal Valve Operator Supervisor (UVOS)
6	02-14802	Molykote Lubricant
7	02-2213	Security Tie
8	IG71-026	Vent Valve Assembly
9	02-10926	Sealing Washer
10	02-10797	G1/4 x R1/8 Adaptor
11	10-2748	Impulse Releasing Module (IRM), not shown

BSP Completer Kit 200 BAR IG-55 – P/N IG71-112-200-55-PM 300 BAR IG-55 – P/N IG71-112-300-55-PM		
Item	Part Number	Description
1	02-13131	Pressure Gauge with Switch Assembly for 200 bar
	02-14066	Pressure Gauge with Switch Assembly for 300 bar
2	IG71-003	Discharge Hose Assembly, 1 inch BSP
3	IG71-247	Universal Energetic Actuator (UEA)
4	02-13713	Actuation Hose
5	02-14627	Universal Valve Operator Supervisor (UVOS)
6	02-14802	Molykote Lubricant
7	02-2213	Security Tie
8	IG71-026	Vent Valve Assembly
9	02-10926	Sealing Washer
10	02-10797	G1/4 x R1/8 Adaptor

2.3.3. Relay Actuator Completer Kit

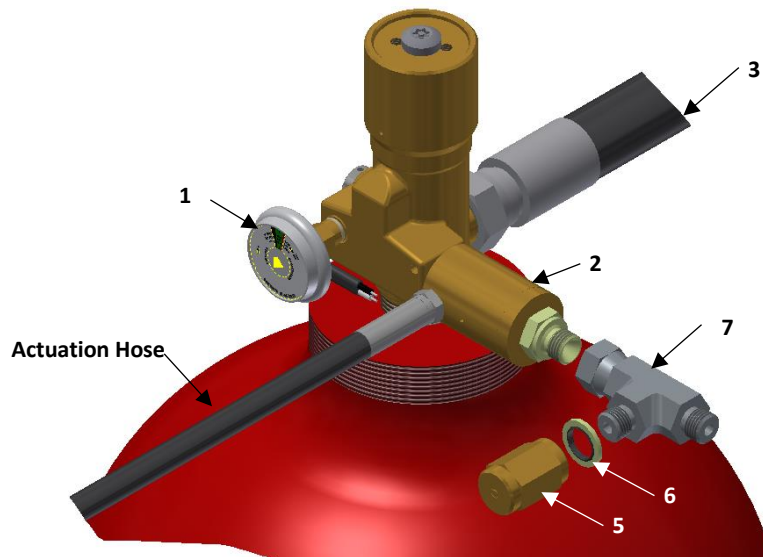


Figure 5 – ProInert Cylinder with Relay Completer Kit

NPT Completer Kit 200 BAR IG-55 – P/N IG71-236-200-55-PP 300 BAR IG-55 – P/N IG71-236-300-55-PP		
Item	Part Number	Description
1	02-13131	Pressure Gauge with Switch Assembly for 200 bar
	02-14066	Pressure Gauge with Switch Assembly for 300 bar
2	IG71-220	Relay Actuator Assembly with Actuation Hose
3	IG71-123	Discharge Hose Assembly, 1 inch NPT
4	02-14802	Molykote Lubricant
5	IG71-026	Vent Valve Assembly
6	02-10926	Sealing Washer
7	02-11731	G1/4(M) x G1/4(F) Swivel x G1/4(M) Tee

BSP Completer Kit 200 BAR IG-55 – P/N IG71-112-200-55-PP 300 BAR IG-55 – P/N IG71-112-300-55-PP		
Item	Part Number	Description
1	02-13131	Pressure Gauge with Switch Assembly for 200 bar
	02-14066	Pressure Gauge with Switch Assembly for 300 bar
2	IG71-220	Relay Actuator Assembly with Actuation Hose
3	IG71-003	Discharge Hose Assembly, 1 inch BSP
4	02-14802	Molykote Lubricant
5	IG71-026	Vent Valve Assembly
6	02-10926	Sealing Washer
7	02-11731	G1/4(M) x G1/4(F) Swivel x G1/4(M) Tee

2.3.4. Secondary Completer Kit

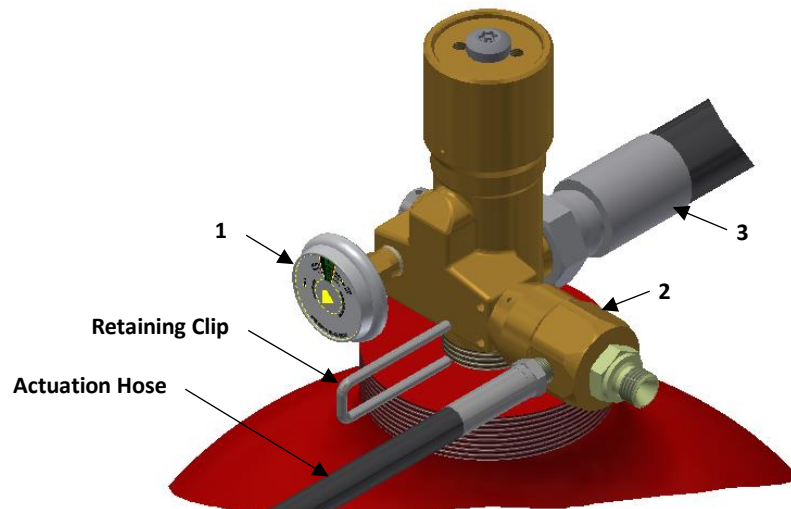


Figure 6 – Prolnert Cylinder with Secondary Completer Kit

NPT Completer Kit 200 BAR IG-55 – P/N IG71-236-200-55-SP 300 BAR IG-55 – P/N IG71-236-300-55-SP		
Item	Part Number	Description
1	02-13441	Pressure Gauge Assembly for 200 bar
	02-13541	Pressure Gauge Assembly for 300 bar
2	IG71-104	Pneumatic Actuator Assembly with Actuation Hose
3	IG71-123	Discharge Hose Assembly, 1 inch NPT
4	02-14802	Molykote Lubricant

BSP Completer Kit 200 BAR IG-55 – P/N IG71-112-200-55-SP 300 BAR IG-55 – P/N IG71-112-300-55-SP		
Item	Part Number	Description
1	02-13441	Pressure Gauge Assembly for 200 bar
	02-13541	Pressure Gauge Assembly for 300 bar
2	IG71-104	Pneumatic Actuator Assembly with Actuation Hose
3	IG71-003	Discharge Hose Assembly, 1 inch BSP
4	02-14802	Molykote Lubricant

2.3.5. Secondary Completer Kit with Pressure Switch Option

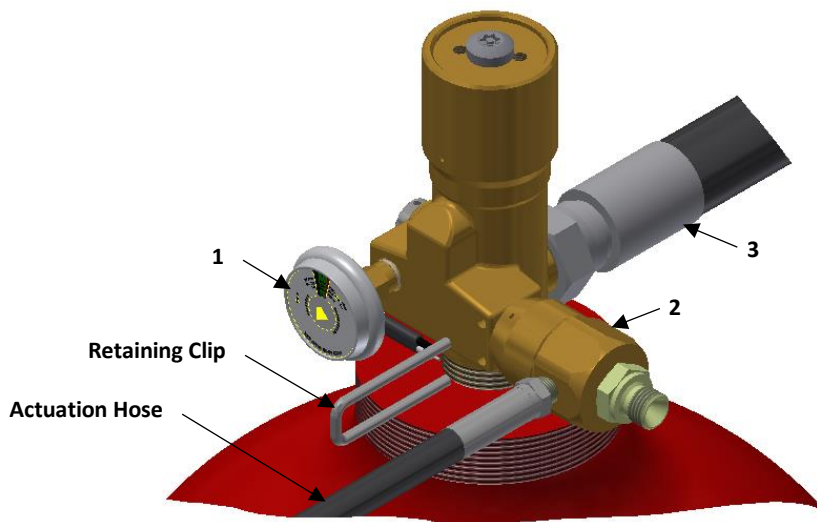


Figure 7 – Prolnert Cylinder with Secondary Completer Kit with Pressure Switch Option

NPT Completer Kit 200 BAR IG-55 – P/N IG71-236-200-55-SPL 300 BAR IG-55 – P/N IG71-236-300-55-SPL		
Item	Part Number	Description
1	02-13131	Pressure Gauge with Switch Assembly for 200 bar
	02-14066	Pressure Gauge with Switch Assembly for 300 bar
2	IG71-104	Pneumatic Actuator Assembly with Actuation Hose
3	IG71-123	Discharge Hose Assembly, 1 inch NPT
4	02-14802	Molykote Lubricant

BSP Completer Kit 200 BAR IG-55 – P/N IG71-112-200-55-SPL 300 BAR IG-55 – P/N IG71-112-300-55-SPL		
Item	Part Number	Description
1	02-13131	Pressure Gauge with Switch Assembly for 200 bar
	02-14066	Pressure Gauge with Switch Assembly for 300 bar
2	IG71-104	Pneumatic Actuator Assembly with Actuation Hose
3	IG71-003	Discharge Hose Assembly, 1 inch BSP
4	02-14802	Molykote Lubricant

2.4. Cylinder Pressure Gauge with Switch

The pressure gauge with low pressure switch provides a visual pressure indication at the cylinder, as well as continuous cylinder pressure monitoring at the control panel. If the pressure inside the cylinder drops below the set pressure, the switch contacts will transfer and invoke a “Supervisory” indication on the control panel. The gauge scale is calibrated to show the actual pressure, as well as a color-coded acceptable operating range, under-pressure range and over-pressure range.

The pressure gauge port on the ProInert valve is designed to allow the gauge to be installed and removed/replaced on a charged cylinder without removing the agent first. The port allows a small controlled amount of leakage past its internal threads. This provides enough flow to operate the pressure gauge while being small enough to allow the gauge to be removed and replaced safely without excessive pressure or agent loss.



Figure 8 - Cylinder Pressure Gauge with Switch

Specifications

Assembly Part Number	02-13131 – 200 bar @ 59°F (15°C) 02-14066 – 300 bar @ 59°F (15°C)
Temperature Limits	-4°F to +120°F (-20°C to +49°C)
Pressure Connection	M10 x 1
Contact Rating	Single pole, 4.5 to 24 VDC/VAC, 5 to 100 mA; 3 W
Wire Leads	(2) 18 gauge x 8.5" (0.21 m) long
Pressure Setting	Normally open under pressure. Contacts close at: 2434 psi / 168 bar (decreasing) for 200 bar cylinder 3395 psi / 234 bar (decreasing) for 300 bar cylinder
Body Material	Stainless steel case, brass process connection

Ordering Information

The pressure gauge can be ordered separately using the part numbers listed above or it can be ordered as part of the discharge valve completer kit (See Section 2.3).

NOTE: The cylinder pressure should read 200 bar or 300 bar at 15°C. For temperatures other than 15°C, reference the Temperature vs. Pressure Chart in Appendix B.

2.5. Cylinder Pressure Gauge

The pressure gauge provides a visual pressure indication at the cylinder. The gauge scale is calibrated to show the actual pressure, as well as a color-coded acceptable operating range, under-pressure range and over-pressure range.

The pressure gauge port on the ProInert valve is designed to allow the gauge to be installed and removed/replaced on a charged cylinder without removing the agent first. The port allows a small controlled amount of leakage past its internal threads. This provides enough flow to operate the pressure gauge while being small enough to allow the gauge to be removed and replaced safely without excessive pressure or agent loss.



Figure 9 - Cylinder Pressure Gauge

Specifications

Assembly Part Number	02-13441 – 200 bar @ 59°F (15°C) 02-13541 – 300 bar @ 59°F (15°C)
Temperature Limits	-4°F to +120°F (-20°C to +49°C)
Pressure Connection	M10 x 1
Body Material	Stainless steel case, brass process connection

Ordering Information

The pressure gauge can be ordered separately using the part numbers listed above or it can be ordered as part of the discharge valve completer kit (See Section 2.3).

NOTE: The cylinder pressure should read 200 bar or 300 bar at 15°C. For temperatures other than 15°C, reference the Temperature vs. Pressure Chart in Appendix B.

2.6. Cylinder Mounting Hardware

ProInert cylinders must be adequately mounted and supported. Fike offers rack assemblies for securing the cylinders. The racking consists of the hardware necessary for assembly, including front support, rear support and clamp rods. The various racking options available provide the installer with multiple options for cylinder arrangement. Cylinders may be mounted in single-row, double-row or triple-row configurations. The rack system components are shipped loose and must be assembled in the field.

NOTE: Each rack assembly provides the necessary parts to secure the cylinders at two levels as shown in the following illustrations.

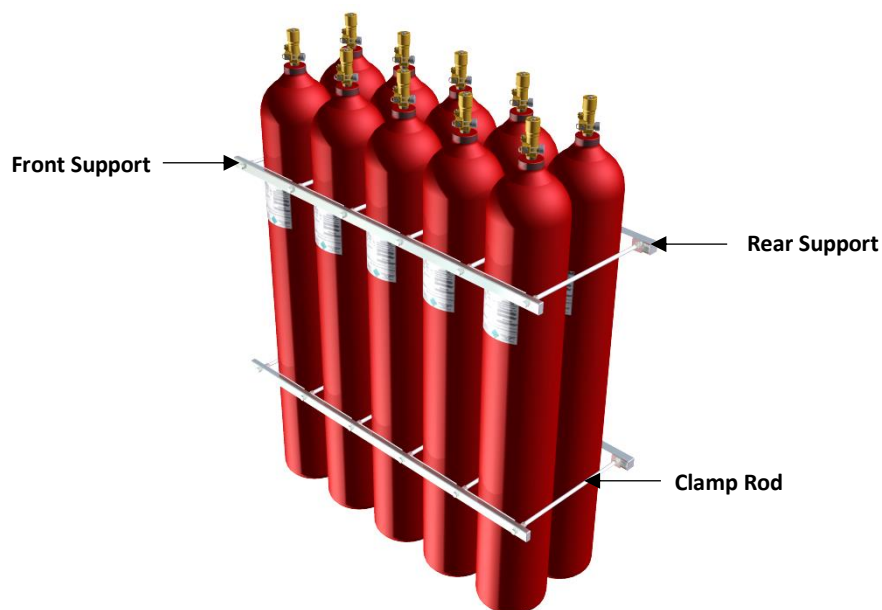
The cylinder racking rear support on all mounting configurations must be secured either to an appropriate load-bearing structure or to a cylinder racking upright. See Section 2.8. The installer must provide the hardware necessary to secure the rear support to the mounting structure or racking upright.

SINGLE-ROW MOUNTING CONFIGURATION

Fike offers single-row cylinder mounting kits for configurations of 1 to 5 cylinders. A single-row cylinder rack utilizes the cylinder mounting straps, along with Unistrut® backing to secure the cylinders. The assembly part numbers include all the hardware required to secure the cylinders to the rear support.

DOUBLE-ROW MOUNTING CONFIGURATION

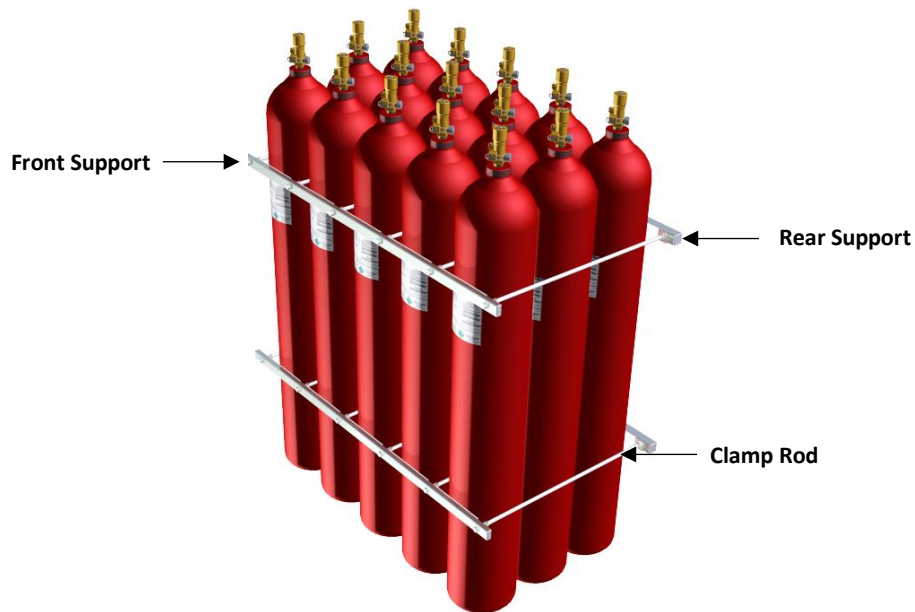
Double-row cylinder mounting may be used when it is necessary to have up to 10 cylinders in a single storage rack. A double-row cylinder storage rack utilizes Unistrut® and threaded rod to secure the cylinders. The assembly part numbers include all the hardware required to assemble the racking and secure the cylinders.



**Figure 10 - Typical Double – Row Cylinder Rack Assembly
(Assembly IG71-082-005 Shown)**

TRIPLE-ROW MOUNTING CONFIGURATION

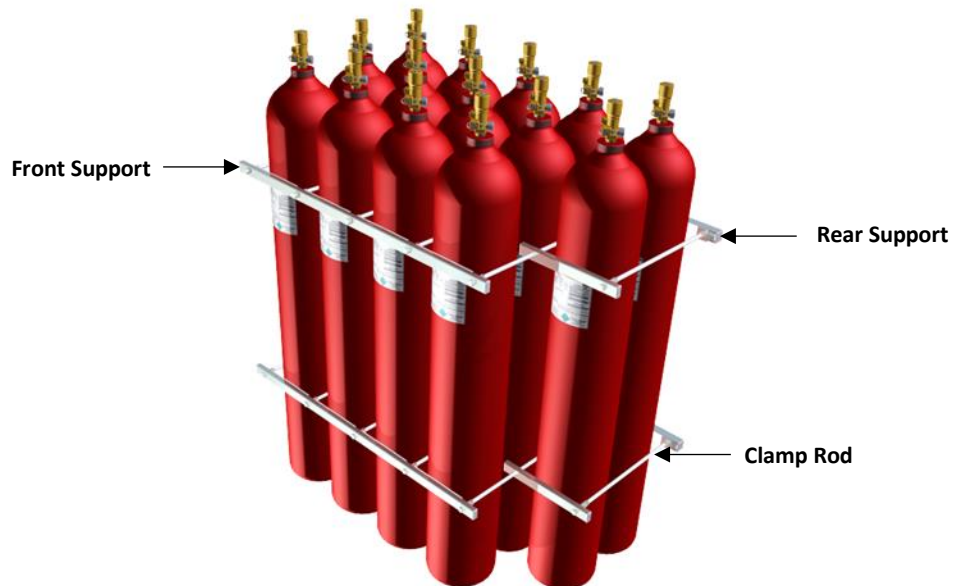
Triple-row cylinder mounting may be used when it is necessary to have up to 15 cylinders in a single storage rack. A triple-row cylinder storage rack utilizes Unistrut® and threaded rod to secure the cylinders. The assembly part numbers include all the hardware required to assemble the racking and secure the cylinders.



**Figure 11 - Typical Triple – Row Cylinder Rack Assembly
(Assembly IG71-083-004 Shown)**

OTHER MOUNTING CONFIGURATIONS

There will be times when the system will require a number of bottles that does not match any of the configurations above. Because of this, Fike makes available additional racking options for cylinder storage. Details for these racking configurations are shown on the next page.



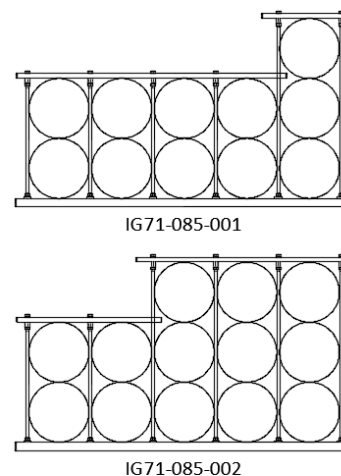
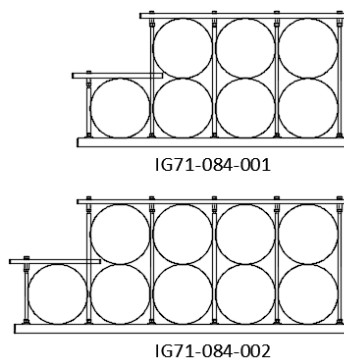
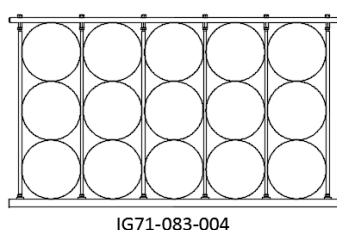
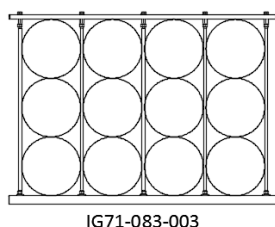
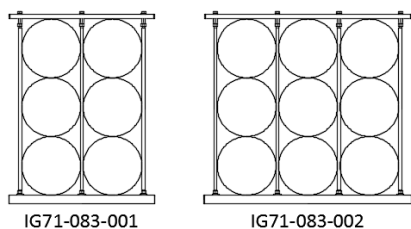
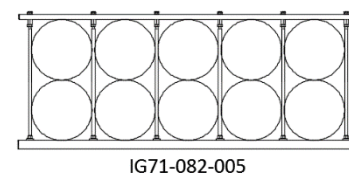
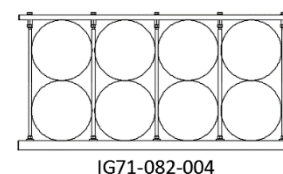
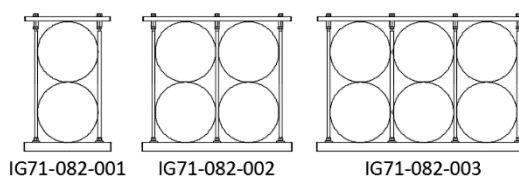
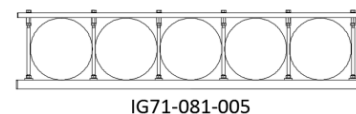
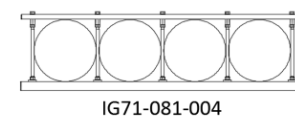
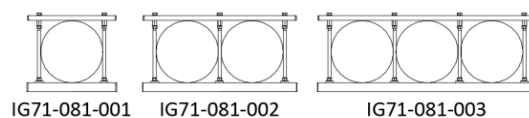
**Figure 12 - Typical Cylinder Rack Assembly
(Assembly IG71-085-003 Shown)**

CYLINDER RACK ASSEMBLY OPTIONS

By utilizing various rack assemblies independently or in combination, the installer may install cylinder banks consisting of up to 15 Prolnert cylinders. The table below shows the available racking options. The diagrams below show the cylinder foot-print for the various racking assemblies available.

Rack Assembly Part Number	Cylinder Arrangement (Cylinder Qty. per Row)			Total Cylinder Count
	Back Row	Middle Row	Front Row	
IG71-081-001	1	-	-	1
IG71-081-002	2	-	-	2
IG71-081-003	3	-	-	3
IG71-081-004	4	-	-	4
IG71-081-005	5	-	-	5
IG71-082-001	1	1	-	2
IG71-082-002	2	2	-	4
IG71-082-003	3	3	-	6
IG71-082-004	4	4	-	8
IG71-082-005	5	5	-	10
IG71-083-001	2	2	2	6
IG71-083-002	3	3	3	9
IG71-083-003	4	4	4	12
IG71-083-004	5	5	5	15
IG71-084-001	4	3	-	7
IG71-084-002	5	4	-	9
IG71-085-001	4	4	3	11
IG71-085-002	5	5	3	13
IG71-085-003	5	5	4	14

See Appendix D for detailed breakdown of racking components.



2.7. Manifold Brackets

Fike offers manifold brackets to support the manifold piping. The brackets must be secured to an appropriate load bearing structure or racking upright (See Section 2.8). Manifold brackets are available for the following cylinder rack configurations.

SINGLE ROW – MANIFOLD BRACKET

Two manifold brackets (P/N 02-11883) are used to support manifold piping for 1 to 5 cylinders in a single-row cylinder configuration. The length of the Unistrut bracket is 12" (0.3 m) long. This provides the space required to mount a single manifold pipe run.

Maximum load: 502 lbs. (228 kg.) per bracket

DOUBLE ROW – MANIFOLD BRACKET

Two manifold brackets (P/N 02-11884) are used to support manifold piping for 2 to 10 cylinders in a double-row cylinder configuration. The length of the Unistrut bracket is 18" (0.46 m) long. This provides the space required to mount two manifold pipe runs (1 for each row of cylinders).

Maximum load: 692 lbs. (314 kg.) per bracket

TRIPLE ROW – MANIFOLD BRACKET

Two manifold brackets (P/N 02-11885) are used to support manifold piping for 3 to 15 cylinders in a triple-row cylinder configuration. The length of the Unistrut bracket is 30" (0.76 m) long. This provides the space required to mount three manifold pipe runs (1 for each row of cylinders).

Maximum load: 1072 lbs. (486 kg.) per bracket

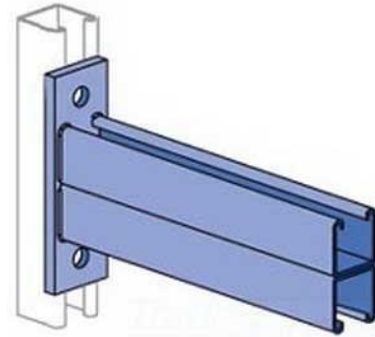


Figure 13 - Manifold Bracket Shown Attached to Racking Upright

NOTE: If installing the bracket directly to a wall, the installer must provide the hardware necessary to secure the manifold brackets. The installer must also provide the hardware necessary to secure the manifold piping to the bracket.

2.8. Cylinder Racking Upright Kit

The cylinder racking upright kit is comprised of Unistrut components and provides a means to install the ProInert cylinders in a free standing configuration versus wall mounting. The kit includes a post base that allows the upright to be secured to the floor with suitable anchors (provided by others). Each upright provides a means to mount the cylinder racking components that are used to restrain the cylinders and provides a Unistrut bracket to support and secure the manifold piping. The Upright Kit components must be assembled in the field.

The kit is offered in a Single-Row, Double-Row, and Triple-Row configuration. Each kit includes the following items:

Single Row Upright Kit, P/N IG71-065-1		
Part Number	Description	Quantity
C02-1209	0.50"-13 Finished Nut	6
IG71-0191	Manifold Support Upright, 86" (2.18 m) long	1
02-11883	Unistrut Bracket, 12" (0.3 m) long	1
02-4229	Unistrut Post Base	1
02-4230	0.50"-13 Hex Bolt	6
02-4233	Unistrut Flat Bracket Tee	2
02-4372	0.50" Regular Lock Washer	6
02-4373	0.50" Plain Washer	12

Double Row Upright Kit, P/N IG71-065-2		
Part Number	Description	Quantity
C02-1209	0.50"-13 Finished Nut	6
IG71-0191	Manifold Support Upright, 86" (2.18 m) long	1
02-11884	Unistrut Bracket, 18" (0.46 m) long	1
02-4229	Unistrut Post Base	1
02-4230	0.50"-13 Hex Bolt	6
02-4233	Unistrut Flat Bracket Tee	2
02-4372	0.50" Regular Lock Washer	6
02-4373	0.50" Plain Washer	12

Triple Row Upright Kit, P/N IG71-065-3		
Part Number	Description	Quantity
C02-1209	0.50"-13 Finished Nut	6
IG71-0191	Manifold Support Upright, 86" (2.18 m) long	1
02-11885	Unistrut Bracket, 30" (0.76 m) long	1
02-4229	Unistrut Post Base	1
02-4230	0.50"-13 Hex Bolt	6
02-4233	Unistrut Flat Bracket Tee	2
02-4372	0.50" Regular Lock Washer	6
02-4373	0.50" Plain Washer	12

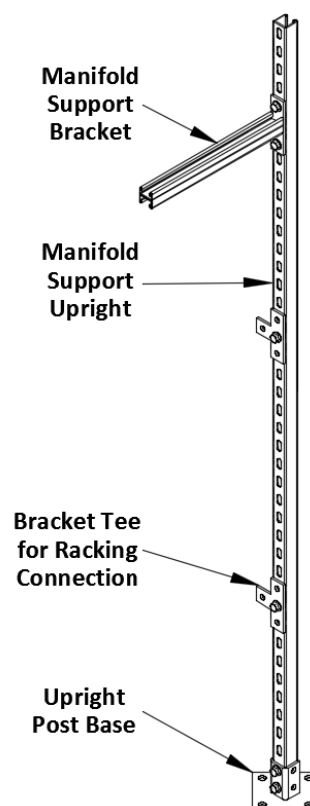


Figure 14 – Cylinder Racking Upright

NOTE: The installer must provide the hardware necessary to secure the manifold piping to the manifold bracket.

2.9. Discharge Hose Assembly

The flexible discharge hose assembly provides the connection between the cylinder valve outlet and the discharge manifold. The hose assembly includes a discharge hose and check valve. When installed properly, the check valve provides a means of preventing back-flow of agent through a disconnected discharge hose in the event of an accidental discharge during installation or while a cylinder is removed for service.

NPT and BSP options are available.



Figure 15 - Discharge Hose Assembly

Specifications

Part Numbers	IG71-123 – 1" NPT Connection IG71-003 – 1" BSP Connection
Pressure Rating	5,076 psi (350 bar)
Material	Hose – synthetic rubber with zinc-plated steel connectors Check Valve – brass
Free Flow Area	0.175 in ² (113 mm ²)
Overall Length	22.0" (560 mm)
Minimum Bend Radius	9.8" (250 mm)

Ordering Information

The discharge hose assembly can be ordered separately using the part numbers listed above or it can be ordered as part of the discharge valve completer kit (See Section 2.3).

2.10. Universal Valve Operator

The universal valve operator (UVO) provides the 'Primary' means to operate the ProInert system. The UVO can be automatically activated by an electric signal from a Fike releasing panel or manually activated by removing the safety cotter pin and depressing the red strike button on the UVO. Once activated, the UVO will latch in the fired position and must be manually reset using a Fike reset tool before being placed back into service.

The UVO can be used to operate the following system components:

- ProInert Valve (Primary)
- Nitrogen Actuator Assembly (Primary)
- Selector Valve Assembly

NOTE: A ProInert system must have at least one 'Primary' actuator for system activation.

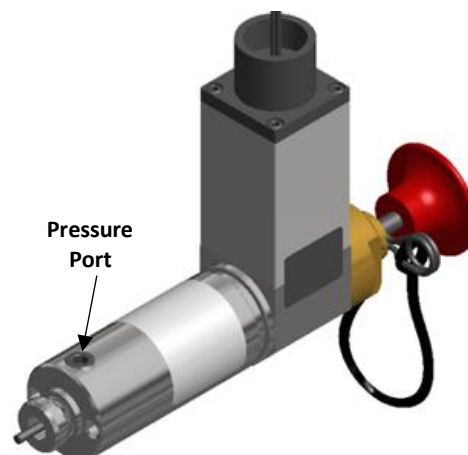


Figure 16 - Universal Valve Operator (UVO)

The UVO is equipped with a pressure port for connection of a flexible pilot hose. This connection is used on a multiple cylinder system to enable the discharge pressure from the activation of the cylinder or nitrogen actuator the UVO is connected to, to pneumatically activate up to 60 additional cylinders connected in series via a pilot line connection or to divert the system discharge pressure to a selector valve for activation.

Specifications

Part Number	02-13571
Construction	Stainless Steel Body Brass End Cap Stainless Steel Piston
Electrical Connection	½" NPT conduit connection
Wires	2, 20 AWG Black Wires, 36" (914 mm) long
Temperature	Limited to system temperature rating
Normal Supply Voltage	24 VDC
Actuation Type	Latching
Reset Requirement	Manually with reset tool
Current Consumption (for battery calculations)	Alarm max. 912 mA / Supervision max. 33.4 mA – SHP Pro Alarm max. 930 mA / Supervision max. 25.4 mA – Cheetah Xi & Xi 50

Ordering Information

The UVO can be ordered separately using the part number listed above, ordered as part of the discharge valve completer kit (See Section 2.3), or it can be ordered as part of the following kit.

UVO Kit (P/N 70-315)	
Component P/N	Description
02-13571	Universal Valve Operator (UVO)
02-14627	Universal Valve Operator Supervisor (UVOS)
02-13713	PTFE ¼ Hose
02-2213	Security Ties

2.11. Universal Energetic Actuator

The universal energetic actuator (UEA) provides an alternate 'Primary' means to operate the Prolnert system. The UEA can be automatically activated by an electric signal from a Fike releasing panel. The UEA does NOT provide a means of manual activation. The UEA is a single shot device that must be replaced after activation.

The UVO can be used to operate the following system components:

- Prolnert Valve (Primary)
- Nitrogen Actuator Assembly (Primary)
- Selector Valve Assembly

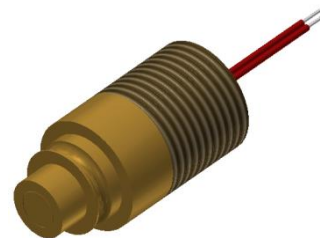


Figure 17 - Universal Energetic Actuator (UEA)

NOTE: A Prolnert system must have at least one 'Primary' actuator for system activation.

Electrical activation of the UEA requires it to be connected to a Fike Impulse Releasing Module (P/N 10-2748). The IRM provides the interface between the UEA and the releasing circuit of the Fike control panel. Refer to Fike document 06-552 for IRM details.

The UEA is equipped with a pressure port for connection of a flexible pilot hose. This connection is used on a multiple cylinder system to enable the discharge pressure from the activation of the cylinder or nitrogen actuator the UEA is connected to, to pneumatically activate up to 60 additional cylinders connected in series via a pilot line connection or to divert the system discharge pressure to a selector valve for activation.

Specifications

Part Number	IG71-247
Construction	Brass
Electrical Connection	½" NPT Male threads for conduit connection
Wires	2, 20 AWG Red Wires, 36" (914 mm) long
Normal Supply Voltage	24 VDC
Monitoring Current	0.01 Amps (battery calculations)
Firing Current	1 Amp max.
Auto Ignition Temp.	≥ 170°C (338 °F)
Operating Temp.	Limited to system temperature rating
Service Life	10 years
Actuation Type	Latching
Reset Requirement	Single Shot, must be replaced
Listings and Approvals	UL

Ordering Information

The UEA can be ordered separately using the part number listed above, ordered as part of the discharge valve completer kit (See Section 2.3), or it can be ordered as part of the following kit.

UEA Kit (P/N IG71-249)	
Component P/N	Description
IG71-247	Universal Energetic Actuator (UEA)
02-14627	Universal Valve Operator Supervisor (UVOS)
02-13713	PTFE ¼ Hose

2.12. Universal Valve Operator Supervisor

The universal valve operator supervisor (UVOS) provides a means to secure and electrically supervise the connection of a 'Primary' actuator (e.g., UVO, UEA or relay actuator assembly) to the actuator port on the Prolnert cylinder, nitrogen actuator, or selector valve release fitting.

The UVOS has a built-in Form-C push-button switch that supervises the connection of the actuator to the cylinders discharge valve. Removal of the UVOS from the discharge valve will trigger the UVOS switch causing a visual and audible "Supervisory" indication at the Fike control panel signaling that the cylinder's actuator has been disconnected.



Figure 18 - Universal Valve Operator Supervisor (UVOS)

Specifications

Part Number	02-14627
Construction	– Plastic housing with insert molded SST clip and sealed push-button switch (Form C)
	– SST flexible conduit, 0.25" (6.4 mm) ID, 50" (1270 mm) long
	– 3/8" electrical connector for 1/2" knockout
	– 22 AWG wire leads, 60" (1524 mm) long; Black (NC) / White (NO) / Red (Common)
Temperature	Limited to system temperature rating
Humidity	93% maximum humidity

Ordering Information

The UVOS can be ordered separately using the part number listed above, ordered as part of the discharge valve completer kit (See Section 2.3), or it can be ordered as part of the following kits.

Component P/N	Description
UVO Kit (P/N 70-315)	
02-13571	Universal Valve Operator (UVO)
02-14627	Universal Valve Operator Supervisor (UVOS)
02-13713	PTFE ¼ Hose
02-2213	Security Ties
UEA Kit (P/N IG71-249)	
IG71-247	Universal Energetic Actuator (UEA)*
02-14627	Universal Valve Operator Supervisor (UVOS)
02-13713	PTFE ¼ Hose

*The UEA is UL Listed only.

2.13. Pneumatic Actuator Assembly

The pneumatic actuator assembly is used to pneumatically activate the Prolnert cylinder valve it is connected to using the discharge pressure from the 'Primary' cylinder or 'Primary' nitrogen actuator. The actuator is mounted to the valve actuator port on all Prolnert 'Secondary' cylinders. Once activated, the actuator will latch in the fired position and must be manually reset using a Fike reset tool before being re-installed onto the cylinder valve.

The pneumatic actuator is equipped with a flexible pilot hose to facilitate connection to the next actuator (pneumatic or relay) on a multiple cylinder system. This pilot line connection allows the discharge pressure from the 'Primary' cylinder to pass through each actuator to the next to initiate pneumatic activation of up to 60 cylinder valves.

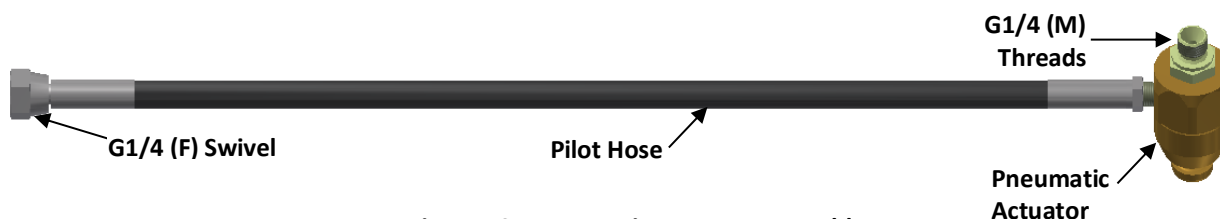


Figure 19 - Pneumatic Actuator Assembly

Specifications

Part Number	IG71-104 (includes the following) - IG71-203 Actuator Assembly - 02-13713 Pneumatic Hose
Actuator Material	Brass Body Stainless Steel Piston
Actuator Operating Pressure	73 psi (5 bar)
Actuation Type	Latching
Reset Requirement	Manually with reset tool
Hose Material	Steel Braid with Polyurethane Cover
Hose Pressure Rating	4400 psi (310 bar)
Hose Overall Length	19" (483 mm)
Hose Minimum Bend Radius	1.6" (40 mm)

Ordering Information

The pneumatic actuator assembly can be ordered separately using the part number listed above or it can be ordered as part of the discharge valve completer kit (See Section 2.3).

2.14. Relay Actuator Assembly

A 'Primary' ProInert cylinder or 'Primary' nitrogen actuator are both capable of activating up to 60 ProInert cylinders equipped with pneumatic actuators. Where the total number of cylinders required exceeds 60, a relay actuator must be mounted to the valve actuator port on every 60th cylinder that is added to the system. The relay actuator replaces the pneumatic actuator.

The relay actuator serves two functions: 1) It is used to pneumatically activate the ProInert cylinder valve it is connected to using the discharge pressure from the 'Primary' cylinder, 'Primary' nitrogen actuator or previous relay actuator and 2) It allows the discharge pressure from the cylinder it is connected to, to be used to pneumatically activate up to 60 additional ProInert cylinders. Once activated, the actuator will latch in the fired position and must be manually reset using a Fike reset tool before being re-installed onto the cylinder valve.

The relay actuator is equipped with a flexible pilot hose to facilitate connection to the next pneumatic actuator on a multiple cylinder system. This pilot line connection allows the discharge pressure from the cylinder the relay actuator is connected to, to pass through the relay actuator to the next pneumatic actuator.

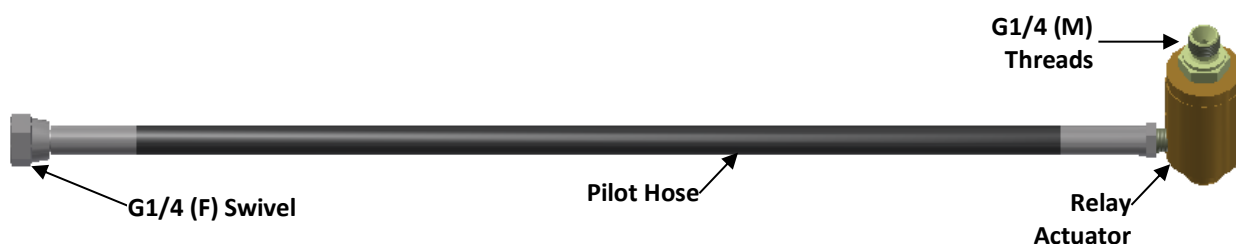


Figure 20 – Relay Actuator Assembly

Specifications

Part Number	IG71-220 (includes the following) - IG71-120 Pneumatic Relay - 02-13713 Pneumatic Hose
Actuator Material	Brass Body Stainless Steel Piston
Actuator Operating Pressure	73 psi (5 bar)
Actuation Type	Latching
Reset Requirement	Manually with reset tool
Hose Material	Steel Braid with Polyurethane Cover
Hose Pressure Rating	4400 psi (310 bar)
Hose Overall Length	19" (483 mm)
Hose Minimum Bend Radius	1.6" (40 mm)

Ordering Information

The relay actuator assembly can be ordered separately using the part number listed above or it can be ordered as part of the discharge valve completer kit (See Section 2.3).

2.15. Manifold Safety Disc Outlet

The manifold safety disc outlet assembly is a pressure relief device that consists of a safety disc housed in a threaded body. It is designed to prevent the entrapment of agent in sections of closed piping per NFPA 2001. Should a large pressure increase occur in the piping network, the internal disc will rupture venting the pressure to atmosphere.

Specifications

Part Number	IG71-076
Material	Brass Body with Nickel Disc
Thread Size	½" NPT
Burst Pressure	1,275 to 1,475 psi (87.9 to 101.7 bar)



Figure 21 - Safety Disc Outlet

2.16. Manifold Pressure Vent

The manifold pressure vent is a pressure relief device designed to vent small amounts of leakage from a closed manifold and piping configuration per NFPA 2001. This prevents pressure from building within the closed manifold and pipe section that could subsequently provide enough backpressure to open the cylinder valves.

NOTE: An insignificant amount of agent leakage will occur through the pressure vent during a system discharge.

Specifications

Part Number	C02-1363
Material	Brass Body
Thread Size	½" NPT Male
Vent Hole	0.031" (0.8 mm) diameter



Figure 22 – Manifold Pressure Vent

2.17. Discharge Nozzles

The discharge nozzles are made of brass and are available in a 180° and 360° discharge patterns. The nozzles are designed to control the agent flow and to distribute the agent throughout the protected enclosure in a uniform, predetermined pattern and concentration.

Seven sizes of discharge nozzles are available, 1/2" (15 mm) through 2" (50 mm). The size refers to the size of schedule 40 or 80 pipe that the nozzle can be connected to. Each nozzle has NPT female threads for connection to the pipe network.

Each discharge nozzle comes with a brass orifice plate that controls the flow of the agent through the nozzle. The hole diameter of the orifice plate is determined by performing a hydraulic calculation using the Fike Engineered ProInert Flow Calculation program. Engineered nozzle(s) should not be ordered until the clean agent system pipe network is installed and an "As Built" hydraulic calculation is performed. Orifice plate drilling must be done at the Fike factory, or at a UL listed nozzle drill station.

Ordering

Part Number	Description
IG71-072-XXX	1/2" (15 mm) 360° nozzle
IG71-073-XXX	3/4" (20 mm) 360° nozzle
IG71-074-XXX	1" (25 mm) 360° nozzle
IG71-215-XXX	1 1/4" (32 mm) 360° nozzle
IG71-075-XXX	1 1/2" (40 mm) 360° nozzle
IG71-214-XXX	2" (50 mm) 360° nozzle
IG71-209-XXX	1/2" (15 mm) 180° nozzle
IG71-210-XXX	3/4" (20 mm) 180° nozzle
IG71-211-XXX	1" (25 mm) 180° nozzle
IG71-216-XXX	1 1/4" (32 mm) 180° nozzle
IG71-212-XXX	1 1/2" (40 mm) 180° nozzle
IG71-213-XXX	2" (50 mm) 180° nozzle

Ordering Format

When placing an order for a ProInert discharge nozzle, you MUST specify the orifice plate hole diameter code in addition to the basic part number for the nozzle needed.

I G 7 1 - X X X - X X X
 A B

A = Basic nozzle part number (e.g. IG71-012-XXX, etc.)

B = Orifice plate hole diameter code (obtained from Engineered Flow Calculation Program)



Figure 23 - 360° Nozzle
(12 orifices)



Figure 24 - 180° Nozzle
(7 orifices)

2.18. Discharge Pressure Switch

The discharge pressure switch is activated by the pressure from the agent during discharge and can be used to signal the releasing panel that the system has actually discharged. The switch latches on operation and has a reset plunger. The discharge pressure switch is supplied with a 3/8 in. NPT Male x 1/4 in. NPT Female adaptor for connection to the actuation pipe, tubing or hose. A 1/2 NPT conduit inlet is provided for connection of electrical wiring for switch monitoring.

NOTE: A discharge pressure switch shall be installed on all ProInert systems where mechanical system actuation is possible.



Figure 25 - Discharge Pressure Switch Assembly

Specifications

Part Number	IG71-202
Switch	Double-pole, Single-throw
Electrical Rating	15 amps @ 120 VAC or 8 amps @ 240 VAC
Connection	1/4" NPT Female (piping network)
	1/2" NPT (conduit inlet)
Operating Pressure	100 psi (690 kPa) minimum

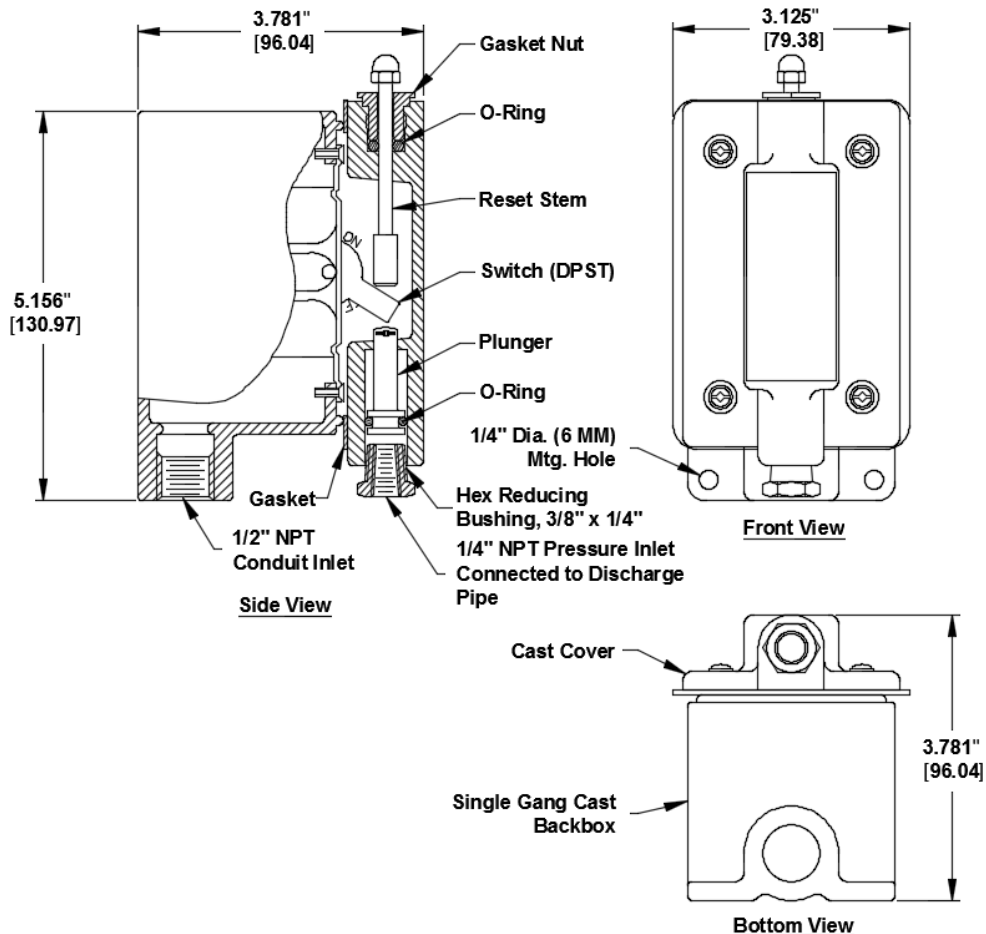


Figure 26 - Discharge Pressure Switch Dimensions

2.19. Main/Reserve Check Valves

Check valves are used to isolate the main and reserve cylinders in a system with a connected reserve. The valve prevents pressurization of the reserve bank of cylinders by blocking the flow of agent from the main system discharge piping. This allows a common discharge manifold and piping network to be used.



Figure 27 - Check Valve

Specifications

Body Material	Brass
Connection	NPT Threads per ASME B1.20.1
Seat Material	Buna-N
Spring Material	316 Stainless Steel
Spring Cracking Pressure	0.500 PSI (0.034 bar)

Ordering and Dimensions

Part Number	English			Metric		
	Nom. Size (NPT)	Length (in)	Dia. (in)	Nom. Size (NPT)	Length (cm)	Dia. (cm)
C02-1204	1/2"	2.75	1.00	1/2"	7.0	2.5
C02-1205	3/4"	2.98	1.25	3/4"	7.6	3.2
C02-1206	1"	3.64	1.63	1"	9.2	4.1
C02-1207	1-1/2"	4.63	2.50	1-1/2"	11.8	3.4
C02-1240	2"	5.85	3.00	2"	14.9	7.6
C02-1393	3"	6.25	4.50	3"	15.9	11.4
C02-1394	4"	7.13	5.50	4"	18.1	14.0

2.20. Odorizer

The odorizer is used to inject a small amount of wintergreen scent into the agent as it flows through the piping network, discharging into the hazard area carrying a scent of wintergreen.

The purpose of the wintergreen scent is to warn personnel that the area contains a concentration of Prolnert agent and precautions must be taken, either to leave the area immediately or secure proper breathing apparatus. The internal ampoule containing the oil of wintergreen must be replaced and the broken glass in the device must be cleaned out after each system discharge. It is recommended to use 1 odorizer per 20 cylinders.

Specifications

Part Number	IG71-240
Rebuild Kit Part Number	IG71-241
Thread Size & Type	3/4" NPT (Male)
Material	Brass (Body)
Listings and Approvals	UL / ULC Listed only



Figure 28 - Odorizer

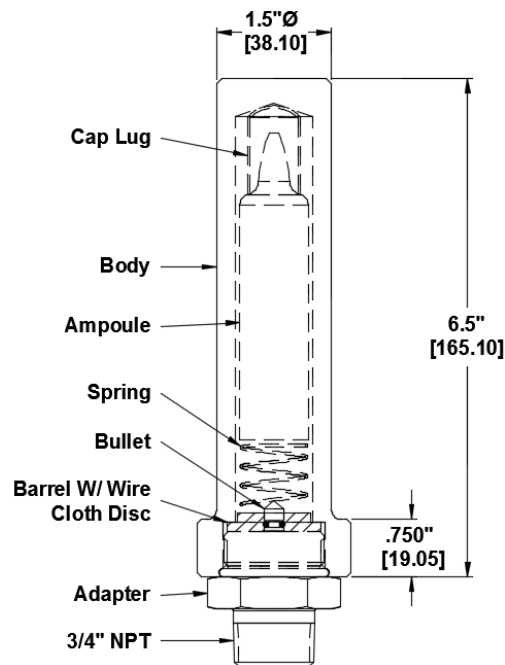


Figure 29 - Odorizer Dimensions

2.21. Caution and Advisory Signs

Instructional signs are used to provide the necessary information to personnel in the area and to comply with NFPA 2001 requirements. The caution lettering and backgrounds meet the requirements of ANSI Z535. The signs are made from flame retardant, Lexan™ polycarbonate material. Each sign has an adhesive backing mounting purposes. These signs are an optional item and must be ordered separately.

CAUTION – EXIT SIGN (P/N 02-11776)

Provided to alert personnel that the room is protected with a ProInert (IG-55) system and that they should evacuate the area when the alarm sounds. Sign should be placed on the inside of each exit door and next to or under an audible/visual alarm inside the protected space.

Overall Size:	14.0" x 7.8" x 0.10" (355.6 mm x 198 mm x 2.54 mm)
Lettering Size:	1-1/2" – Caution 3/8" – Text
Color:	White – Sign Black – Caution and Text lettering Yellow – Caution Background



Figure 30 – Exit Sign

CAUTION – “DO NOT ENTER” SIGN (P/N 02-11777)

Provided to alert personnel that the room is protected by a ProInert (IG-55) system and that they should not enter the area when the alarm sounds or during or after discharge. Sign should be placed adjacent to each audible/visual device outside the protected space and on each entrance door to notify personnel that the ProInert (IG-55) system has discharged.

Overall Size:	14.0" x 7.8" x 0.10" (355.6 mm x 198 mm x 2.54 mm)
Lettering Size:	1-1/2" – Caution 3/8" – Text
Color:	White – Sign Black – Caution and Text lettering Yellow – Caution Background



Figure 31 – “Do Not Enter” Sign

CAUTION - EXIT AREA (P/N 02-11778)

Provided to identify each manual release station associated with the ProInert (IG-55) system as the place where the ProInert (IG-55) system can be manually discharged. This reduces the risk of a manual release station being mistaken for a fire alarm pull station.

Overall Size:	4.0" x 2.25" x 0.10" (101.6 mm x 57.2 mm x 2.54 mm)
Lettering Size:	3/5" – Text
Color:	White – Sign Red – Text lettering

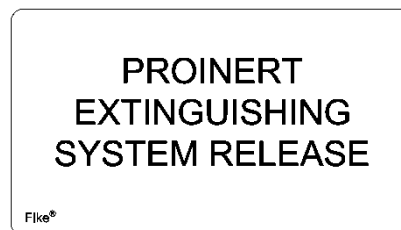


Figure 32 – Exit Area Sign

2.22. Nitrogen Actuator Assembly

The nitrogen actuator assembly consists of a rechargeable nitrogen cylinder, brass valve assembly, pressure gauge and mounting bracket. The stored pressure contained within the assembly's nitrogen cylinder can be used to pneumatically activate the following ProInert system components:

- ProInert valve pneumatic or relay actuator
- Secondary Nitrogen Actuator
- Selector Valve

A completer kit must be purchased separately and installed onto the nitrogen actuator assembly to facilitate electrical/manual, electric or pneumatic activation of the assembly. See Section 2.23, 2.24 and 2.25 for completer kit details.

NOTE: When used for selector valve activation, the nitrogen actuator assembly and required completer kit are supplied with the valve.

Specifications

Nitrogen Cylinder	
Fill Pressure	1800 psig (124 barg)
Volume	28 in ³ (460 ml)
Classification	DOT 3E1800 / TC-3EM 124
Temperature Range	-4°F to 130°F (-20°C to 54°C)
Valve	
Body	Brass
Retaining Clip	SST
Fill Valve Plug	SST
ERD Plug	SST
O-Ring	Polyurethane
Pressure Gauge	
Housing	SST Case, Polycarbonate Lens, Brass Adaptor
Contact Rating	Contacts rated at 333 mA / 30V DC
Electrical Connection	18 AWG 12 inch Leads
Switch Setting	1621 psi (112 bar) decreasing (Normally Open at Operating Pressure)

Ordering

Part Number	Description
70-325-1	Nitrogen Actuator Assembly (Cylinder Pressurized)
70-325-3	Nitrogen Actuator Assembly (Cylinder not Pressurized)

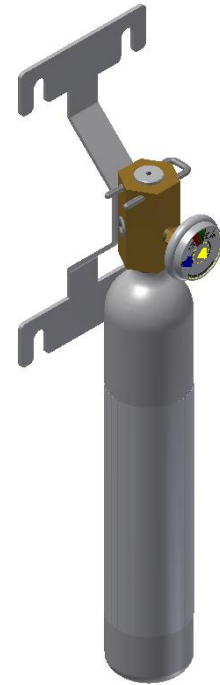


Figure 33 - Nitrogen Actuator Assembly

2.23. UVO Primary Completer Kit

The UVO primary completer kit (P/N IG71-114) provides a means to electrically and manually activate the nitrogen actuator assembly. A UVO, included in the kit, is fitted to the top of the nitrogen actuator assembly. See Section 2.10.

The UVO provides a means to electrically activate the nitrogen actuator assembly via a 24 VDC signal from the control panel and to manually activate the assembly by pressing the red manual strike button on the UVO. Activation of the UVO allows pressure from the nitrogen actuator assembly to flow through a pilot line to the controlled system component resulting in activation.

This combination is commonly used in hazardous rated areas where electrical actuation components are required to be located outside of the protected hazard.

The following parts are included in the completer kit. See Figure 35.

Item No.	Part Number	Description
1	02-13571	Universal Valve Operator (UVO)
2	02-2213	Security Tie
3	02-14627	Universal Valve Operator Supervisor (UVOS)
4	02-13453	36" (914 mm) Hose (1/8 NPT x 1/4 JIC Swivel)
5	02-10797	1/8 NPT x G1/4 Adapter ¹
6	02-10926	1/4" Sealing Washer ¹
7	IG71-026	Vent Valve Assembly ¹

¹ Pilot line vent components shall be installed onto the last pneumatic actuator in the cylinder bank.

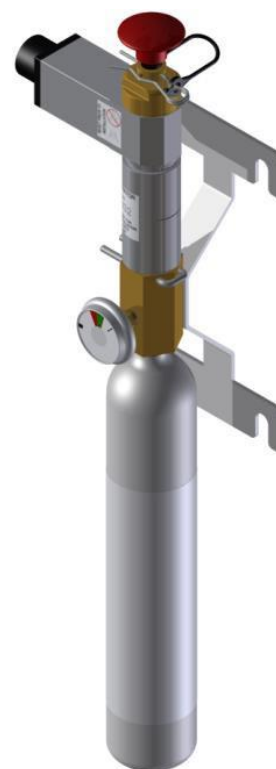


Figure 34 - Nitrogen Actuator Assembly with UVO (Primary)

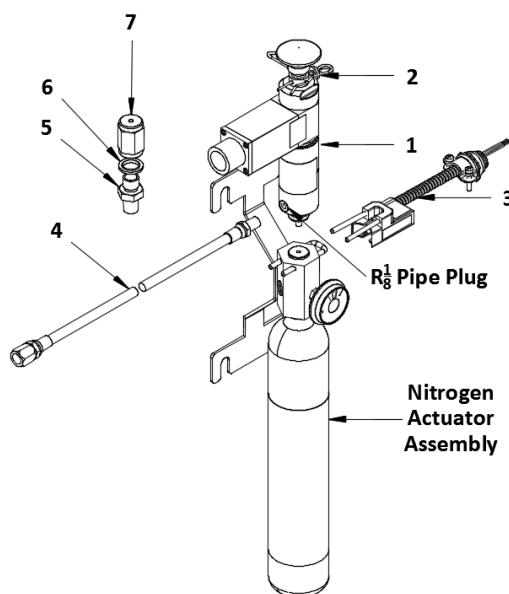


Figure 35 - UVO Primary Completer Kit Components

2.25. Secondary Completer Kit

The secondary completer kit (P/N IG71-115) provides a means to pneumatically activate the nitrogen actuator assembly. See Section 2.22. A pneumatic relay, included in the kit, is fitted to the top of the nitrogen actuator assembly. Pressure from a 'Primary' nitrogen actuator assembly (See Section 2.23 and 2.24) is used to activate the pneumatic relay, which allows pressure from the nitrogen actuator assembly to flow through a pilot line to the controlled system component resulting in activation.

Multiple nitrogen actuator assemblies with secondary completer kits can be daisy chained together to increase the allowable length of the pilot line. The pneumatic relay does not provide a means to manually activate the nitrogen actuator assembly.

The following components are included in the secondary completer kit. See Figure 39.

Item No.	Part Number	Description
1A	IG71-120	Pneumatic Relay
1B	02-11243	1/8 x 1/4 JIC Hex Nipple
1C	02-4977	1/4 JIC x 1/4 JIC Braided Hose
2	02-11731	G1/4(M) x G1/4(F) Swivel x G1/4(M) Tee ¹
3	02-10926	1/4" Sealing Washer ¹
4	IG71-026	Vent Valve Assembly ¹

¹ Pilot line vent components must be installed onto each relay actuator in the cylinder bank.

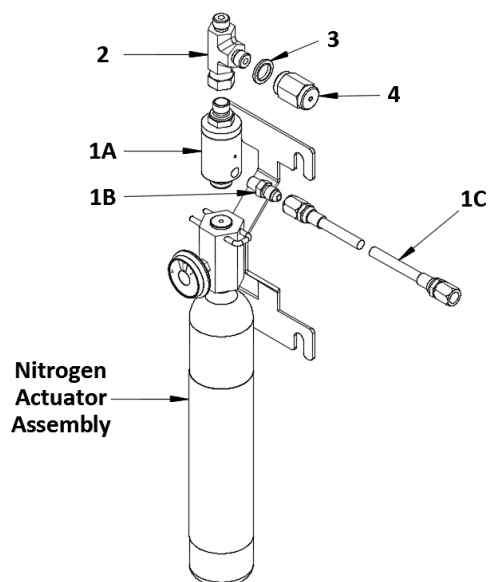


Figure 39 - Secondary Completer Kit Components



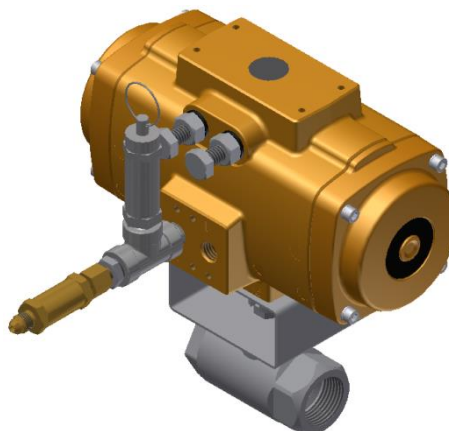
Figure 38 - Nitrogen Actuator Assembly with Pneumatic Relay (Secondary)

2.26. Selector Valve Assembly

Selector valves allow a single agent supply to be utilized for protection of multiple hazards by directing the flow of agent into one specific hazard. This reduces the total amount of agent required to protect multiple hazards. *Selector valve systems can only be used to protect one hazard at a time and will not be effective if two or more hazards are involved in a fire simultaneously.*

Selector valves are closed during normal operation, blocking the flow of agent through the piping network. A release fitting and compatible actuator must be installed in the distribution piping network adjacent to the valve. These components allow the agent discharge pressure from the distribution piping network to be diverted to the selector valve actuator through a pneumatic hose for valve activation. After activation, the selector valve must be manually closed (reset).

It is extremely important that the system designer evaluate the final design concentration that will be reached in each hazard area served by the selector valve system to determine the impact on exposure limitations.



**Figure 40 - Selector Valve Assembly
(Actuation Components not Shown)**

Specifications

Valve	- Standard Port Ball Valve - NPT Threads - Body: Carbon Steel or Stainless Steel - Ball: Stainless Steel - Pressure Rating: 1" (25 mm) = 2000 psi (138 bar) All others = 1500 psi (103 bar)
Actuator	- Rack and Pinion Pneumatic Actuator, ¼ turn, spring return - Pressure Rating: 80 – 142 psi (5.5 – 9.8 bar) - Factory Installed on Ball Valve
Pop-Off Valve	¼" NPT ASME Relief Valve for Air or Gas Service - Set Pressure: 100 psi (6.9 bar) - Relief Capacity: 92 SCFM - Body, Nozzle, Stem and Spring Material: Stainless Steel - Seat Material: Silicone - Conforms to ASME Section VIII Pressure Vessel Code

Ordering

The base selector valve can be ordered separately for replacement purposes as identified in the following table.

Part Number	Description
02-15708-10	Selector Valve, Carbon Steel, 1" NPT
02-15708-15	Selector Valve, Carbon Steel, 1.5" NPT
02-15708-20	Selector Valve, Carbon Steel, 2" NPT
02-15708-30	Selector Valve, Carbon Steel, 3" NPT
02-15709-10	Selector Valve, Stainless Steel, 1" NPT
02-15709-15	Selector Valve, Stainless Steel, 1.5" NPT
02-15709-20	Selector Valve, Stainless Steel, 2" NPT
02-15709-30	Selector Valve, Stainless Steel, 3" NPT

Selector Valve Assembly Ordering Format

The following ordering format must be used to order the selector valve as part of an assembly that includes the components required to install and activate the valve.

Part Number: 70-395-XX-XX	
A BC	
A =	10 – 1" NPT (25 mm) 15 – 1 ½" NPT (40 mm) 20 – 2" NPT (50 mm) 30 – 3" NPT (80 mm)
B =	C – Carbon Steel Body S – Stainless Steel Body
C =	D –Release Fitting with UVO Completer Kit S – Release Fitting with Pneumatic Relay Completer Kit M –Release Fitting with UEA Completer Kit

Part Number	Description	Notes
02-15708-XX-CX	Carbon Steel Selector Valve	Valve material supplied is based on selector valve assembly part number.
02-15709-XX-SX	Stainless Steel Selector Valve	
Each Selector Valve Assembly includes the following parts: IG71-111 Release Fitting		
70-399	Pneumatic Relay Assembly (hose included) ¹	Completer kit supplied is based on selector valve assembly part number.
70-397	Universal Valve Operator (UVO) Kit	
70-398	Universal Energetic Actuator (UEA) Kit	

¹Nitrogen actuator assembly for activation of pneumatic relay must be purchased separately (P/N IG71-114 or IG71-251).

Dimension and Weight Information

Part Number	Size In. (mm)	Type	A	B	C	D	Wt. lb. (kg.)
			In. (mm)				
70-395-10-XX	1 (25)	Threaded	3.37 (86)	1.68 (43)	7.95 (202)	3.34 (85)	7.8 (3.54)
70-395-15-XX	1 ½ (40)	Threaded	4.37 (111)	2.18 (55)	9.05 (230)	3.85 (98)	11.76 (5.33)
70-395-20-XX	2 (50)	Threaded	5.50 (140)	2.75 (70)	10.66 (271)	4.33 (110)	16.67 (7.56)
70-395-30-XX	3 (80)	Threaded	6.75 (171)	3.37 (86)	14.17 (360)	5.51 (140)	30.10 (13.65)

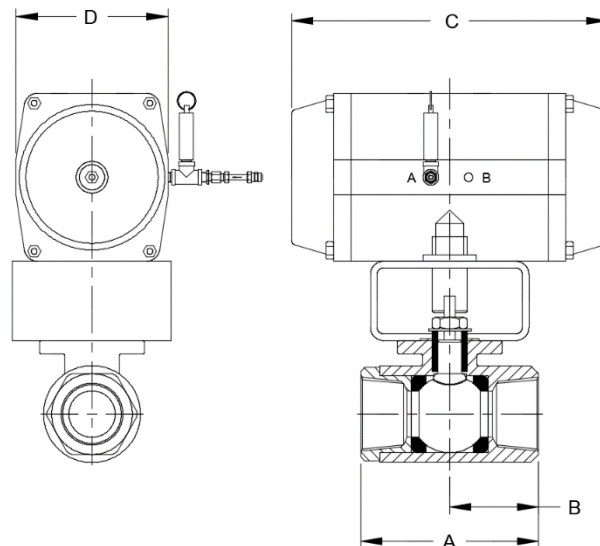


Figure 41 - Selector Valve Dimensions

2.27. Release Fitting

The release fitting (P/N IG71-111) is used in conjunction with a selector valve to facilitate valve activation. The fitting provides a means to utilize the agent discharge pressure from within the piping network to pneumatically activate a selector valve assembly. The release fitting is equipped with ¼" NPT threads to allow it to be installed into the piping network using a standard pipe tee and reducers. The tee must be located upstream and directly adjacent to the selector valve.

The fitting provides a connection point for a universal valve operator (UVO) or universal energetic actuator (UEA). When activated (automatically or manually) these components allow pressure from the piping network to be routed through them to the selector valve via a hose connection causing the valve to open. The UVO or UEA is secured to the release fitting with a universal valve operator supervisor (UVOS).

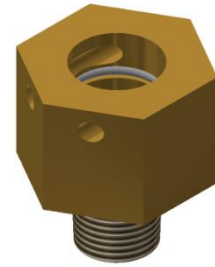


Figure 42 - Release Fitting

Specifications

Material	1 ¼" Hex Brass Body
Thread Size and Type	1/4"-18 NPT (Male)
Valve Core	Schrader Dynamic Operating Pressure: 0 – 200 Bar Static Operating Pressure: 0 – 700 Bar
O-Ring	Polyester Urethane

2.28. Suppression Disconnect Switch

The Suppression Disconnect Switch is used to electrically isolate the releasing device from the associated control panel's releasing circuit. This allows work to be performed in the area protected by the suppression system or on the suppression system itself without the potential for accidental discharge.

The assembly consists of a stainless steel faceplate with etched black text, two-position keyed switch, and normally open and/or normally closed contact blocks. The switch key can only be removed in the ARMED position.

The assembly can be ordered with or without status LEDs (Green – ARMED and Red – DISARMED). The LEDs provide positive indication of the status of the releasing circuit. LEDs require 24 VDC auxiliary power from the associated control panel for operation.

Refer to Fike document 06-472 for switch installation instructions.

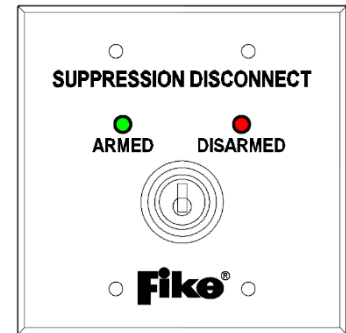


Figure 43 - Disconnect Switch with LEDs

NOTE: NFPA requires that a listed disconnect switch be installed on all electrically activated suppression systems to prevent false discharges when the system is being tested or serviced. Upon activation, the switch shall cause a supervisory signal at the control panel.

Specifications

Input Voltage	15 – 30 VDC
Current	0 mA (no LEDs) 13.1 mA (LED active)
Circuit Limitations	Class B only
Contact Ratings	8A @ 24 VDC resistive 4A @ 24 VDC inductive
Operating Temperature	32 to 120°F (0 to 49°C)
Operating Humidity	93% RH
Weight	0.55 lb. (0.25 kg)

Ordering

Part Number	Description
10-2698	Suppression Disconnect Switch, no LEDs
10-2699	Suppression Disconnect Switch, with LEDs
02-2153	Two-gang masonry box, 2.5" deep (RACO 691 or equal) used with 10-2698 switch
02-11881	Two-gang masonry box, 3" deep (RACO 696 or equal) used with 10-2699 switch

Spare Parts

Part Number	Description	Part Number	Description
02-12294	Double contact block (2 NC)	02-12315	3 block switch
02-12295	Double contact block (2 NO)	02-12316	Single contact block (NC)
02-12296	Replacement keys	02-12318	Locking ring wrench
02-12298	5 block switch	10-2714	Cover plate, no LED holes
02-12300	Single contact block (NO)		

3. SYSTEM DESIGN

The following is a summary of the steps necessary to design a Fike ProInert (IG-55) Clean Agent Fire Suppression System within the limitations established by Fike's UL / ULC listing, FM approval and in compliance with NFPA 2001.

3.1. Pressure Relief / Room Venting

Inert gas fire suppression systems extinguish fires by reducing the level of oxygen to a point where combustion of the flammables cannot be maintained. The amount of gas discharged into the hazard results in a positive pressure, which displaces the air from the room. Suitable means of pressure relief/venting shall always be used in order to avoid structural damage to the building and equipment.

NOTE: Normal room construction will typically withstand an increase in pressure of approximately 5 lbs/ft².

Items that must be considered:

- The pressure relief / room vents must open at a pressure at least half of the structural rating of the enclosure.
- At the end of system discharge, the pressure relief / room vents need to close in order to maintain the minimum concentration as long as possible.
- The pressure relief / room vents should be located on the ceiling, clear of any direct nozzle discharge, or at as high a level as possible on a side wall.
- Each separate enclosure within the protected space must be equipped with its own pressure relief vent device. The pressure relief device must be sufficiently sized taking into account the allowable overpressure in the room.
- The pressure relief/vent area calculation shall be made part of the system documentation and issued to owner for information and compliance.
- It shall also be noted that over-pressure will affect the opening of doors into the room. If the door opens inward and the room is pressurized, it may be almost impossible to open the door. If the door opens outward from a pressurized room, the door may open in a face with a tremendous force as soon as the doorknob is turned.
- Should the pressure relief / room vent be taken to an adjacent room not provided with a pressure relief/vent, this room shall be at least 10 times the volume of the protected enclosure. The products of combustion will be spread to this room, which may affect personnel and any fire detection system.

IMPORTANT NOTES:

The relief vent area required is calculated by Fike Flow Calculation Software program. The pressure relief / vent(s) must be installed prior to the ProInert system being put into operation. The Fike Flow Calculation Software program assumes that the pressure relief / vent(s) are directly venting outdoors or a substantially larger (10 times) volume room. If ducting is used, additional pressure relief / vent area may be required.

Fike does not take any responsibility for verification of weak points that might be in the enclosure construction. Examples of weak points may be: windows, door frames, ceilings etc.

3.2. Determine Hazard Classification

Hazard classification generally falls into one of the three following categories and sometimes a combination thereof. The hazard classification for each protected hazard must be determined in order to select the correct minimum design concentration for determining agent quantity.

- Class A Fires involving ordinary combustible materials, such as wood, cloth, paper, rubber and many plastics (anything that leaves an ash residue after combustion).
- Class B Fires involving flammable liquids, combustible liquids, petroleum greases, tars, oils, oil-based paints, solvents, lacquers, alcohols, and flammable gases.
- Class C Fires involving energized electrical equipment.

3.3. Determine Enclosure Volume

The volume of each hazard to be protected must be calculated by multiplying the enclosure length by the enclosure width to determine the area, and then multiply the area by the enclosure height to determine the volume for each hazard area. If any area is an odd shape, it may need to be divided up into regular shapes that will allow volume calculations. Then, total all of the volumes together to determine the actual volume of the entire area to be protected. If the odd shape of the area will affect the distribution of agent, it may be best to calculate sections of the hazard as separate areas and include nozzles for each of these areas. Volumes that are open to the area being protected (e.g., non-dampened ductwork, unclosable openings, etc.) must be added to the calculated volume.

If the ceiling height exceeds the maximum allowable ceiling height allowed for the nozzle selected, multiple levels of nozzles must be designed into the system. In this case, it is usually beneficial to treat each level as a separate protected area so that proper agent distribution is achieved.

3.4. Calculate Reduced Volume

As a general rule, the enclosure volume should be based on the empty (gross) volume. However, the volume of solid, non-permeable objects in each hazard area that are not removable can be deducted from the volume of the hazard. This includes columns, beams, normally closed closets, ducts that pass completely through the hazard area without any openings, and any other permanently fixed objects that cannot be removed from the hazard enclosure. Any object that can be removed from the hazard area CANNOT be deducted from the total hazard volume.

Calculate the volume of all solid, permanent objects and add them together for each hazard area to determine the volume that can be deducted from the total volume of the hazard area. Subtract the solid object volume from the total volume to determine the reduced volume.

3.5. Determine Minimum Design Concentration

Using the hazard classification (Class A, B or C) determined for each protected hazard, use the following table to determine the minimum design concentration that must be used for a particular hazard.

Hazard Classification	Minimum Design Concentration	NOTES
Class A	35%	Clean Agent System incorporates a detection & control system to automatically discharge agent.
Class C	39.3%	When energized electrical hazard remains powered during/after agent discharge and the clean agent system incorporates a detection & control system to automatically discharge agent.
Class B (Heptane)	46.3%	For design concentrations of other Class B (flammable liquids), consult Fike's Product Support group.

CAUTION: Fike's Prolnert system cannot be used in applications where the design concentration required is above 52%.

3.6. Determine Minimum Quantity of Agent Required

To determine the minimum quantity of agent required, determine the minimum design temperature for each hazard being protected and determine the minimum design concentration required for the material to be extinguished. Minimum design temperature is defined as the minimum anticipated temperature in the enclosure during normal conditions and is usually determined by the environmental conditions or the air handling system. This temperature is used in the design because it typically represents the worst case scenario, requiring the highest amount of agent.

Plug the temperature and design concentration values into the following formula to determine the minimum design quantity of agent required for the hazard. The amount of agent in the system must always be at least this much and may be exceeded. Failure to supply the minimum amount of agent calculated may inhibit the system from suppressing a fire.

The minimum design quantity of agent needed can be determined using the following formula:

$$X = 2.303 \left(\frac{V_s}{S} \right) \log_{10} \left(\frac{100}{100-C} \right)$$

Where:

X [agent volume requirements (lb/ft³) (kg/m³)] = volume of agent required per cubic foot (cubic meter) of protected volume to produce the indicated concentration at temperature specified.

t [temperature (°F) (°C)] = the design temperature in the hazard area.

S [specific volume (lb/ft³) (kg/m³)] = specific volume of superheated IG-55 vapor can be approximated by the formula:

$$(\text{°F}) \quad s = 9.8809 + 0.0215t$$

$$(\text{°C}) \quad s = 0.6598 + 0.00242t$$

C [concentration (%)] = volumetric concentration of IG-55 in air at the temperature indicated.

V_s = the term $X = \ln [100 / (100-C)]$ gives the volume at a rated concentration (%) and temperature to reach an air-agent mixture at the end of flooding time in a volume of 1 ft³ (1 m³).

The second option for calculating the minimum quantity of agent required is to use the Flooding Factors Table below. To use these tables, start by locating the minimum design temperature in the left column, follow this line across until you reach the column for the minimum design concentration needed for the design. The number listed in the cell where the temperature line and concentration column meet is the flooding factor to be used.

To determine the minimum quantity of agent required, multiply the hazard volume by the flooding factor determined from the tables below. Repeat this step for each area protected by the system.

FLOODING FACTORS – Agent vs. Temperature Charts (English Units)							
Temp. (t) (°F) ^c	Specific Vapor Volume(s) (ft ³ /lb) ^d	Volume Requirements of Agent per Unit Volume of Hazard (V _{agent} /V _{enclosure}) ^b					
		IG-55 Design Concentration (% by Volume) ^e					
		35	39.3	42	46.3	50	52
30	10.52577	0.466	0.540	0.589	0.673	0.750	0.794
40	10.74073	0.457	0.529	0.577	0.659	0.735	0.778
50	10.95568	0.448	0.519	0.566	0.646	0.720	0.763
60	11.17064	0.439	0.509	0.555	0.634	0.706	0.748
70	11.38560	0.431	0.499	0.545	0.622	0.693	0.734
80	11.60055	0.423	0.490	0.535	0.610	0.680	0.720
90	11.81551	0.415	0.481	0.525	0.599	0.668	0.707
100	12.03046	0.408	0.472	0.516	0.588	0.656	0.695
110	12.24542	0.401	0.464	0.506	0.578	0.644	0.682
120	12.46038	0.394	0.456	0.498	0.568	0.633	0.671
130	12.67533	0.387	0.448	0.489	0.558	0.623	0.659

FLOODING FACTORS – Agent vs. Temperature Charts (Metric Units)							
Temp. (t) (°C) ^c	Specific Vapor Volume(s) (m ³ /kg) ^d	Volume Requirements of Agent per Unit Volume of Hazard (V _{agent} /V _{enclosure}) ^b					
		IG-55 Design Concentration (% by Volume) ^e					
		35	39.3	42	46.3	50	52
0	0.65979	0.464	0.538	0.587	0.670	0.747	0.791
5	0.67186	0.456	0.528	0.576	0.658	0.733	0.776
10	0.68394	0.448	0.519	0.566	0.646	0.720	0.763
15	0.69602	0.440	0.510	0.556	0.635	0.708	0.749
20	0.70810	0.432	0.501	0.547	0.624	0.696	0.736
25	0.72017	0.425	0.493	0.537	0.613	0.684	0.724
30	0.73225	0.418	0.484	0.529	0.603	0.673	0.712
35	0.74433	0.411	0.477	0.520	0.593	0.662	0.701
40	0.75641	0.405	0.469	0.512	0.584	0.651	0.689
45	0.76848	0.398	0.462	0.504	0.575	0.641	0.679
50	0.78056	0.392	0.454	0.496	0.566	0.631	0.668
55	0.79264	0.386	0.447	0.488	0.557	0.621	0.658

^a The manufacturer's listing specifies the temperature range for operation.

^b X [agent weight requirements (ft³/ft³) or (m³/m³)] = volume of agent required per ft³ (m³) of protected volume needed to produce the indicated concentration at the temperature specified.

$$X = 2.303 \left(\frac{S_0}{s} \right) \log_{10} \left(\frac{100}{100-C} \right) = \left(\frac{S_0}{s} \right) \ln \left(\frac{100}{100-C} \right)$$

^t [temperature (°F) or (°C)] = the design temperature in the hazard area.

^d s [specific volume (ft³/lb)] = specific volume of superheated IG-55 vapor as approximated by the formula: $s = 9.8809 + 0.0215(t)$

s [specific volume (m³/kg)] = specific volume of superheated IG-55 vapor as approximated by the formula: $s = 0.6598 + 0.000242(t)$

^e c [concentration (%)] = volumetric concentration of IG-55 in air at the temperature indicated.

3.7. Apply Altitude Correction Factor

The design quantity of clean agent shall be adjusted to compensate for ambient pressures that vary more than 11 percent [equivalent to approximately 3000 ft. (915 m) of elevation change] from standard sea level pressures. An increase in altitude causes the agent to expand and occupy more space, which will lead to a higher concentration if the agent quantity is not adjusted accordingly. A decrease in altitude will cause the opposite effect, increasing the quantity of agent required.

To make the necessary adjustments, first look up the altitude or pressure of the hazard in the following Altitude Correction Factors table; then, multiply the quantity of agent required for each hazard, as determined in the previous steps, by the altitude correction factor.

ALTITUDE CORRECTION FACTORS				
Equivalent Altitude		Enclosure Pressure (Absolute)		Atmospheric Correction Factor
Feet	Kilometer	PSI	mm Hg	
-3,000	-0.92	16.25	840	1.11
-2,000	-0.61	15.71	812	1.07
-1,000	-0.30	15.23	787	1.04
0	0.00	14.71	760	1.00
1,000	0.30	14.18	733	0.96
2,000	0.61	13.64	705	0.93
3,000	0.91	13.12	679	0.89
4,000	1.22	12.58	650	0.86
5,000	1.52	12.04	622	0.82
6,000	1.83	11.53	596	0.78
7,000	2.13	11.03	570	0.75
8,000	2.45	10.64	550	0.72
9,000	2.74	10.22	528	0.69
10,000	3.05	9.77	505	0.66

NOTE: The IG-55 flow calculation program will automatically calculate the agent required based on the altitude correction factor entered.

3.8. Select System Design Concept

The ProInert system can be designed to deliver the agent to the protected area(s) using one or more of the following piping distribution methods. The method used may depend on several factors including: installation time, the quantity of agent involved, economic factors, number of hazard areas, available space for placement of storage cylinders and customer preferences. Larger projects may require the use of more than one method to address the challenges presented. Therefore, the designer should be familiar with each of these methods and the advantages and disadvantages of each for any particular application.

- 1) Modular System – Individual cylinders are strategically located throughout or around the protected area(s) with each having a dedicated piping system and nozzles to distribute the clean agent supply. This arrangement keeps the discharge piping requirements down to a minimum, but increases the electrical materials necessary to reach each individual cylinder location.

A modular approach is often desirable (or necessary) for larger applications to reduce the amount of piping materials and installation labor necessary to complete the project. In some instances, this approach will be necessary in order to make the system flow the agent required within the design guidelines identified for an Engineered system.

- 2) Central Storage System – All cylinders are located in one location with each having a dedicated piping system and nozzles to distribute the clean agent supply to the protected space(s) from this location. This concept often requires more discharge piping, but it decreases the electrical materials necessary to reach the singular cylinder(s) location. This concept may be more difficult to design due to the increased piping runs involved and the installation labor will tend to be more costly.
- 3) Selector Valve System – A single agent supply is provided to protect multiple hazards by utilizing selector valves and dedicated piping systems to direct the flow of agent into the affected hazard area. By providing a central agent supply sized to protect the largest hazard area, the total amount of agent required to protect multiple hazards is reduced. All cylinders are located in one location and are connected together via a manifold. All cylinders connected to the manifold must be the same size with the same fill density. This concept often requires more discharge piping, but it decreases the electrical materials necessary to reach the singular cylinder(s) location. This concept may be more difficult to design due to the increased piping runs involved and the installation labor will tend to be more costly. Selector Valve systems can only provide protection for a single hazard at a time and will not be effective if more than one hazard is involved in a fire. See Section 4.3.4 for cylinder manifold configurations.
- 4) Main/Reserve System – A connected reserve agent supply is installed to provide immediate protection of the hazard should the primary supply be discharged. The main/reserve cylinder(s) are manifolded together with check valves to allow either cylinder to be removed from service without impacting the operation of the suppression system. Main and reserve cylinders must be the same size with the same fill density. See Section 4.3.4 for cylinder manifold configurations.

NOTE: All system design concepts described above require Engineered flow calculations.
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3.9. Select System Actuation Method

There are two basic methods of activating a Fike Prolnert system: 1) UVO or UEA connected directly to the Prolnert cylinder valve or 2) Nitrogen actuator with UVO or UEA. The selection of the actuation method typically depends upon the classification of the hazard being protected.

3.9.1. System Actuation Using UVO or UEA Connected to Cylinder Valve

This actuation method utilizes a UVO or UEA 'Primary' completer kit attached to the first cylinder in the bank to activate the Prolnert system. This is the most common method for activating the Prolnert system.

With this method, the UVO or UEA is electrically actuated by the Fike releasing panel. The UVO also provides a means to manually activate the system using the red strike button provided on the actuator. The UEA does not provide a means to manually activate the system. Upon activation of the UVO/UEA, pressure from the 'Primary' cylinder the actuator is connected to is routed through the pilot line to the downstream cylinders for valve activation. Up to 60 cylinders can be pneumatically activated by a single 'Primary' cylinder. Where the total number of cylinders required exceeds 60, a relay actuator must be installed on the 61 cylinder to create an additional 'Primary' cylinder. This allows an additional 60 cylinders to be connected to the system. Refer to Appendix E for relay actuator requirements.

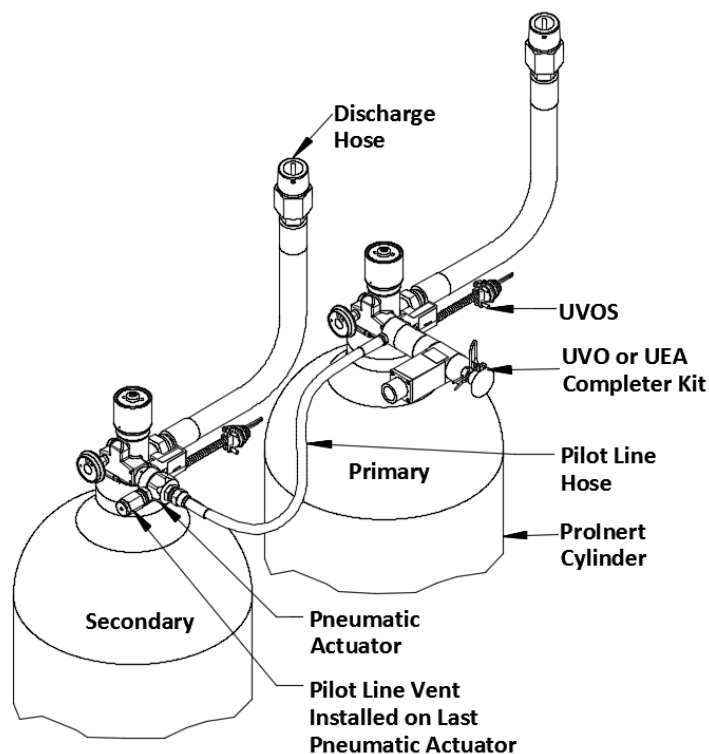


Figure 44 – System Activation Using UVO or UEA

3.9.2. System Actuation Using Nitrogen Actuators

This actuation method utilizes a UVO 'Primary' nitrogen actuator assembly (P/N IG71-114) or UEA 'Primary' nitrogen actuator assembly (P/N IG71-251) for system activation. This actuation method is most commonly used in hazardous rated areas where electrical actuation components are required to be located outside of the protected hazard.

With this method, the UVO or UEA is electrically actuated by the Fike releasing panel. The UVO also provides a means to manually activate the system using the red strike button provided on the actuator. The UEA does not provide a means to manually activate the system. Upon activation of the UVO/UEA, pressure from the 'Primary' nitrogen actuator is routed through the pilot line to the relay actuator installed on the first ProInert cylinder for valve activation. The pressure from the cylinder the relay actuator is connected to is used to pneumatically activate up to 60 ProInert cylinders. Where the total number of cylinders exceeds 60, a relay actuator must be installed on the 61 cylinder to create an additional 'Primary' cylinder. This allows an additional 60 cylinders to be connected to the system. Refer to Appendix E for relay actuator requirements.

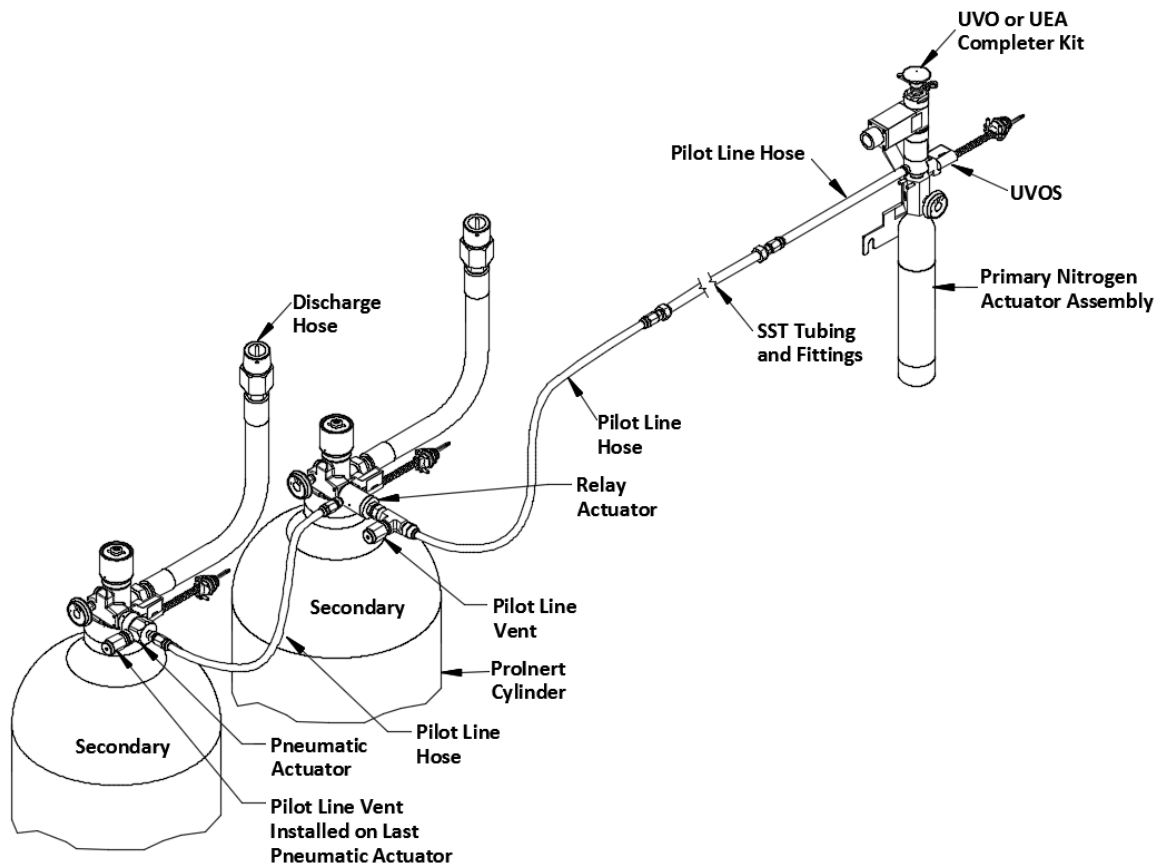


Figure 45 – System Actuation Using Nitrogen Actuator Assembly

Pilot Line Limitations:

- 1) Maximum 150 ft. (45 m) between 'Primary' nitrogen actuator and the first ProInert cylinder equipped with relay actuator.
- 2) Tubing (supplied by others) shall be 1/4" x 0.035" wall stainless steel.
- 3) Pilot line hoses supplied by Fike.

NOTE: For projects that require the 'Primary' nitrogen actuator to be located further than 150 ft. (45 m) away from the cylinder bank, 'Secondary' nitrogen actuators can be inserted into the pilot line to increase the allowable distance between the 'Primary' nitrogen actuator and the first ProInert cylinder. Call Fike for additional information.

3.10. Selector Valve Option

To reduce the total amount of agent required to protect multiple hazards, the designer may want to consider using a selector valve system. The selector valve system utilizes a common agent supply sized to protect the largest hazard volume the suppression system serves. Selector valves with dedicated piping are installed for each hazard area. When the system activates, the selector valve will open to direct the agent flow to the affected hazard.

There are two methods for activating a selector valve. Both methods utilize the pressure from the system discharge to actuate the selector valve.

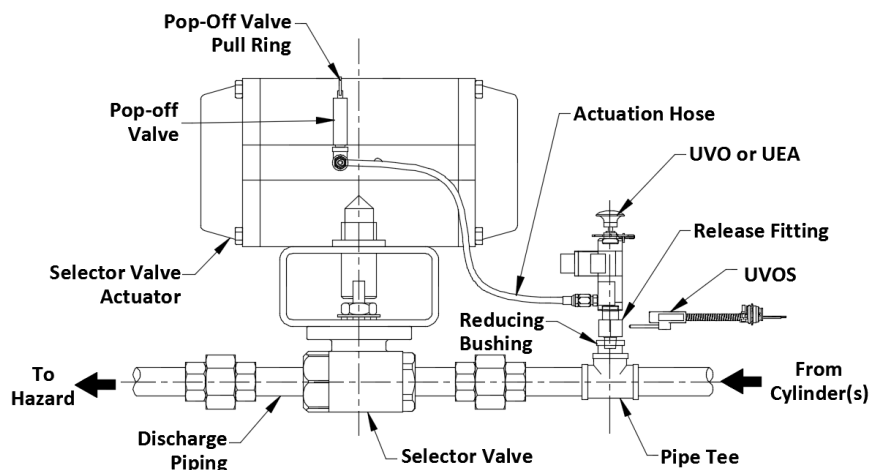


Figure 46 - Selector Valve Activation using UVO and Release Fitting

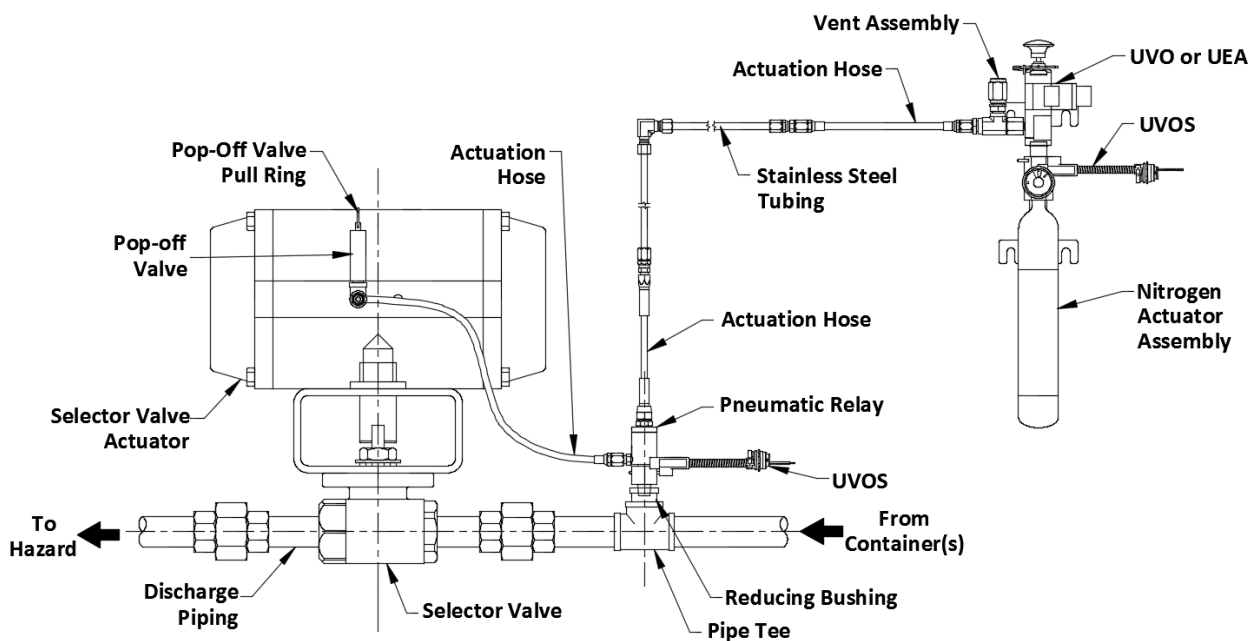


Figure 47 - Selector Valve Activation using Pneumatic Relay

The use of the nitrogen actuator assembly to operate the selector valve, as shown above, is most commonly used where the selector valve is located in an explosion rated space and electric devices cannot be installed within the hazard. The nitrogen actuator, UVO/UEA and actuation hose connections to the pneumatic relay are not included with the selector valve assembly and must be ordered separately.

IMPORTANT NOTE: Selector valve systems can only be used to protect one hazard at a time and will not be effective if two or more hazards are involved in a fire simultaneously.

3.11. Determine Cylinder Locations

The location of the agent cylinder(s) must be based on the following considerations:

- 1) Cylinder(s) must be installed in area that is capable of maintaining an ambient temperature of -4 to 120°F (-20 to 49°C). At temperatures outside this range, the system may not supply the desired quantity of agent or may accidentally discharge due to over-pressure. The IG-55 flow calculation program predictions are based on a cylinder storage temperature range of 60 to 80°F (16 to 27°C).
- 2) The gross weight of the cylinder(s) must be considered when selecting the cylinder location. The floor must be able to support the total weight of the cylinder(s) as they are moved into position. Excessive floor loading may require relocating the cylinder(s) to a more suitable location.
- 3) Cylinder(s) should be located to allow easy accessibility to the actuation package for manual release of the system. Manual release of the system is achieved by removing the locking pin from the UVO and pressing the red manual activation strike knob adjacent to the electric solenoid. This will initiate the pneumatic discharge sequence.
- 4) Cylinder(s) should be located in a clean, dry, and relatively vibration free area. Avoid aisle ways and other high traffic areas where physical damage or tampering is more likely.
- 5) Cylinder(s) should not be located where they would be subject to physical damage, exposure to corrosive chemicals, or harsh weather conditions. Cylinder(s) should not be located where they could potentially be splashed or submerged with any liquid.
- 6) Cylinder(s) should be located where they can be easily accessed for maintenance and service.

3.12. Determine Nozzle Quantity and Placement

Nozzle quantity and placement within each hazard being protected will be determined by many factors, such as size and configuration of the hazard area, height of the ceiling, flow rates through the nozzles, nozzle area coverage, etc. At a minimum, at least one nozzle shall be provided for each hazard area.

All nozzles used on the IG-55 system are required to discharge 95% of the minimum design concentration within a maximum of 60 seconds (1 minute). In addition, the minimum total system discharge time shall be greater than 50 seconds and shall not exceed 70 seconds.

Each size nozzle is capable of delivering a defined flow rate. To estimate the minimum number and size of nozzles required for each area, divide the total quantity of agent required for the protected hazard by 70 seconds to determine the hazards total flow rate; then, use the nozzle flow rate table below to select the nozzle size best suited to provide the required flow rate. More than one nozzle may be required for each protected hazard.

If the flow rate approaches the top end of the allowable flow rate for a given size pipe, it may be in the designer's best interest to increase the pipe size.

NOZZLE FLOW RATES		
Nominal Pipe Size NPT (mm)	Minimum Design Flow Rate (System Limitation) ft ³ /min (m ³ /min)	Maximum Design Flow Rate (Estimate Only) ft ³ /min (m ³ /min)
1/2" (15)	34 (1.0)	654 (18.5)
3/4" (20)	75 (2.1)	1148 (32.5)
1" (25)	128 (3.6)	1860 (52.7)
1 1/4" (32)	199 (5.6)	3000 (84.4)
1 1/2" (40)	287 (8.1)	4381 (124.1)
2" (50)	474 (13.4)	7178 (202.0)

NOTE: The values listed in the table are provided for estimation purposes only. The final system design MUST be verified using the Fike IG-55 Flow Calculation Program.

3.12.1. Evaluate Nozzle Area Coverage

When determining the required quantity of nozzles for each protected hazard, the designer must consider the area coverage limitations of each nozzle. Each nozzle type (180° or 360°) has been UL Listed and FM Approved for the maximum area coverage limitations listed below.

The maximum area coverage is expressed as a radius (“R”) of coverage along the discharge axis for both nozzle types.

Nozzle Size – 1/2" to 2" (15 mm to 50 mm)		
Nozzle Type	Radius “R” Dimension ft. (m)	Ceiling Height Range ft. (m)
180°	40 (12.2)	1.0 to 16.0 (0.3 to 4.9)
360°	25.4 (7.7)	1.0 to 16.0 (0.3 to 4.9)

Maximum Distance	180° Nozzle ft. (m)	360° Nozzle ft. (m)	Note
Below Ceiling	1.0 (0.3)	1.0 (0.3)	Maximum distance above highest point of protection when stacking nozzles.
Away from Sidewall	1.0 (0.3)	---	

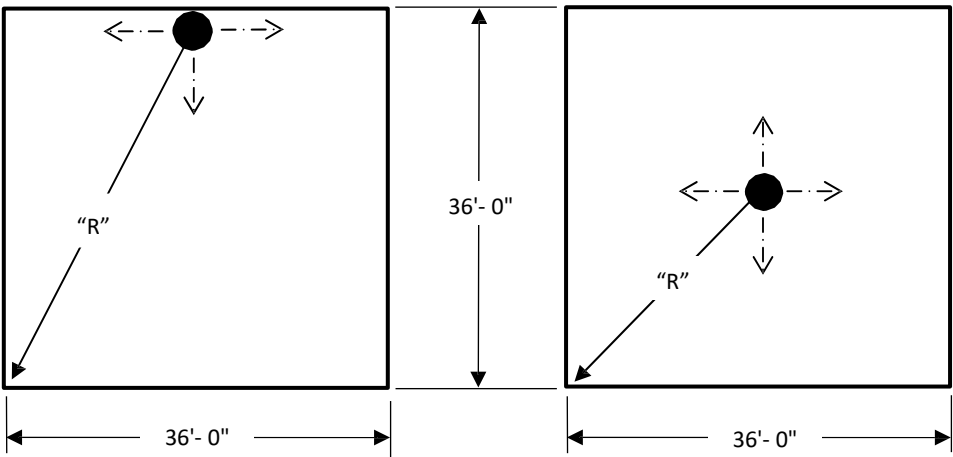


Figure 48 - Nozzle Area Coverage

Nozzle Placement Recommendations

All nozzles should be located in a symmetrical, or near symmetrical, pattern within the protected area. Nozzle patterns need to overlap, to adequately cover the area without any “blind spots” due to nozzle locations.

360° Nozzles

360° nozzles are designed to be located on, or near, the centerline of the protected area, discharging toward the perimeter of the area being covered. The system designer should lay out the nozzles on a floor plan and verify that the entire area being protected is adequately covered without any “blind spots” due to nozzle locations.

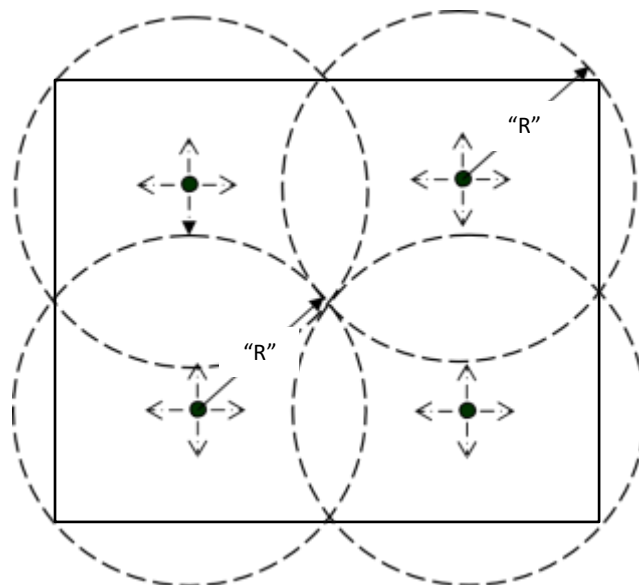


Figure 49 - 360° Nozzle Placement

180° Nozzles

180° nozzles should be located along the perimeter of the area – discharging along the perimeter and toward the opposite side. These nozzles can be located a maximum of 1'-0" (0.3 m) out from the wall.

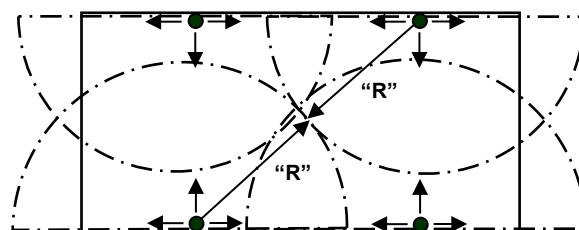


Figure 50 - 180° Nozzle Placement

180° Nozzles – Back-to-Back Application

180° nozzles can also be installed in “Back-to-Back” applications. The distance between nozzles can be a maximum of 3.0' (0.9 m), this allows 35.0' (10.7 m) radius “R” to be used.

NOTE: The use of 180° nozzles in a back-to-back configuration is UL Listed but not FM Approved.

NOTE: Clip all ceiling tiles in the protected enclosure to avoid ceiling tiles from being lifted during agent discharge.

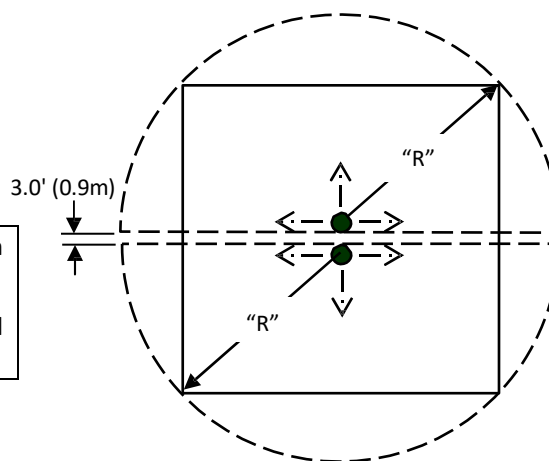


Figure 51 - 180° Nozzle Placement
(Back-to-Back)

3.12.2. Evaluate Nozzle Quantity Based on Enclosure Ceiling Height

When determining the required quantity of nozzles for each protected hazard, the designer must consider the ceiling height limitations for the nozzles. Each nozzle type (180° or 360°) has been UL Listed and FM Approved for enclosures with a ceiling height of 16.0 ft. (5 m). Ceiling heights greater than 16.0 ft. (5 m) to 32.0 ft. (10 m) require nozzles to be placed at multiple levels (elevations) in segments no greater than 16.0 ft. (5 m) in elevation.

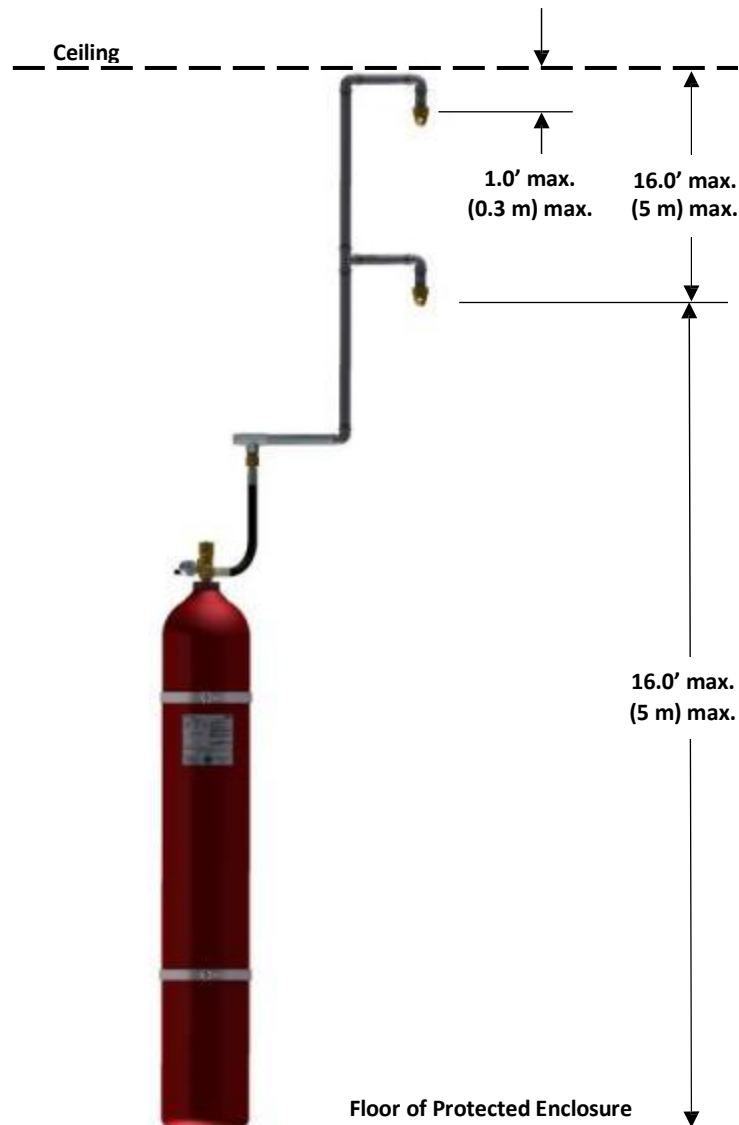


Figure 52 - Nozzle Levels for Enclosure Greater than 16.0 ft. (5 m)

3.12.3. Evaluate Nozzle Discharge Obstructions

Walls, partitions, dense equipment racks and tall equipment can make area coverage obstructions for nozzle discharges. For this reason, the discharge path of the nozzles must also be taken into account when determining the quantity of nozzles required.

Any time solid obstructions extend to where they could interfere with the “line-of-sight” discharge path from the nozzle, they should be treated as separate areas. All nozzles should be located in a manner that will provide a clear discharge path that reaches all of the outer extremes for the protected space.

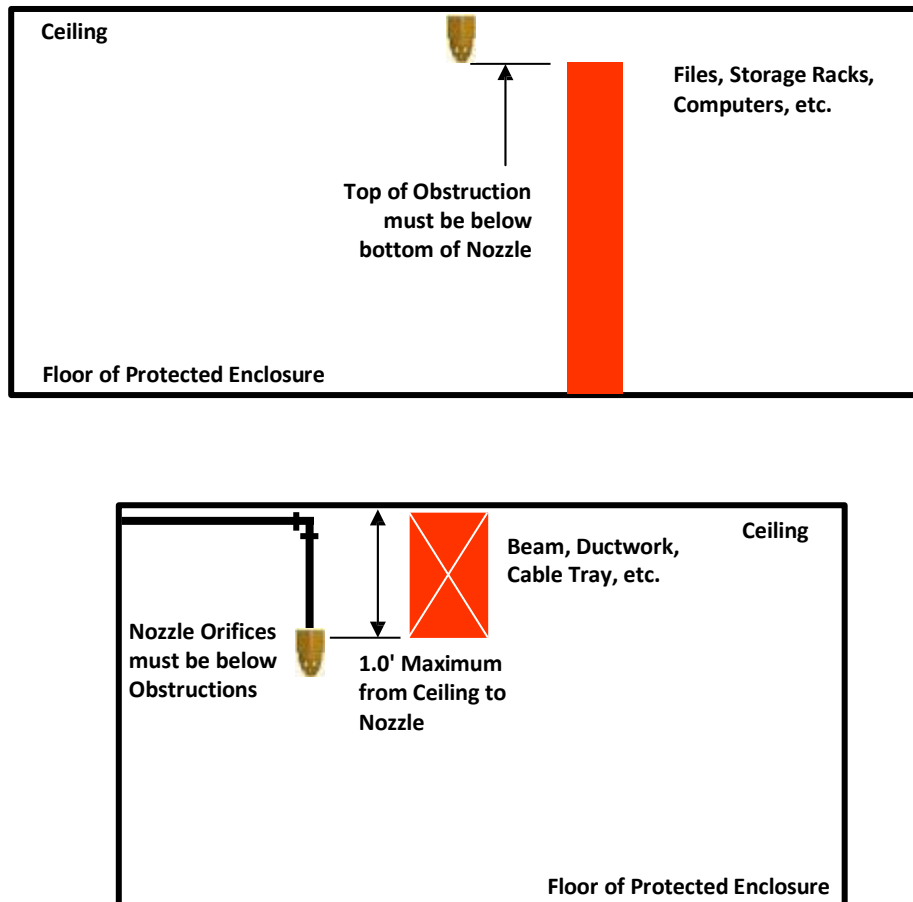


Figure 53 - Evaluating Nozzle Discharge Obstructions

3.13. Determine Piping Layout

Using a plan view drawing of the protected areas, locate each nozzle(s) and cylinder(s); then connect the nozzles together with piping.

3.13.1. Evaluate Minimum Piping Distances

The distance from the cylinder(s) or end of the cylinder manifold to the first tee must be a minimum of ten pipe diameters. This rule does NOT apply to any other fitting configuration.

10 PIPE DIAMETERS VS. PIPE SIZE			
Pipe Size (NPT)	Minimum Length (in)	Pipe Size (mm)	Minimum Length (mm)
1/2"	5	15	127
3/4"	8	20	204
1"	10	25	254
1-1/4"	12	32	305
1-1/2"	15	40	381
2"	20	50	508
2-1/2"	25	65	635
3"	30	80	762
4"	40	100	1016
5"	50	125	1270
6"	60	150	1524
8"	80	200	2032

3.13.2. Minimum Piping Distance Between Tees

The minimum distance between tees shall not be less than 4 inches (0.10 m). This rule does NOT apply to any other fitting configuration.

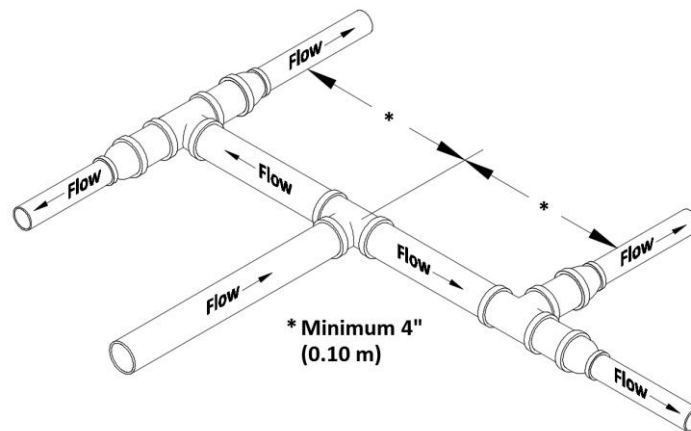


Figure 54 - Minimum Piping Distance Between Tees

3.13.3. Evaluate Tee Split Ratios

Engineered IG-55 systems have been tested to define the maximum degree of imbalance that can be predicted at piping tee splits. This value is expressed in terms of a split ratio of one outlet branch versus the other as illustrated below.

TEE CONFIGURATION – BULLHEAD

Definition: Where the two-outlet branches change direction from the incoming piping inlet.



Figure 55 - Bullhead Tee Configurations

TEE CONFIGURATION – SIDE-THRU

Definition: Where one outlet branch changes direction from the inlet and the other continues straight through in the same direction as the inlet.

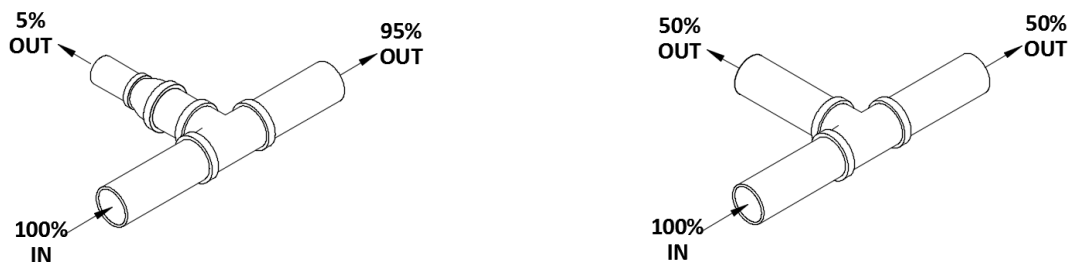


Figure 56 - Correct T-Split Ratios

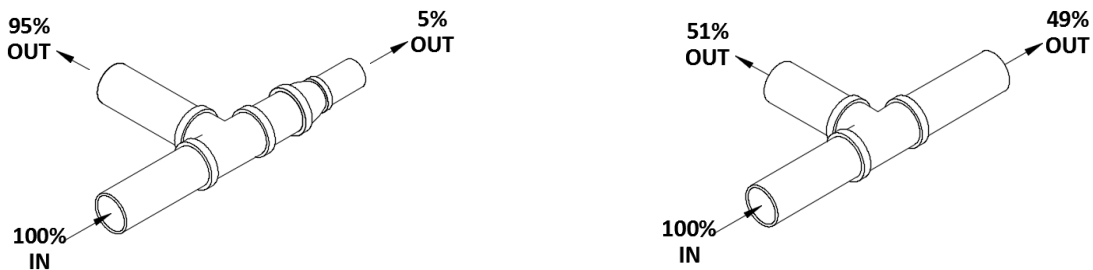


Figure 57 - Incorrect T-Split Ratios

3.13.4. Tee Orientation

Tee orientation on a Fike Engineered Prolnert system is NOT a factor. Both tee inlets and outlets can be in either the vertical or horizontal planes.

3.14. Estimate Pipe Sizes

The IG-55 flow calculation program will estimate pipe sizes automatically; therefore, this step is optional. However, the designer may wish to use the following pipe size estimation chart to estimate the nozzle pipe sizes for quotation purposes.

Pipe size estimations are based on the design flow rate for each pipe section. To determine the flow rate of a pipe section, divide the amount of agent flowing through the pipe section by the discharge time (50 to 70 seconds).

PIPE SIZE ESTIMATING TABLE (Schedule 40)					
English Pipe Sizes			Metric Pipe Sizes		
Pipe Size NPT	Min. Design Flow Rate (Limitation) (ft ³ /min)	Max. Design Flow Rate (Estimate) (ft ³ /min)	Pipe Size Metric	Min. Design Flow Rate (Limitation) (m ³ /min)	Max. Design Flow Rate (Estimate) (m ³ /min)
1/2"	34	654	15 mm	1.0	18.5
3/4"	75	1148	20 mm	2.1	32.5
1"	128	1860	25 mm	2.6	52.7
1-1/4"	216	3219	32 mm	6.1	91.2
1-1/2"	287	4381	40 mm	8.1	124.1
2"	453	7221	50 mm	12.8	204.5
2-1/2"	629	10303	65 mm	17.8	291.7
3"	950	15908	80mm	26.9	450.5
4"	1634	27394	100 mm	46.3	775.7
5"	2633	43050	125 mm	74.6	1219.0
6"	3952	62168	150 mm	111.9	1760.4
8"	7485	107652	200 mm	212.0	3048.4

Generally, the size selection should be based on the smallest pipe size that will handle the design flow rate for the branch lines supplying the discharge nozzles and the next to smallest for trunk lines. If the flow rate approaches the top end of the allowable flow rate for a given pipe size, it may be necessary to increase the pipe size.

WARNING: DO NOT install the piping system based on the pipe size estimates from the chart above. The pipe system design must be verified using the IG-55 Flow Calculation program prior to installing the system.

3.15. Apply Tee Design Factor

When a single agent supply is being used to protect multiple hazards, a tee design factor is applied when more than four tees are used. This step is not applicable to Pre-Engineered systems. Refer to Appendix B. The tee design factor is meant to compensate for the uncertainty in the quantity of agent flowing through a pipe as the agent passes through an increasing number of tees. The design factor tee count shall be determined for each hazard the system protects, using the following guidelines:

- 1) Starting from the point where the piping enters the hazard that is located farthest (hydraulically) from the agent cylinder(s), count the number of tees in the direct flow path as it returns to the agent cylinder(s). DO NOT include tees that are used in the manifold (if applicable). If you are not sure which hazard is farther away, count the tees in the flow path from each hazard and use the highest number.
- 2) Any tee within the hazard that supplies agent to another hazard shall be included in the tee count for the hazard.
- 3) After determining the tee count, use the chart below to determine the tee design factor.
- 4) Apply the tee design factor to the agent quantity calculations by multiplying the tee design factor by the amount of agent previously determined in the volumetric calculations.

Tee Count	Design Factor
0 – 8	0.00
9 - 10	0.01
11 - 12	0.02
13-14	0.03
15 - 16	0.04
17-18	0.05
19	0.06

3.16. Determine the Final Design Quantity Required

Add the agent quantities required for all areas together to determine the final design quantity required for the entire system adjusted to account for design factors and pressure adjustments.

3.17. Determine Concentration at Minimum and Maximum Design Temperature

This step is necessary to properly evaluate the exposure and egress time limitations discussed in Section 3.18 in order to avoid over-concentrating the area due to the additional agent being supplied to the area and the increased or decreased volume of agent caused by room temperature. To determine the expected agent concentration at minimum and maximum ambient temperature, the following formula must be used:

$$C = 100 \frac{10^{\left(\frac{W \cdot s}{2.303 \cdot V}\right)} - 1}{10^{\left(\frac{W \cdot s}{2.303 \cdot V}\right)}}$$

Where:

- W = Agent Weight in lbs. (kg)
- V = Hazard Volume / ft³ (m³)
- C = Design Concentration, Volume %
- S = Specific Volume of agent at the minimum/maximum design temperature of the hazard in ft³/lb (m³/kg)

See Flooding Factor Table in Section 3.6 to determine the “S” value

NOTE: It is important to verify that the worst case design concentration will not exceed the limits for fire suppression on the low end and life safety on the high end.

NOTE: The IG-55 flow calculation program will automatically calculate the design concentration at the maximum ambient temperature entered.

3.18. Evaluate Exposure Limitations

Unnecessary exposure to IG-55 resulting in low oxygen atmospheres shall be avoided. The following provisions shall apply:

1. ProInert systems shall NOT be used to protected enclosures or spaces where the design concentration exceeds 52%.
2. Unprotected personnel shall not enter the area during or after agent discharge.
3. Maximum exposure time shall be limited to:
 - a. No longer than 5 minutes for occupiable spaces with design concentrations below 43%, corresponding to an oxygen concentration of 12%, sea level equivalent.
 - b. No longer than 3 minutes for occupiable spaces with design concentrations between 43% and 52%, corresponding to an oxygen concentration of 12% and 10%, sea level equivalent.

3.19. Perform Flow Calculations

The Fike Engineered ProInert system has been tested to define the limitations necessary to accurately predict how the system will perform when discharged. The physical limitations covered previously (e.g. tee split ratios, flow rate, etc.) are easily seen and managed prior to running a flow calculation. However, the following is a list of physical limitations that are not easily identified until the system designer runs the flow calculation.

3.19.1. Percent Agent in Pipe

A maximum 12% of the total weight of IG-55 agent can reside in pipe network during discharge ensuring the agent will be delivered to the protected space(s) within the sixty (60) second time period allowed.

3.19.2. Minimum Nozzle Pressure

The minimum nozzle pressure allowed for any nozzle within a piping network is 116 psi (8 bar); this is to ensure the proper amount of IG-55 agent is delivered to each nozzle.

3.19.3. Variance in Nozzle Pressure

The maximum pressure variance between nozzles cannot exceed 316 psi (21.8 bar); this is to ensure the proper amount of IG-55 agent is delivered to each nozzle.

3.19.4. Agent Arrival Time Imbalance between Nozzles

The maximum agent arrival time imbalance between nozzles cannot exceed 8.3 seconds; this is to ensure proper distribution of the agent. For example, if agent takes 3 seconds to arrive at the first nozzle, the agent arrive time to all of the remaining nozzles cannot exceed 11.3 seconds.

3.20. Verify System Performance

Once the flow calculation has been completed, it is important that the designer review all results to verify system performance. The designer must review the "System Acceptance" report generated by the flow calculation program to verify that the minimum design concentrations have been achieved in all hazard enclosures.

Refer to Appendix A for Engineered System design example.

3.21. Equivalent Length Values

The following table lists the equivalent length values used by the IG-55 Flow Calculation program for various system components that can be added to a ProInert piping network.

Selector Valves		
Pipe Size NPT (mm)	Sch. 40 ft (m)	Sch. 80 ft (m)
1" (25mm)	2.18 (0.66)	1.3 (0.40)
1-1/2" (40mm)	3.81(1.16)	2.0(0.61)
2" (50mm)	10.66 (3.25)	5.33 (1.62)
3" (80mm)	6.79 (2.07)	3.8 (1.16)

NOTE: Selector Valve Assemblies are FM Approved only.

Check Valves		
Pipe Size NPT (mm)	Sch. 40 ft (m)	Sch. 80 ft (m)
1/2" (15mm)	10.0 (3.05)	5.0 (1.52)
3/4" (20mm)	8.0 (2.44)	4.0 (1.22)
1" (25mm)	6.0 (1.82)	3.0 (0.91)
1-1/2" (40mm)	6.0 (1.82)	3.0 (0.91)
2" (50mm)	5.0 (1.52)	2.5 (0.76)
3" (80mm)	120.0 (36.58)	91.0 (27.74)
4" (100mm)	289.0 (88.09)	225.0 (68.58)

4. INSTALLATION

The system installation shall be performed by an Authorized Fike Distributor in accordance with the requirements of this manual and all appropriate codes and standards adopted by the Authorities Having Jurisdiction (AHJ).

Specific installation drawings must be prepared for the hazard area in accordance with the system design as calculated by the Fike IG-55 System Flow Calculation Program. System installation shall closely follow the drawings to ensure the system meets its design criteria. The piping network is designed to obtain correct discharge time, nozzle pressures, agent quantity and various other design considerations. If for any reason, the pipe network requires modifications, the system must be recalculated before proceeding with installation.

4.1. Agent Storage Cylinder Floor Loading

Floor loading must be considered when installing the agent storage cylinders. The floor must be able to support the total weight of the Fike cylinder(s) as they are moved into position and set in their final mounting place. Where the cylinder is to be mounted onto a raised floor, it is extremely important that the raised floor manufacturer be consulted for floor loading limitations. Fike cannot assume responsibility for determining the suitability of a particular raised floor system to support the suppression cylinder(s); however, the following guidelines provide information to help determine installation requirements:

- When clean agent cylinders are located on a raised floor, floor integrity must be considered to determine if the type of tile and vertical floor support can handle the increased load. If necessary, additional floor supports can be added.
- To help distribute the cylinder weight over a greater area, a ¼" thick steel plate sized to span multiple floor supports can be placed under the cylinder(s). If the cylinder spans multiple floor tiles, add additional floor supports in the area where the cylinder(s) are installed. Minimum of four floor supports, one at each corner of floor tile, must be used. Excessive floor loading may require relocating the cylinder(s) to a more suitable location.

4.2. Installing Cylinder and Racking

ProInert cylinders and manifold piping must be adequately mounted and supported. The rack systems and uprights offered by Fike are designed to allow the cylinders and manifold piping to be secured either directly to a suitable wall structure or floor mounted as a free standing assembly. The following installation instructions identify how to install the racking and upright components.

Racking Wall Mount Installation Instructions

- Step 1. Confirm the cylinder location and mount the rear Unistrut channel to the mounting surface using suitable anchors provided by others. See Figure 57 for Unistrut mounting heights.
- Step 2. Assemble the cylinder racking components to the Unistrut channel. See Appendix D for racking assembly.
- Step 3. Position the cylinders in the racking and loosely tighten the racking components to secure the cylinders.
- Step 4. Remove the safety/shipping cap from the cylinders. Do NOT remove the safety/shipping cap until the cylinders are secured in the racking.
- Step 5. Rotate the cylinders in the racking so that all cylinder discharge outlets face to the right at an angle of 45 degrees toward the wall.
- Step 6. Tighten the racking components so that the cylinders are securely held in place.
- Step 7. Mount the manifold support bracket to the mounting surface using suitable anchors provided by others. See diagram on the next page for top of bracket mounting height. Manifold support brackets should be installed at a maximum of 5.0 ft. (1.5 m) apart.

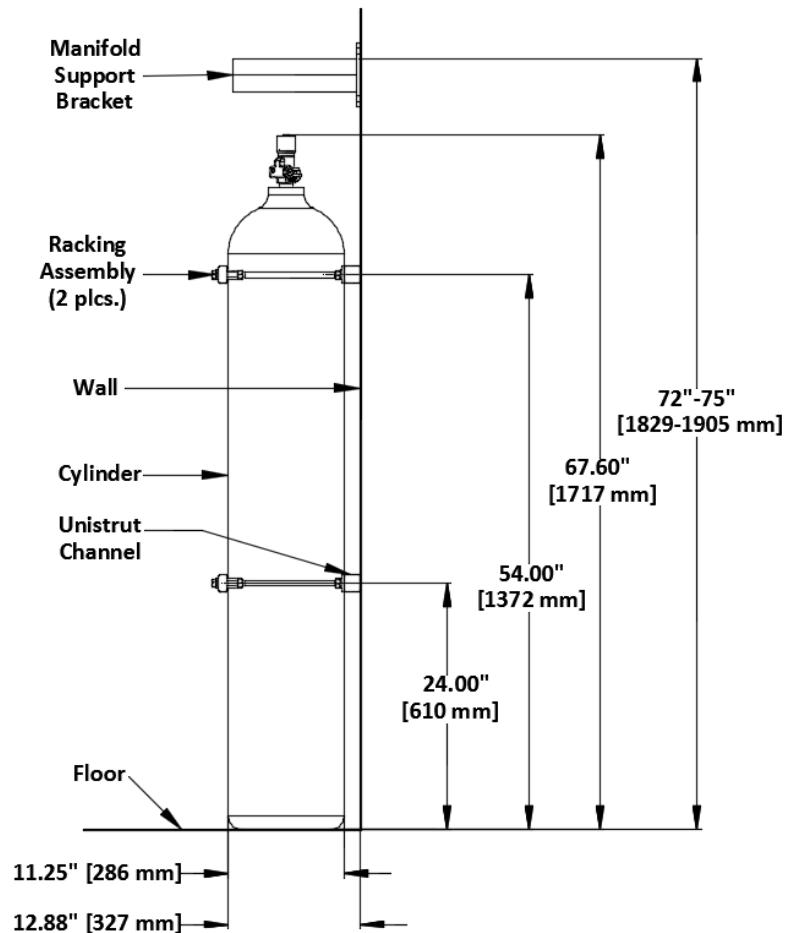


Figure 58 – Mounting Cylinder Racking to Wall

Racking Floor Mount Installation Instructions

- Step 1. Confirm the cylinder location and mount the Unistrut post base to the floor using suitable anchors provided by others. Racking uprights should be installed at a maximum of 5.0 ft. (1.5 m) apart.
- Step 2. Assemble the remaining upright components as shown in the diagrams on the next page. Attach the tee plates and manifold bracket to the upright at heights indicated on Figure 59.
- Step 3. Secure the racking Unistrut channel to the tee plates using suitable anchors provided by others.
- Step 4. Assemble the cylinder racking components to the Unistrut channel. See Appendix D for racking assembly.
- Step 5. Position the cylinders in the racking and loosely tighten the racking components to secure the cylinders.
- Step 6. Remove the safety/shipping cap from the cylinders. Do NOT remove the safety/shipping cap until the cylinders are secured in the racking.
- Step 7. Rotate the cylinders in the racking so that all cylinder discharge outlets face to the right at an angle of 45 degrees to the Unistrut channel.
- Step 8. Tighten the racking components so that the cylinders are securely held in place.
- Step 9. Mount the manifold support bracket to the upright using suitable anchors provided by others. See Figure 59 for top of bracket mounting height.

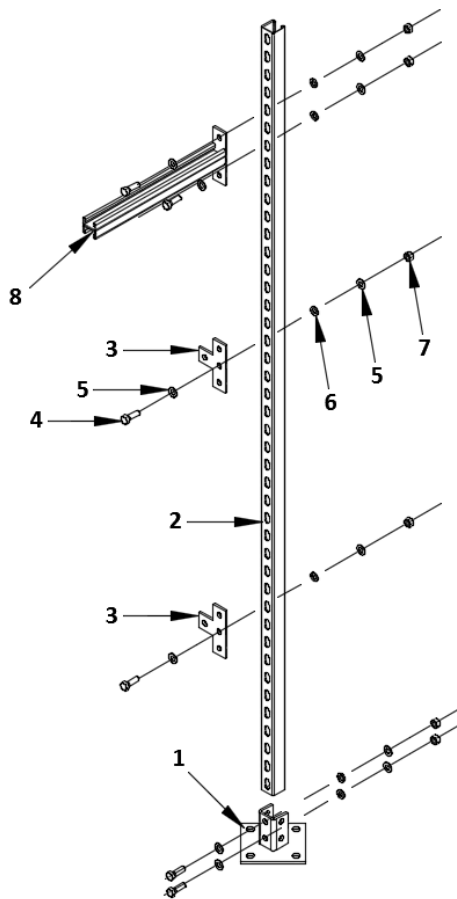


Figure 59 - Cylinder Upright Assembly

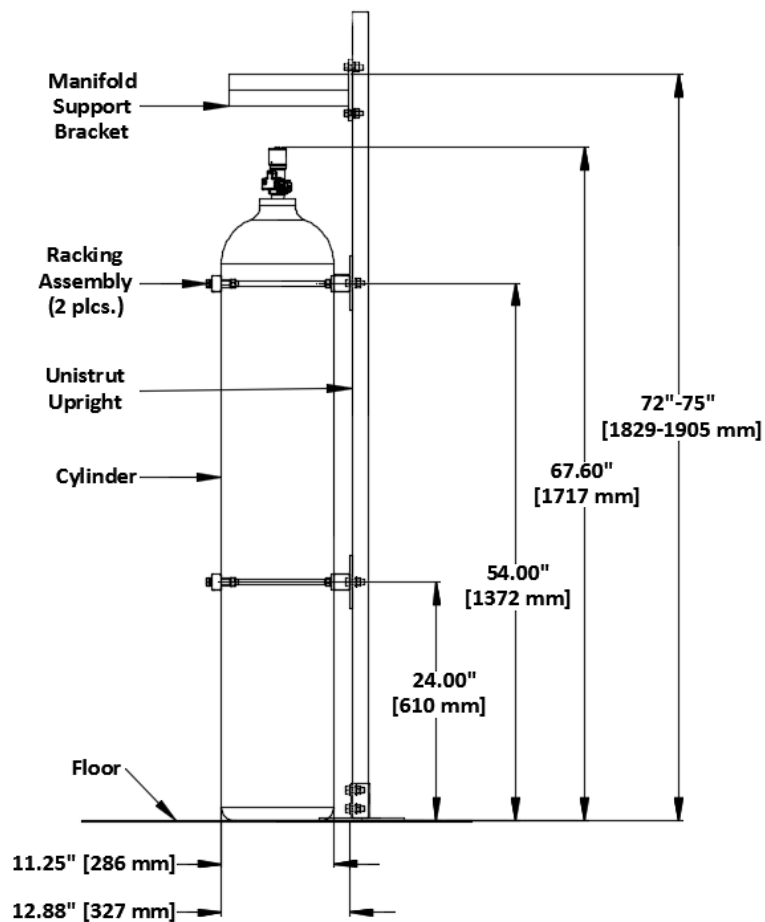


Figure 60 - Cylinder Racking Mounted to Floor

Cylinder Upright Kit Components			
Item	Part Number	Quantity	Description
1	02-4229	1	Unistrut Post Base
2	IG71-0191	1	Unistrut Channel, 86" (2.1 m) Long
3	02-4233	2	Tee Plate
4	02-4230	6	½" Hex Bolt
5	02-4373	12	½" Flat Washer
6	02-4372	6	½" Lock Washer
7	C02-1209	6	½" Nut
8	02-11883	1	Manifold Bracket, 12" (0.30 m) Long (Included in kit IG71-065-1)
	02-11884		Manifold Bracket, 18" (0.46 m) Long (Included in kit IG71-065-2)
	02-11885		Manifold Bracket, 30" (0.76 m) Long (Included in kit IG71-065-3)

4.3. Installing Distribution Piping

In general, distribution piping should be installed in strict accordance to the requirements of NFPA 2001, ISO 14520, requirements of the Local Authority Having Jurisdiction (AHJ) and in accordance with the design drawings and calculations prepared for the project. If piping changes are necessary, the system must be recalculated using Fike's Flow Calculation Program.

System piping shall be installed in areas to prevent mechanical damage and fire damage.

System piping shall be adequately bonded and earthed to minimize the risk of electrostatic discharge. Consult NFPA 2001, ISO 15420 or EN 15004 for guidance on requirements on earthed and electrical clearances.

Systems installed within electrical substations or switch rooms shall be sufficiently bonded and earthed to prevent the metal work from becoming electrically charged.

NOTE: For additional information on pressure rating of pipe and fittings, plus recommended pipe supports and hangers, refer to FSSA's Pipe Design Handbook, FSSA PDH-01.

4.3.1. Pipe and Fittings Materials

Piping materials, supports and spacing must conform to the requirements as outlined in NFPA 2001, ISO 14520 or EN 15004. The thickness of the piping wall shall be calculated in accordance with ASME B31.1 Power Piping Code. For Prolnert, use a minimum piping design pressure of 870 psi at 68°F (60 bar at 20°C).

The following piping materials and configurations are acceptable:

- Schedule 40 Threaded
- Schedule 40 Welded
- Schedule 40 Grooved
- Schedule 80 Threaded
- Schedule 80 Threaded
- BS 1387 Heavy

NOTE: Galvanized piping shall be utilized where corrosion to the pipe network is likely.

CAUTION: Cast iron pipe, steel pipe conforming to ASTM A120, or nonmetallic pipe shall not be used.

Fitting materials must conform to the requirements outlined in NFPA 2001, ISO 14520 or EN 15004 latest editions. Fitting sizes up to 3 inch NPT (80 mm) shall be Class 300 malleable or ductile iron. Fittings over 3 inch NPT (80 mm) shall be 1000 lb. ductile or forged steel. Class 600 flanged fittings can be used on all pipe sizes.

All grooved fittings must be UL Listed and conform to the pressure requirements outlined in NFPA 2001, latest edition. Cast iron fittings shall not be used.

The following piping types and grades are acceptable for pipe configurations utilizing threaded, welded or grooved end connections (reference NFPA 2001):

Pipe Size in (mm)	Pipe Grade												
	BS1387 Heavy		A-53B	A-53B			A-53A			A-53A			
		A-106B	A-106A										
	Pipe & Joint Type												
	Seamless		Seamless	ERW			Seamless			ERW			
1, 2, 3 and 4		1, 2, 3 and 4	1	2,3	4	1	2,3	4	1	2	3	4	
1/2" (15)	✓	Schedule 40	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3/4" (20)	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1" (25)	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1-1/4" (32)	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1-1/2" (40)	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2" (50)	NO		✓	✓	✓	✓	✓	✓	✓	NO	✓	✓	✓
2-1/2" (65)	NO		✓	✓	✓	✓	✓	✓	✓	NO	✓	✓	✓
3" (80)	NO		✓	✓	✓	✓	✓	✓	✓	NO	✓	✓	✓
4" (100)	NO		✓	✓	✓	✓	✓	✓	✓	NO	✓	✓	NO
5" (125)	NO		✓	✓	✓	✓	NO	✓	✓	NO	NO	✓	NO
6" (150)	NO		✓	NO	✓	✓	NO	✓	NO	NO	NO	✓	NO
8" (200)	NO		✓	NO	✓	NO	NO	✓	NO	NO	NO	✓	NO
1/2" (15)	NO	Schedule 80	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3/4" (20)	NO		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1" (25)	NO		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1-1/4" (32)	NO		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
1-1/2" (40)	NO		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2" (50)	NO		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2-1/2" (65)	NO		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3" (80)	NO		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4" (100)	NO		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5" (125)	NO		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6" (150)	NO		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8" (200)	NO		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Joint types: 1 – NPT 2 – BSPT 3 – Rolled Groove & Welded 4 – Cut Groove													
ERW – Electric Resistance Welded Pipe													

4.3.2. Pipe Size Changes

Pipe size changes, to increase or decrease the size, can be done at three different locations in the piping network:

- Pipe Size Change at a Tee - When the change in pipe size is done at a tee, it is accomplished by using either a reducing tee or a standard tee and reducing fittings downstream of the tee. All reducers must be concentric bell reducers or concentric reducing couplings.
- Pipe Size Change at an Elbow - When the change in pipe size is done at an elbow, it is accomplished by using reducing elbows, a standard elbow with concentric bell reducers, or concentric reducing couplings.
- Pipe Size Change at a Coupling - When the change in pipe size is done at a coupling, only concentric bell reducers or concentric reducing couplings can be used.

CAUTION: Reducing bushings, weld-o-let, and hole-cut fittings shall not be used.

4.3.3. General Piping Requirements

- All pipe lengths are measured center-to-center of fittings.
- Before installation, the pipe and fittings shall be carefully reamed, blown clear of chips and scale, and cleaned internally with a nonflammable cleaner such as Perchloroethylene in accordance with NFPA 2001, latest edition. The inside of the pipe and fittings must be free of oil and dirt.
- PTFE tape, thread sealant or compound shall be used on male threads only. If using tape, do NOT allow it to overlap the pipe opening as this could cause possible blockage of the agent
- All grooved coupling gaskets shall be lubricated per the manufacturer's specifications.
- A dirt trap consisting of a tee with a capped nipple, at least 2 inches (50 mm) long, shall be installed at the end of each pipe run.

4.4. Installing Pipe Hangers and Supports

The following general guidelines provide information for the selection and application of pipe hangers and supports utilized to support the pipe network in all conditions of operation, including shock loads or thrusts created during system operation. These guidelines are not intended to provide all information necessary to determine equipment and material requirements for specific installation or applications.

NOTE: Refer to FSSA Pipe Design Guide (PDH-01) for addition guidance on pipe hangers and supports.

General Guidelines:

- Pipe hangers and supports shall be installed in accordance with recognized industry practices and manufacturer's instructions.
- All pipe hangers and supports shall be attached directly to a rigid fixed structure.
- All hangers and components shall be steel.
- Ordinary cast-iron hangers/supports, conduit clamps, or "C" clamps shall not be used.
- Rigid pipe supports are required to support the "Live" load of the pipe system during discharge. Rigid bracing shall be installed at each directional change, fitting, tee and nozzle.
- Nozzles shall be supported so as to prevent movement of the nozzle during discharge. 180° nozzles require back bracing in the opposite direction of the discharge.
- Where seismic bracing is required, bracing shall be in accordance with local codes and the authority having jurisdiction (AHJ). Refer to ANSI B31.1, Power Piping Code and ISO 14520-1 and EN15004-1 tables 3 & 4 for additional information.

- All pipe supports shall be designed and installed to prevent lateral movement of supported pipe during system discharge while permitting longitudinal movement to accommodate expansion and contraction caused by temperature changes.
- Pipe hangers must be spaced according to the size of pipe as indicated in the following table.

Pipe Size in. (mm)	Maximum Distance Between Supports ft. (m)	Rod Diameter in. (mm)
3/8" (10)	7 (2.1)	3/8 (9.5)
1/2 (15)	7 (2.1)	3/8 (9.5)
3/4 (20)	7 (2.1)	3/8 (9.5)
1 (25)	7 (2.1)	3/8 (9.5)
1 1/4 (32)	7 (2.1)	3/8 (9.5)
1 1/2 (40)	9 (2.7)	3/8 (9.5)
2 (50)	10 (3.0)	3/8 (9.5)
2 1/2 (65)	11 (3.4)	1/2 (12.7)
3 (80)	12 (3.7)	1/2 (12.7)
4 (100)	14 (4.3)	5/8 (15.9)
6 (150)	17 (5.2)	3/4 (19.0)

- Hangers must be placed within 12 in. (300 mm) of each discharge nozzle and between elbows that are more than 24 in. (600 mm) apart.

4.5. Installing Cylinder Manifold

When utilizing multiple cylinders or a "Connected Reserve" supply of cylinders in a common cylinder bank, a discharge manifold is necessary. See Figures 52 and 53. Multiple cylinders may be connected to a common discharge manifold to allow delivery of agent through a single piping network. ProInert cylinders are connected to the manifold using discharge hoses. Fike does NOT manufacture nor offer pre-assembled discharge manifolds. Manifolds are supplied by others and are commonly assembled using threaded, welded or flanged fittings.

Care must be taken to ensure that the manifold is located at a height or location that is compatible with the length of the discharge bends. Mount manifold with inlet for discharge hose with check valve oriented downward as illustrated in Figure 60. Approximate distance from the cylinder valve outlet and the center line of the manifold piping is 9" to 12" (229 mm to 305 mm).

Mount the discharge manifold to a solid structural member, such as the racking uprights using pipe clamps or U-bolts. The manifold should NOT be supported by the cylinders. The manifold piping should be secured with pipe hangers or brackets to support the manifold when the cylinders are removed for service. For multi-row racking, a separate manifold shall be used for each row. These will be joined at the ends.

If accessories (such as pressure switches, safety relief devices, etc.) are required, make certain that the manifold configuration includes the fittings necessary to make those connections.

NOTE: The General Piping Requirements outlined in Section 4.3.3 must be adhered to when constructing manifolds.

4.5.1. Typical Manifold Configuration

The manifold shall be constructed as shown in Figure 60 below.

- 1) A discharge pressure switch must be installed in the discharge manifold if the Prolnert system can be manually released.
- 2) An odorizer should be installed on all Prolnert systems, regardless of design concentration, to make it easier for personnel to determine that the system has discharged upon entering the enclosure or space.

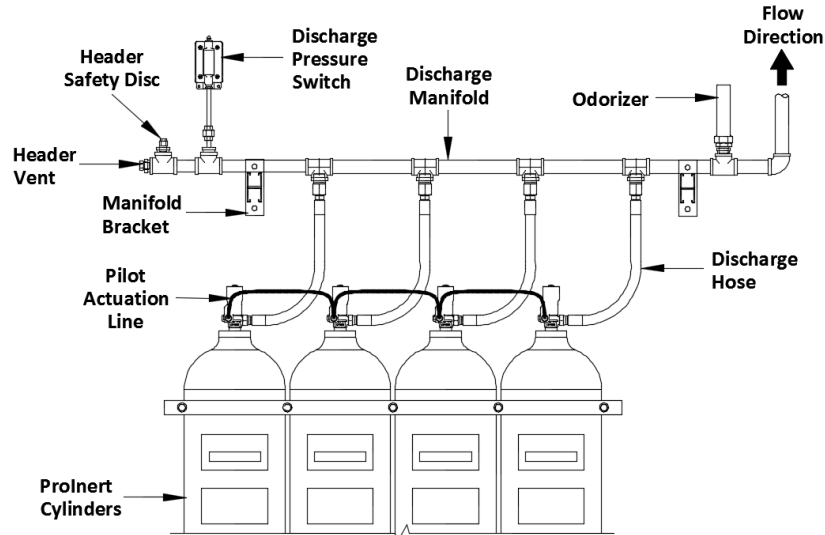


Figure 61 - Typical Manifold Configuration

4.5.2. Manifold Configuration for Main/Reserve System

Both main and reserve supplies for fixed storage systems shall be permanently connected to the piping and arranged for easy changeover, except where the authority having jurisdiction (AHJ) permits an unconnected reserve. When constructing the manifold for a main/reserve system, the reserve cylinders must be segregated from the pressure released from the main cylinders during discharge by adding check valves on both sides of the manifold to isolate each side. It is also necessary to duplicate the header components (i.e., vent, safety, odorizer, etc.) on both sides of the manifold. See Figure 61.

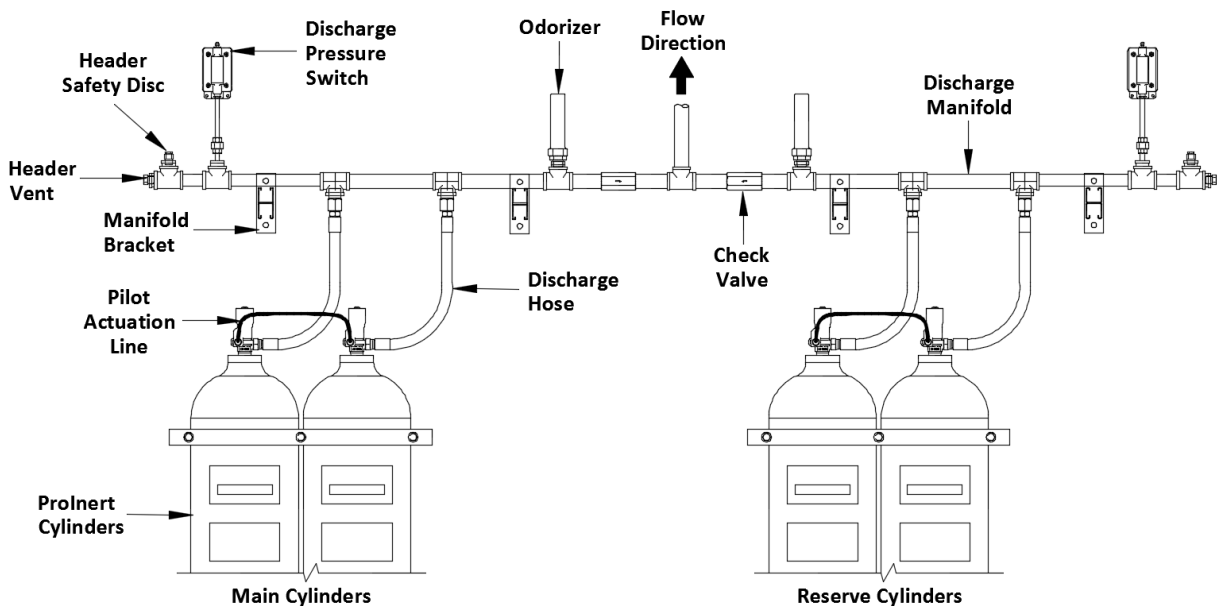


Figure 62 - Typical Main/Reserve Manifold Configuration

4.6. Installing Discharge Pressure Switch

The discharge pressure switch (P/N IG71-202) should be securely mounted in a location that is not prone to accidental damage and yet is accessible to the discharge piping or manifold.

- Step 1. Inspect the pressure switch for damage.
- Step 2. Securely mount the pressure switch in the upright position to a structurally solid mounting surface using the $\frac{1}{4}$ " (6 mm) mounting holes provided in the switch back box.
- Step 3. Install fittings in the discharge manifold to provide a $\frac{1}{4}$ " NPT threaded outlet for connection of the pressure switch actuation line.
- Step 4. Install $\frac{1}{4}$ " NPT pipe, stainless steel flex hose or tubing from the discharge manifold to the discharge pressure switch. Fike recommends installing a union in the line to allow easy removal of the discharge pressure switch for service or replacement.
- Step 5. Apply PTFE tape to the $\frac{1}{4}$ " male NPT threads on the actuation line. Do NOT allow tape to overlap the end of the threads as this could cause possible blockage of the pressure port.
- Step 6. Connect the pilot line to the $\frac{1}{4}$ " Hex bushing on the bottom of the pressure switch.
- Step 7. Install rigid or flexible conduit from the host control panel and connect it to the threaded port on the bottom of the pressure switch.
- Step 8. Remove the cover from the pressure switch
- Step 9. Pull wiring from the releasing panel through the electrical conduit into the pressure switch and connect the wiring to the pressure switch terminals. See Figure 63.

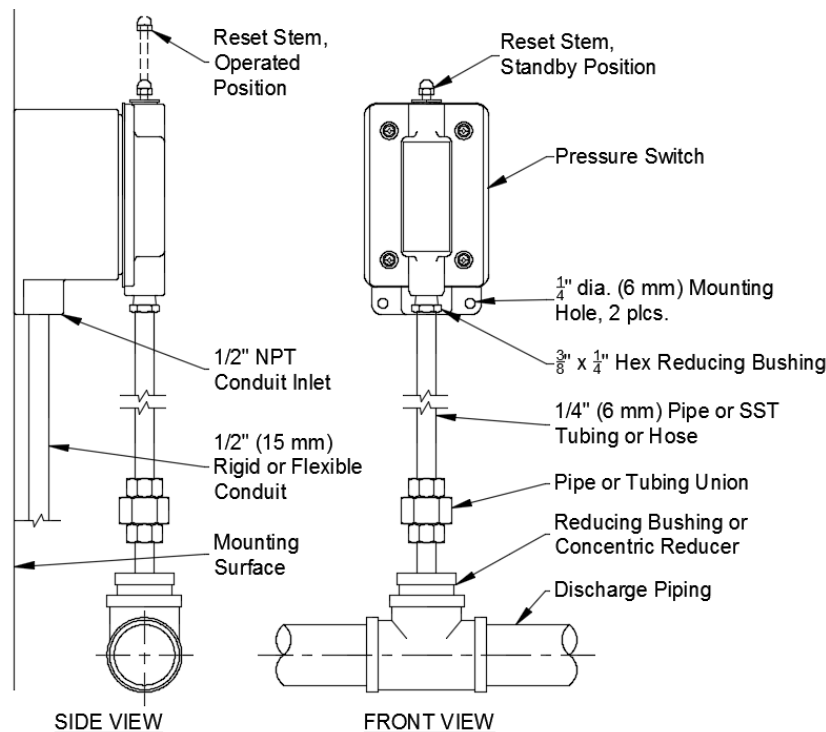


Figure 63 - Discharge Pressure Switch Installation

4.6.1. Discharge Pressure Switch Wiring

Figure 63 shows how to wire the double-pole-single-throw (DPST) switch contacts to the releasing panel's 'Manual Release' input. Refer to the Control Panel Manufacturer's manual for specific wiring details.

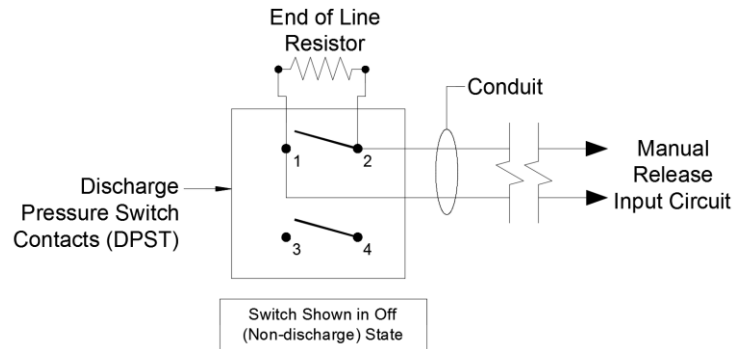


Figure 64 - Discharge Pressure Switch Wiring Diagram

4.7. Installing Safety Disc and Vent

All closed pipe sections that could trap agent or create an over-pressure condition shall be provided with a safety relief device. This situation will occur if lockout valves or selector valves are incorporated into the system's piping network. The pressure relief devices shall be located in such a manner that the discharge of the agent will not injure personnel or damage equipment.

- Step 1. Install fittings in the discharge manifold to provide a $\frac{1}{2}$ " NPT threaded outlet for connection of the safety disc and vent.
- Step 2. Apply PTFE tape to the male threads on the header safety disc and vent. Do NOT allow tape to overlap the end of the fittings as this could cause possible blockage of the pressure port.
- Step 3. Thread the $\frac{1}{2}$ " NPT male threads of the fittings into the tee in the discharge manifold. Secure wrench tight. Do NOT tighten or loosen the safety disc nut on the header safety disc.

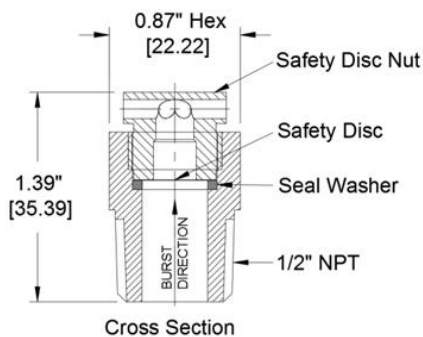


Figure 65 – Header Safety Disc

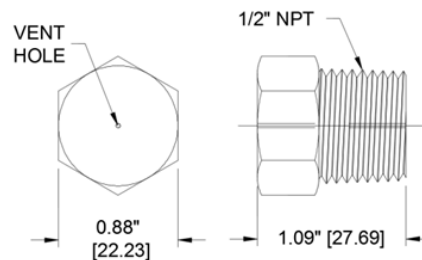


Figure 66 – Header Vent

4.8. Installing Odorizer

The odorizer is installed in the distribution piping and should be located before the stop/maintenance valve (if installed). Install one odorizer for each 20 cylinders.

- Step 1. Inspect the odorizer for damage making sure the ampoule is not damaged.
- Step 2. Install a reducing tee or a tee with a reducing bushing or bell reducer in the discharge manifold to provide a 3/4" (20 mm) NPT female threaded outlet for connection of the pressure switch.
- Step 3. The odorizer must be installed in the upright position.
- Step 4. Apply PTFE tape on the 3/4" (20 mm) NPT threads on the odorizer. Do NOT allow tape to overlap the end of the threads as this could cause possible blockage of the pressure port
- Step 5. Thread the odorizer into the fitting. Secure wrench tight.

NOTE: Handle the odorizer with care to prevent accidental breakage of the ampoule.

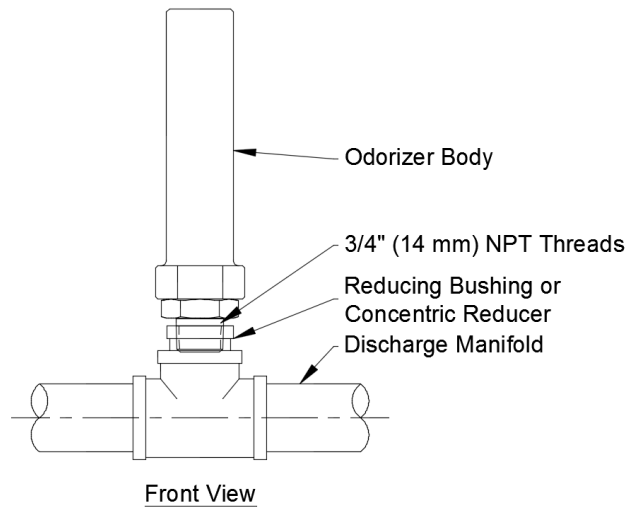


Figure 67 – Odorizer Installation

4.9. Installing Selector Valves

Selector valve activation is accomplished using the pneumatic pressure from discharging agent. The pneumatic pressure is routed to the selector valve via a pneumatic stainless steel hose connection. The two methods for activating the selector valve and the components required are shown in the following sections for reference purposes. Actual installation may vary.

NOTE: Pilot lines shall be installed in a manner that protects them against crimping or mechanical damage. Where the pilot line could be exposed to conditions that could lead to loss of integrity, special precautions shall be taken to ensure that no loss of integrity will occur. Pilot lines shall be secured to a solid surface. Anchoring into plaster, sheetrock wall or any other facing material is NOT acceptable.

4.9.1. Installing Selector Valve Activated with Release Fitting

- Step 1. Install item 1 into the piping network. Fike recommends that threaded unions be installed in the pipe network on each side of the valve to facilitate easy removal of the valve. Supports shall be installed on each side of the selector valve to support its dead load. The pipe network shall NOT be used to support the selector valve.
- Step 2. Install a tee and reducing fittings in the piping network approximately 1 ft. (0.3 m) upstream of the selector valve to facilitate installation of the release fitting. Reducing fittings shall provide a 1/4" NPT connection.
- Step 3. Apply PTFE tape to the 1/4" male NPT threads on item 2. Do NOT allow tape to overlap the end of the fitting as this could cause possible blockage of the pressure port.
- Step 4. Thread item 2 into the reducing fitting. Secure wrench tight.
- Step 5. Remove the pressure port plug from item 3.
- Step 6. Thread the 1/8" NPT end of item 5 into the pressure port on item 3. Secure wrench tight.
- Step 7. Connect the other end of item 5 to the JIC connector provided on item 1. Secure wrench tight.
- Step 1. Check to ensure item 3 is armed (firing pin is retracted). If the firing pin is extended (operated), the actuator must be reset (UVO only) or replaced if using a UEA. See Section 6.1 for UVO reset instructions.

CAUTION: Do NOT install the actuator (UVO or UEA) to the release fitting with the firing pin extended.

- Step 8. Insert item 3 into item 2 and secure in place with item 4.
- Step 9. Connect conduit to items 3 and 4.
- Step 10. Pull item 3 wire leads through the conduit and connect to the control units releasing circuit. See Figures 75 or 76.
- Step 11. Pull item 4 wire leads through conduit and connect to the control unit. See Figure 77.

The Selector Valve is now armed.

See next page for an assembly drawing of the selector valve with release fitting and UVO or UEA.

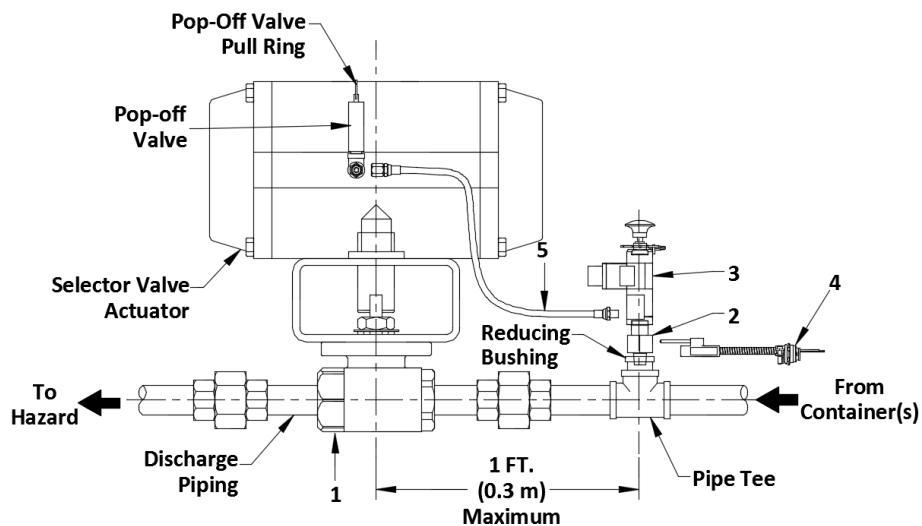


Figure 68 - Selector Valve with Release Fitting Installation

Item No.	Part Number	Description	Notes
1	02-15708-XX	Carbon Steel Selector Valve	Part of 70-395 Selector Valve Assembly
	02-15709-XX	Stainless Steel Selector Valve	
2	IG71-111	Release Fitting	
3A	02-13571	Universal Valve Operator (UVO)	
3B	IG71-247	Universal Energetic Actuator (UEA)	
4	02-14627	Universal Valve Operator Supervisor (UVOS)	
5	02-13453	Pneumatic Hose, 36" (914 mm) Long	

¹Valve material supplied is based on selector valve assembly part number.

4.9.2. Installing Selector Valve Activated with Pneumatic Relay

- Step 1. Install item 1 in the piping network. Fike recommends installing threaded unions on each side of the valve to facilitate easy removal of the valve. Supports shall be installed on each side of the selector valve to support its dead load. The pipe network shall NOT be used to support the selector valve.
- Step 2. Install a tee and reducing fittings in the piping network approximately 1 ft. (0.3 m) upstream of the selector valve to facilitate installation of the release fitting. Reducing fittings shall provide a 1/4" NPT connection.
- Step 3. Apply PTFE tape to the 1/4" male NPT threads on item 2. Do NOT allow tape to overlap the end of the fitting as this could cause possible blockage of the pressure port.
- Step 4. Thread item 2 into the reducing fitting. Secure wrench tight.
- Step 2. Check to ensure item 4 is armed (firing pin is retracted). If the firing pin is extended (operated), the actuator must be reset. See Section 6.2 for reset instructions.

CAUTION: Do NOT install the Pneumatic Relay to the release fitting with the firing pin extended.

- Step 5. Insert item 4 into item 2 and secure in place with item 3.
- Step 6. Connect the loose end of the hose connected to item 4 to the JIC connector provided on item 1. Secure wrench tight.

- Step 7. Install item 9 at the location indicated on the installation drawings. See Section 4.13.9 for installation instructions.
- Step 8. Install the pilot line components (items 6 thru 8). Apply PTFE tape to all NPT male threads. Do NOT allow tape to overlap the end of the fitting as this could cause possible blockage of the pressure port. Secure all connections, wrench tight. Terminate each end of the pilot line within 24" (610 mm) of item 4 and item 10 to enable connection of the actuation hoses.
- Step 9. Apply PTFE tape to the NPT male threads of items 10C, 10D, 10E and 10G. Do NOT allow tape to overlap the end of the fitting as this could cause possible blockage of the pressure port.
- Step 10. Assemble item 10C, item 10D and item 10E together. Secure wrench tight.
- Step 11. Remove the plug from item 10A.
- Step 12. Screw the items assembled in Step 10 into the threaded port on item 10A. Secure wrench tight. Orient the assembly so the side outlet of item 10D is positioned horizontally.
- Step 13. Screw item 10G into the side outlet of item 10D. Secure wrench tight.
- Step 14. Install item 10H onto item 10G.
- Step 15. Screw item 10J onto item 10G. Secure wrench tight.
- Step 16. Connect one end of item 10F to item 10E. Secure wrench tight.
- Step 17. Connect the other end of item 10F to the pilot line item 6. Secure wrench tight.
- Step 18. Apply PTFE Tape to the G1/4 male threads of item 4. Do NOT allow tape to overlap the end of the fitting as this could cause possible blockage of the pressure port.
- Step 19. Connect the G1/4 end of item 5 to item 4. Secure wrench tight.
- Step 20. Connect the other end of item 5 to the pilot line item 6. Secure wrench tight.
- Step 3. Check to ensure that items 4 and 10A are armed (firing pin retracted). If the firing pin is extended (operated), the actuator must be reset (UVO only) or replaced if using a UEA. See Section 6.1 for UVO reset instructions.

Step 4. **CAUTION:** Do NOT install the actuator (UVO or UEA) to the cylinder with the firing pin extended as this may cause damage to the cylinder valve or accidental discharge.

- Step 21. Remove the retaining clip and plug from the brass valve on item 9. Keep these items for future use should the cylinder have to be removed for service.
- Step 22. Connect 10A to item 9 and secure in place with item 10B.
- Step 23. Connect conduit to item 10A and 10B.
- Step 24. Pull item 10A wire leads through the conduit and connect to the control units releasing circuit. See Figures 75 or 76.
- Step 25. Pull item 10B wire leads through conduit and connect to the control unit. See Figure 77.

CAUTION: Installation of the system actuation components should be the last item completed before the system is placed into service.

- Step 26. Remove item 3 from item 2.
- Step 27. Insert item 4 into item 2 and secure in place with item 3.

The Selector Valve is now armed.

See next page for an assembly drawing of the selector valve with release fitting and pneumatic relay.

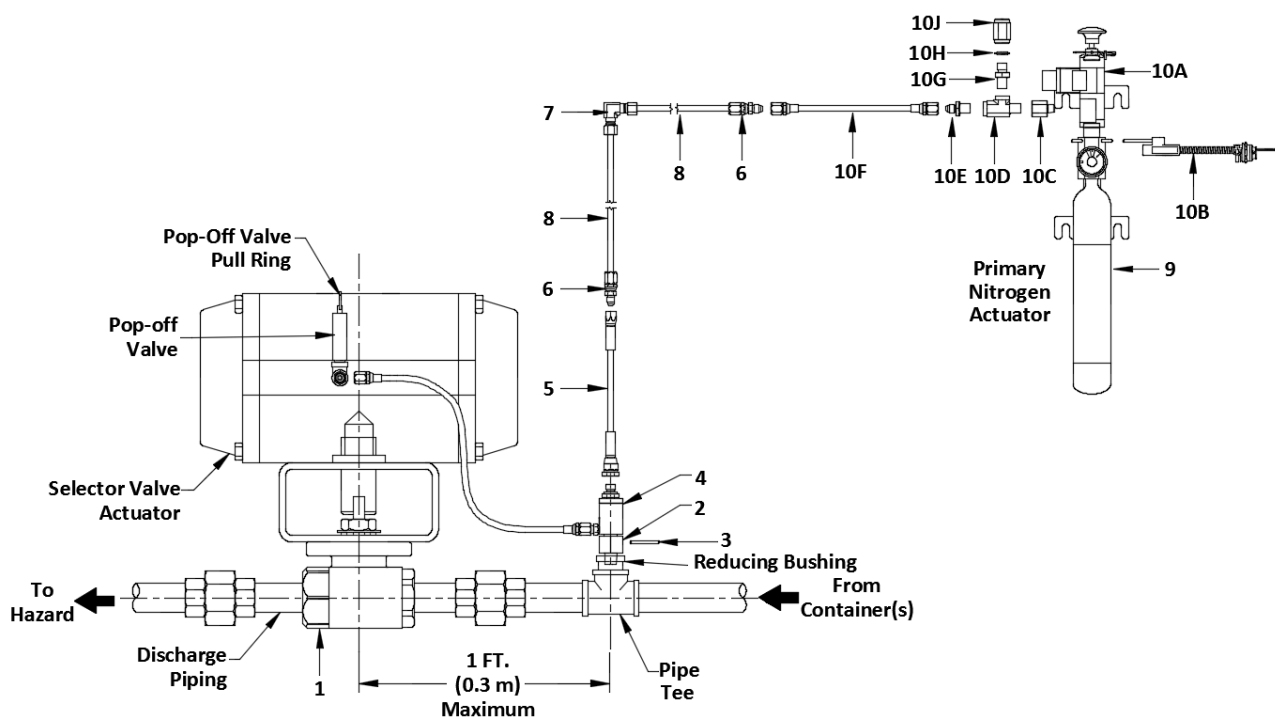


Figure 69 - Selector Valve with Pneumatic Relay Installation

Pilot Line Limitations:

- 1) Actuation hoses supplied by Fike.
- 2) Pilot line between nitrogen actuator and pneumatic relay shall not exceed a maximum of 150 ft. (45 m).

Item No.	Part Number	Description	Notes
1	02-15708-XX	Carbon Steel Selector Valve ¹	Part of 70-395 Selector Valve Assembly
	02-15709-XX	Stainless Steel Selector Valve ¹	
2	IG71-111	Release Fitting	
3	02-11755	Retaining Clip	
4	70-334	Pneumatic Relay with Hose	
5	02-10801	G1/4 x 1/4 JIC x 39 in. (1 m) Long Actuation Hose	
6	02-12695	¼ Tube x ¼ JIC Adapter	
7	02-12696	¼" Tube 90° Elbow	
8	N/A	¼ x 0.035 Wall, Stainless Steel Tubing, Cut to Length	Supplied by others
9	70-325-X	Nitrogen Actuator Assembly	
10A	02-13571	Universal Valve Operator (UVO)	Part of 70-335 and 70-400 Primary Completer Kits
	IG71-247	Universal Energetic Actuator (UEA)	
10B	02-14627	Universal Valve Operator Supervisor (UVOS)	
10C	02-13640	1/8 NPT x 1/4 NPT Adapter	
10D	C02-1335	1/4 NPT Street Tee	
10E	02-4530	1/4 NPT x 1/4 JIC Adapter	
10F	02-4977	35" (889 mm) Hose, 1/4 JIC x 1/4 JIC	
10G	02-11766	1/4 NPT x G1/4 Adapter	
10H	02-10926	¼ Sealing Washer	
10J	IG71-026	Vent Valve Assembly	

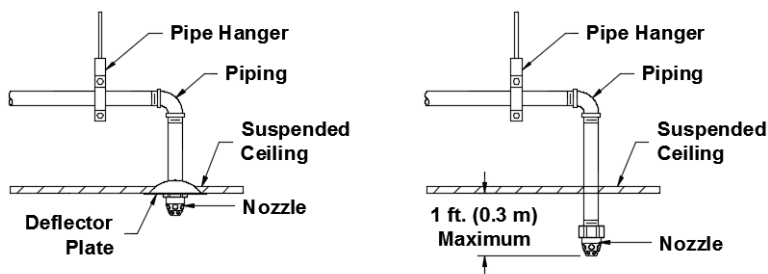
¹ Valve material supplied is based on selector valve assembly part number.

4.10. Installing Discharge Nozzles

Prior to installing the discharge nozzle(s), the following checks shall be performed:

- Compare the part number that is stamped on the wrench flat of the nozzle to be installed with the nozzle part number listed on the system installation plans. It is extremely important that the nozzle part numbers match in order to ensure that proper agent design quantities and concentrations are achieved.
- Verify that there are no obstructions located in the nozzles discharge path that could obstruct the distribution of the agent during discharge.
- Verify that the position of each discharge nozzle is located within 1 ft. (0.3 m) of its intended location as indicated on the system installation plans.
- Verify that piping discharge nozzles are properly braced to prevent movement during discharge. 180° nozzles require back bracing.
- Verify that the distribution piping network has been blown clear to remove chips, mill scale, or metal shavings, and has been cleaned to remove dirt and cutting oil before installing nozzles.
- Verify that discharge nozzles are mounted in a vertical position, facing either up or down, as shown in Figure 69.

Ceiling Mount



Subfloor Mount

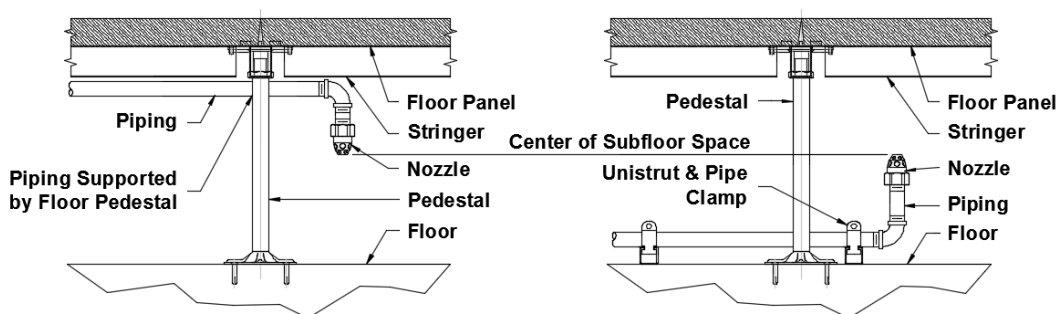


Figure 70 - Nozzle Mounting Details

- Step 1. Apply PTFE tape or joint compound to the male threads of the distribution piping. Do NOT allow tape or compound to overlap the pipe opening as this could cause possible blockage of the nozzle.
- Step 2. Thread the nozzle onto the pipe. Secure wrench tight.
- Step 3. If installing 180° discharge nozzles, verify that the nozzle orifice holes are correctly orientated to allow proper agent discharge.
- Step 4. Clip all ceiling tiles in the protected enclosure to prevent ceiling tiles from being lifted during agent discharge.

4.11. Installing Discharge Hose/Check Valve

The Discharge Hose provides the connection between the cylinder valve outlet and the discharge manifold as shown in Figure 70.

CAUTION: When removing a cylinder from a manifold DO NOT remove the check valve or the hose from the check valve prior to disconnecting from the valve.

IMPORTANT: Hose check valve outlet must be mounted in the vertical upright position to ensure proper operation.

- Step 1. Remove protected cap from the threaded end of the discharge hose.
- Step 2. Apply PTFE tape to the male threads on the discharge hose check valve. Do NOT allow tape to overlap the end of the fitting as this could cause possible blockage of the pressure port.
- Step 3. Thread the 1" NPT/BPS male end of the hose into the tee in the discharge manifold, wrench tight.
- Step 4. Connect the G5/8 swivel end of the hose to the cylinder valve discharge outlet, wrench tight.
- Step 5. Verify that the discharge hose does not have any kinks in it. Minimum bend radius for hose is 9.8" (250 mm).

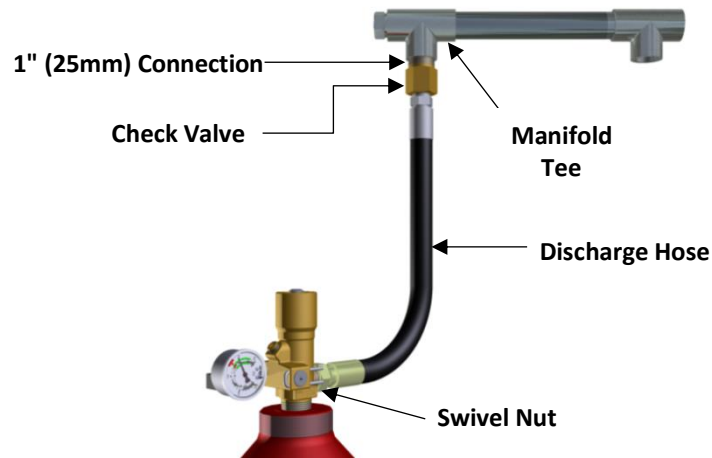


Figure 71 - Typical Valve to Manifold Connection

4.12. Installing Cylinder Pressure Gauge

The pressure gauge is to be installed in the fill port on a Prolnert cylinder that is fully charged using the following procedure. The cylinder must be securely mounted in the cylinder racking before installing or removing a pressure gauge.

NOTE: The following installation instructions shall be used to install both the 'Primary' and 'Secondary' cylinder pressure gauges.

- Step 1. Lubricate the pressure gauge o-ring with Molykote 55 or equivalent. Use care not to get lubricant into the vent port of the pressure gauge. Do not apply PTFE thread tape to the pressure gauge threads.
- Step 2. Remove and retain the plug from the valve fill port.
- Step 3. Use extreme care not to cross thread the pressure gauge during installation. Screw the pressure gauge into the fill port by hand until resistance is felt. Use locking pliers or wrench to further screw the gauge into the port two full turns.
- Step 4. To properly orient the pressure gauge face, turn the gauge up to half a turn in either direction.
- Step 5. Leak check around the fill port using Snoop® leak test fluid or equivalent. If leak is detected, remove the pressure gauge and clean the lubricant and contaminants from the o-ring, threads and valve port using isopropyl alcohol and a soft clean cloth. Lubricate the o-ring with Molykote 55 or equivalent and reinstall the pressure gauge following the previous steps.
- Step 6. Leak check around the fill port. If a leak is still present, remove the pressure gauge from the fill port and remove and replace the existing gauge o-ring. Lubricate the o-ring with Molykote 55 or equivalent and reinstall the pressure gauge following the previous steps. Leak check around the fill port.
- Step 7. Check the cylinder pressure. Cylinders should read 200 bar or 300 bar at 15°C. For temperatures other than 15°C, refer to the Temperature vs. Pressure Chart in Appendix B.

WARNING: When removing the pressure gauge from a pressurized Prolnert cylinder, a "POP" sound will occur. This is the result of a minor amount of gas being trapped in the pressure gauge port. This is a normal occurrence. If a pressure leak continues after backing-off the pressure gauge five turns (when o-ring is visible), the Schrader core did not reseal. If this should occur, do NOT remove the pressure gauge. Instead, reinstall the pressure gauge and contact Fike Mechanical Technical Support.

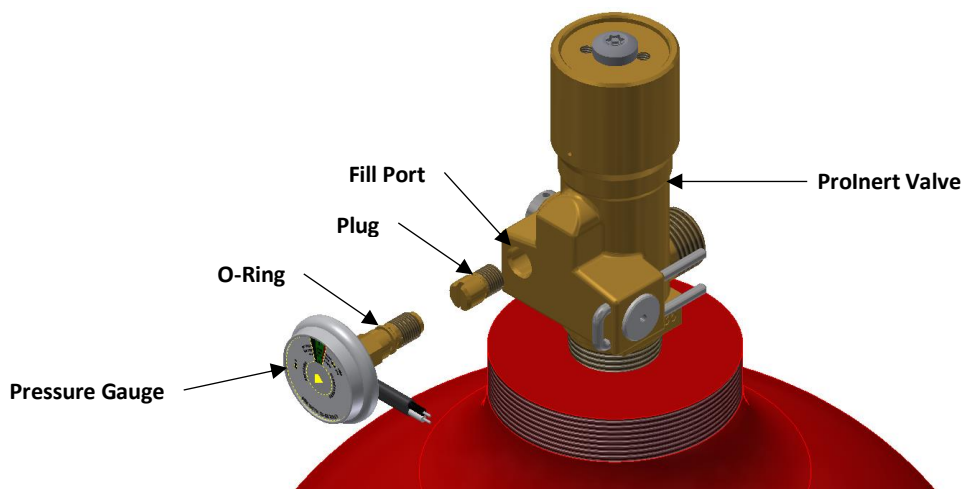


Figure 72 - Pressure Gauge Installation

4.12.1. Primary Pressure Gauge with Low Pressure Switch Wiring

The Primary Pressure Gauge with Low Pressure Switch should be wired to the releasing panel to provide a “Supervisory” signal if the cylinder pressure drops below normal or rises above normal. The switch is wired as a normally open contact while under pressure as shown in Figure 72.

NOTE: Refer to the Installation, Operation & Maintenance Manual for the control panel being used for specific wiring criteria.

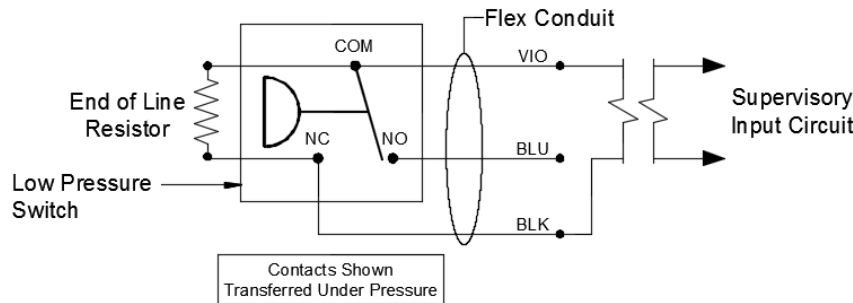


Figure 73 - Low Pressure Switch Wiring Diagram

4.13. Installing System Actuation Components

Prior to installation of the cylinder actuation components, the following items should be completed:

- Cylinders should be installed and secured in the cylinder racking or straps.
- Discharge piping and all bracing, brackets, etc. should be installed.
- Discharge nozzles should be installed.
- The electrical control system must be thoroughly checked out to verify that there are no issues present in the system that could cause inadvertent activation of the suppression system.

CAUTION: Installation of the system actuation components should be the last item completed before the system is placed into service.

4.13.1. Installing Universal Valve Operator (UVO)

- Step 5. Remove the threaded plug from item 1. Retain the plug for future use.
- Step 6. Apply PTFE tape to the 1/8" NPT threads on item 2. Do NOT allow tape to overlap the end of the fitting as this could cause possible blockage of the pressure port.
- Step 7. Thread the 1/8" NPT end of item 2 into the port on item 1. Secure wrench tight.
- Step 8. Remove the retaining clip from the cylinder valve body and retain for future use.
- Step 9. Use a set screw or reset tool (P/N IG71-0166) to remove the port plug from the cylinder's actuator port. Retain the plug for future use.
- Step 10. Check to ensure that item 1 is armed (firing pin retracted) and the safety pin is in place. If the firing pin is extended (operated), the actuator must be reset. See Section 6.1 for reset instructions.

CAUTION: Installing the UVO with the firing pin extended may cause accidental discharge.

Step 11. Install conduit from item 1 and item 3 to the control panel.

Step 12. Pull wire leads from item 1 and item 3 through the conduit and connect it to the control units releasing circuit and supervisory circuit respectively. See Figures 75 and 77.

Step 13. Insert item 1 into the cylinder valve actuator port and secure in place with item 3.

Step 14. Install items 4, 5 and 6 to the last pneumatic actuator in the cylinder bank. See Section 4.13.8 for installation instructions.

The cylinder is now armed.

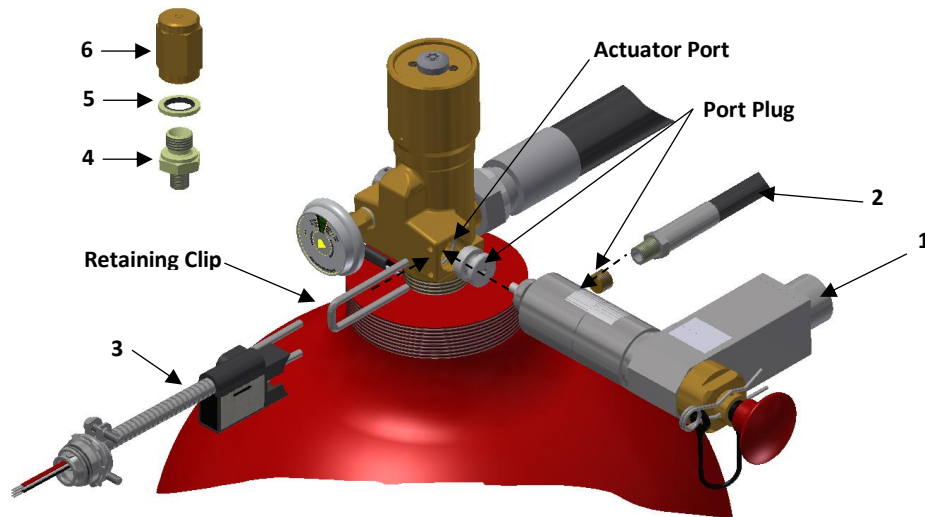


Figure 74 – Installing UVO to Cylinder Valve

Item No.	Part Number	Description	Notes
1	02-13571	Universal Valve Operator (UVO)	Part of UVO Primary Completer Kit
2	02-13713	G1/4 x R1/8 Actuation Hose, 19 in. (483 mm) Long	
3	02-14627	Universal Valve operator Supervisor (UVOS)	
4	02-10797	G1/4 x R1/8 Adaptor	
5	02-10926	Sealing Washer	
6	IG71-026	Vent Valve Assembly	

4.13.2. Installing Universal Energetic Actuator (UEA)

- Step 1. Remove the threaded plug from item 1. Retain the plug for future use.
- Step 2. Apply PTFE tape to the 1/8" NPT threads on item 2. Do NOT allow tape to overlap the end of the fitting as this could cause possible blockage of the pressure port.
- Step 3. Thread the 1/8" NPT end of item 2 into the port on item 1. Secure wrench tight.
- Step 4. Remove the retaining clip from the cylinder valve body and retain for future use.
- Step 5. Use a set screw or reset tool (P/N IG71-0166) to remove the port plug from the cylinder's actuator port. Retain the plug for future use.
- Step 6. Check to ensure that the item 1 firing pin is retracted (flush with actuator body). If the firing pin is extended (operated), the actuator must be replaced.

CAUTION: Installing the UEA with the firing pin extended may cause accidental discharge.

- Step 7. Install conduit from item 1 and item 3 to the control panel.
- Step 8. Pull wire leads from item 1 and item 3 through the conduit and connect it to the control units releasing circuit and supervisory circuit respectively. See Figures 76 and 77.
- Step 9. Insert item 1 into the cylinder valve actuator port and secure in place with item 3.
- Step 10. Install items 4, 5 and 6 to the last pneumatic actuator in the cylinder bank. See Section 4.13.8 for installation instructions.

The cylinder is now armed.

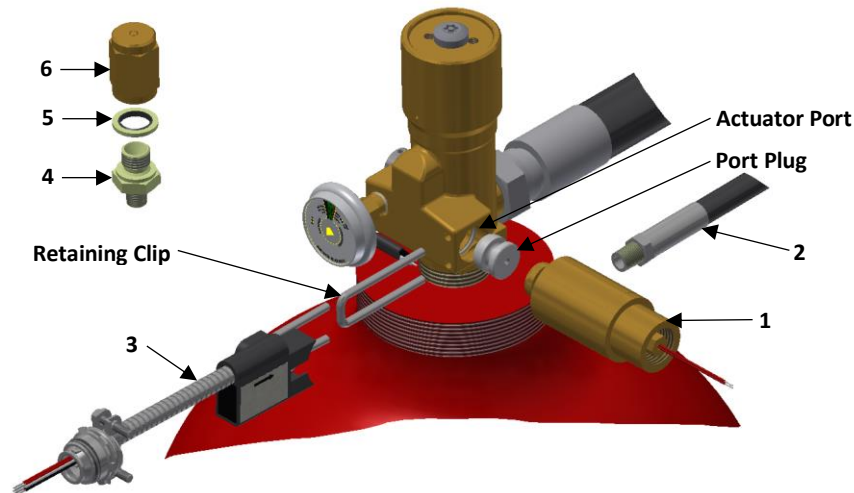


Figure 75 – Connecting UEA to Cylinder Valve

Item No.	Part Number	Description	Notes
1	IG71-247	Universal Energetic Actuator (UEA)	Part of UEA Primary Completer Kit
2	02-13713	G1/4 x R1/8 Actuation Hose, 19 in. (483 mm) Long	
3	02-14627	Universal Valve operator Supervisor (UVOS)	
4	02-10797	G1/4 x R1/8 Adaptor	
5	02-10926	Sealing Washer	
6	IG71-026	Vent Valve Assembly	

4.13.3. Typical Universal Valve Operator (UVO) Wiring

The UVO is wired directly to the releasing circuit of a Fike releasing panel (SHP-Pro or Cheetah Xi) and **MUST** not be connected to an Impulse Release Module (IRM). Refer to the appropriate control panel manual for further information.

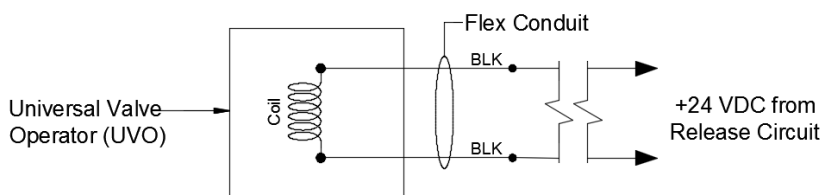


Figure 76 – Universal Valve Operator Wiring Diagram

CAUTION: If the UVO is to be connected to a Fike Cheetah Xi Releasing Control Module, a Solenoid Supervision and Protection Assembly (P/N 10-2360) must be installed. Refer to Fike document 06-344.

4.13.4. Typical Universal Energetic Actuator (UEA) Wiring

The UEA is wired to an Impulse Release Module (IRM), which is connected to a compatible Fike releasing panel (SHP-Pro or Cheetah Xi). Refer to Fike document 06-552 for IRM wiring details.

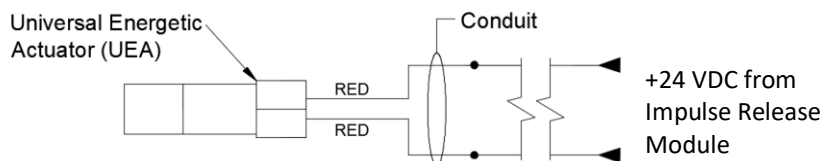


Figure 77 – Universal Energetic Actuator Wiring Diagram

4.13.5. Typical Universal Valve Operator Supervisor (UVOS) Wiring

The UVOS is wired to a "Supervisory" input on a compatible Fike releasing panel (SHP-Pro or Cheetah Xi). Refer to the appropriate control panel manual for further information.

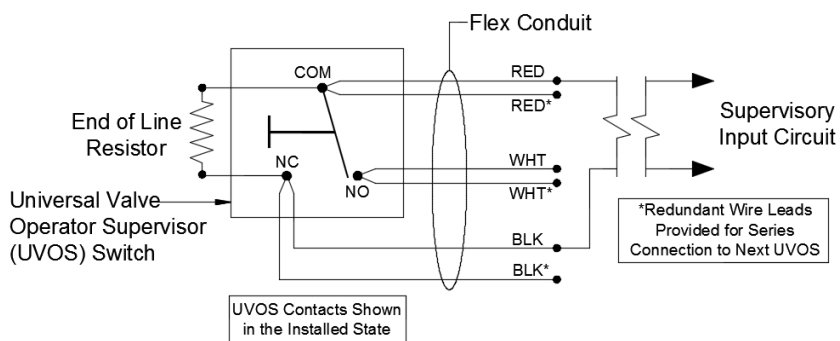


Figure 78 - Universal Valve Operator Supervisor Wiring Diagram

4.13.6. Installing Pneumatic Actuator

Step 1. Check to ensure that the firing pin on item 1A is retracted (flush with actuator body). If the firing pin is extended (operated), the actuator must be reset. See Section 6.2 for reset instructions.

CAUTION: Installing the UEA with the firing pin extended may cause accidental discharge.

- Step 2. Remove the retaining clip from the valve body.
- Step 3. Use a set screw or reset tool (P/N IG71-0166) to remove the plug from the valve actuator port. Retain the plug for future use.
- Step 4. Insert item 1A into the valve actuator port and secure in place with the retaining clip removed in Step 2.
- Step 5. Connect item 1B to the next pneumatic actuator. Secure wrench tight.
- Step 6. Connect item 2 from the previous pneumatic actuator assembly or UVO/UEA installed on the 'Primary' cylinder to the G1/4 threads on item 1A. Secure wrench tight.
- Step 7. Repeat this process for each 'Secondary' cylinder.

The cylinder is now armed.

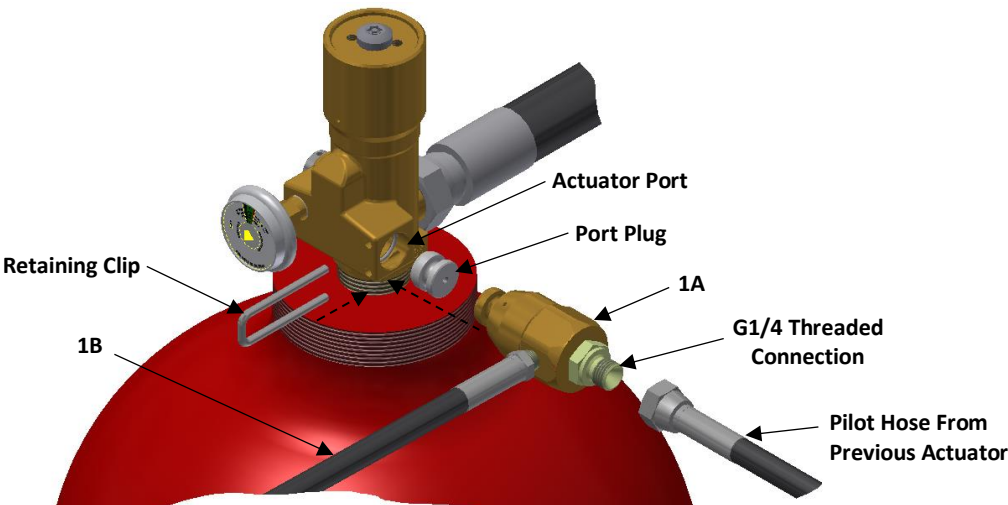


Figure 79 - Pneumatic Actuator Installation

Item No.	Part Number	Description	Notes
1A	IG71-104	Pneumatic Actuator Assembly	Part of Pneumatic Actuator Assembly
1B	02-13713	G1/4 x R1/8 Actuation Hose, 19 in. (483 mm) Long	

4.13.7. Installing Relay Actuator

- Step 1. Remove the retaining clip from the ProInert valve body.
- Step 2. Use a set screw or reset tool (P/N IG71-0166) to remove the plug from the valve actuator port. Retain the plug for future use.
- Step 3. Check to ensure that the firing pin on item 1A is retracted (flush with actuator body). If the firing pin is extended (operated), the actuator must be reset. See Section 6.2 for reset instructions.

CAUTION: Installing the relay actuator with the firing pin extended may cause accidental discharge.

- Step 4. Insert item 1A into the valve actuator port and secure in place with the retaining clip removed in Step 1.
- Step 5. Connect item 1B to the next pneumatic actuator. Secure wrench tight.
- Step 6. Apply PTFE thread tape or thread sealant (Loctite 542 or equivalent) to the G1/4 male threads on item 1A.
- Step 7. Thread item 2 onto the pneumatic actuator. Secure wrench tight.
- Step 8. Apply PTFE thread tape or thread sealant (Loctite 542 or equivalent) to the G1/4 male threads on item 2.
- Step 9. Install items 3 and item 4 onto the side outlet of the tee. Secure wrench tight.
- Step 10. Connect pilot hose from the previous actuator to item 2. Secure wrench tight.

The cylinder is now armed.

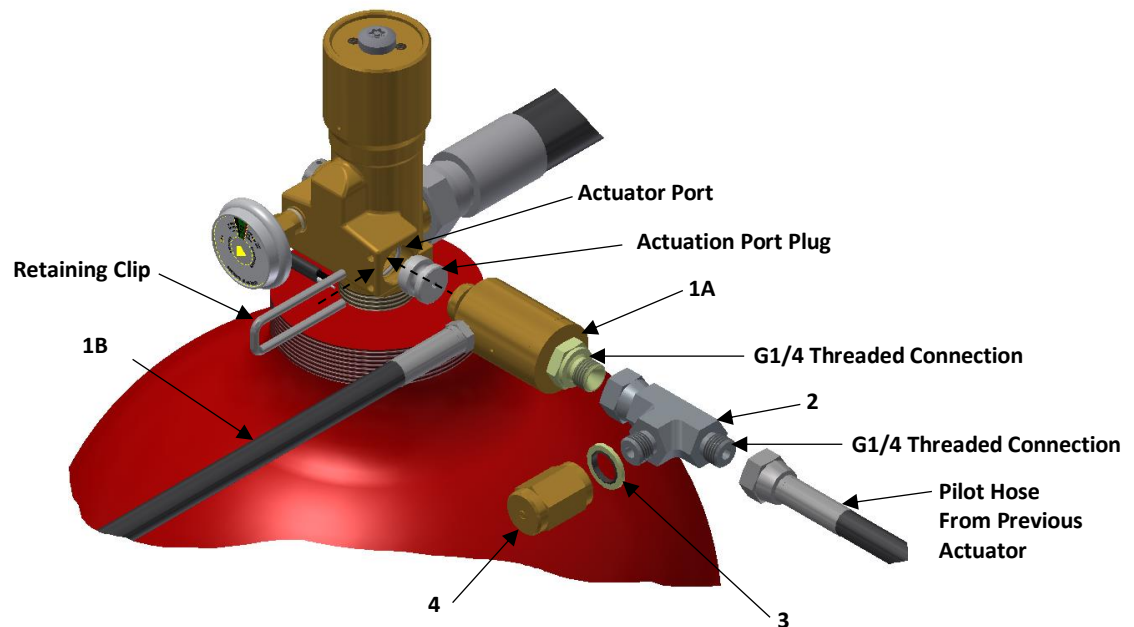


Figure 80 – Relay Actuator Installation

Item No.	Part Number	Description	Notes
1A	IG71-220	Pneumatic Actuator Assembly	Part of Relay Actuator Assembly
1B	02-13713	G1/4 x R1/8 Actuation Hose, 19 in. (483 mm) Long	
2	02-11731	G1/4(M) x G1/4(F) Swivel x G1/4(M) Tee	
3	02-10926	Sealing Washer	
4	IG71-026	Vent Valve Assembly	

4.13.8. Installing Pneumatic Actuator Pressure Vent

A pneumatic actuator pressure vent must be installed to the last secondary cylinder in the pilot line. The method for installing the pneumatic actuator pressure vent depends upon the cylinder manifold configuration and how the pilot line hoses are interconnected between the cylinder valves. Refer to installation instructions below.

NOTE: Refer to Appendix E for diagrams showing the correct locations for installing the pneumatic actuator pressure vent.

4.13.8.1. Installing Pneumatic Actuator Pressure Vent (Side)

- Step 1. Remove the retaining clip from the ProInert valve body.
- Step 2. Use a set screw or reset tool (P/N IG71-0166) to remove the plug from the valve actuator port. Retain the plug for future use.
- Step 3. Remove actuation hose from the side outlet on the last pneumatic actuator in the cylinder bank and discard. Hose not shown for clarity.
- Step 4. Apply PTFE thread tape or thread sealant (Loctite 542 or equivalent) to the NPT threads on item 2.
- Step 5. Thread item 2 into item 1A. Secure wrench tight.
- Step 6. Apply PTFE thread tape or thread sealant (Loctite 542 or equivalent) to the G1/4 threads on item 2.
- Step 7. Install item 3 and item 4 onto item 2. Secure wrench tight.
- Step 8. Install item 1 to the last cylinder in the bank and secure in position with the retaining pin removed in Step 1.
- Step 9. Connect pilot hose from the previous actuator to item 1. Secure wrench tight.

The cylinder is now armed.

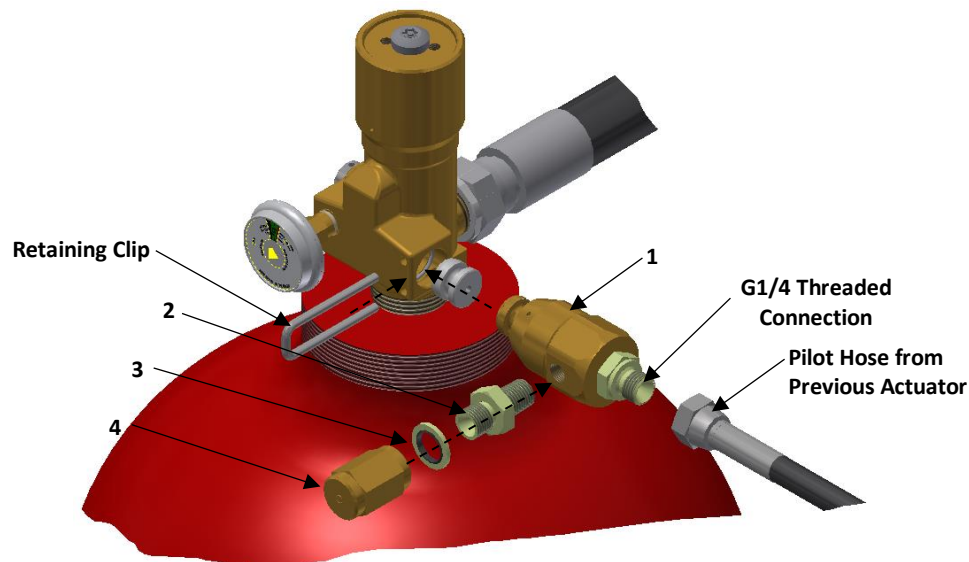


Figure 81 – Pneumatic Actuator Pressure Vent Side Installation

Item No.	Part Number	Description	Notes
1	IG71-104	Pneumatic Actuator Assembly	
2	02-10797	G1/4 x R1/8 Adaptor	
3	02-10926	Sealing Washer	
4	IG71-026	Vent Valve Assembly	

4.13.8.2. Installing Pneumatic Actuator Pressure Vent (Top)

- Step 1. Remove the retaining clip from the ProInert valve body.
- Step 2. Use a set screw or reset tool (P/N IG71-0166) to remove the plug from the valve actuator port. Retain the plug for future use.
- Step 3. Apply PTFE thread tape or thread sealant (Loctite 542 or equivalent) to the G 1/4 threads on item 1A
- Step 4. Install item 2 and item 3 onto item 1A. Secure wrench tight.
- Step 5. Install item 1A to the last cylinder in the bank and secure in position with the retaining pin removed in Step 1.

The cylinder is now armed.

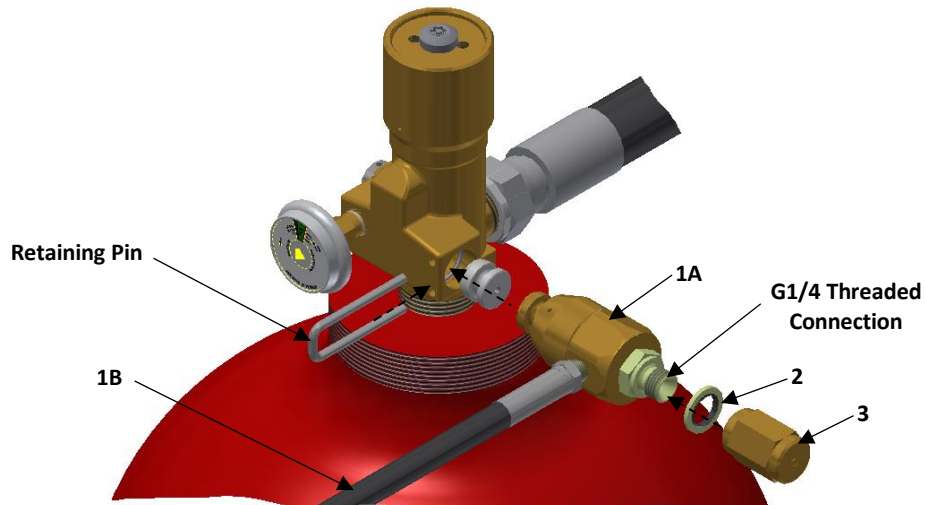


Figure 82 – Pneumatic Actuator Pressure Vent Top Installation

Item No.	Part Number	Description	Notes
1A	IG71-104	Pneumatic Actuator Assembly	
1B	02-13713	G1/4 x R1/8 Actuation Hose, 19 in. (483 mm) Long	
2	02-10926	Sealing Washer	
3	IG71-026	Vent Valve Assembly	

4.13.9. Installing Nitrogen Actuator Assembly

Prior to installing the nitrogen actuator assembly, the following items shall be verified.

- The nitrogen actuator assembly should be the last component installed on the system.
- Verify that the location for installing the nitrogen actuator assembly is suitably protected so that it is not subject to mechanical, chemical, or other damage that would render it inoperable.
- Verify that the location for installing the nitrogen actuator assembly is easily accessible at all times, including at the time of a fire.
- When used as a 'Primary' actuator, verify that signage has been installed to identify the hazard that each nitrogen actuator assembly serves.

Step 1. Use the nitrogen actuator assembly mounting bracket as a template to mark and drill the mounting holes.

NOTE: When using a universal valve operator (UVO) with manual strike button to activate the nitrogen actuator assembly, the UVO strike button shall NOT be located greater than 4 ft. (1.2 m) above the floor.

Step 2. Secure the nitrogen actuator assembly to the mounting surface using suitable anchors, provided by others.

Step 3. Attach the chosen actuator (UVO, UEA or Pneumatic Relay) to the nitrogen actuator assembly valve following the steps indicated in Sections 4.13.10, 4.13.11, and 4.13.12.

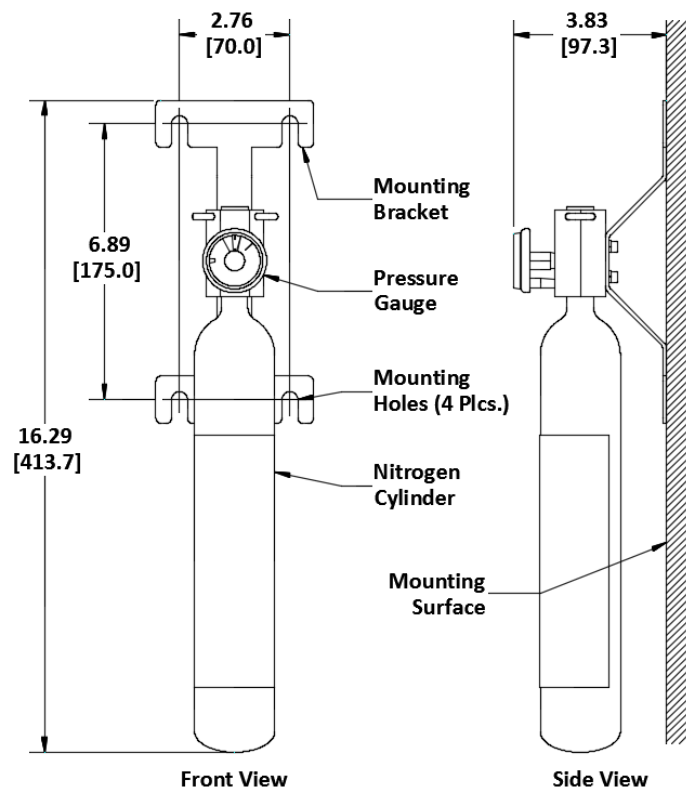


Figure 83 - Nitrogen Actuator Assembly (Without Actuator)

NOTE: See Section 3.10 for specific details on the various system activation methods using the nitrogen actuator assembly.

4.13.10. Installing UVO Primary Completer Kit (P/N IG71-114)

- Step 1. Apply PTFE Tape to the NPT male threads of item 7. Do NOT allow tape to overlap the end of the fitting as this could cause possible blockage of the pressure port.
- Step 2. Remove item 5 from item 4.
- Step 3. Install the item 7 to the threaded port on item 4. Secure wrench tight.
- Step 4. Connect the other end of item 7 to the pilot line tubing (not shown). Secure wrench tight.
- Step 5. Install and connected conduit to item 4.
- Step 6. Pull item 4 wire leads through conduit and connect to the host control panel or module. See Figure 75.
- Step 7. Connect item 6 wire leads to the host control panel or module. See Figure 77.
- Step 8. Remove item 2 and item 3 from item 1. Keep these items for future use should the cylinder have to be removed for service.
- Step 9. Check to ensure that item 4 is armed (firing pin retracted) and the safety pin is in place. If the firing pin is extended (operated), the actuator must be reset. See Section 6.1 for reset instructions.

CAUTION: Installing the UVO with the firing pin extended may cause accidental discharge.

- Step 10. Connect the item 4 to item 1 and secure in place with item 6.

CAUTION: Installation of the system actuation components should be the last item completed before the system is placed into service.

- Step 11. See Section 4.13.8 for installation of items 8 through 10.

The nitrogen actuator is now armed.

NOTE: See next page for an assembly drawing of the nitrogen actuator assembly with UVO completer kit.

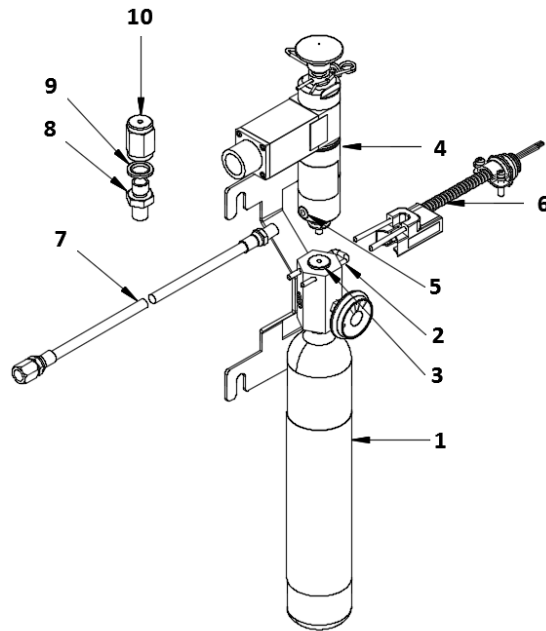


Figure 84 - Nitrogen Actuator Assembly with UVO Primary Completer Kit

Item No.	Part Number	Description	Notes
1	70-325-X	Nitrogen Actuator Assembly	
2	02-11755	Retaining Clip	Part of 70-325 Nitrogen Actuator Assembly
3	IG71-0151	Valve Fill Adapter Plug	
4	02-13571	Universal Valve Operator (UVO)	Part of IG71-114 Completer Kit.
5	02-14053	Pipe Plug	
6	02-14627	Universal Valve Operator Supervisory (UVOS)	
7	02-13453	1/8 NPT x 1/4 JIC Swivel Hose, 36 in. (914 mm) Long	
8	02-10797	1/8 NPT x G1/4 Adapter ¹	
9	02-10926	1/4" Sealing Washer ¹	
10	IG71-026	Vent Valve Assembly ¹	

¹Pilot line vent components shall be installed onto the last pneumatic actuator in the cylinder bank. See Section 4.13.8.

4.13.11. Installing UEA Primary Completer Kit (P/N IG71-251)

- Step 1. Apply PTFE Tape to the NPT male threads of item 7. Do NOT allow tape to overlap the end of the fitting as this could cause possible blockage of the pressure port.
- Step 2. Remove item 5 from item 4.
- Step 3. Install the item 7 to the threaded port on item 4. Secure wrench tight.
- Step 4. Connect the other end of item 7 to the pilot line tubing (not shown). Secure wrench tight.
- Step 5. Install and connected conduit to item 4.
- Step 6. Pull item 4 wire leads through conduit and connect to the Impulse Release Module (IRM). See Figure 76.
- Step 7. Connect item 6 wire leads to the host control panel or module. See Figure 77.
- Step 8. Remove item 2 and item 3 from item 1. Keep these items for future use should the cylinder have to be removed for service.
- Step 9. Check to ensure that item 4 is armed (firing pin retracted). If the firing pin is extended (operated), the actuator must be replaced

CAUTION: Installing the UEA with the firing pin extended may cause accidental discharge.

- Step 10. Connect the item 4 to item 1 and secure in place with item 6.

CAUTION: Installation of the system actuation components should be the last item completed before the system is placed into service.

- Step 11. See Section 4.13.8 for installation of items 8 through 10.

The Nitrogen Actuator is now armed.

NOTE: See next page for an assembly drawing of the Nitrogen Actuator Assembly with UEA Completer Kit.

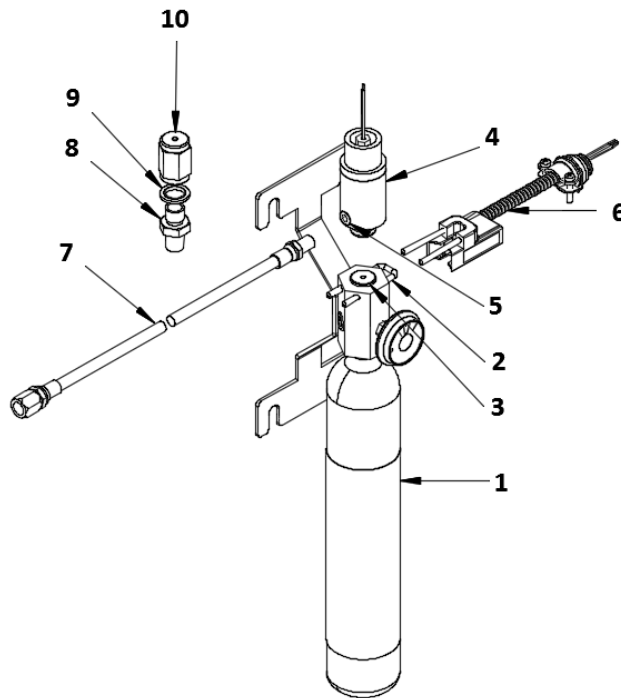


Figure 85 - Nitrogen Actuator Assembly with UEA Primary Completer Kit

Item No.	Part Number	Description	Notes
1	70-325-X	Nitrogen Actuator Assembly	
2	02-11755	Retaining Clip	Part of 70-325 Nitrogen Actuator Assembly
3	IG71-0151	Valve Fill Adapter Plug	
4	IG7-247	Universal Energetic Actuator (UEA)	Part of IG71-251 Completer Kit.
5	02-14053	Pipe Plug	
6	02-14627	Universal Valve Operator Supervisory (UVOS)	
7	02-13453	1/8 NPT x 1/4 JIC Swivel Hose, 36 in. (914 mm) Long	
8	02-10797	1/8 NPT x G1/4 Adapter ¹	
9	02-10926	1/4" Sealing Washer ¹	
10	IG71-026	Vent Valve Assembly ¹	
11	10-2748	Impulse Release Module (IRM), <i>not shown</i>	

¹Pilot line vent components shall be installed onto the last pneumatic actuator in the cylinder bank. See Section 4.13.8.

4.13.12. Installing Pneumatic Relay Secondary Completer Kit (P/N IG71-115)

- Step 1. Apply PTFE Tape to the NPT male threads of items 4A, 4B and 6. Do NOT allow tape to overlap the end of the fitting as this could cause possible blockage of the pressure port.
- Step 2. Remove item 5 from item 4A.
- Step 3. Install item 4B to the threaded port on item 4A. Secure wrench tight.
- Step 4. Connect item 4C to item 4B. Secure wrench tight.
- Step 5. Connect the other end of item 4C to the pilot line tubing (not shown). Secure wrench tight.
- Step 6. Connect JIC swivel end of item 6 to item 4A. Secure wrench tight.
- Step 7. Install item 7 onto the side outlet of item 6.
- Step 8. Install item 8 onto the side outlet of item 6. Secure wrench tight.
- Step 9. Connect pilot line hose from previous actuator (not shown) to the G1/4 outlet of item 6. Secure wrench tight.
- Step 10. Remove item 2 and item 3 from item 1. Keep these items for future use should the cylinder have to be removed for service.
- Step 11. Check to ensure that item 4A is armed (firing pin retracted). If the firing pin is extended (operated), the actuator must be reset. See Section 6.2 for reset instructions.

CAUTION: Installing the Pneumatic Relay with the firing pin extended may cause accidental discharge.

- Step 12. Connect item 4A to item 1 and secure in place with item 2.

CAUTION: Installation of the system actuation components should be the last item completed before the system is placed into service.

- Step 13. See Section 4.13.8 for installation of items 8 through 10.

The Nitrogen Actuator is now armed.

NOTE: See next page for an assembly drawing of the Nitrogen Actuator Assembly with Pneumatic Relay Secondary Completer Kit.

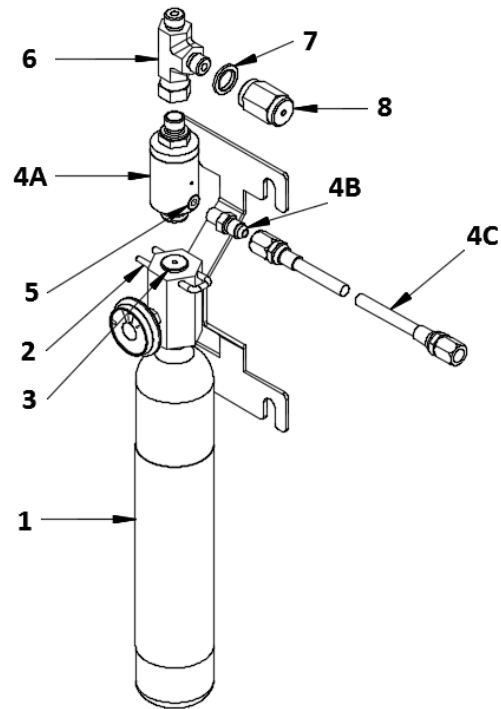


Figure 86 - Nitrogen Actuator Assembly with Pneumatic Relay Secondary Completer Kit

Item No.	Part Number	Description	Notes
1	70-325-X	Nitrogen Actuator Assembly	
2	02-11755	Retaining Clip	Part of 70-325 Nitrogen Actuator Assembly
3	IG71-0151	Valve Fill Adapter Plug	
4A	70-334	Pneumatic Relay Assembly	Part of IG71-115 Completer Kit
4B	02-11243	R1/8 x 1/4 JIC Hex Nipple	Part of 70-334 Relay Assembly
4C	02-4977	1/4 JIC x 3 ft. (0.9 m) Long Actuation	
5	02-14053	Pipe Plug	Ordered separately
6	02-11731	G1/4 x G1/4 Swivel x G1/4 Tee	Part of IG71-115 Completer Kit
7	02-10926	1/4 Sealing Washer	
8	IG71-026	Vent Valve Assembly	

4.14. Installing Nitrogen Actuator for System Activation

- Step 1. Install item 1 at the location indicated on the installation drawings. See Section 4.13.9 for installation instructions.
- Step 2. Install the pilot line components (items 3 thru 5). Apply PTFE tape to all NPT male threads. Do NOT allow tape to overlap the end of the fitting as this could cause possible blockage of the pressure port. Secure all connections, wrench tight. Terminate each end of the pilot line within 2 ft. (.61 m) of item 1 and the 'Primary' ProInert cylinder.
- Step 3. Apply PTFE Tape to the 1/8" NPT male threads of item 2B. Do NOT allow tape to overlap the end of the fitting as this could cause possible blockage of the pressure port.
- Step 4. Remove the pressure port plug from item 2A.
- Step 5. Thread the 1/8" NPT end of item 2B into the pressure port on item 2A. Secure wrench tight.
- Step 6. Connect the other end of item 2B to the pilot line item 3. Secure wrench tight.
- Step 7. Apply PTFE thread tape or thread sealant (Loctite 542 or equivalent) to the G1/4 male threads on tee fitting installed on the relay actuator.
- Step 8. Thread the G1/4 end of item 6 onto the tee fitting install on the relay actuator. Secure wrench tight.
- Step 9. Connect the JIC end of item 6 to the pilot line item 3. Secure wrench tight.
- Step 10. Remove the pilot line hose from the side of the last pneumatic actuator in the cylinder bank.
- Step 11. Apply PTFE thread tape or thread sealant (Loctite 542 or equivalent) to the male threads on item 2D.
- Step 12. Install item 2D into the side outlet of the pneumatic actuator. Secure wrench tight.
- Step 13. Install item 2E onto item 2D.
- Step 14. Thread item 2F onto item 2D. Secure wrench tight.
- Step 15. Check to ensure that item 2A is armed (firing pin retracted). If the firing pin is extended (operated), the actuator must be reset (UVO only) or replaced if using a UEA. See Section 6.1 for UVO reset instructions.

CAUTION: Installing the actuator (UVO or UEA) with the firing pin extended may cause accidental discharge.

- Step 15. Remove the retaining clip and plug from the brass valve on item 1. Keep these items for future use should the cylinder have to be removed for service.
- Step 16. Connect item 2A to item 1 and secure in place with item 2C.
- Step 17. Connect conduit to item 2A.
- Step 18. Pull item 2A wire leads through the conduit and connect to the control units releasing circuit. See Figure 75 or 76.
- Step 19. Connect item 2C wire leads to the control unit. See Figure 77.

CAUTION: Installation of the system actuation components should be the last item completed before the system is placed into service.

The system is now armed.

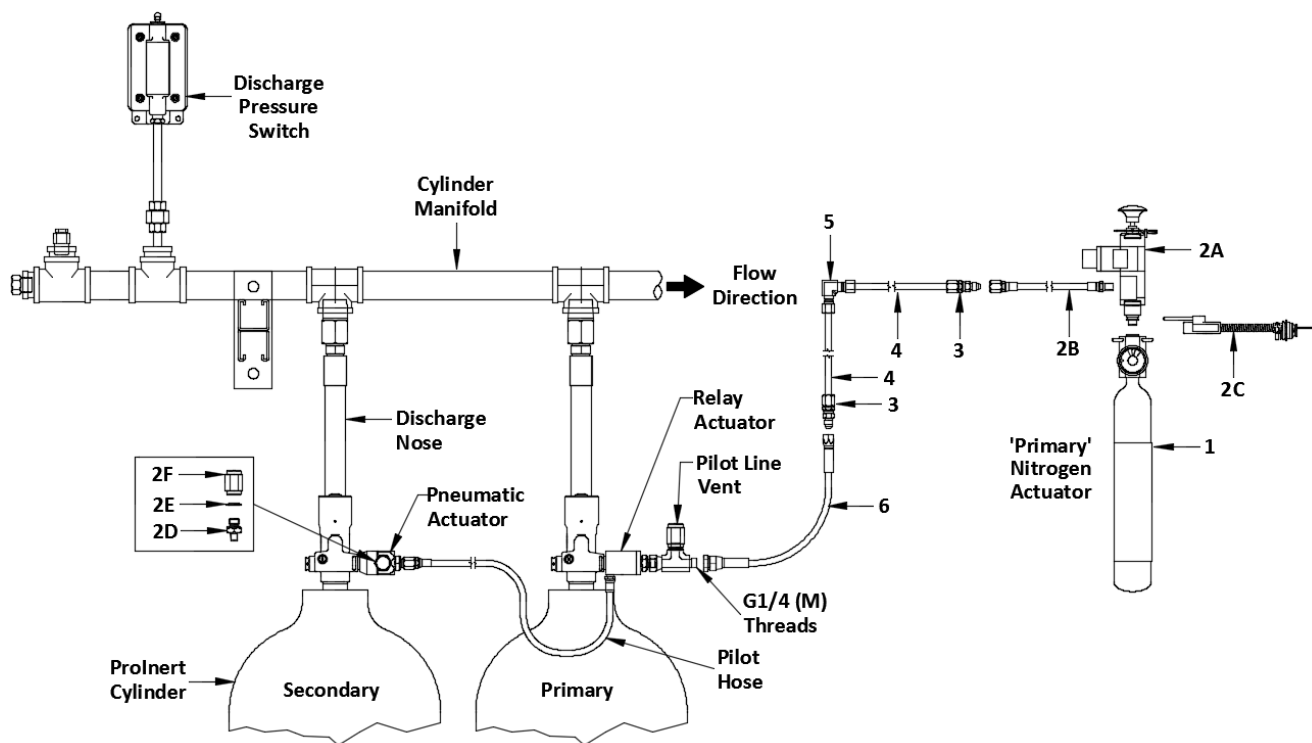


Figure 87 – System Activated by Nitrogen Actuators

Pilot Line Limitations:

- 1) Maximum 150 ft. (45 m) between 'Primary' nitrogen actuator and the first ProInert cylinder.
- 2) Tubing (supplied by others) shall be 1/4" x 0.035" wall stainless steel.
- 3) Pilot line hoses supplied by Fike.

NOTE: The UVO shown in the diagram above can be replaced with a UEA

Item No.	Part Number	Description	Notes
1	70-325-X	Nitrogen Actuator Assembly	
2A	02-13571	Universal Valve Operator (UVO)	Part of IG71-114 Completer Kit or IG71-251 Completer Kit
	IG7-247	Universal Energetic Actuator (UEA)	
2B	02-13453	1/8 NPT x 1/4 JIC Swivel Hose, 36 in. (914 mm) Long	
2C	02-14627	Universal Valve Operator Supervisory (UVOS)	
2D	02-10797	1/8 NPT x G1/4 Adapter ¹	
2E	02-10926	1/4" Sealing Washer ¹	
2F	IG71-026	Vent Valve Assembly ¹	
3	02-12695	1/4 Tube x 1/4 JIC Adapter	
4	N/A	1/4" x 0.035 Wall, Stainless Steel Tubing	
5	C02-1359	1/4" Tube Tee	
6	02-10801	G1/4 x 1/4 JIC x 39 in. (1 m) Long Actuation Hose	

¹Pilot line vent components shall be installed onto the last pneumatic actuator in the cylinder bank. See Section 4.13.8.

5. ACCEPTANCE TESTING

The completed system shall be reviewed and tested by qualified personnel that have knowledge and experience of the testing requirements contained in this manual and NFPA 2001. Testing personnel shall follow all safety procedures during system testing. The following acceptance testing procedures are intended to represent the minimum requirement for the extinguishing portion of the system. Additional testing may be required by the AHJ.

If the system is connected to an alarm receiving office, notify the alarm receiving office that a fire system test is to be conducted and that emergency response by the fire department or alarm station personnel is not required. Notify all personnel in the areas that could be affected by the testing that a test is to be conducted and instruct them as to the events that could occur during the test.

CAUTION: The releasing mechanism on each storage cylinder or nitrogen actuator **must** be disconnected from the cylinder prior to conducting the acceptance test in order to prevent activation of the suppression system during testing.

5.1. Pre-Checks and Visual Inspections

When the installation is complete and before making the final connections, the following system checks should be made:

Enclosure Checks

- ___ 1. Check the hazard area dimensions against those shown on the system plan(s). If the area volume has changed, the agent weight should be recalculated and compared with the agent supplied.
- ___ 2. Check the hazard area for walls or movable partitions that may have been added or changed. If walls or partitions have been added, check to see that all areas within the hazard still receive adequate nozzle coverage and agent distribution.
- ___ 3. Thoroughly examine the enclosure to verify that it has been properly constructed and sealed to eliminate any significant air leaks that could result in failure of the enclosure to hold the agent concentration.
- ___ 4. Perform an Enclosure Integrity Test on all protected enclosures. A Door Fan Test is the accepted method to estimate worst-case room leakage and agent (concentration) hold time. Refer to NFPA Standard 2001, latest edition for additional information and door fan test procedures.

Mechanical Checks

- ___ 1. Inspect the piping distribution system(s) to verify that it has been installed in compliance with the design drawings. Nozzle locations, nozzle orientation, pipe sizes, pipe size reductions and orientation of tees shall be checked against the design drawings. If piping system as installed differs from the design drawings, the system **MUST** be recalculated to reflect the piping system as installed.
- ___ 2. Visually inspect all components for signs of damage (i.e., corrosion, dents, twisted, etc.).
- ___ 3. Check that all agent storage cylinders are properly located in accordance with the design drawings
- ___ 4. Check that all agent storage cylinders are securely fastened with supplied brackets.
- ___ 5. Check that all piping joints, discharge nozzles, and piping supports are securely fastened to prevent unacceptable vertical or lateral movement during discharge.
- ___ 6. Check that all warning and instruction signs are mounted where required.

- ___ 7. Check that all nozzles are the proper type, correctly placed in accordance with the design drawings, and properly oriented. Make certain there are no obstructions that could block the discharge of agent from the nozzle(s).
- ___ 8. Make sure all nozzle set screws are in place.
- ___ 9. Check the cylinder gauge to confirm cylinder pressure is in operable range. Pressure should read 2,900 PSIG at 60°F (200 BAR at 15°C). For temperatures other than 60°F (15°C), reference Temperature vs. Pressure Chart in Appendix B.
- ___ 10. Check the model markings on each cylinder nameplate to verify that the correct cylinder has been installed in accordance with the design drawings.
- ___ 11. Verify the operation of auxiliary functions such as door closures, damper closures, air handling shutdown, etc. should be verified when the control system is activated, both manually and automatically.
- ___ 12. Verify that the Discharge Pressure Switch (if installed) is properly secured to the piping network and wired properly to control panel.
- ___ 13. Check the system actuators (UVO, UEA, Nitrogen Actuator, Pneumatic Actuator, Relay Actuator) are disconnected from the cylinders or nitrogen actuators to prevent false activation of the system.
- ___ 14. Check all pipe joints for mechanical tightness.
- ___ 15. Perform a pressure test on the piping network in accordance with NFPA 2001, latest edition.
- ___ 16. Verify that all check valves (if used) are installed with the "Flow Arrow" pointing in the correct direction.

Pneumatic Checks

The following pneumatic checks should be made:

- ___ 1. Remove all actuators (UVO, UEA, Pneumatic Actuator, Relay Actuator)) from cylinder valves.

IMPORTANT NOTE: Failure to disconnect all actuators from the cylinders will result in agent discharge when performing pneumatic checks.

- ___ 2. Disconnect actuation hose from the 'Primary' cylinder actuator (UVO or UEA) or Nitrogen Actuator Assembly.
- ___ 3. Provide 100 psi (6.9 bar) pressure to the disconnected actuation hose.
- ___ 4. Verify all cylinder actuators are in the fired (piston extended) position. Reset actuators upon completion of testing.
- ___ 5. Verify all vent valves close upon pressure being applied to pneumatic actuation (pilot) line.

Electrical Checks

The information contained in this document does not cover service and maintenance procedures for the Detection and Control System (electrical portion). The electrical portion of the system must be thoroughly checked out according to the manufacturer's recommendations and the requirements of the AHJ.

IMPORTANT NOTE: Do not arm the Fike Clean Agent Fire Suppression system before the Detection and Control System has been checked out and all circuits are free of trouble and ground fault conditions. If control panel checks out, install the releasing mechanism to the cylinder(s).

The results of the system checkout shall be documented in a test report. The test report shall be maintained by the system owner for the life of the suppression system.

6. MAINTENANCE

The completed system shall be maintained by qualified personnel that have knowledge and experience of the maintenance and service requirements contained in this manual and NFPA 2001. Testing personnel shall follow all safety procedures during system testing. The following maintenance procedures are intended to represent the minimum requirement for the extinguishing portion of the system. Additional maintenance procedures may be required by the AHJ.

IMPORTANT NOTE: This information **does not** cover maintenance procedures for the electrical and control portions of the system. The control portion of the system should be thoroughly checked out according to the manufacturer's recommendations and the requirements of the AHJ.

CAUTION: The releasing mechanism on each storage cylinder **must** be disconnected from the cylinder prior to conducting the acceptance test in order to prevent activation of the suppression system cylinder during testing.

Monthly Inspection

- ___ 1. Check that the releasing panel is powered and is free of supervisory, trouble, or alarm conditions.
- ___ 2. Check that all manual controls (i.e., manual release, abort, pneumatic actuators, etc.) are unobstructed.
- ___ 3. Check that the system components show no signs of physical damage, corrosion or a condition that could prevent operation.
- ___ 4. Check all piping supports to make sure they are tight and all piping is properly supported.
- ___ 5. Check all nozzle orifices for signs of corrosion.
- ___ 6. Check all nozzles to make certain there are no obstructions that could block the discharge of agent from the nozzles.
- ___ 7. Check the cylinder gauge to confirm cylinder pressure is in operable range. Pressure should read 2,900 PSIG at 60°F (200 BAR at 15°C). For temperatures other than 60°F (15°C), reference Temperature vs. Pressure Chart in Appendix B. If the pressure loss indicated exceeds 10% of the nominal pressure, check the cylinder for leaks and repair as necessary.
- ___ 8. Check that the protected equipment or hazard area has not been changed or modified.
- ___ 9. Check that all penetrations made through the protected enclosure are properly sealed. Any new penetration shall be sealed immediately maintaining the original fire resistance rating of the enclosure.
- ___ 10. Verify that any previously noted deficiencies have been corrected.

If any deficiencies are found, appropriate corrective action shall be taken immediately. When the corrective action involves maintenance or repair, it shall be conducted by a qualified fire protection service technician.

Semiannual Inspection and Service

- ___ 1. Verify the amount of agent in the cylinder(s) matches the agent weight stamped on the cylinder label, by either weighing the cylinder or by using the cylinder's Liquid Level Indicator (LLI), if installed. This information should be recorded and affixed to the cylinder so it can be used during cylinder maintenance. If the weight indicates a shortage exceeding 5% of required weight, the cylinder must be removed from service for repair and/or recharge.

Annual Inspection and Service

- ___ 1. The checks listed in Section 5, Acceptance Testing should be performed.
- ___ 2. Check the hazard area dimensions against those shown on the system plan(s). If the area volume has changed, the agent weight should be recalculated and compared with the agent weight supplied to determine if the correct amount of agent is being supplied to protect the hazard.
- ___ 3. Thoroughly examine the enclosure to verify that the integrity of the enclosure has been maintained. Any new penetrations into the enclosure have been properly sealed to eliminate any significant air leaks that could result in failure of the enclosure to hold the agent concentration. If hazard conditions indicate the inability to maintain the agent concentration, a door fan test should be performed in accordance with NFPA 2001, latest edition.

5 Year Inspection and Service

- ___ 1. Perform a complete external visual inspection of each cylinder in accordance with the Code of Federal Regulations, Title 49 and Compressed Gas Association (CGA) Pamphlet C-6, Section 3. The cylinder does not need to be emptied or stamped while under pressure for this inspection. The inspection shall be performed by a CGA/DOT approved inspector only.

Where the external visual inspection indicates that the cylinder has been damaged, additional strength tests shall be required.
- ___ 2. All hoses shall be detached from the system and a hydrostatic pressure test shall be performed in accordance with NFPA 2001, latest edition. Hoses failing the test must be marked and destroyed and replaced. Hoses passing the test shall be marked to show the date of test prior to reinstallation.

After System Discharge

Recharge discharged cylinders

- ___ 1. Use the main-reserve switch to engage the reserve agent supply, if provided.
- ___ 2. Remove the Impulse Valve Operator Supervisor (IVOS) and disconnect the actuator (i.e., IVO, IVPO, IEA) from the actuator port on the empty cylinder.
- ___ 3. Disconnect and remove the Low Pressure Switch from the cylinder fill port on the empty cylinder. Reinstall the threaded port plug retained during switch installation.
- ___ 4. Disconnect the empty cylinder from the suppression piping and remove it from its mounting bracket or strap.
- ___ 5. Install the cylinder baffle plate to prepare the cylinder for shipping. Return the cylinder to Fike or to an authorized cylinder fill station for cylinder rebuild and recharge. Refer to Fike document P/N 06-806 for cylinder recharge procedure.
- ___ 6. Reinstall the recharged cylinder making sure that the correct cylinder is installed in the correct location.
- ___ 7. Reconnect the discharge piping to the recharged cylinder.
- ___ 8. Reinstall the Low Pressure Switch to the cylinder fill port. See Section 4.12 for instructions.
- ___ 9. Reset the IVO and IVPO actuators where used. See Section 6.1 for reset instructions. Where an Impulse Energetic Actuator (IEA) is used, replace it with new. The IEA is a single use device that MUST be replaced after system discharge.
- ___ 10. Reconnect the actuator to the cylinder valve.

Recharge discharged Nitrogen Actuator Assembly (if applicable)

NOTE: Nitrogen Actuators are used for primary cylinder activation or selector valve activation.
--

- ____ 1. Disconnect the actuator (UVO, UEA or Relay Actuator) from the Nitrogen Actuator Assembly.
- ____ 2. Remove the Nitrogen Actuator Assembly from the mounting surface and recharge the nitrogen cylinder. Refer to Nitrogen Actuator Recharge Manual 06-721 for recharge instructions.
- ____ 3. Reinstall the recharged Nitrogen Actuator Assembly to the mounting surface.
- ____ 4. Reset the actuator (UVO or Relay Actuator). See Section 6.1 for reset instructions. Where a UEA is used, replace it with new. The UEA is a single use device that must be replaced after system discharge.
- ____ 5. Reconnect the actuator to the Nitrogen Actuator Assembly.

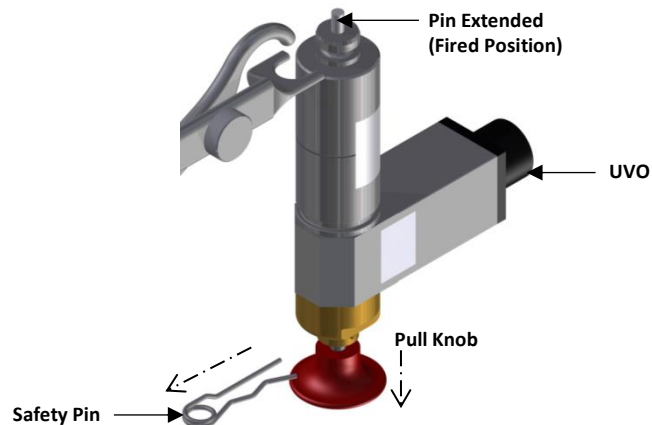
Reset Selector Valves (if applicable)

- ____ 1. Lift the pull ring on the pop-off valve to release the pressure from the actuator.
- ____ 2. Use a wrench or apply pressure to Port B on the actuator to close the valve after it has been activated.
- ____ 3. Disconnect the actuator (UVO, UEA, or Relay Actuator) from the release fitting or nitrogen actuator assembly, where used.
- ____ 4. If applicable, remove the Nitrogen Actuator Assembly from the mounting surface and recharge the nitrogen cylinder. Refer to Nitrogen Actuator Recharge Manual 06-721 for recharge instructions.
- ____ 5. Reinstall the recharged Nitrogen Actuator Assembly to the mounting surface.
- ____ 6. Reset the actuator (UVO or Relay Actuator). See Section 6.1 for reset instructions. Where a UEA is used, replace it with new. The UEA is a single use device that must be replaced after system discharge.
- ____ 7. Reconnect the actuator to the Nitrogen Actuator Assembly.

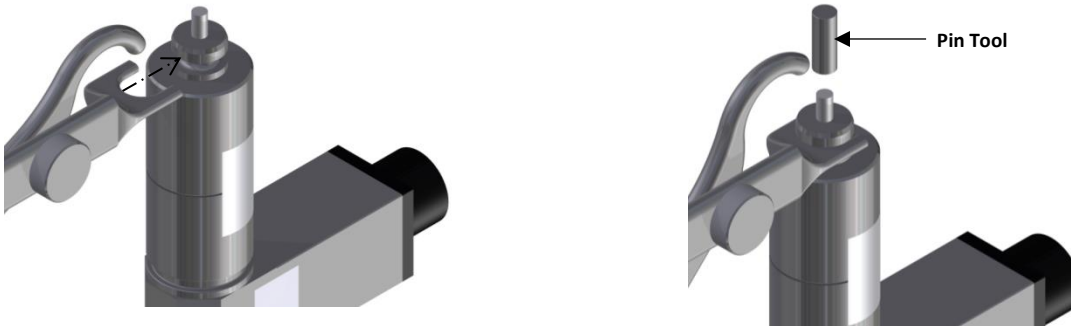
6.1. UVO Reset Instructions

Reset Instructions using the 02-14782 Reset Multi Tool

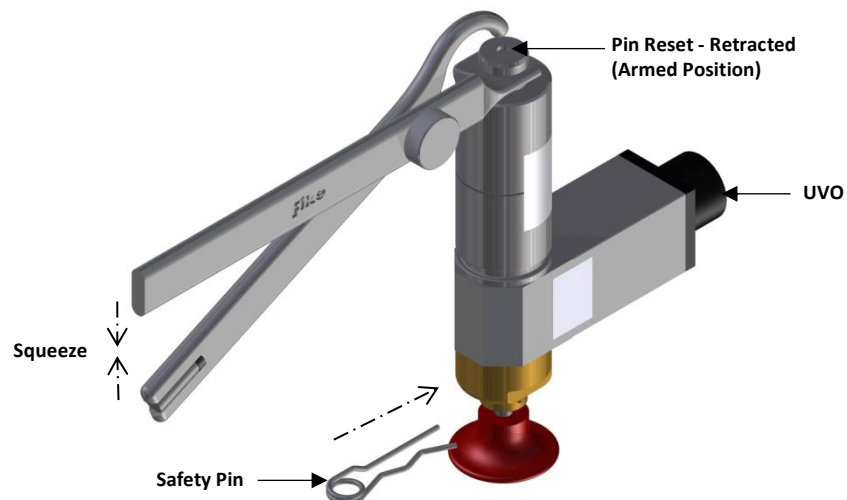
1. Disconnect the UVO from the ProInert valve actuator port by removing the operator supervisor (UVOS) or retaining clip that secures the operator in place.
2. Remove the safety cotter pin from the UVO and pull the manual strike button until the operator resets (clicks into place).



3. Align the forked end of the anvil handle around the grooved end of the UVO tip. It is recommended to use the additional pin tool included with the reset multi-tool.

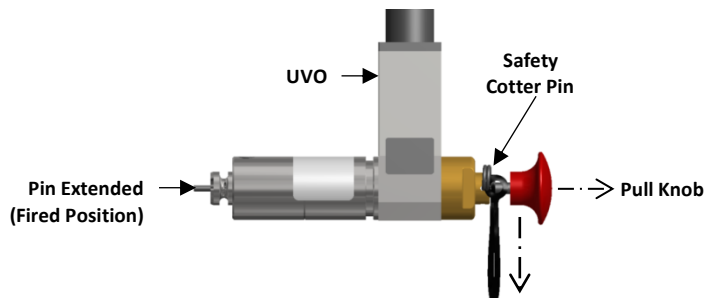


4. Squeeze reset tool handles until UVO pin resets (clicks into place); then, reinsert the safety pin. The UVO is reset and ready to be installed.

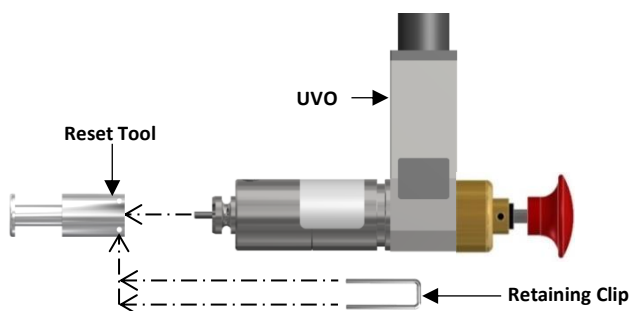


Reset Instructions using the 70-312 Reset Tool

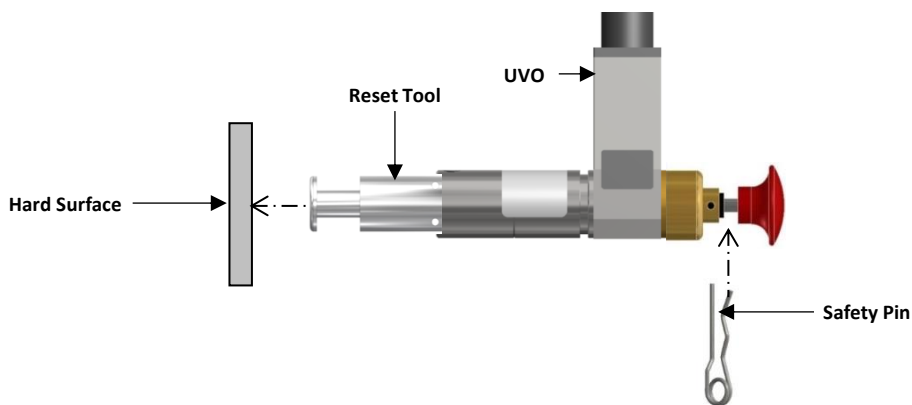
1. Disconnect the UVO from the ProInert valve actuator port by removing the operator supervisor (UVOS) or retaining clip that secures the operator in place.
2. Remove the safety cotter pin from the UVO and pull the manual strike button until the operator resets (clicks into place).



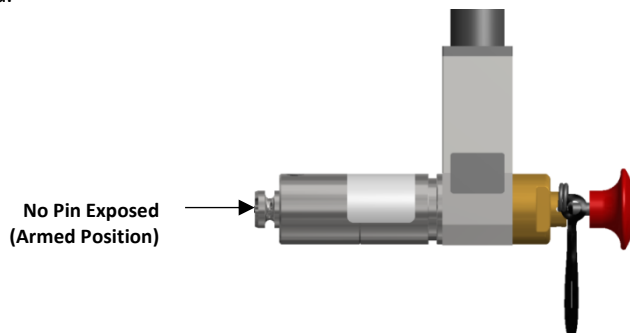
3. Insert the UVO into the end of the reset tool and secure in place with the retaining clip provided.



4. With the reset tool resting firmly against a hard surface, push on the UVO until the firing pin resets (clicks into place).



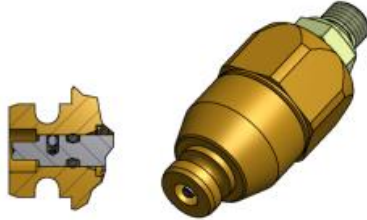
5. Reinsert the safety pin into the UVO; then remove the retaining clip and the reset tool. The UVO is reset and ready to be installed.



6.2. Pneumatic Actuator Reset Instructions

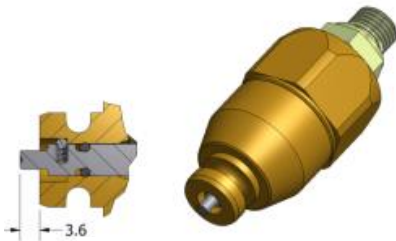
Reset Instructions using the

1. Prior to connecting the pneumatic actuator into the ProInert valve, ensure that the actuation piston is retracted as shown.



Retracted Position

2. If the inspection reveals that the actuator has been operated, the actuator must be reset using the IG71-0166 reset tool or the pin tool component of the reset multi-tool.



Operated Position



**Reset Tool
(P/N IG71-0166)**

3. After the actuator has been reset, it can be reattached to the cylinder.

6.3. Pressure Gauge Replacement Procedure

The following procedure is used to replace the pressure gauge on a charged cylinder. The cylinder must be securely mounted in the cylinder racking or cylinder strap before attempting to replace the pressure gauge.

- Step 1. Disconnect the pressure gauge wire leads from the releasing panel. This is applicable to primary cylinders only.
- Step 2. Lubricate the o-ring on the replacement pressure gauge with Molykote 55 or equivalent. Use care not to get lubricant into the vent port of the pressure gauge. Do NOT apply PTFE thread tape to the pressure gauge threads.
- Step 3. Remove the old pressure gauge.

WARNING: When removing the pressure gauge from a pressurized cylinder, a “POP” sound will occur. This is a result of a minor amount of gas being trapped in the pressure gauge port. This is a normal occurrence. If a pressure leak continues after backing off the pressure gauge five turns (when o-ring is visible), the Schrader core did not reseal. Do NOT continue to remove the pressure gauge. Reinstall the pressure gauge and contact Fike Mechanical Technical Support.

- Step 4. Install the new pressure gauge into the pressure gauge port making sure not to cross thread the gauge. Secure hand-tight until resistance is felt.
- Step 5. Use locking pliers or a wrench to screw in the pressure gauge until it bottoms out. This will open an internal check valve and pressurize the gauge.
- Step 6. To properly orient the pressure gauge, unscrew the gauge up to one turn.
- Step 7. Leak check around the fill port using Snoop® leak test fluid or equivalent. If leak is detected, remove the pressure gauge and clean the lubricant and contaminants from the o-ring, threads and valve port using isopropyl alcohol and a soft clean cloth. Lubricate the o-ring with Molykote 55 or equivalent and reinstall the pressure gauge following the previous steps.
- Step 8. Leak check around the fill port. If a leak is further detected, remove the pressure gauge from the fill port and remove and replace the existing gauge o-ring. Lubricate the o-ring with Molykote 55 or equivalent and reinstall the pressure gauge following the previous steps. Leak check around the fill port.
- Step 9. Check the cylinder pressure. Cylinders should read 200 bar or 300 bar at 15°C. For temperatures other than 15°C, refer to the Temperature vs. Pressure Chart in Appendix B.

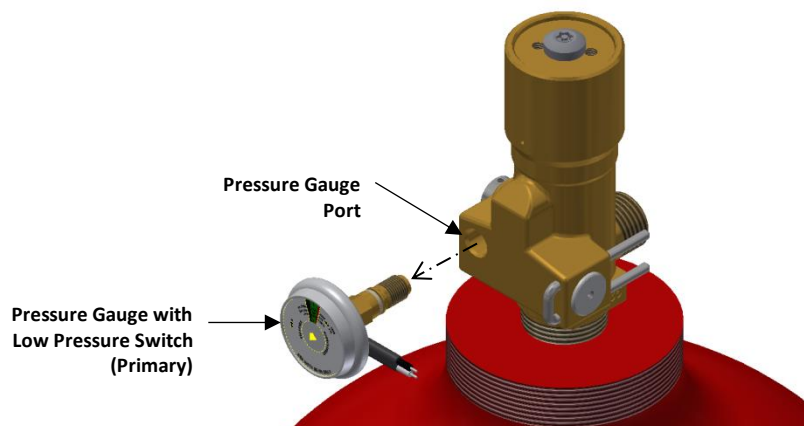


Figure 88 – Pressure Gauge Replacement

6.4. Selector Valve Reset Procedure

After a system discharge, the activated selector valve must be reset using the following procedure prior to returning the suppression system to normal operation.

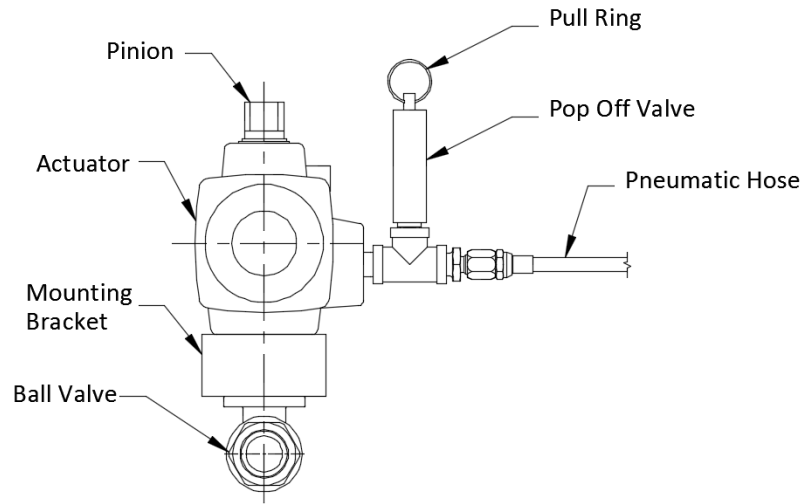


Figure 89 – Typical Selector Valve Configuration

- Step 1. Insert a finger into the pop off valve pull ring mounted to the side of the selector valve actuator.
- Step 2. Pull the ring up to open the valve to allow any stored pressure in the selector valve actuator or pneumatic actuation line to be released.
- Step 3. Using a wrench, turn the actuator pinion clockwise (CW) to close the ball valve.

NOTE: This procedure must be performed for each activated selector valve.

6.5. Cylinder Recharge

After a system discharge, it is imperative that the clean agent suppression cylinders be recharged and returned to service as soon as possible (24 hours maximum) to ensure continued protection. Empty cylinders can be returned to Fike for valve refurbishment and recharge or they can be sent to any Fike authorized Field Recharge Station. Cylinders must be refurbished and recharge following the procedures outlined in the IG-55 Agent Recharge Manual, P/N 06-852.

For system recharge, contact you system installer or Fike's Customer Service Department at +001-816-229-3405.

CAUTION: Under no circumstances should personnel, other than a Fike Authorized Service Representative, attempt to disarm and remove a cylinder for recharge.

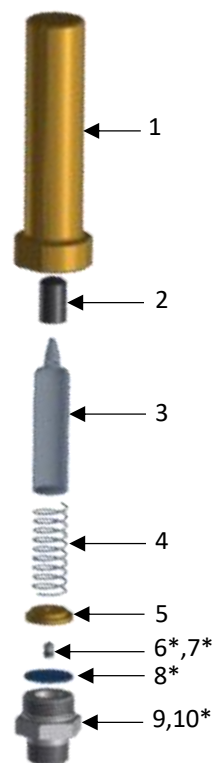
Refer to the ProInert Recharge Manual, P/N 06-806 for system recharge procedures.

6.6. Odorizer Rebuild Instructions

The odorizer is installed in the distribution piping and should be located before the stop/maintenance valve. Install one odorizer for each 20 cylinders. This device is installed in the branch outlet of a tee and must be installed in the upright position.

Rebuild Instructions

- Step 1. Remove odorizer assembly from distribution piping.
- Step 2. Remove thread adaptor (9) from housing (1).
- Step 3. Using a pick, pry the screen (8) from the housing (1) and discard.
- Step 4. Invert the assembly and lightly tap to dislodge the remaining components. A pick may be used to aid in the removal of the barrel (5) should difficulty be encountered.
- Step 5. Clean glass fragments from the barrel (5), spring (4), and housing (1) and retain for assembly.
- Step 6. Discard bullet (6), O-ring (7) and vinyl cap (2).
- Step 7. Place new vinyl cap (2) over neck of new ampoule (3) and insert into housing (1) with FLAT END FACING THE OUTLET!
- Step 8. Insert spring (4) over ampoule (3).
- Step 9. Insert new bullet (6) / O-ring (7) assembly into clean barrel (5) and insert into housing (1) with flat side facing outlet. Ensure barrel (5) is fully seated; all threads of the barrel (5) should be visible.
- Step 10. Insert new screen (8) into housing (1).
- Step 11. Replace O-ring (10) on thread adaptor (9). Lubricate O-ring (10) and install adaptor (9) into housing (1) wrench-tight.



* parts included in Rebuild Kit

Figure 90 – Odorizer Rebuild

APPENDIX A – Engineered System Design Example

The following is an example of a Fike IG-55 suppression system designed within the limitations established by Fike's UL listing and FM approval, and in compliance with NFPA 2001 using Fike Flow Calculation Program reflecting the inputs required and showing the computer program output information.

HAZARD INFORMATION

Design Concentration:	38.5% (minimum)
Temperature Range:	70°F to 85°F (21°C to 29.5°C.)
Enclosure Elevation:	0 Feet (Sea Level)
Room Height:	8.0' (2.44 m)
Uncloseable Openings:	None
No. of Nozzles:	
- Control Room:	2 - 360° Nozzles
- Office / Storage Room:	1 - 360° Nozzles

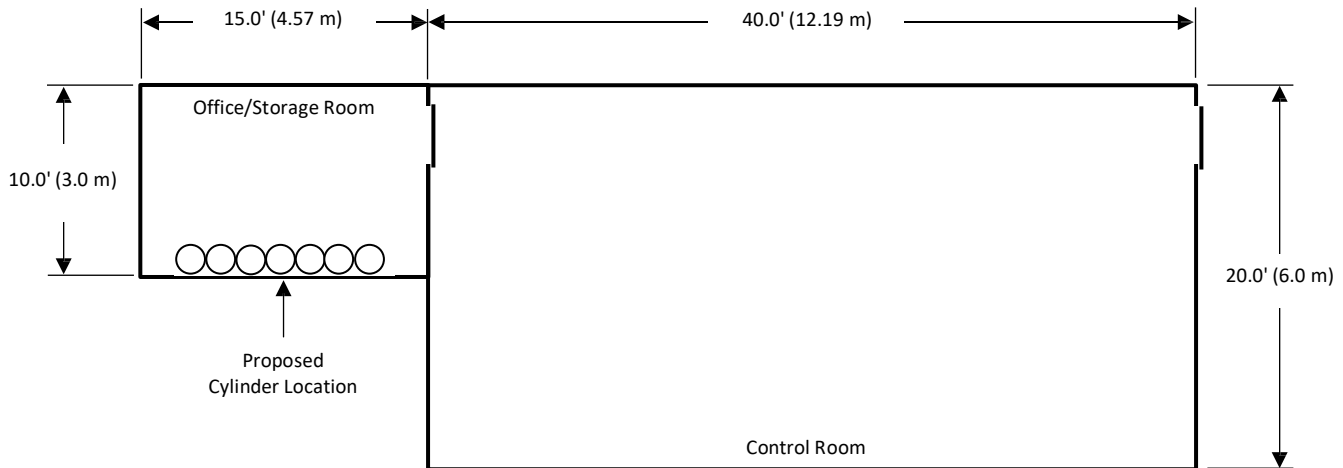


FIGURE – Floor Plan

INPUTS – FIKE IG-55 FLOW CALCULATION PROGRAM

ProInert Flow Calculation

File View Windows Help

Project Information

Customer Information

Company Name: Kolten Corp Phone: Fax:

Company Address: 11 Andrew Ave Contact Information:

Blue Springs MO 64014

Project Information

Project Name: Ferrier Bldg Project Location:

Project Designer: EDN Project Account:

Project Description: Control Room / Office Storage Room

Edit Enclosure Data

Enclosure: Office Storage Room Agent Type: IG55

Enclosure Volume

Enclosure Length (ft): 15.00

Enclosure Width (ft): 10.00

Enclosure Height (ft): 8.00

Base Volume (ft³): 1200.00

Added Volume (ft³): 0.00

Removed Volume (ft³): 0.00

Protected Volume (ft³): 1200.00

Agent Requirements

Minimum Agent Concentration (%): 38.50

Agent Design Concentration (%): 38.50

Maximum Agent Concentration (%): 39.34

Enclosure Minimum Temperature (°F): 70.00

Enclosure Maximum Temperature (°F): 85.00

Enclosure Elevation (ft): 0.00

Amount of Agent Required (ft³): 583.28

Enclosure Vent Calculation

☒ Calculate Equivalent Leakage Area

☐ Calculate Peak Positive Pressure

Enclosure Strength (lbs/ft²): 5.00 Safety Factor: 1.00

Add Enclosure Remove Enclosure Change Name

Edit Enclosure Data

Enclosure: **Control Room**

Agent Type: **IG55**



Enclosure Volume		Agent Requirements	
Enclosure Length (ft)	40.00	Minimum Agent Concentration (%)	38.50
Enclosure Width (ft)	20.00	Agent Design Concentration (%)	38.50
Enclosure Height (ft)	8.00	Maximum Agent Concentration (%)	39.34
Base Volume (ft³)	6400.00	Enclosure Minimum Temperature (°F)	70.00
Added Volume (ft³)	0.00	Enclosure Maximum Temperature (°F)	85.00
Removed Volume (ft³)	0.00	Enclosure Elevation (ft)	0.00
Protected Volume (ft³)	6400.00	Amount of Agent Required (ft³)	3110.77

Enclosure Vent Calculation

☒ Calculate Equivalent Leakage Area Enclosure Strength (lbs./ft²) **5.00** Safety Factor **1.00**

☐ Calculate Peak Positive Pressure

Manifold Data

Select Agent: **IG55**

Select Manifold: **Custom Defined**

Select Cylinder: **IG71-090 80 L (200 bar)**

Number of Rows: **1**

Row 1 Cylinders: **7**

Exit Row Number: **1**

Row	Cylinders	Exit
1	7	Yes

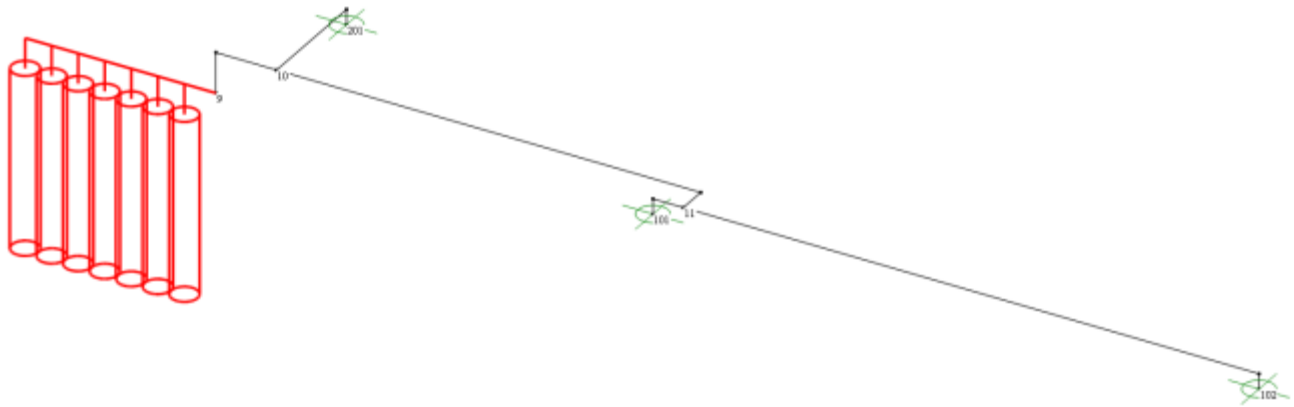
Row Spacing ft: **0.8760** Cyl Spacing ft: **0.8760**

Cyl to Manifold ft: **1.0000** Cyl to Exit ft: **1.0417**

Cyl Fill Amount ft³: **572.30** Total Amt ft³: **4006.11**

Cylinder Dimensions		
Diameter	Height	Valve
0.876 ft	5.9383 ft	1 in

Enclosure [IG55]	Agent ft³	Cyls
Control Room	3110.77	6
Office Storage Room	583.28	2
All Enclosures	3694.06	7



Nozzle Data

Select Enclosure: **Control Room**

Agent Required (ft³): 3110.77 ft³ of IG55

Agent Requested (ft³): 1555.39 Auto Calculate Agent

Agent Needed (ft³): 0.00 Reset All Nozzles

Nozzle Number	Type	Agent Requested
This Nozzle (ID 4)	360°	1555.39 ft³
Nozzle 0102	360°	1555.39 ft³

Ok Cancel

Nozzle Data

Select Enclosure: **Office Storage Room**

Agent Required (ft³): 583.28 ft³ of IG55

Agent Requested (ft³): 583.28 Auto Calculate Agent

Agent Needed (ft³): 0.00 Reset All Nozzles

Nozzle Number	Type	Agent Requested
This Nozzle (ID 16)	360°	583.28 ft³

Ok Cancel

Prolnert Flow Calculation - [PipeTableForm]

File View Windows Help

Select Pipe Network: Pipe Network 1 [IG55] Restore Calculate Copy Results Waiting for Calculation...

	Start Section	End Section	Length (ft)	Elevation Change (ft)	Selected Pipe Diameter	Selected Pipe Schedule	90° Elbows	Thru Tee Branch	Side Tee Branch	Union	Equivalent Length Added (ft)	Cylinders	Selected Nozzle Agent (ft)	Selected Nozzle Orifice (in)
▶	1	2	5.9383	5.9383	1 in	SCH 40 T	0	0	0	0	0.0000	1		
	2	3	1.8760	1.0000	1 in	SCH 40 T	1	0	0	0	0.0000	1		
	3	4	0.8760	0.0000	Auto Pick	Auto Pick	0	1	0	0	0.0000	2		
	4	5	0.8760	0.0000	Auto Pick	Auto Pick	0	1	0	0	0.0000	3		
	5	6	0.8760	0.0000	Auto Pick	Auto Pick	0	1	0	0	0.0000	4		
	6	7	0.8760	0.0000	Auto Pick	Auto Pick	0	1	0	0	0.0000	5		
	7	8	0.8760	0.0000	Auto Pick	Auto Pick	0	1	0	0	0.0000	6		
	8	9	1.0417	0.0000	Auto Pick	Auto Pick	0	1	0	0	0.0000	7		
	9	10	3.3400	1.3400	Auto Pick	Auto Pick	2	0	0	0	0.0000	0		
	10	11	15.0000	0.0000	Auto Pick	Auto Pick	1	1	0	0	0.0000	0		
	10	201	4.5000	-0.5000	Auto Pick	Auto Pick	1	0	1	0	0.0000	0	583.28	Auto Pick
	11	101	1.5000	-0.5000	Auto Pick	Auto Pick	1	0	1	0	0.0000	0	1555.39	Auto Pick
	11	102	19.5000	-0.5000	Auto Pick	Auto Pick	1	0	1	0	0.0000	0	1555.39	Auto Pick

	Start Section	End Section	Pipe Type	Equivalent Length (ft)	Start Pressure (psi)	End Pressure (psi)	Nozzle Agent (ft)	Nozzle Orifice Size (in)	Agent Arrival Time (s)	Agent End Time (s)
▶	1	2	1 -SCH 40	5.9383	2900.00	645.00				
	2	3	1 -SCH 40	4.4985	645.00	645.00				
	3	4	1 1/4-SCH 40	3.1760	645.00	645.00				
	4	5	1 1/4-SCH 40	3.1760	645.00	645.00				
	5	6	1 1/4-SCH 40	3.1760	645.00	645.00				
	6	7	1 1/4-SCH 40	3.1760	645.00	645.00				
	7	8	1 1/4-SCH 40	3.1760	645.00	645.00				
	8	9	1 1/4-SCH 40	3.3417	645.00	623.00				
	9	10	1 1/4-SCH 40	10.2400	623.00	593.00				
	10	11	1 1/4-SCH 40	20.7500	593.00	553.00				
	10	201	1/2 -SCH 40	9.1650	593.00	545.00	644.59	0.3750	0.53	60.89
	11	101	1 -SCH 40	9.3675	553.00	530.00	1663.17	0.6094	0.71	60.89
	11	102	1 -SCH 40	27.3675	553.00	484.00	1698.36	0.6406	1.00	60.89

Prolnert Flow Calculation Version 1.3.1.0

Time to discharge 95% of minimum design concentration in Enclosure 1 is 46.3 seconds
Time to discharge 95% of minimum design concentration in Enclosure 2 is 44 seconds

Calculation performed on Thursday, Sep 15 2011 13:38:49
System calculated within limits of Fikes UL listing and FM approval.

OUTPUTS – FIKE IG-55 FLOW CALCULATION PROGRAM

Pro-Inert Flow Calculation Software

Fike Corporation



Pro-Inert Flow Calculation Software Version 1.3.1.0

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UL Ex4623, FM 3025843

Licensed to EDN, Fike

Results Printed on 9/15/2011

PROJECT INFORMATION

Project Name: Ferrier Bldg
Project Designer: EDN
Project Location:
Project Account:
Project Description: Control Room / Office Storage Room
Project Filename: L:\Tech\Design Control-Corp Eng\Pending Projects\ProInertProject-IG01-100-541-55\06-625 ProInert 200-300bar-UL FM\sample problem-manual.pro

CUSTOMER INFORMATION

Company Name: Kolten Corp
Company Address: 11 Andrew Ave
Blue Springs MO 64014
Company Phone:
Company Fax:
Contact Information:



System Acceptance Report

Pipe Network 1 - UL and FM Approved

Control Room

Nozzle Performance				
Nozzle Number	Orifice Diameter	Agent Requested	Agent Predicted	Nozzle Pressure
0101	0.6094 in	1555.39 ft³	1663.17 ft³	530.00 psi
0102	0.6406 in	1555.39 ft³	1698.36 ft³	484.00 psi
Agent Concentration				
Minimum Conc	Design Conc	Min Predicted Conc	Max Predicted Conc	
38.50%	38.50%	40.86%	41.74%	
Venting Requirements				
Enclosure Wall Strength	Vent Safety Factor		Vent Area Required	
5.00 lbs/ft²	1.00		360 in² (2.5 ft²)	
Agent Discharge Time				
46.3 seconds to reach 95% of Design Concentration				

Office Storage Room

Nozzle Performance				
Nozzle Number	Orifice Diameter	Agent Requested	Agent Predicted	Nozzle Pressure
0201	0.3750 in	583.28 ft³	644.59 ft³	545.00 psi
Agent Concentration				
Minimum Conc	Design Conc	Min Predicted Conc	Max Predicted Conc	
38.50%	38.50%	41.56%	42.45%	
Venting Requirements				
Enclosure Wall Strength	Vent Safety Factor		Vent Area Required	
5.00 lbs/ft²	1.00		69 in² (0.5 ft²)	
Agent Discharge Time				
44.0 seconds to reach 95% of Design Concentration				

System Bill of Materials

Nozzle Parts List	
Nozzle Number	Nozzle Part Number
0101	IG71-074-06094
0102	IG71-074-06406
0201	IG71-072-03750

Cylinder Parts List	
Cylinder Quantity	Cylinder Part Number
7	IG71-090

System Design Information

Control Room

Enclosure Dimensions		Temperature	
Length	40 ft	Minimum Temp	70°F
Width	20 ft	Maximum Temp	85°F
Height	8 ft	Altitude	0ft
Enclosure Volume		Agent Requirements	
Base Volume	6400 ft ³	Design Conc	38.5%
Added Volume	0 ft ³	Minimum Conc	38.5%
Removed Volume	0 ft ³	Maximum Conc	39.3%
Protected Volume	6400 ft ³	Agent Required	3110.77 ft ³

Office Storage Room

Enclosure Dimensions		Temperature	
Length	15 ft	Minimum Temp	70°F
Width	10 ft	Maximum Temp	85°F
Height	8 ft	Altitude	0ft
Enclosure Volume		Agent Requirements	
Base Volume	1200 ft ³	Design Conc	38.5%
Added Volume	0 ft ³	Minimum Conc	38.5%
Removed Volume	0 ft ³	Maximum Conc	39.3%
Protected Volume	1200 ft ³	Agent Required	583.28 ft ³

Nozzle Information

Nozzle Number	Enclosure	Requested Agent
101	Control Room	1555.39 ft ³
102	Control Room	1555.39 ft ³
201	Office Storage Room	583.28 ft ³

Manifold Information

Manifold Description	Custom Defined Custom Defined		
Cylinder Description	IG71-090 80 L (200 bar)		
Cylinder Spacing	0.876 ft		
Row Spacing	0.876 ft		
Length to Manifold Run	1 ft		
Length to Manifold Exit	1.0417 ft		
Total Number of Cylinders	7		
Total Amount of Agent	4006.11 ft ³		
Row Number	Cylinder Quantity	Row Pipe Diameter	Exit Row
1	7	1-1/4 in SCH 40	☒

Flow Calculation Data - Pipe Network 1**Flow Calculation Input Data**

Start	End	Length	Elevation	Diameter	Schedule	90°	Thru	Side	Union	Equ Len	Cylinder	Agent	Orifice
1	2	5.9383 ft	5.9383 ft	1 in	SCH 40 T	0	0	0	0	0.0000 ft	1		
2	3	1.8760 ft	1.0000 ft	1 in	SCH 40 T	1	0	0	0	0.0000 ft	1		
3	4	0.8760 ft	0.0000 ft	Auto Pick	Auto Pick	0	1	0	0	0.0000 ft	2		
4	5	0.8760 ft	0.0000 ft	Auto Pick	Auto Pick	0	1	0	0	0.0000 ft	3		
5	6	0.8760 ft	0.0000 ft	Auto Pick	Auto Pick	0	1	0	0	0.0000 ft	4		
6	7	0.8760 ft	0.0000 ft	Auto Pick	Auto Pick	0	1	0	0	0.0000 ft	5		
7	8	0.8760 ft	0.0000 ft	Auto Pick	Auto Pick	0	1	0	0	0.0000 ft	6		
8	9	1.0417 ft	0.0000 ft	Auto Pick	Auto Pick	0	1	0	0	0.0000 ft	7		
9	10	3.3400 ft	1.3400 ft	Auto Pick	Auto Pick	2	0	0	0	0.0000 ft	0		
10	11	15.0000 ft	0.0000 ft	Auto Pick	Auto Pick	1	1	0	0	0.0000 ft	0		
10	201	4.5000 ft	-0.5000 ft	Auto Pick	Auto Pick	1	0	1	0	0.0000 ft	0	583.28 ft ³	Auto Pick
11	101	1.5000 ft	-0.5000 ft	Auto Pick	Auto Pick	1	0	1	0	0.0000 ft	0	1555.39 ft ³	Auto Pick
11	102	19.5000 ft	-0.5000 ft	Auto Pick	Auto Pick	1	0	1	0	0.0000 ft	0	1555.39 ft ³	Auto Pick

Flow Calculation Output Data

Start	End	Pipe Type	Equ Len	Start Press	End Press	Agent Disch	Orifice	Arrival Time	End Time
1	2	1 -SCH 40	5.9383	2900.00	645.00				
2	3	1 -SCH 40	4.4985	645.00	645.00				
3	4	1 1/4-SCH 40	3.1760	645.00	645.00				
4	5	1 1/4-SCH 40	3.1760	645.00	645.00				
5	6	1 1/4-SCH 40	3.1760	645.00	645.00				
6	7	1 1/4-SCH 40	3.1760	645.00	645.00				
7	8	1 1/4-SCH 40	3.1760	645.00	645.00				
8	9	1 1/4-SCH 40	3.3417	645.00	623.00				
9	10	1 1/4-SCH 40	10.2400	623.00	593.00				
10	11	1 1/4-SCH 40	20.7500	593.00	553.00				
10	201	1/2 -SCH 40	9.1650	593.00	545.00	644.59	0.3750	0.53	60.89
11	101	1 -SCH 40	9.3675	553.00	530.00	1663.17	0.6094	0.71	60.89
11	102	1 -SCH 40	27.3675	553.00	484.00	1698.36	0.6406	1.00	60.89

Flow Calculation Messages

ProInert Flow Calculation Version 1.3.1.0

Time to discharge 95% of minimum design concentration in Enclosure 1 is 46.3 seconds

Time to discharge 95% of minimum design concentration in Enclosure 2 is 44 seconds

Calculation performed on Thursday, Sep 15 2011 13:38:49

System calculated within limits of Fikes UL listing and FM approval.

Venting Report

Enclosure 1 with agent concentration of 42% at 85°F enclosure temperature.

5 lbs/sq ft enclosure strength requires minimum of 360 square inches (2.5 square feet) free vent area. (PSSA method)

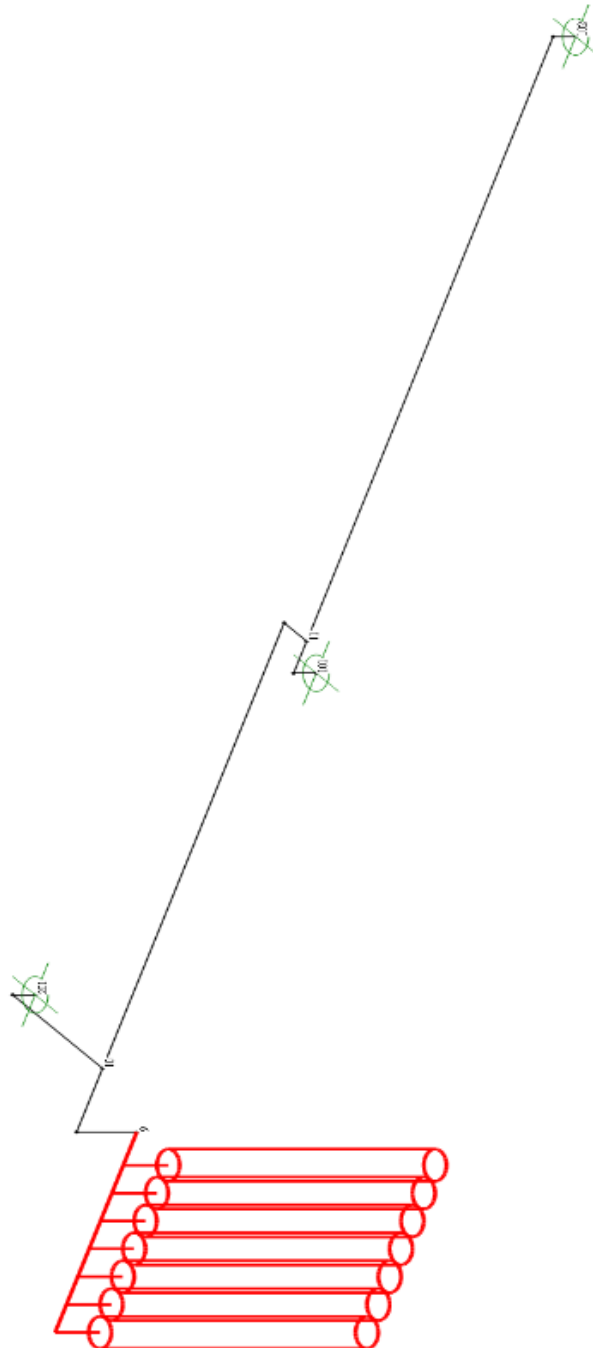
A safety factor of 1 was used in the vent calculation.

Enclosure 2 with agent concentration of 42% at 85°F enclosure temperature.

5 lbs/sq ft enclosure strength requires minimum of 69 square inches (.48 square feet) free vent area. (PSSA method)

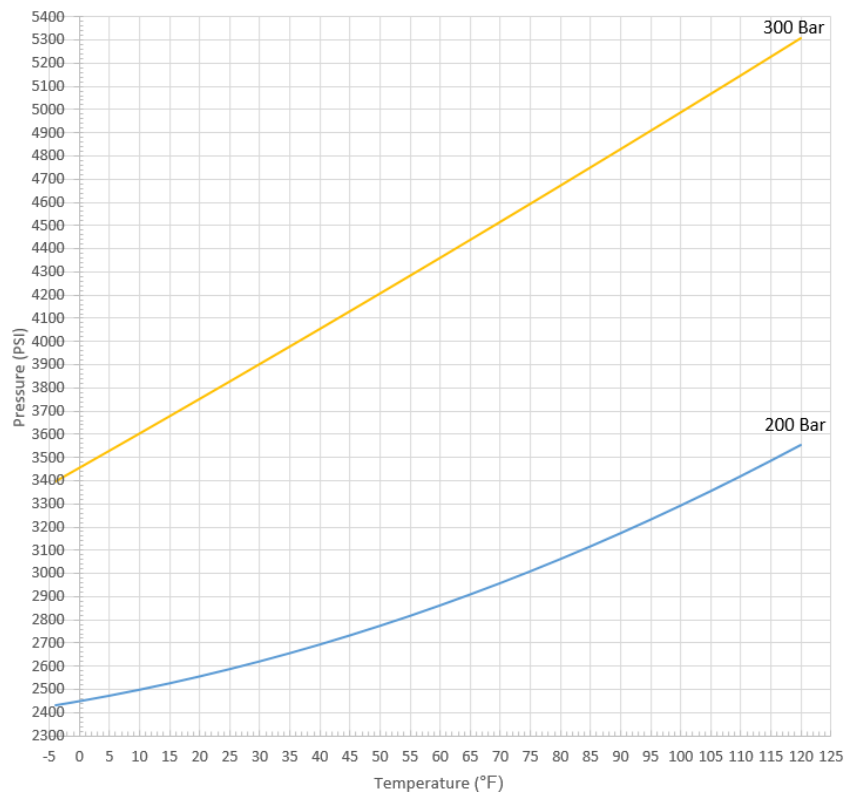
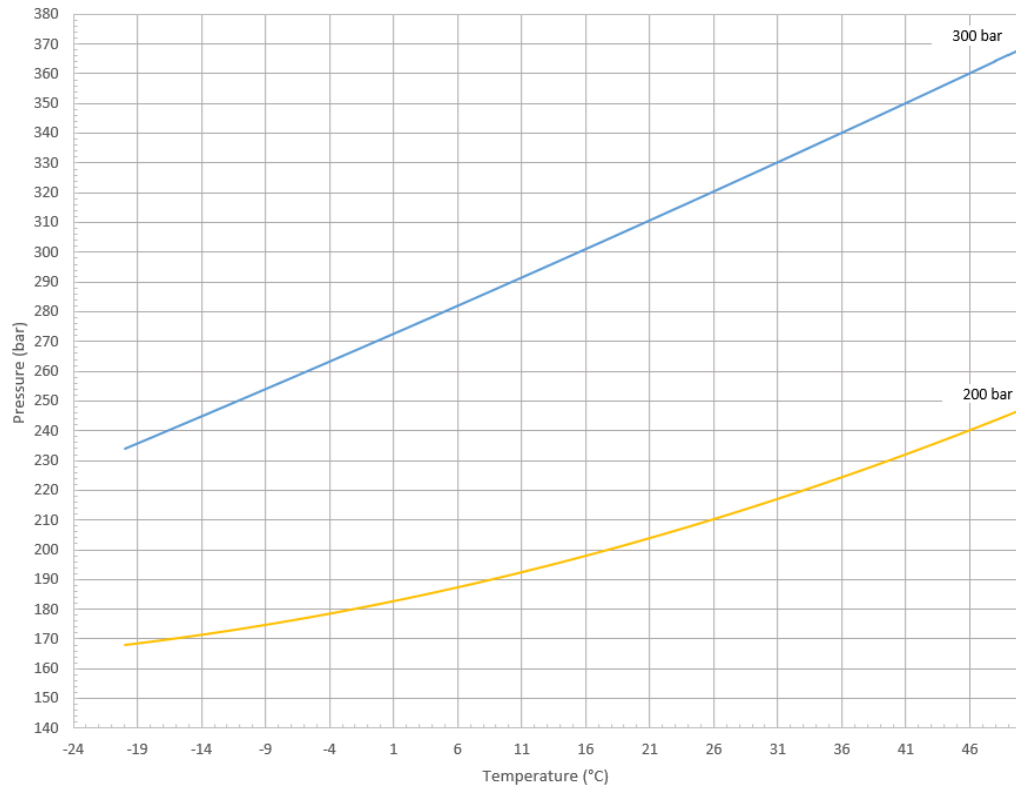
A safety factor of 1 was used in the vent calculation.

Special version with 5 inch pipe and 2 inch nozzles included.



APPENDIX B – Prolnert Temperature vs. Pressure Chart

The cylinder pressure needs to be checked as a part of the installation procedure. They should read 200 bar or 300 bar at 15°C. For temperatures other than 15°C, reference the chart below.



APPENDIX C – ProInert™ (IG-55) Safety Data Sheet

SECTION 1: Product and Company Identification

Product name:

PROINERT™ IG-55

Use of the substance/mixture:

Fire extinguishing agent

Details of the supplier of the SDS:

Fike Corporation

704 SW 10th Street, P.O. Box 610

Blue Springs, MO 64013-0610, USA

Tel: +1 816 229 3405

www.fike.com

SECTION 2: Hazards Identification

Classification:

Gases under pressure; H280 – contains gas under pressure, may explode if heated.

Label element:**Signal word:**

WARNING

Hazard statements:

H280 – Contains gas under pressure; may explode if heated.

Precautionary statements:

P410+403 – Protect from sunlight. Store in a well-ventilated place.

Other hazards:

The gas mixture is heavier than air and can cause suffocation by reducing oxygen available for breathing.

SECTION 3: Composition / Information on Ingredients

Mixture:

50-52% Nitrogen

48-50% Argon

SECTION 4: First-aid Measures

General:

If unconscious, place in recovery position and seek medical advice. Never give anything by mouth to an unconscious person. If breathing is irregular or stopped, administer artificial respiration. If symptoms persist, call a physician.

Following inhalation:

May cause asphyxiation at high concentrations. Symptoms may include loss of mobility or consciousness. Victim may not be aware of asphyxiation. Remove victim to an uncontaminated area, wearing self-contained breathing apparatus. Keep person warm and at rest. Seek medical assistance. Apply artificial respiration if breathing has stopped.

Following skin/eye contact:

Compressed gas directed at the skin can enter the body through small wounds or even penetrate the skin, causing serious or fatal injuries. Seek medical assistance immediately.

Following ingestion:

Ingestion is not considered a potential route of exposure.

SECTION 5: Fire-fighting Measures**Suitable extinguishing media:**

All known extinguishants can be used.

Specific methods:

If possible, stop flow of product. Move cylinder away or cool with water with water from a protected position.

Specific hazards during firefighting:

Pressure build-up. Fire of intense heat may cause violent rupture of cylinders. No hazardous combustion products.

Advice for firefighters:

In confined spaces, use self-contained breathing apparatus. Use personal protective equipment.

SECTION 6: Accidental Release Measures**Personal precautions:**

Evacuate personnel to safe areas. Ventilate area, especially low or enclosed places where the mixture might collect. Refer to protective measures listed in Sections 7 and 8.

Environmental precautions:

Provided it is safe to do so, try to stop release. Prevent from entering sewers, basements and work pits or any place where accumulation can be dangerous.

Methods for containment and cleaning up:

Ventilate area.

SECTION 7: Handling and Storage**Precautions for safe handling:**

Substance is heavier than air and may spread along floors.

Compressed gas cylinders are heavy and contain considerable stored energy. Use equipment specified as suitable for this product, its supply pressure and temperature. Handle with appropriate caution. Contact supplier if in doubt. Backflow of any contaminating substance into cylinder must be prevented.

Conditions for safe storage:

Do not drag, slide or roll cylinders. Never attempt to lift cylinder by its cap. Use a check valve in the discharge line to prevent hazardous backflow into the cylinder.

Keep cylinders in a dry, cool and well-ventilated place at a temperature not below -4°F (-20°C) and not exceeding 122°F (50°C).

SECTION 8: Exposure Controls / Personal Protection**Exposure limits:**

No exposure limit specified; atmosphere must have a minimum of 18% free oxygen.

Exposure controls:

Ensure adequate ventilation, especially in confined areas.

Eye protection – wear safety glasses complying with EN 166 or ANSI Z87.1.

Hand protection – leather gloves that are resistant to low temperature complying with EN 374 or OSHA 29 CFR 1910.138. The choice of the gloves also depends on other quality features other than material and is different from one manufacturer to another. Consideration must be given to specific local conditions, such as danger of cuts, abrasion and contact time with the substance.

Skin and body protection – wear suitable protective equipment.

Protective measures – self-contained breathing apparatus is required if a large release is experienced.

Respiratory protection – for rescue, use self-contained breathing apparatus. The mixture is heavier than air and can cause suffocation by reducing the oxygen concentration available for breathing. Apparatus must comply with EN 137 or OSHA 29 CFR 1910.134.

SECTION 9: Physical and Chemical Properties	
Physical state	: Gas
Appearance	: Colorless gas
Odor	: None
Molecular weight	: 33.95
Melting point	: -199.7°C
Boiling point	: -190.1°C
Critical temperature	: -134.7°C
Relative density (gas)	: Heavier than air
Relative density (liquid)	: Not applicable
Vapor pressure at 20°C	: Not applicable
Solubility in water	: Negligible
Auto-ignition temperature	: Not applicable
Flammability range	: Not applicable
SECTION 10: Stability and Reactivity	
Reactivity and chemical stability: Stable under normal conditions.	
Possibility of hazardous reactions: No known hazardous reactions.	
Conditions to avoid: Refer to Section 7.	
Hazardous decomposition products: None.	
SECTION 11: Toxicological Information	
General: No toxicological effects from this product.	
Acute toxicity: Not classified.	
SECTION 12: Ecological Information	
No ecological damage is caused by this product. Nitrogen and argon are natural components of air, with nitrogen constituting approximately 78% and argon approximately 0.9% of the Earth's atmosphere.	
SECTION 13: Disposal Considerations	
Discharge to atmosphere in a well-ventilated area. Consider noise and pressure hazards. Do not discharge into any place where its accumulation could be dangerous. Return cylinder to supplier; otherwise, dispose of cylinder in accordance with local, regional, national and/or international regulations. Contact Fike Corporation (or Fike-approved supplier) if special guidance is required.	
SECTION 14: Transport Information	
UN number	: 1956
Class	: 2.2
Proper shipping name	: Compressed gas, N.O.S.
ADR/RID Item No. 1	: 2.1a
Other transport information: Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in an emergency.	

Before transporting product, ensure:

- Cylinder valve is closed and not leaking;
- Valve outlet recoil cap, actuation port blanking plug and shipping/safety cap is correctly fitted;
- Adequate ventilation;
- Compliance with applicable regulations.

SECTION 15: Regulatory Information

United States:

Nitrogen and argon are listed on the United States Toxic Substance Control Act (TSCA) Inventory.

Canada:

Nitrogen and argon are listed on the Canadian Domestic Substance List (DSL).

Europe:

Nitrogen and argon are listed on the European Inventory of Existing Commercial Chemical Substances (EINECS).

SECTION 16: Other Information

Date of revision:

10/12/2015

Other information:

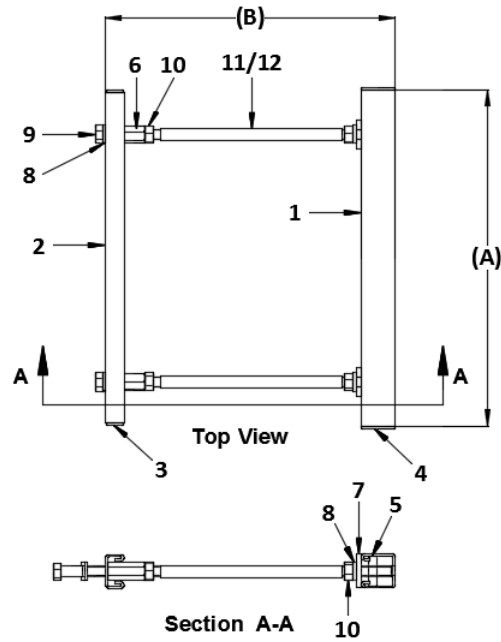
The hazard of asphyxiation is often overlooked and must be stressed during operator training.

Before using this product in any new processes or experiment, a thorough material compatibility and safety study should be carried out.

The information provided in this document is correct at the date of publication. The information is designed only as a guide for safe handling, use, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. Whilst great care has been taken in the preparation of this information, no liability for injury, damage or non-compliance with any legislation or directive arising from its use can be accepted. This document does not constitute or substitute for the user's own assessment of workplace risk, as required by other health and safety legislation.

APPENDIX D – Racking Assemblies

Single Row Rack Assembly

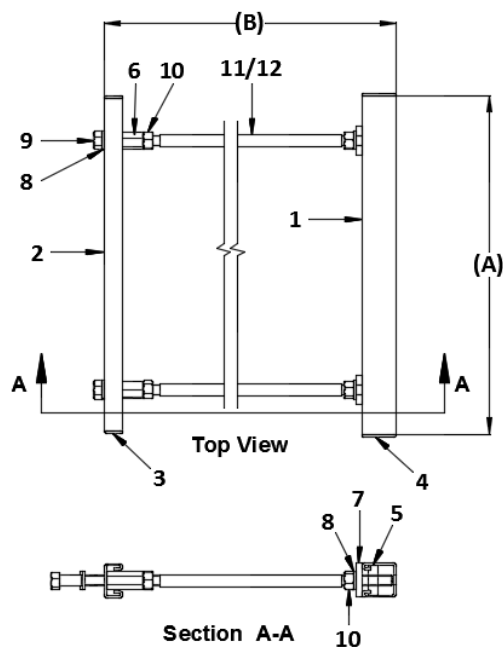


IG71-081-00X Rack Assembly

Item	Part Number	Quantity	Description
1	See Table A	2	Unistrut Channel, Series 1-5/8
2	See Table A	2	Front Bar
3	02-10814	4	End Cap, Unistrut P3300
4	02-10813	4	End Cap, Unistrut P1000/P1100
5	02-4218	Y	Channel Nut with Spring – 1/2-13UNC
6	02-4231	Y	Coupler Nut, 1/2-13UNC x 1.75
7	02-10726	Y	Flat Plate, Unistrut P1064
8	02-4372	Z	Lock Washer, 1/2 Regular Zinc Plated
9	E02-0285	Y	Hex Bolt, 1/2-13UNC x 2.5
10	C02-1209	Z	Nut, 1/2-13UNC Zinc Plated
11	IG71-0182-1	Y	Clamp Rod
12	02-11662-1	Y	Rod Protection Sleeve

Table A						
Assembly P/N	Item 1 P/N	Item 2 P/N	A in. (mm)	B in. (mm)	Y Quantity	Z Quantity
IG71-081-001	IG71-0179-1	IG71-0180-1	16.5 (419)	13.81 (351)	4	8
IG71-081-002	IG71-0179-2	IG71-0180-2	29 (737)	13.81 (351)	6	12
IG71-081-003	IG71-0179-3	IG71-0180-3	41.625 (1057)	13.81 (351)	8	16
IG71-081-004	IG71-0179-4	IG71-0180-4	54.125 (1375)	13.81 (351)	10	20
IG71-081-005	IG71-0179-5	IG71-0180-5	66.625 (1692)	13.81 (351)	12	24

Double Row Rack Assembly

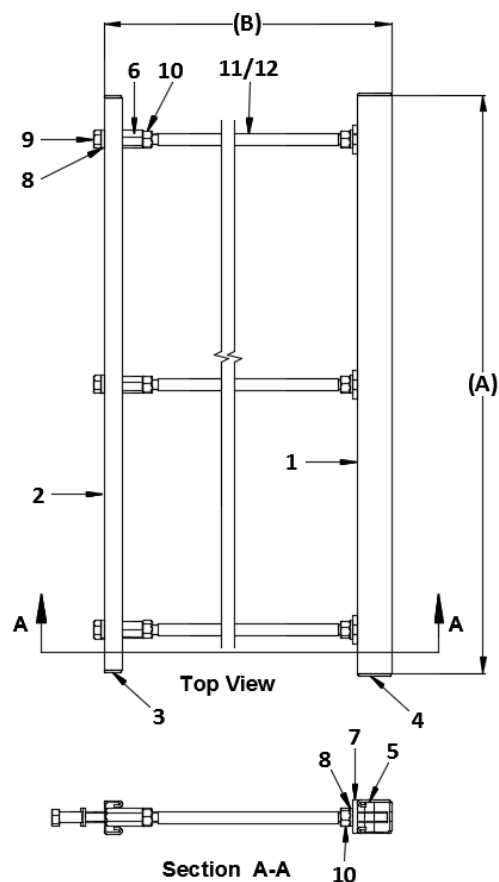


IG71-082-00X Rack Assembly

Item	Part Number	Quantity	Description
1	See Table A	2	Unistrut Channel, Series 1-5/8
2	See Table A	2	Front Bar
3	02-10814	4	End Cap, Unistrut P3300
4	02-10813	4	End Cap, Unistrut P1000/P1100
5	02-4218	Y	Channel Nut with Spring – 1/2-13UNC
6	02-4231	Y	Coupler Nut, 1/2-13UNC x 1.75
7	02-10726	Y	Flat Plate, Unistrut P1064
8	02-4372	Z	Lock Washer, 1/2 Regular Zinc Plated
9	E02-0285	Y	Hex Bolt, 1/2-13UNC x 2.5
10	C02-1209	Z	Nut, 1/2-13UNC Zinc Plated
11	IG71-0182-2	Y	Clamp Rod
12	02-11662-2	Y	Rod Protection Sleeve

Table A						
Assembly P/N	Item 1 P/N	Item 2 P/N	A in. (mm)	B in. (mm)	Y Quantity	Z Quantity
IG71-082-001	IG71-0179-1	IG71-0180-1	16.5 (419)	25.23 (641)	4	8
IG71-082-002	IG71-0179-2	IG71-0180-2	29 (737)	25.23 (641)	6	12
IG71-082-003	IG71-0179-3	IG71-0180-3	41.625 (1057)	25.23 (641)	8	16
IG71-082-004	IG71-0179-4	IG71-0180-4	54.125 (1375)	25.23 (641)	10	20
IG71-082-005	IG71-0179-5	IG71-0180-5	66.625 (1692)	25.23 (641)	12	24

Triple Row Rack Assembly

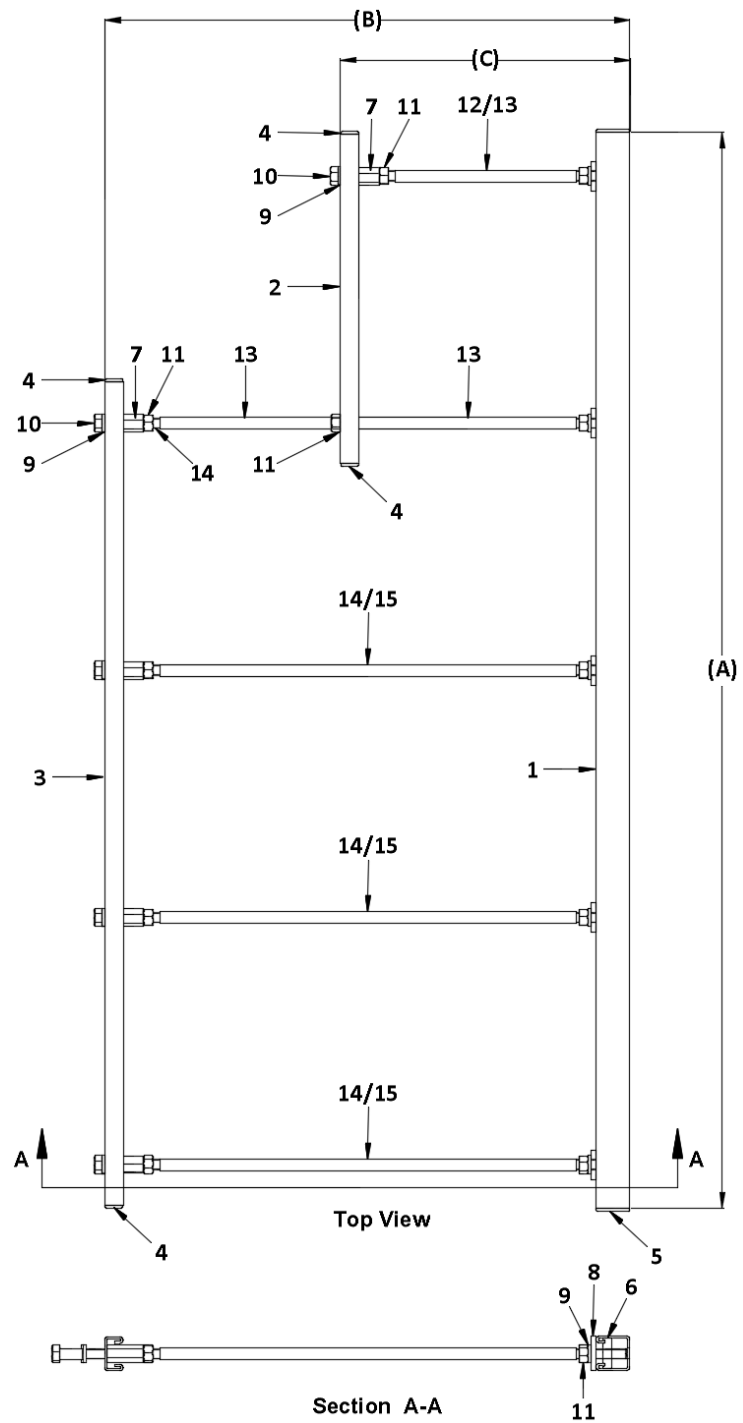


IG71-083-00X Rack Assembly

Item	Part Number	Quantity	Description
1	See Table A	2	Unistrut Channel, Series 1-5/8
2	See Table A	2	Front Bar
3	02-10814	4	End Cap, Unistrut P3300
4	02-10813	4	End Cap, Unistrut P1000/P1100
5	02-4218	Y	Channel Nut with Spring – 1/2-13UNC
6	02-4231	Y	Coupler Nut, 1/2-13UNC x 1.75
7	02-10726	Y	Flat Plate, Unistrut P1064
8	02-4372	Z	Lock Washer, 1/2 Regular Zinc Plated
9	E02-0285	Y	Hex Bolt, 1/2-13UNC x 2.5
10	C02-1209	Z	Nut, 1/2-13UNC Zinc Plated
11	IG71-0182-3	Y	Clamp Rod
12	02-11662-3	Y	Rod Protection Sleeve

Table A						
Assembly P/N	Item 1 P/N	Item 2 P/N	A in. (mm)	B in. (mm)	Y Quantity	Z Quantity
IG71-083-001	IG71-0179-2	IG71-0180-2	29 (737)	36.61 (930)	6	12
IG71-083-002	IG71-0179-3	IG71-0180-3	41.625 (1057)	36.61 (930)	8	16
IG71-083-003	IG71-0179-4	IG71-0180-4	54.125 (1375)	36.61 (930)	10	20
IG71-083-004	IG71-0179-5	IG71-0180-5	66.625 (1692)	36.61 (930)	12	24

Double and Single Row Rack Assembly



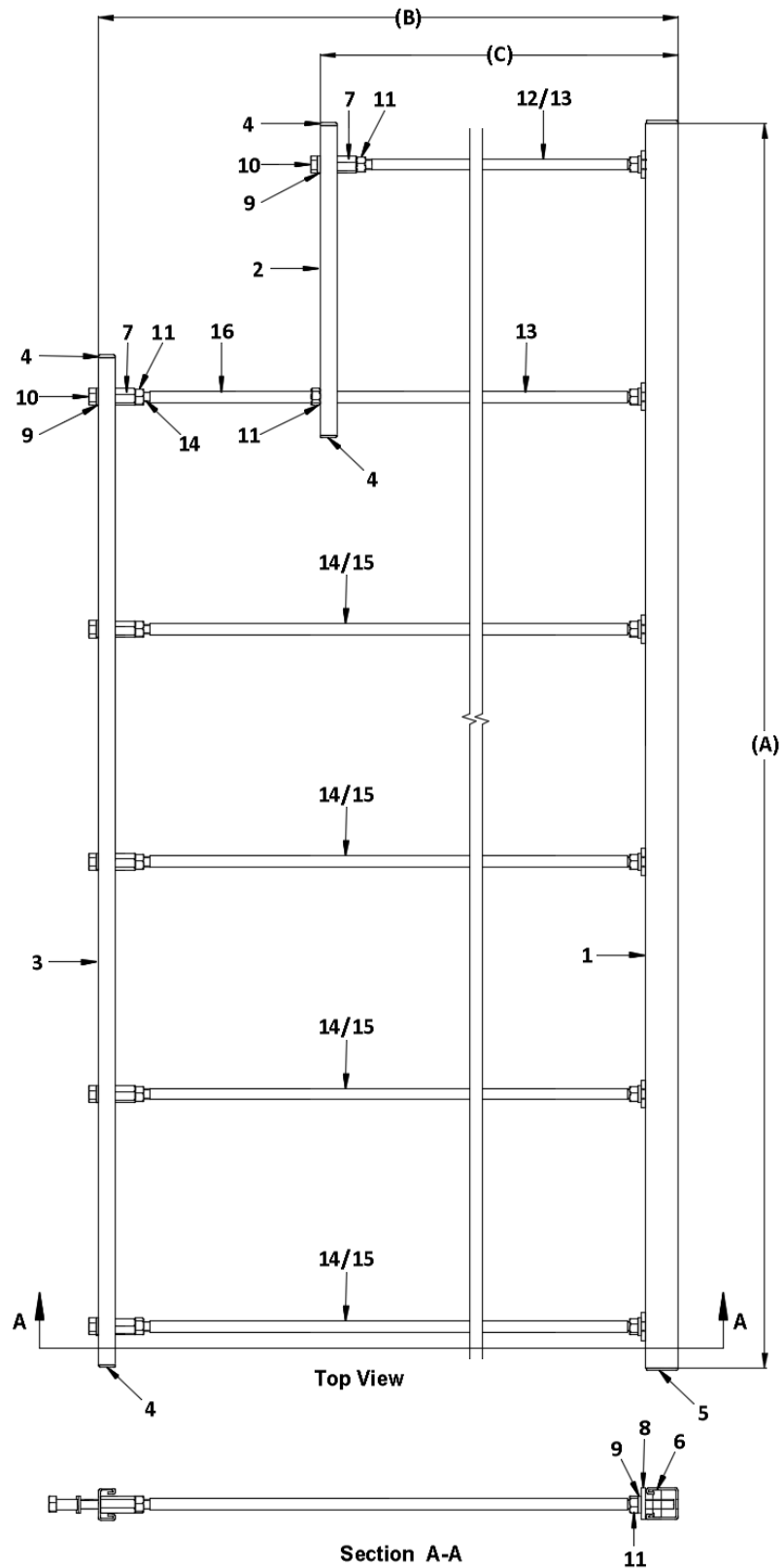
IG71-084-00X Rack Assembly

See next page for a description of numerical callouts shown in the diagram above.

Item	Part Number	Quantity	Description
1	See Table A	2	Unistrut Channel, Series 1-5/8
2	IG71-0180-1	2	Front Bar
3	See Table A	2	Front Bar
4	02-10814	8	End Cap, Unistrut P3300
5	02-10813	4	End Cap, Unistrut P1000/P1100
6	02-4218	W	Channel Nut with Spring – 1/2-13UNC
7	02-4231	W	Coupler Nut, 1/2-13UNC x 1.75
8	02-10726	W	Flat Plate, Unistrut P1064
9	02-4372	T	Lock Washer, 1/2 Regular Zinc Plated
10	E02-0285	W	Hex Bolt, 1/2-13UNC x 2.5
11	C02-1209	Z	Nut, 1/2-13UNC Zinc Plated
12	IG71-0182-1	2	Clamp Rod
13	02-11662-1	6	Rod Protection Sleeve
14	IG71-0182-2	Y	Clamp Rod
15	02-11662-2	U	Rod Protection Sleeve

Table A										
Assembly P/N	Item 1 P/N	Item 3 P/N	A in. (mm)	B in. (mm)	C in. (mm)	Quantity				
						U	T	W	Y	Z
IG71-084-001	IG71-0179-4	IG71-0180-3	54.125 (1375)	25.25 (641)	13.18 (335)	6	20	10	8	22
IG71-084-002	IG71-0179-5	IG71-0180-4	66.625 (1692)	25.25 (641)	13.18 (335)	8	24	12	10	26

Triple and Double Row Rack Assembly



IG71-085-00X Rack Assembly

See next page for a description of numerical callouts shown in the diagram above.

Item	Part Number	Quantity	Description
1	IG71-0179-5	2	Unistrut Channel, Series 1-5/8
2	See Table A	2	Front Bar
3	See Table A	2	Front Bar
4	02-10814	8	End Cap, Unistrut P3300
5	02-10813	4	End Cap, Unistrut P1000/P1100
6	02-4218	12	Channel Nut with Spring – 1/2-13UNC
7	02-4231	12	Coupler Nut, 1/2-13UNC x 1.75
8	02-10726	12	Flat Plate, Unistrut P1064
9	02-4372	24	Lock Washer, 1/2 Regular Zinc Plated
10	E02-0285	12	Hex Bolt, 1/2-13UNC x 2.5
11	C02-1209	26	Nut, 1/2-13UNC Zinc Plated
12	IG71-0182-2	Z	Clamp Rod
13	02-11662-2	Z	Rod Protection Sleeve
14	IG71-0182-3	Y	Clamp Rod
15	02-11662-3	Y	Rod Protection Sleeve
16	02-11662-1	2	Rod Protection Sleeve

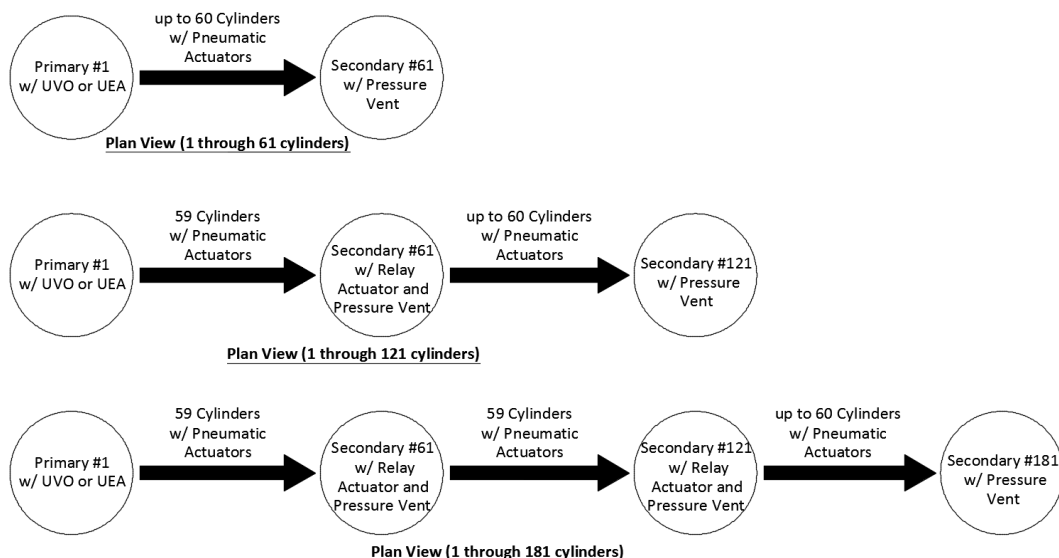
Table A							
Assembly P/N	Item 2 P/N	Item 3 P/N	A in. (mm)	B in. (mm)	C in. (mm)	Quantity	
						Y	Z
IG71-085-001	IG71-0179-4	IG71-0180-1	66.63 (1692)	36.50 (927)	25.25 (641)	4	8
IG71-085-002	IG71-0179-2	IG71-0180-3	66.63 (1692)	36.50 (927)	25.25 (641)	8	4
IG71-085-003	IG71-0180-1	IG71-0180-4	66.63 (1692)	36.50 (927)	25.25 (641)	10	2

APPENDIX E – Pilot Line Pressure Vent Requirements

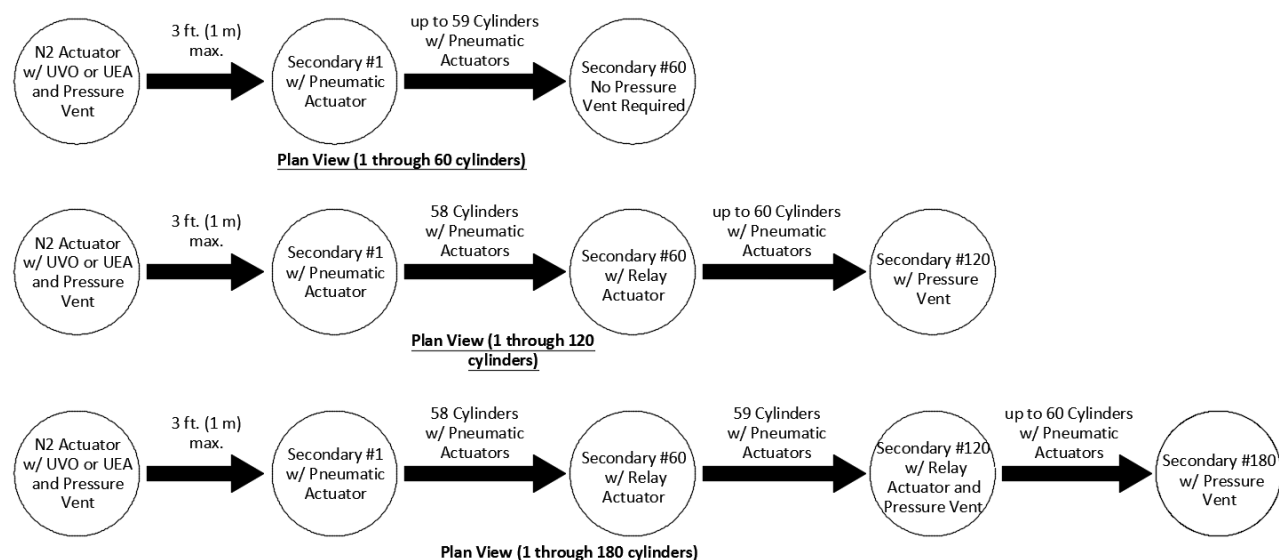
Every ProInert system must have at least one pilot line pressure vent installed to prevent the inadvertent activation of the secondary cylinders due to the leakage of pressure from the primary ProInert cylinder. The quantity and location of the pressure vents will vary depending upon the number of cylinders connected to the ProInert system and the method used to activate the system.

Refer to the following diagrams to determine when and where a pressure vent should be installed.

ProInert System Activated by UVO or UEA



ProInert System Activated by Nitrogen Actuator



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REVISION HISTORY

Original Release Date: **September, 2012**

Revision / Description of Change **Revision Date**

Revision 1 **October, 2014**

Equipment Section

- 1) Revised CompSpec 06-625-1-2 to rev 1, added reference to alternate pressure gauge w/ low pressure switch p/n 02-14066 for 300 bar cylinders and complete kit information for use with NPT threads and BSP threads.
- 2) Revised CompSpec 06-625-1-5 to rev 1, added alternate pressure gauge w/ low pressure switch p/n 02-14066 for 300 bar cylinders and changed Figure 1 Wiring Diagram – Low Pressure Switch from “Closed” under pressure to “Open” under pressure.
- 3) Revised CompSpec 06-631-1-3 to rev 1, added information for Discharge Hose Assemblies to include Check Valve information for both NPT threads (p/n IG71-124) and BSP threads (p/n IG71-008).

Revision 2 **December, 2014**

Equipment Section

- 1) Revised CompSpec 06-625-1-3 to rev 1, added optional pressure gauge p/n 02-14608 for 300 bar cylinders @ 70 °F (21 °C).
- 2) Revised CompSpec 06-625-1-5 to rev 2, added optional pressure gauge w/ low pressure switch p/n 02-14609 for 300 bar cylinders @ 70 °F (21 °C).

Revision 3 **August, 2015**

Equipment Section

- 1) Added information on odorizer.

Revision 4 **November, 2015**

Equipment Section

- 1) Added Universal Valve Operator Supervisor (UVOS) information.
- 2) Remove optional Pressure Gauge w/ LPS (p/n 02-14609) and Pressure Gauge Assembly (p/n 02-14608) from pages 11 & 14.
- 3) Updated Manifold Bracket Hardware information on pages 21 & 22.

Design Section

- 1) Changed minimum design concentration values in Minimum Design Concentration Table on page 52.
- 2) Remove Flooding Factors Tables (English & metric units) on pages 54 & 55.

Revision 5 **March, 2016**

Equipment Section

- 1) Added Release Fitting Assembly p/n IG71-111 on page 48.

Design Section

- 1) MAXIMUM ELEVATION DIFFERENCES IN PIPE RUNS limitation on page 61 changed from 20.4 ft. to “No Limit”; therefore information on the limitation has been deleted from manual.

Revision 6 **June, 2016**

Equipment Section

- 1) Updated UVO Kit information on pages 24, 25 & 29.

REVISION HISTORY

Revision 7..... February, 2017

Equipment Section

- 1) Removed "CompSpec Sheet" columns from Completer Kit tables.
- 2) Removed 02-13508 from Specification table on page 10.
- 3) Updated Pressure Gauge Figures on pages 10, 13 and 14.
- 4) Removed "Cylinder Racking Ordering Format" section.
- 5) Consolidated specification data on Discharge Hose and Check Valve into Discharge Hose Assembly on page 22.
- 6) Added Reset Multi-Tool instructions on page 26.

Annex Material

- 1) Updated Safety Data Sheet for IG-55 to latest.

Revision 8..... February, 2018

Equipment Section

- 1) Added 3" and 4" check valve information to main/reserve check valves component spec on page 44.

Design Section

- 1) Added 3" and 4" check valve equivalent length values to table on page 60.

Revision 9..... January, 2019

Revised entire document to comply with current Fike document standards.

- 1) Added Universal Energetic Actuator (UEA) as a means of primary cylinder activation.
- 2) Revised Selector Valve information.
- 3) Added Nitrogen Actuator as a means of activating cylinders and selector valves.



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