

GENERAL INFORMATION

The Chemetron Fire Systems Sigma Series Systems are automatic suppression systems using the FM-200 chemical agent and consisting of four basic components and their associated accessories.

- FM-200 Components
- Completer Kits
- Detection and Alarm Devices
- Control Panels

Features

- 1** The FM-200 components consist of agent containers, container supports (racks), and discharge nozzles.
- 2** The completer kits consist of warning signs, hoses, connection fittings, pressure gauges or solenoid valves, and the actuator required to operate the cylinder valve.
- 3** The detection, alarm devices and accessories provide fire detection, audible and visual pre-alarm warnings and annunciation of the FM-200 discharge.
- 4** The control panel monitors the detection, actuates the alarms, initiates the agent discharge and controls auxiliary functions such as shut down of vital equipment and ventilation dampers.

The system and its components are agency tested for total flooding applications and should be used in accordance with the guidelines contained in National Fire Protection Association 2001. A total flooding application can be defined as injecting FM-200 into an enclosure or volume having the structural integrity to retain the agent during and after discharge. The design of such a system requires that the FM-200 chemical agent be discharged from its container within 10 seconds and be thoroughly mixed throughout the protected volume, reaching a minimum concentration level of 7%, but not exceeding 9% in normally occupied spaces.

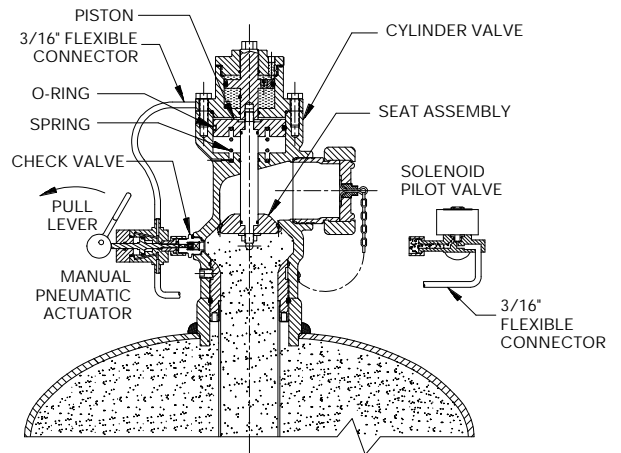
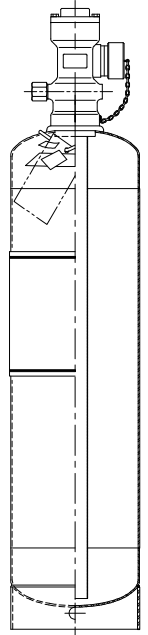
SIGMA SERIES SYSTEM EQUIPMENT DESCRIPTION

The Sigma System permits higher discharge rates and is particularly adaptable to areas requiring larger quantities of FM-200. A description of the various equipment components unique to the Sigma System follows.

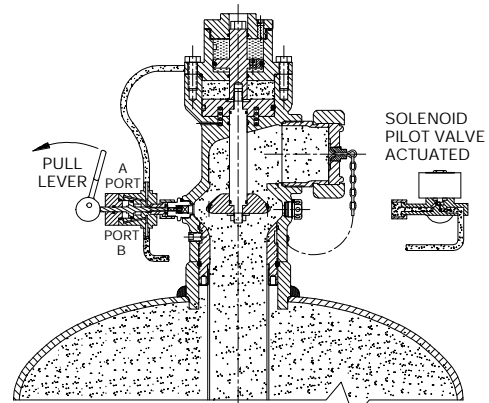
Cylinder and Valve Assembly

Sigma Series cylinders are available in three different capacities and are charged with FM-200 to a filling density up to 70 lb/ft³ (1121 kg/m³) of cylinder volume. All cylinders are superpressurized with dry nitrogen to a pressure of 360 psig (2482 kPa), at 70°F (21°C). Each cylinder is equipped with an identification nameplate indicating the quantity of FM-200.

The standard cylinder assembly, having a rigid dip tube, is designed for mounting in a vertical position only. The cylinder assembly is composed of a cylinder, dip tube, and cylinder valve.

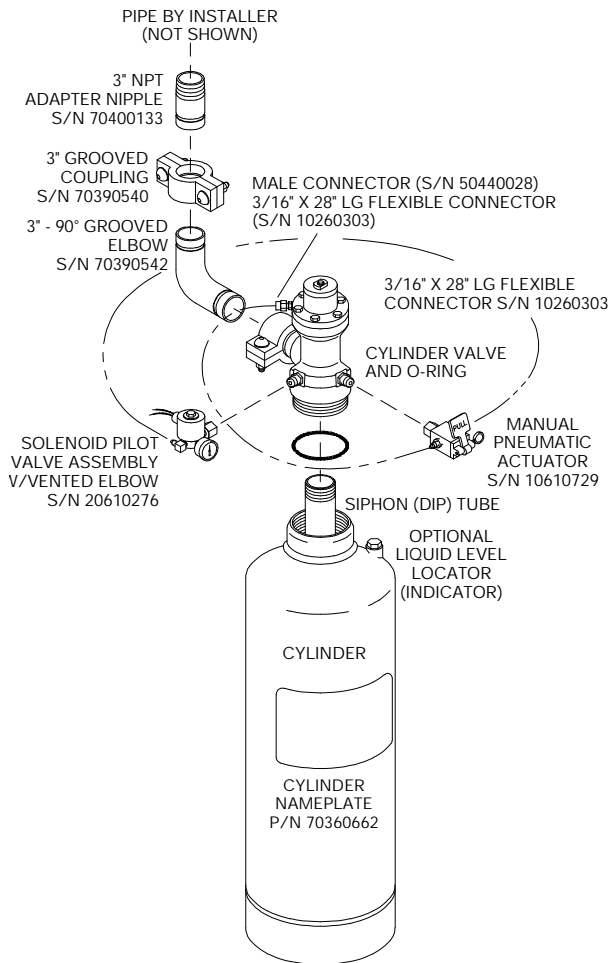


STANDBY



ACTUATED

Cylinder Valve



Sigma Series FM-200 Cylinder Assembly with Completer Kit

Cylinder	Stock Number	Fill Capacity			
		Minimum		Maximum	
		lbs	kg	lb	kg
600 lb.	10481454	304	137.9	607	275.3
750 lb.	10481455	455	206.4	910	412.8
1000 lb.	10481456	620	281.2	1000	453.6

A Cylinder: The welded seam steel cylinders are manufactured to the requirements of the Department of Transportation (DOT) for compressed gas and have internal neck threads for cylinder valve connection.

B Safety Disc: A frangible safety disc is located on the cylinder collar or valve assembly and serves to protect the cylinder against excessive internal pressure. The disc is designed to burst in a range of 850 psi to 1000 psi (5860 kPa to 6895 Kpa).

C Dip Tube: A threaded dip tube extends from the cylinder valve down to within approximately 1 in. (25 mm) of the bottom of the cylinder. The steel tube has a 3-1/2" O.D. and 1/8" (3 mm) wall thickness. The threads are 3-1/2" 12UN-2A.

D Cylinder Valve: A pressure differential type cylinder valve having a cast brass body is attached to the cylinder neck and serves to control the flow of FM-200 from the cylinder. The valve is secured to the cylinder by means of 4.5-12UN-2A screw threads and is sealed by a cylinder O-ring. A synthetic rubber seat is attached to a steel seat retainer, which is screwed into the bottom of the valve. The seat retainer also supports the dip tube.

The cylinder valve has four connections, as follows:

1 Manual-Pneumatic Actuator Connection: This is a threaded connection housing a check valve and serves as the attachment point for the manual-pneumatic actuator.

2 Pressure Gauge/Solenoid Pilot Valve Assembly Connection: This is a threaded connection housing a check valve and serves for the attachment of:

- Solenoid pilot valve assembly (with pressure gauge) for pilot cylinders.
- Pressure gauge assembly for all other system cylinders.

3 Pilot Connection: A 1/4" (6 mm) NPT tap in the cylinder valve cap provides a means of applying pilot pressure above the operating piston.

4 Discharge Connection: This connection (3 in. nominal pipe size) (76 mm) is in the form of an outlet fitting that threads into the valve body and is sealed with an O-ring. The exposed end is grooved for attachment of grooved fittings (Victualic, etc.). The outlet fitting can be removed for replacement if necessary.

COMPLETER KIT

Either a primary or slave completer kit is required to complete the installation of each FM-200 cylinder. The components included in the primary and slave completer kits are detailed in the following chart.

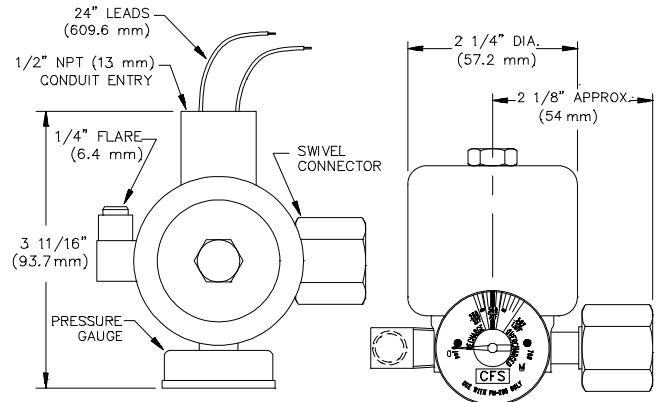
Description	Completer Kits	
	Primary 20480754	Slave 20480756
	Quantity	Quantity
Solenoid valve w/vented elbow	1	0
Solenoid valve w/vented elbow & Supervisory Pressure Switch	1*	0
Manual-pneumatic actuator	1	0
Pneumatic booster assembly	0	1
3/16" flex hose 28" long	2	3
3" 90° Elbow, grooved	1	1
3" Coupling, grooved	1	1
3" Adapter nipple	1	1
Male connector, 1/4" x 1/8" MNPT	1	1
Male connector, 1/4" x 1/4" MNPT	0	2
Pressure gauge	0	1
Pressure gauge w/Supervisory Pressure Switch	0	1*
Warning sign	1	0
Emergency operation nameplate	1	0
* Items are part of the Primary (S/N 20480755) & Slave (S/N 20480757) Completer Kits with Supervisory Pressure Switch		
If cylinders are used in a Main/Reserve system, order decals: Main Decal - S/N 50360753 Reserve Decal - S/N 50360752 and Main to Reserve Transfer Switch, S/N 20100145		

Solenoid Pilot Valve Assembly

The system utilizes a solenoid pilot valve assembly to provide pilot pressure for actuation. The solenoid must be electrically supervised by a recognized fire suppression system control panel.

The solenoid pilot valve assembly includes a pressure gauge and adapter with swivel nut, elbow, and O-ring seal that is attached to the pressure gauge connection of the cylinder valve.

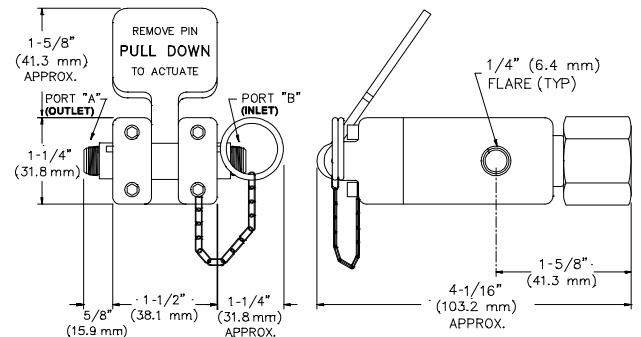
Stock Number	Description
20610276	Solenoid pilot valve assembly 120V-60Hz/24VDC
20610278	Explosionproof Solenoid pilot valve assembly 24 VDC
20610277	Solenoid pilot valve assembly with supervisory pressure switch 120V-60Hz/24VDC



Top View Front View
Solenoid Pilot Valve Assembly - S/N 20610276

Manual-Pneumatic Actuator - S/N 10610729

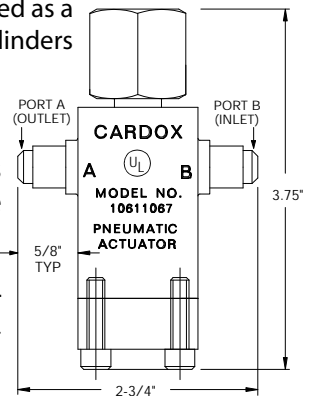
This device is required for the manual actuation of a cylinder and is attached to a check valve connection port. This is a dual purpose device, having an actuating piston connected to a pin to upset the fill check valve when pilot pressure is applied to the piston. With the check valve open, cylinder pressure is applied through the pilot connection to the piston of the pneumatic actuator, thereby opening the cylinder to discharge its contents.



Front View Side View

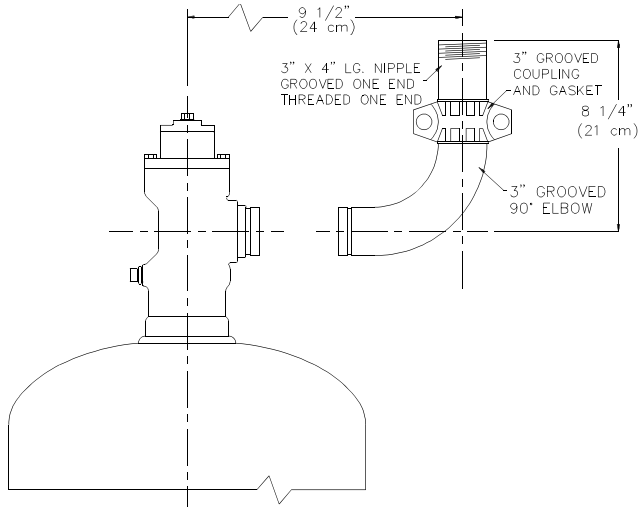
Pneumatic Booster Assembly - S/N 10611067

This pneumatic actuator is used as a pneumatic booster for all cylinders connected to the manifold downstream of the pilot cylinder. Like the manual-pneumatic actuator, the device is attached to the check valve connection port and the internal operation is identical. Actuation of the booster is initiated by manifold pressure created by the opening of the pilot cylinder.



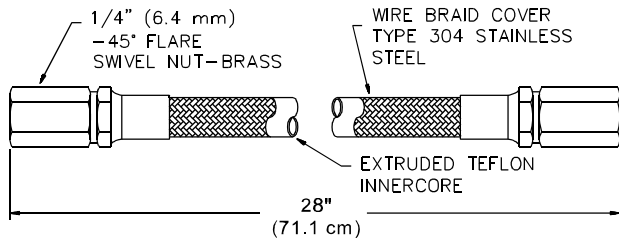
Discharge Connection Fittings - S/N 20710368

A 3 in. (76 mm) grooved elbow, nipple, and companion coupling and gasket are used to extend the discharge outlet fitting of the cylinder valve to the piping system. These fittings ease assembly and accommodate some minor differences in alignment.



Flexible Connector - S/N 10260303

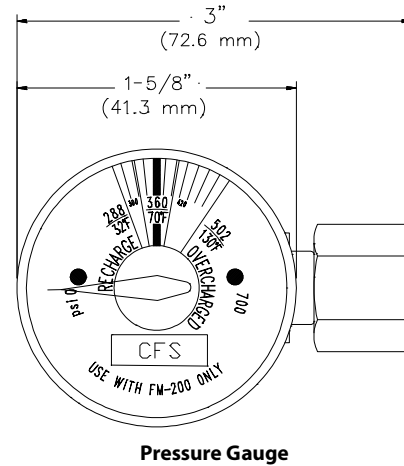
Lengths of 3/16 in. (5 mm) flexible connectors are used to interconnect the cylinder valve devices. These hoses have a stainless steel wire braid cover and a Teflon liner, and are fitted at each end with a 1/4 in. swivel flare nut.



Pressure Gauge Assembly

In systems requiring more than one cylinder, a pressure gauge assembly is required for each cylinder other than the pilot cylinder as a means of visual surveillance of the pressure condition within the cylinder.

Stock Number	Description
20240041	Pressure Gauge Assembly
20610262	Pressure Gauge Assembly w/supervisory pressure switch



Pressure Gauge

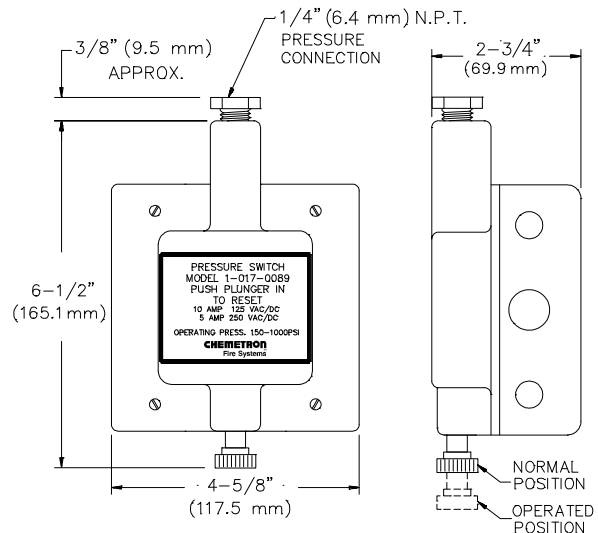
Bleeder

A vented elbow on the outlet side of the solenoid is used to prevent accumulation of pressure due to accidental leakage through the solenoid pilot valve assembly, which, if unvented, could cause a false discharge of the system.

OPTIONAL EQUIPMENT

Pressure Switch

A pressure switch is used in the system to implement the shut down of power and various items of equipment, such as fans; and for annunciation and alarm purposes.

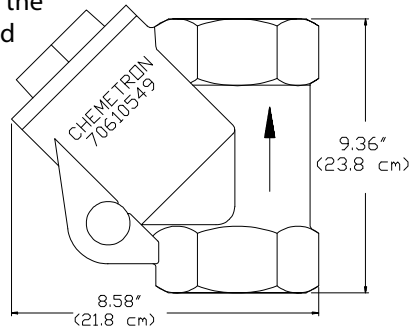


S/N 10170089

Stock Number	Description
10170089	2 Pole Pressure Switch <i>indoor use only</i>
70170229	Explosionproof 3 Pole Pressure Switch
10170065	4 Pole Pressure Switch <i>weatherproof</i>

Check Valve - S/N 70610549

A check valve is used between the cylinder valve discharge outlet flexible connection and the discharge manifold. The check valve prevents back flow from the manifold in the event that the system is discharged when one or more cylinders are disconnected, such as for weighing or general servicing. A check valve is not required on single cylinder systems.

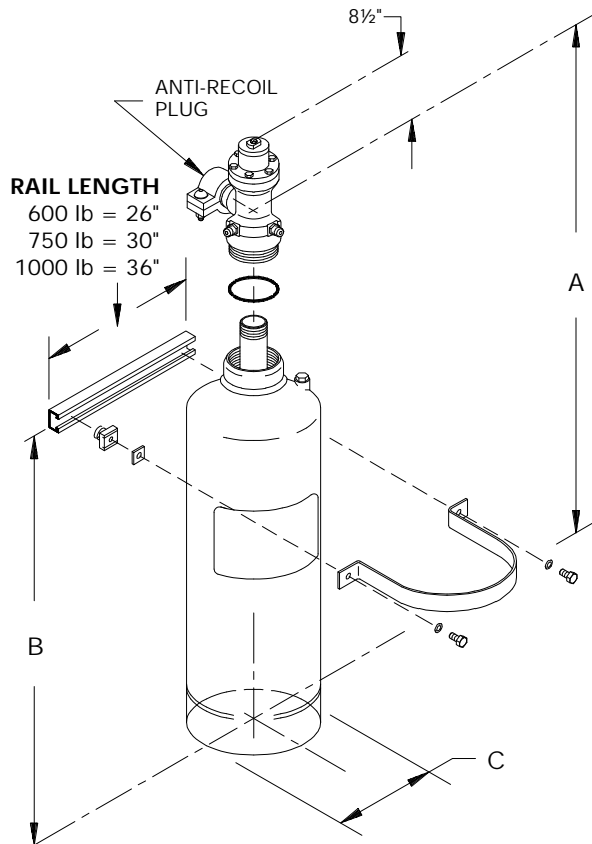


CYLINDER RACK

Single/Multiple Cylinders, Vertically Mounted

600 lb - S/N 20710264
1000 lb - S/N 20710361

750 lb - S/N 20710360



NOTE: During actual cylinder installation, rotate the cylinder so that the nameplate is in the front. This should locate the discharge outlet to the left and angled approximately 45° to the rear.

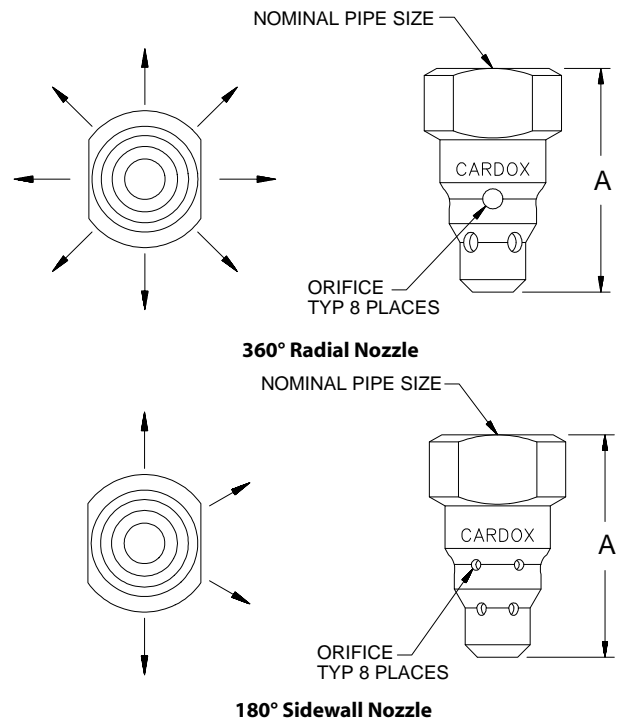
The cylinder rack, consisting of a rail, a strap, and miscellaneous hardware for interconnection, is shipped unassembled. The rail is provided with 1-1/8 in. (2.85 cm) slots on 2 in. (5.0 cm) centers for mounting bolts.

Stock Number	Nominal Cylinder Size	Dimension			
		A		B	
		in	cm	in	cm
10481454	600 lb.	53-9/16	136.0	20-1/2	52.1
10481455	750 lb.	65-1/8	165.4	38-1/2	97.8
10481456	1000 lb.	59-1/4	150.5	29-1/2	74.9

Stock Number	Empty Cylinder Weight Lb (Kg)	Cylinder Assembly Dimensions			
		Height		Diameter (C)	
		in	cm	in	cm
10481454	346 (157)	62-1/16	156.4	22	56.0
10481455	471 (214)	73-5/8	185.7	24	61.0
10481456	766 (347)	67-3/4	170.8	30	76.2

NOZZLES

Nozzles (8 port) are used to control the flow of FM-200 to insure it is discharged within 10 seconds and properly distributed in the protected hazard.



Stock Number		Nominal Pipe Size	Nozzle Height	
			A	
Stainless	Brass		in	mm
■ 360° Radial Nozzle				
10371360	10371415	3/8 in (10 mm)	2.031	51.6
10371361	10371416	1/2 in (13 mm)	2.250	57.2
10371362	10371417	3/4 in (19 mm)	2.688	68.3
10371363	10371418	1 in (25 mm)	2.875	73.0
10371364	10371419	1-1/4 in (32 mm)	3.250	82.6
10371365	10371420	1-1/2 in (38 mm)	3.625	92.1
10371366	10371421	2 in (51 mm)	4.500	114.3
■ 180° Sidewall Nozzle				
10371407	10371423	3/8 in (10 mm)	2.031	51.6
10371408	10371424	1/2 in (13 mm)	2.250	57.2
10371409	10371425	3/4 in (19 mm)	2.688	68.3
10371410	10371426	1 in (25 mm)	2.875	73.0
10371411	10371427	1-1/4 in (32 mm)	3.250	82.6
10371412	10371428	1-1/2 in (38 mm)	3.625	92.1
10371413	10371429	2 in (51 mm)	4.500	114.3

PHYSICAL/CHEMICAL PROPERTIES

FM-200 (CF₃CHFCF₃ - heptafluoropropane) is a compound that consists of carbon, fluorine and hydrogen. It is colorless, odorless, electrically non-conductive, and suppresses fire by interrupting the combustion process and affecting the available oxygen content in the area of the discharge.

FM-200 is clean, efficient, environmentally acceptable, and leaves no residue, thus minimizing any downtime after a fire.

If exposed to temperatures greater than 1300°F, toxic products of decomposition (hydrogen fluoride) are formed. The system is designed to discharge in 10 seconds or less to minimize the amount of toxic byproduct formed during extinguishment of flames. Most materials contained in areas protected by FM-200, such as aluminum, brass, rubber, plastics, steel, and electronic components, are unaffected when exposed to FM-200.

FM-200 is stored as a liquid in steel containers and super-pressurized with nitrogen to 360 psig (2482 kPa) to increase its discharge flow characteristics. When discharged, FM-200 will vaporize at the discharge nozzles and effectively mix with the air throughout the protected area.

SAFETY CONSIDERATIONS

In accordance with NFPA Standard 2001 and the EPA Significant New Alternative Program (SNAP), personnel exposure to FM-200 total flooding system concentrations shall be limited to the following:

The discharge of FM-200 into a hazard may cause a reduction in visibility for a brief period. Any direct contact with the agent can cause frostbite.

A cylinder containing FM-200 should be carefully handled. **All anti-recoil devices must be in place at all times when the cylinder is not restrained.**

The FM-200 Material Safety Data Sheet (MSDS) should be read and understood prior to working with the agent.

Concentration Level	Exposure Restriction
9% or below (current NOAEL)	No restriction
Above 9%, up to 10.5%	Limit to 1 minute
Greater than 10.5% (current LOAEL)	Avoid any exposure

The seller makes no warranties, express or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose, except as expressly stated in seller's sales contract or sales acknowledgment form. Every attempt is made to keep our product information up-to-date and accurate. All specific applications cannot be covered, nor can all requirements be anticipated. All specifications are subject to change without notice.

