UL LISTED

eurosafe

HFC227ea & FK-5112

FIRE SUPPRESSION SYSTEM

ES Series

HFC-227ea/FK-5112 Fire Extinguishing System

The EuroSafe Fire Systems ES Series Clean Agent Fire Extinguishing System utilizes HFC-227ea/FK-5112 as the extinguishing medium. HFC-227ea/FK-5112 is a colorless, non-toxic gas perfectly suited to protect high value assets in areas that may be normally occupied, in locations where clean up of other agents is problematic, when storage space for a fire suppression agent is restricted, or when an electrically non-conductive agent is required. Each system consists of the following components and their associated accessories:

HFC-227ea/FK-5112 Storage Components - Storage components consist of the cylinder assembly (s), which contains the **HFC-227ea/FK-5112** chemical agent, and the cylinder bracket(s), which holds the cylinder assembly securely in place.

HFC-227ea/FK-5112 Distribution Components - Distribution components consist of the discharge nozzles used to introduce the HFC-227ea/FK-5112 agent into a protected hazard along with the associated piping system used to connect the nozzles to the cylinder assembly.

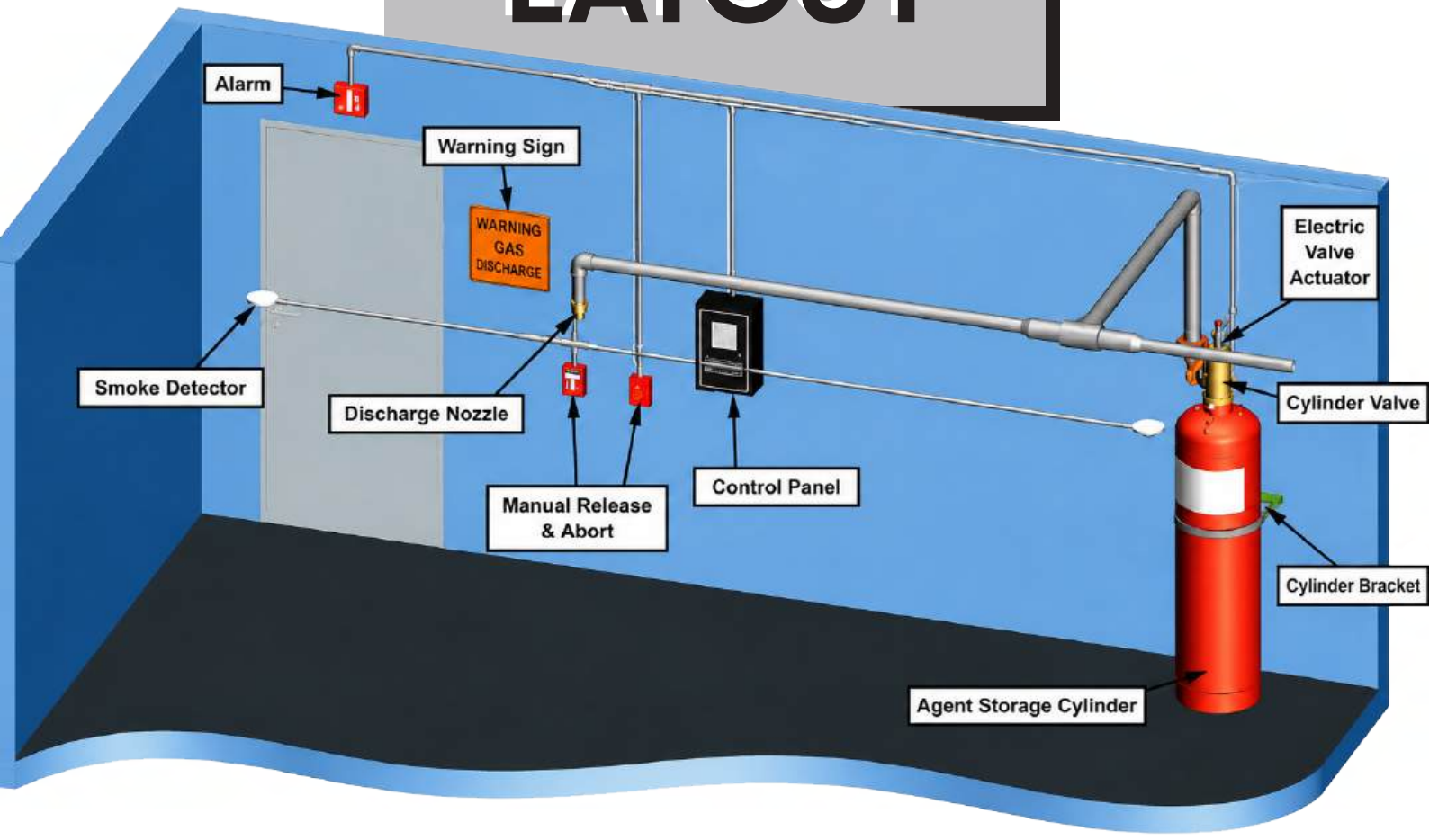
Trim Components - Trim components complete the installation of the HFC-227ea/FK-5112 system and consist of connection fittings, pressure gauge, lowpressure supervisory switch, electric valve actuator, and manual valve actuator

Slave Arrangement Components - Slave arrangement components consist of the pneumatic valve actuator(s), actuation check valve, bleed valve, pilot hose, and fittings required for a multiple cylinder (slave) arrangement.manual valve actuator.

Supplemental Components - Supplemental components include the discharge pressure switch and manifold check valve. They supplement the core equipment or complete a specific multicylinder configuration.

Control Panel - This device monitors the condition of the electric actuator, detectors, warning devices, cylinder pressure, and any manual release and abort stations. All electric or electronic devices must connect to the control panel in order to function.

TYPICAL CLEAN AGENT STYSTEM LAYOUT



ES 1230 FIRE SUPPRESSION SYSTEM

ES is a trademark of ES1230, Dodecafluoro-2-methylpentan-3-one, Another widely used extinguishing dean agent is FK-5-1-12. It is environmentally safe and best used in fire hazard areas containing Ar B, & C classes of fine. It has been approved by US EPA and ISO for its safe characteristic and fire extinguishing effectiveness.
ES1230 is good alternative clean agent for Halon 1301 replacement. ES FK-5-1-12 is guaranteed to meet the minimum NFPA 2001 Requirement as follows.

CLEAN AGENT PROPERTIES	
IUPAC Name	1,1,1,2,2,4,5,5,5-Nonafluoro-4-(trifluoromethyl)-3- pentanone"
ASHRAE Designation	FK-5-1-12
Synonym	Dodecafluoro-2-methylpentan-3-one
CAS Registry Number	756-13-8
CAS Registry Number	756-13-8
Chemical Formula	CF3CFC(O)CF(CFs)2
Molecular Weight	316.04
Freezing Point	-162.4°F (-108°C)
Boiling Point at 760 mmHg	120.2°F (49°C)
Critical Temperature	335.6°F (168.66°C)
Critical Density	39.91 lbm/ft (639.1 kg/m3
Critical Pressure	270.44 psi (1,865 kPa)
Critical Volume	0.0251 ft3/lbm (494.5 cc/mole)
Viscosity, Liquid at 77°F (25°C)	1.27 lb/ft-hr (0.524 cP)
Viscosity, Liquid at 77°F (25°C)	1.27 lb/ft-hr (0.524 cP)
Solubility in Water at 70°F (21.1°C)	<0.001% by weight
PROPERTY	REQUIREMENT
Purity	99.0% (minimum)
Water Content (by weight)	0.01%
Non-Volatile Residue (g/100 ml)	0.05
IMPACT	
Global Warming Potential (GWP)	1
Atmospheric Lifetime (ATL)	0.014 years
US EPA SNAP (Yes/No)	Yes

ES-200 CLEAN AGENT

Agent Physical Properties

Table 1.1 HFC-227ea Agent Physical Properties

Chemical structure	CF_3CHFCF_3
Chemical name	Heptafluoropropane
Molecular weight	170
Boiling point	-16.4°C (1.9°F)
Freezing point	-131.1°C (-204°F)
Critical temperature	101.7°C (214°F)
Critical pressure	2912 kPa (422 psi)
Critical volume	274 cc/mole (.0258cuft./ lb.)
Critical density	621 kg/m3 (38.76lb./ft3)
Saturated vapour density@20°C (68°F)	31.18 kg/m3 (1.95lb./ft3)
(Reference: NFPA2001)	

Table 1.2 Nitrogen Physical Properties

Chemical structure	N_2
Chemical name	Nitrogen
Molecular weight	28
Boiling point	-195.8°C (-320.4°F)
Freezing point	-210.0°C (-346°F)
Critical temperature	-146.9°C (-232.4°F)
Critical pressure	3399 kPa (492.9 psi)
Critical volume	274 cc/mole (.0258cuft./ lb.)
(Reference: NFPA2001)	

Table 1.2 Nitrogen Physical Properties

Environmental	
Ozone Depletion(ODP)	0
Atmospheric Life time (yrs)	36.5
Toxicology	
Acute Exposure LC50(%)	>80
Cardiac Sensitization	
No Observed Adverse Effect Level(NOAEL)	9.00%
Lowest Observed Adverse Effect Level (LOAEL)	10.50%
(Reference: NFPA2001)	

WARNING!

The EUROSAFE HFC-227EA system periodically be inspected by trained personnel.

EUROSAFE HFC-227EA system is the systems tested within limitations contained in the detailed installation manual. The system designer must be consulted whenever changes are planned for the system or area of protection. An authorized installer or system designer must be consulted after the system has discharged.

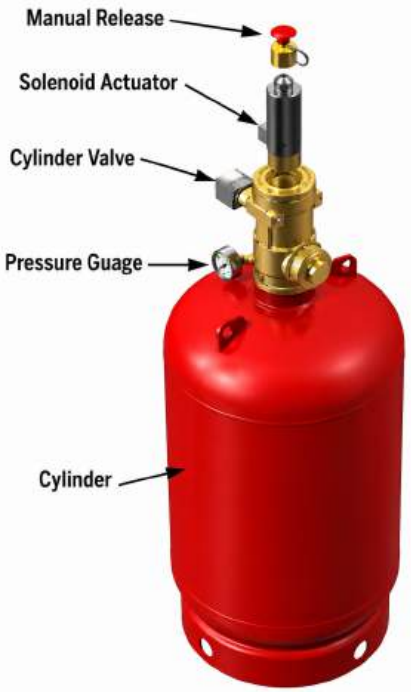
Equipment Description

The HFC-227ea/FK-5112 agent is stored as a liquid in cylinder assemblies designed specifically for the application and charged to a fill density of between 480 kg/m3 and 1121 kg/m3. To ensure optimal performance, each cylinder is superpressurized with dry nitrogen to 25 or 42 bar at 21°C. An identification label is affixed to the cylinder body indicating the fill quantity of HFC-227ea/FK-5112, charging pressure, date of fill, and fill station. The ES Series supports three cylinder capacities.

HFC-227ea/FK-5112 fire extinguishing systems are designed to be discharged within 10 seconds into a room, area, or enclosure with the structural integrity to retain the agent. The HFC-227ea/FK-5112 uniformly mixes throughout the protected area, achieving a minimum concentration level in accordance with NFPA 2001 and/or agency listings.

Cylinder with Valve Assembly Part No.	Nomina Working Pressure (Bar)	Nominal Cylinder Volume (L)	Nominal Cylinder Volume (L)		Outlet Size (mm)	Empty Weight (kg)
			Min.	Max.		
811.101.0156	25	40	19.2	44.8	49	52
811.101.0158	42					
811.101.0166	25	50	24.0	56.0	49	57
811.101.0168	42					
811.101.0176	25	60	28.8	67.2	49	68
811.101.0178	42					
811.101.0186	25	70	33.6	78.4	49	67
811.101.0188	42					
811,101.0196	25	80	38.4	89.6	49	72
811.101.0198	42					
811,101.0206	25	90	43.2	100.8	49	84
811.101.0208	42					
811,101.0216	25	100	48.0	112.0	49	89
811.101.0218	42					
811,101.0226	25	120	57.6	134.4	49	114
811.101.0228	42					
811,101.0236	25	150	72.0	168.0	49	146
811.101.0238	42					
811,101.0246	25	180	86.4	201.6	49	146
811.101.0248	42					
811,101.0155	25	40	19.2	44.8	33	50
811.101.0157	42					
811,101.0165	25	50	24.0	56.0	33	55
811.101.0167	42					
811,101.0165	25	60	28.5	67	33	60
811.101.0167	42					

The cylinder assembly is composed of a cylinder, dip tube, cylinder valve, safety release.



Cylinder Valve

The automatic release of **HFC-227ea/FK-5112** is controlled by a forged brass, differential pressure operated cylinder valve connected to the neck of the cylinder. The valve assembly is shipped with an anti- recoil safety device installed in the discharge outlet and chained to the cylindervalve.

Dip Tube

A threaded, rigid dip tube extends from the cylinder neck down to its bottom.

Cylinder

The light walled, welded seam cylinder is manufactured according to the requirements of TPED. Internal neck threads allow connection of the cylinder valve. The cylinder is designed for mounting in a vertical position only

The cylinder valve has five connection points:

Valve Actuation Connection

A threaded connection located on top of the cylinder valve serves as the attachment point for the electric (primary) or pneumatic (slave) valve actuator.

Pressure Gauge Connection

A female connection serves as the attachment point for the pressure gauge. It is fitted with an internal check valve to allow removal of the gauge while the cylinder is pressurized.

Discharge Outlet

A 1.25 in (33mm) or 2 in (49mm) male thread connection serves as the attachment point for discharge piping.

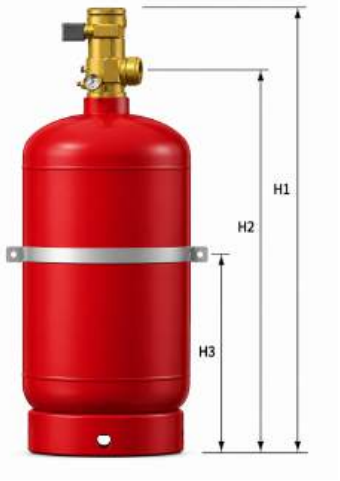
Pilot Actuation Port

A 1/4 in (8 mm) FNPT connection (shipped with a removable plug) provides a means of applying actuation pressure to the slave cylinder(s). This can also be used for attachment of the discharge pressure switch in single cylinder arrangements. The port is pressurized only during the 10 second discharge period.

CYLINDER MOUNTING

Wall Mount Cylinder Bracket Assembly

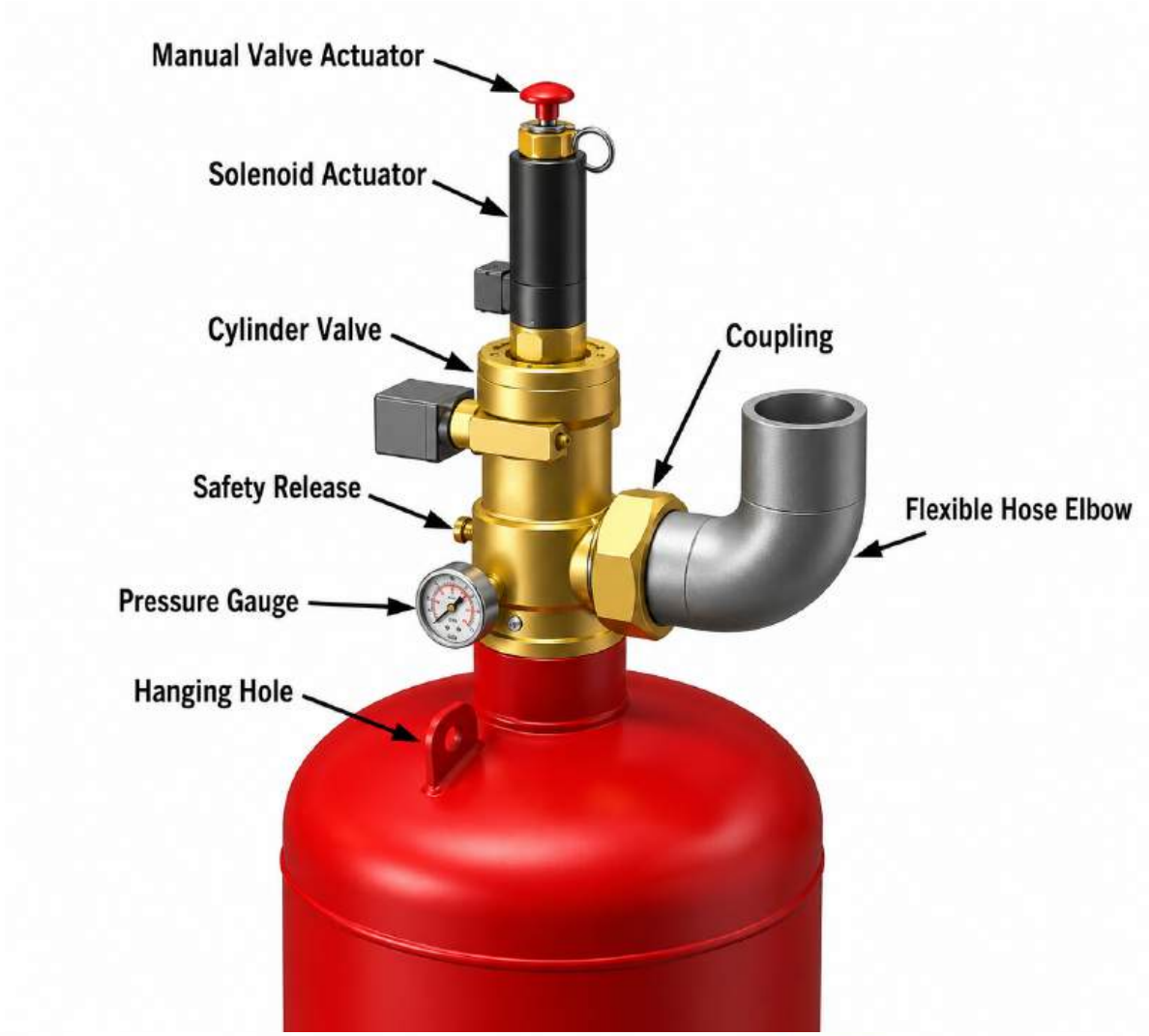
A 1/4 in (8 mm) FNPT connection (shipped with a removable plug) provides a means of applying actuation pressure to the slave cylinder(s). This can also be used for attachment of the discharge pressure switch in single cylinder arrangements. The port is pressurized only during the 10 second discharge period.



Part No	Nomina Working Pressure (Bar)	Nominal Cylinder Volume (L)	H1 (mm)	H2 (mm)	H3 (mm)	D (mm)
811.101.0156	25	40	841	695	290	Ø324
811.101.0158	42					
811.101.0166	25	50	969	823	400	Ø324
811.101.0168	42					
811.101.0176	25	60	1102	956	500	Ø324
811.101.0178	42					
811.101.0186	25	70	1230	1085	600	Ø324
811.101.0188	42					
811,101.0196	25	80	1362	1085	700	Ø324
811.101.0198	42					
811,101.0206	25	90	1362	1085	500	Ø406
811.101.0208	42					
811,101.0216	25	100	1165	1020	550	Ø406
811.101.0218	42					
811,101.0226	25	120	1165	1020	700	Ø406
811.101.0228	42					
811.101.0235	25	150	1165	1429	800	Ø406
811.101.0238	42					
811.101.0245	25	180	1474	1429	800	Ø462
811.101.0248	42					
811,101.0155	25	40	777	1429	290	Ø324
811.101.0157	42					
811,101.0165	25	50	905	802	400	Ø324
811.101.0167	42					
811.101.0115	25	60	1038	935	500	Ø324
811.101.0177	42					

TRIM COMPONENTS

Trim components are required to operate the HFC-227ea/FK-5112 cylinder(s).



Discharge Connection Fittings

A 1.25 in (33 mm) or 2 in (49mm) female thread elbow connects to the male thread cylinder outlet adapter utilizing the coupling factory installed to retain the anti-recoil safety device.

Pressure Gauge Assembly

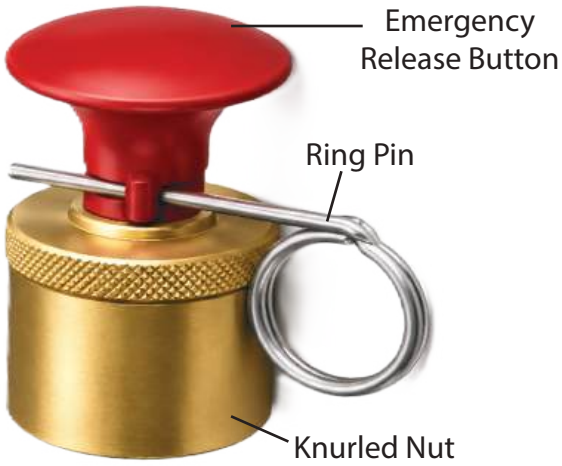
NFPA 2001 mandates a pressure gauge for each cylinder as a method of visually monitoring the internal pressure condition of the cylinder assembly

Solenoid Actuator w/ Supervisory Limit Switch

The Solenoid actuator attaches to the master cylinder at the valve actuation connection and is utilized to automatically open the cylinder valve upon receipt of a signal from the control panel or other source.

The Solenoid actuator is construction with a stainless steel actuation pin that depresses the valve core when energized. The switch contacts are normally closed when the actuator is not installed onto the cylinder valve and open when the actuator is fully installed onto the valve actuation connection at the top of the cylinder valve.

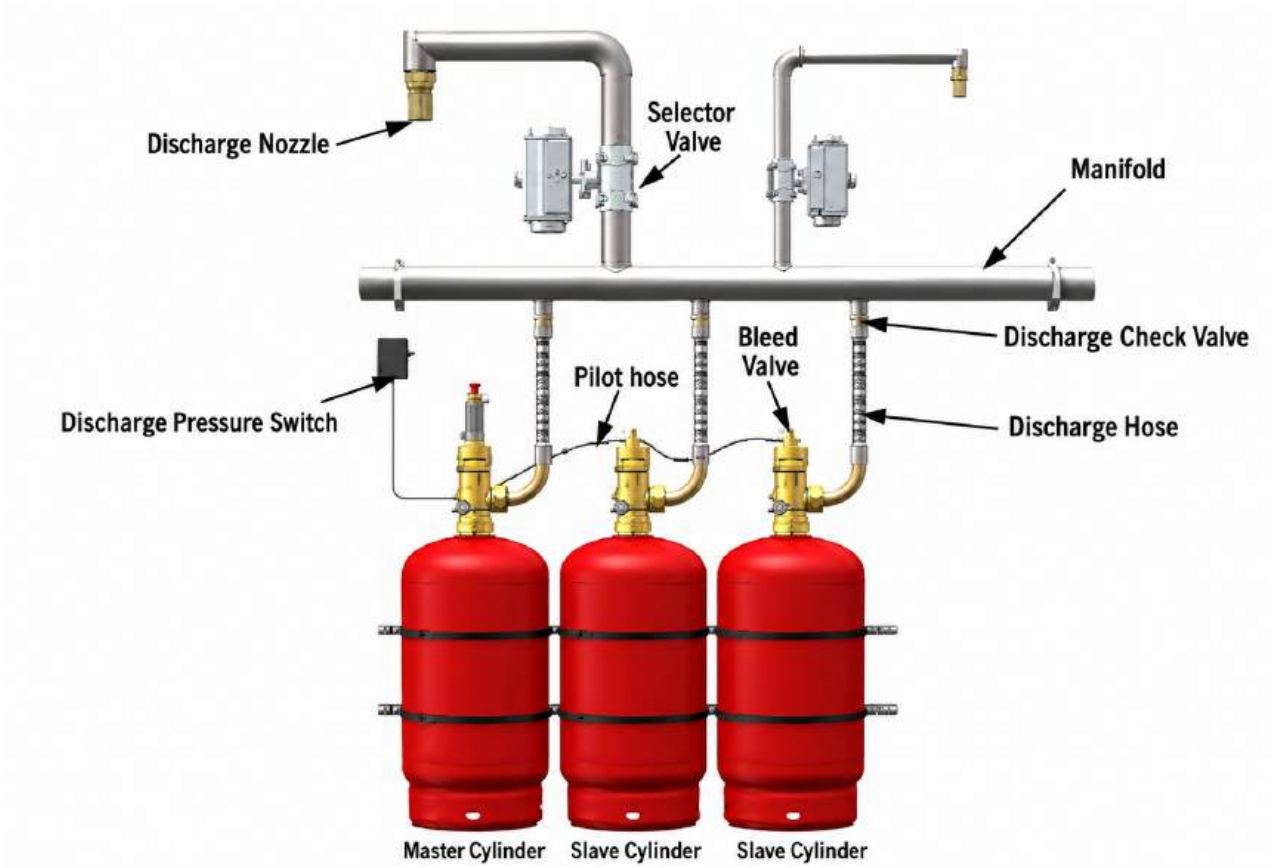
Manual Valve Actuator



An optional manual valve actuator attaches to the top of the solenoid actuator and provides a means to manually open the cylinder valve. All other connected cylinders will be opened pneumatically

SLAVE ARRANGEMENT COMPONENTS

Up to 7 cylinders (1 primary and 6 slav) may be installed in a single arrangement. A typical arrangement is shown below.



Pneumatic Valve Actuator

On multiple cylinder systems the electric valve actuator will open the primary cylinder and then, in a rapidly occurring sequence, the pneumatic valve actuator(s) will open all other cylinders using pressure from the primary cylinder.

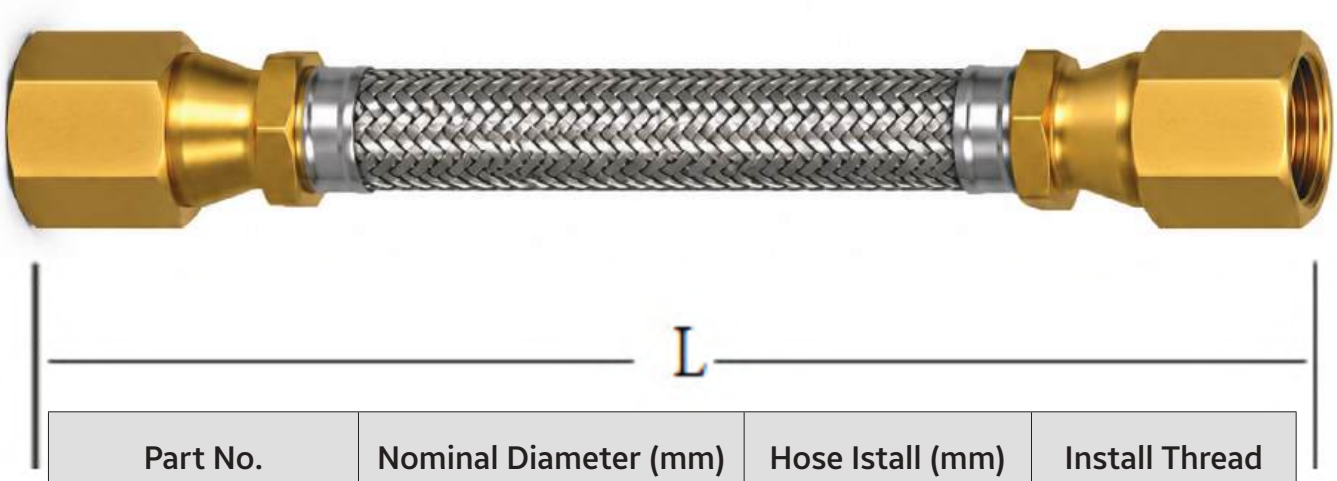
A pneumatic valve actuator attaches to the valve actuation connection of each slave cylinder. It receives pressure from the pilot actuation port of the primary cylinder through the pilot actuation check valve. It Is brass with a brass piston and pin.

Bleed Valve

The bleed valve is a safety device with G1/8 male threads that is to be installed in the pilot actuation line end. It is used to bleed off pressure that may accumulate in the pilot actuation hose or piping minimizing the chance of inadvertent pressurization of the pneumatic actuators or discharge pressure switch.

Pilot Hose

Pilot Hoses are 6 mm rubber hoses of varying lengths with 1/4 in (8 mm) 37 ° female JIC flare fittings. They are utilized to interconnect cylinders when a slave arrangement is req uired. A 1/4 in (8 mm) 37 ° male JIC flare x ma Le JIC flare adapter is available to connect lengths of Pilot Hose together.



Part No.	Nominal Diameter (mm)	Hose Istall (mm)	Install Thread
811.102.003	Ø6	400	M12 x 1.5
811.102.004	Ø6	500	M12 x 1.5
811.102.005	Ø6	600	M12 x 1.5

SUPPLEMENTAL COMPONENTS

Trim components are required to operate the HFC-227ea/FK-5112 cylinder(s)

Discharge Pressure Switch

The discharge pressure switch is used in the system to provide positive indication of agent discharge and to initiate the shut down of equipment that may deplete agent concentration. The pressure switch is a single pole, double throw (SPDT) switch with contacts rated 10 Amps resistive at 30 VDC.

Manifold Check Valve

In a multiple cylinder arrangement where the slave and master cylinders share a common manifold or in a main / reserve arrangement, a 1.25 in or 2 in thread manifold check valve must be placed between the discharge outlet of each cylinder and the discharge manifold to prevent back flow from the manifold should the system be inadvertently discharged when one or more cylinders are disconnected for maintenance.

Liquid Level Indicator

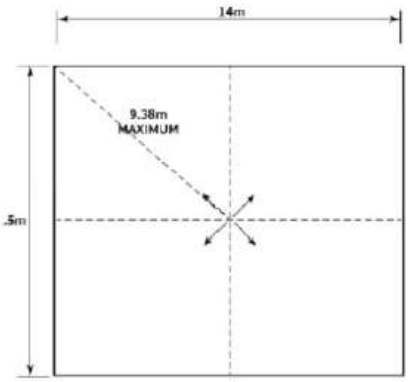
Part Number	Description
811.104.001	Liquid Level Indicator for 150 LB & 250 LB cylinders
811.104.002	Liquid Level Indicator for 375 LB & 560 LB cylinders
811.104.003	Liquid Level Indicator for BOO LB
811.104.004	Liquid Level Indicator for 100Q LB cylinders
811.104.005	Liquid Level Indicator for 1200 LB cylinders

Dishcharge Nozzle

Discharge nozzles are used to uniformly distribute the HFC-227ea/FK-5112 agent. They are performance tested to ensure that the agent is discharged within 10 seconds and properly dispersed throughout the protected area. Maximum nozzle height for a protected space is 5500 mm per tier of nozzles. Additional tiers are required for heights greater than 5500mm.

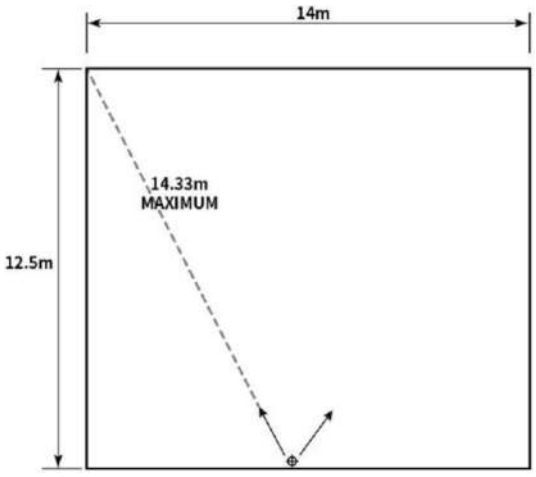
360° Radial Nozzle (8 port)

Discharge Nozzle Top View



360° Radial Nozzle (8 port) Arrangement

180' Sidewall Nozzle (8 Port)



18Q Sidewall Nozzle 18 Port) Arrangement

HFC-227ea/FK-5112
CHEMICAL PROPERTIES

HFC-227ea/FK-5112 is formed from the elements carbon, fluorine and hydrogen (CF3CHFCF3 - heptafluoropropane). The primary extinguishing mechanism of HFC-227ea/FK-5112 is heat absorption, with a secondary chemical contribution from the thermal decomposition of HFC- 227ea in the flame.

HFC-227ea/FK-5112 leaves no residue and is safe for use in occupied spaces. Most common metals, such as aluminum, brass, steel, cast iron, lead, stainless steel, and copper, as well as rubber, plastic, and electronic components, are unaffected when exposed to HFC-227ea/FK-5112.

CONSIDERATIONS

Although the EPA Significant New Alternative Program (SNAP) lists HFC-227ea/FK-5112 as acceptable for occupied spaces, NFPAStandard 2001 and SNAP list the following guidelines for human exposure;

IThe discharge of HFC-227ea/FK-5112 into a hazard may reduce visibility for a brief period. HFC- 227ea may cause frostbite if liquid discharge or escaping vapor contacts the skin.

When HFC-227ea/FK-5112 is exposed to temperatures greater than 1300 ° F (700° C), the by product Hydrogen Fluoride (HF) will be formed. HFC-227ea/FK-5112 systems are designed to discharge in 10 seconds or Less in order to minimize the amount of HF formed.

The HFC-227ea/FK-5112 Material Safety Data Sheet (MSDS) should be read and understood prior to working with the agent.

A cylinder containing HFC-227ea/FK-5112 should be handled carefully. The anti-recoil safety device must be in place at all times when the cylinder is not connected to the discharge piping and restrained.

Notes:

1. Data derived from the EPA-approved and peer-reviewed PBPK model or its equivalent.
2. Based on LOAEL of 10.5% in dogs.

eurosafe
BE-LIVE IN SAFETY

United States of America

+1 (929) 243 - 99 36

7422 Wayland Blvd, Orlando, Florida- 32807

United Kingdom

+44 20 45 773 979

71-75 Shelton Street, Covent Garden, London, United Kingdom

Info@eurosafeglobal.com | www.eurosafeglobal.com