CLEAN AGENT SUPPRESSION SYSTEM

1 - Introduction

HFC-227ea is a clean, safe fire fighting agent for use in total flooding automatic extinguishing systems. It is intended as a long term replacement for Halon 1301 and, whilst maintaining the excellent fire suppression properties of Halon, has none of the environmental problems. Storage and distribution requirements are similar to Halon and the majority of system components are identical. However, HFC-227ea is not a direct replacement for existing Halon 1301 installations due to the difference in agent quantity and discharge characteristics. The minimum HFC-227ea design concentration for Class A hazard is 6.7%, for Class B hazard is 8.7%, and for Class C hazard is 7.0%, therefore requires approximately 45% additional storage capacity over that required for Halon in the same area.

The manufacturers claim that HFC-227ea is safer than Halon 1301 for use in total flooding applications and the US Environmental Protection Agency (EPA) accepts extended use exposures of up to 9%. This has been further confirmed by a published HAG report. HFC-227ea is rated as Zero Ozone Depletion (ODP), is electrically non-

conductive, clean, and leaves no residue. Refer to NFPA 2001 "Clean Agent Fire Extinguishing Systems," Section 1.5 "Safety" for additional exposure requirements.

The systems described in this manual are 'engineered'. Engineered systems for example can consist of several HFC-227ea containers, manifolded together and connected via a pipe network to a number of discharge nozzles.

Systems may be activated mechanically or electrically. Mechanical manual actuation is via a strike knob attached to the container valve. Electrical actuation is via a removable side mounted solenoid. The solenoid can be energised automatically by a signal from a detection and alarm control panel. THE DETECTORS AND CONTROL PANELS USED IN CONJUNCTION WITH THE LIFECO HFC-227EA EXTINGUISHING SYSTEM MUST USE UL LISTED PRODUCTS.

Users of this manual should find that sufficient information is provided to plan, design, purchase components, install, operate and maintain the system. However, in the event that part of the document is not understood, or if there is any concern as to the suitability of the protection, do not hesitate to contact one of our specialist engineers for the matter to be quickly resolved.

1.1 - Approvals and Standards

LIFECO's manufactured equipment and the HFC-227ea agent, have acquired comprehensive approvals and listings providing further support to the overall product.

HFC-227ea Agent

- Underwriters Laboratories Inc. (UL) Recognised Component
- NFPA 2001 Clean Agent Fire Extinguishing Systems (Listed Alternative)

LIFECO Systems Manufactured Systems

- Underwriters Laboratories Inc. (UL Listed)

LIFECO Equipment manufacture in strict accordance with the internationally recognised Quality assurance approved to ISO 9001.

LIFECO Equipment's HFC-227ea Extinguishing System Units are to be designed, installed, inspected, maintained, tested and recharged by qualified, trained personnel in accordance with The Standard on Clean Agent Fire Extinguishing Systems, NFPA2001 and to be used in accordance with Environmental Protection Agency (EPA) Significant New Alternatives Program (SNAP).

1.2 - Health and Safety

A properly designed and installed extinguishing system should not present any significant health or safety problems, however, there are basic precautions to be taken to avoid accidents, and aspects of the system

operation that should be understood. End-users often require reassurance regarding the safety of personnel, and this can only be given if a thorough understanding of the properties of the agent and its effects in different situations are known. Current best practice should be observed e.g. NFPA2001.

Reference should also be made to NFPA 2001 review of the toxic and asphyxiating hazards of clean agents replacements for Halon 1301.

HFC-227ea, like halon, extinguishes by causing a chemical reaction with the combustion products, and does not remove oxygen like CO_2 and other inert agents.

Therefore, exposure to HFC-227ea at the design concentration of 6.7%, and up to 9.0%, is not hazardous to health. Exposure to higher concentrations is permissible for limited periods. Refer to NFPA 2001 Section "Safety" for exposure requirements. As with halons, the US EPA and the National Fire Protection Association (NFPA) recommend that unnecessary exposure to any agent be avoided and that personnel evacuate protected areas as quickly as possible to avoid the decomposition products of the fire.

HFC-227ea can decompose at high temperatures to form halogen acids. If so, their presence is readily detected as a sharp, pungent odour long before hazardous maximum exposure levels are reached. Fire toxicity studies conclude that generally decomposition products from the fire itself, especially carbon monoxide, smoke, heat, and oxygen depletion, create a greater hazard.

The noise created by the HFC-227ea agent discharging can be loud enough to startle people in the vicinity, but is unlikely to cause any permanent injury. Turbulence caused by the high velocity discharge can dislodge substantial objects directly in its path, and cause enough general turbulence within the protected area to move paper and light objects.

Direct contact with the vaporising liquid discharged from an HFC-227ea nozzle has a chilling effect on objects and in extreme cases can cause frostbite to the skin. The liquid phase vaporises rapidly when mixed with air and therefore limits the risk to the immediate vicinity of the nozzle. Minor reduction in visibility may occur for a brief period due to the condensation of water vapour.

First Aid

Skin Maintain at body temperature, thaw affected area with gentle heat. If frostbite occurs seek medical attention. Do not rub affected area.

Eyes Apply gentle heat. Do not allow patient to touch affected area.

1.3 -HFC-227ea Agent Characteristics

HFC-227ea is a clean, gaseous agent containing no particles or oily residues. It is produced under ISO 9002 guidelines to strict manufacturing specifications ensuring product purity. HFC-227ea leaves no residue or oily deposits on delicate electronic equipment, and can be removed from the protected space by ventilation.

HFC-227ea is thermally and chemically stable, but without the extremely long atmospheric lifetimes associated with other proposed halon replacements. The atmospheric lifetime of HFC-227ea has been determined to be

36.5 years. The US EPA SNAP does not consider HFC-227ea to be a long lived substance when discharged, and as such has placed no restrictions on its use (Environmental Protection Agency's Significant New Alternatives Program).

Typical areas that can be protected by an HFC-227ea system are detailed below; the list is by no means exhaustive:

Bank Vaults	Libraries
Rare Book Stores	Electronic Data Processing
Telephone Exchanges	Studios
Communication Centre	Transformer and Switch Rooms
Control Rooms	Test Laboratories
Flammable Liquid Stores	Auxiliary Power Room

The present understanding of the functioning of HFC-227ea is that 80% of its fire fighting effectiveness is achieved through heat absorption and 20% through direct chemical means (action of the fluorine radical on the chain reaction of a flame). Complete suppression using HFC-227ea has the following advantages:

- The low concentration of HFC-227ea required means less visual obscurity and minimal risk to personnel.
- The small quantity of agent discharged minimises over-pressurisation of the protected area.
- Maximum safety for personnel due to low toxicity.
- Most effective when used with automatic detection to introduce HFC-227ea rapidly.
- The ability to prevent re-ignition as long as concentration levels are maintained.

HFC-227ea is stored as a liquified compressed gas and is discharged into the protected area as a vapour. It is stored in approved TPED/GB/DOT containers and is super-pressurised with dry nitrogen to 25 Bar @ 21℃ (360 PSI @ 70℉) and 42 Bar @ 21℃ (600 PSI @ 70℉).

WARNING

HFC-227ea shall not be used on fires involving the following materials unless they have been tested to the satisfaction of the authority having jurisdiction:

- Certain chemicals or mixtures of chemicals, such as cellulose nitrate and gunpowder, those are capable of rapid oxidation in the absence of air.
- Reactive metals such as lithium, sodium, potassium, magnesium, titanium, zirconium, uranium and plutonium.
- Metal hydrides.
- Chemicals capable of undergoing autothermal decomposition, such as certain organic peroxidase and hydrazine.

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/m^3 (38.76lb./ft^3)
Saturated vapour density@20℃(68℉)	31.18 kg/m^3 (1.95lb./ft^3)
(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)
(Reference: NFPA2001)	

Table 1.3 HFC-227ea Safety Instructions

Environmental	
Ozone Depletion(ODP)	0
Atmospheric Life time (yrs)	36.5
Toxicology	
Acute Exposure LC50 (%)	>80
Cardiac Sensitization	
No Observed Adverse Effect Level (NOAEL)	9.0%
Lowest Observed Adverse Effect Level (LOAEL)	10.5%
(Reference: NFPA2001)	

WARNING

THE LIFECO HFC-227EA SYSTEM PERIODICALLY BE INSPECTED BY TRAINED PERSONNEL.

THE LIFECO 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.

2 - System Components

This section describes the individual components that comprise a complete system. Some items are optional depending on the application, and are indicated as such.

2.1 Typical Manifold System

HFC-227ea gas fire extinguishing system includes the cylinder kit, manual release device, discharge hose, check valve, manifold, and relief device of distributor manifold, pressure operating switch, pipe ware and nozzle. HFC-227ea gas fire extinguishing system is linked with automatic alarm system for automatic control. LIFECO typical manifold systems are only for single area protection.
For single area system, the solenoid actuator will act to open the master cylinder after getting the instruction from control panel, and then the gas from the master cylinder will open the slave cylinders.

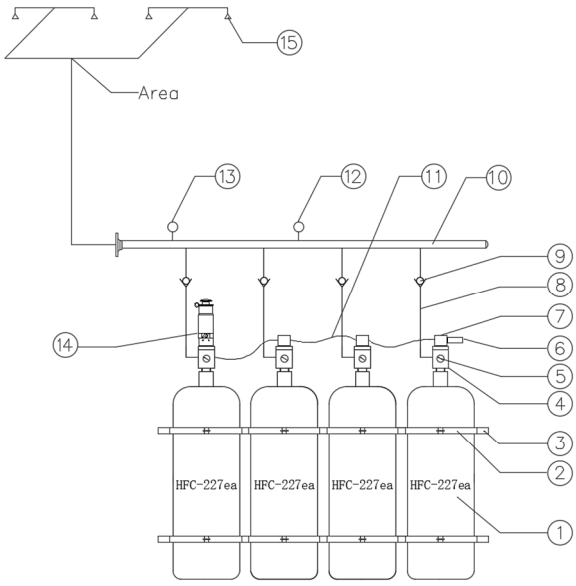


Figure 2.1 – LIFECO Manifold System for Single Area System

No.	Part Name	No.	Part Name
1	Cylinder	9	Manifold Check Valve
2	Mounting Bracket	10	Manifold
3	Fix Steel Channel	11	Pilot Hose
4	Container Valve	12	Manifold Safety Valve
5	Agent Pressure Gauge	13	Discharge Pressure Switch
6	Bleed Valve	14	Solenoid Actuator
7	Pneumatic Actuator	15	Nozzle
8	Discharge Hose		

2.2 HFC-227ea Container

Multiple series of containers are available, including:
The 16.6, 28.3, 40, 50, 60, 70, 80, 90, 100, 120, 150,160 & 170 L containers are manufactured in accordance with TPED.
The 40, 50, 60, 70, 80, 90, 100, 120, 150 & 170 L containers are manufactured in accordance with GB.
The 16.7, 28.3, 49, 52, 62, 80, 103, 106, 147 & 153 L containers are manufactured in accordance with DOT.

Technical Information

Table 2.2.1 HFC-227ea TPED Container

Material	P355M Carbon: ≤0.14% Manganese: ≤1.60% Silicon: ≤0.50% Phosphorus: ≤0.025% Sulphur: ≤0.010%
Nominal Working Pressure	42 bar (609 psi)
Pneumatic Test Pressure	63 bar (914 psi)
Burst Test Pressure	≥ 126 bar (1827 psi)
Work Temperature	-20 °C ~ 65 °C
Paint Specification	Red Polyester Powder Coated
Certification	TPED

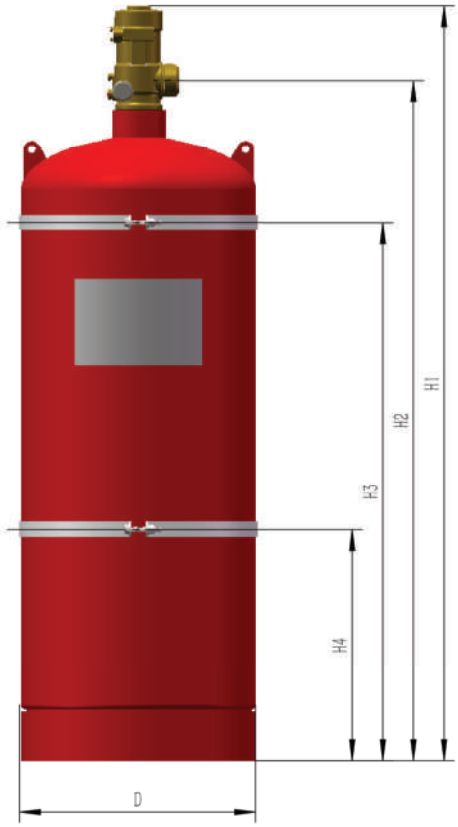


Figure 2.3 - Container Assembly

Table 2.2.2 HFC-227ea GB Container

Material	HP345 Carbon: ≤0.20% Manganese: ≤1.50% Silicon: ≤0.35% Phosphorus: ≤0.025% Sulphur: ≤0.015% Aluminium acid-soluble: ≥0.015
Nominal Working Pressure	53 bar
Hydrostatic Test Pressure	80 bar
Work Temperature	0 °C ~ 50 °C
Paint Specification	Red Polyester Powder Coated
Certification	GB

Table 2.2.3 HFC-227ea DOT Container

Material	HP345 (G3) Carbon: ≤0.20% Manganese: ≤1.25% Phosphorus: ≤0.025%

	Sulphur: ≤0.015%
Nominal Working Pressure	500 psi
Hydrostatic Test Pressure	1000 psi
Burst Test Pressure	＞ 2000 psi
Paint Specification	Red Polyester Powder Coated
Certification	DOT

2.3 HFC-227ea Container Assembly

The agent storage vessel consists of a container fitted with a valve and internal syphon tube, factory filled with HFC-227ea, and super-pressurized with dry nitrogen to 25 bar @ 21℃(360 psi @ 70℉) and 42 bar @ 21℃ (600 psi @ 70℉).

Containers sharing the same manifold shall be equal in size and fill density. Containers are finished in red and are available in various sizes (Figure 2.3).

A nameplate is adhered to the container displaying the agent weight, tare weight, gross weight, fill density and charge date.

Table 2.3.1 HFC-227ea Container Assembly Details (TPED Container)

Cylinder with Valve Assembly Part No.	Container Assembly Type	Nominal Working Pressure (bar)	Nominal Cylinder Volume (L)	Fill Capacity (kg)		Outlet Size (mm)	Empty Weight (kg)
				Min.	Max.		
811.101.0156	LF227SP-25-40D	25	40	19.2	44.8	49	42
811.101.0166	LF227SP-25-50D	25	50	24.0	56.0	49	48
811.101.0176	LF227SP-25-60D	25	60	28.8	67.2	49	53
811.101.0186	LF227SP-25-70D	25	70	33.6	78.4	49	59
811.101.0196	LF227SP-25-80D	25	80	38.4	89.6	49	64
811.101.0206	LF227SP-25-90D	25	90	43.2	100.8	49	73
811.101.0216	LF227SP-25-100D	25	100	48.0	112.0	49	78
811.101.0226	LF227SP-25-120D	25	120	57.6	134.4	49	89
811.101.0236	LF227SP-25-150D	25	150	72.0	168.0	49	105
811.101.0246	LF227SP-25-160D	25	160	76.8	179.2	49	104
811.101.0135	LF227SP-25-16.6C	25	16.6	8.0	18.6	33	21
811.101.0145	LF227SP-25-28.3C	25	28.3	13.6	31.7	33	29
811.101.0155	LF227SP-25-40C	25	40	19.2	44.8	33	37
811.101.0165	LF227SP-25-50C	25	50	24.0	56.0	33	42
811.101.0175	LF227SP-25-60C	25	60	28.8	67.2	33	47
811.101.0158	LF227SP-42-40D	42	40	19.2	44.8	49	42
811.101.0168	LF227SP-42-50D	42	50	24.0	56.0	49	48
811.101.0178	LF227SP-42-60D	42	60	28.8	67.2	49	53
811.101.0188	LF227SP-42-70D	42	70	33.6	78.4	49	59

Cylinder with Valve Assembly Part No.	Container Assembly Type	Nominal Working Pressure (bar)	Nominal Cylinder Volume (L)	Fill Capacity (kg)		Outlet Size (mm)	Empty Weight (kg)
				Min.	Max.		
811.101.0198	LF227SP-42-80D	42	80	38.4	89.6	49	64
811.101.0208	LF227SP-42-90D	42	90	43.2	100.8	49	73
811.101.0218	LF227SP-42-100D	42	100	48.0	112.0	49	78
811.101.0228	LF227SP-42-120D	42	120	57.6	134.4	49	89
811.101.0238	LF227SP-42-150D	42	150	72.0	168.0	49	105
811.101.0248	LF227SP-42-160D	42	160	76.8	179.2	49	104
811.101.0258	LF227SP-42-170D	42	170	81.6	190.4	49	108
811.101.0137	LF227SP-42-16.6C	42	16.6	8.0	18.6	33	21
811.101.0147	LF227SP-42-28.3C	42	28.3	13.6	31.7	33	29
811.101.0157	LF227SP-42-40C	42	40	19.2	44.8	33	37
811.101.0167	LF227SP-42-50C	42	50	24.0	56.0	33	42
811.101.0177	LF227SP-42-60C	42	60	28.8	67.2	33	47

Table 2.3.2 HFC-227ea Container Assembly Details (GB Container)

Cylinder with Valve Assembly Part No.	Container Assembly Type	Nominal Working Pressure (bar)	Nominal Cylinder Volume (L)	Fill Capacity (kg)		Outlet Size (mm)	Empty Weight (kg)
				Min.	Max.		
811.101.0456	LF227SP-25-40M	25	40	19.2	44.8	49	47
811.101.0466	LF227SP-25-50M	25	50	24.0	56.0	49	58
811.101.0476	LF227SP-25-60M	25	60	28.8	67.2	49	65
811.101.0486	LF227SP-25-70M	25	70	33.6	78.4	49	72
811.101.0496	LF227SP-25-80M	25	80	38.4	89.6	49	80
811.101.0506	LF227SP-25-90M	25	90	43.2	100.8	49	94
811.101.0516	LF227SP-25-100M	25	100	48.0	112.0	49	100
811.101.0526	LF227SP-25-120M	25	120	57.6	134.4	49	113
811.101.0546	LF227SP-25-150M	25	150	72.0	168.0	49	134
811.101.0455	LF227SP-25-40K	25	40	19.2	44.8	33	41
811.101.0465	LF227SP-25-50K	25	50	24.0	56.0	33	52
811.101.0475	LF227SP-25-60K	25	60	28.8	67.2	33	59
811.101.0458	LF227SP-42-40M	42	40	19.2	44.8	49	47
811.101.0468	LF227SP-42-50M	42	50	24.0	56.0	49	58
811.101.0478	LF227SP-42-60M	42	60	28.8	67.2	49	65
811.101.0488	LF227SP-42-70M	42	70	33.6	78.4	49	72
811.101.0498	LF227SP-42-80M	42	80	38.4	89.6	49	80
811.101.0508	LF227SP-42-90M	42	90	43.2	100.8	49	94
811.101.0518	LF227SP-42-100M	42	100	48.0	112.0	49	100
811.101.0528	LF227SP-42-120M	42	120	57.6	134.4	49	113
811.101.0548	LF227SP-42-150M	42	150	72.0	168.0	49	134

Cylinder with Valve Assembly Part No.	Container Assembly Type	Nominal Working Pressure (bar)	Nominal Cylinder Volume (L)	Fill Capacity (kg)		Outlet Size (mm)	Empty Weight (kg)
				Min.	Max.		
811.101.0568	LF227SP-42-170M	42	170	81.6	190.4	49	149
811.101.0457	LF227SP-42-40K	42	40	19.2	44.8	33	41
811.101.0467	LF227SP-42-50K	42	50	24.0	56.0	33	52
811.101.0477	LF227SP-42-60K	42	60	28.8	67.2	33	59

Table 2.3.3 HFC-227ea Container Assembly Details (DOT Container)

Cylinder with Valve Assembly Part No.	Container Assembly Type	Nominal Working Pressure (bar)	Nominal Cylinder Volume (L)	Fill Capacity (kg)		Outlet Size (mm)	Empty Weight (kg)
				Min.	Max.		
811.101.0766	LF227SP-25-49S	25	49	23.5	54.9	49	48
811.101.0776	LF227SP-25-52S	25	52	25.0	58.2	49	56
811.101.0786	LF227SP-25-62S	25	62	29.8	69.4	49	53
811.101.0806	LF227SP-25-80S	25	80	38.4	89.6	49	65
811.101.0826	LF227SP-25-103S	25	103	49.4	115.4	49	82
811.101.0836	LF227SP-25-106S	25	106	50.9	118.7	49	84
811.101.0856	LF227SP-25-147S	25	147	70.6	164.6	49	105
811.101.0866	LF227SP-25-153S	25	153	73.4	171.4	49	108
811.101.0735	LF227SP-25-16.7R	25	16.7	8.0	18.7	33	21
811.101.0745	LF227SP-25-28.3R	25	28.3	13.6	31.7	33	29
811.101.0765	LF227SP-25-49R	25	49	23.5	54.9	33	42
811.101.0775	LF227SP-25-52R	25	52	25.0	58.2	33	50
811.101.0785	LF227SP-25-62R	25	62	29.8	69.4	33	47

Table 2.3.4 HFC-227ea Container Assembly Dimension (TPED Container)

Cylinder with Valve Assembly Part No.	Container Assembly Type	Nominal Working Pressure (bar)	Nominal Cylinder Volume (L)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)	D (mm)
811.101.0156	LF227SP-25-40D	25	40	841	695	470	220	Ø324
811.101.0166	LF227SP-25-50D	25	50	969	823	600	330	Ø324
811.101.0176	LF227SP-25-60D	25	60	1102	956	600	330	Ø324
811.101.0186	LF227SP-25-70D	25	70	1231	1085	800	450	Ø324
811.101.0196	LF227SP-25-80D	25	80	1362	1216	950	450	Ø324
811.101.0206	LF227SP-25-90D	25	90	1084	938	600	330	Ø406
811.101.0216	LF227SP-25-100D	25	100	1166	1020	750	450	Ø406
811.101.0226	LF227SP-25-120D	25	120	1329	1183	900	450	Ø406
811.101.0236	LF227SP-25-150D	25	150	1575	1429	1050	450	Ø406
811.101.0246	LF227SP-25-160D	25	160	1346	1200	900	450	Ø462
811.101.0135	LF227SP-25-16.6C	25	16.6	668	566	400	200	Ø228.6

Cylinder with Valve Assembly Part No.	Container Assembly Type	Nominal Working Pressure (bar)	Nominal Cylinder Volume (L)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)	D (mm)
811.101.0145	LF227SP-25-28.3C	25	28.3	975	873	600	330	Ø228.6
811.101.0155	LF227SP-25-40C	25	40	775	673	470	220	Ø324
811.101.0165	LF227SP-25-50C	25	50	903	801	600	330	Ø324
811.101.0175	LF227SP-25-60C	25	60	1036	934	600	330	Ø324
811.101.0158	LF227SP-42-40D	42	40	841	695	470	220	Ø324
811.101.0168	LF227SP-42-50D	42	50	969	823	600	330	Ø324
811.101.0178	LF227SP-42-60D	42	60	1102	956	600	330	Ø324
811.101.0188	LF227SP-42-70D	42	70	1231	1085	800	450	Ø324
811.101.0198	LF227SP-42-80D	42	80	1362	1216	950	450	Ø324
811.101.0208	LF227SP-42-90D	42	90	1084	938	600	330	Ø406
811.101.0218	LF227SP-42-100D	42	100	1166	1020	750	450	Ø406
811.101.0228	LF227SP-42-120D	42	120	1329	1183	900	450	Ø406
811.101.0238	LF227SP-42-150D	42	150	1575	1429	1050	450	Ø406
811.101.0248	LF227SP-42-160D	42	160	1346	1200	900	450	Ø462
811.101.0258	LF227SP-42-170D	42	170	1407	1261	900	450	Ø462
811.101.0137	LF227SP-42-16.6C	42	16.6	668	566	400	200	Ø228.6
811.101.0147	LF227SP-42-28.3C	42	28.3	975	873	600	330	Ø228.6
811.101.0157	LF227SP-42-40C	42	40	775	673	470	220	Ø324
811.101.0167	LF227SP-42-50C	42	50	903	801	600	330	Ø324
811.101.0177	LF227SP-42-60C	42	60	1036	934	600	330	Ø324

Table 2.3.5 HFC-227ea Container Assembly Dimension (GB Container)

Cylinder with Valve Assembly Part No.	Container Assembly Type	Nominal Working Pressure (bar)	Nominal Cylinder Volume (L)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)	D (mm)
811.101.0456	LF227SP-25-40M	25	40	1134	988	750	300	Ø260
811.101.0466	LF227SP-25-50M	25	50	1119	973	750	300	Ø312
811.101.0476	LF227SP-25-60M	25	60	1261	1115	750	300	Ø312
811.101.0486	LF227SP-25-70M	25	70	1403	1257	1050	300	Ø312
811.101.0496	LF227SP-25-80M	25	80	1545	1399	1050	300	Ø312
811.101.0506	LF227SP-25-90M	25	90	1126	980	750	300	Ø416
811.101.0516	LF227SP-25-100M	25	100	1200	1055	750	300	Ø416
811.101.0526	LF227SP-25-120M	25	120	1360	1214	900	300	Ø416
811.101.0546	LF227SP-25-150M	25	150	1599	1453	1050	300	Ø416
811.101.0455	LF227SP-25-40K	25	40	1068	966	750	300	Ø260
811.101.0465	LF227SP-25-50K	25	50	1055	953	750	300	Ø312
811.101.0475	LF227SP-25-60K	25	60	1197	1095	750	300	Ø312
811.101.0458	LF227SP-42-40M	42	40	1134	988	750	300	Ø260

Cylinder with Valve Assembly Part No.	Container Assembly Type	Nominal Working Pressure (bar)	Nominal Cylinder Volume (L)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)	D (mm)
811.101.0468	LF227SP-42-50M	42	50	1119	973	750	300	Ø312
811.101.0478	LF227SP-42-60M	42	60	1261	1115	750	300	Ø312
811.101.0488	LF227SP-42-70M	42	70	1403	1257	1050	300	Ø312
811.101.0498	LF227SP-42-80M	42	80	1545	1399	1050	300	Ø312
811.101.0508	LF227SP-42-90M	42	90	1126	980	750	300	Ø416
811.101.0518	LF227SP-42-100M	42	100	1200	1055	750	300	Ø416
811.101.0528	LF227SP-42-120M	42	120	1360	1214	900	300	Ø416
811.101.0548	LF227SP-42-150M	42	150	1599	1453	1050	300	Ø416
811.101.0568	LF227SP-42-170M	42	170	1758	1612	1200	300	Ø416
811.101.0457	LF227SP-42-40K	42	40	1068	966	750	300	Ø260
811.101.0467	LF227SP-42-50K	42	50	1055	953	750	300	Ø312
811.101.0477	LF227SP-42-60K	42	60	1197	1095	750	300	Ø312

Table 2.3.6 HFC-227ea Container Assembly Dimension (DOT Container)

Cylinder with Valve Assembly Part No.	Container Assembly Type	Nominal Working Pressure (bar)	Nominal Cylinder Volume (L)	H1 (mm)	H2 (mm)	H3 (mm)	H4 (mm)	D (mm)
811.101.0766	LF227SP-25-49S	25	49	964	820	600	300	Ø324
811.101.0776	LF227SP-25-52S	25	52	764	618	400	200	Ø406
811.101.0786	LF227SP-25-62S	25	62	1134	988	750	300	Ø324
811.101.0806	LF227SP-25-80S	25	80	1367	1221	900	300	Ø324
811.101.0826	LF227SP-25-103S	25	103	1179	1033	750	300	Ø406
811.101.0836	LF227SP-25-106S	25	106	1204	1058	750	300	Ø406
811.101.0856	LF227SP-25-147S	25	147	1539	1393	1050	300	Ø406
811.101.0866	LF227SP-25-153S	25	153	1589	1443	1050	300	Ø406
811.101.0735	LF227SP-25-16.7R	25	16.7	674	572	400	200	Ø228.6
811.101.0745	LF227SP-25-28.3R	25	28.3	979	877	600	300	Ø228.6
811.101.0765	LF227SP-25-49R	25	49	900	798	600	300	Ø324
811.101.0775	LF227SP-25-52R	25	52	700	596	400	200	Ø406
811.101.0785	LF227SP-25-62R	25	62	1068	966	750	300	Ø324

2.4 Container Label

The container label details the weight of HFC-227ea contained, empty weight, fill density and charge date. Once the label is applied to the container surface, and to avoid possible tampering it cannot be removed intact.

Technical Information

Material: PET

Adhesive: A general purpose permanent, acrylic based adhesive.

Dimensions: 279.8mm x 168.0 mm (11" x 6.5")
(**Pt. No. 811.108.101** for Containers 16.6, 16.7, 28.3, 40, 49, 50, 52, 60, 62, 70, 80, 90, 100, 103, 106, 120, 147, 150, 153, 160 & 170 L)

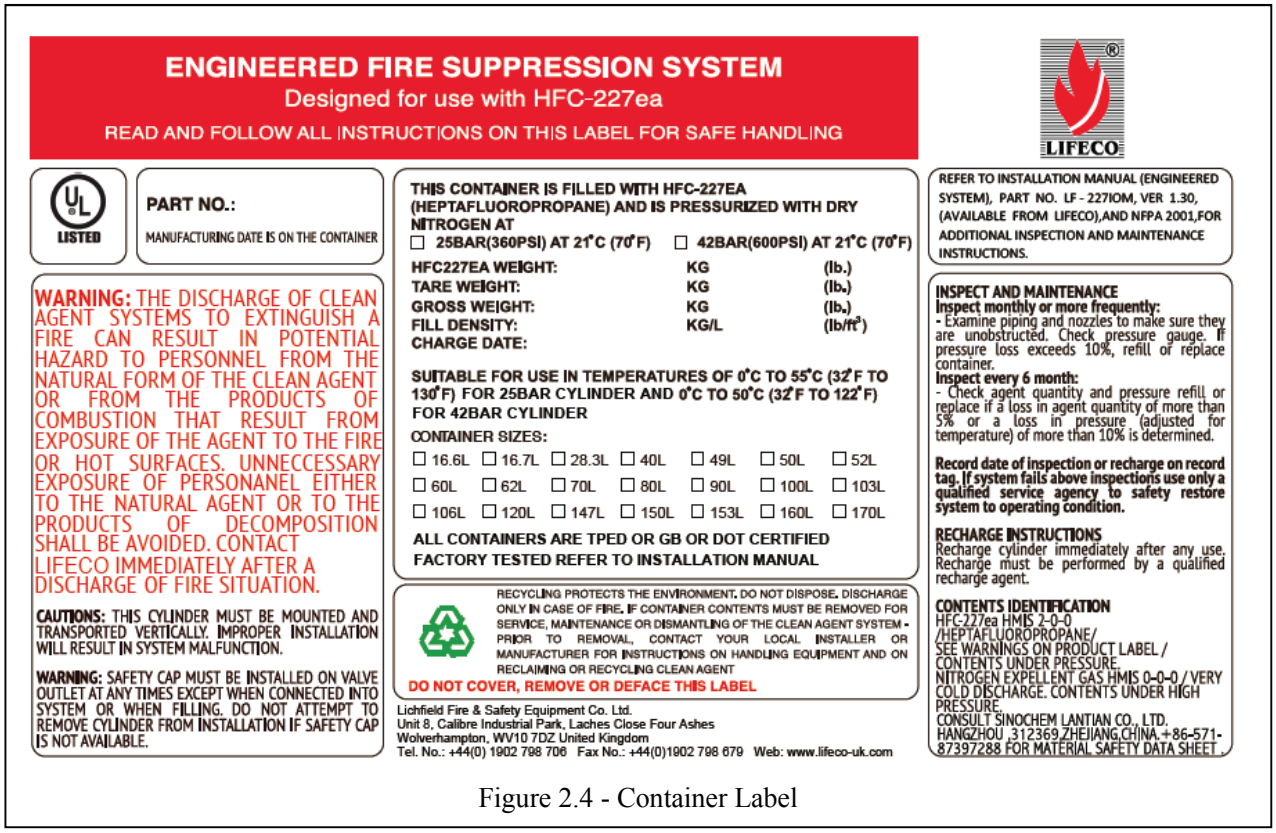


Figure 2.4 - Container Label

2.5 Cylinder Fixing Brackets

The bracket assembly consists of a nut and bolt, two bracket straps and one back channel. To securely hold the container in position during the system discharge, two bracket assemblies are required per container.

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

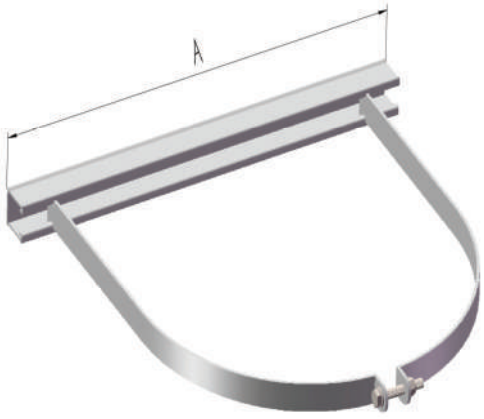


Figure 2.5 - Fixing Bracket

Table 2.5.1 Container Mounting Strap

Part No.	Container Volume (L)	Container Dia. (mm)
811.106.601	16.6, 16.7, 28.3	Φ228.6
811.106.602	40	Φ260
811.106.603	50, 60, 70, 80	Φ312
811.106.604	40, 49, 50, 60, 62, 70, 80	Φ324
811.106.605	90, 100, 103, 106, 120, 147, 150, 153, 170	Φ406, Φ416
811.106.606	160, 170	Φ462
Fastening Bolt	M10X60	

Table 2.5.2 Fixing Back Channel Dimensions

Part No.	Container Diameter (mm)	Dimension A (mm)									
		Container Quantity									
		1	2	3	4	5	6	7	8	9	10
811.106.731-811.106.740	Φ228.6 Φ260	500	800	1100	1400	1700	2000	2300	2600	2900	3200
811.106.701-811.106.710	Φ312 Φ324	600	1000	1400	1800	2200	2600	3000	3400	3800	4200
811.106.711-811.106.720	Φ406 Φ416	700	1200	1700	2200	2700	3200	3700	4200	4700	5200
811.106.721-811.106.730	Φ462	700	1200	1700	2200	2700	3200	3700	4200	4700	5200

2.6 Container Valve

Installed in the gas cylinder is used to control the release of agent. Build up the container valve extinguishing kit together with cylinders started by Solenoid Actuator, Manual Actuator or Pneumatic Actuator. Container valve has long service life, low leakage rate, can automatically reset after use, re-filling agent needn't change any accessories (such as burst disc, etc.). The pressure gauge port of the container valve are available with connection thread of M10X1 or NPT1/8.

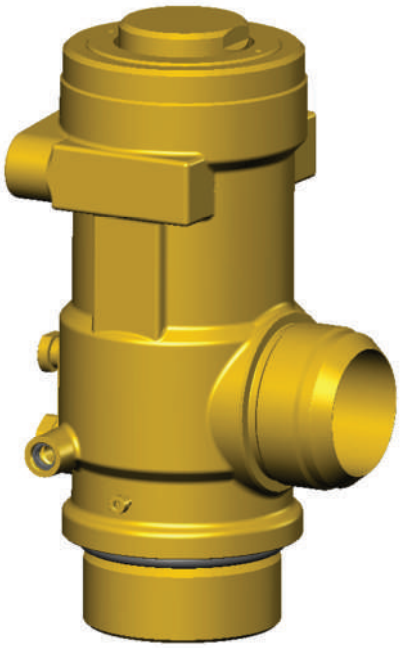


Figure 2.6 - Container Valve

Technical Specification:

Table 2.6 Container Valve

Type	33 mm 25 bar		33 mm 42 bar		49 mm 25 bar		49 mm 42 bar	
Part No.	811.101.0013	811.101.0017	811.101.0014	811.101.0018	811.101.0023	811.101.0027	811.101.0024	811.101.0028
Body Material	Brass		Brass		Brass		Brass	
Nominal Working Pressure	25 bar @21°C		42 bar @21°C		25 bar @21°C		42 bar @21°C	
Safety Relief pressure (Burst Disc Rating)	60±6 bar		100±10 bar		60±6 bar		100±10 bar	
Work Temperature	-20 °C ~60 °C							
Inlet	2.5"-12UN				3"-12UN			
Outlet	1.875"-12UN				2.5"-12UN			
Actuator Port	M42X1.5							
Pilot Pipe Connection	G1/8							
Pressure Gauge Port	M10X1	NPT1/8	M10X1	NPT1/8	M10X1	NPT1/8	M10X1	NPT1/8
Overall Size (mm)	124 (L) ×102 (W) ×184 (H)	124 (L) ×121 (W) ×184 (H)	124 (L) ×102 (W) ×184 (H)	124 (L) ×121 (W) ×184 (H)	149 (L) ×110 (W) ×238 (H)	149 (L) ×129 (W) ×238 (H)	149 (L) ×110 (W) ×238 (H)	149 (L) ×129 (W) ×238 (H)
Weight	4.9 kg				9.5 kg			

2.7 Safety Relief Device

A burst disc is factory fitted to every container valve assembly. It is designed to rupture when the container becomes over pressurized when subjected to temperatures above the designed storage temperature of the container.

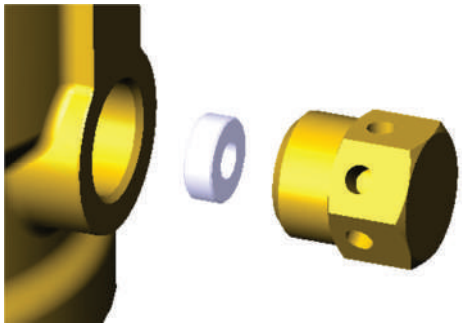


Figure 2.7 - Safety Relief Device

Technical Specification:

Table 2.7 Safety Relief Device

Part No.	811.101.090	811.101.091
Applicable System	25 bar system	42 bar system
Body Material	Brass	
Burst Disc Material	Nickel	
Burst Pressure	60 ± 6 bar	100 ± 10 bar
Work Temperature	-20 °C ~ 55 °C	
Installation Torque	35 Nm	

2.8 Pressure Gauge

Agent Pressure Gauge is installed on each extinguishing agent container valve, as a method of visually monitoring the internal pressure condition of the container assembly.

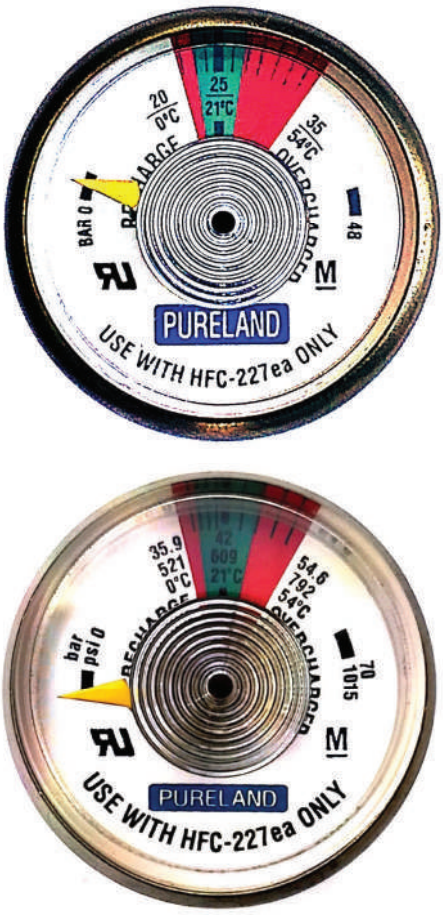


Figure 2.8 - Pressure Gauge

Technical Specification:

Table 2.8 Pressure Gauge

Part No.	811.101.080	811.101.082	811.101.081	811.101.083
Applicable System	25 bar system		42 bar system	
Gauge Diameter	ϕ41 mm			
Body Material	Stainless steel			
Range	0-25-48 bar		0-42-70 bar	
Precision Grade	1.6 Grade			
Work Temperature	-20 °C ~ 60 °C			
Connection Thread	Axial M10X1	Axial NPT1/8	Axial M10X1	Axial NPT1/8
Weight	0.05 kg			
Certification	UL			

2.9 Discharge Pressure Switch

Feedback the information generated by the agent release pressure to tell the extinguishing control panel that system is opened, to indicate extinguishing agent released.

Wiring: Remove the two screws retaining the cover and cover gasket. A 1/2" NPT conduit connection is provided on the left hand side of the enclosure. Two cast-in knockouts for the 1/2" conduit are located on the side and back of the enclosure. These can easily be knocked out by placing the blade of a screwdriver in the groove and tapping sharply with a hammer. The three switch terminals are clearly labeled "common", "normally open" and "normally closed". For switches supplied with leadwires, the following color coding applies: Common-Yellow, Normally Closed-Orange, Normally Open-Brown.

Technical Specification:

Table 2.9 Discharge Pressure Switch

Part No.	811.108.008
Model	SYK101
Material	Die cast aluminum, epoxy powder coated internally and externally
Work Temperature	-40°C ~ 70°C
Over Range Pressure	103.4 bar/ 1500 psi
Proof Pressure	172.4 bar/ 2500 psi
Bursting Pressure	⩾200 bar
Action Pressure	3.5 bar
Switch Output	One SPDT snap action switch; switch may be wired "normally open"
Electrical Rating	15A 125/250/480 VAC, 2A 24VDC
Protection Grade	IP65
Connection Thread	NPT1/4 Female
Electrical Entry	NPT1/2 Female
Overall Size	102mm W × 178mm H × 60mm T
Weight	1.0 kg
Life	6,000 Times
Certification	UL

Figure 2.9.1 - Discharge Pressure Switch

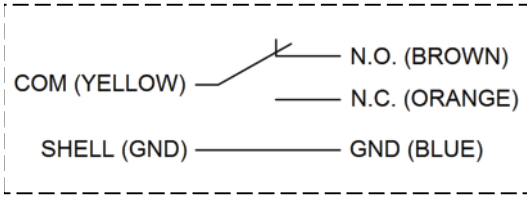


Figure 2.9.2 – Discharge Pressure Switch Wire Diagram

2.10 Safety Valve

The Safety Valve is installed in the Manifold; a burst disc is fitted to this valve. When the internal pressure of the manifold exceeds the expected pressure, the safety disc will be broken quickly, then release the inside pressure. The burst disc is designed to rupture when the manifold becomes over pressurized.

Figure 2.10 – Safety Valve

Technical Specification:

Table 2.10 Safety Valve

Part No.	811.108.004	811.108.005
Applicable System	25 bar system	42 bar system
Body Material	Brass	
Burst Disc Material	Stainless Steel	
Burst Disc Color Code	Blue (Atmospheric Side)	Red (Atmospheric Side)
Burst Pressure	46 ± 4.6 bar	72 ± 7.2 bar
Work Temperature	-20°C ~ 55°C	
Installation Torque	35 Nm	
Connection Thread	NPT3/4 or R3/4	
Overall Size	72 mm (L)× ϕ47mm (D)	
Weight	0.15 kg	

2.11 Electrical Actuator (Removable)

The removable Electrical Actuator locates to the top of the container valve. 24 VDC is required for electrical operation. Provision is made for the connection of a manual actuator to the top of the actuator assembly. Due to the design of the bridge rectifier it will operate regardless of how it is wired up; the positive supply from control panel can be connected to either terminal 1 or 2 with the reverse for the negative supply.

Technical Specification:

Table 2.11 Electrical Actuator

Part No.	811.101.060
Manufacturer	TLX Technologies
Model	PA0421
Material	Body: Mild Steel Swivel Nut: Brass Manual Button: ABS Limit Pin: Stainless Steel
Electrical/ Electronic Configurations	Voltage Supply: 24 VDC Current Supply: 0.50 A Monitoring Current: ＜30 mA Reverse Polarity Compatible Via Bridge Rectifier Circuit. Supervisory Switch (N.C.) internal to Actuator.
Mechanical Configurations	Nominal Pin Movement: 6.35 mm Connection: M42x1.5 Female Overall Size: 175 mm x Ø 53 mm Min Force Provided: 240 N Max Manual Actuation Force: 150 N
Actuation Type	Latching
Reset Method	Manually Via Reset Tool Supplied
Working Temperature	-20 °C to 55 °C
Weight	0.9 kg
Factory Test	100% Check on Start/ Finish Position
Approvals	UL

Figure 2.11.1 - Electrical Actuator

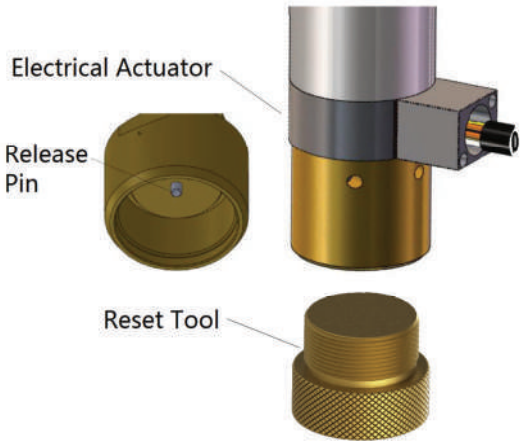


Figure 2.11.2 - Actuator Reset Tool

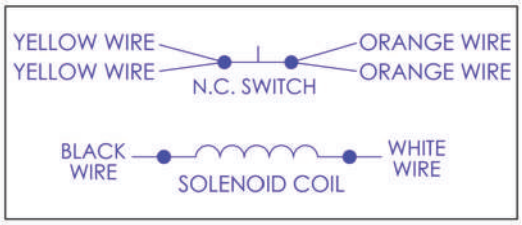


Figure 2.11.3 - Electrical Actuator Wire Diagram

The Electrical Actuator will operate after receiving a 24 VDC nominal voltage signal from the panel. The actuator will latch in the fire position after the signal terminates. It will require to be manually reset by removing the unit from the valve and inserting (screwing in) the Reset Tool (Part No.811.101.066, see Figure 2.11.2)

A Manual Button is installed on the top of the actuator. In addition to the electrically actuate, the actuator can be activated directly by pressing the Manual Button. Before pressing the Button manually, the limit pin at the bottom of the button should be pulled out.

2.12 Pneumatic/Manual Actuator

The actuator is installed on the container valve, is used to manually or pneumatically operate container valve.

The Pneumatic and Manual Actuator is used to manual mechanically or pneumatically operate the system at the container position and is fitted to the top of the valve assembly. Pressure from a 'Master' container or manual force is used to actuate the valve.

Technical Specification:

Table 2.12 Pneumatic/Manual Actuator

Part No.	811.101.065
Material	Body / Piston Rod: Brass Handle / Safety Pin: SS304
Max. Working Pressure	60 bar
Min Actuation Pressure	4 bar
Manual Operating Force	30 N
Install Thread	M42×1.5 Female
Pneumatic Port	G1/8 Female
Work Temperature	-20 °C ~ 60 °C
Overall Size	150 mm (H) × ϕ50mm (D)
Weight	0.6 kg
Install Torque	~15 Nm

Figure 2.12 - Pneumatic & Manual Actuator

2.13 Pneumatic Actuator

The Pneumatic Actuator is used to pneumatically operate the system at the container position and is fitted to the top of the valve assembly. Pressure from a 'Master' Container is used to actuate the valve, via small bore piping or a flexible hose.

Technical Specification:

Table 2.13 Pneumatic Actuator

Part No.	811.101.064
Material	Body: Brass Piston Rod: Brass
Max. Working Pressure	60 bar
Min Actuation Pressure	4 bar
Install Thread	M42×1.5 Female
Pneumatic Port	G1/8 Female
Work Temperature	-20 °C ~ 60 °C
Overall Size	50 mm (H) × ϕ50mm (D)
Weight	0.5 kg
Install Torque	~15 Nm

Figure 2.13 - Pneumatic Actuator

2.14 Manual Actuator

The Manual Actuator is used to mechanically operate the system at the container position and is fitted to the top of the valve assembly. Inadvertent operation is prevented by a safety pin which has to be removed before releasing.

Technical Specification:

Table 2.14 Manual Actuator

Part No.	811.101.063
Material	Body / Piston Rod: Brass Handle / Safety Pin: SS304
Manual Operating Force	30 N
Install Thread	M42×1.5 Female
Work Temperature	-20 °C ~ 60 °C
Overall Size	110mm (L) × 50mm (W)_x 60mm (H)
Weight	0.5 kg
Install Torque	~15 Nm

Figure 2.14 - Manual Release Device

2.15 Discharge Hose

Container installations may be connected to the system by means of a flexible discharge hose. This enables containers to be disconnected for maintenance or recharge without dismantling other container mountings, manifold connections and pipework, etc. The flexible discharge hose is provided with a swivel fitting at the inlet. Discharge hose is installed between container valve and check valve used to connect agent cylinder in a system, convenient installation and maintenance of them.

Technical Specification

Table 2.15 Discharge Hose

Part No.	811.102.001	811.102.002
Hose Material	Teflon hose with stainless steel braid overlay	
Type	1¼" (33 mm)	2" (49 mm)
Length	550 mm	700 mm
Inlet Thread	1.875"-12UN	2.5"-12 UN
Outlet Thread	1.875"-12UN	2.5"-12 UN
Minimum Bending Radius	400 mm	500 mm
Working Temperature	-20°C ~60°C	-20°C ~60°C
Working Pressure	42 bar	42 bar
Burst Pressure	>200 bar	>200 bar
Weight	2.8 kg	4.6 kg

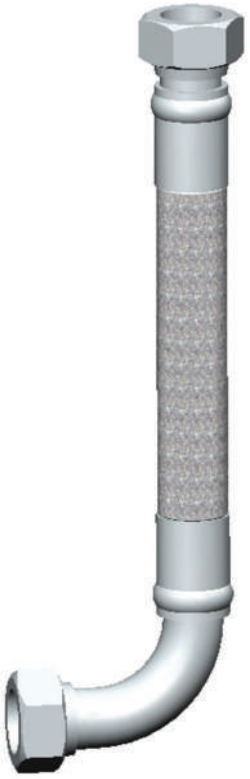


Figure 2.15 - Discharge Hose

2.16 Valve Outlet Adaptor

When a single container is being used without a manifold, three type adaptors are available for connection to the container valve outlet, either grooved, threaded or welded.

Grooved Type

Threaded Type

Welded Type

Figure 2.16 – Valve Outlet Adaptor

Technical Specification

Table 2.16.1 Valve Outlet Adaptor- Grooved Type

Part No.	811.102.010	811.102.011
Material	Stainless Steel	
Type	VOA-33G	VOA-49G
Nominal Diameter	1¼" (33 mm)	2" (49 mm)
Length	150 mm	184 mm
Inlet Thread	1.875"-12UN	2.5"-12 UN
Working Temperature	-20°C ~60°C	-20°C ~60°C
Working Pressure	42 bar	42 bar
Weight	0.9 kg	1.7 kg

Table 2.16.2 Valve Outlet Adaptor- Threaded Type

Part No.	811.102.014	811.102.015
Material	Stainless Steel	
Type	VOA-33T	VOA-49T
Nominal Diameter	1¼" (33 mm)	2" (49 mm)
Length	150 mm	184 mm
Inlet Thread	1.875"-12UN	2.5"-12 UN
Outlet Thread	NPT or R 1¼	NPT or R 2
Working Temperature	-20°C ~60°C	-20°C ~60°C
Working Pressure	42 bar	42 bar
Weight	1.0 kg	2.0 kg

Table 2.16.3 Valve Outlet Adaptor- Welded Type

Part No.	811.102.012	811.102.013
Material	Stainless Steel	
Type	VOA-33W	VOA-49W
Nominal Diameter	1¼" (33 mm)	2" (49 mm)
Length	150 mm	184 mm
Inlet Thread	1.875"-12UN	2.5"-12 UN
Working Temperature	-20°C ~60°C	-20°C ~60°C
Working Pressure	42 bar	42 bar
Weight	0.9 kg	1.7 kg

2.17 Pilot Hose

The pilot hose is used to connect pressure activated devices to the system, e.g. the master cylinder to the slave container to the pressure switch.

Technical Specification:

Table 2.17 Pilot Hose

Part No.	811.102.003	811.102.004	811.102.005
Hose Material	Steel wire braided rubber hose		
Nominal Diameter	Φ6 mm		
Length	400 mm	500 mm	700 mm
Connection Thread	M12×1.5		
Install Torque	22.5±2.5 N·m		
Min. Bending Radius	60 mm		
Working Temperature	-20℃~60℃		
Working Pressure	42 bar		
Burst Pressure	>200 bar		

Figure 2.17 - Pilot Hose

2.18 Bleed Valve

On manifold systems with connected reserves it is necessary to fit bleed valves at the location of the pneumatic actuator of the last slave container of both duty and reserve actuation lines. Also a bleed valve is required to be fitted into the pilot line.

The bleed valve acts to relieve a gradual pressure build-up occurring perhaps as a result of a leaking container valve or check valve. It also provides a means by which pressure trapped in the actuation line may be manually relieved. The bleed valve relieves automatically up to a pressure of approximately 1.5 bar and seals at pressures above this.

Bleed valve is installed in the end of a closed pipeline, normal opened. It is used to eliminate leakage gas due to accumulate in the pipeline, to prevent the system false starts, it will be closed, while inlet pressure up to setting point. After activation press the valve button, release the gas in the pipeline, then valve is reset.

Technical Specification:

Table 2.18 Bleed Valve

Part No.	811.101.006
Material	Brass
Max. Woring Pressure	64 bar
Flow Rate	≥ 6 L/min @ 0.6 bar
Closed Pressure	0.7 ~ 1.5 bar
Install Thread	G1/8
Work Temperature	-20 °C ~ 60 °C
Overall Size	50 mm H × ϕ24 mm Dia
Weight	0.1 kg
Install Torque	8 Nm

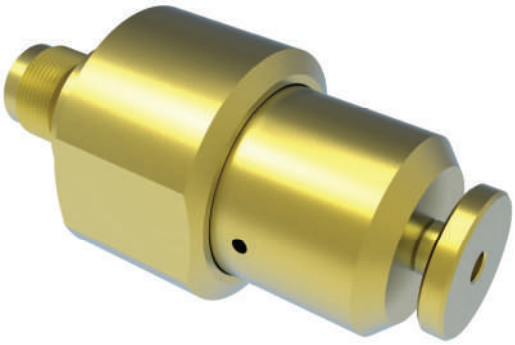


Figure 2.18 - Bleed Valve

2.19 Manifold Check Valve

Manifold check valves are of mushroom pattern type and lift into the manifold as discharge occurs. The function of the check valve is to prevent loss of extinguishing agent during discharge from an outlet, should a container have been removed. All check valves are ordered separately to the manifold assembly.
Manifold check valve is installed on the manifold behind the discharge hose to control the extinguishing agent.

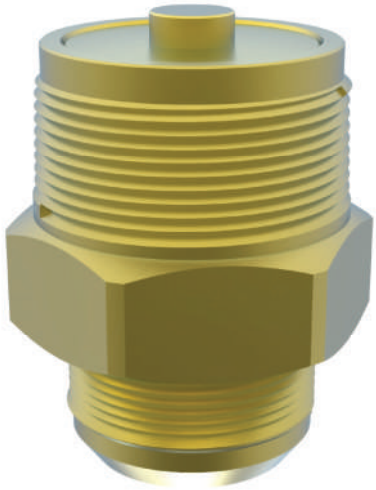


Figure 2.21 - Manifold Check Valve

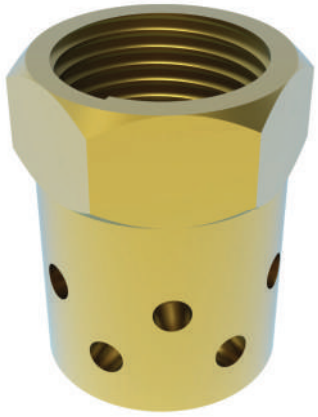
Technical Specification:

Table 2.21 Manifold Check Valve

Part No.	811.103.001	811.103.002
Size	33mm	49mm
Body Material	Brass	Brass
Stem Material	Stainless steel	Stainless steel
Work Pressure	80 bar	80 bar
Leakage Test Pressure	80 bar	80 bar
Hydraulic Strength Test Pressure	100 bar	100 bar
Inlet Thread	1.875"-12UN	2.5"-12UN
Outlet Thread	NPT2 or R2	NPT2½ or R2½
Weight:	0.9 Kg	1.82 Kg

2.20 Discharge Nozzle

HFC-227ea is distributed within the protected area by the discharge nozzle which is sized to ensure the correct flow of agent for the risk. Nozzles are available with 8 ports to allow for 180° or 360° horizontal discharge patterns. Ports are drilled in special increments to the specified system design. Discharge nozzles are installed in the end of pipeline hole size is calculated, discharge the gas uniformly, and satisfies the requirement of discharge time.



180° Nozzle

360° Nozzle

Figure 2.22 - Discharge Nozzle

Technical Specification:

Table 2.22.1 Discharge Nozzle

Part No.	811.104.XXX	811.114.XXX
Nozzle Type	180° 8 Port	360° 8 Port
Material	Brass	
Distance From Ceiling	Max. 370 mm	
Connection Thread	NPT or Rc 3/8 to 2 Female	
Installation Mode	Side Wall	Center
Installation Orientation	Pendent or Upright	

Table 2.22.2 Discharg30e Nozzle List

180° Nozzle				360° Nozzle			
Part No.	Nozzle Type	Hole Dia. (mm)	Thread	Part No.	Nozzle Type	Hole Dia. (mm)	Thread
811.104.001	A180-10-1.4	1.4	3/8"	811.114.001	A360-10-1.4	1.4	3/8"
811.104.002	A180-10-1.6	1.6	3/8"	811.114.002	A360-10-1.6	1.6	3/8"
811.104.003	A180-10-1.8	1.8	3/8"	811.114.003	A360-10-1.8	1.8	3/8"
811.104.004	A180-10-2.0	2.0	3/8"	811.114.004	A360-10-2.0	2.0	3/8"
811.104.005	A180-10-2.2	2.2	3/8"	811.114.005	A360-10-2.2	2.2	3/8"
811.104.006	A180-10-2.4	2.4	3/8"	811.114.006	A360-10-2.4	2.4	3/8"
811.104.007	A180-10-2.6	2.6	3/8"	811.114.007	A360-10-2.6	2.6	3/8"
811.104.008	A180-10-2.8	2.8	3/8"	811.114.008	A360-10-2.8	2.8	3/8"
811.104.009	A180-10-3.0	3.0	3/8"	811.114.009	A360-10-3.0	3.0	3/8"
811.104.010	A180-10-3.2	3.2	3/8"	811.114.010	A360-10-3.2	3.2	3/8"
811.104.011	A180-10-3.4	3.4	3/8"	811.114.011	A360-10-3.4	3.4	3/8"
811.104.012	A180-10-3.6	3.6	3/8"	811.114.012	A360-10-3.6	3.6	3/8"
811.104.013	A180-10-3.8	3.8	3/8"	811.114.013	A360-10-3.8	3.8	3/8"

180° Nozzle				360° Nozzle			
Part No.	Nozzle Type	Hole Dia. (mm)	Thread	Part No.	Nozzle Type	Hole Dia. (mm)	Thread
811.104.101	A180-15-2.2	2.2	1/2"	811.114.101	A360-15-2.2	2.2	1/2"
811.104.102	A180-15-2.5	2.5	1/2"	811.114.102	A360-15-2.5	2.5	1/2"
811.104.103	A180-15-2.8	2.8	1/2"	811.114.103	A360-15-2.8	2.8	1/2"
811.104.104	A180-15-3.1	3.1	1/2"	811.114.104	A360-15-3.1	3.1	1/2"
811.104.105	A180-15-3.4	3.4	1/2"	811.114.105	A360-15-3.4	3.4	1/2"
811.104.106	A180-15-3.7	3.7	1/2"	811.114.106	A360-15-3.7	3.7	1/2"
811.104.107	A180-15-4.0	4.0	1/2"	811.114.107	A360-15-4.0	4.0	1/2"
811.104.108	A180-15-4.3	4.3	1/2"	811.114.108	A360-15-4.3	4.3	1/2"
811.104.109	A180-15-4.6	4.6	1/2"	811.114.109	A360-15-4.6	4.6	1/2"
811.104.110	A180-15-5.0	5.0	1/2"	811.114.110	A360-15-5.0	5.0	1/2"
811.104.201	A180-20-3.1	3.1	3/4"	811.114.201	A360-20-3.1	3.1	3/4"
811.104.202	A180-20-3.4	3.4	3/4"	811.114.202	A360-20-3.4	3.4	3/4"
811.104.203	A180-20-3.7	3.7	3/4"	811.114.203	A360-20-3.7	3.7	3/4"
811.104.204	A180-20-4.0	4.0	3/4"	811.114.204	A360-20-4.0	4.0	3/4"
811.104.205	A180-20-4.3	4.3	3/4"	811.114.205	A360-20-4.3	4.3	3/4"
811.104.206	A180-20-4.6	4.6	3/4"	811.114.206	A360-20-4.6	4.6	3/4"
811.104.207	A180-20-5.0	5.0	3/4"	811.114.207	A360-20-5.0	5.0	3/4"
811.104.208	A180-20-5.3	5.3	3/4"	811.114.208	A360-20-5.3	5.3	3/4"
811.104.209	A180-20-5.6	5.6	3/4"	811.114.209	A360-20-5.6	5.6	3/4"
811.104.210	A180-20-5.9	5.9	3/4"	811.114.210	A360-20-5.9	5.9	3/4"
811.104.211	A180-20-6.2	6.2	3/4"	811.114.211	A360-20-6.2	6.2	3/4"
811.104.212	A180-20-6.6	6.6	3/4"	811.114.212	A360-20-6.6	6.6	3/4"
811.104.301	A180-25-3.9	3.9	1"	811.114.301	A360-25-3.9	3.9	1"
811.104.302	A180-25-4.3	4.3	1"	811.114.302	A360-25-4.3	4.3	1"
811.104.303	A180-25-4.7	4.7	1"	811.114.303	A360-25-4.7	4.7	1"
811.104.304	A180-25-5.1	5.1	1"	811.114.304	A360-25-5.1	5.1	1"
811.104.305	A180-25-5.5	5.5	1"	811.114.305	A360-25-5.5	5.5	1"
811.104.306	A180-25-5.9	5.9	1"	811.114.306	A360-25-5.9	5.9	1"
811.104.307	A180-25-6.3	6.3	1"	811.114.307	A360-25-6.3	6.3	1"
811.104.308	A180-25-6.7	6.7	1"	811.114.308	A360-25-6.7	6.7	1"
811.104.309	A180-25-7.1	7.1	1"	811.114.309	A360-25-7.1	7.1	1"
811.104.310	A180-25-7.5	7.5	1"	811.114.310	A360-25-7.5	7.5	1"
811.104.311	A180-25-7.9	7.9	1"	811.114.311	A360-25-7.9	7.9	1"
811.104.312	A180-25-8.4	8.4	1"	811.114.312	A360-25-8.4	8.4	1"
811.104.401	A180-32-5.1	5.1	1¼"	811.114.401	A360-32-5.1	5.1	1¼"
811.104.402	A180-32-5.5	5.5	1¼"	811.114.402	A360-32-5.5	5.5	1¼"
811.104.403	A180-32-5.9	5.9	1¼"	811.114.403	A360-32-5.9	5.9	1¼"
811.104.404	A180-32-6.3	6.3	1¼"	811.114.404	A360-32-6.3	6.3	1¼"
811.104.405	A180-32-6.7	6.7	1¼"	811.114.405	A360-32-6.7	6.7	1¼"

180° Nozzle				360° Nozzle			
Part No.	Nozzle Type	Hole Dia. (mm)	Thread	Part No.	Nozzle Type	Hole Dia. (mm)	Thread
811.104.406	A180-32-7.1	7.1	1¼"	811.114.406	A360-32-7.1	7.1	1¼"
811.104.407	A180-32-7.5	7.5	1¼"	811.114.407	A360-32-7.5	7.5	1¼"
811.104.408	A180-32-7.9	7.9	1¼"	811.114.408	A360-32-7.9	7.9	1¼"
811.104.409	A180-32-8.4	8.4	1¼"	811.114.409	A360-32-8.4	8.4	1¼"
811.104.410	A180-32-8.8	8.8	1¼"	811.114.410	A360-32-8.8	8.8	1¼"
811.104.411	A180-32-9.2	9.2	1¼"	811.114.411	A360-32-9.2	9.2	1¼"
811.104.412	A180-32-9.6	9.6	1¼"	811.114.412	A360-32-9.6	9.6	1¼"
811.104.413	A180-32-10.0	10.0	1¼"	811.114.413	A360-32-10.0	10.0	1¼"
811.104.414	A180-32-10.4	10.4	1¼"	811.114.414	A360-32-10.4	10.4	1¼"
811.104.415	A180-32-10.8	10.8	1¼"	811.114.415	A360-32-10.8	10.8	1¼"
811.104.416	A180-32-11.0	11.0	1¼"	811.114.416	A360-32-11.0	11.0	1¼"
811.104.501	A180-40-6.5	6.5	1½"	811.114.501	A360-40-6.5	6.5	1½"
811.104.502	A180-40-7.0	7.0	1½"	811.114.502	A360-40-7.0	7.0	1½"
811.104.503	A180-40-7.5	7.5	1½"	811.114.503	A360-40-7.5	7.5	1½"
811.104.504	A180-40-8.0	8.0	1½"	811.114.504	A360-40-8.0	8.0	1½"
811.104.505	A180-40-8.5	8.5	1½"	811.114.505	A360-40-8.5	8.5	1½"
811.104.506	A180-40-9.0	9.0	1½"	811.114.506	A360-40-9.0	9.0	1½"
811.104.507	A180-40-9.5	9.5	1½"	811.114.507	A360-40-9.5	9.5	1½"
811.104.508	A180-40-10.0	10.0	1½"	811.114.508	A360-40-10.0	10.0	1½"
811.104.509	A180-40-10.5	10.5	1½"	811.114.509	A360-40-10.5	10.5	1½"
811.104.510	A180-40-11.0	11.0	1½"	811.114.510	A360-40-11.0	11.0	1½"
811.104.511	A180-40-11.5	11.5	1½"	811.114.511	A360-40-11.5	11.5	1½"
811.104.512	A180-40-12.0	12.0	1½"	811.114.512	A360-40-12.0	12.0	1½"
811.104.513	A180-40-12.5	12.5	1½"	811.114.513	A360-40-12.5	12.5	1½"
811.104.514	A180-40-12.9	12.9	1½"	811.114.514	A360-40-12.9	12.9	1½"
811.104.601	A180-50-8.5	8.5	2"	811.114.601	A360-50-8.5	8.5	2"
811.104.602	A180-50-9.0	9.0	2"	811.114.602	A360-50-9.0	9.0	2"
811.104.603	A180-50-9.5	9.5	2"	811.114.603	A360-50-9.5	9.5	2"
811.104.604	A180-50-10.0	10.0	2"	811.114.604	A360-50-10.0	10.0	2"
811.104.605	A180-50-10.5	10.5	2"	811.114.605	A360-50-10.5	10.5	2"
811.104.606	A180-50-11.0	11.0	2"	811.114.606	A360-50-11.0	11.0	2"
811.104.607	A180-50-11.5	11.5	2"	811.114.607	A360-50-11.5	11.5	2"
811.104.608	A180-50-12.0	12.0	2"	811.114.608	A360-50-12.0	12.0	2"
811.104.609	A180-50-12.5	12.5	2"	811.114.609	A360-50-12.5	12.5	2"
811.104.610	A180-50-13.0	13.0	2"	811.114.610	A360-50-13.0	13.0	2"
811.104.611	A180-50-13.5	13.5	2"	811.114.611	A360-50-13.5	13.5	2"
811.104.612	A180-50-14.0	14.0	2"	811.114.612	A360-50-14.0	14.0	2"
811.104.613	A180-50-14.5	14.5	2"	811.114.613	A360-50-14.5	14.5	2"
811.104.614	A180-50-15.0	15.0	2"	811.114.614	A360-50-15.0	15.0	2"

180° Nozzle				360° Nozzle			
Part No.	Nozzle Type	Hole Dia. (mm)	Thread	Part No.	Nozzle Type	Hole Dia. (mm)	Thread
811.104.615	A180-50-15.5	15.5	2"	811.114.615	A360-50-15.5	15.5	2"
811.104.616	A180-50-16.0	16.0	2"	811.114.616	A360-50-16.0	16.0	2"
811.104.617	A180-50-16.5	16.5	2"	811.114.617	A360-50-16.5	16.5	2"

Note:

The orifice diameter is defined with flow calculation software.

LIFECO Nozzle connection is female thread, and is available in NPT and BSPT. NPT thread nozzle, marked with N after the nozzle code; BSPT thread nozzle, marked with R after the nozzle code.

2.21 Pilot Pipe Connector G1/8

Pilot pipe connector G1/8 is used to connect the pilot hose and actuator, to introduce a pilot gas from the pilot hose for pneumatically actuating other valves.

Figure 2.23 - Pilot Pipe Connector G1/8

Technical Specification:

Table 2.23 Pilot Pipe Connector G1/8

Part No.	811.111.001
Size	Ø4 mm
Material	Stainless Steel
Connection	M12*1.5× G1/8
Max. Working Pressure	150 bar
Overall Size	S14 mm* 25 mm
Weight:	0.025 kg

2.22 Pilot Hose Connector

Pilot Hose Connector is used to connect two pilot hoses together.

Technical Specification:

Table 2.24 Pilot Hose Connector

Part No.	811.111.002
Size	Ø4 mm
Material	Brass
Connection	M12*1.5× M12*1.5
Max. Working Pressure	150 bar
Overall Size	S14 mm* 26 mm
Weight:	0.028 kg

Figure 2.24 - Pilot Hose Connector

2.23 Pilot Pipe Connector NPT¼

Pilot pipe connector NPT¼ connects the pilot hose to the discharge pressure switch.

Technical Specification:

Table 2.25 Pilot Pipe Connector NPT¼

Part No.	811.111.003
Size	Ø4 mm
Material	Brass
Connection	M12*1.5× NPT¼
Max. Working Pressure	150 bar
Overall Size	S17 mm* 29 mm
Weight:	0.032 kg

Figure 2.25 - Pilot Pipe Connector NPT¼

2.24 Pressure Switch Connector

Pressure switch connector is used to connect the pressure switch and the manifold joint.

Figure 2.26 - Pressure Switch Connector

Technical Specification:

Table 2.26 Pressure Switch Connector NPT¼

Part No.	811.111.004
Size	Ø6 mm
Material	Brass
Connection	NPT¼× NPT¼
Max. Working Pressure	150 bar
Overall Size	S17 mm* 36 mm
Weight:	0.035 kg

2.25 Inside Warning Sign

This Inside Warning Sign provides instructions to personnel who may work in an area protected with HFC-227ea fire system. The sign reminds the relevant personnel to leave the protected area immediately when the fire extinguishing system is activated. One sign is to be fixed to all export doors out of an HFC-227ea fire system protected area.

Technical Specification:

Table 2.27 Inside Warning Sign

Part No.	811.108.104
Size	210 mm ×210 mm
Material	Aluminum

Figure 2.27 - Inside Warning Sign

2.26 Outside Warning Sign

The Outside Warning Sign provides instructions to personnel who may enter an area protected with HFC-227ea fire system. This warning sign reminds the relevant personnel not to enter the protected area when the HFC-227ea firefighting system is activated. One plate is to be fixed to all entrance doors into an HFC-227ea fire system protected area.

Technical Specification:

Table 2.28 Outside Warning Sign

Part No.	811.108.105
Size	210 mm ×210 mm
Material	Aluminum

Figure 2.28 - Outside Warning Sign