INSTALLATION MANUAL

SIEX-HC SYSTEM

HFC-227ea
HFC-125
HFC-23

1.28.- Final installation check

INSTALLATION MANUAL

This manual contains installation instructions for components described in the System Component Manual for SIEX-HC fixed extinguishing systems using halogenated gases (HFC-227ea, HFC-125 and HFC-23). Before installation, the list of material in the System Design Manual should be consulted to ensure all the necessary components are available. This manual does not cover the detection and control elements associated with the extinguishing system.

NOTE: ***SIEX-HC fixed extinguishing systems manufactured by SIEX, containing HFC-227ea, HFC-125 and HFC-23 extinguishing agents, are custom designed for a specific application. If the components described here are assembled with another manufacturer's components, or are used for another application not described in this manual, the component operation will not be correct. In this case, SIEX does not guarantee nor will be responsible for improper use or application of the product.***

Any non-approved use or application and/or any non-approved modification of the product or its operation may result in serious accidents and/or personal injury. SIEX is not responsible for any non-approved use or application.

The equipment must not be subjected to adverse mechanical or chemical atmospheric conditions or other damage which might affect the operational capability of the equipment. The equipment must be installed in accordance with NFPA-2001 (current edition), ISO-14520 or UNE-23570 standards, and approved by the authority having jurisdiction.

CAUTION

YOU ARE HANDLING PRESSURISED EQUIPMENT

SIEX-HC CYLINDERS AND
CYLINDER VALVE ASSEMBLIES
MUST BE INSTALLED AND COMMISSIONED
IN ACCORDANCE WITH THE CONTENTS
OF THIS MANUAL.

FAILURE TO FOLLOW THESE INSTRUCTIONS
MAY CAUSE
THE CYLINDERS DISCHARGING VIOLENTLY,
WHICH COULD CAUSE SERIOUS INJURY TO
THE PERSONS HANDLING THEM AND
DAMAGE TO THE SURROUNDING AREA.

1.1 MOST COMMON INSTALLATION TYPES

1.1.1 Single cylinder system (modular cylinder)

The most usual type of single cylinder system (modular cylinder) is shown in Figure 1, fitted with a manual and electrical release.

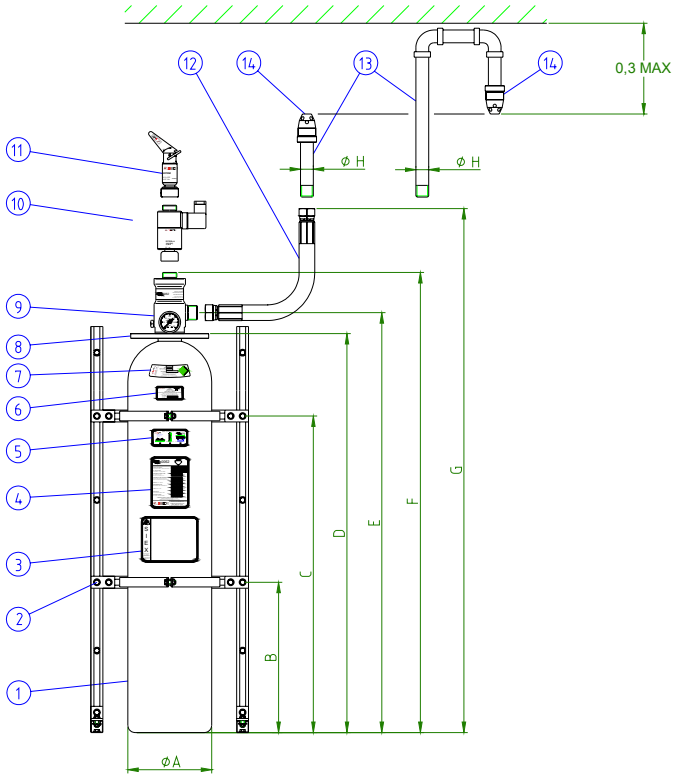


Figure 1. Single cylinder system (modular cylinder)

The components that make up the system are shown in the following table:

Nº	Denomination	Types
1	Cylinder	6.7 / 13.4 / 25 / 26.8 / 40.2 / 61 / 67.5 / 80 / 84 / 100 / 108.4 / 120 / 127 / 150 / 180
2	Modular cylinder bracket anchored to floor	
3	Instructions cylinder sticker	
4	CE marking cylinder sticker	
5	Cylinder positioning sticker	
6	PI marking cylinder sticker	
7	Cylinder sticker toxic gas	
8	Bridle	
9	Container valve	RGS-MAM-20 / RGS-MAM-40-25 / RGS-MAM-40 / RGS-MAM-50
10	Re-assembled electrical actuator	227SOL
11	Manual actuator	227DM
12	Discharge hose	FH-20HC 3/4" BSP / FH-25HC 1" BSP / FH-40HC 1 1/2" BSP / FH-50HC 2" BSP
13	Discharge pipe	3/8" / 1/2" / 3/4" / 1" / 1 1/4" / 1 1/2" / 2"
14	Nozzle	FEDR10 / FEDR15 / FEDR20 / FEDR25 / FEDR32 / FEDR40 / FEDR50 (180º-360º)

The dimensions are shown in the following table:

Cylinder volume (Litres)	ØA (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F(mm)	G (mm)
6.7	140	400		580	598	672	
13.4	204	400		550	568	642	
25	300	300		497	515	589	
26.8	229	600		840	858	932	
40.2	229	400	1000	1210	1228	1302	
61	300	300	800	1039	1075	1174.75	1454.75
67.5	267	500	1300	1470	1506	1605.75	1885.75
80	267	500	1300	1710	1746	1845.75	2125.75
84	300	500	1000	1346	1393	1497	
100	360	500	1000	1240	1276	1375.75	1655.75
108.4	374	300	800	1148	1200	1322	
120	356	450	1250	1504	1540	1639.75	1919.75
127	374	400	1100	1339	1380	1502	1807
150	403			1535	1576	1698	2003
180	406			1594	1635	1757	2062

NOTE: The cylinder dimensions, diameter and length may vary depending on the manufacturer.

The technical characteristics are shown in the following tables:

CYLINDER TYPE	CYLINDER VOLUME (litres)	GAS
High pressure cylinder (seamless)	2.7	HFC-227ea HFC-125
	4.7	
	6.7	HFC-227ea HFC-125 HFC-23 (1)
	13.4	
	26.8	
	40.2	
	67.5	
	80	
	100	
	120	
Low pressure cylinders (welded)	25	HFC-227ea HFC-125 (2)
	61	
	84	
	108.4	
	127	
	180	

NOTE 1: The high and medium pressure (seamless) cylinders filled with HFC-227ea and HFC-125 are pressurised with dry nitrogen at 24 or 42 bar (at 20ºC).

NOTE 2: The low pressure (welded) cylinders filled with HFC-227ea and HFC-125 are pressurised with dry nitrogen at 24 (at 20ºC), **never** at 42 bar.

CYLINDER VALVE	CYLINDER VOLUME (litres)	DISCHARGE HOSE	NOZZLE Ø G
RGS-MAM-11/-4 or 12/-4	2.7	FH-15CO 21.7-1/2" BSP	1/2" BSP
	4.7		
RGS-MAM-20	6.7	FH-6PO 3/4"BSP	3/4" BSP
	13.4		
	25		
	26.8		
	40.2 (1)	FH-25HC 1" BSP	1" BSP
RGS-MAM-40-25	61		
	67.5		
	84		
RGS-MAM-40	61	FH-40HC 1 1/2" BSP	1 1/2" BSP
	67.5		
	80		
	84		
	100		
	120		
RGS-MAM-50	84	FH-50HC 2" BSP	2" BSP
	108.4		
	127		
	180		

NOTE 1: In the case of the 40.2 litre cylinder, an adapter, incorporated in the hose, must be fitted on the valve to hose connection.

1.1.2 Single cylinder system with continuous weighing

This is similar to the previous case except that it includes a continuous weighing system, as well as an electrical and manual discharge head.

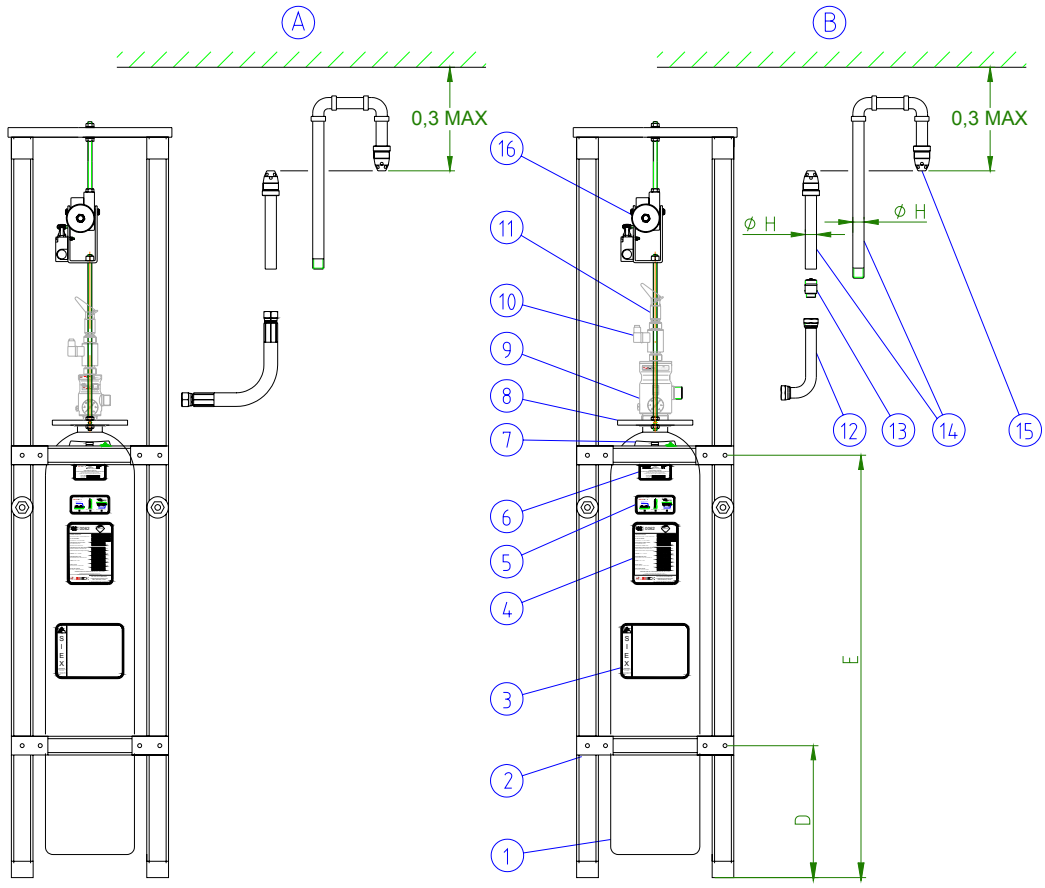


Figure 2. Single cylinder system with continuous weighing

Nº	Denomination	Types
1	Cylinder	A: 6.7 / 13.4 / 25 / 26.8 / 40.2 / 61 / 67 B: 61 / 67,5 / 80 / 84 / 100 / 108,4 / 120 / 127 / 180
2	Bracket type cage	
3	Instructions cylinder sticker	
4	CE marking cylinder sticker	
5	Cylinder positioning sticker	
6	PI marking cylinder sticker	
7	Cylinder sticker toxic gas	
8	Bridle	
9	Container valve	A: RGS-MAM-20 / RGS-MAM-40-25 B: RGS-MAM-40 / RGS-MAM-50
10	Re-assembled electrical actuator	227SOL
11	Manual actuator	227DM / 227DMS
12	Discharge hose	A: FH-20HC 3/4” BSP / FH-25HC 1" BSP B: FH-40HC 1 1/2" BSP / FH-50HC 2" BSP
13	Check valve	VALAN-40-23 / VALAN-50-125
14	Discharge pipe	3/8” / 1/2" / 3/4" / 1" / 1 1/4" / 1 1/2" / 2"
15	Nozzle	FEDR10 / FEDR15 / FEDR20 / FEDR25 / FEDR32 / FEDR40 / FEDR50 (180º-360º)
16	Weighing device	SIEX-WD

1.1.3 Cylinder bank system

In this case, there are two options: single row cylinder bank or double row cylinder bank. Each of these may be fitted with or without a pilot bottle, depending on the number of cylinders in the bank. Banks of 2 to 5 cylinders do not need a pilot bottle, and from 6 cylinders upwards the bank will always be fitted with a pilot bottle. See figures 3, 4, 5 and 6.

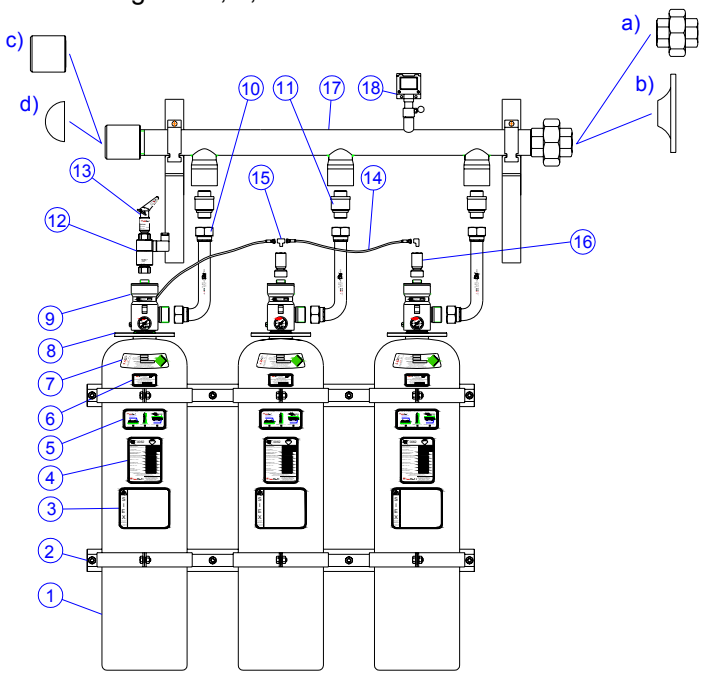


Figure 3. Single row cylinder bank with no pilot bottle.

Nº	Denomination	Types
1	Manifold system	61 / 67,5 / 80 / 84 / 100 / 108,4 / 120 / 127 / 180
2	System cylinder bracket	
3	Instructions cylinder sticker	
4	CE marking cylinder sticker	
5	Cylinder positioning sticker	
6	PI marking cylinder sticker	
7	Cylinder sticker toxic gas	
8	Bridle	
9	Container valve	RGS-MAM-40 / RGS-MAM-50
10	Discharge hose	FH-40HC 1 1/2" BSP / FH-50HC 2" BSP
11	Check valve	VALAN-40-23 / VALAN-50-125
12	Re-assembled electrical actuator	227SOL
13	Manual actuator	227DM
14	Actuator hose	FH-6PO 1/4"G (500 mm)
15	"T" or elbow	1/4" BSP
16	Pneumatic actuator	227CN
17	Discharge manifold (2) a) Raccord union (Threaded) Raccord union (Welded) b) Bridle (Welded) c) Colector cap (Threaded) d) Colector cap (Welded)	Ø Pipe (2" – 5") HFC-23 (2") HFC-23 (2 1/2" – 4") HFC-227ea, HFC-125 (2" - 5") HFC-23 (2") HFC-227ea, HFC-125 (2" - 5") HFC-23 (2 1/2" – 4")
18	Pressure switch	POINPRE

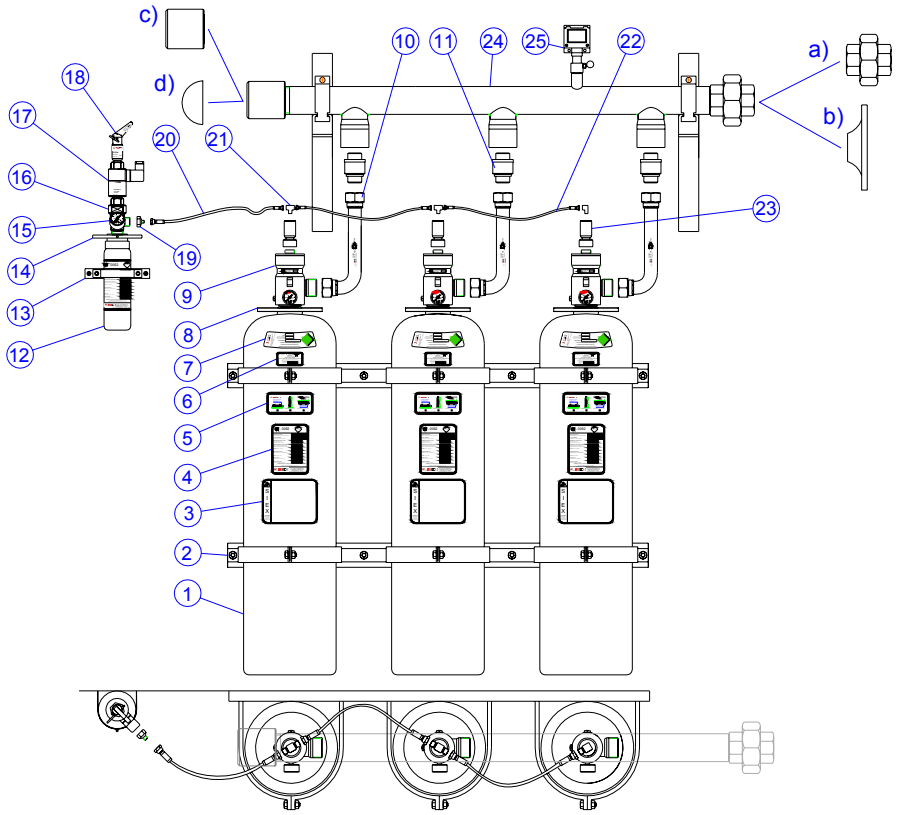


Figure 4. Single row cylinder bank with pilot bottle.

Nº	Denomination	Types
1	Manifold system	61 / 67,4 / 80 / 84 / 100 / 108,4 / 120 / 127 / 180
2	System cylinder bracket	
3	Instructions cylinder sticker	
4	CE marking cylinder sticker	
5	Cylinder positioning sticker	
6	PI marking cylinder sticker	
7	Cylinder sticker toxic gas	
8	Bridle	
9	Container valve	RGS-MAM-40 / RGS-MAM-50
10	Discharge hose	FH-40HC 1 1/2" G / FH-50HC 2" G
11	Check valve	VALAN-40-23 / VALAN-50-125
12	Pilot cylinder (1)	2 litres
13	Pilot cylinder bracket	
14	Bridle	
15	Pressure gauge	5140-P315 1/8” NPT
16	Pilot cylinder valve	RGS-MAM-11/4
17	Re-assembled electrical actuator	227SOL
18	Manual actuator	227DM
19	Adaptor	W21.8x1/14” H – 1/4" G M
20	Actuator hose	FH-6PO
21	"T" or elbow	1/4" G
22	Flexible actuator hose	FH-6PO 1/4”G (500 mm)
23	Pneumatic actuator	227CN
24	Discharge manifold (2) a) Raccord union (Threaded) Raccord union (Welded) b) Bridle (Welded) c) Colector cap (Threaded) d) Colector cap (Welded)	Ø Pipe (2” – 5”) HFC-23 (2”) HFC-23 (2 1/2" – 4”) HFC-227ea, HFC-125 (2” - 5”) HFC-23 (2”) HFC-227ea, HFC-125 (2” - 5”) HFC-23 (2 1/2" – 4”)
25	Pressure switch	POINPRE

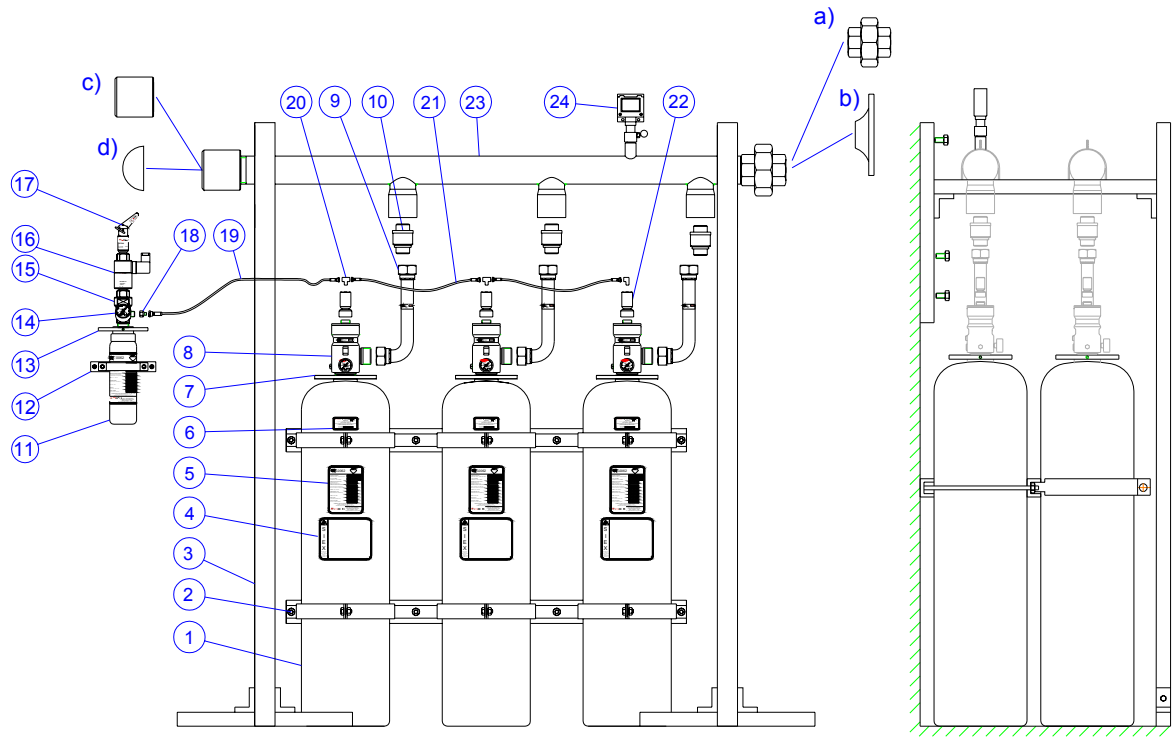


Figure 5. Double row cylinder bank with pilot bottle.

Nº	Denomination	Types
1	Manifold system	61 / 67,5 / 80 / 84 / 100 / 108,4 / 120 / 127 / 180
2	System cylinder bracket	
3	Bracket type cage	
4	Instructions cylinder sticker	
5	CE marking cylinder sticker	
6	PI marking cylinder sticker	
7	Bridle	
8	Container valve	RGS-MAM-40 / RGS-MAM-50
9	Discharge hose	FH-40HC 1 1/2" G / FH-50HC 2" G
10	Check valve	VALAN-40-23 / VALAN-50-125
11	Pilot cylinder (1)	2 litres
12	Pilot cylinder bracket	
13	Bridle	
14	Pressure gauge	5140-P315 1/8” NPT
15	Pilot cylinder valve	RGS-MAM-11/4
16	Re-assembled electrical actuator	227SOL
17	Manual actuator	227DM
18	Adaptor	W 21.8x1/14” H - 1/4" G M
19	Flexible actuator hose	FH-6PO 1/4" G (1000 mm)
20	"T" or elbow	1/4" G
21	Flexible actuator hose	FH-6PO 1/4" G (500 mm)
22	Pneumatic actuator	227CN
23	Discharge manifold (2) a) Raccord union (Threaded) Raccord union (Welded) b) Bridle (Welded) c) Colector cap (Threaded) d) Colector cap (Welded)	Ø Pipe (2” – 5”) HFC-23 (2”) HFC-23 (2 1/2" – 4”) HFC-227ea, HFC-125 (2” - 5”) HFC-23 (2”) HFC-227ea, HFC-125 (2” - 5”) HFC-23 (2 1/2" – 4”)
24	Pressure switch	POINPRE

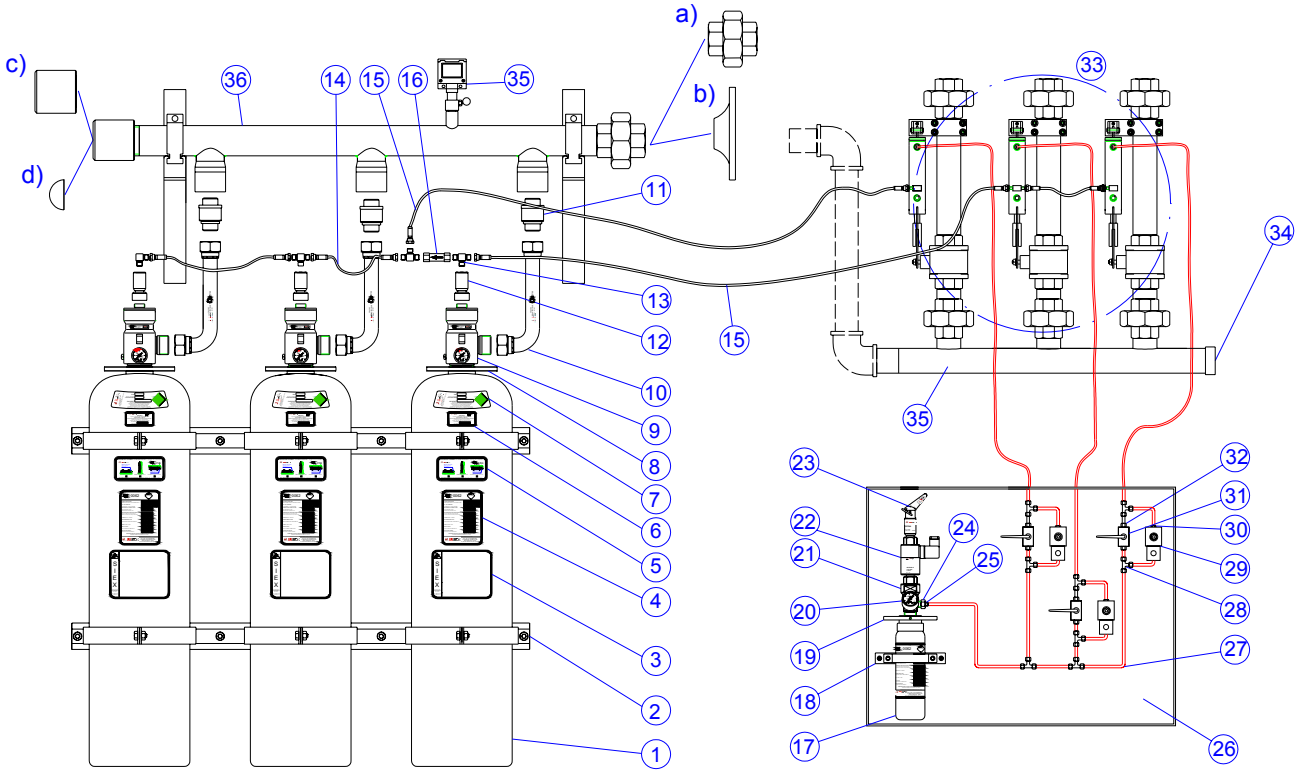


Figure 6. Single row cylinder bank with pilot bottle and selector valve.

Nº	Denomination	Types
1	Manifold system	61 / 67,5 / 80 / 84 / 100 / 108,4 / 120 / 127 / 180
2	System cylinder bracket	
3	Instructions cylinder sticker	
4	CE marking cylinder sticker	
5	Cylinder positioning sticker	
6	PI marking cylinder sticker	
7	Cylinder sticker toxic gas	
8	Bridle	
9	Container valve	RGS-MAM-40 / RGS-MAM-50
10	Discharge hose	FH-40HC 1 1/2" G / FH-50HC 2" G
11	Check valve	VALAN-40-23 / VALAN-50-125
12	Pneumatic actuator	227CN
13	"T" or elbow	1/4" G
14	Flexible actuator hose	FH-6PO 1/4"G (500 mm)
15	Teflon hose 1/4" G or cupper tube 6x4mm	
16	1/4”G non-return valve	
17	Pilot cylinder (1)	2 litres
18	Pilot cylinder bracket	
19	Bridle	
20	Pressure gauge	5140-P315 1/8” NPT
21	Pilot cylinder valve	RGS-MAM-11/4
22	Re-assembled electrical actuator	227SOL

23	Manual actuator	227DM
24	Adaptor	W 21.8x1/14" H – 1/4" G M
25	Adaptor	1/4" G H – Ø6mm
26	Selector cabinet	
27	Copper tube 6x4mm	
28	"T" for copper pipe 6x4mm.	
29	Solenoid 24V(DC) by-pass	
30	Male adaptor	1/8"G M - Ø6mm
31	Manual openning valve 1/4" G by-pas	
32	male adaptor	1/4"G M - Ø6mm
33	Selector valve SVD	SVD20 / 25 / 32 / 40 / 50 / 65 / 80 / 100
34	Female cup	
35	Selector valves manifold	Ø Tubo / Pipe (2" - 5")
36	Discharge manifold (2) a) Raccord union (Threaded) Raccord union (Welded) b) Bridle (Welded) c) Colector cap (Threaded) d) Colector cap (Welded)	Ø Pipe (2" – 5") HFC-23 (2") HFC-23 (2 1/2" – 4") HFC-227ea, HFC-125 (2" - 5") HFC-23 (2") HFC-227ea, HFC-125 (2" - 5") HFC-23 (2 1/2" – 4")
37	Pressure switch	POINPRE

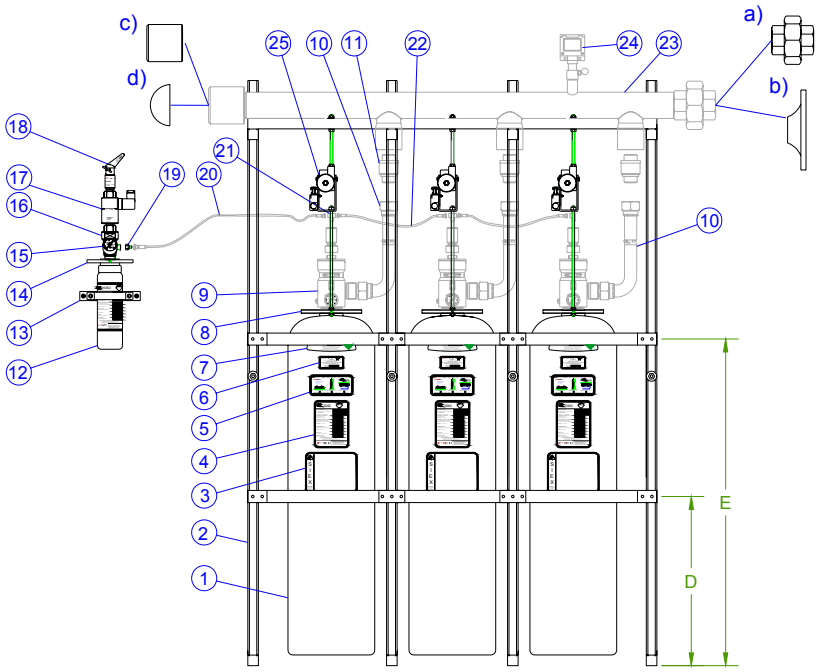


Figure 7. Single row cylinder bank with continuous weighing and pilot bottle

Nº	Denomination	Types
1	Manifold system	61 / 67,5 / 80 / 84 / 100 / 108,4 / 120 / 127 / 180
2	System cylinder bracket	
3	Instructions cylinder sticker	
4	CE marking cylinder sticker	
5	Cylinder positioning sticker	
6	PI marking cylinder sticker	
7	Cylinder sticker toxic gas	
8	Bridle	

9	Container valve	RGS-MAM-40
10	Discharge hose	FH-40HC 1 1/2" G
11	Check valve	VALAN-40-23
12	Pilot cylinder (1)	2 litros / litres
13	Pilot cylinder bracket	
14	Bridle	
15	Pressure gauge	5140-P315 1/8" NPT
16	Pilot cylinder valve	RGS-MAM-11/4
17	Re-assembled electrical actuator	227SOL
18	Manual actuator	227DM
19	Adaptor	W 21.8x1/14" H - 1/4" G M
20	Flexible actuator hose	FH-6PO 1/4" G (1000 mm)
21	"T" or elbow	1/4" G
22	Flexible actuator hose	FH-6PO 1/4"G (500 mm)
23	Discharge manifold (2) a) Raccord union (Threaded) Raccord union (Welded) b) Bridle (Welded) c) Colector cap (Threaded) d) Colector cap (Welded)	Ø Pipe (2" – 5") HFC-23 (2") HFC-23 (2 1/2" – 4") HFC-227ea, HFC-125 (2" - 5") HFC-23 (2") HFC-227ea, HFC-125 (2" - 5") HFC-23 (2 1/2" – 4")
24	Pressure switch	POINPRE
25	Weighing device	SIEX-WD

The dimensions of these systems are shown in the three following tables:

CYLINDER		CYLINDER BANK																	
Volume (litres)	Dia. (mm)	2		3		4		5		6		7		8		9		10	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
61	300	700	880	1100	1280	1500	1680	1900	2080	2300	2480	2700	2880	3100	3280	3500	3680	3900	4080
67.5	267	617	830	967	1180	1317	1530	1667	1880	2017	2230	2367	2580	2717	2930	3067	3280	3417	3630
80	267	617	830	967	1180	1317	1530	1667	1880	2017	2230	2367	2580	2717	2930	3067	3280	3417	3630
84	300	700	880	1100	1280	1500	1680	1900	2080	2300	2480	2700	2880	3100	3280	3500	3680	3900	4080
100	360	715	880	1115	1280	1515	1680	1915	2080	2315	2480	2715	2880	3115	3280	3515	3680	3915	4080
108.4	374																		
120	360	756	880	1156	1280	1556	1680	1956	2080	2356	2480	2756	2880	3156	3280	3556	3680	3956	4080
127	374	824	930	1274	1380	1724	1830	2174	2280	2624	2730	3074	3180	3524	3630	3974	4080	4424	4530
180	450																		

NOTE 1: Cylinders 2 to 5 do not have a pilot bottle fitted. Pilot bottles are fitted from cylinder 6.

NOTE 2: The cylinder dimensions, diameter and length, may vary depending on the manufacturer.

CYLINDER VOLUME (litres)	D (mm)	E (mm)
61	300	800
67,5	500	1300
80	500	1300
84	500	1000
100	500	1300
108,4	300	800
120	500	1300
127	400	1100
180	400	1100

CYLINDER VOLUME (litres)	SINGLE ROW F (mm)	DOUBLE ROW F (mm)
61	370	710
67,5	337	644
80	337	644
84	370	710
100	385	740
108,4	444	858
120	426	622
127	444	858
180	476	922

The technical features of these systems are shown in the following tables:

CYLINDER TYPE	CYLINDER VOLUME (litres)	GAS
High pressure cylinder (seamless)	67.5	HFC-227ea HFC-125 HFC-23 (1)
	80	
	100	
	120	
	150	
Low pressure cylinders (welded)	25	HFC-227ea HFC-125 (2)
	61	
	84	
	108.4	
	127	
	180	

NOTE 1: The high and medium pressure (seamless) cylinders filled with HFC-227ea and HFC-125 are pressurised with dry nitrogen at 24 or 42 bar (at 20ºC).

NOTE 2: The low pressure (welded) cylinders filled with HFC-227ea and HFC-125 are pressurised with dry nitrogen at 24 (at 20ºC), **never** at 42 bar.

NOTE 3: In the case of HFC-227ea and HFC-125 the cylinder banks are not to be fully charged.

CONTAINER VALVE	CYLINDER VOLUME (litres)	DISCHARGE HOSE	CHECK VALVE
RGS-MAM-40	61	FH-40HC 1 1/2" BSP	VALAN-40-23
	67,5		
	80		
	84		
	100		
	120		
RGS-MAM-50	84	FH-50HC 2" BSP	VALAN-50-125
	108,4		
	127		
	180		

1.1.4 SMS System (small spaces)

These systems are specially designed for small spaces, using only halogenated gases HFC-227ea and HFC-125. It is a single (modular cylinder) design, as shown in Fig. 8 with an electrical and manual discharge head.

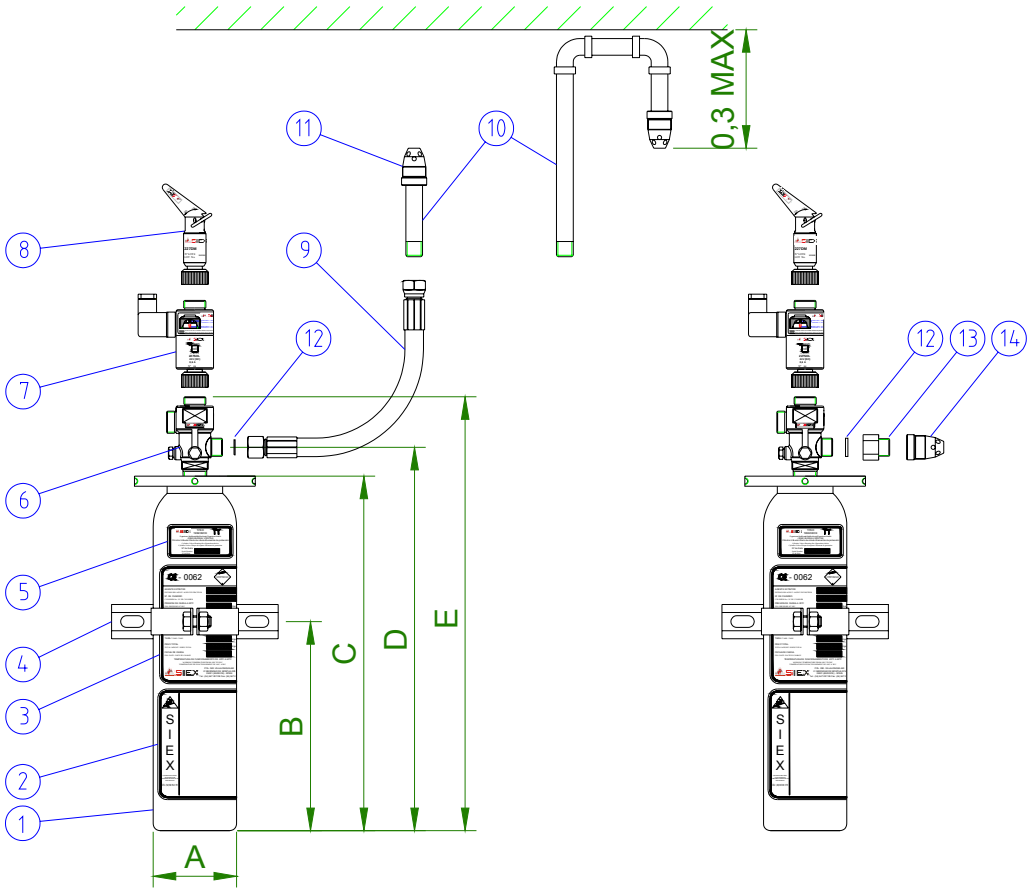


Figure 8. Single cylinder system (SMS system)

Nº	Denomination	Types
1	Cylinder	2,7 / 4,7 / 6.7 / 13.4
2	Instructions cylinder sticker	
3	CE marking cylinder sticker	
4	Modular cylinder bracket	
5	PI marking cylinder sticker	
6	Container valve	RGS-MAM-11-4 ó 12-4
7	Re-assembled electrical actuator	227SOL
8	Manual actuator	227DM
9	Discharge hose	FH-15CO ½”G-W21.7x1/14”
10	Discharge pipe	3/8” / 1/2" / 3/4"
11	Nozzle	FEDR10 / FEDR15 / FEDR20 (180º-360º)
12	Cupper washer	Ø 16x22x1,4
13	Adaptor	W 21,8x1/14” H – ½” BSP M
14	Nozzle	FEDR15 (180º-360º)

The dimensions are shown in the following table:

CYLINDER VOLUME (liters)	Ø A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
2,7	100	300	425	460	520
4,7	140	300	435	470	530
6,7	140	300	560	595	655
13,4	204	300	550	585	645

Cylinder size (l)	Filling ratio (kg.) HFC-227ea	Filling ratio (kg.) HFC-125	Cylinder position	Aproximated tare (kg)
2	1,0-2,0	1,0-1,5	Vertical-Horizontal	4,2
4,7	2,5-5,5	2,0-4,0	Vertical-Horizontal	10
6,7	3,5-7,5	4,0-6,0	Vertical-Horizontal	14
13,4	7,0-15,0	6,0-12,0	Vertical-Horizontal	26,8

1.2 DISTRIBUTION PIPING AND FITTINGS

This section refers to design by computer calculations or pre-engineered systems with pipework. Examine the planned configuration to ensure that the pipework and nozzles do not interfere with objects in the hazard area, and make any necessary changes before proceeding with the installation. The pipework and fittings must comply with the limitations detailed below:

1.2.1 Piping

All the installed piping must be in accordance with the latest requirements included in NFPA-2001, ISO-14520 or UNE-23570. They must be of non-combustible material, and have physical and chemical characteristics that guarantee their integrity under the stresses to which they will be subjected. For the wall thickness calculation we must take into account that they have to withstand a pressure equal to that of the extinguishing gas when stored at 50ºC.

Working pressure at 50ºC with HFC-227ea	(filled at 24 bar) (filled at 42 bar)	34 bar 56 bar
Working pressure at 50ºC with HFC-125	(filled at 24 bar) (filled at 42 bar)	40 bar 75 bar
Working pressure at 50ºC with HFC-23		137 bar

Acceptable piping includes galvanised or black steel to pipe Standard ANSI B31.1. **The types of pipe that must not be used are cast iron, steel pipes to ASTM A 120 specifications and all non-metallic pipes.**

1.2.2 Pipe joints (fittings)

The mode of joining the pipes must meet the most recent requirements of the NFPA 2001, ISO 1450 or the UNE-23570. Acceptable accessories include those which are threaded, with bridles, soldered high pressure grooved and those of brass.

Grooved accessories must be approved for Halocarbonated Gases (HFC-227ea, HFC-125, HFC-23) applications and only those of high pressure in systems that use cylinders charged with 24 bar at 20º.

Common grooved accessories for sprinkler networks must not be used.

Wrought iron accessories must be a minimum of 300lb.
Standard cast iron accessories or those of 150 lbs are not acceptable.

Use threaded accessories of 3000 lbs according to regulation ANSI B.16.11.
Use soldered accessories of 3000 lbs according to regulation ANSI B.16.9.

1.2.3 Reducers

All reductions in the pipe size must be made using reducing fittings such as concentric reducers. Double elbow reducers are not acceptable.

The system installation drawings (calculation software) must be taken as a reference for sizes and lengths of pipes. The maximum pipe diameters and lengths indicated in this manual must be adhered to.

1.2.4 Cleaning

All pipe sections must be fitted and assembled with the appropriate sealants, e.g. Teflon tape or paste (in the case of threaded pipe). All rough edges and residual oils must be removed afterwards.

1.2.5 Threads

It is recommended that Teflon tape be used, applied only to the male threads of the pipe. When Teflon paste is used, impregnate at least one turn of the male thread and one of the female thread. The threads of all the pipes and fittings must be properly sealed.

When 3000 lb fittings with NPT threads are used, ensure that the pipes also have NPT threads.

1.2.6 Installation

All piping must be installed in line with industry best practice. The pipework must be secured with supports that allow for its expansion and contraction.

DISTANCES BETWEEN PIPE SUPPORTS										
Pipe diameter DN (mm)	15	20	25	32	40	50	65	80	100	125
Pipe diameter (inches)	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"
Maximum distance between supports (m)	1.5	1.8	2.1	2.4	2.7	3.4	3.5	3.7	4.3	4.8

- Supports must be located between elbows that are 600 mm apart (see figure A).
- Supports must be fitted 300 mm from any discharge nozzle (see figure B).
- Supports must be secured to structures capable of supporting the pipework.

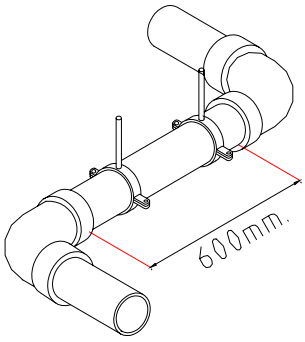


Figure A

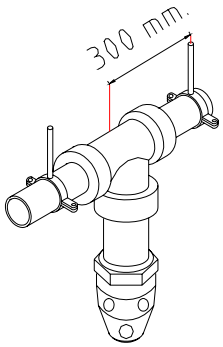


Figure B

1.2.7 Approximate diameters

Pipes with a nominal diameter of less than 10 mm must not be used, except for specific applications. Pipe sections that may be subjected to static pressure (closed sections) must be protected by a relief valve (burst disc valve piped to atmosphere).

APPROXIMATE PIPE DIAMETERS DEPENDING ON THE DISCHARGE CALCULATION FOR HFC-227ea		
PIPE DIAMETERS	**SYSTEMS FILLED at 24 bar**	**SYSTEMS FILLED at a 42 bar**
3/8”	0-8 kg.	0-11 kg.
½”	5-14 kg.	12-24 kg.
¾”	9-27 kg.	25-36 kg.
1”	15-39 kg.	36-47 kg.
1 ¼”	26-60 kg.	48-116 kg.
1 ½”	39-90 kg.	117-194 kg.
2”	60-150 kg.	195-310 kg.
2 ½”	90-260 kg.	311-480 kg.
3”	150-420 kg.	481-645 kg.
4”	260-570 kg.	646-780 kg.
5”	420-1000 kg.	
6”	570-1400 kg.	

APPROXIMATE PIPE DIAMETERS DEPENDING ON THE DISCHARGE CALCULATION FOR HFC-125		
PIPE DIAMETERS	**SYSTEMS FILLED at 24 bar**	**SYSTEMS FILLED at a 42 bar**
3/8”	0-10 kg.	0-11 kg.
½”	6-16 kg.	5-18 kg.
¾”	11-27 kg.	14-31 kg.
1”	19-39 kg.	25-47 kg.
1 ¼”	34-60 kg.	39-112 kg.
1 ½”	47-90 kg.	88-145 kg.
2”	78-160 kg.	125-268 kg.
2 ½”	114-270 kg.	212-370 kg.
3”	180-440 kg.	296-564 kg.
4”	310-600 kg.	450-780 kg.
5”	480-1010 kg.	
6”	710-1420 kg.	

NOTE 1: The flow dependent diameters set out in the above table are only approximate and are for guidance only. They must not under any circumstance be taken as final installation diameters. To determine the final installation diameter hydraulic calculations must be carried out using the appropriate software.
Diameters may vary depending on the amount of extinguishing agent in the cylinder, the pipe runs, the length and distance of pipe runs, etc.

NOTE 2: All halocarbonated gases systems (HFC-227ea, HFC-125, HFC-23) must discharge in a maximum of 10 seconds.

1.2.8 Electrical clearances

Where electrical conductors are present, the minimum distances stipulated in the High Voltage Regulations must be observed. Should it not be possible to comply with these distances, approved insulators must be fitted to the pipes. It is recommended that the system pipework be earthed in order to discharge any static electricity generated during the discharge of the extinguishing agent (HFC-227ea, HFC-125, HFC-23).

SAFETY DISTANCES		
Maximum nominal voltage (kV)	**Distance to closest non-insulated live conductor (m)**	To the closest part of an insulator not at earth potential used as a support for a live conductor. **(m)**
15	2.59	-
33	2.74	-
44	2.89	-
66	3.05	-
88	3.20	2.5
110	3.35	2.5
132	3.50	2.5
165	3.81	2.5
220	4.27	2.5
275	4.57	2.5

1.3 INSTALLING DISCHARGE NOZZLES, WITH OR WITHOUT A CALIBRATED ORIFICE

FEDR type discharge nozzles for SIEX-HC fixed extinguishing systems using halogenated gases (HFC-227ea, HFC-125 and HFC-23) are used to discharge the extinguishing agent within the protected area and in systems for total flooding hazard protection (not used in local application systems).

The extinguishing agent (halogenated gas) is dispersed within the protected area by discharge nozzles, to ensure a proper dispersion of the extinguishing agent within the protected area.

The discharge nozzles are screwed into the discharge piping (DIN 2440, schedule 40 or 80) in a vertical position, and can be 360º and 180º, with threads from 3/8" BSP to 2" BSP for halogenated gases. In all cases the transverse nozzle diameter decreases in the direction of the flow, to avoid obstruction of the nozzle by dry ice.

Normally, when the extinguishing agent is discharged through several nozzles in the risk area, the same amount of gas is discharged through each nozzle. When it is necessary to discharge a different amount of gas through each nozzle, a calibrated orifice plate must be fitted in each one.

The calibrated orifice is located inside the discharge nozzles in order to control exactly the amount of gas to be discharged. As its name indicates, it is a circular plate with a central orifice calibrated according to the hydraulic calculations (calculation software), and its size depends on the amount of gas to be discharged through each nozzle. The diameter of the central calibrated orifice is marked on the lower flat part of the nozzle. Its size is expressed in millimetres to one decimal place (for example, 12.2 mm) (see Figure 8), and corresponds to a value in the calibrated orifice tables for halogenated gases.

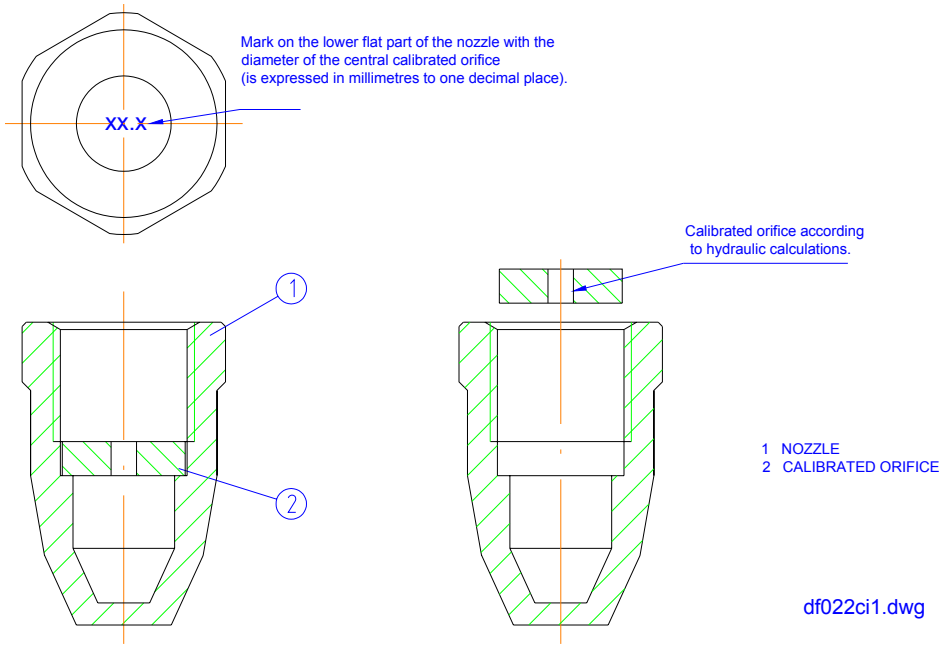


Figure 9

The calibrated orifices must always be fitted into every nozzle that are connected to cylinders or banks of cylinders that have more than one nozzle to protect one or several hazard areas. In modular cylinders with a single nozzle, it is not necessary to use a calibrated orifice. Nor are they necessary in pre-engineered and balanced systems with 2 or 4 nozzles, provided that the distances and requirements of those systems are complied with.

The calibrated orifices are supplied from the factory assembled in the corresponding nozzles, which are marked with the diameter of the calibrated orifice (see Figure 9).

The discharge nozzles, with or without a calibrated orifice, are connected directly to the discharge pipe:

CAUTION

TO AVOID UNNECESSARY RISKS
IT IS ADVISABLE TO INSTALL THE DISCHARGE NOZZLES
BEFORE ASSEMBLING THE CYLINDERS OR CYLINDER BANKS.

OTHERWISE,
ENSURE THAT THE RELEASE AND ACTUATION ELEMENTS
ARE DISCONNECTED OR NOT IN USE.

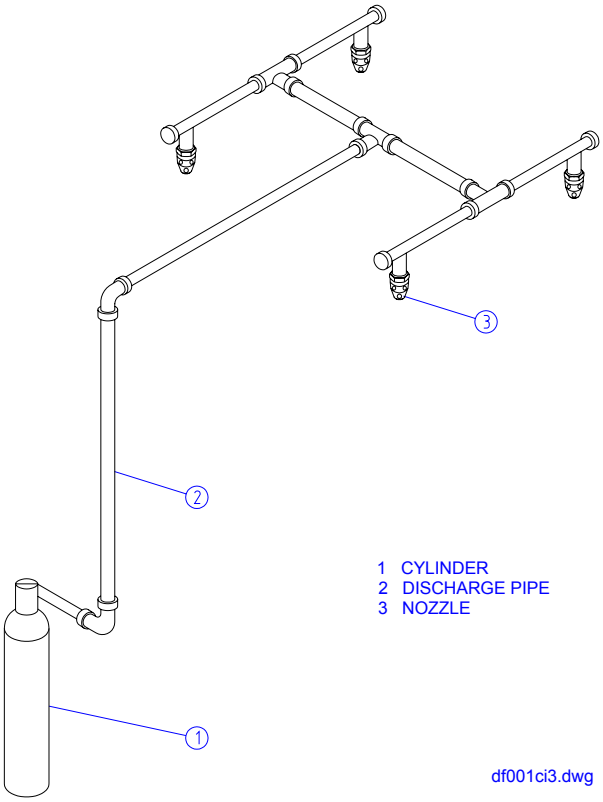


Figure 10

1.3.1 Installation instructions:

To install the nozzles, with or without a calibrated orifice, the instructions below must be followed:

1. Take the installation drawings and study the positioning of the nozzles in the hazard area. Check that there are no light objects or items that are susceptible to move during the gas discharge.

2. Check that the number and size of nozzles supplied agrees with the approved installation plans. If they are to be fitted with calibrated orifices, check that they are suitable for the nozzles in which they are to be fitted.

3. Check that the pipe rises and drops where the nozzles are to be screwed in are at the correct distance and in optimum condition.

4. Check that the bottom surfaces of the pipe rises and drops are totally flat and perpendicular to their axes. The threaded length of the pipe must be greater than that of the nozzle (see figure 8).

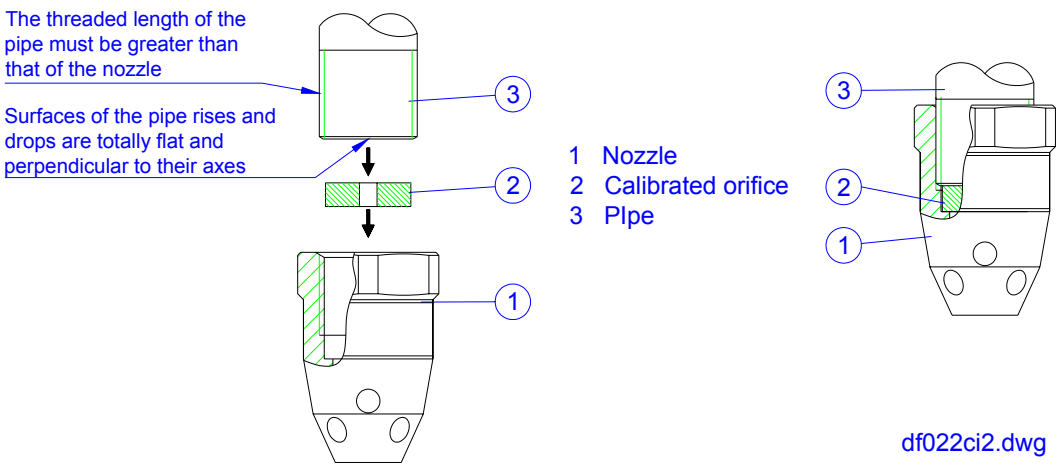


Figure 11

5. Apply Teflon tape to the male thread of the pipe drop where the nozzle is to be fitted.

6. Hold the nozzle by hand and fit the calibrated orifice in its seat (if one is to be fitted). Check that the diameter of the central calibrated orifice is marked on the lower flat part of the nozzle.

7. Screw in the nozzle (with its orifice if appropriate) with a fixed width spanner on the pipe drop or pap. Tighten fully until the pipe drops touch the calibrated orifices, so that they are completely screwed in and the plate is firmly fixed.

1.3.2 Positioning the installed nozzle

The usual position of the installed nozzle is vertical, as shown in Figure 10 and 11.

When positioning the nozzle in the discharge pipe, the assembly steps above must be followed, while ensuring that it is free of any obstacles which could impede the proper discharge of the extinguishing agent.

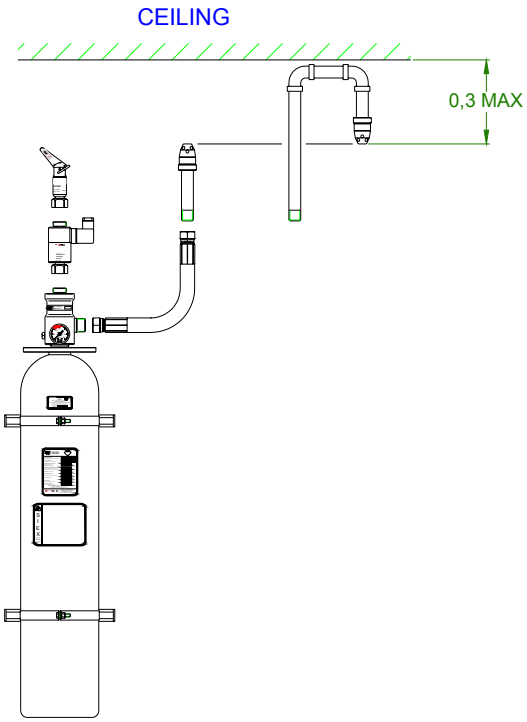


Figure 12

As shown in Figure 12, it must be remembered that the two types of nozzle, 360º and 180º, can be fitted at a maximum of 0.3 m below the ceiling (or the highest protected point when the nozzles are stacked).

180º nozzles can be located at a maximum of 0.3 m from the wall, special attention must be paid to the fitting of the 180º nozzle, that it is in the correct position for its effective operation, with the orifices facing out and not towards the wall, as shown in Figure 11.

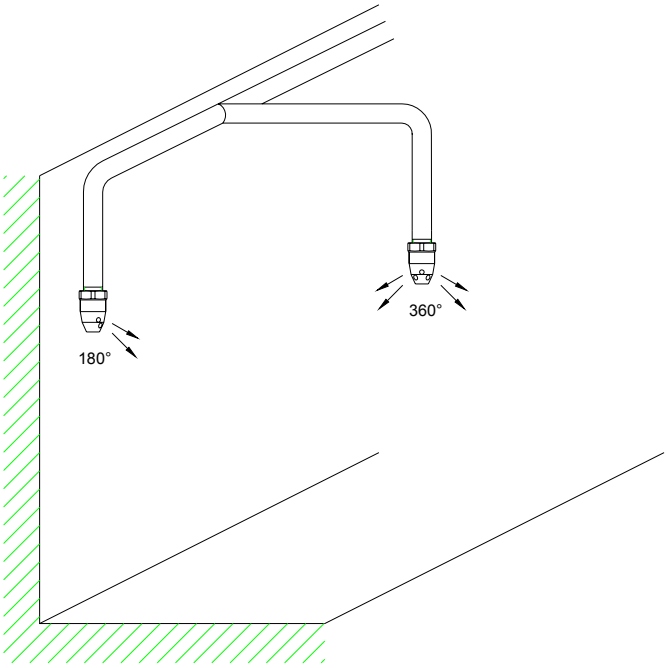


Figure 13

1.4 INSTALLING THE CONTAINER, CYLINDER OR BOTTLE

CAUTION

YOU ARE HANDLING PRESSURISED EQUIPMENT

FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN THE CYLINDERS DISCHARGING VIOLENTLY, LEADING TO SERIOUS PERSONAL INJURY AND/OR DAMAGE TO THE PROPERTY.

From the factory, all cylinders assembled with valves are protected with caps and protective plugs for transport, which must not be removed until the cylinders have been securely fixed to their fixing brackets (keep the protective caps for future use).

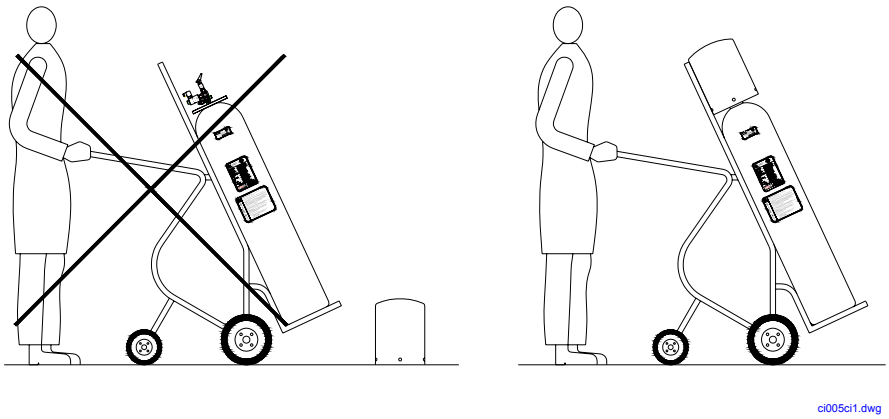
All cylinders are sent from the factory assembled with a protective flange, with its corresponding cylinder valve, RGSRGS-MAM-20/40/50/12-4 or 11-4, together with the cylinder stickers marked with CE, PI and cylinder instructions, with the valve outlet safety plug in place, and with the protective cap screwed into the flange.

The cylinder valve itself comes equipped with a pressure gauge, the burst disc and its end cap, the valve outlet safety plug in the actuation port, and those corresponding to the pilot port and pressure switch connection, if these components are not connected.

The cylinders must be located in an area protected from extreme temperatures and accessible for service and maintenance. The cylinder must be firmly secured to a wall.

CAUTION

DO NOT REMOVE THE CYLINDER PROTECTIVE CAPS UNTIL IT IS FIXED IN ITS BRACKETS, THE CYLINDER MUST ONLY BE MOVED WITH ITS VALVE PROTECTIVE CAP IN PLACE UNTIL IN ITS FINAL POSITION.



No cover or external operating device should be removed at this stage.

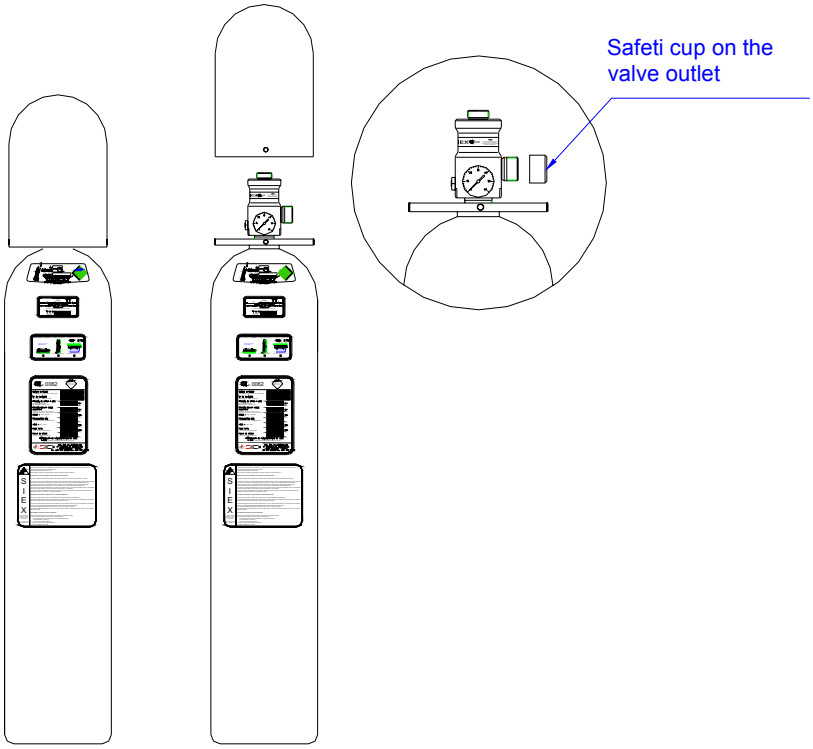
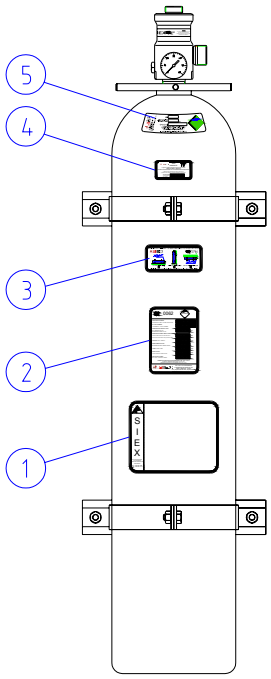


Figure 14. Valve protective cap and output safety plug

1.4.1 Identification labels

With each delivery, SIEX supplies adhesive labels on each cylinder supplied. This label identifies the gas contained in the cylinder, the gas quantity, weight of the empty cylinder, working pressure, identification number of the cylinder and fill date, regular inspection date, fill capacity, minimum cylinder wall thickness, type of cylinder thread, country of origin UN number, manufacturing serial number, product identification number, etc.

1 Cylinder instruction label
2 Cylinder label with CE marking
3 Cylinder position label
4 Cylinder label with PI marking
5 Cylinder label with UN number



CE - 0062

GAS COMPRIMIDO NO INFLAMABLE
COMPRESSED GAS NO INFLAMMABLE
2

AGENTE EXTINTOR EXTINGUISH AGENT / AGENT EXTINCTEUR	[redacted]	
Nº. DE CILINDRO CYLINDER No. / Nº DE CYLINDER	[redacted]	
PRESION DE CARGA A 20ºC FILL PRESSURE AT 20ºC PRESSION DE CHARGE A 20ºC	[redacted]	Bar
PRESION ROTURA DISCO SEGURIDAD BURSTING PRESSURE OF THE SAFETY DISC PRESSION DE RUPTURE DU DISQUE DE SÉCURITÉ	[redacted]	Bar
CARGA / FILL / CHARGE	[redacted]	Kgs.
PRESURIZADO CON PRESSURIZED WHIT / PRESSURISÉ AU	[redacted]	
TARA / TARE / TARE	[redacted]	Kgs.
PESO TOTAL TOTAL WEIGHT / POIDS TOTAL	[redacted]	Kgs.
FECHA DE CARGA FILL DATE / DATE DE CHARGE	[redacted]	

TEMPERATURA DE FUNCIONAMIENTO DE -20ºC A 50ºC
WORKING TEMPERATURE FROM -20ºC TO 50ºC
TEMPÉRATURE DE FONCTIONNEMENT DE -20ºC A 50ºC

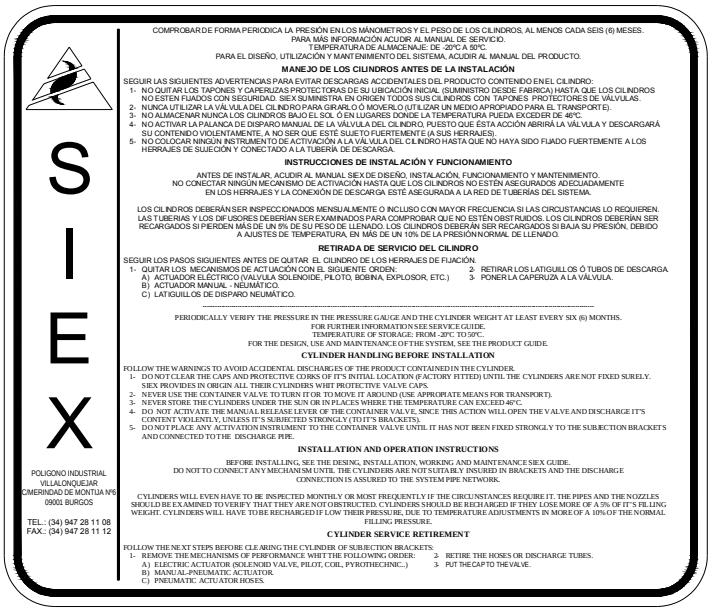
Contiene gases fluorados de efecto invernadero regulados en el protocolo de Kioto
Contains fluorinated greenhouse gases covered by the Kyoto Protocol / Contient de gas à effet de serre fluorés relevant du protocole de kyoto
Sellado herméticamente / *Hermetically Sealed / Hermétiquement sallé*

SIEX
POL. IND. VILLALONQUEJAR
C/ MERINDAD DE MONTIJA Nº6
09001 (BURGOS) - SPAIN
Tel.: (34) 947 281108 Fax: (34) 947 281112

CYLINDER LABEL WITH CE MARKING

SIEX
TPED
1999/36/CE
Organismo Notificado/Notified body/Organisme Notifié
(0062) BUREAU VERITAS
Cilindro+Válvula+Disco de rotura+Elementos de protección
Cylinder+Valve+Bursting disc+Protections device
Cylindre+Valve+Disque de rupture+Eléments de protection
Nº de Serie
Serial Number
Nº de Série
[redacted]

CYLINDER LABEL WITH PI MARKING



COMPROBAR DE FORMA PERIODICA LA PRESIÓN EN LOS MÁNOMETROS Y EL PESO DE LOS CILINDROS, AL MENOS CADA SEIS (6) MESES.
PARA MÁS INFORMACIÓN ACUDIR AL MANUAL DE SERVICIO.
TEMPERATURA DE ALMACENAJE: DE -20ºC A 50ºC.
PARA EL DISEÑO, UTILIZACIÓN Y MANTENIMIENTO DEL SISTEMA, ACUDIR AL MANUAL DEL PRODUCTO.

MANEJO DE LOS CILINDROS ANTES DE LA INSTALACIÓN

SEGUIR LAS SIGUIENTES ADVERTENCIAS PARA EVITAR DESCARGAS ACCIDENTALES DEL PRODUCTO CONTENIDO EN EL CILINDRO:
1- NO QUITAR LOS TAPONES Y CAPERUZAS PROTECTORAS DE SU UBICACIÓN INICIAL (SUMINISTRO DESDE FABRICA) HASTA QUE LOS CILINDROS NO ESTEN FIJADOS CON SEGURIDAD. SIEX SUMINISTRA EN ORIGEN TODOS SUS CILINDROS CON TAPONES PROTECTORES DE VÁLVULAS.
2- NUNCA UTILIZAR LA VÁLVULA DEL CILINDRO PARA GIRARLO Ó MOVERLO (UTILIZAR UN MEDIO APROPIADO PARA EL TRANSPORTE).
3- NO ALMACENAR NUNCA LOS CILINDROS BAJO EL SOL Ó EN LUGARES DONDE LA TEMPERATURA PUEDA EXCEDER DE 40ºC.
4- NO ACTIVAR LA PALANCA DE DISPARO MANUAL DE LA VÁLVULA DEL CILINDRO, PUESTO QUE ÉSTA ACCIÓN ABRIRÁ LA VÁLVULA Y DESCARGARÁ SU CONTENIDO VIOLENTAMENTE, A NO SER QUE ESTE SUJETO FUERTEMENTE (A SUS HERRAJES).
5- NO COLOCAR NINGÚN INSTRUMENTO DE ACTIVACIÓN A LA VÁLVULA DEL CILINDRO HASTA QUE NO HAYA SIDO FIJADO FUERTEMENTE A LOS HERRAJES DE SUJECIÓN Y CONECTADO A LA TUBERÍA DE DESCARGA.

INSTRUCCIONES DE INSTALACIÓN Y FUNCIONAMIENTO

ANTES DE INSTALAR, ACUDIR AL MANUAL SIEX DE DISEÑO, INSTALACIÓN, FUNCIONAMIENTO Y MANTENIMIENTO.
NO CONECTAR NINGÚN MECANISMO DE ACTIVACIÓN HASTA QUE LOS CILINDROS NO ESTÉN ASEGURADOS ADECUADAMENTE EN LOS HERRAJES Y LA CONEXIÓN DE DESCARGA ESTÉ ASEGURADA A LA RED DE TUBERÍAS DEL SISTEMA.

LOS CILINDROS DEBERÁN SER INSPECCIONADOS MENSUALMENTE O INCLUSO CON MAYOR FRECUENCIA SI LAS CIRCUSTANCIAS LO REQUIEREN. LAS TUBERÍAS Y LOS DIFUSORES DEBERÍAN SER EXAMINADOS PARA COMPROBAR QUE NO ESTÉN OBSTRUIDOS. LOS CILINDROS DEBERÍAN SER RECARGADOS SI PIERDEN MÁS DE UN 5% DE SU PESO DE LLENADO. LOS CILINDROS DEBERÁN SER RECARGADOS SI BAJA SU PRESIÓN, DEBIDO A AJUSTES DE TEMPERATURA, EN MÁS DE UN 10% DE LA PRESIÓN NORMAL DE LLENADO.

RETIRADA DE SERVICIO DEL CILINDRO

SEGUIR LOS PASOS SIGUIENTES ANTES DE QUITAR EL CILINDRO DE LOS HERRAJES DE FIJACIÓN.
1- QUITAR LOS MECANISMOS DE ACTUACIÓN CON EL SIGUIENTE ORDEN:
A) ACTUADOR ELÉCTRICO (VÁLVULA SOLENOIDE, PILOTO, BOBINA, EXPLOSOR, ETC.)
B) ACTUADOR MANUAL - NEUMÁTICO.
C) LATIGUILLOS DE DISPARO NEUMÁTICO.
2- RETIRAR LOS LATIGUILLOS Ó TUBOS DE DESCARGA.
3- PONER LA CAPERUZA A LA VÁLVULA.

PERIODICALLY VERIFY THE PRESSURE IN THE PRESSURE GAUGE AND THE CYLINDER WEIGHT AT LEAST EVERY SIX (6) MONTHS.
FOR FURTHER INFORMATION SEE SERVICE GUIDE.
TEMPERATURE OF STORAGE: FROM -20ºC TO 50ºC.
FOR THE DESIGN, USE AND MAINTENANCE OF THE SYSTEM, SEE THE PRODUCT GUIDE.

CYLINDER HANDLING BEFORE INSTALLATION

FOLLOW THE WARNINGS TO AVOID ACCIDENTAL DISCHARGES OF THE PRODUCT CONTAINED IN THE CYLINDER.
1- DO NOT CLEAR THE CAPS AND PROTECTIVE COBKS OF IT'S INITIAL LOCATION (FACTORY FITTED) UNTIL THE CYLINDERS ARE NOT FIXED SURELY. SIEX PROVIDES IN ORIGIN ALL THEIR CYLINDERS WHIT PROTECTIVE VALVE CAPS.
2- NEVER USE THE CONTAINER VALVE TO TURN IT OR TO MOVE IT AROUND (USE APPROPIATE MEANS FOR TRANSPORT).
3- NEVER STORE THE CYLINDERS UNDER THE SUN OR IN PLACES WHERE THE TEMPERATURE CAN EXCEED 40°C.
4- DO NOT ACTIVATE THE MANUAL RELEASE LEVER OF THE CONTAINER VALVE, SINCE THIS ACTION WILL OPEN THE VALVE AND DISCHARGE IT'S CONTENT VIOLENTLY, UNLESS IT'S SUBJECTED STRONGLY (TO IT'S BRACKETS).
5- DO NOT PLACE ANY ACTIVATION INSTRUMENT TO THE CONTAINER VALVE UNTIL IT HAS NOT BEEN FIXED STRONGLY TO THE SUBJECTION BRACKETS AND CONNECTED TO THE DISCHARGE PIPE.

INSTALLATION AND OPERATION INSTRUCTIONS

BEFORE INSTALLING, SEE THE DESING, INSTALLATION, WORKING AND MAINTENANCE SIEX GUIDE.
DO NOT TO CONNECT ANY MECHANISM UNTIL THE CYLINDERS ARE NOT SUITABLY INSURED IN BRACKETS AND THE DISCHARGE CONNECTION IS ASSURED TO THE SYSTEM PIPE NETWORK.

CYLINDERS WILL EVEN HAVE TO BE INSPECTED MONTHLY OR MOST FREQUENTLY IF THE CIRCUNSTANCES REQUIRE IT. THE PIPES AND THE NOZZLES SHOULD BE EXAMINED TO VERIFY THAT THEY ARE NOT OBSTRUCTED. CYLINDERS SHOULD BE RECHARGED IF THEY LOSE MORE OF A 5% OF IT'S FILLING WEIGHT. CYLINDERS WILL HAVE TO BE RECHARGED IF LOW THEIR PRESSURE, DUE TO TEMPERATURE ADJUSTMENTS IN MORE OF A 10% OF THE NORMAL FILLING PRESSURE.

CYLINDER SERVICE RETIREMENT

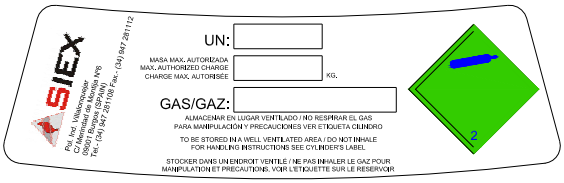
FOLLOW THE NEXT STEPS BEFORE CLEARING THE CYLINDER OF SUBJECTION BRACKETS:
1- REMOVE THE MECHANISMS OF PERFORMANCE WHIT THE FOLLOWING ORDER:
A) ELECTRIC ACTUATOR (SOLENOID VALVE, PILOT, COIL, PYROTECHINC..)
B) MANUAL-PNEUMATIC ACTUATOR.
C) PNEUMATIC ACTUATOR HOSES.
2- RETIRE THE HOSES OR DISCHARGE TUBES.
3- PUT THE CAP TO THE VALVE.

SIEX

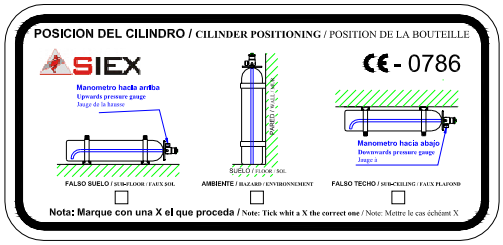
POLIGONO INDUSTRIAL VILLALONQUEJAR
C/MERINDAD DE MONTIJA Nº6
09001 BURGOS

TEL.: (34) 947 28 11 08
FAX.: (34) 947 28 11 12

CYLINDER INSTRUCTION LABEL



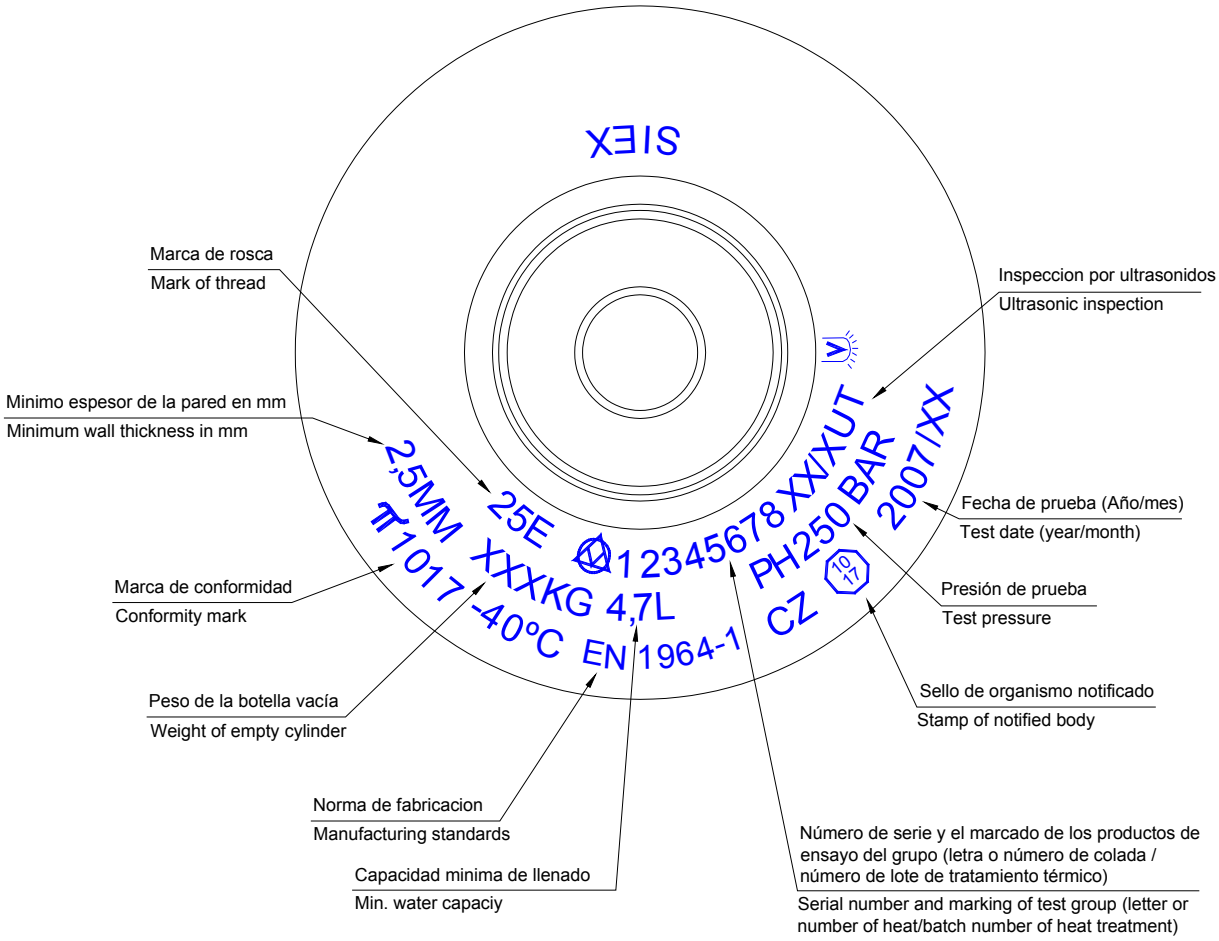
CYLINDER LABEL WITH UN NUMBER



CYLINDER POSITION LABEL

1.4.2 Cylinder inscriptions

As a legal requirement, all cylinders must include a series of markings on their shoulders that detail, among other information: the manufacturer, quality marks, hydraulic test pressure, gas contained, UN number, π marking, CE marking, manufacturing mark, manufacturing serial number, non-destructive testing mark, weight of empty bottle plus valve, fill weight and type of gas, country of origin, type of thread, minimum wall thickness, fill capacity, test month, test pressure and year, regular inspection date, product identification number. Detailed below are the positions of the markings on the SIEX cylinders.



1.5 INSTALLING CYLINDER FIXING BRACKETS

1.5.1 Brackets for a single (modular) cylinder

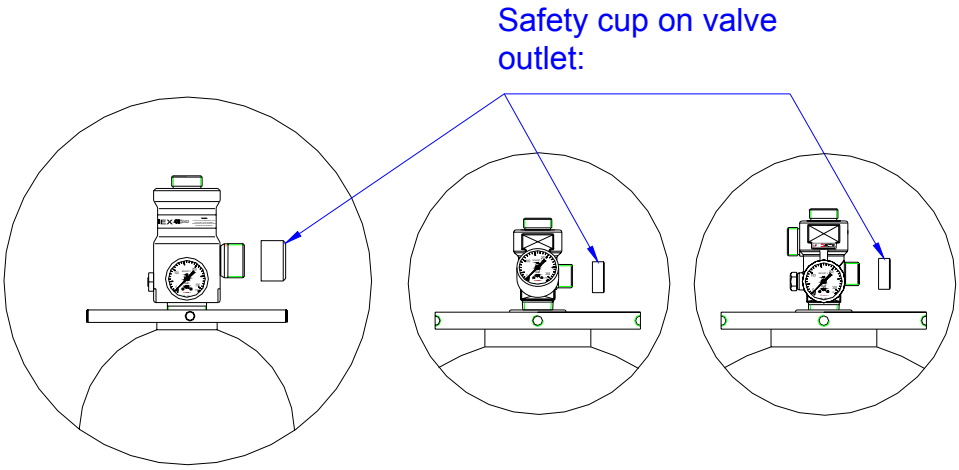
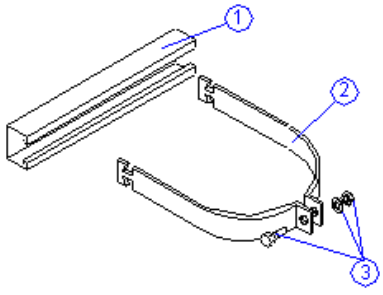


Figure 16

CAUTION

**AT THIS STAGE OF THE INSTALLATION,
DO NOT REMOVE EITHER THE PROTECTIVE VALVE CAP
OR THE OUTLET SAFETY PLUG.**

The brackets assemblies for a modular cylinder comprise a nut, a bolt, a washer, two straps, a rear channel, and two decorative end pieces. To ensure the container or cylinder is securely attached, it is recommended that two fixing brackets per bottle be used, for all 40.2 litre cylinders and above.



1 Back carril
2 Cylinder fixing brackets
3 Fixing nuts and bolts

Figure 16

Each strap has a slot for insertion in the rear channel, to allow the cylinder to be correctly aligned. The assembly channel is designed to be fixed to a rigid surface with the cylinder supported on the floor.

To install the modular cylinder bracket, follow the instructions below:

1. Place the modular cylinder's rear wall channel at the height above the floor indicated in table 1, and mark on the wall the centre of the holes to be drilled.

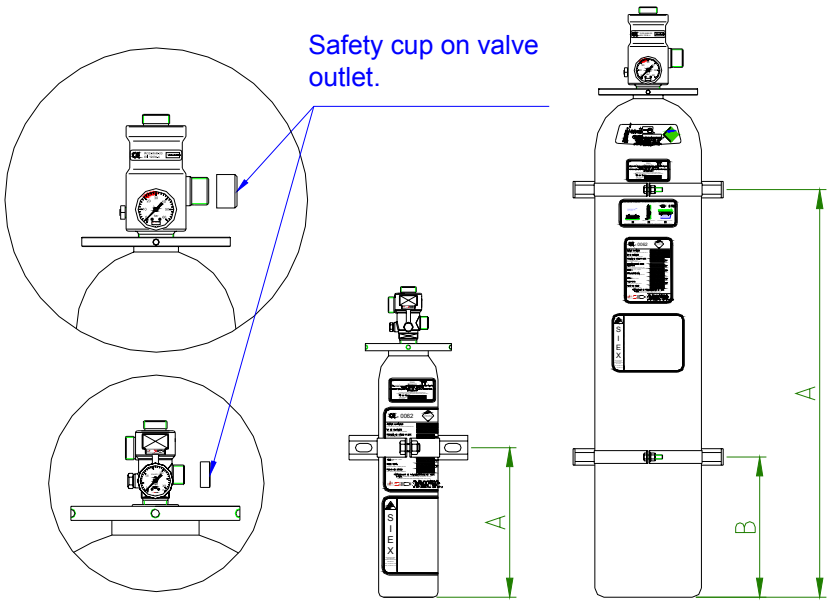


Figure 17

TABLE 1				
Code	**Type of bracket**	**Cylinder volume (litres)**	**Length A (mm)**	**Length B (mm)**
POHE2,7	Modular	2.7	200	-----
POHE6	Modular	4.7 - 6.7	400	-----
POHE13	Modular	13.4	400	-----
POHE25	Modular	25	300	-----
POHE26	Modular	26.8	600	-----
POHE40	Modular	40.2	400	1000
POHE61	Modular	61	300	800
POHE67	Modular	67.5	500	1300
POHE80	Modular	80	500	1300
POHE84	Modular	84	400	1100
HE100	Modular	100	500	1300
HE120	Modular	120	450	1250
HE108	Modular	108.4	300	800
HE127	Modular	127	400	1100
HE180	Modular	180	400	1100

2. Drill two 10 mm diameter holes at the marks on the surface where the rear channel is to be secured and bolt the channel to the wall.

3. Ensure that the cylinder has its valve protective cap and outlet safety plug in place.

4. Place the cylinder (still with its valve protective cap and outlet safety plug in place) in the centre of the channel and against it.

5. Put the cylinder straps in the channel using their slots, and encircling the cylinder. The straps must be offered up in a horizontal position, until reaching the slots, and then rotated 90º until vertical, in such a way as the slots in the straps engage in the channel, as shown in Figure 18.

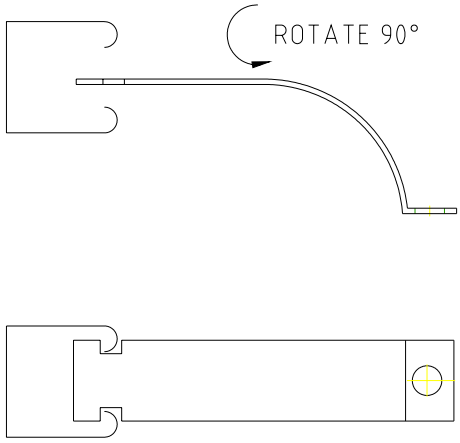


Figure 18

6. Tighten the straps with the bolt, nut and washer until the cylinder is properly secured.

7. At this point, the protective valve cap can be removed and the cylinder orientated so that the valve pressure gauge is facing forward and can be read. To be able to orientate the cylinder, the straps have to be loosened slightly, and retightened afterwards.

8. **Do not remove** the outlet safety plug until indicated in the corresponding chapter of this manual.

1.5.2 Brackets for a single (modular) cylinder installed horizontally on the floor

The usual position of a cylinder with its valve is vertical, but it may also be fitted in a horizontal position, **taking into account that the position of the valve, in this case, is with the pressure gauge facing upwards and the curved part of the syphon tube downwards** (see Figure 6).

It is expressly prohibited to position the cylinder with its valve in an inclined position, as shown in Figure 7.

The steps to follow for the installation of a modular cylinder in a horizontal position are the same for those in a vertical position. In addition the following aspects must be taken into account:

1. The cylinders must be located in an environment protected from adverse weather conditions and where the temperature does not exceed 50°C nor fall below 0°C. Where these temperatures cannot be maintained exterior heating or cooling will be required. The following installation instructions must be followed precisely and in the exact order to avoid any accidental discharge that might cause personal injury or material damage.

2. When the cylinder is fixed by its brackets, in a horizontal position, the valve pressure gauge must be in view facing the ceiling. The valve outlet will thus be in a horizontal position parallel to the floor. (see figure 19).

3. When the cylinders are installed in a horizontal position, a minimum of two fixing brackets are required per cylinder.

4. The cylinders that may be used in a horizontal position are: 2.7, 4.7, 6.7, 13.4, 26.8 40.2 litres.

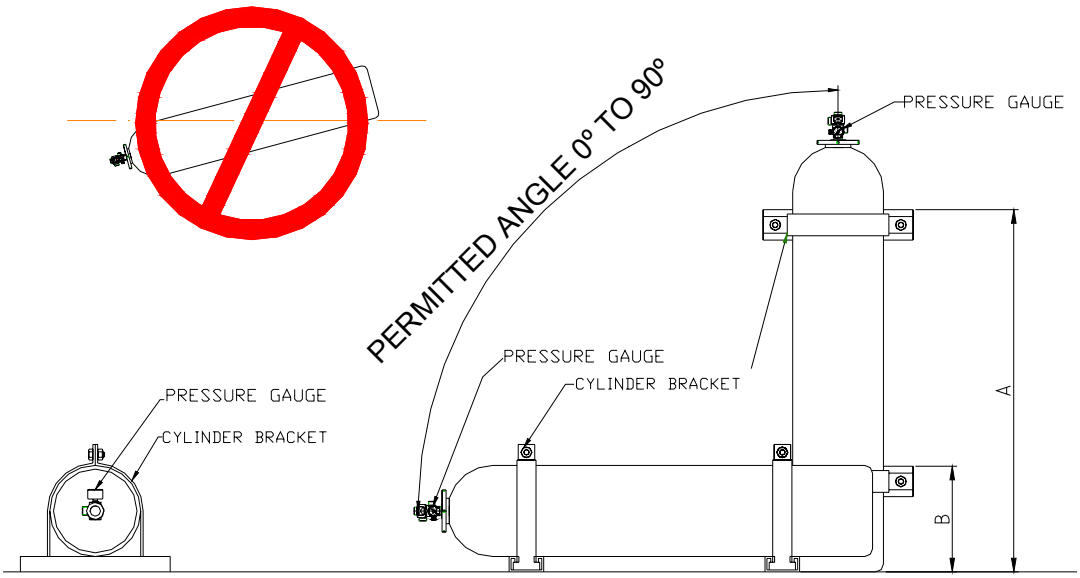


Figure 19. Typical cylinder installation – horizontal fixing.

1.5.3 Brackets for a single row cylinder bank

CAUTION

AT THIS STAGE OF THE INSTALLATION,
DO NOT REMOVE EITHER THE PROTECTIVE VALVE CAP
OR THE OUTLET SAFETY PLUG.

The bracket assemblies for cylinders in single row banks consist of: two rear channels, straps, bolts, nuts, washers and decorative end pieces, as shown in Figure 20.

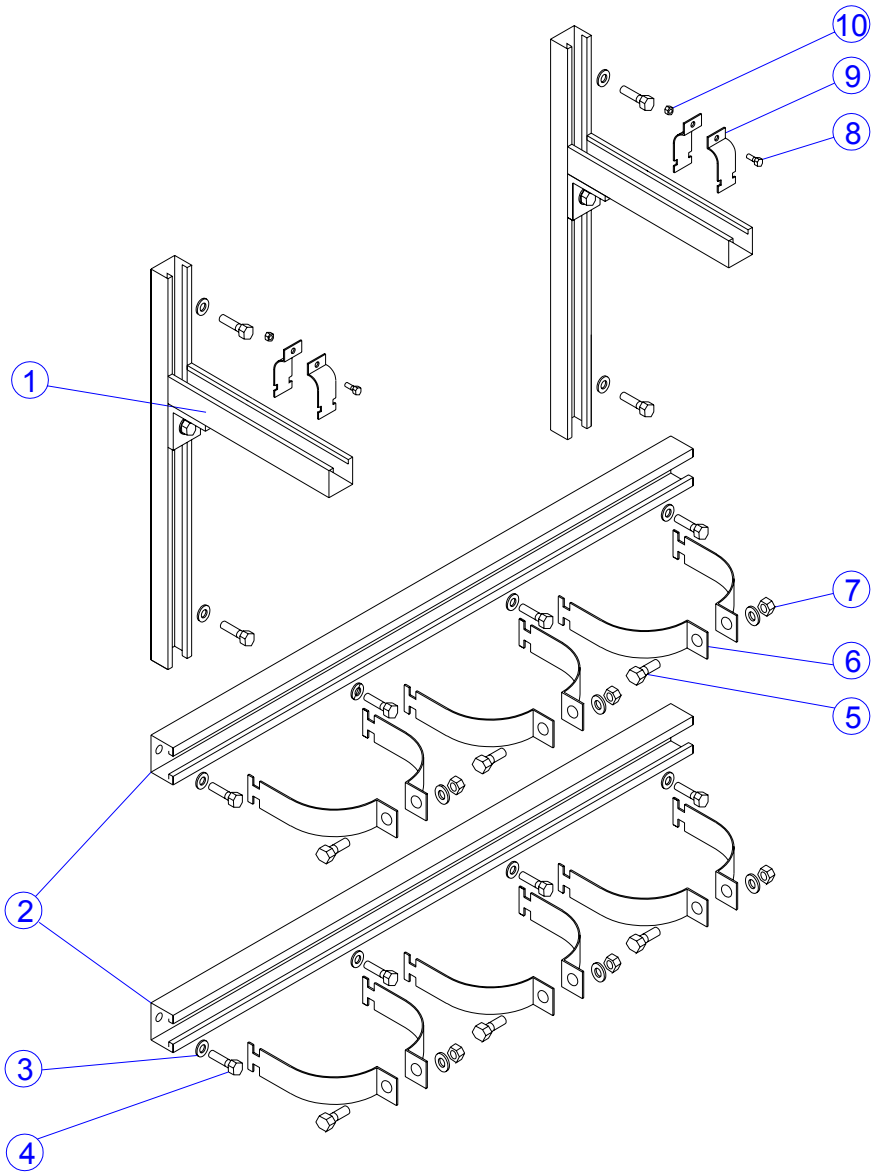


Figure 20. Bracket positions for single row banks.

No.	Description
1	390x300 Manifold bracket 650x400 Manifold bracket
2	Cylinder bank cylinder channel
3	Flat washer A 10.5 DIN 125 ZP
4	Hex. bolt M-10x30 DIN 933 ZP
5	Hex. bolt M-10x40 DIN 933 ZP
6	Cylinder clamp
7	Hex. lock nut M-10 DIN 934 ZP
8	Bolt: M-6x30 => Pipe: 1/2" - 1 1/4" M-8x35 => 1 1/2" - 3" M-10x45 => 4" - 6"
9	Manifold clamp
10	Nut: M-6x30 => Pipe: 1/2" - 1 1/4" M-8x35 => 1 1/2" - 3" M-10x45 => 4" - 6"

To install single row cylinder bank brackets, follow the instructions below:

1. Position the rear channels of the cylinder bank up to the wall, at the height above the floor indicated in table 2, and mark the centre of the holes to be drilled.

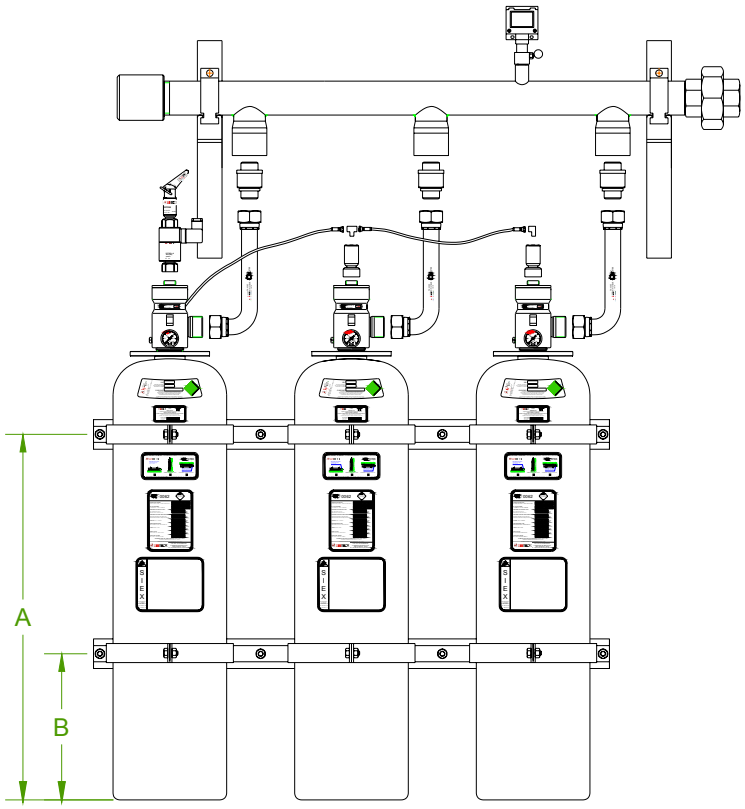
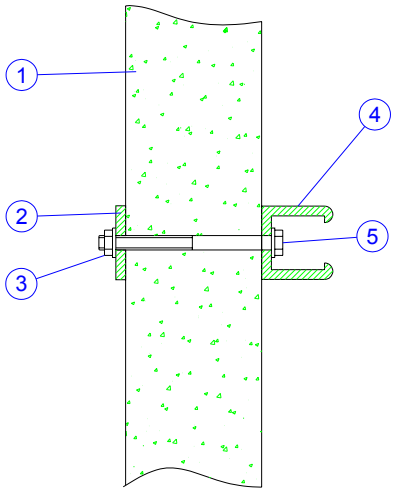


Figure 21

TABLE 2				
Code	**Type of bracket**	**Cylinder volume (litres)**	**Length A (mm)**	**Length B (mm)**
POHE61	Bank	61	300	800
POHE67	Bank	67	500	1300
POHE80	Bank	80	500	1300
POHE84	Bank	84	400	1100
HE100	Bank	100	500	1300
HE120	Bank	120	500	1300
HE127	Bank	127	400	1100
HE180	Bank	180	400	1100

2. Drill 10 mm diameter holes at the marks on the surface where the rear channels are to be secured and bolt the channels to the wall. It is recommended to make an anchoring hole for each two cylinders and always at the ends of the channel.

3. The wall on which the bracket is to be fixed (when necessary) must be perpendicular to the floor and sufficiently robust to support the cylinder during discharge. If the bank is to be anchored to a partition wall, plates must be fitted so that the bracket can be secured to the back face of the partition wall as shown below.

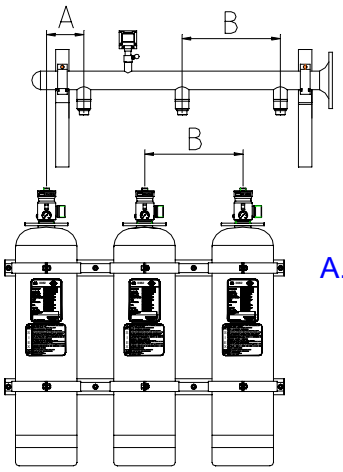


1 Partition
2 Support pad
3 Nut
4 Bracket
5 Anchor bolt

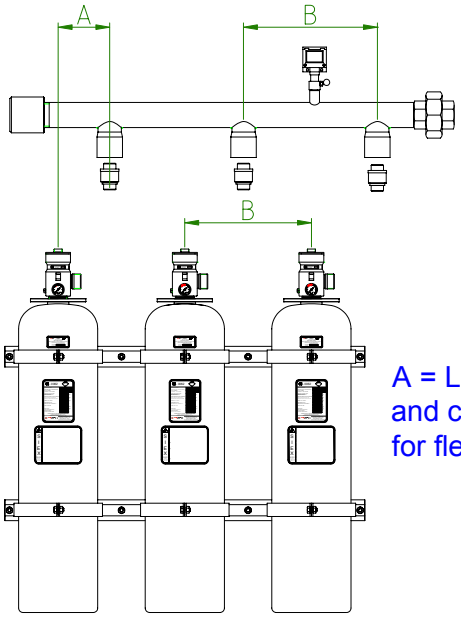
4. Ensure that all the cylinders in the bank have their valve protective caps and outlet safety plugs in place.

5. Position the cylinders (without removing the valve protective caps and outlet safety plugs) against the channel and aligned with reference to the manifold check valves and the discharge hose. The bolt that supports the channel for the first cylinder channel must be located 50 mm from the end of the channel.

6. If the manifold is not installed, measure the distance between the axes of two of the check valves. This is the distance that must be left between the symmetrical axes of each cylinder. (see figure 22).



A.= Desfase entre válvula antirretorno y botella, correspondiente al latiguillo.



A = Lag in the check valve and cylinder, corresponding for flexible actuator hose

Figure 22

7. Fit the clamps in the channel by sliding them along the slots so that they hold the cylinders across their whole diameters. For this, the straps must be positioned horizontally, until reaching the slots, and then rotated 90º until vertical, in such a way that the slots in the strap engage in the channel, as shown in Figure 18.

8. Tighten the straps with the bolts, nuts and washers until the cylinders are properly secured.

9. At this point, the protective valve caps can be removed and the cylinders correctly oriented. To facilitate this, the straps should be loosened slightly, and retightened afterwards.

10. **Do not remove** the outlet safety plugs until indicated in the corresponding chapter of this manual.

1.5.4 Brackets for a double row cylinder bank

CAUTION

**AT THIS STAGE OF THE INSTALLATION,
DO NOT REMOVE EITHER THE PROTECTIVE VALVE CAP
OR THE OUTLET SAFETY PLUG.**

The bracket assemblies for cylinders in double row banks consist of: two front and two rear channels, straps, bolts, nuts, washers, threaded rod, connecting nuts, wide washers and decorative end pieces. The manifold fixing consists of two vertical channels with two perpendicular horizontal ones, complete with straps, bolts, etc., as shown in Figure 23.

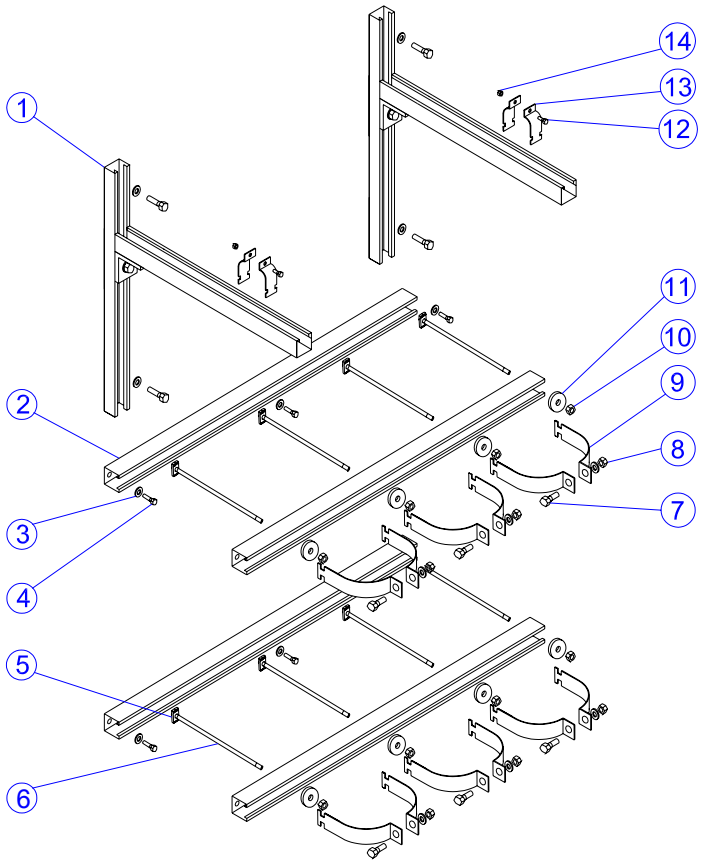


Figure 23

No.	Description
1	390x500 Manifold bracket 650x500 Manifold bracket
2	Bylinder bank cylinder channel
3	Flat washer A 10.5 DIN 125 ZP
4	Hex. bolt M-10x30 DIN 933 ZP
5	M-10 Unistrut channel nut without spring
6	M-10 ZP Threaded rod
7	Hex. bolt M-10x40 DIN 933 ZP
8	Hex. lock nut M-10 DIN 985 ZP
9	Cylinder clamp

10	Hex. nut M-10 DIN 934 ZP
11	M10x40x3 Wide washer
12	Bolt: M-6x30 => Pipe: 1/2" - 1 1/4" M-8x35 => 1 1/2" - 3" M-10x45 => 4" - 6"
13	Manifold clamp
14	Nut: M-6x30 => Pipe: 1/2" - 1 1/4" M-8x35 => 1 1/2" - 3" M-10x45 => 4" - 6"

For the assembly of the brackets of the cylinders in manifold system in double row, follow the next guidelines:

1. Position the rear channels of the cylinder bank up to the wall, at the height above the floor indicated in table 2 (lengths A and B), and mark the centre of the holes to be drilled.

2. Make hole with 10 mm of diameter in the quoted marks, in the surface where the rear channels will be fixed and screw the channels to the wall. It is advisable to make a hole of anchorage for each two cylinders and always in the end of the channels.

3. Ensure that all the cylinders in the bank have their valve protective caps and outlet safety plugs in place.

4. Position the cylinders (without removing the valve protective caps and outlet safety plugs) against the channel and aligned with reference to the manifold check valves and the discharge hose. The bolt that supports the channel for the first cylinder channel must be located 50 mm from the end of the channel.

5. If the manifold is not installed, measure the distance from axis to axis of their retain valves. That will be the distance to be leaven between the symmetrical axis from cylinder to cylinder (see Figure 21).

6. Once the cylinders are in place, place the threaded rod between them and at the ends of the channel, together with their channel linkage nuts. To do this, the nuts must be inserted in a horizontal position and then turned clockwise 90º to a vertical position, so that the slots in the nuts engage in the channel.

7. Once the cylinders are placed, put between them and the ends of the channel, the threaded rod with the join nuts to the channel. For this reason, it is necessary to introduce the nuts in horizontal position and then turn to the right 90º to their vertical position, so that the notches fit onto the channel.

8. Place the two front channels making them to pass by the threaded rods across their holes.

9. Insert the quoted join (point 8) with the respective nut and washer of wide wing.

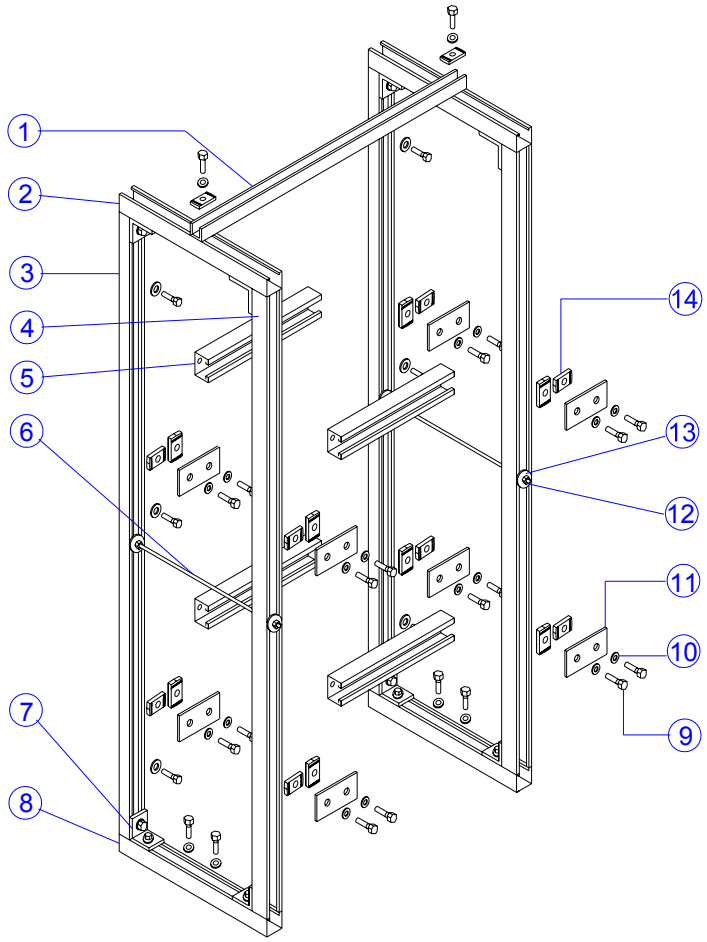
10. Assemble the second row of cylinders as mentioned in the points from 4 to 7 of the previous guideline “Brackets for cylinders in manifold system in single row”.

11. At this point, the protective valve caps can be removed and the cylinders orientated so that the valve pressure gauges are facing forwards and can be read. To orientate the rear cylinders, the threaded rods must be loosened slightly, and retightened afterwards. To orientate the front cylinders, the straps must be loosened slightly, and retightened afterwards.

12. **Do not remove** the outlet safety plugs until indicated in the corresponding chapter of this manual.

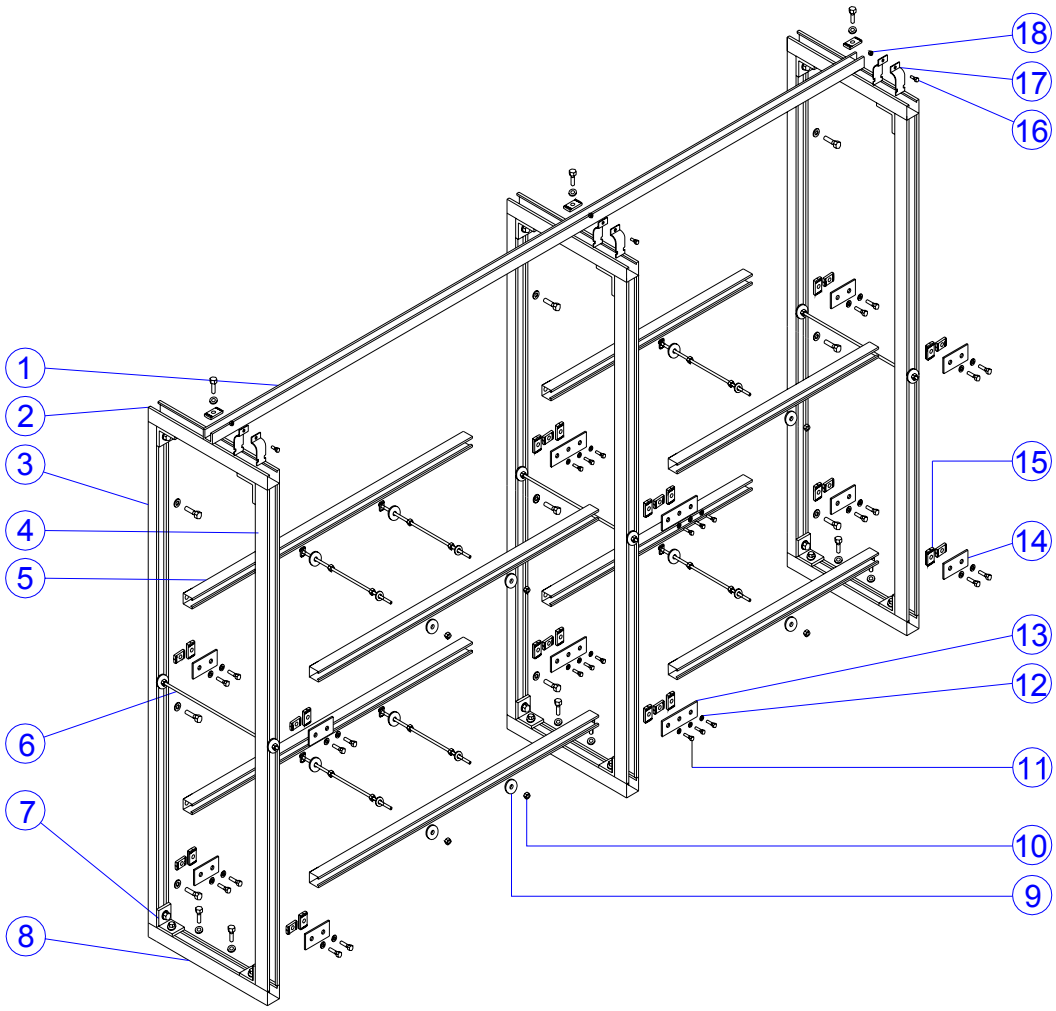
1.5.5 Brackets for a single cylinder with continuous weighing (modular, single and double row)

This fixing system has a horizontal frame in the top part of the brackets, designed to anchor the individual weighing systems on which the charged cylinders rest. This type of fixing is like a cage enclosing the cylinders, anchored either to the wall or the floor, or both.



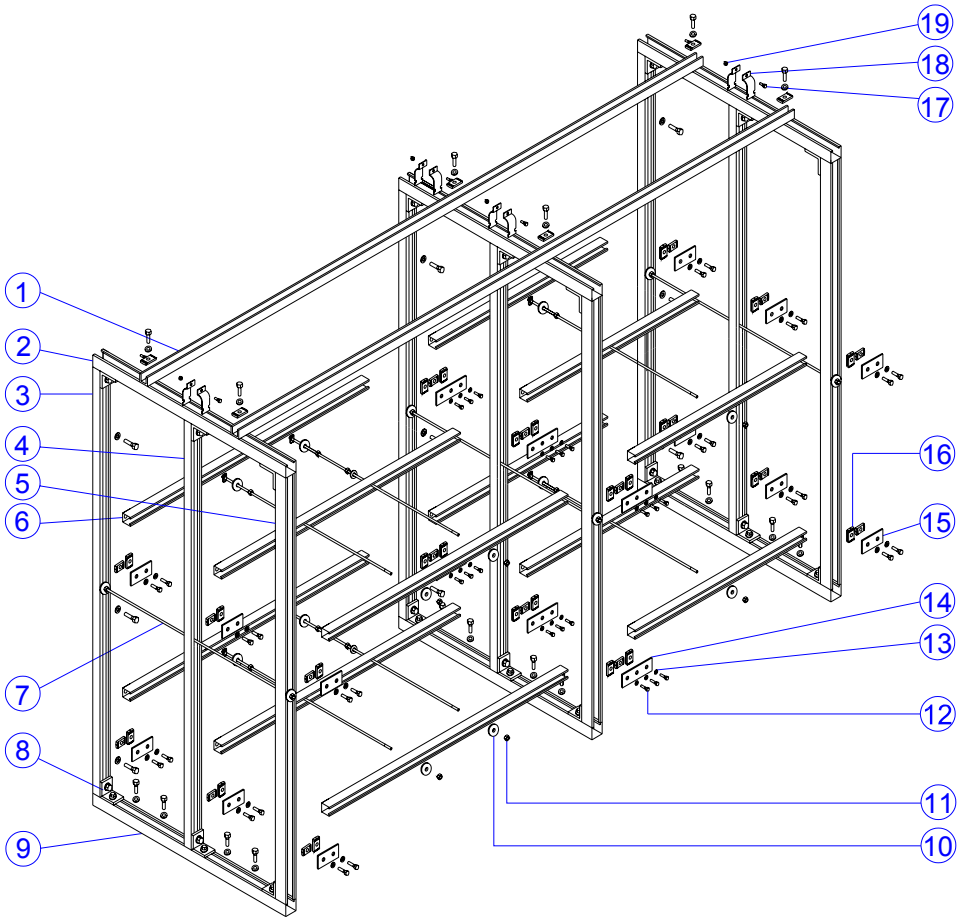
Fixing brackets for modular cylinders

Nº	Denomination
1	Framework
2	Top horizontal side lane
3	Rear vertical side lane
4	Front vertical side lane
5	Manifold system cylinder channel
6	Varilla roscada M-10 HC / M-10 ZP Threaded rod
7	2 Holes square
8	Lower horizontal side lane
9	Ex. screw M-10x40 DIN 933 ZP
10	Washer flat A 10.5 DIN 125 ZP
11	2 Holes Billet
12	Ex. nut M-10 DIN 934 ZP
13	M10x40x3 Washer
14	M10 nut without spring lane unistrut



Bracket for single row cylinder bank with continuous weighing

Nº	Denomination
1	Framework
2	Top horizontal side lane
3	Rear vertical side lane
4	Front vertical side lane
5	Manifold system cylinder channel
6	M-10 ZP Threaded rod
7	2 Holes square
8	Lower horizontal side lane
9	M10x40x3 Washer
10	Ex. nut M-10 DIN 934 ZP
11	Ex. screw M-10x40 DIN 933 ZP
12	Washer flat A 10.5 DIN 125 ZP
13	3 Holes billet
14	2 Holes Billet
15	M10 nut without spring lane unistrut
16	Screw: M-6x30 => Pipe: 1/2" - 1 1/4" M-8x35 => 1 1/2" - 3" M-10x45 => 4" - 6"
17	Manifold clamp
18	Nut: M-6x30 => Pipe: 1/2" - 1 1/4" M-8x35 => 1 1/2" - 3" M-10x45 => 4" - 6"

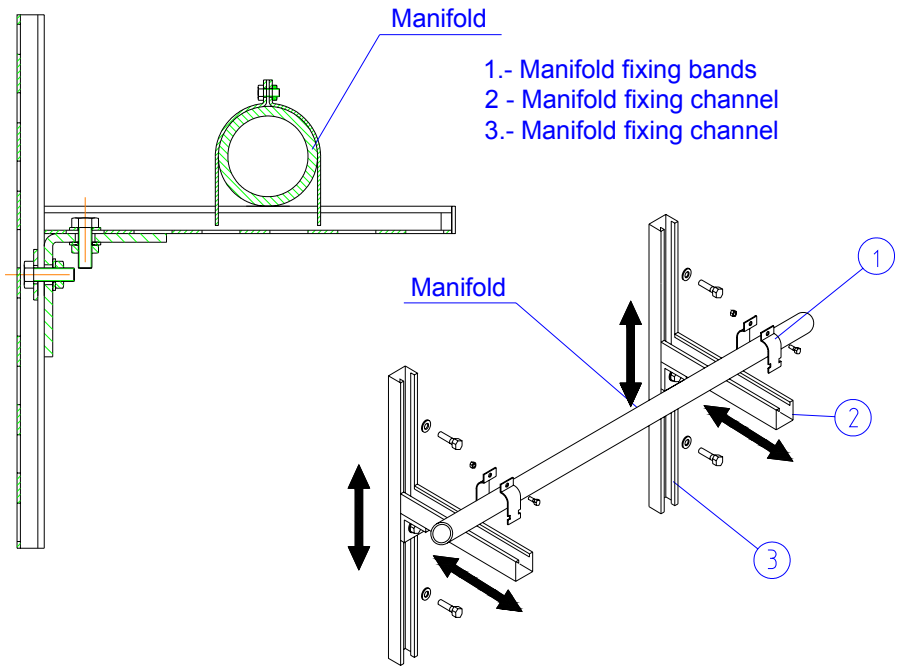


Bracket for double row cylinder bank with continuous weighing

Nº	Denomination
1	Framework
2	Top horizontal side lane
3	Rear vertical side lane
4	Central vertical side lane
5	Front vertical side lane
6	Manifold system cylinder channel
7	M-10 ZP Threaded rod
8	2 Holes square
9	Lower horizontal side lane
10	M10x40x3 Washer
11	Ex. nut M-10 DIN 934 ZP
12	Ex. screw M-10x40 DIN 933 ZP
13	Washer flat A 10.5 DIN 125 ZP
14	3 Holes billet
15	2 Holes Billet
16	M10 nut without spring lane unistrut
17	Screw: M-6x30 => Pipe: 1/2" - 1 1/4" M-8x35 => 1 1/2" - 3" M-10x45 => 4" - 6"
18	Manifold clamp
19	Nut: M-6x30 => Pipe: 1/2" - 1 1/4" M-8x35 => 1 1/2" - 3" M-10x45 => 4" - 6"

1.6 INSTALLING THE MANIFOLD AND MANIFOLD BRACKETS

These consist of two channels that form a 90º angle. The channel that is against the wall is the wall fixing and the one that supports the manifold is the manifold fixing.



To install the discharge manifold and its brackets, follow the instructions below:

1. Fit the wall bracket channel at the correct height using suitable safety bolts. Before carrying out this operation the correct height of the manifold must be calculated.

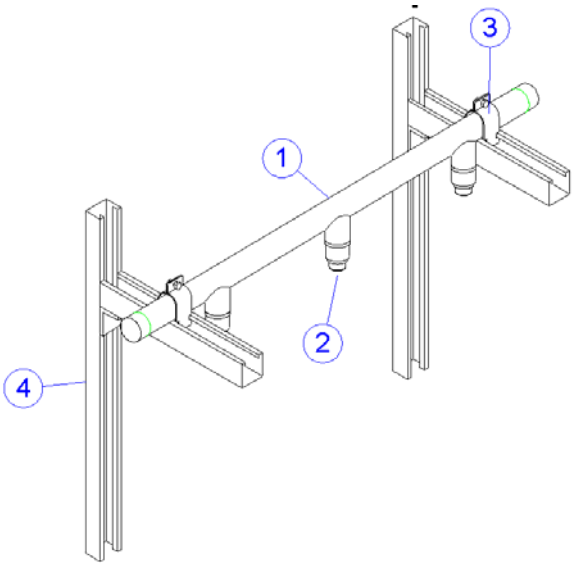
   The joint between the two channels can be made using a 90º solid bracket bolted to the channels, to allow the manifold support channel to be moved vertically to its correct position.

2. Fit the other channel (the manifold support) forming a 90º angle with the rear channel using the corresponding steel bracket. Lightly tighten the solid bracket bolts without over-tightening. The manifold support channel can be slid in the wall channel until it is in the ideal position.

3. Place the manifold clamps or straps in the channel.

4. Place the manifold between the clamps and gently tighten. Due to the form of the channel, the manifold can be slid along it until it is in its ideal position.

5. Finally, when the manifold is installed in the correct position, fully tighten the solid bracket, and the strap nut and bolt.



1.- Manifold
2 - Check valve
3.- Manifold fixing band
4.- Manifold fixing channel

Installing the manifold brackets

1.7 INSTALLING CHECK VALVES IN THE DISCHARGE MANIFOLD

These valves are connected between the discharge hose and the manifold, forcing the gas to flow in only one direction, from the hose to the manifold. The valves prevent gas from escaping from the pipework during a discharge (except, of course, into the protected hazard area), should a cylinder not be connected to the manifold.

They are positioned perpendicular to the manifold centre line, or failing that, at no more than 45º to the vertical. They are supplied from the factory screwed into the manifold socket.

These valves have a telescopic mechanism which slides up and down. This system avoids problems which screwing in the discharge hoses, when the floor on which the cylinders rest is irregular, the cylinders are of different heights or a weighing system is fitted.

The check valves can be installed when the manifold is already fitted to its brackets, or by putting the manifold on a workbench. This instruction is valid for the following check valve models: VALAN-40-23 and VALAN-50-125.

CAUTION

THE CHECK VALVES ARE ASSEMBLED IN THE FACTORY IN THE DISCHARGE MANIFOLD AND THEREFORE DO NOT REQUIRE ANY FORM OF HANDLING.

NEVERTHELESS, THE INSTRUCTIONS IN THIS CHAPTER CAN BE USED FOR OPERATIONS AND GUIDANCE FOR POSSIBLE REPLACEMENT DUE TO MALFUNCTION OR BREAKDOWN.

To install the check valves in the discharge manifold, follow the instructions below:

To install the check valves in the discharge manifold, follow the instructions below:

1. Ensure that the manifold is properly secured by its brackets or on the workbench.

2. Check that interior threads of manifold sockets are clean and free from impurities. Clean the threads with a wire brush for threads.

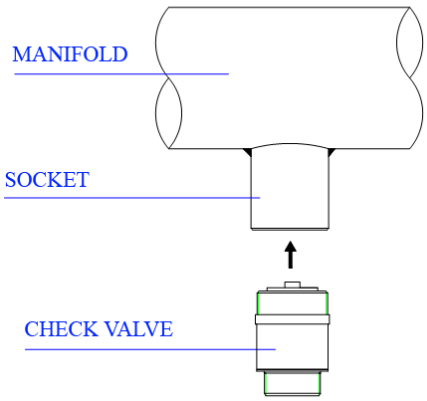
3. Hold the valve by hand and put Teflon tape or paste on to the male thread that is to be screwed into the manifold (2" thread for the VALAN-40-23 and 2 1/2" thread for the VALAN-50-125). If using Teflon tape, wrap 20 turns around the male thread of the check valve, if using paste cover the second turn or thread of the male thread, and to the female thread of the manifold socket. If a liquid thread sealant is to be used, before starting, ensure that it is compatible with the gas with which it will come in contact, in this case, halocarbonated gases (HFC-227ea, HFC-125 or HFC-23).

4. Screw the check valve fully into the manifold socket with spanner for these valves. After this operation, none of the male valve thread must be visible as it must be completely screwed in.

5. Check, pressing with the index finger on the spindle or ball, that the internal movement of the check valve is right.

Positioning of the check valve once installed in the manifold

The usual position of the check valve, once installed, is vertical as shown in figure 1, but it may also be fitted at up to 45º to the vertical plane (figure 25).



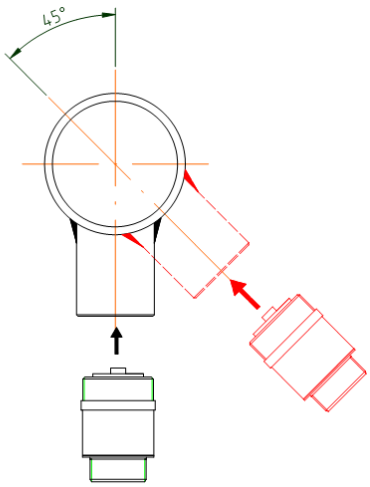


Figure 24 Figure 25

1.8 INSTALLING THE PRESSURE SWITCH

The pressure switch is actuated by the pressure of the extinguishing agent at the moment of discharge. As it is actuated, an electrical signal is transmitted which can be used to signal to the fire panel that the system has discharged.

It has two contacts, one NC (normally closed) and the other NO (normally open) which change state when the switch is actuated, and either can be used depending on the requirements of each installation.
It also incorporates a lever that must be reset after each discharge for the device to work again. Once actuated, **the resetting is done manually, by pulling the ball outwards**.

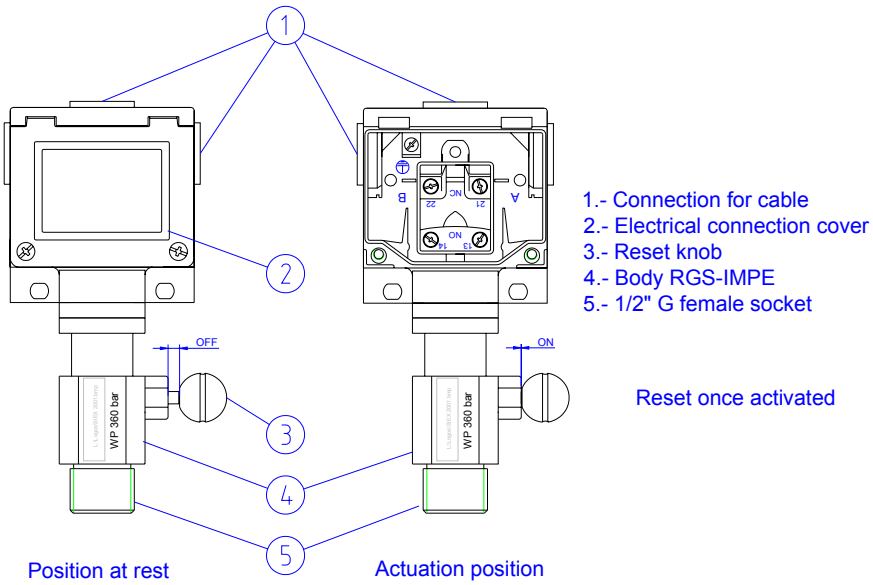


Figure 26

Technical and electrical features of the pressure switch are as follows:

Technical Information

Operating medium	HFC-227ea, HFC-125, HFC-23
Location	Discharge Manifold
Case	Metallic
Pressure connection	Brass
Connection thread	1/2" BSP
Working temperature	-40ºC to 60ºC
Activation pressure	6 bar and up
Tolerance	+/- 0.34 bar
Working pressure at 50ºC with HFC-227 at 24 bar	34 bar
Working pressure at 50ºC with HFC-227 at 42 bar	56 bar
Working pressure at 50ºC with HFC-125 at 24 bar	40 bar
Working pressure at 50ºC with HFC-125 at 42 bar	75 bar
Working pressure at 50ºC with HFC-23	137 bar
Mechanical durability in millions of operations	2
Protection grade	IP66
Connection for cable	3 threaded inlets for a tow press M20x1.5
Instalation	No corrosivo; en interiores / Non corrosive; indoors

Normally the switch is installed on the discharge manifold of cylinder bank systems, in the ½" BSP female socket welded on to the manifold. It may also be installed in the pilot port of the cylinder valve, in modular (single) cylinder systems, through a flexible release hose, and a 1/2" BSP to 1/4" BSP reducer.

1.8.1 Installing the pressure switch on the discharge manifold (cylinder bank)

To install the latching pressure switch in the discharge manifold, follow the instructions below:

CAUTION

BEFORE FITTING THE PRESSURE SWITCH, ENSURE THAT THE CYLINDER BANK MAIN VALVE DOES NOT HAVE EITHER THE ELECTRICAL OR MANUAL RELEASE HEAD CONNECTED.

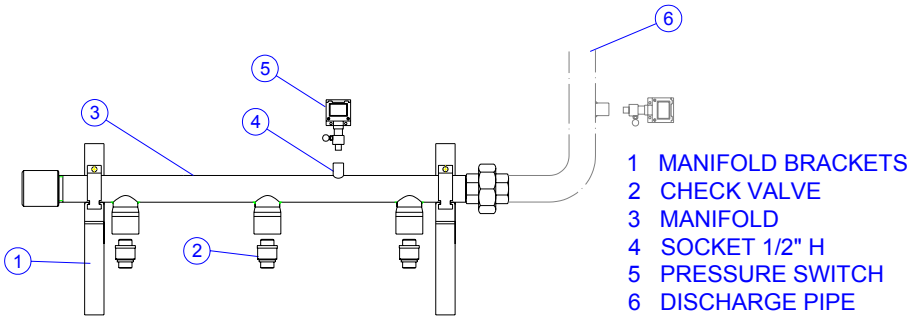


Figure 27

1. Ensure that the discharge manifold is properly secured to its brackets and that the actuation devices of the cylinder banks (electrical and manual release heads) are removed or out of service.

2. Disconnect the release hose screwed to the cylinder or pilot bottle to prevent accidental discharge of the cylinder banks.

3. Before fitting the pressure switch, check that it operates properly by pressing with a screwdriver or punch into the 1/2" BSP pressure sampling point orifice. On carrying out this operation, the actuation pin (part on which the pressure is exerted) must be latched and the reset knob will move to the ON position. To unblock it, pull the knob or ball of the resetting device outwards, the actuation pin returns to its original position and the reset knob goes to the OFF position.

   If, during the test, the pressure switch does not operate correctly, send it to SIEX for further testing.

4. Hold the pressure switch by hand, and wrap Teflon tape around the 1/2” BSP male connecting thread (18 turns approximately).

5. Screw it into the 1/2" BSP female socket on the upper part of the manifold - the socket that is welded to the manifold. Use a 28 mm non-adjustable spanner placing the flat faces on the body of the switch. Tighten it until all the threads have been screwed in.

6. Detach the electrical connection cover, by removing its two screws, in order to make the switch electrical connection to the cable from the fire panel. It has two contacts inside, one normally closed and the other normally open; either may be used depending on the installation requirements (see diagram in point 10 of section 1.8.2.).

1.8.2 Installing the pressure switch on modular cylinder systems

To install the latching pressure switch in modular cylinder systems, follow the instructions below:

CAUTION

**BEFORE FITTING THE PRESSURE SWITCH,
ENSURE THAT THE CYLINDER VALVE,
IS NOT CONNECTED TO
EITHER THE ELECTRIC OR MANUAL RELEASE HEAD.**

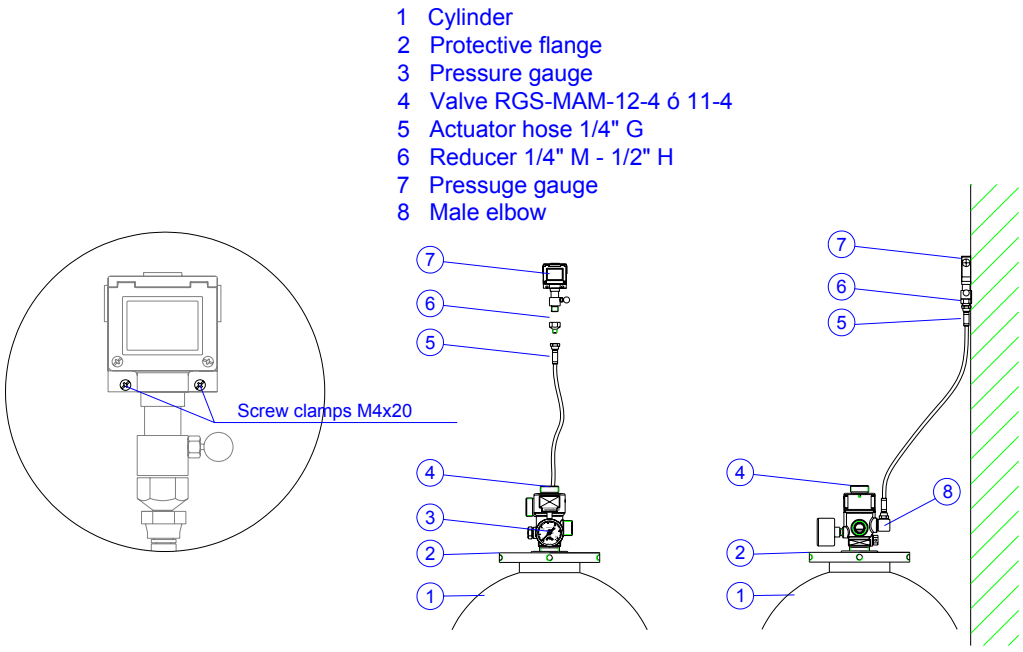


Figure 28

1. Ensure that the cylinder is properly secured to its brackets and that the actuation devices of the cylinder banks (electrical and manual release head) are removed or out of service.

2. Install the 1/4" BSP elbow in the valve pilot port, as is indicated in point 1.13 of this manual “Installing the main valve pilot port”.

3. Before fitting the pressure switch, check that it operates properly by pushing a screwdriver or punch into the 1/2" BSP pressure port. When carrying out this operation, the actuation pin (part on which the pressure is exerted) must be latched and the reset knob will move to the ON position. To unblock it, pull the knob or ball of the resetting device outwards. The actuation pin returns to its original position and the reset knob goes to the OFF position.

   If, during the test, the pressure switch does not operate correctly, send it to SIEX for further testing.

4. Hold the pressure switch by hand, and wrap Teflon tape around the 1/2” BSP male connecting thread (18 turns approximately).

5. Screw the 1/2" BSP female to male 1/4" BSP reducer to the 1/2" BSP pressure sampling point. Teflon paste may also be used (on the male thread of the switch and the female of the reducer).

6. Position and screw the pressure switch to the wall. Check that the joint is secure and sound.

7. Screw the other end of the flexible release hose to the 1/4" BSP elbow of the cylinder valve. Do not use Teflon or glue, or any other type of sealant, since the seal is made between the male cone on the hose and the female cone of the elbow. Tighten these connections fully with a spanner to avoid leaks.

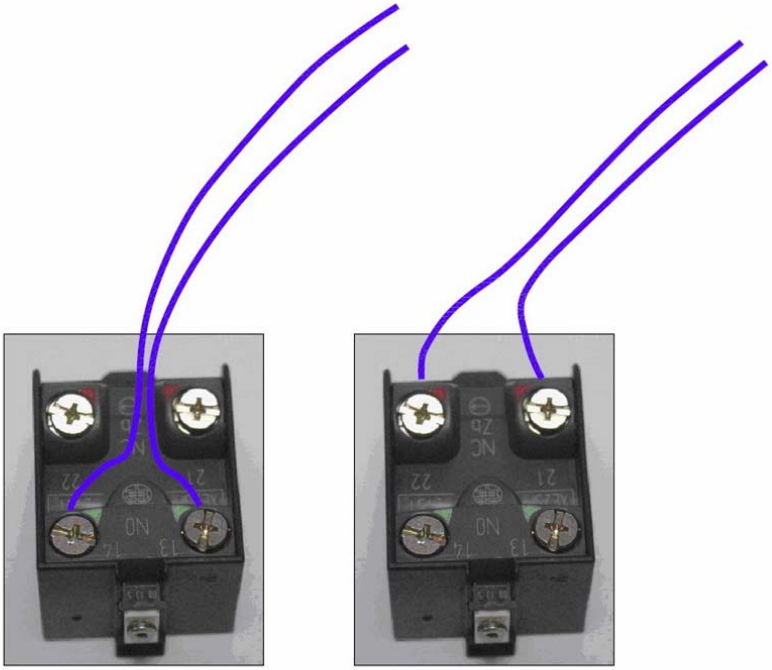
CAUTION

THE FLEXIBLE DISCHARGE HOSE MUST BE CONNECTED TO THE PRESSURE SWITCH BEFORE BEING SCREWED ONTO THE ELBOW ON THE CYLINDER VALVE PILOT PORT.

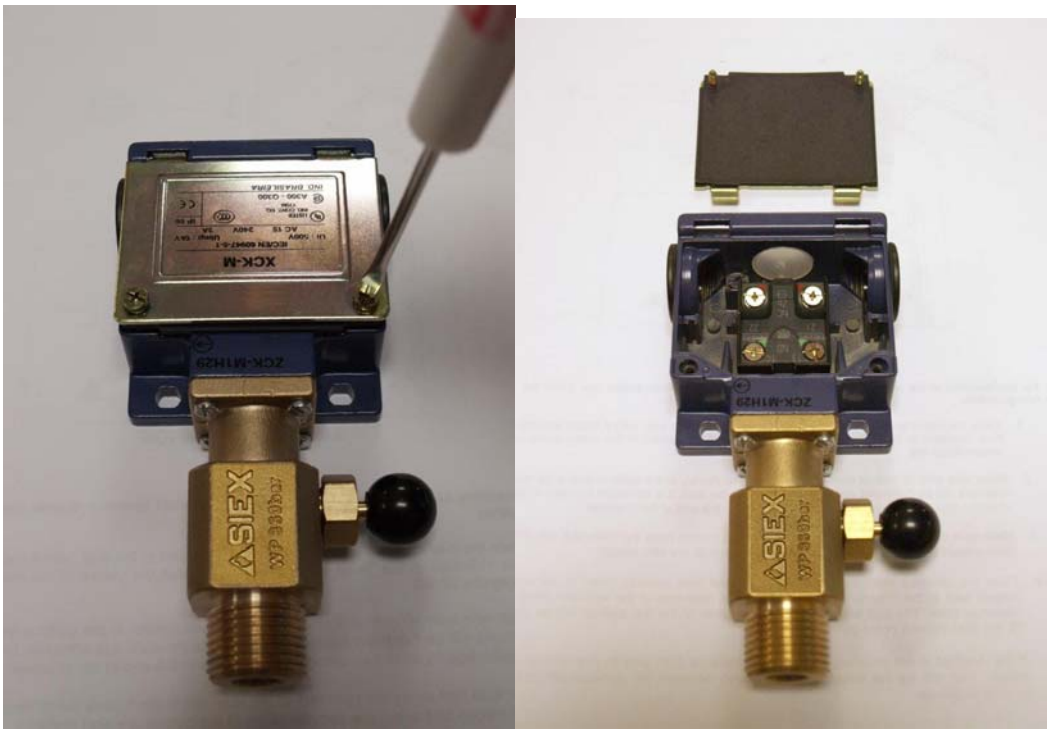
8. To make the electrical wiring connection between the switch and the fire panel, take away the electrical connection cover by removing its two screws. It has two contacts inside, one normally closed and the other normally open; either may be used depending on the installation requirements (See sketch).

9. Fully re-tighten **the two swivel union nuts on the hose with a spanner** to achieve a gas-tight seal.

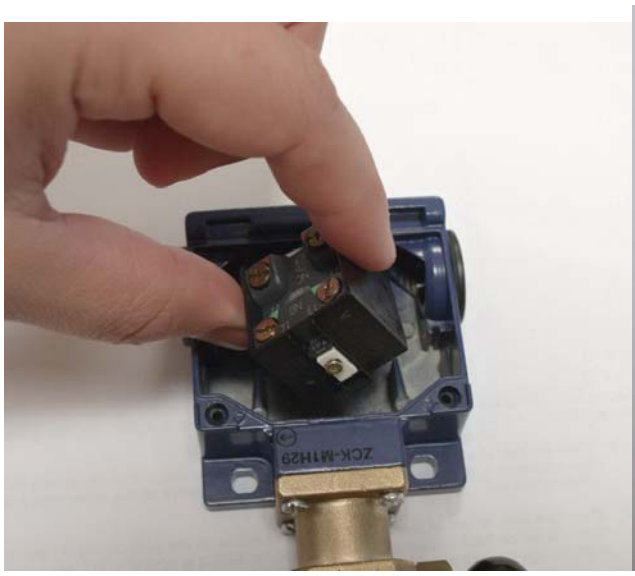
10. Detach the electrical connection cover, by removing its two screws, in order to make the switch electrical connection to the cable from the fire panel. It has two contacts inside, one normally closed and the other normally open; either may be used depending on the installation requirements.



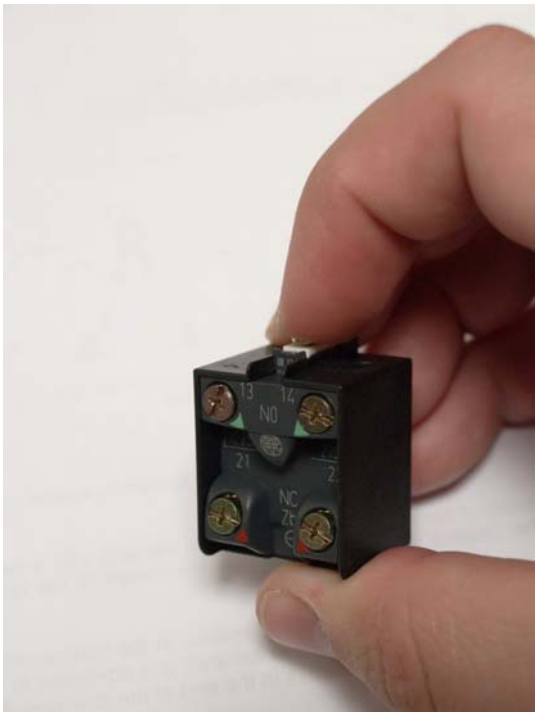
► Remove the cover of the electrical system box.



► Remove the electrical unit from the housing without disconnecting the wiring.



► Press on the lower switch until the upper terminals are shortcircuited by the connecting rod. Check that the control panel receives the corresponding alarm signal.



► Replace the electrical unit of the switch in the housing and rest the pressure switch by pulling on the built-in ball.

1.9 INSTALLING THE MANIFOLD PRESSURE RELIEF VALVE (BURST DISC)

This device is only used on cylinder systems with directional or isolating valves. In the event of an accidental discharge of the extinguishing agent, the gas would remain blocked in the manifold until the burst disc of the exhaust valve detected an excess pressure and allowed the gas to exhaust to the outside in a controlled manner.

The safety membrane is factory fitted with the appropriate operating torque. The exhaust pipe should discharge outside, away from the hazard area or the cylinder bank storage area.

This is a safety mechanism whose purpose is to prevent excess pressure was building up in the manifold when there are stop valves fitted which prevent the extinguishing agent from discharging.

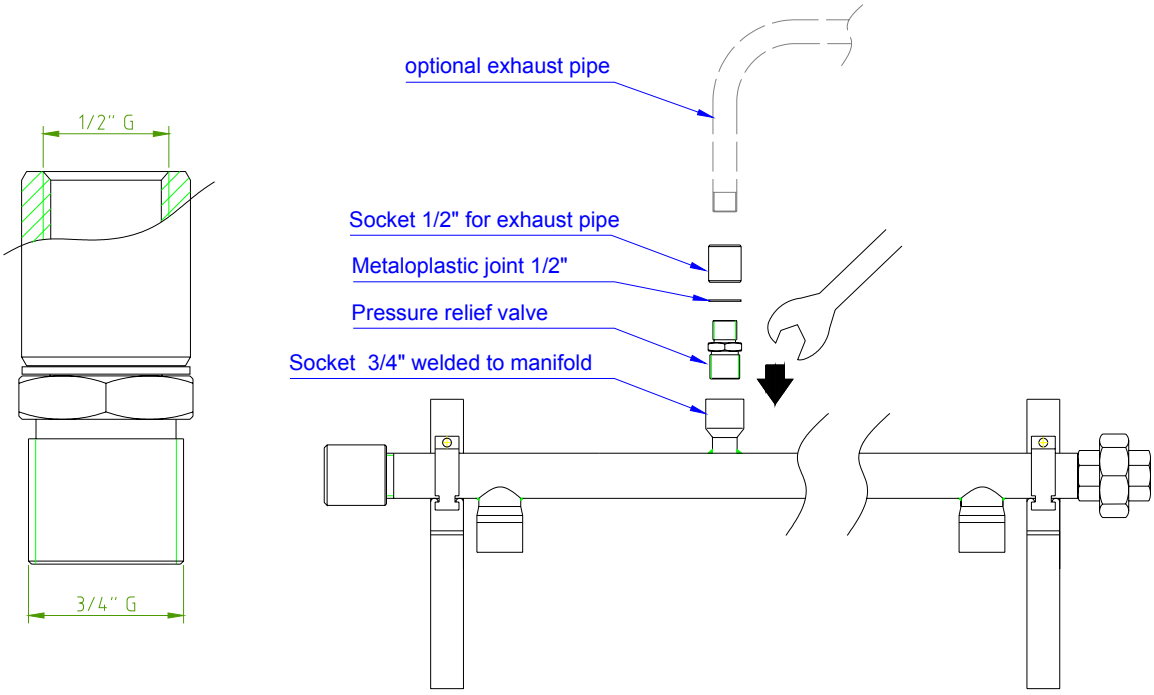


Figure 29: Manifold pressure relief valve. (Code: POVREC20)

Technical Information

Operating medium	HFC-227ea, HFC-125, HFC-23
Location	Discharge manifold
Material	Brass
Body working pressure	137 bar
Body test pressure	1080 bar
Average bursting pressure	185 +-5 bar
Inlet connection	3/4" BSP
Outlet connection	1/2" BSP
Bore size	Ø 6,30 mm

1.10 INSTALLING DISCHARGE HOSES

1.10.1 Single cylinder system (modular cylinder)

The discharge hose must first be screwed into the discharge pipe, and then to the cylinder valve, in that order.

CAUTION

THE FLEXIBLE DISCHARGE HOSE OR VALVE OUTLET ADAPTOR IN THE CASE OF SINGLE (MODULAR) CYLINDERS MUST BE CONNECTED TO DISCHARGE PIPING BEFORE BEING SCREWED ONTO THE CYLINDER VALVE.

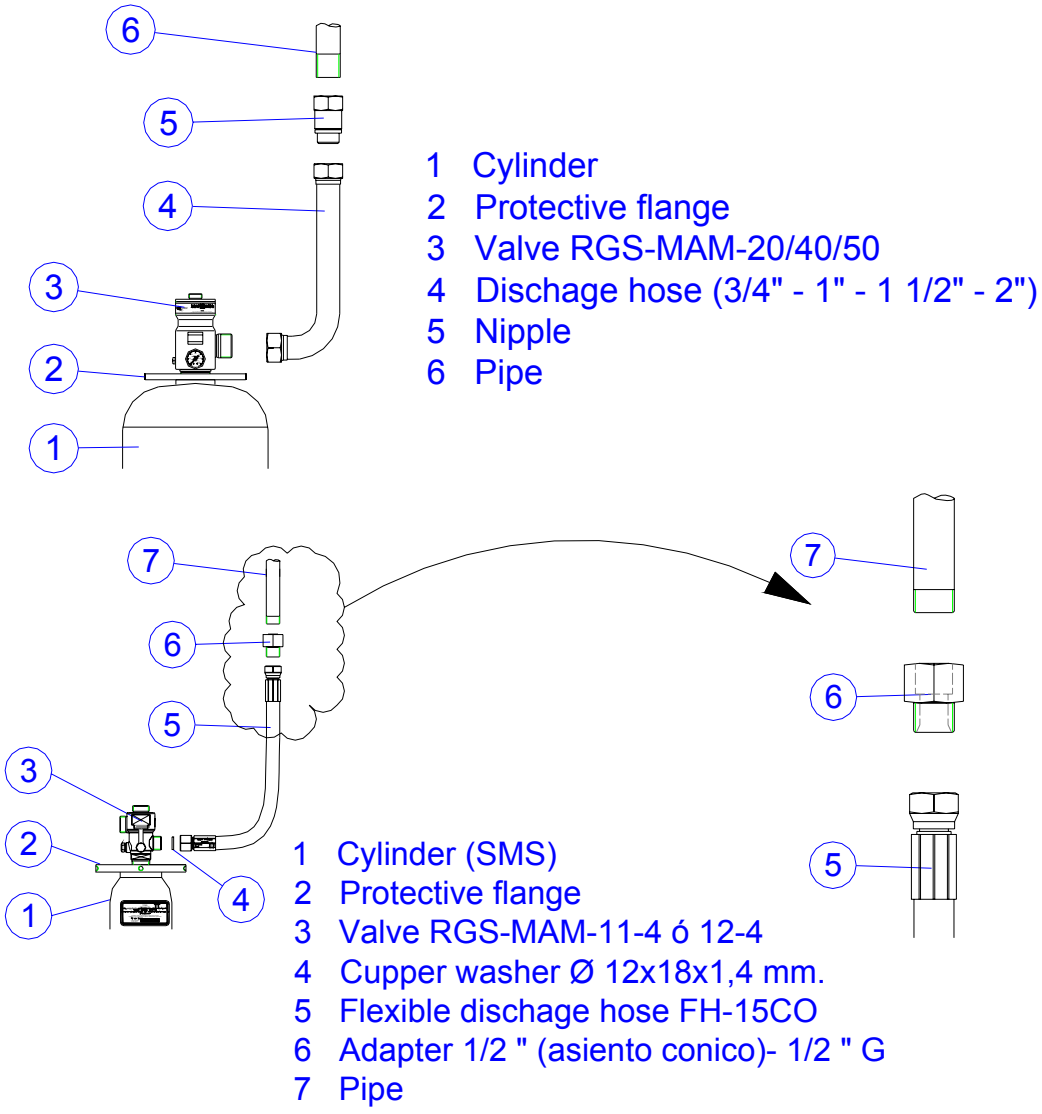


Figure 30

To install the discharge hose in to a modular cylinder system, follow the instructions below:

1. First screw the adaptor or male-female nipple onto the discharge pipe.

   The male thread of the nipple must have a conical seating to ensure that it seals with the swivel nut on the ½", 3/4", 1", 1 1/2" or 2" discharge hose. The female thread of the nipple must be a standard pipe thread with a flat seating. To connect the adaptor or nipple to the discharge pipe, use Teflon tape on the male thread of the pipe.

   The table below shows the various adaptors or nipples that must be used for each one of the discharge hoses used in modular cylinder halogenated gas systems.

Type Discharge hose	Adaptor or nipple	Cylinder valve
FH-20HC 3/4" BSP flexible hose	¾" BSP male thread with conical seating, ¾" female thread with flat seating	RGS-MAM-20
FH-25HC 1" BSP discharge hose	1" BSP male thread with conical seating, 1" BSP female thread with flat seating	
FH-40HC 1 1/2" BSP discharge hose	1 1/2" BSP male thread with conical seating, 1 1/2" BSP female thread with flat seating	RGS-MAM-40
Discharge hose FH-50HC 2" BSP	2" BSP male thread with conical seating, 2" BSP female thread with flat seating	RGS-MAM-50
FH-15CO discharge hose W 21.8x1/14" F to 1/2" BSP	½" BSP male thread with conical seating, ½" BSP female thread with flat seating	RGS-MAM- 11-4 y 12-4

2. Screw one end of the corresponding discharge hoses (see table above) to the nipple. To do this, screw the female swivel nuts of the hose onto the male thread of the nipple. Do not use Teflon or glue, or any other type of thread sealant, since the seal is made between the male cone on the hose and the female cone of the nipple. Fully tighten these connections with a non-adjustable or adjustable spanner to avoid leaks.

3. Remove the cylinder valve protective caps, having first ensured that the cylinder is properly secured to the wall by its brackets. Do not remove the outlet safety plug from the valve yet.

4. Place the cylinder in position, with the valve outlet facing the discharge hose that is already connected to the discharge pipe, and secure it with its straps and bracket. In this operation, sometimes it is necessary to slightly slacken off the cylinder straps to be able to correctly orientate the valve outlet. Take care to re-tighten the straps so that the cylinder is properly secured to the wall by its brackets.

   Remember that the discharge hose has to be screwed in to the discharge pipe before being screwed into the valve output, as stated in point 2.

5. Remove the safety plugs from the cylinder valve output ports. Check that the bracket straps are properly tightened.

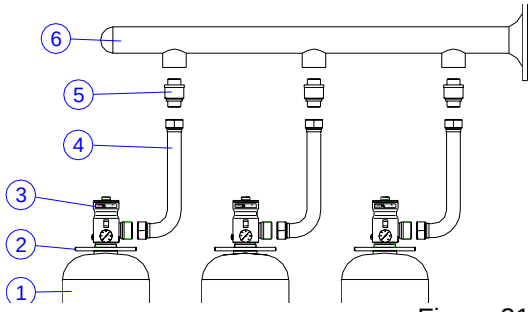
6. Screw the other end of the flexible or rigid discharge hose (½", 3/4", 1", 1 1/2" or 2"), into the outlet port of the cylinder valve (RGS-MAM-20/40/50/11-4 or 12-4). To do this, screw the hose's female swivel nut onto the male thread of the valve. Do not use Teflon, glue or any other type of thread sealant, since the seal is made between the male cone of the hose and the female cone of the valve outlet in the case of valves RGS-MAM-20/40/50, and via a copper washer in the case of valves RGS-MAM-11-4 and 12-4. Tighten this connection fully with a spanner to avoid leaks.

1.10.2 Cylinder bank

The discharge hoses must be screwed first to the manifold check valves and then to the cylinder valves.

CAUTION

THE FLEXIBLE DISCHARGE HOSES OR VALVE OUTLET ADAPTORS IN THE CASE OF CYLINDER BANK SYSTEMS MUST BE CONNECTED TO THE MANIFOLD CHECK VALVES BEFORE BEING SCREWED ONTO THE CYLINDER VALVES.



1 Cylinder
2 Protective flange
3 Valve RGS-MAM-40/50
4 Discharge hose 1 1/2" - 2" G
5 Check valve (VALAN 40-23 / 50-125)
6 Discharge manifold

Figure 31

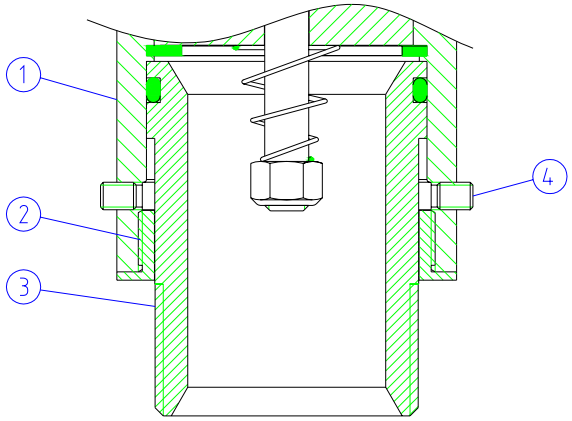
To install the discharge hoses in a cylinder bank system, follow the instructions below:

1. The check valves come ready assembled from the factory in the discharge manifold and so do not require any manipulation. Nevertheless, if it is necessary to replace them due to a malfunction or failure, bear in mind the steps described in chapter 1.7 of this manual (Installing check valves on the discharge manifold).

   The following table shows the relationships between the discharge hoses, the check valves and the cylinder valves used in cylinder bank halogenated gas systems.

Type Discharge hose	Check valve	Cylinder valve
FH-40HC 1 1/2” BSP discharge hose	VALAN-40-23	RGS-MAM-40
Rigid hose FH-50HC 2” BSP	VALAN-50-125	RGS-MAM-50

2. Screw one end of the corresponding discharge hoses (see table above) to the manifold check valves. To do this, screw the female swivel nuts of the hose onto the male thread of the check valves. **Do not use Teflon or glue, or any other type of thread sealant,** since the seal is made between the male cone on the hose and the female cone of the check valve. Fully tighten these connections with a non-adjustable or adjustable spanner to avoid leaks (approximate torque 15 Nm).



1 Body VALAN 40-23 / 50-125
2 Telescopic nut VALAN 40-23 / 50-125
3 Telescopic part VALAN 40-23 / 50-125
4 Lock bolts

vr034cid.dwg

When performing this operation, if the telescopic part of the check valve should rotate, tighten its two lock bolts with a 2.5 mm Allen key to prevent this turning movement.

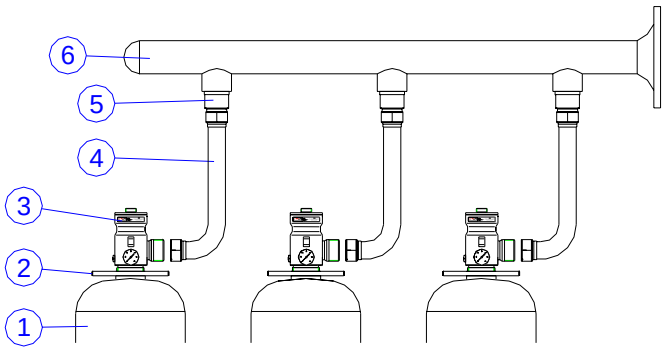
3. Remove the cylinder valve protective caps, having first ensured that the cylinder is properly secured to the wall by its brackets. Do not remove the outlet safety plug from the valve yet.

4. Position the cylinders, with the valve outputs facing the discharge hoses, which are already screwed onto the manifold, and secure them with their straps and brackets. In this operation, it is sometimes necessary to slightly slacken off the cylinder straps to be able to correctly orientate the valve outlets. Take care to re-tighten the straps so that the cylinders are properly secured to the wall by their brackets.

   Remember that the discharge hoses must be screwed onto the manifold before being screwed into the valve outputs, as stated in point 2.

5. Check that the bracket straps are properly tightened. Remove the safety plugs from the cylinder valve output ports.

6. Screw the other end of the rigid discharge hoses (1”, 1 1/2" or 2”), into the outlet ports of the cylinder valves (RGS-MAM-40/50). To do this, screw the female swivel nuts of the hoses onto the male thread of the valve outlets. **Do not use Teflon or glue, or any other type of thread sealant,** since the seal is made between the male cone on the hose and the female cone of the valve outlet. Tighten these connections fully with a spanner to avoid leaks.



1 Cylinder
2 Protective flange
3 Valve RGS-MAM-40/50
4 Discharge hose 1 1/2" - 2"
5 Check valve (VALAN 40-23 / 50-125)
6 Discharge manifold

1.11 INSTALLING 227CN PNEUMATIC DISCHARGE HEAD

The purpose of this discharge head is to pneumatically actuate the valves of the cylinders on which it is fitted. Once all the discharge hoses are connected the head will activate when the system is released and pressure reaches the head.

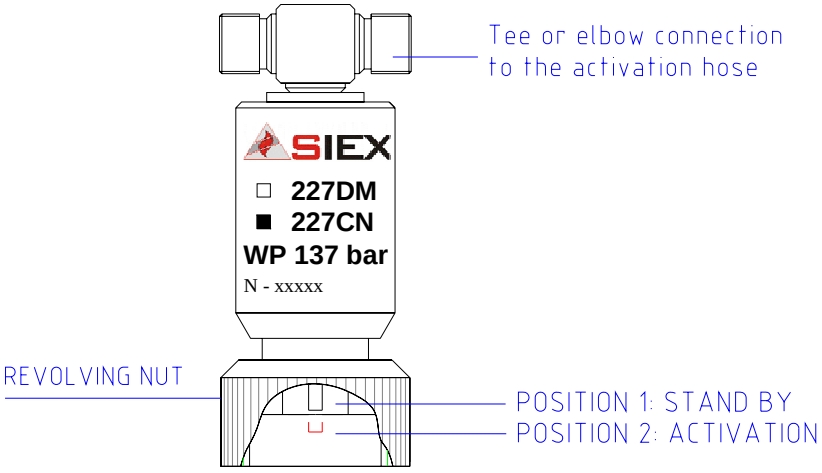
The pneumatic activator can be installed to the upper part of the container valve (activation port) or to the upper part of the electrical firing head (in cylinders that also possess electrical firing). Its function is to pneumatically activate the valve (RGS-MAM-50/40/20) on which it is assembled.

All the pneumatic heads have an integral “T” or an elbow/bend in its pneumatic activation port. This element is supplied from the manufacturer ready-adjusted together with its metal-plastic sealed joint.

CAUTION

BEFORE SCREWING IN THE PNEUMATIC RELEASE HEAD TO THE VALVE ACTUATION PORT, CHECK THAT THE ACTUATION PIN IS WITHDRAWN (POSITION 1).

IF THE ACTUATION PIN IS IN POSITION 2, WHEN SCREWING IN THE PNEUMATIC RELEASE HEAD, THE EXTINGUISHING GAS CONTAINED IN THE CYLINDER WILL DISCHARGE VIOLENTLY, WHICH MIGHT CAUSE SERIOUS INJURY TO TO THE PERSON HANDLING IT.



Technical Information

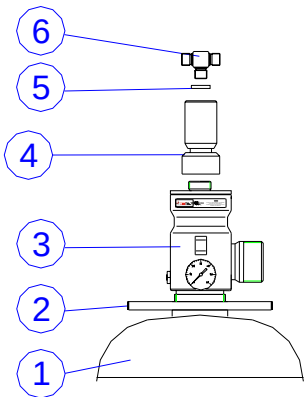
Operating medium	HFC-227ea, HFC-125, HFC-23, N2
Valve type	RGS-MAM-20/40/50/11-4/12-4
Material	Brass
Re-set requirements	Automatic (spring)
Working temperature	-20ºC to +50ºC
Connection to the valve (activation port) or to the electrical actuator (227SOL)	3/4" BSP (female)
Thread of the pneumatic activation port (for Tee or Elbow)	1/4" BSP (female)
Link between pneumatic actuator and Tee or Elbow	1/4“ metal plastic joint
Average pressure when N_2 pilot bottle is used	90 bar
Effective force at 50ºC with N_2 pilot bottle	1760 N
Design pressure	137
Resistance test pressure to the internal pressure	205.5
Test pressure for the actuator strength	411
Minimum duration of the activation pressure	10 sg

To install the pneumatic discharge head, follow the instructions below:

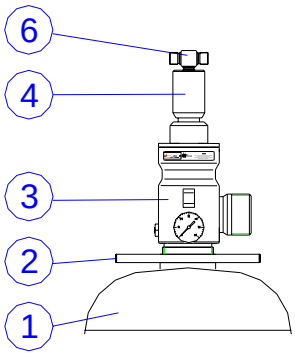
1. Make sure that the cylinder is well attached by its fittings. Check that the valve outlet is threaded to the discharge nipple and that this is threaded to the collector (cylinder bank) or discharge piping (single cylinder system).

2. Hold the pneumatic discharge head and visually check that the piston is in POSITION 1.

3. Remove the plastic safety cap from the activation port of the valve and thread the rotary nut of the pneumatic firing head into place. Do not use Teflon, adhesive, or any other type of thread sealant, simply manually tighten it completely.



1.- Cylinder.
2.- Protected bridle.
3.- RGS-MAM-20/40/50 valve.
4.- Pneumatic actuator.
5.- Metalic-plastic washer 1/4"
6.- Tee or male elbow.



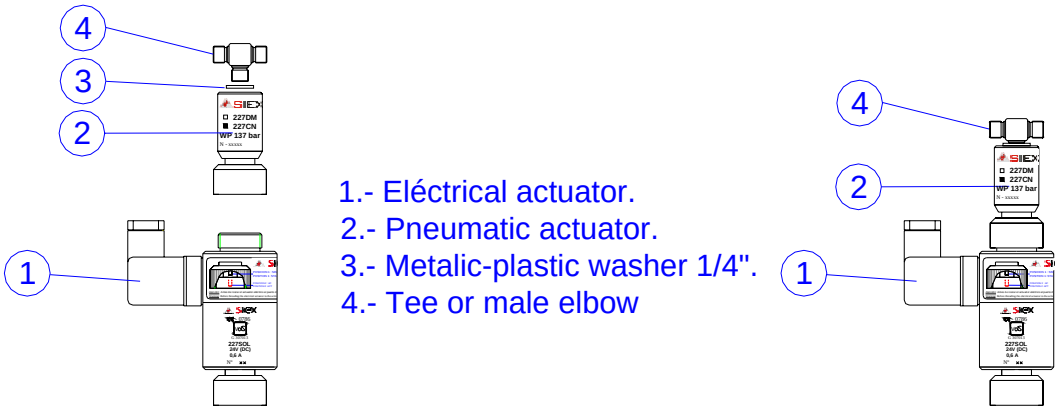
Remember that the link between the discharge head and the valve is made by a swivel nut mechanism that allows the head to be turned up to 360º to the desired position.

4. Point 3 of this section (above), in which the tightening of the pneumatic release head to the valve was described, must be qualified by the following point. It is advisable, before definitively tightening the swivel nut with the hand, to orientate the pneumatic release head with its tee or elbow towards the release hose. Once orientated the definitive tightening can be done. For more information, read chapter 1.12 (Installation of flexible release hoses), of this manual below.

5. In the case of threading directly to the electrical firing head follow the same instructions as in point 3 of this section.

CAUTION

BEFORE SCREWING IN THE ELECTRICAL RELEASE HEAD TO THE VALVE ACTUATION PORT, CHECK THAT THE ACTUATION PIN IS WITHDRAWN (POSITION 1).



6. Connect the corresponding flexible release hose as indicated in chapter 1.12 (Installing the flexible release hoses).

7. To remove the pneumatic release head from the valve, gently loosen the swivel nut by hand or with the hand. If it was screwed directly to the valve, the valve cover must not be turned during this operation, because if it is, the contents of the cylinder might discharge violently, possibly causing serious injury.

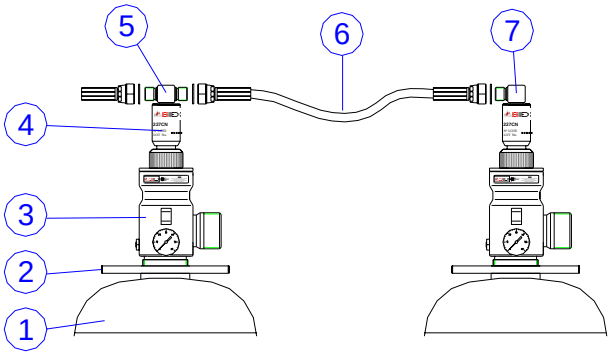
   Never remove the pneumatic release head when the cylinder is not secured to the wall by its brackets.

1.12 INSTALLING FLEXIBLE DISCHARGE HOSES

These are used as a conduit to pneumatically actuate or release the extinguisher gas cylinder valves. Their serial connections allow the gas, from the cylinder or pilot bottle, to flow through them and to actuate the various pneumatic heads of the auxiliary valves. They are linked together by pneumatic heads with a tee or elbow.

CAUTION

BEFORE SCREWING ON THE FLEXIBLE HOSES, ENSURE THAT THE MAIN VALVE (PILOT CYLINDER), DOES NOT HAVE ITS ELECTRIC OR MANUAL RELEASE HEAD FITTED.

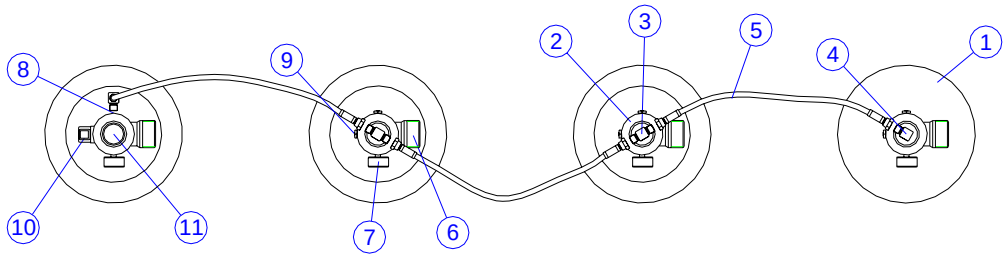


1 Cylinder
2 Protective bridle
3 Valve RGS-MAM-20/40/50
4 Pneumatic actuator 227CN
5 Male tee
6 Flexible actuator hose
7 Male elbow

To install the flexible release hoses, follow the instructions below:

1. Ensure that the cylinder is properly secured by its brackets. Check that the valve outlet is screwed to the discharge hose and this is connected to the manifold or discharge pipe.

2. Check that the pneumatic release heads are correctly orientated as indicated in the figure. If not, loosen the swivel nut and re-position them in the correct position. Tighten the pneumatic release heads as indicated in chapter 1.11 (Installing the 227CN pneumatic release head).



1.- Cylinder.
2.- RGS-MAM-20/40/50 valve.
3.- Male tee assembled into the pneumatic actuator.
4.- Male elbow assembled into the pneumatic actuator.
5.- Flexible actuator hose
6.- Valve outlet
7.- Pressure gauge.
8.- Pilot port.
9.- Presure switch connection.
10.- Electric actuator (227SOL).
11.- Manual actuator (227DM).

3. For banks of less than 5 cylinders (one of them being the pilot cylinder), screw in, of the ends of the first hose to the pilot port elbow of the cylinder valve, without using Teflon nor any other type of sealant, since they are sealed by a metal-to-metal bicone.

   To avoid possible accidental discharges of the cylinder banks, it is recommended to leave the end of the first hose, which has to be connected to the pilot cylinder, loose (not screwed in) at this time. When the system is completely finished and correctly installed, this hose will be the last to be connected.

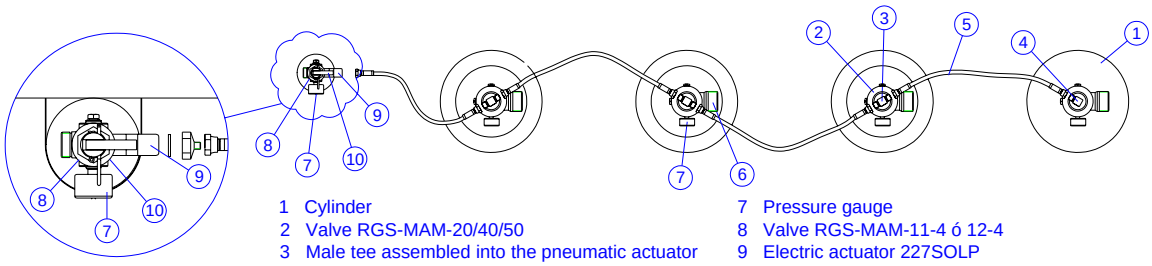
4. The other end of the hose is screwed to the tee or elbow (in a bank of two cylinders) of the pneumatic release head, in the same way as described above, without using Teflon or any type of sealant, since they are sealed by a metal-to-metal bicone.

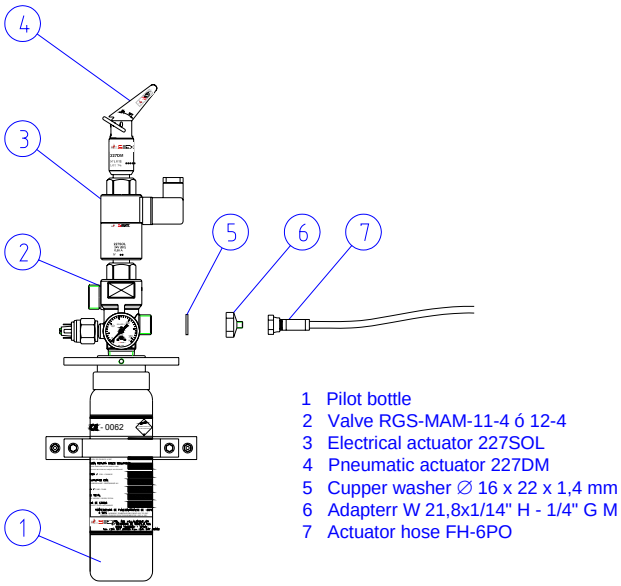
5. Repeat this operation successively until arriving at the last pneumatic release head which will have an elbow.

6. Once all the release hoses are installed, fully tighten, with a non-adjustable spanner, all the threaded joints between the hoses and the tees or elbows of the pneumatic release heads, to achieve a gas-tight seal.

7. In banks of more than 5 cylinders follow the same instructions, with the exception that the first cylinder will be a 2 litre pilot bottle. In this case, the first hose will be screwed to the adaptor that is located on the outlet of the pilot bottle valve. The following steps are the same as for a bank of fewer than 5 cylinders. Ensure, before screwing in the first hose, that the pilot bottle outlet does not have a small leak (easily checked with soapy water).

8. Re-check that all the swivel nuts of the pneumatic release heads are tight.





NOTE 1: It is recommended that, at this time, the end of the first hose that has to be connected to the cylinder or pilot bottle (points 3 and 7) is left loose (without screwing in). In this way, possible accidental discharges of the cylinder bank can be avoided.
When the system is completely finished and correctly installed, this hose will be the last to be connected.

1.13 INSTALLING THE CYLINDER VALVE PILOT PORT

All the RGS-MAM-20/40/50 valves have a ¼" BNP connection (pilot port), that is used so that the valve can operate as the main one in banks of fewer than 5 cylinders. When the main valve is actuated (by its release head), the gas flows through its outlet and pilot port, actuating the various pneumatic release heads, which, in turn, actuate the valves of the remaining cylinders.

When a bank of fewer than nine cylinders is used, the first acts as the pilot or main cylinder, and the rest as ordinary secondary cylinders.
In secondary cylinders, pre-installed in the factory, a ¼ " BSP plug threaded with Teflon tape will be fitted in the pilot port.
In the pilot cylinder, however, there is a threaded elbow fitted with Teflon tape. Then, at the customer's site, the flexible Teflon hose is fitted, without the need for sealant because the seal is made with a bicone.

CAUTION

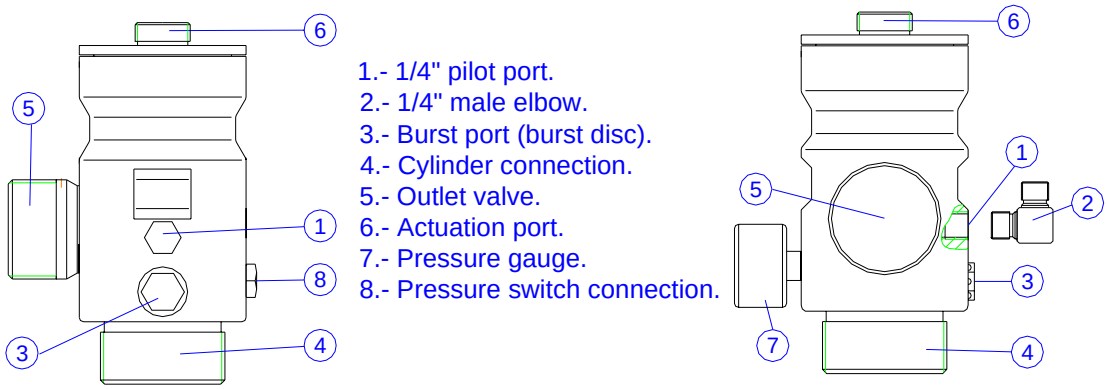
THE PILOT PORT IN BANKS OF FEWER THAN 9 CYLINDERS, IS DELIVERED ALREADY ASSEMBLED FROM THE FACTORY, THEREFORE IT NEED NOT BE HANDLED.

THE INSTRUCTIONS IN THIS CHAPTER ARE FOR OPERATIONAL AND GUIDANCE USE FOR POSSIBLE REPLACEMENTS IN THE SYSTEM.

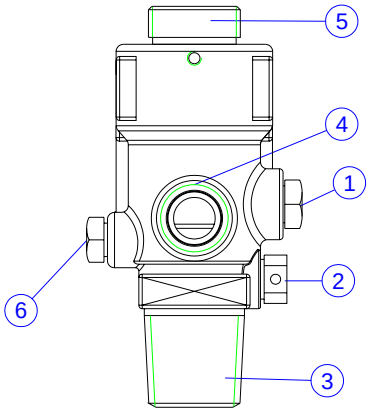
To install the pilot port, follow the instructions below:

1. Ensure that the cylinder is properly secured by its brackets. Check that the valve outlet is screwed to the discharge hose and this, in turn, to the manifold or discharge pipe. The pilot port may also be installed or replaced without the cylinder being connected to the discharge hose, in which case, do not remove (or put on) the valve outlet safety plug while the cylinder is being handled (secured, of course, to its bracket).

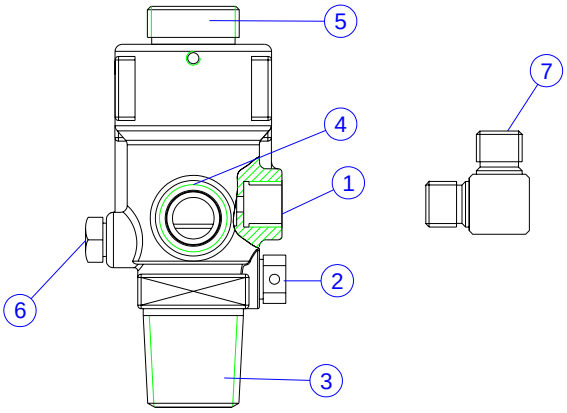
2. Check that the manual or electric release head is not connected to the valve. If it is, remove it.



RGS-MAM-12



RGS-MAM-12



1.- Pilot port.
2.- Burst port (burst disc).
3.- Cylinder connection.
4.- Outlet valve.
5.- Actuation port.
6.- Pressure switch connection.
7.- 1/4" male elbow.

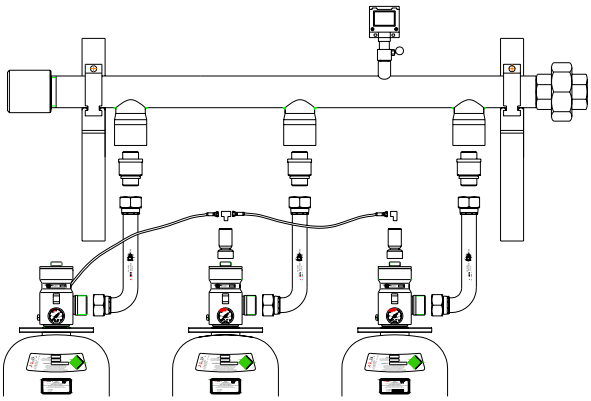
3. Remove the 1/4" BSP pilot port end cap, with a non-adjustable spanner, from the valve that is to be the main one.

4. Hold the 1/4" BSP elbow that connects to the pilot port and wrap Teflon tape onto one of its terminals (18 turns approximately).

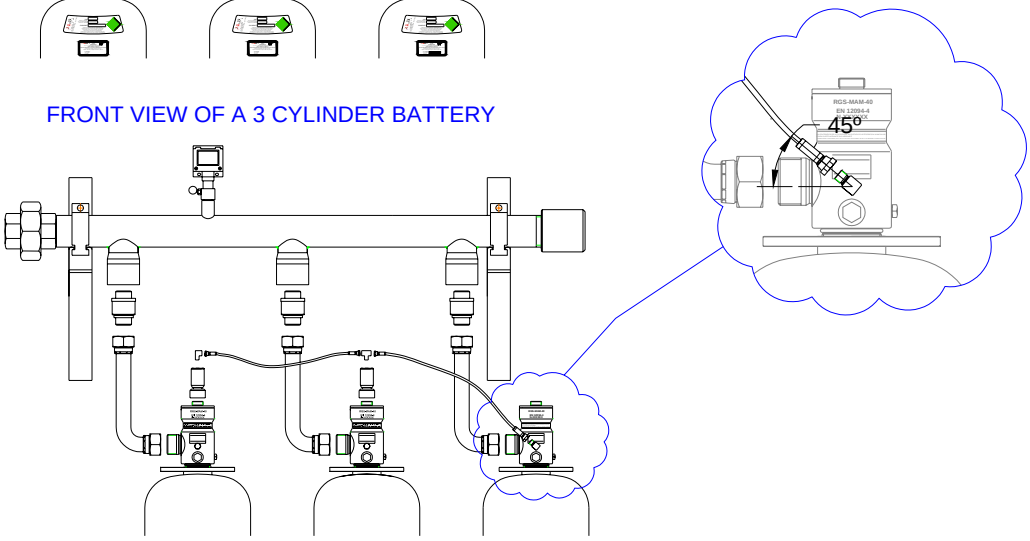
5. Screw the elbow terminal with the Teflon into the pilot port. Try to keep the elbow terminal without the Teflon facing towards the first pneumatic release head with an angle of 45º to the horizontal as shown in the figure.

CAUTION

BEFORE SCREWING THE ELBOW INTO THE PILOT PORT, POSITION THE PNEUMATIC RELEASE HEAD OF THE FIRST SLAVE CYLINDER WITH ITS DISCHARGE HOSE TO ENSURE PROPER POSITIONING OF THE ELBOW.
THE INSTALLATION OF THE MALE ELBOW IN THE PILOT PORT MUST BE ORIENTATED TOWARDS THE NEXT SLAVE CYLINDER IN THE CYLINDER BANK AT AN ANGLE OF 45º TO THE HORIZONTAL. OTHERWISE, THE HOSE WILL BE TOO SHORT AND WILL NOT BE ABLE TO BE CONNECTED.



FRONT VIEW OF A 3 CYLINDER BATTERY



REAR VIEW OF A 3 CYLINDER BATTERY

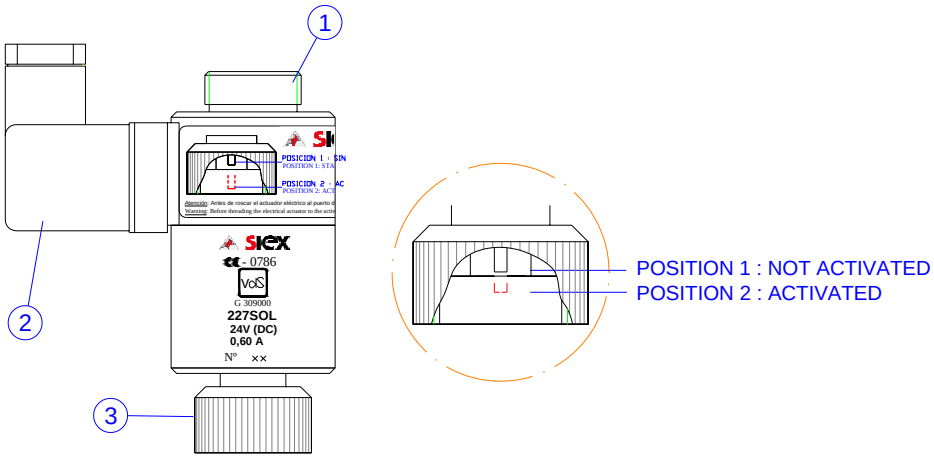
1.14 INSTALLING THE RESETTABLE 227SOL AND 227SOL-E ELECTRICAL DISCHARGE HEAD

The 227SOL or 227SOL-E resettable electric discharge head is installed on top of the cylinder valve (actuation port). Its function is to electrically actuate the cylinder valve (RGS-MAM-20/40/50/11-4 and 12-4) on which it is fitted.

WARNING

BEFORE THREADING THE ELECTRICAL FIRING HEAD TO THE ACTIVATION PORT OF THE VALVE, CHECK THAT THE PISTON IS RETRACTED (POSITION 1).

IF THE PISTON IS IN POSITION 2 WHEN THREADING THE ELECTRICAL FIRING HEAD, THE GAS EXTINGUISHER CONTAINED IN THE CYLINDER COULD BE DISCHARGED VIOLENTLY, CAUSING SERIOUS INJURIES TO THE PERSON HANDLING IT.



1 Connection for manual / neumatic actuator
2 Electrical connection
3 Rotating bolt. Actuation port

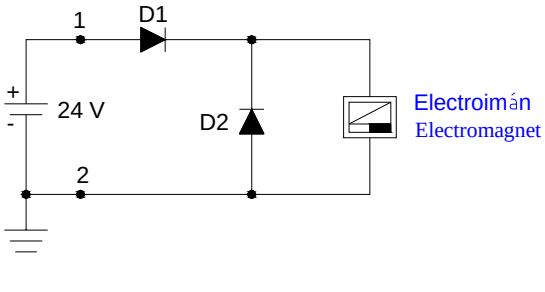
To install the resettable electrical release head, follow the instructions below:

1. Ensure that the cylinder is properly secured by its brackets. Check that the valve outlet is screwed to the discharge hose and this, in turn, to the manifold or discharge pipe.

2. Holding the electric release head by hand, visually check that the actuation pin is in POSITION 1.

3. Remove the head's electrical connector and connect it to the cable from the fire panel. As it has a polarity, respect the polarity as indicated below.

   - The terminal marked 1 corresponds to the positive of the power supply.
   - The terminal marked 2 corresponds to the negative of the power supply.

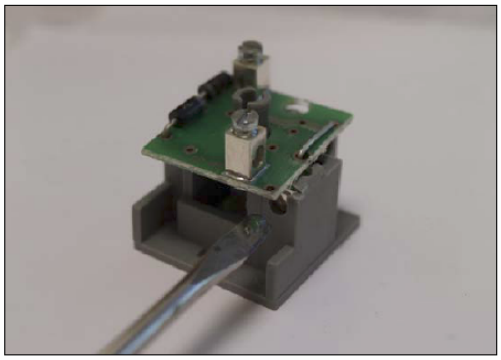


	227SOL	227SOL-E
Operating medium	HFC-227ea, HFC-125, HFC-23	
Valve type	RGS-MAM-20/40/50 and RGS-MAM-11-4/12-4	
Body	Brass – Zinc steel	
Actuator pointer	Stainless steel	
Actuation type	Launching	
Re-assembled requirements	It means manual strength	
Working temperature	-20ºC to +50ºC	
Valve connection (Activation port)	3/4" G (female)	
Stroke	4 mm	
Nominal tension	24V (DC)	
Nominal current	0.6 A	0.98 A
Nominal power at 20ºC	14 W	23.56 W
Effective force provided by the actuator	115 N	200 N
Minimum duration of the activation electrical signal	2 seg.	
Operation Supervisión tensión Max. Supervisión current Max. Supervisión power	Continuos duty 24 V 230 mA 5.5 W	
Electrical connection	3-pin electrical plug (2poles+earth) DIN-43650	
Diode type	1N4007	
Minimum lifetime	20 years after manufacturing	
Test	Check 100%	

4. Once the electrical connection is made, re-connect the electrical connector to the release head.

5. With the discharge head in your hand (still not screwed into the valve), do a proper functional test with power from the fire panel. When the head is energised, the actuation needle moves to POSITION 2. If this is not the case, one of the screws may be loose; disconnect the electrical circuit and proceed as follows:

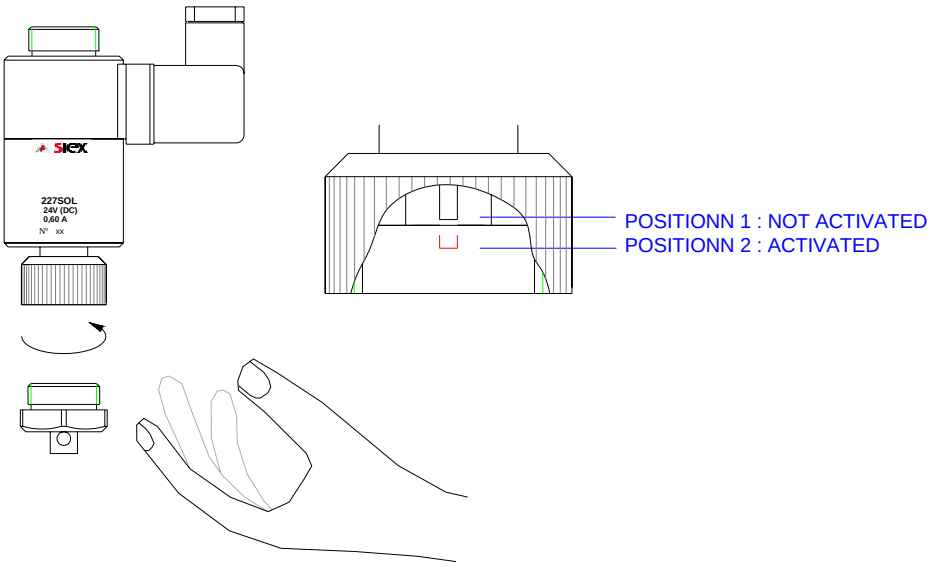
1º Dismantle the electrical part of the actuator 227SOL by removing the rear screw using a screwdriver



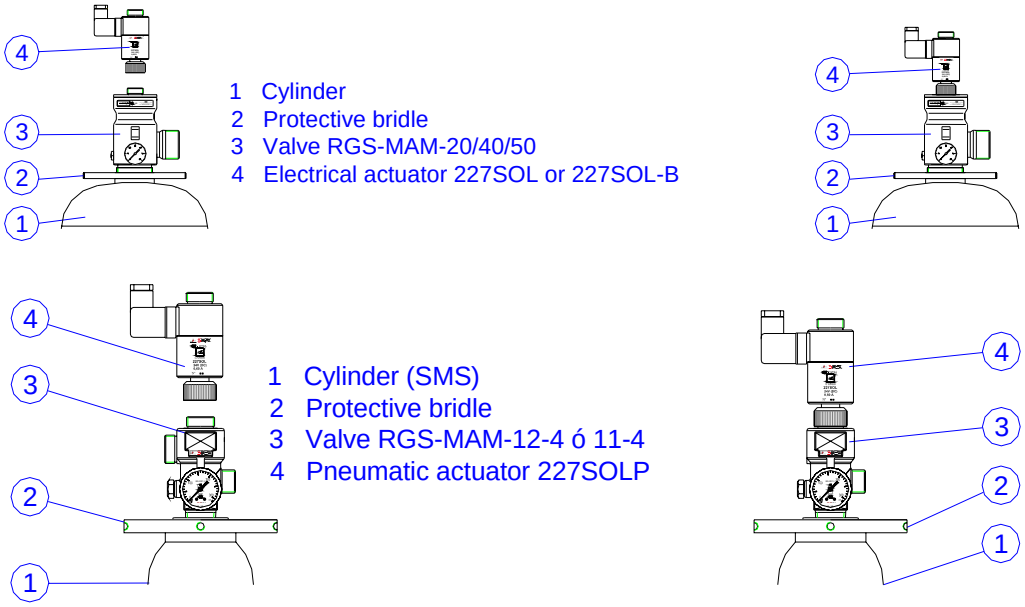
3º Finally, we secure the tightening take of the screw of the picture, and we proceed to assemble of a set

2º Using a lever, remove the lid wich gives access to the electrical circuit

6. Manually reset the 227SOLP or 227SOL electrical release head. To do this, apply force with the resetting screw, or failing that with a sharp instrument (e.g. a punch) until the actuation pin moves to POSITION 1. To check that the resetting has been carried out properly, give the head a light sharp tap on a hard surface, and then check that the actuation pin is still in POSITION 1.



7. Remove the plastic safety plug from the valve actuation port and screw in, in its place, the swivel nut of the electrical release head. **Do not use Teflon, adhesive or any other type of thread sealant;** Just finger-tighten as far as possible, and then finally turn the nut 15º with a 32 mm non-adjustable spanner.



CAUTION

BEFORE SCREWING THE ELECTRICAL RELEASE HEAD TO THE VALVE ACTUATION PORT, CHECK THAT THE ACTUATION PIN IS WITHDRAWN (POSITION 1).

Remember that the link between the release head and the valve is made by a swivel nut mechanism that allows the head to be turned through 360º to the desired position.

8. To remove the electrical release head from the valve, slowly loosen the swivel nut by hand or with a non-adjustable spanner. When carrying out this operation, the valve cover must not be turned, because if it is, the contents of the cylinder might discharge violently, possibly causing serious injury.

   Never remove the electrical release head when the cylinder is not secured to the wall by its brackets.

1.15 INSTALLING 227DM MANUAL DISCHARGE HEAD

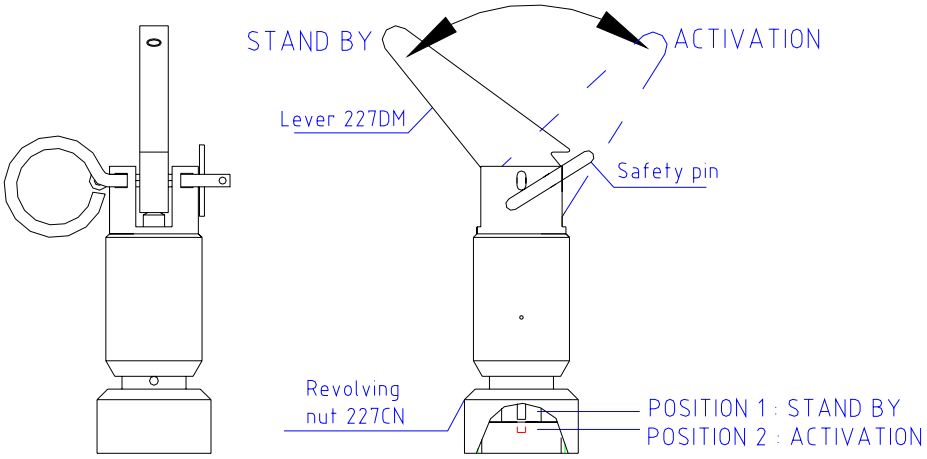
The purpose of this discharge head is to actuate by manual force the valves of the cylinders on which it is fitted. Once the safety ring the head is removed the manual lever can be turned in the opposite direction from its resting position. This will move the needle and produce the release.

The rearmable manual activator can be installed in the upper part of the container valve (activation port) or in the upper part of the electrical firing head (cylinders that also electrical firing). Its function is to manually activate the valve (RGS-MAM-20/40/50/11-4 and 12-4) on which it is assembled.

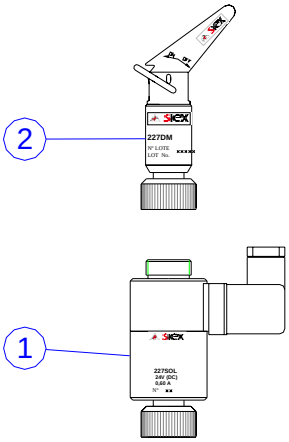
CAUTION

BEFORE SCREWING THE MANUAL DISCHARGE HEAD ONTO THE ACTUATION PORT OF THE VALVE, CHECK THAT THE ACTUATION NEEDLE IS WITHDRAWN (POSITION 1).

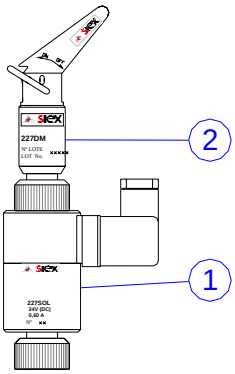
WITH THE ACTUATION NEEDLE IN POSITION 2, SCREWING ON THE MANUAL DISCHARGE HEAD WOULD CAUSE THE SUDDEN AND VIOLENT DISCHARGE OF THE EXTINGUISHING GAS IN THE CYLINDER, WHICH COULD CAUSE SERIOUS INJURY TO THE PERSON INVOLVED.



Manual actuator 227DM



1 Electrical actuator 227SOL
2 Manual actuator 227DM



Technical Information

	227DM/DMP
Operating medium	HFC-227ea, HFC-125, HFC-23, N2
Valve type	RGS-MAM-20/40/50 RGS-MAM-11-4/12-4
Material	Brass
Re-assembled requirements	Automatic (spring)
Working temperature	-20ºC to + 50ºC
Connection to the valve (activation port) or to the electrical actuator (227SOL)	3/4" G (female)
Route of the lever to obtain the activation	86º

CAUTION

BEFORE SCREWING THE MANUAL RELEASE HEAD TO THE VALVE ACTUATION PORT, CHECK THAT THE ACTUATION PIN IS WITHDRAWN (POSITION 1).

IF THE ACTUATION PIN IS IN POSITION 2, ON SCREWING IN THE MANUAL RELEASE HEAD THE EXTINGUISHING GAS CONTAINED IN THE CYLINDER WILL DISCHARGE VIOLENTLY, WHICH MIGHT CAUSE SERIOUS INJURY TO TO THE PERSON HANDLING IT.

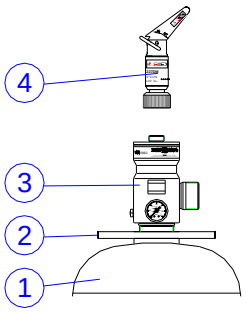
To install the manual release head, follow the instructions below:

1. Ensure that the cylinder is properly secured by its brackets. Check that the valve outlet is screwed to the discharge hose and this, in turn, to the manifold or discharge pipe.

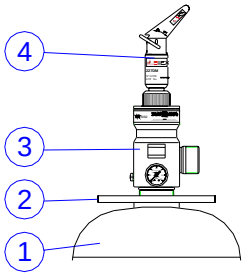
2. Holding the manual release head by hand, visually check that the actuation pin is in POSITION 1.

3. Remove the plastic safety plug from the valve actuation port and screw in, in its place, the swivel nut of the manual discharge head**. Do not use Teflon, adhesive or any other type of thread sealant; just finger-tighten as far as possible.**

Remember that the link between the discharge head and the valve is made by a swivel nut mechanism that allows the head to be turned through 360º to the desired position.



1 Cylinder
2 Protective bridle
3 Valve RGS-MAM-20/40/50
4 Manual actuator 227DM



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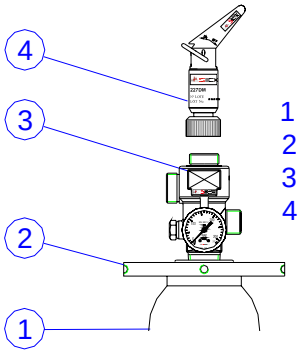
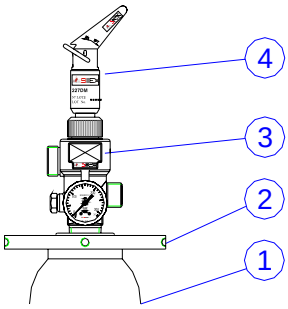


1 Cylinder (SMS)
2 Protective bridle
3 Valve RGS-MAM-12-4 ó 11-4
4 Pneumatic actuator 227DM



4. If screwing it directly to the electrical release head 227SOL, follow the same principles of point 3 above.

CAUTION

BEFORE SCREWING THE ELECTRICAL RELEASE HEAD TO THE VALVE ACTUATION PORT, CHECK THAT THE ACTUATION PIN IS WITHDRAWN (POSITION 1).

5. Check that the safety ring and its seal are in perfect condition and are properly fitted to the head. **Do not remove the safety ring except if the discharge head is to be operated manually.**

6. To remove the manual release head from the valve, gently loosen the swivel nut by hand, and always with the safety ring in place, as a precaution, so that the release head cannot be accidently operated. If it was screwed directly to the valve, the valve cover must not be turned during this operation, because if it is, the contents of the cylinder might discharge violently, possibly causing serious injury.

Never remove the manual release head when the cylinder is not secured to the wall by its brackets.

1.16 INSTALLING THE 227DEE ELECTRIC SQUIB RELEASE HEAD

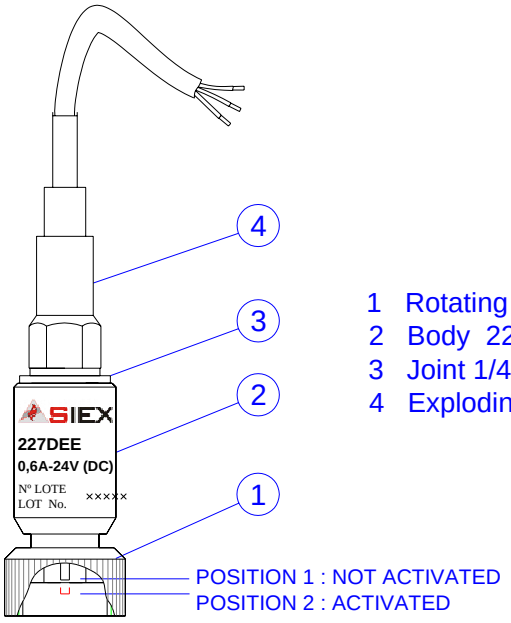
The 227DEE electric squib discharge head may be installed on the upper part of the cylinder valve (actuation port) or on top of the electrical discharge head (for cylinders that also have electric release). Its function is to electrically actuate the valve (RGS-MAM-20/40/50/11-4 and 12-4) on which it is fitted. It consists of an explosive device which generates enough pressure to actuate the valve when triggered by an electrical pulse.

This discharge head is supplied from the factory disassembled and consists of three parts, a pneumatic discharge head, a ¼" copper joint and a CPER electric squib discharge head.

CAUTION

BEFORE SCREWING THE ELECTRICAL SQUIB DISCHARGE HEAD ONTO THE ACTUATION PORT OF THE VALVE, CHECK THAT THE ACTUATION NEEDLE IS WITHDRAWN (POSITION 1).

WITH THE ACTUATION NEEDLE IN POSITION 2, SCREWING ON THE ELECTRICAL SQUIB DISCHARGE HEAD WOULD CAUSE THE SUDDEN AND VIOLENT DISCHARGE OF THE EXTINGUISHING GAS IN THE CYLINDER, WHICH COULD CAUSE SERIOUS INJURY TO THE PERSON INVOLVED.



1 Rotating bolt 227CN
2 Body 227DEE ó DEEP
3 Joint 1/4 "
4 Exploding squib

227DEE

To install the electric squib discharge head, follow the instructions below:

1. Ensure that the cylinder is properly secured by its brackets. Check that the valve outlet is screwed to the discharge hose and this, in turn, to the manifold or discharge pipe.

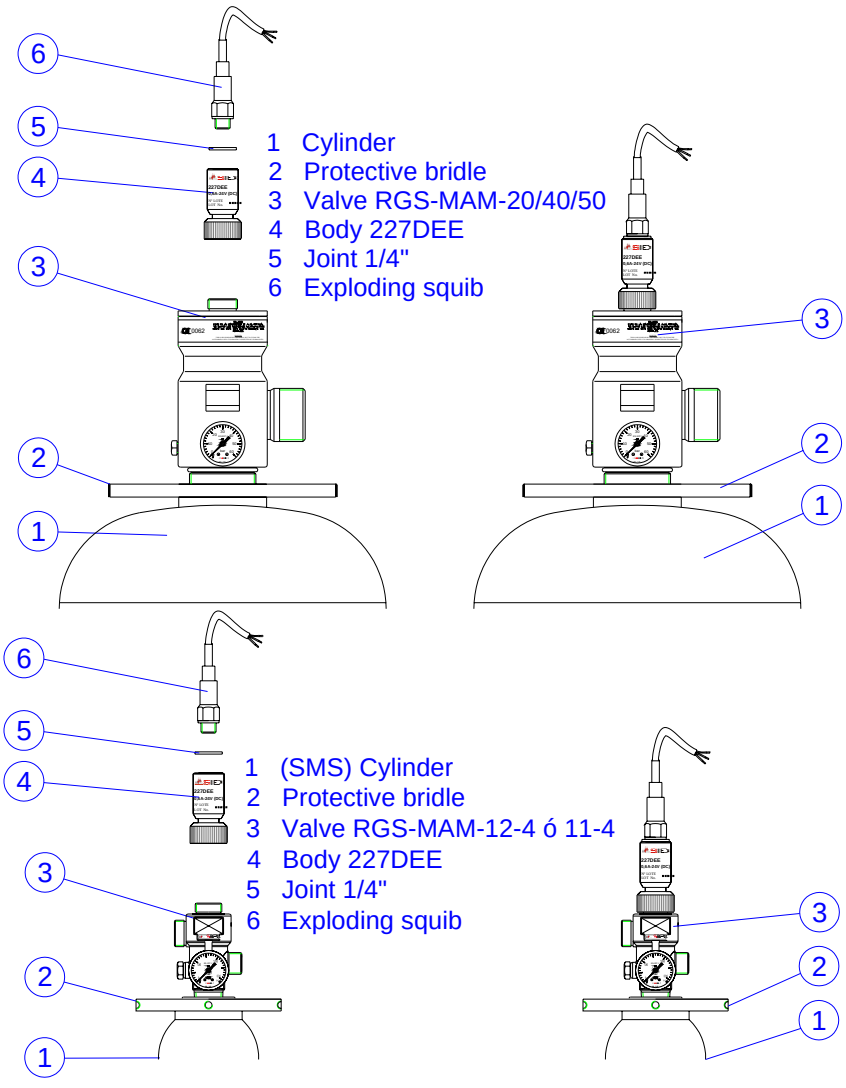
2. Holding the pneumatic discharge head by hand, visually check that the actuation head is in POSITION 1.

3. Screw the explosive squib to the actuation port of the pneumatic discharge head (upper part) fitting a ¼" copper joint as indicated in the figure, so that the seal is gas-tight.

4. Connect the electric cables of the explosive squib to the cable from the fire panel.

5. Visually check that the actuation pin of the electric squib discharge head is in POSITION 1. The exploding squib cannot be actuated to check its operation because it can only be used once, that is, if it is actuated electrically the internal explosive charge is fired, and cannot be used again, but will have to be replaced with a new one.

6. Remove the plastic safety plug from the valve actuation port and screw in, in its place, the swivel nut of the electric squib discharge head. **Do not use Teflon, adhesive or any other type of thread sealant; just finger-tighten as far as possible**.

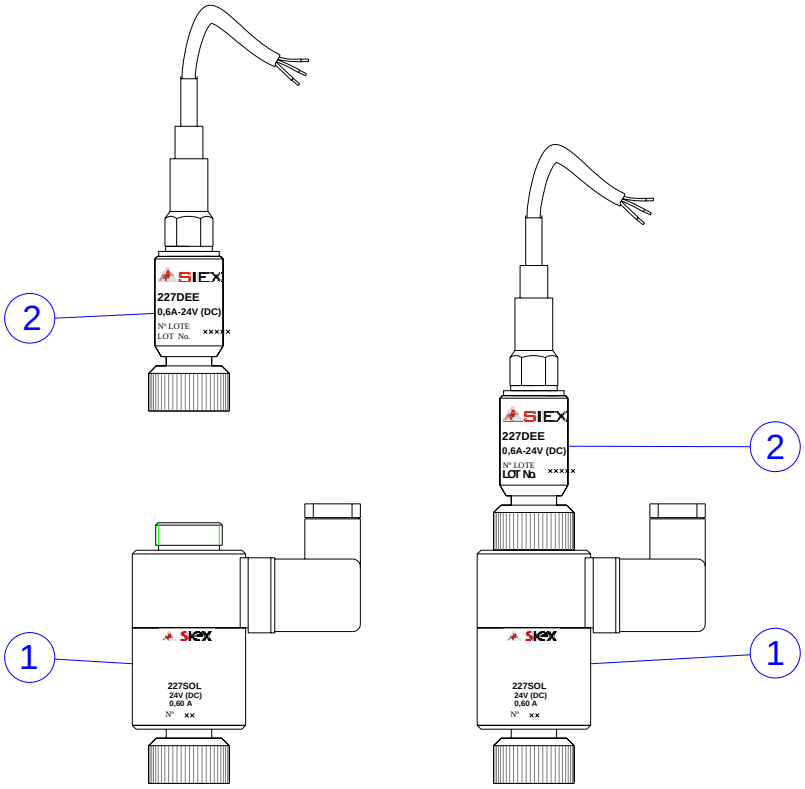


Remember that the link between the discharge head and the valve is made by a swivel nut mechanism that allows the head to be turned through 360º to the desired position.

7. If it is screwed directly to the electrical discharge head, follow the same principles of point 6 above.

CAUTION

BEFORE SCREWING THE ELECTRICAL DISCHARGE HEAD ONTO THE ACTUATION PORT OF THE VALVE, CHECK THAT THE ACTUATION NEEDLE IS WITHDRAWN (POSITION 1).



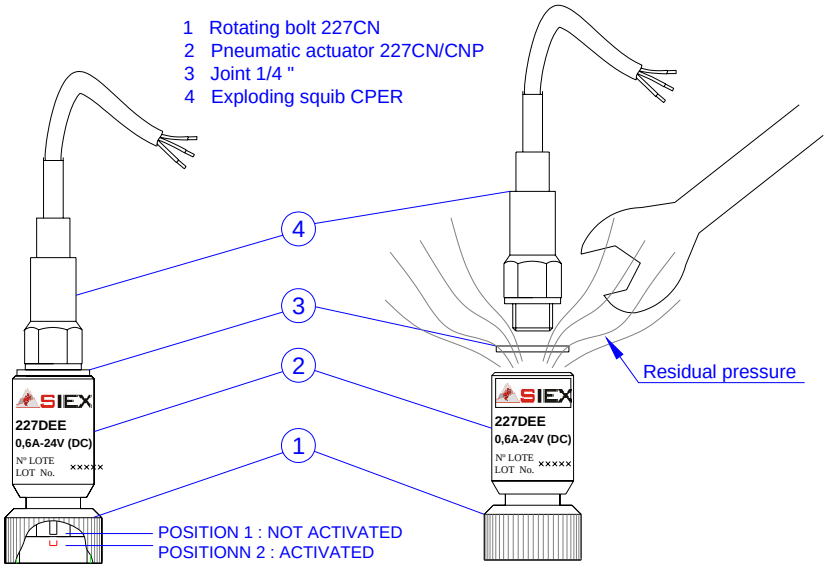
1 Electrical actuator 227SOL
2 Pneumatic actuator 227DEE

8. To remove this discharge head from the valve, gently loosen the swivel nut by hand or with a non-adjustable spanner. If it was screwed directly to the valve, the valve cover must not be turned during this operation, because if it is, the contents of the cylinder might discharge violently, possibly causing serious injury.

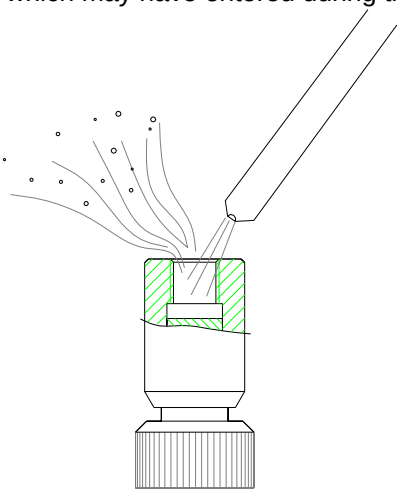
Never remove the electric squib discharge head when the cylinder is not secured to the wall by its brackets.

Instructions following the use of the electric squib discharge head 227DEE:

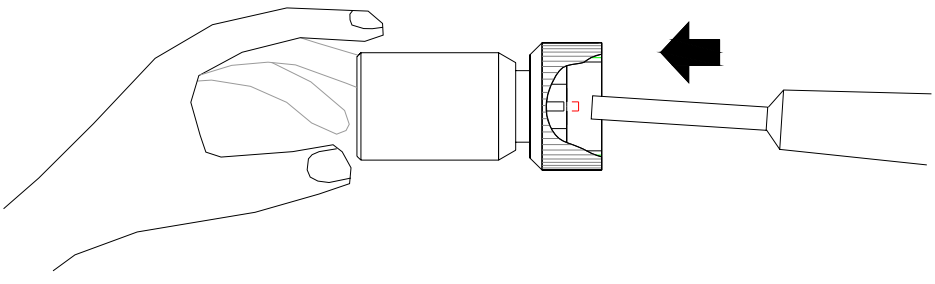
- When this head has been fired to release the cylinder system, **the CPER percussion head must be replaced** with a new one. Unscrew the unit paying **special attention to the release of any residual pressure in the chamber of pneumatic head** 227CN.



- Pneumatic head 227CN resets itself thanks to an internal spring. However, after a release the inside of the chamber of pneumatic head 227CN must be inspected, cleaned and blown out to remove any residual dirt which may have entered during the explosive release.



- If the head does not reset after the process, use a punch or screwdriver to push the tip of the needle. If it still does not reset, contact SIEX.



1.17 INSTALLING THE PILOT BOTTLE (for banks of more than 5 cylinders)

2 litre pilot bottle with RGS-MAM-11-4 and 12-4 valve

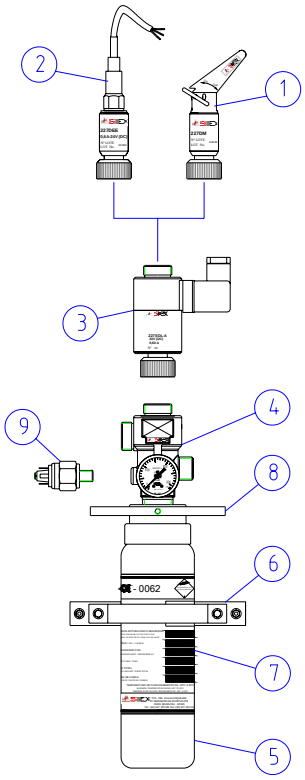
This consists of a 2 litre cylinder, a protective flange and a RGS-MAM-11-4 or 12-4 valve.
The RGS-MAM-11-4 or 12-4 valve has a built-in 227SOL solenoid discharge head, together with a 227DM manual discharge head or a 227DEE electric squib discharge head, in addition to the corresponding pressure gauge (0-200 bar).

Charged with dry nitrogen to 100 bar, it is actuated by an electric or manual signal and its purpose is to actuate the extinguishing agent cylinder bank. When the pilot bottle is actuated, pressurised gas flows through the release hoses and pneumatically actuates the various pneumatic discharge heads, 227CN, which, in turn, actuate the valves (RGS-MAM-20/40/50/11-4 and 12-4) on the slave or secondary cylinders that contain the extinguishing agent.

CAUTION

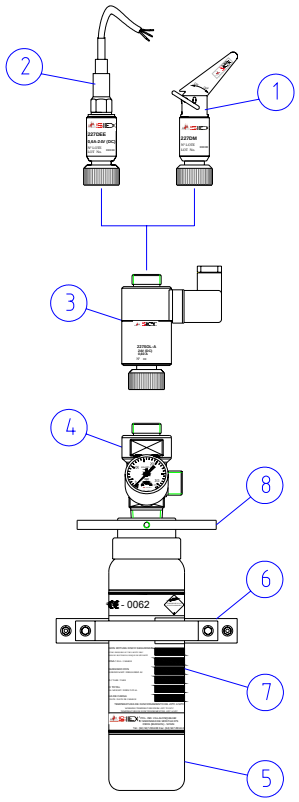
YOU ARE HANDLING PRESSURISED EQUIPMENT

FAILURE TO FOLLOW THESE INSTRUCTIONS MIGHT RESULT IN THE PILOT BOTTLE DISCHARGING VIOLENTLY, LEADING TO SERIOUS DAMAGE OR INJURY TO THE SURROUNDING AREA OR TO THE PERSON HANDLING IT.



1.- Manual discharge head (227DM).
2.- Electrical squib release head (227DEE)
3.- Electrical release head (227SOL)
4.- Valave RGS-MAM-12-4.
5.- Pilot bottle 2L.
6.- Modular braket
7.- Sticker SIEX.
8.- Protective bridle
9.- Pressure switch

Figure 32



1.- Manual discharge head (227DM).
2.- Electrical squib release head (227DEE)
3.- Electrical release head (227SOL)
4.- Valave RGS-MAM-12-4.
5.- Pilot bottle 2L.
6.- Modular braket
7.- Sticker SIEX.
8.- Protective bridle

Figure 33

Technical Information

Cylinder capacity	2L	6,7L	13,4L
Contained gas in the cylinder	N_2		
Valve type	RGS MAM 11-4 ó 12-4		
Actuation mechanism	Actuator port Electric (Model 227SOL), pneumatic (Mod. 227 CN) or manual (Mod. 227 DM)		
Working temperature	-20ºC to 60ºC		
Valve-cylinder connection thread	W28.8 x 1/14" o 1" NPT	W28.8 x 1/14" o 1" NPT	W28.8 x 1/14" o 1" NPT
Outlet valve thread	W21.8 x 1/14"		
Pressure switch connection thread (only RGS-MAM-12-4)	1/8" NPT		
Pilot port connection thread (only RGS-MAM-12-4)	1/4" BSP		
Cylinder ext. Diameter	100 mm	140 mm	204 mm
Cylinder min. Thickness	2.5 mm	2.5 mm	4.3 mm
Cylinder total lenght	640 mm	850 mm	820 mm
Necessary power	24V (DC) / 0,6 Amp / 10W		
Pressure gauge	0-200 bar		
Filling pressure at 20º C	100 bar		
Cylinder pressure test	300 bar		
Approval	99/36 CE		

To install the pilot bottle, follow the instructions below:

1. First install the pilot bottle fixing bracket as indicated in chapter 1.5.1 of this manual (Installing cylinder fixing brackets). Brackets for a single (modular) cylinder.

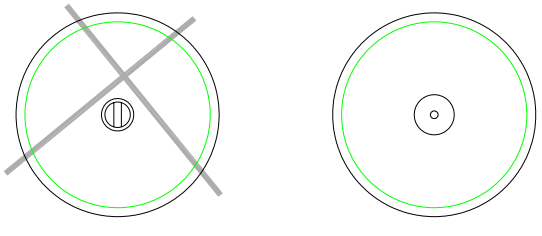
   Before starting, carefully calculate its position, so that the distance from the pilot bottle to the first cylinder is correct and the first flexible release hose is not too short (it should be either 500 or 1000 mm). Adjust the RGS-MAM-11-4 or 12-4 valve output so that it faces the pneumatic discharge heads of the cylinders which are to be actuated.

2. Check with soapy water that the output valve is not leaking. To do this, remove its protective or safety plug. Keep the plug for later use.

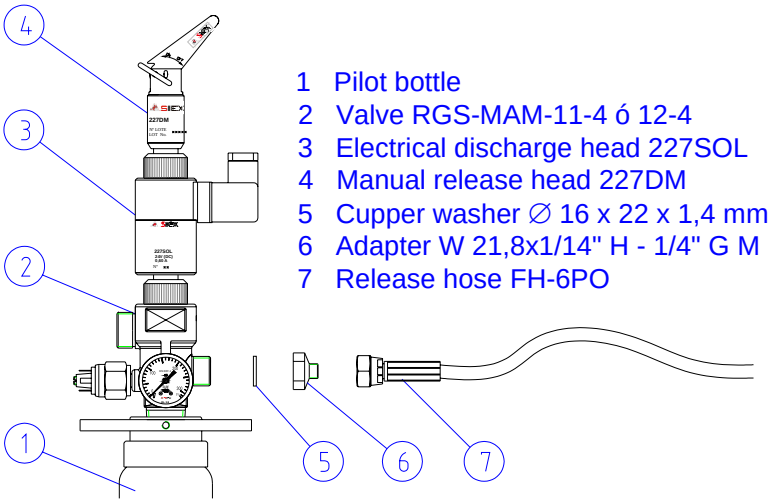
3. Connect the electrical (227SOL) and manual (227DM) discharge heads, ensuring that they are reset (as indicated in 1.14 and 1.15 of this manual).

CAUTION

Never put over the actuation port electric-solenoid (Mod. 227 SOL) when valve core 2 is assembled in to the valve

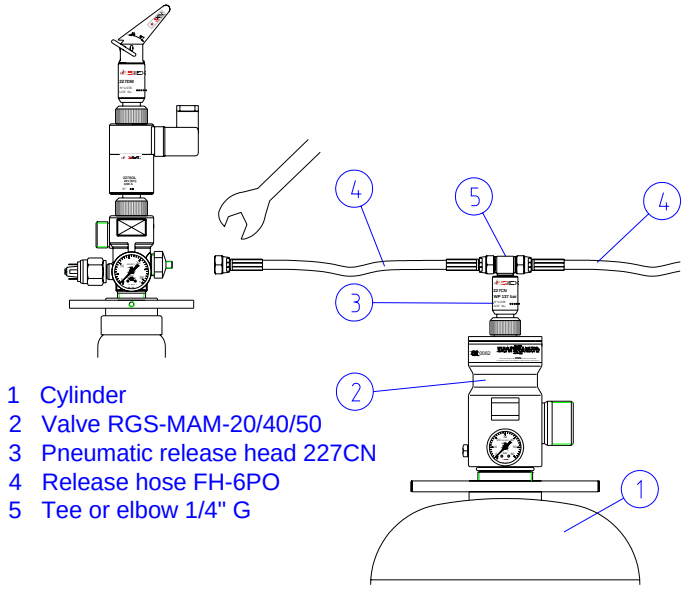


4. Carefully remove the safety plug, gradually to make sure there is no leak, and screw in the female W21.8x1/14" adapter to the ¼" BSP male thread of the valve outlet, placing a 12x18x1.4 copper washer inside the female thread of the W21.8x1/14" adaptor. Firmly tighten this joint with a 30 mm non-adjustable spanner.

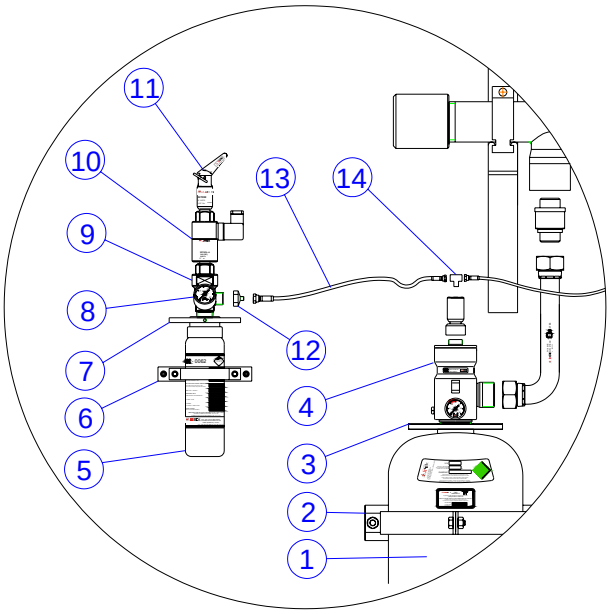


1 Pilot bottle
2 Valve RGS-MAM-11-4 ó 12-4
3 Electrical discharge head 227SOL
4 Manual release head 227DM
5 Cupper washer ∅ 16 x 22 x 1,4 mm
6 Adapter W 21,8x1/14" H - 1/4" G M
7 Release hose FH-6PO

5. Finally, manually connect the flexible release hose (500 or 1000 mm) to the tee of the first pneumatic discharge head of the cylinder bank. Do not use Teflon or any other type of sealant, since it is sealed with a metal-to-metal bicone.



6. Go back and firmly tighten, with a 19 mm non-adjustable spanner, the threaded joints of the two ends of the hose (at the pneumatic discharge head of the bank of cylinders end, and the W21.8x1/14” F - 1/4" BSP M adaptor end) to achieve a gas-tight seal.



Nº	Denomination	Types
1	PI marking cylinder sticker	
2	Cylinder sticker toxic gas	
3	Bridle	
4	Container valve	RGS-MAM-40 / RGS-MAM-50
5	Pilot cylinder (1)	2 litres
6	Pilot cylinder bracket	
7	Bridle	
8	Pressure gauge	5140-P315 1/8” NPT
9	Pilot cylinder valve	RGS-MAM-11-4 ó 12-4
10	Re-assembled electrical actuator	227SOL
11	Manual actuator	227DM
12	Adaptor	W21.8x1/14” H – 1/4" G M
13	Actuator hose	FH-6PO
14	"T" or elbow	1/4" G

Operational test with the charged pilot bottle (installed)

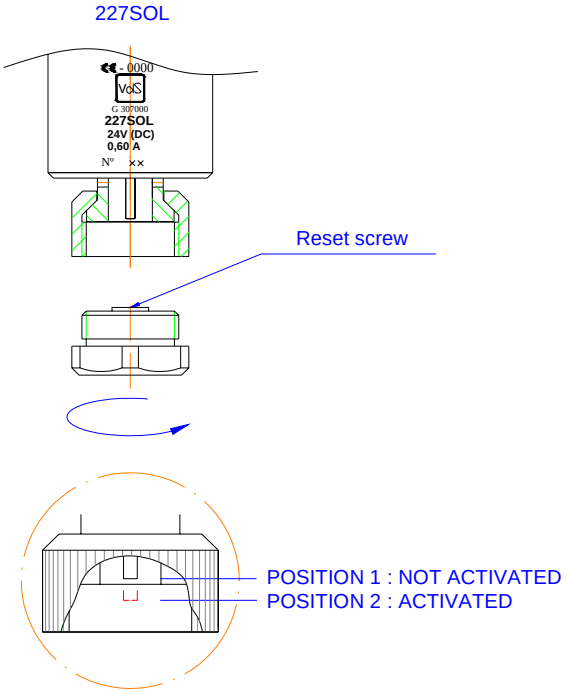
There are two ways to perform this test, during maintenance or operation.
In both cases adaptor 14W21.8x1/14” F - 1/4" BSP M must be removed from the valve outlet and the safety plug inserted in its place.

- To perform this test, either during maintenance or operation, adaptor 14W21.8x1/14” F - 1/4" BSP M must be removed from the valve outlet and the safety plug inserted in its place.

- Detach and unscrew resettable electric discharge head 227SOL and manual discharge head 227DM from their position in the RGS-MAM-11-4 or 12-4 valve actuation port.

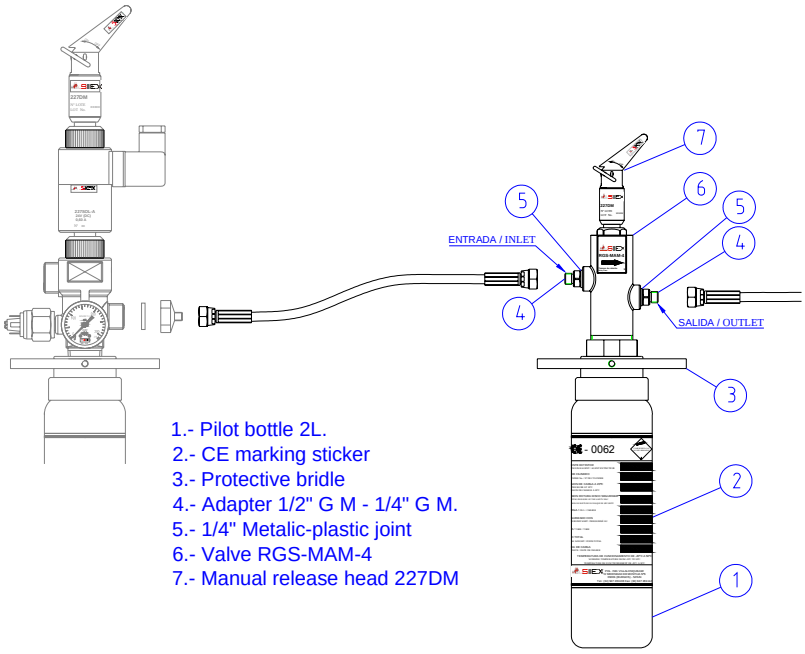
- Holding the discharge head by hand (still not screwed into the valve), visually check that the actuation pin is in POSITION 1. Carry out a true functional test with power from the fire panel. When the head is energised, the actuation pin will move to POSITION 2.

- Manually reset the electrical release head. To do this, apply force to the actuation pin with a sharp instrument (e.g. a punch) until the actuation pin goes to POSITION 1. To check that the resetting has been done properly, give the head a light sharp tap on a hard surface, and then check that the actuation pin is still in POSITION 1.



1.18 INSTALLING THE PILOT BOTTLE WITH AN INDIRECT PNEUMATIC DELAY

The function of the pilot bottle with a pneumatic delay is to delay release of the cylinders (for 30 or 60 seconds) to give time to evacuate the hazard area.
It is fitted between the pilot bottle and the first slave or auxiliary cylinder.



Valve RGS-MAM-4 has a built-in manual discharge head (227DM) on top, whose function is to abort the delay and release the bank of cylinders immediately.

When the pilot bottle or cylinder is actuated, gas flows to the pneumatic delay via its RGS-MAM-4 valve and fills the previously empty bottle. When it is full (after a specific, adjustable time) to the necessary pressure, the piston of valve RGS-MAM-4 operates, gas flows through the discharge hoses and pneumatically actuates all the valves on the slave or secondary cylinders containing the extinguishing agent.

To install the pneumatic delay, follow the instructions below:

1. First install the pilot bottle fixing bracket as indicated in chapter 1.5.1 of this manual (Installing cylinder fixing brackets). Brackets for a single (modular) cylinder.
   Before starting, carefully calculate its position, so that the distance from the pilot bottle to the delay is correct and the first flexible release hose is not too short (either 500 or 1000 mm). Adjust the RGS-MAM-4 valve outlet so that it faces the cylinders to be released.

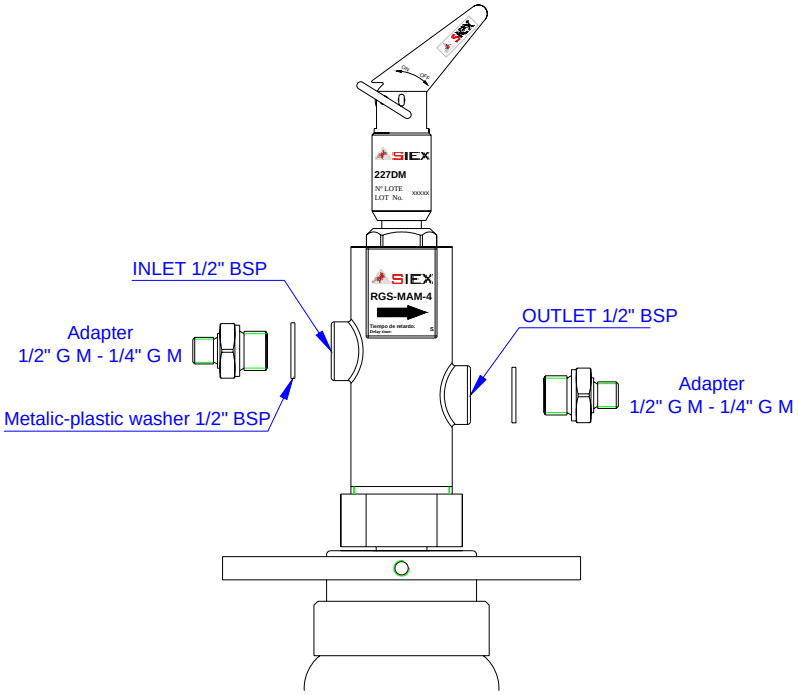
2. Use soapy water to check that the pilot valve is not leaking. To do this, remove its protective or safety plug. Keep the plug for later use.

3. **For the indirect delay:** Both 1/2" BSP M - 1/4" BSP M adaptors are factory screwed into the inlet and outlet of valve RGS-MAM-4, with a ½" metaplastic washer on the male threads of the adaptors. Firmly tighten this connection with a 26 mm non-adjustable spanner.

CAUTION

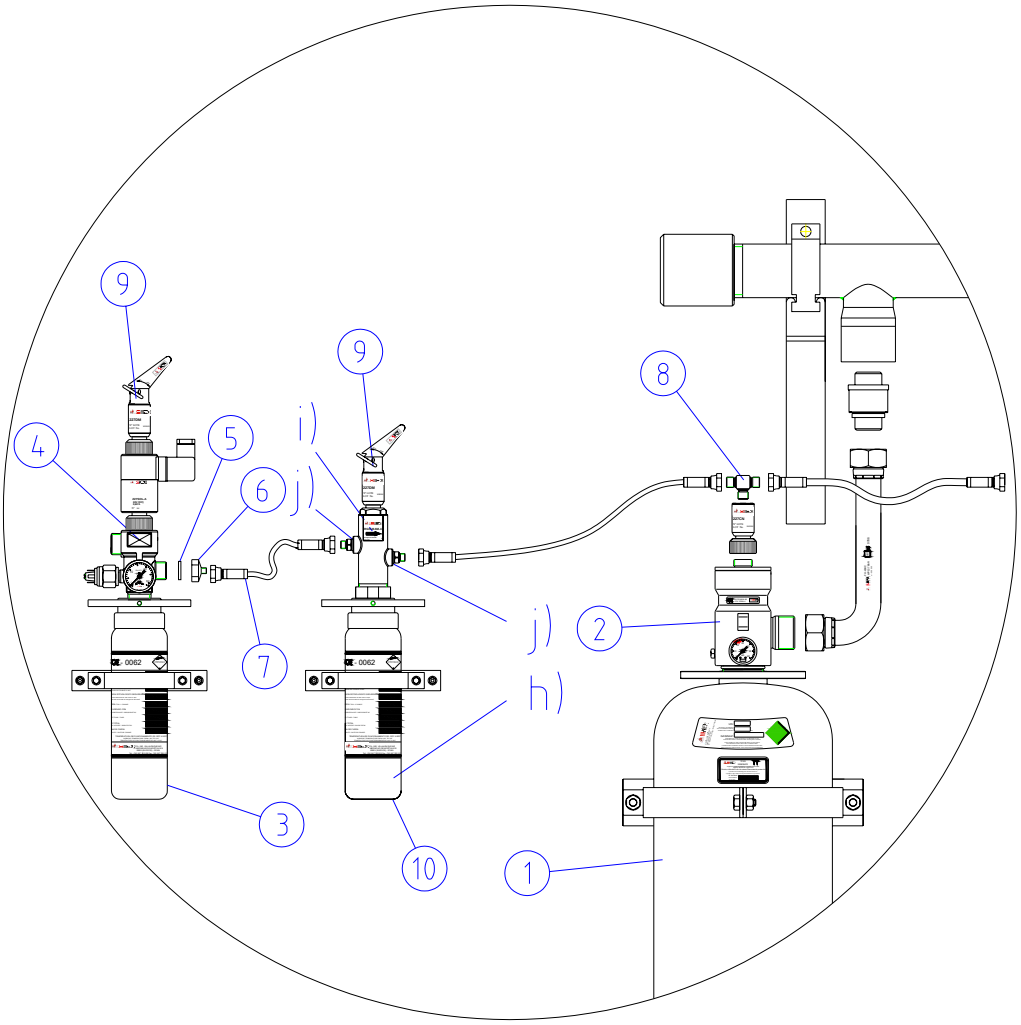
BOTH 1/2" BSP M - 1/4" BSP M ADAPTORS ARE FACTORY FITTED AND DO NOT NEED TO BE ADJUSTED.

THE INSTRUCTIONS IN THIS CHAPTER CAN BE USED FOR OPERATION AND GUIDANCE FOR POSSIBLE CHANGES TO THE SYSTEM.



4. Manually connect the two flexible discharge hoses (500 or 100 mm) to the 1/4“ BSP M threads of the adaptors (factory fitted) without using Teflon or any other type of sealant, as there is a metal-to-metal bicone seal. One of these will come from the hose from the outlet port of the pilot bottle and the other from the tee of the first pneumatic discharge head on the cylinder bank. Firmly tighten this joint with a 19 mm non-adjustable spanner.

5. Retighten the connections between the two hoses and the delay on the pilot bottle and the first cylinder on the bank, using a non-adjustable spanner to make a gas-tight seal.



Installing the indirect pneumatic delay

Nº	Denomination	Types
1	Manifold cylinders	61 / 67,5 / 80 / 84 / 100 / 108,4 / 120 / 127 / 150 / 180
2	Slave container valve	RGS-MAM-20/40/50
3	Pilot cylinder (1)	2 litres
4	Pilot cylinder valve	RGS-MAM-11-4 ó 12-4
5	Cupper washer	Ø 16 x 22 x 1,4 mm.
6	Adaptor	W21.8x1/14” H – 1/4" BSP M
7	Actuator hose	FH-6PO
8	“Tee” or elbow	¼” BSP M
9	Manual actuator	227DM
10	Pneumatic delayer h) Cylinder i) Valve j) Adapter	 h) 2 litres i) RGS-MAM-4 j) 1/2” BSP M – ¼”” BSP M

1.19 INSTALLING THE REMOTE RELEASE PNEUMATIC LINE

The remote pneumatic release line may be used in cylinder banks or in modular cylinders, but its actuation must always be at a distance of less than 90 metres.

The remote release will be carried out by a pilot bottle (with electric and manual release) and a line of pneumatic pipe that carries the pressurised gas to actuate all the pneumatic discharge heads of the cylinders.

The line of pneumatic pipe may be installed in 4x6 copper pipe with bicone fittings or in 1/4" BSP schedule 40 steel pipe.

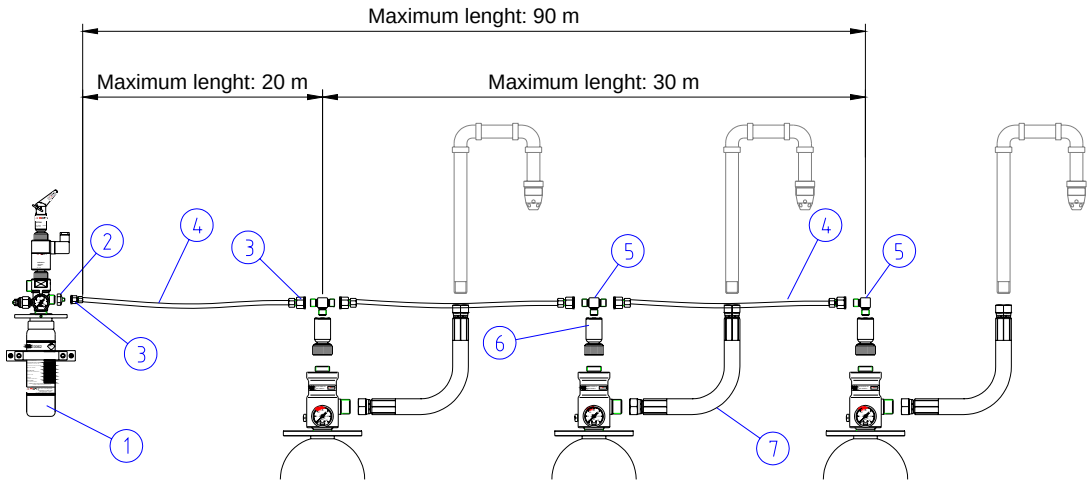
The pilot bottle can also be supplied inside a sheet steel cabinet painted black or red.

The following *limitations* must be taken into account if 4 x 6 copper pipe is used:

A. Maximum total length of copper pipe: 20 metres (for greater lengths contact SIEX).

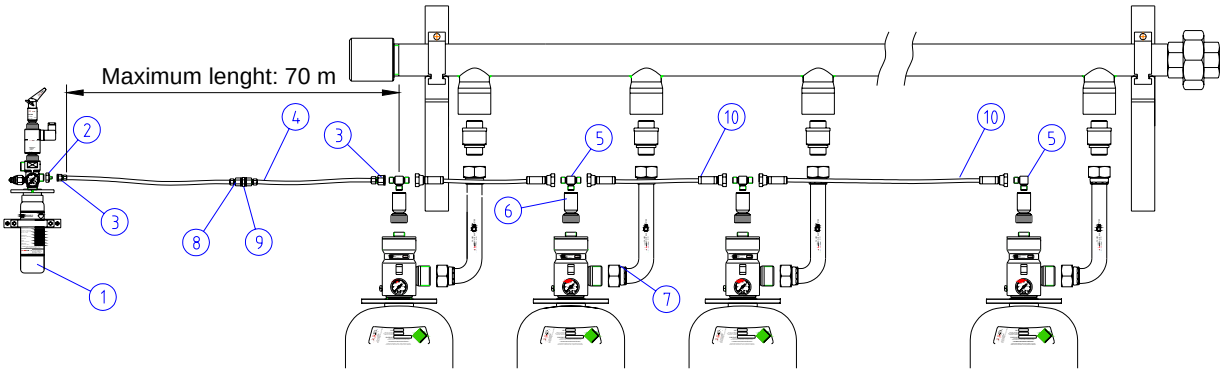
B. Maximum length between the first pneumatic actuator head and the last: 20 metres.

C. The maximum length of copper pipe between the pilot bottle and the first pneumatic release head is 20 metres.



Nº	Denomination	Types
1	Pilot cylinder (1)	2 litres
2	Adaptor	W21.8x1/14” H – 1/4" BSP M
3	¼” to bi-cone cooper tube adaptor	
4	6x4 mm cooper tube	
5	“Tee” or elbow	1/4" BSP M
6	Pneumatic actuator	227CN
7	Discharge hose	3/4”-1 ½”-2”

D. The distance mentioned in point C may be increased to up to 70 metres when only one pneumatic release is being fed (modular cylinder), or a bank of a maximum of 8 cylinders. In this case the design of the cylinder bank would be standard, with all the cylinders connections linked by flexible release hoses. The 70 metres is measured between the pilot cylinder and the first release head of the cylinder bank.



Nº	Denomination	Types
1	Pilot cylinder (1)	2 litres
2	Adaptor	W21.8x1/14” H – 1/4" BSP M
3	Adaptor	1/4” H –cooper tube
4	cooper tube	
5	“Tee” or elbow	1/4" BSP M
6	Pneumatic actuator	227CN
7	Discharge hose	¾”-1 ½”-2”
8	¼” to bi-cone cooper tube adaptor	
9	Adaptor	¼” M – ¼” M
10	Actuator hose	FH-6PO

E. The pneumatic line and its fittings must have a working pressure of 120 bar.

To install the remote release pneumatic line, follow the instructions below:

1. Ensure that the cylinders are properly secured by their brackets. Check that the valve outlets are screwed to the discharge hoses and these, in turn, to the manifold or discharge pipe.

2. Install the pilot bottle with or without a cabinet, in the ideal position for remote operation. For the installation follow the steps described in chapter 1.17 of this manual. (Installation of a pilot bottle (bank of more than 5 cylinders)).

   Do not connect the pilot valve output valve yet and check that the pressure gauge reads at least 120 bar.

3. Install the pneumatic pipes using 4 x 6 copper pipe or 1/4" BSP schedule 40 steel pipe. Place supports for the pipework at a maximum distance of 1.3 metres.

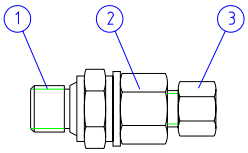
4. Ensure that the fitting of the pneumatic pipes is firm, not subject to knocks, and free from harsh atmospheres and extreme temperatures.

5. Once the pipes are installed (pneumatic line), perform a gas-tightness test at 120 bar. To do this, plug one end of the pipe and pressurise it with nitrogen up to 120 bar from the other end.

6. Connect the end of the pipe that goes to the first pneumatic discharge head.

a. **Cylinder bank:** In the case of cylinders in a bank, instead of joining to the first pneumatic discharge head, the line must be joined to the first flexible release hose.

- If 4x6 copper pipe is used, a copper pipe adaptor must be fitted, with a ¼" BSP female conical seat, screwed with a ¼" metal-to-plastic washer to a ¼" BSP male-to-male adaptor with a conical seat in both ends. The copper pipe is connected to one end of the adapter joint, with the ¼" BSP flexible release hose at the other, without using Teflon or any other type of sealant, as there is a metal-to-metal bicone seal in both cases.



1 1/4¨ male connection to hose
2 1/4" male adaptor (hose) to Cu 6x4 pipe
3 Connection to Cu 6x4 pipe (with hexagon and bicone)

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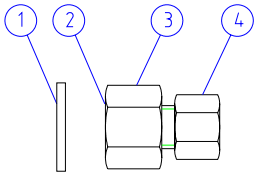
- If 1/4" BSP schedule 40 steel tube is used, a 1/4" BSP female to 1/4" BSP male, with a conical seat must be fitted to the male thread. The steel pipe is connected to the female threaded end of the adaptor using Teflon tape. The flexible release hose is connected directly to the male threaded end of the adaptor, without using Teflon, or any other type of sealant, as the seal is a metal-to-metal bicone.

b. **Modular cylinders:** In this case, the end of the pneumatic pipe is joined to the elbow of the pneumatic discharge head of the first modular cylinder.

- If 4x6 copper pipe is used, connect a ¼" BSP female to copper pipe with conical seat adapter to the elbow of the pneumatic discharge head. For this connection, fit a 1/4" metal-to-plastic washer, which will make the connection between the adaptor and the elbow gas-tight, without using Teflon or any other type of sealant. Next, screw the copper tube with its bicone to the adaptor, also without using Teflon or any other type of sealant, as the seal is a metal-to-metal bicone.



1 1/4" metal-to-plastic washer
2 1/4" female connection to release head tee
3 1/4" female adaptor (tee) to Cu 6x4 pipe
4 Connection to Cu 6x4 pipe (with hexagon and bicone)

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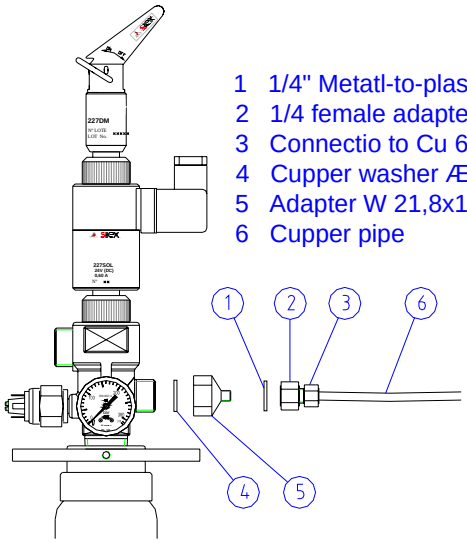
- If 1/4" BSP schedule 40 steel pipe is used, connect a 1/4" BSP female to 1/4" BSP female adaptor to the elbow of the pneumatic discharge head. For this connection, fit a 1/4" metal-to-plastic washer, which will make the connection between the adaptor and the elbow gas-tight, without using Teflon or any other type of sealant. Next, screw the steel pipe to the female threaded end of the adaptor using Teflon tape.

7. Connect the other end of the pneumatic line to the pilot bottle. Use the steps described in section 1.17 of this manual. (Installation of a pilot bottle (bank of more than 5 cylinders)).

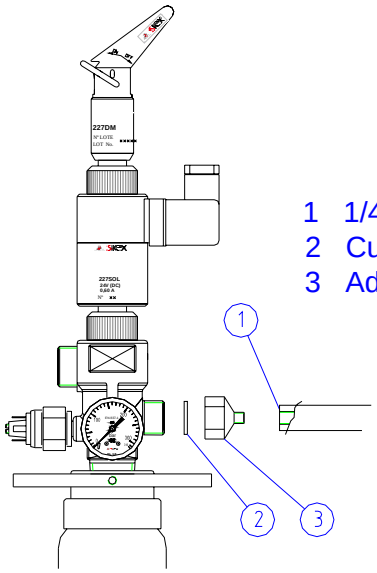
   a. **2 litre pilot bottle with RGS-MAM-11-4 and 12-4 valve:** In this case, the pneumatic line must be connected to the W21.8x1/14” male thread of the pilot bottle output valve.

   - If 4x6 copper pipe is used, screw a W21.8x1/14” female to 1/4" BSP male adaptor into the pilot bottle output valve, fitting a 12x18x1.4 copper washer into the W21.8x1/14” female thread of the adaptor. Then wrap Teflon tape to the ¼” BSP male thread of the adaptor and screw another adapter – a ¼” BSP female to copper tube with a conical seat, to the male thread. Next, screw the copper tube with its bicone to the adaptor, without using Teflon or any other type of sealant, as it is a metal-to-metal bicone seal.



1 1/4" Metatl-to-plastic washer
2 1/4 female adapter (tee) to Cu 6x4 pipe.
3 Connectio to Cu 6x4 pipe (con hexagon y bicone)
4 Cupper washer Æ 16 x 22 x 1,4 mm
5 Adapter W 21,8x1/14" H - 1/4" G M
6 Cupper pipe

   - If ¼” BSP schedule 40 steel pipe is used, screw a W21.8x1/14” female to ¼" BSP male adapter into the pilot bottle outlet valve, fitting a 12x18x1.4 copper washer inside the W21.8x1/14” female thread of the adaptor. Then, wrap Teflon tape to the ¼” BSP male thread of the adaptor and screw in a ¼” BSP female nipple. Then, wrap Teflon around the steel pipe male thread and screw it to the threaded nipple.

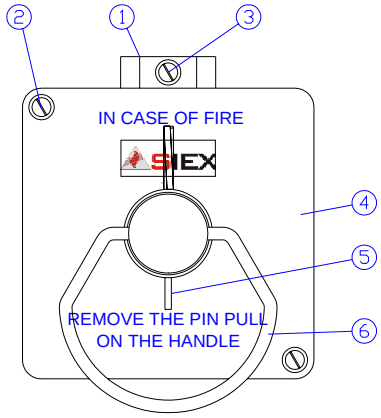


1 1/4" BSP schedule 40 steel pipe.
2 Cupper washer Æ 16 x 22 x 1,4 mm
3 Adapter W 21,8x1/14" H - 1/4" G M

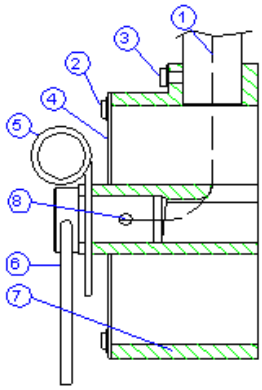
1.20 INSTALLING REMOTE RELEASE MANUAL PULL STATION AND PULLEY ELBOWS

This is used for modular cylinders or cylinders in banks to manually actuate the extinguishing system remotely by acting on the cylinder or pilot bottle. The manual handle is linked by a steel cable in a pipe (protective pipework) to the manual discharge head of the cylinder or pilot bottle. **It can be located up to 39.5 metres from the extinguishing system.**

The cable is mounted inside a steel pipe with pulley elbows for changes of direction.



1 Steel cable outlet
2 Cover fixing screw
3 Protective pipe fixing screw
4 Removable cover
5 Safety pin6 Handle
7 Body
8 Allen screw for tightening cable

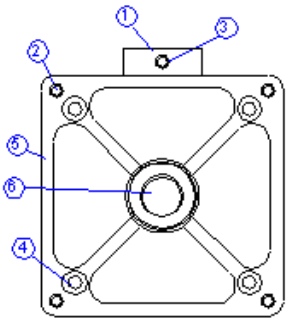


To install the remote release pneumatic line, follow the instructions below:

1. Ensure that the cylinder or cylinders are properly secured by their brackets. Check that the valve outlets are screwed to the discharge hoses and these, in turn, to the manifold.

2. Calculate the length of steel cable necessary to reach the remote manual release handle from the cylinder or cylinder bank. Always add 10% to the estimate in case of unforeseen problems that might arise during the installation. Remember that the maximum distance is 39.5 metres.

3. Remove the detachable cover and handle in order to fit the pull station body to the wall or structure where it is to be located. Use the four fitting holes with appropriate screws and plugs.



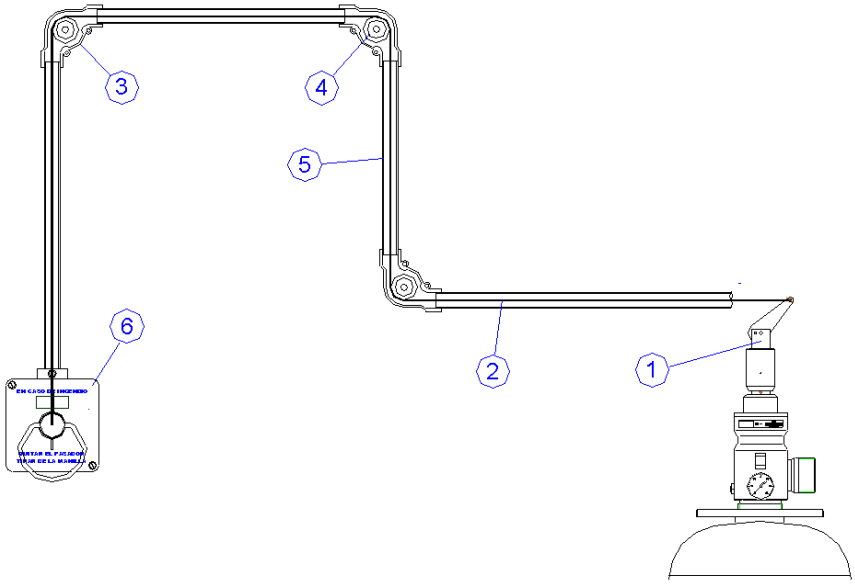
1 Steel cable outlet
2 Cover fixing screw
3 Protective pipe fixing screw
4 Orifice for fixing body
5 Manual pull station body
6 Orifice for handle

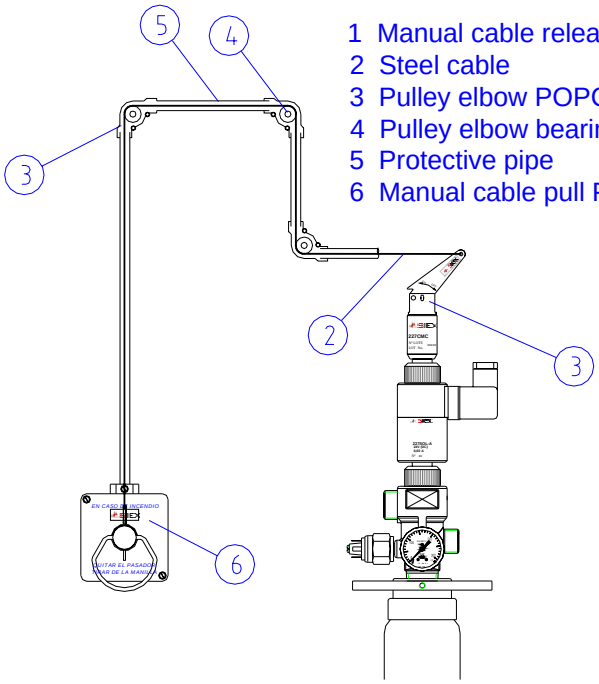
4. Pass the steel cable from the hole where the handle is fitted to the cable outlet (1), via the removable cover. Feed the end of the cable into the handle and fully tighten the Allen screw to secure it.
5. Fit the detachable cover in position with its fixing screws.

6. Fit the handle in its original hole and put its safety catch on.

7. Pass the other end of the cable through the first section of protective pipe. Join this section to the manual pull station using its fixing screw.

8. Continue with the cable and pipe installation until arriving at the manual discharge head of the bottle. Use pulley elbows for changes in direction. **Remember that the maximum number of pulley elbows that may be used per installation is 20 units.**





1 Manual cable release head CMC
2 Steel cable
3 Pulley elbow POPC
4 Pulley elbow bearing
5 Protective pipe
6 Manual cable pull POTMC

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9. Once all the cable and protective pipe installation is completed, remove the safety catch of the manual pull station and check that the cable slides within the pipe. This test is carried by placing one person at each end of the cable, in order to be able to slide it in both directions.

10. Link the last section of cable to the manual discharge head with an end-of-line device. Before tensing the cable leave a small amount of slack so that the head lever is not under pressure.

11. Remove the safety ring from the manual discharge head.

CAUTION

TO LEAVE THE SYSTEM READY FOR OPERATION, DO NOT FORGET TO REMOVE THE SAFETY RING FROM THE CABLE-OPERATED MANUAL RELEASE HEAD. IF THIS OPERATION IS NOT CARRIED OUT, THE SYSTEM WILL NOT BE OPERATIVE.

12. Check that the remote manual pull station has its safety catch in position with its corresponding seal.

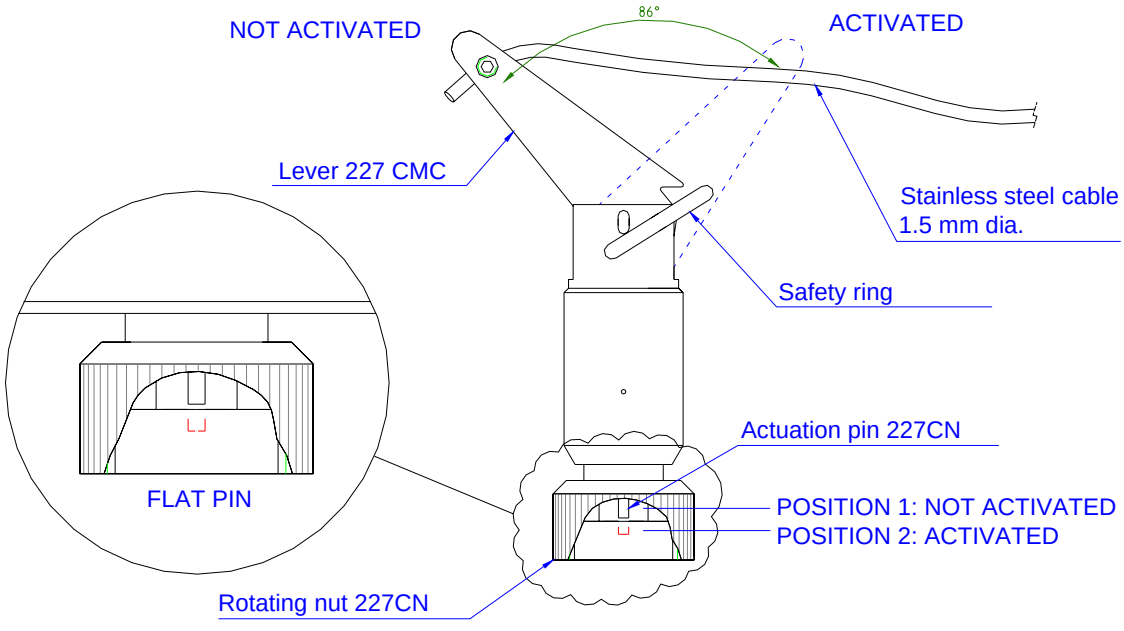
1.21 INSTALLING 227CMC CABLE-OPERATED MANUAL RELEASE HEAD

The 227CMC cable-operated manual discharge head may be installed on the upper part of the cylinder valve (actuation port) or on top of the electrical discharge head (for cylinders that also have electric release). Its function is to remotely actuate the valve (RGS-MAM-20/40/50/11-4 and 12-4) on which it is mounted, using a cable pull.

CAUTION

BEFORE SCREWING THE MANUAL CABLE-OPERATED DISCHARGE HEAD ONTO THE ACTUATION PORT OF THE VALVE, CHECK THAT THE ACTUATION NEEDLE IS WITHDRAWN (POSITION 1).

IF THE ACTUATION PIN IS IN POSITION 2, SCREWING ON THE MANUAL CABLE-OPERATED DISCHARGE HEAD WOULD CAUSE THE SUDDEN AND VIOLENT DISCHARGE OF THE EXTINGUISHING GAS IN THE CYLINDER, WHICH COULD CAUSE SERIOUS INJURY TO THE PERSON INVOLVED.



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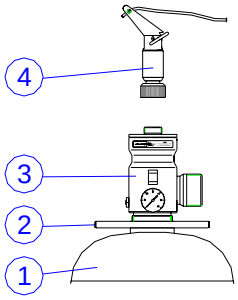
To install the cable-operated manual discharge head, follow the instructions below:

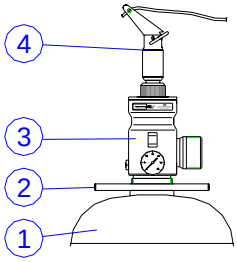
1. Ensure that the cylinder is properly secured by its brackets. Check that the valve outlet is screwed to the discharge hose and this, in turn, to the manifold or discharge pipe.

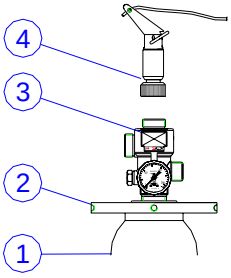
2. Holding the manual discharge head by hand, visually check that the actuation pin is in POSITION 1.

3. Remove the plastic safety plug from the valve actuation port and screw in, in its place, the swivel nut of the manual discharge head. **Do not use Teflon, adhesive or any other type of thread sealant; just finger-tighten as far as possible.**

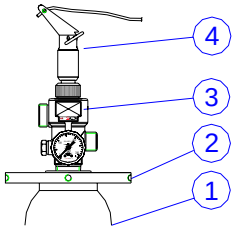


1 Cylinder
2 Protective bridle
3 Valve RGS-MAM-20/40/50
4 Manual release head 227CMC





1 Cylinder (SMS)
2 Protective bridle
3 Valve RGS-MAM-12-4 ó 11-4
4 Pneumatic release head 227CMC

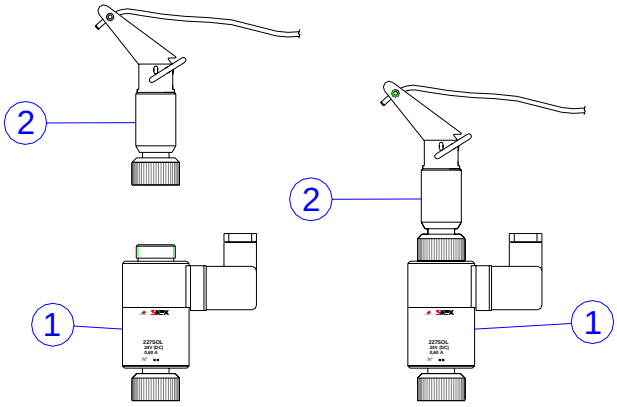


Remember that the link between the discharge head and the valve is made by a swivel nut mechanism that allows the head to be turned through 360º to the desired position.

4. If it is screwed directly to the electrical discharge head, follow the same principles of point 3 above.

CAUTION

BEFORE SCREWING THE ELECTRICAL DISCHARGE HEAD ONTO THE ACTUATION PORT OF THE VALVE, CHECK THAT THE ACTUATION NEEDLE IS WITHDRAWN (POSITION 1).



1 Electrical release head 227SOL/SOL-E
2 Manual release head 227CMC

5. Check that the safety ring and its seal are in perfect condition and are properly fitted to the head. Do not remove the safety ring at this stage of the installation.

6. Pass the stainless steel cable through the hole in the lever of the discharge head and screw in the retaining bolt until it is firmly secured. Check, by tugging on the cable, **always with the safety ring in place**, that the cable is properly secured and not loose.

7. Once the cable is located inside the protective pipe and tied to the manual cable operating handle, which is positioned at a distance depending on the installation, check that the cable is tight and that it is properly installed.

8. At this point, **remove the seal and the safety ring** from the discharge head so that the system can operate correctly, and the valve can be actuated manually and remotely from a cable pull.

9. To remove the cable-operated manual discharge head, first replace the safety ring, as a precaution, so that the discharge head cannot actuate accidentally, and then gently loosen the swivel nut by hand or with a non-adjustable spanner. If it was screwed directly to the valve, the valve cover must not be turned during this operation, because if it is, the contents of the cylinder might discharge violently, possibly causing serious injury to the person involved.

   Never remove the cable-operated manual discharge head when the cylinder is not secured to the wall by its brackets.

1.22 FITTING THE ABORT OR ISOLATION VALVE TO THE MANIFOLD

Abort valves for fixed SVA gas model extinguishing systems are used to stop the extinguishing gas discharging in the protected area.

At all times during the installation when a hazardous situation for personnel might arise, the abort valve must be positioned to prevent the extinguishing agent discharging and producing a concentration of gas hazardous to human life. In multiple area installations, an abort valve is provided for each individual flooding area.

In normally occupied areas, or areas not normally occupied for concentrations greater than the LOAEL, an abort valve must be fitted to prevent an escape of gas to the outside when there is personnel within the protected area (in accordance with ISO-14520 and UNE-23570).

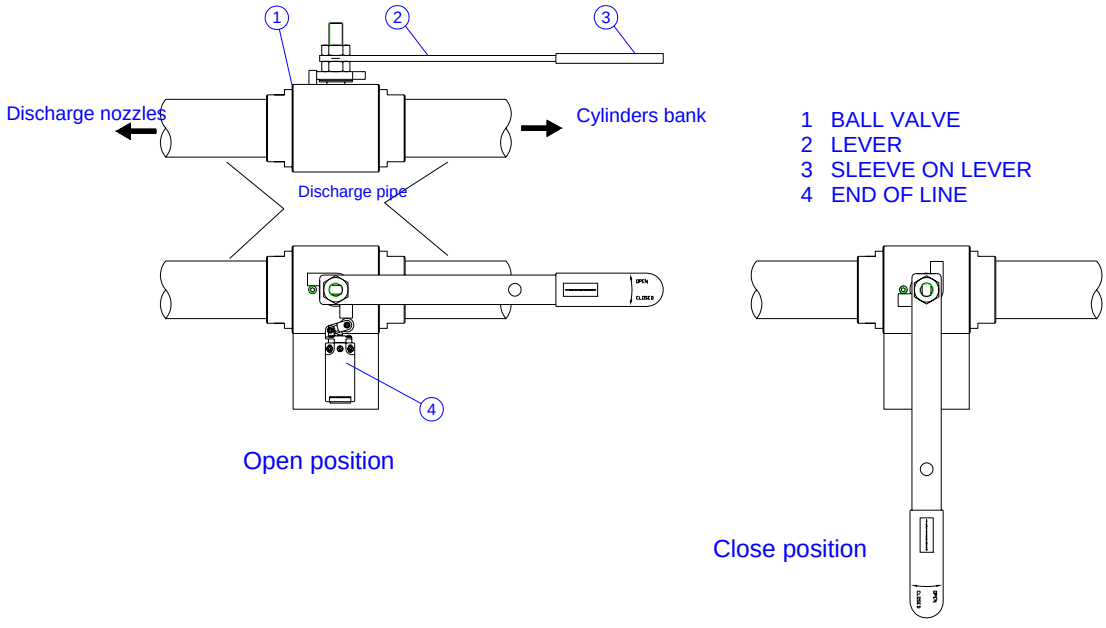
The abort valve must remain in the closed position when the protected area is inhabited, to prevent gas escaping when there are people within the protected hazard area, and in the open position when there is no personnel in the area.

It is also used when the installation is being maintained or inspected, to prevent accidental discharge, thus avoiding any kind of accidental discharge (automatic or manual) during maintenance work in the protected area.

The abort valves are fitted by screwing them into the discharge manifold with sealant or Teflon tape.

CAUTION

BEFORE SCREWING IN THE ABORT OR ISOLATION VALVE, ENSURE THAT THE MAIN VALVE (CYLINDER OR PILOT BOTTLE), DOES NOT HAVE ITS ELECTRIC OR MANUAL RELEASE HEAD FITTED.



A 2-pole microswitch may be fitted, with one normally open (NO) contact and one normally closed (NC), set to change state when the valve is opened or closed, sending an electrical signal to the fire panel to indicate that the system is isolated or operative. Either contact may be used, depending on the requirements of the installation.

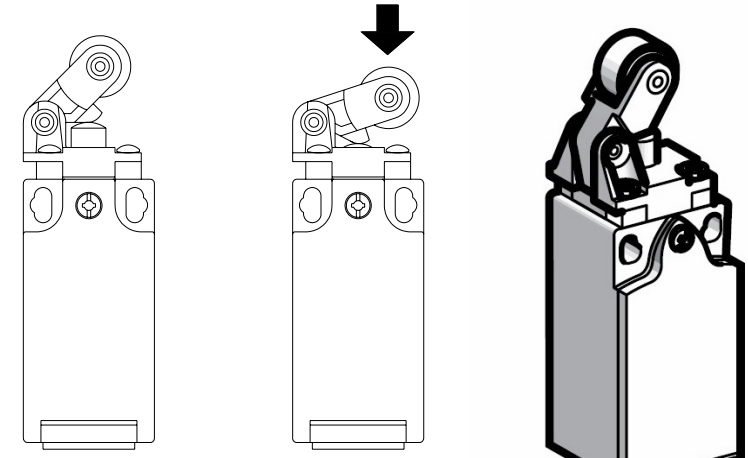
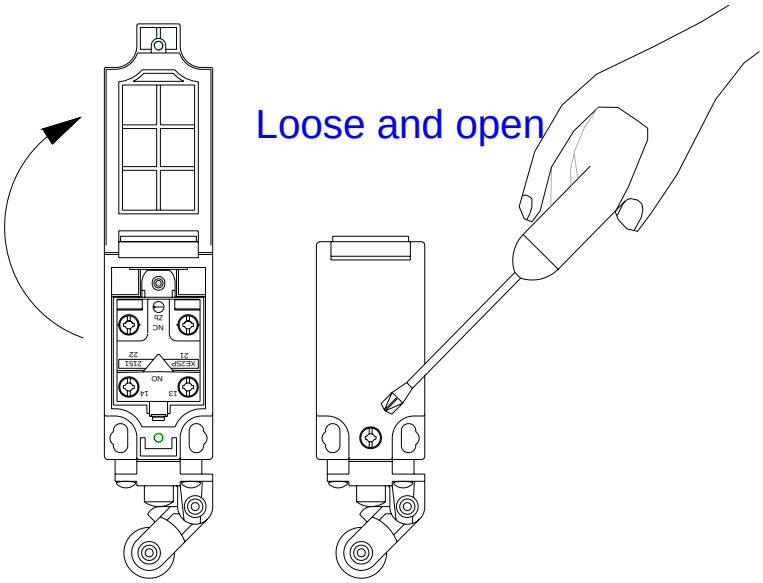
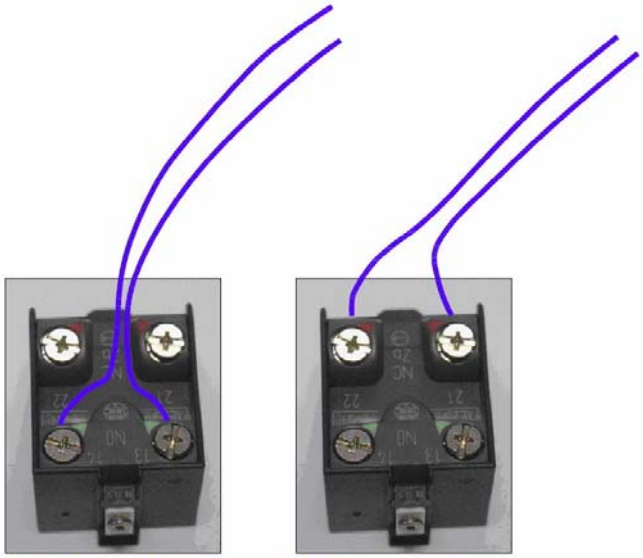


Figure 34





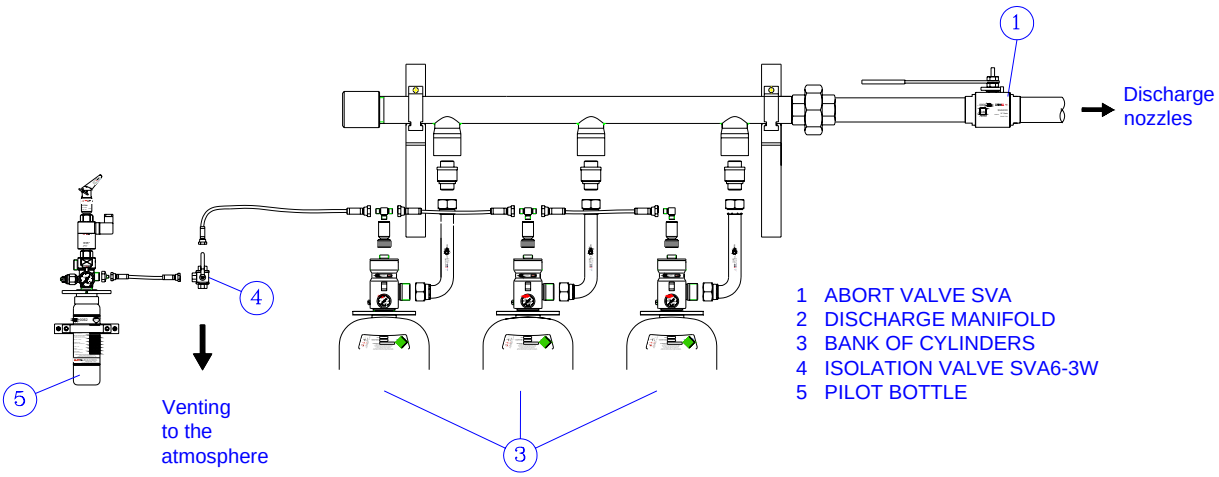
WIRING CONNECTIONS NORMALLY OPEN (NA)

WIRING CONNECTIONS NORMALLY CLOSE (NC)

Technical Information

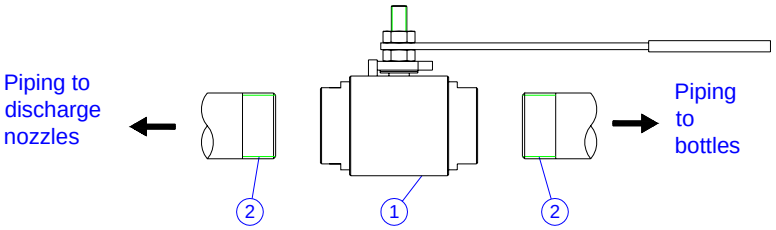
Location	Selector valve
Case	Plastic
Working temperature	-40ºC to 60ºC
Tension	24V (DC)
Current	3 A
Response time in miliseconds	>1,5
Mechanical durability per milion operations	10
Operation minimum torque	6 N
Positive opening minimum torque	10 N
Protection grade	IP65
Connection for cable	1 thread inlet for a tow press M20x1.5
Instalation	Non corrosive; indoors

1.22.1 Installation instructions:



1. Ensure that the discharge manifold is properly secured to its brackets and that the actuation devices of the cylinder banks (electrical and manual discharge heads) are removed or out of service.

2. Check that the external threads on the discharge pipework are clean and free from impurities. Clean with a wire brush for threads.



MODELO	DE
SVA20	3/4" G
SVA25	1" G
SVA32	1 1/4" G
SVA40	1 1/2" G
SVA50	2" G
SVA65	2 1/2" G
SVA80	3" G
SVA100	4" G

DRAWING OF THE VALVE WITH PIPE AND TABLE OF VALVE THREADS

3. Wrap Teflon tape or put paste on the male thread of the discharge pipe where the abort valve is to be screwed in. If using Teflon tape put 20 turns around the male thread of the pipe; if using paste cover the second thread of the female thread of the abort valve and to the threaded end of the pipe (male). If a liquid thread sealant is to be used, first ensure that it is compatible with the gas it will come in contact with, i.e. inert gas (HFC-227ea, HFC-125 and HFC-23).

4. Fully screw in the valve to the fixed threaded end of the pipe closest to the manifold. In this operation the pipe will be fixed and the valve mobile, therefore, to screw the valve in it must be turned with a non-adjustable or adjustable spanner. Try to ensure that the valve is well positioned, and free from obstacles that might make access for its opening and closing difficult.

5. Manually open and close the abort valve to check that it is operating correctly.

6. Then screw the other end of the pipe to the abort valve. At this stage the valve will be fixed and the pipe mobile, so the pipe must be screwed in using a pipe wrench.

7. If the abort valve has a microswitch with a contact for an electrical signal, open the electrical connection cover by removing the two screws to make the cable connection. It has two contacts inside, one normally open (NO) and one normally closed (NC), either of which may be used depending on the requirements of each installation.

8. Once the electrical connection is made, manually open and close the valve to check that the electrical contact is operating correctly. The abort or isolation valve must send an electrical signal in the closed position, but not in the open position.

NOTE 1: For greater safety, it is recommended that the abort valve be connected before the cylinder actuation fittings (electric, manual pneumatic etc.) are fitted. For the same reason, although the cylinders are fixed in their brackets, they must have their safety plugs screwed into their valve outputs. This will prevent accidental discharges due to poor handling.

1.22.2 Positioning the installed abort valve

The usual position of the installed abort valve is horizontal, as shown in Figure 35, but it may also be fitted vertically or at an angle as shown in figure 36.

When fitting the valve in the installation, the size and travel of the closing handle or lever for opening and closing the valve must be taken into account. The travel of the handle must be free of any obstacles that might prevent the abort valve opening and closing correctly.

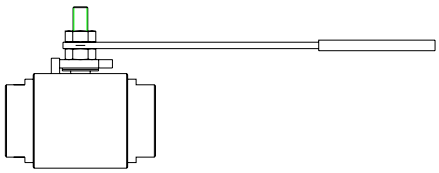
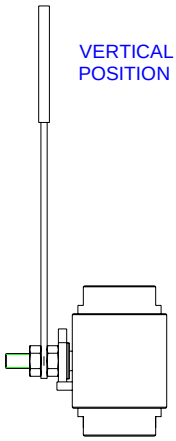


Figure 35



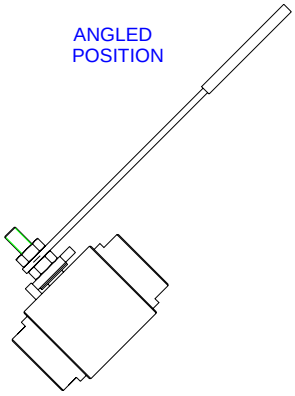


Figure 36

Technical Information

Denomination	Material
Ball valve SKH-G 1 1/4" - 2"	Steel
Short lever 1 1/4" SVA Short lever 1 1/2" SVA Short lever 2" SVA	Zinc steel F-275 ST-42
Short lever handle 30x6x110 SVA	Flexible black pvc ref: RRWA-91689-110

1.23 FITTING THE ISOLATION VALVE TO THE RELEASE LINE

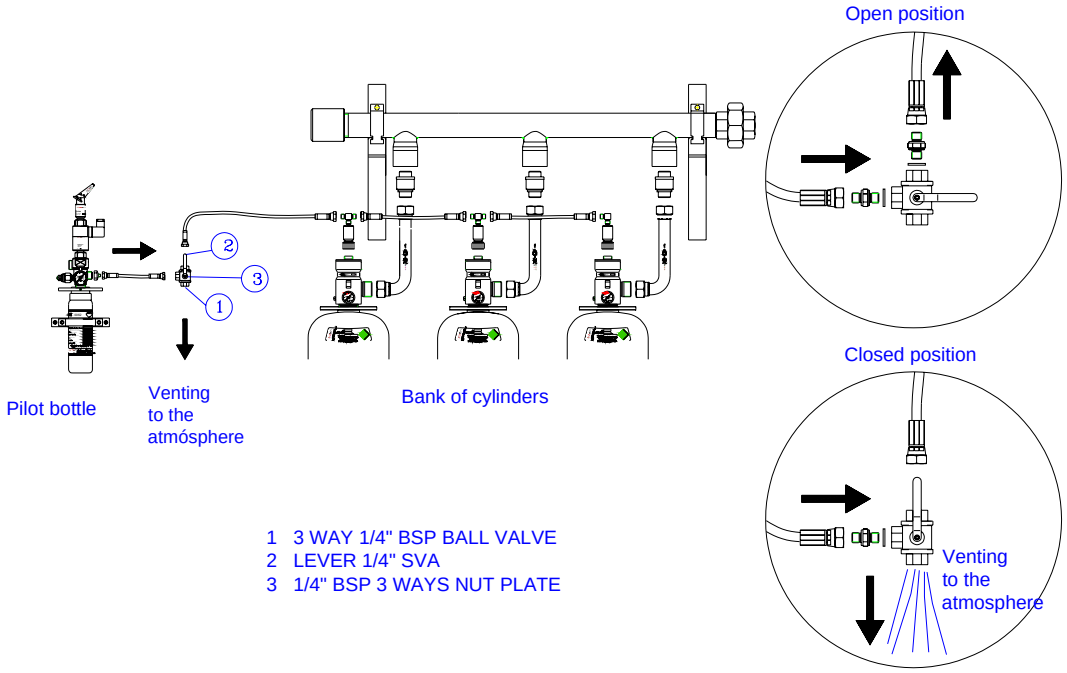
Its function is to isolate the pilot bottle or cylinder release line in cylinder bank systems. This prevents accidental actuation of the system.

The isolation valve is installed in the pilot release line, after the pilot bottle or cylinder discharge hose.

For this purpose a 1/4” BSP, 2 position, 3-way ball valve is used, in order to vent to atmosphere in the closed position and thus avoid a build up of pressure due to possible leaks in the pilot bottle. This type of valve has three connections, the pilot bottle input, an output to the cylinder bank and another vented to atmosphere.

CAUTION

**BEFORE SCREWING IN THE ISOLATION VALVE,
ENSURE THAT THE MAIN VALVE (CYLINDER OR PILOT BOTTLE),
DOES NOT HAVE ITS ELECTRIC OR MANUAL RELEASE HEAD FITTED.**



To install the isolation valve, follow the instructions below:

1. The pilot bottle input connection and the output connection to the cylinder bank are done in the same way, screwed to a 1/4” BSP Teflon hose. To do this, a 1/4” BSP male to male connector with a 1/4” metal-to-plastic washer is screwed to the valve outlet, and then the 1/4” BSP hose swivel nut is manually screwed to the 1/4" BSP male to male connector, without any type of sealant, as it is a conical seal (metal-to-metal). Fully tighten this link with a 19 mm non-adjustable spanner to ensure its gas-tightness (approximate torque 15 Nm).

2. A 1/4” BSP vent plug is screwed with its 1/4" metal-to-plastic washer to the vent to atmosphere connection. It can also be done with 1/4” BSP pipe to vent the gas to wherever is desired.

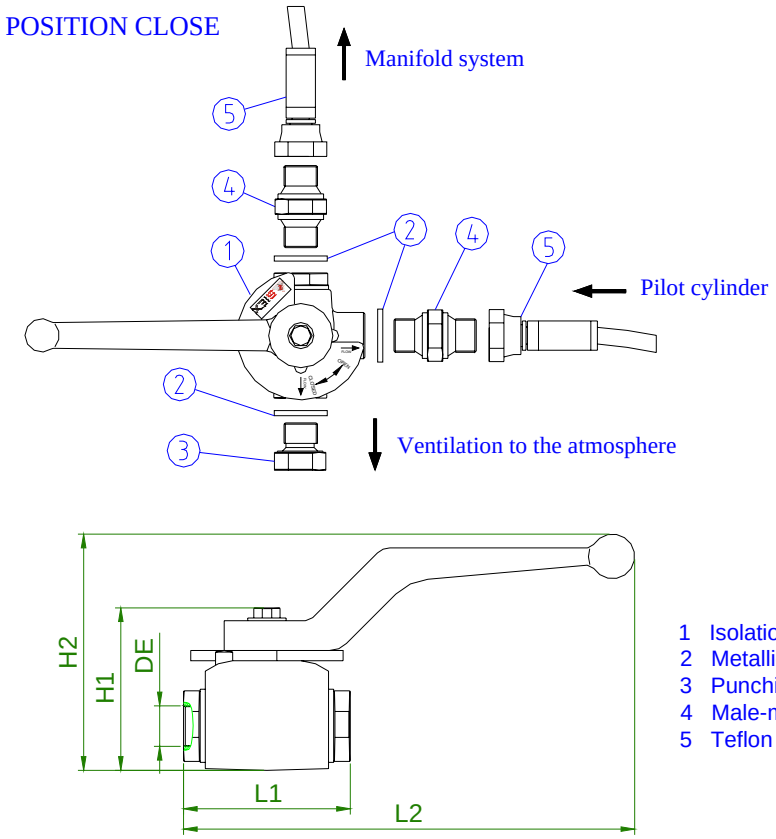


Figure 37

Technical Information

Operating medium	N2
Activation valve	Manual
Connection pipe	Thread GAS
Working temperature	-20º C to 50º C
Test temperature	20º C
Working pressure	360 bar
Test pressure	540 bar
Resistance test pressure	1080 bar
Nominal pressure of the ball valve	400 bar

1.24 INSTALLING OR REPLACING PRESSURE SWITCHES

Assembled in the factory directly onto the cylinder valve with a 1/8" NPT thread, the pressure switch is used to send an electrical signal directly to the fire panel when the cylinder pressure falls. There are two variants, NC (normally closed, with open pressure) or NO (normally open, with closed pressure).

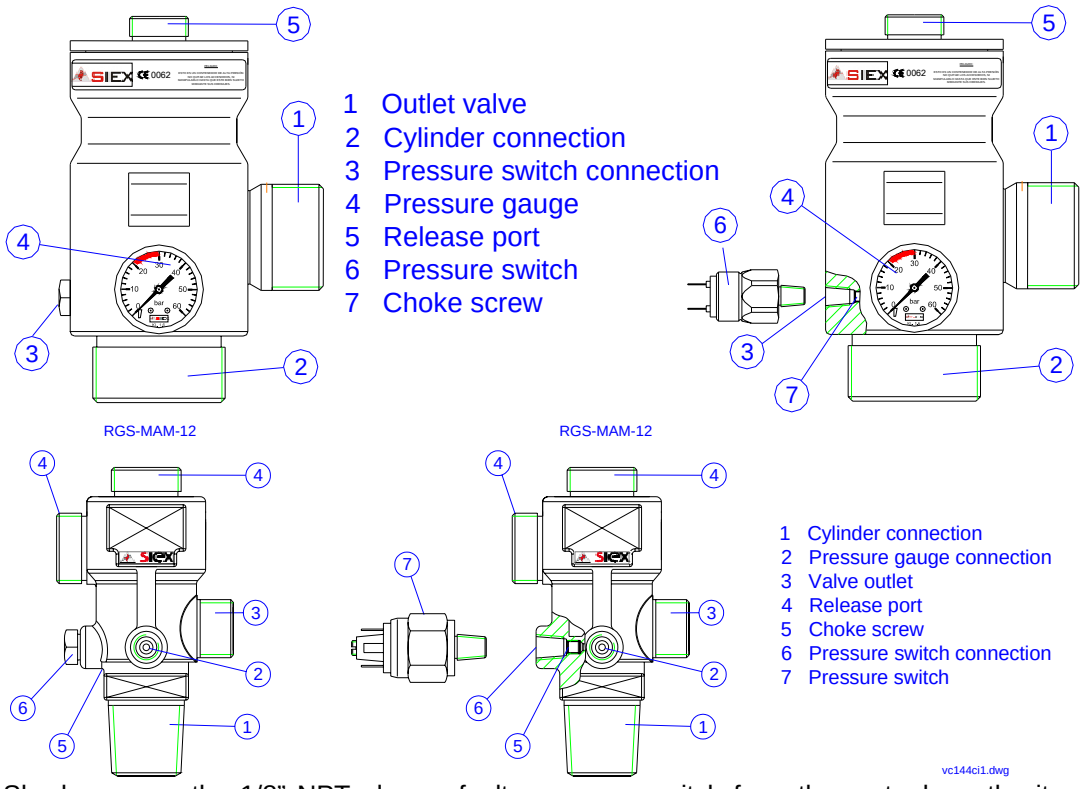
To install or change a pressure switch with the cylinder charged with extinguishing agent, follow the instructions below:

1. Ensure that the cylinder is properly secured by its brackets. Check that the valve outlet is screwed to the discharge hose and this, in turn, to the manifold or discharge pipe. The pressure switch may also be installed or replaced without the cylinder being connected to the discharge hose, in which case, do not remove (or put on) the valve outlet safety plug while the cylinder is being handled (secured, of course, to its bracket).

CAUTION

BEFORE SCREWING IN THE PRESSURE SWITCH, ENSURE THAT THE MAIN VALVE (PILOT CYLINDER), DOES NOT HAVE ITS ELECTRICAL, MANUAL, PNEUMATIC OR ELECTRICAL SQUIB RELEASE CONNECTED.

2. Holding the pressure switch by hand, wrap Teflon tape around the 1/8” NPT connecting thread (18 turns approximately).



3. Slowly remove the 1/8” NPT plug or faulty pressure switch from the port where the item is going to be connected. During this operation a small amount of gas will leak through the choke

Allen screw inside the valve. This screw is for regulating this small gas leak. If the gas leak is too great, turning the screw clockwise will reduce the flow, and if the flow is too small turning the screw in the opposite direction will increase it. Bear in mind that this small gas leak must exist (as small as possible) so that when the pressure switch is fitted, it is under pressure.

It is advisable to reduce the fitting time to a minimum; otherwise a small quantity of gas will be lost. The estimated time to carry out this operation is 10 seconds.

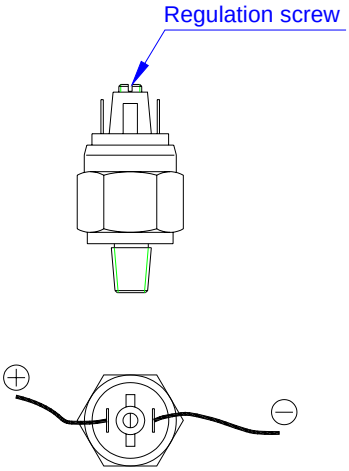
4. Quickly screw in the pressure switch with a 24 mm non-adjustable spanner until it is fully tightened.

5. Check with soapy water that there are no leaks in the joint between the valve and the pressure switch. If there is a leak, repeat all the above operations.

6. Check the continuity of its Faston terminals with a tester. Depending on whether the chosen pressure switch is normally open or normally closed (NO/NC), it will give a different type of electrical signal.

7. If the required signal is not the one being received, and the chosen pressure switch is the correct one, turn the regulator screw to the left or right until an optimal position is found as shown in the picture.

8. If on following point 7 of this section, you still do not get the desired results, it means that the choke screw is too tight and therefore the pressure switch must be removed and the operations carried out again (from point 2).



Technical Information

Operating medium		HFC-227ea, HFC-125, HFC-23, N2
Valve type		RGS-MAM-20/40/50 RGS-MAM-11-4/12-4
Body		Bicromathed steel
Valve connection		1/8” NPT
electrical terminals		Faston
Maximum voltaje		48 V
Inductive current		0.2 A
Resistant current		0.5 A
Protection index		IP 54
Working temperature		-5ºC to 60ºC
Mechanical life		10^6 cicle
Contact type		NA / NC
Regulation field	HFC-227ea, HFC-125	20-80 bar (Model PMN 80)
	HFC-23	50-150 bar (Model PMN 150)
Max. Static pressure		300 bar
Weigh		85 gr

1.25 INSTALLING OR REPLACING PRESSURE GAUGES

Assembled in the factory directly on the cylinder valve, it indicates at all times the pressure (in bar) in the cylinder charged with extinguishing agent.

CAUTION

THE PRESSURE GAUGE IS ASSEMBLED IN THE FACTORY ON THE CYLINDER VALVE AND THEREFORE DOES NOT REQUIRE ANY FORM OF HANDLING

HOWEVER, THE INSTRUCTIONS IN THIS CHAPTER ARE FOR OPERATIONAL AND GUIDANCE USE FOR POSSIBLE REPLACEMENTS DUE TO MALFUNCTION OR BREAKAGE.

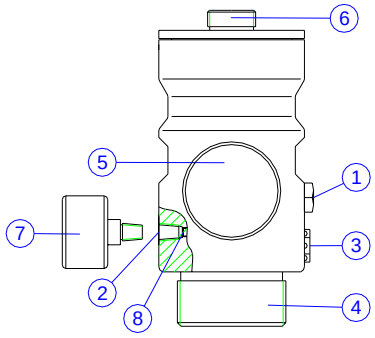
To install or replace a pressure gauge when the cylinder is charged with extinguishing agent, follow the instructions below:

1. Ensure that the cylinder is properly secured by its brackets. Check that the valve outlet is screwed to the discharge hose and this, in turn, to the manifold or discharge pipe. The pressure gauge may also be installed or replaced without the cylinder being connected to the discharge hose, in which case, do not remove (or put on) the valve outlet safety plug while the cylinder is being handled (secured, of course, to its bracket).

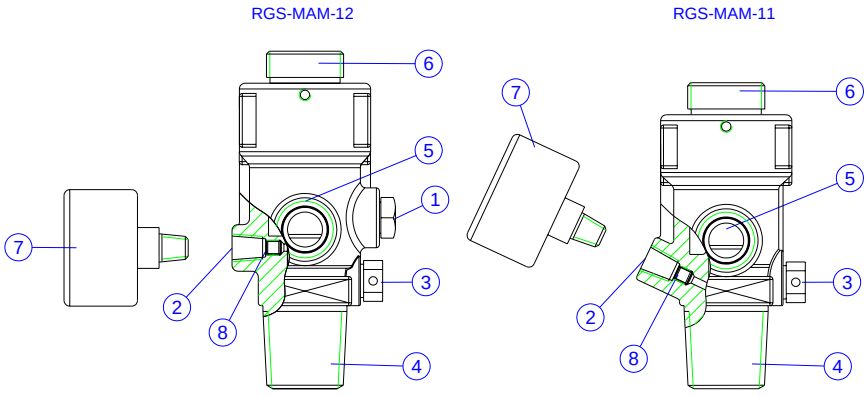
CAUTION

BEFORE SCREWING IN THE PRESSURE GAUGE, ENSURE THAT THE MAIN VALVE (PILOT CYLINDER), DOES NOT HAVE ITS ELECTRICAL, MANUAL, PNEUMATIC OR ELECTRIC SQUIB RELEASE CONNECTED.

2. Holding the pressure gauge by hand, wrap Teflon tape around the 1/8” NPT connecting thread (18 turns approximately).



1 Pilot port
2 Pressure gauge connection
3 Safety cup (Bursting disc)
4 Cylinder connection
5 Volve outlet
6 Release port
7 Pressure gauge
8 Choke screw



3. Slowly remove the 1/8” NPT plug or broken pressure gauge from the port where the item is to be connected. During this operation a small amount of gas will leak through the choke Allen screw inside the valve. This screw is for regulating this small gas leak. If the gas leak is too great, turning the screw clockwise will reduce the flow, and if the flow is too small turning the screw in the opposite direction will increase it. Bear in mind that this small gas leak must exist (as small as possible) so that when the pressure gauge is fitted, it is under pressure.

   It is advisable to reduce the fitting time to a minimum; otherwise a small quantity of gas will be lost. The estimated time to carry out this operation is 10 seconds.

4. Quickly screw in the pressure gauge with a 14 mm non-adjustable spanner until it is fully tightened.

5. Check with soapy water that there are no leaks in the joint between the valve and the pressure switch. If there is a leak, repeat all the above operations.

6. Check that the pressure gauge shows pressure on its dial. If it does not show the correct pressure, weigh the cylinder to check whether extinguishing gas has been lost. If it has, send the cylinder to SIEX to be recharged.

7. If the pressure gauge does not show any pressure on its gauge, repeat all the operations of this section, because the choke screw is probably too tight.

1.26 INSTALLING THE CYLINDER VALVE BURST DISC

The burst disc is factory pre-installed in the escape or burst port of the RGS-MAM-20/40/50/11-4/12-4 cylinder valve, and does not require any form of handling.

CAUTION

THE BURST DISC IS ASSEMBLED IN THE FACTORY AND THEREFORE DOES NOT REQUIRE ANY HANDLING.

HOWEVER, THE INSTRUCTIONS IN THIS CHAPTER CAN BE USED FOR OPERATION AND GUIDANCE FOR POSSIBLE LATER CHANGES TO THE SYSTEM.

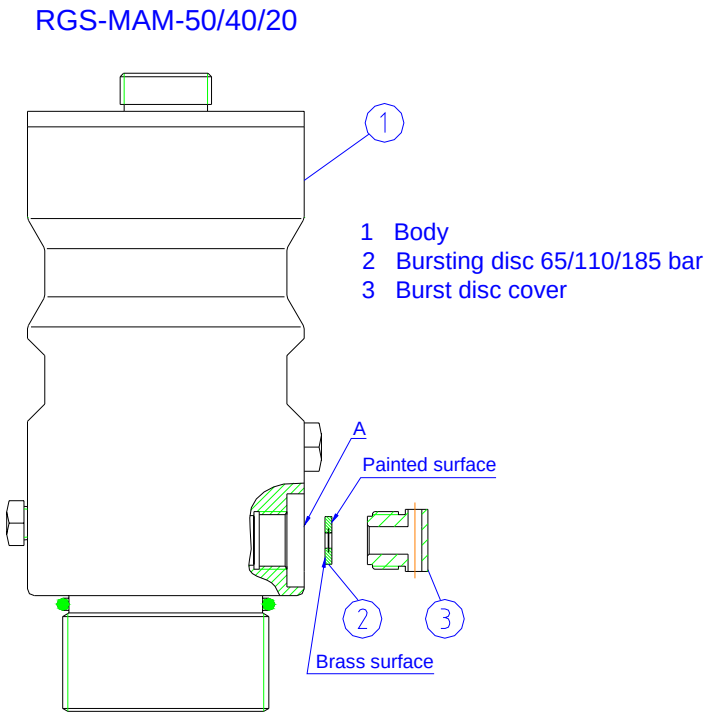


Figure 38

The burst disc must only be replaced with an original SIEX 2001, SL spare.

It may only be replaced with the cylinder discharged (unpressurised) and never with the cylinder charged (pressurised).

To install or change a burst disc with the cylinder discharged, follow the instructions below:

1. Ensure that the cylinder is properly secured by its brackets. Check that the valve outlet is screwed to the discharge hose and this, in turn, to the manifold or discharge pipe. The burst disc can also be installed or changed without the cylinder being connected to the discharge hose, in which case do not remove (or put on) the valve outlet safety plug while the cylinder is being handled (secured, of course, to its bracket).

CAUTION

BEFORE REPLACING THE BURST DISC, MAKE SURE THAT THE CYLINDER IS DISCHARGED (NO PRESSURE).

NEVER INSTALL A BURST DISC WITH THE CYLINDER CHARGED (PRESSURISED)

2. Unscrew the end cap of the burst disc from the valve body (exhaust or burst port) using a spanner.

3. Remove the broken burst disc and discard it.

4. Place the new burst disc, exclusively supplied by SIEX, in the valve body, in the burst or exhaust port.

   Place the smooth brass surface of the disc against the valve body seat, with the painted or coloured side of the disc facing outwards, so that it can be seen from the outside.

   The characteristics of the burst disc to be fitted are in the following table:

TABLE 10

Burst disc material		Nickel/brass/copper
Average burst for HFC-227ea	charged to 24 bar (20ºC) charged to 42 bar (20ºC)	65 bar +/-6.5% 110 bar +/-11%
Average burst for HFC-125	charged to 24 bar (20ºC) charged to 42 bar (20ºC)	65 bar +/-6.5% 110 bar +/-11%
Average burst for HFC-23		185 bar +/-18%
Colour of the burst disc	65 bar 110 bar 185 bar	Red Blue Green
Burst disc diameter	RGS-MAM-20 RGS-MAM-40 RGS-MAM-50 RGS-MAM-11/-4 or 12/-4	11 mm 13.9 mm 13.9 mm 11 mm
Burst disc cap thread	RGS-MAM-20 RGS-MAM-40 RGS-MAM-50 RGS-MAM-11/-4 or 12/-4	1/4” BSP 3/8” BSP 3/8” BSP 1/4” BSP
Thread torque		18 Nm (1/4" BSP, thread) 20 Nm (3/8" BSP thread)

5. Screw in the burst disc end cap, supplied exclusively by SIEX, into the valve body escape or burst port, without any type of sealant, but it must be tightened to 18 or 20 ± 2 Nm, depending on the valve, see table 10 above. **Do not use Teflon, adhesive, or any other type of thread sealant,** simply finger-tighten as much as possible, and then finally turn the nut 15º with a spanner.

1.27 INSTALLING THE WARNING SIGNS

There are two types of warning signs for SIEX-HC halogenated gas fixed extinguishing systems. A sign at each entry door to the hazard area to indicate that it is a hazard area and a warning sign at each point where a manual release can be carried out. These signs are specific to the halogenated gas system used.

Door sign:

A warning note is required on all the entrance doors to the protected hazard area to advise personnel that they are entering a protected area.

For protected areas with concentrations greater than the NOAEL, a warning must be made to this effect.

Place the sign on the door itself, in such a way that it is visible and it cannot fall off or be removed.

Sign that shows a manual actuation can be carried out:

A warning note is required to indicate that the system can be actuated manually, at each point where this is the case.

The sign is fixed next to the manual actuation device in such as way that it is visible and cannot fall off or be removed.

CAUTION

WARNING SIGNS MUST BE PLACED VISIBLY ON ALL THE ENTRANCE DOORS TO THE HAZARD AREA AND AT ALL POINTS WHERE MANUAL ACTUATION IS POSSIBLE.

1.28 FINAL INSTALLATION CHECK

After carrying out the installation of the SIEX-HC system, the appropriate inspection and tests must be carried out.

1. Check that the cylinders have the correct weight and pressure and are installed in accordance with the installation drawings.

2. Check that the brackets and straps are correctly installed and all the fittings are properly tightened.

3. The system pipework must be inspected according to the drawings in the manual, in accordance with the ISO-14520 (UNE-23570) standard and the design limitations in this manual.

4. Check that the discharge and actuation pipes are fully secured. Check that all the fittings are properly screwed in and tightened to prevent any dangerous movements during discharge. The means of carrying out pipe size reductions and the position of the tees must be checked depending on the requirements of the design.

5. System pipework must be clean inside, free of pores and internally inspected so as to avoid the presence of oils or foreign particles that could dirty the hazard area, or affect the dispersal of the agent due to a reduction in the nozzle surface area.

6. The pipework must be pressure tested in accordance with the requirements of the authority having jurisdiction.

CAUTION

BEFORE CARRYING OUT THE INSPECTION TEST OF THE PNEUMATIC RELEASE LINE (RELEASE HOSES), THE RELEASE HEADS (ELECTRICAL, MANUAL, PNEUMATIC ETC) MUST BE REMOVED FROM THE VALVES SO THAT ACCIDENTAL DISCHARGES OF THE SIEX-HC SYSTEM ARE AVOIDED.

7. Carry out the test on the pneumatic release line with nitrogen at 124 bars (1800 psig), to check its integrity and gas tightness.

8. Check that the nozzles are installed in the correct position (according to the installation drawings) with its bore number marked on the lower flat part of the nozzle. The discharge nozzles must be oriented to optimise agent dispersal. Check the nozzle orifices to avoid any obstructions.

9. The discharge nozzles, pipework and assembly straps must be installed in such a way that they cannot cause personal injury. The extinguishing agent must not be discharged directly on personnel, as they could suffer injury. The discharge must not be aimed directly at objects or shelves, upper parts of cupboards or similar surfaces where loose or portable objects could be thrown or displaced by the gas during discharge.

10. The remote actuation stations must be correctly installed, easily accessible and appropriately identified. All the manual stations used to actuate the SIEX-HC for halocarbonated gases systems must be appropriately identified for this purpose. Special care must be taken when the manual pull stations for more than one system are very close and could be confused. In this case, the manual stations must be clearly identified as to the hazard area they affect.

11. A test of the electric release head must be carried out, following the description in chapter 6 on the cylinders equipped with this head.

12. Carry out a pressure switch test of all the pressure switches installed as specified in chapter 1.2.4.