STRATEGEM®
An ISO 9001:2008 Certified

STRATEGEM ICEBERG INDUSTRIAL SOLUTION INDIA PVT LTD

FIRE FIGHTING EQUIPMENT

INTRODUCTION

STRATEGEM activity was started for the production of components in the field of fire fighting system, and since then the Company has been working on the Italian market, serving the main Italian companies building complete fire fighting systems.

Since the early days our product range has been enlarged and modified according to the market requests and the incredible advances in the manufacturing technologies which have been possible along the years.

Today STRATEGEM has become one of the players on the world market regarding spray nozzles for industrial processes, while the firefighting product line has undergone improvements and modifications to adapt for market requests.

Today our product range for firefighting includes the following

A complete line of products in the field of foam based systems.

Here our customers find literally everything which is required to build a foam based system, from the foam agent tank to the most advanced types of monitors.
All our equipment, parts and machines, incorporate more than 40 years of field experience in the most important Italian refineries, where many engineers only accept our products.

A complete line for hydraulic spray nozzles

In this field our deep knowledge of the product, together with one of the largest laboratories in Europe for nozzle testing puts us miles ahead of other competitors.

A new line of water mist nozzles

In these field, where such nozzles are rapidly finding enthusiastic consent in the trade, we can proudly pretend to be at the forefront of the technology thanks to a machine tool park unequalled in the world.

This catalog covers only the main products used to assemble large foam system as used in oil refineries and petrochemical industries. An additional catalog covers the rest of the product mentioned above.

GENERAL INFORMATION

International System of Units

Description

The **INTERNATIONAL SYSTEM OF UNITS** sometimes called SI, has been defined by the International Standards Organization (ISO) and is based upon metric units. The following notes include most units which are likely to be used in handing of fluids. The system consists of nine base units, and supplementary units which are coherently derived from them. The coherence consists in the fact that the product, or the quotient of any two unit quantities in the system result in another unit quantity. Because of the world wide trend to use this modern metric system, we are providing in the following the conversion constants for the most useful units.

Base Units and derived units

The SI has defined the following base unit:

N°	QUANTITY UNIT	NAME UNIT	SYMBOL	
1	Length	meter	m	
2	Mass	kilogram	kg	
3	Time	second	s	
4	Thermodynamic temperature	Kelvin	K	
5	Molecular substance	mole	mol	
6	Electric current	Ampere	A	
7	Light intensity	candela	cd	
8	Plane angle	radiante	rad	
9	Solid angle	steradian	sr	

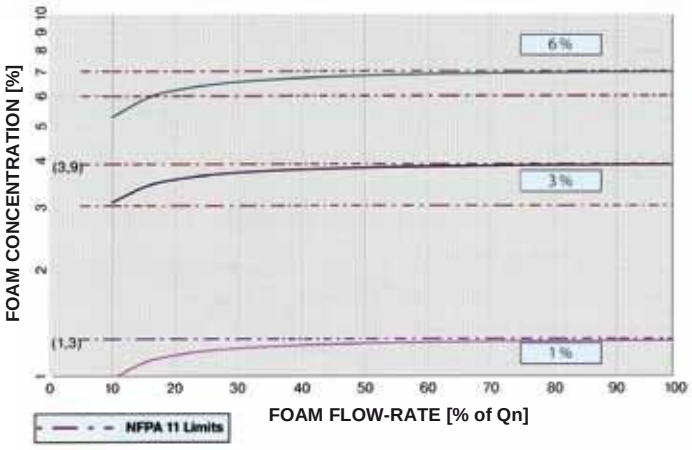
Out of these base units many other have been derived, the most interesting for our purposes being listed below.

N°	QUANTITY UNIT	NAME UNIT	SYMBOL	EQUIVALENCES
10	Area	square meter	m^2	
11	Volume	cubic meter	m^3	
12	Density	kilogram per cubic meter	Kg/m^3	
13	Velocity	meter per second	m/s	
14	Acceleration	meter per second squared	m/s^2	
15	Angular velocity	radian per second	rad /s	
16	Frequency	Hertz	Hz	Hz = cicli / s
17	Force	Newton	N	$N = kg \cdot m/s^2$
18	Pressure	Pascal	Pa	$Pa = N/m^2$
19	Momentum	kilogram meter per second	Kg m/s	
20	Energy	Joule	J	$J = N \cdot m$
21	Power	Watt	W	W = J/s
22	Moment of force	Newton meter	N m	
23	Kinematic viscosity	square meter per second	m^2/s	
24	Dynamic Viscosity	Pascal second	Pa s	
25	Thermal conductivity	Watt per meter Kelvin	$W (m \cdot K)$	

FOAM MXERS

Positive displacement

Typicalperformance



This is the most modern and precise type of proportioning equipment for large stationary systems, where it is required to maintain a stock of foaming agent available.

These machines have been developed to overcome limitations and disadvantages coming from the operation of bladder tanks, that is the following:

- Limited operation time, once used the foaming agent in the bladder tank the tank needs refilling
- Limited range of precise proportioning, typically lower than 1:5 in capacity range
- Costly and complicated maintenance, especially if tank placed inside a building

The machine concept is very simple, consisting in two volumetric (screw) pumps, the bigger one working as a motor makes use of the main water line pressure to rotate the smaller one, which injects the foaming agent under pressure into the main water line.
With this design the machine is self-powered and does not need any kind of additional energy.
A three way valve allows for the foam agent being injected in the main water line or alternatively being sent back to the foam agent tank when testing the system.

The mechanical (elastic) coupling between the two machines, which pump a precise liquid volume at each turn, assures a constant and precise proportioning for any given capacity value, in an operating range well over 1:10, which is unparalleled in the whole world market.

The sturdiness of the system and the very strong design of screw pumps assure the highest reliability year over year, even when the system is tested in operation every month.
In addition these machines assure the following advantages:

- System can work for unlimited time, foaming agent being supplied from any atmospheric pressure container, like trucks or even 200 liter barrels
- System works fine even at very little load, e.g. using one only monitor out of a group
- In a large plant one only foam agent stock can be built in a central location serving all systems
- Workers can supply foam agent away from the fire area, with lower risks
- The system is compliant with NFPA 11
- The machine can work with sea water

Materials

The materials used are resistant to the most common foam agents and allow the machine to be flushed with sweet water after testing.

Drive motor

Body	Epoxy coated cast iron / Full bronze on small sizes
Idle rotor	Bronze
Drive rotor	Cr Stainless steel

Injection pump

Body	Cast iron GG25 with internal Teflon / Graphite coating
Rotors	Cr Stainless steel

These materials allow for operation with both sweet and sea water

BLADDER TANKs

STRATEGEM offers a very complete range of bladder tanks, built in thousands of units and fully tested in hundreds of sites. Our long experience in the construction of professional fire fighting equipment allows us to offer the highest quality on the market today, and what most matters, a reliable solution to all of your design problems.

Quality features

In addition to the high quality of all the materials used to build our tanks we also supply them with our specially made bladder, which has the collar for tank connection cast in one piece, so as to be able to hold internal pressure for long time without any fluid loss.

On request specifications

Construction according to ASME codes.
Construction on customer specified pressure.
Welding check through dye penetration or X-ray.
Performance test on factory proving ground and manufacturer certificate.

Documents delivered with our tanks

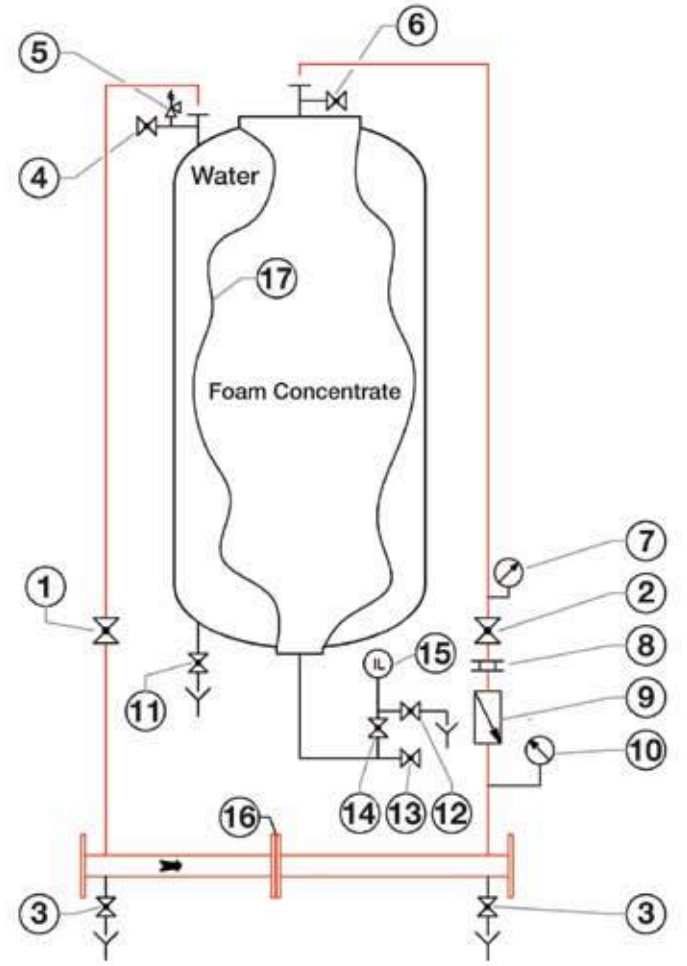
Warranty certificate.
Hydraulic pressure test certificate.
Operation and service manual, including filling instructions (available in Italian, English, French).

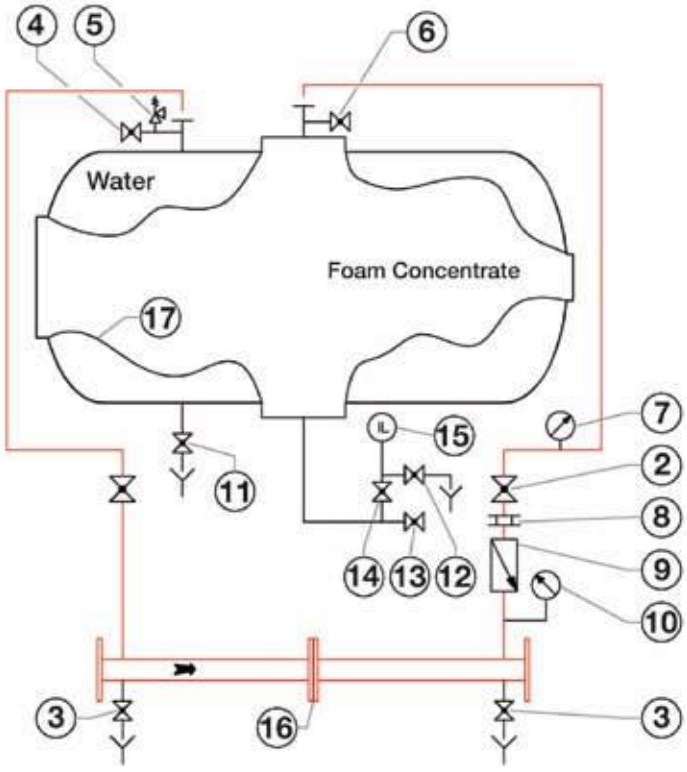
Documents available at our Offices

All documents relating to products built according to the PED norms are available to any authorities at our Offices.

BLADDER TANKs

Bladder tanks functional schemes

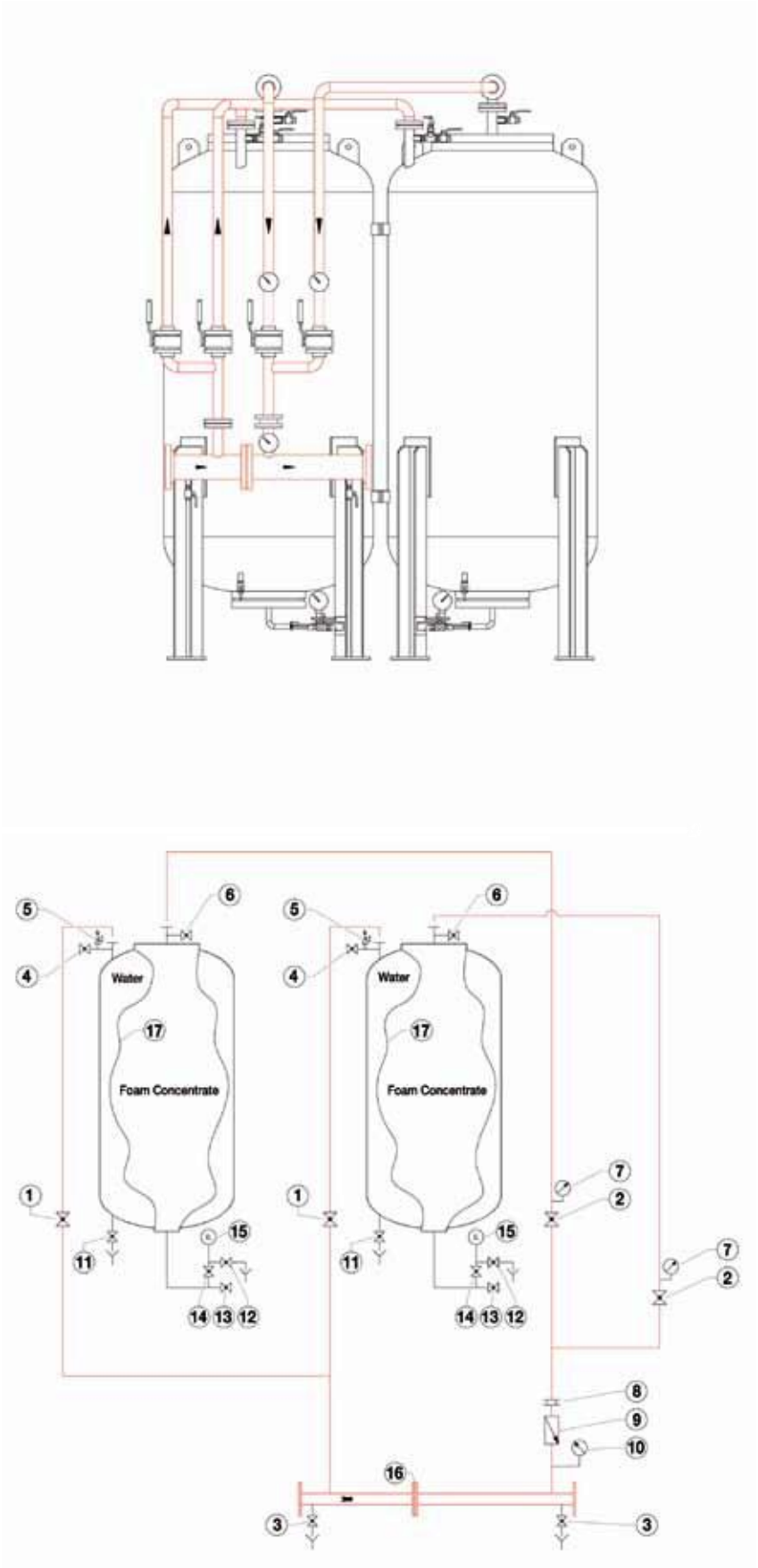




1.	Stop valve
2.	Concentrate stop valve
3.	Drain valve, mixer
4.	Water vent valve
5.	Safety valve
6.	Vent valve
7.	Pressure gauge
8.	Foam diaphragm
9.	Check valve
10.	Pressure gauge, differential
11.	Drain valve, water
12.	Drain valve, level gauge
13.	Drain valve, concentrate (& filling valve)
14.	Cut-off valve, level gauge
15.	Level gauge
16.	Water diaphragm
17.	Bladder

BLADDER TANKS

Twin bladder tanks functional schemes



1.	Stop valve
2.	Concentrate stop valve
3.	Drain valve, mixer
4.	Water vent valve
5.	Safety valve
6.	Vent valve
7.	Pressure gauge
8.	Foam diaphragm
9.	Check valve
10.	Pressure gauge, differential
11.	Drain valve, water
12.	Drain valve, level gauge
13.	Drain valve, concentrate (& filling valve)
14.	Cut-off valve, level gauge
15.	Level gauge
16.	Water diaphragm
17.	Bladder

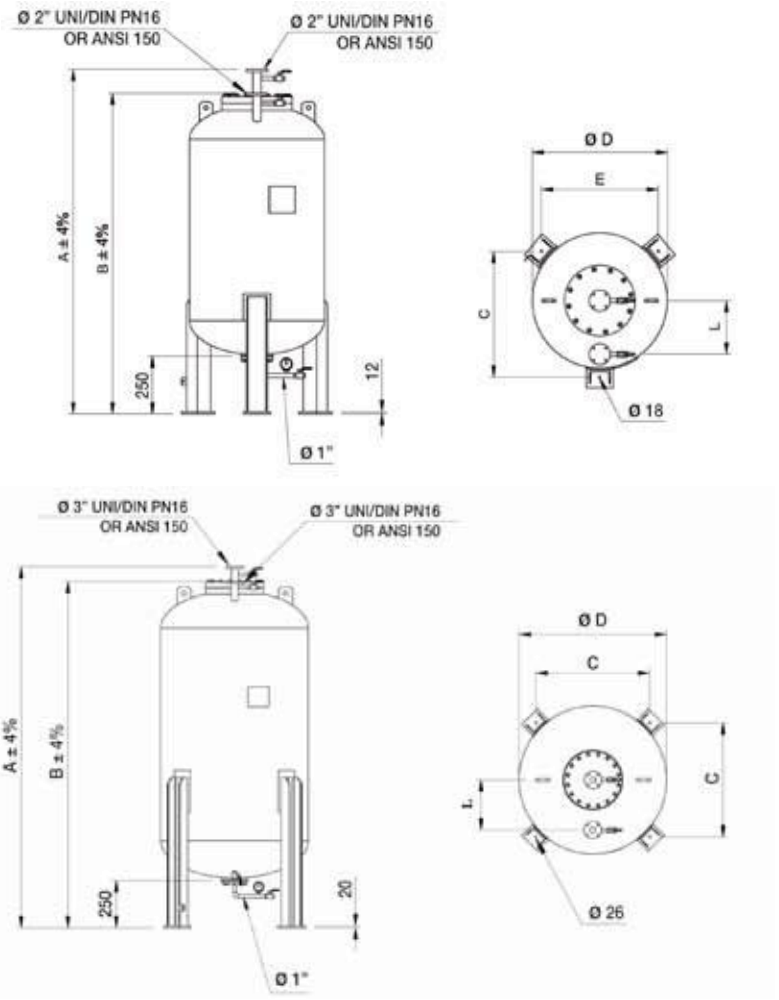
We can design and quote any size of twin bladder tanks according to customer specification.
Please ask our Offices or Distributors

BLADDER TANKs

Vertical, without foam mixer

The tanks in this page are not fitted with the foam mixer, allowing the system designer to choose the most convenient layout for any specific case, the weight value shown in the table does not include therefore the mixer and its piping.

All our bladder tanks are built with the very best quality materials, as specified into the list of materials given at page 16.
Please consider that all given dimensions are understood with a plus/minus 4% tolerance.



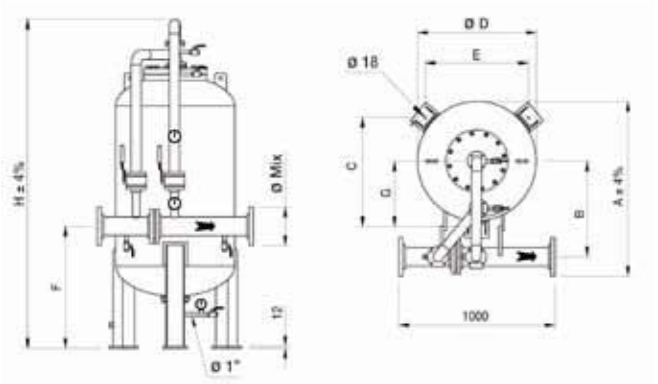
Code	Capacity *litres*	A *mm*	B *mm*	C *mm*	D *mm*	E *mm*	L *mm*	W *kg*
TTV 0020 A4KE	200	1565	1400	500	600	580	240	155
TTV 0040 A4KE	400	2080	1915	500	600	580	260	175
TTV 0060 A4KE	600	2000	1835	652	800	755	280	200
TTV 0100 A4LE	1000	2070	1905	760	1000	-	300	316
TTV 0150 A4LE	1500	2710	2545	760	1000	-	300	376
TTV 0200 A4LE	2000	2865	2700	830	1100	-	300	563
TTV 0250 A4ME	2500	3115	2950	920	1200	-	400	800
TTV 0300 A4ME	3000	2861	2710	1065	1400	-	400	950
TTV 0350 A4ME	3500	3287	3137	1065	1400	-	400	1090
TTV 0400 A4ME	4000	3510	3360	1065	1400	-	400	1120
TTV 0450 A4ME	4500	3185	3035	1210	1600	-	400	1270
TTV 0500 A4ME	5000	3400	3250	1210	1600	-	400	1370
TTV 0600 A4ME	6000	3500	3350	1315	1750	-	500	1650
TTV 0700 A4ME	7000	3260	3110	1500	2000	-	500	2000
TTV 0800 A4ME	8000	3605	3455	1500	2000	-	500	2190
TTV 0900 A4ME	9000	3910	3760	1500	2000	-	500	2340
TTV 1000 A4ME	10000	4260	4110	1500	2000	-	500	2530
TTV 1200 A4ME	12000	4910	4760	1500	2000	-	500	2870

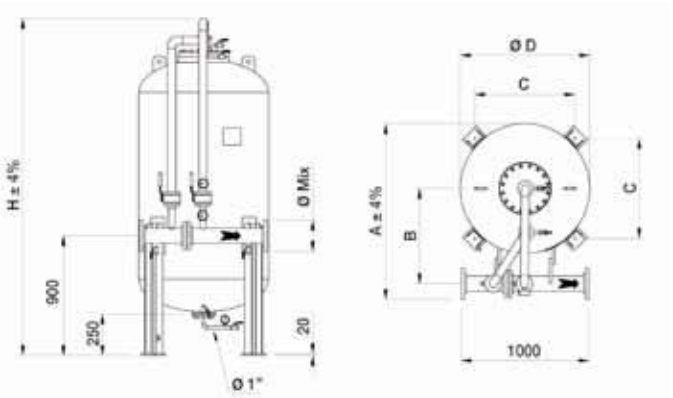
The above capacity values are only the most frequently supplied.
We can of course quote on any desired capacity value required, maintaining the same quality.

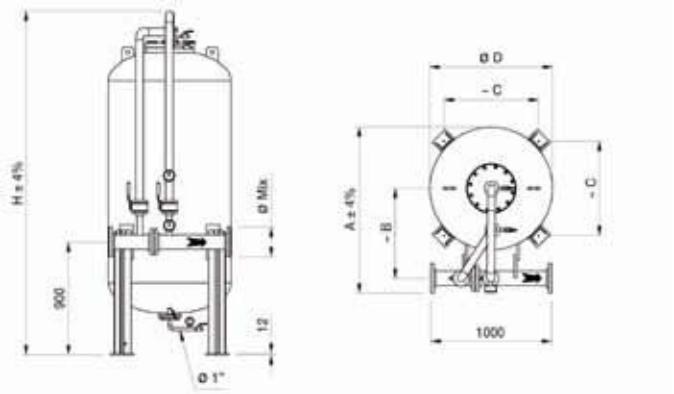
BLADDER TANKs

Vertical, with foam mixer

The tanks in this page are delivered complete with the foam mixer, and therefore the weight value shown in the table does include the mixer and its piping.
All our bladder tanks are built with the very best quality materials, as specified into the list of materials given at page 16.
Please consider that the given dimensions relate to a 3” size mixer for capacities up to 600. 4” for capacities up to 2000 and 6 inch from 2.500 up (additional sizes also available). All dimensions understood with a plus/minus 4% tolerance.







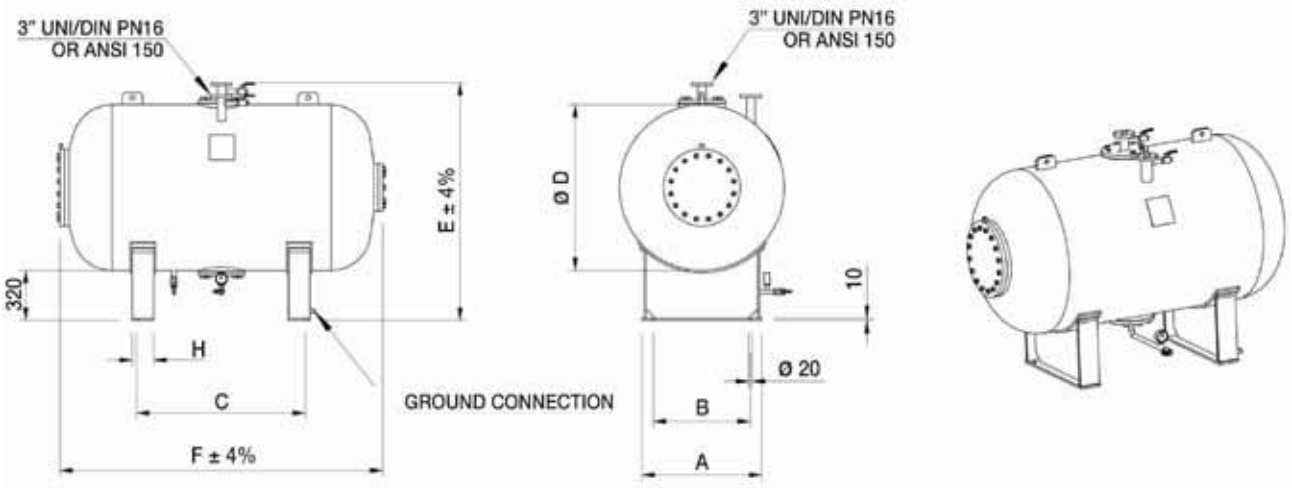
Code	Capacity	A	B	C	D	E	F	G	h	W
	litres	*mm*	*mm*	*mm*	*mm*	*mm*	*mm*	*mm*	*mm*	*kg*
TTV 002M A4KE	200	915	500	500	600	580	700	335	1730	160
TTV 004M A4KE	400	915	500	500	600	580	700	335	2280	180
TTV 006M A4KE	600	1115	600	652	800	755	900	435	2160	210
TTV 010P A4LE	1000	1335	710	760	1000	-	-	-	2295	326
TTV 012P A4LE	1250	1335	710	760	1000	-	-	-	2595	356
TTV 015P A4LE	1500	1335	710	760	1000	-	-	-	2975	386
TTV 020P A4LE	2000	1435	760	830	1100	-	-	-	3235	573
TTV 025R A4ME	2500	1530	845	920	1200	-	-	-	3365	810
TTV 030R A4ME	3000	1790	945	1065	1400	-	-	-	3110	960
TTV 035R A4ME	3500	1790	945	1065	1400	-	-	-	3610	1100
TTV 040R A4ME	4000	1790	945	1065	1400	-	-	-	3760	1130
TTV 045R A4ME	4500	1990	1045	1210	1600	-	-	-	3435	1280
TTV 050R A4ME	5000	1990	1045	1210	1600	-	-	-	3685	1380
TTV 060R A4ME	6000	2140	1120	1315	1750	-	-	-	3800	1660
TTV 070R A4ME	7000	2395	1250	1500	2000	-	-	-	3545	2010
TTV 080R A4ME	8000	2395	1250	1500	2000	-	-	-	3890	2200
TTV 090R A4ME	9000	2395	1250	1500	2000	-	-	-	4195	2350
TTV 100R A4ME	10000	2395	1250	1500	2000	-	-	-	4540	2540
TTV 120R A4ME	12000	2395	1250	1500	2000	-	-	-	5185	2880

The above capacity values are only the most frequently supplied.
We can of course quote on any desired capacity value required, maintaining the same quality.

BLADDER TANKs

Horizontal, without foam mixer

The tanks in this page are not fitted with the foam mixer, allowing the system designer to choose the most convenient layout for any specific case, the weight value shown in the table does not include therefore the mixer and its piping.
All our bladder tanks are built with the very best quality materials, as specified into the list of materials given at page 16.
Please consider that all given dimensions are understood with a plus/minus 4% tolerance.



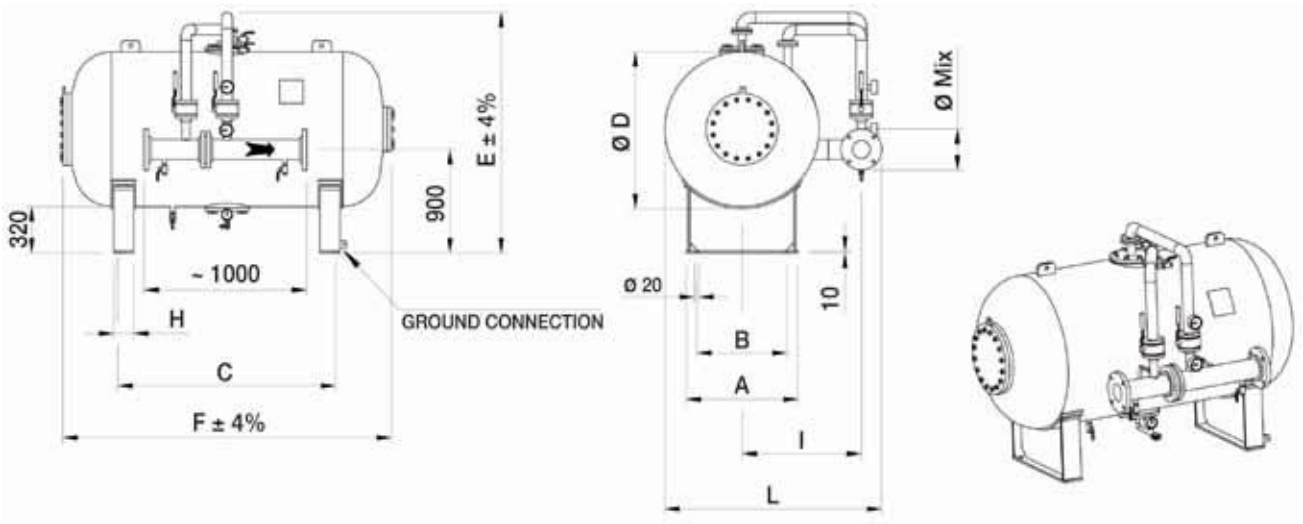
Code	Capacity *litres*	A *mm*	B *mm*	C *mm*	E *mm*	F *mm*	h *mm*	DIA *mm*	W *kg*
TTH 0060 A4ME	600	600	500	730	1430	1500	120	600	330
TTH 0100 A4ME	1000	700	600	820	1650	1776	120	1000	550
TTH 0150 A4ME	1500	700	600	1360	1650	2426	120	1000	630
TTH 0200 A4ME	2000	800	700	1520	1755	2582	120	1100	755
TTH 0250 A4ME	2500	900	800	1560	1885	2715	150	1200	790
TTH 0300 A4ME	3000	1000	850	1600	2025	2062	150	1400	1040
TTH 0350 A4ME	3500	1000	850	1680	2090	2562	150	1400	1160
TTH 0400 A4ME	4000	1000	850	1770	2025	2712	150	1400	1215
TTH 0450 A4ME	4500	1100	950	1680	2220	2825	150	1600	1370
TTH 0500 A4ME	5000	1100	950	1680	2290	3075	200	1600	1490
TTH 0600 A4ME	6000	1200	1050	1680	2440	3170	200	1750	1910
TTH 0700 A4ME	7000	1500	1350	1250	2682	2902	250	2000	2165
TTH 0800 A4ME	8000	1500	1350	1600	2682	3252	250	2000	2440
TTH 0900 A4ME	9000	1500	1350	1900	2685	3552	250	2000	2700
TTH 1000 A4ME	10000	1500	1350	2250	2682	3902	250	2000	2875
TTH 1100 A4ME	11000	1500	1350	2550	2682	4202	250	2000	2940
TTH 1200 A4ME	12000	1500	1350	2900	2682	4552	250	2000	3060

The above capacity values are only the most frequently supplied.
We can of course quote on any desired capacity value required, maintaining the same quality.

BLADDER TANKs

Horizontal, with foam mixer

The tanks in this page are fitted with the foam mixer, the weight value shown in the table does include therefore here the mixer and its piping.
All our bladder tanks are built with the very best quality materials, as specified into the list of materials given at page 16.
Please consider that all given dimensions are understood with a plus/minus 4% tolerance.
Please consider that the given dimensions relate to a 4" for capacities up to 2000 and 6 inch from 2.500 up (additional sizes also available).

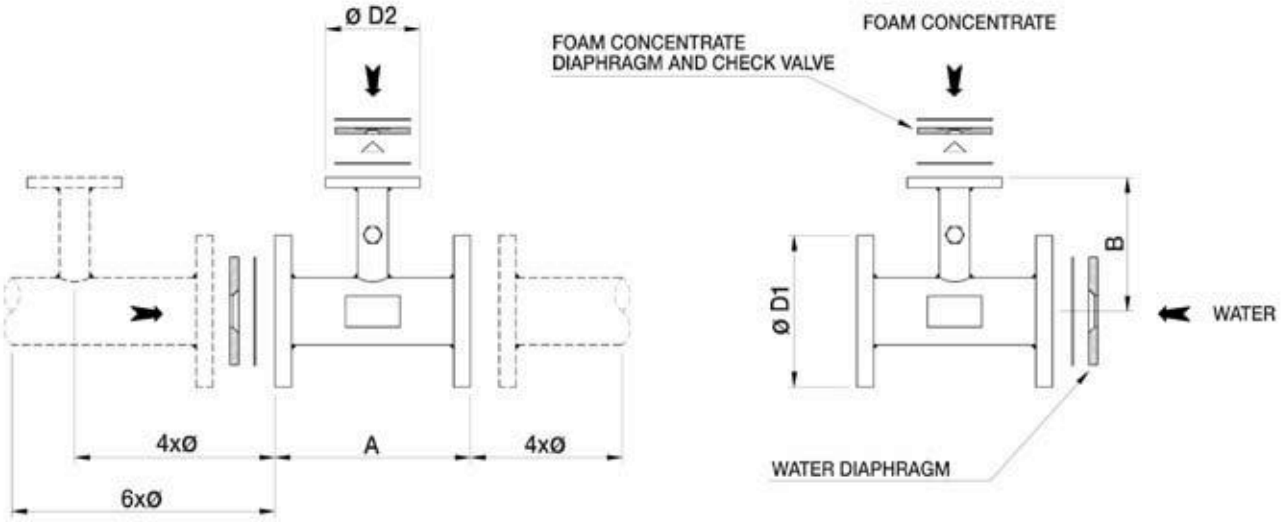


Code	Capacity	A	B	C	E	F	h	DIA	I	L	W
	litres	*mm*	*mm*	*mm*	*mm*	*mm*	*mm*	*mm*	*mm*	*mm*	*kg*
TTH 006E A4ME	600	600	500	730	1560	1500	120	600	640	1135	336
TTH 010E A4ME	1000	700	600	820	1760	1776	120	1000	740	1335	560
TTH 015E A4ME	1500	700	600	1360	1760	2426	120	1000	740	1335	640
TTH 020E A4ME	2000	800	700	1520	1860	2582	120	1100	790	1435	765
TTH 025E A4ME	2500	900	800	1560	1960	2715	150	1200	875	1590	800
TTH 030E A4ME	3000	1000	850	1600	2175	2062	150	1400	925	1790	1050
TTH 035E A4ME	3500	1000	850	1680	2175	2562	150	1400	975	1790	1170
TTH 040E A4ME	4000	1000	850	1770	2175	2712	150	1400	1000	1790	1225
TTH 045E A4ME	4500	1100	950	1680	2370	2825	150	1600	1025	1990	1380
TTH 050E A4ME	5000	1100	950	1680	2370	3075	200	1600	1075	1990	1500
TTH 060E A4ME	6000	1200	1050	1680	2520	3170	200	1750	1150	2140	1920
TTH 070E A4ME	7000	1500	1350	1250	2770	2902	250	2000	1280	2395	2175
TTH 080E A4ME	8000	1500	1350	1600	2770	3252	250	2000	1280	2395	2450
TTH 090E A4ME	9000	1500	1350	1900	2770	3552	250	2000	1280	2395	2710
TTH 100E A4ME	10000	1500	1350	2250	2770	3902	250	2000	1280	2395	2885
TTH 110E A4ME	11000	1500	1350	2550	2770	4202	250	2000	1280	2395	2950
TTH 120E A4ME	12000	1500	1350	2900	2770	4552	250	2000	1280	2395	3070

The above capacity values are only the most frequently supplied.
We can of course quote on any desired capacity value required, maintaining the same quality.

BLADDER TANK FOAM MIXER

The foam mixers shown in this page are delivered disassembled, and together with bladder tanks where the mixer is not built in, so as to leave the system installer the freedom of positioning it in the most convenient location.



Code	D1 *inch*	Capacity range *lpm*	D2 *Inch*	A *mm*	B *mm*	3%	6%	W kg
TFT 0653 A4LE	2+1/2	75 / 650	1+1/4	216	238	*	*	12
TFT 0803 A4LE	3”	100 / 900	1+1/2	216	244	*	*	16
TFT 0803 A4HE		150 / 1250				*	*	
TFT 1003 A4LE	4”	250 / 1800	1+1/2	216	257	*	*	22
TFT 1003 A4HE		380 / 2700	-	-	-	*	*	
TFT 1503 A4LE	6”	450 / 3500	2”	216	284	*	*	35
TFT 1503 A4HE		650 / 5500				*	*	
TFT 2003 A4LE	8”	1100 / 8000	2+1/2	256	310	*	*	45
TFT 2003 A4HE	10”	1680 / 11000	3”	300	336	*	*	65

Please note all these mixers have a maximum pressure drop of 1.0 bar over a 6x capacity range

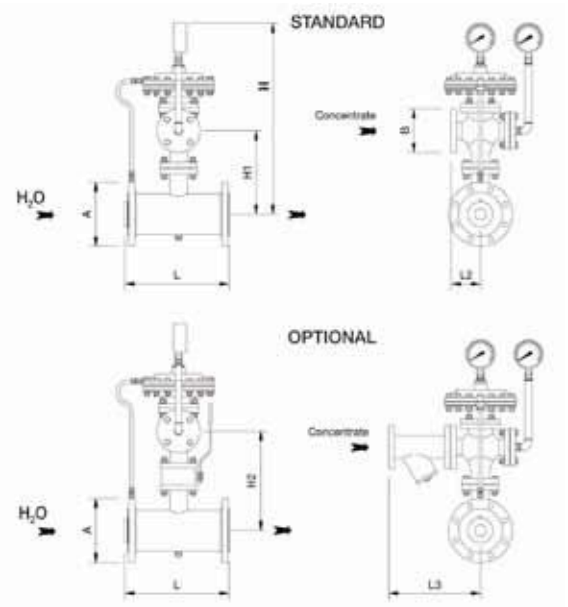
FOAM MIXER

Balanced Pressure Proportioner

This mixer works balancing the pressure from water and foaming agent in order to assure a correct mixing ratio for different water pressure values, the device adjusts instantly the mixing ratio since the two pressure values are picked up from the water line and the foaming agent line and transferred into a balancing head at the top of the device.
Therefore the stem of the inside regulation valve positions itself to assure the correct quantity of foaming agent to be injected into the water line, which happens in the low pressure area of the Venturi mixer contained in the lower part.
A calibrated diaphragm at the inlet of the lower body defines the nominal mix percentage.
It is required for a correct operation that the foaming agent pressure is about 2 bar higher than the expected water pressure.

Adjustable mixing rate
The drawing on the right side shows the mixer including a mixing ratio adjustment valve, which is inserted between the lower Venturi body and the valve section.
This valve, machined with high precision, assures a proportional regulation of the foaming agent flow.
It is then possible to use a mixer designed to assure a 6% ratio with foaming agents requiring lower percentage ratios.

These mixers have been awarded a RINA Type Approval Certificate, whose certificate is available on request.



Materials

Mixer body	Cast iron	
	Bronze	on request
	AISI 316 stainless steel	on request
Venturi nozzle	Bronze	
Automatic valve parts	AISI 316 stainless steel	
Mix ratio valve	Body carbon steel	
	Ball AISI 316 stainless steel	

Code	Capacity	L	h	h1	L2	L3	FS	FA	W	h2*	W*
	lpm	*mm*	*mm*	*mm*	*mm*	*mm*	*inch*	*inch*	*kg*	*mm*	*kg*
TFA 1003 G1SE	216 / 2160	205	504	210	296	100	1+1/2	4	50	275	58
TFA 1253 G1SE	325 / 3250	250	516	220	296	100	1+1/2	5	58	290	66
TFA 1503 G1SE	475 / 4750	300	572	265	345	115	2	6	65	355	75
TFA 2003 G1SE	850 / 8700	400	592	286	345	115	2	8	90	375	100
TFA 2503 G1SE	1366 / 13660	500	656	213	431	145	2+1/2	10	130	420	142
TFA 3003 G1SE	1916 / 19160	602	684	342	431	145	2+1/2	12	180	450	182
TFA 3503 G1SE	2533 / 25330	692	702	358	431	145	2+1/2	14	215	465	230

* When fitted with percentage adjustment valve

Mix percentage
The codes given in the above table refer to a mix percentage of 3%. Please refer to following page for complete coding information.

FOAM MIXER

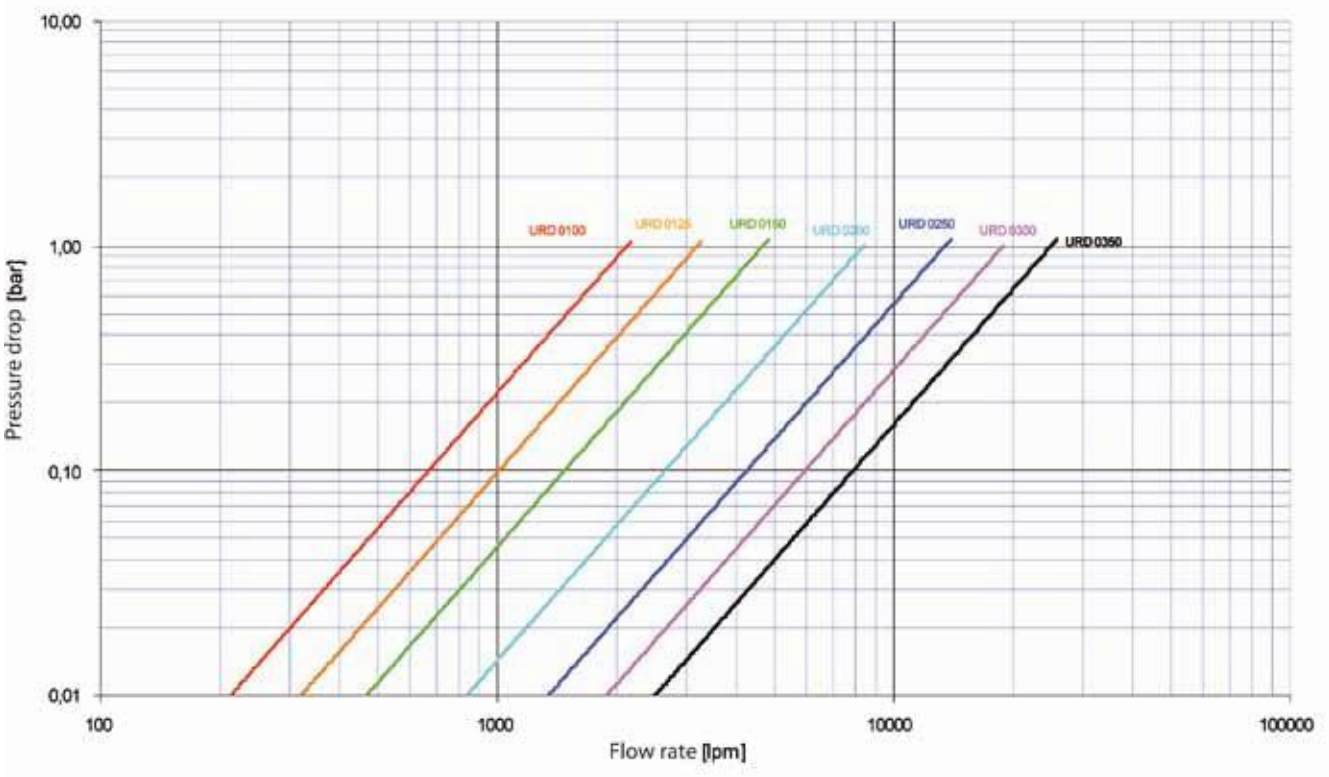
Balanced Pressure Proportioner

Coding information

The codes for these products show a digit giving mix percentage, which can be modified as follows.

TFA 1003 G1SE	TFA 1006 G1SE	TFA 100R G1SE
Mix 3%	Mix 6%	Mix adjustable

Pressure drop diagram for URD mixers



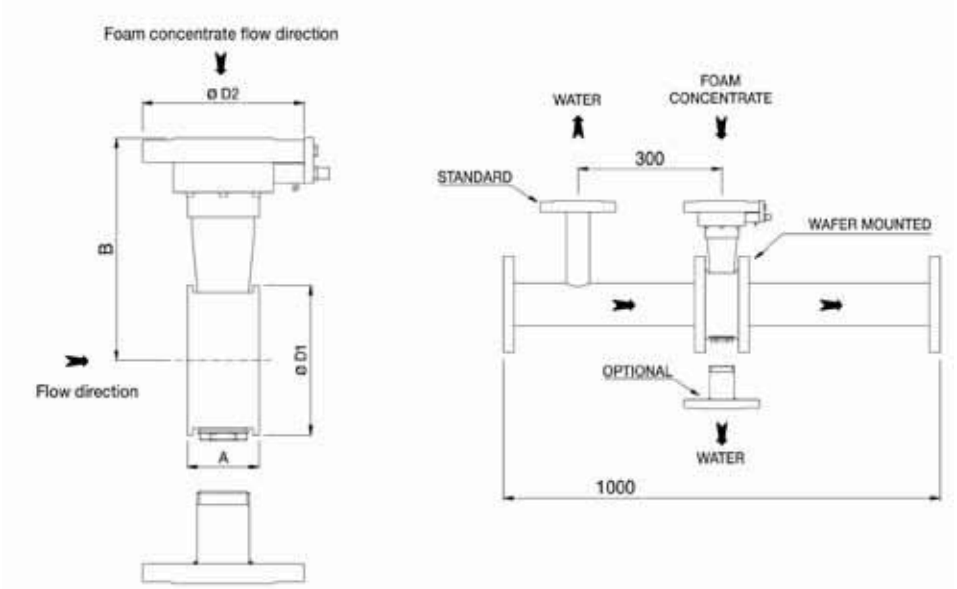
User manual

A complete user manual, including service instructions and spare parts list is available at our offices upon request and at no cost for our customers.

FOAM MIXER

Wide Range Proportioner

This very special mixer offers a very extended capacity range and is expressly designed for such systems where a large number of spray devices can be totally or partially required in use.
The mixer is built up from totally machined parts without castings, which makes it possible a construction in bronze, stainless steel and any other special alloy.
The lower part including the Venturi profile mixing area has a wafer design that allows an easy assembly with flanges of any type.



Materials

Body	Gun metal
	AISI 316L stainless steel
Inner parts	AISI 316 stainless steel

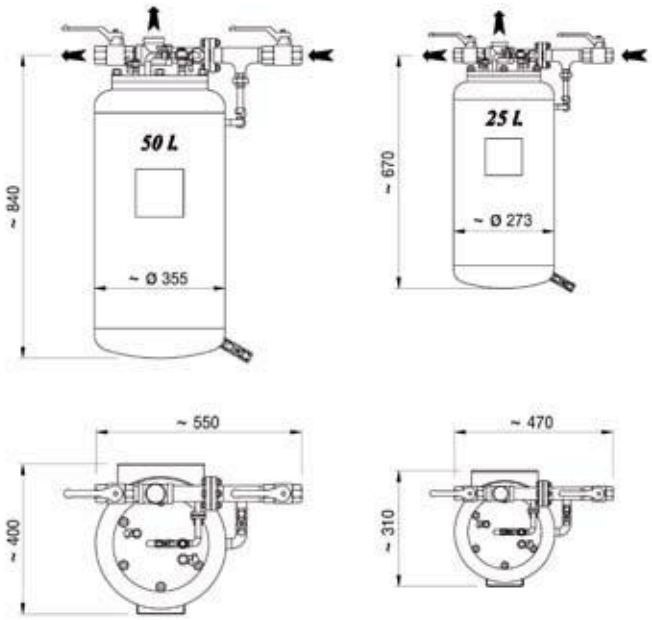
Code	A *mm*	B *mm*	D1 *inches*	D2 *inches*	Capacity *lpm*	press. drop *bar*	Ratio *%*	K *factor*	W *kg*
TFR 1003 T1SE	70	210	4	2	80/2450	0,2 - 2	3	2.038	15
TFR 1503 T1SE	70	240	6	2	110/5500	-	-	4.560	23
TFR 2003 T1SE	82	290	8	3	125/10500	-	-	8.640	39
TFR 2503 T1SE	82	322	10	3	150/16000	-	-	13.000	48

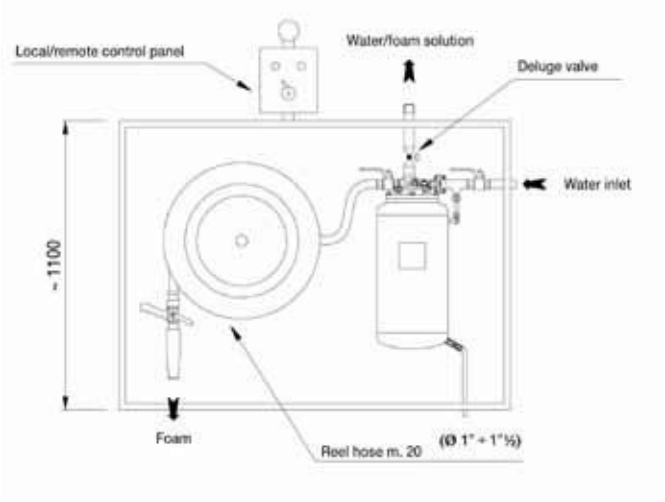
SMALL CAPACITY MIXERs

The same principle of the bladder tank can also be applied to build smaller devices for special applications in restricted spaces.
A typical application is the protection of railway or highway tunnels, by locating one device at predetermined distances along the tunnel section to be protected.

Such devices are delivered complete with Venturi mixers, and all necessary valves in the water inlet line, mix exit line and the two filling lines.
General specification, manufacturing norms and construction materials are the same as listed at page 13 for bigger models.
Capacities available are for 25 and 50 litres.
All valves made out of nickel plated brass.

Options
Body Stainless steel
Flange connections





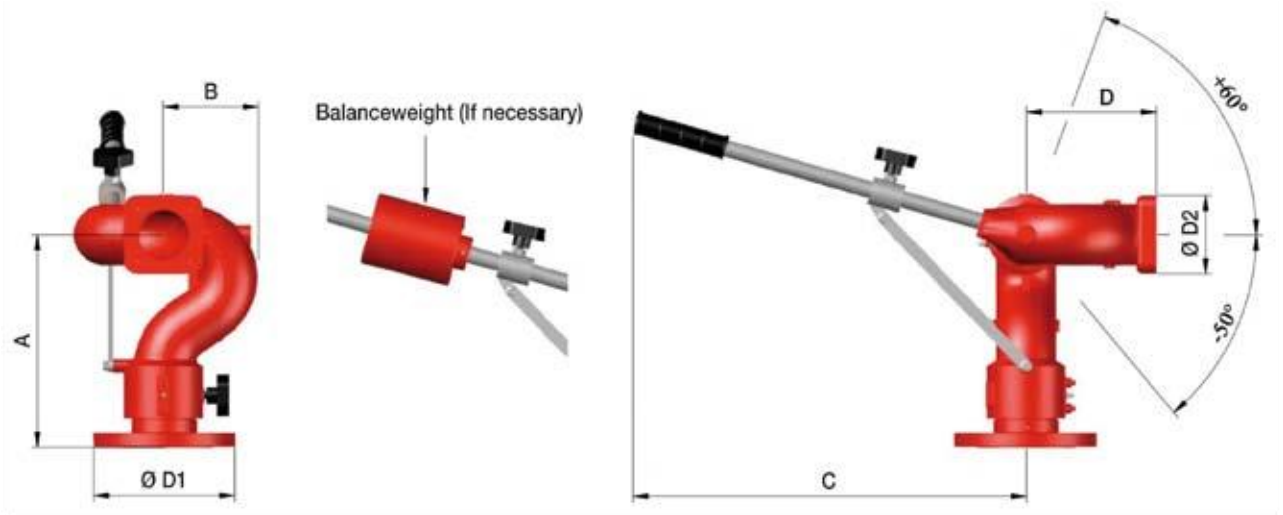
Wall Construction

For added convenience these small capacity mixers can be delivered pre-assembled in a steel box containing an hose reel for being mounted on a wall as a self-contasined unit.
Please ask for detailed information.

MONITORs / CAST BODY

Lever Control

The monitor shown in this page are cast in bronze, without any welding, and mostly required for operation under marine conditions and operation with sea water.
These monitors are supplied only for manual operation and can be locked in position by means of locknuts with hand wheel on both bearings.
The hand lever is made out of AISI 316 stainless steel, with a grip handle and a locking nut.
Both ball bearings are built with stainless steel balls and fitted with a grease nipple.
The same 3” monitor is available with a 3” or a 4” connection flange, while the outlet connection is in both cases a square flange.



Specifications and materials

Body material	Bronze
Connection flange	ASTM A 105 ANSI 150 RF
Rotation angle	360°
Operation pressure max	12 bar
Design pressure	16 bar
Test pressure	23 bar
Operation temperatures	- 20°C + 60°C
Surface coating	Epoxy paint RAL 3000

Code	Body *inches*	D1 *inch*	Q *mm*	A *mm*	B *mm*	C *mm*	E *mm*	Capacity *lpm*	Weight *kg*
TMM 080L B3ME	3 “	3 “	125	340	145	615	249	4.000	40
TMM 100L B3PE	3 “	4 “	125	340	145	615	249	4.000	41

Options available

Base flange	DIN norms
Base flange material	AISI 316
Base flange	with automatic drainage
Elevation angle	85°
Special model	ATEX compliant
Body material	AISI 316

MONITORs / WELDED BODY

General Specification

Our wide range of welded monitors includes many possible combinations.
We have gathered in this page the performance data of the whole range of monitors, and arranged in the following pages the information relating to the precise identification of each single type.

MONITOR BODY SIZE 2+½ INCHES

Specifications	Capacity *Lpm*	Inlet *inch*	Body *inch*	Outlet *inch*	Weight *kg*					
	2.000	2,5/3	2	2+1/2	15					

Pressure drops at partial loads	Press drop (bar) vs flow (lpm)								
	500	1000	1500	2000					
	0.16	0.37	0.65	1.00					

Recoil Forces (Kg) for different pressures and flow values	Flow	Operation pressure (bar)							
	Lpm	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
	500	25	32	39	46	53	61	69	77
	1000	40	55	70	85	100	115	130	145
	1500	75	85	100	115	130	145	160	185
	2000	85	110	128	141	160	180	200	215

MONITOR BODY SIZE 3 INCHES

Specifications	Capacity *Lpm*	Inlet *inch*	Body *inch*	Outlet *inch*	Weight *kg*					
	4.000	3/4	3	3	21					

Pressure drops at partial loads	Press drop (bar) vs flow (lpm)								
	2000	3000	3500	4000					
	0.35	0.62	0.80	1.00					

Recoil Forces (Kg) for different pressures and flow values	Flow	Operation pressure (bar)							
	Lpm	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
	2000	90	115	132	150	170	190	210	225
	3000	145	160	200	225	250	280	310	340
	3500	165	200	240	275	300	335	360	390
	4000	185	215	260	300	335	375	410	450

MONITOR BODY SIZE 4 INCHES

Specifications	Capacity *Lpm*	Inlet *inch*	Body *inch*	Outlet *inch*	Weight *kg*					
	7.000	4/6	4	4	31					

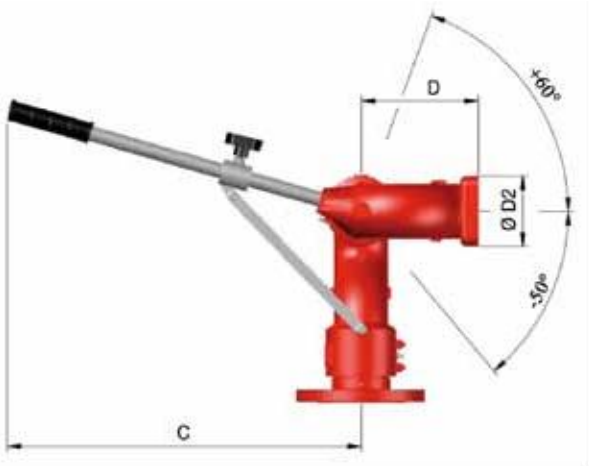
Pressure drops at partial loads	Press drop (bar) vs flow (lpm)								
	4000	5000	6000	7000					
	0.37	0.52	0.70	1.00					

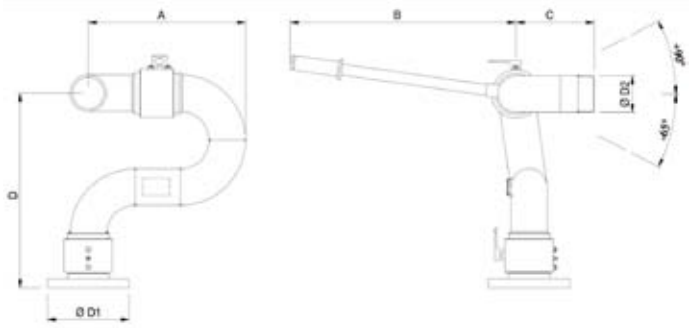
Recoil Forces (Kg) for different pressures and flow values	Flow	Operation pressure (bar)							
	Lpm	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
	4000	180	220	260	300	340	380	420	460
	5000	235	280	325	380	425	475	520	570
	6000	265	310	370	415	475	525	580	640
	7000	280	345	400	450	510	560	620	675

MONITORs / WELDED BODY

Lever Control

The monitor shown in this page are built according with the specifications given at page 27, in three different sizes, these monitors are supplied only for manual operation through a lever and can be locked in position by means of locknuts with hand wheel on both bearings.
The hand lever is fitted with a grip handle and a locking nut.
The single models are available with a different sizes for inlet flanges, while the outlet connection is always obtained through a male BSP thread on the outlet pipe.





Code	pipe *size*	Inlet *flange*	Outlet *thread*	Capacity *lpm*	Weight *kg*	A *mm*	B *mm*	C *mm*	D *mm*
TMM 065V B3LE	2+1/2	2+1/2	2+1/2	2000	15	320	552	160	400
TMM 065V B3ME		3				320	552	160	400
TMM 080V B3ME	3	3	3	4.000	21	375	552	190	460
TMM 080V B3PE		4				375	552	190	460
TMM 100V B3PE	4	4	4	7000	31	460	700	230	600
TMM 100V B3QE		5				460	700	230	600
TMM 100V B3RE		6				460	700	230	600

Materials

Body (pipes and joints)	AISI 316 stainless steel
Swivel balls	Phosphorus bronze
Inlet flange	DIN ND16 Carbon steel (AISI 316 / ANSI 150 as an option)
Operation lever	AISI 316 stainless steel
Surface coating	Epoxy / Polyurethane red RAL 3000

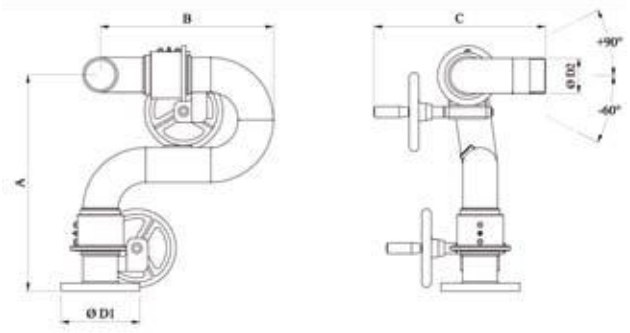
Operation pressure

Design pressure	16 bar
Operation pressure (Recommended)	12 bar

MONITORs / WELDED BODY

Hand wheel control

The monitor shown in this page are built according with the general specifications given at page 27, in two different sizes.
These monitors are supplied only for manual operation through one or two hand wheels.
The model with hand wheel control on elevation only can be locked in any horizontal position by means of a locking handle on the lower bearing.
The hand lever is fitted with a grip handle and a locking nut.
The single models are available with a different sizes for inlet flanges, while the outlet connection is always obtained through a male BSP thread on the outlet pipe.



One hand wheel model

Code	pipe *size*	Inlet *flange*	Outlet *thread*	Capacity *lpm*	Weight *kg*
TMM 300V B3ME	3	3	3	4.000	32
TMM 300V B3PE		4			
TMM 400V B3PE	4	4	4	7.000	36
TMM 400V B3QE		5			
TMM 400V B3RE		6			

Two hand wheels model

Code	pipe *size*	Inlet *flange*	Outlet *thread*	Capacity *lpm*	Weight *kg*
TMM 300W B3ME	3	3	3	4.000	32
TMM 300W B3PE		4			
TMM 400W B3PE	4	4	4	7.000	36
TMM 400W B3QE		5			
TMM 400W B3RE		6			

Materials

Body (pipes and joints)	AISI 316 stainless steel
Swivel balls	Phosphorus bronze
Inlet flange	DIN ND16 Carbon steel (AISI 316 / ANSI 150 as an option)
Operation lever	AISI 316 stainless steel
Surface coating	Epoxy / Polyurethane red RAL 3000

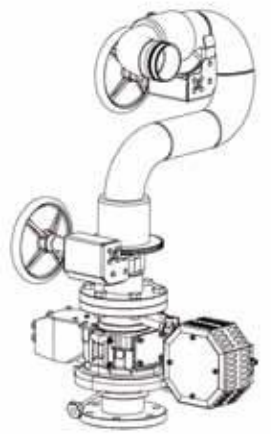
Operation pressure

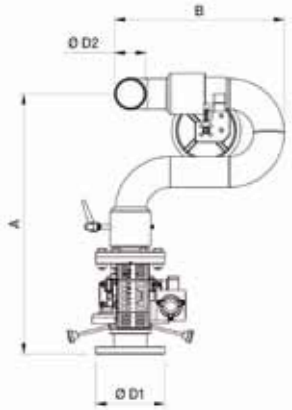
Design pressure	16 bar
Operation pressure (recommended)	12 bar

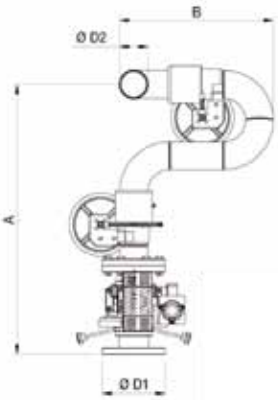
MONITORs / WELDED BODY

Self Oscillating Type

The monitor shown in this page are built according with the general specifications given at page 27, in two different sizes. These monitors are fitted with a water self oscillating system which provides movement in the horizontal xx plane and an adjustable upper joint with hand wheel for elevation control.
The lower bearing can be fitted with cam handle or hand wheel, which makes it possible to disassemble the self oscillating unit in case of malfunction and still keep a fully efficient monitor in service.
The single models are available with a different sizes for inlet flanges, while the outlet connection is always obtained through a male BSP thread on the outlet pipe.
See oscillating unit specification and data on next page.







One hand wheels model

Code	pipe *size*	Inlet *flange*	Outlet *thread*	Capacity *lpm*	Weight *kg*
TMA 080V B3ME	3	3	3	4.000	49
TMA 080V B3PE		4			
TMA 100V B3PE	4	4	4	5.000	54
TMA 100V B3QE		5			
TMA 100V B3RE		6			

Two hand wheels model

Code	pipe *size*	Inlet *flange*	Outlet *thread*	Capacity *lpm*	Weight *kg*
TMA 080W B3ME	3	3	3	4.000	52
TMA 080W B3PE		4			
TMA 100W B3PE	4	4	4	5.000	57
TMA 100W B3QE		5			
TMA 100W B3RE		6			

Materials

Body (pipes and joints)	AISI 316 stainless steel
Swivel balls	Phosphorus bronze
Inlet flange	DIN ND16 Carbon steel (AISI 316 / ANSI 150 as an option)
Surface coating	Epoxy / Polyurethane red RAL 3000

Operation pressure

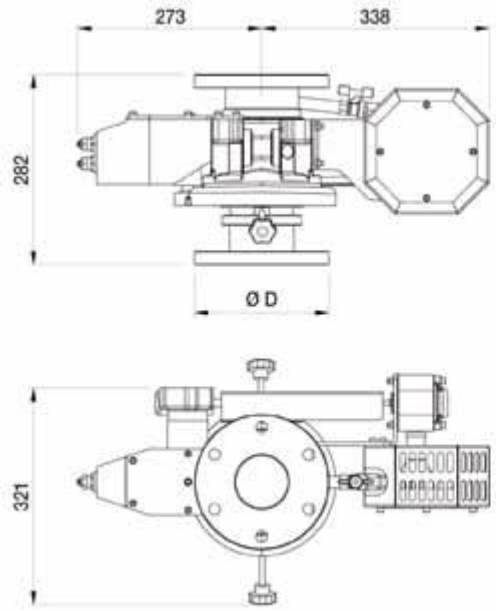
Design pressure	16 bar
Operation pressure (recommended)	12 bar

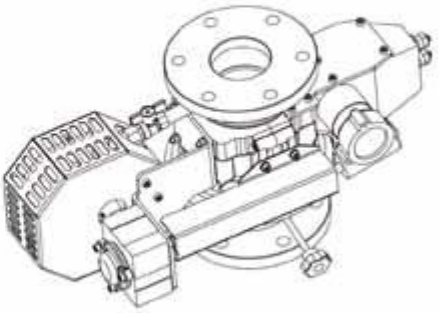
MONITORs / WELDED BODY

Self Oscillating Unit

Our self oscillating unit is based onto the classical design where a water driven turbine wheel supplies the energy to rotate the monitor through a gear train.
Our long experience, which has been built over thousands of units supplied in the last thirty years, makes it possible to reach a very high degree of reliability in operation together with the very good resistance to weather conditions obtained by the choice of the best quality materials and surface treatment.

This unit can be retro fitted to each one of our standard hand control monitors in order to change it into a self oscillating one, or can be disassembled from a self oscillating one in case of malfunction still leaving the monitor fully available albeit with hand control.





Materials

Body (pipes and joints)	AISI 316 stainless steel
Swivel balls	Phosphorus bronze
Inlet flange	DIN ND16 Carbon steel (AISI 316 / ANSI 150 as an option)
Surface coating	Epoxy / Polyurethane red RAL 3000

Specification

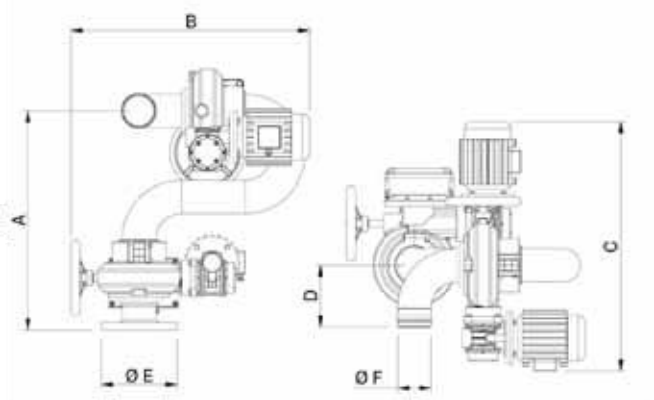
Design pressure	16 bar
Operation pressure (recommended)	12 bar
Water requirement (7 bar)	20 lpm
Rotation rate (7 bar)	5° per second
Rotation range	15° to 360°
Weight	18 kg
Maximum water capacity (7 bar)	5.000 lpm
Inlet flange	3” / 4”

Many optional designs are available, like monitors with an elevation joint only, or with hand lever control, whose specifications are available to our customers upon request.

MONITORs / WELDED BODY

Electric Powered Type

The monitor shown in this page are built according with the general specifications given at page 27, in the two different sizes with a capacity of 4.000 and 7.000 lpm. These monitors are fitted with two electric motors which provide movement to the direction and elevation swivel joints, allowing therefore complete remote control for the monitor.
Both electric drive units are fitted with an emergency hand wheel in case of malfunction.
The single models are available with different sizes for inlet flanges, while the outlet connection is always obtained through a male BSP thread on the outlet pipe.



Code	pipe *size*	Inlet *flange*	Outlet *thread*	Capacity *lpm*	A *mm*	B *mm*	C *mm*	D *mm*	Weight *kg*
TMA 080E B3ME	3	3	3	4.000	590	640	665	175	73
TMA 080E B3PE		4							
TMA 100E B3PE	4	4	4	7.000	680	700	630	205	83
TMA 100E B3QE		5							
TMA 100E B3RE		6							

Materials

Body (pipes and joints)	AISI 316 stainless steel
Swivel balls	Phosphorus bronze
Inlet flange	DIN ND16 Carbon steel (AISI 316 / ANSI 150 as an option)
Gear casing	Light alloy, sea worthy anodised
Surface coating	Epoxy / Polyurethane red RAL 3000

Specification

Electric motors	Three-phase 230-400 V
E-motors	0,25 Kw IP55
Rotation speed	16 degrees per second
E-power required	0,5 Kw
Limit switches	With safety clutch
E-junction box	Stainless steel
Max direction angle	340°
Max elevation range	+ 85 / - 60 degrees

Operation pressure

Design pressure	16 bar
Operation pressure (recommended)	12 bar

Optional construction

Several options are available on these products:

- E-motors with different voltage
- Electric limit switches
- Limited elevation and rotation ranges as requested within above said values
- Stainless steel connection flange
- ATEX version

MONITORs / WELDED BODY

Hydraulic Powered Type

The monitor shown in this page are built according with the general specifications given at page 27, in the two different sizes with a capacity of 4.000 and 7.000 lpm. These monitors are fitted with two hydraulic motors which provide movement to the direction and elevation swivel joints, allowing therefore complete remote control for the monitor.
Both hydraulic drive units are fitted with an emergency hand wheel in case of malfunction.
The single models are available with different sizes for inlet flanges, while the outlet connection is always obtained through a male BSP thread on the outlet pipe.

Code	pipe *size*	Inlet *flange*	Outlet *thread*	Capacity *lpm*	A *mm*	B *mm*	C *mm*	D *mm*	Weight *kg*
TMA 080H B3ME	3	3	3	4.000	590	620	510	175	63
TMA 080H B3PE	3	3	3		690	620	510	175	73
TMA 100H B3PE	4	4	4	7.000	680	680	540	205	68
TMA 100H B3RE	4	6	4		780	780	540	205	78

Codes and Data in Italics refer to optional 360° rotation models

Materials

Body (pipes and joints)	AISI 316 stainless steel
Swivel balls	Phosphorus bronze
Inlet flange	DIN ND16 Carbon steel (AISI 316 / ANSI 150 as an option)
Gear casing	Light alloy, sea worthy anodised
Surface coating	Epoxy / Polyurethane red RAL 3000

Specification

Rotation speed	8 degrees per second (increases with oil pressure)
Oil pressure	40 / 60 bar (or higher, ask our offices)
Required oil capacity	180 lpm
Max direction angle	340°
Max elevation range	+ 85 / - 50 degrees

Operation pressure

Design pressure	16 bar
Operation pressure (recommended)	12 bar

Optional construction

Several options are available on these products:

- Limit switches to reduce rotation angle
- Limited elevation and rotation ranges as requested within above said values
- Stainless steel connection flange
- Rotation over 360°, see coding below
- Compact design, see coding below

MONITORs / WELDED BODY

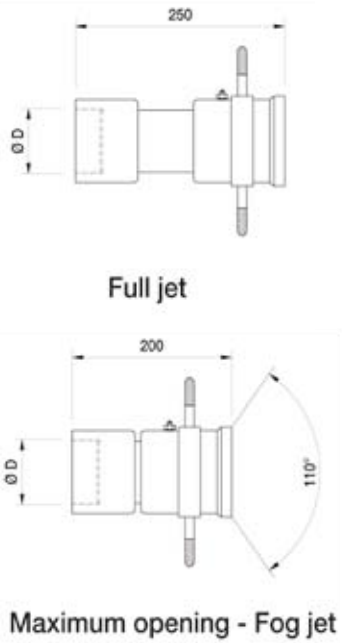
End Devices / Adjustable nozzles

Adjustable jet nozze

These nozzles can be fitted through their female thread connection directly onto the monitor pipe, and produce a variety of jets with different spray angles, from a powerful straight jet to a very wide angle one.
The last three columns on the right of table show the weight of same model for different materials

Materials

V1	Aluminum
B31	AISI 316 Stainless steel
T5	Bronze



Code	Capacity (lpm) at pressures bar						A mm	B mm	C inch	alfa deg	B3 kg	T5 kg	V1 kg
	5	6	7	8	9	10							
TBM 0150 T5LG	1230	1400	1500	1600	1700	1780	203	170	2+1/2	110	*	6,8	2,5
TBM 0200 T5LG	1600	1950	2000	2080	2150	2210							
TBM 0250 T5LG	2200	2350	2500	2630	2700	2715							
TBM 0300 B3MG	2650	2800	3000	3100	3200	3250	203	170	3”	110	8.0	8.0	*
TBM 0400 B3PG	3200	3600	4000	4300	4500	4700	250	200	4”	110	10	10	*
TBM 0500 B3PG	4200	4600	5000	5300	5600	5800							
TBM 0600 B3PG	5100	5500	6000	6300	6600	6800							

Throw Specification

The following table lists the throw distance in meters of the above nuzzle models for different operation pressure values in bar

Code		Throw length (m) at different pressures (bar)							
		5	6	7	8	9	10	11	12
TBM 0150 T5LG	**2+1/2**	46	48	54	57	59	60	61	62
TBM 0200 T5LG		48	54	57	60	63	64	65	66
TBM 0250 T5LG		54	57	62	64	67	68	70	70
TBM 0300 B3MG	**3”**	65	67	70	72	75	76	77	78
TBM 0400 B3PG	**4”**	65	69	71	74	76	78	80	81
TBM 0500 B3PG		70	73	75	77	79	82	83	84
TBM 0600 B3PG		75	78	81	83	86	88	89	90

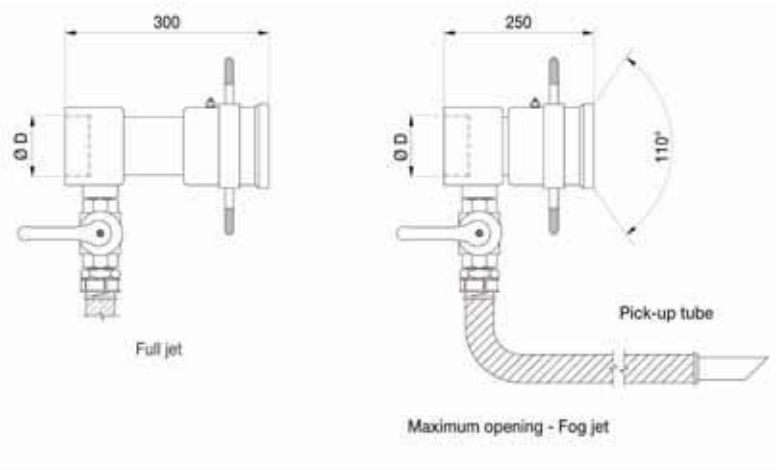
MONITORs / WELDED BODY

End Devices / Adjustable Nozzles

Adjustable Jet Nozzle, Water / Foam

These nozzles can be fitted through their female thread connection directly onto the monitor pipe, and produce a variety of jets with different spray angles, from a powerful straight jet to a very wide angle one.
A pick-up hose at the bottom allows for foam agent to be sucked by an internal Venturi mixer and injected into the water stream with different percentages [0 – 3 – 6].
Foam is then produced, with **a normal expansion ratio of 1:4, depending upon foam agent**.
The last three columns on the right of table show the weight of same model for different materials

Materials T5 Bronze



Code	Capacity (lpm) at pressures bar						A mm	B mm	C inch	alfa deg	T5 kg
	5	6	7	8	9	10					
TBM 0151 T5LG	1230	1400	1500	1600	1700	1780	203	170	2-1/2	110	7.8
TBM 0201 T5LG	1600	1950	2000	2080	2150	2210					
TBM 0251 T5LG	2200	2350	2500	2630	2700	2715					
TBM 0401 B3PG	3200	3600	4000	4300	4500	4700	250	200	4”	110	12
TBM 0501 B3PG	4200	4600	5000	5300	5600	5800					

Throw Specification

The following table lists the throw distance in meters of the above nuzzle models for different operation pressure values in bar

Code		Throw length (m) at different pressures (bar)							
		5	6	7	8	9	10	11	12
TBM 0151 T5LG	**2+1/2**	39	41	46	47	48	49	49	49
TBM 0201 T5LG		41	46	48	49	52	52	53	53
TBM 0251 T5LG		46	48	53	54	55	56	57	57
TBM 0401 B3PG	**4”**	55	58	60	62	64	66	67	68
TBM 0501 B3PG		59	61	63	65	67	69	70	71

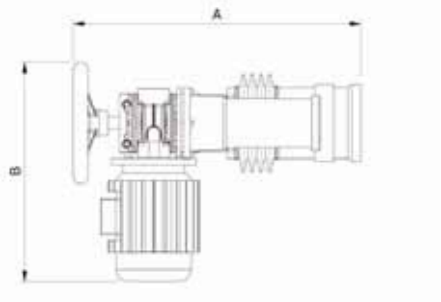
Pick-Up Hose

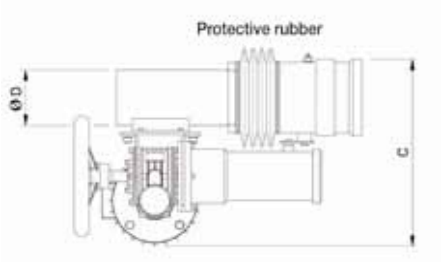
Pick-up hose body is made out of heavy thickness PVC reinforced with an internal stainless steel wire spiral.
Connection to injection valve is normally through a UNI 25 (1”) quick coupling, while other connection styles can be supplied as an option.

MONITORs / WELDED BODY

End Devices / Adjustable Nozzles

Our adjustable nozzles, in the 3” and 4” sizes as shown in the previous pages, can be fitted with power units so as adjust their jet with remote control.
Our range includes two different types.





Electric powered

Here the nozzle is powered by an electric motor coupled with a gear box and an emergency hand wheel.
The moving parts are protected by an expansion part in rubber.

Specification

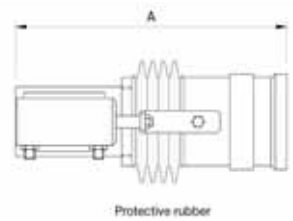
Electrical parts protection degree	IP55
Power unit design pressure	16 bar
E-motor	Three-phase, 230 / 400 V 0.36 Kw
Surface coating painted parts	Epoxy / polyurethane cycle RAL 3000
Surface coating gear case	Sea worthy anodising

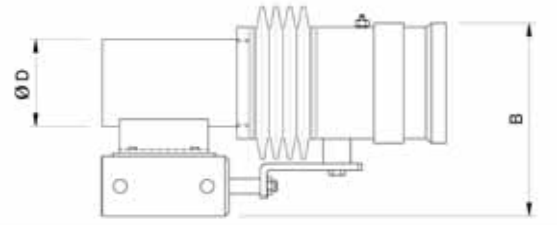
Options

Following options are available
E-motors with any desired voltage
Limit switches
EexD (Atex) models

Codes for e-powered nozzles

Shall be supplied on request.





Hydraulic Powered

Hydraulic powered nozzles include an hydraulic cylinder fed from the existing hydraulic system in hydraulic powered monitors, with the moving rod protected by an expansion rubber cover.

Specification

Design pressure	16 bar
Hydraulic cylinder	Stainless steel
Surface coating not required	

Codes for hydraulic powered nozzles

Shall be supplied on request.

MONITORs / WELDED BODY

End Devices / Water Lances

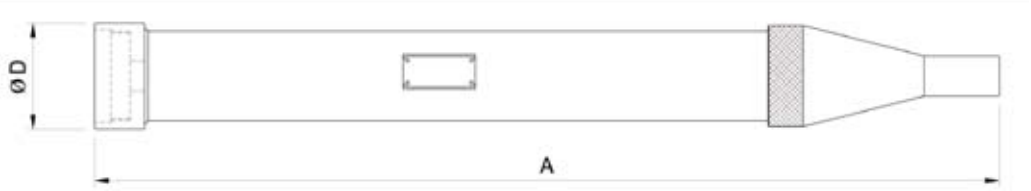
Our range for water lances covers the whole dimension range from our monitors, with female BSP thread connections from 2+1/2” to 4”.

Materials

Lance body	AISI 316 stainless steel
Nozzle	Light alloy, anodised*

Options

Bronze nozzle



Capacity table

Code	Capacity (lpm) at pressures bar								A mm	D inch	Weight kg
	5	6	7	8	9	10	11	12			
TLH 0100 B3LG	850	925	1000	1075	1150	1225	1300	1375	800	2+1/2	7.5
TLH 0150 B3LG	1350	1425	1500	1575	1650	1725	1800	1875			
TLH 0200 B3LG	1700	1800	2000	2100	2200	2350	2500	2700			
TLH 0250 B3MG	2050	2250	2500	2700	2900	3050	3200	3350	800	3”	10
TLH 0300 B3MG	2550	2750	3000	3200	3400	3600	3800	4000			
TLH 0400 B3MG	3300	3600	4000	4200	4600	4800	5000	5200			
TLH 0500 B3PG	4200	4600	5000	5400	5800	6000	6300	6600	950	4”	11
TLH 0600 B3PG	5000	5500	6000	6500	6800	7000	7400	7600			

Throw specification

The following table lists the throw distance in meters of the above lance models for different operation pressure values in bar

Code		Throw length (m) at different pressures (bar)							
		5	6	7	8	9	10	11	12
TLH 0100 B3LG	**2+1/2**	36	38	44	48	50	51	54	56
TLH 0150 B3LG		38	44	48	51	53	55	58	60
TLH 0200 B3LG		48	51	54	58	61	63	66	68
TLH 0250 B3MG	**3”**	56	58	60	62	63	65	68	74
TLH 0300 B3MG		64	66	69	70	72	74	77	79
TLH 0400 B3MG		66	68	70	71	74	76	81	88
TLH 0500 B3PG	**4”**	72	76	78	80	84	86	91	94
TLH 0600 B3PG		86	79	81	83	85	88	101	106

MONITORs / WELDED BODY

End Devices / Water / foam lances

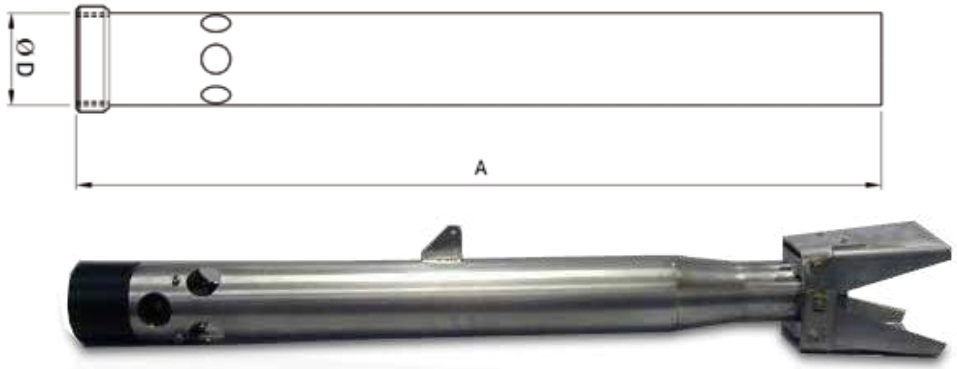
Our range for water / foam lances covers a range from 2.500 to 7.000 lpm (nominal values at 7 bar), with female BSP thread connections from 3” to 5”.

Materials

Lance body	AISI 316 stainless steel
Nozzle	Light alloy, anodised*

Options

Brass nozzle



Option
Foam lances can be supplied equipped with jet shaping device.
Contact our offices for proper coding

Capacity table

Code	Capacity (lpm) at pressures bar								A mm	D inch	Weight kg
	5	6	7	8	9	10	11	12			
TLF 0100 B3LG	800	900	1000	1100	1150	1200	1250	1300	1000	2+1/2”	8.0
TLF 0150 B3LG	1200	1290	1500	1580	1640	1730	1850	1960		+	8.0
TLF 0200 B3LG	1660	1725	2000	2070	2150	2230	2350	2515		+	8.0
TLF 0250 B3MG	2000	2250	2500	2560	2630	2785	2925	2935	1000	3°”	8.0
TLF 0300 B3MG	2500	2650	3000	3135	3250	3500	3630	3800	1150	°	11
TLF 0350 B3MG	2850	3300	3500	3700	3850	3950	4020	4100	1150	°	11
TLF 0400 B3MG	3300	3600	4000	4250	4600	4800	5000	5100	1150	°	13
TLF 0500 B3PG	4150	4300	5000	5350	5860	6000	3150	6300	1300	4”	14
TLF 0600 B3PG	5000	5500	6000	6300	6700	7000	7250	7380		*	
TLF 0700 B3PG	6000	6500	7000	7400	7800	8200	8700	9000		*	

When ordering one of the above lances fitted with jet shaping device please use TLM code instead of TLF.
Example TLF 0100 B3LG = standard model / TLM 0100 B3LG = lance fitted with jet shaping device.

Throw specification

The following table lists the throw distance in meters of the above lance models for different operation pressure values in bar

Code		Throw length (m) at different pressures (bar)							
		5	6	7	8	9	10	11	12
TLF 0100 B3LG	**2+1/2**	31	33	38	41	43	45	47	53
TLF 0150 B3LG		35	41	48	50	53	56	60	64
TLF 0200 B3LG		42	48	53	60	63	68	70	74
TLF 0250 B3MG	**3”**	45	54	59	63	66	68	74	78
TLF 0300 B3MG		54	58	61	65	67	70	76	80
TLF 0350 B3MG		55	61	63	66	69	71	78	81
TLF 0400 B3MG		57	64	68	70	75	80	82	83
TLF 0500 B3PG	**4”**	64	67	71	74	78	82	84	85
TLF 0600 B3PG		66	70	74	77	80	83	85	86
TLF 0700 B3PG		71	75	78	80	84	86	88	90

Note:
+ also available with 3” connection: contact our offices for proper coding
° also available with 4” connection: contact our offices for proper coding
** also available with 5” connection: contact our offices for proper coding*

MONITORs / WELDED BODY

End Devices / Water/foam lances / Self-aspirating

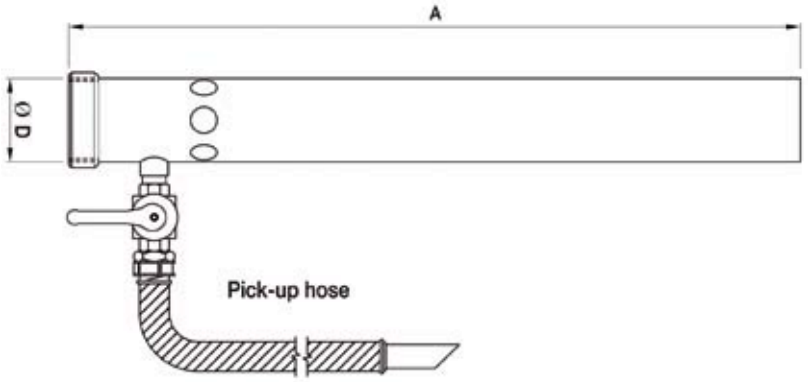
This range of self-aspirating water foam lances covers a range from 1.000 to 3.500 lpm (nominal values at 7 bar), with female BSP thread connections from 2+1/2" to 4".
A proportioning valve on the lance bottom, with different percentages [0 – 3 – 6], is connected through a quick coupling to the suction hose for the foam agent.
Foam is then produced, with a normal expansion ratio of 1:4, depending upon foam agent.

Materials

Lance body	AISI 316 stainless steel
Nozzle	Bronze
Suction hose	PVC, internal steel spiral
Suction devices	Light alloy, anodised

Options

Suction devices	Bronze



Capacity table

Code	Capacity (lpm) at pressures bar								A mm	D inch	Weight kg
	5	6	7	8	9	10	11	12			
TLF 0101 B3LG	800	900	1000	1100	1150	1200	1250	1300	1200	2+1/2"	10
TLF 0151 B3LG	1200	1290	1500	1580	1640	1730	1850	1960		+	10
TLF 0201 B3LG	1660	1725	2000	2070	2150	2230	2350	2516		+	10
TLF 0251 B3MG	2000	2250	2500	2560	2630	2785	2925	2935	1200	3"	10
TLF 0301 B3MG	2500	2650	3000	3135	3250	3500	3630	3800	1300	°	13
TLF 0351 B3MG	2800	3300	3500	3700	3850	3950	4020	4100	1300	°	13

Throw specification

The following table lists the throw distance in meters of the above lance models for different operation pressure values in bar

Code		Throw length (m) at different pressures (bar)							
		5	6	7	8	9	10	11	12
TLF 0101 B3LG	**2+1/2**	31	33	38	41	43	45	47	53
TLF 0151 B3LG		35	41	48	50	53	56	60	64
TLF 0201 B3LG		42	48	53	60	63	68	70	74
TLF 0251 B3MG	**3"**	45	54	58	63	66	68	74	78
TLF 0301 B3MG		52	58	61	65	67	70	76	80
TLF 0351 B3MG		55	61	63	66	69	71	78	81

Note:
+ also available with 3" connection: contact our offices for proper coding
° also available with 4" connection: contact our offices for proper coding

MONITORs / WELDED BODY

Platform Towers

Platform Design

A variety of platforms, either fixed or rotating can be supplied on customer specification.
Our platform are designed to host monitors working at 16 bar, normally being operated at 12 bars.
The steel structure is designed to withstand wind velocity of 130 km/h, and weighs in the usual height of 10 meters 1670 kg.

Materials

Structure	Carbon steel
Surface treatment	Epoxy paint RAL 3000

Options

Surfcae treatment	Hot dip galvanizing
Tpwer height	To customer specification

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