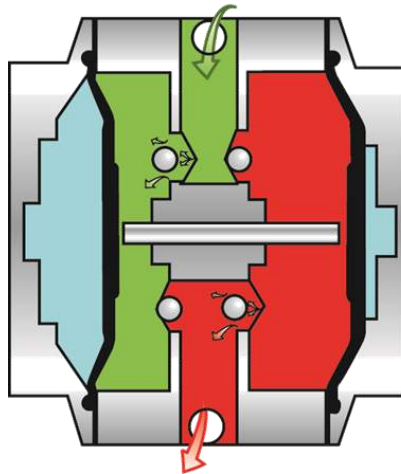




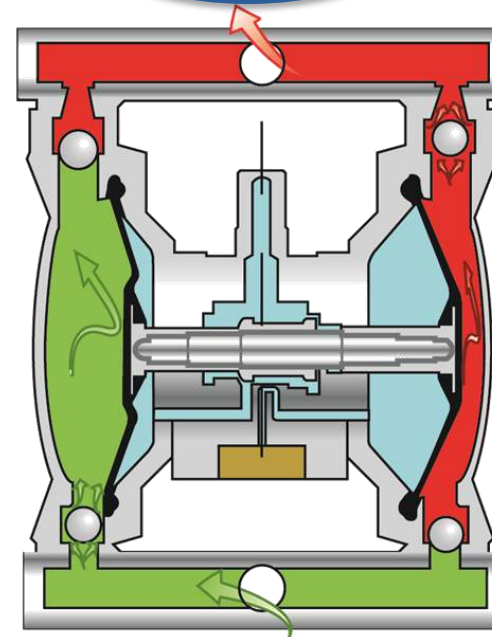


DIRECTFLO – CENTRAL FLOW TECHNOLOGY

DIRECTFLO



CONVENTIONAL
PUMPS



Directflo[®]: Natural pump evolution.

Diaphragm pumps have changed very little since they have appeared. Flow runs through the periphery of the pump, requiring manifolds, and they have four ball valves to control the flow direction.

Despite these pumps offer several advantages over electric pumps they also have some issues.

Advantages

- Lower cost.
- Easier installation and operation.
- Tolerance of dry running.
- No rotary shaft mechanical seals or packings.
- Versatility to handle most fluids.

Disadvantages

- Highly pulsating flow.
- High life cycle cost (short life of diaphragms, balls and ball seats and long repair times).
- Pumps stalling.
- Excessive noise level.
- High air consumption.



Conventional diaphragm pump with peripheral flow path, manifolds and four ball valves.

Directflo®: Natural pump evolution.

To address the issues associated with conventional AODDPs, around year 2000 a radical INSIDE-OUT pump concept was adopted: a pump with a central flow path design.

A new air distribution system was developed. The new system switches the air flow between the pump chambers in a fraction of a second, allowing shorter diaphragm strokes and reducing their fatigue. The new pump had flap valves instead of ball check valves.

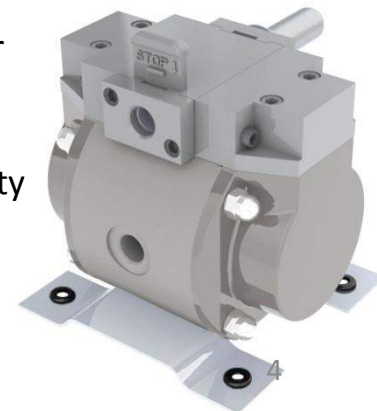
This new design solve many of the issues of traditional peripheral flow AODDPs, but the execution of an excellent concept was not flawless, and the offered materials options were very limited.

Advantages

- Central flow design with reduced internal hydraulic losses, together with an efficient air valve with reduced air losses, deliver reduced air consumption per litre pumped.
- Central flow provides full serviceability of the pump without removing it from the fluid inlet and outlet lines.
- Longer diaphragm life and reduced parts count design ensure longer maintenance service intervals and fast, non expert, repair.
- Reduced pulsation and noise.

Disadvantages

- Inadequate flanges and flange fastenings can lead to fluid leaks.
- Flap valves allowing internal fluid leaks and air valve leaks prevent the pump being used as a “deadheading” system pump.
- Few wetted material options offer compatibility with only a very limited range of fluids.



Pump with central flow path and flap valves.

Directflo® : Natural pump evolution.

In 2010, the INSIDE-OUT pump concept was reengineered to retain the advantages of traditional peripheral flow AODDPs over electric pumps and the advantages offered by the Central Flow concept. The complete air distribution system (the directional air valve, end of stroke sensors and the air channels), was refined to avoid air leaks while keeping the fast reciprocating action and the possibility to work with real world air supplies: non-lubricated, oily, dry, humid and dirty.

Also, flap valves were replaced with ball check valves, widely used in traditional AODDPs. Ball check valves have proven over the years to provide reliable sealing and tolerance to solids in suspension. A wider range of wetted materials is available, allowing complete compatibility with most fluids.

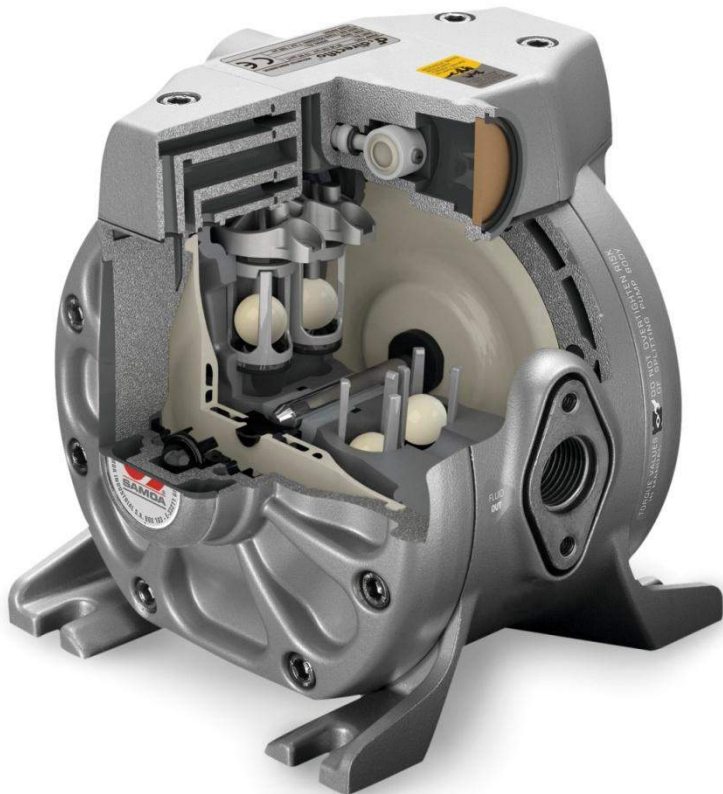
Compared to the superseded year 2000 central flow and flap valves pump design, **Directflo® advantages include:**

- Complete fluid containment, no fluid leaks in both metallic and plastic versions.
- No air leaks from the air distribution system, even when the pump is in standby in a deadheading application with the fluid outlet line closed.
- Pump stops when the fluid outlet line is closed.
- Non stalling air valve, pump starts up reliably every time.
- Increased suction head.
- Total compatibility of pump wetted materials to pumped fluid (increased range of diaphragm and check ball materials).



Directflo Pump with central flow path and ball valves.

Directflo® pumps: SIMPLE RELIABILITY REDUCED TO THE MAX.



Directflo® pumps are extremely simple. The reduced number of internal components results in a very reliable pump, with minimal maintenance requirements.

Thanks to its central flow design, with no manifolds, the pump can be fully serviced without the need to disconnect the fluid distribution line. Furthermore, routine service and maintenance (air valve service, cleaning or replacing ball valves, replacing worn diaphragms, etc.) can be performed quickly and without errors by non-expert personnel.

Directflo® pumps: The best of both worlds.

Directflo® pumps offer all the advantages of conventional AODDPs:

- Discharge fluids at up to 100 psi (7 bar), to pump medium viscosity fluids even over long pipe runs and up to significant heights.
- No rotating shaft seals: no leaks pumping abrasive fluids.
- No rotating parts and no tight clearances: pump slurries.
- Gentle pumping action suitable for shear sensitive fluids or fluids that may form emulsions.
- Compressed air operation with no electricity required, inherently safe concept for environments with explosion risks. ATEX certified models available.
- Variable flow rate and pressure through simple adjustment of the air pressure.
- Tolerate dry running.
- Dead heading: pumps stop without any risk of damage when the fluid discharge line is fully closed.

Plus significant improvements, through the unique Directflo® design, that will be appreciated in your application:

- Superior performance against back pressure, less loss of nominal flow capacity under real application conditions.
- Significant dry suction lift, eliminate self-priming issues pumping from drums and even tall tanks.
- Dependable lube free directional pivot air valve: starts-up every time. Tolerant of oil, moisture and dirt. Non icing. No air leaks when pumps are stalled by closing the fluid discharge line.
- Reduced air consumption per liter pumped, saves energy and possibly avoids the need to buy a bigger compressor.
- Reduced pulsation, greater accuracy during dosing and less splashing when dispensing.
- Fewer vibrations and lower noise level.
- Extremely reliable: reduced part count design and very long life wear parts.
- Inline servicing of air valve, diaphragms and ball valves, without disconnecting the plumbing. The low part count design allows fast and reliable servicing by non-expert technicians.
- Robust, compact design.



Directflo® pumps: Markets and applications.

- Flexographic and gravure inks
- Chemical solutions for the painting industry
- Coatings
- Paint
- Varnish
- Solvents
- Additives
- Pulp and paper
- General chemical industry
- Concrete additives
- Surface treatment and finishing
- Detergent and soaps
- Waste treatment
- Metal works

Directflo® pumps: TRUE INNOVATIONS - FLEXIBLE DIAPHRAGM SUSPENSION



The Directflo® pump design concept considered paramount the pump's most critical components: the diaphragms.

One of the many aspects of the overall pump design, that facilitates long leak free diaphragm life and reduced downtime for service and maintenance when required, is the FDS (Flexible Diaphragm Suspension) technology.

With FDS, instead of fixing the diaphragms rigidly to the shaft, all Directflo® diaphragms include inserts with a grooved adapter embedded into the centre of the diaphragms. The diaphragm adapters slide onto the pump's shaft.

When servicing the diaphragms of conventional AODDPs, complex diaphragm to shaft connection systems require the user to wrestle with a collection of diaphragm discs, fasteners and o-rings.

Compare this with Directflo®: the diaphragms simply slide on and off the shaft, no time is wasted and the risks of leaks and early diaphragm failures due to assembly errors are eliminated.

Directflo® pumps: TRUE INNOVATIONS - FRICTIONLESS PIVOTING AIR VALVE



The FDS concept is complemented with the use of short stroke diaphragms that reciprocate very quickly. Shortening the stroke length dramatically reduces the fatigue wear of the diaphragms and so extends their life.

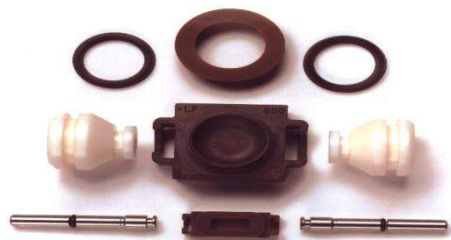
A traditional sliding air valve could not be used as the friction in these kind of air valves is too high to allow the fast reversing action required. Therefore a new friction free and extremely fast air valve, the FPV (Frictionless Pivoting Air Valve), was developed.

The FPV is the heart of the reciprocating drive system and ensures very high operational reliability. The air distribution system (including the directional air valve module, the end of stroke sensor valves, and the air channels) is self-cleaning and withstands non lubricated, oily, dry, humid and dirty compressed air.

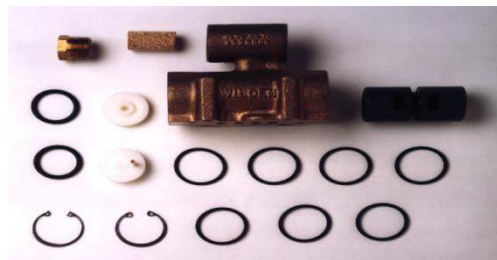
Aro air valve



Graco air valve

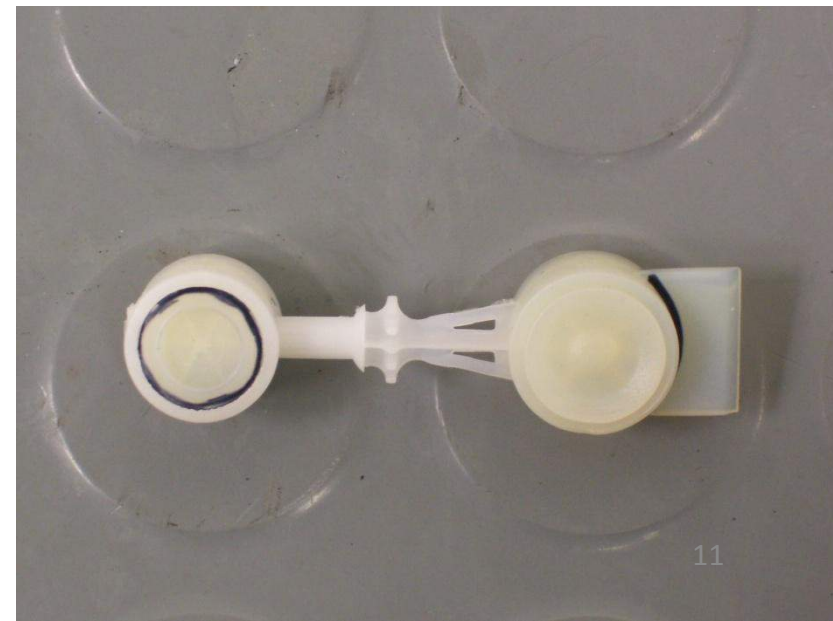


Wilden air valve

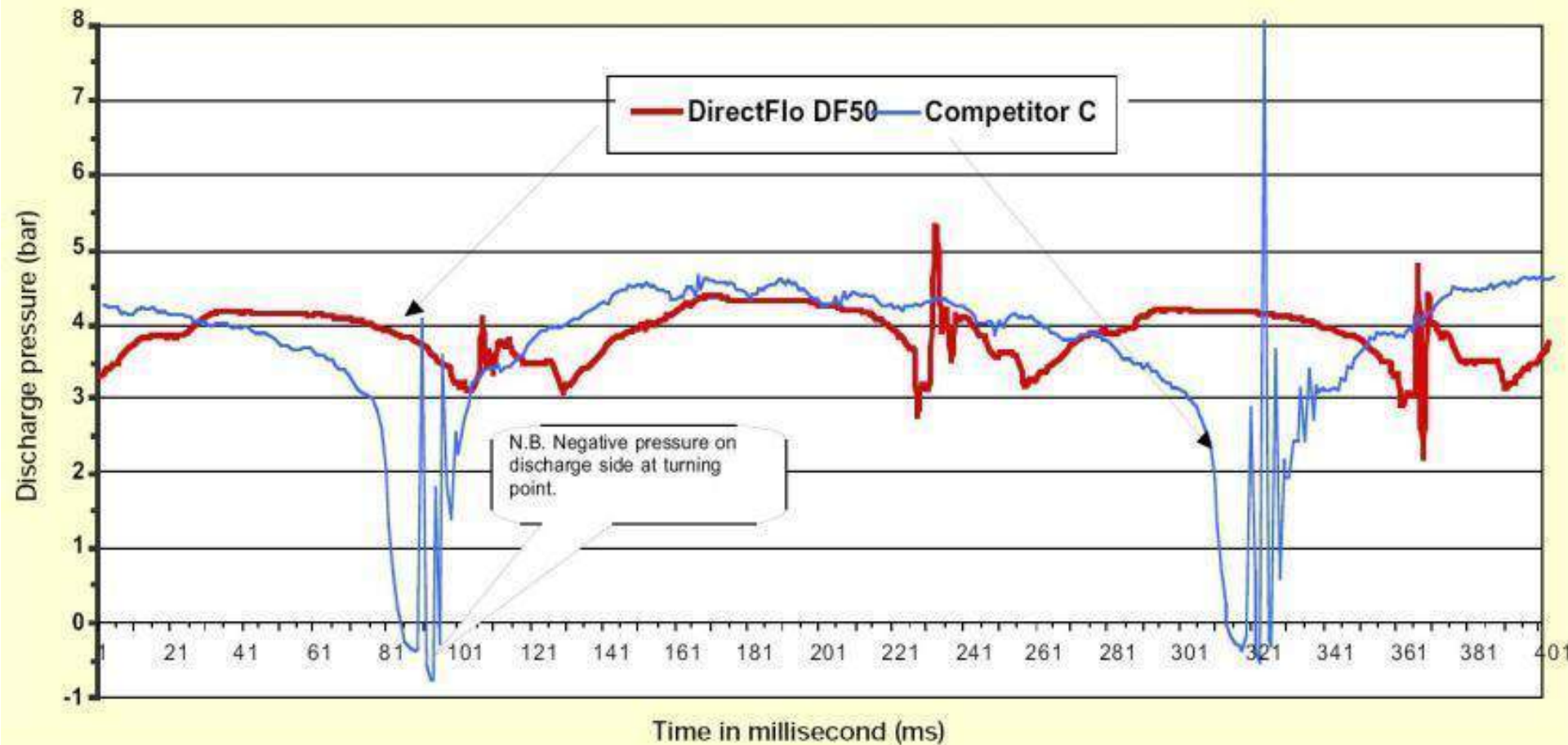


**Directflo® pumps: TRUE INNOVATIONS.
FRICTIONLESS PIVOTING AIR VALVE – NOTHING CAN BE SIMPLER**

Directflo Frictionless Pivoting patented air valve.
Simpler impossible.



Directflo® pumps: TRUE INNOVATIONS – REDUCTION OF FLOW PULSATION



Directflo® pumps: TRUE INNOVATIONS - SIMPLE MAINTENANCE

Pump maintenance has never been so easy.

The entire pump can be disassembled without dismounting the fluid pipe lines. This makes replacing diaphragms, cleaning valves and other maintenance jobs easier and faster than in other diaphragm pumps.

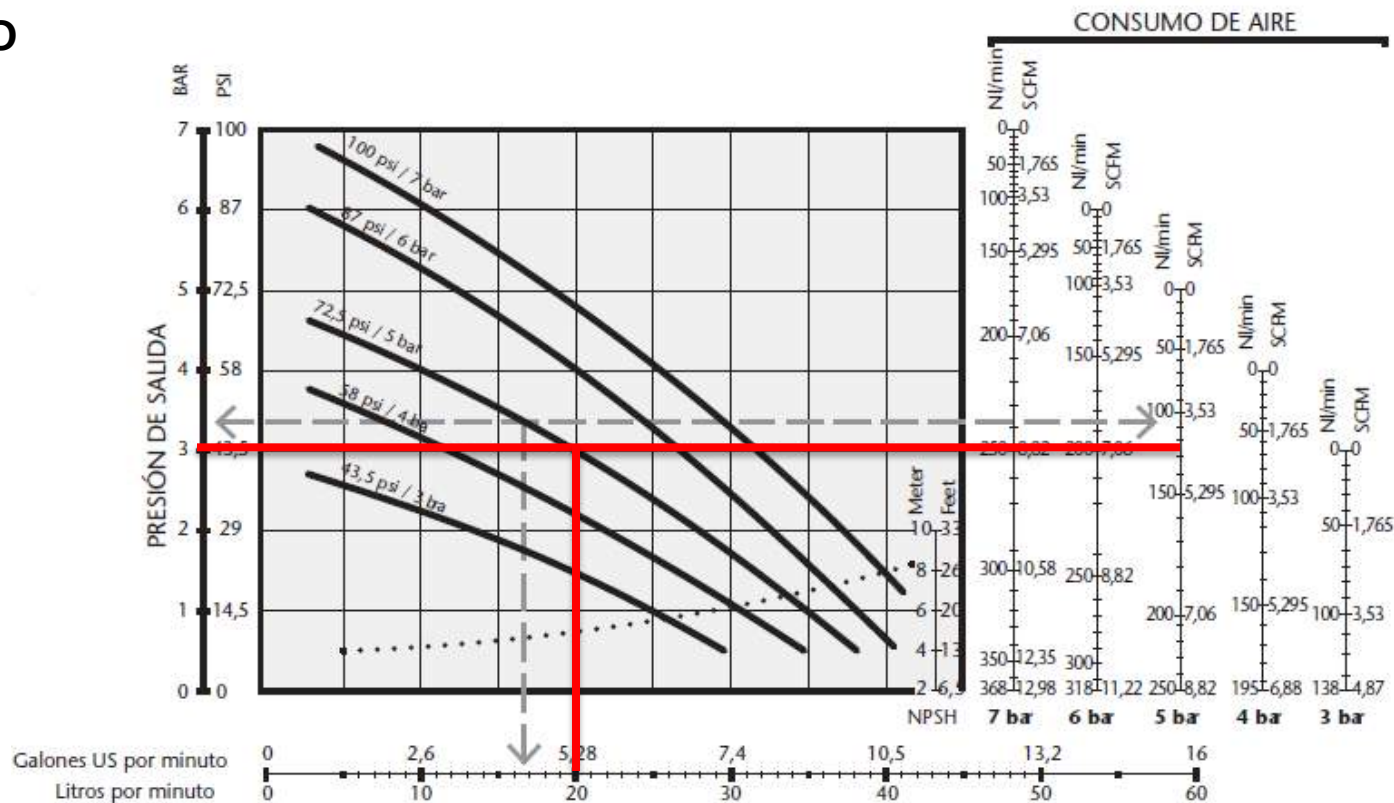




Directflo[®] pumps: TRUE INNOVATIONS – LESS AIR CONSUMPTION

- The exclusive air motor and diaphragms design increase the pump efficiency.
- The simpler air circuit contributes to dramatically reduce air consumption.
- The Frictionless Pivoting Valve (FPV) has no air leaks when the pump stops.
- Air consumption reduced up to 50 % when compared with other equivalent pumps

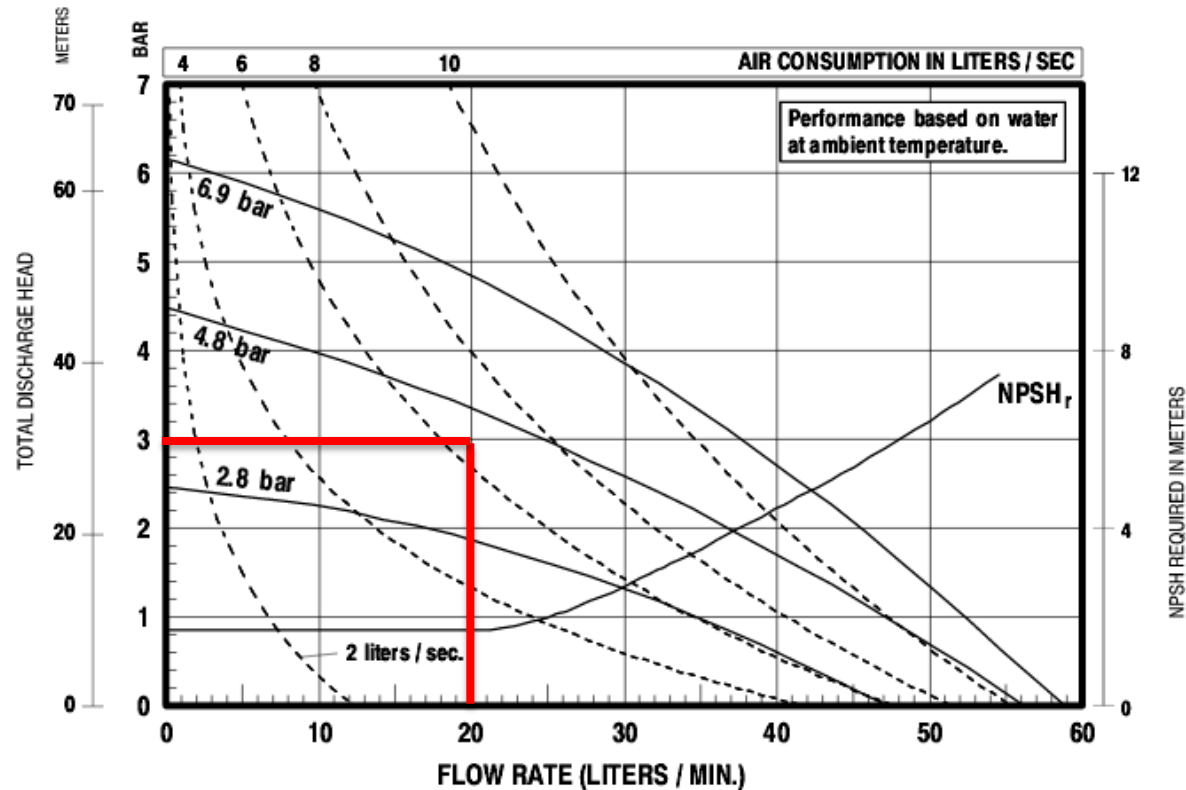
DIRECTFLO



APPROXIMATE AIR CONSUMPTION FOR 20 l/min WITH A PRESSURE DROP OF 3 bar:

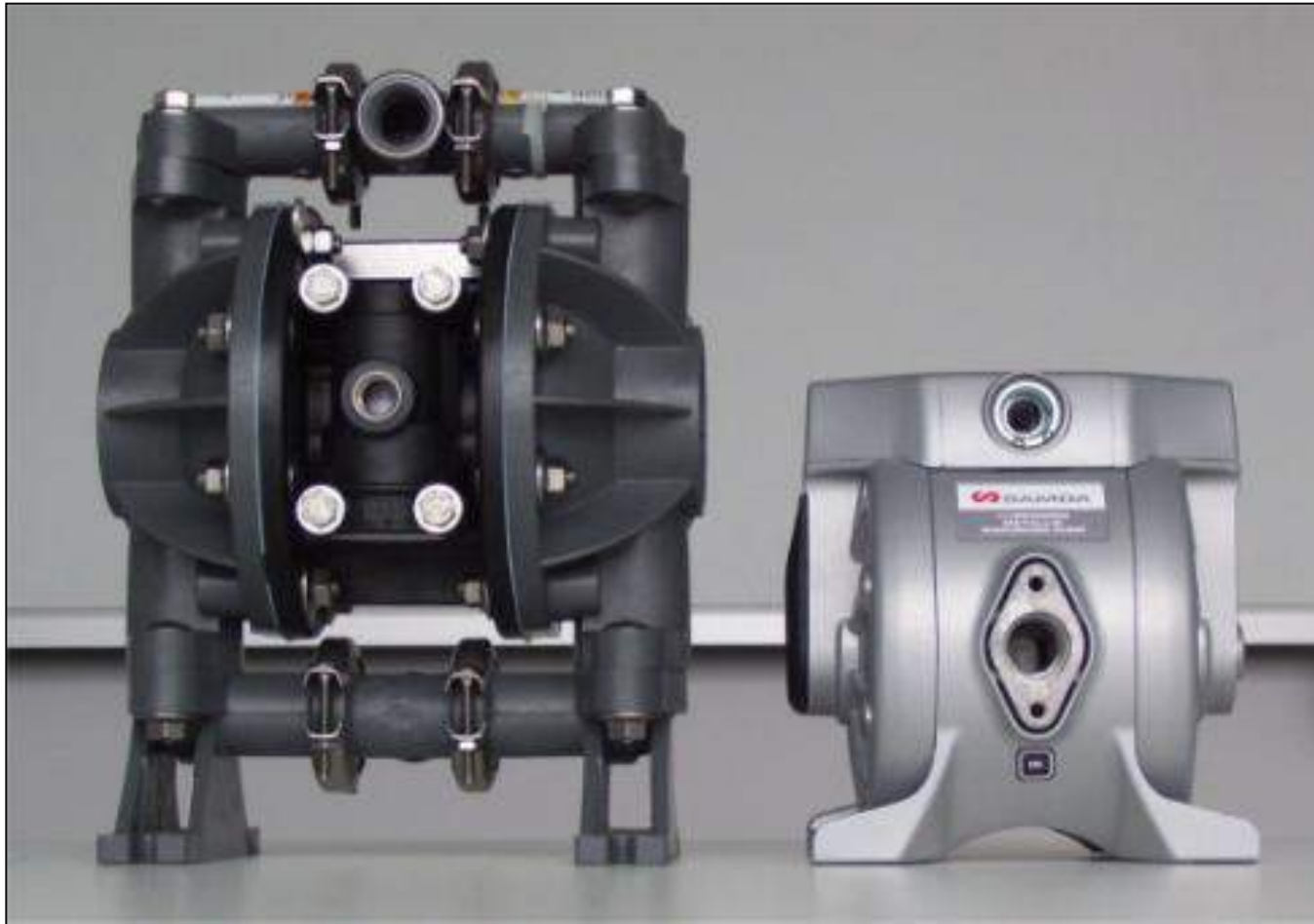
≈ 125 Nl/min (5 bar)

ARO



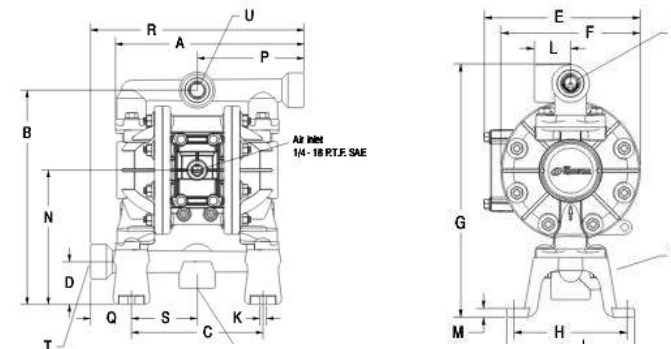
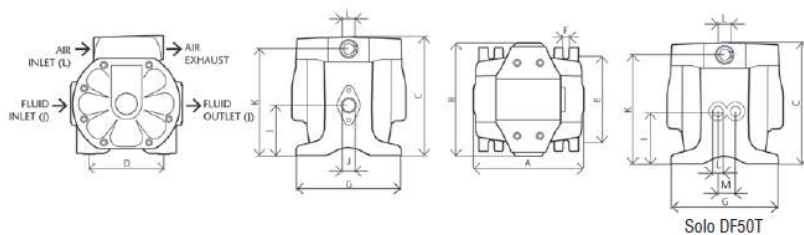
APPROXIMATE AIR CONSUMPTION FOR 20 l/min WITH A PRESSURE DROP OF 3 bar: $\approx$
380 NL/min (4,3 bar)

Directflo® pumps: Compact and modern design



Directflo® pumps: Compact and modern design

DF50 / DF50T							
H	I	J	K	L	M	N	P
140 mm	70 mm	1/2" BPS NPT NPSM	150 mm	3/8" NPSM	24 mm	M6	41 mm
5,51"	2,76"	-	5,91"	-	0,94"	-	1,61"
A	B	C	D	E	F	G	H
156 mm	160 mm	167 mm	105 mm	122 mm	8 mm	146 mm	140 mm
6,14"	6,3"	6,57"	4,13"	4,8"	0,31"	5,75"	5,51"



DIMENSIONS

A 8-27/32" (221.3 mm)	G 10-7/8" (275.7 mm)	N 6-5/16" (159.9 mm)
B 10-1/16" (255.0 mm)	H 4-7/8" (123.8 mm)	P 5" (127.0 mm)
C 6.164" (158.6 mm)	J 5-1/2" (139.7 mm)	Q 1-59/64" (48.8 mm)
D 2" (50.8 mm)	K 5/16" (8.0 mm)	R 10" (254.0 mm)
E 6-23/32" (170.6 mm)	L 1-9/16" (38.7 mm)	S 3-3/32" (78.3 mm)
F 6" (152.4 mm)	M 3/8" (9.5 mm)	

Model	"T" Material Inlet	"U" Material Outlet
PD05P-AXS-XXX-B	1/2 - 14 N.P.T.F. - 1	1/2 - 14 N.P.T.F. - 1
PD05P-BXS-XXX-B	Rp 1/2 (1/2 - 14 BSP)	Rp 1/2 (1/2 - 14 BSP)

NOTE: Dimensions are shown in inches and (mm) and are supplied for reference only.

Total volume DIRECTFLO: 4168,32 cm³

Total volume of competitor: 11.946,74 cm³

Directflo® pumps: COMPONENTS - Pump body



The pump body is a single molded part that includes the flow path, the valve housings and the pump wet chambers. Since it is a single molded part, no leak is possible.

Thanks to the central flow technology the fluid flows directly through the centre of the pump body and no manifolds are required. Conventional AODDPs, on the other hand, include two 90° elbows in both the inlet and the discharge. Consequently, Directflo® pumps are more compact, cause less pressure drop within the pump and eliminate the risk of leaks from seals between manifold parts.

Additionally, the wet chamber inlet and outlet valves are directly adjacent to the diaphragms, dramatically improving pump suction capacity and pump performance against back pressure and when used with viscous fluids.



Directflo® pumps: COMPONENTS – Pump body



ALUMINUM

A general purpose metal. It is a light weight material used in non-corrosive, non-abrasive applications.



STAINLESS STEEL

Offers a high resistance against corrosion and abrasion. It can be used with many chemically aggressive fluids.



POLYPROPYLENE

A thermoplastic polymer with good chemical compatibility, resisting strong acids and alkalines. It is attacked by some strong oxidizing agents and is not compatible with some petroleum based solvents.



ACETAL

Tough, impact resistance material with good abrasion resistance and low friction surface. Generally inert, has good chemical resistance except for strong acids, alkalines and oxidizing agents. Compatible with a wide variety of solvents.



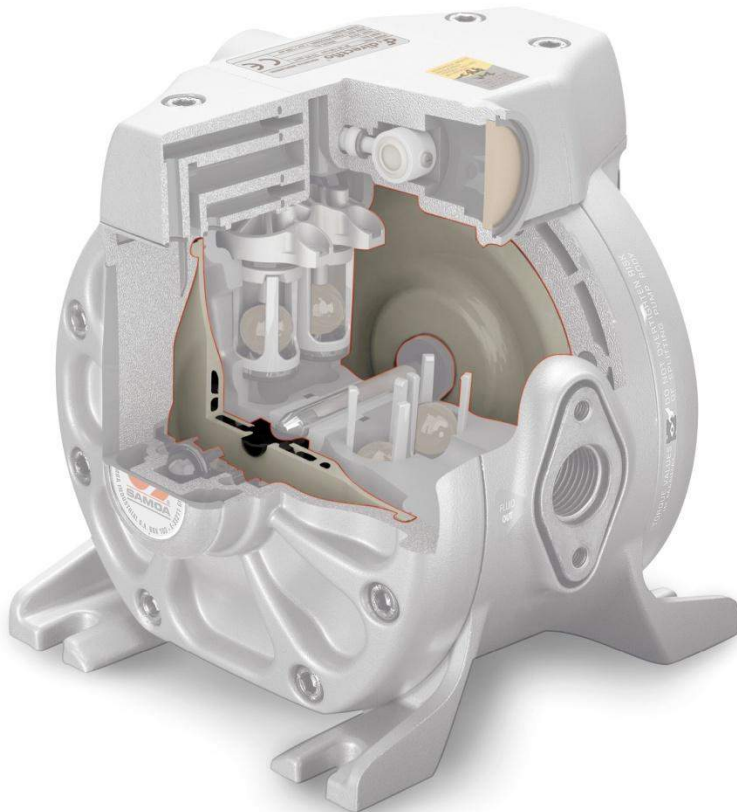
CONDUCTIVE PP AND ACETAL

Pumps manufactured in conductive PP or acetal are ATEX approved. Polypropylene or acetal with carbon fibre composite bodies are conductive and so allow grounding the pump to eliminate the risk of static electricity build up.

Other materials available:

PVDF & Conductive PVDF

Directflo® pumps: COMPONENTS - Diaphragms



A diaphragm is a sealing element that works as a moving surface isolating two volumes. They are used to transform compressed air energy into fluid flow. Directflo® pump design has revolved around the pump's most critical component, the diaphragms.

Key diaphragm characteristics that Directflo® pumps aim to optimize are:

- Longest possible diaphragm life
- Long leak free life
- Reduced downtime for service and maintenance.

Directflo® pumps: COMPONENTS - PTFE (Teflon®) Diaphragms

PTFE (TEFLON®) DIAPHRAGMS.

PTFE diaphragms are used for pumping a wide variety of fluids. With an excellent fluid compatibility, it is the right choice for pumping highly aggressive fluids such as aromatic or chlorinated hydrocarbons, acids, caustics, ketones and acetones.

However, PTFE is a rigid material and most traditional design diaphragm pumps are not optimized for using diaphragms made of PTFE. The diaphragms in these pumps are rigidly linked to a transmission shaft that reciprocates with long strokes and the diaphragms are significantly deformed with every stroke. Whilst this design is suitable for diaphragms made of elastic materials, the short cycle of life of PTFE diaphragms in such pumps is unsatisfactory.



To ensure long cycle-life Directflo® pumps feature:

Short strokes to minimize diaphragm deformation and so reduce material strain.

PTFE/EPDM bonded diaphragms, with a fluid side PTFE layer bonded to an air side EPDM rubber support. The EPDM support incorporates fabric reinforcement. The three materials are bonded into a single piece diaphragm with a geometry that readily flexes.

Directflo[®] pumps: COMPONENTS - Thermoplastic Elastomer (TPE) Diaphragms



TPE diaphragms offer an excellent flexibility making them the right choice for pumping a wide range of fluids.

TPE diaphragms can be manufactured in two materials:

HYTREL[®]

Hytrel[®] diaphragms are used in general purpose applications and are durable diaphragms with excellent abrasion resistance. They offer a long life in non aggressive applications.



SANTOPRENE[®]

Offers a very good resistance to abrasion and long mechanical flex life. Santoprene[®] diaphragms present good resistance to chemicals (such as acids and caustics) but they are not recommended for use with solvents.

Directflo® pumps: COMPONENTS - Ball check valves



Directflo® pumps have 4 ball check valves to control the flow direction. The type of valves used ensure that the pump will stall against pressure. So, Directflo® pumps may be used as reliable system pumps, starting up and stopping “on demand”, in response to the opening and closing of a remote dispensing valve.

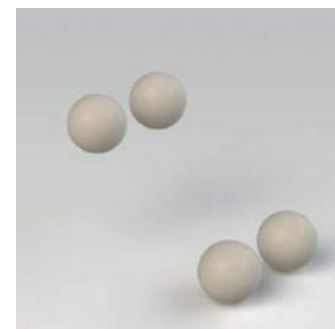
Inlet valves are located in the upper level whilst outlet valves are located in the lower level of the pump. Diaphragm pumps are often used for pumping contaminated fluids or with particles in suspension. By locating the outlet valves at the bottom of the wet chambers, the discharged fluid flushes out solids that would otherwise settle in the chambers.

Directflo® pump check valves have three components: the ball, the valve seat and the valve cage.

Balls are manufactured in PTFE (Teflon®), acetal or stainless steel. **PTFE** balls offer excellent chemical compatibility. **Acetal** balls have good resistance against abrasion and wide fluid compatibility.

Stainless steel balls are recommended for use with high viscosity or highly abrasive fluids.

Balls are guided by the valve cage, which contributes to an efficient valve action by preventing the fluid flow from causing erratic ball movements. All valve seats are manufactured in stainless steel.



Directflo® pumps: COMPONENTS - Shaft and sleeve

The compressed air in the pressurized dry chamber pushes the diaphragm towards the center of the pump, compressing the fluid in the wet chamber and forcing it out of the pump. Meanwhile, the other diaphragm elastically recovers to its rest position, moving away from the pump center and so creating the suction effect required to fill the wet chamber with fluid. Both chambers are totally isolated from one another with a bushing and a seal. Depending on the fluid pumped, the bushing seal can be selected from PTFE, FKM or EPDM for maximum fluid compatibility and durability.

The shaft is manufactured in stainless steel (other materials on demand) and the sleeve can be made in the following materials:

PTFE

Provides maximum fluid compatibility and minimum friction.

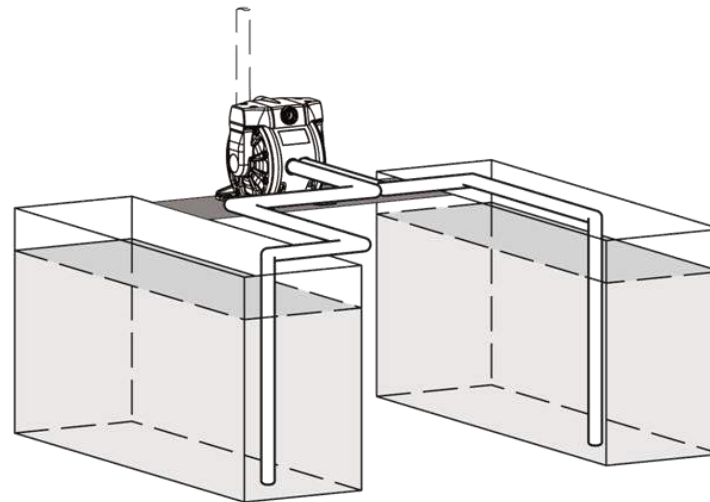
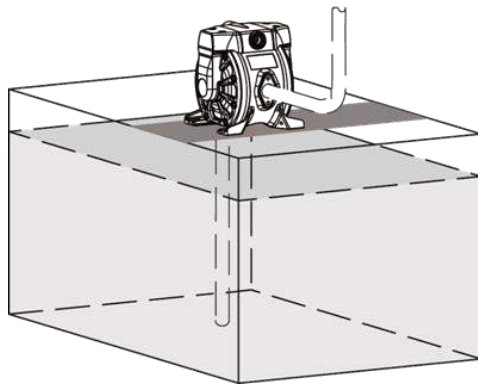
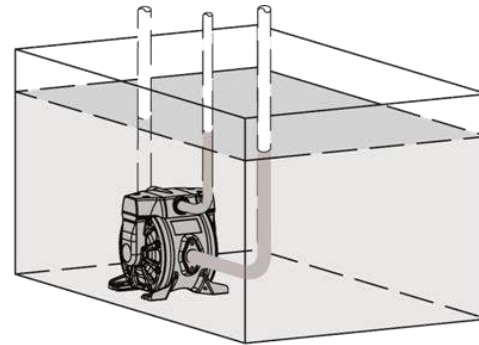
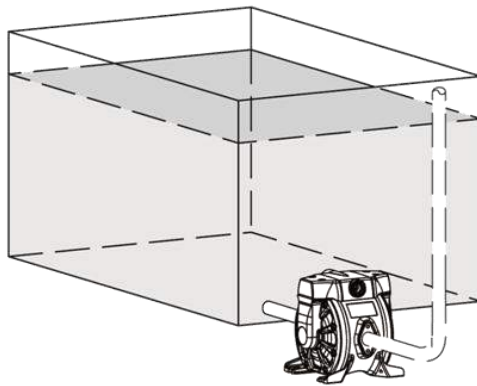
CONDUCTIVE POLYPROPYLENE OR ACETAL

Polypropylene and acetal offer excellent resistance to a broad range of chemicals. By including carbon fibre, the bushing is also conductive and so allows the pump to be effectively grounded as required for pumps. Conductive polypropylene or acetal are required for pumps working in potentially explosive environments (ATEX approved pumps).





Suggested installations





Samoa Directflo range



Directflo® pumps: MODELS – DF30 NON METALLIC PUMPS

TECHNICAL DATA

Pressure ratio	1:1
Maximum free delivery (1)	38 l/min (10.4 US gpm)
Delivery per stroke approx. (1)	0,07 litres (0.019 US gallons)
Air pressure operating range	3 to 7 bar (45 to 100 psi)
Solids in suspension max size	3 mm (1/8")
Max dry suction head (1)	2,5 m (8.20')
Max wet suction head (1)	8 m (26.25')
Weight	2,2 Kg (4.85 lb)
Fluid inlet	1/2" BSP/NPT (F) and flange
Fluid outlet	1/2" BSP/NPT (F) and flange
Air inlet	3/8" NPSM (F)
Wetted part materials	See Recommended Part Numbers

(1) Data measured with water, air inlet pressure 7 bar (100 psi), 20 °C (68 °F).
Capacity curves, see page 16.



DF30APP23THBAS



DF30ADN76TTBAS

Directflo® pumps: MODELS – DF30 ALL PLASTIC PUMPS



Air valve module and side covers are manufactured in polypropylene, suitable for working in highly corrosive environments.

Wetted pump body manufactured in polypropylene, conductive polypropylene, PVDF or conductive PVDF, with hastelloy or stainless steel pump shaft and PTFE diaphragms and ball valves for maximum fluid compatibility.

Directflo® pumps: MODELS – DF30 DUAL INLET NON METALLIC PUMPS



DF30TAPP23THBAS



DF30TADN76TTBAS

TECHNICAL DATA

Pressure ratio	1:1
Maximum free delivery (1)	38 l/min (10.4 US gpm)
Delivery per stroke approx. (1)	0,07 litres (0.019 US gallons)
Air pressure operating range	3 to 7 bar (45 to 100 psi)
Solids in suspension max size	3 mm (1/8")
Max dry suction head (1)	2,5 m (8.20")
Max wet suction head (1)	8 m (26.25')
Weight	2,2 Kg (4.85 lb)
Fluid inlet	2 x 3/8" BSP/NPT (F)
Fluid outlet	1/2" BSP/NPT (F) and flange
Air inlet	3/8" NPSM (F)
Wetted part materials	See Recommended Part Numbers

(1) Data measured with water, air inlet pressure 7 bar (100 psi), 20 °C (68 °F).
Capacity curves, see page 16.

Directflo® pumps: MODELS – DF50 METALLIC AND NON METALLIC PUMPS



TECHNICAL DATA

Pressure ratio	1:1
Maximum free delivery (1)	50 l/min (14 US gpm)
Delivery per stroke approx. (1)	0,1 litres (0.026 US gallons)
Air pressure operating range	3 to 7 bar (45 to 100 psi)
Solids in suspension max size	3 mm (1/8")
Max dry suction head (1)	6 m (20')
Max wet suction head (1)	8 m (26')
Weight	3,5 Kg (7.72 lb) (metallic) 2,8 kg (6.17 lb) (non metallic)
Fluid inlet	1/2" NPSM (F) and flange (metallic) 1/2" BSP/NPT (F) and flange (non metallic)
Fluid outlet	1/2" NPSM (F) and flange (metallic) 1/2" BSP/NPT (F) and flange (non metallic)
Air inlet	3/8" NPSM (F)
Wetted part materials	See Recommended Part Numbers

(1) Data measured with water, air inlet pressure 7 bar (100 psi), 20 °C (68 °F).
Capacity curves, see page 16.

Directflo® pumps: MODELS – DF50 DUAL INLET PUMPS



DF50TAPP23THBAS



DF50TAAA23THBAS

TECHNICAL DATA

Pressure ratio	1:1
Maximum free delivery (1)	50 l/min (14 US gpm)
Delivery per stroke approx. (1)	0,1 litres (0.026 US gallons)
Air pressure operating range	3 to 7 bar (45 to 100 psi)
Solids in suspension max size	3 mm (1/8")
Max dry suction head (1)	6 m (20')
Max wet suction head (1)	8 m (26.25')
Weight	3,5 Kg (7.72 lb) (metallic) 2,8 kg (6.17 lb) (non metallic)
Fluid inlet	2 x 3/8" NPSM (F) (metallic) 2 x 3/8" BSP/NPT (F) (non metallic)
Fluid outlet	1/2" NPSM (F) and flange (metallic) 1/2" BSP/NPT (F) and flange (non metallic)
Air inlet	3/8" NPSM (F)
Wetted part materials	See Recommended Part Numbers

(1) Data measured with water, air inlet pressure 7 bar (100 psi), 20 °C (68 °F).
 Capacity curves, see page 16.

Directflo® pumps: MODELS – DF100 METALLIC AND NON METALLIC PUMPS

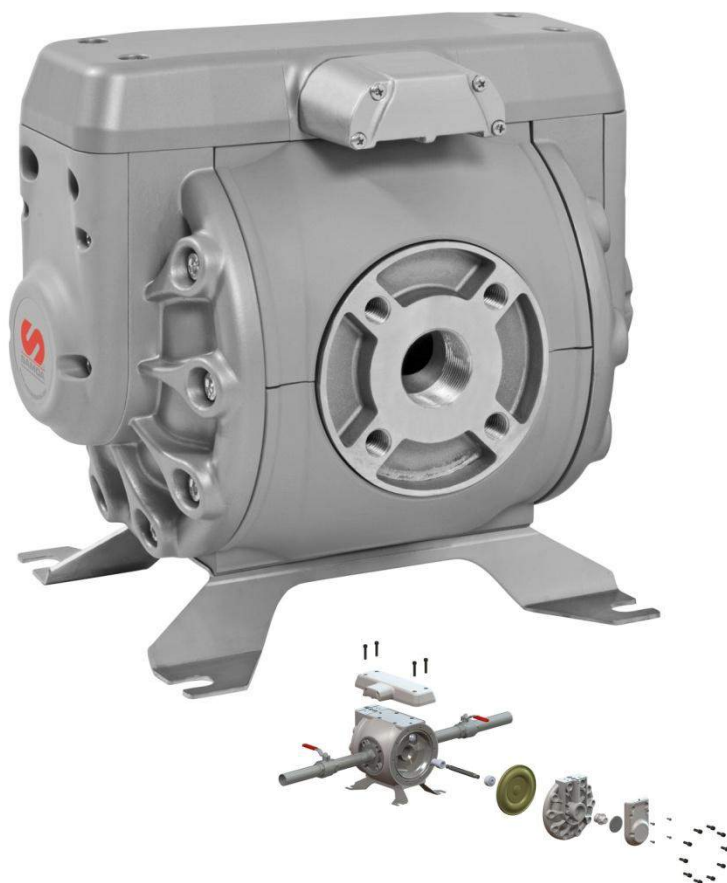


TECHNICAL DATA

Pressure Ratio	1:1
Maximum free delivery (1)	100 l/min (28 US gpm)
Delivery per stroke approx. (1)	0,25 l (0.064 US gallons)
Air pressure operating range	3 to 7 bar (45 to 100 psi)
Solids in suspension max size	4 mm (3/16")
Max dry suction head (1)	4,5 m (15')
Max wet suction head (1)	7 m (23')
Weight	7,2 Kg (16 lb) (metallic) 6,5 Kg (14.4 lb) (non metallic)
Fluid inlet	1" BSP/NPT (F) and flange
Fluid outlet	1" BSP/NPT (F) and flange
Air inlet	3/8" NPSM (F)
Wetted part materials	See Recommended Part Numbers

(1) Data measured with water, air inlet pressure 7 bar (100 psi), 20 °C (68 °F).
Capacity curves, see page 16.

Directflo® pumps: MODELS – DF250 METALLIC PUMPS



Pump Pressure ratio	1:1
Maximum free flow at 6 bar (87 psi) air inlet	250 l/min (66 g.p.m.)
Delivery per stroke	0.62 l (21 fl.oz.)
Air pressure operating range	3 to 7 bar (44 to 103 psi)
Maximum diameter of solids in suspension	6 mm (1/4")
Maximum suction head	6 m (19.7') dry 8 m (26.3') wet
Weight (aluminum pump)	20 kg (44 lb)
Fluid Inlet / Outlet	1-1/2" BSPP(F) (NPT available on request)
Air inlet	1/2" BSPP(F)



Main advantages Directflo:

- Less flow pulsation.
- Easier maintenance.
- Higher productivity, less production interruptions.
- Less spares costs.
- Better performance.
- Less air consumption.
- Less noise level.
- Compact, modern and light design.
- High performance even with low quality air.
- Main technical developments: FPV y FDS



- The Samoa Group headquarters are located in Gijón, Spain
- The Samoa Group designs, manufactures and distributes systems and components for viscous fluid handling - pumping, measurement and control - for the vehicle maintenance, manufacturing, process, mining, construction, farming, paint, water treatment, chemical, etc. industries.
- The Samoa Group products are available in more than 100 countries through its own subsidiaries and a select distributor network.





directflo® CENTRAL FLOW TECHNOLOGY

