MFP14
Automatic Pumps

Description

The Spirax Sarco MFP14 automatic pump is a displacement receiver operated by steam or compressed air. It is generally used to lift liquids such as condensate to a higher level. Subject to the conditions being suitable, the pump can also be used to directly drain closed vessels under vacuum or pressure. In conjunction with a float steam trap the pump can be used to effectively drain temperature controlled heat exchangers under all operating conditions.

Available types
The MFP14 is available with the following body materials:

SG iron	MFP14

Certification
This product is available with certification to EN 10204 3.1.
Note: All certification/inspection requirements must be stated at the time of order placement.

Sizes and pipe connections

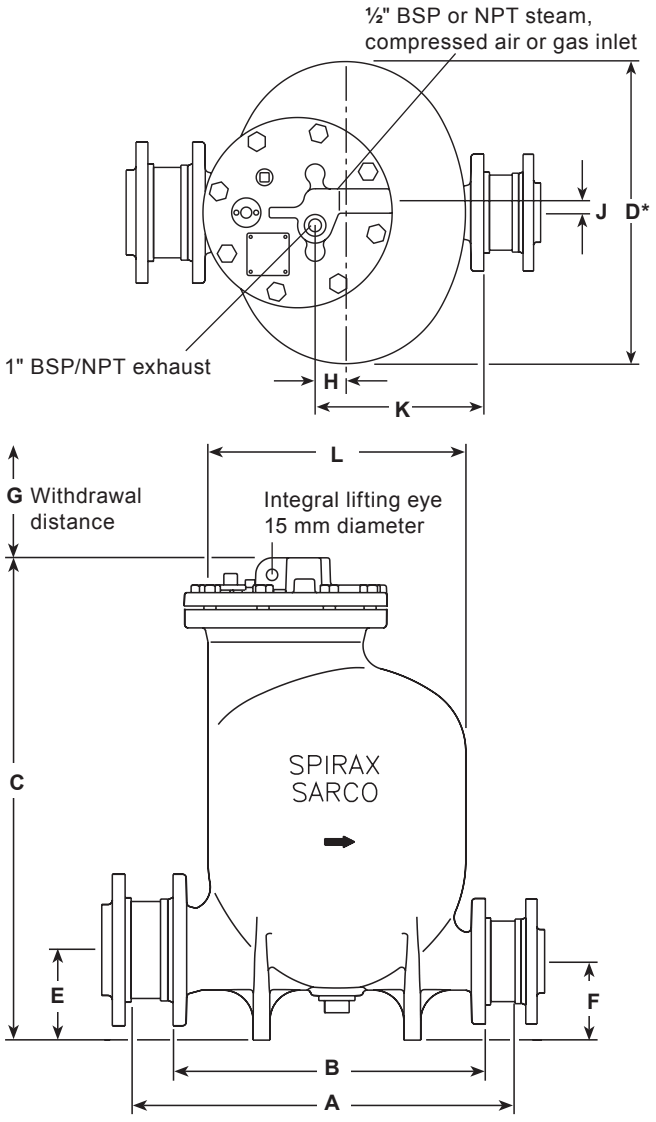
SG iron	1", 1½", 2" and 3" x 2" screwed BSP and NPT. DN25, DN40, DN50 and DN80 x DN50 flanged ASME B16.42 Class 150

Optional extra

Electronic pump monitors A plugged boss is provided on the pump cover, screwed ½" BSP for connecting an electronic pump monitor (For full details see TI-P136-24):

EPM1	A simple stand-alone unit with an 8 digit LCD display, powered by an integral 1.5 V lithium battery.
EPM2	A version suitable for coupling to a remote counter/building energy management system (BEMS).

Insulation jacket - An insulation jacket tailor made for each size of MFP14 is available for energy savings and health and safety. See TI-P136-07.



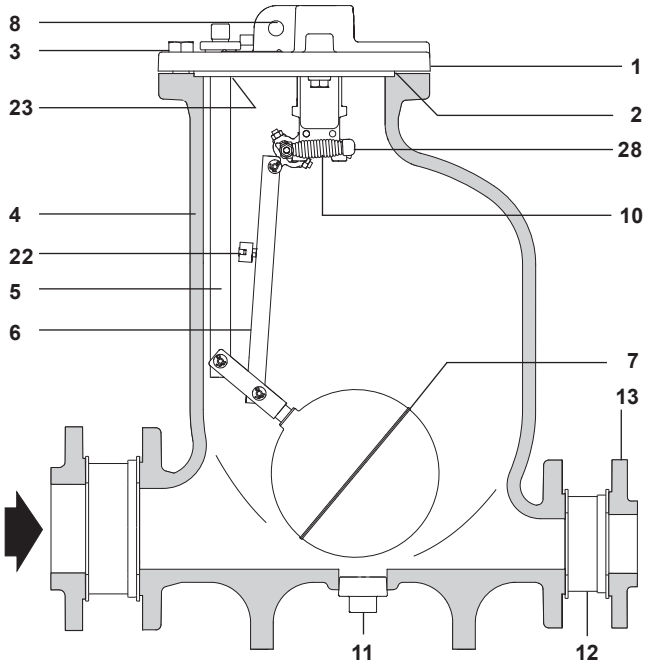
Dimensions/weights (approximate) in mm and kg

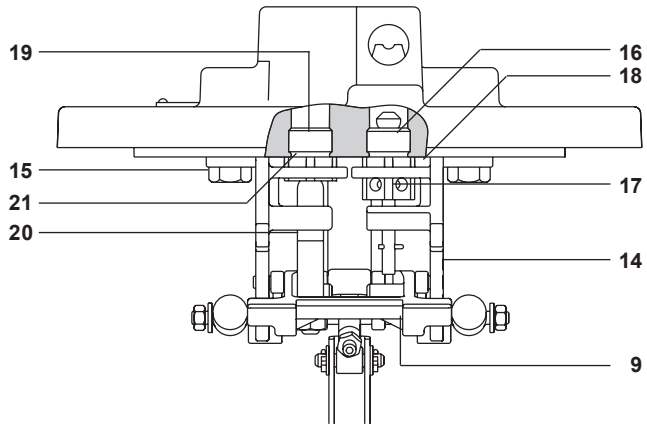
Size	A		B	C	*D	E	F	G	H	J	K	L	Pump	
	PN16	ANSI											Pump only	Including check valves and flanges
DN25	350	375	305	507	-	68	68	480	13	18	165	Ø 280	51	58
DN40	370	400	305	527	-	81	81	480	13	18	165	Ø 280	54	63
DN50	505	535	420	637	-	104	104	580	33	18	245	Ø 321	72	82
DN80 x DN50	515	555	420	637	430	119	104	580	33	18	245	342	88	98

* **Note:** Dimension **D** only applies to the DN80 x DN50 pump which has an oval body. The DN25, DN40 and DN50 are round bodied therefore dimension **L** is sufficient.

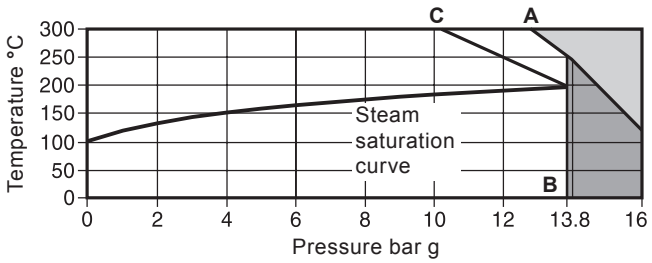
Materials

No.	Part	Material	
1	Cover	SG iron	(EN JS 1025) EN-GJS-400-18-LT
2	Cover gasket	Synthetic fibre	
3	Cover screws	Stainless steel	ISO 3506 Gr. A2-70
4	Body	SG iron	(EN JS 1025) EN-GJS-400-18-LT
5	Pillar	Stainless steel	BS 970, 431 S29
6	Connector rod	Stainless steel	BS 1449, 304 S11
7	Float and lever	Stainless steel	AISI 304
8	Eyebolt (integral)	SG iron	(EN JS 1025) EN-GJS-400-18-LT
9	Mechanism lever	Stainless steel	BS 3146 pt.2 ANC 2
10	Spring	Inconel 718	ASTM 5962 / ASTM B367
11	Pressure plug	Steel	DIN 267 Part III Class 5.8
12	Check valves	Stainless steel	
13	Screwed boss flanges	Steel	
14	Mechanism bracket	Stainless steel	BS 3146 pt. 2 ANC 4B
15	Bracket screws	Stainless steel	BS 6105 Gr. A2-70
16	Inlet valve seat	Stainless steel	BS 970, 431 S29
17	Inlet valve stem	Stainless steel	ASTM A276 440B
18	Inlet valve seat gasket	Stainless steel	BS 1449 409 S19
19	Exhaust valve seat	Stainless steel	BS 970 431 S29
20	Exhaust valve	Stainless steel	BS 3146 pt. 2 ANC 2
21	Exhaust valve seat gasket	Stainless steel	BS 1449 409 S19
22	EPM actuator	ALNICO	
23	'O' ring seal	EPDM	
28	Spring anchor	Stainless steel	BS 970 431 S29





Pressure / temperature limits



The product **must not** be used in this region.

For use in this region contact Spirax Sarco -
As standard this product should not be used in this region or beyond its operating range.

A - B Flanged PN16
C - B Flanged ANSI 150

Body design conditions	PN16
Maximum motive inlet pressure (steam air or gas)	13.8 bar g
PMA Maximum allowable pressure	16 bar g @ 120°C
TMA Maximum allowable temperature	300°C @ 12.8 bar g
Minimum allowable temperature. For lower temperatures consult Spirax Sarco	0°C
PMO Maximum operating pressure for saturated steam service	13.8 bar g @ 198°C
TMO Maximum operating temperature for saturated steam service	198°C @ 13.8 bar g
Minimum operating temperature. For lower temperatures consult Spirax Sarco	0°C

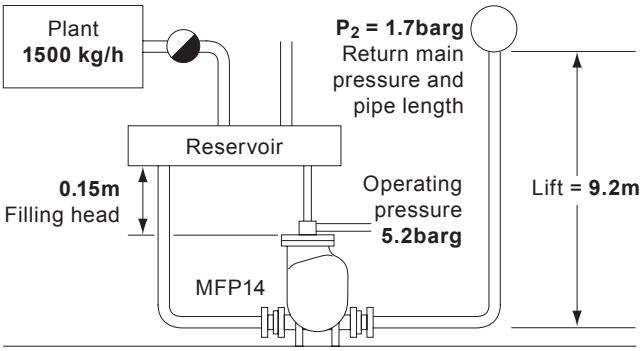
Total lift or backpressure (static head plus pressure in the return system) which must be below the motive fluid inlet pressure to allow capacity to be achieved:-
Height (H) in metres x 0.0981 plus pressure (bar g) in return line, plus downstream piping friction pressure drop in bar calculated at a flowrate of the lesser of six times the actual condensate rate or 30 000 litres/h.

Recommended filling head above the pump	0.3 m
Minimum filling head required	0.15 m (reduced capacity)
Standard pump operates with liquids of specific gravity:	1 down to 0.8

	DN80 x 50	DN50	DN40 and DN25
Pump discharge per cycle	19.3 litres	12.8 litres	7 litres
Steam consumption	20 kg/h maximum	20 kg/h maximum	16 kg/h maximum
Air consumption (Free air)	5.6 dm^3/s maximum	5.6 dm^3/s maximum	4.4 dm^3/s maximum

How to size and select

Considering the inlet pressure, backpressure and filling head conditions, select the pump size which meets the capacity requirements of the application.



The known data

Condensate load	**1500 kg/h**
Steam pressure available for operating pump	**5.2 bar g**
Vertical lift from pump to the return piping	**9.2 m**
Pressure in the return piping (piping friction negligible)	**1.7 bar g**
Filling head on the pump available	**0.15 m**

Note: It is strongly recommended that the maximum motive / backpressure differential is between 2 - 4 bar g.

Selection example

Firstly calculate the total effective lift against which condensate must be pumped.
Total effective lift is calculated by adding **vertical lift from the pump to return piping (9.2 m)** to the **pressure in the return piping (1.7 bar g).** To convert pressure in the return pipe into pressure head, divide it by the conversion factor of 0.0981:-
P_2 = 1.7 bar g ÷ 0.098 1 = 17.3 m Pressure head (lift)
The total effective lift then becomes calculable :-

9.2 m + 17.3 m

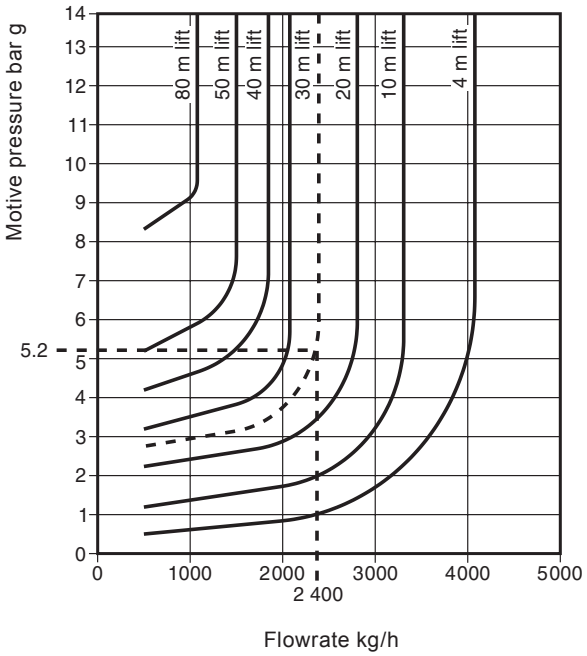
The total effective lift is 26.5 m

Now that the total effective lift has been calculated, a pump can be selected by plotting the known data onto the graphs on page 5.

1. Plot a horizontal line from 5.2 bar g (Motive pressure).
2. Plot a line indicating 26.5 m lift.
3. From the point where the motive pressure line crosses the m lift line, drop a vertical line to the X axis.
4. Read the corresponding capacity (2400 kg/h).

Note: As the filling head is different to 0.3 m, then the capacity calculated above must be corrected by the appropriate factor selected from the table opposite.

How to use the sizing chart



Example
DN50 pump capacities

Capacity multiplying factors for other filling heads

Filling head metres (m)	Capacity multiplying factors			
	DN25	DN40	DN50	DN80 x DN50
0.15	0.90	0.75	0.75	0.80
0.30	1.00	1.00	1.00	1.00
0.60	1.15	1.10	1.20	1.05
0.90	1.35	1.25	1.30	1.15

For motive fluids other than steam, see the table below.

Final pump selection

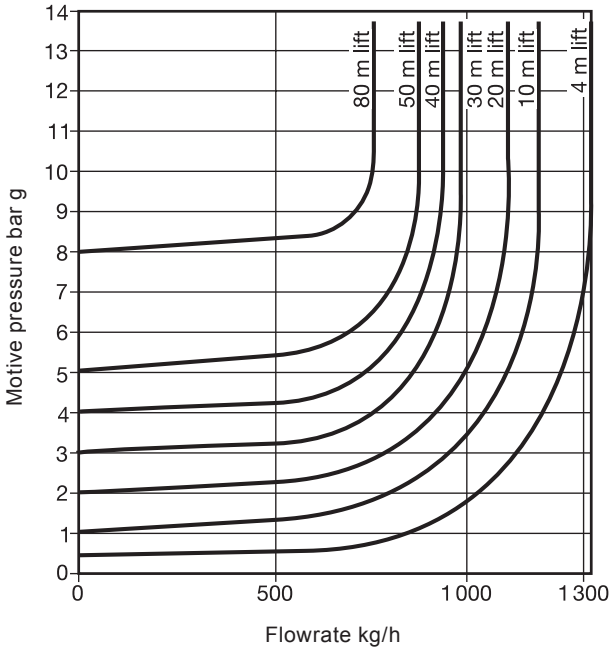
The size of pump selected in this case would be **DN50.**
This has the capability to pump:-
0.75 x 2400 kg/h = 1800 kg/h
easily coping with a condensate load of 1500 kg/h.

Note: If the motive fluid is not steam, then the capacity above must be multiplied by the appropriate factor in the table below.

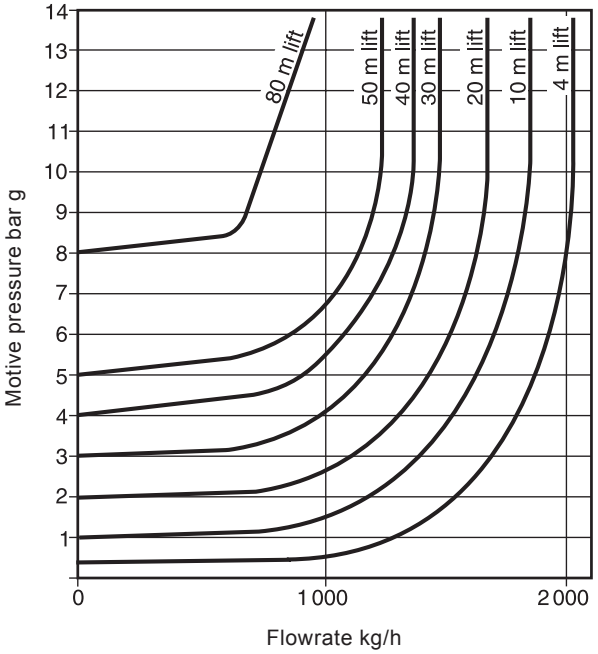
Capacity multiplying factors for motive gas supplies (other than steam)

Pump size	% Backpressure Vs Motive pressure (BP/MP)								
	10%	20%	30%	40%	50%	60%	70%	80%	90%
	Capacity multiplying factors								
DN25	1.20	1.25	1.30	1.35	1.40	1.43	1.46	1.50	1.53
DN40	1.20	1.25	1.30	1.35	1.40	1.43	1.46	1.50	1.53
DN50	1.02	1.05	1.08	1.10	1.15	1.20	1.27	1.33	1.40
DN80 x DN50	1.02	1.05	1.08	1.10	1.15	1.20	1.27	1.33	1.40

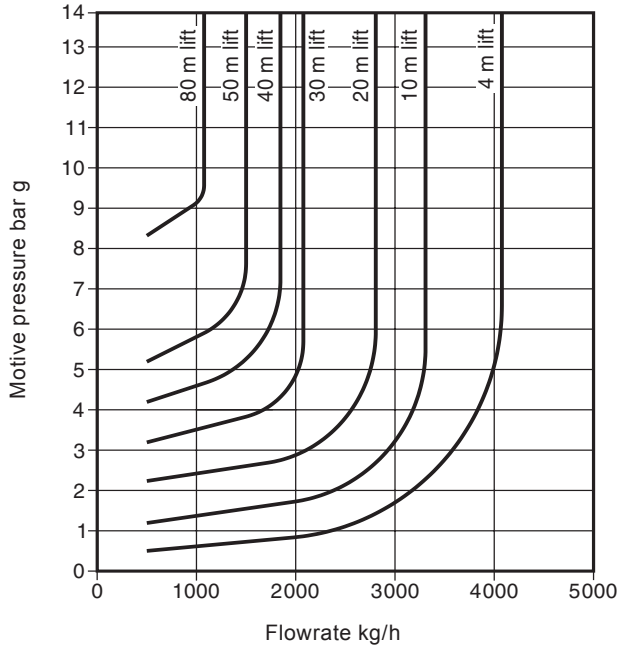
The capacity charts are based on a filling head of 0.3 m.
The lift lines represent the net effective lift (i.e. lift plus frictional resistance).



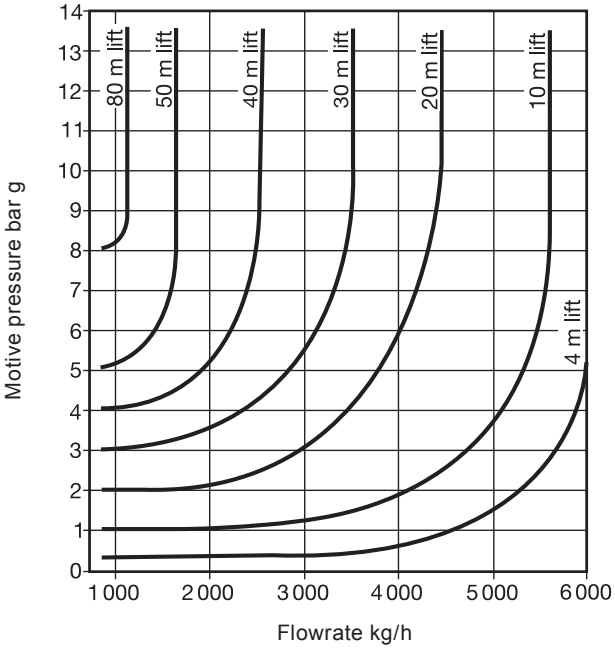
DN25 pump capacities



DN40 pump capacities



DN50 pump capacities



DN80 x DN50 pump capacities

Note: If you are in any doubt about the size of the pump required or if the conditions are unusual we will be glad to advise you if you give us the
answers to the following questions:-

1. Nature of liquid to be pumped.
2. Temperature of liquid to be pumped.
3. Quantity to be pumped (kg/h or litres/h).
4. Initial lift horizontal distance and net effective lift (i.e. initial lift less subsequent fall in discharge line).
5. Operating medium (steam, compressed air or gas).
6. Operating pressure available.
7. The pump is generally used to drain water from a vented receiver but under certain circumstances can drain a unit from under steam pressure or vacuum - state which.

Note: To achieve rated capacity, the pump must be installed with check valves as supplied by Spirax Sarco. Use of a substitute check valve may affect the performance of the pump.

Safety information, installation and maintenance
For full details see the Installation and Maintenance Instructions (IM-IBR16-29IN) supplied with the product.

Installation note:
For best operation any flash steam must be vented or condensed ahead of the pump inlet.

How to specify
Automatic pumps shall be Spirax Sarco type MFP14 with SG iron bodies and flanged/screwed connections. They shall have stainless steel valve and float assemblies, and a stainless steel disc check valve on the condensate inlet and outlet connections. They shall have screwed steam/compressed air inlet and exhaust connections.

How to order
Example: 1 off Spirax Sarco DN50 MFP14 automatic pump having flanged ANSI 150 connections with NPT motive fluid connections, complete with check valves and 2" NPT screwed boss flanges.

Spare parts
The spare parts available are detailed below. No other parts are available as spares.

Available spares	
Cover gasket	**2**
Float	**7**
Inlet/outlet check valve (each)	**12**
Cover and internal mechanism assembly	**1, 2, 7** (complete)
Valve set (inlet and exhaust valves and seats)	**16, 17, 18, 19, 20, 21**
Spring shaft kit (two spring assemblies including anchors and two shafts plus nuts and washers for rear shaft)	**10**

How to order spares
Always order spares by using the description given in the column headed 'Available spares' and state the size and type of pump.
Example: 1 off Cover gasket for a Spirax Sarco DN50 MFP14 automatic pump.