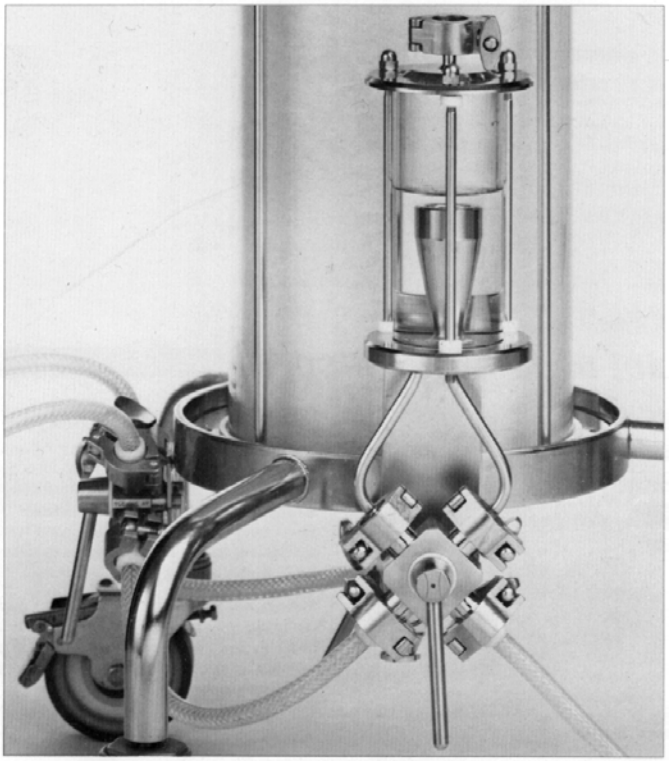
cytiva

Column Air Trap

User Manual



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Important user information

All users must read this entire manual to fully understand the safe use of Column Air Trap.

Important!

Column Air Trap should not be used in any clinical or *in vitro* procedures for diagnostic purposes.

Safety notices

This manual contains warnings and cautions concerning the safe use of the product. See definitions below.

WARNING
The WARNING symbol and notice highlight instructions that must be followed to avoid personal injury. Do not proceed until all stated conditions are clearly understood and met.

CAUTION
The CAUTION notice highlights instructions that must be followed to avoid damage to the product or other equipment. Do not proceed until all stated conditions are met and clearly understood.

Notes

Note: *A Note is used to indicate information that is important for trouble-free and optimal use of the product.*

WARNING
All repairs should be done by personnel authorized by Cytiva. Do not open any covers or replace parts unless specifically stated in the instructions.

CE-certification

This product complies with the European directives listed below, by fulfilling corresponding standards. A copy of the Declaration of Conformity is available on request.

- 97/23/EEC, Pressure Equipment Directive

The **CE** logo and corresponding declaration of conformity, is valid for the instrument when it is:

- used as a stand-alone unit, or
- connected to other CE-marked Cytiva instruments, or
- connected to other products recommended or described in this manual, and
- used in the same state as it was delivered from Cytiva except for alterations described in this manual.

Note: *The Declaration of conformity is valid only for systems that are marked with the **CE** logo:*

CE

1 Introduction

In this chapter

1.1 Column Air Trap

Column Air Trap has been designed to meet the most stringent demands in the production of biomolecules for human health care and special consideration has been given to hygienic operation. The unique funnel design, used at the inlet to the air trap chamber, is highly efficient for removing even the smallest air bubbles.

All materials used in the construction have been carefully selected and extensively tested to ensure the maximum resistance to chemicals used in production and cleaning processes, and in autoclaving. To simplify maintenance, the number of components used has been reduced to a minimum. The overall design, high quality welding and the use of clamp couplings prevent the formation of dead zones where contaminants could collect.

The air trap can be operated at pressures up to 8 bar, see *Table 3.1, on page 14*. Three kits are available which enable the air trap to be fitted directly to the base of all BPG™, all INdEX™, FineLINE™ 70, 100 and FineLINE 200 columns.

1.2 Accessories

A full range of accessories, including manually operated 2-way, 4-way and top valves, manometers and safety valves are described in this manual. Each of these accessories has been thoroughly tested under operational conditions in conjunction with the air trap.

Note: *The air trap is specified for operation at pressures[1] up to 8 bar, see Table 3.1, on page 14. Consequently local authorities may consider the air trap a pressure vessel. Users of this equipment must therefore check the local authorities' specification of a pressure vessel and comply with the applicable regulations.*

[1] *Defined as the pressure in excess of ambient (1 bar).*

1.3 Abbreviations

The abbreviations used in this manual are defined below:

CIP	Cleaning-in-place
EPDM	Ethyl propylene
FEP	Fluoroethenepropene
PA	Polyamide
PP	Polypropene
PMMA	Polymetylmethacrylate
PTFE	Polytetraflourethane
PVC	Polyvinyl chloride
SS	Stainless steel

2 Unpacking and equipment list

The air trap is available as a complete kit in alternative configurations to fit all BPG, all INdEX columns, FineLINE 70, 100 and 200. Air Traps 100 and 200 are also available as assembled air traps without any ancillary components.

Unpack the equipment carefully and check the contents of the container against the information in the appropriate table below. Item no. refers to *Fig. 9.1, on page 61* and *Fig. 9.2, on page 62* in *Appendix A Spare parts, on page 60*. Check for signs of damage that might have occurred during transportation.

Table 2.1: Air Trap 100 and 200 complete to fit BPG, INdEX and FineLINE columns with 70 and 100 or 140 and 200 mm tube diameter.

Item no.	Description	Quantity	Code no.
	Air Trap body assembled,		
	Air Trap 100 complete		18-1102-96
	Air Trap 200 complete		18-1102-97
	consisting of:		
1	Glass tube	1	
7	Protection tube	1	
6	Rod	3	
5	Domed nut M6	3	
4	Threaded spacer	6	
	Top plate	1	
	Bottom plate	1	
	Blind flange and packing	1	
2/3	O-ring, 57.5 × 3.0 mm, EPDM	2	
16	Mounting bracket for Air Trap 100	1	
17	Mounting bracket for Air Trap 200	1	
12	Screw M6 × 12	2	
13	Screw M6 × 25	2	
14	Screw M6 × 45	2	
15	Washer M6	2	
8	Valve 4-way, manual	2	
9	Clamps, 25 mm	9	
	Tubing with clamp fitting, 30 cm	2	
	Tubing with clamp fitting, 200 cm	1	

10	Gaskets 25 mm i.d. 6 mm 10	10

Table 2.2: Air Trap 300 and 450 complete to fit BPG 300 or BPG 450.

Item no.	Description	Quantity	Code no.
	Air Trap body assembled,		
	Air Trap 300 complete		18-1102-98
	Air Trap 450 complete		18-1103-00
	consisting of:		
18	Glass tube	1	
	Bottom plate	1	
	Top plate	1	
20	O-ring 104.37 × 3.53	2	
22	Protection tube	1	
19	O-ring 8.1 × 1.6	2	
21	Washer 10.5 × 20	1	
21	Domed nut M10	1	
23	Valve, 4-way, manual	1	
29	Mounting bracket for Air Trap 300	1	
32	Mounting bracket for Air Trap 450	1	
9	Clamps, 25 mm	1	
26/30	Screw, M5 × 10	3	
27/31	Screw, M6 × 25	2	
	Blind flange	1	
28	Nut, M6	2	
24	Gaskets 25 mm i.d. 10	3	

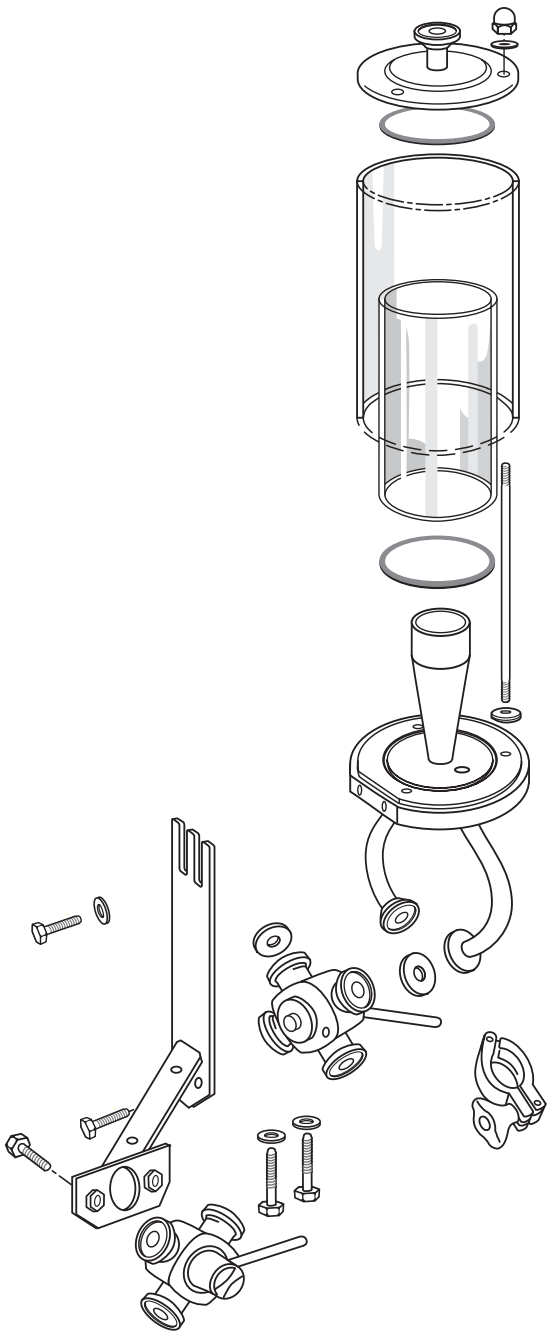

Figure 2.1: Air Trap 100 and 200 to fit to BPG, INdEX and FineLINE with 70, 100 mm and 200 mm tube diameter.

Table 2.3: 18-0019-59 Air Trap 100 and 200, without ancillary components.

Item no.[1]	**Description Ref**	**Quantity**
	Air Trap body assembled, consisting of:	
1	Glass tube	1
7	Protection tube	1
6	Rod	3
5	Domed nut M6	3
4	Threaded spacer	6
	Top plate	1
	Bottom plate	1

[1] Item no. refers to *Fig. 9.1, on page 61*

3 The Column Air Trap

In this chapter

3.1 Specifications and characteristics

The primary specifications and characteristics of Column Air Traps are given in the Table below.

Table 3.1: Dimensions, working volume and pressure ranges for Column Air Traps.

	100 & 200	**300 & 450**
Maximum working pressure[1]	8[2]	4
Working volume range	200–300 ml (approx)	300–1700 ml (approx)
Weight	4.5 kg	5 kg
Internal diameter	55 mm	100 mm
Internal height	150 mm	220 mm
Overall height	420 mm	534 mm
Example on working floor/bench space required: with air trap included		
BPG 100 and INdEX 100 column	260 mm radius	
BPG 200 and INdEX 200 column	400 mm radius	
BPG 300 column	500 mm radius	
BPG 450 column	800 mm radius	

[1] Defined as the pressure in excess of ambient (1 bar)
[2] Note that FineLINE columns have a higher maximum working pressure than 8 bar.

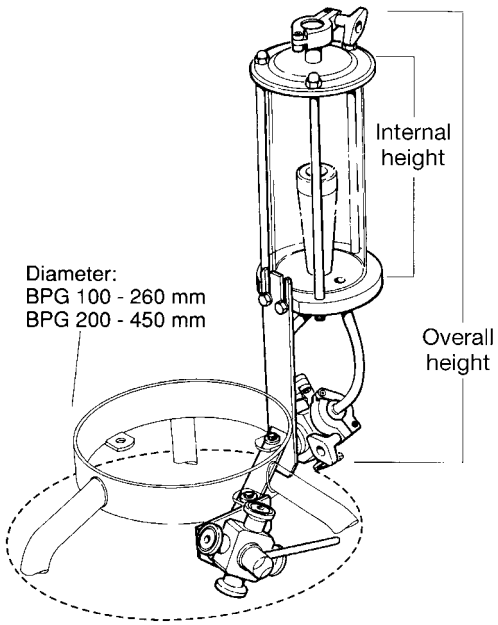

Figure 3.1: Dimensions of the air trap

3.2 Construction materials

The materials used in the construction of the air trap have been carefully selected to be compatible with the solvents most commonly used in purification by chromatography, in maintenance and in cleaning processes.

The components of the air trap may be considered to contain wet and dry parts. The wet parts, which come into contact with the process liquids, are either stainless steel 316 or borosilicate glass. The dry parts are of high industrial quality which meet the requirements of the industrial environment. The Table below shows the major components of the air trap and identifies the materials from which they are manufactured.

Table 3.2: Column Air Trap component materials.

Component	**Material**
Glass tube	Borosilicate glass
4-way valves	SS316L/PTFE
Top and base	SS316L
Mounting bracket	SS316
Clamps	SS304
Tubings	PVC
Gaskets	EPDM
O-rings	EPDM/FEP[1]

[1] FEP is an option to EPDM.

3.3 Chemical resistance

The Table below is a guide to the resistance of the materials used in the air trap.

Table 3.3: Chemical resistance of materials in the air trap.

Substance	**Concentration by volume**	**60-90 days**[1]
Acetic acid	10%	OK
Acetic acid	25%	OK
Acetonitrile	5%	see note[2]
Acetonitrile	50%	see note [2]
Acetone	10%	see note [2]
Cyclohexane	100%	see note [2]
Ethanol	100%	see note [2]
Ethyl acetate	100%	OK
Ethylene glycol	50%	OK
Glycerol	100%	OK
Hexane	100%	see note [2]
Hydrochloric acid	0.1 M	see note[3]
Isopropyl alcohol	100%	see note [2]
Methanol	100%	see note [2]
Nitric acid	0.1 M	OK
n-Propanol	100%	OK
Sodium chloride	2 M	see note[4]
Sodium hydroxide	2 M	OK
Trifluoroacetic acid	0.10%	see note[5]
Triton™ X-100	100%	OK
Urea	8 M	OK

[1] The test does not include Polyamide nets and PVC tubing.
[2] EPDM rubber changes characteristics. For repetitive and long term use, use FEP Orings.
[3] Not longer than 4 hours.
[4] Can be used under normal running conditions. Do not use NaCl in storage solutions. Please note that NaCl can cause corrosion on stainless steel in acid solutions (pH below 4.0).
[5] FEP changes characteristics, use EPDM O-rings.

In general, the use of the following chemicals should be avoided:

- Extreme oxidisers
- Fluorine and halogenated compounds
- Chlorinated solvents (such as methylene chloride)
- Esters (such as acetates)

- Aromatic hydrocarbons (such as toluene)

3.4 Operational characteristics

When installed in series with a column, the air trap collects and retains any bubbles of air, or other gases, which are suspended in the continuous supply of liquid from the pump. The air trap also serves to dampen pulsations which may be introduced by the action of the pump.

It should be noted that the air trap must never be subjected to internal pressures which exceed the air trap's stated pressure limit (see *Table 3.1, on page 14*). In applications where the pressure limit of the air trap may be exceeded, it is strongly recommended that an automatic control and/or visual pressure indicator is incorporated into the system.

A safety valve and a manometer are available from the range of standard accessories for the air trap. Full details of these can be found in *Table 8.2, on page 54*.

Two 4-way manual valves are included in the air trap kit (for Air Trap 300 and 450 only one 4-way valve). The right-hand valve, Valve 1, enables the air trap to be included in or isolated from the rest of the system, see *Fig. 4.2, on page 29*. Turning the left hand valve, Valve 2, enables the incoming flow to be directed to either the top or the bottom of the column.

It is recommended to always direct the flow of buffer through the air trap. However, when the chromatography system is being used for applications such as gel filtration, where it is important to avoid dilution or back mixing during sample application, Valve 1 should be used to isolate the air trap during that part of the operation.

3.5 Accessories

In this section

3.5.1 Manometer kit

The manometer kit includes all components necessary to install it directly into any BPG, INdEX, FineLINE 70, 100 or 200 column system. The dial on the manometer is calibrated either from 0-10 bar or from 0-5 bar. The manometer kit can be installed in other parts of the system as well as on the air trap.

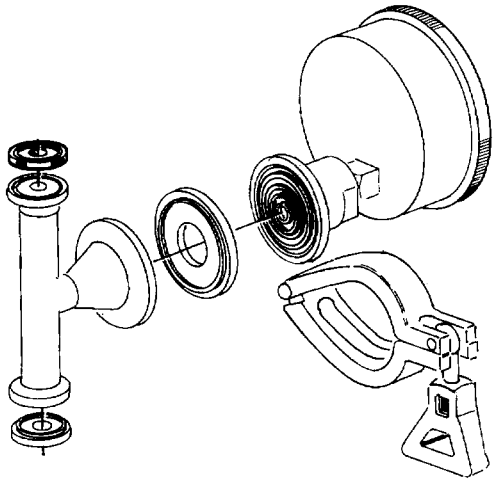

Figure 3.2: Manometer kit.

3.5.2 Safety valve

The safety valve is a precalibrated sealed unit which will automatically open to release pressure at a settled level. See *Table 3.1, on page 14* for appropriate levels. It is strongly recommended to install the safety valve into any system where pressures may exceed the listed maximum pressure for the column. Typical causes of overpressure are operator error and gradual changes in the characteristics of column packing materials.

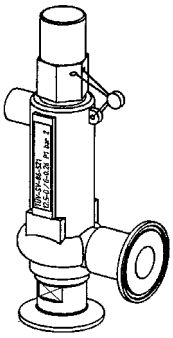

Figure 3.3: Safety valve.

3.5.3 Top valve

The manually operated valve is recommended for use at the top of the air trap as an air outlet control.

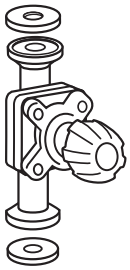

Figure 3.4: Top valve, manual.

3.5.4 2-way valve, L-type, manual and 4-way valve manual

The 4-way valve is identical to the valves supplied in the air trap kit.

The 2-way, L-type valve is recommended for use as a stop valve. It may be included at any point in the system and is particularly useful when changing column packing and during maintenance operations.

Note that valves with two different inner diameters are available (6 and 10 mm).

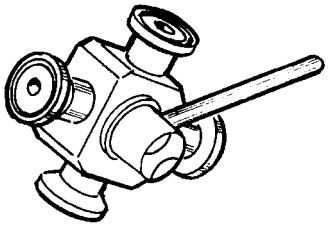

Figure 3.5: 4-way valve manual.

3.5.5 Tubings and connection kits

PVC tubings with premoulded clamp fittings are available in a variety of lengths. Connection kits are available to enable a range of alternative tube types to be connected to 25 mm clamp connectors. Full details of these accessories can be found in *Table 8.2, on page 54*.

Figure 3.6: Tubing with premoulded clamp fittings.

4 Installation

The main body of the air trap is assembled on delivery. Users are advised to consider either autoclaving or cleaning-in-place before putting the equipment into operation.

In this chapter

4.1 How to install Air Trap 100 and 200

Step	Action
1	Locate the stainless steel mounting bracket. With the operating levers pointing downwards, mount the two 4-way valves onto the bracket using the M6 × 25 mm screws provided. Tighten the valves into position using a small wrench. Refer to the Figure below and locate the two screws in the base of the column stand. These screws will be used to attach the mounting bracket to the stand.

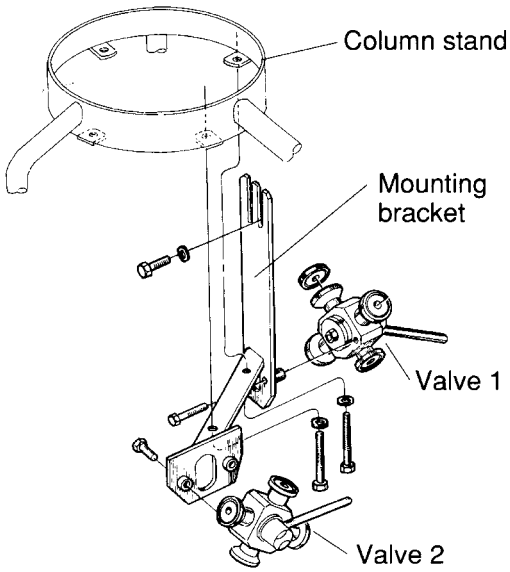

Figure 4.1: Assembling the mounting bracket.

2	Before loosening the two screws securing the column, ensure that the correct position has been selected. This is done by aligning the holes in the cross member of the mounting bracket with the screw heads and checking that there is sufficient free space to operate the two 4-way manual valves.
3	Unscrew the screws securing the column. Mount the bracket and retighten the screws.
4	Locate two of the 25 mm stainless steel clamps and two of the 25 mm gaskets provided in the kit.
5	Carefully place the gaskets into each upper port of the right-hand valve. Ensure that the gaskets are evenly located into the ports.

Step	Action
6	Locate the two screw holes in the straight edge on the side of the base of the air trap. Place a washer onto each of the two M6 × 12 screws provided and screw the two screws part way into the base.
7	Hold the air trap vertically and carefully lower the threaded part of the two screws into the two slots in the upright on the right-hand side of the bracket.
8	Ensuring that the gaskets do not become distorted, lower the air trap body until the flanges on the stainless steel inlet and outlet tubes locate over the flanges on the valve ports.
9	Fit one of the 25 mm stainless steel clamps over each pair of flanges. Before tightening the clamps, check that they are each in a position which allows free movement of the valve handle.
10	Use a small wrench to tighten the two screws holding the body of the air trap to the bracket.
11	The air trap is now fixed in position. Accessories may be fitted to the flange, or to the blind cap supplied with the kit, in the top plate of the air trap. The accessories available are the manometer, the safety valve and the manually operated diaphragm top valve. Each of these accessories is supplied in a separate kit and each kit includes all the necessary gaskets and clamps. Install the accessories on the top flange. ***Note:*** *The packing piece on the top flange is similar to a standard 25 mm gasket but has no hole in the centre.* Assemble the accessories following the directions supplied in the individual kits.

Step	Action
12	Locate the set of tubing's supplied with the kit. These tubing's have pre-moulded flanges for clamp fittings at each end. To identify the tubing lengths and connection points, refer to the Figure below.

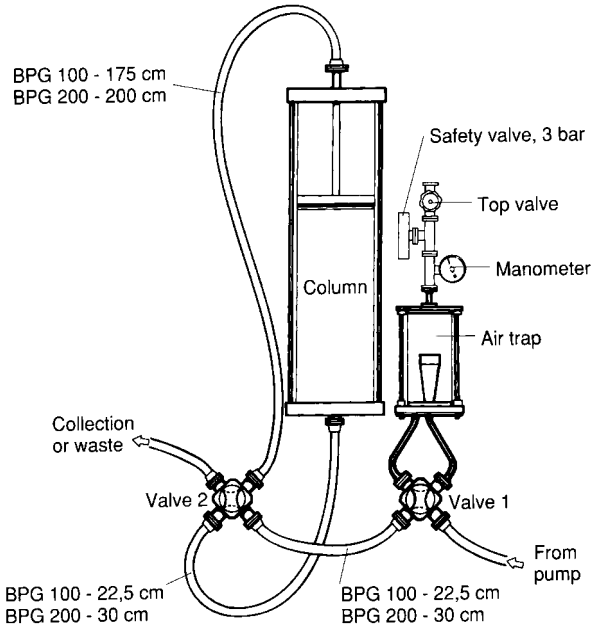

Figure 4.2: Tubing connections.

13	Select the first tube to be fitted. Carefully place a 25 mm gasket into the flange on the valve. Press the pre-moulded flange on the end of the tube firmly against the gasket seated in the valve flange. Fit a 25 mm stainless steel clamp around the connection.
14	Before finally tightening the clamp, check that the thumb screw is in a position which allows free movement of the valve lever.
15	Refer to the Figure above to check where the free end of the tube is to be fitted.
16	Repeat steps 13 to 15 above to complete the connection of all the tubings.

4.2 How to install Air Trap 300

Step	Action
1	Mount the valve on the bracket with the M6 × 25 screws. Do not tighten.
2	Mount the air trap with the M5 × 10 screws. Do not tighten.
3	Connect the valve and air trap with the gasket and clamp.
4	Hang the bracket holding the air trap on the stand so that the bracket is supported by the leg. Secure the clamp under the leg with the two screws and nuts.
5	Tighten all the screws.
6	The valve 2, refer to *Fig. 4.2, on page 29*, needs to be fastened on a separate stand not supported by Cytiva.

4.3 How to install Air Trap 450

Step	Action
1	Mount the valve on the bracket with the M6 × 25 screws. Do not tighten.
2	Mount the air trap with the M5 × 10 screws. Do not tighten.
3	Connect the valve and air trap with gasket and clamp.
4	Hang the bracket under the bottom plate, using the M10 screw.
5	Tighten all the screws.
6	The valve 2, refer to *Fig. 4.2, on page 29*, needs to be fastened on a separate stand not supported by Cytiva.

We recommend standard laboratory stands.

5 Operation

Before putting the chromatographic system into operation, the operator is advised to ensure that the air trap is clean. Recommended cleaning procedures are detailed in *Chapter 6 Maintenance and service, on page 36*.

In this chapter

5.1 Preparing the air trap

Step	Action
1	After thoroughly cleaning the air trap, fill it to a level about two thirds up the glass tube with the solvent in use. For liquid to enter the air trap, air must be released. If the manual top valve accessory is fitted, it should be opened. If no manual top valve is fitted, the blind flange must be removed from the top of the air trap or from the T-junction of an accessory.
2	Start the pump and allow the air trap to fill to the desired level.
3	Stop the pump and close the manual top valve or replace the blind fitting.
4	The inlet tubings to either the top or the bottom of the column may be flushed by selecting the desired position of Valve 2. Disconnect the inlet tubing at the column and switch on the pump.
5	When the tubing has been flushed, switch off the pump. Ensure that no air is allowed to enter the system during reconnection. If necessary, switch on the pump and change the position of Valve 2 to reverse the flow and remove any air from the connector at the end of the column. Refit the tubing connector.

5.2 Applying the sample to the column

To overcome dilution effects while the sample is being applied to the column, the air trap should be temporarily isolated from the system. This is particularly important when operating gel filtration systems. Turn the handle on Valve 1 to direct the flow to Valve 2.

Once sample application is completed, return the handle on Valve 1 back to the original position to redirect the buffer flow through the air trap.

5.3 Pressure effects within the system

WARNING
The pressure must never be allowed to exceed the pressure limits in *Table 3.1, on page 14* in any part of the system. A safety valve is available to protect the system against overpressure.

The air trap will introduce a pressure drop into the system. In order to monitor the working pressure accurately, we recommended fitting a manometer both to the air trap and at the inlet to the column.

Pressure/flow rate curves for packed columns do not normally include the effects of an air trap and the consequent pressure drop in the system. To subtract the pressure effect introduced into the complete system by the air trap, use the values from the curve in the Figure below.

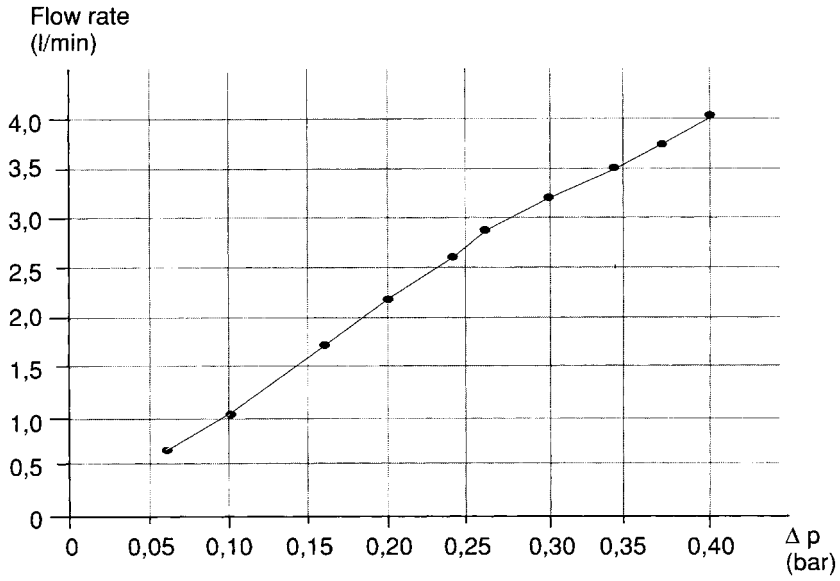

Figure 5.1: Pressure/flow rate curve for the air trap when connected to a BPG 100 or BPG 200 column.

6 Maintenance and service

The air trap requires little routine maintenance. To facilitate simple cleaning methods and reliable operation, the air trap contains the minimum number of components.

In this chapter

6.1 Air trap hygiene

In this section

6.1.1 General

The air trap has been designed to give a high level of hygiene. The funnel, inlet and outlet tubes are welded to the base to form a single unit which is free of hidden pockets where dead zones could give rise to microbial growth. The clamp connector fittings permit cleaning-in-place. Furthermore, the air trap can be autoclaved.

Thorough tests were performed in conjunction with a BPG 100/500 column to confirm the hygienic design of the air trap. The column bed was packed with S Sepharose™ Fast Flow to a bed height of 10 cm. It was infected with five microorganisms; a yeast, a mould and three bacteria selected from the American Type Culture Collection (ATCC). The test cultures used are shown in the Table below.

Table 6.1: Column hygiene test cultures.

Organism	ATCC	Type
Escherishia coli	8789	gram negative bacterium
Psuedomonas aeruginosa	9027	gram negative bacterium
Staphylococcus aureus	6538	gram positive bacterium
Candida albicans	10231	yeast
Aspergillus niger	16404	mould

The microorganisms, at a concentration of 107/ml, were pumped into the system at a pressure of 2 bar and allowed to stand at 0 bar for 16 hours. After draining, samples taken at seventeen points in the system were found to contain 10^4 to 10^6 organisms/ml. After rinsing the system for 30 minutes at 0.5 bar with 0.1 M NaOH for bacteria and with 0.5 M NaOH for yeast and mould, samples taken at the same points in the system were found to contain a significantly reduced concentration of organisms.

6.1.2 Autoclaving

Autoclaving requires that the protection tube be removed from the air trap. To remove the air trap, loosen and remove the two 25 mm clamp fittings connecting the stainless steel inlet and outlet tubes to Valve 1. Loosen the two screws holding the air trap to the upright on the mounting bracket. Lift the air trap upwards, free of the mounting bracket.

The air trap may be autoclaved without further disassembly. Place the air trap in the autoclave and perform the steps given in the Table below.

Table 6.2: Autoclaving procedure

Step	Temperature	Time	Pressure
1	20°C–121°C	6 minutes	1–2.2 bar
2	121°C	30 minutes	2.2 bar
3	121°C–20°C	20 minutes	2.2–1 bar

6.1.3 Cleaning-in-place (CIP)

If it is suspected that the air trap has become contaminated with bacteria, yeasts or viruses, an individual CIP protocol must be determined according to the regulatory demands. As a guide, where the air trap is mildly contaminated, wash the air trap with 0.1 M NaOH for 1 hour.

If contamination with fungi or moulds is suspected, an individual CIP protocol must be designed according to the regulatory demands. As a guide, where the air trap is mildly contaminated, wash the air trap with 1 M NaOH for 1 hour.

6.2 Disassembling and reassembling the air trap

In this section

6.2.1 Disassembling the air trap

The sealing rings become less flexible with time and need to be replaced. Refer to *Table 8.3, on page 57* to identify the correct O-rings for the buffer and cleaning system.

Step	Action
1	To disassemble the air trap, remove any accessories fitted to the air trap and unscrew the nuts securing the top plate.
2	Remove the top plate and the glass tube and inspect each O-ring.

6.2.2 Reassembling the air trap

Step	Action
1	Refer to *Table 8.3, on page 57* to select the correct O-rings. Damp them with sterile distilled water and carefully position them into the grooves in the top and base.
2	Inspect the rim at each end of the glass tube for any damage.
3	Lower the glass tube between the rods and spacers and carefully locate it onto the O-ring in the base.
4	Lower the stainless steel top over the rods and locate the O-ring onto the top rim of the glass tube. Check that the O-ring is in the correct position.
5	Screw the domed nuts onto the rods until finger-tight.
6	Use a torque wrench to tighten the nuts to 4 Nm.

Step	Action
7	When correctly assembled, the air trap will operate at pressures up to 8 bar.

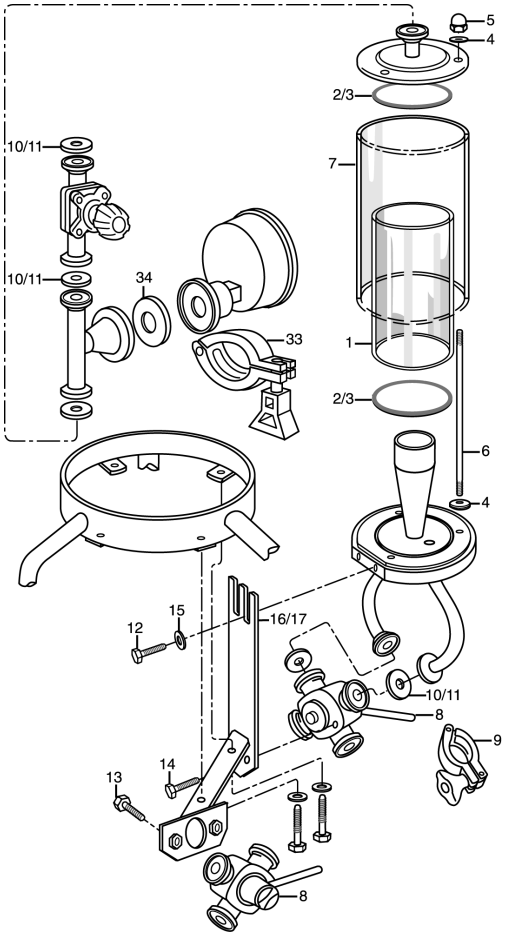

Figure 6.1: Exploded view of air trap components, Air Trap 100–200.

WARNING
The air trap must now be checked in accordance with local authority regulations. Consult the laboratory safety officer before putting the air trap into operation.

6.2.3 Disassembling the valves

The core of the valve has been tightened into the body to a pressure on the retaining nut of 1.5 Nm. This will minimize the gap inside the valve and thereby minimize the risk of microbial growth.

Valves will become stiff to operate if precipitated salts or foreign particles settle in them. Moving surfaces may then be damaged.

Step	Action
1	Unscrew the retaining nut on the back of the valve.
2	Remove the coned core of the valve by drawing the handle forward.
3	Inspect and clean the core and stainless steel body. Do not scratch any of the contact surfaces or use any abrasive materials when cleaning the core.

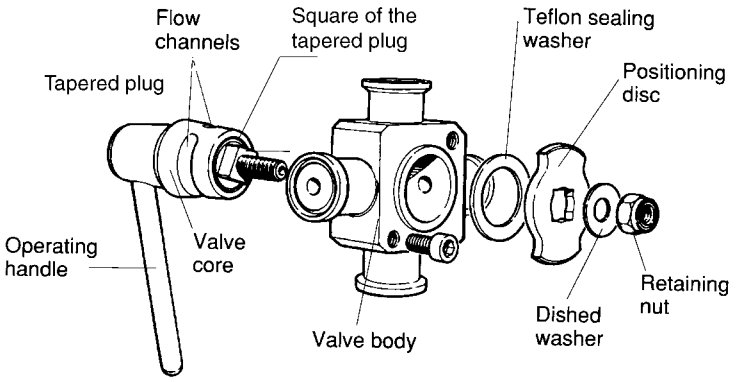

Figure 6.2: Exploded view of valve components

6.2.4 Reassembling the valves

Step	Action
1	Dampen the core with sterile distilled water and insert it into the body.
2	Refer to *Fig. 6.2, on page 45* to reassemble the PTFE sealing washer, the positioning disc and the dished spring washer.
3	Replace the retaining nut and use a torque wrench to tighten it to 1.5 Nm.

The maximum pressure for all valves is 10 bar.

The PTFE sealing washer is available as spare part, see *Chapter 8 Ordering information, on page 52*.

6.2.5 Replacement of the PTFE sealing washer

Step	Action
1	Unscrew the retaining nut at the bottom of the valve.
2	Insert the new PTFE sealing washer in the positioning disc.
3	Insert the positioning disc in the square of the tapered plug (the PTFE sealing washer has to touch the body).
4	Insert the dished washer (the larger diameter has to touch the positioning disc).
5	Tighten the retaining nut until the dished-washer is flat.
6	Tighten the retaining nut up to 1/4 turn.
7	Stabilize the valve for 24 hour minimum (as PTFE is a floating material).
8	Screw the retaining nut off 3/8 turn (the tightening torque of the retaining nut is 1.5 Nm).

7 Trouble-shooting guide

This trouble-shooting guide is intended to aid the operator when problems arise. The guide has been organized as a series of questions to help to direct the operator to the cause of the problem. If, after having consulted the guide, the problem cannot be solved, contact your local Cytiva representative for advice.

In this chapter

7.1 High back-pressure

WARNING
If the pressure is approaching the maximum pressure for the column, switch off the pump.

Step	Action
1	Check that all valves in the system are in the correct position.
2	Check that the correct pump flow rate has been selected.
3	Refer to the manual covering the chromatography column to identify any possible problem caused by the column packing.

7.2 Leakage from connectors or seals

Step	Action
1	Check the system pressure. If this is high, switch off the pump and refer to *Section 7.1 High back-pressure, on page 49*
2	Switch off the pump and drain the part of the system near to the leak. Uncouple the leaking component. Inspect it for damaged gaskets or cracked flanges. Replace the component if necessary.

7.3 Manual valves stiff to operate

Step	Action
1	Switch off the pump and drain the part of the system directly connected to the valve. Refer to *Chapter 6 Maintenance and service, on page 36* for directions to disassemble, inspect and reassemble the valve.

8 Ordering information

In this chapter

8.1 Air traps

The air trap may be ordered in three alternative configurations. Two individual kits are available which are designed to fit the air trap directly onto the base of the 100 and 200 range of columns. Each of these kits is delivered complete with a mounting bracket for the appropriate column. Alternatively, the air trap can be ordered without any ancillary components.

The Table below gives the code numbers for the available range of air trap kit configurations.

Table 8.1: Air Trap configuration.

Air Trap range	Fits to INdEX, BPG and FineLINE with:	Code no.
Air Trap 100 complete	Tube diameters 70 and 100 mm	18-1102-96
Air Trap 200 complete	Tube diameters 140 and 200	18-1102-97
Air Trap 300 complete	Tube diameter 300	18-1102-98
Air Trap 450 complete	Tube diameter 450	18-1103-00
Air Trap 100 & 200	Tube diameters 70–200, no ancillary components included	18-0019-59

8.2 Accessories

The Table below lists the accessories available for use with the air trap. For more detailed information, see *Section 3.5 Accessories, on page 20*

Table 8.2: Accessories available for use with the air trap.

Accessory	Material	Code no.	Qty per pack	Pcs per kit
Manometer kit complete consisting of:		18-1031-07		
Manometer 0-10 bar	SS316	18-1103-67	1	1
T-junction	SS316L	28-4057-65	1	1
Clamp, 51 mm	SS304	44-7134-01	1	2
Gasket, 51 mm	EPDM	44-7133-01	5	1
Clamp, 25 mm	SS304	18-1001-31	1	2
Gasket, 25 mm	EPDM	18-0019-27	2	1
Manometer kit complete consisting of:		18-1031-08		
Manometer 0-5 bar	SS316	18-1103-68	1	1
T-junction	SS316L	18-1003-63	1	1
Clamp, 51 mm	SS304	44-7134-01	1	2
Gasket, 51 mm	EPDM	44-7133-01	5	1
Clamp, 25 mm	SS304	18-1001-31	1	2
Gasket, 25 mm	EPDM	18-0019-27	2	1
Top valve	SS316L/ EPDM	18-1121-44	1	
Tubings 25 mm clamp fittings.				
Length (cm)				
30	PVC	18-0005-42	1	
75	PVC	18-0005-43	1	
125	PVC	18-0005-44	1	
150	PVC	18-0005-45	1	
200	PVC	18-0005-47	1	
Connection kit complete, 25 mm clamp/M6 threaded connectors consisting of:		18-1031-09		

Connector	–			2
Clamp, 25 mm	SS304	18-1001-31	1	2
Gasket, 25 mm	EPDM	18-0019-27	2	1
Safety valve, 2.5 bar	see note[1]	18-1103-65	1	
Safety valve, 3 bar		18-5738-01	1	
Safety valve, 8 bar	see note [1]	18-1035-80	1	
Safety valve, 6 bar	see note [1]	18-1035-81	1	
Safety valve, 4 bar	see note [1]	18-1035-82	1	
Valve 2-way, Manual, 6mm	see note [1]	18-5757-01	1	
Valve 4-way, manual, 6 mm	SS316L/ PTFE	18-5758-01	1	
Valve 4-way, manual, 10 mm	SS316L/ PTFE	18-1012-57	1	
Blind flange and packing	SS316L/ EPDM	18-1001-25	1	
Connection kit complete, 25 mm clamp/10 mm threaded connector consisting of:		44-0353-01		
Connector	–		2	
Clamp, 25 mm	SS304	18-1001-31	1	2
Gasket, 25 mm	EPDM	18-0019-27	2	1
Connection kit complete, 25 mm clamp/51 mm consisting of:				
Connector	–		2	
Clamp, 25 mm	SS304	18-1001-31	1	2
Gasket, 25 mm	EPDM	18-0019-27	2	1
Clamp, 51 mm	SS304	44-7134-01	1	2
Gasket, 51 mm	EPDM	44-7133-01	5	1

[1] The only materials in contact with liquid or gas in the safety valve are EPDM and stainless steel. For further details, contact your local Cytiva representative.

WARNING
If the air trap has been disassembled, it must be checked in accordance with local authority instructions before being returned to operation.

8.3 Spare parts

The Table below provides information about the individual components of the air trap. The item numbers correspond to the numbers in *Fig. 9.1, on page 61* & *Fig. 9.2, on page 62*. The items with code numbers can be ordered as spare parts.

Table 8.3: Spare parts

Designation		Material	Code No.	Qty per pack
For Air Trap 100 and 200				
1	Glass tube	Borosilicate glass	18-1001-29	1
2/3	O-ring, 57.5 × 3.0 mm	EPDM	18-1001-30	5
2/3	O-ring, 57.5 × 3.0 mm	FEP	18-1003-62	5
4	Threaded spacers M6	PTFE	18-1103-27	6
5	Domed nut, M6"	SS316	18-1103-28	3
6	Rod M6 × 180 mm	SS316	18-1001-28	1
7	Protection tube	PMMA	18-1102-99	1
8	Valve 4-way, manual	SS316L/ PTFE	18-5758-01	1
10	Gasket, 25 mm, ID 6 mm	EPDM	18-0019-27	2
11	Gasket, 25 mm, ID 6 mm	PTFE	18-0019-28	2
Mounting kit for Air Trap 100 and 200 consisting of:			18-1001-24	
12	Screw M6 × 12	SS316		2
13	Screw M6 × 25	SS316		2
14	Screw M6 × 45	SS316		2
15	Washer	SS316		2
16	Mounting bracket, Air Trap 100		18-1103-24	1
17	Mounting bracket, Air Trap 200		18-1103-25	1
For Air Trap 300 and 450				
18	Glass tube	Borosilicate glass	44-0451-09	1
O-ring kit consisting of:			18-1103-62	
19	O-ring 8.1 × 1.6 and	EPDM		2
20	O-ring 104.37 × 3.53	EPDM		2
20	O-ring 104.37 × 3.53	PTFE	18-1105-50	1

21	Domed nut, M10 and washer	SS316	18-1103-20	1/1
22	Protection tube	PMMA	18-1103-63	1
23	Valve 4-way, manual, 10 mm	SS316L/ PTFE	18-1012-57	1
24	Gasket, 25 mm, ID 10 mm	EPDM	18-1012-39	5
25	Gasket, 25 mm, ID 10 mm	PTFE	18-1012-40	5
Mounting kit for Air Trap 300 consisting of:			18-1103-64	
26	Screw M5 × 10	SS316		2
27	Screw M6 × 25	SS316		4
28	Nut M6	SS316		2
29	Mounting bracket, Air Trap 300		18-1103-26	1
Mounting kit for Air Trap 450 consisting of:			18-1103-66	
30	Screw M5 × 10	SS316		2
31	Screw M10 × 35	SS316		1
32	Mounting bracket, Air Trap 450		18-1103-29	1
General				
9	Clamp, 25 mm	SS304	18-1001-31	1
33	Clamp, 51 mm	SS304	44-7134-01	1
34	Gasket, 51 mm	EPDM	44-7133-01	5
34	Gasket, 51 mm	PTFE	44-5493-74	2
See note [1]	Blind flange and packing, 25 mm	SS304/ EPDM	18-1001-25	1/1
See note [1]	Valve sealing washer[2]	PTFE	18-1128-69	2
	Tubings with 25 mm clamp fittings			
	Length (cm)			
See note [1]	30	PVC	18-0005-42	1
See note [1]	75	PVC	18-0005-43	1
See note [1]	125	PVC	18-0005-44	1

See note [1]	150	PVC	18-0005-45	1
See note [1]	200	PVC	18-0005-47	1

[1] Not shown in *Fig. 9.1,* and *Fig. 9.2,* .
[2] Fits 6 and 10 mm, 2 and 4 way valves, refer to *Fig. 6.2,* .

Appendix A

Spare parts

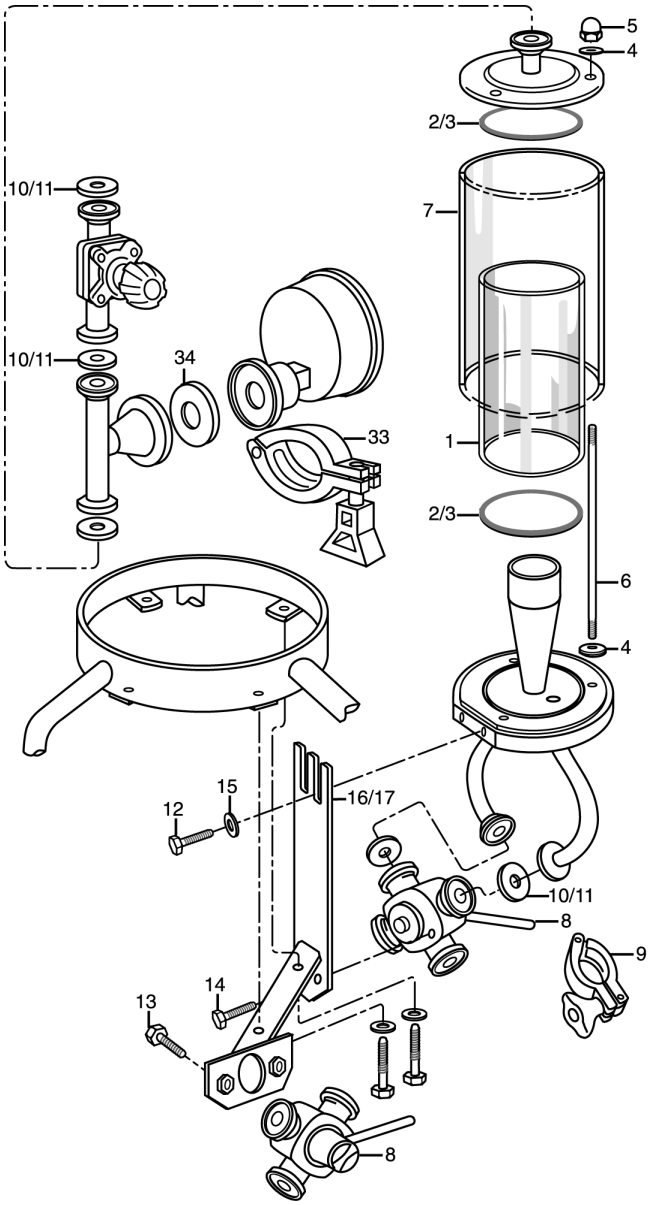

Figure 9.1: Spare parts Air Trap 70–200.

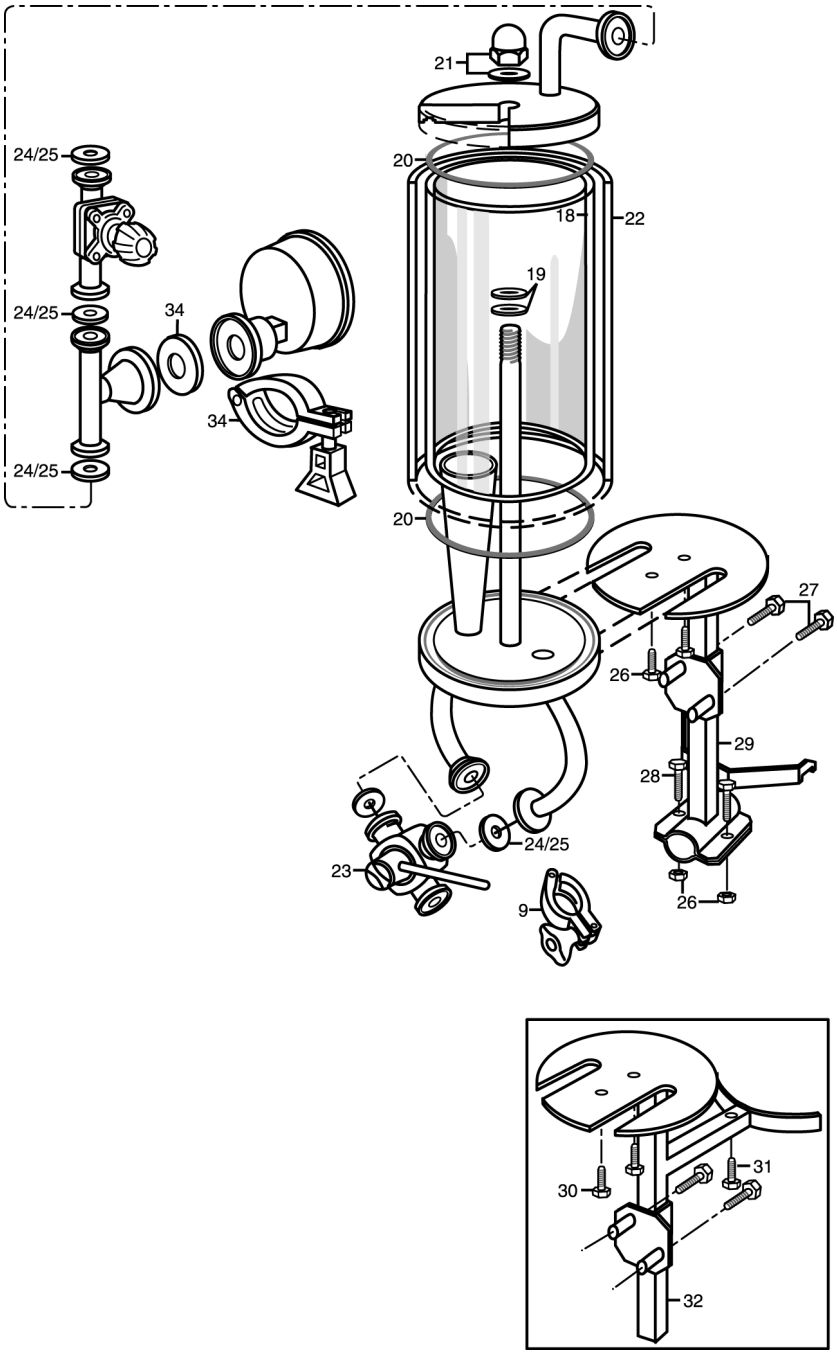

Figure 9.2: Spare parts Air Trap 300 and 450.

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