CONVENTIONAL OIL SEPARATORS

The function of a Conventional Oil Separator is to remove oil from the discharge gas and return it to the compressor, either directly or indirectly. This helps maintain the compressor crankcase oil level and raises the efficiency of the system by preventing excessive oil circulation.

Applications

Conventional oil separators can be used in a wide variety of applications.

Common applications include multi-compressor racks and remote condensing units.

Conventional oil separators are intended for Low Pressure Oil Management Systems, using HCFC and HFC refrigerants along with their associated oils.

These separators are designed for use with scroll and reciprocating type compressors. They are not recommended for screw or rotary vane compressors

How it works

Oil-laden refrigerant gas from the compressor enters the separator and passes through an inlet screen. On entering the separator, the velocity of the gas is reduced. This reduction in velocity causes a change in momentum. The fine oil particles collide with one another to form heavier particles, which adhere to the inlet screen and inside wall of the separator.

The gas then passes through an outlet screen where final separation takes place. Refrigerant gas, with the majority of oil removed, then exits the separator.

The separated oil falls to the bottom of the separator where a float operated needle valve returns the oil to the crankcase or oil reservoir in the same way as the helical oil separator.

With proper selection, oil separation efficiency is typically 80%.

Main Features

- Low pressure drop
- Cleanable/replaceable oil float assemblies for S-57*, S-58* and S-19* models

Technical Specification

Allowable operating pressure = 0 to 31 barg

Allowable operating temperature = -15°C to +120°C

Materials of Construction

The main components; shell, end caps and connections are made from carbon steel. The oil float is made from stainless steel. The needle valve seat is made from brass

Part No	Conn Size (Inch)	Dimensions (mm)						Mounting details	Drawing reference	Weight (kg)	Pre-charge qty (l)	CE Cat
		Ø A	B	C	D	E	Ø F					
S-5580	1/4 ODS	102	210	48	N/A	N/A	N/A	3/8"- 16 UNC	fig.1	1.9	0.4	SEP
S-5581	3/8 ODS	102	210	48	N/A	N/A	N/A	3/8"- 16 UNC	fig.1	1.9	0.4	SEP
S-5582	1/2 ODS	102	260	48	N/A	N/A	N/A	3/8"- 16 UNC	fig.1	2.3	0.4	SEP
S-5585-CE	5/8 ODS	102	362	48	N/A	N/A	N/A	3/8"- 16 UNC	fig.1	3.2	0.4	Cat I
S-5587-CE	7/8 ODS	102	451	48	N/A	N/A	N/A	3/8"- 16 UNC	fig.1	3.6	0.4	Cat I
S-5588-CE	1 1/8 ODS	102	533	48	N/A	N/A	N/A	3/8"- 16 UNC	fig.1	4.1	0.4	Cat I
S-5590-CE	1 3/8 ODS	102	540	48	N/A	N/A	N/A	3/8"- 16 UNC	fig.1	4.5	0.4	Cat I
S-5882	1/2 ODS	102	260	48	140	N/A	N/A	3/8"- 16 UNC	fig.2	4.1	0.4	SEP
S-5885-CE	5/8 ODS	102	362	48	140	N/A	N/A	3/8"- 16 UNC	fig.2	5	0.4	Cat I
S-5887-CE	7/8 ODS	102	451	48	140	N/A	N/A	3/8"- 16 UNC	fig.2	5.5	0.4	Cat I
S-5888-CE	1 1/8 ODS	102	533	48	140	N/A	N/A	3/8"- 16 UNC	fig.2	5.9	0.4	Cat I
S-5890-CE	1 3/8 ODS	102	540	48	140	N/A	N/A	3/8"- 16 UNC	fig.2	5.9	0.4	Cat I
S-5687-CE	7/8 ODS	152	283	76	N/A	N/A	N/A	3/8"- 16 UNC	fig.1	5.5	0.9	Cat I
S-5688-CE	1 1/8 ODS	152	391	76	N/A	N/A	N/A	3/8"- 16 UNC	fig.1	6.8	0.9	Cat I
S-5690-CE	1 3/8 ODS	152	397	76	N/A	N/A	N/A	3/8"- 16 UNC	fig.1	6.8	0.9	Cat I
S-5692-CE	1 5/8 ODS	152	473	76	N/A	N/A	N/A	3/8"- 16 UNC	fig.1	8.2	0.9	Cat II
S-5694-CE	2 1/8 ODS	152	486	76	N/A	N/A	N/A	3/8"- 16 UNC	fig.1	8.6	0.9	Cat II
S-5792-CE	1 5/8 ODS	152	743	121	127	203	223	2 x Ø 9/16" slots	fig.3	12.3	0.6	Cat II
S-5794-CE	2 1/8 ODS	152	751	117	133	203	223	2 x Ø 9/16" slots	fig.3	12.3	0.6	Cat II
S-1901-CE	1 5/8 ODS	203	533	89	N/A	100.5	160	3 x Ø 9/16" slots	fig.4	14.1	0.6	Cat II
S-1902-CE	2 1/8 ODS	203	533	89	N/A	100.5	160	3 x Ø 9/16" slots	fig.4	14.5	0.6	Cat II
S-1903-CE	2 5/8 ODS	254	546	118	N/A	83	214	3 x Ø 9/16" slots	fig.4	20	0.6	Cat II
S-1904-CE	3 1/8 ODS	305	654	141	N/A	83	269	3 x Ø 9/16" slots	fig.4	34	0.6	Cat II

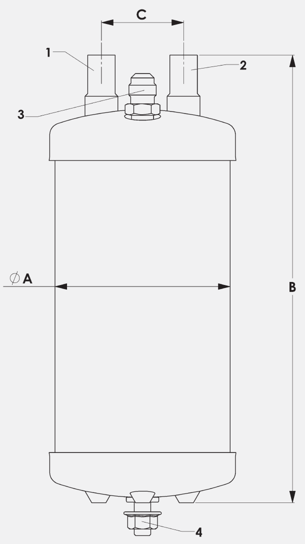

Fig. 1

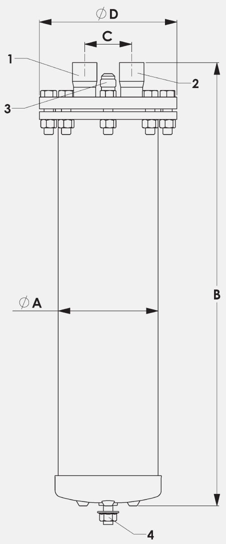

Fig. 2

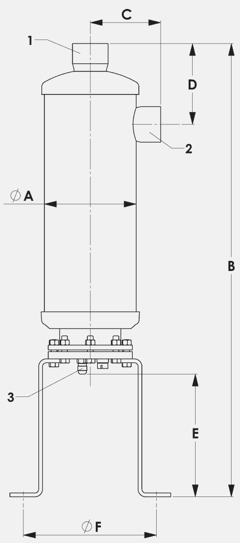

Fig. 3

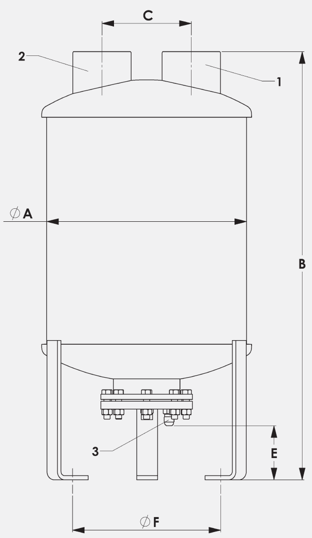

Fig. 4

1. Inlet
2. Outlet
3. Oil return, Rotalock valve, 3/8 SAE Flare
4. 3/8-16 UNC Stud and Nut

Performance data

This table provides a summary of the kW capacity of each separator for fixed evaporating and condensing temperatures.

This table can be used as a quick reference guide. However, the Selection Guidelines are recommended for conventional oil separator sizing.

Part No	Capacity in kW of refrigeration at nominal evaporator temperature				Maximum discharge volume (m^3/hr)
	R404A/507		R 22		
	-40°C	5°C	-40°C	5°C	
S-5580	2.9	3.7	3.1	3.5	1.3
S-5581	3.8	4.9	4.2	4.7	1.7
S-5582, S-5882	5.7	7.4	6.3	7.1	2.6
S-5585-CE, S-5885-CE	15.2	19.7	16.8	19	6.8
S-5587-CE, S-5887-CE	22.8	29.5	25.1	28.4	10.2
S-5588-CE, S-5888-CE	30.4	39.3	33.5	37.8	13.6
S-5590-CE, S-5890-CE	38	49.2	42	47.3	17
S-5687-CE	28.5	36.9	31.4	35.4	12.8
S-5688-CE	34.2	44.2	37.7	42.5	15.3
S-5690-CE	41.8	54.1	46.1	52	18.7
S-5692-CE, S-5792-CE	53.2	68.8	58.6	66.1	23.8
S-5694-CE, S-5794-CE	85.6	110	94.3	106	38.3
S-1901-CE	68.4	88.5	75.4	84	30.6
S-1902-CE	102	132	113	127	45.9
S-1903-CE	186	240	205	231	83.3
S-1904-CE	258	334	284	321	115

Notes:-
1. All data is for a 38°C condensing temperature, 18°C suction temperature and a connection size the same as the compressor discharge valve.

Selection Guidelines

The most important parameter for selection is the discharge volumetric flow rate, expressed in m^3/hr. This is the calculated volume flow rate at entry to the oil separator. It is not to be confused with the compressor displacement or swept volume.

A quick method is to use the selection graphs. For HCFC and HFC refrigerants, the same graphs apply for both conventional and helical oil separators. Conventional separators are not suitable for use with ammonia hence the R717 graph should not be used.

As with the helical separators, where a higher degree of accuracy is required to calculate the m^3/hr, the flow rate calculation method is recommended. The flow rate calculation method is also recommended for special applications.

Conventional Separator Selection using the Graphs

To use the selection graphs, the refrigerant type, maximum refrigeration capacity, minimum refrigeration capacity, evaporating temperature and the condensing temperature is required.

Example:

Refrigerant R404A

Maximum refrigeration capacity = 100 kW

Minimum refrigeration capacity = 50 kW

Evaporating temperature = -10°C

Condensing temperature = +40°C

From the R404A graph, follow the -10°C evaporator temperature line to the intersection of the 40°C condensing temperature line.

Extend a line horizontally from this point to the m^3/hr/kW factor.

Multiply this factor by the maximum and minimum refrigeration capacities to compute the maximum and minimum discharge volume flow rates.

From the R404A graph, the [m^3/hr/kW factor] = 0.355

Therefore:-

Maximum discharge volume flow rates = (0.355 x 100) = 35.5 m^3/hr

Minimum discharge volume flow rates = (0.355 x 50) = 17.75 m^3/hr

The maximum and minimum m^3/hr figures should be compared with the rated capacity of the conventional separator. Refer to the Performance Data Table for the rated capacities.

The general recommendation is that the calculated maximum flow should not exceed the rated capacity of the separator. Also, the minimum flow should not be below 33% of the rated capacity.

Using these m^3/hr figures, the recommended helical separator selection is either model S-5694-CE or S-5794-CE, both with a rated capacity of 38.3 m^3/hr. The final selection depends on whether or not the user requires a separator model with a removable/cleanable oil float assembly.

Additional notes on selection:-

1. The 33% minimum recommendation rule is to optimise efficiency. Below this load factor, the efficiency of the separator will decrease. On systems with extreme unloading conditions, one separator per compressor should be used rather then one separator for a common discharge line.
2. Understanding the system refrigeration capacity and the percentage of full and low load run times can also be helpful in selecting the separator.
3. In cases where the maximum discharge has been exceeded by only a minimal amount and the system has unloading characteristics, select the smaller separator. It is not recommended to oversize.

Installation – Main issues

Same as for helical oil separators.