



# SEA-BIRD®

An ISO 9001:2000 Organization

Refrigeration Technologies



## OIL SEPARATORS

**R134a R404A R507A R407C R22  
R410A R508b R717 CO<sub>2</sub>**



ENVIRONMENT FRIENDLY



LESS ELECTRICITY CONSUMPTION



WORLD CLASS TECHNOLOGY



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### THE SEA BIRD GROUP

The SEABIRD Group is today diversified into different industries, also at the forefront of Asian Compressors production. Since 1983 SEABIRD has enjoyed continuous growth, and has invested heavily in highly advanced computerised production machinery, to ensure that quality and reliability of our products remain the foundation of our success. SEABIRD has production facilities in different parts of India and four service centres abroad, from where we service customers around the globe.

SEABIRD is now market leader in the segment of high quality Compressors, Condensing Units, Pressure Vessels, Chillers and Cold Rooms which has always been the core business of the company's activities.

SEABIRD is also ventured into Plastic industry, Automobile industry, Automation industry and software industry.

Continuing investments for research and development into new products, together with the design of ultramodern plant, options and design.

This is a success that has been consolidated over the years by the work of a flexible, dynamic and enthusiastic organization, in which the company culture is very much oriented towards quality, customer care and efficiency.



Prestigious National Award Winner



An ISO 14001:2004 Organization

An ISO 9001:2000 Organization

## APPLICATIONS

The advantages of the oil separator on the discharge line of a compressor in a refrigeration system are confirmed by many years of experience. **The oil separator intercepts the oil mixed with compressed gas and returns it to the crankcase of the compressor thus assuring an efficient lubrication of its moving parts.** Furthermore the **oil separator maintains a high coefficient of condenser and evaporator performance by almost completely removing oil deposits from their exchange surfaces & limit accumulates of oil at Sensitive System Components.** When a very high temperature at the end of the compression stage leads to the formation of oil vapours, **a separator with a capacity (\*exceeding the values shown in the table) should be used. Moreover, the oil separator, damping the valves pulsations, reduces system noise with an open or semi-hermetic compressor.**

The **SEA-BIRD** oil separators are impingement screen type oil separators. They work by having the compressed mass flow enter into a larger separator chamber, which lowers the velocity. The atomized oil droplets collect on the impingement screen surface. As the oil droplets agglomerate, they fall to the bottom of the separator oil reservoir. The 600 series is designed for OEM applications where accessibility of the 500 series is not required.

They are designed for installation on commercial refrigerating systems and on civil and industrial conditioning plants, which use refrigerant fluids.

Finally, **the use of an oil separator** leads to:

- a longer life of the compressor (ensure positive oil return);**
- a better performance of the whole system with consequent energy saving;**
- A quieter operation by reducing pulsations.**

\* Table 1 & 2 show the technical data relating to the working conditions of oil separators.

## CONSTRUCTION

**SEA-BIRD** manufactures two type of oil separators:

Separators series 500 can be overhauled for maintenance and can be replaced from the system.

Separators series 600 are closed type and they can not be dismantled from the system, except cutting the piping.

The body is manufactured from stainless steel pipe of adequate thickness. Flanges and cover are also made of steel.

The internal device is simple in order to assure a trouble-free long operation. Appropriate stainless steel metallic screens, placed on the inlet & outlet, rapidly reduce gas speed, and create the conditions required for the separation of the oil from the refrigerant. A float operated needle valve, set on the bottom of the vessel, return the oil to the crankcase of compressor. The bottom also includes a chamber that collects all metallic debris. A permanent magnet holds these impurities to avoid they stop or damage the operation of needle, moved by floating.

## SELECTING THE SIZE OF OIL SEPARATORS

The selecting of an oil separator should be done comparing the characteristics of the installed compressor, establishing:

- Inlet connection must be the same size or larger than the discharge diameter of the compressor
- Refrigerant flow capacity with fixed working conditions (saturated discharge temperature, saturated suction temperature, eventually liquid subcooling, sucked vapour overheating).

This is necessary to define the gas speed referred to the cross section of oil separator, assigned an end compression temperature. It is advisable the above mentioned speed doesn't exceed 0,5 m/s, to avoid great swirl phenomena.

Table 2 has been written following this principle.

Generally fixed the following data:

Refrigerating capacity of compressor, type of refrigerant and working conditions, the volumetric capacity  $Q_v$ , of compressed gas, is given by:

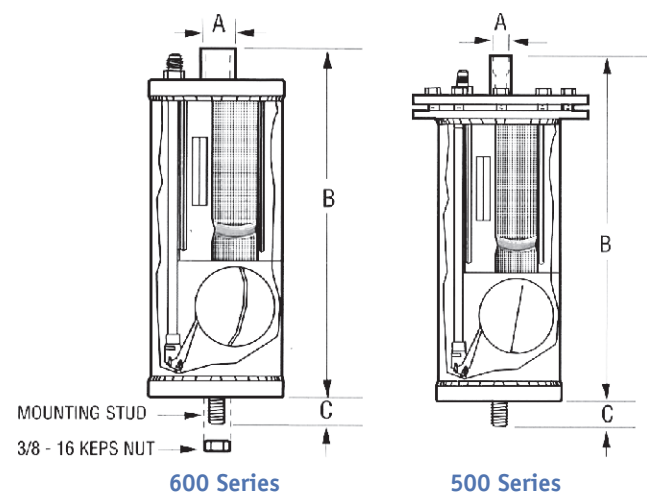
$$Q_v = \frac{P}{H} \times V_g \text{ [m}^3\text{/s] with}$$

- $P$ = refrigerant flow capacity [kW]
- $H$ = heat content differential [kJ/kg]
- $V_g$ = specific volume of compressed gas, separator inlet [m<sup>3</sup>/kg]

Check of gas speed, referred to the cross section of oil separator, is given by:

$$V = \frac{Q_v}{S} \text{ [m/s] with:}$$

- $S$ = gross cross section of shell separator [m<sup>2</sup>]



## INSTALLATION

The oil separator type 500 and 600 should be installed in the discharge line between the compressor and the condenser mounted securely in a vertical position as close to the compressor.

To prevent the return of refrigerant from condenser, during the off cycle of the system, it's advisable to install a check valve between the condenser and oil separator outlet connection. Oil separator performs best when operating at or near the compressor discharge temperature. In location the oil separator, choose a position to avoid, as far as possible, chilling of the shell, which may result in condensing of liquid within the separator. If this is not possible, it is advisable to supply the separator with the better solutions (insulation, strap heater, others) to prevent the refrigerant in the system from the condensing in the shell (specially in low temp. application). Before the oil separator is installed, either 500 or 600, an initial charge of oil should be added to it. Refer to general characteristics of oil separators or to instruction sheet for the proper amount of oil. **Oil pre-charge is very important**, failure to pre-charge separator sump may result in damage to the oil return float mechanism. Use the same type of oil that is in the compressor crankcase.

Acting as the layout of refrigerating system, the return line may be run from the oil fitting to:

- the compressor crankcase;
- the suction line upstream the compressor or upstream the receiver, if present;
- the oil reservoir if oil control system is being used.

A sight glass may be installed in the oil line, in a position that oil is flowing through the tube, to check the correct working of the oil separator.

**Model 501, 502, 503, 504, 505, 506, 507**  
**Oil Separator - Accessible Impingement**

Model	Maximum Working Pressure	Oil Connector Size	Diameter	"A" Dimension	"B" Dimension	"C" Dimension	Oil Charge Amount	
501	450 PSIG	1/4" SAE	4"	1/2" ODS	10 1/4"	3/4"	16 oz	475 ml
502	450 PSIG	1/4" SAE	4"	5/8" ODS	12 7/8"	3/4"	16 oz	475 ml
503	450 PSIG	1/4" SAE	4"	7/8" ODS	14 5/8"	3/4"	16 oz	475 ml
504	450 PSIG	1/4" SAE	4"	1 1/8" ODS	15 5/8"	3/4"	16 oz	475 ml
505	450 PSIG	1/4" SAE	4"	1 3/8" ODS	18 7/8"	3/4"	16 oz	475 ml
506	450 PSIG	1/4" SAE	6"	1 5/8" ODS	20 1/4"	--	20 oz	590 ml
507	450 PSIG	1/4" SAE	6"	2 1/8" ODS	21 1/2"	--	20 oz	590 ml

**Model 600, 601, 602, 603, 604, 605, 606, 607**  
**Oil Separator - Hermetic Impingement**

Model	Maximum Working Pressure	Oil Connector Size	Diameter	"A" Dimension	"B" Dimension	"C" Dimension	Oil Charge Amount	
600	450 PSIG	1/4" SAE	4"	3/8" ODS	8 1/8"	3/4"	15 oz	445 ml
601	450 PSIG	1/4" SAE	4"	1/2" ODS	10 1/4"	3/4"	12 oz	355 ml
602	450 PSIG	1/4" SAE	4"	5/8" ODS	12 7/8"	3/4"	12 oz	355 ml
603	450 PSIG	1/4" SAE	4"	7/8" ODS	14 5/8"	3/4"	12 oz	355 ml
604	450 PSIG	1/4" SAE	4"	1 1/8" ODS	15 1/2"	3/4"	12 oz	355 ml
605	450 PSIG	1/4" SAE	4"	1 3/8" ODS	18 1/2"	3/4"	12 oz	355 ml
606	450 PSIG	3/8" SAE	6"	1 5/8" ODS	18 3/8"	--	29 oz	850 ml
607	450 PSIG	3/8" SAE	6"	2 1/8" ODS	19 3/8"	--	29 oz	850 ml

MODEL	Connection Size "A"	R-12, R-134a		R-22, R-502, R-507, R-404a		R-717 (NH <sub>3</sub> )	
		+40	-40	+40	-40	+40	-40
		Evaporator Temp. Tons		Evaporator Temp. Tons		Evaporator Temp. Tons	
501	1/2"	1.83	1.51	2.8	2.38	3.32	3.07
502	5/8"	3.66	3.02	5.6	4.76	6.65	6.13
503	7/8"	5.49	4.49	8.4	7.14	9.97	9.20
504	1 1/8"	7.32	6.04	11.2	9.52	13.27	12.24
505	1 3/8"	9.16	7.55	14.0	11.9	15.64	14.43
506	1 5/8"	13.0	10.7	23.6	19.9	26.66	24.59
507	2 1/8"	23.0	19.0	40.0	34.0	45.2	41.69
600	3/8"	1.22	1.01	1.87	1.59	2.21	2.05
601	1/2"	1.83	1.51	2.8	2.38	3.32	3.07
602	5/8"	3.66	3.02	5.6	4.76	6.65	6.13
603	7/8"	5.49	4.49	8.4	7.14	9.97	9.20
604	1 1/8"	7.32	6.04	11.2	9.52	13.27	12.24
605	1 3/8"	9.16	7.55	14.0	11.9	15.64	14.43
606	1 5/8"	13.0	10.7	23.6	19.9	26.66	24.59
607	2 1/8"	23.0	19.0	40.0	34.0	45.2	41.69

\* **SEA-BIRD®/AMOKING** are trade mark of Sea Bird Refrigeration Pvt. Ltd., Delhi.

- Capacity in tons and pounds per minute based on 140°F(60°C) superheated discharge gas and the refrigerant entering the expansion valve at 110°F(43°C) condensing temperature.



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