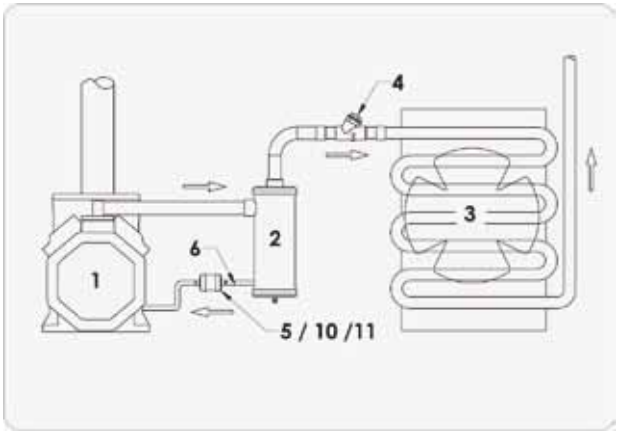
## Introduction

This guide is intended for oil management systems installed with reciprocating or scroll compressors using HCFC or HFC refrigerants. For other systems, please contact Heldon Products Australia Pty. Ltd. for guidance.

A proper oil management system is essential to ensure compressor lubrication and energy efficient cooling.
An oil management system is a cost effective alternative to replacing expensive compressors due to incorrect lubrication. If selected and installed correctly, an oil management system will give years of trouble free operation, protecting the compressors from both low and excess oil levels, with little or no maintenance. Excessive oil within the system can lead to a slug of oil returning to the compressor. A slug of oil can be as damaging to a compressor as a slug of liquid refrigerant. By removing oil from the discharge gas, the system efficiency is increased. Oil in a refrigeration or air conditioning system reduces the efficiency of the system by:-

1. A reduction in heat transfer due to oil coating of the condenser and evaporator walls.
2. Displacing refrigerant volume resulting in an increase in system mass flow.

Oil does not change phase from liquid to vapour and is therefore a very poor refrigerant. A minimal amount of oil flowing through the system is necessary to provide lubrication to valves, but a very small amount is needed.




Single Compressor System

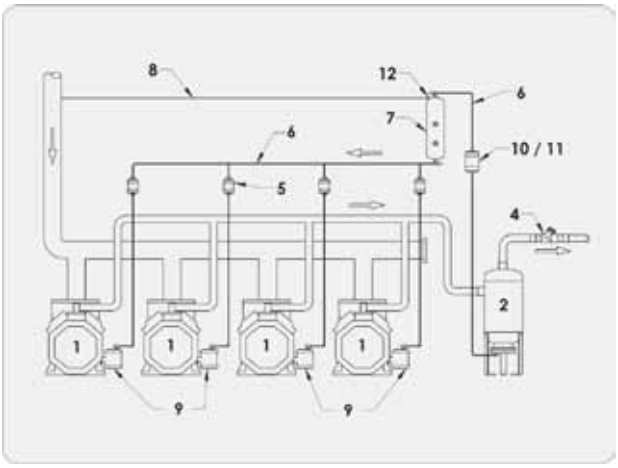
## Single Compressor System

A single compressor has the most basic oil system. The compressor discharge is piped to the inlet of an oil separator (2) and the outlet of the oil separator is piped to the condenser (3). A discharge check valve should be fitted (4). An oil return line (6) is connected from the oil separator through an oil strainer (5), oil filter (10) or oil filter drier (11), to the compressor crankcase.

A float valve in the oil separator opens and feeds a small amount of oil by-passing the rest of the cooling system. The oil is returned under discharge pressure to the crankcase. The float valve prevents hot gas from bypassing to the crankcase by closing when the oil level falls.

It is recognised best practice to fit a solenoid valve, sight glass and shut-off valve in the oil return line. These components are not shown in the diagram.

**Refer to equipment list for further details on each component in the oil system.**




Low Pressure Oil Management System

## Low Pressure Oil Management System

This system is normally used for parallel compressors and uses three main components; Oil Separator (2), Oil Reservoir (7) and Oil Level Regulators (9).

The common discharge line is piped to the inlet of the oil separator and the outlet of the oil separator is piped to the condenser via a discharge check valve (4). An oil return line is connected from the oil separator to the top valve of the oil reservoir (7). A vent line (8) is installed to the suction line, using a pressure valve (12), to reduce the pressure in the reservoir, making it a so called “low pressure oil system”. This valve will keep the reservoir pressure at a set pressure above the suction pressure. Although mechanical oil level regulators (9) are shown in the diagram, Optronic oil level regulators can also be used.

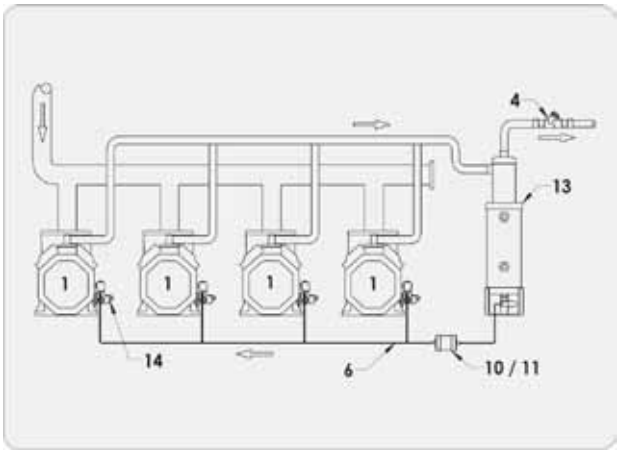
The bottom valve of the oil reservoir is piped to the oil level regulators mounted on the compressor crankcases. These regulators open to feed oil as the oil level drops and close as the oil level rises to the set level. In this way, the oil level in the compressor is controlled. An oil strainer (5) per regulator should be used to remove debris from the oil. One oil strainer is installed between the oil reservoir and each regulator. Alternatively, the oil strainers may be replaced by one oil filter (10) or an oil filter drier (11).

The oil filter or oil filter drier must however be installed between the separator and oil reservoir. Due to the scavenging nature of POE oil, it is recommended to install either an oil filter or oil filter drier on a HFC / POE system instead of individual oil strainers.

On dual temperature and satellite systems, ensure that all regulators see a positive oil differential pressure that falls within their allowable operating range.

It is recognised best practice to fit a solenoid valve, sight glass and shut-off valve in the oil return line. These components are not shown in the diagram.

**Refer to equipment list for further details on each component in the oil system.**




High Pressure Oil Management System

## High Pressure Oil Management System

High Pressure Oil Management Systems remove the need for a separate oil reservoir. This type of system also reduces the amount of pipe work and fittings.

A high pressure oil management system relies on the oil level regulators being able to operate with a high pressure differential. Mechanical oil level regulators should not be used on this type of system. The Optronic oil level regulator is recommended for this application. A high pressure system is not recommended for HCFC / mineral oil systems due to the potential foaming problems.

A discharge check valve should be fitted (4). An oil separator-reservoir (13) is fitted in the discharge line similar to an oil separator. The oil return connection, positioned at the bottom of the vessel, is piped to the oil level regulators. An oil filter (10) or oil filter drier (11) should be installed between the oil separator-reservoir and the regulators (14).

It is recognised best practice to fit a solenoid valve, sight glass and shut-off valve in the oil return line. These components are not shown in the diagram.

**Refer to equipment list for further details on each component in the oil system.**

## Equipment List For Oil Level Control

1. **Compressor**.
2. **Oil Separator** – The function of an 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. Oil Separators are not 100% efficient, so installing an oil separator should not be viewed as a replacement for oil traps, accumulators, or good oil return piping practices. Heldon Products Australia manufactures two different types of oil separator; Conventional and Helical.
3. **Condenser.**
4. **Discharge Check Valve** – The function of a Check Valve is to allow fluid flow in one direction only. This prevents condensed liquid refrigerant returning down the discharge line into the separator. If this check valve is not installed the separator can feed excessive liquid refrigerant into the compressor on start up. This can cause oil dilution, excessive foaming, erratic oil pressures and possible compressor damage. The check valve must be installed after the oil separator.
5. **Oil strainer** – The function of an oil strainer is to remove system debris from the refrigerant oil. Their purpose is to protect compressors and oil level regulators from damage. For recommendations on HFC / POE systems, refer to the Heldon catalogue section on oil filters and oil filter driers.

6. **Oil Return Line.**
7. **Oil Reservoir** – The function of an Oil Reservoir is to provide a holding charge of oil, as part of a Low Pressure Oil Management System. The amount of oil circulating in a system varies depending on the operating conditions. The oil reservoir caters for these fluctuations by providing additional storage capacity.
8. **Vent Line.**
9. **Mechanical Oil Level Regulators** – The function of a Mechanical Oil Level Regulator is to control the oil level in the compressor crankcase. This protects the compressors from damage. Heldon's oil level regulator feature an adjustable float mechanism which means that the crankcase oil level can be adjusted, in line with the compressor manufacturer's guidelines.

   These regulators have an allowable oil pressure differential range of 0.35 to 6.2 barg. Oil pressure differential is the difference between the crankcase pressure and the pressure in the oil reservoir. Gravity pressure head should be included also, if applicable.

   A model fitted with an equalisation connection is also available, which enables the oil levels between several compressors to be balanced.
10. **Oil Filter** – The function of an Oil Filter is to remove system debris from the refrigerant oil. An oil filter is recommended for HFC / POE systems instead of individual oil strainers, where filtration only is required.
11. **Oil Filter Drier** – The function of an Oil Filter Drier is to remove both system debris and moisture from the refrigerant oil. An oil filter drier is recommended for HFC / POE systems instead of individual oil strainers, where both filtration and moisture removal is required.
12. **Pressure Vent Valve** – The function of a Pressure Vent Valve is to maintain a positive pressure in the Oil Reservoir above the compressor crankcase pressure. Three different pressure settings are available; 0.35 barg, 1.4 barg and 2.4 barg. A higher pressure differential will increase the oil flow rate from the oil reservoir back to the compressors. The pressure setting should be selected taking into account the allowable oil pressure differential of the oil level regulator.
13. **Oil Separator-Reservoir** – The function of an Oil Separator-Reservoir is to provide a Separator and Oil Reservoir in one unit. It is designed for high pressure oil management systems and eliminates the need for a separate Oil Reservoir and its associated piping.
14. **Optronic Oil Regulator** – The function of the Optronic Regulator is to control the oil level in the compressor crankcase. This protects the compressors from damage. This regulator can be used on high pressure oil management system.