

CO2 Applications -> Increased demand for Oil Management



Food Retail or Industrial

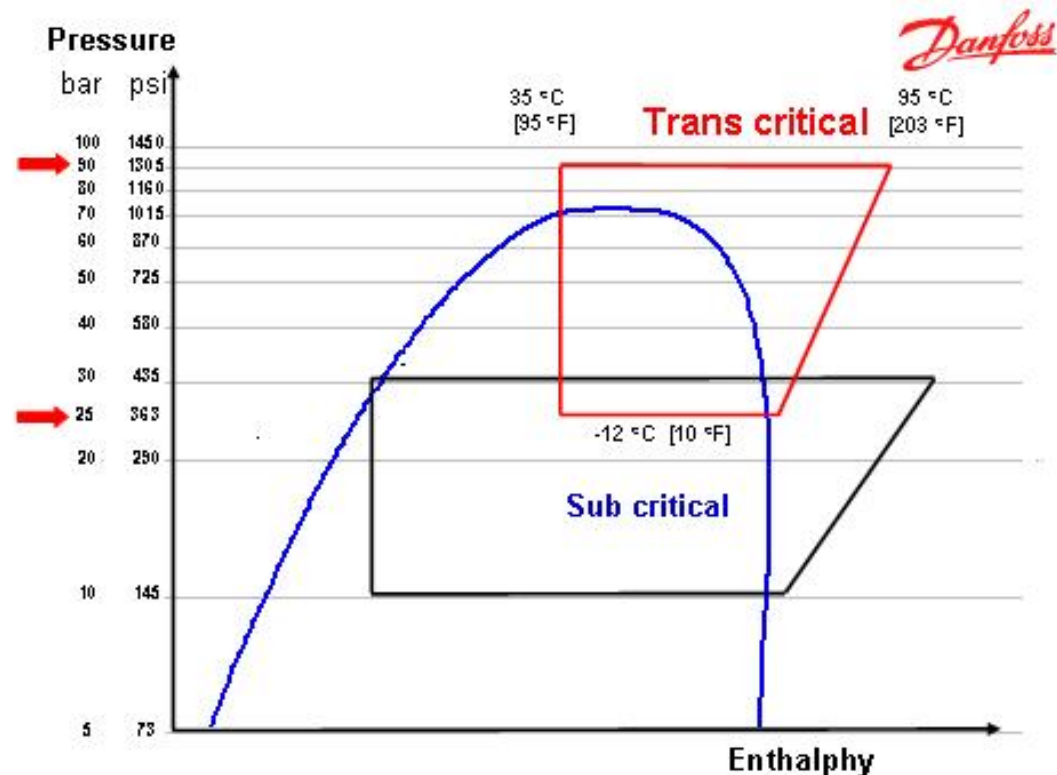
Difficult or impossible to handle oil level and oil injection as usual.

Trans critical CO2 applications

High pressure

Sub critical CO2 applications

Medium pressure



Active Oil Management

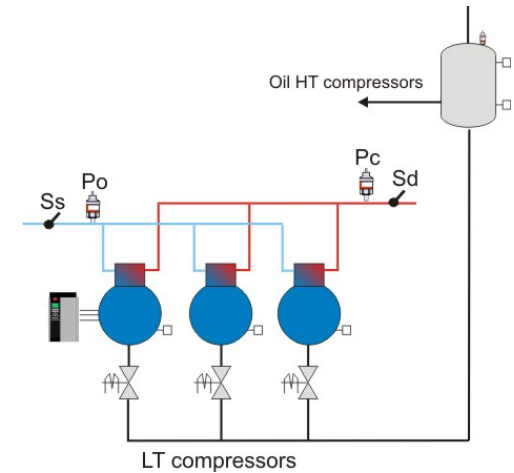
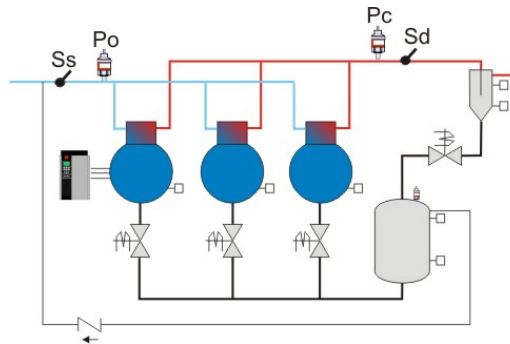
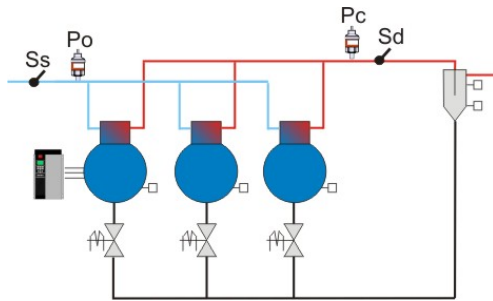


- Why use active oil management on CO2 systems?
- Automatic mechanical valves don't work when differential pressure is x10! They can not close!
 - Visibility (status)
 - Oil amount used (counter)
 - Alarm's (routing)
 - Log's

Transcritical systems and oil management

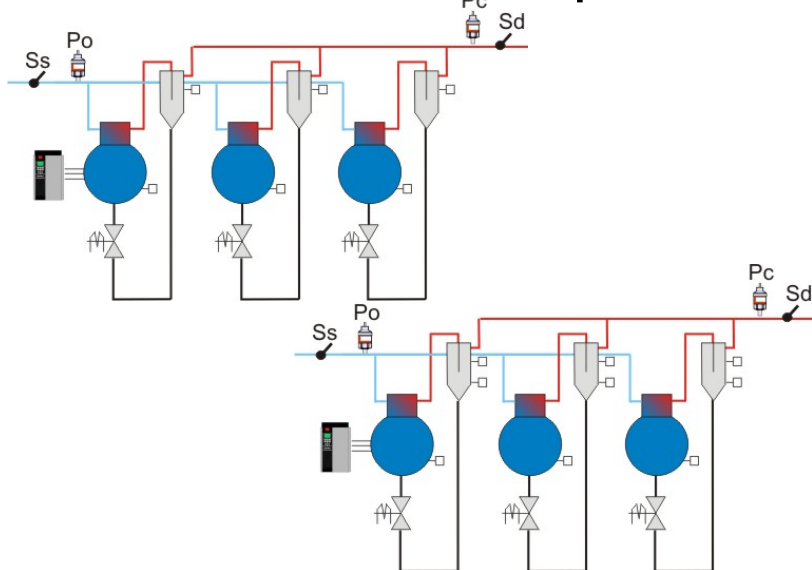
- It is necessary to use an electronic oil management system, as traditional float-based oil management systems are not suitable due to the pressure rating
- **Oil management system consists of:**
 - Pack controller with integrated oil management algorithms
 - Solenoid valves
 - Oil level sensors
 - Oil cooling (use the free thermostats/pressostats)

Active oil management systems, possible configurations

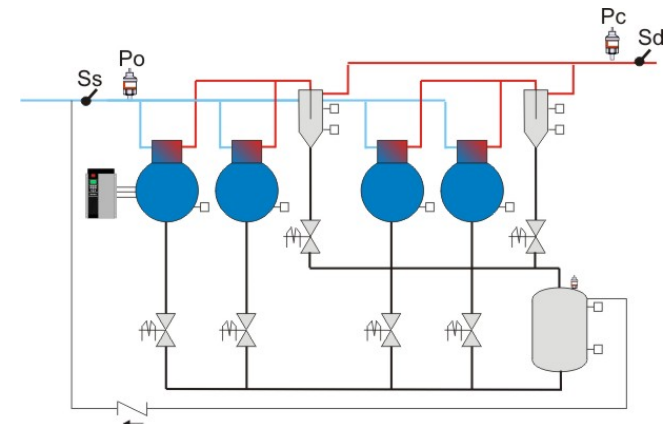


- Common Oil separator

- Individual Oil separator



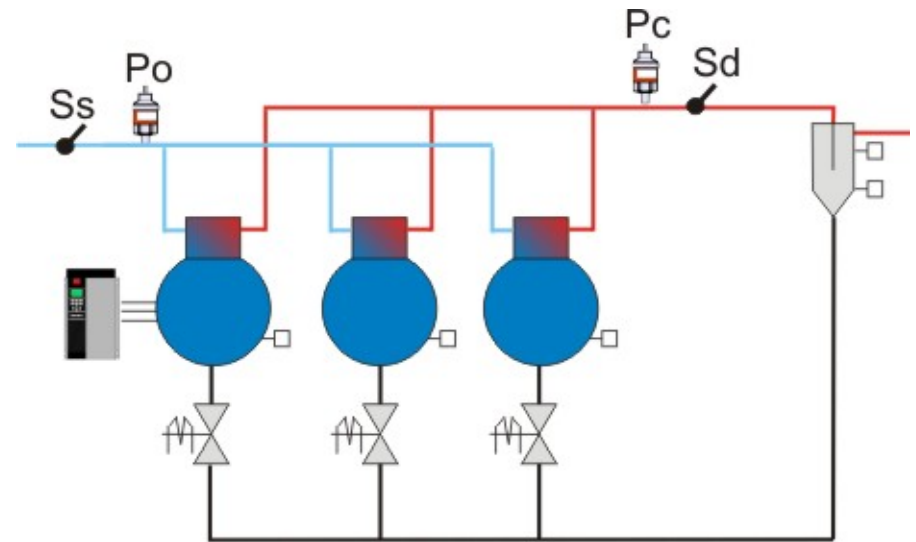
- Multi Oil separator



Oil management

Application Example 1: High pressure suction group, common oil separator

- ✓ All valves share same settings as default
- ✓ Each valve can be individually configured
 - ✓ Length of period
 - ✓ Open time within actual period
 - ✓ How many periods to be operated before an alarm is issued
- ✓ Individual alarms and cut out for each compressor
- ✓ Level switch in the oil separator
 - ✓ High level switch or
 - ✓ High and Low level switch
 - ✓ Alarms for each configuration

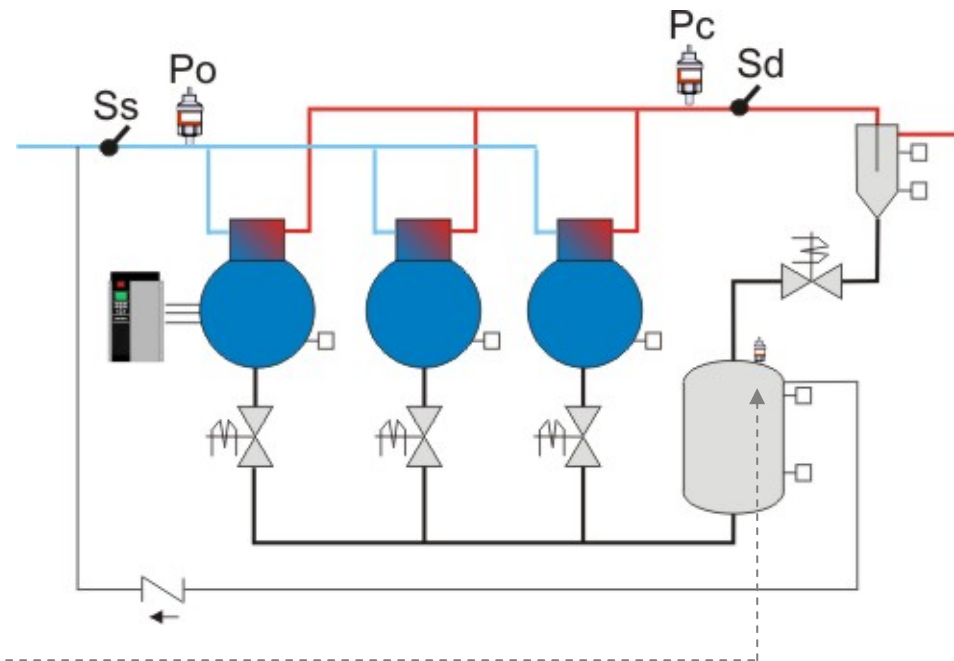


Oil management – 1 of 2

Application Example 2:

High pressure suction group, oil separator and receiver

- ✓ All valves share same settings as default
- ✓ Each valve can be individually configured
 - ✓ Same as Example 1
- ✓ Individual alarms and cut out for each compressor
- ✓ Level switch in the oil separator
 - ✓ Same as Example 1
- ✓ Control of valve between oil separator and receiver
 - ✓ Based on pressure in reservoir or based on counter.
 - ✓ Used to obtain a constant pressure difference for oil inlet to compressors
- ✓ Additional alarms for oil reservoir



Oil management – 2 of 2

Application Example 2:

High pressure suction group, oil separator and receiver

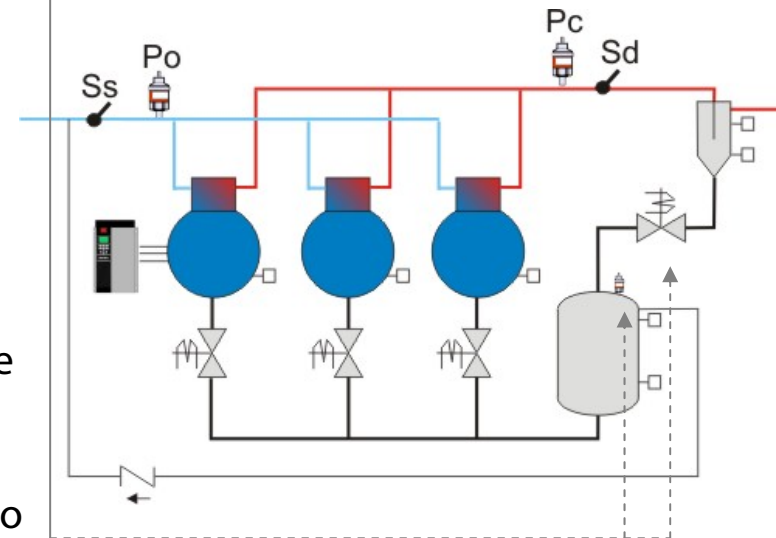
Details: It is essential to ensure a proper differential pressure to ensure that oil from the oil receiver can enter the compressors.

This can be done with two different methods, that is selected in the controller:

1: A pressure transducer on the receiver can be used to keep a proper pressure in the oil receiver. This will be done with the valve between the oil separator and the receiver.

2: The controller counts how many pulses has been used to "shoot" oil into the compressors from the reservoir. When a user defined number of pulses have been used, the controller starts a pulse sequence to "fill" pressure into the receiver. This will be done with the valve between the oil separator and the receiver.

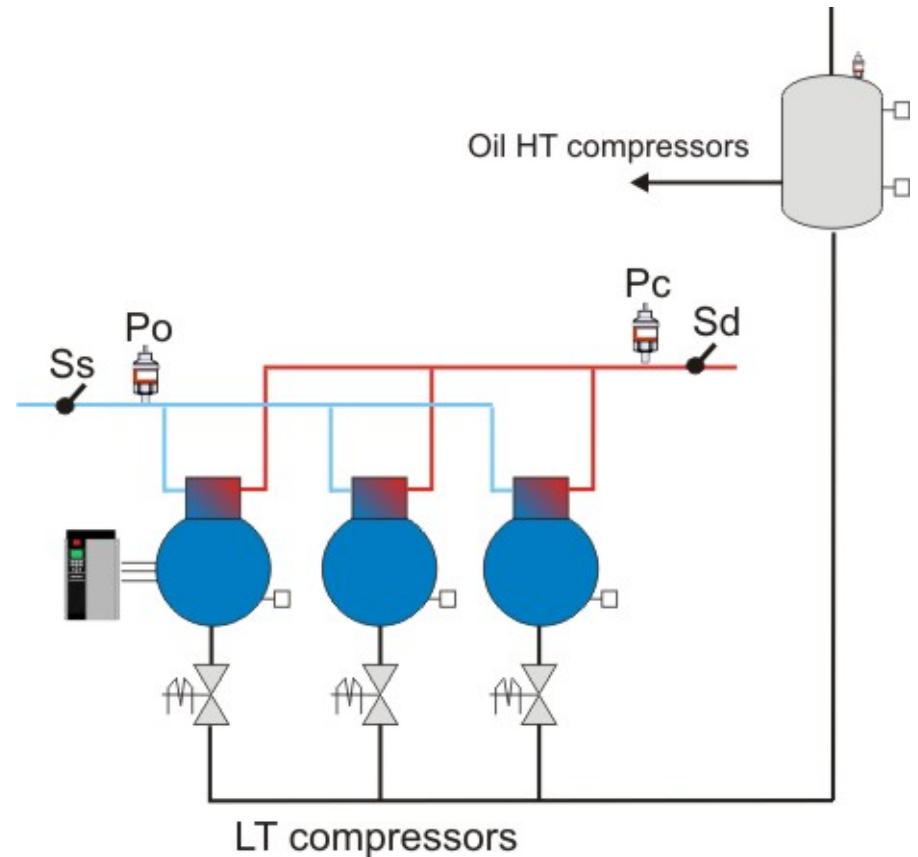
Note: An differential pressure valve **MUST** be installed from the receiver to the suction inlet of the compressors.



Oil management

Application Example 3: Low pressure suction group

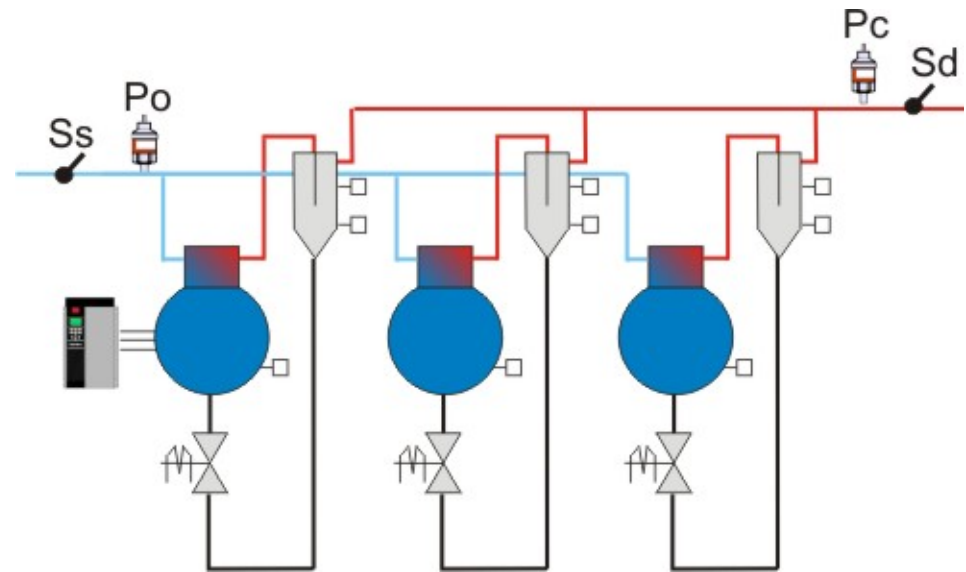
- ✓ All valves share same settings as default
- ✓ Each valve can be individually configured
 - ✓ Length of period
 - ✓ Open time within actual period
 - ✓ How many periods to be operated before an alarm is issued
- ✓ Individual alarms and cut out for each compressor



Oil management

Application Example 4: One suction group, individual oil separator

- ✓ All valves share same settings as default
- ✓ Each valve can be individually configured
 - ✓ Length of period
 - ✓ Open time within actual period
 - ✓ How many periods to be operated before an alarm is issued
- ✓ Individual alarms and cut out for each compressor
- ✓ Level switch in each oil separator
 - ✓ High level switch or
 - ✓ High and Low level switch
 - ✓ Alarms for each configuration

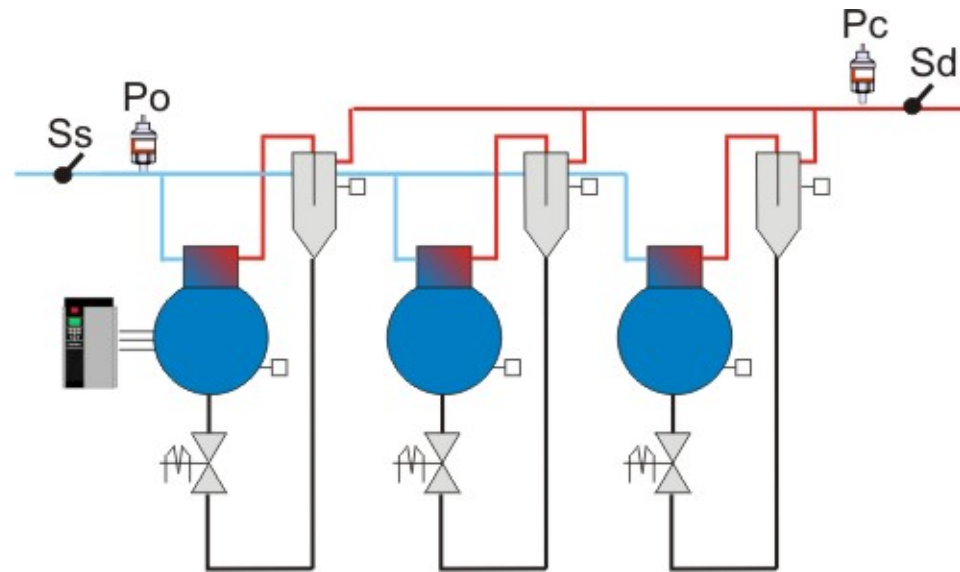


Oil management

Application Example 5:

One suction group, reduced number of level switches.

- ✓ All valves share same settings as default
- ✓ Each valve can be individually configured
 - ✓ Same as Example 4
- ✓ Individual alarms and cut out for each compressor
- ✓ Level switch in each oil separator
 - ✓ Same as Example 4



Oil management

Application Example 6:

One suction group, two-four multi oil separators (only AK-PC780)

- ✓ All valves share same settings as default
- ✓ Each valve can be individually configured
 - ✓ Same as Example 4
- ✓ Individual alarms and cut out for each compressor
- ✓ Level switch in two multi oil separator
 - ✓ Same as Example 4
- ✓ Control of valve between oil separator and receiver
 - ✓ Same as Example 2
- ✓ Additional alarms for oil reservoir
- ✓ **Up to 8 Compressors can be placed in groups with a maximum of 4 multi oil separators (only for AK-PC780)**

