

Introduction

The purpose of the Suction Accumulator is to provide temporary storage for any liquid refrigerant and oil that is returning to the compressor from the evaporator. The accumulator's internal piping is designed to meter back this liquid in an atomized form so that liquid "slugging" of the compressor does not occur. Controlled oil return is also achieved.

As the refrigeration compressor is designed to compress refrigerant vapour only, any liquid refrigerant that enters its crankcase has the potential to dilute the compressor's oil, wash out the bearings, and cause hydraulic damage to internal components such as valve reeds, pistons and connecting rods. The "Down-time" and Repair costs involved can be a substantial expense. To protect against this condition on systems vulnerable to such damage, Suction Accumulators are commonly employed. Typical applications include Low-Temperature refrigeration systems employing electric or hot gas defrost, Transport refrigeration with dual temperature function (Cooler / Freezer duty) and also with Reverse Cycle / Heat Pumps. They are a must for any systems that may experience low return vapour superheat readings at the compressor's suction service valve.

Description

Located in the suction line immediately before the compressor, the suction accumulator intercepts all refrigerant including that at saturated conditions. Its construction allows the separation of the liquid refrigerant from the vapour. Employing a U-tube in the vessel's outlet plumbing allows vapour to be drawn off even when the accumulator is almost completely full of liquid refrigerant. A dedicated metering device located low on this U-tube picks up any liquid refrigerant, vapourises it and returns it to the compressor along with any oil that has collected in the accumulator. The metering device's orifice is matched to the refrigeration system's capacity and features a protective screen to guard against foreign particles affecting the metering function.

A vent hole at the top of the U-tube outlet acts as a vacuum break to prevent an accumulator that has flooded during the off-cycle from "slugging" upon start up of the system. Improved refrigeration system balance can also be achieved with the installation of a suction accumulator.

A suction accumulator can act as a storage vessel for any unvapourised refrigerant returning from the evaporator as a result of condenser or evaporator load variations as well as provide protection from liquid migration to the compressor during its off-cycle.

The Heldon suction accumulator comes in a range of refrigeration capacities, holding volumes and connection sizes. The range is suitable for all popular refrigerants including R410A and CO2.

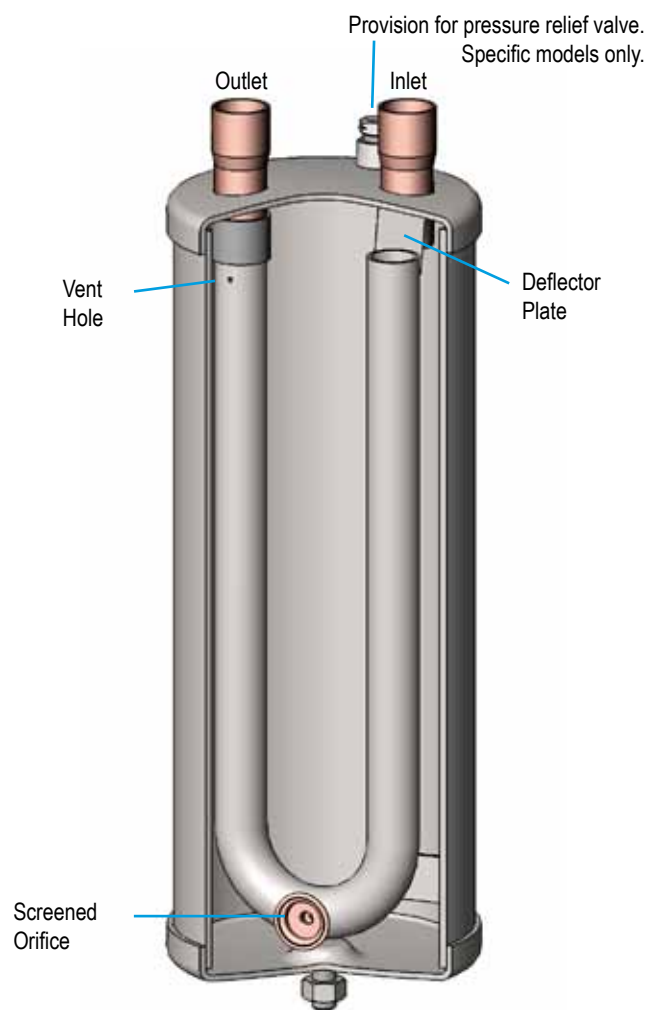
Features and Benefits

Features

- Designed for maximum flow and minimal pressure drop.
- Solid copper connectors.
- Optimised metering device orifice for maximum mass flow.
- A 30 mesh screen fitted to the orifice of the metering device.
- U-tube inlet positioned behind and above vessel inlet.
- Stamped inlet position.
- Powder coated finish

Benefits

- Negligible loss in system efficiency.
- Easier installation without the need for flux.
- Positive oil return with controlled liquid injection
- Reduced chance of orifice blocking.
- Reduced risk of high velocity liquid carryover
- Ensures correct installation orientation.
- Exceeds 500 hour ASTM salt spray tests.



Technical Information

Manufactured in accordance with AS 2971, AS 1210 and UL207.
 General Safe Working Pressure for Heldon Suction Accumulators is 2,500kPa. A-Series SWP rated at 3,100 kPa.
 General Minimum Burst Pressure for Heldon Accumulators is 12,500 kPa. A-Series MBP rated at 15,500 kPa.
 The Design Temperature range of all Heldon Accumulators is -30°c to +50°c.
 Copper tubing and fittings in accordance with AS 1571-1995 or ASTM B28.
 Vessel Classification (As 2971) is Class 2 Tier 1. Contents Hazard level: Non-Harmful.

Note: Heldon Suction Accumulators have the inlet connection clearly stamped so as to avoid confusion. If connected back-to-front, oil would be trapped and severe compressor damage could result.

Accumulator Selection

Suction accumulators must be selected according to Refrigeration Capacity, Evaporating Temperature and Holding Capacity Volume. As a rule of thumb, systems employing a Thermostatic Expansion Valve (TXV) require an accumulator Holding Capacity of approximately 50% of the system refrigerant charge.

Accumulator Location

Positioned between the evaporator and compressor, as close as practicable to the compressor and at the same level. This will ensure a short pipe run between accumulator outlet and compressor suction service valve.

Effects Of Liquid “Slugging” On A Compressor

Liquid slugging is a phenomenon caused by a full bore of liquid refrigerant entering the compressor crankcase. The liquid will wash out the oil film on the cylinder liner and make its way into the compression chamber. When the piston rises to compress the gas it will force the liquid up and hammer the suction and discharge valves, forcing them onto their stops and in some cases shattering them. The loose pieces of valve material then damage the pistons and cylinder linings resulting in compressor failure. Such a phenomenon can occur in very short timeframe.

New Refrigerants

New generation refrigerants & oils can display miscibility issues at lower temperatures and can actually separate into layers in the base of an accumulator. Heldon’s answer is to provide active mixing of any layers present through a combination of inlet flow direction, outlet U-tube positioning and dedicated metering device location.

Field Replacement

It is good trade practice to replace an accumulator after a compressor failure. System contaminants and “old” oil inside the vessel can significantly reduce the life span of the replacement compressor.

Effects of Pressure drop on system capacity on suction lines:

When sizing piping and components for Refrigeration systems, there is a balance between costs imposed for larger Piping and components, versus efficiency considerations due to pressure drop and oil entrainment.

Pressure drop in suction lines can cause a dramatic reduction in system capacity as Table 1 demonstrates

Table 1

Approximate Effect of Gas Line Pressure Drops on R-22 Compressor Capacity and Power *		
Line Loss, K Suction Line	Capacity, %	Energy, % **
0	100	100
1	96.8	104.3
2	93.6	107.3

* For an evaporating temperature of 5°C and 40°C condensing

**Energy rated @ kW power / kW cooling effect

Recommended system practices for Halocarbon refrigerants according to the ASHRAE Handbook R02 – Refrigeration, take into consideration economic factors such as costs of materials and system efficiency. Pressure drop calculations for each segment of the system are based on change in saturation temperature of the refrigerant; in suction lines the total drop should be limited to 1 K in equivalent pressure loss.

A Worked Example

The standard range of Heldon accumulators have been sized to ensure no more than a ½ K temperature loss across them when they are within the Max kW ratings as called out on the table.

In order to select the correct model the following conditions should be established:

- Determine the Evaporating Temperature (°C)
- Type of Refrigerant used (e.g. R404A)
- The total cooling load (kW)
- Trapping Capacity (kg) of Refrigerant at -15 C

Data from the following chart may then be used to select;

Heldon New Part Number	Connection Size	Trapping Capacity kg	kW of Refrigeration (Max)											
			R134a			R404A/R507			R22			R407C		
			-10 C	-5 C	0 C	-40 C	-20 C	-5 C	-40 C	-20 C	-5 C	-20 C	-5 C	5 C
3100-084010A	1/2" ODS	0.9	2.2	2.6	3.2	1.0	2.3	4.1	1.1	2.6	4.4	2.3	4.1	6.0
3100-104010A	5/8" ODS	0.9	4.1	5.0	6.1	1.8	4.4	7.9	2.1	5.0	8.5	4.3	7.9	11.3
3100-104017A	5/8" ODS	1.53	4.1	5.0	6.1	1.8	4.4	7.9	2.1	5.0	8.5	4.3	7.9	11.3
3100-124017A	3/4" ODS	1.53	11.8	14.3	17.2	4.0	9.4	16.2	6.5	14.5	24.1	7.9	16.7	23.4
3100-125024A	3/4" ODS	2.17	11.8	14.3	17.2	4.0	9.4	16.2	6.5	14.5	24.1	7.9	16.7	23.4
3100-145024A	7/8" ODS	2.17	12.6	15.5	18.8	5.5	13.6	24.0	6.5	15.2	26.1	13.3	24.2	34.7
3100-145040A	7/8" ODS	3.4	12.6	15.5	18.8	5.5	13.6	24.0	6.5	15.2	26.1	13.3	24.2	34.7
3100-185048A	1-1/8" ODS	4.3	25.0	30.5	37.1	11.0	26.8	47.5	13.0	30.2	51.5	26.3	47.8	68.3
3100-225048A	1-3/8" ODS	4.3	45.8	56.0	69.5	20.1	32.1	86.8	23.8	55.5	94.5	48.3	87.5	125.0
3100-266011A	1-5/8" ODS	10	76.0	93.0	113.0	33.4	81.5	143.6	39.7	92.3	160.0	80.0	145.1	206.8

Example:

Heldon New Part Number	Trapping Capacity kg	kW of Refrigeration (Max) R404A/R507			Temperature
		-40 C	-20 C	-5 C	
3100-145040A	3.4	5.5	13.6	24.0	Too Low
3100-185048A	4.3	11.0	26.8	47.5	
3100-225048A	4.3	20.1	32.1	86.8	Too High

Selection
Capacity

1 For an R404A system at 30 kW duty, evaporating at -5 C and condensing at 40 C, follow the data for R404A/R507, select the nearest higher capacity for the system, in this case 47.5 kW

2 Next read across to the model designation for ordering information.

Ensure that the model selected has enough trapping capacity to hold 50% of the total system charge, in the selected model's case this will be 4.3 kg, so a total system charge of 8.6 kg.

Nomenclature

Series Number → **3100 - XX XX XX _**

Suction Accumulators

ODF Connections

08 = 1/2"	22 = 1 3/8"
10 = 5/8"	26 = 1 5/8"
12 = 3/4"	34 = 2 1/8"
14 = 7/8"	42 = 2 5/8"
18 = 1 1/8"	50 = 3 1/8"

Nominal Shell Diameter

30 = 3"	60 = 6"
40 = 4"	65 = 6.5"
50 = 5"	86 = 8.6"
55 = 5.5"	11 = 11"

Volume (Litres)

07 = 0.7 LTS	59 = 5.8 LTS
16 = 1.6 LTS	63 = 6.3 LTS
17 = 1.7 LTS	72 = 7.2 LTS
19 = 1.9 LTS	96 = 9.6 LTS
24 = 2.4 LTS	10 = 10.5 LTS
26 = 2.6 LTS	13 = 13 LTS
34 = 3.4 LTS	15 = 15 LTS
40 = 4.0 LTS	25 = 25 LTS
55 = 5.5 LTS	35 = 35 LTS

P = Parker Replacement
A = Alco Replacement

Heldon P-Series & A-Series Suction Accumulator cross reference tables

Heldon P-Series / Parker 'Drop-In' Replacement

Heldon Part Number	Parker Model
3100-104016P	PA4065-9-5C
3100-124016P	PA4065-9-6C
3100-125024P	PA5083-9-6C
3100-125029P	PA5083-11-6C
3100-145034P	PA5083-12-7C
3100-186055P	PA6125-15-9C
3100-18603P	PA6125-18-9C
3100-226071P	PA6125-20-11C

Heldon A-Series Part Number	Alco Part Number	Henry Part Number
3100-084010A	AAS-464	No Match
3100-104010A	AAS-465	S-7043 *
3100-104017A	AAS-4105	S-7045
3100-124017A	AAS-4106	S-7046
3100-125024A	AAS-596	No Match
3100-145024A	AAS-597	S-7057 *
3100-145040A	AAS-5137	No Match
3100-185048A	AAS-5179	No Match
3100-225048A	AAS-51711	No Match
3100-266011A	AAS-62513	S-7065

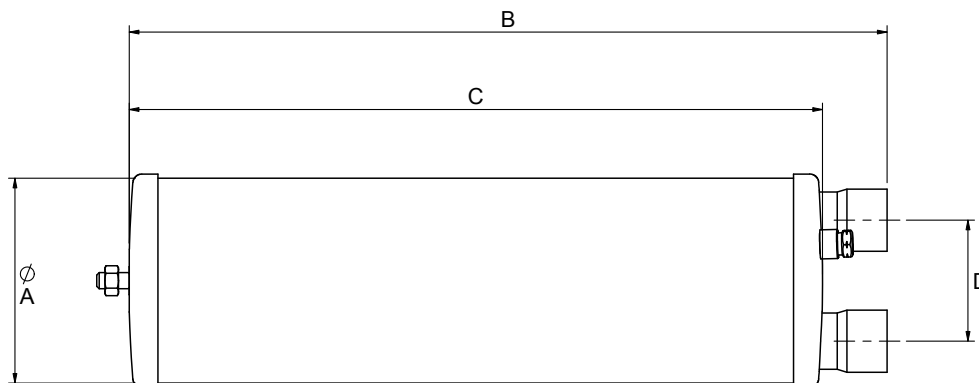
NOTE:

* Denotes close match but not exact drop-in

- The Heldon P-Series & A-Series Accumulators are both provided with a "plugged" gas fitting, for pressure relief purposes where applicable. This connection can be used for a relief device as required by UL207 (overseas markets only)
- The Heldon P-series / Parker connections are offset in relation to the centre line of the accumulator.

Dimensions and Capacities

Connector	Part Number	Volume (L)	Nominal Capacity kW @ +5c set & 30c sct, pressure drop = 7kPa			DIA mm A	Dimensions			Weight kg
			R404A	R134a	R410A		mm B	mm C	mm D	
1/2"	3100-084010A	1.0	10.20	5.80	9.80	102.0	168	143	63.5	1.27
5/8"	3100-104010A	1.0	11.40	8.70	12.40	102.0	165	143	63.5	1.27
5/8"	3100-104016P	1.6	11.40	8.70	12.40	102.0	218	194	43.5	1.9
5/8"	3100-104017A	1.7	11.40	8.70	12.40	102.0	279	254	63.5	2.1
5/8"	3100-104019	1.9	11.40	8.70	12.40	102.0	270	235	52.0	2.6
3/4"	3100-124016P	1.6	24.00	20.50	32.00	102.0	244	220	43.5	2.2
3/4"	3100-124017A	1.7	24.00	20.50	32.00	102.0	284	254	63.5	2.1
3/4"	3100-125024A	2.4	24.00	20.50	32.00	127.0	246	216	70.0	2.3
3/4"	3100-125024P	2.4	24.00	20.50	32.00	127.0	215	186	43.5	2.8
3/4"	3100-125029P	2.6	24.00	20.50	32.00	127.0	255	222	43.5	3.2
7/8"	3100-145024A	2.4	35.20	22.50	38.30	127.0	251	216	70.0	2.3
7/8"	3100-145034P	3.4	35.20	22.50	38.30	127.0	285	245	43.5	3.5
7/8"	3100-145040	4.0	35.20	22.50	38.30	127.0	368	328	70.0	3.8
7/8"	3100-145040A	3.7	35.20	22.50	38.30	127.0	374	340	70.0	3.22
1 1/8"	3100-185040	4.0	60.00	44.00	71.00	127.0	360	315	70.0	3.8
1-1/8"	3100-185048A	4.8	60.00	44.00	71.00	127.0	466	429	70.0	3.8
1 1/8"	3100-185559	5.9	60.00	44.00	71.00	140.0	430	385	75.0	6.2
1 1/8"	3100-186055P	5.5	60.00	44.00	71.00	160.0	340	290	60.5	5.9
1 1/8"	3100-186063P	6.3	60.00	44.00	71.00	160.0	420	370	60.5	6.8
1-3/8"	3100-225048A	4.8	110.00	86.30	120.00	127.0	470	430	70.0	3.8
1 3/8"	3100-226071P	7.1	110.00	86.30	120.00	160.0	460	406	60.5	7.4
1 3/8"	3100-226563	6.3	110.00	86.30	120.00	160.0	350	305	85.0	6.2
1-5/8"	3100-266011A	11.0	190.00	136.00	208.00	160.0	680	635	75.0	10.3
1 5/8"	3100-266510	10.5	190.00	136.00	208.00	160.0	575	525	85.0	9.3
2 1/8"	3100-346013P	13.0	195.00	141.00	215.00	160.0	874	820	70.5	14.0
2 1/8"	3100-348615	15.0	195.00	141.00	215.00	219.0	533	499	123.0	13.3
2 5/8"	3100-421125	25.0	200.00	150.00	221.00	273.0	522	461	165.0	16.0
3 1/8"	3100-501135	35.0	204.00	156.00	225.00	273.0	683	623	165.0	23.0



Note: All Heldon Suction Accumulators are to be mounted vertically.