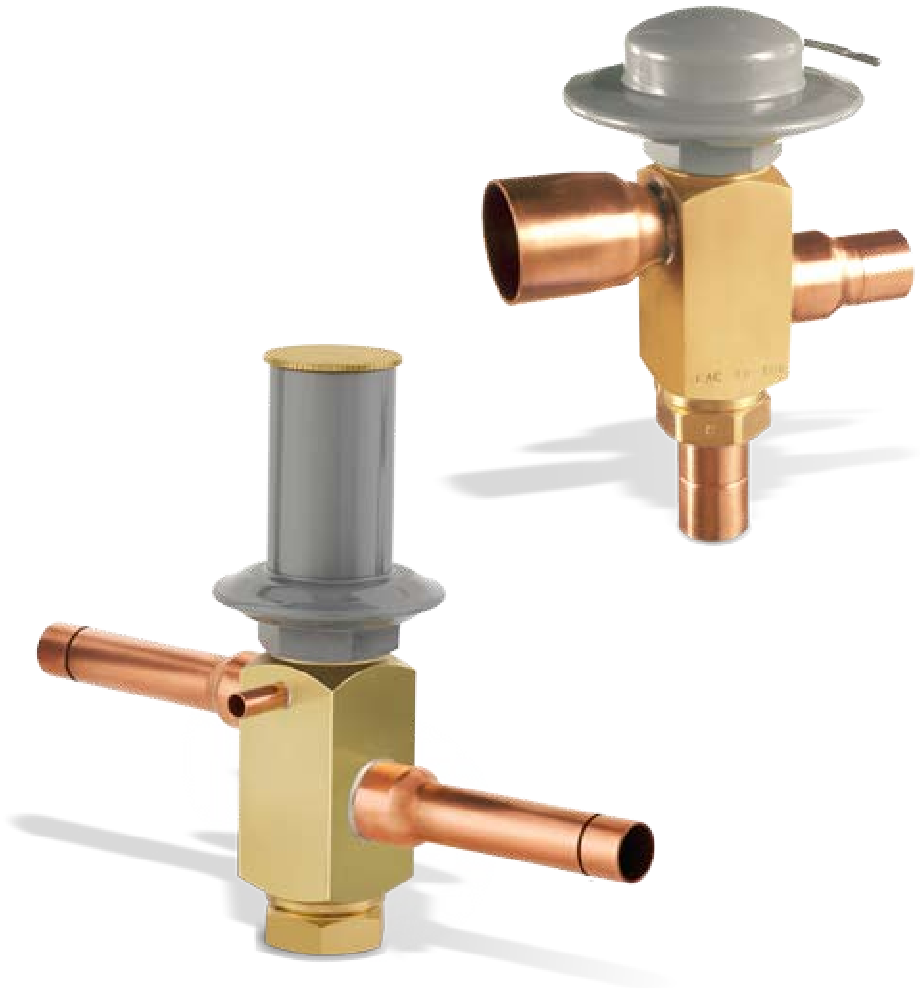
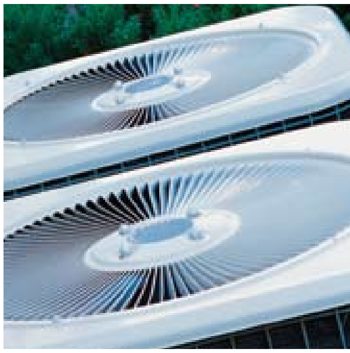
aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



Pressure Regulating Valves

Catalog F-1, October 2007



Parker

ENGINEERING YOUR SUCCESS.

Head Pressure Control Valves

Discharge Bypass Valves

Head Pressure Control Valves

Design

The design of air conditioning systems utilizing air cooled condensing units involves two main problems that must be solved if the system is to operate reliably and economically . . . high ambient and low ambient operation. If the condensing unit is properly sized, it will operate satisfactorily during extremely high ambient temperatures. However, since most units will be required to operate at ambient temperatures below their design dry bulb temperature during most of the year, the solution to low ambient operation is more complex.

Without good head pressure control during low ambient operation, the system can experience both running cycle and off-cycle problems. Two running cycle problems are of prime concern:

1. Since the pressure differential across the thermostatic expansion valve port affects the rate of refrigerant flow, low head pressure generally causes insufficient refrigerant to be fed to the evaporator.

2. Any system using hot gas for compressor capacity control must have a normal head pressure to operate properly. Failure to have sufficient head pressure will result in low suction pressure and/or iced evaporator coils.

The primary off-cycle problem is refrigerant migration to the outdoor condenser and/or the receiver. The typical method of maintaining normal head pressure in an Air Conditioning system during periods of low ambient temperature is to restrict liquid flow from the condenser to the receiver, and at the same time divert hot gas to the inlet of the receiver. This backs liquid refrigerant up into the condenser reducing its capacity which in turn increases the condensing pressure. At the same time the hot gas raises liquid pressure in the receiver, allowing the system to operate normally.

Operation

LAC-4 – The valve designation LAC stands for Low Ambient Control. The LAC-4 is a three way modulating valve that responds to discharge pressure. As shown in Figure 1, the discharge pressure bleeds around the pushrod to the underside of the diaphragm. The discharge pressure opposes the dome pressure. When the outdoor ambient falls, the condensing pressure falls. This causes the discharge pressure to fall as well. When the discharge pressure falls below the dome pressure, the valve modulates open to the discharge port which allows discharge gas to bypass the condenser. Mixing the discharge gas with the liquid creates a high pressure at the condenser outlet, reducing the flow and causing liquid to back up in the condenser. Flooding the condenser reduces the area available for condensing. This reduction in effective condenser surface area results in a rise in condensing pressure. During summer conditions, the discharge pressure is high thus closing the discharge port. Hence, there is full liquid flow from the condenser to the receiver.

LAC-5, LAC-10 – The LAC-5 and LAC-10 are also three-way modulating valves but they respond to receiver pressure. As shown in Figure 2, the receiver pressure acts under the diaphragm. As the receiver pressure drops below the valve setting, the seat moves away from the discharge port allowing discharge gas to bypass the condenser. This discharge gas warms the liquid in the receiver and raises the pressure to the valve setting. At the same time discharge gas is bypassing the condenser, liquid flow from the condenser is restricted, which allows liquid to back up in the condenser. Flooding the condenser reduces the area available for condensing thus raising the condensing pressure. During summer conditions, the seat closes the discharge port due to high pressure in the receiver. Therefore, there is full liquid flow from the condenser to the receiver.

Application

LAC Pressure Settings – The LAC valves are available with three standard settings which should handle the majority of applications: 100 psig (6.9 bar) for R-134a; 295 psig (20.3 bar)for R-410A; and 180 psig (12.4 bar) for R-22, R-407C and R-502; Generally, standard settings may be used for these refrigerants but special settings may be preferred for some applications.

Refrigerant Migration – During an off cycle there is a potential for refrigerant to migrate from the warm receiver to the cold condenser. An auxiliary check valve should be used in the liquid line between the LAC and the receiver to prevent this from occurring. See Figure 3.

While valve capacity ratings and basic selection procedures are given later, two other factors affect the proper selection of head pressure control valves . . . paralleling valves for larger systems and pressure settings. These are discussed separately below along with the other application factors that affect the operation of a system.

Figure 1

LAC-4

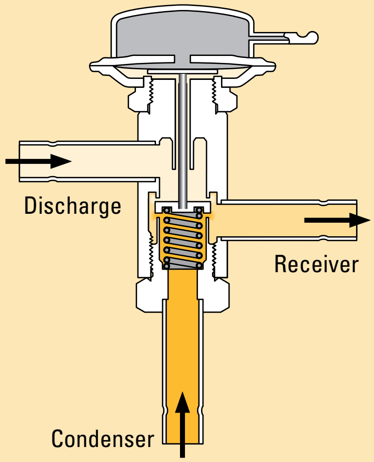
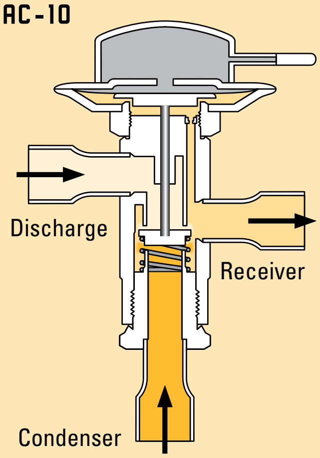


Figure 2

LAC-5
LAC-10



Head Pressure Control Valves

Paralleling Valves – Parker Head Pressure Control Valves may be applied in parallel to provide higher refrigerant flow rates for large systems with load requirements greater than any single valve's capacity. Since it is ***not*** harmful to oversize any of these valves, it is better to select them equal to or larger than the system capacity to minimize pressure drop.

Head Pressure Control for Reclaim Systems – When employing heat reclaim on an air conditioning system, the addition of head pressure controls is important not only to maintain liquid pressure at the expansion valve inlet, but also to assure the availability of quality hot gas at the reclaim heat exchanger.

Pressure Settings – The pressure settings of these valves determine to a great extent how well the system will operate once they are installed. The proper setting is a function of the specific system on which the valves are applied. Generally, the setting should be equivalent to a condensing temperature of approximately 90°F to 100°F (32 to 38°C) or a receiver pressure equivalent to a temperature of approximately 80°F to 90°F (27 to 32°C). This means that when the ambient temperature falls below approximately 70°F (21°C), the head pressure control valve will start to throttle. Normally, it is not necessary or economical to operate with a higher setting than this. On systems with hot gas bypass for capacity control, or heat reclamation it is important that proper head pressure control be utilized to ensure sufficient heat to operate. One factor to keep in mind is that the valve setting doesn't make any difference if the system is short of refrigerant.

Piping Suggestions – Figure 3 is a piping schematic only to illustrate the general location of the head pressure control valves in the system. Parker recommends that recognized piping references be consulted for assistance in piping procedures. Parker is not responsible for system design, any damage arising from faulty system design, or for misapplication of its products. If these valves are applied in any manner other than as described in this bulletin, the Parker warranty is void.

Selection Procedures

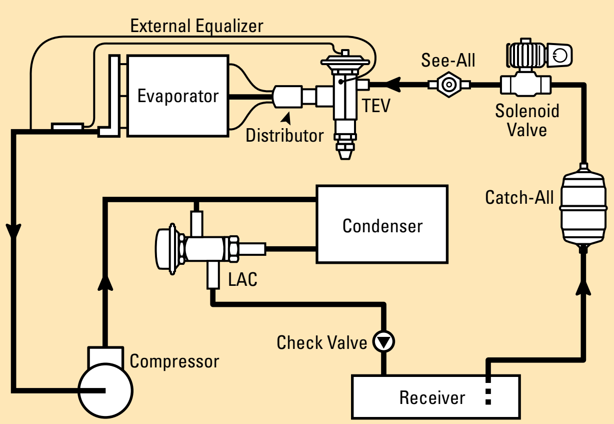
The actual selection of Parker Head Pressure Control Valves involves four basic items:

1. System capacity in tons
2. Refrigerant
3. Minimum ambient design temperature
4. Allowable pressure drop across the valve

When selecting these valves it is necessary to consider the valve's capacity when it is controlling at the minimum ambient design temperature. The minimum ambient design temperature is a factor because the bypassed discharge gas must heat the subcooled liquid leaving the condenser to maintain the receiver pressure. This subcooled liquid will approach the ambient temperature. It is the flow of the discharge gas and liquid mixture flowing through the valve at the minimum design ambient conditions that will determine the valve's capacity. Once the valve's capacity and pressure drop have been determined at minimum design ambient conditions, the capacity of the valve during high ambient conditions should be checked to determine the pressure drop of the valve with full liquid flow.

Example – Select a LAC valve for a 10 ton (35kW), R-22 unit with a minimum design ambient temperature of -20°F (-28°C). The LAC-10 has a capacity of 10.2 tons (36.3kW) at a 2 psi (0.14 bar) drop across the valve according to the Low Ambient Capacity Table on page 5. The LAC-10 also has a capacity of 11.7 tons (41.8kW) at a 1 psi (0.07 bar) drop across the valve according to the High Ambient Capacity Table on page 6. The LAC-10 is the correct selection.

Figure 3



Head Pressure Control Valve Capacities

Low Ambient (WINTER) Capacities - Tons, psi, °F

Capacities are based on 0°F evaporator, 94°F condenser, 10°F subcooled liquid.

Refrigerant Valve Setting (psig)	Minimum Ambient Design Temperature °F	Pressure Drop Across Valve (psi)	Valve Type		
			LAC-4	LAC-5	LAC-10
22 (180)	-20	1	1.71	3.04	7.30
		2	2.41	4.29	10.2
		5	3.77	6.77	15.9
		10	5.26	9.53	22.1
		15	6.37	11.6	26.7
		20	7.28	13.4	30.3
		25	8.05	14.9	33.4
		30	8.73	16.2	36.0
	0	1	1.85	3.28	7.85
		2	2.60	4.63	11.0
		5	4.07	7.30	17.1
		10	5.69	10.3	23.7
		15	6.88	12.5	28.6
		20	7.86	14.4	32.5
		25	8.70	16.1	35.8
		30	9.43	17.5	38.6
	+20	1	2.03	3.58	8.57
		2	2.86	5.06	12.0
		5	4.46	7.99	18.6
		10	6.22	11.3	25.8
		15	7.53	13.7	31.1
		20	8.60	15.8	35.3
		25	9.51	17.6	38.8
		30	10.3	19.2	41.9

Low Ambient (WINTER) Capacities - kW, bar, °C

Capacities are based on -18°C evaporator, 35°C condenser, 6°C subcooled liquid.

Refrigerant Valve Setting (bar)	Minimum Ambient Design Temperature °C	Pressure Drop Across Valve (bar)	Valve Type		
			LAC-4	LAC-5	LAC-10
22 (12.4)	-28	0.07	6.07	10.8	25.9
		0.14	8.53	15.2	36.3
		0.35	13.4	24	56.5
		0.70	18.7	33.8	78.4
		1.0	22.1	40.2	92.4
		1.3	24.9	45.7	104
		1.6	27.4	50.5	114
		2.0	30.3	56.2	125
	-18	0.07	6.51	11.5	27.6
		0.14	9.15	16.3	38.7
		0.35	14.3	25.7	60.2
		0.70	20	36.1	83.5
		1.0	23.6	43	98.3
		1.3	26.7	48.9	111
		1.6	29.4	54.1	121
		2.0	32.4	60.1	133
	-8	0.07	7.06	12.5	29.8
		0.14	9.92	17.6	41.7
		0.35	15.5	27.8	64.8
		0.70	21.6	39.1	89.8
		1.0	25.6	46.6	106
		1.3	28.9	52.9	119
		1.6	31.8	58.5	130
		2.0	35.1	65.1	143

Low Ambient (WINTER) Capacities - Tons, psi, °F

Capacities are based on 0°F evaporator, 94°F condenser, 10°F subcooled liquid.

Refrigerant Valve Setting (psig)	Minimum Ambient Design Temperature °F	Pressure Drop Across Valve (psi)	Valve Type		
			LAC-4	LAC-5	LAC-10
134a (100)	-20	1	1.36	2.42	5.83
		2	1.91	3.41	8.17
		5	2.98	5.37	12.7
		10	4.13	7.54	17.4
		15	4.96	9.17	20.8
		20	5.62	10.5	23.4
		25	6.16	11.6	25.4
		30	6.62	12.7	27.1
	0	1	1.48	2.64	6.34
		2	2.09	3.72	8.88
		5	3.25	5.86	13.7
		10	4.51	8.23	18.9
		15	5.42	10.0	22.5
		20	6.14	11.5	25.3
		25	6.73	12.7	27.6
		30	7.24	13.8	29.4
	+20	1	1.66	2.94	7.03
		2	2.33	4.15	9.84
		5	3.63	6.53	15.2
		10	5.03	9.16	20.9
		15	6.04	11.1	24.9
		20	6.84	12.8	28.0
		25	7.51	14.2	30.4
		30	8.07	15.4	32.4

Low Ambient (WINTER) Capacities - kW, bar, °C

Capacities are based on -18°C evaporator, 35°C condenser, 6°C subcooled liquid.

Refrigerant Valve Setting (bar)	Minimum Ambient Design Temperature °C	Pressure Drop Across Valve (bar)	Valve Type		
			LAC-4	LAC-5	LAC-10
134a (6.9)	-28	0.07	4.84	8.63	20.8
		0.14	6.8	12.2	29.1
		0.35	10.6	19.2	45.1
		0.70	14.7	26.9	62
		1.0	17.3	31.9	72.4
		1.3	19.4	36.2	80.7
		1.6	21.2	39.8	87.5
		2.0	23.1	44.1	94.8
	-18	0.07	5.25	9.33	22.4
		0.14	7.38	13.2	31.4
		0.35	11.5	20.7	48.6
		0.70	15.9	29.1	66.8
		1.0	18.7	34.5	77.9
		1.3	21	39.1	86.8
		1.6	22.9	43.1	94.1
		2.0	25.1	47.8	102
	-8	0.07	5.8	10.3	24.6
		0.14	8.14	14.5	34.4
		0.35	12.7	22.8	53.2
		0.70	17.6	32	73
		1.0	20.6	38	85.1
		1.3	23.1	43.1	94.8
		1.6	25.3	47.4	103
		2.0	27.6	52.6	111

Head Pressure Control Valve Capacities

Low Ambient (WINTER) Capacities - Tons, psi, °F

Capacities are based on 0°F evaporator, 94°F condenser, 10°F subcooled liquid.

Refrigerant Valve Setting (psig)	Minimum Ambient Design Temperature °F	Pressure Drop Across Valve (psi)	Valve Type		
			LAC-4	LAC-5	LAC-10
410A (295)	-20	1	1.74	3.09	5.83
		2	2.46	4.37	8.18
		5	3.85	6.90	12.8
		10	5.40	9.74	17.8
		15	6.56	11.9	21.5
		20	7.52	13.7	24.5
		25	8.35	15.3	27.0
		30	9.09	16.7	29.2
	0	1	1.88	3.33	6.27
		2	2.65	4.71	8.79
		5	4.16	7.44	13.7
		10	5.82	10.5	19.0
		15	7.07	12.8	23.0
		20	8.11	14.8	26.2
		25	9.00	16.5	28.9
		30	9.79	18.0	31.3
	+20	1	2.06	3.63	6.82
		2	2.90	5.14	9.56
		5	4.54	8.11	14.9
		10	6.35	11.4	20.7
		15	7.72	14.0	24.9
		20	8.84	16.1	28.4
		25	9.81	17.9	31.3
		30	10.7	19.6	33.9

Low Ambient (WINTER) Capacities - kW, bar, °C

Capacities are based on -18°C evaporator, 35°C condenser, 6°C subcooled liquid.

Refrigerant Valve Setting (bar)	Minimum Ambient Design Temperature °C	Pressure Drop Across Valve (bar)	Valve Type		
			LAC-4	LAC-5	LAC-10
410A (20.3)	-28	0.07	6.17	10.9	20.6
		0.14	8.69	15.5	28.9
		0.35	13.6	24.4	45.1
		0.70	19.1	34.5	62.8
		1.0	22.7	41.7	74.2
		1.3	25.7	46.7	83.7
		1.6	28.3	51.7	91.9
		2.0	31.4	57.7	101
	-18	0.07	6.61	11.7	22.0
		0.14	9.31	16.5	30.9
		0.35	14.6	26.1	48.1
		0.70	20.4	36.8	66.9
		1.0	24.3	43.9	78.9
		1.3	27.5	50.0	89.0
		1.6	30.3	55.3	97.7
		2.0	33.6	61.6	108
	-8	0.07	7.16	12.6	23.7
		0.14	10.1	17.8	33.2
		0.35	15.8	28.2	51.7
		0.70	22.1	39.7	71.8
		1.0	26.2	47.4	84.7
		1.3	29.7	53.9	95.5
		1.6	32.7	59.7	105
		2.0	36.3	66.5	115

High Ambient (SUMMER) Capacities - Tons, psi, °F

Capacities are based on 0°F evaporator, 110°F condenser, 10°F subcooled liquid.

Refrigerant	Pressure Drop Across Valve (psi)	Valve Type		
		LAC-4	LAC-5	LAC-10
22	1	2.57	5.50	11.7
	2	3.59	7.78	16.3
	3	4.37	9.53	19.7
	4	5.02	11.0	22.6
	5	5.60	12.3	25.1
	6	6.11	13.5	27.3
	8	7.02	15.6	31.3
	10	7.82	17.4	34.8
134a	1	2.30	4.92	10.5
	2	3.22	6.96	14.5
	3	3.91	8.53	17.6
	4	4.49	9.85	20.2
	5	5.01	11.0	22.4
	6	5.47	12.1	24.5
	8	6.28	13.9	28.0
	10	7.00	15.6	31.2
410A	1	2.44	5.22	8.23
	2	3.42	7.38	11.4
	3	4.15	9.04	13.9
	4	4.77	10.4	15.9
	5	5.32	11.7	17.6
	6	5.81	12.8	19.2
	8	6.67	14.8	22.0
	10	7.43	16.5	24.5

High Ambient (SUMMER) Capacities - kW, bar, °C

Capacities are based on -18°C evaporator, 43°C condenser, 6°C subcooled liquid.

Refrigerant	Pressure Drop Across Valve (bar)	Valve Type		
		LAC-4	LAC-5	LAC-10
22	0.07	9.18	19.6	41.8
	0.14	12.8	27.8	58
	0.35	15.6	34	70.3
	0.70	17.9	39.3	80.6
	1.0	20	44	89.5
	1.3	21.8	48.2	97.6
	1.6	25.1	55.6	112
	2.0	27.9	62.2	124
134a	0.07	8.22	17.6	37.4
	0.14	11.5	24.9	52
	0.35	14	30.5	63
	0.70	16.1	35.2	72.2
	1.0	17.9	39.4	80.2
	1.3	19.5	43.2	87.4
	1.6	22.5	49.8	100
	2.0	25	55.7	111
410A	0.07	8.75	18.7	29.5
	0.14	12.2	26.4	40.9
	0.35	14.9	32.4	49.6
	0.70	17.1	37.4	56.8
	1.0	19	41.8	63.2
	1.3	20.8	45.8	68.9
	1.6	23.9	52.9	78.9
	2.0	26.6	59.1	87.7

Specifications - Inches

Valve Type	Standard Factory Setting (psig)	Connections ODF Solder (Inches)		Dimensions (Inches)									Weight (lbs.)			Replacement Parts
		Inlet(s)	Outlet	A	B	C	D	E		F	H	I	Net	Ship		
								D3L	R3L						Replacement Elements	
LAC-4		1/4	1/4	1.78	1.87	3.02	2.38	4.73					0.77	0.85		Not Available
		3/8	3/8										0.80	0.88		
		1/2	1/2										0.82	0.90		
LAC-5	100, 180, or 295	1/2	1/2	1.65	1.60	3.77	2.99	6.10	5.59				2.50	2.65		Non-Adjustable Dome Element: D3L (specfiy setting) or Non-Adjustable Remote Bulb Element: R3L (specify setting)
		5/8	5/8	1.74	1.69	3.86	3.08	6.19	5.68				2.55	2.70		
		7/8	7/8	2.23	2.18	4.35	3.57	6.68	6.17	–	–	–	2.60	2.75		
		1-1/8	1-1/8	2.38	2.33	4.50	3.72	6.83	6.32				2.75	2.90		
LAC-10		① 1-3/8 ② 7/8	7/8	2.82	2.67	4.39	3.43	6.91	6.40				3.20	3.42		
		① 1-3/8 ② 1-1/8	1-1/8		2.56	4.83	3.87	7.35	6.84				3.28	3.50		

① Discharge Connection, ② Condenser Connection

Specifications - Metric

Valve Type	Standard Factory Setting (bar)	Connections ODF Solder (Inches)		Dimensions (mm)									Weight (Kg)			Replacement Parts
		Inlet(s)	Outlet	A	B	C	D	E		F	H	I	Net	Ship		
								D3L	R3L						Replacement Elements	
LAC-4		1/4	1/4	45	48	77	60	120					.35	.39		Not Available
		3/8	3/8										.36	.40		
		1/2	1/2										.37	.41		
LAC-5	6.9 12.4 or 20.3	1/2	1/2	42	41	93	76	155	142				1.13	1.20		Non-Adjustable Dome Element: D3L (specfiy setting) or Non-Adjustable Remote Bulb Element: R3L (specify setting)
		5/8	5/8	44	43	98	78	157	144				1.16	1.22		
		7/8	7/8	57	55	110	91	170	157	–	–	–	1.18	1.25		
		1-1/8	1-1/8	61	59	114	95	173	161				1.25	1.32		
LAC-10		① 1-3/8 ② 7/8	7/8	72	68	112	87	176	163				1.45	1.55		
		① 1-3/8 ② 1-1/8	1-1/8		65	123	98	187	173				1.49	1.59		

① Discharge Connection, ② Condenser Connection

Materials and Construction Details

Valve Type	Adjustable	Port Size (Inches)	Element Type & Material	Connections		Body Material	Seating Material	Type of Joints
				Type	Material			
LAC-4	No	1/2	Domed Steel	Solder	Copper	Brass	Metal to Metal	Knife Edge (Metal to Metal)
LAC-5		5/8						
LAC-10		3/4						

Underwriter's Laboratory Information

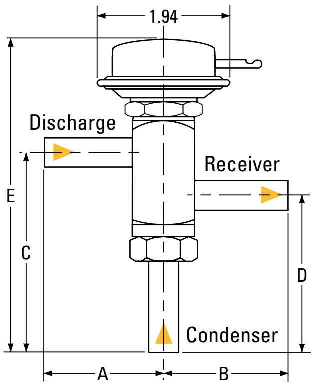
The LAC valves are all U.L. Recognized components. The MRP for the LAC-4 is 500 psig (34.5 bar), while the LAC-5, and LAC-10 have a MRP of 450 psig (31 bar). All valves are in U.L. file SA-5460.

Head Pressure Control Valves - Dimensions

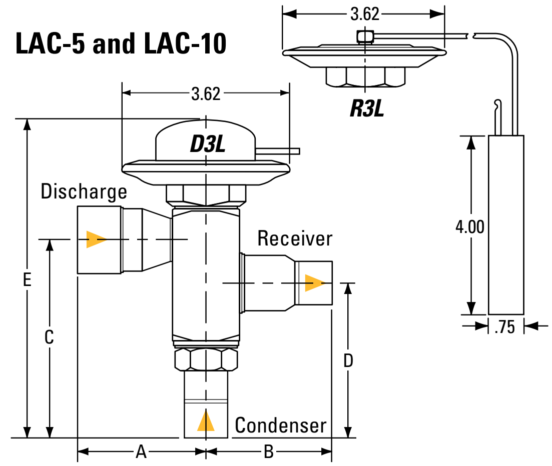
Valve Designation/Ordering Instructions

To eliminate shipment delays, specify complete valve designation.

LAC-4



LAC-5 and LAC-10



LAC	–	4	–	100/180/295 HP	–	3/8	x	3/8	x	3/8	ODF
Valve Type Low Ambient Control		**Valve Size**		**Valve Setting(s) (psig)** Specifiy one setting for standard dome element		**Discharge Connection** (Inches)		**Condenser Connection** (Inches)		**Receiver Connection** (Inches)	**Solder Connections**

LAC	–	5	–	180/295 HP	–	5/8	x	5/8	x	5/8	ODF
Valve Type Low Ambient Control		**Valve Size**		**Valve Setting (psig)**		**Discharge Connection** (Inches)		**Condenser Connection** (Inches)		**Receiver Connection** (Inches)	**Solder Connections**

Discharge Bypass Valves for System Capacity Control

System Capacity Control

On many air conditioning systems it is desirable to limit the minimum evaporating pressure during periods of low load either to prevent coil icing or to avoid operating the compressor at a lower suction pressure than it was designed to operate. Various methods have been used to achieve this result — integral cylinder unloading, variable speed control, or multiple smaller systems. Compressor cylinder unloading is used extensively on larger systems but is too costly on small equipment, usually 10 hp and below. Cycling the compressor with a low pressure cutout control is a method used in limited applications, but has the following three concerns.

1. On-off control on air conditioning systems is uncomfortable and does a poor job of humidity and mold control.
2. Compressor cycling reduces equipment life.
3. In most cases, compressor cycling is not economical because of peak load demand charges.

One method that offers a practical and economical solution to the problem, is to bypass a portion of the hot discharge gas directly into the low side. This is done by a modulating control valve — commonly called a Discharge Bypass Valve (DBV). This valve, which opens on a decrease in suction pressure, can be set to automatically maintain a desired minimum evaporating pressure regardless of the decrease in evaporator load.

Application

Parker Discharge Bypass Valves provide an economical method of compressor capacity control in place of cylinder unloaders or the handling of unloading requirements below the last step of cylinder unloading.

On air conditioning systems, the minimum allowable evaporating temperature that will avoid coil icing depends on evaporator design and the amount of air passing over the coil. The refrigerant temperature may be below 32°F (0°C), but coil icing will not usually occur with high air velocities since the external surface temperature of the tube will be above 32°F (0°C). For most air conditioning systems the minimum evaporating temperature is 20°F to 25°F (-6.7 to -3.9°C). However, when air velocities are reduced considerably, the minimum evaporating temperature should be 26°F to 28°F (-3.3 to -2.2°C).

Parker Discharge Bypass Valves can be set so they start to open at an evaporating pressure equivalent to 32°F (0°C) saturation temperature. Therefore, they would be at their ***rated*** capacity at 26°F (-3.3°C) evaporating temperature.

The discharge bypass valve is applied in a branch line, off the discharge line, as close to the compressor as possible. The bypassed vapor can enter the low side at one of the following locations:

1. Evaporator inlet with distributor.
2. Evaporator inlet without distributor.

Each is illustrated and discussed below. While Figure 4 shows a specific type of discharge bypass valve, all types can be used in place of the one shown.

Discharge Bypass Valves for System Capacity Control

Bypass to Evaporator Inlet with Distributor

This method of application, illustrated in Figure 4, provides distinct advantages over the other methods, especially for unitary or field built-up units where the high and low side are close coupled.

This method is also applicable on systems with remote condensing units, especially when the evaporator is located below the condensing unit, see discussion below.

The primary advantage of this method is that the system thermostatic expansion valve will respond to the increased superheat of the vapor leaving the evaporator and will provide the liquid required for desuperheating. Also the evaporator serves as an excellent mixing chamber for the bypassed hot gas and the liquid-vapor mixture from the expansion valve. This ensures a dry vapor reaching the compressor. Oil return from the evaporator is also improved since the velocity in the evaporator is kept high by the hot gas.

Parker Distributor or ASC – Two refrigerant distribution methods are available to introduce hot gas in this manner:

1. Bypass to Parker distributor with an auxiliary side connection.
2. Bypass to Parker ASC series Auxiliary Side Connector.

Method 1 is normally utilized on factory assembled or unitary systems where hot gas bypass is initially designed into the system. The Parker distributor allows the hot gas to enter downstream of the distributor nozzle. Method 2 is applicable on field built-up systems or on existing systems where the standard refrigerant distributor is already installed on the evaporator.

Some caution is necessary with either of these methods. If the distributor circuits are sized properly for normal cooling duty, the flow of hot gas through the circuits may cause excessive pressure drop and/or noise. Therefore, it is recommended that the distributor circuits be selected one size larger than for straight cooling duty. See Selection Procedures Section for selection information on this method of hot gas bypass. For complete technical details on the Parker series distributor and the ASC series Auxiliary Side Connector, refer to page 15, or Catalog O-3.

Valve/Equipment Location and Piping – When the evaporator is located ***below*** the compressor on a ***remote*** system, bypass to the evaporator inlet is still the best method of hot gas bypass to ensure sufficient oil return to the compressor. In order for the bypass to achieve rated capacity at the conditions for which it was selected, the bypass valve and hot gas solenoid valve (if used) must be located at the compressor, rather than at the evaporator. If the evaporator is above or on the same level as the compressor, this valve location will also eliminate the possibility of hot gas condensing in the long bypass line and running back into the compressor during the off cycle.

Whenever hot gas bypass to the evaporator inlet is necessary for a system with two or more evaporator ***sections,*** each with its own TEV (no liquid line solenoid valves), but handling the same load, two methods may be used to avoid operating interference between sections:

1. Use a separate discharge bypass valve for each evaporator section.
2. Use one discharge bypass valve to feed two bypass lines, each with a check valve between the bypass valve and the evaporator section inlet. The check valves will prevent interaction between the TEVs when the bypass valve is closed.

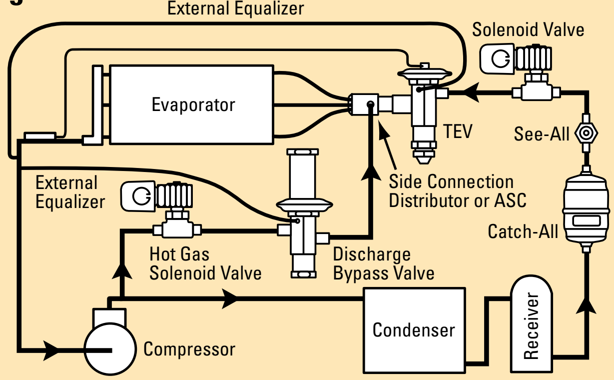
Externally Equalized Bypass Valves – Since the primary function of the DBV is to maintain suction pressure, the compressor suction pressure is the ***control*** pressure and must be exerted on the underside of the valve diaphragm. When the DBV is applied as shown in Figure 4, where there is an appreciable pressure drop between the valve outlet and the compressor suction, the externally equalized valve must be used. This is true because when the valve opens, a sudden rise in pressure occurs at the valve outlet. This creates a false ***control*** pressure, which causes the internally equalized valve to close.

Caution – Introduction of the bypassed gas between the thermostatic expansion valve and the distributor is ***not*** generally recommended because of the large pressure drop caused by the hot gas flowing through the distributor nozzle, or throat, and the tube circuits, which have been sized for normal cooling flow rates. Careful evaluation and testing should precede any application where hot gas is bypassed between the TEV and the distributor.

Bypass to Evaporator Inlet without Distributor – Many refrigeration systems and water chillers do not use refrigerant distributors, but may require some method of compressor capacity control. This type of application provides the same advantages as bypassing hot gas to the evaporator inlet with a distributor. All information relating to bypassing hot gas to the evaporator inlet with a distributor, **except that concerning distributors or ASCs,** also applies to bypassing to the evaporator inlet without a distributor.

Paralleling Valves – If the hot gas bypass requirement on any system is greater than the capacity of the largest discharge bypass valve, these valves can be applied in parallel. The pressure settings of the paralleled valves should be the same to get the most sensitive performance, and the piping to each valve should be identical to keep the pressure drop across each valve the same.

Figure 4

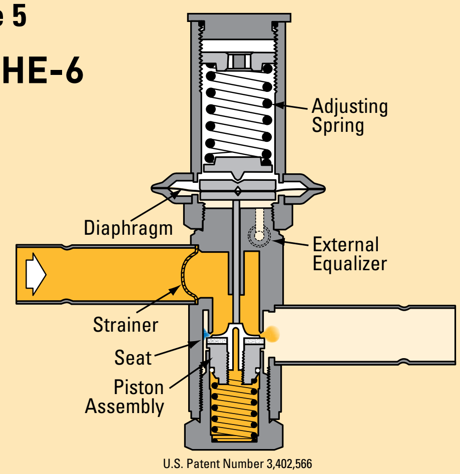


Discharge Bypass Valves for System Capacity Control

Piping Suggestions – Figure 4 is a piping schematics only to illustrate the general location of the discharge bypass valves in the system. Parker recommends that recognized piping references, such as equipment manufacturers' literature and the ASHRAE Handbook, be consulted for assistance. Parker is not responsible for system design, any damage arising from faulty system design, or for misapplication of its products. If these valves are applied in any manner other than as described in this bulletin, the Parker warranty is void. Actual system piping must be done so as to protect the compressor at all times. This includes protection against overheating, slugging with liquid refrigerant, and trapping of oil in various system locations.

Figure 5

ADRHE-6



The inlet connection on the discharge bypass valve should be sized to match system piping requirements. If a hot gas solenoid valve is used, its connection size will help determine the necessary connections on the bypass valve. Matching connections is easy if all components are reviewed in light of the most efficient system operation: side connection on distributor or ASC, hot gas solenoid valve, discharge line, suction line, etc.

Inlet strainers are available for all solder type bypass valves. The need for an inlet strainer is a function of system cleanliness. Moisture and particles too small for the strainer are harmful to the system and must also be removed. Therefore, it is recommended that a Parker Filter-Drier be applied in the liquid line and suction line (if required). See Catalog A-1.

Hot Gas Solenoid Valve – The schematic drawing in this application section shows a solenoid valve in a hot gas bypass line. Systems that operate on a pump down cycle require a solenoid valve in the hot gas bypass line in addition to the liquid line solenoid valve, since the bypass valve will open as the suction pressure is reduced. The two solenoid valves, hot gas and liquid line, should be wired in parallel so they are de-energized by a thermostat or any of the compressor safety devices, after which the compressor will shut down.

Even if the system is not on a pump down cycle, it is usually best to have a shut-off valve in the hot gas bypass line so the system can be pumped down for service.

A hot gas solenoid valve is also needed if the compressor does not have an integral temperature protection device. The valve serves as a safety measure against an extremely high superheat condition at the compressor suction. This condition can occur if the system experiences a malfunction of the thermostatic expansion valve, which is serving to desuperheat the bypassed hot gas; or, if the system is short of refrigerant. The hot gas solenoid valve is wired in series with a bi-metal thermostat fastened to the discharge line close to the compressor. This causes the solenoid valve to close if the discharge line temperature becomes excessive.

Complete selection information is given in the Selection Procedures Section.

DBV with Other Pressure Regulating Valves – If the discharge bypass valve is required on a system with a crankcase pressure regulating valve, the pressure setting of the DBV must be ***lower*** than the CRO valve setting for each valve to function properly.

Normally, when hot gas bypass is used for capacity control during periods of low load, the outdoor ambient drops below 70°F (21.1°C). Therefore, all air cooled systems that utilize hot gas bypass for capacity control should have some type of head pressure control to maintain satisfactory performance.

For information on other Parker pressure regulating valves refer to pages 3-6 and/or Parker Refrigerating Specialites Flo•Con Catalog 611F.

Operation

Direct Acting Valves – ADRS, ADRP, and ADRH – Parker DBVs respond to changes in downstream or suction pressure. See Figure 5. When the evaporating pressure is above the valve setting, the valve remains closed. As the suction pressure drops below the valve setting, the valve responds and begins to open. As with all modulating type valves, the amount of opening is proportional to the change in the variable being controlled — in this case the suction pressure. As the suction pressure continues to drop, the valve continues to open until the limit of the valve stroke is reached. However, on normal applications there is not sufficient pressure change to open these valves to the limit of their stroke. The amount of pressure change from the point at which it is desired to have the valve closed, to the point at which it is to open, varies widely with the type of refrigerant used and the evaporating temperature. For this reason Parker DBVs are rated on the basis of allowable evaporator temperature change from closed position to rated opening. A 6°F (3.33°C) change is considered normal for most applications and is the basis of our capacity ratings. Multipliers for other temperature changes are given in the Selection Procedures section.

These factors must be considered in the application and selection of all DBV's. Therefore, the following sections completely explain how the various factors are utilized in determining the proper valve to use, and the correct method of application.

Adustable Ranges Pressure Settings

Adjustable Spring Heads on Direct Acting Valves – The fully adjustable type utilizes a spring assembly which can be fixed at the desired pressure

Discharge Bypass Valves for System Capacity Control

setting (opening pressure). This setting will not be affected by other factors such as ambient or hot gas temperatures. The ADRS(E)-2, ADRP(E)-3 and ADRH(E)-6 are available with a fully adjustable range of 0/80 psig. The standard factory settings for the fully adjustable, 0/30, range is 20 psi.

The 0/80 range is generally required for air conditioning systems. The capacity table shows the evaporating temperatures at which the valves can be applied.

Specifications

Parker Discharge Bypass Valves utilize many of the proven construction features of our line of thermostatic expansion valves. The valves are constructed of the finest materials — those best suited for the specific purpose intended for each valve component. This ensures long life and dependable service.

Since there are numerous models available, valve designations have been made distinctly different to aid in specifying each type properly. Refer to the Ordering Instructions on Page 13 for an explanation of the valve designations.

Element Designations – The table on page 12 lists the element and spring range for each valve type. When ordering any element, the adjustment range and the valve type ***must*** be specified.

The fully adjustable spring element A3-0/80 and is interchangeable between the ADRPE and ADRHE valve models.

Selection Procedures

The selection of a discharge bypass valve, and the necessary companion devices, is simplified ***if complete system information is available.*** This will result in the most economical selection because the components will match the system requirements.

Besides the discharge bypass valve, a specific application may require a hot gas solenoid valve and an auxiliary side connection distributor or ASC adaptor. Once the type of application (review Application Section) is determined, the necessary valves can be selected from the information discussed in this section.

Discharge Bypass Valves – The selection of a Parker Discharge Bypass Valve involves five basic items:

1. **Refrigerant -** valve capacities vary considerably for different refrigerants.
2. **Minimum allowable evaporating temperature at the reduced load condition** - depending on the system, this value must be set to prevent coil icing and/or compressor short cycling. For example, this may be 32°F to 34°F (0°C to 1.1°C) for a water chiller; 26°F to 28°F (-3.3°C to -2.2°C) for a normal air conditioning system; and, the freezing temperature of the specific product for a refrigeration system.
3. **Compressor capacity (tons) at minimum allowable evaporating temperature** - consult compressor capacity ratings for this value.
4. **Minimum evaporator load (tons) at which the system is to be operated -** most systems are not required to operate down to zero load but this value will depend on the type of system. For example, most air conditioning systems only need to operate down to 15-25% of full load. However, air conditioning systems for data processing and "white" rooms, and most refrigeration systems may be required to bypass to zero load conditions.
5. **Condensing temperature when minimum load exists -** since the capacity ratings of the bypass valves are a function of condensing temperature, it is vital that proper head pressure is maintained, especially during low load operation. As the capacity table indicates, a condensing temperature of 80°F (26.7°C) is considered the minimum allowable for satisfactory system operation. See pages 3-8 for information on Parker's Head Pressure Valves.

The discharge bypass valve must be selected to handle the difference between items 3 and 4 above. If the minimum evaporator load (item 4) is zero, the hot gas bypass requirement is simply the compressor capacity at the minimum allowable evaporating temperature (item 3). The following discussion on Capacity Ratings and the Example show how these factors affect a selection on a typical air conditioning system.

Capacity Ratings – As the Discharge Bypass Valve Capacity Table indicates, valve ratings are dependent on the evaporating and condensing temperature ***at the reduced load condition*** and the refrigerant used. Therefore, once this information and the hot gas bypass requirement in tons is determined, a discharge bypass valve can be selected.

As the capacity table heading indicates, these are ***valve*** capacities, ***not*** the system capacity on which the valve is applied. The ratings are the sum of the hot gas bypassed and the liquid refrigerant for desuperheating. The capacities are based on an evaporator temperature change of 6°F (3.33°C) from a closed position to the rated opening. This is a nominal rating value based on years of application experience. Since a discharge bypass valve is actually a ***pressure*** regulating valve, it should be pointed out that the capacity ratings based on a 6°F (3.33°C) evaporator temperature change take into account that a 6°F (3.33°C) change @ 40°F (4.4°C) on Refrigerant 22 is a 9.1 psi (0.63 bar) change, The 6°F (3.33°C) nominal change is used so all the various pressure changes do not need to be shown in the table. If additional capacity is required and a greater evaporator temperature change can be tolerated, these valves are capable of opening further. Capacity multipliers for this purpose. For example, an ADRHE-6-0/80 rated for 9.58 tons at a 26°F evaporating temperature will start to open at 32°F (26° + 6°); and, when the evaporating temperature has dropped to 26°F (-3°C), the valve will be open far enough to bypass 9.9 tons of hot gas. If a temperature change of 8°F can be tolerated, the valve would start opening at 34°F (26° + 8°) and be open far enough to bypass 9.9 times 1.15 or 11.39 tons of hot gas.

Occasionally, a bypass valve is selected for an evaporator temperature change of less than 6°F (3.33°C). Multipliers for those situations are also given in the table on page 12.

Example – Select a discharge bypass valve for a 20 ton (70kW) Refrigerant 22 air conditioning system with 67% cylinder unloading (4 of 6 cylinders unloaded). Normal operating conditions are 45°F (7.2°C) evaporating temperature and 120°F (48.9°C) condensing temperature with a ***minimum*** condensing temperature of 80°F (26.7°C) due to head pressure control.

When the evaporator load drops below the last step of cylinder unloading, it is necessary to keep the system on-the-line to maintain proper space temperatures, and avoid frosting of the coil. From the compressor manufacturer's capacity table, the compressor capacity in tons at the minimum allowable evaporating temperature is approximately 7 tons (25kW). If the system had to be on-the-line down to zero load, the bypass valve would have to bypass 7 tons (25kW) of hot gas. With the necessary system factors — R-22, 26°F (-3°C) evaporating temperature at the reduced load condition, and 80°F (26.7°C) condensing temperature — the capacity table is

Discharge Bypass Valves for System Capacity Control

checked for a valve which can handle the ***7 tons*** (25kW) ***bypass capacity:***

The ADRHE-6-0/80 AR has a capacity of 7.69 tons (27kW) at these conditions. Therefore, if the system must operate to zero load, this would be the proper selection.

However, if the minimum evaporator load is 4 tons (14.1kW) (20% of total system capacity), an ADRPE-3-0/80 would be the proper selection (valve capacity of 4.86 tons (17.1kW)). The only additional information necessary is the valve connections. While various connections are available, the proper valve connections must be selected to match the system's piping requirements.

Hot Gas Solenoid Valves – The selection of a Parker Hot Gas Solenoid Valve involves some of the same basic items already determined for the selection of the discharge bypass valve plus one additional factor:

1. **Refrigerant.**
2. **Minimum allowable evaporating temperature at the reduced load condition.**
3. **Hot gas bypass requirement in tons** - this is not the bypass valve capacity.
4. **Allowable pressure drop across valve port** - since excessive pressure drop across the solenoid valve reduces the capacity of the DBV, the recommended pressure drop for a Refrigerant 134a system is approximately 5 psi (0.35 bar) and for a Refrigerant 22 system approximately 10 psi (0.70 bar).

Capacity Ratings – Once the data listed above is determined, the appropriate solenoid valve can be easily selected from the capacity table.

Example – Based on the data for the earlier DBV selection: Refrigerant 22, 26°F (-3°C) minimum allowable evaporating temperature at the reduced load condition, and either 7 tons (25kW) or 4 tons (14.1kW) as the hot gas bypass requirement, the best solenoid valve selection for each case would be:

For 7 tons:
R30E15, 7/8" or 1-1/8" ODF connections, and the necessary voltage and cycles.

For 4 tons:
R30E12, 5/8" ODF connections, and the necessary voltage and cycles.

The R30E15 and R30E12 would have a pressure drop of greater than 5 psi (0.35 bar). Both selections depend on whether adequate condensing pressure is maintained year round with some form of head pressure control. See HPC Valve section, pages 3-8.

Replacement Elements

Replacement Element Type		Fits Valve Type	Standard Adjustment Range (psig)	Standard Settings
Adjustable Spring Type	A-8-①	ADRS-2	0/80	60
	A-3-①	ADRP-3	0/30	20
	A-3-①	ADRH-6		

① Specify Range of Adjustment

Direct Acting Valves - Materials and Construction Details

Valve Type	Port Size (Inches)	Element Type and Material	Connections		Body Material	Seating Material	Type of Joints
			Type	Material			
ADRS(E)-2	1/4	Diaphragm - Stainless Steel	Solder	Copper	Brass	Metal-to-Metal	Knife Edge Metal-to-Metal
ADRS(E)-3	3/8		Solder	Copper			
ADRS(E)-6	3/4		Solder	Copper		Synthetic-to-Metal	

The DRS(E), DRP(E) and DRHE valves are all recognized components under Underwriter's Laboratories Guide Number SFJQ2, File Number SA5460. The maximum rated pressure for all models is 500 psig (3448 kPa).

Capacity Multipliers - °F
for Evaporator Temperature Changes Other Than 6°F Nominal Change

Evaporator Temperature Change – °F	Refrigerant	Evaporator Temperature – °F		
		40	26	20
2	134a, 401A	0.65	0.65	0.65
	22, 402A, 404A, 407C, 507	0.72	0.70	0.70
	410A	.045	0.40	0.38
4	134a, 401A	0.80	0.80	0.80
	22, 402A, 404A, 407C, 507	0.87	0.85	0.85
	410A	0.82	0.78	0.76
8	134a, 401A	1.11	1.11	1.11
	22, 402A, 404A, 407C, 507	1.17	1.15	1.11
	410A	1.08	1.11	1.13
10	134a, 401A	1.22	1.20	1.19
	22, 402A, 404A, 407C, 507	1.34	1.27	1.25
	410A	1.11	1.17	1.20

Capacity Multipliers - °C
for Evaporator Temperature Changes Other Than 3.33°C Nominal Change

Evaporator Temperature Change – °C	Refrigerant	Evaporator Temperature – °C		
		4.4	-3.3	-6.3
1.1	134a, 401A	0.65	0.65	0.65
	22, 402A, 404A, 407C, 507	0.72	0.70	0.70
	410A	.045	0.40	0.38
2.2	134a, 401A	0.80	0.80	0.80
	22, 402A, 404A, 407C, 507	0.87	0.85	0.85
	410A	0.82	0.78	0.76
4.4	134a, 401A	1.11	1.11	1.11
	22, 402A, 404A, 407C, 507	1.17	1.15	1.11
	410A	1.08	1.11	1.13
5.6	134a, 401A	1.22	1.20	1.19
	22, 402A, 404A, 407C, 507	1.34	1.27	1.25
	410A	1.11	1.17	1.20

Discharge Bypass Valves for System Capacity Control

Direct Acting Valves - Dimensions - Inches

Valve Type		Connections (Inches) Standard Connections in BOLD	Dimensions (Inches)							Weight (Pounds)		Inlet Strainer Part Number
Internally Equalized	Externally Equalized ①		A	B	C	D	E	F	Socket Depth	Net	Shipping	
Adjustable Models												
ADRS-2	ADRSE-2	3/8 ODF	6.44	2.50	1.94	1.44		2.75	0.31	2.00	2.25	877-3
		1/2 ODF				1.37			0.37			877-4
		5/8 ODF				1.50			0.50			877-5
ADRP-3	ADRPE-3	1/2 ODF	6.94	2.81	2.06	1.69	1.62	2.75	0.37	2.75	3.00	877-4
		5/8 ODF				1.81	1.75		0.50			887-5
Not Available	ADRHE-6	5/8 ODF	7.06	2.88	1.88	4.62		2.75	0.50	3.50	4.00	877-5
		7/8 ODF							0.75			877-7
		1-1/8 ODF							0.91			825-9

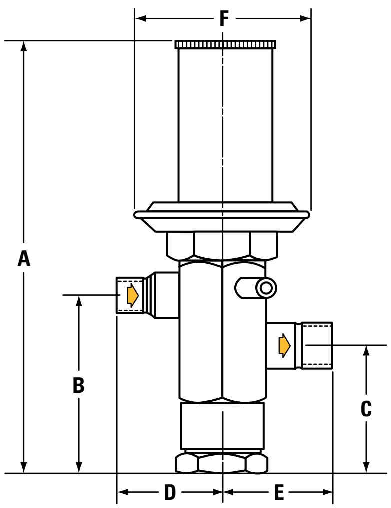
① Standard External Equalizer connection is 1/4" ODF.

Direct Acting Valves - Dimensions - Metric

Valve Type		Connections (Inches) Standard Connections in BOLD	Dimensions (cm)							Weight (Kg)		Inlet Strainer Part Number
Internally Equalized	Externally Equalized ①		A	B	C	D	E	F	Socket Depth	Net	Shipping	
Adjustable Models												
ADRS-2	ADRSE-2	3/8 ODF	16.4	6.4	4.9	3.66		6.9	0.79	5.1	5.7	877-3
		1/2 ODF				3.48			0.94			877-4
		5/8 ODF				3.81			1.27			877-5
ADRP-3	ADRPE-3	1/2 ODF	17.6	7.1	5.2	4.29	4.11	6.9	0.94	7.0	7.6	877-4
		5/8 ODF				4.60	4.45		1.27			887-5
Not Available	ADRHE-6	5/8 ODF	17.9	7.3	4.8	11.7		6.9	1.27	8.9	10.2	877-5
		7/8 ODF							1.91			877-7
		1-1/8 ODF							2.31			825-9

① Standard External Equalizer connection is 1/4" ODF.

ADR



Discharge Bypass Valves for System Capacity Control

Direct Acting Discharge Bypass Valve Capacities - Tons, psi, °F

Capacities based on discharge temperatures 50°F above isentropic compression, 25°F superheat at the compressor, 10°F sub-cooling, and includes both the hot gas bypassed and liquid refrigerant for desuperheating, regardless of whether the liquid is fed through the system thermostatic expansion valves or an auxillary desuperheating thermostaic expansion valve.

Refrigerant	Valve Type	Adjustment Range (bar)	Minimum Allowable Evaporator Temperature at the Reduced Load – °F								
			40			26			20		
			Condensing Temperature – °F								
			80	100	120	80	100	120	80	100	120
Adjustable Models											
22	ADRP-2 ADRPE-2	0/80	2.73	3.51	4.42	2.77	3.57	4.50	2.79	3.59	4.53
	ADRPE-3	0/80	4.65	5.99	7.54	4.86	6.26	7.88	4.95	6.37	8.03
	ADRHE-6	0/80	7.12	9.16	11.5	7.69	9.90	12.5	7.92	10.2	12.8
134a	ADRS-2 ADRSE-2	0/30	–	–	–	1.97	2.60	3.34	1.94	2.56	3.30
		0/80	2.02	2.67	3.43	1.85	2.44	3.15	1.85	2.44	3.15
	ADRP-3 ADRPE-3	0/30	–	–	–	3.75	4.95	6.38	3.76	4.96	6.39
		0/80	3.74	4.94	6.37	3.35	4.42	5.70	3.36	4.43	5.71
	ADRHE-6	0/30	–	–	–	7.09	9.36	12.1	7.09	9.37	12.1
		0/80	7.07	9.34	12.0	5.50	7.26	9.36	5.53	7.31	9.41
410A	HGBE-5	95/115	4.15	5.28	6.56	3.88	4.94	6.14	3.73	4.75	5.91

Direct Acting Discharge Bypass Valve Capacities - kW, bar, °C

Capacities based on discharge temperatures 17°C above isentropic compression, 14°C superheat at the compressor, 5°C sub-cooling, and includes both the hot gas bypassed and liquid refrigerant for desuperheating, regardless of whether the liquid is fed through the system thermostatic expansion valves or an auxillary desuperheating thermostaic expansion valve.

Refrigerant	Valve Type	Adjustment Range (bar)	Minimum Allowable Evaporator Temperature at the Reduced Load – °C								
			4.44			-3.3			-6.7		
			Condensing Temperature – °C								
			26.7	37.8	48.9	26.7	37.8	48.9	26.7	37.8	48.9
Adjustable Models											
22	ADRP-2 ADRPE-2	0/5.5	9.61	12.4	15.6	9.75	12.6	15.8	9.82	12.6	15.9
	ADRPE-3	0/5.5	16.4	21.1	26.5	17.1	22.0	27.7	17.4	22.4	28.3
	ADRHE-6	0/5.5	25.1	32.2	40.5	27.1	34.8	44.0	27.9	35.9	45.1
134a	ADRS-2	0/2	–	–	–	6.93	9.15	11.8	6.83	9.01	11.6
	ADRSE-2	0/5.5	7.11	9.40	12.1	6.51	8.59	11.1	6.51	8.59	11.1
	ADRP-3	0/2	–	–	–	13.2	17.4	22.5	13.2	17.5	22.5
	ADRPE-3	0/5.5	13.2	17.4	22.4	11.8	15.6	20.1	11.8	15.6	20.1
	ADRHE-6	0/2	–	–	–	25.0	32.9	42.6	25.0	33.0	42.6
		0/5.5	24.9	32.9	42.2	19.4	25.6	32.9	19.5	25.7	33.1
410A	HGBE-5	6.6/7.9	14.6	18.6	23.1	13.7	17.4	21.6	13.1	16.7	20.8

Direct Acting Valve - Valve Designation

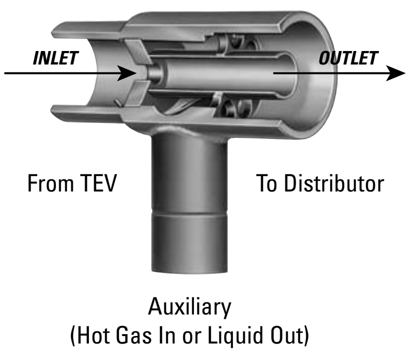
A	DR	H	E	6	0/80	7/8" ODF
Fully Adjustable 0/80 psig	**Valve Type** **D**ischarge **R**egulating	**Body Style** S, P, or H	**External Equalizer** Omit if internally Equalized	**Port Size** in Eighths of an Inch	**Adjustment Range** 0/80	**Connection** Solder

Distributors and Auxiliary Side Connectors

For non-ammonia applications

Auxiliary side connectors (ASCs) permit removable nozzle type refrigerant distributors, without side connections, to be used for hot gas bypass, hot gas defrost, or reverse cycle applications, see Figure 6.

Figure 6



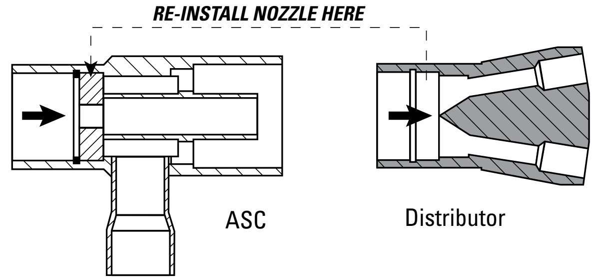
The ASC is installed between the TEV and distributor. First, the nozzle and retainer ring are removed from the distributor and reinstalled in the ASC inlet. The ASC outlet is then connected to the distributor inlet. The inlet of the ASC is connected to the TEV outlet.

As with side connection type distributors, the ASC allows hot gas or liquid refrigerant in the reverse cycle to bypass the nozzle. In addition, the two-phase refrigerant flowing from the TEV passes through the nozzle, and a nozzle tube extension, which terminates at the distributor's dispersion cone. This tube eliminates any interference in TEV flow from hot gas flow entering through the side connection. The tube is supported by a perforated web allowing hot gas or liquid refrigerant in the reverse cycle to flow through with minimal pressure drop.

Selection

1. Select an ASC which matches the size of the distributor inlet. The table below lists distributors and their matching ASC.

2. If the ASC is installed on an existing system, confirm the distributor nozzle orifice size. In addition, verify the distributor tube size is adequate for the application.

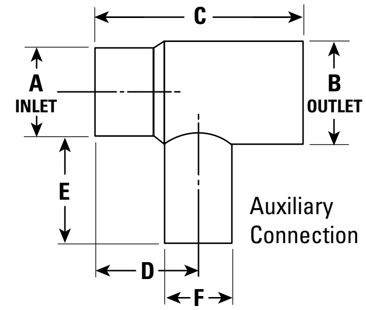


Specifications

ASC-5-4, ASC-7-4, ASC-9-5, ASC-11-7, and ASC-13-9

Selection

For proper distributor type, order by complete Parker type listed below. E.g., an 160 distributor requires an ASC-11-7 Auxiliary Side Connector. ***Do not use an ASC that is smaller or larger than recommended. Bushing up or down at the outlet defeats the purpose of the internal nozzle tube extension.***



Type	Connection Sizes (Inches)			Distributors Type Numbers	Nozzle Size	Dimensions								
	Inlet ODM Solder	Outlet ODM Solder	Auxiliary ODF Solder			A	B	C		D		E		F
								In.	mm	In.	mm	In.	mm	
ASC-5-4	5/8	5/8	1/2	21, 22, 1620, 1622	J	5/8 ODM	5/8 ODF	1.88	48	0.95	24	1.25	32	1/2 ODF
ASC-7-4	7/8	7/8	1/2	117, 120, 1112, 1113	G	7/8 ODM	7/8 ODF	2.25	57	1.06	27	1.38	35	1/2 ODF
ASC-9-5	1-1/8	1-1/8	5/8	130, 150, 1115, 1116	E	1-1/8 ODM	1-1/8 ODF	2.81	71	1.47	37	1.62	41	5/8 ODF
ASC-11-7	1-3/8	1-3/8	7/8	140, 160, 170, 1117, 1126, 1128	C	1-3/8 ODM	1-3/8 ODF	3.53	90	1.89	48	2.19	56	7/8 ODF
ASC-13-9	1-5/8	1-5/8	1-1/8	175, 180, 190, 1125, 1127, 1143	A	1-5/8 ODM	1-5/8 ODF	3.72	95	1.83	47	2.75	70	1-1/8 ODF

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- CO_2 controls
- Electronic controllers
- Filter-driers
- Hand shut-off valves
- Heat exchangers
- Hose & fittings
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- Refrigerant distributors
- Safety relief valves
- Solenoid valves
- Thermostatic expansion valves

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- Fluid conveyance systems
- Fluid metering delivery & atomization devices
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- Hydraulic systems & components
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- Structural extrusions

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- Condition monitoring
- Engine air, fuel & oil filtration & systems
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- Process, chemical, water & microfiltration filters
- Nitrogen, hydrogen & zero air generators

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- Brass fittings & valves
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- PTFE & PFA hose, tubing & plastic fittings
- Quick disconnects
- Rubber & thermoplastic hose & couplings
- Tube fittings & adapters

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- Hydraulic systems
- Hydraulic valves & controls
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- Quick disconnects
- Rubber & thermoplastic hose & couplings
- Tube fittings & adapters

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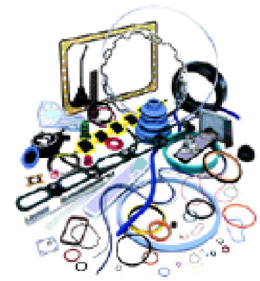
- Instrumentation fittings, valves & regulators
- Medium pressure fittings & valves
- Process control manifolds



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