

Head Pressure Control Valves

High and Low Ambient Stability

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, some 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. 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. 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 condenser. Insufficient flow through the TEV will cause a low suction pressure. The typical method of maintaining normal head pressure in a refrigeration 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. Parker Sporlan Head Pressure Control for systems with air cooled condensers can be accomplished using one of several valve options; the non-adjustable ORO-5, the adjustable ORI/ORD combination, or the economical LAC series.

For all requests, consult your nearest Parker Sporlan Wholesaler or contact us on: racecustomerservice@parker.com / www.parker.com/race

Valve Nomenclature/Ordering Instructions

LAC

LAC	-	4	-	DS	-	100/80	-	3/8 "	X	3/8 "	X	3/8 "
Valve Type Low Ambient Control		Valve Size		Dual Setting Omit for standard dome element		Valve Setting (s) (psig) - Specify one setting for		Discharge Connection (inches)		Condensed Connection (inches)		Receiver Connection (inches)
LAC	-	5	-	180	-	5/8"	X	5/8"	X	3/8 "		ODF
Valve Type Low Ambient Control		Valve Size		Valve Setting(s) (psig)		Discharge Connection (inches)		Condensed Connection (inches)		Receiver Connection (inches)		Solder Connections

ORI

ORI	-	6	-	65/225	-	7/8" ODF	-	With Strainer	-	H
Valve Type Open on rise of Inlet Pressure		Port Size Eighths of an Inch		Nominal Adjustment Range (psig)		Connection Solder		Inlet Strainer (Optional)		Designates High Pressure Bellows

OROA

OROA	-	5	-	180	-	5/8" ODF	-	With Strainer
Valve Type Open on rise of Outlet		Port Size Eighths of an Inch		Pressure Setting (psig)		Connection Solder		Inlet Strainer (Optional)

ORD-4

ORD	-	4	-	20
Valve Type Open on rise of Differential Pressure		Port Size Eighths of an Inch		Opening Pressure Differential (psi)

Materials and Construction Details

Valve Type	LAC-4,-5,-10		ORI-6,-10	ORD-4	OROA
Body Material	Brass		Brass	Copper	Brass
Seat	Metal to Metal		Metal to Metal	Metal to Metal	Metal to Metal
Element Type and Material	Domed Steel	Remote Bulb only for R410A LAC-5-HP, -10-HP valves	Bellows - Brass	Bellows - Brass	Diaphragm Stainless Steel
Type of Joints	Knife Edge, Metal to Metal		Hermetic Construction	Hermetic Construction	Hermetic Construction
Connections	ODF Copper		ODF Copper	ODF Copper	ODF Copper
MRP	46.9 barg (680 psig) R410A only		31 barg (450psig)	31 barg (450psig)	31 barg (450psig)
	LAC-4 =34.5 barg (500 psig)	LAC-5, -10 = 31 barg (450 psig)			
Max External Leakage	.10 oz/yr @ 300 psig (2.8 gram/yr @ 20 bar)				
UL	SA-5460				
Compatibility	All HFC, HCFC, Refrigerants and blends				

Accurate at the time of going to print.

Selection Tables

Low Ambient Capacities - kW of Refrigeration

Capacities are based on -20°C evaporator temperature, 35°C condenser, 6°C subcooled liquid.

Refrigerant Valve Setting (bar)	Minimum Ambient Design Temp. °C	Pressure Drop Across Valve (bar)	Valve Type				
			LAC-4	LAC-5	LAC-10	OROA-5	ORD-4
22 407C (12.4 bar)	-30	0.07	5.96	10.6	25.4	-	-
		0.14	8.38	14.9	35.7	-	-
		0.35	13.1	23.6	55.5	-	-
		1.6	26.9	49.6	112	54.4	54.4
		2	29.8	55.2	123	83.3	83.3
	-20	0.07	6.38	11.3	27.1	-	-
		0.14	8.97	16	38	-	-
		0.35	14	25.2	59.1	-	-
		1.6	28.8	53	119	61.3	61.3
		2	31.8	59	131	93.8	93.8
	-10	0.07	6.91	12.2	29.2	-	-
		0.14	9.71	17.2	40.8	-	-
		0.35	15.2	27.2	63.5	-	-
		1.6	31.1	57.2	127	71.2	71.2
		2	34.3	63.7	140	109	109
134a (6.9 bar)	-30	0.07	4.86	8.65	20.9	-	-
		0.14	6.83	12.2	29.2	-	-
		0.35	10.7	19.2	45.4	-	-
		1.6	21.4	40.1	88.8	40.6	40.6
		2	23.5	44.5	96.6	62.4	62.4
	-20	0.07	5.24	9.3	22.4	-	-
		0.14	7.36	13.1	31.3	-	-
		0.35	11.5	20.7	48.5	-	-
		1.6	23.1	43.1	94.9	45.7	45.7
		2	25.3	47.8	103	70.2	70.2
	-10	0.07	5.73	10.1	24.3	-	-
		0.14	8.05	14.3	34	-	-
		0.35	12.5	22.6	52.7	-	-
		1.6	25.2	47.1	103	53.3	53.3
		2	27.6	52.2	112	81.8	81.8
R-410A (20.3 bar)	-30	0.07	6.06	10.8	20.3	-	-
		0.14	8.54	15.2	28.5	-	-
		0.35	13.4	24	44.4	-	-
		0.7	18.8	33.9	61.8	-	-
		0.07	6.48	11.5	21.6	-	-
	-20	0.14	9.13	16.2	30.3	-	-
		0.35	14.3	25.6	47.2	-	-
		0.7	20	36.1	65.6	-	-
		0.07	7	12.4	23.2	-	-
		-10	0.14	9.85	17.5	32.5	-
	0.35		15.4	27.6	50.6	-	-
	0.7		21.6	38.9	70.4	-	-

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Selection Tables

Low Ambient WINTER Capacities - kW of Refrigeration

Capacities are based on -20°C evaporator temperature, 35°C condenser, 6°C subcooled liquid.

Refrigerant Valve Setting (bar)	Minimum Ambient Design Temp. °C	Pressure Drop Accross Valve (bar)	Valve Type				
			LAC-4	LAC-5	LAC-10	OROA-5	ORD-4
404A (14.5 bar)	-30	0.07	4.37	7.75	18.7	-	-
		0.14	6.15	11	26.2	-	-
		0.35	9.63	17.3	40.9	-	-
		1.6	19.9	36.5	83	39.5	39.5
		2	22	40.6	91.5	60.4	60.4
	-20	0.07	4.64	8.2	19.7	-	-
		0.14	9.52	11.6	27.7	-	-
		0.35	10.2	18.3	43.1	-	-
		1.6	21.1	38.6	87.4	44	44
		2	23.3	43	96.3	67.4	67.4
	-10	0.07	4.98	8.78	21.1	-	-
		0.14	7.00	12.4	29.5	-	-
		0.35	10.9	19.6	45.9	-	-
		1.6	22.5	41.3	92.9	50.7	50.7
		2	24.9	46	102	77.6	77.6
507 (14.5 bar)	-30	0.07	4.12	7.32	17.6	-	-
		0.14	5.8	10.3	24.8	-	-
		0.35	9.10	16.3	38.6	-	-
		1.6	18.8	34.5	78.5	37.2	37.2
		2	20.8	38.4	86.5	57	57
	-20	0.07	4.40	7.79	18.7	-	-
		0.14	6.20	11	26.3	-	-
		0.35	9.70	17.4	40.9	-	-
		1.6	20	36.7	83	41.9	41.9
		2	22.1	40.9	91.5	64.1	64.1
	-10	0.07	4.75	8.38	20.1	-	-
		0.14	6.68	11.8	28.1	-	-
		0.35	10.4	18.7	43.8	-	-
		1.6	21.5	39.5	88.6	48.7	48.7
		2	23.8	43.9	97.6	74.6	74.6

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Selection Tables

High Ambient SUMMER Capacities - kW of Refrigeration

Capacities are based on -20°C evaporator temperature, 43°C condenser, 6°C subcooled liquid.

Refrigerant Valve Setting (bar)	Pressure Drop Across Valve (bar)	Valve Type						
		LAC-4	LAC-5	LAC-10	OROA-5	ORI-6	ORI-10	ORD-4
22 407C (12.4 bar)	0.07	9.13	19.5	41.5	37	26	69.2	
	0.14	12.8	27.6	57.7	52.1	37.8	95.6	-
	0.21	15.5	33.9	69.9	63.7	47	116	-
	0.28	17.8	39.1	80.1	73.5	54.9	132	-
	0.35	19.9	43.7	89	82.1	61.9	147	-
134a (6.9 bar)	0.07	8.15	17.4	37.1	33	18.2	45.6	-
	0.14	11.4	27.4	51.5	46.5	26.4	63	-
	0.21	13.9	30.2	62.4	56.9	32.9	76.1	-
	0.28	15.9	34.9	71.5	65.6	38.5	87	-
	0.35	17.7	39	79.5	73.2	43.4	96.5	-
410A (20.3 bar)	0.07	8.7	18.6	29.3	-	-	-	-
	0.14	12.2	26.3	40.7	-	-	-	-
	0.21	14.8	32.2	49.3	-	-	-	-
	0.28	17	37.2	56.5	-	-	-	-
	0.35	18.9	41.6	62.8	-	-	-	-

High Ambient SUMMER Capacities - kW of Refrigeration

Capacities are based on -20°C evaporator temperature, 43°C condenser, 6°C subcooled liquid.

Refrigerant Valve Setting (bar)	Pressure Drop Across Valve (bar)	Valve Type						
		LAC-4	LAC-5	LAC-10	OROA-5	ORI-6	ORI-10	ORD-4
404A (14.5 bar)	0.07	5.71	12.2	26	23	17.5	48.4	-
	0.14	7.98	17.2	36.1	32.5	25.4	66.8	-
	0.21	9.7	21.1	43.8	39.7	31.7	80.7	-
	0.28	11.2	24.4	50.2	45.8	37	92.3	-
	0.35	12.4	27.2	55.8	51.2	41.7	102	-
507 (14.5 bar)	0.07	5.58	11.9	25.5	22.6	17.8	49.3	-
	0.14	7.8	16.9	35.3	31.8	25.8	68.1	-
	0.21	9.49	20.7	42.8	38.9	32.1	82.3	-
	0.28	10.9	23.9	49.1	44.9	37.5	94.1	-
	0.35	12.2	26.7	54.5	50.1	42.4	104	-

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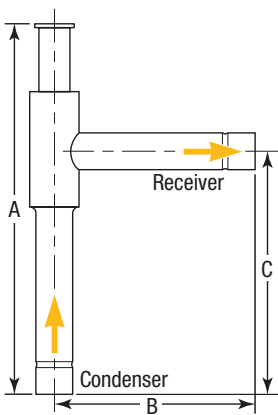
Valve Dimensions

Specifications and Dimensions

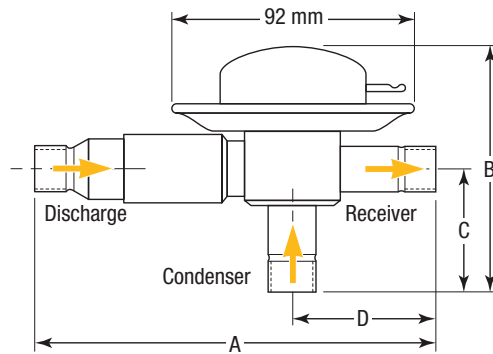
Valve Type	Standard Factory Setting bar	Connections ODF Solder (Inches)		Dimensions - mm								Weight kg		Replacement Parts	
		Inlet(s)	Outlet	A	B	C	D	E	F	G	I	Net	Ship		
ORI-6-65/225-H	8.3	5/8	5/8	250	128	162	-					0.45	0.57	Inlet Strainer	825-5
		7/8	7/8												825-7
		1-1/8	1-1/8												0.57
ORI-10-65/225-H	8.3	1-1/8	1-1/8	280	139	167	-					1.13	1.25		825-9
		1-3/8	1-3/8												825-11
ORD-4-20	1.4	5/8	5/8	167	25	-	-	-	-	-	-	0.15	0.23		825-5
OROA-5	6.9, 12.4 or 14.5	(1) 5/8 (2) 5/8	5/8	151	95	48	55					0.91	1.02	825-5	
		(1) 5/8 (2) 7/8	7/8	157	102	54	61							825-7	

(1) Discharge Connection
(2) Condenser Connection

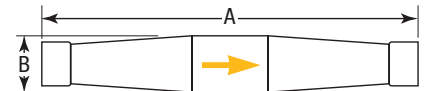
ORI



OROA



ORD-4



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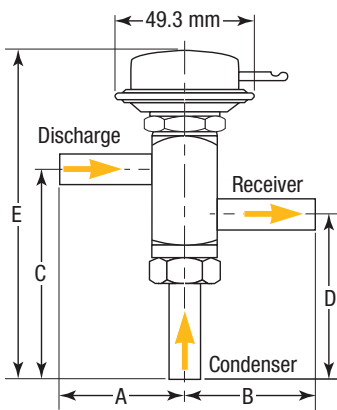
Valve Dimensions

Specifications and Dimensions

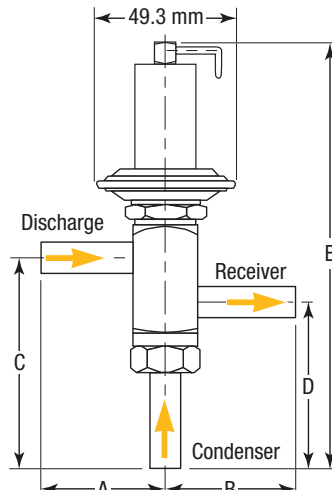
Valve Type	Standard Factory Setting bar	Connections ODF Solder (Inches)		Dimensions - mm								Weight kg				
		Inlet(s)	Outlet	A	B	C	D	E		F	G	I	Net	Ship		
LAC-4	6.9, 12.4 or 14.5	1/4	1/4	45	48	77	61	120		-	-	-	0.34	0.39		
		3/8	3/8										0.36	0.40		
		1/2	1/2										0.37	0.41		
LAC-4-DS		3/8	3/8	45	48	77	61	155		-	-	-	0.40	0.46		
		1/2	1/2										0.43	.49		
LAC-5		1/2	1/2	42	41	96	76	Dome Element	155	Bulb Element	142	-	-	-	1.13	1.20
		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	60	114	95		173		161				1.25	1.32
LAC-10		(1) 1-3/8 (2) 7/8	7/8	72	68	112	88	Dome Element	176	Bulb Element	163	-	-	-	1.45	1.55
	(1) 1-3/8 (2) 1-1/8	1-1/8	65		123	98	187		174		1.49				1.59	

(1) Discharge Connection
(2) Condenser Connection

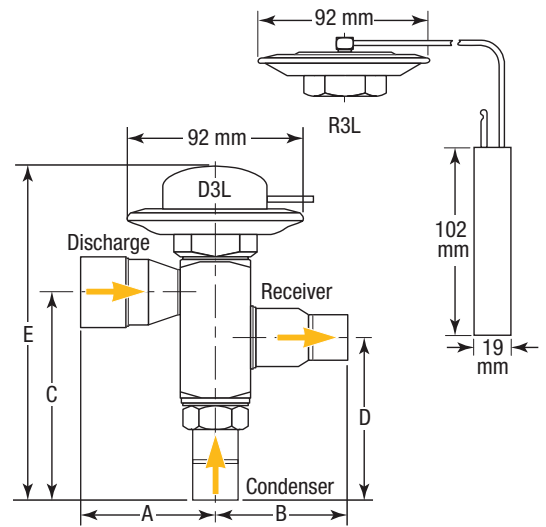
LAC-4



LAC-4-DS



LAC-5 & 10



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Order Selection Guide

Head Pressure Control Valves

Valve Type	Connctions - Inches		Standard Factory Setting (PSI)	Standard Factory Setting (bar)	Part Number	
	Discharge	Condenser/Receiver				
LAC-4	3/8 ODF	3/8 ODF	100	6.9	903017	
	1/2 ODF	1/2 ODF			903031	
	3/8 ODF	3/8 ODF	180	12.4	903024	
	1/2 ODF	1/2 ODF			903038	
LAC-4-DS	3/8 ODF	3/8 ODF	100/180	6.9/12.4	903080	
	1/2 ODF	1/2 ODF			903085	
LAC-4-HP	1/2 ODF	1/2 ODF	295HP	20.3	903111	
LAC-5	5/8 ODF	5/8 ODF	180	12.4	903029	
	7/8 ODF	7/8 ODF	180	12.4	903033	
	1/2 x 1/2 ODF, 5/8 x 5/8 ODF, 7/8 x 7/8 ODF, 1-1/8 x 1-1/8 ODF		100, 180	6.9/12.4	Special order valve	
	LAC-5-HP	5/8 ODF	5/8 ODF	295HP	20.3	903107
	LAC-10	7/8 x 7/8 ODF, 1-3/8 x 1-3/8 ODF		100, 180	6.9/12.4	Special order valve
LAC-10-HP	1-3/8 ODF	7/8 ODF	295HP	20.3	903106	
	1-3/8 ODF	1-1/8 ODF			903109	
ORI-6-65/225H	5/8 ODF	5/8 ODF	120	8.3	900826	
	7/8 ODF	7/8 ODF			900833	
	1-1/8 ODF	1-1/8 ODF			900847	
ORI-10-65/225H	1-1/8 ODF	1-1/8 ODF	120	8.3	900861	
	1-3/8 ODF	1-3/8 ODF			900882	
ORD-4	5/8 ODF	5/8 ODF	20	1.4	902877	
			25	1.7	902884	
			30	2.07	902891	
			35	2.4	902898	
OROA-5	5/8 ODF	5/8 ODF	100	6.9	902905	
					180	12.4
			180	12.4		
					180	12.4
OROAB-5	5/8 ODF	5/8 ODF	100	6.9		
					180	12.4
			180	12.4		
					180	12.4
OROAC-5 OROAD-5	5/8 x 5/8 ODF, 5/8 x 7/8 ODF		100	6.9		
			180	12.4		

Maximum Pressure Drop Between Compressor and Receiver - bar	Head Pressure Component Selection
Below 0.97	OROA-5-100 or -180
	ORD-4-20 & ORI
1 - 1.3	OROAB-5-100 or -180
	ORD-4-25 & ORI
1.4 - 1.65	OROAC-5-100 or -180
	ORD-4-30 & ORI
1.7- 2	OROAD-5-100 or -180
	ORD-4-35 & ORI

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