Thermostatic Expansion Valves (TXVs) and Constant Pressure (Automatic) Expansion Valves (AXVs) Table of Contents

Visual Table of Contents

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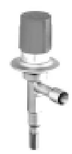
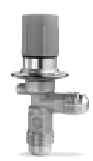
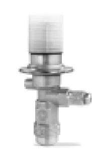






TXV Model Number Selection Guide

S	(E)	5	V
MODEL	EXTERNAL EQUALIZER OPTIONAL	CAPACITY	REFRIGERANT

S

EG(C)
C = internal
check valve

I

H(C)(A)
C = internal check valve
A = adjustable

RE

EC

G

N

C

B5

(E) for Externally Equalized
Evaporator pressure drop > 3 psi

BLANK for Internally Equalized
Evaporator pressure drop < 3 psi
or smaller tonnage evaporators
See page 163

Capacity

Parker's expansion valves offer a range of capacities from 1/8 ton to 70 tons depending on valve series.
See pages 152-157 for capacity tables.

**Rainbow Charge™
Refrigerant Designation**

J	R-134a, R-401A (MP39), R-401B (MP66)
V	R-407C (AC9000), R-22
S	R-125, R-404A (HP62), R-402A (HP80), R402B (HP81), R-507 (AZ50)
Z	R-410A

Refrigerant Color Code

R-12 - (yellow)
R-22 - (green)
R-502 - (purple)
R-134a - (light blue)
R-404A - (orange)
R-407C - (brown)
R-410A - (rose)
HP80 - (canary)
HP81 - (olive)

X	100	B	20
CHARGE TYPE	M.O.P.	BLEED OPTIONAL	BLEED CAPACITY

Bleed Capacity

Calculated based on nominal capacity of valve specified by manufacturer or Parker.

Typically 30% or less.

Calculated by:

$$\frac{\text{Desired Bypass Capacity}}{\text{Rated Valve Capacity}} \times 100\%$$

Bleed

Denoted by "B".

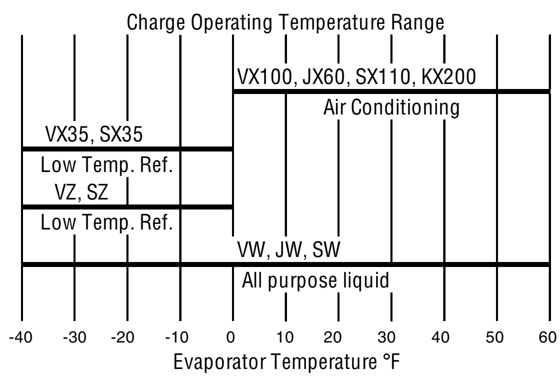
Not available on all TXVs.

See bleed capacity.

Used for equalizing system during off cycle (compressor unloading). Consult Parker.

See page 164.

M.O.P.
Maximum Operating Pressure



Rainbow Charge™ Refrigerant Designation

JW, JX60
VX100, VW, VX35, VZ
SW, SX35, SX110, SZ
KX200

Charge Type

"W" (all-purpose) liquid charge maintains nearly "flat" superheat control over a -40F° to +60F° (-40C° to +15C°) evaporator temperature range.

"Z" (low temperature) charge provides fast pulldown benefits like a gas charge with the non-migrating benefits of a liquid charge; usable over a -40F° to 0F° (-40C° to -20C°) evaporator temperature range.

"X" (damped response) gas charge provides a pressure limiting (MOP) charge with anti-hunt characteristics over a -40F° to +60F° (-40C° to +15C°) evaporator temperature range.

Notes: M.O.P. not available on "W" or "Z" charge.

*May not be used on systems in which bulb temperature will exceed 130 ° F (i.e. defrost). Contact Parker for pressure and temperature.

S Series

Parker's S series is well suited for new or replacement installations on a variety of small to medium tonnage air-conditioning, heat pump, and refrigeration systems. A brass body with standard ODF solder connections and balanced port construction lends itself to installation on systems requiring stability and control under low load and other varying conditions.

Applications
- Air Conditioning
- Heat Pumps
- Commerical Refrigeration
- Transport Refrigeration
- Beverage Dispensers
- Dehumidifiers
- Ice Machines

Features and Benefits
- 60" capillary tube with shock loop
- Optional external equalizer
- Stainless steel power element
- Weight: .7 lbs. (.32 kg)
- Optional bleed
- Field adjustable superheat

Specifications

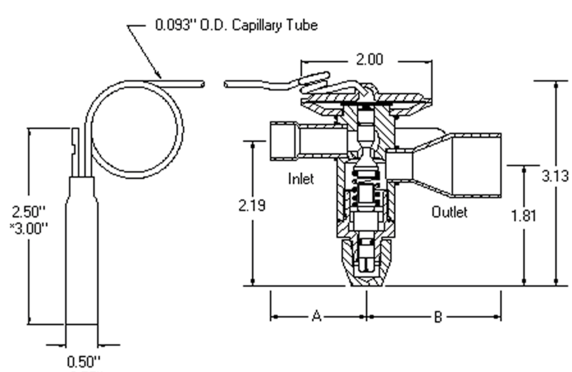
Refrigerant	Refrigerant Designation	Capacity Range Tons	Internally Equalized Models	Externally Equalized Models	Rainbow Charges™	Inlet Connection ODF (Optional)	Outlet Connection ODF (Optional)	Equalizer Connection (Optional)
R-12 R-134a R-401A R-401B	J	1/8 - 1/2	S 1/2J	SE 1/2J	W, X60	1/4 (3/8)	1/2 (3/8)	1/4" ODF (1/4" SAE)
		1/4 - 1	S 1J	SE 1J		3/8 (1/4)	1/2 (3/8)	
		1 - 2	S 2J	SE 2J		1/2	5/8 (7/8)	
		1 1/2 - 3	S 3J	SE 3J		1/2	7/8 (5/8)	
		3 1/2 - 5	S 5J	SE 5J		5/8	7/8	
R- 402B R- 404A R-402A R- 502 R- 507	S	1/8 - 1/2	S 1/2S	SE 1/2S	W, Z, X110 X35	1/4 (3/8)	1/2 (3/8)	1/4" ODF (1/4" SAE)
		1/4 - 1	S 1S	SE 1S		3/8 (1/4)	3/8	
		1 - 2	S 2S	SE 2S		1/2	5/8 (7/8)	
		1 1/2 - 4	S 4S	SE 4S		1/2	7/8 (5/8)	
		4 1/2 - 6	S 6S	SE 6S		5/8	7/8	
R-22 R-407C	V	1/5 - 3/4	S 3/4V	S 3/4V	W, Z, X100 X35	1/4 (3/8)	1/2 (3/8)	1/4" ODF (1/4" SAE)
		1/2 - 1 1/2	S 1-1/2V	SE 1-1/2V		3/8 (1/4)	1/2 (3/8)	
		1 1/2 - 3	S 3V	SE 3V		1/2	5/8 (7/8)	
		3 1/2- 5	S 5V	SE 5V		1/2	7/8 (5/8)	
		5 1/2 - 7 1/2	S 7 1/2	SE 7-1/2V		5/8	7/8	
		8 - 10	S 10	SE 10V		5/8	7/8	
R-410A	K	1/2 - 1 1/2	S 1 1/2K	SE 1 1/2K	KX200	3/8	1/2	1/4" ODF (1/4" SAE)
		1 1/2 - 3	S 3K	SE 3K		3/8	1/2	
		3 1/2 - 5	S 5K	SE 5K		1/2	5/8	
		5 1/2 - 7 1/2	S 7K	SE 7K		1/2	5/8	
		7 1/2 - 9	S 9K	SE 9K		5/8	7/8	

Notes:
1. U.L. recognized for maximum operational pressure of 650 psig (45 bars).
2. Maximum storage temperature 130°F (55°C).
3. Consult Parker for pressure and temperature exceptions.
4. Do not use "W" or "Z" liquid charges in applications where bulb temperatures can exceed 130°F (55°C). For these applications use type "X" MOP gas charge only.

Dimensions

Fitting	Inlet A	Outlet B
1/4 ODF	1.46	-
3/8 ODF	1.69	1.69
1/2 ODF	1.46	1.46
5/8 ODF	1.57	1.57
7/8 ODF	-	2.07

* VX100, KX200 only



Parker Hannifin Corporation
Climate & Industrial Controls Group
Cleveland, OH

I Series

The right angle I Series with pure copper connections is an ideal compact size brass valve where landscape and precise control is of greatest concern (as in fractional horsepower refrigeration systems). The superheat is factory set to optimize system performance for original equipment applications.

Applications

- Salad Bars
- Ice Machines
- Slush Machines
- Vending Machines
- Beverage Dispensers
- Back bar Reach-in Cases
- Mobile/Self-contained Cases

Features and Benefits

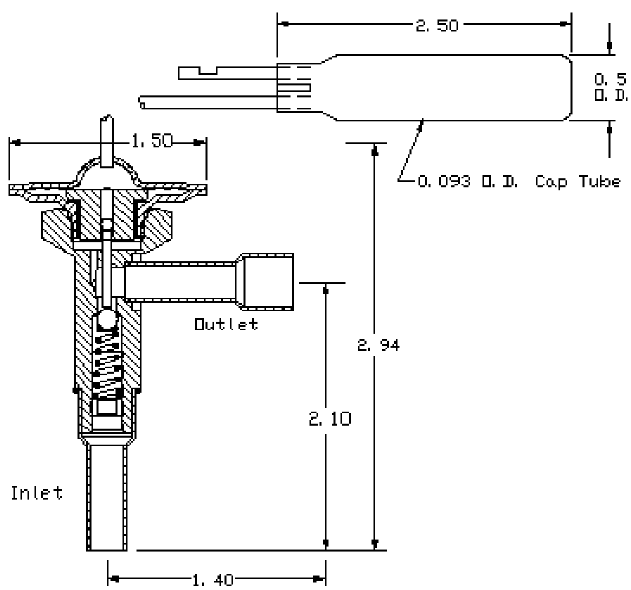
- Bottom Inlet
- Stainless steel power element
- 30" capillary tube
- Factory set superheat
- W, Z charges
- Weight: 3.5 oz / 0.1 k

Specifications

Refrigerant	Refrigerant Designation	Nominal Capacity	Capacity Range	Model No. Internally Equalized	Rainbow Charges™	Inlet Connection	Outlet Connection
R-12 R134a R-401A R-401B	J	1/2 1	1/4 - 1/2 3/4 - 1	I 1/2J I 1J	W W	1/4" ODF	3/8" ODF
R-402A R-402B R-404A R-502 R-507	S	1/2 1	1/4 - 1/2 3/4 - 1	I 1/2S I 1S	W, Z W, Z	1/4" ODF	3/8" ODF
R-22 R-407C	V	1 2	1/2 - 1 1 1/2 - 2	I 1V I 2V	W, Z W, Z	1/4" ODF	3/8" ODF

Notes:
1. Maximum operational pressure 500 psig (35 bars) high side and 275 psig (19 bars) low side.
2. Maximum storage temperature 130°F (55°C).
3. Consult Parker for pressure and temperature exceptions.
4. Do not use "W" or "Z" liquid charges in applications where bulb temperatures can exceed 130°F (55°C).

Dimensions



Parker
Parker Hannifin Corporation
Climate & Industrial Controls Group
Cleveland, OH

EG Series

The EG series refrigeration right angle brass body expansion valve incorporates a new shock loop, stainless steel power element, and a removable inlet strainer, making it an ideal choice for commerical refrigeration and supermarket applications. New Rainbow Charges™ are noted below for use on medium temperature (“W” charges), low temperature (“Z” charges) or MOP (“X” charges). See details on page 135.

Applications

- Supermarket Cases
- Self-contained Cases
- Walk-in Coolers/Freezers
- Ice Machines
- Salad Bars
- Transport Refrigeration

Features and Benefits

- Stainless steel power element
- 30" capillary tube with shock loop
- Removable inlet strainer
- Field adjustable superheat
- 1/4" ODF external equalizer
- W, Z or MOP (X) charges available
- Weight: 1.0 lbs / 0.45 kg

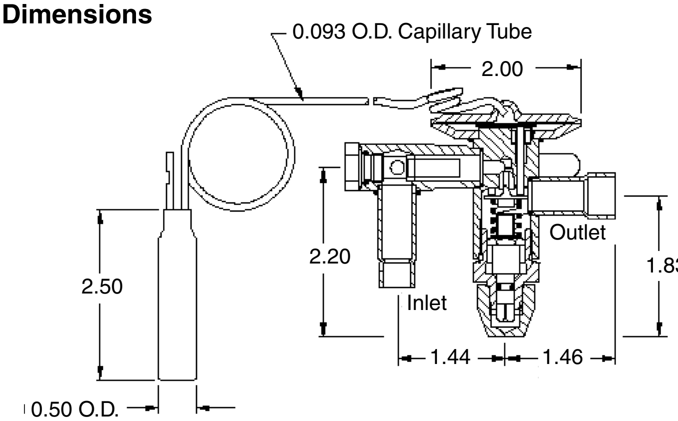
Specifications

Refrigerant	Refrigerant Designation	Nominal Capacity	Internally Equalized	Externally Equalized	Rainbow Charges™	Inlet Connection	Outlet Connection
R-12 R-134a R-401A R-401B	J	1/8 1/4 1/2 1 1 1/2 2	EG 1/8 J EG 1/4 J EG 1/2 J EG 1 J EG 1-1/2 J EG 2 J	EGE 1/8 J EGE 1/4 J EGE 1/2 J EGE 1 J EGE 1-1/2 J EGE 2 J	W, X60	3/8" ODF	1/2" ODF
R-402B R-404A R-402A R-502 R-507	S	1/8 1/4 1/2 1 1 1/2 2	EG 1/8 S EG 1/4 S EG 1/2 S EG 1 S EG 1-1/2 S EG 2 S	EGE 1/8 S EGE 1/4 S EGE 1/2 S EGE 1 S EGE 1-1/2 S EGE 2 S	W, Z, X35, X110	3/8" ODF	1/2" ODF
R-22 R-407C	V	1/4 1/2 1 1 1/2 2 2 1/2 3	EG 1/4 V EG 1/2 V EG 1 V EG 1-1/2 V EG 2 V EG 2 1/2V EG 3 V	EGE 1/4 V EGE 1/2 V EGE 1 V EGE 1-1/2 V EGE 2 V EGE 2 1/2 V EGE 3 V	W, Z, X35, X100	3/8" ODF	1/2" ODF

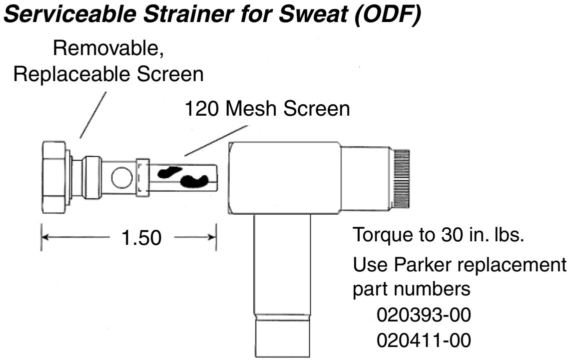
Notes:

1. Maximum operational pressure 500 psig (35 bars) high side and 275 psig (19 bars) low side.
2. Maximum storage temperature 130°F (55°C).
3. Consult Parker for pressure and temperature exceptions.
4. Do not use “W” or “Z” liquid charges in applications where bulb temperatures can exceed 130°F (55°C). For these applications use type “X” MOP gas charge only.

Dimensions



Serviceable Strainer for Sweat (ODF)



EGC Series

This valve is similar to the EG series except it incorporates an internal check valve, providing reverse flow up to 2 tons for hot or cool gas defrost applications. This eliminates the need for an external check valve and related bypass plumbing. A brass body, ODF solder connections, stainless steel power element and a removable inlet strainer make installations easier. New Rainbow Charges™ listed below cover medium "W" temperature charges, low "Z" temperature charges or MOP "X" charges.

Applications

- Hot Gas Defrost
- Cool Gas Defrost
- Supermarket Cases
- Back Shelf Storage Cases
- Walk-in Coolers/Freezers
- Salad Bars
- Transport Refrigeration

Features and Benefits

- Extended ODF connections
- Balanced port design
- 30" capillary tube with shock loop
- Stainless steel power element
- Field adjustable superheat
- 1/4" ODF external equalizer
- Rainbow charges available
- Weight: 1.0 lbs / 0.45 kg

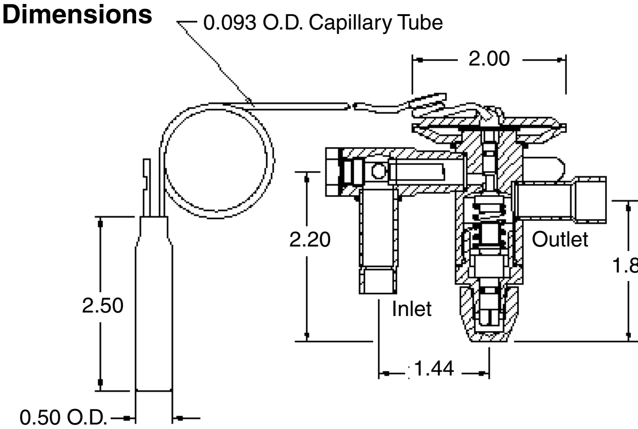
Specifications

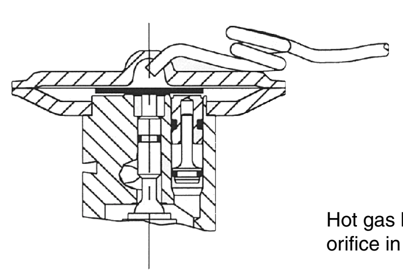
Refrigerant	Refrigerant Designation	Nominal Capacity	Internally Equalized	Externally Equalized	Rainbow Charges™	Inlet Connection	Outlet Connection
R-12 R-134a R-401A R-401B	J	1/8 1/4 1/2 1 1 1/2 2	EGC 1/8 J EGC 1/4 J EGC 1/2 J EGC 1 J EGC 1-1/2 J EGC 2 J	EGCE 1/8 J EGCE 1/4 J EGCE 1/2 J EGCE 1 J EGCE 1-1/2 J EGCE 2 J	W, X60	3/8" ODF	1/2" ODF
R-402B R-404A R-402A R-502 R-507	S	1/8 1/4 1/2 1 1 1/2 2	EGC 1/8 S EGC 1/4 S EGC 1/2 S EGC 1 S EGC 1-1/2 S EGC 2 S	EGCE 1/8 S EGCE 1/4 S EGCE 1/2 S EGCE 1 S EGCE 1-1/2 S EGCE 2 S	W, Z, X35, X110	3/8" ODF	1/2" ODF
R-22 R-407C	V	1/4 1/2 1 1 1/2 2	EGC 1/4 V EGC 1/2 V EGC 1 V EGC 1-1/2 V EGC 2 V	EGCE 1/4 V EGCE 1/2 V EGCE 1 V EGCE 1-1/2 V EGCE 2 V	W, Z, X35, X100	3/8" ODF	1/2" ODF

Notes:

1. Maximum operational pressure 500 psig (35 bars) high side and 275 psig (19 bars) low side.
2. Maximum storage temperature 130°F (55°C)
3. Consult Parker for pressure and temperature exceptions.
4. Do not use "W" or "Z" liquid charges in applications where bulb temperatures can exceed 130°F (55°C). For these applications use type "X" MOP gas charge only.

Dimensions





Hot gas bypasses txv orifice in defrost

CHECK VALVE SECTION

RE Series

The Parker RE series valve utilizes balanced port construction to provide optimum operation on medium to large tonnage air conditioning and refrigeration systems. Two brass body styles with copper ODF connections and a removable Rainbow Charged™ thermostatic power element provide the stability and control required in a variety of applications, especially where there are wide changes in load conditions. Body Style 1 has an R-22 nominal capacity up to 30 tons, while Body Style 2 extends the capacity range to 70 tons.

Applications

- Air Conditioning
- Process Chillers
- Industrial Refrigeration
- Transport Refrigeration

Features and Benefits

- Balanced port design
- Removable stainless steel power element
- Field adjustable superheat
- 1/4" sweat external equalizer
- Rainbow Charges™
- Weight: Body Style 1 - 1.7 lbs. / .77 kg
  Body Style 2 - 2.5 lbs. / 1.13 kg
- Forward or reverse flow
- 60" capillary tube (120" optional)

Specifications

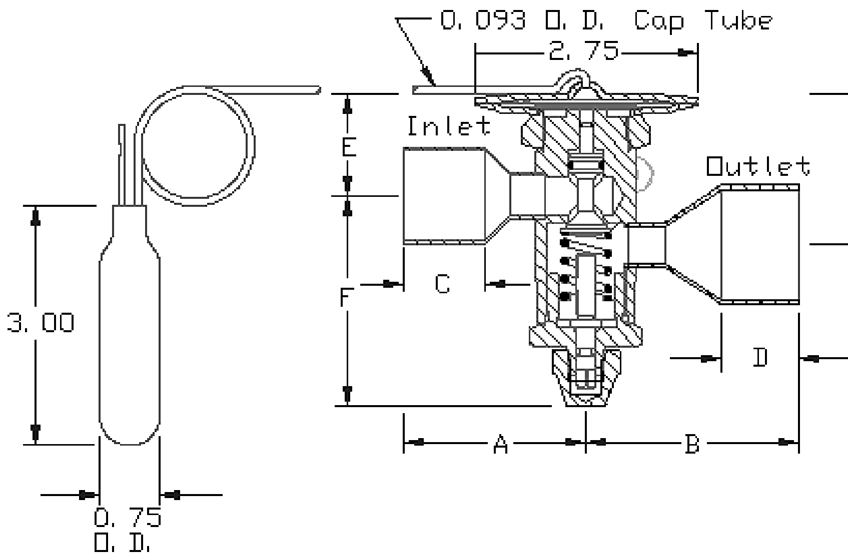
Refrigerant	Refrigerant Designation	Nominal Capacity	Body Style	Externally Equalized	Rainbow Charges™	Inlet Connection (Optional)	Outlet Connection
R-12 R-134a R-401A R-401B	J	6	1	RE 6 J	W, X60	5/8"	7/8"
		9	1	RE 9 J		7/8"	1-1/8"
		12	1	RE 12 J		7/8 (1-1/8")	1-3/8"
		16	1	RE 16 J		1-1/8"	1-3/8"
		23	2	RE 23 J		1-1/8"	1-3/8"
		40	2	RE 40 J		1-1/8"	1-5/8"
R-402B R-404A R-402A R-502 R-507	S	6	1	RE 6 S	W, Z, X110, X35	5/8"	7/8"
		9	1	RE 9 S		7/8"	1-1/8"
		12	1	RE 12 S		7/8 (1-1/8")	1-3/8"
		21	1	RE 21 S		1-1/8"	1-3/8"
		30	2	RE 30 S		1-1/8"	1-3/8"
		45	2	RE 45 S		1-1/8"	1-5/8"
R-22 R-407C	V	10	1	RE 10 V	W, Z, X100, X35	5/8"	7/8"
		15	1	RE 15 V		7/8"	1-1/8"
		20	1	RE 20 V		7/8 (1-1/8")	1-3/8"
		30	1	RE 30 V		1 -1/8"	1-3/8"
		40	2	RE 40 V		1-1/8"	1-3/8"
		70	2	RE 70 V		1-1/8"	1-5/8"

Notes:
1. Maximum operational pressure 500 psig (35 bars) high side and 275 psig (19 bars) low side.
2. Maximum storage temperature 130°F (55°C)
3. Consult Parker for pressure and temperature exceptions.
4. Do not use "W" or "Z" liquid charges in applications where bulb temperatures can exceed 130°F (55°C). For these applications use type "X" MOP gas charge only.

TXVs & AXVs

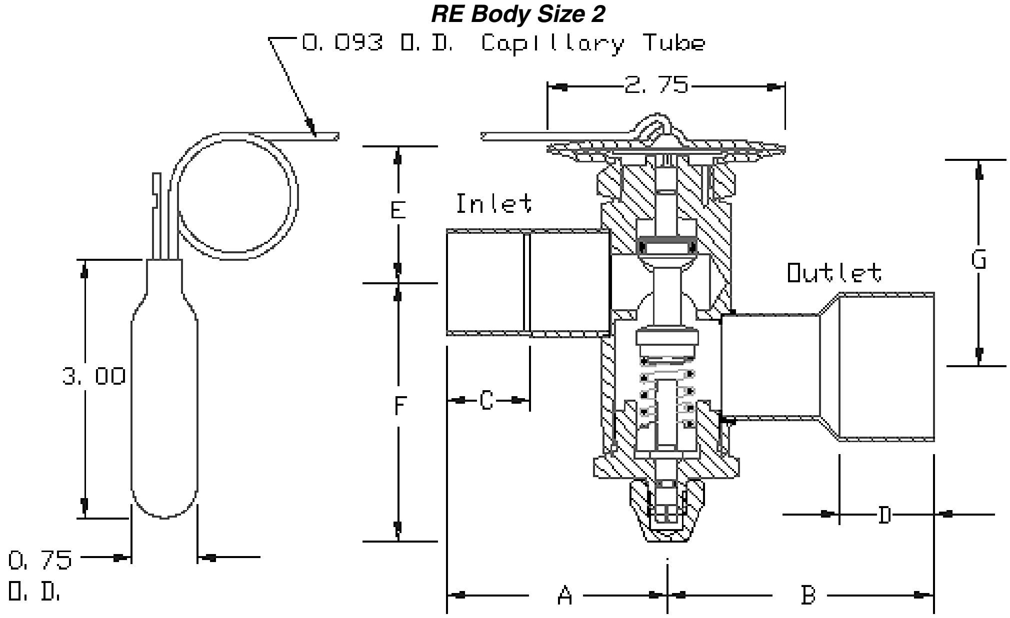
Dimensions

RE Body Size 1



Fitting Size	RE Body Size 1						
ODF	A	B	C	D	E	F	G
5/8	1.55	–	0.36 Min	–	1.45	2.56	2.06
7/8	2	2	.73 Min.	.73 Min.	1.45	2.56	2.06
1 1/8	2.3	2.3	.93 Min.	.93 Min.	1.45	2.56	2.06
1 3/8	–	2.68	–	.93 Min.	1.45	2.56	2.06

RE Body Size 2



Fitting Size	RE Body Size 2						
ODF	A	B	C	D	E	F	G
1 1/8	2.7	2.7	.91 Min.	.91 Min.	1.83	2.96	2.81
1 3/8	–	2.85	–	.97 Min.	1.83	2.96	2.81
1 5/8	–	3.13	–	1.09 Min.	1.83	2.96	2.81

H Series and HC Series

The H series balanced port valve is designed specifically for air conditioning and heat pumps used in both air or water source systems. It offers features such as select indoor and/or outdoor thermostatic Rainbow Charges™, bleeds, and a variety of connection styles for the inlet, outlet, and external equalizer.

The HC series adds a built-in 5 ton check valve for R-22, R-407C and R-410A heat pump applications with either factory set or field adjustable superheat.

Applications
- Air Conditioning Systems
- Heat Pump Systems
- Bi-flow (package) Systems

Features and Benefits
- Stainless steel power element
- Bypass bleeds available
- Bi-directional metering available
- Weight: 10.7 oz. (.30 kg)
- Factory set or field adjustable superheat
- Low pressure drop internal check valve

Specifications

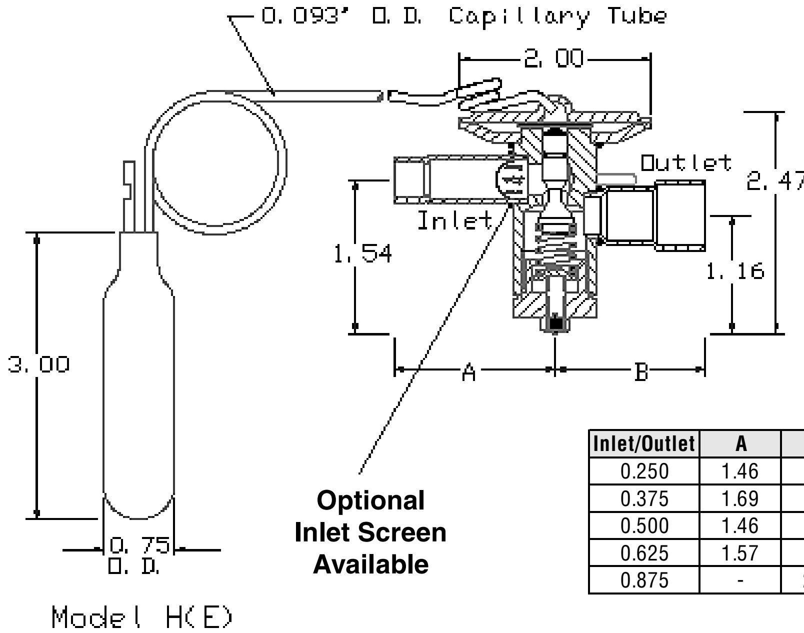
Refrigerant	Regfrigerant Designation	Capacity Range	Nominal Capacity	Internal Equalized	Exterior Equalized	Rainbow Charges	Bleed for Off Cycle Operation	Inlet Connections	Outlet Connections
R-407C	V	1/2 - 1 1/2	1 - 1/2	HA 1-1/2V	HAE 1 1/2V	X-100A, X100	B	1/4, 3/8, 1/2 & 5/8" ODF flo-rater	3/8,1/2,5/8 & 7/8" ODF flo-rater
		1 1/2 - 3	3	HA 3V	HAE 3V		B		
		3 1/2 - 5	5	HA 5V	HAE 5V		B		
		5 1/2 - 7 1/2	7 1/2	-	HAE 7 1/2V		B		
		8 - 10	10	-	HAE 10V		B		
		models with internal check valves - "C" designation							
		1/2 - 1 1/2	1 1/2V	HCA1-1/2V	HCAE 1 1/2V	X100A, X100	B	1/4, 3/8, 1/2 & 5/8" ODF flo-rater	3/8,1/2,5/8 & 7/8" ODF flo-rater
		1 1/2 - 3	3	HCA 3V	HCAE 3V		B		
		3 1/2 - 5	5	HCA 5V	HCAE 5V		B		
R-410A	K	1/2 - 1 1/2	1 1/2V	HA 1-1/2K	HAE 1 1/2K	X200	B	1/4, 3/8, 1/2 & 5/8" ODF flo-rater	3/8,1/2,5/8 & 7/8" ODF flo-rater
		1 1/2 - 3	3	HA 3K	HAE 3K		B		
		3 1/2 - 5	5	HA 5K	HAE 5K		B		
		5 1/2 - 7	7	-	HAE 7K		B		
		7 1/2 - 9	9	-	HAE 9K		B		
		specific models with internal check valves - "C" designation							
		1/2 - 1 1/2	1 1/2	HCA1-1/2K	HCAE 1 1/2K	X200	B	1/4, 3/8, 1/2 & 5/8" ODF flo-rater	3/8,1/2,5/8 & 7/8" ODF flo-rater
		1 - 2	2	HCA 2K	HCAE 2K		B		
		1 1/2 - 3	3	HCA 3K	HCAE 3K		B		
		3 1/2 - 5	5	HCA 5K	HCAE 5K		B		

Notes:
1. U.L. recognized for maximum operational pressure of 650 psig (45 bars).
2. Maximum storage temperature 130°F (55°C).
3. Consult Parker for pressure and temperature exceptions.

Parker Hannifin Corporation
Climate & Industrial Controls Group
Cleveland, OH

Dimensions

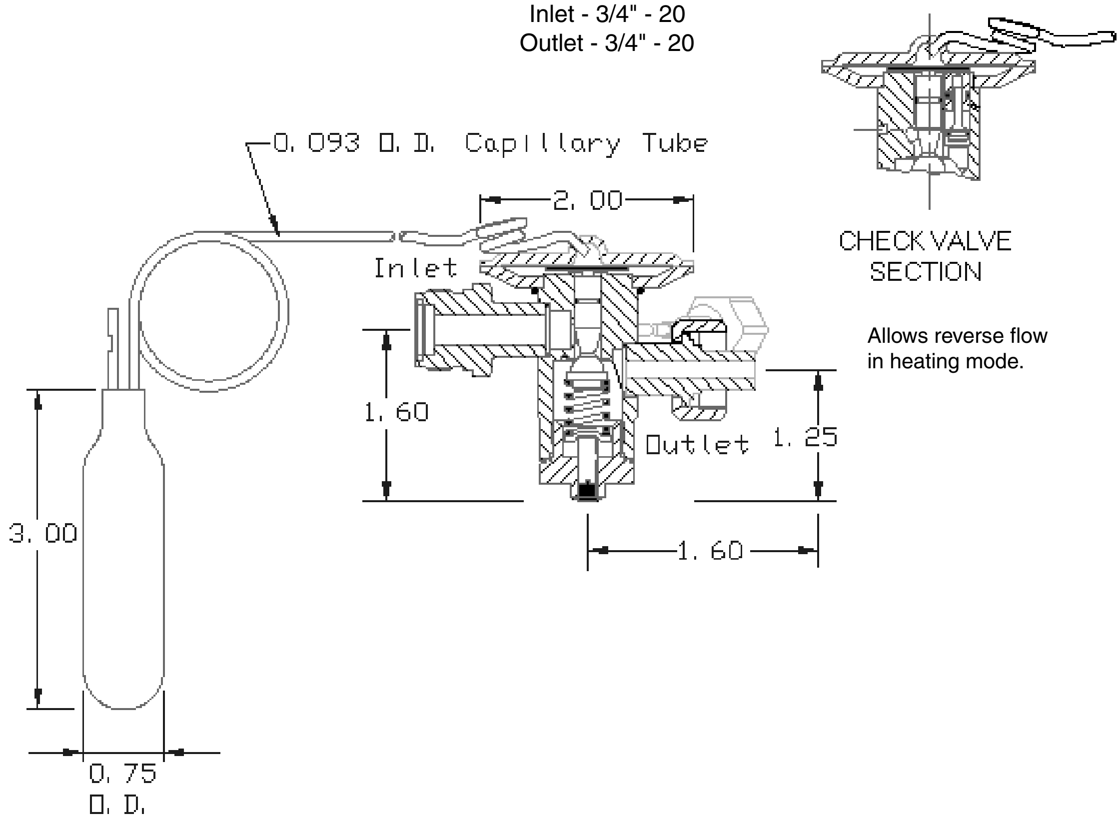
H and& HC Series
Dimensions (inches)
Connections (ODF)



Optional Inlet Screen Available

Inlet/Outlet	A	B
0.250	1.46	1.46
0.375	1.69	1.69
0.500	1.46	1.46
0.625	1.57	1.57
0.875	-	2.07

H and HC Series
Connections - flo-rater
Inlet - 3/4" - 20
Outlet - 3/4" - 20



Allows reverse flow in heating mode.

EC Series

The EC series features extended ODF solder connections, brass body, and balanced port design. The new stainless steel power element makes it suited for both refrigeration and air conditioning applications. Rainbow Charges™ are indicated in the chart below for medium temperature “W” charges, low temperature “Z” charges or MOP “X” charge for those applications.

Applications

- Small Chillers
- Heat Pump Units
- Air Conditioning Units
- Freezers
- Walk-in Boxes
- Refrigerated Cases
- Mobile Refrigeration

Features and Benefits

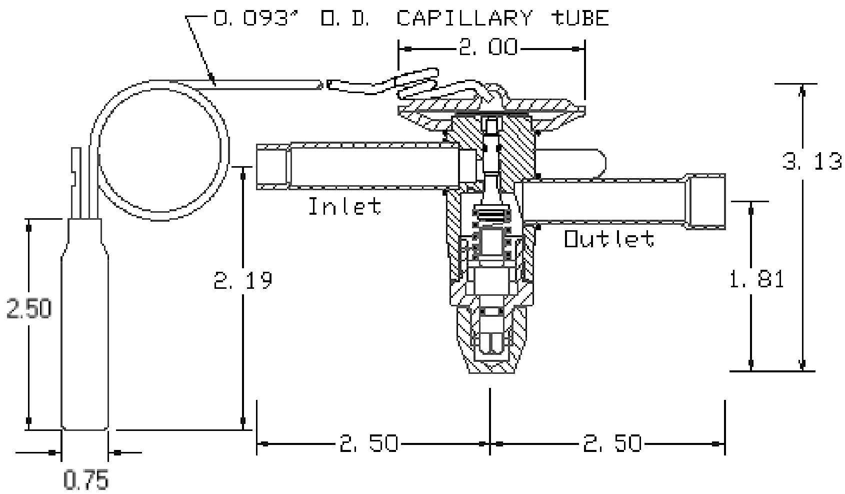
- Extended ODF connections
- Balanced port design
- 30" capillary tube with shock loop
- Stainless steel power element
- Field adjustable superheat
- 1/4" ODF external equalizer
- Rainbow charges available
- Weight: 1.0 lbs / 0.45 kg

Specifications

Refrigerant	Refrigerant Designation	Orifice Designation	Capacity Range	Internally Equalized	Externally Equalized	Rainbow Charges™	Inlet Connection	Outlet Connect (Optional)	Equalizer Connection
R-12 R-134a R-401A R-401B	J	AA A B C	1/8 - 1/2 1/4 - 1 1 - 2 1 1/2 - 3	EC-AA-J EC-A-J EC-B-J EC-C-J	ECE-AA-J ECE-A-J ECE-B-J ECE-C-J	W, X60	3/8" ODF	1/2" ODF (5/8" ODF)	1/4" ODF
R-402A R-402B R-404A R-502 R-507	S	AA A B C	1/8 - 1/2 1/4 - 1 1 - 2 1 1/2 - 4	EC-AA-S EC-A-S EC-B-S EC-C-S	ECE-AA-S ECE-A-S ECE-B-S ECE-C-S	W, Z, X110 X35	3/8" ODF	1/2" ODF (5/8" ODF)	1/4" ODF
R-22 R-407C	V	AA A B C	1/5 - 3/4 1/2 - 1 1/2 1 1/2 - 3 3 1/2 - 5	EC-AA-V EC-A-V EC-B-V EC-C-V	ECE-AA-V ECE-A-V ECE-B-V ECE-C-V	W, Z, X100 X35	3/8" ODF	1/2" ODF (5/8" ODF)	1/4" ODF

Notes:
1. Maximum operational pressure 500 psig (35 bars) high side and 275 psig (19 bars) low side.
2. Maximum storage temperature 130°F (55°C) .
3. Consult Parker for pressure and temperature exceptions.
4. Do not use “W” or “Z” liquid charges in applications where bulb temperatures can exceed 130°F (55°C). For these applications use type “X” MOP gas charge only.

Dimensions



Parker Hannifin Corporation
Climate & Industrial Controls Group
Cleveland, OH

ECC Series

The ECC series is similar to the EC series except it incorporates an internal check valve, providing reverse flow of up to 2 tons for hot or cool gas defrost applications. This eliminates the need for an external check valve and related hot gas plumbing. A brass body, ODF solder connections, and a removable inlet strainer make installations easier. New Rainbow Charges™ are indicated in the chart below for medium temperature "W" charges, low temperature "Z" charges or MOP "X" charge for those applications.

Applications

- Heat Pump Units
- Air Conditioning Units
- Freezers
- Walk-in Boxes
- Refrigerated Cases

Features and Benefits

- Extended ODF connections
- Balanced port design
- 30" capillary tube with shock loop
- Stainless steel power element
- Field adjustable superheat
- 1/4" ODF external equalizer
- Rainbow charges available
- Weight: 1.0 lbs / 0.45 kg

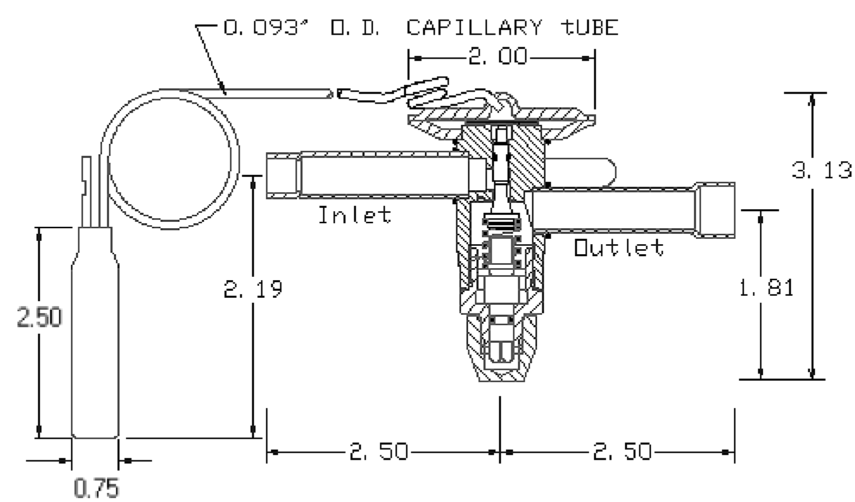
Specifications

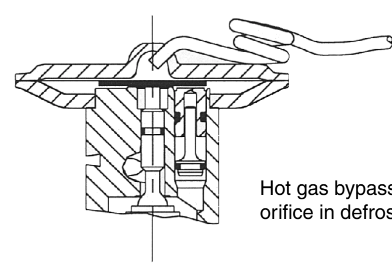
Refrigerant	Refrigerant Designation	Orifice Designation	Capacity Range	Internally Equalized	Externally Equalized	Rainbow Charges™	Inlet Connection	Outlet Connect (Optional)	Equalizer Connection
R-12 R-134a R-401A R-401B	J	AA A B C	1/8 - 1/2 1/4 - 1 1 - 2 1 1/2 - 3	ECC-AA-J ECC-A-J ECC-B-J ECC-C-J	ECCE-AA-J ECCE-A-J ECCE-B-J ECCE-C-J	W, X60	3/8" ODF	1/2" ODF (5/8" ODF optional)	1/4" ODF
R-402A R-402B R-404A R-502 R-507	S	AA A B C	1/8 - 1/2 1/4 - 1 1 - 2 1 1/2 - 4	ECC-AA-S ECC-A-S ECC-B-S ECC-C-S	ECCE-AA-S ECCE-A-S ECCE-B-S ECCE-C-S	W, Z, X110 X35	3/8" ODF	1/2" ODF (5/8" ODF optional)	1/4" ODF
R-22 R-407C	V	AA A B C	1/5 - 3/4 1/2 - 1 1/2 1 1/2 - 3 3 1/2 - 5	ECC-AA-V ECC-A-V ECC-B-V ECC-C-V	ECCE-AA-V ECCE-A-V ECCE-B-V ECCE-C-V	W, Z, X100 X35	3/8" ODF	1/2" ODF (5/8" ODF optional)	1/4" ODF

Notes:

1. Maximum operational pressure 500 psig (35 bars) high side and 275 psig (19 bars) low side.
2. Maximum storage temperature 130°F (55°C).
3. Consult Parker for pressure and temperature exceptions.
4. Do not use "W" or "Z" liquid charges in applications where bulb temperatures can exceed 130°F (55°C). For these applications use type "X" MOP gas charge only.

Dimensions





CHECK VALVE SECTION

Parker
Parker Hannifin Corporation
Climate & Industrial Controls Group
Cleveland, OH

G Series

The G series features a brass body with SAE flare connections and is available internally or externally equalized through a 1/4" SAE male fitting. It provides accurate and stable control over changing loads, and is an ideal selection for refrigeration and air conditioning systems. An array of Rainbow Charges™ provide the necessary control and operation.

Applications

- Small Refrigeration Machines
- Slush Machines
- Air Conditioning Units
- Freezers
- Walk-in Boxes
- Refrigerated Cases

Features and Benefits

- 30" capillary tube with shock loop
- Stainless steel power element
- Field adjustable superheat
- 1/4" SAE external equalizer
- Inlet strainer
- Rainbow Charges™ available
- Weight: 1.0 lbs / 0.45 kg

Specifications

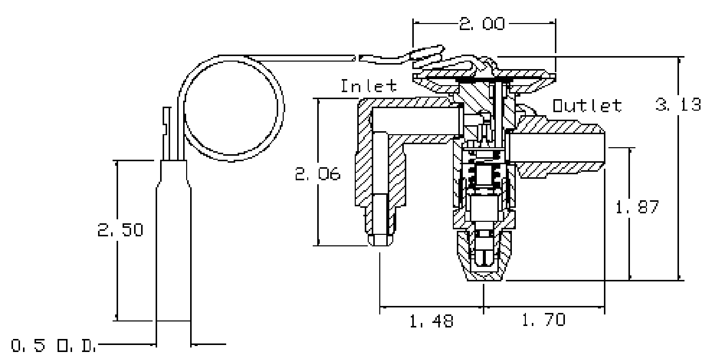
Refrigerant	Refrigerant Designation	Nominal Capacity	Internally Equalized	Externally Equalized	Rainbow Charges™	Inlet Connection (Optional)	Outlet Connection (Optional)	Equalizer Connection
R-12 R-134a R-401A R-401B	J	1/8	G 1/8 J	GE 1/8 J	W, X60	1/4" SAE & (3/8")	1/2" SAE	1/4" SAE
		1/4	G 1/4 J	GE 1/4 J				
		1/2	G 1/2 J	GE 1/2 J				
		1	G 1 J	GE 1 J		3/8" SAE		
		1 1/2	G 1-1/2 J	GE 1-1/2 J				
		2	G 2 J	GE 2 J				
		2 1/2	G 2-1/2 J	GE 2-1/2 J				
		3	G 3 J	GE 3 J		3/8" SAE & (1/2")	1/2" SAE & (5/8")	
		5	G 5 J	GE 5 J		1/2" SAE	5/8" SAE	
R-402A R-402B R-404A R-502 R-507	S	1/8	G 1/8 S	GE 1/8 S	W, Z, X110 X35	1/4" SAE & (3/8")	1/2" SAE	1/4" SAE
		1/4	G 1/4 S	GE 1/4 S				
		1/2	G 1/2 S	GE 1/2 S				
		1	G 1 S	GE 1 S		(1/4" SAE) 3/8" SAE		
		1-1/2	G 1-1/2 S	GE 1-1/2 S				
		2	G 2 S	GE 2 S				
		2-1/2	G 2-1/2 S	GE 2-1/2 S				
		3	G 3 S	GE 3 S		3/8" SAE	1/2" SAE	
		4	G 4S	GE 4 S				
		6	G 6 S	GE 6 S		1/2" SAE	5/8" SAE	
R-22 R-407C	V	1/4	G 1/4 V	GE 1/4 V	W, Z, X100 X35	1/4" SAE & (3/8")	1/2" SAE	1/4" SAE
		1/2	G 1/2 V	GE 1/2 V				
		1	G 1 V	GE 1 V		3/8" SAE & 1/4" SAE		
		1 1/2	G 1-1/2 V	GE1-1/2 V				
		2 1/2	G 2 1/2 V	GE 2 1/2V				
		2	G 2 V	GE 2 V		3/8" SAE & 1/2"	3/8" SAE & (1/2")	
		3	G 3 V	GE 3 V			1/2" SAE & (5/8")	
		4	G 4 V	GE 4 V		1/2" SAE	5/8" SAE	
		5	G 5 V	GE 5 V				
		8	G 8 V	GE 8 V				

Notes:
1. Maximum operational pressure 500 psig (35 bars) high side and 275 psig (19 bars) low side.
2. Maximum storage temperature 130°F (55°C).
3. Consult Parker for pressure and temperature exceptions.
4. Do not use “W” or “Z” liquid charges in applications where bulb temperatures can exceed 130°F (55°C). For these applications use type “X” MOP gas charge only.

Optional inlet screen available.

Use Parker part numbers:
056813-00
056820-00

Dimensions



N Series

This small flare brass valve series is ideally suited where space is at a premium. Its stainless steel power element and compact body has always made it the first choice for installation in commercial refrigeration systems. External equalized models are provided with a 30" capillary and 1/4" SAE flare nut, eliminating the need to run a separate equalizer line. Medium, low & MOP (X) charges are available as noted below.

Applications

- Low Profile Coolers
- Beverage Dispensers
- Beverage Boxes
- Small Chillers
- Ice Machines
- Small Freezers

Features and Benefits

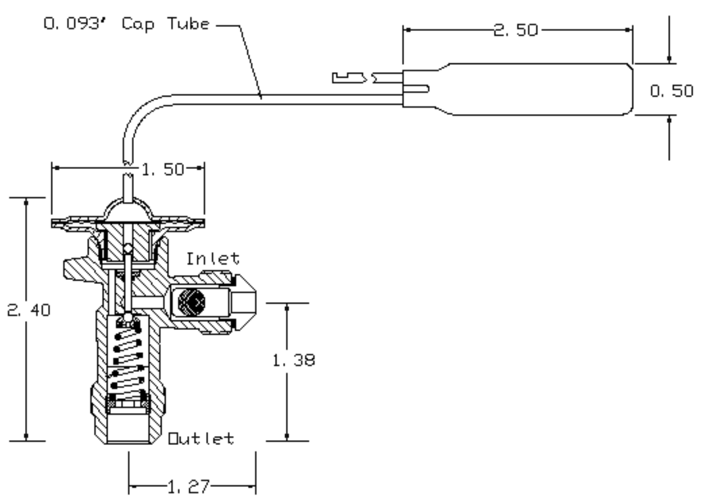
- Compact body
- Removable inlet screen
- Factory set superheat
- Accurate and stable control
- Right angle configuration
- 30" capillary tube
- Weight: 5.0 oz. / .14 kg

Specifications

Refrigerant	Refrigerant Designation	Nominal Capacity	Capacity Range	Internally Equalized	Externally Equalized	Rainbow Charges™	Inlet Connection	Outlet Connection
R-12								
R-134a		1/4	1/4 - 1/2	N 1/4 J			1/4 SAE	1/2 SAE
R-401A	J	1/2	1/4 - 3/4	N 1/2 J		W, X60	1/4 SAE	
R-401B		2	1 - 2	N 2 J	NE 2 J		3/8 SAE	
R-402A								
R-402B		1/4	1/4 - 1/2	N 1/4 S			1/4 SAE	
R-404A	S	1/2	1/4 - 3/4	N 1/2 S		W, Z, X110	1/4 & 3/8 SAE	1/2 SAE
R-502		2	1 - 2	N 2 S	NE 2 S	X35	3/8 SAE	
R-507								
		1/4	1/4 - 1/2	N 1/4 V			1/4 SAE	
R-22		1/2	1/4 - 3/4	N 1/2 V		W, Z, X100		
R-407C	V	1	1/2 - 1	N 1 V		X35	1/4 or 3/8 SAE	1/2 SAE
		3	1 1/2 - 3	N 3 V	NE 3 V		3/8 SAE	

Notes:
1. Maximum operational pressure 500 psig (35 bars) high side and 275 psig (19 bars) low side.
2. Maximum storage temperature 130°F (55°C).
3. Consult Parker for pressure and temperature exceptions.
4. Do not use "W" or "Z" liquid charges in applications where bulb temperatures can exceed 130°F (55°C). For these applications use type "X" MOP gas charge only.

Dimensions



C Series

The C series incorporates a brass body with SAE flare fittings using balanced port construction, allowing operation over varying load conditions. Designed for use on small refrigeration and or air conditioning systems, the external equalized models are provided with a 1/4" SAE male connection. The new stainless steel power element element and shock loop provides added benefits to all installations. A variety of Rainbow Charges™ add further flexibility for operation and selection.

Applications

- Small Refrigeration Systems
- Slush Machines
- Air Conditioning Units
- Freezers
- Walk-in Coolers
- Refrigerated Cases
- Rail & Transport Refrigeration

Features and Benefits

- Balanced port
- Stainless steel power element
- Inlet strainer
- 30" capillary tube with shock loop
- Field adjustable superheat
- 1/4" SAE external equalizer
- Weight: 1.0 lbs / 0.45 kg

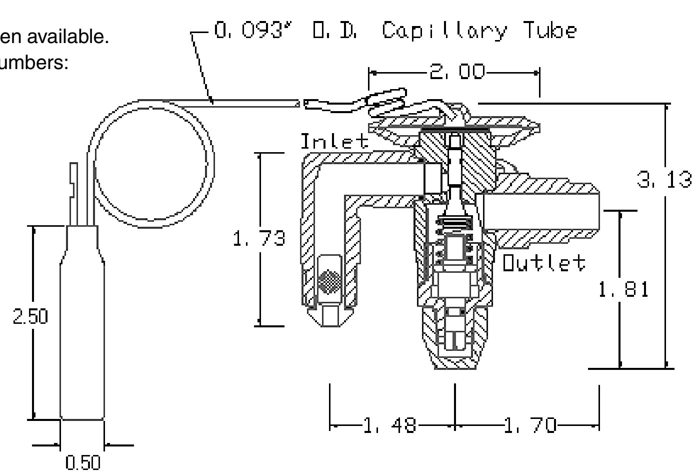
Specifications

Refrigerant	Refrigerant Designation	Orifice Designation	Capacity Range	Internally Equalized	Externally Equalized	Rainbow Charges™	Inlet Connection	Outlet Connection	Equalizer Connection
R-12		AA	1/8 - 1/2	C-AA-J	CE-AA-J		1/4"SAE (3/8" optional)		
R-134a		A	1/4 - 1	C-A-J	CE-A-J			1/2 SAE	1/4 SAE
R-401A	J	B	1 - 2	C-B-J	CE-B-J	W, X60	3/8" SAE		
R-401B		C	1 1/2 - 3	C-C-J	CE-C-J				
R-402A		AA	1/8 -1/2	C-AA-S	CE-AA-S		1/4 SAE (3/8" optional)		
R-402B		A	1/4 - 1	C-A-S	CE-A-S				
R-404A	S	B	1 - 2	C-B-S	CE-B-S	W, Z, X110	3/8" SAE	1/2 SAE	1/4 SAE
R-502		C	1 1/2 - 4	C-C-S	CE-C-S	X-35			
R-507									
		AA	1/5 - 3/4	C-AA-V	CE-AA-V		1/4 SAE (3/8" optional)		
R-22		A	1/2 - 1 1/2	C-A-V	CE-A-V	W, Z, X100		1/2 SAE	1/2 SAE
R-407C	V	B	1 1/2 - 3	C-B-V	CE-B-V	X-35	3/8 SAE		
		C	3 1/2- 5	C-C-V	CE-C-V				

Notes:
1. Maximum operational pressure 500 psig (35 bars) high side and 275 psig (19 bars) low side.
2. Maximum storage temperature 130°F (55°C).
3. Consult Parker for pressure and temperature exceptions.
4. Do not use “W” or “Z” liquid charges in applications where bulb temperatures can exceed 130°F (55°C). For these applications use type “X” MOP gas charge only.

Dimensions

Optional inlet screen available.
Use Parker part numbers:
056813-00
56820-00



Parker
Parker Hannifin Corporation
Climate & Industrial Controls Group
Cleveland, OH

B5 Series

The new Parker B5 series is designed to work with interchangeable orifice cartridges. This choice allows the highest accuracy and the easiest way to select the better flow into the system.

A special O-ring seal prevents leakage by the pin (saturated liquid from evaporator inlet) from spraying on the lower side of the power element and affecting valve operation. This also allows more versatility in bulb mounting location, as it is no longer a requirement to mount the bulb upstream of the external equalizer connection (it can be mounted either upstream or downstream) as there will be no flow of refrigerant.

Capillary tube on the top of the valve is brazed horizontally in order to avoid any braking during the installation.

Applications

- Air Conditioning Systems
- Refrigeration

Features and Benefits

- Works with interchangeable orifice cartridges.
- Versatility in bulb mounting location.
- Provides precise control for a variety of applications.
- Adjustable superheat is factory set at 5°C.
- Nominal capacities range is from 0.5 up to 17.5 kW (R22).

Specifications and Dimensions

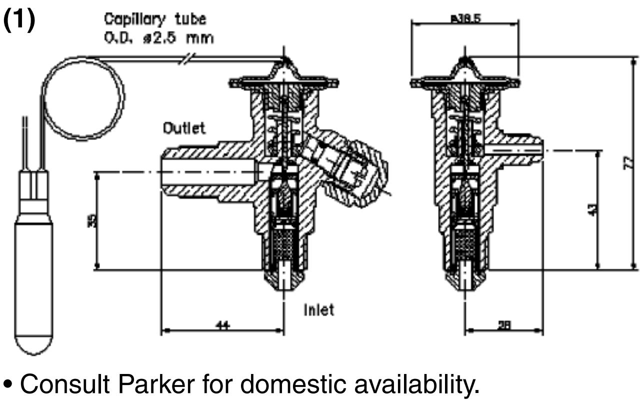
Model	Equalization	Inlet	Outlet	External Equalization	Dimensioned Drawing (Below)
B5	Internal	3/8" SAE	1/2" SAE	–	1
BE5	External	3/8" SAE	1/2" SAE	1/4" SAE	1
B5/S	Internal	3/8" SAE*	12 mm ODF	–	2
B5/SP	Internal	3/8" SAE*	1/2" ODF	–	2
BE5/S	External	3/8" SAE*	12 mm ODF	6 mm ODF	2
BE5/SP	External	3/8" SAE*	1/2" ODF	1/4" ODF	2

*See adaptors list at right.

*Adapters for Brazing Models

Model	Valve Body	Copper Tube
A2S	3/8" SAE	6 mm ODF
A2SP	3/8" SAE	1/4" ODF
A3S	3/8" SAE	10 mm ODF
A3SP	3/8" SAE	3/8" ODF

(1)



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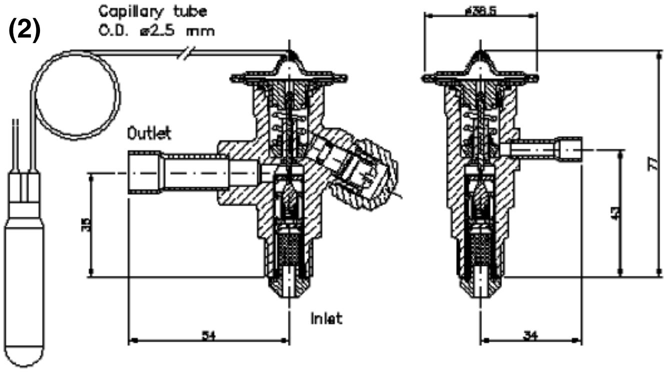


• Consult Parker for domestic availability.

Valves

Model	Refrigerant	May Be Used With	Mop	Capillary Tube
V-NX100	R407C	R22	100	1500 mm
V-NW	R407C	R22	–	1500 mm
JX60	R134a	R12, R401A, R401B	60	1500 mm
JW	R134a	R12, R401A, R401B	–	1500 mm
SX110	R404a	R125, R502, R402A, R402B, R507	110	1500 mm
SW	R404a	R125, R502, R402A, R402B, R507		1500 mm

Cartridges/Models and Nominal Capacities (kW)

Model	R22	R134a	R404A
Cx	0.5	0.4	0.38
C0	1.0	0.9	0.7
C1	2.5	1.8	1.6
C2	3.5	2.6	2.1
C3	5.2	4.6	4.2
C4	8.0	6.7	6.0
C5	10.5	8.6	7.7
C6	15.5	10.5	9.1

Capacity Tables

R22 (kW)

	Pressure Drop (bar)							
	2	4	6	8	10	12	14	16
	Evaporator Temperature +10°C							
CX	0.37	0.48	0.55	0.60	0.63	0.65	0.65	0.67
C0	0.87	1.1	1.2	1.30	1.4	1.4	1.4	1.5
C1	2.2	2.8	3.2	3.40	3.6	3.7	3.8	3.8
C2	3.0	4.0	4.7	5.10	5.4	5.6	5.8	5.8
C3	5.4	7.2	8.3	9.10	9.7	10.0	10.2	10.3
C4	8.1	10.8	12.5	13.80	14.5	15.0	15.4	15.5
C5	10.2	13.6	15.7	17.20	18.3	18.9	19.3	19.5
C6	12.6	16.7	19.3	21.00	22.3	23.1	23.5	23.7
	Evaporator Temperature 0°C							
CX	0.37	0.48	0.55	0.59	0.63	0.65	0.66	0.66
C0	0.84	1.0	1.2	1.30	1.3	1.4	1.4	1.4
C1	1.9	2.4	2.7	3.00	3.1	3.2	3.3	3.3
C2	2.6	3.4	4.0	4.30	4.6	4.8	4.9	5.0
C3	4.6	6.1	7.1	7.80	8.2	8.5	8.7	8.8
C4	6.9	9.1	10.5	11.50	12.2	12.7	13.0	13.2
C5	8.8	11.6	13.3	14.60	15.5	16.1	16.4	16.6
C6	10.8	14.2	16.3	17.80	18.9	19.6	20.0	20.2
	Evaporator Temperature -10°C							
CX	0.37	0.47	0.53	0.57	0.60	0.63	0.64	0.64
C0	0.79	0.96	1.1	1.20	1.2	1.3	1.3	1.3
C1	1.6	2.0	2.3	2.50	2.6	2.7	2.8	2.8
C2	2.2	2.9	3.3	3.60	3.8	4.0	4.1	4.1
C3	3.9	5.1	5.9	6.40	6.8	7.1	7.3	7.3
C4	5.8	7.6	8.7	9.50	10.1	10.5	10.8	10.9
C5	7.4	9.6	11.0	12.00	12.8	13.3	13.6	13.8
C6	9.1	11.8	13.5	14.70	15.6	16.2	16.6	16.8
	Evaporator Temperature -20°C							
CX	–	0.44	0.50	0.54	0.57	0.59	0.61	0.61
C0	–	0.88	1.00	1.10	1.1	1.2	1.2	1.2
C1	–	1.7	1.9	2.00	2.2	2.3	2.3	2.3
C2	–	2.4	2.7	2.90	3.1	3.2	3.3	3.3
C3	–	4.2	4.8	5.20	5.5	5.8	5.9	6.0
C4	–	6.2	7.1	7.70	8.2	8.5	8.7	8.8
C5	–	7.9	9.0	9.80	10.3	10.8	11.0	11.2
C6	–	9.6	11.0	11.90	12.6	13.1	13.5	13.7
	Evaporator Temperature -30°C							
CX	–	0.40	0.45	0.49	0.52	0.55	0.56	0.57
C0	–	0.79	0.90	0.96	1.0	1.1	1.1	1.1
C1	–	1.4	1.5	1.70	1.8	1.8	1.9	1.9
C2	–	1.9	2.2	2.70	2.5	2.6	2.6	2.7
C3	–	3.4	3.9	4.20	4.4	4.6	4.7	4.8
C4	–	5.0	5.7	6.20	6.5	6.8	7.0	7.1
C5	–	6.4	7.2	7.80	8.3	8.6	8.8	9.0
C6	–	7.8	8.8	9.60	10.1	10.5	10.8	11.0
	Evaporator Temperature -40°C							
CX	–	–	0.42	0.45	0.48	0.50	0.52	0.53
C0	–	–	0.80	0.86	0.92	0.95	0.98	0.99
C1	–	–	1.3	1.40	1.4	1.5	1.5	1.6
C2	–	–	1.7	1.90	2.0	2.0	2.1	2.1
C3	–	–	3.1	3.40	3.5	3.7	3.8	3.8
C4	–	–	4.6	4.90	5.2	5.4	5.6	5.7
C5	–	–	5.8	6.30	6.6	6.9	7.1	7.2
C6	–	–	7.1	7.70	8.1	8.4	8.7	8.8

R134a (kW)

	Pressure Drop (bar)				
	2	4	6	8	10
	Evaporator Temp. +10°C				
CX	0.34	0.43	0.47	0.50	0.51
C0	0.71	0.86	0.93	0.97	0.98
C1	1.50	1.86	2.05	2.15	2.19
C2	2.03	2.63	2.96	3.14	3.23
C3	3.64	4.71	5.29	5.61	5.77
C4	5.40	6.98	7.84	8.32	8.55
C5	6.86	8.85	9.93	10.8	10.9
C6	8.42	10.8	12.1	12.8	13.2
	Evaporator Temp. 0°C				
CX	0.33	0.42	0.46	0.47	0.49
C0	0.65	0.78	0.86	0.89	0.91
C1	1.25	1.55	1.71	1.80	1.83
C2	1.69	2.17	2.43	2.58	2.64
C3	3.04	3.89	4.36	4.61	4.73
C4	4.47	5.72	6.42	6.80	6.97
C5	5.69	7.27	8.14	8.62	8.83
C6	6.98	8.89	9.95	10.5	10.8
	Evaporator Temp. -10°C				
CX	0.30	0.38	0.43	0.44	0.44
C0	0.59	0.70	0.77	0.81	0.82
C1	1.01	1.25	1.39	1.46	1.49
C2	1.38	1.75	1.95	2.06	2.11
C3	2.48	3.13	3.49	3.69	3.77
C4	3.63	4.59	5.12	5.42	5.55
C5	4.62	5.83	6.51	6.88	7.05
C6	5.66	7.12	7.95	8.40	8.61
	Evaporator Temp. -20°C				
CX	0.28	0.35	0.39	0.41	0.42
C0	0.53	0.62	0.69	0.72	0.73
C1	0.81	1.00	1.11	1.17	1.19
C2	1.11	1.39	1.54	1.62	1.65
C3	2.00	2.48	2.75	2.90	2.96
C4	2.90	3.62	4.02	4.25	4.35
C5	3.70	4.60	5.11	5.40	5.53
C6	5.52	5.62	6.24	6.60	6.76
	Evaporator Temp. -30°C				
CX	0.25	0.32	0.35	0.37	0.38
C0	0.48	0.55	0.61	0.64	0.64
C1	0.66	0.80	0.88	0.93	0.95
C2	0.90	1.10	1.21	1.27	1.29
C3	1.60	1.97	2.17	2.28	2.32
C4	2.32	2.85	3.16	3.33	3.41
C5	2.95	3.63	4.02	4.24	4.34
C6	3.61	4.43	4.91	5.18	5.31
	Evaporator Temp. -40°C				
CX	0.23	0.28	0.32	0.33	0.34
C0	0.44	0.50	0.54	0.56	0.57
C1	0.54	0.65	0.72	0.76	0.77
C2	0.74	0.89	0.98	1.02	1.04
C3	1.32	1.60	1.75	1.84	1.86
C4	1.90	2.31	2.55	2.68	2.74
C5	2.42	2.94	3.24	3.42	3.49
C6	2.95	3.59	3.96	4.18	4.28

R404A (kW)

	Pressure Drop (bar)							
	2	4	6	8	10	12	14	16
	Evaporator Temperature +10°C							
CX	0.28	0.36	0.40	0.42	0.44	0.44	0.44	0.44
C0	0.63	0.76	0.83	0.87	0.89	0.90	0.92	0.92
C1	1.35	1.71	1.88	1.98	2.04	2.06	2.07	2.08
C2	1.84	2.42	2.74	2.92	3.03	3.06	3.08	3.08
C3	3.29	4.31	4.89	5.22	5.40	5.47	5.52	5.52
C4	4.88	6.40	7.25	7.73	8.01	8.12	8.19	8.20
C5	6.21	8.12	9.18	9.77	10.12	10.25	10.32	10.33
C6	7.61	9.93	11.21	11.92	12.33	12.49	12.58	12.60
	Evaporator Temperature 0°C							
CX	0.27	0.35	0.39	0.40	0.41	0.41	0.41	0.42
C0	0.58	0.71	0.78	0.81	0.83	0.83	0.83	0.84
C1	1.13	1.43	1.61	1.68	1.72	1.72	1.72	1.72
C2	1.53	2.00	2.28	2.42	2.50	2.52	2.52	2.51
C3	2.75	3.59	4.08	4.34	4.47	4.49	4.49	4.48
C4	4.05	5.30	6.00	6.4	6.59	6.65	6.66	6.65
C5	5.17	6.73	7.62	8.11	8.35	8.40	8.43	8.40
C6	6.33	8.23	9.31	9.9	10.19	10.26	10.28	10.26
	Evaporator Temperature -10°C							
CX	0.26	0.33	0.38	0.39	0.40	0.40	0.40	0.40
C0	0.53	0.66	0.73	0.76	0.78	0.78	0.78	0.78
C1	0.96	1.21	1.37	1.44	1.47	1.47	1.46	1.45
C2	1.31	1.68	1.91	2.03	2.09	2.08	2.07	2.06
C3	2.33	3.03	3.42	3.64	3.74	3.74	3.72	3.68
C4	3.42	4.42	5.02	5.35	5.50	5.51	5.49	5.46
C5	4.36	5.63	6.37	6.79	6.98	6.99	6.96	6.93
C6	5.34	6.89	7.79	8.30	8.53	8.54	8.51	8.46
	Evaporator Temperature -20°C							
CX	–	0.31	0.35	0.37	0.38	0.37	0.38	0.38
C0	–	0.59	0.67	0.70	0.71	0.71	0.71	0.71
C1	–	0.99	1.11	1.18	1.22	1.22	1.21	1.19
C2	–	1.36	1.54	1.64	1.68	1.70	1.67	1.65
C3	–	2.44	2.75	2.96	3.03	3.04	3.01	2.96
C4	–	3.55	4.02	4.34	4.45	4.48	4.45	4.40
C5	–	4.52	5.12	5.51	5.66	5.70	5.65	5.59
C6	–	5.53	6.26	6.73	6.91	6.97	6.91	6.84
	Evaporator Temperature -30°C							
CX	–	–	0.32	0.34	0.36	0.35	0.35	0.34
C0	–	–	0.60	0.63	0.64	0.64	0.64	0.64
C1	–	–	0.90	0.96	0.99	0.98	0.97	0.95
C2	–	–	1.23	1.30	1.34	1.34	1.32	1.28
C3	–	–	2.20	2.34	2.42	2.41	2.38	2.33
C4	–	–	3.20	3.43	3.55	3.56	3.53	3.48
C5	–	–	4.08	4.36	4.52	4.55	4.49	4.43
C6	–	–	4.99	5.34	5.53	5.57	5.50	5.42
	Evaporator Temperature -40°C							
CX	–	–	0.29	0.31	0.32	0.31	0.32	0.31
C0	–	–	0.53	0.55	0.56	0.56	0.56	0.54
C1	–	–	0.71	0.76	0.78	0.77	0.76	0.74
C2	–	–	0.96	1.01	1.04	1.04	1.02	0.99
C3	–	–	1.72	1.83	1.88	1.88	1.84	1.79
C4	–	–	2.50	2.68	2.77	2.78	2.75	2.70
C5	–	–	3.19	3.41	3.54	3.55	3.50	3.44
C6	–	–	3.90	4.18	4.33	4.36	4.30	4.22

Pressure Temperature Chart

Temp		R-12	R-22	R-123	R-134a	R-502	AZ-50 R-507	R-717	MP 39 R-401A		HP 80 R-402A		HP 62 R-404A	FX 10 R-408A	FX 56 R-409A		AZ 20 R-410A
°F	°C								Liquid	Vapor	Liquid	Vapor	Liquid	Liquid	Liquid	Vapor	
-50	-45.6	*15.4*	*6.2*	*29.2*	*18.4*	*0.2*	1.0	*14.4*	-	-	-	-	0.6	1.6	12.4	17.2	5.0
-45	-42.8	*13.3*	*2.7*	*29.0*	*16.6*	1.9	3.0	*11.8*	-	-	-	-	2.7	1.1	9.7	15.2	7.0
-40	-40.0	*11.0*	0.5	*28.9*	*14.7*	4.1	5.5	*8.8*	*8.1*	*13.2*	6.8	6.3	5.0	3.3	6.8	13.1	11.6
-35	-37.2	*8.4*	2.6	*28.7*	*12.3*	6.5	8.2	*5.5*	*5.1*	*10.7*	9.6	9.1	7.6	5.6	3.5	10.7	14.9
-30	-34.4	*5.5*	4.9	*28.4*	*9.7*	9.2	11.1	*1.7*	*1.7*	*7.9*	12.6	12.1	10.4	8.2	0.0	8.1	18.5
-25	-31.7	*2.3*	7.4	*28.1*	*6.8*	12.1	14.3	1.2	1.0	*4.8*	16.0	15.4	13.4	11.0	2.0	5.1	22.5
-20	-28.9	0.6	10.1	*27.8*	*3.6*	15.3	17.8	3.5	3.0	*1.4*	19.6	18.9	16.8	14.1	4.1	1.9	26.9
-15	-26.1	2.4	13.2	*27.4*	*0.1*	18.8	21.7	6.2	5.2	1.2	23.6	22.9	20.5	17.5	6.5	0.8	31.6
-10	-23.3	4.5	16.4	*27.0*	2.0	22.6	25.8	9.0	7.7	3.3	27.9	27.1	24.5	21.2	9.0	2.8	36.8
-5	-20.6	6.7	20.0	*26.5*	4.1	26.6	30.3	12.3	10.3	5.5	32.6	31.7	28.8	25.2	11.8	4.9	42.5
0	-17.8	9.1	24.0	*25.9*	6.5	31.1	35.2	15.6	13.2	8.0	37.6	36.7	33.5	29.5	14.8	7.2	48.6
5	-15.0	11.8	28.2	*25.3*	9.1	35.9	40.5	19.5	16.3	10.7	43.1	42.1	38.6	34.2	18.1	9.7	55.2
10	-12.2	14.6	32.7	*24.6*	11.9	41.0	46.1	23.7	19.7	13.7	49.0	48.0	44.0	39.3	21.7	12.5	62.3
15	-9.4	17.7	37.7	*23.7*	15.1	46.5	52.2	28.3	23.4	16.9	55.3	54.2	49.9	44.8	25.5	15.4	70.0
20	-6.7	21.0	43.0	*22.8*	18.4	52.5	58.8	33.4	27.4	20.4	62.1	60.9	56.2	50.7	29.6	18.7	78.3
25	-3.9	24.6	48.7	*21.8*	22.1	58.8	65.8	38.8	31.7	24.2	69.3	68.1	63.0	57.0	34.0	22.2	87.2
30	-1.1	28.4	54.9	*20.7*	26.1	65.6	73.3	44.9	36.4	28.3	77.1	75.8	70.3	63.7	38.7	26.0	96.8
35	1.7	32.5	61.4	*19.5*	30.4	72.8	81.3	51.4	41.3	32.8	85.4	84.0	78.1	71.0	43.8	30.1	107.0
40	4.4	36.9	68.5	*18.1*	35.1	80.5	89.8	58.4	46.6	37.6	94.2	92.8	86.4	78.7	49.2	34.5	118.0
45	7.2	41.6	76.0	*16.6*	40.0	88.7	98.9	66.1	52.4	42.7	104.0	102.0	95.2	87.0	54.9	39.2	130.0
50	10.0	46.7	84.0	*15.0*	45.4	97.4	109.0	74.3	58.5	48.2	114.0	112.0	104.7	95.8	61.0	44.3	142.0
55	12.8	52.0	92.5	*13.1*	51.2	107.0	119.0	83.2	65.0	54.1	124.0	123.0	114.7	105.1	67.6	49.8	156.0
60	15.6	57.7	101.6	*11.2*	57.4	116.4	130.0	92.6	71.9	60.4	136.0	134.0	125.3	115.1	74.5	55.6	170.0
65	18.3	63.7	111.0	*9.0*	64.0	127.0	141.0	102.8	79.3	67.2	147.0	146.0	136.6	125.6	81.8	61.9	185.0
70	21.1	70.1	121.4	*6.6*	71.1	138.0	154.0	113.8	87.1	74.4	160.0	158.0	148.6	136.8	89.5	68.6	201.0
75	23.9	76.9	132.0	*4.0*	78.6	149.0	167.0	125.5	95.4	82.1	173.0	171.0	161.2	148.7	97.7	75.8	217.0
80	26.7	84.1	144.0	*1.2*	86.7	161.0	180.0	138.0	104.0	90.2	187.0	185.0	174.6	161.2	106.4	83.4	235.0
85	29.4	91.7	156.0	0.9	95.1	174.0	195.0	151.4	114.0	98.9	202.0	200.0	188.8	174.4	115.5	91.5	254.0
90	32.2	99.7	168.4	2.5	104.2	187.4	210.0	165.5	123.0	108.0	218.0	215.0	203.7	188.4	125.2	100.2	274.0
95	35.0	108.0	182.0	4.2	113.8	201.0	226.0	180.6	134.0	118.0	233.0	232.0	219.4	203.1	135.3	109.4	295.0
100	37.8	117.0	196.0	6.1	124.1	216.2	244.0	196.7	145.0	128.0	251.0	249.0	235.9	218.7	146.0	119.2	317.0
105	40.6	127.0	211.0	8.1	134.9	232.0	252.0	213.9	156.0	139.0	269.0	267.0	253.4	235.0	157.2	129.6	341.0
110	43.3	136.0	226.4	10.3	146.3	247.9	281.0	231.8	169.0	151.0	288.0	286.0	271.7	252.1	169.0	140.6	365.0
115	46.1	147.0	243.0	12.6	158.4	265.0	301.0	251.0	181.0	163.0	308.0	305.0	290.9	270.2	181.4	152.3	391.0
120	48.9	158.0	260.0	15.1	171.1	282.7	322.0	271.1	195.0	176.0	238.0	326.0	311.1	289.1	194.4	164.7	418.0
125	51.7	169.0	278.4	17.7	184.5	301.0	344.0	292.5	209.0	189.0	350.0	347.0	332.3	308.9	208.0	177.8	446.0
130	54.4	181.0	296.8	20.6	198.7	320.8	368.0	314.9	224.0	203.0	372.0	370.0	354.5	329.7	222.3	191.6	476.0
135	57.2	193.0	317.0	23.6	213.6	341.0	393.0	338.8	239.0	218.0	396.0	393.0	377.8	351.5	237.2	206.3	507.0
140	60.0	207.0	337.3	26.8	229.3	362.6	419.0	363.5	255.0	234.0	420.0	418.0	402.2	374.3	252.9	221.8	539.0
145	62.8	220.0	359.0	30.2	245.7	385.0	446.0	390.2	272.0	250.0	446.0	443.0	427.7	398.1	269.3	238.2	573.0
150	65.6	235.0	381.0	33.8	263.0	408.4	475.0	417.4	299.0	267.0	472.0	470.0	454.4	423.0	293.0	286.4	608.0

Black figures = psig
Figures in italics = inches Hg. Below 1 ATM

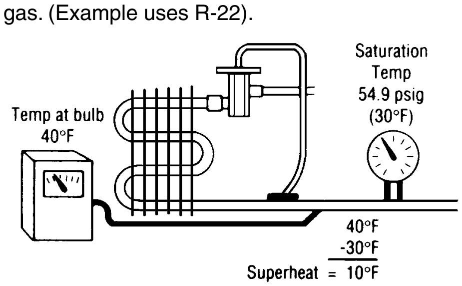
Quick Alternate Refrigerant Reference			
ASHRAE #	***Replaces***	***Applications***	***Notes***
R-134a	R-12	New equip. & retrofits	Close match to CFC-12
R-401A	R-12	Retrofits	Close match to R-12
R-402A	R-502/R-12	Retrofits	Higher discharge pressure than R-502
R-404A	R-502/R-22	New equip. & retrofits	Close match to R-502 & R-22
R-407B	R-502	New equip. & retrofits	Close match to R-502
R-407C	R-22	New equipment	Close match to R-22
R-408A	R-502/R-22	Retrofits	Higher discharge pressure than R-502
R-409A	R-12	Retrofits	Higher discharge pressure than R-12
R-410A	R-22	New equipment	Extremely higher discharge pressures
R-507	R-502/R-22	New equip. & retrofits	Close match to R-502

CONVERSION REFERENCE

Temperature °F = ((°C X 9) / 5) + 32	Meters = inches X 0.0254	***Water Properties***
Temperature °C = ((°F - 32) * 5) / 9	Kilograms = lbs. X 0.4536	Weight of One Gallon = 8.34 LB. @ 68°F
COP = KW Out/KW In	Cubic Feet = Gallons X 0.1337	Specific Heat = 1 BTU/LB/F°
EER = BTUH Out/Watts In	Cubic Feet/Hr = GPM X 8.021	Qt = 500 X GPM X TD
BTU min = Kw X 56.92	kPa = Inches Hg X 3.39	1 ft. (head) = 0.433 PSI
BTU = KwH X 3,413	kPa = PSI X 6.89	
BTUs = HP hrs X 2547	Atmospheres = PSI X .06804	***Psychometrics***
BTU hour = Watts X 3.4129	Inches of Mercury = PSI X 2.037	Qs = 1.10 X TD X CFM
HP = Kw X 1.34	PSIA = PSIG + 14.7	Qt = 4.5 X HD X CFM
1 Ton (Refrigeration) = 12,000 BTU hour		
Watts = HP X 745.7		

How to Determine Superheat

1. Determine suction pressure at the evaporator outlet with gauge. On close coupled installations, suction pressure may be read at compressor suction connection.
2. Use pressure temperature chart to determine saturation temperature at observed suction pressure.
3. Measure suction gas temperature on the line at the expansion valve bulb's remote location.
4. Subtract saturation temperature (from Step 2) from suction gas temperature (from Step 3). The difference is the superheat of the suction gas. (Example uses R-22).



R134a/R401A*/R401B*/R12* U.S. Extended Capacities in Tons

EVAPORATOR TEMP. (°F)				40°F						20°F						0°F					
PRESSURE DROP (PSIG)				40	60	80	100	120	140	60	80	100	120	140	160	60	80	100	120	140	160
Valve Type	Orifice	Nominal Capacity (tons)	Capacity Range* (tons)																		
G(E), EG(E)		1/8		0.10	0.13	0.14	0.16	0.18	0.19	0.12	0.14	0.15	0.17	0.18	0.20	0.11	0.12	0.14	0.15	0.16	0.17
G(E), EG(E)		1/4		0.20	0.25	0.29	0.32	0.35	0.38	0.24	0.28	0.31	0.34	0.37	0.39	0.21	0.25	0.27	0.30	0.32	0.35
G(E), EG(E)		1/2		0.41	0.50	0.58	0.65	0.71	0.76	0.48	0.55	0.62	0.68	0.73	0.78	0.43	0.49	0.55	0.60	0.65	0.69
C(E), EC(E)	AA	1/2	1/8 - 1/2	0.41	0.50	0.58	0.65	0.71	0.76	0.48	0.55	0.62	0.68	0.73	0.78	0.43	0.49	0.55	0.60	0.65	0.69
S(E)		1/2	1/8 - 1/2	0.41	0.50	0.58	0.65	0.71	0.76	0.48	0.55	0.62	0.68	0.73	0.78	0.43	0.49	0.55	0.60	0.65	0.69
I		1/2	1/4 - 1/2	0.41	0.50	0.58	0.65	0.71	0.76	0.48	0.55	0.62	0.68	0.73	0.78	0.43	0.49	0.55	0.60	0.65	0.69
N		1/2	1/4 - 3/4	0.61	0.75	0.87	0.97	1.06	1.15	0.72	0.83	0.93	1.02	1.10	1.18	0.64	0.74	0.82	0.90	0.97	1.04
G(E), EG(E)		1		0.82	1.00	1.15	1.29	1.41	1.53	0.96	1.11	1.24	1.36	1.47	1.57	0.85	0.98	1.10	1.20	1.30	1.39
C(E), EC(E)	A	1	1/4 - 1	0.82	1.00	1.15	1.29	1.41	1.53	0.96	1.11	1.24	1.36	1.47	1.57	0.85	0.98	1.10	1.20	1.30	1.39
S(E)		1	1/4 - 1	0.82	1.00	1.15	1.29	1.41	1.53	0.96	1.11	1.24	1.36	1.47	1.57	0.85	0.98	1.10	1.20	1.30	1.39
I		1	3/4 - 1	0.82	1.00	1.15	1.29	1.41	1.53	0.96	1.11	1.24	1.36	1.47	1.57	0.85	0.98	1.10	1.20	1.30	1.39
G(E), EG(E)		1 1/2		1.22	1.50	1.73	1.94	2.12	2.29	1.44	1.66	1.86	2.04	2.20	2.35	1.28	1.47	1.65	1.80	1.95	2.08
G(E), EG(E)		2		1.63	2.00	2.31	2.58	2.83	3.06	1.92	2.22	2.48	2.72	2.93	3.14	1.70	1.96	2.19	2.40	2.60	2.78
C(E), EC(E)	B	2	1 - 2	1.63	2.00	2.31	2.58	2.83	3.06	1.92	2.22	2.48	2.72	2.93	3.14	1.70	1.96	2.19	2.40	2.60	2.78
S(E), N(E)		2	1-2	1.63	2.00	2.31	2.58	2.83	3.06	1.92	2.22	2.48	2.72	2.93	3.14	1.70	1.96	2.19	2.40	2.60	2.78
G(E)		2 1/2		2.04	2.50	2.89	3.23	3.54	3.82	2.40	2.77	3.10	3.39	3.67	3.92	2.13	2.45	2.74	3.01	3.25	3.47
G(E)		3		2.45	3.00	3.46	3.87	4.24	4.58	2.88	3.33	3.72	4.07	4.40	4.70	2.55	2.94	3.29	3.61	3.90	4.16
C(E), EC(E)	C	3	1 1/2 - 3	2.45	3.00	3.46	3.87	4.24	4.58	2.88	3.33	3.72	4.07	4.40	4.70	2.55	2.94	3.29	3.61	3.90	4.16
S(E)		3	1 1/2 - 3	2.45	3.00	3.46	3.87	4.24	4.58	2.88	3.33	3.72	4.07	4.40	4.70	2.55	2.94	3.29	3.61	3.90	4.16
G(E)		5		4.08	5.00	5.77	6.45	7.07	7.64	4.80	5.54	6.20	6.79	7.33	7.84	4.25	4.91	5.49	6.01	6.49	6.94
S(E)	D	5	3 1/2 - 5	4.08	5.00	5.77	6.45	7.07	7.64	4.80	5.54	6.20	6.79	7.33	7.84	4.25	4.91	5.49	6.01	6.49	6.94
RE		6		4.90	6.00	6.93	7.75	8.49	9.17	5.76	6.65	7.44	8.15	8.80	9.41	5.10	5.89	6.58	7.21	7.79	8.33
RE		9		7.35	9.00	10.40	11.60	12.70	13.70	8.64	9.98	11.20	12.20	13.20	14.10	7.65	8.83	9.88	10.80	11.70	12.50
RE		12		9.8	12.0	13.9	15.5	17.0	18.3	11.5	13.3	14.9	16.3	17.6	18.8	10.2	11.8	13.2	14.4	15.6	16.7
RE		16		13.1	16.0	18.5	20.7	22.6	24.4	15.4	17.7	19.8	21.7	23.5	25.1	13.6	15.7	17.6	19.2	20.8	22.2
RE		23		18.8	23.0	26.6	29.7	32.5	35.1	22.1	25.5	28.5	31.2	33.7	36.1	19.6	22.6	25.2	27.6	29.9	31.9
RE		40		32.7	40.0	46.2	51.6	56.6	61.1	38.4	44.3	49.6	54.3	58.7	62.7	34.0	39.3	43.9	48.1	51.9	55.5

*Balanced port valves are designed to cover an operating range from 50% of nominal capacity up to110% of nominal capacity.

R134a/R401A*/R401B*/R12* Metric Extended Capacities in Kilowatts

EVAPORATOR TEMP. (°C)				10°C						0°C						-10°C					
PRESSURE DROP (BAR)				3	4	6	7	8	10	4	6	7	8	10	11	4	6	7	8	10	11
Valve Type	Orifice	Nominal Capacity (kW)	Capacity Range* (kW)																		
G(E), EG(E)		1/2		0.39	0.45	0.55	0.59	0.63	0.71	0.43	0.53	0.58	0.62	0.69	0.72	0.41	0.51	0.55	0.58	0.65	0.68
G(E), EG(E)		1		0.78	0.90	1.10	1.19	1.27	1.42	0.87	1.07	1.15	1.23	1.38	1.44	0.83	1.01	1.09	1.17	1.30	1.37
G(E), EG(E)		2		1.55	1.79	2.20	2.37	2.54	2.84	1.74	2.13	2.30	2.46	2.75	2.89	1.65	2.02	2.18	2.33	2.61	2.74
C(E), EC(E)	AA	2	1/2-2	1.55	1.79	2.20	2.37	2.54	2.84	1.74	2.13	2.30	2.46	2.75	2.89	1.65	2.02	2.18	2.33	2.61	2.74
S(E)		2	1/2-2	1.55	1.79	2.20	2.37	2.54	2.84	1.74	2.13	2.30	2.46	2.75	2.89	1.65	2.02	2.18	2.33	2.61	2.74
I		2	1-2	1.55	1.79	2.20	2.37	2.54	2.84	1.74	2.13	2.30	2.46	2.75	2.89	1.65	2.02	2.18	2.33	2.61	2.74
N		3	1-3	2.33	2.69	3.30	3.56	3.80	4.25	2.61	3.20	3.45	3.69	4.13	4.33	2.48	3.03	3.27	3.50	3.91	4.10
G(E), EG(E)		4		3.11	3.59	4.39	4.75	5.07	5.67	3.48	4.26	4.60	4.92	5.50	5.77	3.30	4.04	4.37	4.67	5.22	5.47
C(E), EC(E)	A	4	1-4	3.11	3.59	4.39	4.75	5.07	5.67	3.48	4.26	4.60	4.92	5.50	5.77	3.30	4.04	4.37	4.67	5.22	5.47
S(E)		4	1-4	3.11	3.59	4.39	4.75	5.07	5.67	3.48	4.26	4.60	4.92	5.50	5.77	3.30	4.04	4.37	4.67	5.22	5.47
I		4	3-4	3.11	3.59	4.39	4.75	5.07	5.67	3.48	4.26	4.60	4.92	5.50	5.77	3.30	4.04	4.37	4.67	5.22	5.47
G(E), EG(E)		5		4.66	5.38	6.59	7.12	7.61	8.51	5.22	6.39	6.90	7.38	8.25	8.66	4.95	6.06	6.55	7.00	7.83	8.21
G(E), EG(E)		7		6.21	7.17	8.79	9.49	10.10	11.30	6.96	8.52	9.21	9.84	11.00	11.50	6.60	8.08	8.73	9.33	10.40	10.90
C(E), EC(E)	B	7	4-7	6.21	7.17	8.79	9.49	10.10	11.30	6.96	8.52	9.21	9.84	11.00	11.50	6.60	8.08	8.73	9.33	10.40	10.90
S(E), N(E)		7	4-7	6.21	7.17	8.79	9.49	10.10	11.30	6.96	8.52	9.21	9.84	11.00	11.50	6.60	8.08	8.73	9.33	10.40	10.90
G(E)		9		7.77	8.97	11.00	11.90	12.70	14.20	8.70	10.70	11.50	12.30	13.80	14.40	8.25	10.10	10.90	11.70	13.00	13.70
G(E)		11		9.32	10.80	13.20	14.20	15.20	17.00	10.40	12.80	13.80	14.80	16.50	17.30	9.90	12.10	13.10	14.00	15.70	16.40
C(E), EC(E)	C	11	5-11	9.32	10.80	13.20	14.20	15.20	17.00	10.40	12.80	13.80	14.80	16.50	17.30	9.90	12.10	13.10	14.00	15.70	16.40
S(E)		11	5-11	9.32	10.80	13.20	14.20	15.20	17.00	10.40	12.80	13.80	14.80	16.50	17.30	9.90	12.10	13.10	14.00	15.70	16.40
G(E)		18		15.5	17.9	22.0	23.7	25.4	28.4	17.4	21.3	23.0	24.6	27.5	28.9	16.5	20.2	21.8	23.3	26.1	27.4
S(E)	D	18	12-18	15.5	17.9	22.0	23.7	25.4	28.4	17.4	21.3	23.0	24.6	27.5	28.9	16.5	20.2	21.8	23.3	26.1	27.4
RE		21		18.6	21.5	26.4	28.5	30.4	34.0	20.9	25.6	27.6	29.5	33.0	34.6	19.8	24.3	26.2	28.0	31.3	32.8
RE		32		28.0	32.3	39.5	42.7	45.7	51.0	31.3	38.4	41.4	44.3	49.5	51.9	29.7	36.4	39.3	42.0	47.0	49.3
RE		42		37.3	43.0	52.7	56.9	60.9	68.1	41.8	51.1	55.2	59.1	66.0	69.2	39.6	48.5	52.4	56.0	62.6	65.7
RE		56		49.7	57.4	70.3	75.9	81.2	90.8	55.7	68.2	73.7	78.7	88.0	92.3	52.8	64.7	69.9	74.7	83.5	87.6
RE		81		72	83	101	109	117	130	80	98	106	113	127	133	76	93	100	107	120	126
RE		141		124	143	176	190	203	227	139	170	184	197	220	231	132	162	175	187	209	219

* See page 160.

Shaded areas are standard conditions.

Liquid Refrigerant Temperature Correction Factor chart on the following page.

Liquid Refrigerant Temperature Correction Factor

Liquid Line Temp.	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F	130°F	140°F
Multiplier R-134a	1.33	1.27	1.21	1.11	1.07	1.00	0.93	0.87	0.81	0.71

Liquid Line Temp.	0°C	20°C	30°C	40°C	50°C	60°C
Multiplier R-134a	1.33	1.21	1.09	1.00	0.85	0.71

These ratings are based on vapor free 100°F liquid refrigerant entering the expansion valve, and a maximum of 7°F change in superheat.

R410A U.S. Extended Capacities in Tons

EVAPORATOR TEMP. (°F)				40°F						20°F						0°F					
PRESSURE DROP (PSIG)				120	160	200	240	280	320	120	160	200	240	280	320	120	160	200	240	280	320
Valve Type	Orifice	Nominal Capacity (tons)	Capacity Range* (tons)																		
S(E) H(E)	AA	1 1/2	1/2 - 1 1/2	1.30	1.50	1.68	1.84	1.98	2.12	1.27	1.47	1.64	1.80	1.94	2.08	1.22	1.41	1.58	1.73	1.87	1.99
S(E) H(E)	A	3	1 1/2 - 3	2.60	3.00	3.35	3.67	3.97	4.24	2.55	2.94	3.29	3.60	3.89	4.16	2.44	2.82	3.15	3.45	3.73	3.99
S(E), H(E)	B	5	3 1/2 - 5	4.33	5.00	5.59	6.12	6.61	7.07	4.24	4.90	5.48	6.00	6.48	6.93	4.07	4.70	5.25	5.76	6.22	6.65
S(E) H(E)	C	7	5 1/2 - 7	6.06	7.00	7.83	8.57	9.26	9.90	5.94	6.86	7.67	8.40	9.07	9.70	5.70	6.58	7.36	8.06	8.70	9.31
S(E) H(E)	D	9	7 1/2 - 9	7.79	9.00	10.06	11.02	11.91	12.73	7.64	8.82	9.86	10.80	11.67	12.47	7.33	8.46	9.46	10.36	11.19	11.96

*Balanced port valves are designed to cover an operating range from 50% of nominal capacity up to10% of nominal capacity.
Shaded areas are standard conditions.

Liquid Refrigerant Temperature Correction Factor

Liquid Line Temp.	70°F	80°F	90°F	100°F	110°F	120°F	130°F	140°F
Multiplier R-410A	1.09	1.06	1.03	1.00	0.97	0.93	0.89	0.84

R410A Metric Extended Capacities in Kilowatts

EVAPORATOR TEMP. (°C)				10°F						0°F						-10°F					
PRESSURE DROP (PSIG)				8	11	14	17	20	22	8	11	14	17	20	22	8	11	14	17	20	22
Valve Type	Orifice	Nominal Capacity kW)	Capacity Range* (kW)																		
S(E) H(E)	AA	6	2 - 6	5.12	6.00	6.77	7.46	8.09	8.49	5.01	5.88	6.63	7.31	7.93	8.32	4.91	5.76	6.50	7.16	7.77	8.15
S(E) H(E)	A	11	6 - 11	9.38	11.00	12.41	13.67	14.83	15.56	9.19	10.78	12.16	13.40	14.54	15.25	9.01	10.56	11.91	13.13	14.24	14.93
S(E), H(E)	B	18	12 - 18	15.35	18.00	20.31	22.38	24.27	25.46	15.04	17.64	19.90	21.93	23.79	24.95	14.74	17.28	19.49	21.48	23.30	24.44
S(E) H(E)	C	23	19 - 23	19.61	23.00	25.95	28.59	31.01	32.53	19.22	22.54	25.43	28.02	30.39	31.88	18.83	22.08	24.91	27.45	29.77	31.23
S(E) H(E)	D	31	24 - 31	26.44	31.00	34.97	38.54	41.80	43.84	25.91	30.38	34.27	37.77	40.96	42.96	25.38	29.76	33.57	37.00	40.13	42.09

* See page 160.
Shaded areas are standard conditions.

Liquid Refrigerant Temperature Correction Factor

Liquid Line Temp.	20°C	30°C	40°C	50°C	60°C
Multiplier R-410A	1.18	1.12	1.06	1.00	0.94

R22/R407C* U.S. Extended Capacities in Tons

EVAPORATOR TEMP. (°F)				40°F						20°F						0°F					
PRESSURE DROP (PSIG)				75	100	125	150	175	200	75	100	125	150	175	200	75	100	125	150	175	200
Valve Type	Orifice	Nominal Capacity (tons)	Capacity Range* (tons)																		
G(E), EG(E)		1/4		0.22	0.25	0.28	0.31	0.33	0.35	0.21	0.25	0.27	0.30	0.32	0.35	0.19	0.22	0.25	0.27	0.29	0.31
G(E), EG(E)		1/2		0.43	0.50	0.56	0.61	0.66	0.71	0.42	0.49	0.55	0.60	0.65	0.69	0.38	0.44	0.49	0.54	0.58	0.62
C(E), EC(E)	AA	3/4	1/5-3/4	0.65	0.75	0.84	0.92	0.99	1.06	0.64	0.74	0.82	0.90	0.97	1.04	0.57	0.66	0.74	0.81	0.87	0.93
S(E)		3/4	1/5-3/4	0.65	0.75	0.84	0.92	0.99	1.06	0.64	0.74	0.82	0.90	0.97	1.04	0.57	0.66	0.74	0.81	0.87	0.93
G(E), EG(E)		1		0.87	1.00	1.12	1.22	1.32	1.41	0.85	0.98	1.10	1.20	1.30	1.39	0.76	0.88	0.98	1.08	1.16	1.24
I, N		1	1/2-1	0.87	1.00	1.12	1.22	1.32	1.41	0.85	0.98	1.10	1.20	1.30	1.39	0.76	0.88	0.98	1.08	1.16	1.24
G(E), EG(E)		1 1/2		1.30	1.50	1.68	1.84	1.98	2.12	1.27	1.47	1.64	1.80	1.94	2.08	1.14	1.32	1.48	1.62	1.75	1.87
C(E), EC(E)	A	1 1/2	1/2-1 1/2	1.30	1.50	1.68	1.84	1.98	2.12	1.27	1.47	1.64	1.80	1.94	2.08	1.14	1.32	1.48	1.62	1.75	1.87
S(E)		1 1/2	1/2-1 1/2	1.30	1.50	1.68	1.84	1.98	2.12	1.27	1.47	1.64	1.80	1.94	2.08	1.14	1.32	1.48	1.62	1.75	1.87
G(E), EG(E)		2		1.73	2.00	2.24	2.45	2.65	2.83	1.70	1.96	2.19	2.40	2.59	2.77	1.52	1.76	1.97	2.16	2.33	2.49
I		2	1 1/2-2	1.73	2.00	2.24	2.45	2.65	2.83	1.70	1.96	2.19	2.40	2.59	2.77	1.52	1.76	1.97	2.16	2.33	2.49
G(E), EG(E)		2 1/2		2.17	2.50	2.80	3.06	3.31	3.54	2.12	2.45	2.74	3.00	3.24	3.46	1.91	2.20	2.46	2.69	2.91	3.11
G(E), EG(E)		3		2.60	3.00	3.35	3.67	3.97	4.24	2.55	2.94	3.29	3.60	3.89	4.16	2.29	2.64	2.95	3.23	3.49	3.73
C(E), EC(E)	B	3	1 1/2-3	2.60	3.00	3.35	3.67	3.97	4.24	2.55	2.94	3.29	3.60	3.89	4.16	2.29	2.64	2.95	3.23	3.49	3.73
S(E), N(E)		3	1 1/2-3	2.60	3.00	3.35	3.67	3.97	4.24	2.55	2.94	3.29	3.60	3.89	4.16	2.29	2.64	2.95	3.23	3.49	3.73
G(E)		4		3.46	4.00	4.47	4.90	5.29	5.66	3.39	3.92	4.38	4.80	5.19	5.54	3.05	3.52	3.94	4.31	4.66	4.98
G(E)		5		4.33	5.00	5.59	6.12	6.61	7.07	4.24	4.90	5.48	6.00	6.48	6.93	3.81	4.40	4.92	5.39	5.82	6.22
C(E), EC(E)	C	5	3 1/2-5	4.33	5.00	5.59	6.12	6.61	7.07	4.24	4.90	5.48	6.00	6.48	6.93	3.81	4.40	4.92	5.39	5.82	6.22
S(E)		5	3 1/2-5	4.33	5.00	5.59	6.12	6.61	7.07	4.24	4.90	5.48	6.00	6.48	6.93	3.81	4.40	4.92	5.39	5.82	6.22
S(E)	D	7 1/2	5 1/2-7 1/2	6.50	7.50	8.39	9.19	9.92	10.60	6.37	7.35	8.22	9.00	9.72	10.40	5.72	6.60	7.38	8.08	8.73	9.33
G(E)		8		6.93	8.00	8.94	9.80	10.60	11.30	6.79	7.84	8.77	9.60	10.40	11.10	6.10	7.04	7.87	8.62	9.31	9.96
S(E)		10	8-10	8.66	10.0	11.2	12.2	13.2	14.1	8.49	9.80	11.0	12.0	13.0	13.90	7.62	8.80	9.84	10.8	11.6	12.4
RE		10		8.66	10.0	11.2	12.2	13.2	14.1	8.49	9.80	11.0	12.0	13.0	13.90	7.62	8.80	9.84	10.8	11.6	12.4
RE		15		13.0	15.0	16.8	18.4	19.8	21.2	12.7	14.7	16.4	18.0	19.4	20.8	11.4	13.2	14.8	16.2	17.5	18.7
RE		20		17.3	20.0	22.4	24.5	26.5	28.3	17.0	19.6	21.9	24.0	25.9	27.7	15.2	17.6	19.7	21.6	23.3	24.9
RE		30		26.0	30.0	33.5	36.7	39.7	42.4	25.5	29.4	32.9	36.0	38.9	41.6	22.9	26.4	29.5	32.3	34.9	37.3
RE		40		34.6	40.0	44.7	49.0	52.9	56.6	33.9	39.2	43.8	48.0	51.9	55.4	30.5	35.2	39.4	43.1	46.6	49.8
RE		70		60.6	70.0	78.3	85.7	92.6	99.0	59.4	68.6	76.7	84.0	90.7	97.0	53.3	61.6	68.9	75.4	81.5	87.1

EVAPORATOR TEMP. (°F)				-10°F						-20°F						-40°F					
PRESSURE DROP (PSIG)				100	125	150	175	200	225	125	150	175	200	225	250	125	150	175	200	225	250
Valve Type	Orifice	Nominal Capacity (tons)	Capacity Range* (tons)																		
G(E), EG(E)		1/4		0.19	0.21	0.23	0.24	0.26	0.28	0.17	0.19	0.20	0.22	0.23	0.24	0.11	0.13	0.14	0.14	0.15	0.16
G(E), EG(E)		1/2		0.37	0.41	0.45	0.49	0.52	0.56	0.34	0.37	0.40	0.43	0.46	0.48	0.23	0.25	0.27	0.29	0.31	0.32
C(E), EC(E)	AA	3/4	1/5-3/4	0.56	0.62	0.68	0.73	0.78	0.83	0.51	0.56	0.61	0.65	0.69	0.72	0.34	0.38	0.41	0.43	0.46	0.49
S(E)		3/4	1/5-3/4	0.56	0.62	0.68	0.73	0.78	0.83	0.51	0.56	0.61	0.65	0.69	0.72	0.34	0.38	0.41	0.43	0.46	0.49
G(E), EG(E)		1		0.74	0.83	0.91	0.98	1.05	1.11	0.68	0.75	0.81	0.86	0.92	0.96	0.46	0.50	0.54	0.58	0.62	0.65
I, N		1	1/2-1	0.74	0.83	0.91	0.98	1.05	1.11	0.68	0.75	0.81	0.86	0.92	0.96	0.46	0.50	0.54	0.58	0.62	0.65
G(E), EG(E)		1 1/2		1.11	1.24	1.36	1.47	1.57	1.67	1.02	1.12	1.21	1.29	1.37	1.45	0.69	0.75	0.81	0.87	0.92	0.97
C(E), EC(E)	A	1 1/2	1/2-1 1/2	1.11	1.24	1.36	1.47	1.57	1.67	1.02	1.12	1.21	1.29	1.37	1.45	0.69	0.75	0.81	0.87	0.92	0.97
S(E)		1 1/2	1/2-1 1/2	1.11	1.24	1.36	1.47	1.57	1.67	1.02	1.12	1.21	1.29	1.37	1.45	0.69	0.75	0.81	0.87	0.92	0.97
G(E), EG(E)		2		1.48	1.65	1.81	1.96	2.09	2.22	1.36	1.49	1.61	1.73	1.83	1.93	0.92	1.00	1.08	1.16	1.23	1.30
I		2	1 1/2-2	1.48	1.65	1.81	1.96	2.09	2.22	1.36	1.49	1.61	1.73	1.83	1.93	0.92	1.00	1.08	1.16	1.23	1.30
G(E), EG(E)		2 1/2		1.85	2.07	2.27	2.45	2.62	2.78	1.71	1.87	2.02	2.16	2.29	2.41	1.15	1.26	1.36	1.45	1.54	1.62
G(E), EG(E)		3		2.22	2.48	2.72	2.94	3.14	3.33	2.05	2.24	2.42	2.59	2.75	2.89	1.38	1.51	1.63	1.74	1.85	1.94
C(E), EC(E)	B	3	1 1/2-3	2.22	2.48	2.72	2.94	3.14	3.33	2.05	2.24	2.42	2.59	2.75	2.89	1.38	1.51	1.63	1.74	1.85	1.94
S(E), N(E)		3	1 1/2-3	2.22	2.48	2.72	2.94	3.14	3.33	2.05	2.24	2.42	2.59	2.75	2.89	1.38	1.51	1.63	1.74	1.85	1.94
G(E)		4		2.96	3.31	3.63	3.92	4.19	4.44	2.73	2.99	3.23	3.45	3.66	3.86	1.83	2.01	2.17	2.32	2.46	2.59
G(E)		5		3.70	4.14	4.53	4.89	5.23	5.55	3.41	3.74	4.03	4.31	4.58	4.82	2.29	2.51	2.71	2.90	3.08	3.24
C(E), EC(E)	C	5	3 1/2-5	3.70	4.14	4.53	4.89	5.23	5.55	3.41	3.74	4.03	4.31	4.58	4.82	2.29	2.51	2.71	2.90	3.08	3.24
S(E)		5	3 1/2-5	3.70	4.14	4.53	4.89	5.23	5.55	3.41	3.74	4.03	4.31	4.58	4.82	2.29	2.51	2.71	2.90	3.08	3.24
S(E)	D	7 1/2	5 1/2-7 1/2	5.55	6.21	6.80	7.34	7.85	8.33	5.12	5.60	6.05	6.47	6.86	7.23	3.44	3.77	4.07	4.35	4.61	4.86
G(E)		8		5.92	6.62	7.25	7.83	8.37	8.88	5.46	5.98	6.46	6.90	7.32	7.72	3.67	4.02	4.34	4.64	4.92	5.19
S(E)		10	8-10	7.40	8.27	9.06	9.79	10.50	11.10	6.82	7.47	8.07	8.63	9.15	9.64	4.58	5.02	5.42	5.80	6.15	6.48
RE		10		7.40	8.27	9.06	9.79	10.50	11.10	6.82	7.47	8.07	8.63	9.15	9.64	4.58	5.02	5.42	5.80	6.15	6.48
RE		15		11.1	12.4	13.6	14.7	15.7	16.7	10.2	11.2	12.1	12.9	13.7	14.5	6.88	7.53	8.14	8.70	9.23	9.72
RE		20		14.8	16.5	18.1	19.6	20.9	22.2	13.6	14.9	16.1	17.3	18.3	19.3	9.2	10.0	10.8	11.6	12.3	13.0
RE		30		22.2	24.8	27.2	29.4	31.4	33.3	20.5	22.4	24.2	25.9	27.5	28.9	13.8	15.1	16.3	17.4	18.5	19.4
RE		40		29.6	33.1	36.3	39.2	41.9	44.4	27.3	29.9	32.3	34.5	36.6	38.6	18.3	20.1	21.7	23.2	24.6	25.9
RE		70		51.8	57.9	63.4	68.5	73.3	77.7	47.7	52.3	56.5	60.4	64.1	67.5	32.1	35.2	38.0	40.6	43.1	45.4

* See page 160.

Shaded areas are standard conditions.

Liquid Refrigerant Temperature Correction Factor

Liquid Line Temp.	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F	130°F	140°F
Multiplier R-22	1.30	1.24	1.18	1.12	1.06	1.00	0.94	0.88	0.82	0.77

These ratings are based on vapor free 100°F liquid refrigerant entering the expansion valve, and a maximum of 7°F change in superheat.
*Balanced port valves are designed to cover an operating range from 50% of nominal capacity up to 110% of nominal capacity.

R22/R407C* Metric Extended Capacities in Kilowatts

EVAPORATOR TEMP. (°C)				10°C						0°C						-10°C					
PRESSURE DROP (BAR)				5	7	9	10	12	14	5	7	9	10	12	14	7	9	10	12	14	16
Valve Type	Orifice	Nominal Capacity (kW)	Capacity Range* (kW)																		
G(E), EG(E)		1		0.75	0.89	1.01	1.06	1.16	1.26	0.74	0.87	0.99	1.04	1.14	1.23	0.84	0.96	1.01	1.10	1.19	1.28
G(E), EG(E)		2		1.50	1.78	2.01	2.12	2.33	2.51	1.47	1.74	1.97	2.08	2.28	2.46	1.69	1.91	2.02	2.21	2.39	2.55
C(E), EC(E)	AA	3	3/4-3	2.25	2.66	3.02	3.18	3.49	3.77	2.21	2.61	2.96	3.12	3.42	3.69	2.53	2.87	3.03	3.31	3.58	3.83
S(E)		3	3/4-3	2.25	2.66	3.02	3.18	3.49	3.77	2.21	2.61	2.96	3.12	3.42	3.69	2.53	2.87	3.03	3.31	3.58	3.83
G(E), EG(E)		4		3.00	3.55	4.03	4.25	4.65	5.02	2.94	3.48	3.95	4.16	4.56	4.92	3.37	3.83	4.03	4.42	4.77	5.10
I, N		4	2-4	3.00	3.55	4.03	4.25	4.65	5.02	2.94	3.48	3.95	4.16	4.56	4.92	3.37	3.83	4.03	4.42	4.77	5.10
G(E), EG(E)		5		4.50	5.33	6.04	6.37	6.98	7.54	4.41	5.22	5.92	6.24	6.84	7.38	5.06	5.74	6.05	6.63	7.16	7.65
C(E), EC(E)	A	5	2-5	4.50	5.33	6.04	6.37	6.98	7.54	4.41	5.22	5.92	6.24	6.84	7.38	5.06	5.74	6.05	6.63	7.16	7.65
S(E)		5	2-5	4.50	5.33	6.04	6.37	6.98	7.54	4.41	5.22	5.92	6.24	6.84	7.38	5.06	5.74	6.05	6.63	7.16	7.65
G(E), EG(E)		7		6.00	7.10	8.06	8.49	9.30	10.00	5.88	6.96	7.89	8.32	9.12	9.85	6.75	7.65	8.07	8.84	9.54	10.20
I		7	5-7	6.00	7.10	8.06	8.49	9.30	10.00	5.88	6.96	7.89	8.32	9.12	9.85	6.75	7.65	8.07	8.84	9.54	10.20
G(E), EG(E)		9		7.51	8.88	10.10	10.60	11.60	12.60	7.36	8.70	9.87	10.40	11.40	12.30	8.44	9.57	10.10	11.00	11.90	12.80
G(E), EG(E)		11		9.01	10.70	12.10	12.70	14.00	15.10	8.83	10.40	11.80	12.50	13.70	14.80	10.10	11.50	12.10	13.30	14.30	15.30
C(E), EC(E)	B	11	5-11	9.01	10.70	12.10	12.70	14.00	15.10	8.83	10.40	11.80	12.50	13.70	14.80	10.10	11.50	12.10	13.30	14.30	15.30
S(E), N(E)		11	5-11	9.01	10.70	12.10	12.70	14.00	15.10	8.83	10.40	11.80	12.50	13.70	14.80	10.10	11.50	12.10	13.30	14.30	15.30
G(E)		14		12.00	14.20	16.10	17.00	18.60	20.10	11.80	13.90	15.80	16.60	18.20	19.70	13.50	15.30	16.10	17.70	19.10	20.40
G(E)		18		15.00	17.80	20.10	21.20	23.30	25.10	14.70	17.40	19.70	20.80	22.80	24.60	16.90	19.10	20.20	22.10	23.90	25.50
C(E), EC(E)	C	18	12-18	15.00	17.80	20.10	21.20	23.30	25.10	14.70	17.40	19.70	20.80	22.80	24.60	16.90	19.10	20.20	22.10	23.90	25.50
S(E)		18	12-18	15.00	17.80	20.10	21.20	23.30	25.10	14.70	17.40	19.70	20.80	22.80	24.60	16.90	19.10	20.20	22.10	23.90	25.50
S(E)	D	26	19-26	22.50	26.60	30.20	31.80	34.90	37.70	22.10	26.10	29.60	31.20	34.20	36.90	25.30	28.70	30.30	33.10	35.80	38.30
G(E)		28		24.00	28.40	32.20	34.00	37.20	40.20	23.50	27.80	31.60	33.30	36.50	39.40	27.00	30.60	32.30	35.30	38.20	40.80
S(E)		35	28-35	30.00	35.50	40.30	42.50	46.50	50.20	29.40	34.80	39.50	41.60	45.60	49.20	33.70	38.30	40.30	44.20	47.70	51.00
RE		35		30.00	35.50	40.30	42.50	46.50	50.20	29.40	34.80	39.50	41.60	45.60	49.20	33.70	38.30	40.30	44.20	47.70	51.00
RE		53		45.00	53.30	60.40	63.70	69.80	75.00	44.10	52.20	59.20	62.40	68.40	73.80	50.60	57.40	60.50	66.30	71.60	76.50
RE		70		60.00	71.00	80.60	84.90	93.00	100.0	58.80	69.60	78.90	83.20	91.20	98.50	67.50	76.50	80.70	88.40	95.40	102.0
RE		106		90.1	107.0	121.0	127.0	140.0	151.0	88.3	104.0	118.0	125.0	137.0	148.0	101.0	115.0	121.0	133.0	143.0	153.0
RE		141		120.0	142.0	161.0	170.0	186.0	201.0	118.0	139.0	158.0	166.0	182.0	197.0	135.0	153.0	161.0	177.0	191.0	204.0
RE		246		210.0	249.0	282.0	297.0	326.0	352.0	206.0	244.0	276.0	291.0	319.0	345.0	236.0	268.0	282.0	309.0	334.0	357.0

EVAPORATOR TEMP. (°F)				-20°C						-30°C						-40°C					
PRESSURE DROP (BAR)				9	10	12	14	16	17	9	10	12	14	16	17	9	10	12	14	16	17
Valve Type	Orifice	Nominal Capacity (kW)	Capacity Range* (kW)																		
G(E), EG(E)		1		0.82	0.86	0.94	1.02	1.09	1.12	0.60	0.64	0.70	0.75	0.81	0.83	0.40	0.42	0.47	0.50	0.54	0.55
G(E), EG(E)		2		1.63	1.72	1.88	2.03	2.18	2.24	1.21	1.27	1.40	1.51	1.61	1.66	0.81	0.85	0.93	1.00	1.07	1.11
C(E), EC(E)	AA	3	3/4-3	2.45	2.58	2.83	3.05	3.26	3.36	1.81	1.91	2.09	2.26	2.42	2.49	1.21	1.27	1.40	1.51	1.61	1.66
S(E)		3	3/4-3	2.45	2.58	2.83	3.05	3.26	3.36	1.81	1.91	2.09	2.26	2.42	2.49	1.21	1.27	1.40	1.51	1.61	1.66
G(E), EG(E)		4		3.26	3.44	3.77	4.07	4.35	4.48	2.42	2.55	2.79	3.01	3.22	3.32	1.61	1.70	1.86	2.01	2.15	2.21
I, N		4	2-4	3.26	3.44	3.77	4.07	4.35	4.48	2.42	2.55	2.79	3.01	3.22	3.32	1.61	1.70	1.86	2.01	2.15	2.21
G(E), EG(E)		5		4.89	5.16	5.65	6.10	6.53	6.73	3.63	3.82	4.19	4.52	4.83	4.98	2.42	2.55	2.79	3.01	3.22	3.32
C(E), EC(E)	A	5	2-5	4.89	5.16	5.65	6.10	6.53	6.73	3.63	3.82	4.19	4.52	4.83	4.98	2.42	2.55	2.79	3.01	3.22	3.32
S(E)		5	2-5	4.89	5.16	5.65	6.10	6.53	6.73	3.63	3.82	4.19	4.52	4.83	4.98	2.42	2.55	2.79	3.01	3.22	3.32
G(E), EG(E)		7		6.53	6.88	7.53	8.14	8.70	8.97	4.83	5.09	5.58	6.03	6.44	6.64	3.22	3.40	3.72	4.02	4.30	4.43
I		7	5-7	6.53	6.88	7.53	8.14	8.70	8.97	4.83	5.09	5.58	6.03	6.44	6.64	3.22	3.40	3.72	4.02	4.30	4.43
G(E), EG(E)		9		8.16	8.60	9.42	10.20	10.90	11.20	6.04	6.37	6.98	7.54	8.06	8.30	4.03	4.25	4.65	5.02	5.37	5.54
G(E), EG(E)		11		9.79	10.30	11.30	12.20	13.10	13.50	7.25	7.64	8.37	9.04	9.67	9.96	4.83	5.09	5.58	6.03	6.44	6.64
C(E), EC(E)	B	11	5-11	9.79	10.30	11.30	12.20	13.10	13.50	7.25	7.64	8.37	9.04	9.67	9.96	4.83	5.09	5.58	6.03	6.44	6.64
S(E), N(E)		11	5-11	9.79	10.30	11.30	12.20	13.10	13.50	7.25	7.64	8.37	9.04	9.67	9.96	4.83	5.09	5.58	6.03	6.44	6.64
G(E)		14		13.1	13.8	15.1	16.3	17.4	17.9	9.67	10.20	11.20	12.10	12.90	13.30	6.44	6.79	7.44	8.04	8.59	8.86
G(E)		18		16.3	17.2	18.8	20.3	21.8	22.4	12.1	12.7	14.0	15.1	16.1	16.6	8.06	8.49	9.30	10.0	10.7	11.1
C(E), EC(E)	C	18	12-18	16.3	17.2	18.8	20.3	21.8	22.4	12.1	12.7	14.0	15.1	16.1	16.6	8.06	8.49	9.30	10.0	10.7	11.1
S(E)		18	12-18	16.3	17.2	18.8	20.3	21.8	22.4	12.1	12.7	14.0	15.1	16.1	16.6	8.06	8.49	9.30	10.0	10.7	11.1
S(E)	D	26	19-26	24.5	25.8	28.3	30.5	32.6	33.6	18.1	19.1	20.9	22.6	24.2	24.9	12.1	12.7	14.0	15.1	16.1	16.6
G(E)		28		26.1	27.5	30.1	32.6	34.8	35.9	19.3	20.4	22.3	24.1	25.8	26.6	12.9	13.6	14.9	16.1	17.2	17.7
S(E)		35	28-35	32.6	34.4	37.7	40.7	43.5	44.8	24.2	25.5	27.9	30.1	32.2	33.2	16.1	17.0	18.6	20.1	21.5	22.1
RE		35		32.6	34.4	37.7	40.7	43.5	44.8	24.2	25.5	27.9	30.1	32.2	33.2	16.1	17.0	18.6	20.1	21.5	22.1
RE		53		48.9	51.6	56.5	61.0	65.3	67.3	36.3	38.2	41.9	45.2	48.3	49.8	24.2	25.5	27.9	30.1	32.2	33.2
RE		70		65.3	68.8	75.3	81.4	87.0	89.7	48.3	50.9	55.8	60.3	64.4	66.4	32.2	34.0	37.2	40.2	43.0	44.3
RE		106		97.9	103.0	113.0	122.0	131.0	135.0	72.5	76.4	83.7	90.4	96.7	99.6	48.3	50.9	55.8	60.3	64.4	66.4
RE		141		131	138	151	163	174	179	97	102	112	121	129	133	64.4	67.9	74.4	80.4	85.9	88.6
RE		246		228	241	264	285	305	314	169	178	195	211	226	232	113	119	130	141	150	155

* See page 160.

Shaded areas are standard conditions.

Liquid Refrigerant Temperature Correction Factor

Liquid Line Temp	10°C	20°C	30°C	40°C	50°C	60°C
Multiplier R-22	1.30	1.21	1.10	1.00	0.89	0.78

R404A/R502*/R402A*, B*/R507* U.S. Extended Capacities in Tons

EVAPORATOR TEMP. (°F)				40°F						20°F						0°F					
PRESSURE DROP (PSIG)				75	100	125	150	175	200	75	100	125	150	175	200	75	100	125	150	175	200
Valve Type	Orifice	Nominal Capacity (tons)	Capacity Range* (tons)																		
G(E), EG(E)		1/8		0.11	0.13	0.14	0.15	0.17	0.18	0.10	0.12	0.13	0.15	0.16	0.17	0.09	0.11	0.12	0.13	0.14	0.15
G(E), EG(E)		1/4		0.22	0.25	0.28	0.31	0.33	0.35	0.21	0.24	0.27	0.29	0.32	0.34	0.19	0.22	0.24	0.27	0.29	0.31
G(E), EG(E)		1/2		0.43	0.50	0.56	0.61	0.66	0.71	0.42	0.48	0.54	0.59	0.63	0.68	0.38	0.44	0.49	0.53	0.58	0.62
C(E), EC(E)	AA	1/2	1/8-1/2	0.43	0.50	0.56	0.61	0.66	0.71	0.42	0.48	0.54	0.59	0.63	0.68	0.38	0.44	0.49	0.53	0.58	0.62
S(E)		1/2	1/8-1/2	0.43	0.50	0.56	0.61	0.66	0.71	0.42	0.48	0.54	0.59	0.63	0.68	0.38	0.44	0.49	0.53	0.58	0.62
I		1/2	1/4-1/2	0.43	0.50	0.56	0.61	0.66	0.71	0.42	0.48	0.54	0.59	0.63	0.68	0.38	0.44	0.49	0.53	0.58	0.62
N		1/2	1/4-3/4	0.65	0.75	0.84	0.92	0.99	1.06	0.62	0.72	0.80	0.88	0.95	1.02	0.57	0.65	0.73	0.80	0.86	0.92
G(E), EG(E)		1		0.87	1.00	1.12	1.22	1.32	1.41	0.83	0.96	1.07	1.18	1.27	1.36	0.75	0.87	0.97	1.07	1.15	1.23
C(E), EC(E)	A	1	1/4-1	0.87	1.00	1.12	1.22	1.32	1.41	0.83	0.96	1.07	1.18	1.27	1.36	0.75	0.87	0.97	1.07	1.15	1.23
S(E)		1	1/4 -1	0.87	1.00	1.12	1.22	1.32	1.41	0.83	0.96	1.07	1.18	1.27	1.36	0.75	0.87	0.97	1.07	1.15	1.23
I		1	3/4-1	0.87	1.00	1.12	1.22	1.32	1.41	0.83	0.96	1.07	1.18	1.27	1.36	0.75	0.87	0.97	1.07	1.15	1.23
G(E), EG(E)		1 1/2		1.30	1.50	1.68	1.84	1.98	2.12	1.25	1.44	1.61	1.76	1.90	2.04	1.13	1.31	1.46	1.60	1.73	1.85
G(E), EG(E)		2		1.73	2.00	2.24	2.45	2.65	2.83	1.66	1.92	2.15	2.35	2.54	2.72	1.51	1.74	1.95	2.13	2.30	2.46
C(E), EC(E)	B	2	1 - 2	1.73	2.00	2.24	2.45	2.65	2.83	1.66	1.92	2.15	2.35	2.54	2.72	1.51	1.74	1.95	2.13	2.30	2.46
S(E), N(E)		2		1.73	2.00	2.24	2.45	2.65	2.83	1.66	1.92	2.15	2.35	2.54	2.72	1.51	1.74	1.95	2.13	2.30	2.46
G(E)		3		2.60	3.00	3.35	3.67	3.97	4.24	2.49	2.88	3.22	3.53	3.81	4.07	2.26	2.61	2.92	3.20	3.45	3.69
G(E)		4		3.46	4.00	4.47	4.90	5.29	5.66	3.33	3.84	4.29	4.70	5.08	5.43	3.01	3.48	3.89	4.26	4.60	4.92
C(E), EC(E)	C	4	1 1/2-4	3.46	4.00	4.47	4.90	5.29	5.66	3.33	3.84	4.29	4.70	5.08	5.43	3.01	3.48	3.89	4.26	4.60	4.92
S(E)		4	1 1/2-4	3.46	4.00	4.47	4.90	5.29	5.66	3.33	3.84	4.29	4.70	5.08	5.43	3.01	3.48	3.89	4.26	4.60	4.92
G(E)		6		5.20	6.00	6.71	7.35	7.94	8.49	4.99	5.76	6.44	7.05	7.62	8.15	4.52	5.22	5.84	6.39	6.91	7.38
C(E)	D	6	4 1/2-6	5.20	6.00	6.71	7.35	7.94	8.49	4.99	5.76	6.44	7.05	7.62	8.15	4.52	5.22	5.84	6.39	6.91	7.38
RE		6		5.20	6.00	6.71	7.35	7.94	8.49	4.99	5.76	6.44	7.05	7.62	8.15	4.52	5.22	5.84	6.39	6.91	7.38
RE		9		7.79	9.00	10.10	11.00	11.90	12.70	7.48	8.64	9.66	10.60	11.40	12.20	6.78	7.83	8.75	9.59	10.40	11.10
RE		12		10.4	12.0	13.4	14.7	15.9	17.0	10.0	11.5	12.9	14.1	15.2	16.3	9.0	10.4	11.7	12.8	13.8	14.8
RE		21		18.2	21.0	23.5	25.7	27.8	29.7	17.5	20.2	22.5	24.7	26.7	28.5	15.8	18.3	20.4	22.4	24.2	25.8
RE		30		26.0	30.0	33.5	36.7	39.7	42.4	24.9	28.8	32.2	35.3	38.1	40.7	22.6	26.1	29.2	32.0	34.5	36.9
RE		45		39.0	45.0	50.3	55.1	59.5	63.6	37.4	43.2	48.3	52.9	57.1	61.1	33.9	39.2	43.8	47.9	51.8	55.4

EVAPORATOR TEMP. (°F)				-10°F						-20°F						-40°F					
PRESSURE DROP (PSIG)				100	125	150	175	200	225	125	150	175	200	225	250	125	150	175	200	225	250
Valve Type	Orifice	Nominal Capacity (tons)	Capacity Range* (tons)																		
G(E), EG(E)		1/8		0.09	0.10	0.11	0.12	0.13	0.14	0.09	0.09	0.10	0.11	0.11	0.12	0.05	0.06	0.06	0.07	0.07	0.08
G(E), EG(E)		1/4		0.19	0.21	0.23	0.24	0.26	0.28	0.17	0.19	0.20	0.22	0.23	0.24	0.11	0.12	0.13	0.14	0.15	0.15
G(E), EG(E)		1/2		0.37	0.41	0.45	0.49	0.52	0.56	0.34	0.37	0.40	0.43	0.46	0.48	0.22	0.24	0.26	0.28	0.29	0.31
C(E), EC(E)	AA	1/2	1/8-1/2	0.37	0.41	0.45	0.49	0.52	0.56	0.34	0.37	0.40	0.43	0.46	0.48	0.22	0.24	0.26	0.28	0.29	0.31
S(E)		1/2	1/8-1/2	0.37	0.41	0.45	0.49	0.52	0.56	0.34	0.37	0.40	0.43	0.46	0.48	0.22	0.24	0.26	0.28	0.29	0.31
I		1/2	1/4-1/2	0.37	0.41	0.45	0.49	0.52	0.56	0.34	0.37	0.40	0.43	0.46	0.48	0.22	0.24	0.26	0.28	0.29	0.31
N		1/2	1/4-3/4	0.56	0.62	0.68	0.73	0.78	0.83	0.51	0.56	0.61	0.65	0.69	0.72	0.33	0.36	0.39	0.41	0.44	0.46
G(E), EG(E)		1		0.74	0.83	0.91	0.98	1.05	1.11	0.68	0.75	0.81	0.86	0.92	0.96	0.44	0.48	0.52	0.55	0.59	0.62
C(E), EC(E)	A	1	1/4-1	0.74	0.83	0.91	0.98	1.05	1.11	0.68	0.75	0.81	0.86	0.92	0.96	0.44	0.48	0.52	0.55	0.59	0.62
S(E)		1	1/4 -1	0.74	0.83	0.91	0.98	1.05	1.11	0.68	0.75	0.81	0.86	0.92	0.96	0.44	0.48	0.52	0.55	0.59	0.62
I		1	3/4-1	0.74	0.83	0.91	0.98	1.05	1.11	0.68	0.75	0.81	0.86	0.92	0.96	0.44	0.48	0.52	0.55	0.59	0.62
G(E), EG(E)		1 1/2		1.11	1.24	1.36	1.47	1.57	1.67	1.02	1.12	1.21	1.29	1.37	1.45	0.65	0.72	0.77	0.83	0.88	0.92
G(E), EG(E)		2		1.48	1.65	1.81	1.96	2.09	2.22	1.36	1.49	1.61	1.73	1.83	1.93	0.87	0.96	1.03	1.10	1.17	1.23
C(E), EC(E)	B	2	1-2	1.48	1.65	1.81	1.96	2.09	2.22	1.36	1.49	1.61	1.73	1.83	1.93	0.87	0.96	1.03	1.10	1.17	1.23
S(E), N(E)		2	1-2	1.48	1.65	1.81	1.96	2.09	2.22	1.36	1.49	1.61	1.73	1.83	1.93	0.87	0.96	1.03	1.10	1.17	1.23
G(E)		3		2.22	2.48	2.72	2.94	3.14	3.33	2.05	2.24	2.42	2.59	2.75	2.89	1.31	1.43	1.55	1.65	1.76	1.85
G(E)		4		2.96	3.31	3.63	3.92	4.19	4.44	2.73	2.99	3.23	3.45	3.66	3.86	1.74	1.91	2.06	2.21	2.34	2.47
C(E), EC(E)	C	4	1 1/2-4	2.96	3.31	3.63	3.92	4.19	4.44	2.73	2.99	3.23	3.45	3.66	3.86	1.74	1.91	2.06	2.21	2.34	2.47
S(E)		4	1 1/2-4	2.96	3.31	3.63	3.92	4.19	4.44	2.73	2.99	3.23	3.45	3.66	3.86	1.74	1.91	2.06	2.21	2.34	2.47
G(E)		6		4.44	4.96	5.44	5.87	6.28	6.66	4.09	4.48	4.84	5.18	5.49	5.79	2.62	2.87	3.10	3.31	3.51	3.70
C(E)	D	6	4 1/2-6	4.44	4.96	5.44	5.87	6.28	6.66	4.09	4.48	4.84	5.18	5.49	5.79	2.62	2.87	3.10	3.31	3.51	3.70
RE		6		4.44	4.96	5.44	5.87	6.28	6.66	4.09	4.48	4.84	5.18	5.49	5.79	2.62	2.87	3.10	3.31	3.51	3.70
RE		9		6.66	7.45	8.16	8.81	9.42	9.99	6.14	6.72	7.26	7.76	8.24	8.68	3.92	4.30	4.64	4.96	5.27	5.55
RE		12		8.88	9.93	10.9	11.7	12.6	13.3	8.18	8.97	9.68	10.40	11.00	11.60	5.23	5.73	6.19	6.62	7.02	7.40
RE		21		15.5	17.4	19.0	20.6	22.0	23.3	14.3	15.7	16.9	18.1	19.2	20.3	9.2	10.0	10.8	11.6	12.3	12.9
RE		30		22.2	24.8	27.2	29.4	31.4	33.3	20.5	22.4	24.2	25.9	27.5	28.9	13.1	14.3	15.5	16.5	17.6	18.5
RE		45		33.3	37.2	40.8	44.1	47.1	50.0	30.7	33.6	36.3	38.8	41.2	43.4	19.6	21.5	23.2	24.8	26.3	27.7

* See page 160.
Shaded areas are standard conditions.

Liquid Refrigerant Temperature Correction Factor

Liquid Line Temp.	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F	130°F	140°F
Multiplier R-404	1.43	1.33	1.24	1.17	1.08	1.00	0.91	0.83	0.73	0.64

These ratings are based on vapor free 100°F liquid refrigerant entering the expansion valve, and a maximum of 7°F change in superheat.
*Balanced port valves are designed to cover an operating range from 50% of nominal capacity up to 110% of nominal capacity.

R404A/R502*/R402A*, B/R507* Metric Extended Capacities in Kilowatts

EVAPORATOR TEMP. (°C)				10°C						0°C						-10°C					
PRESSURE DROP (BAR)				5	7	9	10	12	14	5	7	9	10	12	14	5	7	9	10	12	14
Valve Type	Orifice	Nominal Capacity (kW)	Capacity Range*																		
G(E), EG(E)		1/2		0.38	0.45	0.51	0.54	0.59	0.64	0.36	0.43	0.49	0.51	0.56	0.61	0.34	0.41	0.46	0.49	0.53	0.58
G(E), EG(E)		1		0.77	0.91	1.03	1.08	1.19	1.28	0.73	0.86	0.98	1.03	1.13	1.22	0.69	0.82	0.92	0.97	1.07	1.15
G(E), EG(E)		2		1.53	1.81	2.05	2.16	2.37	2.56	1.45	1.72	1.95	2.06	2.25	2.43	1.38	1.63	1.85	1.95	2.13	2.31
C(E), EC(E)	AA	2 1/2-2		1.53	1.81	2.05	2.16	2.37	2.56	1.45	1.72	1.95	2.06	2.25	2.43	1.38	1.63	1.85	1.95	2.13	2.31
S(E)		2	1/2-2	1.53	1.81	2.05	2.16	2.37	2.56	1.45	1.72	1.95	2.06	2.25	2.43	1.38	1.63	1.85	1.95	2.13	2.31
I		2	1-2	1.53	1.81	2.05	2.16	2.37	2.56	1.45	1.72	1.95	2.06	2.25	2.43	1.38	1.63	1.85	1.95	2.13	2.31
N		3	1-3	2.30	2.72	3.08	3.25	3.56	3.84	2.18	2.58	2.93	3.08	3.38	3.65	2.07	2.45	2.77	2.92	3.20	3.46
G(E) ,EG(E)		4		3.06	3.62	4.11	4.33	4.74	5.12	2.91	3.44	3.90	4.11	4.51	4.87	2.76	3.26	3.70	3.90	4.27	4.61
C(E), EC(E)	A	4	1-4	3.06	3.62	4.11	4.33	4.74	5.12	2.91	3.44	3.90	4.11	4.51	4.87	2.76	3.26	3.70	3.90	4.27	4.61
S(E)		4	1-4	3.06	3.62	4.11	4.33	4.74	5.12	2.91	3.44	3.90	4.11	4.51	4.87	2.76	3.26	3.70	3.90	4.27	4.61
I		4	3-4	3.06	3.62	4.11	4.33	4.74	5.12	2.91	3.44	3.90	4.11	4.51	4.87	2.76	3.26	3.70	3.90	4.27	4.61
G(E), EG(E)		5		4.59	5.43	6.16	6.49	7.11	7.68	4.36	5.16	5.85	6.17	6.76	7.30	4.13	4.89	5.55	5.85	6.40	6.92
G(E), EG(E)		7		6.12	7.25	8.22	8.66	9.49	10.20	5.82	6.88	7.80	8.23	9.01	9.73	5.51	6.52	7.39	7.79	8.54	9.22
C(E), EC(E)	B	7	4-7	6.12	7.25	8.22	8.66	9.49	10.20	5.82	6.88	7.80	8.23	9.01	9.73	5.51	6.52	7.39	7.79	8.54	9.22
S(E), N(E)		7	4-7	6.12	7.25	8.22	8.66	9.49	10.20	5.82	6.88	7.80	8.23	9.01	9.73	5.51	6.52	7.39	7.79	8.54	9.22
G(E)		11		9.18	10.9	12.3	13.0	14.2	15.4	8.7	10.3	11.7	12.3	13.5	14.6	8.3	9.8	11.1	11.7	12.8	13.8
G(E)		14		12.2	14.5	16.4	17.3	19.0	20.5	11.6	13.8	15.6	16.5	18.0	19.5	11.0	13.0	14.8	15.6	17.1	18.4
C(E), EC(E)	C	14	5-14	12.2	14.5	16.4	17.3	19.0	20.5	11.6	13.8	15.6	16.5	18.0	19.5	11.0	13.0	14.8	15.6	17.1	18.4
S(E)		14	5-14	12.2	14.5	16.4	17.3	19.0	20.5	11.6	13.8	15.6	16.5	18.0	19.5	11.0	13.0	14.8	15.6	17.1	18.4
G(E)		21		18.4	21.7	24.6	26.0	28.5	30.7	17.5	20.6	23.4	24.7	27.0	29.2	16.5	19.6	22.2	23.4	25.6	27.7
C(E)	D	21	16-21	18.4	21.7	24.6	26.0	28.5	30.7	17.5	20.6	23.4	24.7	27.0	29.2	16.5	19.6	22.2	23.4	25.6	27.7
RE		21		18.4	21.7	24.6	26.0	28.5	30.7	17.5	20.6	23.4	24.7	27.0	29.2	16.5	19.6	22.2	23.4	25.6	27.7
RE		32		27.6	32.6	37.0	39.0	42.7	46.1	26.2	31.0	35.1	37.0	40.6	43.8	24.8	29.3	33.3	35.1	38.4	41.5
RE		42		36.7	43.5	49.3	52.0	56.9	61.5	34.9	41.3	46.8	49.4	54.1	58.4	33.1	39.1	44.4	46.8	51.2	55.3
RE		74		64.3	76.1	86.3	90.9	99.6	108.0	61.1	72.3	81.9	86.4	94.6	102.0	57.9	68.5	77.6	81.8	89.6	96.8
RE		106		91.8	109	123	130	142	154	87	103	117	123	135	146	83	98	111	117	128	138
RE		158		138	163	185	195	213	231	131	155	176	185	203	219	124	147	166	175	192	207

EVAPORATOR TEMP. (°C)				-20°C						-30°C						-40°C					
PRESSURE DROP (BAR)				7	9	10	12	14	16	9	10	12	14	16	17	9	10	12	14	16	17
Valve Type	Orifice	Nominal Capacity (kw)	Capacity Range* (kW)																		
G(E), EG(E)		1/2		0.35	0.40	0.42	0.46	0.50	0.53	0.29	0.30	0.33	0.36	0.38	0.40	0.19	0.20	0.22	0.24	0.25	0.26
G(E), EG(E)		1		0.71	0.80	0.84	0.92	1.00	1.07	0.58	0.61	0.66	0.72	0.77	0.79	0.38	0.40	0.44	0.47	0.51	0.52
G(E), EG(E)		2		1.41	1.60	1.69	1.85	2.00	2.14	1.15	1.21	1.33	1.43	1.53	1.58	0.76	0.80	0.88	0.95	1.01	1.04
C(E), EC(E)	AA	1/2-2		1.41	1.60	1.69	1.85	2.00	2.14	1.15	1.21	1.33	1.43	1.53	1.58	0.76	0.80	0.88	0.95	1.01	1.04
S(E)		2	1/2-2	1.41	1.60	1.69	1.85	2.00	2.14	1.15	1.21	1.33	1.43	1.53	1.58	0.76	0.80	0.88	0.95	1.01	1.04
I		2	1-2	1.41	1.60	1.69	1.85	2.00	2.14	1.15	1.21	1.33	1.43	1.53	1.58	0.76	0.80	0.88	0.95	1.01	1.04
N		3	1-3	2.12	2.40	2.53	2.77	3.00	3.20	1.73	1.82	1.99	2.15	2.30	2.37	1.14	1.20	1.32	1.42	1.52	1.57
G(E) ,EG(E)		4		2.83	3.20	3.38	3.70	4.00	4.27	2.30	2.42	2.66	2.87	3.07	3.16	1.52	1.60	1.75	1.90	2.03	2.09
C(E), EC(E)	A	4	1-4	2.83	3.20	3.38	3.70	4.00	4.27	2.30	2.42	2.66	2.87	3.07	3.16	1.52	1.60	1.75	1.90	2.03	2.09
S(E)		4	1-4	2.83	3.20	3.38	3.70	4.00	4.27	2.30	2.42	2.66	2.87	3.07	3.16	1.52	1.60	1.75	1.90	2.03	2.09
I		4	3-4	2.83	3.20	3.38	3.70	4.00	4.27	2.30	2.42	2.66	2.87	3.07	3.16	1.52	1.60	1.75	1.90	2.03	2.09
G(E), EG(E)		5		4.24	4.81	5.07	5.55	5.99	6.41	3.45	3.64	3.98	4.30	4.60	4.74	2.28	2.40	2.63	2.84	3.04	3.13
G(E), EG(E)		7		5.65	6.41	6.75	7.40	7.99	8.54	4.60	4.85	5.31	5.74	6.13	6.32	3.04	3.20	3.51	3.79	4.05	4.18
C(E), EC(E)	B	7	4-7	5.65	6.41	6.75	7.40	7.99	8.54	4.60	4.85	5.31	5.74	6.13	6.32	3.04	3.20	3.51	3.79	4.05	4.18
S(E), N(E)		7	4-7	5.65	6.41	6.75	7.40	7.99	8.54	4.60	4.85	5.31	5.74	6.13	6.32	3.04	3.20	3.51	3.79	4.05	4.18
G(E)		11		8.48	9.61	10.1	11.1	12.0	12.8	6.90	7.27	7.97	8.61	9.20	9.48	4.56	4.81	5.26	5.69	6.08	6.27
G(E)		14		11.3	12.8	13.5	14.8	16.0	17.1	9.2	9.7	10.6	11.5	12.3	12.6	6.08	6.41	7.02	7.58	8.11	8.36
C(E), EC(E)	C	14	5-14	11.3	12.8	13.5	14.8	16.0	17.1	9.2	9.7	10.6	11.5	12.3	12.6	6.08	6.41	7.02	7.58	8.11	8.36
S(E)		14	5-14	11.3	12.8	13.5	14.8	16.0	17.1	9.2	9.7	10.6	11.5	12.3	12.6	6.08	6.41	7.02	7.58	8.11	8.36
G(E)		21		17.0	19.2	20.3	22.2	24.0	25.6	13.8	14.5	15.9	17.2	18.4	19.0	9.12	9.61	10.5	11.4	12.2	12.5
C(E)	D	21	16-21	17.0	19.2	20.3	22.2	24.0	25.6	13.8	14.5	15.9	17.2	18.4	19.0	9.12	9.61	10.5	11.4	12.2	12.5
RE		21		17.0	19.2	20.3	22.2	24.0	25.6	13.8	14.5	15.9	17.2	18.4	19.0	9.12	9.61	10.5	11.4	12.2	12.5
RE		32		25.4	28.8	30.4	33.3	36.0	38.4	20.7	21.8	23.9	25.8	27.6	28.5	13.7	14.4	15.8	17.1	18.2	18.8
RE		42		33.9	38.4	40.5	44.4	48.0	51.3	27.6	29.1	31.9	34.4	36.8	37.9	18.2	19.2	21.1	22.7	24.3	25.1
RE		74		59.3	67.3	70.9	77.7	83.9	89.7	48.3	50.9	55.8	60.2	64.4	66.4	31.9	33.6	36.9	39.8	42.6	43.9
RE		106		84.8	96.1	101	111	120	128	69.0	72.7	79.7	86.1	92.0	94.8	45.6	48.1	52.6	56.9	60.8	62.7
RE		158		127	144	152	166	180	192	104	109	120	129	138	142	68	72	79	85	91	94

* See page 160.
Shaded areas are standard conditions.

Liquid Refrigerant Temperature Correction Factor

Liquid Line Temp.	10°C	20°C	30°C	40°C	50°C	60°C
Multiplier R404A	1.48	1.33	1.14	1.00	0.76	0.56

TXVs & AXVs

Parker Hannifin Corporation
Climate & Industrial Controls Group
Cleveland, OH

Applications

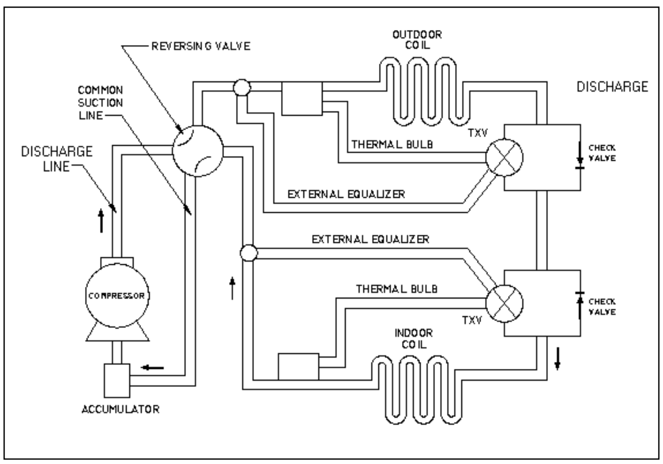
Bi-Directional Valves

The conventional means of applying thermostatic expansion valves to a split system heat pump is shown in the schematic below. This system employs two thermostatic expansion valves and two check valves and could be simplified by using a single thermostatic expansion valve as depicted in the schematic at the right labelled “Bi-directional TXV.”

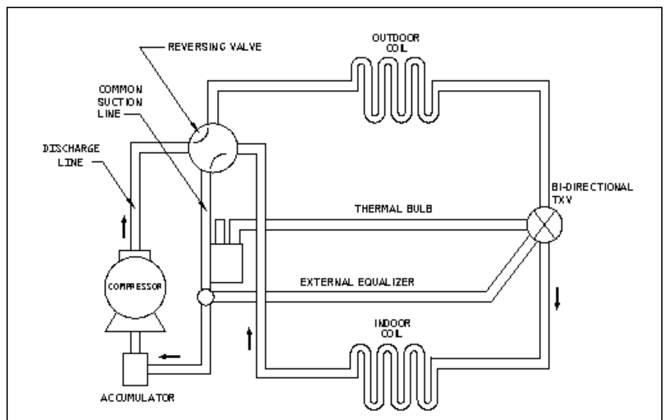
The drawing at the bottom right is a schematic of a heat pump employing a single externally equalized bi-directional thermostatic expansion valve controlling superheat in both the cooling and heating modes. The balanced port valve is ideally suited for this application since its internal construction prevents liquid by-pass through the external equalizer connection in both modes of operation. *Only externally equalized* valves can be used for this application.

When the bi-directional valve is used on a split system and installed on the condensing unit, it may be necessary to insulate the tubing between the expansion valve and the indoor heat exchanger. To decrease the pressure drop, it may also be necessary to increase the diameter of the insulated tubing. These system modifications are not necessary when the valve is applied to a single packaged heat pump.

Note: The schematics at the right show the air conditioning systems in the cooling mode. By switching the 4-way valve, flow from the compressor will be directed from the outdoor coil to the indoor coil changing the systems from cooling to heating.



Conventional TXV



Use models HC, EGC, ECC

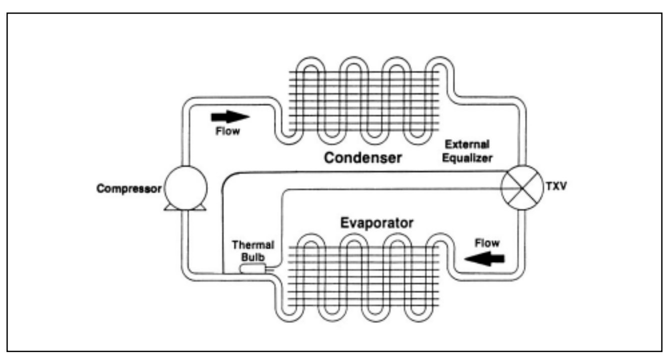
Bi-directional TXV

General Information

Operation

The thermostatic expansion valve is a metering device designed to regulate the flow of liquid to the vaporator, at a rate equal to the evaporation of the liquid in the evaporator. This is accomplished by maintaining a predetermined superheat at the evaporator outlet (suctionline) which ensures that all liquid refrigerant vaporizes in the evaporator with only refrigerant gas returning to thecompressor.

The thermostatic expansion valve (see the schematic at the right) is installed in the liquid line at the evaporator inlet separating the high and low pressure side of the system. The thermal bulb is connected to the outlet of the evaporator, sensing the evaporator outlet temperature. The expansion valve will remain in the closed position until the preset superheat setting is reached. Subsequently, refrigerant flow through the valve orifice will maintain a flow rate consistent with the heat load and the valve superheat setting. If the temperature sensed by the thermal bulb increases, the flow rate will increase, maintaining the proper evaporator outlet superheat. If the temperature decreases, the



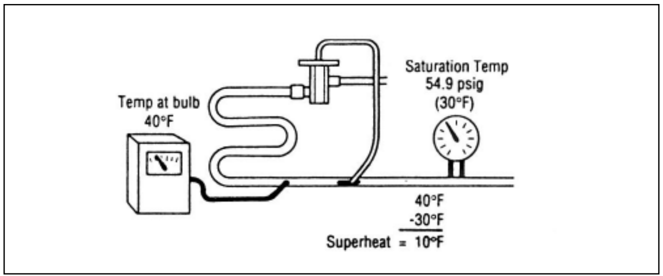
Thermostatic Expansion Valve

valve will stroke in the closing direction in response to the reduced heat load on the evaporator, again maintaining the proper evaporator outlet superheat.

The superheated suction gas flows to the compressor where its pressure and temperature are increased due to compression. The superheated discharge gas from the compressor then flows to the condenser where heat isrejected, changing the gas into a high pressure subcooled liquid. The liquid refrigerant then flows to the expansion valve inlet and is metered into the evaporator at a flow rate necessary to maintain proper evaporator superheat.

How To Determine Superheat

1. Determine suction pressure at evaporator outlet with gauge. On close coupled installations, suction pressure may be read at compressor suction connection.
2. Use Pressure-Temperature Chart to determine saturation temperature at observed suction pressure. For example, with an R-22 system: 54.9 psig = 30°F.
3. Measure temperature of suction gas at the expansion valve's remote bulb location. For example: 40°F.
4. Subtract saturation temperature of 30°F (Step 2) from suction gas temperature of 40°F (Step 3). The difference, 10°F, is the superheat of the suction gas.



Determining Superheat

Superheat

Superheat is the temperature of refrigerant gas above its saturated vapor (dewpoint) temperature. Superheat as it relates to thermostatic expansion valves, can be broken down into three categories:

- Static Superheat – The amount of superheat necessary to overcome the superheat spring force biased in a closed position. Any additional superheat (force) would open the valve.
- Opening Superheat – The amount of superheat necessary to open the valve to its rated capacity.
- Operating Superheat – The superheat at which the valve operates at normal running conditions or normal capacity. The operating superheat is the sum of the static and opening superheat. The figure at the right illustrates the three superheat categories. The reserve capacity, as shown in the graph, is important since it provides the ability to compensate for occasional substantial increases in evaporator load, intermittent flash gas, reduction in high side pressure due to low ambient conditions, shortage of refrigerant, etc.

Valve Setting

Parker "sets" the thermostatic expansion valve superheat at the static condition described above. Turning the adjusting screw clockwise will increase the static superheat. Conversely, turning the adjusting screw counterclockwise will decrease the superheat. Parker valves can also be adjusted at the operating point, indicated above. When a system is operating, any adjustments made will change the operating superheat. The static superheat range of adjustment is 3°F to 18°F. One full turn clockwise will typically increase superheat 2°F to 4°F.

NOTE: Refer to the valve's installation bulletin for specific directions on superheat adjustment.

Charges

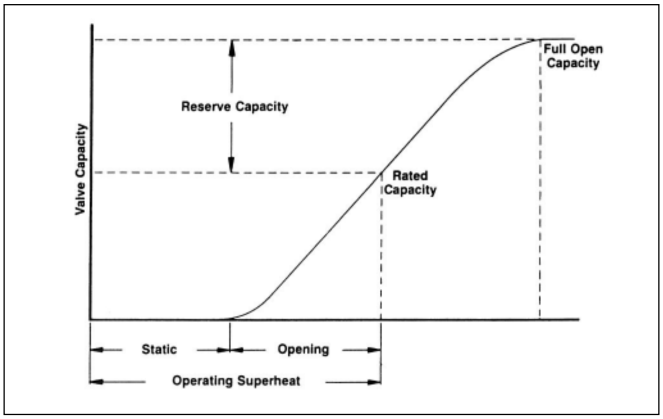
Power elements may be system charged (charged with the same refrigerant used in the system) or cross charged (refrigerant different from that used in the system).

"W" Charge

The Parker "W" liquid cross charge can be used with evaporator temperatures from -40°F to +60°F (-40°C to +15°C). Unlike conventional cross charges, the "W" charge maintains a nearly constant superheat throughout this range of evaporator temperatures. A liquid charged bulb maintains control even when the power element is colder than the bulb.

"Z" Charge

The Parker "Z" low temperature liquid cross charge can be used with evaporator temperatures from -40°F to 0°F (-40°C to -20°C). The "Z" cross charge is designed specifically for low temperature applications; therefore, it can control the system so that the desired

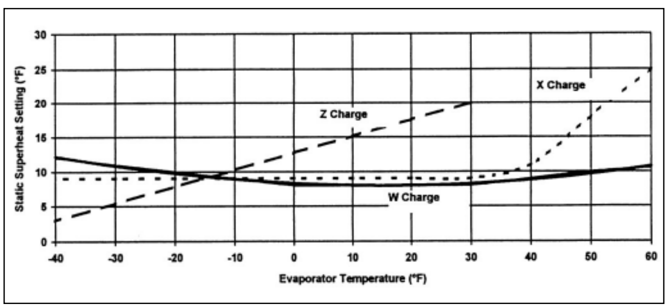


Superheat Capacities

evaporator conditions are achieved more rapidly than the all purpose "W" liquid charge. Additionally, the "Z" charge prevents the possibility for compressor floodback on startup due to higher operating superheats at higher evaporator temperatures. Like the "W" charge, the "Z" liquid charged bulb maintains control even when the valve power element is colder than the bulb.

Since the "Z" charge is designed specifically for low temperature applications, it does not exhibit "flat" superheat control over the entire operating range. This characteristic decrease in superheat as the evaporator temperature decreases allows the system to reach the desired operating conditions quickly. Due to this "slope" in superheat control (see graph at the right below), it is possible to optimize the operating superheat for any particular application by adjusting the valve after operating conditions are achieved.

The graph at the right illustrates the typical superheat control characteristics of Parker thermostatic valve bulb charges.



Parker Thermostatic Bulb Charges

X Charge

The Parker "X" anti-hunt gas cross charge can be used with evaporator temperatures from -40°F to +60°F (-40°C to +15°C). Every "X" charge is a pressure limiting, or MOP (Maximum Operating Pressure), type charge which limits flow on startup to prevent flooding and/or compressor overload. The approximate maximum evaporator operating pressure is designated in psig by the numbers which follow the "X", e.g. "X60" has an approximate pressure limit of 60 psig. Due to the pressure limiting characteristics of these charges, each charge is usable over a specific evaporator temperature range which can be determined by referencing the MOP number and refrigerant type in the table below.

Valves with an "X" type charge should not be used where the power element could get colder than the thermal bulb. Migration of the bulb charge to the power element can occur causing a loss of valve control. The only exceptions to this are the R-22 type VX100 charge and R-410A type KX200 charge, which are non-migrating charges designed specifically for air-conditioning, heat pump and medium temperature applications.

Recommended thermostatic valve charges are listed in the table at the right. A "–" indicates that a charge is not available for an application.

Recommended Thermostatic Valve Charges

Application	Applicable Evaporator Temperature Range	R-22 R-407C	R-12 R-134a	R-502 R-404A	R-410A
Low Temp Refrigeration	-40°F to 0°F (-40°C to -20°C)	VZ	–	SZ	–
Commercial Refrigeration	-40°F to +60°F (-40°C to +15°C)	VW	JW	SW	–
Low Temp Pressure Limiting	-40°F to 0°F (-40°C to -20°C)	VX35	–	SX35	–
Commercial Pressure Limiting	-10°F to +60°F (-20°C to +15°C)	VX100	JX60	SX110	KX200
Air Conditioning	+30°F to +60°F (0°C to +15°C)	VX100 VX100A	JX60	SX110	KX200
Heat Pump	-15°F to +60°F (-30°C to +15°C)	VX100	–	–	KX200

The Parker Rainbow Charge™

Multiple Use Thermostatic Charges for Alternative Refrigerants

Parker Rainbow Charges™ are designed to provide precise control for a complex variety of old and new refrigerant applications. Rainbow Charge labeling visually indicates which refrigerants each valve is designed for to simplify selection and reduce inventory. Rainbow Charge colors are consistent with industry standard refrigerant identification, insuring that the right Rainbow Charges are chosen for the application See pages 134 and 160 for more information on bulb charges.

Charge	May also be used with
JW, JX60 (R-134a)	R-12, R-401A (MP39), R-401B (MP66)
VW, VX35, VX100, VZ (R22)	R-407C (AC9000)
SW, SX35, SX110, SZ (R404A)	R-125, R-502, R-402A (HP80), R-402B (HP81), R-507 (AZ50)

Use the following steps to determine the correct capacity valve for use with one of the alternative refrigerants listed above:

1. Choose an expansion valve, using the capacity tables, which meets the requirements of the application. For example, if applying an R-22 valve to an R-407C system, choose an appropriate R-22 valve using the conditions of the R-407C system (choose appropriate evaporator temperature and valve pressure drop from R-22 capacity table).
2. Multiply the capacity found in the table by the appropriate factor below to determine actual valve capacity with the new alternative.

From	To	Multiply by	Special Considerations
R-134a	R-12	0.80	Decrease superheat by approximately 5°
R-134a	R-401A (MP-39)	1.05	Adjust superheat only if necessary
R-134a	R-401B (MP-66)	1.05	Adjust superheat only if necessary
R-22	R-407C (AC9000)	1.01	Increase superheat by approximately 5°
R-404A	R-125	0.77	Decrease superheat by approximately 5° for -10°F evap or lower
R-404A	R-502	1.02	Adjust superheat only if necessary
R-404A	R-402A (HP-80)	1.00	Decrease superheat by approximately 5° for 20°F evap or lower
R-404A	R-402B (HP-80)	1.10	Adjust superheat only if necessary
R-404A	R-507 (AZ50)	0.98	Decrease superheat by approximately 5°

3. Correct the capacity determined in the previous step for liquid line temperature.

	Degrees F														
Refrigerant	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°	130°	140°
R-134a	1.66	1.60	1.54	1.47	1.40	1.33	1.27	1.21	1.11	1.07	1.00	0.93	0.87	0.81	0.71
R-401A (MP-39)	1.57	1.51	1.43	1.37	1.35	1.28	1.23	1.17	1.11	1.06	1.00	0.94	0.88	0.82	0.75
R-401B (MP-66)	1.58	1.52	1.47	1.41	1.37	1.30	1.24	1.18	1.12	1.06	1.00	0.94	0.88	0.81	0.75
R-407C (AC9000)	1.60	1.56	1.49	1.43	1.37	1.32	1.25	1.18	1.12	1.07	1.00	0.94	0.85	0.78	0.71
R-125	2.14	2.00	1.91	1.79	1.71	1.58	1.47	1.38	1.26	1.12	1.00	0.88	0.73	0.57	0.40
R-404A (HP62)	1.91	1.83	1.74	1.64	1.56	1.48	1.39	1.30	1.19	1.10	1.00	0.89	0.78	0.67	0.56
R-402A (HP-80)	1.92	1.84	1.75	1.65	1.59	1.49	1.39	1.29	1.19	1.10	1.00	0.90	0.79	0.69	0.58
R-402B (HP-81)	1.76	1.69	1.61	1.54	1.47	1.39	1.31	1.24	1.16	1.08	1.00	0.91	0.83	0.73	0.64
R-507 (AZ50)	1.96	1.86	1.77	1.68	1.58	1.48	1.39	1.29	1.19	1.10	1.00	0.90	0.80	0.67	0.54

Anti-Hunt Ballast Bulb ("X" Charge)

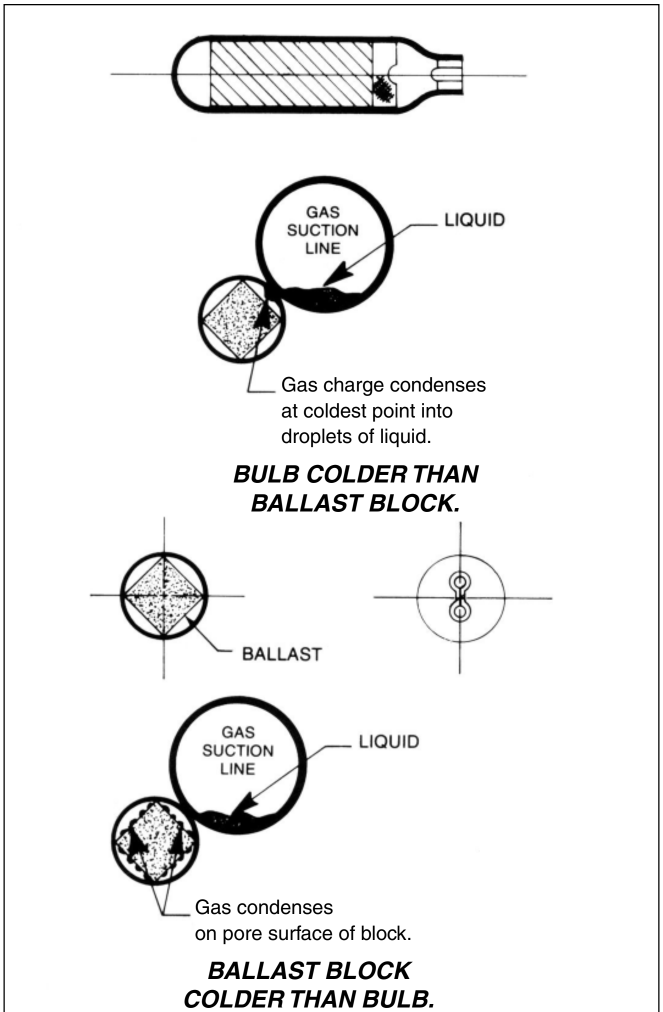
The power element sensing bulb for an "X" charge contains an internal ballast material and the entire assembly is gas cross charged.

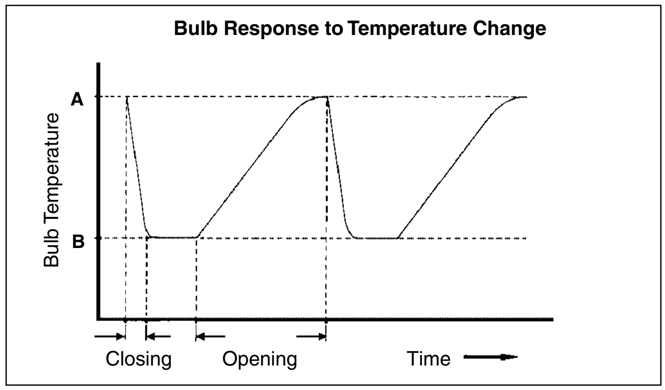
The combination of the cross charge and internal ballast results in a variable rate time constant dampening that reduces or entirely eliminates undesirable system hunt or instability caused by overfeeding or underfeeding the evaporator.

The top two graphs at the right illustrate the thermal ballast time delay characteristics. The top graph shows the bulb response to temperature change. The thermal bulb pressure will decrease rapidly when the temperature is decreased from point A to B causing the valve to modulate toward a lower flow position. As the temperature is increased back to point A, considerably more time is required to increase the thermal bulb pressure

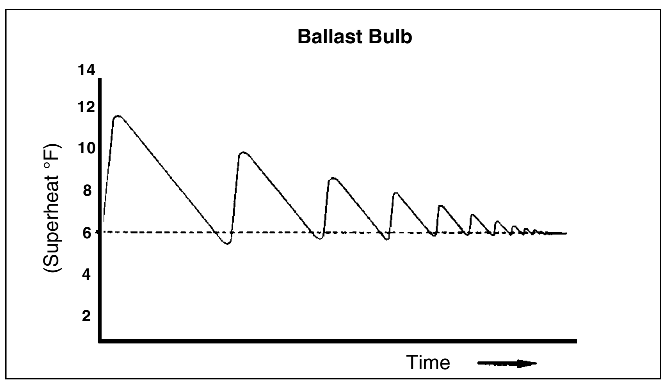
The second graph is an illustration characterizing the operating superheat variation of a typical refrigeration system. When the system load decreases, the suction line temperature and flow decrease and the operating superheat rises rapidly. As the suction line temperature increases, the bulb pressure will slowly increase and the operating superheat will decrease slowly to the predetermined level. This results in a sawtooth wave form which minimizes the system floodback. After several cycles of continuous dampened amplitude, the system will operate at the predetermined superheat with minimum suction line fluctuations (anti-hunt).

The bottom graph illustrates the operation of a non-ballast bulb charge. Since it will respond quickly in an opening and closing manner, the valve may overfeed and underfeed causing undesirable system fluctuation referred to as hunt.

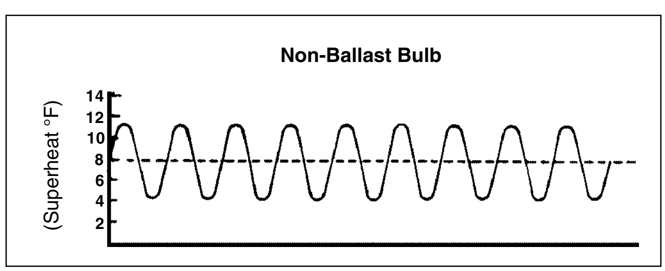




Bulb Response to Temperature Change



Operating Superheat Variation of a Typical Refrigeration System

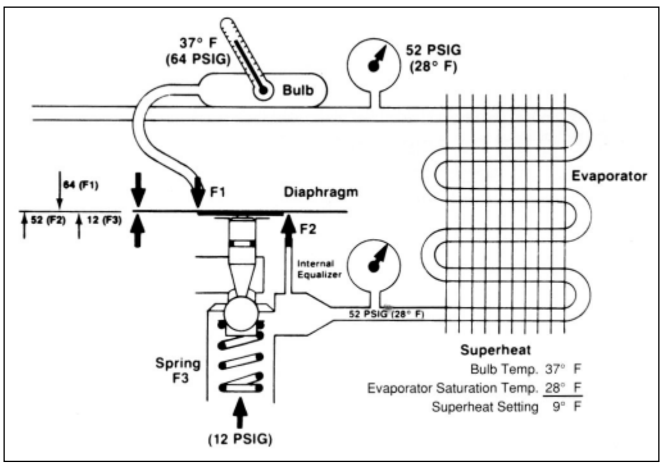


Operation of a Non-Ballast Bulb Charge

Internally Equalized Valves

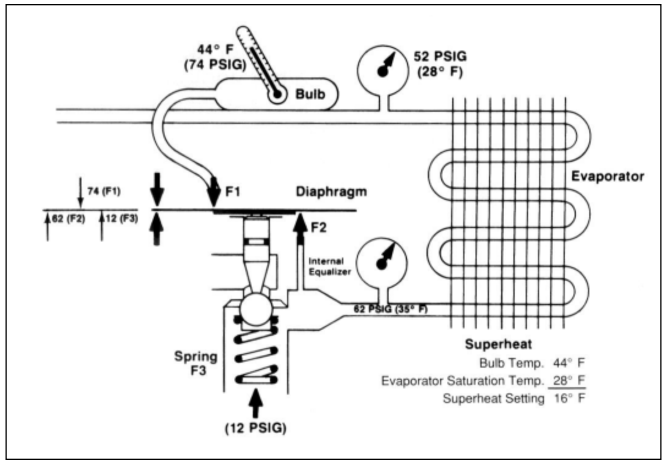
The outlet pressure of an internally equalized valve is transmitted to the underside of the diaphragm through an equalizer hole inside the valve body. Internally equalized valves are used with evaporators that have a pressure drop of less than 3 psi.

The equalizer passageway is the communication link from the evaporator to the underside of the diaphragm (F2). Internally equalized valves incorporate an internal communication passage from the outlet valve cavity to the underside of the diaphragm. In applications where the pressure drop between the valve outlet and the evaporator outlet is negligible, internal equalizers are effective to communicate the actual evaporator pressure to the underside of the diaphragm. In the schematic below, the F-1 force corresponding to refrigerant R-22 at 37°F is 64 psig. The evaporator pressure F-2 is 52 psig at 28°F and the superheat spring force F-3 is set for the balancing pressure of 12 psig. The valve is now in balance with 64 psig above and below the diaphragm and the superheat setting is 9°F.



Internally Equalized Valve with 0 PSI Drop in Evaporator

The following schematic shows the application of an internally equalized valve with a pressure drop of 10 psi across the evaporator. The evaporator saturated inlet pressure is 62 psig at 35°F. The superheat spring force (F-3) is set for an equivalent of 12 psig. The pressure under the diaphragm for an internally equalized valve would total 74 psig (12 + 62 psig). The remote thermal bulb force F-1 is 74 psig, for balanced conditions. This bulb pressure corresponds to a saturation temperature of 44°F. The pressure at the outlet of the evaporator is only 52 psig, 10 psig below the inlet pressure. The saturation temperature at 52 psig is 28°F. Use of an internally equalized valve will result in a superheat of 16°F (44°F- 28°F) at the evaporator outlet. Accordingly, the internally equalized valve used with a high pressure drop evaporator will cause excessive superheat and corresponding capacity loss.

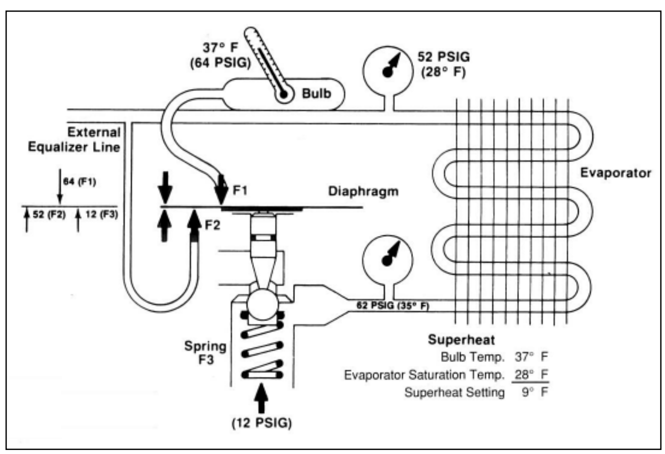


R-22 Internally Equalized Valve with 10 PSI Drop in Evaporator

Externally Equalized Valves

Employment of an externally equalized valve is required to control the evaporator at the proper superheat when the pressure drop of the evaporator is high, i.e. greater than 3 psig. The externally equalized valve will sense the pressure at the outlet of the evaporator. In the schematic below, the pressure under the diaphragm now totals 64 psig (12 plus 52 psig). The thermal bulb pressure above the diaphragm force, F-1, also equals 64 psig while the corresponding saturation temperature is 37°F.

The superheat at the outlet of the evaporator is 9°F (37°F-28°F). The use of a valve with an external equalizer has decreased the superheat from 16°F to 9°F and restored the superheat to the original value of 9°F with the same spring force of 12 psig.



Externally Equalized Valve with 10 PSI Drop in Evaporator

Note: Never cap an external equalizer service port.

Refer to the evaporator manufacturer's installation bulletin or look for a service port near the outlet of the evaporator for external equalizer installation.

Off Cycle Unloading (Bleed)

Internal bleed orifices are used to equalize the high and low side pressures during the off cycle so that low starting torque compressors can start. Systems such as air conditioners and heat pumps sometimes require a TXV with internal bleed due to the frequent cycling that occurs.

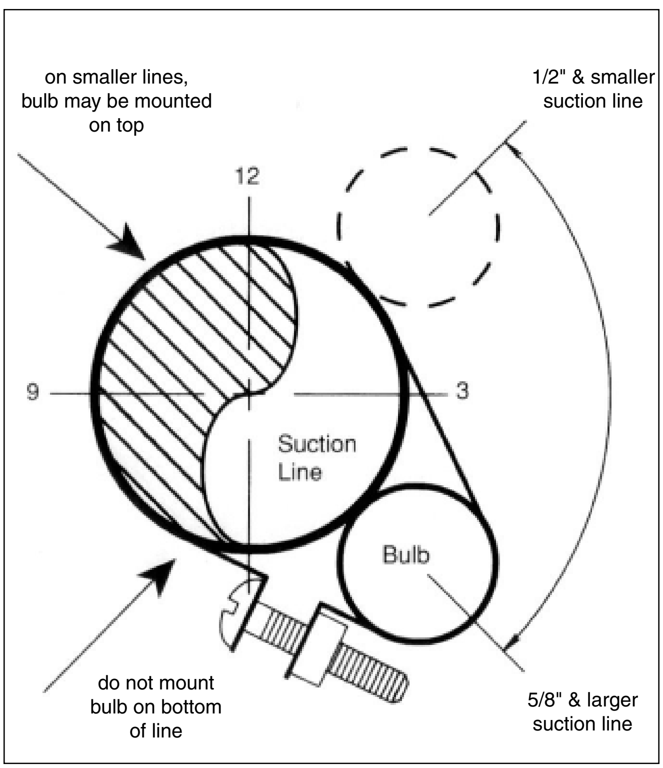
Consult the factory if a bypass bleed is required.

The required bleed size is a function of high and low side system volumes, refrigerant charge, and pressure difference across the valve prior to shutdown. These variables affect the equalization time required by a time delay device or thermostat reset. Bleed sizes are usually specified as a percentage of the nominal valve capacity and can range from 5% to 50%, although 15% to 30% is more commonly specified.

At the end of the valve model number, a letter “B” followed by digits indicates an internal bleed. These digits represent the bleed capacity as a percentage of the valve’s nominal capacity.

Example: SE5VX100B20 – Bleed orifice 20% of 5 tons, or 1 ton bypass bleed.

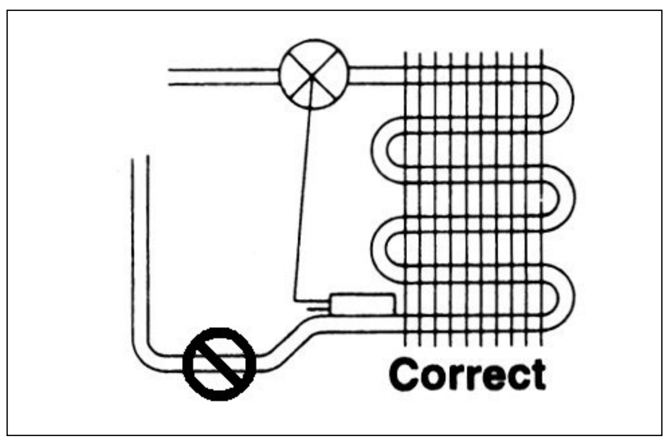
Because the internal bleed is an additional flow path in the valve, adding a bleed will increase the capacity of the valve. Thus, a 5 ton valve with a 20% bleed is actually capable of 6 tons. However, intentionally adding an internal bleed to increase the capacity of a valve is not recommended.



Bulb Location and Installation

Since the control response of the bulb is crucial for satisfactory operation, care should be taken in its mounting and positioning.

- Always make sure the suction line is cleaned before clamping the bulb in place.
- On lines that are 1/2" O.D. or smaller, the bulb may be installed on top of the line or side mounted (preferably at the 3 o’clock position).
- On lines that are 7/8" O.D. or larger, the remote bulb should be installed at 45° or at approximately the 4 or 8 o’clock position.
- Never mount a bulb on the bottom of suction lines because a mixture of refrigerant and oil may be present at that point, especially on smaller lines.
- It is good practice to insulate the bulb regardless of the refrigerant type. This ensures that the bulb will only respond to the suction gas temperature and will not be affected by condensation, ice formation or ambient temperatures.
- Avoid mounting the bulb on vertical lines or close to reversing valves.
- The bulb should always be mounted between the evaporator outlet and the external equalizer connection and should be as close to the evaporator outlet as possible (generally 3 to 6 inches).
- On systems that have multiple evaporators, the bulb must be mounted on the suction line of the evaporator which it controls. Do not mount the bulb on the common suction line.
- Install traps on vertical risers. (See the illustration below.)



Installation of Traps

Balanced Port Valves

Parker balanced port thermostatic expansion valves can be applied to a broad range of air conditioning and refrigeration systems. They exhibit exceptional performance over a wide variation in load on a specific system, or the same valve can be applied to a large range of application capacities.

Features of the balanced port valve include:

- Fully balanced port design incorporating a patented power piston.
- Compensates for wide variations in high to low side pressure.
- Has sufficient capacity to allow for intermittent flash gas.
- Compensates for wide variations in evaporator load.
- Compensates for changes in liquid line temperatures.
- Compensates for wide variations in pressure drop across the thermostatic expansion valve.

Operation

Conventional thermostatic expansion valves respond to four forces (See the illustration at the right):

Force 1 — Thermal bulb pressure times the diaphragm effective area. This force acts on the top of the diaphragm which tends to open the valve.

Force 2 — Evaporator pressure times the diaphragm effective area. This force acts on the underside of the diaphragm. It tends to close the valve. This force is transmitted to the diaphragm through the valve body with internally equalized valves and through the external connection on externally equalized valves.

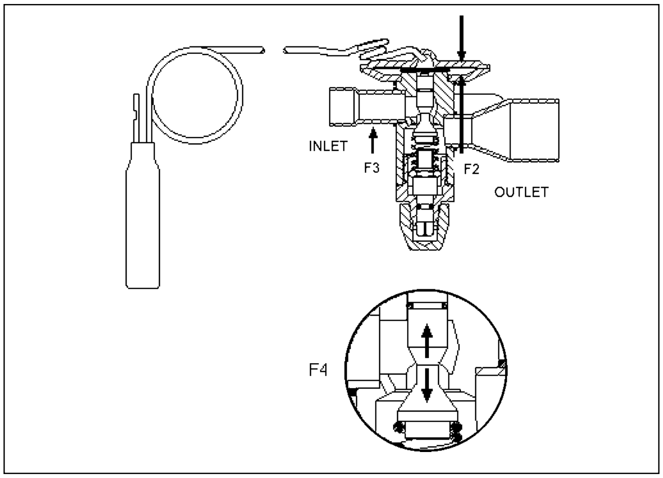
Force 3 — Superheat spring force which assists in closing the valve.

Force 4 — High and low side pressure differential times the port area. This differential pressure force tends to open the valve.

Balanced port valves respond to forces (F-1), (F-2) and (F-3) in a manner similar to conventional valves; however, they take a unique approach to the (F-4) force created by high and low side pressure differentials across the ball and valve orifice. (See figure A.) The area of the Parker Power Piston® is equal to the area of the port diameter. This force is cancelled out as the piston force and the force across the port are equal and opposite.

As inlet pressure changes, the (F-4) force changes but always remain equal and opposite and is cancelled out, therefore, variations in valve system pressures do not have any effect on the static superheat setting of the valve.

The change in operation superheat is only affected by operating changes in load requirements. In contrast, unbalanced (conventional) valves will also change



Forces that Cause Conventional Thermostatic Expansion Valves Responses

operating superheat due to the changes in inlet pressure (F-4). This additional superheat change increases considerably as the port diameter and valve capacity increase.

Assuming a port diameter of .250 inches and a high side pressure change of 100 psi, the change in force of an unbalanced valve would be (100 x .049) or 4.9 pounds. If the effective area of the diaphragm was 1.00 square inch, the change in evaporator pressure would be 4.0psig. If this example is applied to high side variations of 100 to 200 psi, and all common refrigerants are considered at evaporator temperatures from -20°F to +40°F, it is possible that the superheat change could vary 3.5°F to 22°F. This superheat change (not inherent in balanced valves) is in variations in load conditions.

Parker thermostatic expansion valves incorporate the power piston (balanced port), which has been used successfully for over 30 years. The balanced port power element assembly incorporates heavy duty diaphragm housings and a high strength stainless steel flat diaphragm to withstand severe high pressures. The assembly also includes a “buffer” ring for additional support and subsequent additional endurance. The flat steel diaphragm provides a smooth stroke without “snap.” The rugged stainless steel piston assembly uses a proven Parker “O” Ring packing compound for refrigerant use. The element is protected from any system contaminants by virtue of the piston seal on the Parker Power Piston. Additionally, this seal prevents any leakage from the high to low side of the valve.

In the manufacturing process, secondary operations are made on Parker valves that places the diaphragm at a specific position relative to neutral (weld point). This important manufacturing process insures uniform diaphragm sensitivity. Through this unique manufacturing process, Parker valves essentially minimize the variation in superheat change to attain a specific capacity.

Valve Selection Procedure

1. Determine application information.

It is important to obtain specific system information in order to choose the correct valve for a particular application. Listing this information will aid in making choices such as capacity, charge, and fitting configuration which will result in the best possible valve choice for the application.

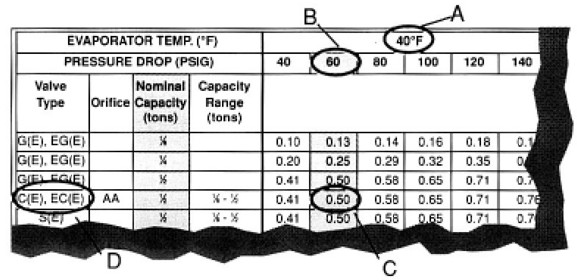
- **System refrigerant**. Determine what refrigerant will be used in the system.
- **Evaporator load or system capacity**. Determine the design system capacity.
- **Evaporator operating temperature/pressure**. Determine the design evaporator temperature and pressure. *Evaporator temperature* is usually specified, or can be calculated by subtracting the "TD" temperature from the desired environment control temperature. *Evaporator pressure* can be determined by looking up the associated saturation pressure for the known evaporator temperature in a refrigerant table.
- **Evaporator pressure drop, distributor pressure drop**. Determine any pressure drop which will occur after the refrigerant exits the valve, such as distributor pressure drop and evaporator pressure drop.
- **Condenser operating pressure/liquid temperature**. Determine the condenser pressure and liquid temperature. The liquid temperature can be determined directly or by subtracting a desired subcooling amount from the condenser design temperature. When determining the liquid pressure, consider any factors which may affect the pressure entering the valve; such as friction losses, vertical lift, and pressure drop across system components such as dryers, sight glasses, and other valves.

	Vertical Lift Pressure Drop					
Refrigerant	20 ft.	6 m	40 ft.	12 m	60 ft.	18 m
R-12	11	0.75	23	1.6	33	2.3
R-22	10	0.69	20	1.4	30	2.1
R-502	10	0.69	21	1.4	31	2.1
R-134a	10	0.69	20	1.4	30	2.1
R-404A	8.5	0.59	17	1.2	25	1.7

- **Connection configuration** (fitting types, sizes, orientations.) Determine what style connections are best suited for the application, SAE flare or ODF copper.
- **Valve adjustment requirements** (adjustable, non-adjustable.) Determine whether or not field adjustment is required.
- **Bypass bleed requirements**. Determine if the system requires equalization of high and low side pressures due to compressor starting limitations. Contact the factory if this is necessary.

2. Determine the required nominal capacity and charge for the valve.

Liquid Line Temp.	70°F	80°F	90°F	100°F	110°F	120°F	130°F	140°F
Multiplier R-22	1.21	1.11	1.07	1.00	0.93	0.87	0.81	0.71



A.Evaporator temperature
B. Pressure Drop
C. Design System Tonnage
D. Valve Type

Selection of nominal capacity

- **Find the correct capacity table**. Refer to capacity table section and find the correct page for the system refrigerant in either English or metric units.
- **Find the correct evaporator temperature section for the application** based on the design evaporator temperature.
- **Determine the pressure drop available across the expansion valve**. Deduct the evaporator pressure from the condenser pressure, then deduct pressure losses due to distributors, vertical lift, strainers, other valves, dryers in liquid line, and any significant friction losses in the evaporator and condenser refrigerant lines.
- **Find correct pressure drop column.**
- **Find a capacity selection in that column** which most closely matches the desired system capacity. The usable capacity published in the table represents the valve's nominal capacity at a specific condition. The system design capacity at that same condition should be at least 50% of, but not more than 10% over the selected valve's capacity.
- **Determine the correct type and capacity valve**. Read across to the leftmost columns which describe the model(s) and nominal capacity which will be best for the application.
- **Correct table capacity for liquid line (subcooling) temperature.** Subcooling will normally increase both system and valve capacities. Subcooling will also increase the density of the liquid refrigerant, increase the enthalpy difference across the evaporator and prevent flash gas at the metering device. Flash gas severely reduces the refrigerant flow through the valve orifice, decreasing valve capacity and increasing operating superheat. Correct the system design capacity for liquid line temperature with the liquid temperature correction table located on that page.

Selection of charge

- **Refer to pages 159 and 160 for a full explanation of charge selection.**
- **Select a charge which is best suited for the application.** Type “W” charges are good all-purpose charges, “Z” charges are meant for low temperature applications, and “X” charges are for applications requiring a pressure limit.

3. Choose the valve configuration which best suits the application.

- Select a model which best suits the needs of the application based on fitting type, size, and orientation. Consider physical size and type of adjustment available for each model.
- **Determine whether an external equalizer is necessary.** Combined pressure drops of the distributor and evaporator which exceed 3 psi will require an externally equalized valve for proper operation.
- **Determine the full model number** by combining the information.

Nomenclature *(Example)*

G	E	3	V	X	100	3/8"r SAE	x	1/2" SAE	x	1/4" SAE/ODF
Valve Model	**External Equalizer** Omit for Internal Equalizer	**Nominal Capacity in Tons**	**Refrigerant** See pages 134 and 157.	**Valve Charge** See pages 134 and 157. W Z X	**Maximum Operating Pressure (MOP)**	**Inlet Fitting Size and Type**		**Outlet Fitting Size and Type**		**External Equalizer Size and Type**

Example of Valve Selection Procedure

1. Determine application information. The following information was obtained from system design constraints. The example application is an R-22 freezer which operates continuously at a temperature of 15°F. The evaporator is rated at a 10° TD, therefore the evaporator temperature is approximately 5°F. There are no special pressure constraints on the compressor.

• **System refrigerant**	R-22
• **System capacity**	13,600 BTU/hr (1.13 tons)
• **Evaporator temperature**	5°F
Evaporator pressure	28 psig
• **Evaporator pressure losses**	
Distributor pressure drop	15 psi (estimated)
Evaporator pressure drop	6 psi (estimated)
• **Condenser pressure**	225 psig
Liquid line pressure losses	4 psi (estimated)
Liquid temperature	90°F
• **Connections required**	3/8" SAE liquid line con. 1/2" SAE evaporator con.
• **Valve adjustment requirements**	Adjustable
• **Bypass bleed requirements**	None

2. Determine the required nominal capacity and charge for the valve.

Selection of nominal capacity

• **Find the correct capacity table**	Correct R-22 table on p. 154
• **Find the correct evaporator**	Refer to 0° evaporator section (closest to 5°F design temp.)

• **Determine available pressure drop**	Condenser pressure	225 psig
	Evaporator pressure	- 28 psig
	Total pressure drop	197 psig
	Subtract losses	
	Liquid line -	4 psi
	Distributor -	15 psi
	Evaporator -	6 psi
	Net pressure drop	172 psi
• **Find correct pressure drop column**	Refer to 175 psi pressure drop column	
• **Find a capacity selection**	Find that there is a G(E)1 valve rated at 1.16 tons	
• **Correct table capacity for liquid temperature correction**	Refer to the liquid temperature table for R-22 and find a factor of 1.08 1.16 tons x 1.08 = 1.23 tons This valve will be operating at 92% capacity	

Selection of charge

• **Select appropriate charge**	From evaporator temperature range on page 135, choose VW charge

3. Choose the valve configuration that's best for the application

• **Select valve model**	Choose the G(E)1 for this example.
• **Determine if there is an external eqaulizer**	Pressure drop after the expansion valve is 11 psi (5 psi + 6 psi). It is necessary for the valve to be externally equalized, therefore the model number for the valve will include the “E”.

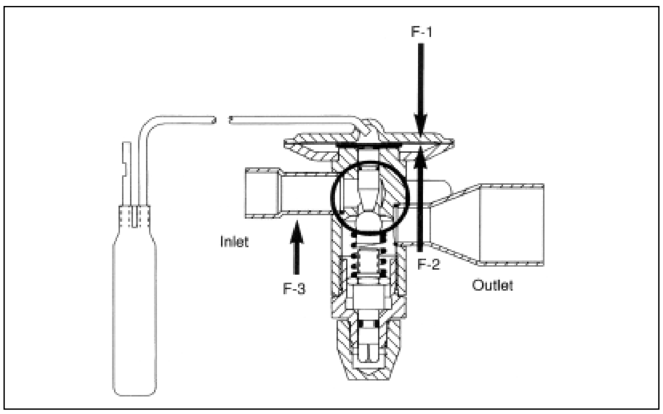
- **Determine the full model number;** put the information together:
GE 1 VW 3/8"R SAE X 1/2" SAE X 1/4" SAE

Tips for Understanding and Preventing Superheat Hunting in TXVs

A common problem facing refrigeration and air conditioning service technicians and contractors is that of superheat hunting by thermostatic expansion valves (TXVs). Here is a better understanding of a commonly overlooked cause of superheat hunting and how the problem might be corrected.

Defining Superheat "Hunting"

Superheat hunting is a cyclical fluctuation in suction superheat due to varying refrigerant flow rate in the system. Superheat hunting is the result of the expansion valve (see the illustration below) excessively opening and closing in an attempt to maintain a constant operating condition. Hunting can be observed as regular fluctuations in suction temperature, and in extremes, suction pressure. Excessive hunting can reduce the capacity and efficiency of the system resulting in uncomfortable conditions, loss of product, and wasted energy.



A conventional balanced port thermostatic expansion valve and the three forces it responds to:
Force F1 – Thermal bulb pressure times the diaphragm effective area. This force acts on the top of the diaphragm which tends to open the valve.
Force F2 – Evaporator pressure times the diaphragm effective area. This force acts on the underside of the diaphragm. It tends to close the valve. This force is transmitted to the diaphragm through the valve body with internal equalized valves and through the external connection in external equalized valves.
Force F3 – Superheat spring force which assists in closing the valve.

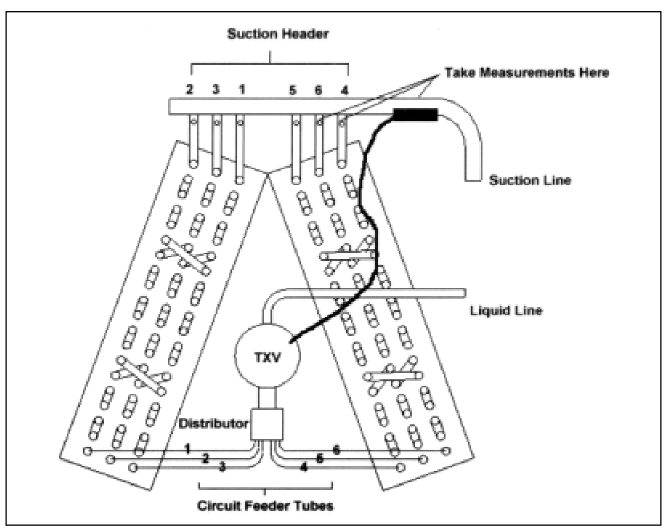
Common Reasons for TXV Hunting

- **Oversized valve –** The expansion valve may be oversized for the application or operating condition of the system. If the valve capacity significantly exceeds the requirements of the system, when the valve attempts to adjust to system load it overcompensates because it is oversized.
- **Incorrect charge selection –** The charge selected does not have the necessary control characteristics and / or dampening ability to stabilize operation.
- **Undercharged system –** Intermittent loss of subcooling is causing loss of expansion valve capacity and resulting intermittent high superheat.
- **Poor bulb contact –** Loss or delay of temperature signal to bulb causes erratic and unpredictable operation.
- **An imbalanced heat exchanger (multi-circuit coil) –** An imbalance in the heat load on each circuit creates a false temperature signal to the expansion valve bulb and results in erratic operation. Since this problem is commonly overlooked in the field, a closer examination and a possible solution are in order.

Balanced or Unbalanced Circuits? TXVs on Multi-Circuit Heat Exchangers

TXVs respond, in part, to the temperature of the suction line. At the expansion valve outlet, flow is divided into 2 or more paths (circuits) at the inlet of the evaporator by the distributor. These paths recombine as they exit the evaporator into the suction manifold. (See the illustration below.)

Ideally, each circuit is equally loaded and absorbs an equivalent amount of heat. If one assumes the refrigerant flow rate and heat load through each circuit is equal, then the superheat condition exiting each circuit will be equal and when all of the flow streams recombine, the result is a "true" average condition of the evaporator suction gas. When one or more circuits has a lighter heat load, some refrigerant from that circuit remains unevaporated when it exits the coil. When this unevaporated liquid refrigerant combines with the other superheated flow streams, the recombined suction flow



Expansion Valve Flow

no longer represents an average condition. The suction temperature where the bulb is mounted will be lower than the "true" average of the circuits if they were all properly superheated.

Sensing a "cold" suction condition will cause the valve to close down because it is sensing a condition which is not superheated enough; when the valve closes down, it restricts flow to all circuits and eventually "dries out" the circuits which are is flooding. By this time, the remaining circuits have become highly superheated due to the reduced flow rate. At the point the "flooding" circuit(s) begin to be superheated, the suction temperature rises rapidly because there is no more liquid present to falsely reduce the suction temperature.

Sensing a now "warm" suction condition, the valve opens to decrease superheat and the lightly loaded circuit begins to flood into the suction manifold again. Suction temperature drops rapidly again, the valve closes down again, the sequence repeating in a cyclical fashion.

Again, the ideal situation is to assume each circuit is equally loaded and absorbs an equivalent amount of heat; in reality, this situation does not always occur. There are several reasons why circuits can become unevenly loaded:

- **Poor heat exchanger design –** In this case, each circuit is not of equal length and loading.
- **Poor refrigerant distribution –** This problem occurs due to the wrong choice of distributor or feeder tubes, partially blocked passageways of feeder tubes, unequal feeder tube lengths, and/or kinked feeder tubes.
- **Uneven air flow –** Air flow across the evaporator is reduced in some areas while increased in other areas. Dirty coils or damaged coil fins can have a similar effect on air flow.

Diagnosing a Hunting Problem: Is It the Heat Exchanger?

Diagnosing a hunting problem due to an imbalanced heat exchanger requires measuring the exit temperature of each circuit upstream of the suction manifold. To perform this process, average the temperatures of all of the circuits upstream of the suction manifold and compare this average temperature to the actual temperature of the suction manifold close to where the bulb is mounted. If the average value of the circuit exit temperatures exceeds the actual suction temperature value by more than 2°F, then there is likely one or more circuit(s) which are not completely superheated (flooding). A closer examination of the individual circuit temperatures and the associated suction pressure should reveal which circuit(s) are causing the problem.

One simple rule to remember is that the valve's response will favor the circuit that is flooding. Because of this favorable response, a heat exchanger can be operating at a reasonable exit superheat but still have a significant loss in capacity because the expansion valve is responding to one or more flooding circuits while the other circuits remain highly superheated, and thus highly inefficient.

Correcting the Problem

Correcting the problem can be a difficult task. First, the service tech must recognize the cause of the problem. If not, the problem can only be compensated for and this could mean a reduction in system performance. Here are some tips for correcting or compensating for an imbalanced heat exchanger:

- If possible, examine and correct any problems with air flow, coil circuitry, and distribution such that the circuits are more evenly fed and loaded. The goal is a more consistent circuit exit temperature on all circuits. One lightly loaded circuit may be tolerable if there are, for example, eight circuits. However, this is probably not the case if there are only three.
- Adjust the superheat of the valve to a slightly higher value. Attempting to control an evaporator near to or lower than 5°F operating superheat can exceed the sensing capability of most expansion valves and result in hunting and subsequent intermittent flooding.
- If practical, move the bulb farther downstream on the suction line. Better mixing of the refrigerant prior to the bulb can "smooth" out the valve response although capacity and efficiency may not improve significantly.

Parker Hannifin Corporation
Climate & Industrial Controls Group
Cleveland, OH

Model 104A & 104F Constant Pressure Expansion Valves

Specifications

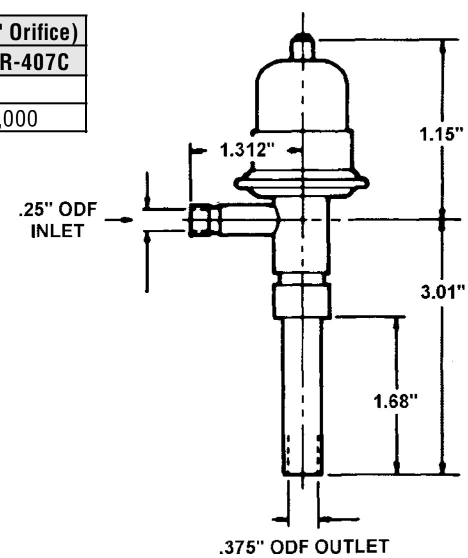
- **Hermetic construction.**
- **Solder connections:** High temperature type 1/4" O.D.F. inlet, 3/8" O.D.F. outlet (5/16" outlet available).
- **Valve opening point adjusting range:** 0 to 90 psig is standard for valves. A higher adjustment range is available.
- **Adjusting screw:** Set at a pre-determined pressure with sealant or lock nut.
- **With or without bleed** for offcycle unloading in all orifice sizes.
- **Orifice sizes:** .120" is standard; .093" and .140" orifices are available.
- **Bleed sizes:** B2 through B60 nicked seat type; B60 through B140 drilled by-pass type.
- **Maximum Operating Pressures**
  High Side: 500 psig (35 bars)
  Low Side: 300 psig (21 bars)
- **Construction:** Brass, copper and stainless steel.

104A

Capacities (BTU/hr) Model 104A

Model No.	Device No.	Nominal Capacity (.120" Orifice) R-12 R-134a	R-22 R-407C
Model 104A			
104A	104-505	14,000	24,000

Dimensions

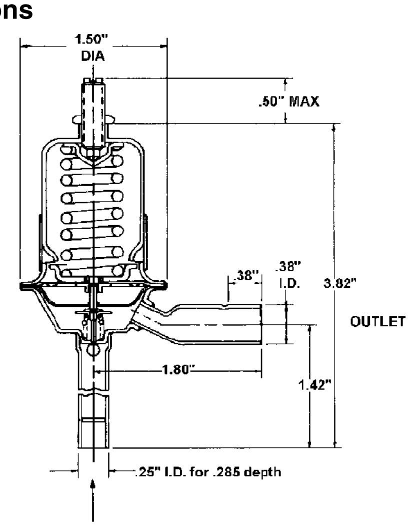


104F

Capacities (BTU/hr) Model 104A

Refrigerant	Orifice Size .093"	.120"
R-12 R-134a	12,000	15,000
R-407C R-22	18,000	24,000

Dimensions



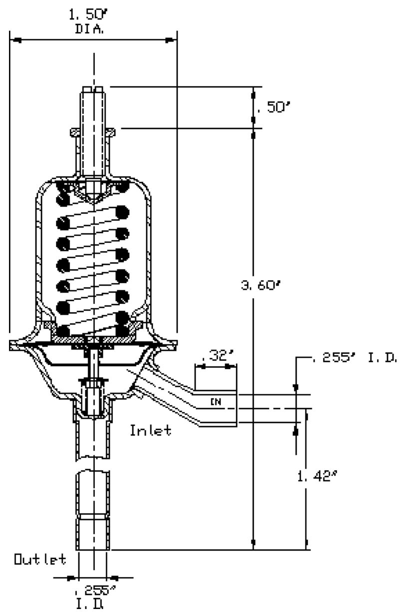
Parker Hannifin Corporation
Climate & Industrial Controls Group
Cleveland, OH

Model 139 Evaporator Pressure Regulator (EPR)

Specifications

- **Solder Connections –** 1/4" ODM inlet, 1/4"
  ODF outlet.
- **Adjustment Range –** Consult Parker.
- **Adjusting Screw –** Set at pre-determined
  pressure with sealant or locknut.
- **Nominal Capacities –** For fractional horsepower compressors. For more detail consult Parker.
- **Construction –** All brass, copper and stainless steel.
- **Maximum Operating Pressure –** Consult Parker.

Dimensions



A Series Constant Pressure Expansion Valves

Specifications

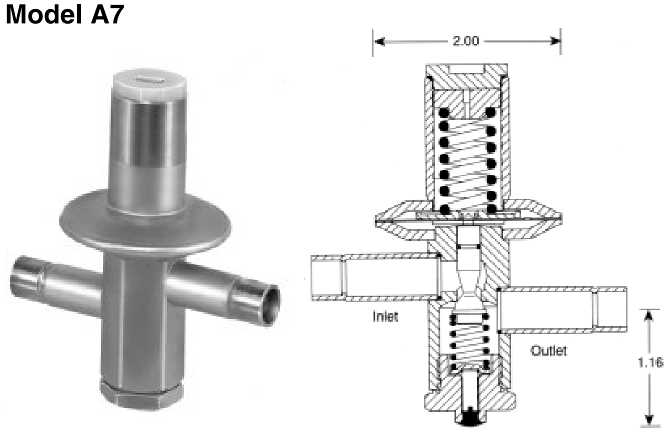
- 0-90 psig adjustment range.
- Bypass bleeds available.
- Construction: Brass, copper and stainless steel.
- Optional external equalizer.
- U.L. recognized for maximum operating pressure of 500 psig high side, 225 psig low side.

Model No.	Equalizer	Connections	
		Inlet	Outlet
A1	Internal	1/4" SAE	1/4" NPTF
A2*	Internal	1/4" SAE	1/2 SAE
A3	Internal	3/8" SAE	1/2" SAE
AE3**	External	3/8" SAE	1/2" SAE
A4	Internal	1/4" SAE	1/2" SAE
AS	Internal	1/4" ODF	3/8" ODF
A7	Internal	3/8" ODF	3/8" ODF
AT	Internal	1/4 SAE 1/4 ODF 8 mm ODF	1/4 NPTF 8 mm ODF

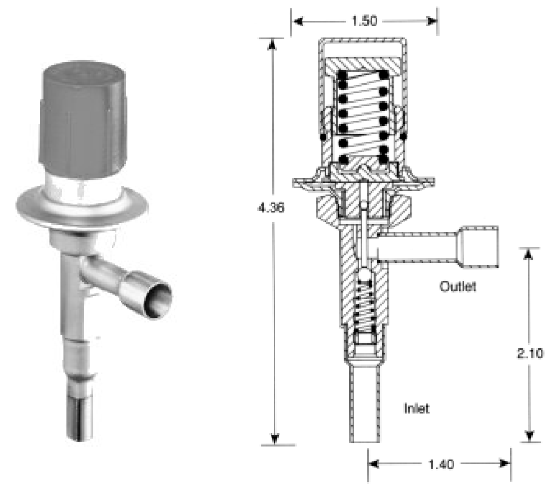
* 1/2" x 3/8" SAE flare adapter available.

** It is recommended that external equalizer type be used when pressure drop through the evaporator and/or distributor exceeds 5 psi.

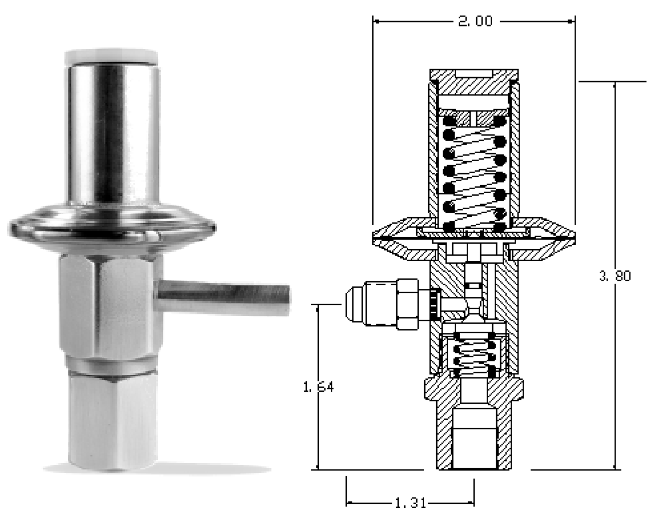
Model A7



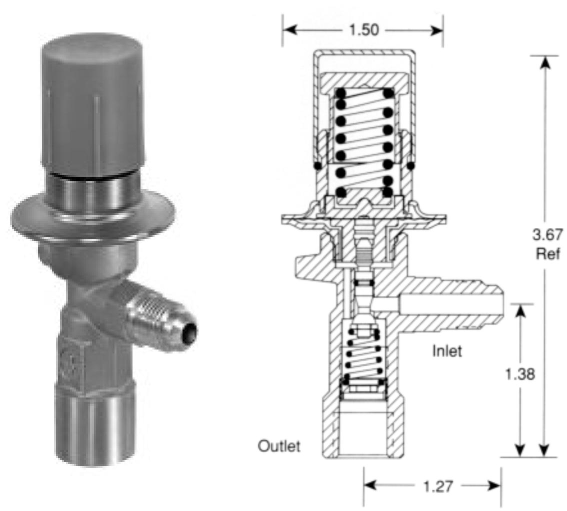
Model AS



Model AT



Model A1



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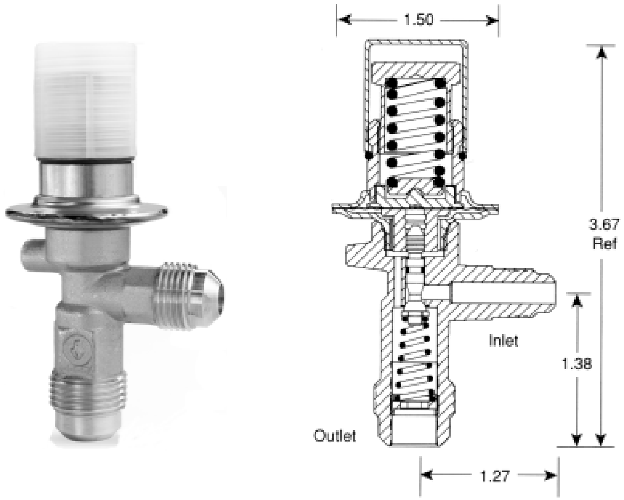
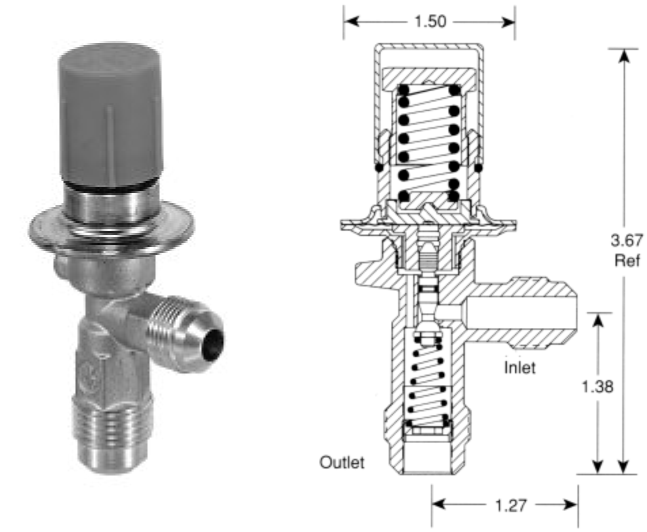
Cleveland, OH

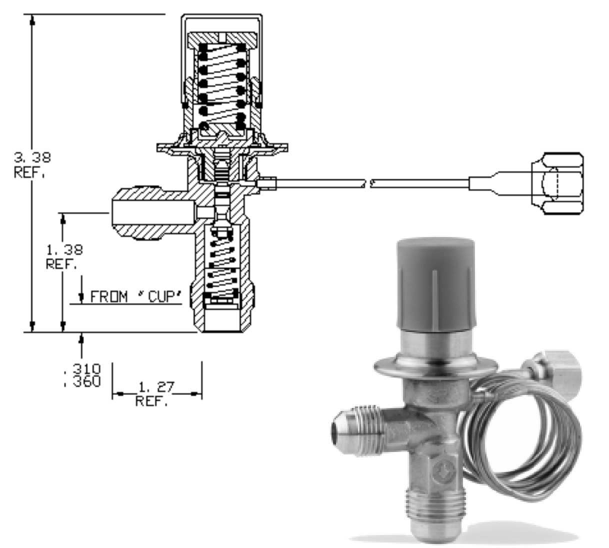
Model A2



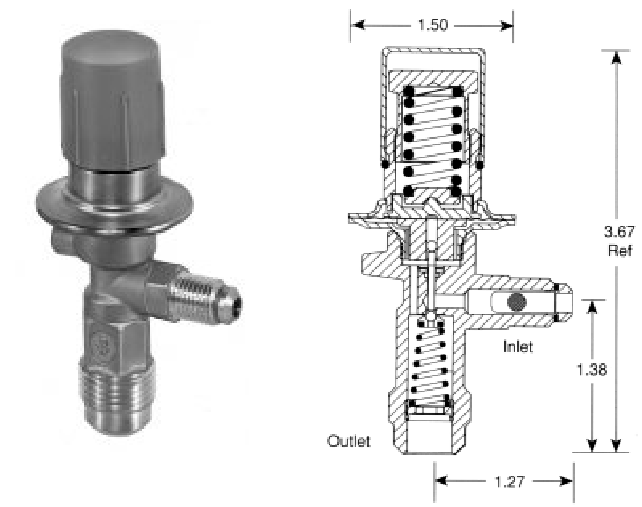
Model A3



Model AE3



Model A4



R-134a/R-401A/R-401B/R-12 U.S. Extended Capacities in Tons

Evaporator Temp. (°F)				40°F						20°F						0°F					
Pressure Drop (PSIG)				40	60	80	100	120	140	60	80	100	120	140	160	60	80	100	120	140	160
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1, A2, A(E)3, AT	B	2	1-2	1.63	2.00	2.31	2.58	2.83	3.06	1.90	2.19	2.45	2.69	2.90	3.10	1.70	1.96	2.19	2.40	2.60	2.78
A4		1/2	1/4-3/4	0.61	0.75	0.87	0.97	1.06	1.15	0.71	0.82	0.92	1.01	1.09	1.16	0.64	0.74	0.82	0.90	0.97	1.04
A7-AA	AA	1/2	1/8-1/2	0.41	0.50	0.58	0.65	0.71	0.76	0.48	0.55	0.61	0.67	0.73	0.78	0.43	0.49	0.55	0.60	0.65	0.69
A7-A	A	1	1/4-1	0.82	1.00	1.15	1.29	1.41	1.53	0.95	1.10	1.23	1.34	1.45	1.55	0.85	0.98	1.10	1.20	1.30	1.39
A7-B	B	2	1-2	1.63	2.00	2.31	2.58	2.83	3.06	1.90	2.19	2.45	2.69	2.90	3.10	1.70	1.96	2.19	2.40	2.60	2.78
A7-C	C	3	1 1/2 - 3	2.45	3.00	3.46	3.87	4.24	4.58	2.85	3.29	3.68	4.03	4.35	4.65	2.55	2.94	3.29	3.61	3.90	4.16
AS, ASB20		1	1/4-1	0.82	1.00	1.15	1.29	1.41	1.53	0.95	1.10	1.23	1.34	1.45	1.55	0.85	0.98	1.10	1.20	1.30	1.39
104A	.093	1		0.82	1.00	1.15	1.29	1.41	1.53	0.95	1.10	1.23	1.34	1.45	1.55	0.85	0.98	1.10	1.20	1.30	1.39
104A, 104F	.120	1 1/4		1.03	1.25	1.44	1.61	1.76	1.91	1.19	1.38	1.54	1.68	1.81	1.94	1.06	1.23	1.38	1.50	1.63	1.74
104A, 104F	.140	1 1/2		1.23	1.50	1.73	1.94	2.12	2.30	1.43	1.65	1.85	2.01	2.18	2.33	1.28	1.47	1.65	1.80	1.95	2.09
Evaporator Temp. (°F)				**-10°F**						**-20°F**						**-40°F**					
Pressure Drop (PSIG)				**80**	**100**	**120**	**140**	**160**	**180**	**80**	**100**	**120**	**140**	**160**	**180**	**80**	**100**	**120**	**140**	**160**	**180**
Valve Type	**Orifice**	**Nominal Capacity**	**Capacity Range**																		
A1, A2, A(E)3, AT	B	2	1-2	1.64	1.83	2.01	2.17	2.32	2.46	1.34	1.50	1.64	1.77	1.89	2.01	0.88	0.98	1.07	1.16	1.24	1.32
A4		1/2	1/4-3/4	0.61	0.69	0.75	0.81	0.87	0.92	0.50	0.56	0.62	0.66	0.71	0.75	0.33	0.37	0.40	0.44	0.47	0.49
A7-AA	AA	1/2	1/8-1/2	0.41	0.46	0.50	0.54	0.58	0.61	0.33	0.37	0.41	0.44	0.47	0.50	0.22	0.25	0.27	0.29	0.31	0.33
A7-A	A	1	1/4-1	0.82	0.92	1.00	1.08	1.16	1.23	0.67	0.75	0.82	0.89	0.95	1.00	0.44	0.49	0.54	0.58	0.62	0.66
A7-B	B	2	1-2	1.64	1.83	2.01	2.17	2.32	2.46	1.34	1.50	1.64	1.77	1.89	2.01	0.88	0.98	1.07	1.16	1.24	1.32
A7-C	C	3	1 1/2 - 3	2.46	2.75	3.01	3.25	3.48	3.69	2.01	2.25	2.46	2.66	2.84	3.01	1.32	1.47	1.61	1.74	1.86	1.97
AS, ASB20		1	1/4-1	0.82	0.92	1.00	1.08	1.16	1.23	0.67	0.75	0.82	0.89	0.95	1.00	0.44	0.49	0.54	0.58	0.62	0.66
Pressure Drop (PSIG)				**40**	**60**	**80**	**100**	**120**	**140**	**60**	**80**	**100**	**120**	**140**	**160**	**60**	**80**	**100**	**120**	**140**	**160**
104A	.093	1		0.82	0.92	1.00	1.08	1.16	1.23	0.67	0.75	0.82	0.89	0.95	1.00	0.44	0.49	0.54	0.58	0.62	0.66
104A, 104F	.120	1 1/4		1.03	1.15	1.25	1.35	1.45	1.54	0.84	0.94	1.03	1.11	1.19	1.25	0.55	0.61	0.60	0.73	0.78	0.83
104A, 104F	.140	1 1/2		1.23	1.38	1.50	1.62	1.74	1.85	1.01	1.13	1.23	1.34	1.43	1.50	0.66	0.74	0.81	0.87	0.93	0.99

Shaded areas are standard conditions.

R-22/R-407C* U.S. Extended Capacities in Tons

Evaporator Temp. (°F)				40°F						20°F						0°F					
Pressure Drop (PSIG)				75	100	125	150	175	200	75	100	125	150	175	200	75	100	125	150	175	200
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1, A2, A(E)3, AT	B	3	1 1/2-3	2.60	3.00	3.35	3.67	3.97	4.24	2.55	2.94	3.29	3.60	3.89	4.16	2.29	2.64	2.95	3.23	3.49	3.73
A4		1	1/2-1	0.87	1.00	1.12	1.22	1.32	1.41	0.85	0.98	1.10	1.20	1.30	1.39	0.76	0.88	0.98	1.08	1.16	1.24
A7-AA	AA	3/4	1/5-3/4	0.65	0.75	0.84	0.92	0.99	1.06	0.64	0.74	0.82	0.90	0.97	1.04	0.57	0.66	0.74	0.81	0.87	0.93
A7-A	A	11/2	1/2-1 1/2	1.30	1.50	1.68	1.84	1.98	2.12	1.27	1.47	1.64	1.80	1.94	2.08	1.14	1.32	1.48	1.62	1.75	1.87
A7-B	B	3	11/2-3	2.60	3.00	3.35	3.67	3.97	4.24	2.55	2.94	3.29	3.60	3.89	4.16	2.29	2.64	2.95	3.23	3.49	3.73
A7-C	C	5	3 1/2-5	4.33	5.00	5.59	6.12	6.61	7.07	4.24	4.90	5.48	6.00	6.48	6.93	3.81	4.40	4.92	5.39	5.82	6.22
AS, ASB20		11/2	1/2-1 1/2	1.30	1.50	1.68	1.84	1.98	2.12	1.27	1.47	1.64	1.80	1.94	2.08	1.14	1.32	1.48	1.62	1.75	1.87
104A	.093	1.5		1.30	1.50	1.68	1.84	1.98	2.12	1.27	1.47	1.64	1.80	1.94	2.08	1.14	1.32	1.48	1.62	1.75	1.87
104A, 104F	.120	2.0		1.63	2.00	2.10	2.30	2.48	2.65	1.59	1.84	2.05	2.25	2.43	2.60	1.43	1.65	1.85	2.03	2.19	2.34
104A, 104F	.140	2.5		1.95	2.50	2.52	2.76	2.97	3.18	1.91	2.21	2.46	2.70	2.91	3.12	1.71	1.98	2.22	2.43	2.63	2.81
Evaporator Temp. (°F)				**-10°F**						**-20°F**						**-40°F**					
Pressure Drop (PSIG)				**100**	**125**	**150**	**175**	**200**	**225**	**125**	**150**	**175**	**200**	**225**	**250**	**125**	**150**	**175**	**200**	**225**	**250**
Valve Type	**Orifice**	**Nominal Capacity**	**Capacity Range**																		
A1, A2, A(E)3, AT	B	3	1 1/2-3	2.22	2.48	2.72	2.94	3.14	3.33	2.05	2.24	2.42	2.59	2.75	2.89	1.38	1.51	1.63	1.74	1.85	1.94
A4		1	1/2-1	0.74	0.83	0.91	0.98	1.05	1.11	0.68	0.75	0.81	0.86	0.92	0.96	0.46	0.50	0.54	0.58	0.62	0.65
A7-AA	AA	3/4	1/5-3/4	0.56	0.62	0.68	0.73	0.78	0.83	0.51	0.56	0.61	0.65	0.69	0.72	0.34	0.38	0.41	0.43	0.46	0.49
A7-A	A	11/2	1/2-1 1/2	1.11	1.24	1.36	1.47	1.57	1.67	1.02	1.12	1.21	1.29	1.37	1.45	0.69	0.75	0.81	0.87	0.92	0.97
A7-B	B	3	1 1/2-3	2.22	2.48	2.72	2.94	3.14	3.33	2.05	2.24	2.42	2.59	2.75	2.89	1.38	1.51	1.63	1.74	1.85	1.94
A7-C	C	5	3 1/2-5	3.70	4.14	4.53	4.89	5.23	5.55	3.41	3.74	4.03	4.31	4.58	4.82	2.29	2.51	2.71	2.90	3.08	3.24
AS, ASB20		11/2	1/2-1 1/2	1.11	1.24	1.36	1.47	1.57	1.67	1.02	1.12	1.21	1.29	1.37	1.45	0.69	0.75	0.81	0.87	0.92	0.97
Pressure Drop (PSIG)				**75**	**100**	**125**	**150**	**175**	**200**	**75**	**100**	**125**	**150**	**175**	**200**	**75**	**100**	**125**	**150**	**175**	**200**
104A	.093	1.5		1.11	1.24	1.36	1.47	1.57	1.67	1.02	1.12	1.21	1.29	1.37	1.45	0.69	0.75	0.81	0.87	0.92	0.97
104A, 104F	.120	2.0		1.39	1.55	1.70	1.84	1.96	2.09	1.28	1.40	1.51	1.61	1.71	1.81	0.86	0.94	1.01	1.09	1.15	1.21
104A, 104F	.140	2.5		1.67	1.86	2.04	2.21	2.36	2.51	1.53	1.68	1.82	1.94	2.06	2.18	1.04	1.13	1.22	1.31	1.38	1.46

* See page 160.
Shaded areas are standard conditions.

TXVs & AXVs

R-404A/R-502*/R-402A*, B*/R-507* U.S. Extended Capacities in Tons

Evaporator Temp. (°F)				40°F						20°F						0°F					
Pressure Drop (PSIG)				**75**	**100**	**125**	**150**	**175**	**200**	**75**	**100**	**125**	**150**	**175**	**200**	**75**	**100**	**125**	**150**	**175**	**200**
Valve Type	**Orifice**	**Nominal Capacity**	**Capacity Range**																		
A1, A2, A(E)3, AT	B	2	1-2	1.73	2.00	2.24	2.45	2.65	2.83	1.66	1.92	2.15	2.35	2.54	2.72	1.51	1.74	1.95	2.13	2.30	2.46
A4		1/2	1/4-3/4	0.65	0.75	0.84	0.92	0.99	1.06	0.62	0.72	0.80	0.88	0.95	1.02	0.57	0.65	0.73	0.80	0.86	0.92
A7-AA	AA	1/2	1/8-1/2	0.43	0.50	0.56	0.61	0.66	0.71	0.42	0.48	0.54	0.59	0.63	0.68	0.38	0.44	0.49	0.53	0.58	0.62
A7-A	A	1	1/4-1	0.87	1.00	1.12	1.22	1.32	1.41	0.83	0.96	1.07	1.18	1.27	1.36	0.75	0.87	0.97	1.07	1.15	1.23
A7-B	B	2	1-2	1.73	2.00	2.24	2.45	2.65	2.83	1.66	1.92	2.15	2.35	2.54	2.72	1.51	1.74	1.95	2.13	2.30	2.46
A7-C	C	4	1 1/2 - 4	3.46	4.00	4.47	4.90	5.29	5.66	3.33	3.84	4.29	4.70	5.08	5.43	3.01	3.48	3.89	4.26	4.60	4.92
AS, ASB20		1	1/4-1	0.87	1.00	1.12	1.22	1.32	1.41	0.83	0.96	1.07	1.18	1.27	1.36	0.75	0.87	0.97	1.07	1.15	1.23
104A	.093	1.5		0.87	1.00	1.12	1.22	1.32	1.41	0.83	0.96	1.07	1.18	1.27	1.36	0.75	0.87	0.97	1.07	1.15	1.23
104A, 104F	.120	2.0		1.09	1.25	1.40	1.53	1.65	1.76	1.04	1.20	1.34	1.48	1.59	1.70	0.94	1.09	1.21	1.34	1.44	1.54
104A, 104F	.140	2.5		1.31	1.50	1.68	1.83	1.98	2.12	1.25	1.44	1.61	1.77	1.91	2.04	1.13	1.31	1.46	1.61	1.73	1.85
Evaporator Temp. (°F)				**-10°F**						**-20°F**						**-40°F**					
Pressure Drop (PSIG)				**100**	**125**	**150**	**175**	**200**	**225**	**125**	**150**	**175**	**200**	**225**	**250**	**125**	**150**	**175**	**200**	**225**	**250**
Valve Type	**Orifice**	**Nominal Capacity**	**Capacity Range**																		
A1, A2, A(E)3, AT	B	2	1-2	1.48	1.65	1.81	1.96	2.09	2.22	1.36	1.49	1.61	1.73	1.83	1.93	0.87	0.96	1.03	1.10	1.17	1.23
A4		1/2	1/4-3/4	0.56	0.62	0.68	0.73	0.78	0.83	0.51	0.56	0.61	0.65	0.69	0.72	0.33	0.36	0.39	0.41	0.44	0.46
A7-AA	AA	1/2	1/8-1/2	0.37	0.41	0.45	0.49	0.52	0.56	0.34	0.37	0.40	0.43	0.46	0.48	0.22	0.24	0.26	0.28	0.29	0.31
A7-A	A	1	1/4-1	0.74	0.83	0.91	0.98	1.05	1.11	0.68	0.75	0.81	0.86	0.92	0.96	0.44	0.48	0.52	0.55	0.59	0.62
A7-B	B	2	1-2	1.48	1.65	1.81	1.96	2.09	2.22	1.36	1.49	1.61	1.73	1.83	1.93	0.87	0.96	1.03	1.10	1.17	1.23
A7-C	C	4	1 1/2 - 4	2.96	3.31	3.63	3.92	4.19	4.44	2.73	2.99	3.23	3.45	3.66	3.86	1.74	1.91	2.06	2.21	2.34	2.47
AS, ASB20		1	1/4-1	0.74	0.83	0.91	0.98	1.05	1.11	0.68	0.75	0.81	0.86	0.92	0.96	0.44	0.48	0.52	0.55	0.59	0.62
Pressure Drop (PSIG)				**75**	**100**	**125**	**150**	**175**	**200**	**75**	**100**	**125**	**150**	**175**	**200**	**75**	**100**	**125**	**150**	**175**	**200**
104A	.093	1.5		0.74	0.83	0.91	0.98	1.05	1.11	0.68	0.75	0.81	0.86	0.92	0.96	0.44	0.48	0.52	0.55	0.59	0.62
104A, 104F	.120	2.0		0.93	1.04	1.14	1.23	1.31	1.39	0.85	0.94	1.01	1.08	1.15	1.20	0.55	0.60	0.65	0.69	0.74	0.78
104A, 104F	.140	2.5		1.11	1.25	1.37	1.47	1.58	1.67	1.02	1.13	1.22	1.29	1.38	1.44	0.66	0.72	0.78	0.83	0.89	0.93

* See page 160.
Shaded areas are standard conditions.

Liquid Refrigerant Correction Factors

R-12	**Liquid Line Temp**	**50°F**	**60°F**	**70°F**	**80°F**	**90°F**	**100°F**	**110°F**	**120°F**	**130°F**	**140°F**
	R-12 Multiplier	1.30	1.24	1.18	1.12	1.06	1.00	0.94	0.88	0.82	0.76
R-404A	**Liquid Line Temp**	**50°F**	**60°F**	**70°F**	**80°F**	**90°F**	**100°F**	**110°F**	**120°F**	**130°F**	**140°F**
	R-404A Multiplier	1.48	1.39	1.30	1.19	1.10	1.00	0.89	0.78	0.67	0.56
R-134a	**Liquid Line Temp**	**50°F**	**60°F**	**70°F**	**80°F**	**90°F**	**100°F**	**110°F**	**120°F**	**130°F**	**140°F**
	R-134a Multiplier	1.33	1.27	1.21	1.11	1.07	1.00	0.93	0.87	0.81	0.71
R-22	**Liquid Line Temp**	**50°F**	**60°F**	**70°F**	**80°F**	**90°F**	**100°F**	**110°F**	**120°F**	**130°F**	**140°F**
	R-22 Multiplier	1.30	1.24	1.18	1.12	1.06	1.00	0.94	0.88	0.82	0.77
R-502	**Liquid Line Temp**	**50°F**	**60°F**	**70°F**	**80°F**	**90°F**	**100°F**	**110°F**	**120°F**	**130°F**	**140°F**
	R-502 Multiplier	1.43	1.33	1.24	1.17	1.08	1.00	0.91	0.83	0.73	0.64

R-12	**Liquid Line Temp**	**10°C**	**20°C**	**30°C**	**40°C**	**50°C**	**60°C**
	Multiplier R-12	1.30	1.21	1.10	1.00	0.89	0.77
R-22	**Liquid Line Temp**	**10°C**	**20°C**	**30°C**	**40°C**	**50°C**	**60°C**
	Multiplier R-22	1.30	1.21	1.10	1.00	0.89	0.78
R-404A	**Liquid Line Temp**	**10°C**	**20°C**	**30°C**	**40°C**	**50°C**	**60°C**
	Multiplier R-404A	1.48	1.33	1.14	1.00	0.76	0.56
R-134a	**Liquid Line Temp**	**10°C**	**20°C**	**30°C**	**40°C**	**50°C**	**60°C**
	Multiplier R-134a	1.33	1.21	1.09	1.00	0.85	0.71
R-502	**Liquid Line Temp**	**10°C**	**20°C**	**30°C**	**40°C**	**50°C**	**60°C**
	Multiplier R-502	1.43	1.31	1.17	1.00	0.84	0.67

R-134a/R-401A/R-401B/R-12 U.S. Extended Capacities in Kilowatts

Evaporator Temp. (°C)				10°C						0°C						-10°C					
Pressure Drop (BAR)				3	4	6	7	8	10	4	6	7	8	10	11	4	6	7	8	10	11
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1, A2, A(E)3, AT	B	7	4-7	6.21	7.17	8.79	9.49	10.10	11.30	6.89	8.44	9.11	9.74	10.90	11.40	6.46	7.91	8.54	9.13	10.20	10.70
A4		3	1-3	2.33	2.69	3.30	3.56	3.80	4.25	2.58	3.16	3.42	3.65	4.08	4.28	2.42	2.97	3.20	3.42	3.83	4.02
A7-AA	AA	2	1/2-2	1.55	1.79	2.20	2.37	2.54	2.84	1.72	2.11	2.28	2.44	2.72	2.86	1.61	1.98	2.14	2.28	2.55	2.68
A7-A	A	4	1-4	3.11	3.59	4.39	4.75	5.07	5.67	3.44	4.22	4.56	4.87	5.45	5.71	3.23	3.95	4.27	4.57	5.10	5.35
A7-B	B	7	4-7	6.21	7.17	8.79	9.49	10.10	11.30	6.89	8.44	9.11	9.74	10.90	11.40	6.46	7.91	8.54	9.13	10.20	10.70
A7-C	C	11	5-11	9.32	10.80	13.20	14.20	15.20	17.00	10.30	12.70	13.70	14.60	16.30	17.10	9.69	11.90	12.80	13.70	15.30	16.10
AS, ASB20		4	1-4	3.11	3.59	4.39	4.75	5.07	5.67	3.44	4.22	4.56	4.87	5.45	5.71	3.23	3.95	4.27	4.57	5.10	5.35
104A	.093	1	1-4	3.11	3.59	4.39	4.75	5.07	5.67	3.44	4.22	4.56	4.87	5.45	5.71	3.23	3.95	4.27	4.57	5.10	5.35
104A, 104F	.120	1 1/4	2-5	3.89	4.49	5.49	5.94	6.34	7.09	4.30	5.28	5.70	6.09	6.81	7.14	4.04	4.94	5.34	5.71	6.38	6.69
104A, 104F	.140	1 1/2	3-6	4.67	5.39	6.59	7.13	7.61	8.51	5.16	6.33	6.84	7.31	8.18	8.57	4.85	5.93	6.41	6.86	7.65	8.03
Evaporator Temp. (°C)				-20°C						-30°C						-40°C					
Pressure Drop (BAR)				6	7	8	10	11	12	6	7	8	10	11	12	6	7	8	10	11	12
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1, A2, A(E)3, AT	B	7	4-7	6.77	7.31	7.81	8.74	9.16	9.57	5.01	5.41	5.78	6.47	6.78	7.08	3.25	3.51	3.75	4.20	4.40	4.60
A4		3	1-3	2.54	2.74	2.93	3.28	3.44	3.59	1.88	2.03	2.17	2.42	2.54	2.66	1.22	1.32	1.41	1.57	1.65	1.72
A7-AA	AA	2	1/2-2	1.69	1.83	1.95	2.18	2.29	2.39	1.25	1.35	1.45	1.62	1.70	1.77	0.81	0.88	0.94	1.05	1.10	1.15
A7-A	A	4	1-4	3.38	3.65	3.91	4.37	4.58	4.78	2.50	2.70	2.89	3.23	3.39	3.54	1.63	1.76	1.88	2.10	2.20	2.30
A7-B	B	7	4-7	6.77	7.31	7.81	8.74	9.16	9.57	5.01	5.41	5.78	6.47	6.78	7.08	3.25	3.51	3.75	4.20	4.40	4.60
A7-C	C	11	5-11	10.10	11.00	11.70	13.10	13.70	14.40	7.51	8.11	8.68	9.70	10.20	10.60	4.88	5.27	5.63	6.30	6.60	6.90
AS, ASB20		4	1-4	3.38	3.65	3.91	4.37	4.58	4.78	2.50	2.70	2.89	3.23	3.39	3.54	1.63	1.76	1.88	2.10	2.20	2.30
104A	.093	1	1-4	3.38	3.65	3.91	4.37	4.58	4.78	2.50	2.70	2.89	3.23	3.39	3.54	1.63	1.76	1.88	2.10	2.20	2.30
104A, 104F	.120	1 1/4	2-5	4.23	4.56	4.89	5.46	5.73	5.98	3.13	3.38	3.61	4.04	4.24	4.43	2.04	2.20	2.35	2.63	2.75	2.88
104A, 104F	.140	1 1/2	3-6	5.07	5.48	5.87	6.56	6.87	7.17	3.75	4.05	4.34	4.85	5.09	5.31	2.45	2.64	2.82	3.15	3.30	3.45

Shaded areas are standard conditions.

R-22/R-407C U.S. Extended Capacities in Kilowatts

Evaporator Temp. (°C)				10°C						0°C						-10°C					
Pressure Drop (BAR)				5	7	9	10	12	14	5	7	9	10	12	14	7	9	10	12	14	16
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1, A2, A(E)3, AT	B	11	5-11	9.01	10.70	12.10	12.70	14.00	15.10	8.83	10.40	11.80	12.50	13.70	14.80	10.10	11.50	12.10	13.30	14.30	15.30
A4		4	2-4	3.00	3.55	4.03	4.25	4.65	5.02	2.94	3.48	3.95	4.16	4.56	4.92	3.37	3.83	4.03	4.42	4.77	5.10
A7-AA	AA	3	3/4-3	2.25	2.66	3.02	3.18	3.49	3.77	2.21	2.61	2.96	3.12	3.42	3.69	2.53	2.87	3.03	3.31	3.58	3.83
A7-A	A	5	2-5	4.50	5.33	6.04	6.37	6.98	7.54	4.41	5.22	5.92	6.24	6.84	7.38	5.06	5.74	6.05	6.63	7.16	7.65
A7-B	B	11	5-11	9.01	10.70	12.10	12.70	14.00	15.10	8.83	10.40	11.80	12.50	13.70	14.80	10.10	11.50	12.10	13.30	14.30	15.30
A7-C	C	18	12-18	15.00	17.80	20.10	21.20	23.30	25.10	14.70	17.40	19.70	20.80	22.80	24.60	16.90	19.10	20.20	22.10	23.90	25.50
AS, ASB20		5	2-5	4.50	5.33	6.04	6.37	6.98	7.54	4.41	5.22	5.92	6.24	6.84	7.38	5.06	5.74	6.05	6.63	7.16	7.65
104A	.093	5	2 - 5	4.50	5.33	6.04	6.37	6.98	7.54	4.41	5.22	5.92	6.24	6.84	7.38	5.06	5.74	6.05	6.63	7.16	7.65
104A, 104F	.120	6 1/2	3 - 6 1/2	5.63	6.66	7.55	7.96	8.73	9.43	5.51	6.53	7.40	7.80	8.55	9.23	6.33	7.18	7.56	8.29	8.95	9.56
104A, 104F	.140	8	4 - 8	6.75	7.99	9.06	9.56	10.50	11.30	6.62	7.83	8.88	9.36	10.30	11.10	7.59	8.61	9.08	9.95	10.70	11.50
Evaporator Temp. (°C)				-20°C						-30°C						-40°C					
Pressure Drop (BAR)				9	10	12	14	16	17	9	10	12	14	16	17	9	10	12	14	16	17
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1, A2, A(E)3, AT	B	11	5-11	9.79	10.30	11.30	12.20	13.10	13.50	7.25	7.64	8.37	9.04	9.67	9.96	4.83	5.09	5.58	6.03	6.44	6.64
A4		4	2-4	3.26	3.44	3.77	4.07	4.35	4.48	2.42	2.55	2.79	3.01	3.22	3.32	1.61	1.70	1.86	2.01	2.15	2.21
A7-AA	AA	3	3/4-3	2.45	2.58	2.83	3.05	3.26	3.36	1.81	1.91	2.09	2.26	2.42	2.49	1.21	1.27	1.40	1.51	1.61	1.66
A7-A	A	5	2-5	4.89	5.16	5.65	6.10	6.53	6.73	3.63	3.82	4.19	4.52	4.83	4.98	2.42	2.55	2.79	3.01	3.22	3.32
A7-B	B	11	5-11	9.79	10.30	11.30	12.20	13.10	13.50	7.25	7.64	8.37	9.04	9.67	9.96	4.83	5.09	5.58	6.03	6.44	6.64
A7-C	C	18	12-18	16.30	17.20	18.80	20.30	21.80	22.40	12.10	12.70	14.00	15.10	16.10	16.60	8.06	8.49	9.30	10.00	10.70	11.10
AS, ASB20		5	2-5	4.89	5.16	5.65	6.10	6.53	6.73	3.63	3.82	4.19	4.52	4.83	4.98	2.42	2.55	2.79	3.01	3.22	3.32
104A	.093	5	2 - 5	4.89	5.16	5.65	6.10	6.53	6.73	3.63	3.82	4.19	4.52	4.83	4.98	2.42	2.55	2.79	3.01	3.22	3.32
104A, 104F	.120	6 1/2	3 - 6 1/2	6.11	6.45	7.06	7.63	8.16	8.41	4.54	4.78	5.24	5.65	6.04	6.23	3.03	3.19	3.49	3.76	4.03	4.15
104A, 104F	.140	8	4 - 8	7.34	7.74	8.48	9.15	9.80	10.10	5.45	5.73	6.29	6.78	7.25	7.47	3.63	3.83	4.19	4.52	4.83	4.98

Shaded areas are standard conditions.

R-404A/R-502/R-402A, B/R-507 U.S. Extended Capacities in Kilowatts

Evaporator Temp. (°C)				10°C						0°C						-10°C					
Pressure Drop (BAR)				5	7	9	10	12	14	5	7	9	10	12	14	5	7	9	10	12	14
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1, A2, A(E)3, AT	B	7	4-7	6.06	7.17	8.14	8.58	9.39	10.10	5.88	6.96	7.89	8.32	9.11	9.84	5.58	6.60	7.48	7.89	8.64	9.33
A4		3	1-3	2.27	2.69	3.05	3.22	3.52	3.80	2.21	2.61	2.96	3.12	3.42	3.69	2.09	2.48	2.81	2.96	3.24	3.50
A7-AA	AA	2	1/2-2	1.52	1.79	2.03	2.14	2.35	2.54	1.47	1.74	1.97	2.08	2.28	2.46	1.39	1.65	1.87	1.97	2.16	2.33
A7-A	A	4	1-4	3.03	3.59	4.07	4.29	4.70	5.07	2.94	3.48	3.95	4.16	4.56	4.92	2.79	3.30	3.74	3.94	4.32	4.67
A7-B	B	7	4-7	6.06	7.17	8.14	8.58	9.39	10.10	5.88	6.96	7.89	8.32	9.11	9.84	5.58	6.60	7.48	7.89	8.64	9.33
A7-C	C	14	5-14	12.1	14.3	16.3	17.2	18.8	20.3	11.8	13.9	15.8	16.6	18.2	19.7	11.2	13.2	15.0	15.8	17.3	18.7
AS, ASB20		4	1-4	3.03	3.59	4.07	4.29	4.70	5.07	2.94	3.48	3.95	4.16	4.56	4.92	2.79	3.30	3.74	3.94	4.32	4.67
104A	.093	1	1-4	3.03	3.59	4.07	4.29	4.70	5.07	2.94	3.48	3.95	4.16	4.56	4.92	2.79	3.30	3.74	3.94	4.32	4.67
104A, 104F	.120	1 1/4	2-5	3.79	4.49	5.09	5.36	5.88	6.34	3.68	4.35	4.94	5.20	5.70	6.15	3.49	4.13	4.68	4.93	5.40	5.84
104A, 104F	.140	1 1/2	3-6	4.55	5.39	6.11	6.44	7.05	7.61	4.41	5.22	5.93	6.24	6.84	7.38	4.19	4.95	5.61	5.91	6.48	7.01
Evaporator Temp. (°C)				-20°C						-30°C						-40°C					
Pressure Drop (BAR)				7	9	10	12	14	16	9	10	12	14	16	17	9	10	12	14	16	17
Valve Type	Orifice	Nominal Capacity	Capacity Range																		
A1, A2, A(E)3, AT	B	7	4-7	5.67	6.43	6.77	7.42	8.02	8.57	4.80	5.06	5.54	5.99	6.40	6.60	3.09	3.26	3.57	3.86	4.12	4.25
A4		3	1-3	2.13	2.41	2.54	2.78	3.01	3.21	1.80	1.90	2.08	2.24	2.40	2.47	1.16	1.22	1.34	1.45	1.55	1.59
A7-AA	AA	2	1/2-2	1.42	1.61	1.69	1.86	2.00	2.14	1.20	1.26	1.39	1.50	1.60	1.65	0.77	0.81	0.89	0.96	1.03	1.06
A7-A	A	4	1-4	2.83	3.21	3.39	3.71	4.01	4.28	2.40	2.53	2.77	2.99	3.20	3.30	1.55	1.63	1.78	1.93	2.06	2.12
A7-B	B	7	4-7	5.67	6.43	6.77	7.42	8.02	8.57	4.80	5.06	5.54	5.99	6.40	6.60	3.09	3.26	3.57	3.86	4.12	4.25
A7-C	C	14	5-14	11.3	12.9	13.5	14.8	16.0	17.1	9.60	10.1	11.1	12.0	12.8	13.2	6.18	6.52	7.14	7.71	8.24	8.50
AS, ASB20		4	1-4	2.83	3.21	3.39	3.71	4.01	4.28	2.40	2.53	2.77	2.99	3.20	3.30	1.55	1.63	1.78	1.93	2.06	2.12
104A	.093	1	1-4	2.83	3.21	3.39	3.71	4.01	4.28	2.40	2.53	2.77	2.99	3.20	3.30	1.55	1.63	1.78	1.93	2.06	2.12
104A, 104F	.120	1 1/4	2-5	3.54	4.01	4.24	4.64	5.01	5.35	3.00	3.16	3.46	3.74	4.00	4.13	1.94	2.04	2.23	2.41	2.58	2.65
104A, 104F	.140	1 1/2	3-6	4.25	4.82	5.09	5.57	6.02	6.42	3.60	3.80	4.16	4.49	4.80	4.95	2.33	2.45	2.67	2.90	3.09	3.18

Shaded areas are standard conditions.

Liquid Refrigerant Correction Factors

R-12	Liquid Line Temp	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F	130°F	140°F
	R-12 Multiplier	1.30	1.24	1.18	1.12	1.06	1.00	0.94	0.88	0.82	0.76
R-404A	Liquid Line Temp	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F	130°F	140°F
	R-404A Multiplier	1.48	1.39	1.30	1.19	1.10	1.00	0.89	0.78	0.67	0.56
R-134a	Liquid Line Temp	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F	130°F	140°F
	R-134a Multiplier	1.33	1.27	1.21	1.11	1.07	1.00	0.93	0.87	0.81	0.71
R-22	Liquid Line Temp	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F	130°F	140°F
	R-22 Multiplier	1.30	1.24	1.18	1.12	1.06	1.00	0.94	0.88	0.82	0.77
R-502	Liquid Line Temp	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F	130°F	140°F
	R-502 Multiplier	1.43	1.33	1.24	1.17	1.08	1.00	0.91	0.83	0.73	0.64

R-12	Liquid Line Temp	10°C	20°C	30°C	40°C	50°C	60°C
	Multiplier R-12	1.30	1.21	1.10	1.00	0.89	0.77
R-22	Liquid Line Temp	10°C	20°C	30°C	40°C	50°C	60°C
	Multiplier R-22	1.30	1.21	1.10	1.00	0.89	0.78
R-404A	Liquid Line Temp	10°C	20°C	30°C	40°C	50°C	60°C
	Multiplier R-404A	1.48	1.33	1.14	1.00	0.76	0.56
R-134a	Liquid Line Temp	10°C	20°C	30°C	40°C	50°C	60°C
	Multiplier R-134a	1.33	1.21	1.09	1.00	0.85	0.71
R-502	Liquid Line Temp	10°C	20°C	30°C	40°C	50°C	60°C
	Multiplier R-502	1.43	1.31	1.17	1.00	0.84	0.67

Understanding the Constant Pressure Valve

The constant pressure valve is a vital component of many refrigeration and A/C systems. It automatically meters refrigerant to the evaporator at a rate equal to compressor pumping capacity.

The constant pressure valve contains a diaphragm, control spring (FS1), seat and valve needle or ball. The control spring, above the diaphragm, moves the diaphragm down. This moves the valve open.

The opposing force is provided by low side evaporator pressure (FE) and a constant body spring force (FS2). This moves the valve closed. During the off cycle, evaporator pressure builds and overcomes spring pressure. This keeps the valve closed until the next on cycle. At the start of the on cycle, the compressor quickly reduces evaporator pressure. When this pressure equals the control spring pressure, the valve begins to open.

The valve opens when evaporator pressure is just below the control spring pressure setting. This is the valve's opening point, or setting.

Bleeds

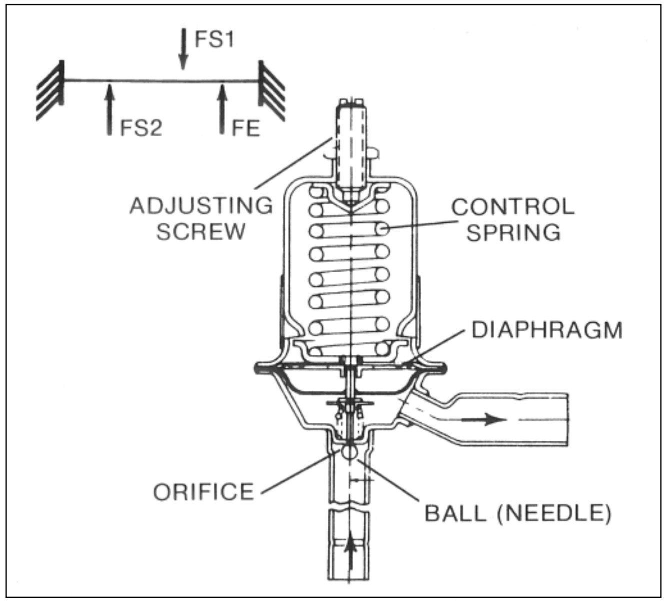
Bleed type valves permit pressures in the system to reach a balance point during the off cycle. At the next running cycle, the motor starts under practically no load. This allows the use of low starting torque compressor motors.

The bleed type (or slotted orifice) valve has a small slot in the valve seat. This prevents complete close off at the end of the machine's-on cycle, permitting refrigerant flow at a reduced rate.

Proper selection should result in a bleed and orifice which will always have control over the refrigerant flow at all standard operating conditions. Application of a larger bleed will speed equalization time, but may cause the valve to lose control at high head pressure operating conditions. Loss of control means all the flow will be through the bleed and the valve will be closed because the bleed capacity matches the compressor capacity.

How to Select Constant Pressure Expansion Valves

1. Load on the system in Btu's per hour or in tons (12,000 Btu per hour equals 1 ton)
2. System refrigerant
3. Evaporator temperature or pressure
4. Condensing temperature or pressure
5. Pressure drop across the valve
6. Off-cycle unloading, if required



Elevation Change and Valve Setting

The control spring in a constant pressure valve works with atmospheric pressure to move the valve in an opening direction. Any substantial change in altitude after a valve has been adjusted will alter the low side flow rate maintained by the valve.

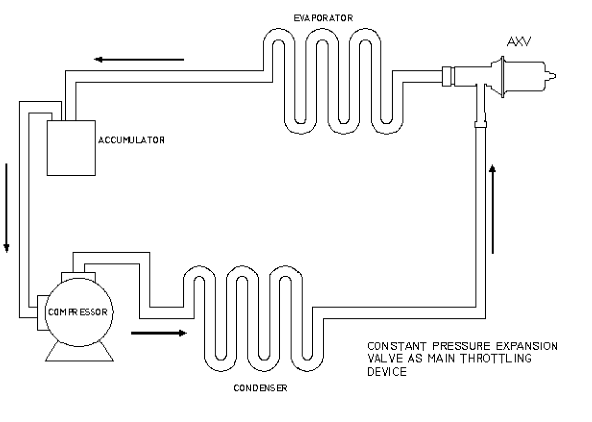
If a low side gauge is available, adjust the valve to increase the system pressure above the sea level reading by the amount shown in the gauge pressure correction column of the table below.

Altitutde Feet	Barametric Pressure Inches Hg.	psia	Gage Pressure correction (psia)
0	29.92	14.70	-
500	29.38	14.70	-0.30
1000	28.86	14.19	-0.51
1500	28.33	13.91	-0.79
2000	27.82	13.58	-1.12
2500	27.32	13.41	-1.29
3000	26.82	13.20	-1.50
3500	26.33	12.92	-1.78
4000	25.84	12.70	-2.00
4500	25.37	12.44	-2.26
5000	24.90	12.23	-2.57
5500	24.43	12.01	-2.69
6000	23.98	11.78	-2.92
6500	23.53	11.55	-3.15
7000	23.09	11.33	-3.37
7500	22.65	11.10	-3.60
8000	22.22	10.92	-3.78
8500	21.80	10.70	-4.00
9000	21.39	10.50	-4.20
9500	20.98	10.30	-4.40
10000	120.58	10.10	-4.60

Constant Pressure and EPR Valve Applications

Constant Evaporator Pressure

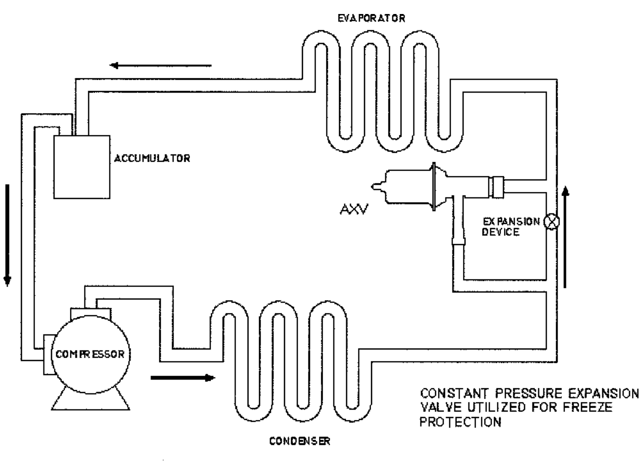
Parker constant pressure expansion valves maintain a constant evaporator pressure for applications when close control of evaporator pressure and temperature are required.



MAIN THROTTLE

Freeze Protection

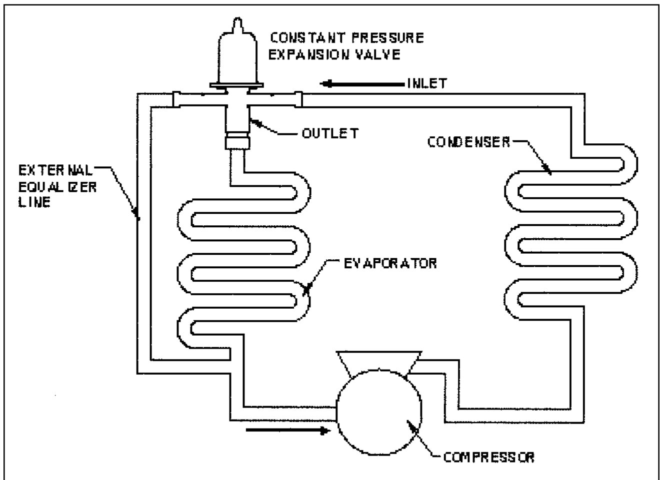
Parker constant pressure expansion valves can be used to prevent evaporator freezing, which may occur at low loads on small air conditioning applications. The valve is installed in parallel with the system expansion device to maintain a minimum evaporator pressure when flow through the main expansion device is insufficient. An accumulator to protect the compressor from liquid is recommended.



FREEZE PROTECTION

External Equalizer

The Parker Model AE3 is available with an external equalizer. External equalizer models are recommended in applications where the pressure drop through the distributor and/or evaporator exceeds 5 psi. The outlet pressure of the evaporator is communicated to the underside of the diaphragm through the external equalizer line.

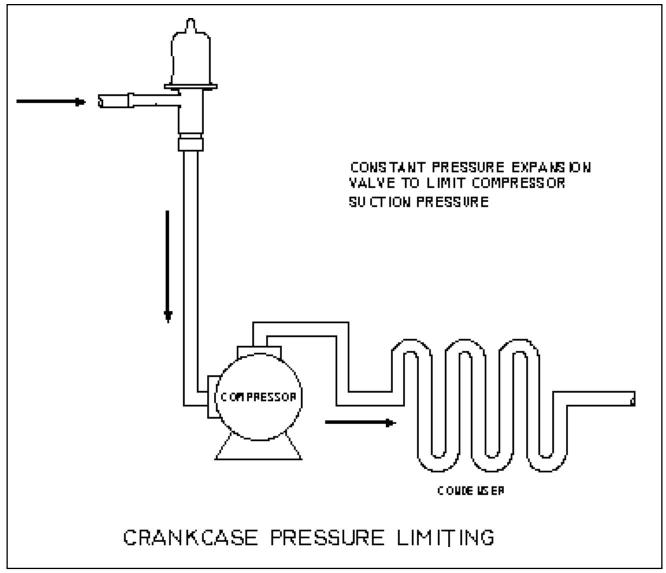


EXTERNAL EQUALIZER

Parker Hannifin Corporation
Climate & Industrial Controls Group
Cleveland, OH

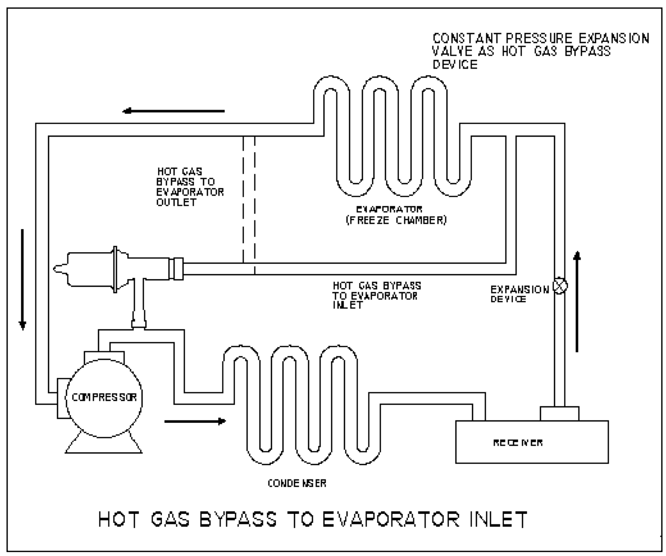
Crankcase Pressure Limiting

Parker constant pressure expansion valves can be used to limit the maximum operating suction pressure to the compressor. The valve is adjusted to open at a predetermined outlet pressure while restricting flow at higher system inlet pressures in order to protect the compressor. Non-bleed type valves are recommended for this type application.



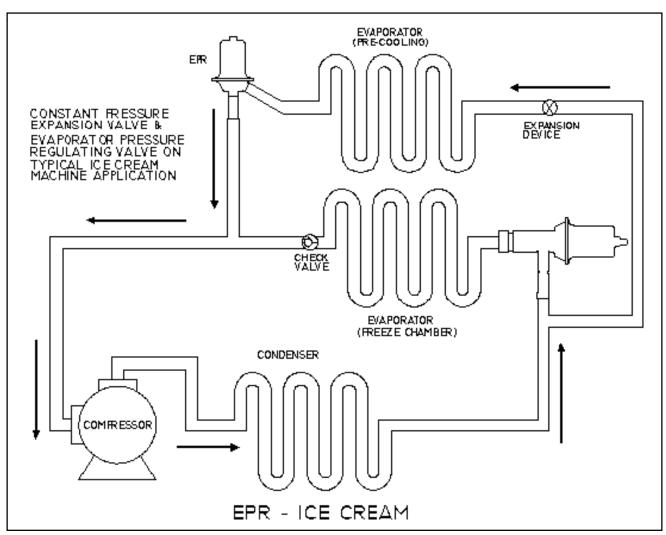
Hot Gas Bypass to Evaporator Inlet

Constant pressure expansion valves control hot gas bypass in systems where temperature is extremely critical and load conditions vary widely – particularly low loads. Installed between the discharge line and the evaporator, the valve controls pressure precisely. As the load drops, evaporator pressure decreases. It throttles open to maintain outlet pressure. This action maintains the temperature of the evaporator. This application may also be used as freeze protection.



EPR - Ice Cream Machine

Parker Model 139 EPRs are specifically designed for fractional horsepower evaporator applications where precise control of evaportor pressure is required when using a primary expansion device. A typical application is in a multiple evaporator system where different evaporator pressures and temperatures are desired. The 139 EPR may be used to control at a higher evaporator pressure then is present at the compressor suction.



Model 625 — Thermal Electric Valve

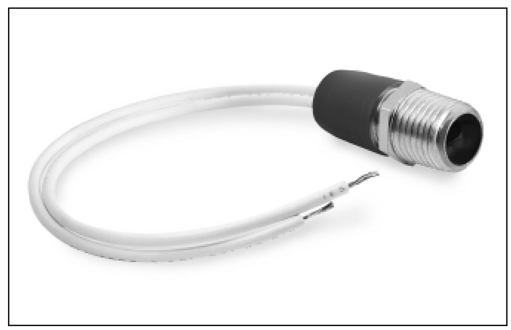
Specifications
- **Refrigerant –** Can be used with most refrigerants except ammonia.
- **Voltage –** 24 volts AC or DC (in accordance with U.L. low voltage class 2 specifications).
- **Power –** 4.13 watts at capacity rating.
- **Dielectric Strength –** 500 RMS volts minimum (1 lead to ground).
- **Resistance –** 70 ohms.
- **Electrical Leads –** 1/4" spade connectors.
- **Valve Construction** – Brass, copper, and stainless steel.
- **Net Weight** – 5 3/4 ounces.
- **Connections –** 3/8" ODM x 5/8" ODF

Nominal Capacities
R-22 - 1/2 through 10 tons
R-134a - 1/3 through 7 tons
R-404a - 1/3 through 7 tons

Standard Valves

Orifice Size	Part Number
0.040	040925-023
0.047	040925-014
0.062	040925-013
0.070	040925-025
0.078	040925-002
0.093	040925-003
0.109	040925-004
0.125	040925-001
0.140	040925-005
0.187	040925-028

Model 625 — Liquid Sensing Thermistor

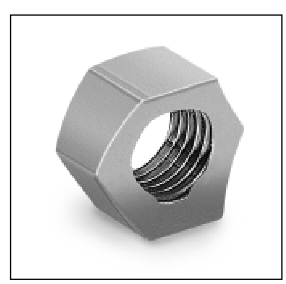


Specifications
- **Refrigerant –** Can be used with all refrigerants except ammonia.
- **Max. power rating –** 800 milliwatts in still air.
- **Max. temperature rating –** 302°F (150°C).
- **Dielectric Strength –** 500 RMS volts minimum (1 lead to ground).
- **Resistance –**See device chart.
- **Leads –** 22 gauge, 221°F (105°C) appliance wire pigtails.
- **Fitting material** – Brass.
- **Net weight** – 3/4 ounce.

Typical Applications	Thermistor Resistance (77° F)	Size	Bonnet color and length	Part Number
Air Conditioners Heat Pumps Meat Cases Chillers Ice Makers Low Temp Display Cases Ice Cream Freezers Cascade Systems Low Temp Blower Coils	50 ohms	1/4 mpt	Green 6" Leads	040930-150
Special applications with extremely high load changes	100 ohms	1/4 mpt	Red 6" Leads	040930-519

Model 625 - Thermistor Suction Line Adapter

Suction line or refrigerant tubing O.D.	Part Number	Suction line or refrigerant tubing O.D.	Part Number
1/2"	040935-01	1 1/8"	040935-06
5/8"	040935-02	1 1/4"	040935-07
3/4"	040935-03	1 3/8"	040935-08
7/8"	040935-04	1 1/2"	040935-09
1 1/8"	040935-05	1 5/8"	040935-10



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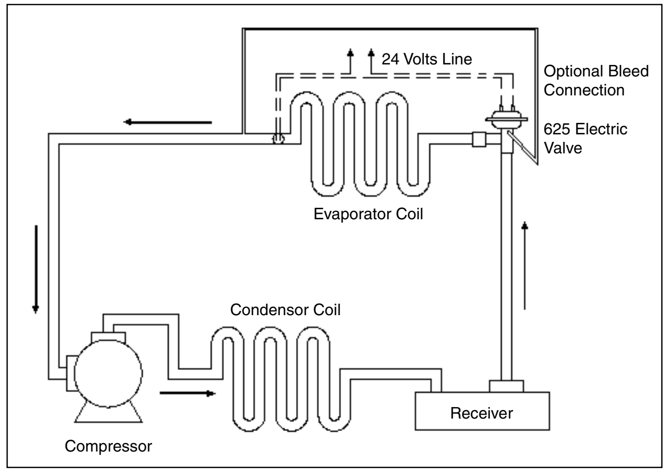
Thermal Electric Valve Model 625 — Applications

Parker's thermal electric valve can be used for a variety of applications demanding control functions that are difficult to accomplish with thermostatic expansion valves. When considering this valve for an application, consider that the thermal electric valve inherently provides the following benefits:

- Approximately 10 percent additional coil capacity.
- Rapid system unloading.
- Controlled suction refrigerant quality or superheat.
- Cool suction gas.
- Similar capacity stroke from –20°F (-29°C) through + 40°F (+4°C).
- Reduction in valve inventory (no special bulb charges, no external equalizers, no superheat settings).



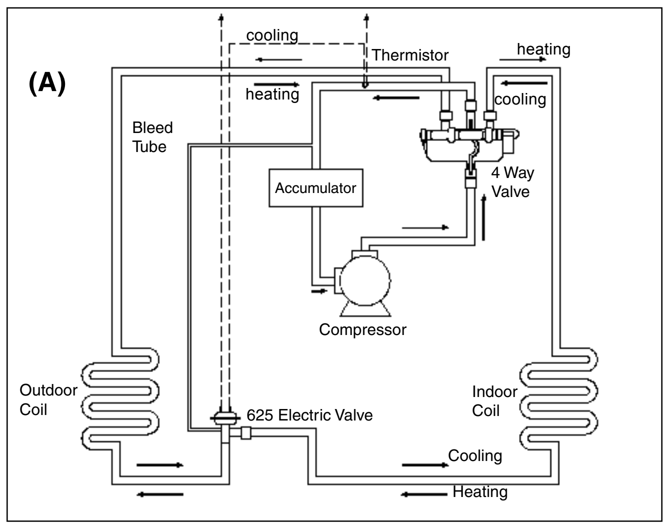
Eliminating Super Heat in Evaporators

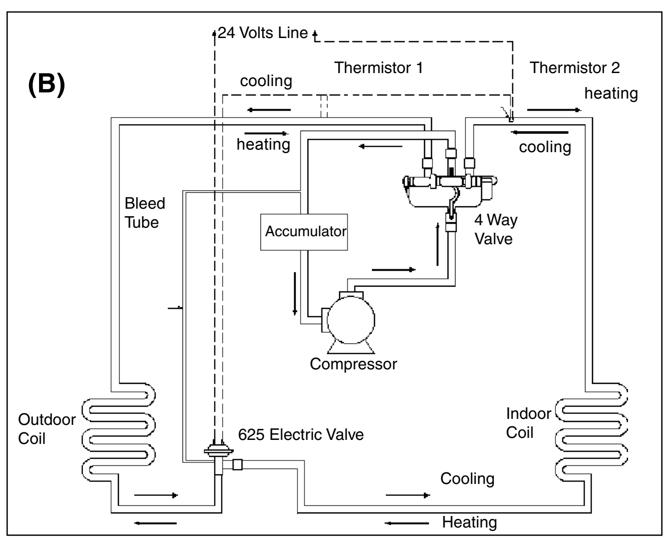
The thermal electric valve maintains zero degrees superheat in the evaporator at all loads. This means that 10-15% more evaporator coil surface is available for added cooling capacity.

Improving the Operating Performance and Cost of Heat Pumps

Bi-directional operation makes the electric valve a popular heat pump control. One electric valve and one or two thermistors reduce the number of components normally used: two thermostatic types, two check valves and their connections.

- **Application A**: The first heat pump uses only one thermistor in the common suction line between the reversing valve and the compressor. This produces a saturated vapor entering the compressor.
- **Application B**: Two thermistors, wired in series with the electric valve, are used in the second schematic. With this arrangement, suction gas entering the compressor is slightly superheated due to heat transfer in the reversing valve.
  1. During cooling, thermistor #2 controls the electric valve. Thermistor #1 is in the compressor discharge line. Thermistor #1 has no effect on valve operation because it is sensing hot gas and self-heating to low resistance (full open).
  2. In the heating cycle, thermistor #1 controls the valve and thermistor #2 is located in the compressor discharge line. Compressor protection during defrost cycles is another advantage of the system.





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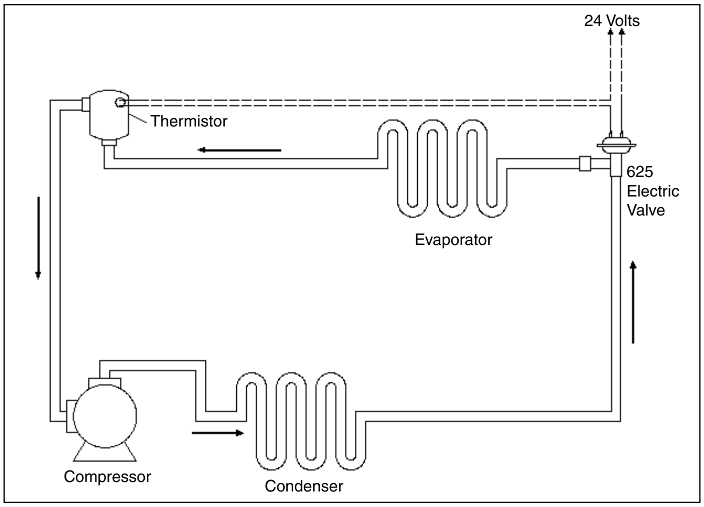
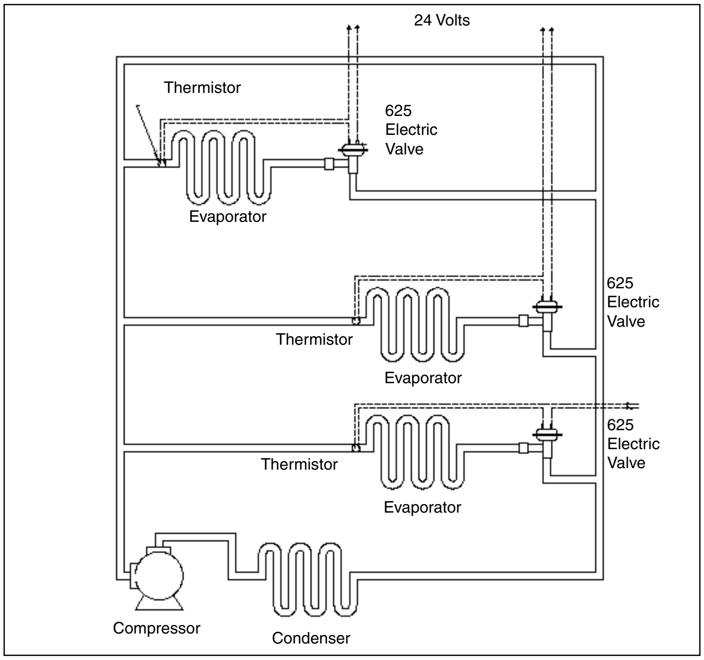
Maintaining a Flooded Evaporator

Place the thermistor in an accumulator to control the level of liquid refrigerant.



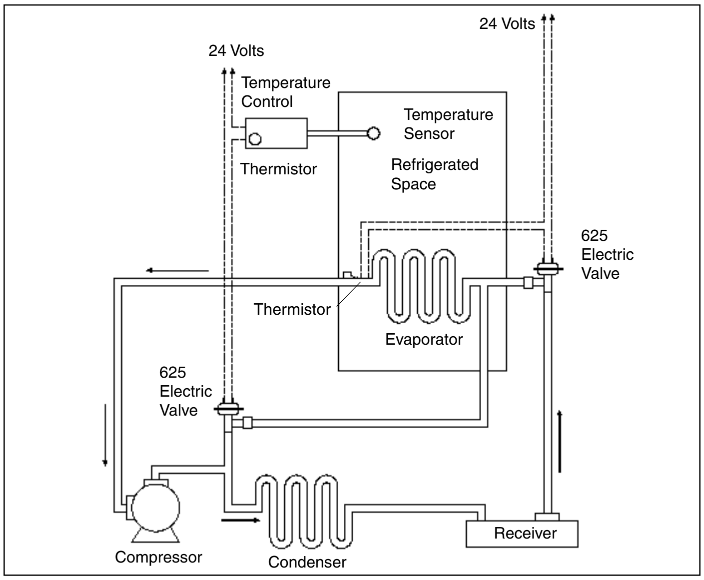
Multiple Evaporator Systems

The electric valve can increase the efficiency and reduce the number of controls required. Put a 625 valve and thermistor on each evaporator. Thermostats can be used to maintain different temperatures, reducing requirements for pressure regulators and solenoids.



Hot Gas and/or Evaporator Temperature Regulator

A special temperature sensing probe is mounted inside the refrigerated space. A solid state temperature control amplifies the electrical signal of the probe and controls the modulation of the electric valve. As the temperature in the refrigerated space drops, voltage to the valve increases and the valve admits hot refrigerant gas directly into the evaporator.



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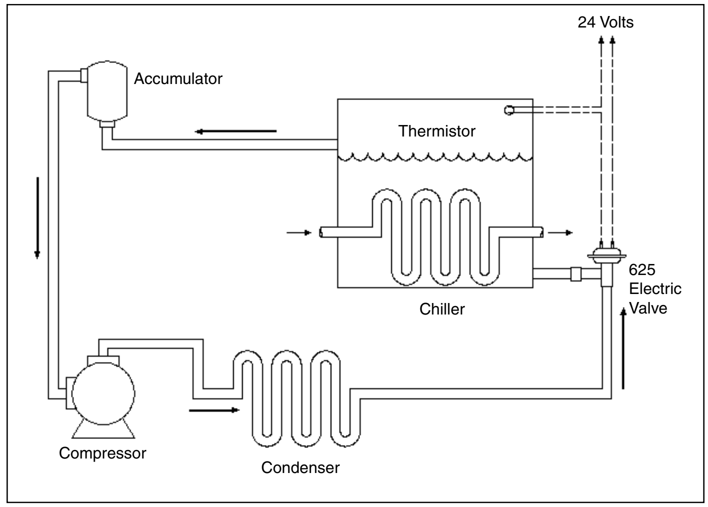
Chillers

This chiller design uses the thermistor as a liquid level control and the electric valve as a normal expansion device.

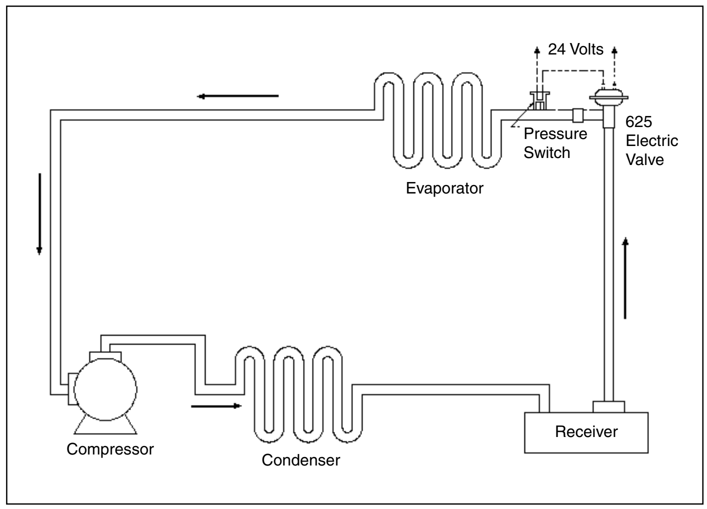


Constant Pressure Control

When combined with a pressure or temperature switch, the electric valve can be used to control evaporator pressure. The switch, which senses evaporator pressure or temperature, closes when the evaporator drops below the set point. The closing of the switch energizes the electric valve. The resulting increase in refrigerant flow raises evaporator pressure. The pressure switch then opens and the valve modulates, maintaining the set point.

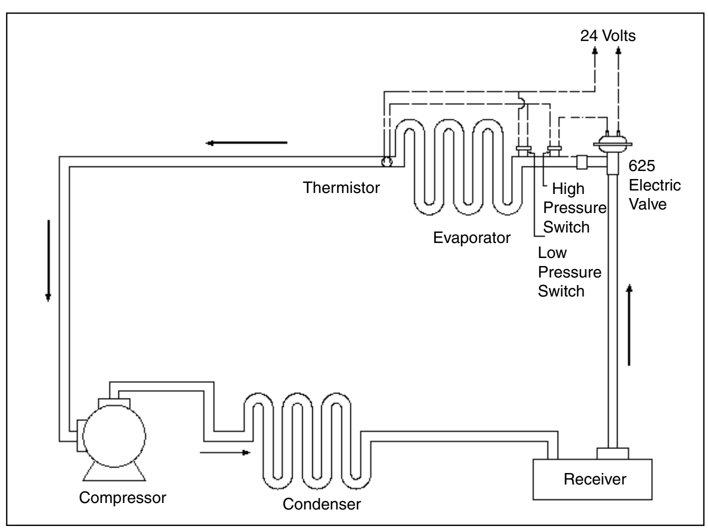
Pressure switches can be used to limit both maximum and minimum system pressure. These switches can be placed anywhere in the system to close the electric valve or limit its capacity when desired levels of pressure or temperature are reached.

Pressure transducers and certain proportional controllers can also be used to provide closer pressure control.



High and Low Pressure Limit

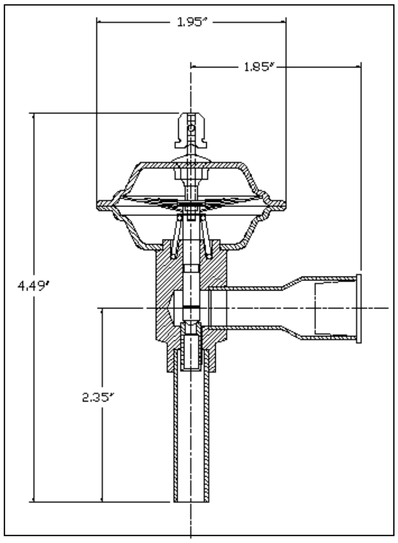
Combine the thermistor with a pressure switch to automatically convert the electric valve to a pressure limiting control. A high pressure limit switch prevents further increase when its pressure setting is reached. A low pressure limit switch prevents further decrease when its pressure setting is reached. A low pressure limit switch is wired in parallel with the thermistor. This arrangement provides zero degree superheat between high and low pressure limits. Note that the compressor suction line is still allowed to superheat.



Thermal Electric Valve Model 625 Operation

The thermal electric valve is operated by, and responds to, low voltage electricity. The valve's operation is simple and easy to understand.

The operating parts of the valve are shown in the figure at the right. They are: a wire-bound bimetal heater and a spring-loaded needle.

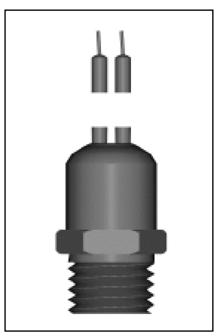


Model 625 Thermal Electric Valve

The amount of voltage applied to the heater controls the degree of the valve opening. At zero voltage, the valve is closed. As voltage is applied, the heater deflects the bimetal upward. The stainless steel needle follows the bimetal deflection and opens the valve. The more voltage applied to the valve, the greater the valve opening.

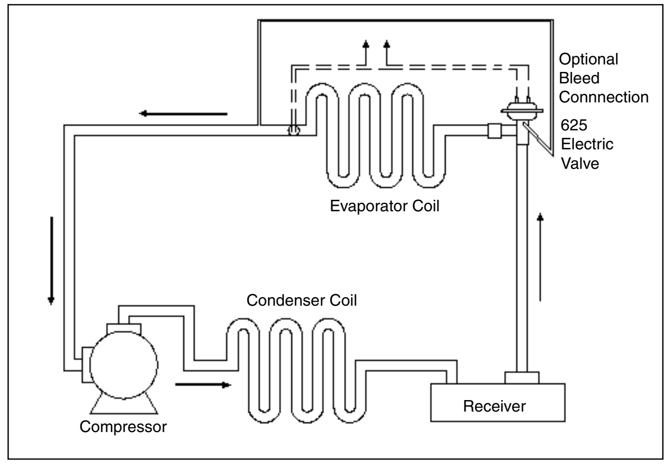
Because system pressure or temperature doesn't affect it, one valve will work for all applications from low temperature freezers to unitary air conditioners.

A special device, called a liquid sensing thermistor (shown here), regulates voltage to the electric valve. The thermistor is installed in the suction line at the exact point where complete change of refrigerant from liquid to gas is desired. Here, the thermistor reacts to the amount of liquid present in the refrigerant as it leaves the evaporator.



Liquid Sensing Thermistor

The schematic at the top of the right column illustrates the operation of the thermistor and the electric valve when they are wired in series. When voltage is applied, the thermistor acts like a small heater. An increase in evaporator load causes superheat to increase. This means the refrigerant changes to superheated gas at the thermistor location. Because the gas is superheated, there is no liquid present and the thermistor has nothing to cool it. When exposed to dry refrigerant gas in this manner, the thermistor is heated to a high temperature by the voltage applied to it and the resistance drops. This causes an increase in voltage across the bimetal heater inside the valve head and the bimetal deflects upward. This deflection opens the valve more.



Operation of the Thermistor and the Electric Valve when They are Wired in Series

The valve stays open until enough liquid refrigerant is fed into the evaporator to reduce superheat. Once superheat is eliminated, wet refrigerant gas again contacts the thermistor. The wet gas cools the thermistor. The thermistor's resistance increases and less voltage is sent to the valve. The valve moves toward closing.

Ambient Effect

The electric valve is calibrated to close in a 70°F (21°C) ambient when no voltage is applied. Above 70°F (21°C) the valve opens and bleeds off refrigerant. The valve has a normal tendency to lose capacity at a lower ambient temperature. The thermistor, however, compensates for these changes automatically.

Bleed Connections

In many cases, the electric valve is manufactured with a third connection that bleeds off small quantities of liquid refrigerant that may collect in the head of the valve where the bimetal heater is located, which limits capacity. With the bleed connection, full capacity of the valve is available at all conditions. The bleed tube is always connected to the system suction line.

Easy Servicing

The electric valve makes system analysis trouble shooting fast and easy. Service personnel need only attach a voltmeter to the electric valve and thermistor. The readings obtained from the voltmeter will tell how the valve is operating at a glance. A simple check of system conditions will indicate thermistor function and identify problems elsewhere in the system.

Thermal Electric Valve Model 625 Installation

Mounting Position – The valve should be installed such that the thermal head is within 30° of an upright position to insure maximum capacity.

Sweat Soldering – The same precautions should be used when sweating this valve into a system that would normally be used with conventional valves to prevent excessive temperature build up (damp cloth – chill block – and so on).

Thermistor Suction Line Adapter – The thermistor should be located flush, or slightly less, with the inside wall of the suction line. The 5/16" dimension shown in the second illustration at the right will correctly locate the thermistor assembly with the inside wall of the suction line. Projection of the female adapter fittings, as well as the thermistor assembly, into the suction line should be avoided (see the illustration at the right).

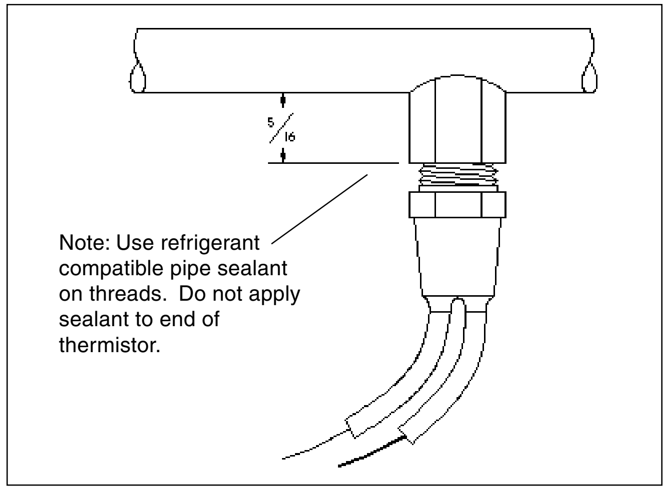
Thermistor Location & Sensing Positions – The liquid sensing thermistor assembly can be used in any suction line with a diameter of 1/2" or larger. It will work on both vertical and horizontal suction lines, but should never be located where liquid refrigerant is likely to accumulate or trap off. For instance; in a bottom U-Bend connecting two vertical risers (see the bottom graphic at the right).

Since suction refrigerant flow depends upon many factors including suction line size, suction gas velocity, elbows, reducers, etc.; it is important to establish firm rules regarding the best location of the liquid sensing thermistor.

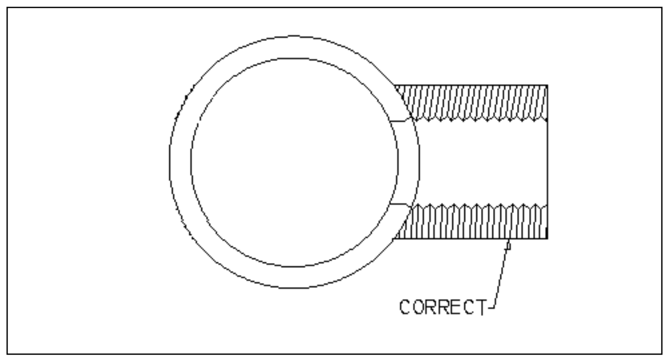
The following observations have been made on a wide variety of applications and have proven to be useful guidelines for locating thermistor assemblies in suction lines.

1. High velocity suction locations are preferable over low velocity locations.
2. Smaller diameter suction locations are preferable over larger diameter locations.
3. Unless the flow pattern around an elbow or reducer is well known or specifically designed for the liquid sensing thermistor assembly, it is best to stay at least 6 inches away when locating downstream of them.
4. Vertical suction lines make excellent locations, but trapping should be avoided as mentioned earlier (see the bottom graphic at the right).

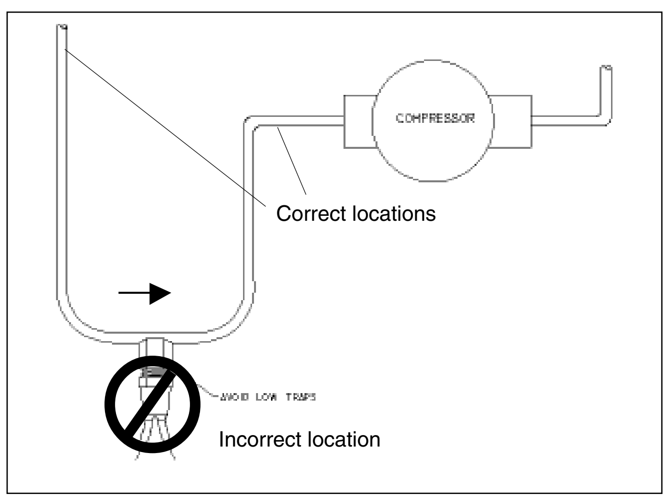
(Continued on the following page.)



Suction Line Identifying Location of Thermistor Assembly



Correct Placement of Thermistor Assembly into Suction Line



Correct and Incorrect Locations for Thermistor Assembly

If the line is at some angle other than vertical, the lower or gravity side is preferable (see the illustration at the right).

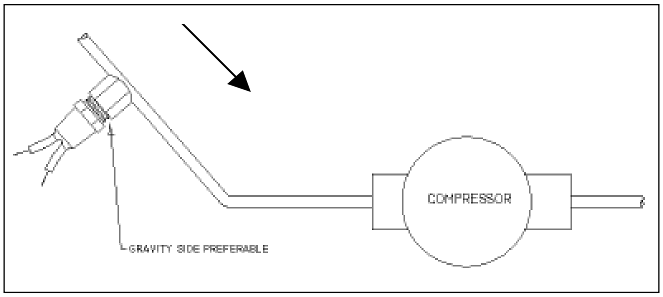
5. Thermistor location on horizontal suction lines is more common and in some cases (large diameter low velocity suction lines) permits adjustments to be made in suction gas saturation (see illustration in the right column). The best thermistor sensing positions in horizontal suction lines are generally between 4 o'clock and 8 o'clock in the lower half of the suction line, although successful applications have been made with the thermistor in all axial locations. **As a rule, the thermistor should be located as high axially in the 4 to 8 o'clock range as possible on horizontal suction lines using tolerable suction gas wetness as the limiting factor.**
6. The most important rule regarding the location of the liquid sensing thermistor on any applications is simply this; make sure that liquid or wet refrigerant gas can come into good contact with the thermistor at all loads. Once a location has been established on a given application, subsequent units will show excellent repeatability.

Effects of Ambients and Blowers During Running Periods – Exposure to fan or blower air movement has almost no effect on the valve. It will operate properly in all ambients from -40°F (-40°C) to +150°F (+66°C). The valve has a normal tendency to lose capacity at lower ambients and gain capacity at high ambients. The thermistor, however, generally compensates for these changes automatically.

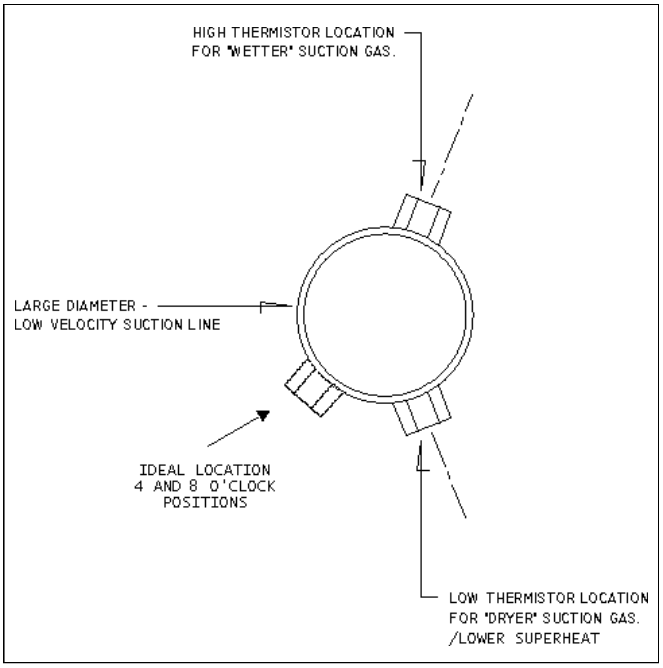
Effect of Ambient During Off-Cycle Periods – During off-cycle periods, the valve will bleed off refrigerant if exposed to ambients above 70°F (21°C) and will close off relatively tight if exposed to ambients of less than 70°F. In short, the valve is simply calibrated to close at 70°F with no electrical energy applied.

Off-Cycle System Unloading – The valve can be left energized 100% of the time, in which case it will completely and rapidly unload the system during off-cycle periods.

The valve can be de-energized during off-cycle periods with the compressor, in which case it will partially unload the system, depending upon the amount of charge and the ambient. (See Effect of Ambient During Off-Cycle Periods above).



Preferable Location for Thermistor Assembly on Angled Line



Best Thermistor Sensing Positions on Horizontal Suction Lines

Note: Do not install in vertical lines.

Troubleshooting

Testing For Proper Operation

The valve and thermistor should be wired in series as shown in the illustration below. All wiring should be made in accordance with U.L. low voltage class 2 codes.

Some Precautions

1. Never apply more than the output of a 24 volt transformer to the valve circuit.
2. Don't apply 24 volts directly across the thermistor leads. It will short out the valve and damage the thermistor if both terminals of the electric valve are touched with one volt-ohmmeter lead.

Initial Electrical Checkout

If the electric valve and/or thermistor are suspected to be inoperative, check the following:

1. Are the electrical connections to the valve and thermistor tight and correctly wired?

   If the connections are okay, continue to step 2.
2. With the transformer disconnected, make a simple electrical continuity check of the valve and thermistor using the volt-ohmmeter.

Service Gauge Manifold Tests

If no problem is found during the volt-ohmmeter tests, reconnect the power supply and connect a service gauge manifold to the system. Then observe high and low side pressures during the following tests:

1. **To see if the valve is closing:**

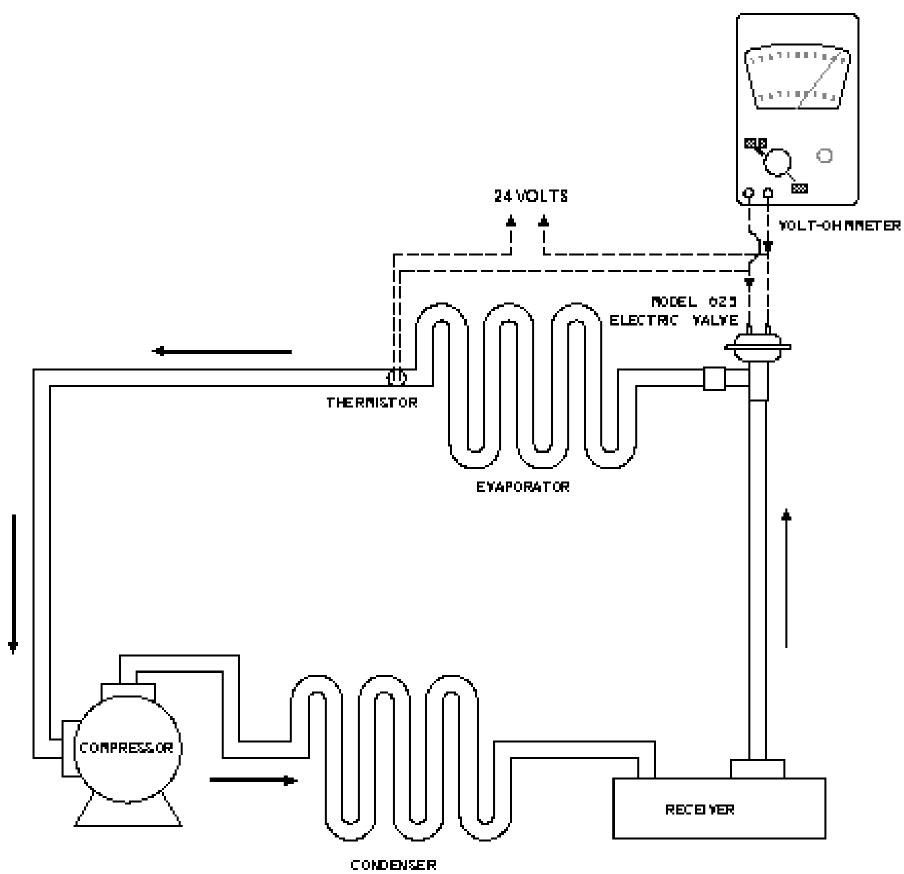
   Remove voltage to the valve by disconnecting any wire in the circuit.

   With the circuit open, low side pressure should begin to drop. Wait three or four minutes, if the pressure does drop the valve is closing freely and is not clogged or sticking.
2. **To see if the valve is opening:**

   Remove the thermistor from the circuit by placing a jumper wire across the two thermistor leads. This will send 24 volts directly to the valve.

   With 24 volts at the valve as the valve opens, low side pressure should begin to increase. If low side pressure does increase, the valve is opening properly and is okay. Note that this kind of testing cannot be done with a capillary tube system.

   With a thermostatic expansion valve system, the thermal bulb has to be removed from the suction line and heated to see if the valve is opening properly.



Proper Wiring of Valve and Thermistor

Problem: Voltage to the valve is low, liquid is in the suction line.
__Probable cause:__ Solder or other electrically conductive material has clogged the thermistor.

Problem: Voltage to the valve is high, superheated condition at the thermistor location.
__Probable cause:__ Some contaminant is shorting the thermistor out of the circuit.

Problem: Voltage will not drop below 17 volts and goes as high as 26 volts.
__Probable cause:__ Transformer output too high.

Valve Replacement

Always replace a defective electric valve with an exact duplicate.

Mounting

If possible, install the valve with the head within 30 degrees of upright. This prevents any liquid from migrating to the bimetal chamber where it could affect valve operation.

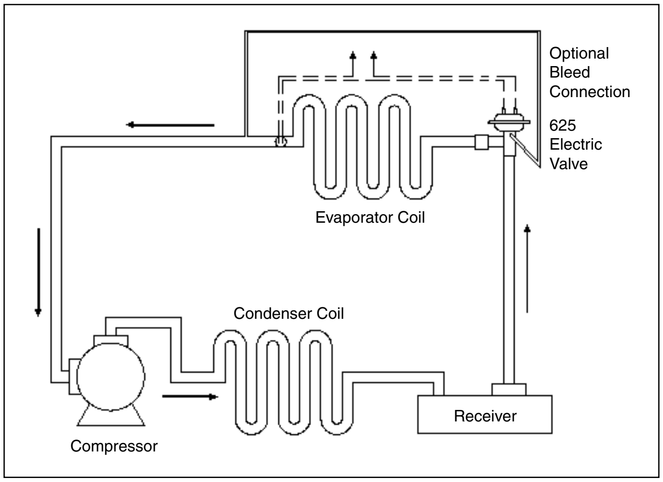
If the valve is mounted with the head down, an electric valve with a bleed tube connection must be used.

Bleed Connection

The third solder connection on solder-type electric valves is the bleed connection. It prevents migration of liquid refrigerant to the bimetal chamber. A valve with a bleed tube must always be used on heat pumps.

Connect the bleed tube downstream of the thermistor in the system suction line as shown in the illustration below. On heat pumps, connect the bleed tube to the common suction line.

Remember to use a chill block or wet cloths to protect the valve body when soldering.



TXVs & AXVs

Valve Ratings

The following ratings are based on 100°F (38°C) vapor-free liquid refrigerant entering the valve.

Refrigerant R-134a/R-12/R-401A, B
Tons of Refrigeration — Evaporator Temperatures °F/C

Part Number	Orifice Size	+40°F (+4°C)					+20°F (-7°C)					-10°F (-23°C)					-40°F (-40°C)				
		PRESSURE DROP ACROSS VALVE (PSIG)																			
		40	60	80	100	120	60	80	100	120	140	80	100	120	140	160	100	120	140	160	180
040925-023	.040	.274	.335	.387	.433	.476	.318	.368	.411	.450	.486	.335	.374	.410	.442	.473	.332	.364	.393	.420	.446
040925-014	.047	.530	.650	.750	.840	.923	.618	.715	.798	.875	.945	.648	.725	.794	.857	.917	.642	.703	.760	.812	.862
040925-013	.062	.735	.900	1.04	1.07	1.28	.860	.995	1.11	1.22	1.31	.905	1.01	1.11	1.20	1.28	.895	.980	1.06	1.13	1.20
040925-025	.070	.875	1.07	1.24	1.39	1.52	1.00	1.16	1.30	1.42	1.53	1.04	1.16	1.27	1.37	1.46	1.00	1.09	1.18	1.26	1.34
040925-002	.078	1.36	1.66	1.92	2.15	2.36	1.58	1.82	2.04	2.23	2.41	1.65	1.85	2.02	2.19	2.34	1.64	1.79	1.94	2.07	2.20
040925-003	.093	1.87	2.29	2.65	2.96	3.26	2.15	2.49	2.78	3.04	3.29	2.26	2.53	2.77	2.99	3.20	2.21	2.42	2.61	2.79	2.96
040925-004	.109	2.29	2.80	3.24	3.63	3.98	2.64	3.05	3.41	3.73	4.04	2.74	3.07	3.36	3.63	3.88	2.65	2.90	3.14	3.35	3.55
040925-001	.125	2.65	3.25	3.75	4.20	4.61	3.05	3.53	3.94	4.31	4.66	3.14	3.51	3.84	4.15	4.44	3.03	3.32	3.58	3.83	4.06
040925-005	.140	3.01	3.68	4.25	4.75	5.23	3.42	3.78	4.42	4.84	5.23	3.52	3.93	4.30	4.65	4.96	3.40	3.72	4.03	4.30	4.56
040925-028	.187	4.42	5.41	6.25	7.00	7.68	5.04	5.83	6.51	7.13	7.70	5.17	5.78	6.33	6.84	7.32	5.00	5.47	5.92	6.32	6.71

Liquid Refrigerant Temp Entering Valve	Multiplier Factor	Liquid Refrigerant Temp Entering Valve	Multiplier Factor
80°F (27°C)	1.11	110°F (43°C)	0.93
90°F (32°C)	1.07	120°F (49°C)	0.87
100°F (38°C)	1.00	130°F (54°C)	0.81
		140°F (60°C)	0.71

To determine valve ratings for other liquid refrigerant temperatures entering the valve, multiply the capacities listed above by the proper multiplier factor listed.

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Climate & Industrial Controls Group
Cleveland, OH

Refrigerant R-404a/R-502/R-507C/R-402A,B/R-125
Tons of Refrigeration — Evaporator Temperatures °F/C

Part Number	Orifice Size	+40°F (+4°C)					+20°F (+4°C)					-10°F (-23°C)					-40°F (-40°C)				
		PRESSURE DROP ACROSS VALVE (PSIG)																			
		75	100	125	150	175	100	125	150	175	200	125	150	175	200	225	150	175	200	225	250
040925-023	.040	.325	.374	.419	.461	.494	.355	.395	.435	.470	.502	.352	.386	.417	.446	.473	.334	.360	.386	.409	.431
040925-014	.047	.629	.725	.811	.892	.956	.685	.765	.840	.907	.970	.681	.747	.807	.864	9.15	.647	.699	.747	.793	.836
040925-013	.062	.876	1.01	1.13	1.24	1.33	.955	1.07	1.17	1.26	1.35	.948	1.04	1.12	1.20	1.27	.900	.973	1.04	1.10	1.16
040925-025	.070	1.04	1.20	1.34	1.47	1.58	1.12	1.25	1.38	1.49	1.59	1.12	1.23	1.32	1.41	1.50	1.06	1.14	1.22	1.29	1.37
040925-002	.078	1.61	1.86	2.08	2.29	2.45	1.75	1.96	2.15	2.32	2.48	1.75	1.92	2.07	2.22	2.35	1.66	1.79	1.92	2.03	2.14
040925-003	.093	2.22	2.56	2.87	3.16	3.38	2.40	2.69	2.95	3.18	3.40	2.39	2.62	2.83	3.03	3.20	2.24	2.42	2.59	2.74	2.89
040925-004	.109	2.71	3.13	3.50	3.85	4.13	2.93	3.27	3.59	3.87	4.14	2.88	3.16	3.41	3.65	3.86	2.67	2.88	3.08	3.27	3.45
040925-001	.125	3.16	3.64	4.07	4.48	4.80	3.41	3.81	4.18	4.52	4.83	3.32	3.64	3.93	4.20	4.45	3.07	3.31	3.54	3.76	3.96
040925-005	.140	3.56	4.11	4.60	5.06	5.42	3.81	4.26	4.67	5.05	5.39	3.70	4.06	4.38	4.69	4.96	3.43	3.70	3.96	4.20	4.42
040925-028	.187	5.23	6.04	6.75	7.43	7.47	5.60	6.26	6.86	7.40	7.93	5.44	5.97	6.45	6.90	7.30	5.05	5.45	5.83	6.17	6.52

Liquid Refrigerant Temperature Entering Valve	Multiplier Factor	Liquid Refrigerant Temperature Entering Valve	Multiplier Factor
80°F (27°C)	1.17	110°F (43°C)	0.91
90°F (32°C)	1.08	120°F (49°C)	0.88
100°F (38°C)	1.00	130°F (54°C)	0.82
		140°F (60°C)	0.77

Refrigerant R-22/R-407C
Tons of Refrigeration — Evaporator Temperatures °F/C

Part Number	Orifice Size	+40°F (+4°C)					+20°F (-7°C)					-10° F (-23° C)					-40°F (-40°C)				
		PRESSURE DROP ACROSS VALVE (PSIG)																			
		75	100	125	150	175	100	125	150	175	200	125	150	175	200	225	150	175	200	225	250
040925-023	.040	.486	.560	.626	.689	.740	.540	.604	.662	.715	.765	.556	.610	.659	.704	.746	.554	.598	.640	.678	.715
040925-014	.047	.938	1.08	1.21	1.33	1.43	1.04	1.17	1.28	1.38	1.48	1.08	1.18	1.28	1.36	1.45	1.07	1.16	1.24	1.31	1.38
040925-013	.062	1.31	1.51	1.69	1.86	2.00	1.46	1.63	1.79	1.93	2.07	1.50	1.65	1.78	1.91	2.02	1.50	1.62	1.73	1.84	1.94
040925-025	.070	1.56	1.79	2.01	2.21	2.37	1.69	1.88	2.07	2.23	2.38	1.68	1.84	1.99	2.12	2.24	1.60	1.73	1.84	1.95	2.06
040925-002	.078	2.39	2.75	3.08	3.39	3.63	2.66	2.97	3.26	3.52	3.76	2.73	3.00	3.24	3.46	3.67	2.72	2.94	3.14	3.33	3.51
040925-003	.093	3.29	3.80	4.25	4.67	5.02	3.63	4.06	4.45	4.81	5.14	3.73	4.09	4.42	4.72	5.01	3.66	3.95	4.23	4.48	4.73
040925-004	.109	4.05	4.67	5.23	5.76	6.17	4.47	5.00	5.48	5.93	6.34	4.55	5.00	5.40	5.77	6.12	4.42	4.77	5.11	5.41	5.71
040925-001	.125	4.70	5.42	6.06	6.66	7.15	5.16	5.77	6.33	6.83	7.32	5.22	5.72	6.18	6.61	7.00	5.06	5.46	5.84	6.19	6.53
040925-005	.140	5.34	6.16	6.89	7.58	8.12	5.82	6.51	7.14	7.71	8.25	5.87	6.44	6.95	7.44	7.88	5.69	6.15	6.57	6.97	7.34
040925-028	.187	7.84	9.04	10.1	11.1	11.9	8.50	9.49	10.4	11.2	12.0	8.62	9.43	10.2	10.9	11.5	8.34	9.00	9.63	10.2	10.7

Liquid Refrigerant Temp Entering Valve	Multiplier Factor	Liquid Refrigerant Temp Entering Valve	Multiplier Factor
80°F (27°C)	1.12	110°F (43°C)	0.94
90°F (32°C)	1.06	120°F (49°C)	0.88
100°F (38°C)	1.00	130°F (54°C)	0.82
		140°F (60°C)	0.77