SPORLAN

QuickTips

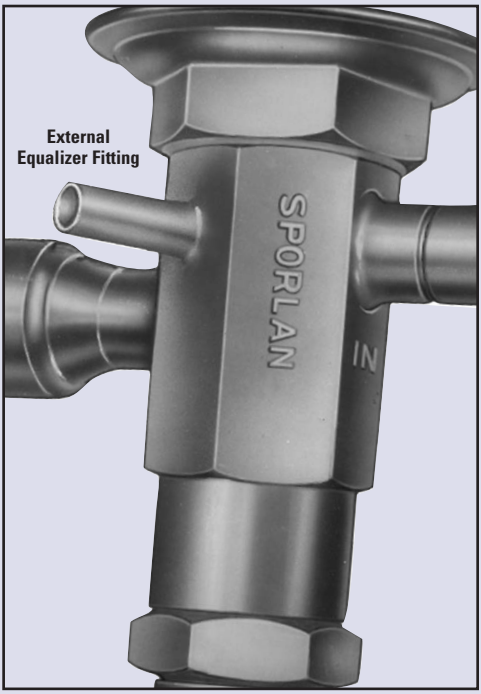
March 2007

Do you have questions?

We have answers.

The Questions

Q. Where should the TEV External Equalizer be installed?



A.

The purpose of the external equalizer is to sense the pressure in the suction line **AT THE BULB LOCATION** and transmit it to the TEV diaphragm.

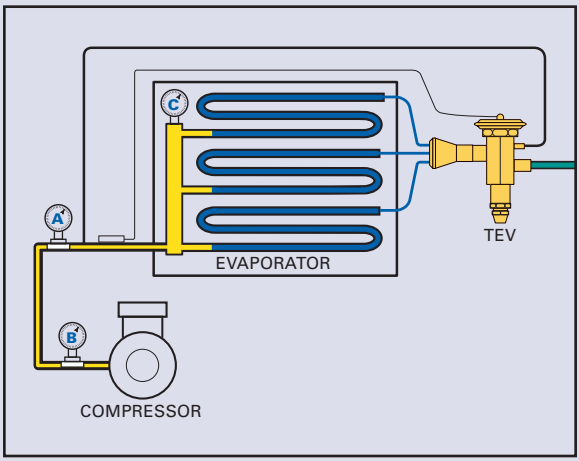
This usually means installing the external equalizer immediately down stream from the bulb. This ensures the correct pressure is signaled to the TEV.

In some situations this "ideal" location may not be possible. In these cases, an alternate location, such as at **B** or **C**

(see diagram), could be used. However, the pressure at these locations must be nearly identical to the pressure in the line where the bulb is located.

In other words, locations **B** and **C** are acceptable as long as these pressures are essentially the same as **A** when the system is operating at full load.

In the past there has been concern about installing the external equalizer "up-stream" from the bulb. This was due to the possibility of refrigerant leaking past the TEV push rods, passing through the equalizer line and into the suction line, thus falsely influencing the TEV bulb temperature. Today, with Sporlan's TEV design, this possibility is virtually eliminated.



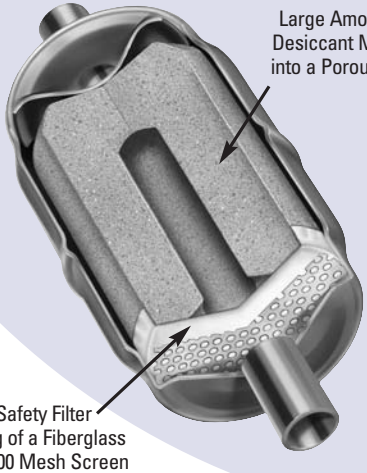
Q. What makes the Sporlan Catch-All® different?

A.

The famous molded porous core. The Sporlan Catch-All Filter-Drier eliminates all the weaknesses of loose-filled models by molding a blend of **specially selected desiccants** into a porous core. The core provides excellent filtration without the problem of desiccant powdering, packing and escaping into the system, a common problem with many loose fill driers.

Sporlan Catch-All

The Perfect Filter-Drier



QuickTips #2

Q. What are the functions of the Catch-All's special blend of desiccants?

A.

Moisture Removal - Moisture is an important factor in the formation of acids, sludge, copper plating and corrosion.

Dirt Removal - Numerous metallic contaminants such as cast iron dust, rust, steel and copper chips can damage compressor bearings and plug capillary tubes or expansion valves.

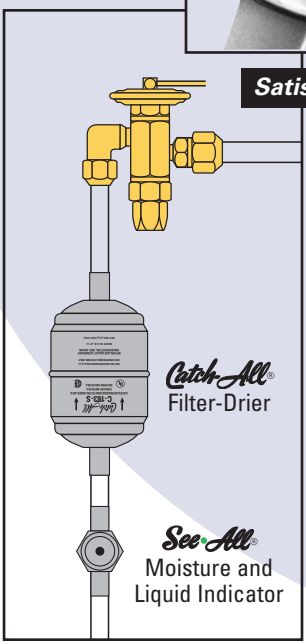
Acid Removal - Acid-forming chemical reactions can occur under certain conditions. As an example, at elevated temperatures, many refrigerants will react with oil to form acids. This is particularly true when moisture is present.

Sludge and Varnish Removal - Although the utmost precaution may be taken in the design and fabrication of a system, once in operation, unusually high discharge temperatures will cause the oil to break down and form sludge and varnish.

Q. Where should the Sporlan See•All® be installed?

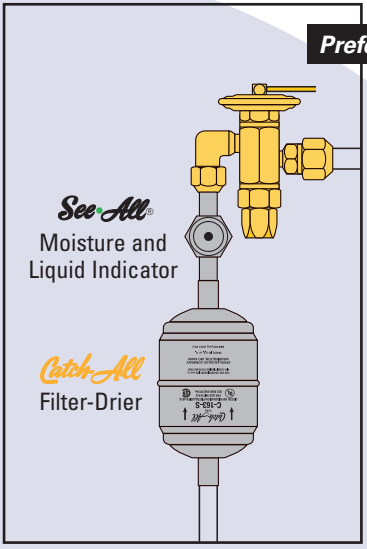
A.

The Sporlan See•All is a combination moisture and liquid indicator. Therefore, it serves two functions when installed in the liquid line.



Satisfactory Location

For indicating the **moisture content**, the See•Alls location can be anywhere in the liquid line. Because the level of moisture contained in the refrigerant reaches "equilibrium" soon after the installation of the Catch-All, and should remain at that level unless moisture is introduced from some external source, the See•All correctly measures the proper moisture concentration at any point in the liquid line.



From the standpoint of indicating the **condition of the refrigerant** (100% liquid or mixture of liquid and bubbles) the preferred location is **immediately before the TEV.**

One of the requirements for proper TEV operation, is a solid stream of liquid refrigerant entering the valve. Positioning the See-All immediately before the TEV helps to ensure that is the case. A clear sight glass is also an indication of a properly charged system.

By locating the See-All downstream of the Catch-All, it can signal a restriction in the Catch-All should one occur. However, be careful not to confuse this with a shortage of refrigerant.

Q. Where should the TEV's bulb be located?

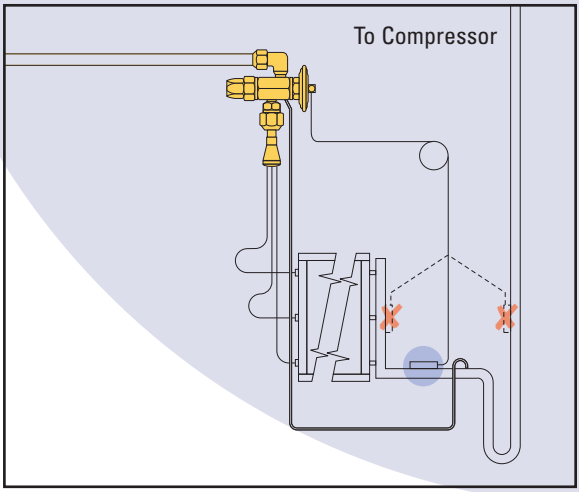
A.

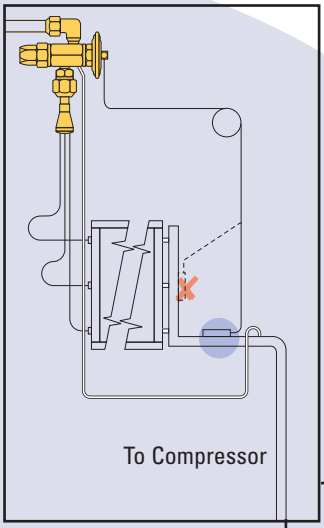
In general, the TEV bulb should be installed on a **straight** section of **horizontal** suction line.

When the compressor is above the evaporator

Locate the bulb on a straight, horizontal line, pitched slightly down, immediately after it leaves the evaporator.

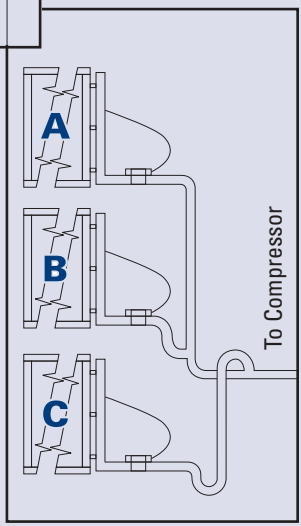
A short trap should follow before the vertical line rises to be connected to the compressor suction. With the line pitched down, any liquid refrigerant and/or oil will pass into the trap, **away** from the bulb. As the trap fills with oil, the velocity of the refrigerant will carry the trapped oil into the vertical section and be returned to the compressor.





When the compressor is below the evaporator

In this piping configuration, no trap is required after the bulb location, but the line should be pitched slightly down to prevent any liquid refrigerant or oil from being trapped at the bulb location.



When several evaporators are installed both below and above the common suction line

Observing the same principles outlined above, the piping should be arranged to prevent the accumulation of oil and/or refrigerant at the bulb location. Also, traps installed in the suction lines of evaporators **B** and **C** prevent the refrigerant from one evaporator from entering the suction line of another evaporator.

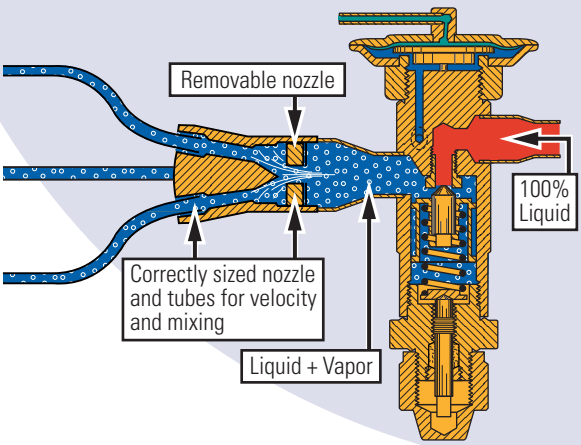
Q. What is important in refrigerant distributor performance?

A.

Except for very small sizes, most direct expansion evaporators used in refrigeration and air conditioning systems use two or more circuits. In order for the evaporator to perform at its maximum capacity, equal refrigerant feed to each circuit is a necessity. In addition, each circuit must be exposed to identical heat loads.

Distributing equal amounts of liquid to each circuit is important in refrigeration evaporators because the refrigerant leaving the TEV is a **mixture of liquid and vapor**. There is a natural tendency for the liquid and vapor to separate, resulting in unequal amounts of liquid being fed to the various circuits. It is the liquid refrigerant flow into the evaporator that produces nearly all the refrigeration effect. The vapor contributes very little.

To ensure equal refrigerant feed, it is important to size the distributor nozzle and tubes to match the system capacity as close as possible. By doing this, the proper velocities are created to **completely mix the liquid and vapor**.



In addition to feeding equal amounts of liquid and vapor into each circuit to utilize the full capacity of the evaporator, each circuit must be equally loaded. **Figure A** is a schematic illustration of typical temperature conditions in the evaporator when both **equal distribution and equal loading** occur.

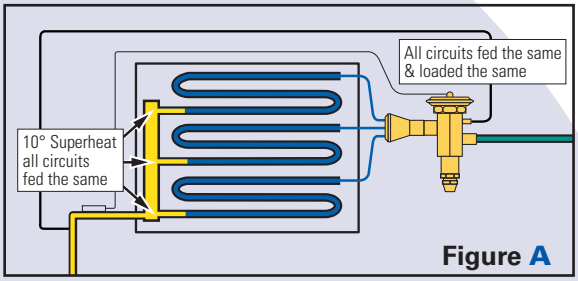


Figure A

Figure B illustrates the same evaporator but with the air flow (and thus the load) less over circuit #3. The load imbalance will be indicated by low superheat at the outlet of circuit #3, and high superheat at the outlet of circuits #1 and #2. Other symptoms are lower than normal suction pressure, reduced evaporator capacity and TEV hunting with possible flood-back.

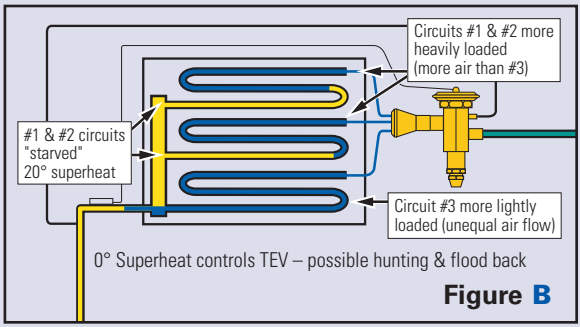


Figure B

When planning a system refrigerant conversion it is critical to consider nozzle and tube sizing.

For complete sizing and application information refer to Sporlan Bulletin 20-10.

A product selection program is available in CD-ROM format from Sporlan. See the Sporlan Field Sales Engineer in your area.

When should a Catch-All® Filter-Drier be changed?

It is not uncommon to see refrigeration and air conditioning systems that have operated for decades, without any service being performed, and with the Catch-All undisturbed since the original installation. This speaks well, not only for the reliability and durability of all the system operating components, but also for the Catch-All which has provided protection to these components over the many years of operation.

At the initial start-up the Catch-All removed any dirt or excessive moisture that may have been in the system. During the years of operation, the Catch-All continued to provide protection by insuring that no acid or contaminants formed during periods of high condensing or discharge temperatures.

Unfortunately, things do not always go this smoothly and service calls are necessary. This is when consideration should be given to changing the filter-drier.

Here are some questions that will help determine whether to change the Catch-All:

1. Did the See•All indicate moisture was present?
2. Was the system open during service?
3. Were there any unusual circumstances that could have permitted moisture to enter the system? (ruptured chiller or water cooled condenser; wet conditions in area where repairs are taking place)
4. Was there a hermetic motor burn-out involved?
5. Was excessive compressor heat involved in the failure?
6. Is the refrigerant oil discolored or found to be acidic? (A Sporlan Acid Test Kit will determine this)
7. Was it evident that dirt, metal chips or other contaminants were involved in causing the failure?

QuickTips #6

If the answer to any of these is "yes", a new Catch-All is good insurance against a repeat problem. If questions 3, 4 or 5 are answered "yes", both a suction line and liquid line Catch-All are recommended to remove acids and products of oil decomposition. Sporlan Bulletin 40-10 outlines the procedure for this type of cleanup.

The Sporlan See•All and Acid Test Kits are excellent service tools for determining if a replacement of the Catch-All or other filter-drier is required.

Catch-All®

With the famous molded core

Compact Style Suction Line Catch-All

Replaceable Core Catch-All

See-All®

A combination Moisture & Liquid Indicator

ACID TEST KITS

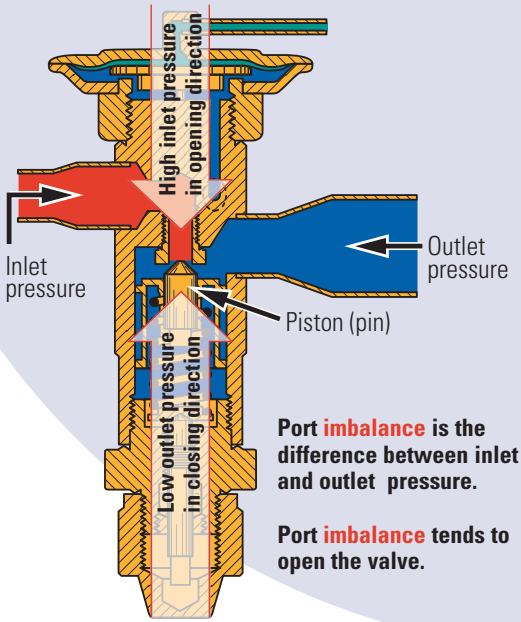
TA-1

AK-3

What's different about the Sporlan "O" Valve?

The O valve uses a forced balanced piston to reduce the impact of varying condensing or valve inlet pressure on the valve's superheat control setting. The piston (pin) in a conventional TEV design is exposed to high inlet pressure on the top and low outlet pressure on the bottom. The pressure imbalance across the pin acts as an opening force that will vary the superheat control setting of the valve by increasing the load on the superheat adjustment spring. As pressure differential across a conventional TEV pin increases, typically caused by increasing condensing

CONVENTIONAL TEV

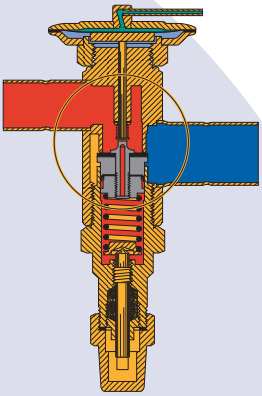


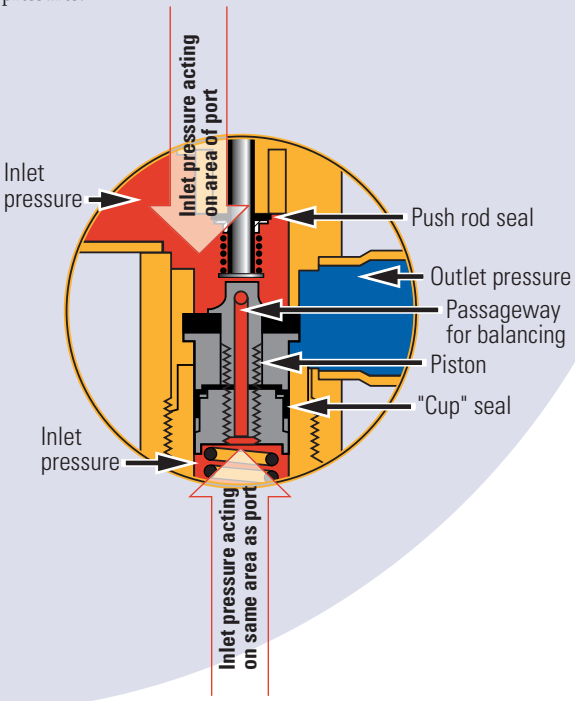
Port imbalance is the difference between inlet and outlet pressure.

Port imbalance tends to open the valve.

pressure, the valve's superheat control setting will decrease. Inversely, if the differental across the TEV pin decreases the valve's superheat control setting will increase. The force balanced piston in the O-valve is specially designed to transmit the inlet pressure such that force created by the pressure acting on the piston across the port, is "balanced" by the inlet pressure acting on an equal area opposing the port. Balanced port valve designs are essential for the effective operation of large capacity vlaves, and/or on systems that experience a wide range of evaporator loads and varying condensing pressures.

TYPE "O" VALVE





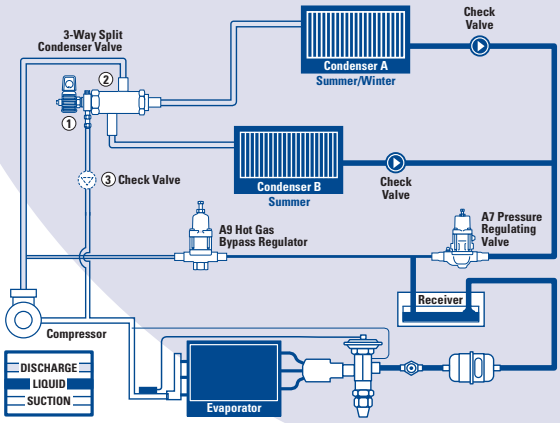
What is a Split Condenser?

Split-Condensers are used in large refrigeration systems to assist in head pressure control and to minimize the amount of system refrigerant charge required.

The size of the condenser required for summer operation is split into two parallel circuits. One circuit (designated "summer/winter") is active in summer and winter. The other circuit (designated "summer condenser") is rendered inactive during winter operation by a 3-Way Split Condenser Valve.

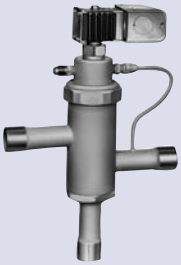
As the piping diagram indicates, a check valve is installed in the outlet of each condenser circuit, and head pressure controls are used to maintain minimum and stable head pressures. The two condensers are usually split 50/50 in size and are contained in the same "tube bundle" using condenser fan control as a supplement to the head pressure control valves. With this combination, the required refrigerant charge is kept to an absolute minimum.

TYPICAL PIPING SCHEMATIC



QuickTips #8

There are three sizes of Sporlan 3-Way Split Condenser Valves with connection sizes from 7/8 to 2-1/8 ODF. The "B" model is designed with an internal bleed. This feature allows refrigerant to bleed from the summer condenser back to suction when it is inactive during periods of low outdoor temperatures.



TYPE	PORT SIZE (Inches)	CONNECTION ODF Solder (Inches)
8D9B-SC	3/4	1-1/8
12D11B-SC	1-1/4	1-3/8
12D13B-SC		1-5/8
12D17B-SC		2-1/8
16D17B-SC 16D17C-SC	2	2-1/8

ORDERING INSTRUCTIONS

16D 17 C – SC

- 16D — Valve Type
- 17 — Connections in 1/8"
- C — Non-Bleed Version
- SC — Split Condenser

* Also specify voltage and cycles *

For more detailed information, refer to Sporlan Bulletin 30-20.

Q. What are the advantages of the Sporlan "Q" TEV?

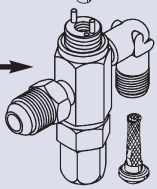
A.

By changing cartridges, a single Q valve body can be easily altered from 1/4 to 5 tons R-22 and from 1/8 to 3 tons on R-134a. Also, the correct thermostatic charge to suit the application is installed at the same time. These modifications can be conveniently made either before or after it is installed on the system.

Any of Sporlan Selective Charges →

7 Different Cartridges All Color Coded and Number Identified →

Assortment of 3 Different Body Styles Externally or Internally Equalized →



All Sporlan Selective Thermostatic Charges

RECOMMENDED THERMOSTATIC ELEMENTS

APPLICATION	REFRIGERANT								THERMOSTATIC ELEMENT CHARGE	MOP SYSTEM psig
	12	22 407A	134a	401A	402A 507	404A 408A 502	407C	409A		
AIR CONDITIONING	x		x	x				x	KT-43-FCP60	50
		x					x		KT-43-VCP100	90
		x					x		KT-43-VGA	–
						x			KT-43-RCP115	105
COMMERCIAL REFRIGERATION 50 F to –1 °F	x		x	x				x	KT-43-FC	–
		x					x		KT-43-VC	–
						x			KT-43-RC	–
					x				KT-43-PC	–
LOW TEMPERATURE REFRIGERATION 0°F to –40°F	x								KT-43-FZ	–
	x								KT-43-FZP	12
		x							KT-43-VZ	–
		x							KT-43-VZP40	30
					x	x			KT-43-RZ	–
					x	x			KT-43-RZP	35

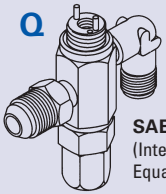
QuickTips #9

7 CARTRIDGES

Nominal Capacity (tons) of Sporlan Valve to be Replaced					Q Valve Cartridge	
R-12	R-22	R-502	R-134a	R-404A	SIZE	COLOR CODE
1/8	1/4	1/8	1/8	1/8	0	RED
1/6	1/3	1/6	1/6	1/6		
1/4	1/2	1/4	1/4	1/4	1	YELLOW
	3/4					
1/2	1	1/2	1/2	1/2	2	GREEN
1	1-1/2	1	1	1	3	BLUE
1-1/2	2	1-1/2	1-1/2	1-1/2	4	PINK
	2-1/2					
2	3	2	2	2	5	BLACK
2-1/2	4	3	2-1/2	3	6	WHITE
3	5		3			

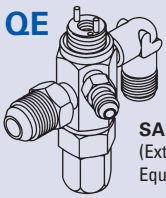
6 BODY STYLES

Q



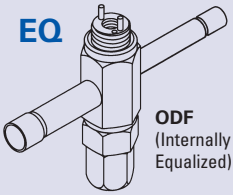
SAE
(Internally Equalized)

QE



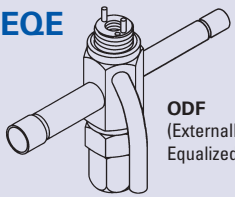
SAE
(Externally Equalized)

EQ



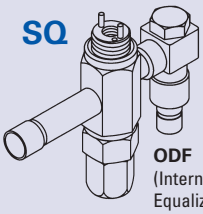
ODF
(Internally Equalized)

EQE



ODF
(Externally Equalized)

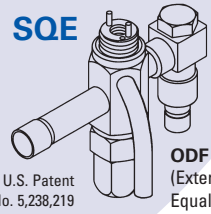
SQ



ODF
(Internally Equalized)

Replaceable Strainer
- U.S. Patent No. 5,232,015
- P/N 3427-000

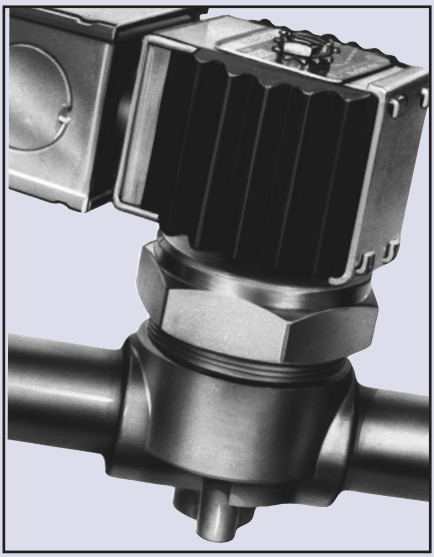
SQE



U.S. Patent No. 5,238,219

ODF
(Externally Equalized)

Q. Should a solenoid valve be selected based on line size?



A.

There has always been a tendency to select solenoid valves on the basis of line size. This is very risky.

While a 5/8" line size and a 5/8" ODF sweat connection sound like a perfect match, other factors must be considered.

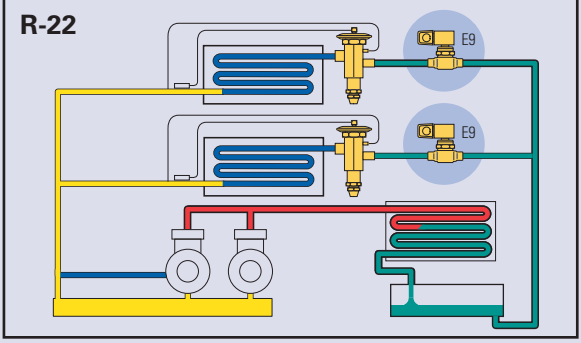
The valve may be used in the liquid, discharge, or suction line. A valve applied in the suction line may have a capacity of 0.52 tons, while the same valve used in the liquid line would have a capacity of 8 tons. Using an oversized valve may mean the valve won't close properly, not to mention that you probably paid for more valve than you needed.

QuickTips #10

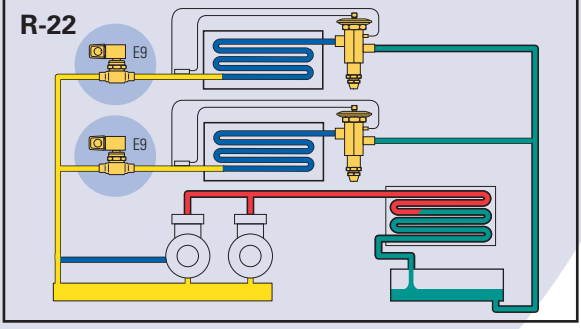
The valve capacity and application should always be the determining factors when selecting a solenoid valve. Use this five step process to help make the correct selection every time:

1. type of refrigerant in the system
2. application: discharge, liquid, or suction
3. flow capacity required
4. line size
5. electrical specifications

LIQUID LINE - E9 CAPACITY 8 TONS



SUCTION LINE - E9 CAPACITY .52 TONS



For additional information contact Sporlan or your Authorized Sporlan Wholesaler and request Bulletin 30-10.

A product selection program is available in CD-ROM format from Sporlan. See the Sporlan Field Sales Engineer in your area.

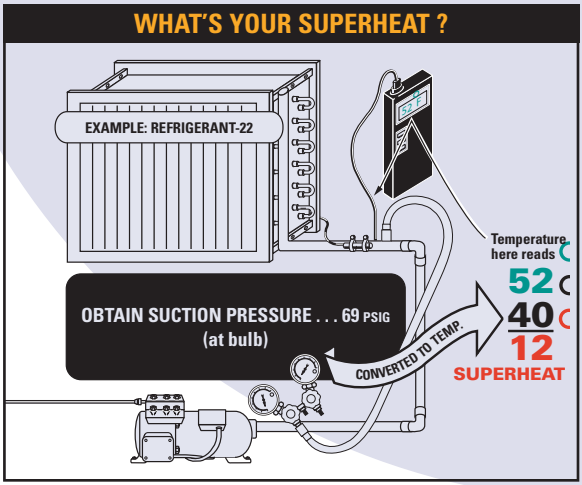
Q. Should a Sporlan thermostatic expansion valve (TEV) be adjusted after installation?

A.

Before leaving the factory, a specific superheat setting is made on each and every Sporlan TEV. A **standard** superheat setting has been established for every size and every thermostatic charge. This standard setting provides the proper superheat on the average system to which the particular TEV size and charge is likely to be applied.

Therefore, in most cases, a superheat adjustment on the job will not be necessary. Sporlan recommends a change in the superheat adjustment only after it has been determined that it is required. A careful measurement of the operating superheat, using the recommended procedure, will establish if a change would be beneficial.

To reduce the superheat, turn the adjusting stem COUNTER-CLOCKWISE. To increase the superheat, turn the adjusting stem

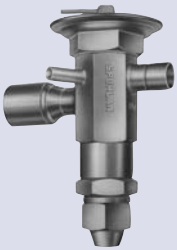


CLOCKWISE. When adjusting the valve, make no more than one turn of the stem at a time and observe the change in superheat closely to prevent over-shooting the desired setting. On adjustable TEVs, Sporlan attempts to position the adjusting stem at the half-way point when it is at the standard setting. This allows maximum adjustment in both directions.

Application	Air Conditioning & Heat Pump	Commercial Refrigeration	Low Temperature Refrigeration
Evap.Temp. °F	50° to 40°	40° to 0°	0° to -40°
Suggested Superheat Settings °F	8° to 12°	6° to 8°	4° to 6°

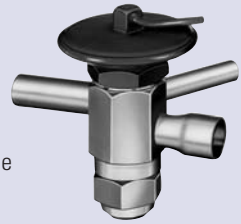
Sporlan supplies a number of OEMs with non-**adjustable** TEVs. The OEM determines the superheat setting through laboratory testing of the unit. Some of these valves can be converted in the field to adjustable models.

SPORLAN TYPE S



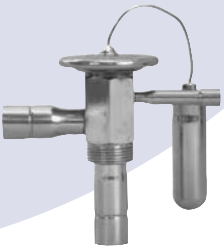
Adjustable Superheat

SPORLAN TYPE BBI



Non-adjustable Superheat

SPORLAN PLATFORM VALVE



Non-adjustable Superheat

After looking at your application tables for Catch-All Filter-Driers, I notice there is a dramatic difference in the recommendations for OEM compared to Field Replacement (See following page).

Why is there such a difference?

Generally speaking, when a manufacturer installs a Catch-All on a piece of epuipment, the engineers often (but not always) select the most economical product they feel will handle their application. Most manufacturers employ processes that minimize the amount of contaminants in the system. By analyzing their production methods, decisions are made based on filter drier capability, dimensions, and cost. Often these decisions result in the selection of a smaller sized filter drier, because they, are installed in a controlled environment.

When it becomes necessary to replace a filter-drier in the field, the likelihood of the presence of contaminants such as mositure, acid, sludge etc. is very real. The Catch-All application tables are designed to recommend a filter-drier size that is sufficient to handle these problems, and also minimize pressure drop across the drier.

Since it is wise to err on the side of caution, the technician replacing a drier or suction filter in the field is wise to consider the recommendations on the Catch-All package or bulletin 40-10 rather than going by what is on the system.

TYPE	SURFACE FILTERING AREA Sq. In.	RATINGS AT ARI STANDARD CONDITIONS			SELECTION RECOMMENDATIONS (Tons)		
		WATER CAPACITY DROPS AT 60 PPM		REFRIGERANT FLOW CAPACITY Tons at 1 psi ΔP	REFRIGERATION	AIR CONDITIONING	
		75°F	125°F		Commercial & Low Temperature Equipment	O.E.M. Self Contained	Field Replacement or Field Built-Up Systems
C-082	21	240	196	2.1	1/2 thru 1-1/2	1 thru 5	1 thru 2
C-082-S							
C-0825-S				3.7			
C-083				4.5			
C-083-S				5.2			
C-084				8.7			
C-084-S				9.6			
C-162	33	364	297	2.1	1-1/2 thru 3	2 thru 10	1-1/2 thru 5
C-162-S							
C-1625-S				3.7			
C-163				4.5			
C-163-S				5.2			
C-164				10.1			
C-164-S				11.0			
C-165				13.8			
C-165-S				15.9			

How can I tell if my TEV is adjustable?

Most of the TEVs listed in Sporlan Catalog 201 or Bulletin 10-10 will be adjustable unless there is an "N" stamped in the valve body as part of the nomenclature (i.e. NSVE-5). Many of the valves made specifically for OEM customers are non-adjustable. One way to tell if a valve is adjustable or non-adjustable is to look at the bottom cap.

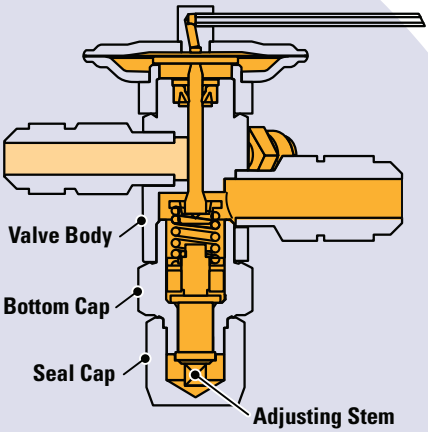
Adjustable expansion valves will have a threaded joint between the valve body and bottom cap as well as a threaded joint between the bottom cap and a hex seal cap that is removable to expose the adjusting stem. See photo of adjustable valve on following page.

Non-adjustable valves on the other hand will generally have only one threaded joint between the valve body and bottom cap. An exception to this rule is a factory adjustable valve with two threaded joints and a smooth, round non-removable seal cap. See photo of non-adjustable valve on following page.

Many non-adjustable valves can be converted to adjustable by changing the bottom cap assembly Contact Sporlan's Technical Support department for more information. They will need all the information you can get from the valve's markings to assist you.

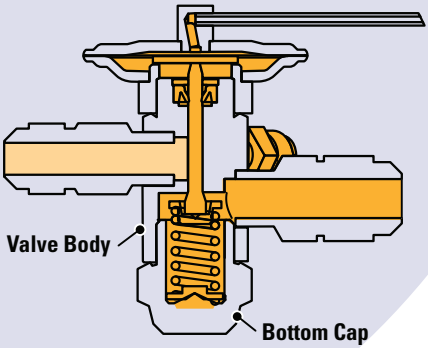
CAUTION: Never attempt to determine if a valve is adjustable by removing the bottom cap assembly unless the system has been pumped down, it could result in serious injury.

SPORLAN BBIE VALVE



Adjustable

SPORLAN BBIE VALVE



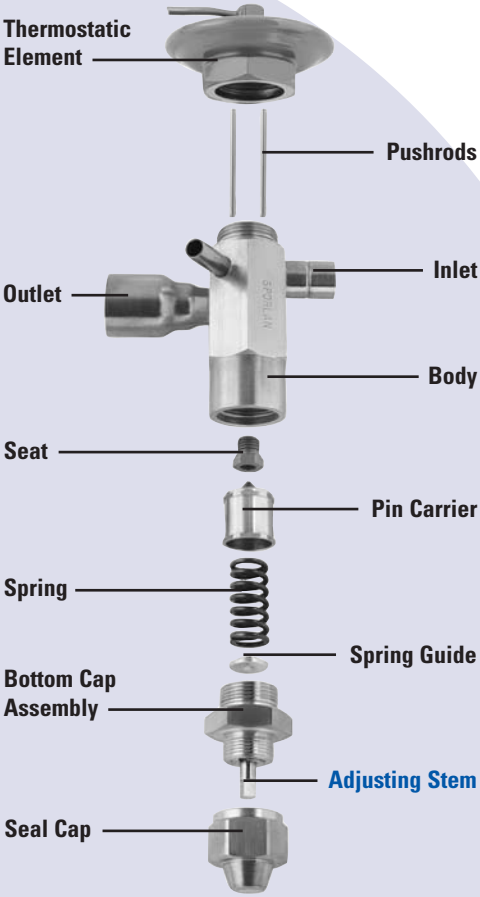
Non-Adjustable

I've turned the superheat adjusting stem on a Sporlan expansion valve both directions, how can I return the valve to its factory setting?

In most cases, the set point for the adjustable thermostatic expansion valves is midway in the range of the adjustment. The valve can be returned to midway in the adjustment range by simply turning the adjustment counter clockwise to the "fully open" adjustment stop, and then turning the adjustment clockwise half of the number of complete turns available in the adjustment. The total number of turns from fully open to fully closed varies according to valve model, and are listed in the table below.

Caution: Never force the adjustment stem in either direction. Excerting too much force at the adjustment stops on either end can result in damage to adjustment mechanism.

Please contact Sporlan's Technical Support department for help with your specific valve. They will require all of the information you can get from the markings on the valve.



Adjustment Assembly	Used with Following Valve Types	Approximate Number of Turns
KA-I/BI	I, BI	6
KA-Y1132	CBI, CBBI	8
KA-1	A	20
KA-2	D	14
KA-3	P, H	12
KA-4	F, (E)BF, SBF, BBI, Q, FB	8
KA-5X	X	9
KA-6	M, V, K	20
KA-7	W	20
KA-8	G, C, S, EBS	9
Small O		9
Large O		15

Can I replace the power head on my Sporlan TEV and how do I know what to get?

With a few exceptions, most Sporlan thermostatic expansion valves manufactured after 1993 have replaceable thermostatic elements. The exceptions are valves with a "H" before the valve nomenclature (i.e. HSVE-10), and the relatively new Platform valves. The Platform valves can be identified by a stainless steel element. The valves with the "H" in the nomenclature have had the elements soldered to the valve body at the customer's request.

Sporlan makes replacement element kits that are available through Authorized Sporlan Wholesalers.

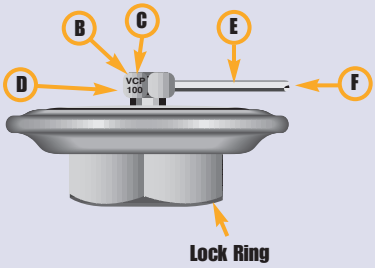
The thermostatic elements on Sporlan expansion valves are identified by a series of numbers and letters. The number (i.e. 33, 43, 83, etc.) identifies the element size, while the letters (i.e. VGA, RC, JCP, etc.) identify the regfrigerant and thermostatic charge. A replacement element kit can be obtained based on that information. For example, a valve with markings on the element of 83 and VCP100 will require a KT-83-VCP100 element kit. (For more imformation on element identification, consult Bulletin 210-60.)

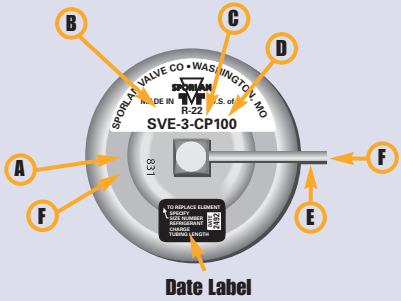
If markings on the element are no longer legible, contact Sporlan's Technical Support department for help in selecting a replacement element. They will need all information available from the valve body, and a description of the application.

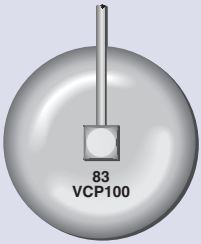
QuickTips #15

To completely identify a SPORLAN thermostatic element the following information is required:

A. Element size number
B. Refrigerant
C. Thermostatic charge
D. MOP (Maximum Operating Pressure) if other than standard
E. Capillary tubing length
F. Bulb size if other than standard







Replaceable Thermostatic Elements manufactured after 1991 had the element number and thermostatic charge marked on top of the element.

Refrigerant Designation, Letter and Color Code Used on Decals.					
H	R-11	Blue	**J**	R-134a	Blue
F	R-12	Yellow	**L**	R-402A	Sand
E	R-13	Blue	**S**	R-404A	Orange
T	R-13B1	Blue	**D**	R-500	Orange
V	R-22	Green	**R**	R-502	Purple
G	R-23	Blue	**W**	R-503	Blue
B	R-114	Blue	**P**	R-507	Teal
Q	R-124	Green	**A**	R-717	White

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