

INSTALLATION

For peak performance, it is important to select a Sporlan Thermostatic Expansion Valve (TEV) with correct capacity, selective charge, external or internal equalizer, etc. See Bulletins 10-9 and 10-10 Parker Sporlan Refrigeration & Air Conditioning Catalogue for complete application information. Equally important is the proper installation, which can determine the success or failure of the entire system.

VALVE LOCATION

TEVs may be mounted in any position, but they should be installed as close to the evaporator as possible. If a refrigerant distributor is used with the expansion valve, best performance is obtained if the distributor is mounted directly to the valve outlet. If the distributor cannot be mounted directly to the valve outlet, the distance between the valve outlet and distributor should not exceed 610 mm and be straight or refrigerant distribution problems may occur. Also, the tube connecting the valve outlet and distributor can be sized smaller to maintain refrigerant velocity and better distribution. Elbows located between the expansion valve and distributor or one expansion valve installed for multiple distributors will hinder proper distribution and are not recommended.

Best distribution is usually obtained if the expansion valve feeds vertically up or down into the distributor. System manufacturers, however, have successfully applied distributors in other orientations. See Bulletin 20-10 for application and selection information on refrigerant distributors.

While not always convenient or possible, thermostatic expansion valve are easier to service if mounted in a vertical and upright position. If mounted in a horizontal position, the internal parts must be carefully reassembled to prevent damage to them. Also, some consideration should be taken in mounting larger sized expansion valves. They must be adequately supported since system vibration and the weight of the valve may cause valve connections to fracture.

If a hand valve is located on the outlet side of the TEV it should have a full sized port. No restrictions should appear between the TEV and the evaporator, except a refrigerant distributor if one is used.

Sporlan TEVs having Selective Charges C, Z, W, or X may be installed and operated in most locations. The

amount of thermostatic charge and the bulb size are such that the bulb retains control despite a colder valve body or diaphragm case. The exception is when the element is subjected to sub-zero temperatures for extended periods of time during an off-cycle. In this case, start-up may be prolonged until the bulb and element are warmed sufficiently to open the valve.

To minimize the possibility of charge migration, the Sporlan MOP type charges (CP series and ZP series) and GA series should be installed so the diaphragm case is warmer than the bulb. Special non-condensable charges without MOP and double diaphragm hydraulic elements with MOP are available for system manufacturers to overcome this potential problem.

Occasionally, TEVs are located in corrosive atmospheric conditions that can damage the valve and/or the element assembly. Due to this possibility, the valve must be protected with appropriate materials to prevent premature failure. Consult specialists in protective coatings.

Precautions:

When the evaporator and TEV are located above the receiver, there is a static pressure loss in the liquid line. This is due to the weight of the column of liquid refrigerant, and this weight may be interpreted in terms of pressure loss in bar. If the vertical lift is great enough, vapor or **flash gas** will form in the liquid line causing a serious reduction in the capacity of the TEV.

When an appreciable vertical lift is unavoidable, precautions should be taken to prevent the accompanying pressure loss from producing liquid line vapor. This can be accomplished by providing enough subcooling to the liquid refrigerant, either in the condenser or after the liquid leaves the receiver. Subcooling is determined by subtracting the actual liquid temperature from the condensing temperature (corresponding to the condensing pressure). A subcooling calculation example is provided in the "subcooling" section of Bulletin 10-9.

Liquid subcooling is provided by the following methods:

1. In the condenser
2. Suction - liquid heat exchanger
3. Special devices

Method 1 - will provide sufficient subcooling for the simple short-coupled system that has only moderate liquid line pressure drop.

Method 2 - will usually not provide more than 18 Kelvin subcooling on air conditioning systems operating at normal head pressures. The amount of subcooling will depend on the design and size of the heat exchanger and on the operating suction and discharge pressures.

Method 3 - may be used to provide considerable subcooling required for systems with excessive vertical lift. The following special devices are the most commonly used methods:

- Water coils in heat exchange relationship with the liquid line.
- Separate refrigeration system.
- Special heat exchanger which uses a portion of the refrigerant to cool the main body of liquid. See Figure 1.

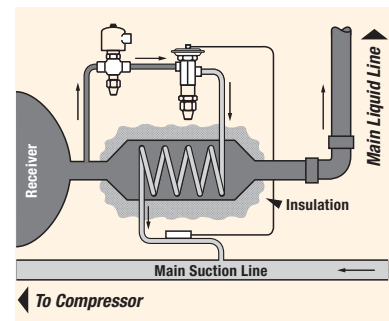


Figure 1

Ordinarily the conventional suction-liquid heat exchanger is installed near the evaporator, where the suction vapor is the coldest, to re-condense any vapor in the liquid line. When the primary purpose of the heat exchanger is to prevent the formation of flash gas - particularly on systems that have a long liquid line or excessive vertical lift - install the heat exchanger near the receiver **before the vertical lift occurs**. (This also applies to the special devices described in Method 3). Because vapor in the liquid line considerably increases friction losses, the total pressure drop available across the expansion device on these types of systems is reduced. Also, the suction line and liquid line should be carefully insulated to minimize heat gain if subcooled below ambient temperature.

Important

Preventing the formation of vapor in liquid lines having high pressure losses does not eliminate the requirement that an adequate pressure drop must be available across the TEV. The capacity tables show valve capacities at pressure drops lower than normal. For TEV application data and capacities at pressure drops below those listed, **consult Parker Sporlan or Parker RACE Division.**