

Thermostatic Expansion Valves (TXVs) regulate the flow of refrigerant into the evaporator. Relative to pistons and other fixed orifice metering devices, they improve system efficiency and performance. Due to this, manufacturers have shifted to using TXVs and most traditional residential AC and heat pump split systems in the US utilize them today.

Working Principle of TXVs

At its most basic, a refrigeration system has four components – a compressor, a metering device, and two coils, one for the evaporator and one for the condenser. The compressor serves as a pump and does the work of compressing refrigerant after it leaves the evaporator where it absorbs heat from the space being cooled. The metering device manages the flow of liquid refrigerant into the evaporator after heat is rejected as it passes through the condenser coil.

TXVs differ from more basic fixed orifice metering devices (like pistons and capillary tubes) because they modulate the flow of refrigerant based on a superheat setting. They do this by sensing the pressure at the outlet of the evaporator using a sensing bulb. As the pressure in the evaporator increases and decreases, the temperature of the evaporator outlet changes, resulting in an increase or decrease in the pressure in the sensing bulb. That increase or decrease in pressure is transmitted via capillary tube to the power element, where it applies (or reduces) pressure on a diaphragm. This drives a pushpin up or down, opening and closing the valve orifice. As the orifice is opened and closed, the flow of refrigerant from the liquid line into the evaporator is increased or reduced. By basing the flow of refrigerant on the superheat setting, the valve ensures that the system is operating at peak performance and efficiency.

MARS Universal AC/HP TXV Kit

MARS offers seven valve kits – three for R-410A and four for R-22 for capacities ranging from 1.5 to 5 tons. To select the right valve, the technician just needs to know the refrigerant and system capacity.

Each kit includes three evaporator connections – Aeroquip, Chatleff, and 3/8" flare. The valve has a 3/8" connection, so it can be brazed directly into some systems, but typically the correct fitting must be brazed onto the valve prior to installing it into the system. MARS

also includes 3/4" and 7/8" evaporator tees in case the valve is being installed into a system with no existing external equalization connection.

Refrigerant	System Capacity (Tons)	Part No.
R410A	1-1/2 – 3	72001
	3-1/2 – 4	72002
	4-1/2 – 5	72003
R22/R407C	1-1/2 – 2	72004
	2-1/2 – 3	72005
	3-1/2 – 4	72006
	5 – 6	72007

Common Challenges and Solutions

Some technicians have found TXVs troubling to use in the field. The truth of the matter is that TXVs rarely fail. Analysis of valves returned from field installation typically show that they operate correctly. When they do fail, the most common causes are failed power elements, overheated valves, or clogged orifices/screens.

- Valve overheating can be prevented by using a wet rag or thermal paste when brazing the valve.
- Clogged orifices can be prevented by using industry best practices such as replacing the filter drier and removing any moisture (as well as preventing its access) whenever the system is opened, and the use of a nitrogen purge while brazing.
- Power element failure can be prevented by minimizing rubbing of the capillary tube with valves using a copper capillary tube or through the use of a stainless steel power element assembly, as you will find on a MARS Universal AC/HP TXV.

Lastly, care should also be taken to install a TXV correctly. The sensing bulb must be securely fastened and placed so that it is sensing evaporated refrigerant temperature, not liquid refrigerant or oil. When the equalization line is installed, care should be taken to remove any Schrader core if the valve doesn't include a Schrader depressor. If proper care is used when installing or servicing a system equipped with a TXV, it will help maximize system performance and efficiency.

Name _____ Company _____

Address _____

MARS Sales Rep _____

When completed, please fax to: 631-348-7160

Choose the best answer.

1. TXVs are an example of what type of device?

- a. Compressor
- b. Condenser Coil
- c. Evaporator Coil
- d. Metering Device

2. TXVs regulate the flow of refrigerant into which component?

- a. Compressor
- b. Evaporator Coil
- c. Condenser Coil
- d. Filter Drier

3. To reduce the likelihood of getting an obstruction of the TXV orifice, technicians should do which of the following?

- a. Not use a wet rag when brazing in a TXV
- b. Not use a filter drier
- c. Purge with nitrogen while brazing

4. Select the two fixed orifice metering devices.

- a. TXV
- b. Electric Expansion Valve
- c. Piston
- d. Capillary Tube

5. To select a MARS Universal AC/HP TXV Kit, a technician needs to know the system refrigerant as well as what?

- a. Compressor type
- b. Capacity
- c. Color
- d. Height

6. Valve overheating can be prevented by doing which of the following?

- a. Using a thermal overload in the compressor
- b. Blowing on the valve during brazing
- c. Using a wet rag when brazing in a valve
- d. Aggressively hoping that the valve doesn't overheat while installing

7. What component does a TXV use to sense pressure at the outlet of the evaporator?

- a. Diaphragm
- b. Sensing bulb
- c. Capillary tube
- d. Spring

8. Which evaporator connection fittings are included in each MARS kit to accommodate different system configurations?

- a. Aeroquip and Chatleff connections only
- b. 3/8" flare connection only
- c. 3/4" and 7/8" evaporator tees
- d. Aeroquip, Chatleff, and 3/8" flare connections

9. How does a TXV ensure peak system performance and efficiency?

- a. By modulating refrigerant flow based on superheat setting
- b. By regulating condenser coil temperature
- c. By increasing evaporator coil size

10. What does the MARS Universal AC/HP TXV Kit portfolio consist of?

- a. Seven valve kits for various capacities and refrigerants
- b. Four valve kits for R-410A only
- c. Three valve kits for R-22 only