Refrigeration Valves & Controls

J106A T4 - Refrigeration Liquid Flow Controls

Valve Type	Purpose	Fitted in system	Notes
AXV (Automatic expansion valve).	Refrigerant Metering device. Maintains constant evaporator pressure. P1 = spring, P2 = Evap.		Poor efficiency - Best used for constant loads.
TX (Thermal Expansion Valve) Internally Equalized	Refrigerant Metering Device. Set superheat with adjustment screw.	Before evaporator – ensure bulb makes contact with suction line	Pbulb=Pspring + Pevap, select orifice & refrigerant type to suit
TX (Thermal Expansion Valve) Externally Equalized	Refrigerant Metering Device, used on large coils with pressure drop. Set superheat with adjustment screw.	Before distributor - ensure bulb makes contact with suction line	Pbulb=Pspring + Pevap, select orifice & refrigerant type to suit
Thermo-Electric Valve.	Refrigerant Metering Device, Uses thermistors to control operation.	Before evaporator.	Thermistors replace the refrigerant bulb.
Electronic Expansion Valve	Refrigerant Metering Device, Uses thermistors and Controller to control operation	Before evaporator.	Expensive but very efficient. Superheats as low as zero K
Capillary Tube	Refrigerant Metering Device – simple and cheap with no moving parts.	Before evaporator. Needs 1m contact with suction line.	Sized to match pumping capacity of compressor.
Accurator	Refrigerant metering device for reverse cycle heat pumps	Usually in the outdoor unit	
Low side float	Flooded evaporator system to chill fluids	Ball float operates a needle valve to maintain pressure level	Temprites and water/fluid coolers
High Side Float	Feed liquid to match evaporator load	At outlet of condenser Used in large Air Conditioning systems and ammonia systems.	Critical charge.
Hand Valve	Simplest liquid feed device	Large industrial liquid recirculation systems	Requires an operator.
Distributors: Weir, centrifugal, pressure drop and venturi.	Used to distribute refrigerant to parallel passes in evaporators.	After metering device before evaporator.	May contain orifice. Line lengths must be equal.

J106A T5 - Refrigeration Vapour Flow Controls

Device	Purpose	Fitted in system	Notes
Crankcase pressure regulator or CPR or compressor overload valve	Limits back pressure to compressor after a defrost in a low temp application and prevents compressor overload.	Installed in the refrigeration system suction line immediately before the compressor.	Pressure to set 90% of FLA of compressor.
Condensing pressure regulator (CPR)	Maintains constant pressure in air-cooled condensers. Can be used instead of fan control.	Installed between the air-cooled condenser and the receiver.	It opens on rising inlet pressure (condensing press).
Receiver pressure regulator	Maintain sufficiently high receiver pressure in refrigeration systems. Used with a condensing pressure regulator for low ambient conditions.	Fitted between discharge line and liquid receiver. Feeds discharge gas into receiver to ensure high side pressure.	Used with condenser pressure regulator where there are low ambient conditions.
Capacity regulator	Used in low-load situations where it is necessary to avoid low suction pressure and “compressor cycling”.	Installed in a bypass line between compressor discharge tube and suction tube. Opens on falling suction pressure.	Feeds discharge directly into suction to increase compressor load.
Differential pressure regulator	Can also be a receiver pressure regulator.	Installed in a line from the discharge to the receiver. Non return type valve.	Used with condenser Press Reg where there are low ambient conditions.
Capacity regulator CPCE	CPCE capacity regulator can be used for greater accuracy in the regulation.	Installed in a bypass line between compressor discharge tube and evaporator to create a ‘dummy’ heat load.	Feeds discharge directly into evaporator after the metering device.
Evaporating pressure regulator	Maintains a pre-set minimum evaporating pressure. Regulates the temperature in multi temp cabinets using one compressor.	In the suction line after the evaporator.	Put gauges on access valve to set pressure. Need PT chart.

J106A T3 - Refrigeration Pipework Accessories

Reversing Valve: pilot operated.	Change direction of refrigerant flow and swap outdoor and indoor coil.	In discharge line. Found in air conditioning (heat pump) systems.	Keep cool when brazing.
Suction line accumulator	Prevent liquid entering the compressor.	In suction line before the compressor.	Also returns any oil in the bottom through an orifice.
Oil Separator	Removes oil from the discharge vapour and returns it to the sump of the compressor.	Immediately after the compressor in the discharge line.	Add oil to a new unit: refer to manufacturers instructions.
Liquid Receiver; Horizontal or vertical.	Hold refrigerant charge during pump down, and supply full head of liquid to the metering device.	After the condenser before the metering device.	Supply taken from the bottom.
Line drier: Bi-flow or single direction. Replaceable cartridge.	Remove moisture and debris from system.	In liquid line after the receiver or suction line before the compressor.	Keep cool when brazing.
Oil trap	Traps oil in long vertical vapour risers and returns the oil to the compressor.	After the evaporator or compressor in vertical risers.	Made with elbows or ‘u’ shaped copper tube.
Heat exchanger – plate, tube in tube, tube in shell.	Exchange heat from one medium to another. Water to refrigerant, liquid to suction etc.	Where required to transfer heat.	Use contra flow for all types.
Service Valves: Schraeder and service valves	To facilitate fitting of gauges and access to the system.	Various depending on system type.	Do not over tighten glands and spindles.
Sight Glass	Allows visual access to the inside of liquid line. Indicates refrigerant flow, short of gas and presence of moisture.	Liquid line after drier.	Moisture indicator green/yellow. Keep cool when brazing.
Vibration eliminator	Reduce vibration and cracks and leaks in pipework either side of the compressor.	Immediately before and after the compressor.	Keep cool during brazing. Parallel to crankshaft
Sump Heater	Keep compressor oil warm, prevent refrigerant condensing in the oil and increase viscosity	Electric heater In compressor sump.	Wired to operate on the ‘off’ cycle.
Discharge Muffler	Mufflers contain baffles which break up the pulsations and reduce the noise output.	Placed in the discharge line, especially in air conditioning systems.	Keep cool when brazing.
Solenoid Valves – direct and pilot (servo)	Opens or closes a line 100%. Electrically operated.	Depends on purpose.	Keep cool when brazing, ensure correct direction of flow.

Vapour compression systems

Condenser: Air, water cooled or evaporative cooled.	Rejects the heat of compression and system, condenses the refrigerant to liquid.	After the compressor.	Keep it clean to ensure good heat transfer.
Evaporator: DX, secondary or flooded.	Absorbs (removes) heat from the conditioned pace, converts 100% liquid to superheated vapour.	In the space to be conditioned, after metering device before compressor.	Many different types.
Compressor: Recip, centrif, screw, rotary, scroll.	Circulates refrigerant, and takes low pressure vapour and converts to high temp high pressure vapour.	Between evaporator and condenser.	Capacity must match system design and refrigerant type.