LIQUID INJECTION VALVE (TECHNICAL RESPONSE EXPANSION VALVE)

1. OPERATION

The liquid injection valve is mainly used in the low temperature system, assembled on the compressor. When the compressor discharge temperature is higher than the valve setting temperature, the sensor tube will push the valve opening. The cooling principle is that after condensing liquid refrigerant throttled by the liquid injection valve, medium pressure and low temperature refrigerant is injected into the compressor cavity to reduce the discharge temperature.

2. TECHNICAL PARAMETERS

2.1 Condition

- Refrigerant:R22, R404A etc.
- Oil: Mineral(3GS), POE etc
- Operating environment-40°C~60°C
- MOP: 4.2Mpa
- Medium temperature:-40~70°C
- Opening temperature: 90°C

2.1 Capacity Table

Capacity Table						
Pressure Drop at Valve Inlet and Outlet		1.46	1.63	1.76	1.85	1.93
Saturated Temperature Valve Outlet C		0	-10	-20	-30	-40
Nominal Capacity (RT)	1	1.10	1.05	0.94	0.84	0.74

*Basic conditions: R404A, C.T. 45°C, Liquid Temperature 40°C

Liquid Temperature Correction Factor						
Liquid Temperature (°C)	0	10	20	30	40	50
Factor	1.41	1.31	1.21	1.10	1.00	0.89

*Basic conditions: R404A, C.T. 45 °C, E.T. -30°C

3. VALVE SELECTION

Estimation coefficient of required compressor capacity.

E.T. (°C)	Suction Temperature (°C)				
	-20	-10	0	10	20
-20	0%	0%	0%	3%	7%
-40	8%	9%	11%	12%	13%

*Basic Conditions：R404A C.T. 45 C, Compressor Injection Capacity Count

Example:

Refrigerant: R404A Compressor capacity: 5RT

Condition: E.T. -30°C, C.T. 40°C, Subcooling 5°C, Suction 20°C

→ Selection of the estimating coefficient: 10%

→ Required capacity: 10%*5RT=0.5RT

→ Liquid temperature correction: 0.5RT/1.05=0.476RT

→ Capacity table Qtab=0.84RT, Q/Qtab=56.7%.

(note: here the valve output pressure is set as evaporating pressure, if it is adjusted as injection pressure it will be more accurate)

→ The temperature of the sensing tube is estimated as: 6°C*56.7%=3.4°C Therefore, for 90°C valve opening, the discharge temperature is 90°C+ 3.4°C=93.4°C. Accounting for the influence of the environment and the sensing error, the actual control temperature may be slightly high.

Quick selection: according to many tests and usage with compressor, 1RT liquid is suitable for:

Compressor of 2-12HP R404A

Compressor 2-7HP R22

SANHUA

4. INSTALLATION AND USE

When the connection between the valve and the pipeline requires welding, the flame temperature should be controlled below 700 °C. The valve casing should be cooled by wet cloth wrapping.

Prevent the valve casing from overheating. The valve casing must be maintained below 100 °C, while the temperature sensing tube (which is filled with expandable substances) must not be heated to a high temperature. Control the casing temperature below the opening temperature point.

Avoid bending the same part of the capillary at a great angle repeatedly, but also avoid exerting too much impact or load on the valve, especially the temperature sensing tube. The phenomenon of hitting and crushing on the package will affect the temperature characteristics of the product.

During operation, the compressor discharge temperature in normal startup is higher (4-5) °C than in stable operation. In extreme operating conditions (high pressure ratio), when the compressor stops for a short time and restarts, the peak discharge temperature will be significantly high.

At this time, the maximum discharge temperature of the compressor should not exceed 30°C above the opening point. Otherwise, the lifespan of the valve will be considerably shortened. Because there are many variables that affect valve control, actual installation testing should be performed to confirm the extent of temperature control requirements.