

# EXPANSION VALVES

## GENERAL INFORMATION

SAGInoMIYA

### VALVE SELECTION

In order to properly select Expansion Valves, the following items should be considered.

- 1) Required valve capacity should be based on the actual system operating conditions rather than the normal valve capacity rating.
- 2) When there exists an appreciable pressure drop between the valve outlet and the evaporator outlet, i.e., above 0.02 MPa {0.2 kgf/cm<sup>2</sup>}, or when a pressure drop type of refrigerant distributor is used at the evaporator inlet, the valve should have the external equalizer feature for best performance. Otherwise, it will increase a static superheat (valve opening temp.), restricting the refrigerant flow and causing the reduction of system capacity. As for R134a, 0.01 MPa {0.1kgf/cm<sup>2</sup>} pressure drop will increase the static superheat approximately 1°C.
- 3) Internally equalized valve may be used with the evaporator which has a negligible pressure drop, i.e., below 0.02 MPa {0.2 kgf/cm<sup>2</sup>}

### GUIDE FOR EQUALIZER (Internal or External)

An internal or external equalizer should be selected depending on pressure drop between valve outlet and evaporator outlet. Internal equalizer increases superheat in the refrigeration system of which evaporator has some pressure drop, and the increase of superheat decreases the effective area of evaporator.

Select internal or external equalizer depending on refrigerant, pressure drop and evaporating temperature. The Guide Table for Equalizer indicates the pressure difference of refrigerant corresponding to 1°C temperature. The external equalizer valves should be used when the pressure drop exceeds the value of pressure difference indicated in the Table.

### GUIDE TABLE FOR EQUALIZER

Unit: MPa {kgf/cm<sup>2</sup>}

Refrigerant	Evaporating Temperature (°C)									
	10	5	0	-5	-10	-20	-30	-40	-50	-60
R134a	0.014 {0.14}	0.012 {0.12}	0.011 {0.11}	0.009 {0.09}	0.008 {0.08}	0.006 {0.06}	0.004 {0.04}	0.003 {0.03}	—	—
R22	0.024 {0.24}	0.02 {0.20}	0.018 {0.18}	0.016 {0.16}	0.014 {0.14}	0.011 {0.11}	0.008 {0.08}	0.006 {0.06}	0.004 {0.04}	0.003 {0.03}
R404A	0.025 {0.25}	0.022 {0.22}	0.019 {0.19}	0.017 {0.17}	0.015 {0.15}	0.012 {0.12}	0.008 {0.08}	0.006 {0.06}	0.004 {0.04}	0.003 {0.03}
R407C	0.021 {0.21}	0.018 {0.18}	0.016 {0.16}	0.014 {0.14}	0.012 {0.12}	0.009 {0.09}	0.006 {0.06}	0.004 {0.04}	0.003 {0.03}	0.002 {0.02}
R410A	0.033 {0.33}	0.029 {0.29}	0.026 {0.26}	0.023 {0.23}	0.020 {0.20}	0.015 {0.15}	0.011 {0.11}	0.008 {0.08}	0.006 {0.06}	0.004 {0.04}

Pressure Diff. corresponding to 1°C temperature.

## GUIDE FOR SETTING OF SUPERHEAT

Superheat Adjuster of Expansion Valve adjusts the superheat by which the valve begins to open from the fully closed condition, and this superheat is called Static Superheat.

S.S.H.: Static Superheat

O.S.H.: Operating Superheat (Superheat necessary for valve and refrigeration system operation)

S.H.C.: Superheat Change (Superheat which keeps the valve opening at the optimum balance point for refrigeration systems)

$S.S.H. = O.S.H. - S.H.C.$

To change the adjustment, remove the seal cap and turn the adjusting spindle. Turning the spindle clockwise to compress the spring decreases flow and raises superheat and turning the spindle counter clockwise to loosen the spring increases flow and lowers superheat.

## CHARGE & MOP (MAXIMUM OPERATING PRESSURE)

G-Charge: Gas charge used generally on air conditioning gives pressure limiting, but loses control if valve body becomes colder than sensing bulb. A gas charged valve should be installed in a location where the valve body can be warmer than the bulb to prevent condensation of the charge in the powerhead.

L-Charge: Liquid charge provides accurate control when valve body becomes colder than sensing bulb; hence a liquid charged valve may be installed in any location regardless of temperature. The charge, however, does not provide maximum operating pressure (pressure limiting) for motor overload protection.

C-Charge: Cross charge and Cross Low Temp. charge used generally on low temperature range application will not lose control even if valve body becomes colder than sensing bulb. A cross charged valve may be installed in any location regardless of temperature. Cross charge (C) for normal refrigeration (higher than  $-40^{\circ}\text{C}$  temp. range) and Cross Low Temp. charge (CL and CY) for low temp. refrigeration (CY...  $-70$  to  $-40^{\circ}\text{C}$  with R22 for Type ATX valves).

S-Charge: Saginomiya's all purpose special charge combines the best properties of gas and liquid charges. The charge provides accurate control even if valve body becomes colder than sensing bulb and further it provides MOP (pressure limiting) for motor overload protection. S-charged valve may be installed in any location regardless of temperature.

## ORDERING INFORMATION

1) Catalog Number ... On standard products, specify the Catalog No. only.

2) Special Specifications ... On special applications, specify the followings:

- |  |                                       |
|--|---------------------------------------|
| a) Normal Pressure and Maximum Pressure            | g) Length of Capillary Tube           |
| b) Normal Temperature and Minimum Temperature      | h) External or Internal Evaporator    |
| c) Detailed Application                            | i) Pressure Drop at Evaporator        |
| d) Refrigerant                                     | j) MOP (Maximum Operating Pressure)   |
| e) Valve Location                                  | k) Two Stage Compressor System or not |
| f) Capacity (Condensing & Evaporating Temperature) |                                       |