Bulletin 10-10-4
January 2006

# TYPE EMC & Y1155
## Thermostatic Expansion Valves

# TYPE EMC

**with ODF Solder or SAE Flare Connections for Refrigerants 22, 134a, 404A & 507**

U.S. Patent Numbers
5,277,364 and 5,232,015

The Sporlan Type EMC thermostatic expansion valve (TEV) is a patented two port valve designed to perform effectively over the range of load conditions inherent with most refrigeration systems.

On any refrigerated fixture, e.g., display case, freezer, walk-in cooler, the load on the evaporator will be greatest during a startup, following a defrost, or when warm product is being added to the fixture. The refrigeration system must then operate in a 'pulldown' mode until the fixture reaches its design temperature. Once design temperature has been reached, the evaporator will be at its minimum load condition, i.e., its 'holding' load. A typical load profile for a refrigerated fixture is shown in Figure 1 below.

Maximum pulldown load can be as high as 2 to 3 times greater than the holding load. As a result, consideration must be given to the pulldown load when sizing a TEV. For many refrigerated fixtures, the desired pulldown time is typically less than one hour. To minimize this time, the TEV must be oversized somewhat with respect to the holding load, or the valve will starve the coil during pulldown. But the more oversized the valve, the less capable it is in maintaining stable superheat at low load conditions, particularly when variations in condensing pressure from summertime to wintertime operation are considered.

*Figure 1*

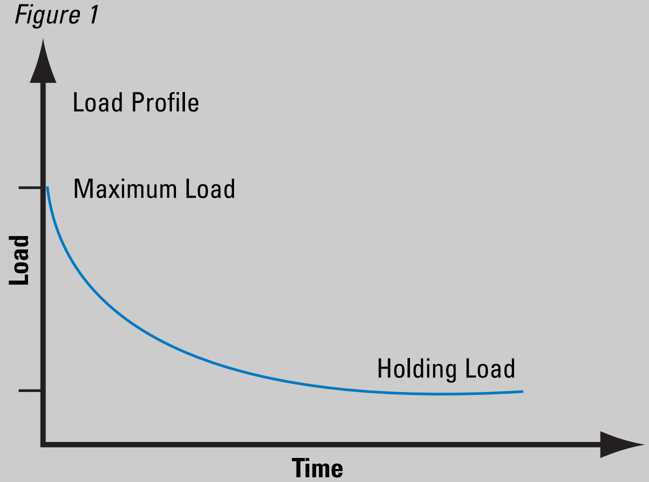
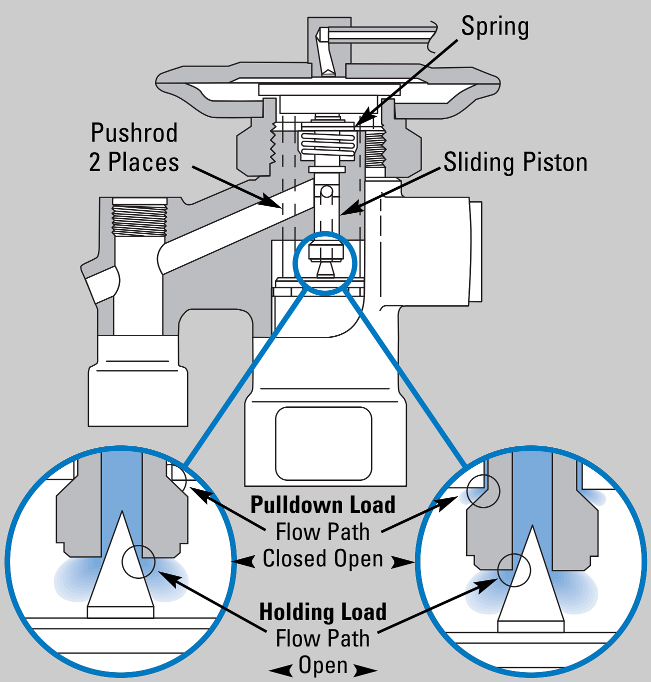
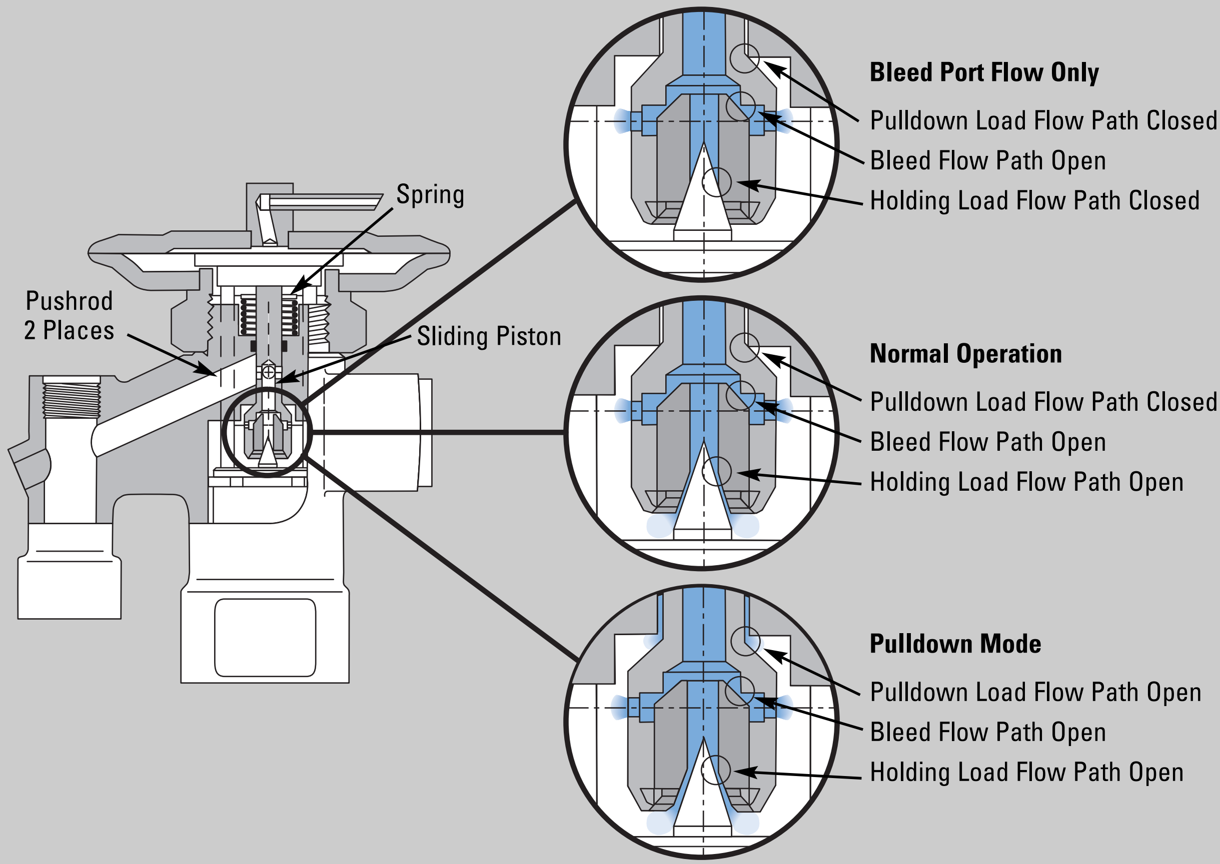



*Figure 2*




The Type EMC valve solves this problem by providing two independent capacities: a large port for pulldown loads and a smaller port to control holding loads (Figure 2). During holding load operation, the large capacity port remains closed and the valve regulates with the small capacity port in the same manner as a conventional TEV. During pulldown, the valve diaphragm moves far enough in the opening direction to contact the top of the sliding piston, opening the large capacity port. With the large capacity port opened, valve capacity is effectively doubled. This design allows the Type EMC valve to be sized based on the ***holding load*** without concern for the pulldown load.

*Figure 3*




The addition of a resealable bleed port allows for more stable superheat control with medium temperature applications. Figure 3 shows the bleed port which opens as the valve begins to operate. As the stroke of the bleed port is reached, the small capacity port begins to open. At this point, the valve regulates in the same manner as a conventional TEV. During pulldown, all three ports will be open.

The resealable bleed is suggested for all medium temperature (above 0°F evaporator) applications, provided the flow through the bleed does not represent more than approximately 70 percent of the holding load requirements. See valve selection examples.

On low temperature (below 0°F evaporator) applications, the resealable bleed does not have as significant an influence on valve performance. As a result, the non-bleed style valve is recommended.

## Selection examples:

### Example 1

**R-22**

Evaporator temperature . . . . . . . . . . . . . . . . . . . . . . . -20°F
Condenser temperature . . . . . . . . . (maximum) . . 110°F
. . . . . . . . . . . . . . . . . . . . . . . . . . . (minimum) . . . 70°F
Liquid temperature (entering TEV) . . . . . . . . . . . . . 60°F
Evap. coil rating or holding load. . .3000 Btu/hr (0.25 ton)

| Available pressure drop across TEV: | max | min |
|---|---|---|
| Condensing pressure (psig) | 226 | 122 |
| Evaporator pressure (psig) | -10 | -10 |
| | 216 | 112 |
| High side pressure loss (psi) | -7 | -7 |
| Distributor and tubes loss (psi) | -35 | -35 |
| | 174 | 70 |

**Refrigerant liquid correction factor: 1.23**
**Pressure drop correction factor: 1.08 0.68**

The EMCE-10-VZ valve has the following ratings and percentage loadings at minimum and maximum condensing pressures:

| PRESSURE DROP psi | RATING tons .683 | PERCENTAGE LOADING |
|---|---|---|
| 70* | 0.36 x .68 x 1.23 = 0.30 | 0.25 / 0.30 = 0.83 or 83% |
| 174 | 0.36 x 1.08 x 1.23 = 0.48 | 0.25 / 0.48 = 0.52 or 52% |

**Example 2**

**R-404A**

Evaporator temperature . . . . . . . . . . . . . . . . . . . . . . . 20°F
Condenser temperature . . . . . . . . . (maximum) . . 110°F
. . . . . . . . . . . . . . . . . . . . . . . . . . (minimum) . . . 70°F
Liquid temperature (entering TEV) . . . . . . . . . . . . . 60°F
Evap. coil rating or holding load 12,000 Btu/hr (1.00 ton)

| Available pressure drop across TEV: | max | min |
|---|---|---|
| Condensing pressure (psig) | 273 | 150 |
| Evaporator pressure (psig) | -56 | -56 |
| | 217 | 94 |
| High side pressure loss (psi) | -7 | -7 |
| Distributor and tubes loss (psi) | -35 | -35 |
| | 175 | 52 |

**Refrigerant liquid correction factor: 1.40**
**Pressure drop correction factor: 1.18 .64**

The EMCE-22-SC valve has the following ratings and percentage loadings at minimum and maximum condensing pressures:

| PRESSURE DROP psi | RATING tons | PERCENTAGE LOADING |
|---|---|---|
| 52* | 1.17 x 0.64 x 1.40 = 1.05 | 1.00 / 1.05 = 0.95 or 95% |
| 175 | 1.17 x 0.64 x 1.40 = 1.05 | 1.00 / 1.05 = 0.52 or 52% |

| PRESSURE DROP psi | BLEED tons | % LOAD HANDLED BY BLEED |
|---|---|---|
| 52* | (1.17 – 0.86) x 0.64 x 1.40 = 0.28 | 0.28 / 1.00 = 0.28 or 28% |
| 175 | (1.17 – 0.86) x 1.18 x 1.40 = 0.51 | 0.51 / 1.00 = 0.51 or 51% |

Bleed capacity can be calculated by subtracting the valve's rating without the bleed from its rating with the bleed. In the above case, the EMCE-12-SC rating was subtracted from the EMCE-22-SC rating.

**R-134a**

**Example 3**

Evaporator temperature . . . . . . . . . . . . . . . . . . . . . . . 20°F
Condenser temperature . . . . . . . . . (maximum) . . 110°F
. . . . . . . . . . . . . . . . . . . . . . . . . . (minimum) . . . 70°F
Liquid temperature (entering TEV) . . . . . . . . . . . . . 60°F
Evap. coil rating or holding load. . 6,000 Btu/hr (0.50 ton)

| Available pressure drop across TEV: | max | min |
|---|---|---|
| Condensing pressure (psig) | 146 | 71 |
| Evaporator pressure (psig) | -18 | -18 |
| | 128 | 53 |
| High side pressure loss (psi) | -7 | -7 |
| Distributor and tubes loss (psi) | -0 | -0 |
| | 121 | 46 |

**Refrigerant liquid correction factor: 1.29**
**Pressure drop correction factor: 1.23 0.76**

The EMC-20-JC valve has the following ratings and percentage loadings at minimum and maximum condensing pressures:

| PRESSURE DROP psi | RATING tons | PERCENTAGE LOADING |
|---|---|---|
| 46* | 0.51 x 0.76 x 1.29 = 0.50 | 0.50 / 0.50 = 1.00 or 100% |
| 121 | 0.51 x 1.23 x 1.29 = 0.97 | 0.50 / 0.81 = 0.62 or 62% |

| PRESSURE DROP psi | BLEED tons | % LOAD HANDLED BY BLEED |
|---|---|---|
| 46* | (0.51 – 0.26) x 0.76 x 1.29 = 0.25 | 0.25 / 0.50 = 0.50 or 50% |
| 121 | (0.51 – 0.26) x 1.23 x 1.29 = 0.40 | 0.40 / 0.50 = 0.80 or 80% |

Since 82% of the load will be handled by the resealable bleed at the maximum condensing temperature condition, it would be safer to choose a valve without the resealable bleed. The EMC-11-JC has the following ratings:

| PRESSURE DROP psi | RATING tons | PERCENTAGE LOADING |
|---|---|---|
| 46* | 0.63 x 0.76 x 1.29 = 0.62 | 0.50 / 0.62 = 0.81 or 81% |
| 121 | 0.63 x 1.23 x 1.29 = 1.00 | 0.50 / 1.00 = 0.50 or 50% |

**Valve Nomenclature:**

| E | MC | E | - | 1 | 0 | - | S | C |
|---|---|---|---|---|---|---|---|---|
| **Extended ODF Connections** Omit for SAE Flare Connections | **Valve Type** | **External Equalizer** Omit if Internally Equalized | | **1 = No Bleed 2 = Resealable Bleed** | **Port Code** (0, 1, 2 or 3) | | **Refrigerant Code** | **Thermostatic Charge** |

**Refrigerant Letter & Color Codes**

| REFRIGERANT | SPORLAN LETTER CODE | SPORLAN COLOR CODE |
|---|---|---|
| 22 | V | Green |
| 134a | J | Sky Blue |
| 401A (MP39) | X | Coral (Pink) |
| 402A (HP80) | L | Light Brown |
| 404A (HP62) | S | Orange |
| 507 (AZ-50) | P | Teal (Green-Blue) |

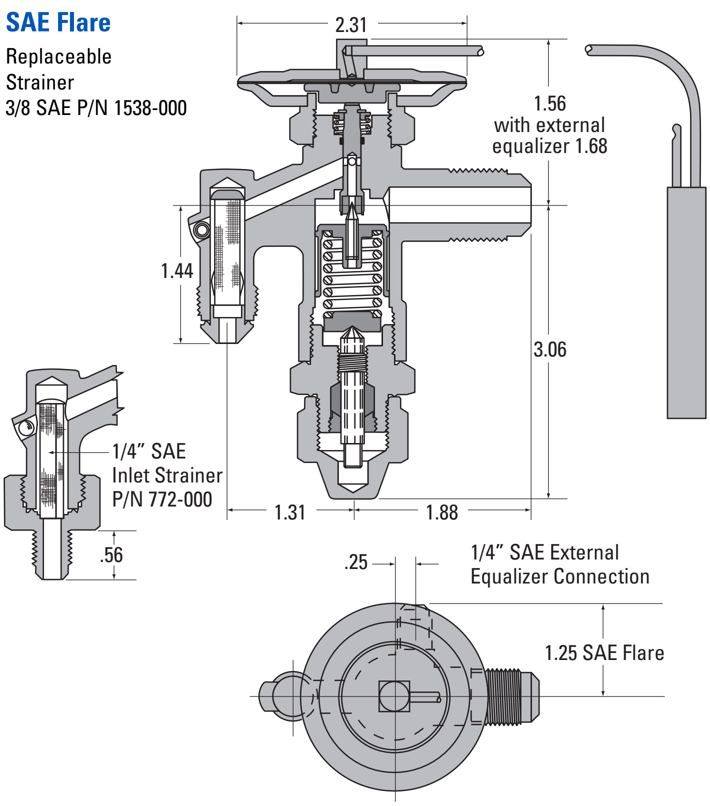
**SPECIFICATIONS – ELEMENT SIZE NO. 43, KNIFE EDGE JOINT**

| REFRIGERANT (Sporlan Code) | TYPE: NO BLEED – Internal Equalizer | TYPE: NO BLEED – External Equalizer | TYPE: WITH BLEED – Internal Equalizer | TYPE: WITH BLEED – External Equalizer | NOMINAL CAPACITY Tons of Refrigeration – No Bleed | NOMINAL CAPACITY Tons of Refrigeration – With Bleed | * Thermostatic Charges Available | Standard Tubing Length – Feet | **CONNECTIONS – Inches SAE Flare / ODF Solder – INLET | **CONNECTIONS – Inches SAE Flare / ODF Solder – OUTLET | Net Weight - Lbs. | Shipping Weight - Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **22 (V)** 407C (N) 407A (V) | EMC-10-V | EMCE-10-V | EMC-20-V | EMCE-20-V | 0.32 | 0.64 | C, Z | 5 | 3/8 | 1/2 | 2 | 3 |
| | EMC-11-V | EMCE-11-V | EMC-21-V | EMCE-21-V | 0.79 | 1.11 | | | | | | |
| | EMC-12-V | EMCE-12-V | EMC-22-V | EMCE-22-V | 1.22 | 1.67 | | | | | | |
| | EMC-13-V | EMCE-13-V | EMC-23-V | EMCE-23-V | 1.69 | 2.34 | | | | | | |
| **134a (J)** 12 (F) 401 (X) 409A (F) | EMC-10-J | EMCE-10-J | EMC-20-J | EMCE-20-J | 0.23 | 0.46 | C | | | | | |
| | EMC-11-J | EMCE-11-J | EMC-21-J | EMCE-21-J | 0.57 | 0.80 | | | | | | |
| | EMC-12-J | EMCE-12-J | EMC-22-J | EMCE-22-J | 0.89 | 1.20 | | | | | | |
| | EMC-13-J | EMCE-13-J | EMC-23-J | EMCE-23-J | 1.22 | 1.69 | | | | | | |
| **404A (S)** 502 (R) 408A (R) | EMC-10-S | EMCE-10-S | EMC-20-S | EMCE-20-S | 0.21 | 0.43 | C, Z | | | | | |
| | EMC-11-S | EMCE-11-S | EMC-21-S | EMCE-21-S | 0.52 | 0.73 | | | | | | |
| | EMC-12-S | EMCE-12-S | EMC-22-S | EMCE-22-S | 0.81 | 1.11 | | | | | | |
| | EMC-13-S | EMCE-13-S | EMC-23-S | EMCE-23-S | 1.12 | 1.55 | | | | | | |
| **507 (P)** 402A (L) | EMC-10-P | EMCE-10-P | EMC-20-P | EMCE-20-P | 0.21 | 0.42 | C, Z | | | | | |
| | EMC-11-P | EMCE-11-P | EMC-21-P | EMCE-21-P | 0.51 | 0.72 | | | | | | |
| | EMC-12-P | EMCE-12-P | EMC-22-P | EMCE-22-P | 0.79 | 1.08 | | | | | | |
| | EMC-13-P | EMCE-13-P | EMC-23-P | EMCE-23-P | 1.10 | 1.51 | | | | | | |

Contact Sporlan Valve for application information not shown on this specification sheet.
* The "MOP" charge is not recommended as it may limit the opening of the pulldown port.
** To specify SAE flare connection, omit the "E" prefix from the valve model number, e.g., MCE-10-SC.

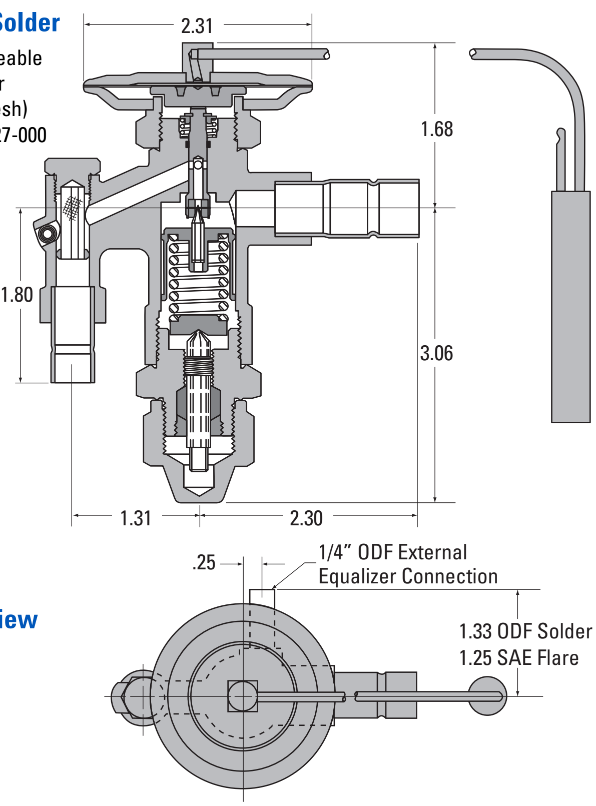
**SAE Flare**

Replaceable Strainer
3/8 SAE P/N 1538-000




**ODF Solder**

Replaceable Strainer
(100 mesh)
P/N 3427-000




**Top View**

**BULB SIZES – Inches**

| STANDARD CHARGES | REFRIGERANT: 22 | REFRIGERANT: 404A, 507 | REFRIGERANT: 134a |
|---|---|---|---|
| C | 0.50 OD x 3.50 | | |
| Z | 0.50 OD x 3.50 | | — |

| PORT CODE | EMC CAPACITIES | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | REFRIGERANT | | | | | | | | |
| | 22 | | | | | | 134a | | |
| | RECOMMENDED THERMOSTATIC CHARGE | | | | | | | | |
| | VC | | | VZ | | | JC | | |
| | EVAPORATOR TEMPERATURES °F | | | | | | | | |
| | 40 | 20 | 0 | -10 | -20 | -40 | 40 | 20 | 0 |
| | EMC WITHOUT BLEED | | | | | | | | |
| **10** | 0.32 | 0.35 | 0.34 | 0.37 | 0.36 | 0.38 | 0.23 | 0.26 | 0.24 |
| **11** | 0.79 | 0.86 | 0.84 | 0.90 | 0.89 | 0.92 | 0.57 | 0.63 | 0.60 |
| **12** | 1.22 | 1.34 | 1.30 | 1.41 | 1.37 | 1.44 | 0.89 | 0.98 | 0.93 |
| **13** | 1.69 | 1.84 | 1.80 | 1.94 | 1.91 | 1.99 | 1.22 | 1.35 | 1.28 |
| | EMC WITH BLEED | | | | | | | | |
| **20** | 0.64 | 0.70 | 0.68 | 0.73 | 0.72 | 0.75 | 0.46 | 0.51 | 0.49 |
| **21** | 1.11 | 1.21 | 1.18 | 1.27 | 1.25 | 1.30 | 0.80 | 0.88 | 0.84 |
| **22** | 1.67 | 1.82 | 1.77 | 1.91 | 1.87 | 1.96 | 1.20 | 1.33 | 1.26 |
| **23** | 2.34 | 2.55 | 2.47 | 2.67 | 2.62 | 2.74 | 1.69 | 1.86 | 1.77 |

| PORT CODE | EMC CAPACITIES | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | REFRIGERANT | | | | | | | | | | | |
| | 404A | | | | | | 507 | | | | | |
| | RECOMMENDED THERMOSTATIC CHARGE | | | | | | | | | | | |
| | SC | | | SZ | | | PC | | | PZ | | |
| | EVAPORATOR TEMPERATURES °F | | | | | | | | | | | |
| | 40 | 20 | 0 | -10 | -20 | -40 | 40 | 20 | 0 | -10 | -20 | -40 |
| | EMC WITHOUT BLEED | | | | | | | | | | | |
| **10** | 0.21 | 0.23 | 0.21 | 0.22 | 0.22 | 0.22 | 0.21 | 0.22 | 0.21 | 0.22 | 0.21 | 0.21 |
| **11** | 0.52 | 0.55 | 0.52 | 0.55 | 0.53 | 0.53 | 0.51 | 0.54 | 0.51 | 0.54 | 0.52 | 0.52 |
| **12** | 0.81 | 0.86 | 0.81 | 0.86 | 0.83 | 0.83 | 0.79 | 0.84 | 0.79 | 0.84 | 0.81 | 0.82 |
| **13** | 1.12 | 1.19 | 1.12 | 1.19 | 1.15 | 1.15 | 1.10 | 1.16 | 1.09 | 1.16 | 1.12 | 1.12 |
| | EMC WITH BLEED | | | | | | | | | | | |
| **20** | 0.43 | 0.45 | 0.42 | 0.45 | 0.43 | 0.43 | 0.42 | 0.44 | 0.42 | 0.44 | 0.43 | 0.43 |
| **21** | 0.73 | 0.78 | 0.73 | 0.78 | 0.75 | 0.75 | 0.72 | 0.76 | 0.72 | 0.76 | 0.73 | 0.74 |
| **22** | 1.11 | 1.17 | 1.10 | 1.17 | 1.12 | 1.12 | 1.08 | 1.14 | 1.07 | 1.15 | 1.10 | 1.11 |
| **23** | 1.55 | 1.63 | 1.54 | 1.63 | 1.57 | 1.57 | 1.51 | 1.61 | 1.51 | 1.60 | 1.55 | 1.55 |

## Liquid Correction Table

| REFRIGERANT | REFRIGERANT LIQUID TEMP. °F | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **22** | Correction Factor | 1.56 | 1.51 | 1.45 | 1.40 | 1.34 | 1.29 | 1.23 | 1.17 | 1.12 | 1.06 | 1.00 | 0.94 | 0.88 | 0.82 | 0.76 |
| **134a** | | 1.70 | 1.63 | 1.56 | 1.49 | 1.42 | 1.36 | 1.29 | 1.21 | 1.14 | 1.07 | 1.00 | 0.93 | 0.85 | 0.78 | 0.71 |
| **404A** | | 2.04 | 1.94 | 1.84 | 1.74 | 1.64 | 1.54 | 1.43 | 1.33 | 1.22 | 1.11 | 1.00 | 0.89 | 0.77 | 0.65 | 0.53 |
| **507** | | 1.99 | 1.89 | 1.79 | 1.69 | 1.59 | 1.50 | 1.40 | 1.30 | 1.20 | 1.10 | 1.00 | 0.89 | 0.78 | 0.66 | 0.51 |

These factors include corrections for liquid refrigerant density and net refrigerating effect and are based on an average evaporator temperature of 0°F. However they may be used for any evaporator temperature from -40°F to 40°F since the variation in the actual factors across this range is insignificant.

## Pressure Correction Table – R-22, 404A, 507

| EVAP. TEMP. °F | PRESSURE DROP ACROSS TEV psi | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 30 | 50 | 75 | 100 | 125 | 150 | 175 | 200 | 225 | 250 | 275 | 300 |
| | CORRECTION FACTOR, CF PRESSURE DROP | | | | | | | | | | | |
| **40** | 0.55 | 0.71 | 0.87 | 1.00 | 1.12 | 1.22 | 1.32 | 1.41 | 1.50 | 1.58 | 1.66 | 1.73 |
| **20 & 0** | 0.49 | 0.63 | 0.77 | 0.89 | 1.00 | 1.10 | 1.18 | 1.26 | 1.34 | 1.41 | 1.48 | 1.55 |
| **-10 & -20** | 0.45 | 0.58 | 0.71 | 0.82 | 0.91 | 1.00 | 1.08 | 1.15 | 1.22 | 1.29 | 1.35 | 1.41 |
| **-40** | 0.41 | 0.53 | 0.65 | 0.76 | 0.85 | 0.93 | 1.00 | 1.07 | 1.13 | 1.20 | 1.25 | 1.31 |

## Pressure Correction Table – R-134a

| EVAP. TEMP. °F | PRESSURE DROP ACROSS TEV psi | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 20 | 40 | 60 | 80 | 100 | 120 | 140 | 160 |
| | CORRECTION FACTOR, CF PRESSURE DROP | | | | | | | |
| **40** | 0.58 | 0.82 | 1.00 | 1.15 | 1.29 | 1.41 | 1.53 | 1.63 |
| **20 & 0** | 0.50 | 0.71 | 0.87 | 1.00 | 1.12 | 1.22 | 1.32 | 1.41 |

# TYPE Y1155

**for Refrigerants 22, 134a, 404A, & 507**

On supermarket applications, the liquid temperature leaving the condenser fluctuates with the ambient temperature. In addition, as the loads in the various fixtures fluctuate, the demand for liquid refrigerant will vary too. To minimize fluctuations in the temperature of the liquid refrigerant being supplied to the fixture TEVs, many supermarket racks will incorporate the use of a mechanical subcooler.

The function of the subcooler is twofold: (1) to provide a subcooled (vapor free) source of liquid refrigerant for the fixture TEVs, and (2) maintain a fairly consistent temperature. The subcooled refrigerant flows to the liquid header, which in turn supplies liquid to each system of fixtures in the supermaket. TEV capacity is based, in part, on the temperature of the liquid refrigerant being supplied to it. Therefore, it becomes important to maintain the liquid temperature as consistent as possible. Large variations in liquid temperature will result in TEV capacities that vary, leading to system instability.

One method, of maintaining proper liquid temperature over the ever changing load requirements of a subcooler is to use two TEVs. Liquid solenoid valves, controlled by the store's energy management system, are required to cycle the two TEVs as necessary in an attempt to maintain constant liquid temperature.

## Specifications

The broad loading range of the Y1155 is ideal for most supermarket subcooling applications. The Y1155 valve is a combination of our Type S valve and Type MC valve. Using the large flow rate capacity of the S valve, with the multi-port design of the MC valve, allows the Y1155 valve to control superheat accurately over the subcooler's broad range of capacity requirements.

For subcooling applications, the C charge is recommended.

## Valve Nomenclature:

**Y1155 - V C**

Valve Type

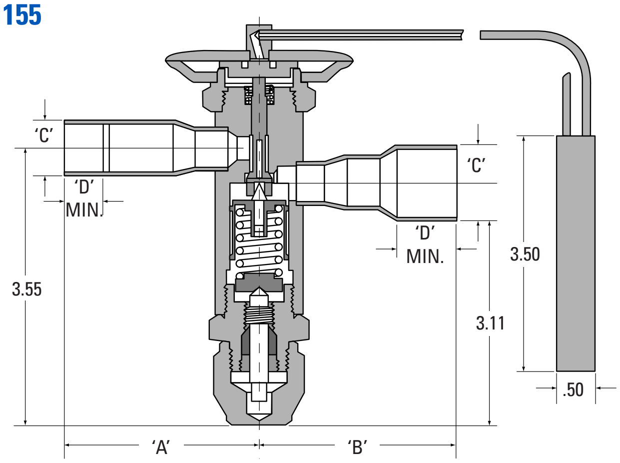
Refrigerant Code

Thermostatic Charge

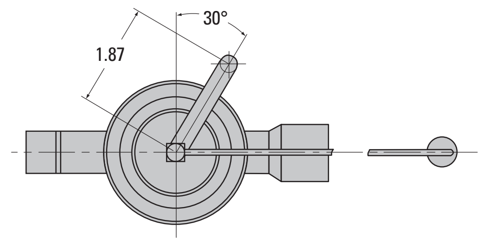
**SPECIFICATIONS – ELEMENT SIZE NO. 83, KNIFE EDGE JOINT**

| REFRIGERANT (Sporlan Code) | TYPE Internal Equalizer | Thermostatic Charges Available | Standard Tubing Length – Feet | CONNECTIONS – Inches Blue figures are standard and will be furnished unless otherwise specified. Extended ODF Solder INLET | OUTLET | EXTERNAL EQUALIZER | Net Weight - Lbs. | Shipping Weight - Lbs. |
|---|---|---|---|---|---|---|---|---|
| **22 (V)** 407C (N) 407A (V) | Y1155-V | C, Z | 5 | **5/8** | **7/8** or 1-1/8 | 1/4" extended ODF bent toward bottom cap<br>Not available with extended connection | 2 | 3 |
| **134a (J)** 12 (F) 401 (X) 409A (F) | Y1155-J | C | | | | | | |
| **404A (S)** 502 (R) 408A (R) | Y1155-S | C, Z | | | | | | |
| **507 (P)** 402A (L) | Y1155-P | C, Z | | | | | | |

## Y1155




## Top View




| FITTING | 'A' | 'B' | 'C' | 'D' |
|---|---|---|---|---|
| 1/4" | — | — | .2525/256 | .31 |
| 1/2" | 2.49 | — | .5025/.506 | .37 |
| 5/8" | 2.46 | — | .6275/.631 | .50 |
| 7/8" | — | 2.53 | .8775/.881 | .75 |
| 1-1/8" | — | 2.53 | 1.128/1.1315 | .91 |

| BULB SIZES – Inches | | | |
|---|---|---|---|
| STANDARD CHARGES | REFRIGERANT | | |
| | 22 | 404A, 507 | 134a |
| C | 0.50 OD x 3.50 | | |
| Z | 0.50 OD x 3.50 | | — |

| Y1155 CAPACITIES | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CAPACITY | REFRIGERANT | | | | | | | | |
| | 22 | | | | | | 134a | | |
| | EVAPORATOR TEMPERATURES °F | | | | | | | | |
| | 40 | 20 | 0 | -10 | -20 | -40 | 40 | 20 | 0 |
| **Minimum** | 0.89 | 0.98 | 0.95 | 1.02 | 1.01 | 1.05 | 0.65 | 0.71 | 0.68 |
| **Holding Port** | 2.63 | 2.87 | 2.79 | 3.00 | 2.96 | 3.08 | 1.90 | 2.10 | 1.99 |
| **Maximum** | 10.06 | 10.96 | 10.65 | 11.49 | 11.30 | 11.79 | 7.27 | 8.01 | 7.62 |

| Y1155 CAPACITIES | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CAPACITY | REFRIGERANT | | | | | | | | | | | |
| | 404A | | | | | | 507 | | | | | |
| | EVAPORATOR TEMPERATURES °F | | | | | | | | | | | |
| | 40 | 20 | 0 | -10 | -20 | -40 | 40 | 20 | 0 | -10 | -20 | -40 |
| **Minimum** | 0.59 | 0.63 | 0.59 | 0.63 | 0.60 | 0.60 | 0.58 | 0.61 | 0.58 | 0.61 | 0.59 | 0.59 |
| **Holding Port** | 1.74 | 1.84 | 1.74 | 1.84 | 1.78 | 1.78 | 1.70 | 1.80 | 1.70 | 1.80 | 1.74 | 1.75 |
| **Maximum** | 6.65 | 7.05 | 6.63 | 7.03 | 6.79 | 6.79 | 6.51 | 6.90 | 6.50 | 6.89 | 6.66 | 6.69 |

### Liquid Correction Table

| REFRIGERANT | REFRIGERANT LIQUID TEMP. °F | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **22** | Correction Factor | 1.57 | 1.51 | 1.45 | 1.40 | 1.34 | 1.29 | 1.23 | 1.17 | 1.12 | 1.06 | 1.00 | 0.94 | 0.88 | 0.82 | 0.76 |
| **134a** | | 1.69 | 1.63 | 1.56 | 1.49 | 1.42 | 1.35 | 1.29 | 1.21 | 1.14 | 1.07 | 1.00 | 0.93 | 0.85 | 0.78 | 0.71 |
| **404A** | | 2.04 | 1.94 | 1.84 | 1.74 | 1.64 | 1.54 | 1.43 | 1.33 | 1.22 | 1.11 | 1.00 | 0.89 | 0.77 | 0.65 | 0.53 |
| **507** | | 1.99 | 1.89 | 1.79 | 1.69 | 1.59 | 1.50 | 1.40 | 1.30 | 1.20 | 1.10 | 1.00 | 0.89 | 0.78 | 0.66 | 0.51 |

### Pressure Correction Table – R-22, 404A, 507

| EVAP. TEMP. °F | PRESSURE DROP ACROSS TEV psi | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 30 | 50 | 75 | 100 | 125 | 150 | 175 | 200 | 225 | 250 | 275 | 300 |
| | CORRECTION FACTOR, CF PRESSURE DROP | | | | | | | | | | | |
| **40** | 0.55 | 0.71 | 0.87 | 1.00 | 1.12 | 1.22 | 1.32 | 1.41 | 1.50 | 1.58 | 1.66 | 1.73 |
| **20 & 0** | 0.49 | 0.63 | 0.77 | 0.89 | 1.00 | 1.10 | 1.18 | 1.26 | 1.34 | 1.41 | 1.48 | 1.55 |
| **-10 & -20** | 0.45 | 0.58 | 0.71 | 0.82 | 0.91 | 1.00 | 1.08 | 1.15 | 1.22 | 1.29 | 1.35 | 1.41 |
| **-40** | 0.41 | 0.53 | 0.65 | 0.76 | 0.85 | 0.93 | 1.00 | 1.07 | 1.13 | 1.20 | 1.25 | 1.31 |

### Pressure Correction Table – R-134a

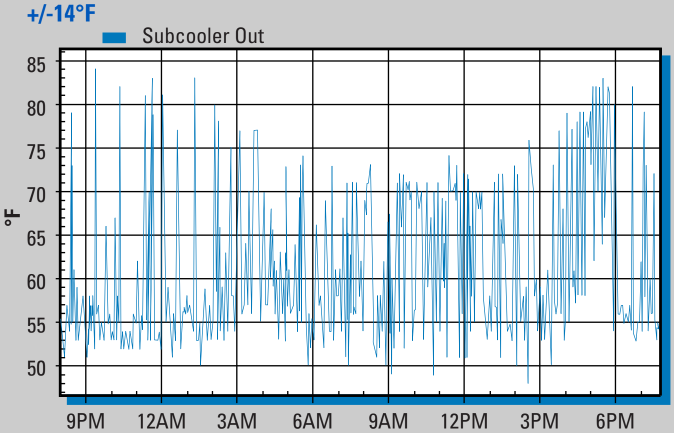
| EVAP. TEMP. °F | PRESSURE DROP ACROSS TEV psi | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 20 | 40 | 60 | 80 | 100 | 120 | 140 | 160 |
| | CORRECTION FACTOR, CF PRESSURE DROP | | | | | | | |
| **40** | 0.58 | 0.82 | 1.00 | 1.15 | 1.29 | 1.41 | 1.53 | 1.63 |
| **20 & 0** | 0.50 | 0.71 | 0.87 | 1.00 | 1.12 | 1.22 | 1.32 | 1.41 |

Figure 4 shows the superior control of the Y1155 valve over other traditional methods of subcooler control. It not only maintains the design temperature of the liquid refrigerant with more accuracy, it simplifies the piping requirements. In addition, the reduction in required braze joints will save installation time, and reduce the potential for leaks.

*Figure 4*

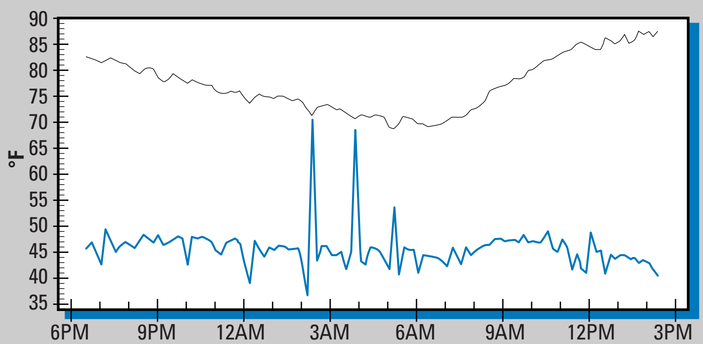
## Traditional Subcooler Control

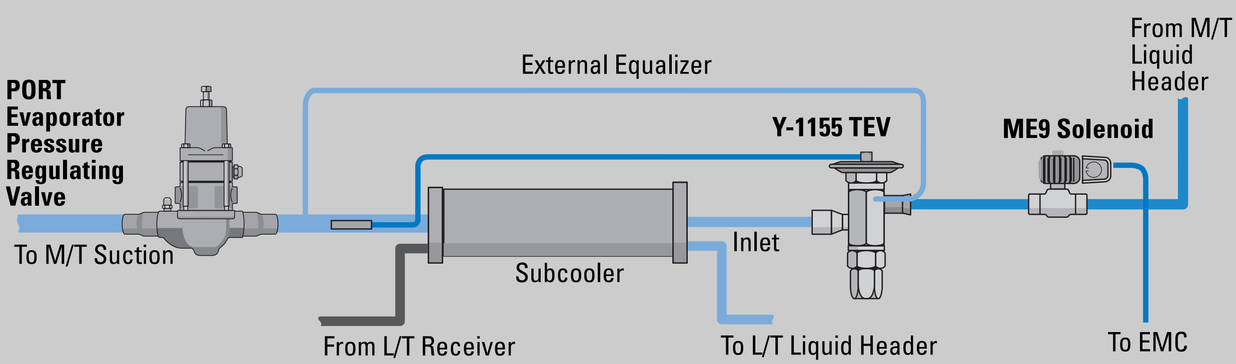
**+/-14°F**




## Subcooler Control – Y1155 Valve with EPR Valve

**+/-3°F**

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