

ELECTRONIC TEMPERATURE CONTROL SYSTEMS

Electric Evaporator Pressure Regulating Valves

The CDS valves are designed for more precise and energy efficient control of temperatures in evaporators. Proper temperature is obtained by regulating refrigerant flow in the evaporator in response to signals generated by an electronic controller and sensor combination. The valves are built around balanced ports, which allows input power of only 4 watts, less than one quarter of the power used by older heat motor and analog designs. When not actively stepping, power to the motor is removed for further energy savings. The step motors used are standard 12-volt DC bipolar designs, which in concert with the integral gear reduction, give the valves unsurpassed accuracy and repeatability over the entire operating range. Since the valves are powered from an external



controller, no pilot lines or high to low side bleeds are required. The properly applied CDS valve and controller can replace standard mechanical evaporator pressure regulators (EPR), suction stop solenoid valves, and conventional thermostats.

With different seating materials, CDS-16 valves may be applied as heat reclaim, head pressure control, or liquid line differential valves. CDS-9 and -17 are suitable for these applications as supplied. Contact Sporlan for more information.

Due to the step motor design, the CDS series are the first evaporator control valves that may be sized to contribute NO additional pressure drop to the suction line.

Simplified cartridge design allows all moving parts to be replaced as a unit. Only the valve body is left in the line. This will allow maintenance or repair without unsweating the entire valve.

Specifications

(Standard Connections and Cable Lengths are in **BOLD type**.)

| TYPE | CONNECTIONS ODF SOLDER – Inches | CONFIGURATION | CABLE LENGTH m | CABLE ENDS |
|--------|------------------------------------|---------------------------|-------------------|-----------------------|
| CDS-4 | 1/2, 5/8, 7/8 | Straight Through | 3 | S-Stripped and Tinned |
| CDS-7 | 5/8, 7/8, 1-1/8, 1-3/8 | Straight Through | 3 | |
| CDS-9 | 5/8, 7/8 , 1-1/8, 1-3/8 | Angle or Straight Through | 3 | |
| CDS-16 | 1-3/8 | Angle | 3 | |
| CDS-17 | 1-3/8, 1-5/8 , 2-1/8 | Straight Through | 3 | |

Capacities – kW

| TYPE | EVAPO-RATOR TEMP. °C | REFRIGERANT | | | | | | | | | | | | | | | | | | | | | | | |
|--------|-------------------------|----------------------------------|------|------|------|------|------|----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | | 134a | | | | | | 404A/507 | | | | | | 407C | | | | | | 410A | | | | | |
| | | PRESSURE DROP ACROSS VALVE – bar | | | | | | | | | | | | | | | | | | | | | | | |
| | | 0.03 | 0.06 | 0.1 | 0.2 | 0.4 | 0.7 | 0.03 | 0.06 | 0.1 | 0.2 | 0.4 | 0.7 | 0.03 | 0.06 | 0.1 | 0.2 | 0.4 | 0.7 | 0.03 | 0.06 | 0.1 | 0.2 | 0.4 | 0.7 |
| CDS-4 | 0 | 2.62 | 3.68 | 4.72 | 6.63 | 9.10 | 11.4 | 3.07 | 4.31 | 5.53 | 7.76 | 10.9 | 14.4 | 3.22 | 4.52 | 5.8 | 8.14 | 11.5 | 14.7 | 4.17 | 5.86 | 7.52 | 10.6 | 14.8 | 19.5 |
| | -10 | 2.12 | 2.98 | 3.83 | 5.30 | 7.09 | 8.60 | 2.53 | 3.55 | 4.55 | 6.39 | 9.06 | 11.6 | 2.63 | 3.69 | 4.74 | 6.65 | 9.18 | 11.5 | 3.49 | 4.9 | 6.30 | 8.84 | 12.4 | 16.3 |
| | -20 | 1.69 | 2.37 | 3.01 | 4.09 | 5.3 | 6.07 | 2.05 | 2.88 | 3.69 | 5.18 | 7.17 | 9.01 | 2.11 | 2.97 | 3.81 | 5.29 | 7.11 | 8.67 | 2.88 | 4.04 | 5.19 | 7.28 | 10.2 | 13.0 |
| | -30 | 1.31 | 1.82 | 2.29 | 3.03 | 3.70 | 3.83 | 1.63 | 2.29 | 2.94 | 4.09 | 5.51 | 6.72 | 1.67 | 2.34 | 2.97 | 4.04 | 5.27 | 6.09 | 2.33 | 3.27 | 4.20 | 5.89 | 8.04 | 10.0 |
| CDS-7 | 0 | 7.49 | 10.4 | 13.3 | 18.3 | 24.5 | 29.5 | 8.69 | 12.0 | 15.3 | 21.1 | 29.2 | 39.3 | 9.21 | 12.7 | 16.2 | 22.4 | 31.6 | 39.4 | 11.8 | 16.4 | 20.8 | 28.8 | 39.8 | 51.7 |
| | -10 | 6.02 | 8.41 | 10.7 | 14.5 | 18.7 | 21.1 | 7.20 | 9.97 | 12.7 | 17.5 | 24.9 | 31.0 | 7.51 | 10.5 | 13.3 | 18.4 | 24.8 | 30.1 | 9.98 | 13.8 | 17.5 | 24.2 | 33.5 | 44.5 |
| | -20 | 4.75 | 6.59 | 8.29 | 11.0 | 13.3 | 13.8 | 5.87 | 8.14 | 10.3 | 14.3 | 19.4 | 23.5 | 5.99 | 8.38 | 10.6 | 14.5 | 18.8 | 21.6 | 8.25 | 11.5 | 14.5 | 20.1 | 28.0 | 34.8 |
| | -30 | 3.65 | 5.01 | 6.21 | 7.85 | 8.53 | 8.53 | 4.64 | 6.49 | 8.24 | 11.2 | 14.6 | 16.7 | 4.68 | 6.50 | 8.19 | 10.9 | 13.3 | 13.9 | 6.63 | 9.29 | 11.9 | 16.3 | 21.7 | 25.9 |
| CDS-9 | 0 | 11.0 | 15.5 | 19.8 | 27.5 | 37.5 | 46.6 | 13.0 | 18.0 | 22.9 | 31.9 | 44.3 | 59.5 | 13.6 | 19.0 | 24.2 | 33.7 | 47.5 | 60.5 | 17.6 | 24.5 | 31.2 | 43.4 | 60.3 | 78.6 |
| | -10 | 8.88 | 12.5 | 15.9 | 21.9 | 29.1 | 34.9 | 10.7 | 14.9 | 19.0 | 26.4 | 37.4 | 47.6 | 11.1 | 15.6 | 19.9 | 27.7 | 37.8 | 47.3 | 14.8 | 20.6 | 26.3 | 36.5 | 50.7 | 67.4 |
| | -20 | 7.02 | 9.80 | 12.4 | 16.8 | 21.6 | 24.3 | 8.65 | 12.1 | 15.5 | 21.5 | 29.6 | 36.9 | 8.84 | 12.4 | 15.8 | 21.8 | 29.2 | 35.3 | 12.2 | 17.1 | 21.8 | 30.2 | 42.3 | 53.7 |
| | -30 | 5.42 | 7.51 | 9.44 | 12.4 | 14.9 | 15.2 | 6.84 | 9.60 | 12.3 | 16.9 | 22.6 | 27.4 | 6.92 | 9.67 | 12.3 | 16.6 | 21.5 | 24.4 | 9.77 | 13.7 | 17.6 | 24.4 | 33.1 | 41.0 |
| CDS-16 | 0 | 18.5 | 25.9 | 32.8 | 45.3 | 60.1 | 71.5 | 21.5 | 29.7 | 37.8 | 52.2 | 72.1 | 96.4 | 22.8 | 31.5 | 40.0 | 55.3 | 77.6 | 96.4 | 29.3 | 40.5 | 51.4 | 71.1 | 98.3 | 128 |
| | -10 | 14.9 | 20.7 | 26.3 | 35.5 | 45.5 | 50.7 | 17.8 | 24.7 | 31.3 | 43.3 | 61.0 | 75.9 | 18.5 | 26.0 | 33.0 | 45.6 | 60.9 | 73.2 | 24.7 | 34.2 | 43.4 | 59.9 | 82.8 | 109 |
| | -20 | 11.7 | 16.2 | 20.4 | 26.8 | 32.2 | 32.8 | 14.5 | 20.2 | 25.6 | 35.4 | 47.6 | 57.2 | 14.8 | 20.7 | 26.2 | 35.5 | 45.8 | 51.9 | 20.4 | 28.4 | 36.0 | 49.8 | 68.8 | 85.1 |
| | -30 | 9.01 | 12.3 | 15.2 | 19.0 | 20.3 | 20.3 | 11.4 | 16.0 | 20.3 | 27.5 | 35.5 | 40.3 | 11.5 | 16.0 | 20.1 | 26.6 | 32.2 | 33.1 | 16.4 | 22.9 | 29.2 | 40.0 | 53.0 | 62.8 |
| CDS-17 | 0 | 20.0 | 27.8 | 35.5 | 49.4 | 67.6 | 83.5 | 23.2 | 32.3 | 41.1 | 57.3 | 79.7 | 108 | 24.4 | 34.0 | 43.4 | 60.4 | 85.9 | 109 | 31.6 | 43.9 | 56.0 | 78.0 | 109 | 142 |
| | -10 | 16.1 | 22.6 | 28.8 | 39.5 | 52.3 | 62.1 | 19.2 | 26.7 | 34.0 | 47.3 | 67.6 | 85.8 | 20.1 | 27.9 | 35.6 | 49.6 | 68.2 | 84.8 | 26.5 | 36.9 | 47.1 | 65.5 | 91.2 | 122 |
| | -20 | 12.7 | 17.8 | 22.5 | 30.3 | 38.6 | 42.6 | 15.6 | 21.7 | 27.7 | 38.6 | 53.3 | 66.3 | 16.0 | 22.5 | 28.7 | 39.4 | 52.5 | 62.9 | 21.9 | 30.5 | 39.0 | 54.2 | 76.4 | 96.6 |
| | -30 | 9.83 | 13.6 | 17.0 | 22.2 | 26.2 | 26.5 | 12.4 | 17.4 | 22.2 | 30.5 | 40.7 | 48.8 | 12.6 | 17.5 | 22.2 | 30.0 | 38.4 | 42.9 | 17.7 | 24.8 | 31.7 | 44.1 | 59.7 | 73.6 |

Capacities based on 16°C liquid and 14°C superheated vapor.

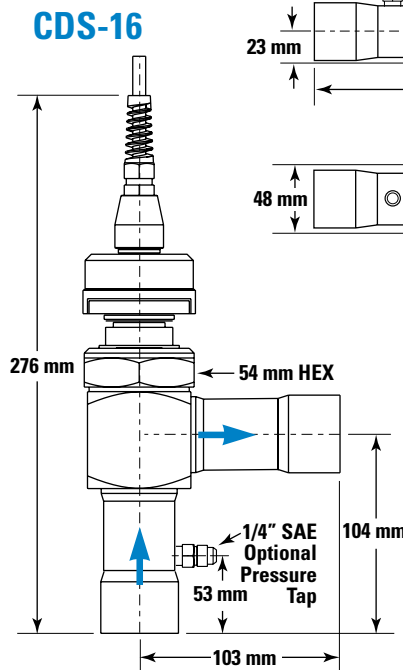
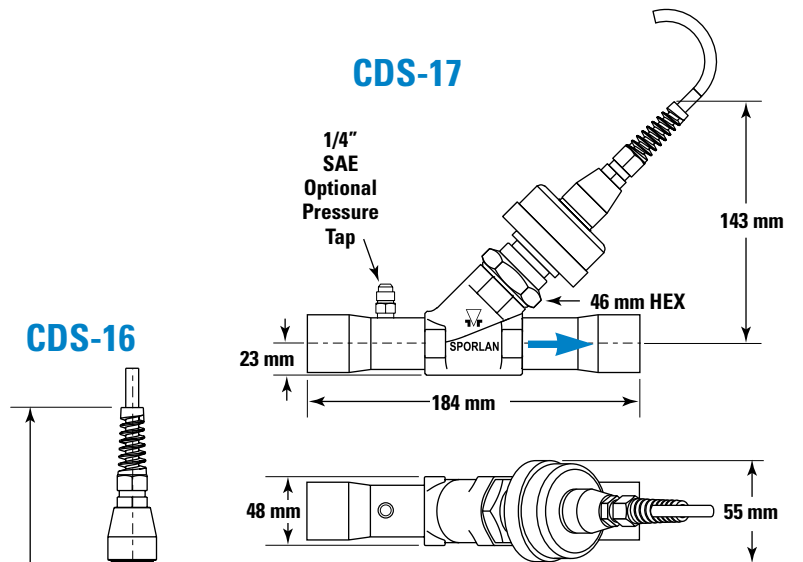
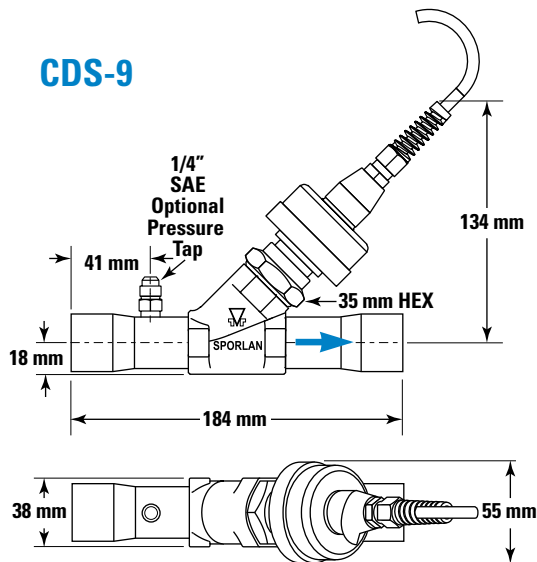
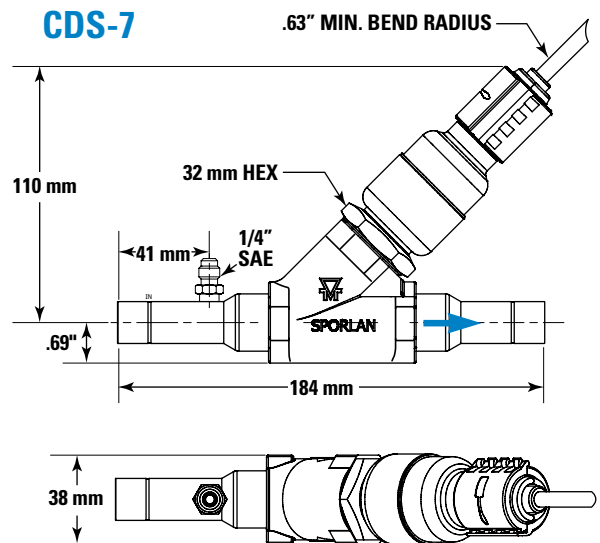
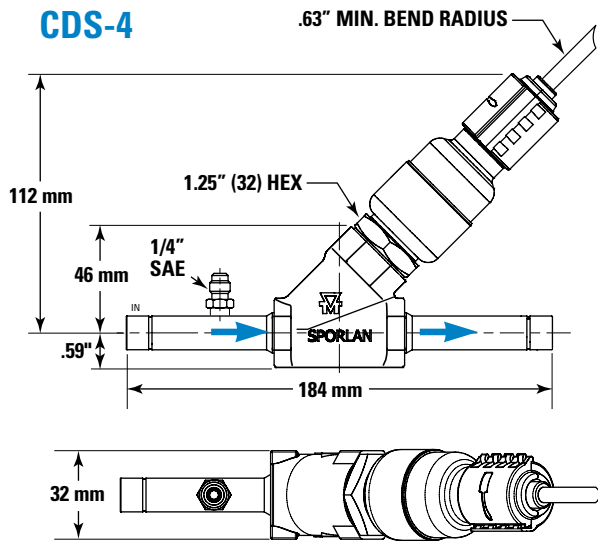
| REFRIGERANT | LIQUID TEMPERATURE ENTERING TEV °C | | | | | | | | | | |
|-------------|--|------|------|------|------|------|------|------|------|------|------|
| | -10° | -5° | 0° | 5° | 10° | 15° | 20° | 25° | 30° | 35° | 40° |
| | CORRECTION FACTOR, CF LIQUID TEMPERATURE | | | | | | | | | | |
| 134a | 1.21 | 1.17 | 1.13 | 1.09 | 1.05 | 1.01 | 0.97 | 0.92 | 0.88 | 0.84 | 0.79 |
| 404A/507 | 1.27 | 1.22 | 1.17 | 1.12 | 1.07 | 1.01 | 0.96 | 0.90 | 0.84 | 0.78 | 0.72 |
| 407C | 1.21 | 1.17 | 1.13 | 1.09 | 1.05 | 1.01 | 0.97 | 0.92 | 0.88 | 0.84 | 0.79 |
| 410A | 1.21 | 1.17 | 1.13 | 1.09 | 1.05 | 1.01 | 0.97 | 0.92 | 0.87 | 0.83 | 0.78 |

Use the correction factor for 38°C liquid temperature and the capacities at 5°C evaporator temperature to determine ARI standard capacity ratings.

Example: The capacity of a CDS-7 using R-407C, evaporator temperature of -25°C, 0.06 bar pressure drop across the valve and a liquid temperature of 10°C is equal to (7.41 x 1.05) 7.78 kilowatts.

These factors correct for net refrigerating effect and are based on an average temperature of -15°C. However, they may be used for any evaporator temperature from -30°C to 5°C since the variation in the actual factors across this range is insignificant.

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CDS – Valve Nomenclature/Ordering Instructions

The CDS-16 is the only angled valve. The CDS-4, CDS-7, CDS-9 and CDS-17 are straight through valves.

| CDS | T | 17 | 1-3/8 x 1-3/8 ODF | 20 | S | Angle |
|------------------------------|-----------------------------|--------------|-------------------|---|---|--|
| Controls Discharge Stepmotor | Optional Inlet Pressure Tap | Model Number | Fitting Size | Cable Length 20' standard, others available | S = Stripped and tinned cable ends. Custom Connectors available | Used only if angled configuration CDS-16 Only |