



Virtual Engineer: Sporlan Division

Differential Pressure Regulators

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Defrost Differential Pressure Regulating Valves

In many supermarket applications refrigerant gas from the discharge line, or from the top of the receiver, is used for defrost. This method of defrost relies on a reverse flow of refrigerant gas, which can only be achieved if the pressure of the defrost header is greater than the pressure of the liquid header. The difference in pressure is known as the defrost differential. Several methods are used to obtain the defrost differential, either acting through the liquid line using a (O)LDR valve or through the discharge line using a DDR valve. A CDS valve can also be used in both methods.

Mechanical Differential Pressure Regulating Valve

Sporlan offers two mechanical differential pressure regulating valves. The (O)LDR valve is used in liquid line application, and it combines the features of a liquid differential check valve and a solenoid valve into a single component and are commonly called the liquid line differential valve. The OLDR is in the full open position when the coil is de-energized, and it is in the differential operation mode when the coil is energized. The LDR is in the differential operation mode when the coil is de-energized, and it is in the full open position when the coil is energized.

The DDR valve is used in discharge line applications. A solenoid feature allows the valve to control the differential when the coil is de-energized and to operate full open when the coil is energized. A solenoid bypass feature is incorporated in the valve so that the valve will modulate fully open when there is no need to create a differential. Energizing the solenoid coil opens the valve fully.

Refer [Bulletin 90-50](#) for more information on Sporlan Mechanical Differential Pressure Regulating valves.

Electric Differential Pressure Regulating Valve

The Sporlan CDS family represents a line of electronically controlled step motor valves, designed to contribute minimal pressure drop to the system. By providing synchronized signals to the step motor, discrete angular movements are translated through a Digital Linear Actuator (DLA) into precise linear positioning of the valve piston. The balanced pistons and ports are uniquely characterized, providing superb flow resolution and performance across a range of applications and operating conditions.

Sporlan CDS valves are available in two styles—the CDS-2, CDS-4 and CDS-7 provide 2500 steps of resolution, while the larger CDS-9, CDS-16 and CDS-17 provide 6386 steps of resolution. Capable of tremendous versatility, CDS valves can be used to replace a variety of mechanical and solenoid valves throughout typical refrigeration and air conditioning systems, where low pressure drop and precise refrigerant flow control are desired. And because the valves are powered by an external controller, no pilot lines or high to low side bleeds are required.

Refer to [Bulletin 100-40](#) for more information on Sporlan CDS valves.

Valve Sizing in Virtual Engineer

Inputting Sizing Information

Refrigerant is the type of refrigerant the system is operating with, by ASHRAE R-number designation.

Evaporator Temperature is the saturated temperature at evaporator or suction pressure. Virtual Engineer will allow Liquid Temperature to be less than the Evaporator Temperature.

Condensing Temperature is the saturated temperature at discharge or condensing pressure. It is checked against the Liquid Temperature. Virtual Engineer will not allow Condensing Temperature to be less than Liquid Temperature.

Liquid Temperature is the liquid refrigerant temperature at the inlet of the expansion valve.

System Capacity is the total cooling capacity of the system.

Enter the required information into the left pane of the sizing tool. As information is entered, Virtual Engineer will filter products meeting that criteria in the right pane. When you have entered the required information, valid products will be available to compare in the right pane, including (O)LDR, DDR, and CDS valves. All valid products are included to compare by default. You may uncheck any product you don't wish to compare.

Getting Results and Comparing Choices

Click the "Compare" button at the top of the right pane to be taken to the Compare Table. The Compare Table will display the results of the selection, and the values input. The best selection within each compared product will be highlighted. The Compare Table will also show other selections within the compared products.

Click the "Select Columns" button at the upper left corner of the Compare Table to select what values you would like to appear in the Compare Table. Below is a quick explanation of the columns that can be selected for the Differential Pressure Regulator tool:

- **Valve Type:** The family that the valve belongs to
- **Required Pressure Drop:** Reduction of pressure required to deliver specified capacity
- **Percent Rated Capacity:** How much of the valve's capacity is being used
- **Coil Size:** Standard Sporlan Coil Sizes are MKC-1, MKC-2, OMKC-1, and OMKC-2. Refer to [Bulletin 30-10](#) for more information on Sporlan Coils.
- **Port Size:** The size of the valve's internal port
- **Adjustment Range:** The pressure adjustment range of the mechanical valve
- **Maximum Rated Pressure:** The maximum working pressure of the valve in ambient conditions
- **Number of Steps:** Total number of steps at full stroke of the electric valve

After selecting columns, you can click and drag the column header to change the order of the columns. You can also click the ▼ in the column headers to further narrow or sort your results.

Click the "Group by Series" button at the top of the Compare Table to group the results by the valve family they belong to. Click the button again to ungroup.

Click the "Close" button below the Compare Table or the X in the upper right corner of the screen to close the Compare Table and return to the input screen.

Configuring a Part and Saving Results

In the second column of the Compare Table, there are two buttons that can appear: "Configure" or "Select."

Click the “Configure” button next to the desired series to be taken to its eConfigurator. The eConfigurator can be used to configure a part according to your unique system. The eConfigurator will give an item number that can be used to purchase your part. Click the “Save” button to save your configuration and return to Virtual Engineer’s dashboard. The configured part will appear in your system.

If a “Select” button appears next to the desired series, then there is no eConfigurator currently available for that product, and the series will be selected without any configuration.

Click the “Export” button at the upper right corner of the Compare Table to save your results as an Excel spreadsheet.

Click the blue page icon in the “RPT” column of the Compare Table to generate a summary report of your inputs and choices. If the part was configured using an eConfigurator, the item number will also appear in the summary report. This report can be downloaded as a PDF and printed as needed.