VAL-SIF-168
PDN Virtual Engineer: Valve
ISSUED: February 2025
Supersedes: None

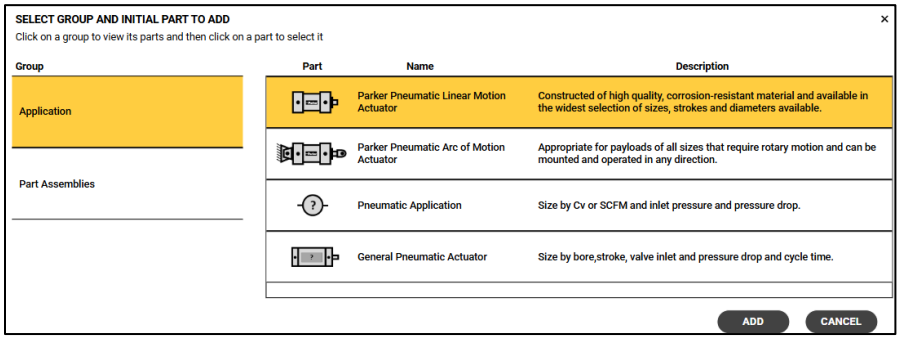
Pneumatic Division
Richland, Michigan 49083

Virtual Engineer

Virtual Engineer: Pneumatic Technologies: Help for Valve

Please note – This sizing software does not simply apply filters to Parker's product list based on user inputs. There are a significant number of calculations taking place to simulate the performance of Parker's products in the application. Occasionally, these calculations may cause a slower than expected response, but the result is a more accurate approximation of performance.

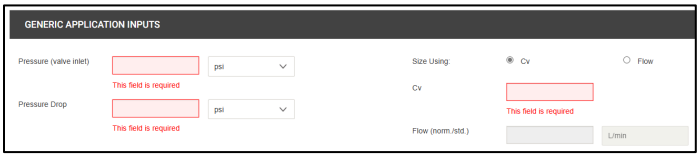
Application Choices



Group: Application – Lists the type of sizing applications for a single application.

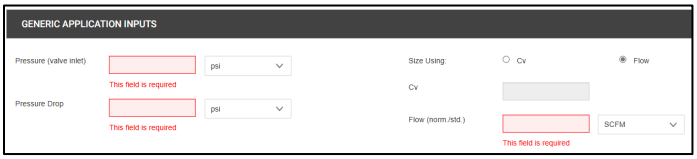
- Parker Pneumatic Linear Motion Actuator: Size valve by Virtual Engineer Actuator
- Parker Pneumatic Arc of Motion Actuator: Size valve by Virtual Engineer Actuator

<u>Pneumatic Application: Cv</u>



- Pressure (valve inlet): Products not capable of this operating pressure will be eliminated as possible solutions.
- Pressure Drop: Pressure drop from valve inlet to valve outlet. Alternatively, pressure drop from valve inlet to application which considers valve pressure drop and tube length pressure drop.
- Cv: This is the application Cv and not the maximum valve Cv. Products not cable of this Cv will be eliminated as possible solutions.

Pneumatic Application: SCFM

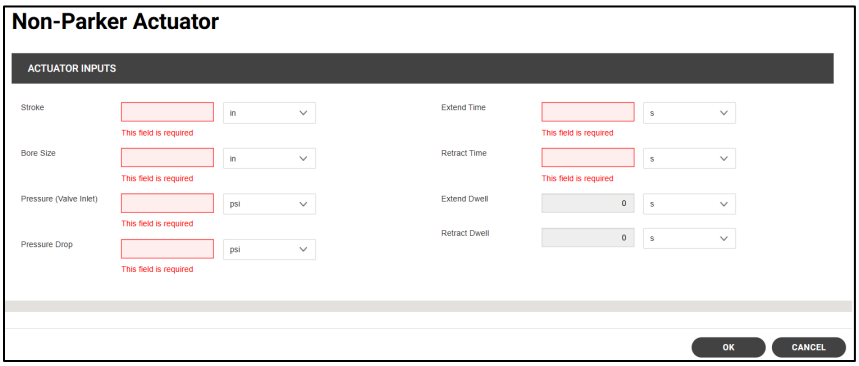


- Pressure (valve inlet): Products not capable of this operating pressure will be eliminated as possible solutions.

Pressure Drop – Pressure drop from valve inlet to valve outlet. OR. If you decided total pressure drop from valve inlet to application which considers valve pressure drop and tube length pressure drop.

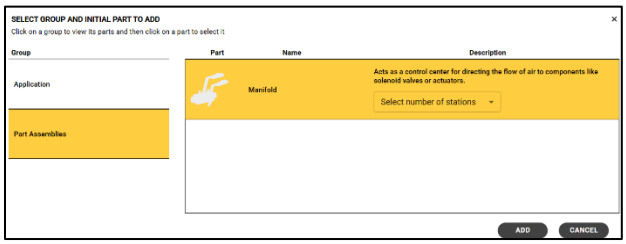
- SCFM: Application SCFM. Cv will be calculated from SCFM, inlet pressure and pressure drop. Products not cable of the calculated Cv will be eliminated as possible solutions.

General Pneumatic Actuator



- Bore: Bore of the cylinder. Calculation will be made using cap end area.
- Stroke: Travel of the piston in the cylinder.
- Pressure (valve inlet): Products not capable of this operating pressure will be eliminated as possible solutions.
- Pressure Drop: Pressure drop from valve inlet to application.
- Extend Time: The amount of time the actuator will take to travel from fully retracted to fully extended.
- Retract Time: The amount of time the actuator will take to travel from fully extended to fully retracted
- Dwell time: not used in Virtual Engineer Valve

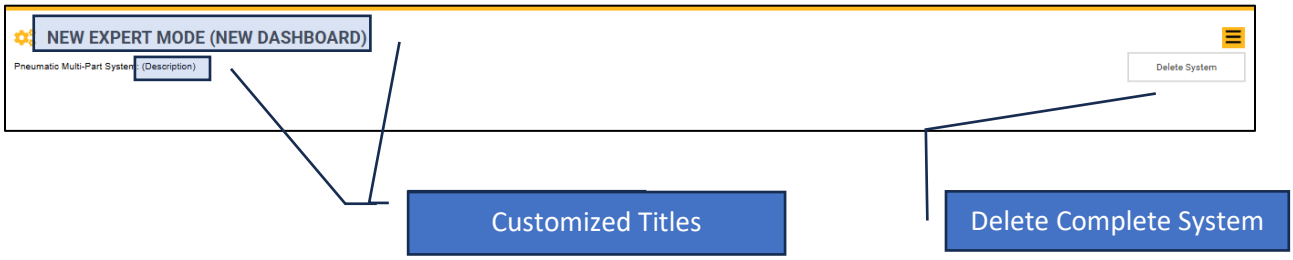
Group: Part Assemblies:



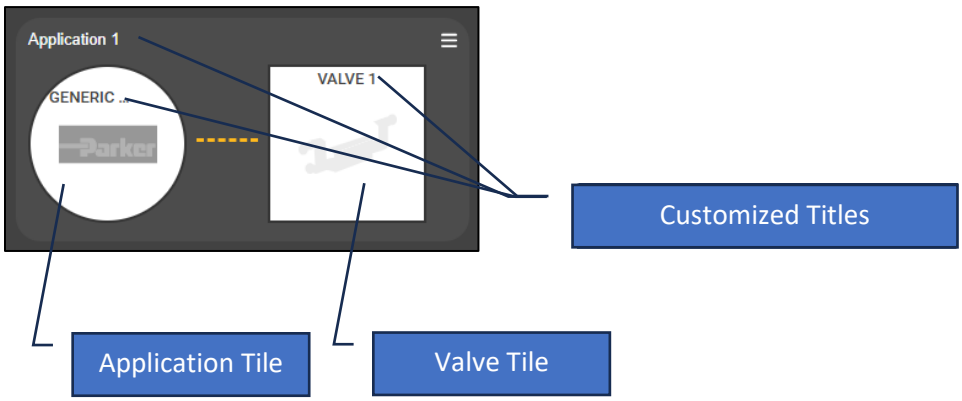
Creates a manifold of "x" number of stations.

- *Each station is considered an application.*
- *Each application is sized by Group Applications.*

Dashboard: Details



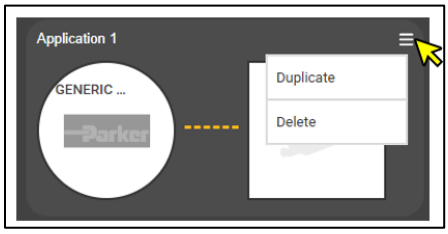
Individual Valve Application



Application Tile: Application based on Virtual Engineer Actuator, Pneumatic Application or General Pneumatic Actuator application details.

Valve Tile:

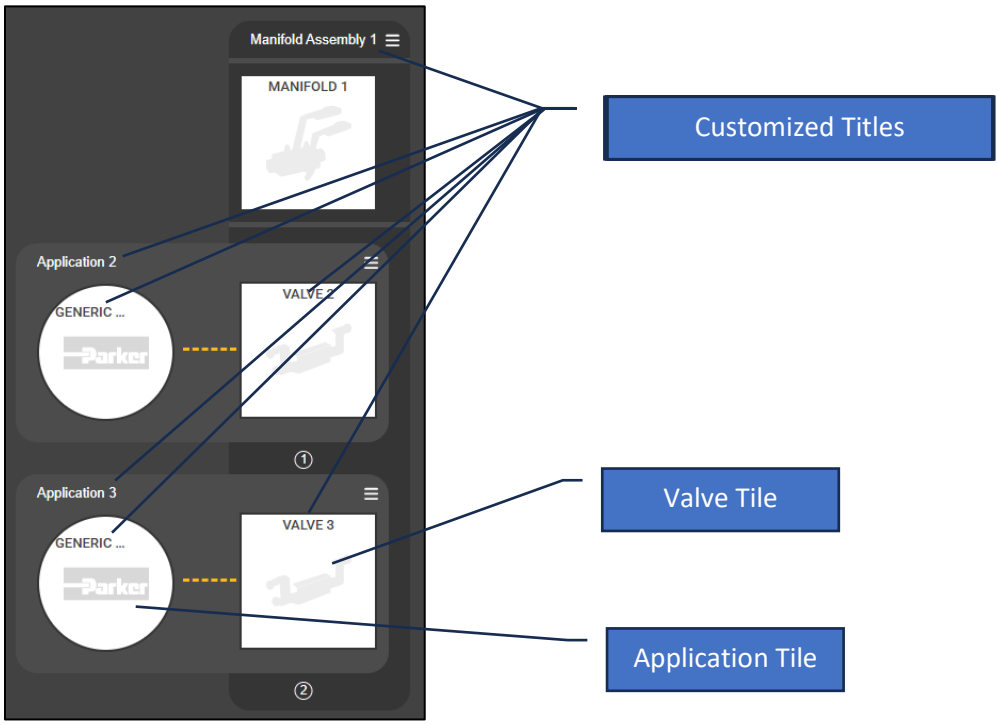
- Generic valve picture: pre-optimized valve
- Valve series picture: Optimized valve with part number, summary, and cad links.

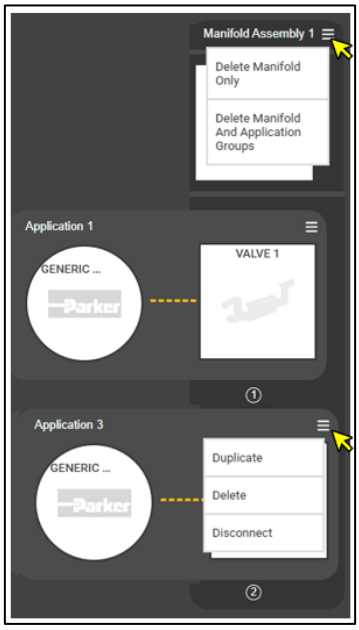


Duplicate: Duplicate will copy the application *type*: (Virtual Engineer Actuator, Pneumatic Application or General Pneumatic Application) with new application and valve tile. Data of the original application is not duplicated.

Delete: Will delete Application and Valve Tile.

Manifold Assembly Application





Delete Manifold: Will delete the manifold but keep Application 2 and 3 as independent applications.

Deleted Manifold and Application Group: Will delete manifold and all applications.

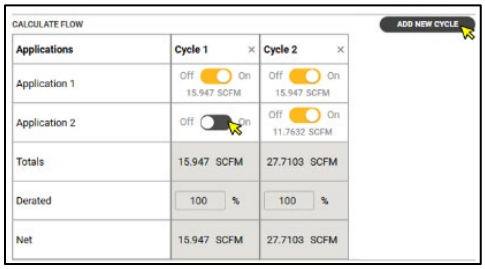
Duplicate: Duplicate will copy the application type (Virtual Engineer Actuator, Pneumatic Application or General Pneumatic Application) in new application and valve tile. Data of the original application is not duplicated. Will open in separate application outside of the manifold. Use can add to existing manifold.

Delete: Will delete Application and Valve Tile from the manifold.

Disconnect: Will disconnect the Application and Valve from the manifold and copy to a separate application outside of the manifold. Application and Valve tile can not be added back to the manifold.

Manifold Sizing Inputs

Valve Sequence: Model the maximum flow requirement of the manifold based on valve actuation. This calculation will be used for end plate selection and potential addition of auxiliary inlet segments in the manifold.



The sequence tool calculates maximum inlet flow to the manifold based on valve actuation cycles. Multiple machine cycles can be modeled, and each cycle can be de-rated by a percent. De-rating is useful if there is partial overlap of valve actuation times. 100% rating should only be used if all valves operate at the same time in that cycle. The calculated maximum flow will be used to suggest proper end plate port options and, when required, add auxiliary inlet modules to provide additional inlet flow to the manifold.

- Add additional cycles using the upper right “ADD NEW CYCLE” button.
- Use the slider to indicate if the valve is “OFF” or “ON” in that cycle.
- The total flow will be for all “ON” valves at the rated flow that is listed in the application tile. Flow is calculated from Cv, Inlet Pressure and Pressure Drop.
- Total flow is not only useful for manifold inlet options, but this value can be used to size the appropriate FRL for conditioning the air inlet to the manifold.

Valve Operator Voltage: The operating voltage of the valves on your desired manifold or individual solenoid operated valve.

Valve Electrical Connection to the Manifold: Manifold systems are Plug-in or Non-Plug-in type manifolds. Plug-in manifolds include valves that have solenoids connected internally to the manifold to the left end plate. The left end plate includes the electrical connection type to operate the solenoids on the valves.

Manifold Electrical Category: This is choice of electrical control on the left end plate of the manifold for Plug-In valves. Industrial Network – Fieldbus and End Plate Collective Wire are the choices. The type of connection will have to be chosen by the user.

Manifold Electrical Connection Type: Type of control and wiring of the left end plate.

Port Type: Thread or OD tube type of the pneumatic an exhaust ports of the manifold or individual valve.

- NPT / Inch OD Tube: Virtual Engineer will search for solutions with either NPT threaded ports or Inch OD Tube in the ports.
- BSPP / Meter OD Tube: Virtual Engineer will search for solutions with either BSPP threaded ports or Metric OD Tube in the ports.

Valve Temperature:

Temperature Min: Minimum ambient temperature where the valve is mounting. Products not capable of this temperature will be eliminated as possible solutions.

Temperature Max: Maximum ambient temperature where the valve is mounting. Products not capable of this temperature will be eliminated as possible solutions.

Note: Temperature maybe the same or different from the temperature used in Virtual Engineer Actuator to size an actuator. Changing units of measure with the drop down will not convert the temperature. Be careful when switching from Celsius to Fahrenheit and vice versa.

Valve Options: Function Requirements

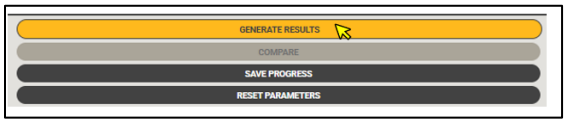
- 3/2: 3-way, 2 position, 3 ported, Normally Closed.
  - If a valve series does not have a 3/2 function, Virtual engineering will convert the valve function to a 4-way valve. User can block port 2 for a Normally Closed Function or block port 4 for a Normally Open Function.
  - If there are multiple 3/2 valves in a manifold, Virtual Engineer Valve will offer a dual 3/2 Normally Closed Valve as a possible solution.
- 5/2: 4-way, 2 position, 5 ported: will search for 4/2: 4-way, 2 position, 4 ported as well.
- 5/3: 4-way, 3 position, 5 ported: will search for 4/3: 4-way, 3 position, 4 ported as well.
- 4/2: 4-way, 2 position, 4 ported: will search for 5/2: 4-way, 2 position, 5 ported as well
- 4/3: 4-way, 3 position, 4 ported: will search for 4/3: 4-way, 3 position, 4 ported as well.
- Virtual Engineer will offer both 5 ported and 4 ported options 4-way valve solutions.

Valve Operator Type:

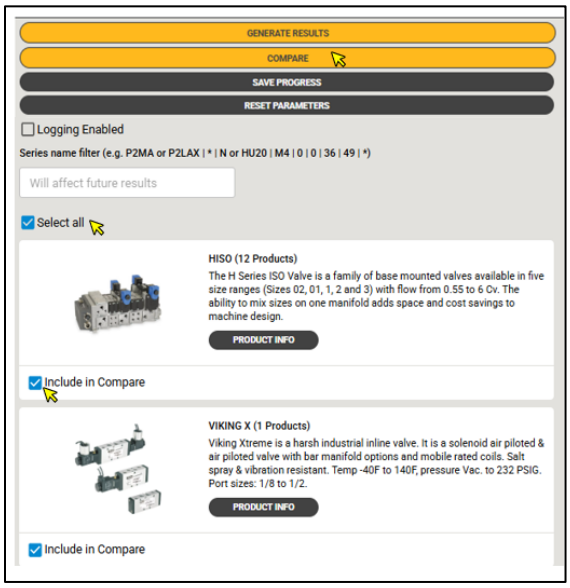
- Operator of the valve. Solenoid or air pilot.
- Manual valves are typically operated by humans such as lever, foot, or push-button valves.
- Mechanical valves are typically operated by automation such as toggle, roller or one way tripper valves.

Regulator options:

- User option to add an intermediate regulator to the valve station. Beware that regulators will reduce the maximum Cv flow of the valve. Using sandwich regulators will increase the physical size of the valve to meeting the application flow.



Generate Results*:* After entering application information, click this button. Calculations will run in the background to determine which cylinders can meet the needs of the application.



Select All: After results are generated, all product series with solutions will be shown.

- "Select All" will show all product solutions.
- Unclick "Select All" and chose specific product solutions by clicking "Include in Compare" box.
- Click "PRODUCT INFO" to view information on parker.com such as Technical Solutions and catalogs in a separate window. *Caution: use the back arrow button to return to Virtual Engineer Valve.*

Compare*:* Once calculations have been completed, click the compare button to generate a table of information enabling the comparison of all qualified potential solutions.

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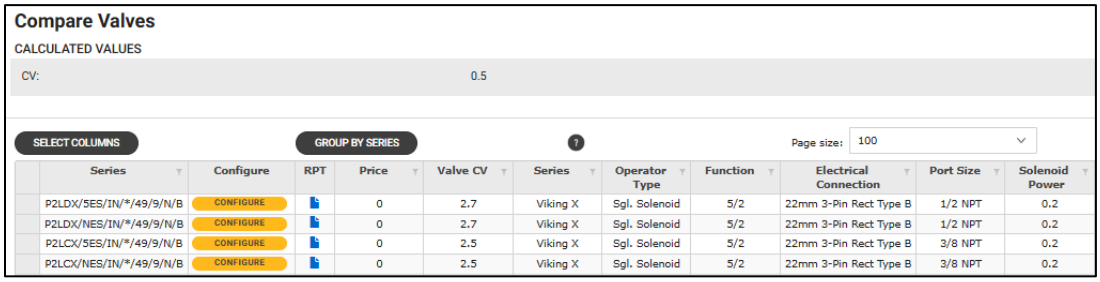
Compare Table Headers (Single Valves)



Compare Valves

CALCULATED VALUES

CV: 0.5

SELECT COLUMNS | GROUP BY SERIES | Page size: 100

Series	Configure	RPT	Price	Valve CV	Series	Operator Type	Function	Electrical Connection	Port Size	Solenoid Power
P2LDX/5ES/IN/*/49/9/N/B	CONFIGURE		0	2.7	Viking X	Sgl. Solenoid	5/2	22mm 3-Pin Rect Type B	1/2 NPT	0.2
P2LDX/NES/IN/*/49/9/N/B	CONFIGURE		0	2.7	Viking X	Sgl. Solenoid	5/2	22mm 3-Pin Rect Type B	1/2 NPT	0.2
P2LCX/5ES/IN/*/49/9/N/B	CONFIGURE		0	2.5	Viking X	Sgl. Solenoid	5/2	22mm 3-Pin Rect Type B	3/8 NPT	0.2
P2LCX/NES/IN/*/49/9/N/B	CONFIGURE		0	2.5	Viking X	Sgl. Solenoid	5/2	22mm 3-Pin Rect Type B	3/8 NPT	0.2

Calculated Valve CV: Application Cv. Example Cv = 0.5

Products: The product column is composed of attributes to complete the valve/manifold in the Parker E-**Configurators**: Typically, this is product size, valve function, port type, operator, and voltage.

Configure: Click to complete product in the parker.com e-configurators.

RPT: Will show a summary report of the product series and application details. Part number will not be fully configured.

Relative Price: Price index showing the least expensive solution as an index of 1.00. All other solutions will have a relative price index greater than the index of 1.00. Example: 1.33 solutions has list price 33% higher index 1.00 solution.

Valve Cv: Cv value indicates the flow rate that the valve can handle. A higher Cv means the valve can pass a larger flow rate for a given pressure drop.

Series: Parker product series.

Operator Type: The mechanism by which the valve is actuated or controlled. Primary operator types of pneumatic valves are Manual, Mechanical, Solenoid or Air Piloted.

Valve Function: Controls the direction of airflow to actuators or applications (e.g., 3/2, 5/2 or 5/3 valves).

Port Size: Thread or OD tube type. Size of thread or tube.

Solenoid Power: Power required to operate a solenoid valve.

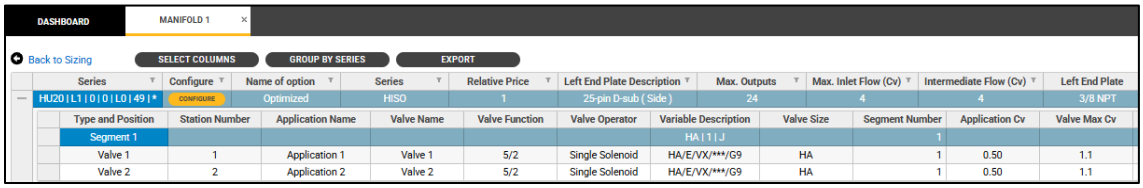
Electrical Connection: Electrical connection type to the solenoid.

Min Pressure (psi): Minimum operating pressure of the valve.

Max Pressure (psi): Maximum operating pressure of the valve.

Cert.: Any applicable certifications.

Compare Table Headers (Manifold Valve)



DASHBOARD | MANIFOLD 1

Back to Sizing | SELECT COLUMNS | GROUP BY SERIES | EXPORT

Series	Configure	Name of option	Series	Relative Price	Left End Plate Description	Max. Outputs	Max. Inlet Flow (Cv)	Intermediate Flow (Cv)	Left End Plate
HU20 | L1 | 0 | 0 | L0 | 49 | *	CONFIGURE	Optimized	HISO	1	25-pin D-sub (Side)	24	4	4	3/8 NPT

Type and Position	Station Number	Application Name	Valve Name	Valve Function	Valve Operator	Variable Description	Valve Size	Segment Number	Application Cv	Valve Max Cv
Segment 1						HA | 1 | J		1		
Valve 1	1	Application 1	Valve 1	5/2	Single Solenoid	HA/E/VX/***/G9	HA	1	0.50	1.1
Valve 2	2	Application 2	Valve 2	5/2	Single Solenoid	HA/E/VX/***/G9	HA	1	0.50	1.1

Name of Option:

- Optimized:
  - Segments with single solenoids will used single address segments.
  - Segments with single and double solenoid valves will used double address segments.
  - Segments with double solenoid valves will used double address segments.
  - May convert multiple 3/2 applications to dual 3/2 valves.
  - May convert single 3/2 applications to 4/2 or 5/2 valves.
- All DA Segments:
  - Same as Optimized but all segments are double addressed segments if applicable.
- No Dual Valves:
  - Converts all 3/2 valves to 5/2 valves.
  - Segments with single solenoids will used single address segments.
  - Segments with single and double solenoid valves will used double address segments.
  - Segments with double solenoid valves will used double address segments.

- No Dual Valves and All DA Segments:
  - Converts all 3/2 valve to 5/2 and segments to double address segments.
  - All segments are double addressed segments if applicable.

Valve Connection:

- "Valve Electrical Connection" if Non-Plug-In valve. See additional information for solenoid connection.
- Left hand end plate electrical connection for Plug-In valves. See additional information on left hand end plates.

Max Inlet Flow (Cv): Combined inlet flow to the manifold from the left-, right-hand end plates and any additional auxiliary inlet modules.

% Inlet Flow Used: The percent of the Max Inlet Flow (Cv) consumed by the applications calculated via simultaneous flow application.

Actual Manifold Outputs:

- Non-Plug-In Valve Manifold: Total number of operating solenoids, if applicable.
- Plug-In Valve Manifold: Sum of all circuit board addresses in the manifold. This may or may not be equal to the total number of valve solenoids.

Optimization Log: Shows the optimization steps to complete each valve application tile.

Station Outputs:

- Double Address: Segment consumes 2 addresses.
- Single Address: Segment consumes 1 address.
- See Valve: Review Valve Operator for single (1 address) or double (2 addresses).

Pop Up Window

- Check open tabs in Dashboard.

- Example: Valve 1 is open. Close Valve 1.

1. **Manual Operated Valves**
2. **Description**: These valves are operated by hand, typically using a lever, knob, or push button.

- **Applications**: Used in situations where manual control is sufficient, such as in maintenance or testing setups.

2. Solenoid Operated Valves

- **Description**: These valves use an electromagnetic coil (solenoid) to open or close the valve. When electricity is applied to the solenoid, it creates a magnetic field that moves a plunger to actuate the valve.
- **Applications**: Commonly used in automated systems where remote control is needed, such as in industrial machinery and robotics.

3. Pneumatically Operated (Air Piloted) Valves

- **Description**: These valves are actuated by compressed air. They often use a diaphragm or piston that moves in response to air pressure changes.
- **Applications**: Used in applications requiring high reliability and speed, such as in production lines and automated processes.

4. Electro-Pneumatic (Solenoid Air Piloted) Valves

- **Description**: These valves combine electrical and pneumatic actuation. They are controlled by an electrical signal but use pneumatic pressure to operate the valve.
- **Applications**: Suitable for applications requiring precise control and automation, often found in complex manufacturing systems.

5. Spring-Return Valves

- **Description**: These valves are held in a default position by a spring. When actuated (manually or electrically), they move to another position, but the spring returns them to the default position when the actuation force is removed.
- **Applications**: Used in safety applications where a return to a default state is necessary when power is lost.

6. Pilot-Operated Valves

- **Description**: These valves use a small pilot valve to control a larger valve. The pilot valve is actuated by a manual or electrical signal, which then controls the flow of air to the larger valve.
- **Applications**: Used in systems where high flow rates are needed but where the actuation force must be minimized.

7. Mechanical Operated Valves

- **Description**: These valves are actuated through mechanical means, such as levers or cams, often linked to other mechanical systems.
- **Applications**: Used in applications where mechanical actuation is preferred or necessary, such as in certain types of machinery.

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