

Why Right Sizing Matters White Paper

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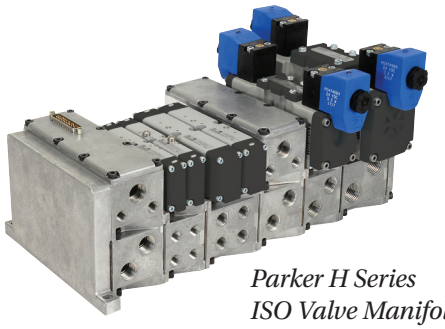
Why Right Sizing Matters



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Innovative machine design is integral to the success of any machine builder. Smart machine design serves innovators with the reward of optimized space on the plant floor, considerable savings on components and installation, inherent safety by design and oh yes, it must meet the functional needs of the ever changing application. One machine will have multiple different speed and load requirements. A sound understanding of the components used in machine design is fundamental, knowledge of current machinery safety standards as well as an understanding in the desired outcome of the machines function. Designers need to meet all of these requirements when choosing products for the application. This phenomenon is known as right sizing. In Pneumatic applications right sizing can have considerable benefits, especially on valve manifolds.



Parker H Series
ISO Valve Manifold

How Valves Are Selected

Valves are generally sized by cylinder bore, actuation speed and pressure required. In the past the entire valve manifold would be sized based on the largest force / speed requirements to ensure enough flow was present in the pneumatic system or split between two manifolds (low and high pressure/ flow). This methodology resulted in waste both in the form of compressed air and in the expense and size of the manifold not to mention labor to install two manifolds.

Today, right sizing is accomplished by selecting the correct valve for each actuator on one manifold based on speed and bore size for a given flow requirement. The Parker H Series ISO valve manifold shown above allows a broad range of flows (0.55 to 3.0 Cv) on one manifold for ease of right sizing. Handy charts provided by the manufacturer like the one shown below can assist in the specification of product.

Cylinder Bore Size - inches (mm)

Cylinder Speed - in/s (mm/s)	1-1/4" (32 mm)	1-1/2" (40 mm)	2.00" (50 mm)	2-1/2" (63 mm)	3-1/4" (80 mm)	4.00" (100 mm)	5.00" (125 mm)	6.00" (150 mm)
1.96 (50)	0.03	0.04	0.06	0.10	0.17	0.26	0.41	0.59
3.93 (100)	0.05	0.08	0.13	0.21	0.35	0.53	0.82	1.19
5.90 (150)	0.08	0.12	0.20	0.31	0.52	0.79	1.24	1.78
7.87 (200)	0.10	0.16	0.26	0.41	0.69	1.05	1.64	2.37
9.84 (250)	0.13	0.20	0.33	0.52	0.87	1.32	2.06	2.97
11.81 (300)	0.16	0.25	0.40	0.62	1.05	1.58	2.47	3.56
13.77 (350)	0.18	0.29	0.46	0.72	1.22	1.85	2.88	4.15
15.74 (400)	0.21	0.33	0.53	0.82	1.39	2.11	3.30	4.75
17.71 (450)	0.24	0.37	0.59	0.93	1.57	2.37	3.71	5.34
19.68 (500)	0.26	0.41	0.66	1.03	1.74	2.64	4.12	5.94
	HB (18mm)		HA (26mm)		H1 (40mm)	H2 (53mm)	H3 (60mm)	

Valve Size

A practical example:

Assuming an application with the following needs:

4 actuators requiring < 0.5 Cv | 4 actuators requiring 1 Cv | 2 actuators requiring 2 Cv

This application can be sized several different ways. The chart below illustrates sizing this based on (solution 1) the highest flow requirements, (solution 2) by splitting the application to two different manifolds for varying flow and finally (solution 3) by right sizing each valve to the corresponding actuator. A cost estimation for both a collective wiring and a networked system was also provided in USA List pricing to show the savings of each scenario. Note that labor is not included and will be an added cost particularly for solution 2 where you would have two manifolds to install. Additionally, purchasing and ISO design ensures easy interchange and availability of parts for future repairs or expansion.

Solution 1:

Single manifold sized to the largest flow requirement



Description Hardwired	Qty	Total LIST Hardwired	Description with Ethernet	Qty	Total LIST Ethernet
Size 2 bases	10	$ 635.00	Size 2 bases	10	$ 635.00
Size 2 single solenoid valves	10	$ 1,174.00	Size 2 single solenoid valves	10	$ 1,174.00
25 pin side end plate	1	$ 92.00	End plate	1	$ 102.00
			Ethernet node	1	$ 450.00
TOTAL		$ 1,901.00			$ 2,361.00

Solution 2:

Split to two manifolds based on flow

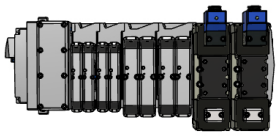




Description Hardwired	Qty	Total LIST Hardwired	Description with Ethernet	Qty	Total LIST Ethernet
Size 2 bases	2	$ 127.00	Size 2 bases	2	$ 127.00
Size 2 single solenoid valves	2	$ 234.80	Size 2 single solenoid valves	2	$ 234.80
Size 02 bases	2	$ 120.00	Size 02 bases	2	$ 120.00
Size 02 single solenoid valves	4	$ 262.40	Size 02 single solenoid valves	4	$ 262.40
Size 01 bases	2	$ 135.00	Size 01 bases	2	$ 135.00
Size 01 single solenoid valves	4	$ 273.20	Size 01 single solenoid valves	4	$ 273.20
25 pin side end plate	2	$ 184.00	Side end plate	2	$ 204.00
			Ethernet node	2	$ 900.00
TOTAL		$ 1,336.40			$ 2,256.40

Solution 3:

Right size the valves on one manifold



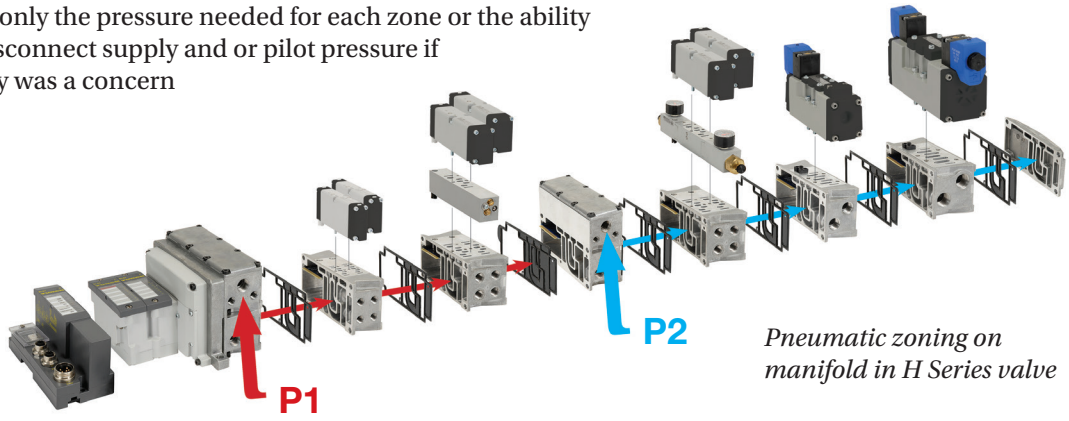
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Size 01 bases	2	$ 135.00	Size 01 bases	2	$ 135.00
Size 01 single solenoid valves	4	$ 273.20	Size 01 single solenoid valves	4	$ 273.20
25 pin side end plate	1	$ 92.00	Side end plate	1	$ 102.00
			Ethernet node	1	$ 450.00
TOTAL		$ 1,244.40			$ 1,704.40

The Clear Advantage

The machine designer with the right sized solution, saves money in installation costs, space on the floor and in the cost of components by taking the time to right size the application. Depending on the application savings can be significant especially in networked applications where purchasing a new network node can cost several hundred dollars.

Why Right Sizing Works

- The range of flow on the H Series valve is 0.55 Cv up to 3.0 Cv (meeting most of your flow requirements)
- Buying only one manifold means purchasing fewer overall components
- The cost of smaller valves is less than buying all the large sized valves
- The use of compressed air was reduced resulting in some uncalculated energy savings
- The labor was reduced to one manifold to install
- Less space is consumed by the manifold
- The manifold can be zoned into different sections and supplied with only the pressure needed for each zone or the ability to disconnect supply and or pilot pressure if safety was a concern



Pneumatic zoning on manifold in H Series valve

Why Right Sizing Matters

Small components on machine add up to a big machine. Build it smarter, lighter and faster with only what you need to save space, money, and to reduce your labor time. As a strategic partner in the pursuit of innovation Parker is here to help engineer your success. Right sizing is exactly what Parker built into the new global valve manifold product the "H Series Valve (with Universal manifold)". Parker understands that one product can be used to feed an entire machine (saving you space) with varying load and speed requirements (saving you money) and must be able to shut down as needed (safety). For these reasons Parker added incredible versatility into one very functional and easy to install component (saving labor) – the valve manifold. Offer yourself the ability to expand the manifold as needed for future expansion (up to 32 piloted solenoids). Consider decentralized mounting for greater functionality. Purchase a product that allows you to create multiple zones for safety, different pressures or to simply add vacuum to the manifold. Building it right saves space, time and money every time.

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