



VALVES, FITTINGS & TUBING PRESSURE VESSELS & REACTORS



High Pressure Equipment
A GRACO Company



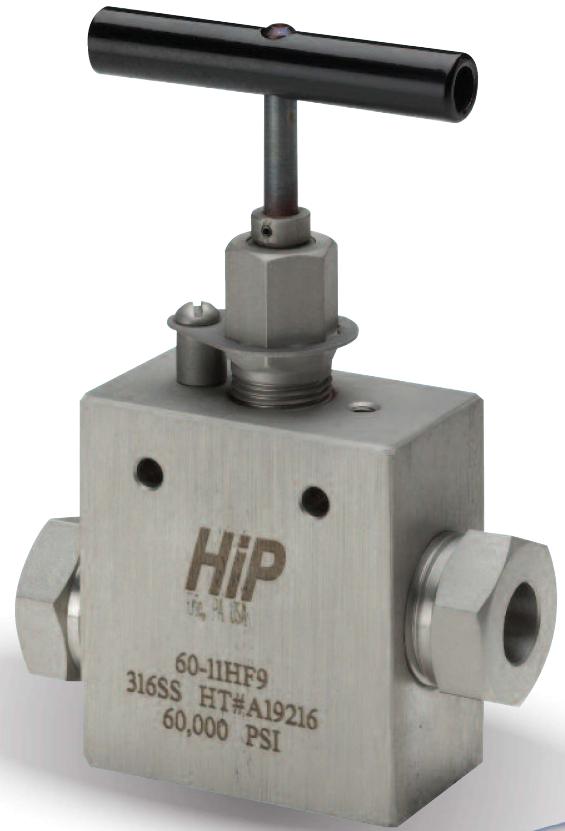
HiP... Our Name is High Pressure

High pressure valves, fittings and tubing manufactured to the highest quality standards, delivered with the shortest lead times, and priced to make you money... it's been the focus at HiP throughout our more than 65 year history. We offer a broad product portfolio capable of handling pressures up to 150,000 psi and carry an extensive inventory allowing us to offer same day shipping of many items. In addition to our high pressure valves, we offer a complete line of reactors and pressure vessels and an expanded family of pumping systems and instrument valves.

In addition to our standard products, we offer a complete line of valves and fittings for oil and gas industry use with sour gas (H₂S). For applications involving specialty gases, corrosive liquids, and extreme temperatures/conditions, we'll make our products using exotic alloys and temperature extensions, as well as design and build a solution to meet your exact requirements, such as our popular custom manifolds. This dedication to satisfying our loyal customers is the driving force behind our continued growth, including our passing the 4 million high pressure valves and fittings shipped milestone.

Commitment to Quality

As a company that exclusively deals in elevated pressure applications, we understand that our customers depend on our products to provide safe and reliable operation at pressures as high as 150,000 psi. Throughout our history we have been dedicated to continuous improvement in all aspects of our manufacturing operation and customer service. This commitment has only increased over time, including our joining the Graco family of companies and implementing their world class quality systems.



Markets

Our high standards for quality, service and value have enabled us to achieve preferred supplier status with a wide variety of market leaders in many different industries.

- **Waterjet Cutting and Blasting**
- **Oil and Gas**
- **Chemical and Petrochemical**
- **Research and Development**
- **Universities and Government**
- **General Industry**

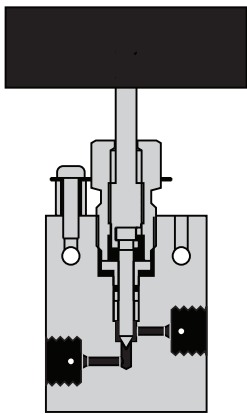
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Valve Design

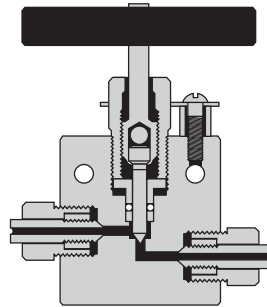
General

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- Valve bodies through 100,000 psi are high tensile Type 316 stainless steel, 150,000 psi valve bodies are 17-4 PH stainless steel.
- Stem assemblies have non-rotating tips to prevent galling with valve seats.
- Packing is located below the stem threads to prevent contact with media (liquid or gas).
- Packing glands are equipped with locking devices or lock nuts.
- Six valve patterns (see chart on page 7).
- Tubing connections are: $\frac{1}{16}$ " , $\frac{1}{8}$ " , $\frac{1}{4}$ " , $\frac{3}{8}$ " , $\frac{9}{16}$ " , $\frac{3}{4}$ " , 1" and $1\frac{1}{2}$ ".
Pipe connections include: $\frac{1}{8}$ " , $\frac{1}{4}$ " , $\frac{3}{8}$ " , $\frac{1}{2}$ " , $\frac{3}{4}$ " , and 1" NPT.
- Remote control air operators are available for most valves.



Slotted Stem



Rolled Style Stem

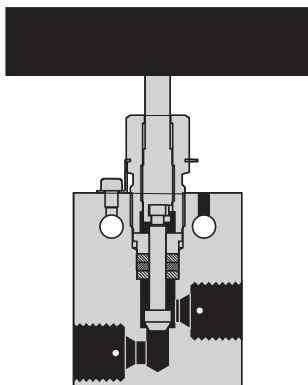
Slotted Stem: Non-rotating slotted stems are standard on AF4, AF6, LF4, LF6, LF9, HF6, HF4, and HF9 (30,000 psi) HF2, HF4, HF6, HF9 (60,000 psi) for on-off service and ensure long life on valve seats. Regulating tip stems are available for all valves at no additional cost, add -REG to part number.

Rolled Style Stem: This simple two-piece design is also non-rotating and is ideal for smaller valves and for valves made from exotic materials. The standard lower section stem is manufactured from hardened 17-4 PH stainless steel. It is affixed to a one-piece upper stem requiring no periodic adjustment. The two stem components are free to rotate independently of each other, thereby minimizing rotation of the lower stem against the valve seat.

The Rolled Style Stem is standard for all AF1, AF2, NFA, NFB, LF4, LF6 valves, 30,000 psi HF2, XF4, and XF6 valves, as well as most valves requiring stems made from exotic materials. It is optional for any valve normally supplied with a Positive Guide Stem.

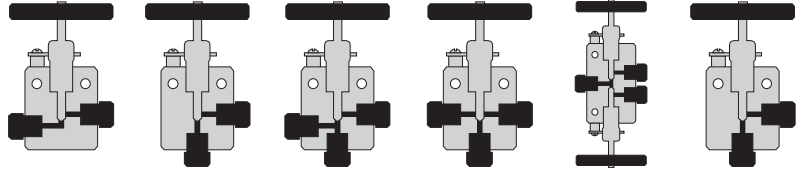
Pinned Stem Design: This variation on the Rolled Style Stem is a three-piece design in which the lower stem is pinned into a freely-rotating stem guide. It has all of the advantages of the rolled style stem, with the additional benefit of a replaceable lower section stem.

The Pinned Stem Design is standard for all NFC, NFD, NFF, NFH, LF9, LF12, LF16, and HF16 valves.



Pinned Stem

Quick Selector Guide to Standard Valves



1

Taper Seal Valves

NPT Valves

Medium Pressure Valves

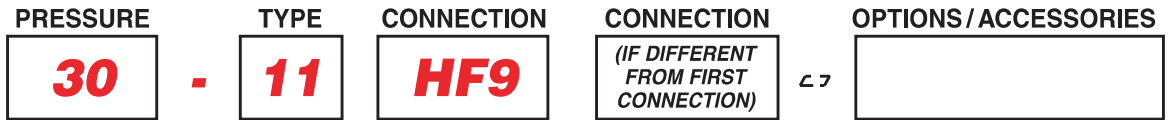
High Pressure Valves

Ultra High Pressure Valves

	10,000 psi	15,000 psi	10,000 psi	15,000 psi	10,000 psi	15,000 psi	20,000 psi	30,000 psi	60,000 psi	100,000 psi	150,000 psi	
Pressure	10,000 psi	15,000 psi	10,000 psi	15,000 psi	10,000 psi	15,000 psi	20,000 psi	30,000 psi	60,000 psi	100,000 psi	150,000 psi	
Valve Type	Two Way Straight	Two Way Angle	Three Way Two Press	Three Way One Press	Three Way Two Stem	Replaceable Seat	Two Way Straight	Two Way Angle	Three Way Two Press	Three Way One Press	Three Way Two Stem	Replaceable Seat
Tube Size	1/4" O.D. / 1/8" I.D.	3/8" O.D. / 1/4" I.D.	1/16" O.D. / .030" I.D.	1/8" O.D. / 1/16" I.D.	1/8" O.D. / .040" I.D.	1/4" O.D. / .083" I.D.	3/8" O.D. / 1/8" I.D.	9/16" O.D. / 3/16" I.D.	1" O.D. / .437" I.D.	1/8" O.D. / .020" I.D.	1/4" O.D. / 1/16" I.D.	3/8" O.D. / 1/8" I.D.
10,000 psi	10-11AF4	10-12AF4	10-13AF4	10-14AF4	10-15AF4	10-12AF4-R	10-11NFA	10-12NFA	10-13NFA	10-14NFA	10-15NFA	10-12NFA-R
10,000 psi	10-11AF6	10-12AF6	10-13AF6	10-14AF6	10-15AF6	10-12AF6-R	10-11NFB	10-12NFB	10-13NFB	10-14NFB	10-15NFB	10-12NFB-R
10,000 psi	10-11NFC	10-12NFC	10-13NFC	10-14NFC	10-15NFC	10-12NFC-R	10-11NFD	10-12NFD	10-13NFD	10-14NFD	10-15NFD	10-12NFD-R
10,000 psi	10F-11NFF	10F-12NFF	10F-13NFF	10F-14NFF	10F-15NFF	10F-12NFF-R	10-11NFH	10F-12NFH	10F-13NFH	10F-14NFH	10F-15NFH	10F-12NFH-R
15,000 psi	15-11AF1	15-12AF1	15-13AF1	15-14AF1	15-15AF1	NA	15F-11NFA	15F-12NFA	15F-13NFA	15F-14NFA	15F-15NFA	15F-12NFA-R
15,000 psi	15-11AF2	15-12AF2	15-13AF2	15-14AF2	15-15AF2	NA	15F-11NFB	15F-12NFB	15F-13NFB	15F-14NFB	15F-15NFB	15F-12NFB-R
15,000 psi	15-11NFC	15F-12NFC	15F-13NFC	15F-14NFC	15F-15NFC	15F-12NFC-R	15F-11NFD	15F-12NFD	15F-13NFD	15F-14NFD	15F-15NFD	15F-12NFD-R
10,000 psi	10-11LF12	10-12LF12	10-13LF12	10-14LF12	10-15LF12	10-12LF12-R	1" O.D. / 11/16" I.D.	10-12LF16	10-13LF16	10-14LF16	10-15LF16	10-12LF16-R
15,000 psi	15-11LF24	15-12LF24	15-13LF24	15-14LF24	15-15LF24	15-12LF24-R	20-11LF4	20-12LF4	20-13LF4	20-14LF4	20-15LF4	20-12LF4R
20,000 psi	20-11LF6	20-12LF6	20-13LF6	20-14LF6	20-15LF6	20-12LF6R	20-11LF9	20-12LF9	20-13LF9	20-14LF9	20-15LF9	20-12LF9R
20,000 psi	20-11LF12	20-12LF12	20-13LF12	20-14LF12	20-15LF12	20-12LF12R	20-11LF16	20-12LF16	20-13LF16	20-14LF16	20-15LF16	20-12LF16R
30,000 psi	30-11HF2	30-12HF2	30-13HF2	30-14HF2	30-15HF2	30-12HF2R	30-11HF4	30-12HF4	30-13HF4	30-14HF4	30-15HF4	30-12HF4R
30,000 psi	30-11HF6	30-12HF6	30-13HF6	30-14HF6	30-15HF6	30-12HF6R	30-11HF9	30-12HF9	30-13HF9	30-14HF9	30-15HF9	30-12HF9R
30,000 psi	30-11HF16	30-12HF16	30-13HF16	30-14HF16	30-15HF16	30-12HF16R	60-11HF2	60-12HF2	60-13HF2	60-14HF2	60-15HF2	60-12HF2R
60,000 psi	60-11HF4	60-12HF4	60-13HF4	60-14HF4	60-15HF4	60-12HF4R	60-11HF6	60-12HF6	60-13HF6	60-14HF6	60-15HF6	60-12HF6R
60,000 psi	60-11HF9	60-12HF9	60-13HF9	60-14HF9	60-15HF9	60-12HF9R	100-11XF4	100-12XF4	100-13XF4	100-14XF4	NA	100-12XF4R
100,000 psi	150-11XF6	150-12XF6	150-13XF6	150-14XF6	NA	150-12XF6R	NA	NA	NA	NA	NA	NA
150,000 psi	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Catalog Numbering System

1



Pressure Series

- 10 = 10,000 psi
- 15 = 15,000 psi
- 20 = 20,000 psi
- 30 = 30,000 psi
- 40 = 40,000 psi
- 60 = 60,000 psi
- 100 = 100,000 psi
- 150 = 150,000 psi

Catalog part numbers for some components (NPT fittings, special alloy parts) have been maintained for historical consideration.

The referred pressure series may not reflect the actual pressure rating. Please refer to applicable catalog page for pressure rating, or consult the factory.

Type of Components

- 2 = Gland, Collar or Sleeve
- 3 = Anti-Vibration Assembly
- 7 = Plug
- 11 = 2-Way Straight Valve
- 12 = 2-Way Angle Valve
- 13 = 3-Way Valve with Two Pressure Connections
- 14 = 3-Way Valve with One Pressure Connections
- 15 = 3-Way, 2-Stem Valve
- 16 = Ball Valve (Floating)
- 21 = Coupling or Adapter
- 22 = Elbow
- 23 = Tee
- 24 = Cross
- 41 = Check Valve
- 51 = Line Filter
- 61 = Safety Head (Straight)
- 63 = Safety Head (Tee Type)
- 71 = 2-Way Ball Valve *
- 72 = 3-Way Ball Valve 180° *
- 73 = 3-Way Ball Valve Diverter *
- 74 = 2-Way Ball Valve *
- 75 = 3-Way Ball Valve 180° *
- 76 = 3-Way Ball Valve Diverter *
- 77 = 3-Way Mini Ball Valve 1/4" NPT
- 80 = 2-Way Ball Valve *
- 81 = 3-Way Ball Valve 180° *
- 82 = 3-Way Ball Valve Diverter *

* (Trunion)

Connection(s) Size and Type

Female	Male
AF1	AM1 1/16" Taper Seal
AF2	AM2 1/8" Taper Seal
AF4	AM4 1/4" Taper Seal
AF6	AM6 3/8" Taper Seal
LF4	LM4 1/4" Medium Pressure
LF6	LM6 3/8" Medium Pressure
LF9	LM9 9/16" Medium Pressure
LF12	LM12 3/4" Medium Pressure
LF16	LM16 1" Medium Pressure
LF24	LM24 1 1/2" Medium Pressure
HF2	HM2 1/8" High Pressure
HF4	HM4 1/4" High Pressure
HF6	HM6 3/8" High Pressure
HF9	HM9 9/16" High Pressure
HF16	HM16 1" High Pressure
XF4	XM4 1/4" Ultra High Pressure
XF6	XM6 3/8" Ultra High Pressure
NFA	NMA 1/8" NPT Pipe
NFB	NMB 1/4" NPT Pipe
NFC	NMC 3/8" NPT Pipe
NFD	NMD 1/2" NPT Pipe
NFF	NMF 3/4" NPT Pipe
NFH	NMH 1" NPT Pipe
—	HA9 9/16" Hose
—	HA12 3/4" Hose
—	HA16 1" Hose
—	HA21 1 5/16" Hose

Options

- V = Micro Control Metering Assembly
- HT = High Temperature Stem Extension (Up to 1,000° F)
- SGS = Sour Gas (H₂S) Service
- N/O = Normally Open
- N/C = Normally Closed
- K = With Antivibration Collars and Glands
- REG = Regulating Tip
- TSR8 = Ball Valve Actuator
- TDA8 = Ball Valve Actuator Double Acting
- W/O = Without Collars and Glands
- LT = Low Temperature Stem Extension (to -320°F)
- MPO-NO = Medium Duty Piston Operator Normally Open
- MPO-NC = Medium Duty Piston Operator Normally Closed
- HPO-NO = Heavy Duty Piston Operator Normally Open
- HPO-NC = Heavy Duty Piston Operator Normally Closed
- EHPO-NO = Extra Heavy Piston Operator Normally Open
- EHPO-NC = Extra Heavy Piston Operator Normally Closed
- OC = Oxygen Cleaning
- HL = Handle Lock (Ball Valve Only)
- MHNO = Mini Hippo Normally Open
- MHNC = Mini Hippo Normally Closed
- LS = Limit Switch

How to Order Valves and Fittings

Simply indicate catalog number and specify option or special requirement.

Examples:

30-11HF4 = 30,000 psi Straight Valve for 1/4" O.D. tubing

60-23HF4 = 60,000 psi Tee for 1/4" O.D. tubing

15-21AF2 = 15,000 psi Straight Coupling for 1/8" O.D. tubing, Taper Seal connections

15-21AF2NMB = 15,000 psi Adapter with one end 1/8" O.D. Female Taper Seal and opposite end Male 1/4" NPT Pipe

30-11HF6-HT = 30,000 psi Straight Valve for 3/8" O.D. tubing with High Temperature Extension

"HIPCO" 10-12NFB (N/C) = 10,000 psi Angle Valve for 1/4" NPT Pipe with "Hipco" Air Operator, Normally Closed

"HIPPO" 15-11A4F (N/C) = 10,000 psi Angle Valve for 1/4" Taper Seal with "Hippo" Piston Operator, Normally Closed

60-21HF4 (Hastelloy C-276) = 60,000 psi Straight Coupling for 1/4" O.D. tubing, made from Hastelloy C-276 material



High Pressure Equipment

Air Operated Valves

High Pressure Equipment Company offers five lines of air operators to accommodate remote operation of pressure valves up to 100,000 psi. Various models of diaphragm and piston operated valves are available in both normally open and normally closed models, and can be controlled by air regulator, electrical solenoid or low pressure manual valve. The Remetco line of air operated metering valves provides remote operation for fine metering applications.



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6,000 psi Mini-Hippo Piston Air Operators for Remote Operation

Mini-Hippo Air Operators are available for both normally open service (spring to open/air to close) and for normally closed service (air to open/spring to close). These piston air operators provide remote automatic on/off operation of valves and can be controlled by means of an air regulator, an electrical solenoid, or a manual low pressure valve in the user's air supply line. Air inlet is 1/8" NPT. Air pressure requirement ranges from 50 to 90 psi.

The Mini-Hippo air operators may be supplied with the valves and operating pressures shown in table.

To order simply specify catalog number of valve and type operation required.

EXAMPLES: 30-11HF4-MHNC (normally closed)
 10-12AF6-MHNO (normally open)
 10-15AF4-MHNO-MHNC (normally open/normally closed)

Normally Open (Spring To Open / Air To Close)

Valve Series	Maximum Operating Pressure	Approximate Air Pressure to Seat Valve
15-**AF2	6,000 psi	55 psi
10-**AF4	6,000 psi	55 psi
10-**AF6	6,000 psi	55 psi
30-**HF4	6,000 psi	55 psi
30-**HF6	6,000 psi	55 psi
30-**HF9	6,000 psi	55 psi

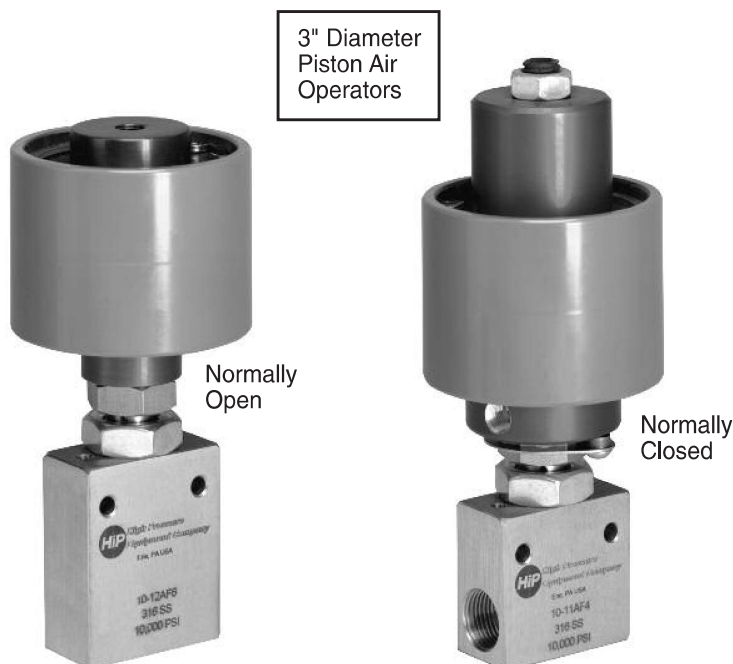
Normally Closed (Air To Open / Spring To Close)

Valve Series	Maximum Operating Pressure	Minimum Adjusting Screw Torque	Approximate Air Pressure to Unseat Valve	Approximate Air Pressure to Fully Open Valve
10-**AF4	6,000 psi	15 in. lb.	50 psi	90 psi
10-**AF6	6,000 psi	15 in. lb.	50 psi	90 psi
30-**HF4	6,000 psi	15 in. lb.	50 psi	90 psi
30-**HF6	6,000 psi	15 in. lb.	50 psi	90 psi
30-**HF9	6,000 psi	15 in. lb.	50 psi	90 psi

** Standard Valve Patterns (reference Page 8)

OPTIONS: *Stems & Seats* . . . Carbide (for cyclic service)
 Stellite (for cyclic service)
 17-4 (for cyclic service)

Valve Bodies Hastelloy C, Hastelloy B
 Inconel 600, Inconel 625
 Incoloy 800, Incoloy 825
 Titanium Grade 2, Titanium 6AL4V
 Nickel
 Monel



Air Operated Valves

Hipco Diaphragm Air Operators for Remote Operation

To 60,000 psi

Hipco Air Operators are available for both normally open service (spring to open/air to close) and for normally closed service (air to open/spring to close). These diaphragm air operators provide remote automatic on/off operation of valves and can be controlled by means of an air regulator, an electrical solenoid, or a manual low pressure valve in the user's air supply line. Air inlet is 1/4" NPT.

The Hipco air operators may be supplied with the valves and operating pressures shown in table.

To order simply specify catalog number of valve and type operation required.

EXAMPLES:

- 30-11HF4-NC (normally closed)
- 10-12NFB-NO (normally open)
- 10-15AF4-NO-NC (normally open/normally closed)

OPTIONS:

Stems & Seats Carbide (for cyclic service)
 Stellite (for cyclic service)
 17-4 (for cyclic service)

Valve Bodies Hastelloy C, Hastelloy B
 Inconel 600, Inconel 625
 Incoloy 800, Incoloy 825
 Titanium Grade 2,
 Titanium 6AL4V
 Nickel
 Monel

Packing PolyPak, High Cyclic

Temperature

Considerations Extended stuffing box for temperatures from -423°F to 1,200°F (medium and high pressure connections only)

6 7/8" Diameter Diaphragm Air Operators



Normally Open (Spring To Open / Air To Close)

Valve Series	Maximum Operating Pressure	Approximate Air Pressure to Seat Valve
10-**AF4	10,000 psi	35 psi
10-**AF6	10,000 psi	35 psi
10-**NFA	10,000 psi	35 psi
10-**NFB	10,000 psi	35 psi
10-**NFC	10,000 psi	35 psi
15F-**NFA	15,000 psi	85 psi
15F-**NFB	15,000 psi	85 psi
15F-**NFC	10,000 psi	100 psi
15F-**NFD	10,000 psi	100 psi
20-**LF4	20,000 psi	60 psi
20-**LF6	15,000 psi	85 psi
20-**LF9	10,000 psi	100 psi
30-**HF4	30,000 psi	60 psi
30-**HF6	30,000 psi	85 psi
30-**HF9	30,000 psi	85 psi
40-**HF9	30,000 psi	85 psi
60-**HF4	60,000 psi	70 psi
60-**HF6	60,000 psi	70 psi
60-**HF9	60,000 psi	70 psi

Normally Closed (Air To Open / Spring To Close)

Valve Series	Maximum Operating Pressure	Minimum Adjusting Screw Torque	Approximate Air Pressure to Unseat Valve	Approximate Air Pressure to Fully Open Valve
10-**AF4	10,000 psi	20 in. lb.	30 psi	45 psi
10-**AF6	10,000 psi	20 in. lb.	30 psi	45 psi
10-**NFA	10,000 psi	20 in. lb.	30 psi	45 psi
10-**NFB	10,000 psi	20 in. lb.	30 psi	45 psi
10-**NFC	10,000 psi	20 in. lb.	30 psi	45 psi
15F-**NFA	15,000 psi	60 in. lb.	80 psi	100 psi
15F-**NFB	15,000 psi	60 in. lb.	80 psi	100 psi
15F-**NFC	10,000 psi	75 in. lb.	95 psi	100 psi
15F-**NFD	10,000 psi	75 in. lb.	95 psi	100 psi
20-**LF4	20,000 psi	40 in. lb.	55 psi	90 psi
20-**LF6	15,000 psi	60 in. lb.	80 psi	100 psi
20-**LF9	10,000 psi	75 in. lb.	95 psi	100 psi
30-**HF4	30,000 psi	40 in. lb.	55 psi	75 psi
30-**HF6	30,000 psi	60 in. lb.	80 psi	100 psi
30-**HF9	30,000 psi	60 in. lb.	80 psi	100 psi
40-**HF9	30,000 psi	60 in. lb.	80 psi	100 psi
60-**HF4	60,000 psi	50 in. lb.	65 psi	85 psi
60-**HF6	60,000 psi	50 in. lb.	65 psi	85 psi
60-**HF9	60,000 psi	50 in. lb.	65 psi	85 psi

** Standard Valve Patterns (reference Page 8)

Remarco Diaphragm Operated Valves for Remote Operation

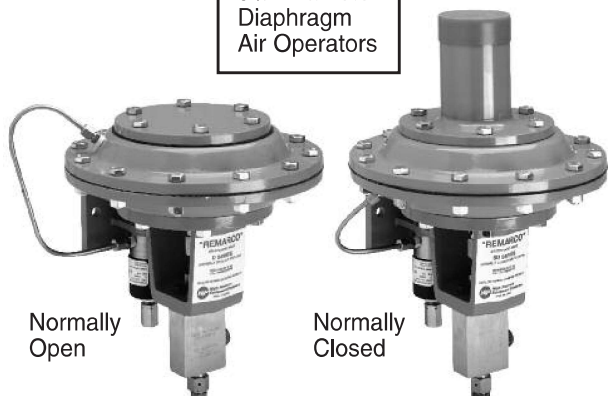
To 100,000 psi

Remarco air operated valves are available for both normally open service (spring to open/air to close) and for normally closed service (air to open/spring to close). These diaphragm operated valves provide remote operation up to 100,000 psi by means of an air input supply ranging from 25 to 90 psi to the air actuator.

An electrical solenoid valve for the air supply is provided with all Remarco valves and is mounted directly to the valve. The standard solenoid is 120 volt, 60 cycle, 11 watts with 1/8" NPT air inlet. (Other voltages available at additional charge—consult factory). The solenoid is normally closed and when energized allows air into the diaphragm casing to activate the valve. In the event of an electrical or air line failure, the valve will return to its "normal" position.

The Remarco valve features removable stem seats. Valve bodies are 316 stainless steel. Valve stems are hardened 17-4PH stainless steel up to 60,000 psi. Tool steel stems are standard on 100,000 psi valves. Standard packing on the 30,000 psi and 60,000 psi Remarco valves is Teflon O-ring with Buna-N, Viton, or Silicone, available at no additional cost.

9 7/8" Diameter Diaphragm Air Operators



Normally Open (Spring To Open / Air To Close)

Valve Series	Maximum Operating Pressure	Approximate Air Pressure to Seat Valve	Orifice	Connections	Tubing Size	
					O.D.	I.D.
D10R12LF9R	10,000 psi	60 psi	1/4"	LF9	9/16"	5/16"
D20R12LF9R	20,000 psi	75 psi	1/4"	LF9	9/16"	5/16"
D30R12HF4R	30,000 psi	65 psi	1/8"	HF4	1/4"	.083"
D30R12HF6R	30,000 psi	65 psi	1/8"	HF6	3/8"	1/8"
D30R12HF9R	30,000 psi	65 psi	1/8"	HF9	9/16"	3/16"
D10R12HF9R	10,000 psi	60 psi	1/4"	HF9	9/16"	5/16"
D60R12HF4R	60,000 psi	55 psi	1/16"	HF4	1/4"	1/16"
D60R12HF6R	60,000 psi	55 psi	1/16"	HF6	3/8"	1/8"
D60R12HF9R	60,000 psi	55 psi	1/16"	HF9	9/16"	3/16"
D100R12XF4R	100,000 psi	40 psi	1/16"	XF4	1/4"	1/16"
D100R12XF6R	100,000 psi	50 psi	1/16"	XF6	3/8"	1/16"

Normally Closed (Air To Open / Spring To Close)

Valve Series	Maximum Operating Pressure	Lock Nut Torque Setting	Approximate Air Pressure to Unseat Valve	Approximate Air Pressure to Fully Open Valve	Orifice	Connections	Tubing Size	
							O.D.	I.D.
SD10R12LF9R	10,000 psi	20 ft. lb.	55 psi	90 psi	1/4"	LF9	9/16"	5/16"
SD20R12LF9R	20,000 psi	40 ft. lb.	70 psi	90 psi	1/4"	LF9	9/16"	5/16"
SD30R12HF4R	30,000 psi	20 ft. lb.	60 psi	75 psi	1/8"	HF4	1/4"	.083"
SD30R12HF6R	30,000 psi	20 ft. lb.	60 psi	75 psi	1/8"	HF6	3/8"	1/8"
SD30R12HF9R	30,000 psi	20 ft. lb.	60 psi	75 psi	1/8"	HF9	9/16"	3/16"
SD10R12HF9R	10,000 psi	20 ft. lb.	55 psi	90 psi	1/4"	HF9	9/16"	5/16"
SD60R12HF4R	60,000 psi	20 ft. lb.	50 psi	65 psi	1/16"	HF4	1/4"	1/16"
SD60R12HF6R	60,000 psi	20 ft. lb.	50 psi	65 psi	1/16"	HF6	3/8"	1/8"
SD60R12HF9R	60,000 psi	20 ft. lb.	50 psi	65 psi	1/16"	HF9	9/16"	3/16"
SD100R12XF4R	100,000 psi	30 ft. lb.	85 psi	100 psi	1/16"	XF4	1/4"	1/16"
SD100R12XF6R	100,000 psi	30 ft. lb.	85 psi	100 psi	1/16"	XF6	3/8"	1/16"

- OPTIONS: *Stems & Seats* . . . Carbide (for cyclic service)
 Stellite (for cyclic service)
- Valve Bodies* MP35N – water service 100K valve
 Hastelloy C, Hastelloy B
 Inconel 600, Inconel 625
 Incoloy 800, Incoloy 825
 Titanium Grade 2, Titanium 6AL4V
 Nickel, Monel
- Packing* PolyPak, High Cyclic

7

Air Operated Valves

Hippo Piston Air Operators for Remote Operation

To 60,000 psi

Hippo Piston Air Operators are available for both normally open service (spring to open/air to close) and for normally closed service (air to open/spring to close). These piston air operators provide remote automatic on/off operation of valves and can be controlled by means of an air regulator, an electrical solenoid, or a manual low pressure valve in the user's air supply line. Air inlet is 1/8" NPT. Air pressure requirement ranges from 35 psi to 120 psi.

These operators may be supplied with the valves and operating pressures shown in table.

Normally Closed (Air To Open/Spring To Close)

Medium Duty

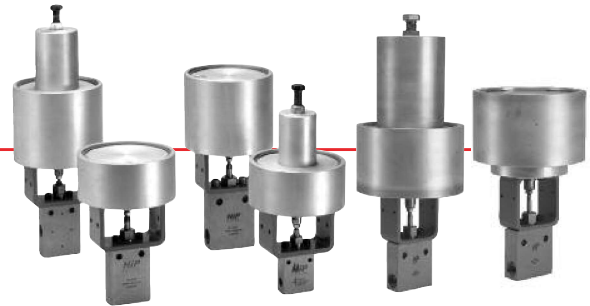
Valve Series	Maximum Operating Pressure	Orifice Size	Minimum Adjusting Screw Torque	Approximate Air Pressure to Unseat Valve	Approximate Air Pressure to Fully Open	Part Number Suffix
10-**AF4	10,000 psi	1/8"	25 in.lb.	30 psi	40 psi	MPO-NC
10-**AF6	10,000 psi	1/8"	25 in.lb.	30 psi	40 psi	MPO-NC
15F-**NFA	15,000 psi	13/64"	45 in.lb.	55 psi	75 psi	MPO-NC
15F-**NFB	15,000 psi	13/64"	45 in.lb.	55 psi	75 psi	MPO-NC
15F-**NFC	10,000 psi	5/16"	55 in.lb.	70 psi	95 psi	MPO-NC
15F-**NFD	10,000 psi	5/16"	55 in.lb.	70 psi	95 psi	MPO-NC
20-**LF4	20,000 psi	1/8"	50 in.lb.	70 psi	95 psi	MPO-NC
20-**LF6	20,000 psi	13/64"	55 in.lb.	70 psi	95 psi	MPO-NC
20-**LF9	10,000 psi	5/16"	55 in.lb.	70 psi	95 psi	MPO-NC
30-**HF4	30,000 psi	3/32"	50 in.lb.	60 psi	75 psi	MPO-NC
30-**HF6	30,000 psi	1/8"	55 in.lb.	60 psi	75 psi	MPO-NC
30-**HF9	30,000 psi	1/8"	55 in.lb.	60 psi	75 psi	MPO-NC
60-**HF4	60,000 psi	1/16"	50 in.lb.	50 psi	65 psi	MPO-NC
60-**HF6	60,000 psi	1/16"	50 in.lb.	50 psi	65 psi	MPO-NC
60-**HF9	60,000 psi	1/16"	50 in.lb.	50 psi	65 psi	MPO-NC

Heavy Duty

15F-**NFC	15,000 psi	5/16"	85 in.lb.	60 psi	75 psi	HPO-NC
15F-**NFD	15,000 psi	5/16"	85 in.lb.	60 psi	75 psi	HPO-NC
20-**LF4	20,000 psi	1/8"	55 in.lb.	35 psi	50 psi	HPO-NC
20-**LF6	20,000 psi	13/64"	60 in.lb.	35 psi	50 psi	HPO-NC
20-**LF9	16,000 psi	5/16"	85 in.lb.	60 psi	75 psi	HPO-NC
20-**LF12	9,000 psi	7/16"	85 in.lb.	60 psi	75 psi	HPO-NC
20-**LF16	6,000 psi	9/16"	85 in.lb.	60 psi	75 psi	HPO-NC
30-**HF4	30,000 psi	3/32"	50 in.lb.	30 psi	40 psi	HPO-NC
30-**HF6	30,000 psi	1/8"	55 in.lb.	30 psi	40 psi	HPO-NC
30-**HF9	30,000 psi	1/8"	55 in.lb.	30 psi	40 psi	HPO-NC
60-**HF4	60,000 psi	1/16"	50 in.lb.	25 psi	35 psi	HPO-NC
60-**HF6	60,000 psi	1/16"	50 in.lb.	25 psi	35 psi	HPO-NC
60-**HF9	60,000 psi	1/16"	50 in.lb.	25 psi	35 psi	HPO-NC

Extra Heavy Duty

20-**LF12	20,000 psi	7/16"	60 ft.lb.	35 psi	60 psi	EHPO-NC
10-**NFF	10,000 psi	11/16"	75 ft.lb.	45 psi	70 psi	EHPO-NC
10-**NFH	10,000 psi	11/16"	75 ft.lb.	45 psi	70 psi	EHPO-NC
10-**LF16	10,000 psi	11/16"	75 ft.lb.	45 psi	70 psi	EHPO-NC
20-**LF16	20,000 psi	9/16"	95 ft.lb.	55 psi	95 psi	EHPO-NC
30-**HF16	30,000 psi	7/16"	90 ft.lb.	50 psi	85 psi	EHPO-NC



To order simply specify catalog number of valve and appropriate suffix of operator required.

EXAMPLES: 20-11LF4-MPO-NC (normally closed)
20-12LF6-HPO-NO (normally open)

OPTIONS:

Stems & Seat . . . Carbide, ceramic or Stellite (for cyclic service)

Valve Bodies . . . Hastelloy C, Hastelloy B
Inconel 600, Inconel 625
Incoloy 800, Incoloy 825
Titanium Grade 2, Titanium 6AL4V
Monel

Packing PolyPak, High Cyclic

Temperature

Consideration . . . Extended stuffing box for temperatures from -423°F to 1,200°F (medium and high pressure connections only)

Normally Open (Spring To Open / Air To Close)

Medium Duty

Valve Series	Maximum Operating Pressure	Orifice Size	Approximate Air Pressure to Seat Valve	Part Number Suffix
10-**AF4	10,000 psi	1/8"	35 psi	MPO-NO
10-**AF6	10,000 psi	1/8"	35 psi	MPO-NO
15F-**NFA	15,000 psi	13/64"	75 psi	MPO-NO
15F-**NFB	15,000 psi	13/64"	75 psi	MPO-NO
15F-**NFC	10,000 psi	5/16"	100 psi	MPO-NO
15F-**NFD	10,000 psi	5/16"	100 psi	MPO-NO
20-**LF4	20,000 psi	1/8"	95 psi	MPO-NO
20-**LF6	20,000 psi	13/64"	100 psi	MPO-NO
20-**LF9	10,000 psi	5/16"	100 psi	MPO-NO
20-**LF12	6,000 psi	7/16"	100 psi	MPO-NO
30-**HF4	30,000 psi	3/32"	60 psi	MPO-NO
30-**HF6	30,000 psi	1/8"	60 psi	MPO-NO
30-**HF9	30,000 psi	1/8"	60 psi	MPO-NO
60-**HF4	60,000 psi	1/16"	55 psi	MPO-NO
60-**HF6	60,000 psi	1/16"	55 psi	MPO-NO
60-**HF9	60,000 psi	1/16"	55 psi	MPO-NO

Heavy Duty

15F-**NFC	15,000 psi	5/16"	75 psi	HPO-NO
15F-**NFD	15,000 psi	5/16"	75 psi	HPO-NO
20-**LF4	20,000 psi	1/8"	55 psi	HPO-NO
20-**LF6	20,000 psi	13/64"	55 psi	HPO-NO
20-**LF9	20,000 psi	5/16"	95 psi	HPO-NO
20-**LF12	13,000 psi	7/16"	100 psi	HPO-NO
20-**LF16	8,800 psi	9/16"	100 psi	HPO-NO
30-**HF4	30,000 psi	3/32"	35 psi	HPO-NO
30-**HF6	30,000 psi	1/8"	35 psi	HPO-NO
30-**HF9	30,000 psi	1/8"	35 psi	HPO-NO
60-**HF4	60,000 psi	1/16"	30 psi	HPO-NO
60-**HF6	60,000 psi	1/16"	30 psi	HPO-NO
60-**HF9	60,000 psi	1/16"	30 psi	HPO-NO

Extra Heavy Duty

20-**LF12	20,000 psi	7/16"	55 psi	EHPO-NO
10-**NFF	10,000 psi	11/16"	45 psi	EHPO-NO
10-**NFH	10,000 psi	11/16"	45 psi	EHPO-NO
10-**LF16	10,000 psi	11/16"	45 psi	EHPO-NO
20-**LF16	20,000 psi	9/16"	55 psi	EHPO-NO
30-**HF16	30,000 psi	7/16"	50 psi	EHPO-NO

** Standard Valve Patterns (reference Page 8)

Remetco Piston Operated Fine Metering Valves

For Liquids or Gases

Precise control with fast response is possible in fine metering applications to 60,000 psi with Remetco Valves. Pinpoint accuracy and repeatability are assured by a unique stem travel control device working in concert with a Conoflow operator, which is actuated by an input air pressure of only 15 psi.

Body material is Type 316 stainless steel, with both stem and removable seat of 17-4PH. The stem tip is ground to a 9° included taper, with orifice sizes as listed in the ordering table.

Installation requires only connection to an air supply of 20 to 100 psi. This is connected both to the supply air connection and to the instrument air inlet. The latter is regulated between 3 and 15 psi to actuate the valve to the desired position.

Regulation is effected by the user's instrument or by the optional instrument panel at lower right. Thus the valve is in its full open position with a 3 psi air input and in the closed position with a 15 psi air input.

Failsafe operation. In standard configuration, the valve OPENS upon failure of the air supply. It may also be supplied to close upon air failure, to open upon an increase in air signal, or any combination of these specifications.

Remote Valve Positioner "RVP." Optional instrument panel shown at bottom can be ordered as an accessory. It is a manually operated remote air signal valve positioner which permits positioning the stem at any desired point within the 1 1/8" travel of the stem (1 1/2" travel on 20M series). The dial indicator is graduated into 100 increments; thus each dial increment moves the stem 0.0112".

Standard inlet and outlet connections to the Remetco Valve are for 9/16" OD coned and threaded tubing. Adapters may be supplied for other tubing sizes upon request.

Shutoff not recommended. While this valve is capable of on-off operation, it is designed as a fine metering instrument. To assure maximum stem life, a manual on-off valve should be used in the line upstream of the Remetco Valve.

To order, use assembly number in table and specify if operation is to be other than the standard closure upon air failure. Add "RVP" as suffix if remote air signal valve positioner is desired.

Ordering Table

Assembly Number	Pressure Rating	Orifice Size	CV
10M-12HF9R	10,000 psi	1/4"	1.2
20M-12LF12R	20,000 psi	3/8"	1.8
30M-12HF9R	30,000 psi	1/8"	0.22
60M-12HF9R	60,000 psi	1/16"	0.06

OPTIONS: *Stems & Seats* . . . Carbide (for cyclic service)
Stellite (for cyclic service)

Valve Bodies Hastelloy-C, Hastelloy B
Inconel 600, Inconel 625
Incoloy 800, Incoloy 825
Titanium Grade 2, Titanium GAL4V
Nickel
Monel

Packing PolyPak available for
LF12 series only



Dimensions shown for 10M, 30M and 60M size. Consult factory for 20M dimensions.



Remote Valve Stem Positioner "RVP" above permits remote positioning of valve stem in increments of 0.0112". To order, add suffix "RVP" to base order number.

Packing Options

NPT Air Operated Valves

HIPCO 10,000 psi Series

Material	Part Number
	NFA NFB
Teflon*	B-181
Grafoil	B-1417
Buna-N	B-102
Viton	B-849
Silicone	B-147

HIPCO 15,000 psi Series

Material	Part Number	
	NFA NFB	NFC NFD
Teflon*	B-1392 Set	207341 Set
Grafoil	B-1391 Set	B-1386 Set
Polypak	B-1388 (1)	B-1387 (1)

HIPPO 15,000 psi Series

Material	Part Number	
	NFA NFB	NFC NFD
Teflon*	B-1392 Set	207341 Set
Grafoil	B-1391 Set	B-1386 Set
Polypak	B-1388 (1)	B-1387 (1)

Air Operated Valves

HIPCO Taper Seal

Material	Part Number
	AF4 AF6
Teflon*	B-181
Buna-N	B-102
Viton	B-849
Silicone	B-147

HIPPO Taper Seal

Material	Part Number
	AF4 AF6
Teflon*	B-181
Buna-N	B-102
Viton	B-849
Silicone	B-147

Mini HIPPO

Material	Part Number		
	AF2	AF4/ AF6	HF4/HF6/ HF9
Teflon*	B-195	B-181	B-181
Buna-N	B-101	B-102	B-102
Viton	B-614	B-849	B-849
Silicone	B-149	B-147	B-147

HIPCO Medium Pressure

Material	Part Number	
	LF4/ LF6	LF9
Teflon*	B-1392 Set	207341 Set
Grafoil	B-1391 Set	B-1386 Set
Polypak	B-1388 (1)	B-1387 (1)

HIPPO Medium Pressure

Material	Part Number	
	LF4/ LF6	LF9
Teflon*	B-1392 Set	207341 Set
Grafoil	B-1391 Set	B-1386 Set
Polypak	B-1388 (1)	B-1387 (1)

HIPCO High Pressure 30,000 psi

Material	Part Number
	HF4/HF6/ HF9
Teflon*	B-181
Grafoil	B-1417
TFE/Buna-N	209276

HIPPO High Pressure 30,000 psi

Material	Part Number
	HF4/HF6/ HF9
Teflon*	B-181
Grafoil	B-1417
TFE/Buna-N	209276

HIPCO High Pressure 60,000 psi

Material	Part Number
	HF2/HF4/ HF6/HF9
Teflon/Nylon**	209689
Grafoil	B-1379
TFE/Viton	212401

HIPPO High Pressure 60,000 psi

Material	Part Number
	HF2/HF4/ HF6/HF9
Teflon/Nylon**	209689
Grafoil	B-1379
TFE/Viton	212401

Temperature Ratings for Packing Options

Material	Maximum Temperature Rating
Buna-N	200°F
Grafoil	800°F
PolyPak	200°F
Silicone	400°F
Teflon	450°F
TFE/Nylon	180°F
TFE/Viton	400°F
Viton	400°F

* Teflon packing supplied as standard

** Teflon/Nylon packing supplied as standard

Note: For pricing see Spare Parts list in Price List