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AUTOMATIC CONTROL VALVES



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Now in its ninth decade, Conbraco Industries, Inc. is a leading manufacturer of flow control products for U.S. and international markets. The company's headquarters is based in Matthews, North Carolina with manufacturing plants and foundries located in Pageland and Conway, South Carolina.

Conbraco has a history of new product development and innovation that dates back to the company's inception in 1928. Today, the Conbraco line of products is marketed under the "Apollo Valves" brand and includes: ball valves, butterfly valves, backflow prevention devices, water pressure reducing valves, mixing valves, safety relief valves, water gauges, strainers, actuation and APOLLOXPRESS® products.

Conbraco's vertically integrated manufacturing ensures a consistency of production, testing, quality and availability. You can be assured that Conbraco flow control products will deliver long term reliability. All manufacturing facilities are ISO 9001:2008 certified.

The Conbraco line continues to expand with new products, designs and advanced materials to better serve the needs of our customers. Markets served include: chemical processing, pulp and paper, petroleum, residential and commercial plumbing and heating, OEM, irrigation, water works, and fire protection.



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CONTROL VALVES

Basic Control Valve



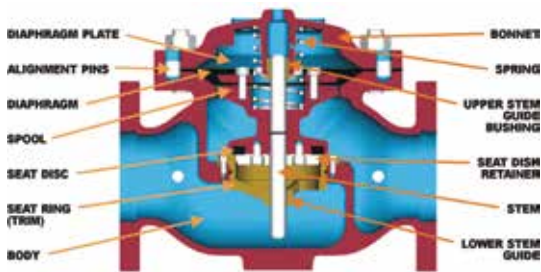
The Apollo Basic Control Valve is a diaphragm actuated, engineered valve. When equipped with a variety of pilots and accessories the valve performs a wide range of automatic fluid control, making it a specified valve in municipal water, fire protection, irrigation, industrial, petroleum and aviation fueling systems.

The Apollo Control Valve is dependable and hard working; with a simplicity of design that ensures minimal part wear with exceptional performance and longevity. Self-contained, the valve operates automatically utilizing line pressure.

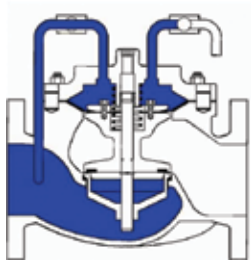
The Apollo Control Valve consists of three major components: body, bonnet and diaphragm assembly.

FEATURES:

- Operates automatically utilizing line pressure.
- Heavy-duty, nylon-reinforced diaphragm isolates top chamber operating pressure from bottom chamber line pressure.
- Rectangular-shaped, soft seat seal provides drip-tight Class VI closure.
- Diaphragm assembly guided top and bottom.
- Throttling seat retainer for flow and pressure stability.
- Easily maintained without removal from the line.
- Diaphragm replaceable without removing internal stem assembly.
- Replaceable seat ring.
- Stainless steel alignment pins assure proper reassembly after maintenance.
- Center-tapped bonnet facilitates installation of position indicator or valve-actuated switches.
- Ductile iron and steel valves are epoxy-coated inside and out, for maximum corrosion protection.
- Valves are factory tested.
- Valves are serial numbered and registered to facilitate replacement parts and factory support.



OPERATION:



VALVE CLOSED

When line pressure from the valve inlet is applied to the cover chamber, pressuring the diaphragm, the valve is closed drip-tight.



VALVE OPEN

When diaphragm chamber pressure is vented the valve travels to the full open position.

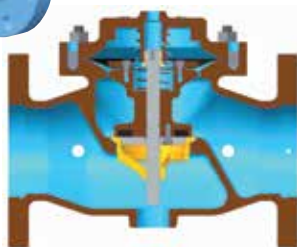


VALVE MODULATING

The valve is between full open and closed. The valve's control pilot modulates the pressure in the diaphragm chamber, positioning the valve to control the desired pressure or flow.

Apollo pilot systems provide accurate control in a wide range of performance requirements.

Reduced Port Valve



The A765 Control Valve is a globe pattern, reduced port engineered valve. The body, bonnet, internals and seat area are a size smaller than the flange size. Reduced port valves address the need for correctly sized valves without the use of pipeline reducers, allowing the valve to handle an application that demands flow rates of a smaller valve. An example would be an application where the flow rate dictates a 3" valve is used but the line size is 4 inches; thus a Model A765, 4" flanged body with 3" internals appropriately fits this condition.

Reduced port valves are available in most Apollo valve series. Valve models using the reduced port basic valve start with a number 7. For example: Model A127 (full port pressure reducing) would become a Model A727 (reduced port pressure reducing).



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CONTROL VALVES

Pressure Reducing Valves

The APOLLO Basic Valve Model A65/A765 when fitted with an external control pilot circuit becomes a very effective pilot operated pressure reducing valve. These “pilot operated regulators” reduce a higher inlet pressure to a constant outlet pressure over a wide range of demand without the pressure “fall-off” characteristic of direct acting regulators. They offer a much higher flow capacity than “direct acting” types and are therefore sized differently; refer to sizing guidelines. (Pages 6 and 7) They can provide additional hydraulic control functions, increasing the versatility of the valve. The Apollo series of pressure reducing valves fall into three distinct types of applications, each of which is defined by their flow characteristics.

COMMERCIAL BUILDINGS



* Image demonstrates fixture usage and is not a recommendation for valve installation, sizing or building design.

A129/A729, A129LF/A729LF

- Valves are located in domestic supply lines
- Flow rates are driven by plumbing fixtures
- Demand may range from zero to moderate
- Water usage can vary greatly depending on time of day
- Piping is typically sized for 100% usage of fixtures that realistically never occurs
- Supply may be from city water pressure and/or pumps

SIZING GUIDELINES

- Minimum demand is a more important consideration than maximum demand!
- Line sized valves are rarely necessary
- Avoid sizing valves for anticipated future demand
- If more than one PRV is feeding the same zone, divide the total zone demand by the number of PRV's
- Refer to the Sizing Charts and contact your Apollo representative for assistance

RECOMMENDED APOLLO MODELS

A129 / A729

- 3-way pilot closes valve quickly when outlet pressure rises due to loss of flow
- Simple outlet pressure adjustable from 20-200 psi
- Pilot system strainer and isolation ball valves
- Manual air bleed valve
- Outlet pressure gauge
- Lead free construction
- Maintained inline
- Sizes: A129 – 1 ½", 2", 2 ½", 3", 4", 6" A729 – 3", 4", 6"
- Refer to Materials / Specification for additional information

A129LF / A729LF

- Same features same a A129 / A729
- Equipped with bypass flow regulator for extreme low flows

ADDITIONAL FUNCTIONS AVAILABLE

- Reverse flow check

FIXTURE USAGE REFERENCE TABLE

This guide is intended to illustrate water supply fixture units or flow demand of plumbing fixtures, common in residential and commercial building water systems. Consider that fixtures are never all used simultaneously when sizing your pilot operated PRV.

1 Fixture Unit = 1 GPM / 3.79 l/m

FIXTURE TYPE based on ½" size	WATER SUPPLY FIXTURE UNITS (WSFU) PER MINUTE	WATER AVERAGE USE (estimate)
Bath Tub – ¾"	4 gal	35 gal
Dishwasher-residential	1.5 gal	10-20 gal
Drinking fountain	0.5	Volume based on time
Hose bib	2.5	Volume based on time
Lavatory	2.2 gal	1-2 gal
Clinic sink	3	Volume based on time
Kitchen sink	1.5	Volume based on time
Mop basin	1.5	Volume based on time
Shower head	2.5 gal	25-50 gal
Wash fountain- ¾"	4	Volume based on time
Toilet-gravity tank	2.5 gal	3-7 gal
Toilet-flushometer tank	1.6	Volume based on time
Washing Machine		18-40 gal / load

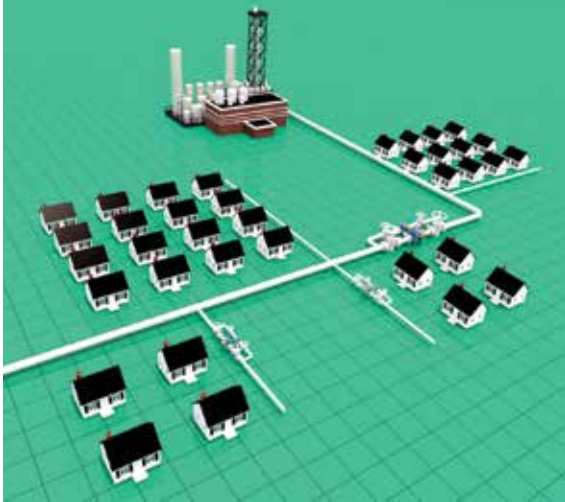


**A129
SHOWN WITH OPTIONAL
LOW FLOW BYPASS
(A129LF)**

CONTROL VALVES

Pressure Reducing Valves

DISTRIBUTION SYSTEMS



** Image demonstrates distribution usage and is not a recommendation for valve installation, sizing or system design.*

A127/A727

- Valves are located in municipal supply lines
- Demand may range from low to high
- High demand may be for fire flow
- Water usage varies relatively slowly over time

SIZING GUIDELINES

- Line sized valves are rarely necessary but are commonly specified
- When sizing valves for anticipated future demand, consider parallel PRV's
- Refer to the Sizing Charts and contact your Apollo Representative for assistance.

RECOMMENDED APOLLO MODELS

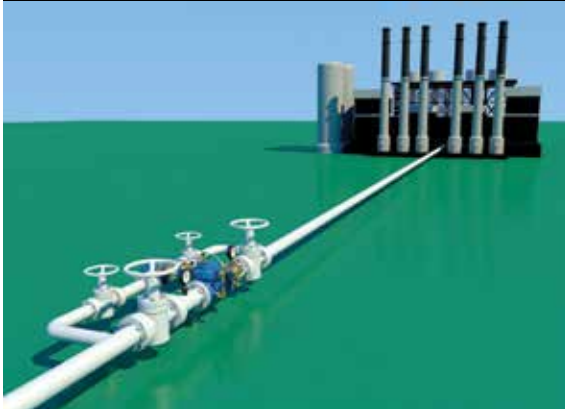
A127 / A727

- 2-way pilot controls valve in response to changes in demand
- Simple adjustment of outlet pressure
- Outlet pressure settings 20-200 psi
- Pilot system strainer, adjustable valve opening speed and isolation ball valves
- Inline maintenance
- Refer to Materials / Specification for additional information

ADDITIONAL FUNCTIONS AVAILABLE

- Back pressure sustaining
- Reverse flow check

PROCESS SYSTEMS



** Image demonstrates process usage and is not a recommendation for valve installation, sizing or system design.*

A127-5/A727-5

- Valves are located in any system where a process rapidly decreases a relatively high flow rate
- Demand may range from very low to high

SIZING GUIDELINES

- Line sized valves are rarely necessary but are commonly specified
- Refer to the Sizing Charts and contact your Apollo Representative for assistance.

RECOMMENDED APOLLO MODELS

A127-5 / A727-5

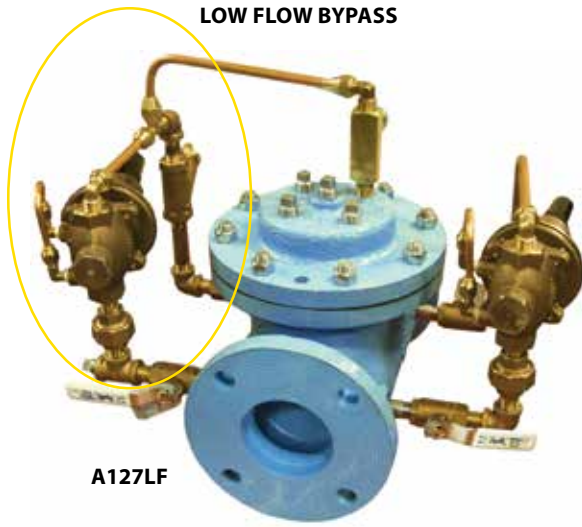
- 2-way pilot controls valve outlet pressure in response to changes in demand
- Surge pilot minimizes downstream pressure buildup by quickly closing valve on rise in outlet pressure (loss of demand)
- Simple adjustment of outlet pressure and surge pressure settings
- Outlet pressure settings (spring ranges) 20-200, 100-300 psi
- Surge pressure setting typically 5-10 psi over outlet pressure setting
- Pilot system strainer, adjustable valve opening speed and isolation ball valves
- Inline Maintenance
- Refer to Materials / Specification for additional information

ADDITIONAL FUNCTIONS AVAILABLE

- Back pressure sustaining
- Solenoid shutoff
- Reverse flow check

CONTROL VALVES

Pressure Reducing Valve Sizing Guide



A127LF

Sizing pilot operated reducing valves is not a complicated process. It starts with determining requirements and following these guidelines in valve size selection. Sizing the PRV involves two factors; Pressure Drop or Differential and Flow Rate.

STEP 1 –

Determine the application type where the valve is being used. Refer to the comments “Sizing Guidelines” under the category selected on page 5 and 6.

- Commercial / Residential Buildings –
- Refer to the fixture usage table for examples of usage in these types of applications.
- Distribution System
- Process System

STEP 2 –

Determine the pressure differential – this is the difference between the inlet pressure (–) minus the outlet pressure.

Example:

INLET 100 psi – OUTLET 50 psi (the pressure desired in the system) Difference = 50 psid

INLET 80 psi – OUTLET 40 psi (the pressure desired to provide to the system) Difference = 40 psid

STEP 3 –

Determine the flow rate (range) that your system may require, Minimum and Maximum flows.

STEP 4 –

Select the valve size from the table on the next page that best fits the application conditions. Select the valve size that provides minimum and maximum flow ranges (min.-max.) for the pressure drop/differential that was calculated. The following types of PRV applications may apply.

SINGLE VALVE

One valve can handle the minimum and maximum at the pressure drop/differential required.

Example: INLET 100 psi with 50 psi OUTLET pressure (differential 50 psi), flows from 25 gpm to 500 gpm. Line size is 4". Valve selection would be the reduced port 4". Outlet pressure would be constant 50 psi over the required flow range.

- 4" Full Port Valve 38-1000 gpm.
- 4" Reduced Port Valve (4" flanges x 3" internals) 29-630 gpm

SINGLE VALVE WITH LOW-FLOW BYPASS

Valves can be equipped with a direct acting regulator or low flow bypass to regulate extremely low flows. This bypass regulator, mounted on the larger main valve, is set at a pressure of 5-10 psi higher than the main valve pilot. It reduces pressure under low flow conditions until the flow rate increases beyond its capacity and the outlet pressure drops. When pressure reaches the main valve pilot setting, it opens to provide pressure at the higher flows. The low-flow bypass configuration is typical for use in “building applications.”

- Direct acting low flow regulators have limited flow capacity. They are most effectively applied to valves sizes 6" x 4" and smaller.

PARALLEL PRESSURE REDUCING VALVES

If one (1) valve is capable of handling the low flow requirements but not the high flow, then two parallel valves may be required. Similar to the low flow bypass, the smaller PRV controls the lower flow rates at a slightly higher pressure setting than the larger PRV. This PARALLEL configuration allows pressure control over a wide range of flows.

- To avoid a gap in flow ranges, select valves so the smaller valve high flow overlaps the larger valve low flow.

Example: INLET 80 psi with 40 psi OUTLET pressure (differential 40 psi) Flows from 10 gpm to 800 gpm.



Selection options would be:

LOW FLOW	
1 1/2" flow range	5 gpm - 154 gpm
2" flow range	9 gpm - 260 gpm
HIGH FLOW	
4" flow range	38 gpm - 1000 gpm
6" x 4" flow range	41 gpm - 1100 gpm

PARALLEL PRESSURE REDUCING VALVE APPLICATION

CONTROL VALVES

Pressure Reducing Valve Sizing Guide

MINIMUM AND MAXIMUM FLOW RATES, GPM, VS. VALVE SIZE AND PRESSURE DIFFERENTIAL

How to use:

- 1.) Determine differential pressure: Inlet pressure minus outlet = differential
- 2.) Find the valve minimum and maximum flow rates per each size valve under the differential column.

Note: 3% OPEN MIN. FLOW / MAXIMUM FLOW BASED ON 90% OPEN OR 25 FT/SEC (which ever is lowest)

FLOW RATE IN GPM

VALVE SIZE	DIFFERENTIAL PRESSURE, PSID							
	10	20	30	40	50	60	70	80
1-1/4"	2-65	3-93	4-113	4-115	5-115	5-115	6-115	6-115
1-1/2"	3-77	4-109	4-133	5-154	6-160	6-160	7-160	7-160
2"	4-134	6-189	8-232	9-260	10-260	11-260	12-260	13-260
2-1/2"	6-194	9-274	11-335	13-375	14-375	16-375	17-375	18-375
3" (Reduced Port)	7-198	9-280	12-285	13-285	15-285	16-285	18-285	19-285
3"	11-342	16-483	20-570	23-570	25-570	28-570	30-570	32-570
4" (Reduced Port)	13-385	18-545	22-630	26-630	29-630	31-630	34-630	37-630
4"	19-569	27-805	33-986	38-1000	42-1000	46-1000	50-1000	54-1000
6" (Reduced Port)	20-610	29-865	35-1060	41-1100	46-1100	50-1100	54-1100	57-1100
6"	35-1053	50-1489	61-1824	70-2106	78-2250	86-2250	93-2250	99-2250
8" (Reduced Port)	46-1366	64-1930	79-2365	91-2475	102-2475	112-2475	120-2475	129-2475
8"	71-2135	101-3019	123-3697	142-3900	159-3900	174-3900	188-3900	201-3900
10"	114-3415	161-4830	197-5915	228-6125	255-6125	279-6125	301-6125	322-6125
12"	186-5578	263-7889	322-8800	372-8800	416-8800	455-8800	492-8800	526-8800
14"	209-6261	295-8855	361-10750	417-10750	467-10750	511-10750	552-10750	590-10750
16"	256-7684	362-10887	444-13310	512-14225	573-14225	627-14225	678-14225	724-14225
18" (Reduced Port)	285-8538	402-12075	493-14225	569-14225	636-14225	697-14225	753-14225	805-14225
20" (Reduced Port)	313-9392	443-13282	542-14225	626-14225	700-14225	767-14225	828-14225	885-14225
24"	655-19638	926-27772	1134-31500	1309-3150	1464-31500	1603-31500	1732-31500	1851-31500

FLOW RATE IN GPM

VALVE SIZE	DIFFERENTIAL PRESSURE, PSID						
	90	100	110	120	130	140	150
1-1/4"	7-115	7-115	7-115	8-115	8-115	8-115	8-115
1-1/2"	8-160	8-160	8-160	9-160	8-160	10-160	10-160
2"	13-260	14-260	15-260	15-260	16-260	17-260	17-260
2-1/2"	19-375	20-375	21-375	22-375	23-375	24-375	25-375
3" (Reduced Port)	20-285	21-285	22-285	23-285	24-285	25-285	26-285
3"	34-570	36-570	38-570	39-570	41-570	43-570	44-570
4" (Reduced Port)	39-630	41-630	43-630	45-630	47-630	49-630	50-630
4"	57-1000	60-1000	63-1000	66-1000	68-1000	71-1000	73-1000
6" (Reduced Port)	61-1100	64-1100	67-1100	70-1100	73-1100	76-1100	78-1100
6"	105-2250	111-2250	116-2250	122-2250	127-2250	131-2250	136-2250
8" (Reduced Port)	137-2475	144-2475	151-2475	158-2475	164-2475	170-2475	176-2475
8"	213-3900	225-3900	236-3900	246-3900	257-3900	266-3900	276-3900
10"	342-6125	360-6125	378-6125	394-6125	410-6125	426-6125	441-6125
12"	558-8800	588-8800	617-8800	644-8800	670-8800	696-8800	720-8800
14"	626-10750	660-10750	692-10750	723-10750	753-10750	781-10750	808-10750
16"	768-14225	810-14225	850-14225	887-14225	924-14225	958-14225	992-14225
18" (Reduced Port)	854-14225	900-14225	944-14225	986-14225	1026-14225	1065-14225	1102-14225
20" (Reduced Port)	939-14225	990-14225	1038-14225	1084-14225	1129-14225	1171-14225	1212-14225
24"	1964-31500	2070-31500	2171-31500	2268-31500	2360-31500	2449-31500	2535-31500



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FIRE PROTECTION CONTROL VALVES

Pressure Reducing Valve

129FC SERIES



The Model 129FC automatically reduces high pressure in building riser pipe to a pressure that can be easily handled by the fire protection components it supplies.

FEATURES:

- Maintains constant discharge pressure despite variations in demand or inlet pressure.
- Eliminates pressure fall off.
- Easily adjusted for discharge pressure ranging from 50-165 psi.
- Easily cleaned, repaired and adjusted without removal from the line.
- Underwriters Laboratories listed, Control Number 1855. (manufactured by OCV Control Valves)
- Diaphragm assembly guided top and bottom is the only moving part of the main valve.
- UL / ULC Listed for pressure control service in sizes 1.5" - 8", globe or angle configuration. (manufactured by OCV Control Valves)
- Horizontal or vertical mounting in all sizes.
- ANSI Flanged Class 150 or Class 300.
- Grooved end flanges available on 1.5" - 6".
- Screwed end flanges available on 1.5", 2", 2.5" and 3".

* See Specifications sheet for options

Fire Pump Relief Valve

108FC SERIES



The Model 108FC automatically relieves excess fire pump discharge pressure, to prevent the pressure from exceeding the rating of the fire system components.

FEATURES:

- Limits maximum pump discharge pressure.
- Adjustable 60-180 psi or 100-300 psi.
- Factory tested and pre-set to your requirements.
- UL Listed & Factory Mutual Approved for both split-case centrifugal and vertical turbine pumps. (manufactured by OCV Control Valves)
- Sizes 3" - 8", globe and angle pattern.
- ANSI Flanged Class 150, Class 300, and 300 inlet x 150 outlet.

* See Specifications sheet for options

Thermal Expansion Pressure Relief Valve

1330FC SERIES



The model 1330FC is a two-way, normally closed valve, that senses pressure under its diaphragm and balances it against an adjustable spring load. An increase in pressure above the spring set point tends to make the valve open.

FEATURES:

- UL Listed. (manufactured by OCV Control Valves)
- 1330FC meets the NFPA 13 requirement for an approved thermal expansion relief valve to be installed downstream of all pressure reducing valves in all sprinkler systems.
- Field adjustable spring range 60-175 psi for accurate control.
- Local sense line (self-contained sense loop).
- All parts replaceable while valve is installed.
- Bronze, stainless steel or nickel aluminum bronze construction.

* See Specifications sheet for options

Pump Suction Control Valve

108FPS SERIES



The model 108FPS is used to prevent the fire pump from outdrawing the available supply. In so doing, it protects the pump suction supply from damage associated with a pressure that is too low or backflow and assures adequate supply pressure to the fire system components.

FEATURES:

- Maintains minimum pump suction pressure.
- Installs on fire pump discharge; senses pump suction.
- Suction pressure is adjustable with single screw.
- Adjustable 5-30 psi range.
- Sizes 3" - 8", globe and angle
- Pilot-operated main valve.
- Maintain without removal from the line.
- Adjustable opening speed.
- Factory tested and can be pre-set to your requirements.
- Factory Mutual Approved. (manufactured by OCV Control Valves)

* See Specifications sheet for options

ADDITIONAL WATER APPLICATION SOLUTIONS

Pressure Relief/Back Pressure

A108 SERIES

NSF



In many liquid piping systems, it is vital that line pressure is maintained within relatively narrow limits. This is the function of the A108 Pressure Relief/Back Pressure Series of the Apollo control valves. Installed in the main flow line, the standard Model A108 acts as a back pressure or pressure sustaining valve. In this configuration, the valve maintains a constant upstream pressure regardless of fluctuating downstream demand. When used in a bypass line, the same model will function as a relief valve, protecting the system against potentially damaging surges.

FEATURES:

- Relief: Maintains a constant inlet pressure by relieving excess high pressure.
- Sustaining: Prevents pressure from dropping below a minimum.
- Inlet pressure is accurate over a wide range of flow.
- Inlet pressure is adjustable with a complete range of control springs.
- Quick opening with controlled closing.
- Isolation ball valves to facilitate maintenance and troubleshooting.
- Spring ranges (inlet setting): 5-30 psi, 20-80 psi, 20-200 standard psi, and 100-300 psi.
- High pressure model A108-2HP spring ranges (inlet setting): 200-750 psi.

* See specifications sheet for material options.

Solenoid Control

A115 SERIES

NSF



The Apollo Series A115 Solenoid Control Valve is designed to provide on/off or open/close control of fluids in response to an electrical signal. The valve consists of the basic Apollo model A65 with solenoid-operated pilot. With the appropriate solenoid, the valve may be normally closed (energize to open) or normally open (energize to close).

FEATURES:

- The A115 Series provides responsive control in answer to such triggering devices as clocks, timers, relays, probes, pressure or temperature sensors.
- Available for AC or DC voltages.
- Wider range of sizes and flow capacity than is available with direct-acting solenoid valves.
- Valves can be equipped with Manual Override solenoid operation.
- Solenoid feature can be added to other hydraulic control functions.
- Isolation ball valves to facilitate maintenance and troubleshooting.

* See specifications sheet for material options.

Differential Control

A110 SERIES

NSF



The Apollo A110 Series Differential Control Valve is designed to accurately control the pressure difference between any two points. In some systems this means the valve remains closed until pressure differential commands its opening. It is a pilot operated, modulating type valve which controls pressure accurately and consistently at the desired setting.

FEATURES:

- Opens on increasing differential.
- Dual pilot sense lines can be valve or remote connected.
- Differential is adjustable over complete range of control springs.
- Isolation ball valves to facilitate maintenance and troubleshooting.
- Spring ranges (outlet setting): 5-30 psid, 20-80 psid, 20-200 psid, and 100-300 psid.

* See specifications sheet for material options.

ADDITIONAL WATER APPLICATION SOLUTIONS

Rate of Flow

A120 SERIES

NSF



The Apollo Series A120 Rate of Flow control valve is designed to control or limit flow to a predetermined rate, regardless of fluctuations in downstream or upstream pressure.

FEATURES:

- Self contained, including the differential sensing orifice plate and pilot.
 - Flow rate is field adjustable (within orifice bore range).
 - Extra sensitive differential pilot specifically designed for rate of flow application.
 - Works equally well on all types of clean, nonabrasive liquids.
 - Isolation ball valves to facilitate maintenance and troubleshooting.
- * See specifications sheet for material options.

Float Control

A800 SERIES

NSF



The Apollo Series A800 Float Control Valves are designed to maintain a desired level in a tank or reservoir by opening for filling the tank when fluid is below the high level point and closing tightly when the desired level is reached.

FEATURES:

- The A800 is a non-modulating valve; either full open or full closed. It is available in two basic configurations:
 1. Model A800, with the float pilot provided separate from the main valve for remote mounting. This configuration is used when the fill line is located at the bottom of the tank.
 2. Model A800VM, with the float pilot mounted on the main valve. This configuration is typically used when the fill line is located at the top of the tank.
 - All Series A800 valves include an Apollo Model A65 Basic Valve assembly and a Model A814 three-way rotary float pilot. For faster operation, valves 8" and larger also include a three-way auxiliary pilot.
 - Isolation ball valves to facilitate maintenance and troubleshooting.
- * See specifications sheet for material options.

Diaphragm Check

A94 SERIES

NSF



The Apollo Series A94 Check Valve is a simple on-off valve that opens to allow forward flow when inlet pressure exceeds outlet and closes tightly to prevent backflow when outlet pressure exceeds inlet pressure.

FEATURES:

- Non-surge opening and/or closing when equipped with adjustable opening and/or closing speed controls.
 - Equipped with valve position indicator on all models.
 - Isolation ball valves to facilitate maintenance and troubleshooting.
- * See specifications sheet for material options.

ADDITIONAL WATER APPLICATION SOLUTIONS

Digital Electronic Valve

A22 SERIES

NSF

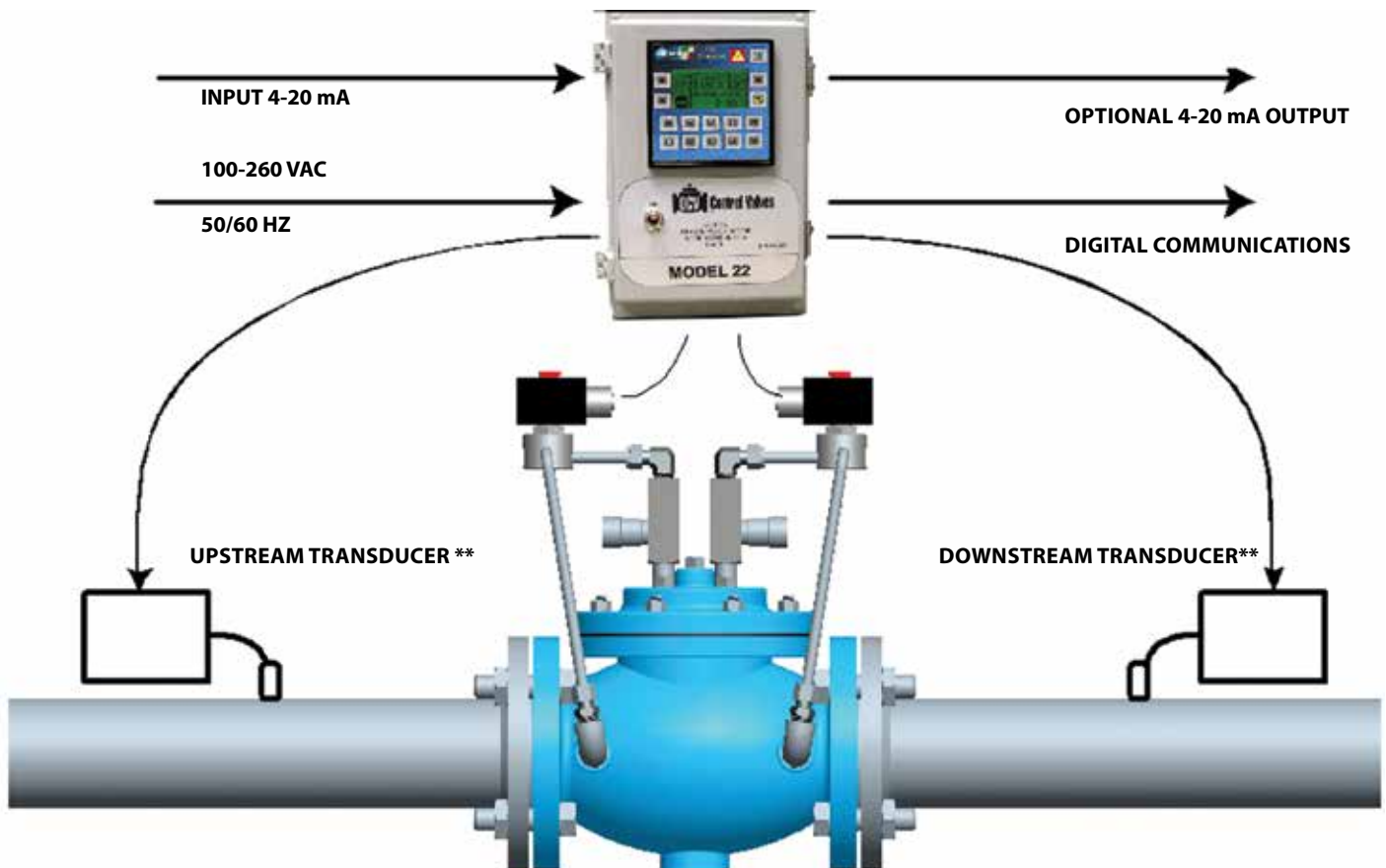


With the development and proliferation of high level SCADA systems comes the need for automatic control valves to interface with such systems. The Apollo Series A22 Digital Electronic Control Valves were specifically designed for this task. While retaining the advantages of simplicity and operation from line pressure, these valves offer a level of ease of operation and degree of control not previously achieved.

FEATURES:

- Can be used as part of a SCADA system, or as a “stand alone.”
- Extreme stability over a wide range of flows.
- Useful when set points must be changed frequently.
- Can be used to control almost any process variable.
- Hydraulic pilot backup available.
- Can be configured to accept all common process signals (4-20 mA, 0-5 volt, etc).
- Can be configured for low head pressure applications.
- Simple valve sizing.
- Isolation ball valves to facilitate maintenance and troubleshooting.

* See specifications sheet for material options.



** PRESSURE TRANSDUCER, FLOW METER, LEVEL TRANSMITTER, THERMOCOUPLE OR RTD

CONTROL VALVES

Specifications



NOTE: All waterworks valves meet the Low-Lead laws of the United States, including individual state laws, as of March 2014. NSF 372

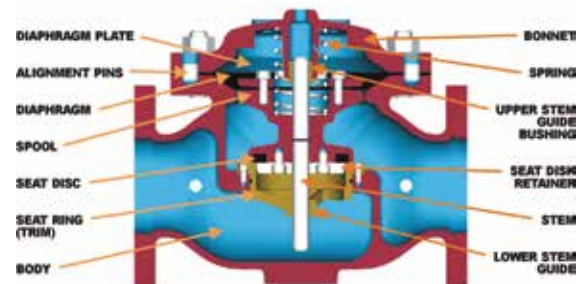
VALVE BODY & BONNET	DUCTILE IRON		CAST STEEL		CAST BRONZE		STAINLESS STEEL	
Material Specifications	ASTM A536/65-45-12 (epoxy coated)		ASTM A216/WCB (epoxy coated)		ASTM B61		ASTM A743/CF8M	
END CONNECTIONS								
Flange Standard (also available in metric)	ANSI B16.42		ANSI B16.5		ANSI B16.24		ANSI B16.5	
Flange Class	150 #	300 #	150 #	300 #	150 #	300 #	150 #	300 #
Flange Face	Flat	Raised	Raised	Raised	Flat	Flat	Raised	Raised
Maximum Working Pressure	250 psi	640 psi	285 psi	740 psi	225 psi	500 psi	285 psi	740 psi
Screwed Working Pressure:	ANSI B1.20.1 (B2.1) 640 psi (Bronze 500 psi)							
Grooved End Working Pressure:	300 psi							
INTERNALS								
Stem	Stainless Steel AISI 303				Optional Monel			
Spring	Stainless Steel AISI 302							
Spool	Ductile Iron ASTM A536 (epoxy coated)				Bronze		Stainless Steel	
Seat Disc Retainer	Ductile Iron ASTM A536 (epoxy coated) 4" & smaller valves - Stainless Steel				Bronze		Stainless Steel	
Diaphragm Plate	Ductile Iron ASTM A536 (epoxy coated)				Bronze		Stainless Steel	
Seat Ring (Trim)	Bronze ASTM B584-C89836 Optional Stainless Steel ASTM A743/CF8M						STN.STL.ASTM A743/CF8M	
Upper Stem Bushing	Standard Bronze ASTM B438			Valve w/Stainless Steel Seat Ring - Teflon			Teflon	
Lower Stem Bushing	Seat Material Valves w/Stainless Steel Seat Ring - Teflon						Teflon	
ELASTOMER PARTS (RUBBER)								
Diaphragm/Seat Disc/O-Rings	Standard - BUNA-N Nylon Reinforced				Optional - Viton®		Optional - EPDM	
Operating Temperature	-40°F to 180°F				32°F to 400°F		0°F to 300°F	
COATINGS	Wide range of coating per your fluid application. Coatings handle municipal potable water, seawater, petroleum and refined products.							
ELECTRICAL SOLENOIDS								
Bodies	Standard Brass				Stainless Steel (Optional)			
Enclosures	Water tight, NEMA 1, 3, 4, & 4X							
Power	AC, 60Hz-24, 120, 240, 480 volts				AC, 50 Hz - In 110 volt multiples		DC, 6, 12, 24, 240 volts	
Operation	Energize to open (normally closed)				De-energize to open (normally open)			

CONTROL PILOTS		
Bodies	Low-Head Bronze	Stainless Steel ASTM A743/CF8M
Internal	Stainless Steel	Stainless Steel
CONTROL CIRCUITS		
Tubing	Copper	Stainless Steel
Fittings	Low-Head Brass	Stainless Steel

SALTWATER SERVICE VALVE MATERIALS

Cast Steel Special Coatings - Ni Aluminum Bronze ASTM B148 - Super Duplex Stainless Steel

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Globe Flanged Sizes

1.25"	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"	16"	18"*	20"*	24"
32mm	40mm	50mm	65mm	80mm	100mm	150mm	200mm	250mm	300mm	350mm	400mm	450mm*	500mm*	600mm

* Consult Factory

Globe Flanged Sizes - Flange X Port (Reduced Port)

3x2"	4x3"	6x4"	8x6"	10x8"*	12x10"*	16x12"*	18x16"	20x16"	24x16"
80x50mm	100x80mm	150x100mm	200x150mm	250x200mm	300x250mm	400x300mm	450x400mm	500x400mm	600x400mm

* Consult Factory

Angle Flanged Sizes

1.25"	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	16"
32mm	40mm	50mm	65mm	80mm	100mm	150mm	200mm	250mm	300mm	400mm

Globe/Angle Screwed Sizes

1.25"	1.5"	2"	2.5"	3"
32mm	40mm	50mm	65mm	80mm



Globe/Angle Grooved Sizes

1.5"	2"	2.5"	3"	4"	6"*
32mm	50mm	65mm	80mm	100mm	150mm*

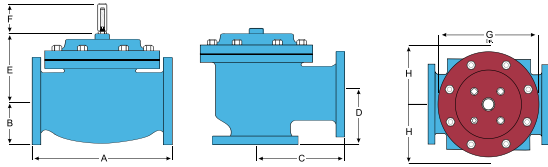
* Globe only

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CONTROL VALVES

Dimensions

FULL PORT VALVE DIMENSIONS



For maximum efficiency, the control valve should be mounted in a piping system so that the valve bonnet (cover) is in the top position. Other positions are acceptable but may not allow the valve to function to its fullest and safest potential. In particular please consult the factory before installing 8" and larger valves, or any valves with a limit switch, in positions other than described. Space should be taken into consideration when mounting valves and their pilot systems.

A routine inspection and maintenance program should be established and conducted yearly by a qualified technician.

U.S. DIMENSIONS - INCHES

DIM	END CONN.	1-1/4 - 1-1/2	2	2-1/2	3	4	6	8	10	12	14	16	24
A	SCREWED	8-3/4	9-7/8	10-1/2	13	--	--	--	--	--	--	--	--
	GROOVED	8-3/4	9-7/8	10-1/2	13	15-1/4	20	--	--	--	--	--	--
	150# FLGD	8-1/2	9-3/8	10-1/2	12	15	17-3/4	25-3/8	29-3/4	34	39	40-3/8	62
	300# FLGD	8-3/4	9-7/8	11-1/8	12-3/4	15-5/8	18-5/8	26-3/8	31-1/8	35-1/2	40-1/2	42	63-3/4
B	SCREWED	1-7/16	1-11/16	1-7/8	2-1/4	--	--	--	--	--	--	--	--
	GROOVED	1*	1-3/16	1-7/16	1-3/4	2-1/4	3-5/16	--	--	--	--	--	--
	150# FLGD	2-5/16 - 2-1/2	3	3-1/2	3-3/4	4-1/2	5-1/2	6-3/4	8	9-1/2	10-5/8	11-3/4	16
	300# FLGD	2-5/8 - 3-1/16	3-1/4	3-3/4	4-1/8	5	6-1/4	7-1/2	8-3/4	10-1/4	11-1/2	12-3/4	18
C Angle	SCREWED	4-3/8	4-3/4	6	6-1/2	--	--	--	--	--	--	--	--
	GROOVED	4-3/8*	4-3/4	6	6-1/2	7-5/8	--	--	--	--	--	--	--
	150# FLGD	4-1/4	4-3/4	6	6	7-1/2	10	12-11/16	14-7/8	17	--	20-13/16	--
	300# FLGD	4-3/8	5	6-3/8	6-3/8	7-13/16	10-1/2	13-3/16	15-9/16	17-3/4	--	21-5/8	--
D Angle	SCREWED	3-1/8	3-7/8	4	4-1/2	--	--	--	--	--	--	--	--
	GROOVED	3-1/8*	3-7/8	4	4-1/2	5-5/8	--	--	--	--	--	--	--
	150# FLGD	3	3-7/8	4	4	5-1/2	6	8	11-3/8	11	--	15-11/16	--
	300# FLGD	3-1/8	4-1/8	4-3/8	4-3/8	5-13/16	6-1/2	8-1/2	12-1/16	11-3/4	--	16-1/2	--
E	ALL	6	6	7	6-1/2	8	10	11-7/8	15-3/8	17	18	19	27
F	ALL	3-7/8	3-7/8	3-7/8	3-7/8	3-7/8	3-7/8	6-3/8	6-3/8	6-3/8	6-3/8	6-3/8	8
G	ALL	6	6-3/4	7-11/16	8-3/4	11-3/4	14	21	24-1/2	28	31-1/4	34-1/2	52
H	ALL	10	11	11	11	12	13	14	17	18	20	20	28-1/2

* GROOVED END NOT AVAILABLE IN 1-1/4"

METRIC DIMENSIONS - M.M.

DIM	END CONN.	DN32-DN40	DN50	DN65	DN80	DN100	DN150	DN200	DN250	DN300	DN350	DN400	DN600
A	SCREWED	222	251	267	330	--	--	--	--	--	--	--	--
	GROOVED	222	251	267	330	387	--	--	--	--	--	--	--
	150# FLGD	216	238	267	305	381	451	645	756	864	991	1026	1575
	300# FLGD	222	251	283	324	397	473	670	791	902	1029	1067	1619
B	SCREWED	37	43	48	57	--	--	--	--	--	--	--	--
	GROOVED	25*	30	37	44	57	--	--	--	--	--	--	--
	150# FLGD	59-64	76	89	95	114	140	171	203	241	270	298	406
	300# FLGD	67-78	83	95	105	127	159	191	222	260	292	324	457
C Angle	SCREWED	111	121	152	165	--	--	--	--	--	--	--	--
	GROOVED	111*	121	152	165	194	--	--	--	--	--	--	--
	150# FLGD	108	121	152	152	191	254	322	378	432	--	529	--
	300# FLGD	111	127	162	162	198	267	335	395	451	--	549	--
D Angle	SCREWED	79	98	102	114	--	--	--	--	--	--	--	--
	GROOVED	79*	98	102	114	143	--	--	--	--	--	--	--
	150# FLGD	76	98	102	102	140	152	203	289	279	--	398	--
	300# FLGD	79	105	111	111	148	165	216	306	298	--	419	--
E	ALL	152	152	178	165	203	254	302	391	432	457	483	686
F	ALL	98	98	98	98	98	98	162	162	162	162	162	203
G	ALL	152	171	195	222	298	356	533	622	711	794	876	1321
H	ALL	254	279	279	279	305	330	356	432	457	508	508	724

* GROOVED END NOT AVAILABLE IN DN32

REDUCED PORT VALVE DIMENSIONS - A700 SERIES

DIM	ANSI CLASS	VALVE SIZE										
		3	4	6	8	10*	12*	16*	18	20	24	
A	150	10.50	13.50	15.50	21.62	26.00	30.00	35.00	48.00	48.00	48.00	48.00
	300	10.88	14.12	16.38	22.62	27.38	31.50	36.62	49.62	49.62	49.75	49.75
B	150	3.75	4.50	5.50	6.75	8.00	9.50	11.75	12.50	13.75	16.00	16.00
	300	4.12	5.00	6.25	7.50	8.75	10.25	12.75	14.00	15.25	18.00	18.00
E	ALL	6.00	6.50	7.92	10.00	11.88	15.38	17.00	19.00	19.00	19.00	19.00
F	ALL	3.88	3.88	3.88	3.88	6.38	6.38	6.38	6.38	6.38	6.38	6.38
G	ALL	6.75	8.75	11.75	14.00	21.00	24.50	28.00	34.50	34.50	34.50	34.50
H	ALL	11.00	11.00	12.00	13.00	14.00	17.00	18.00	20.00	20.00	20.00	20.00
INTERIOR PORT		2"	3"	4"	6"	8"	10"	12"	16"	16"	16"	16"
Cv		70	135	215	480	--	--	--	3000	3300	3600	3600

* consult factory



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CONTROL VALVES

Valve Flow Characteristics



General flow characteristics for on/off valve sizes are listed below. DO NOT use this data to size modulating valves. Refer to earlier sizing information in this brochure for sizing valves.

FLOW CHARACTERISTICS:

Valve Size	US	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	6"	8"	10"	12"	14"	16"	24"
	Metric	DN32	DN40	DN50	DN65	DN80	DN100	DN150	DN200	DN250	DN300	DN350	DN400	DN600
Globe Cv	US	23	27	47	68	120	200	450	760	1250	1940	2200	2850	6900
	Metric	5.5	6.5	11.3	16.3	28.7	47.9	108	182	299	465	527	683	1653
Angle Cv	US	30	35	65	87	160	270	550	1000	1600	2400	--	4000	--
	Metric	7.2	8.4	15.6	20.8	38.3	64.7	132	240	383	575	--	958	--

$$DP = sg \left(\frac{Q}{Cv} \right)^2$$

where:

Q = Flow Rate in USGPM (U.S.) or

Cv = Flow Rate in USGPM @ 1 psi pressure drop (U.S.) or

DP = Pressure drop in psi (U.S.) or

sg = specific gravity of line fluid

Q = Flow Rate in liters/sec (Metric)

Cv = Flow Rate in liter/sec @ 1 bar pressure drop (Metric)

DP = Pressure drop in bar (Metric)

Reduced Port Valve Flow Characteristics



General flow characteristics for on/off valve sizes are listed below. DO NOT use this data to size modulating valves. Refer to earlier sizing information in this brochure for sizing valves.

FLOW CHARACTERISTICS:

Flange Size (inches)	3"	4"	6"	8"	10"*	12"*	16"*	18"	20"	24"
Interior Port (inches)	2"	3"	4"	6"	8"	10"	12"	16"	16"	16"
Flange Size (Metric)	DN80	DN100	DN150	DN200	DN250	DN300	DN400	DN450	DN500	DN600
Interior Port (Metric)	50	80	100	150	200	250	300	400	400	400
Cv (US Gal @ 1 PSID)	70	135	215	480	--	--	--	3000	3300	3600
Cv (L/Sec @ 1 bar)	16.7	32.3	51.4	114.7	--	--	--	717	789	860

*consult factory

$$DP = sg \left(\frac{Q}{Cv} \right)^2$$

where:

Q = Flow Rate in USGPM (U.S.) or

Cv = Flow Rate in USGPM @ 1 psi pressure drop (U.S.) or

DP = Pressure drop in psi (U.S.) or

sg = specific gravity of line fluid

Q = Flow Rate in liters/sec (Metric)

Cv = Flow Rate in liter/sec @ 1 bar pressure drop (Metric)

DP = Pressure drop in bar (Metric)

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Conbraco Industries, Inc. warrants, to its initial purchaser only, that its products which are delivered to this initial purchaser will be of the kind described in the order or price list and will be free of defects in workmanship or material for a period of FIVE years from the date of delivery to you, our initial purchaser. This warranty applies to Apollo brand product with "Made in the USA" markings only.

Should any failure to conform to this warranty appear within FIVE years after the date of the initial delivery to our initial purchaser, Conbraco will, upon written notification thereof and substantiation that the goods have been stored, installed, maintained and operated in accordance with Conbraco's recommendations and standard industry practice, correct such defects by suitable repair or replacement at Conbraco's own expense.

APOLLO INTERNATIONAL PRODUCTS: Conbraco Industries, Inc. warrants its International products, to its initial purchaser only, that its international products which are delivered to this initial purchaser will be of the kind described in the order or price list and will be free of defects in workmanship or material for a period of TWO years from the date of delivery to you, our initial purchaser.

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* It is the end user's responsibility to confirm that items intended for use satisfy local codes and standards.



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REGIONAL MANAGEMENT – APOLLO VALVES, ELKHART PRODUCTS & LASCO FITTINGS

	AREAS COVERED	EMAIL	PHONE
SENIOR MANAGEMENT			
Brian Ragone	Senior VP - Sales & Marketing	brian.ragone@conbraco.com	513-200-5415
Don Russell	VP Sales - Commercial & Industrial	don.russell@conbraco.com	614-943-0688

REGIONAL SALES DIRECTORS – COMMERCIAL & INDUSTRIAL			
Mike Bedzyk	Central/Northeast	michael.bedzyk@conbraco.com	614-619-4993
Mitch Davis	S. Central/Southeast	mitch.davis@conbraco.com	678-628-4478
Phillip Merino	West	phillip.merino@conbraco.com	702-960-9935

REGIONAL SALES MANAGERS – COMMERCIAL & INDUSTRIAL			
Kevin Ashworth	Southeast	kevin.ashworth@conbraco.com	757-272-6200
Keith Baca	Southeast	keith.baca@conbraco.com	615-630-3892
Mike Blair	Central	mike.blair@conbraco.com	330-413-0035
Steve Brown	Northwest	steve.brown@conbraco.com	425-985-5095
Ken Copeland	Southwest	ken.copeland@conbraco.com	623-853-5744
Ben Lauletta	Northeast	ben.lauletta@conbraco.com	518-795-4629
Wesley Reinart	S. Central	wesley.reinart@conbraco.com	214-620-9901

INDUSTRIAL MARKET MANAGERS			
Dave Eck	Northeast	david.eck@conbraco.com	302-268-4411
Ken Griffin	Industrial & Commercial Valve Trainer	ken.griffin@conbraco.com	704-621-9296
Mark Sordelet	Central	mark.sordelet@conbraco.com	260-433-7393
Skip Wilson	Northwest	skip.wilson@conbraco.com	760-518-2222

BACKFLOW MARKET MANAGERS			
Pete Chapman	National Manager	pete.chapman@conbraco.com	559-577-2593
Cary Wiley	East	cary.wiley@conbraco.com	678-642-3356

APOLLOXPRESS MARKET MANAGERS			
John Rankel	National Manager	john.rankel@conbraco.com	702-445-0309
Todd Green	South Central	todd.green@conbraco.com	501-920-2029
Brian Jennings	North Central	brian.jennings@conbraco.com	859-394-3319
Robert Purchia	East	robert.purchia@conbraco.com	704-960-3532

	AREAS COVERED	EMAIL	PHONE
APOLLOPUSH MARKET MANAGERS			
George Dragoz	Northeast	george.dragosz@elkhartproducts.com	574-206-3953
Mark Schanback	Southeast	mark.schanback@conbraco.com	407-916-9626
Jeremy Small	Central	jeremy.small@conbraco.com	214-766-2106
Dean Weidlein	West	dean.weidlein@elkhartproducts.com	702-355-8615

WROT/CAST MARKET MANAGERS			
Cindy Goodwin	National Manager	cindy.goodwin@elkhartproducts.com	517-294-0007

CANADA			
Jeff Cooper	General Manager	jeff.cooper@conbraco.com	416-451-9336
Andy Fretz	Commercial	andy.fretz@conbraco.com	647-281-3161
Jim Todman	Industrial	jim.todman@conbraco.com	905-407-8385

LASCO FITTINGS REGIONAL SALES MANAGERS – IRRIGATION			
David Beyer	Northeast	dbeyer@lascofittings.com	561-718-9379
Don Caver	Central	dcaver@lascofittings.com	469-628-4918
Ben Freeman	Southeast	bfreeman@lascofittings.com	205-919-4944
Bryan Jackman	West	bjackman@lascofittings.com	714-673-5875
Jimmy White	National Sales Manager	jwhite@lascofittings.com	731-234-2372
Rick Williamson	Eastern Specifications Manager	rwilliamson@lascofittings.com	386-451-2307

INTERNATIONAL SALES MANAGERS			
Bill McNamara	Director of International Sales	bill.mcnamara@elkhartproducts.com	1-574-903-3821
JR Jefferson	Central/South America & the Caribbean	jr.jefferson@conbraco.com	1-832-220-3783
Brencliff Group	Australia, New Zealand	petermcl@brencliff.com	61 477 223110
Pegler Yorkshire	United Kingdom	adrian.byrne@conbraco.com	44-7740-449858
Pegler Yorkshire Mid East	Middle East/India	peter.pydubai@gmail.com	971-4-454-2353
	Europe/Africa/Israel	customersupport@conbraco.com	1-704-841-6000

current as of 7/20/15

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