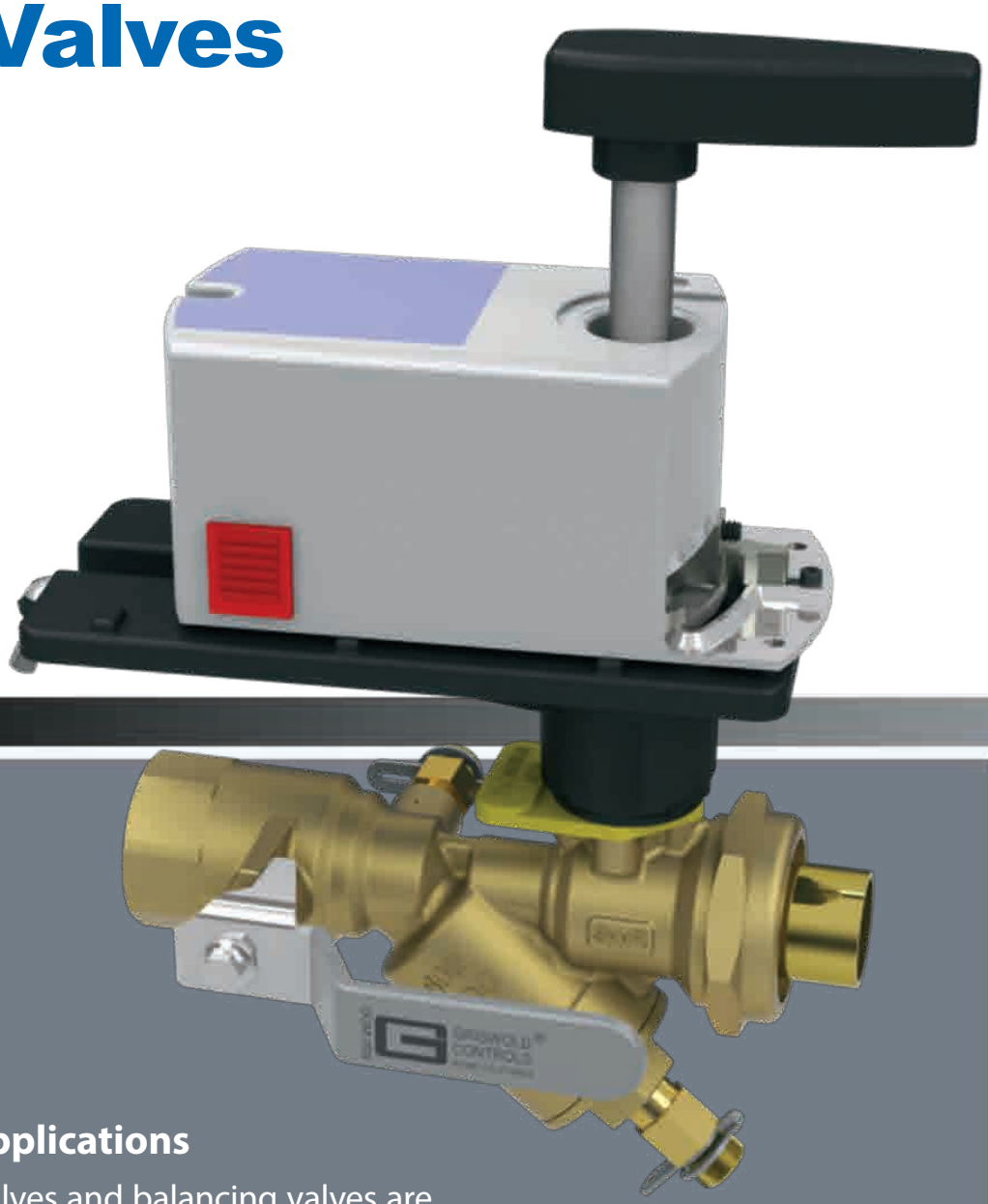
GRISWOLD CONTROLS®

Automizer® Combination Control Valves

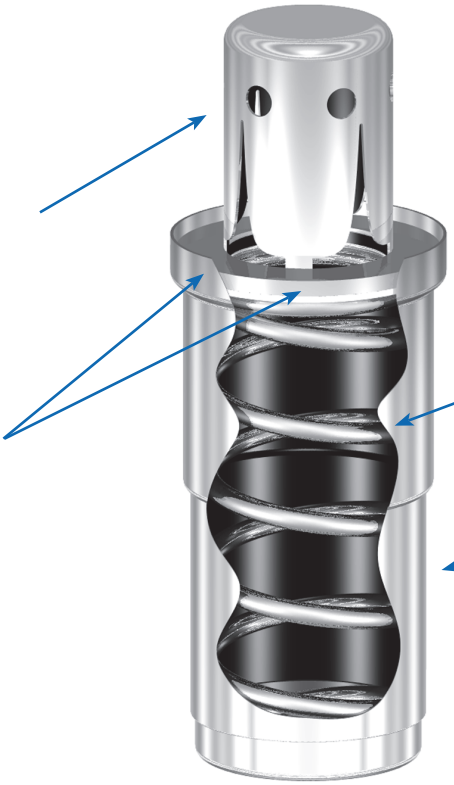


Recommended Applications

- Where actuated valves and balancing valves are used to control the flow
- For VAV boxes, fan coil units and terminal boxes
- Where space is tight

Absolute Control. Optimized Efficiency.

Flow Limit



Additional Flow Openings:
Can be added to achieve desired flow level at coil

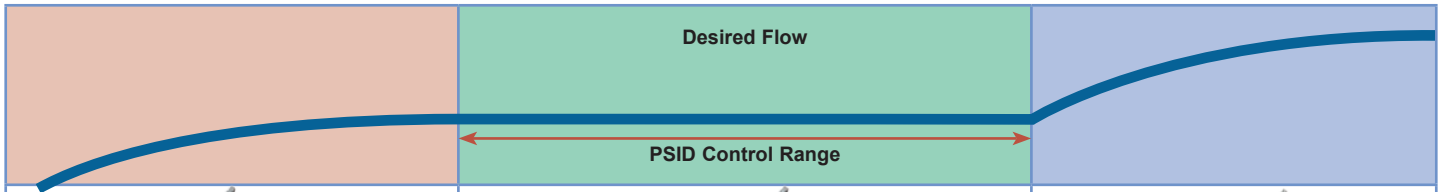
Precision Cut:
Cut by a computer–guided laser beam for 100% consistency

Parabolic Engineered Passage Profile:
Proven to reliably produce a smooth flow curve

Stainless Steel Spring:
Will not erode or rust over years of service.

Stainless Steel Design:
Resists corrosion and is the industry standard material. Griswold Controls has always used stainless steel in their cartridges

The Griswold Controls Flow Limiting Cartridge



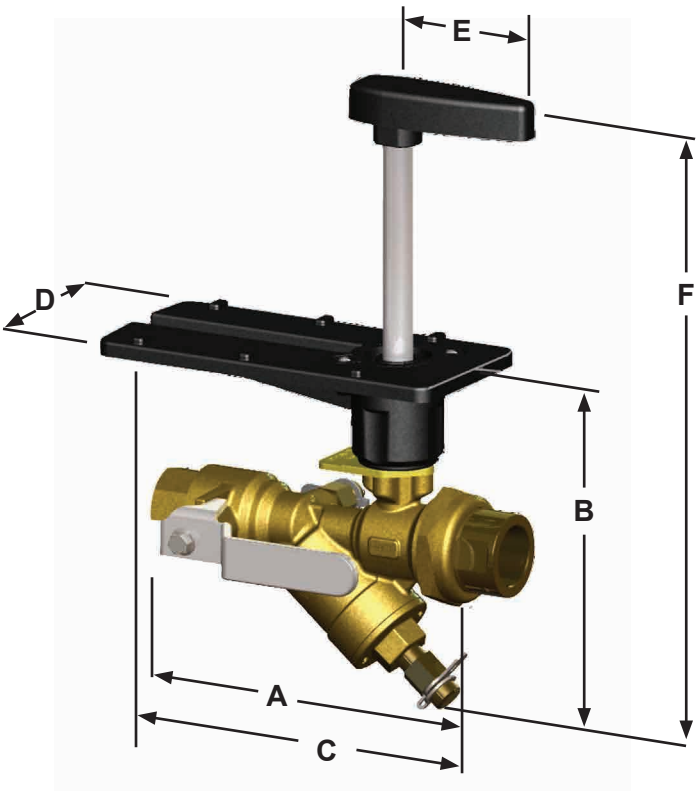
Cup Fully Out	*Cup Partially Out*	*Cup Fully In*
Below the control range, the cartridge acts as a variable flow device allowing flow to fluctuate below the rated amount.	Within the wide control range, the cartridge modulates in response to pressure differential changes to maintain a fixed flow rate within ±5% accuracy.	Above the control range, the cartridge acts as a variable flow device, allowing flow to fluctuate above the rated amount.

Close–off/Torque

Unlike similar flow devices, the 100–130 PSID close–off pressure[1] of Griswold Controls' Automizer® Combination Control Valve applies to both full port valves and valves with the Optimizer insert. This high close–off is achieved with a low-torque (35 in-lb.) actuator. Griswold's close–off is higher than the competition because although the PSID against the modulating valve is rarely over 30 PSID, the system pressure working against the valve when it is closed can be much higher (60–80 PSI).

Close–off ΔP/Required Torque			
SpaceSaver	Small Body	Large Body	XL Body
1/2" SS 3/4" SS	1/2" 3/4" 1"	1" 1–1/4" 1–1/2"	1–1/2" XL 2" XL
130 PSID	130 PSID	100 PSID	100 PSID

1 The close–off pressure is the maximum allowable pressure drop across the valve body when the valve is fully closed.



Control Valve Specifications

Static Pressure/Temp	360 PSI/250°F
Flow Optimizer Material	Glass–filled polymer
Service	Chilled Water, Hot Water, up to 50% Glycol, or contact factory for additional fluids
Body Material	Forged Brass ASTM B584
End Connections	Brass
Stem Material	Brass
Stem Seals	EPDM O–Rings
Ball Seals	Teflon Seals with EPDM O–Rings
Body Tappings	1/4" NPT
Ball Valve	Chemically Nickel–Plated brass ball
Angle of Rotation	0–90°

Dimensions shown are for valve and mounting kit only, and do not include actuator. For actuator dimensions, see Griswold Controls Actuated Control Valve Catalog. ***Dimensions are nominal and are subject to change without notice.*** *3/4" model shown.*

Nominal Dimensions (in inches and pounds unless otherwise noted)

Size	Model No.	A[1] Body Length	Union Connection Length			B Height	C[1] Total Length	D[2] Depth	E Handle Radius	F Height	Weight
			FNPT	MNPT	SWT						
1/2 SS	AR0_	5.8 Fixed X Fixed Option: 5.7	1.0	1.0	0.8	W/O Plate 3.3 W/ Plate: 4.8	W/O Plate N/A W/Plate: 5.8	3.1	N/A	W/O plate 5.7 W/ Plate: varies by actuator	1.7
3/4 SS	ARO_	6.5	N/A	1.2	1.1	5.3	8.1	3.8	2.5	10.3	3.5
1/2	AR1_		1.0	1.0	0.7						
3/4	AR1_		1.0	1.0	0.9						
1	AR1_	10.2	N/A	1.4	1.3	10.5	7.8	4.3	2.5	11.5	7.8
1 L	AR2_		1.7	1.7	1.7						
1–1/4	AR2_		1.7	1.7	1.7						
1–1/2	AR2_	14.2	1.7	1.7	1.4	7.2	8.8	5.2	2.5	11.8	12.8
1–1/2 XL	AR3_		1.6	1.6	1.7						
2 XL	AR3_		N/A	1.6	1.6						

1 Dimensions A and C do not include union connection. Add union connection length to body length.

2 Dimension D depth is defined by plate depth or valve depth, whichever is larger.

Universal Mounting Plates

We are compatible with Siemens, Invensys, Honeywell, Neptronics, Johnson Controls, KMC Controls and Belimo actuators.

Flow Rates & Cv Selection

Typical selection for HVAC 2–position applications is 0.5 to 1.0 PSID. Typical selection for HVAC modulating applications is 3.0 to 5.0 PSID.

End Size		Model No	Flowrate (GPM) @ Differential Pressure (PSID)											
			2-Position HVAC Apps		HVAC Modulating Apps									
				Cv[1]										
			0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	7	10
SpaceSaver	1/2	AR0_1	0.3	0.43	0.53	0.61	0.68	0.74	0.8	0.86	0.91	1	1.1	1.4
		AR0_2	0.78	1.1	1.3	1.5	1.7	1.8	2	2.1	2.2	2.3	2.8	3.3
		AR0_3	1	1.4	1.7	1.9	2.2	2.4	2.5	2.7	2.9	3	3.6	4.3
		AR0_4	1.8	2.6	3.2	3.7	4.1	4.5	4.9	5.2	5.5	5.8	6.9	8.2
		AR0_5	3.1	4.4	5.4	6.2	6.9	7.6	8.2	8.7	9.3	9.8	11.6	13.8
	3/4	AR0_1	0.3	0.43	0.53	0.61	0.68	0.74	0.8	0.86	0.91	1	1.1	1.4
		AR0_2	0.66	0.94	1.2	1.3	1.5	1.6	1.8	1.9	2	2.1	2.5	3
		AR0_3	0.92	1.3	1.6	1.9	2.1	2.3	2.5	2.6	2.8	3	3.5	4.2
		AR0_4	1.7	2.5	3	3.5	3.9	4.3	4.6	4.9	5.2	5.5	6.5	7.8
		AR0_5	2.7	3.9	4.7	5.5	6.1	6.7	7.2	7.7	8.2	8.7	10.2	12.2
Smaller Valve	1/2”	AR1_1	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.9	1.1	1.3
		AR1_2	0.5	0.7	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.9	2.2
		AR1_3	0.9	1.3	1.6	1.8	2.1	2.3	2.4	2.6	2.8	2.9	3.4	4.1
		AR1_4	1.7	2.4	2.9	3.4	3.8	4.2	4.5	4.8	5.1	5.4	6.3	7.6
		AR1_5	2.6	3.7	4.5	5.2	5.9	6.4	6.9	7.4	7.8	8.3	9.8	11.7
		AR1_6	4.4	6.2	7.6	8.8	9.8	10.7	11.6	12.4	13.2	13.9	16.4	19.6
	3/4”	AR1_1	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.9	1.1	1.3
		AR1_2	0.5	0.7	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.9	2.2
		AR1_3	0.9	1.3	1.6	1.8	2.1	2.3	2.4	2.6	2.8	2.9	3.4	4.1
		AR1_4	1.8	2.6	3.2	3.7	4.1	4.5	4.9	5.2	5.5	5.8	6.9	8.2
		AR1_5	3	4.3	5.3	6.1	6.8	7.4	8	8.6	9.1	9.6	11.4	13.6
		AR1_6	5.2	7.4	9.1	10.5	11.7	12.8	13.8	14.8	15.7	16.5	19.6	23.4
	1”	AR1_1	0.2	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.7	0.8	0.9
		AR1_2	0.4	0.6	0.7	0.8	0.9	1	1.1	1.2	1.3	1.3	1.6	1.9
		AR1_3	0.9	1.3	1.6	1.8	2.1	2.3	2.4	2.6	2.8	2.9	3.4	4.1
		AR1_4	1.6	2.3	2.8	3.3	3.6	4	4.3	4.6	4.9	5.1	6.1	7.3
		AR1_5	2.7	3.8	4.7	5.4	6	6.6	7.1	7.6	8.1	8.5	10.1	12
		AR1_6	4.9	6.9	8.5	9.8	10.9	12	12.9	13.8	14.6	15.4	18.3	21.8
Larger Valve	1”	AR2_3	3	4.2	5.1	5.9	6.6	7.3	7.9	8.4	8.9	9.4	11.1	13.3
		AR2_4	5	7.1	8.7	10	11.2	12.3	13.3	14.2	15.1	15.9	18.8	22.5
		AR2_1	7.4	10.5	12.9	14.8	16.6	18.2	19.6	21	22.3	23.5	27.8	33.2
		AR2_2	10.2	14.4	17.6	20.4	22.8	24.9	26.9	28.8	30.5	32.2	38.1	45.5
	1-1/4”	AR2_3	2.8	4	4.9	5.7	6.3	6.9	7.5	8	8.5	8.9	10.6	12.6
		AR2_4	4.0	7.3	8.9	10.3	11.5	12.6	13.7	14.6	15.5	16.3	19.3	23.1
		AR2_1	7.4	10.4	12.7	14.7	16.4	18	19.5	20.8	22.1	23.3	27.5	32.9
		AR2_2	10.3	14.6	17.9	20.6	23.1	25.3	27.3	29.2	31	32.6	38.6	46.2
	1-1/2”	AR2_3	2.8	4	4.9	5.7	6.3	6.9	7.5	8	8.5	8.9	10.6	12.6
		AR2_4	4	7.3	8.9	10.3	11.5	12.6	13.7	14.6	15.5	16.3	19.3	23.1
		AR2_1	7.2	10.2	12.5	14.4	16.1	17.7	19.1	20.4	21.6	22.8	27	32.3
		AR2_2	10.3	14.5	17.8	20.5	22.9	25.1	27.1	29	30.8	32.4	38.4	45.9
XL Valve	1-1/2”	AR3_1	24	34	41.6	48.1	53.8	58.9	63.6	68	72.1	76	90	107.5
		AR3_2	36.8	52	63.7	73.5	82.2	90.1	97.3	104	110.3	116.3	137.6	164.4
		AR3_3	46	65	79.6	91.9	102.8	112.6	121.6	130	137.9	145.3	172	205.5
	2”	AR3_1	24	34	41.6	48.1	53.8	58.9	63.6	68	72.1	76	90	107.5
		AR3_2	36.8	52	63.7	73.5	82.2	90.1	97.3	104	110.3	116.3	137.6	164.4
		AR3_3	48.1	68	83.3	96.2	107.5	117.8	127.2	136	144.2	152.1	179.9	215

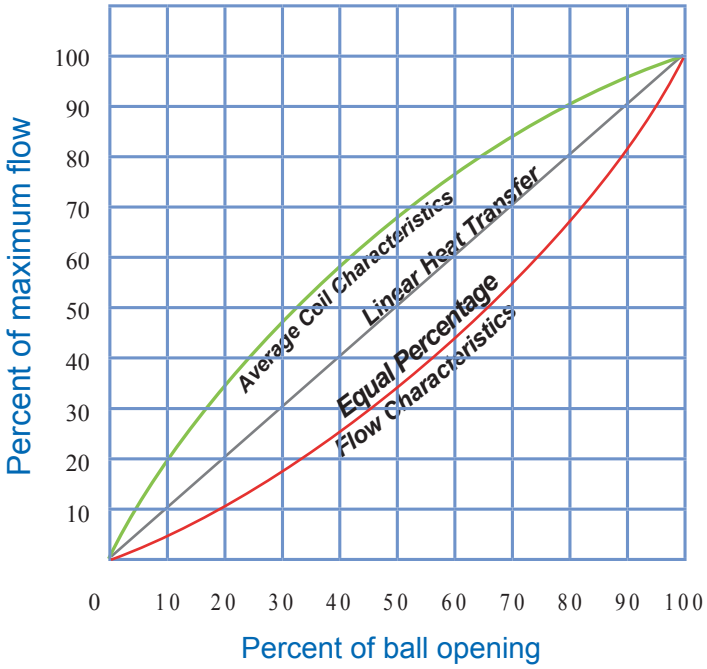
1 Cv, or flow coefficient, is defined as the quantity of water, in GPM at 60°F, that will pass through a given valve with a pressure drop of 1 PSI.

Optimizer™

Griswold Controls' Optimizer™ has been improving performance for almost ten years. After proving itself in the Quickset™ line of manual balance valves, the Optimizer™ now highlights our actuated ball valve temperature controls, allowing the performance of a globe valve at a ball valve price.

Equal Percentage Flow

Equal movements of the valve stem at any point of the flow range change the existing flow an equal percentage regardless of the existing flow. As you can see in the graph below, our valve (red curve) mirrors the equal percentage characteristic of the coil (green curve), resulting in linear heat transfer.



True Equal Percentage Flow

True equal percentage flow means temperature adjusts smoothly, without major changes that send building occupants running for the thermostat. When the thermostat setting stays in place, the owner saves energy and money!

True Equal Percentage Flow Provides Linear Heat Transfer

Linear heat transfer means the relationship between valve opening percentage and increase in heat transfer is linear. Temperature control is functioning efficiently because it is being controlled according to design. The linear heat transfer of our 3-way Unimizer™ means an end to fluctuating comfort conditions normally present with all other 3–way valves. Temperature adjusts smoothly and subtly to meet changing load conditions.

Press–fit is better

The physical design of the Optimizer™ Parabolic Flow Insert also contributes to its strength. The tapered shape means that once the Optimizer™ Parabolic Flow Insert is press–fit into the ball it cannot be forced out because the back side of the insert is too large to be forced through the ball's port. As pressure increases behind the Optimizer™ insert, it compresses even farther into the ball's port, making a tight fit even tighter for guaranteed protection against leak–by.

Because the Optimizer™ Parabolic Flow Insert is press–fit into the ball, the valve is able to modulate in systems where the differential pressure is over 160 psi without affecting the life or performance of the insert. This is a benefit specific to the Griswold Optimizer™ Parabolic Flow Insert. Other companies have used a ball with a plastic disc in front of the ball that cannot modulate with differential pressures over 50 psi because the disc will deform and eventually at higher pressures push through the ball. It is important to note that some companies have advertised Close–Off Pressures which only apply to full port valves without such a device.

Material properties

The Optimizer™ Parabolic Flow Insert is molded from GE's NORYL, a glass filled polymer. This technology of reinforcement also contributes to the retention of the mechanical properties, the chemical resistance and its dimensional stability.

The Optimizer™ Parabolic Flow Insert is very stable in environments where extreme temperature variations occur, such as in common hydronic heating and cooling systems, and has been tested in both water and 50% glycol from 50° to 240°F. The Optimizer™ Parabolic Flow Insert retained its shape and its material properties even after prolonnged exposure to those extreme conditions.

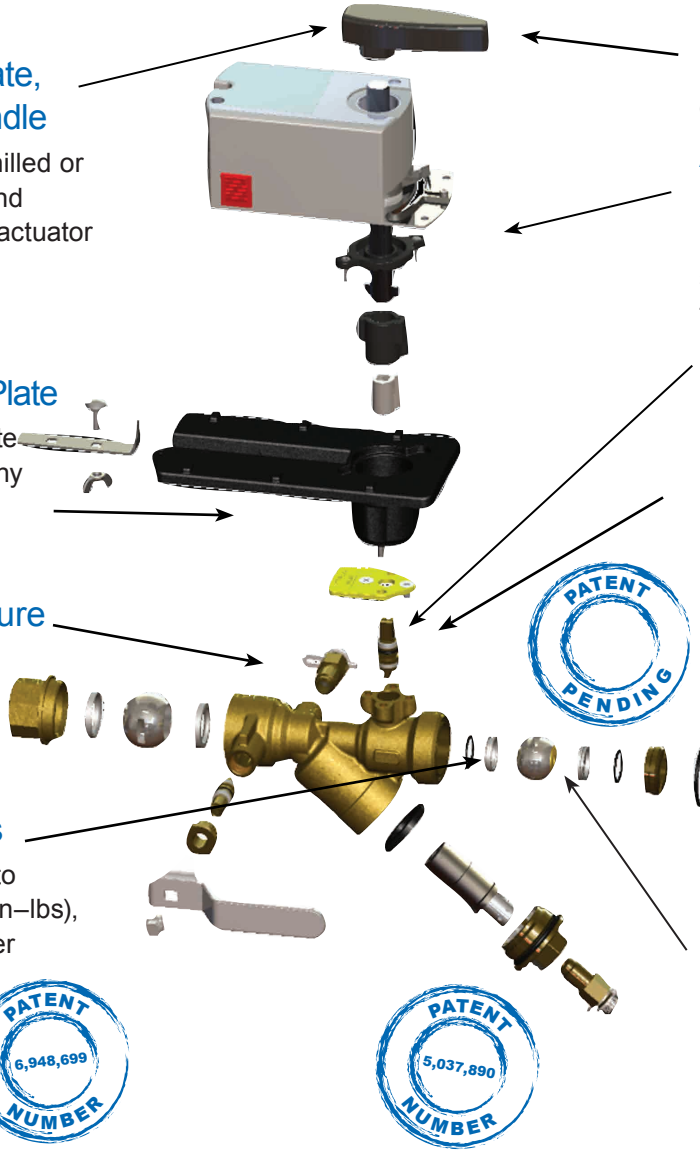
NORYL has superior hydrolytic stability, which means that this material retains its physical properties when exposed to water. The Optimizer™ Parabolic Flow Insert has the lowest water absorption rate of any thermoplastic material.

NORYL's mechanical strength and hardness values are higher than other thermoplastic materials such as PVC, CPVC, ABS, DELRIN, TEFLON, etc. NORYL has been used successfully for fluid handling components like ball valves, pipe fittings, pumps, and pump impellers in irrigation, swimming pool and chemical industries.

Features and Benefits

- The Optimizer™ Parabolic Flow Insert's profile results in a smooth flow curve and 30 to 50% more rotation response than ball valves without an insert.
- Overflow problems, when the total flow exceeds the flow required for the system, are eliminated by the combination of the Optimizer™ parabolic flow insert and Griswold Controls' automatic flow cartridge.
- Cv ratings were designed to be similar to the Cv ratings of globe valves, the range most piping systems are designed for. The Automizer® can be sized for globe valves, but at a considerable savings.
- Optimizer™ inserts have different size openings, providing five or six Cvs per valve size. This allows for an exact match to the pressure drop requirement, thereby improving the valve's authority in the system.
- Griswold Controls' Automizer® combination control valve features multi-actuator compatibility because the same actuator is not the right choice for every job.
- SpaceSaver™ sizes are ideal for in-cabinet or baseboard heating applications, and Siemens GDE and Belimo actuators mount directly on the SpaceSaver™ valve.
- XL sizes are perfect for small terminal units or AHUs Next Generation Triple Seals and Field Repairable Stems allow for field servicing without removing the valve from the line.

Exploded View



Plastic Mounting Plate, Extensions and Handle

Will not condensate in chilled or hot water applications, and reduces heat transfer to actuator in hot water applications.

Universal Mounting Plate

Allows one mounting plate to be used with almost any manufacturers' actuator.

Pressure/Temperature Test Ports

Allows for easy pressure differential readings.

Seals and O–Rings

Reduce torque required to rotate ball (less than 35 in–lbs), allowing for use of smaller actuator.

Manual Operation

Can be operated in the event of a power failure.

Actuator and Plate can be Rotated after Mounting

Provides for installation in confined spaces, and makes wiring the actuator easier.

Blow–Out Proof Stem

Is able to withstand high pressures, providing added safety.

Next Generation Triple Seals and Field Repairable Stem

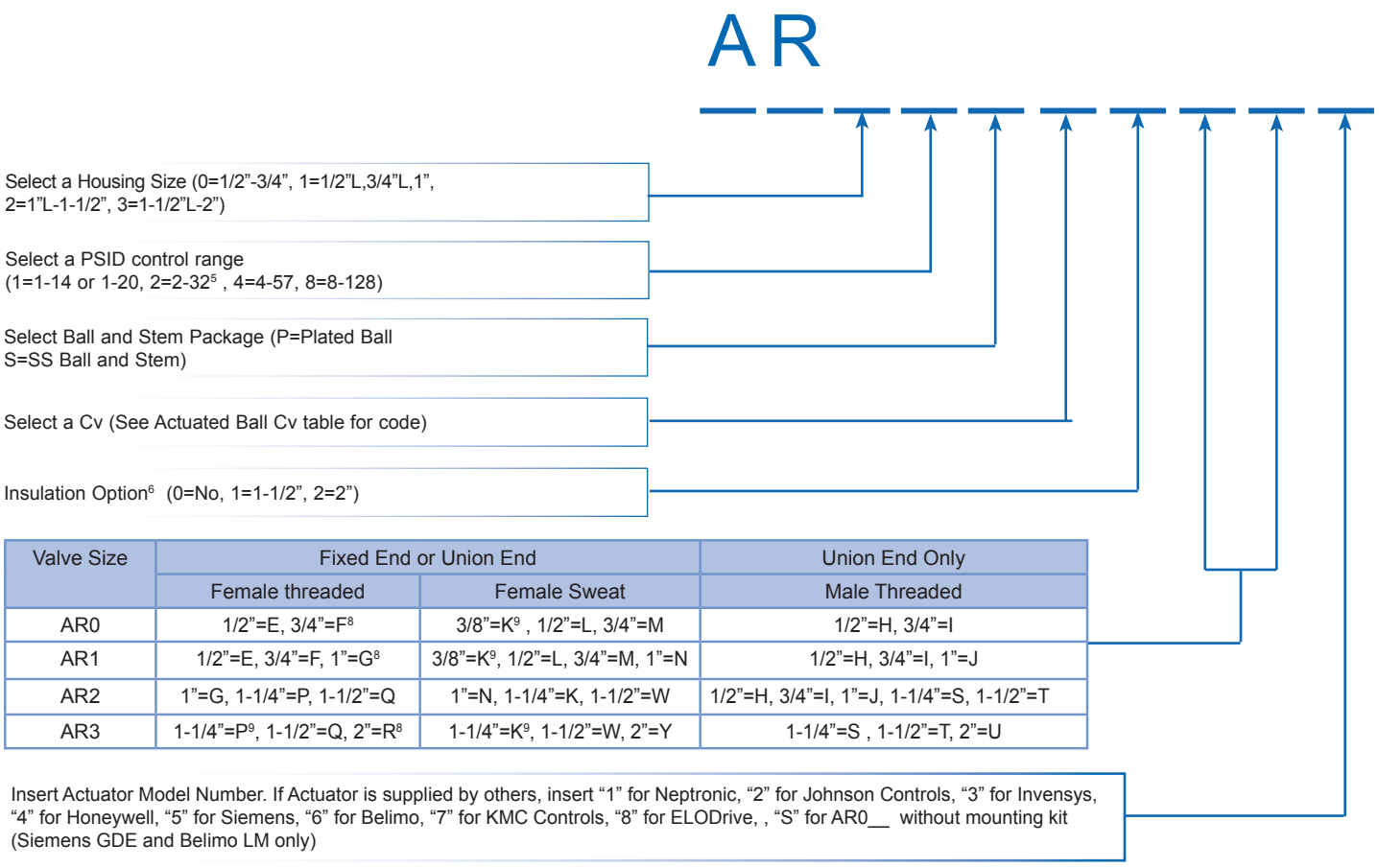
Provides resistance to today's chemical treatments and to temperature fluctuations following evening system shutdown, and allows for field servicing without removing the valve.

Flow Optimizer

Provides equal percentage control; lowers Cv levels to globe valve range taking the guess work out of selecting control valves and eliminating the need to downsize pipes; and offers multiple CVs per valve size.

NOTE: 3/4" valve shown. SS and XL valves have different configurations but contain the same features.

Model Number



Valve Size	Fixed End or Union End		Union End Only
	Female threaded	Female Sweat	Male Threaded
AR0	1/2"=E, 3/4"=F[8]	3/8"=K[9] , 1/2"=L, 3/4"=M	1/2"=H, 3/4"=I
AR1	1/2"=E, 3/4"=F, 1"=G[8]	3/8"=K[9], 1/2"=L, 3/4"=M, 1"=N	1/2"=H, 3/4"=I, 1"=J
AR2	1"=G, 1-1/4"=P, 1-1/2"=Q	1"=N, 1-1/4"=K, 1-1/2"=W	1/2"=H, 3/4"=I, 1"=J, 1-1/4"=S, 1-1/2"=T
AR3	1-1/4"=P[9], 1-1/2"=Q, 2"=R[8]	1-1/4"=K[9], 1-1/2"=W, 2"=Y	1-1/4"=S , 1-1/2"=T, 2"=U

Flow Limiting Cartridge Flow Rates (±5%)

End Size	Model No.	Head Loss In Feet [10]	PSID Range	GPM
1/2" 3/4" SpaceSaver	AR02	7.4	2-32	0.25, 0.33, 0.50, 1.00, 1.50, 2.00, 2.50, 3.00
1/2" 3/4" 1"	AR11	3.5	1-14	0.33, 0.50, 0.67, 1.00, 1.33, 1.67, 2.00, 2.33, 2.67, 3.33, 4.00, 4.67, 5.00
	AR12	7.4	2-32	0.55, 0.75, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 5.00, 6.00, 7.00, 8.00
	AR14	13.4	4-57	0.75, 1.00, 1.33, 2.00, 2.67, 3.33, 4.00, 4.67, 5.33, 6.67, 8.00, 9.33, 10.0
	AR18	30	8-128	1.10, 1.50, 2.00, 3.00, 4.00, 5.00, 6.00, 7.00, 8.00, 10.0, 12.0, 14.0, 16.0
1"(L) 1-1/4" 1-1/2"	AR21	3.5	1-14	3.00, 3.33, 4.00, 4.67, 5.33, 6.00, 6.67, 7.33, 8.00, 8.67, 9.33, 10.00, 10.67, 11.33, 12.00, 12.67, 13.33, 14.00, 14.67
	AR22	7.4	2-32	4.50, 5.00, 6.00, 7.00, 8.00, 9.00, 10.0, 11.0, 12.0, 13.0, 14.0, 15.0, 16.0, 17.0, 18.0, 19.0, 20.0, 21.0, 22.0
	AR24	13.4	4-57	6.00, 6.67, 8.00, 9.33, 10.67, 12.00, 13.33, 14.67, 16.00, 17.33, 18.67, 20.00, 21.33, 22.67, 24.00, 25.33, 26.67, 28.00, 29.33
	AR28	30	8-128	9.00, 10.0, 12.0, 14.0, 16.0, 18.0, 20.0, 22.0 ,24.0, 26.0, 28.0, 30.0, 32.0, 34.0, 36.0, 38.0, 40.0, 42.0, 44.0
1-1/2" 2" XL	AR31	3.5	1-14	12.0, 14.0, 16.0, 18.0, 20.0, 22.0, 24.0, 26.0, 28.0, 30.0, 32.0, 34.0, 36.0, 38.0
	AR32	7.4	2-32	18.0, 21.0, 24.0, 27.0, 30.0, 33.0, 36.0, 39.0, 42.0, 45.0, 48.0, 51.0, 54.0, 57.0
	AR34	13.4	4-57	24.0, 28.0, 32.0, 36.0, 40.0, 44.0, 48.0, 52.0, 56.0, 60.0, 64.0, 68.0, 72.0, 76.0
	AR38	30	8-128	36.0, 42.0, 48.0, 54.0, 60.0, 66.0, 72.0, 78.0, 84.0, 90.0, 96.0, 102, 108, 114

AR0__ is 2-32 PSID control range only.

6 Insulation Option includes handle cover and Accessory extensions.

7 Select the Fixed End First and the Union End Second. For AR0__ fixed end only option fill in 2nd digit with an "X".

8 Tailpiece is not available for this size. Male tailpiece used with coupling.

9 Fixed end not available for this size. Union tailpiece only.

10 Head Loss in Feet is provided for pump head calculations. (1 PSI = 2.307 Feet of Water)

Griswold Controls' Coil Piping Package program includes over 900 standard packages. Engineers do not have to design or detail the various elements that are required at the supply and return end of each coil. They can just select one of Griswold Controls standard packages, which are available for both automatic and manual flow control applications. We also offer downsized components to the automatic temperature control as a standard package. Standard packages up to 2" ship within 48 hours after the order is received direct to the job site, preassembled and ready to install. If variations to the standard packages are necessary they can be readily accommodated, but they will affect the 48 hour ship time.

In addition, options such as hoses and extension kits can be easily added, but similarly this will increase the lead time.

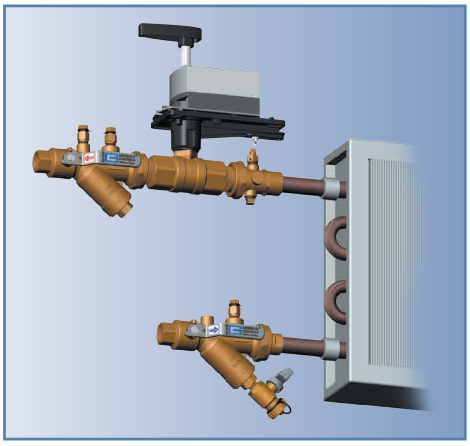
Standard packages offer:

- Wide selection of preassembled, easy to order configurations
- Easy ordering: order by specific part numbers
- Timely delivery
- Variety of options: downsized automatic temperature control, extra pressure / temperature ports, and the inclusion of Griswold Controls Automizer® and Unimizer® temperature control valves.

Custom Coil Piping Packages

Griswold Controls offers custom packages in line sizes from 2–1/2" thru 8". The components can be shipped loose or assembled and shipped on a skid—your choice. These packages are available with flange, weld or grooved end connections and can include balancing valves, strainers, butterfly valves, control valves and reducers. A variety of options are also available for customized packages, including the addition of hoses and extension kits.

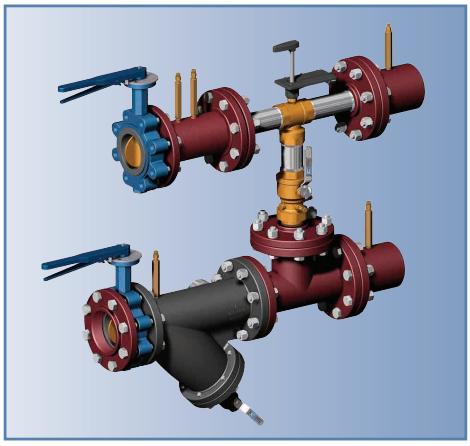
Terminal Units 1/2" - 2"



Standard 2–way IRIS Package with Unimizer®

- Isolator S with 20–Mesh Strainer, CPTA and Drain Valve
- Union with CPTA
- 2–Way Unimizer (with any standard actuator)
- Isolator R with Automatic Flow Control Cartridge and two CPTA valves

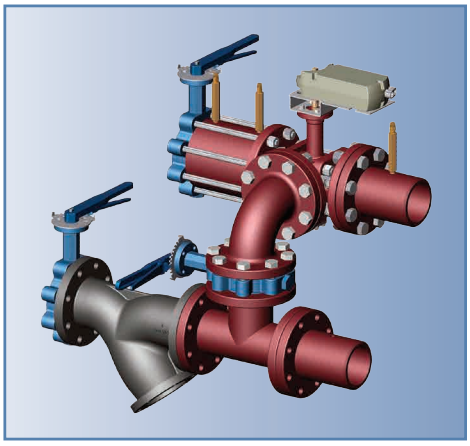
Air Handling Units 2" - 3"



Custom 3–way 3UF Package with Unimizer®

- Y–Strainer with Butterfly and Drain Valve
- Tee Connection
- 3-Way Unimizer
- Flange Valve with Butterfly Valve
- Accessory Flanges with PTs

Equipment Rooms 4" - 8"



Custom 2–way 3WR Package with Unimizer®

- Y-Strainer with Butterfly Valve
- Tee Connection
- Butterfly Valve on Bypass
- 3-Way Unimizer
- Wafer Valve with Butterfly Valve
- Accessory Flanges with PTs

Griswold Controls Representative

GRISWOLD CONTROLS®

2803 Barranca Parkway • Irvine CA 92606 | Phone 800 838 0858 • Fax 800 543 8662

E-mail info@griswoldcontrols.com | www.griswoldcontrols.com

10/14
F-4372 K