


Submittal Package

**Engineering Specification, Installation, Operation and Maintenance
Series LFM113-32 – Large**

Solenoid (On-Off) Control Valve with Hydraulic Check Feature (6" and Larger)

Sizes: 20 and 24"

⚠ WARNING



Read this Manual **BEFORE** using this equipment. Failure to read and follow all safety and use information can result in death, serious personal injury, property damage, or damage to the equipment. Keep this Manual for future reference.

THINK SAFETY FIRST

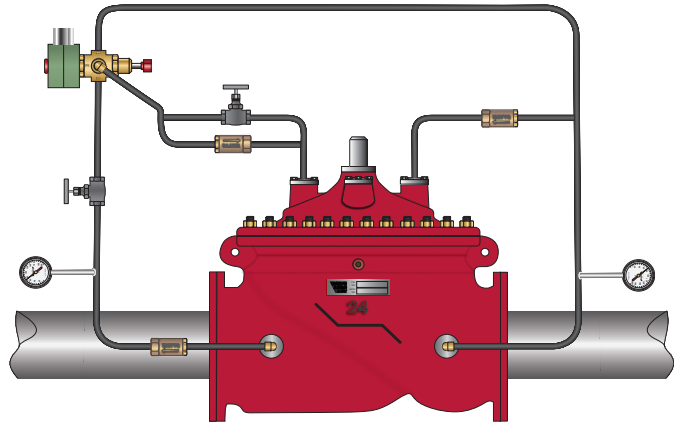
⚠ WARNING

Local building or plumbing codes may require modifications to the information provided. You are required to consult the local building and plumbing codes prior to installation. If the information provided here is not consistent with local building or plumbing codes, the local codes should be followed. This product must be installed by a licensed contractor in accordance with local codes and ordinances.

⚠ WARNING

Need for Periodic Inspection/Maintenance: This product must be tested periodically in compliance with local codes, but at least once per year or more as service conditions warrant. All products must be retested once maintenance has been performed. Corrosive water conditions and/or unauthorized adjustments or repair could render the product ineffective for the service intended. Regular checking and cleaning of the product's internal and external components helps assure maximum life and proper product function.

If installed on a fire sprinkler system, all mechanical checks, such as alarm checks and backflow preventers, should be flow tested and inspected internally in accordance with NFPA 13 and NFPA 25.



LFM113-32

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Watts product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Watts Technical Service. Watts reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Watts products previously or subsequently sold.



LEAD FREE*

Series LFM113-32 - Large

Solenoid (On-Off) Control Valve with Hydraulic Check Feature (6" and Larger)

Full Port Ductile Iron Single Chamber Valve

Features

- Electrically operated on / off (open / closed) valve
- Normally Open or Closed operation
- High capacity pilot system for quick response
- Adjustable Opening and Closing Speed
- Hydraulic Check Feature prevents flow reversal
- Solenoid equipped with Manual Operator

Standard Components

- 1 — Main Valve - M100 Single Chamber
- 2 — Three-Way Solenoid
- 3 — ACS - Adjustable Closing Speed (Globe Valve)
- 4 — AOS - Adjustable Opening Speed (Globe with Check)
- 5 — Check Valve
- 6 — Pressure Gauges
- X — Isolation Cocks
- Y — Wye-Strainer

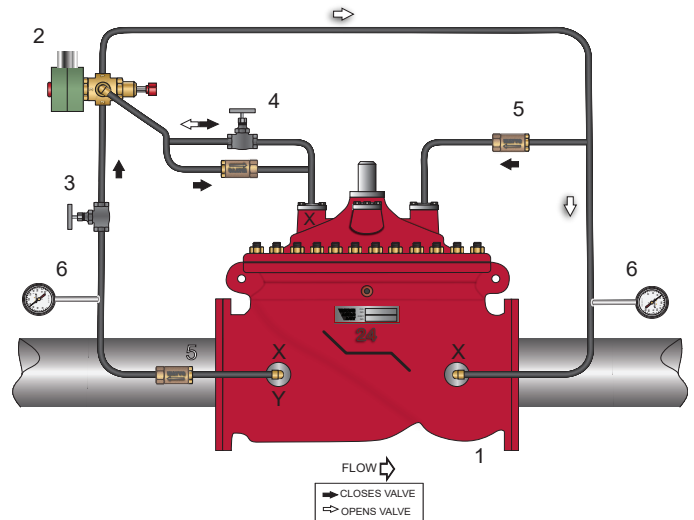
Options and Accessories

- L Limit Switch
- P Position Indicator

Operation

The Solenoid On-Off ACV with Hydraulic Check Feature is designed to open fully or close drip-tight as commanded by the 3-Way Solenoid Pilot, and close drip-tight when downstream pressure becomes greater than upstream pressure. The Solenoid Pilot directs upstream pressure into and out of the cover chamber of the 3-way Accelerator Pilot. When the cover of the Accelerator Pilot is pressurized, the main valve cover chamber is vented downstream (dry drain) or to atmosphere (wet drain), causing the valve to open fully. When the cover of the Accelerator Pilot is de-pressurized, the main valve cover chamber is connected to upstream pressure, causing the valve to close drip tight. Valve opening and closing speeds are separately adjustable. Engaging the Solenoid Manual operator simulates power to the solenoid, manually controlling the main valve. Disengaging the Solenoid Manual operator returns the valve to electrical on-off service.

If downstream pressure becomes greater than upstream pressure, downstream pressure is admitted to the main valve cover chamber, closing the valve and preventing reversal of flow. Normal On-Off operation resumes when upstream pressure exceeds downstream pressure.



NOTICE

Specify voltage and MAIN VALVE actuation (energize to open or close), and "wet" or "dry" drain PRIOR to ordering.

*The wetted surface of this product contacted by consumable water contains less than 0.25% of lead by weight.

M Series Basic Valves

Solenoid (On-Off) Control Valve with Hydraulic Check Feature (6" and Larger)


Full Port Ductile Iron Single Chamber Basic Valve

This Watts Automatic Control Valve (ACV) is a full port, single chamber basic valve that incorporates a one-piece disc and diaphragm assembly. This assembly is the only moving part within the valve allowing it to open, close, or modulate as commanded by the pilot control system.

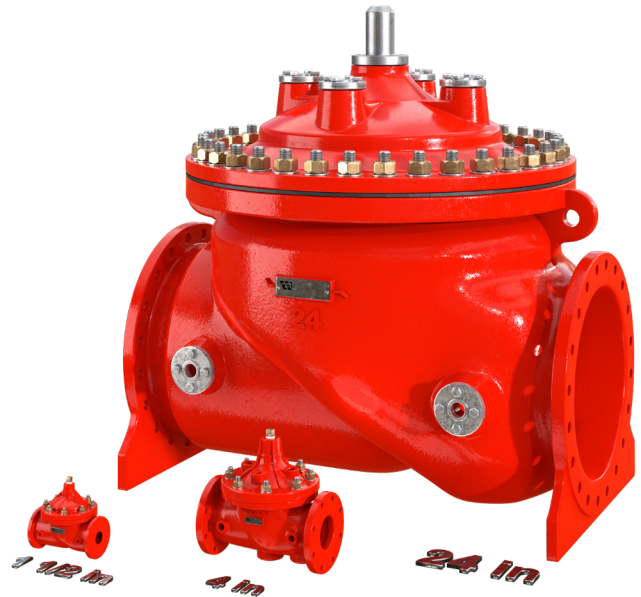
Watts ACV Main Valves are Lead Free. The Watts ACV piloting system contains Lead Free* components, ensuring all of our configurations are Lead Free compliant.

Globe Pattern Single Chamber Basic Valve (M100)

Standard Materials

Body and Cover:	Ductile Iron ASTM A536	
Coating:	NSF Listed Fusion Bonded Epoxy Lined and Coated	
Trim:	316 Stainless Steel	
Elastomers:	Buna-N (standard)	
Nut, Spring and Stem:	Stainless Steel	
Anti-Scale:	Xylan Coated Stem and Seat (Optional)	

Basic Valve Body Options



Globe Flanged

Operating Pressure

150# Flanged = 250psi (17.2 bar)

300# Flanged = 400psi (27.6 bar)

Operating Temperature

Buna-N: 160°F (71°C) Maximum

Epoxy Coating**: 225°F (107°C) Maximum

** Valves can be provided without internal epoxy coating consult factory

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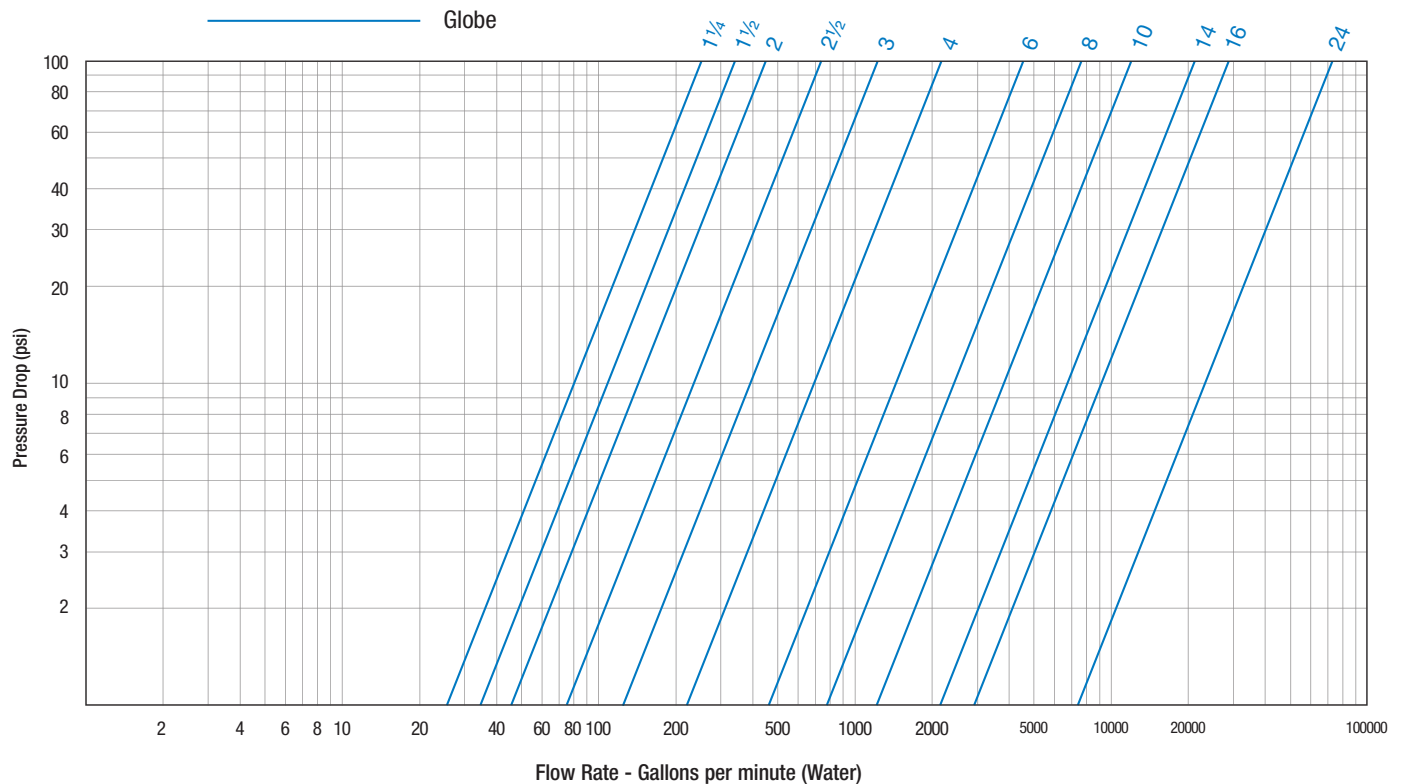
ACV Schematic - Series LFM113-32 - Large

Flow Data

Valve Size - Inches		1¼	1½	2	2½	3	4	6	8	10	12	14	16	20	24	
Suggested	Maximum Continuous Flow Rate Gpm (Water)	95	130	210	300	485	800	1850	3100	5000	7000	8500	11100	19600	28200	
	Maximum Intermittent Flow Rate Gpm (Water)	119	161	265	390	590	1000	2300	4000	6250	8900	10800	14100	24500	35250	
	Minimum Flow Rate Gpm (Water)	3	5	6	9	15	16	17	25	55	70	190	400			315
C_v	CV Factor GPM (Globe)	26	26	48	75	112	188	387	764	1215	1734	2234	3131			7447
	CV Factor GPM (Angle)	26	27	57	91	125	207	571	889	1530	1945					

- Maximum continuous flow based on velocity of 20 ft. per second.
- Maximum intermittent flow based on velocity of 25 ft. per second.
- Minimum flow rates based on a 20-40 psi pressure drop.
- The C_v Factor of a valve is the flow rate in US GPM at 60°F that will cause a 1psi drop in pressure.
- C_v factor can be used in the following equations to determine Flow (Q) and Pressure Drop (ΔP):

$$Q \text{ (Flow)} = C_v \sqrt{\Delta P} \quad \Delta P \text{ (Pressure Drop)} = (Q/C_v)^2$$



Valve Cover Chamber Capacity

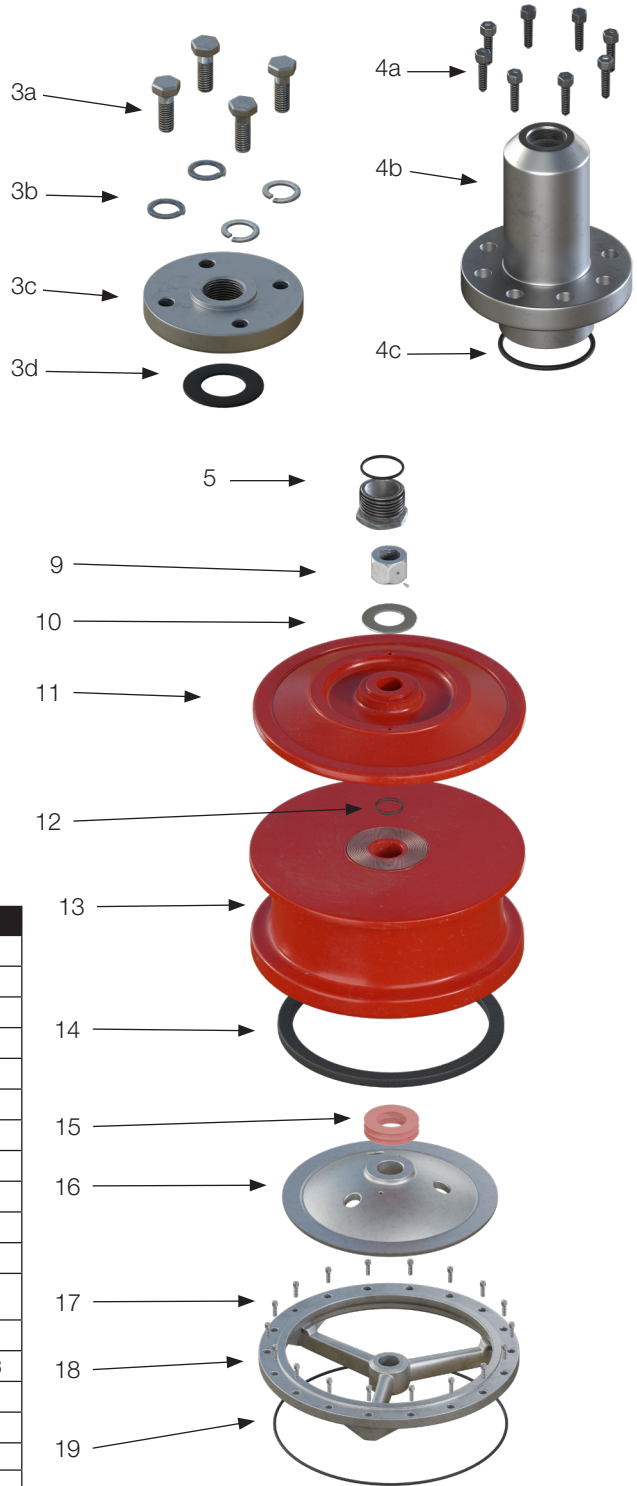
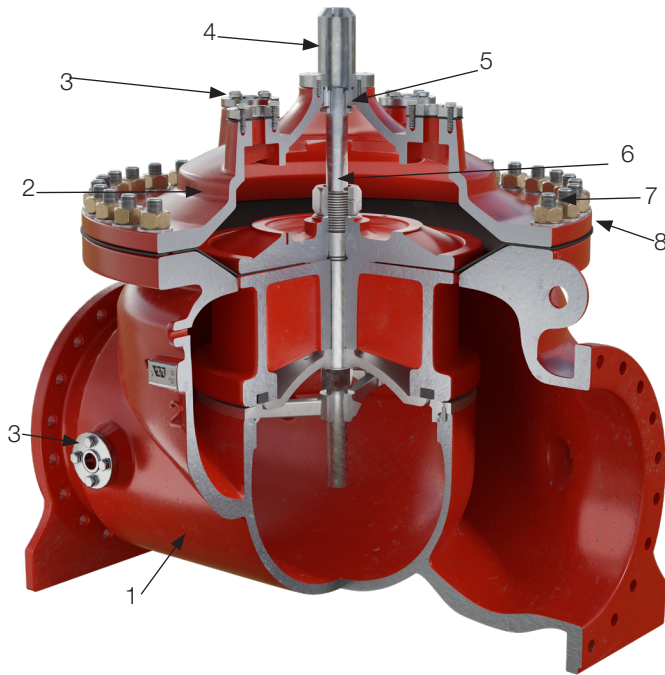
Valve Size - Inches	20	24
U.S. Gal	25.5	37.1
Liter	96.5	140.4

Valve Travel

Valve Size - Inches	20		24	
	in.	cm.	in.	cm.
Travel - Inches	5.62	14.3	6.75	17.1

ACV Schematic - Series LFM113-32 - Large

Basic Valve



Item	Description	Material
1	150# Body	Epoxy Coated Ductile Iron - ASTM A536
2	Cover	Epoxy Coated Ductile Iron - ASTM A536
3a	Flange Screws x4	Stainless Steel 18-8
3b	3/4 Lock Washer	Stainless Steel - UNS S30400
3c	Flange 1 1/2 NPT, 300 CL	Stainless Steel 18-8
3d	Gasket 1 1/2 Pipe	Buna-N
4a	Guide Cover Screws	Stainless Steel 18-8
4b	Guide Cover	Stainless Steel - UNS S30400
4c	O-Ring	Buna-N - 70 DURO
5	Cover Bearing with O-Ring	ASTM A276 UNS S30400, Buna-N - 70 DURO
6	Stem	Xylan Coated Stainless Steel - UNS S30400
7	Cover Stud with Hex Nut and Flat Washer	ASTM A193 GRB7 Yellow Zinc PLT; ASTM A194 GR2H Yellow Zinc PLT; Carbon Steel Zinc Plated
8	Diaphragm	Buna-N
9	Stem Nut with Set Screw	Stainless Steel ASTM A276 304; Stainless Steel - 18-8
10	Stem Nut Washer	Stainless Steel - UNS S30400
11	Diaphragm Washer	Epoxy Coated Ductile Iron - ASTM A536
12	O-Rings x2	Buna-N
13	Disc Retainer	Epoxy Coated Ductile Iron - ASTM A536
14	Disc	Buna-N
15	Spacer Washer x3	Vulcanized Fiber
16	Disc Guide	CF8M
17	Seat Screws x18	Stainless Steel 18-8
18	Seat	ASTM A743 CF8M
19	O-Ring	Buna-N

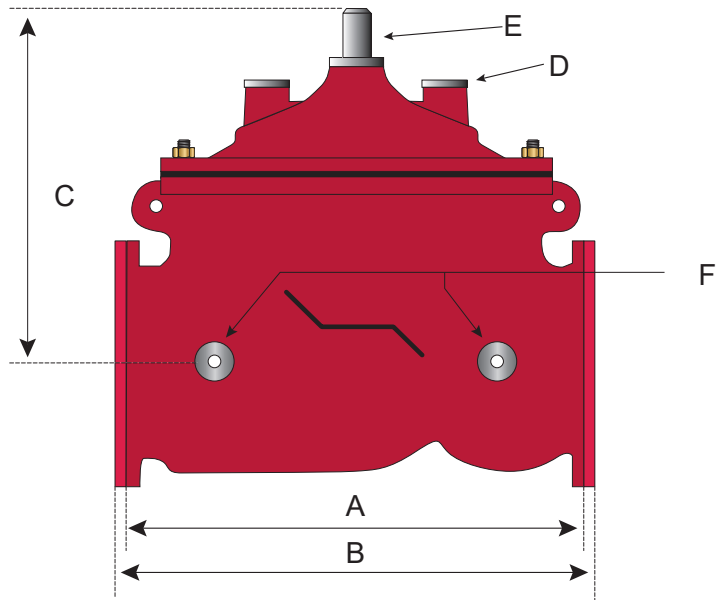
* Contained in Main Valve Repair Kit

NOTICE

Installation: If unit is installed in any orientation other than horizontal (cover up) OR extreme space constraints exist, consult customer service prior to or at the time of order.

ACV Schematic - Series LFM113-32 - Large

Dimensions



Valve Size	Globe 150#		Globe 300#		Cover To Center		Port Size NPT		Port Size NPT		Port Size NPT		Shipping Weights*	
	A		B		C		D		E		F		lbs.	kgs.
<i>in.</i>	<i>in.</i>	<i>mm</i>	<i>in.</i>	<i>mm</i>	<i>in.</i>	<i>mm</i>	<i>in.</i>	<i>mm</i>	<i>in.</i>	<i>mm</i>	<i>in.</i>	<i>mm</i>		
20	52	1320.8	53%	1361.9	39%	1000	1½	38.1	1½	38.1	1½	38.1	4312	1955.9
24	61½	1562.1	63¼	1606.3	47	1192.8	1½	38.1	1½	38.1	1½	38.1	6629	3006.9

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Model CK

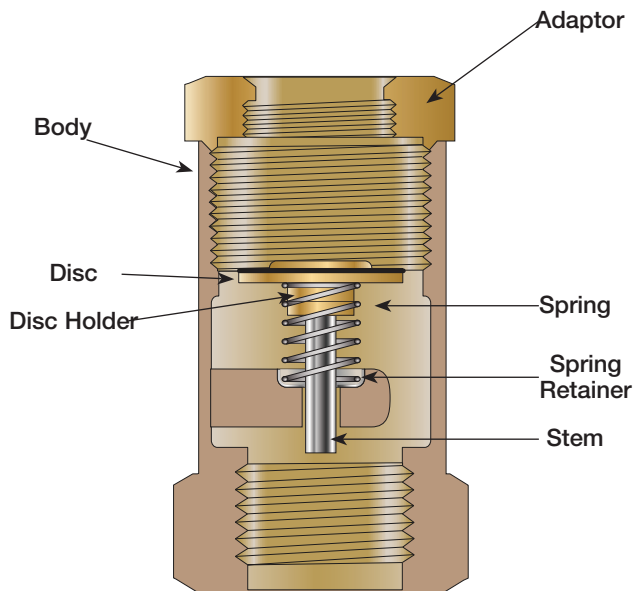
Check Valve

Size: 1/4" - 1" NPT

Model CK Check Valves are pilot line check valves. In typical applications these low cracking pressure in-line checks provide a hydraulic check feature to a pilot system. When the main valve outlet pressure exceeds inlet pressure, fluid is directed from the outlet to the main valve cover. This causes the main valve to close until inlet pressure is again greater than outlet.



Model LFCK



Specifications

Standard Material: Brass Housing and Body
Stainless Steel Indicating Rod

Optional Material: Stainless Steel Housing and Body Disc
Viton® (1/4" - 1/2")
PTFF (1")

Pressure Rating: 400psi (27.6 bar)

Viton® is a registered trademark of DuPont Dow Elastomers.

*The wetted surface of this product contacted by consumable water contains less than 0.25% of lead by weight.

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Model LF60-1

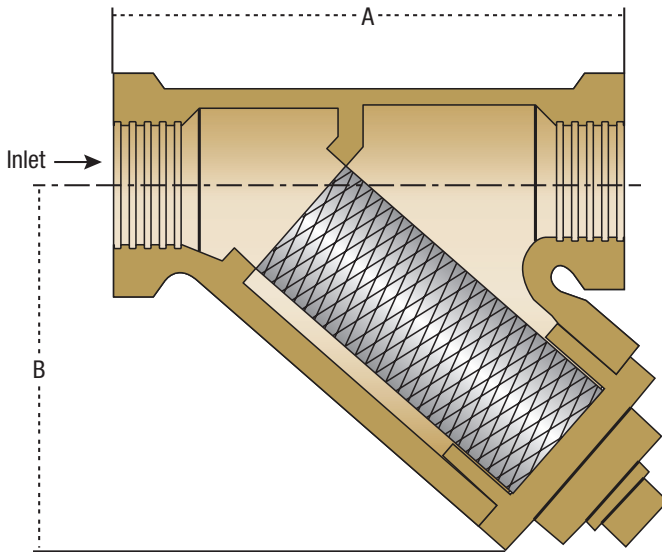
Y-Pattern Strainer

Size: ¼" – ¾" NPT

Model LF60-1 Y-Pattern Strainers are used to filter the fluid passing through the pilot circuit, and provide protection to pilot circuit speed controls and pilots. The filter element can be accessed for cleaning by removing the clean-out cap, or may be cleaned by installing an optional "blow-down" ball valve.



Model LF60-1



Specifications

- Body Material:** Lead Free Copper Silicon Alloy
CF8M (316) Stainless Steel (optional)
- Retainer Cap:** Lead Free Copper Silicon Alloy
- Cap Gasket:** EPDM
- Pressure Rating:** 400psi (27.6 bar)
- Filter Element:** 304 Stainless Steel
- Mesh Options:** 60 Mesh (standard)
100 Mesh (optional)

Dimensions

SIZE	DIMENSIONS				WEIGHT	
	A		B		lbs.	kgs.
in.	in	mm	in	mm		
¼	2 ¹ / ₁₆	68	1 ¹ / ₁₆	43	1.7	0.77
⅜	2 ¹ / ₁₆	68	1 ¹ / ₁₆	43	1.7	0.77
½	3	76	2	51	1.7	0.77
¾	3 ⁵ / ₁₆	84	2 ⁵ / ₁₆	59	1.7	0.77

*The wetted surface of this product contacted by consumable water contains less than 0.25% of lead by weight.

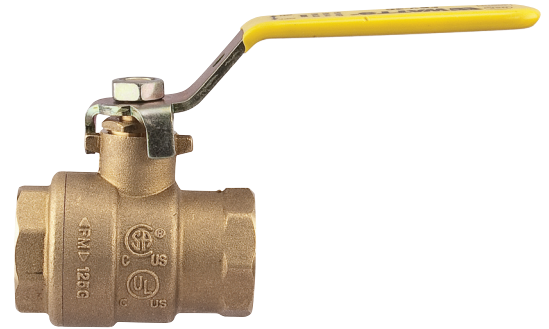
LEAD FREE*

Model BV

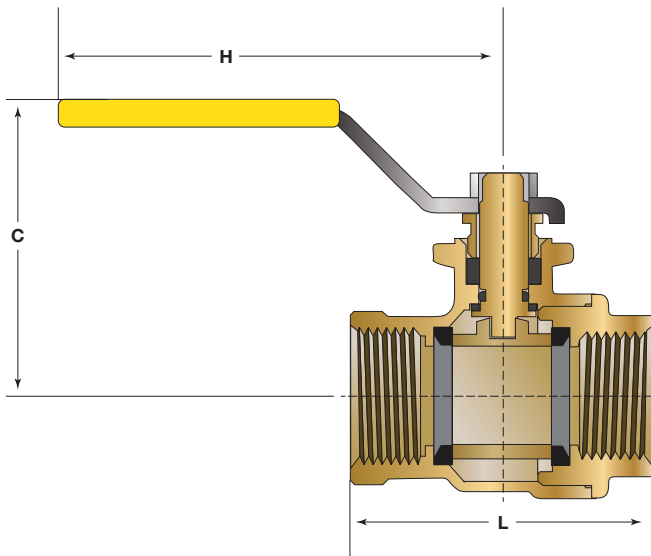
Ball Valve

Size: 1/4" - 1" NPT

Model BV Ball Valves are used in pilot lines to provide a positive shutoff in any override or maintenance situation for simple trouble shooting. This 2-piece, full port valve features: bottom loaded stems, PTFE seats and packing.



Lead Free Ball Valve



Specifications

Standard Material: Copper Silicon Alloy Body and Adaptor
Chrome Plated Ball

Optional Material: Stainless Steel Housing, Body and Adaptor
Stainless Steel Ball

Pressure Rating: 600psi (41 bar) Non Shock

Temp Rating: -40°F - 400°F

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Size	Dimensions						Weight	
	C		H		L			
in.	in.	mm	in.	mm	in.	mm	lbs.	kg.
1/4	1 13/16	46	3 7/16	87	1 3/4	45	0.4	0.2
3/8	1 13/16	46	3 7/16	87	1 3/4	45	0.4	0.2
1/2	1 13/16	46	3 7/16	87	1 15/16	50	0.4	0.2
3/4	2 1/4	57	4	101	2 5/16	59	0.8	0.3

Model S3W

3-Way Solenoid

Size: 1/8" – 1/2" NPT

Model S3W are pilot system 3-way solenoids. The solenoids can control valves independently or in combination with other control circuit pilots or accessories. Product is available with a wide range of options including: voltage (24VDC, 24VAC or 120VAC), operation (energize to open or closed) and a range of enclosures (general service to watertight to explosion proof).

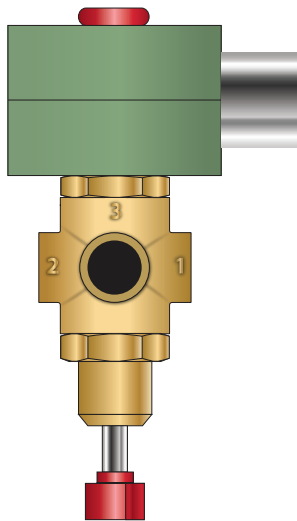


Model S3W
Brass

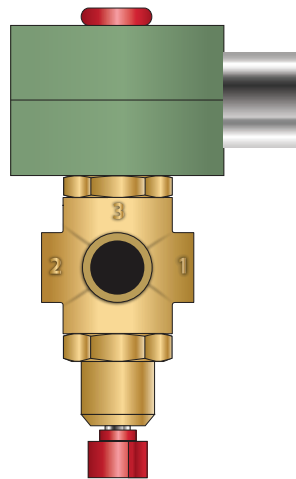


Model S3W
Stainless Steel

Manual Operator



Normal Operating Condition



Manual Override

Specifications

Body Material:	Brass (standard)*** Stainless Steel (optional)
Elastomers:	Nitrile (standard) EPDM (optional) Viton™ (optional)
Voltage:	24VDC, 24VAC or 120VAC
Enclosure:	General Purpose – NEMA 4 (standard) Explosion Proof – NEMA 6, 6P, 7, 9 (optional)
Action:	Normally Open or Normally Closed**

**Solenoid Action only. Main valve action (energize-to-open or energize-to-close) is dependent on the particulars of the pilot system.

***Brass solenoids are not lead free and it is illegal to use them in potable services in the United States such as drinking water, handwashing, food preparation, and dishwashing. However, brass solenoids may be used as a replacement component in a lead free Watts ACV main valve, as the wetted surface of a lead free Watts ACV main valve including installed brass solenoids contains less than 0.25% of lead by weight.

Viton™ is a trademark of The Chemours Company FC, LLC

*The wetted surface of this product contacted by consumable water contains less than 0.25% of lead by weight.

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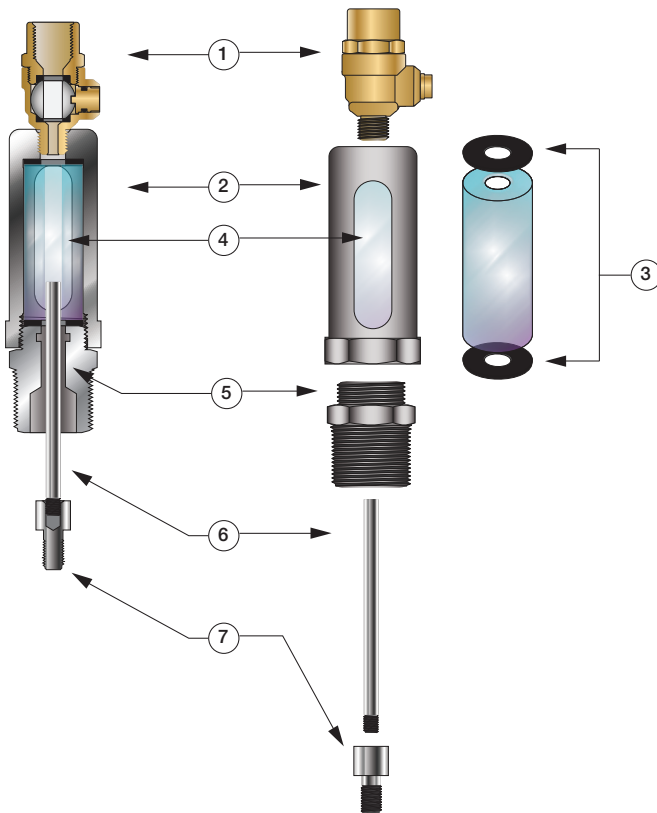
Model 50
Position Indicator

When specified as an option on a Control Valve, the Model 50 Position Indicator is installed in the topmost cover port of the Main Valve and allows for visual indication of valve position. The Model 50 is also very useful during valve start-up and troubleshooting procedures.

A stainless steel indicating rod threads into the tapped portion of the Main Valve stem and moves inside of a cylindrical Pyrex sight tube. The indicating rod travels up and down, following Main Valve stem movement. The housing protects the sight tube and indicating rod, and allows visibility on two sides. The screw driver operated test cock installed on the top of the Model 50 housing provides a controlled method of removal of air from the cover chamber during start-up or troubleshooting of the Main Valve.



Model LF50



Item	Description
1	Test Cock
2	Housing
3	Gasket
4	Pyrex Sight Tube
5	Body
6	Indicating Rod
7	Stem Adaptor (8" or Larger)

Specifications

- Standard Material:** Stainless Steel Housing and Body
Stainless Steel Indicating Rod
Lead Free Test Cock
Pyrex Sight Tube
- Optional Material:** Stainless Steel Test Cock

Pressure Rating: 400psi (27.6 bar)

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Dimensions

Valve Size (in)	Dimension (in)
1½ - 1½	7¾
2	4¾
2½	4¾
3	4¾
4	5
6	5
8	5¾
10	5¾
12	7¼
14	7¼
16	7¼
18*	7¼
20*	7¼
24*	7¼

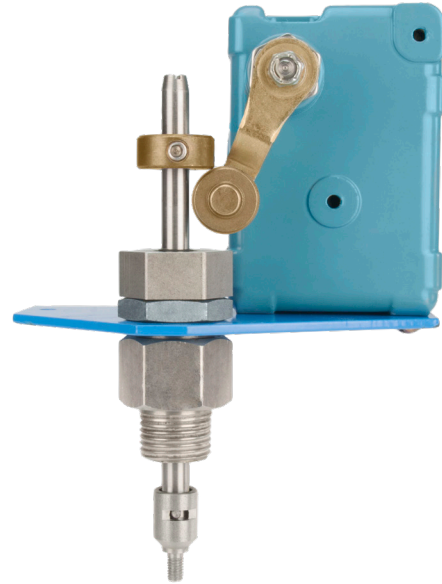
*Reduced Port

LEAD FREE*

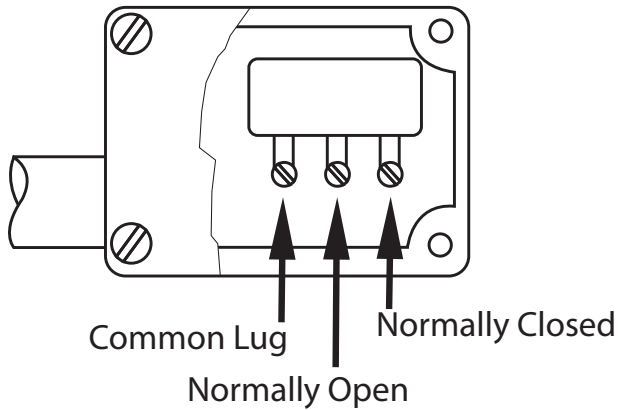
Model 51 Single Limit Switch

The Model 51 Single Limit Switch provides visual indication of valve position, as well as remote electrical indication of "valve open" or "valve closed". The single pole double throw Micro-Switch can be connected to open or close an electrical circuit when the valve opens or closes.

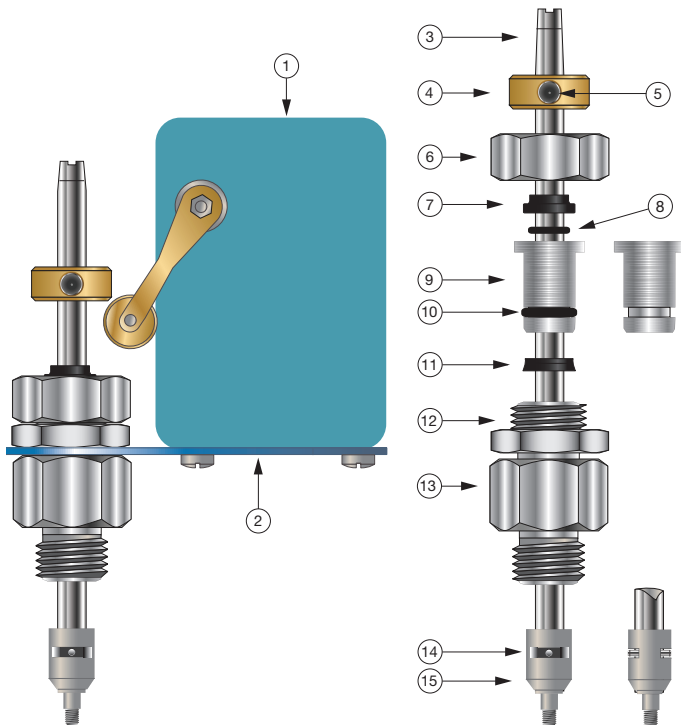
The adjustable collar is normally set to contact the trip arm when the main valve is closed. The collar can be positioned on the stem by loosening the set-screw to actuate the switch at the desired point of valve travel.



Model LF51



Single Pole Double Throw Switch



Specifications

Body Material: Stainless Steel

Elastomers: Buna-N (standard)
EPDM (optional)
Viton™ (optional)

Enclosure: NEMA 1, 3, 4 and 13 General Purpose (standard)
NEMA 1, 7 and 9 Explosion Proof (optional)

Electrical: Form C SPDT Switch
15 amp. 125, 250 or 480 VAC
½ amp. 125 VDC
¼ amp. 250 VDC
½" Conduit Connection

Viton™ is a trademark of The Chemours Company FC, LLC

*The wetted surface of this product contacted by consumable water contains less than 0.25% of lead by weight.

Parts List

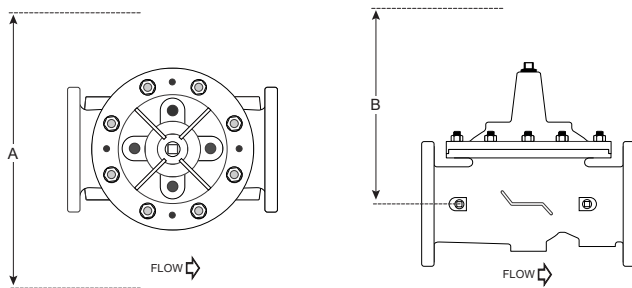
Item	Description
1	Limit Switch
2	Bracket
3	Stem
4	Trip collar
5	Set Screw
6	Cap
7	Wiper Ring*
8	O-Ring*
9	Guide
10	O-Ring*
11	Polypak*
12	Locknut
13	Body
14	Pin
15	Coupling

*Included in Repair Kit

Installation

1. Prior to installation, flush line to remove debris.
2. Install valve so the flow arrow matches flow through the line, and gauges to monitor valve inlet and outlet pressures. A Position Indicator can be installed to provide visual indication of valve position and operation without disassembly.
3. Install isolation valves upstream and downstream of the main valve.
4. Provide adequate clearance for valve servicing and maintenance. Refer to valve servicing dimensions on next page. Avoid installing valves 6" and larger in the vertical position (main valve stem horizontal). Automatic Control Valves (ACVs) are designed for horizontal in-line installation, with the cover facing up (main valve stem vertical). Slow operation or premature stem and guide wear may occur if valve is not installed according to factory recommendations. Consult factory for detailed engineering review prior to ordering if valve is to be installed other than horizontally in-line.
5. If valve is equipped with a pilot control system, extra precautions should be made during installation to protect the piping circuit from damage. Only remove the pilot control system from the valve if necessary. Tubing and fittings should be kept clean and replaced exactly as removed. Consult appropriate hydraulic schematic to ensure proper re-assembly.
6. Connect solenoid wiring leads to desired switching device, using safe, standard electrical practices.

Valve Servicing Dimensions



The following tables detail the recommended minimum valve servicing dimensions.

Globe

Size (in)	20		24	
	<i>in.</i>	<i>cm.</i>	<i>in.</i>	<i>cm.</i>
A (in)	82	209	82	209
B (in)	48	209	82	209

Limited Warranty: Watts Regulator Co. (the "Company") warrants each product to be free from defects in material and workmanship under normal usage for a period of one year from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge.

THE WARRANTY SET FORTH HEREIN IS GIVEN EXPRESSLY AND IS THE ONLY WARRANTY GIVEN BY THE COMPANY WITH RESPECT TO THE PRODUCT. THE COMPANY MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED. THE COMPANY HEREBY SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

The remedy described in the first paragraph of this warranty shall constitute the sole and exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental, special or consequential damages, including without limitation, lost profits or the cost of repairing or replacing other property which is damaged if this product does not work properly, other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemical, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication, improper installation or improper maintenance or alteration of the product.

Some States do not allow limitations on how long an implied warranty lasts, and some States do not allow the exclusion or limitation of incidental or consequential damages. Therefore the above limitations may not apply to you. This Limited Warranty gives you specific legal rights, and you may have other rights that vary from State to State. You should consult applicable state laws to determine your rights. **SO FAR AS IS CONSISTENT WITH APPLICABLE STATE LAW, ANY IMPLIED WARRANTIES THAT MAY NOT BE DISCLAIMED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO ONE YEAR FROM THE DATE OF ORIGINAL SHIPMENT.**



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