



## YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

SERIES 9200, 9100, 5300 AND BPR

Self-contained, low maintenance and reliable automatic recirculation control (ARC) valves engineered to protect centrifugal pumps against thermal damage and destruction



### FEATURES

- Precise recirculation control.
- Stable design.
- Integral check valve.
- Low maintenance.
- Self-operating.
- Ease of installation.
- Suitable for all fluids.
- Dampening of pulsations.
- Multistage pressure letdown.
- Cavitation prevention.
- Eliminate external power sources or signals.
- Reliable performance.

### GENERAL APPLICATION

The Automatic Recirculation Control (ARC) valve is a self contained, low maintenance and reliable device, engineered to protect centrifugal pumps against thermal damage and destruction. With a track record of more than 40 years, Yarway ARC valves have provided customers with a peace of mind knowing that their pumps are protected during low flow events.

### TECHNICAL DATA

Materials:	Carbon steel, stainless steel, 6Mo, super duplex, NACE
Sizes:	1" to 14" (DN 25 to 350)
Temperature range:	-100° to 550°F (-73° to 287°C)
Pressure ratings:	ANSI B16.34 Class 150 to 2500

# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

SERIES 9200, 9100, 5300 AND BPR

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# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

SERIES 9200, 9100, 5300 AND BPR

## HOW TO SELECT A VALVE TYPE

Please use the following guidelines to determine the ARC pump protection valve model appropriate for your application.

1. Determine which valve model is suitable for your application by using the Application Guide on this page.
2. Review the corresponding model's features, operation and technical data in the catalog.
3. Once you have determined the model and features required for your application, refer to the sizing guide to determine valve size, materials selection and data necessary for sizing.
4. If you are not able to determine the valve model required for your application, please consult your local Emerson sales office for Yarway ARC sizing and selection.

## APPLICATION GUIDE

	Series	9200	9100	5300
Pressure class	150	X	X	
Pressure class	300	X	X	
Pressure class	600		X	
Pressure class	900			X
Pressure class	1500			X
Pressure class	2500			X
Function	Modulating	X	X	
	On/off			X
Bypass line	Back pressure regulator	X	X	
	Orifice plate			X



A wide range of products with same-day shipment capability supporting our service centers, sales offices and channel partners.

### Brands

- Anderson Greenwood
- Crosby
- Varec
- Yarway ARC

### Spare parts inventory

- Soft-goods kits
- Hard parts
- Retrofit kits

### Delivery\*

- Same day
- Next day
- 3-5 day
- After hours and weekends

\* Reference PRONTO price guide

# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## SERIES 9200

### SERIES 9200

A self-contained valve that functions as an integral check valve, flow sensing element and bypass control valve.

### OVERVIEW

By providing recirculation flow to the suction source of the pump, the 9200 ARC assures a minimum flow for stable pump operation.

Its balanced bypass trim design offers improved efficiency in pressure letdown, improved flow capacity, stability and performance at all service conditions. Externally, a compact and light weight one-piece design is used to ease valve installation, handling, maintenance, pipe support requirements and considerations. Internally, a flow conditioner is used to improve pressure letdown in the bypass further and reduce noise. For special requirements, the 9200 ARC offers a configurable trim design.

The modulating Series 9200 ARC recirculates only the flow required to assure minimum flow through the pump at all times. Recirculation flow is not required under full process flow but becomes necessary as process flow demand decreases. Unlike continuous recirculation, the ARC responds directly to this need, avoiding the necessity to oversize the pump and prime mover which can add substantially to the capital, energy and operating costs of the system.

The ARC also provides cost savings over an instrumented flow control loop. Instead of a multiple component system, the ARC is self-contained: a flow sensing orifice; a check valve; a recirculation control valve and a pressure letdown device. Moreover, it requires no instrument signal or power source and none of the associated maintenance.

### OPTIONS

- NACE conforming to MR0175
- External BPR (back pressure regulator) if required
- DIN, BS, JIS, RTJ, FF flanges
- High alloy (6Mo) construction
- Super duplex stainless steel (Zeron 100) construction
- Extreme temperature design (Variseal)

### TECHNICAL DATA

Sizes	2", 3", 4", 6", 8", 10", 12" and 14"
Rating	ANSI B16.34 Class 150 and 300
Connections	ASME B16.5 raised face
Temperature range	-100°F to 550°F [-73°C to 287°C]
Materials	Carbon steel SA216 WCB, stainless steel SA351 CF8M, PTFE, EPDM, FKM



### FEATURES

- Eliminates high cost of installation and maintenance of complex conventional flow control loops.
- Eliminates multiple component vendors.
- Eliminates cavitation in the valve and piping.
- Only three pipe connections.
- Eliminates any power source or instrument signal.
- One piece bonnetless, packless body design eliminates a potential leak path to atmosphere.
- Intrinsically safe for a broad range of pumping applications in the hydrocarbon industry.
- Totally mechanical bypass activation with no levers, linkage, control signals or pilot valves to fail reduces maintenance and improves reliability.
- Integral vortex-inducing flow conditioner controls the damaging effects of cavitation resulting from fluid pressure reduction.
- Balanced stem designed with characterized orifices provides a two-stage pressure reduction, extending trim life and eliminating potentially destructive cavitation, ensuring stable operation.
- Flow loop testing and performance curve evaluation of each valve order assures reliable performance from every valve.

# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

SERIES 9200

SERIES 9200

## Stable by design

Large disc, spring and snubber design combined to achieve optimum operating stability at various process flow conditions.

## Integral check valve

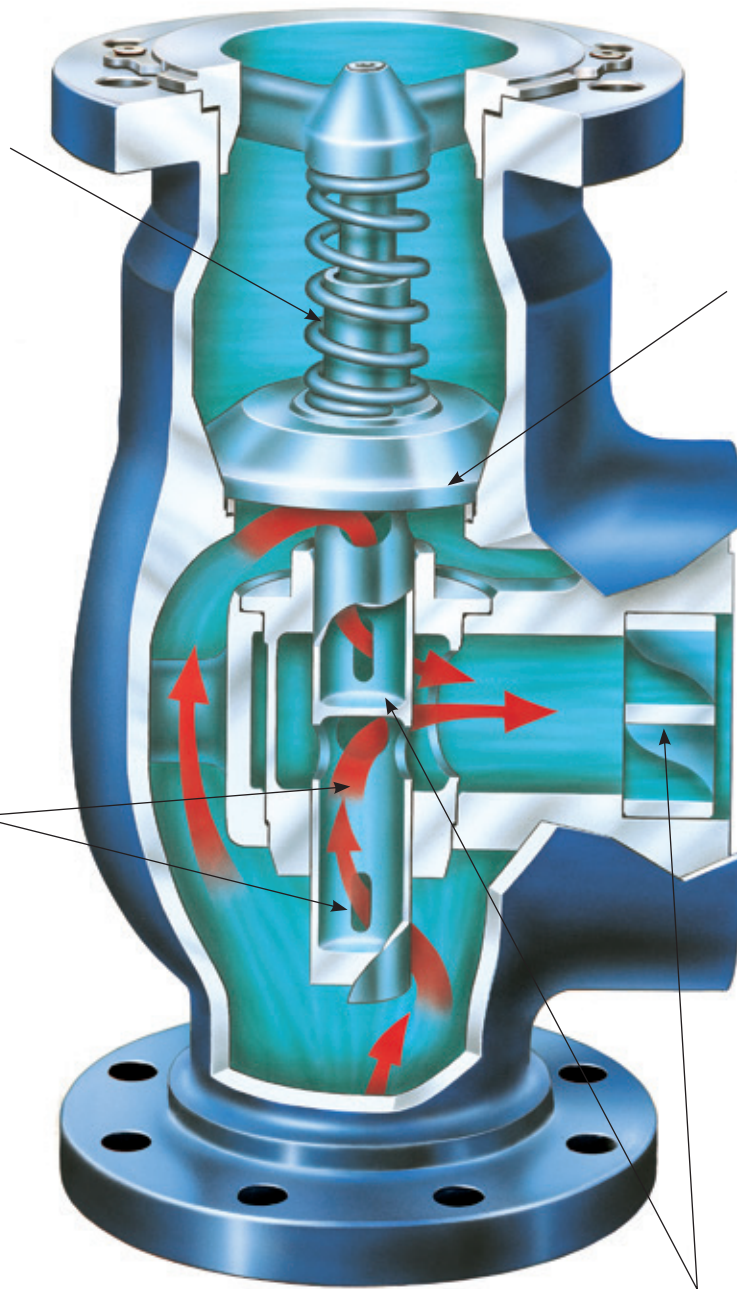
Spring-loaded against seat, the flow sensing disc acts as a main flow check valve.

## Superior recirculation flow control

Characterized orifices in the bypass element provide accurate, modulated recirculation flow.

## Staged pressure letdown

Balanced bypass trim design provides multistage pressure reduction.



# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## SERIES 9100

### SERIES 9100

A self-contained system that requires no instrument signal or power source.

### OVERVIEW

By providing recirculation flow to the inlet of the pump, the 9100 ARC helps ensure a minimum flow for stable pump operation.

The modulating 9100 ARC recirculates only the flow required to help ensure a minimum flow through the pump at all times. Recirculation flow is not required under full process main flow demand but becomes necessary as the process main flow demand decreases. Unlike continuous recirculation, the ARC responds directly to this need, eliminating the necessity to oversize the pump and prime mover, minimizing their capital cost as well as the cost of energy needed for their operation.

An ARC valve also saves most of the costs of a conventional multiple component flow control loop because the valve itself is a completely self-contained system: it is a flow sensing orifice; a check valve; a recirculation control valve and a pressure letdown device. As a self-contained system, it requires no instrument signal or power source or any of the associated maintenance.

### OPTIONS

- NACE conforming to MR0175
- External BPR (back pressure regulator) if required
- DIN, BS, JIS, RTJ, FF flanges
- High alloy (6Mo) construction
- Super duplex stainless steel (Zeron 100) construction
- Extreme temperature design (Variseal)

### TECHNICAL DATA

Sizes	1", 1½", 2", 3", 4", 6", 8", 10", 12"
Rating	ANSI B16.34 Class 150, 300 and 600
Connections	ASME B16.5 raised face
Temperature range	-100°F to 550°F (-73°C to 287°C)
Materials	Carbon steel SA216 WCB, stainless steel SA351 CF8M, PTFE, EPDM, FKM



### FEATURES

- Eliminates high cost of installation and maintenance of complex conventional flow control loops.
- Eliminates multiple component vendors.
- Eliminates cavitation in the valve and piping.
- Only three pipe connections.
- Eliminates any power source or instrument signal.
- Intrinsically safe design with all static seals, packless design (no stuffing boxes), no leak path to atmosphere and no electrical wiring.
- Ideal for broad pumping applications in the hydrocarbon industry.
- Totally mechanical self-powered design with no linkages, control signals, pilot valves, etc. reduces maintenance costs dramatically.
- Certified test curve supplied with each valve lot.



# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

SERIES 9100

SERIES 9100

### Stable design

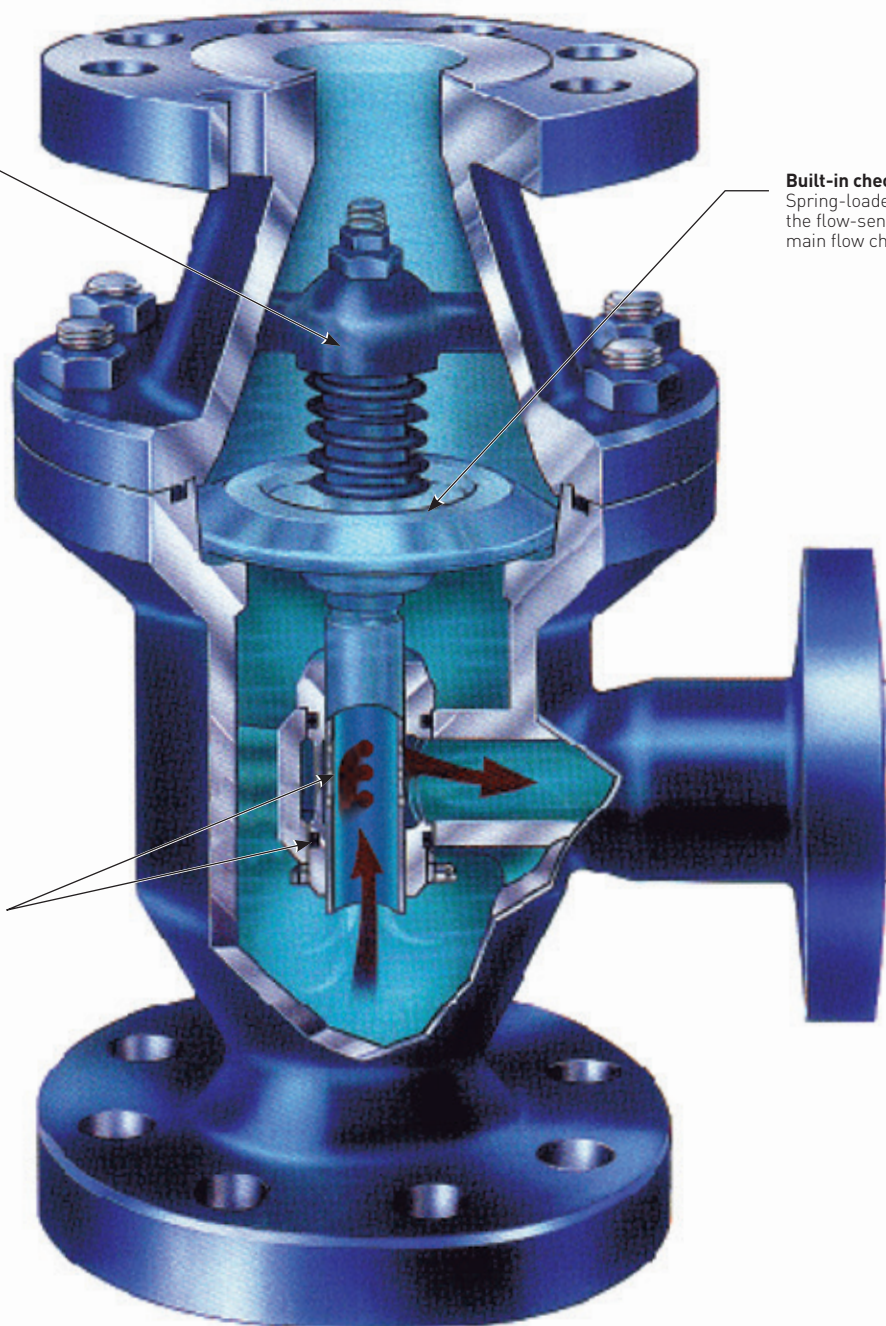
Vibration guide structures at top and bottom of flow-sensing disc provide full support to assembly. Top guide includes a snubber to minimize vibration.

### Built-in check valve

Spring-loaded against seat, the flow-sensing disc acts as a main flow check valve.

### Precise recirculation control

Characterized orifices in the bypass element provide accurate, modulated recirculation flow.



# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## SERIES 5300

### SERIES 5300

A self-contained system that includes pressure reducing trim.

### OVERVIEW

Centrifugal feed pumps need a reliable recirculation system to prevent pump instability and overheating during critical low load periods. Because many such systems are constructed from a number of components, they can become both complex and costly, requiring substantial outlays for design, installation and maintenance.

The 5300 ARC valve is a complete system which performs four separate functions within the pumping circuit - all within one compact body. Essentially, the 5300 ARC valve is a check valve installed in the main line but also acts as the sensing and powering element which pilots the operation of a recirculation control valve. The sensing system responds to changes in flow rather than pressure.

The control valve incorporates a pressure reducing device that divides recirculation flow and guides the resulting streams through successive 90° turns to dissipate the destructive energies of high pressure while controlling fluid velocity.

As the 5300 ARC valve recirculates only that flow needed to cool a feed pump at critical times of low load rather than permitting a continuous recirculation flow, it saves the electrical power that continuous recirculation would consume, which can cost several thousand dollars per year.

### OPTIONS

- NACE conforming to MR0175
- DIN, BS, JIS, RTJ, FF, BWE flanges

### TECHNICAL DATA

Sizes	3", 4", 6", 8", 10", 12", 14"
Rating	ANSI B16.34 Class 900, 1500, 2500
Connections	ASME B16.5 raised face
Temperature range	-50°F to 500°F (-46°C to 260°C)
Materials	Carbon steel SA216 WCB, stainless steel SA351 CF8M, PTFE, EPDM, FKM, Kalrez



### FEATURES

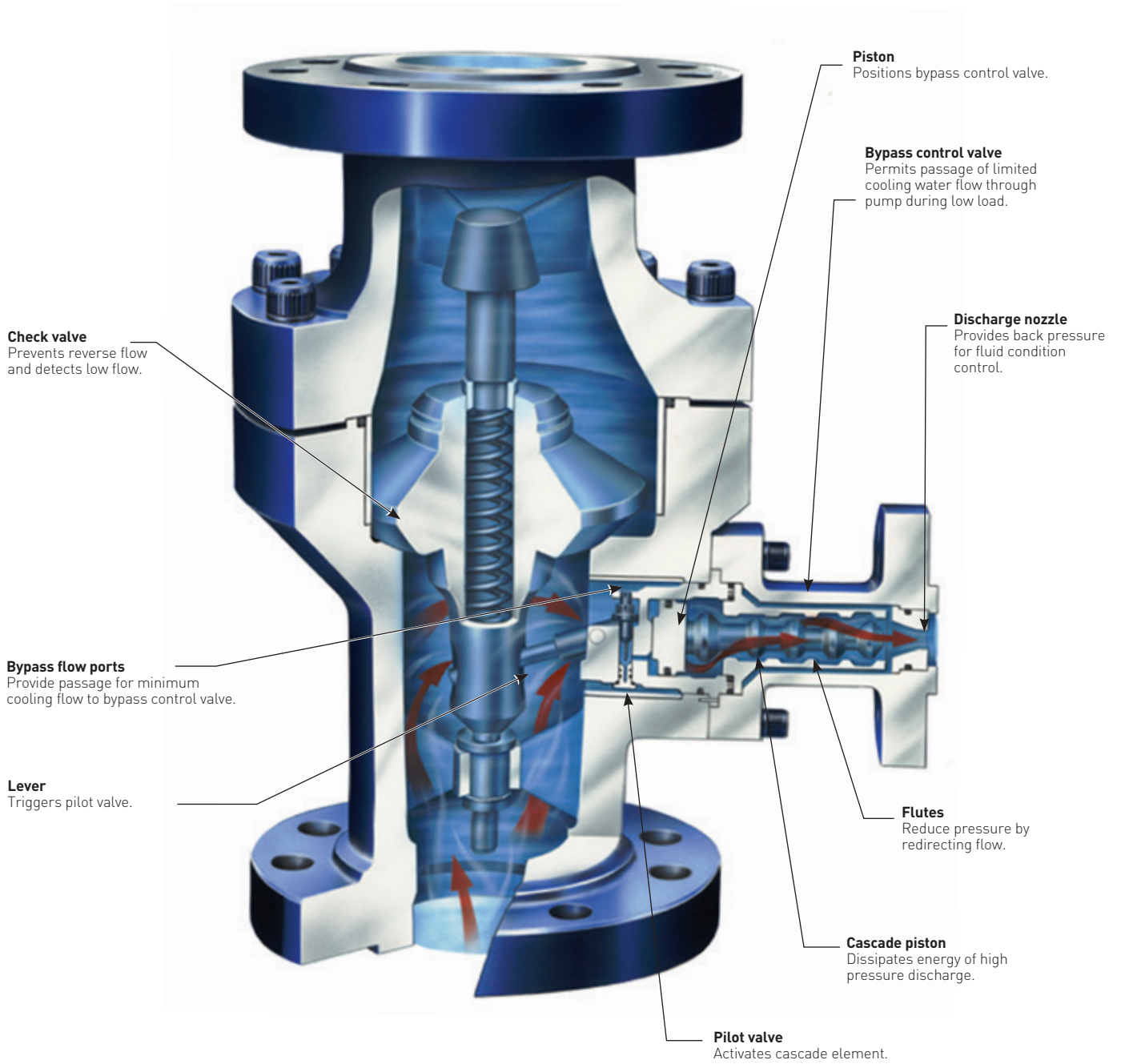
- Saves power costs by eliminating the need for continuous recirculation to cool the pump.
- Saves system engineering time through the inclusion of reverse flow prevention, low flow detection, recirculation flow control and recirculation flow pressure reduction.
- Eliminates multiple vendor complexities associated with systems combining various pneumatic, thermal and mechanical components.
- Saves installation and maintenance costs
  - Needs no electrical wiring, plant or instrument air.
  - Eliminates other components of a conventional system.
  - Eliminates multiple pressure reducing orifices and capillary tubes.
  - Eliminates duplication created by two control valves in a series - one for pressure reduction and one for tight shut-off.
- Reduces downtime by minimizing the problems of high velocity wire-drawing and cavitation erosion common to high pressure drop service.



# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

SERIES 5300

SERIES 5300



# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION) BACK PRESSURE REGULATOR (BPR)

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## OVERVIEW

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In high pressure pumping applications the system often does not provide adequate pressure in the bypass line to prevent cavitation or flashing. Either of these conditions can cause damage to both valves and the pipe system or cause a reduction in flow beyond the minimum desired, jeopardizing the pump protection system.

The requirement of back pressure is generic to all pressure reducing applications. Pressure reduction, even by multiple stage cascading such as in the Series 5300 ARC, can minimize the requirement. However, no valve design will redefine a fluid's physical properties.

This becomes especially important in modulating systems. A fixed orifice will not provide the proper back pressure at all flow levels. As the flow in the bypass line is reduced, the orifice becomes less effective. Proper system design should be used to optimize valve pressure reduction and consider all fluid dynamic effects downstream of any pressure reducing device.

When adequate back pressure is not available downstream of a pressure reducing valve, vapor bubbles will form in the zone just downstream of the valve last stage control surface. This zone is defined as the 'vena contracta' and represents the point of highest fluid velocity and lowest pressure. The potential for damage to downstream piping components and flow reduction exists from this point.

When line pressure remains below the fluid vapor pressure, any existing bubbles will remain and expand as piping friction reduces line pressure further. This can be defined as a 'flashing condition' and is characterized by a polished appearance on affected surfaces. When the line pressure drops below the fluid vapor pressure and then recovers, any entrapped vapor bubbles will collapse (implode). This is defined as a 'cavitating condition' and is characterized by a cinder-like appearance on affected surfaces. The resolution of either condition is best addressed by eliminating vapor formation which can be ensured by the provision of adequate back pressure. The 'back pressure factor' is key to reliable system operation and must not be ignored in piping design considerations.

It is the obligation of a responsible automatic recirculation control valve manufacturer to analyze the system needs and supply a back pressure regulator (BPR) when it is warranted by the laws of fluid dynamics. For on/off systems this could be a simple orifice but for modulating conditions it must be a dedicated BPR device.



## OPTIONS

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- NACE conforming to MR0175
- High alloy (6Mo) construction
- Super duplex stainless steel (Zeron 100) construction
- RTJ flanges

## TECHNICAL DATA

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Sizes	1½", 2", 3", 4", 6" (flanged) ¾", 1½", 2", 3", 4", 6" (wafer)
Rating	ANSI B16.34 Class 150, 300, 600, 900, 1500
Connections	ASME B16.5 raised face
Temperature range	-50°F to 500°F (-46°C to 260°C)
Materials	Carbon steel A105 WCB, stainless steel SA479 316, PTFE, EPDM, FKM

# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## OPERATION

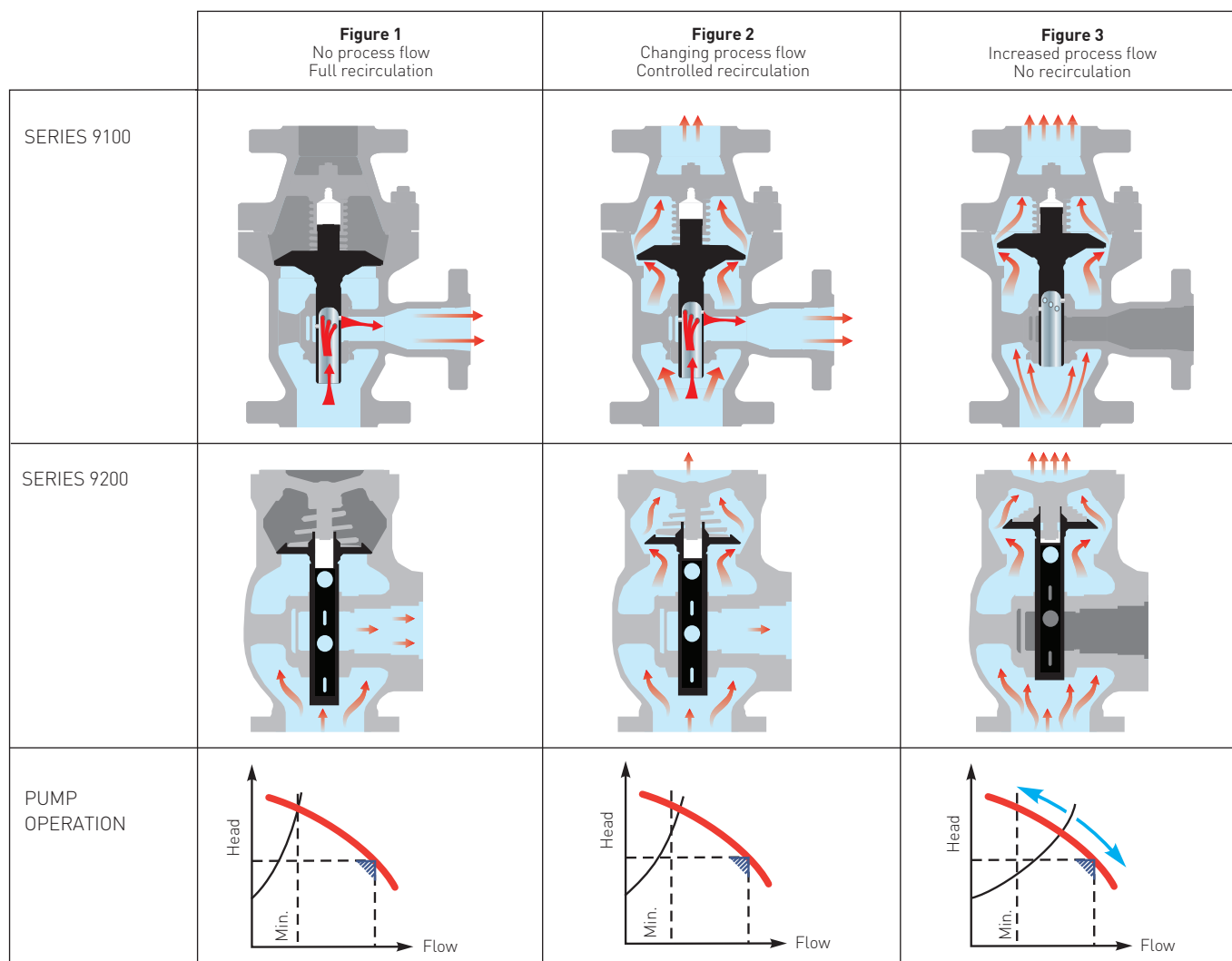
### SERIES 9200 AND 9100

The heart of the recirculation valve is a main flow sensing check valve disc which is flow, not pressure, sensitive. The disc modulates to the demand for process flow at the same time assuring a minimum flow through the pump, resulting in a consistent, stable and repeatable performance over the full pressure range.

(Figure 1) shows the disc in the closed position where there is no process flow and the bypass is fully open. This protects the pump against planned or accidental 'dead heading' which can result from a closed downstream pump isolation valve or process control valve.

As the disc lifts (Figure 2) in response to an increase in flow to the process, the bypass element, which is integral to the disc, closes the bypass flow orifices reducing recirculation flow, which is controlled with disc position. This modulation feature assures that the total of process flow and recirculation flow exceed the minimum flow through the pump as specified by the pump manufacturer.

When the disc is set at full lift position (Figure 3), the bypass is closed. As process flow decreases, the reverse action occurs and the recirculation flow increases again. Flow enters the bypass element at the bottom of the disc assembly and is controlled by characterized orifices inside the disc stem. Flow continues through an annulus in the bypass bushing and is directed to the outlet of the valve.



# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## OPERATION

### SERIES 5300

The ARC valve is installed in the pump discharge line in the position of the main check valve it replaces. It is adaptable to horizontal or vertical piping and to either horizontal or vertical upward flow. Flanged or welded ends are optional to suit specifications.

Decreasing flow through the valve causes the spring loaded disc to move toward its seat. At a flow rate determined by the minimum flow requirement through the pump, the disc triggers the pilot valve through the lever. This vents the pressure on the head of the piston. Pressure acting on the opposite side of the piston opens the bypass valve, permitting flow through the multi-stage cascade element. The flow rate through the bypass valve is equal to the minimum flow requirement of the pump.

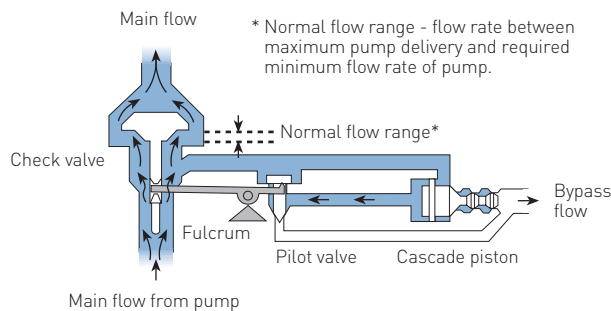
The directional changes of the successive helical flutes, as well as the multiple orifices, provide for the absorption of pressure energy.

The bypass valve will remain in an open position as long as the pilot valve is open. This corresponds with the position the disc assumes at flow rates between an established low flow and no flow through the main check valve. As the flow rate exceeds the minimum flow rate, the rising disc allows the pilot valve to close; pressure entering the chamber over the piston through the annular clearance around the pilot.

### MAIN FLOW

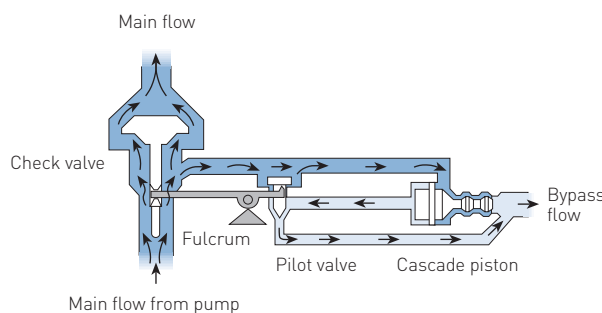
#### Normal main flow

Check valve - open  
Pilot valve - closed  
Cascade valve - closed



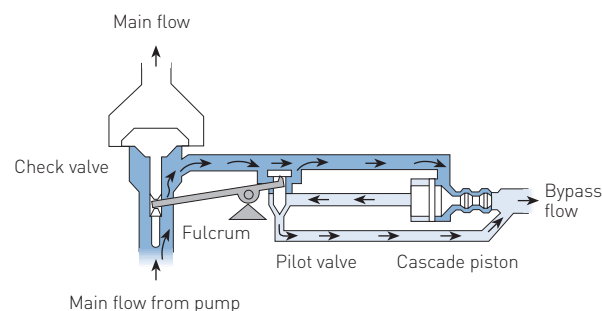
#### Low main flow

Check valve - at switch point  
Pilot valve - partially open  
Cascade valve - opening



#### Low main flow

Check valve - closed  
Pilot valve - open  
Cascade valve - open



# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION) ENERGY SAVINGS

## ARC PUMP PROTECTION VS. CONTINUOUS RECIRCULATION

The cost of the electricity consumed in continuous recirculation cooling is significantly higher than usually realized. For example, the manufacturer of a 1200 gpm pump with a discharge head of 500 feet, may require 400 gpm recirculated flow to keep it cool (Figure 1). Continuously pumping 400 gpm against a 500-foot head requires 65 horsepower. In a 10¢/kwh power cost area, total annual cost savings using an ARC valve would be approximately \$48,000 (Figure 2).

FIGURE 1  
Requirements for pump circulation (hp)

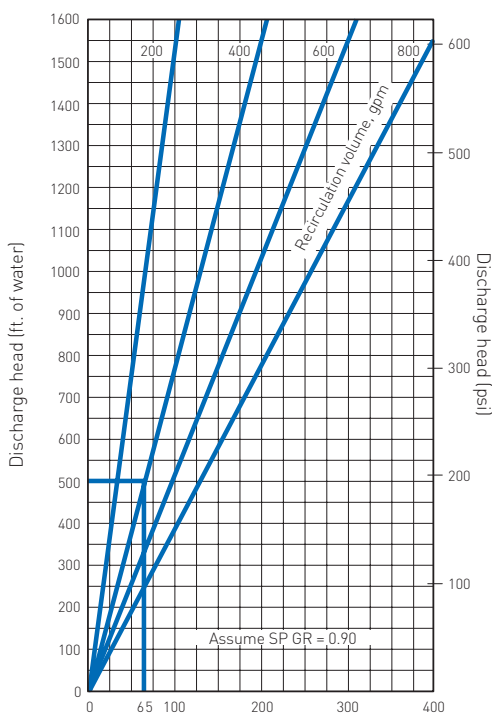
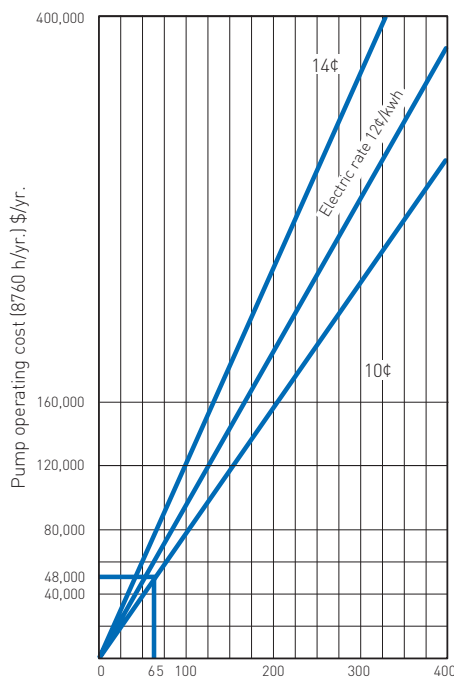
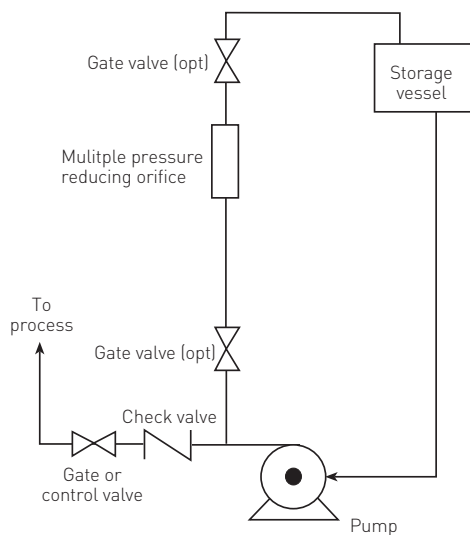


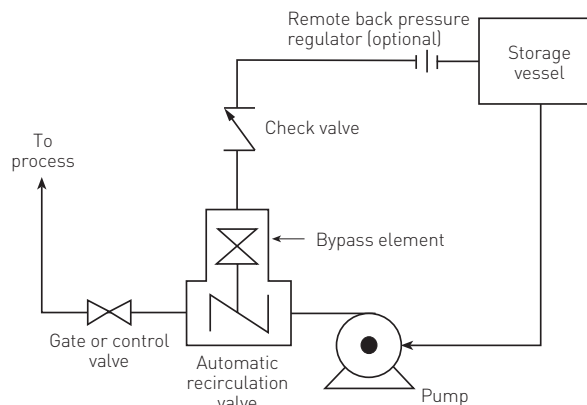
FIGURE 2  
Power required for recirculation (hp)



### CONTINUOUS RECIRCULATION SYSTEM



### YARWAY SYSTEM



# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION) INSTALLATION RECOMMENDATIONS

## VALVE INSTALLATION

Two common installation approaches are illustrated below. In the first, a common recirculation line is used to return bypass flow to the receiver vessel where multiple pumps are used to produce process flow. In these installations, each pump must be protected with a dedicated pump protection valve. The second diagram shows the more common one pump, one bypass system approach.

In each of these cases, treatment of the bypass line is very similar once flow requirements have been determined. Commonly, a back pressure device with fixed or variable orifice is mounted close to the receiver vessel where flashing liquid is discharged safely. Check valves are installed in the bypass line to prevent bypass back flow and block valves are installed with a lock open option to allow closure by authorized personnel only.

The ARC can be installed in a vertical flow up or horizontal position. Other piping practices regarding velocity, geometry and location of valve and pipe members should be consistent with good industry practices and standards.

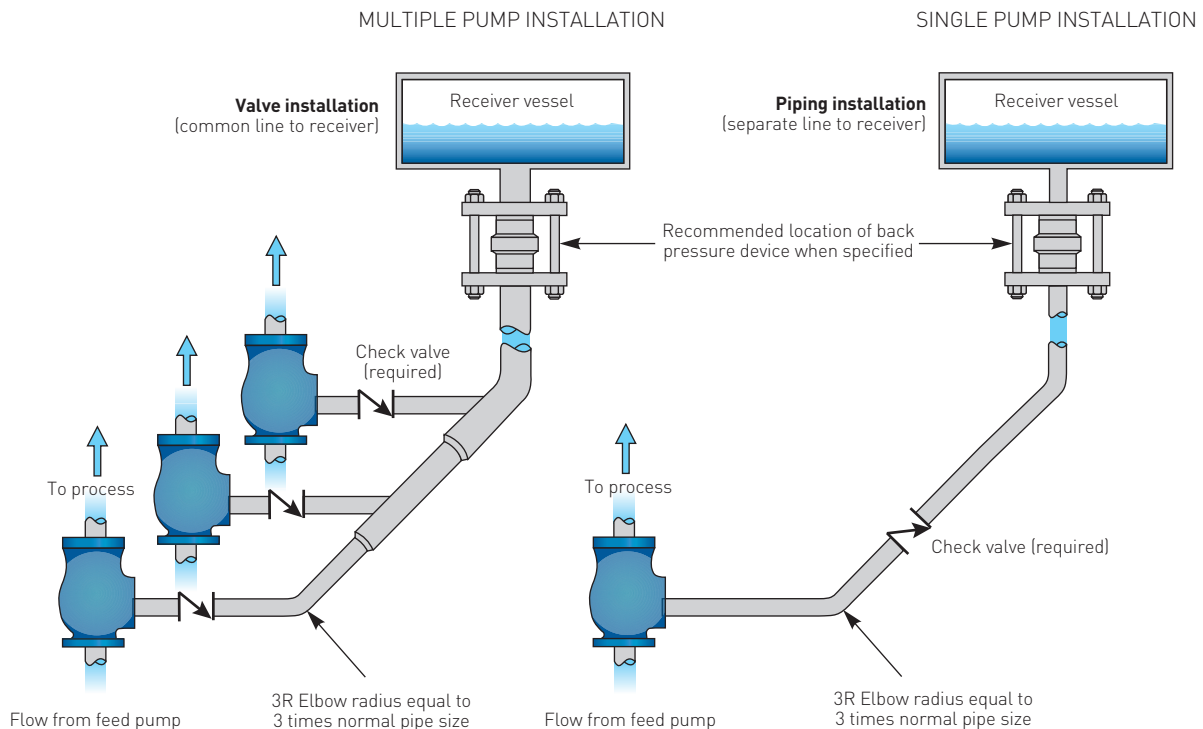
## BACK PRESSURE REGULATOR

In high pressure pumping applications the system often does not provide adequate pressure in the bypass line to prevent cavitation or flashing. Either of these conditions is undesirable in that it can cause damage both to valves and the pipe system or cause a reduction in flow below the minimum desired, jeopardizing the pump protection system.

The requirement of back pressure is generic to all pressure reducing applications. Pressure reduction even by multiple stage cascading can minimize the requirement, however no valve design will redefine a fluid's physical properties.

This becomes especially important in modulating systems. A fixed orifice will not provide the proper back pressure at all flow levels. As the flow in the bypass line is reduced, the orifice becomes less effective.

Proper system design should be used to optimize valve pressure reduction and consider all fluid dynamic effects downstream or any pressure reducing device.



# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## SPECIFICATION

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### HOW TO SPECIFY

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Centrifugal pump minimum flow protection shall be provided by a self-contained multi-function valve requiring no external power source or actuation device.

#### The valve shall provide the functions of:

1. Spring loaded check valve, to prevent pump damage from reverse flow.
2. Flow sensor, which will activate a recirculating device at the specified minimum pump flow rate.
3. Pressure reducing device, to reduce high pump discharge pressures effectively to low receiver tank/sump pressures.

#### Additional considerations:

1. Pump protection valve shall be sized to provide the required minimum pump flow rate.
2. Bypass actuation shall be by direct contact of the switching mechanism to the flow sensing check valve disc.
3. Bypass trim shall have a 1:1 ratio with the flow sensing check valve disc travel providing optimum modulated control (applies to 9200 and 9100 models only).
4. Bypass trim shall have the capability of providing extended bypass control service. External manual bypass piping shall not be acceptable.
5. Pump protection valve shall be designed and constructed in accordance with ANSI B16.34 and PED.
6. Pressure reduction in the bypass shall be the vendor's responsibility to control flashing, cavitation and choked flow conditions within the valve's trim and at the valve's discharge.
7. Sealing surfaces in the valve trim shall be located in an area to minimize erosion and cavitation damage.
8. The sum of the process and bypass flow rates shall always exceed the specified minimum pump protection flow rate.
9. The bypass shall be shut off when the process flow rate is greater than the minimum pump protection flow rate.
10. Valve manufacturer shall provide a sizing, configuration report and flow graph.
11. Valves shall be designed to be repairable.
12. Valves shall include a snubber device on the check valve disc to provide pulsation damping due to pressure transients.
13. Valves shall be flow tested by the manufacturer and certified performance reports shall be provided.



# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## SIZING GUIDE

### MAXIMUM MAIN FLOW (gpm (m<sup>3</sup>/hr) at specific gravity = 1)

Series	Inch (DN)										
	1 (25)	1½ (40)	2 (50)	3 (80)	4 (100)	6 (150)	8 (200)	10 (250)	12 (305)	14 (350)	16 (400)
9200	-	-	190 (43)	430 (98)	765 (174)	1600 (364)	2800 (636)	4500 (1023)	6500 (1477)	8500 (1932)	-
9100	47 (10.7)	110 (25)	190 (43)	400 (91)	700 (133)	1600 (364)	2800 (636)	4500 (1023)	6500 (1477)	-	-
5300	-	-	-	392 (89)	735 (167)	1567 (356)	2743 (623)	4114 (934)	5388 (1224)	6466 (1469)	8621 (1958)

### MATERIAL SELECTION

Body material	ANSI Class - CWP					
Model number - description	150	300	600	900	1500	2500
0 - WCB	285	740	1480	2220	3705	6170
1 - CF8M	275	720	1440	2160	3600	6000
5 - Super Duplex	290	750	1500	2250	3750	6250
6 - 6Mo	290	750	1500	2250	3750	6250

Soft goods	Temperature	
Model number - description	Max.	Min.
P - TFE Propylene	400	-20
V - Fluorocarbon Rubber (FKM)	400	-20
E - Ethylene Propylene Rubber (EPDM)	300	-65
K - Kalrez	600	20
G - Graphite/Turcon	500	-328
P - LT - Low Temp Turcon	500	-328
T - LT - Low Temp TFE	400	-423

### SIZING PROGRAM - PRV<sup>2</sup>SIZE

Emerson's PRV<sup>2</sup>SIZE software incorporates over 135 years of experience and engineering expertise with an extensive array of Anderson Greenwood, Crosby and Varec pressure relief and tank protection devices as well as Yarway pump protection products. Emerson's PRV<sup>2</sup>SIZE software is a single program providing industry standard product sizing and selection for customers and engineers.

#### Features include:

- Easy to use and intuitive interface
- Fully configured product selection
- Catalog integration
- Detailed product specifications including cross sectional drawings, dimensions and weights in U.S. Customary Units or Metric
- Flow curves for pump protection products

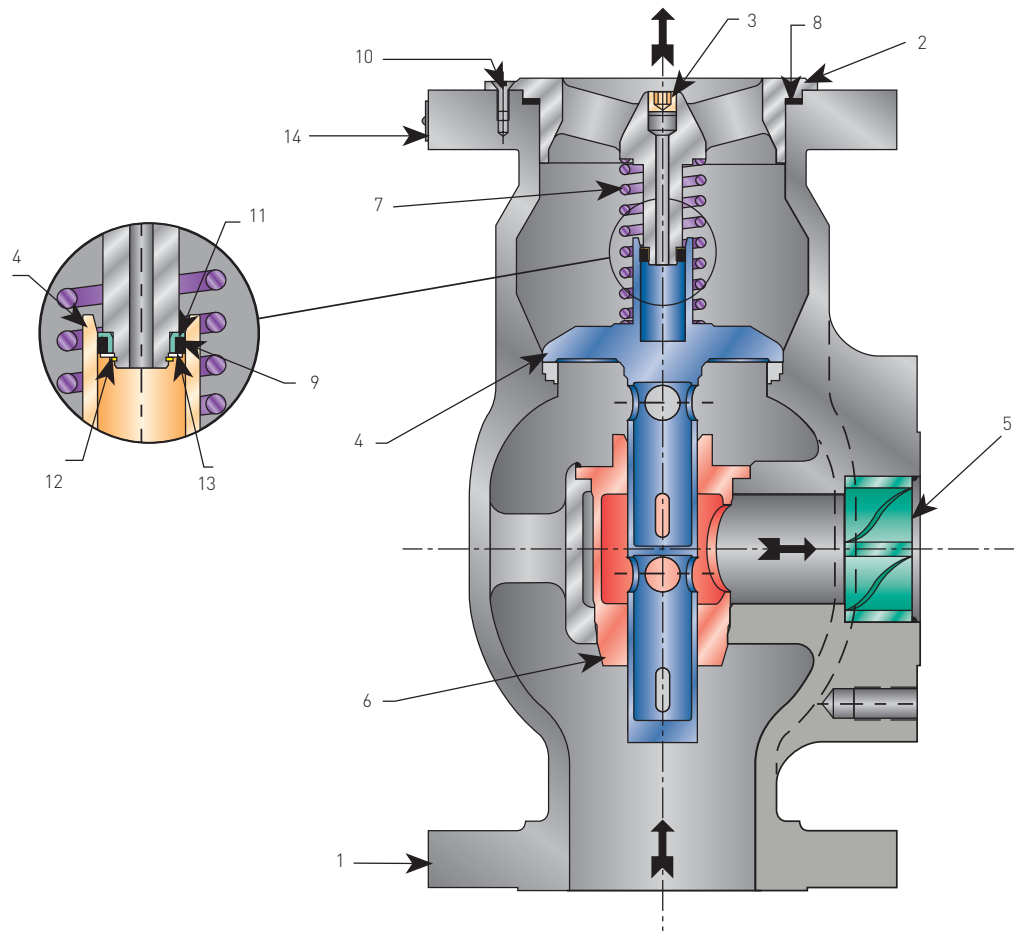
Emerson PRV<sup>2</sup>SIZE software website: [valvesizing.emerson.com](http://valvesizing.emerson.com)



# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## PARTS AND MATERIALS - SERIES 9200

SERIES 9200 - SIZES 2", 3" AND 4"



### PARTS AND MATERIALS

Item	Part	Material
1	Body	ASTM A-216 Grade WCB with ASTM A747 Grade CB7Cu-1 (17-4 PH Cast) Condition H900 (J92180) seat ring
2	Upper stop	ASTM A216 WCB
3	Orifice	18-8
4 <sup>[2]</sup>	Disc assembly	ASTM A351 type CF8M
5	Flow conditioner	ASTM A351 type CF8M
6	Bypass bushing	ASTM A747 Grade CB7Cu-1 (17-4 PH Cast) Condition H900 (J92180)
7 <sup>[2]</sup>	Spring	AISI 316 stainless steel
8 <sup>[1][2]</sup>	Gasket	Sigraflex BP (Graphite)
9 <sup>[1][2]</sup>	Snubber seal	Variseal - Carbon filled TFE
10	Screw	AISI 316 stainless steel
11 <sup>[1][2]</sup>	Snubber ring	ASTM A276-S21800A (Nitronic 60 bar)
12 <sup>[1][2]</sup>	Spiral ring	PH15-7MO
13 <sup>[1][2]</sup>	Snubber washer	AISI 316 stainless steel
14	Nameplate	AISI 300 series stainless steel

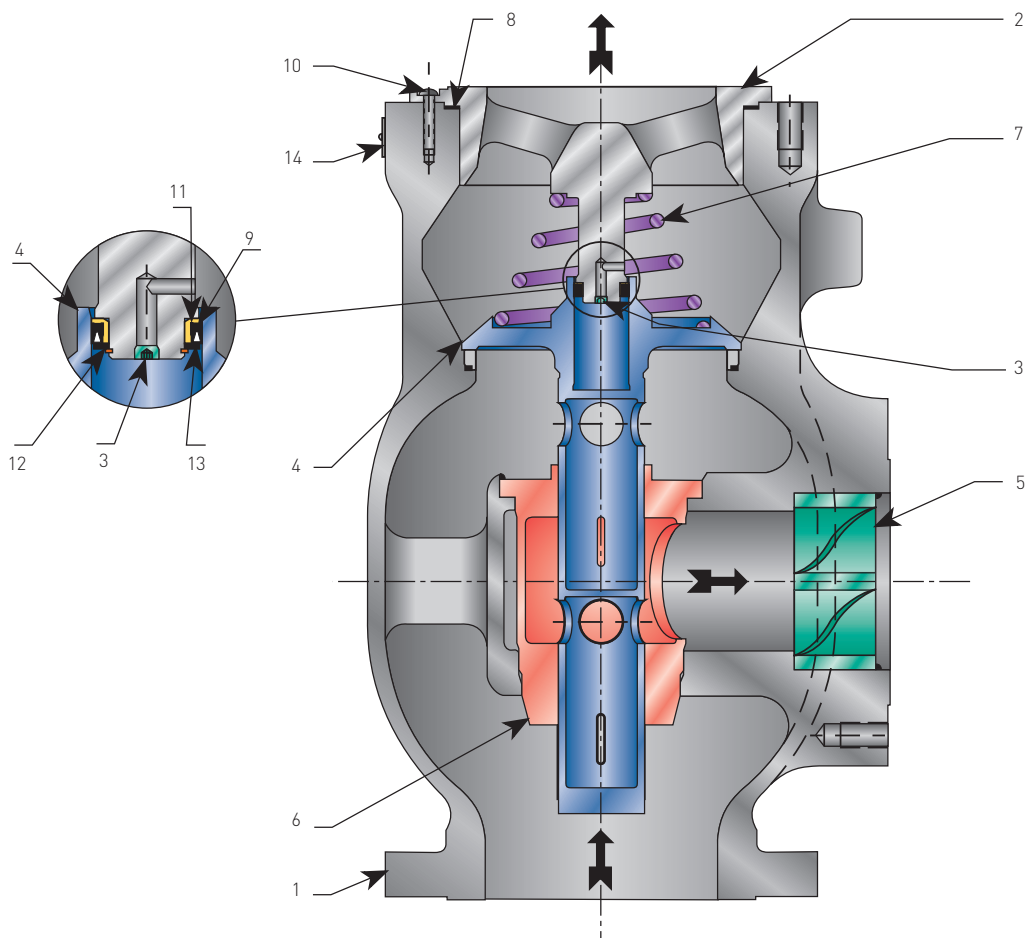
### NOTES

1. Recommended spare parts for service inspection
2. Recommended spare parts for service overhaul

# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## PARTS AND MATERIALS - SERIES 9200

SERIES 9200 - SIZES 6" AND 8"



### PARTS AND MATERIALS

Item	Part	Material
1	Body	ASTM A-216 Grade WCB with ASTM A747 Grade CB7Cu-1 (17-4 PH Cast) Condition H900 (J92180) seat ring
2	Upper stop	ASTM A216 WCB
3	Orifice	18-8
4 <sup>[2]</sup>	Disc assembly	ASTM A351 type CF8M
5	Flow conditioner	ASTM A351 type CF8M
6	Bypass bushing	ASTM A747 Grade CB7Cu-1 (17-4 PH Cast) Condition H900 (J92180)
7 <sup>[2]</sup>	Spring	SST 17-7 PH H900
8 <sup>[1][2]</sup>	Gasket	Sigraflex BP (Graphite)
9 <sup>[1][2]</sup>	Snubber seal	Variseal - Carbon filled TFE
10	Screw	AISI 316 stainless steel
11 <sup>[1][2]</sup>	Snubber ring	ASTM A276-S21800A (Nitronic 60 bar)
12 <sup>[1][2]</sup>	Spiral ring	PH15-7MO
13 <sup>[1][2]</sup>	Snubber washer	AISI 316 stainless steel
14	Nameplate	AISI 300 series stainless steel

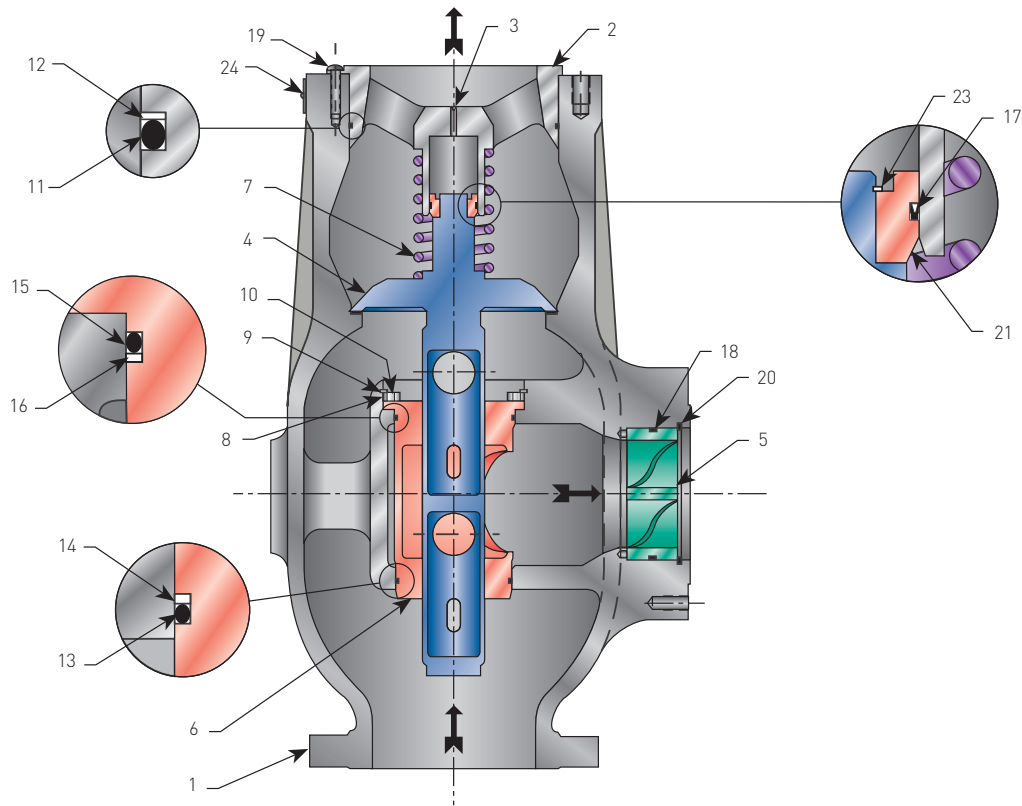
### NOTES

1. Recommended spare parts for service inspection
2. Recommended spare parts for service overhaul

# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## PARTS AND MATERIALS - SERIES 9200

SERIES 9200 - SIZES 10", 12" AND 14"



### PARTS AND MATERIALS

Item	Part	Material
1	Body	ASTM A-216 Grade WCB
2	Upper stop	ASTM A-216 Grade WCB
3	Orifice	Stainless steel 18-8
4 <sup>[2]</sup>	Disc assembly	ASTM A351 type CF8M disc with ASTM A479 Type A21800A stem
5	Flow conditioner	ASTM A351 type CF8M
6 <sup>[2]</sup>	Bypass bushing	ASTM A747 Grade CB7Cu-1 (17-4 PH Cast) Condition H900 (J92180)
7 <sup>[2]</sup>	Spring	17-7 PH Condition CH-900
8	Bushing retainer	ASTM A479 type 410
9 <sup>[1][2]</sup>	Spiral ring	ASTM A564 type 631 (17-7 PH)
10	Set screw	ASTM A286 UNS S66286
11 <sup>[1][2]</sup>	O-ring	EPDM
12 <sup>[1][2]</sup>	Backup ring	Carbon/Graphite reinforced PTFE (Turcite 51)
13 <sup>[1][2]</sup>	O-ring	EPDM
14 <sup>[1][2]</sup>	Backup ring	Carbon/Graphite reinforced PTFE (Turcite 51)
15 <sup>[1][2]</sup>	O-ring	EPDM
16 <sup>[1][2]</sup>	Backup ring	Carbon/Graphite reinforced PTFE (Turcite 51)
17 <sup>[1][2]</sup>	Snubber seal	Variseal Turcon 10
18 <sup>[1][2]</sup>	O-ring	EPDM
19	Screw	Stainless steel 316
20	Spiral ring	ASTM A564 type 631 (17-7 PH)
21 <sup>[2]</sup>	Snubber ring	ASTM A479 type S21800A (Nitronic 60 bar)
23 <sup>[1][2]</sup>	Spiral ring	ASTM A564 type 631 (17-7 PH)
24	Nameplate	300 series stainless steel

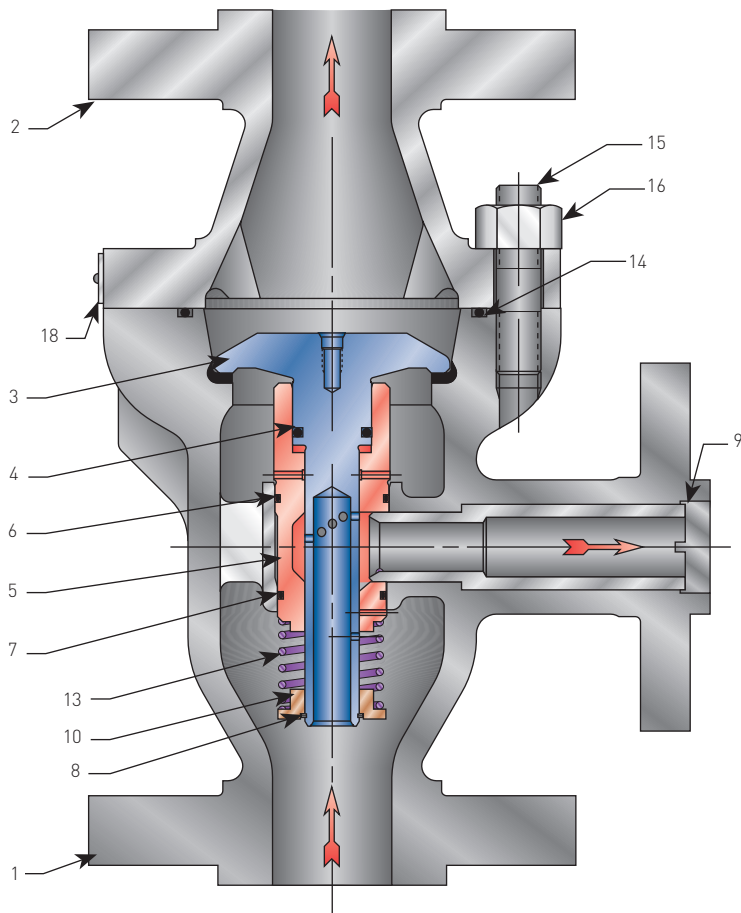
### NOTES

1. Recommended spare parts for service inspection.
2. Recommended spare parts for service overhaul.

# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## PARTS AND MATERIALS - SERIES 9100

SERIES 9100 - SIZES 1" AND 1½"



### PARTS AND MATERIALS

Item	Part	Material
1	Body	ASTM A351 type CF8M (J92900)
2	Bonnet	ASTM A351 type CF8M (J92900)
3 <sup>[2]</sup>	Disc	ASTM A479 type S21800A (Nitronic 60 bar)
4 <sup>[1][2]</sup>	Snubber-seal assembly	Turcite 51 (Glyd ring) and TFE/Propylene (O-ring)
5 <sup>[2]</sup>	Bypass bushing	ASME SA564 Grade 630 (17-4 PH Bar) Condition SA (S17400)
6 <sup>[1][2]</sup>	O-ring	TFE/Propylene
7 <sup>[1][2]</sup>	O-ring	TFE/Propylene
8 <sup>[1][2]</sup>	Spiral ring	Inconel X-750
9 <sup>[1][2]</sup>	Bypass tube	ASTM A312 type 304
10	Spring retainer	ASME SA479 type 316
13 <sup>[2]</sup>	Spring	17-7 PH Condition CH-900
14 <sup>[1][2]</sup>	O-ring	TFE/Propylene
15	Stud	ASTM A193 Grade B7 (G41400)
16	Nut	ASTM A194 Grade 2H (K04002)
18	Nameplate	300 series stainless steel

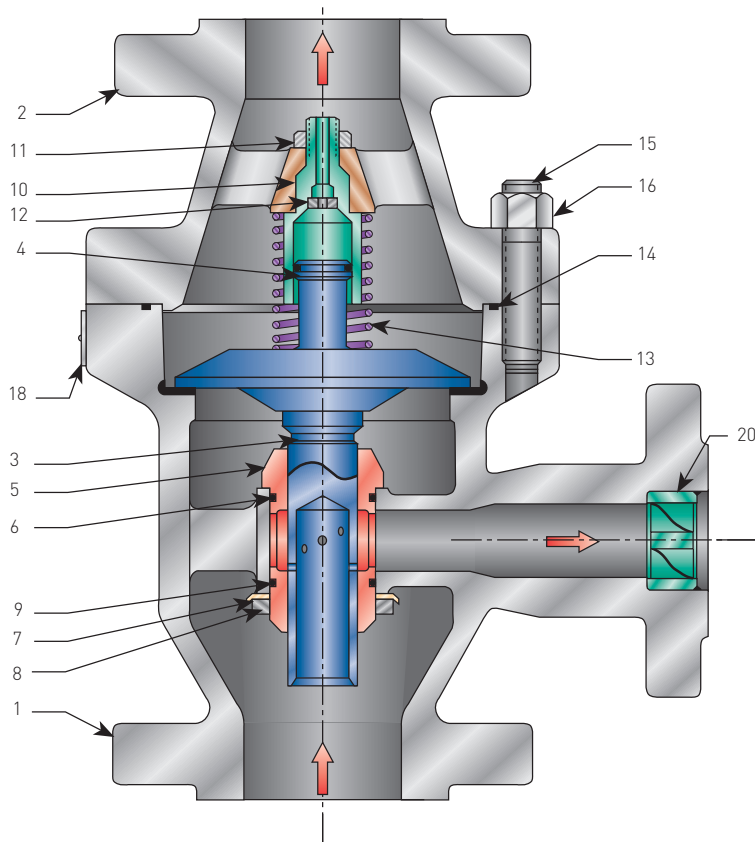
### NOTES

1. Recommended spare parts for service inspection.
2. Recommended spare parts for service overhaul.

# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## PARTS AND MATERIALS - SERIES 9100

SERIES 9100 - SIZES 2" TO 12"



### PARTS AND MATERIALS

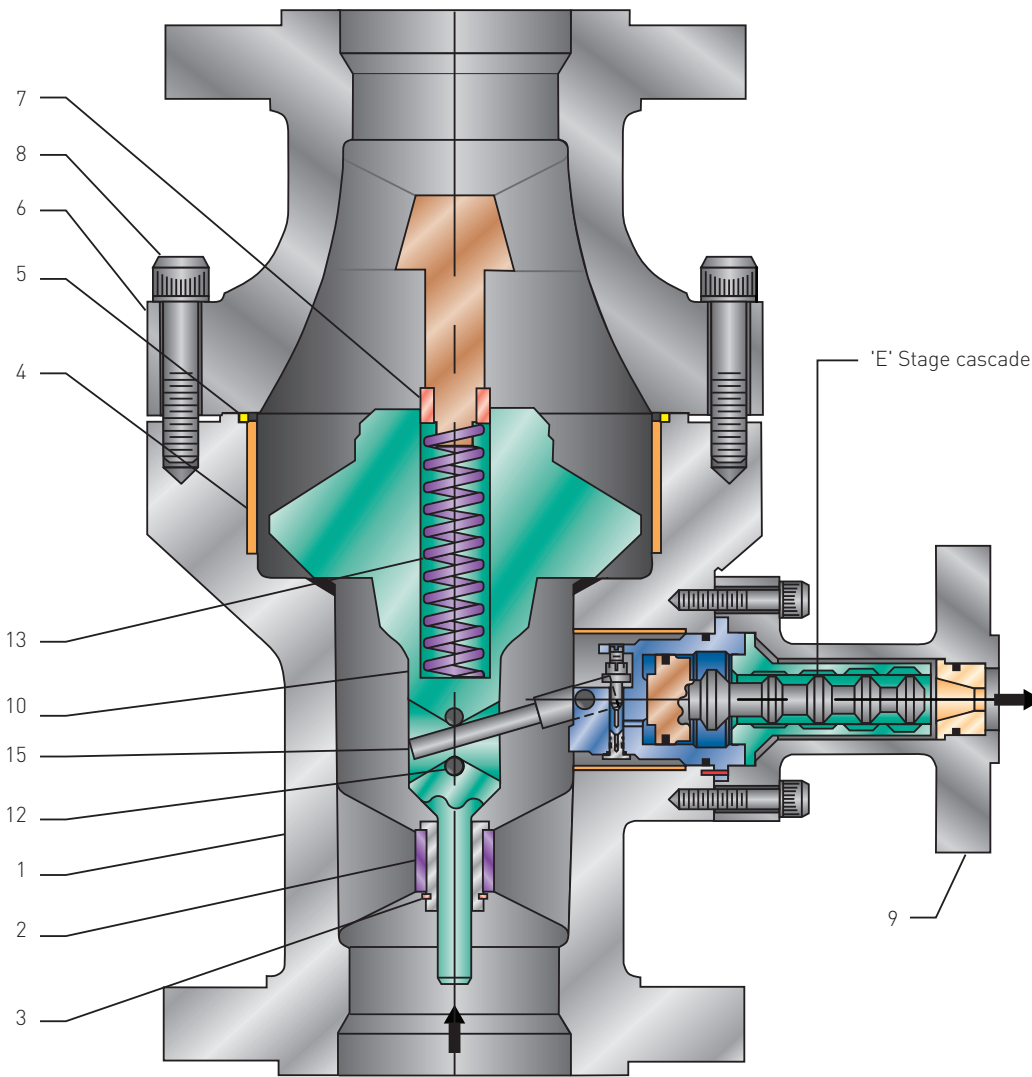
Item	Part	Material
1	Body	ASTM A-216 Grade WCB
2	Bonnet	ASTM A-216 Grade WCB
3 <sup>[2]</sup>	Disc assembly (bypass element)	2" to 6": ASTM A351 type CF10SMnN (Nitronic 60 Cast) 8" to 12": ASTM A351 type CF8M disc with ASTM A479 type A21800A stem
4 <sup>[1][2]</sup>	Snubber-seal assembly	Turcite 51 (Glyd ring) and TFE/Propylene (O-ring)
5 <sup>[2]</sup>	Bypass bushing	ASTM A747 Grade CB7Cu-1 (17-4PH Cast) Condition H900 (J92180)
6 <sup>[1][2]</sup>	O-ring	TFE/Propylene
7 <sup>[1][2]</sup>	O-ring	TFE/Propylene
8 <sup>[2]</sup>	Lock washer	ASTM A194 Grade 8 (18-8)
9 <sup>[2]</sup>	Lock nut	Stainless steel 18-8
10 <sup>[2]</sup>	Upper guide bushing	ASTM A747 Grade CB7Cu-1 (17-4 PH Cast) Condition A
11 <sup>[2]</sup>	Lock nut	300 series stainless steel
12 <sup>[2]</sup>	Snubber orifice	Stainless steel 18-8
13 <sup>[2]</sup>	Spring	17-7 PH Condition CH-900
14 <sup>[1][2]</sup>	O-ring	TFE/Propylene
15	Stud	ASTM A193 Grade B7 (G41400)
16	Nut	ASTM A194 Grade 2H (K04002)
18	Nameplate	300 series stainless steel
20	Flow conditioner (600 class only)	ASTM A351 type CF8M

### NOTES

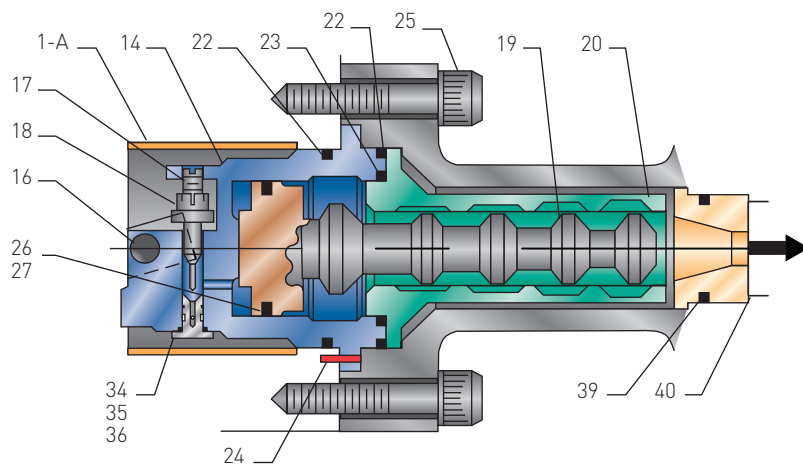
1. Recommended spare parts for service inspection.
2. Recommended spare parts for service overhaul.

**YARWAY** ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)  
PARTS AND MATERIALS - SERIES 5300

SERIES 5300



SERIES 5300 'E' STAGE CASCADE





# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## PARTS AND MATERIALS - SERIES 5300

### PARTS AND MATERIAL

Item	Part	Material
1	Body	ASTM A-216 Grade WCB
1-A	Liner	AISI 302 stainless steel
2 <sup>[2]</sup>	Body bushing	ASTM A276-S21800 (Nitronic 60 bar)
3 <sup>[2]</sup>	Retaining ring	Steel
4	Liner	AISI 304 stainless steel
5 <sup>[1][2]</sup>	O-ring	TFE/Propylene
6	Bonnet	ASTM A-216 Grade WCB
7 <sup>[2]</sup>	Guide ring	ASTM A276-S21800 (Nitronic 60 bar)
8	Cap screw	ASTM A193 Grade B7
9	Body bypass	ASTM A-216 Grade WCB
10	Disc	ASTM A351 type CF8M
12 <sup>[2]</sup>	Disc pin x 2	ASME SA564-S63000 COND A
13 <sup>[2]</sup>	Spring	ASTM A313-S30200
14 <sup>[2]</sup>	Control head (I/C)	ASTM A747 Grade CB7Cu-1 (17-4 PH Cast) Condition H900 (J92180)
14 <sup>[2]</sup>	Control head (bar stock)	ASME SA564-S63000 COND A
15 <sup>[2]</sup>	Lever	ASTM A582-S41600
16 <sup>[2]</sup>	Pivot pin	ASTM A582-S41600 COND T
17 <sup>[2]</sup>	Pilot valve	ASTM A276-S43100
18 <sup>[2]</sup>	Pilot valve nut	AISI 420F
19 <sup>[2]</sup>	Cascade piston	ASME SA479 S41000
20 <sup>[2]</sup>	Cascade seat bushing	ASTM A747 Grade CB7Cu-1 (17-4 PH Cast) Condition H900 (J92180)
21 <sup>[2]</sup>	Piston guide pin (bar stock head)	ASME SA564-S63000 COND A
22 <sup>[1][2]</sup>	O-ring	TFE/Propylene
23 <sup>[1][2]</sup>	O-ring	TFE/Propylene
24 <sup>[2]</sup>	Guide pin	Stainless steel 18-8
25	Cap screw	ASTM A193 Grade B7
26 <sup>[1][2]</sup>	Seal ring	Turcon T11 (Glyd ring)
27 <sup>[1][2]</sup>	O-ring	TFE/Propylene
34 <sup>[2]</sup>	Pilot valve seat	ASTM A276-S43100
35 <sup>[1][2]</sup>	O-ring	TFE/Propylene
36 <sup>[1][2]</sup>	O-ring	TFE/Propylene
39 <sup>[1][2]</sup>	O-ring	TFE/Propylene
40 <sup>[2]</sup>	Orifice	ASME SA479-S31600

### NOTES

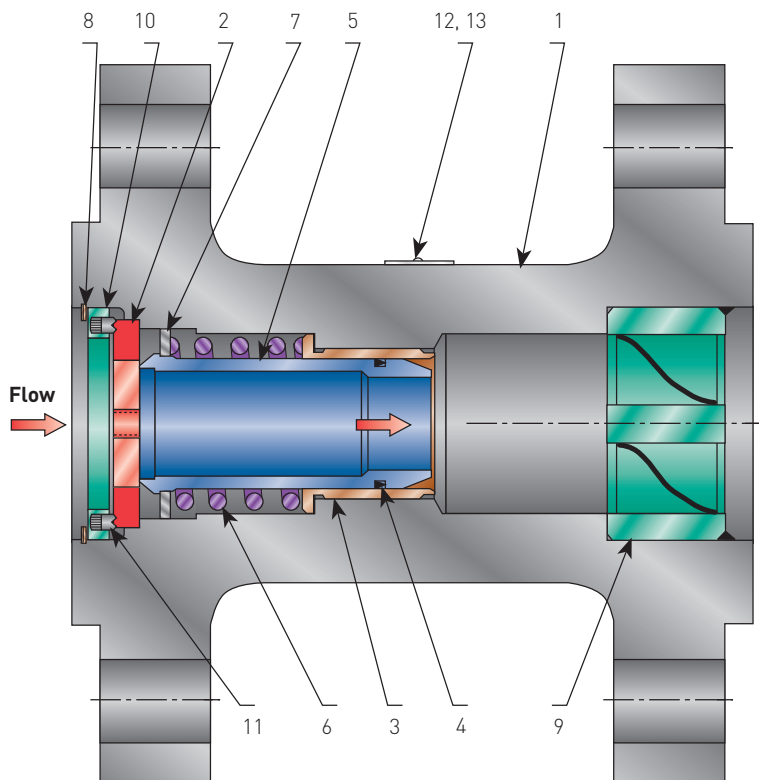
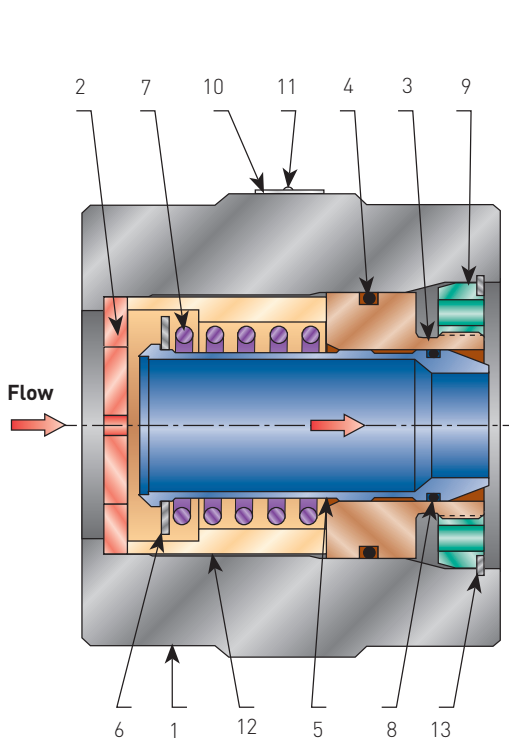
1. Recommended spare parts for service inspection
2. Recommended spare parts for service overhaul

# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## PARTS AND MATERIALS - BACK PRESSURE REGULATOR (BPR)

WAFER BPR - 3/4" TO 6"

REMOTE MOUNTED FLANGE BPR - 1 1/2" TO 6"



### PARTS AND MATERIALS

Item	Part	Material
1	Body	ASME SA105
2 <sup>(1)</sup>	Seat	ASTM A747-CB7Cu-1 with heat treatment
3 <sup>(1)</sup>	Plunger guide	ASTM A276-S21800 (Nitronic 60 bar)
4 <sup>(1)</sup>	O-ring	TFE/P (Fluoraz 799)
5 <sup>(1)</sup>	Plunger	AISI 431 stainless steel with heat treatment
6 <sup>(1)</sup>	Spring retainer	AISI 304 stainless steel
7 <sup>(1)</sup>	Spring	ASTM A564 type 631 (17-7 PH) H-900 heat treatment
8 <sup>(1)</sup>	Energized 'U' cup seal	Filled TFE
9 <sup>(1)</sup>	Retaining ring	AISI 304 stainless steel
10	Nameplate	AISI 300 series stainless steel
11	Drive screw	Stainless steel
12 <sup>(1)</sup>	Spacer	A269-304
13 <sup>(1)</sup>	Spiral ring	Inconel X-750

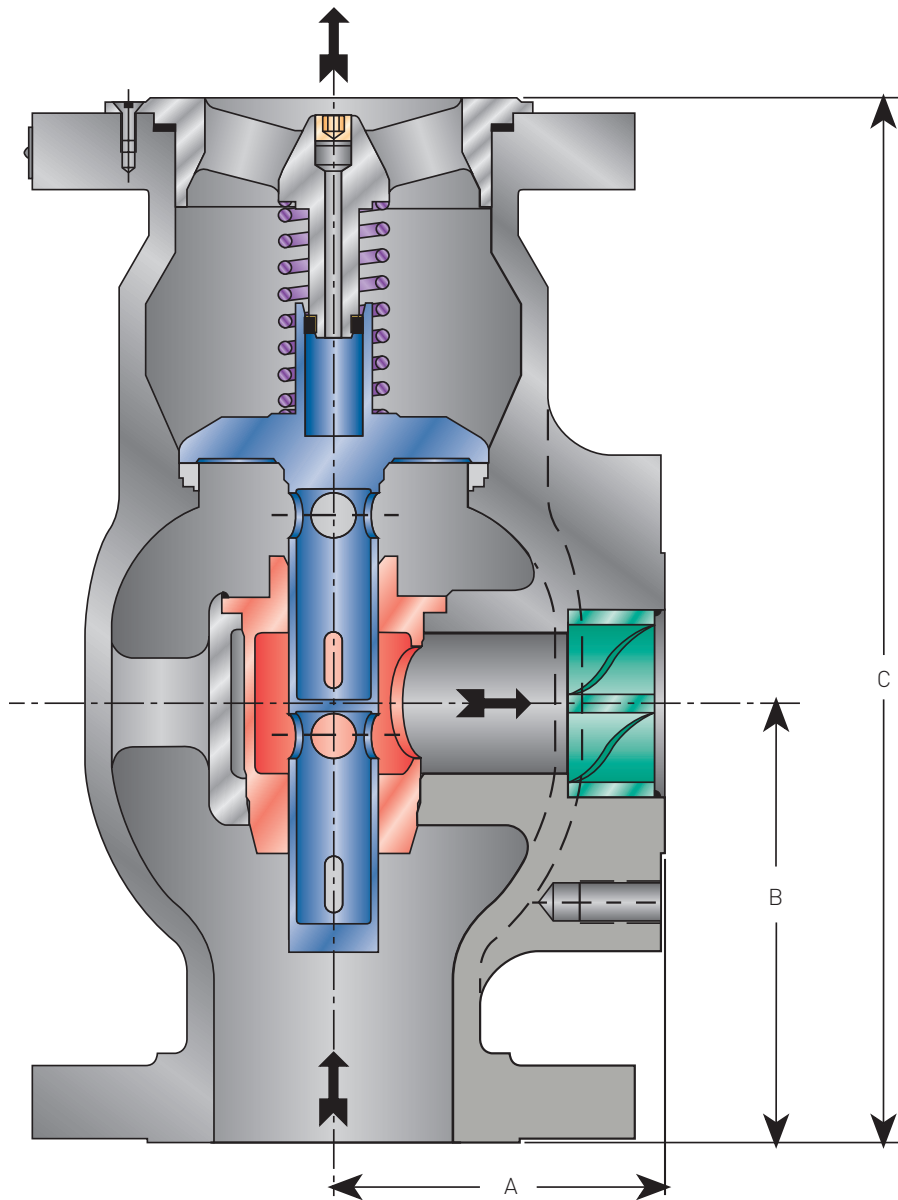
### PARTS AND MATERIALS

Item	Part	Material
1	Body	ASME SA105
2 <sup>(1)</sup>	Seat	ASTM A747-CB7Cu-1 with heat treatment
3 <sup>(1)</sup>	Plunger guide	ASTM A564 type 630 (17-4 PH) H-900 heat treatment
4 <sup>(1)</sup>	Energized 'U' cup seal	Filled TFE
5 <sup>(1)</sup>	Plunger	ASTM A479-431 stainless steel with heat treatment
6 <sup>(1)</sup>	Spring	ASTM A564 type 631 (17-7 PH) H-900 heat treatment
7 <sup>(1)</sup>	Spring retainer	AISI 304 stainless steel
8 <sup>(1)</sup>	Spiral ring	AISI 302
9 <sup>(1)</sup>	Flow conditioner	ASME SA747-CB7Cu-1
10 <sup>(1)</sup>	Retaining ring	AISI 316 stainless steel
11 <sup>(1)</sup>	Set screw	ASTM A194 Grade 8 (18-8)
12	Nameplate	AISI 300 series stainless steel
13	Drive screw	Stainless steel

### NOTE

1. Spare parts are serviced by a complete capsule assembly

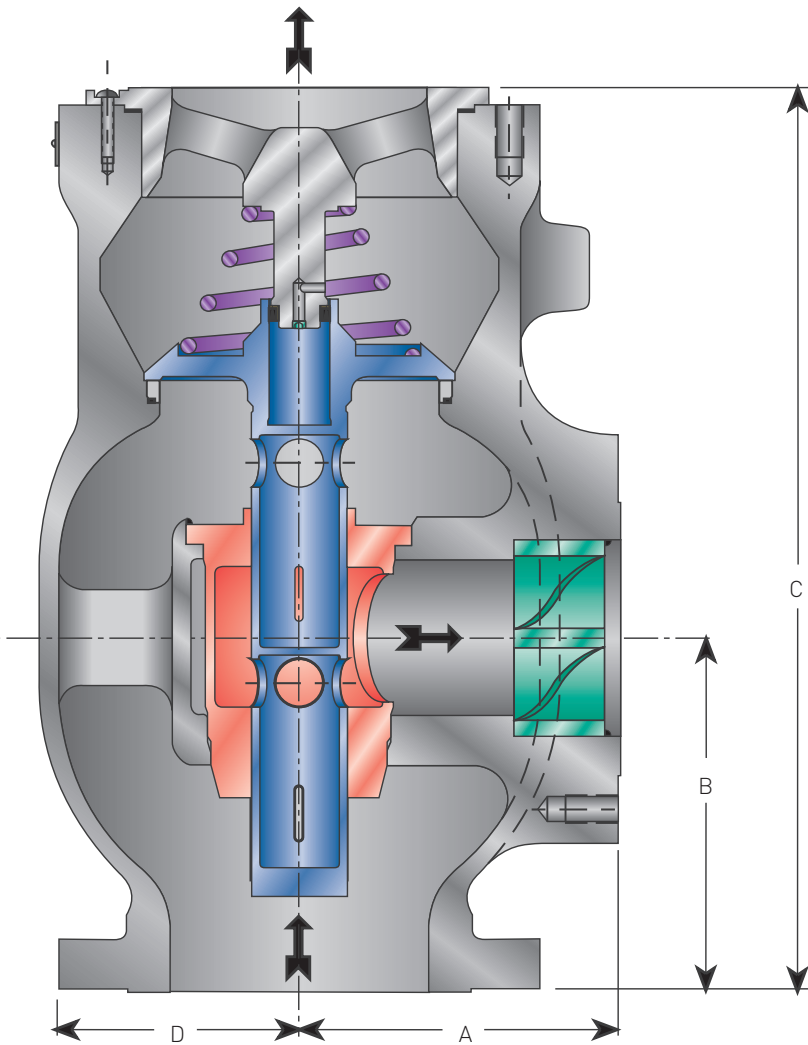
**YARWAY** ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)  
 DIMENSIONS AND WEIGHTS - SERIES 9200 (SIZES 2", 3" AND 4")



**DIMENSIONS AND WEIGHTS**

Valve size in. (DN)	Class ANSI	Dimensions, in. (mm)			Bypass flange size in. (DN)	Weight lb. (kg)
		A	B	C		
2 (50)	150	4 1/4 (108.4)	4 3/4 (120.7)	11 (279.4)	1 1/2 (40)	42 (19.0)
	300					46 (20.9)
3 (80)	150	4 3/4 (120.7)	5 1/4 (146.1)	13 3/4 (349.3)	2 (50)	73 (33.1)
	300					81 (36.7)
4 (100)	150	5 1/2 (139.7)	7 3/4 (196.9)	17 3/4 (450.9)	3 (80)	126 (57.2)
	300					147 (66.7)

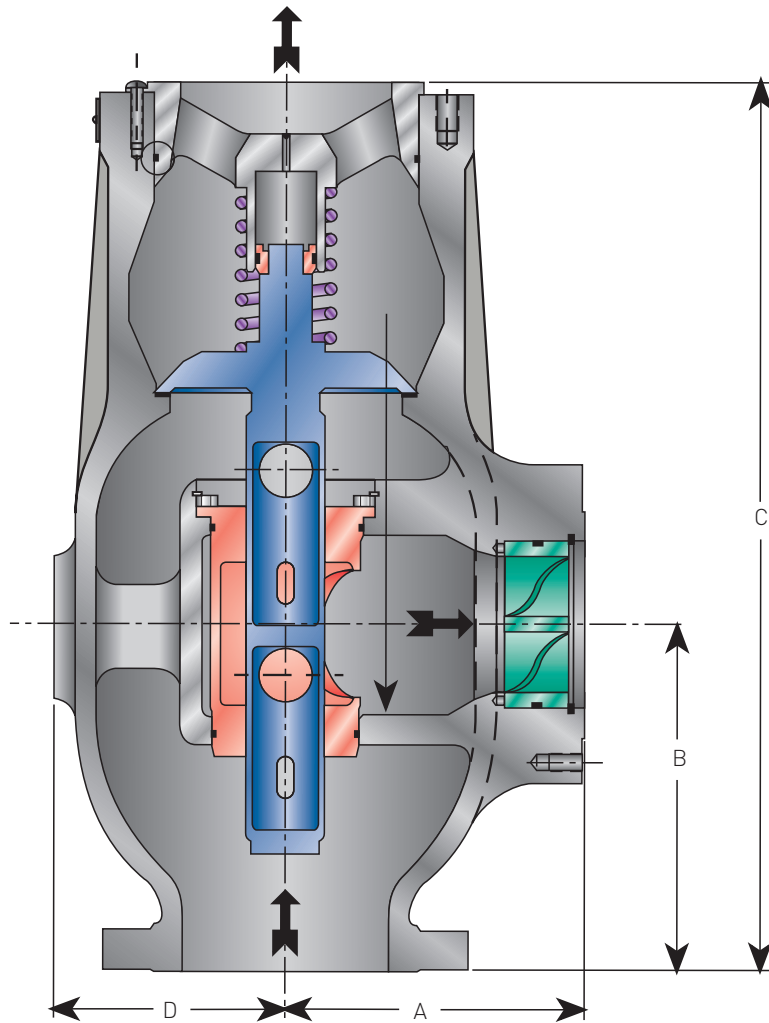
**YARWAY** ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)  
 DIMENSIONS AND WEIGHTS - SERIES 9200 (SIZES 6" AND 8")



**DIMENSIONS AND WEIGHTS**

Valve size in. (DN)	Class ANSI	Dimensions, in. (mm)				Bypass flange size in. (DN)	Weight lb. (kg)
		A	B	C	D		
6 (150)	150	7½ (190)	8½ (216)	21½ (546)	-	4 (100)	296 (135)
	300						344 (156)
8 (200)	150	10 (254)	11 (279.5)	28 (711)	8¾ (222)	6 (150)	559 (254)
	300						613 (278)

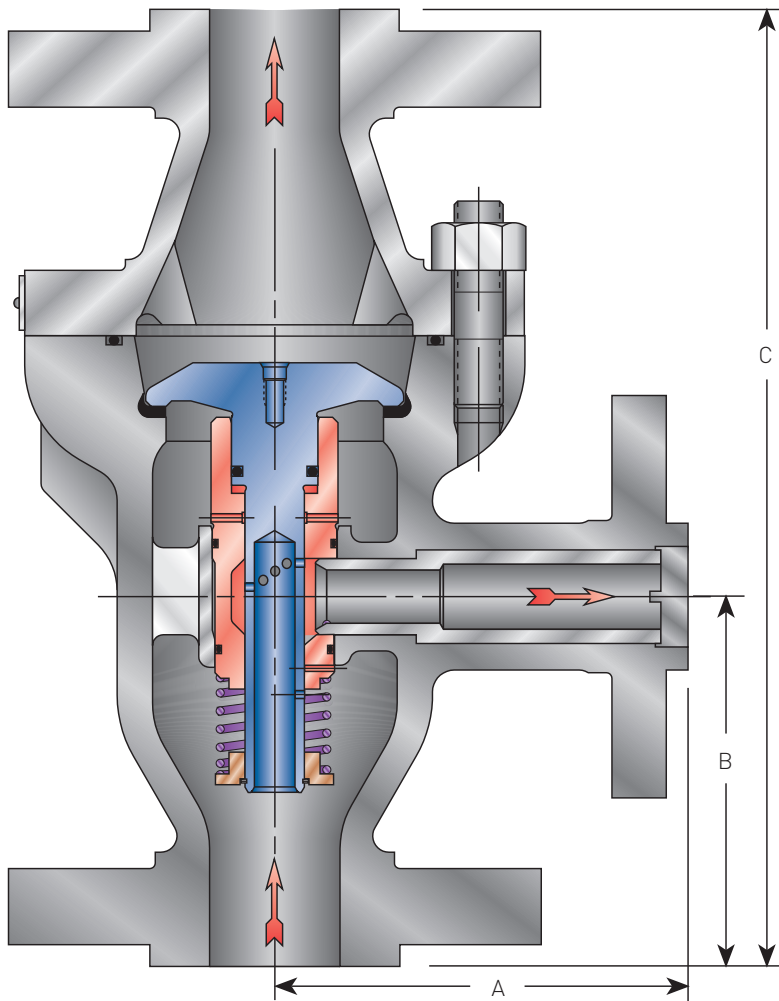
**YARWAY** ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)  
 DIMENSIONS AND WEIGHTS - SERIES 9200 (SIZES 10", 12" AND 14")



**DIMENSIONS AND WEIGHTS**

Valve size in. (DN)	Class ANSI	Dimensions, in. (mm)				Bypass flange size in. (DN)	Weight lb. (kg)
		A	B	C	D		
10 (250)	150 300	13 (330)	16 (406)	41½ (1054)	10¾ (273)	8 (200)	1600 (726)
12 (300)	150 300	15 (381)	19 (483)	50 (1270)	12¾ (324)	10 (250)	2650 (1200)
14 (350)	150 300	16½ (419)	21 (533)	57½ (1461)	14¾ (375)	10 (250)	3350 (1520)

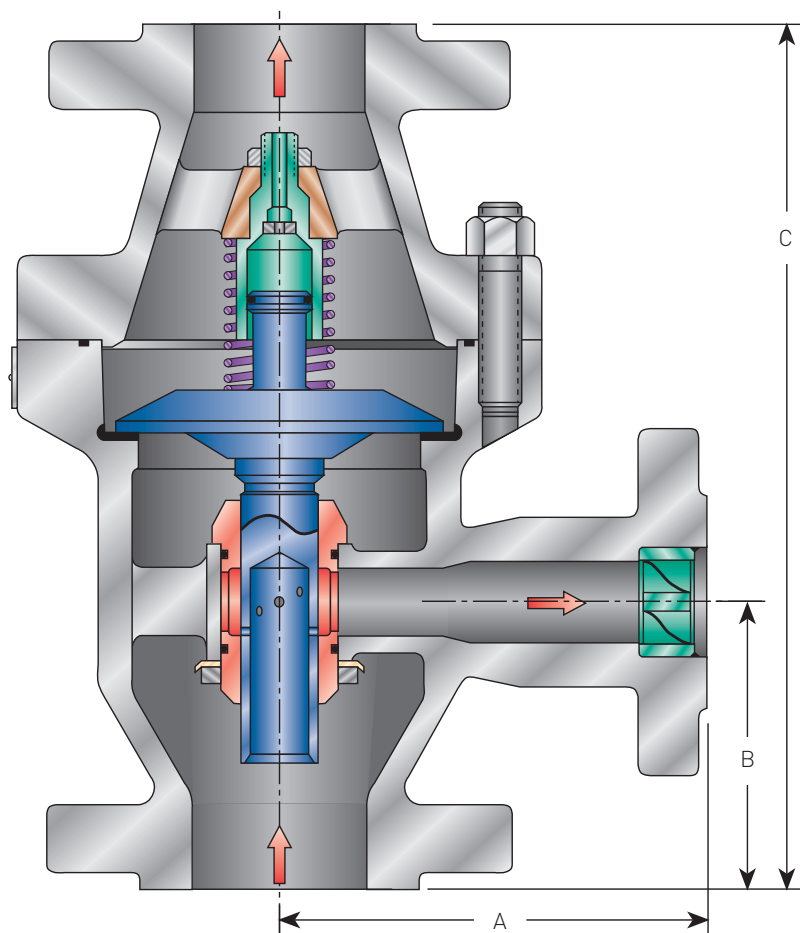
**YARWAY** ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)  
 DIMENSIONS AND WEIGHTS - SERIES 9100 (SIZES 1" AND 1½")



**DIMENSIONS AND WEIGHTS**

Valve size in. (DN)	Class ANSI	Dimensions, in. (mm)			Bypass flange size in. (DN)	Weight lb. (kg)
		A ± 1/16 (1.6)	B ± 1/16 (1.6)	C ± 1/16 (1.6)		
1 (25)	150	4½ (115)	4 (102)	10½ (267)	¾ (20)	27 (12.2)
	300	4½ (115)	4 (102)	10½ (267)		32 (14.5)
	600	4¾ (120)	4¼ (108)	11 (280)		34 (15.4)
1½ (40)	150	4½ (115)	4 (102)	10½ (267)	¾ (20)	30 (13.6)
	300	4½ (115)	4 (102)	10½ (267)		39 (17.7)
	600	4¾ (120)	4¼ (108)	11 (280)		40 (18.1)

**YARWAY** ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)  
 DIMENSIONS AND WEIGHTS - SERIES 9100 (SIZES 2" TO 12")



**DIMENSIONS AND WEIGHTS**

Valve <sup>(1)</sup> size in. (DN)	Class ANSI	Dimensions, in. (mm)			Bypass flange size in. (DN)	Weight lb. (kg)
		A ± 1/16 (1.6)	B ± 1/16 (1.6)	C ± 1/16 (1.6)		
2 (50)	150	5 15/16 (151)	4 (102)	11 1/2 (292)	1 1/2 (40)	45 (20)
	300	6 3/16 (157)	4 1/4 (108)	12 (305)		53 (24)
	600	6 1/2 (165)	4 5/8 (117)	12 3/4 (324)		55 (25)
3 (80)	150	7 1/8 (181)	5 (127)	15 1/4 (387)	2 (50)	97 (44)
	300	7 3/8 (187)	5 3/8 (137)	16 (406)		107 (49)
	600	7 3/4 (197)	5 3/4 (146)	16 3/4 (425)		110 (50)
4 (100)	150	9 (229)	5 15/16 (150)	18 7/8 (479)	3 (80)	205 (93)
	300	9 3/8 (238)	6 1/4 (159)	19 1/2 (495)		230 (104)
	600	9 3/4 (248)	6 3/4 (171)	20 1/2 (521)		250 (113)
6 (150)	150	11 11/16 (297)	6 7/8 (175)	21 3/4 (552)	4 (100)	310 (141)
	300	12 (305)	7 5/16 (186)	22 3/8 (575)		340 (154)
	600	12 1/2 (318)	8 (203)	24 (610)		450 (204)
8 (200)	150	17 11/16 (449)	11 1/2 (292)	34 1/2 (786)	6 (150)	580 (263)
	300	18 5/16 (465)	12 (305)	35 1/2 (902)		660 (299)
	600	18 13/16 (478)	12 13/16 (325)	37 1/8 (943)		770 (349)

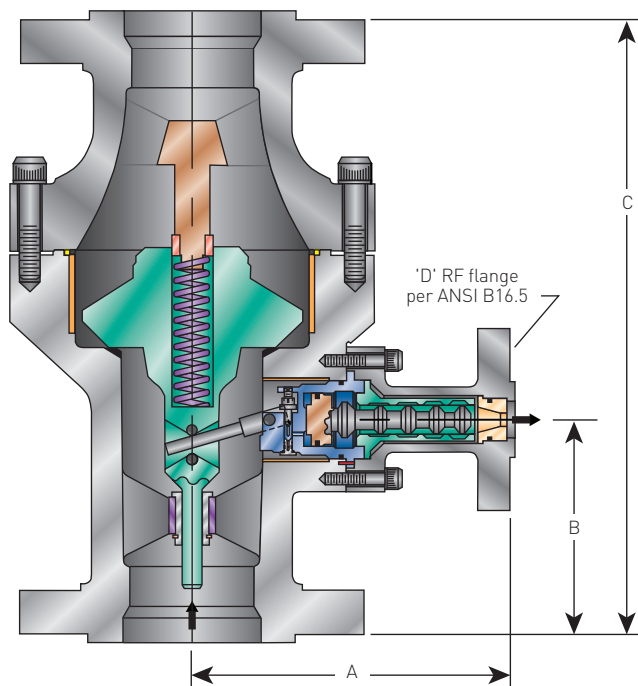
**NOTE**

1. 10" and 12" sizes available, contact your sales representative for more information.



# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## DIMENSIONS AND WEIGHTS - SERIES 5300 (FLANGE ENDS)



### DIMENSIONS AND WEIGHTS

Valve <sup>[1]</sup> size in. (DN)	Class ANSI	Dimensions, in. (mm)			(D) Bypass flange size in. (DN)	Weight lb. (kg)
		A	B	C		
3 (80)	600	10½ (266.7)	6 (152.4)	17½ (433.4)	1 (25)	170 (77)
3 (80)	900	10½ (266.7)	6 (152.4)	17½ (433.4)	1 (25)	200 (91)
3 (80)	1500	10½ (266.7)	6½ (173.0)	19 (504.8)	1 (25)	*
3 (80)	2500	13 (330.2)	7 (192.1)	21 (555.6)	1 (25)	*
4 (100)	600	15½ (393.7)	6¾ (171.5)	19½ (490.5)	1½ (40)	300 (136)
4 (100)	900	15½ (393.7)	6¾ (171.5)	19½ (496.9)	1½ (40)	340 (154)
4 (100)	1500	15½ (393.7)	8 (208.0)	24 (617.5)	1½ (40)	525 (238)
4 (100)	2500	18¼ (463.6)	9 (230.2)	26 (663.6)	1½ (40)	560 (254)
6 (150)	600	17 (447.7)	9 (235.0)	25 (655.6)	2 (50)	680 (308)
6 (150)	900	17 (447.7)	9 (242.9)	26 (663.6)	2 (50)	740 (336)
6 (150)	1500	17 (447.7)	11 (279.4)	30 (785.8)	2 (50)	1400 (635)
6 (150)	2500	22½ (571.5)	12 (304.8)	32 (836.6)	2 (50)	1480 (671)
8 (200)	600	21 (533.4)	11 (301.6)	33 (858.8)	2½ (65)	1180 (535)
8 (200)	900	21 (533.4)	11 (301.6)	33 (858.8)	2½ (65)	1330 (603)
8 (200)	1500	21 (533.4)	11 (301.6)	33 (858.8)	2½ (65)	1730 (785)
8 (200)	2500	24¾ (628.7)	14 (355.6)	41 (1058.9)	2½ (65)	*
10 (250)	600	28½ (723.9)	13 (341.3)	36 (927.1)	3 (80)	1900 (862)
10 (250)	900	28½ (723.9)	13 (341.3)	36 (927.1)	3 (80)	2000 (907)
10 (250)	1500	28½ (723.9)	14 (376.2)	41 (1046.2)	3 (80)	3020 (1370)
10 (250)	2500	32½ (825.5)	18 (468.3)	52 (1322.4)	3 (80)	5000 (2268)
12 (300)	600	32 (835.0)	15 (393.7)	40 (1022.4)	3 (80)	2350 (1066)
12 (300)	900	32 (835.0)	15 (393.7)	40 (1022.4)	3 (80)	2600 (1179)
12 (300)	1500	32 (835.0)	17 (435.0)	48 (1219.2)	3 (80)	*

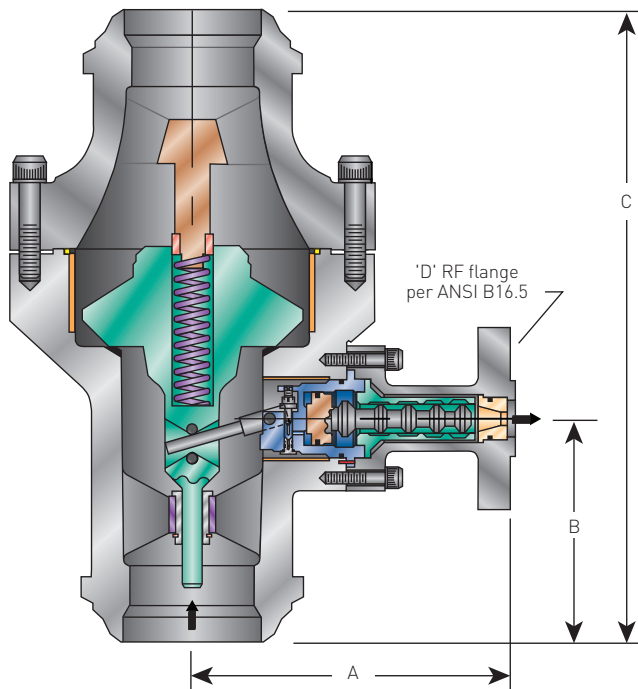
### NOTES

\* Contact your local sales representative.

1. 14" and 16" sizes available, contact your sales representative for more information.

# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## DIMENSIONS AND WEIGHTS - SERIES 5300 (BUTT WELDING ENDS)



### DIMENSIONS AND WEIGHTS

Valve <sup>(1)</sup> size in. (DN)	Class ANSI	Dimensions, in. (mm)			(D) Bypass flange size in. (DN)	Weight lb. (kg)
		A	B	C		
3 (80)	900	10½ (266.7)	6 (152.4)	17½ (433.4)	1 (25)	136 (62)
3 (80)	1500	10½ (266.7)	6½ (155.6)	19 (482.6)	1 (25)	*
3 (80)	2500	13 (330.2)	6½ (155.6)	19 (482.6)	1 (25)	*
4 (100)	900	15½ (393.7)	6½ (165.1)	19½ (484.2)	1½ (40)	285 (129)
4 (100)	1500	15½ (393.7)	8½ (208.0)	23¾ (606.4)	1½ (40)	450 (204)
4 (100)	2500	18¼ (463.6)	8¾ (208.0)	23¾ (606.4)	1½ (40)	470 (213)
6 (150)	900	17¾ (447.7)	9¾ (247.6)	26¾ (674.7)	2 (50)	640 (290)
6 (150)	1500	17¾ (447.7)	11 (279.4)	30½ (785.8)	2 (50)	1125 (510)
6 (150)	2500	22½ (571.5)	10¾ (273.0)	30½ (779.5)	2 (50)	1200 (544)
8 (200)	900	21 (533.4)	12¾ (327.0)	34¾ (885.8)	2½ (65)	1025 (465)
8 (200)	1500	21 (533.4)	12¾ (327.0)	34¾ (885.8)	2½ (65)	1290 (585)
8 (200)	2500	24¾ (628.6)	13¾ (338.1)	35¼ (895.3)	2½ (65)	2400 (1089)
10 (250)	900	28½ (723.9)	14¾ (363.5)	37¾ (949.3)	3 (80)	1600 (726)
10 (250)	1500	28½ (723.9)	14¾ (363.5)	40¾ (1020.8)	3 (80)	2150 (975)
10 (250)	2500	32½ (825.5)	15¾ (385.8)	40¾ (1036.6)	3 (80)	4150 (1882)
12 (300)	900	32¾ (835.0)	15½ (393.7)	40¼ (1022.4)	3 (80)	1740 (789)
12 (300)	1500	32¾ (835.0)	17¾ (435.0)	48 (1219.2)	3 (80)	*
12 (300)	2500	42 (1066.8)	17¼ (438.2)	48 (1219.2)	3 (80)	*

### NOTES

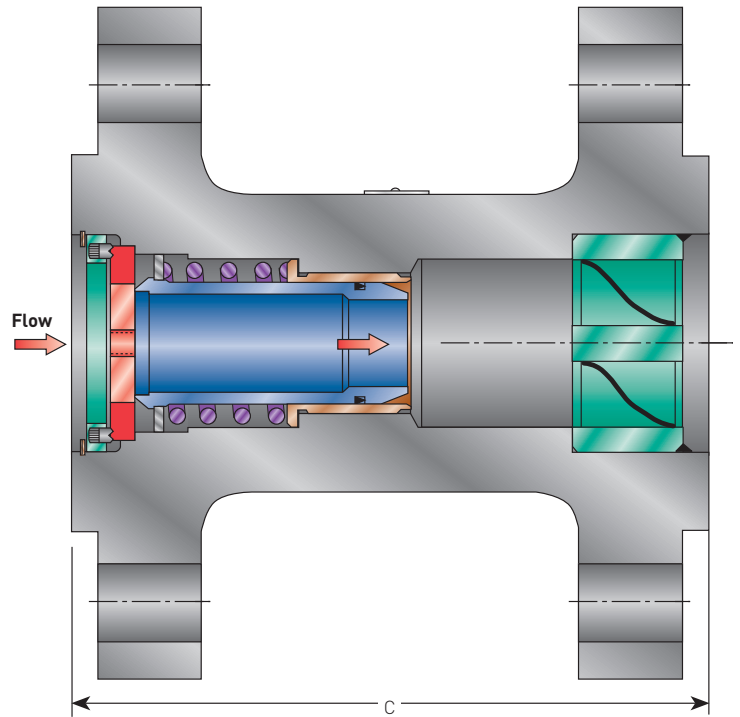
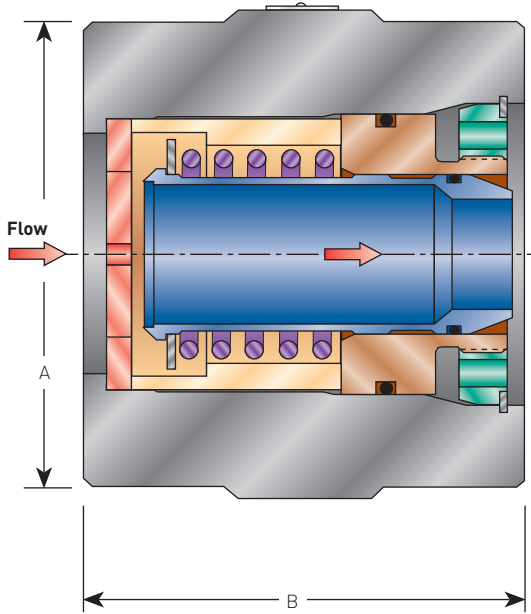
\* Contact your local sales representative.

1. 14" and 16" sizes available, contact your sales representative for more information.

**YARWAY** ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)  
 DIMENSIONS AND WEIGHTS - BACK PRESSURE REGULATOR (BPR)

WAFER BPR - 3/4" TO 6"

FLANGED BPR - 1 1/2" TO 6"



**DIMENSIONS AND WEIGHTS**

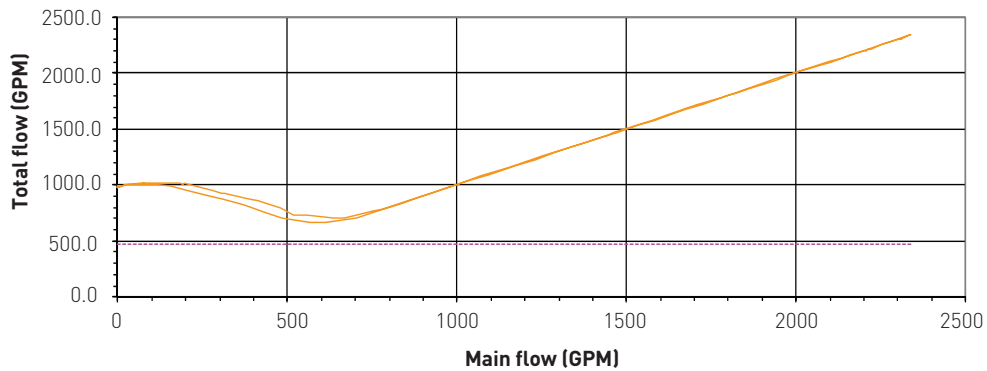
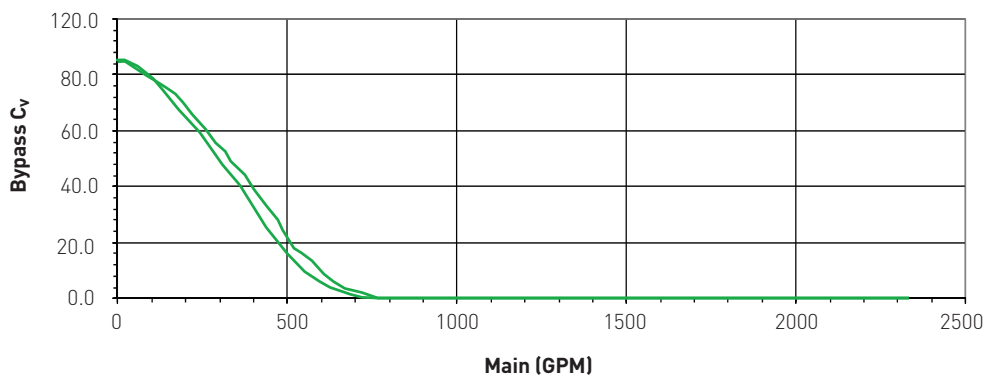
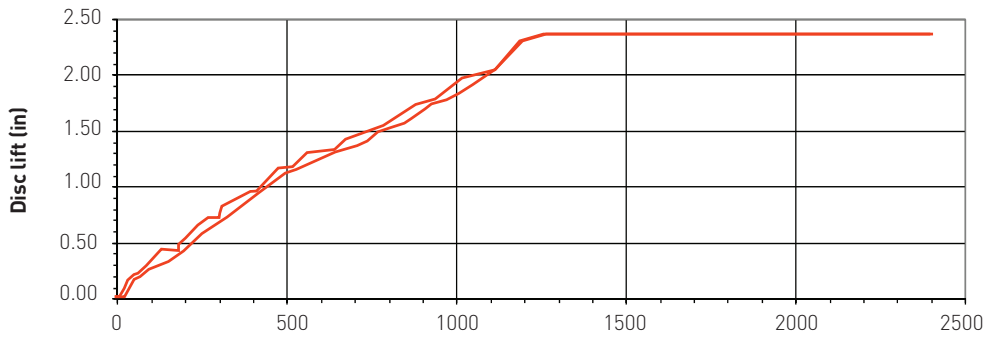
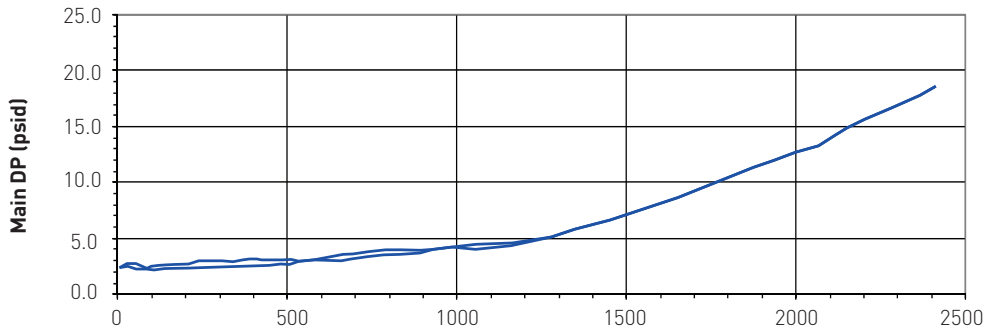
BPR size <sup>(1)</sup>	Dimensions, in. (mm)			Wafer approx. weight lb. (kg)
	A ± 1/16" (1.6)	B ± 1/16" (1.6)	Flanged C ± 1/16" (1.6)	
3/4"	1 1/8 (42.9)	4 (101.6)	-	5 (2.3)
1 1/2"	2 7/8 (73.0)	2 7/8 (73.0)	6 (152.4)	5 (2.3)
2"	3 5/8 (92.1)	3 3/8 (85.7)	6 (152.4)	8 (3.6)
3"	5 (127.0)	4 5/8 (117.5)	8 (203.2)	21 (9.5)
4"	6 3/16 (157.2)	5 3/4 (146.0)	12 (304.8)	40 (18.1)
6"	8 1/2 (215.9)	7 1/2 (190.5)	17 (431.8)	96 (43.5)

**NOTES**

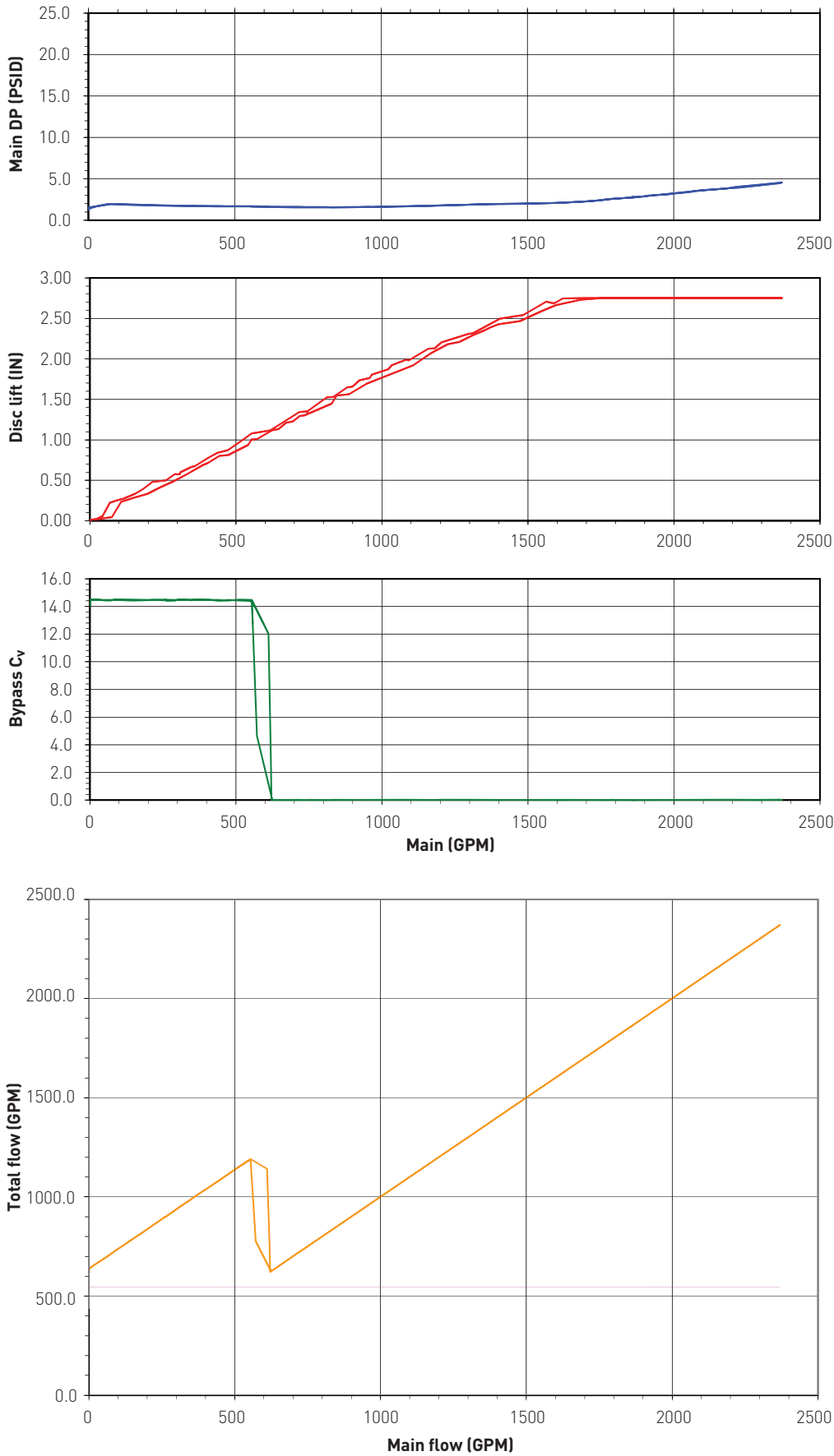
1. For flanged 8" and 10", contact your sales representative.

# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

FLOW TEST EXAMPLE - SERIES 9200, 9100



**YARWAY** ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)  
 FLOW TEST EXAMPLE - SERIES 5300



# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

MODEL NUMBERING - SERIES 9200, 9100 AND 5300

## SELECTION GUIDE

Example:	91	0	1	N	-04	-T	XXXX	XXXX	-	-L	-LT
<b>Series</b>											
<b>53</b> 5300											
<b>91</b> 9100											
<b>92</b> 9200											
<b>Material</b>											
<b>0</b> WCB											
<b>5</b> Super duplex											
<b>1</b> CF8M											
<b>6</b> 6Mo											
<b>Pressure class</b>											
<b>1</b> 150											
<b>4</b> 900											
<b>2</b> 300											
<b>5</b> 1500											
<b>3</b> 600											
<b>6</b> 2500											
<b>NACE</b>											
<b>N</b> NACE											
<b>-</b> No NACE											
<b>Size</b>											
<b>01</b> 1" <sup>[2]</sup>											
<b>04</b> 4"											
<b>12</b> 12"											
<b>15</b> 1.5" <sup>[2]</sup>											
<b>06</b> 6"											
<b>14</b> 14"											
<b>02</b> 2"											
<b>08</b> 8"											
<b>03</b> 3"											
<b>10</b> 10"											
<b>Soft goods</b>											
<b>P</b> PTFE/Flouraz											
<b>V</b> FKM											
PTFE/Turcon <sup>[3]</sup>											
<b>FKM/Turcon<sup>[3]</sup></b>											
<b>E</b> EPDM											
<b>G</b> Graphite/Turcon <sup>[3]</sup>											
EPDM/Turcon <sup>[3]</sup>											
<b>T</b> Turcite Variseal <sup>[2]</sup>											
<b>K</b> Kalrez											
Virgin TFE/Turcon <sup>[3]</sup>											
<b>Main C<sub>v</sub></b>											
<b>XXXXH<sup>[1]</sup></b>											
<b>XXXXV<sup>[1]</sup></b>											
<b>XXXX</b>											
<b>Bypass C<sub>v</sub></b>											
<b>XXXX</b>											
<b>Flange type</b>											
<b>RF</b> Raised face											
<b>RJ</b> RTJ											
<b>FF</b> Flat face											
<b>BW</b> Butt weld											
<b>Spring type</b>											
<b>L</b> Low <sup>[2]</sup>											
<b>H</b> High <sup>[2]</sup>											
<b>-</b> None											
<b>Option</b>											
<b>LT</b> Low temp <sup>[2][3]</sup>											
<b>-</b> None											

## NOTES

1. 5300 only, main C<sub>v</sub> with orientation
2. 9100 only
3. 9200 only

# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## MODEL NUMBERING - BACK PRESSURE REGULATOR (BPR)

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### SELECTION GUIDE

Example:	91	60	N	-200	-P	-R100
<b>Series</b>						
91	9100					
<b>Material</b>						
60	WCB					
70	CF8M					
<b>NACE</b>						
N	NACE					
-	No NACE					
<b>Size</b>						
075	0.75"	300	3"			
150	1.5"	400	4"			
200	2"	600	6"			
<b>Soft goods</b>						
P	PTFE/Flouraz (STD)					
V	FKM					
E	EPDM					
<b>dP rating</b>						
R100						
R200						
R300						
R400						
R500						



# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## SIZING

To enable correct valve sizing for your application, please provide the following information:

Customer:..... E-Mail: .....  
Company:..... Qty Required:.....  
Project:..... Delivery Required: .....  
Location:..... Additional Info: .....  
Phone:..... Tags(s) ID:.....

### PUMP FLOW

Normal - **Process** - flow:  GPM  
Maximum - **Process** - flow:  GPM  
Minimum - **Process** - flow (if to be considered):  (optional) GPM  
Minimum - **Pump protection** - (recirculation) flow:  GPM

### PUMP DISCHARGE PRESSURE

Pressure at Shut Off (zero) flow:  psig  
Pressure at Normal - **Process** - flow:  psig  
Pressure at Minimum - **Process** - flow:  (optional) psig  
Pressure at Minimum - **Pump protection** - flow:  psig  
Recirculation line (existing) - Back Pressure:  psig

### TEMPERATURE

Normal temperature at ARC Valve:  Deg F  
Maximum temperature at ARC Valve:  Deg F

### FLUID DATA

Media	<input type="text"/>		Orientation of ARC Valve:	<input type="text"/>
Specific Gravity	<input type="text"/>		Desired Valve Size:	<input type="text"/>
Vapor Pressure	<input type="text"/>	PSIA	Desired End Connections:	<input type="text"/>
Critical Pressure	<input type="text"/>	PSIA	Pressure Class:	<input type="text"/>
Viscosity	<input type="text"/>	cP	Desired Body Material:	<input type="text"/>
			Desired Seal Material:	<input type="text"/>
			Pump Drive Type:	<input type="text"/>

Comments:

NACE materials required?  Certificate of Compliance for hydro test required?   
Flow test with Performance Certificate required?  Magnetic Particle test required?   
Customer Inspection required prior to shipment?  Radiograph Inspection required (specify scope)?   
Certified Material Test Report (Pressure Containing Components only)?

Flow tests are conducted on all models, one per valve size with additional tests at additional cost.  
If flange drilling is other than ANSI, please specify in "Comments." Please include Pump Curve if available

## YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION) HYDRAULIC PERFORMANCE TEST LAB

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In our hydraulic performance test laboratory, state-of-the-art data acquisition and computer graphics techniques are called upon for evaluation of the significant performance characteristics of Yarway recirculation control valves.

The lab's equipment makes it possible to test a valve over its complete flow range for factors including:

- Total flow through the pump
- Disc position
- Pressure drop across the main check
- Bypass  $C_v$
- Bypass  $dP$
- Valve response to sudden changes in flow
- Bypass piston pressure

These detailed analyses are the user's complete assurance that the valve meets performance requirements in all respects and can be supplied with the valve.

A certified test curve is shipped with each valve (see pages 33-34 for examples).

Insist on it, as you would for your pump!

# YARWAY ARC PUMP PROTECTION VALVES (AUTOMATIC RECIRCULATION)

## VALVE SERVICES



### Response

Emerson delivers factory-trained teams of mobile technicians, 24/7/365. A fleet of fully-stocked service vehicles, pickup and delivery services allows us to work anywhere you need us, from the field to our own state-of-the-art production facility with minimal downtime.

### Knowledge

Our advanced TecSmart™ technician training program and eDge™ asset management software allow us to build on our extensive knowledge and leverage lessons learned, making Emerson a global leader in valve repair, testing and service.

Our service facilities hold numerous industry stamps and certifications, including ASME UV, National Board, VR, provincial certifications in Canada and more.

### Expertise

With skills and knowledge acquired over a century of experience, we can service a vast range of valves and controls products.

We also offer on-site valve repair, wellhead valve service, full-valve modifications and services from plant surveys and on-site relief valve testing to routine maintenance and repairs.

### Availability

With direct access to a worldwide system of local, ready-to-deliver inventory, our global network of expert service technicians and manufacturing facilities ensures that you have instant access to the service you need, when and where you need it.

### Services

- Pressure relief valve repair.
- Line valve repair
  - Gate valve - Butterfly valve
  - Globe valve - Control valve
  - Check valve - Plug valve
  - Ball valve
- Pump protection valve repair.
- Tank vent repair.
- In-line valve testing and repair - Section I and Section VIII applications.
- 24/7 repair and field service support.
- Mobile units.
- Valve and inventory management.
- Training.
- Steam trap surveys/repairs.
- Actuation and control repair/calibration.
- Wellhead valve service.
- Valve modification services.

### eDge™ asset management software

- Simplifies the task of tracking valves.
- Helps you plan efficiently for future maintenance outages.
- Live internet access.
- Tracks your valves through the repair process.
- Stores images and pictures so you can see damaged valve parts first hand.
- Stores your specific notes or comments.
- Provides permanent document storage.

