

## MODEL CB800

### Circuit Balancing Valves

Model CB800 Circuit Balancing Valves are designed to achieve accurate and efficient balancing of hydronic heating or cooling systems. Circuit Balancing Valves provide superior accuracy in measuring flows rather than ball type circuit setters.

The CB800 valve serves 5 functions:

- Throttling
- Measuring differential pressure
- Draining
- Filling
- Positive shutoff

These valves are rated at 300 psi (20.7 bar) at 300°F (150°C). Flanged (125#) and grooved connections are available for sizes 2½" – 12" (65mm – 300mm) with cast iron bodies.

The Y-Pattern style provides low pressure drop. The globe style valve allows for precise throttling. The easy-to-adjust digital/vernier handwheel provides a minimum of 70 unique handwheel positions. The handwheel and test ports are located on one side for easy access. A built-in memory stop ensures the setting can be returned to a balanced position after shutoff. The self-sealing pressure/temperature test ports use standard insertion probes to eliminate additional components.

The Gruvlok Circuit Balancing Valve is installed with flow in the direction of the arrow, and may be in the horizontal or vertical position. The handwheel can be positioned up or down, or on either side.

#### MAXIMUM WORKING PRESSURE:

- 300 psi (20.7 bar) Grooved Connection
- 235 psi (16.0 bar) Flanged Connection



#### MATERIAL SPECIFICATIONS

**BODY:** Grooved or Flanged Connection: Cast Iron

**STEM:** Dezincification resistant brass

**VALVE DISC:** Bronze

**O-RING:** EPDM

**HANDWHEEL:** Thermoplastic

For accessories and replacement parts contact an Anvil Sales Representative for details.

#### VALVE SIZING

All balancing valves are sized to perform in a normal operation range between 25% and 100% of the full open position, at a minimum differential pressure between 1 – 3 ft. (0.3m – 0.9m) of water. It is recommended that for improved accuracy, the valve is set to open 70%+.

When maximum flow is known but a pressure drop through the balancing valve is unknown, select a balancing valve for a maximum pressure drop of 2 ft. (0.6m) water 0.8 psi (0.06 bar) in the full open position as shown in the table to the right.

Accurate flow measurement requires that the velocity distribution near the balancing valve remains constant, regardless of the total flow through the pipe. Fittings, such as elbows and tees, disturb the normal flow profile which is established through straight pipe. Pumps create even greater disturbances. Failure to allow water flows around fittings and pumps to normalize can affect measuring accuracy by as much as 20% when the valve is in the fully open position. Minimum lengths (diameters, D) of straight pipe before and after the balancing valve prevent these errors.

Valves are designed for vertical, horizontal, or inclined installation.

#### CB800 CIRCUIT BALANCING VALVES

Valve Size	Flow Rate	Connection Type
<i>In./mm</i>	<i>GPM/LPM</i>	–
2½ 65	39 - 106 10.30 - 28.01	Flanged or Grooved
76.1mm 65	39 - 106 10.30 - 28.01	
3 80	60 - 132 15.85 - 34.87	
4 100	100 - 217 26.42 - 57.33	
139.7mm 125	112 - 317 29.59 - 83.75	
5 125	112 - 317 29.59 - 83.75	
165.1mm 150	220 - 437 58.12 - 115.46	
6 150	220 - 437 58.12 - 115.46	
8 200	223 - 881 58.92 - 232.76	
10 250	292 - 1298 77.15 - 342.93	
12 300	616 - 1731 162.75 - 457.33	

#### PROJECT INFORMATION

#### APPROVAL STAMP

<b>Project:</b>	<input type="checkbox"/> Approved
<b>Address:</b>	<input type="checkbox"/> Approved as noted
<b>Contractor:</b>	<input type="checkbox"/> Not approved
<b>Engineer:</b>	<b>Remarks:</b>
<b>Submittal Date:</b>	
<b>Notes 1:</b>	
<b>Notes 2:</b>	

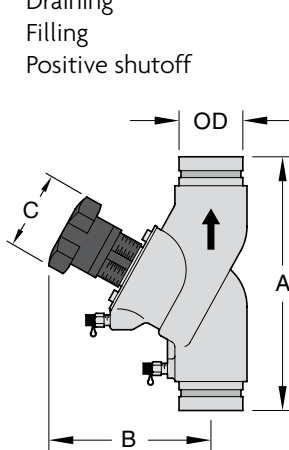
## MODEL CB800

### Circuit Balancing Valves – Grooved Ends

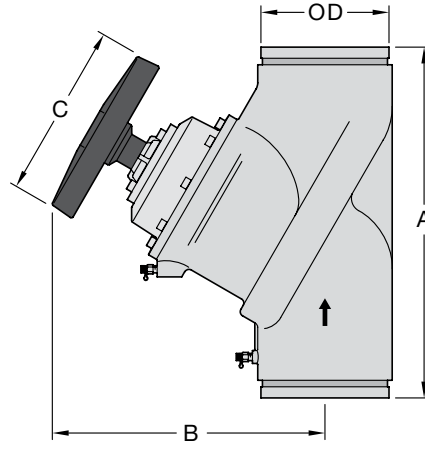
The Model CB800 Balancing Valve provides features for achieving accurate and efficient balancing of hydronic heating or cooling systems. The Gruvlok Groove-by-Groove Model CB800 Valve, available sizes 2½" to 12" (65 to 300mm), is composed of cast iron.

The CB800 valve serves 5 functions:

- Throttling
- Measuring differential pressure
- Draining
- Filling
- Positive shutoff



2½" to 6" (65 to 150mm)



8" to 12" (200 to 300mm)



CB800 CIRCUIT BALANCING VALVES – GROOVED ENDS							
Valve Size	O.D.	Dimensions			Approx. Wt. Ea.	Limits	Handwheel Turns
		A	B	C			
<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Lbs./Kg</i>	<i>PSI/F • PN/C</i>	–
2½ 65	2.875 73.0	11.44 290.6	7.38 187.5	4.33 110.0	19.7 8.9	300/300 20.7/150	8
76.1mm 65	3.000 76.1	11.44 290.6	7.38 187.5	4.33 110.0	19.7 8.9	300/300 20.7/150	8
3 80	3.500 88.9	12.25 311.2	8.00 203.2	4.33 110.0	27.8 12.6	300/300 20.7/150	8
4 100	4.500 114.3	13.75 349.3	9.44 239.8	6.30 160.0	45.3 20.6	300/300 20.7/150	8
139.7mm 125	5.500 139.7	15.75 400.0	11.13 282.7	6.30 160.0	70.0 31.8	300/300 20.7/150	8
5 125	5.563 141.3	15.75 400.0	11.13 282.7	6.30 160.0	70.0 31.8	300/300 20.7/150	8
165.1mm 150	6.500 165.1	18.88 479.6	11.25 285.8	6.30 160.0	95.7 43.5	300/300 20.7/150	8
6 150	6.625 168.3	18.88 479.6	11.25 285.8	6.30 160.0	95.7 43.5	300/300 20.7/150	8
8 200	8.625 219.1	23.63 600.2	18.44 468.4	11.80 300.0	255.2 116.0	300/300 20.7/150	12
10 250	10.750 273.1	28.75 730.3	18.88 479.6	11.80 300.0	377.3 171.5	300/300 20.7/150	12
12 300	12.750 323.9	33.44 849.4	20.25 514.4	11.80 300.0	520.3 236.5	300/300 20.7/150	12

For information on larger sizes, contact an Anvil Sales Representative.  
See circuit balancing valve specifications on first page.

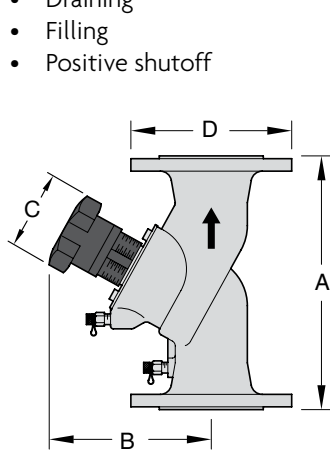
## MODEL CB800

### Circuit Balancing Valves – Flanged Ends, ANSI Class 125#

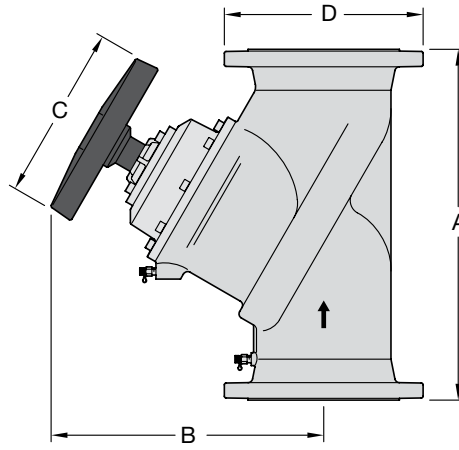
The Model CB800 Balancing Valve provides features for achieving accurate and efficient balancing of hydronic heating or cooling systems. One valve serves five functions: throttling, measuring (pressure and temperature), positive shutoff, draining, and filling. The Gruvlok Flange-by-Flange Model CB800 Valve, available in sizes 2½" to 12" (65mm to 300mm), is composed of cast iron.

The CB800 valve serves 5 functions:

- Throttling
- Measuring differential pressure
- Draining
- Filling
- Positive shutoff



2½" to 6" (65 to 150mm)



8" to 12" (200 to 300mm)



#### CB800 CIRCUIT BALANCING VALVES – FLANGED ENDS, ANSI CLASS 125#

Valve Size	O.D.	Dimensions				Approx. Wt. Ea.	Limits	Handwheel Turns
		A	B	C	D			
<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>In./mm</i>	<i>Lbs./Kg</i>	<i>PSI/F • PN/C</i>	-
2½	2.875	11.44	7.38	4.33	7.25	31.7	235/300	8
65	73.0	290.6	187.5	110.0	184.2	14.4	16/150	
76.1mm	3.000	11.44	7.38	4.33	7.25	31.7	235/300	8
65	76.1	290.6	187.5	110.0	184.2	14.4	16/150	
3	3.500	12.25	8.00	4.33	7.88	39.8	235/300	8
80	88.9	311.2	203.2	110.0	200.2	18.0	16/150	
4	4.500	13.75	9.50	6.30	8.69	61.3	235/300	8
100	114.3	349.3	241.3	160.0	220.7	27.8	16/150	
139.7mm	5.500	15.75	11.13	6.30	9.88	89.9	235/300	8
125	139.7	400.1	282.7	160.0	250.9	40.9	16/150	
5	5.563	15.75	11.13	6.30	9.88	89.9	235/300	8
125	141.3	400.1	282.7	160.0	250.9	40.9	16/150	
165.1mm	6.500	18.88	11.25	6.30	11.25	113.9	235/300	8
150	165.1	479.6	285.8	160.0	285.8	51.8	16/150	
6	6.625	18.88	11.25	6.30	11.25	113.9	235/300	8
150	168.3	479.6	285.8	160.0	285.8	51.8	16/150	
8	8.625	23.63	18.38	11.80	13.38	361.9	235/300	12
200	219.1	600.2	466.9	300.0	339.9	164.5	16/150	
10	10.750	28.75	18.94	11.80	15.94	431.2	235/300	12
250	273.1	730.3	481.1	300.0	404.9	196.0	16/150	
12	12.750	33.50	20.25	11.80	18.13	581.9	235/300	12
300	323.9	850.9	514.4	300.0	460.5	264.5	16/150	

For information on larger sizes, contact an Anvil Sales Representative.  
See circuit balancing valve specifications on first page.

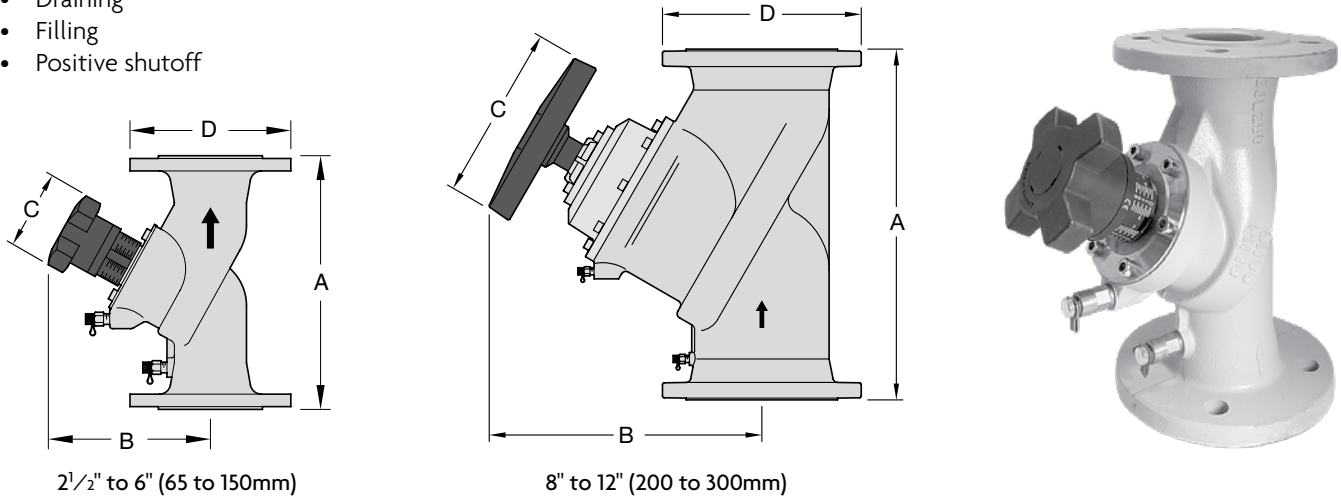
## MODEL CB800

### Circuit Balancing Valves – Flanged Ends, PN16/PN10

The Model CB800 Balancing Valve provides features for achieving accurate and efficient balancing of hydronic heating or cooling systems. One valve serves five functions: throttling, measuring (pressure and temperature), positive shutoff, draining, and filling. The Gruvlok Flange-by-Flange Model CB800 Valve, available in sizes 2½" to 12" (65mm to 300mm), is composed of cast iron.

The CB800 valve serves 5 functions:

- Throttling
- Measuring differential pressure
- Draining
- Filling
- Positive shutoff



**CB800 CIRCUIT BALANCING VALVES – FLANGED ENDS, PN16/PN10**

Valve Size	O.D.	Dimensions				Approx. Wt. Ea.	Limits	Handwheel Turns
		A	B	C	D			
2½"	2.875	11.44	7.38	4.33	7.25	31.7	235/300	8
65	73.0	290.6	187.5	110.0	184.2	14.4	16/150	8
76.1mm	3.000	11.44	7.38	4.33	7.25	31.7	235/300	8
65	76.1	290.6	187.5	110.0	184.2	14.4	16/150	8
3	3.500	12.25	8.00	4.33	7.88	39.8	235/300	8
80	88.9	311.2	203.2	110.0	200.2	18.0	16/150	8
4	4.500	13.75	9.50	6.30	8.69	61.3	235/300	8
100	114.3	349.3	241.3	160.0	220.7	27.8	16/150	8
139.7mm	5.500	15.75	11.13	6.30	9.88	89.9	235/300	8
125	139.7	400.1	282.7	160.0	250.9	40.9	16/150	8
5	5.563	15.75	11.13	6.30	9.88	89.9	235/300	8
125	141.3	400.1	282.7	160.0	250.9	40.9	16/150	8
165.1mm	6.500	18.88	11.25	6.30	11.25	113.9	235/300	8
150	165.1	479.6	285.8	160.0	285.8	51.8	16/150	8
6	6.625	18.88	11.25	6.30	11.25	113.9	235/300	8
150	168.3	479.6	285.8	160.0	285.8	51.8	16/150	8
8	8.625	23.63	18.38	11.80	13.38	361.9	235/300	12
200	219.1	600.2	466.9	300.0	339.9	164.5	16/150	12
10	10.750	28.75	18.94	11.80	15.94	431.2	235/300	12
250	273.1	730.3	481.1	300.0	404.9	196.0	16/150	12
12	12.750	33.50	20.25	11.80	18.13	581.9	235/300	12
300	323.9	850.9	514.4	300.0	460.5	264.5	16/150	12

For information on larger sizes, contact an Anvil Sales Representative.  
See circuit balancing valve specifications on first page.

## MODEL CB800

### Circuit Balancing Valves

Gruvlok CB800 Circuit Balancing Valves are designed for installation in hot water heating and chilled water air conditioning systems and serve to achieve a hydronic balance between the various circuits of the system.

These installation instructions are designed for the Grooved and Flanged type Circuit Balancing Valves.

#### GENERAL INSTRUCTIONS

Always read and understand the instructions. Never remove any piping component without verifying that the system is depressurized and drained.

It is the designer's responsibility to select products suitable for the intended service and to ensure that pressure ratings and performance data are not exceeded.

The valve may be installed in supply or return line. Install the valve with the flow in the same direction as the arrow cast in the body.

Valve must be installed with a minimum of 3D (3 x nominal pipe diameter) of straight pipe in the upstream side.

Valve may be installed in the vertical or horizontal position, with the hand-wheel up, down or on the side.

#### PRE-SETTING

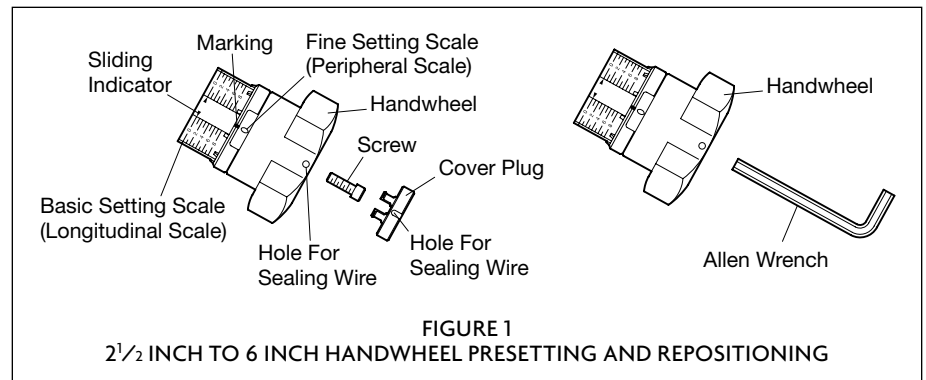
The required preset value can be obtained by referencing the flow chart for the appropriate size of valve. Following the steps below, adjust the basic and fine adjustment scale on the handwheel to match the selected presetting.

**Step 1.** The preset value of the valve is adjusted with the handwheel (Ref. Figure 1 or 2).

**Step 2.** Turn the handwheel so that the arrow on the sliding indicator matches the basic adjustment value. One complete turn of the handwheel adjusts the indicator one full position.

The fine setting is displayed in the scale under the handwheel and indicates 1/10th of a turn of the handwheel.

**Step 3.** With the valve open to the preset value, use a small screwdriver and gently pry the cover plug out of the hand-wheel. Using a 4 mm Allen key for the 2 1/2 inch to 6 inch, or a 10 mm screwdriver for the 8 to 12 inch, insert the tool into the screw (Ref. Figure 1 or 2) and turn clockwise until tight. This will lock the hand-wheel so that the valve can not be



opened beyond the preset value. The handwheel may still be turned to the closed position. Replace the cover plug.

#### REPOSITIONING THE HANDWHEEL

Depending on the position of the valve in the system, it may be desirable to move the 2 1/2 inch to 6 inch handwheel and adjustment scales to make it easier to read.

**Step 1.** Ensure the valve is closed and the adjustment scale is set at 0.

**Step 2.** Use a small screwdriver and gently pry the cover plug out of the hand-wheel.

**Step 3.** Use a 6mm Allen key for the 2 1/2 inch to 6 inch handwheel to remove the Allen screw (Ref. Figure 1).

**Step 4.** Gently pull the handwheel up and remove it from the valve spindle.

**Step 5.** Reposition the handwheel so that the adjustment scale is visible and slide the handwheel down on the spindle.

**Step 6.** Replace the screw and tighten.

**Step 7.** Replace the cover plug.

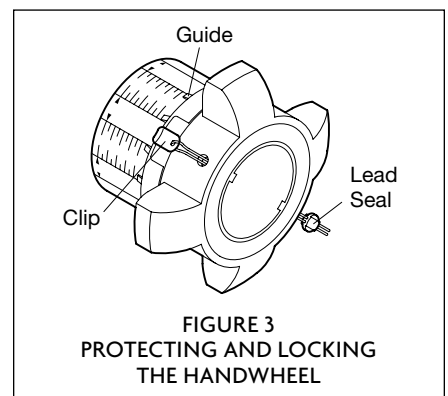
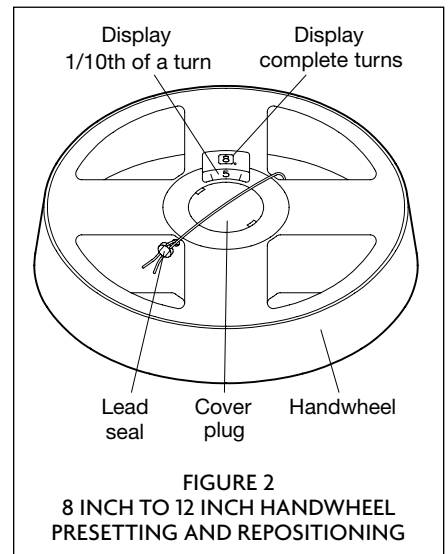
#### PROTECTING THE SETTING

A sealing wire may be threaded through the hole in the handwheel (Ref. Figure 2 or 3) and the lead seal to be fixed to prevent tampering of the setting.

#### LOCKING THE HANDWHEEL

##### Locking 2 1/2 Inch to 6 Inch Handwheel

The hand wheel can be locked in any position. Slide the enclosed clip into the cut-out in the hand wheel between the guides (Ref. Figure 3), making sure it locates into the sliding indicator. Attach the lead seal wire through the hole in the clip then through the hole in the side of the hand wheel. Ensure the sealing wire is fitted tightly, then crimp the seal.



##### Locking 8 Inch to 14 Inch Handwheel

The handwheel can be locked in any position (1/10th of a turn) by removing the existing cover plug and replacing it with a special one. The sealing wire is fitted through the hole in the handwheel and a Lead Seal is fitted (Ref. Figure 2).

**NOTICE:** For presetting and fine adjustment of the flow volume, use the Gruvlok Model MC2 flow computing hand held Differential Measuring Computer.

## MODEL CB800

### Circuit Balancing Valves

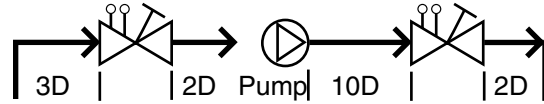
#### VALVE SIZING

All balancing valves are sized to perform in a normal operation range between 25% and 100% of the full open position, at a minimum differential pressure between 1 to 3 ft. (0.3 to 0.9 m) of water. It is recommended that for improved accuracy, the valve is set to open 70%+.

When maximum flow is known but a pressure drop through the balancing valve is unknown, select a balancing valve for a maximum pressure drop of 2 ft. water (0,0057 bar) in the full open position as shown in the table.

Accurate flow measurement requires that the velocity distribution near the balancing valve stays constant, regardless of the total flow through the pipe. Fittings, such as elbows and tees, disturb the normal flow profile, which is established through straight pipe. Pumps create even greater disturbances. Failure to allow water flows around fittings and pumps to normalize can affect measuring accuracy by as much as 20% when the valve is in the fully open position. Minimum lengths (diameters, D) of straight pipe before and after the balancing valve prevent these errors. Valves are designed for vertical, horizontal or inclined installation.

#### Minimum Pipe Diameters from Fittings



#### BALANCING VALVE SELECTION

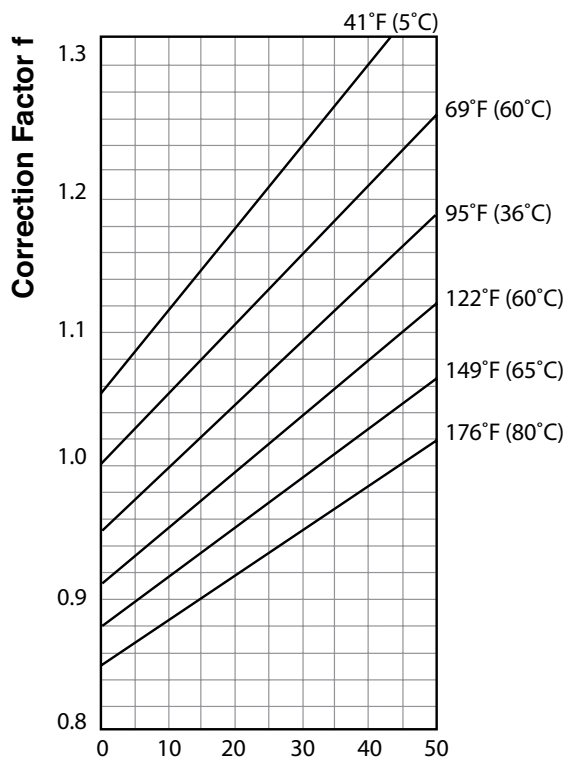
Flow	Valve Size	Flow	Valve Size
GPM(L/h)	in./mm	GPM(L/h)	in./mm
40 - 102 10k - 25k	2½ 65	300 - 430 76k - 108k	6 150
102 - 125 25k - 31k	3 80	430 - 760 108k - 190k	8 200
125 - 210 31k - 50k	4 100	760 - 1350 190k - 340k	10 250
210 - 300 50k - 76k	5 125	1350 - 1500 340k - 377k	12 300

#### INSTALLATION

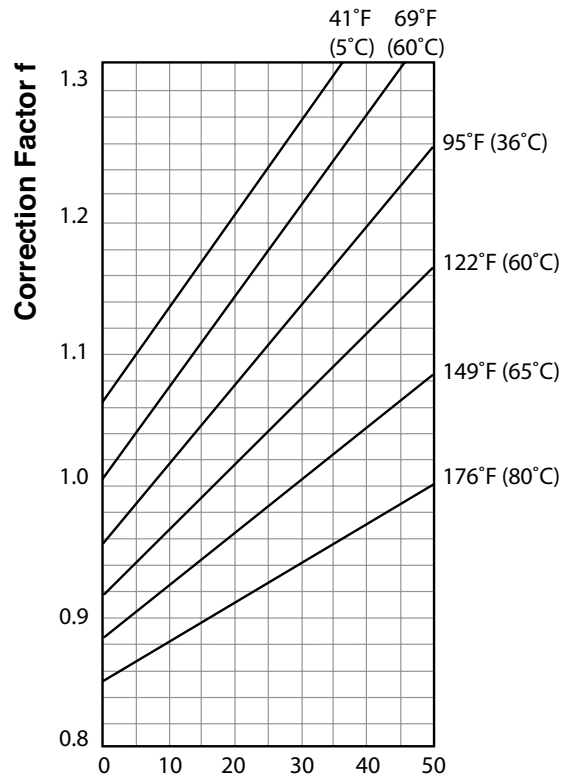
The valve may be installed in the supply or return line, in the vertical or horizontal position, with the hand-wheel up, down or on the side. Install the valve with the flow in the same direction as the arrow cast in the body. Install with a minimum of 3D (3 x nominal pipe diameter) of straight pipe in the upstream side.

#### CORRECTION FACTORS FOR WATER AND GLYCOL MIXTURES

When antifreeze is added to the heating water, the pressure loss in the chart must be multiplied by the correction factor f.



Weight proportion of Ethylene Glycol [%]



Weight proportion of Propylene Glycol [%]

## MODEL CB800

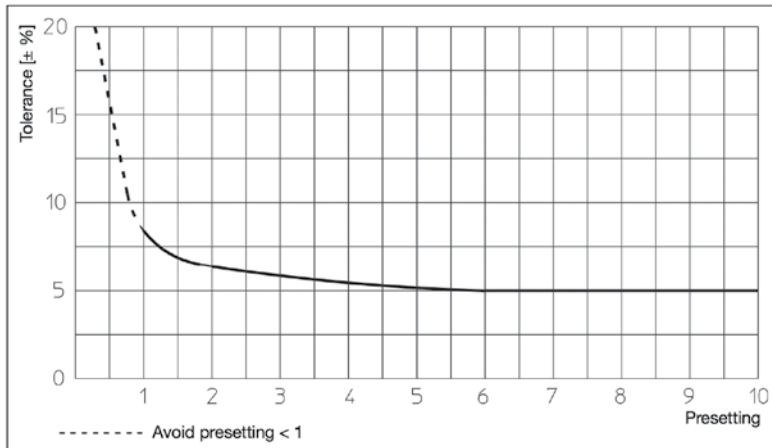
Circuit Balancing Valves



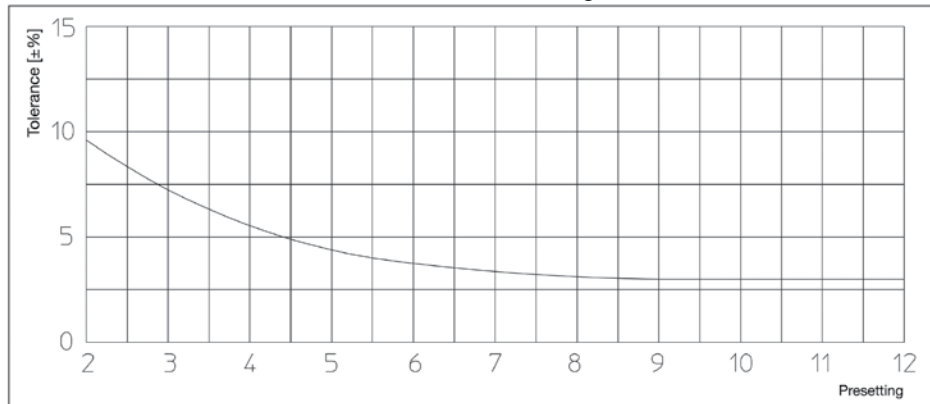
CALIBRATED BALANCING VALVE FLOW SPECIFICATIONS GROOVED & FLANGED ENDS				
Valve Size	Absolute Minimum Flow	Recommended Minimum Flow	Recommended Maximum Flow	Absolute Maximum Flow
<i>In./mm</i>	<i>GPM(L/s)</i>			
2½ 65	1.4 0.088	47 2.97	106.0 6.69	335.3 21.15
3 80	1.5 0.095	48 3.03	132.2 8.34	418.1 26.38
4 100	1.9 0.120	78 4.92	217.5 13.72	687.7 43.39
5 125	4.2 0.265	87 5.49	317.0 20.00	1,002 63.2
6 150	5 0.315	180 11.36	437.4 27.60	1,383 87.3
8 200	30 1.89	163 10.28	881.3 55.60	2,787 175.8
10 250	70 4.42	210 13.25	1,298 81.9	4,106 259.1
12 300	115 7.26	518 32.68	1,731 109.2	5,474 345.4

### FLOW MEASUREMENT ACCURACY

2 ½" - 6" Valves Flow Measuring Tolerance



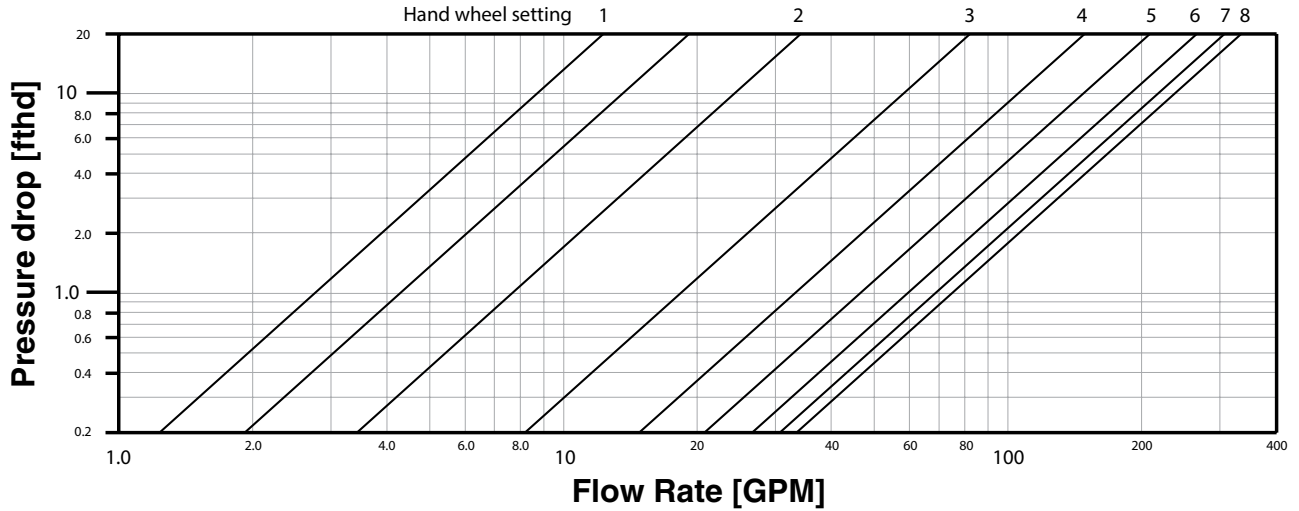
8" - 12" Valves Flow Measuring Tolerance



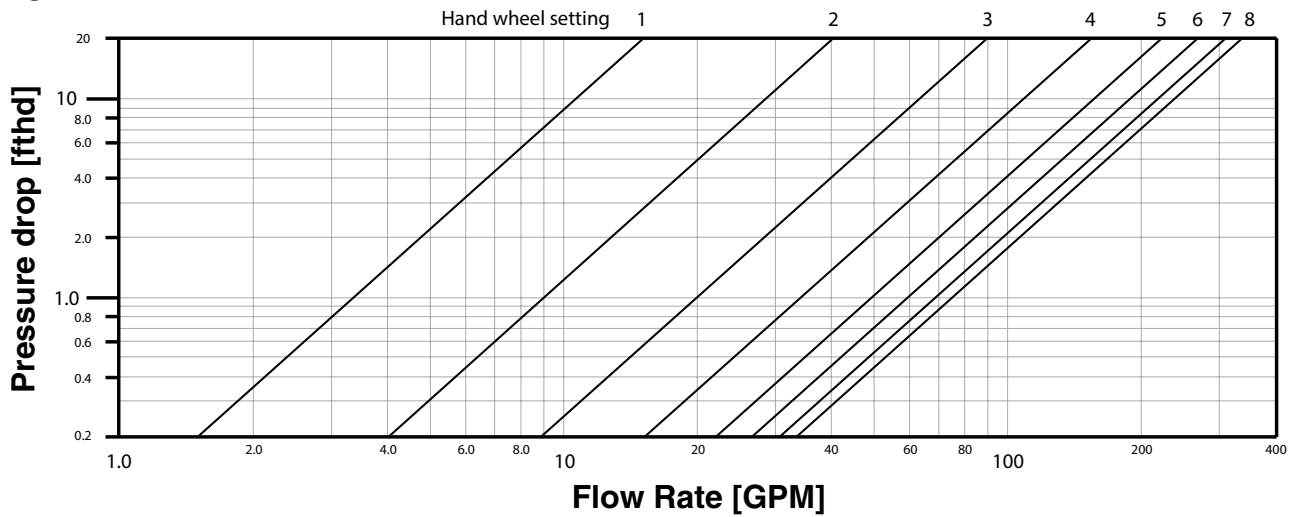
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Circuit Balancing Valves

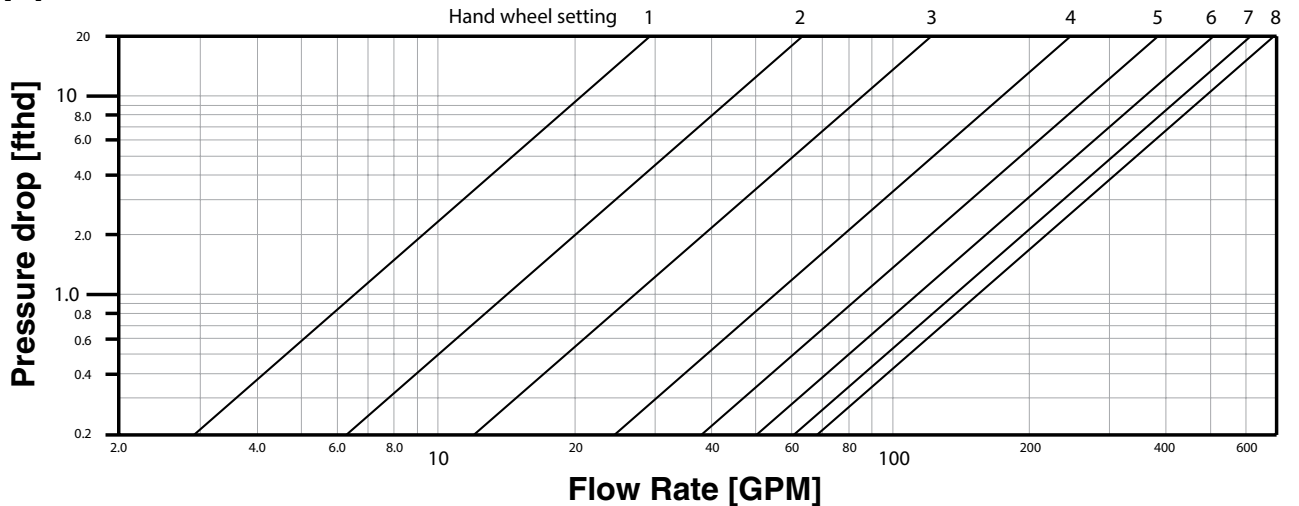
**Size: 2 1/2"**



**Size: 3"**



**Size: 4"**

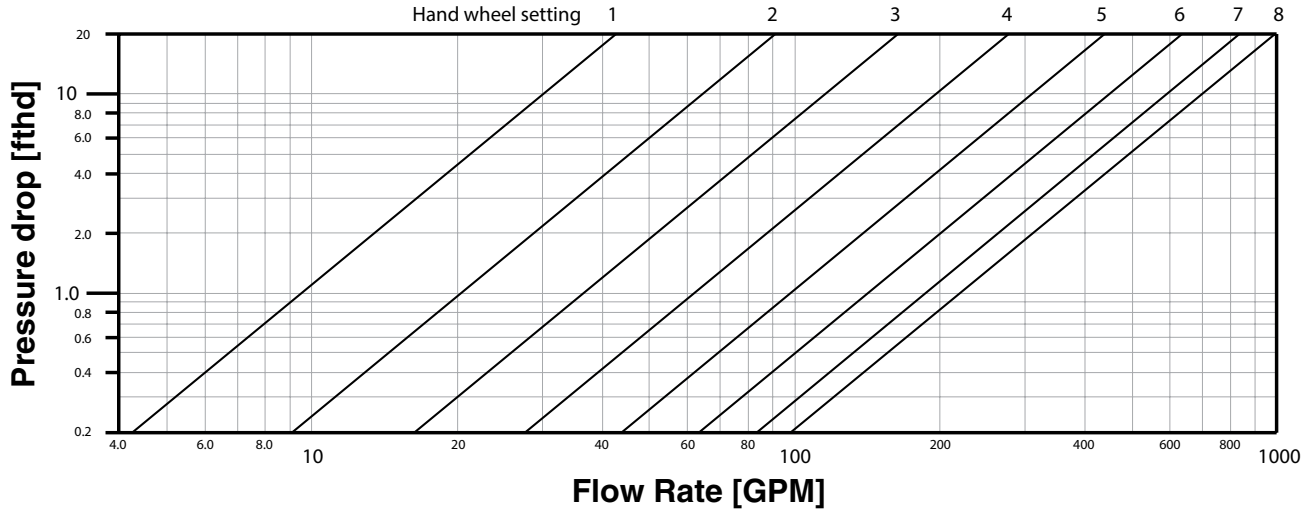




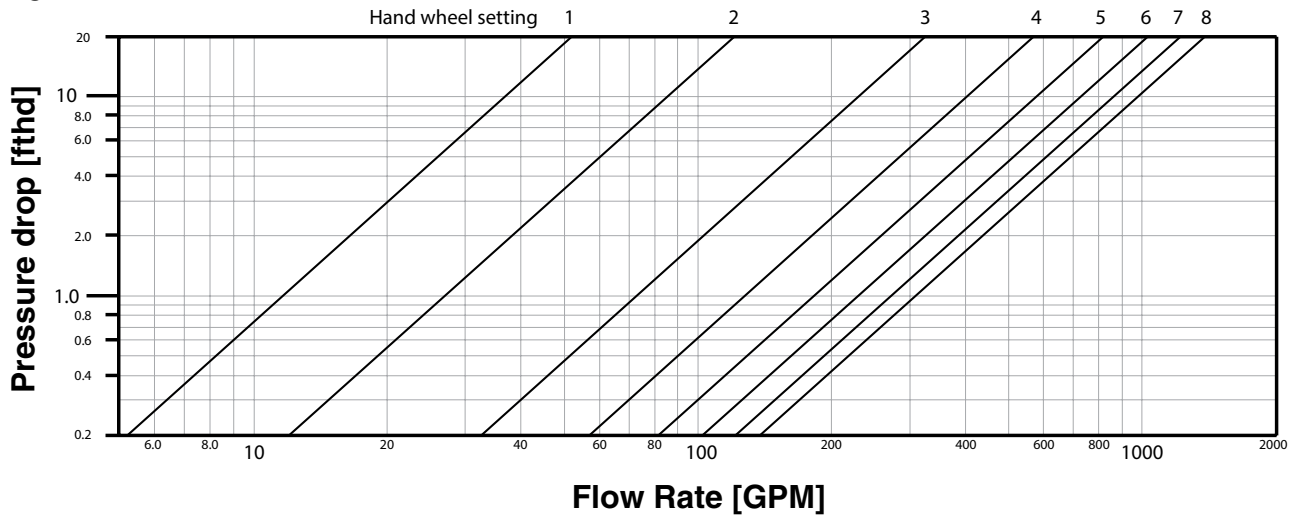
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Circuit Balancing Valves

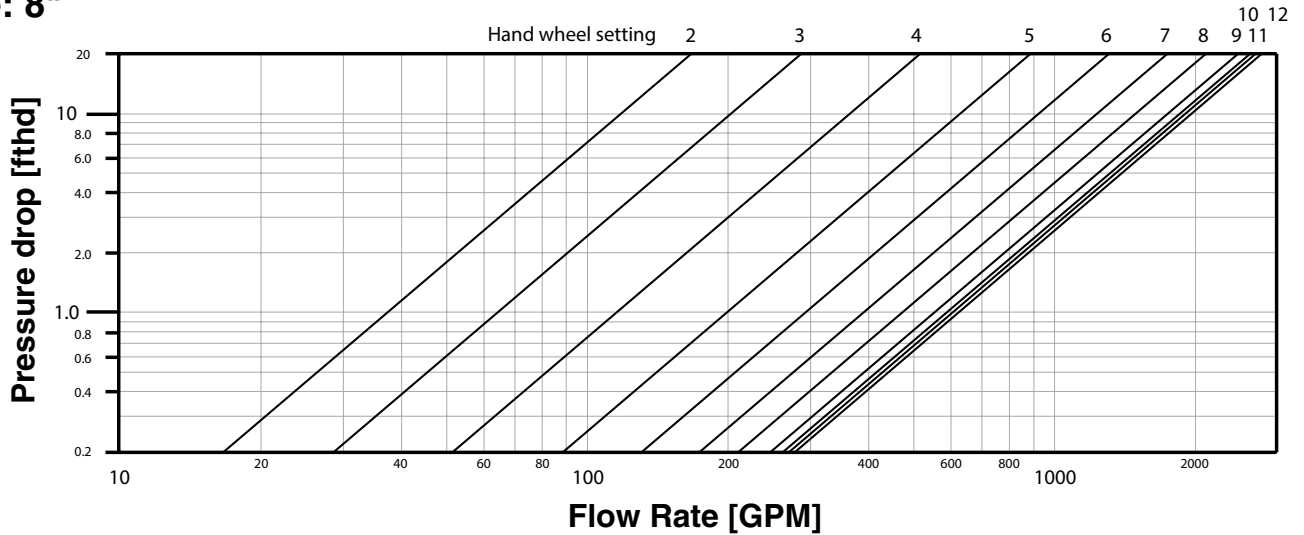
## Size: 5"



## Size: 6"



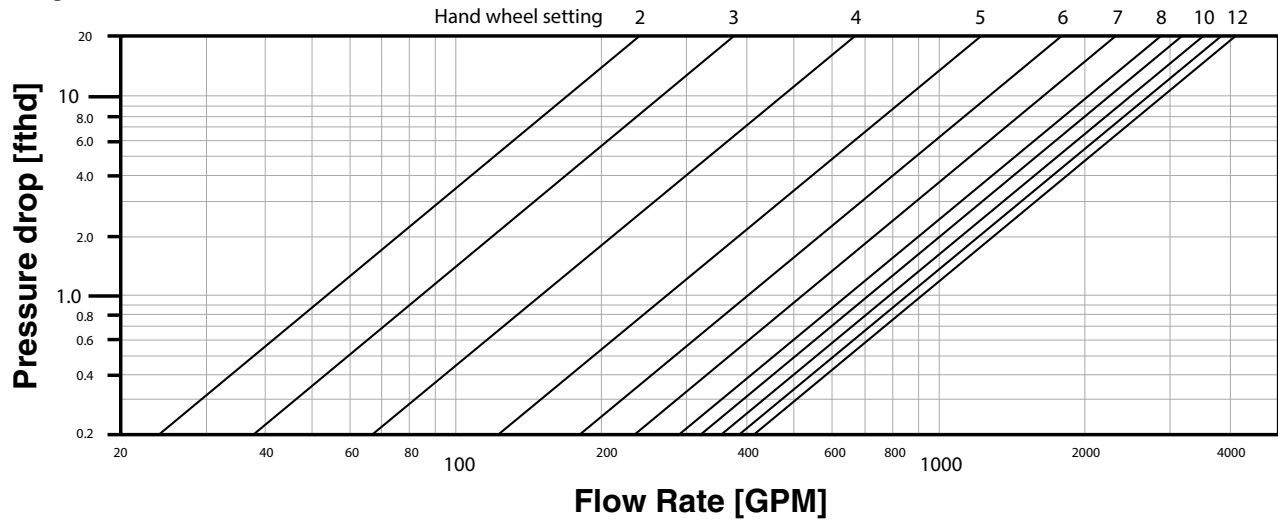
## Size: 8"



# MODEL CB800

Circuit Balancing Valves

## Size: 10"



## Size: 12"

