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INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

Review Date: 01/18/2012
Original Date: NA

Flow Data for NIBCO® Circuit Balancing Valves 1/2" to 2" (Figure Number 1710)

CAUTION: Only qualified personnel should undertake the procedures outlined in this document. NIBCO INC., its agents, representatives and employees assumes no liability for the use of these procedures. These procedures are offered as suggestions only.

Why Balance Your System?

Whether a system is designed for heating or chilling it must be properly adjusted and balanced for optimum design performance. An unbalanced system will produce temperature variations of up to 14°F between rooms which can typically add 35% to energy costs.

Engineers save valuable time and money when the system they are installing matches a predetermined design and if accurate pressure drop calculations have already been made.

The Concept of Proportional Balancing

Balancing is dependent upon two basic principles:

1. The adjustment of a valve in a sub-circuit alters the flow not only in the sub-circuit but also in other circuits within the system. If such an adjustment reduces the flow in the sub-circuit then the flow elsewhere must increase. By such means the flow through parallel circuits may be adjusted so that the proportion of design flow is equalized.

2. If water flows through a pipe which has a number of branches then the percentage of the total flow in each branch remains constant irrespective of how the total mass flow alters.

By the use of these principles a circuit can be adjusted so that each sub-circuit receives its design flow rate within acceptable tolerances.

The Benefits to the Client of System Balancing

- A balanced system ensures a comfortable indoor climate.
- The correct flow in boilers and chillers.
- The desired flow distribution throughout the building.
- Energy savings - and thereby cost savings.
- Trouble-free operation and ease of maintenance.
- Lower capital costs.

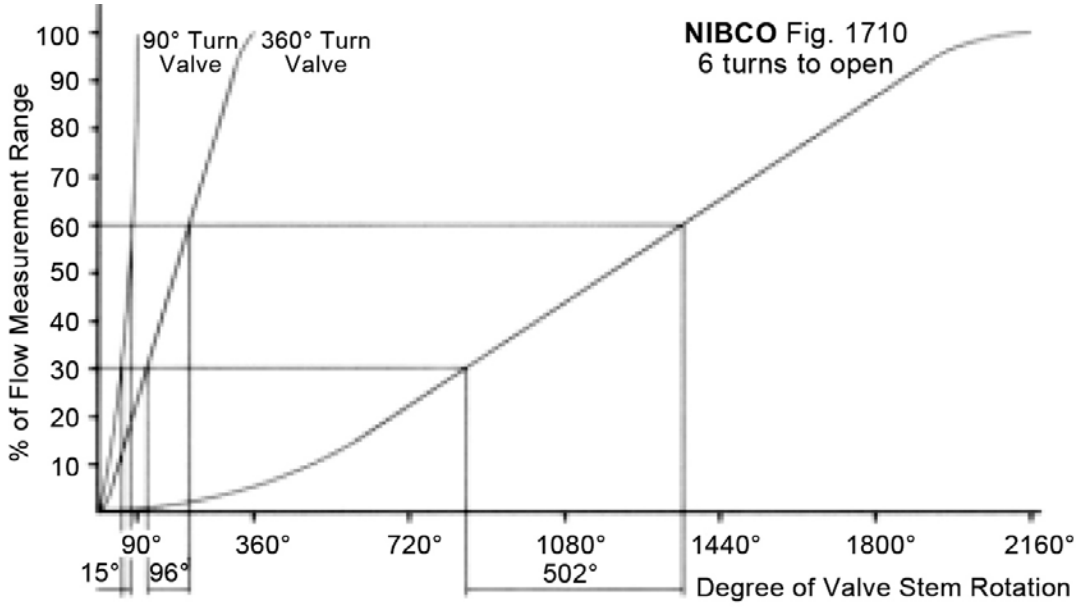
The NIBCO® Commercial Valve Line is one of the most highly specified mechanical service Quarter-Turn and Multi-turn lines in use today. Specifying Engineers recognize NIBCO Valves by name and figure number and have made them the choice in building service and general utility service applications. This versatile valve line is specified worldwide in applications such as:

- Hot and Cold Water
- Condenser and Chilled Water
- Hot Water Heating
- Low and Medium Pressure Steam
- Fire Protection
- Compressed Air and Gas
- Vacuum
- Natural Gas Systems
- Medical Gas Systems

Why Engineers Specify NIBCO® Valves:

- Multiple Design Options
- Ball Valves
- Butterfly Valves
- Gate Valves
- Globe Valves
- Check Valves
- Circuit Balancing Valves
- Actuators and Controls
- Constructed of High Quality Materials
- ISO Registered Manufacturing Plants
- Well Trained Factory Direct Sales Force
- Leader in “e-Commerce”

A Comparison of Throttling Characteristics – Why Choose NIBCO?



- These curves illustrate the advantages of multi-turn adjustment available with all NIBCO Fig. 1710 balancing valves.
- A quarter-turn 90° open valve would require a 15° change in adjustment to result in a 30% change in flow measurement.
- A one turn 360° open valve would require a 96° change in adjustment to result in a 30% change in flow measurement.
- All NIBCO Fig. 1710 valves would require a minimum of 502° change in adjustment to result in a 30% change in the flow measurement.

Circuit Balancing Valve Typical Specifications

Manual Circuit Balancing Valves installed in Domestic Hot Water Service

Circuit Balancing Valves 1/2" to 2" for domestic hot water service shall be NIBCO Globe Style, Series 1710 or approved equal. Valve shall have integral metering/test ports for flow balancing and flow measurement. Test ports shall have internal check valve and be equipped with caps. Valves shall be manufactured from dezincification resistant brass or bronze rated 240 psi at 250°F. All balancing valves shall have position indication readout and built in memory stop for repeatable regulation and control.

Manual Circuit Balancing Valves installed on Fan Coil Units

Circuit Balancing Valves 1/2" to 3/4" to be installed on fan coil units shall be NIBCO Figure S1709 with solder end connections or approved equal. Valve shall be globe style of dezincification resistant brass or bronze alloy. All valves shall have two integral metering/test ports with internal check valves and protective caps. The valves must be equipped with visual position readout and memory stop for repeatable regulation and control.

Manual Circuit Balancing Valves installed in HVAC Systems

Circuit Balancing Valves for heating and chilled water service shall be based on NIBCO Figure 1710, 1/2" to 2" and NIBCO Figure 737 2" to 12" or approved equal. 1/2" to 2" valves shall be constructed of dezincification resistant brass or bronze alloy. 2" to 12" valves will be constructed of iron with ANSI Class 125/150 flanged or grooved ends. All valves shall be globe style for precise regulation and control and rated 175 psi for iron and 240 psi for bronze at 250°F. Each valve shall have two metering/test ports with internal check valves and protective caps. All valves must be equipped with visual position readout and memory stop for repeatable regulation and control.

DZR Metal

Dezincification of duplex brass, which is a form of corrosion, may occur when in contact with certain aggressive waters.

Dezincification is the selective attack, by electrolytic corrosion, of the zinc rich beta phase in duplex brasses and is characterized by a porous coppery appearance.

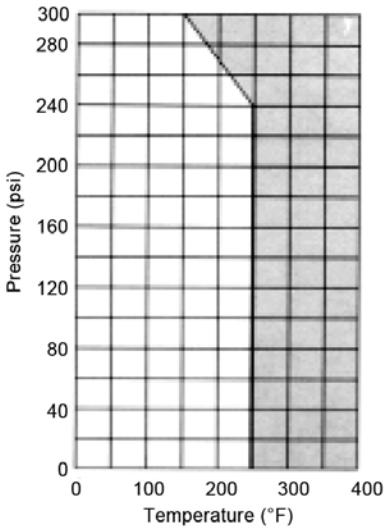
To overcome the problem special copper alloys, which contain an inhibitor and undergo heat treatment, have been developed which are resistant to corrosion by dezincification.

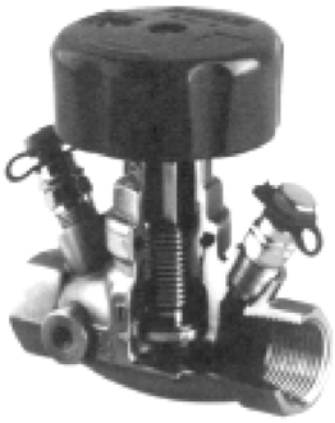
These materials are known as DZR or DZR metal.

DZR Balancing Valves – Fig. T1710 and S1710

Pressure/Temperature Rating

240 psi to 250°F
300 psi from -20°F to 150°F





Test Pressures (Hydraulic)

Shell: 450 psi
Seat: 330 psi

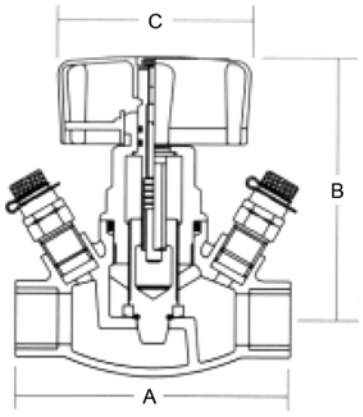
Specification

Non-rising stem
Screwed bonnet
Parabolic regulating disk
Double regulating (memory stop) device
Flow measurement accuracy
  Full open ±5%
  25% open ±10%
Supplied fitted with two DuSeal test points (Fig. 631) which accept commercial pressure and temperature probes. End connections threaded to ANSI B1.20 (NPT) and solder end to ANSI B16.18

Options

Drain Plug
Extended test points
Pre-formed insulation

MATERIAL SPECIFICATIONS	
Component	**Material**
Handwheel	Polymer
Isolating Stem	DZR Metal
Stem Seals	EPDM
Regulating Stem	DZR Metal
Bonnet	DZR Metal
Disk Nut	DZR Metal
Disk Seat Ring	DZR Metal
Disk O-ring	EPDM
Body	DZR Metal



DIMENSIONS

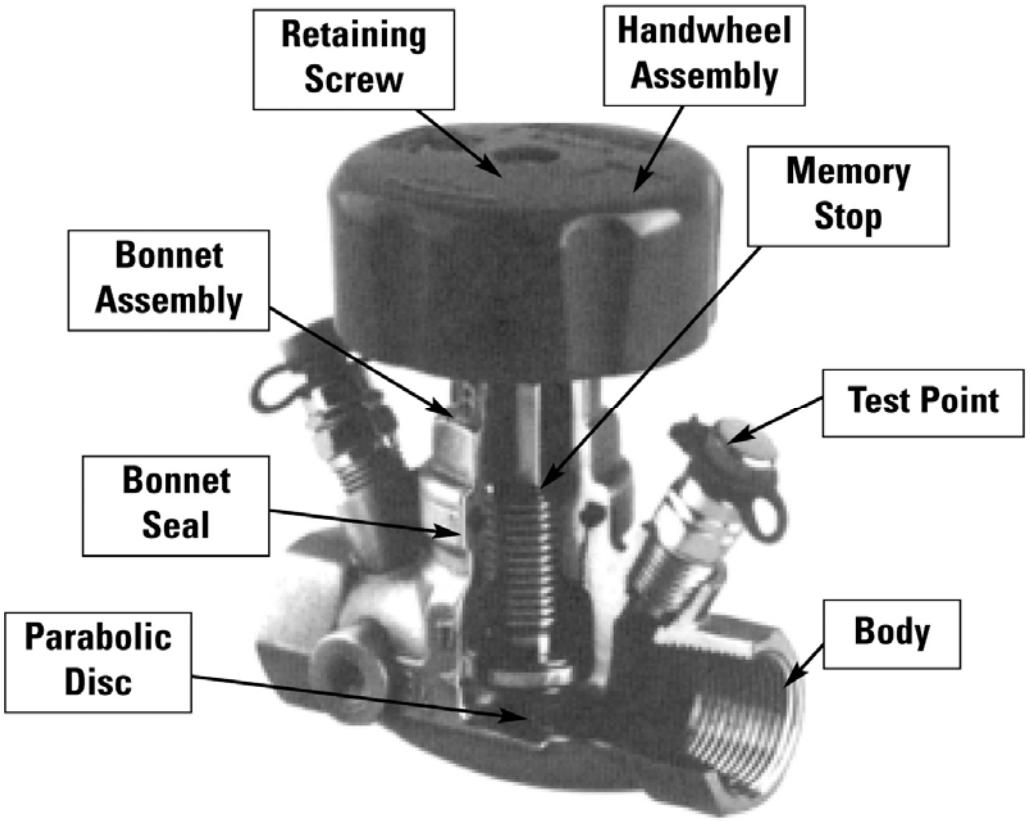
Nominal Size		A		B		C		Weight	
in.	mm	in.	mm	in.	mm	in.	mm	lb.	kg
1/2	15	4	100	37/8	97	23/4	70	1.7	0.77
3/4	20	4	100	37/8	97	23/4	70	2.0	0.91
1	25	43/4	120	41/4	107	23/4	70	3.1	1.41
11/4	32	51/2	140	43/8	112	23/4	70	4.2	1.91
11/2	40	57/8	150	43/8	112	33/4	95	5.1	2.32
2	50	61/2	165	53/8	136	33/4	95	8.0	3.64

Figure 1710 C_v / C_{vs} Values

Valve Size (in.)	Valve Position														
	1.5	1.75	2.0	2.25	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	7.0	8.0	9.0
1/2	0.76	0.87	0.98	1.16	1.34	13.84	2.40	2.90	3.42	3.84	4.10	4.30	—	—	—
3/4	1.02	1.17	1.33	1.61	1.90	2.68	3.69	4.82	5.80	6.60	7.31	8.06	—	—	—
1	—	—	—	2.10	2.37	3.14	4.00	4.98	6.06	7.90	8.10	8.92	10.40	11.83	13.55
1-1/4	—	—	3.64	4.23	4.80	6.15	7.66	9.38	11.13	13.18	15.16	17.18	20.44	23.99	—
1-1/2	—	—	2.10	2.62	3.14	4.59	6.27	8.20	10.37	12.91	15.71	18.76	24.57	29.10	—
2	—	5.51	6.58	7.91	9.25	12.37	16.14	20.74	26.60	31.77	36.24	40.70	43.30	—	—

Key: **25% Open Position**

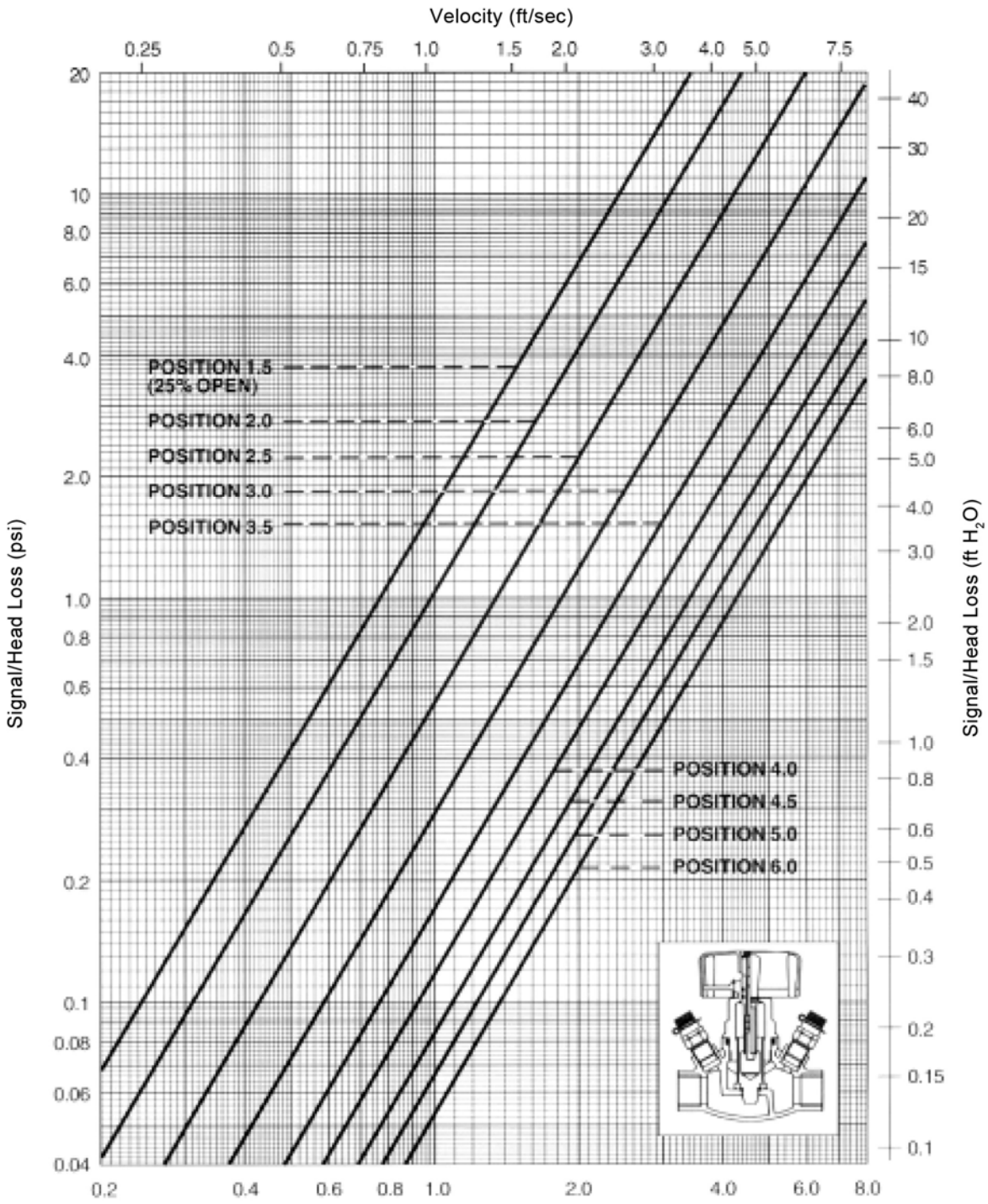
Notes: 1) $C_V = C_{VS} = \frac{Q}{\sqrt{\blacktriangle P}}$ where Q = flow rate in US gpm
and $\blacktriangle P$ = head loss for C_V and signal for C_{VS} in psi



1/2” Figure T1710 / S1710 Circuit Balancing Valve

Graph of Signal/Head loss against Flow Rate indicating pressure drop attributable to the valve installed in a circuit.

Velocity based on average inside diameter of Schedule 40 pipe.

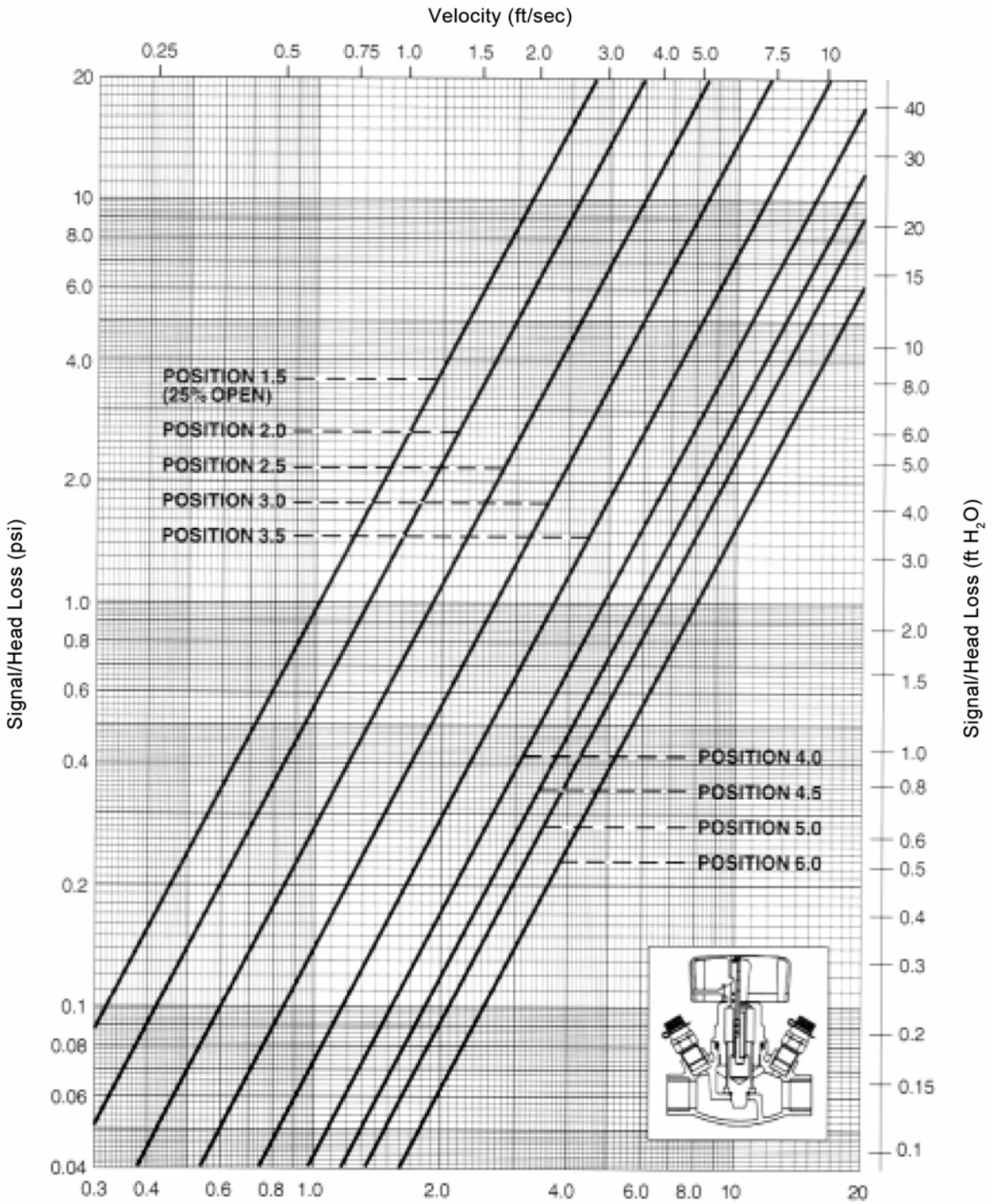


1/2” Figure 1710

3/4” Figure T1710 / S1710 Circuit Balancing Valve

Graph of Signal/Head loss against Flow Rate indicating pressure drop attributable to the valve installed in a circuit.

Velocity based on average inside diameter of Schedule 40 pipe.

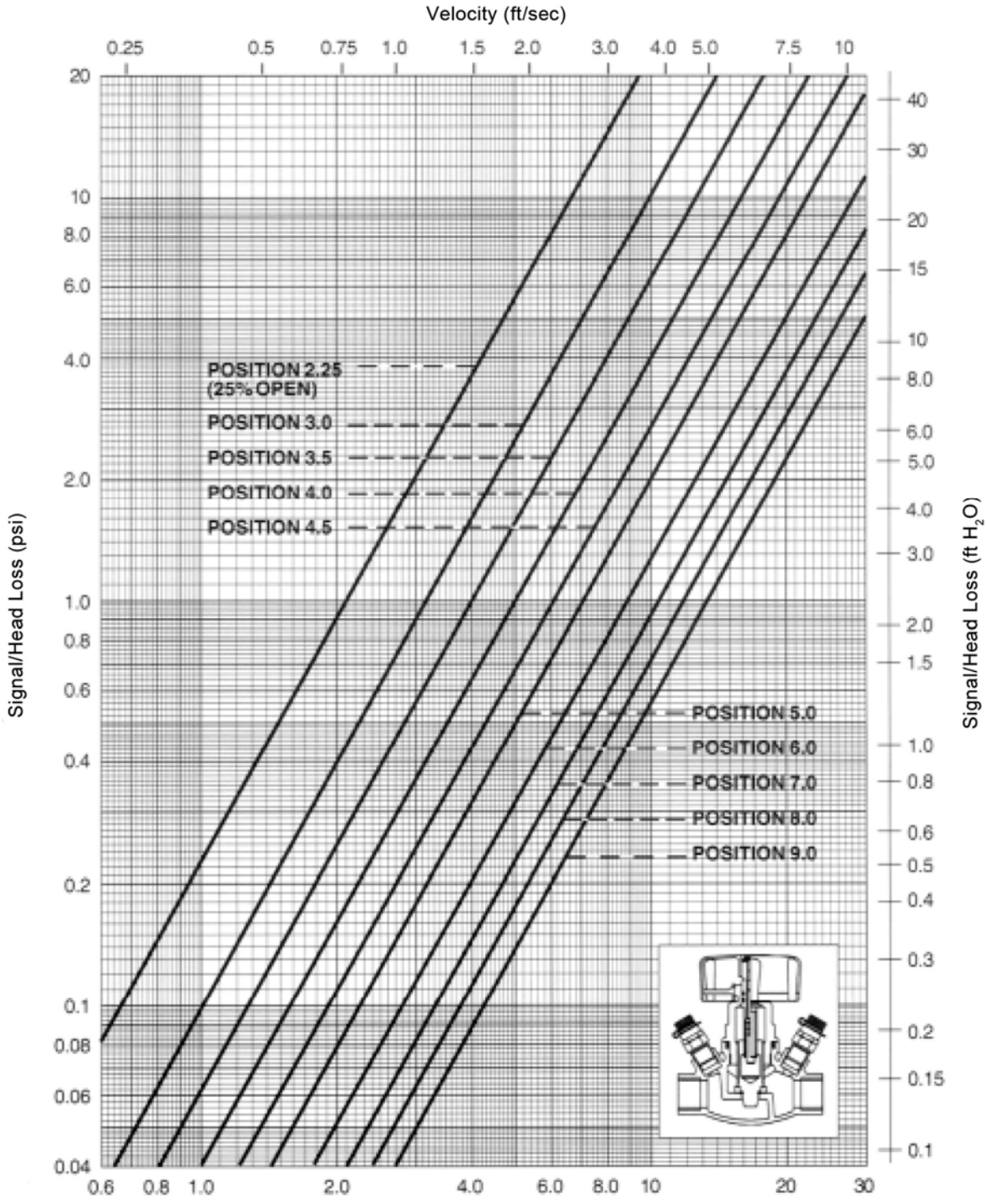


3/4” Figure 1710

1” Figure T1710 / S1710 Circuit Balancing Valve

Graph of Signal/Head loss against Flow Rate indicating pressure drop attributable to the valve installed in a circuit.

Velocity based on average inside diameter of Schedule 40 pipe.

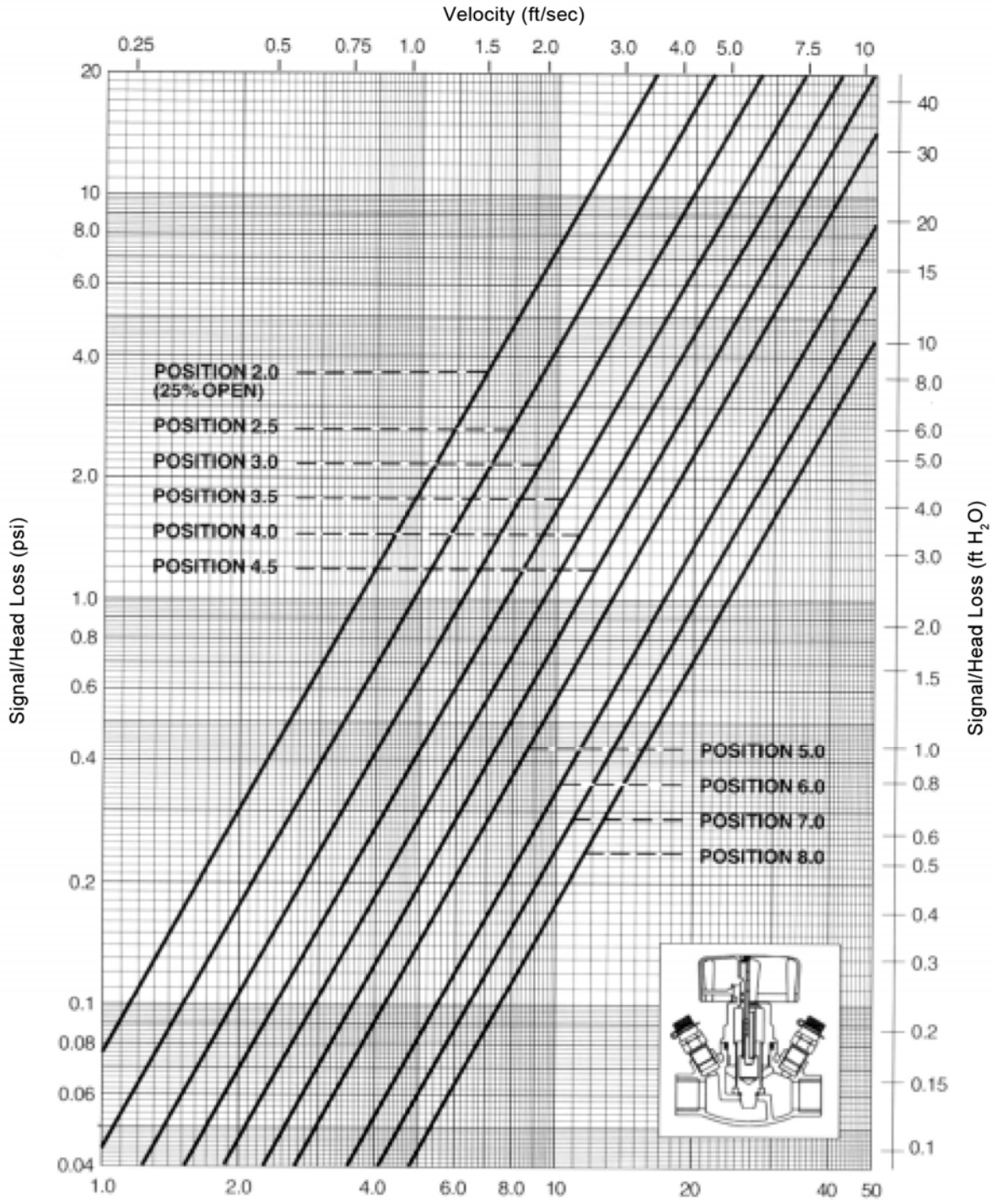


1” Figure 1710

1-1/4” Figure T1710 / S1710 Circuit Balancing Valve

Graph of Signal/Head loss against Flow Rate indicating pressure drop attributable to the valve installed in a circuit.

Velocity based on average inside diameter of Schedule 40 pipe.

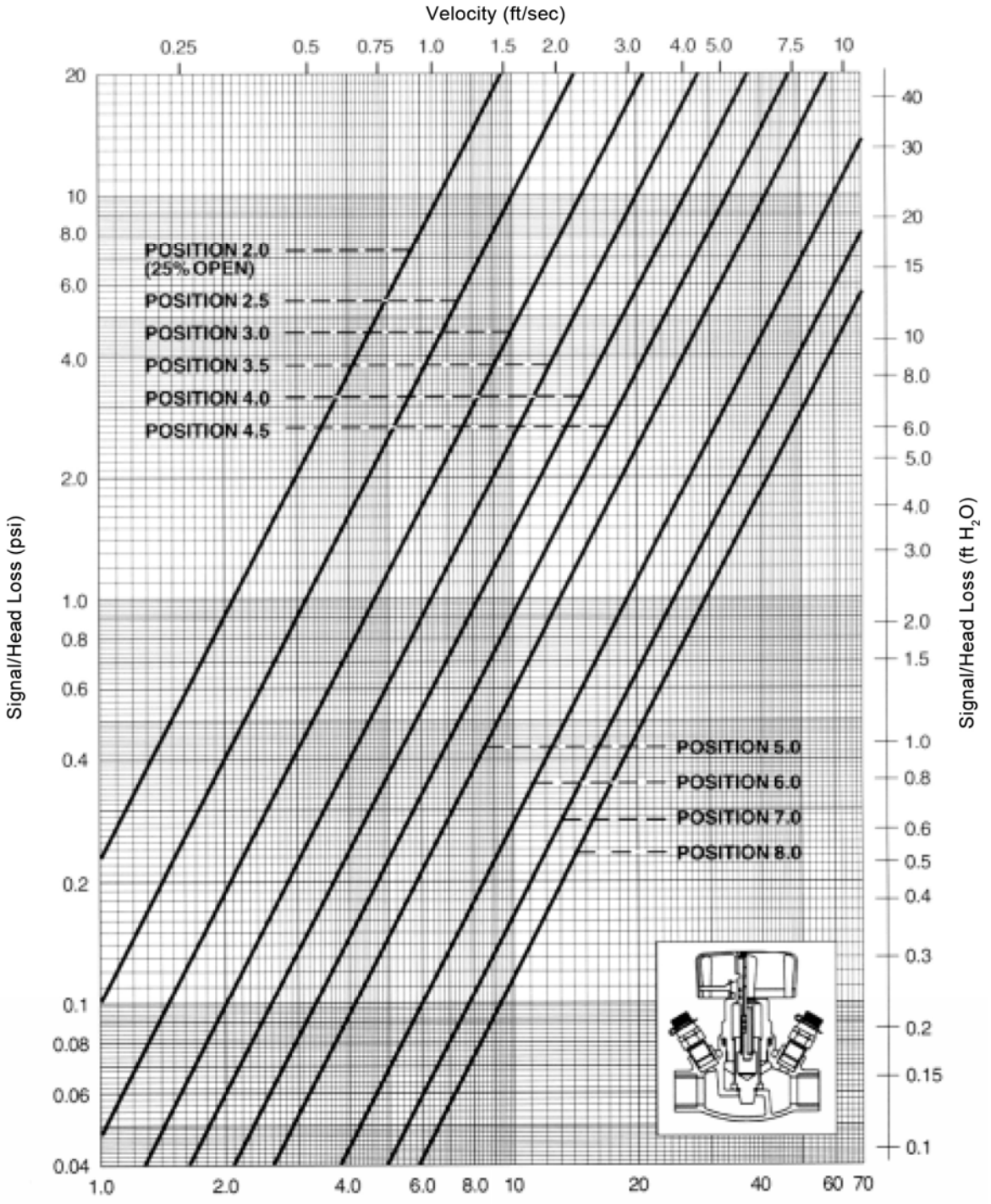


1-1/4” Figure 1710

1-1/2” Figure T1710 / S1710 Circuit Balancing Valve

Graph of Signal/Head loss against Flow Rate indicating pressure drop attributable to the valve installed in a circuit.

Velocity based on average inside diameter of Schedule 40 pipe.

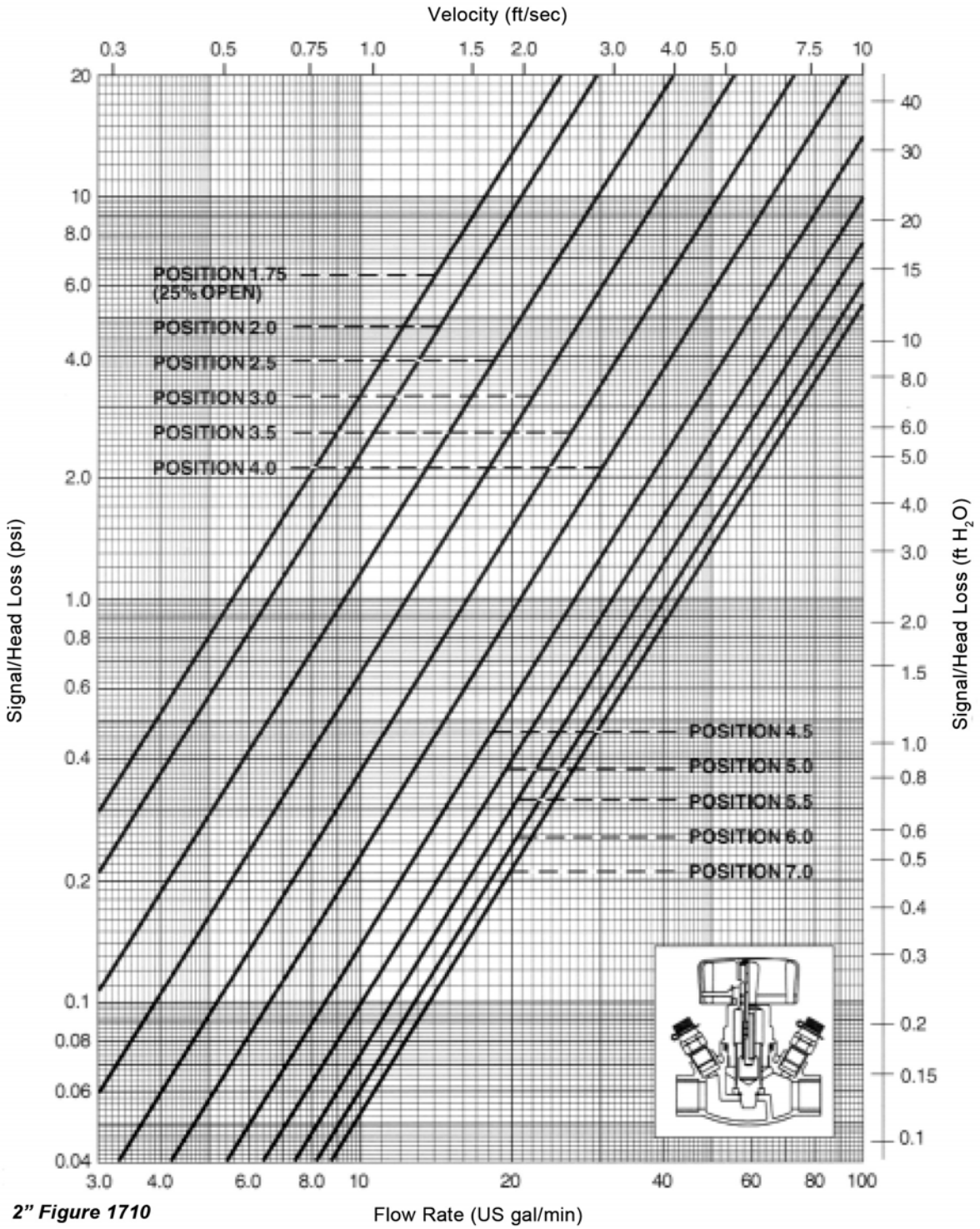


1-1/2” Figure 1710

2” Figure T1710 / S1710 Circuit Balancing Valve

Graph of Signal/Head loss against Flow Rate indicating pressure drop attributable to the valve installed in a circuit.

Velocity based on average inside diameter of Schedule 40 pipe.



2” Figure 1710