

# Balancing Valves

## TA Series 786/787/788/789 and Series 78K



insertion-type pressure or temperature probes.

All valves are rated from  $-4^{\circ}\text{F}/-20^{\circ}\text{C}$  to  $+250^{\circ}\text{F}/+120^{\circ}\text{C}$ . Service will also be governed by the connecting coupling gasket ratings for grooved and flanged valves.

Insulation kits are available for  $\frac{1}{2}$  – 6"/15 – 150 mm sizes for Series 78K and TA Series 786, 787, 788 and 789 balancing valves.

### Product Description:

Tour & Andersson calibrated balancing valves offer a reliable, simple and cost effective way to measure and balance all flow rates. Full throttling range is achieved by 4, 8, 12, 16, 20 or 22 full turns of the handwheel, enabling a precise setting. This high degree of accurate adjustment means that the system can be balanced precisely.

The actual pressure drops in heating and cooling systems are difficult to establish by calculation because water flows vary from design flows. They can be corrected easily by regulating the desired water flow with Tour & Andersson globe style balancing valves. By measuring the pressure drop across measuring ports at a particular handwheel setting, the water flow for the valve size can be read easily from the appropriate pressure drop graph or flow balancing wheel. If the flow does not conform with that specified, adjust the valve and repeat the measuring procedure until the correct flow has been obtained.

NOTE: All Tour & Andersson balancing valves include a concealed memory feature with a locking tamper-proof setting.

Series 78K and TA Series 786 and 787 valves have an Ametal® body.

TA Series 788 and 789 balancing valves have ductile iron bodies and Ametal or ductile iron trim, depending on size. Test ports feature self-sealing construction for

### Job/Owner

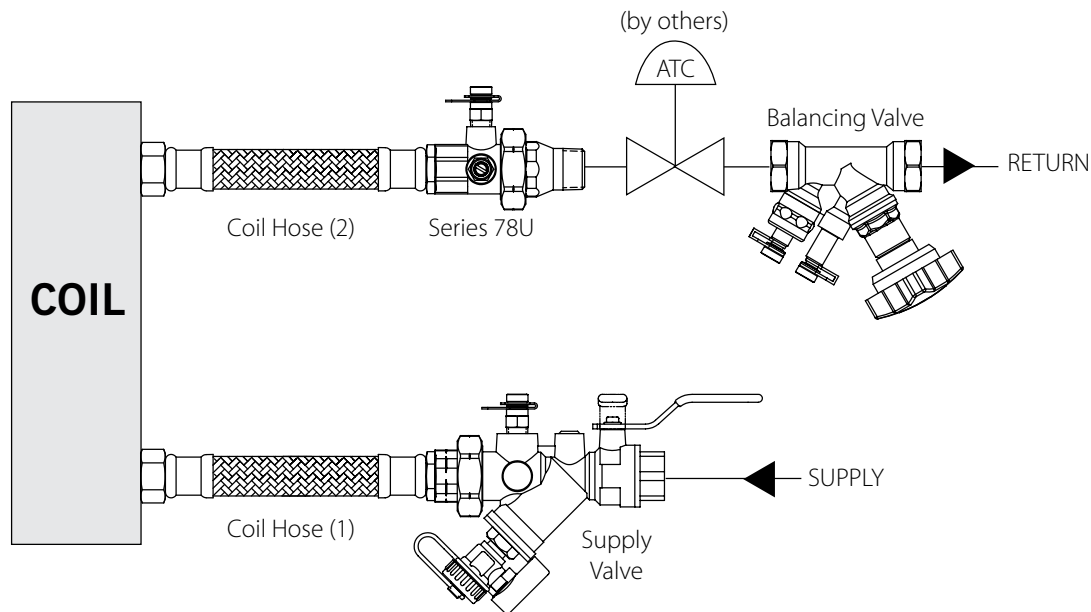
System No.	
Location	

### Contractor

Submitted By	
Date	

### Engineer

Spec Section	
Paragraph	
Approved	
Date	



Victaulic Series 799/79V KOIL-KIT™ Coil Pack  
 Note: TA Series 787 shown, other options available.

Balancing valves can be ordered individually or as a component of the Series 799, 79V, 79B, or 79A KOIL-KIT Coil Pack. See the Series 799/79V/79B/79A Contractor Order Form (A) (publication SF-33) for help ordering your Victaulic KOILKIT Coil Pack.

Victaulic KOIL-KIT Coil Packs provide a simplified, quality coil installation while ensuring optimal hydronic systems design requirements are met. The Series 799/79V is suitable for a variety of hot and cold water applications including treated and untreated water systems.

The Victaulic KOIL-KIT Coil Pack consists of the following components: Series 78Y Y-Strainer/Ball Valve or Series 78T Ball Valve Union Combination, two Coil Hoses, a Series 78U Union Port Fitting and a TA balancing valve. There are two options when ordering a Victaulic KOIL-KIT Coil Pack: Series 799 KOIL-KIT Coil Pack or Series 79V KOIL-KIT Coil Pack with ATC Valve.

The Series 799 and Series 79V comes standard with the components listed above. Additionally, the Series 79V includes the option to have the ATC valve of your choosing assembled and shipped with the Victaulic KOIL-KIT Coil Pack. Please note that when ordering a Series 79V, Victaulic offers one balancing valve, the Series 78K. Specify either Series 799 or Series 79V when ordering.

The Series 79B and Series 79A come standard with the components listed above, however these two packages also include the Bypass Option. When choosing a Victaulic KOIL-KIT Coil Pack with a Bypass Option, the following components are available as options: Series 78Y with Bypass Tee or Series 78T with Bypass Tee, a third coil hose, and a bypass valve. (Bypass valve options consist of Series 78Y, 78T, 78K, 786, 787).

The Series 79A includes the Bypass Option and the option to have the ATC valve of your choosing assembled and shipped with the Victaulic KOIL-KIT Coil Pack.

For added convenience, when coil hoses are ordered as a component of the Series 799 or 79V KOIL-KIT Coil Pack, all hoses can be provided pre-connected to the Series 78Y or 78T on the supply side and the Series 78U on the return side (specify connection preference when ordering).

For information on Victaulic KOIL-KIT Coil Packs in ½ – 2"/15 – 50 mm sizes, refer to publication [08.30](#).

For information on Victaulic KOIL-KITS for air handling units in 2 ½ – 6"/65 – 150 mm sizes, refer to publication [08.35](#).

## Material Specifications:

### Balancing Valves

#### Body:

Series 78K and TA Series 786, 787: Ametal, (pressure die cast, nonporous copper alloy)

TA Series 788, 789: Ductile iron, ASTM A536 Grade 60-40-18 (BS Grade 400/15)

#### Body coating:

TA Series 788, 789: 2 ½, 3, 4" – Epoxy resin coated  
5 – 16" – painted

#### Trim: (Bonnet, Stem and Restriction Cone)

Series 78K and TA Series 786, 787: Ametal

TA Series 788, 789:

Bonnet – 2 ½ – 6" – Ametal

Bonnet – 8 – 16" – Ductile Iron

Stem: Ametal

Restriction Cone: Ametal

#### Union:

Series 78K: Brass with EPDM o-ring

#### Tailpiece & adapter:

Series 78K: DZR Brass

#### Seat:

Series 78K, and TA Series 786, 787: Ametal

TA Series 788, 789: Ductile Iron

#### Seat seal:

Series 78K and TA Series, 786, 787, 788, 789: EPDM

#### Stem seals:

EPDM

#### Probe seals:

EPDM

#### Handwheel:

Series 78K and TA Series 786, 787 – Red Polyamide plastic

TA Series 788, 789: 2 ½ – 6" – Red Polyamide plastic

8 – 16" – Aluminum

#### Optional Equipment:

TA Series 786, 787: Drain kit-Ametal

TA Series 786, 787: Insulation Kit-Polyurethane.

Also available on TA Series 789 2 ½ – 6" sizes.

#### Allen wrench sizes:

3 mm memory ½ – 2" TA Series 786, 788 valves

5 mm memory 2 ½ – 12" TA Series 788 & 2 ½ – 6" TA Series 789 valves

8 mm memory 8 – 16" TA Series 789 valves

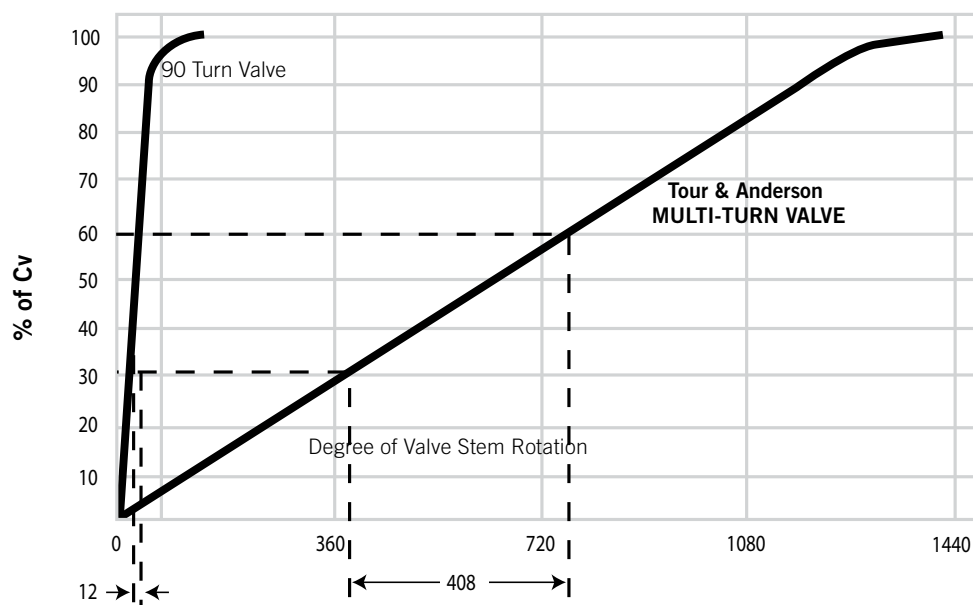
5 mm drain kit ½ – 2" TA Series 786 valves

## Comparison of balancing valve throttling characteristics

This curve illustrates the advantage of the four (4) turn adjustment available with Tour & Andersson balancing valves ( $\frac{1}{2}$  – 2"/15 – 50 mm). Valves 2  $\frac{1}{2}$ "/65 mm) and larger have 8, 12 or 16 turns.

A 90° fully open to closed valve requires just a 12° change in adjustment to equal 30% change of the flow.

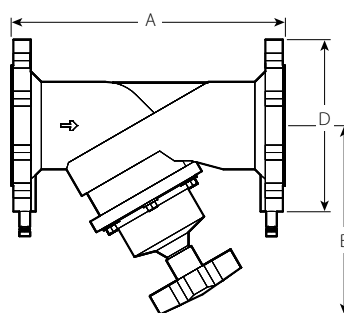
Tour & Andersson balancing valves would require a 408° change in adjustment to equal the same 30% change in the flow.



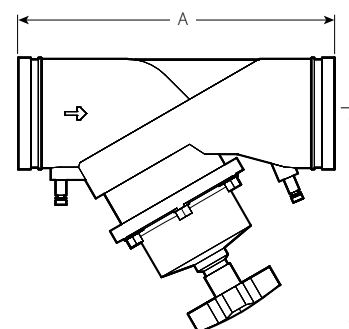
## Balancing Valve

**TA Series 788** Flanged End  
(Class 150 RF, ASME/ANSI B16.42)

**TA Series 789** Grooved End



TA Series 788  
Typical 2½–16"/65–400 mm sizes



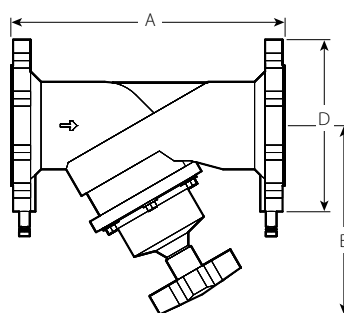
TA Series 789  
Typical 2½–12"/65–300 mm sizes

Size		TA Series 788 Flanged End (250 psi/1720 kPa) Balancing Valve			TA Series 789 Grooved End (350 psi/2400 kPa) Balancing Valve		
Nominal Size inches mm	Actual Outside Diameter inches mm	A End to End inches mm	B Center to Top inches mm	Approx. Weight Each Lbs. kg	A End to End inches mm	B Center to Top inches mm	Approx. Weight Each Lbs. kg
2½ 65	2.875 73.0	11.38 289	8.00 203	24.0 10.9	11.38 289	8.00 203	14.0 6.4
3 80	3.500 88.9	12.25 311	8.63 219	31.0 14.1	12.25 311	8.63 219	20.0 9.1
4 100	4.500 114.3	13.75 350	9.44 240	43.0 19.6	13.75 350	9.44 240	31.0 14.1
5 125	5.563 141.3	15.75 400	10.88 276	62.0 28.5	15.75 400	10.88 276	50.0 22.7
6 150	6.625 168.3	18.88 480	11.25 286	82.0 37.5	18.88 480	11.25 286	69.0 31.3
8 200	8.625 219.1	23.63 600	17.00 432	168.0 76.5	23.63 600	17.00 432	140.0 63.7
10 250	10.750 273.0	28.75 730	17.75 451	270.0 122.9	28.75 730	17.75 451	202.0 91.9
12 300	12.750 323.9	33.50 851	19.00 483	360.0 163.9	33.50 851	19.00 483	280.0 127.4
14 350	14.00 355.6	38.60 980	23.00 584	655 297	–	–	–
16 400	16.00 406.4	43.30 1100	25.20 640	895 406	–	–	–

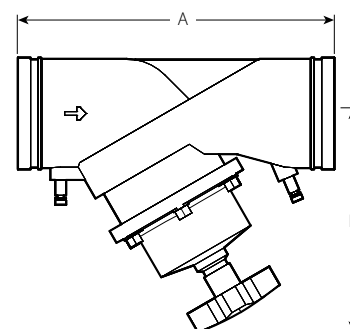
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**TA Series 789** Grooved End



TA Series 788  
Typical 2½–16"/65–400 mm sizes



TA Series 789  
Typical 2½–12"/65–300 mm sizes

## Valve Selection Guide:

Size		Flow Data for TA Series 788 & 789		
Nominal Size inches mm	Actual Outside Diameter inches mm	Absolute Min. Flow GPM LPM	Nominal Range of Flow GPM LPM	Absolute Max. Flow GPM LPM
2½ 65	2.875 73.0	1.4 5.3	38.0 – 100.0 144.0 – 379.0	290.0 1097.7
3 80	3.500 88.9	1.5 5.7	31.0 – 130.0 117.0 – 493.0	410.0 1551.9
4 100	4.500 114.3	1.9 7.2	68.0 – 200.0 257.0 – 757.0	650.0 2460.3
5 125	5.563 141.3	4.2 15.9	90.0 – 320.0 341.0 – 1211.0	1020.0 3860.7
6 150	6.625 168.3	5.0 18.9	182.0 – 450.0 689.0 – 1703.0	1430.0 5412.6
8 200	8.625 219.1	30.0 113.6	367.0 – 820.0 1389.0 – 3104.0	2600.0 9841.0
10 250	10.750 273.0	70.0 265.0	540.0 – 1300.0 2044.0 – 4921.0	4040.0 15291.4
12 300	12.750 323.9	115.0 435.3	960.0 – 1500.0 3634.0 – 5678.0	4950.0 18735.8
14 <sup>3</sup> 350	14.00 355.6	83.0 314.0	1020.0 – 2700.0 3861.0 – 10220.0	7414.0 28062.0
16 <sup>3</sup> 400	16.00 406.4	95.0 360.0	1330.0 – 3400.0 5034.0 – 12869.0	9371.0 35469.0

3 Only the TA Series 788 Flanged End Balancing Valves is available in 14-16" / 350-400mm sizes

### Important Notes (See page 5 for Balancing Accuracy):

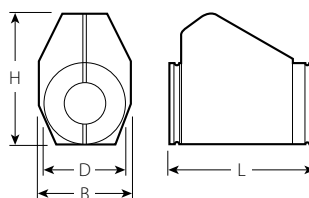
Balancing valves should be sized in accordance with the GPM/LPM flows (and not in relation to pipeline size). Sizing balancing valves based on the minimum or maximum flow rates is not recommended. Valves should be sized using the nominal flow rate only. The Minimum Flow is calculated from the minimum open setting of the valve and a minimum pressure drop 1 Ft. WG (= 3 kPa). The Nominal Flow is calculated from the maximum open setting of the valve and the minimum recommended pressure drop, 2 Ft. WG (= 6 kPa). The Maximum Flow is calculated from the maximum open setting of the valve and the maximum pressure drop, 20 Ft. WG (= 60 kPa). A computer program, TA-Select, is available for calculation of valve handwheel pre-set position and other applications.

Note: For information regarding Allen Wrench sizes see the Material Specifications section on page 3.

Note: For the most accurate results, a Series 734 TA SCOPE or Series 73M CMI should be used. However, any differential pressure meter may be used.

## Prefab Insulation

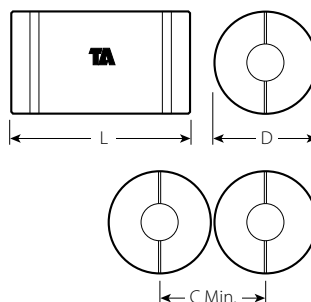
### TA Series 786 & TA Series 787



Valve Size inches mm	Part Code	Dimensions Inches/mm			
		H	D	B	L
1/2 & 3/4 15 & 20	K-004-784-INS	5.31 135	3.54 90	4.06 103	5.51 140
1 25	K-010-784-INS	5.59 142	3.70 94	4.06 103	6.30 160
1 1/4 32	K-012-784-INS	6.14 156	4.17 106	4.06 103	7.09 180
1 1/2 40	K-014-784-INS	6.65 169	4.25 108	4.45 113	8.43 214
2 50	K-020-784-INS	7.01 178	4.25 108	4.49 114	9.65 245

## Prefab Insulation

### TA Series 788 & TA Series 789

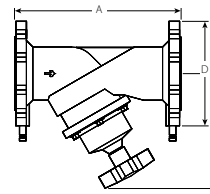


Valve Size inches mm	Part Code	Dimensions Inches/mm		
		H	D	B
2 1/2 65	K-024-784-INS	17.75 451	10.63 270	10.63 270
3 80	K-030-784-INS	19.00 483	11.44 291	11.44 291
4 100	K-040-784-INS	20.50 521	12.63 321	12.63 321
5 125	K-050-784-INS	22.50 572	13.75 349	13.75 349
6 150	K-060-784-INS	26.00 660	15.00 381	15.00 381

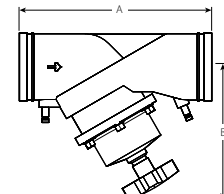
## C<sub>v</sub> Values for various handle settings

### TA Series 788/789

The values below or the graph on page 17 and 18 may be used when calculating and sizing a piping system.



TA Series 788



TA Series 789

Style	C <sub>v</sub> Values for Sizes listed below <sup>4</sup>									
No. of Turns	2 1/2"	3"	4"	5"	6"	8"	10"	12"	14" <sup>5</sup>	16" <sup>5</sup>
0.50	2.09	2.32	2.90	6.38	7.54	—	—	—	—	—
1.00	3.94	4.64	6.96	12.20	13.90	—	—	—	—	—
1.50	5.68	6.96	10.40	18.00	25.50	—	—	—	—	—
2.00	7.54	9.28	13.30	24.90	46.40	46.40	104.00	—	—	—
2.50	10.80	12.80	18.60	31.30	75.40	58.00	128.00	—	—	—
3.00	18.90	16.20	30.20	41.80	116.00	75.40	162.00	174.00	124.90	143.20
3.50	29.70	22.60	51.00	63.80	157.00	104.00	226.00	267.00	147.80	169.60
4.00	40.90	33.60	73.10	96.30	196.00	139.00	296.00	348.00	169.60	195.50
4.50	51.60	47.60	92.80	132.00	240.00	191.00	371.00	429.00	194.80	238.30
5.00	60.30	63.80	114.00	164.00	281.00	261.00	447.00	522.00	237.10	302.40
5.50	70.20	78.90	133.00	194.00	324.00	331.00	516.00	621.00	291.00	373.50
6.00	78.90	92.80	153.00	229.00	362.00	394.00	580.00	719.00	346.00	442.20
6.50	84.70	107.00	168.00	255.00	394.00	464.00	632.00	800.00	403.30	514.40
7.00	89.30	119.00	184.00	289.00	426.00	505.00	684.00	870.00	462.80	590.00
7.50	93.40	131.00	203.00	320.00	454.00	545.00	766.00	945.00	539.60	675.90
8.00	98.60 <sup>6</sup>	139.00 <sup>6</sup>	220.00 <sup>6</sup>	348.00 <sup>6</sup>	487.00 <sup>6</sup>	597.00	841.00	1032.00	637.00	779.00
9.00	—	—	—	—	—	690.00	951.00	1125.00	898.10	1024.20
10.00	—	—	—	—	—	754.00	1090.00	1206.00	1096.40	1306.00
11.00	—	—	—	—	—	824.00	1218.00	1299.00	1260.20	1432.00
12.00	—	—	—	—	—	887.00 <sup>6</sup>	1375.00 <sup>6</sup>	1392.00	1443.50	1603.90
13.00	—	—	—	—	—	—	—	1531.00	1626.80	1787.20
14.00	—	—	—	—	—	—	—	1589.00	1844.50	1981.90
15.00	—	—	—	—	—	—	—	1624.00	2016.30	2222.50
16.00	—	—	—	—	—	—	—	1682.00 <sup>6</sup>	2142.30	2451.60
17.00	—	—	—	—	—	—	—	—	2245.40	2612.00
18.00	—	—	—	—	—	—	—	—	2337.10	2760.90
19.00	—	—	—	—	—	—	—	—	2440.20	2898.40
20.00	—	—	—	—	—	—	—	—	2520.40 <sup>6</sup>	3013.00
21.00	—	—	—	—	—	—	—	—	—	3104.60
22.00	—	—	—	—	—	—	—	—	—	3184.80 <sup>6</sup>

<sup>4</sup> C<sub>v</sub> = GPM at a ΔP of 1 psi/7 kPa through the valve at any given setting.

1 psi = 2.31 ft. of H<sub>2</sub>O

<sup>5</sup> Only the TA Series 788 Flanged End Balancing Valve is available in 14-16" / 350-400mm sizes.

<sup>6</sup> Full open valve.



Diagram

**TA Series 788/789**  
**Sizes 2½ – 6"/60 – 150 mm**

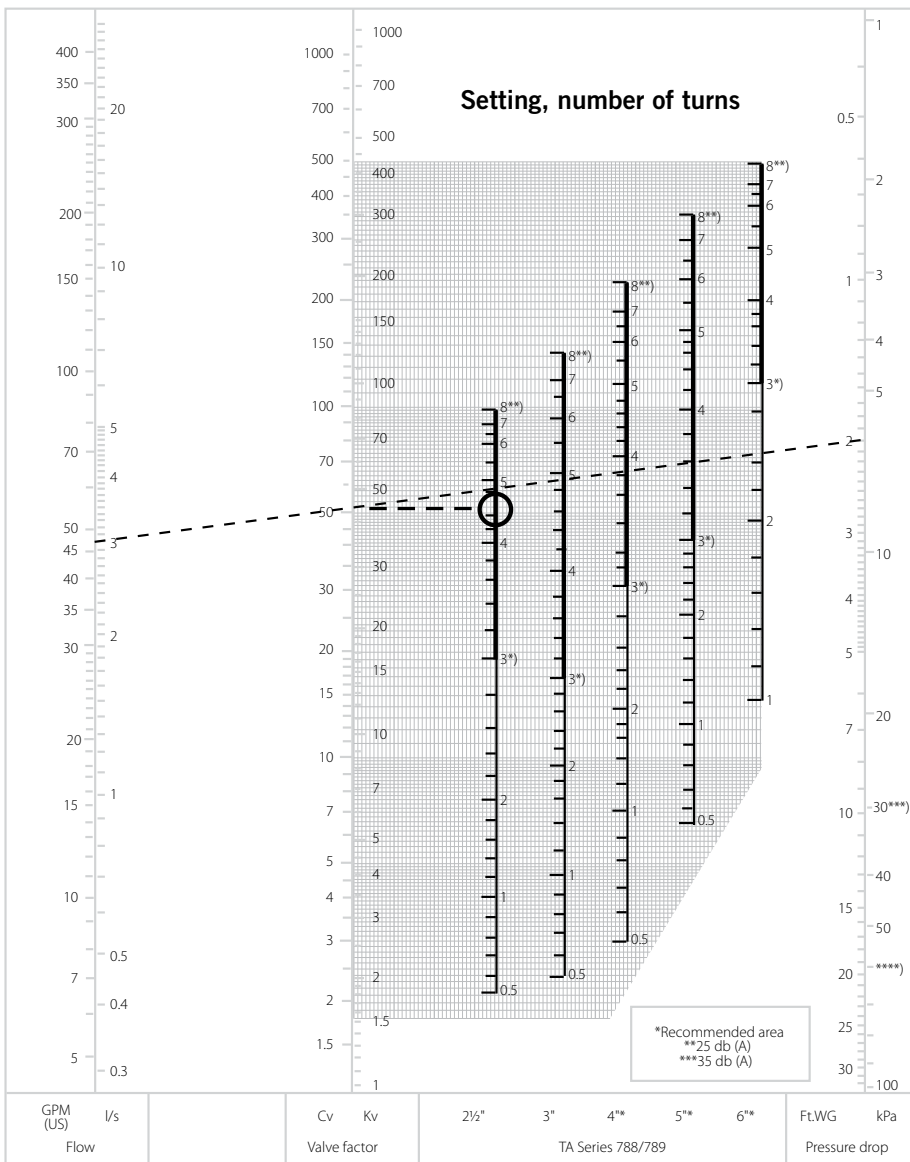
This graph shows the pressure drop across the pressure test points of the valve.

A straight line connecting the flow rate scale,  $C_v$  and pressure drop shows the relationship between these variables.

**Example:**

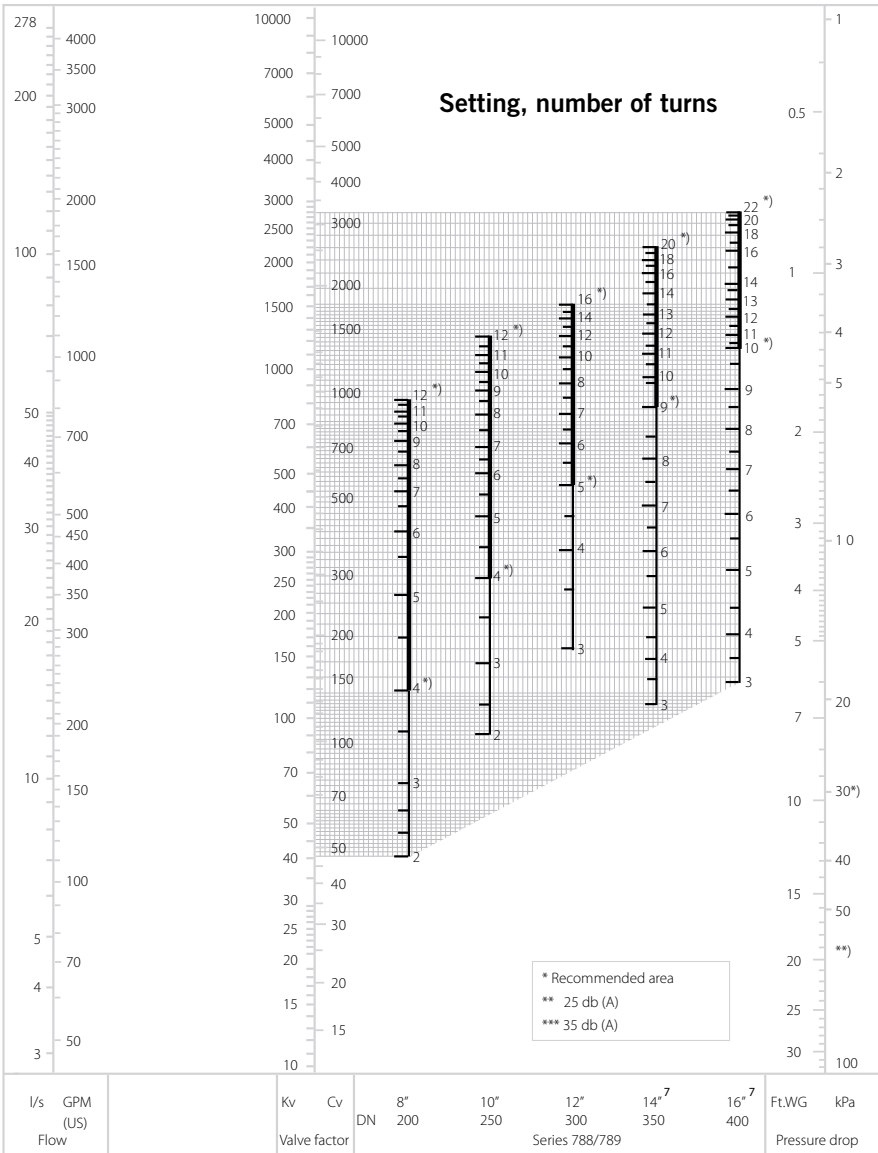
Wanted: Pre-setting for a TA Series 788 or TA Series 789 2½" at a desired flow rate of 47 GPM and a pressure drop of 2 ft. WG.

Solution: Draw straight line joining 47 GPM and 2 ft. WG. This gives  $C_v = 50$ . Now draw a horizontal line from  $C_v = 50$ . This intersects the flow rate scale for Series 788 2½" at the desired pre-setting of 4.5 turns.



Diagram

TA Series 788/789  
Sizes 8 – 16"/200 – 400 mm



7 Only the TA Series 788 Flanged End Balancing Valve is available in 14-16" / 350-400mm sizes.

## Typical Specifications:

### SERIES 78K – (½ – 2" M x F)

#### TA SERIES 786 STAS – (½ – 2" SOLDER WITH DIGITAL HAND WHEEL)

#### TA SERIES 787 STAD – (½ – 2" NPT)

Furnish and install, as shown on the job plans, TA Series 786/787 Balancing Valves with provision for connecting a portable differential (Ft. of Head) pressure meter. Each meter shall have pressure/temperature probes.

The balancing valves shall be Y-pattern globe style design and all metal parts of nonferrous, pressure die cast, nonporous Ametal. Each valve shall provide four (4) functions:

- (1) Precise flow measurement, (2) Precision flow balancing, (3) Positive shut-off with no drip seat, eliminating the need of an additional isolation valve,
- (4) Drain connection using 3/4 " NPT hose end thread.

These valves shall have four (4) 360° adjustment turns of the handwheel for precise setting with hidden memory to provide a tamper-proof balancing setting. Handwheel shall have digital readout. The handwheel can be installed in any position without affecting performance.

#### TA SERIES 788 STAF – (2 ½ – 12" FLANGED WITH DIGITAL HAND WHEEL)

#### TA SERIES 789 STAG – (2 ½ – 12" GROOVED WITH DIGITAL HAND WHEEL)

Furnish and install, as shown on the job plans, TA Series 788/789 Balancing valves with provision for connecting a portable differential (Ft. of Head) pressure meter. Each meter connection shall have pressure/temperature probes.

The balancing valves shall be Y-pattern globe style design with ductile iron body all other wetted parts of nonferrous, pressure die cast Ametal. Each valve shall provide three (3) functions:

- (1) Precision flow measurement, (2) Precision flow balancing, (3) Shut-off feature, eliminating the need of an additional isolation valve.

These valves shall have eight (8), twelve (12), sixteen (16) or twenty-two (22) 360° adjustment turns of the handwheel for precise setting with hidden memory feature to program the valve with precision tamper-proof balancing setting. Handwheel shall have digital readout. The handwheel can be installed in any position without affecting performance.

#### TA Balancing Valves ½" through 2":

300 psi/2065 kPa, y-pattern, globe type with soldered or threaded ends, non-ferrous Ametal® brass copper alloy body, EPDM o-ring seals. 4-turn digital readout handwheel for balancing, hidden memory feature with locking tamper-proof setting, and connections for portable differential meter. TA Series 786 STAS or 787 STAD.

#### TA Balancing Valves 2 ½" through 16":

250 psi / 1725 kPa (TA Series 788) 350 psi / 2400 kPa (TA Series 789), y-pattern, globe type with flanged or grooved ends, ASTM A536 ductile iron body, all other metal parts of Ametal® brass copper alloy, EPDM O-ring seals. 8, 12, 16, 20 or 22 turn digital readout handwheel for balancing, hidden memory feature with locking tamper-proof setting, and connections for portable differential meter. TA Series 788 STAF or 789 STAG.

Purchased TA CBI-II or TA CMI balancing instruments are to be left with the project owner upon completion of the project.

#### Balancing Meter:

If a balancing meter is required to be left with the owner after commissioning, the balancing meter shall be from the same provider as the balancing valves, Victaulic/Tour and Andersson. The Series 734 TA-Scope, or TA Series 73M CMI Pressure Differential Meter are acceptable and are manufactured by Tour and Andersson. Needle gauge type meters will not be allowed.

#### INSULATION:

For insulation against heat loss or condensation. Preformed rigid polyurethane insulation is available for ½ – 2" TA Series 786/787 valves and for 2 ½ – 6" TA Series 788/789 valves.

#### Installation

Reference should always be made to the current TA Hydronics installation/assembly instructions for the product you are installing. For coupling and strainer installation, reference should always be made to the [I-100 Victaulic Field Installation Handbook](#) for the product you are installing. Handbooks are included with each shipment of Victaulic products for complete installation and assembly data, and are available in PDF format on our website at [www.victaulic.com](http://www.victaulic.com)

#### Warranty

Refer to the Warranty section of the current Price List or contact Victaulic for details.

#### Note

This product shall be manufactured by Victaulic or to Victaulic specifications. Victaulic recommends all products to be installed in accordance with current TA Hydronics installation/assembly instructions. Victaulic and TA Hydronics reserve the right to change product specifications, designs and standard equipment without notice and without incurring obligations.

#### Trademarks

Victaulic® is a registered trademark of Victaulic Company.