

TBV Terminal Balancing and Control Valves

Series TC – On/Off Control

Series TCM – Modulating Control



TBV without actuator



TBV with EMO T actuator



TBV with TA Slider 160 actuator

1.0 PRODUCT DESCRIPTION

Available Sizes

- ½ – 1"/DN15 – DN25

Maximum Working Pressure

- 230 psi/1586 kPa/16 bar

Operating Temperature Range

- –4°F to +250°F/–20°C to +120°C

Application

- Hydronic heating and cooling systems

Function

- Control
 - On/Off (Series TC only)
 - Modulating (Depending on actuation) (Series TCM only)
 - Digitally configurable with proportional control (With TA Slider 160 Family only)
 - With optional TA Slider fail-safe actuators, the Series TC/TCM valves can be programmed to return to any given position (full open, full closed, or anywhere in the travel) on loss of power
- Balancing via pre-setting (max. flow)
- Measuring (ΔH , T, q)
- Shut-off

2.0 CERTIFICATION/LISTINGS

Not applicable – contact Victaulic with any questions.

ALWAYS REFER TO ANY NOTIFICATIONS AT THE END OF THIS DOCUMENT REGARDING PRODUCT INSTALLATION, MAINTENANCE OR SUPPORT.

3.0 SPECIFICATIONS – MATERIAL

Series TC Terminal Balancing Valve for On/Off Control

Body: Non-ferrous AMETAL® DZR brass copper alloy

Spindle Seal: EPDM O-ring

Seat Seal: EPDM O-ring

Valve Insert: Non-ferrous AMETAL® DZR brass copper alloy, polyphenylsulphide (PPS)

Return Spring: Stainless steel

Spindle: Nedox® coated AMETAL®

Nipple: Non-ferrous AMETAL® DZR brass copper alloy

Valve Plug: Polyphenylsulphide (PPS)

Series TCM Terminal Balancing Valve for Modulating Control

Body: Non-ferrous AMETAL® DZR brass copper alloy

Spindle Seal: EPDM O-ring

Seat Seal: EPDM O-ring

EPDM/Stainless steel: ½ – ¾"/DN15 – DN20

EPDM/AMETAL®: 1"/DN25

Valve Insert: Non-ferrous AMETAL® DZR brass copper alloy, polyphenylsulphide (PPS)

Return Spring: Stainless steel

Spindle: Nedox® coated AMETAL®

Valve Plug: Polyphenylsulphide (PPS)

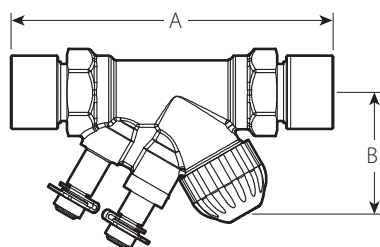
NOTES

- AMETAL® is the dezincification-resistant brass alloy of IMI TA.
- Body material shall be ISO 6509 compliant.

4.0 DIMENSIONS

Series TC Terminal Balancing Valve for On/Off Control

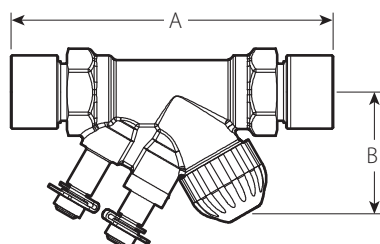
Female x Female Threaded



Size		Dimensions		Weight
Nominal inches DN	Actual Outside Diameter inches mm	A End to End inches mm	B inches mm	Approximate (Each) lb kg
½ DN15	0.840 21.3	5 127	2.3 58	0.7 0.3
¾ DN20	1.050 26.7	5.4 137	2.2 57	1.1 0.5
1 DN25	1.315 33.7	6.4 163	2.5 64	1.6 0.7

Series TCM Terminal Balancing Valve for Modulating Control

Female x Female Threaded



Size		Dimensions		Weight
Nominal inches DN	Actual Outside Diameter inches mm	A End to End inches mm	B inches mm	Approximate (Each) lb kg
½ DN15	0.840 21.3	5 127	2.3 58	0.7 0.3
¾ DN20	1.050 26.7	5.4 137	2.2 57	0.8 0.4
1 DN25	1.315 33.7	6.4 163	2.5 64	1.5 0.7

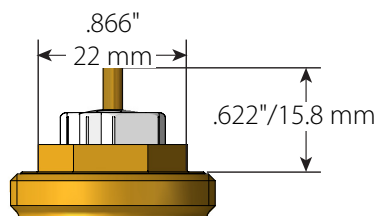
5.0 PERFORMANCE

The Series TC and TCM valves are designed to work together with the EMO or TA Slider 160 actuator families. For the Series TC, this includes the EMO T Normally Open, the EMO T Normally Closed, and the TA Slider 160 Family. For the Series TCM, this includes the EMO TM, the EMO 1 (mechanical proportional actuator for 0-10 V signals) the EMO 3 (mechanical three-point actuator for 24 V AC signals), and the TA Slider 160 Family.

Actuators of other brands require a working range of:

- $\frac{1}{2} - \frac{3}{4}$ " X (closed - fully open) = 0.46 – 0.62"/11.7 – 15.7 mm
- 1 – 1 $\frac{1}{4}$ " X (closed - fully open) = 0.40 – 0.66"/10.1 – 16.8 mm

Closing force: Minimum 28 lbf (maximum 112 lbf) for $\frac{1}{2} - \frac{3}{4}$ "; Minimum 43 lbf for 1 – 1 $\frac{1}{4}$ " (maximum 112 lbf)



IMA TA and Victaulic will not be held responsible for the control function if actuators other than the EMO T, EMO TM, EMO 1, EMO 3 or TA Slider 160 Family are used.

Actuation Speed	
Control Valve	Actuator Travel Speed seconds/mm
EMO T	Approx. 4-minute cycle
EMO TM	30 s/mm
EMO 1	25 s/mm
EMO 3	70 s/mm – 50 Hz
	56 s/mm – 60 Hz
TA Slider 160 Family	10 s/mm

NOTE

- The Series TC and Series TCM valves have 4 mm of travel.

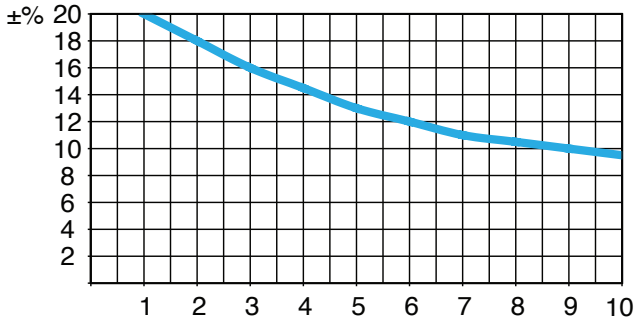
5.1 PERFORMANCE

Measuring Accuracy

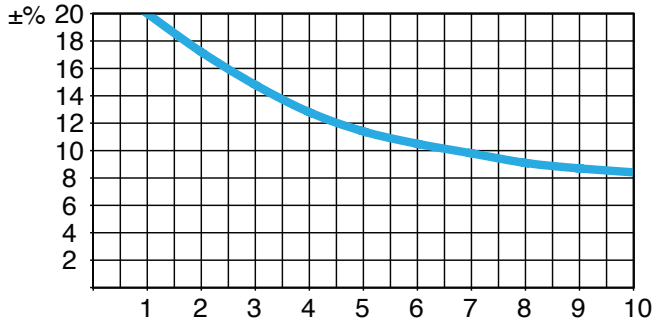
Maximum flow deviation at different settings

Series TCM LF

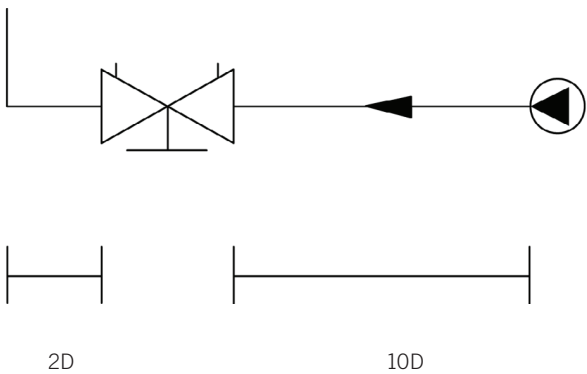
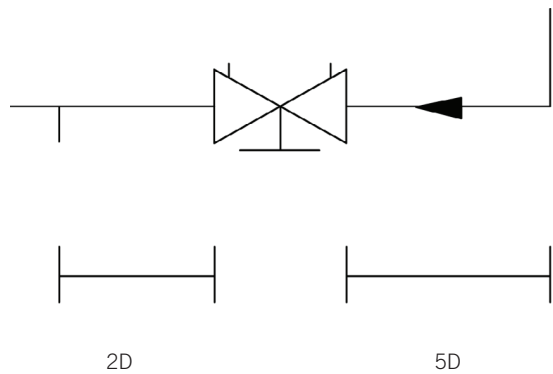
½" size only



Series TCM NF



Try to avoid mounting taps and pumps immediately before the valve.



5.2 PERFORMANCE

Sizing

Series TC and Series TCM

When Δp and the design flow rate are known, use the formula shown to calculate the design C_v value.

$$C_v = q / \sqrt{\Delta p} \quad K_v = Q / \sqrt{\Delta p}$$

q in GPM, Δp in psi Q in m³/hr, Δp in bar

Recommended setting position is between 3-10.

Series	Flow Rating Per Valve Position	Position									
		1	2	3	4	5	6	7	8	9	10
TC LF ½"	C_v/K_v	0.06	0.17	0.26	0.30	0.36	0.48	0.61	0.79	0.86	1.04
		0.06	0.15	0.23	0.26	0.31	0.42	0.53	0.68	0.71	0.90
TC NF ½"	C_v/K_v	0.26	0.38	0.52	0.58	0.70	0.95	1.15	1.28	1.62	2.09
		0.23	0.33	0.45	0.50	0.61	0.82	1.00	1.11	1.40	1.81
TC NF ¾"	C_v/K_v	0.46	0.61	0.78	0.95	1.16	1.51	1.97	2.78	3.48	3.94
		0.40	0.40	0.68	0.82	1.00	1.31	1.70	2.40	3.00	3.40
TC NF 1"	C_v/K_v	0.93	1.16	1.51	1.97	2.55	3.25	4.06	5.57	7.08	8.35
		0.81	1.00	1.31	1.70	2.20	2.81	3.50	4.81	6.11	7.20

Series	Flow Rating Per Valve Position	Position									
		1	2	3	4	5	6	7	8	9	10
TCM LF ½"	C_{vMAX}/K_{vMAX}	0.06	0.19	0.24	0.27	0.29	0.34	0.36	0.38	0.41	0.46
		0.06	0.17	0.21	0.24	0.25	0.30	0.31	0.33	0.36	0.40
TCM NF ½"	C_{vMAX}/K_{vMAX}	0.27	0.37	0.49	0.52	0.64	0.73	0.84	0.90	1.03	1.16
		0.24	0.32	0.43	0.45	0.56	0.63	0.73	0.78	0.89	1.00
TCM NF ¾"	C_{vMAX}/K_{vMAX}	0.44	0.55	0.73	0.87	1.08	1.28	1.39	1.74	2.20	2.32
		0.38	0.48	0.63	0.75	0.93	1.11	1.20	1.50	1.90	2.00
TCM NF 1"	C_{vMAX}/K_{vMAX}	0.93	1.28	1.62	1.97	2.44	2.90	3.25	3.71	4.29	4.64
		0.81	1.11	1.40	1.70	2.11	2.50	2.81	3.20	3.70	4.00

NOTE

- C_{vMAX} = gpm at a pressure drop of 1 psi at each pre-setting and fully open valve plug.

Correction Factors

The flow calculations are valid for water (68°F/20°C). For other liquids with approximately the same viscosity as water (≤ 20 cSt = $3^\circ E = 100$ S.U.), it is only necessary to compensate for the specific density. However, at low temperatures, the viscosity increases and laminar flow may occur in the valves. This causes a flow deviation that increases with small valves, low settings and low differential pressures. Correction for this deviation can be made with the software HySelect or directly in IMI TA's balancing instruments. The TA Series 734 scope balancing instrument or the HyTools app may be used to convert differential pressure measurements to flow rates based on valve position.

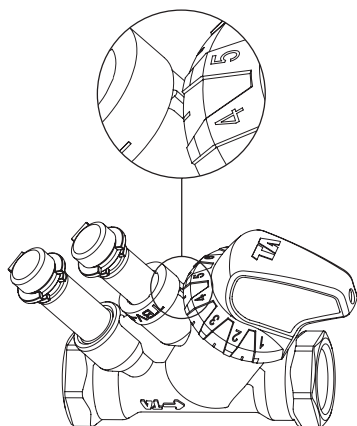
5.3 PERFORMANCE

Setting

Series TC and TCM are delivered with a red protective cap and the pre-setting fully open. The setting of a valve for a given pressure drop, e.g. corresponding to position 5, is done as follows:

1. Place the pre-setting tool at the valve.
2. Turn the pre-setting tool so that position 5 is pointing at the index of the valve body.
3. Remove the pre-setting tool. The valve is now set.

There is a diagram for every valve size that shows the flow for different pressure drops and settings.



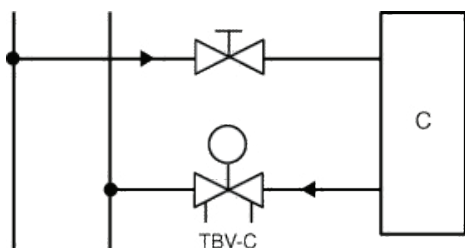
Series TC and Series TCM

5.4 PERFORMANCE

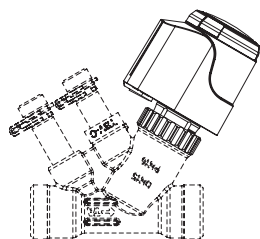
Installation

Application Example

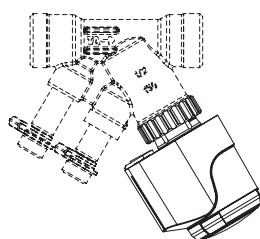
Series TC



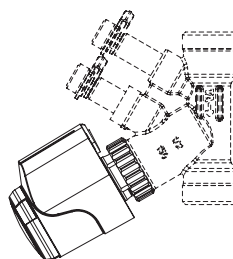
Series TC + EMO T (Normally Open or Normally Closed) or TA Slider 160 Family Actuators



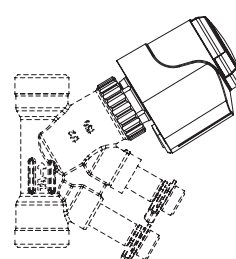
IP54 for EMO T
& TA Slider 160 Family



IP54 for EMO T
& TA Slider 160 Family¹

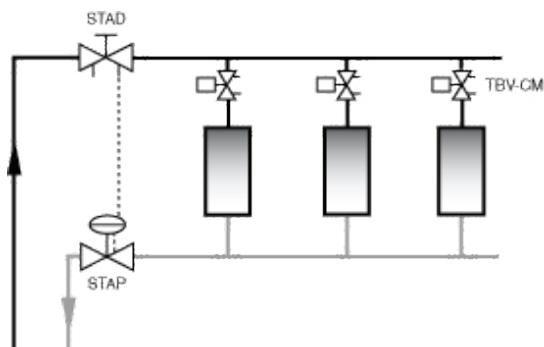


IP54 for EMO T
& TA Slider 160 Family

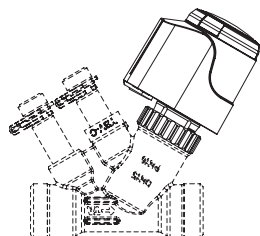


IP54 for EMO T
& TA Slider 160 Family

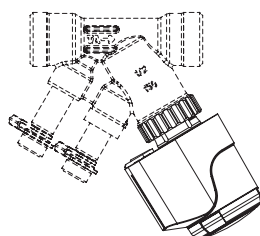
Series TCM



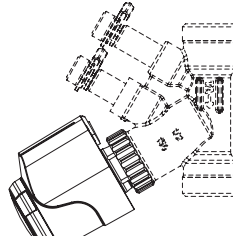
Series TCM + EMO TM, EMO 1, EMO 3 or TA Slider 160 Family Actuators



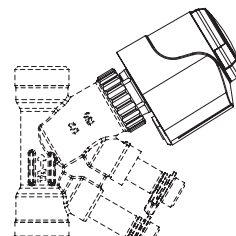
IP54 for EMO TM
& TA Slider 160 Family
IP 43 for EMO 1 & EMO 3



IP54 for EMO TM
& TA Slider 160 Family¹
Not allowed for EMO 1 & EMO 3



IP54 for EMO TM
& TA Slider 160 Family
Not allowed for EMO 1 & EMO 3



IP54 for EMO TM
& TA Slider 160 Family
IP42 for EMO 1 & EMO 3

¹ For chilled water applications, the valve and surrounding pipe should be insulated to prevent condensation from dripping onto actuator.

NOTES

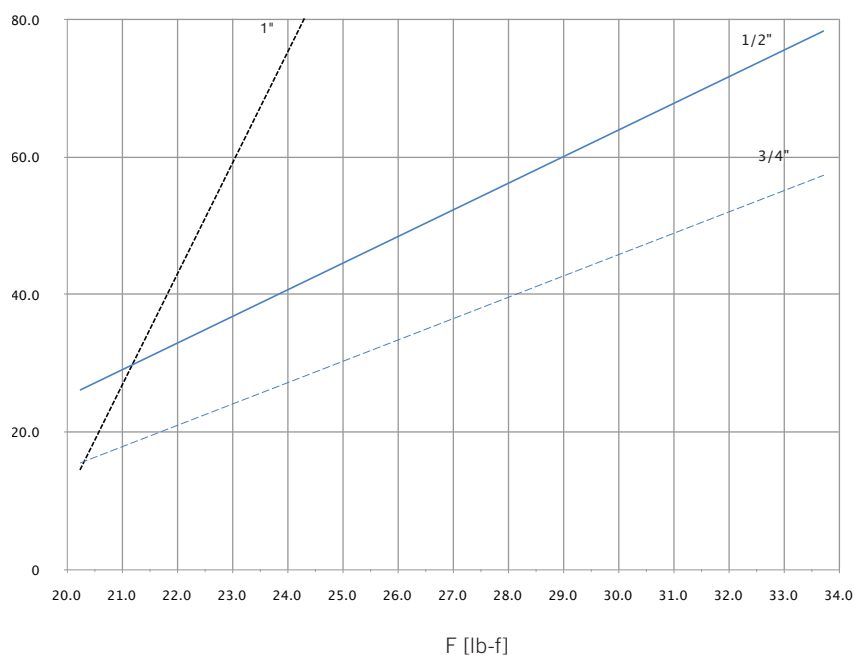
- Actuator IP54 at any position. CE approved as well.
- IP54 - dust protected water splashing okay. (NEMA 3 rating applicable)

5.5 PERFORMANCE

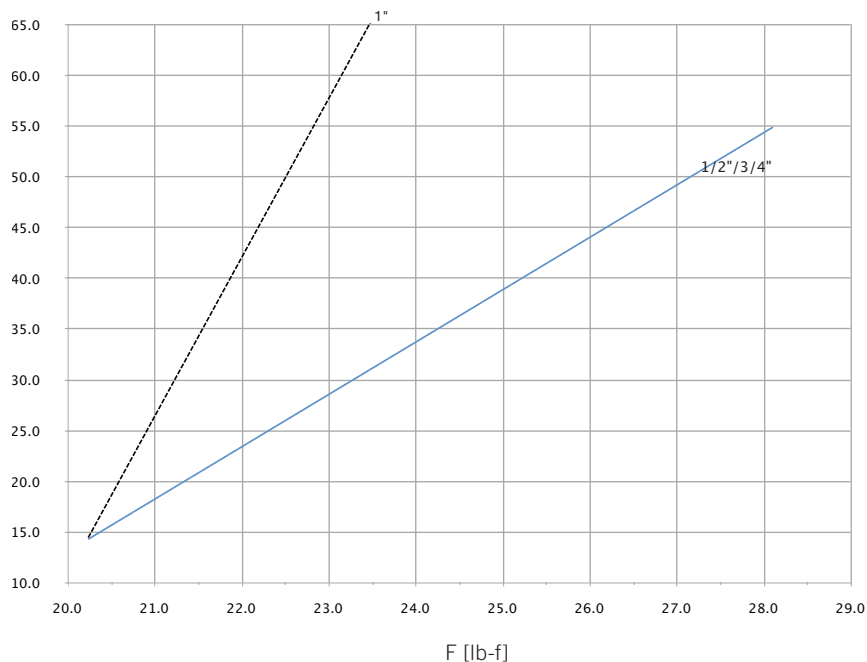
Operating Torque

Necessary force (F) to close the valve vs. the differential pressure (Δp)

Series TC – On/Off Control



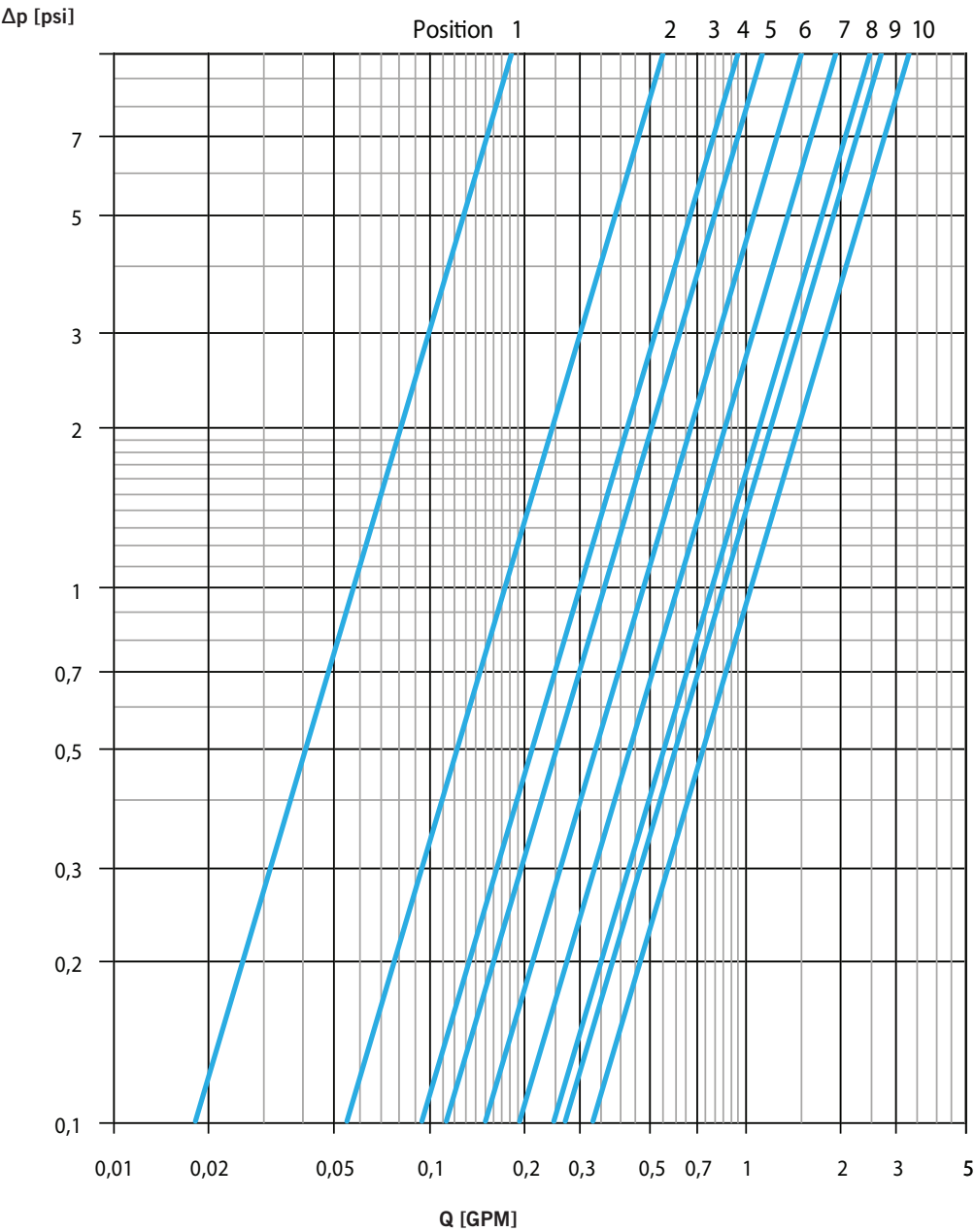
Series TCM – Modulating Control



5.5 PERFORMANCE (CONTINUED)

Diagram

Series TC LF 1/2"



Position	1	2	3	4	5	6	7	8	9	10
C_v	0.06	0.17	0.26	0.30	0.36	0.48	0.61	0.79	0.86	1.04
K_v	0.06	0.15	0.23	0.26	0.31	0.42	0.53	0.68	0.71	0.90

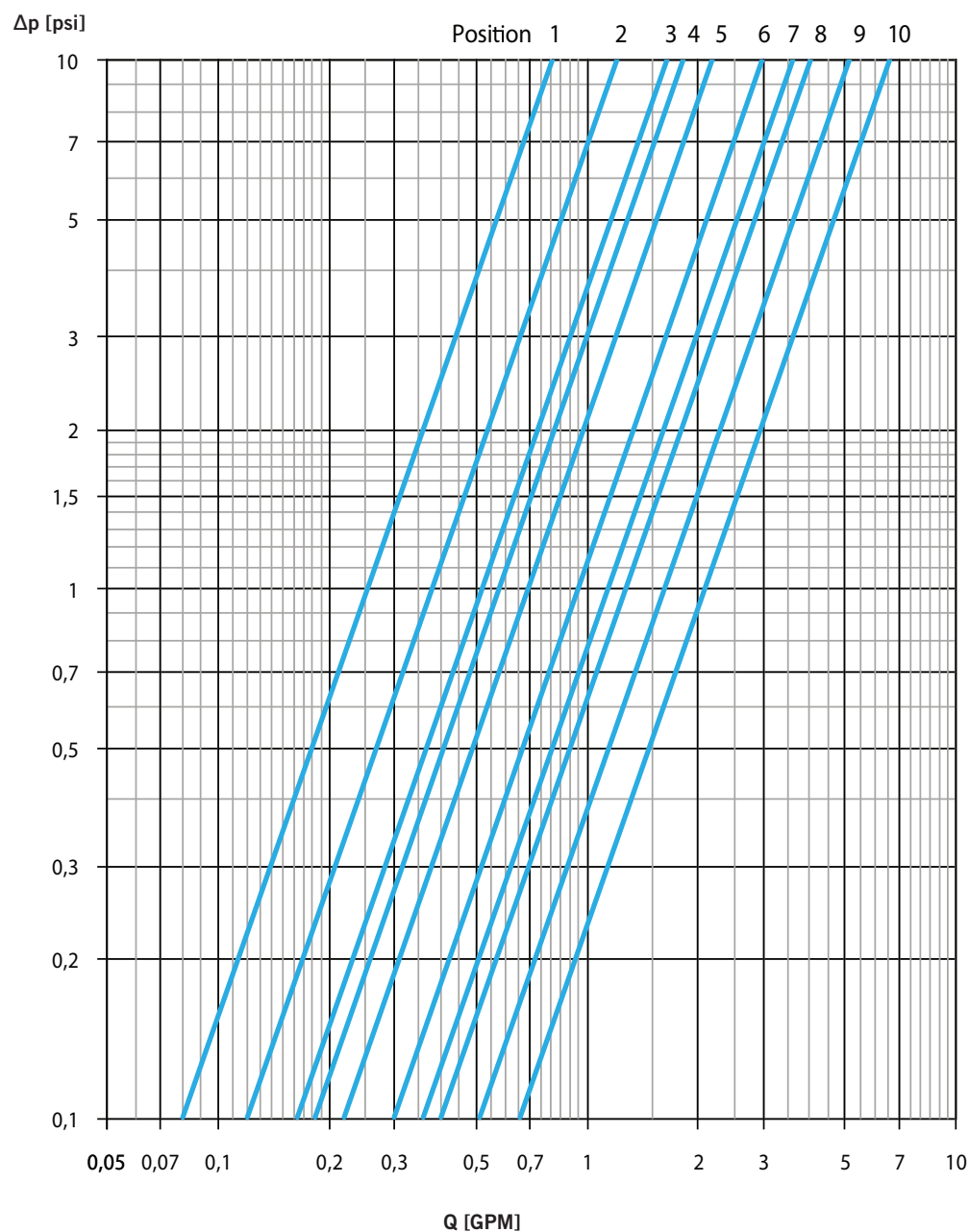
NOTE

- The recommended setting position is between 3-10.

5.5 PERFORMANCE (CONTINUED)

Diagram

Series TC NF ½"



Position	1	2	3	4	5	6	7	8	9	10
C_v	0.26	0.38	0.52	0.58	0.70	0.95	1.15	1.28	1.62	2.09
K_v	0.23	0.33	0.45	0.50	0.61	0.82	1.00	1.11	1.40	1.81

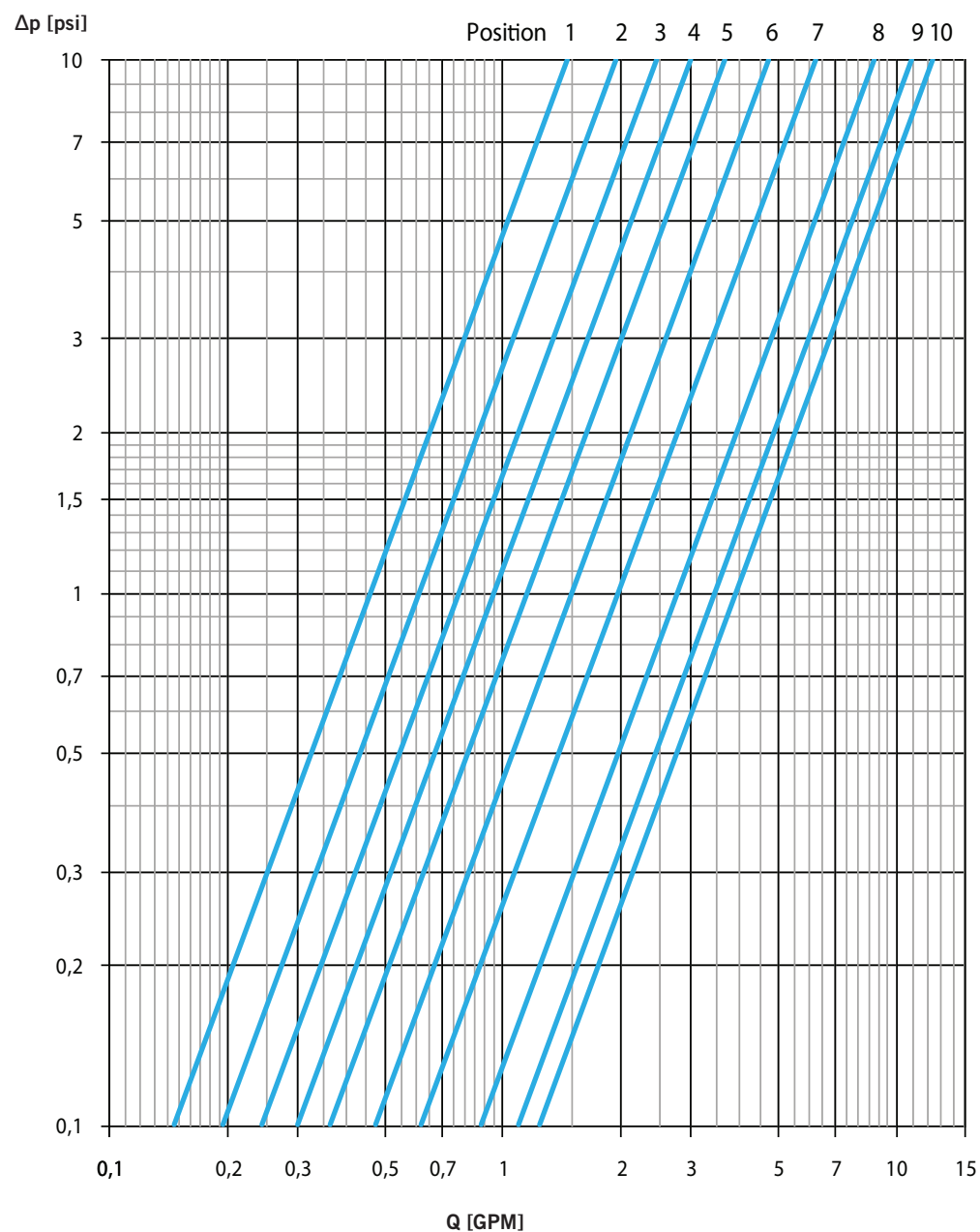
NOTE

- The recommended setting position is between 3-10.

5.5 PERFORMANCE (CONTINUED)

Diagram

Series TC NF ¾"



Position	1	2	3	4	5	6	7	8	9	10
C_v	0.46	0.61	0.78	0.95	1.16	1.51	1.97	2.78	3.48	3.94
K_v	0.40	0.53	0.68	0.82	1.00	1.31	1.70	2.40	3.00	3.40

NOTE

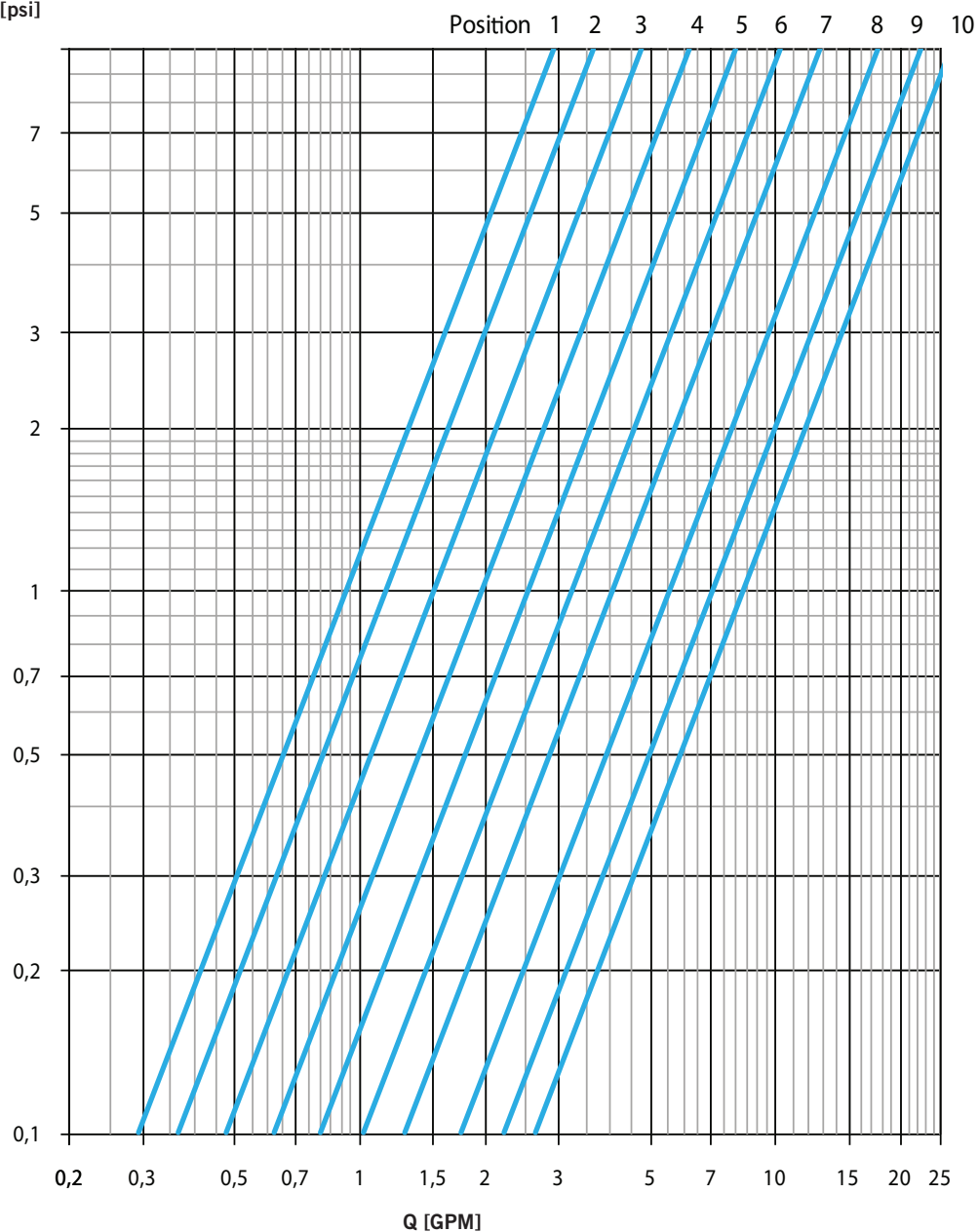
- The recommended setting position is between 3-10.

5.5 PERFORMANCE (CONTINUED)

Diagram

Series TC NF 1"

Δp [psi]



Position	1	2	3	4	5	6	7	8	9	10
C_v	0.93	1.16	1.51	1.97	2.55	3.25	4.06	5.57	7.08	8.35
K_v	0.81	1.00	1.31	1.70	2.20	2.81	3.50	4.81	6.11	7.20

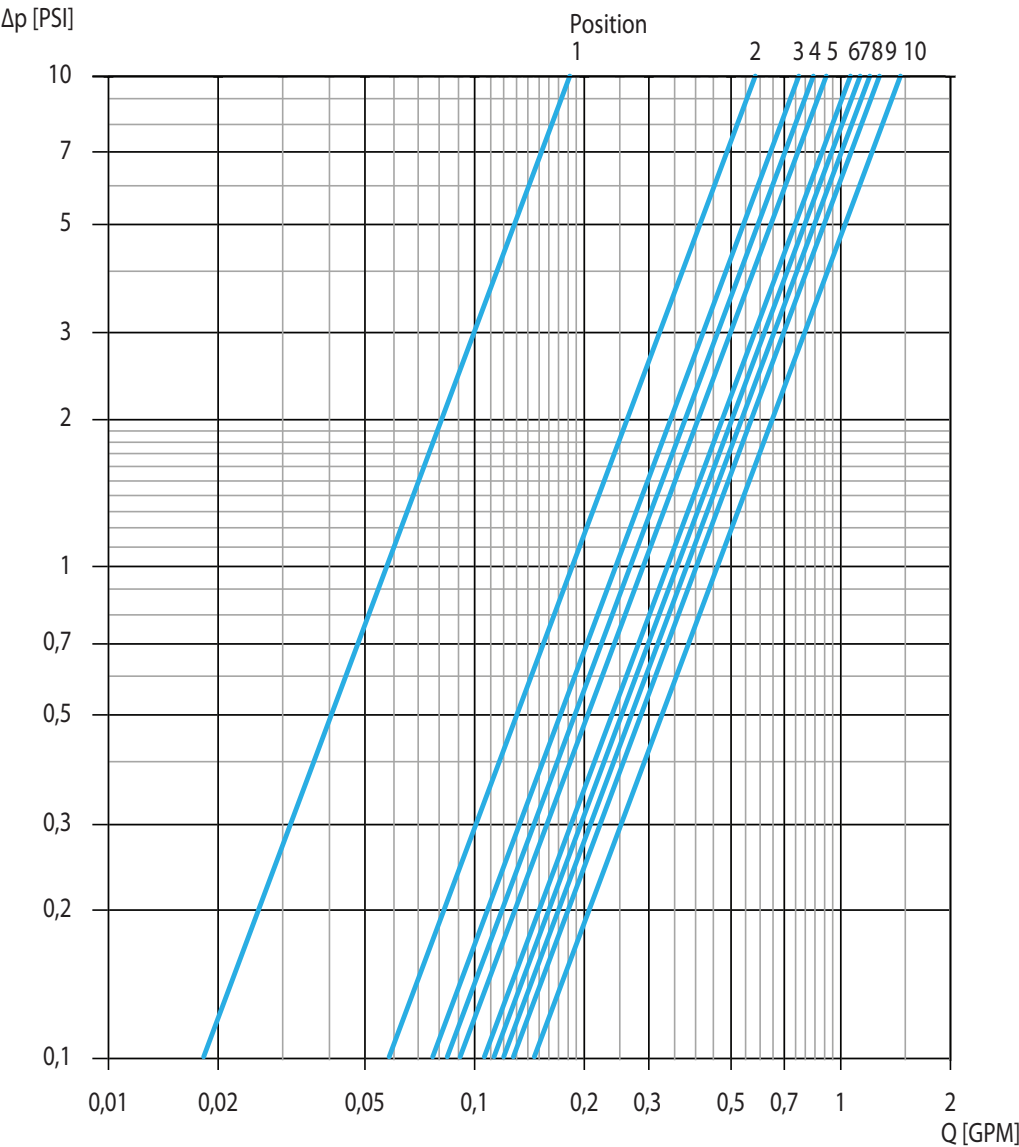
NOTE

- The recommended setting position is between 3-10.

5.5 PERFORMANCE (CONTINUED)

Diagram

Series TCM LF 1/2"



Position	1	2	3	4	5	6	7	8	9	10
$C_{V\text{ MAX}}$	0.06	0.19	0.24	0.27	0.29	0.34	0.36	0.38	0.41	0.46
K_v	0.06	0.17	0.21	0.24	0.25	0.30	0.31	0.33	0.36	0.40

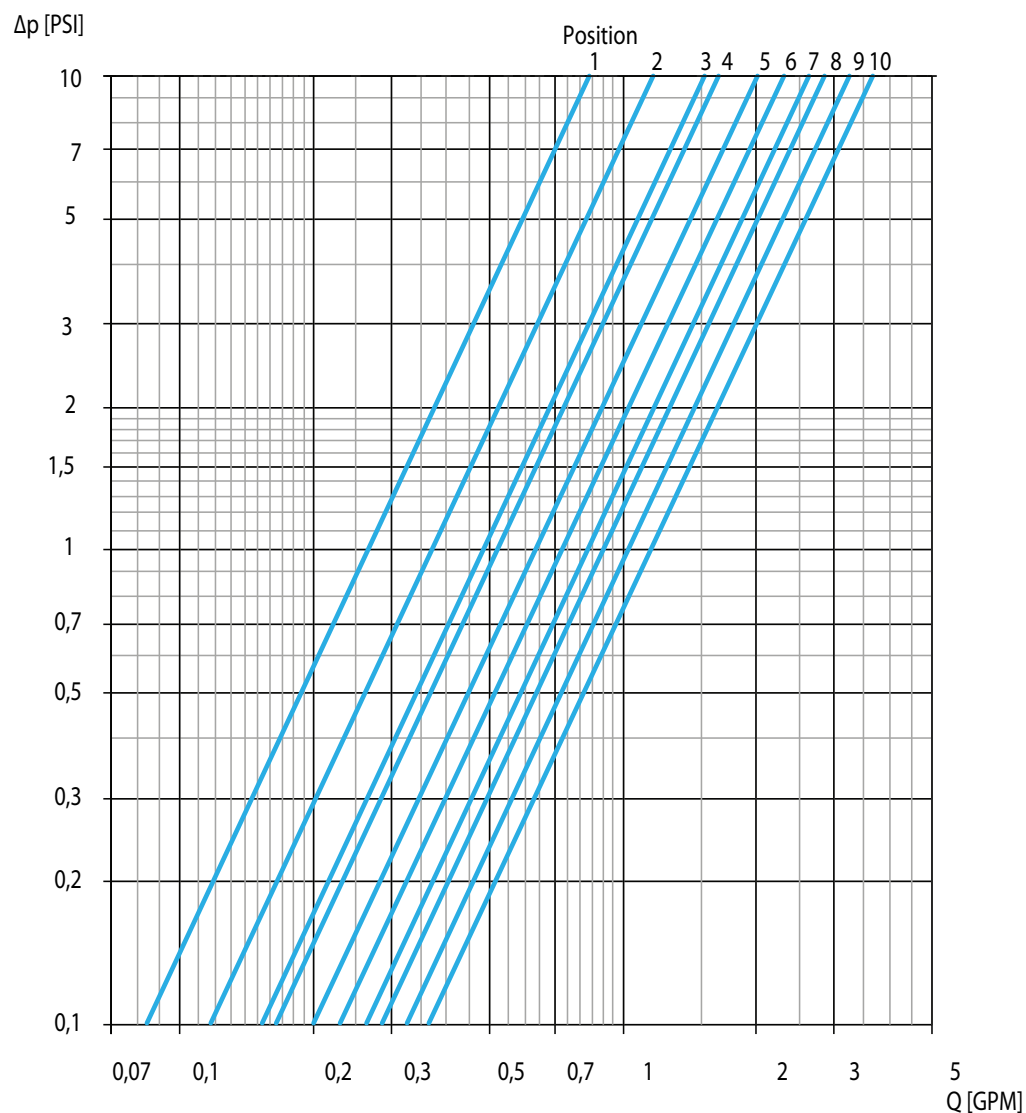
NOTE

- The recommended setting position is between 3-10.

5.5 PERFORMANCE (CONTINUED)

Diagram

Series TCM NF ½"



Q [GPM]

Position	1	2	3	4	5	6	7	8	9	10
$C_{V\text{ MAX}}$	0.27	0.37	0.49	0.52	0.64	0.73	0.84	0.90	1.03	1.16
K_v	0.24	0.32	0.43	0.45	0.56	0.63	0.73	0.78	0.89	1.00

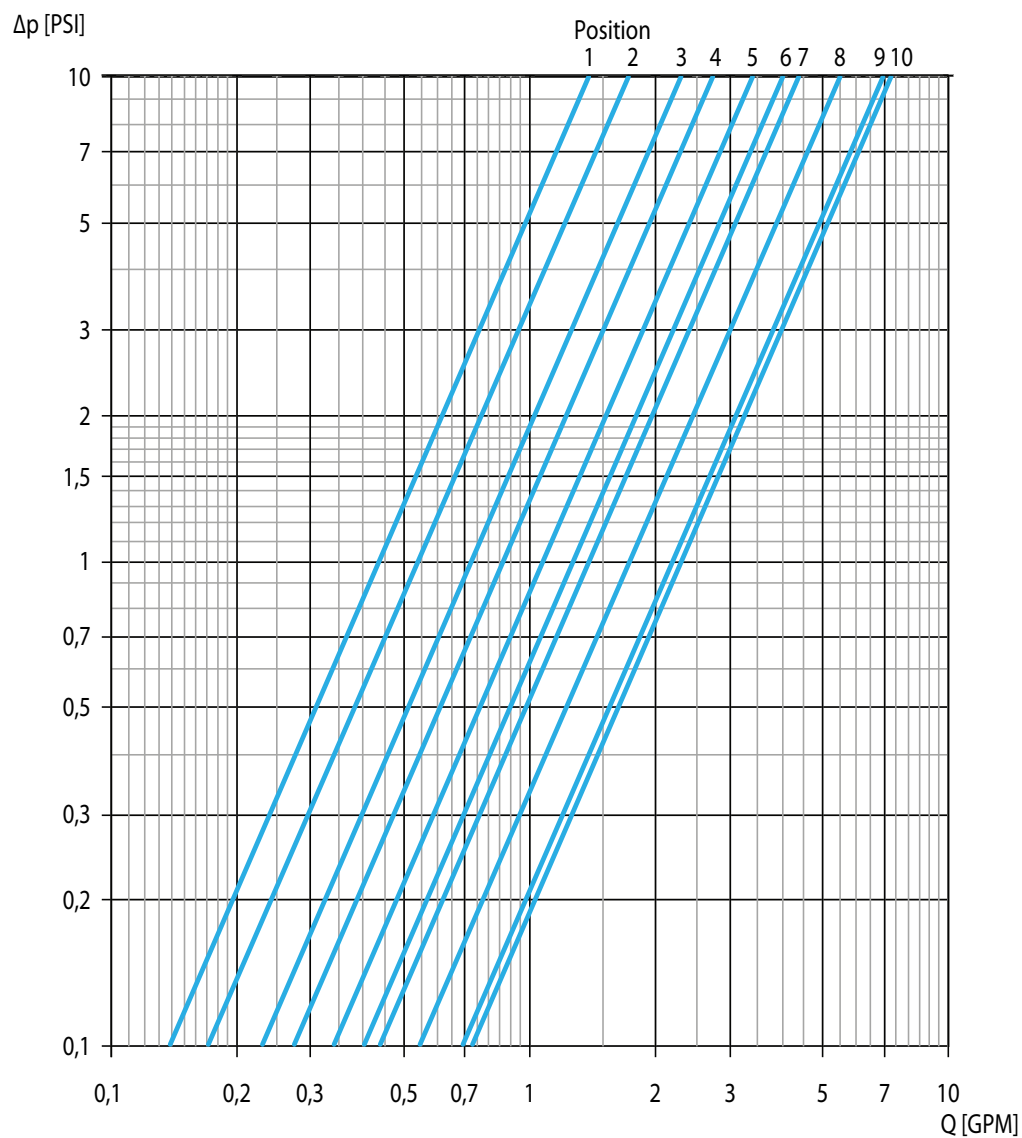
NOTE

- The recommended setting position is between 3-10.

5.5 PERFORMANCE (CONTINUED)

Diagram

Series TCM NF 3/4"



Q [GPM]

Position	1	2	3	4	5	6	7	8	9	10
$C_{V\text{ MAX}}$	0.44	0.55	0.73	0.87	1.08	1.28	1.39	1.74	2.20	2.32
K_v	0.38	0.48	0.63	0.75	0.93	1.11	1.20	1.50	1.90	2.00

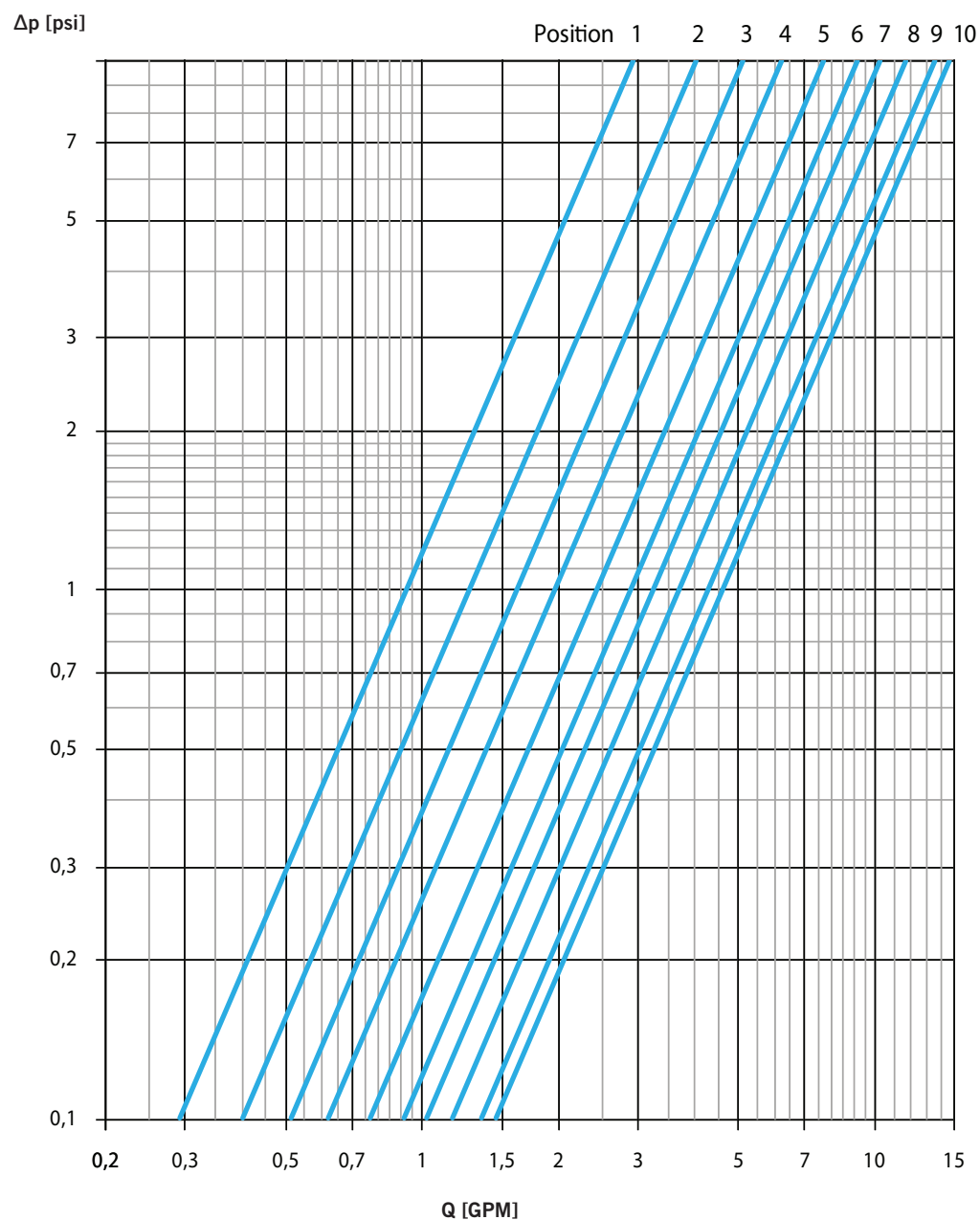
NOTE

- The recommended setting position is between 3-10.

5.5 PERFORMANCE (CONTINUED)

Diagram

Series TCM NF 1"



Position	1	2	3	4	5	6	7	8	9	10
$C_{V\text{ MAX}}$	0.93	1.28	1.62	1.97	2.44	2.90	3.25	3.71	4.29	4.64
K_v	0.81	1.11	1.40	1.70	2.11	2.50	2.81	3.20	3.70	4.00

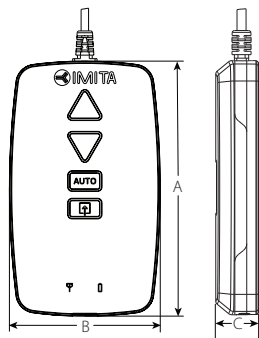
NOTE

- The recommended setting position is between 3-10.

5.6 PERFORMANCE

Accessories

Dongle

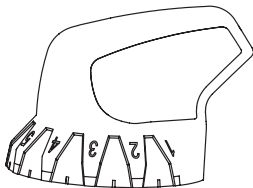


Size			Part Code
A	B	C	
inches mm	inches mm	inches mm	
5.12 130	3.03 77	0.71 18	P0007MPDON

NOTE

- The TA Dongle is available for use with the TA Slider 160 actuators only. The dongle is used to field program and interface with these actuators.

Presetting Tool



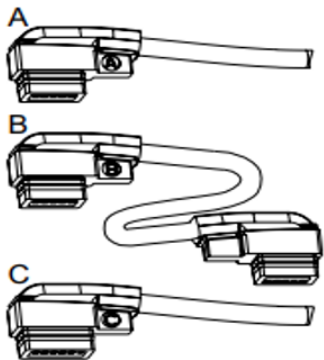
The presetting tool (part code R000TBV000) is sold separately.

Measuring Nipple



Description	Length	Part Code
	in mm	
Measuring Nipple Can be installed without draining the system	2.36 60	K000740012

Daisy Chain Cable



Cable A: To connect the first TA Slider 160/500 BACnet or Modbus of a daisy chain to the Bus.

Cable B: Between two actuators in a daisy chain.

Cable C: To enable hybrid mode or provide power supply if the daisy chain is long enough.

Daisy Chain Cable	Length	Part Code
	ft m	
Type A	4.9 1.5	P0007MPCA1
	16.4 5.0	P0007MPCA2
	32.8 10.0	P0007MPCA3
Type B	4.9 1.5	P0007MPCB1
	16.4 5.0	P0007MPCB2
	32.8 10.0	P0007MPCB3
Type C	4.9 1.5	P0007MPCC1
	16.4 5.0	P0007MPCC2
	32.8 10.0	P0007MPCC3

6.0 NOTIFICATIONS

Not applicable – contact Victaulic with any questions.

7.0 REFERENCE MATERIALS

[08.30: Victaulic Koil-Kit™ Coil Pack – Series 799/79V/79B/79A, Series 78Y/78T/78U and Coil Hoses](#)

[08.35: Victaulic Koil-Kit™ Coil Pack – Series 79C/79D](#)

[08.37: Victaulic Compact Pressure Independent Balancing and Control Valve \(Compact-P\) TA Series 7CP](#)

[08.55: Victaulic Compact Pressure Independent Balancing and Control Valve TA Series 7MP](#)

[I-KOIL.KIT: Koil-Kit™ Coil Pack Installation and Maintenance Instructions](#)

User Responsibility for Product Selection and Suitability

Each user bears final responsibility for making a determination as to the suitability of Victaulic products for a particular end-use application, in accordance with industry standards and project specifications, as well as Victaulic performance, maintenance, safety, and warning instructions. Nothing in this or any other document, nor any verbal recommendation, advice, or opinion from any Victaulic employee, shall be deemed to alter, vary, supersede, or waive any provision of Victaulic Company's standard conditions of sale, installation guide, or this disclaimer.

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Note

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

Installation

Reference should always be made to the Victaulic installation handbook or installation instructions of the product you are installing. Handbooks are included with each shipment of Victaulic products, providing complete installation and assembly data, and are available in PDF format on our website at www.victaulic.com.

Warranty

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

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