Schlumberger

TRM-4P and -4HP Series Safety Valves

General service, premium rod piston, metal-seal body joints, flapper valve with working pressures to 10,000 psi [68,950 kPa]

APPLICATION

- Sweet to severely corrosive applications from 40 degF to 300 degF [4 degC to 149 degC]

BENEFITS

- Has downstop that protects the hydraulic piston bore and increases reliability.
- Allows fewer potential leak paths.
- Reduces operating friction and resists corrosive chemicals to provide safe, long-term operation.
- Reduces solids and scale-deposition problems.
- Provides a simple slickline procedure, with or without secondary communication.
- Has high hydraulic system pressure rating (15,000-psi [103,421-kPa] piston seals).

FEATURES

- Static nonelastomeric operating piston seat in full-open position
- Minimum number of seals
- Metal-seal body joints and static operating piston seal in full-closed position
- Rod piston hydraulic seals
- Optimal geometry and clearance between sliding components
- Metal-seal communication and lockout mechanism
- Full metal-to-metal sealing Inconel® flapper mechanism

The Camco* TRM-4P and -4HP tubing-retrievable, surface-controlled, subsurface safety valves are value engineered to provide long-lasting, safe, and reliable operation. These valves feature rod-piston actuation, metal-to-metal seal body joints, a rugged flapper-closure mechanism, and a minimum number of critical seals to ensure maximum reliability.

The TRM-4P and -4HP valves have only two body joints and use the proprietary Cam-P* threads to achieve a reliable, metal-to-metal seal. The premium flapper mechanism in these valves also features full metal-to-metal sealing plus a secondary soft seat, and it meets a leakage-acceptance criterion that is substantially more stringent than API and ISO specifications.

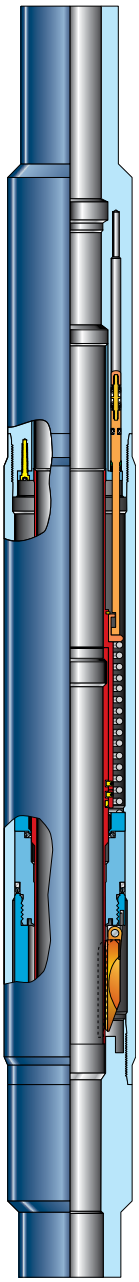
The valve's modular design allows a maximum number of material and design options, including a wide range of nipple profiles, to cost effectively fit specific applications and operating environments. These TRM-series valves are available with working pressure ratings to 10,000 psi [68,950 kPa] and setting depths to 2,500 ft [762 m].

PREMIUM PISTON SYSTEM

The rod piston system uses a reliable spring-energized, filled Teflon sealing element. Operating within the valve's chamber housing, this system consists of a stepped OD, a compliant downstop of a polyetheretherketone polymer, a static, full-closed, metal-to-metal seal and an integral piston centralizer. As the operating piston reaches full open, it seats to form a static seal and protects the dynamic operating piston from produced fluids. The polymer sealing element provides a compliant sealing surface to avoid incomplete sealing caused by particulate matter, and the piston system components are manufactured from wear-resistant materials for maximum durability.

VALVE OPERATION

The TRM-4P and -4HP series safety valves are normally closed. They are opened by applying hydraulic pressure through a control line that extends from the safety valve through the wellhead to the control panel. Hydraulic pressure applied from the surface control panel pushes the rod piston and the flow tube down. This force compresses the power spring, moves the flapper off seat, and continues until the valve is in the open position. When fully open, the flapper and seat system are isolated from production flow to prevent contamination. When the hydraulic control line pressure is released, the power spring lifts the flow tube and the rod piston. This upward movement permits the torsion spring on the hinged flapper to move the flapper into the flow stream, close against the flapper seat, and shut in flow from the well.



TRM-4HP safety valve.

TRM-4P and -4HP Series Safety Valves

LOCKOUT OPERATION

A unique mechanism enables a simple slickline procedure to move a lockout sleeve located above the flow tube downward to part a shear plug, engage the lockout rod, and permanently lock the safety valve open while establishing hydraulic communication to the valve ID. A secondary valve can then be installed in these valves. A second lockout option allows these TRM series safety valves to be locked open without activating secondary hydraulic communication.

Engineering Data for TRM-4P Series Safety Valves

Tubing Size† (in [mm])	Valve Type	Max. OD (in [mm])	Nipple Bore (in [mm])	Working Pressure (psi [kPa])	Tensile Strength‡ (lbf [kg])
2.375 [60.3]	TRM-4P	3.625 [92.1]	1.875 [47.6]	5,000 [34,475]	132,213 [59,960.5]
		3.640 [92.5]			108,000 [48,979.6]
		3.688 [93.7]	1.812 [46.0]		127,000 [57,596.4]
2.875 [73.0]		4.609 [117.1]	2.312 [58.7]		184,000 [83,446.7]
3.500 [88.9]		5.176 [131.5]	2.812 [71.4]		261,000 [118,367.3]
4.500 [114.3]		6.923 [175.8]	3.812 [96.8]		413,000 [187,301.6]
5.500 [139.7]		8.226 [208.9]	4.562 [115.9]		466,000 [211,337.9]
		7.798 [198.1]	4.312 [109.5]	7,500 [51,713]	687,000 [311,564.6]
		8.226 [208.9]	4.562 [115.9]	6,000 [41,370]	466,300 [211,473.9]
		8.187 [207.9]		7,500 [51,713]	922,465 [418,351.5]
7.000 [177.8]	TRM-4P-CF	9.234 [234.5]	6.000 [152.4]	5,000 [34,475]	692,750 [314,172.3]
		9.453 [240.1]	5.500 [139.7]		736,000 [333,786.8]
		9.250 [235.0]	5.939 [150.9]		885,000 [401,360.5]
		9.453 [240.1]	6.000 [152.4]	6,750 [46,541]	692,750 [314,172.3]
		9.156 [232.6]	5.875 [149.2]	5,000 [34,475]	778,800 [353,197.3]

Engineering Data for TRM-4HP Series Safety Valves

Tubing Size† (in [mm])	Valve Type	Max. OD (in [mm])	Nipple Bore (in [mm])	Working Pressure (psi [kPa])	Tensile Strength‡ (lbf [kg])
2.375 [60.3]	TRM-4HP	4.124 [104.7]	1.812 [46.0]	10,000 [68,950]	133,000 [60,317.5]
2.875 [73.0]		4.801 [121.9]	2.312 [58.7]		222,000 [100,680.3]
		5.166 [131.2]			267,000 [121,088.4]
3.500 [114.3]		5.610 [142.5]	2.812 [71.4]		312,000 [141,496.6]
		5.507 [139.9]			362,000 [164,172.3]
		5.680 [144.3]			263,637 [119,563.3]
		5.568 [141.4]	2.562 [65.1]		395,000 [179,138.3]
4.500 [114.3]		7.923 [201.2]	3.812 [96.8]		495,000 [224,489.8]
		7.515 [190.9]			
5.500 [139.7]		8.125 [206.4]	4.312 [109.5]		804,000 [364,625.9]
		8.686 [220.6]	4.437 [112.7]		835,000 [378,684.8]
		8.962 [227.6]	4.312 [109.5]		804,700 [364,943.3]
7.000 [177.8]		9.000 [228.6]	5.000 [127.0]	8,500 [58,608]	1,029,000 [466,666.7]

† The engineering data provided illustrate the scope of this product offering but are not all inclusive. Additional sizes and pressure ratings are available upon request.
In 7-in sizes, the curved flapper is the standard version. A flat-flapper version can be obtained on request to meet specific strength requirements (e.g., 10,000-psi working pressures).

‡ Tensile ratings are given for specific example valves; higher-strength materials affect this value. Tensile ratings shown are exclusive of end connection (EOEC) and at ambient temperature.

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