

TRM-4 and -4H Series Safety Valves

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

APPLICATION

- Sweet to moderately corrosive environments from 40 degF to 300 degF [4 degC to 149 degC]

BENEFITS

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

FEATURES

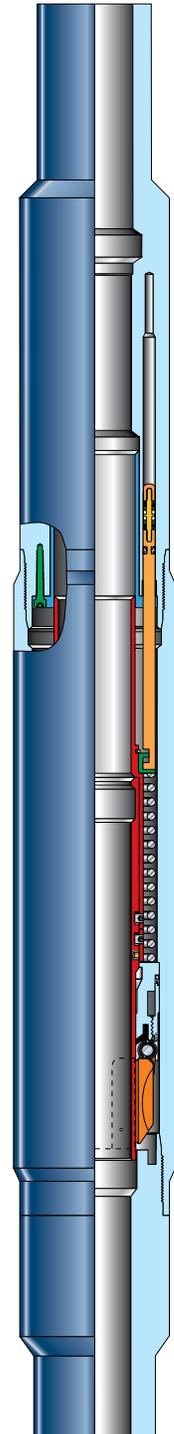
- Full metal-to-metal sealing Inconel® flapper mechanism
- Minimum number of seals
- Metal-seal body joints and static operating piston seal in full-closed position.
- Rod piston hydraulic seals
- Optimal geometry and clearance between sliding components
- Metal-seal communication and lockout mechanism

The Camco* TRM-4 and -4H series tubing-retrievable, surface-controlled, subsurface safety valves are value engineered to provide long-lasting, safe, and reliable operation. Their compact design incorporates the best of the unsurpassed, field-proven Schlumberger technologies. The TRM-4 and -4H series 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.

All TRM-4 and -4H series valves use a single-rod piston with reliable spring-energized, filled Teflon® sealing elements; a static, full-closed, metal-to-metal seal; and a dual centralizing system. For maximum reliability, all TRM-4 and -4H valves have only two body joints and use proprietary Cam-P* threads to achieve a solid, metal-to-metal seal. The premium flapper mechanism in the TRM-4 and -4H also has 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 modular design of the TRM-4 and -4H series allows for a maximum number of material and design options, including a wide range of nipple profiles, to cost effectively fit specific applications and operating environments. TRM-4 and -4H valves are available with working pressure ratings to 10,000 psi [68,950 kPa] and setting depths to 2,500 ft [762 m]. Other TRM series valves provide reduced OD, premium piston systems, deepset designs, and many other optional features.

Schlumberger offers a special optional ScaleGard* surface treatment on selected internal surfaces that minimizes solids buildup caused by produced fluids.



TRM-4 safety valve.

TRM-4 and -4H Series Safety Valves

VALVE OPERATION

The TRM-4 and -4H 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 downward force compresses the power spring, moves the flapper off seat, and continues until the valve is in the fully open position. When fully open, the flapper and seat system are isolated from production flow, thereby preventing 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.

LOCKOUT OPERATION

A unique lockout mechanism enables a simple slickline procedure to permanently lock the valve open and initiate secondary hydraulic communication. A lockout sleeve located above the flow tube is shifted downward. This downward movement parts the shear plug, engages the lockout rod, and permanently locks the safety valve open while establishing hydraulic communication to the valve ID. A secondary valve can then be installed in the TRM-4 or -4H valve. A second lockout option in the lower end of the valve allows the TRM-4 and -4H series safety valves to be locked open without activating secondary hydraulic communication.

Engineering Data for TRM-4 Series Safety Valves

Tube 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-4	3.688 [93.7]	1.875 [47.6]	5,000 [34,475]	127,000 [57,606]
2.875 [73.0]		4.609 [117.1]	2.312 [58.7]		184,000 [83,461]
3.500 [88.9]		5.176 [131.5]	2.812 [71.4]		261,000 [118,388]
4.500 [114.3]		6.923 [175.8]	3.813 [96.9]		413,000 [187,334]
5.500 [139.7]		8.226 [208.9]	4.562 [115.9]		466,000 [211,374]

Engineering Data for TRM-4H Series Safety Valves

Tube 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-4H	4.124 [104.7]	1.875 [47.6]	10,000 [68,950]	133,000 [60,328]
2.875 [73.0]		5.166 [131.2]	2.312 [58.7]		222,000 [100,698]
3.500 [88.9]		5.916 [150.2]	2.812 [71.4]		263,000 [119,295]
4.500 [114.3]		7.923 [201.2]	3.813 [96.9]		495,000 [224,528]

[†] The engineering data provided illustrate the scope of this product offering and are not all inclusive.

Additional sizes and pressure ratings are available upon request.

[‡] Tensile ratings are given for specific example valves. Tensile ratings shown are exclusive of end connection [EOEC] and at ambient temperature.

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