Optimax™ Series Wireline-Retrievable Surface-Controlled Subsurface Safety Valve

Models WVE-10, WVN-10 and WIT-10

Weatherford's *Optimax* series wireline-retrievable surface-controlled subsurface safety valves, models WVE-10, WVN-10 and WIT-10 are rod-piston actuated, flapper valves designed to shut in a well during an uncontrolled flow caused by equipment failure or damage.

An integral part of the valves' function is the ability to apply pressure through the control line. The WVE-10 and WVN-10 safety valves are designed for use in a safety valve landing nipple (WNI), which is part of the tubing string and is connected by control line to surface. The WIT-10 safety valve is designed for use in a locked-open and communicated tubing-retrievable safety valve (TRSV), which is connected by control line to surface. While the WVE-10, WVN-10 and WIT-10 all operate in the same manner, the WIT-10 uses a spacer tube, which aligns the seals across the appropriate seal bores of the TRSV. Application of control-line pressure keeps these valves open during well production or injection. When pressure is bled off during an uncontrolled flow, the valves close on command to protect property, personnel, and the environment.

Each model can be installed and retrieved on slickline and is installed using an *Optimax* OQXSV safety valve lock. The standard *Optimax* OQXSV safety valve lock is a large-bore version of Weatherford's Petroline® QXSV lock.

Applications

- Fluid and gas environments
- Production and injection applications

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Features, Advantages and Benefits

- The design, material, manufacturing, assembly, and test documentation retention according to API Q1 and API 14A quality programs ensure design and manufacturing integrity and conformance to industry standards.
- Several features of the models maximize reliability:
  - The reduction in the number of seals minimizes potential leak paths and simplifies redressing.
  - The hydraulic control system has only two potential leak paths, the industry minimum.
  - The elastomeric flapper soft seat reinforces the primary metal-to-metal seat for low-pressure seal integrity.
- The eccentric valve design enables use of flat-flapper technology while maintaining a large throughbore, yielding up to 30 percent larger flow areas than other products, and a lower flowing pressure drop.
- The flat flapper, mounted eccentrically, provides an equivalent bore to curved-flapper designs. The flat flapper and seat require only simple lapping to remove slight imperfections discovered during redress, saving time in the field.
- The chevron-type packing can be totally replaced without disassembling or disturbing the valve internals, saving time.
- Elastomeric dynamic rod-piston seal is used with bearing backup rings.
- The minimized number of threaded connections minimizes leak paths and reduces the potential for galling damage.

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Specifications

Size (in./*mm*)	**2-3/8 × 1.875** *60.32 × 47.62*	**2-7/8 × 2.188** *73.02 × 55.57*	**2-7/8 × 2.313** *73.02 × 58.75*	**3-1/2 × 2.750** *88.90 × 69.85*	**3-1/2 × 2.813** *88.90 × 71.45*	**4-1/2 × 3.688** *114.30 × 93.67*	**4-1/2 × 3.813** *114.30 × 96.85*
Maximum lock no-go OD (in./*mm*)	1.928 *48.97*	2.243 *56.97*	2.366 *60.10*	2.803 *71.20*	2.866 *72.80*	3.749 *95.22*	3.873 *98.37*
Maximum safety valve OD (in./*mm*)	1.862 *47.29*	2.175 *55.24*	2.302 *58.47*	2.740 *69.60*	2.801 *71.14*	3.677 *93.40*	3.803 *96.60*
Standard sealbore (minimum bore) (in./*mm*)	0.787 *19.99*		1.291 *32.79*	1.575 *40.00*	1.630 *41.40*	2.335 *59.31*	2.461 *62.51*
Working pressure (psi/*MPa*)	5,000 to 10,000 *34 to 69*						
Test pressure (psi/*MPa*)	7,500 to 15,000 *52 to 103*						
Rated working temperature (°F/°C)	30 to 300 *–1 to 149*						
Fail-safe setting depth (ft/*m*)	2,000 *610*						
Operating pressure, fully open[1] (psi/*MPa*)	2,000 *14*						
Operating pressure, fully closed[1] (psi/*MPa*)	1,000 *7*						
Dynamic seal system	Rod piston with proprietary Viton® elastomeric T-seal and bearing backup rings of Teflon® filled with molybdenum disulfide solid lubricant, verified in tests to a 10,000-psi (69-MPa) gas differential pressure at 300°F (149°C)						
Flapper soft seal	Proprietary Viton seal material to provide a reliable low-pressure seal						
Standard metallic materials[2]							
Lock and most safety valve components	13% minimum chrome 80,000-psi (*552-MPa*) minimum yield						
Piston rod, flapper, and seat	INCOLOY® 925						
Power spring, flapper pin, and torsion spring	MP 35 N						
Design and manufacturing compliance	API Q1 and API 14A						
Class of service	API 14A 3S2						

[1]Estimated, subject to verification

[2]All materials heat-treated according to NACE MR 01 75

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Size (in./*mm*)	**5-1/2 × 4.562** ***139.70 × 115.875***	**5-1/2 × 4.578** ***139.70 × 116.28***	**5-1/2 × 4.750** ***139.70 × 120.65***	**7 × 5.813 × 5.750** ***177.80 × 147.65 × 146.05***	**7 × 5.875 × 5.813** ***177.80 × 149.22 × 147.65***	**7 × 6.000 × 5.963** ***177.80 × 152.40 × 151.46***	***9-5/8 × 8.410 × 8.375*** ***244.40 × 213.61 × 212.72***
Maximum lock no-go OD (in./*mm*)	4.622 *117.40*	4.638 *117.80*	4.808 *122.12*	5.893 *149.68*	5.955 *151.26*	6.080 *154.43*	8.416 *213.78*
Maximum safety valve OD (in./*mm*)	4.551 *115.59*		4.740 *120.40*	5.740 *145.80*	5.803 *147.40*	5.953 *151.21*	8.377 *212.77*
Standard sealbore (minimum bore) (in./*mm*)	2.953 *75.01*			3.622 *92.00*			6.000 *152.40*
Working pressure (psi/*MPa*)	5,000 to10,000 *34 to 69*						
Test pressure (psi/*MPa*)	7.500 to15,000 *52 to103*						
Rated working temperature (°F/°*C*)	30 to 300 *–1 to 149*						
Fail-safe setting depth (ft/*m*)	2,000 *610*						
Operating pressure, fully open[1] (psi/*MPa*)	2,000 *14*						
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Options

- A robust, field-proven, through-the-flapper, self-equalizing subassembly is available for the model WVE-10. This subassembly is simple to operate.
- The safety valve can be configured to accept any manufacturer's lock.
- A wide choice of seal materials is available to ensure fluid compatibility.

Available Accessories

- *Optimax* OQXSV running tool
- *Optimax* OQXSV pinning handle
- *Optimax* OQXSV pulling probe
- *Optimax* running prong
- *Optimax* pulling probe