

MZ-Xpress Service Tool

Cased hole, single-trip, multizone gravel and frac packing

SYSTEM APPLICATIONS

- Multizone completions
- Frac-packing operations
- Gravel-packing operations
- Land and offshore environments, including deep water
- Vertical or deviated wells

SYSTEM BENEFITS

- Cost and time savings due to
 - reduced rig time
 - high-flow-rate and proppant capacity

SERVICE TOOL FEATURES

- Anchor above setting tool that mitigates buckling of internal service string and minimizes movement inside completion
- Positive service tool position indication
- Optimized hydraulics during gravel- and frac-pack placement
- Erosion-resistant crossover port
- Check valve (with engineered weep) that provides live annulus during treatment
- Engineered, bonded seals designed to provide pressure integrity during cumulative MZ-Xpress operations

The MZ-Xpress* service tool is used with the MZ-Xpress completion system for multizone gravel and frac packing in a single trip. It includes a mechanical anchor, a hydraulically actuated mechanism for setting the top gravel-pack packer, an internal string, a crossover assembly with bonded seals, and shifting collets.

Mechanical anchor

The mechanical anchor is run above the setting tool mechanism. Its function is to anchor the workstring against the casing above the hydraulic setting module during placement of the sand control treatment. Anchoring minimizes the string's movement inside the completion during the pumping treatment, and it minimizes buckling and damage to the internal string, which is particularly important while the upper intervals are being treated. Without the anchor, screenout forces created by a combination of pressure and differential area (workstring versus the inner string) can create excess buckling and damage to the inner string.

QUANTUM MAX hydraulic setting module

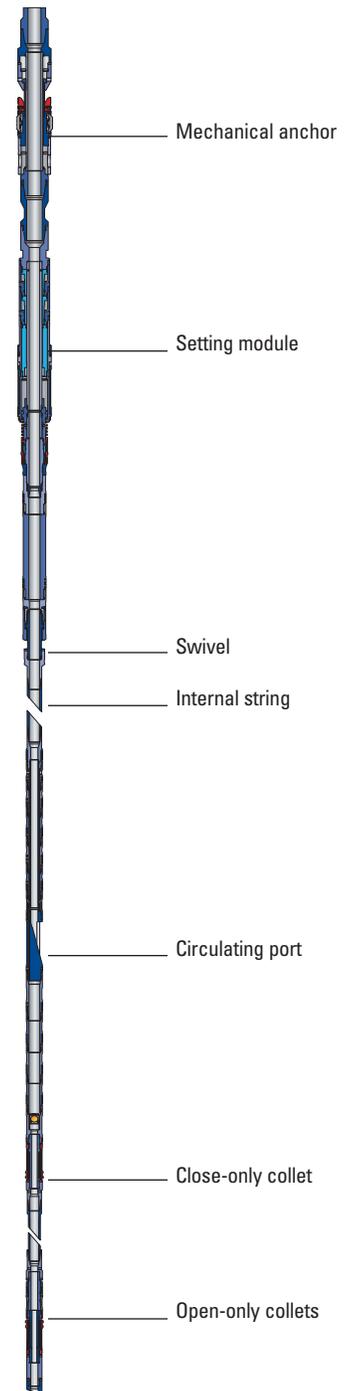
The QUANTUM MAX hydraulic setting module is used to convey the MZ-Xpress system below either a QUANTUM packer or QUANTUM MAX packer. This field-proven setting module allows for both hydraulic release (primary) and rotational release (secondary) of the MZ-Xpress service tool from the packer. A swivel assembly below the setting module eliminates rotation of the lower service tool components.

Internal string

The internal string consists of a high-tensile, tight-torsion flush joint pipe. Dimensions have been optimized for hydraulic performance during placement of the gravel pack and frac pack as well as for reverse-out operations. The internal string length is determined by the number and length of intervals.

Crossover assembly

The crossover assembly delivers the sand-laden slurry from the internal string into the annulus between the casing and screen, the perforations, and the formation and allows returns during gravel packing. A check valve designed with an engineered weep allows a live annulus during frac-pack treatments yet restricts fluid losses during reverse-out operations. The crossover port



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has a uniport design that allows it to handle cumulative erosion from gravel- and frac-pack treatments over multiple zones. Redundant seal units were specially designed and tested to ensure pressure integrity during all cumulative MZ-Xpress operations.

Shifting tool section

The shifting tool section is a very simple configuration of two multifunction collets: a close-only collet and an open-only collet. The open-only collet opens the screen valves and closure sleeves downward and also resets the position indicators in the housing extensions. This collet is deactivated while the packer assembly is being run inside the MZ-Xpress assembly at the surface so that the closure sleeves and screen valves are not inadvertently or prematurely shifted open.

The open-only collet is activated within the MZ-Xpress pressure test assembly and provides confirmation of activation before operations are resumed. The close-only collet closes the screen valves and closure sleeves (within the ported MZ-Xpress housing extension) upward and interfaces with the position indicators in the completion.

Position indication is observed at 30,000 to 50,000 lbf of overpull, depending on the MZ-Xpress size. The shifting tools are spaced apart to ensure that all valves can be operated independently.

MZ-Xpress Service Tool Specifications

Casing size, in	7.000, 7.625, 9.625	9.625
Tool OD, in [mm]	2.813 [71.5]	4.562 [115.8]
Differential pressure rating at max. temperature, psi	10,000 at 250 degF	10,000 at 250 degF
Max. pump rate, bbl/min	16	45
Max. proppant capacity, lbm	300,000 (ramp to 12 ppa of CARBOPROP®)	1,000,000 (ramp to 12 ppa of CARBOPROP)
Internal string size, in	2.50 × .375 wall (8.51 lbm/ft)	4.00 × .262 wall (11.00 lbm/ft)

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