Schlumberger

MZ-Xpress Completion System

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

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

FEATURES

- QUANTUM* or QUANTUM MAX* packer
- Customized service string with optimized hydraulics
- Integral fluid loss and production control
- Exact tool positioning
- Debris concerns addressed
- High pump-rate and proppant capacity
- Ability to retrieve
- Capability of stacking
- 6,000- and 10,000-psi versions

The MZ-Xpress* completion system performs multizone gravel and frac packing in a single trip. All zones of interest are perforated, and then the MZ-Xpress system hardware is deployed, set, and tested. Individual zones are gravel packed or frac packed from the bottom up. The MZ-Xpress system allows complete isolation of the zones not immediately being completed and can be used when interval lengths or zone spacings differ.

The MZ-Xpress system was designed to address from two to more than five zones. Reservoir pressure gradients, zone length, spacing, and pumping treatment size limit the number of zones to be completed and vary depending on the wellbore size.

This MZ-Xpress single-trip system is suitable for low-tier and land wells, as well as the next generation of challenging wells, including those in deep water.

Service tool

The MZ-Xpress service tool includes a mechanical anchor to keep the service tool in position during treatment, a hydraulically actuated module for setting the top gravel-pack packer, an internal string, a crossover tool for delivering slurry to each interval, and shifting collets for sleeve actuation and position indication. All service tool components were designed and tested to function under the rigors of multizone conditions.

Top gravel-pack or frac-pack packer

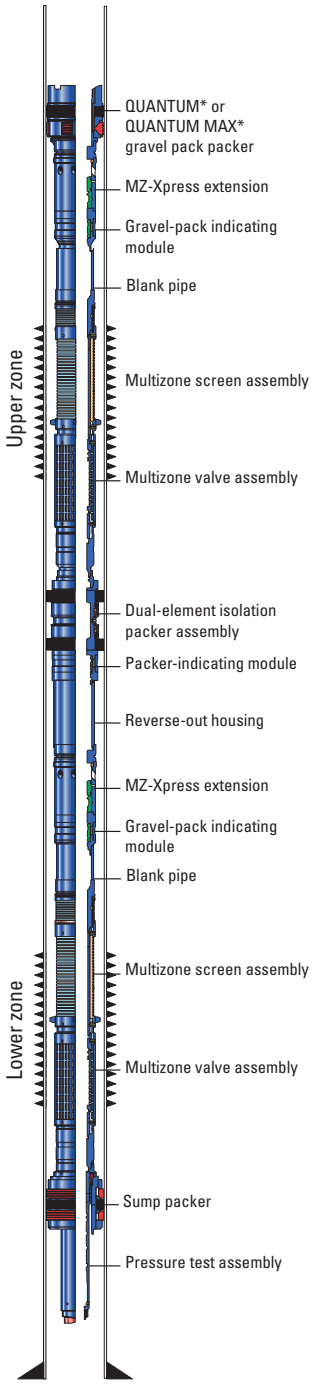
The MZ-Xpress system uses the field-proven, highly reliable QUANTUM or QUANTUM MAX gravel-pack packer, depending on well conditions.

Housing extension and reverse-out housing

The MZ-Xpress housing extension consists of an upper polished bore receptacle (PBR), a ported extension with closure sleeve, a lower PBR, and indicating module. The reverse-out housing, positioned above the housing extension, provides a large ID to allow all the bonded seals in the service tool crossover section to be placed inside to facilitate debris removal.

The service tool collets open and close the closure sleeve. The crossover section of this tool is positioned within the housing extension of each zone as the service tool open-only collet interfaces with the indicating module. After overpull is observed, the workstring is rotated to set the casing anchor and then slacked off. The gravel or frac pack is then pumped.

The closure sleeve within the housing extension is designed to handle the erosion of the gravel-pack or frac-pack treatment while providing a high level of assurance that the sleeve will retain pressure integrity when closed.



MZ-Xpress completion system.

MZ-Xpress Completion System

Isolation packers

The MZ-Xpress isolation packers provide isolation during the gravel-pack or frac-pack installation and during production. These hydraulic packers can be set simultaneously or sequentially. Various configurations are available depending on well conditions and requirements, ranging from a single- to a dual-element design (which permits pressure testing), either with or without a hydraulic anchor. A built-in indicating module facilitates mechanical service tool positioning when individual setting or testing is desired.

Screen and valve assemblies

The MZ-Xpress screen and valve assemblies are modular, allowing for variations in interval lengths and productivity rates. MZ-Xpress screens are constructed of a direct-wrapped wire jacket and high rib wires. The slot openings can be tailored for appropriate gravel or proppant sizes. Screen outer dimensions allow for proper annular clearance for gravel-pack and frac-pack placement and for fishing.

The screen basepipe is unperforated, providing complete isolation when adjacent valve assemblies are closed. The MZ-Xpress screen and valve assemblies allow circulation during sandface completion installation without the need for washpipe. All screen valve assemblies remain closed during run-in-hole operations, permitting the setting of the gravel pack and isolation packer without the need for dropping a setting ball, saving rig time. While the service tool is being tripped out of the hole, the MZ-Xpress screen valves are closed both to prevent fluid loss and to control the well by providing bidirectional pressure integrity.

Depending on expected production rates, multiple valve assemblies can be incorporated into each zone—below, between, or above the MZ-Xpress screen joints, allowing selective production.

Pressure test assembly

The pressure test assembly is run at the bottom of the MZ-Xpress assembly and allows the pressure integrity of the housing extension sleeves and screen valve sleeves to be tested before and after the service string is installed at the rig floor. Versions are available to allow stacked MZ-Xpress applications. The pressure test assembly is also used to activate and confirm activation of the open-only collet.

While the MZ-Xpress assembly is being run in hole, the pressure test assembly permits the workstring to be filled with brine. The bottom of the pressure test assembly contains a guide shoe for easy insertion into the sump packer. A snap latch at the top of the pressure test assembly confirms that the MZ-Xpress system has been run to the correct depth within the well.

Production

After production tubing has been installed, a shifting tool is run in hole with the tubing, coiled tubing, or slickline to selectively open the screen valves for production. The shifting tool is selectively configured to engage the screen valves only, leaving the ported housing extension sleeves close.

Debris management

Debris management is critical to the success of any multizone, single-trip sand control system. The MZ-Xpress system has been designed with this concern in mind. The system is designed to allow debris and any proppant between the service tool and completion hardware to drop to the bottom of the well after a zone is treated, preventing the service tool from sticking. This action is done by placing all of the crossover tool seals inside the large ID reverse-out housing, allowing any debris, such as proppant, to exit from around the tool. The area around the service tool stays clean for the next operation.

The system hydraulics have been designed to allow proper debris removal, especially the reverse-out of excess proppant at the end of each treatment. The system ID, including screens, valves, housing extension, and isolation packers, and the inner string OD have been optimized to achieve the necessary reverse-out rates for debris removal.

Service tool positioning

Tool positioning is critical to the success of any multizone, single-trip sand control system. The MZ-Xpress system has been designed to ensure that the service tool can be positioned precisely and repeatedly. Indicating modules are located at the bottom of each housing extension and at the bottom of each isolation packer assembly. Sufficient overpull is indicated by the open-only collet in even the most challenging well. Positioning can also be confirmed hydraulically. These indicating modules are reset by the close-only collet, allowing the service tool and inner string to pass through without excess setdown force. The robust casing anchor allows enough weight to be set down to counteract any hydraulic or thermal effects during the gravel- or frac-pack treatments.

MZ-Xpress System Specifications			
Size, in (casing weight range, lbm/ft)	7.000 (26–35) 7.625 (26.4–39)	9.625 (47–53.5)	9.625 (47–53.5)
System ID, in	2.813	2.813	4.562
Max. pump rate, bbl/min	16	16	45
Max. proppant capacity per zone, lbm	100,000 (ramp to 12 ppa of CARBOPROP®)	100,000 (ramp to 12 ppa of CARBOPROP)	330,000 (ramp to 12 ppa of CARBOPROP)
Max. proppant capacity, service tool, lbm	300,000 (ramp to 12 ppa of CARBOPROP)	300,000 (ramp to 12 ppa of CARBOPROP)	1,000,000 (ramp to 12 ppa of CARBOPROP)
Differential pressure rating at max. temperature, psi	6,000–10,000 at 250 degF	6,000–10,000 at 250 degF	6,000–10,000 at 250 degF
Position indication, lbm	20,000–30,000 overpull	20,000–30,000 overpull	20,000–30,000 overpull
Screen—nominal basepipe/OD, in	3.5/4.75	5.5/6.2	5.5/7.125

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