MOCS G2

Technical Summary

Multiple Opening Circulation Sub

The Next Generation in Circulation

The second generation multiple opening circulation sub from NOV can improve drilling efficiency, reduce drilling costs, and enhance the safety of your operation. The MOCS G2 is activated and infinitely cycled with a single ball that changes the drilling fluid flow path from the ID of the string (non-bypass) to the annulus (bypass), providing unlimited and reliable on-demand cycling in as little as 10 seconds.

With the MOCS G2 in your drillstring, you quickly and effectively tackle multiple mud/fluid-loss situations and hole cleaning applications in the same interval. And because the tool does not require any dedicated trips to empty an internal ball catcher, it can reduce NPT and improve the efficiency of your operation.

Features and Benefits

- **Easy to use** - simple operation requires only one ball
- **On-demand performance** - cycles in as little as 10 seconds with ball on seat
- **Unlimited cycling** - flow rate actuation alleviates need for multiple balls
- **Versatile** - can be loaded on surface and placed anywhere in the string
- **Safe** - eliminates the need to break string at every cycle
- **ID Compatibility** - variable ball size allows for flexibility with various string IDs
- **Reduced invisible-lost time** - no wasted trips for an exhausted ball catcher
- **Designed to trip dry pipe** - ports shift closed when pumps are off, automatically draining to the lower BHA
- **Allows fishing operations below the tool** - open through bore before activation or by fishing the ball
- **Maintains well control safety** - automatically closes ports when incoming flow drops

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Technical Specifications				
Tool O.D.	4¾ in	6½ in	8 in	9½ in
Tool I.D.	1¼ in	1⅞ in	2⅜ in	2¾ in
Tool length	8.4 ft	8.3 ft	9.4 ft	12.5 ft
Weight	380 lbs	750 lbs	1,240 lbs	2,600 lbs
Tensile yield	500,000 lbs	1,250,000 lbs	1,800,000 lbs	3,000,000 lbs
Torsional yield	30,000 ft–lbs	50,000 ft–lbs	110,000 ft–lbs	220,000 ft–lbs
Maximum allowable flow rate[1]	700 gpm	900 gpm	1,400 gpm	2,000 gpm
Activation flow rate[2]	230 gpm	430 gpm	580 gpm	580 gpm
Maximum recommended operating torque	18,000 ft–lbs	30,000 ft–lbs	60,000 ft–lbs	140,000 ft–lbs
TFA in bypass position	0.88 in^2	1.49 in^2	3.00 in^2	4.15 in^2
TFA in non–bypass position	0.78 in^2	1.45 in^2	2.01 in^2	2.19 in^2
Maximum hydrostatic pressure	30,000 psi	30,000 psi	30,000 psi	30,000 psi
Standard drop ball diameter	1.63 in	2.25 in	2.50 in	2.81 in
Standard tool joint	API 3½ in IF	API 4½ in IF	API 6⅝ in Regular	API 7⅝ in Regular

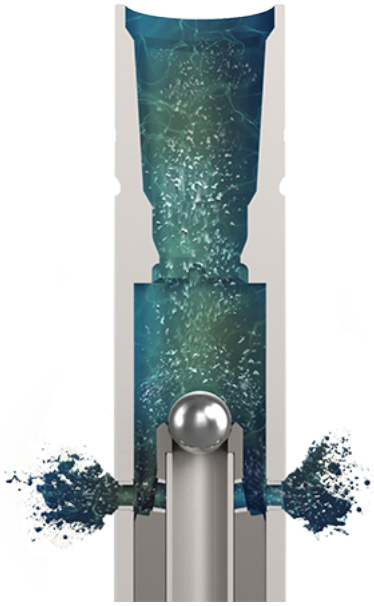
TFA and drop ball sizes can be changed upon request

[1]Only applies when circulating to the annulus in bypass mode, [2]When drilling fluid density equals 8.3 lb/gal (water)

Unactivated Mode No Drop Ball

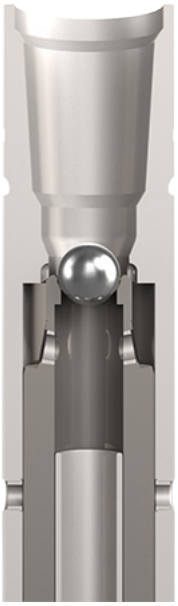
Run in hole position with open through bore.

Bypass Mode After Ball Drop



Pump pressure forces the piston valve down, opening the ports to the annulus and closing off flow through sensitive BHA components.

Reset Mode Pumps Off



With pumps off, the tool returns to reset position. Even with the ball on seat, the MOCS G2 is designed to allow the drill stem to drain while tripping pipe.

Non-Bypass Mode

Once in non–bypass mode with the ball on the seat, the tool routes flow back to the bit to continue circulation through the entire BHA.