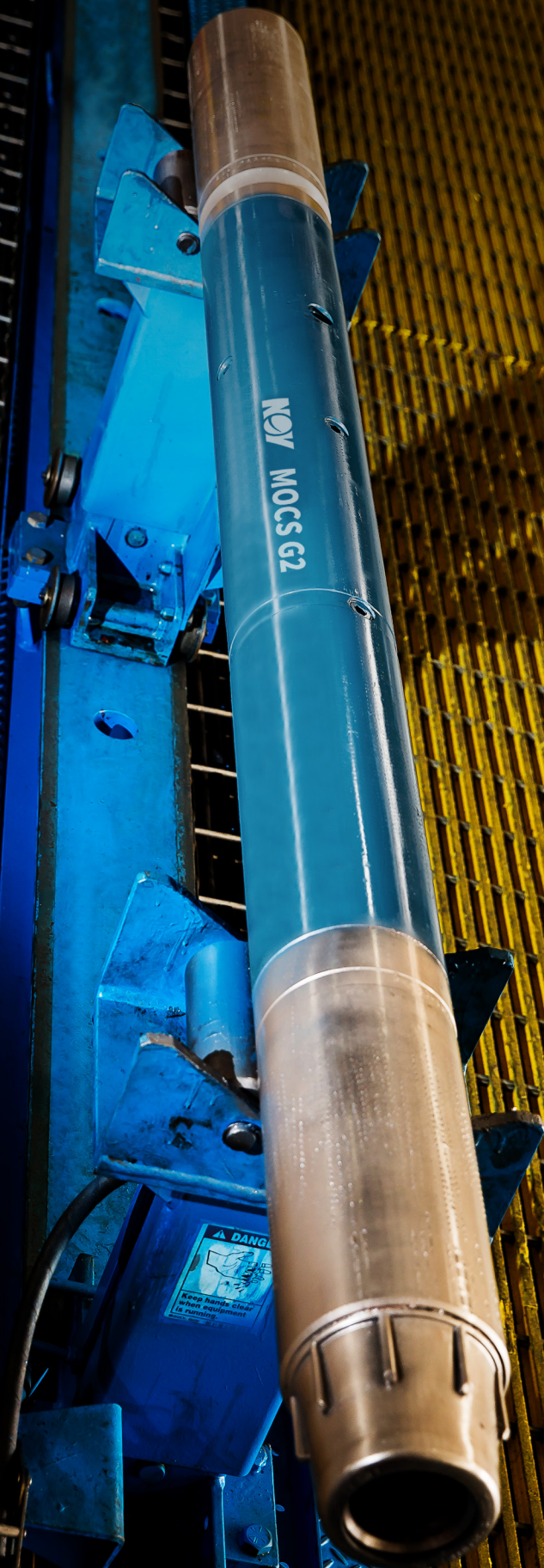


MOCS G2



We developed the second generation **Multiple Opening Circulation Sub (MOCS G2)** to 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). By simply changing flow regimes, you can cycle the tool between bypass and non-bypass modes an unlimited number of times.

A REVELATION IN CIRCULATION

Our engineers designed the innovative technology in the MOCS G2 to address the needs of your operation, and we're continually improving that technology to further your performance.

By providing unlimited, on-demand cycling between bypass and non-bypass modes in as little as 10 seconds, the tool can help you quickly and reliably tackle multiple fluid-loss situations with high lost circulation material concentration. And because the MOCS G2 does not require any dedicated trips to empty an internal ball catcher, it can reduce invisible lost time and improve the efficiency of your operation.

In hole cleaning while drilling applications, situations that require boosting annular fluid velocities for effective cuttings removal, the MOCS G2 gives you the flexibility to change the flow path at every string break. In certain applications, the MOCS G2 has been cycled more than 50 times in the same run, effectively cleaning the well at every connection.

Unactivated Mode
No Drop Ball



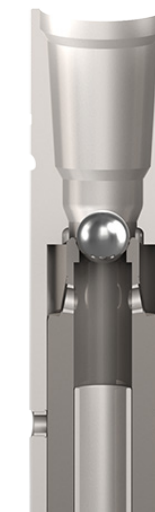
Run in hole position with open through bore.

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.



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, needless of a through bore ID above the tool

Safe

Eliminates need to break string at every cycle

ID compatibility

Variable ball size allows for flexibility with various string IDs

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 lower BHA

Allows fishing operations below the tool

Open through bore before activation or by fishing ball

Maintains well control safety

Automatically closes ports when incoming flow drops

APPLICATIONS

BHA protection

- Pumping LCM for lost circulation
- Spotting acid or cement

Hole cleaning while drilling

- Increasing annular velocities for improved cutting/debris removal

Wellbore cleanout

- Work-over/completion operations
- Subsea riser/BOP jetting

Borehole enlargement

- Cutting acceleration while reaming
- Control of underreamer function

Coring

- Enhances hole cleaning
- Provides cutting relief
- Reduced lag time when circulating samples or displacing fluid

Fishing

- Effectively utilized with the *Agitator™* system

SPECIFICATIONS

Technical Specifications				
Tool O.D.	4¾ in	6½ in	8 in	9½ in*
Tool I.D.	1¼ in	1⅞ in	2¾ 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 rate¹	700 gpm	900 gpm	1,400 gpm	2,000 gpm
Activation flow rate² (Water)	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 6½ in Regular	API 7½ in Regular

TFA and Drop Ball sizes can be changed upon request

Anything in this brochure may change without notice.

¹Only applies when circulating to the annulus in bypass mode, ²When drilling fluid density equals 8.3 lb/gal (water) *Commercial in January 2017

RELIABILITY WITH EVERY TURN

With the most experience and locations throughout the world, we deliver the highest quality products, equipment, and support to meet the needs of your operation.

Each MOCS G2 from NOV includes tool and engineering support specific to your job requirements, as well as continuous monitoring and improvements. Everything we do is geared toward providing reliability and improving the efficiency of your operation.

When our solutions arrive at your drill site, we want to deliver performance—so you can.



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