

Product trade name	Point-the-bit or Push-the-bit	Length (ft)	O.D. & I.D. (in.)	Hole size (in.)	Max DLS capability (°/100')	Automated closed loop deviation control (yes/no) (+/-degrees)	Build rate increment	Is deviation force continuous?	Max temp (°C/°F)	Max internal pressure (psi)	Other special pressure limitations	Does tool require configuration based on anticipated flow rate?
APS Technology												
SureSteer-RSM (Rotary Steerable Motor) RSM675 (6-3/4")	Push	Steering Section (14.5'), Power Section (17.2')	OD: 7.78 ID: 1.5	8.375" to 8.75" nominal	5.5	Yes, Inclination and MTF to within 0.1°	Configurable	Yes and variable	150/302	20,000	None	No
SureSteer-RSS RSS475	Push	Steering Head - 10.6'	Nominal OD - 4.75" Steering Pad Upset OD - 5.75" ID 2.7 - 3.1"	6.0" to 6.75"	12.0	Yes, Inclination and MTF to within 0.1°	Configurable	Yes and variable	150/302 175/347 (option)	20,000	None	Yes
Baker Hughes https://www.bakerhughes.com/												
6.75" AutoTrak Curve (conventional motor can be added)	Continuous Proportional Steering	38 (fully inclusive of steering system & MWD) Steering head length = 9.3	OD: 6.75 ID: N/A	8.375 - 9.875	15	Yes Precise to within 0.2°	Build Force programmable from surface via downlink. Target inclination in 0.125° increments	Yes	150/302	20,000	None	Steering system: No MWD system: No
9.5" AutoTrak G3	Continuous Proportional Steering	58 (fully inclusive of steering system & MWD/LWD) Steering head length = 8.2	OD: 9.5 ID: N/A	12.00 - 28.00	6.5	Yes Precise to within 0.1°	Build Force programmable from surface via downlink. Target inclination in 0.125° increments	Yes	150/302 (175/347 on request)	20,000 (25,000 & 30,000 on request)	None	Steering system: No MWD system: Yes
6.75" AutoTrak G3	Continuous Proportional Steering	50 (fully inclusive of steering system & MWD/LWD) Steering head length = 7.2	OD: 6.75 ID: N/A	8.375 - 10.625	6.5	Yes Precise to within 0.1°	Build Force programmable from surface via downlink. Target inclination in 0.125° increments	Yes	150/302 (175/347 on request)	20,000 (25,000 & 30,000 on request)	None	Steering system: No MWD system: Yes
9.5" AutoTrak X-treme (Adds Integrated pre-contoured drilling motor)	Continuous Proportional Steering	88 (fully inclusive of steering system, motor power section & MWD/LWD) Steering head length = 8.2	OD: 9.5 ID: N/A	12.00 - 28	6.5	Yes Precise to within 0.1°	Build Force programmable from surface via downlink. Target inclination in 0.125° increments	Yes	150/302 (175/347 on request)	20,000 (25,000 & 30,000 on request)	None	Steering system: No MWD system: Yes
6.75" AutoTrak X-treme (Adds Integrated pre-contoured drilling motor)	Continuous Proportional Steering	76 fully inclusive of steering system, motor power section & MWD/LWD) Steering head length = 7.2	OD: 6.75 ID: N/A	8.375 - 10.625	6.5	Yes Precise to within 0.1°	Build Force programmable from surface via downlink. Target inclination in 0.125° increments	Yes	150/302 (175/347 on request)	20,000 (25,000 & 30,000 on request)	None	Steering system: No MWD system: Yes
9.5" AutoTrak eXpress (Base level RSS service)	Continuous Proportional Steering	64.6 (fully inclusive of steering system & MWD) Steering head length = 8.2	OD: 9.5 ID: N/A	12.00 - 28.00	6.5	Yes Precise to within 0.1°	Programmable from surface via downlink from 0-6.5° /100 ft	Yes	150/302	20,000	None	Steering system: No MWD system: Yes
6.75" AutoTrak eXpress (Base level RSS service)	Continuous Proportional Steering	58.2 (fully inclusive of steering system & MWD) Steering head length = 7.2	OD: 6.75 ID: N/A	8.375 - 10.625	8	Yes Precise to within 0.1°	Programmable from surface via downlink from 0-8° /100 ft	Yes	150/302	20,000	None	Steering system: No MWD system: Yes

Sensor distance (ft) Inc/Azm/GR/Res	Control from surface (Downlink) (Y/N)	If yes, tool control method	Rig time req'd to communicate change in target (minutes)	Minimum kickoff inclination (degrees)	Max RPM / WOB	Min flow rate (gpm)	Max flow rate (gpm)	LCM limits	Power source	Bit requirements	Integrated LWD?
4' Inc/Mag ToolFacE	Y	Mud Pumps and Rotary	3.5 to 8 min	0	80 RPM, 50 klb	300	600	None	Alternator driven off motor	Per APS Bit Recommendations	No - Can be operated below any LWD/MWD
Inc (RSS) - 14.1' Gamma - 17.2' MWD Dir - 21.6"	Y	Mud Pumps and Rotary	3.5 to 8 min	0	200 RPM, 30 klb	150	350	None	Turbine Alternator driven by Mud flow	Per APS Bit Recommendations	MWD & LWD can be intergrated with steering head
5.9 / 21.6 / 11.5 / NA	Y	Negative pulse from surface skid unit	While drilling ahead	0	400RPM 56 klbf	300	750	50 lb/bbl medium nutplug, Cedar Fiber	Turbine generator	Application specific	No
Inc: 3.9 Others BHA dependent	Y	Negative pulse from surface skid unit	While drilling ahead	0	300 RPM 100 klbf	300	1,600	Steering system: None MWD system: 40 lb/bbl fine nutplug (higher conc. on request)	Turbine generator	Application specific	Yes
Inc: 3.1 Others BHA dependent	Y	Negative pulse from surface skid unit	While drilling ahead	0	400 RPM 57 klbf	200	900	Steering system: None MWD system: 40 lb/bbl fine nutplug (higher conc. on request)	Turbine generator	Application specific	Yes
Inc: 3.9 Others BHA dependent	Y	Negative pulse from surface skid unit	While drilling ahead	0	300 RPM 60 klbf	530	1,600	Steering system: None MWD system: 40 lb/bbl fine nutplug (higher conc. on request)	Turbine generator	Application specific	Yes
Inc: 3.1 Others BHA dependent	Y	Negative pulse from surface skid unit	While drilling ahead	0	400 RPM 36 klbf	265	660	Steering system: None MWD system: 40 lb/bbl fine nutplug (higher conc. on request)	Turbine generator	Application specific	Yes
Inc: 3.9 Others BHA dependent	Y	Flow rate change	While drilling ahead	0	300 RPM 100 klbf	300	1,600	Steering system: None MWD system: 40 lb/bbl fine nutplug (higher conc. on request)	Turbine generator	Application specific	No
Inc: 3.1 Others BHA dependent	Y	Flow rate change	While drilling ahead	0	400 RPM 55 klbf	200	900	Steering system: None MWD system: 40 lb/bbl fine nutplug (higher conc. on request)	Turbine generator	Application specific	No

Product trade name	Point-the-bit or Push-the-bit	Length (ft)	O.D. & I.D. (in.)	Hole size (in.)	Max DLS capability (°/100')	Automated closed loop deviation control (yes/no) (+/-degrees)	Build rate increment	Is deviation force continuous?	Max temp (°C/°F)	Max internal pressure (psi)	Other special pressure limitations	Does tool require configuration based on anticipated flow rate?	
9.5" AutoTrak V (RSS for vertical drilling)	Continuous Proportional Steering	24 fully inclusive. Steering head = 8.2	OD: 9.5 ID: N/A	12.00 - 28.00	Vertical Drilling	Yes Precise to within 0.1°	Vertical Drilling	Yes	150/302	20,000 (25,000 & 30,000 on request)	None	No	3.9 NA
6.75" AutoTrak V (RSS for vertical drilling)	Continuous Proportional Steering	21 fully inclusive. Steering head = 7.2	OD: 6.75 ID: N/A	8.375 - 10.625	Vertical Drilling	Yes Precise to within 0.1°	Vertical Drilling	Yes	150/302	20,000 (25,000 & 30,000 on request)	None	No	3.1 NA
6.75" AutoTrak eXact (Can be integrated with pre-contoured drilling motor)	Continuous Proportional Steering	38 (fully inclusive of steering system & MWD) Steering head length = 9.3	OD: 6.75 ID: N/A	8.375 - 9.875	15	Yes Precise to within 0.2°	Build Force programmable from surface via downlink. Target inclination in 0.125° increments	Yes	150/302	20,000	None	Steering system: No MWD system: No	Inc. Other depe
4.75" AutoTrak eXact (Can be integrated with pre-contoured drilling motor)	Continuous Proportional Steering	39 (fully inclusive of steering system & MWD) Steering head length = 9.62	OD: 4.75 ID: N/A	5.75 - 6.75	15	Yes Precise to within 0.1°	Build Force programmable from surface via downlink. Target inclination in 0.125° increments	Yes	165/329	30,000	None	Steering system: No MWD system: No	Inc. Other depe

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Well-Guide 10-300	Point	30 collar	OD:10.25 ID: 2.813	12.25 - 18.25	3	Yes inclination and azimuth to within 0.1°	0 to 100%	Yes	150/302	20,000	None	No	
Well-Guide 10-400	Point	33 collar	OD:10.25 ID: 2.813	12.25 - 18.25	3	Yes inclination and azimuth to within 0.1°	0 to 100%	Yes	150/302	20,000	None	No	
Well-Guide 7-100	Point	25 collar	OD: 7.25 ID: 1.9375	8.375 - 9.875	7	Yes inclination and azimuth to within 0.1°	0 to 100%	Yes	150/302	20,000	None	No	
Well-Guide 7-200	Point	28 collar	OD: 7.25 ID: 1.9375	8.375 - 9.875	7	Yes inclination and azimuth to within 0.1°	0 to 100%	Yes	150/302	20,000	None	No	
Well-Guide 4-100	Point	24 collar	OD:4.75 ID: 1.25	5.875 - 6.75	12	Yes inclination and azimuth to within 0.1°	0 to 100%	Yes	150/302	20,000	None	No	

Nabors Drilling Services Steve Krase Andy Biem Neil Bird

OrientXpress Rotary Steerable Tool 700 Series	Hybrid	12.5	7.1 OD 1.6 ID	7 7/8" to 8 3/4	15	"Yes Inclination (+/-0.1) Azimuth (+/- 1 deg)"	Continuous	Yes	150°C	20,000	None	Yes (generator)	
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National Oilwell Varco

VectorEDGE	Push the bit	21	OD:6.5" ID: N/A	7-7/8" - 8 3/4	5	Yes (0.2)	1% and 1 to TF	No	120°C / 248°F	30,000	Optimized for Drilling conditions	Yes	
VectorZIEL 800	Push the bit	30	OD: 8" ID: N/A	12 1/4" - 13 7/8	5	Yes (0.1)	5%	Yes	150°C - 302°F	20,000	None	No	
VectorZIEL 600	Push the bit	28	OD: 6.75" ID: N/A	8 1/2" - 9 7/8	8	Yes (0.1)	5%	Yes	150°C - 302°F	20,000	None	No	

	Sensor distance (ft) Inc/Azm/GR/Res	Control from surface (Downlink) (Y/N)	If yes, tool control method	Rig time req'd to communicate change in target (minutes)	Minimum kickoff inclination (degrees)	Max RPM / WOB	Min flow rate (gpm)	Max flow rate (gpm)	LCM limits	Power source	Bit requirements	Integrated LWD?
/ NA / / NA	Y	Flow rate change	While drilling ahead	0	300 RPM 70 klbf	300	1,600	Steering system: None MWD system: 40 lb/bbl fine nutplug (higher conc. on request)	Turbine generator	Application specific	No	
/ NA / / NA	Y	Flow rate change	While drilling ahead	0	400RPM 55 klbf	200	900	Steering system: None MWD system: 40 lb/bbl fine nutplug (higher conc. on request)	Turbine generator	Application specific	No	
: 5.9 rs BHA endent	Y	Negative pulse from surface skid unit	While drilling ahead	0	400 RPM 56 klbf	300	750	Steering system: None MWD system: 40 lb/bbl fine nutplug (higher conc. on request)	Turbine generator	Application specific	Yes	
: 4.8 rs BHA endent	Y	Negative pulse from surface skid unit	While drilling ahead	0	400 RPM 35 klbs	475	1,325	Steering system: None 40 ppb (114 kg/m³) medium nut plug, cedar fiber	Turbine generator	Application specific	Yes	
	8 Azm	Inc/	Y	Rotary (or via mud motor)	12	0	150 RPM 70 klb	none (2.813 bore - no restriction)	None	Lithium batteries/rotation	Best bit for formation - Prefer 0.5 x hole diameter passive gauge	No - Can be operated below any LWD/MWD
	8 Inc/Azm		Y	Rotary (or via mud motor)	12	0	150 RPM 70 klb	none (2.813 bore - no restriction)	None	Lithium batteries/rotation	Best bit for formation - Prefer 0.5 x hole diameter passive gauge	Yes - integrated with Gyrodata MWD/LWD to give real-time near bit inc and azi
	5.5 Azm	Inc/	Y	Rotary (or via mud motor)	12	0	250 RPM 53 klb	none (1.9375 bore - no restriction)	None	Lithium batteries/rotation	Best bit for formation - Prefer 0.5 x hole diameter passive gauge	No - Can be operated below any LWD/MWD
	5.5 Azm/GR	Inc/	Y	Rotary (or via mud motor)	12	0	250 RPM 53 klb	none (1.9375 bore - no restriction)	None	Lithium batteries/rotation	Best bit for formation - Prefer 0.5 x hole diameter passive gauge	Yes - integrated with Gyrodata MWD/LWD to give real-time near bit inc, azi and gamma
	11.25 Inc/Azm/GR		Y	Rotary (or via mud motor)	12	0	250 RPM 30 klb	none (1.25" slick bore - no restriction)	None	Lithium batteries/rotation	Best bit for formation - Prefer 0.5 x hole diameter passive gauge	Yes - integrated with Gyrodata MWD/LWD to give real-time near bit inc, azi and gamma
	Inc/Azi 6.8ft Azi GR 22ft	Yes	Flow	3 mins (while drilling)	0	400 / 60K	400	700	None	Turbine alternator driven by mud flow	Nabors specifications preferred	Integrated with Nabors AccuMP or AccuSteer
	N/A	Y	Rotary	Avg 5 min	3	300 / 50,000	300	700	40 ppb med nut plug	9	Application Specific	No
	6/6/6/30	Y	Mud flow via surface skid	Avg 6 min	0	400 / 56,000	520	1100	Steering system none, MWD, 50ppb med nut plug	Turbine Generator	Application Specific	Yes
	4/4/4/29	Y	Mud flow via surface skid	Avg 6 min	0	400 / 45,000	320	650	Steering system none, MWD, 50ppb med nut plug	Turbine Generator	Application Specific	Yes

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VectorZIEL 400	Push the bit	26	OD: 4.75" ID: N/A	6" - 6 3/4"	8	Yes (0.1)	5%	Yes	150°C - 302°F	20,000	None	No	
VectorEXAKT 900	Push the bit	26	OD: 9" ID: N/A	14 3/4" - 17 1/2"	Vertical Drilling	Yes (0.1)	Vertical Drilling	Yes	150°C - 302°F	20,000	None	No	
VectorEXAKT 800	Push the bit	25	OD: 8" ID: N/A	12 1/4" - 13 7/8"	Vertical Drilling	Yes (0.1)	Vertical Drilling	Yes	150°C - 302°F	20,000	None	No	
VectorEXAKT 600	Push the bit	25	OD: 6.75" ID: N/A	8 1/2" - 9 7/8"	Vertical Drilling	Yes (0.1)	Vertical Drilling	Yes	150°C - 302°F	20,000	None	No	
Sanvean Technologies Scout Downhole													
9.625" Rotary Steerable Scout	Push	18.22	OD: 9.63 ID: 2.75	12.25 - 16.00	3	Yes +/- 0.1°	25%	Yes	150/302	20,000	None	No	
7.125" Rotary Steerable Scout	Push	14.11	OD: 7.13 ID: 1.63	8.5 - 8.75	6	Yes +/- 0.1°	25%	Yes	150/302	20,000	None	No	
Schlumberger +1-281-285-8500													
PowerDrive Archer 675	Hybrid-Point-the-bit	16.15	OD: 6.75 ID: N/A	8.375 - 9.675	15	Yes, Azimuth and Inclination +/- 0.1°	1% and 1° TF resolution	Adjustable on Fully Rotating Tool	150/302	20,000	Optimized for Drilling conditions	Optimized for Drilling conditions	Inc 9.9 GR
PowerDrive Archer 475	Hybrid-Point-the-bit	14.98	OD: 4.75 ID: N/A	5.875 - 6.75	18	Yes, Azimuth and Inclination +/- 0.1°	1% and 1° TF resolution	Adjustable on Fully Rotating Tool	150/302	20,000	Optimized for Drilling conditions	Optimized for Drilling conditions	Inc 8.41 GR
PowerDrive Orbit 1100	Hybrid Push-the-bit	15.22	OD: 11 ID: N/A	20 - 28	2	Yes, Azimuth and Inclination +/- 0.1°	1% and 1° TF resolution	Adjustable on Fully Rotating Tool	150/302	20,000 (35,000 Optional)	Optimized for Drilling conditions	Optimized for Drilling conditions	Inc 8.99 GR
PowerDrive Orbit G2 900	Hybrid Push-the-bit	13.94	OD: 9 ID: N/A	12 - 18.5	5	Yes, Azimuth and Inclination +/- 0.1°	1% and 1° TF resolution	Adjustable on Fully Rotating Tool	150/302	20,000 (35,000 Optional)	Optimized for Drilling conditions	Optimized for Drilling conditions	
PowerDrive Orbit 825	Hybrid Push-the-bit	13.84	OD: 8.25 ID: N/A	10.625 - 11.625	6	Yes, Azimuth and Inclination +/- 0.1°	1% and 1° TF resolution	Adjustable on Fully Rotating Tool	150/302	20,000 (35,000 Optional)	Optimized for Drilling conditions	Optimized for Drilling conditions	
PowerDrive Orbit G2 675	Hybrid Push-the-bit	13.43	OD: 6.75 ID: N/A	8.375 - 9.675	8	Yes, Azimuth and Inclination +/- 0.1°	1% and 1° TF resolution	Adjustable on Fully Rotating Tool	150/302 (175/350 optional)	20,000 (35,000 Optional)	Optimized for Drilling conditions	Optimized for Drilling conditions	
PowerDrive Orbit G2 475	Hybrid Push-the-bit	13.38	OD: 4.75 ID: N/A	5.875 - 6.75	10	Yes, Azimuth and Inclination +/- 0.1°	1% and 1° TF resolution	Adjustable on Fully Rotating Tool	150/302 (175/350 optional)	20,000	Optimized for Drilling conditions	Optimized for Drilling conditions	
PowerV 1100	Hybrid Push-the-bit	15.22	OD: 11 ID: N/A	20 - 28	Vertical Drilling	Yes, Azimuth and Inclination +/- 0.1°	1% and 1° TF resolution	Adjustable on Fully Rotating Tool	150/302	20,000 (35,000 Optional)	Optimized for Drilling conditions	Optimized for Drilling conditions	
PowerV 900	Hybrid Push-the-bit	14.05	OD: 9 ID: N/A	12 - 18.5	Vertical Drilling	Yes, Azimuth and Inclination +/- 0.1°	1% and 1° TF resolution	Adjustable on Fully Rotating Tool	150/302	20,000 (35,000 Optional)	Optimized for Drilling conditions	Optimized for Drilling conditions	
PowerV 825	Hybrid Push-the-bit	13.84	OD: 8.25 ID: N/A	10.625 - 11.625	Vertical Drilling	Yes, Azimuth and Inclination +/- 0.1°	1% and 1° TF resolution	Adjustable on Fully Rotating Tool	150/302	20,000 (35,000 Optional)	Optimized for Drilling conditions	Optimized for Drilling conditions	
PowerV 675	Hybrid Push-the-bit	13.53	OD: 6.75 ID: N/A	8.375 - 9.675	Vertical Drilling	Yes, Azimuth and Inclination +/- 0.1°	1% and 1° TF resolution	Adjustable on Fully Rotating Tool	150/302 (175/350 optional)	20,000 (35,000 Optional)	Optimized for Drilling conditions	Optimized for Drilling conditions	
PowerV 475	Hybrid Push-the-bit	13.5	OD: 4.75 ID: N/A	5.875 - 6.75	Vertical Drilling	Yes, Azimuth and Inclination +/- 0.1°	1% and 1° TF resolution	Adjustable on Fully Rotating Tool	150/302 (175/350 optional)	20,000	Optimized for Drilling conditions	Optimized for Drilling conditions	
PowerDrive Xcel 675	Point-the-bit	24.93	OD: 6.75 ID: N/A	8.375 - 10.625	8	Yes, Azimuth and Inclination +/- 0.1°	1% and 1° TF resolution	Adjustable on Fully Rotating Tool	150/302	20,000	None	Optimized for Drilling conditions	

	Sensor distance (ft) Inc/Azm/GR/Res	Control from surface (Downlink) (Y/N)	If yes, tool control method	Rig time req'd to communicate change in target (minutes)	Minimum kickoff inclination (degrees)	Max RPM / WOB	Min flow rate (gpm)	Max flow rate (gpm)	LCM limits	Power source	Bit requirements	Integrated LWD?
	4/4/4/27	Y	Mud flow via surface skid	Avg 6 min	0	400 / 16,000	230	300	Steering system none, MWD, 50ppb med nut plug	Turbine Generator	Application Specific	Yes
	6/NA/6/NA	Y	Mud flow via surface skid	Avg 6 min	Vertical Drilling	300 / 90,000	630	1500	Steering system none, MWD, 50ppb med nut plug	Turbine Generator	Application Specific	No
	6/NA/6/NA	Y	Mud flow via surface skid	Avg 6 min	Vertical Drilling	300 / 56,000	520	1100	Steering system none, MWD, 50ppb med nut plug	Turbine Generator	Application Specific	No
	4/NA/4/NA	Y	Mud flow via surface skid	Avg 6 min	Vertical Drilling	400 / 45,000	320	650	Steering system none, MWD, 50ppb med nut plug	Turbine Generator	Application Specific	No
	8.42, 9.67, NA, NA	Y	Rotary	3 Minutes	0	400 RPM/85 kbf	500 psi pressure drop at bit	1800	60 lb/bbl med nut plug	Lithium Batteries	Application Specific	No
	5.17, 6.42, NA, NA	Y	Rotary	3 Minutes	0	400 RPM/55 kbf	500 psi pressure drop at bit	800	60 lb/bbl med nut plug	Lithium Batteries	Application Specific	No
/ Azm / 12.01 / 9.01	Y	Flow rate and/or RPM change	While drilling ahead	0	350 RPM As per Smith PDC bit guidelines	220	650	50 lb/bbl med. nut plug	Turbine generator	Application specific	Modular	
/ Azm / 10.51 / 7.51	Y	Flow rate and/or RPM change	While drilling ahead	0	350 RPM As per Smith PDC bit guidelines	130	355	35 lb/bbl med. nut plug	Turbine generator	Application specific	Modular	
/ Azm / 11.19 / 8.19	Y	Flow rate and/or RPM change	While drilling ahead	0	350 RPM 225 kbf	280	2000	50 lb/bbl med. nut plug	Turbine generator	Application specific	Modular	
Inc / Azm 7.71 / 9.91 GR 6.92	Y	Flow rate and/or RPM change	While drilling ahead	0	350 RPM 370 kbf	280	2,000	50 lb/bbl med. nut plug	Turbine generator	Application specific	Modular	
Inc / Azm 7.94 / 10.14 GR 7.14	Y	Flow rate and/or RPM change	While drilling ahead	0	350 RPM 270 kbf	280	2000	50 lb/bbl med. nut plug	Turbine generator	Application specific	Modular	
Inc / Azm 7.10 / 9.30 GR 6.31	Y	Flow rate and/or RPM change	While drilling ahead	0	350 RPM 180 kbf	210	970	50 lb/bbl med. nut plug	Turbine generator	Application specific	Modular	
Inc / Azm 6.85/ 8.95 GR 5.96	Y	Flow rate and/or RPM change	While drilling ahead	0	350 RPM 31 kbf	120	355	35 lb/bbl med. nut plug	Turbine generator	Application specific	Modular	
Inc / Azm 8.99 / 11.19 GR 8.19	Y	Flow rate and/or RPM change	While drilling ahead	0	350 RPM 225 kbf	280	2000	50 lb/bbl med. nut plug	Turbine generator	Application specific	Modular	
Inc / Azm 7.71 / 9.91 GR 6.92	Y	Flow rate and/or RPM change	While drilling ahead	0	350 RPM 370 kbf	280	2,000	50 lb/bbl med. nut plug	Turbine generator	Application specific	Modular	
Inc / Azm 7.94 / 10.14 GR 7.14	Y	Flow rate and/or RPM change	While drilling ahead	0	350 RPM 270 kbf	280	2000	50 lb/bbl med. nut plug	Turbine generator	Application specific	Modular	
Inc / Azm 7.10 / 9.30 GR 6.31	Y	Flow rate and/or RPM change	While drilling ahead	0	350 RPM 180 kbf	210	970	50 lb/bbl med. nut plug	Turbine generator	Application specific	Modular	
Inc / Azm 6.85/ 8.95 GR 5.96	Y	Flow rate and/or RPM change	While drilling ahead	0	350 RPM 31 kbf	120	355	35 lb/bbl med. nut plug	Turbine generator	Application specific	Modular	
Inc / Azm 14.5 / 12.9 GR 15.83	Y	Flow rate and/or RPM change	While drilling ahead	0	350 RPM 55 kbf	260	805	50 lb/bbl med. nut plug	Turbine generator	Application specific - bi-center compatible	Modular	

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PowerDrive Xcel 900	Point-the-bit	27.89	OD: 9.00 ID: N/A	12-17.5	6.5	Yes, Azimuth and Inclination +/- 0.1°	1% and 1° TF resolution	Adjustable on Fully Rotating Tool	150/302	20,000	None	Optimized for Drilling conditions
PowerDrive ICE	Hybrid Push-the-bit	34.26	OD: 6.75 ID: N/A	8.5	8	Yes, Azimuth and Inclination +/- 0.1°	1% and 1° TF resolution	Adjustable on Fully Rotating Tool	200/392	30,000	Optimized for Drilling conditions	Optimized for Drilling conditions
Scientific Drilling International												
HALO 650	Push-the-bit / proportional control	35.5 ft	OD: 6.50" ID: N/A	7.875" - 9.875"	15	Yes, azimuth to 0.5 deg, inclination to 0.125 deg	Controllable in 12.5% Force or 0.125 deg increments	Yes, in Autopilot modes deviation force will auto adjust.	150/302	20k psi	None	Steering Unit - No. MWD - Yes.
HALO 500	Push-the-bit / proportional control	35.1 ft	OD: 5.00" ID: N/A	5.875"-6.75"	13	Yes, azimuth to 0.5 deg, inclination to 0.125 deg	Controllable in 12.5% Force or 0.125 deg increments	Yes, in Autopilot modes deviation force will auto adjust.	150/302	20k psi	None	Steering Unit - No. MWD - Yes.
TerraVici Drilling Solutions Kevin McMillin kevin.mcmillin@terravici.com												
TerraVici 4.75" RSS	Point-the-bit	20	4.75	6.00 - 6.75	15	Yes	0-100% and 1° TF resolution	Yes	150 / 302	20,000	None	Yes
TerraVici 6.5" RSS	Point-the-bit	22	6.5	7.875 - 9.875	12	Yes	0-100% and 1° TF resolution	Yes	150 / 302	20,000	None	Yes
TerraVici 8" RSS	Point-the-bit	23	8	9.875 - 12.25	4	Yes	0-100% and 1° TF resolution	Yes	150 / 302	20,000	None	Yes
Weatherford John Rice, Global Service Line Manager - RSS John.Rice@weatherford.com												
Revolution 825 rotary steerable system (Core, Heat)	Point	17.8	OD: 8.25 ID: 2.75	10.625 - 18.25	7.5	Yes	Variable	Yes	149/300 Core 175/347 Heat	25,000 Core 30,000 Heat	None	No
Revolution 675 rotary steerable system (Core, Heat)	Point	14.8	OD: 6.75 ID: 2.0	7.875 - 9.875	10	Yes	Variable	Yes	149/300 Core 175/347 Heat	25,000 Core 30,000 Heat	None	No
Revolution 475 rotary steerable system (Core, Heat)	Point	12.9	OD: 4.75 ID: 1.75	5.875 - 6.75	10	Yes	Variable	Yes	149/300 Core 175/347 Heat	25,000 Core 30,000 Heat	None	No
Magnus 1100 Rotary Steerable System	Push	22.7	OD: 11.00 ID: 2.75	14.75 - 18.50	5	Yes	Variable	Yes	150/302	25,000	None	Yes
Magnus 950 Rotary Steerable System	Push	22.7	OD: 9.50 ID: 2.75	12.00 - 14.50	6	Yes	Variable	Yes	150/302	25,000	None	Yes
Magnus 675 Rotary Steerable System	Push	21.5	OD: 6.75 ID: 2.0	8.375 - 9.875	10	Yes	Variable	Yes	150/302	30,000	None	Yes

Sensor distance (ft) Inc/Azm/GR/Res	Control from surface (Downlink) (Y/N)	If yes, tool control method	Rig time req'd to communicate change in target (minutes)	Minimum kickoff inclination (degrees)	Max RPM / WOB	Min flow rate (gpm)	Max flow rate (gpm)	LCM limits	Power source	Bit requirements	Integrated LWD?
Inc / Azm 16.2 / 14.6 GR 10.89	Y	Flow rate and/or RPM change	While drilling ahead	0	350 RPM 75 klbf	260	1,800	50 lb/bbl med. nut plug	Turbine generator	Application specific - bi-center compatible	Modular
Inc / Azm 13.30/13.30	Y	Flow rate and/or RPM change	While drilling ahead	0	350 RPM 105.6 klbf	275	800	50 lb/bbl med. nut plug	Turbine generator	Application specific	Modular
PWD - 2.3' NBI/NBA - 5.9' AZ GR - 15.4' Survey - 21.0'	Y	Rig pumps - variable flow rate.	3-6 mins with confirmation. Downlinks can be performed while drilling ahead. Full MWD decoding possible during downlink.	Vertical	350 RPM / 60 klbs WOB	350 gpm	600 gpm	50 ppb medium fibrous	System powered by downhole generator. Lithium battery used for flow off surveys.	Application Specific	Single collar loadout, with steering unit and integrated MWD system.
PWD - 2.1' NBI/NBA - 5.5' AZ GR - 14.4' Survey - 21.0'	Y	Rig pumps - variable flow rate.	3-6 mins with confirmation. Downlinks can be performed while drilling ahead. Full MWD decoding possible during downlink.	Vertical	350 RPM / 30 klbs WOB	130 gpm	360 gpm	50 ppb medium fibrous	System powered by downhole generator. Lithium battery used for flow off surveys.	Application Specific	Single collar loadout, with steering unit and integrated MWD system.
Inc / Azm 10 / 10	Y	Flow rate change, MWD direct-connect, or short hop	While drilling ahead	0	250 RPM / 25 klbf	180	400	40 lb/bbl med. nut plug	Turbine generator	Application Specific	No - Will function below any MWD/ LWD
Inc / Azm 10 / 10	Y	Flow rate change, MWD direct-connect, or short hop	While drilling ahead	0	250 RPM / 50 klbf	320	750	40 lb/bbl med. nut plug	Turbine generator	Application Specific	No - Will function below any MWD/ LWD
Inc / Azm 10 / 10	Y	Flow rate change, MWD direct-connect, or short hop	While drilling ahead	0	250 RPM / 50 klbf	320	750	40 lb/bbl med. nut plug	Turbine generator	Application Specific	No - Will function below any MWD/ LWD
Brad Zukiwsky, Product Champion - Magnus RSS bradley.zukiwsky@weatherford.com www.weatherford.com											
14/14/16/42	Y	Drillstring rotation or negative pulse from surface	Typically < 3	0	180 RPM 90 klb	No minimum requirement	1,500	Steering system: None MWD system: 80 lb/bbl fine/ med (higher conc. on request)	Lithium batteries	Long passive gauge PDC	Yes
12/ 12/14/40	Y	Drillstring rotation or negative pulse from surface	Typically < 3	0	200 RPM 50 klb	No minimum requirement	750	Steering system: None MWD system: 80 lb/bbl fine/ med (higher conc. on request)	Lithium batteries	Long passive gauge PDC	Yes
9/ 9/16/39	Y	Drillstring rotation or negative pulse from surface	Typically < 3	0	200 RPM 25 klb	No minimum requirement	350	Steering system: None MWD system: 80 lb/bbl fine/ med (higher conc. on request)	Lithium batteries	Long passive gauge PDC	Yes
7/7/7/47	Y	Negative pulse from surface	Typically < 3	0	300 RPM / 90 klb	No minimum requirement	1,400	80 lb/bbl fine/ med (higher conc. on request)	Turbine Generator or Lithium batteries	None	Yes
7/7/7/47	Y	Negative pulse from surface	Typically < 3	0	300 RPM / 90 klb	No minimum requirement	1,200	80 lb/bbl fine/ med (higher conc. on request)	Turbine Generator or Lithium batteries	None	Yes
6/6/6/444	Y	Negative pulse from surface	Typically < 3	0	300 RPM / 50 klb	No minimum requirement	700	80 lb/bbl fine/ med (higher conc. on request)	Turbine Generator or Lithium batteries	None	Yes