

INTELLISERV™ PRODUCT CATALOG



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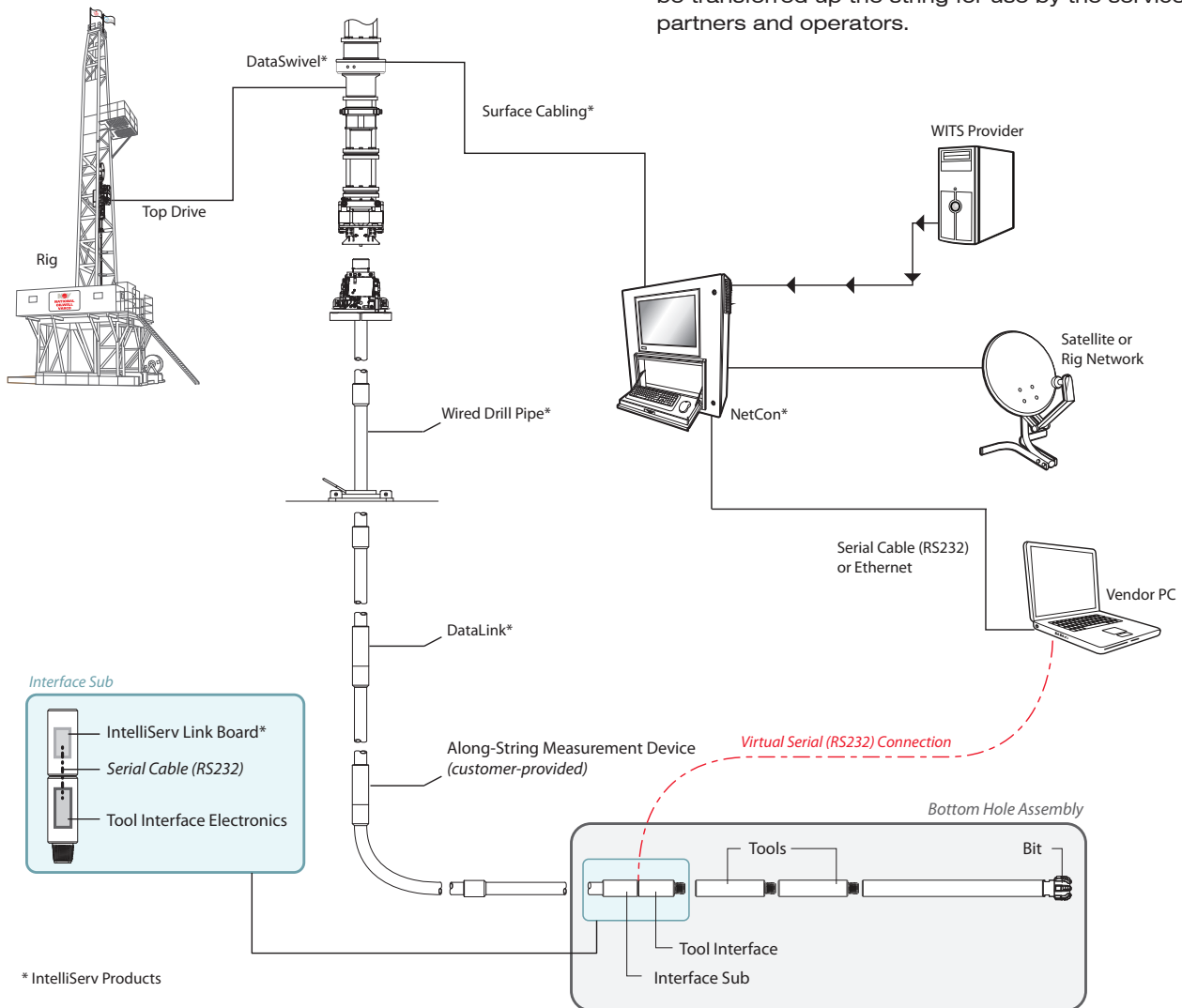


IntelliServ™ Network – General Overview

The IntelliServ™ Network revolutionizes the drilling industry, providing drilling engineers with access to critical information at speeds up to 57,600 bits per second. Commands from the surface or between downhole devices can be sent, received and acted upon instantaneously to significantly improve monitoring and measurement of all vital data during downhole operations. When run in parallel with a mud pulse device, full telemetry redundancy dramatically reduces the risk of data transmission loss, reducing unplanned trips and eliminating associated non-productive time and well costs. The IntelliServ Network is an open architecture system that allows connectivity of any network-enabled downhole device, regardless of vendor. An almost limitless number of discrete tools can be networked, ranging from standard direction and inclination sensors to more complex petrophysical logging while drilling, rotary steerable, wireline, well intervention, well completion and even fishing tools.

There are 5 main components used to run the IntelliServ Network:

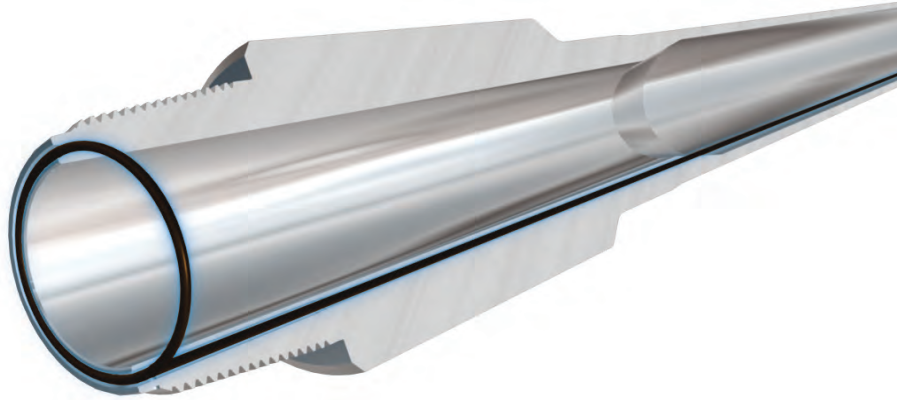
- **Wired Drillstring components (Drill Pipe, Heavy-Weights and Drill Collars)** — transmits high-definition broadband downhole data with inductive coupling at each connection that enables communication in all drilling fluids
- **DataLinks** — cleans and boosts the data signal for optimal signal-to-noise ratio along the network
- **NetCon and Surface Cabling** — securely transfers data and tool commands to and from local and remote users in real time
- **DataSwivel** — extracts and relays data from rotating drill pipe to the Network Controller, NetCon, to be used by service partners and operators.
- **Along String Measurement Devices** — IntelliServ compatible measurement devices provided by third party partners positioned at multiple points along the drillstring. The data from the measurements will be transferred up the string for use by the service partners and operators.



* IntelliServ Products

Wired Drill Pipe

The IntelliServ™ Network is based on premium quality Grant Prideco tubulars with proprietary Grant Prideco Double Shoulder™ connections (XT™, TT™ or GPDS™ depending on size). Each tubular is modified to include a high-speed, high-strength DataCable along the internal diameter and patented IntelliCoil™ in the connection secondary shoulders.



| Wired Drill Pipe | | | | | | | | |
|-------------------------|------------|-----------------------|----------------|----------------|---------------|---------------|---------------|---------------|
| Size | Connection | Grades | Wall Thickness | Nominal Weight | Tool Joint ID | Tool Joint OD | Maximum RMUT | Minimum MUT |
| 4" Wired Drill Pipe | XT38 | S-135, CYX-105 | 0.330 | 14.0 lb/ft | 2.438 | 4.875 | 17,149 ft-lbs | 14,291 ft-lbs |
| 4" Wired Drill Pipe | TT390 | S-135, CYX-105 | 0.330 | 14.0 lb/ft | 2.438 | 5.000 | 28,288 ft-lbs | 21,760 ft-lbs |
| 5" Wired Drill Pipe | GPDS50 | S-135, CYX-105, V-150 | 0.362 | 19.5 lb/ft | 3.250 | 6.625 | 37,179 ft-lbs | 30,982 ft-lbs |
| 5-1/2" Wired Drill Pipe | TT550 | Z-140, S-135, V-150 | 0.361 | 21.9 lb/ft | 4.000 | 6.750 | 56,306 ft-lbs | 43,312 ft-lbs |
| 5-7/8" Wired Drill Pipe | XT57 | Z-140, S-135, V-150 | 0.361 | 23.4 lb/ft | 4.250 | 7.000 | 46,840 ft-lbs | 39,033 ft-lbs |
| 5-7/8" Wired Drill Pipe | XT57 | Z-140, S-135, V-150 | 0.415 | 26.3 lb/ft | 4.250 | 7.000 | 46,840 ft-lbs | 39,033 ft-lbs |
| 6-5/8" Wired Drill Pipe | GPDS65 | Z-140, S-135, V-150 | 0.362 | 27.7 lb/ft | 4.250 | 8.500 | 83,798 ft-lbs | 69,832 ft-lbs |
| 6-5/8" Wired Drill Pipe | GPDS65 | Z-140, S-135, V-150 | 0.522 | 40.0 lb/ft | 4.250 | 8.500 | 83,798 ft-lbs | 69,832 ft-lbs |
| 6-5/8" Wired Drill Pipe | GPDS65 | Z-140, S-135, V-150 | 0.625 | 34.0 lb/ft | 4.250 | 8.500 | 83,798 ft-lbs | 69,832 ft-lbs |

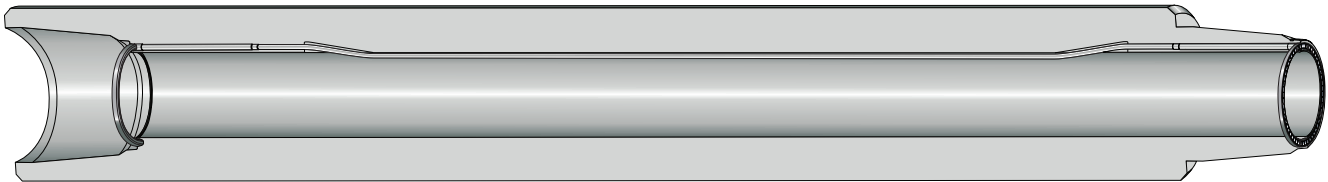
Features and Options

- Internal Plastic Coating: TK™ -34, TK™ -34P
- Hardbanding: Duraband, TCSTi
- Extended tool joints
- Range 2 or Range 3
- Other options available upon request

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BHA Components*

Similar to the Wired Drill Pipe, the IntelliServ™ Network uses premium quality Grant Prideco Heavy Weight Drill Pipe with GPDS, TT and XT connections as well as premium quality Grant Prideco Drill Collars with DC, GPDS, TT and XT connection. These BHA components have been modified to include a high-speed, high-strength DataCable along the internal diameter and patented induction coils in the connection secondary shoulders. A full range of crossovers and saver subs are available upon request.



| Wired Heavy-Weight Drill Pipe | | | | | | | |
|-------------------------------|------------|------------------------|-------------------|---------|-------------|---------------|---------------|
| Size | Connection | Grades | Wear Section Type | Range | Weight | Tool Joint ID | Tool Joint OD |
| 4" HW Drill Pipe | XT38 | HW-95, HW-105, Non-Mag | Tri-Spiral | Range 2 | 29.82 lb/ft | 2.438 | 4.875 |
| 4" HW Drill Pipe | TT390 | HW-95, HW-105, Non-Mag | Tri-Spiral | Range 2 | 30.35 lb/ft | 2.438 | 5.000 |
| 5" HW Drill Pipe | GPDS50 | HW-95, HW-105, Non-Mag | Tri-Spiral | Range 2 | 51.73 lb/ft | 3.000 | 6.625 |
| 5-1/2" HW Drill Pipe | TT550 | HW-95, HW-105, Non-Mag | Tri-Spiral | Range 2 | 58.20 lb/ft | 4.000 | 6.750 |
| 5-7/8" HW Drill Pipe | XT57 | HW-95, HW-105, Non-Mag | Tri-Spiral | Range 2 | 60.37 lb/ft | 4.000 | 7.000 |
| 6-5/8" HW Drill Pipe | GPDS65 | HW-95, HW-105, Non-Mag | Tri-Spiral | Range 2 | 84.26 lb/ft | 4.250 | 8.250 |

| Wired Drill Collars | | | | | | | |
|---------------------|------------|---------------|---------------|--------------|----------------|---------------|---------------|
| Size | Connection | Grades | Body Type | Weight | Wall Thickness | Tool Joint ID | Tool Joint OD |
| 4-7/8" Drill Collar | XTF38 | 4145, Non-Mag | Spiral, Slick | 47.58 lb/ft | 1.219 | 2.438 | 4.875 |
| 5" Drill Collar | XTF38 | 4145, Non-Mag | Spiral, Slick | 50.88 lb/ft | 1.375 | 2.250 | 5.000 |
| 6-1/2" Drill Collar | GPDS50 | 4145, Non-Mag | Spiral, Slick | 88.78 lb/ft | 1.750 | 3.000 | 6.500 |
| 8" Drill Collar | DC58 | 4145, Non-Mag | Spiral, Slick | 146.85 lb/ft | 2.500 | 3.000 | 8.000 |
| 9.5" Drill Collar | DC69 | 4145, Non-Mag | Spiral, Slick | 208.26 lb/ft | 2.500 | 3.500 | 9.500 |

Features and Options

- Hardbanding
- Internal coating
- Slip/Elevator groove

* Crossovers available upon request

BHA Components* (continued)

| Stabilizers | | |
|------------------------|------------|------------------|
| Size | Connection | Blade Size Range |
| 4-5/8" Body Stabilizer | XT38 | 6-1/8" - 6-3/4" |
| 6-1/2" Body Stabilizer | GPDS50 | 8-3/8" - 9-1/2" |
| 8" Body Stabilizer | DC58 | 10-5/8" - 26" |
| 9-1/2" Body Stabilizer | DC69 | 12-1/4" - 26" |

Ancillary Components**

NOV IntelliServ can supply a range of common drillstring ancillary components wired for use on the IntelliServ Network.

| Ancillary Components | | |
|----------------------|--------|-------------|
| Component | Sizes | Connections |
| Float Subs | 4-7/8" | XT38 |
| | 6-1/2" | GPDS50 |
| | 6-5/8" | GPDS50 |
| | 8" | DC58 |
| Dart Subs | 7" | XT57 |
| | 4-7/8" | XT38 |
| Safety Valves | 5-1/4" | XT38 |
| | 7" | GPDS50 |
| | 7-3/8" | XT57 |
| Pump In Subs | 6-5/8" | GPDS50 |

* Crossovers available upon request

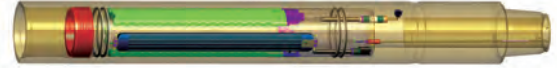
** Steel or non-magnetic options

¹ OD and ID are determined based upon connection type.

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DataLinks

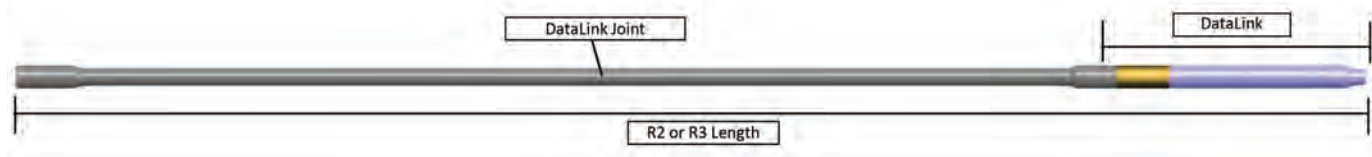
The IntelliServ™ Network is created when DataLinks are installed into the wired drill string. DataLinks contain signal amplification electronics and a self-contained power source to enable the data signal to be amplified and transmitted reliably along the drill string. DataLinks are designed as a 6.0 ft long sub with drill pipe connections on both ends. These can be added to conventional wired drill pipe stands for racking and tripping operations. IntelliServ can also supply DataLink joints in both drill pipe and HWDP configurations, which can be mated to the DataLink to create a conventional Range 2 or Range 3 length assembly. DataLinks are typically placed every 1,400 – 1,500 feet along the drill string and have a battery life of over 1,000 hours.



| DataLinks | | | | | | | |
|-----------------|------------|-----------|-----------|--------|---------------|-------------------|--------------|
| DataLink | Connection | Box TJ OD | Pin TJ OD | Min ID | Length | Temperature Range | Battery Life |
| 4" DataLink | XT38 | 4.875" | 4.975" | 1.750" | 6.0 ft / 1.9m | -40 to 150 C | 750 hrs |
| 4" DataLink | TT390 | 5.000" | 4.975" | 1.750" | 6.0 ft / 1.9m | -40 to 150 C | 850 hrs |
| 5" DataLink | DS50 | 6.625" | 6.625" | 3.250" | 6.0 ft / 1.9m | -40 to 150 C | 1000 hrs |
| 5½" DataLink | TT550 | 6.750" | 7.000" | 3.500" | 6.0 ft / 1.9m | -40 to 150 C | 1250 hrs |
| 5-7/8" DataLink | XT57 | 7.000" | 7.000" | 3.500" | 6.0 ft / 1.9m | -40 to 150 C | 1000 hrs |
| 6-5/8" DataLink | DS65 | 8.500" | 8.500" | 4.125" | 6.0 ft / 1.9m | -40 to 150 C | 1250 hrs |

| DataLink | Connection | Length | Additional Information |
|------------------------------|---------------|----------------|---|
| Drillpipe DataLink Joints | | | |
| 4" DataLink DP (Range 2) | XT38 or TT390 | 25.5ft / 7.8m | |
| 4" DataLink DP (Range 3) | XT38 or TT390 | 38.5ft / 11.7m | |
| 5" DataLink DP (Range 2) | DS50 | 25.5ft / 7.8m | |
| 5" DataLink DP (Range 3) | DS50 | 38.5ft / 11.7m | |
| 5½" DataLink DP (Range 2) | TT550 | 25.5ft / 7.8m | |
| 5½" DataLink DP (Range 3) | TT550 | 38.5ft / 11.7m | |
| 5-7/8" DataLink DP (Range 2) | XT57 | 25.5ft / 7.8m | Available in 0.361" or 0.415" wall thicknesses |
| 5-7/8" DataLink DP (Range 3) | XT57 | 38.5ft / 11.7m | Available in 0.361" or 0.415" wall thicknesses |
| 6-5/8" DataLink DP (Range 2) | DS65 | 25.5ft / 7.8m | Available in 0.362", 0.522" and 0.625" wall thicknesses |
| 6-5/8" DataLink DP (Range 3) | DS65 | 38.5ft / 11.7m | |
| HWDP DataLink Joints | | | |
| 4" DataLink HWDP | XT38 or TT390 | 25.5ft / 7.8m | |
| 5" DataLink HWDP | DS50 | 25.5ft / 7.8m | |
| 5 ½" DataLink HWDP | TT550 | 25.5ft / 7.8m | |
| 5-7/8" DataLink HWDP | XT57 | 25.5ft / 7.8m | |
| 6-5/8" DataLink HWDP | DS65 | 25.5ft / 7.8m | |
| Drill Collar DataLink Joints | | | |
| 4-7/8" DataLink Drill Collar | XTF38 | 25.5ft / 7.8m | |
| 6½" DataLink Drill Collar | DS50 | 25.5ft / 7.8m | |

DataLink Assembly Design



* Dependant upon operating conditions, battery life refers to active Network hours. DataLink enters lower power sleep mode when not active.

** NOV IntelliServ recommends additional units for service contingency. Consult NOV IntelliServ for DataLink spacing guidance.

Surface System

The IntelliServ Surface System is a group of products that consists of an IntelliServ network controller (NetCon), testing fixtures of various sizes, and NetPulse a functional integrated pipe tester. NetCon securely transfers data and tool commands to and from local and remote users in real time. Multiple discrete users can be connected (via serial or Ethernet protocol), allowing independent, simultaneous use of the network by different tool vendors. NetCon also includes the ability to test the network periodically to ensure a constant flow of downhole data.



NetCon

| NetCon | | | | | | | |
|--------------------------------------|-----------|-------|-------|---------|--|-------------------|---|
| Description | Height | Width | Depth | Weight | Certifications* | Power Requirement | Data Connections |
| NetCon - land, included internal UPS | 36" | 30" | 12" | 199 lbs | Outputs: ATEX/IECEX Class I, Zone 0 Group IIB and FM US/CA Class I, Div. 1, Groups C, D. Overall: CE | 100-240 V AC | RS-232 WITS - Ethernet, Swivel - Twinaxial, Testing - Twinaxial |
| NetCon - offshore, no internal UPS | 36" | 30" | 12" | 185 lbs | Outputs: ATEX/IECEX Class I, Zone 0 Group IIB and FM US/CA Class I, Div. 1, Groups C, D. Overall: CE | 100-240 V AC | RS-232 WITS - Ethernet, Swivel - Twinaxial, Testing - Twinaxial |
| Adjustable Stand for the NetCon | 24" - 36" | 36" | 20" | 180 lbs | (Not Applicable) | (Not Applicable) | (Not Applicable) |
| External Touchscreen Monitor Kit | 19" - 24" | 24" | 11" | 50 lbs | CE, Protection Class IP 65 | (Not Applicable) | (Not Applicable) |
| Shipping Case for NetCon | 19" | 53" | 43" | 125 lbs | Certifications: Mil. Spec., air and water tight, dust proof, corrosion resistant | (Not Applicable) | (Not Applicable) |

| Surface Cabling** | | |
|---|----------------------|------------------------------|
| Description | # of Cables Included | # of Junction Boxes Included |
| Basic Surface Cabling Kit | 20 | 8 |
| Basic Surface Cabling Kit (designed for basic offshore rigs where cables are cut to length upon installation) | 20 | 8 |

| NetPulse | | | | | | | |
|---|--------|-------|--------|----------|-----------------|--------------------|--------------|
| Description | Height | Width | Length | Weight | Certifications* | Power Requirements | Battery life |
| NetPulse - Complete system with Cart and Elec. Toolbox AC and Battery powered | 59.8" | 32" | 59.8" | ~200 lbs | CE | 100-240 V AC | 3.5 hours |
| NetPulse - Electronics tool box AC and Battery Powered | 27" | 19.3" | 20.3" | ~25 lbs | CE | 100-240 V AC | 3.5 hours |

| Test Fixtures | |
|--------------------------|-----------------|
| Description | Connection Type |
| Slimline Testing Fixture | DS50 |
| Slimline Testing Fixture | XT57 |
| Slimline Testing Fixture | DC58 |
| Slimline Testing Fixture | XT38 |
| Slimline Testing Fixture | DS65 |
| Slimline Testing Fixture | NC61 |
| Slimline Testing Fixture | DC69 |
| Slimline Testing Fixture | TT390 |
| Slimline Testing Fixture | TT550 |



Test Fixtures



NetPulse

* Certifications for these products are pending approval.

** Other specialized Surface Cabling Kits and additional individual or special cables are available upon request.

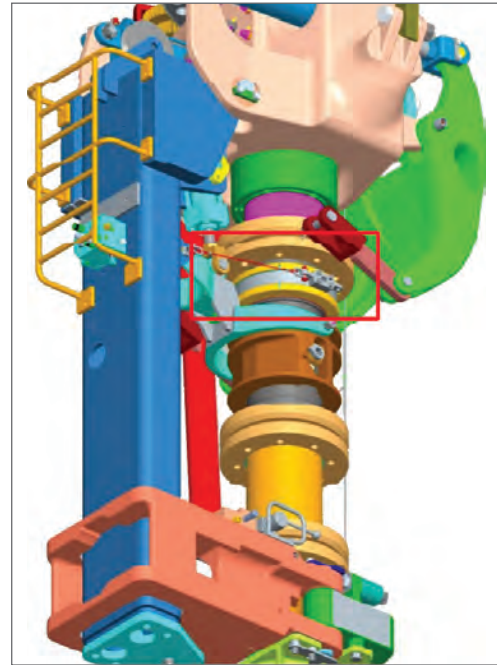
DataSwivel Installation Kit*

A key component of the IntelliServ™ Network is the DataSwivel which provides the interface between rotating and stationary environments. There is a requirement to insert an IntelliServ™ DataSwivel on the top of the Network integrated with the upper IBOP on the Top Drive Assembly. This allows for transfer of data from the rotational string to a stationary component. There are several options that may be used to insert the needed components into the top drive assembly to allow for this data transfer. Surface data cabling is configured to meet the requirements individual rig requirements.

IntelliServ has developed DataSwivels for the following Top Drive models.

| DSIK Models | |
|------------------------|-----------------|
| Partner | Top Drive Model |
| Maritime Hydraulics | DDM-1000 |
| National Oilwell Varco | TDS-11 |
| National Oilwell Varco | TDS-4 |
| National Oilwell Varco | HPS-SG |
| National Oilwell Varco | HPS-KT |
| National Oilwell Varco | TDS-7 |
| National Oilwell Varco | TDS-3 |
| National Oilwell Varco | TDS-8 |
| National Oilwell Varco | PS2-650/750 |

* Additional models can be engineered upon request.



DataSwivel, shown in yellow, integrated into the TDS-8 Top Drive Assembly

Drill String Accessories from Partners

NOV IntelliServ works closely with leading downhole and surface tool providers to make available a wide array of other wired drill string components, including drilling jars, underreamers, accelerators, and roller reamers.

The following table lists the range of drilling tools that have been developed to operate on the IntelliServ Network using a wired variant.



| BHA Components | | | | | |
|----------------|-----------------------------|---------|------------|-------------------------------|--|
| Component | Manufacturer | Size | Connection | Additional Description | |
| Jar | Weatherford® | 6-1/2" | XT57 | Hydro-Mechanical | |
| Jar | Weatherford® | 8" | DC58 | Hydro-Mechanical | |
| Jar | Weatherford® | 8" | XT57 | Hydro-Mechanical | |
| Jar | NOV | 4-3/4" | XT38 | Hydro-Mechanical | |
| Jar | NOV | 6-1/2" | GPDS50 | Hydro-Mechanical | |
| Jar | NOV | 8" | GPDS65 | Hydro-Mechanical | |
| Jar | NOV | 8" | XT57 | Hydro-Mechanical | |
| Jar | NOV | 8" | DC58 | Hydro-Mechanical | |
| Jar | NOV Shock Force Jar | 6 1/2" | GPDS50 | Hydraulic | |
| Jar | NOV Shock Force Jar | 7" | GPDS50 | Hydraulic | |
| Jar | NOV Shock Force Jar | 8" | DC58 | Hydraulic | |
| Jar | Schlumberger® Smith | 6-5/8" | GPDS50 | Hydraulic | |
| Accelerator | Weatherford® | 6-1/2" | GPDS50 | Hydro-Mechanical | |
| Accelerator | Weatherford® | 8" | XT57 | Hydro-Mechanical | |
| Accelerator | NOV Intensifier | 8" | XT57/DC58 | Hydro-Mechanical | |
| Accelerator | NOV Intensifier | 6 1/2" | GPDS50 | Hydro-Mechanical | |
| PBL | PBL Flow Bypass Sub | 6-3/4" | GPDS50 | Circulating Sub | |
| PBL | PBL Flow Bypass Sub | 8" | DC58 | Circulating Sub | |
| Roller Reamer | Redback | 8-1/4" | GPDS50 | Fixed Gauge | |
| Roller Reamer | Redback | 12-1/4" | DC58 | Fixed Gauge | |
| Roller Reamer | Redback | 8-1/2" | GPDS50 | Fixed Gauge | |
| Underreamer | Schlumberger® Smith (10000) | 10" | DC58 | 11-12 1/2" Opening Size | |
| Underreamer | Schlumberger® Smith (11625) | 11-5/8" | DC58 | 13 - 15" Opening Size | |
| Underreamer | Schlumberger® Smith (14250) | 14-1/4" | DC58 | 15 3/4 - 18 1/4" Opening Size | |
| Underreamer | NOV Andergauge | 8-1/2" | GPDS50 | 9 - 9 7/8" Opening Size | |
| Underreamer | NOV Andergauge | 12-1/4" | DC58 | 12 3/4 - 14 3/4" Opening Size | |
| Drift Catcher | Churchill | 7" | XT57 | Drift OD 3.25" | |
| Drift Catcher | Churchill | 6-5/8" | GPDS50 | Drift OD 2.42" | |
| Drift Catcher | Churchill | 4-7/8" | XT38 | Drift OD 2.25" | |

* Wired Saver Subs available upon request

Downhole Solutions

Drilling Solutions

Engineering and Project Management Solutions

Industrial Solutions

Lifting and Handling Solutions

Production Solutions

Supply Chain Solutions

Tubular and Corrosion Control Solutions

Well Service and Completion Solutions

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