Drilling Tools

QUICK REFERENCE GUIDE

2011 EDITION

Schlumberger

Table of Contents

PowerPak HT	4
PowerPak ERT HT	5
PowerDrive X6 HT 825	6
PowerDrive X6 HT 675	7
PowerDrive X6 HT 475	8
PowerV HT	9
PowerDrive vorteX HT	10
Neyrfor Turbodrill	11
TeleScope HT	12
SlimPulse HT	13
ImPulse HT	15
VPWD HT 475	16
arcVISION HT 825	17
arcVISION HT 675	18
adnVISION HT 675	19
adnVISION HT 475	20
sonicVISION HT 825	21
sonicVISION HT 675	22
EcoScope HT 675	23
SonicScope HT 475	25
StethoScope HT 675	26
Hydra-Jar AP	27
ENVIROTHERM NT	28

HIGH TEMPERATURE

Schlumberger is the most experienced HT service provider in the world. With a suite of best-in-class technologies, procedures, and HT-certified engineers, we provide DD/MLWD, turbodrills, hydraulic jars, and drilling fluids for HT environments.

Our drilling services have successful track records for HT applications, and our field engineers and maintenance personnel are fully HT certified. Before and after each job, maintenance personnel perform rigorous maintenance on our tools using the HT Drilling Maintenance Procedures to ensure optimal performance. Field personnel conduct operations according to stringent HT Drilling Operations Procedures.

PowerPak HT

Positive Displacement Motors

MAIN SERVICES
Steerable positive displacement motor service

APPLICATIONS
Performance and directional drilling

ADVANCED FEATURES
Extra power (XP) or greater torque (GT) power sections

High-speed, low-torque or low-speed, high-torque power sections

Custom-fitted power sections for every application

Mud-lubricated and oil-sealed bearing assemblies with optional sleeve stabilizers

High-temperature elastomer for oil- and water-base drilling systems

Angular contact bearings for increased weight on bit (WOB) capability

Surface adjustable bent housing for tailoring drilling at the wellsite

OPERATING SPECIFICATIONS
Size: 2⅛–11¼ in

Mud: WBM/OBM/SOBM

Max. operating temperature:
175 degC [350 degF];
optional 190 degC [374 degF]

Torque: 280–24,000 ft.lbf

Horsepower: 15–709 hp

For further technical information, reference *The PowerPak Steerable Motor Handbook.*

PowerPak ERT HT

High-Performance Displacement Motors

MAIN SERVICES
High-performance, steerable positive displacement motor service

APPLICATIONS
Performance and directional drilling

ADVANCED FEATURES
High-torque transmission

Angular contact bearings for increased weight on bit (WOB) capability

Higher torque available with shorter or similar length power sections when compared to standard motors

Optimized fit allows for maximum hydraulic efficiency and power

Mud-lubricated bearing assemblies

New-generation elastomer technology

OPERATING SPECIFICATIONS
Size: 4¾–9⅝ in

Mud: WBM/OBM/SOBM

Max. operating temperature:
175 degC [350 degF]

For further technical information, reference
The PowerPak Steerable Motor Handbook.

PowerDrive X6 HT 825

Rotary Steerable System

MAIN SERVICES
Fully rotating rotary steerable directional service

APPLICATIONS
Performance drilling

ADVANCED FEATURES
Real-time data using TeleScope HT services

Continuous near-bit surveys (inclination and azimuth)

Near-bit shock and vibration data

Bit rpm

Near-bit, azimuthal gamma ray for geosteering

Automatic inclination hold

OPERATING SPECIFICATIONS
Hole size: 10⅝–11⅝ in

Mud: WBM/OBM/SOBM

Max. operating temperature: 175 degC [350 degF]

Max. build: 6°/100 ft

Flow range: 300–2,000 galUS/min

Low/med/high flow configurations

Max. pressure: 20,000 psi

Max. rpm: 220 rpm

PowerDrive X6 HT 675

Rotary Steerable System

MAIN SERVICES
Fully rotating rotary steerable directional service

APPLICATIONS
Performance drilling

ADVANCED FEATURES
Real-time data using TeleScope HT services

Continuous near-bit surveys (inclination and azimuth)

Near-bit shock and vibration data

Bit rpm

Near-bit, azimuthal gamma ray for geosteering

Automatic inclination hold

OPERATING SPECIFICATIONS
Hole size: 8½–9⅞ in

Mud: WBM/OBM/SOBM

Max. operating temperature: 175 degC [350 degF]

Max. build: 8°/100 ft

Flow range: 200–950 galUS/min

Low/med/high flow configurations

Max. pressure: 20,000 psi

Max. rpm: 220 rpm

PowerDrive X6 HT 475

Rotary Steerable System

MAIN SERVICES
Fully rotating rotary steerable directional service

APPLICATIONS
Performance drilling

ADVANCED FEATURES
Real-time data using ImPulse HT services

Continuous near-bit surveys (inclination and azimuth)

Near-bit shock and vibration data

Bit rpm

Near-bit, azimuthal gamma ray for geosteering

Automatic inclination hold

OPERATING SPECIFICATIONS
Hole size: 5½–6¾ in

Mud: WBM/OBM/SOBM

Max. operating temperature: 175 degC [350 degF]

Max. build: 8°/100 ft

Flow range: 100–380 galUS/min

Low/med/high flow configurations

Max. pressure: 20,000 psi

Max. rpm: 220 rpm

PowerV HT

Rotary Steerable System

MAIN SERVICES
Fully rotating rotary steerable directional service

APPLICATIONS
Automatic vertical drilling optimization

ADVANCED FEATURES
Combinable with PowerDrive vorteX HT RSS

OPERATING SPECIFICATIONS
Same operating specifications as PowerDrive X6 HT system for the selected collar size (8¼–4¾ in)

Max. operating temperature: 175 degC [350 degF]

Max. pressure: 20,000 psi

PowerDrive vorteX HT

Rotary Steerable System

MAIN SERVICES
Powered rotary steerable directional service running a PowerDrive X6 HT bias unit

APPLICATIONS
High-performance directional drilling where increased downhole power is needed or is advantageous

ADVANCED FEATURES
Multiple stabilization options

Automatic inclination hold

Integrated high-performance power section

OPERATING SPECIFICATIONS
Same operating specifications as PowerDrive X6 HT system for selected collar size (11–4¾ in)

Max. operating temperature: 175 degC [350 degF]

Max. pressure: 20,000 psi

Neyrfor Turbodrill

High-Performance Turbodrill

APPLICATIONS
Performance and directional drilling

ADVANCED FEATURES
High-speed, low-torque tool

Custom-fitted turbodrill for HPHT applications

100% metallic tool configuration

Surface-adjustable bend housing for directional or horizontal applications

Customized power sections (one to three)

OPERATING SPECIFICATIONS
Hole size: 3¾–17½ in

Mud: WBM/OBM/SOBM

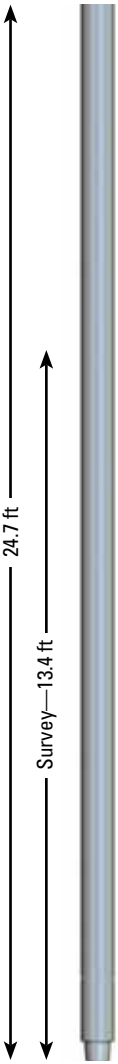
Max. operating temperature:
260 degC [500 degF]

Torque: 215–9,020 ft.lbf

Horsepower: 74–710 hp

TeleScope HT

Power, Telemetry, and Combinability



MAIN SERVICES

Real-time data
[0.5–12 bps physical rate,
>100 bps effective rate]

Toolface

Direction and inclination

Downhole tool power

Continuous rotary surveys

APPLICATIONS

Real-time measurement
and data transmission

Fast drilling sections where
high-density data is needed

ADVANCED FEATURES

Telemetry capabilities to maximize
real-time data delivery and efficiency

Power to more HT LWD tools
than previously possible

OPERATING SPECIFICATIONS

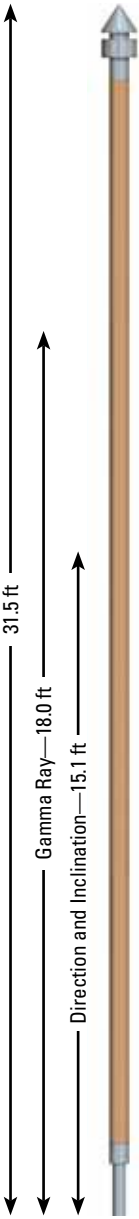
Hole size: 8⅜ in and up

Max. operating temperature:
175 degC [350 degF]

Max. pressure: 25,000 psi;
HP option: 30,000 psi

SlimPulse HT

Retrievable MWD Service



MAIN SERVICES

Real-time and memory data
[0.25 to > 3 bps real-time telemetry using Orion II features]

Gamma ray

Toolface

Direction and inclination

Continuous rotary surveys
- Shock and vibration
- Stick/slip

APPLICATIONS

Reliable, precise real-time directional measurements

Wireline retrievable and reseatable for efficiency and risk mitigation

Short radius drilling

Re-entry wells

OPERATING SPECIFICATIONS

Probe OD: 1¾ in

Pulser OD: 1⅞ in, 2⅛ in, 2⅜ in, 2⅝ in

Mud: WBM/OBM/SOBM

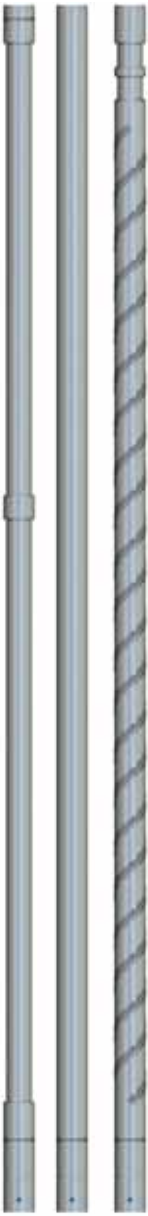
Max. operating temperature: 175 degC [350 degF]

Max. probe curvature: 50°/100 ft

Max. pressure: 20,000 psi; HP option: 22,500 psi

SlimPulse HT

Retrievable MWD Service



OPERATING SPECIFICATIONS

2½-in Collar
Hole size: extra slim holes

Max. tool curvature: refer to collar specs

Max. flow rate: 80 galUS/min

3¼-in Collar
Hole size: 4¾ in and up

Max. tool curvature: refer to collar specs

Max. flow rate: 240 galUS/min

4¾-in Collar
Hole size: 5⅞ in and up

Max. tool curvature: refer to collar specs

Max. flow rate: 440 galUS/min

6- or 6¾-in Collar
Hole size: 8½ in and up

Max. tool curvature: refer to collar specs

Max. flow rate: 500 galUS/min

8¼-in Collar
Hole size: 9⅞ in and up

Max. tool curvature: refer to collar specs

Max. flow rate: 1,200 galUS/min

Combinable with typical collar types and various collar sizes

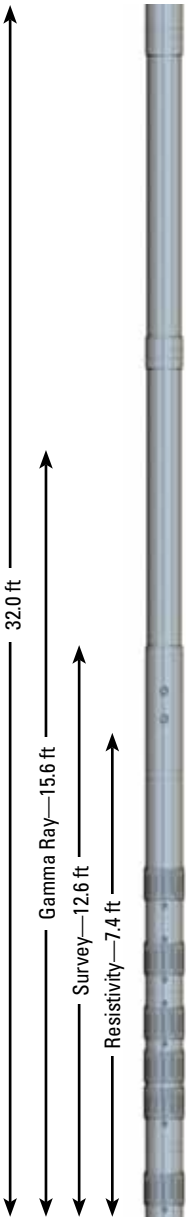
9½-in Collar
Hole size: 14¾–26 in

Max. tool curvature: refer to collar specs

Max. flow rate: 1,200 galUS/min

ImPulse HT

Collar Mounted—
Telemetry, Surveying, and Resistivity



MAIN SERVICES

Real-time [0.5–6 bps, up to 70 bps using Orion II service] and memory data

Azimuthal gamma ray

10 multidepth resistivities (five phase and five attenuation)

Toolface

Direction and inclination

Downhole tool power

APPLICATIONS

Real-time survey, gamma ray, and resistivity measurements

ADVANCED FEATURES

Reliable, precise real-time measurements for all general drilling

Real-time density and porosity with adnVISION HT service

Invasion profiles

Phase caliper in WBM

OPERATING SPECIFICATIONS

Mud: WBM/OBM/SOBM

Max. operating temperature: 175 degC [350 degF]

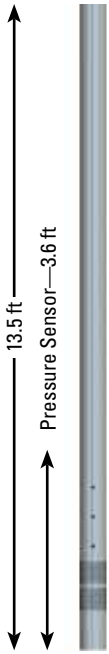
Max. tool curvature:
15°/100 ft rotating
30°/100 ft sliding

Flow range: 130–360 galUS/min

Max. pressure: 20,000 psi

VPWD HT 475

Collar Mounted—
Verified Pressure While Drilling



MAIN SERVICES

APWD annular pressure while drilling

Annular temperature while drilling

Internal pressure while drilling

APPLICATIONS

Real-time data using ImPulse HT service

Mud weight optimization

ADVANCED FEATURES

Formation integrity and leakoff tests

OPERATING SPECIFICATIONS

Max. operating temperature:
165 degC [330 degF]

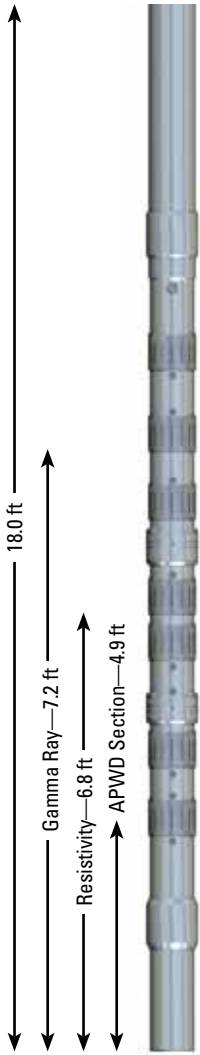
Max. tool curvature:
15°/100 ft rotating
30°/100 ft sliding

Max. flow rate: 400 galUS/min

Max. pressure: 25,000 psi

arcVISION HT 825

Collar Mounted—Propagation Resistivity



MAIN SERVICES

20 multidepth, dual-frequency resistivities

Phase and attenuation measurements—16-, 22-, 28-, 34-, and 40-in spacings

Gamma ray

Real-time while-drilling data using TeleScope HT service

APPLICATIONS

Real-time quantitative formation evaluation

Well-to-well correlations

Well placement

ADVANCED FEATURES

Phase caliper in WBM

Resistivity invasion profiles

APWD annular pressure while drilling

OPERATING SPECIFICATIONS

Hole size: 10½–14¾ in

Mud: WBM/OBM/SOBM

Max. operating temperature: 175 degC [350 degF]

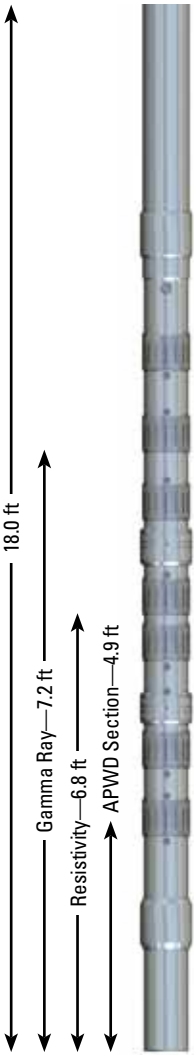
Max. tool curvature:
- 7°/100 ft rotating
- 14°/100 ft sliding

Max. flow rate: 1,600 galUS/min

Max. pressure: 25,000 psi; HP option: 30,000 psi

arcVISION HT 675

Collar Mounted—Propagation Resistivity



MAIN SERVICES

20 multidepth, dual-frequency resistivities

Phase and attenuation measurements—16-, 22-, 28-, 34-, and 40-in spacings

Gamma ray

Real-time while-drilling data using TeleScope HT service

APPLICATIONS

Real-time quantitative formation evaluation

Well-to-well correlations

Well placement

ADVANCED FEATURES

Phase caliper in WBM

Resistivity invasion profiles

APWD annular pressure while drilling

OPERATING SPECIFICATIONS

Hole size: 8¼–9⅞ in

Mud: WBM/OBM/SOBM

Max. operating temperature: 175 degC [350 degF]

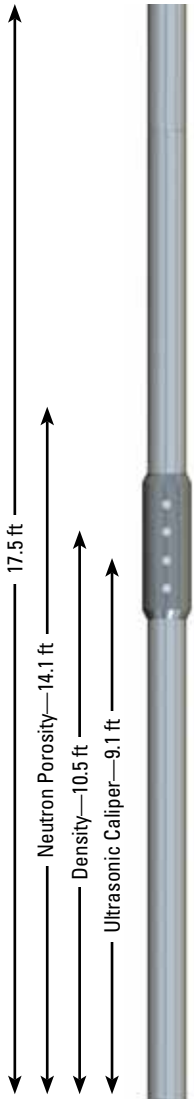
Max. tool curvature:
8°/100 ft rotating
16°/100 ft sliding

Max. flow rate: 800 galUS/min

Max. pressure: 25,000 psi; HP option: 30,000 psi

adnVISION HT 675

Collar Mounted—Density and Porosity



MAIN SERVICES

Azimuthal density/PEF

Neutron porosity

Ultrasonic caliper

Downhole shocks and rpm

Real-time data using TeleScope HT service

APPLICATIONS

Applicable to all hole deviations

Formation evaluation

Formation dip

Fault identification

Thin-bed identification

Caliper applications

ADVANCED FEATURES

Borehole imaging (density and PEF)

3D density caliper

Image-derived density

Borehole invariant porosity

Slick or stabilized

Wireline retrievable sources and data

OPERATING SPECIFICATIONS

Hole size: 8¼–9⅞ in

Max. operating temperature: 175 degC [350 degF]

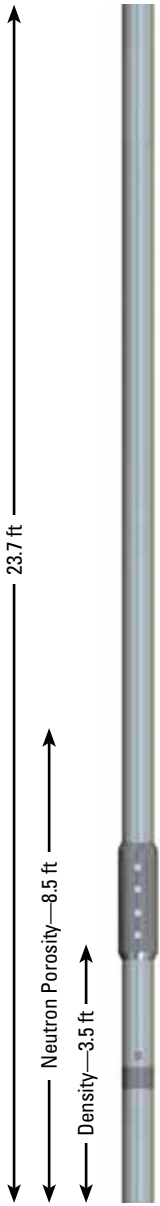
Max. tool curvature:
- 4.5°/100 ft rotating (IBS collar)
- 8°/100 ft rotating (slick)
- 16°/100 ft sliding

Max. flow rate: 800 galUS/min

Max. pressure: 25,000 psi

adnVISION HT 475

Collar Mounted—Density and Porosity



MAIN SERVICES

Azimuthal density/PEF

Neutron porosity

Downhole shocks and rpm

Real-time data using ImPulse HT service

APPLICATIONS

Applicable to all hole deviations

Formation evaluation

Formation dip

Fault identification

Thin-bed identification

Caliper applications

ADVANCED FEATURES

Borehole imaging (density and PEF)

3D density caliper

Image-derived density

Borehole invariant porosity

Slick or stabilized

Wireline retrievable sources and data

OPERATING SPECIFICATIONS

Hole size: 5¾–6¾ in

Max. operating temperature: 175 degC [350 degF]

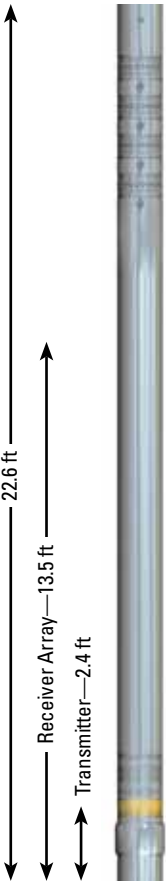
Max. tool curvature:
- 10°/100 ft rotating (IBS collar)
- 15°/100 ft rotating (slick)
- 30°/100 ft sliding

Max. flow rate: 400 galUS/min

Max. pressure: 25,000 psi

sonicVISION HT 825

Collar Mounted—Sonic



MAIN SERVICES

Borehole compensated sonic

Real-time monopole compressional and shear data

Real-time slowness-time-coherence (STC) projection

Real-time data TeleScope HT service

APPLICATIONS

Real-time pore pressure management

Real-time rock mechanics with real-time STC projections

Formation damage indicator

Top-of-cement identification

Synthetic seismogram for seismic tie-in

Sonic porosity

Hydrocarbon identification

ADVANCED FEATURES

Variable density log

Pumps-off delta-T compressional

OPERATING SPECIFICATIONS

Hole size: 10⅝–30 in

Mud: WBM/OBM/SOBM

Max. operating temperature: 175 degC [350 degF]

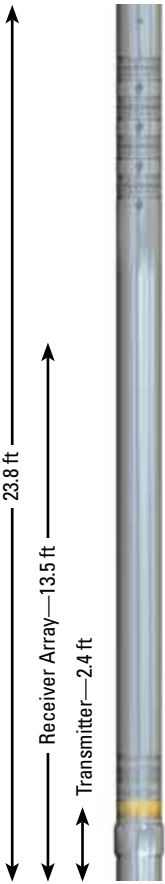
Max. tool curvature:
6°/100 ft rotating
14°/100 ft sliding

Max. flow rate: 1,200 galUS/min

Max. pressure: 25,000 psi; HP option: 30,000 psi

sonicVISION HT 675

Collar Mounted—Sonic



MAIN SERVICES

Borehole compensated sonic

Real-time monopole compressional and shear data

Real-time slowness-time-coherence (STC) projection

Real-time data TeleScope HT service

APPLICATIONS

Real-time pore pressure management

Real-time rock mechanics with real-time STC projections

Formation damage indicator

Top-of-cement identification

Synthetic seismogram for seismic tie-in

Sonic porosity

Hydrocarbon identification

ADVANCED FEATURES

Variable density log

Pumps-off delta-T compressional

OPERATING SPECIFICATIONS

Hole size: 8½–14 in

Mud: WBM/OBM/SOBM

Max. operating temperature: 175 degC [350 degF]

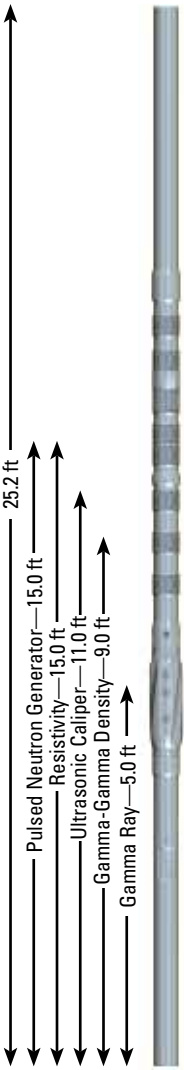
Max. tool curvature:
8°/100 ft rotating
16°/100 ft sliding

Max. flow rate: 800 galUS/min

Max. pressure: 25,000 psi; HP option: 30,000 psi

EcoScope HT 675

Multifunction Formation Evaluation



MAIN SERVICES

Neutron porosity

Bulk density

Dual-frequency, array induction resistivity

Elemental capture spectroscopy

Formation sigma

Azimuthal and image measurements
- Natural gamma ray
- Gamma-gamma density
- Photoelectric factor (PEF)

Ultrasonic caliper

Dual-sensor ultrasonic caliper

Inclination

Multi-axis shocks (3-axis and torsional)

Collar rpm

APWD annular pressure while drilling

Annular temperature

Full real-time capability

EcoScope HT 675

Multifunction Formation Evaluation

APPLICATIONS

Well-to-well correlation with spectroscopy/gamma ray/sigma/resistivity/density/porosity

Applications to all hole deviations

Formation evaluation

Formation dip

Fault identification

Thin-bed identification

Caliper applications

Well placement

Drilling-induced fracture identification

ADVANCED FEATURES

Sourceless operations with neutron-gamma density

Drilling dynamics data

OPERATING SPECIFICATIONS

Hole size: 8⅜–9⅞ in

Max. operating temperature: 175 degC [350 degF]

Max. tool curvature:
- 8°/100 ft rotating
- 16°/100 ft sliding

Max. flow rate: 800 galUS/min

Max. pressure: 20,000 psi

SonicScope HT 475

Multipole Sonic While Drilling

MAIN SERVICES

Borehole compensated sonic

Real-time monopole compressional and shear data

Recorded multipole

Real-time slowness-time-coherence projection

Real-time data using ImPulse HT service

APPLICATIONS

Real-time pore pressure monitoring borehole stability

Top-of-cement identification

Sonic-to-seismic processing

Fracture detection

Porosity evaluation and hydrocarbon identification

Perforation location optimization

Hydraulic fracture optimization

ADVANCED FEATURES

Robust shear data in slow formations

Real-time compressional and shear data

OPERATING SPECIFICATIONS

Hole size: 5⅝–8 in

Mud: WBM/OBM/SOBM

Max. operating temperature: 175 degC [350 degF]

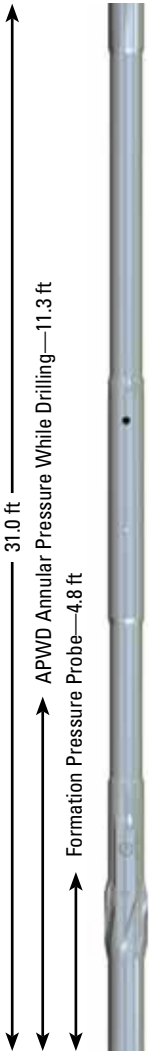
Max. tool curvature:
15°/100 ft rotating
30°/100 ft sliding

Max. flow rate: 400 galUS/min

Max. pressure: 25,000 psi

StethoScope HT 675

Formation Pressure While Drilling



MAIN SERVICES

Real-time formation pressure

Annular pressure during pretests

Real-time data using TeleScope HT service

APPLICATIONS

Mud weight optimization

Pore pressure calibration

Pressure geosteering

Gradient analysis

Fluid contacts

ADVANCED FEATURES

Real-time mobility

TOP time-optimized pretest

On-demand frame interpreted pretests

OPERATING SPECIFICATIONS

Hole size: 8½–10½ in (8¼-in stabilizer)
9½–11½ in (9¼-in stabilizer)

Diameter reach: 10½ in
(11½-in max. with 9¼-in stabilizer)

Max. operating temperature:
165 degC [330 degF]

Max. tool curvature:
8°/100 ft rotating
16°/100 ft sliding

Max. flow rate: 800 galUS/min

Max. pressure:
20,000 psi (Primary gauge: ACQG gauge)
25,000 psi (Primary gauge: strain gauge)

Hydra-Jar AP

Double-Acting Hydraulic Drilling Jar

APPLICATIONS

Impact to dislodge stuck drillstem components

Land or offshore operations, vertical or deviated wells, and ultradeep or ultrahot boreholes

ADVANCED FEATURES

Reduced risk of lost equipment

Prevention of costs to plug back and sidetrack

High-temperature seals

Flexibility to control direction (up or down), force, and frequency of impact

Compatible with wireline tools

OPERATING SPECIFICATIONS

Tool size: 4¼–26 in

Max. operating temperature: 260 degC [500 degF]

Jarring force: >1,000,000 lbf

ENVIROTHERM NT

Water-Base Drilling Fluid System

The ENVIROTHERM NT drilling system is an HPHT chrome-free, water-base fluid that maintains its stable properties while drilling, and during the prolonged static conditions experienced during tripping, logging, and testing operations.

MAIN SERVICES

Water-base drilling fluid

APPLICATIONS

High temperature wells in shale plays

Environmentally sensitive operations

Projects requiring water-base drilling fluid systems

ADVANCED FEATURES

HPHT rheology stabilizer

Fluid-loss control

Secondary viscosifier

Chrome-free HPHT thinners

Shale/filtercake sealing additive

OPERATING SPECIFICATIONS

Type: Water-base fluid

Max. operating temperature:
177 degC [350 degF]

PowerPak HT, PowerPak ERT HT, PowerDrive X8 HT, PowerV HT, PowerDrive vorteX HT, TeleScope HT, SlimPulse HT, ImPulse HT, VPWD HT, arcVISION HT, adnVISION HT, sonicVISION HT, SonicScope HT, EcoScope HT, StethoScope HT, Neyrfor Turbodrill, Hydra-Jar AP, VISION, Scope, Drilling Office, TOP, APWD are marks of Schlumberger. ENVIROTHERM NT is a mark of M-I L.L.C.

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