

# 4<sup>3</sup>/<sub>4</sub>" Well-Guide RSS™: 4-100

Point-the-Bit Rotary Steerable System

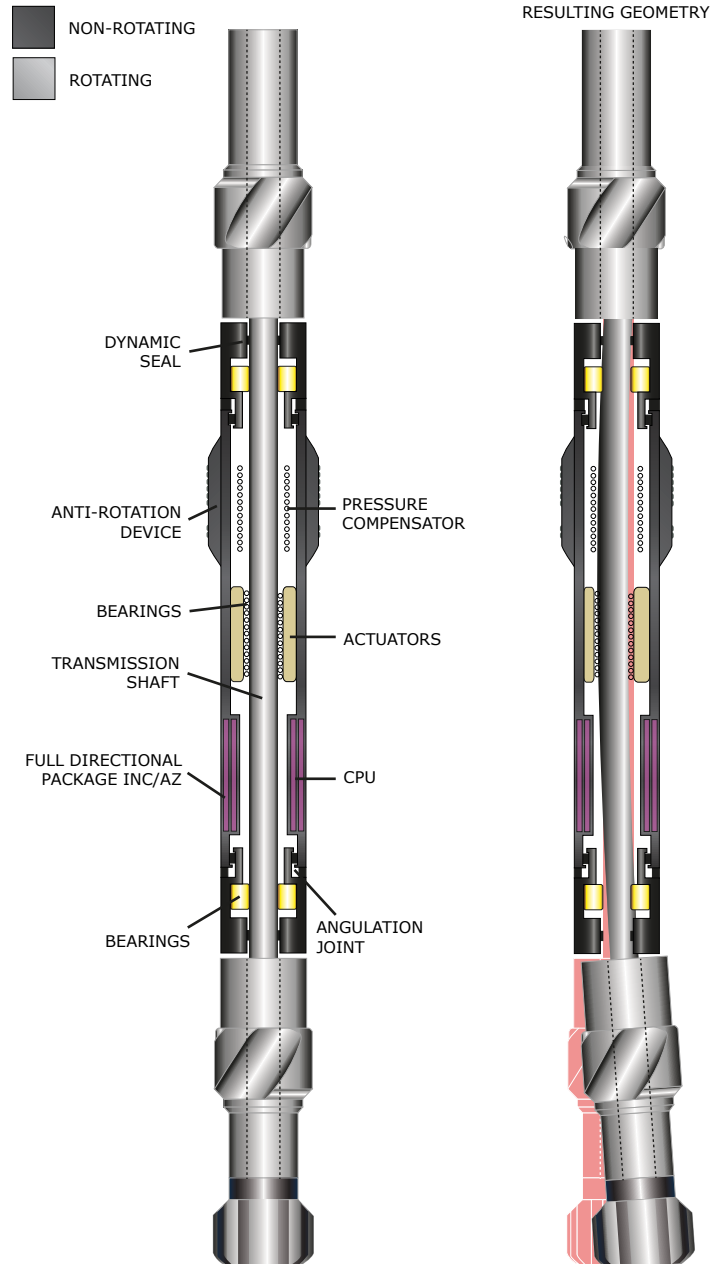


## Features

- » **Closed-loop, fully automated inclination & azimuth directional control**
  - Minimal surface input needed to achieve and maintain course
  - Allows for low inclination directional control
  - Manual override control available
- » **Non-Mag Construction**
  - Allows for a full directional sensor array placed near the bit (inc/azi)
- » **Point-the-Bit**
  - 3 point geometry set up between the bit, NBS and Well-Guide upper stabilizer
  - Gives smooth borehole with low tortuosity
  - Bit drills on its front face, with no side cutting action required
  - Independent of formation
  - Low side forces are generated
- » **Versatility**
  - Wide range of bit types can be used
  - Standard operation can be used independent of MWD provider
  - Capable of drilling any directional profile – Vertical, "S" Well, Curve, Horizontal, 3-D Profile
- » **Rotating Stabilizers**
  - Minimizing stuck pipe situations
- » **Normal drilling parameters can be used**
  - No limit on mud pressure, sand content, or LCM
  - No pressure drop required to operate tool allows for optimized bit hydraulics
- » **Compatible with all types of drilling fluids**
- » **Re-programmable downhole**
  - 12 minutes of varying RPM sequences re-program Well-Guide's Inc/Azi targets

## Operating Principle

- » Well-Guide takes a survey every 90 seconds using its own directional sensor package, and automatically calculates the correct toolface required to achieve its programmed course
- » This toolface is achieved by hydraulically deflecting the central rotating shaft to point the bit
- » The tool is initially programmed with a target course (inclination & azimuth) on surface and can be re-programmed downhole by using a series of fast and slow drillstring rotations (no pressure variance required)
- » Tool surveys, downhole temperatures, vibrations and tool operating parameters are logged and can be downloaded on the surface



## Specifications 4<sup>3</sup>/<sub>4</sub>" Well-Guide Series 4-100

### Dimensions

Borehole Sizes (Bit only)	5 7/8" to 6 3/4"
Length	24 ft/7.3m
Tool OD	4 3/4"
Bore of central shaft (no restriction)	1 1/4"
Upper Connection	3 1/2" IF (NC38) box
Lower Connection	3 1/2" Reg box
Tool weight (hole size)	0.55 t/1212 lb (5 3/8")

### Drilling Parameters

Maximum RPM	200 RPM
Maximum Downhole Torque	8,000 lbft/10,846Nm
Maximum indicated WOB	30,000 lb/13,000daN
Maximum Overpull	350,000 lb/160,000daN
Maximum Downhole Temperature	150°C/302°F
Maximum Downhole Pressure	20,000 psi/138MPa
Maximum Mud Flow	300 GPM
Downlink rotary speeds	High 100 RPM Low 50 RPM

### Performance

Maximum dogleg	12.5°/100ft
Battery life (unlimited if alternator fitted)	200 hrs
Make-up Torque Lower	3 1/2" Reg box 9,000 lbft/12,202Nm
Upper	3 1/2" IF (NC38) box 10,000 lbft/13,558Nm

# 4 3/4" Well-Guide RSS™: 4-100

## Case Study - Initial Run



Drilling Automation

- » Gyrodata's first 4-3/4" Well-Guide RSS run was a 6" curve drilled in West Texas
- » A competitor was unable to achieve a consistent dogleg severity using a conventional motor assembly
- » The 4-3/4" Well-Guide RSS was programmed to kick off from vertical and build to 90° of inclination
- » The Gyrodata Sidetrack Plan required a dogleg severity of 8.9°/100' to land the well within the desired target zone
- » The tool achieved the desired dogleg by averaging 9.14°/100' throughout the curve and landed 3.8' high of the revised target line
- » The curve was drilled through the Bone Springs, and landed in the Wolfcamp Formation
- » The curve was designed and executed to allow adequate separation from the open hole whipstock tubing
- » Well-Guide's closed-loop automated control system drilled the curve with minimal surface interface
- » Once the curve was landed, the tool was able to hold the programmed 90° inclination in the lateral

