

# TELEPACER

## Fixed-collar Directional Survey

### APPLICATIONS

- Wellbore surveying
- HP/HT drilling environments +++

### BENEFITS

- Operates in standard non-magnetic drill collars
- Can be run with or without gamma sensor module
- Vibration sensor for detection of potentially harmful drilling dynamics
- Full system test capability uses no rig time
- All modules are wellsite replaceable and interchangeable between collar sizes
- Long battery operating life
- Downhole re-programmable for telemetry and data transmission parameters

### DIRECTIONAL SENSOR FEATURES

- Efficient low-power positive pulse pulser
- Proven directional sensor technology
- Computed surveys or raw data can be transmitted to the surface
- Battery power supply allows survey acquisition with or without mud flow
- Raw data for all surveys is stored in memory allowing for post-run analysis
- Tri-axial magnetic azimuth correction available

### GAMMA SENSOR FEATURES

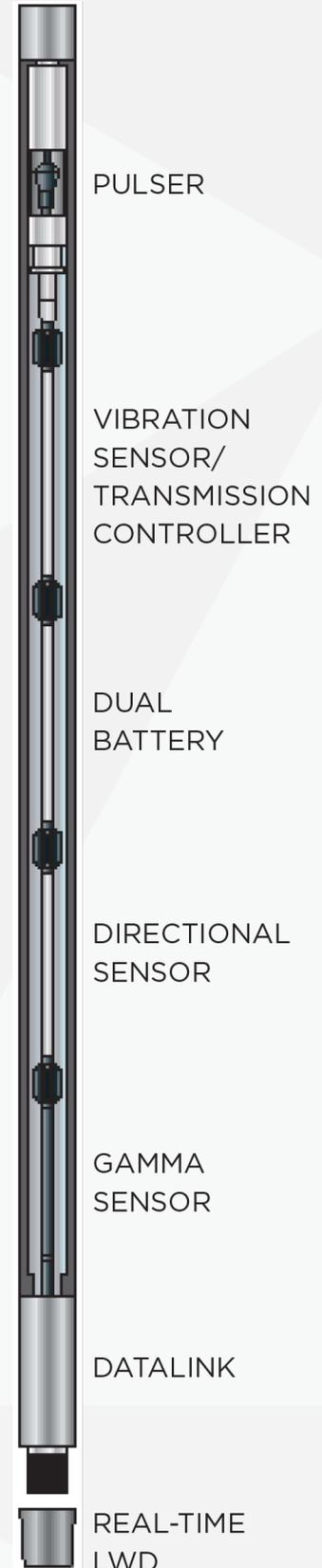
- Reliable scintillation crystal/ photomultiplier design
- Full American Petroleum Institute (API) calibration

At the core of the Extreme™ measurements-while-drilling/ logging-while-drilling (MWD/ LWD) system is the modular TelePacer \* fixed collar directional tool with positive-pulse telemetry. The tool provides continuous inclination and azimuth information and acts as the telemetry module to make real-time data transmission possible. The Datalink\* MWD real-time communications platform provides communication with downhole LWD sensors.

The gamma ray service is easily added to the directional assembly and will produce high-resolution, repeatable logs for lithology determination and/or correlation.

Operating modes are fully programmable at the surface. For added tool flexibility, pulse width and transmitted parameters can be reprogrammed while the tool is in operation downhole.

The simple, proven, reliable Extreme™ vibration monitor in the bottomhole assembly (BHA) is integrated to the TelePacer MWD platform. The internal vibration sensor output in counts of shock above 5g per second. Once BHA vibration is detected, the necessary adjustments can be made to the drilling parameters to reduce BHA damage and improve drilling performance.

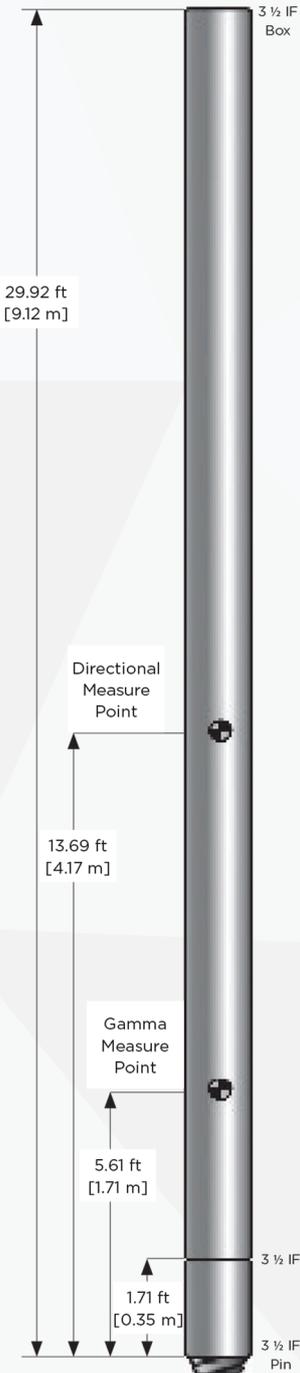


TOOL SPECIFICATIONS					
Collar OD, in [mm]	9 1/2 [165.1]	8 [203.2] HF	8 [203.2] LF	6 3/4 [171.5]	4 3/4 [120.7]
Tool length, ft [m]	30.13 [9.18]	30.26 [9.22]	30.26 [9.22]	30.26 [9.22]	29.92 [9.12]
Flow rates, gal/min [m <sup>3</sup> /min]	500 to 1,500 [1.89 to 5.68]	500 to 1,500 [1.89 to 5.68]	250 to 900 [0.95 to 3.41]	250 to 750 [0.95 to 2.84]	125 to 375 [0.47 to 1.42]
Pressure drop, psi in water					
@ 1,000 gal/min	100	100	n/a	n/a	n/a
@ 750 gal/min	75	75	100	125	n/a
@ 400 gal/min	n/a	n/a	45	45	150
@ 150 gal/min	n/a	n/a	n/a	n/a	75
DIRECTIONAL SENSOR SPECIFICATIONS †		ACCURACY		RESOLUTION	
Azimuth, range 0 to 360 deg					
Inclination >6 deg		± 1.0		0.1	
Inclination of 3deg		± 2.0		0.1	
Inclination, range 0 to 360 deg		± 0.15		0.1	
Toolface, range 0 to 360 deg					
Inclination >6 deg		± 1.5		1.5	
Inclination of 3 deg		± 3.0		1.5	
Magnetic field strength, range is 0.1 to 65 µT		±2.0 mGauss (± 0.2 µT)		1.0 mGauss(0.1 µT)	
Dip angle, range -90.0 deg to+ 90.0 deg		± 0.3		0.1	
GAMMA RAY SENSOR SPECIFICATIONS					
Detector type, in [mm]	4.25 [114.3] scintillation	Measurement range, API	0 to 508		
VIBRATION SENSOR					
Measurement range, g [m/s <sup>2</sup> ]	± 50 [490.3] (lateral)	Frequency response	20 to 500 Hz		
Alarm threshold	selectable	Transmission range, shocks/sec	0 to 500 (above threshold)		
TEMPERATURE SENSOR SPECIFICATIONS					
Range, degF [degC]	32 to 302 [0 to 150], 32 to 350 [0 to 175] †††	Accuracy, degF [degC]	± 5.0 [± 2.5]		
Resolution, degF [degC]	±4.0 [± 2.0]				
TRANSMISSION TIME SPECIFICATIONS ††					
Pulse length, sec pulse		0.4		0.8	
Static survey, sec		40		80	
Toolface, sec		4		8	
Gamma logging, sec		4.4		8.8	
Toolface/gamma, sec		7.6		15.2	
ENVIRONMENTAL SPECIFICATIONS					
Max. vibration, g [m/s <sup>2</sup> ]	20 [200] Grms random, 5 to 1,000 Hz	Max. shock, g [m/s <sup>2</sup> ]	500 [4,903.3]		
Operating temp. range, degF [degC]	32 to 350 [0 to 175]	Max. working press., psi [MPa]	25,000 [172.4]		
Mud sand content, percent	1	Max. bit press. drop	no limitation		

† Operational accuracy dependent on local geometric field.

† † Other data rates and transmission options available.

† † † Standard tool configuration 32 to 302 degF [0 to 150 degC], optional Survivor Series rating 32 to 350 degF [0 to 175 degC].



### TOOL SPECIFICATIONS

Nominal OD, in [mm]	4.75 [120.7]	Internal diameters, in [mm]	3.38[85.9], 2.81 [71.4], 2.50 [63.5]
Length, ft [m]	29.9 [9.12]	Weight, lbm [kg]	1,420 [644]

### TOOL JOINT SPECIFICATIONS

#### API 3 1/2 IF (NC 38)

Makeup torque, lbf.ft [N.m]	10,000 [13,558]
Bending-strength ratio	2.54

#### API 3 1/2 IF (NC 38)

Makeup torque, lbf.ft [N.m]	10,000 [13,558]
Bending-strength ratio	2.1

#### API 3 1/2 IF (NC 38)

Makeup torque, lbf.ft [N.m]	10,000 [13,558]
Bending-strength ratio	2.54

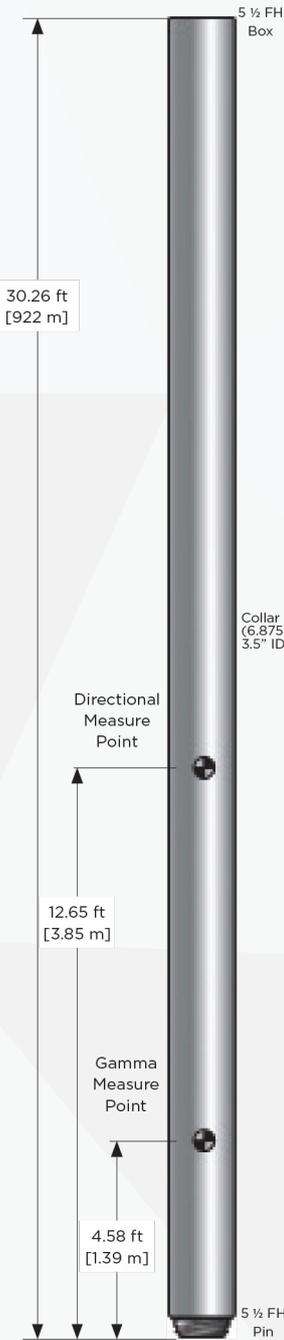
### OPERATING SPECIFICATIONS

Max. dogleg, rotating †, deg/ft	17/100	Max. dogleg, sliding, deg/ft	31/100
Max. compression, lb [kg]	20,000 [9,090]	Max. tension, lb [kg]	735,000 [3,269,443]
Max. torque, lbf.ft [N.m]	10,000 [13,558]	Torque to failure, lbf.ft [N.m]	18,800 [25,489]
Max. temp., degF [degC]	302 [150], 350 [175]**	Max. RPM	250
Flow rate range, gal/min [m3/min]	125-375 [0.473-1.420]		

† In some applications, the maximum dogleg may exceed the recommended value. Each situation must be analyzed on an individual basis to determine specific equipment capabilities.

\*\* Standard tool configuration 32 to 302 degF [0 to 150 degC], optional Survivor Series rating 32 to 350 degF [0 to 175 degC].

Note: All dimensions are nominal. Configuration options are available. Tool drawing is not to scale.



### TOOL SPECIFICATIONS

Nominal OD, in [mm]	6.75 [171.5]	Internal diameters, in[mm]	5.02 [127.5], 3.50 [88.9], 3.00 [76.2]
Length, ft [m]	30.26 [9.23]	Weight, lbm [kg]	3,175 [1,440]
Equivalent stiffness, in[mm]	6.74 [171.2] OD/ 2.81 (71.4) ID	Equivalent moment of inertia, in4 [cm4]	99.53 [4,086.9]

### TOOL JOINT SPECIFICATIONS

#### API 5 1/2 FH

Makeup torque, lbf [N.m]	26,000 [35,251]
Bending-strength ratio	2.14

#### API 5 1/2 FH

Makeup torque, lbf [N.m]	26,000 [35,251]
Bending-strength ratio	1.82

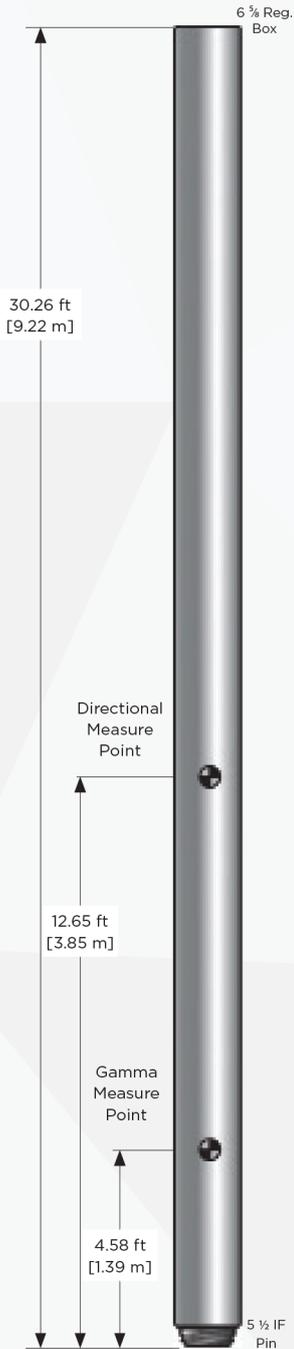
### OPERATING SPECIFICATIONS

Max. dogleg, rotating t, deg/ft	9/100	Max. dogleg, sliding, deg/ft	17/100
Max. compression, lb [kg]	50,000 [22,727]	Max. tension, lb [kg]	1,485,000 [673,469]
Max. torque, ft.lbf [N.m]	26,000 [35,251]	Torque to failure, ft.lbf [N.m]	43,500 [58,978]
Max. temp., degF [degC]	302 [150], 350 [175]**	Max. RPM	250
Flow rate, gal/ min [m3/ min]	250 to 750 [0.946-2.838]		

† In some applications, the maximum dogleg may exceed the recommended value. Each situation must be analyzed on an individual basis to determine specific equipment capabilities.

\*\* Standard tool configuration 32 to 302 degF [0 to 150 degC], optional Survivor Series rating 32 to 350 degF [0 to 175 degC].

Note: All dimensions are nominal. Configuration options are available. Tool drawing is not to scale.



### TOOL SPECIFICATIONS

Nominal OD, in [mm]	8 [203.2]	Internal diameters, in[mm]	5.02 [127.5], 3.50 [88.9], 3.00 [76.2]
Length, ft [m]	30.26 [9.23]	Weight, lbm [kg]	4,425 [2,007]
Equivalent stiffness, in[mm]	7.98 [202.7]OD / 2.81 [71.4] ID	Equivalent moment of inertia, in.4 [cm4]	196 [8,048]

### TOOL JOINT SPECIFICATIONS

#### API 65/8 Reg.t

Makeup torque, lbf.ft [N.m]	45,000 [61,012]
Bending-strength ratio	2.76

#### API 51/2 IF

Makeup torque, lbf.ft [N.m]	45,000 [61,012]
Bending-strength ratio	2.51

### OPERATING SPECIFICATIONS

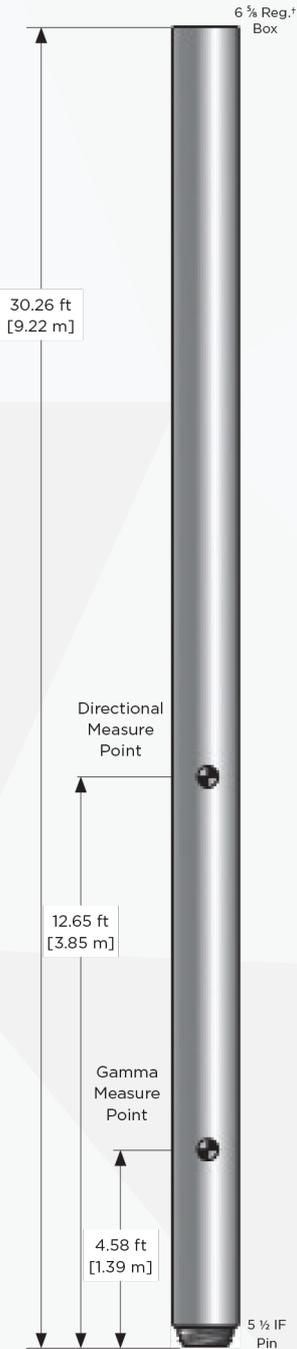
Max. dogleg, rotating <sup>††</sup> , deg/ft,	9/100	Max. dogleg, sliding, deg/ft	18/100
Max. compression, lb [kg]	50,000 [22,727]	Max. tension, lb [kg]	1,455,000 [659,864]
Max. torque, lbf.ft [N.m]	45,000 [61,012]	Torque to failure, lbf.ft [N.m]	75,000 [101,686]
Max. temp., degF [degC]	302 [150], 350 [175] <sup>†††</sup>	Max. RPM	250
Flow rate, gal/ min [m3/ min]	250 to 750 [0.946-2.838]		

<sup>†</sup> 6 5/8 Reg. with top X/O sub, 5 1/2 without.

<sup>††</sup> In some applications, the maximum dogleg may exceed the recommended value. Each situation must be analyzed on an individual basis to determine specific equipment capabilities.

<sup>†††</sup> Standard tool configuration 32 to 302 degF [0 to 150 deg C], optional Survivor Series rating 32 to 350 degF [0 to 175 deg C].

Note: All dimensions are nominal. Configuration options are available. Tool drawing is not to scale.



### TOOL SPECIFICATIONS

Nominal OD, in [mm]	8 [203.2]	Internal diameters, in[mm]	5.76 [146.3], 4.25 [108.0], 3.00 [76.2]
Length, ft [m]	30.26 [9.23]	Weight, lbm [kg]	4,425 [2,007]
Equivalent stiffness, in[mm]	7.98 [202.7]OD / 2.81 [71.4] ID	Equivalent moment of inertia, in.4 [cm4]	196 [8,048]

### TOOL JOINT SPECIFICATIONS

API 6 5/8 Reg.t

Makeup torque, lbf.ft [N.m]	45,000 [61,012]
Bending-strength ratio	2.76
API 5 1/2 IF	
Makeup torque, lbf.ft[N.m]	45,000 [61,012]
Bending-strength ratio	2.51

### OPERATING SPECIFICATIONS

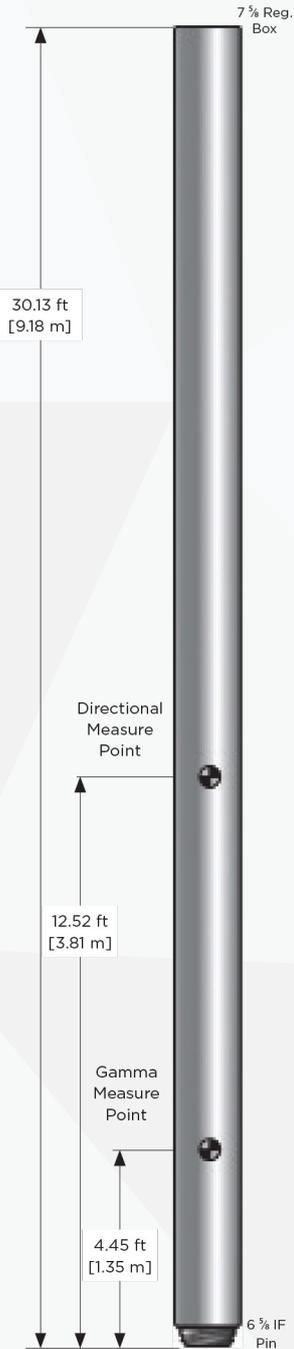
Max. dogleg, rotating <sup>††</sup> , deg/ft	9/100	Max. dogleg, sliding, deg/ft	18/100
Max. compression, lb [kg]	50,000 [22,727]	Max. tension, lb [kg]	1,455,000 [659,864]
Max. torque, lbf.ft [N.m]	45,000 [61,012]	Torque to failure, lbf.ft [N.m]	75,000 [101,686]
Max. temp., degF [degC]	302 [150], 350 [175] <sup>†††</sup>	Max. RPM	250
Flow rate, gal/ min [m3/min]	500 to 1,500 [1.893-5.678]		

<sup>†</sup> 6 5/8 Reg. with top X/O sub, 5 1/2 IF without.

<sup>††</sup> In some applications, the maximum dogleg may exceed the recommended value. Each situation must be analyzed on an individual basis to determine specific equipment capabilities.

<sup>†††</sup> Standard tool configuration 32 to 302 degF [0 to 150 deg C], optional Survivor Series rating 32 to 350 degF [0 to 175 deg C].

Note: All dimensions are nominal. Configuration options are available. Tool drawing is not to scale.



### TOOL SPECIFICATIONS

Nominal OD, in [mm]	9.50 [241.3]	Internal diameters, in[mm]	5.76 [146.3], 4.25 [108.0], 3.00 [76.2]
Length, ft [m]	30.13 [9.2]	Weight, lbm [kg]	6,890 [3,125]
Equivalent stiffness, in[mm]	9.50 [241.3]OD / 3.00 [76.2] ID	Equivalent moment of inertia, in.4 [cm4]	395.8 [1,625]

### TOOL JOINT SPECIFICATIONS

API 7 5/8 Reg.

Makeup torque, lbf.ft [N.m]	75,000 [101,686]
Bending-strength ratio	2.92
API 6 5/8 IF	
Makeup torque, lbf.ft [N.m]	95,000 [128,803]
Bending-strength ratio	2.18

### OPERATING SPECIFICATIONS

Max. dogleg, rotating t, deg/ft	8/100	Max. dogleg, sliding, deg/ft	15/100
Max. compression, lb [kg]	50,000 [22,727]	Max. tension, lb [kg]	2,550,000 [1,156,463]
Max. torque, lbf.ft [N.m]	75,000 [101,686]	Torque to failure, lbf.ft [N.m]	140,000 [196,594]
Max. temp., degF [degC]	302 (1501, 350 [175] **	Max. RPM	250
Flow rate, gal/ min [m3/ min]	500 to 1,500 [1.893-5.678]		

† In some applications, the maximum dogleg may exceed the recommended value. Each situation must be analyzed on an individual basis to determine specific equipment capabilities.

\*\* standard tool configuration 32 to 302 degF [0 to 150 degC], optional Survivor Series rating 32 to 350 degF [0 to 175 deg C].

Note: All dimensions are nominal. Configuration options are available. Tool drawing is not to scale.