



TorkSub™ Stand-Alone Torque Measuring System

The patent-pending TorkSub stand-alone torque measuring system uses strain-gauge techniques to measure applied torque during connection makeup and the weight of the pipe string after makeup. The system also measures the temperature of the TorkSub shaft, which can be used in monitoring mud temperatures. The TorkSub system can be used with the Weatherford TorkDrive™ tool or any other top-drive makeup tool to precisely measure the torque transferred from the top drive to the top-drive makeup tool. The TorkSub system can also be used as a stand-alone system to obtain the same measurements in other drilling-related applications.

An integrated Namur-output gear-wheel-turns counter measures the rotation of the shaft with high-resolution output. All data is sampled in the electrical interface box and can be transmitted to any controlling system in a variety of formats. The TorkSub system is ATEX certified and rated for Zone 1, so Analog output (4 to 20 mA and Namur) and digital output (CANbus) are explosion protected.



Applications

- Monitoring premium- or API-connection makeup torque-turn
- Monitoring drilling/reaming torque, rotation speed, string weight, and drilling-fluid temperature
- Calibrating the torque and weight measurement systems of the drilling contractor's top drive

Features, Advantages, and Benefits

- The strain-gauge technique that this system uses provides accurate torque measurement across the full torque range, up to 60,000 ft-lb (81,000 N•m). This capability can compensate for the inaccuracy of top drives with analog control systems and prevents the application of inadequate or excessive torque to pipe connections.
- The TorkSub stand-alone system provides precise measurement of the string weight after makeup by measuring the weight of only the string below the system; that is, without the weight of the top drive. This capability enables faster, more precise measurement of pickup and slackoff weights and provides an efficient indication of string sticking.

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Features, Advantages, and Benefits (continued)

- The system is ATEX certified and rated for Zone 1; safety is enhanced by elimination of the potential for gas ignition.
- Static and dynamic components communicate via wireless antennas, which enhances system reliability and safety and reduces the potential for troubleshooting operations.
- The integrated turns sensor precisely measures turns in both directions, which provides the ability to read positive and negative torque. This feature enables monitoring and early response to typically hidden top-drive makeup back-swing effects. It also guards against inadequate torque to pipe connections, which minimizes the potential for dropped or leaking casing or tubing.
- The TorkSub standalone system is fully compatible with Weatherford torque monitoring systems and TorkPro™ top-drive makeup software. This compatibility facilitates rig up and interfacing with the JAMPro™ joint-analyzed makeup system to save time and minimize the potential for inaccurate input that leads to pipe damage.
- Load, torque, and temperature ratings cover a wide range of industry requirements for greater operational flexibility.
- Dual signal-output standards (analog and digital) make the system interchangeable with JAMPro and TorkPro software and enable integration with the rig system.
- Several features of the TorkSub stand-alone system facilitate efficient troubleshooting:
 - The TorkSub interface and the LED power indicator signal whether the coil is operational.
 - Compatibility with ATEX-certified handheld devices enables equipment checking and calibration in rig-floor conditions.

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Specifications

Storage temperature (°F, °C)		-40 to +158 -40 to +70
Operating temperature (°F, °C)		-40 to +140 -40 to +60
Approximate weight (lb, kg)		617 280
Dimensions ^a (in., mm)	Depth	24.20 628
	Width	20.63 524
	Height	35.98 914
Rated load (ton, tonnes)		500 453
TorkSub top connection		6 5/8-in. API Reg RH box
TorkSub bottom connection		6 5/8-in. API Reg RH pin
Connection shoulder OD (in., mm)		7-3/4 197
Flowline ID		2-1/2 in.
Maximum mud flow rate (gal/min, L/min)		526 1,990
Maximum mud temperature (°F, °C)		194 90
Maximum torque (ft-lb, N·m)		60,000 81,000
Supply voltage		100 to 240 V AC
Measurement data interface ^b		I.S. CAN
		I.S. 4 to 20 mA
		I.S. Namur
Accuracy of torque measurement		<0.5% of range ^c
Resolution of torque measurement		<0.05% of range
Resolution of turns measurement		1,455 pulses per revolution
Design standard	Machine guidelines	2006/42/EC/API 8C
	ATEX directive	94/9/EC
	EMC directive	2004/108/EC
ATEX marking, TorkSub interface		II 2 G Ex e ia mb [ia Gb] IIB T4 Gb 
ATEX marking, TorkSub power supply		II 2 G Ex d e IIB T4 
ATEX marking, TorkSub unit		II 2 G Ex e ia mb IIB T4 Gb II 2 G c IIB T4 

^aRefer to Fig. 1.

^bOptimized for use with the Weatherford JAMPro™ joint-analyzed makeup system.

^cAt room temperature



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Specifications (continued)

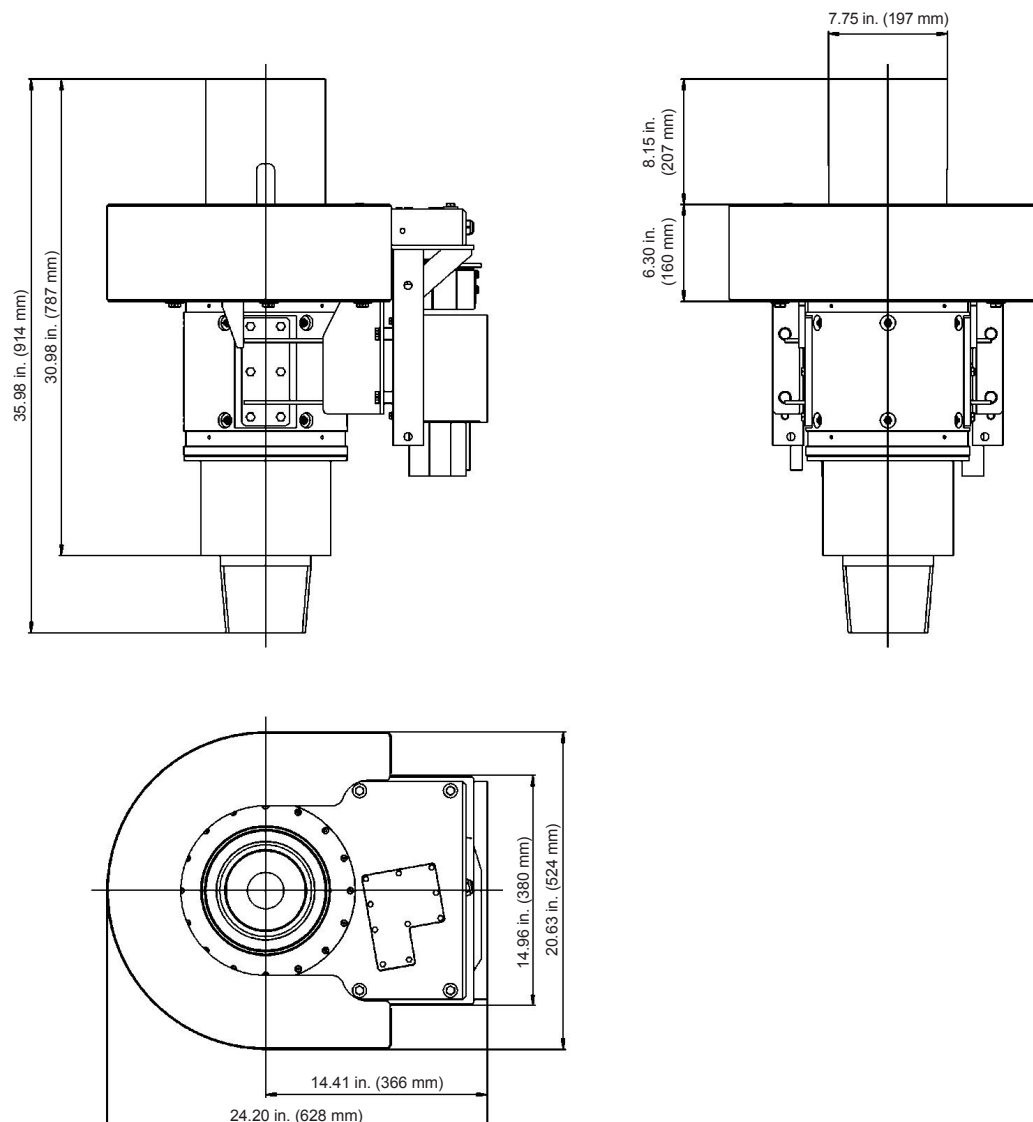


Fig. 1. Dimensions of the TorkSub stand-alone system