

**INTRODUCING**

The most innovative,  
wireless sensor technology  
for the oil/gas drilling,  
mining or directional  
drilling industries



**SENSOR DATA**  
TECHNOLOGIES INC.





## WHY CHOSE SENSORDATA?

### BENEFITS OF SENSORDATA SENSORS

- Provides valuable real-time data
- Wireless, onboard technology
- Specific customized integration - not an add-on
- Superior to competitive sensors
- Saves time and money
- Enhances efficiency and safe operations
- Helps prevent expensive catastrophic events
- Greatly enhances safety
- Class 1, Div 1 qualified

At Sensordata Technologies, we've recognized the importance of "real-time" force and torque measurement in the petroleum drilling, mining or non-benign (hazardous) industries. This has led to the development of the most advanced wireless force and torque sensor in the world.

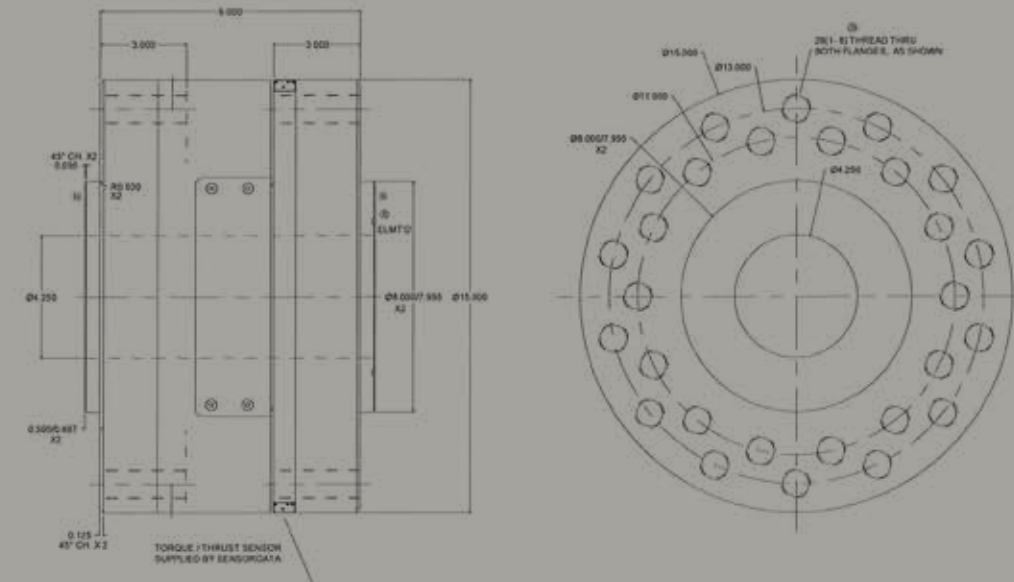
#### **Introducing the M412 dual-range torque thrust.**

This onboard wireless dual range force and torque sensor provides important data that helps prevent catastrophic failure during expensive drilling operations - hence saving time and money.



## ENGINEERING MANUAL

### Model M412 -107



## 1 GENERAL

We are the first to introduce real on-board wireless capability for our torque and force lines.

Our wireless systems are specially designed for integration in our sensors not just canned add-on's as other manufacturers started to follow-wise.

We use "Telemetry" and "Bluetooth" technologies in our sensors.

With almost two decades now since SensorData's wireless flagship was introduced, these sensors proved to be well hardened for EMC and unforgiving working conditions.

Added integrated intelligence on-board on our sensors, made us able to offer extended warranties (lifetime in some products), 1,000% overload capability and dual range options.

## 2 ENVIRONMENT

Electrical equipment can cause explosions in certain atmospheres. Equipment used in areas where explosive concentrations of dusts or vapors may exist must be designed with special wiring and other electrical components for safety purposes. Hazardous (classified) locations such as these might exist in aircraft hangars, gasoline stations, paint-finishing locations, grain bins or oil drilling sites.

In North America, the most widely used hazardous location classification system is defined by the National Fire Protection Association (NFPA) Publication 70. The type of hazardous substances that is or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures is specified.

The NFPA establishes area classifications based on Classes, Divisions and Zones that when combined delineate the hazardous conditions of a specific area.

The M412-107 sensor is qualified for; **Class 1- Div 1- Zone 1**

Notice that it is only the sensor that may exist in a Class1- Div1- Zone1 environment, both transceiver and power supply may not, usually they both are in a cabinet or a control room a distance away from the sensor. Yet they both are qualified for the same environment.

### Class I, Division 1:

There are three different situations that could exist to classify an area as a Class I, Division 1 location:

1. Ignitable concentrations of flammable gases or vapors may exist under normal operating conditions.
2. Ignitable concentrations of such gases or vapors may exist frequently because of repair or maintenance operations or because of leakage.
3. Breakdown or faulty operation of equipment or processes might release ignitable concentrations of flammable gases or vapors, and might also cause simultaneous failure of electric equipment.

### Class I, Zone 1:

One of the following two situations must exist in order for an area to be considered a Class I, Zone 1 location:

1. Ignitable concentrations of flammable gases or vapors are likely to exist under normal operating conditions.
2. Ignitable concentrations of flammable gases or vapors may exist frequently because of repair or maintenance operations or because of leakage.

For relevant codes, refer to;

- National Fire Protection Association (NFPA) Publication 70
- National Electric Code® (NEC), Articles 500 to 506
- The Occupational Safety and Health Administration (OSHA), Code 29 of Federal Register (CFR) 1910.399.

### 3 SPECIFICATIONS

**Capacities:** The M412 family can be made into different capacities and dimensions according to application.

**Range:** Range of wireless signal transmission is 100 Ft. (30 m). Consult factory for longer distances.

**Accuracy:** better than 1% overall accuracy. Such accuracy proves very valuable to customers as it protect against damaging expensive tooling or equipment downstream of the sensor when excessive torque or thrust values are reached.

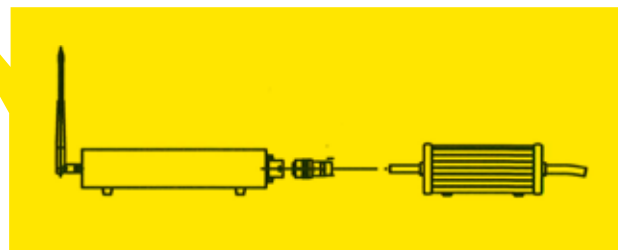
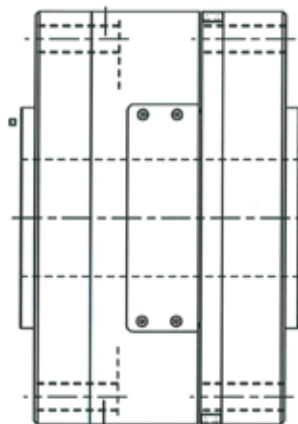
### 4 PRECAUTIONS

**A wireless Bluetooth signal is transmitted between antennas on the sensor and the transceiver.**

**Sensor antenna is a copper wire embedded into the fiberglass ring on the sensor. Though well protected, care must be taken not to damage this fiberglass or copper antenna by any hard object. Dust, grease, dirt, will not impede wireless transmission.**

### 5 EMC

Sensor or transceiver (FIG. 1) will not be affected by or affect any Bluetooth equipment in the vicinity.



### 6 UNPACKING SENSOR

#### STEP 1.



**Remove top:** Remove top of box with claw hammer or similar device exposing transceiver and power supply. Set aside.

#### STEP 2.



**Remove inner lid with using screwdriver:** Unscrew (4) screws and remove the inner lid.

#### STEP 3.



**Remove 2"x 4" crossbars:** Remove the (2) loose cross-bars exposing the protective cardboard packing material.

#### STEP 4.



**Remove protective cardboard packing:** Remove top and side cardboard packing material to expose sensor.

### 6 UNPACKING SENSOR (con't)



**Slide chains through sensor:** Make sure chains have a protective surface around sensor. Lift with hoist.



**Place sensor on clean, flat work surface:** Be sure to place sensor with battery panel facing up.

#### ITEMS INSIDE CRATE:

- Sensor with pre-installed battery module
- Wireless Transceiver
- 110v Power Supply

### 7 REMOVING/INSTALLING BATTERY MODULE FOR CHARGING & STORING

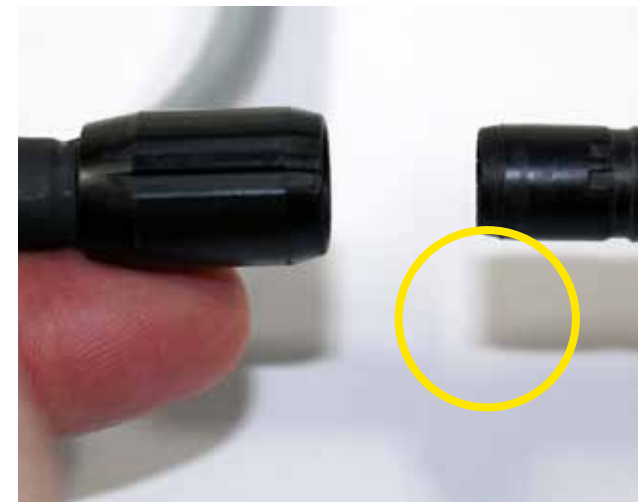
Sensor arrives with batteries installed and fully charged.



**1: Battery module access:** Batteries are located inside sensor behind the module access panel. Remove the (4) 1/4-28 socket head screws located on the corners of the battery module.



**2: Carefully remove battery module:** Grasp battery module firmly by the corners and pull out.



**3: Retrieve Power-In Cable:** Expose cable and unplug connector from plug.

#### IMPORTANT NOTE:

- Observe orientation of POLARIZING RIBS when plugging connectors together.

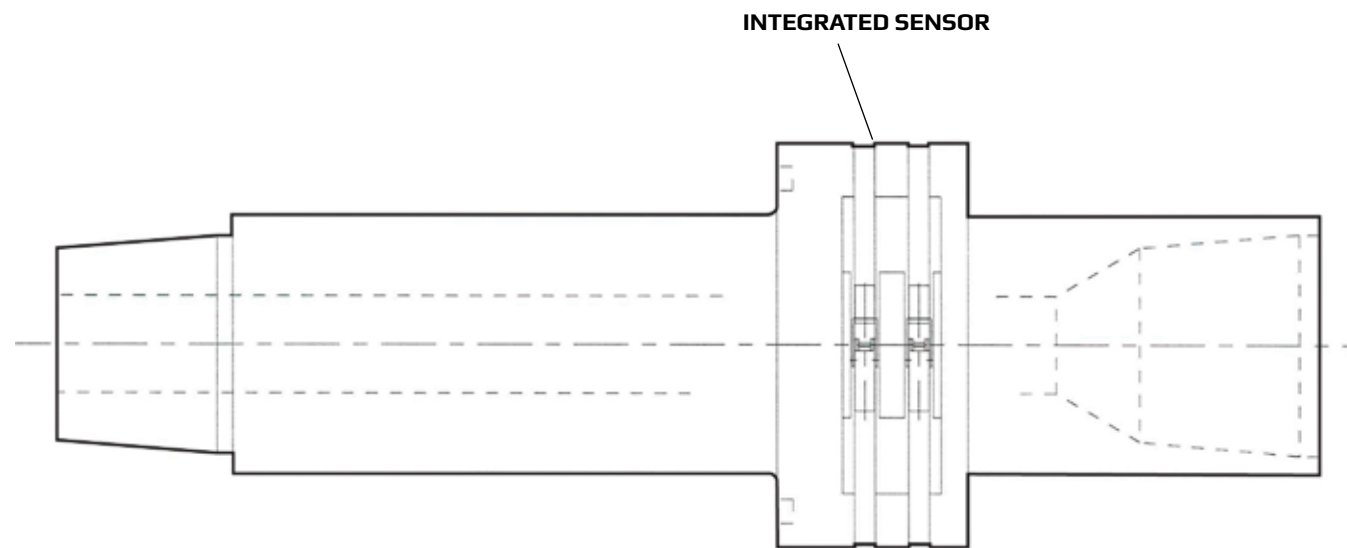
#### GENERAL BATTERY PACK CARE:

- Do Not Charge Battery In Ambient Temperature Over 30 Degrees C to Maximize Cycle Life. Charging Causes Pack to Rise 46°C Over Ambient.
- Battery Pack Life is maximum 6 Days (192 Hrs) fully charged.
- To maximize cycle life, wait till voltage is between 5.5 to 5.2 VDC before recharging.
- See Charger Instructions & Charger LED Battery Status on Green Card (In Charger Box).

#### NOTE:

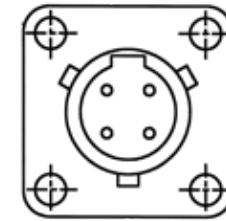
- Do not leave battery pack plugged into sub after 192 Hrs of operation. This would reduce heat during re-charge & maximizes cycle life.
- When battery pack drops to less than 5.5V in 4 days (96 Hrs.), send back to SensorData for cell replacement

### 8. MODEL M412-106

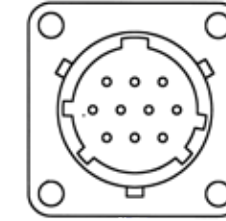


**M412-106 ONE PIECE DESIGN**

### 9. PLUG n' PLAY



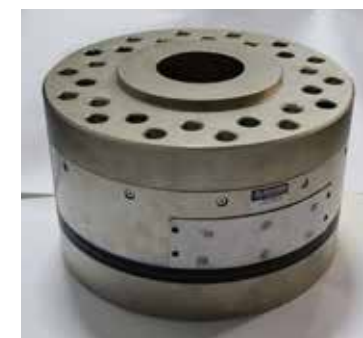
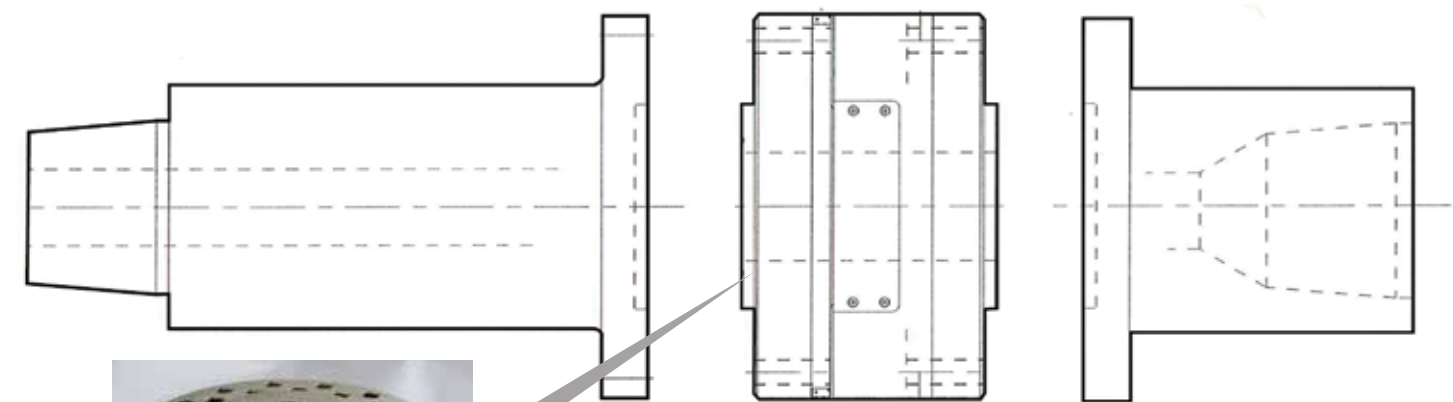
**Fig.-1**  
4- PIN Connector -  
To Transceiver



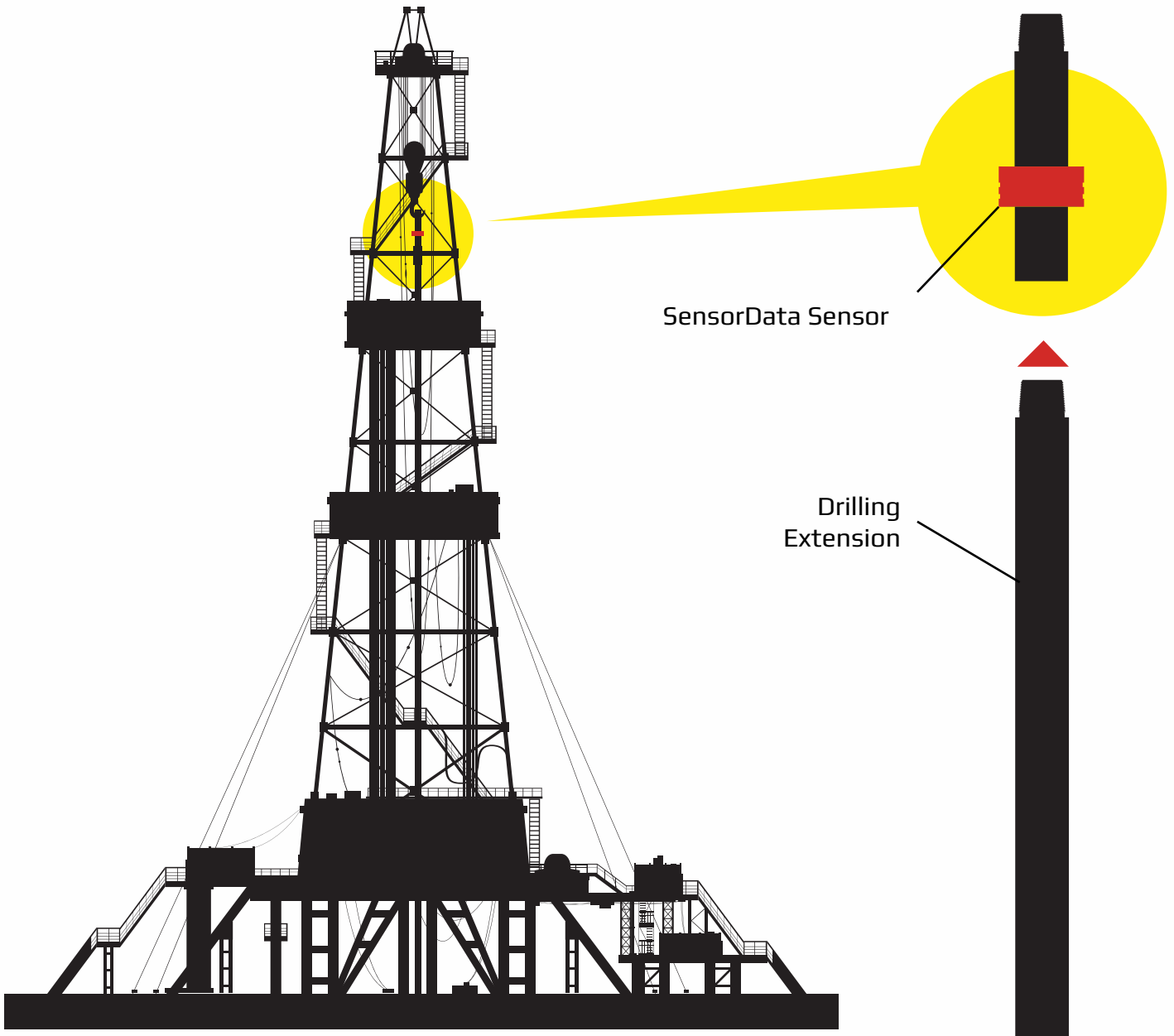
**Fig.-2**  
4- PIN Connector -  
To DAQ



1. Sensor is received with batteries fully charged but disconnected.
2. When ready to run, connect battery cable to circuitry as shown in (Fig3). Please refer to sec. 7 Removing/Installing Battery Module,
3. Power "Transceiver" using supplied power supply, via the the **4-pin connector (Fig. 1)** in the back,
4. Use the 10 pin connector (**Fig. 2**) to connect the transceiver to any DAQ of choice,
5. Once power supply is plugged into 110 V source, a wireless link between sensor and transceiver will be established in max 7 seconds, identified by a red light in the back end of the transceiver.
6. Any torque or force applied to the sensor (even by hand) will be read directly on the connected DAQ
7. Customer is recommended to familiarize him/her self with the system by using any DVM in place of the DAQ. This would also prove useful in troubleshooting any faults.



**M412-1076 3 PIECE DESIGN**



**TYPICAL OIL DRILLING SENSOR APPLICATION**

**IMPORTANT NOTICE**

Dimensions above are in inches unless otherwise noted. Manufacturer not responsible for any modification to product, fixtures, or accessories made by user or third party. User should request certified drawings before designing mountings or fixtures. Manufacturer reserves right to modify or change design, dimensions, specifications, and features of this product without prior written notice. Changes to NOTICE must be in writing and accepted by manufacturer.

[www.sensordata-burster.com](http://www.sensordata-burster.com)

