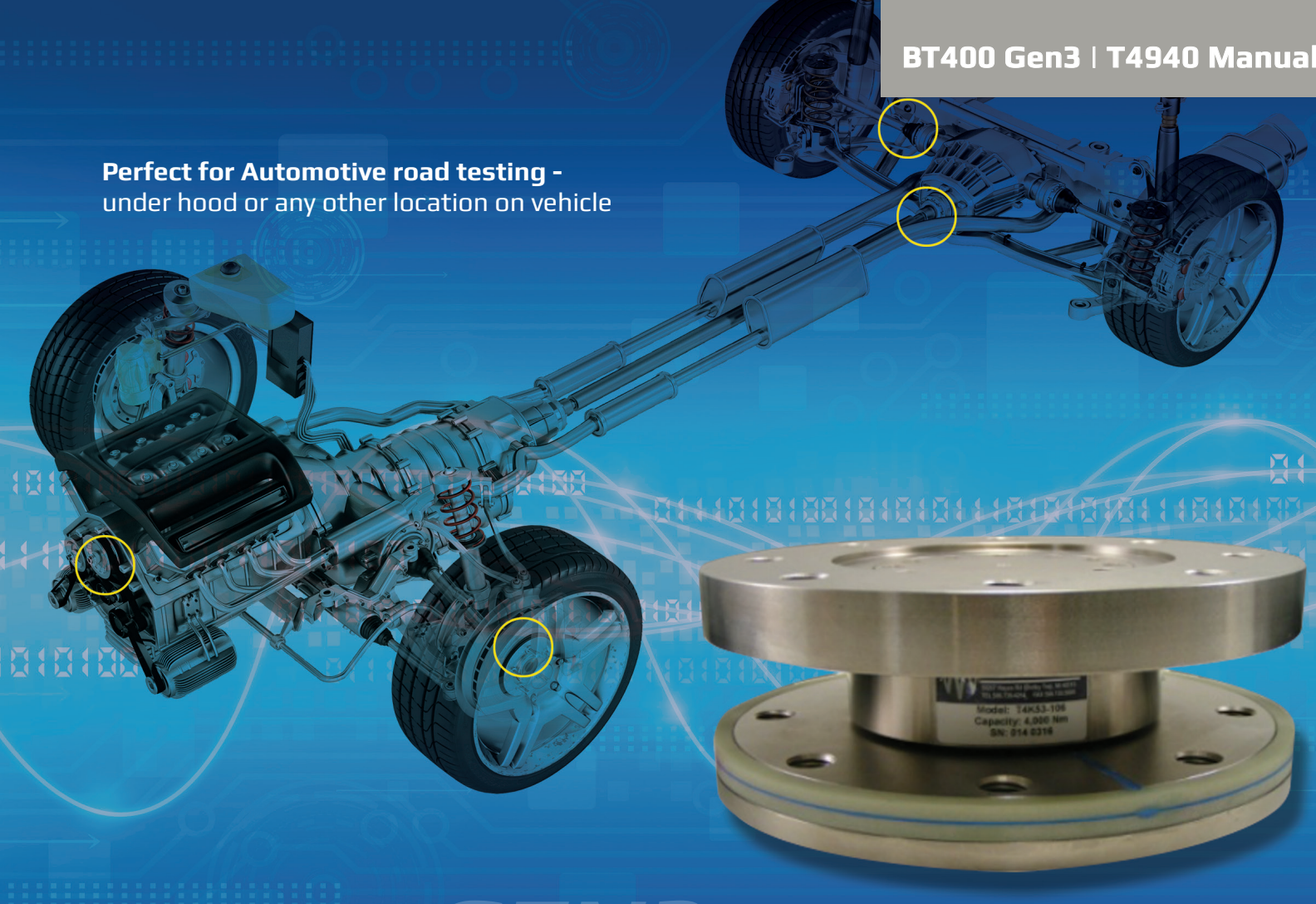
Perfect for Automotive road testing -
under hood or any other location on vehicle



INTRODUCING BT400 GEN3

The Most Advanced Wireless Torque Sensor on the Planet

T4940 leapfrogs current state of the art by transmitting information wirelessly to destinations 100' away

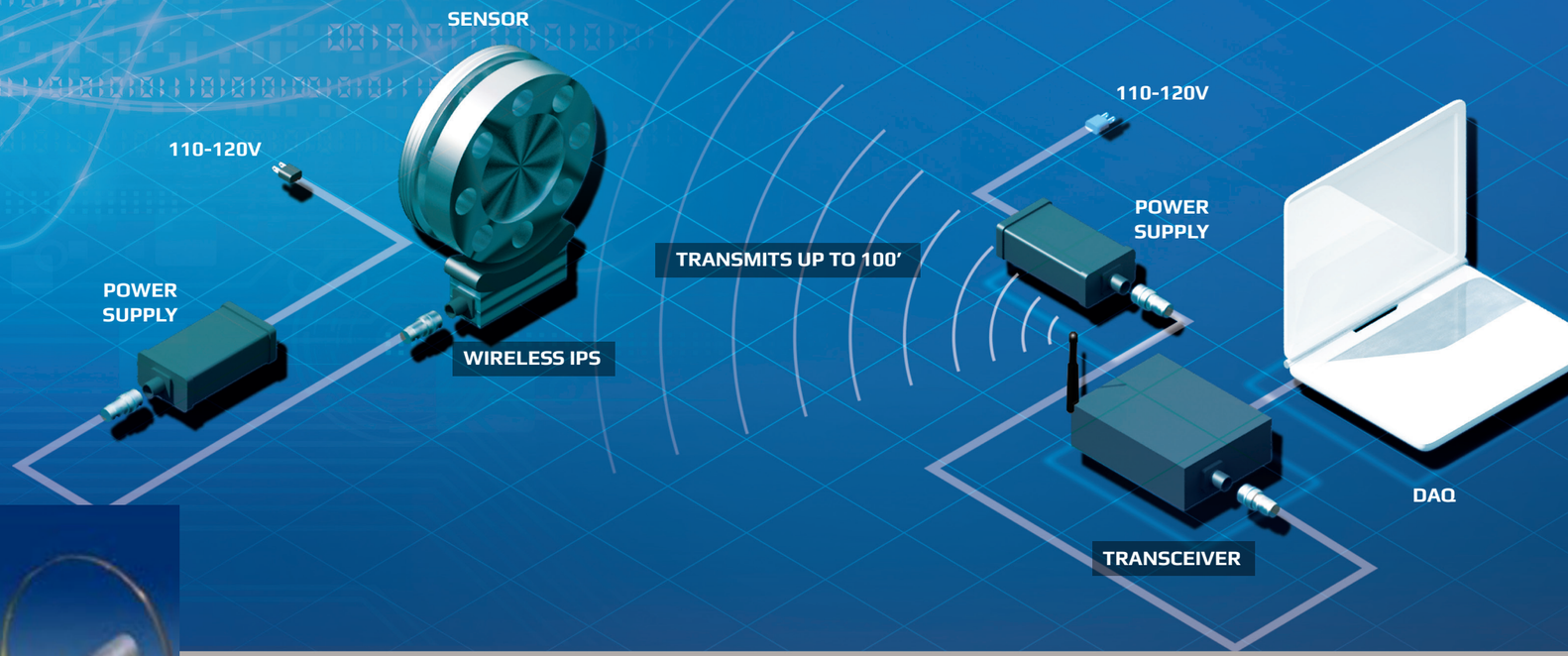
SENSORDATA TECHNOLOGIES INC.

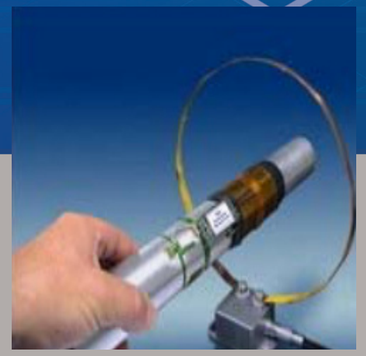
CONTENTS:

The technology That *LEAPFROGS* the existing State of the Art

BENEFITS AND ADVANTAGES

- **Transmits** information wirelessly to destinations **100' away**
- The main difference between ***Digital Telemetry*** **and** ***True Wireless Sensors*** is the length of the wireless link
- Very valuable asset for Test Engineers. **Portable version available**
- **Perfect for Automotive road testing -** under hood or any other location on vehicle



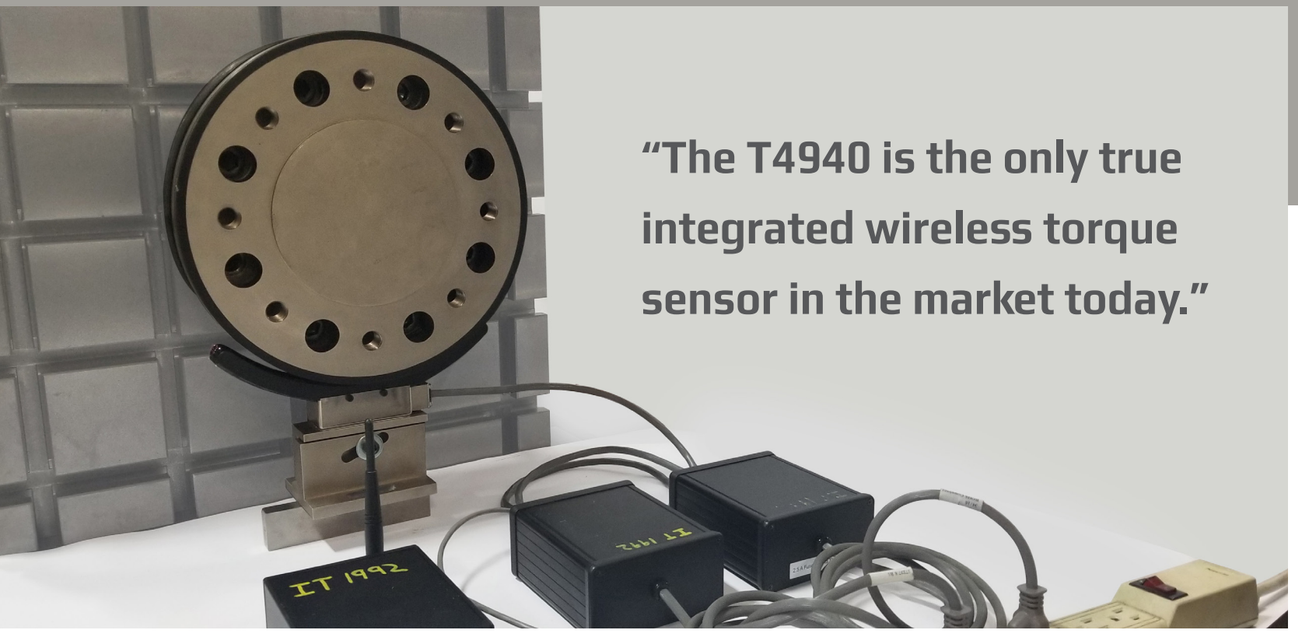


CURRENT TECHNOLOGY: Digital Telemetry Sensors

1 THE SENSORDATA TECHNOLOGY ADVANTAGE

THIS IS WHERE WE ARE TODAY. The current state of the art is best described as "Telemetry Transducers", trafficking data between rotating and stationary subsystems that are extremely close to one another. "Telemetry Systems" have been in use for the past 50- 60 years with some minor variations in shape.

The T4940 leapfrogs current state of the art by transmitting information wirelessly to destinations 100' away. This is the only sensor known to our knowledge that has this capability.



"The T4940 is the only true integrated wireless torque sensor in the market today."

2 T4940 - GENERAL FEATURES

- Rotor - low inertia & high stiffness
- Compact design
- Rated capacities up to* 10K Nm
- Rated speed up to 25,000 rpm
- Zero velocity speed sensor – optional
- Remote Bluetooth base station – standard
- Digital and Analog signal options
- SAE 4340 alloy steel - satin nickel finish
- Output; ±5 VDC, ±10 VDC, 12±8 mA, 60±20 KHz

THE BT400 SERIES WIRELESS SENSOR

The BT400 Series Bluetooth Non-contact Radio Coupled Rotary Flange Torque Sensor provides radio transmission of measured data, requires relatively little space for installation, and is capable of measuring torque up to 8,000 lb-ft at speeds up to 25,000 rpm. A zero velocity speed sensor option is available.

The BT400 encapsulated on-board electronics provides excitation for the strain gage bridge, amplifies the output of the bridge, and converts the amplified signal to a 16 bit digital word. Computers equipped to receive 2.4 GHz Bluetooth data can receive wireless transmission from the BT400. The BT400 can also transmit to an optional remote Bluetooth Base Station that provides 3 analog outputs and a USB digital port for interconnection to a P.C. The BT400 on-board electronics facilitates remote shunt calibration. LabVIEW® software is supplied.

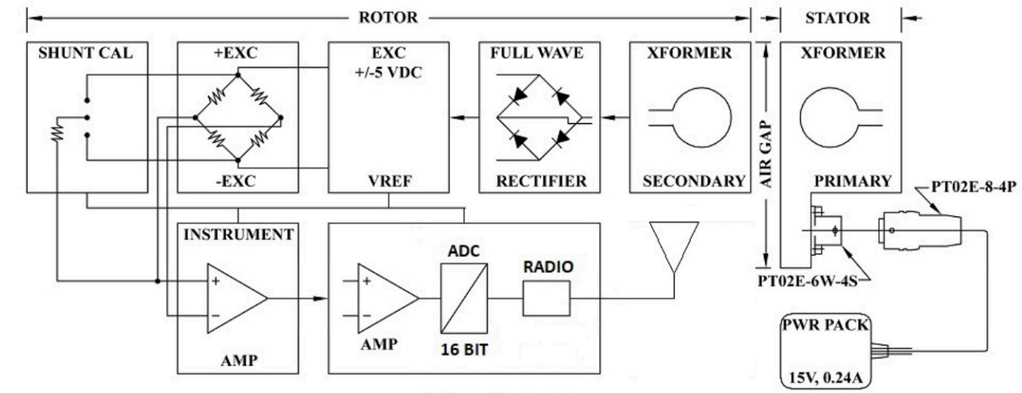
On-board amplification of the signal and its immediate conversion to a 16 bit digital word significantly reduces the effects of conducted noise that is inherent in other types of rotary torque measurement systems. The BT400 is not susceptible to the harmful effects of EMI and ESD, and is immune to nearby metal structures. Installation of the BT400 into a dynamometer driveline does not require external couplings or expensive alignment procedures.

T4940- True Bluetooth Wireless Torque Sensor

3 BLUETOOTH RADIO (subject to change without notice):

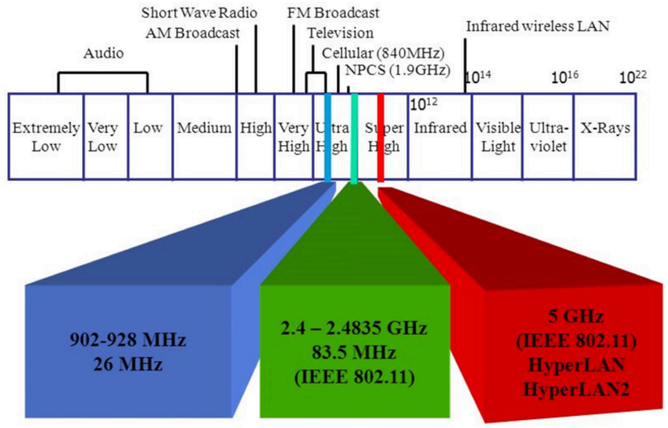
T4940 is the only true Bluetooth integrated sensor in the market Transmission Distance with Antenna Embedded in Rotor up to 100'.

"The Bluetooth Radio operates in the unlicensed ISM band at 2.4 GHz. The system employs a frequency hop transceiver to combat interference and fading, and provides many FHSS carriers. RF operation uses a shaped, binary frequency modulation to minimize transceiver complexity. The Basic Rate is 1 Mega sample per second (Msps) supporting a bit rate of 1 Megabit per second (Mbps)."



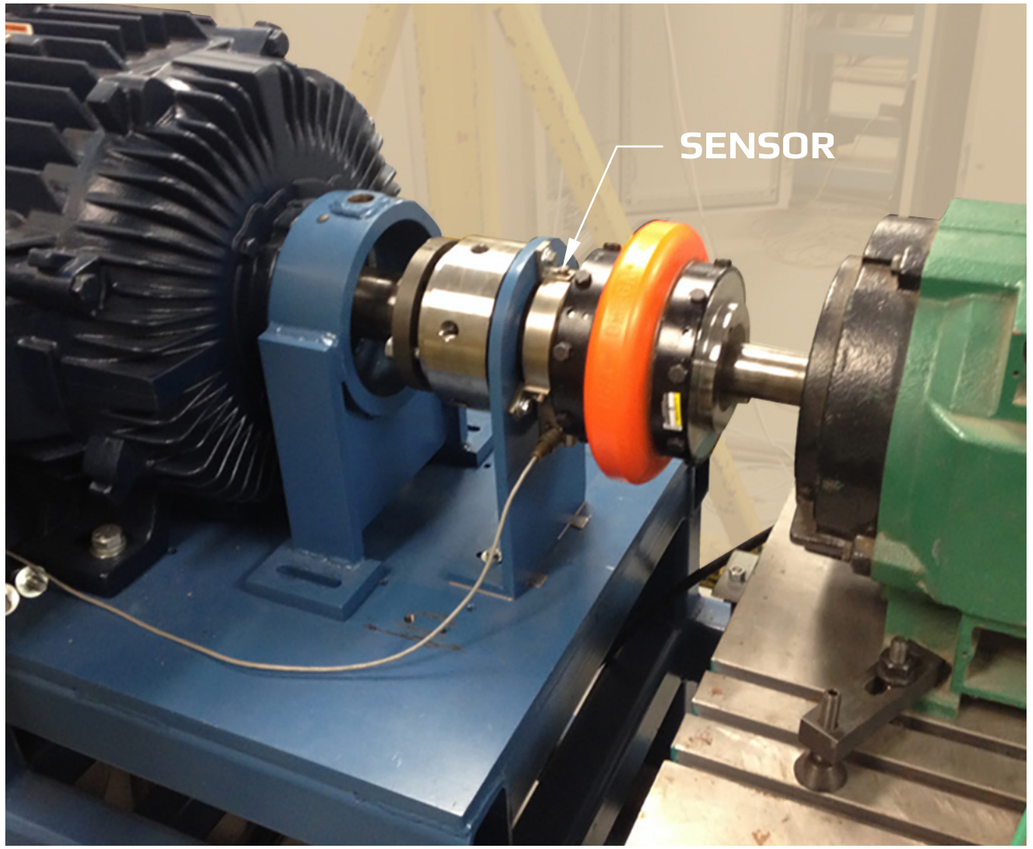
SETUP DIAGRAM
(Subject to change without notice)

ISM UNLICENSED FREQUENCY BANDS

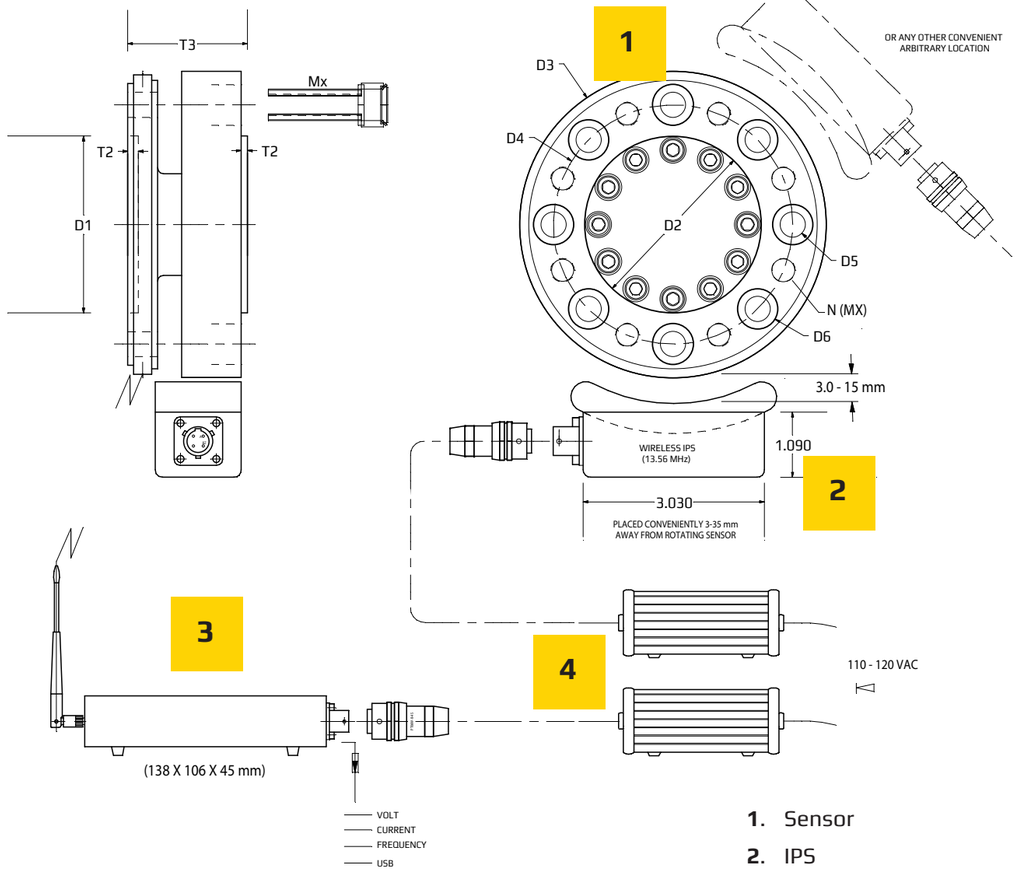


4. APPLICATIONS

Reliability and fatigue testing of gears, pumps, transmissions, electric motors, ICE's, whether on bench test setups, large floor test rigs or even in field runs since measured quantities can be sent wirelessly farther longer than the 3/8" claimed today for one of the popular products in the market.



5 SYSTEM COMPONENTS AND DIMENSIONS



1. Sensor
2. IPS
3. Transceiver
4. Power supply (2 of)

CAP	UNIT	D1 H7	D2 h6	D3	D4	D5	D6	T1
50, 100, 200	N.m	57	57	110	84	8.2	14	2
500, 1000	N.m	75	75	130	101.5	10.5	17	2
2, 3	kN.m	90	90	165	130	12.5	19	2.5
5	kN.m	110	110	195	155.5	14.5	22	2.8
10	kN.m	140	140	245	196	17	26	3.5

6 SPECIFICATIONS

Rated Capacity	Varies with application, up to 10 kN.m
Rated Speed	up to 25,000 rpm
Nonlinearity & Hysteresis	0.05% of rated output
Non Repeatability	0.02% of rated output
Zero Balance	±1% of rated output
Temperature Range, compensated	+70 to +170° F
Temperature Range, useable	-40 to +185° F
Temperature Range, Effect on Output	0.002% of load/°F
Temperature Range, Effect on Zero	0.002% of rated output/°F
Insulation Resistance, bridge to case	>5000 mega ohms
Maximum Load, safe & ultimate	150% of rated capacity standard. Higher overload protection available
Torsional Stiffness, rotor, Ke, typical	14.58 x 10 lb-in/rad
Deflection at Rated Capacity, rotor, typical	0.029 degrees
Mass Moment of Inertia, rotor, Je, typical	Varies with models & capacity. Consult Factory
Weight	Varies with models & capacity. Consult Factory
Construction	SAE 4340 alloy steel with satin nickel finish

DC Amplifier

Full Power Bandwidth- 3dB;	50 KHz
Nonlinearity; % FS deviation from BF straight line	±0.002
Temp. Effect on Output / Zero; % FS/°F	±0.00083
Temp. Range; °F	40 to +185
Humidity; % non condensing	5- 95

A-D Converter

Resolution; Sigma-Delta ADC	16 bit bipolar mode
Samples Per Second (SPS);	12000
Readings per Second (RPS);	3000
Differential Nonlinearity Error (DNL);	0
Nyquist Frequency; Hz	6000
Offset Error; LSB	±1/2
Signal to Noise Ratio (SNR); dB	85
Temp. Range; °F	-40 to +185
Humidity; % non condensing	5- 95

7 INSTALLATION

One of the sensor flanges has a set of holes to be used to bolt thru to the UUT and the other to the driver. Make sure the UUT is bolted to the flange marked G (Ground). Place the crescent shaped IPS unit as shown in the OD drawing supplied. No stringent accuracy required since the gap between the sensor and the IPS unit is wide enough. Plug in the one power supply unit to the IPS receptacle. Place the Transceiver in a convenient location from the sensor (~100'). Power the plug transceiver to the second power supply. Connect both power supplies to the 110/220 outlet

8 PRECAUTIONS AND USE

1. **Welding**
   - Arc welding 15' from the sensor or the base station requires that the system be powered down.
   - Welding inside of 5' from the sensor or the base station requires the removal of the Sensor and Base Station that are within that distance.
   - Welding to any components that have a potential to cause an electric loop to the sensor or base station requires the removal of that component. (e.g. welding to the drive shaft that mates up to the sensor).
2. **Base Station**
   - Power Base Station before IPS (Sensor).
   - The Base Station is designed to sit on its rubber feet (Isolates Antenna).
   - Do Not Short Any Analog Output to ±Cal (A or D).
3. **Antennas (Base Station)**
   - Extension coax cables should be made in lengths in multiples of 4.84" for optimal wave length. Otherwise you may stack SensorData #0306-1006.
   - If Antenna is mounted inside Shroud Coax Jack must be insulated.
   - 2 or More Base Station Antennas need to be spaced 10 – 12"apart.
4. **Sensor Assembly**
   - Sensor is Earth Grounded
   - DO NOT Pick Sensor Up by (Black) Rotor Coil Ring!!
5. **IPS Assembly**
   - IPS Module is Earth Grounded.
   - The IPS Module Base should be bolted to metal, as it generates some heat.
   - IPS Module to Rotor is Gap = ___" (See Cert.) Average (Plastic to Plastic).

Note:

The Radio has nominal transient protection built in, but it is reduced when compared to the balance of the electronics. Antenna inputs in general have nominal transient (ESD) protection since full protection would interfere with performance

9 THE T4940 ADVANTAGE

1. Large metal objects nearby

With all telemetry systems, nearby metal objects (and type of metal) act as secondary antennas to draw away the induced power. Metal objects have to be kept at distance from hoop or antenna of telemetry systems including protective shrouds around rotating applications.

Not a concern with 2.4GHz Bluetooth wireless torque sensor T4940

2. Electromagnetic emission;

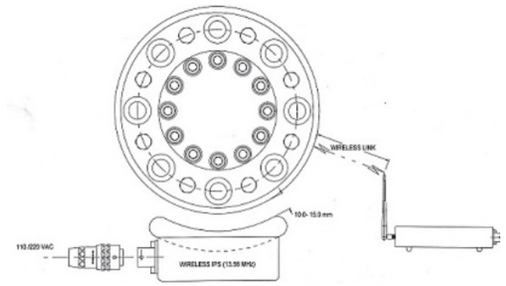
Telemetry systems are sources of electromagnetic emissions as they do not follow the frequency bands allocated for ISM applications designated by the FCC and ITU

Not a concern with 2.4GHz Bluetooth wireless torque sensor T4940

3. Critical setup

9mm
See Fig. 1

VS



See Fig. 2

Plastic ring embedded antenna is critical to setup with 4.5mm clearance from caliper sides and a vulnerable part to break under severe vibration and/or shock loading.

Not a concern with 2.4GHz Bluetooth wireless torque sensor T4940

4. Rigidity

Hoop antennas are more vulnerable to damage more than the rigid crescent stator of T4940.

Not a concern with 2.4GHz Bluetooth wireless torque sensor T4940

5. BNC cable

No BNC cable is required for the T4940, while one with restricted length is always required for any telemetry system to transmit signal to DAQ's.

Not a concern with 2.4GHz Bluetooth wireless torque sensor T4940

6. Wireless vs. Telemety

In a T4940 data is transferred wirelessly to any DAQ 100' away from sensor. For telemetry systems data is only bridging a distance of 3/16" to a stator then through a BNC cable to DAQ.

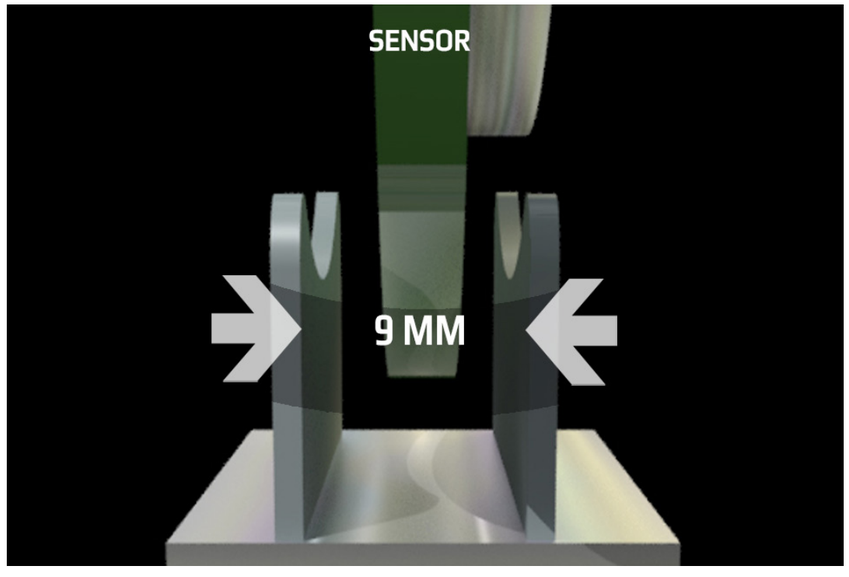


FIG 1: 4.5mm per caliper side is vulnerable to part breaking under severe vibration

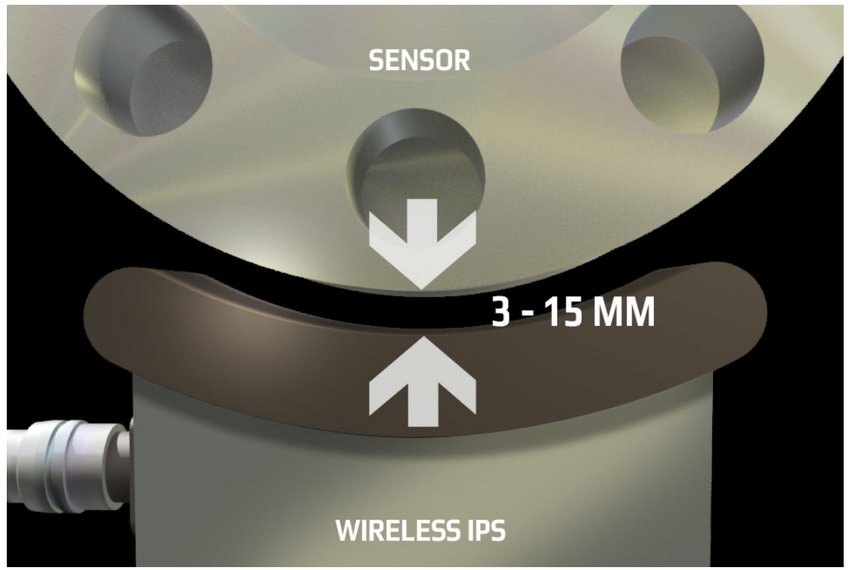
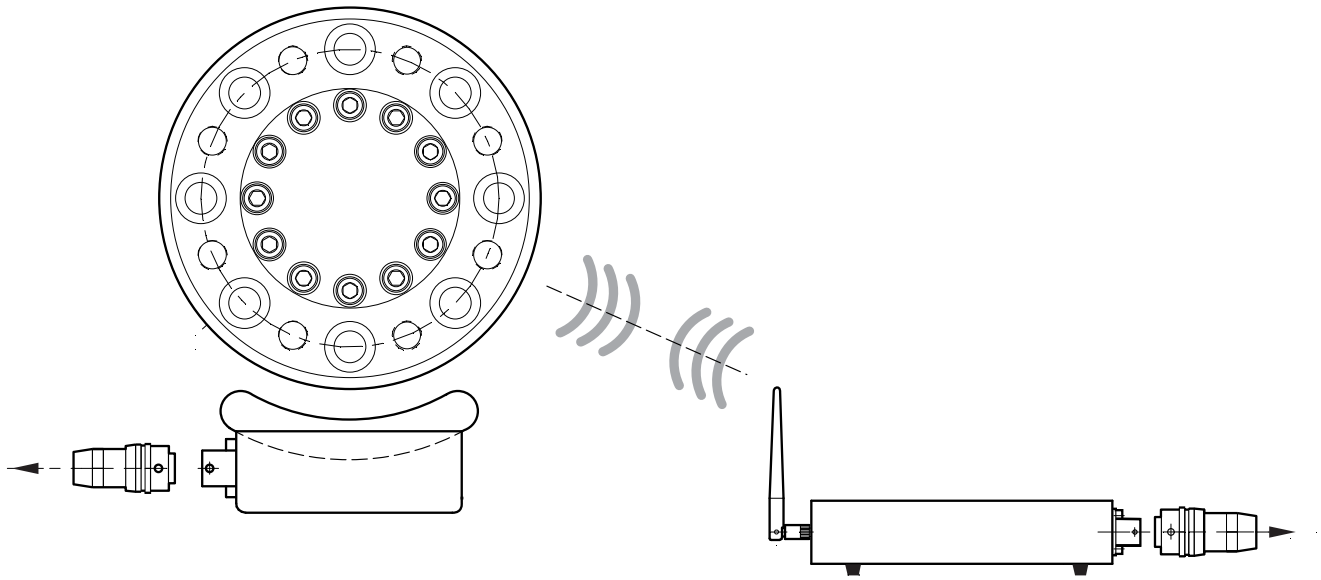


FIG 2: Placed conveniently 3-15 mm away from rotating sensor. Zero vulnerability.



The T4940 is the ONLY TRUE integrated wireless torque sensor in the market

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