HITECSENSORS
A HUMANETICS COMPANY

TEST AND MEASUREMENT
SENSOR SOLUTIONS

1st Edition

SENSOR INTELLIGENCE

CONTENTS

ABOUT HITEC SENSORS

HITEC Sensor Developments, with locations in Massachusetts, USA, and Sri Lanka, is a global network of employees and company representatives with over 50 years of experience providing sensors, custom sensor solutions and specialized engineering services. We design and manufacture strain gauge-based force sensors, load cells, torque transducers, instruments and complete test systems, and are an innovator of custom sensor solutions specific to a customer's application. HITEC also performs component instrumentation and on-site strain gauge installation services. Our products are engineered for high performance within some of the harshest environments and serve diverse industries and applications, including Medical, Aerospace, Industrial, Transportation, Energy and many others.

MAIN MARKETS

Automotive

Aerospace

Medical

Agriculture

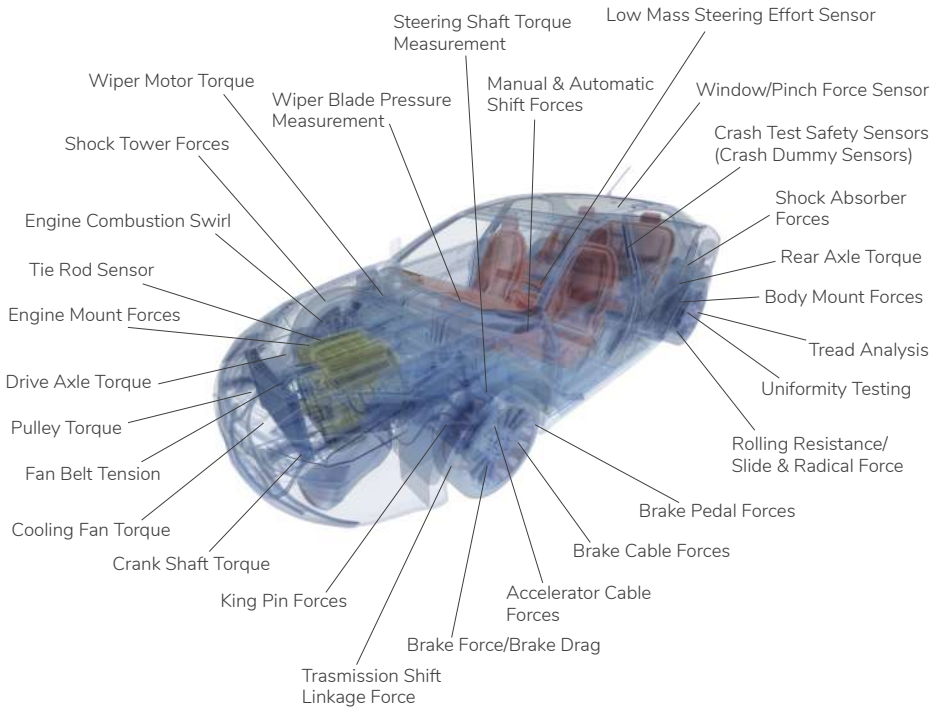
Automation

Construction

Robotics

Testing

VEHICLE TEST APPLICATIONS



Safety and quality are paramount in the automotive industry. Manufacturers today do extensive R&D and engineering to design vehicles that meet the standards demanded by their customers, and use sensors for testing to validate that quality is present in the vehicles that roll out of their assembly plants. HITEC Sensor Developments is proud to support these efforts with application-specific sensors and systems that monitor quality and ensure adherence to performance specs. From Pinch Force Sensors that certify power windows and doors are in compliance with federal safety standards, to Weld Force Gauges that monitor the effectiveness of the welding process, to instrumentation for process monitoring and control, HITEC Sensor Developments has the solution for almost any vehicle test and measurement application.

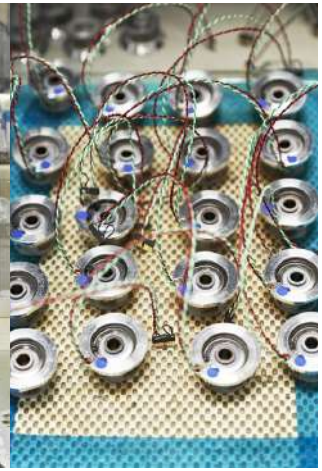
OEM MANUFACTURING

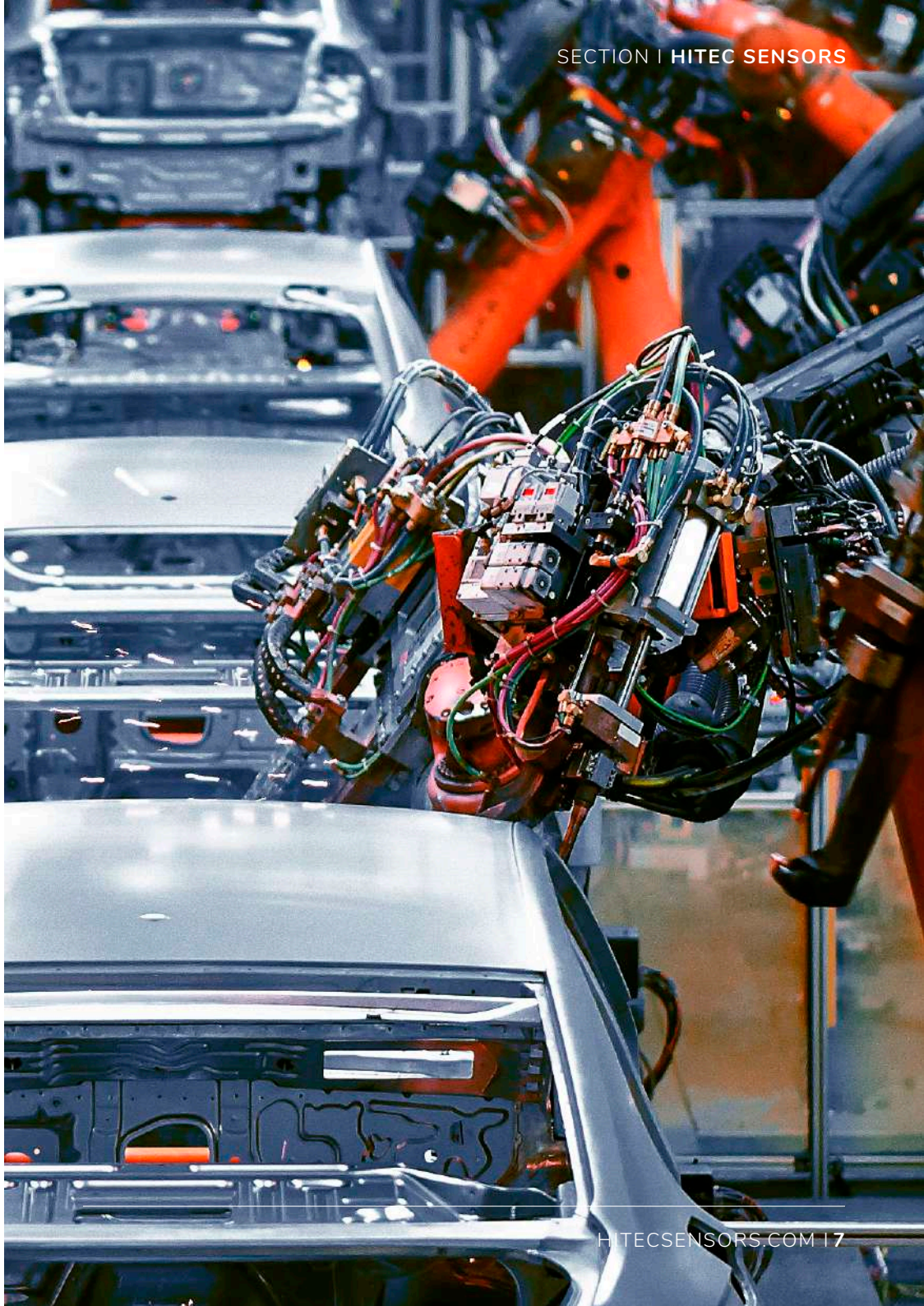
A strain gauge transducer is the most accurate means of measuring force, torque, load and pressure. Simply put, a transducer is an effective way of converting mechanical strain into electrical values. Our transducers can be integrated into your component or assembly during any stage of the product life cycle.

Utilizing a HITEC designed and manufactured custom strain gauge-based transducer, provides freedom by eliminating the need to adapt standard off-the-shelf transducers.

We start with an in depth face-to-face discussion to understand measurement requirements. We then produce transducer specifications, mechanical design and electrical documentation. The design is reviewed and customer approved. A small run of prototypes are tested before a full production run. We can produce any custom transducer in various quantities, from one to over 100,000.

All transducers are delivered after final health checks including bridge resistance, shunt reading, insulation resistance and zero balance values at a minimum. Communication with engineering and our customer service teams supports your needs utilizing most traditional scheduling systems such as Kanban for just-in-time delivery.





PRODUCTS

HITEC Sensor Developments designs and manufactures strain gauge-based load cells, torque transducers, force sensors, specialty test systems and instrumentation for critical sensing applications in medical, aerospace, industrial, automotive, energy, and other industries.

LOAD CELLS

THREADED ROD LOAD CELL

This series of Threaded Rod Load Cell is designed for general tension measurement applications. Both English and Metric versions are available (models 10188 & 10190, respectively). All models are machined from high strength steel alloy. A durable, molded elastomer cover offers mechanical protection. It also provides strain relief for the integral cable that exits out the side of the load cell and terminates in 3" pigtails.

SPECIFICATION

	MODEL 10188 & 10190
Model 10188 (lbs.)	2K to 50K (See chart)
Model 10190 (N)	10K to 200K (See chart)
Overload capacity (%)	150 of FS
Output at FS (mV/V)	2.0 nominal
Non-linearity (%)	0.10 of FS
Hysteresis (%)	0.10 of FS
Zero balance (%)	1 of FS
Compensated temperature (°F)	70 to 170
Useable temperature (°F)	65 to +250
Temperature effect on zero (%)	0.002 of FS/°F
Temperature effect on span (%)	0.002 of Rdg./°F
Bridge resistance (Ohms)	350
Excitation voltage, maximum (Vdc)	20
Material	Alloy steel

HIGH OVERLOAD PROTECTED LOAD CELL

The VHO stands for "Very High Overload" protection in all ranges. High Overload Protected Load Cell (10164) incorporates a bidirectional overload protection system. At approximately 130% of the full-scale capacity of the load cell, pre-loaded springs are engaged which direct the force path away from the sensing structure and through the housing. This protects it from damage due to loads up to 1000 lbs. VHO load cells can be mounted in series providing a dual range force measurement package.

SPECIFICATION

	MODEL 10164
Output at FS, nominal (mV/V)	2.0
Non-linearity (%)	0.10 of FS
Hysteresis (%)	0.10 of FS
Zero balance (%)	1 of FS
Compensated temperature (°F)	70 to 170
Useable temperature (°F)	-65 to +250
Temperature effect on zero (%)	0.002 of FS/°F
Temperature effect on span (%)	0.002 of Rdg./°F
Bridge resistance (Ohms)	350
Excitation voltage, maximum	20 Vdc
Material	Aluminum

THROUGH HOLE PANCAKE LOAD CELL

The 10043 hollow force sensor is designed to measure compression only loads. The 10019 is designed to measure tension and compression loads. These versatile, high precision sensors are used in both metal working and automotive applications. Because of their design, they are ideal in limited or tight space applications.

SPECIFICATION

	MODEL 10019 & 10043
Overload capacity (%)	150 of F.S.
Output at full scale (mV/V)	10019: 1.0 10043: 1.5
Non-linearity (%)	0.25 of FS
Hysteresis (%)	0.25 of FS
Zero balance (%)	1 of FS
Compensated temperature (°F)	70 to 170
Useable temperature (°F)	-65 to +250
Temperature effect on zero (%)	0.002 of FS/°F
Temperature effect on span (%)	0.002 of Rdg./°F
Bridge resistance (Ohms)	700/350
Excitation voltage, maximum (Vdc)	20
Material	10019: Aluminum 10043: Alloy steel

ROD END FORCE

This Rod End Force (10144) sensor is capable of measuring forces in both tension and compression. The load cell is machined from 4140 steel, and is supplied with a metal housing, providing mechanical protection for the sensing section. A side mounted industrial connector is supplied for easy cable connection. This cell is designed for direct attachment to hydraulic actuators.

SPECIFICATION

	MODEL 10144
Overload capacity (%)	150 of FS
Output at FS (mV/V)	2.0 nominal
Non-linearity (%)	0.10 of FS
Hysteresis (%)	0.10 of FS
Zero balance (%)	1 of FS
Compensated temperature(°F)	70 to 170
Useable temperature (°F)	-65 to +250
Temperature effect on zero (%)	0.002 of FS/°F
Temperature effect on span (%)	0.002 of Rdg./°F
Bridge resistance (Ohms)	350
Excitation voltage, maximum (Vdc)	20
Material	Alloy steel

PANCAKE FORCE SENSOR

This is a compact, universal Pancake Force Sensor (10174). This low profile unit has a small outer diameter and is capable of measuring both tension and compression. The sensor's shear web design yields high performance and offers high resistance to extraneous forces such as bending, side loads, and torsion. For compression only applications, an optional load button can be supplied. A base plate is also available.

SPECIFICATION

	MODEL 10174
Capacities (lbs)	300 to 100,000 (1.3 to 444kN)
Overload capacity (%)	150 of FS
Output at full-scale (mV/V)	2 nominal
Non-linearity (%)	0.25 of FS
Hysteresis (%)	0.25 of FS
Zero balance (%)	1 of FS
Compensated temperature (°F)	70 to 170
Useable temperature (°F)	-65 to +250
Temperature effect on zero (%)	0.002 of FS/°F
Temperature effect on span (%)	0.002 of Rdg/°F
Bridge resistance (Ohms)	350
Excitation voltage, maximum (Vdc)	20
Material	Alloy steel

WINDOW PINCH FORCE SYSTEMS: HANDS-FREE PINCH FORCE

Window Pinch Force Systems: Hands-Free Pinch Force (10293) is used to measure the pinch force of automatically closing windows, doors and sunroof systems under defined spring rates and displacements. The sensor features five interchangeable spring packs, adjustable measurement height, and a hand held peak force display.

The user will configure the sensor spring rate by screwing in the spring packs and adjusting the window bracket to the desired window opening. In operation, the sensor is clipped onto the window and the closer actuated. The companion instrument records the peak force developed to verify compliance to the specifications.

The sensor can also be mated to more sophisticated instrumentation for development applications. The sensor was designed to help automakers and OEM's comply with FMVSS 118 (Federal Motor Vehicle Safety Standard section 571, title 49) and European standards.

SPECIFICATION

	MODEL 10293	
Output (at 200N Max Load) (mV/V)	2 nominal	
Non-Linearity (% FS)	0.1	
Hysteresis (% FS)	0.1	
Overload Capacity	1,000	
Compensated Temperature Range (°F)	70 to +170	
Useable Temperature Range (°F)	-65 to +250	
Spring Rates and Maximum Load	**Spring Rate**	**Max Load**
	2 N/mm	40 N
	5 N/mm	85 N
	10 N/mm	125 N
	20 N/mm	200 N
	65 N/mm	200 N

HAND HELD PINCH FORCE SENSOR

This Hand Held Pinch Force Sensor (90250) is used to measure pinch force of automatically closing windows, doors, and sunroof systems. It includes four sensors, the PMAC 3000 portable readout instrument, and hard shell carrying case. The hand held units measure and record the closing force of a power window or sunroof. The sensors have a tuned stiffness and were designed to help automakers and OEM's comply with FMVSS 118 (Federal Motor Vehicle Safety Standard section 571, title 49). The instrument and sensors are Auto-ID enabled allowing self-calibration with no operator intervention.

KIT INCLUDES FOUR SIZES REQUIRED BY FMVSS

- 5 mm @ 65 N/mm stiffness [Model 10246-031-A0C00]
- 25 mm @ 65 N/mm stiffness [Model 10246-031-A0000]
- 50 mm @ 20 N/mm stiffness [Model 10246-031-A0A00]
- 200 mm @ 20 N/mm stiffness [Model 10246-031-AB00]
- PMAC 3000 instrument [Model 90424]

(Each sensor is overload protected to 300% FS)

OPTIONS

- 500N FS capacity wand with 100mm @ 20N/mm stiffness (Model 10246-012-AOEBA)

POWER SLIDING DOOR ASSEMBLY

The Power Sliding Door Assembly (90411) fixture allows the pinch sensor to be mounted to a sliding door panel and measure the peak closing forces generated, prior to motor reversal, at various opening widths. By allowing the sensor to be positioned parallel to direction of travel, and not just parallel to the door, the true force generated is measured, not just a component of that force.

SPECIFICATION

	MODEL 90411
Output (at 200N Max Load) (mV/V)	2 nominal
Non-linearity (%FS)	0.1
Hysteresis (%FS)	0.1
Overload Capacity (N)	1,000
Compensated Temperature Range (°F)	70 to +170
Usable Temperature Range (°F)	-65 to +250

NON-AIR BAG COMPATIBLE STEERING EFFORT SENSOR

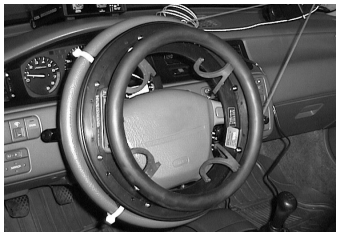
The Non-Air Bag Compatible Steering Effort Sensor (01027) was designed to evaluate steering torque requirements of non-airbag equipped, new and existing steering systems and components used in automobile, trucks, buses, and material handling equipment. Quantitative evaluations of steering systems, steering geometries, tire interactions, and safety factors are made using this device. The steering effort sensor is equipped with a 14” steering wheel. This is fastened to the existing steering wheel by means of a fixed or optional adjustable 3 point clamp assembly. For direct steering shaft attachment, a custom adapter plate is available.

SPECIFICATION

	MODEL 01027
Capacity (in. lbs.)	100 to 3,000
Overload Capacity (FS)	150%
Output at full scale load.	2.0mV/V nominal
Non-Linearity (FS)	0.10%
Hysteresis (FS)	0.10%
Zero Balance (FS)	1%
Compensated Temp. Range (°F)	70 to 170
Useable Temp. °F	-65 to +250
Temp. Effect On Zero (FS/°F)	0.002%
Temperature Effect On Span (Rdg./°F)	0.002%
Bridge Resistance (Ohms)	350
Maximum Excitation Voltage (Vdc)	20
Excitation/Signal Transmission	Slip ring coupled
Resolution	Infinite
Encoder	Resistive
Encoder Range (Ohms)	10 turns - 10K

AIR BAG COMPATIBLE STEERING EFFORT SENSOR

Air Bag Compatible Steering Effort Sensor (01184) offers continuous, non-contact torque data from the very low mass, rotating steering sensor to a stationary receiver. This system provides a portable, state- of-the-art steering effort sensor. It can be used in the field, laboratory, or on the test track to measure steering torque and angle requirements.



SPECIFICATION

	MODEL 01184
Capacity (in. lbs.) (FS)	200, 500, 1000, 1500
Output (FS)	± 5 volts DC nominal
Signal Coupling	FM Transmitter/Receiver
Encoder (optical)	7,200 PPR w/Quadrature
High (H) Resolution (°C)	.05
Max Range (°C)	± 409
Output at max range (volts)	± 5
Low (L) Resolution (°C)	0.2
Max Range (°C)	± 1638
Output at max range (volts)	± 5
Rate (°C/sec)	2.8
Range (°C/sec)	± 1000
Output at max range (volts)	± 5
Mass Moment of Inertia	.20 lb/sec^2

IN-LINE STEERING EFFORT SENSOR

This low profile In-Line Steering Effort Sensor (01227) is installed in line with the steering column and is virtually unnoticed by the driver. In-Line Steering Effort Sensor is used to evaluate steering torque and angle in new and existing steering systems and components in automobiles, trucks, and buses.

SPECIFICATION

	MODEL 01227
Capacity (in. lbs.)	300 - 2000
Output (FS)	2.0 mV/V nominal
Torque Accuracy (FS)	± 0.1%
Optical Encoder Resolution (1440 PPR)	0.25°/pulse
Compensated Temperature (°F)	70 to 170
Useable Temperature (°F)	-65 to +250
Temperature Effect on Zero (FS/°F)	0.002%
Temperature Effect on Span (Rdg./°F)	0.002%
Bridge Resistance (Ohms)	350
Maximum Excitation Voltage (Vdc)	20
Excitation/Signal Transmission	Slip ring coupled

INCLINOMETER DRIFT ANGLE SYSTEM

The Inclinometer Drift Angle System (90413) sensor measures steering angle using a bi-directional MEMS inclinometer. The inclinometer is oriented such that one axis measures the steering angle directly, while the other axis measures the tilt angle of the wheel. When the steering wheel is tilted, the sensitivity of the steering angle measurement changes. This is not a property of the MEMS sensor, but is the result of physical reality and can be computed using geometric principles.

SPECIFICATION

	MODEL 90413
Input Voltage (Vdc)	5 – 9
Current Consumption (mA)	42
Recommended Battery (Vdc)	9 Alkaline
Approximate Battery Life (hours)	10
Steering Angle (degrees)	+/- 19.99
Tilt Angle (degrees)	-0 to +40
Accuracy (degrees)	+/- .1
Operating Temperature (°C)	0 – 50

DRIFT PULL MEASUREMENT

The Drift Pull Measurement (90408) is a special steering torque and angle sensor that is specifically designed to test drift pull on vehicles. Featuring integrated electronics that are powered by the USB connection, operators are able to use their laptop computer to acquire and process torque and angle. The unit is easily clamped to the vehicles steering wheel, tared to establish vehicle ground, and allowed to run at a preset recording period. The torque and angle data is then stored and available for further analysis.

SPECIFICATION

	MODEL 90408
Capacity (lbs)	13 (58N) of moment force (approx. 85in-lbs/9.5Nm of torque).
Overload capacity (%)	150 of FS
Output at full scale load	USB 1.0/2.0 compatible
Non-linearity (%)	0.10 of FS
Hysteresis(%)	0.10 of FS
Zero balance (%)	1 of FS
Temperature effect on zero (%)	0.002 of FS/°F
Temperature effect on span (%)	0.002 of Rdg/°F
Bridge resistance (Ohms)	350
Angle Resolution (degrees)	.05
Angle Range (degrees)	+/-20

WHEEL TORQUE SENSOR

This telemetry based Wheel Torque Sensor (90360) is used to measure the torque, speed, and temperature of tire/brake systems without the need for wheel rim modifications or anti-rotation brackets. The 90360 series consists of three primary components: The torque sensor, vehicle adapter plates to integrate the sensor, and the digital FM telemetry to transmit and process signals. All output signals are conditioned to a high level analog output.

SPECIFICATION

	MODEL 90360
Typical full scale loads (in-lbs)	7,000 to 80,000
Maximum rpm	1200/1750
Temperature reading range (RTD based) (°C)	-100 to +500
Analog output (receiver)	0 to +/- 5V (FS)
Sensor low pass filter (Hz)	300, 4-pole Butterworth type
Sensor Hysteresis (%)	0.25 of full scale
Sensor Non-linearity (%)	0.25 of full scale
Sensor signal sample rate (Hz)	950
Cross-talk (%)	<2 full scale

SHIFT KNOB

The Shift Knob (50006) sensor mounts either directly (replacing the gear shift knob) or indirectly with a shaft gripping adapter and allows real time measurement of the “X” and “Y” force components as experienced by the driver. Dynamic recording of the signals produced by the sensor allows the design engineer to immediately verify changes in linkage mechanisms which can improve the subjective feel of the automobile to the driver.

SPECIFICATION

	MODEL 50006
Capacities (lbs)	50, 100, 200
Overload capacity (%)	150 of FS
Output at full scale load (mV/V)	2.0 nominal
Non-linearity (%)	0.25 of FS
Hysteresis (%)	0.25 of FS
Zero balance (%)	1 of FS
Compensated temperature (°F)	70 to 170
Useable temperature (°F)	-65 to +250°F
Temperature effect on zero (%)	0.002 of FS/°F
Temperature effect on span (%)	0.002 of Rdg./°F
Bridge resistance (Ohms)	350
Excitation voltage, maximum (Vdc)	20
Adaptor	Ordered separately

PEDAL FORCE SENSOR

The Pedal Force Sensor (10118) is used to evaluate the force requirements of new and existing brake systems. The transducer adapts to pedals in automobiles, trucks, buses, or material handling equipment. It mounts directly to the pedal with spring-loaded, quick-change clamping arms or cable ties for easy installation. The sensor is available in capacities ranging from 25 to 400 lbs. The required capacity needs to be specified at time of order.

SPECIFICATION

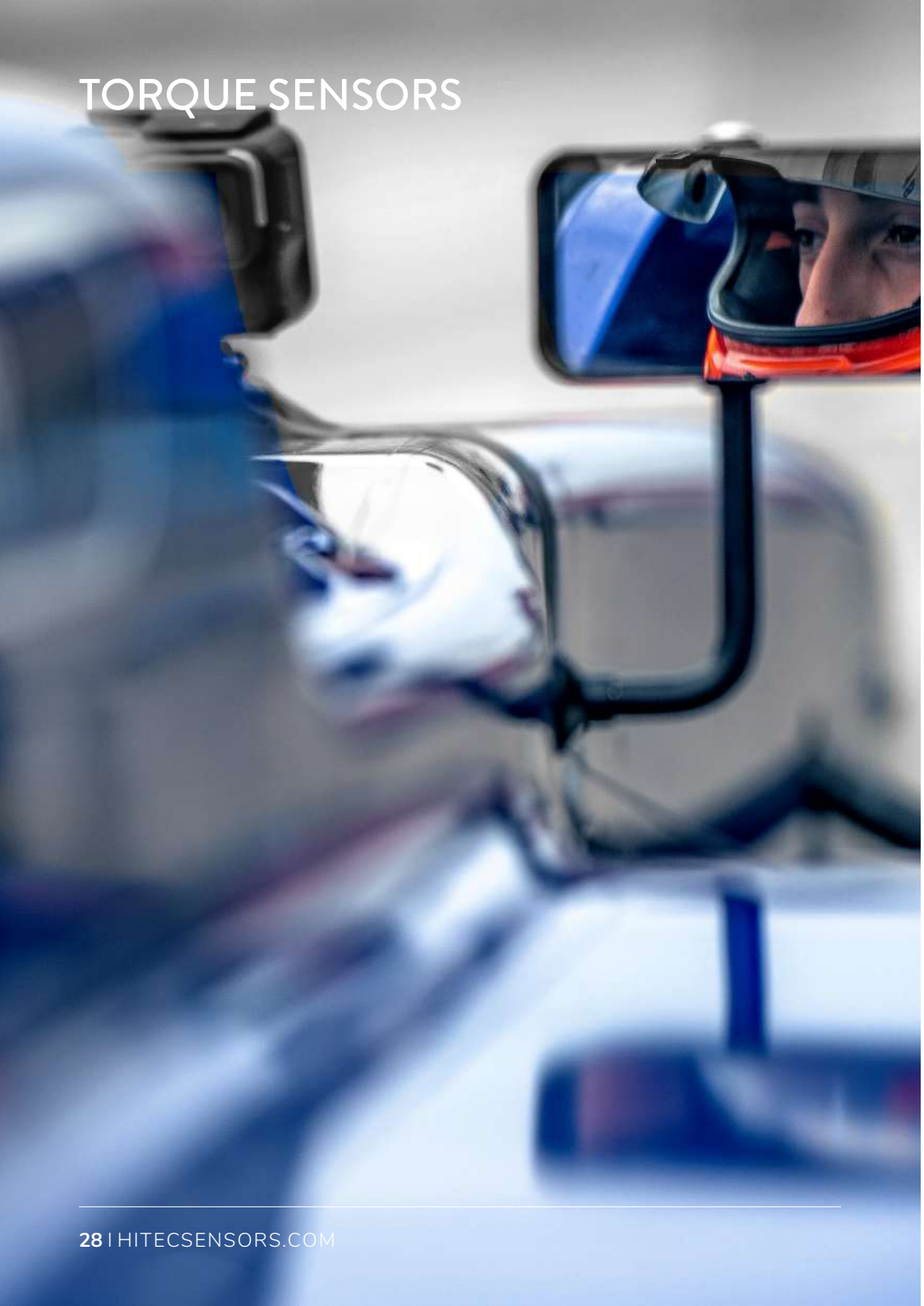
	MODEL 10118
Capacities (lbs)	25 to 400 (See chart)
Overload capacity (%)	150 of FS
Output at full scale load (mV/V)	2.0 nominal
Non-linearity (%)	0.10 of FS
Hysteresis (%)	0.10 of FS
Zero balance (%)	1 of FS
Compensated temperature (°F)	70 to 170
Useable temperature (°F)	-65 to +250
Temperature effect on zero (%)	0.002 of FS/°F
Temperature effect on span (%)	0.002 of Rdg/°F
Bridge resistance (Ohms)	700
Excitation voltage, maximum (Vdc)	20

WELD FORCE GAUGE

Weld Force Gauge (90061) is a self-contained, portable measurement system, which allows auditing of the pinch force generated between the electrodes of resistance spot welders. Resistance welding uses a pair of electrodes to clamp two base metals firmly together prior to and during application of electrical current. Poorly clamped parts result in a defective joint. A correctly clamped assembly aids in reducing the resistance in the joint and allows the current flow to properly heat the base metals to weld the part.

SPECIFICATION

	MODEL 90061
Capacity (lbs)	1K, 3K, 5K, 10K
Overload Capacity (FS)	150%
Display	4 digits standard
Accuracy (FS)	0.5%
Weight (lbs)	4.0
Battery Life	50 hours continuous use
Battery Type	AA size alkaline
Analog Output (V)	0 to 4.5 DC



IRT DYNAMOMETER TORQUE SENSOR

The IRT (Infra-Red Torque) Dynamometer Torque Sensor (90415), from HITEC Sensor Developments, is a simple to use, yet very powerful, noncontact torque measurement system. The basic system consists of three parts, the sensor, the base, and the receiver. When the system is powered up and the base is placed in the proper location, readings are sent from the rotating sensor to the base, where they are forwarded to the receiver.

SPECIFICATION

	MODEL 90415
Sensor – Ch1 & Ch 2 Torque and/or Thrust	
Resolution (bits)	16
Accuracy (%)	.01 *
Sample Rate	5000 samples/sec/channel
Anti‐Aliasing Filter	4 pole Butterworth low pass @ 1000Hz
Power Input	Provide by Base
Temperature Range (°C)	-20 to +85
Temperature Drift (°C)	.005% per, max.
Base	
Power Input	12VDC +/-5%, 1A Max (Provided by Receiver)
Temperature Range (°C)	-20 to +70
Receiver	
Resolution (bits)	16
Accuracy (%)	.01
Analog Output Voltage Ranges (Vdc)	±10, ±5, or 2.5 ±2.5
Analog Output Current Ranges (mA)	12 ±8 (4-20)
Frequency Output Ranges (kHz)	10 ±5, 60 ±20 or 60 ±30
External Shunt Inputs (3)	5VDC @ 2mA to 24VDC @ 12mA
Power Input	12VDC ±5% @ 3A

ROTARY SHAFT DIGITAL NON-CONTACT TORQUE SENSOR

The Rotary Shaft Digital Non-Contact Torque Sensor (01424) is designed to measure rotating drive torque using a conventional shaft-to-shaft configuration for in-line placement. The unique design incorporates a digital non-contact wireless system that provides power to the rotating electronics mounted on the shaft and transmits the signal back to the receiver in digital format. The torque signal is then represented as a calibrated high level analog voltage. The sensor features high rotational speed, high frequency response, and high accuracy. These sensors can also be supplied with an optical encoder to measure angle or speed.

SPECIFICATION

	MODEL 01424
Capacity (in-lbs.)	50 in. oz. to 100,000
Overload Capacity (FS)	150%
Output (FS)	Isolated +/- 5Vdc
Sample Rate	20,000 samples per sec
Bandwidth (kHz)	DC - 1
Non-Linearity (FS)	0.10%
Hysteresis (FS)	0.10%
Zero Balance (FS)	1.00%
Compensated Temperature (°F)	70 to 170
Useable Temperature (°F)	-40 to +185
Temperature Effect on Zero (%)(FS/°F)	0.002
Temperature Effect on Span (%)(Rdg./°F)	0.002
Supply Voltage (Vdc)	12-15
Maximum Supply Current (mA)	350
Maximum Shaft Speed (RPM) *	10000

ROTARY SHAFT TORQUE SENSOR

The Rotary Shaft Torque Sensor (01100) strain gauge based sensor is designed to measure rotating torque in systems that undergo large angular displacements. Examples are motor shafts, fans, and crankshafts. These sensors incorporate a slip ring design to transmit the signals produced during operation.

SPECIFICATION

	MODEL 01100
Capacity (in-lbs)	100 to 20,000
Overload capacity (%)	150 of FS
Output at FS (mV/V)	2
Non-linearity (%)	0.10 of FS
Hysteresis (%)	0.10 of FS
Zero balance (%)	1.00 of FS
Compensated temperature (°F)	70 to 170
Useable temperature (°F)	-65 to +250
Temperature effect on zero (%)	0.002 of FS/°F
Temperature effect on span (%)	0.002 of Rdg/°F
Bridge resistance (Ohms)	350
Excitation voltage, maximum (Vdc)	20
Maximum speed (RPM)	6000
Shaft Material	Alloy Steel

ROTARY SHAFT SLIP RING TORQUE SENSOR

Rotary Shaft Slip Ring Torque Sensor (01324) is designed to measure rotating drive torque using a conventional shaft-to-shaft configuration for in-line placement. The design incorporates a coin silver slip ring assembly that transmits excitation voltage to, and output signals from, the rotating sensor. These sensors can be supplied with Auto-ID, which eliminates scaling when used with the PTI or PMAC 3000 instruments. An optical encoder to measure angle or speed is also available with this model.

SPECIFICATION

	MODEL 01324
Capacity	50 in. oz. to 20,000 in. lb. (.35 to 2300Nm)
Overload Capacity (FS)	150%
Output (FS)	2.0 mV/V nominal
Non-Linearity (FS)	0.10%
Hysteresis (FS)	0.10%
Zero Balance (FS)	1.00%
Compensated Temperature (°F)	70 to 170
Useable Temperature (°F)	-40 to +185
Temperature Effect on Zero (FS/°F)	0.002%
Temperature Effect on Span (Rdg./°F)	0.002%
Bridge Resistance (Ohms)	1000
Maximum Excitation Voltage (Vdc)	20
Maximum Shaft Speed (RPM)	5000

ROTARY SOCKET SLIP RING TORQUE SENSOR

An angle encoder and round or square housings are available with the Rotary Socket Slip Ring Torque Sensor (01325). Square housings have optional foot mounts. These strain gauge based sensors are designed to measure torque in low capacity applications such as checking calibration in mechanical torque wrenches and air powered nut runners. The design incorporates a coin silver slip ring assembly that transmits excitation voltage to, and output signals from, the rotating drive sensor.

SPECIFICATION

	MODEL 01325
Capacity	See chart
Overload capacity (%)	150 of FS
Output at FS	See chart
Non-linearity (%)	0.10 of FS
Hysteresis (%)	0.10 of FS
Zero balance (%)	1.00 of FS
Compensated temperature (°F)	70 to 170
Useable temperature (°F)	-40 to +185
Temperature effect on zero (%)	0.002 of FS/°F
Temperature effect on span (%)	0.002 of Rdg/°F
Bridge resistance (Ohms)	1000
Excitation voltage, maximum (Vdc)	20
Maximum speed (RPM)	5000*
Material:	Shaft: Alloy Steel Housing: Aluminum

CUSTOM TORQUE DESIGNS MOTOR FLANGE C FACE MOUNT REACTION TORQUE SENSOR

This unique style torque sensor is designed to measure the reaction forces exerted on the motor housing that feature a C-face mount. Custom Torque Designs Motor Flange C Face Mount Reaction Torque Sensor (01291) is directly mounted to the motor's flange face as the main interface between it and the torque load. It can be used with variable displacement motors, fluid meters, linear actuators, and other drive motors to measure the output torque, in real-time and at the source.

SPECIFICATION

	MODEL 01291
Capacity (in-lbs)	500
Overload capacity (%)	150 of FS
Output at FS (mV/V)	2.0 nominal
Non-linearity (%)	0.10 of FS
Hysteresis (%)	0.10 of FS
Zero balance (%)	1.00 of FS
Compensated temperature (°F)	70 to 170
Useable temperature (°F)	-65 to +250
Temperature effect on zero (%)	0.002 of FS/°F
Temperature effect on span (%)	0.002 of Rdg/°F
Bridge resistance (Ohms)	350
Excitation voltage, maximum (Vdc)	20

SAE FLANGE REACTION TORQUE SENSOR

Accurately measure torque with hydraulic motor and pump load adapters and eliminate the guesswork of how hose pressure relates to drive torque with SAE Flange Reaction Torque Sensor (01298). The reaction torque sensor features male and female SAE type flanges for easy integration in between the motor and load adapter. Various capacities and SAE flanges are available. This approach can also be adapted to other flange interfaces. Please contact factory regarding custom configurations.

SPECIFICATION

	MODEL 01298
Capacity (in-lbs)	1400
Overload capacity (%)	150 of FS
Output at FS (mV/V)	2.0 nominal
Non-linearity (%)	0.10 of FS
Hysteresis (%)	0.10 of FS
Zero balance (%)	1.00 of FS
Compensated temperature (°F)	70 to 170
Useable temperature (°F)	-65 to +250
Temperature effect on zero (%)	0.002 of FS/°F
Temperature effect on span (%)	0.002 of Rdg/°F
Bridge resistance (Ohms)	350
Excitation voltage, maximum (Vdc)	20

MOTOR MOUNT REACTION TORQUE SENSOR

This unique style torque sensor is designed to measure the reaction forces exerted on the motor housing. The Motor Mount Reaction Torque Sensor (01302) is directly mounted to the motor's flange face as the main interface between it and the torque load. It can be used with variable displacement motors, fluid meters, linear actuators, and other drive motors to measure the output torque, in real-time and at the source. The use of this sensor greatly reduces the potential of electrical noise due to bearings or slip-ring brushes, and allows for more extreme environmental exposures, such as at sea or at remote field sites.

SPECIFICATION

	MODEL 01302
Capacity (in.lb)	1200
Overload capacity (%)	150 of FS
Output at FS (mV/V)	2.0 nominal
Non-linearity (%)	0.10 of FS
Hysteresis (%)	0.10 of FS
Zero balance (%)	1.00 of FS
Compensated temperature (°F)	70 to 170
Useable temperature (°F)	-65 to +250
Excitation voltage, maximum (Vdc)	20

FLANGE TO FLANGE REACTION TORQUE SENSOR

The Flange to Flange Reaction Torque Sensor (01165-01171) is ideal for measuring reaction or restraining torque in motor, pump, and fixture mounts. These hollow sensors are well suited for limited rotation applications. Because non-accelerating systems must have equal reactions to actions produced, it is often possible to measure output torque by measuring reaction forces acting on the device's housing.

SPECIFICATION

	MODEL 01165, 01166, 01167, 01168, 01169, 01170 & 01171
Capacity (in.lb)	50 to 200,000
Overload capacity (%)	150 of FS
Output at FS (mV/V)	2.0 nominal
Non-linearity (%)	0.10 of FS
Hysteresis (%)	0.10 of FS
Zero balance (%)	1.00 of FS
Compensated temperature (°F)	70 to 170
Useable temperature (°F)	-65 to +250
Temperature effect on zero (%)	0.002 of FS/°F
Temperature effect on span (%)	0.002 of Rdg/°F
Bridge resistance (Ohms)	700/350
Excitation voltage, maximum (Vdc)	20

SOCKET REACTION TORQUE SENSOR

The Socket Reaction Torque Sensor (01190) is a strain gauge-based sensor that is designed for static and limited rotation torque measurement applications such as drive socket systems, calibration of hand and click wrenches, and checking applied torque values. They are available in ten wide ranging capacities. All use a full, four-arm Wheatstone Bridge circuit and have an elastomer coating to protect against mechanical damage. SDI's Auto-ID connector is optional.

SPECIFICATION

	MODEL 01190
Capacities (ft.lb)	25 to 7,000
Overload capacity (%)	150 of FS
Output at F.S	See chart
Non-linearity (%)	0.10 of FS
Hysteresis (%)	0.10 of FS
Zero balance (%)	1.00 of FS
Compensated temperature (°F)	70 to 170
Useable temperature (°F)	-65 to +250
Temperature effect on zero (%)	0.002 of FS/°F
Temperature effect on span (%)	0.002 of Rdg/°F
Bridge resistance (Ohms)	1000
Excitation voltage, maximum (Vdc)	20
Material	Alloy Steel

KEYED SHAFT REACTION TORQUE SENSOR

The Keyed Shaft Reaction Torque Sensor (01091 & 01092) torque output of motors and absorbers can often be sensed by measuring the reaction torque required to prevent the housing from rotating. They are also ideal for limited rotation applications such as the measurement of torque required to turn a valve, fastener or actuator shaft.

SPECIFICATION

	MODEL 01091 & 01092
Capacity (in-lbs)	100 to 10,000
Overload capacity (%)	150 of FS
Output at FS (mV/V)	2.0 nominal
Non-linearity (%)	0.10 of FS
Hysteresis (%)	0.10 of FS
Zero balance (%)	1.00 of FS
Compensated temperature (°F)	70 to 170
Useable temperature (°F)	-65 to +250
Temperature effect on zero (%)	0.002 of FS/°F
Temperature effect on span (%)	0.002 of Rdg/°F
Bridge resistance (Ohms)	350
Excitation voltage, maximum (Vdc)	20
Material	Alloy Steel

REPRESENTATIVES

We have representatives in the following countries. The most up-to-date information including contact details can be found on our website:
hitecsensors.com/contact-us-locations

BRAZIL
CHINA
FRANCE
GERMANY
INDIA
ITALY
JAPAN
KOREA
MEXICO
NETHERLANDS
SRI LANKA
TAIWAN
USA

■ HITEC LOCATIONS ● REPRESENTATIVE LOCATIONS

USA AND WORLDWIDE

HITEC Sensor Developments, Inc.
10 Elizabeth Drive
Chelmsford, MA 01824
United States of America

T +1 (978) 742-9032
F +1 (978) 742-9033

SRI LANKA

HITEC Sensor Developments Pvt. Ltd.
Flinth Commercial Park
Ranmuthugala Estate
Kadawatha, Sri Lanka

T +94 11 4501078
F +94 11 4501079

hitecsensors.com