

SENSOR APPLICATION GUIDE

- PRESSURE
- HUMIDITY
- TEMPERATURE
- ULTRASONIC
- PHOTO OPTIC
- POSITION
- VIBRATION
- FORCE



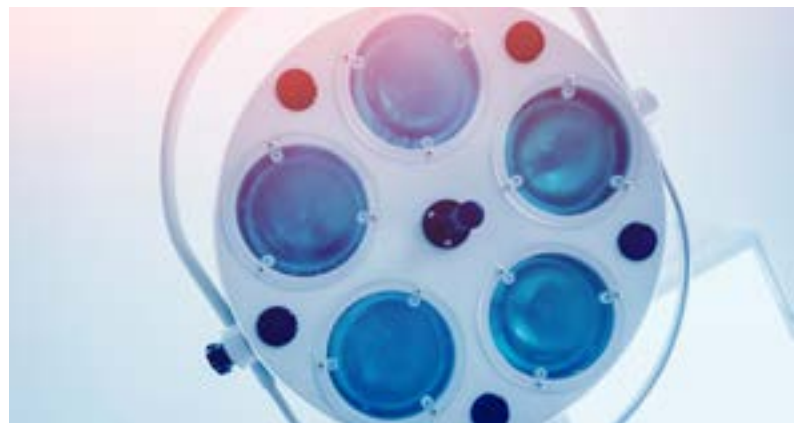
SENSOR APPLICATION GUIDE

TE Connectivity (TE) is a global technology leader, providing connectivity and sensor solutions essential in today's increasingly connected world. TE is one of the largest sensor companies in the world. Our sensors are vital to the next generation of data driven technology. Our portfolio of intelligent, efficient and high-performing sensor solutions are used for customers across a broad range of industries and applications.

Explore the possibilities by utilizing TE's Sensor Application Guide to help transform concepts into smart, connected creations.

TE CONNECTIVITY SENSORS

- PRESSURE
- HUMIDITY
- TEMPERATURE
- ULTRASONIC
- PHOTO OPTIC
- POSITION
- VIBRATION
- FORCE





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SENSOR TECHNOLOGIES

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PRODUCT AND MARKET MATRIX

AEROSPACE & DEFENSE	AGRICULTURE	APPLIANCES	AUTOMATION & CONTROL	AUTOMOTIVE	DATA & DEVICES	INDUSTRIAL	ICT	INTELLIGENT BUILDINGS	MEDICAL	OIL AND GAS	TEST & MEASUREMENT	RAIL	OTHERS (SPECIFIED)
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LM31 LIQUID LEVEL PRESSURE SENSOR		●		●	●		●	●		●			●	
MODEL 154N PRESSURE TRANSDUCER		●		●			●		●		●			
MS45X5 BOARD LEVEL PRESSURE SENSOR			●			●		●	●					
MS5525DSO PRESSURE SENSOR			●	●		●	●	●	●	●				
MS5837-02BA PRESSURE SENSOR					●				●					
MS5840-02BA PRESSURE SENSOR		●			●			●			●		*	
M3200 ANALOG/DIGITAL PRESSURE TRANSDUCER		●		●		●		●	●		●			
M5600 DIGITAL WIRELESS TRANSDUCER		●		●		●		●				●		
SM9000 ULTRA-LOW PRESSURE SENSORS	●	●	●	●		●		●	●		●			
U5600 DIGITAL WIRELESS TRANSDUCER				●				●	●	●		●		
HM15X0LF HUMIDITY PROBE		●				●		●			●	●		
HTU2XY RELATIVE HUMIDITY & TEMPERATURE SENSOR		●	●	●	●			●	●					
HTU31 RELATIVE HUMIDITY & TEMPERATURE SENSOR		●	●		●	●		●	●					
MBD AND MCD SERIES THERMISTOR PROBES				●		●			●		●			
PLATINUM THIN FILM TEMPERATURE ELEMENTS	●	●		●	●	●	●	●	●		●			

PRODUCT AND MARKET MATRIX

	AEROSPACE & DEFENSE	AGRICULTURE	APPLIANCES	AUTOMATION & CONTROL	AUTOMOTIVE	DATA & DEVICES	INDUSTRIAL	ICT	INTELLIGENT BUILDINGS	MEDICAL	OIL AND GAS	TEST & MEASUREMENT	RAIL	OTHERS (SPECIFIED)
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STAINLESS STEEL BULLET TEMPERATURE PROBE	●		●	●			●		●		●			
TPE OVERMOLD TEMPERATURE PROBE			●	●			●		●				●	
TPE OVERMOLD TEMPERATURE PROBE WITH STAINLESS STEEL HOUSING			●	●			●		●				●	
TSD SERIES DIGITAL THERMOPILE TEMPERATURE SENSORS			●				●		●					
TSYS01/02 DIGITAL TEMPERATURE SENSOR			●	●		●			●	●				
TSYS03 DIGITAL TEMPERATURE SENSORS			●		●	●	●		●	●				
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AD-101 ULTRASONIC / OPTIC SENSOR		●	●				●		●					
SMT PHOTO OPTIC / SPO ₂ COMPONENTS									●					
AXISENSE MEMS INCLINOMETER	●	●		●				●					●	
KMXP SERIES POSITION SENSORS			●	●	●	●	●	●	●			●		
820M1 EMBEDDED PE ACCELEROMETER	●			●			●	●	●			●	●	
FC22 FORCE COMPRESSION LOAD CELL			●				●	●	●			●		
FS19 FORCE COMPRESSION LOAD CELL			●				●		●			●		
FX29 FORCE COMPRESSION LOAD CELL	●		●	●			●		●			●		

● Market application examples found in the guide || ● Market served but not represented in guide

* Autonomous Vehicles

PRESSURE SENSORS

LM31 LIQUID LEVEL SENSOR



Rooftop water storage



FEATURE	FUNCTION	BENEFIT
±3% total error band	Provide accurate indication of water level	Ensures that tank volume is reported accurately
Threaded process fitting	Means of mounting the sensor in the application	Easy installation and replacement

Liquids in Factory Processing



FEATURE	FUNCTION	BENEFIT
Stainless steel wetted surfaces	Robust interface to medium	Compatible with aggressive and hostile media
0.5 to 4.5V output signal	Varying voltage proportional to liquid level	Simple electronic interface used in factory systems

Liquid Transport Vehicles



FEATURE	FUNCTION	BENEFIT
Rugged vibration resistant design	Maintain reliability in use	Survive harsh environment found in highway vehicles
High accuracy output	Honest reporting of actual liquid volume	Provides correct empty/full levels

Sump Pump Operation



FEATURE	FUNCTION	BENEFIT
High sensitivity to low pressures	Ability to detect very low liquid levels	Helps prevent flooding and water damage
Low cost	Use in many applications	Excellent performance without breaking the bank

PRESSURE SENSORS

LM31 LIQUID LEVEL SENSOR



RV Water Storage Tanks



FEATURE	FUNCTION	BENEFIT
Very low pressure ranges	Monitor hydrostatic liquid level depth	Accurate measurement of shallow water tanks
5 volt input power	Provide energy to operate the sensor	Uses a convenient voltage found in automotive systems

Livestock Water Tanks



FEATURE	FUNCTION	BENEFIT
Rugged PVC outer housing	Protect the sensor interior	Allows sensor placement in harsh environments
Very low pressure ranges	Monitor hydrostatic liquid level depth	Accurate measurement of shallow water tanks

PRESSURE SENSORS

MODEL 154N PRESSURE CAPSULE



Surgical Machines



FEATURE	FUNCTION	BENEFIT
Very high accuracy performance	Provides precise measurements of surgical fluid pressure	Ensures proper machine operation and patient safety
316L stainless steel wetted surfaces	Provides appropriate media compatibility	Unaffected by exposure to harsh chemicals

Food Processing



FEATURE	FUNCTION	BENEFIT
Capable of measuring very low pressures	Responds to small pressure changes	Improves the consistency of the finished product
Available with digital outputs	Communicates data to the system	Compatible with modern industry IIoT systems

Pharmaceutical Manufacturing



FEATURE	FUNCTION	BENEFIT
High accuracy and high resolution measurements	Provide accurate feedback to the control system	Ensures product consistency and meets FDA standards
Temperature compensated at the factory	Provides unit-to-unit consistency	Allows operation over wide temperature ranges

Fresh Water Treatment



FEATURE	FUNCTION	BENEFIT
O-ring mounting into ports and manifolds	Provides a sealed interface with no leaks	Allows for easy part replacement on site
316L stainless steel wetted surfaces	Provides appropriate media compatibility	No hazardous materials in contact with the water

PRESSURE SENSORS

MS45x5 BOARD LEVEL PRESSURE SENSOR



Industrial Flow Meters



FEATURE	FUNCTION	BENEFIT
Very high accuracy performance	Provides precise measurements of process fluid pressure	Ensures proper machine operation and product quality
Many different pressure ranges	From 2" H ₂ O to 150 psi	One form factor can address many different customer applications

UAV Airspeed



FEATURE	FUNCTION	BENEFIT
Capable of measuring very low pressures	Responds to small pressure changes	Accurate at low airspeeds
Small size and low mass	Fits into small spaces	Allows larger vehicle payloads

Medical Incubator



FEATURE	FUNCTION	BENEFIT
High accuracy and high resolution measurements	Provide accurate feedback to the control system	Ensures patient safety and meets FDA standards
Temperature compensated at the factory	Provides unit-to-unit consistency	Allows operation over wide temperature ranges

Gas Distribution Systems



FEATURE	FUNCTION	BENEFIT
Barbed ports	Provides a sealed reliable interface with no leaks	Easy assembly and replacement
Inert wetted surfaces	Compatible with all types of dry non-corrosive gasses	Adapts easily to a wide variety of applications

PRESSURE SENSORS

MS45x5 BOARD LEVEL PRESSURE SENSOR



HVACR 



FEATURE	FUNCTION	BENEFIT
High accuracy and high resolution measurements	Provide accurate feedback to the control system	Helps to increase the efficiency of the system
Temperature compensated at the factory	Provides unit-to-unit consistency	Allows operation over wide temperature ranges

Medical Ventilator



FEATURE	FUNCTION	BENEFIT
High accuracy and high resolution measurements	Provide accurate feedback to the control system	Ensures patient safety and meets FDA standards
Very low pressure ranges (MS4515)	Monitors respiration and breathing airflows	Provides accurate feedback data to the system

PRESSURE SENSORS

MS5525DSO PRESSURE SENSOR



Medical Ventilator



FEATURE	FUNCTION	BENEFIT
Wide pressure range	Address a large array of applications	One product can be used for many applications
Differential pressure measurements	Facilitates flow rate measurements	Accurate monitoring of critical medical equipment

UAV Airspeed Measurement



FEATURE	FUNCTION	BENEFIT
Small footprint and weight	Fits into compact assemblies	Reduces total aircraft weight
Very low power requirements	Enough energy to operate the sensor efficiently	Helps extend flight times and battery life

Pneumatic Control Systems



FEATURE	FUNCTION	BENEFIT
Low pressure capability	Able to monitor small pressure changes	Compatible with typical low pressure control systems
Available in gauge, differential, compound ranges	Variety of pressure references available	Easily adapts to different pneumatic systems

HVACR Control



FEATURE	FUNCTION	BENEFIT
Low pressure capability	Able to monitor small pressure changes	Compatible with air pressures typically found in ductwork
Differential pressure sensing capability	Measures the difference between two applied pressures	Adapts to air flow measurement equipment

PRESSURE SENSORS

MS5525DSO PRESSURE SENSOR



Gas Flow Monitoring



FEATURE	FUNCTION	BENEFIT
Small size	Ability to fit into compact assemblies	Easy to integrate into high density electronic packaging
I ² C of SPI interface	For data communications	Easy interface to a microcontroller

Blood Pressure Monitor



FEATURE	FUNCTION	BENEFIT
Sleep mode available	Puts sensor into very low power mode	Ideal for battery powered products
High accuracy measurements	Provide reliable data to the system	Numbers provided to the patient are correct

PRESSURE SENSORS

MS5837-02BA PRESSURE SENSOR



Fitness Watches



FEATURE	FUNCTION	BENEFIT
Designed for harsh environments	Able to withstand abuse	Ideal for products used by active people
Very small footprint	Fit into compact assemblies	Adapts easily to high density packaging

Swimmers Watches



FEATURE	FUNCTION	BENEFIT
Gel seal over pressure port	Allows sensor to be submerged	Adapts to water and underwater activities
I ² C interface	Data communication	Easy interface to a microcontroller

Multi-Sport Watches



FEATURE	FUNCTION	BENEFIT
I ² C interface	Communicates pressure data	Adapts easily to digital electronics
Sleep mode	Puts sensor into very low power configuration	Extends device battery life

e-Cigarettes



FEATURE	FUNCTION	BENEFIT
Very small footprint	Fit into compact assemblies	Adapts easily to high density packaging
Gel seal over pressure port	Protects from moisture and debris	Reliable operation in harsh environments

PRESSURE SENSORS

MS5837-02BA PRESSURE SENSOR



Bicycle Computers



FEATURE	FUNCTION	BENEFIT
Gel seal over pressure port	Protects sensor internal components	Provides reliable service when exposed to weather and the elements
I ² C interface	Data communication	Easy interface to a system microcontroller

Mobile Altimeters/Barometers



FEATURE	FUNCTION	BENEFIT
Very high resolution	Able to detect very small changes in pressure	Accurate altitude data for the system
Sleep mode	Puts sensor into very low power configuration	Extends device battery life

PRESSURE SENSORS

MS5840-02BA PRESSURE SENSOR



Fitness Watches



FEATURE	FUNCTION	BENEFIT
Designed for harsh environments	Able to withstand abuse	Ideal for products used by active people
Very small footprint	Fit into compact assemblies	Adapts easily to high density packaging

Swimmers Watches



FEATURE	FUNCTION	BENEFIT
Gel seal over pressure port	Allows sensor to be submerged	Adapts to water and underwater activities
I ² C interface	Data communication	Easy interface to a microcontroller

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e-Cigarettes



FEATURE	FUNCTION	BENEFIT
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PRESSURE SENSORS

MS5840-02BA PRESSURE SENSOR



Bicycle Computers



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I ² C interface	Data communication	Easy interface to a system microcontroller

Mobile Altimeters/Barometers



FEATURE	FUNCTION	BENEFIT
Very high resolution	Able to detect very small changes in pressure	Accurate altitude data for the system
Sleep mode	Puts sensor into very low power configuration	Extends device battery life

PRESSURE SENSORS

M3200 ANALOG/DIGITAL PRESSURE TRANSDUCER



HVACR Systems



FEATURE	FUNCTION	BENEFIT
Supports a variety of output signals	Send sensor data to control system	Compatible with most HVACR control systems
Microfused front end design	Provide a ruggedized sensing element	Withstand compressor pressure spikes
Available with integral valve depressor	Compatible with standard Schrader valves	Easy attachment to typical HVACR systems

Energy and Water Management



FEATURE	FUNCTION	BENEFIT
316L stainless steel front end	Process fitting with integrated sense elements	Resists corrosion from chlorinated water
Pressure ranges up to 5,000psi	Compatible with a wide range of systems	Allows direct connection to system
Weatherproof IP67 rated housing	Protects sensor interior from moisture and debris	Survives outdoors without any special enclosures

Hydraulic Control Systems



FEATURE	FUNCTION	BENEFIT
Wide operating temperature range	Sensor compatible with outdoor applications	Provides accurate and reliable use in tough environments
Rugged enclosure with IP67 rating	Protect sensor interior from abuse	Able to survive rough handling in use
Many standard process fitting configurations	Mates with the device under test	Eliminates fitting adaptors or special connections

Medical Gas Systems



FEATURE	FUNCTION	BENEFIT
Very low power requirements	Sensor operates on low power	Excellent for low power systems and energy savings
316L stainless steel front end	Inert process fitting with integrated sense elements	Sensor is compatible with most gases
High accuracy and excellent long-term stability	Provides accurate feedback to control system	Ensures systems provide the right level of gas

PRESSURE SENSORS

M3200 ANALOG/DIGITAL PRESSURE TRANSDUCER



Injection Molding Systems



FEATURE	FUNCTION	BENEFIT
High overrange protection	Able to withstand surges and spikes in the system	Reliable and accurate operation in a range of applications
Rugged enclosure with IP67 rating	Protect sensor interior from abuse	Suitable for high vibration environments
Many standard process fitting configurations	Mates with the device under test	Eliminates fitting adaptors or special connections

Air Compressors/Pumps



FEATURE	FUNCTION	BENEFIT
Very low power requirements	Digital version can be put into sleep mode	Excellent for low power applications
316L stainless steel front end	Inert process fitting with integrated sense elements	Sensor is compatible with difficult media
Weatherproof IP67 rated housing	Protects sensor interior from moisture and debris	Survives outdoors without any special enclosures

PRESSURE SENSORS

M5600 DIGITAL WIRELESS TRANSDUCER



HVACR Systems



FEATURE	FUNCTION	BENEFIT
Wireless communications	Send sensor data to a remote system control	Eliminate installation cost of signal wiring
Microfused front end design	Provide a ruggedized sensing element	Withstand compressor pressure spikes
Available with integral valve depressor	Compatible with standard Schrader valves	Easy attachment to typical HVACR systems

Pool/Spa Pumps



FEATURE	FUNCTION	BENEFIT
316L stainless steel front end	Process fitting with integrated sense elements	Resists corrosion from pool/spa water
Sensor is battery powered	Self contained power for all sensor operations	Eliminates wiring costs and cable failure points
Weatherproof IP67 rated housing	Protects sensor interior from moisture and debris	Survives outdoors without any special enclosures

Engine Test Stands



FEATURE	FUNCTION	BENEFIT
Wireless communications and battery powered	Makes sensor completely self-contained	Easy install and removal during test cycles
Rugged enclosure with IP67 rating	Protect sensor interior from abuse	Able to survive rough handling in use
Many standard process fitting configurations	Mates with the device under test	Eliminates fitting adaptors or special connections

Agriculture Pumps



FEATURE	FUNCTION	BENEFIT
Very low power requirements	Sensor is battery powered with long battery life	Excellent for low power and energy harvesting
316L stainless steel front end	Inert process fitting with integrated sense elements	Sensor is compatible with injected fertilizers
Weatherproof IP67 rated housing	Protects sensor interior from moisture and debris	Survives outdoors without any special enclosures

PRESSURE SENSORS

SM9000 ULTRA-LOW PRESSURE SENSORS



HVACR



FEATURE	FUNCTION	BENEFIT
High accuracy and high resolution measurements at low pressures	Provide accurate feedback to the control system	Provides accurate flow rate data in low velocity return ducts
Temperature compensated at the factory	Provides unit-to-unit consistency	Eliminates the need for field calibration

Variable Air Volume Controller



FEATURE	FUNCTION	BENEFIT
Extremely low pressure versions	Measure very small pressure changes in variable air volume systems	Accurate and precise control of damper positions
Differential pressure measurements	Adds flexibility to measure airflow in either direction	Accurate monitoring of critical HVAC operations

Blocked Filter (Consumer)



FEATURE	FUNCTION	BENEFIT
High resolution and ultra-low pressure	Ability to measure very small pressure changes	Enhanced sensitivity to air flow reduction because of blockage
Compound and differential sensing	Measures both positive and negative pressures	Can measure airflow thru the filter in either direction

Blocked Filter (Industrial)



FEATURE	FUNCTION	BENEFIT
High resolution and ultra-low pressure	Ability to measure very small pressure changes	Enhanced sensitivity to air flow reduction because of blockage
Compound and differential sensing	Measures both positive and negative pressures	Can measure airflow thru the filter in either direction

PRESSURE SENSORS

SM9000 ULTRA-LOW PRESSURE SENSORS



Industrial Flow Meters



FEATURE	FUNCTION	BENEFIT
Very high accuracy performance at low differential pressures	Provides precise measurements of process gas pressure	Ensures proper machine operation and product quality
Many different pressure ranges	From ± 125 Pa to 600 Pa	One form factor can address many different customer applications

Oxygen Conservers And Concentrators



FEATURE	FUNCTION	BENEFIT
Operates from milliwatts of power	Stays active with minimal battery drain	Extends portable product battery life
High sensitivity at low pressures	Accurate pressure data	Detect pressure changes with patient inhale and exhale activities

Ventilators/Respirators



FEATURE	FUNCTION	BENEFIT
Excellent long term stability	Low drift for critical parameters	Equipment doesn't require periodic recalibration
I ² C Interface	Data communication	Easy interface to a system microcontroller

Bio-safety Cabinet



FEATURE	FUNCTION	BENEFIT
Measure very low differential pressures	Monitor the inside vs outside pressure of the cabinet	Maintains very low negative pressure in the work area
Very low long term drift	Retains accuracy over years	Improves long term reliability for the cabinet

PRESSURE SENSORS

SM9000 ULTRA-LOW PRESSURE SENSORS



Clothes Washer Water Level



FEATURE	FUNCTION	BENEFIT
Gauge pressure reference	Provides water level to the control system	Allows washer to operate with minimum water
Easy board level mounting	Secure attachment under vibration conditions	Minimizes manufacturing costs

Dish Washer Water Level



FEATURE	FUNCTION	BENEFIT
Gauge pressure reference	Provides water level to the control system	Allows washer to operate with minimum water
Easy board level mounting	Secure attachment under vibration conditions	Minimizes manufacturing costs

Humidifier Water Level



FEATURE	FUNCTION	BENEFIT
Gauge pressure reference	Provides water level information to the control system	Helps prevent the humidifier from running dry
Easy board level mounting	Secure attachment under vibration conditions	Minimizes manufacturing costs

UAV Airspeed Measurement



FEATURE	FUNCTION	BENEFIT
Small footprint and weight	Fits into compact assemblies	Reduces total aircraft weight
Very low power requirements	Enough energy to operate the sensor efficiently	Helps extend flight times and battery life

PRESSURE SENSORS

U5600 DIGITAL WIRELESS TRANSDUCER



HVACR Systems



FEATURE	FUNCTION	BENEFIT
Wireless communications	Send sensor data to a remote system controller	Eliminate installation cost of signal wiring
Ultrastable front end design	Provides a high accuracy low pressure output	Accurate monitoring of air duct pressures
Temperature output	Provides data on ambient temperature	Eliminates the need for a separate temp sensor

Medical Equipment



FEATURE	FUNCTION	BENEFIT
316L stainless steel front end	Process fitting connecting to the equipment	Compatible with fluids in medical procedures
Sensor is battery powered	Self contained power for all sensor operations	Eliminates wiring costs and cable failure points
Wireless communication	Sends sensor data to the nurse station	Reduces cable "clutter" around the patient

Water Treatment Facilities



FEATURE	FUNCTION	BENEFIT
Wireless communications and battery powered	Makes the sensor self contained	No need for long and expensive wire runs
Rugged enclosure with IP67 rating	Protect sensor from corrosive fluids and gasses	Able to survive exposure to treatment chemicals
Many standard process fitting configurations	Mates with a variety of machines and equipment	Eliminates fitting adaptors or special connections

Storage Tank Liquid Level



FEATURE	FUNCTION	BENEFIT
Accurate measure at very low pressures	Able to monitor small pressure fluctuations	Very accurate indication of liquid level in the tank
316L stainless steel front end	Corrosion resistant process fitting	Sensor is compatible with different types of liquids
Weatherproof IP67 rated housing	Protects sensor interior from moisture and debris	Survives outdoors without any special enclosures

HUMIDITY SENSORS

HM15x0LF HUMIDITY PROBE



HVACR Systems



FEATURE	FUNCTION	BENEFIT
3 to 10 VDC power required	Make the sensor operational	Adapts easily to systems that use different voltages
Able to withstand contact with water	Operation is normal after drying from water contact	No maintenance after severe condensation
Only 2 mA of current required	Power for the sensor	Energy efficient and only low voltage wiring needed

Lab Test Chambers



FEATURE	FUNCTION	BENEFIT
0 to 100% humidity measurement	Provide full range output	Covers every possible condition in the chamber
Analog output	Provides sensor reading to control system	Analog signals are easy to interface
60mm x 15mm package size	Compact size to be unobtrusive	Saves space and reduces temp and humidity loading

Clean Room



FEATURE	FUNCTION	BENEFIT
Small size	Convenient packaging	Unobtrusive and able to fit into tight spaces
Full range sensitivity of 0 to 100% RH	Output data from the sensor	Able to monitor any condition that occurs
Low voltage and low current requirements	Provides device power	Easy to power from convenient sources

Environmental Monitoring



FEATURE	FUNCTION	BENEFIT
Rugged but simple enclosure	Protect internal components	Able to survive outdoor environments
Low voltage and low current required	Provides device power	Easy to power from energy harvested sources
No damage from exposure to water	Sensor recovers fully when dried out	Withstand precipitation and condensation

HUMIDITY SENSORS

HTU31 RELATIVE HUMIDITY AND TEMPERATURE SENSOR



HVACR Systems



FEATURE	FUNCTION	BENEFIT
Measures full range of humidity from 0 to 100%	Provide accurate data in any condition	Accurate inputs to the central control system
Embedded temperature sensor	Measure ambient temperature	Provides accurate compensation for the humidity sensor

Refrigerators



FEATURE	FUNCTION	BENEFIT
3.0 to 5.5 operating voltage	Power for the sensor	Compatible with any fridge power source
Small size 1.9 x 1.9 x 0.9mm	Saves material costs	Fits well on high density PC boards

Medical CPAP



FEATURE	FUNCTION	BENEFIT
Fast response	Responds quickly to changes in humidity and temperature	Provides fast feedback to controls
Very low standby current less than one microamp	Provides power to maintain electronics activity	Extends life of standby battery power

Security Cameras



FEATURE	FUNCTION	BENEFIT
Accurate measurements near 0% RH	Provides full scale span accurately	Able to detect leaks in hermetically sealed enclosures
Humidity and temperature outputs available	Act as a multi-sensor module	Able to calculate dew point providing three data points

HUMIDITY SENSORS

HTU31 RELATIVE HUMIDITY AND TEMPERATURE SENSOR



Home Comfort



FEATURE	FUNCTION	BENEFIT
Small size SMD mountable package	Standard package for PC board assemblies	Fits into very dense electronic packaging
Accurate measurement over full range	Measures 0 to 100% RH within spec	Ensures proper operation of the system under any conditions

Washer/Dryer



FEATURE	FUNCTION	BENEFIT
Rugged small footprint packaging	Able to withstand harsh environments	Reliable sensor functions over the life of the machine
Sensor withstands moisture and condensation	Once dried, the sensor works normally again	Occasional spills do not affect long term performance

HUMIDITY SENSORS

HTU2XY RELATIVE HUMIDITY AND TEMPERATURE SENSOR



HVACR Systems



FEATURE	FUNCTION	BENEFIT
Measures full range of humidity from 0 to 100%	Provide accurate data in any condition	Accurate inputs to the central control system
Embedded temperature sensor	Measure ambient temperature	Provides accurate compensation for the humidity sensor

Refrigerators



FEATURE	FUNCTION	BENEFIT
1.5 to 3.6 operating voltage	Power for the sensor	Compatible with any fridge power source
Small size 3.0 x 3.0 x 0.9 mm	Saves material costs	Fits well on high density PC boards

Medical CPAP



FEATURE	FUNCTION	BENEFIT
PTFE filter over sensor active area	Prevents accumulation of debris and water	Reliability in hostile environments
Humidity and temperature outputs available	Act as a multi-sensor module	Able to calculate dew point providing three data points

Security Cameras



FEATURE	FUNCTION	BENEFIT
Accurate measurements near 0% RH	Provides full scale span accurately	Able to detect leaks in hermetically sealed enclosures
Very low standby current; less than one microamp	Provides power to maintain electronics activity	Extends life of standby battery power

HUMIDITY SENSORS

HTU2XY RELATIVE HUMIDITY AND TEMPERATURE SENSOR



Home Comfort



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Small size SMD mountable package	Standard package for PC board assemblies	Fits into very dense electronic packaging
Accurate measurement over full range	Measures 0 to 100% RH within spec	Ensures proper operation of system under any conditions

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FEATURE	FUNCTION	BENEFIT
Rugged small footprint packaging	Able to withstand harsh environments	Reliable sensor functions over the life of the machine
Sensor withstands moisture and condensation	Once dried, the sensor works normally again	Occasional spills do not affect long term performance

TEMPERATURE SENSORS

MBD AND MCD SERIES THERMISTOR PROBES

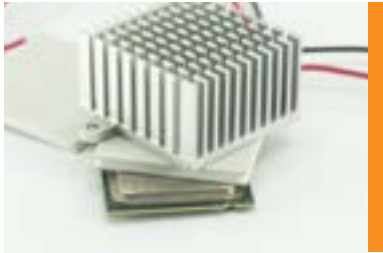


Medical Catheters



FEATURE	FUNCTION	BENEFIT
Small size	Designed for range of intrusive catheter based products	More comfortable to patient, less post operative issues
Very fast time response	Fast response to changes in temperature	Allows doctors to see activity in real time
Standard polyimide housing	Provides consistent size and protects sensing element and insulates sensor electrically	Allows for easy, cost effective installation and rugged design

Peltier Coolers



FEATURE	FUNCTION	BENEFIT
Rugged design	Suitable for a range of industrial and medical applications	Provides excellent reliability
Accurate thermistor sensor	Provides accurate feedback information to controller	Allows for easy installation on a variety of tube sizes
Customizable tolerances and lengths	Usable in a variety of locations in the system	Provides good cost/performance ratio

Flow Sensors



FEATURE	FUNCTION	BENEFIT
Small size	Provides fast response to changes in flow	Allows for easy analysis of flow rates and changes
Compatible materials	Probe materials compatible with a wide range of applications	Allow easier approval for new products
Available in a range of sizes and other options	Compatible with most control systems	Allows faster time to market and more choices for designers

Miniature Probe Assemblies



FEATURE	FUNCTION	BENEFIT
Custom lengths and other options available	Allows use in wide range of systems	Eliminates splices and minimizes overall cost
Small, consistent head size	Provides rugged and reliable design	Provides cost efficient assembly and reliable designs
Simple, elegant design	Allows range of options and efficient assembly	Maximizes flexibility and minimizes cost

TEMPERATURE SENSORS

PLATINUM THIN FILM TEMPERATURE ELEMENTS



HVAC Systems



FEATURE	FUNCTION	BENEFIT
Rugged construction	Designed for long life	Minimizes field failures and need for replacement
Fast response time	Provides temperature feedback to system	Allows for fast response times to increase efficiency
Available with wide range of base resistance values	Compatible with most standard HVAC controls	Can be used with most HVAC systems worldwide

Temperature Probes And Assemblies



FEATURE	FUNCTION	BENEFIT
Compact design	Provides very fast time response	Ideal for applications with rapid temperature changes
Variety of outline dimensions	Sensor profile	Allows for easy packaging in a variety of housing styles and sizes
Gold coated nickel lead wire or silver lead wire	Connection to sensing element	Provides flexibility to weld or solder lead wires

Electric Motors And Generators



FEATURE	FUNCTION	BENEFIT
Wide temperature range – as wide as -50° to 600°C (Class B)	Sensor operating temperature range	Provides accurate, stable temp sensing in many industrial applications
Global interchangeability, conforms to DIN EN 60751	Resistance versus temperature specifications	Compatible with a wide range of industrial controls
RO: 100Ω, 1000Ω values available (Pt100, Pt1000)	Compatible with most standard controls	Can be used with most control systems worldwide

Instrumentation



FEATURE	FUNCTION	BENEFIT
Compact design	Provides very fast time response	Ideal for applications with rapid temperature changes
Available with custom lead lengths and connectors	Provides design flexibility for OEM designer	Does not require additional labor at end customer
Customizable tolerances and accuracies	Usable in a variety of locations in the system	Provides good cost/performance ratio

TEMPERATURE SENSORS

PLATINUM THIN FILM TEMPERATURE ELEMENTS



Medical Equipment



FEATURE	FUNCTION	BENEFIT
Compact design	Provides very fast time response	Ideal for applications with rapid temperature changes
Very Low drift over lifetime	Provides consistent temperature readings	Ideal for applications requiring high accuracy and stability
Accuracies to class AA ($\pm 0.1^{\circ}\text{C}$)	Compatible with most medical requirements	Suitable for apps with tight accuracy requirements

Appliance/Cooking Equipment



FEATURE	FUNCTION	BENEFIT
Manufactured with automated production system	Provides for low cost and easy assembly	Ideal for higher volume, cost sensitive applications
Wide temperature range - as wide as -50° to 600°C (Class B)	Sensor operating temperature range	Provides accurate, stable temp sensing in many appliance applications
Rugged construction	Designed for long life	Minimizes field failures and need for replacement

TEMPERATURE SENSORS

STAINLESS STEEL BULLET PROBE



Commercial HVAC Systems



FEATURE	FUNCTION	BENEFIT
Rugged construction	Designed for long life	Minimizes field failures and need for replacement
Standard housing design	Can be used as a fast response immersion sensor with a thermowell	Allows for easy installation in chiller systems
Available with wide range of R25 values and curves	Compatible with most standard HVAC controls	Can be used with most HVAC systems worldwide

Commercial Refrigeration



FEATURE	FUNCTION	BENEFIT
Compact design	Provides very fast time response	Ideal for applications with rapid temperature changes
Available with a standard bullet housing	Can be mounted as an air or surface sensor	Allows for easy installation for a variety of applications
Customizable tolerances and accuracies	Usable in a variety of locations in the system	Provides good cost/performance ratio

Container Storage



FEATURE	FUNCTION	BENEFIT
NTC sensor	Accurate, low cost sensor	Provides good price-to-performance ratio
Broad operating temperature range	Operates over a wide range of temperatures	Good accuracy and reliability at cold temps
Available with wide range of R25 values and curves	Compatible with most standard controls	Can be used with most control systems worldwide

Instrumentation



FEATURE	FUNCTION	BENEFIT
Compact design	Provides very fast time response	Ideal for applications with rapid temperature changes
Available with custom lead lengths and connectors	Provides design flexibility for OEM designer	Does not require additional labor at end customer
Customizable tolerances and accuracies	Usable in a variety of locations in the system	Provides good price-to-performance ratio

TEMPERATURE SENSORS

STAINLESS STEEL BULLET PROBE



Medical Equipment



FEATURE	FUNCTION	BENEFIT
Compact design	Provides very fast time response	Ideal for applications with rapid temperature changes
High accuracy NTC thermistor sensor	Provides accurate temperature reading	Ideal for applications requiring high accuracy
Stainless steel housing	Compatible with most medical and food requirements	Suitable for applications with special requirements

Appliance



FEATURE	FUNCTION	BENEFIT
NTC thermistor assembly with stainless steel housing	Provides for low cost and easy assembly	Ideal for higher volume, cost sensitive applications
Available with custom lead lengths and connectors	Provides design flexibility for OEM designer	Does not require additional labor at end customer
Customizable tolerances and accuracies	Usable in a variety of locations in the system	Provides good price-to-performance ratio

TEMPERATURE SENSORS

SURFACE MOUNT FLAG TERMINAL TEMPERATURE PROBE



Power Supplies / Heatsinks



FEATURE	FUNCTION	BENEFIT
Rugged construction	Designed for long life	Minimizes field failures and need for replacement
Copper housing	Fast thermal transfer	Overheat and failure conditions are sensed quickly
Available with wide range of R25 values and curves	Compatible with most standard controls	Can be used with most temperature control systems worldwide

Servo Motors



FEATURE	FUNCTION	BENEFIT
Operating temp range from -40°C to +125°C	Covers most industrial application temp ranges	One design fits many applications
Range of ring terminal sizes available	Suitable for a wide range of motor sizes	Design can be used on a range of products
Customizable tolerances and accuracies	Usable in a variety of locations in the system	Provides good cost/performance ratio

Appliances



FEATURE	FUNCTION	BENEFIT
NTC thermistor element	Provides for a cost effective design	Can be used in cost critical applications
Available in a range of wire lengths and connectors	Flexible design, compatible with many systems	Eliminates fitting adaptors or special connections

Miniature Probe Assemblies



FEATURE	FUNCTION	BENEFIT
Custom cable lengths and other options available	Allows use in wide range of systems	Eliminates splices and minimizes overall cost
Available in a range of R25 values and curves	Compatible with most HVACR controls	No need for special programming or changes

TEMPERATURE SENSORS

SURFACE MOUNT FLAG TERMINAL TEMPERATURE PROBE



Medical Equipment



FEATURE	FUNCTION	BENEFIT
Range of sensor accuracies available	Suitable for high accuracy applications	Accurate monitoring of critical medical equipment
Simple, rugged design	Designed for long life	Minimizes field failures and need for replacement

Alternative Energy



FEATURE	FUNCTION	BENEFIT
Small footprint and weight	Fits into compact assemblies	Reduces total weight and cost
Can accommodate thermistors, RTDs and other sensing elements	Compatible with standard solar controls	Can be used with most systems worldwide

TEMPERATURE SENSORS

THERMISTOR PIPE PROBE



Air Conditioning Systems



FEATURE	FUNCTION	BENEFIT
Rugged construction	Designed for long life	Minimizes field failures and need for replacement
Standard housing/clip design	Minimizes part count	Allows for easy installation in chiller systems
Available with wide range of R25 values and curves	Compatible with most standard HVAC controls	Can be used with most HVAC systems worldwide

Commercial Refrigeration



FEATURE	FUNCTION	BENEFIT
Overmolded TPE design	Great for high moisture and freeze/thaw applications	Provides excellent reliability
Available with an integral mounting clip	Can be mounted directly to refrigerant tubes	Allows for easy installation on a variety of tube sizes
Customizable tolerances and accuracies	Usable in a variety of locations in the system	Provides good cost/performance ratio

Commercial HVAC



FEATURE	FUNCTION	BENEFIT
Overmolded design	Provides good electrical/mechanical specifications	Allows for easy approval for regulatory controlled systems
Rugged design	Highly moisture resistant and good for freeze/thaw	Provides years of reliable operation in critical systems
Available in a range of connector options	Compatible with most control systems	Eliminates fitting adaptors or special connections

Mobile HVAC



FEATURE	FUNCTION	BENEFIT
Custom cable lengths and other options available	Allows use in wide range of systems	Eliminates splices and minimizes overall cost
Overmolded TPE subassembly	Provides rugged and reliable design	Prevents field failures
Simple, elegant design	Allows range of options and efficient assembly	Maximizes flexibility and minimizes cost

TEMPERATURE SENSORS

TPE OVERMOLD PROBE



Residential HVACR Systems



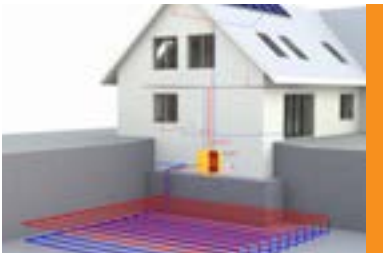
FEATURE	FUNCTION	BENEFIT
Rugged construction	Designed for long life	Minimizes field failures and need for replacement
Standard housing design	Can be used with or without clip	Allows for easy installation in chiller systems
Available with wide range of R25 values and curves	Compatible with most standard HVACR controls	Can be used with most HVACR systems worldwide

Commercial Refrigeration



FEATURE	FUNCTION	BENEFIT
IP68 rated	Great for high moisture and freeze/thaw applications	Provides excellent reliability
Available with a range of clip sizes	Can be mounted directly to refrigerant tubes	Allows for easy installation on a variety of tube sizes
Customizable tolerances and accuracies	Usable in a variety of locations in the system	Provides good cost/performance ratio

Heat Pumps



FEATURE	FUNCTION	BENEFIT
Double insulated design	Provides good electrical/mechanical specifications	Allows for easy approval for regulatory controlled systems
Rugged design with IP68 rating	Highly moisture resistant and good for freeze/thaw	Provides years of reliable operation in critical systems
Available in a range of connector options	Compatible with most control systems	Eliminates fitting adaptors or special connections

Container Storage



FEATURE	FUNCTION	BENEFIT
Custom lengths and other options available	Allows use in wide range of systems	Eliminates splices and minimizes overall cost
Overmolded TPE subassembly	Provides rugged and reliable design	Prevents field failures
Simple, elegant design	Allows range of options and efficient assembly	Maximizes flexibility and minimizes cost

TEMPERATURE SENSORS

TPE OVERMOLD PROBE WITH SS HOUSING



HVACR Chiller Systems



FEATURE	FUNCTION	BENEFIT
Rugged construction	Designed for long life	Minimizes field failures and need for replacement
Standard bullet housing design	Can be used with or without well	Allows for easy installation in chiller systems
Available with wide range of R25 values and curves	Compatible with most standard HVACR controls	Can be used with most HVACR systems worldwide

Commercial Refrigeration



FEATURE	FUNCTION	BENEFIT
IP68 rated	Great for high moisture and freeze/thaw applications	Provides excellent reliability
Available with a range of clip sizes	Can be mounted directly to refrigerant tubes	Allows for easy installation on a variety of tube sizes
Customizable tolerances and accuracies	Usable in a variety of locations in the system	Provides good cost/performance ratio

Heat Pumps



FEATURE	FUNCTION	BENEFIT
Double insulated design	Provides good electrical/mechanical specifications	Allows for easy approval for regulatory controlled systems
Rugged design with IP68 rating	Highly moisture resistant and good for freeze/thaw	Provides years of reliable operation in critical systems
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Container Storage



FEATURE	FUNCTION	BENEFIT
Custom lengths and other options available	Allows use in wide range of systems	Eliminates splices and minimizes overall cost
Overmolded TPE subassembly	Provides rugged and reliable design	Prevents field failures
Simple, elegant design	Allows range of options and efficient assembly	Maximizes flexibility and minimizes cost

TEMPERATURE SENSORS

TSD SERIES DIGITAL THERMOPILE SENSORS



Temperature Scanning



FEATURE	FUNCTION	BENEFIT
Non-contact measurement	Sensor element does not have to contact skin	Prevents contamination and debris collection
Digital output signal	Basic sensor information for the electronics	Digital output is an easy interface with a microprocessor
Small size	Ability to fit limited spaces	Easy to apply to handheld devices and products

Microwave Oven



FEATURE	FUNCTION	BENEFIT
Thermopile field of view	Accommodates various microwave cooking areas	Insensitive to the size of food item
Non-contact measurement	Can measure temperature accurately from a distance	Measure food temperature while it is rotating
Sensor housing is sealed	Eliminates problems from dust, dirt, debris	Food spatter and spills do not damage the sensor

Roll / Drum Printer, Copiers And Laminators



FEATURE	FUNCTION	BENEFIT
Non-contact measurements	Measures temperature without physical contact	Easy to measure the temp of rotating surfaces
Narrow field of view	Measures a small surface area accurately	Is not affected by background temperatures
Digital signal output	Sends digital temperature info to system controller	Simple interface, no A/D conversion required

Presence / Occupancy Detection



FEATURE	FUNCTION	BENEFIT
Continuous detection of thermal sources in a space	Sensitive to single or multiple heat sources	Excellent for occupancy sensing of rooms
Signal path from heat source is DC steady state	Continuous output signal when heat source present	Monitor a space when occupants are stationary
Narrow field of view versions are available	Allows sensor to focus on a small area of interest	Area discrimination when optic elements (lens) used

TEMPERATURE SENSORS

TSYS01/TSYS02 DIGITAL TEMPERATURE SENSORS



HVACR Systems



FEATURE	FUNCTION	BENEFIT
Factory calibrated	True plug and play operation	Accurate inputs to the central control system; no calibration
High accuracy	Measure ambient air temperature or system temperatures	Provides accurate reading for personal comfort or for efficient machine operation

Home Healthcare



FEATURE	FUNCTION	BENEFIT
Fast conversion time	Provides fast and accurate temperature readings	Allows accurate readings and continuous monitoring of critical information
Complete solution - system in a package	Combines temperature sensor, ADC converter and digital output circuitry	Saves design time, lower overall cost, higher accuracy

Mobile Devices



FEATURE	FUNCTION	BENEFIT
Small size	Minimizes board space and overall part profile	Fits into very dense electronic packaging
Low power operation	Able to be put into sleep mode, operates with μA of current	Excellent for battery powered systems; minimizes power drain

Weather Stations



FEATURE	FUNCTION	BENEFIT
Accurate temperature measurements	Provides temperature accuracies down to $\pm 0.1^\circ\text{C}$	Able to provide accurate temperature information for residential and commercial applications
Operates over a wide temperature range	Operates from -40°C to $+125^\circ\text{C}$	Able to operate outdoors and in extreme conditions

TEMPERATURE SENSORS

TSYS01/TSYS02 DIGITAL TEMPERATURE SENSORS



Home Comfort



FEATURE	FUNCTION	BENEFIT
Small size SMD mountable package	Standard package for PC board assemblies	Fits into very dense electronic packaging
Accurate temperature measurement over a wide range of temperatures	Accuracies down to $\pm 0.1^{\circ}\text{C}$ from -5°C to $+50^{\circ}\text{C}$	Ensures proper operation of the system under any conditions

Wireless Systems



FEATURE	FUNCTION	BENEFIT
Very low power	Only active when data is needed; operates with only μA of power	Excellent for battery powered systems; minimizes power drain
Digital interface	Utilize industry standard I ² C or SPI interfaces	Easy to interface to; minimizes programming

TEMPERATURE SENSORS

TSYSO3 DIGITAL TEMPERATURE SENSORS

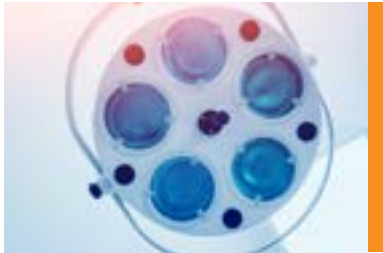


HVACR Systems



FEATURE	FUNCTION	BENEFIT
Factory calibrated	True plug and play operation	Accurate inputs to the central control system; no calibration
High accuracy	Measure ambient air temperature or system temperatures	Provides accurate reading for personal comfort or for efficient machine operation

Healthcare Systems



FEATURE	FUNCTION	BENEFIT
Fast conversion time	Provides fast and accurate temperature readings	Allows accurate readings and continuous monitoring of critical information
Complete solution - system in a package	Combines temperature sensor, ADC converter and digital output circuitry	Saves design time, lower overall cost, higher accuracy

Mobile Devices



FEATURE	FUNCTION	BENEFIT
Small size	Minimizes board space and overall part profile	Fits into very dense electronic packaging
Low power operation	Able to be put into sleep mode, operates with μA of current	Excellent for battery powered systems; minimizes power drain

Weather Station



FEATURE	FUNCTION	BENEFIT
Accurate temperature measurements	Provides temperature accuracies down to $\pm 0.1^\circ\text{C}$	Able to provide accurate temperature information for residential and commercial applications
Operates over a wide temperature range	Operates from -40°C to $+125^\circ\text{C}$	Able to operate outdoors and in extreme conditions

TEMPERATURE SENSORS

TSYSO3 DIGITAL TEMPERATURE SENSORS



Automotive Comfort Systems



FEATURE	FUNCTION	BENEFIT
Small size	Minimizes board space and overall part profile	Fits into very dense electronic packaging
Operates over a wide temperature range	Operates from -40°C to +125°C	Able to operate outdoors and in extreme conditions

Wireless Systems



FEATURE	FUNCTION	BENEFIT
Accurate temperature measurements	Provides temperature accuracies down to $\pm 0.1^\circ\text{C}$	Able to provide accurate temperature data for residential and commercial applications
Low power operation	Able to be put into sleep mode, operates with μA of current	Excellent for battery powered systems; minimizes power drain

TEMPERATURE SENSORS

10K3CG LEADLESS CHIP GOLD NTC TEMPERATURE SENSOR



Laser LED Thermal Monitoring



FEATURE	FUNCTION	BENEFIT
Gold electrodes on both sides of the NTC chip	Forms electrical contacts	High thermal conductivity, easy to solder and wire bond
Small size and mass	Reduce thermal inertia	Fast response to changes in temperature

Fiber-optic Communications



FEATURE	FUNCTION	BENEFIT
Parts are interchangeable	Performance parameters are uniform part to part	Uniform results on multi-channel applications
Low profile chip design	Easy to mount on a substrate	Fits well into products that are space or dimension limited

Thermopile Reference Sensor



FEATURE	FUNCTION	BENEFIT
NTC sensing element	Provides predictable and uniform output performance	Improves the output accuracy of total product
Gold contacts	Make electrical connections	Compatible with many contact surfaces (plated header, solder, wire bond wire)

Local Thermal Protection



FEATURE	FUNCTION	BENEFIT
Small size and low profile	Reduce volume and thermal mass	Fits into tight spaces and under thermal producing components
Gold contacts	Make electrical connections	Excellent thermal transfer to provide fast response to temperature changes

ULTRASONIC SENSORS

AD-101 AIR BUBBLE DETECTOR



Medical Infusion Pumps



FEATURE	FUNCTION	BENEFIT
Non-invasive measurements	Detect bubbles without making contact to the liquid	Eliminates the chance of contamination
Compatible with different tube diameters	Provides good acoustic contact with the tubing	Able to work with a variety of infusion systems

Industrial Inkjet Printers



FEATURE	FUNCTION	BENEFIT
Fast detection of bubbles	Indication provided within 2.0 ms of detection	Alerts the machine of a problem before damage occurs
Broad operating voltage range	Powers the sensor	Easy to power from any voltage available in the machine

Food And Beverage Production



FEATURE	FUNCTION	BENEFIT
Detects large interruptions in liquid flow	Senses any bubble size greater than 70% of tube I.D.	Ensures proper filling of package containers
Non-invasive detection	Measures bubble through tubing wall	Assures food safety by eliminating contamination

Dialysis Equipment



FEATURE	FUNCTION	BENEFIT
Non-invasive detection	Senses bubbles without contacting the liquid	Not possible to introduce bacteria via the sensor
Sensor has a built-in diagnostic capability	Continuous monitoring of sensor operation	Provides an instant notification of a sensor malfunction

ULTRASONIC SENSORS

AD-101 AIR BUBBLE DETECTOR



Hydroponic Farming



FEATURE	FUNCTION	BENEFIT
Able to determine a no-liquid condition in the tube	Response to air in the tubing	Quickly detects interruption of irrigation flow
Adapts to various size tubing	Connection of the sensors to the liquid flow	Eliminates need for special adaptors

Pharmaceutical Production



FEATURE	FUNCTION	BENEFIT
Detects large interruptions in liquid flow	Senses any bubble size greater than 70% of tube I.D.	Ensures each package contains proper medication dose
Continuous self test feature in the sensor	Indication provided if sensor is malfunctioning	Ensures vial is filled with proper dosage of medication

PHOTO OPTIC SENSORS

SMT PHOTO OPTIC / SPO₂ COMPONENTS



Pulse Oximetry



FEATURE	FUNCTION	BENEFIT
Tight tolerance on red LED wavelength	Precision is driven by proprietary emitters spectrally matched to function with a detector	More precision in acute medical conditions can mean the difference between life and death
Reflow solderable	Decreases manual soldering processes	Enable medical device designers to design products with reduced overall cost due to reduced labor as well as increased quality

Finger Probes



FEATURE	FUNCTION	BENEFIT
High reliability	Proven track record in quality and reliability	Great overall value in cost and performance
Flexibility to meet any customer's requirements	Dual drive emitters, both red and IR	Able to meet a wide range of customer specifications and needs

Ear Probes



FEATURE	FUNCTION	BENEFIT
Scalable, value-added manufacturing	Can meet large component volume requirements	On-time delivery, even in large quantities saves time and money
Gold contacts	Make electrical connections	Compatible with many contact surfaces (plated header, solder, wire bond wire)

Disposable



FEATURE	FUNCTION	BENEFIT
Spectrally paired photo-detectors components	Matches wavelength of emitter LEDs	Allow easy and reliable matching of emitter and detector
Includes both photo optic components and complete sensor solutions	Wide range of products	Provides greater flexibility for OEM manufacturers

POSITION SENSORS

AXISENSE MEMS INCLINOMETER



Cranes and Hoists



FEATURE	FUNCTION	BENEFIT
Simple two-bolt mounting feature	Attach sensor to moving equipment	Simple attachment to any available mounting surface
Rugged construction	Protect the sensor components and corresponding benefit	Sensors can be used in harsh environments

Dump Trucks



FEATURE	FUNCTION	BENEFIT
Senses in both X and Y axis	Determine tilt in any direction	Adapts well to mobile applications
J1939 CAN interface	Communicates data to the system	Compatible with industry standard systems

Bucket Position



FEATURE	FUNCTION	BENEFIT
Angular capability of $\pm 90^\circ$	Covers a large range of motion	Adapts to applications with significant movement
IP-65 Enclosure	Protect sensor interior from dust, dirt, debris	Reliable operation in "dirty" environments

Cabin Leveling



FEATURE	FUNCTION	BENEFIT
$\pm 0.5^\circ$ accuracy	Sends precision data to the host system	Leveling feature provides operator comfort
Operating temperature is -40 to $+85^\circ\text{C}$	Accurate tilt information in a variety of conditions	Reliable operation in environmental extremes

POSITION SENSORS

AXISENSE MEMS INCLINOMETER



Paving Equipment



FEATURE	FUNCTION	BENEFIT
8 - 30 VDC operation	Power for the DOG2	Adapts to a wide variety of machine electrical systems
±0.5° accuracy	Sends precision data to the host system	Ensures pavement tilts and angles are correct

RV Leveling



FEATURE	FUNCTION	BENEFIT
Senses in both X and Y axis	Determine tilt in any direction	Makes operations simple for the owner
8 - 30 VDC operation	Power for the DOG2	Adapts to the variety of electrical systems found on RVs

POSITION SENSORS

KMXP SERIES POSITION SENSORS



Surgical Robots



FEATURE	FUNCTION	BENEFIT
Small size	Suitable for small spaces	Allows for compact, reliable designs
Contactless position measurements	Provides accurate position measurements with no wear	Provides for reliable sensing in demanding applications and long life

Prosthetics



FEATURE	FUNCTION	BENEFIT
Linear and rotational detection	Can determine linear or angular position	Provides flexible position measurement
Not susceptible to EMC	Protects the sensing elements from electromagnetic interference	Can be used in high EMF environments without extra protection

Syringe and Infusion Pumps



FEATURE	FUNCTION	BENEFIT
10-50 μm accuracy with sub μm resolution for linear use	Suitable for high accuracy applications	Allows for precise control of fluids
DFN solderable packaging or SMT	Ease of manufacturing and integration	Provides for cost effective reliable designs

Medical Tables And Chairs



FEATURE	FUNCTION	BENEFIT
Linear and rotational detection	Can determine linear or angular position	Provides flexible position measurement
Simple electronic interface; standard electronics available	Low cost electronics to interface sensor to system	Keeps costs low and provides good accuracy

POSITION SENSORS

KMXP SERIES POSITION SENSORS



Machine Tools



FEATURE	FUNCTION	BENEFIT
Not susceptible to EMC	Protects the sensing elements from electromagnetic interference	Can be used in high EMF environments without extra protection
DFN solderable packaging or SMT	Ease of manufacturing and integration	Provides for cost effective reliable designs

Cutting Tools



FEATURE	FUNCTION	BENEFIT
10-50 μm accuracy with sub μm resolution for linear use	Suitable for high accuracy applications	Allows for precise cutting of materials
Reliable, accurate measurements in harsh environments	Provides long life even in the toughest environments	High reliability, minimizes warranty issues

X-Y Tables



FEATURE	FUNCTION	BENEFIT
10-50 μm accuracy with sub μm resolution for linear use	Suitable for high accuracy applications	Allows for precise control of fluids
DFN solderable packaging or SMT	Ease of manufacturing and integration	Provides for cost effective reliable designs

Semiconductor Handling Equipment



FEATURE	FUNCTION	BENEFIT
Operates at high temperatures	Good for high temperature applications	Reliable operation over a broad temperature range
Small size	Suitable for small spaces	Allows for compact, reliable designs

VIBRATION SENSORS

820M1 EMBEDDED PE ACCELEROMETER



Machine Condition Monitoring



FEATURE	FUNCTION	BENEFIT
Variety of g ranges available	Ability to detect small to large vibration amplitudes	Allows use on a wide variety of equipment and machines
Low mass	Does not affect vibration characteristics	Provides best fidelity of the output signal

Transport Data Loggers



FEATURE	FUNCTION	BENEFIT
9 x 9 x 4.2 mm dimensions	Minimize real estate needed on PC board	Allows use in small and handheld applications
62µA current consumption	Requires very low power	Ideal for battery powered products

Drop Testing Equipment



FEATURE	FUNCTION	BENEFIT
Piezoelectric sensing element	Enables a durable sensor	Sustains large impacts and shocks without damage
Kovar/ceramic housing	Protects critical sub-assemblies on the interior of the sensor	Same as above

Bearing Monitoring



FEATURE	FUNCTION	BENEFIT
Kovar/ceramic housing	Protects critical sub-assemblies on the interior of the sensor	Provides a hermetic seal against harsh environments
±5g lowest range	Gives high sensitivity to acoustic sounds	Enables early detection of bearing problems

VIBRATION SENSORS

820M1 EMBEDDED PE ACCELEROMETER



Acoustic Emission Testing



FEATURE	FUNCTION	BENEFIT
Flat frequency response from 2Hz to 10kHz	Up to 10kHz frequency response	Captures full range of acoustic emission spectrum
Piezoelectric sensing element	Provides resolutions greater than MEMS based capacitive technology	Capability to detect very small acoustic signal levels

Tamper Detection



FEATURE	FUNCTION	BENEFIT
±5g lowest range	Ability to hear very low amplitude signals	Provides high sensitivity to a tamper event
9 x 9 x 4mm package size	Space saving design	Allows the sensor to be hidden in inconspicuous places

FORCE SENSORS

FC22 COMPRESSION LOAD CELL



Medical Infusion Pumps



FEATURE	FUNCTION	BENEFIT
Range of output options: mV, amplified	Simplified circuitry	Greater system accuracy, more flexibility in designs
Very small footprint	Fit into compact assemblies	Adapts easily to high density packaging

Industrial Robotics



FEATURE	FUNCTION	BENEFIT
High overrange protection	Able to withstand surges and spikes in the system	Provides reliable operation in a range of applications and environments
Limitless cycle life	Microfused technology, glass bonded	Extended service life

Weighing Systems



FEATURE	FUNCTION	BENEFIT
High overrange protection	Able to withstand surges in the system	Provides reliable operation in a range of applications and environments
High accuracy and good long term stability	Data to system	Provides accurate output with good reliability

Pumps



FEATURE	FUNCTION	BENEFIT
Fast response time	Reacts quickly to changes in force	Provides quick feedback to system
Stainless steel housing	Protects from moisture and debris	Reliable operation in harsh environments and compatible with most materials

FORCE SENSORS

FC22 COMPRESSION LOAD CELL



Exercise Machines



FEATURE	FUNCTION	BENEFIT
Optimized for embedded force applications	Provides exceptional price-to-performance ratio	Affordable, accurate sensing for many applications
Low off-center errors	Minimizes errors due to setup	Provides accurate force data over a range of environments

Household Appliances



FEATURE	FUNCTION	BENEFIT
Good price-to-performance ratio	Provides competitive pricing	Good for higher volume, consumer applications
Wide force ranges available	Adapts to different applications and locations	Able to be used in a broad range of applications

FORCE SENSORS

FS19 COMPRESSION LOAD CELL



Medical Infusion Pumps



FEATURE	FUNCTION	BENEFIT
Stainless steel exterior	Provides clean body	Suitable for medical applications
Very small footprint	Fit into compact assemblies	Adapts easily to high density packaging

Syringe Pumps



FEATURE	FUNCTION	BENEFIT
Simple design	Lower cost to manufacture	Affordable for a range for higher volume applications
Wide force ranges available	Adapts to different applications and locations	Able to be used in a broad range of applications
Can be combined with ultrasonic sensor	Used for patient feeding	Provides lower cost and simplified design

Weighing Systems



FEATURE	FUNCTION	BENEFIT
High sensitivity	Provides high resolution readings	Good accuracy and simplified electronics
Good non-linearity and hysteresis	Provides accurate information	Provides accurate readings to user

Eye Surgery Equipment



FEATURE	FUNCTION	BENEFIT
Occlusion detection	Detects blockages in flow	Prevents high pressures from causing damage
Stainless steel housing	Protects from moisture and debris	Reliable operation in harsh environments and compatible with most materials

FORCE SENSORS

FS19 COMPRESSION LOAD CELL



Industrial Robotics



FEATURE	FUNCTION	BENEFIT
High overrange protection	Able to withstand surges and spikes in the system	Provides reliable operation in a range of applications and environments
Limitless cycle life	Microfused technology, glass bonded	Extended service life

Household Appliances



FEATURE	FUNCTION	BENEFIT
Good price-to-performance ratio	Provides competitive pricing	Good for higher volume, consumer applications
Wide force ranges available	Adapts to different applications and locations	Able to be used in a broad range of applications

FORCE SENSORS

FX29 COMPRESSION LOAD CELL



Medical Infusion Pumps



FEATURE	FUNCTION	BENEFIT
Range of output options: mV, amplified, digital	Digital simplified circuitry	Greater system accuracy, more flexibility in designs
Very small footprint	Fit into compact assemblies	Adapts easily to high density packaging

Industrial Robotics



FEATURE	FUNCTION	BENEFIT
Simplified design	Lower cost to manufacture	Affordable for a range of higher volume applications
Wide force ranges available	Adapts to different applications and locations	Able to be used in a broad range of applications

Weighing Systems



FEATURE	FUNCTION	BENEFIT
I ² C Interface	Communicates force data	Adapts easily to digital electronics
Sleep mode	Puts sensor into very low power configuration	Extends device battery life

Orthopedic Instruments



FEATURE	FUNCTION	BENEFIT
Very small footprint	Fit into compact assemblies	Adapts easily to high density packaging
Stainless steel housing	Protects from moisture and debris	Reliable operation in harsh environments and compatible with most materials

FORCE SENSORS

FX29 COMPRESSION LOAD CELL



Press Tools



FEATURE	FUNCTION	BENEFIT
Optimized for embedded force applications	Provides exceptional price-to-performance ratio	Affordable, accurate sensing for many applications
I ² C Interface	Data communication	Easy interface to a system microcontroller

Hydraulic Force Monitoring



FEATURE	FUNCTION	BENEFIT
High overrange protection	Able to withstand surges and spikes in the system	Provides reliable operation in a range of applications and environments
Limitless cycle life	Microfused technology, glass bonded	Extended service life

About TTI, Inc.

TTI, Inc. is a premier specialty distributor of electronic components known to customers and manufacturers around the globe. A legacy branded in pride for unsurpassed customer service and product knowledge has won TTI recognition from its customer and supplier partners time and time again. Over 40 years ago, TTI positioned itself as the leading authorized distributor offering passive, connector, electromechanical and discrete components. Broader and deeper inventory and leading-edge technology products have established TTI as The Specialist in electronic component distribution.

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