

# SENSOR APPLICATION GUIDE

PRESSURE • HUMIDITY • TEMPERATURE  
ULTRASONIC • PHOTO OPTIC • POSITION

# 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.



## SENSOR SOLUTIONS

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

PRODUCT AND MARKET MATRIX	IoT READY SENSOR											
	AEROSPACE AND DEFENCE	AGRICULTURE	APPLIANCES	AUTOMATION & CONTROL	AUTOMOTIVE	DATA & DEVICES	INDUSTRIAL	ICT	INTELLIGENT BUILDINGS	MEDICAL	OIL AND GAS	TEST AND MEASUREMENT
MS5525DSO PRESSURE SENSOR 			●	●		●	●		●	●	●	
MS5837-02BA PRESSURE SENSOR 						●				●		
M5600 DIGITAL WIRELESS TRANSDUCER 		●		●			●		●			
U5600 DIGITAL WIRELESS TRANSDUCER 				●					●	●	●	
HTU2XY RELATIVE HUMIDITY & TEMPERATURE SENSOR 		●	●	●	●				●	●		
HM1500LF HUMIDITY SENSOR		●					●		●			●
TSYS01/02 DIGITAL TEMPERATURE SENSOR 			●	●		●			●	●		
TSD SERIES DIGITAL THERMOPILE TEMPERATURE SENSORS 				●			●		●			
SURFACE MOUNT FLAG TERMINAL TEMPERATURE PROBE			●	●			●		●			
TPE OVERMOLD TEMPERATURE PROBE			●	●			●		●			
TPE OVERMOLD TEMPERATURE PROBE WITH STAINLESS STEEL HOUSING			●	●			●		●			
PIPE PROBE TEMPERATURE SENSOR							●		●			
MBD AND MCD SERIES THERMISTOR PROBES				●			●			●		●
10K3CG LEADLESS CHIP GOLD NTC TEMPERATURE SENSOR	●					●	●					
AD-101 ULTRASONIC/OPTIC SENSOR		●	●				●			●		
SMT PHOTO OPTIC / SPO <sub>2</sub> COMPONENTS										●		
DOG2 MEMS INCLINOMETER	●	●		●				●				

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



# SENSORS APPLICATION GUIDE

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- UAV Airspeed Measurement
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- HVAC Control
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- Blood Pressure Monitor

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# 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

### HVAC 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 <sup>2</sup> 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 Watch



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

### Swim Watch



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

### Multi-Sport Watch



FEATURE	FUNCTION	BENEFIT
I <sup>2</sup> 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 <sup>2</sup> 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

## 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 HVAC systems

### Pool/Spa Pumps



FEATURE	FUNCTION	BENEFIT
316L stainless 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 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

## 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



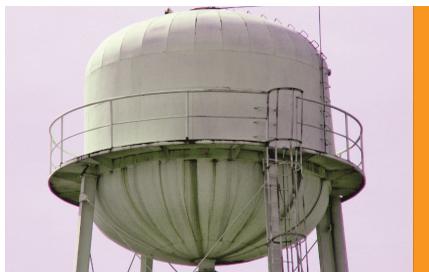
FEATURE	FUNCTION	BENEFIT
316L stainless front end	Process fitting connecting to the equipment	Compatible with fluids in medical procedures
Sensor is battery powered	Self contained power for all sensor operations	Eliminates wiring costs and cable failure points
Wireless communication	Sends sensor data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

## HTU2XY RELATIVE HUMIDITY & 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 & 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 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

## 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 & 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 & condensation

# 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 $\mu\text{A}$ 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 $-40^\circ\text{C}$ 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 $-5^{\circ}\text{C}$ 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 $\mu\text{A}$ of power	Excellent for battery powered systems; minimizes power drain
Digital interface	Utilize industry standard I <sup>2</sup> C or SPI interfaces	Easy to interface to; minimizes programming

# TEMPERATURE SENSORS

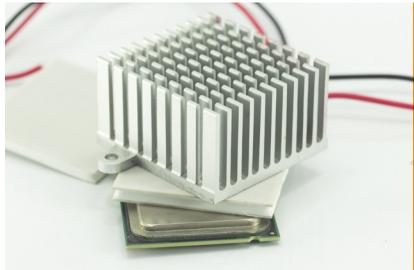
## MBD AND MCD SERIES THERMISTOR PROBES

### 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



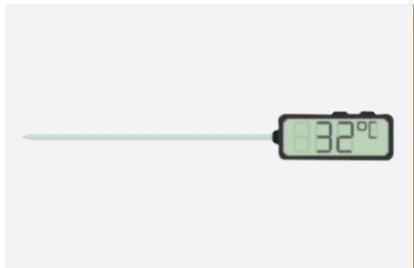
FEATURE	FUNCTION	BENEFIT
Rugged design	Suitable for a range of industrial and medical applications	Provides excellent reliability
Accurate thermistor sensor	Provides accurate feedback information to controller	Allows for easy installation on a variety of tube sizes
Customizable tolerances and lengths	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 & 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

## 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 & 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

## 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

## TPE OVERMOLD PROBE



### Residential HVAC Systems



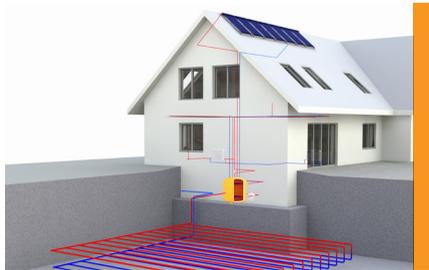
FEATURE	FUNCTION	BENEFIT
Rugged construction	Designed for long life	Minimizes field failures and need for replacement
Standard housing design	Can be used with or without clip	Allows for easy installation in chiller systems
Available with wide range of R25 values and curves	Compatible with most standard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

### HVAC 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 HVAC controls	Can be used with most HVAC systems worldwide

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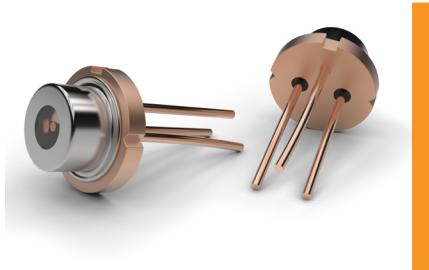
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# TEMPERATURE SENSORS

## 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



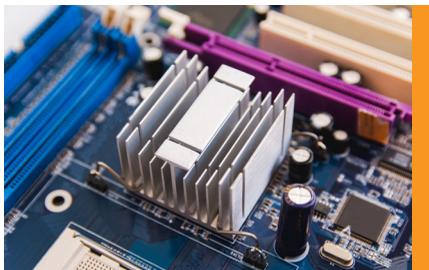
FEATURE	FUNCTION	BENEFIT
Parts are interchangeable	Performance parameters are uniform part to part	Uniform results on multi-channel applications
Low profile chip design	Easy to mount on a substrate	Fits well into products that are space or dimension limited

### 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 & OPTICAL 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 & 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 & OPTICAL 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

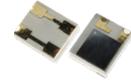
### Pharmaceutical Production



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

# ULTRASONIC & OPTICAL SENSORS

## SMT PHOTO OPTIC / SPO<sub>2</sub> 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

## DOG2 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
IP65 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°C	Accurate tilt information in a variety of conditions	Reliable operation in environmental extremes

# POSITION SENSORS

## DOG2 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







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