

A close-up, top-down view of a medical device, possibly a patient warming blanket or a specialized incubator. It features a light blue plastic frame with several large, circular, translucent blue sensor or heating elements arranged in a grid. There are also smaller red circular components and a black control knob visible. The background is a soft, out-of-focus light blue.

SENSOR SOLUTIONS FOR MEDICAL

SENSOR SOLUTIONS FOR MEDICAL

TE Connectivity (TE) is one of the largest sensor companies in the world, with innovative sensor solutions that help customers transform concepts into smart, connected creations. Electronic systems in medical equipment, devices and probes rely on sensor signals as a basis for control activities, accurate diagnosis and treatment. TE designs and manufactures sensors to exacting specifications for the rigors of medical applications, with ISO 13485 certification and FDA registration for various products. Our engineers provide full support of application-specific, standard and custom requirements, from product concept through manufacturing.



SENSOR SOLUTIONS

- AIR BUBBLE
- FORCE
- HUMIDITY
- LIQUID LEVEL
- PIEZO FILM
- POSITION
- PRESSURE
- PULSE OXIMETRY
- TEMPERATURE
- VIBRATION

QUALITY CERTIFICATION AND AUDITED PROCESSES

- ISO 13485
- ISO 9001
- CE-MDD
- FDA
- CMDR-Health Canada



MEDICAL APPLICATION SOLUTIONS

MEDICAL PUMP TECHNOLOGY

The body and the medical devices that support them rely on liquids to flow continuously without interruption. Infusion pumps, hemodialysis and blood flow monitoring applications are vital technologies for surviving certain medical conditions. Sensors are embedded in various pump and flow applications to confirm the continuous, accurate flow, detect occlusion, externally detect bubbles in lines, and measure liquid levels. These robust sensors from TE Connectivity (TE) are easy to integrate, provide superior reliability and deliver confidence and trust in system performance.

BLOOD PRESSURE MONITORING

Blood pressure is a key indicator of health and can provide insight into future health problems. There are two ways in which blood pressure can be measured: non-invasive blood pressure (NIBP) monitoring and invasive blood pressure (IBP) monitoring. TE's 1620 and 1630 series pressure sensors are fully piezoresistive pressure sensors for use in invasive blood pressure monitoring. These sensors are designed to be used with automated assembly equipment and can be dropped directly into a customer's disposable blood pressure housing.

BODY TEMPERATURE MEASUREMENT

External temperature measurement has advanced in technology with the addition of sensor technologies, increasing patient comfort, improving accuracy, and creating better tools for monitoring. Its data can be crucial to patients suffering from various conditions, from infections to hypothermia. The temperature measurement of the surface of the body can be accomplished using different sensor technologies. TE manufactures NTC (negative thermal coefficient) thermistors, thermopiles, and digital temperature sensors to support the wide range of accuracy, packaging, and performance conditions amongst the different applications.

WEARABLE TECHNOLOGY

The expectation of connectivity anytime, anywhere drives the need for wearable products. And as TE sensor platforms bring wearable technologies to life, users become safer and healthier. To get powerful functionality to fit inside wearable health monitoring devices, TE relies on cross-industry experience and an ongoing commitment to research and development. From heart pacemaker and prosthetic sensor technologies to wearable fitness bands, TE can help you develop solutions for your wearable ideas.

FORCE SENSORS



FS19

Sensor Type	OEM compression load cell
Dimensions (mm)	ø9.50 x 3.45
Accuracy	±1% FSO (CNL&H)
Range	1 - 7 Lbf
Unique Features	• Low range • High overload protection • Ultra high cycle life • Analog output
Typical Applications	Medical devices, physical therapy, oxygen tank, infusion pumps



FS20

Sensor Type	Miniature force sensor
Dimensions (mm)	30.708 x 17.272 x 8.255
Accuracy	±1% FSO (CNL&H)
Range	1 - 7 Lbf
Unique Features	• Low range • High overload protection • Ultra high cycle life • Analog output
Typical Applications	Medical devices, physical therapy, oxygen tank, infusion pumps



FC22

Sensor Type	Miniature force sensor
Dimensions (mm)	Ø 26.00 x 42.00 x 19.50
Accuracy	±1% FSO (CNL&H)
Range	10 - 100 Lbf
Unique Features	• Low range • High overload protection • Ultra high cycle life • Analog output
Typical Applications	Medical devices, physical therapy, oxygen tank, infusion pumps

HUMIDITY SENSORS



HTU3500

Sensor Type	Analog voltage RH and NTC temperature
Dimensions (mm)	27 x 11.9 x YY (Depending on the connector, from 6 to 10.8 length)
Accuracy	20% to 80%RH
Range	0 to 100% RH
Unique Features	• PTFE filter (Optional) • Electronics fully protected (5 V) • Multiple connector choices (JST, Samtec board through hole) • Based on HTU21
Typical Applications	Plug and play transducers for OEM medical devices



HTU2x

Sensor Type	Digital miniature humidity and temperature sensor
Dimensions (mm)	3.0 x 3.0 x 1.0
Accuracy	±3% RH at 25°C (10 to 95% RH) ±0.3°C at 25°C
Range	0 to 100% RH
Unique Features	• Low power consumption • Fast response time • Very low temperature coefficient • I²C interface or PWM interface or SDM interface
Typical Applications	Humidifier for medical ventilator



HS1101LF

Sensor Type	Analog RHS humidity sensor
Dimensions (mm)	ø10 x 6.0
Accuracy	±2% (10%RH to 90% RH) ^f
Range	0 to 100% RH
Unique Features	• High reliability and long term stability • Fast response time • Lead free component • Very low temperature coefficient
Typical Applications	Sleep apnea, respirator

PHOTO OPTIC SENSORS



ELM 4000

Sensor Type	Photo optic lead frame emitter
Dimensions (mm)	4.4 x 5.1 x 1.9
Accuracy	Sensor dependent
Range	660 - 940 nm
Unique Features	• Low cost • Dual drive • Clear epoxy lens
Typical Applications	Pulse oximetry, finger and ear probes, disposable



EPM 4001

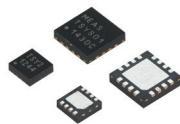
Sensor Type	Photo optic lead frame detector
Dimensions (mm)	4.4 x 5.1 x 1.8
Accuracy	Sensor dependent
Range	660 - 940 nm
Unique Features	• Low cost • High efficiency • Clear epoxy lens
Typical Applications	Pulse oximetry, finger and ear probes, disposable



Finger Clip, Disposable SpO₂

Sensor Type	Biocompatible SpO ₂ sensor
Dimensions (mm)	Application dependent
Accuracy	Sensor dependent
Range	Adult / neonatal
Unique Features	• Soft pads • Lightweight • Easily cleaned
Typical Applications	Pulse oximetry

TEMPERATURE SENSORS



Temperature System Sensor (TSYS) Series

Sensor Type	I ² C, SPI, PWM, SDM (Convertible to analog voltage)
Dimensions (mm)	QFN16: 4 x 4 x 0.85 TDFN: 2.5 x 2.5 x 0.75
Accuracy	Up to ±0.1°C at -5°C to 50°C
Range	-
Unique Features	• Low power • Small size • Calibrated and ready to use • 16-bit resolution
Typical Applications	Patient monitoring, temperature logging, fluid temperature, warming blanket



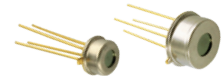
Model 600 / G22K7MCD8

Sensor Type	Micro-thermocouple / Micro-thermistors
Dimensions (mm)	From 0.23 OD
Accuracy	From ±0.1°C
Range	Thermocouple type T, K / NTC from 1K to 100KΩ
Unique Features	• Welded or soldered junction (Thermocouple) • Low profile, fast response • Polyesterimide wire insulation
Typical Applications	Medical catheters



400 AC Series Reusable, 4400 Series Disposable

Sensor Type	Patient monitoring probes
Dimensions (mm)	Reusable: 3 m cable with sensor Disposable: Sensor <1 m; 3 m reusable adapter cable
Accuracy	Probes meet both: EN-12470: ±0.1°C at 25°C to 45°C ISO-80601-2-56: ±0.2°C at 35°C to 42°C
Range	400 series, 700 series (Reusable only)
Unique Features	• Autoclavable reusables • Sterile disposables • Developed by YSI temperature
Typical Applications	Patient monitoring



TS / TSD Series

Sensor Type	Thermopiles / Single thermopile digital output series
Dimensions (mm)	Dia. 9.15mm x 4.3mm (body)
Accuracy	Application dependent Typical 1% full range (TSD only)
Range	-20°C to +85°C (Permanent) 20°C to +100°C (Non-permanent) 0°C to +300°C (TSD only)
Unique Features	• High signal output • Accurate reference sensors • Calibrated and ready to use, I²C interface (TSD only)
Typical Applications	Medical thermometer (ear and forehead), pyrometer

PRESSURE SENSORS



1620, 1630

Sensor Type	Invasive blood pressure monitoring
Dimensions (mm)	1620: 11.43 x 8.13 x 4.20 1630: 12.7 x 5.08 x 3.94
Accuracy	1.0% FSO
Range	-30 to 300 mmHg
Unique Features	• Low cost, disposable design • Supplied in tape and reel • Compliant to AAMI spec
Typical Applications	Disposable blood pressure, surgical procedures, ICU, kidney dialysis machines, medical instrumentation



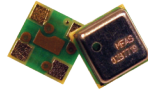
85 Flush Mount

Sensor Type	Media isolated pressure sensor for aggressive fluids
Dimensions (mm)	Ø 17.2 x 11.4
Accuracy	±0.1% FSO non-linearity
Range	0 - 1, 2, 3, 7, 21, 34 bar / 0 - 15, 30, 50, 100, 300, 500 psi
Unique Features	• High performance • High stability • Minimizes trapped volume
Typical Applications	Dialysis machines, infusion pumps, medical systems



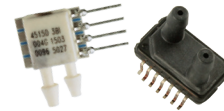
MS5805

Sensor Type	Miniature board mounted pressure sensors
Dimensions (mm)	4.5 x 4.5 x 3.5
Accuracy	±2.0 mbar at 25°C
Range	10 to 2K mbar
Unique Features	• 24-bit digital sensor • 20 cm resolution • Supply voltage: 1.8 to 3.6 V • Sealing designed for 2.5 x 1 mm o-ring • Silicone gel protection • Waterproof
Typical Applications	Fall detection, pneumatic handheld drills, respirators / ventilators



MS5637

Sensor Type	Miniature board mounted pressure sensors
Dimensions (mm)	3 x 3 x 0.9
Accuracy	±2.0 mbar / ±0.03 psi at 25°C
Range	10 to 2000 mbar abs. / 0.15 to 29 psi abs.
Unique Features	• 24-bit digital sensor • Altitude resolution of less than 15 cm • Supply voltage: 1.5 to 3.6 V • Low power, 0.6 µA (Standby ≤ 0.1 µA at 25°C) • Digital temperature readout
Typical Applications	Fall detection, pneumatic handheld drills, respirators / ventilators



MS45XX, MS55XX

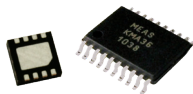
Sensor Type	Miniature board mounted pressure sensor
Dimensions (mm)	12.5 x 9.9
Accuracy	0.25% / 1% TEB
Range	0 - 2, 4, 5, 10, 20, 30, H ₂ O (MS4515/DO) 0 - 1, 2, 4, 5, 10, 30, 50, 150 psi (MS4525/DO)
Unique Features	• MS4515/25 (12-bit DAC analog) • MS4515DO/25DO (14-bit digital SPI or I²C) • MS5525DSO (24-bit digital SPI or I²C) • Wide supply voltage: 1.8 to 5.7 VDC • Small package footprint • Varied port configurations
Typical Applications	Medical instruments, respirators / ventilators

POSITION SENSORS



KMT32B

Sensor Type	Angular sensor
Dimensions (mm)	TDFN: 2.5 x 2.5 x 0.8 / TSSOP20: 5 x 4 x 1.75
Accuracy	Typ. 0.1° to 1.0°
Range	180° angle
Unique Features	• High accuracy • High resolution
Typical Applications	Various position control applications



MS32, KMA36

Sensor Type	Magnetoresistive linear and angular sensors
Dimensions (mm)	TDFN: 2.5 x 2.5 x 0.8 / TSSOP20: 6.5 x 6.4 x 1.2
Accuracy	Typ. 0.1 kA/m / typ. 0.3°
Range	1 to 3 kA/m magnetic switching field / 360° angle
Unique Features	• Ultra low cost • Ultra small size • High accuracy • Digital / analog output
Typical Applications	Various position control applications



KMXP Series

Sensor Type	Magnetic linear position sensor
Dimensions (mm)	TDLMP12 6.0 x 2.0 x 0.75
Accuracy	10-50 µm
Range	1-5mm
Unique Features	• Magnetoresistive (MR) • High precision and resolution • Easy assembly • Superior performance
Typical Applications	Surgical robots, prosthetics, syringe pumps



SM, SP

Sensor Type	Cable extension transducer
Dimensions (mm)	43 x 45 x 68
Accuracy	±0.25% to ±1%
Range	0 - 2.5 to 0 - 50 inches
Unique Features	• Compact design • Low cost, high value stringpot • Custom configurations available for OEM customers
Typical Applications	Medical imaging systems, surgical robots

ULTRASONIC SENSOR



AD-101

Sensor Type	Ultrasonic air-in-liquid detectors
Dimensions (mm)	Application dependent
Accuracy	Application dependent
Range	Detects bubbles 4 µl and larger (Standard; consult factory for 1 µl and smaller bubble size)
Unique Features	• Bubble detection from 1 mm tube • Integral electronics • Occlusion option • Fluid differentiation • 3.3 and 5 V input option
Typical Applications	Infusion pumps, dialysis machines, apheresis, auto-transfusion, 3D printing



MiniSense 100

Sensor Type	Piezoelectrical film sensors
Dimensions (mm)	19.05 x 6.35 x 6.35
Accuracy	±20.0% (Typical)
Range	±10 g (Typical)
Unique Features	• Very low cost • High sensitivity (1 V/g) • Ultra low power (Self generating)
Typical Applications	Wake-up switch, impact sensing, vital signs monitoring

te.com/medicalsensorsolutions

© 2018 TE Connectivity. All Rights Reserved.

TE Connectivity, TE, and the TE connectivity (logo) are trademarks of the TE Connectivity Ltd. family of companies. Other logos, product and company names mentioned herein may be trademarks of their respective owners.

While TE has made every reasonable effort to ensure the accuracy of the information in this brochure, TE does not guarantee that it is error-free, nor does TE make any other representation, warranty or guarantee that the information is accurate, correct, reliable or current. TE reserves the right to make any adjustments to the information contained herein at any time without notice. TE expressly disclaims all implied warranties regarding the information contained herein, including, but not limited to, any implied warranties of merchantability or fitness for a particular purpose. The dimensions in this brochure are for reference purposes only and are subject to change without notice. Specifications are subject to change without notice. Consult TE for the latest dimensions and design specifications.

SS-TS-MED102 12/2018

TE CONNECTIVITY

For More Information Contact TE:
te.com/sensorsolutions-contact