Sensors and Switches for Potential Medical Applications

**Pressure Sensors - Board Mount**
- TruStability™ RSC, HSC, SSC, TSC, NSC Series
- Basic ABP, TBP, NBP Series
- MicroPressure MPR Series
- 24PC, 26PC Series

**Pressure Transducers - Heavy Duty**
- 13 mm Series
- 19 mm Series
- MLH Series
- SPT Series

**Force Sensors**
- MicroForce FMA Series
- FSA Series
- FSG Series
- FSS Series
- FSS-SMT Series
- Basic TBF Series
- 1865 Series

**Airflow Sensors**
- Honeywell Zephyr™ HAF Series

**Humidity Sensors**
- Honeywell HumidIcon™
- HIH-4000 Series (5 V)

**Temperature Sensors**
- HIH-5030/5031 Series (3 V)

**Subminiature Basic Switches**
- SM Series
- SX Series
- Watertight V1.5W Series
- ZD Series
- ZM Series
- ZW Series
- ZX Series

**Pressure Switches**
- 5000 Series

**Value-Added Solutions**
- Custom 1865 Series Force Sensor Assembly

**Barcode Scan Engines**
- CM Series Compact 2D Imager Module
- N6600 Series Ultra-Slim Area Imaging Engine

**Barcode Decoding and Character Recognition Software**
- SwiftDecoder™ SDK for iOS, Android™, and Windows® Operating System

**Pressure, Airflow, and Force Sensor Ranges**

**PRESSURE SENSORS - BOARD MOUNT**
- ±1.6 mbar to ±10 bar | ±160 Pa to ±1 MPa | ±0.5 inH₂O to ±150 psi
- ±60 mbar to ±10 bar | ±6 kPa to ±1 MPa | ±1 psi to ±150 psi
- ±60 mbar to 1.6 kPa to 250 kPa | 1 psid to 30 psi
- ±0.5 psi to ±25 psi (SIP, DIP), ±1 psi to ±15 psi (SMT)
- ±1 psi to ±250 psi (SIP, DIP), ±1 psi to ±15 psi (SMT)
- ±60 mbar to ±10 bar | ±6 kPa to ±1 MPa | ±1 psi to ±150 psi
- ±60 mbar to ±10 bar | ±6 kPa to ±1 MPa | ±1 psi to ±150 psi
- ±60 mbar to 1.6 kPa to 250 kPa | 1 psid to 30 psi
- ±0.5 psi to ±25 psi (SIP, DIP), ±1 psi to ±15 psi (SMT)
- ±1 psi to ±250 psi (SIP, DIP), ±1 psi to ±15 psi (SMT)

**PRESSURE TRANSDUCERS - HEAVY DUTY**
- 0 psi to 500 psi through 0 psi to 5000 psi
- 0 psi to 3 psi through 0 psi to 500 psi
- 0 psi to 50 psi through 0 psi to 8000 psi
- 0 psi to 3 psi through 0 psi to 5000 psi

**AIRFLOW SENSORS**
- ±50 SCCM to ±750 SCCM, 10 SLPM to 300 SLPM
- ±25.0 SCCM, ±1.0 SLPM, ±6.0 SLPM
- 300 SLPM
- ±200 SCCM, ±5.0 mbar SCCM (±2 inH₂O)

**FORCE SENSORS**
- ±5 N, ±15 N, ±25 N
- ±5 N, ±7.5 N, ±10 N, ±15 N, ±20 N, ±25 lb, ±1 lbf, ±3.5 lbf, ±5 lbf, ±10 lbf, ±20 lbf
- 0 N to ±5 N, 0 N to ±10 N, 0 N to ±15 N, 0 N to ±20 N
- ±1 bar to ±10 bar | ±100 kPa to ±10 MPa | ±15 psi to ±150 psi
- ±0.5 psi to ±5 psi, ±0 psi to ±10 psi, ±0 psi to ±15 psi, ±0 psi to ±25 psi, ±0 psi ±30 psi
Anesthesia Delivery Machines
- Airflow sensors measure air, oxygen, and nitrous oxide flow
- Magnetic sensor ICs enable smooth motor control that reduces noise/vibration
- Pressure sensors may be used to meter and measure the anesthesia gas so that pressure doesn’t exceed the desired level
- Thermistors enable accurate air temperature control
- Value-added TruStability™ board mount pressure sensor assembly transforms anesthesia liquid into a gas

Dental Equipment
- Magnetic sensor ICs enable accurate motion control and positioning of the dental imaging system and promote energy efficiency in hand-held, battery-operated dental equipment
- Pressure sensors keep water flow constant in dental instruments, allowing smooth operation

Hospital Diagnostics
- Airflow sensors in gas chromatography equipment regulate the flow rate to eliminate outgassing
- Barcode scan engine or barcode decoding software obtain positive patient confirmation, and often a brief code of the physician’s order, before sampling (blood/chemistry analyzer, chromatography, cytometry/cellular analysis, molecular diagnostics/PCR)
- Pressure sensors in blood analyzer pump systems regulate pressure to draw/transport samples
- Pressure sensors in gas chromatography equipment sense and control gas stream pressure to maintain a constant, precise flow
- Thermistors in blood analyzers monitor chamber, diffusion lamp, and motor temperature to prevent overheating

Hospital Hardware
- Embedded barcode reader or barcode scanning software enables the ability to scan labels for positive patient confirmation and clinician information
- Humidity sensors maintain temperature and humidity levels in incubators and microenvironments
- Magnetic sensor ICs enable locking/unlocking of medication dispensing cabinets
- Magnetic sensor ICs in exercise equipment may be used as an emergency stop switch, to control RPM, and to determine incline position
- Magnetic sensor ICs in hospital beds determine bed adjustment end and beginning positions
- MICRO SWITCH subminiature basic switches determine min/max position of electrically adjustable hospital beds
- Position sensors (SMART Arcs) in hospital beds monitor backrest elevation, which helps ensure the proper angle is maintained
- Pressure sensors control a hospital bed’s air columns to help prevent patients from developing bedsores
- Pressure sensors measure pressure in blood pressure monitors
- Pressure switches in hospital gas distribution systems indicate to a control panel that the main pressure tank is empty and needs to be replaced
- Thermistors monitor the incubator system’s temperature
- Thermistors in patient warmers control or limit temperature

Hospital Rooms
- Pressure sensors monitor airflow rates to provide continuous positive or negative air pressure to prevent contamination

Infusion, Insulin, Syringe Pumps
- Force sensors detect blockage in the pump’s tube that delivers medication
- Infrared sensors are used with an encoder wheel on the pump shaft to count shaft rotation
- Magnetic sensor ICs enable smooth motor control that reduces noise and vibration (infusion, insulin pumps only)
- Pressure sensors monitor and control the flow of fluid

Kidney Dialysis Machines
- Embedded barcode reader that is tethered to the equipment supports the identification and delivery process
- Force sensors detect the presence/absence/weight of a dialysate cartridge and monitor flexible tubing pressure
- Magnetic sensor ICs enable smooth motor control that reduces noise/vibration

For more information
Honeywell Sensing and Internet of Things services its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or the nearest Authorized Distributor, visit sensing.honeywell.com or call:
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Oxygen Concentrators
- Airflow sensors detect ultra-low air flow levels that sense when the patient exhales for efficient oxygen delivery
- Pressure sensors detect when the patient begins to inhale for efficient oxygen delivery
- Pressure sensors sense surge tank pressure for accurate compressor pressure levels
- Pressure switches alert the user when the pressure exceeds a specified limit

Patient Monitoring Systems
- Barcode scanner software enables the ability to track the patient via a mobile device
- Pressure sensors in blood glucose monitoring equipment control the pumps used to extract and return blood so that the pressure doesn’t rupture the veins
- Pressure sensors in nebulizers carefully monitor airflow rates so that the specified amount of medicine, amid a humid environment, is delivered to the patient
- Pressure sensors in spirometers measure in/out patient airflow
- Pressure sensors monitor blood pressure
- Thermistors in temperature monitoring equipment monitor temperature

Pneumatic Circuit Control
- Pressure sensors control pneumatic flow and system pressure for efficient performance in respiratory breathing circuits (nebulizers, spirometers, patient monitoring), flow/pressure control (therapeutic hospital beds), gas collection/delivery (hospital gas supply, oxygen concentrators) and sampling/gas flow (blood analysis, gas chromatography, analytical instrument sampling systems)

Sleep Apnea Machines
- Airflow sensors monitor breathing and send an output to reduce airflow when the patient exhales
- Biometric commercial thermostats on-board (stand-alone) devices on flexible heaters control temperature without adding associated software or electronics
- Humidity sensors monitor the air to provide adequate moisture
- Magnetic sensor ICs enable smooth motor control that reduces noise/vibration
- Pressure sensors monitor the delivered air pressure
- Thermistors and pre-packaged temperature probes provide warm, moist air

Spirometers
- Airflow sensors measure the airflow from the patient upon exhalation
- Pressure sensors measure in/out patient airflow

Surgical Equipment
- Force sensors regulate a fluid management system’s pump head pressure
- Position sensors (SMART Arcs) and force sensors in robotically assisted surgery equipment control robotic arms that hold the articulated instrument tips
- Pressure sensors in surgical fluid management systems sense joint site pressure during arthroscopic surgery

Ventilators
- Airflow sensors measure air and oxygen flow so the correct amount is delivered to the patient
- Humidity sensors deliver warm, moist air to the patient
- Magnetic sensor ICs enable smooth motor control, reducing noise/vibration
- Pressure sensors detect when the breath changes from inhalation to exhalation to measure in/out patient airflow
- Pressure transducers allow use in corrosive media
- Thermistors monitor and control air temperature

Consumer Medical (Pressure Sensors)
- Measure pressure in non-invasive blood pressure monitoring
- Monitor pressure applied to the wound via the suction system in negative pressure wound therapy
- Measure partial vacuum on the suction side of miniature pumps, such as breast pumps, to provide continuous suction pressure monitoring
- Monitor water level in CPAP water tanks
- Provide pressure measurement in medical wearables