# Sensors and Switches for Potential Medical Applications

## Pressure Sensors – Board Mount
- **TruStability™**
  - RSC, HSC, SSC, TSC, NSC Series
- **24PC, 26PC Series**
- **24PC, 26PC Flow Through Series**
- **Basic ABP, TBP, NBP Series**

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

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

## Airflow Sensors
- **AWM40000 Series**
- **AWM700 Series**
- **AWM90000 Series**
- **HIH-5030/5031 Series (3 V)**
- **HIH-4000 Series (5 V)**
- **HIH-4602 Series**

## Temperature Sensors
- **HIH-4000 Series (5 V)**
- **HIH-4600 Series**

## Humidity Sensors
- **HIH-5030/5031 Series (3 V)**
- **HIH-4000 Series (5 V)**
- **HIH-4602 Series**

## Position Sensing

## Subminiature Basic Switches
- **SM Series**
- **SX Series**
- **Watertight V15W Series**
- **ZD Series**
- **ZM Series**
- **ZW Series**
- **ZX Series**
- **5000 Series**

## Pressure Switches
- **2455R Series**
- **Basic TBF Series**
- **FSS-SMT Series**

## Pressure, Airflow, and Force Sensor Ranges

### Pressure Sensors - Board Mount (LOW)
- **TruStability™**
  - RSC, HSC, SSC, TSC, NSC Series
  - ±60 mbar to ±10 bar | ±6 kPa to ±1 MPa | ±1 psi to ±150 psi
- **Basic ABP, TBP, NBP Series**
  - ±60 mbar to ±10 bar | ±6 kPa to ±1 MPa | ±1 psi to ±150 psi
- **24PC Series**
  - 0.5 psi to 250 psi (SIP, DIP), 1 psi to 15 psi (SMT)
- **26PC Series**
  - 1 psi to 250 psi (SIP, DIP), 1 psi to 15 psi (SMT)
- **26PC Flow Through Series**
  - 1 psi to 150 psi

### Pressure Sensors - Board Mount (ULTRA-LOW)
- **TruStability™**
  - RSC, HSC, SSC, TSC, NSC Series
  - ±1.6 bar to ±40 bar | ±160 kPa to ±4 kPa | ±0.5 inH2O to ±30 inH2O

### Pressure Transducers - Heavy Duty
- **13 mm Series**
  - 0 psi to 500 psi through 0 psi to 5000 psi
- **19 mm Series**
  - 0 psi to 3 psi through 0 psi to 500 psi
- **MLH Series**
  - 0 psi to 50 psi through 0 psi to 8000 psi
- **SPT Series**
  - 0 psi to 3 psi through 0 psi to 500 psi

### Airflow Sensors
- **HAF Series - High Accuracy**
  - ±50 SCCM to ±750 SCCM, 10 SLPM to 300 SLPM
- **AWM40000 Series**
  - ±25.0 SCCM, 1.0 SLPM, 6.0 SLPM
- **AWM700 Series**
  - 300 SLPM
- **AWM90000 Series**
  - ±200 SCCM, ±5.0 mbar SCCM [2.0 inH2O]

### Force Sensors
- **FSA Series**
  - N: 5, 7.5, 10, 15, 20, 25; lb: 1, 1.5, 2, 3, 5; g: 500, 750, kg: 1, 2
- **FSS Series, FSS Series, FSS-SMT Series**
  - 0 N to 5 N, 0 N to 10 N, 0 N to 15 N, 0 N to 20 N
- **Basic TBF Series**
  - 1 bar to 10 bar | 110 kPa to 1 MPa | 15 psi to 150 psi
- **1865 Series**
  - 0 psi to 5 psi, 0 psi to 10 psi, 0 psi to 15 psi, 0 psi to 25 psi, 0 psi to 30 psi
Anesthesia Delivery Machines
- Airflow sensors measure air, oxygen, and nitrous oxide flow
- Pressure sensors may be used to meter and measure the anesthesia gas so that pressure doesn’t exceed the desired level
- Magnetic sensor ICs enable smooth motor control that reduces noise and vibration
- Thermistors enable accurate air temperature control
- Value-added TruStability™ board mount pressure sensor assembly transforms anesthesia liquid into a gas

Dental Equipment
- Pressure sensors (board mount) keep water flow constant in dental instruments, allowing smooth operation
- 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

Hospital Diagnostics
- Airflow sensors in gas chromatography equipment regulate the flow rate to eliminate outgassing
- Pressure sensors (board mount) in blood analyzer pump systems regulate pressure to draw/transport samples
- Pressure sensors (board mount) in gas chromatography equipment sense and control pressure of the gas stream to maintain a constant and precise flow
- Thermistors in blood analyzers monitor chamber, diffusion lamp, and motor temperature to prevent overheating

Hospital Hardware
- Pressure sensors (board mount) control a hospital bed’s air columns to help prevent patients from developing bedsores
- Pressure sensors (board mount) measure pressure in blood pressure monitors
- 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 hospital beds determine bed adjustment end and beginning positions
- Magnetic sensor ICs in exercise equipment may be used as an emergency stop switch, to count RPM, and to determine incline position
- MICROSWITCH subminiature basic switches determine min/max position of electrically adjustable hospital beds
- Position sensors (SMART Arc) in hospital beds monitor backrest elevation, which helps ensure the proper angle is maintained
- Thermistors monitor the incubator system’s temperature
- Thermostats in patient warmers control or limit temperature
- Pressure switches in hospital gas distribution systems indicate a control panel that the main pressure tank is empty and needs to be replaced

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

Infusion, Insulin, Syringe Pumps
- Pressure sensors (board mount) monitor and control the flow of fluid
- 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)

Kidney Dialysis Machines
- Pressure sensors (board mount) obtain dialysate and venous pressure measurements without interrupting flow
- 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 and vibration
- Pressure transducers (heavy duty) monitor pressure in the cartridge’s flexible tubing
- Thermistors provide enhanced temperature control of the permeation rate across the dialysis membrane
- Thermostats control or limit temperature
- Thermostats in peritoneal dialysis machines may be used for dialysate heater tray control

Oxygen Concentrators
- Airflow sensors detect ultra-low airflow levels that sense when the patient exhales for efficient oxygen delivery
- Pressure sensors (board mount) detect when the patient begins to inhale for efficient oxygen delivery
- Pressure sensors (heavy duty) sense surge tank pressure for accurate compressor pressure levels
- Pressure switches alert the user when the pressure exceeds a specified limit

Patient Monitoring Systems
- Pressure sensors (board mount) 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 (board mount) in blood pressure equipment monitor blood pressure
- Pressure sensors (board mount) in nebulizers carefully monitor airflow rates so that the specified amount of medicine, amid a humid environment, is delivered to the patient
- Pressure sensors (board mount) in spirometers measure airflow in and out of the patient
- Thermistors in temperature monitoring equipment monitor the patient’s temperature

Pneumatic Circuit Control
- Pressure sensors (board mount) 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
- Bimetallic commercial thermostats on-board (stand-alone) devices on flexible heaters control temperature without adding associated software or electronics
- Pressure sensors (board mount) monitor the air pressure delivered to the patient
- Humidity sensors monitor the air to provide adequate moisture
- Magnetic sensor ICs enable smooth motor control that reduces noise and vibration
- Thermistors and pre-packaged temperature probes provide warm, moist air

Spirometers
- Airflow sensors measure the airflow from the patient upon exhalation
- Pressure sensors (board mount) measure airflow in and out of the patient

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

Ventilators
- Airflow sensors measure air and oxygen flow so the correct amount is delivered to the patient
- Pressure sensors (board mount) detect when the breath changes from inhalation to exhalation in order to measure the airflow to and from the patient
- Humidity sensors deliver warm and moist air to the patient
- Magnetic sensor ICs enable smooth motor control that reduces noise and vibration
- Pressure transducers (heavy duty) provide a sensing solution in corrosive media
- Thermistors monitor and control air temperature

For more information
To learn more about Honeywell’s sensing and switching products, call 1.800.537.6945, visit sensing.honeywell.com, or e-mail inquiries to info.sc@honeywell.com

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