

# Sensors and Switches for Potential Medical Applications

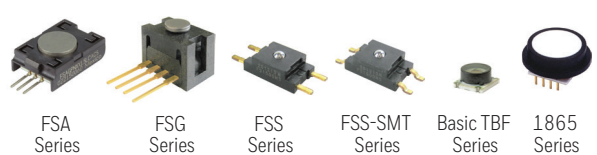
## Pressure Sensors - Board Mount



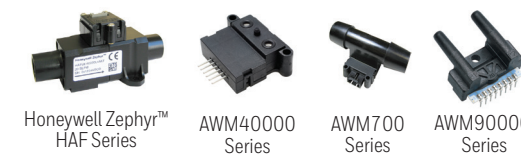
## Pressure Transducers - Heavy Duty



## Force Sensors



## Airflow Sensors



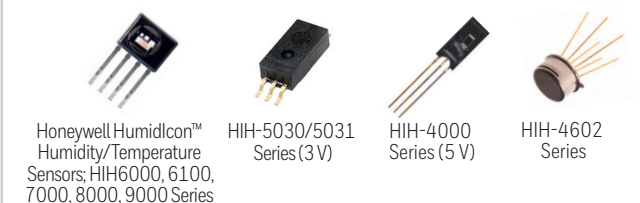
## Magnetic Sensor ICs



## Temperature Sensors



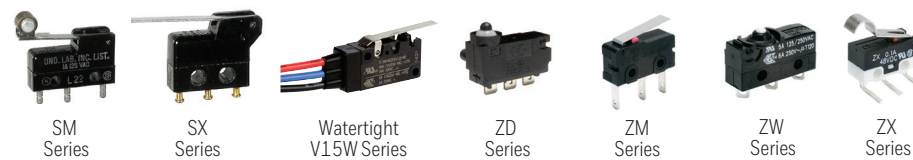
## Humidity Sensors



## Position Sensors - SMART



## Subminiature Basic Switches



## Pressure Switches



## Value-Added Solutions



## Barcode Scan Engines and Decoding Software



SwiftDecoder™ Barcode Decoding and Character Recognition Software:

- SwiftDecoder SDK for iOS
- SwiftDecoder SDK for Android™
- SwiftDecoder SDK for Windows® Operating System

## 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, NSC Series	±1.6 mbar to ±40 bar   ±160 Pa to ±4 kPa   ±0.5 inH <sub>2</sub> O to ±30 inH <sub>2</sub> O
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 5000 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 inH <sub>2</sub> O]
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
FSG 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   100 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
- 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 (board mount) 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 (board mount) in blood analyzer pump systems regulate pressure to draw/transport samples
- Pressure sensors (board mount) 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 count RPM, and to determine incline position
- Magnetic sensor ICs in hospital beds determine bed adjustment end and beginning positions
- 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
- 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
- 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
- Thermostats in patient warmers control or limit temperature

### Hospital Rooms

- Pressure sensors (board mount) 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 (board mount) monitor and control the flow of fluid

### For more information

To learn more about Honeywell's sensing and switching products, call 1.800.537.6945, visit [sensing.honeywell.com](http://sensing.honeywell.com), or e-mail inquiries to [info.sc@honeywell.com](mailto:info.sc@honeywell.com)

To learn more about Honeywell's scan engines and barcode software, visit [honeywellaidc.com](http://honeywellaidc.com).

### Honeywell Sensing and Internet of Things

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### 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
- Pressure sensors (board mount) obtain dialysate and venous pressure measurements without interrupting flow
- 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 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

- Barcode scanner software enables the ability to track the patient via a mobile device
- 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 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 in/out patient airflow
- Pressure sensors (board mount) monitor blood pressure
- Thermistors in temperature monitoring equipment monitor 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
- Humidity sensors monitor the air to provide adequate moisture
- Magnetic sensor ICs enable smooth motor control that reduces noise/vibration
- Pressure sensors (board mount) 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 (board mount) measure in/out patient airflow

### Surgical Equipment

- 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
- Pressure sensors (board mount) 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 (board mount) detect when the breath changes from inhalation to exhalation to measure in/out patient airflow
- Pressure transducers (heavy duty) allow use in corrosive media
- Thermistors monitor and control air temperature