



# Iso-Tek SPM2000

## SPACE PRESSURIZATION MONITOR SYSTEM FOR ISOLATION ROOMS AND LABORATORIES

Space Pressurization is required in Hospitals, Laboratories, Clean Rooms and Pharmaceutical Production Areas. Tek-Air's Iso-Tek space pressurization monitor is designed specifically for the continuous monitoring of the space differential pressure for these and other critical applications.

- Measures transfer air velocities and pressures bi-directionally, allowing room polarity indexing by remote switch or through Building Automation System
- Utilizes high accuracy, low drift, micro-machined, thermal mass airflow sensors, capable of measuring ultra-low pressures as low as 0.001"wc
- Convenient room display module with alarm capabilities for alerting personnel to unsafe conditions
- Configurable to meet a wide variety of application requirements
- Provides analog status signal and digital alarm contact interfaces to Building Automation System
- N2 communications capable



### Application

Tek-Air's **Iso-Tek** space pressurization monitoring system is designed for use in a wide variety of applications that necessitate the monitoring of air flow from one room to another. The monitor system can be configured by the user for bi-directional measurement of either air velocity in feet per minute (fpm), or air pressure in inches of water column ("wc).

Hospital applications include patient isolation, autopsy, and operating rooms. CDC guidelines published in the Federal Register suggest: "Transmission of mycobacterium tuberculosis is a recognized risk to patients and health-care workers in health-care facilities..."; "TB isolation rooms should be checked daily for negative pressure while being used for TB isolation."; "The minimum pressure difference necessary to achieve and maintain negative pressure that will result in airflow into a room is very small (0.001 inch of water)."; and "Pressure-sensing devices should incorporate an audible warning with a time delay..."

Experienced test and balance contractors state that tests with anemometers and smoke sticks take an average of fifteen minutes per room, per day. If performed by hospital maintenance staff, the cost of testing will exceed three thousand dollars per room, per year, and far more if performed by an outside contractor. **Iso-Tek** provides continuous monitoring at a fraction of the cost of manual techniques.

**Iso-Tek** also serves applications in prisons and shelters; wherever individuals with TB, HIV or other infectious diseases are treated. In chemical laboratory applications, **Iso-Tek** is designed to accurately monitor and ensure proper room pressurization. **Iso-Tek** meets requirements of the American National Standards Institute (ANSI) and the American Industrial Hygiene Association (AIHA) Lab Safety Standard, Z9.5-1992.

**Iso-Tek** has many advantages over measurement systems that utilize "through the wall" thermal sensing methods. Advantages include rugged construction, fewer installation constraints, and immunity to fouling by lint and dirt. **Iso-Tek** has the same advantages that "through the wall" systems have over diaphragm sensors such as long-term stability, high sensitivity and measurement capabilities at ultra-low pressures.

### Hardware

The **Iso-Tek SPM2100** system consists of four major components: the transmitter unit, display module, room sensing and reference probes. Tubing required to connect the probes to the transmitter, and the cable for connecting the display module to the transmitter are also included. For those applications requiring a digital LCD readout of room pressure or velocity, the **SPM2200** adds this feature to the display module.

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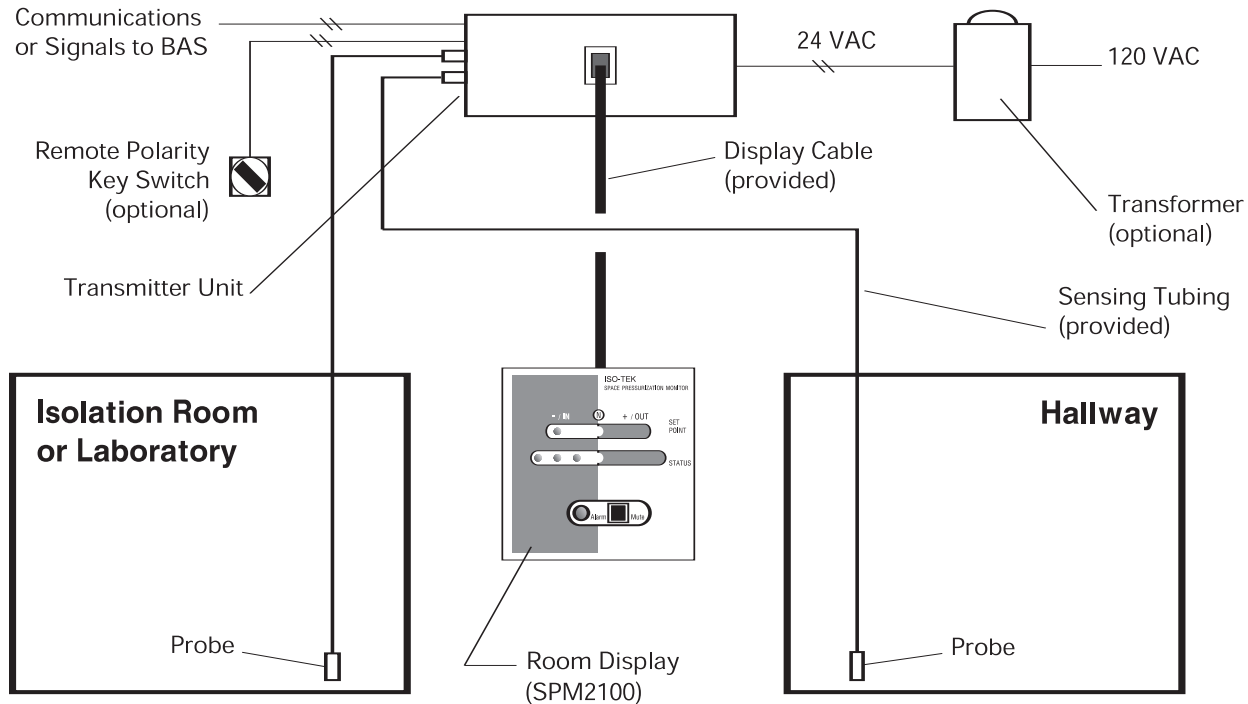
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# ISO-TEK Space Pressurization Monitor

## Monitor System Components



In applications where a local display is not required, the **Iso-Tek SPM2000** can be substituted. The **SPM2000** includes the same components as the **SPM2100**, except the room display module. Configuration of the **SPM2000** is performed with the **SPM7000 Setup Tool**, described later. A display module can be added to the **SPM2000** at any time in the future. As an economical alternative to the standard **Iso-Tek** display module, Tek-Air now offers the **IMD5000 Mini Display**. Contact your Tek-Air sales rep for more information.

The transmitter is the heart of the **Iso-Tek** system. It incorporates the microprocessor based electronics and the thermal mass airflow sensor. The transmitter provides several types of logic and signal interfaces to meet the requirements of a wide variety of applications. Simple interface to Building Management Systems includes contact closures for alarms and a 4-20mA analog output signal for transmitting measurement values. The transmitter can be interfaced to contact inputs for remote polarity indexing. Full, seamless integration with many Building Automation systems can be achieved with **Iso-Tek's** direct digital communications.

Two space pressure probes (available in ceiling or wall mount) are provided with each pressure monitoring system. One is mounted in the room to be monitored, and the other in the adjacent hallway. These probes are designed to minimize the effect of room turbulence on the measurement pickup points.

The probes connect to the transmitter by means of standard 1/2" O.D. control tubing (provided), which may be up to fifty feet in length. The narrow width of the tubing eliminates the need for large penetrations normally associated with "through the wall" type thermal anemometers.

The 4.5" x 4.5" room display is provided with the **SPM2100**, and is designed for use where continuous visual monitoring of the space pressurization status is required. The display includes setpoint alarm and status LED's (light emitting diodes), an alarm horn, and an acknowledge button. Unlike other displays that use confusing numbers, the **Iso-Tek** display is designed to be simple and intuitive, requiring little or no interpretation by the user.

The room display module is mounted in the lab, patient room, anteroom, or hallway on a standard electrical utility box. Alarm settings are made via adjustment controls on the rear of the display housing. The room display and functions of the transmitter can be configured through selection switches located on the rear of the display as well, to tailor the operation to the needs of the application.

For selectable room pressure, or rooms that need to be turned to standby mode to shut off nuisance alarm during maintenance, an electronic key switch is available as an option. The **KSA7000 Electronic Key Switch** options allow selectable Negative, Positive, and Standby pressure polarities from convenient wall-mounted switch assemblies. Contact your Tek-Air sales rep for more information.

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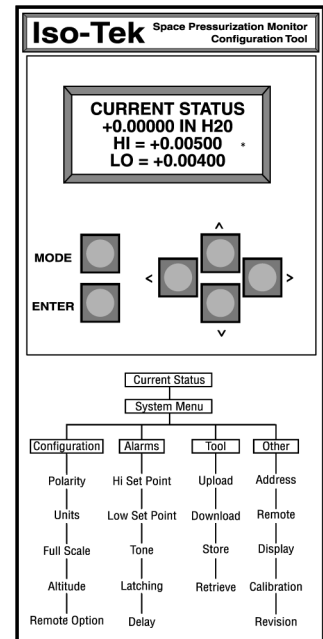
# ISO-TEK Space Pressurization Monitor

## SPM7000 Setup Tool

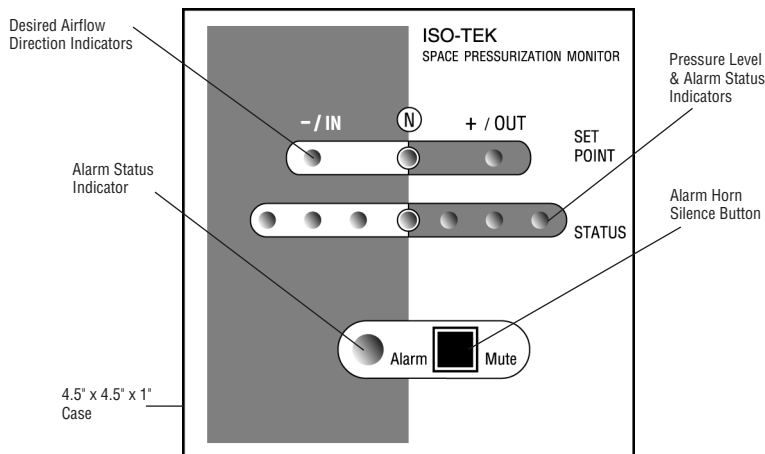
### Configuration Selections Include:

- Pressurization Polarity; Negative; Neutral, Positive, or Standby
- Measurement in fpm or inches H<sub>2</sub>O
- Range of operation
- Deactivate/Activate audible alarm
- Period of time delay
- Latching or Non-Latching alarm selection
- Remote polarity selection

The **SPM2000** (without display module) can be ordered preconfigured from the factory or it can be field configured using the optional **SPM7000 Setup Tool**. The **SPM7000** is a hand-held, microprocessor-based, configuration tool which allows the user to connect to the **SPM2000**, **2100**, and **2200** transmitters. The **SPM7000** comes with a plug-in coil cord which allows for attachment to the display connector or directly to the transmitter. The **SPM7000 Setup Tool** can be used to select the transmitters operational features, and adjusts its setpoints. The tool also provides the ability, via a digital display, to read the actual measurements being made in either feet per minute or inches of water. The tool has the ability to upload previously stored configurations or download and store existing configurations.



## Room Display Module



The microprocessor in the transmitter then compares the measurement with the desired polarity (direction) and magnitude established by the adjustable alarm setpoints. If the alarm limits are exceeded, the alarm output contacts change to the alarm mode after the selected delay time is exceeded.

In situations where an indication of the measured velocity or pressure is required, and industry standard 4-20mA output signal is provided. This signal can be used to drive a stand-alone indicator or to transmit to the user's Building Automation System. The operational range of this output can be set by the user to one of four scales to provide the maximum resolution for a given application.

The transmitter also has provisions for receiving input signals from external contacts, buttons, or key switches. The function of these inputs can be configured for either a remote mute capability or the ability to remotely establish the desired direction of airflow (polarity) for the alarm operation. Remote muting allows the user to extinguish the alarm horn from a remote location, such as a nurses station. The polarity switching feature allows the user to index the operation of the monitor to one of four states: Negative, Neutral, Positive, or Standby. This feature is extremely valuable when isolation rooms or labs are not in use and monitoring is irrelevant during maintenance.

## Operation

The transmitter unit is connected to sensing probes located in the room and in the hallway (or other reference space) by 1/2" O.D. sensor tubing. The pressure difference between the two probes causes an extremely minute volume of air (14 cubic centimeters per minute at 0.001" H<sub>2</sub>O) to be induced through the velocity sensor inside the transmitter. The low volume helps eliminate fouling dust. The transmitter components then convert the electrical signals from the sensor into either a velocity reading in fpm, or a pressure reading in "wc, depending on the configuration.

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A display is normally used with the transmitter. Three yellow "Set Point" indicators are provided on the display face, one of which will be lit to show the desired direction of airflow and pressurization level. The lit set point indicator will flash periodically to provide a visual indication that the monitor system is functioning properly.

The "Status" indicators provide a graphic indication of the level of pressurization. These dual colored, light emitting diodes (LEDs) indicate status with the color green for normal and red for an off normal condition. When the pressurization level is normal, the green status indicator directly under the yellow set point indicator will be lit. Should the pressure level decrease or increase outside of the alarm limits, the normal indicator light will turn off and the appropriate indicator to the left or right of the normal light will turn red.

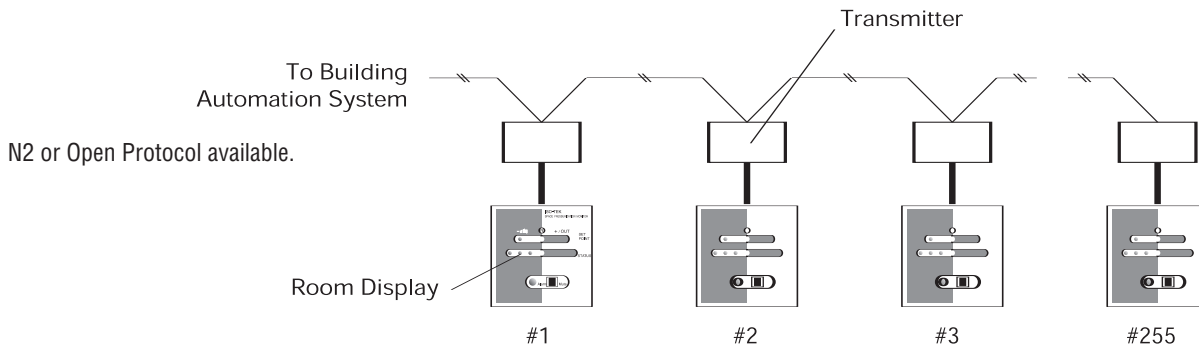
A large red LED alarm indicator is provided to display the presence of an alarm condition. This indicator flashes when

an alarm condition has occurred for a length of time exceeding the selected time delay period. An audible alarm horn is built into the display; this sounds in conjunction with the LED alarm indicator. When the alarm is acknowledged by pressing the MUTE button, the horn will silence and the LED alarm indicator will provide a steady red indication. This will continue as long as the alarm condition still exists.

When placed in "Inactive" or "Standby" mode the setpoint lights and alarms are deactivated. However, the status lights continue to operate as the transmitter continues to monitor room pressure.

All LED indicators are raised from the case slightly to provide adequate viewing from any angle. The LED alarm indicator can be seen from fifty feet away in normal ambient lighting conditions. This allows the display to be mounted in locations which are out of reach to those who would tamper with the unit.

## Digital Communications to Building Automation System



### Communication

The **SPM2000 Iso-Tek Transmitter** is capable of digital communications on an RS485, two conductor network cable at 9600 baud. Up to 255 units can be addressed on one network. Two communications protocols are available to the user: Tek-Air Open Protocol, and JCI N2 Protocol. In both cases, the **SPM2000 Iso-Tek** can share the network with Tek-Air's **FVC2000 Fume Hood Controllers**. In the case of N2 Protocol the JCI N2 compatible units can also share the network with Tek-Air units. Open Protocol allows the **SPM2000 Iso-Tek Transmitter** to interface with the Honeywell Excell system.

Tek-Air will make the communications protocol available to any control system manufacturer, (call factory for more information). Data communicated to the remote system includes transfer air velocity, alarm setpoints, and alarm status. Parameters, which can be modified by the remote system, include alarm setpoints, and air-flow polarity.

### Room Pressure Control

Tek-Air offers a complete line of products that can be used for critical controlled spaces for isolation of disease and clean room environments. The pressure differences to these critical spaces can only be done efficiently with quality control instrumentation and control valves, (standard VAV box type controllers should be avoided). The **Iso-Tek SPM2000** series transmitter as a pressure monitor has the capability to monitor and alarm when a control system is not at design conditions due to a door opening, fan failure or HEPA filter blocking. Tek-Air's **Multipurpose Valve (MPV)**, used with a **KSA7000 Electric Key Switch** and **SPM2000 Space Pressure Monitor**, can provide a flexible system to the facility operators to keep the isolation suite or clean room manufacturing space at design conditions when it is part of a dynamic ventilation control system. For more help, please call your local Tek-Air Systems Integrator to get additional applications information.

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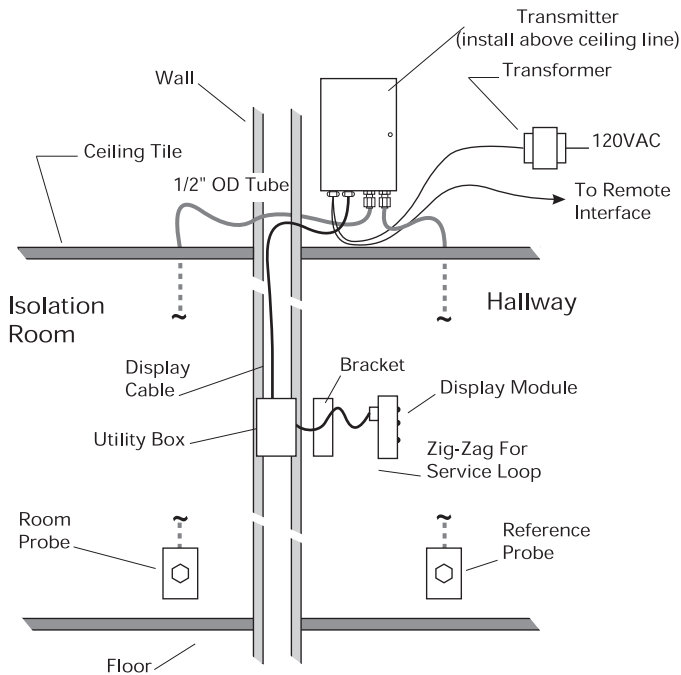
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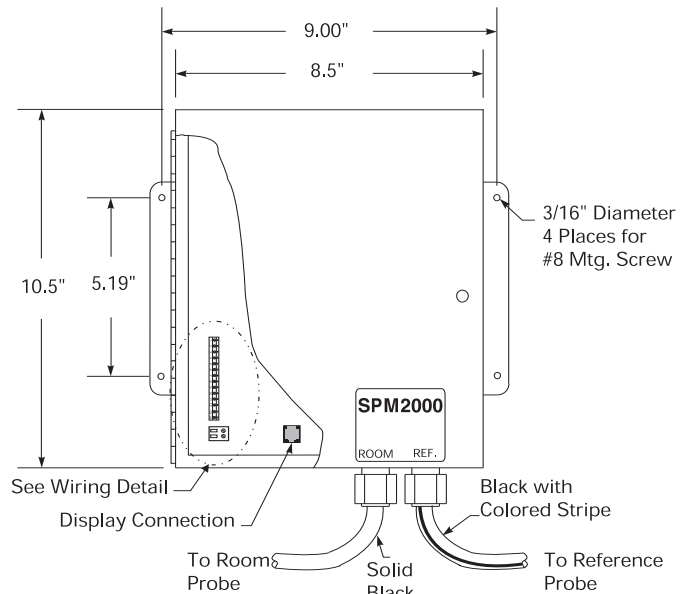


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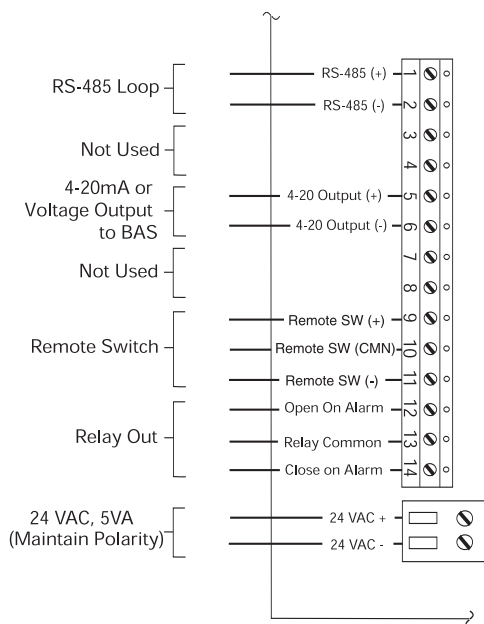
## Mounting and Wiring



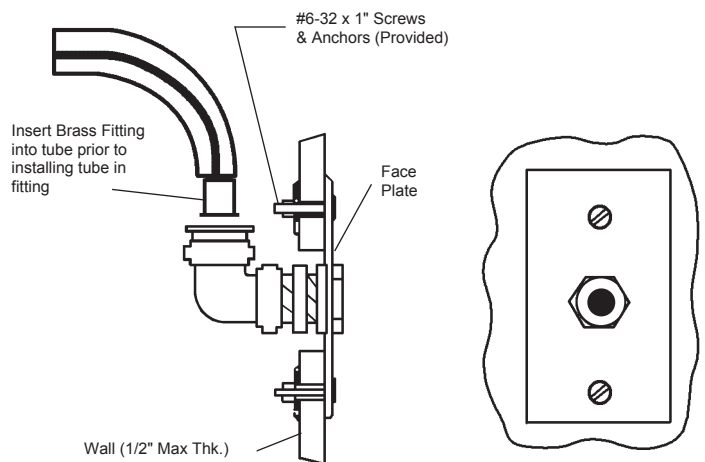
**Component Installation**



**Mounting and Tube Detail**



**Wiring Diagram**



**Space Probe Mounting**

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# ISO-TEK Space Pressurization Monitor

## Specifications

### Velocity Range

-1000 to +1000 fpm, full scale range adjustable to +/- 100, 250, 500, or 1000 fpm

### Pressure Range

-0.100 to +0.100 "wc, full scale

### Accuracy

Pressure: +/- 2% of set range

Velocity: +/- 10 fpm

### Analog Resolution

Pressure: 0.0001 "wc

Velocity: 1.0 fpm

### Digital Resolution

+/- 0.5 fpm, +/- 0.00005 "wc

### Airflow Polarity

Selectable for Positive, Negative, Neutral, or Standby

### 4-20mA Output

Self-powered, 500Ω load maximum, Neutral is 12mA

### Power Supply

24VAC, +/- 4V, <10VA

### Communications

RS-485, half duplex, Open Protocol, N2 compatible available upon request

### Alarm Contacts

SPDT, 0.5A max.

## Guide Specifications

Provide as indicated on the accompanying plans, electronic room pressure transmitters, for the purpose of continuously monitoring the room pressures on all critical areas.

The room pressure monitor shall consist of a transmitter with two room sensors that are connected between the room and referenced area, which will allow a volume of transfer air to pass over the bi-directional thermal mass air flow sensor. This volume of air, equal to no more than 14 CCMs (cubic centimeters per minute), will be scaled by the microprocessor to either a velocity (fpm) or room pressure ("wc) signal.

The range of the monitor/transmitter shall be user configurable either by a setup tool or by dip switches, and has selectable ranges including +0.1 to -0.1, +0.01 to -0.10, +0.005 to -0.005, and +.001 to -.001"wc. The 4-20mA output shall be proportional to the scaled range.

The alarming feature will have N.C. and N.O. contacts for a hardwire connection to the BMS, and will have a local room pressure display which has 7 LEDs that change color between red and green relative to the room pressure and its alarm limits. The alarms can be configured for either latching or non-latching.

The audible alarm horn will be provided and will sound when an alarm condition occurs which exceeds the selected time delay periods of either 15, 30, 60 or 120 seconds to allow for the opening and closing of the door for normal traffic. Personnel may silence the horn by pressing the mute button on the display that has a configuration jumper to allow the horn to be deactivated if so desired.

The room display monitor shall be mounted on a 2" x 4" handi-box with screws. The display shall be capable of being mounted up to 50 feet from the transmitter if the setup tool connection port is utilized. The LEDs shall be visible at an angle up to 90degrees from center and from fifty feet away, to permit viewing from down the hallway.



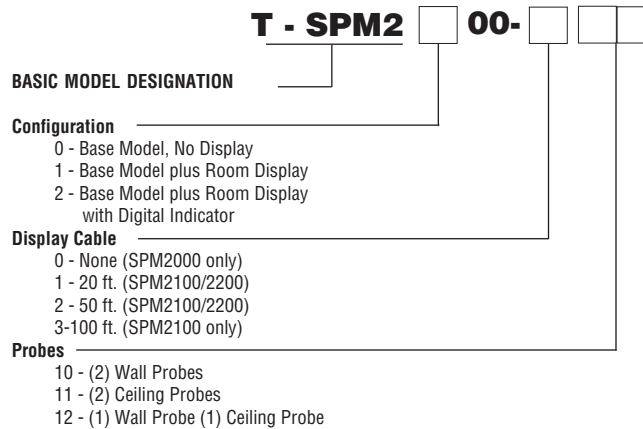
# ISO-TEK Space Pressurization Monitor

**NOTE: Consult your local Tek-Air representative for further information.  
( for your local representative listing please visit our web site at [www.tek-air.com](http://www.tek-air.com) )**

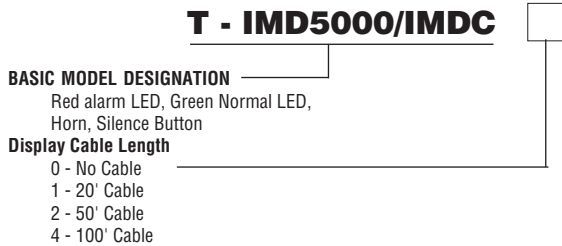
## Iso-Tek Model Codes

**Iso-Tek** space pressure measuring system is designed to provide for the measurement of transfer air velocity between adjacent rooms. Iso-Tek normally consists of the transmitter module, room display, 20 foot display cable, and wall mount space pressure sensing probes. It may be ordered without the room display. A scaled digital indicator is offered as an option, but the full scale range must be selected at the time of order.

### SPM2000 Model Code

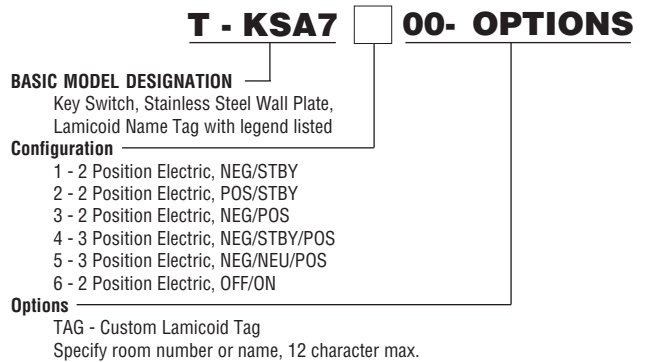


### T-IMD5000 Model Code



### KSA7000 Key Switch Model Code

Key Switch options for selectable room pressure.



### Iso-Tek Setup Tool Model Codes

**Iso-Tek** setup tool is designed to provide the user who purchases model **SPM2000** monitors with a convenient method for configuring the unit.

### T - SPM - 7000

**BASIC MODEL DESIGNATION**  
Includes hand held tool and connecting cable

All specifications are subject to change without notice.

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