

1. Differential Room Pressure is to be monitored by a Setra Systems, Inc. – Setra FLEX (Device), with functions that shall include both visible and audible monitoring and alarming of room environmental conditions, and control of related equipment when required.
2. Software Monitoring Operation:
 - a) The Device shall be capable of monitoring the differential pressure between three (or four, including reference space) individual spaces at all specified locations on the drawings.
 - b) The display shall have the capability to show up to three rooms individually, or together on one screen.
 - c) Each of the three rooms may show up to 6 parameters, 4 of which are viewable on an individual room screen. The standard parameters available for selection shall be room differential pressure, temperature, relative humidity, and air changes per hour (also known as air change rate, or ACH). Two optional user-defined parameters may be displayed, which can be brought into view using a swipe action on the display.
 - d) The two user-defined parameters shall accept light, sound, airflow velocity, or other sensing elements via either electrical or BACnet network input signals.
 - e) The display shall have the capability to show the following parameters together on a single screen:
 - a. Room name
 - b. Up to 5 user-defined room Profiles (or modes), one of which is STANDBY
 - c. Full-screen mode selection, which causes the display to show all rooms simultaneously on one screen
 - d. Configuration mode selection, to define the operation of the Device
 - e. A banner indicating NORMAL, WARNING, ALARM, and STANDBY modes. During ALARM mode, the entire display background turns red.
 - f. Alarm delay period, selectable from 0-9999 seconds
 - g. Alarm silence period, selectable from 0 to infinite
 - h. One-touch disable of all alarm functions
 - i. Room icon, intended to provide a visual depiction of the room's use
 - j. Two lines of user-defined text, intended to inform staff of the room's use
 - k. Icons which appear to indicate alarm, silence, door, or reset functions
 - l. A choice of 5 screen background colors; green, yellow, blue, red, and orange
 - m. Up to 6 environmental parameters per room, total of 18, noted above
 - f) Each Device shall have two levels of password protection; Operator and Supervisor, which will limit permission to access levels of functionality. Key switches as methods of security are not acceptable.
 - g) Each Device shall have the ability to be set in Negative, Positive, or Neutral status enabled through alarm setup. Key switches to change room mode are not acceptable.
 - h) When configured with an on-board differential pressure sensor, each Device shall be able to be calibrated through the touch screen interface with simultaneous access to the on-board sensor module and corresponding output signal.

- i) Each Device shall have the option to communicate on either BACnet MS/TP networks or BACnet/IP networks. When using BACnet/IP, either static IP or Dynamic Host Control Protocol (DHCP) may be used.
- j) Each Device shall have the ability for the setup to be cloned, so that the settings can be copied and uploaded to each Device in the facility if desired. This is to be done through a standard USB connection.
- k) Each Device shall have the ability for the setup to be network-configured, so that the settings can be copied and uploaded to each Device in the facility if desired. This is to be done through either a BACnet MS/TP network or BACnet/IP network.
- l) Any function that can be configured via the touch display interface can also be configured over the network via BACnet protocol. Exceptions include changing Operator or Supervisor passwords, Device ID, and other read-only attributes.
- m) A secondary Device may operate as a slave, or duplicate display, whereby functions of the master Device are mapped via BACnet objects from one Device to the other. In this manner, one Device may monitor and alarm on the parameters of the other Device.

3. Software Control Operation:

- a) The Device shall be capable of performing equipment control operation using two Proportional-Integral (PI) control loops that drive on-board or external analog outputs and relays.
- b) The Device shall be capable of performing equipment control operation by read/write control of BACnet objects on the network, mapping control points from other Devices or third-party controllers. Two independent control functions operate in this manner.
- c) Any of the 6 environmental parameters per room, total of 18, can be configured for control operation.
- d) Control operation, whether by PI loop or BACnet, shall allow for both override setpoint changes and duration of setpoint override.

4. Mechanical and Electrical Operation:

- a) The Device shall utilize a direct pressure sensing device for differential pressure measurement; flow-through technologies (i.e. hot wire anemometers) that require frequent cleaning are not acceptable. The Device will have an internal pressure sensor as well as the capability to use an external (remote) pressure sensor input. Each Device must be provided with a NIST-traceable calibration certificate for the differential pressure sensing element.
- b) The on-board or external differential pressure sensor shall be capacitive-based transducer, with bi-directional ranges from $\pm 0.05''$ WC (± 12.5 Pa) to $\pm 1.0''$ WC (± 250 Pa). Performance characteristics of the sensor shall be Accuracy RSS $\pm 0.25\%$ of full-scale, Non-linearity by Best Fit Straight Line (BFSL) method $\pm 0.24\%$, Hysteresis $\pm 0.05\%$, Non-repeatability $\pm 0.05\%$, Span Setting Tolerance $\pm 0.5\%$ Rdg, Zero/Span Shift $\pm 0.03\%$ of full-scale.



- c) The differential pressure sensor shall be dead-ended in design, where tubes and the sensing element require no cleaning for continuous reliable operation.
- d) Each Device shall be provided with a 3-inch anti-kink tubing section for each remote pressure pickup port.
- e) Each Device shall have the option of either an internal differential pressure sensor, or external differential pressure sensor, with the ability to send an analog output of 4 to 20 mA, 0 to 5 VDC, or 0 to 10 VDC to a system controller. The device shall have a display resolution of 0.0001" WC.
- f) Each Device shall have a 7" projected-capacitive display, dimmable, full color touch-screen display with an 800x600 resolution, capable of use with medical gloves. The brightness of the display shall have 7 levels from dim to bright, with an ability to control brightness over the BACnet network.
- g) Each Device shall be flush mount design and installed in a standard off-the-shelf electrical wall box with no visible external fasteners; visible screw heads are not acceptable. Stand-off from the wall surface shall not exceed 0.72" (18.3 mm).
- h) Audible alarms via dual buzzers with 7 volume levels between 0-75 decibels.
- i) The Device shall have on-board inputs and outputs, including 3 universal inputs, 1 analog input, 1 analog output, and 1 relay output.
- j) The Device shall have an optional external input and output module, which includes an ability to extend the Device's monitoring and control points to an additional 8 universal inputs, 4 analog outputs, and 4 relay outputs.
- k) All connectors for wiring shall be removable, for convenience of installation.
- l) Power shall be either 24 volts AC or DC, compliant with full operation in the range of 18-32 volts.
- m) Ingress Protection (IP) rating shall be IP-54.
- n) The Device depth within the wall cavity shall not exceed 50 mm.

5. Acceptable Manufacturers:

- a) The functions of room monitoring, alarming, and optional control shall be Setra FLEX as manufactured by Setra Systems, Inc., Boxborough, MA. Telephone (978) 263-1400 Fax (978) 264-0292 Web Site www.setra.com