SMART CONTROLS

Application Manual
Smart IAQ™: SI-40-L

IAQ Multi-Sense™

Document Number 37-0312-00

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Device Overview

1.1 Introduction

Smart Controls combines the power of microprocessor-based control and sensing with the precision of solid-state sensors to provide IAQ Multi-Sense technology.

The Smart IAQ SI-40-L provides significant installation configuration capability while maintaining the ultimate in user simplicity.

A simple set of push buttons allows the end-user to easily obtain set-point comfort adjustment control, signal an override event and review predefined ambient conditions. The end-user is only exposed to comfort creating capability.

Predefined default settings allow the installer to have a fully functional sensor interface ready for immediate operation with no programming or configuration necessary. To provide expanded capability, a rich set of menus are available to meet specific end-user needs and system requirements. There are no jumpers to set.

All configuration settings can be made through viewing the large LCD display or over a LonWorks Free-Topology network connection. After pressing the appropriate push buttons for a predefined period of time a simple set of menus are available to configure or adjust parameters to provide the desired performance. Extensive data from the SI-40-L can be obtained through a LonWorks Free-Topology network connection. No additional connections are necessary to monitor individual sensors and track indoor air quality conditions.

1.2 Application Sections

The functional application of the IAQ Multi-Sense is divided into three sections.

1) User Interface
2) Data Display
3) Configuration

The User Interface screens allows the end-user to view ambient conditions and adjust for comfort as necessary in the occupied space with a simple easy to use push button keypad.

The Data Display is for the installer or facilities manager to use for viewing of current and previous ambient conditions in the last 24 hours. A specific set of push buttons must be pressed for a predefined period of time to enter and view the ambient sensor data.

The Configuration section allows access to a rich set of features and parameters to tailor the IAQ Multi-Sense application if necessary. A specific set of push buttons must be pressed for a predefined period of time to enter the initial configuration menus. The Configuration menus allow selection of the specific area for adjustment. All adjustments are saved in non-volatile FLASH memory. Therefore, setting are maintained when power is removed and are available again when power is applied.

2

User Interface

2.1 Overview

The User Interface provides the end-user with comfort adjustment, override signal and viewing of ambient conditions.

Figure 2.1 shows the block diagram of the User Interface screens in the IAQ Multi-Sense Application.

Main Application Screens

Scroll: Manual/Auto, Default - Manual

E
ROOMTEMP
(°F/°C)

D
HUMIDITY
(0.00 - 99.99% RH)

D
CO2
(0-9999ppm)

D
VOC
(0-1000ppm)

Auxilary

NOTE: Returns to originating memu/screen

SETPOINT
(value)

OVERRIDE
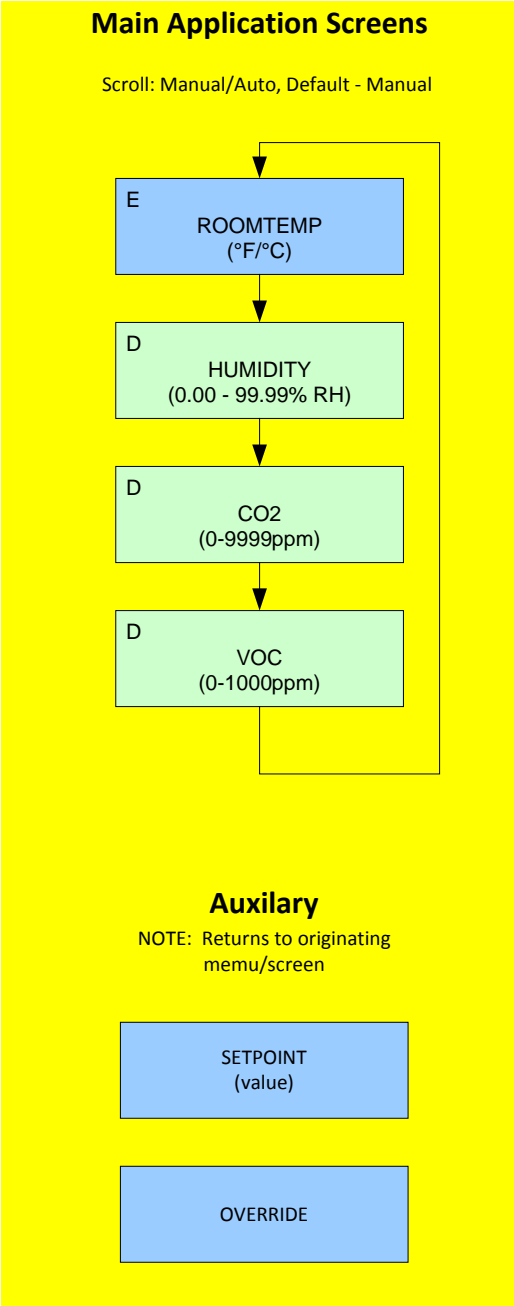
Figure 2.1 User Interface Block Diagram

2.2 Keypad Functions

Table 2.2 defines the keypad push button functions while in the User Interface screens.

Push Button	Duration	Description
Warmer	immediate	Increment comfort adjustment
Cooler	immediate	Decrement comfort adjustment
Override	immediate	Override status
Next	immediate	Next screen if available
Warmer+Cooler+Override	8 Seconds	Enter Configuration Menu
Warmer+Cooler+Next	8 Seconds	Enter Data Display Screens

Table 2.2 User Interface Push button Functions

2.3 Temperature Screen

Display

The Temperature Screen displays the ambient temperature provided by the on-board temperature sensor.

Units

The value can be displayed in Fahrenheit (°F) or Celsius (°C).   The default is Fahrenheit.

Resolution

The numeric value of the Temperature Screen can be displayed with different resolutions.   There are three different types of resolution. The default value is "Tenths". Table 2.3 shows the different types of resolution.

Resolution	Digits	Examples
Ones	X to XXXX	3, 75, 100
Half-Tenths	X.0 or X.5, XXX.0 or XXX.5	3.0, 3.5 75.0, 75.5 100.0, 100.5
Tenths (Default)	X.X to XXX.X	3.0, 3.3, 3.9 75.1, 75.4, 75.8 100.2, 100.5, 100.7

Table 2.3 Temperature Resolution Options

Viewing Option

The Temperature Screen has the option for the display to be enabled or disable to allow viewing of the ambient temperature value by the end-user. The default is enabled, allowing the end-user to view the Temperature Screen.

2.4 Humidity Screen

Display

The Humidity Screen displays the ambient humidity provided by the on-board Humidity sensor.

Units

The value is displayed in percent (%) relative humidity (RH).

Resolution

The numeric value of the Humidity Screen is displayed with a resolution of Hundredths.   Table 2.4 shows the resolution.

Resolution	Digits	Examples
Hundredths (only)	X.XX to XX.XX	3.00, 3.35, 3.99 45.19, 45.46, 45.30 68.28, 68.51, 68.72

Table 2.4 Humidity Resolution (Hundredths)

Viewing Option

The Humidity Screen has the option for the display to be enabled or disable to allow viewing of the humidity value by the end-user. The default is disabled; therefore the Humidity Screen is not displayed.

2.5 CO2 Screen

Display

The CO2 Screen displays the ambient CO2 level measured by the on-board CO2 sensor.

Units

The value is displayed in parts-per-million (ppm).

Resolution

The numeric value of the CO2 Screen is displayed with a resolution of Ones. Table 2.5 shows the resolution.

Resolution	Digits	Examples
One (only)	X to XXXX	400, 732, 1426, 2193

Table 2.5, CO2 Resolution (Ones)

Viewing Option

The CO2 Screen has the option for the display to be enabled or disable to allow viewing of the CO2 value by the end-user. The default is disabled; therefore the CO2 Screen is not displayed.

2.6 VOC Screen

Display

The VOC Screen displays the ambient VOC level measured by the on-board VOC sensor.

Units

The value displayed has a range of 0 to 1000 and is scaled over the range of the VOC sensor.

Resolution

The numeric value of the VOC Screen is displayed with a resolution of Ones. Table 2.6 shows the resolution.

Resolution	Digits	Examples
One (only)	X to XXXX	58, 376, 691, 942

Table 2.6 VOC Resolution (Ones)

Viewing Option

The VOC Screen has the option for the display to be enabled or disable to allow viewing of the VOC value by the end-user. The default is disabled; therefore the VOC Screen is not displayed.

2.7 Set Point Adjust Screen

Warmer/Cooler Push buttons

When either the WARMER or COOLER push button is pressed with any of the User Interface Display present the Set Point Adjust Screen will then be displayed. The value that is first shown is the current set point adjustment value. With any subsequent presses of the WARMER or COOLER push buttons the set point will be adjusted. The WARMER push button will increment the set point adjust value by one over the predefined configurable set point adjustment range. The COOLER push button will decrement the set point adjust value by one over the predefined configurable set point adjustment range. The increment or decrement adjustment is limited to the values within the set point adjust range.

Exit

The NEXT push button can be used to immediately exit out of the Set Point Adjustment Screen. If no push buttons are pressed for a period of five (5) seconds, the Display Screen will revert back to the initial display screen (Temperature Screen) in the User Interface sequence.

Reset Period

When a set point adjustment has been made a configurable time period is started that will reset the set point adjust value back to zero (0). If additional changes are made during the configurable time period, the time period is reset and a new time period will be started. The default reset period is disabled (0) preventing the set point adjustment to be reset back to a zero (0) value; the current set point adjustment value will be maintained.

2.8 Override Screen

Display

The Override Screen display indicates the present OVERRIDE status. When the OVERRIDE push button is pressed the first time, it will display the current override status. If no push buttons are pressed within four (4) seconds, the Display Screen will revert back to the sensor display screen present when the OVERRIDE push button was pressed. For all other display screens the override screen will return to the initial screen in the display sequence; Temperature unless disabled from viewing. When the OVERRIDE push button is pressed again within four (4) seconds, the OVERRIDE status will be toggled either ON or OFF. The new status is saved when existing the Override Screen. When the OVERRIDE status is toggled from ON to OFF to ON again, the override time will be reset and a new override period will begin upon existing the Override Screen.

Exit

The NEXT push button can be used to immediately exit out of the Override Screen and implement any change in the OVERRIDE status.

OVERRIDE Time

When the OVERRIDE status is toggled ON, a countdown timer will activate after existing the OVERRIDE display screen. When this countdown timer reaches zero, the OVERRIDE status will switch to OFF. This Timer period is measured in minutes and ranges from 0-9999 minutes. The default period is set for 120 minutes.

2.9 Manual/Automatic Scrolling

Scrolling

When more than one screen has been enabled, the display has the ability to have Manual or Automatic Scrolling of the Display Screens. The screens display in the following order:

> Temperature
> Humidity
> CO2
> VOC

Manual

When manual scrolling has been selected, the NEXT push button can be used to scroll to the next screen. When the last screen has been reach the next screen will be the first screen that was viewed. If the Display is left viewing Humidity, CO2 or VOC for thirty (30) seconds, the display screen will revert back to the initial screen in the display sequence; Temperature unless disabled from viewing. The initial screen (Temperature Screen) will remain as the current viewing screen until the NEXT push button is pressed again.

Automatic

When automatic scrolling has been select, after a screen has been viewed for a period of four (4) seconds, the display screen will automatically scroll to the next screen. The NEXT push button can be used in the automatic scrolling mode to further increment the scrolling process and manually move to another screen. All screens are viewable for predefined period of four (4) seconds in the automatic scrolling mode.

3

Data Display

3.1 Overview

The Data Display provides the installer, facilities manager or end-user with current and previous ambient conditions in the last 24 hours. A specific set of push buttons must be pressed and held for a predefined period of time to enter and view the ambient sensor data.

Figure 3.1 shows the block diagram of the Data Display screens in the IAQ Multi-Sense Application.

Note! To enter into and see the Data Display screens you must press the WARMER, COOLER and NEXT push buttons simultaneously for 8 seconds.
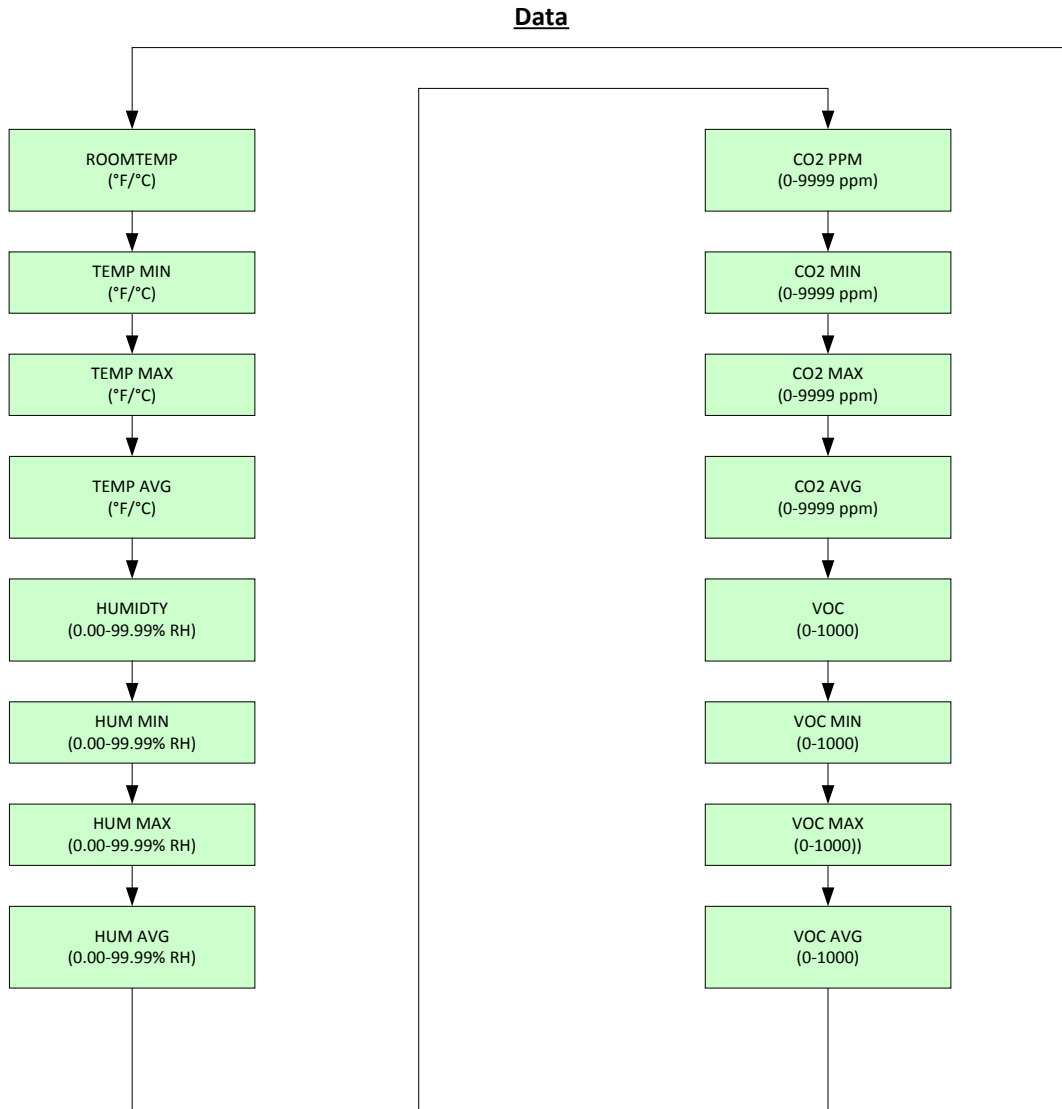
Data

Figure 3.1, Data Display Block Diagram

3.2 Temperature

Current Temperature

The current ambient space temperature is measured and the display is updated every one second.

The current ambient space temperature value can be in degrees Fahrenheit (°F) or Celsius (°C). The selection is dependent upon the configuration setting made in the Configuration section for setting temperature units on the SI-40-L.

Minimum Temperature

The minimum temperature that was measured over the current 24-hour period is displayed.

The 24-hour period is fixed and not adjustable. It begins when the unit first has power applied. The minimum Temperature data is stored in RAM memory. Any loss of power or power cycling will erase the data obtained in the current 24-hour period. A new 24-hour period will start and a new minimum temperature will be obtained when power is re-established.

The minimum temperature value can be in degrees Fahrenheit (°F) or Celsius (°C). The selection is dependent upon the configuration setting made in the Configuration section for setting temperature units on the SI-40-L.

Maximum Temperature

The maximum temperature that was measured over the current 24-hour period is displayed.

The 24-hour period is fixed and not adjustable. It begins when the unit first has power applied. The Maximum Temperature data is stored in RAM memory. Any loss of power or power cycling will erase the data obtained in the current 24-hour period. A new 24-hour period will start and a new maximum temperature will be obtained when power is re-established.

The maximum temperature value can be in degrees Fahrenheit (°F) or Celsius (°C). The selection is dependent upon the configuration setting made in the Configuration section for setting temperature units on the SI-40-L.

Average Temperature

The average temperature is calculated over the current 24-hour period and displayed.

The 24-hour period is fixed and not adjustable. It begins when the unit first has power applied. The Average Temperature data is stored in RAM memory.

Any loss of power or power cycling will erase the data obtained in the current 24-hour period. A new 24-hour period will start and a new average temperature will be calculated when power is re-established.

The average temperature value can be in degrees Fahrenheit (°F) or Celsius (°C). The selection is dependent upon the configuration setting made in the Configuration section for setting temperature units on the SI-40-L.

3.3 Humidity

Current Humidity

The current ambient space humidity is measured and the display is updated every two seconds.

The current ambient humidity value is in percent relative humidity (%RH).

Minimum Humidity

The minimum humidity that was measured over the current 24-hour period is displayed.

The 24-hour period is fixed and not adjustable. It begins when the unit first has power applied. The minimum humidity data is stored in RAM memory. Any loss of power or power cycling will erase the data obtained in the current 24-hour period. A new 24-hour period will start and a new minimum humidity will be obtained when power is re-established.

The minimum humidity value is in percent relative humidity (%RH).

Maximum Humidity

The maximum humidity that was measured over the current 24-hour period is displayed.

The 24-hour period is fixed and not adjustable. It begins when the unit first has power applied. The Maximum Humidity data is stored in RAM memory. Any loss of power or power cycling will erase the data obtained in the current 24-hour period. A new 24-hour period will start and a new maximum humidity will be obtained when power is re-established.

The maximum humidity value is in percent relative humidity (%RH).

Average Humidity

The average humidity is calculated over the current 24-hour period and displayed.

The 24-hour period is fixed and not adjustable. It begins when the unit first has power applied. The Average Humidity data is stored in RAM memory. Any loss of power or power cycling will erase the data obtained in the current 24-hour period. A new 24-hour period will start and a new average humidity will be calculated when power is re-established.

The average humidity value is in percent relative humidity (%RH).

3.4 CO2

Current CO2

The current ambient space CO2 is measured and the display is updated every two seconds.

The current ambient CO2 value is in parts per million (ppm).

Minimum CO2

The minimum CO2 that was measured over the current 24-hour period is displayed.

The 24-hour period is fixed and not adjustable. It begins when the unit first has power applied. The minimum CO2 data is stored in RAM memory. Any loss of power or power cycling will erase the data obtained in the current 24-hour period. A new 24-hour period will start and a new minimum CO2 will be obtained when power is re-established.

The minimum CO2 value is in parts per million (ppm).

Maximum CO2

The maximum CO2 that was measured over the current 24-hour period is displayed.

The 24-hour period is fixed and not adjustable. It begins when the unit first has power applied. The Maximum CO2 data is stored in RAM memory. Any loss of power or power cycling will erase the data obtained in the current 24-hour period. A new 24-hour period will start and a new maximum CO2 will be obtained when power is re-established.

The maximum CO2 value is in parts per million (ppm).

Average CO2

The average CO2 is calculated over the current 24-hour period and displayed.

The 24-hour period is fixed and not adjustable. It begins when the unit first has power applied. The Average CO2 data is stored in RAM memory. Any loss of power or power cycling will erase the data obtained in the current 24-

hour period. A new 24-hour period will start and a new average CO2 will be calculated when power is re-established.

The average CO2 value is in parts per million (ppm).

3.5 VOC

Current VOC

The current ambient space VOC is measured and the display is updated every two seconds.

The current ambient VOC value is scaled over the span of the sensor and has a range of 0 to 1000. There are no units.

Minimum VOC

The minimum VOC that was measured over the current 24-hour period is displayed.

The 24-hour period is fixed and not adjustable. It begins when the unit first has power applied. The minimum VOC data is stored in RAM memory. Any loss of power or power cycling will erase the data obtained in the current 24-hour period. A new 24-hour period will start and a new minimum VOC will be obtained when power is re-established.

The minimum VOC value is scaled over the span of the sensor and has a range of 0 to 1000. There are no units.

Maximum VOC

The maximum VOC that was measured over the current 24-hour period is displayed.

The 24-hour period is fixed and not adjustable. It begins when the unit first has power applied. The Maximum VOC data is stored in RAM memory. Any loss of power or power cycling will erase the data obtained in the current 24-hour period. A new 24-hour period will start and a new maximum VOC will be obtained when power is re-established.

The maximum VOC value is scaled over the span of the sensor and has a range of 0 to 1000. There are no units.

Average VOC

The average VOC is calculated over the current 24-hour period and displayed.

The 24-hour period is fixed and not adjustable. It begins when the unit first has power applied. The Average VOC data is stored in RAM memory. Any

loss of power or power cycling will erase the data obtained in the current 24-hour period. A new 24-hour period will start and a new average VOC will be calculated when power is re-established.

The average VOC value is scaled over the span of the sensor and has a range of 0 to 1000. There are no units.

4

Configuration

4.1 Overview

The Configuration section allows access to a rich set of features and parameters to tailor the IAQ Multi-Sense application if necessary. A specific set of push buttons must be pressed for a predefined period of time to enter the initial configuration menus. The Configuration menus allow selection of the specific area for adjustment. All adjustments are saved in non-volatile FLASH memory. Therefore, setting are maintained when power is removed and are available again when power is applied.

> *Note!* *To enter into and see the Configuration Display screens you must press the WARMER, COOLER and OVERRIDE push buttons simultaneously for 8 seconds.*

4.2 Configuration Menu

Table 4.2 provides a description of the headings seen in the Configuration Menu.

Display Heading	Description
SET DISP	Set the sensor display screens to be viewed on the Sensor Interface.
SET TEMP	Set the temperature calibration, units, and resolution values.
SET HUM	Set the humidity calibration values.
SET CO2	Set the CO2 calibration values.
SET VOC	Set the VOC calibration values.
SET STPT	Set the Set Point Adjust range and reset time.
SET SAMP	Set the number of samples sensor measurements are averaged.
SET OT	Set the number of minutes that the OVERRIDE period will last.

Table 4.2, Configuration Menu Headings and Descriptions.

Figure 4.2 shows the block diagram of the Configuration Menu screens in the IAQ Multi-Sense Application

Main Configuration Selection Screens

```
      ┌──────────────────────┐
      │                      │
      ▼                      │
  ┌─────────┐                │
  │ SET DISP│                │
  └─────────┘                │
      │                      │
      ▼                      │
  ┌─────────┐                │
  │ SET TEMP│                │
  └─────────┘                │
      │                      │
      ▼                      │
  ┌─────────┐                │
  │ SET HUM │                │
  └─────────┘                │
      │                      │
      ▼                      │
  ┌─────────┐                │
  │ SET CO2 │                │
  └─────────┘                │
      │                      │
      ▼                      │
  ┌─────────┐                │
  │ SET VOC │                │
  └─────────┘                │
      │                      │
      ▼                      │
  ┌─────────┐                │
  │ SET STPT│                │
  └─────────┘                │
      │                      │
      ▼                      │
  ┌─────────┐                │
  │ SET SAMP│                │
  └─────────┘                │
      │                      │
      ▼                      │
  ┌─────────┐                │
  │ SET OT  │                │
  └─────────┘                │
      │                      │
      └──────────────────────┘
```
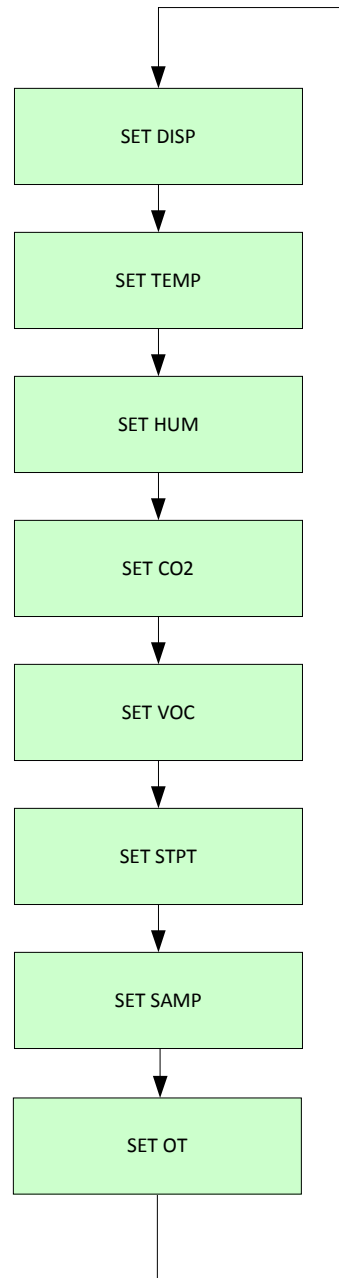
Figure 4.2, Configuration Menu Block Diagram

4.3 Set Display Options

Block Diagram

Figure 4.5 shows a block diagram of the screens that are available to set the configuration parameters for the User Interface screens that can be displayed and if automatic scrolling is enabled.

```
      ┌──────────────┐
      │   SET DISP   │
      └──────┬───────┘
             │
      ┌──────▼───────┐
      │   ENA TEMP   │
      └──────┬───────┘
             │
      ┌──────▼───────┐
      │   ENA HUM    │
      └──────┬───────┘
             │
      ┌──────▼───────┐
      │   ENA CO2    │
      └──────┬───────┘
             │
      ┌──────▼───────┐
      │   ENA VOC    │
      └──────┬───────┘
             │
      ┌──────▼───────┐
      │    SCROLL    │
      └──────┬───────┘
             │
             ▼
```
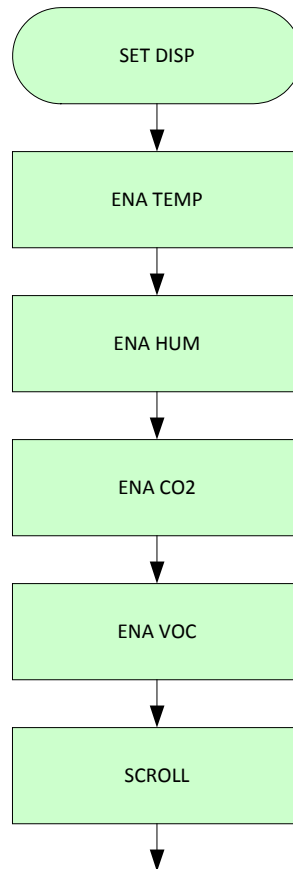
Figure 4.3, User Interface Display Configuration Screens

Temperature

Enable or disable the display of the ambient temperature measurement in the User Interface display screens. Use the WARMER and COOLER push buttons to toggle between "ON" and "OFF" to enable or disable the display screen, respectively. An "ON" enables and "OFF" disables the ambient temperature display screen.

The default is "ON" with the ambient temperature display screen enabled.

Humidity

Enable or disable the display of the ambient humidity measurement in the User Interface display screens. Use the WARMER and COOLER push buttons to toggle between "ON" and "OFF" to enable or disable the display screen, respectively. An "ON" enables and "OFF" disables the ambient humidity display screen.

The default is "OFF" with the ambient humidity display screen disabled.

CO2

Enable or disable the display of the ambient CO2 measurement in the User Interface display screens. Use the WARMER and COOLER push buttons to toggle between "ON" and "OFF" to enable or disable the display screen, respectively. A "ON" enables and "OFF" disables the ambient CO2 display screen.

The default is "OFF" with the ambient CO2 display screen disabled.

VOC

Enable or disable the display of the ambient VOC measurement in the User Interface display screens. Use the WARMER and COOLER push buttons to toggle between "ON" and "OFF" to enable or disable the display screen, respectively. An "ON" enables and "OFF" disables the ambient VOC display screen.

The default is "OFF" with the ambient VOC display screen disabled.

Scroll

Enable or disable the automatic scrolling of the User Interface display screens. Use the WARMER and COOLER push buttons to toggle between "ON" and "OFF" to enable or disable the automatic scrolling of display screens, respectively. An "ON" enables and "OFF" disables the automatic scrolling of the User Interface display screens. When the automatic scrolling has been disabled, manual scrolling of the display screens can be done. By pressing the NEXT push button, the next screen in the display sequence is displayed. Two are more display screens have to be enabled for automatic or manual scrolling. If no display screens are enabled the IAQ Multi-Sense application will default to the initial screen (Temperature unless disabled) in the sequence.

The display screen sequence is as follows:
<div align="center">

Temperature
Humidity
CO2
VOC
</div>

The default is "OFF" with automatic scrolling of the display screen disabled. Manual scrolling is the default method of scrolling when two or more display screens are enabled.

4.4 Set Temperature

Block Diagram

Figure 4.4 shows a block diagram of the screens that are available to set the configuration parameters for Temperature.

```
        ┌──────────────┐
        │   SET TEMP   │
        └──────┬───────┘
               │
               ▼
      ┌─────────────────┐
      │    TEMP CAL     │
      │  (Offset Value) │
      └────────┬────────┘
               │
               ▼
      ┌─────────────────┐
      │   TEMP UNITS    │
      │  (F/C, Default F)│
      └────────┬────────┘
               │
               ▼
      ┌──────────────────────────────┐
      │          DISP RES            │
      │ (00.0, 00.5, 00, Default 00.0)│
      └───────────────┬──────────────┘
                      │
                      ▼
```

Figure 4.4, Temperature Configuration Screens

Temperature

Adjust the offset value that is added to the measured temperature to provide an adjusted measured temperature. The WARMER push button will increment and the COOLER push button will decrement the temperature-offset value. The offset value can be in Fahrenheit (°F) of Celsius (°C) depending on the temperature configuration units setting. The adjustment resolution is in tenths of a degree in degrees Fahrenheit or Celsius. When switching between units (°F or °C) the offset value will scale to the units selected.

The default offset value is 0.0 degrees.

Temperature Units

Toggle between "°F" (Fahrenheit) and "°C" (Celsius) using the WARMER or COOLER push button to set the units of the temperature displayed in the User Interface and Data Display screens.

Display Resolution

The temperature displayed in the User Interface and Data Display screens can be set to one of three resolutions. The following are the three resolutions that can be selected.

Selection	Resolution	Digits	Examples
00.0	Tenths (Default)	X.X to XXX.X	3.0, 3.3, 3.9 75.1, 75.4, 75.8 100.2, 100.5, 100.7
00	Ones	X to XXXX	3, 75, 100
00.5	Half-Tenths	X.0 or X.5, XXX.0 or XXX.5	3.0, 3.5 75.0, 75.5 100.0, 100.5

Table 4.4, Temperature Display Resolution Selection

Use the WARMER and COOLER push buttons to toggle between 00.0, 00 and 00.5 to selected the desired temperature resolution.

The default resolution setting is Tenths (00.0).

4.5 Set Humidity

Block Diagram

Figure 4.5 shows a block diagram of the screens that are available to set the configuration parameters for Humidity.
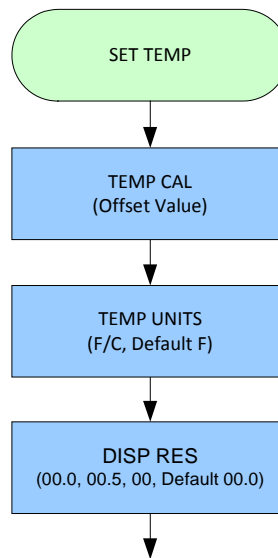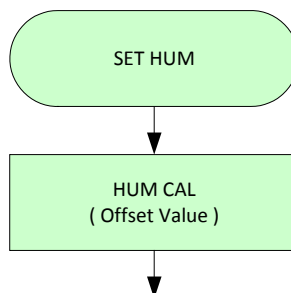

Figure 4.5, Humidity Configuration Screens

Humidity

Adjust the offset value that is added to the measured humidity to provide an adjusted measured humidity. The WARMER push button will increment and the COOLER push button will decrement the humidity-offset value. The offset value is in percent (%) relative humidity (RH). The adjustment resolution is in hundredths (0.01) of a percent relative humidity.

The default offset value is 0.00 % RH.

4.6 Set CO2

Introduction

The CO2 Sensor has a built-in self-correcting ABC algorithm. ABC stands for Automatic Baseline Calibration and is a self-calibrating function for achieving long-term stability in sensor performance.

Block Diagram

Figure 4.6 shows a block diagram of the screens that are available to set the configuration parameters for CO2.

```
        ╭───────────────╮
        │    SET CO2    │
        ╰───────┬───────╯
                │
                ▼
        ┌───────────────┐
        │    ABC CAL    │
        └───────┬───────┘
                │
                ▼
        ┌───────────────┐
        │    C02 CAL    │
        │ (Offset Value)│
        └───────┬───────┘
                │
                ▼
        ┌───────────────┐
        │    INCH HG    │
        │ (15.00 to 35.00,│
        │  Default 29.22)│
        └───────┬───────┘
                │
                ▼
```
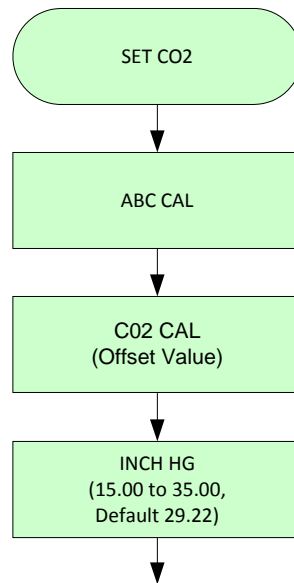
Figure 4.6, CO2 Configuration Screens

ABC Calibration

ABC Calibration of the CO2 sensor can be enabled or disabled. Toggle between enable, "ON" and disable "OFF" by using the WARMER or COOLER push buttons.

The default value is enabled, "ON", to have ABC Calibration performed.

CO2 Calibration

When ABC calibration has been disabled ("OFF") the CO2 Calibration display screen is made available to provide manual calibration of the CO2 sensor. The value seen on the screen is the actual measured CO2 value plus calibration offset. A measurement can be taken by another accurate CO2 sensing device in close proximity to the SI-40-L and that measured value can be manual placed on the CO2 Calibration display screen. The desired CO2 value can be incremented with the WARMER push button and decremented with the COOLER push button. The CO2 value is in parts per million (ppm). The adjustment resolution is in one (1) ppm. The range of adjustment is from 1 to 5000 ppm.

The default value is with no calibration adjustment.

Atmospheric Pressure Setting

When ABC calibration has been disabled ("OFF") the Atmospheric Pressure Setting display screen is made available to provide compensation for changes in elevation. The desired value can be incremented with the WARMER push button and decremented with the COOLER push button. The Atmospheric Pressure is in inches of mercury (in Hg). The adjustment resolution is in hundredths (0.01) of an inch of mercury. The range of adjustment is from 15.00 to 35.00 in Hg.

The default Atmospheric Pressure is at sea-level and is 29.22 in Hg.

4.7 Set VOC

Block Diagram

Figure 4.7 shows a block diagram of the screens that are available to set the configuration parameters for VOC.
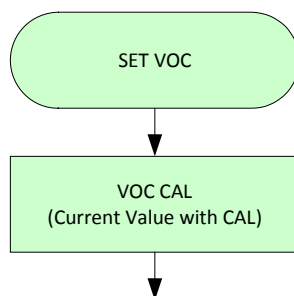

Figure 4.7, VOC Configuration Screens

VOC

Adjust the offset value that is added to the measured VOC value to provide an adjusted measured VOC value. The WARMER push button will increment and the COOLER push button will decrement the VOC-offset value. The offset value has no units. The adjustment resolution is a value of one (1). The range for adjustment is ±500.

The default offset value is 0.

4.8 Set Point Adjust

Introduction

The Set Point Adjust is used to establish a range that provides comfort adjustment for the ambient temperature within a space. The comfort adjustment can be used to increase or decrease the ambient temperature in the occupied space.

Block Diagram

Figure 4.8 shows a block diagram of the screens that are available to set the configuration parameters for Set Point Adjustment (Comfort Adjust).
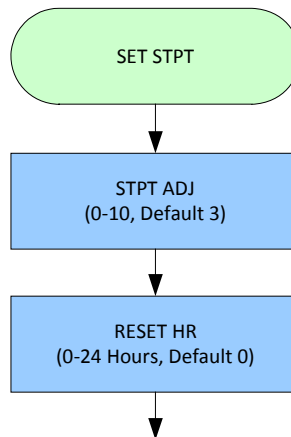
Figure 4.8, Set Point Adjustment Configuration Screens

Set Point Adjustment Range

The Set Point Adjustment Range establishes a numeric value that allows the end user a plus (+) and minus (-) adjustment range to increase or decrease the desired temperature for better comfort. Increasing the numeric value for the Set Point Adjustment Range allows the end users more points or better resolution to provide finer adjustments. Decreasing the numeric value for the

Set Point Adjustment Range provides the end user with less points or a larger resolution to provide a more coarse adjustment.

The Set Point Adjustment Range can be incremented with the WARMER push button and decremented with the COOLER push button. The value can be incremented or decremented by one (1). The range of adjustment is from 0 to 10 and is an absolute value. One value sets the plus (+) and minus (-) range. A value of 0 disables set point adjustment.

The default Set Point Adjustment Range value is 3 (-3 to +3 range).

Reset Time (RESET HR)

After an end-user has changed the set point value for comfort on the User Interface Display screen a reset timer is started. When the reset timer expires, the IAQ Multi-Sense application will reset the set point value back to the mid-point setting of zero (0). Returning the adjustment back to the mid-point prevents the end-user adjustment from being maintained after the end-user or occupants have left the space.

The value on the configuration screen for the Reset Time is in hours. The Reset Time value can be incremented with the WARMER push button and decremented with the COOLER push button. The value can be incremented or decremented in one (1) hour units. The range of adjustment is from 0 to 24 hours. A value of zero (0) will disable the Reset Time and the set point adjust value entered by the end-user will be maintained until the end-user makes another change or power cycle resets the value. The default value is 0 hours (Reset Time is disabled).

4.9 Set Samples

Introduction

The conditions in an occupied space can fluctuate due to doors opening, the movement of occupants and other actions that can affect the flow and quality of air in a space. Ambient sensors can sense and respond to the changes in the occupied or unoccupied environment. The concern is with short duration fluctuations in the ambient space. Many times it is not practical for control systems to respond immediately to these changes. Time will dissipate the change and there may not be a need for the control system to provide an immediate response. To minimize the effects of short duration fluctuations in a control system the IAQ Multi-Sense features an adjustable averaging filter. The number of measurements or samples that are taken can be then be averaged to produce a more stable ambient reading. In the IAQ Multi-Sense Application the number of samples taken can be adjusted to meet the requirements for the control system. A default value is used that will provide an accurate response for a control system allowing the installer a quick and simple installation.

The sample value set in the IAQ Multi-Sense application is used for all sensor readings. There is no individual sample value adjustment provided for each sensor.

Block Diagram

Figure 4.9 shows a block diagram of the screens that are available to set the configuration parameters for Samples.

```
     ┌─────────────────┐
    (     SET  SAMP     )
     └────────┬────────┘
              │
              ▼
     ┌─────────────────┐
     │   SAMP  AVG      │
     │ (0-25, Default 15)│
     └────────┬────────┘
              │
              ▼
```
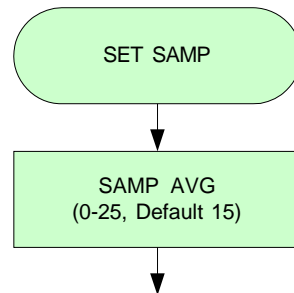
Figure 4.9, Sample Configuration Screens

Measurement Rate

When reviewing the capability to average the sensor measurements, the rate at which a sensor performs a measurement needs to be considered along with the number of samples taken.

The table below shows the rate at which each sensor performs a measurement of the ambient conditions.

Sensor	Measurement Rate (Seconds)
Temperature	1
Humidity	2
CO2	2
VOC	2

Table 4.9, Sensor Measurement Rate

As an example the CO2 sensor takes a reading every 2 seconds. The default number of samples taken when averaging is 15. Therefore, in this particular example, the CO2 reading on the display and value provided is averaged over a 30 second period.

2 seconds per reading x 15 readings = 30 second period average

Samples

The number of measurements or samples that are taken and averaged can be adjusted. The range of samples that can be taken is 0 to 25. A value of zero (0) will disable any samples from being taken and each measurement will be displayed as new measurements are taken. A sample value of one (1) will have the same effect except the averaging algorithm will be enabled and the single sample will be averaged over a value of one.

The WARMER push button will increment and the COOLER push button will decrement the number of samples that are taken and averaged.

The default sample average value is 15.

4.10 Set Override Time

Introduction

The Override Time Period allows the end-user to provide an override state from the SI-40-L for a finite period of time. When the override state has been set to "ON", an override time period is started. At the expiration of the time period the override state will be automatically set back to "OFF". If the override display indicates "ON" and the display is toggled "OFF" then back to "ON" (ON-OFF-ON) the time period is reset and a new time period will be started. The time period is displayed in minutes and ranges from 0-9999. The default time period is set for 120 minutes.

Block Diagram

Figure 4.10 shows a block diagram of the screens that are available to set the configuration parameters for Override Time.
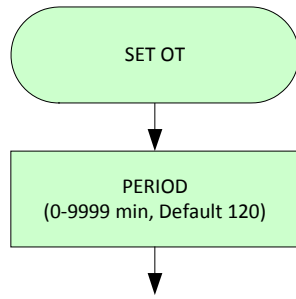
Figure 4.10, OT Configuration Screens

5

Application Functional Profiles

5.1 Overview

This section provides an overview of the functional profiles that are available with the SI-40-L.

5.2 Network System

Standard Network Variable Types

LonWorks systems use "network variables" to enable various devices to communicate with one another. These devices can be Smart Controls modules or products from other companies that use "Standard Network Variable Types", or SNVTs (pronounced "sni-vets") and "User Network Variable Types", or UNVTs (pronounced "u-nivets").

These network variables are like "soft" terminal blocks. They can be logically "soft wired" or "bound" between devices, just like wires can connect physical terminal blocks. When "soft wired", information from a transmitting device is received in those device(s) that are soft wired to the transmitting device.

The network variables are logically connected, or "bound", to other devices with a network management tool such as Echelon's LonMaker Turbo or OpenLNS CT and VisualControl's Network Manager.

5.3 Network Logical Installation

Installing a node

Network management tools need to have nodes on the network "logically" installed. When the network management tool asks you to install the node or press the service pin, the service push button will need to be pressed.

The location for the service push button on the SI-40-L is hidden from general user interaction. The service push button can be accessed by pressing the area below the COOLER push button as shown in Figure 5.3.

The Service push button is hidden from general user interaction. The push button can be accessed by pressing the area below the COOLER push button.

WARMER OVERRIDE

COOLER NEXT
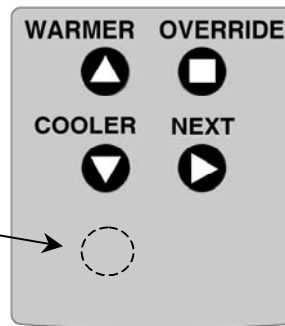
Figure 5.3, Service Pin Location on SI-40-L

Pressing the service push button will send a "service-pin" message consisting of the Neuron and Program IDs. When used with a network management tool, this step provides the device information to logically install the physically node into the network management's database. The network management tool will then send the SI-40-L addressing and binding information to install the SI-40-L into the LON network.

5.4 Network Variables & Configuration Properties

The following information describes the network variables and configuration properties that are provide in each function profile on the SI-40-L. The network variables are graphically depicted below.

Temperature Sensor, Object Type #1040

Mandatory Network Variables

nvoTemp
SNVT_temp_p

Mandatory Configuration Properties

Maximum Send Time (SCPTmaxSendTime)
Minimum Send Time (SCPTminSendTime)
Minimum Change To Send (SCPTminDeltaTemp)

Optional Network Variables

Optional Configuration Properties

Temperature Offset (SCPTtempOffset)

Manufacturer Network Variables

nviOverride SNVT_override	nvoOverride SNVT_override
nciOvridPeriod SNVT_time_min	nvoOvridPeriod SNVT_time_min
nviTempStptAdj SNVT_count_inc	nvoTempStptAdj SNVT_count_inc
nciStptAdjRange SNVT_count	nvoStptAdjRange SNVT_count
nciTempOffset SNVT_temp_diff_p	nvoTempOffset SNVT_temp_diff_p
	nvoTempMin SNVT_temp_p
	nvoTempMinTime SNVT_time_stamp
	nvoTempMax SNVT_temp_p
	nvoRHMaxTime SNVT_time_stamp
	nvoTempAvg SNVT_temp_p
	nvoOvridTime SNVT_time_min

Manufacturer Configuration Properties

Set point Adjustment Range (UCPTStptAdjRange)
Set point Adjustment Reset (UCPTstptAdjReset)
Temperature Display (UCPTtempDisp)
Temperature Display Resolution (UCPTtempDispRes)
Temperature Units (UCPTtempUnits)
Override Period (UCPTovridPeriod)

Temperature Sensor, Object Type #1040

Network Variables:

nviOverride (SNVT_override): Input command to change the override status.

nciOvridPeriod (SNVT_time_min): Value of the override period in minutes. Default value is 120.

nciTempStptAdj (SNVT_count_inc): Value that allows the adjustment of the actual temperature set point for comfort control. Can only be adjusted over the set point adjustment range.

nciStptAdjRange (SNVT_count): The range the set point can be adjusted. The range value is an absolute value that controls a +/- range. The maximum value is 10. The default is 3.

nciTempOffset (SNVT_temp_diff_p): Offset value added to the actual temperature measurement.

nvoTemp (SNVT_temp_p): Current ambient temperature.

nvoOverride (SNVT_override): Command to signal an override request to change from unoccupied to occupied temperature settings.

nvoOvridPeriod (SNVT_time_min): Value of the override period in minutes.

nvoTempStptAdj (UNVT_count_inc): Value that allows the adjustment of the actual temperature set point for comfort control.

nvoStptAdjRange (SNVT_count): Value of the set point adjustment range.

nvoTempOffset (SNVT_temp_diff_p): Offset value added to the actual temperature measurement.

nvoTempMin (SNVT_temp_p): Minimum temperature over a 24-hour period.

nvoTempMinTime (SNVT_time_stamp): Time of minimum temperature over 24-hour period.

nvoTempMax (SNVT_temp_p): Maximum temperature over a 24-hour period.

nvoTempMaxTime (SNVT_time_stamp): Time of maximum temperature over 24-hour period.

nvoTempAvg (SNVT_temp_p): Average temperature over a 24-hour period.

nvoOvridtime (SNVT_time_min): Value of the override time in minutes.

Configuration Properties:

Maximum Send Time (SCPTmaxSentTime): Controls the maximum period of time that expires before the Temperature, Override and Temperature Set Point Adjustment output values are transmitted. Default value is 60.0 seconds.

Minimum Send Time (SCPTminSendTime): Controls the minimum period of time between output value transmissions. Default value is 5.0 seconds.

Minimum Change To Send (SCPTminDeltaTemp): The minimum change in temperature required before transmission of the output value. Default value is 0.54 °F (0.3°C).

Temperature Offset (SCPToffsetTemp): Used to adjust the measured temperature with an additive offset value. Default value is 0.0 degrees.

Set Point Adjustment Range (UCPTtempStptAdj): Range over which the set point adjustment can be adjusted. The range is 0 to 10. Default value is 3.

Set Point Adjustment Reset (UCPTstptAdjReset): Time in hours when the set point adjustment will reset back to the no adjustment value (0). The range is 0-24 hours. Default value is 0 hours, disabled.

Temperature Display (UCPTtempDisp): Enable or disable the displaying of the main temperature display screen. The default is enabled.

Temperature Display Resolution (UCPTtmpDispRes): Display resolution of the temperature value. Resolution can be 0.1, 0.5 or 1. Default value is 0.1.

Temperature Units (UCPTtempUnits): Temperature units of the displayed temperature value. Default value is Fahrenheit.

Override Period (UCPTovridPeriod): Value of the override period in minutes.

Relative Humidity Sensor, Object Type #1050
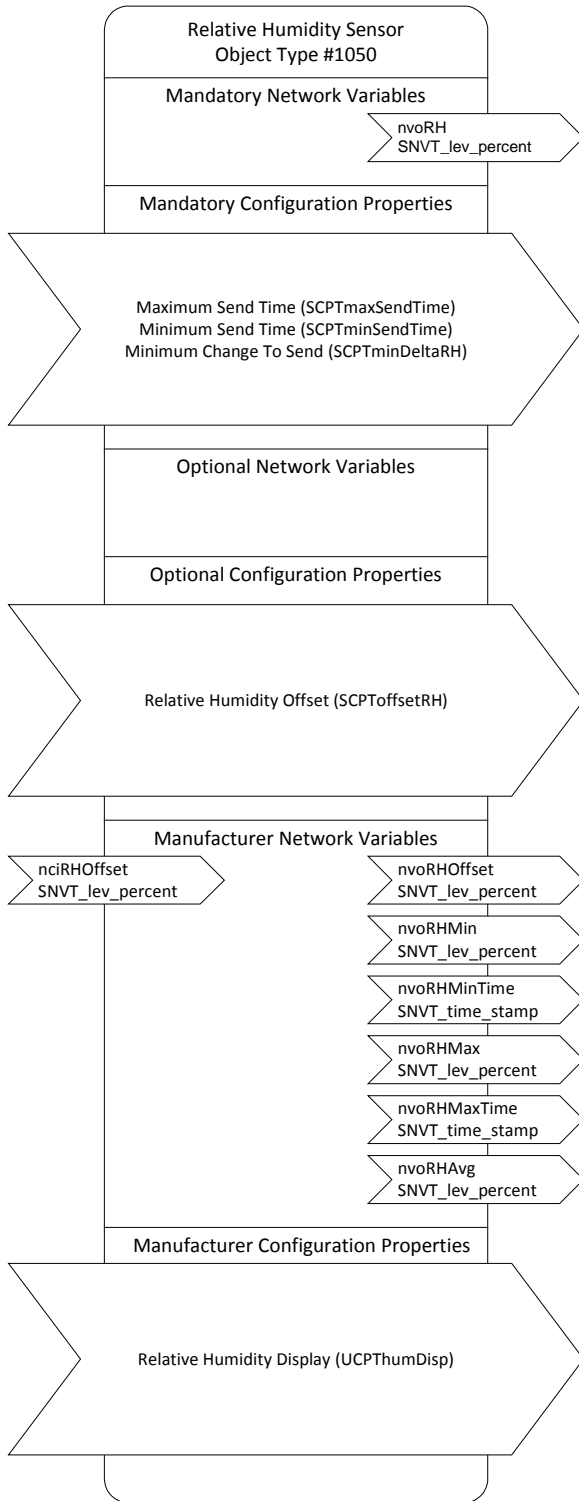
Network Variables:

nciRHOffset (SNVT_lev_percent): Offset value added to the actual humidity measurement.

nvoRH (SNVT_lev_percent): Current relative humidity in percent.

nvoRHOffset (SNVT_lev_percent): Offset value added to the actual humidity measurement.

nvoRHMin (SNVT_lev_percent): Minimum relative humidity over a 24-hour period.

nvoRHMinTime (SNVT_time_stamp): Time of minimum relative humidity over 24-hour period.

nvoRHMax (SNVT_lev_percent): Maximum relative humidity over a 24-hour period.

nvoRHMaxTime (SNVT_time_stamp): Time of maximum relative humidity over 24-hour period.

nvoRHAvg (SNVT_lev_percent): Average relative humidity over a 24-hour period.

Configuration Properties:

Maximum Send Time (SCPTmaxSentTime): Controls the maximum period of time that expires before the Humidity value is transmitted. Default value is 60.0 seconds.

Minimum Send Time (SCPTminSendTime): Controls the minimum period of time between output value transmissions. Default value is 5.0 seconds.

Minimum Change To Send (SCPTminDeltaRH): The minimum change in relative humidity required before transmission of the output value. Default value is 1.00 percent.

Relative Humidity Offset (SCPToffsetRH): Used to adjust the measured relative humidity with an additive offset value. Default value is 0.00 percent.

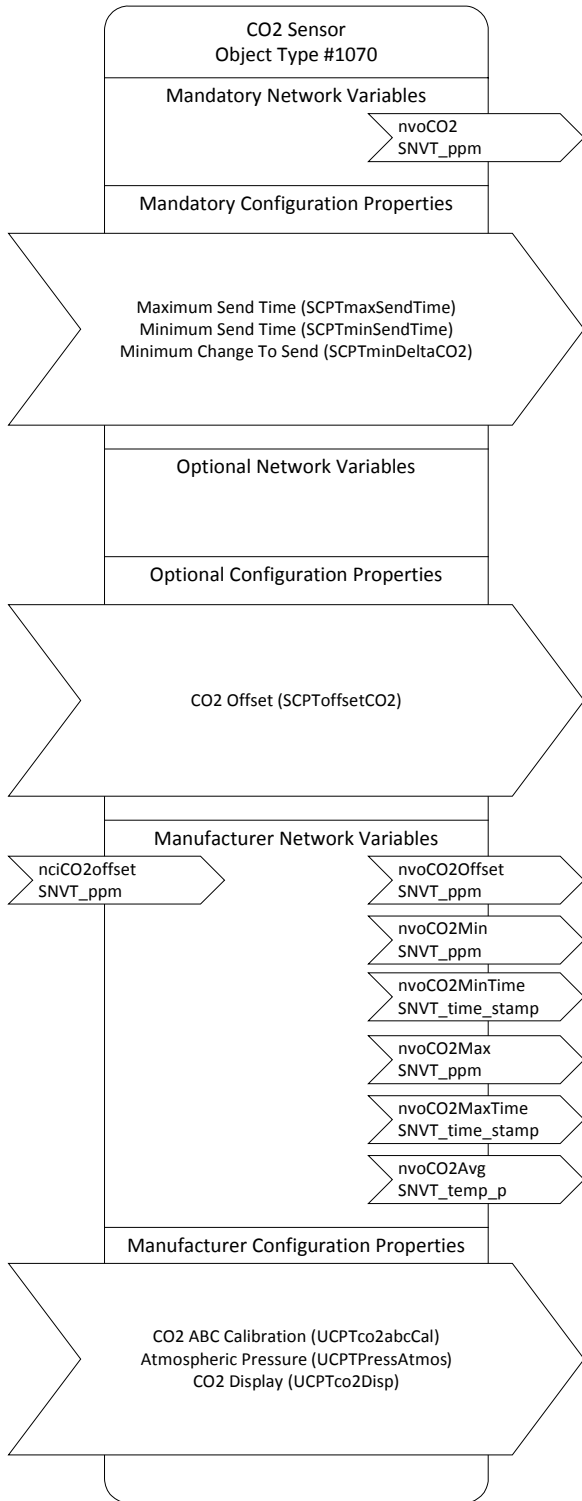**Relative Humidity Display (UCPThumDisp):** Enable or disable the displaying of the main humidity display screen. The default is disabled.

Relative Humidity Sensor
Object Type #1050

Mandatory Network Variables

nvoRH
SNVT_lev_percent

Mandatory Configuration Properties

Maximum Send Time (SCPTmaxSendTime)
Minimum Send Time (SCPTminSendTime)
Minimum Change To Send (SCPTminDeltaRH)

Optional Network Variables

Optional Configuration Properties

Relative Humidity Offset (SCPToffsetRH)

Manufacturer Network Variables

nciRHOffset
SNVT_lev_percent

nvoRHOffset
SNVT_lev_percent

nvoRHMin
SNVT_lev_percent

nvoRHMinTime
SNVT_time_stamp

nvoRHMax
SNVT_lev_percent

nvoRHMaxTime
SNVT_time_stamp

nvoRHAvg
SNVT_lev_percent

Manufacturer Configuration Properties

Relative Humidity Display (UCPThumDisp)

CO2 Sensor
Object Type #1070

Mandatory Network Variables

nvoCO2
SNVT_ppm

Mandatory Configuration Properties

Maximum Send Time (SCPTmaxSendTime)
Minimum Send Time (SCPTminSendTime)
Minimum Change To Send (SCPTminDeltaCO2)

Optional Network Variables

Optional Configuration Properties

CO2 Offset (SCPToffsetCO2)

Manufacturer Network Variables

nciCO2offset
SNVT_ppm

nvoCO2Offset
SNVT_ppm

nvoCO2Min
SNVT_ppm

nvoCO2MinTime
SNVT_time_stamp

nvoCO2Max
SNVT_ppm

nvoCO2MaxTime
SNVT_time_stamp

nvoCO2Avg
SNVT_temp_p

Manufacturer Configuration Properties

CO2 ABC Calibration (UCPTco2abcCal)
Atmospheric Pressure (UCPTPressAtmos)
CO2 Display (UCPTco2Disp)

Network Variables:

nvoCO2 (SNVT_ppm): Current CO2 concentration in part-per-million.

nciCO2offset (SNVT_ppm): Offset value added to the actual CO2 measurement.

nvoCO2Offset (SNVT_ppm): Offset value added to the actual CO2 measurement.

nvoCO2Min (SNVT_ppm): Minimum CO2 concentration over a 24-hour period.

nvoCO2MinTime (SNVT_time_stamp): Time of minimum CO2 over 24-hour period.

nvoCO2Max (SNVT_ppm): Maximum CO2 concentration over a 24-hour period.

nvoCO2Maxtime (SNVT_time_stamp): Time of minimum CO2 over 24-hour period.

nvoCO2Avg (SNVT_ppm): Average CO2 concentration over a 24-hour period.

Configuration Properties:

Maximum Send Time (SCPTmaxSentTime): Controls the maximum period of time that expires before the CO2 value is transmitted. Default value is 60.0 seconds.

Minimum Send Time (SCPTminSendTime): Controls the minimum period of time between output value transmissions. Default value is 5.0 seconds.

Minimum Change To Send (SCPTminDeltaCO2): The minimum change in CO2 required before transmission of the output value. Default value is 10 ppm.
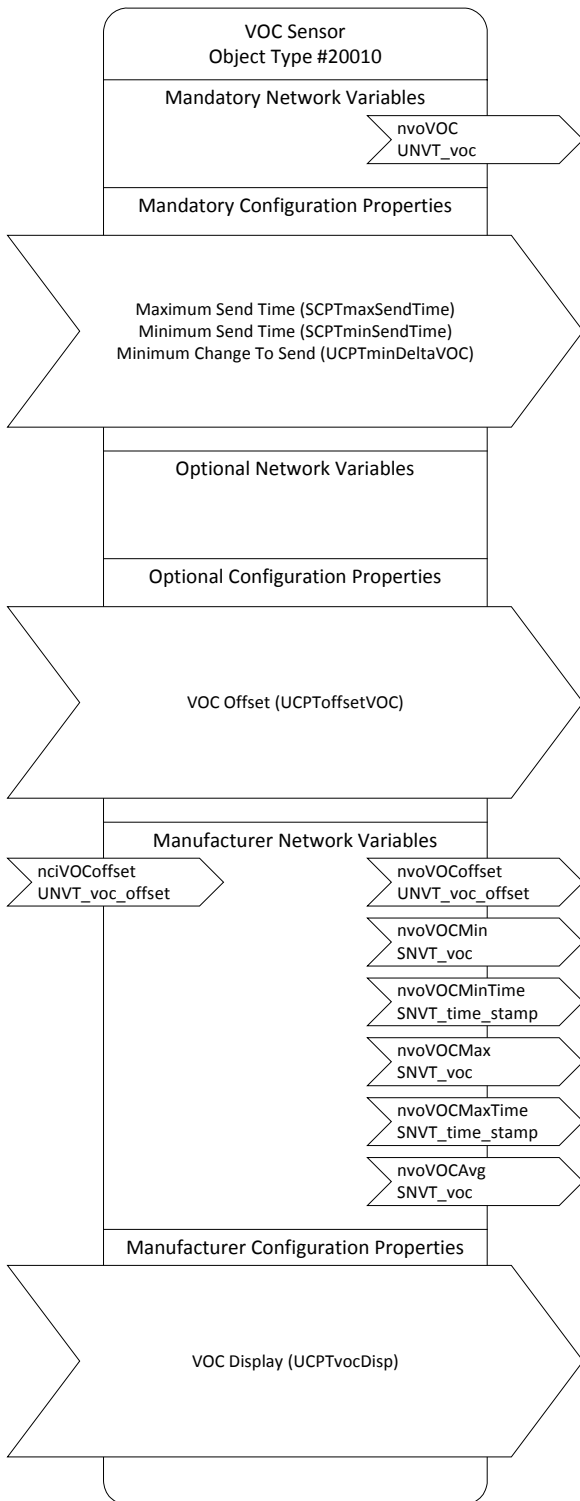
CO2 Offset (SCPToffsetCO2): Used to adjust the measured CO2 with an additive offset value. This property is only used when ABC calibration is disabled. Default value is 0 ppm.

CO2 ABC Calibration (UCPTco2abcCal): Enable or disable calibration of the CO2 sensor using ABC calibration. Default value is enabled.

Atmospheric Pressure (UCPTPressAtmos): Atmospheric pressure in inches of mercury. This property is only used when ABC calibration is disabled to provide compensation for changes in altitude pressure if necessary. Default value is 29.22 inches of mercury (sea level).

CO2 Display (UCPTco2Disp): Enable or disable the displaying of the main CO2 display screen. The default is disabled.

VOC Sensor, Object Type #20010

VOC Sensor Object Type #20010

Mandatory Network Variables

nvoVOC
UNVT_voc

Mandatory Configuration Properties

Maximum Send Time (SCPTmaxSendTime)
Minimum Send Time (SCPTminSendTime)
Minimum Change To Send (UCPTminDeltaVOC)

Optional Network Variables

Optional Configuration Properties

VOC Offset (UCPToffsetVOC)

Manufacturer Network Variables

nciVOCoffset
UNVT_voc_offset

nvoVOCoffset
UNVT_voc_offset

nvoVOCMin
SNVT_voc

nvoVOCMinTime
SNVT_time_stamp

nvoVOCMax
SNVT_voc

nvoVOCMaxTime
SNVT_time_stamp

nvoVOCAvg
SNVT_voc

Manufacturer Configuration Properties

VOC Display (UCPTvocDisp)

Network Variables:

nciVOCoffset (UNVT_voc_offset): Offset value added to the actual VOC measurement.

nvoVOC (UNVT_voc): Current VOC level. Range 0 to 1000.

nvoVOCoffset (UNVT_voc_offset): Offset value added to the actual VOC measurement.

nvoVOCMin (UNVT_voc): Minimum VOC level over a 24-hour period.

nvoVOCMinTime (SNVT_time_stamp): Time of minimum VOC over 24-hour period.

nvoVOCMax (UNVT_voc): Maximum VOC level over a 24-hour period.

nvoVOCMaxtime (SNVT_time_stamp): Time of minimum VOC over 24-hour period.

nvoVOCAvg (UNVT_voc): Average VOC level over a 24-hour period.

Configuration Properties:

Maximum Send Time (SCPTmaxSentTime): Controls the maximum period of time that expires before the VOC value is transmitted. Default value is 60.0 seconds.
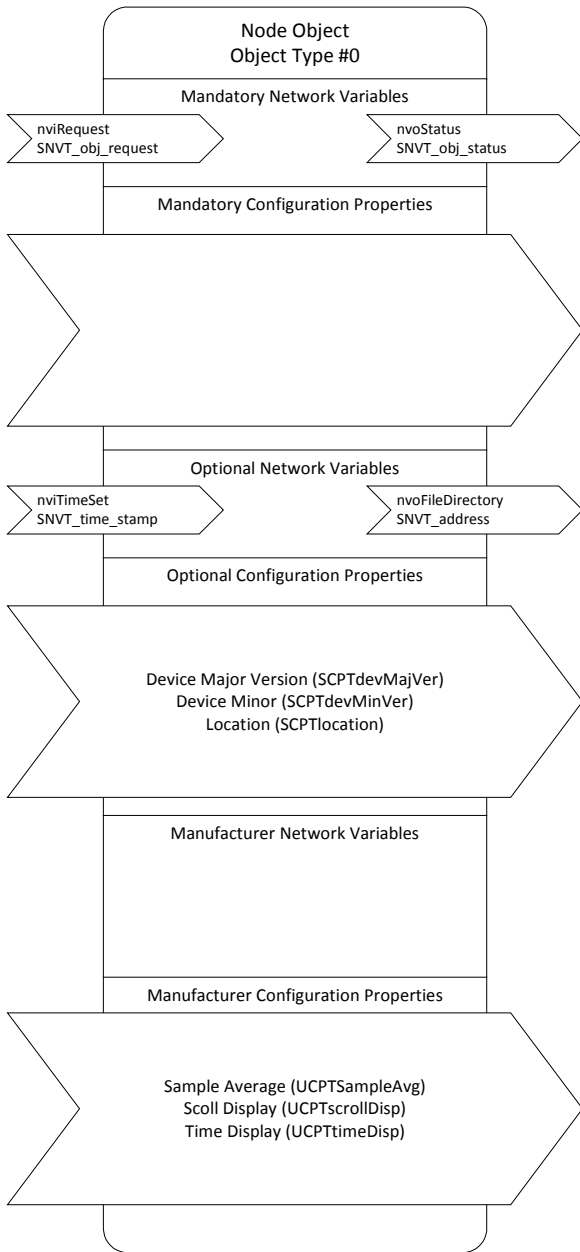
Minimum Send Time (SCPTminSendTime): Controls the minimum period of time between output value transmissions. Default value is 5.0 seconds.

Minimum Change To Send (SCPTminDeltaVOC): The minimum change in VOC required before transmission of the output value. Default value is 10.

VOC Offset (SCPToffsetVOC): Used to adjust the measured VOC with an additive offset value. Default value is 0.

VOC Display (UCPTvocDisp): Enable or disable the displaying of the main VOC display screen. The default is disabled.

Node Object
Object Type #0

Mandatory Network Variables

| nviRequest SNVT_obj_request | | nvoStatus SNVT_obj_status |

Mandatory Configuration Properties

Optional Network Variables

| nviTimeSet SNVT_time_stamp | | nvoFileDirectory SNVT_address |

Optional Configuration Properties

Device Major Version (SCPTdevMajVer)
Device Minor (SCPTdevMinVer)
Location (SCPTlocation)

Manufacturer Network Variables

Manufacturer Configuration Properties

Sample Average (UCPTSampleAvg)
Scoll Display (UCPTscrollDisp)
Time Display (UCPTtimeDisp)

Network Variables:

nviRequest (SNVT_obj_request): Requests a particular mode for a particular object in the device.

nviTimeSet (SNVT_time_stamp): Synchronize the node's internal real time clock with an external time source.

nvoStatus (SNVT_Obj_status): Reports the status of requested object in the device.

nvoFileDirectory (SNVT_address): Address for the file directory containing descriptors for configuration files.

Configuration Properties:

DevMajVer (SCPTdevMajVer): The major version number for the device. Value is 1.

DevMinVer (SCPTdevMinVer): The minor version number for the device. Value is 0.

Location (SCPTlocation): Identifies the subsystem containing the device. The subsystem may be a simple location name or a hierarchical subsystem name. If a hierarchical subsystem name is specified, the subsystem hierarchy components must be separated by periods("."). Periods must not otherwise be used. Other characters that cannot be used in a subsystem name are the backslash ("\"), colon (":"), forward slash ("/"), or double-quote characters. For very large networks, subsystem numbers may be used instead of subsystem names, for example: "1.2.29".

SampleAvg (UCPTsampleAvg): Number of data samples to be taken for calculating an average value. The range is 0 to 25. Default Value is 15.

ScrollDisp (UCPTscrollDisp): Enable or disable the scrolling of the main display screens. The default is disabled.

TimeDisp (UCPTtimeDisp): Enable or disable the displaying of the main Time display screen. The default is disabled.

6

Specifications

6.1 Overview

This section includes the key electrical and environmental specifications for the SI-40-L.

6.2 Electrical

Power Supply Input

Nominal Input Voltage: 24 VAC/VDC
Input Voltage Range: 19.2-28.8 VAC
    21-28 VDC

Maximum Power Consumption

SI-40-L-TC	1.5 VA
SI-40-L-TH	1.4 VA
SI-40-L-THC	1.6 VA
SI-40-L-THCV	2.0 VA

6.3 Environmental

Temperature

Operating   0 to 50 °C, 32 to 122 °F
Non-operating   -20 to 70 °C, -4 to 158 °C

Humidity

Operating   5 – 95% RH @ 25 °C (non-condensing)
Non-operating   5 – 95% RH (non-condensing)

6.4 Temperature Sensor

Display

Range: Limits of Sensor (-37.22 to 115.56 °C, -35.0 to 240.0 °F), Note: must stay within operating temperature range of SI-40-L (0 to 50 °C, 32 to 122 °F)

Sensor

Sensor Type: Thermistor, 10K Type II
Accuracy: ± 0.5 °C, ± 1.0 °F
Resolution: 0.1 degree both °C and °F (default), optional software selectable 0.5 and 1 degree.

6.5 Humidity Sensor

Display

Range: 0.00 to 99.99 %RH

Sensor

Type: Capacitive 4C CMOSens®
Accuracy: $\pm 1.8\%$ RH (10 to 90% RH)
Repeatability: +0.1 %RH, typical
Hysteresis: ± 1 %RH, typical
Long Term Drift: <0.5 %RH/yr, typical

6.6 CO2 Sensor

Display

Range: 0 to 9999 ppm

Sensor

Type: Non-Dispersive Infrared (NDIR)
Accuracy: ± 30 ppm $\pm 2\%$ of measured value (25°C, 101.325KPa)
Repeatability: ± 20ppm $\pm 1\%$ of measured value

6.7 VOC Sensor

Display

Range: 0 to 1000 (no units), scaled over range of sensor

Sensor

Type: Metal Oxide Semiconductor
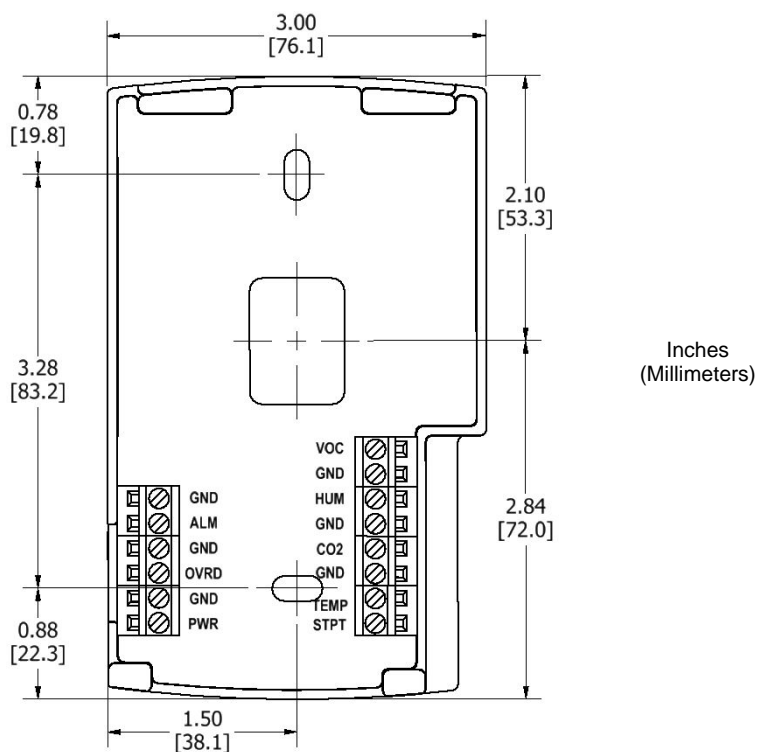Target Gases: Air Contaminants

7

Mechanical

7.1 Overview

This section includes the key mechanical dimensions and mounting information for the SI-40-L.

7.2 Dimensions

Overall Dimensions
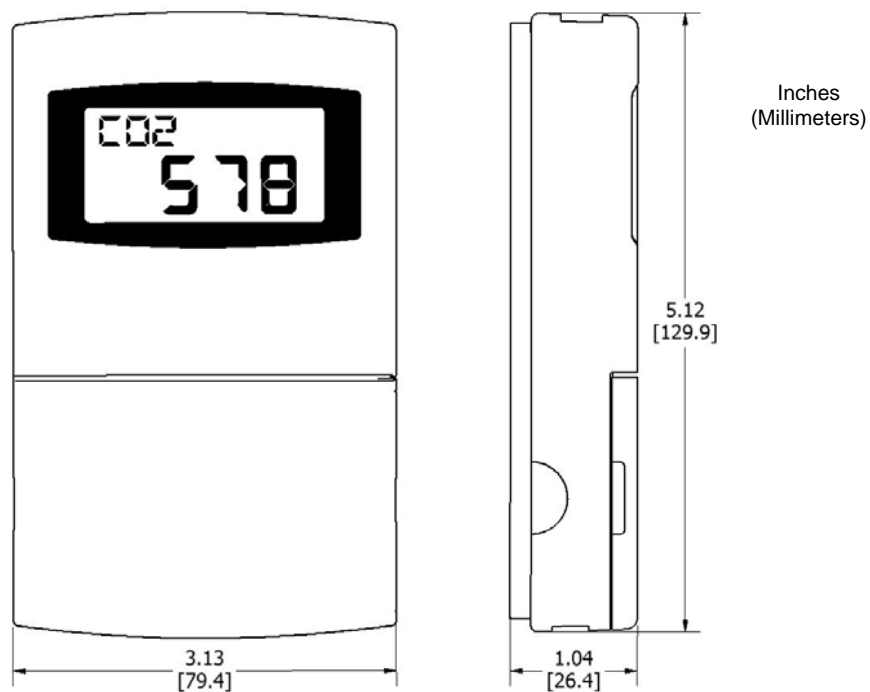
Base Plate

7.3 Mounting

Location

Position the SI-40-L vertically on the wall in the proper up-right position. The SI-40-L should be mounted approximately 4 ½ feet (54 inches) high from the floor and should be located on an interior wall. Do not mount the SI-40-L close to windows, vents or any other type of ventilation or heating/cooling source.

Locking Set Screws

When removing the cover from the base, make sure the two locking set screws at the bottom of the cover are not protruding into the cover and locking the cover in place. To release the cover from the base use a 1/16 inch hex key or allen wrench to back the screws into the base to free the cover for removal.

The locking screws prevent the cover from being easily removed without the necessary tools. Locking the cover to the base also prevents removal of the SI-40-L once mounted at its proper location.
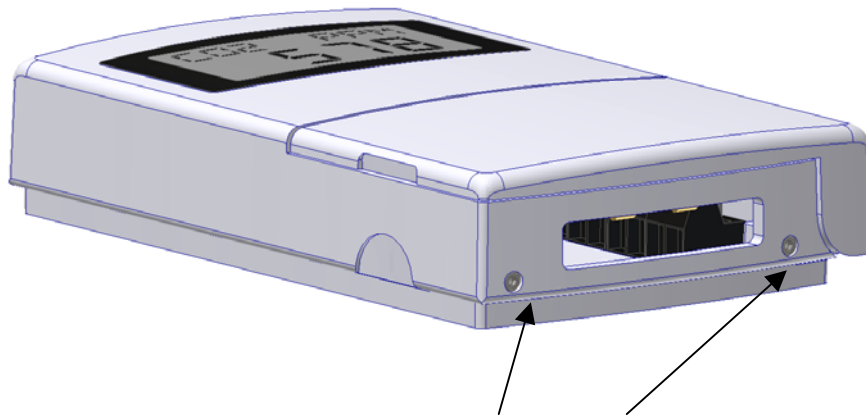
Set Screws to lock Cover to Base.
Use 1/16 inch hex key or allen
wrench to adjust.

Figure 7.3.1, Set Screw Location

Cover Removal – Not Mounted

When not mounted on a wall, remove the cover by holding onto the base with one hand and then with the other hand, hold the bottom of the cover and gently pull the bottom portion of the cover away from the base. This will create a small lever like motion.   See Figure 7.3 for gently pulling on the bottom of the cover.
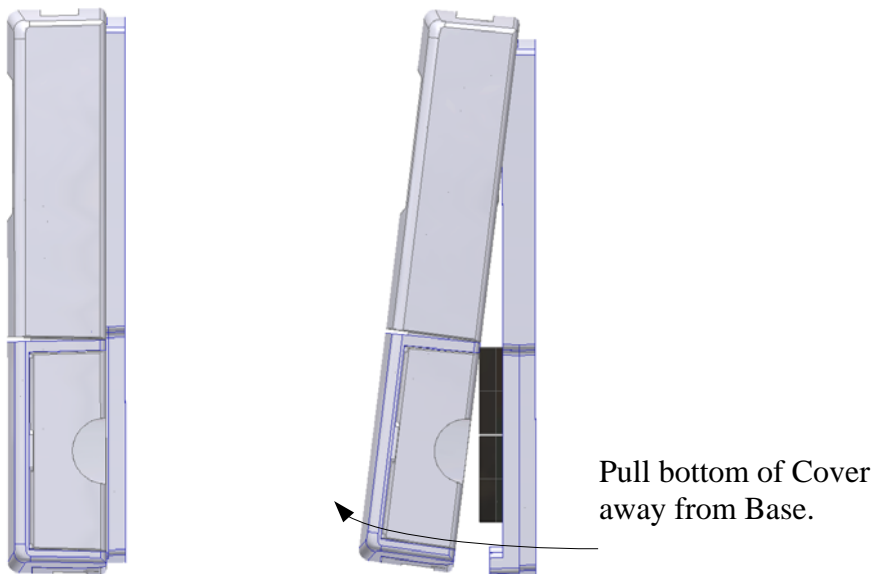
Pull bottom of Cover away from Base.

Figure 7.3.2, Remove Cover by first gently pulling the bottom portion of the Cover away from the Base.

Note, the mounting tabs on the cover and the mounting slots on the base will still fasten the top of the cover to the base at this point. See Figure 7.3.3.

Figure 7.3.3, Top Cover Mounting Tabs and Top Base Mounting Slots

Once the bottom of the cover becomes free from the base, apply a small upward motion to remove the top mounting tabs on the cover from the top mounting slots on the base fully releasing the cover from the base. See Figure 7.3.4. Care must be taken when applying the small upward motion so that the mounting slots on the base do not hit or damage any sensors or circuit components inside the cover.

Move Cover slightly upward and away from base to remove cover mounting tabs from base mounting slots and free the cover from the base.
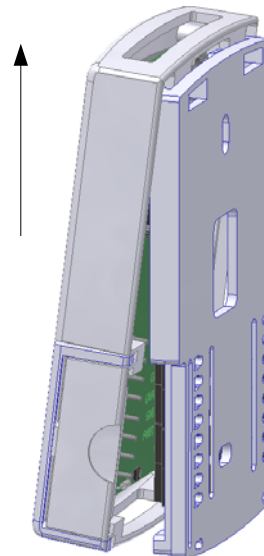

Figure 7.3.4, Remove the Cover mounting tabs from the Base mounting slots.

Cover Removal - Mounted

When mounted on a wall, remove the cover by holding the bottom of the cover by its sides and gently pull the bottom portion of the cover away from the base. This will create a small lever like motion. Note, the mounting tabs on the cover and the mounting slots on the base will still fasten the top of the cover to the base at this point. Once the bottom of the cover becomes free from the base, apply a small upward motion to remove the top mounting tabs on the cover from the top mounting slots on the base fully releasing the cover from the base. Care must be taken when applying the small upward motion so that the mounting slots on the base do not hit or damage any sensors or circuit components inside the cover.

Base Plate Mounting

There are two mounting holes in the base plate to mount the SI-40-L to a wall, junction box or other fixture. See Section 7.2 for dimensions of base plate and mounting holes. Note, all connection wires are run through the center rectangular hole to the base plate plugs.
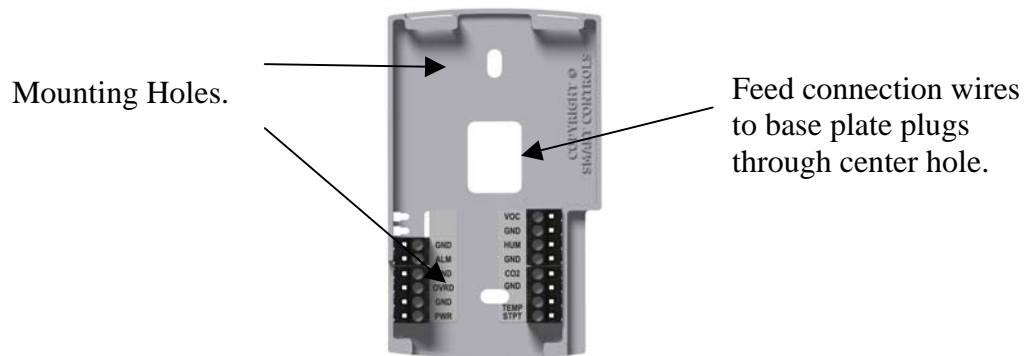

Mounting Holes.

Feed connection wires to base plate plugs through center hole.

Figure 7.3.5, Mounting Hole Location

Wiring

See section 8.1 for an example of how to wire the SI-40-L.

Cover Placement

To place the cover back on the base, align the mounting tabs on the top of the cover with the mounting slots on the base. See Figure 7.3.6. Slide the mounting tabs into the mounting slots.

Figure 7.3.6, Align Cover Mounting Tabs with Base Mounting Slots

Pivot the bottom of the cover into the base plate connecting the terminals on the cover with the plugs on the base. See Figure 7.3.7. Make sure the locking set screws are not protruding from the base while pivoting the cover. The locking set screws will prevent the base from fully pivoting shut if they are protruding while trying to place the cover on the base.
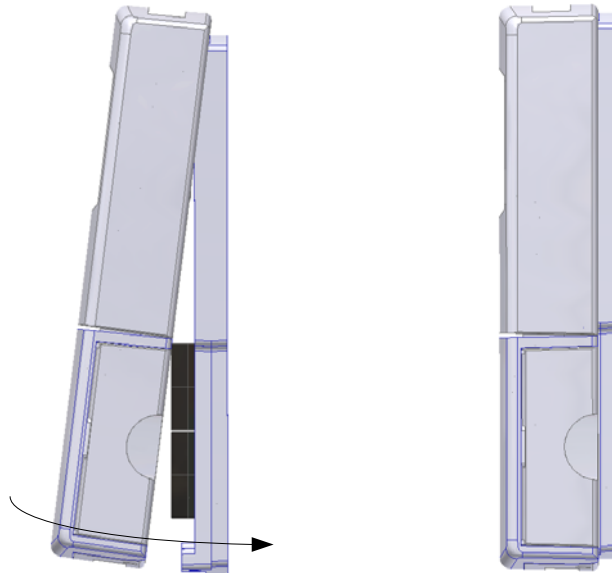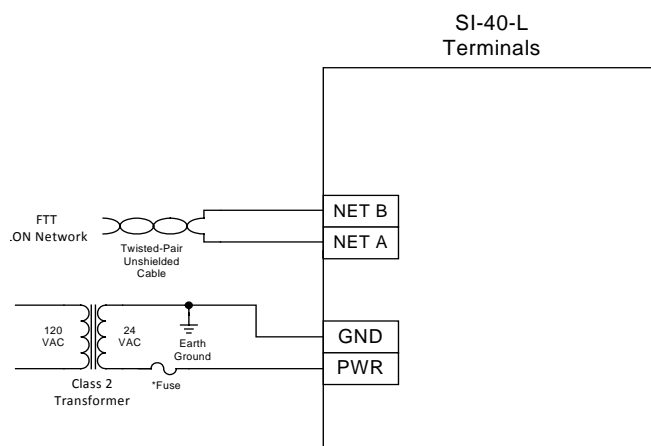

Figure 7.3.7, Pivot the Bottom of the Cover on into the Base

Once the cover is fastened to the base, the locking set screws can be backed out to securely lock the cover to the base.

8

Wiring

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8.1 Example Diagram

This section includes example wiring of the SI-40-L

SI-40-L
Terminals

NET B
NET A

FTT
.ON Network
Twisted-Pair
Unshielded
Cable

120
VAC

24
VAC

Earth
Ground

GND
PWR

Class 2
Transformer

*Fuse

IMPORTANT WIRING
INFORMATION

This diagram is an example of
device connections and no
reference to an application is bein
provided.

Secondary of Class 2 Transforme
should always be earth grounded
provide reliable communication ar
sensor readings.

*External fuse not supplied. Size
fuse according to application load
and not to exceed 5 Amps.

Power wires should always be
located away from signal wires.

Figure 8.1, Example Wiring Diagram for the SI-40-L