# IOX MODULES
# USER MANUAL

AMERICAN
AUTO-MATRIX®
SMART BUILDING SOLUTIONS®

*IOX Module User Manual*

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WORLD HEADQUARTERS

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***Version 1.1***

- §1.4 - Explicitly dtate 18-22 ga. requirement for STATbus wiring.
- §3.3 - Corrected power limits for GPC1 and GPC3.
- Typographical fixes.

***Version 1.0*** - Initial Manual Release

## Section 1 - Overview



## Section 2 - IOX Modules

## Section 3 - STATbus design



## Appendix A - Approved Relays

# Section 1: Overview

This section describes IOX modules, gives a brief description of their features and lists the specifications for the different units.

## In this section

## 1.1 WHAT ARE IOX MODULES?

IOX modules are specialized STATbus devices which allow you to add remote I/O points to controllers in the GPC family.

IOX modules are an integral part of the NB-GPC3 and SBC-GPC3 controllers. These units have no on-board I/O and, instead, are built up using IOX modules to achieve the number of inputs and outputs needed. This allows you to craft a controller with a completely customized I/O profile. In this way, you can tailor the controller to suit the job rather than designing the job around the capabilities of a controller. This will allow you to make decisions based on good design principles rather than system limitations.

## 1.2 FEATURES OF IOX MODULES

- Provide remote I/O points to GPC controllers
- Provide the ability to locate I/O hardware where it is most convenient
- Communication via STATbus
- Easy 2- or 4- wire connection using twisted pair wire
- Easy configuration via software tools such as *NB*-Pro or SoloPro

## 1.3 REMOTE I/O AND MAPPING POINTS

IOX modules provide additional, remote I/O points to GPC controllers. Modules exist that can provide additional Universal Input, Pulse Input, Analog Output and Digital Output points. These points appear to the GPC to be identical to an on-board input or output, therefore only minimal additional work is needed when commissioning IOX modules

Remote I/O behaves in the same way as on-board I/O, except that it is located remotely from the controller. Because they are not on-board, each remote device requires a unique address, known as a Global Identification (GID) number so that the controller may recognize and direct communications to it. When working with IOX modules, there is the additional commissioning step of associating the remote I/O point with inputs and outputs within the controller. This is accomplished by assigning the GID number of the device to the desired input or output. Once the IOX module is mapped in this way, it will function as any other input or output of the same type.

# 1.4 SPECIFICATIONS

## 1.4.1 GENERAL

### 1.4.1.1 NETWORKING

- **communications protocol:** STATbus
- **wiring:** 2- or 4-wire (device dependent), 18-22 ga., twisted pair
- **update frequency:** nominally every 100 mS
- **network configuration:** multidrop bus

### 1.4.1.2 TERMINATIONS

- Pluggable terminal blocks for inputs and/or outputs, power and network connection.

### 1.4.1.3 OPERATING ENVIRONMENT

- **temperature range:** 32-122°F (0-50°C)
- **humidity range:** 0-80% RH, non-condensing

### 1.4.1.4 AGENCY APPROVALS

- UL listed 916, Management Equipment, Energy (PAZX) (pending)
- FCC rules Part 15 Class B Computing Device (pending)
- UL 873 Recognized, Component-Temperature Indicating and Regulating Equipment
- Complies with CE directives and standards (XAPX2) (pending)

## 1.4.2 SSB-FI1

### 1.4.2.1 I/O

- One (1) 12-bit Universal Input (interpolated to a 16-bit value)
- Selectable 0-5 VDC,0-10 VDC, 0-20 mA or 0-250 kΩ input range

### 1.4.2.2 POWER REQUIREMENTS

- None

### 1.4.2.3 DIMENSIONS

- **size:** 3.02 x 1.41 x .95in. (7.67 x 3.58 x 2.41 cm)
- **shipping weight:** .04 lb. (.018 kg)

## 1.4.3 SSB-UI1

### 1.4.3.1 I/O

- One (1) 24-bit Universal Input
- Selectable 0-5 VDC,0-10 VDC, 0-20 mA or 0-250 kΩ input range

### 1.4.3.2 POWER REQUIREMENTS

- 24VAC, 50/60 Hz, 1 A (max)

### 1.4.3.3 DIMENSIONS

- **size:** 4.2 x 4.2 x 1.0 in. (10.67 x 10.67 x 2.54 cm)
- **shipping weight:** .50 lb. (.23 kg)

## 1.4.4 SSB-AO1

### 1.4.4.1 I/O

- One (1) Analog Output
- Selectable 0-10 VDC or 0-20 mA output range

### 1.4.4.2 POWER REQUIREMENTS

- 24VAC, 50/60 Hz, 1 A (max)

### 1.4.4.3 DIMENSIONS

- **size:** 4.2 x 4.2 x 1.0 in. (10.67 x1 0.67 x2 .54 cm)
- **shipping weight:** .50 lb. (.23 kg)

## 1.4.5 SSB-DI1

### 1.4.5.1 I/O

- One (1) Optically Isolated, Pulse Counting, Digital Input

### 1.4.5.2 POWER REQUIREMENTS

- 24VAC, 50/60 Hz, 1 A (max)

### 1.4.5.3 DIMENSIONS

- **size:** 4.2 x 4.2 x 1.0 in. (10.67 x 10.67 x 2.54 cm)
- **shipping weight:** .50 lb. (.23 kg)

## 1.4.6 SSB-DO1

### 1.4.6.1 I/O

- One (1) Digital Output (relay)

### 1.4.6.2 POWER REQUIREMENTS

- 24VAC, 50/60 Hz, .25 A (max)

### 1.4.6.3 DIMENSIONS

- **size:** 4.75 x 3.25 x 2.0 in. (12.07 x 8.26 x 5.08 cm)
- **shipping weight:** .50 lb. (.23 kg)

## 1.4.7 SSB-DO1-I

### 1.4.7.1 I/O

- One (1) Digital Output (relay)
- One (1) Digital Input (dry contact only, no pulse counting)

### 1.4.7.2 POWER REQUIREMENTS

- 24VAC, 50/60 Hz, .25 A (max)

### 1.4.7.3 DIMENSIONS

- **size:** 4.75 x 3.25 x 2.0 in. (12.07 x 8.26 x 5.08 cm)
- **shipping weight:** .50 lb. (.23 kg)

## 1.4.8 SSB-DO2

### 1.4.8.1 I/O

- Two (2) Digital Outputs (relays)

### 1.4.8.2 POWER REQUIREMENTS

- 24VAC, 50/60 Hz, .25 A (max)

### 1.4.8.3 DIMENSIONS

- **size:** 4.75 x 3.25 x 2.0 in. (12.07 x 8.26 x 5.08 cm)
- **shipping weight:** .56 lb. (.25 kg)

## 1.4.9 SSB-DO2-I

### 1.4.9.1 I/O

- Two (2) Digital Outputs (relays)
- Two (2) Digital Inputs (dry contacts only, no pulse counting)

### 1.4.9.2 POWER REQUIREMENTS

- 24VAC, 50/60 Hz, .25 A (max)

### 1.4.9.3 DIMENSIONS

- **size:** 4.75 x 3.25 x 2.0 in. (12.07 x 8.26 x 5.08 cm)
- **shipping weight:** .56 lb. (.25 kg)

## 1.4.10 SSB-IOX1

### 1.4.10.1 I/O

- Four (4) 24-bit Universal Inputs
- Selectable 0-5 VDC,0-10 VDC, 0-20 mA or 0-250 kΩ input range
- One (1) Optically Isolated, Pulse Counting, Digital Input
- Two (2) Analog Outputs
- Selectable 0-10 VDC or 0-20 mA output range
- Two (2) Digital Outputs (triacs)

### 1.4.10.2 POWER REQUIREMENTS

- 24VAC, 50/60 Hz, 1.85 A (max)

### 1.4.10.3 DIMENSIONS

- **size:** 5.75 x 6.35 x 1.05 in. (14.60 x 16.13 x 2.67 cm)
- **shipping weight:** .95 lb. (.42 kg)

# Section 2: IOX Modules

*This section describes the features of the various IOX modules, STATbus devices designed to expand the I/O capabilities of the GPC. The installation, configuration and usage of these modules will be discussed.*

## In this section



*Table 2-1: IOX module Configurations*

| IOX Module | Universal Inputs | Digital Inputs | Analog Outputs | Digital Outputs |
|---|---|---|---|---|
| SSB-FI1 | 1 | - | - | - |
| SSB-UI1 | 1 | - | - | - |
| SSB-AO1 | - | - | 1 | - |
| SSB-DI1 | - | 1 | - | - |
| SSB-DO1 | - | - | - | 1 |
| SSB-DO1-I | - | 1* | - | 1 |
| SSB-DO2 | - | - | - | 2 |
| SSB-DO2-I | - | 2* | - | 2 |
| SSB-IOX1 | 4 | 1 | 2 | 2 |

* The digital inputs on the SSB-DO1-I and SSB-DO2-I may only be used for dry contacts and have no pulse counting capabilties.

## 2.1 INTRODUCTION

IOX (Input / Output eXpansion) modules are STATbus devices that add remote inputs and/or outputs to GPC controllers. Depending on the module used, the I/O of the controller can be incremented in groups or by as little as a single input or output. I/O points on IOX modules behave just as on-board I/O points except that they require the additional commissioning step of mapping the IOX module to input(s) and/or output(s) in the controller.

# 2.2 GID NUMBERS AND MAPPING IOX MODULES

## 2.2.1 WRITING GIDS TO DEVICES

Every IOX module has a unique Global Identification (GID) which is identical to the unit's serial number. The GID number is the address that the GPC will use to uniquely identify and communicate with the module. The GID numbers are used during commissioning to map the remote I/O point(s) on the IOX modules to inputs and/or outputs in the GPC.

**NOTE**

It is recommended that, at some point before or during installation, you compile a list of all the STATbus devices, their location or function, and their GID numbers. This information will be needed in the commissioning of the project and may be difficult to obtain once the units are installed.

To prepare the controller to perform this mapping you must set the **(CR) Configure Remote I/O** property in the Device object for BACnet controllers or the FF00;**CR** attribute for PUP controllers. Setting the Configure Remote I/O property or attribute to "Edit I/O GIDs" (**CR**=2) allows you to manually assign the GID numbers of remote I/O devices located on the STATbus to the inputs or outputs in the GPC.

You must select an input or output in the controller and choose the device you wish to assign to it. You must then enter the GID number of the chosen device in to the **(GI) GID of I/O Device** property for the input or output or FE0x;**GI**, FE3x;**GI**, FD0x;**GI**, or FB0x;**GI** attribute. If the GID entered is valid, the GID number will be displayed. For BACnet controllers, the type of device will be displayed in **GI** as well. You can repeat this process of assigning GIDs for as many devices as you wish to configure.

Once all the devices you wish to configure have had their GIDs successfully assigned to an input or output, you must set the **(CR) Configure Remote I/O** property or the FF00;**CR** attribute to "GPC to Bus" (**CR**=1). This will write the configuration information to the devices on the STATbus network. The Configure Remote I/O setting will automatically return to "Normal" (**CR**=0) once the write is complete, eliminating the possibility of accidentally overwriting STATbus configuration information.

**NOTE**

When working with the SBC-GPC1 and NB-GPC1, you may only assign remote I/O points to Universal Inputs 13-24, Digital Inputs 2-4, Analog Outputs 7-12, and Digital Outputs 7-12. The other inputs and outputs have the controller's the on-board I/O mapped to them.

### 2.2.2 REMOVING GID ASSIGNMENTS

Once the GID of an IOX module has been mapped to a particular input or output, that mapping is stored both in the controller and on the device itself. If you wish to remove a GID mapping, you can do so by entering a value of 0 into the **GI** property or attribute for the input or output. Unmapping a module in this way will only remove the assignment to that particular input or output and will not effect any other inputs or outputs to which the module is mapped. If the module has multiple inputs or outputs, this will leave all other mappings intact. This situation will cause communication problems between the controller and the module that will result in the module behaving unpredictably.

**NOTE**

When unmapping the GID of a module with multiple inputs and/or outputs, you must zero the GID in all objects or channels to which it is assigned.

### 2.2.3 READING CONFIGURED DEVICES

When configuration information is written to an IOX module, that information is stored on the module. IOX modules store the input or output number to which they are mapped as well as values for most of the properties/attributes settings affecting the module. These includes such things as minimum and maximum scaled values, assigned schedules, alarming options, and more. Using the "GPC from Bus" (**CR**=3) option in the **(CR) Configure Remote I/O** property in the Device object for BACnet controllers or the FF00;**CR** attribute for PUP controllers, allows you to read this configuration information into the controller from the IOX module.

This allows you to pre-configure modules before taking them out into the field and then, once the module is installed, you can simply read the configuration information into the controller. This pre-configuration can greatly reduce the time needed to commission the job.

**CAUTION**

*Each module must be assigned to a different input or output before using the "GPC from Bus" option. If two or more modules are configured to be mapped to the same input or output, the first one read will be the one assigned. All other modules will be ignored.*

**NOTE**

The "GPC from Bus" option will not overwrite assignments already made in the controller. If a non-zero GID value has been assigned to an input or output, the "GPC from Bus" option will not cause that value to be overwritten with a value read from the STATbus.

### 2.2.4 IOX MODULES WITH MULTIPLE I/O POINTS

Some IOX modules provide more than one input or output point on a single module. All of the input and output points on a single module have the same GID number. For these units, mapping the GID number of the device will assign all of the I/O points of that type. These inputs or outputs will be assigned as a block of consecutive inputs or outputs, starting with the input or output to which you assigned the GID number. For example, mapping the GID of an SSB-IOX1 module, which has four universal input points, to Universal Input 13 would automatically assign the same GID to Universal Inputs 14, 15, and 16 as well. Any devices previously mapped to the these inputs would have their GID numbers removed before the GID of the IOX module was written. If the previous assignment was a module with multiple inputs or outputs, all instances of the GID will be removed when the assignment is made. Care should be exercised as mapping multi-point IOX modules can cause previously mapped inputs or outputs to have their assignment information removed.

**CAUTION**

*Assigning the GID number of an IOX module deletes any previous instances where that GID may have already been assigned and overwrites any GID numbers currently assigned to that input or outputs. Mapping IOX modules with more than one input or output can cause previous configuration information to be overwritten.*

When the GID number of IOX modules with multiple inputs or outputs is assigned, the lowest numbered input or output will correspondingly be mapped to the lowest numbered object. In the previous example, the first input on the SSB-IOX1 module, labeled "Universal Input 1", would be mapped to Universal Input 13 on the controller, the second to Universal Input 14, the third to Universal Input 15, etc.

When editing the GIDs, the controller will not accept an entered GID unless there are sufficient channels/objects for all of the remote module's inputs or outputs of the type being assigned. For example, in the example above, if you were to try to assign the SSB-IOX1 module to Universal Input 22, it would not be

accepted because you would not have enough inputs to be able to map all four of the inputs on the module.

# 2.3 SSB-FI1

## 2.3.1 FEATURES

The SSB-FI1, shown in Figure 2-1, is a STATbus device which provides a single remote Flexible Input. A Flexible Input is a lower resolution version of the Universal Input found on the GPC itself. The signal read by the SSB-FI1 is processed using a 12-bit analog-to-digital converter and, through digital signal processing algorithms, extrapolated to a 16-bit reading. The SSB-FI1 is the ideal choice for sensors which do not require excitation power or for inputs which do not require the additional resolution provided by the SSB-UI1.

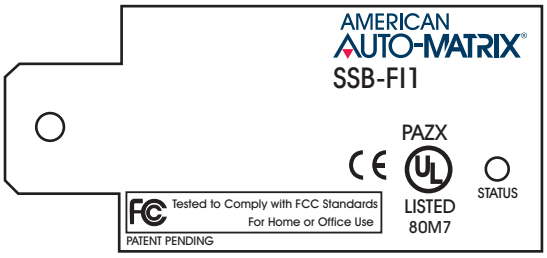


*Figure 2-1: The SSB-FI1*

The input on the SSB-FI1 can be configured to read a 0-10 V, 0-5 V, 0-20 mA or 0-250 kΩ signal using jumpers located on the device. Any of the jumper configurations can also be interpreted by the controller as a digital value by setting the sensor type to digital (**ST**=0). When being interpreted as a digital signal, a reading of 0-25% of full scale corresponds to a zero state and a reading of 26-100% of full scale corresponds to a one state.

## 2.3.2 WIRING/CONFIGURATION

### 2.3.2.1 IVR JUMPER

Before installing the SSB-FI1, you must configure the SSB-FI1 for the type of sensor connected to it, connect the sensor to be used, and connect the SSB-FI1 to the STATbus network. The jumpers used to determine the type of sensor connected to the SSB-FI1 are shown in Figure 2-2.

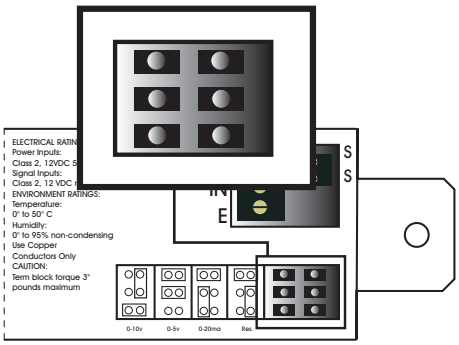


*Figure 2-2: Location of the Input Select Jumpers*

Once the type of sensor that will be connected to the SSB-FI1 has been determined, the jumpers should be moved to the positions appropriate for that type. The jumper settings for a 0-10 V, 0-5 V, 0-20 mA and 0-250 kΩ resistive inputs are given in Figure 2-3a-d respectively. The jumper configurations are also printed on the SSB-FI1 enclosure adjacent to the jumpers.

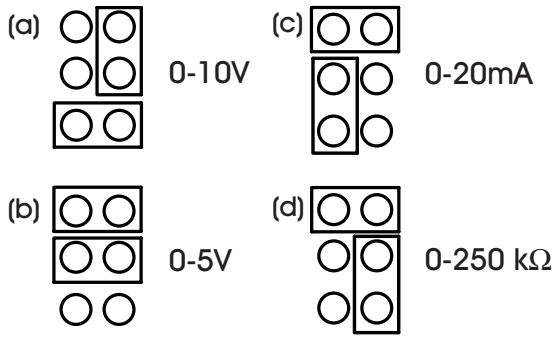


*Figure 2-3: Jumper Settings for the SSB-FI1*

#### 2.3.2.2 INPUT WIRING

The SSB-FI1 is ideal for any sensor which does not require power. A voltage sensor (0-10 V or 0-5V), current sensor (0-20 mA or 4-20 mA), or resistance sensor would all be wired to the SSB-FI1 by connecting the common wire to the COM terminal and the signal wire to the IN terminal as shown in Figure 2-4.

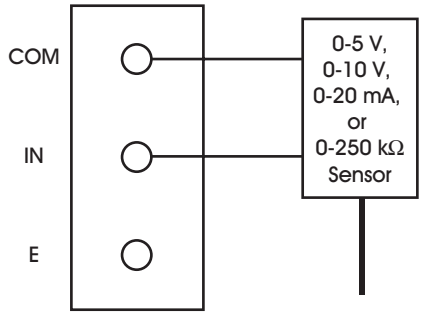


*Figure 2-4: Wiring an Input to the SSB-FI1*

**NOTE**

The COM terminal on the SSB-FI1 is not an electrical ground. The SSB-FI1 will only function properly when connected to isolated, non-grounded sensors.

#### 2.3.2.3 POSITION POTENTIOMETER

The SSB-FI1 can also be used to read information from a position potentiometer. For this type of sensor, the jumpers must be set so that the SSB-FI1 is configured as a voltage input (either 0-5 V or 0-10 V). One side of the resistor should be connected to the COM terminal and the other side to the E terminal. The wiper, providing the position information, is connected to the IN terminal as shown in Figure 2-5.

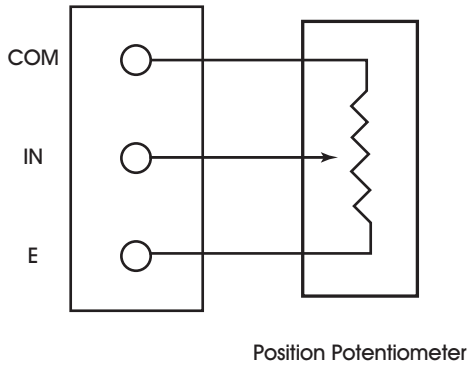


*Figure 2-5:Wiring a Position Potentiometer to the SSB-FI1*

Once the sensor is connected to the SSB-FI1, it must be added to the STATbus network. Connect the pair of wires coming from the last STATbus device to the two-pin terminal block labelled SS on the SSB-FI1. The STATbus network is non-polar, so you do not need to worry about maintaining polarity between devices.

### 2.3.3 MOUNTING THE SSB-FI1

The SSB-FI1 is designed to be mounted inside a standard 2x4 junction box as shown in Figure 2-6. The SSB-FI1 is mounted in the junction box by attaching a screw to the junction box, through the mounting hole, securing the SSB-FI1. The SSB-FI1 should be mounted such that the terminal blocks face the inside of the junction box. When the SSB-FI1 is correctly installed, the GID number printed on the label should be clearly visible.

**NOTE**

All connections should be made to the SSB-FI1 before it is mounted. Before final mounting, make sure that all wires are securely seated in the terminal block plugs and the that the terminal block plugs are firmly inserted in the correct socket.

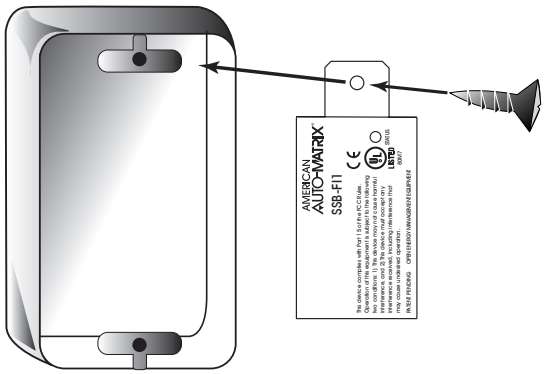


*Figure 2-6: Mounting the SSB-FI1*

### 2.3.4 STATUS INDICATOR LED

The SSB-FI1 has a status indicator LED which provides feedback as to the device's current operational status. The status indicator LED is located on the front of the SSB-FI1 (the side that faces out when installed) as shown in Figure 2-7. This allows status diagnostics to be performed without having to remove the SSB-FI1 or disconnect it from the STATbus.

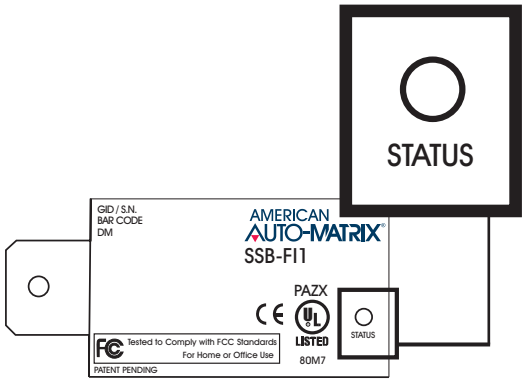


*Figure 2-7: Location of the Status Indicator LED on the SSB-FI1*

The status indicator LED shows one of four different states: powered but not enumerated, enumerated but not configured, configured, and "identify". The different states are indicated by the rate at which the LED blinks. The LED blinking quickly, approximately three to four times per second, indicates that the unit is powered but has not yet been enumerated by the controller. This is useful for identifying units that are correctly wired but not configured. When the device is enumerated but not configured, the blink rate will slow to approximately twice a second.

Once the device has been configured, the blink rate will slow down to approximately one blink per second. This will be the normal state of the device when it is correctly wired, powered, enumerated, and configured in the controller.

When the controller is set to “Identify” in the Configure Function and Configure Device properties, the LED on the SSB-FI1 will be blink three times in quick succession and then pause before repeating the three blinks again. This is especially useful for quickly identifying an individual device in the field when troubleshooting the STATbus.

# 2.4 SSB-UI1

## 2.4.1 FEATURES

The SSB-UI1, shown in Figure 2-8, is a STATbus device which provides a single remote universal input. The input the SSB-UI1 provides is a true 24-bit universal input with more robust signal processing electronics than the SSB-FI1. The SSB-UI1 should be used when using an input which requires excitation power. The SSB-FI1, while capable of reading the signal from such devices, albeit at a lower resolution, is not capable of providing excitation power, so it is not a viable choice when dealing with sensors of this kind.

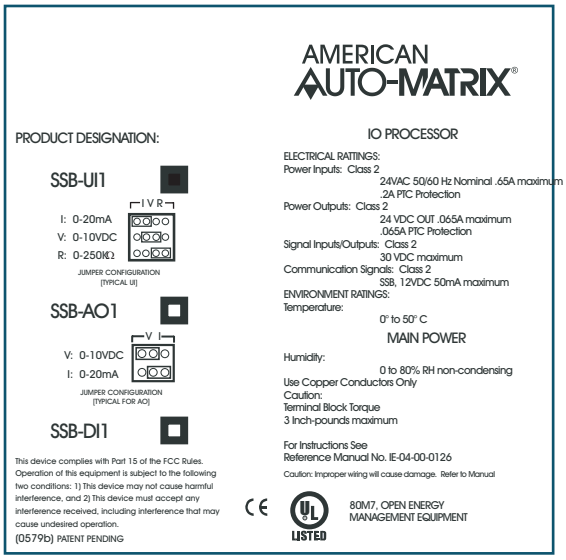


*Figure 2-8: The SSB-UI1*

## 2.4.2 WIRING/CONFIGURATION

Connecting a sensor to the SSB-UI1 requires two steps, connecting the wires from the sensor to the SSB-UI1 and configuring the IVR jumper.

Connections are made to the SSB-UI1 via the terminal blocks, located on the side of the unit which faces into the junction box, as shown in Figure 2-9. There are two sets of terminal blocks, the first is for connection to the STATbus network and power and the second is for the connection of the sensor to the SSB-UI1.

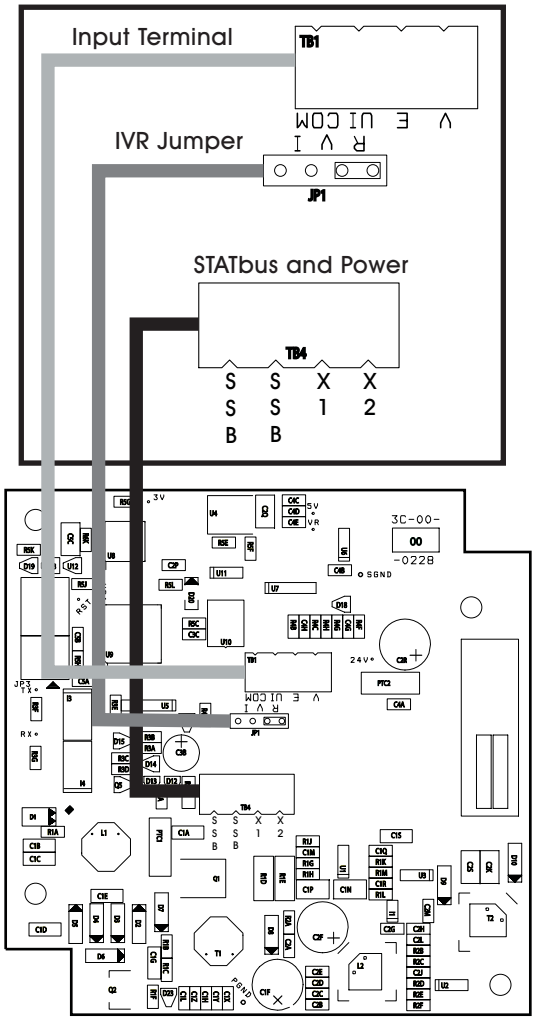


*Figure 2-9: SSB-UI1 Terminal Block Locations*

#### 2.4.2.1 IVR JUMPER

The SSB-UI1 has an IVR jumper, identical in function to the ones found on the GPC, which is used to select the type of input connected to the module. The SSB-UI1 can be configured to read a 0-20 mA, 0-10 V or a 0-250 kΩ sensor. The jumper settings corresponding to these options are shown in Figure 2-10a-c respectively.

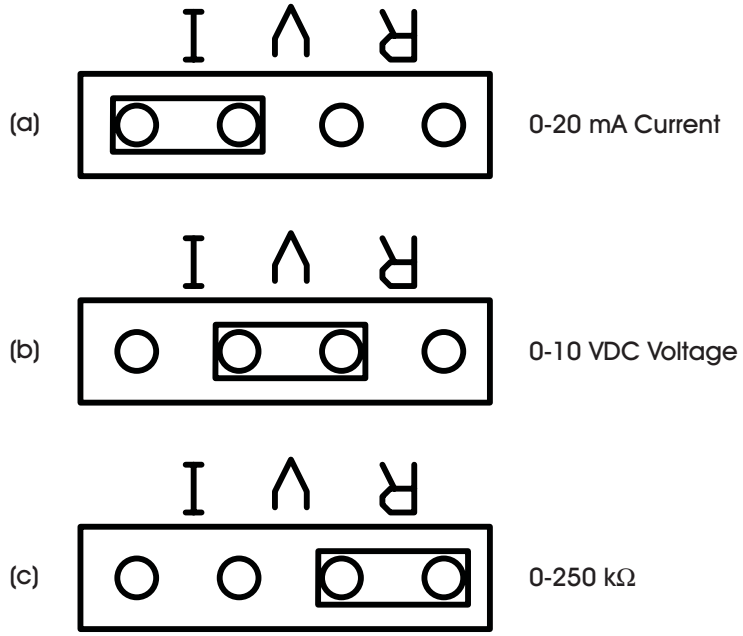


*Figure 2-10: SSB-UI1 IVR Jumper Positions*

#### 2.4.2.2 RESISTIVE INPUTS

A resistive input, such as a thermistor, would be connected as shown in Figure 2-11. One side of the input should be connected to the UI terminal and the other to the COM terminal. Since a thermistor is a resistive input, the IVR jumper should be set to the "R" position.

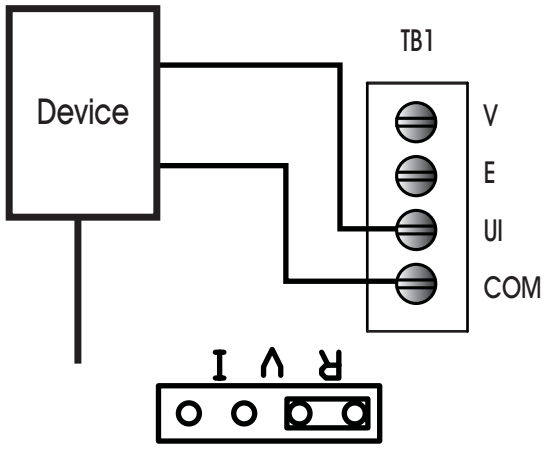


*Figure 2-11: Wiring a Resistive Input to the SSB-UI1*

#### 2.4.2.3 VOLTAGE INPUTS

The connections needed to use a voltage sensor with the SSB-UI1 are shown in Figure 2-12. The signal wire from the sensor should be connected to the UI terminal, the power connection should be connected to

the V terminal and the common wire should be connected to the COM terminal. The IVR jumper should be set to the "V" position when using this type of input.

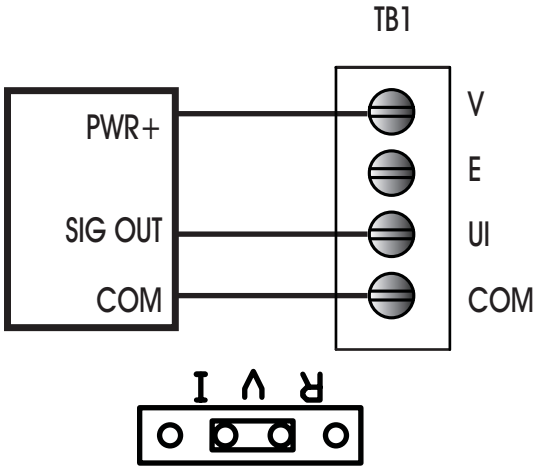


*Figure 2-12: Wiring a Voltage Input to the SSB-UI1*

#### 2.4.2.4 CURRENT INPUTS

When using a current sensor with the SSB-UI1, the sensor would be connected as shown in Figure 2-13. The + and - terminals of the sensor should be connected to the V and UI terminals on the SSB-UI1 respectively. When using 3-wire current sensors, the COM terminal on the sensor should be connected to the COM terminal on the SSB-UI1. Regardless of which type of current sensor you are using, the IVR jumper should be set to the "I" position.

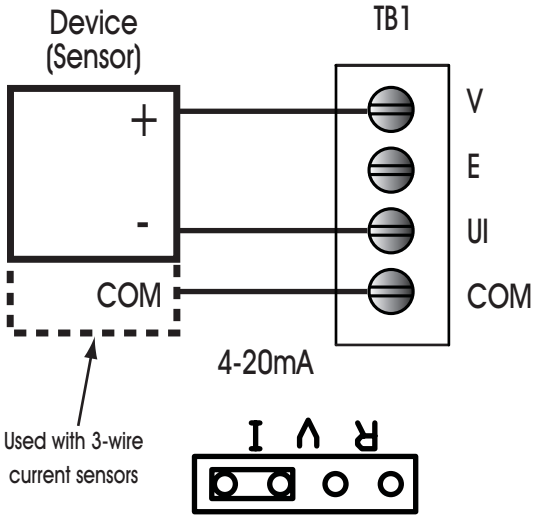


*Figure 2-13: Wiring a Current Input to the SSB-UI1*

#### 2.4.2.5 POSITION POTENTIOMETER

The SSB-UI1 can be configured to read the signal from a position potentiometer as shown in Figure 2-14. For this type of sensor, the one side of the resistor should be connected to the COM terminal, the other side should be connected to the E terminal, and the wiper, providing the position information, should be connected to the UI terminal. When using this type of sensor, the IVR jumper should be set to the "V" position.

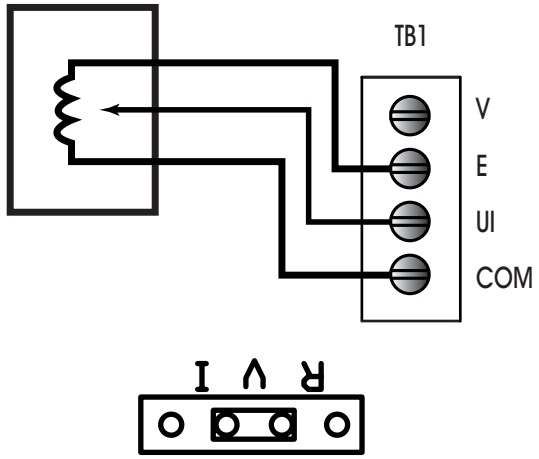


*Figure 2-14: Wiring a Position Potentiometer to the SSB-UI1*

### 2.4.3 MOUNTING THE SSB-UI1

The SSB-UI1 has the same footprint as, and is designed to be mounted on top of, a standard 4x4 junction box, replacing the junction box's cover plate.

Before mounting the SSB-UI1 to the junction box, verify all wiring is correct, making sure that all screw terminals are sufficiently tightened and all terminal blocks are securely seated.

With the wires attached to the device, loosen the screws on the 4x4 junction box slightly. The screws should be loose enough to provide room to slide the SSB-UI1 onto the screws, but not so loose that they can fall out. Align the channels on the back corners of the SSB-UI1 with the screws on the junction box and slide the unit downward onto the screws as shown in Figure 2-15. Tighten the screws through the holes in the front of the SSB-UI1 to secure the device to the junction box.

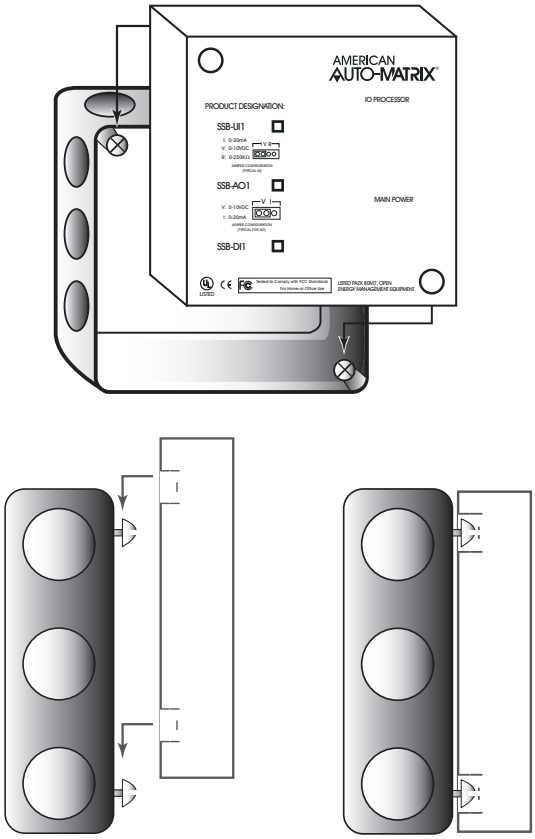


*Figure 2-15: Mounting the SSB-UI1 to a 4x4 junction box*

### 2.4.4 STATUS INDICATOR LED

The SSB-UI1 has an IO Processor indicator LED which provides feedback as to the device's current operational status. The IO Processor indicator LED is located on the front of the SSB-UI1 (the side that faces out when installed) as shown in Figure 2-16. This allows status diagnostics to be performed without having to remove the SSB-UI1.

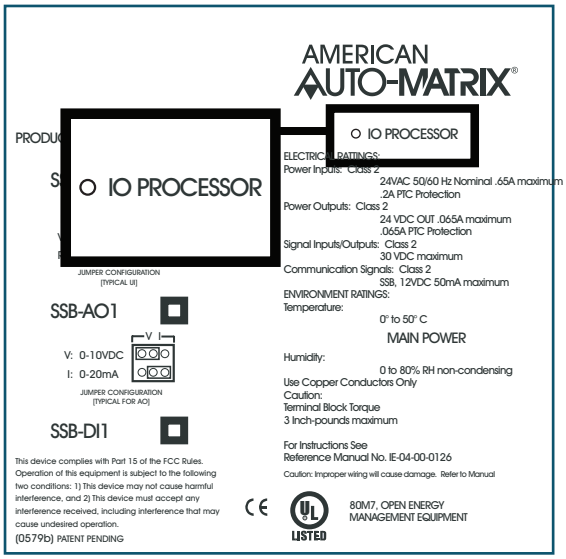


*Figure 2-16: Location of the IO Processor Indicator LED on the SSB-UI1*

The status indicator LED shows one of four different states: powered but not enumerated, enumerated but not configured, configured, and “identify”. The different states are indicated by the rate at which the LED blinks. The LED blinking quickly, approximately three to four times per second, indicates that the unit is powered but has not yet been enumerated by the controller. This is useful for identifying units that are correctly wired but not configured. When the device is enumerated but not configured, the blink rate will slow to approximately twice a second.

Once the device has been configured, the blink rate will slow down to approximately one blink per second. This will be the normal state of the device when it is correctly wired, powered, enumerated, and configured in the controller.

When the controller is set to “Identify” in the Configure Function and Configure Device properties, the LED on the SSB-UI1 will be blink three times in quick succession and then pause before repeating the three blinks again. This is especially useful for quickly identifying an individual device in the field when troubleshooting the STATbus.

# 2.5 SSB-AO1

## 2.5.1 FEATURES

The SSB-AO1, shown in Figure 2-17, is a STATbus device which provides a single remote analog output to the GPC. This output can be configured as either a 0-10 VDC or 0-20 mA output via a user-selectable jumper.


*Figure 2-17: The SSB-AO1*

## 2.5.2 WIRING/CONFIGURATION

Connections are made to the SSB-AO1 via the terminal blocks shown in Figure 2-18. The terminal blocks are located on the side of the unit which faces the junction box. There are two terminal blocks, the first is for connections to the STATbus network and power and the second is for the connection to the output device.

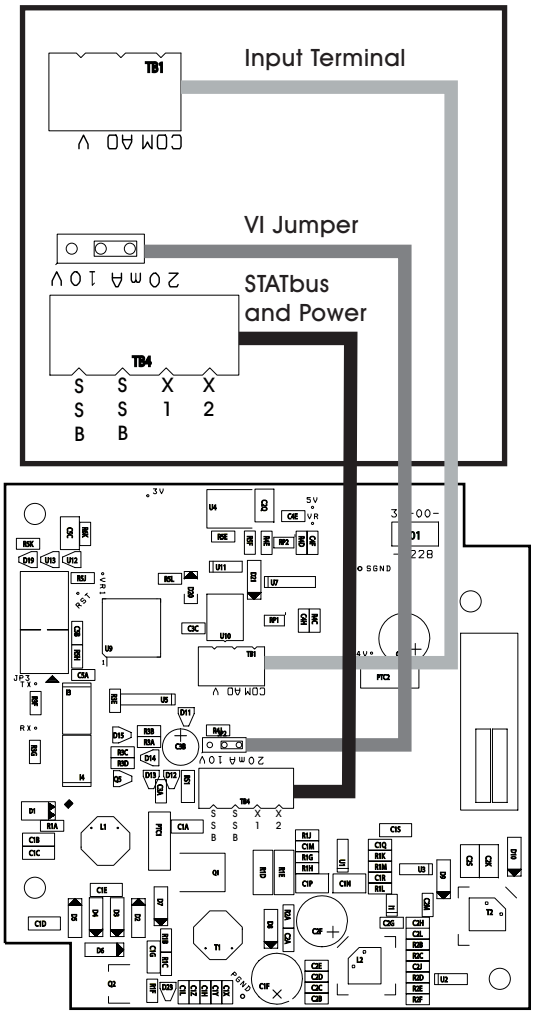


*Figure 2-18:SSB-AO1 Terminal Block Locations*

Each SSB-AO1 has a VI jumper identical to the ones found on the GPC. This is used to select the output range of the SSB-AO1. The output can be configured for 0-10 VDC or 0-20 mA operation, using the jumper positions shown in Figure 2-19a and b respectively.

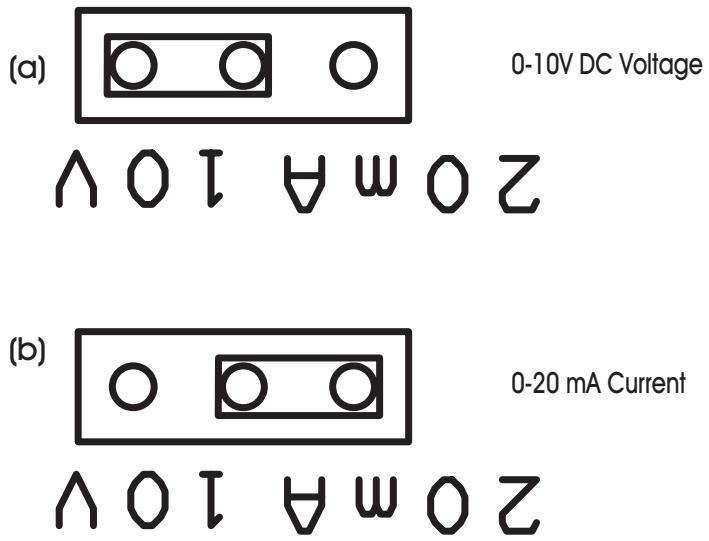


*Figure 2-19: SSB-AO1 VI Jumper Positions*

#### 2.5.2.1 OUTPUT WIRING

When using devices which do not require power, either because they do not require a power supply or because they have a dedicated external power supply, the SSB-AO1 is wired as shown in Figure 2-20. The signal wire should be connected to the AO terminal on the SSB-AO1 and the common wire should be connected to the COM terminal. For a 0-10 V device, the VI jumper should be set to the "V" position. If the device operated on a 0-20 mA signal, you would instead set the VI jumper to the "I" position.

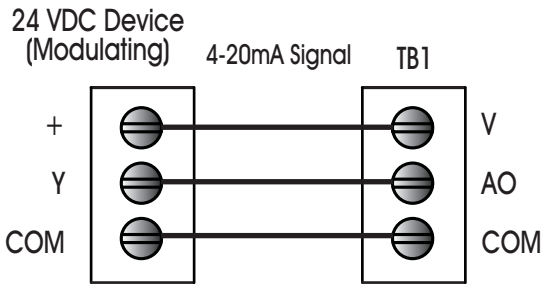


*Figure 2-20: Wiring the SSB-AO1 to a Device That Does Not Require Power*

#### 2.5.2.2 POWERED DEVICES

When the output device requires power, the SSB-AO1 would be connected as shown in Figure 2-21. The + or power wire from the sensor should be connected to the V terminal on the SSB-AO1. The Y wire should be connected to the AO terminal and the common wire should be connected to the COM terminal. For a 0-10 V device, the VI jumper should be set to the "V" position. If the device operated on a 0-20 mA signal, you would instead set the VI jumper to the "I" position.

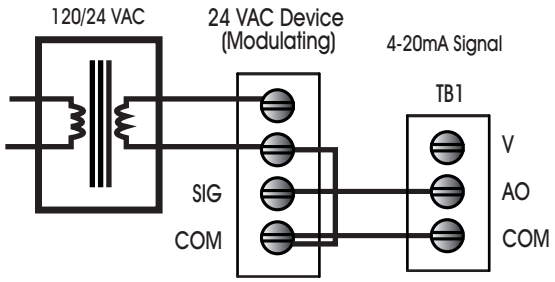


*Figure 2-21: Wiring the SSB-AO1 to a Device That Requires Power*

### 2.5.3 MOUNTING THE SSB-AO1

The SSB-AO1 has the same footprint as, and is designed to be mounted on top of, a standard 4x4 junction box, replacing the junction box's cover plate.

Before mounting the SSB-AO1 to the junction box, verify all wiring is correct, making sure that all screw terminals are sufficiently tightened and all terminal blocks are securely seated.

With the wires attached to the device, loosen the screws on the 4x4 junction box slightly. The screws should be loose enough to provide room to slide the SSB-AO1 onto the screws, but not so loose that they can fall out. Align the channels on the back corners of the SSB-AO1 with the screws on the junction box and slide the unit downward onto the screws as shown in Figure 2-22. Tighten the screws through the holes in the front of the SSB-AO1 to secure the device to the junction box.

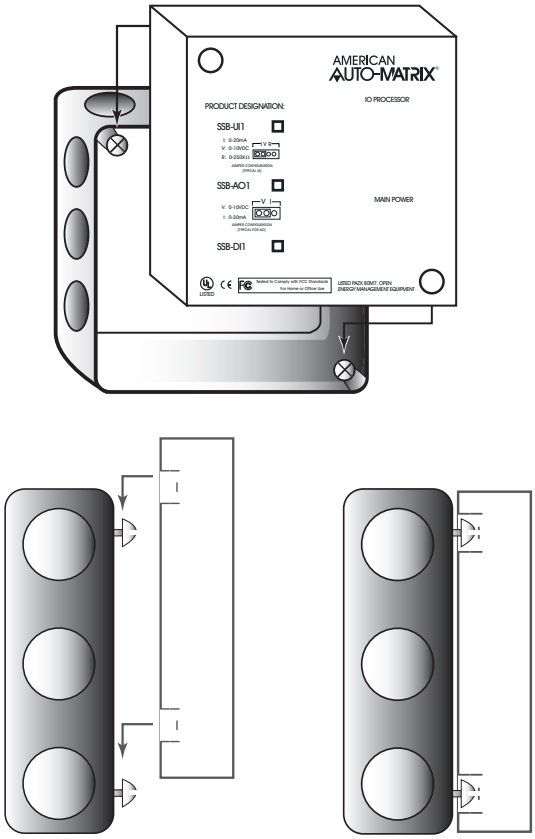


*Figure 2-22: Mounting the SSB-AO1 to a 4x4 junction box*

## 2.5.4 STATUS INDICATOR LED

The SSB-AO1 has an IO Processor indicator LED which provides feedback as to the device's current operational status. The IO Processor indicator LED is located on the front of the SSB-AO1 (the side that faces out when installed) as shown in Figure 2-23. This allows status diagnostics to be performed without having to remove the SSB-AO1.

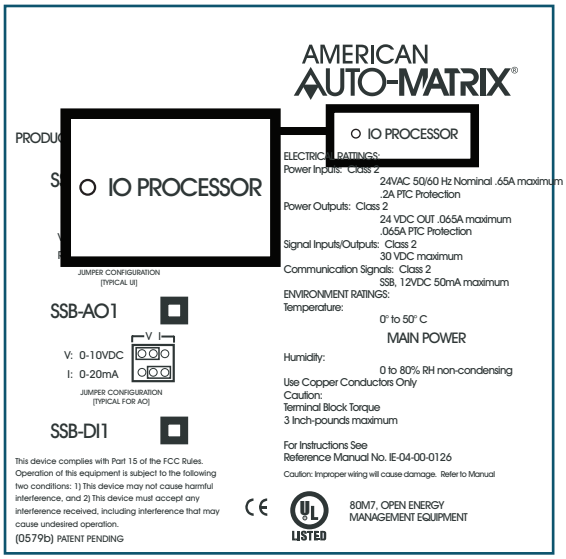


*Figure 2-23: Location of the IO Processor Indicator LED on the SSB-AO1*

The status indicator LED shows one of four different states: powered but not enumerated, enumerated but not configured, configured, and “identify”. The different states are indicated by the rate at which the LED blinks. The LED blinking quickly, approximately three to four times per second, indicates that the unit is powered but has not yet been enumerated by the controller. This is useful for identifying units that are correctly wired but not configured. When the device is enumerated but not configured, the blink rate will slow to approximately twice a second.

Once the device has been configured, the blink rate will slow down to approximately one blink per second. This will be the normal state of the device when it is correctly wired, powered, enumerated, and configured in the controller.

When the controller is set to “Identify” in the Configure Function and Configure Device properties, the LED on the SSB-AO1 will be blink three times in quick succession and then pause before repeating the three blinks again. This is especially useful for quickly identifying an individual device in the field when troubleshooting the STATbus.

# 2.6 SSB-DI1

## 2.6.1 FEATURES

The SSB-DI1, shown in Figure 2-24, is a STATbus module which provides a single remote digital input to the GPC. This input is a wet contact that is capable of pulse counting.


*Figure 2-24: The SSB-DI1*

## 2.6.2 WIRING/CONFIGURATION

Connections are made to the SSB-DI1 via the terminal blocks shown in Figure 2-25. The terminal blocks are located on the side of the unit which faces the junction box. There are two blocks, the first for connections to the STATbus network and power, and the second for the connection to the input device.

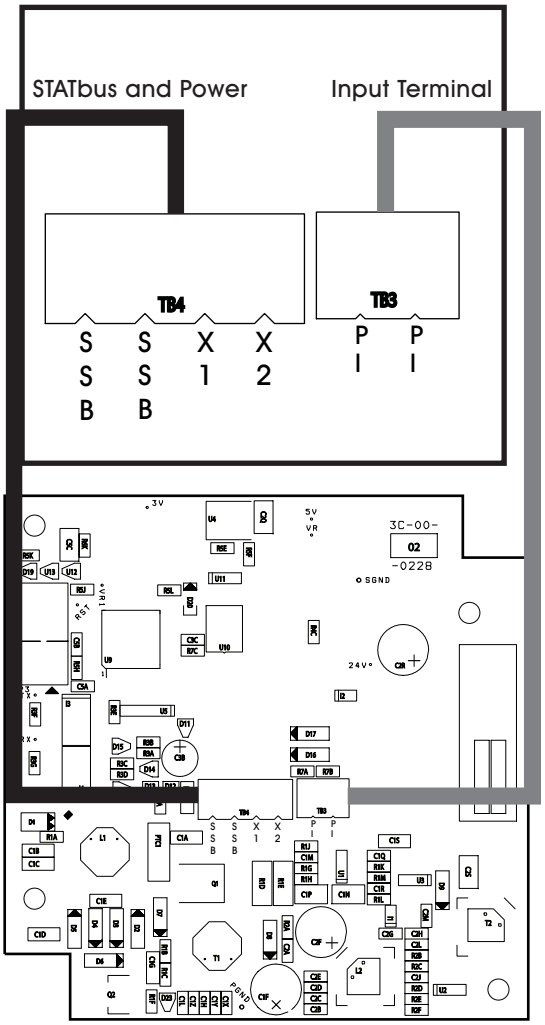


*Figure 2-25:SSB-DI1 Terminal Block Locations*

When the SSB-DI1 is configured to operate with an internally powered input, it would be wired as shown in Figure 2-26. The two wires from the input should be connected to the to PI terminals on the SSB-DI1.

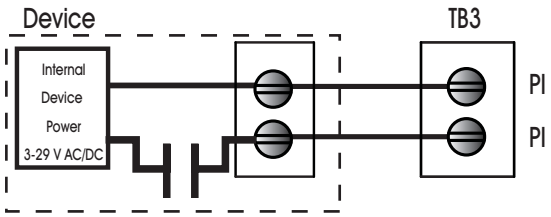


*Figure 2-26: Wiring the SSB-DI1 for use with an Internally Powered Input*

If the SSB-DI1 is to be used with a externally powered input, the wiring must include a source of power for the input device. As shown in Figure 2-27, the X1 and X2 terminals are connected to one of side of the sensor and one of the PI terminal. The other side of the sensor is wired to the remaining PI terminal.

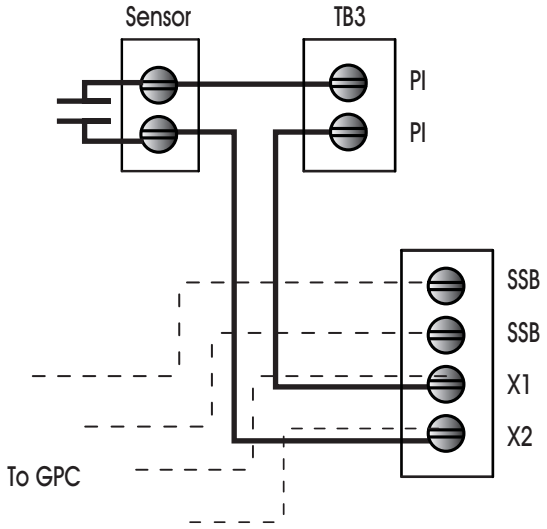


*Figure 2-27: Wiring the SSB-DI1 for use with an Externally Powered Input*

### 2.6.3 MOUNTING THE SSB-DI1

The SSB-DI1 has the same footprint and is designed to be mounted on top of a standard 4x4 junction box, replacing the junction box's cover plate.

Before mounting the SSB-DI1 to the junction box, verify all wiring is correct, making sure that all screw terminals are sufficiently tightened and all terminal blocks are securely seated.

WIth the wires attached to the device, loosen the screws on the 4x4 junction box slightly. The screws should be loose enough to provide room to slide the SSB-DI1 onto the screws, but not so loose that they can fall out. Align the channels on the back corners of the SSB-DI1 with the screws on the junction box and slide the unit downward onto the screws as shown in Figure 2-28. Tighten the screws through the holes in the front of the SSB-DI1 to secure the device to the junction box.

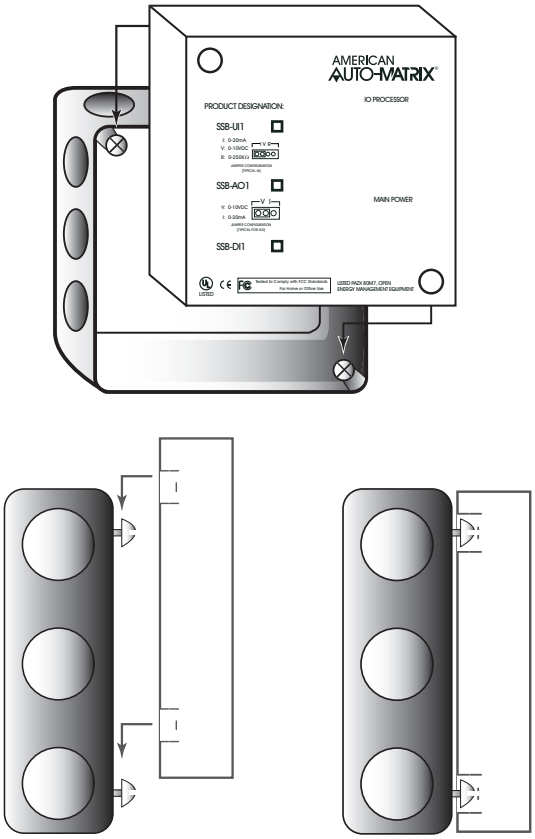


*Figure 2-28: Mounting the SSB-DI1 to a 4x4 junction box*

## 2.6.4 STATUS INDICATOR LED

The SSB-DI1 has an IO Processor indicator LED which provides feedback as to the device's current operational status. The IO Processor indicator LED is located on the front of the SSB-DI1 (the side that faces out when installed) as shown in Figure 2-29. This allows status diagnostics to be performed without having to remove the SSB-DI1.

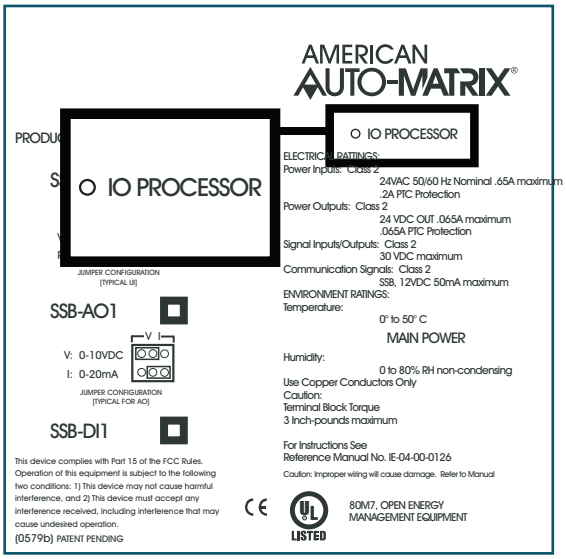


*Figure 2-29: Location of the IO Processor Indicator LED on the SSB-DI1*

The status indicator LED shows one of four different states: powered but not enumerated, enumerated but not configured, configured, and “identify”. The different states are indicated by the rate at which the LED blinks. The LED blinking quickly, approximately three to four times per second, indicates that the unit is powered but has not yet been enumerated by the controller. This is useful for identifying units that are correctly wired but not configured. When the device is enumerated but not configured, the blink rate will slow to approximately twice a second.

Once the device has been configured, the blink rate will slow down to approximately one blink per second. This will be the normal state of the device when it is correctly wired, powered, enumerated, and configured in the controller.

When the controller is set to “Identify” in the Configure Function and Configure Device properties, the LED on the SSB-ADI1 will be blink three times in quick succession and then pause before repeating the three blinks again. This is especially useful for quickly identifying an individual device in the field when troubleshooting the STATbus.

# 2.7 SSB-DO1

## 2.7.1 FEATURES

The SSB-DO1, shown in Figure 2-30, is a STATbus module which provides a single remote digital output to the GPC. The digital output on the SSB-DO1 is a relay capable of switching up to 250 VAC/DC at up to 10 A.

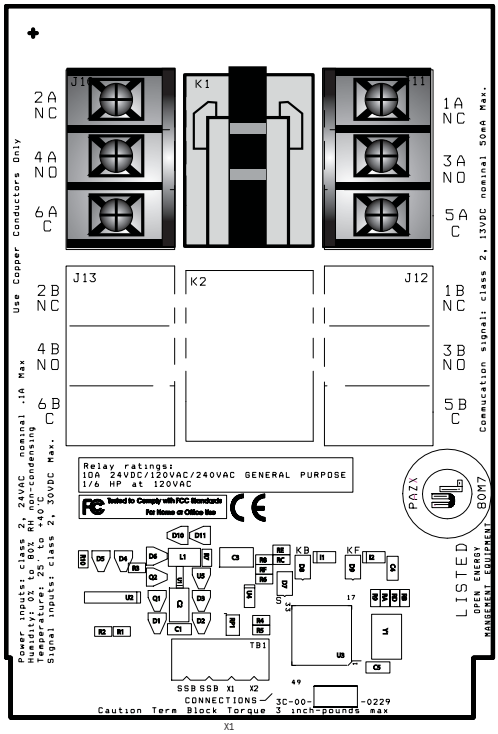


*Figure 2-30: The SSB-DO1*

## 2.7.2 MOUNTING THE SSB-DO1

The SSB-DO1 is intended to be installed near the equipment it is going to control. The module is designed to be mounted in the snap-in plastic track included with the module.

Before installing the module, the snap-in plastic track should be attached to the mounting surface using the screws provided. Once the snap-in plastic track has been firmly attached, the SSB-DO1 should be installed by first inserting one edge of the module in the channel on the inside of one side of the rail and then pressing the module so that it snaps into the other side. This is shown in Figure 2-31.

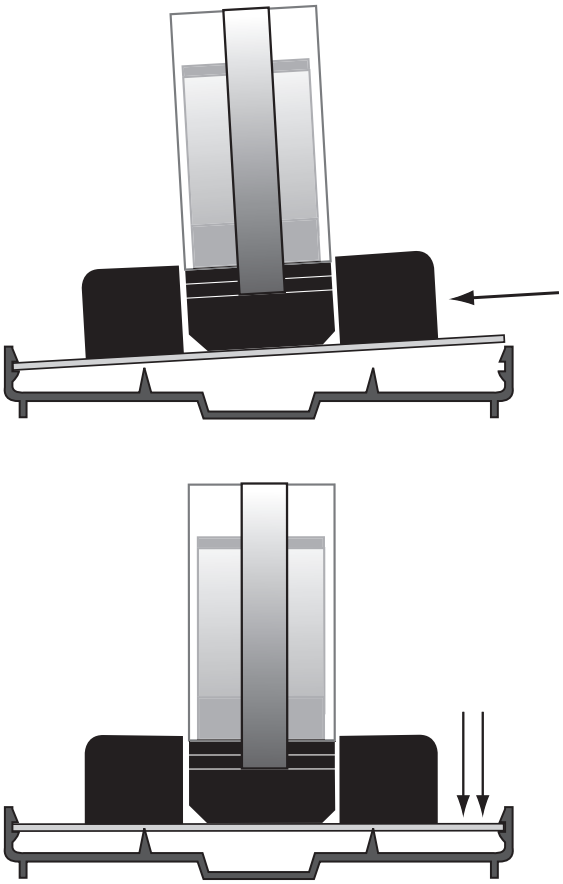

*Figure 2-31: Attaching the SSB-DO1 to the Snap-in Plastic Track*

**CAUTION**

*To avoid damage to the module, you should not attempt to slide the module into the snap-in plastic track.*

Once the module has been properly mounted, you may make the connections for STATbus and power.

## 2.7.3 WIRING/CONFIGURATION

### 2.7.3.1 POWER AND STATBUS CONNECTIONS

Connections for power and STATbus communications are made via terminal block TB1, shown in Figure 2-32. The two wire connection for STATbus communications should be connected to the two leftmost terminals labeled “SSB”. A source of 24VAC should be connected to the right two terminals labeled “X1” and “X2”. The easiest way to connect these terminals is to connect them to the AC OUT terminals on the same terminal block as the SSB connection on the controller. This allows you to simply run a 4-conductor

cable to connect both power and STATbus communications to the device without any additional wiring. Alternately, a dedicated external power supply may be provided for the module.

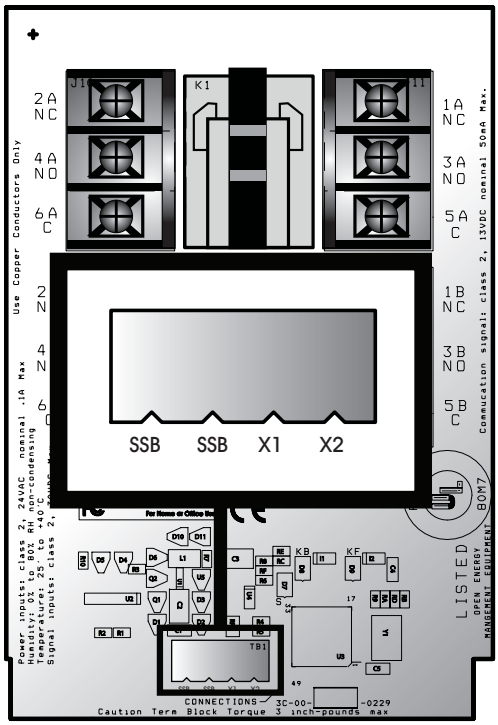


*Figure 2-32: SSB and Power Connections on the SSB-DO1*

### 2.7.3.2 RELAY CONNECTIONS

The SSB-DO1 has a single DPDT relay for its output. When the output is energized, the connection is made between the normally open terminal, labeled 3A and 4A, and the common terminals, labeled 5A and 6A. The normally open terminals are labeled “NO” below the terminal number and the common terminals are labeled “C”. When the output is not energized, connections will be made between the normally closed terminals, labeled 1A and 2A, and the common terminals. Like the normally open terminals, the normally closed terminals are labeled “NC” below the terminal number. The function of each of the relay terminals is summarized in Table 2-2:.

*Table 2-2: SSB-DO1 Relay Terminals*

| Terminal | Connection |
|---|---|
| 1A | Normally Closed (NC) |
| 2A | Normally Closed (NC) |
| 3A | Normally Open (NO) |
| 4A | Normally Open (NO) |
| 5A | Common |

*Table 2-2: SSB-DO1 Relay Terminals*

| Terminal | Connection |
|---|---|
| 6A | Common |

#### 2.7.3.3 CONFIGURATION

To configure the module, you must assign the GID number of the device to the chosen input object by setting the **(CR) Configure Remote I/O** property in the Device Object (for BACnet controllers) or the **CR** attribute in the System channel (for PUP controllers) to “2 = Edit I/O GIDs” and then entering the SSB-DO1 module’s GID number into the **(GI) GID of I/O Device** property of the chosen input object. Once the GID number has been entered, you must set **CR** to “1 = GPC to Bus” to write the configuration information to the module.

# 2.8 SSB-DO1-I

## 2.8.1 FEATURES

The SSB-DO1-I, shown in Figure 2-33, is identical to the SSB-DO1 except that it includes a single dry contact, digital input. The digital output on the SSB-DO1-I is a relay capable of switching up to 250 VAC/ DC at up to 10 A. The digital input is a dry contact which is intended for status monitoring of the output state of the relay. Connecting a wet contact to this input will result in damage to the SSB-DO1-I. This input is mapped to a Digital Input on the GPC but, unlike the digital input on the GPC, is not capable of performing pulse counting.

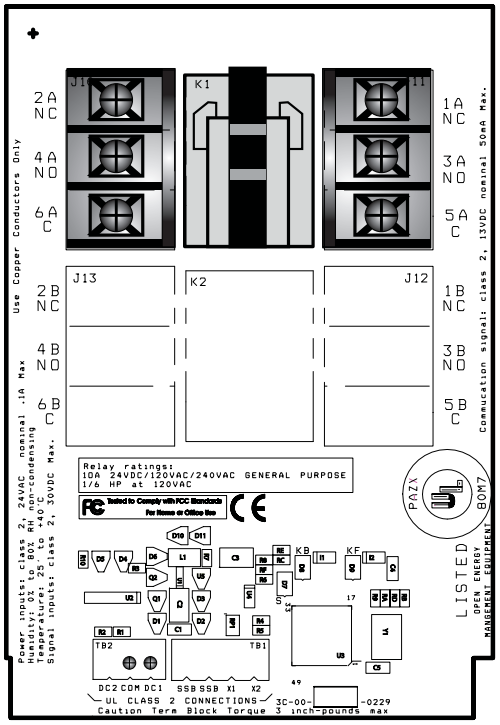


*Figure 2-33: The SSB-DO1-I*

## 2.8.2 MOUNTING THE SSB-DO1-I

The SSB-DO1-I is intended to be installed near the equipment it is going to control. The module is designed to be mounted in the snap-in plastic track included with the module.

Before installing the module, the snap-in plastic track should be attached to the mounting surface using the screws provided. Once the snap-in plastic track has been firmly attached, the SSB-DO1-I should be installed by first inserting one edge of the module in the channel on the inside of one side of the rail and then pressing the module so that it snaps into the other side. This is shown in Figure 2-34.

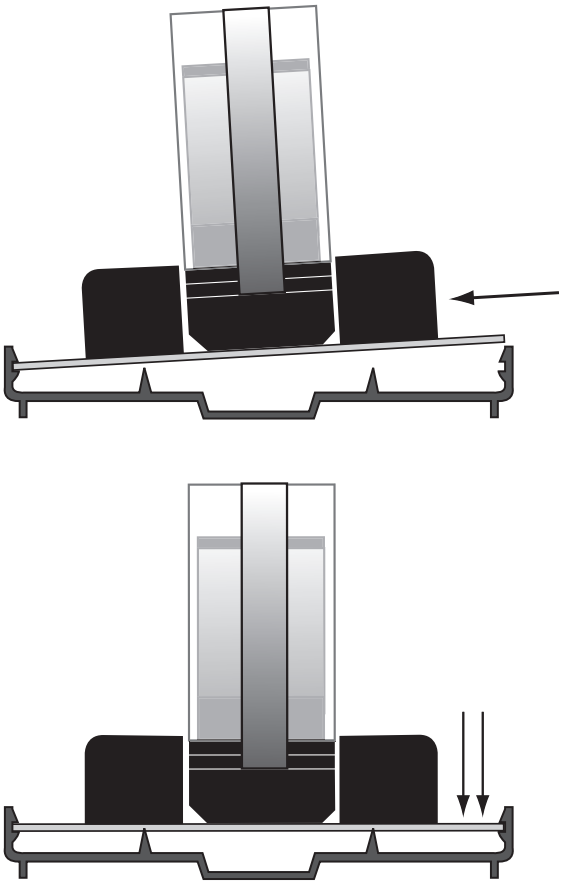

*Figure 2-34: Attaching the SSB-DO1-I to the Snap-in Plastic Track*

**CAUTION**

*To avoid damage to the module, you should not attempt to slide the module into the snap-in plastic track.*

Once the module has been properly mounted, you may make the connections for STATbus and power.

## 2.8.3 WIRING/CONFIGURATION

### 2.8.3.1 POWER AND STATBUS CONNECTIONS

Connections for power and STATbus communications are made via terminal block TB1, shown in Figure 2-35. The two wire connection for STATbus communications should be connected to the two leftmost terminals labeled “SSB”. A source of 24VAC should be connected to the right two terminals labeled “X1” and “X2”. The easiest way to connect these terminals is to connect them to the AC OUT terminals on the same terminal block as the SSB connection on the controller. This allows you to simply run a 4-conductor

cable to connect both power and STATbus communications to the device without any additional wiring. Alternately, a dedicated external power supply may be provided for the module.

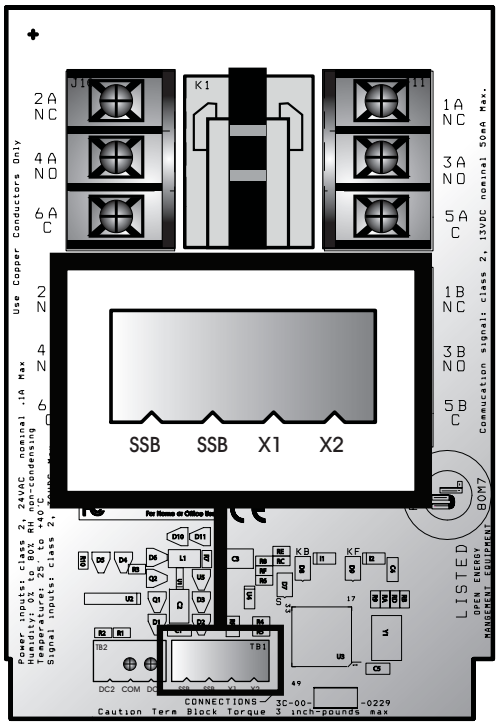


*Figure 2-35: SSB and Power Connections on the SSB-DO1-I*

### 2.8.3.2 RELAY CONNECTIONS

The SSB-DO1-I has a single DPDT relay for its output. When the output is energized, the connection is made between the normally open terminal, labeled 3A and 4A, and the common terminals, labeled 5A and 6A. The normally open terminals are labeled “NO” below the terminal number and the common terminals are labeled “C”. When the output is not energized, connections will be made between the normally closed terminals, labeled 1A and 2A, and the common terminals. Like the normally open terminals, the normally closed terminals are labeled “NC” below the terminal number. The function of each of the relay terminals is summarized in Table 2-3:.

*Table 2-3: SSB-DO1-I Relay Terminals*

| Terminal | Connection |
|---|---|
| 1A | Normally Closed (NC) |
| 2A | Normally Closed (NC) |
| 3A | Normally Open (NO) |
| 4A | Normally Open (NO) |
| 5A | Common |

*Table 2-3: SSB-DO1-I Relay Terminals*

| Terminal | Connection |
|---|---|
| 6A | Common |

### 2.8.3.3 DRY CONTACT INPUT CONNECTION

The SSB-DO1-I has a single dry contact digital input intended for use as a status monitor for the relay on the module. Connecting a wet contact to this input will result in damage to the SSB-DO1-I. This input can only be assigned to a Digital Input in the controller. Unlike the on-board digital input on the GPC, the dry contact input on the SSB-DO1-I is not capable of performing pulse counting. Connections for the input are via the COM and DC1 terminals on terminal block TB2 as shown in Figure 2-36.

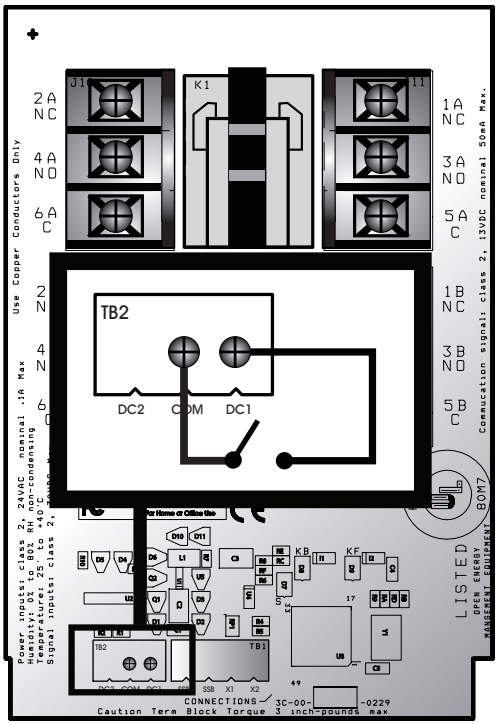


*Figure 2-36: Connecting a Dry Contact Input to the SSB-DO1-I*

### 2.8.3.4 CONFIGURATION

To configure the module, you must assign the GID number of the device to the chosen input object by setting the **(CR) Configure Remote I/O** property in the Device Object (for BACnet controllers) or the **CR** attribute in the System channel (for PUP controllers) to "2 = Edit I/O GIDs" and then entering the SSB-DO1-I module's GID number into the **(GI) GID of I/O Device** property of the chosen input object. Once the GID number has been entered, you must set **CR** to "1 = GPC to Bus" to write the configuration information to the module.

**NOTE**

Assigning the SSB-DO1-I's GID number to the **GI** property of an input only assigns the input on the module. The output will not be assigned unless the GID number is also assigned to a Digital Output in the controller.

# 2.9 SSB-DO2

## 2.9.1 FEATURES

The SSB-DO2, shown in Figure 2-37, is a STATbus module which provides two remote digital outputs to the GPC. The digital outputs on the SSB-DO2 are relays capable of switching up to 250 VAC/DC at up to 10 A each.

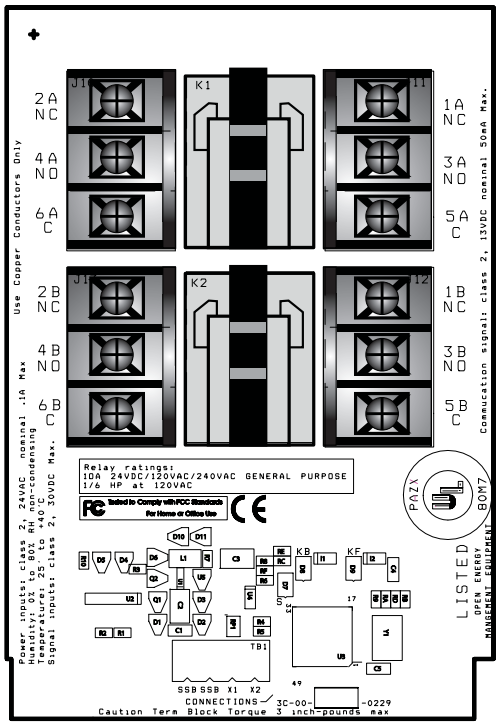


*Figure 2-37: The SSB-DO2*

## 2.9.2 MOUNTING THE SSB-DO2

The SSB-DO2 is intended to be installed near the equipment it is going to control. The module is designed to be mounted in the snap-in plastic track included with the module.

Before installing the module, the snap-in plastic track should be attached to the mounting surface using the screws provided. Once the snap-in plastic track has been firmly attached, the SSB-DO2 should be installed by first inserting one edge of the module in the channel on the inside of one side of the rail and then pressing the module so that it snaps into the other side. This is shown in Figure 2-38.

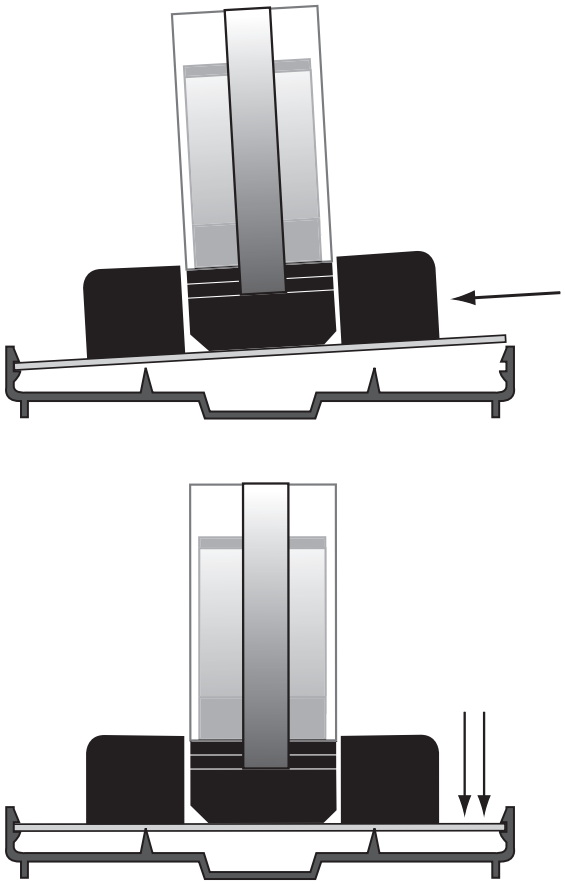

*Figure 2-38: Attaching the SSB-DO2 to the Snap-in Plastic Track*

**CAUTION**

*To avoid damage to the module, you should not attempt to slide the module into the snap-in plastic track.*

Once the module has been properly mounted, you may make the connections for STATbus and power.

## 2.9.3 WIRING/CONFIGURATION

### 2.9.3.1 POWER AND STATBUS CONNECTIONS

Connections for power and STATbus communications are made via terminal block TB1, shown in Figure 2-39. The two wire connection for STATbus communications should be connected to the two leftmost terminals labeled “SSB”. A source of 24VAC should be connected to the right two terminals labeled “X1” and “X2”. The easiest way to connect these terminals is to connect them to the AC OUT terminals on the same terminal block as the SSB connection on the controller. This allows you to simply run a 4-conductor

cable to connect both power and STATbus communications to the device without any additional wiring. Alternately, a dedicated external power supply may be provided for the module.

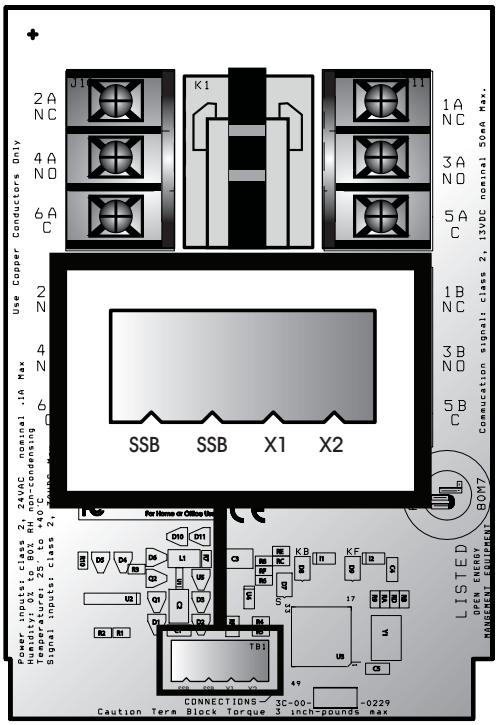


*Figure 2-39: SSB and Power Connections on the SSB-DO2*

### 2.9.3.2 RELAY CONNECTIONS

The SSB-DO2 has two (2) DPDT relays for its outputs. When output 1 is energized, the connection is made between the normally open terminal, labeled 3A and 4A, and the common terminals, labeled 5 A and 6A. When the coil for output 2 is energized, the connection is made between the normally open terminal, labeled 3B and 4B, and the common terminals, labeled 5B and 6B. The normally open terminals are labeled “NO” below the terminal number and the common terminals are labeled “C”. When the output 1 is not energized connections will be made between the normally closed terminals, labeled 1A and 2A, and the common terminals. SImilarly, when output 2 is no energized, connections will be made between the normally closed terminals, labeled 1B and 2B, and the common terminals. Like the normally open terminals, the normally closed terminals are labeled “NC” below the terminal number. The function of each of the relay terminals is summarized in Table 2-4:.

*Table 2-4: SSB-DO2 Relay Terminals*

| Terminal | Connection |
|---|---|
| 1A | Normally Closed (NC) |
| 2A | Normally Closed (NC) |
| 3A | Normally Open (NO) |

*Table 2-4: SSB-DO2 Relay Terminals*

| Terminal | Connection |
|---|---|
| 4A | Normally Open (NO) |
| 5A | Common |
| 6A | Common |
| 1B | Normally Closed (NC) |
| 2B | Normally Closed (NC) |
| 3B | Normally Open (NO) |
| 4B | Normally Open (NO) |
| 5B | Common |
| 6B | Common |

#### 2.9.3.3 CONFIGURATION

To configure the module, you must assign the GID number of the device to the chosen input object by setting the **(CR) Configure Remote I/O** property in the Device Object (for BACnet controllers) or the **CR** attribute in the System channel (for PUP controllers) to "2 = Edit I/O GIDs" and then entering the SSB-DO2 module's GID number into the **(GI) GID of I/O Device** property of the chosen input object. Once the GID number has been entered, you must set **CR** to "1 = GPC to Bus" to write the configuration information to the module.

# 2.10 SSB-DO2-I

## 2.10.1 FEATURES

The SSB-DO2-I, shown in Figure 2-40, is identical to the SSB-DO2 except that it includes two dry contact, digital inputs for device status monitoring. The digital inputs are dry contacts which are intended for status monitoring of the output states of the relays. Connecting wet contacts to these inputs will result in damage to the SSB-DO2-I. These inputs are mapped to Digital Inputs on the GPC but, unlike the digital input on the GPC, are not capable of performing pulse counting.

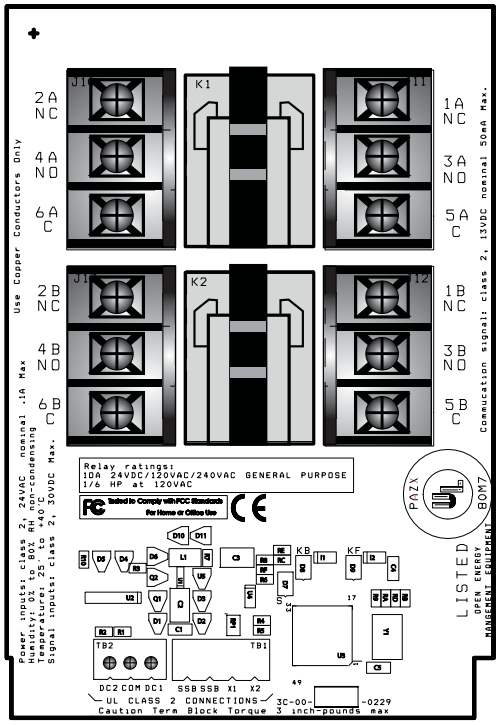


*Figure 2-40: The SSB-DO2-I*

## 2.10.2 MOUNTING THE SSB-DO2-I

The SSB-DO2-I is intended to be installed near the equipment it is going to control. The module is designed to be mounted in the snap-in plastic track included with the module.

Before installing the module, the snap-in plastic track should be attached to the mounting surface using the screws provided. Once the snap-in plastic track has been firmly attached, the SSB-DO2-I should be installed by first inserting one edge of the module in the channel on the inside of one side of the rail and then pressing the module so that it snaps into the other side. This is shown in Figure 2-41.

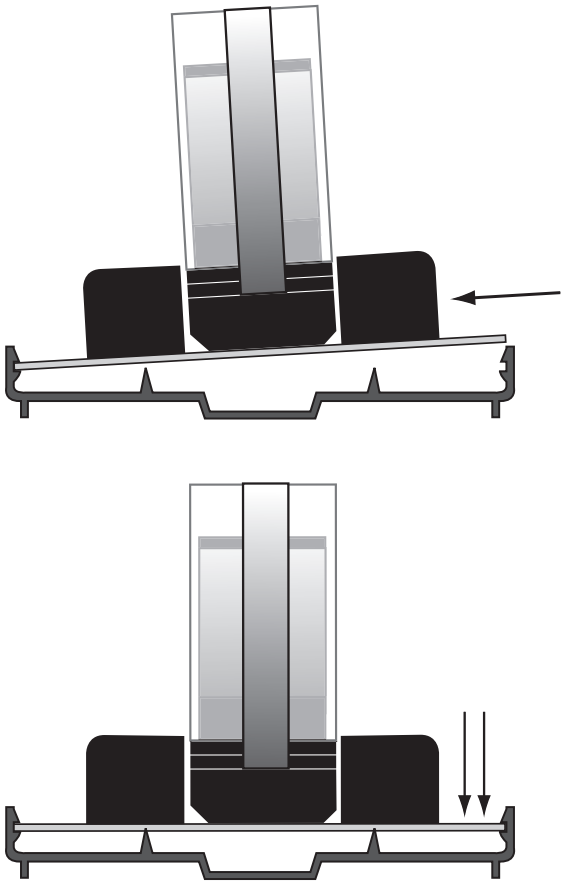

*Figure 2-41: Attaching the SSB-DO2-I to the Snap-in Plastic Track*

**CAUTION**

*To avoid damage to the module, you should not attempt to slide the module into the snap-in plastic track.*

Once the module has been properly mounted, you may make the connections for STATbus and power.

## 2.10.3 WIRING/CONFIGURATION

### 2.10.3.1 POWER AND STATBUS CONNECTIONS

Connections for power and STATbus communications are made via terminal block TB1, shown in Figure 2-42. The two wire connection for STATbus communications should be connected to the two leftmost terminals labeled “SSB”. A source of 24VAC should be connected to the right two terminals labeled “X1” and “X2”. The easiest way to connect these terminals is to connect them to the AC OUT terminals on the same terminal block as the SSB connection on the controller. This allows you to simply run a 4-conductor

cable to connect both power and STATbus communications to the device without any additional wiring. Alternately, a dedicated external power supply may be provided for the module.

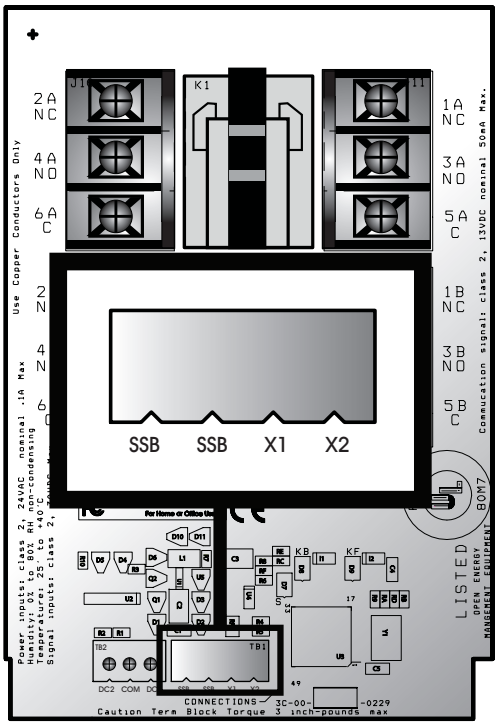


*Figure 2-42: SSB and Power Connections on the SSB-DO2-I*

### 2.10.3.2 RELAY CONNECTIONS

The SSB-DO2-I has two (2) DPDT relays for its outputs. When output 1 is energized, the connection is made between the normally open terminal, labeled 3A and 4A, and the common terminals, labeled 5 A and 6A. When the coil for output 2 is energized, the connection is made between the normally open terminal, labeled 3B and 4B, and the common terminals, labeled 5B and 6B. The normally open terminals are labeled “NO” below the terminal number and the common terminals are labeled “C”. When the output 1 is not energized connections will be made between the normally closed terminals, labeled 1A and 2A, and the common terminals. SImilarly, when output 2 is no energized, connections will be made between the normally closed terminals, labeled 1B and 2B, and the common terminals. The normally closed terminals are labeled “NC” below the terminal number. The function of each of the relay terminals is summarized in Table 2-5:.

*Table 2-5: SSB-DO2-I Relay Terminals*

| Terminal | Connection |
|---|---|
| 1A | Normally Closed (NC) |
| 2A | Normally Closed (NC) |
| 3A | Normally Open (NO) |

*Table 2-5: SSB-DO2-I Relay Terminals*

| Terminal | Connection |
|---|---|
| 4A | Normally Open (NO) |
| 5A | Common |
| 6A | Common |
| 1B | Normally Closed (NC) |
| 2B | Normally Closed (NC) |
| 3B | Normally Open (NO) |
| 4B | Normally Open (NO) |
| 5B | Common |
| 6B | Common |

### 2.10.3.3 DRY CONTACT INPUT CONNECTIONS

The SSB-DO2-I has two dry contact digital inputs intended for use as a status monitors for the relays on the module. Connecting a wet contact to these input will result in damage to the SSB-DO2-I. These inputs can only be assigned to Digital Inputs in the controller. Unlike the on-board digital input on the GPC, the dry contact inputs on the SSB-DO1-I are not capable of performing pulse counting. Connections for the inputs are made on terminal block TB2, with the first dry contact connected to the COM and DC1 terminals and the second dry contact connected to the COM and DC2 terminals as shown in Figure 2-43.

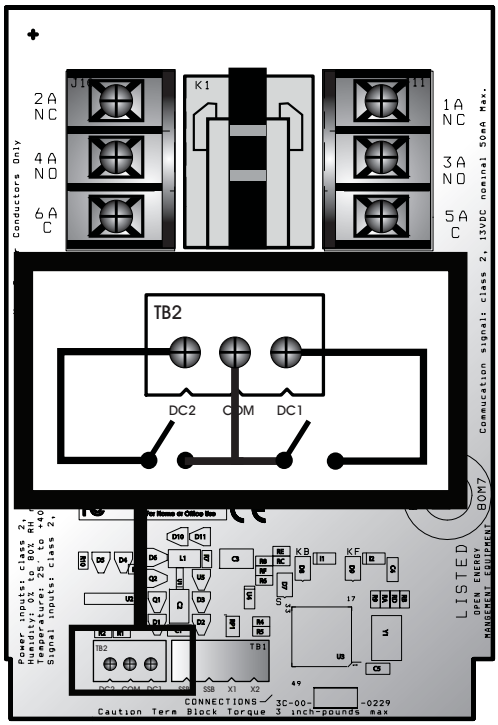


*Figure 2-43: Connecting Dry Contact Inputs to the SSB-DO2-I*

#### 2.10.3.4 CONFIGURATION

To configure the module, you must assign the GID number of the device to the chosen input object by setting the **(CR) Configure Remote I/O** property in the Device Object (for BACnet controllers) or the **CR** attribute in the System channel (for PUP controllers) to "2 = Edit I/O GIDs" and then entering the SSB-DO2-I module's GID number into the **(GI) GID of I/O Device** property of the chosen input object. Once the GID number has been entered, you must set **CR** to "1 = GPC to Bus" to write the configuration information to the module.

**NOTE**

Assigning the SSB-DO2-I's GID number to an input assigns both of the inputs on the module. The input connected to DC1 will be assigned to input selected and the input connected to DC2 will be assigned to the next higher numbered input. Assigning the inputs will not assign the outputs on the module.

**NOTE**

Assigning the SSB-DO2-I's GID number to the **GI** property of an input only assigns the inputs on the module. The outputs will not be assigned unless the GID number is also assigned to a Digital Output in the controller.

# 2.11 SSB-IOX1

## 2.11.1 FEATURES

The SSB-IOX1, shown in Figure 2-44, is a STATbus module based on the same hardware as the GPC2 controller. It provides four (4) universal inputs, one (1) pulse input, two (2) analog outputs, and two (2) digital outputs.

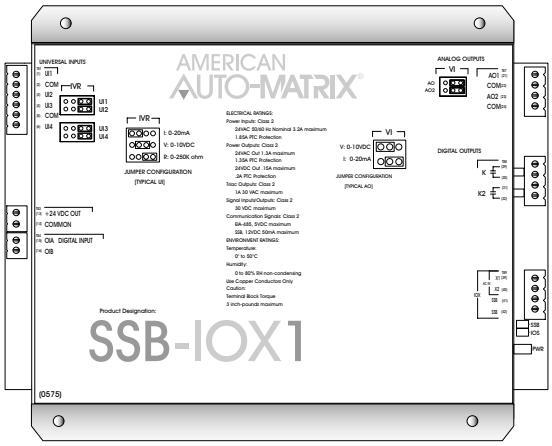


*Figure 2-44: The SSB-IOX1*

## 2.11.2 WIRING/CONFIGURATION

To properly configure the SSB-IOX1, you must connect the wires for network and power, connect any inputs and/or outputs, configure the IVR jumpers for Universal Inputs, and configure the VI jumpers for any Analog Outputs.

### 2.11.2.1 NETWORK & POWER

The SSB-IOX1 must be connected to the STATbus network so that it may communicate. The network connection is made to terminal 41 and 42, labeled SSB, of terminal block TB9. The location of these terminals are shown in Figure 2-45. Power for the module is connected to terminals 39 and 40, labeled X1 and X2, on the same terminal block. This power may be provided from the AC Out terminals of the STATbus connection at the controller or a dedicated transformer may be connected.

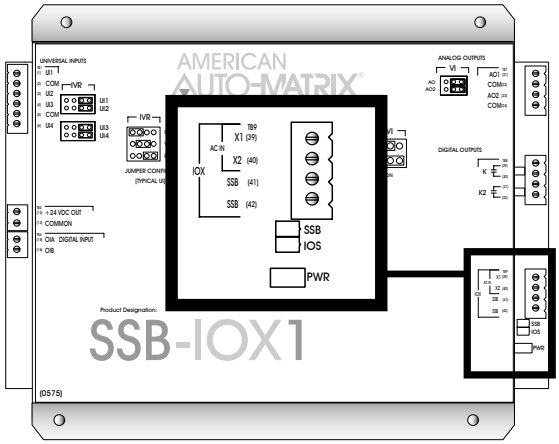


*Figure 2-45: Location of the Network and Power Connections on the SSB-IOX1*

### 2.11.2.2 UNIVERSAL INPUTS

To properly connect and configure the Universal Inputs on the SSB-IOX1, you must connect the sensor to the input and configure the IVR jumper to specify the type of sensor connected. The Universal Inputs are located in the upper left corner of the controller, as shown in Figure 2-46.

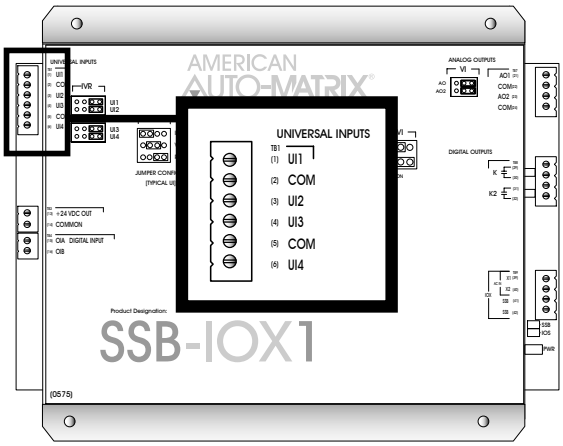


*Figure 2-46: Location of the Universal Inputs on the SSB-IOX1*

To connect an input device to the SSB-IOX1, you must insert the leads from the sensor into the terminals for the desired input and the adjacent COM terminal. Two inputs share a single COM terminal, i.e. UIs 1 and 2 use the COM connection on terminal 2 while UIs 3 and 4 use the COM connection on terminal 5. Figure 2-47 shows how a thermistor would be connected to UI3.

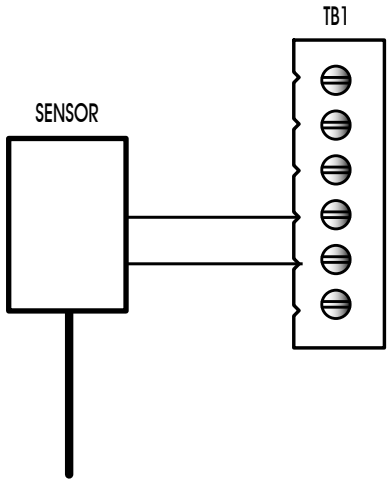


*Figure 2-47: Connecting a Sensor to an Input on the SSB-IOX1*

Each Universal Input on the SSB-IOX1 has an IVR jumper, shown in Figure 2-48, associated with it which is used to select the type of input connected to the corresponding input.

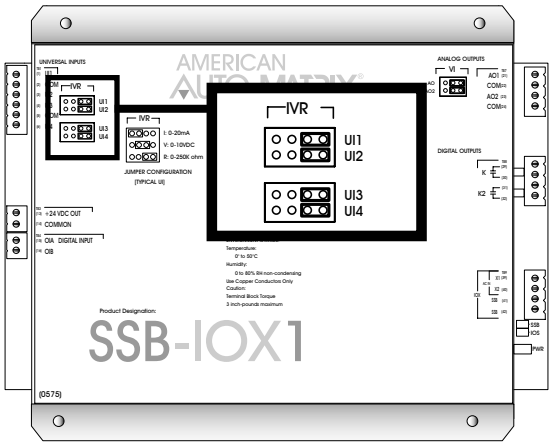


*Figure 2-48: Location of the IVR Jumpers on the SSB-IOX1*

Each input can be configured to read a 0-20 mA, 0-10 V or a 0-250 kΩ. The jumper settings corresponding to these options are shown in Figure 2-49a-c respectively.

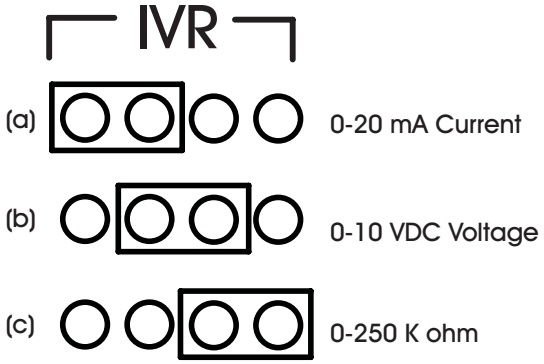


*Figure 2-49: SSB-IOX1 IVR Jumper Positions*

### 2.11.2.3 DIGITAL INPUTS

The SSB-IOX1 has a single Digital Input which is capable of performing pulse counting. The digital input is a wet contact input located on the left side of the module, as shown in Figure 2-50. There is a 24VDC power output connected to TB3 which is provided as a convenient way to power the wet contact connected to the input.

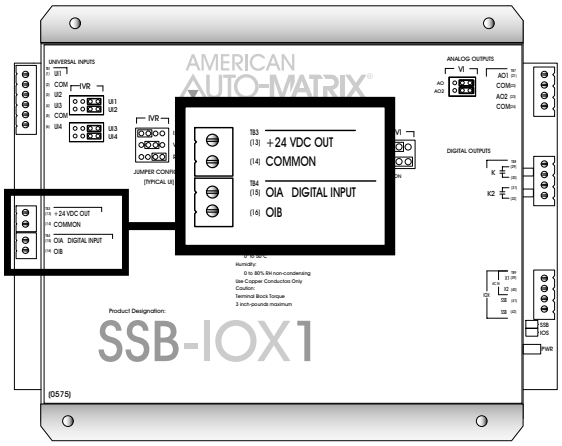


*Figure 2-50: Location of the Digital Input and 24VDC Output on the SSB-IOX1*

To connect a sensor to the pulse input on the SSB-IOX1, you must attach the leads from the sensor to the OIA and OIB terminals on terminal block TB4 as shown in Figure 2-51.

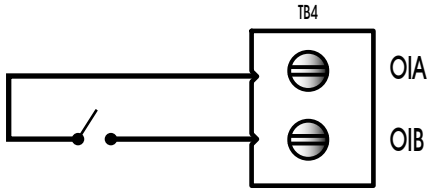


*Figure 2-51: Connecting a Digital Input to the SSB-IOX1*

### 2.11.2.4 ANALOG OUTPUTS

The SSB-IOX1 has two analog outputs located in the upper right side of the module a shown in

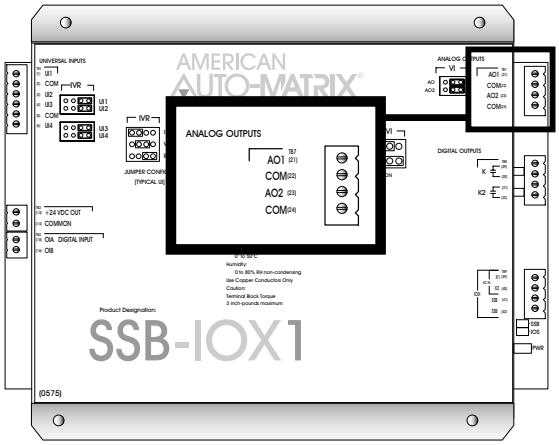


*Figure 2-52: Location of the Analog Outputs on the SSB-IOX1*

Analog outputs are connected to either terminals 21 (AO1) and 22 (COM) or 23 (AO2) and 24 (COM). A device connected to Analog Output 2 is shown in Figure 2-53.

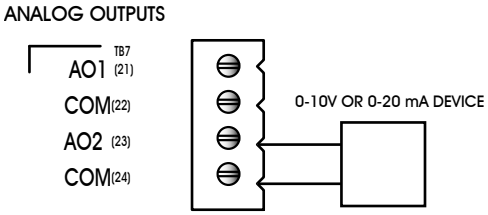


*Figure 2-53: Connecting an Analog Output to the SSB-IOX1*

For each Analog Output on the SSB-IOX1 there is a corresponding VI jumper used to select the output range for that output. These jumpers are located to the left of TB7. Each output can be configured for 0-10 VDC or 0-20 mA operation, using the jumper positions shown in Figure 2-54a and b respectively.

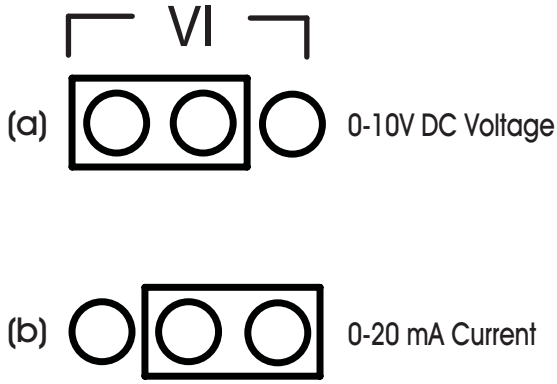


*Figure 2-54: SSB-IOX1 VI Jumper Positions*

### 2.11.2.5 DIGITAL OUTPUTS

The SSB-IOX1's two Digital Outputs are located on the right side of the controller as shown in Figure 2-55.

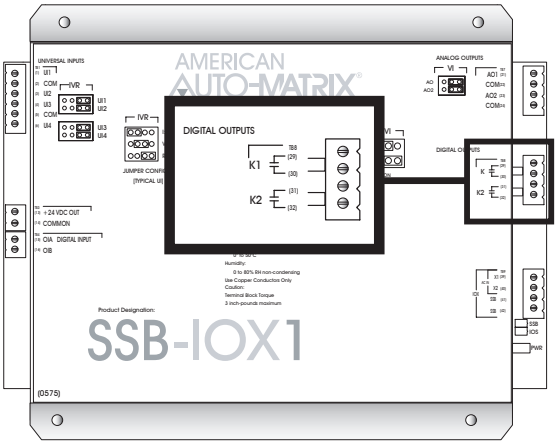


*Figure 2-55: Location of the Digital Outputs on the SSB-IOX1*

Output devices are connected using terminals 29 and 30 (labeled K1), for Digital Output 1, and terminals 31 and 32 (labeled K2), for Digital Output 2. Figure 2-56 shown a device connected to Digital Output 1.

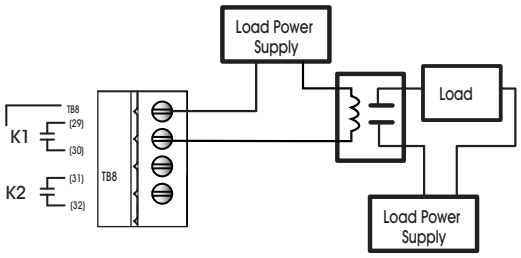


*Figure 2-56: Connecting an Digital Output to the SSB-IOX1*

### 2.11.3 MOUNTING THE SSB-IOX1

**NOTE**

The SSB-IOX1 is an open type device which, to meet UL specifications, is intended to be mounted on a panel that completes the ultimate enclosure.

The SSB-IOX1 should be mounted to a site where the temperature is between 32º F and 122º F (0º C to 50º C) with a relative humidity of 0-80% non-condensing.

The mounting area should be flat and unobstructed by other equipment or machinery, free of moisture, and located away from potential leakage.

**NOTE**

When installing the SSB-IOX1 make sure that there is sufficient room to allow insertion and removal of the terminal block plugs.

### 2.11.4 STATUS INDICATOR LED

The SSB-IOX1 has an IOS indicator LED which provides feedback on the current operational status of the module's IO processor. The IOS LED is located on lower right side of the module as shown in Figure 2-57.

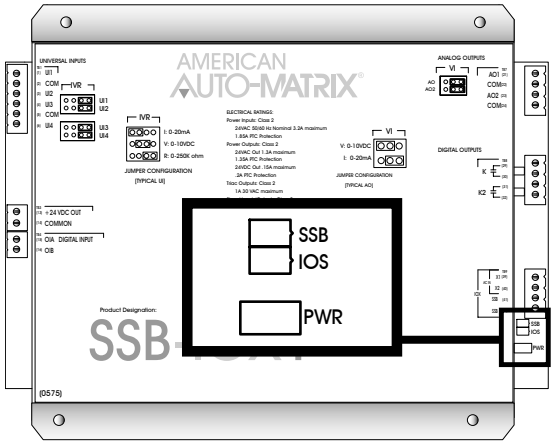


*Figure 2-57: Location of the IOS Indicator LED on the SSB-IOX1*

The IOS LED shows one of four different states: powered but not enumerated, enumerated but not configured, configured, and "identify". The different states are indicated by the rate at which the LED blinks. The LED blinking quickly, approximately three to four times per second, indicates that the unit is powered but has not yet been enumerated by the controller. This is useful for identifying units that are correctly wired but not configured. When the device is enumerated but not configured, the blink rate will slow to approximately twice a second.

Once the device has been configured, the blink rate will slow down to approximately one blink per second. This will be the normal state of the device when it is correctly wired, powered, enumerated, and configured in the controller.

When the controller is set to "Identify" in the Configure Function and Configure Device properties, the IOS LED on the SSB-IOX1 will be blink three times in quick succession and then pause before repeating the three blinks again. This is especially useful for quickly identifying an individual device in the field when troubleshooting the STATbus.

# Section 3: STATbus Design

*This section explains the rules for designing a properly functioning STATbus network. Restrictions on the size of the network, the number of devices on the network, as well as the distribution of devices across multiple STATbus channels will be discussed.*

## In this section

## 3.1 LENGTH OF THE NETWORK

The distance measured from the controller to the STATbus device on the network located furthest away from it should not exceed 1000' in length. The STATbus shown in Figure 3-1a is a valid configuration because the distance from the controller to the most distant device is less than 1000' whereas the configuration shown in Figure 3-1b is not valid because the total length to the most distant device is 1150', exceeding the 1000' maximum.

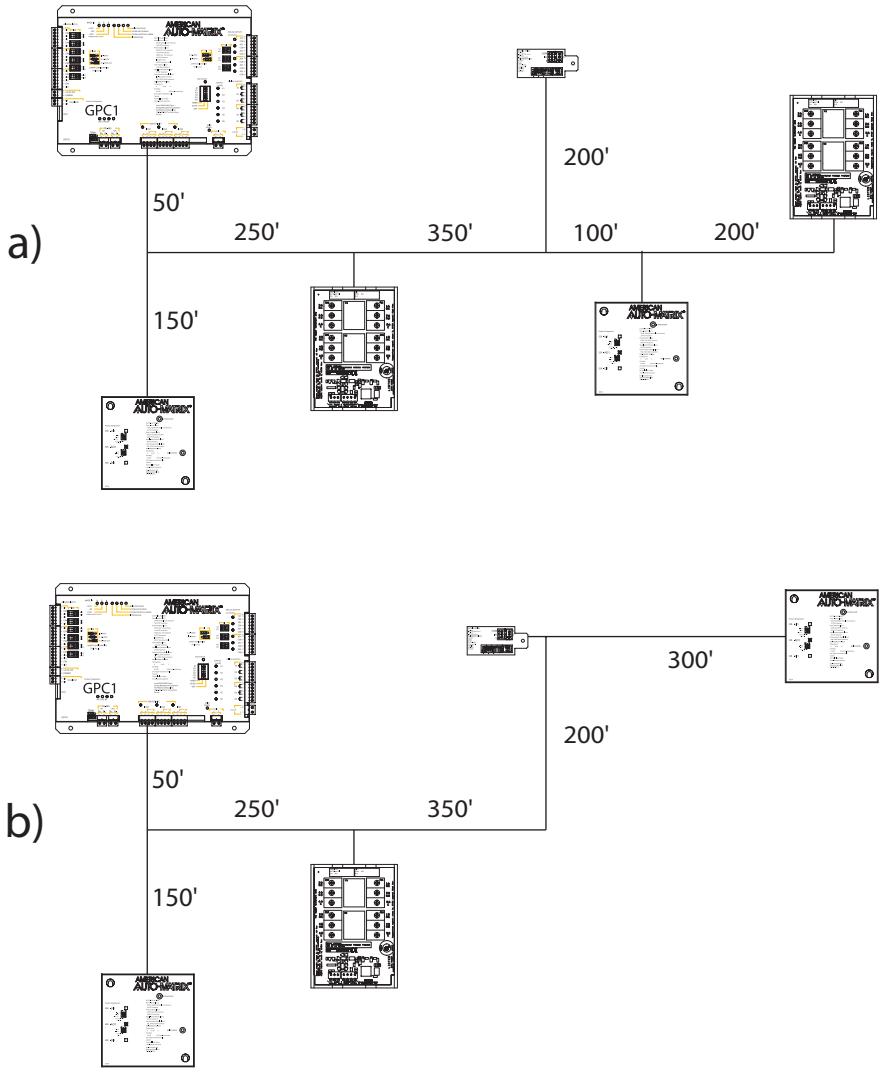


*Figure 3-1 Determining Maximum STATbus Length*

## 3.2 NUMBER OF DEVICES

Each STATbus channel on the controller will support a maximum of thirteen (13) devices.

**CAUTION**

*A maximum of thirteen (13) devices can be connected to a single STATbus channel. If more than thirteen devices are connected, only thirteen will be enumerated by the controller. If more than thirteen devices are connected, there is no way to predict which devices will be enumerated and which will be left off.*

### 3.2.1 COMMUNICATIONS LIMITS

While the STATbus protocol allows up to thirteen devices to be connected to a single network, certain devices reduce the maximum number of other devices that may be used on a single channel. In particular, STAT1D, STAT2D, and STAT3 have a higher power requirement than other STATbus devices and limit the total number of devices that can be put on the network and still communicate. When one or more STAT devices are included on the network, the maximum number of devices allowed on the network will be reduced.

#### 3.2.1.1 NO STATS ON THE STATBUS

If your STATbus channel does not have any STATs (STAT1D, STAT2D, or STAT3) on it, then you may have up to thirteen devices in any combination on the network. This may include SSB-FI1s, SSB-UI1s, SSB-AO1s, SSB-DI1s, SSB-DO1s, SSB-DO1-Is, SSB-DO2s, SSB-DO2-Is, and SSB-IOX1 modules.

#### 3.2.1.2 ONE OR MORE STATS ON THE STATBUS

If one or more STATs are being used, the total number of devices that can communicate on a single STATbus channel will be reduced. Table 3-1 lists the number of additional STATbus devices that can be connected for a given number of STATs.

*Table 3-1 Number of Devices Allowed on a STATbus*

| Number of STATs | Number of other STATbus Devices |
|---|---|
| 1 | 11 |
| 2 | 9 |
| 3 | 7 |
| 4 | 5 |
| 5 | 2 |

#### 3.2.1.3 EXAMPLE: NO STATS ON THE STATBUS

With no STATs on the Bus, you may use any combination of SSB devices, up to a maximum of thirteen devices total. This means any of the following would be valid:

- 13 SSB-FI1s to read a number of different inputs
- 6 SSB-FI1s and 6 SSB-AO1s to provide simple damper control for six zones

- 3 SSB-UI1s, 3 SSB-AO1s, and 3 SSB-DO1-Is, giving three zones with a zone temperature input, control for a damper and a reheat coil with supervisory monitoring

#### 3.2.1.4 EXAMPLE: STATS ON THE STATBUS

For a STATbus design that contains STATs, you must refer to the Table 3-1 above to determine the number of devices that can be used in addition to the STATs.

For a system with 4 STATs, for example, Table 3-1 indicates that up to five additional devices can be connected to the bus. You could use four SSB-AO1s to create four zones with damper control.

## 3.3 POWERING STATBUS DEVICES

The connection for STATbus is a four pin connector with two pins for communication and two for optionally providing 24 VAC power to devices on the STATbus. This power output can eliminate the need for dedicated transformers for remote devices, allowing potentially faster, easier installation at a lower cost. If you plan to power STATbus devices using this output, you must be aware that there are limitations imposed by the ability to transmit that power to remote devices as well as the power capacity of the controller.

Though STATBus communication signals can be carried up to the network maximum of 1000' over 22 gauge cabling, due to power losses, this cable is not sufficient to transmit the 24 VAC used to power remote devices. For a longer network runs, the voltage drop across such a cable will leave less than the required voltage to operate many sensors and actuators. Therefore, when using devices which draw their power from the STATbus, you must use 18 gauge cabling to carry the power.

Using 18 gauge cabling to carry power, the controller should be able to provide the voltage and current necessary to operate most normal sensors, powered outputs, and smaller actuators. If you are using a large number of powered devices or devices which are known to have high power requirements, then you should supplement the power provided by the controller by using dedicated transformers on some of those units. Units with high power consumption would be the first candidates for dedicated transformers in this case.

You should never try to power large actuators using the STATbus as, in most cases, they simply require more power than the controller can provide. You should always use a dedicated power transformer when using these devices.

**NOTE**

The STATbus power outputs on the GPC1 and GPC3 controllers are protected and are rated for a maximum output of 24 VAC at .9 A and 3 A respectively for all STATbusses on the controller.

## 3.4 DISTRIBUTION OF DEVICES

Whenever possible, you should try to distribute your STATbus devices over all the available STATbus channels on the controller. For example, if you have a total of twelve STATbus devices connected to a GPC1 controller, it is better to have 4 devices on each of the three STATbus channels than to have all twelve devices on a single channel. If you were connecting the same twelve devices to a GPC3 controller, you would try to put three devices on each of the four STATbus channels. This reduces the communications load on any one STATbus channel and will result in better overall system performance.

# Appendix A: Approved Relays

This section contains a list of the relays approved for use with the SSB-DO1, SSB-DO1-I, SSB-DO2, and SSB-DO2-I modules.

| Manufacturer | Model |
|---|---|
| R/C Magnetic | NLDX2 |
| P&B | K10P-11A15-24 |
| IDEC | RH2B-UL-AC-24V |
| | RH2B-UC-AC-24V |
| | RH2B-U-AC-24V |
| | RH2B-ULC-AC-24V |
| Omron | LY2-AC24 |
| | LY2I4-AC24 |
| | LY2I4N-AC24 |
| | LY2N-AC24 |
| Song Chuan | SCL-DPDT-24VAC |
| | SCL-L-DPDT-24VAC |
| | SCL-D-DPDT-24VAC |
| | SCLM-DPDT-24VAC |