EBTRON® CENSus

Single Entry Door/Opening Occupancy Counting Device

SERIES 100

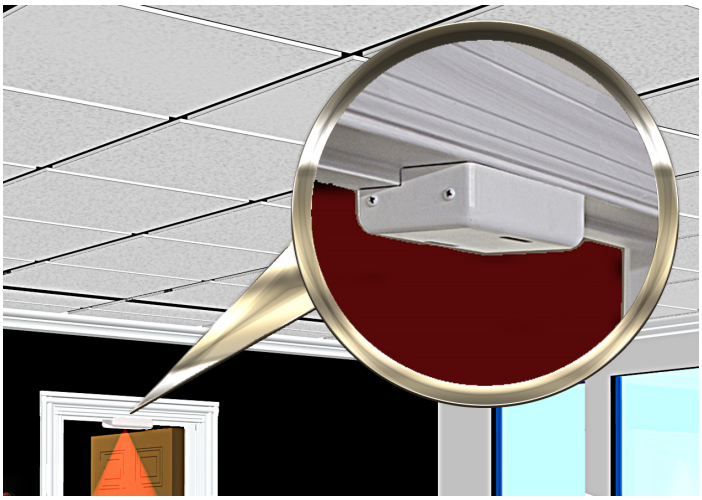
CENSUS-x100

INSTALLATION / SETUP

DOCUMENT PN: 930-0530

CENSUS-C100 INSTALLATION AND SETUP

INTRODUCTION



The CENSus Occupancy Counting Device is designed for mounting on the overhead jamb of single wide doorways meeting the following criteria:

Doorway Opening*:	Width: ≤ 3.5 ft (42 in) Height: ≤ 8 ft (96 in)
Door Closure Devices:	Ensure that the CENSus device does not interfere with any installed door closure devices.

*The CENSus device is designed for interior doors.

The CENSus Occupancy Counting Device requires 24VAC (+10%/-5%) at 1.2VA nominal. Wiring can be routed internally through the door jamb or externally as required. Ensure that all wiring has been roughed in to the CENSus installation location. All wiring must be accomplished in accordance with National Electric Code and local codes and ordinances. An RS-485 network connection is required to configure the CENSus device.

Figure 1 shows the mechanical outline details of the CENSus device.

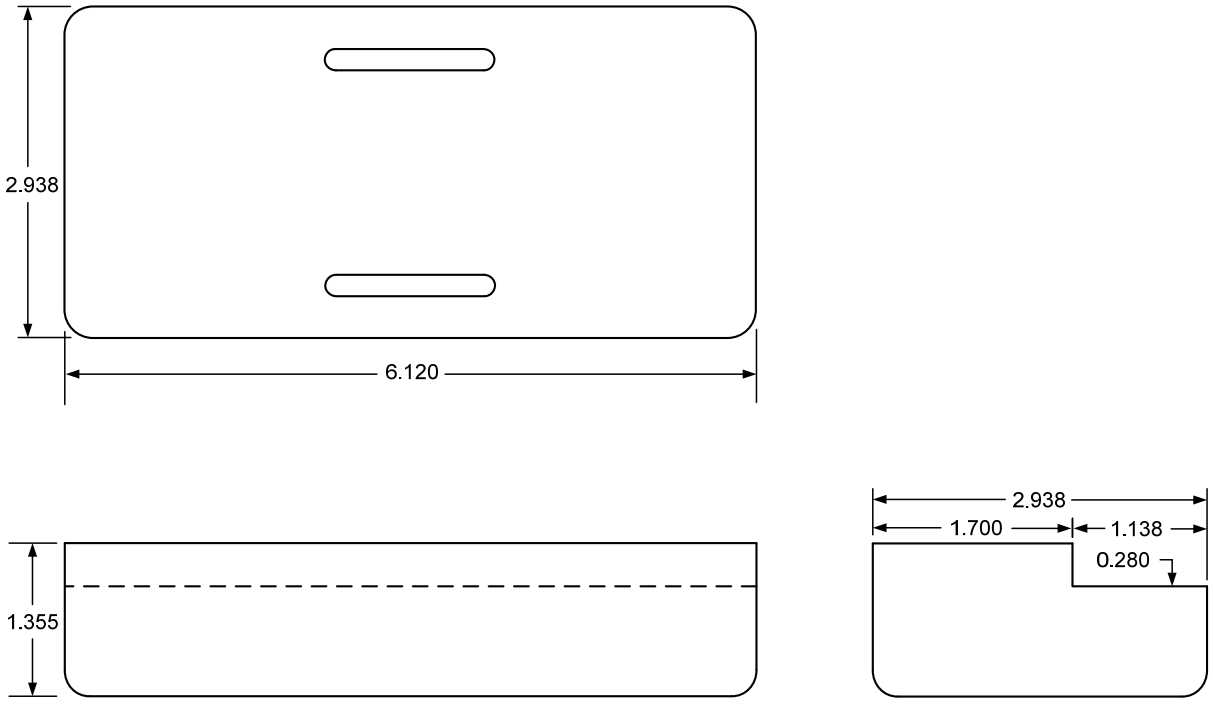


Figure 1. CENSus Mechanical Outline Detail

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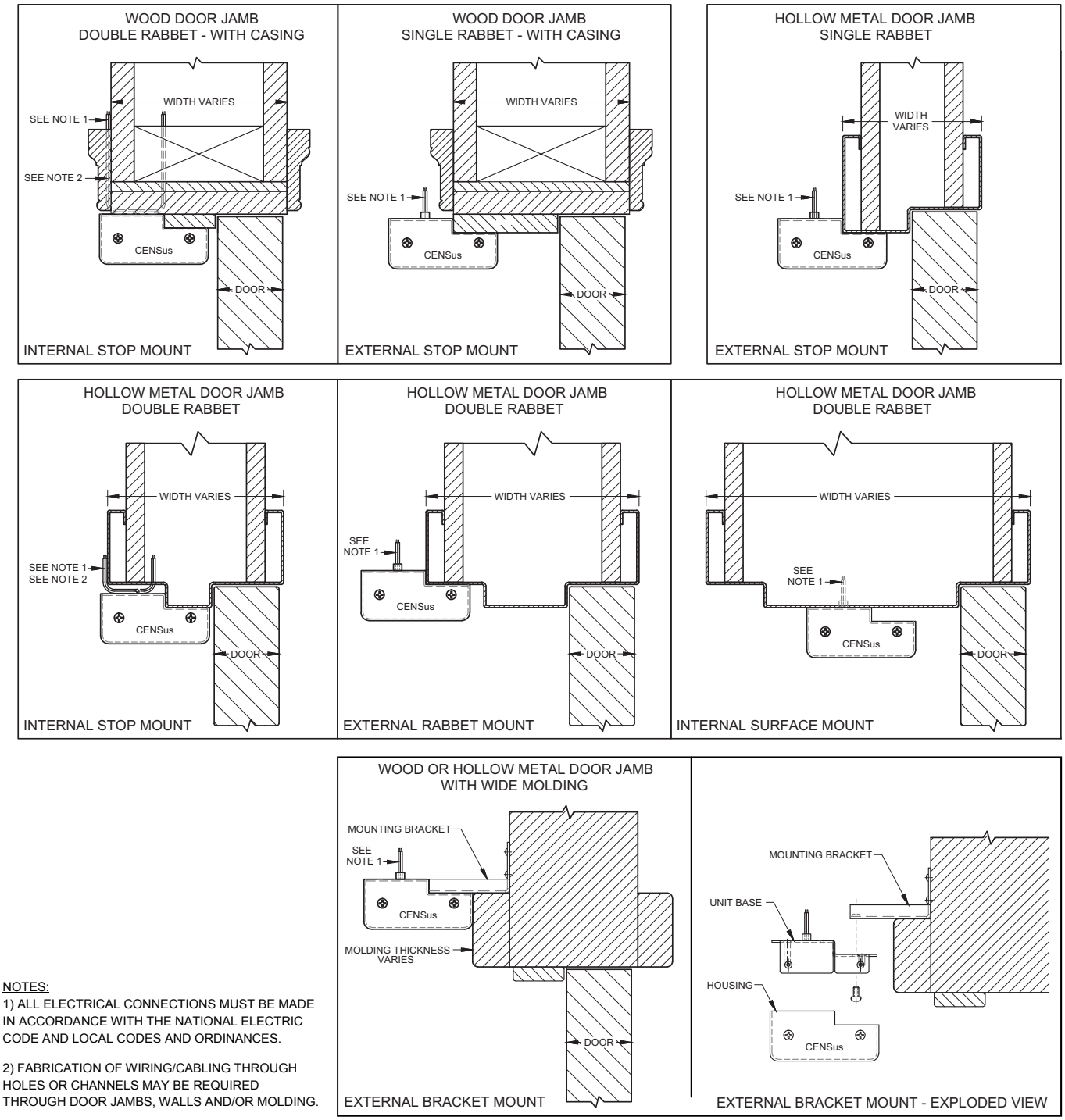
INSTALLATION

Ensure that 24VAC power (22.8 to 26.4VAC), network wiring and analog output cabling (if required) are available at the CENSus mounting location. Using the CENSus Mounting Hole Template (page 7 of this document) , mark the mounting locations and install the device as shown in Figure 2 (CENSus Mounting Style Applications) below.



NOTES:
1) ALL ELECTRICAL CONNECTIONS MUST BE MADE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND LOCAL CODES AND ORDINANCES.

2) FABRICATION OF WIRING/CABLING THROUGH HOLES OR CHANNELS MAY BE REQUIRED THROUGH DOOR JAMBS, WALLS AND/OR MOLDING.

Figure 2. CENSus Mounting Style Applications

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CENSUS-C100 CIRCUIT BOARD LAYOUT AND COMPONENT IDENTIFICATION

CENSUS BOARD LAYOUT AND COMPONENT IDENTIFICATION

Remove the four (4) 6-32 cover screws, and remove the cover from the CENSUS. Place all these aside for safe keeping. Do not touch or remove the protective film that covers the IR sensor compartments. Figure 3 details the CENSus main board layout and the locations of items that will be addressed.

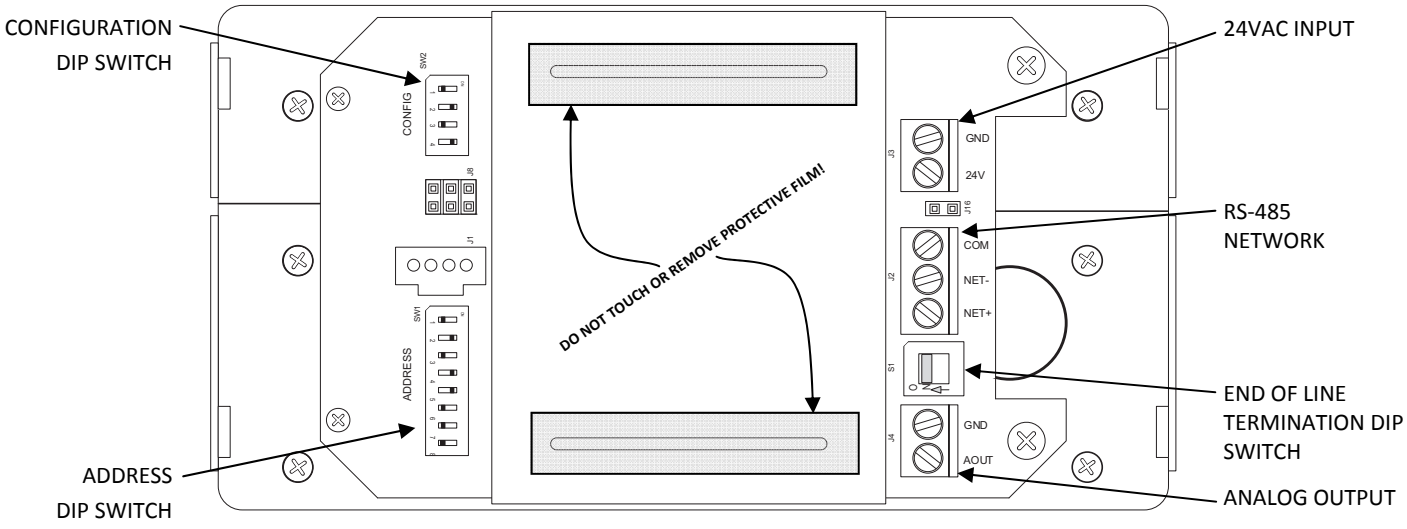


Figure 3. CENSus Board Layout Detail

CENSUS-C100 ELECTRICAL CONNECTIONS

ELECTRICAL CONNECTIONS

Wiring can be accomplished internally through the door jamb or externally as needed for the specific installation.

Deactivate the 24VAC power before wiring the CENSus device at the 24V and GND terminals.

CAUTION:

The CENSus device is a non-isolated device. Where isolation is required, a separate 24VAC transformer must be used to power the device. Failure to do so may result in damage to the CENSus device or to other network connected devices.

An RS-485 network connection is required to configure the CENSus device. Network wiring is accomplished at the RS-485 Network NET+, NET– and COM terminals. Shielded twisted pair network wiring is recommended.

Analog output wiring (if required) is accomplished at the AOUT and GND terminals. The analog output of 0-10VDC indicates the current occupancy count. The scale is set by the Maximum Count object/register. (See Table 1 for BACnet Objects and Modbus Register Map).

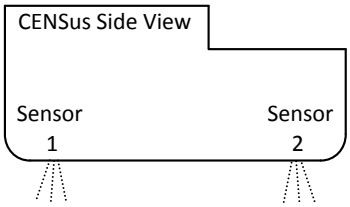
CENSUS-C100 CONFIGURATION DIP SWITCH SETTINGS

CONFIGURATION DIP SWITCH SETTINGS

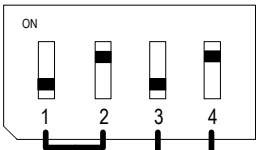
CONFIG switch SW2 is a 4 position DIP switch used to set the baud rate, door/entry configuration and BACnet MSTP or Modbus network protocols as shown in Figure 4.

DOORWAY Switch Position Setting

As shown in the detail below, DOORWAY switch position 3 configures the direction that the CENSus device increments the population count when triggered. When switch position 3 is set to OFF, the occupancy count is added to each time an occupant passes first through sensor 1 and then sensor 2. When switch position 3 is set to ON, the occupancy count is added to each time an occupant passes first through sensor 2 and then sensor 1.



OBSERVE MARKINGS ON SWITCH BODY



BAUD RATE		
1	2	RESULT
OFF	OFF	76800 BAUD
OFF	ON	19200 BAUD
ON	OFF	38400 BAUD
ON	ON	9600 BAUD

PROTOCOL	
4	RESULT
OFF	PROTOCOL= BACnet MSTP
ON	PROTOCOL= Modbus

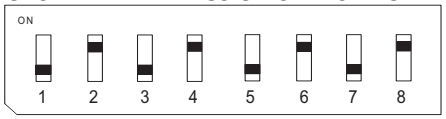
DOORWAY	
3	RESULT
OFF	COUNT IS ADDED WHEN MOVEMENT OCCURS FROM SENSOR 1 TO 2
ON	COUNT IS ADDED WHEN MOVEMENT OCCURS FROM SENSOR 2 TO 1

Figure 4. CENSus CONFIG DIP Switch Settings and Detail

CENSUS-C100 ADDRESS DIP SWITCH SETTINGS

ADDRESS DIP SWITCH SETTINGS

OBSERVE MARKINGS ON SWITCH BODY



ADDRESS DIP Switch SW1 Detail

When network protocol is set for MSTP (see **CONFIG DIP** switch **SW2** position 4 above), **ADDRESS DIP** switch **SW1** is used to set the CENSus network address and Device Instance. Switch positions 1 through 7 are used to set the network address and Device Instance (0 – 126). Position 8 is used to store the Device Instance. To change the factory default Device Instance (which is 2), with power OFF, set switch positions 1-7 to the desired Device Instance (from 0 to 126), and switch position 8 to ON (high). Next, power up the CENSus for 5 seconds, and then set position 8 to OFF (low). You can now set the address of the CENSus as desired. The Device Instance can also be set through the network from 0 to 4194302. When switch positions 1-8 are all set to ON at power up, the CENSus will start in firmware update mode (for factory use only).

When network protocol is set for Modbus operation (see **CONFIG DIP SW2** position 4 above), all 8 positions of the ADDRESS switch are used to set the network address (from 0 to 254). When switch positions 1-8 are all set to ON at power up, the CENSus will start in firmware update mode (for factory use only).

CENSUS-C100 END OF LINE TERMINATION DIP SWITCH SETTINGS

END OF LINE TERMINATION DIP SWITCH SETTINGS

The END OF LINE TERMINATION DIP switch should be set to ON when the CENSus device is located at the end of a network segment in order to provide a termination for the device. When the CENSus is NOT located at the end of a network segment, the END OF LINE TERMINATION switch should be set to OFF.

CENSUS-C100 BACNET OBJECTS / MODBUS REGISTER MAP

Table 1. BACnet Objects and Modbus Register Map

BACnet OBJECTS

Type, ID	Name	Default
DEV	CENSus	
AV1	Occupancy Count	0
AV2	Maximum Count	100
AV3	Inactivity Reset* (minutes)	720
AV4	Inactivity Reset Count	0
AV5	Entry Rounding	0
AV6	Exit Rounding**	0
AV6	Advanced Tuning Options**	
BV1	Entry/Exit Polarity	INACTIVE
BV2	Allow Negative Count	ACTIVE
BV3	Turnstile Counting	INACTIVE

* When Inactivity Reset is set to 0 minutes, the Inactivity Reset feature is disabled.

** Advanced tuning options are available. Consult the factory for access to them, and for guidance in their use.

Modbus Register Map

Function	Address	Type	Description	Range	Default
4	30001 - 30002	float	Occupancy Count	-16383 to 16383	0
4	30003	16 bit signed	Maximum Count	1 to 16,383	100
4	30004	16 bit unsigned	Inactivity Reset* (minutes)		720
4	30005	16 bit signed	Inactivity Count	-16383 to 16383	0
4	30006	16 bit signed	Entry Rounding	-1, 0, 1	0
4	30007	16 bit signed	Exit Rounding	-1, 0, 1	0
4	30008	16 bit unsigned	Entry/Exit Polarity	0 or 1; read only	0
4	30009	16 bit unsigned	Allow Negative Count	0 (no negatives) or 1;	1
4	30010	16 bit unsigned	Turnstile Counting	0 or 1 (entry count only)	0
4	30011	16 bit unsigned	Firmware Revision		
4	30012	16 bit unsigned	Float word order	0 (CD AB) or 1 (AB CD)	0
4	30013	16 bit unsigned	Advanced Tuning Options**		

* When Inactivity Reset is set to 0 minutes, the Inactivity Reset feature is disabled.

** Advanced tuning options are available. Consult the factory for access to them, and for guidance in their use.

Note: No parity, 1 stop bit.

CENSUS-C100 NETWORK OBJECT FUNCTIONS/DESCRIPTIONS

Table 2. Network Object Functions and Descriptions

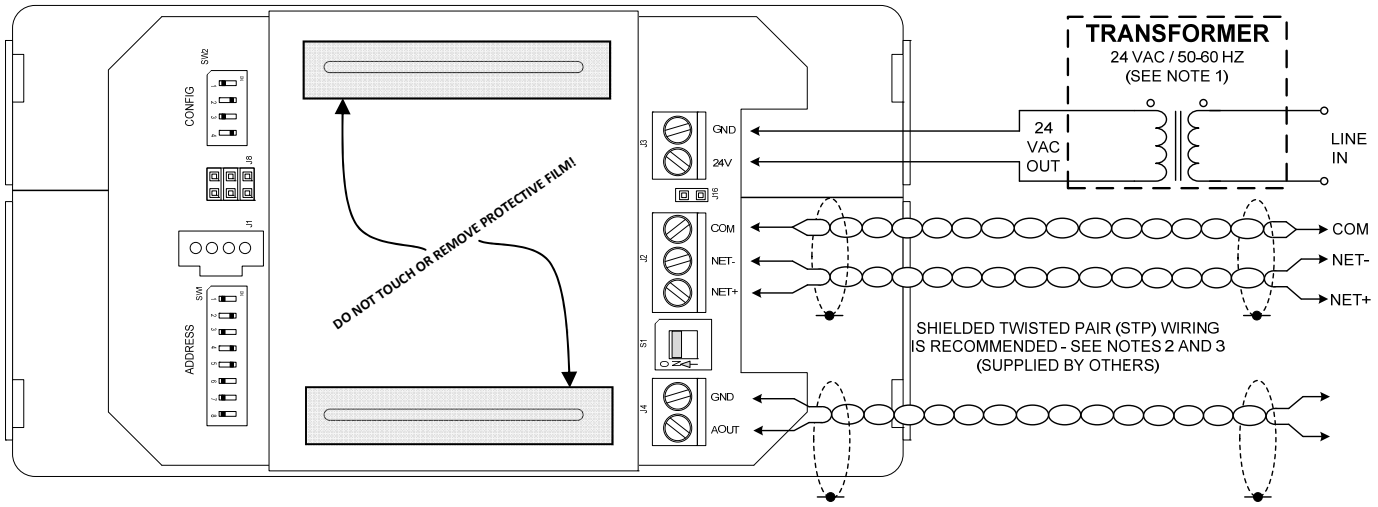
NAME	FUNCTION/DESCRIPTION
CENSus	Device name
Occupancy Count	Current count
Maximum Count	Maximum allowable count; also used as full scale for analog output
Inactivity Reset	Time in minutes without activity before the count is reset to the 'Inactivity Reset Count' value. A setting of 0 minutes disables this Inactivity Reset feature.
Inactivity Reset Count	The count that the device is reset to, after the selected 'Inactivity Reset' time value has elapsed.
Entry Rounding	When count is not a whole number, set the Entry rounding type: -1 = round down; 0 = no rounding; 1=round up
Exit Rounding	When count is not a whole number, set the Exit rounding type: -1 = round down; 0 = no rounding; 1=round up
Entry/Exit Polarity	Returns the position of CONFIG SW2 position 3 switch; 0 or INACTIVE = OFF (Entry 1-2); 1 or ACTIVE = ON (Entry 2-1)
Allow Negative Count	Allow count to go below zero; 0 or INACTIVE = OFF; 1 or ACTIVE = ON
Advanced Tuning Options	Activated with factory service guidance.
Turnstile Counting	Increments occupancy count only on entry; 0 or INACTIVE = OFF; 1 or ACTIVE = ON.

CENSUS-C100 ANALOG OUTPUT CONVERSION

Table 3. Analog Output Conversion

CENSUS SETUP	ANALOG OUTPUT CONVERSION
Allow Negative Count = ON (Default)	Occupancy Count = (Output Voltage-5)/5 * Maximum Count
Allow Negative Count = OFF	Occupancy Count = Output Voltage/10 * Maximum Count

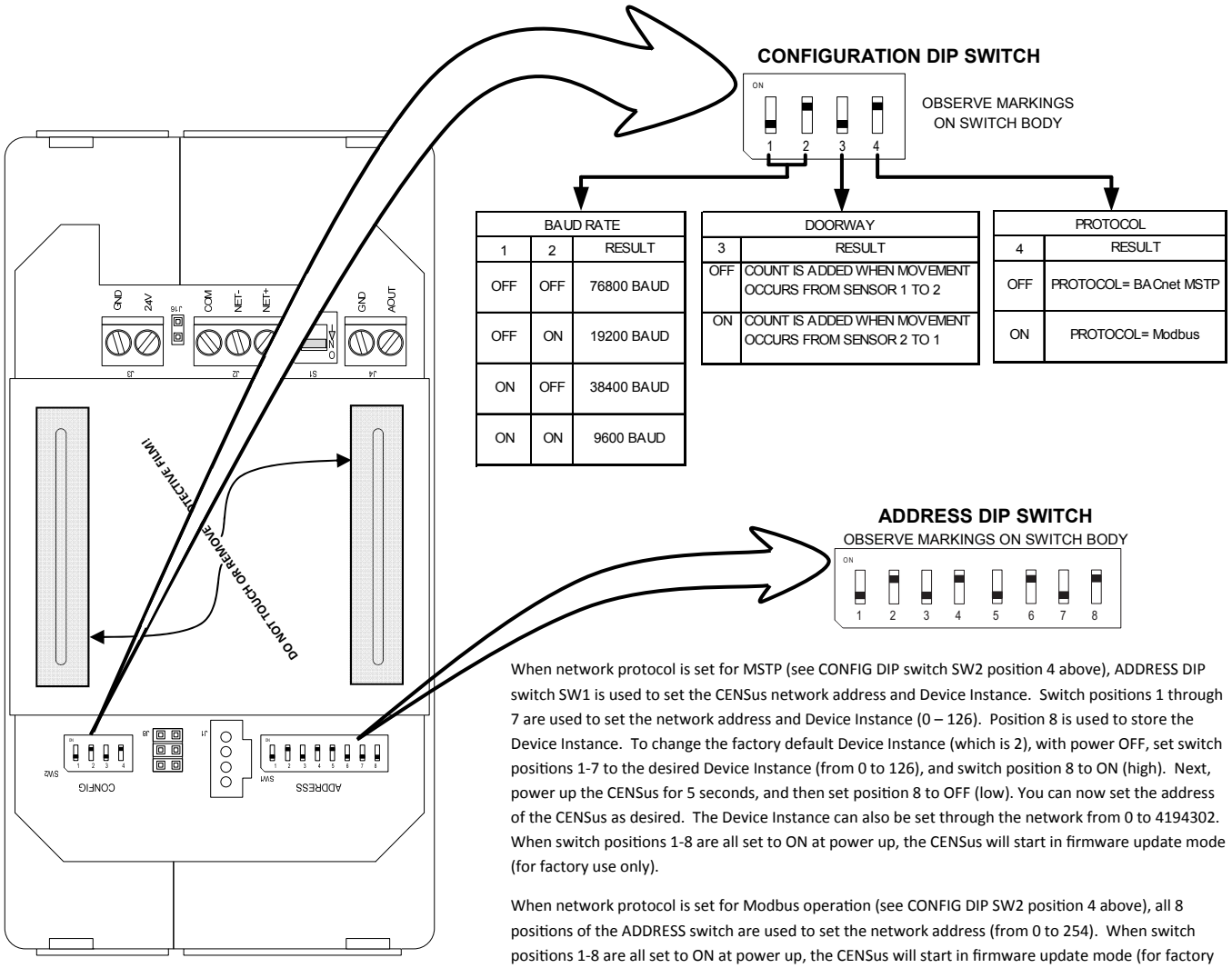
CENSUS-C100 WIRING DIAGRAM



NOTES:

1. THE CENSUS DEVICE IS A NON-ISOLATED NETWORK DEVICE. WHERE ISOLATION IS REQUIRED, A SEPARATE 24VAC TRANSFORMERS MUST BE USED TO POWER THE DEVICE.
2. CONNECT OUTPUT SIGNAL CABLE DRAINS TO EARTH GROUND AT ONE END OF EACH CABLE ONLY.
3. COM CONNECTION MAY BE WIRED USING A SINGLE CONDUCTOR.

CENSUS-DIP SWITCH SETTINGS



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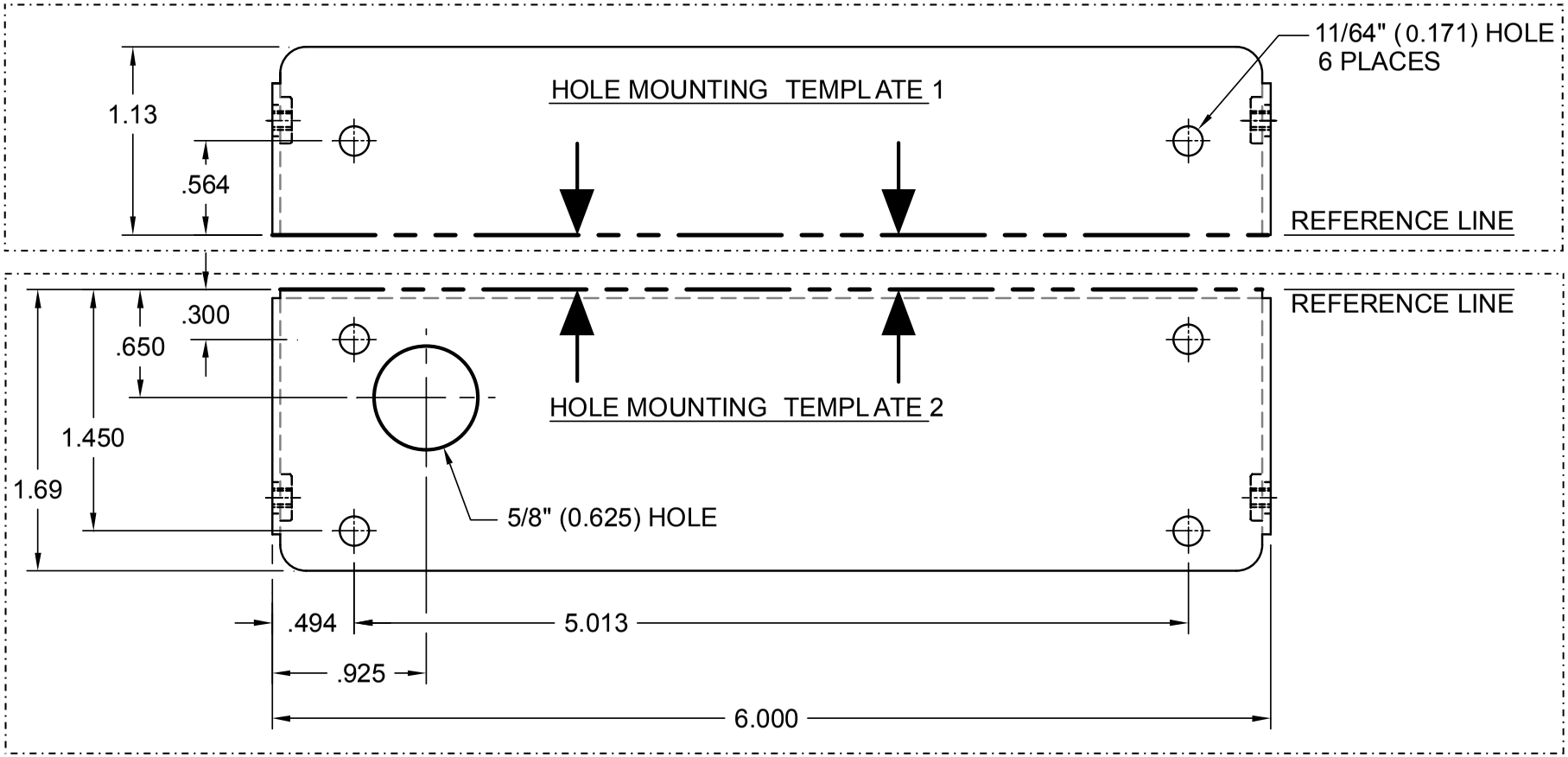
CENSus Mounting Hole Template

DIMENSIONED TEMPLATE - DO NOT COPY!

BEFORE DRILLING HOLES, MEASURE THE 6.00 INCH DIMENSION ON TEMPLATE 2
TO VERIFY THAT THIS TEMPLATE IS SCALED CORRECTLY.



NOTE:

POSITION TEMPLATE REFERENCE LINES IN ACCORDANCE WITH MOUNTING STYLE APPLICATIONS.
REFER TO MOUNTING STYLE APPLICATIONS SHEET FOR ADDITION DETAIL.

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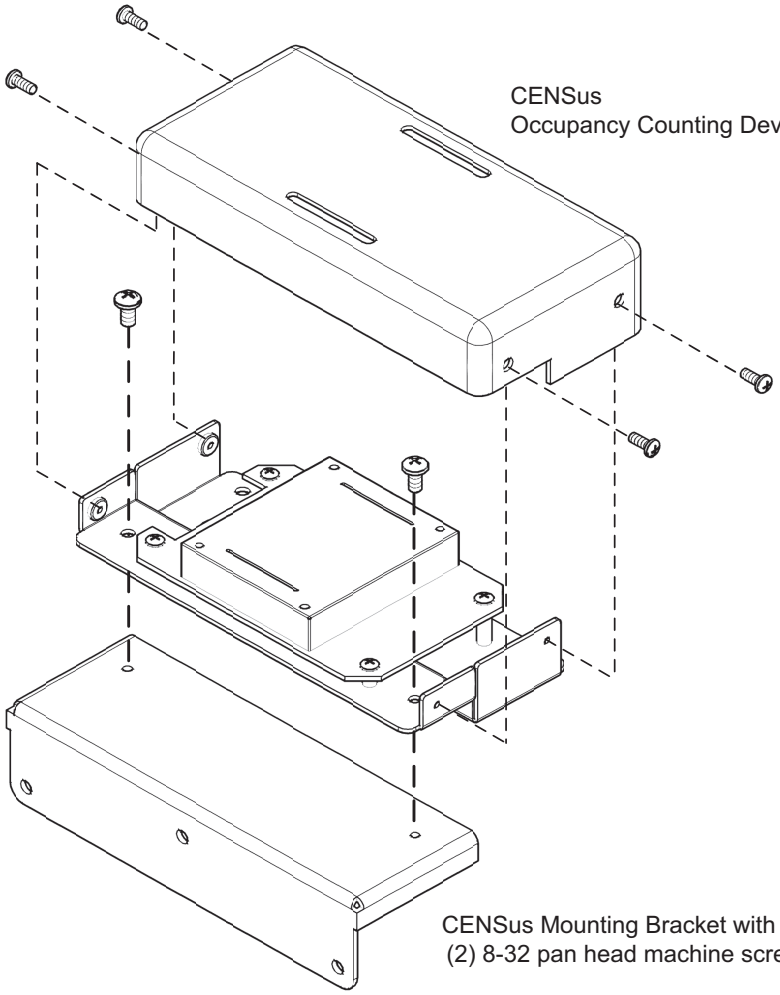
CENSUS-C100 OPTIONAL MOUNTING BRACKET INSTALLATION

CENSus Optional Mounting Bracket Installation Kit



Items Supplied
(1) CENSus Welded Mounting Bracket
(2) 8-32 pan head mounting screws
Instruction Sheet

Items Required
(1) CENSus Occupancy Sensing Device
(1) CENSus Mounting Bracket Kit
(1) #2 Phillips Screwdriver

Installation Instructions

1. Remove CENSus cover by removing the four 6-32 white cover screws.
2. Position the bracket as shown, and install using the two 8-32 mounting screws provided.
3. Re-install CENSus cover using the four 6-32 white cover screws removed in step 1.

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