# GreenTrol® Automation Inc.

# GC-N100 Counter

## Single Entry Door/Opening Occupancy Counting Device

# INSTALLATION / SETUP

**DOCUMENT PN: 960-0100**

## GC-N100 INSTALLATION AND SETUP

### INTRODUCTION

The GC-N100 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 GC-N100 device does not interfere with any installed door closure devices. |

*The GC-N100 device is designed for interior doors.

The GC-N100 Occupancy Counting Device requires 24VAC (+10%/-5%) at 1.5VA nominal. Wiring can be routed internally through the door jamb or externally as required. Ensure that all wiring has been roughed in to the GC-N100 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 GC-N100 device.

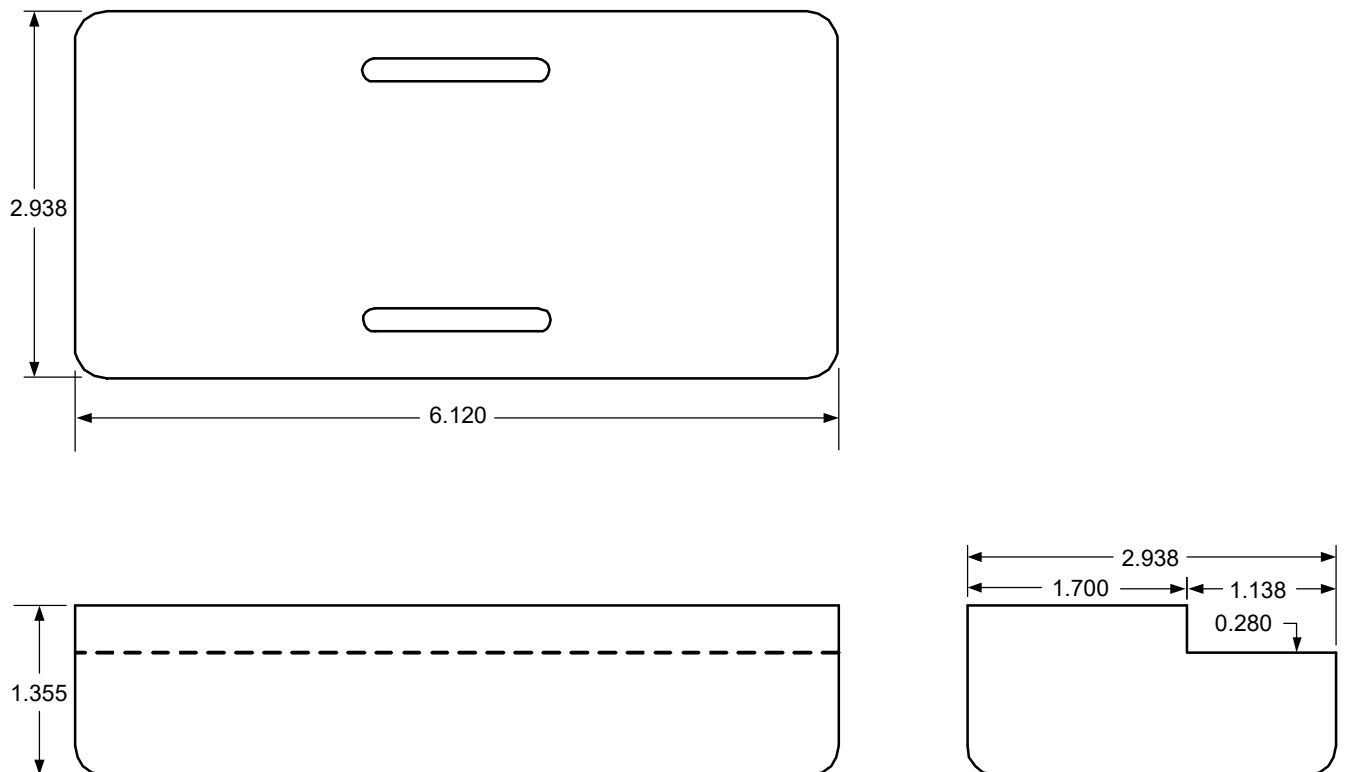Figure 1 shows the mechanical outline details of the GC-N100 device.



Figure 1. GC-N100 Mechanical Outline Detail

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1

## INSTALLATION

Ensure that 24VAC power (22.8 to 26.4VAC), network wiring and analog output cabling (if required) are available at the GC-N100 mounting location.  Using the GC-N100 Mounting Hole Template (page 7 of this document) , mark the mounting locations and install the device as shown in Figure 2 (GC-N100 Mounting Style Applications) below.
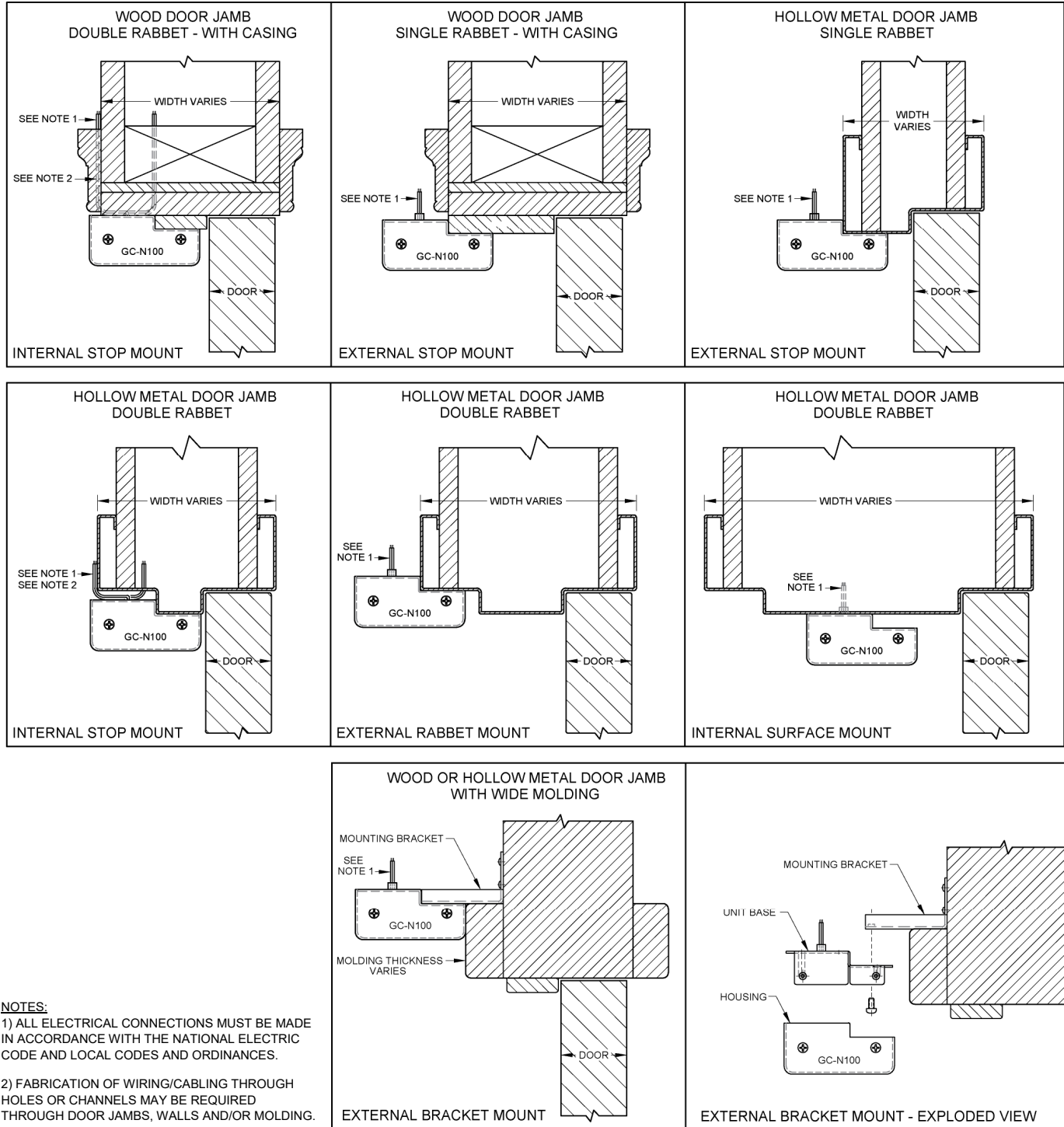


NOTES:
1) ALL ELECTRICAL CONNECTIONS MUST BE MADE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND LOCAL CODES AND ORDINANCES.

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

Figure 2. GC-N100 Mounting Style Applications

**GC-N100 BOARD LAYOUT AND COMPONENT IDENTIFICATION**

Remove the four (4) 6-32 cover screws, and remove the cover from the GC-N100.  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 GC-N100 main board layout and the locations of items that will be addressed.
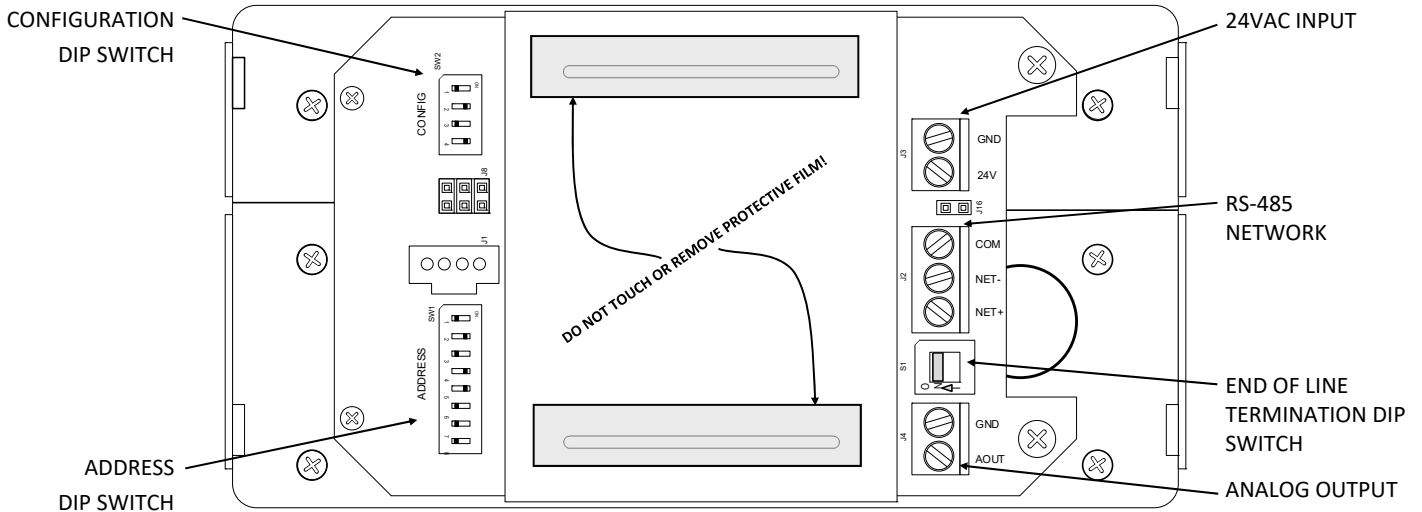


Figure 3. GC-N100 Board Layout Detail

# GC-N100 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 GC-N100 device at the 24V and GND terminals.

**CAUTION:**

The GC-N100 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 GC-N100 device or to other network connected devices.

An RS-485 network connection is required to configure the GC-N100 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).

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3

# GC-N100 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 GC-N100 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.
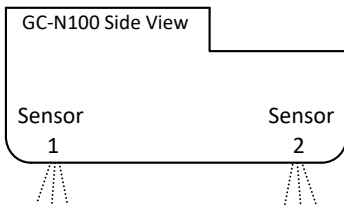
OBSERVE MARKINGS ON SWITCH BODY

| 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 |

GC-N100 Side View

Sensor 1        Sensor 2

Figure 4. GC-N100 CONFIG DIP Switch Settings and Detail

# GC-N100 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 GC-N100 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 GC-N100 for 5 seconds, and then set position 8 to OFF (low). You can now set the address of the GC-N100 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 GC-N100 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 GC-N100 will start in firmware update mode (for factory use only).

# GC-N100 END OF LINE TERMINATION DIP SWITCH SETTINGS

The END OF LINE TERMINATION DIP switch should be set to ON when the GC-N100 device is located at the end of a network segment in order to provide a termination for the device. When the GC-N100 is NOT located at the end of a network segment, the END OF LINE TERMINATION switch should be set to OFF.

# GC-N100 BACNET OBJECTS / MODBUS REGISTER MAP

## Table 1. BACnet Objects and Modbus Register Map

### BACnet OBJECTS

| Type, ID | Name | Default |
|---|---|---|
| DEV | GC-N100 | |
| 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.

# GC-N100 NETWORK OBJECT FUNCTIONS/DESCRIPTIONS

## Table 2. Network Object Functions and Descriptions

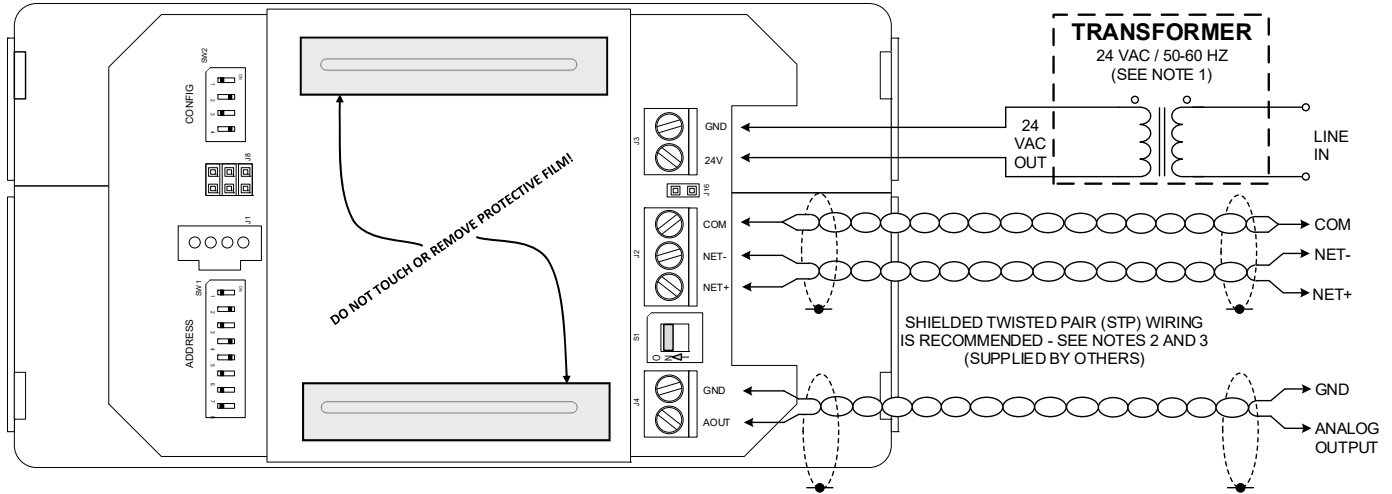| NAME | FUNCTION/DESCRIPTION |
|---|---|
| GC-N100 | Device name |
| Occupancy Count | Current count |
| Maximum Count | Maximum allowable count; also used as full scale for analog output |
| Inactivity Reset | Time in minutes without activity before the count is reset to the 'Inactivity Reset Count' 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. |

# GC-N100 ANALOG OUTPUT CONVERSION

## Table 3. Analog Output Conversion

| GC-N100 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 |

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5

# GC-N100 WIRING DIAGRAM



**TRANSFORMER**
24 VAC / 50-60 HZ
(SEE NOTE 1)

NOTES:
1. THE GC-N100 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.

# GC-N100-DIP SWITCH SETTINGS



**CONFIGURATION DIP SWITCH**

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 |

| 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 |

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

**ADDRESS DIP SWITCH**

When network protocol is set for MSTP (see CONFIG DIP switch SW2 position 4 above), ADDRESS DIP switch SW1 is used to set the GC-N100 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 GC-N100 for 5 seconds, and then set position 8 to OFF (low). You can now set the address of the GC-N100 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 GC-N100 will start in firmware update mode (for factory use only).
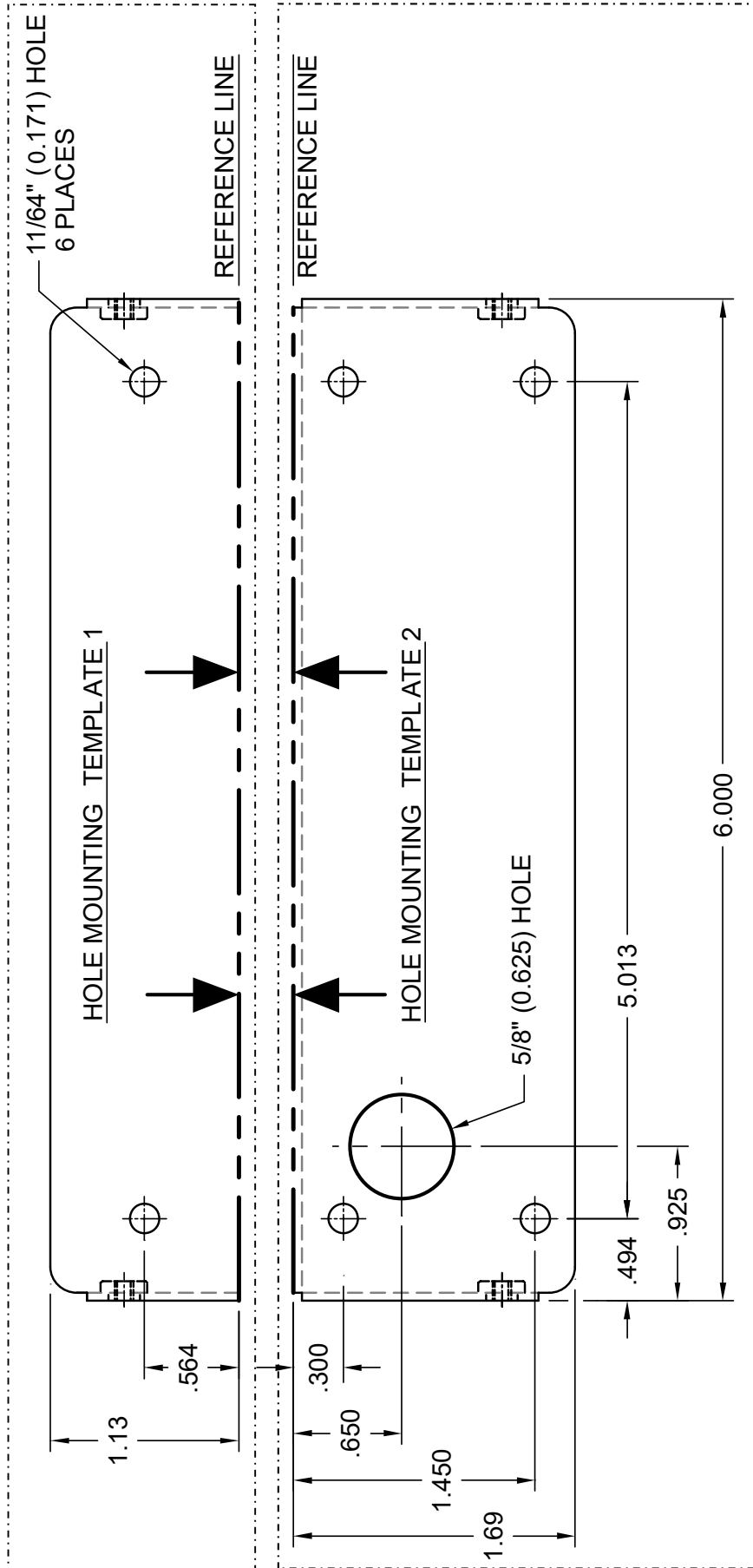
When network protocol is set for Modbus operation (see CONFIG DIP SW2 position 4 above), all 8 positions of the ADDRESS switch are used to set the network address (from 0 to 254). When switch positions 1-8 are all set to ON at power up, the GC-N100 will start in firmware update mode (for factory use only).

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# GC-N100 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.

11/64" (0.171) HOLE
6 PLACES

REFERENCE LINE

REFERENCE LINE

HOLE MOUNTING  TEMPLATE 1

HOLE MOUNTING  TEMPLATE 2

5/8" (0.625) HOLE

6.000

5.013

.925

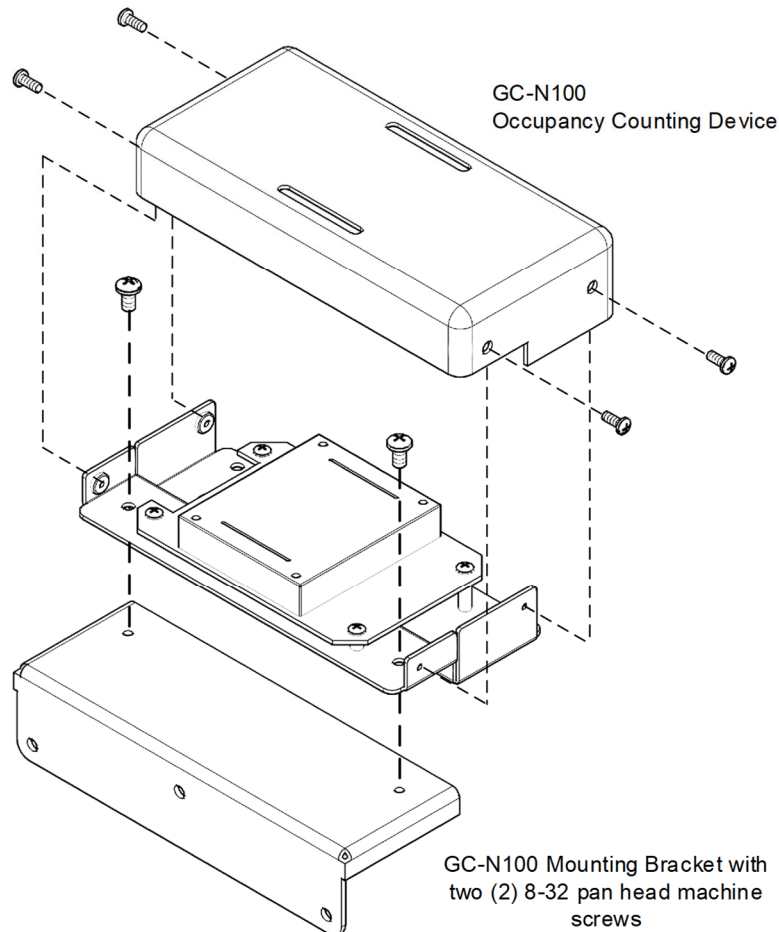.494

.564

.300

.650

1.13

1.450

1.69

NOTE:

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

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# GC-N100 Optional Mounting Bracket Installation Kit

GC-N100
Occupancy Counting Device

GC-N100 Mounting Bracket with
two (2) 8-32 pan head machine
screws

## Items Supplied

(1) GC-N100 Welded Mounting Bracket
(2) 8-32 pan head mounting screws
Instruction Sheet

## Items Required

(1) GC-N100 Occupancy Sensing Device
(1) GC-N100 Mounting Bracket Kit
(1) #2 Phillips Screwdriver

## Installation Instructions

**1**     Remove GC-N100 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 GC-N100 cover using the four 6-32 white cover screws removed in step 1.

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