



## Power Monitoring Products

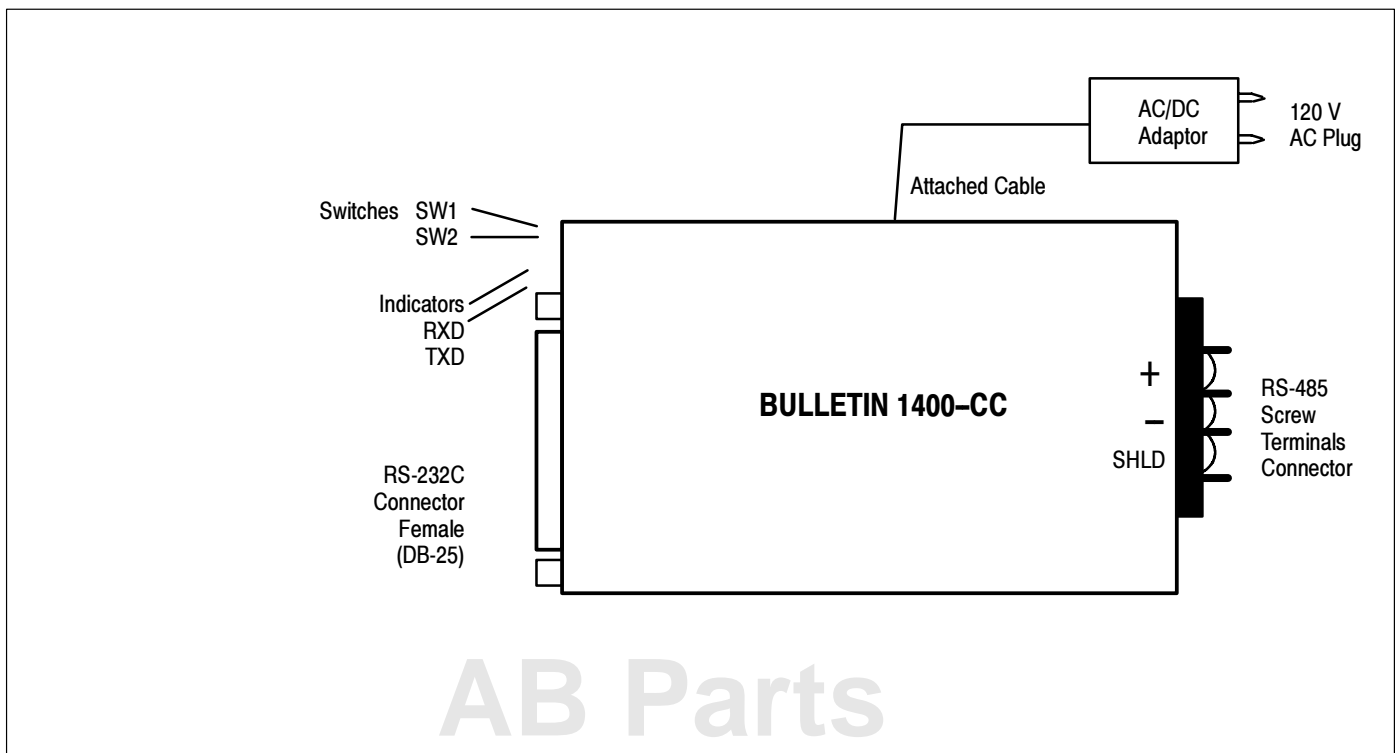
### Bulletin 1400-CC RS-232C to RS-485 Converter

#### Instruction Sheet

#### Features

- 1200, 2400, 4800 or 9600 baud operation.
- Full electrical isolation between RS-232C and RS-485 to 500V.
- Works directly with Bulletin 1400-SP Powermonitor Software.
- Compact package.
- May be used with direct computer connection, or with modems. Switches allow the setting of carrier detect, internal timing or Request to Send (RTS) control.
- Powered from 120V AC to DC adaptor (included).

**Figure 1**  
**Bulletin 1400-CC Physical Features**



## Introduction

Some applications may require the need to communicate from an RS-232C device to one of a group of devices connected via RS-485. To accomplish this, a media converter is required:

1. RS-232C is fundamentally a duplex standard. Separate signals can be transmitted and received simultaneously. RS-485 is strictly simplex. Signals can be transmitted in only one direction at a time. When interfacing between an RS-232C device and an RS-485 device, there must be some method of controlling whether the RS-232C device listens or transmits onto the RS-485 bus. The Bulletin 1400-CC provides two ways of doing this. The first is the standard approach of using the RS-232C RTS signal to provide directional control. This works fine provided that the RTS signal is available, and the computer software being run on the PC supports this method of operation. In many cases, these conditions are not met.

The Bulletin 1400-CC is unique in that it also supports an “automatic” mode which allows it to detect the change of RS-232 devices from a listen mode to transmit mode. The timing functions for control of direction of data on the RS-485 bus is handled for rates of 1200 to 9600 baud.

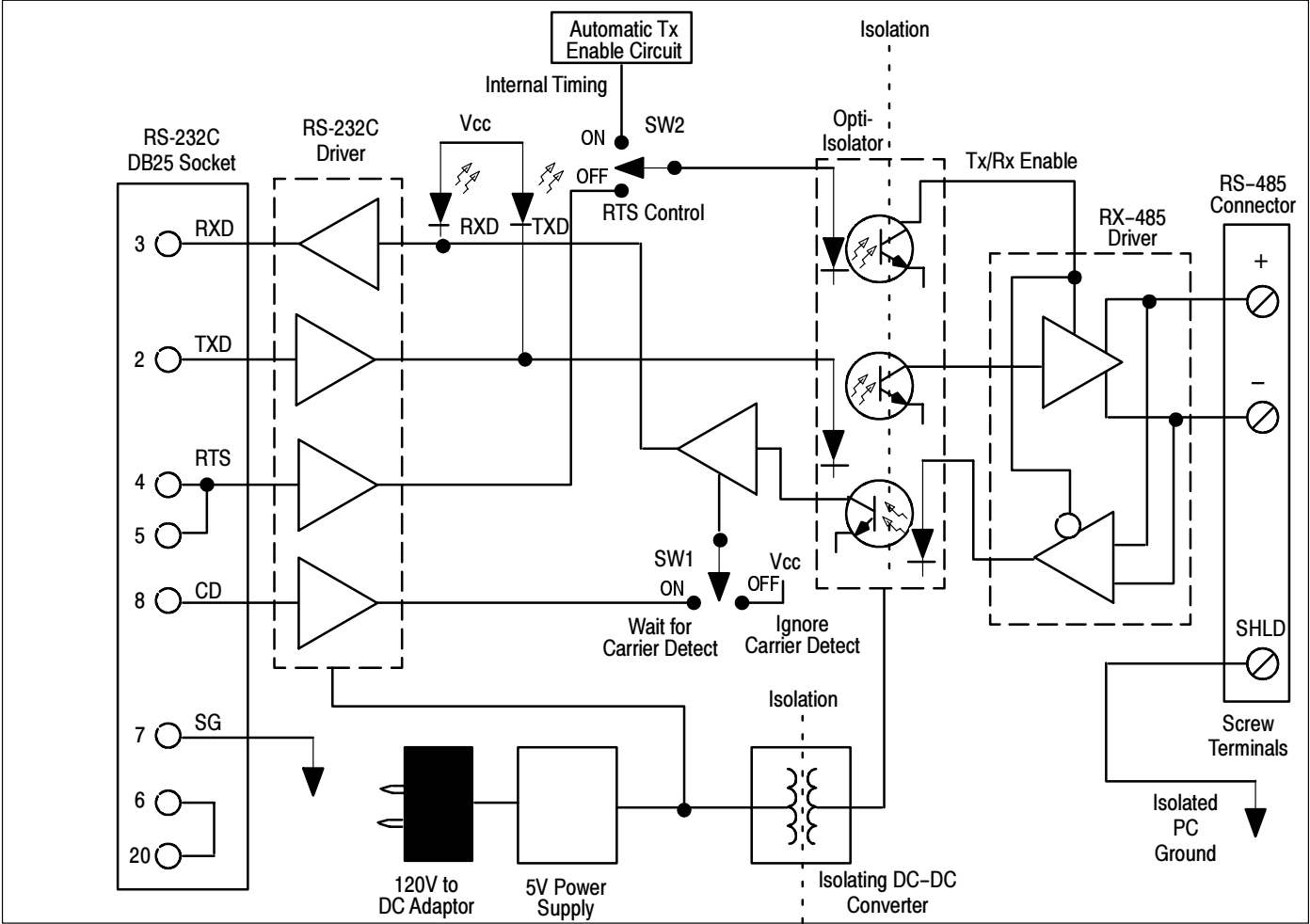
2. RS-485 loops are generally quite long, and they often run through electrically noisy environments. The risk of exposure to transient voltage surges and spikes on an RS-485 line is substantially higher than on an RS-232C line. The Bulletin 1400-CC module uses isolation between the RS-232C and RS-485 sections to protect the computer equipment on the RS-232C from damage due to surges or spikes from the RS-485 bus.



**ATTENTION:** Special high level isolation is required between units when the possibility of high ground potential differences exist. This may occur when communicating between devices where separate grounds are used. Failure to do so can lead to personal injury or death, property damage, or economic loss.

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**Figure 2**  
**Bulletin 1400-CC Operational Block Diagram**



## Installation and Operation

### Installation With Direct Connection to a Computer

The Bulletin 1400-CC device is configured as DCE, (data communications equipment) it may be connected directly to the serial port of a standard PC, which will be DTE (data terminal equipment). As shown in Figure 3, the DB-25 connector on the Bulletin 1400-CC unit is connected directly (cable wires are run straight through) to the DB-25 connector of the computer.

1. Make the connection between the Bulletin 1400-CC and the computer by wiring 1 to 1 through 25 to 25 between devices. The shield should be connected to pin 1 at the computer end. To wire the RS-485 bus, use a shielded twisted pair cable. See Figure 3.
2. The RS-485 connections are made to the “Data +” and “Data -” terminals of the Bulletin 1400-CC. Ensure that the polarity is correct in all places. See Figure 3.
3. The cables shields between devices should be connected to the terminal labeled SHLD. See Figure 3.

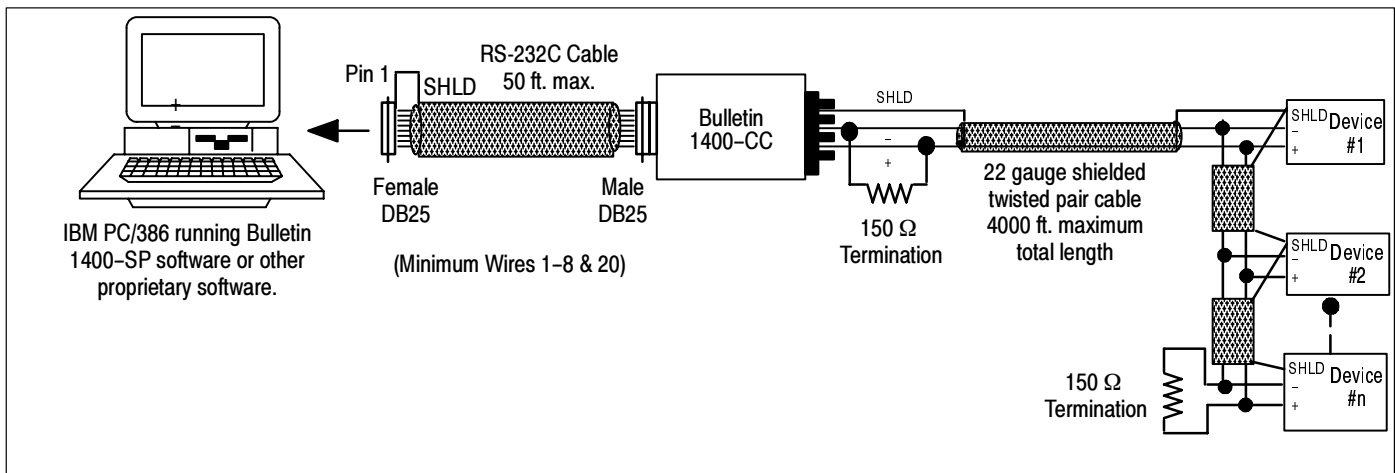
With the Bulletin 1400-SP running on a PC in a direct connect mode, the RTS line of the RS-232 will control the RS-485 data direction. The switch settings on the Bulletin 1400-CC for direct connection should be:

SW-1: OFF (ignore carrier detect).

SW-2: OFF (RS-485 under control of RTS).

(Refer to Figure 5 on Page 7)

**Figure 3**  
**Bulletin 1400-CC Direct Connection to Computer**



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## **Installation and Operation (continued)**

### **Installation With Connection to a Modem**

The DB-25 connector on the Bulletin 1400-CC converter can be connected to the DB-25 connector of a modem using a Bulletin 1400-MCA (Modem Cable Adaptor) and a standard male to female 25 wire RS-232 cable. Both the Bulletin 1400-CC unit and the modem are configured as DCE (data communications equipment), both units have female DB-25 connectors and both have the transmit and receive signals appearing on the same numbered pins. To interface the two units without using the Bulletin 1400-MCA, the interconnecting cable must then have male to male connectors, the transmit and receive signal wires must be transposed, and some pins need looped back jumpers because of the requirements of some modems. (See Figure 4 on page 6 for interconnection using a Bulletin 1400-MCA connector and a standard RS-232 cable or for configuration of your own cable).

A shielded twisted pair cable is used to make the RS-485 connections to the “Data +”, “Data -” and SHLD terminals of the Bulletin 1400-CC. Ensure that the polarity is correct throughout the RS-485 bus between the Bulletin 1400-CC and all RS-485 devices.

If the converter is being used to allow the modem to control an active RS-485 data loop, the converter must be set to pass data to the modem only after the modem carrier has been detected. For modem CD (carrier deject) control of Bulletin 1400-CC, the switch SW1 settings should be:

SW-1: ON (wait for carrier detect).

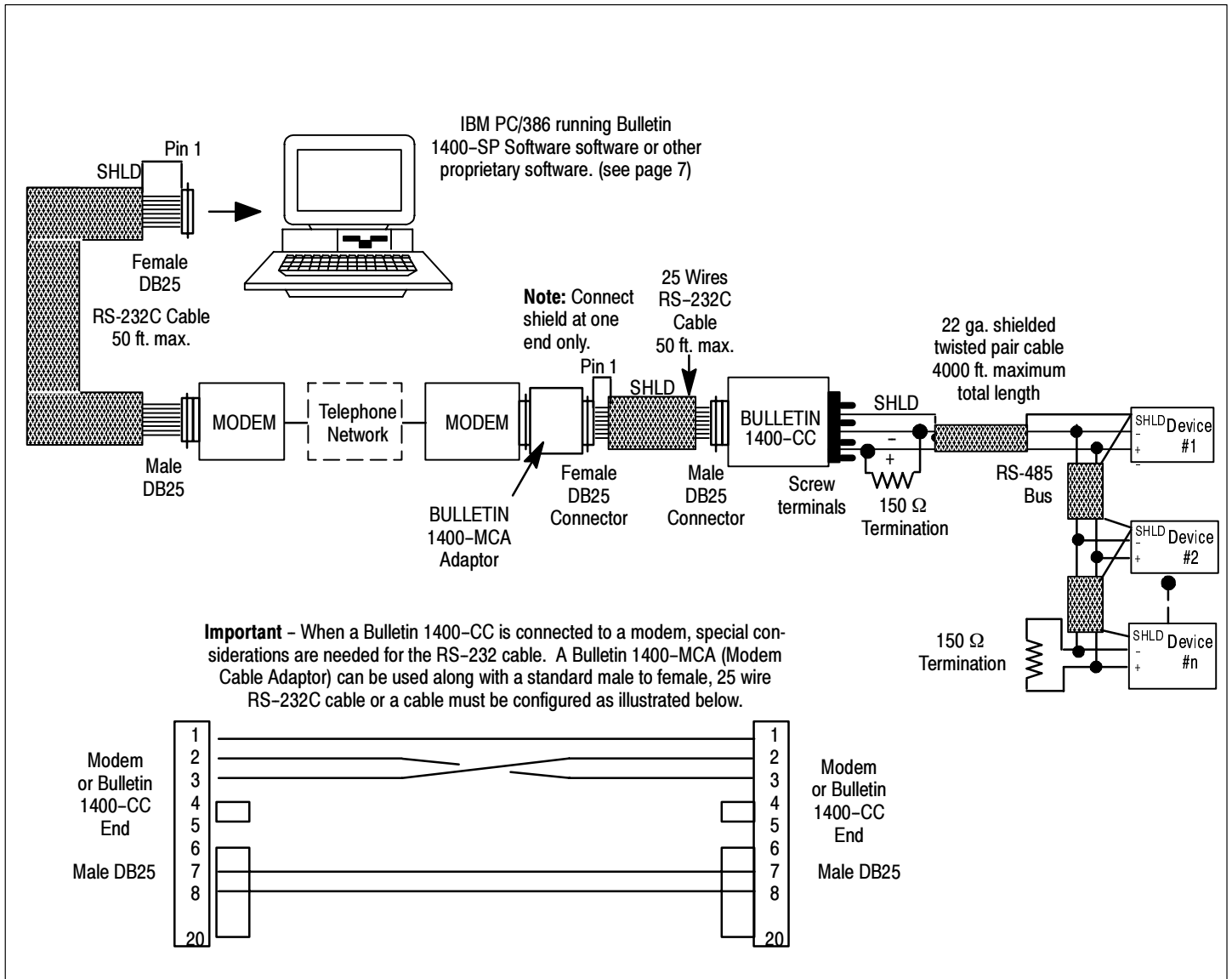
Switch SW-2 provides optional RTS signal control of transmit to the RS-485 bus, if the RS-485 bus is to be software controlled. If the software does not support RTS control, or the modem being used does not pass this signal, SW-2 must be set to the automatic internal timing mode. The two possible settings of SW-2 are as follows:

SW-2: OFF (RTS controls the RS-485 bus).

SW-2: ON (RTS is not available: the converter uses internal timing to control the RS-485 bus).

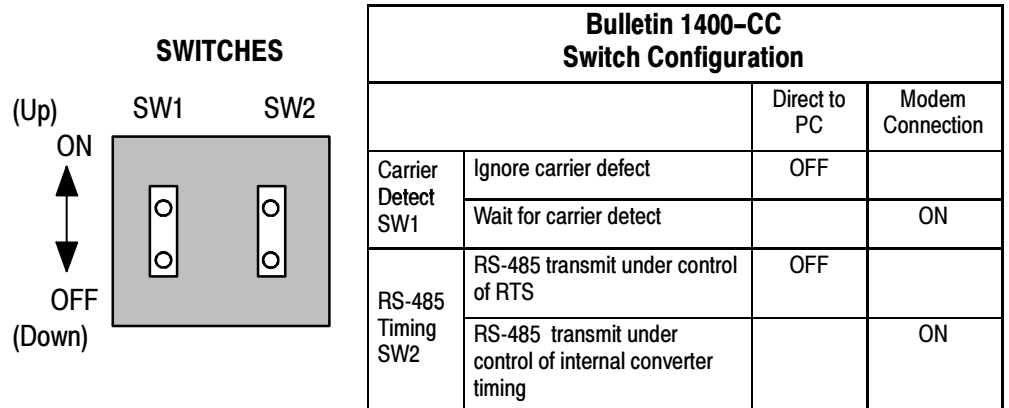
(Refer to Figure 2 on Page 3 for the Operational Block Diagram. Refer to Figure 5 on Page 7 for the Switch Configuration Chart.)

**Figure 4**  
**Bulletin 1400-CC Connection to a Modem**



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**Figure 5**  
**Bulletin 1400-CC Configuration**



**Power Connection**

To power the Bulletin 1400-CC, the AC to DC adaptor should be plugged into a standard 120V AC outlet. When powered, the TXD and RXD indicators should normally come on. As data is passed through the converter, the lights will normally flicker off.

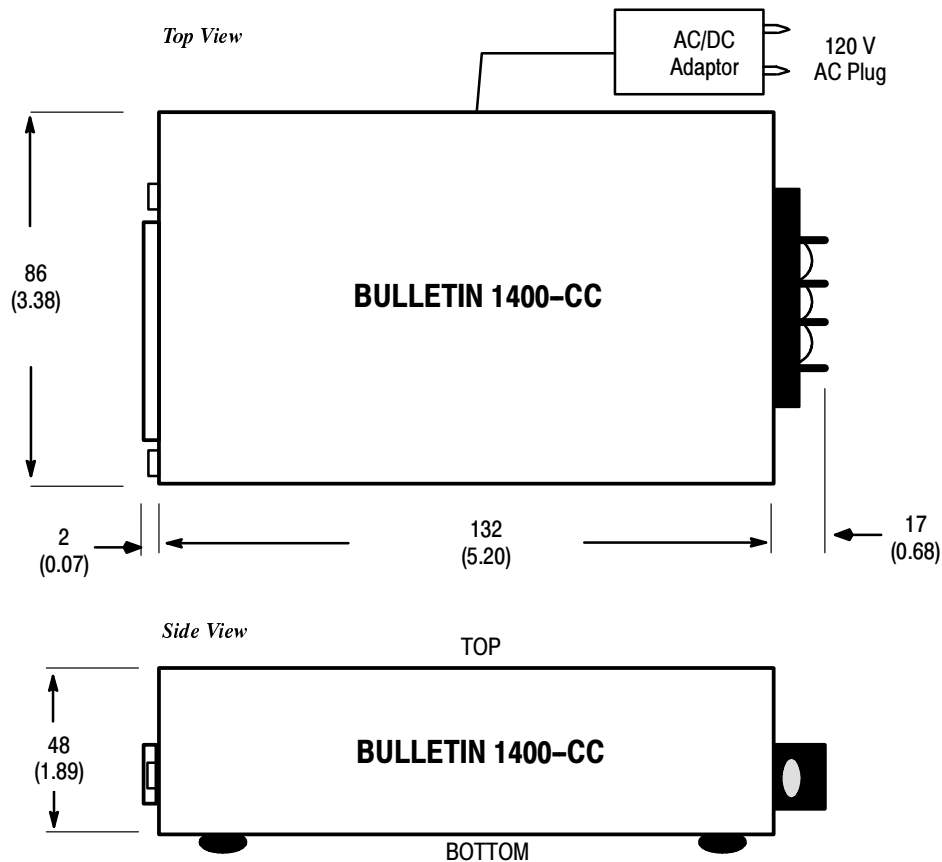
**For Use with Other Software**

Software engineers, who are designing software to work with this device, or a user, who is assessing whether an existing software package will function with the converter, must meet the following conditions for successful operation:

1. Two padding bytes are recommended at the start of each packet. This ensures that proper bus control is established before actual data is sent, and ensures that any data collisions will involve only the pad bytes.
2. If the unit is to be used in automatic control mode, packets must be tightly packed, such that there is less than one byte time between the transmission of each byte within a packet.

**Figure 6**  
**Bulletin 1400-CC Approximate Dimensions**

Dimensions shown in millimeters (inches).  
 Dimensions are not intended to be used for manufacturing purposes.



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