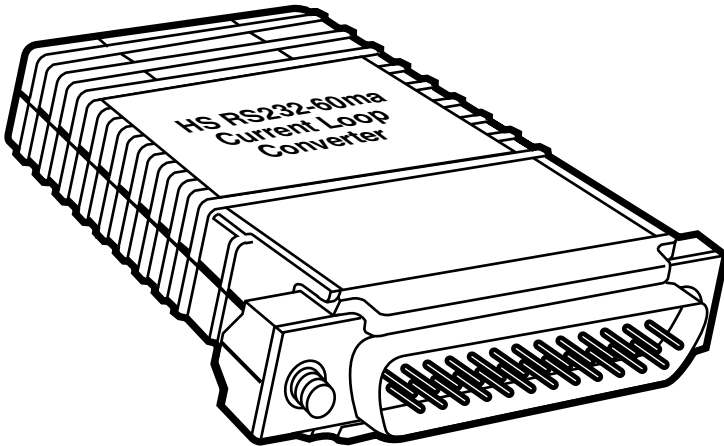




HS RS-232↔60 ma Current Loop Converter



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**FEDERAL COMMUNICATIONS COMMISSION
AND
INDUSTRY CANADA
RADIO FREQUENCY INTERFERENCE STATEMENTS**

This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

TRADEMARKS USED IN THIS MANUAL

Any trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.

**NORMAS OFICIALES MEXICANAS (NOM)
ELECTRICAL SAFETY STATEMENT**

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
 - A: El cable de poder o el contacto ha sido dañado; u
 - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - C: El aparato ha sido expuesto a la lluvia; o
 - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - E: El aparato ha sido tirado o su cubierta ha sido dañada.

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1. Specifications

Transmission Line—19 to 26 AWG twisted pair

Range—4 miles on 24 AWG twisted pair

Interfaces—Asynchronous, EIA RS-232, ITU/CCITT V.24 full duplex, 60-mA current loop (4-wire full duplex only)

Data Rates—0 to 115.2 kbps

Isolation—2500 V RMS via opto-isolators

Surge Suppression—Over-voltage protection for opto-isolators via Silicon Avalanche Diodes

Connectors—CL080A-F: (1) DB25 female, (1) terminal block; CL080A-M: (1) DB25 male, (1) terminal block; CL081A-F: (1) DB25 female, (1) RJ-45; CL081A-M: (1) DB25 male, (1) RJ-45; CL082A-F: (1) DB25 female, (1) RJ-11; CL082A-M: (1) DB25 male, (1) RJ-11

Power Supply—No external power required; uses power from RS-232 interface

Temperature Range—32 to 122°F (0 to 50°C)

Altitude—Up to 15,000 feet

Humidity—5 to 95% noncondensing

Size—1.2"H x 0.75"W x 2.5"D (3.1 x 1.9 x 6.4 cm)

Weight—1.5 oz.

2. Introduction

The HS RS-232↔60 ma Current Loop Converter lets an asynchronous RS-232 device communicate with a 60-mA current-loop device. The Converter requires no AC power or batteries to operate and supports data rates to 115.2 kbps.

Operating full duplex, the Converter supports communication distances up to 4 miles over two unconditioned 24 AWG twisted pair, depending on the data speed. To guard against data loss due to ground loops, the Converter is equipped with 2500 V RMS optical isolators.

The Converter connects directly to the RS-232 interface using a male or female DB25 connector. Two-pair cable running to the 60-mA current-loop device attaches to the Converter by an RJ-11 jack, RJ-45 jack, or terminal blocks with built-in strain relief. An external DCE/DTE switch on the Converter eliminates the need for a crossover cable on the RS-232 interface.

3. Configuration

The Converter is designed to be easy to use. There are no internal jumpers or DIP switches to set, so there is no need to open the case to configure the unit (you may need to open the case for wire connection—refer to **Chapter 4**). The only configuration necessary for operation is proper setting of the external DCE/DTE switch.

The diagram below shows the location of the DCE/DTE switch on the PC board, as well as the location of the terminal block and surge suppressors (“S” model only).

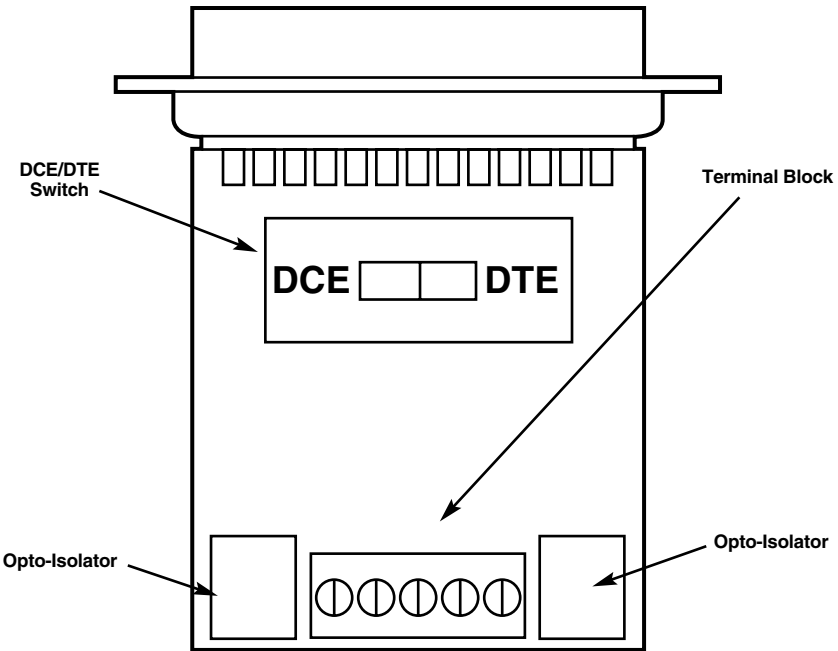


Figure 3-1. PC Board.

3.1 Setting the DCE/DTE Switch

For your convenience, the Converter has an externally accessible DCE/DTE switch. If the RS-232 device connected to the Converter is a modem or multiplexor (or is wired like one), set the switch to “DTE.” This setting causes the Converter to behave like Data Terminal Equipment and transmit data on pin 2.

If the RS-232 device connected to the Converter is a PC, terminal or host computer (or is wired like one), set the switch to “DCE.” This setting causes the Converter to behave like Data Communications Equipment and transmit data on pin 3.

4. Installation

The Converter is simple to install. After configuring the DTE/DCE switch, connect the two twisted pairs using one of three methods: terminal blocks with strain relief, RJ-11 jack, or RJ-45 jack. The method you use will depend on the specific model you have.

4.1 Twisted-Pair Wiring Overview

Only one Converter is needed for each RS-232 to 60-mA current-loop circuit. The Converter is connected to the current-loop device using two twisted pairs. The pairs must be “dry” (unconditioned) metallic wire, 19 to 26 AWG. Best distance is achieved with larger gauges. When you have completed wiring for your data circuit, the pin connections should be as shown below:

```

XMT+ ————— RCV+
XMT- ————— RCV-
G ————— To Shield (Optional) ————— G
RCV+ ————— XMT+
RCV - ————— XMT -

```

4.1.1 TWISTED-PAIR CONNECTION USING TERMINAL BLOCKS

The terminal-block/strain-relief version of the Converter allows you to hook up the line-side interface using bare wires. The following instructions will tell you how to open the case, connect the bare wires, and fasten the strain-relief collar in place.

1. Open the unit by gently inserting a screwdriver between the DB25 connector and the lip of the plastic case (see **Figure 4-2**). You don't have to worry about breaking the plastic, but be careful not to bend the D-sub connector.

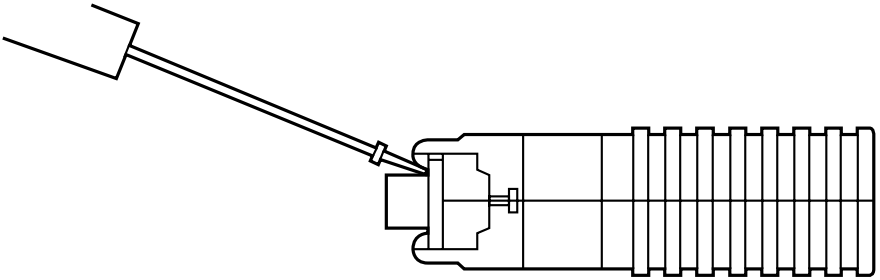


Figure 4-2. Opening the Unit.

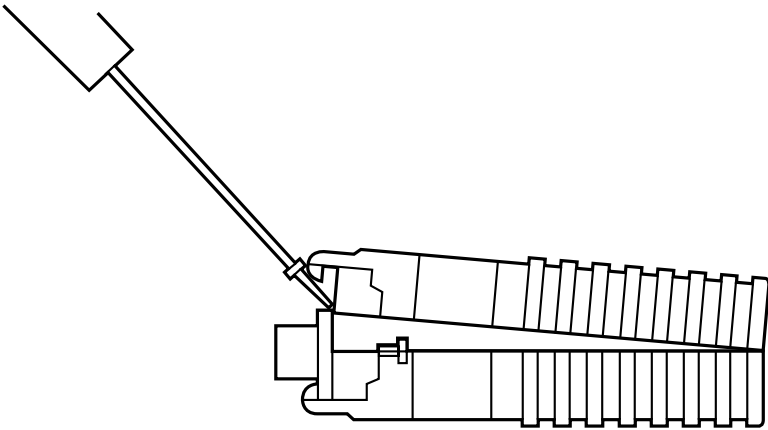


Figure 4-3. Opening the Unit.

2. Strip the outer insulation from the twisted pairs about one inch from the end.
3. Strip back the insulation on each of the 2 twisted-pair wires about $\frac{1}{2}$ inch.

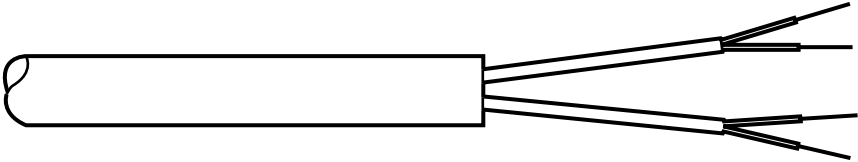


Figure 4-4. Stripping the Insulation.

HS RS-232↔60 MA CURRENT LOOP CONVERTER

4. Connect one pair of wires in the telephone cable to “XMT” (Transmit) on the terminal block, being careful to observe the polarity. (The wire connected to “XMT+” must be connected at the other end of the telephone line to “RCV+” in the other unit, and the wire connected to “XMT-” must be connected at the other end of the telephone line to “RCV-” in the other unit.)
5. Connect the other pair of wires in the telephone cable to “RCV” (Receive), again being careful to observe the polarity. (The wire connected to “RCV+” must be connected at the other end of the telephone line to “XMT+” in the other unit, and the wire connected to “RCV-” must be connected at the other end of the telephone line to “XMT-” in the other unit.)
6. If there is a shield around the telephone cable, it may be connected to “G” on the terminal block. To avoid ground loops, we recommend connecting the shield at the computer end only. A ground wire is not necessary for proper operation of these units.
7. When you finish connecting the wires to the terminal block, the assembly should resemble the diagram below:

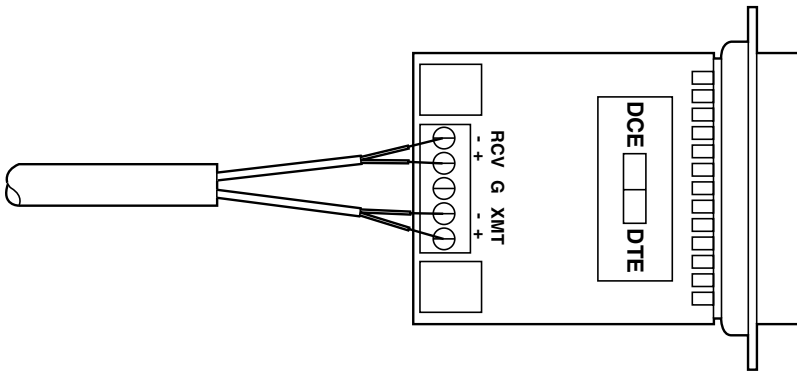


Figure 4-5. Terminal Block Assembly.

- Place the 2 halves of the strain-relief assembly on either side of the telephone wire and press together very lightly. Slide the assembly so that it is about 2 inches from the terminal posts and press together firmly.

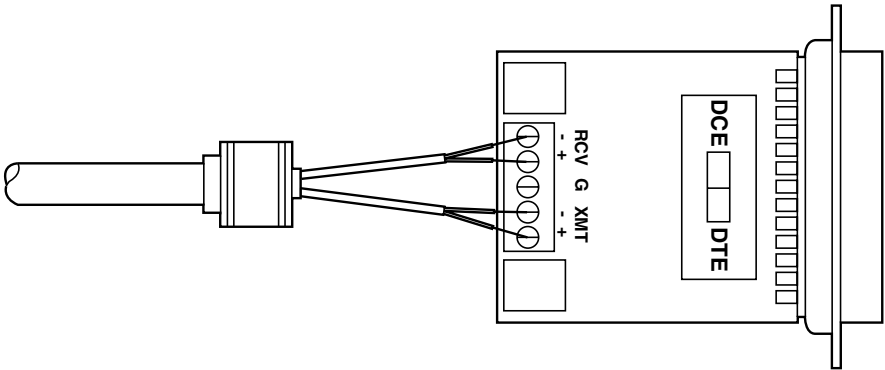


Figure 4-6. Strain Relief Assembly.

- Insert the strain-relief assembly with the wire going through it into the slot in the bottom half of the modem case and set it into the recess in the case.

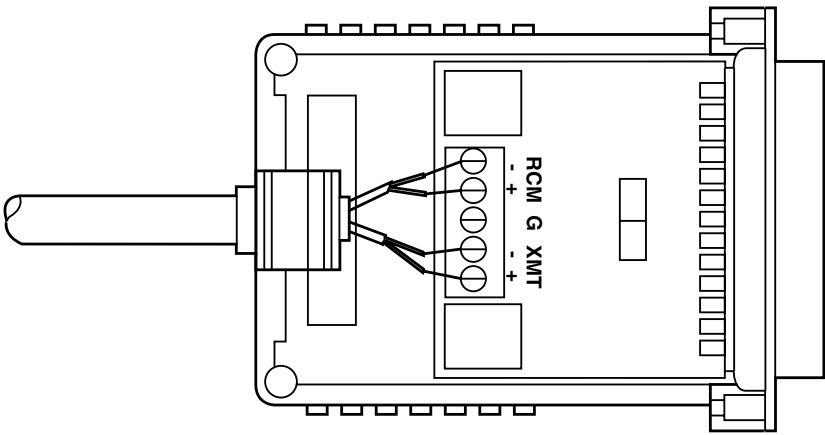


Figure 4-7. Inserting the Strain Relief Assembly into the Slot.

10. BEND the top half of the case as necessary to place it over the strain relief assembly. Do not snap the case together yet.

11. Insert one captive screw through a saddle washer and then insert the captive screw with the washer on it, through the hole in the DB25 end of the case. Snap that side of the case closed. Repeat the process for the other side. This completes the cable installation process.

4.1.2 TWISTED PAIR CONNECTION USING MODULAR JACKS

The modular versions of the Converter have an RJ-11 or RJ-45 jack mounted in the case. These jacks are prewired for a standard telco wiring environment. To be sure you have the right wiring, use the table below as a guide.

<u>RJ-11</u>	<u>SIGNAL</u>	<u>RJ-45</u>	<u>SIGNAL</u>
1	GND*	1	N/C
2	RCV-	2	GND
3	XMT+	3	RCV-
4	XMT-	4	XMT+
5	RCV+	5	XMT-
6	GND	6	RCV+
		7	GND
		8	N/C

*Connection to ground is optional.

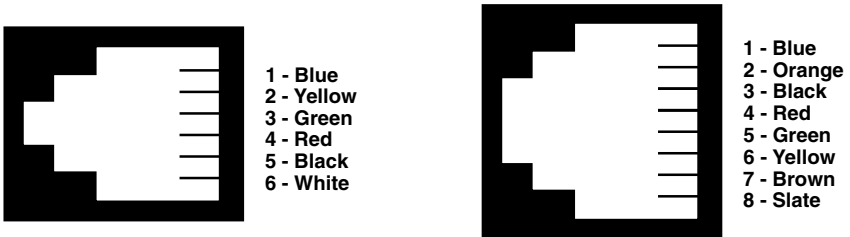


Figure 4-8. Modular Jacks.

4.2 Completing the Installation

Once you have configured the unit for DTE or DCE and connected the twisted pair wires correctly, simply plug the Converter into the RS-232 data port. Remember to insert and tighten the two captive connector screws.

The Converter requires no power supply or batteries for operation. It will work automatically at any data rate from 50 to 115.2 kbps, as long as there is any data or control voltage being applied.

Appendix: RS-232C Pin Configurations

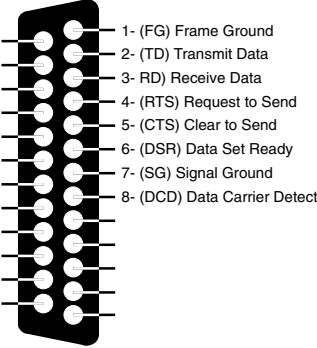
DIRECTION	STANDARD "DCE" SETTING	DIRECTION
To Converter		<p>To Converter</p> <p>From Converter</p> <p>To Converter</p> <p>From Converter</p> <p>From Converter</p> <p>From Converter</p> <p>From Converter</p>

Figure A-1. Standard DCE Setting.

HS RS-232↔60 MA CURRENT LOOP CONVERTER

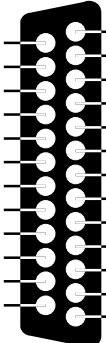
DIRECTION	STANDARD "DTE" SETTING	DIRECTION
From Converter	<div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 10px;">Data Term. Ready (DTR) - 20</div>  <div style="margin-left: 10px;"> <p>1- (FG) Frame Ground</p> <p>2- (TD) Transmit Data</p> <p>3- RD) Receive Data</p> <p>4- (RTS) Request to Send</p> <p>5- (CTS) Clear to Send</p> <p>6- (DSR) Data Set Ready</p> <p>7- (SG) Signal Ground</p> <p>8- (DCD) Data Carrier Detect</p> </div> </div>	<p>From Converter</p> <p>To Converter</p> <p>From Converter</p> <p>To Converter</p> <p>To Converter</p> <p>To Converter</p>

Figure A-2. Standard DTE Setting.



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