Installation

The DPU2000R unit comes enclosed in a metal case. Follow the instructions and diagrams in this section to install the DPU2000R.

Receipt of the DPU2000R

When you receive the DPU2000R, examine it carefully for shipping damage. If any damage or loss is evident, file a claim at once with the shipping agent and promptly notify the nearest ABB sales office.

Before installing the unit, it is suggested that the following procedures be performed using the OCI:

• Power up the relay. The LEDs should light and a slight clicking sound will be heard.

• Using the arrow keys, go to the Main Menu, scroll to Settings, press <E>, scroll to Unit Information, press <E>. Verify unit information against front panel nameplate.

• Press <C> to return to the Settings Menu, scroll to Show Settings, press <E>. Check default settings against the tables supplied in this manual.

• After checking the default settings, press <C> twice to return to the Main Menu. Scroll to Test and press <E>, at the Self Test selection, press <E>. The unit will self test.

• After performing the self test, press <C> twice to return to the Main Menu. Scroll to Settings and press <E>, in the Settings Menu, scroll to Change Settings and press <E>. In the Settings Menu, scroll to Clock, and set the unit clock.

• Press <E> to enter the correct time and return to the Settings Menu.

• Set the PASSWORD by scrolling to Configuration and press <E>. At the Password prompt, press <E> again. Once in the Change Confi Sett Menu, scroll to Relay Password and enter a password. This will be the main password for entry to the unit. Press <E> to enter the password and return to the Change Confi Sett Menu. Scroll to Test Password, and enter a different password. This password allows low level entry to the Test options of the unit.

WARNING: If the password entered in the Relay Password Section is lost or forgotten, the unit cannot be accessed. If this situation occurs, contact ABB Allentown Technical Support at 1-800-634-6005.

Installing the DPU2000R

The DPU2000R is enclosed in a standard 3U (3 rack units), 19 x 5-inch case designed for rack mounting. Figure 9-2 shows the dimensions of the DPU2000R.
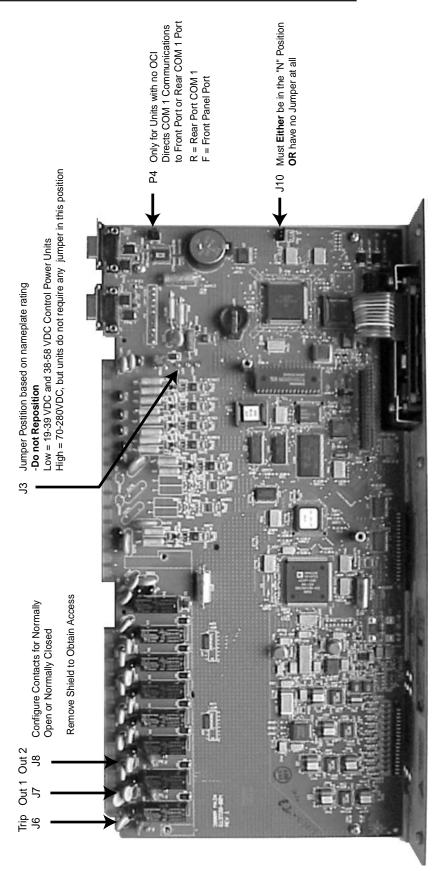
P4 Only for Units with no OCI
Directs COM 1 Communications
to Front Port or Rear COM 1 Port

R = Rear Port COM 1
F = Front Panel Port

J10 Must **Either** be in the "N" Position
OR have no Jumper at all

J3 Jumper Postition based on nameplate rating
-**Do not Reposition**
Low = 19-39 VDC and 38-58 VDC Control Power Units
High = 70-280VDC, but units do not require any jumper in this position

Configure Contacts for Normally
Open or Normally Closed

Remove Shield to Obtain Access

Out 2 J8

Out 1 J7

Trip J6

Figure 9-1. Main Circuit Board Jumpers

Case Dimensions (Standard 19" Rack Mount 3 Units High)
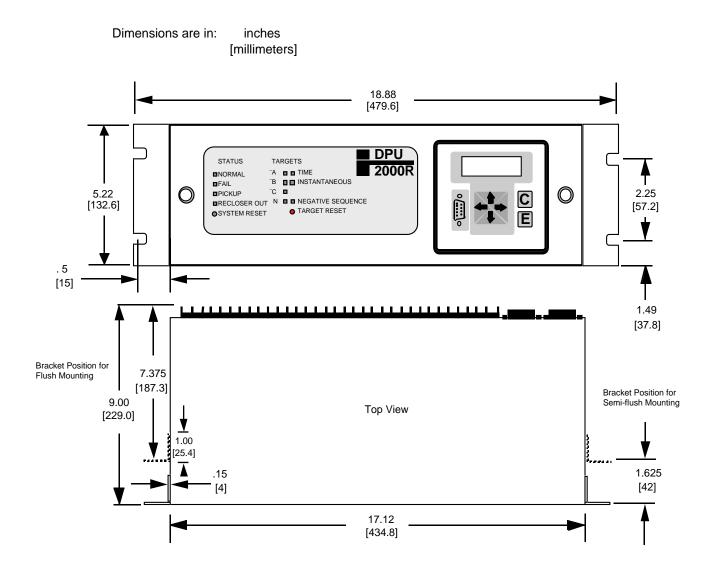
Dimensions are in: inches
[millimeters]

Figure 9-2. Case Dimensions

Panel Mounting Kit

The complete kit will include a bezel, its associated hardware and gasket, as well as a lens cover with its associated hardware. This kit will provide a means for panel mounting and dustproofing.

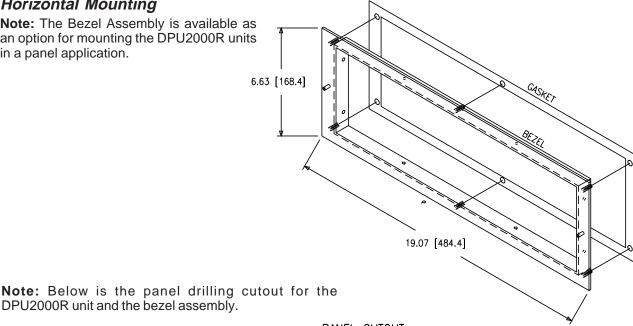| *Ordering Information:*	
Horizontal Panel Mounting Kit	604513-K1
Vertical Panel Mounting Kit	604513-K2

Spare Parts List:	
Bezel/gasket assembly only	604513-K3
Horizontal lens cover assembly	613724-K1
Vertical lens cover assembly	613724-K2

Horizontal Mounting

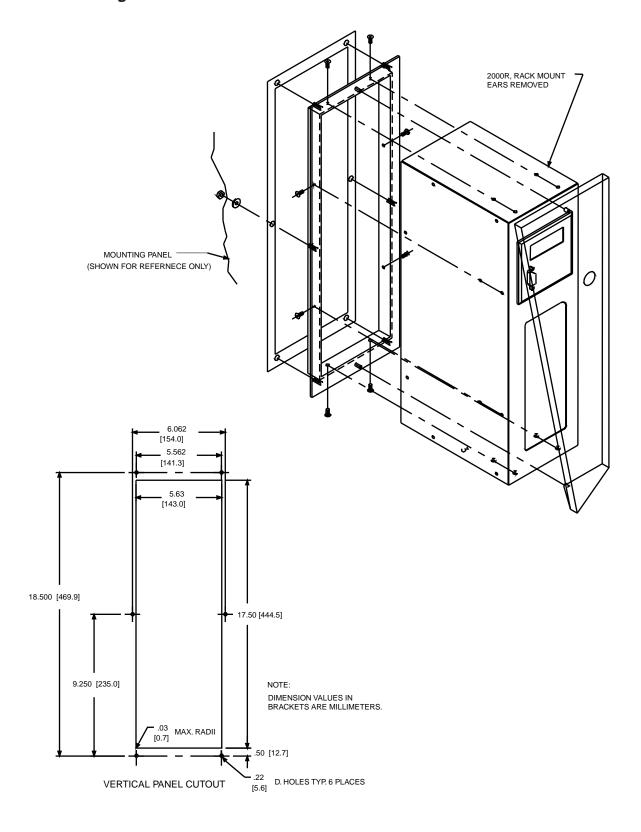**Note:** The Bezel Assembly is available as an option for mounting the DPU2000R units in a panel application.

Note: Below is the panel drilling cutout for the DPU2000R unit and the bezel assembly.

NOTE: DIMENSIONS ARE INCHES [MILLIMETERS]

Vertical Mounting

2000R, RACK MOUNT
EARS REMOVED

MOUNTING PANEL
(SHOWN FOR REFERNECE ONLY)

6.062
[154.0]

5.562
[141.3]

5.63
[143.0]

18.500 [469.9]

17.50 [444.5]

9.250 [235.0]

NOTE:

DIMENSION VALUES IN
BRACKETS ARE MILLIMETERS.

.03   MAX. RADII
[0.7]

.50 [12.7]

VERTICAL PANEL CUTOUT

.22   D. HOLES TYP. 6 PLACES
[5.6]

Rear Terminal Block Connections

Apply only rated control voltage marked on the front panel of the unit to the positive terminal and the negative terminal. Wire the ground stud on the rear of the case to the equipment ground bus with at least #10 gauge wire. Figure 9-3 shows the rear terminal block layout and numbers.

With exception of the CTs and burden board, you can totally withdraw the DPU2000R from its case.

Use input IN7 or IN8 as a Trip Coil Monitor (TCM) input. When the breaker is closed, a small trace current of 6 milliamperes is passed from the positive terminal through the negative terminal and the trip coil circuit. If an open circuit is detected while the breaker is closed, the Trip Circuit Failure Alarm (TCFA) contacts are actuated and a "Trip Coil Failed" message appears on the OCI display.

Note: On older relays, terminals 35-38 do not exist. This should not have any effect on wiring except for SEF and Sync Check units. For SEF and Sync Check units, the V_0 (or Vline) input should be the highest numbered sensor installed in the unit, which will be sensor 8 on older units and sensor 10 in present production.
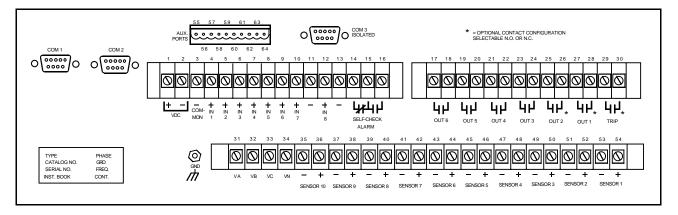

Figure 9-3. Rear Terminal Block

Table 9-1. Minimum Connections

Required Connections	Terminals
Control Voltage Input	Positive: 1, Negative: 2, Common Negative: 3
Current Inputs	IA: 54 & 53; IB: 52 & 51; IC: 50 & 49; IN: 48 & 47
52A (XO) Contact Input	4(+)
52B (XI) Contact Input	5(+)
43A (AR) Contact Input	6(+)
TRIP Output Contact	29 & 30 (N.O./N.C. Jumper #J1)
SELF-CHECK ALARM Output Contacts	15 & 16 N.O.; 14 & 15 N.C. (DPU2000R powered down)
Optional Connections	Terminals
Voltage Inputs	VA: 31; VB: 32; VC: 33; VN: 34

Relay External Connections

Note:
In this case, OUT 2 is shown programmed as the breaker close contact. Inputs 1, 2 and 3 on terminals 4, 5 and 6 are shown mapped to the 52A (XO), 52B (XI) and 43A (AR) logic functions respectively. Refer to Section 6 for other available I/O logic mapping functions.

Self check alarm contacts are shown in the powered down condition. When control power is applied, contacts will change state.

OPTIONAL: OPEN DELTA PT CONFIGURATION

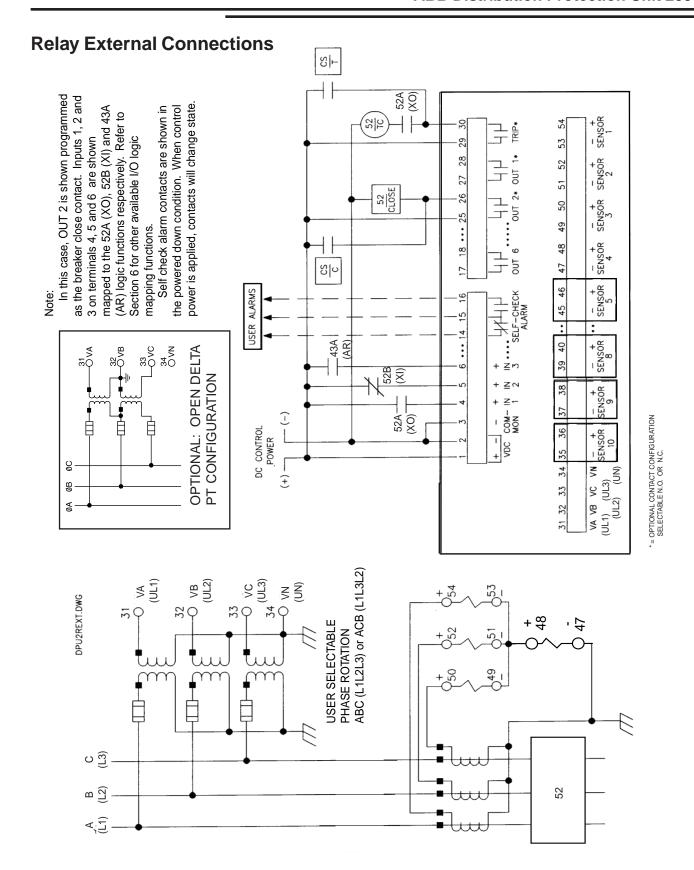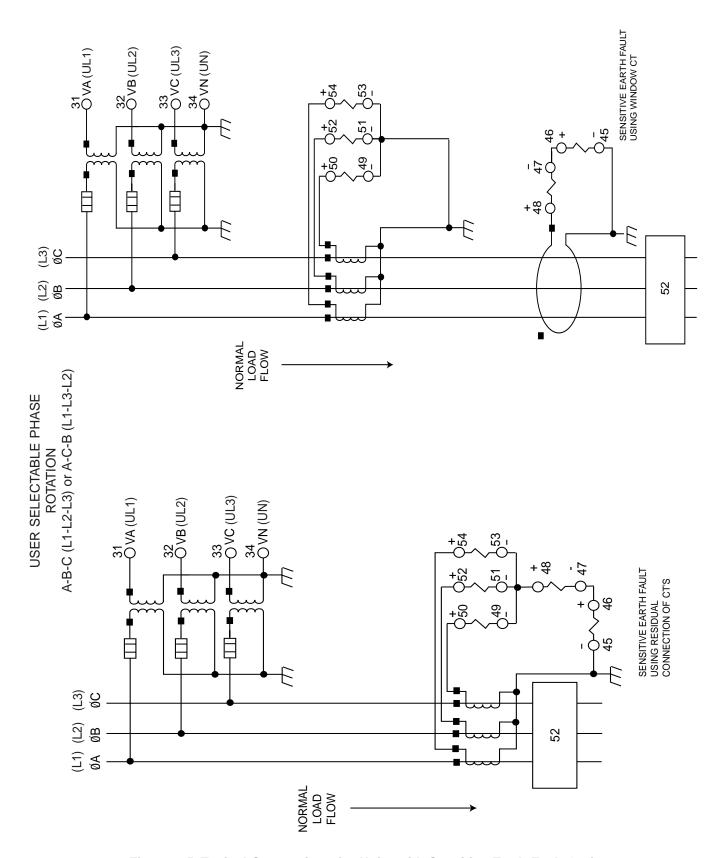**Figure 9-4. Typical External Connections**

Figure 9-5. Typical Connections for Units with Sensitive Earth Fault Option

USER SELECTABLE PHASE ROTATION
A-B-C (L1-L2-L3) or A-C-B (L1-L3-L2)

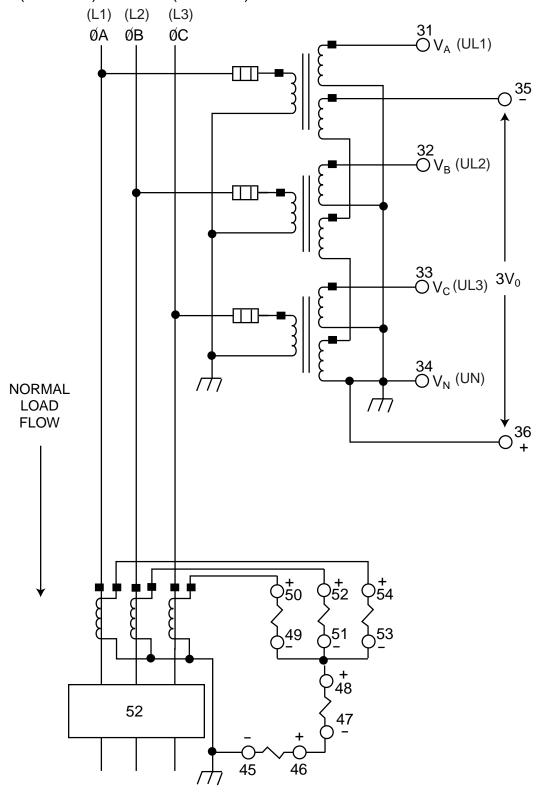**Figure 9-6. Typical VT and CT Connections for Directional Sensitive Earth Fault Units**
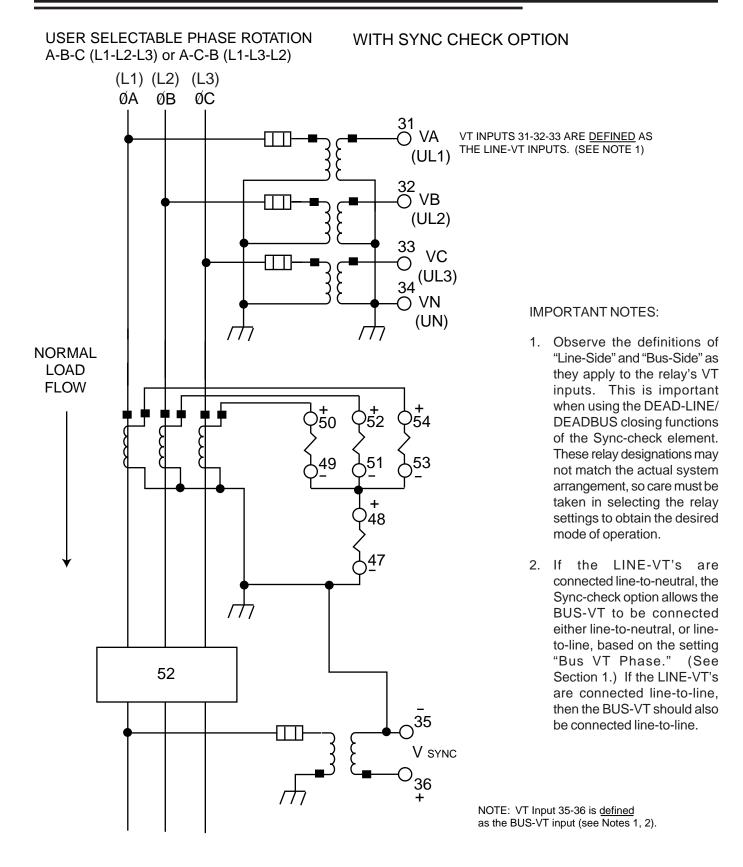
USER SELECTABLE PHASE ROTATION
A-B-C (L1-L2-L3) or A-C-B (L1-L3-L2)

WITH SYNC CHECK OPTION

(L1) (L2) (L3)
ØA   ØB   ØC

31 VA
(UL1)

VT INPUTS 31-32-33 ARE <u>DEFINED</u> AS
THE LINE-VT INPUTS. (SEE NOTE 1)

32 VB
(UL2)

33 VC
(UL3)

34 VN
(UN)

NORMAL
LOAD
FLOW

+50   +52   +54

49   51   53
_   _   _

+48

47
_

52

_35

V SYNC

36
+

IMPORTANT NOTES:

1. Observe the definitions of "Line-Side" and "Bus-Side" as they apply to the relay's VT inputs. This is important when using the DEAD-LINE/DEADBUS closing functions of the Sync-check element. These relay designations may not match the actual system arrangement, so care must be taken in selecting the relay settings to obtain the desired mode of operation.

2. If the LINE-VT's are connected line-to-neutral, the Sync-check option allows the BUS-VT to be connected either line-to-neutral, or line-to-line, based on the setting "Bus VT Phase." (See Section 1.) If the LINE-VT's are connected line-to-line, then the BUS-VT should also be connected line-to-line.

NOTE: VT Input 35-36 is <u>defined</u> as the BUS-VT input (see Notes 1, 2).

Figure 9-7. Typical Connections with Sync Check Option

Communications Ports

The DPU-2000R has a standard 9-pin RS-232C interface on the front for serial port communications. Connect a 9-pin RS-232C cable and 9-pin null modem adaptor from this port to your personal computer to have direct point-to-point communications using WinECP software provided with the relay. Refer to the External Communications in Section 5 of this manual for the proper communications parameters.

If the DPU2000R relay has been provided with the newer enhanced Operator Control Interface (OCI) panel, as discussed in Section 14, it is not necesary to use a null modem adapter; rather a conventional 9 pin cable will function. A null modem cable cannot be used for the port located on the front of the OCI panel. For the ports located on the rear of the realy, a null modem calbe or adapter is required for communication to the relay.

As an option, one or two serial port terminations can be provided at the rear of the DPU-2000R. This rear port, can be a 9-pin RS-232C, 3-wire RS-485, 2-wire INCOM, IRIG-B or SCADA Interface Unit (SIU) connection. You must refer to the catalog number of the unit shown in the Unit Information menu item to know which rear port option is implemented. The front or rear RS-232C ports can interface with a modem using a straight through cable and a remotely connected computer. The RS-232C ports can also interface directly to a PC with the use of a null modem cable. The RS-232C ports are configured as data terminal equipment.

The DPU-2000R supports various byte-oriented protocols. The command message structure and substructures for these protocols are available upon request. Contact the nearest ABB sales office or ABB at its Allentown, PA factory and request the "Protocol Document" for the unit type (DPU2000R and the specific protocol of interest). The following protocols are available in the DPU-2000R relay:

- STANDARD—ABB 2000 series-specific ASCII oriented 10 byte communication protocol available through all ports
- INCOM®—a two-wire communications system and protocol
- DNP 3.0 (IEC870-5)—a protocol available through the Auxiliary Communications port
- Modbus®—a protocol available through the Auxiliary Communications port
- Modbus Plus™—a token ring network capable of high speed communication (1 Mb/sec)
- UCA—Utility Communications Architecture is an open communications protocol. This allows the DPU2000R relay to be integrated into system solutions.

Pin Connections

The pin connections for the various communications ports are shown in Tables 9-2 and 9-3.

Table 9-2. RS-232 Pin Connections

Pin Number	Pin Number
2	Receive data-Relay receives data through this pin
3	Transmit data-Relay transmits data through this pin
5	Signal ground--Front port and standard rear ports have signal ground tied to the chassis. There is an optional RS-232 rear port where both data and signal ground are fully isolated.

Table 9-3. RS-485, INCOM, SIU and IRIG-B Pin Connections

Pin Number	Pin Number
64	IRIG-B Minus
63	IRIG-B Positive
62	INCOM
61	INCOM
60	+5 VDC at 100 milliamperes
59	Direction minus
58	Direction positive
57	RS-485 common/VDC return
56	RS-485 minus or SIU minus (aux. comm. port)
55	RS-485 positive or SIU positive (aux. comm. port)

RS-485 Port and Communications Card Internal Jumper Positioning

For all communications hardware options with a single RS-485 port, that port is provided at terminals 55(+), 56 (-), and 57 (com). See Table 9-3.

For communications hardware option #8, dual RS485 ports, terminals 55, 56, and 57 are designated RS485 Rear Port #2, and pins 1(+), 2 (-), and 7(com) of the COM3 DB-9 connector represent RS485 Rear Port #1.

The RS485 port on the GPU-2000R has three associated resistors and jumper links that allow insertion or removal of these resistors, depending on the location of the relay in the network. Jumper link J6 on the communications card is for the termination resistor. A termination resistor should be inserted at the first and last devices on the network. Typically J6 would be set for "IN" for the last relay on the RS485 network; and, J6 would be set in the "OUT" position for all other relays in the loop. The first unit on the network, typically an ABB 245X series convertor, has the terminating resistor built-in. For communication hardware option "8," dual RS485 ports, J6 is for Port #2 and a similar jumper, J16 is provided for RS485 Port #1.

Jumper links J7 and J8 insert or remove "pull-up" resistors. These resistors establish a known voltage level on the RS485 bus when no units are transmitting, in order to reduce noise. These jumpers should be set to the "IN" position on only one relay at either end of the RS485 loop. If an ABB communications convertor, catalog series 245X, is used on the network, it has these resistors built-in, and all relays can have J7 and J8 in the out position. For communications hardware option "8", dual RS485 ports, J7 and J8 are for Port #2, and J17 and J18 are for Port #1.

The RS485 cable should be shielded 3 conductor twisted cable. The shield should be grounded at one end of the communications circuit, preferably where the RS485 circuit begins; eg: at the convertor unit. A typical RS485 connection diagram, drawing 604765, is available on request from the factory.

Recommended cables are Alpha #58902, Belden #9729, #9842, #9829 and Carol #58902.