Optically Isolated Communications Adapters

Product Specifications and Installation Data

1 DESCRIPTION

The Horner APG Isolated Communications Adapters extend the communications capabilities of the PLC. In the factory environment, PLC multidrop applications are common, where a single host communicates with multiple PLCs, although the number of PLCs and total network distance is limited. The Horner APG Communications Adapters increase the number of PLCs which can be connected in a multidrop configuration as well as the total network distance. These communications adapters are optically isolated, which provides the added benefit of >500V ground isolation. They allow communications between two points whose differing ground potential precludes normal communications.

Two models of adapters are offered. The HE485ISO232 allows an RS-232 host to communicate with RS-485 slaves. The HE485ISO485 is an RS-485 repeater, extending the possible network distance beyond the 1200 meter RS-485 restriction. By using a maximum of three adapters/repeaters between two communicating devices, total network distance can extend to approximately 4800 meters. The communications adapters are encased in a compact metal enclosure, measuring 4"W x 3.75"H x 1.75"D. RS-232 connections are made to a DB9 female connector (HE485ISO232), and RS-485 connections are made to DB-15 female connectors (HE485ISO485 and HE485ISO232). The Isolated Adapter/Repeaters are powered by 8-32VDC @ 2.5W, maximum. Power is supplied to a removable two position terminal strip on the front of the unit.

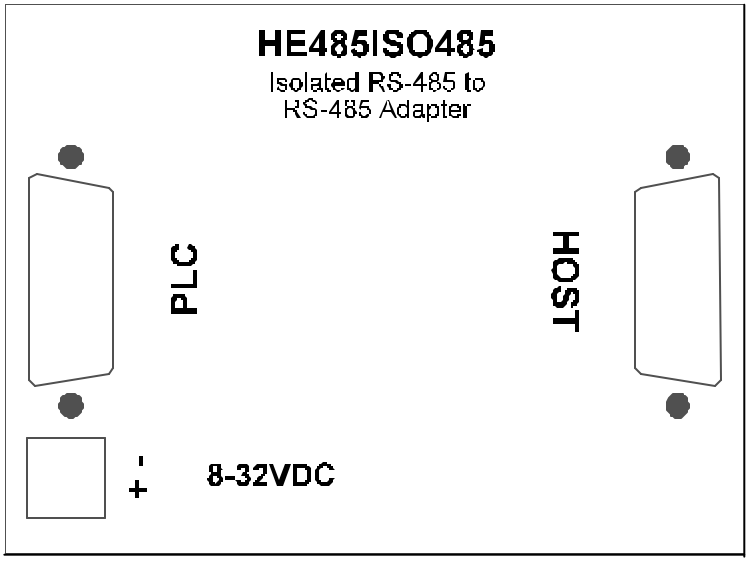


Figure 1.1 – HE485ISO485 Communications Adapter (Actual Size)

2 BACKPLATE MOUNTING

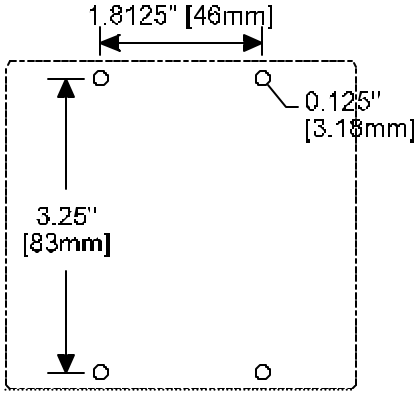


Figure 2.1 – Backplate Mounting

Backplate Mounting Holes (4). Dotted Line indicates footprint of adapter when mounted on backplate. The case will not be grounded to the backplate unless paint is removed from one or more mounting holes.

3 COMMUNICATIONS PORT PINOUTS

Table 3.1 – RS-232 Pinout of HE485ISO232 (Host port)

Pin	Signal	Function	I/O
shell	FRM	Frame (Case)	n/a
2	TXD	Transmit Data	Out
3	RXD	Receive Data	In
5	GND	Signal Ground	n/a
7	CTS	Clear to Send	In
8	RTS	Request to Send	Out

Table 3.2 – RS-485 Pinout of HE485ISO485 (Host and PLC ports) and HE485ISO232 (PLC port)

Pin	Signal	Function	I/O
Shell	FRM	Frame (Case)	n/a
2	NC	No Connection	n/a
6	RTS-	Request to Send (-)	Out
7	GND	Signal Ground	n/a
8	CTS+	Clear to Send (+)	In
9	TERM	Terminating Resistor	Out
10	RXD-	Receive Data (-)	In
11	RXD+	Receive Data (+)	In
12	TXD-	Transmit Data (-)	Out
13	TXD+	Transmit Data (+)	Out
14	RTS+	Request to Send (+)	Out
15	CTS-	Clear to Send (-)	In

4 CABLE DIAGRAMS

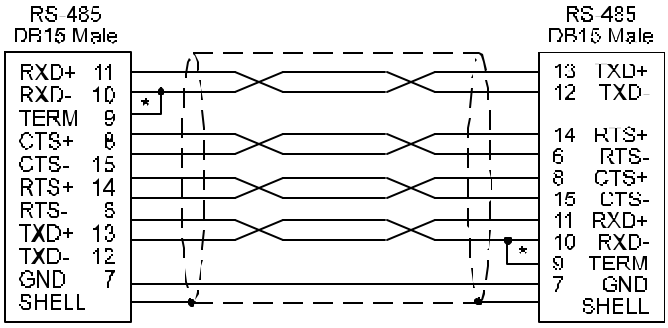


Figure 4.1 – Reversing RS-485 Cable

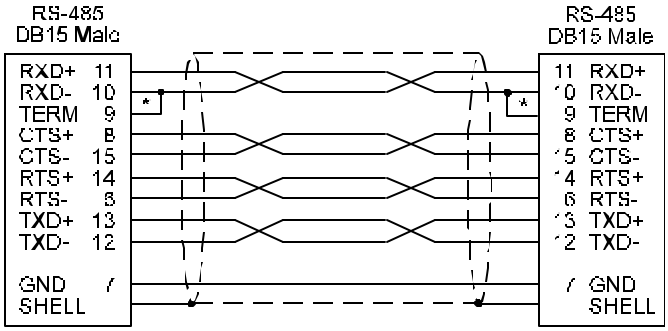


Figure 4.2 – Non-reversing RS-485 Cable

* *termination on ends of RS-485 segments only*

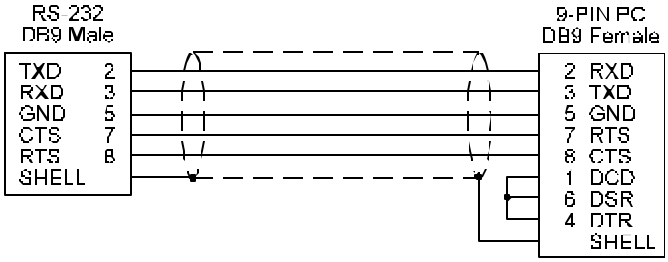


Figure 4.3 - RS-232 Cable for Personal Computer 9-pin

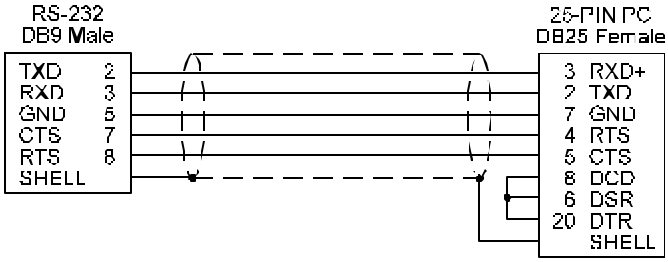


Figure 4.4 – RS-232 Cable for Personal Computer 25-pin

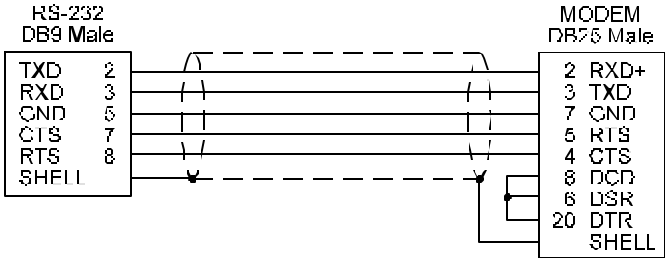


Figure 4.5 – RS-232 Cable for Modem

5 APPLICATION INFORMATION

There are three primary reasons for using one or more isolated adapters in an application. They are:

1) To allow two devices to communicate which have a ground potential between them greater than 7V,

2) to extend network distance beyond the RS-485 standard 1200 meter restriction,

3) and/or to increase the number of nodes which can be supported on the network (the standard restriction is 17 nodes within 600m or 9 nodes within 1200m).

There are several rules which should be kept in mind when installing and cabling the isolated adapter/repeaters. These rules are detailed below:

The Adapter/Repeater Host port and PLC port must be connected to the proper side of the network. Wiring connected to the HOST port should ultimately (either through direct wiring or through other repeaters) be connected to the network host, or master. Wiring connected to the port labeled PLC should ultimately (either directly or through other repeaters) be connected to one or more PLCs.

There is a maximum of three Adapter/Repeaters in any communications path. There should be no more than three adapter/repeaters between the host and any PLC on the network. If more than three repeaters exist between two devices attempting to communicate, propagation delays can cause communications problems.

Each network segment must be terminated at both ends. A segment is a continuous section of cabling joining two (or more) devices in parallel (see Figure 1). No segment of the network may be longer than 1200 meters. Termination is accomplished by placing a jumper between pins 9 and 10 on the RS-485 connector at each end. This jumpering method works only with devices using GE Fanuc's standard 15-pin pinout.

Each network segment supports a limited number of nodes. There is a limit to the number of nodes on any segment of the network. A node is any device communicating on the network, including the Host, Adapter/Repeaters, and PLCs. A segment of 600 meters or less can support up to 17 nodes. A segment 600-1200 meters in length can support up to 9 nodes. The maximum network size may consist of 16 segments, each containing 16 PLCs. This network utilizes 1 Host, 16 Adapter/Repeaters, and 256 PLCs.

A Reversing Cable or Non-reversing Cable must be used. There are two (and only two) pinouts for RS-485 cables when using the isolated adapter/repeaters with Series 90 PLCs. A Reversing Cable is used when connecting any device to the isolated adapter's PLC port. A Non-reversing Cable is used when connecting any other devices to the network. This does not apply to devices such as hosts which do not use GE Fanuc's 15-pin RS-485 pinout convention.

Example network layouts are shown on the following page. These layouts use symbols to represent devices and cables. The legend for these symbols is shown at the upper right hand corner of the example page.

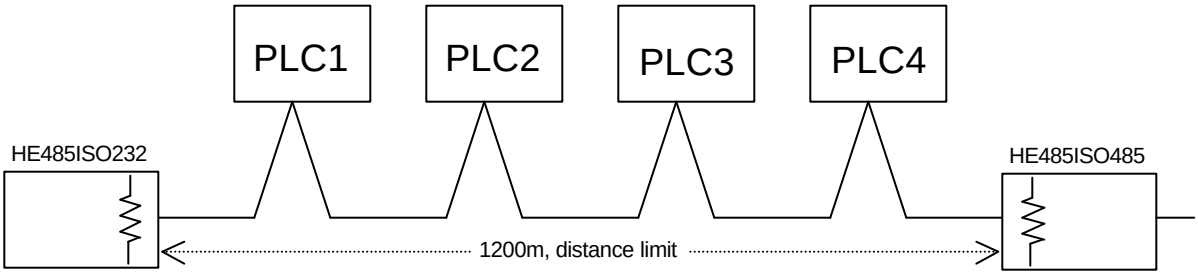


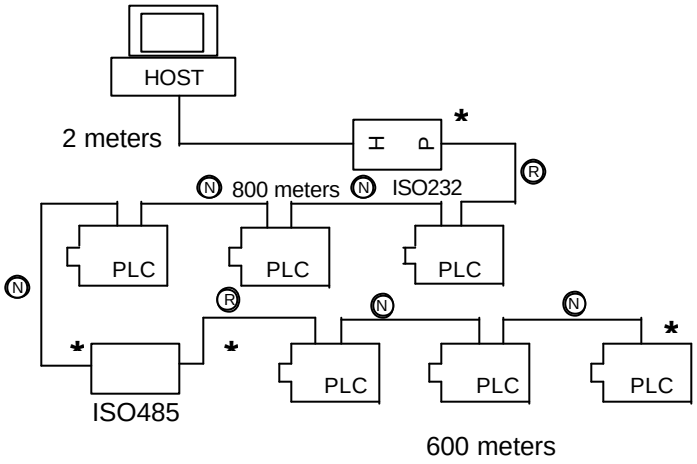
Figure 5.1 – Network

A segment joins devices in parallel and is terminated on either end. This example shows an HE485ISOxxx terminating each end of the segment.

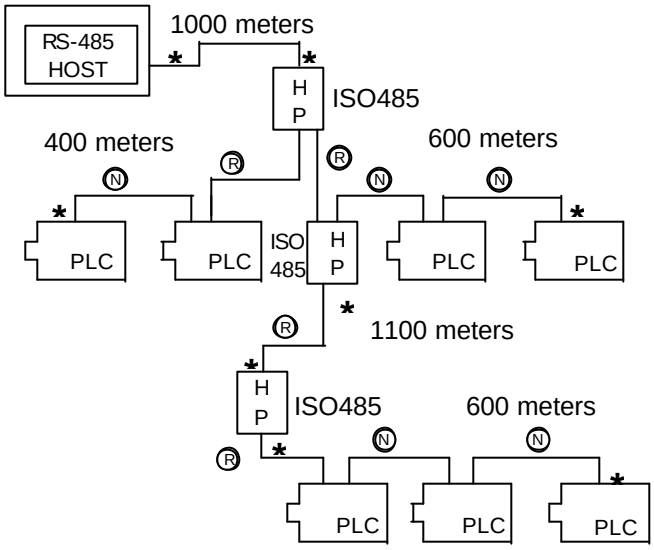
6 EXAMPLES

Symbols

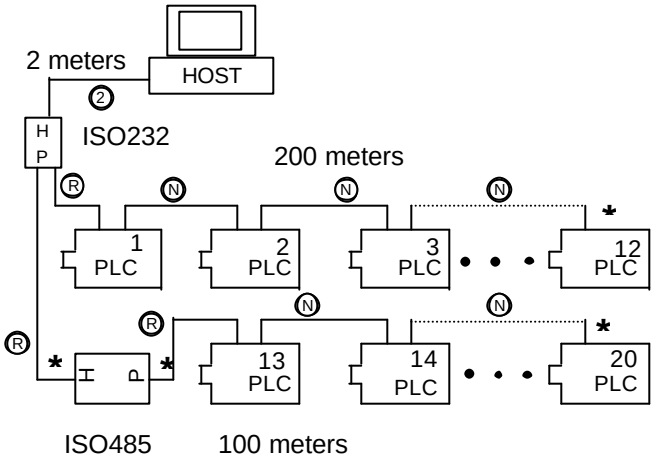
(R)	Reversing	H	Adapter Host Port
(N)	Non-reversing Cable	P	Adapter PLC Port
(2)	RS-232	*	Termination



Example 1. In this example, the total network distance is 1400 meters. An Isolated Repeater is required to break the network into two segments.



Example 2. This example illustrates a network which is stretched over a great distance. Three PLCs are connected to the network which are several thousand meters from the Host. Notice that there are three repeaters between the Host and the last three PLCs. This is the maximum recommended number of repeaters in any signal path.



Example 3. In this example, an Isolated Repeater is required not because of distance, but because of the number of total network nodes. The network is divided into two segments; one with 12 PLCs and the other with 8 PLCs. Sixteen PLCs is the maximum number which can reside on a single segment.