

PROFIBUS COMPETENCY CENTRE, AUSTRALIA TECHNICAL SERIES

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SUBJECT: PROFIBUS RS485 WIRING

RS485 transmission is balanced to improve noise rejection. It is mandatory to earth the cable screen at both ends to ensure that it is effective at high frequencies. This is normally done by connecting the cable screen to the device earth. Consequently, we must ensure that the device is correctly earthed. Poor shielding or earthing is a very common wiring error!

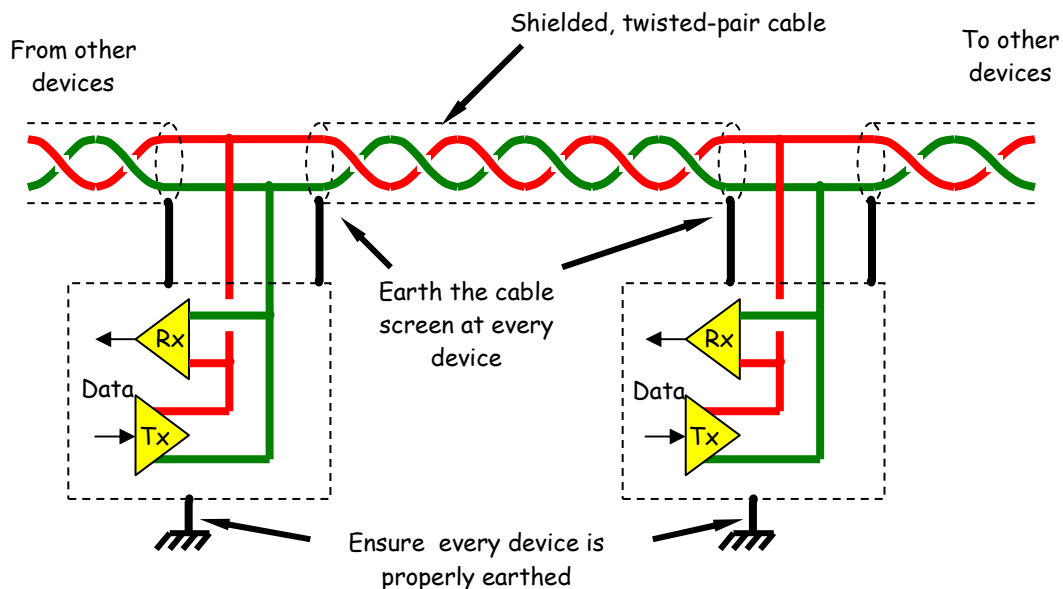


Fig. 1 RS485 Wiring Diagram ⁱ

The 2 cores in the twisted pair cable carry the Data Line plus (normally red) and minus (normally green), or B-Line and A-line and are surrounded by the shield as shown. It is essential that the core colours are used consistently throughout the network to avoid data errors.

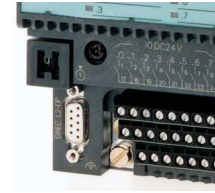
PROFIBUS DP devices are normally supplied with a standard 9-pin sub-D connectors (protected environment). M12 connectors are also available for use in exposed environments (rated up to IP68). Other types of connection, including screw and press fit terminals may also be available. If 9-pin sub-D connectors or M12 connectors are used, the wiring must comply with that set down in the standard.



Non standard plug connections



M12 Connections



Sub-D 9 pin connector

Fig. 2 Examples of Profibus connectors

Tables showing pin allocations

Pin No.	Signal	Description
1	Shield	Earth Connection
2	M24	Earth for 24v Supply
3	Rxd/TxD-P	Data Line plus (B-Line)
4	CNTR-P	Repeater direction control signal
5	DGND	Data Earth
6	VP	+5v supply for termination
7	P24	+24v supply
8	RxD/TxD-N	Data Line minus (A-line)
9	CNTR-N	Repeater direction control signal
Case	Shield	Earth Connection

Table 1. 9 Pin Sub-D Profibus Connectors

Pin No.	Signal	Description
1	VP	+5v supply for termination
2	Rxd/TxD-N	Data Line minus (A-line)
3	DGND	Data Earth
4	Rxd/TxD-P	Data Line plus (B-Line)
5	Shield	Earth Connection Data Earth
Thread	Shield	Earth Connection +5v supply for termination

Table 2. M12 Connectors

Generally Spur Lines (also known as stub or drop lines) need to be avoided as much as possible on RS485 wiring, as they can cause reflections. Each segment should be connected in a daisy chain as far as possible. Notably, some new intelligent hubs allow the connection of star/spur configurations without compromising the integrity of the segment

References:

ⁱ CPIC Presentation L02 Verwer Training & Consultancy Ltd.
The New and Rapid Way to PROFIBUS DP, Manfred Popp

<http://www.profibuscentre.com.au>

<http://www.profibus.com/>