User Manual

ASeries A450

Interface Converter

RS-232 ⇔ RS-485 Multi-drop

the Interfacing Specialists

ALFATRON

A450 User Manual

Version 1.10

May 2003

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WARRANTY EXCLUSIONS

The above warranty shall not apply to defects resulting from improper or inadequate maintenance by the customer, unauthorised modifications or misues, operation outside the environmental specifications for the product, damage due to power surges, lightening strikes or any other phenomenon outside normal operational specifications.

DECLARATION OF CONFORMITY

according to the European Commissions EMC Directive 89/336/EEC

We, Name of Manufacturer: ALFATRON PTY. LTD

of, Address of Manufacturer: UNIT 9, 36 NEW ST., RINGWOOD VIC 3134 AUSTRALIA

Australian Company Number: ABN: 65 005 410 819

declare under sole responsibility that the product:

Product Name: ASeries RS-232 to RS-485 Multi-drop Interface Converter

Model Number: A450

to which this declaration relates is in conformity with the following standards:

CISPR-22 / EN 55022 class B	EMI from Information Technology Equipment (ITE)
IEC 801-2 / prEN55024-2	Electro Static Discharge Immunity
IEC 801-3 / prEN55024-3	Radiated RF Immunity
IEC 801-4 / prEN55024-4	Electrical Fast Transients Immunity

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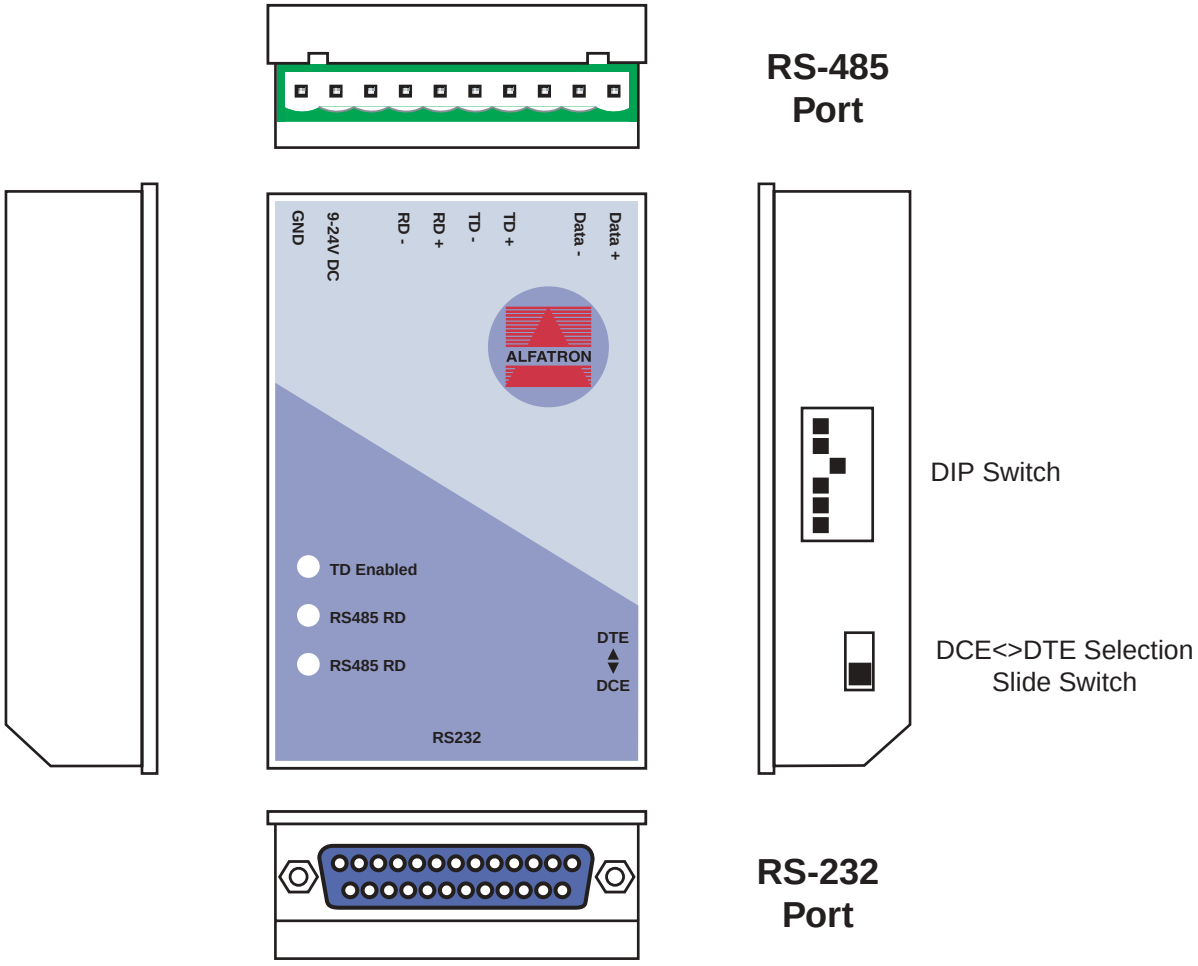
1.0 PRODUCT DESCRIPTION

An asynchronous RS-232 to RS-485 point-to-point or multi-drop interface converter incorporating the following features:

- 2-wire and 4-wire RS-485 operation
- RS-485 transmitter control with RS-232 handshake lines or dipswitch
- 5.08mm spacing snap fit terminals for both data and power
- DCE/DTE switch selectable RS-232 uses DB25 connector
- Transient Voltage Supression diodes used on RS-485 lines
- Transmit data at up to 115.2Kbps
- RS-485 range up to 1200 metres, longer with low loss cable
- RS-232 line powered RS-485 operation up to 100 metres using point-to-point or 9-12V DC power supply
- RS-485 multi-drop up to 32 driver and 32 receivers on 4-wire setup
- Switchable termination resistors for RS-485 port
- DIP switch selectable RS-485 local echo
- RS-485 LED indicators for RD, TD & Transmit Enable



2.0 INSTALLATION

- Set DIP Switch settings to the requirement of the RS-485 target device.
- Select RS-232 port as either DCE or DTE as required.

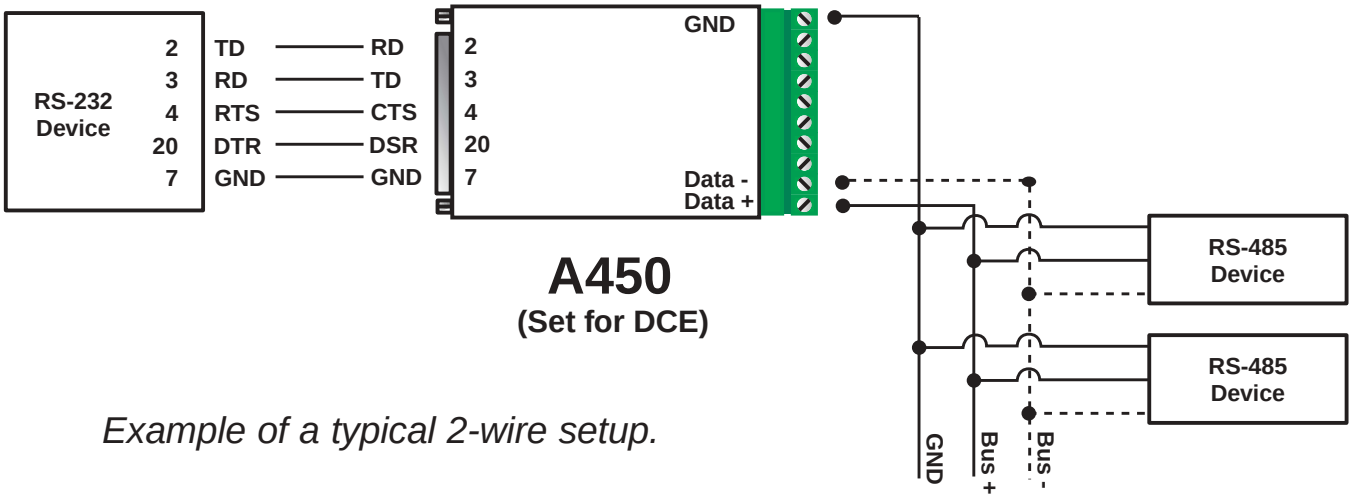
2.1 LED indicators

- LEDs will operate only if DIP Switch 4 is set to the 'ON' position.
- 'RD' LED will flash each time data is received by RS-485 Port.
- 'TD' LED will flash each time data is sent by the RS-485 Port.
- 'TD Enable' LED will illuminate when the RS-485 transmitter is enabled.
- These LEDs will not operate at any other time.

3.0 INTERFACE APPLICATION NOTES

3.1 Using RS-485 in 2-wire bus mode

- Simply connect the BUSa(+) and the BUSb(-) to the RS-485 2-wire bus positions 'Data +' and 'Data -'.
- When running a 2-wire RS-485 bus the RS-485 transmitter must be controlled by the RS-232 serial device. This transmitter may be controlled by either the RTS/CTS or DTR/DSR handshake pairs.
- If the RS-232 side is using software to control devices then it may require a local echo of what it transmits.



Example of a typical 2-wire setup.

- A long RS-485 2-wire bus should have a termination resistor at both ends of the bus.
- When DIP Switch 'position 6' is set to the 'ON' position it engages a 120ohm resistor across 'Data +' and 'Data -'.

3.2 Using the RS-232 Port

The RS-232 connection is switchable between DTE or DCE, allowing the use of both ‘straight though’ or ‘crossed’ cables.

3.21 Straight Through RS-232 Cable

To connect to a PC with a ‘straight through’ serial cable (sometimes called a modem cable), choose DCE.

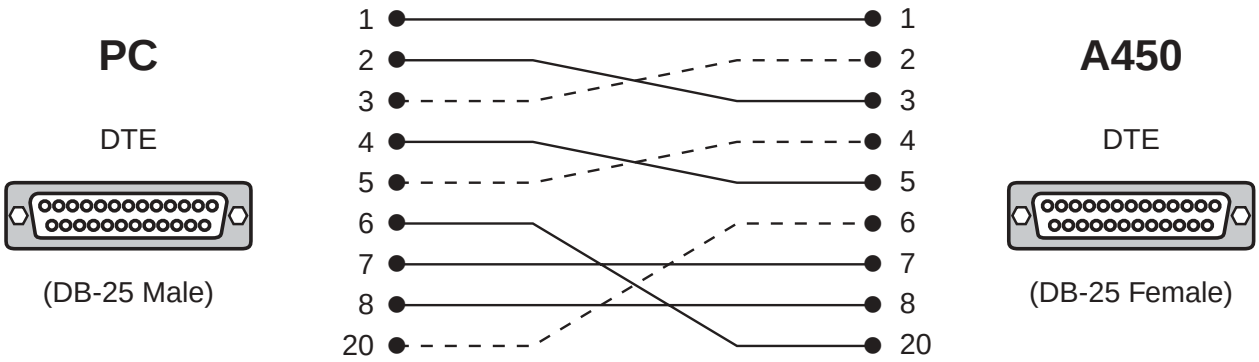
A typical ‘straight through’ serial cable connects pins 1, 2, 3, 4, 5, 6, 7, 8, 20 on the DB-25 connector.

Power is drawn from CTS/RTS and DTR/DSR, therefore it is necessary to connect these if the A450 is to be used in non-powered mode.

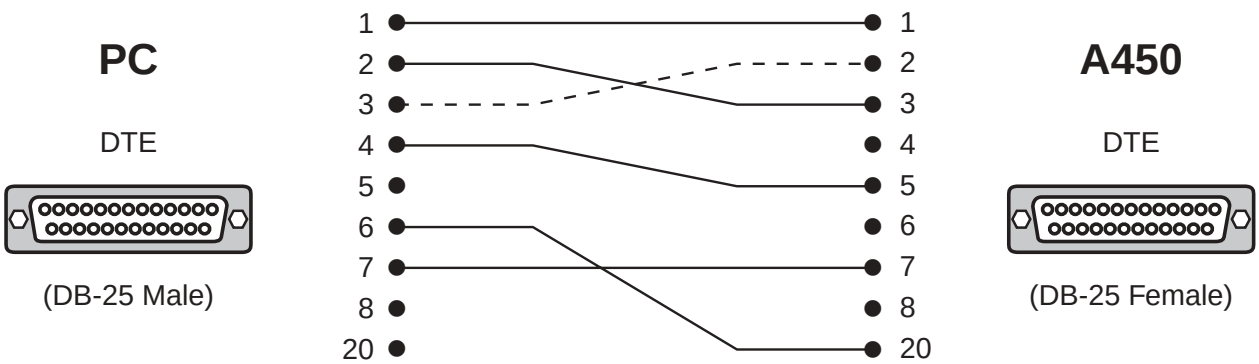
In most applications, it is necessary to connect all of the commonly used pins on the RS-232 port (i.e. 1, 2, 3, 4, 5, 6, 7, 8 and 20 on a DB-25 interface).

3.22 Crossed RS-232 Cable

To connect to a PC with a ‘crossed’ serial cable, choose DTE. A ‘crossed’ cable is typically used to connect a PC to a Printer. The following diagram shows a typical cable:



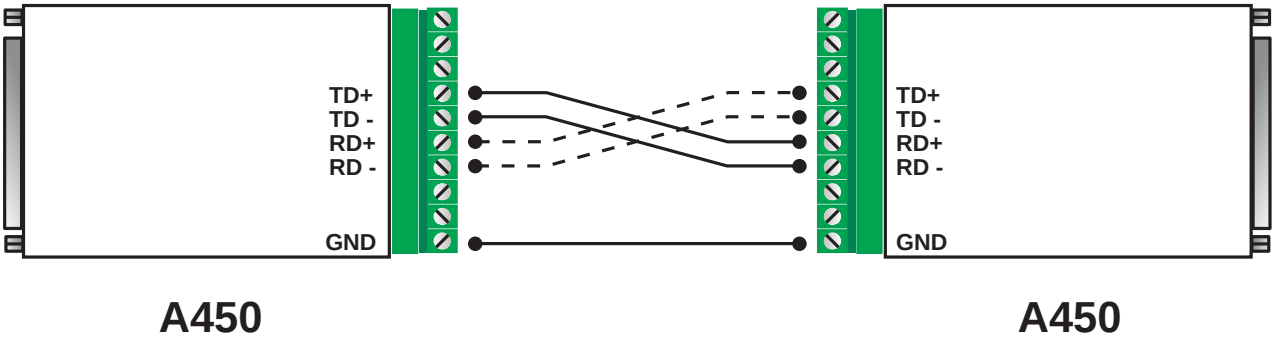
For reliable RS-232 line powered operation of the A450 use a cable with all pins connected as shown in the diagram above. However, the A450 internally ties CTS to RTS and DSR to DTR. This means that the diagram below is a minimum cable configuration for unpowered operation.



3.3 Using A450s as RS-232 Line Extenders

A pair of A450s may be used to extend the distance at which RS-232 data is transmitted. The A450s are connected via their RS-485 ports to take advantage of the greater data transfer distances available using RS-485.

Recommended connection for two A450s together via their RS-485 ports:



3.4 Transient Protection

Power surges, or electrical transient voltages, can be induced into cabling by such things as lightning strikes, electric motors, switches and the operation of heavy industrial equipment. The use of long cables also increases the exposure to transient voltages.

A transient of sufficient magnitude can destroy an unprotected interface converter. It is also possible for certain transients to pass though an unprotected interface converter and cause damage to the equipment which is attached.

By using High Speed Transient Voltage Suppressors on its communication lines, the A450 absorbs much of the transient energy on these lines and helps clamp these surge voltages to a safe level. This will ensure that both the A450 and any connected equipment are protected from damage due to transients.

The A450 uses a Transient Voltage Suppressor Diode on each of the following:

- Transmitter pair ‘TD+’ and ‘TD-’
- Receiver pair ‘RD+’ and ‘RD-’
- Data pair ‘Data +’ and ‘Data -’

Each diode has a response time of less than 1ps and power dissipation of 300 Watts for 1ms.

4.0 HARDWARE CONFIGURATION

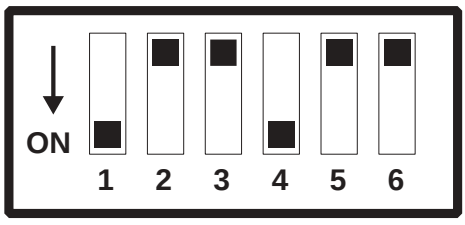
4.1 RS-485 DIP Switch Settings

In bus modes the RS-485 'transmitter enable' is controlled by the RS-232 handshake lines. To enable the RS-485 transmitter, both the CTS/RTS and DTR/DSR pairs must be asserted (high).

Switch			Function (Switch Settings: ● = ON ❍ = OFF)
1	2	3	
❍	❍	❍	2-wire broadcast with local echo
❍	❍	●	4-wire point to point
●	❍	❍	2-wire bus with local echo
●	❍	●	4-wire bus
●	●	❍	2-wire bus

DIP Switch	Setting	Function (Switch settings: ● = ON ❍ = OFF)
4	❍	LEDs always OFF. Saves power in 'non powered' operation
	●	LEDs indicate active
5	❍	No termination on 4-wire RS485 receiver
	●	120ohm termination on 4-wire RS485 receiver
6	❍	No termination on 2-wire (Bus) RS485 receiver
	●	120ohm termination on 2-wire (Bus) RS485 receiver

4.2 Default Factory DIP Switch Settings



- LEDs indicate RD/TD Data Flow
- No Termination on RS-485 Receiver
- RS-485 Transmitter enabled when handshake lines are asserted.
- RS-485 Receiver ALWAYS enabled (2-wire Bus with local echo)

DCE < > DTE

- Factory Default for the RS-232 Port is DCE

5.0 INTERFACE PORT PIN ASSIGNMENTS

5.1 RS-232C Serial Port Pinout

Pin	*Status*	*Set for DCE*	*Set for DTE*
1	Used	Frame Ground	Frame Ground (FG)
2	Input / Output	RD	TD
3	Output / Input	TD	RD
4	Linked to Pin 5	CTS	RTS
5	Linked to Pin 4	RTS	CTS
6	Linked to Pin 20	DTR	DSR
7	Used	Signal Ground	Signal Ground (SG)
8	Not used-Pulled High 4K7	DCD	DCD
20	Linked to Pin 6	DSR	DTR

5.2 RS-232 Interface Notes

The ‘RD’ signal must always be present , even if it is not used by the attached RS-232 device.

Pins 4, 5, 6, 8 and 20 are pulled to the correct levels to allow a PC serial port to operate under most conditions without any additional loopback connections.

In the unpowered mode, the power is scavanged from pins 4,5,6 and 20.

Pins 4,5,6 and 20 are used to control the RS-485 transmitter enable when DIP Switch 1 is ‘ON’.

6.0 CABLE REQUIREMENTS

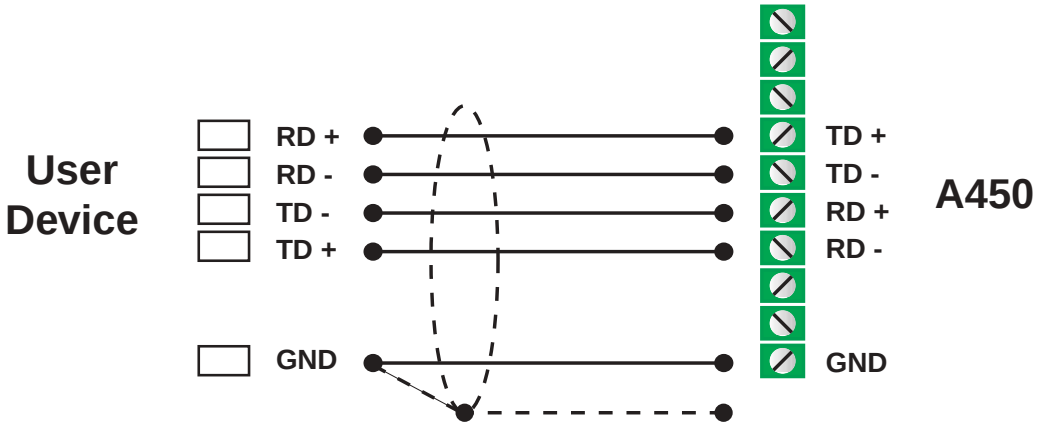
Alfatron recommends the use of shielded cable with all of its products. Shielding reduces EMI Radiation and improves noise immunity. This helps minimise interference to other equipment and will improve communications reliability.

The recommended cable construction is as follows:

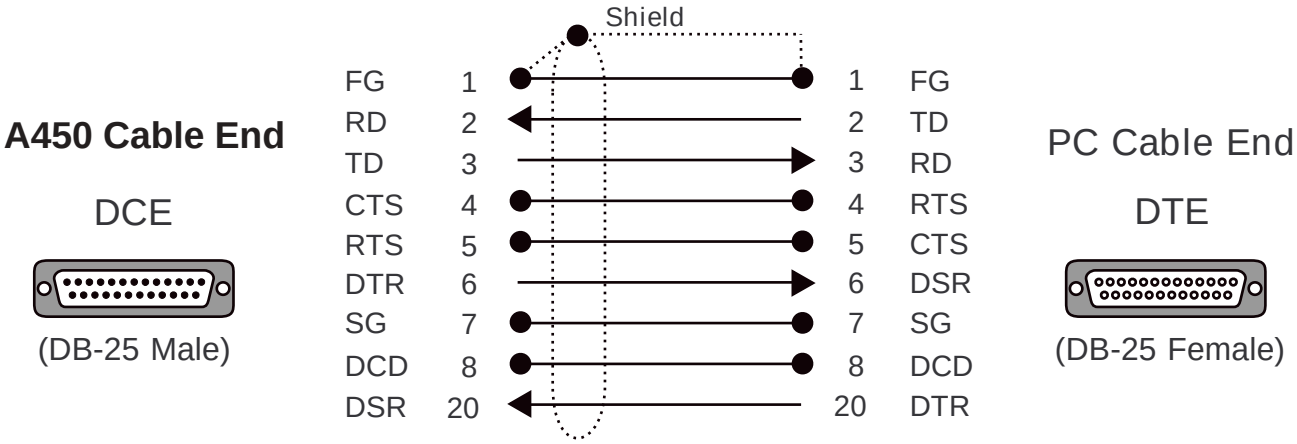
- Take the shield (surrounding cable wires) and solder it to the Frame Ground (FG) pin. If FG is not available, use Signal Ground (SG) but in this case always use a separate wire for ground which is connected at both ends.
- The shield must be connected at both ends of the cable.

7.0 CABLE EXAMPLES

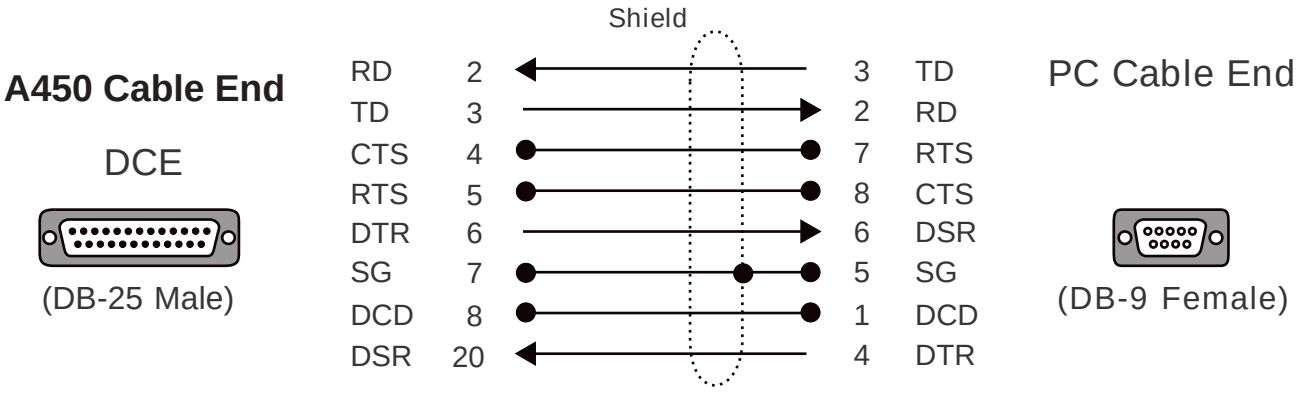
7.1 RS-485 Cable from A450 to User Device



7.2 RS-232 Connection to a PC with a DB-25 Serial Connector



7.3 RS-232 Connection to a PC with a DB-9 Serial Connector



8.0 SPECIFICATIONS

RS-232C Port:	Asynchronous RS-232D/V.24 Select as DCE or DTE DB-25 female connector Speed capability dependant on cable length up to 115.2k bits per second
RS-485 Port:	RS-485 10 position Screw Terminal Block Switchable 120ohm Termination for 4-wire receiver Switchable 120ohm Termination for 2-wire receiver
Transient Protection:	Transient Voltage Supression Diodes on: RS-485 - TD(A)- and TD(B)+ - RD(A)- and RD(B)+ Surge capacity of 300 Watts per device at 1ms. Response Time of less than 1ps.
LED Indicators:	Receive Data - RS-485 (Green) Transmit Data - RS-485 (Green) Transmit Enable Data - RS-485 (Yellow)
Power Supply:	Accepts 9V - 24V DC on input Supplied with 9V (200mA) DC Power Adapter Reverse polarity protection Power screw terminal accepts wire range 14-24AWG
Dimensions:	84mm x 58mm x 23mm
Weight:	160 grams
Operating Temperature:	10° to 35° C
Stroage Temperature:	0° to 45° C

All specifications subject to change without notice