6000

SYSTEM

EUROTHERM
PROCESS
AUTOMATION

D241
Communications isolator/ converter

Product specification

Features

* Isolates and converts between RS232/RS422 and RS485/RS422
* Multidrop RS485/RS422 output
* Three port isolation : input/power supply/output
* Flexible AC mains power supply
* Transmit/Receive line status LEDs
* Simple setup of options by internal switches
* Synchronises data to internal highly accurate crystal clock
* Maximum of 32 nodes on a cable at least 1km long
* DIN rail mounting

Functional Description

Isolation

The Port A/Port B interface has a 60V working isolation from the Port C interface. Both interfaces are isolated from the mains input.

Connectors

The fascia of the box has two female 9-way D-type connectors. On the left is the RS232 interface (Port A) and on the right is the RS422 interface (Port B).

Table 1 shows the connections for the RS232 interface.

Table 2 shows the connections for the RS422 interface.

The upper terminal block is used for the RS485/RS422 interface (Port C). Table 3 shows the connections.

The mains power supply input is on the lower terminal block. Table 4 shows the connections.

Pin No	Signal Direction	Signal Name	Signal Function
1	-	-	-
2	Output	RS232 RX	Serial data from D241
3	Input	RS232 TX	Serial data into D241
4	-	-	-
5		Signal Ground	0V connection
6	-	-	-
7	-		
8	-		
9	-		

Table 1 *RS232 Interface Connections*

Pin No	Signal Direction	Signal Name	Signal Function
1		Protective Ground	
2	-	-	
3	-	Signal Ground	0V Connection
4	Output	RS422 XMT+	Serial data from D241
5	Output	RS422 XMT–	Serial data from D241
6	-	-	
7	Input	RS422 RCV+	Serial data into D241
8	Input	RS422 RCV–	Serial data into D241

Table 2 *RS422 Interface Connections*

Terminal Number	Signal Direction	Port C Signal Functions RS422 Mode	RS482 Mode
1	Input	RS422 RCV+	-
2	Input	RS422 RCV–	-
3	Output/I/O	RS422 XMT+	RS485 TX+RX+
4	Output/I/O	RS422 XMT–	RS485 TX–RX–
5		—Signal Ground	Signal Ground
6		—Protective Ground	Protective Ground

Table 3 *Upper Terminal Block Connections*

Terminal Number	Function
7	Line
8	Neutral
9	Earth
10	Link 115V
11	Link common
12	Link 240V

Table 4 *Lower Terminal Block Connections*

Functional Description (cont.)

Configuration

Note: Isolate unit from mains supply before attempting to change switch configuration.

The eight way DIP switch (SW1) visible through the top of the box is used to set up all of the options. Starting on the left the switches are marked 1-8.

To enable the unit to work out when to tristate the outputs there are 2 parameters which must be configured. Even if automatic tristating is not used the baud rate switches must still be configured as the data is resynchronised to the internal clock.

■ Switches 1, 2 (MSB, LSB) select the number of bits per transmitted character. This ranges from 8 to 11 bits. It is calculated by adding together the number of data bits, the parity bit (if there is one) and the number of stop bits. *The start bit is not included.*

Number of Bits	Switch 1	2
8	ON	ON
9	ON	OFF
10	OFF	ON
11	OFF	OFF

■ Switches 4,5,6 (MSB-LSB) select the baud rate from the following list:-

Baud Rate	Switch 4	5	6
76800 baud	ON	ON	ON
38400 baud	ON	ON	OFF
19200 baud	ON	OFF	ON
9600 baud	ON	OFF	OFF
4800 baud	OFF	ON	ON
2400 baud	OFF	ON	OFF
1200 baud	OFF	OFF	ON
300 baud	OFF	OFF	OFF

e.g.:- Transmission at 9600 baud with 8 data bits, parity and 1 stop bit. For a baud
rate of 9600 switch 4 is on and 5,6 off. The number of bits per character is 8+1+1 + 10. ie. switch 1 is off, 2 on.

Switch 3 selects whether Port C interface is either RS422 or RS485.

Port C	Switch 3
RS485	OFF
RS422	ON

With switch 7 'off' the driver outputs are immediately enabled by the transmission of data, and the moment the transmission stops the outputs are tristated.

Port C	Switch 7
Auto Tristating ON	OFF
Auto Tristating OFF	ON

Switch 8 controls reception of data from the RS485 interface. The RS485 receivers receive whatever data is on the RS485 bus so they also receive everything the unit transmits. This switch stops the unit receiving its own transmissions (off) or allows it (on).

Factory Setting of Switches

Switch	Function Selected
1 - OFF)	10 bits/character
2 - ON)	
3 - OFF	RS485
4 - ON)	
5 - OFF)	9600 baud
6 - OFF)	
7 - OFF	Auto tristate of driver lines
8 - ON	Unit receives its own transmission

Power Supply

The unit is supplied from the mains and has 2 external link selectable ranges. The lower terminal block on the unit is marked along the connector length to show where the mains inputs are and which mains link to use.

Mains Input	Link
115V	Pin 10 to 11
240V	Pin 11 to 12

The mains input has a 100mA fuse fitted in a 20x 5 mm fuse holder. The main purpose of this fuse it to protect against connecting the unit to the mains with the wrong range selected ie. 240v with 115v link selected. The fuse will blow.

LED Indicators

There are 3 LEDs on the fascia

- Power
- Transmit status
- Receive status

The green power led indicates the unit is powered up.

The yellow transmit LED indicates that the unit is receiving data from the RS232 or RS422 interface and transmitting it to the RS422/485 interface.

The yellow receive LED indicates the unit is receiving data from the RS422/485 interface and transmitting it to both the RS232 and RS422 interface. The LED only lights when it is receiving data that another node has sent, so in RS485 mode where it is receiving its own transmissions it will not light.

When a break (continuous 0) is transmitted to the RS485 interface the transmit LED stays on but when a break is received the receive LED stays off.

RS485 Cable and Termination

The cable has a single twisted pair for the data lines and a ground wire. Around these wires will be a shield. At either end of the cable is a termination resistor equal to the characteristic impedance of the cable (about 120R). The shield of the cable is connected at one point only to ground and at each break in the cable for a node the shields are joined together, but not to the signal ground.

The termination resistors are external to the unit and must be used.

For safety reasons the cable may have to be grounded in more than one place in which case 100R resistors may need to be placed in series with the ground connections (see RS485 spec). The mains ground on the top terminal block is connected to mains ground on the bottom terminal block via a 100R resistor.

Receiver Biasing

The RS422/485 data lines have internal pullup and pulldown resistors (100kΩ) to bias the line receivers when the line is tristated (or not connected).

Technical Specification

Communications Inputs/Outputs

■ RS232

Mode of operation:	Single ended
No. of drivers and receivers allowed on line:	1 driver 1 receiver
Cable length:	15 m (max)
Data rate:	Switch selectable up to 19.2 kilobaud (max)
Common mode voltage:	± 30V
Driver output signal:	± 5V min ±10V max
Driver load:	3 KΩ max
Receiver sensitivity:	± 3V min
Receiver input resistance:	3 KΩ

■ RS422 Input

Mode of operation:	Differential
No. of drivers and receivers allowed on line:	1 driver 8 receivers
Cable length:	1200 m
Data rate:	Switch selectable up to 76.8 kilobaud (max)
Common mode voltage:	+6V to –0.25V
Driver output signal:	0-5V 0-2V min
Driver load:	100 Ω
Receiver sensitivity:	± 200mV
Receiver input resistance:	>4 KΩ

■ RS485

Mode of operation:	Differential
No. of drivers & receivers allowed on line:	32 drivers 32 receivers
Cable length:	1200 m
Data rate:	Switch selectable up to 76.8 kilobaud
Common mode voltage:	+12V to –7V
Driver output signal:	0-5V 0-1.5V min
Driver load:	60 Ω
Receiver sensitivity:	± 300mV
Receiver input resistance:	>12 KΩ

Power Supply

a) Supply voltage (nominal): 115V/240V a.c. rms
b) Supply voltage range:
99V - 132V a.c. rms
207V - 264V a.c. rms
(88-112V build option)
c) Supply voltage frequency: 50/60 Hz
d) Input power: 5 watts
e) Supply fuse: 100mA, 20x5mm on primary side of transformer

Isolation

a) Power supply to Port A or Port B or Port C: Working : 250V DC/250V AC rms
Test : 3000V AC rms (IEC 348)
b)Port A/Port B to Port C: Working : 60 V DC/60V AC rms
Test : 750V AC rms (IEC 348)

RFI Performance (Susceptibility)

(Subject to approval)
The unit has been designed to conform to limits specified by CEGB DN5 (Feb 82) using test method IEC 801-3 (1984). (With all digital inputs being exercised and all outputs being monitored, no maloperation, spurious indication or change of state shall occur with a field strength of 10V/m over the frequency range of 20MHz to 1GHz.)

Controls and Indications

a) LED indications
Number of LEDs: 3
Functions: XMT data - Yellow
RCV data - Yellow
Supply on - Green

Physical Specification

a) Packaging
Dimensions (mm): Width 48
Height 110
Depth 97
Weight (g): 600

b) Mounting: Clip-on DIN rail type T35
c) Connector types
Port A: 9 way 'D' type female
Port B : 9 way 'D' type female
Port C: 6 way screw terminal block (removable)
AC supply input: 6 way screw terminal block (fixed)

d) Environmental
Operating temperature: 0 to +50°C
Storage temperature: –20 to +55°C

Ordering Information

Description	Order Code
Communications Isolator/Converter	D241

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