Connective Peripherals Pte Ltd

USB to Serial Converters Manual

Document Reference No.: CP_000032

Version 1.3

Issue Date: 2019-03-20

The ES-U-xxxx-x adapters are a series of USB Serial Converters from Connective Peripherals Pte Ltd. They provide a simple method of adapting legacy RS-232 or RS-422/485 devices to work with modern USB ports using a trusted and reliable FTDI chip set. Available in a variety of enclosures and port numbers, they are ideal for allowing factory automation equipment, multi-drop data collection devices, barcode readers, time clocks, scales, data entry terminals and serial communication equipment to be connected to USB ports in industrial environments.

This manual covers the following USB to Serial Converter products:

ES-U-1001	ES-U-1002-M	ES-U-2001	ES-U-2002	ES-U-2104-M
ES-U-1001-A	ES-U-1004	ES-U-2001B	ES-U-2002-M	ES-U-2008-M
ES-U-1001-M	ES-U-1008	ES-U-2101	ES-U-2102	ES-U-2016-RM
ES-U-1101-M	ES-U-1016-RM	ES-U-2101B	ES-U-2102-M	ES-U-3001-M
ES-U-1002	ES-U-1032-RM	ES-U-2101-M	ES-U-2004	ES-U-3008-RM
ES-U-1002-A				ES-U-3016-RM

Connective Peripherals Pte Ltd
178 Paya Lebar Road, #07-03 Singapore 409030
Tel.: +65 67430980 Fax: +65 68416071

E-Mail (Support): support@connectiveperipherals.com Web: www.connectiveperipherals.com/products

Neither the whole nor any part of the information contained in, or the product described in this manual, may be adapted or reproduced in any material or electronic form without the prior written consent of the copyright holder. This product and its documentation are supplied on an as-is basis and no warranty as to their suitability for any particular purpose is either made or implied. Connective Peripherals Pte Ltd will not accept any claim for damages howsoever arising as a result of use or failure of this product. Your statutory rights are not affected. This product or any variant of it is not intended for use in any medical appliance, device or system in which the failure of the product might reasonably be expected to result in personal injury. This document provides preliminary information that may be subject to change without notice. No freedom to use patents or other intellectual property rights is implied by the publication of this document. Connective Peripherals Pte Ltd, 178 Paya Lebar Road, #07-03 Singapore 409030. Registered Number: 201617872E

Copyright © Connective Peripherals Pte Ltd

Table of Contents

1 Introduction 4
2 Specifications 5
2.1 Standard Features 5
2.2 Interfaces Supported 5
2.3 Features by Model 6
3 Features of the ES-U-xxxx-x Family 7
3.1 USB and Serial Interface 7
3.2 Case Styles 8
3.3 Power Supply 9
3.4 Optical Isolation & Surge Protection 10
3.5 Configuring for RS-232, RS-422 and RS-485 Modes 10
4 Installing the Converter 11
4.1 Installation Steps 11
4.2 Changing COM Port Properties and COM Number 13
5 Switch and Jumper Settings 15
5.1 General Notes and Warnings 15
5.2 ES-U-2xxx Adapters (Plastic Enclosure) 16
5.3 ES-U-2x01B Adapters (Plastic Enclosure) 17
5.4 ES-U-2xxx-M and ES-U-2xxx-RM with 3 DIP Switches 19
5.5 ES-U-2xxx-M with 4 DIP Switches 20
5.6 ES-U-3xxx-x 21
6 Connector Pinout Information 23
6.1 RS-232 Signal Pin-out 23
6.2 RS-422 Signal Pin-out 24
6.3 RS-485 Signal Pin-out (Half Duplex) 27
6.4 RS-485 Signal Pin-out (Full Duplex) 28
6.5 5V Power Output (ES-U-1002-M only) 30
7 Troubleshooting 31
7.1 Hardware 31
7.2 Manual Installation of Driver 32

Copyright © Connective Peripherals Pte Ltd

7.3 Device Driver Options 35
7.4 Further Information on Resolving Driver Issues 35
8 Contact Information 36
Appendix A - List of Figures and Tables 37
Appendix B - Revision History 39

Copyright © Connective Peripherals Pte Ltd

1 Introduction

The CP-U-xxxx-x family of converters provide a quick and simple way to add serial communication ports to your computer. They connect to a single USB port on your computer to instantly provide up to 32 serial ports. They take advantage of the plug-and-play and hot-plug features of the USB bus to make it easier than ever to add communication ports to your system.

Installation is easy. There are no IRQ & COM port conflicts as the port doesn't require any additional IRQ, DMA or memory resources on the system. Each RS-232 or RS-422/RS-485 port functions as a native Windows COM port, and is compatible with Windows serial communication applications.

The ES-U-xxxx-x converters provide instant connectivity to RS-232 or RS-422/RS-485 compatible devices, including factory automation equipment, multi-drop data collection devices, barcode readers, time clocks, scales, data entry terminals and a variety of other devices in industrial environments.

This manual covers the following models:

USB to RS-232 converters

- Single channel (ES-U-1001, ES-U-1001-A, ES-U-1001-M, ES-U-1101-M)
- Dual channel (ES-U-1002, ES-U-1002-A, ES-U-1002-M)
- Quad channel (ES-U-1004)
- 8-channel (ES-U-1008)
- 16-channel (ES-U-1016-RM)
- 32-channel (ES-U-1032-RM)

USB to RS-422/485 converters

- Single channel (ES-U-2001, ES-U-2001B, ES-U-2101, ES-U-2101B, ES-U-2101-M)
- Dual channel (ES-U-2002, ES-U-2002-M, ES-U-2102, ES-U-2102-M)
- Quad channel (ES-U-2004, ES-U-2104-M)
- 8-channel (ES-U-2008-M)
- 16-channel (ES-U-2016-RM)

USB to RS-232/422/485 converters

- Single channel (ES-U-3001-M)
- 8-channel (ES-U-3008-RM)
- 16-channel (ES-U-3016-RM)

Copyright © Connective Peripherals Pte Ltd

2 Specifications

2.1 Standard Features

- Internal Transmit and Receive buffers
- Requires no IRQ, DMA, I/O port
- DB-9 male serial connectors *
- LEDs for each port indicate TxD and RxD
- Virtual COM port drivers available for Windows 7, Windows Server 2008, Windows Vista, Windows XP, Windows 2000, Windows Server 2003, Mac, Linux and WinCE (4.2 – 6.0)
- Operating temperature range of 0 – 55ºC

USB to RS-232 Features (available on ES-U-1xxx and ES-U-30xx)

- Adds RS-232 ports via USB connection
- Data rates up to 921.6Kbps depending on model
- RS-232 data signals : DCD, RxD, TxD, DTR, GND, DSR, RTS, CTS, RI

USB to RS-422/RS-485 Features (available on ES-U-20xx and ES-U-30xx)

- Adds RS-422 / RS-485 ports via USB connection
- Data rates up to 1Mbps depending on model
- Auto transmit buffer control for 2-wire RS-485 half-duplex operation
- Internal termination and bias resistors on some models (enabled by jumper)
- RS-422 data signals : TX-, TX+, RX+, RX-, GND, RTS-, RTS+, CTS+, CTS-
- RS-485 signals (half duplex) : Data+, Data-, GND
- RS-485 signals (full-duplex) : TX-, TX+, RX-, RX+, GND

Additional Opto-isolation Features (available on ES-U-11xx and ES-U-21xx)

- Each RS-232 or RS-422/RS-485 port is individually isolated with 2000 volt DC optical isolation
- Each RS-232 or RS-422/RS-485 port is individually protected by a surge protector to withstand electrostatic discharge and power surges up to 25KV ESD

2.2 Interfaces Supported

The USB-serial converters in the ES-U-xxxx-x family support the following interfaces:

ES-U-10xx-x	USB – RS-232
ES-U-11xx-x	USB – RS-232 (with opto-isolation)
ES-U-20xx-x	USB – RS-422 or RS-485 **
ES-U-21xx-x	USB – RS-422 or RS-485 (with opto-isolation) **
ES-U-30xx-x	USB – RS-232 or RS-422 or RS-485 **

* *ES-U-1032-RM has RJ45 ports which can be converted to DB-9 male if required using the supplied cables*

** *Support multiple serial protocols - Jumpers or DIP switches are used to select the required serial protocol*

Copyright © Connective Peripherals Pte Ltd

2.3 Features by Model

The table below summarises the features for each model in the ES-U-xxxx-x family.

Model Number		Serial Interfaces				Case		Power Supply	Opto Isolated	Additional features and Notes
Current Model number	Original Model number	Ports	RS232	RS422	RS485	Metal	Rack			
ES-U-1001	USB-COM	1	Y	-	-	-	-	USB	-	
ES-U-1001-A	USB-COM-PL	1	Y	-	-	-	-	USB	-	
ES-U-1001-M	USB-COM-M	1	Y	-	-	Y	-	USB	-	
ES-U-1101-M	USB-COM-SI-M	1	Y	-	-	Y	-	USB	Y	
ES-U-1002	USB-2COM	2	Y	-	-	-	-	USB		
ES-U-1002-A	USB-2COM-PL	2	Y	-	-	-	-	USB	-	
ES-U-1002-M	USB-2COM-M	2	Y	-	-	Y	-	USB	-	5V 150mA output on 2-way screw terminal
ES-U-1004	USB-4COM	4	Y	-	-	-	-	Ext	-	5VDC (2A) power adapter (barrel plug) *
ES-U-1008	USB-8COM	8	Y	-	-	-	-	Ext	-	5VDC (2A) power adapter (barrel plug) *
ES-U-1016-RM	USB-16COM-RM	16	Y	-	-	Y	Y	Int	-	
ES-U-1032-RM	USB-32COM-RM	32	Y	-	-	Y	Y	Int	-	RJ45 serial connectors
ES-U-2001	USB-COMi	1	-	Y	Y	-	-	USB	-	
ES-U-2001B		1	-	Y	Y	-	-	USB	-	Revision B of ES-U-2001
ES-U-2101	USB-COMi-SI	1	-	Y	Y	-	-	USB	Y	ES-U-2001 with isolation
ES-U-2101B		1	-	Y	Y	-	-	USB	Y	Revision B of ES-U-2101
ES-U-2101-M	USB-COMi-SI-M	1	-	Y	Y	Y	-	USB	Y	6-way screw terminal
ES-U-2102	USB-2COMi-SI	2	-	Y	Y	-	-	Ext	Y	6VDC (2.1A) power adapter (barrel plug) *
ES-U-2002	USB-2COMi	2	-	Y	Y	-	-	Ext	-	5VDC (2A) power adapter (barrel plug) *
ES-U-2004	USB-4COMi	4	-	Y	Y	-	-	Ext	-	5VDC (2A) power adapter (barrel plug) *
ES-U-2002-M	USB-2COMi-M	2	-	Y	Y	Y	-	USB	-	5-way screw terminals
ES-U-2102-M	USB-2COMi-SI-M	2	-	Y	Y	Y	-	USB	Y	ES-U-2002-M with isolation
ES-U-2104-M	USB-4COMi-SI-M	4	-	Y	Y	Y	-	Ext	Y	5VDC (2A) power adapter (barrel plug) *
ES-U-2008-M	USB-8COMi-M	8	-	Y	Y	Y	-	Ext	-	12VDC (1.5A) power adapter (3-pin terminal) *
ES-U-2016-RM	USB-16COMi-M	16	-	Y	Y	Y	Y	Int	-	
ES-U-3001-M	USB-COMi-M	1	Y	Y	Y	Y	-	USB	-	6-way screw terminal, 5V output
ES-U-3008-RM	USB-8COMi-RM	8	Y	Y	Y	Y	Y	Int	-	
ES-U-3016-RM	USB-16COMi-RM	16	Y	Y	Y	Y	Y	Int	-	

Table 1 - Features of the ES-U-xxxx-x converters

Power supply types are USB (USB powered), Ext (external power adapter) or Int (internal power supply)

* Power adapter voltages and currents shown in the comments column are for indication only and are subject to change. To avoid damage, always use the adapter which was provided with your converter to ensure that you are supplying the correct voltage for operation.

Copyright © Connective Peripherals Pte Ltd

3 Features of the ES-U-xxxx-x Family

3.1 USB and Serial Interface

USB Interface

All devices in the ES-U-xxxx-x series feature a standard USB type-B socket. A standard USB A-B cable is supplied to connect to the PC.

Serial Interface

The ES-U-xxxx-x converters have DB-9 male connectors for connection to the RS-232/422/485 interface.

Some models have the following additional features:

- Terminal block connections in addition to the DB-9 connector.
- Optional 5V output.

The ES-U-1032-RM unit has RJ45 connectors on the front panel instead of DB-9, but is provided with adapter cables to convert these to DB-9 male connectors if required.

Figure 1 - DB-9 Male serial connectors. Some models also feature terminal blocks.

Figure 2 - ES-U-1032-RM (RJ45 connectors) is supplied with RJ45-to-DB-9 cables

Copyright © Connective Peripherals Pte Ltd

3.2 Case Styles

The ES-U-xxxx-x converters are available in Plastic, Metal and Metal Rackmount enclosure styles. All units can be used on a desktop with the self-adhesive feet provided.

- Plastic case desktop converters are supplied with USB cable and power adapter localised to country of sale (when required depending on model).
- Metal case converters are supplied with wall mounting hardware, USB cable and power adapter with plug localised to country of sale (when required depending on model).
- Metal rack mount converters are supplied with rack mounting hardware, USB cable and power cable localised to country of sale.

Transmit and receive LEDs for each port is included on the front or top panel of the enclosure, to show when data is being transmitted or received by the associated port. A power LED is also included (on units with metal enclosures) to show that the converter is receiving power.

Figure 3 - Example of the Metal Rack-mount enclosure

Figure 4 - Examples of the Plastic and Metal (wall mountable) enclosures

Copyright © Connective Peripherals Pte Ltd

3.3 Power Supply

Depending on the model, power will either be supplied from the USB port, from an external power adapter or from an internal switching supply. The different types are described below. Table 1 on page 6 shows which type of power supply is required for each converter model.

USB powered

These devices are powered directly from the USB port. No power supply is required for these converters.

Power Adapter

These devices are provided with an external power adapter in the package. The adapter supplied has a UK, EU or USA plug depending on the country of sale and so may vary from the one shown below. The low voltage connector is either a 3-pin terminal block connector or a barrel-type jack as shown below, depending on the model. For more details, see Table 1 on page 6.

The low voltage cable should be connected to the power (or DC in) socket on the converter, and the AC input plug should be connected to a power source before using the converter.

Always use the supplied adapter to power your ES-U-xxxx-x converter; damage will occur if an adapter providing the wrong voltage is used.

Figure 5 - Some models use a power adapter with barrel or terminal connector

Internal Switching Power Supply

The rack mountable (ES-U-xxxx-RM) devices require an AC input (100V ~ 240V, 47 – 63 Hz) for the internal switching power supply. A power cable is supplied with the converter, and connects to the power inlet socket on the rear panel. The cable has a UK, EU or USA plug depending on the country of sale and so may vary from the one shown below.

Figure 6 - Rack-mount models have an internal supply with AC input connector

Copyright © Connective Peripherals Pte Ltd

3.4 Optical Isolation & Surge Protection

Optical isolation and surge protection are available in the ES-U-11xx and ES-U-21xx converters.

Each serial port is individually optically isolated with 2000 volt DC optical isolation. The optical isolation protects your PC or notebook from spikes and surges on the RS-232 or RS-422/RS-485 network, by converting the electrical data into an optical signal and then changing it back into electrical data. Your computer is well protected, since the surges and spikes cannot cross the optical link.

Each serial port is individually protected by surge protector to withstand electrostatic discharge and power surges up to 25KV ESD. Surge suppression on all signals protects against damage caused by lightning or high voltage.

3.5 Configuring for RS-232, RS-422 and RS-485 Modes

The ES-U-2xxx-x and ES-U-3xxx-x converters can be configured for different interface types. These converters have DIP switches or internal jumpers to select the required interface. They also feature internal jumpers to select options such as termination and biasing of the RS-422 and RS-485 lines.

Please refer to section 5 for more information on the DIP switch and jumper settings available on each model of converter.

Figure 7 - ES-U-2xxx and ES-U-3xxx have DIP switches to select the serial mode

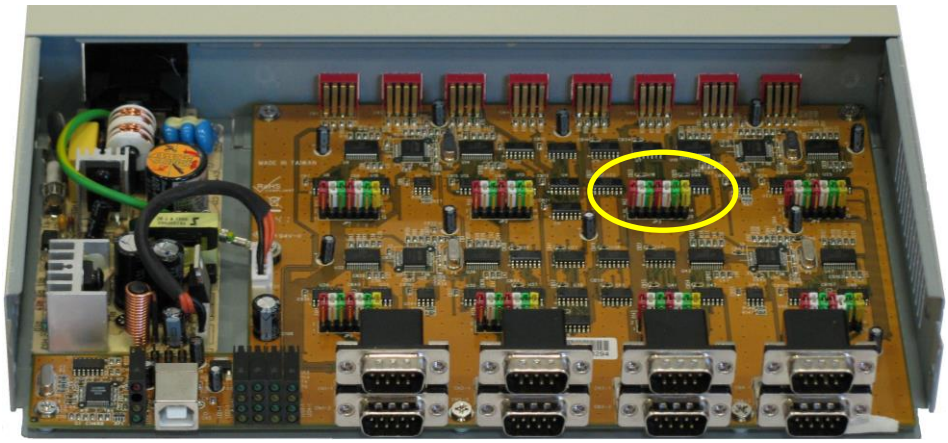


Figure 8 - ES-U-3008-RM has a set of jumpers for each port (one set circled)

4 Installing the Converter

4.1 Installation Steps

The main steps in configuring your converter are as follows:

1. Configure the switches and jumpers on your converter to match your serial bus type. See section 5 for details of the settings for your particular model of converter.

   Do not connect the converter to the power supply, the PC USB port or the RS-232/422/485 serial network at this stage. Note that ES-U-1xxx-x converters do not have any DIP switches or jumpers and you can proceed to step 2 immediately.

2. Install the drivers for the converter on your computer. You can do this using either the *Windows Update* or the *Driver Executable* method below.

   You need to have administrator privileges to install any new drivers in Windows. To install the driver or update the configuration please log onto Windows as "Administrator" or ask your system administrator to install the USB to serial driver.

   The following instructions are for installation on Windows XP. For installation on Windows Vista, Windows 7, Mac OS X, Linux or Windows CE, please refer to the FTDI device drivers and installation guides for your operating system which are available at the following links.

   Installation Guides http://www.ftdichip.com/Support/Documents/InstallGuides.htm

   Drivers http://www.ftdichip.com/Drivers/VCP.htm

   Option 1 - Windows Update

   If your computer is currently connected to the internet, these steps will help you to install the driver automatically using Windows Update. If your computer is not connected to the internet, use the Driver Executable method on the following page instead.

   a. Connect the power supply cable to the power inlet socket on the rear panel of the converter, and connect the adapter to a power outlet.

   b. Connect the USB cable to your converter and the other end to an available USB port on your PC.

   c. The computer will recognise the converter and display the Found New Hardware wizard.

   d. Select the option to allow Windows to connect to Windows Update to search for a driver. *Note that you must be connected to the internet to allow this to work. If you are not able to connect to the internet during the install process, use the Driver Executable method. In this case, disconnect the USB cable from the computer and cancel the Found New Hardware wizard before proceeding to step (a) of the Driver Executable section below.*

   e. Select 'Install the software automatically (recommended)'. Windows will download the driver from Windows Update and install it.

   f. For some converters in the ES-U-xxxx family, Windows will display the Found New Hardware wizard several more times to install all of the serial ports on the converter. Each time the wizard is displayed, repeat steps (c) to (e) above.

   g. Once installation is complete, you will see the following message. Please proceed to step 3 below to verify the installation. You do not need to run the steps shown in the Driver Executable section on the following page.

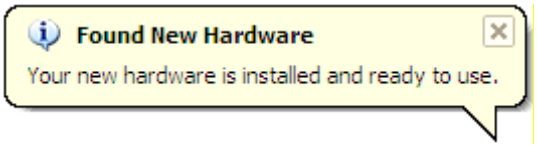


Figure 9 - Hardware installed successfully

Option2 - Driver Executable

If your computer will not be connected to the internet during installation, use the following instructions to install the driver. If you have already completed steps (a) to (g) in the Windows Update section above, jump to step 3 below as the driver is already installed.

a. Download the latest version of the driver setup executable file from the following link. Version 2.08.14 was the latest driver executable available when this manual was published (as circled below), but please check the link to the driver page below before installing your converter and use the latest version.

http://www.ftdichip.com/Drivers/VCP.htm

		Processor Architecture							
Operating System	**Release Date**	**x86 (32-bit)**	**x64 (64-bit)**	**PPC**	**ARM**	**MIPSII**	**MIPSIV**	**SH4**	**Comments**
Windows*	2011-04-12	2.08.14	2.08.14	-	-	-	-	-	WHQL Certified Available as setup executable Release notes
Linux	2009-05-14	1.5.0	1.5.0	-	-	-	-	-	Included in 2.6.31 kernel and later ReadMe
Mac OS X	2011-02-28	2.2.16	2.2.16	2.2.16	-	-	-	-	Customers wishing to have a VID/PID combination added should contact FTDI Support
Windows CE 4.2-5.2**	2010-02-11	1.1.0.6	-	-	1.1.0.6	1.1.0.6	1.1.0.6	1.1.0.6	
Windows CE 6.0	2010-02-11	1.1.0.6	-	-	1.1.0.6	1.1.0.6	1.1.0.6	1.1.0.6	

Figure 10 Driver download from FTDI website

Note: If you wish to install the converter on a computer which is never connected to the internet, you can download the file using another computer and use a USB flash drive or similar to copy the file over to the computer which will be used with the converter.

b. Double-click the exe file to run the driver installation.

c. The following window will appear. It will disappear when installation is complete.

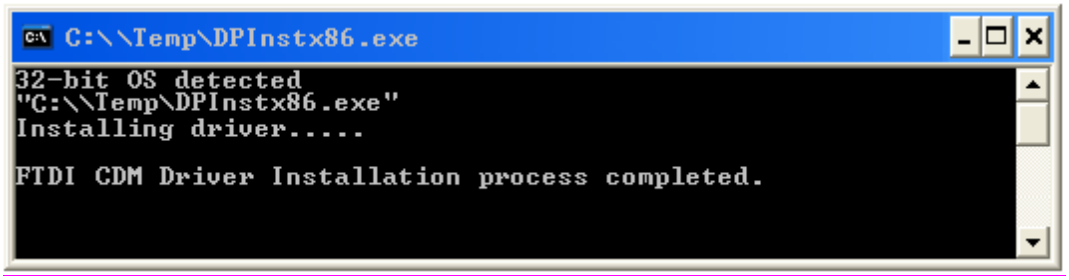


Figure 11 - Driver **I**nstallation **W**indow

d. Connect the power supply cable to the power inlet socket on the rear panel of the converter, and connect the adapter to an AC power outlet.

e. Connect the USB cable to your converter and the other end to a USB port on your PC.

f. The computer will recognise the converter and will complete the installation of the converter and the associated serial ports.

g. Then proceed to step 3 below to verify the installation.

3. Check that the drivers were installed correctly by looking under Device Manager of the System Properties screen. This is shown below.

a. Go to Start-Settings-Control Panel-System Properties-Hardware-Device Manager.

b. This also shows you the com port numbers assigned to each port on your device (the four ports on the device below have been assigned COM4, COM5, COM6 and COM7).

c. Your converter is now ready to use. If you would like to change the com port numbers assigned to your device, refer to section 4.2 below.

d. If you had problems during the installation, please refer to the Troubleshooting information in section 7 on page 31.

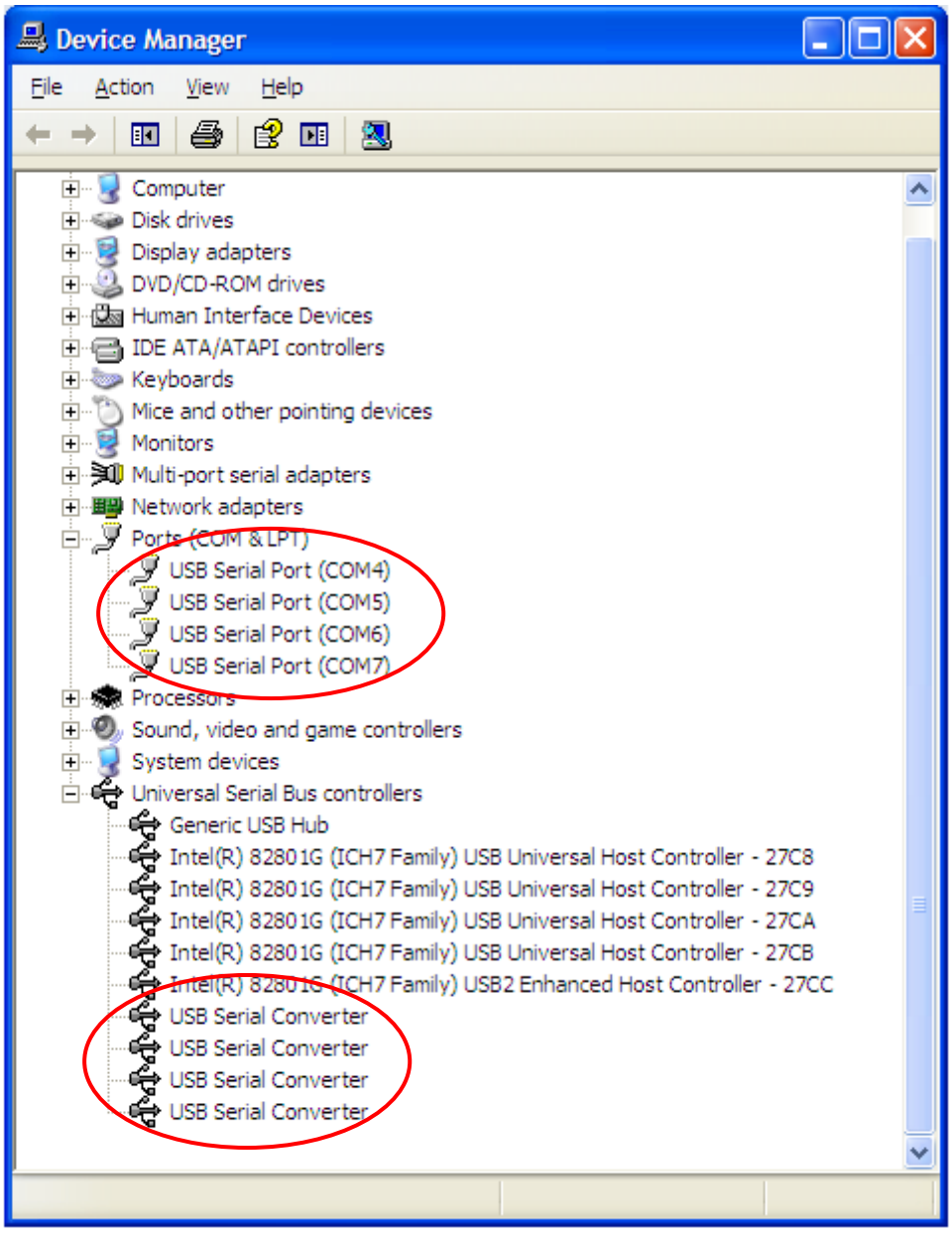


Figure 12 - Device Manager after installing a converter with four ports

4.2 Changing COM Port Properties and COM Number

This feature is particularly useful for programs which only work with COM1 through COM4. Please note that you cannot change to a COM port number which is already in use.

To change the virtual COM port properties:

1. Double-click the "USB Serial Port "in the Device Manager.

2. Select "Port Setting" and “Advanced”.
3. Click the drop down arrow on COM Port Number, scroll to the required COM port and Select "OK".
4. Return to the Device Manager Screen. You will see that the USB Serial Port installation has been changed to the new COM Port Number.

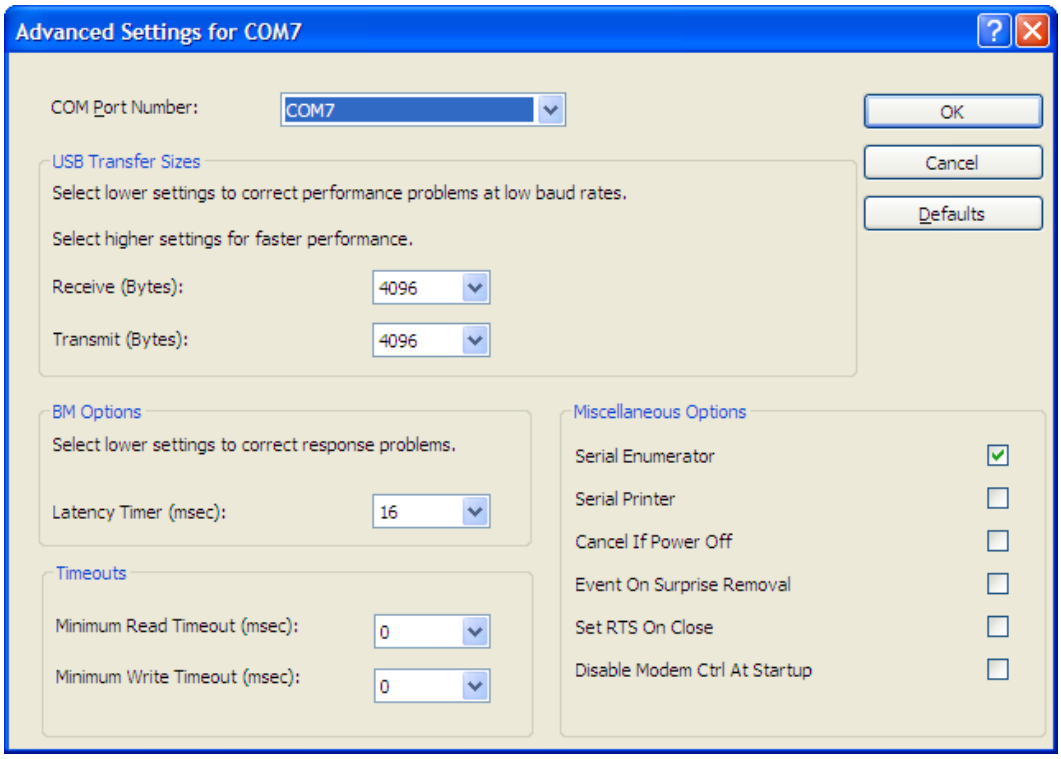


Figure 13 - Advanced port settings dialog

5 Switch and Jumper Settings

This section applies to ES-U-2xxx-x and ES-U-3xxx-x converters, which can be configured for different interface types. These converters have DIP switches and internal jumpers to select the required interface. The following pages give details of the settings required for each particular model of converter.

Ensure that you refer to the correct section for your model of converter. The relevant model numbers are listed at the top of each section. Please also read the general notes and warnings on this page before proceeding to configure your device.

5.1 General Notes and Warnings

Safety

For ES-U-xxxx-RM models with internal power supplies, the power cable must be disconnected before removing the cover. Avoid contact with the power supply board inside the converter. In common with all switching power supplies connected to the mains (120/240VAC), the power supply board in these products can remain charged with dangerous voltages for some time after the power input is disconnected.

Serial Bus Configuration

It is important to configure the DIP switches and jumpers to select the correct type of serial bus (RS-232, RS-422 or RS-485) for your application before connecting the ES-U-xxxx-x converter to your serial bus. Otherwise damage can occur to the converter or other equipment on the RS-232/RS-422/RS-485 bus.

To avoid damage, the power supply (or power cable in rack-mount units), serial cables and USB cable should be disconnected from your converter before changing DIP switch settings and before opening the case to change jumper settings.

Termination

For RS-422 or RS-485, it may be necessary to enable termination of the data transmission lines. This depends on the way in which your network is connected and if termination is already provided by other devices on the network. Before applying the termination, check your cable specification for proper impedance matching.

Termination is normally used in the node at each end of the bus, but nodes in the middle of the bus should not have termination enabled. The ES-U-xxxx-x converters have jumpers (or DIP switches) to allow internal termination resistors to be enabled if required. This avoids the need to provide an external resistor at the ES-U-xxxx-x end of the bus.

ES-U-xxxx-x converters have jumpers/switches for both Tx +/- termination and Rx +/- termination. When using RS-485 half-duplex, only the Tx +/- termination should be enabled as indicated by the comments in the jumper / switch setting tables for each product.

Biasing

For RS-485 half-duplex, it may be necessary to enable biasing of the data transmission lines. In some cases, the RS-485 lines may float to undefined levels when no transmitter is active, and this can cause additional unexpected characters to appear at the start or end of a message. Biasing resistors are used to set a defined logic level on the serial lines when no node is transmitting.

Some ES-U-xxxx-x models feature internal 750 ohm resistors with jumpers to enable/disable them. These should be disabled if another device on your serial bus already provides biasing as biasing of data lines must only occur at a single point in the cabling. They are not required in RS-422 or RS-485 full-duplex, since the transmitter is always enabled.

ES-U-xxxx-x converters have four jumpers to select biasing on Tx+, Tx-, Rx+ and Rx-. Section 5 describes these in more detail. For half-duplex RS-485, only the jumpers for Rx biasing (*Pull up of Rx+* and *Pull down of Rx-*) should be fitted. The jumpers for Tx biasing (*Pull up of Tx+* and *Pull down of Tx-*) should not be fitted as this would provide two biasing resistors per line.

Copyright © Connective Peripherals Pte Ltd

5.2 ES-U-2xxx Adapters (Plastic Enclosure)

This section applies to the following adapters:

- ES-U-2001 (see note below)
- ES-U-2101 (see note below)
- ES-U-2002
- ES-U-2004
- ES-U-2102

Note: This section applies to the ES-U-2001 and ES-U-2101. It does not apply to the revision B units which have part number ES-U-2001B and ES-U-2101B. Please refer to Section 5.3 for identifying and configuring the ES-U-2001B and ES-U-2101B.

This section does not apply to ES-U-2xxx-M (metal case) adapters. Please see sections 5.4 and 5.5 for these products.

Inside the adapter, there are is a 10 x 2 (20 pin) header block for each serial port. Jumpers are used to select the mode of operation. You will need to open up the cover and set the jumpers for RS-422 mode or RS-485 mode as per the requirements of your application. Please also refer to the comments in the Function column as some jumpers (such as termination on RS-485 networks) should be set depending on your particular serial network set-up.

See the General Notes and Warnings on page 15 before changing settings or opening the cover. The jumpers should be set to select the correct serial mode before connecting the converter to your RS-422/RS-485 serial bus.

Jumper Settings for RS-422

Jumper	Function
1 - 2	Enable TxD / RxD Termination with 120 Ohm. This jumper should always be populated for RS-422 mode.
3 – 4	Enable CTS / RTS Termination with 120 Ohm. This jumper should always be populated for RS-422 mode.
9 – 10	TxD Driver Always ON. As RS-422 is full duplex point to point, the transmitter should always be enabled.
13 – 14	RxD Driver Always ON. As RS-422 is a full duplex point to point connection, the receiver should always be enabled.
17 - 18	Enable CTS Handshaking. This setting allows the data flow to be controlled using CTS/RTS handshaking if required by the application.

Table 2 - RS-422 Mode Configuration

Note: *all other positions = no jumper populated.*

Copyright © Connective Peripherals Pte Ltd

Jumper Settings for RS-485

Jumper	Function
1 - 2	Enable TxD / RxD Termination with 120 Ohm. This jumper should only be populated if this ES-U-xxxx-x converter is at one end of the cable, to meet RS-485 termination requirements.
5 - 6 7 - 8	TxD / RxD Single pair (half duplex for RS-485). Populate both these jumpers for half-duplex RS-485.
11 - 12	Enable TxD Driver only when transmitting. This is required for RS-485 half-duplex, as multiple devices can transmit over the same twisted pair. When an RS-485 node is not transmitting, its transmitter must be turned off to allow other devices to communicate over the same wire.
13 – 14 (echo) OR 15 – 16 (no echo)	RxD Always Enabled. In this RS-485 mode, characters transmitted by the RS-485 device will also be received by the same device. These echoed characters are usually stripped out by the application software. Transmit Data Echo Suppression Mode. In this mode, characters transmitted by the RS-485 device will NOT be received by the same device. In this mode there is no need for the application software to strip out the transmitted data from the received data as it is handled by the hardware.
19 - 20	CTS Always Enabled. As there is no hardware handshaking in RS-485, CTS should be permanently enabled to allow unrestricted flow of data. If handshaking is required for RS-485 it can be done using X-On / X-Off handshaking protocol.

Table 3 - RS-485 Mode Configuration

Note: *all other positions = no jumper populated.*

5.3 ES-U-2x01B Adapters (Plastic Enclosure)

This section applies to the following adapters:

- ES-U-2001B (see note below)
- ES-U-2101B (see note below)

Note: This section applies only to revision B units which have part number ES-U-2001B and ES-U-2101B. For the ES-U-2001 and ES-U-2101, please refer to Section 5.2 above.

This section does not apply to ES-U-2xxx-M (metal case) adapters. Please see sections 5.4 and 5.5 for these products.

ES-U-2x01B Differences

ES-U-2x01B units look similar to the ES-U-2x01 externally but have the following additional features:

- 3-way DIP switch to select the mode and a 7 x 3 header block with jumpers to select the termination and biasing. (ES-U-2x01 has a single 10 x 2 header to select mode and termination). The switches and header block are located inside the plastic enclosure.
- Internal biasing resistors which can be enabled using jumpers (ES-U-2x01 does not have these resistors)
- Tx and Rx LEDs are located near to the USB connector and are yellow and green (ES-U-2x01 has red and green LEDs located in the centre of the enclosure)

Copyright © Connective Peripherals Pte Ltd

See the General Notes and Warnings on page 15 before changing settings or opening the cover. The jumpers should be set to select the correct serial mode before connecting the converter to your RS-422/RS-485 serial bus.

DIP Switch Settings

On the inside of the unit, there are three DIP switches, which are used to select the required serial mode (RS-422 or RS-485).

	Operation Mode	S1	S2	S3
RS-422	4 Wire with handshaking	ON	ON	ON
RS-485	Full Duplex (4 wire)	OFF	ON	ON
	Half Duplex (2 wire) with Echo	OFF	OFF	ON
	Half Duplex (2 wire) without Echo	OFF	OFF	OFF

Table 4 - RS-422 & RS-485 Mode Configuration

Jumper Settings

Inside the unit, there is a 7x3 (21 pin) header block. Jumpers are used to select features such as 120 Ohm termination on Tx, Rx and CTS, and 750 Ohm biasing resistors on Tx and Rx. You will need to open up the cover and set the jumpers as per the requirements of your application.

Jumper	Function
1 - 2	Enable Tx+/- Termination with 120 Ohm. This jumper should be populated for RS-485 half-Duplex mode
2 – 3	Disable Tx+/- Termination
4 – 5	Pull-up Tx+ to VCC by 750 Ohm Bias resistor. This jumper should be populated to enable pull-up of Tx+
5 – 6	Disable Pull-up of Tx+ to VCC
7 – 8	Pull-down Tx- to GND by 750 Ohm Bias resistor This jumper should be populated to enable pull-down of Tx-
8 – 9	Disable Pull-down of Tx- to GND
10 - 11	Enable Rx+/- Termination with 120 Ohm. This jumper should be populated for RS-422 and RS-485 Full-Duplex mode
11 – 12	Disable Rx+/- Termination
13 – 14	Pull-up Rx+ to VCC by 750 Ohm Bias resistor. This jumper should be populated to enable pull-up of Rx+
14 – 15	Disable Pull-up of Rx+ to VCC
16 – 17	Pull-down Rx- to GND by 750 Ohm Bias resistor. This jumper should be populated to enable pull-down of Rx-
17 – 18	Disable Pull-down of Rx- to GND

Copyright © Connective Peripherals Pte Ltd

19 – 20	Enable CTS Termination with 120 Ohm. This jumper should be populated for RS-422 mode
20 - 21	Disable CTS Termination

Table 5 - Jumpers to select Termination and Biasing

Note: *If biasing of an RS-485 half-duplex bus is required, enable Rx biasing only (Pull-up Rx+ to VCC by 750 Ohm Bias resistor and Pull-down Rx- to GND by 750 Ohm Bias resistor). Tx biasing should not be used as this would provide two sets of biasing resistors on the bus.*

5.4 ES-U-2xxx-M and ES-U-2xxx-RM with 3 DIP Switches

This section applies to the following adapters:

- ES-U-2002-M
- ES-U-2102-M
- ES-U-2008-M
- ES-U-2016-RM

See the General Notes and Warnings on page 15 before changing settings or opening the cover. The DIP switches should be set to select the correct serial mode before connecting the converter to your RS-422/RS-485 serial bus.

DIP Switch Settings

On the outside of the unit, there are three DIP switches, which are used to select the required serial mode (RS-422 or RS-485).

	Operation Mode	S1	S2	S3
RS-422	4 Wire with handshaking	ON	ON	ON
RS-485	Full Duplex (4 wire)	OFF	ON	ON
	Half Duplex (2 wire) with Echo	OFF	OFF	ON
	Half Duplex (2 wire) without Echo	OFF	OFF	OFF

Table 6 - RS-422 & RS-485 Mode Configuration

Jumper Settings

Inside the unit, there is a 7x2 (14 pin) header block for each serial port. Jumpers are used to select features such as 120 Ohm termination on Tx, Rx and CTS, and 750 Ohm biasing resistors on Tx and Rx. You will need to open up the cover and set the jumpers as per the requirements of your application.

Jumper	Function
1 - 2	Enable Tx+/- Termination with 120 Ohm. This jumper should be populated for RS-485 half-Duplex mode
3 - 4	Pull-up Tx+ to VCC by 750 Ohm Bias resistor. This jumper should be populated to enable pull-up of Tx+
5 - 6	Pull-down Tx- to GND by 750 Ohm Bias resistor This jumper should be populated to enable pull-down of Tx-
7 - 8	Enable Rx+/- Termination with 120 Ohm. This jumper should be populated for RS-422 and RS-485 Full-Duplex mode

Copyright © Connective Peripherals Pte Ltd

9 - 10	Pull-up Rx+ to VCC by 750 Ohm Bias resistor. This jumper should be populated to enable pull-up of Rx+
11 - 12	Pull-down Rx- to GND by 750 Ohm Bias resistor. This jumper should be populated to enable pull-down of Rx-
13 - 14	Enable CTS Termination with 120 Ohm. This jumper should be populated for RS-422 mode

Table 7 - Jumpers to select Termination and *Biasing*

5.5 ES-U-2xxx-M with 4 DIP Switches

This section applies to the following adapters:

- ES-U-2101-M
- ES-U-2104-M

See the General Notes and Warnings on page 15 before changing settings or opening the cover. The DIP switches should be set to select the correct serial mode before connecting the converter to your RS-422/RS-485 serial bus.

DIP Switch Settings

On the outside of the unit, there are four DIP switches, which are used to select the required serial mode (RS-422 or RS-485).

	Operation Mode	S1	S2	S3	S4
RS-422	4 Wire with handshaking	ON	ON	OFF	OFF
RS-485	Full Duplex (4 wire)	ON	OFF	OFF	OFF
	Half Duplex (2 wire) with Echo	OFF	OFF	OFF	ON
	Half Duplex (2 wire) without Echo	OFF	OFF	ON	ON

Table 8 - RS-422 & RS-485 Mode Configuration

Switch S4 selects 120R termination of TxD. It is normally enabled for half-duplex RS-485 modes but may not be required if both ends of your network are already terminated.

Jumper Settings

Inside the unit, there is a 6x2 (12 pin) header block for each serial port. Jumpers are used to select features such as 120 Ohm termination on Rx and CTS, and 750 Ohm biasing resistors on Tx and Rx. You will need to open up the cover and set the jumpers as per the requirements of your application.

Jumper	Function
1 - 2	Pull-up Tx+ to VCC by 750 Ohm Bias resistor. This jumper should be populated to enable pull-up of Tx+
3 - 4	Pull-down Tx- to GND by 750 Ohm Bias resistor This jumper should be populate to enable pull-down of Tx-
5 - 6	Enable Rx+/- Termination with 120 Ohm. This jumper should be populated for RS-422 and RS-485 Full-Duplex mode
7 - 8	Pull-up Rx+ to VCC by 750 Ohm Bias resistor. This jumper should be populated to enable pull-up of Rx+

Copyright © Connective Peripherals Pte Ltd

9 - 10	Pull-down Rx- to GND by 750 Ohm Bias resistor. This jumper should be populated to enable pull-down of Rx-
11 - 12	Enable CTS Termination with 120 Ohm. This jumper should be populated for RS-422 mode

Table 9 - Jumpers to select Termination and Biasing

See the notes in section 5.1 before setting Termination and Biasing

5.6 ES-U-3xxx-x

This section applies to the following adapters:

- ES-U-3001-M
- ES-U-3008-RM
- ES-U-3016-RM

See the General Notes and Warnings on page 15 before changing settings or opening the cover. The DIP switches should be set to select the correct serial mode before connecting the converter to your RS-232/RS-422/RS-485 serial bus.

DIP Switch Settings

On the outside of the unit, there are four DIP switches, which are used to select the required serial mode (RS-232, RS-422 or RS-485).

	Operation Mode	S1	S2	S3	S4
RS-232		OFF	ON	ON	ON
RS-422	4 Wire with handshaking	ON	ON	ON	ON
RS-485	Full Duplex (4 wire)	ON	OFF	ON	ON
	Half Duplex (2 wire) with Echo	ON	OFF	OFF	ON
	Half Duplex (2 wire) without Echo	ON	OFF	OFF	OFF

Table 10 - RS-232, RS-422 & RS-485 Mode Configuration

Jumper Settings

Inside the unit, there is a 7x2 (14 pin) header block for each serial port. Jumpers are used to select features such as 120 Ohm termination on Tx, Rx and CTS, and 750 Ohm biasing resistors on Tx and Rx. You will need to open up the cover and set the jumpers as per the requirements of your application.

Jumper	Function
1 - 2	Enable Tx+/- Termination with 120 Ohm. This jumper should be populated for RS-485 half-Duplex mode
3 - 4	Pull-up Tx+ to VCC by 750 Ohm Bias resistor. This jumper should be populated to enable pull-up of Tx+
5 - 6	Pull-down Tx- to GND by 750 Ohm Bias resistor This jumper should be populated to enable pull-down of Tx-
7 - 8	Enable Rx+/- Termination with 120 Ohm. This jumper should be populated for RS-422 and RS-485 Full-Duplex mode

Copyright © Connective Peripherals Pte Ltd

9 - 10	Pull-up Rx+ to VCC by 750 Ohm Bias resistor. This jumper should be populated to enable pull-up of Rx+
11 - 12	Pull-down Rx- to GND by 750 Ohm Bias resistor. This jumper should be populated to enable pull-down of Rx-
13 - 14	Enable CTS Termination with 120 Ohm. This jumper should be populated for RS-422 mode.

Table 11 - Jumpers to select Termination and Biasing

See the notes in section 5.1 before setting Termination and Biasing

5V Power Enable Jumper (ES-U-3001-M)

The ES-U-3001-M can supply 5V (at up to 150mA) through Pin 5 of the terminal block to allow external devices to be powered. By default, this feature is disabled. To enable the power, you need to open the metal case and set the jumper (JP2) to the position of "ON".

Jumper	Function
ON	Enable the 5V 150mA output on pin 5 of the Terminal Block to provide power for external devices
OFF	Disable the 5V 150mA power (Default)

Table 12 - Jumper to select 5V output

Copyright © Connective Peripherals Pte Ltd

6 Connector Pinout Information

This section shows the connector pinouts used on the ES-U-xxxx-x converters.

6.1 RS-232 Signal Pin-out

DB-9 Male connector

The RS232 ports are configured as Data Terminal Equipment (DTE), with a 9-contact D-Sub Pin connector. Pin assignments are according to TIA/EIA-574 which formally defines the assignments for a COM port found on many personal computers.

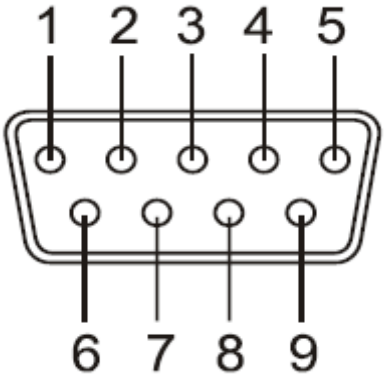


Figure 14 - DB-9 Male Connector Pin Numbers

Pin Number	Pin Type	Description
1	Input	DCD = Data Carrier Detect
2	Input	RXD = Receive Data
3	Output	TXD = Transmit Data
4	Output	DTR = Data Terminal Ready
5	Ground	GND = RS232 signal ground
6	Input	DSR = Data Set Ready
7	Output	RTS = Request To Send
8	Input	CTS = Clear To Send
9	Input	RI = Ring Indicator
Shield	Case Ground	Drain = typically connected to the host PC case

Table 13 - RS-232 Pin-Out for DB-9 connector

Copyright © Connective Peripherals Pte Ltd

RJ45 connector

The table below shows the pin-out of the RJ45 connectors used on the ES-U-1032-RM converter.

This converter is also provided with adapter cables which convert the RJ45 into a DB-9 connector. This connector uses the same pin-out as in Table 13 above but the Ring Indicator signal is not available as it is not brought out on the RJ45 connector.

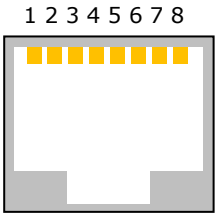


Figure 15 -RJ45 Connector Pin Numbers

Pin Number	Pin Type	Description
1	Output	RTS = Request To Send
2	Output	DTR = Data Terminal Ready
3	Ground	GND = RS232 signal ground
4	Output	TXD = Transmit Data
5	Input	RXD = Receive Data
6	Input	DCD = Data Carrier Detect
7	Input	DSR = Data Set Ready
8	Input	CTS = Clear To Send

Table 14 - RS-232 Pin-Out for RJ45 Connector

6.2 RS-422 Signal Pin-out

DB-9 Male connector

The table below shows the RS-422 pin-out of the DB-9 Male connector

Pin Number	Pin Type	Description
1	Output	TxD- = Transmit data, negative polarity
2	Output	TxD+ = Transmit data, positive polarity
3	Input	RxD+ = Receive data, positive polarity
4	Input	RxD- = Receive data, negative polarity
5	Ground	GND = Signal ground
6	Output	RTS- = Request to send, negative polarity

Copyright © Connective Peripherals Pte Ltd

7	Output	RTS+ = Request to send, positive polarity
8	Input	CTS+ = Clear to send , positive polarity
9	Input	CTS- = Clear to send, negative polarity
Shield	Case Ground	Drain = typically connected to the host PC case

Table 15 - RS-422 Pin-Out for DB-9 Connector

5-way Terminal Block

The table below shows the RS-422 pin-out of the 5 way terminal block (only available on some models).

Pin Number	Pin Type	Description
1	Output	TxD- = Transmit data, negative polarity
2	Output	TxD+ = Transmit data, positive polarity
3	Input	RxD+ = Receive data, positive polarity
4	Input	RxD- = Receive data, negative polarity
5	Ground	GND = Signal ground

Table 16 - RS-422 Pin-Out for 5-way Terminal Block

6-way Terminal Block

The table below shows the RS-422 pin-out of the 6 way terminal block (only available on some models).

Pin Number	Pin Type	Description
1	Output	TxD- = Transmit data, negative polarity
2	Output	TxD+ = Transmit data, positive polarity
3	Input	RxD+ = Receive data, positive polarity
4	Input	RxD- = Receive data, negative polarity
5	See Description	For ES-U-2101-M, pin 5 is GND For ES-U-3001-M, pin 5 is optional 5VDC output
6	Ground	GND = Signal ground

Table 17 - RS-422 Pin-Out for 6-way Terminal Block

Wiring Diagrams

The following diagram shows an RS-422 full-duplex bus. The ES-U-xxxx-x has a built-in resistor for terminating its RxD +/- input, which can be enabled using a jumper. The Tx +/- lines which are outputs from the ES-U-xxxx-x are terminated at the receiver at the other end of the bus as shown. Twisted pair wires are required for each signal pair.

Copyright © Connective Peripherals Pte Ltd

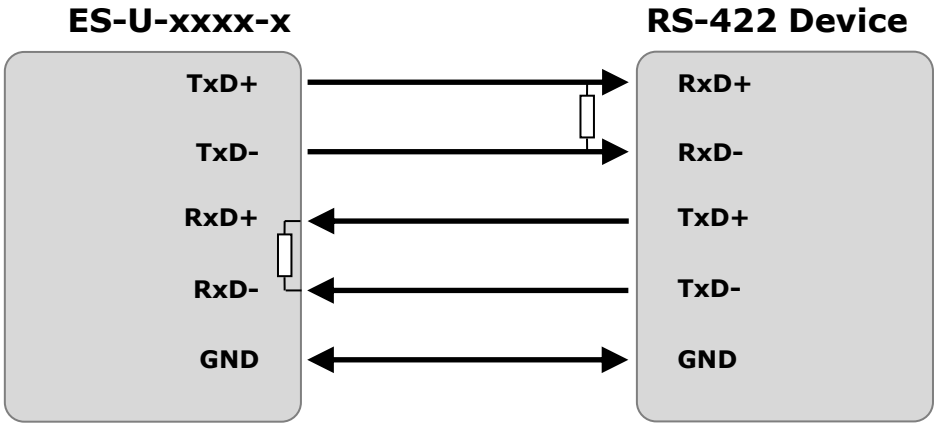


Figure 16 - RS-422 4 Wire Full Duplex

The following diagram shows an RS-422 full-duplex bus with handshaking signals connected. The ES-U-xxxx-x has built-in resistors for terminating its RxD +/- and CTS +/- inputs, which can be enabled using jumpers. The TxD +/- and RTS +/- lines which are outputs from the ES-U-xxxx-x are terminated at the receiver at the other end of the bus as shown. Twisted pair wires are required for each signal pair.

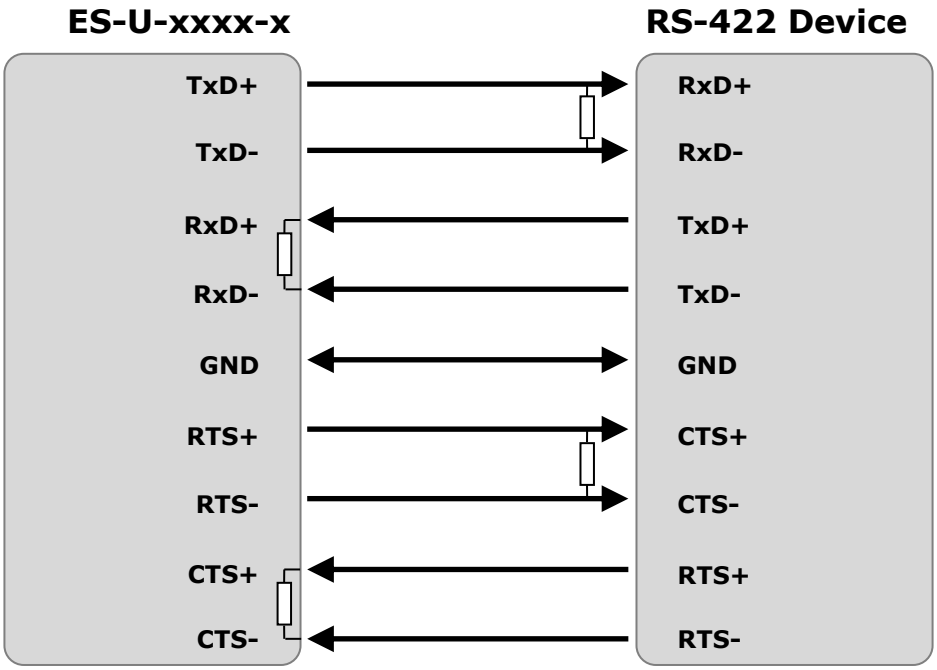


Figure 17 - RS-422 with Handshaking Signals Connected

Copyright © Connective Peripherals Pte Ltd

6.3 RS-485 Signal Pin-out (Half Duplex)

DB-9 Male connector

The table below shows the RS-485 (half duplex) pinout of the DB-9 male connector.

Pin Number	Pin Type	Description
1	Out / In	Data– = Transmit / Receive Data, negative polarity
2	Out / In	Data+ = Transmit / Receive Data, positive polarity
5	Ground	GND = Signal ground
Shield	Case Ground	Drain = typically connected to the host PC case

Table 18 - RS-485 Half-Duplex Pin-out for DB-9 Connector

Note: *Other pins have no function in this mode and should be left un-connected.*

5-way Terminal Block

The table below shows the RS-485 (half duplex) pinout of the 5 way terminal block (only available on some models).

Pin Number	Pin Type	Description
1	Out / In	Data– = Transmit / Receive Data, negative polarity
2	Out / In	Data+ = Transmit / Receive Data, positive polarity
5	Ground	GND = Signal ground

Table 19 - RS-485 Half-Duplex Pin-Out for 5-way Terminal Block

Note: *Other terminals have no function in this mode and should be left un-connected.*

6-way Terminal Block

The table below shows the RS-485 (half duplex) pinout of the 6 way terminal block (only available on some models).

Pin Number	Pin Type	Description
1	Out / In	Data– = Transmit / Receive Data, negative polarity
2	Out / In	Data+ = Transmit / Receive Data, positive polarity
5	See Description	For ES-U-2101-M, pin 5 is GND For ES-U-3001-M, pin 5 is optional 5VDC output
6	Ground	GND = Signal ground

Table 20 - RS-485 Half-Duplex Pin-out for 6-way Terminal Block

Note: *Other terminals have no function in this mode and should be left un-connected.*

Copyright © Connective Peripherals Pte Ltd

Wiring Diagrams

The diagram shows an ES-U-xxxx-x converter connected to an RS-485 half-duplex bus. If the CP-U-xxxx-x is at one end of the bus (as shown), the built-in resistor can be enabled to terminate the Data +/- lines. The Tx +/- termination jumper or DIP switch is used to enable this resistor. A second termination resistor is fitted at the other end of the bus as shown.

If additional unexpected zero bytes are being received, some models of ES-U-xxxx-x converter also features bias resistors (not shown below) which can be enabled by fitting the *Pull up Tx+ to VCC* and *Pull down Tx- to GND* jumpers. These should not be enabled if another device on the bus is already providing biasing. Twisted pair wires are required for each signal pair.

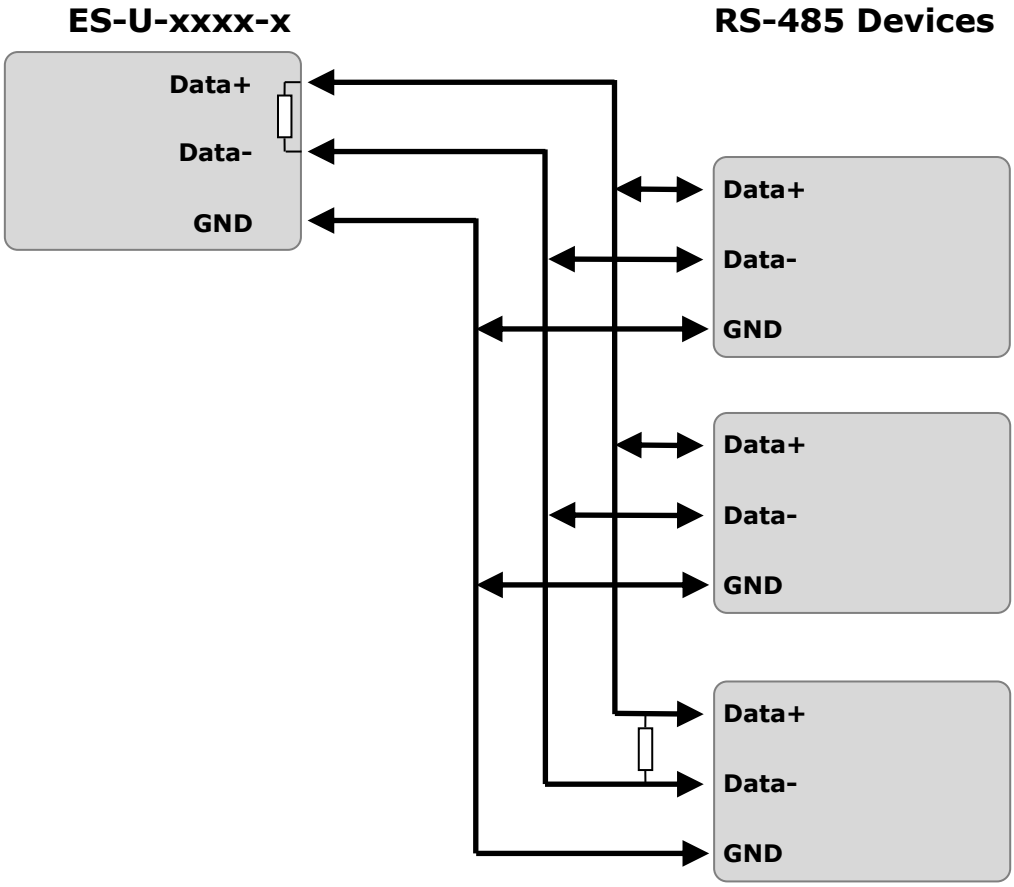


Figure 18 - RS-485 Half Duplex Wiring

6.4 RS-485 Signal Pin-out (Full Duplex)

DB-9 Male connector

The table below shows the RS-485 (full duplex) pinout of the DB-9 male connector.

Pin Number	Pin Type	Description
1	Output	TxD- = Transmit data, negative polarity
2	Output	TxD+ = Transmit data, positive polarity
3	Input	RxD+ = Receive data, positive polarity

Copyright © Connective Peripherals Pte Ltd

4	Input	RxD– = Receive data, negative polarity
5	Ground	GND = Signal ground
Shield	Case Ground	Drain = typically connected to the host PC case

Table 21 - RS-485 Full Duplex Pin-out for DB-9 Connector

Note: *Other pins have no function in this mode and should be left un-connected.*

5-way Terminal Block

The table below shows the RS-485 (full duplex) pinout of the 5 way terminal block (only available on some models).

Pin Number	Pin Type	Description
1	Output	TxD- = Transmit data, negative polarity
2	Output	TxD+ = Transmit data, positive polarity
3	Input	RxD+ = Receive data, positive polarity
4	Input	RxD– = Receive data, negative polarity
5	Ground	GND = Signal ground

Table 22 - RS-485 Full Duplex Pin-out for Terminal Block

6-way Terminal Block

The table below shows the RS-485 (full duplex) pin-out of the 6 way terminal block (only available on some models).

Pin Number	Pin Type	Description
1	Output	TxD- = Transmit data, negative polarity
2	Output	TxD+ = Transmit data, positive polarity
3	Input	RxD+ = Receive data, positive polarity
4	Input	RxD– = Receive data, negative polarity
5	See Description	For ES-U-2101-M, pin 5 is GND For ES-U-3001-M, pin 5 is optional 5VDC output
6	Ground	GND = Signal ground

Table 23 - RS-485 Full Duplex Pin-out for Terminal Block

Copyright © Connective Peripherals Pte Ltd

Wiring Diagrams

The following diagram shows an RS-485 full-duplex bus. The ES-U-xxxx-x has a built-in resistor for terminating its RxD +/- input, which can be enabled using a jumper. The Tx +/- lines which are outputs from the ES-U-xxxx-x would be terminated at the receiver at the other end of the bus as shown. Twisted pair wires are required for each signal pair.

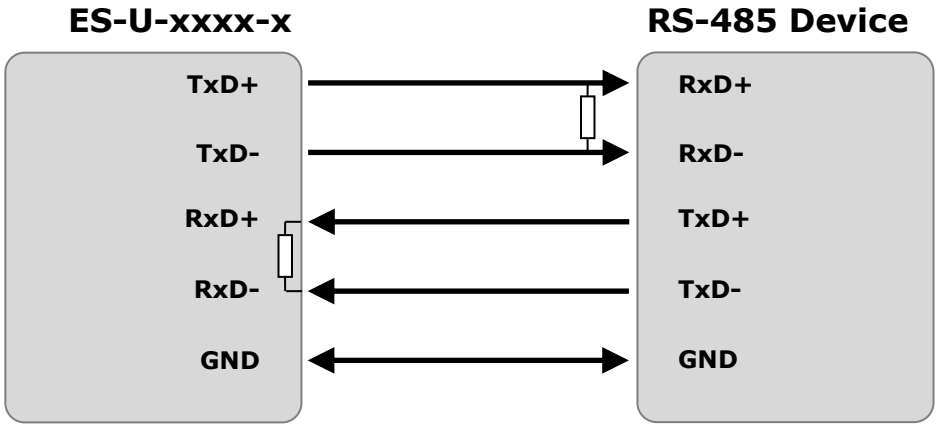


Figure 19 - RS-485 Full Duplex Wiring

6.5 5V Power Output (ES-U-1002-M only)

2-way Terminal Block

The table below shows the pin-out of the 2-way terminal block on the ES-U-1002-M converter. This provides 5V at up to 150mA for external devices. This power is supplied by the USB port of the computer.

Pin Number	Pin Type	Description
1	Output	5V output at up to 150mA
2	Ground	Ground

Table 24- 5V Power Output

Copyright © Connective Peripherals Pte Ltd

7 Troubleshooting

This section provides some advice to help if you encounter problems during installation or use of your converter. Please check these items before contacting Connective Peripherals technical support. If you still have problems, you can contact technical support using the contact details in section 8 on page 36.

7.1 Hardware

Cables are the most common source of problems with external devices. Please check the following:

USB Connections:

- USB cable is properly connected at both the Computer and the Converter ends
- Computer power is ON
- Computer is not in Sleep or Standby

USB Hubs:

- If a USB Hub is used, be sure all cables are securely connected
- Try connecting the USB cable from the converter directly to a port on the PC to see if this works
- If the hub requires a power supply to operate, ensure that this is connected and that the hub is powered up correctly.
- Hubs certified by the USB-IF are recommended.

Power Connections:

- Check that the power LED on the converter is on.
- If your converter requires an external power supply, ensure that the power supply is securely connected to both the power input socket on the converter and the AC power outlet.
- If your converter has an internal power supply, ensure that the power cable is securely connected to both the power inlet socket on the rear panel of the converter and the AC power outlet.

RS-232 Connections:

- On converters supporting multiple protocols, check that the DIP switches are set for RS-232 mode.
- Output signals (TXD, RTS, DTR) are connected to the respective inputs (RXD, CTS, DSR) in each direction.
- Check for specific handshake requirements of your RS232 peripheral. If handshake signals are not used, ensure the application is set to “No Hardware Handshake”, or equivalent.
- Ensure that the converter’s baud rate and parity settings match the equipment on the other end of the cable.
- Test the port with a loop-back connector. Connect TXD to RXD, RTS to CTS and DTR to DSR. Use a simple terminal program to check that data is transmitted and received.

RS-485/RS-422 Connections:

- Check that the DIP switches or jumpers are set for the serial correct mode (see section 5 starting on page 15). The DIP switch and jumper settings are slightly different for some models of converter, please ensure that you use the instructions in section 5 which correspond to your model of converter.
- Ensure that you have connected the correct pins/terminals according to the wiring diagrams in section 6 (starting on page 23).
- Confirm if the jumper settings, such as termination and biasing, are correct for your particular application. This will depend on the other devices on your RS-422/RS-485 network and how they are connected.
- If your application is receiving additional unexpected zero bytes, the biasing resistors can be enabled to resolve this. Section 5 gives details of how to enable the biasing resistors for each model of converter. Note that ES-U-2xxx converters with plastic enclosures do not have internal biasing resistors and so these would need to be fitted externally.

Copyright © Connective Peripherals Pte Ltd

- Some application programs cannot work with the Echo enabled. This can be resolved by disabling the Echo option using the DIP switches or jumpers (depending on model of converter). Section 5 gives details of how to select RS-485 mode without Echo.

7.2 Manual Installation of Driver

Normally, the driver should be installed using one of the methods described in section 4 (on page 11). If these were not successful, you can install the driver manually as shown below.

1. First, configure your DIP switches/jumpers as detailed in section 5.
2. Create a folder on your computer with a name such as EasySync Driver
3. Download the latest USB driver zip file from the driver website link below, and save it in the folder which you have created. Version 2.08.14 was the latest version of the driver zip file when this manual was published (as shown in Figure 20), but newer drivers may be available in future. Please check the link below for newer drivers, and always use the latest version available.

   http://www.ftdichip.com/Drivers/VCP.htm

		Processor Architecture							
Operating System	**Release Date**	**x86 (32-bit)**	**x64 (64-bit)**	**PPC**	**ARM**	**MIPSII**	**MIPSIV**	**SH4**	**Comments**
Windows*	2011-04-12	2.08.14	2.08.14	-	-	-	-	-	WHQL Certified Available as setup executable Release notes
Linux	2009-05-14	1.5.0	1.5.0	-	-	-	-	-	Included in 2.6.31 kernel and later ReadMe
Mac OS X	2011-02-28	2.2.16	2.2.16	2.2.16	-	-	-	-	Customers wishing to have a VID/PID combination added should contact FTDI Support
Windows CE 4.2-5.2**	2010-02-11	1.1.0.6	-	-	1.1.0.6	1.1.0.6	1.1.0.6	1.1.0.6	
Windows CE 6.0	2010-02-11	1.1.0.6	-	-	1.1.0.6	1.1.0.6	1.1.0.6	1.1.0.6	

Figure 20 - Driver Download from FTDI Website

Note: If you wish to install the converter on a computer which is never connected to the internet, you can download the file using another computer and use a USB flash drive or similar to copy the file over to the computer which will be used with the converter.

4. Un-zip the file to the same folder. The following Windows XP screen shots show the zip file being extracted to a folder. The Windows Compressed Folders wizard was used in the example below. The un-zip process may be slightly different from the one shown below if you are using a different utility.

   a. Right-click on the USB Driver zip file and select Extract All.

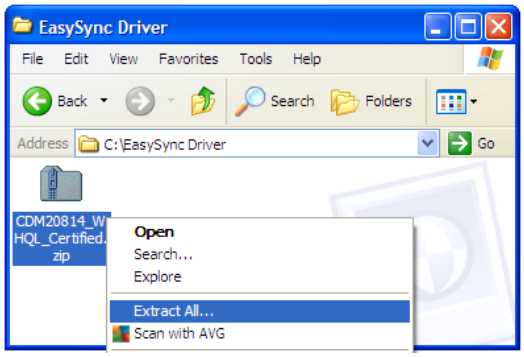


Figure 21 - Right-click on the zip file and select Extract All

b. The Windows Compressed Folders wizard will open. Select Next and the Wizard will ask you to select a destination for the unzipped files. In this case, select the EasySync Driver folder which was created in step 2. This may already be the default destination as shown below. Click 'Next' to unzip the files.

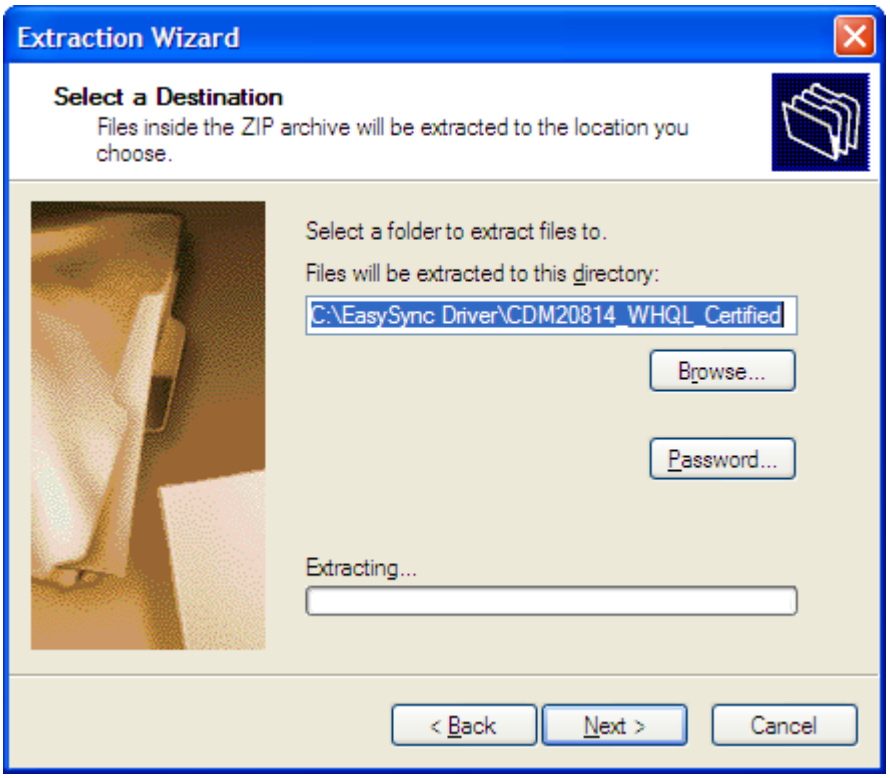


Figure 22 - The extracted files will be put into the EasySync Driver folder

c. The next screen will confirm 'Extraction Complete'. Click Finish to close the wizard.

d. The driver files are now unzipped to a folder within the EasySync Driver folder. In the example below, they are in the EasySync Driver\CDM20814 WHQL Certified folder. The folder name may be slightly if a new driver has been released since this document was published.

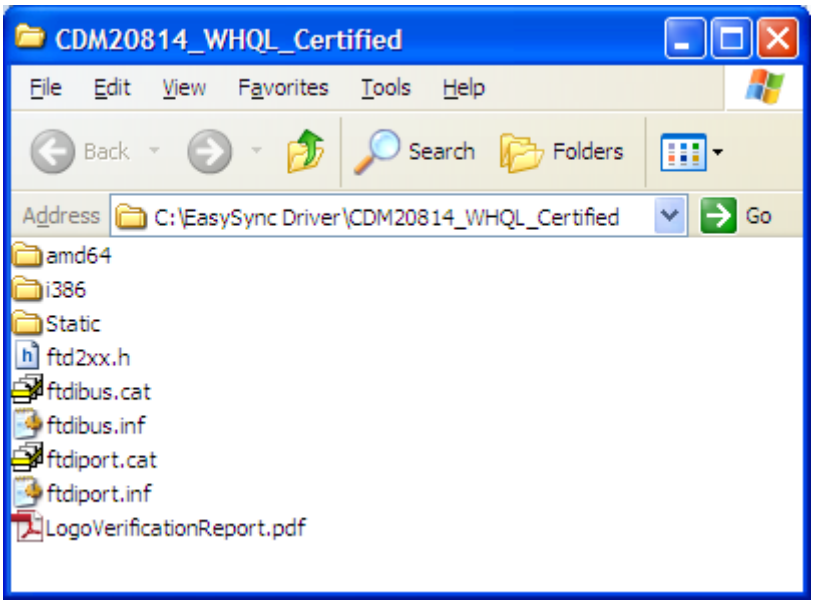


Figure 23 - The extracted driver files

5. If your converter requires external power, connect the power supply cable to the power inlet socket on the rear panel of the converter, and connect the adapter (or cable) to a suitable AC outlet socket.
6. Connect the USB cable to your converter and the other end to an available USB port on your PC.
7. The computer will recognise the converter and will display the Found New Hardware wizard.
8. The wizard will ask if Windows can connect to Windows Update to search for the driver software. Select 'No, not this time' and click next.
9. In the next window, select 'Install from a list or specific location (Advanced)' and click next.
10. In the next window, select the location where you created your folder in step 2. The following screen shows this. Then click next.

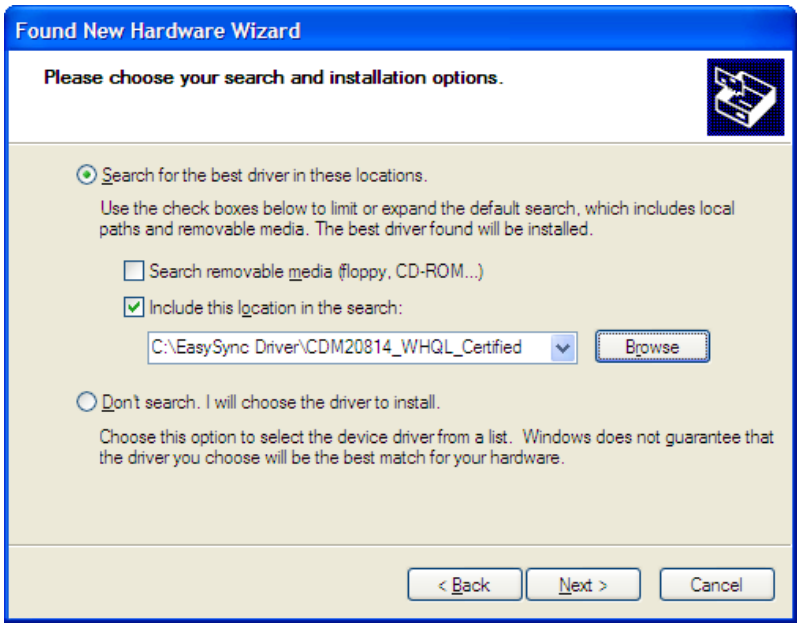


Figure 24 - Point Windows to the location where your driver is stored

11. The next screen will tell you that 'The wizard has finished installing the software'. Now click on Finish.

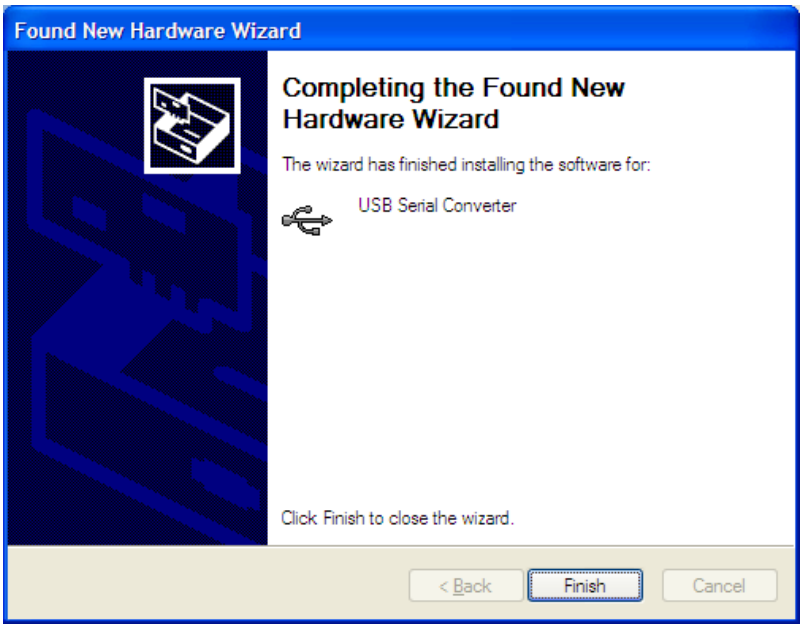


Figure 25 - The wizard has finished installing the driver

12. You may need to repeat steps 7 – 11 several times depending on the model of converter that you are using. Each time, please ensure that you select 'Install from a list or specific location' in step 9 as Windows defaults to 'Install the software automatically'.
13. Once installation is complete, you will see the following message appear. Your converter is now ready to use. Please refer back to step 3 on page 12 to verify the installation in Device Manager.

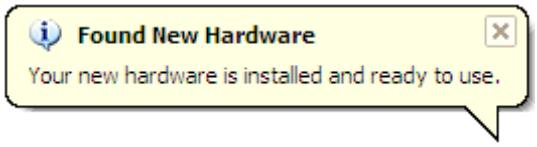


Figure 26 - Hardware installed successfully

7.3 Device Driver Options

Some common Windows Device Driver issues can be resolved by changing the advanced driver options.

- Device Times Out

  The default settings of the device driver assume typical data transfers of hundreds to thousands or more bytes at a given time. Some applications, such as a GPS device, only send data in short packets, often only a few bytes. If this is the case, it may be necessary to adjust the driver buffer size and/or latency timer to smaller values. These values can be adjusted through the Advanced Driver Options as noted in Figure 13 on page 14. The buffer size can be reduced to 64 bytes. The latency timer can be set as low as 2ms. A setting of 1ms will cause unnecessary USB traffic and could adversely affect data transmission.

- Erratic mouse pointer (or my adapter appears as a mouse)

  The device driver defaults to query an attached device to find out whether it is a mouse or modem, consistent with native COM port operation. Some RS232 peripherals constantly send short packets of data, causing the host system to "think" a mouse or modem has been attached. These short packets will interfere with normal mouse operation causing the pointer to jump around the screen. If this happens, disconnect the RS232 device and uncheck the Serial Enumerator option, also found on the advanced driver options screen (see Figure 13 on page 14).

- COM port number in use

  Windows keeps track of all COM port assignments. If multiple products have been connected to a single system, the COM port number will increase, even if the other devices are not attached. If the higher COM port assignments are not acceptable for the application, known unused COM port numbers should be uninstalled according to the FTDI installation guide: http://www.ftdichip.com/Documents/InstallGuides.htm.

7.4 Further Information on Resolving Driver Issues

The following resources may be helpful:

- Look at the Installation guide for your operating system at the link below

  http://www.ftdichip.com/Support/Documents/InstallGuides.htm

- Look at the troubleshooting app note

  http://www.ftdichip.com/Support/Documents/TechnicalNotes/TN_104_Guide%20to%20Debugging_Customers_Failed_Driver_%20Installation_%20on_%20Windows.pdf

- If other devices with FTDI chips are installed in the system, check with all manufacturers of these devices for the latest device drivers.

If you have tried the steps shown in section 7 and are still having problems with your ES-U-xxxx-x converter, you can contact Connective Peripherals support using the contact information on the following page.

Copyright © Connective Peripherals Pte Ltd

8 Contact Information

Global Headquarters – Singapore

Connective Peripherals Pte Ltd
178 Paya Lebar Road
#07-03
Singapore 409030

Tel: +65 67430980
Fax: +65 68416071

E-Mail (Sales) sales@connectiveperipherals.com
E-Mail (Support) support@connectiveperipherals.com
Web Site URL http://www.connectiveperipherals.com
Web Shop URL http://www.connectiveperipherals.com

Appendix A - List of Figures and Tables

List of Figures

Figure 1 - DB-9 Male serial connectors. Some models also feature terminal blocks. 7
Figure 2 - ES-U-1032-RM (RJ45 connectors) is supplied with RJ45-to-DB-9 cables 7
Figure 3 - Example of the Metal Rack-mount enclosure 8
Figure 4 - Examples of the Plastic and Metal (wall mountable) enclosures 8
Figure 5 - Some models use a power adapter with barrel or terminal connector 9
Figure 6 - Rack-mount models have an internal supply with AC input connector 9
Figure 7 - ES-U-2xxx and ES-U-3xxx have DIP switches to select the serial mode 10
Figure 8 - ES-U-3008-RM has a set of jumpers for each port (one set circled) 10
Figure 9 - Hardware installed successfully 11
Figure 10 Driver download from FTDI website 12
Figure 11 - Driver Installation Window 12
Figure 12 - Device Manager after installing a converter with four ports 13
Figure 13 - Advanced port settings dialog 14
Figure 14 - DB-9 Male Connector Pin Numbers 23
Figure 15 -RJ45 Connector Pin Numbers 24
Figure 16 - RS-422 4 Wire Full Duplex 26
Figure 17 - RS-422 with Handshaking Signals Connected 26
Figure 18 - RS-485 Half Duplex Wiring 28
Figure 19 - RS-485 Full Duplex Wiring 30
Figure 20 - Driver Download from FTDI Website 32
Figure 21 - Right-click on the zip file and select Extract All 32
Figure 22 - The extracted files will be put into the EasySync Driver folder 33
Figure 23 - The extracted driver files 33
Figure 24 - Point Windows to the location where your driver is stored 34
Figure 25 - The wizard has finished installing the driver 34
Figure 26 - Hardware installed successfully 35

List of Tables

Table 1 - Features of the ES-U-xxxx-x converters 6
Table 2 - RS-422 Mode Configuration 16
Table 3 - RS-485 Mode Configuration 17
Table 4 - RS-422 & RS-485 Mode Configuration 18
Table 5 - Jumpers to select Termination and Biasing 19
Table 6 - RS-422 & RS-485 Mode Configuration 19
Table 7 - Jumpers to select Termination and *Biasing* 20

Copyright © Connective Peripherals Pte Ltd

Table 8 - RS-422 & RS-485 Mode Configuration 20
Table 9 - Jumpers to select Termination and Biasing 21
Table 10 - RS-232, RS-422 & RS-485 Mode Configuration 21
Table 11 - Jumpers to select Termination and Biasing 22
Table 12 - Jumper to select 5V output 22
Table 13 - RS-232 Pin-Out for DB-9 connector 23
Table 14 - RS-232 Pin-Out for RJ45 Connector 24
Table 15 - RS-422 Pin-Out for DB-9 Connector 25
Table 16 - RS-422 Pin-Out for 5-way Terminal Block 25
Table 17 - RS-422 Pin-Out for 6-way Terminal Block 25
Table 18 - RS-485 Half-Duplex Pin-out for DB-9 Connector 27
Table 19 - RS-485 Half-Duplex Pin-Out for 5-way Terminal Block 27
Table 20 - RS-485 Half-Duplex Pin-out for 6-way Terminal Block 27
Table 21 - RS-485 Full Duplex Pin-out for DB-9 Connector 29
Table 22 - RS-485 Full Duplex Pin-out for Terminal Block 29
Table 23 - RS-485 Full Duplex Pin-out for Terminal Block 29
Table 24- 5V Power Output 30

Copyright © Connective Peripherals Pte Ltd

Appendix B - Revision History

Revision	Changes	Date
1.0	Initial release	2010-12-06
1.1	Added operating temperature specification to section 2.1	2011-01-26
1.2	Added section 5.3 for ES-U-2001B and ES-U-2101B Updated driver screenshots to show latest version (2.08.14) Recommend setting Rx biasing only when using RS-485 half-duplex	2011-08-23
1.3	Re-branding to reflect the migration of the product from EasySync to Connective Peripherals name – logo change, copyright changed, contact information Changed, all internal hyperlinks changed.	2019-03-20

Copyright © Connective Peripherals Pte Ltd

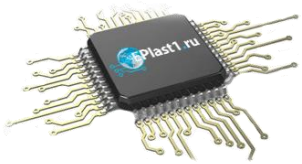
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)
Факс: 8 (812) 320-02-42
Электронная почта: org@eplast1.ru
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.