



RST INSTRUMENTS LTD.

Digital Bus Tilt Meter
Host Software
Instruction Manual
PC Platform

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Digital Bus Tilt Meter Host Software Instruction Manual

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1 INTRODUCTION

The Digital Bus Tilt Meter host software permits operators to view and record data from any tilt sensor connected to the common bus. The software is compatible with Microsoft™ Windows based desktops and laptops.

Digital Tilt

Each tilt meter is identified by a Serial Number, and has a corresponding Calibration Certificate. The sensing principle of the MEMS tiltmeter is that of an accelerometer with the sensitive axis is oriented horizontally.

Digital Sensor Interface Adapter

The Digital Sensor Interface provides power and data isolation as well as transient protection.

2 SYSTEM COMPONENTS

The following picture depicts the main components of the RST Digital Tilt System:

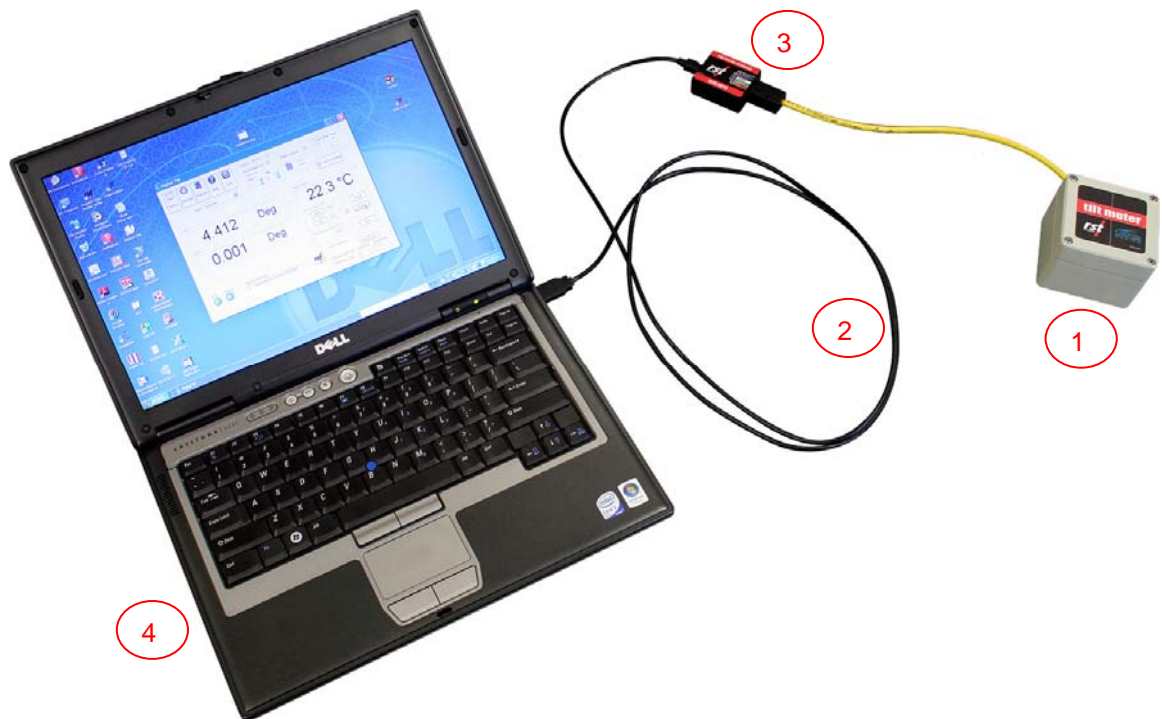


Figure 1 – Digital Tilt System Overview

1. Digital Tilt Node
2. Power/Communication Cable
3. RS485 Digital Sensor Interface
4. Laptop or desktop PC

3 QUICK START INSTRUCTIONS

The following instructions outline the basic steps needed to read data from any instrument connected to the RS485 bus.

3.1 SOFTWARE INSTALLATION

1. Insert the supplied CD-ROM into your drive. The disk contains an auto-run feature. Click on the install software button.
2. Follow the on-screen instructions to install the software. The default directory is:
C:\Program Files\RST Instruments\Digital Tilt
3. Run USB Driver installation. Navigate to Digital Tilt program group and click on Install USB Driver located in Tools folder. Ensure that the driver installation is finished successfully.

3.2 SYSTEM SETUP

1. Connect the supplied RST USB to RS485 adaptor cable to USB port on your computer.
2. If a dialog pops-up, follow instructions in driver install section of this manual.
3. From the *Start* menu, choose *Digital Bus Tilt Meter* to launch the program.
4. Ensure that *USB COM* port is selected.
5. Select the address of the desired instrument from pull-down menu or type it in the edit box.
6. Click on Update to connect to the chosen device and start reading data.

3.3 HELP SYSTEM

Extensive help system can be activated anytime by pressing F1 or help icon. Answers to common problems and troubleshooting tips can be found by browsing help topics or searching using keywords.

4 SOFTWARE USER INTERFACE

Upon start-up, the program will automatically begin searching for the Digital Sensor Interface. Be sure the interface is connected to a Digital Tilt bus and the power is turned on. The status will be displayed at the bottom of the screen (Figure 2) illustrates a successful connection). If a connection cannot be made, the connection settings will have to be changed (section 4.2).

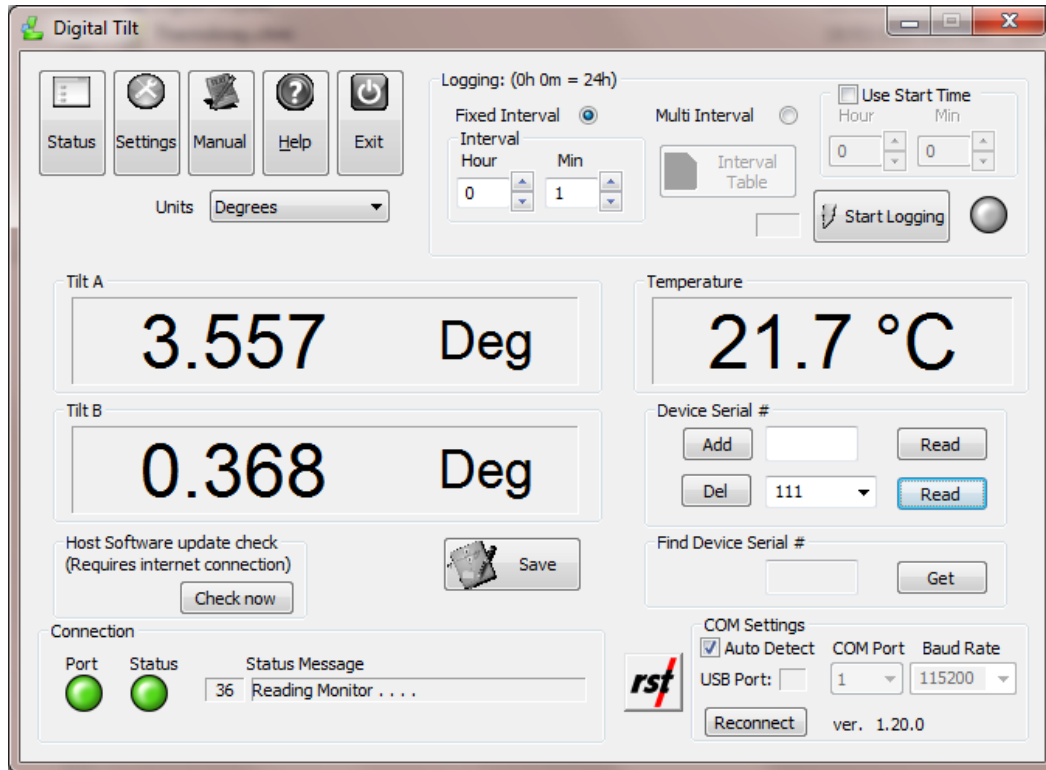


Figure 2 – RST Digital Tilt Software Main Menu

The *Main Menu* screen (Figure 2) contains tilt and temperature display regions and device management and selection controls. Desired instrument address can be either typed into the *Current Address* edit box or selected from pull down menu. After selecting device, click on *Read* button to connect to the device and read values. New devices can be added or existing removed using appropriate buttons.

Upon pressing the *Read* button, the software will establish connection to the selected device and start displaying tilt and temperature data. Tilt values are displayed as a sinus of the angle by default. Choose *Degrees* from pull down menu to change tilt display units. For troubleshooting, see Section 5.

To help in troubleshooting and for diagnostic purposes, the connected instrument address retrieval *Get Address* feature is included.

Note

Get Address feature will work only if single instrument is connected to the bus.

The logging feature is available for recording date and time, tilt angle and temperature readings in predetermined intervals. The logger needs to establish a data connection and display tilt value before starting any data logging. Recorded data will be appended to the CSV formatted data file in following directory:

/My Documents/DigitalTilt/

By default, the data file is named:

RST_DigitalTilt_LOG.csv

To save single reading into data file, click on *Save*.

Log file can be viewed using Microsoft Excel or text editor.

The COM Port setting specifies which communication port is used by the Digital Bus Tilt Meter Host software. For RST USB to RS485 adaptor choose USB port.

4.1 MENU BUTTONS

4.1.1 STATUS

The status tab allows the user to retrieve and display information recorded in each connected instrument. The following information is available: *Firmware version, Board revision, Serial Number, Model Label and Label*. Type the desired instrument address and press *Update* to retrieve the information.

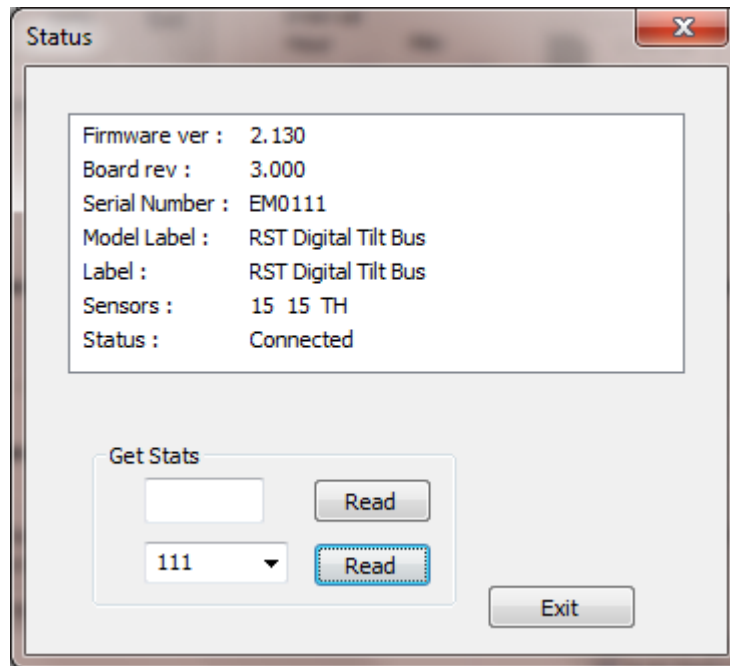


Figure 3 – Status Screen

4.1.2 SETTINGS

Click *Settings* button to open settings dialog.

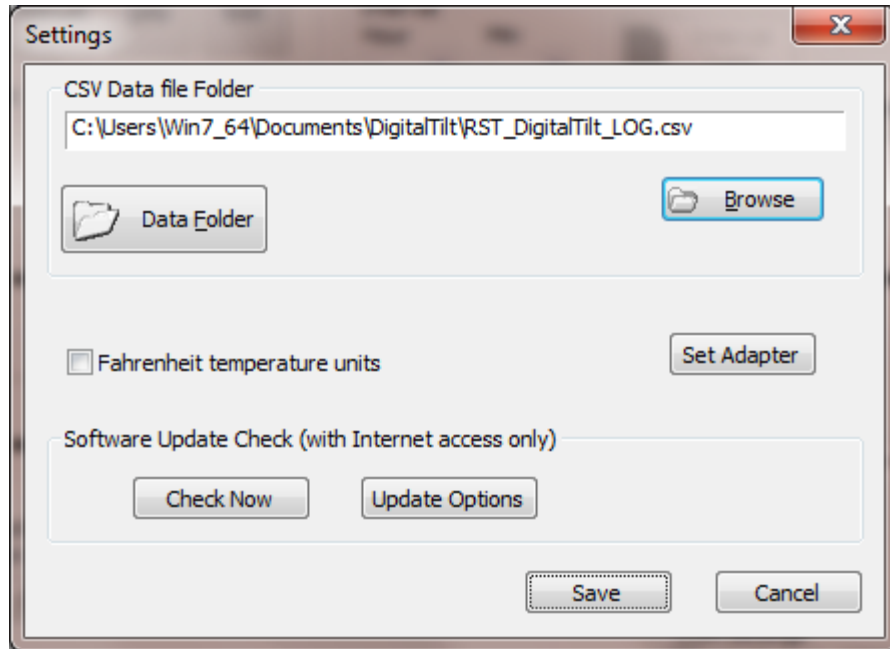


Figure 4 – File Saving Setup screen

The file name can be changed in the same dialog. After all changes are complete, click on Save button.

Data file will be saved in CSV format with following column headers:

Date, Site, Plate, Temp, Axis A, Axis B, Units

The following image shows sample data file.

	A	B	C	D	E	F	G	H
1	Date	Site	Location	Temp	Axis A	Axis B	Units	
2	8/3/2011 17:42	Bridge_79	Plate_1	23.43 °C	0.008316	-1.6E-05	Sin	
3	8/3/2011 17:42	Bridge_79	Plate_1	23.43 °C	0.008315	-2.4E-05	Sin	
4	8/3/2011 17:42	Bridge_79	Plate_1	23.43 °C	0.008315	-3.4E-05	Sin	
5	8/3/2011 17:42	Bridge_79	Plate_1	23.45 °C	0.008312	-3.6E-05	Sin	
6	8/3/2011 17:44	Bridge_79	Default	23.39 °C	0.479	-0.001	Deg	
7	8/3/2011 17:44	Bridge_79	Default	23.40 °C	0.479	-0.002	Deg	
8								
9								

Figure 5 – Sample Data File

4.1.3 SOFTWARE MANUAL

Software manual in PDF format will be displayed whenever *Manual* button is clicked. PDF viewing software is required for this option. Adobe Acrobat Reader can be downloaded free of charge from <http://get.adobe.com>.

4.1.4 DATA LOGGING

This section is used to set the logging interval. *Fixed Interval* and *Multi Interval* options are available. The fixed logging interval can be invoked by choosing the *Fixed Interval* radio button, and set within the main setup tab. Arrow buttons allow the user to scroll up or down preset values.

To setup the software with multiple intervals, select the *Multi Interval* radio button. Clicking the *Interval Table* button launches the Interval Table dialog, where up to 12 custom, multiple intervals can be applied.

Multi Interval Table				
	Hour	Min	Iterations	Interval Fill Time
Interval #1:	0	1	10	0d 00h 10m
Interval #2:	2	0	0	2665d 20h 00m
Interval #3:	0	0	0	
Interval #4:	0	0	0	
Interval #5:	0	0	0	
Interval #6:	0	0	0	
Interval #7:	0	0	0	
Interval #8:	0	0	0	
Interval #9:	0	0	0	
Interval #10:	0	0	0	
Interval #11:	0	0	0	
Interval #12:	0	0	0	
Totals:	10			2665d 20h 10m

Figure 6 – Multi Interval Table

The hour, minute and number of iterations per interval must be specified.

Note

Each interval MUST have an iteration except the last iteration which must be set to zero. This tells the program that the logging will continue at the last iteration rate.

There is a maximum of 32,000 iterations for all intervals. The dialog features an Interval Fill Time field, which allows the user to see the exact time, relative to the start time of the interval, the interval iterations will finish. To update both the *Interval Fill Time* and *Total Iterations field*, click the “Update Totals” button. To save changes, click the *Exit & Save* button.

After setting up the logging intervals, click on *Start Logging* to enter into data logging mode. Files produced by data logging feature will have Campbell Scientific format

Logging Options

Use Start Time: A check box can be selected to enable a custom start time interval. The hour and minute can be entered in 24-hour format. The software will wait for this amount of time before logging starts.

4.2 CONNECTION SETTINGS

Digital Tilt software supports both RS232 serial port communication and new USB connection. Port settings depend on the type of RS485 Digital Sensor Interface in use.

RS232 COM Port

Automatic detection works for USB connection only. When RS232 COM port is used, remove the check mark from *Auto Detect* check box. Select the COM port number that was used for connecting RS485 Digital Sensor Adapter. Adjust baud rate if necessary.

USB Port

For USB connections, put a check mark next to *Auto Detect*. The RS485 Digital Sensor Interface and port number will be detected automatically. For information and connection troubleshooting, refer to section 5.1 and section 6.

5 TROUBLESHOOTING

5.1 CONNECTION PROBLEMS

Upon launching, Digital Tilt software will try to connect to RS485 Digital Sensor Interface using current communication settings. Once connected, the port and status indicators turn green and the *Status* screen should display interface information.

The connection status is displayed on status bar. If the connection fails (status indicators are red or yellow, or status screen shows no status data), take note of the message and number displayed, then find the corresponding description in the Table 1: Status Messages.

1. Port not open: The communication port is being used by some other application.
Solution: Close other windows applications that might be using serial port assigned to Digital Tilt. To change port, click on *COM Port* combo box.
2. Connecting to Sensor Interface message continuously displayed.
Solution: Verify that the serial communication cable is connected and connections are tight.
3. USB connection problems:
Ensure that RS485 Digital Sensor Interface drivers have been installed correctly. Refer to section 6 for more information.

5.2 SOFTWARE STABILITY

The Digital Tilt real time readout relies on continuous data transmission over serial communication port. This transmission may be occasionally interrupted by other computer activity resulting with program freezing or displaying erroneous data. If this happens, Digital Tilt needs to be closed down and restarted. Always close software when disconnecting RS485 Digital Sensor Interface adapter or reconnecting serial communication cable.

6 RST USB TO RS485 CONTROLLER DRIVER SET INSTALLATION

Note

When using RS232 to RS485 adapter, USB driver installation does NOT apply..

The USB to RS485 adapter requires a set of drivers installed on the host computer in order to communicate over USB communication port. All steps must be completed for USB communication to work correctly.

It is recommended to install the drivers from Microsoft Windows Update if internet connection is available. This will ensure the most up to date drivers are used. Just connect the RST USB to RS485 adapter to desktop or laptop PC using included USB cable. Follow onscreen prompts for easy installation.

In case internet connection is not available, follow the steps below. Current USB drivers and software can be also downloaded from RST Instruments website <http://www.rstinstruments.com>.

The following outlines a procedure for installing the RST USB to RS485 Controller Driver Set on Microsoft™ WindowsXP, Microsoft™ Windows Vista and Microsoft™ Windows 7 platforms. The actual screenshots may differ but the steps will be very similar.

6.1 MICROSOFT™ WINDOWSXP INSTALLATION PROCEDURE

After successful installation of DigitalTilt Host software, click on *Install USB Drivers* in *Tools* section of *DigitalTilt* program group. *DigitalTilt* group should reside under *RST Instruments* start menu by default. USB driver setup starts showing following dialog:



Figure 7 – RST USB to RS485 adapter Windows XP Driver Set Installation

Click **Next**.

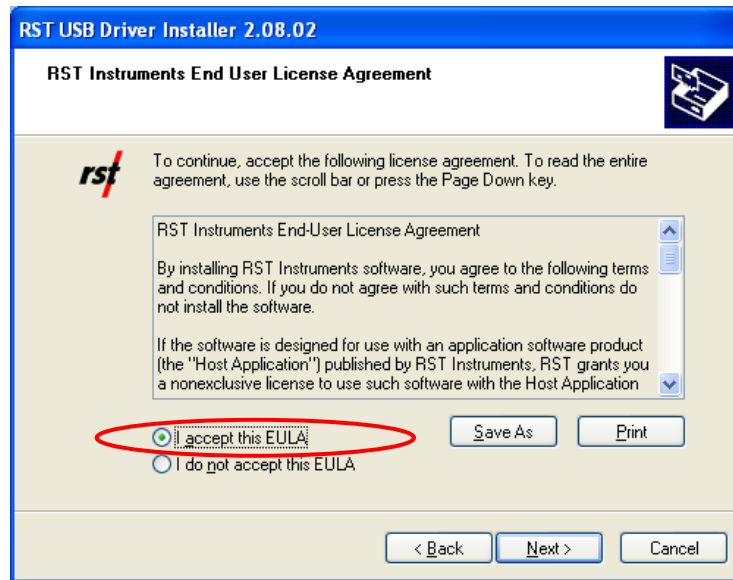


Figure 8 – New Hardware Wizard for USB to UART

Select your acceptance of RST Instruments End User License Agreement, click **Next**.

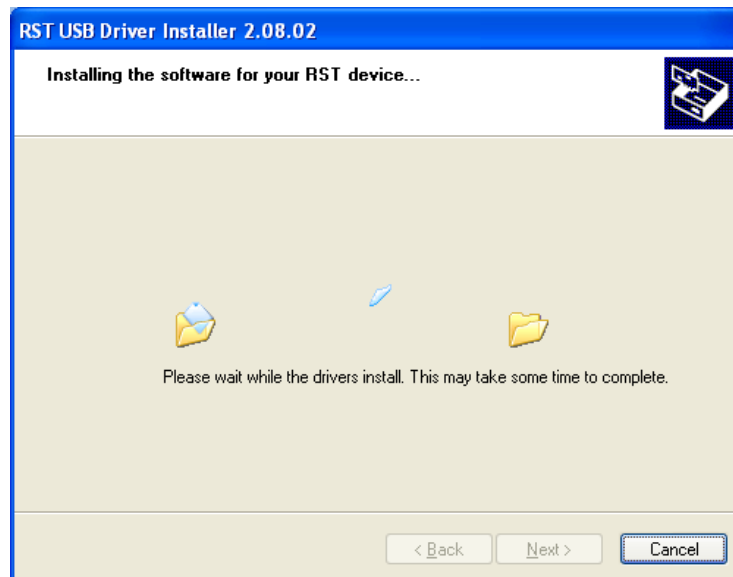


Figure 9 – New Hardware Wizard for USB to UART – File Transfer

The Wizard will install device drivers and display the following screen. Click **Finish** to complete device drivers installation.



Figure 10 – New Hardware Wizard for USB to UART – Install Complete

After successful installation of USB to UART device drivers, the RST USB to RS485 Adapter should be connected to the host computer. The MS Windows system should detect the new device and display the yellow message balloon (Figure 10) in the lower right hand corner stating that all device drivers are installed and ready to use.

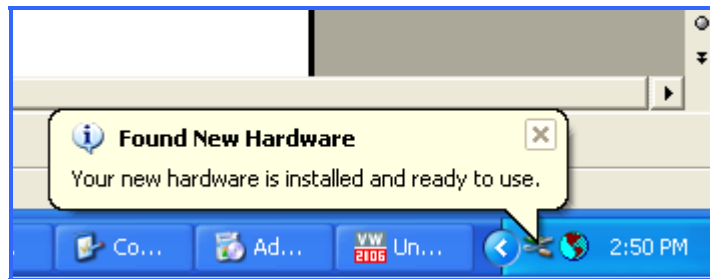


Figure 11 – New Hardware Installed Confirmation

Alternatively, correct installation of the device drivers can be verified by navigating to the *Windows Control Panel*, choosing *System* and then selecting the *Hardware* tab. Clicking on *Device Manager* will bring up the following screen:

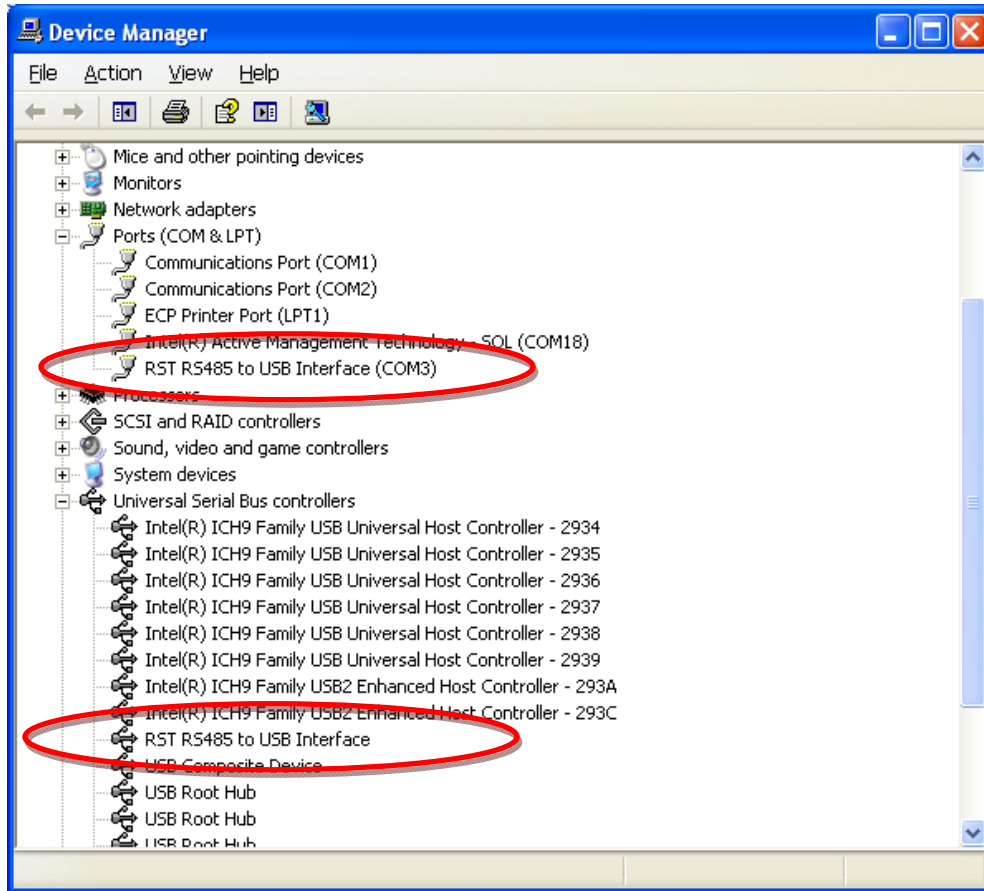


Figure 12 – Windows XP Device Manager

If the driver was installed correctly, the RST USB to UART Controller port will appear as in Figure 12 above. If the driver has not been installed correctly, yellow exclamation mark will appear next to the device. Once the above has been verified, note the COM number which has been assigned to the USB serial port. This will vary from computer to computer, in this example it is COM3.

Close the device manager and launch the DigitalTilt Host Software. The Host Software should now connect to the RST USB to RS485 Adapter. Confirmation can be made by looking at the status screen (Figure 3)

6.2 MICROSOFT™ WINDOWS VISTA ,WINDOWS7 AND LATER INSTALLATION PROCEDURE

After successful installation of DigitalTilt Host software, click on *Install USB Drivers* in *Tools* section of *DigitalTilt* program group. *DigitalTilt* group should reside under *RST Instruments* start menu by default. USB driver setup starts showing following dialog:



Figure 13 – RST USB to RS485 adapter Driver Set Installation

Click **Next**, the following dialog appears:

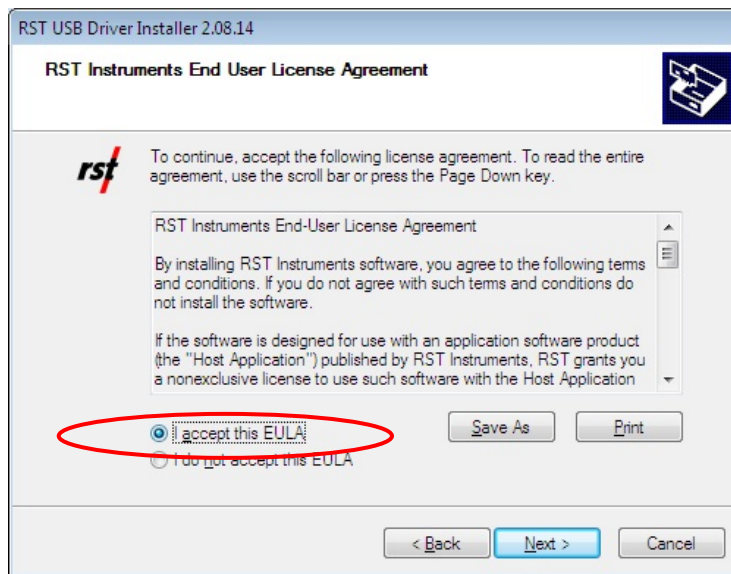


Figure 14 – USB to UART Driver Set Installation

Select your acceptance of RST Instruments End User License Agreement, click **Next**.

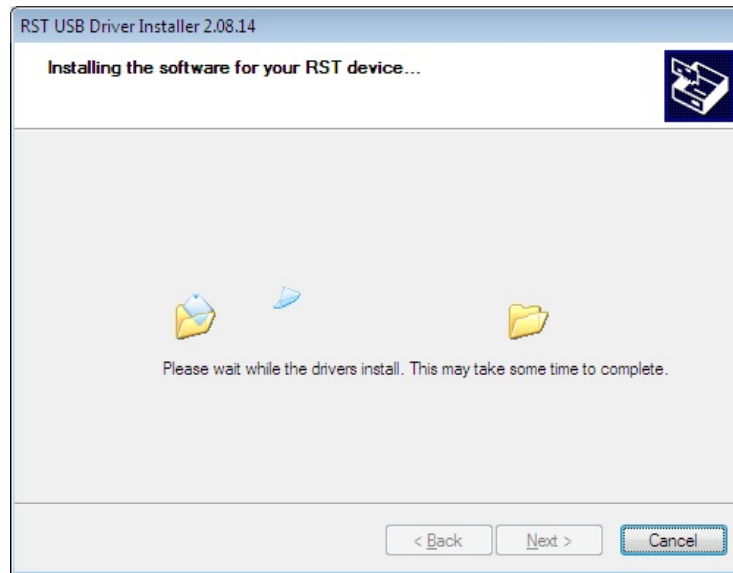


Figure 15 – USB to UART Driver Set Installation – File Transfer

The Wizard will install device drivers and display the following screen. Click **Finish** to complete device drivers installation.

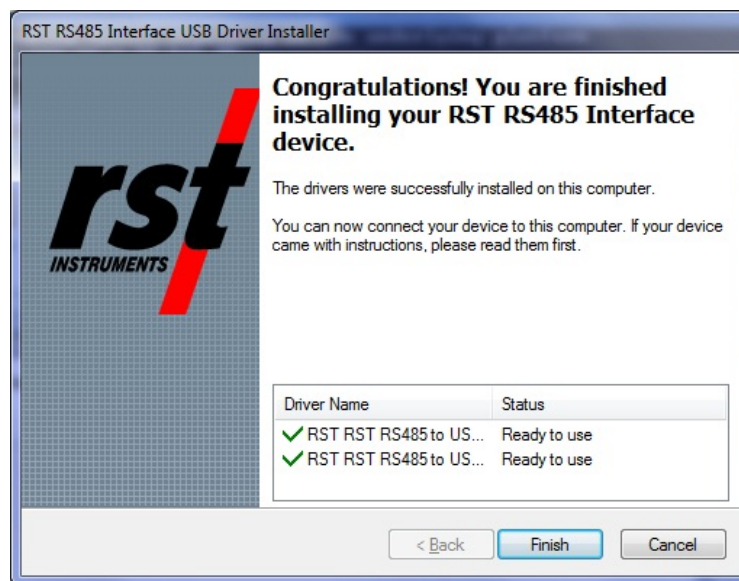


Figure 16 – USB to UART Driver Set Installation – Install Complete

After successful installation of USB to UART device drivers, the RST USB to RS485 Adapter should be connected to the host computer. The MS Windows system should detect the new device and complete the USB serial port installation, as shown on following dialogs:

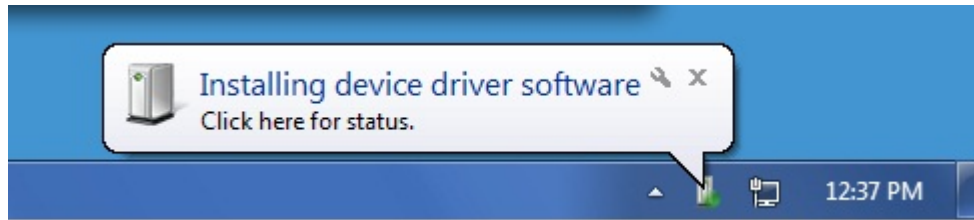


Figure 17 – USB Serial Port Driver Installation

MS Windows will display the yellow message balloon (Figure 18)in the lower right hand corner stating that all device drivers are installed and ready to use.

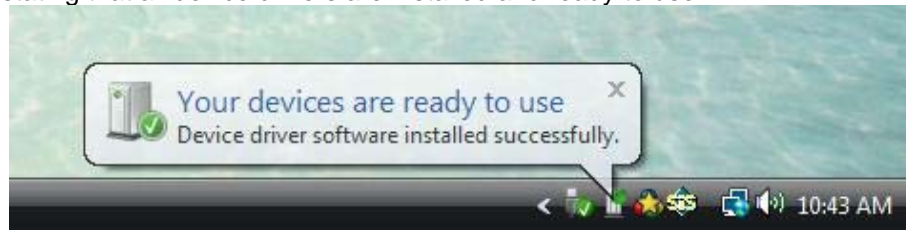


Figure 18 – New Hardware Installed Confirmation

Alternatively, correct installation of the device drivers can be verified by navigating to the *Windows Control Panel* and choosing *System*. Clicking on *Device Manager* will bring up the following screen:

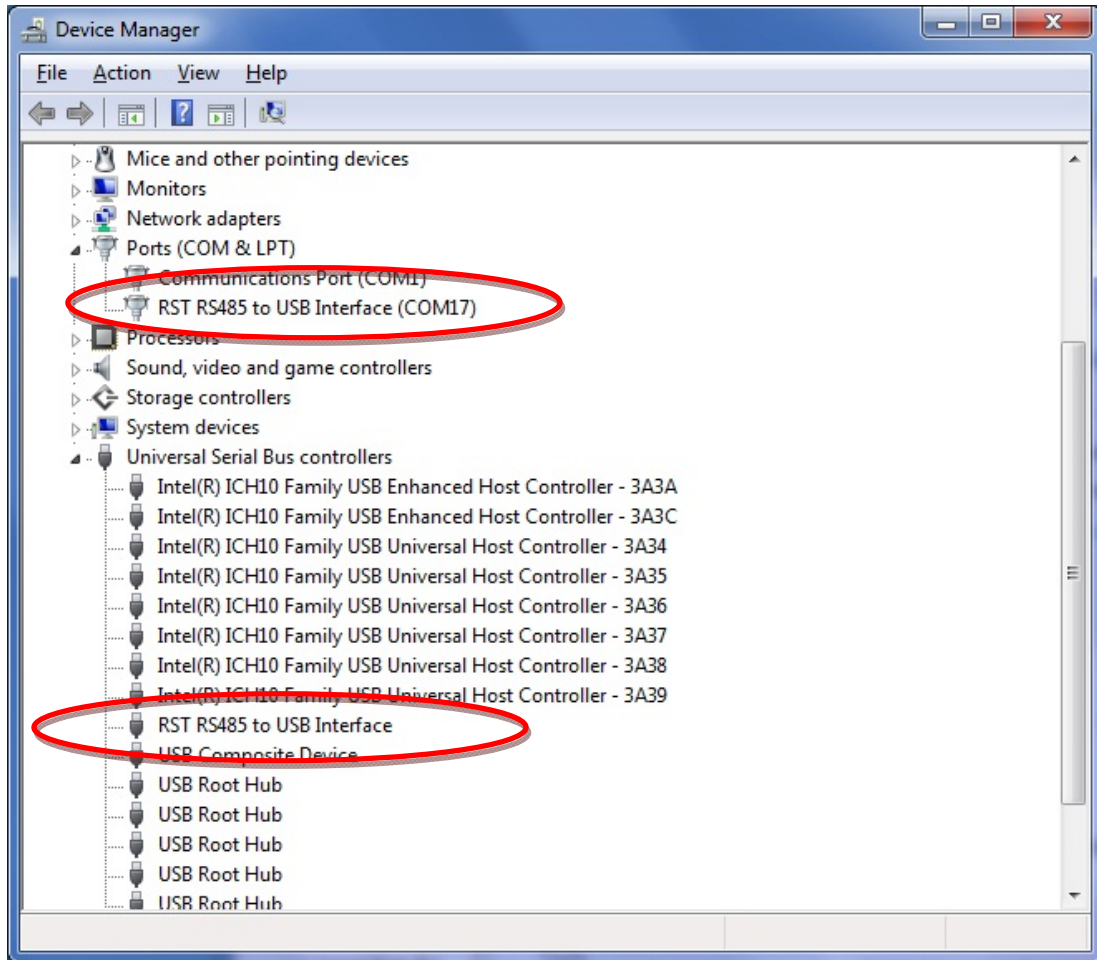


Figure 19 – Windows Vista, Windows 7 and later Device Manager

If the driver was installed correctly, the RST USB to UART Adapter port will appear as in Figure 19 above. If the driver has not been installed correctly, yellow exclamation mark will appear next to the device. Once the above has been verified, note the COM number which has been assigned to the USB serial port. This will vary from computer to computer, in this example it is COM17.

Close the device manager and launch the DigitalTilt Host Software. The Host Software should now connect to the RST USB to UART Adapter. Confirmation can be made by looking at the status screen (Figure 3)

7 CONNECTION MESSAGES

The following table lists the status messages with descriptions.

#	Status Message	Description
4	Opening port	Opening communication port
6	Initializing	Exchanging status information
9	Connecting to Sensor Interface	Digital Tilt is trying to connect to the RS485 Digital Sensor Interface
10	Reading Sensor Interface information	Digital Tilt is reading status information from Sensor Interface
12	Connected to Sensor Interface	Digital Tilt was able to connect to the RS485 Digital Sensor Interface
14	Testing connection to Sensor Interface	Testing connection to the RS485 Digital Sensor Interface
15	Disconnecting from Sensor Interface	Sensor Interface is being disconnected
16	Monitor probe	Reading live Digital Tilt node data
26	Taking readings	Transferring data from Digital Tilt nodes
29	Saving readings	Writing data into file
10	Digital Tilt settings successfully read	All interface settings were successfully transferred to Digital Tilt

Table 1: Status Messages

8 SPECIFICATIONS

Digital Tilt Node

Temperature Range	-20 to 50 C
Resolution	0.01 C
Accuracy	0.07 C
Time Constant	20 seconds
Address Range	0-255
Power Supply Voltage	4 – 6 VDC
Current per Node	0.8 mA
Acquisition Time	0.2 second
Node Length	30 mm
Node Diameter	15 mm

Digital Tilt Cable

Conductors	4
Diameter	7 mm
Breaking Strength	5 kN
Maximum Segment Length	500 m
Minimum Node Spacing	100 mm
Mechanical Terminal	6 mm x 1 mm threaded

Digital Tilt Terminal

Maximum Nodes	255
Input Power	6 VDC

9 CONTACT US

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