TubeMarker™ 2

Operation Manual

Version: 1.0

CE

4titude®

From Research to Molecular Diagnostics

4titude
From Research to Molecular Diagnostics

CE

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Safety Information

This operation manual contains important operating and maintenance instructions which must be read, understood, and followed by the product user. Failure to use this product according to this operation manual may degrade or defeat the protection normally provided by this product. Read this manual prior to product use and keep it for future reference.

Safety Instructions

1. Keep the device away from humidity.

2. Before you connect the equipment to the power outlet, please check the voltage of the power source.

3. Take care not to spill any liquid on the printer.

4. For safety and warranty reasons, only qualified service personnel should unscrew the base of the instrument or touch the back of the LCD display.

5. Turn off the power and unplug the device before maintenance.

6. Do not touch moving parts.

7. Only use the TubeMarker™ 2 with the AC/DC adaptor provided with the equipment.

8. If the power supply is damaged please do not attempt to use the TubeMarker™ 2.

9. Do not position the TubeMarker™ 2 so that it is difficult to operate the disconnecting device (detachable plug).

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

This product has been tested to meet the requirements of IEC/EN 61010-1:2010, UL 61010-1 (2012) and CAN/CSA-C22.2 No. 61010 (2012).

Table of Contents

1 TubeMarker™ 2 Introduction

1.1 The Instrument

The TubeMarker™ 2 allows printing directly onto the surface of centrifuge and cryogenic tubes from 0.2 – 50 ml in volume. There is no need for using labels or marker pens anymore. Marking is resistant to ethanol, isopropanol, water, DMSO, liquid nitrogen and mechanical stress. The prints are also stable over a wide temperature range (-196°C to 100°C). Markings do not stain your hands when touching the tubes.

Depending on the size of the tube, several lines of text can be printed, for example sample name, sampling site, your name, date, time etc. All TrueType fonts available on the connected computer can be printed with the different font types and sizes determining the maximum printed content. Bold and italic type is also possible.

The instrument also prints linear barcodes (standard and wide), 2D codes (standard and small) and graphic files (monochrome .bmp, .gif, .tiff) such as logos. Print orientation can be vertical or horizontal (except for barcodes which print vertically only).

1.2 Package Contents
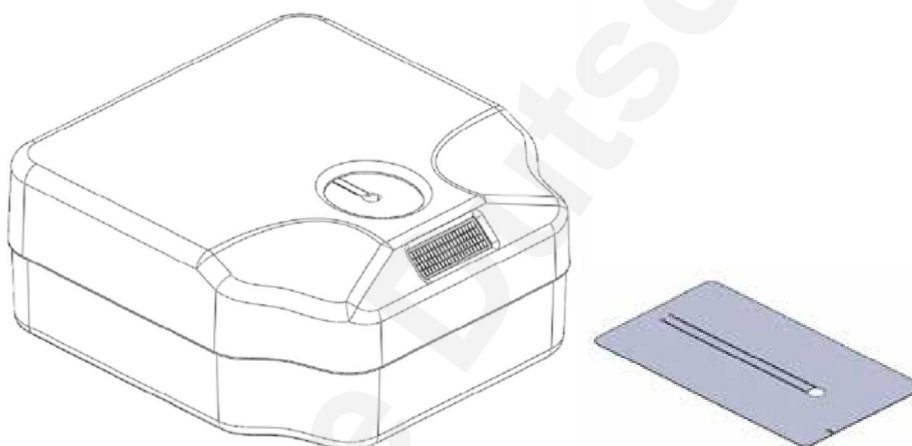
- TubeMarker™ 2 (Product code 4ti-0680-1)
- 4 x Tube Adaptors

Tube Adaptor	Hole Diameter	Product Code
Tube Adaptor for 1.5 ml/2 ml tubes	11.5 mm	4ti-0681
Tube Adaptor for 0.5 ml tubes	8.5 mm	4ti-0682
Tube Adaptor for 2D cluster tubes	8.5 mm	4ti-0683
Tube Adaptor for cryo tubes	12.7 mm	4ti-0684

- AC adaptor 18W 18VDC (input 100-240VAC)
- 7 mm magnetic pole adaptor
- USB A-B cable
- 50 x 2ml polypropylene tubes (as of serial number 001-000387)
  Note! For printing optimisation only. The smooth surface of the tubes will give best printing results which will serve as a reference for printing optimisation of other tubes.
- Operation manual
- Shipping safety instruction
- USB Flash Drive

1.3 TubeMarker™ 2 Parts

1.3.1 TubeMarker™ 2 External Parts

TubeMarker™ 2 front
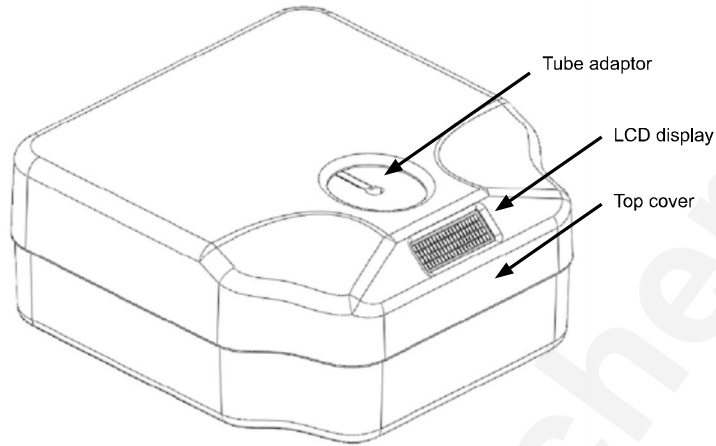
TubeMarker™ 2 back

1.3.2 TubeMarker™ 2 Internal Parts

2 Installation

2.1 Hardware Installation

2.1.1 Ink Ribbon Installation

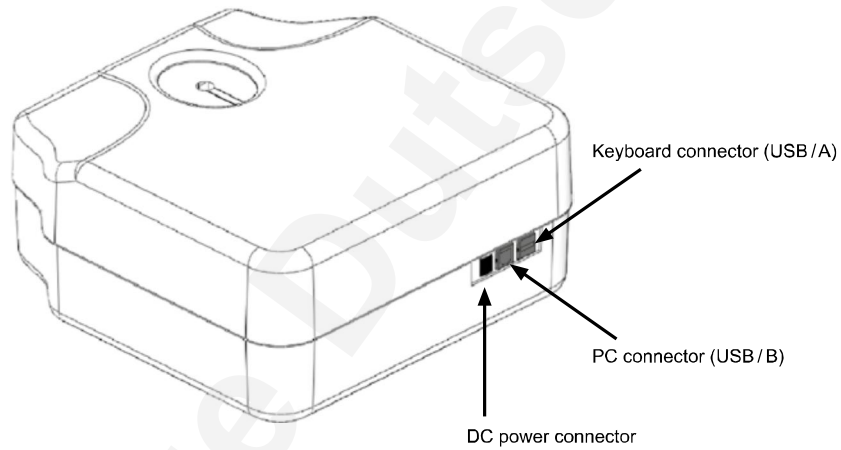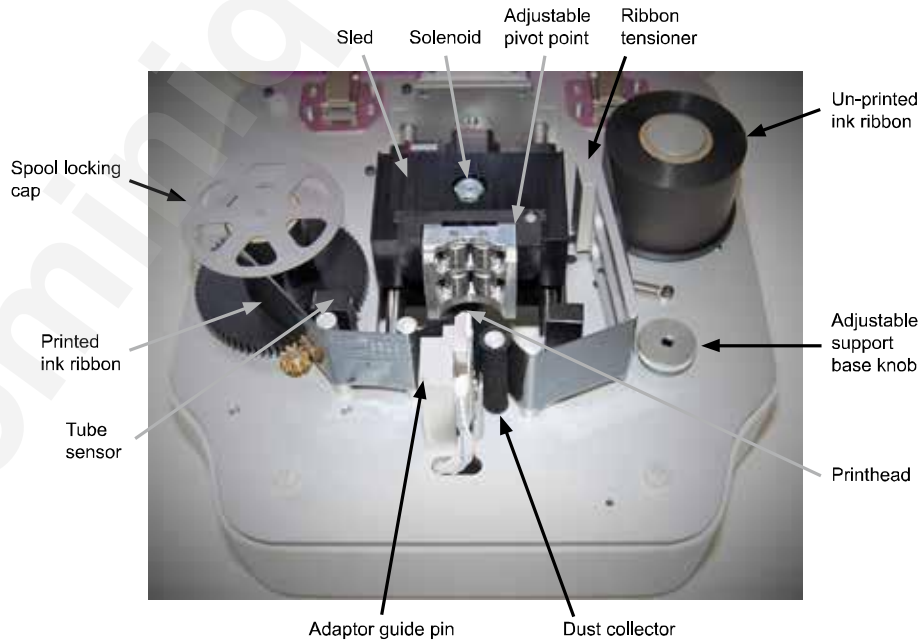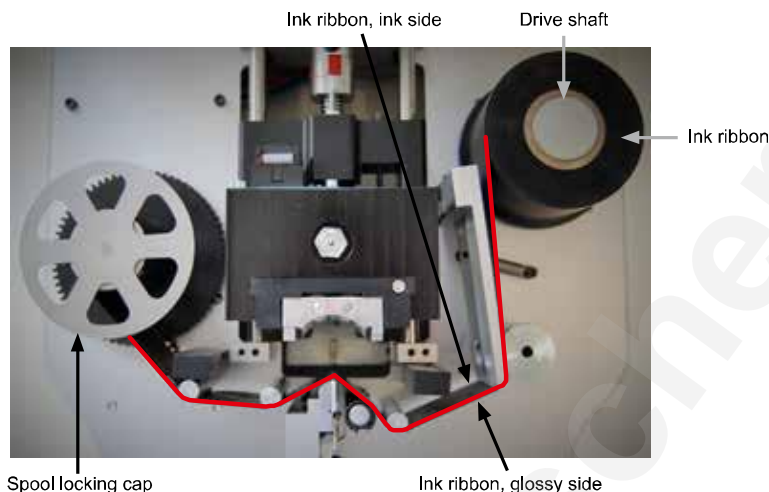Ensure all cables are disconnected from the TubeMarker™ 2 and the instrument is switched off with the top cover open.

Remove the spool locking cap and insert the empty ink ribbon core onto the drive mechanism shaft on the left hand side of the unit. Make sure that the pin at the base of the drive mechanism shaft goes into the slot on the ink ribbon core. Check that the core goes all the way down and there is no gap between the bottom of the core and the base of the drive mechanism.

Insert the ink ribbon on the right-hand spindle in the same way as the empty ink ribbon core.

Thread the ink ribbon through the path highlighted by the red line in the picture above.

Use thin adhesive tape to attach the ribbon to the empty ink ribbon core. Make sure that the lower edge of the ink ribbon is as close to the black drive mechanism as possible and that it is not wrinkled. Lock the spool and ribbon in place by screwing the spool locking cap down, this will help to align the ribbon.

Turn the drive mechanism and core clockwise until the start of the ink ribbon is on the core. If necessary, turn the right hand side ink ribbon roll clockwise to tighten the ribbon as shown in the picture above.

Close the top cover and proceed to section 2.1.3. The TubeMarker™ 2 will carry out a calibration procedure at startup.

If startup is interrupted the unit will auto-calibrate before the first print.

NOTE! The glossy side of the ink ribbon should be against the printhead, otherwise the printhead might be damaged when used.

Avoid touching the unused area (between the printhead and right-hand side roll holder) of the ink ribbon with bare hands. Any dirt or grease on the ink ribbon will reduce the print quality.

2.1.2 Tube Adaptor Installation

Tube adaptor guide pin   Sled

Insert the tube adaptor on the sled as shown in the picture above. The tube adaptor is selected according to the tube diameter.

Check that the plate guide pin slots into the small hole in the tube adaptor.

2.1.3 Connecting the Power Source

Please check the following items before connecting the power source:
• There is no tube inside the TubeMarker™ 2
• The ink ribbon is inserted correctly
• The tube adaptor is inserted correctly
• The TubeMarker™ 2 top cover is closed

Connect the DC power source plug to the connector shown in section 1.3.1.

The TubeMarker™ 2 will carry out a calibration procedure at startup. Wait for calibration to finish before proceeding. If calibration is interrupted it will auto-calibrate once the first print is triggered. Alternatively, you can restart the TubeMarker™ 2 by disconnecting and reconnecting the power supply.

NOTE! You cannot perform a manual calibration of the ink ribbon without being connected to the PC software. First time users should install software first.

2.2   Software Installation

Users will need to follow a 3 step installation procedure to install the TubeMarker™ 2 software to a PC. If you do not have a Java environment or the latest version of Java installed on the PC, the installer will recognise this before launching the software. You will be automatically directed to the Java website, from here you will need to download the version applicable to your windows operating system before accessing the software. Follow each step below carefully for a successful, first time installation.

2.2.1 Detect Windows Version

Detect whether your Windows Version is 32 bit or 64 bit

To detect whether your Windows version is 32 bit or 64 bit follow one of the instructions below. You will need this information later in the installation.

• Search "system information" in the Windows search bar **OR**

• For Windows 10 users use Cortana and search "system information" **OR**

• Check the automatic version detection results from: https://support.microsoft.com/en-us/kb/827218

2.2.2 Installing TubeMarker™ 2 Software

Copy and paste the latest version of the TubeMarker™ 2 setup file (*TubeMarker_setup_v#.##*) to your desktop from the USB stick provided. Once this has been done, please remove the USB stick from your PC to avoid any interference with the installation.

Alternatively, should you not have access to the USB flash drive you can download the installer from our website, following this link: https://www.dropbox.com/sh/0stzi03vjil0tjx/AACOGerP3x_l7Z7Wk8aGR3zRa?dl=0

Connect the TubeMarker™ 2 and the PC via the USB A-B cable provided. The connection between both devices is essential.

Apply power.

Double click on the *TubeMarker_setup* icon.

The following message will appear:
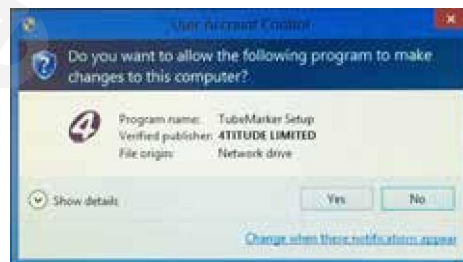
Click Yes .

You will now be able to begin the installation process.

Click Install .
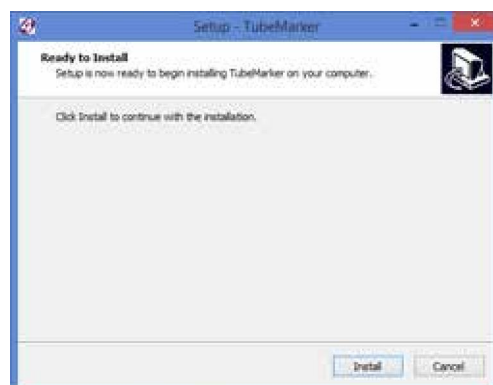
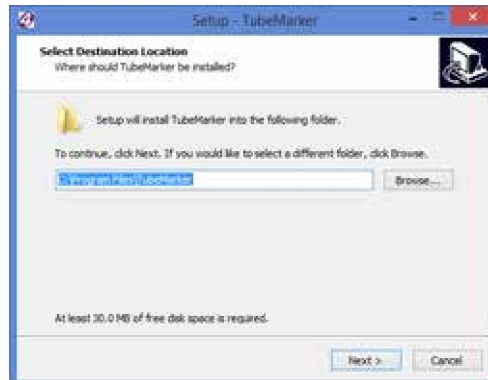The set-up wizard will ask you the location you wish to install the TubeMarker™ 2 software. 4titude® recommends the location below. Click [Next >] once you are happy with the location.

Once set-up has been completed, click [Install].
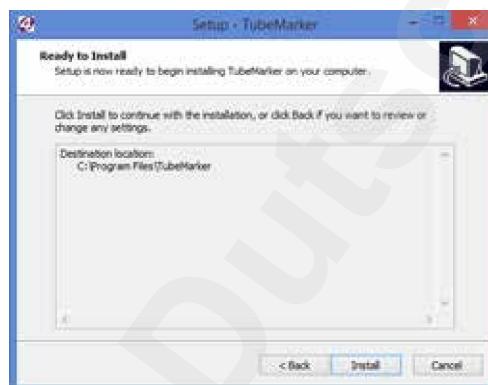
The installer will extract the necessary files for you.
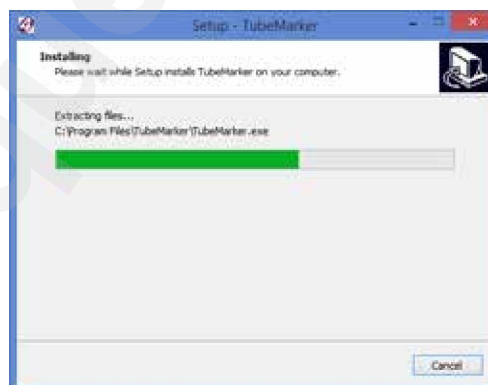
Before launching the installer, you will need to extract the FTDI CDM Drivers.

The FTDI CDM drivers will extract. A Driver Installation Wizard will appear to help install the software driver that TubeMarker™ 2 needs to work.
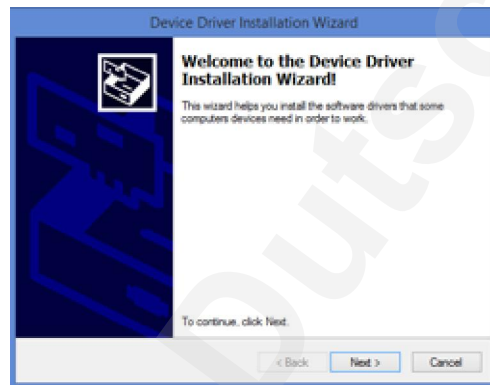
Prior to this you will be navigated to a License Agreement. After you have carefully read and understood the terms and conditions, check the *I accept this agreement* box and click ⬚Next >⬚ . You can also save and/or print the agreement for your reference.

The installation will begin and the installation wizard will update your devices. If your hardware devices already have the updated software installed, then installation wizard will not update your devices.

Click [Finish] to complete the installation.

You will be asked if you want to launch the TubeMarker™ 2 software automatically at the end of the installation (recommended) click [Finish].

If you do not require launching the software, simply uncheck the tick box and click [Finish].

If you checked the Launch TubeMarker™ 2 box and already have the latest Java version installed the software will open and be fully operational. To set-up the first print see section 4.1.
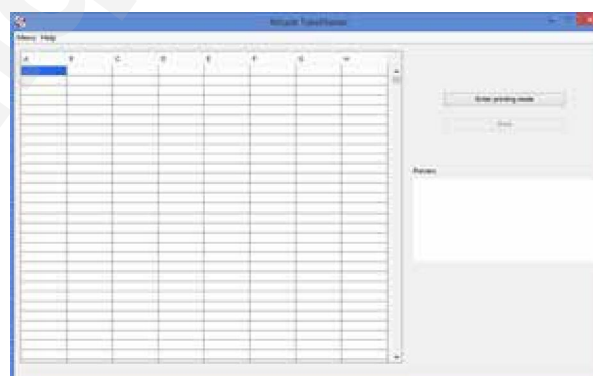
NOTE: To launch the 4titude® TubeMarker™ 2 software for future use you will find the application in your Windows Start Menu. From here you can create shortcuts to your task bar and/or desktop.

If you do not have the latest or any Java environment installed on your PC then the installer will recognise this and navigate you to the Java download page.

2.2.3 Install Java

You will need to install the latest version of Java to run the TubeMarker™ 2 software.

Click [OK] .

The Java website will open up in your chosen web browser.

Double-click on link according to the operating version of your PC to start the installation process and follow the on screen instructions.

• Choose Windows Offline if you have 32 bit Windows

• Choose Windows Offline (64-bit) if you have 64 bit Windows

NOTE: Do not use online installation because it is made for browser use only.

Click [Save] .

Click [Run] .

The Java Installer Wizard will open.

Click [Install] . By doing so you will agree to Java's license agreement.

The Java installer progress window will initialise.

Once Java set-up has completed, click Close .

To launch the 4titude® TubeMarker™ 2 software you will find the application in your Windows Start Menu. From here you can create shortcuts to your task bar and/or desktop.
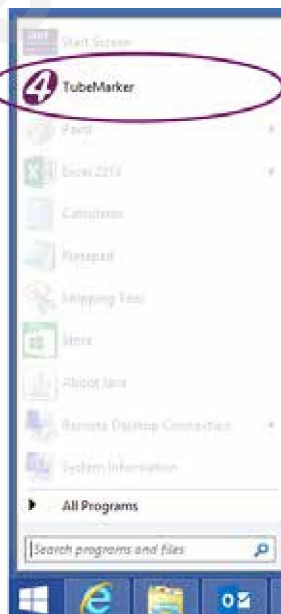
NOTE: 4titude® recommends to cut and paste the 4titude_setup installer into a dedicated TubeMarker™ 2 folder. It should be removed from the desktop so not to confuse the user when launching the software in the future.

After clicking on the app icon the software will open and be fully operational.

3 TubeMarker™ 2 Software Menu Settings

3.1 Settings

Menu	Description	Settings
Tube print area	Set printing area width of the tube in mm. Choose area according to the length of the straight part of the tube to be printed on. For ≥40 mm tube writing areas the tube type should be set to 40 mm	6 – 40 mm

Example centrifuge tube volumes and tube types

Volume	Tube Type
0.5 ml	14 mm
1.5 ml	19 mm
2.0 ml	34 mm

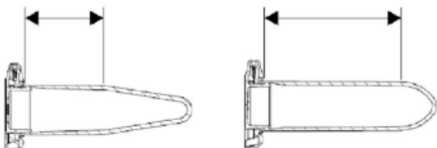*NOTE! It is very important to select the correct tube type before printing. Too high values can damage the tube and the printhead or break the ink ribbon.*

Menu	Description	Settings
Tube diameter	Set tube diameter in mm. This only affects the preview screen and allows you identify the tolerance for printable data.	
▲ / ▼	Manual sled movement, backwards (away from the printhead) or forwards (towards the printhead)	
Text orientation	Set text orientation. No matter the orientation of the code the text will always be to the right side of the barcode.	Horizontal (perpendicular to a tube) or Vertical (parallel to a tube)
Font	Set text font type	Choose from the fonts installed on the computer*
Font size	Set text font size (default value is 20)	10 (smaller) – 90 (larger)
Barcode	Set barcode format	
	None: No barcode is created from the data.	
	Datamatrix (2D): A datamatrix 2D code is created from the text in the first column of each row.	
	Datamatrix (2D) small: A datamatrix 2D code is created from the text in the first column of each row.	
	Code 128 (1D): A Code 128 linear barcode is created from the text in the first column of each row.	
	Code 128 wide (1D): A Code 128 wide linear barcode is created from the text in the first column of each row. This is a larger 2 pixel variation of the standard Code 128 (1D) barcode.	
Picture	Add or remove a picture such as a logo which will be printed on every tube.	Select file format monochrome .bmp, .gif, .tiff. See section 4.5
Advanced settings, see section 3.2		
Calibration settings, see section 9		
Save As	Save current settings to a configuration file.	
Open File	Load settings from a configuration file.	

* For Chinese characters, set a compatible font type (e.g. Sans Serif) and import text information from a Microsoft® Excel file, (see section 4.4).
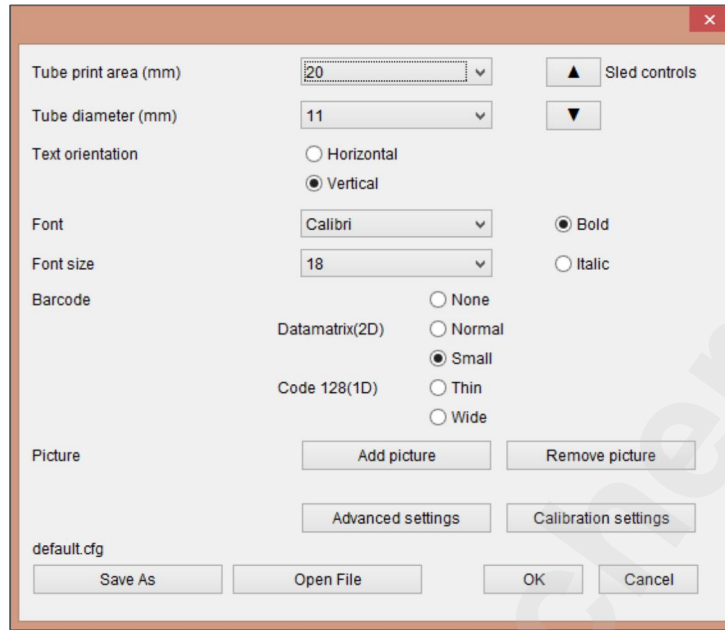
Settings menu
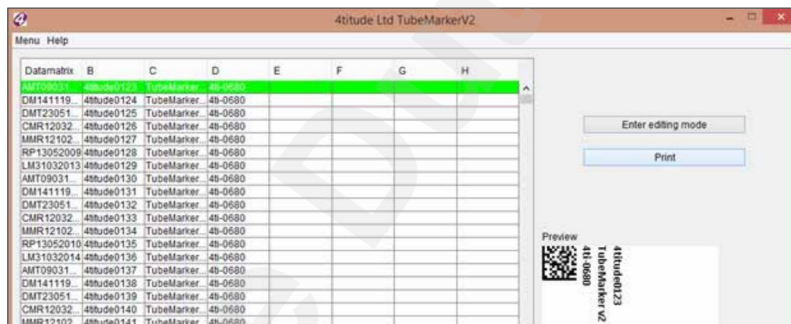
TubeMarker™ 2 printing table

3.2 Advanced Settings

Go to [Menu] > [Settings] > [Advanced settings]

Menu	Description	Settings
Tube lifting	Tube lifting can be used to ease the removal of the tubes	No or Yes
Display brightness	Adjust TubeMarker™ 2 LCD screen brightness	1 (darker) - 5 (brighter)
Power off delay (min)	Adjust power off delay, the TubeMarker™ 2 goes into power saving mode within the set delay period when no keys are pressed.	1 - 1,000 min
Pressing force	Pressing force should be adjusted according to the selected tube type. It is important to select the correct tube type according to the tube print area explained in section 3.1. Default value is 35	0 (lower) - 51 (higher)
Additional heating time	Heat transfer energy can be increased by setting additional heating. It slows down the print process and is recommended only for special tubes. Default value is 0.	0 - 100%
Automatic printing delay (s)	The user can set the TubeMarker™ 2 to print on their tubes automatically, without the need to trigger the print via the space bar or print button, by inserting a tube which will break the sensor beam and trigger a print. The first print will need to be triggered, there are 8 time delays to choose from.	OFF, 0 (trigger is instant), 0.5-3.0 (increments of 0.5 seconds)
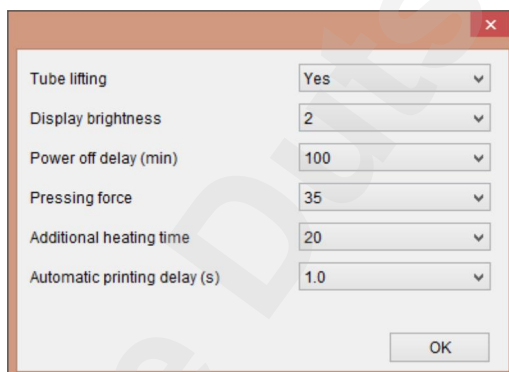
4 Printing

4.1 Preparation for Printing

4.1.1 Select Ink Ribbon

Metallic blue, black and white ink ribbons are available to print on all kind of tube colours and tubes with dark coloured content (see section 10.1.2). Choose the ribbon colour that gives the best contrast to the tube colour and the colour of the tube content respectively. This is especially important for printing barcodes so negative scanning is avoided.

4.1.2 Select Tube Adaptor

The TubeMarker™ 2 delivery package contains tube adaptors for 1.5 ml/2 ml tubes (4ti-0681, hole diameter 11.5 mm), 0.5 ml tubes (4ti-0682, hole diameter 8.5 mm), 2D cluster tubes (4ti-0683, hole diameter 8.5 mm) and cryo tubes (4ti-0684, hole diameter 12.7 mm).

To print on tubes that are not supported by the standard adaptors please see section 10.2 or refer to our website *www.4ti.co.uk* to see the latest additions to the TubeMarker™ 2 portfolio.

Tubes without a collar will be supported from the bottom via an adjustable adaptor. They will also be aligned with the print head from the top via an adaptor plate.

Tube adaptors for tubes not fitting to any of the existing adaptors are available on request. Please contact 4titude® at info@4ti.co.uk.

4.1.3 Prepare the TubeMarker™ 2

Connect the TubeMarker™ 2 to the PC with the USB cable and connect the DC power source as described in section 2.1.3.

Open the shortcut to the TubeMarker™ 2 Software folder and execute the TubeMarkerV2.jar file. Connection will happen automatically.

The TubeMarker™ 2 is now ready for use.

4.1.4 Adjusting the Position of the Sled Pivot Point

To improve the overall print quality, users have the ability to adjust the position of the sled's pivot point, increasing the surface area of the tube in which pressure is applied. This is particularly useful for larger tubes or those which are not printing fully near the base of the tube. The pivot point can only be lowered to a maximum of 14 mm below the default position. Follow the step-by-step guide below for how to effectively utilize the adjustable pivot point.

Open the top cover and remove the adaptor if applicable.

Take the 2.5 mm hex key provided and adjust the height of the pivot point. To lower the pivot point turn the hex key clockwise; turning anti-clockwise will raise the pivot point (see figure next page).

For best results, you want to adjust the pivot point so it is applying pressure to the centre or just below the centre of the tube you are printing on. The pivot point is located in the middle roller of the top set of 3 rollers, as shown in the photo below.

NOTE: DO NOT raise the pivot point above the default position. Default position is flush with the top of the sled.
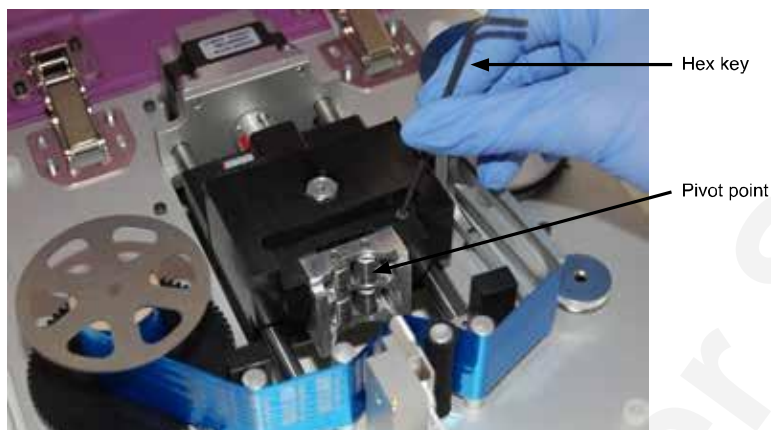
Once you are happy with the pivot point positioning, replace the adaptor suitable for the tube(s) you wish to print onto and close the top cover.

For tubes that do not have a lip or collar, please refer to section 4.1.5.

See below, examples of prints which were printed with the pivot point at default position and again with the pivot point adjusted to the centre of the tube. The print quality has drastically improved and important label data hasn't been lost as a result of the lowered pivot point.

Pivot point default


Pivot point 10 mm lower

4.1.5 Using the Tube Support Platform

Housed within the TubeMarker™ 2 unit is an adjustable support platform from which tubes without a lip or collar can be fully supported. Integrated within the support platform is a magnet which attract and stabilize the magnetic pole attachment used to support tubes of less than 65 mm in length and do not have a collar or lip. The magnet within the support platform has been designed and positioned in such a way to help users perfectly locate the pole attachment and eliminate misalignment against the printhead and sled; which could potentially damage these components.

Open the top cover and remove the adaptor if applicable.

To raise the support platform turn the knob clockwise. Turning anti-clockwise will lower the platform.

Adjustable tube support platform knob

Tube support platform
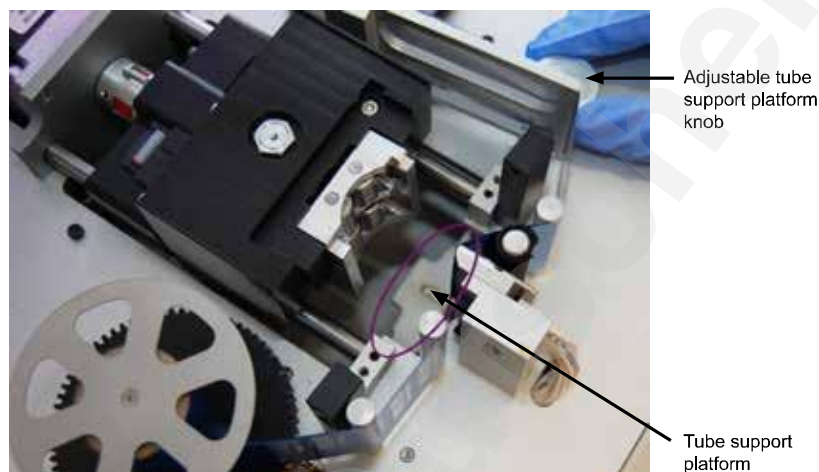
To perfectly optimize print results for your tube(s), you may need to adjust the pivot point of the sled to even out pressure across the whole tube surface area, see section 4.1.4. Additionally, you may also require the use of the 7 mm magnetic pole attachment. See below for details how to correctly position the attachment.

Positioning of Magnetic Pole Attachment

Whilst connected to the software with cover closed, go to ⬜ Menu > ⬜ Settings and use the up arrow ▲ to open up the sled. This will give you extra room to maneuver the pole attachment. Open the cover of the unit to place the pole attachment.

The attachment should be placed in such a way that is fully supportive to the tube you wish to print onto. Once positioned where you think is optimal, shut the cover and close the sled by using the down arrow ▼ within the settings menu; leaving enough room to insert the tube for printing onto.

Insert the tube and close the sled further so the tube is locked in position. You may need to make fine adjustments

to tube platform height and pole attachment to optimise the printed label position. Ensure there is no pressure coming from the sled when making these adjustments.
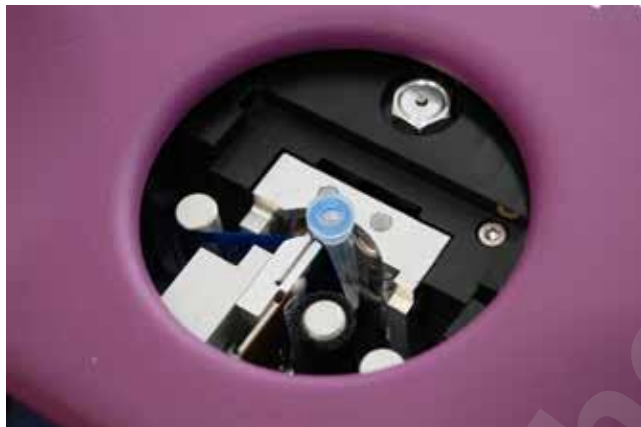
In other instances where the tubes are larger and more susceptible to falling over, 4titude® recommends the use of an adaptor plate to align the tube against the printhead and sled. This will alleviate any possibility of the tube dropping into the unit after a print has been made.

If the tube is over 65 mm in length, there is no need for the pole attachment.

NOTE: Switch tube lift OFF in the advanced settings menu for tubes without a collar.

4.2 Printing – Data Entered Manually

*NOTE: Touching the tubes with bare hands before printing should be avoided, because any dirt or grease on the tube surface contributes to a decrease in print quality. Nitrile gloves or similar are recommended for use when handling the tubes before printing. After printing the tubes can be handled without gloves*

Select the right settings for the tube that you want to print on in the `Settings` menu. You will find a list of various settings that you can change at your convenience.

You can use the `Save As` and `Open File` buttons when your happy with the optimised settings. `Save As` will allow you to save your settings under a specific name. `Open File` allows you to load previously saved files.

You can also select whether you would like to add a Datamatrix (2D) code small or standard or linear barcodes: code 128 (1D) or code 128 wide (1D) variations.

Please refer to section 3.1 for a detailed overview.
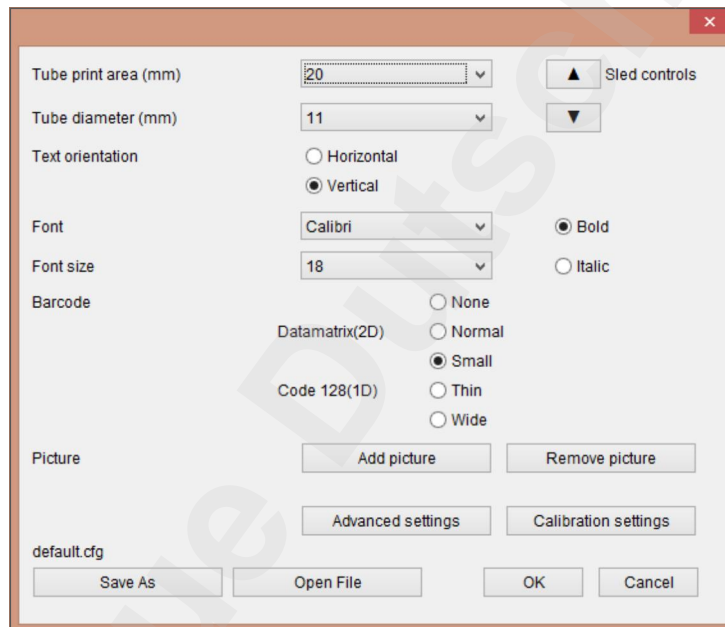
Type the required information in the main TubeMarker™ 2 window (see below).

Each horizontal row resembles the information to be printed on one tube. Each vertical column resembles the subsequent line the text will be printed onto. Each cell represents the line the text will appear on. Check the preview box to ensure the layout of your print is correct.

NOTE: When a barcode is selected from the settings menu, information for that barcode has to be written in the headed column (A). Human readable text must be entered into columns B-H.

The preview box will show you how the printed outcome will look on the tube. The preview picture is created from the data of the row which is selected.

Press the `Enter printing mode` button to send the information to the TubeMarker™ 2.

Change back to editing mode by pressing `Enter editing mode`.
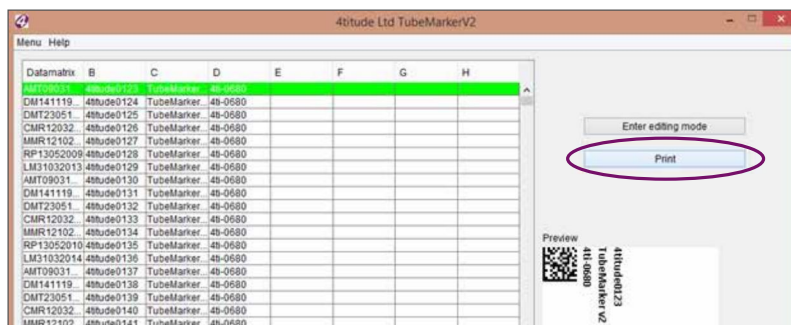
Once the information has been sent to the TubeMarker™ 2 the top row will turn green.

Enter the tube into the TubeMarker™ 2 and press ⬚ Print ⬚ in the menu or ⬚ Space ⬚ of the computer keyboard.

During the print process the tube will rotate clockwise, printing in a counter-clockwise direction.

For multiple prints all information will be sent to the TubeMarker™ 2 once printing mode has been selected. Once a line of information has been printed, the next line will be highlighted green automatically and the text will be shown in the preview box.

Enter a new tube and trigger the print button.
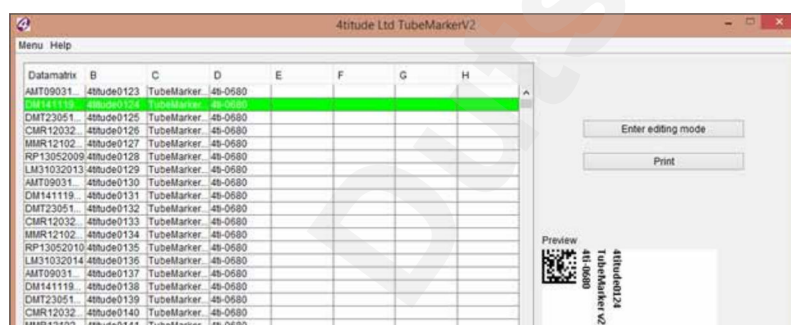
4.3   Printing – How to Use Auto Print Delay

When connected to the software go to ⬚ Menu ⬚ > ⬚ Settings ⬚ > ⬚ Advanced settings ⬚

Click on the "Automatic Printing Delay" drop down menu and select your time delay from the 8 options available. These range from OFF to 3.0 seconds.
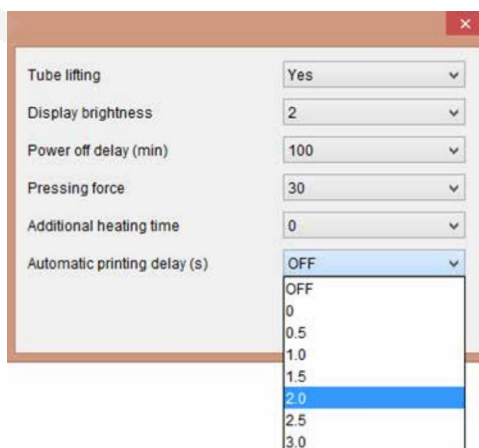
NOTE: The time delay is in seconds, meaning 0 triggers the print instantly, whereas 3.0 triggers the print to start 3 seconds after recognizing a tube has been inserted.

Once your time delay has been selected, click [OK] at the bottom of the "Advanced settings" page:
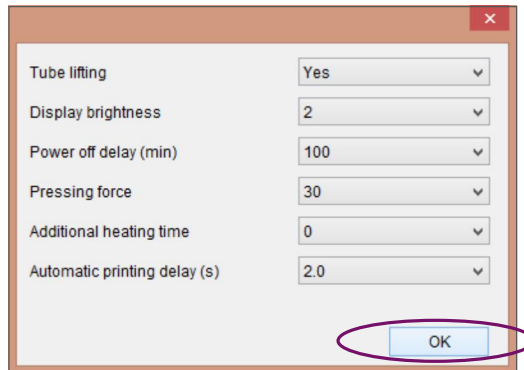
This will direct you to the main settings page again. To save your settings and return to the printing table, click [OK], as shown below:
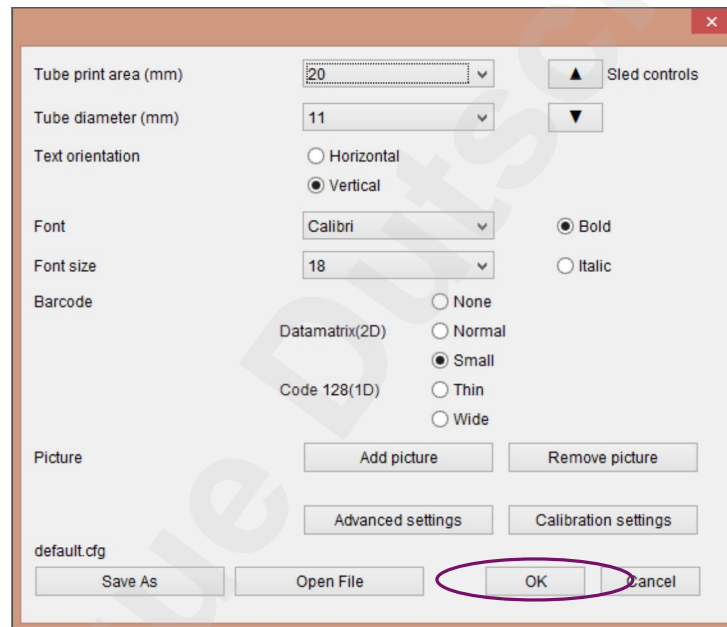
To print the data that you have entered into the printing table automatically, click on [Enter printing mode]. The top line will be highlighted green:
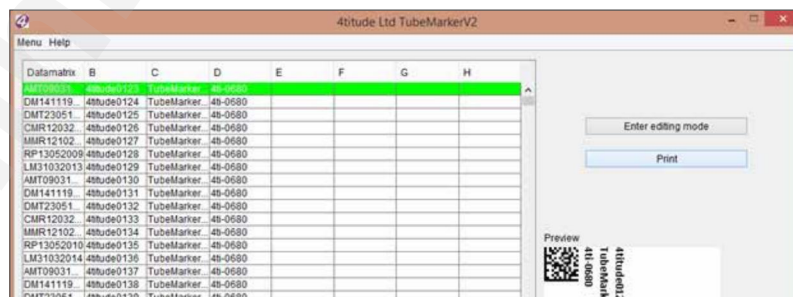
Enter your tube into the TubeMarker and click on [Print] in the menu or [Space] of the computer keyboard to trigger the first print.

Once printing has finished, the green highlighted line automatically will jump to the next row of text, you can now enter a new tube and the print will be triggered automatically after the tube is recognised – depending on the time delay you have set.

4.4   Printing – Data Import from Microsoft® Excel

The TubeMarker™ 2 can import .xls, .xlsx and .csv files.

Go to   Menu   >   Import
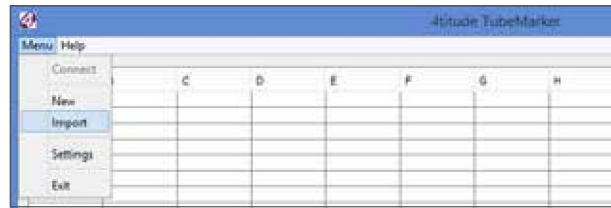
You will be directed to the *My Documents* folder. From here locate the place of the file to import and double click on the file name. In this instance the program will import the data.

Once the file has been imported it will show up on the TubeMarker™ 2 print table. From here follow the steps detailed in section 4.2 and 4.3 on how to print the information on a tube.
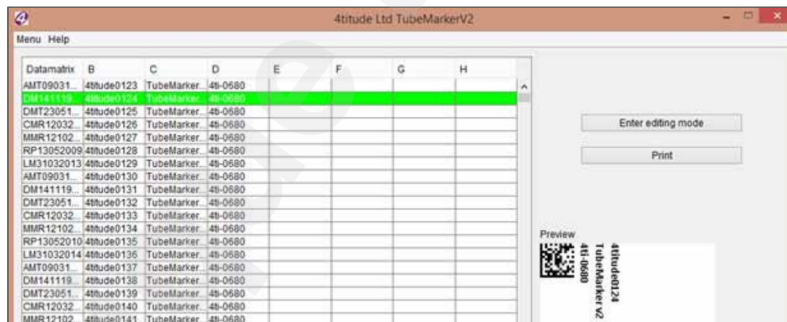
4.5 Printing – Adding a Picture / Logo

Save the picture such as a logo in a suitable file format (monochrome .bmp, .gif, .tiff) and resolution.

1 pixel corresponds to 0.125 mm. For example a picture of 100 x 100 pixels is 12.5 mm in width.

Go to Menu > Settings > Add picture
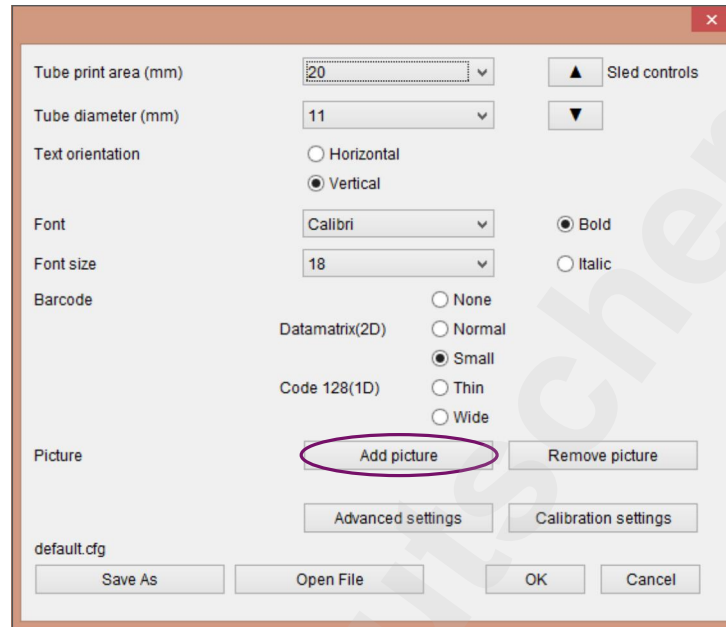
You will be directed to the *My Documents* folder. From here locate the place of the file to import and double click on the file name. In this instance the program will import the graphic file.

Once the file has been imported it will show up in the preview box of the TubeMarker™ 2 main window.
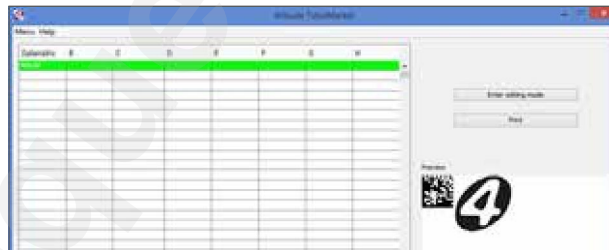
A graphic file will only print onto a tube, when in conjunction with text or a barcode.

TIP: If you wish to only print the graphic or logo select "none" in the settings menu and enter a full stop "." in column A. The full stop is very inconspicuous and doesn't interfere with the logo or graphic.

To remove the graphic file go to the Settings menu and click Remove picture .

From here follow the steps detailed in section 4.2 and 4.3 on how to print the information on a tube.

Note: The orientation of the picture cannot be changed in the TubeMarker™ 2 software so the picture may need to be rotated in a graphic program (e.g. Microsoft® Paint) before saving.

4.6   Printing – Use of Tubes with Frosted Writing Field

Extensive testing has shown that the use of tubes with a frosted writing field can lead to inconsistent printing results. Eppendorf® Safe-Lock microcentrifuge tubes in particular cannot be recommended to be used with the TubeMarker™ 2.

Alternatively, 4titude® also offers 1.5 and 2.0 ml microcentrifuge tubes, graduated, with frosted window and flat, safe-lock cap (Product code 4ti-0797 and 4ti-0798). Their safe-lock mechanism guarantees the tubes remain closed during boiling or autoclaving and the frosted writing field is perfectly suited for use with the TubeMarker™ 2. Compared to Eppendorf® tubes, our tubes have a much finer and smoother frosting allowing for great printing results within and across the window.

For an overview of tested tubes that are suitable please refer to the TubeMarker™ 2 webpage.

5   Maintenance / Cleaning the Printhead

To ensure high quality printing, the ceramic surface of the printhead should be cleaned at a regular interval to remove any dirt or dust that might accumulate. This also applies to the ribbon tensioner surface.

NOTE! Touching the printhead with bare fingers should be avoided. Any dirt or grease might cause corrosion and damage the printhead.

Cleaning is carried out as follows:

1. Go to the $\boxed{\text{Settings}}$ menu and drive the sled further away from the printhead by pressing $\boxed{\blacktriangle}$.

2. Unplug the power cord and open the top cover.

3. Remove the tube adaptor.

4. Loosen the ink ribbon by twisting the right-hand side ink ribbon roll anticlockwise until the ink ribbon is loose enough to be moved a few centimeters away from the printhead. A pen or similar tool can be used to move the ink ribbon.

5. Twist the dust collector (see section 1.3) a little until the cleaner area is located towards the ink ribbon. In case the dust collector is dirty, remove it, clean it and put it back again. Pressurised air can be used to remove the dust.

6. Wipe the ceramic area of the printhead (the area which is against the ink ribbon in normal use) with a lint-free cloth moistened with alcohol.

7. Wait until the alcohol evaporates from the surface of the printhead.

8. Tighten the ink ribbon by turning the right-hand side ink ribbon roll clockwise until the ink ribbon is according to the picture in section 2.1.1. Check that the upper edge of the ink ribbon is on the same level with the ceramic (white) part of the printhead.

6 Error Messages / Troubleshooting

6.1 Error Messages

Message	Reason
`Insert new tube`	Printing is ready but the tube has not been changed before printing the next tube.
`No tube`	No tube inserted and trying to print.
`Cover open`	The top cover is open or not completely closed. When in automatic printing mode, if the top cover is opened the data sent to the printer will be erased.
`Text field empty`	The text field is empty and numbering is not in use.
`Force sensor fault`	The pressing force sensor might be damaged. Contact 4titude® at info@4ti.co.uk.
`Ribbon fault`	The ink ribbon is loose, broken or not inserted. Check that the ribbon is inserted correctly. If the problem persists, contact 4titude® at info@4ti.co.uk.
`Tube detector fault`	Tube detection components might be damaged. Contact 4titude® at info@4ti.co.uk.
`Power supply fault`	Incorrect DC power supply connected to the device. Check that the device is connected to the power supply which came with the device. The operating voltage is marked on the label on the back of the TubeMarker™ 2. *NOTE! The device might be damaged if incorrect power supply is used.*
`Hardware error`	Some of the electric components might have a fault. Contact 4titude® at info@4ti.co.uk.
`Memory error`	Some of the electric components might have a fault. Contact 4titude® at info@4ti.co.uk.

6.2 Troubleshooting

6.2.1 Troubleshooting – General

Problem	Solution
Power supply connected but the display is not on	The TubeMarker™ 2 is in power save mode.
	Execute software if closed, this will wake the TubeMarker™ 2 up and connect to the PC.
	Press `Enter printing mode` to end the power saving mode.
	Alternatively, press `OK` in the `Settings` menu to end power saving mode.
	Press `Space` when using the TubeMarker™ 2 with the keyboard.
There is an error message on the display	Check the message in section 6 and act according to the instructions. The message disappears by pressing `Space` in keyboard use or press `OK` on the pop-up message in software.
The ink ribbon is broken	Open cover and close software down first to send TubeMarker™ 2 to sleep mode. Shutdown in keyboard use.
	Insert the ink ribbon according to the instructions in section 2.1.1.
	Once inserted, close the cover, wait for auto-calibration to finish and re-execute the software or press the space bar when in keyboard use.
	Make sure that the chosen tube type is correct before continuing printing.
The ink ribbon does not move	Open cover and close software down first to send TubeMarker™ 2 to sleep mode. Shutdown in keyboard use.
	Check that the ink ribbon is set correctly (see section 2.1.1).
	Make sure that the ribbon core sits firmly on the shaft and the pin at the base of the drive mechanism shaft goes into the slot on the ink ribbon core to allow for correct movement of the ribbon core.

Problem	Solution
The TubeMarker™ 2 appears to be working, but no text can be seen on the tube surface	Check that the settings are optimised for the tube chosen (see section 3.1) and that the ink ribbon is set correctly (see section 2.1.1).
Bad quality printing	check that the settings are optimised for the tube chosen (see section 3.1)
	Check that the ink ribbon is set correctly (see section 2.1.1).
	Please also refer to section 6.2.2.
	For tubes with frosted writing field, see section 4.6.
NOTE! The surface of the tubes must be flat. The use of tubes with embossed scale should be avoided.	

If the problems persist, contact 4titude® at info@4ti.co.uk.

6.2.2 Troubleshooting – Insufficient Printing Quality

Problem	Example	Solution
Bad quality printing at top edge		Check that the ribbon is flat and not wrinkled. If necessary, correct the position of the ribbon but remember to switch unit off first.
Patchy print image		As the print head in the TubeMarker™ 2 is flat it is very sensitive to surface changes. Try to ensure tubes are as flat as possible. Additionally, you can increase pressing force, clean the print head and ribbon tensioner. Ensure the ribbon is set correctly and is clean.
Distorted / stretched print image		Contact 4titude® at info@4ti.co.uk.
Print correct, but faint print image		Increase pressing force and additional heating time, for more details see section 3.2.
		Please contact 4titude® at info@4ti.co.uk should the problem persist.
Print is not complete		Check that the settings are optimised for the tube chosen (see section 3.1)
		The preview box shows what the print outcome will look like. You may have to adjust font type, size and text orientation to fit it within the tube area.
		Adjust the pivot point of the sled so that the pressure is centralised in the middle of the printing area.
Print correct, but not lasting (scratches off)		Add additional heating time (see section 3.2).

7   Appendix A: Technical Specifications

Dimensions (W x L x H)	270 x 280 x 122 mm
Weight	4.8 kg
Printing Area Height	6 - 40 mm
Power Supply	18V $\overline{\cdots}$ 1000mA $\ominus\!-\!\mathbb{C}\!-\!\oplus$
Operating Temperature	18° to 26°C
Operating Humidity	20% to 70% relative humidity, noncondensing
Storage Temperature	10° to 40°C
Fuses	No customer-replaceable fuses in system
Computer Interface	USB 2.0

Note: Technical specifications are subject to change without prior notice.

8 Appendix B: Using the TubeMarker™ 2 with a Keyboard (not provided)

8.1 Connecting the Keyboard

It is possible to control the TubeMarker™ 2 via a keyboard using the onscreen commands to input data, change the settings on the instrument and initiate the print process.

Connect the keyboard to the USB / A connector shown in the picture of section 1.3.1.

NOTE! Only standard keyboards are compatible with the TubeMarker™ 2. Mac keyboards are not compatible.

8.2 Menu Structure

Use [Enter] to choose the menu and [ESC] to go back.

Use [▶]/[◀]/[▲]/[▼] to select the values in the menu.

Menu		Settings	
Tube print area	Printing area width [mm]	6 - 40	
Numbering	No Yes	Start number 0 - 60,000 End number 0 - 60,000	
Text	Write your text here		
Print	Press [Space] to activate printing		
Settings	Tube lift	No Yes	
	Text orientation	Vertical Horizontal	
	Display brightness	1 - 5	
	Power save delay	1 - 1,000	
	Font size	1 - 4	
	Pressing force	0 - 51	
	Additional Heating Time	0 - 100	
	Autoprint Delay [ms]	1 - 3,000	
	Language	English Finnish Swedish	
Serial number			
Shut down			

Numbering

Sequential numbering is set on / off by pressing [▶]/[◀] in the **Numbering** menu. If the numbering is in use, the start and end numbers can be set by pressing [▼] in the **Numbering** menu.

The numbers increase / decrease by pressing [◀]/[▶]. Numbers can also be set by using the number keys + pressing [Enter].

When the numbering is in use, it is shown in the **Text** menu as `Sequential numbering`. This text indicates the row on which the sequential number will be printed.

Advanced Settings

Setting	Description
`Tube lift`	Tube lifting can be used to ease the removal of the tubes from the TubeMarker™ 2. It can be set on / off by pressing ◄ / ► in the **Tube lift** menu.
`Text orientation`	Text orientation can be selected as Vertical (parallel to the tube) or Horizontal (perpendicular to the tube).
`Display brightness`	The screen brightness can be adjusted between 1 - 5 (darker - brighter) by pressing ◄ / ► . The brightness can also be set by using the number keys + pressing Enter .
`Power save delay`	Power saving delay (in minutes) can be set by pressing ◄ / ► between 1-1000. The delay can also be set by using the number keys + pressing Enter . The TubeMarker™ 2 goes into power saving mode when no keys are pressed within the set delay period. Power saving mode is ended by pressing Space .
`Font size`	Font size can be decreased / increased between 1 - 4 by pressing ◄ / ► . Default value is 2.
`Pressing force`	Pressing force is adjusted automatically according to the selected tube type. It is important to select the correct tube type according to the tube area explained in section 3.1. Pressing force can be adjusted between 0 - 51. Default value is 30.
`Additional heating`	Heat transfer energy can be increased by setting additional heating. It slows down the print process and is recommended only for special tubes. Percentage value can be adjusted between 0 - 100. Default value is 0.
`Autoprint delay`	When placing a tube in the TubeMarker™ 2 this will automatically print each time once the first print is triggered by the Space bar. The time in which the print is delayed by is from 1 millisecond to 3 seconds. This delays the time the sled engages the tube after being entered into the unit. To turn this feature off go back to Settings and write 0 followed by Enter .
`Language`	The language can be changed by pressing ◄ / ► . Options are English, Finnish, and Swedish.

Serial Number

Device-specific serial number and installed firmware version are shown by pressing Enter in **Serial number** menu.

Shut Down

The TubeMarker™ 2 goes into power save mode by pressing Enter in **Shut down** menu. Power saving mode is ended by pressing Space . To shut down completely put TubeMarker™ 2 into power save mode and remove power supply.

8.3 Printing

If the tube type is changed to a greater diameter tube or the tube doesn't fit in the printer, you can increase the gap by pressing ▲ in the **Print** menu.

Printing is started by pressing Space in the **Print** menu after a tube is inserted. Sequential numbes are shown in the **Print** menu if it is in use. It can be decreased / increased by pressing ◄ / ► .

Message `Printing done` is given when the tube corresponding to the end number is printed.

9 Appendix C: Calibration Settings

Caution: Apart from the calibration of the used ribbon roll diameter, users should not make any changes to the calibration settings unless instructed to by the technical support of 4titude®.

Go to | Menu | > | Settings | > | Calibration settings |

Menu	Description
IR sensor limit value / tubes	Adjust the limit value for tubes.
Printhead resistance	Set the printhead average heating element resistance.
IR sensor limit value / sled	Adjust the limit value for the sled.
Ribbon stepping length	Read only value for step count of one pixel.
Edit	Enable editing the values (needs a password).
Set	Save the settings.
Ribbon tensioner value	Read only value for ribbon tensioner moving distance.
Used ribbon roll diameter [mm]	Adjust the diameter of the left side ribbon diameter.
Calibrate	Calculate new value for ribbon tensioner and save the value.
Refresh values	Read current values from TubeMarker™ 2.
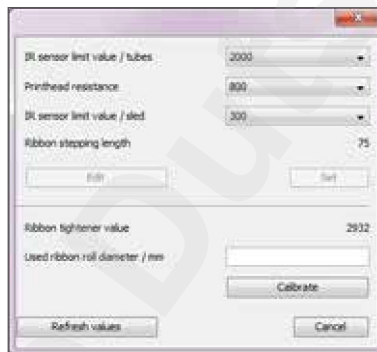
NOTE: When calibrating the ribbon it must be inserted correctly and cover must be closed!

10 Appendix D: Accessories / Ordering Information

10.1 Accessories

10.1.1 Tube Adaptor

Different sized tube adaptors are available on request. For details please see section 10.2, refer to our webpage *www.4ti.co.uk* or contact 4titude® at *info@4ti.co.uk*.

Delivery package contains tube adaptors with hole diameters of 8.5 mm, 11.5 mm and 12.7 mm. These sizes are compatible with the most common 0.5 ml, 1.5 ml and 2.0 ml centrifuge tubes as well as cryo tubes.

10.1.2 Ink Ribbon

Metallic blue, black and white ink ribbons are available to print on all kind of tube colours and tubes with dark coloured content. Choose the ribbon colour that gives the best contrast to the tube colour and the colour of the tube content respectively.

For details please refer to the ordering information (section 10.2), our webpage *www.4ti.co.uk* or contact 4titude® at *info@4ti.co.uk*.

10.2 Ordering Information

Code	Description	Quantity
4ti-0680-1	TubeMarker™ 2, Printer for marking the side of 0.2 to 50 ml tubes	1
4ti-0686	TubeMarker™ Ribbon, metallic blue, 300M x 40mm	1 roll
4ti-0686/10	TubeMarker™ Ribbon, metallic blue, 300M x 40mm	10 rolls
4ti-0688	TubeMarker™ Ribbon, white, 300M x 40mm	1 roll
4ti-0689	TubeMarker™ Ribbon, black, 300M x 40mm	1 roll
4ti-0681*	Tube Adaptor for 1.5 ml/2 ml tubes, hole diameter 11.5 mm	1
4ti-0682*	Tube Adaptor for 0.5 ml tubes, hole diameter 8.5 mm	1
4ti-0683*	Tube Adaptor for 2D cluster tubes, hole diameter 8.5 mm	1
4ti-0684*	Tube Adaptor for cryo tubes, hole diameter 12.7 mm	1
4ti-0685-1	Tube Adaptor for 2 ml screw cap tubes (10 mm diameter), hole diameter 10.4 mm	1
4ti-0685-2	Tube Adaptor for 15 ml tubes, hole diameter 18 mm	1
4ti-0685-3	Tube Adaptor for 50 ml tubes, hole diameter 30 mm	1

*These items are included with the TubeMarker™ 2 (Code 4ti-0680-1)

11 Appendix E: Warranty

4titude® warrants that the TubeMarker™ 2 (4ti-0680-1) should be free from defects in materials and workmanship for a period of **12 months** from the date of purchase. The purchase date is determined by the invoice date from 4titude® to the customer. If the instrument is being incorporated into an automated system by a third party, the warranty period may be extended by a maximum of 6 months or the date the system is commissioned, whichever is the shorter. For this automation extension to be valid, 4titude® must be notified of this requirement along with the details of the integrator at the point of purchase.

Each TubeMarker™ 2 is tested and documented by the manufacturer before shipping. 4titude® Ltd's Quality Control System guarantees that the performance of the TubeMarker™ 2 you have purchased is within its specifications.

The warranty covers all parts and labour costs associated with a repair of the unit within the first 12 months. The need for returning a unit for service must first be agreed with 4titude® via telephone support. Once it is established a return is necessary, 4titude® will issue a returns number, details of which must be returned with the unit.

The warranty does not cover defects caused by excessive wear and tear or damage due to shipping, accident, abuse, misuse, problems with electrical power, or usage not in accordance with product instructions or if other than original spare parts supplied by the manufacturer have been used.

The warranty does not automatically cover shipping charges. Shipping costs (both ways) will be covered by 4titude® where a returns number is issued within 8 weeks of the original delivery date (as confirmed by the invoice date). Shipping costs after this period will need to be covered by the customer.

Once returned to a 4titude® designated service centre, the unit will be inspected and repaired accordingly and a report provided to the customer. 4titude® would expect to carry out this work and return the unit within 10 working days of receiving the unit.

Onsite service or a swap out service (where a loaner instrument is shipped to the customer whilst theirs is repaired) can be arranged at extra cost. Please contact 4titude® if you are interested in this service.

This standard warranty can be extended to 24 or 36 months respectively.

Extended warranty must be purchased within 4 weeks of the original invoice address.

Code	Description
4ti-0680-10	12 months parts and labour warranty for 4ti-0680-1 TubeMarker™ 2
4ti-0680-11	12 month warranty extension to 4ti-0680-10 for TubeMarker™ 2, second year
4ti-0680-12	24 month warranty extension to 4ti-0680-10 for TubeMarker™ 2, second and third year
4ti-0680-113	12 month warranty extension to 4ti-0680-11 for TubeMarker™ 2, third year

Please contact 4titude® or your local distributor for pricing details.

The warranty does not cover damage caused to the unit in shipping due to unsuitable or insufficient packaging being used. Wherever possible, the original shipping box should be retained by the customer and used for returning the unit. Please also refer to section 12, TubeMarker™ 2 Shipping Instruction.

12 Appendix F: Shipping Instruction

When packing the TubeMarker™ 2 for shipping YOU must ensure that the sled is tight up against the printhead.

Disconnect the instrument from the power source and turn the sled screw locking nut so that it cannot be turned anymore. Please refer to the picture below.

Once screwed up as tight as possible the sled position will look like this:

Note: After shipping, the sled will automatically move backwards during calibration which happens straight after supplying power. There is no need to unlock the sled manually.

If the sled does not move after supplying power, loosening the nut by turning it once can resolve the problem.

13 Appendix G: Disposal Information

If you want to dispose this product, do not mix it with general household waste. There is a separate collection system for used electronic products in accordance with legislation that requires proper treatment, recovery and recycling.