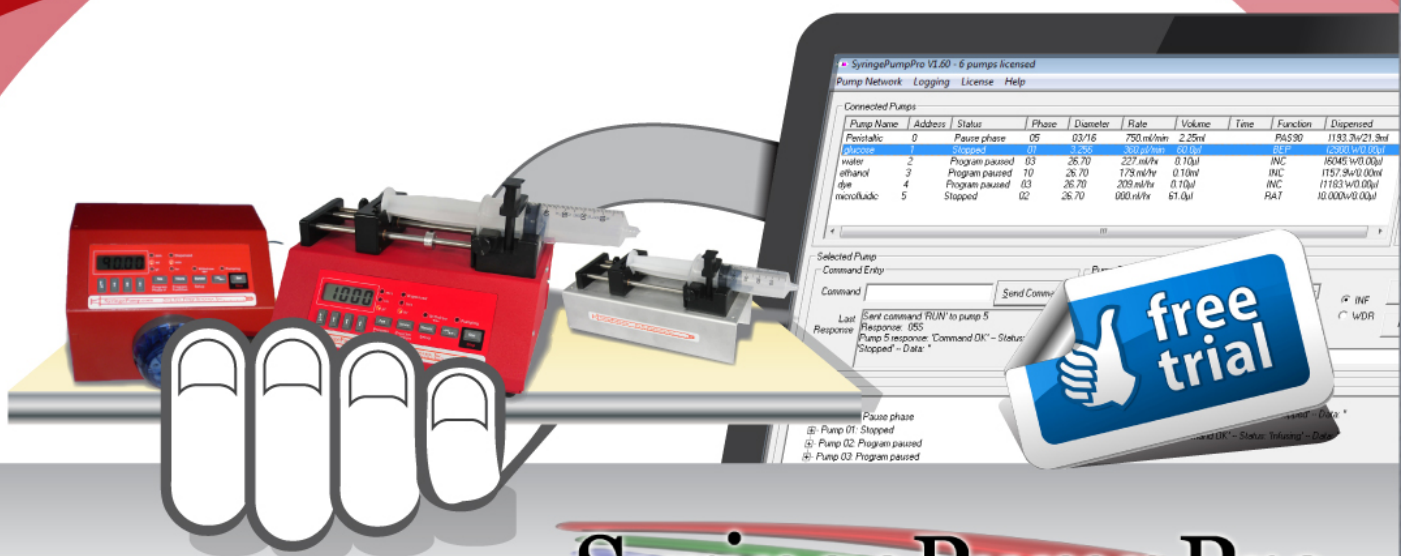


# Take Control Of Your Pumps



www.syringepumppro.com  
timb@syringepumppro.com

## SyringePumpPro

*Control programmable infusion syringe pumps (including OEM models) from several of the major syringe pump suppliers.*

# SyringePumpPro V1 User Guide

# SyringePumpPro

## User Guide

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Printed: Monday, June 09, 2014 in Adelaide, South Australia

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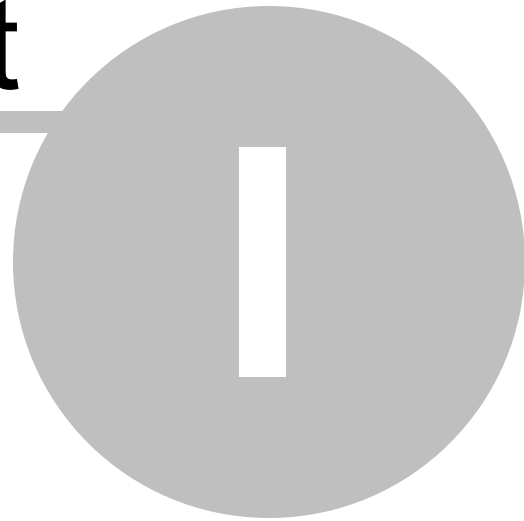
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# Part



# Syringe Pump Pro

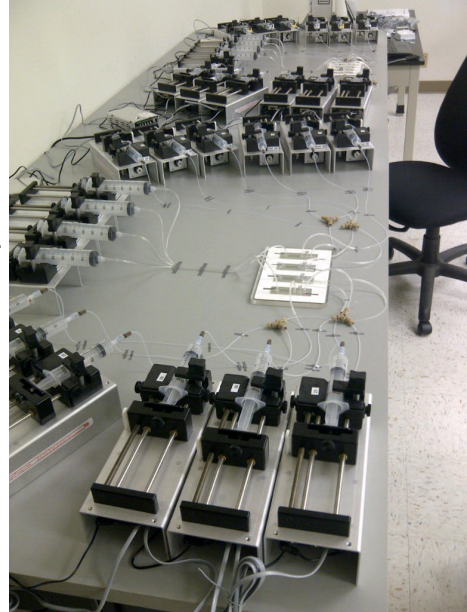
## User Guide



# 1 Introduction

SyringePumpPro is a computer application which provides a user interface for controlling one or more programmable syringe pumps configured as a network of Syringe Pumps.

- Manages standard, Microfluidic and OEM pumps
- Control pump networks containing both standard and Microfluidic pumps
- Easily configure and control your multi-pump protocols.
- Designed and built to be an easier interface than programming pumps manually via terminal programs.
- Synchronize multi-pump operations.
- Start and stop pumps individually (you select the pump from a list of connected pumps) or as a group (all connected pumps told to start and stop as a group)
- Upload pump programs to each pump.
- Different pumping programs to each connected pump.
- Each pump can have it's own rates and flows etc.
- Safe mode – CRC detection and functionality is automatic. SyringePumpPro detects when a pump is in safe mode and will communicate appropriately with the pump. SyringePumpPro sends periodic “pings” to safe mode pumps to avoid alarms. The operator can set this interval.
- Up to 100 pumps can be connected to SyringePumpPro.
- Auto-baud and pump detection – SyringePumpPro will detect the baud rate of the network (using pump 00's settings) and also detect all pumps on the network.
- Pump response history – pump commands and responses are logged on the screen.
- User-configurable COM port and baud rates.
- Send commands manually to connected pumps - just type your command and click enter.
- Communications errors – COM port errors/disconnects are noted and handled.
- Automatic refresh of pump value(s) after 'set' commands are issued.
- PPL file functionality – upload a program to the pump from a text file.
- Logging – all communications with the pump network are logged.
- Real-time display of message statistics.
- Assign labels to each pump to help with identification.



32 pumps connected to SyringePumpPro

and much more..

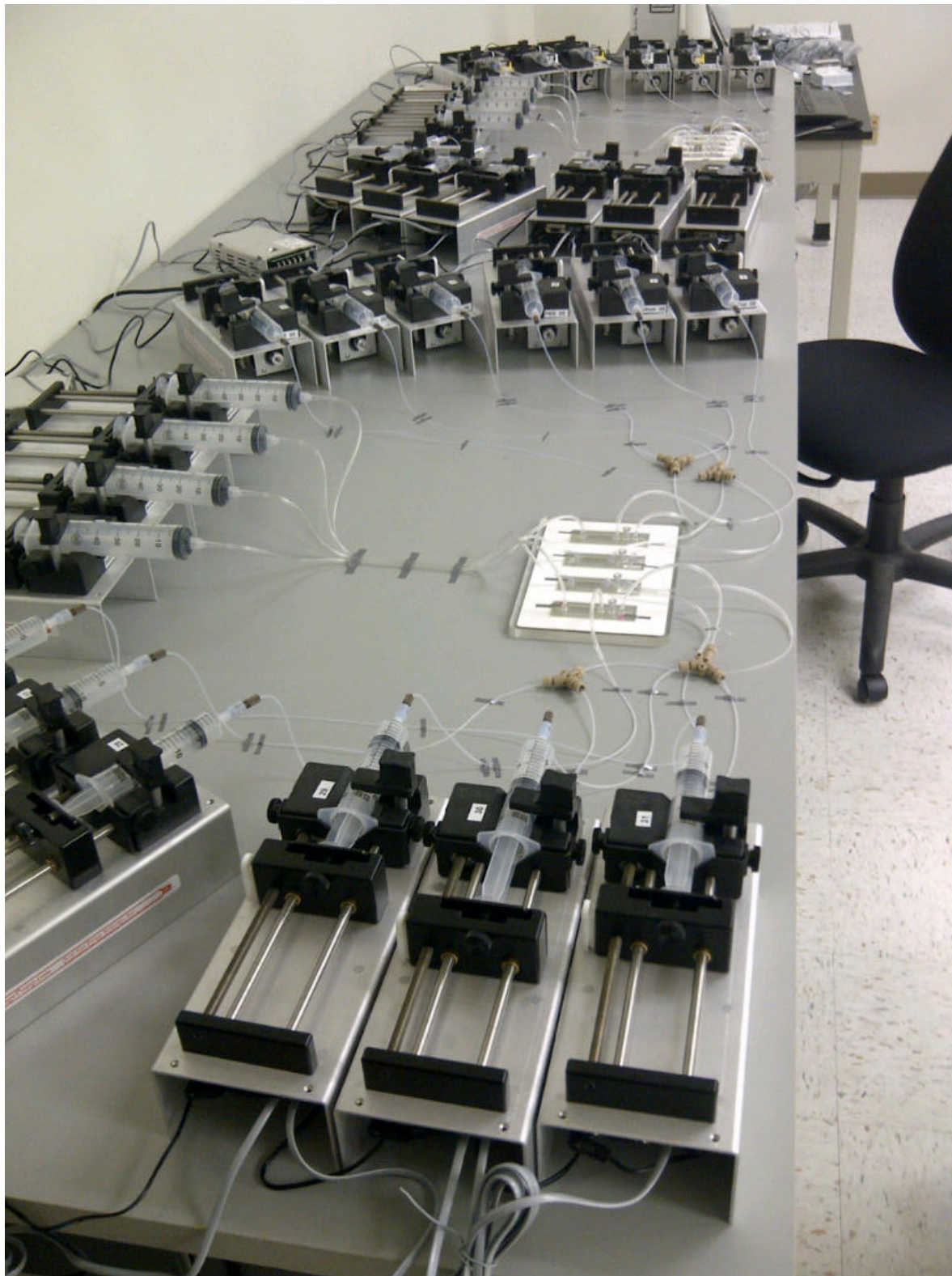




## 1.1 What's Possible

32 pumps - one copy of SyringePumpPro. SyringePumpPro is written to support 99 networked pumps.

This is the largest installation I know of so far. This was a prototype by a medical devices firm for a dual task bio-analysis workstation. They would set up 2 micro-fluidic chambers, one in the center of each workstation and then use SyringePumpPro to simultaneously start all the pumps running their pump programs. This device has now been patented and they are working on a commercial version.



32 Pumps - One copy of SyringePumpPro



## 1.2 Who's Using SyringePumpPro





MIT University College



Texas Biomedical Research Institute



Engineering at Birmingham



CSIRO Scientific and Industrial Division

[The Protein Physics Lab](#)

The Protein Physics Lab



Thermacore



The University of Tennessee Knoxville



The University of Bayreuth



The University of Birmingham



The University of Bologna



The University of Hull



University of North Carolina Charlotte



The Flow Measurement Specialists  
 Transonic Flow Measurement



TRC City Mohre



UC Davis

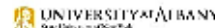
Università di Sassari



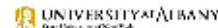
University of California Davis



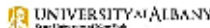
Nacional de Ingeniería



University of Albany



University of Albany



University of Albany



University of Delaware



University of Maryland



University of Nevada, Reno



University of Sheffield



University of Virginia



University of Twente



Virginia Polytechnic Institute and State University



Virginia State Laboratory



Virginia State Laboratory



Volcano Corp.



William & Mary College



Winthrop University



Accuri Cytometers



Angstrom Power Inc.



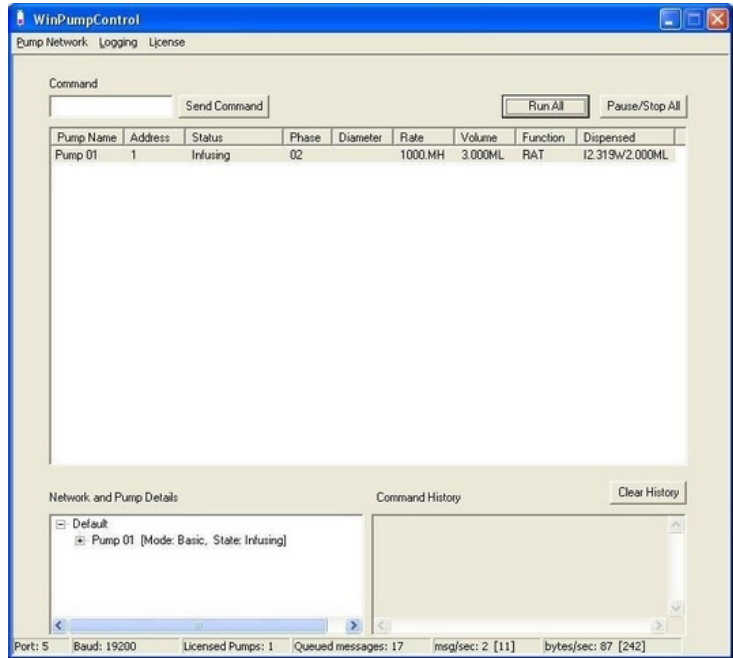
## 1.3 Constantly Evolving

A nice way of saying not finished yet?

SyringePumpPro is now in it's 4th year and it's growing and evolving into a more useful tool for managing your pumps. Take a look at the screen shot of Version 1.2.

My policy is to release software updates often (but not too often) so that all users (trial users, and those great folks who purchase a license) get to benefit from the latest features.

I notify every one when there's been a bug fix that I feel will make a difference however, I don't want to get like Adobe when it seems like every 5 minutes there's a new update. If you feel in the mood, you can do a [Help->Check For Updates Now](#)<sup>[58]</sup>. Sure couldn't do that back in V1.2!



Version 1.2 circa 2010 - come a long way baby!

As such this manual - into which I pour all the content I can, is in a state of never being finished. The [latest version is available online](#).

We all tend to be slow on the documentation side of things - because we all hate doing it. Truth is there are certain days when I love doing it like today. They are rare though.

The greatest contributor to the rough spots in the manual is my practice of creating rough notes in the manual as I work.

So if I add a new feature or think of something that should be in the manual - I will put it straight in and promise that before I release the update I will go through the manual and clean it up. I don't need to explain what happens next.

The other great contributor is that someone will ask me a question, and as I answer it I will think - this belongs in the manual and I will slap it in then and there, again promising that I will come past and clean up.

Creating content for blogs and manuals is a big job, so blog posts and manual pages are often almost identical. This is because technical content about syringe pumps is worth organizing into a manual, and worth blogging about because someone will Google/Bing to find the answer to a question they have about syringe pumps. I will often create a blog post to answer someone's question and send them to read it, knowing that it will be there to help more than one person.

### Conclusion

In places my manual could use a polish - look around in it - there's some real gems in there.

A lot of folks do comment about how comprehensive this manual is.

## 1.4 Getting Support

I want SyringePumpPro to be a valuable tool that let's you do more with your syringe pumps. So if you need support please email me [timb@syringepumppro.com](mailto:timb@syringepumppro.com).



### FAQ's

There are [frequently asked questions](#) on the SyringePumpPro website..

**Links** will take you to a page of interesting syringe pump related web sites.

**[User Manual is presented online.](#)**

FAQ Menu

**Blog** The [SyringePumpPro blog](#) is a diary of developments and happenings.

Blog Menu Entry

### Contact

Use the [forms](#) provided to make:

- Requesting New features requests
- Suggestions
- Reporting Bugs
- Licensing Issues

Contact menu entry



## 1.5 Contact SyringePumpPro

If you are having any problems with your pumps or SyringePumpPro, or you have questions or suggestions, please send me an email.

I respond quickly and keep working with you until you tell me it's all working correctly.

# SyringePumpPro

Tim Burgess  
CEO SyringePumpPro

Web: <http://www.syringepumppro.com>

✉: [timb@syringepumppro.com](mailto:timb@syringepumppro.com)



[Linked In](#)



Postal: PO Box 506, Gawler, South Australia 5118

## 1.6 Versions of this Manual

### PDF

In the [downloads section](#) of the SyringePumpPro Website you can find pdf versions of this manual. You will need pdf reading software to view these files.



There are 2 versions available:

1. formatted for Letter Paper
2. formatted for A4 Paper.

Either version is suitable for on-screen viewing.

### Online Pages

These may be viewed at the [SyringePumpPro website](#). Look for the User Manual entry in the FAQ menu.

## 1.7 About SyringePumpPro

SyringePumpPro is run by me, Tim Burgess.

As a single person business I undertake computer consulting work, usually creating software for manufacturers of devices. My specialty is creating programs that interface humans to a computer, and the computer to some piece of hardware.

A fantastic thing about dealing with a one person company is that when you interact with SyringePumpPro, you are talking to the CEO/Software Guy. If you need technical support or a question answered, you'll get a response straight from the one person who should know

or can get you an answer!

***Imagine!***  
**Software support that doesn't fade away.**

SyringePumpPro benefits from my experience in:

- Defense Research laboratories where I wrote software to collect and process experimental data.
- Working for a medicines manufacturer.
- Creating machine control software for a world leading manufacturer of transformer core making machines. This software has been exported world-wide for several years.
- Training - I was a senior lecturer in programming.
- A lengthy career in building software and computer administration.

If you have any questions or comments about SyringePumpPro, I'd love to hear from you. My address is [timb@syringepumppro.com](mailto:timb@syringepumppro.com).

I would be delighted to hear about your syringe pump application, and any suggestions you may have for future versions of SyringePumpPro.

Sincerely,  
Tim Burgess

### 1.7.1 Where Am I?

I get asked quite a lot - where am I? This map should help clear things up



In the land down under!

## 1.8 New in this Version

*Note All users of SyringePumpPro Version 1 may upgrade to the latest version free.*

Version 1.64

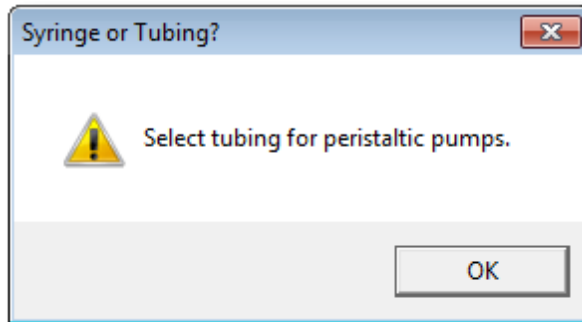
- **Version 1.6.4.7 has been released.**



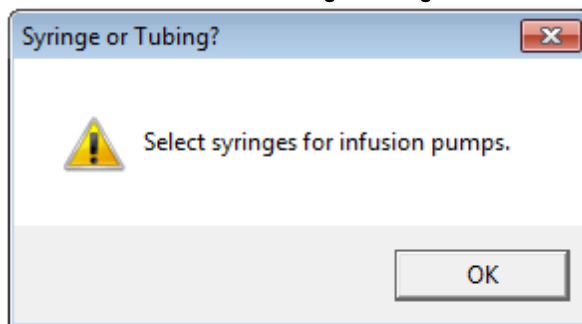


**This is an Important update.  
All installations should be updated as soon as possible.**

- 3rd party library update.
- a second 3rd party library update.
- a later edition of the second 3rd party library update - sheesh!
- An update to the documentation tool I use.
- Bug: Leading digit of pump diameter in drop down discarded. Wrong diameter sent to pump. Wrong infusion rates.
- Bug: pump at address -50 from send command box.
- Bug: NE-9000 tubing settings several problems
- Bug: License key copy button loads garbage characters into clipboard - you find out when you paste them into emails.
- Bug: Don't let people set tubing diameters on infusion pump and syringe diameters on Peristaltic pumps.



Select Tubing Warning

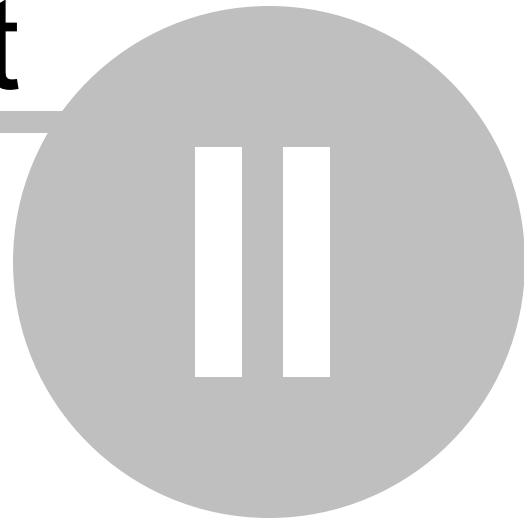


Select Syringes Warning

- Change to the Syringe data file for the NE-9000 - changed decimal tubing diameters to fractional representation. WARNING if you have added or removed entries - these changes will need to be re-done.
- Report new diameter setting in the history window.
- Trial date not setting properly for some up-graders.
- Show all version number in the title bar.
- Selecting particular Hamilton syringe lead to a crash.
- Added instructions how to select microfluidic units in programming spreadsheets.
- Updated to latest pump programming spreadsheets - thanks to Barry from New Era

Pump Systems.

# Part



# Syringe Pump Pro

## User Guide



## 2 Using SyringePumpPro

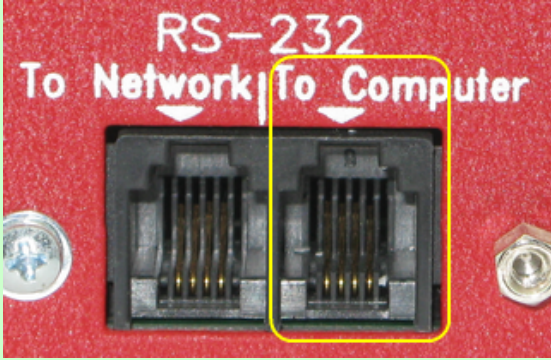
This section will take you through the different areas of the application and explain how to use them.

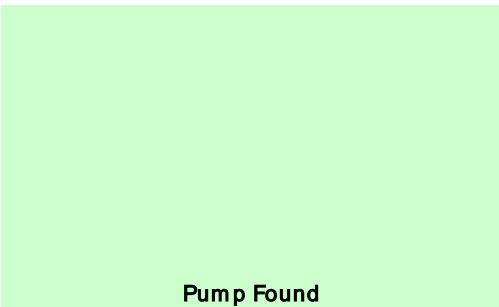
### 2.1 Quick Start Guide

Here's how to very quickly get SyringePumpPro up and running with a single pump. Don't try to get multiple pumps working straight away. Alright try it and if it doesn't work immediately, go back to a single pump.

Step	Instructions	Illustration
1	<ul style="list-style-type: none"> <li>• Unpack your pump. <b>If you have more than one pump - just start with a single pump..</b></li> <li>• Connect the power pack to the mains supply and to the pump..</li> <li>• Power on each pump and you should see a display.</li> <li>• Turn off the pump.</li> </ul>	<p style="text-align: right;"><b>New Era Pump Systems - a few models</b></p>
2	<p>Unpack your cables, and familiarize yourself with <a href="#">How to connect your pump</a><sup>[83]</sup>(s) But only connect the USB-RS232 device and the first pump cable for now.</p>	<p style="text-align: center;"><b>Pump Network Diagram</b></p>
	<p>Connect the USB-RS232 device to your computer. Windows should take you through installing a driver. There is more detail on this in the section <a href="#">Using USB-RS232 Adaptors</a><sup>[86]</sup></p>	<p style="text-align: right;"><b>USB-RS232 adaptor</b></p>



Step	Instructions	Illustration
	<p>ATEN, but Prolific.</p>	
<p>3</p>	<p>Now it's time to connect your first pump.</p> <p>We will start by connecting one pump and confirming that it is working.</p> <p>Connect the data cable. The large end connects to your USB-RS232 device and the small end (similar to a telephone connector) plugs into the pump to the socket labeled "To Computer".</p> <p>The photo of the rear of the pump shows where the telephone style connector goes. IT's the socket on the right hand side looking at the rear panel like the photo on</p>  <p>the right.</p> <p><b><i>Do not attempt to use the DB9 connector marked TTL - this is not the communications port.</i></b></p> <p>There's more detailed information about connecting your pumps in the section <a href="#">Connecting Your Pump(s)</a><sup>83</sup>.</p>	<p>Windows found new hardware</p> <p>Primary Cable</p> <p>RS232 port on rear of pump - not the DB9</p>

Step	Instructions	Illustration
4	<p>Download and install SyringePumpPro - if you haven't already.</p> <p>See the section <a href="#">How to Install SyringePumpPro</a><sup>[28]</sup> for details on how to do this.</p>	<p style="text-align: center;"><b>Installation Welcome Screen</b></p>  <p style="text-align: center;"><b>Pump Found</b></p>

## 2.2 SyringePumpPro Licensing

When first installed SyringePumpPro is unlicensed and operates in a limited functionality mode for 14 days - the trial period.

Following the trial period the SyringePumpPro will cease to function except to accept a [purchased license key](#)<sup>[27]</sup>.

At the end of the trial period, the user is expected to remove SyringePumpPro from their computer or purchase a license.

[Visit the SyringePumpPro Website](#)

See the section [Purchasing a License](#)<sup>[27]</sup> for more details.

### About the License key



The license for SyringePumpPro takes the form of a serial number created from a special number generated by an installed copy of SyringePumpPro. This serial number is delivered via email to the person using the license.



The person who installs SyringePumpPro should contact [timb@syringepumppro.com](mailto:timb@syringepumppro.com) for a license

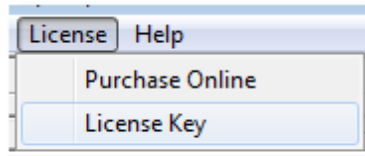


key. Further details about licensing are found in the section of this manual [Installing the License](#)<sup>36</sup>.

## 2.2.1 Entering Your License Key

### Let's get your copy of SyringePumpPro installed and activated.

- [Download SyringePumpPro](#) from the SyringePumpPro website. The trial version is the full version of the software, which your license key will unlock.
- **Install the software on the computer** to be used with your syringe pump(s) connected. Your purchase is for one license key assigned to the computer you nominate. It cannot be moved.
- Start SyringePumpPro. From the menu **select License->License Key**



Select License Key

- The license key dialog will appear.

License Key

Buy a license!

**Buy Now!**

Also available from your pump supplier, or directly from  
[New Era Pump Systems](#)

Machine ID  
52A7632D-SyringePumpPro

Email request Copy

Note: Your license key is for a single computer with the above Machine ID.

Your License Key  
ENTER LICENSE KEY HERE...

Paste Valid Key Pumps Licensed 0

Licensing Procedure

Purchase a license key from my webshop, or your pump supplier.

Email the Machine ID to me. Make your own email or click on the email request button.

You will receive your license key via return email.

Copy the license key from my email to you, then paste it into the License Key using the Paste button..

Cancel OK

Machine ID area in outlined in red

- In the red square click the **Email request button**.
- An email window will appear.  
In the email, fill in your name and company/institution details, and your agent's name and order number if you have one. **Send the email** when you have finished. If you don't have email software configured on the computer you are using, copy the MachineID from the box and create an email to [timb@SyringePumpPro.com](mailto:timb@SyringePumpPro.com). Don't forget to include the your name and company/institution details, and your agent's name and order number.
- I will generate your license key and email it to you - typically within 24hours.
- **Paste/type** your license key where it says ENTER LICENSE KEY HERE.
- If your key is entered correctly you will see a tick and the number of licensed pumps.

Your License Key

1KXD VX02YAF5G72A0I7CXD

Paste Valid Key Pumps Licensed 6

Tick indicates your license key has been accepted

That's it - your done!





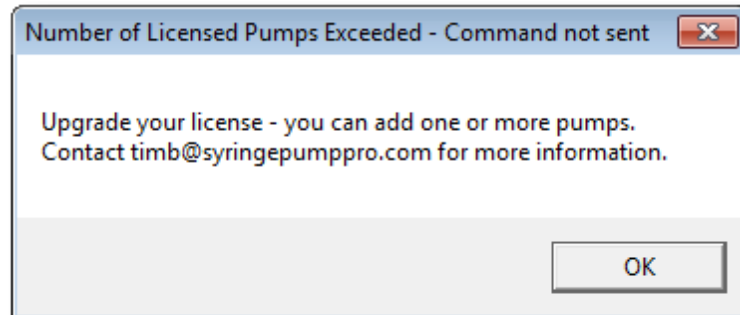
## 2.2.2 How is SyringePumpPro Licensed

### How is SyringePumpPro Licensed?

SyringePumpPro is licensed to a single computer for a number of pumps. The number of pumps licensed is entered when making your purchase.

For example: You may license 5 pumps on one computer and 10 pumps for another computer. These two licenses are distinct. Pumps may move from computer to computer without effecting the license.

If you connect more pumps than you have purchased a license for, you will not be able to operate the extra pumps.



Number licensed pumps exceeded

### Can I Upgrade My License? - YES

Number of pumps license upgrades can be purchased from the SyringePumpPro web shop and are priced such that there is no penalty for purchasing license upgrades or purchasing the full number of pumps outright.

### Moving Licenses

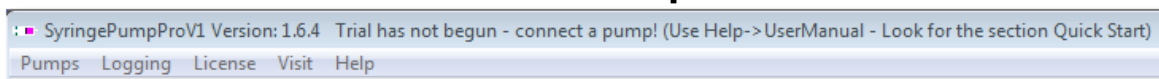
The license is not transferable to another computer.

## 2.2.3 Trial and Licensed Mode

### What are the modes?

There's only the two modes, Trail and Licesense. The main difference is that you have to spend money to get to licensed mode, Trial mode only lasts 14 days AFTER a pump is detected.

### Trial Mode - Installation Until Pump Detected

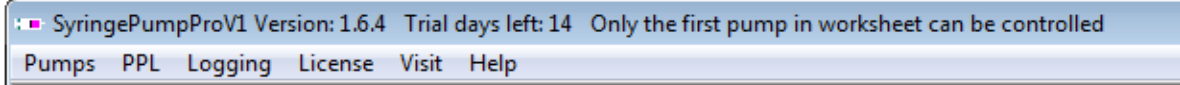


Trial period does not commence until you connect your pump

When SyringePumpPro installs, it begins operating in Trial mode. where it operates as though your have purchased a single pump license.

Limited information for unlicensed pumps is displayed in the pump explorer

### Trial Mode - Pump Detected, and 14 Days After



Top bar indicates the number of trial days left

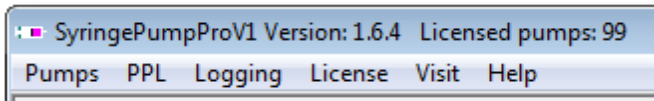
## After the Trial Period - No License Key

"SyringePumpPro %s Time to purchase a license - in the menu select Options -> License"



If your trial runs for the full 14 days, SyringePumpPro will deactivate the single pump trial license and all connected pumps will operate with trial license restrictions. SyringePumpPro will still detect and connected to pumps, and monitor them for you. Don't forget - you still have access to the manuals and documentation. So it will be handy.

## License Key Purchased and Installed



### 2.2.4 Trial Limitations



The trial version will operate fully with the first displayed pump for a period of 14 days after detecting a pump. It will show any other pumps connected but not send commands to them.

***After the trial period expires, SyringePumpPro will cease to function.***

During the trial period a number of limitations are imposed on SyringePumpPro. During the trail period you are granted a time limited license for a single pump. That pump is the first



pump appearing on the pump worksheet. Referred to below as the first pump.

These are:

- It is limited to controlling the first pump.
- Pump programs may only be uploaded the first pump.
- The All Pumps start and stop buttons will only work with the first pump.
- SyringePumpPro will “see” and report the status of all connected pumps, however it will be unable to send commands where the pump replies with data, nor will it process PPL files for any pump other than the first pump.
- Users of the trial version of SyringePumpPro are welcome to use support.
- The number of trial days remaining is displayed on the top of the SyringePumpPro window.
- The \* commands Reset, Adr, Buz are available and will be sent to all pumps - for fault finding pump network connections.

## 2.2.5 Licensed Limitations

### Are there any limitations on a licensed version?

**Your license key is for exactly one computer with the machine ID you supply for the license key I send. If that machine ID changes for any reason, you will need to purchase another license.**

Please consider what would happen to my income if a single pump license at \$49 was able to be used on as many computers you would like, and also consider what would happen if that license could be handed around the world via the internet.

In addition:

- If you purchase a 6+ license - no - except that you may only install it on one computer.
- If you purchase say a 3 pump license, then you will be able to completely operate the first three pumps in the pump worksheet and any further pumps detected will have the full trial limitations applied to them.

## 2.2.6 Do I really need to buy two copies for two computers?

This question comes up a lot. - Yes.

Please try to look at it this way - I have a mortgage and bills to pay, and a wife and dog to feed. You might have one or all of them two. Would you or the company you work for offer me two for the price of one? Really?

## 2.3 Purchasing a License Key

You can purchase your license online in the [SyringePumpPro shop](#), or from your local pump supplier

### Will I Get An Invoice?



The Online shop will email you an invoice. If you don't receive it, please email [timb@syringepumppro.com](mailto:timb@syringepumppro.com) and I can resend it, or print and post it.

### Do I Offer Discounts?



I don't offer educational discounts.



I do offer volume discounts. Generally I will give 10% off for 5 + licenses.

### How Will The Software Be Delivered?



SyringePumpPro is available via download from the [SyringePumpPro](#) website. This provides instant delivery and no import or customs worries.

As downloaded the software is configured in trial mode and will only operate for 14 days following installation.



Purchase a SyringePumpPro CD in the Web shop. This CD does not contain a license key. It's not a cheap licensed version of the software.

#### 2.3.1 Pricing

When you purchase SyringePumpPro, you will need to pay for a license based on the number of pumps you wish to have connected at one time. See the [Pricing page at the SyringePumpPro Web shop](#).

SyringePumpPro is licensed by installation (installed copies) and the number of pumps connected to that/those installation(s). All licenses apply to a single computer.

Here are some alternative license examples:

- Connecting 5 pumps to a single computer, at the same time, you will need one 5 pump license.



- If you have 5 pumps connected one at a time, to one computer, a 1 pump license will do.
- If you need to connect 5 single pumps to 5 separate computers, purchase five 1 pump licenses.

### 2.3.2 What Payment Methods Are Available?

## What Payment Methods Are Available?

All major Credit Cards are accepted.

All major  
credit cards

PayPal

PayPal  
Inside PayPal you can use most major credit cards too.

Direct Transfer



In the shop, select payment method -  
Generate Purchase Order  
Bank Account details

National Australia Bank  
Branch: Gawler, South Australia  
Swift Code NATA AU3305A  
BSB: 085-599 Account:56-619-0421

Cheque



Cheques are not accepted. My bank's fees, currency conversion losses and charges for failed cheques have forced me to no longer accept payment by cheque.

## 2.4 Getting Started

Enter topic text here.

### 2.4.1 Installing SyringePumpPro


The basic steps are:

- Download from the website
- Run the installer
- Trial SyringePumpPro for 14 days
- Purchase SyringePumpPro
- Enter your License Key

#### 2.4.1.1 System Requirements

SyringePumpPro will run on:

- Windows XP, and Vista. and Windows 7, Windows 7 Starter (for net books) and Windows 7 X64, Windows 8.0 (X32 and X64), Windows 8.1(X32 and X64)
- Users report it running under Windows Emulation on Mac platforms.

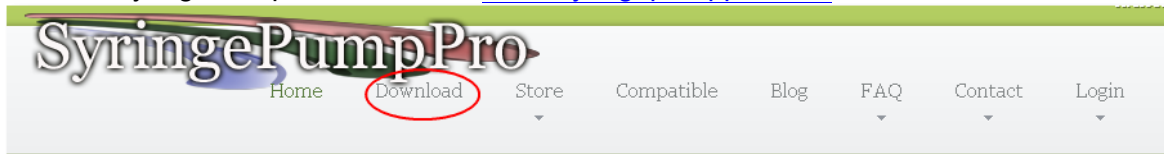
- Any modern computer - less than 5 years old. Older computers will most likely work too.
- Requires a correctly set and advancing computer clock.
- About 200mb of free disk space.
- A pre-installed pdf reader. I recommend Adobe Reader 
- At least one RS232 serial port is required along with the appropriate connecting cable(s) to the pump and/or pump network. (Please follow the instructions contained in the New Era Pump manual.) or a compatible USB to serial converter. Note some of these converters work better than others.
- Pump cables - see the cabling diagrams.



Windows 2000, Windows NT and Windows 9X are NOT supported  
 Windows XP 32 bit is supported, 64 bit - hasn't been tested.  
 Windows Vista (32 and 64 bit) is supported - but hey upgrade!  
 Windows 7 (32 and 64 bit),  
 Windows 8, 8.1 (32 and 64 bit) are supported

#### 2.4.1.2 How to Download SyringePumpPro

Visit the SyringePumpPro website at [www.syringepumppro.com](http://www.syringepumppro.com)



SyringePumpPro website - menu

Click Download

#### 2.4.1.3 Downloading The Installer - Step By Step

SyringePumpPro is delivered as a single file download, which when run, installs a number of files on your computer, and configures your computer's menu's to work with SyringePumpPro.

If you are having trouble download or finding the install program, please [send me an email](#) and ask for some help.

Visit the SyringePumpPro Website. The address is <http://www.SyringePumpPro.com>

In these screen shots I am using Mozilla Firefox web browser.





You should see a menu entry, Downloads. Click.

**Download menu  
entry**

To start the download process, click the download button.

**Click the download button**

You will be asked what you want to do with the download - click save

**Choose Save**

Once you have clicked the download button, your web browser will show you some sort of progress indicator.

**Download completed**

Now you need to run the installer program. Try double clicking the name of the installer in the window pictured above - that's probably all you need to do. You should see the last image on this page.

You can go to the folder where the download was placed by right clicking on the name of the download in the picture above and you will see

**Right click will give options**

Choose Open Containing Folder and you will be taken to where the download is.

**In Windows Explorer top left  
hand corner**

**It's here in your Downloads Folder**

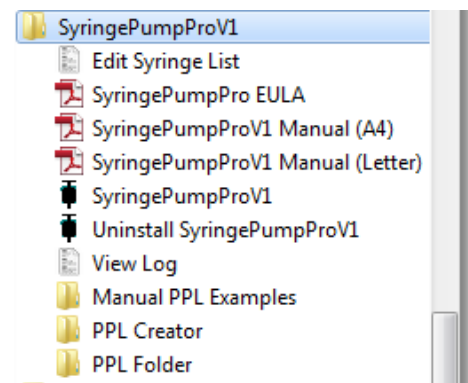
Here's the download sitting in your Downloads folder.

Double click it to launch.

This is the first screen of the installer, start clicking next to get SyringePumpPro installed!



The installer has begun, click next...



Look for SyringePumpPro in your start menu, and on your desktop.

#### 2.4.1.4 Digitally Signed for Your Safety



How do you know that the files you download, are the ones I prepared and have not been interfered with by some spammer? Bad guys are out there and precautions should be taken to protect your computer's security.

### To check your download (Windows):

Locate the downloaded installer which will be named SyringePumpPro-Vx.y-Setup.exe, where x.y is the version of SyringePumpPro.

Right click on the installer exe and in the pop up menu select Properties.

The installer icon





A window will pop up to show the properties of the installer executable.

Select the Digital Signatures tab at the top

#### Properties of the installer

In the Signature list area, click on the signer name TBITC Pty Ltd.

By now your confidence about the authenticity can begin to increase.

#### Checking the digital signature

Click the Details button and the display will now show the image on the right, without the red rectangle which I have placed to draw your attention to the statement 'The digital signature is OK.'

#### Details of the digital signature

### 2.4.1.5 Installing SyringePumpPro

Download the installation program.

To do this follow the instructions in the [Purchasing A License](#) <sup>[27]</sup> section of this manual

On your computer double click the installer executable file.

NOTE SyringePumpPro does not support installation on network shares, or running multiple copies of SyringePumpPro from a single network folder.

A window like the following will appear ->  
This is the installer program running.



First screen of the installer

This is the License Agreement Screen.  
Read the contents of the license and if you do not agree to the terms, cancel the installation.

If you do agree to the license terms, indicate your acceptance by clicking on "I accept the agreement".

Click next

License agreement

For help with connecting your pumps see the section in this manual [Connecting Your Pumps](#)

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About to start the installation



### Creating a desktop shortcut

The default action is to create a desktop shortcut and I recommend that you do.

With the box ticked - a shortcut to SyringePumpPro will be placed on your Desktop. This makes for easy day to day starting of SyringePumpPro.

### Installation - create desktop shortcut

### Installation proceeds

Whilst the installation is in progress you will see the progress bar move to the right, and file names will flicker past.

### Installation in progress

Your SyringePumpPro installation has been completed!

### Installation has completed

This is the final installation screen.

When you click finish SyringePumpPro will be loaded.

Click finish!



Close the installation program

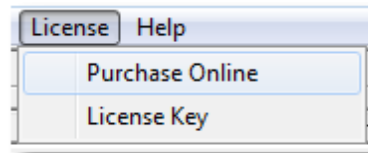
#### 2.4.1.6 Obtaining Your License Key

Install and run the SyringePumpPro. See [Installing SyringePumpPro](#) [32]

Select License ->License Key from the main menu.

The .License Key window will appear.

- Select the Machine ID by double clicking somewhere on the Machine ID text.
- Right click your mouse and select



Machine ID in the top field



- copy.
- You can now paste your Machine ID into emails.
- Email your Machine ID to [timb@syringepumppro.com](mailto:timb@syringepumppro.com)
- I will generate your license key and return it via email. This usually within a few hours. Please think about the time zone differences we are in.

#### 2.4.1.7 Activating Your License Key

Once you have received your license code, you need to activate SyringePumpPro

License menu

- Start SyringePumpPro.

- Return to the license configuration dialog, from the menu, select License->Configure.
- Enter the supplied license key into the License Key box. It's best if you use Windows cut and paste feature to copy the license key. Enter the code exactly as supplied into the license dialog box shown above.
- Close SyringePumpPro and then restart it. You should no longer be warned about evaluation periods

Enter your license key to activate the full features



### 2.4.1.8 Checking Your License Key

To confirm that your license code has installed correctly,

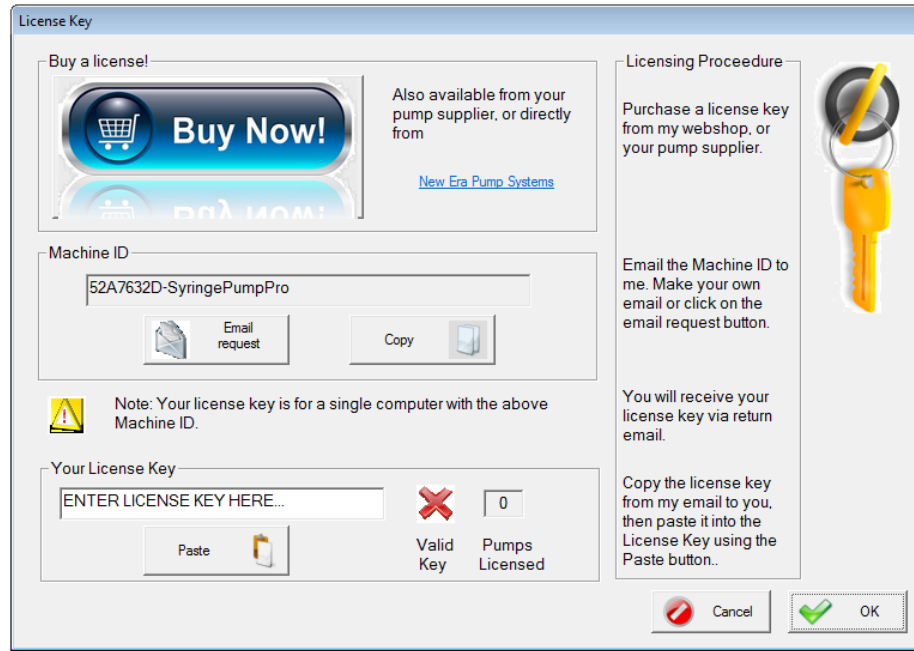
- Run SyringePumpPro
- Look at the lower left corner of the window on the [status bar](#)

Version and number of licensed pumps indicated

- The number of licensed pumps is also reported in the application title bar.
- After entering your license key - you can check it by select

License menu

ing  
Licen  
se-  
>Lice  
nse  
Key



Entered license key is displayed

#### 2.4.1.9 Uninstalling SPP

If you need to uninstall SyringePumpPro simply click on Uninstall in the start menu.

Start Menu

## 2.5 A First Look

This section will walk you through the displays and tell you where to find things. Then there will be a section of this manual dedicated to each screen to tell you what all the controls do. Be sure to spend some time familiarizing yourself with the controls and core options. There's a lot of functionality here!





## 2.5.1 Start Menu Entries

The installation program creates a new entry in your start menu called SyringePumpPro

Note: Your icons may appear in a different order - this is determined by Windows.

Inside this are the entries shown to the right.

- Edit the syringe list used by Quick Set
- End User License Agreement - legal document
- SyringePumpPro User Guide A4 format
- SyringePumpPro User Guide Letter format
- Launches SyringePumpPro
- Uninstalls SyringePumpPro
- Opens the pump log file in Windows Notepad
- Loads the SyringePumpPro Website into your web browser

**Start Menu**

The remaining folders lead to the PPL examples, SyringePumpPro on the web and the PPL Creator spreadsheets

PPL Creator spreadsheets. Use these sheets to write your PPL code. Basic value and syntax checking are done here. Very handy!

Be sure to use the spreadsheet appropriate to your pump. The different spreadsheets support the differing feature sets and limitations of the pump family members.

**PPL Creator sub menu**

- Choose between syringe or peristaltic (NE9000) examples.

**Manual PPL Examples sub menu**

- PPL Example1,2,3,4,5,6,7 -  
Launches the PPL Example files in  
Windows Notepad

The examples are in your pump manual  
- very helpful to learn pump  
programming and to borrow bits of PPL  
code.

These examples apply to the entire New  
Era Pump Systems syringe pumps and  
other brands.

#### NE1000 Family sub menu

- PPL Example1,2,3,4,5,6,7 -  
Launches the PPL Example files in  
Windows Notepad

The examples are in your NE 9000  
pump manual - very helpful to learn  
pump programming and to borrow bits  
of PPL code.

These examples apply to the New Era  
Pump Systems peristaltic pumps and  
other brands.

#### NE9000 sub menu

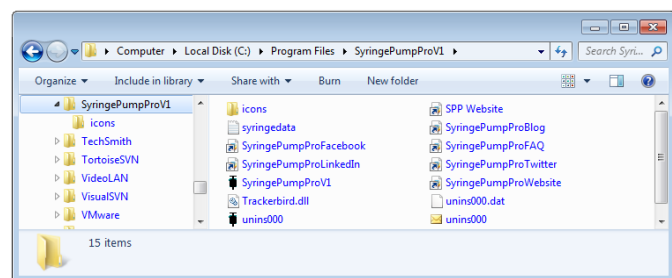
## 2.5.2 Files and Folders

When SyringePumpPro is installed on your computer it creates a number of folders and files. The following sections tell you what they are used for.

As a general rule: Don't delete any files or edit/change any files with any other application. SyringePumpPro expect all files and folders to be where they are installed.

### 2.5.2.1 Folders

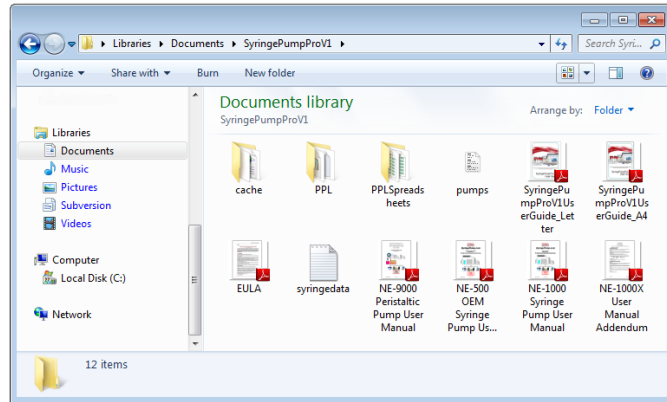
Here is the layout of the c:  
\Program Files\SyringePumpPro  
directory. The icon to launch  
SyringePumpPro is the one  
showing the syringe. The  
SyringePumpPro installation  
program creates menu entries in  
your [Start Menu](#) <sup>40</sup> and on your  
desktop.





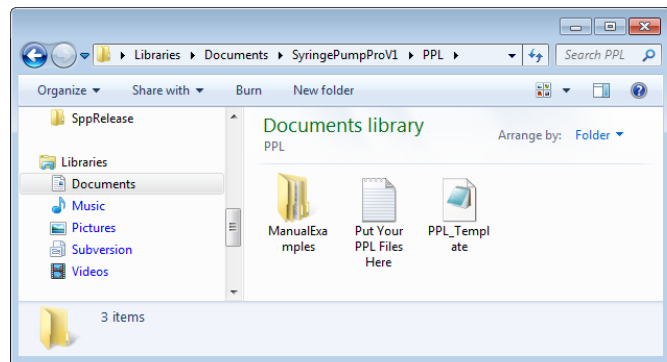
SyringePumpPro stores the manuals, ppl spreadsheets and PPL examples in your Libraries Documents Folder.

You are encouraged to save your ppl files in the PPL directory. See the next row.



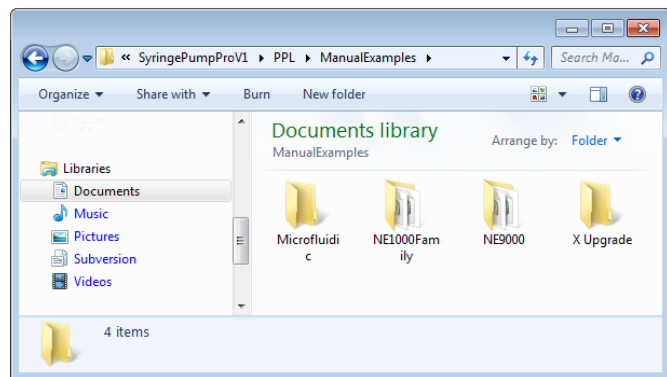
The PPL directory is the default place where SyringePumpPro looks for PPL files when uploading them.

Place your PPL files in this directory for the quickest and easiest access.

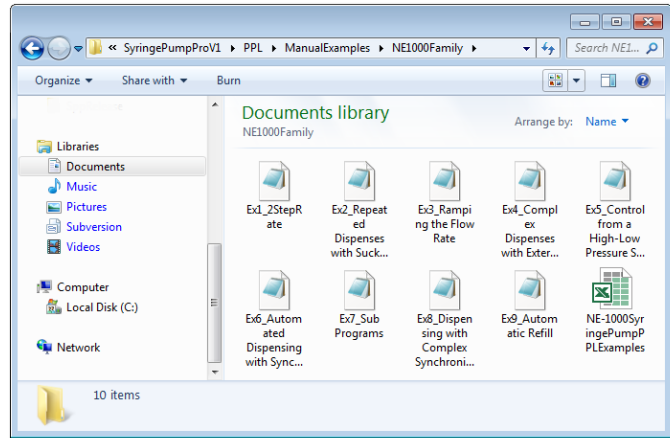


The folder Manual Examples contains the ppl files for the programming examples in the pump manuals.

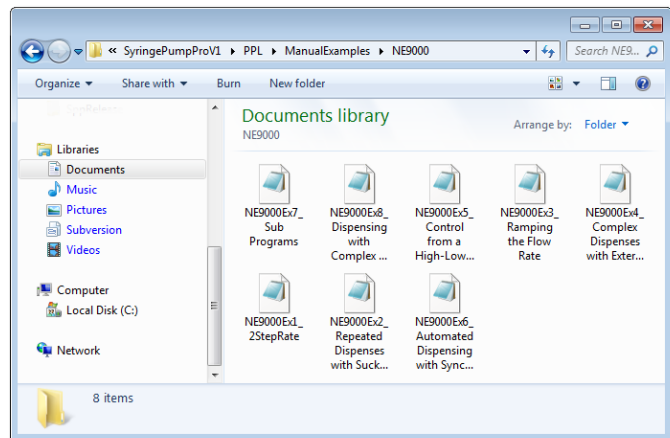
They are divided into the PPL for the NE1000 family - the syringe pumps and the NE9000 the peristaltic pump.



In the NE1000 Family folder are the example ppl code from the NE1000 manual and a spreadsheet that contains all of the examples.



In the NE9000 folder is the examples from the NE9000 manual.





### 2.5.2.2 Files

SyringePumpPro uses a number of different file types. Their icons and any issues are listed here.



#### **PPL files**

These files contain a saved PPL.



Electronic version of this manual.

This icon will be determined by the PDF reader software you have installed.

Double clicking on this icon will load the electronic version of this manual into your PDF viewing software.



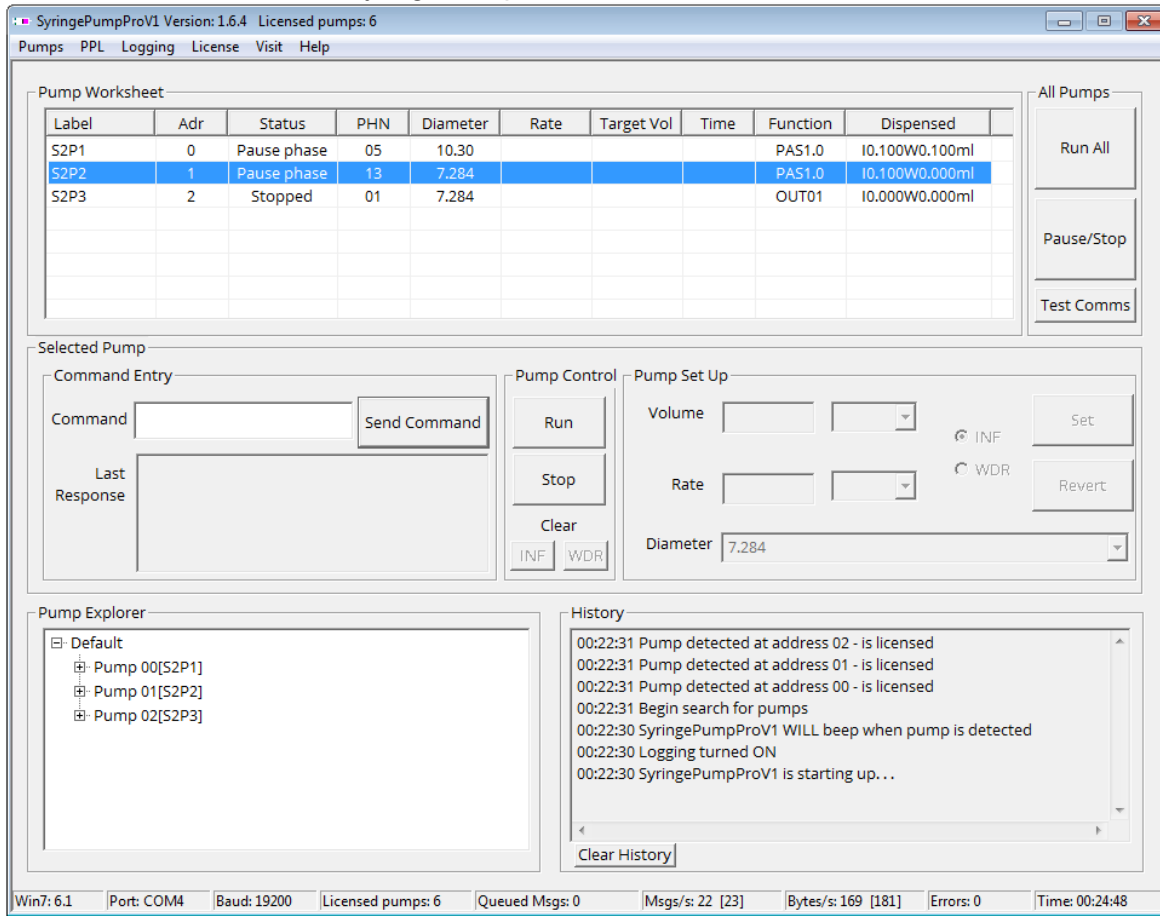
This icon indicates an internet shortcut.

Note that the icon will change depending on the Web browser you use.

For safety, speed and compliance with standards, I recommend using Firefox which is available from [www.mozilla.com](http://www.mozilla.com)

## 2.6 Screen Layout

Here is an overview of the SyringePumpPro screen.



Screen Layout

The major areas of the screen are surrounded by boxes labeled:

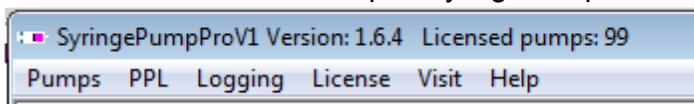
- Pump Worksheet
- All Pumps
- Selected Pump which contains Your Command, Pump Control and Pump Setup
- Pump Explorer
- History

There are three other screen areas:

- The Application Title bar
- The menu system at the top
- The status bar at the bottom

### 2.6.1 Menus

This is the menu bar at the top of SyringePumpPro

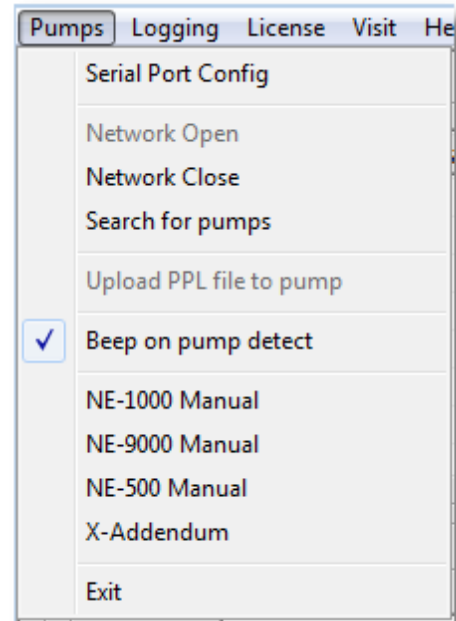




The sub menus:

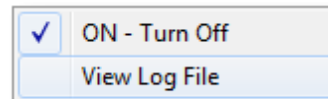
### Pump Network

- Offers commands to control pump connections and upload PPL files to pumps.
- A selection of pump reference manuals and X upgrade addendum.
- Exit SyringePumpPro



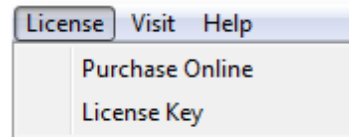
### Logging

- Turns logging of pump communications on/off
- View the log of pump communications.
- Normally logging is left turned on.



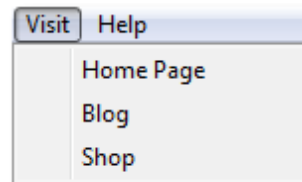
### License

- Used to go to the website to purchase a license
- License Key is used to access the Machine Id and enter the license key you have purchased.



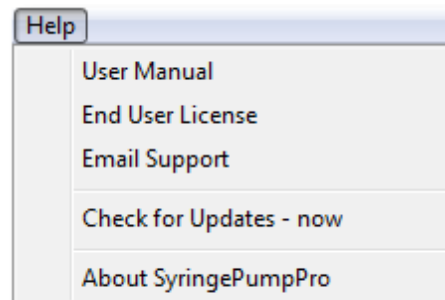
### Visit

- SyringePumpPro website.
- My blog for news and other information.
- My online shop.



### Help

Will open this User Manual on your computer, Take you to visit the SyringePumpPro website, or show you the End User License Agreement for SyringePumpPro.



### 2.6.1.1 Pumps

This menu group supply pump related functionality.

#### 2.6.1.1.1 Serial Port Config

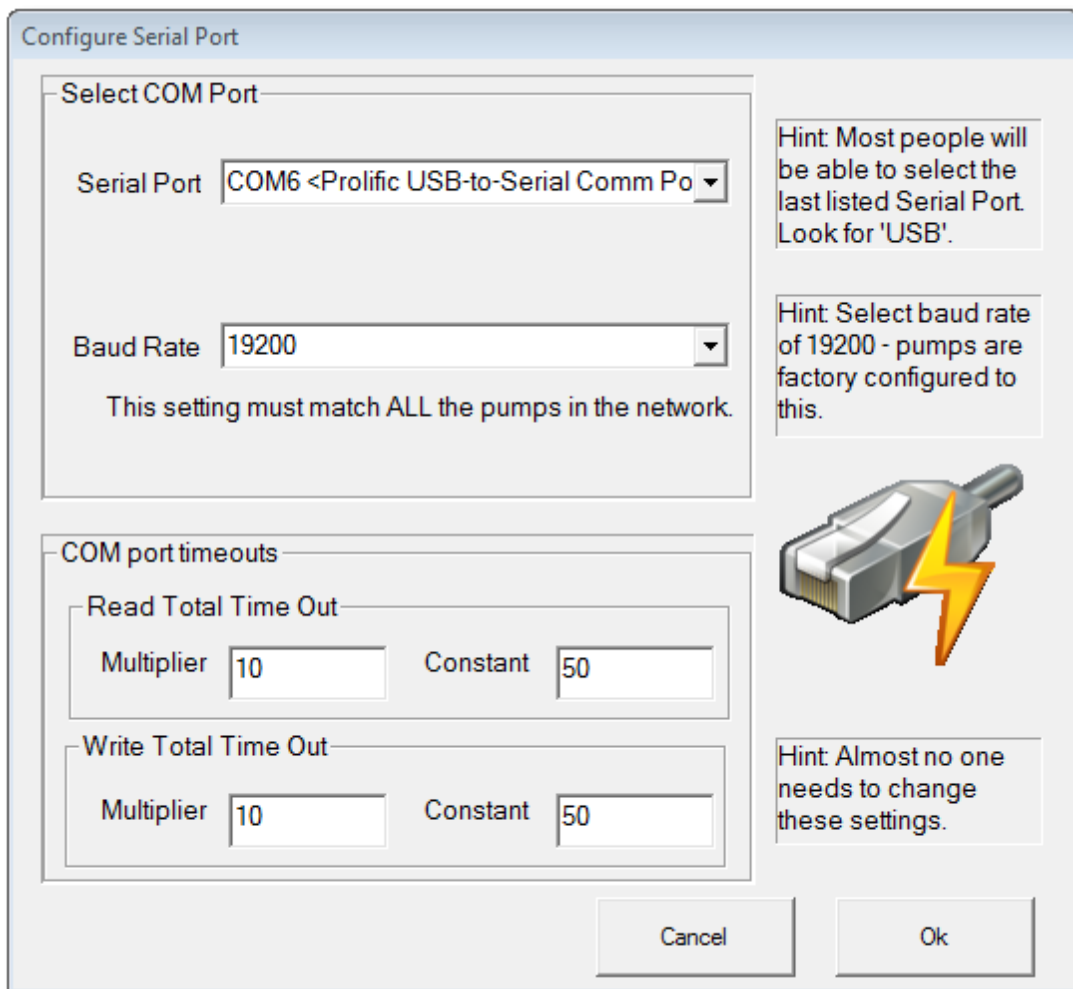
You shouldn't need to use this dialog! Ever!

This dialog is used to select and configure the serial port used to communicate with your connected syringe pumps.

The port is normally supplied by a US-RS232 device, but it can be a built in com port.

When you first run SyringePumpPro and until you have successfully connected to a pump, SyringePumpPro will look for a USB-RS232 device and automatically use it.

AFTER you have successfully connected to a pump, SyringePumpPro will no longer automatically configure the serial port.



The Serial Port Configuration Window

Specify the maximum number of milliseconds that can elapse between two characters without a timeout occurring with the ReadIntervalTimeout member.

Specify the read timeout multiplier with the ReadTotalTimeoutMultiplier member.





## RTTM RTTC WTTM WTTM explained

First don't adjust these settings. They have been selected for operation at 19200 baud and with the syringe pump's timing in mind.

For each read operation, this number is multiplied by the number of bytes that the read operation expects to receive.

Specify the read timeout constant with the ReadTotalTimeoutConstant member.

This member is the number of milliseconds added to the result of multiplying the total number of bytes to read by ReadTotalTimeoutMultiplier.

The result is the number of milliseconds that must elapse before a timeout for the read operation occurs.

Specify the write timeout multiplier with the WriteTotalTimeoutMultiplier member.

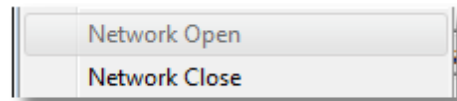
For each write operation, this number is multiplied by the number of bytes that the write operation expects to receive.

Specify the write timeout constant with the WriteTotalTimeoutConstant member.

This member is the number of milliseconds added to the result of multiplying the total number of bytes to write by WriteTotalTimeoutMultiplier.

The result is the number of milliseconds that must elapse before a timeout for the write operation occurs.

### 2.6.1.1.2 Network Open and Close



Open and Close entries

These two menu entries let you control the configured serial port.

Notice that they can be greyed out when their action is not possible. In the image above the Network is already open, but you could close the network.

### ***When would you need this?***

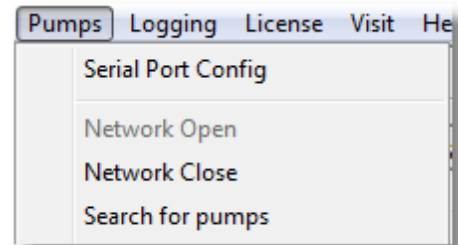
If you have to manually configure the serial port, you might have to manually open the port and close it.

### 2.6.1.1.3 Search for pumps

This menu entry starts a search for pumps on the current communications port at the current baud rate.

Your pumps will NOT be detected if:

- They are configured for a different baud rate
- Not uniquely addressed - duplicate address pumps will return random results or no result.
- Not wired to serial port configured in the [serial port configuration dialog](#)<sup>47</sup>.



Addresses 0 through 99 are interrogated.

You can initiate a search for pumps at anytime, running pumps will not be interrupted.

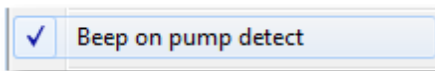
#### ***When would you use this?***

Usually used when

- Configuring, opening serial ports - trying to diagnose pump connection problems.
- If you have added a pump to a running network with SyringePumpPro running.

### 2.6.1.1.4 Beep On Pump Detect

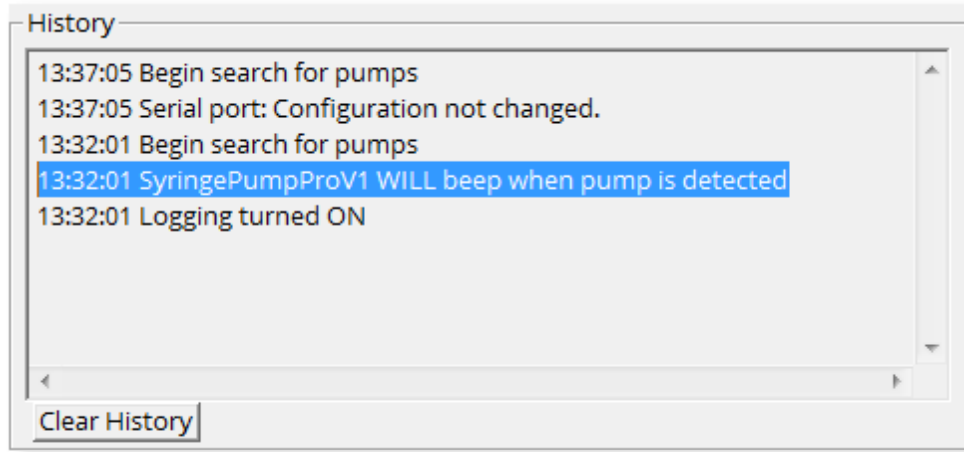
This option enables a detected pump to beep twice letting you know that it has successfully connected.



**When checked - detected pumps will emit  
2 beeps when they are found**

Clicking this menu entry will turn on and off this option, and the menu tick indicates when this feature is on..

When you use this menu entry a message recording the change will be reported in the History window.

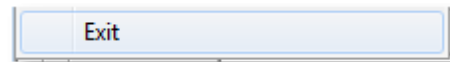


Highlighted entry showing Beep on pump detect state change

#### 2.6.1.1.5 Exit

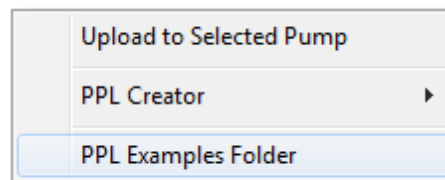
This menu entry is used to exit SyringePumpPro.

Your pumps will be left in the state they are in - running or stopped.



Exit menu entry

#### 2.6.1.2 PPL

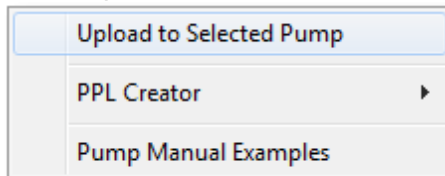


PPL Menu

Enter topic text here.

#### 2.6.1.2.1 Upload to Selected Pump

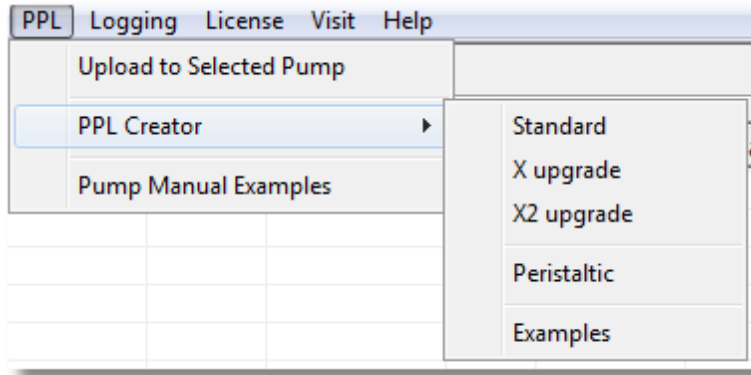
Enter topic text here.



Upload to selected pump

## 2.6.1.2.2 PPL Creator

Enter topic text here.



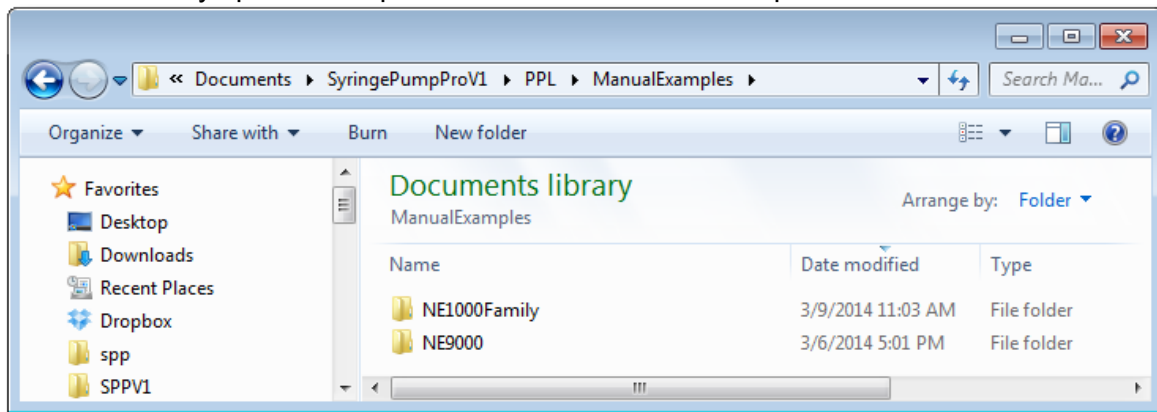
**PPL Creator Sub menu**

## 2.6.1.2.3 Edit PPL File

Enter topic text here.

## 2.6.1.2.4 PPL Examples Folder

This menu entry opens the top level folder where PPL example files are installed.



**PPL examples are in here**

Browse through the folders and the example ppl files for inspiration!

## 2.6.1.2.5 Advert - PPL for \$

Enter topic text here.

## 2.6.1.2.6 Help - Creating PPL

To create PPL programs quickly and easily Barry of New Era Pump Systems has created a spreadsheet. This makes the initial creation of a ppl program quick and easy.

## 2.6.1.2.7 Help - Editing PPL

Enter topic text here.

## 2.6.1.2.8 Help - Uploading PPL

Enter topic text here.



### 2.6.1.3 Logging

Logging of pump commands sent and pump responses over time is very useful for keeping records of pump actions and for “debugging.”

Logging is controlled via the menu item “Logging.” When enabled, the menu item will read, “Disable” and when not active, will read, “Enable.”

Logging is **ENABLED**

Logging is **DISABLED**

Use the Clear Log menu entry to empty the contents of the log file. Note - if you have the log file open to view, this command will not clear the log file.

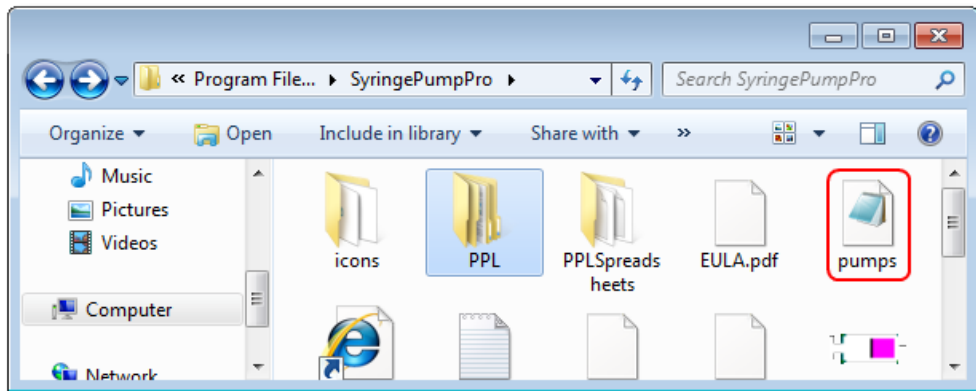
Clear log file

Use the View Log menu entry to open the current log contents in notepad.

View the log file

Note you cannot edit and/or save the log file, unless you choose another file name.

The log is stored in the file pumps.log, located in the c:\Program Files\SyringePumpPro directory.



show contents of a log

The log file defaults to pumps.log in the directory where SyringePumpPro is executed.

#### 2.6.1.3.1 What Is Logged

All events include the following:

- Date/time
- Event type
- Item (pump, network)
- Data – any associated data corresponding to the event)

SyringePumpPro logs the following events

- Network open and close
- Pump discovered
- User command sent to pump network
- Response received from the pump network for user command
- Phase change
- Pump Status change



- Alarm received

The fields in the log files are separated by commas so the file can be viewed in table format in Excel. The user may wish to set the log file name to \*.csv for simplicity if the user chooses to view primarily with Excel or other spreadsheet software.

#### 2.6.1.3.1.1 Sample Log Entries

The following are sample entries –

```
<05/04/06 14:01:13> , <Command sent> , <Pump 0> , <Command: 'DIA' Source:
'User command'>
<05/04/06 14:01:13> , <Pump Response> , <Pump 0> , <Result: 'Command OK'
Status: 'Withdrawing' Data: '27.00'>
<05/04/06 14:01:15> , <Command sent> , <Pump 0> , <Command: 'VOL' Source:
'User command'>
<05/04/06 14:01:15> , <Pump Response> , <Pump 0> , <Result: 'Command OK'
Status: 'Withdrawing' Data: '55.00ML'>
<05/04/06 14:01:37> , <Pump Status Change> , <Pump 0> , <Withdrawing>
```

The trial version does not provide specific event details.

```
<05/04/06 13:48:06> , <Pump Status Change> , <Event specific information
not available in trial version>
```

#### 2.6.1.3.2 The Log File

The log is stored  
in the file  
pumps.splog,  
located in the c:  
\Program Files  
\SyringePumpPr  
o directory.

**show contents of a log**

#### 2.6.1.3.2.1 Log Entry Timing

##### **Accuracy**

Entries in the log file have time resolutions in milliseconds, however, due to timing skew with the Windows operating system and depending on the load the computer is running under it is not recommended that you rely on these values to resolutions below tenths of seconds.

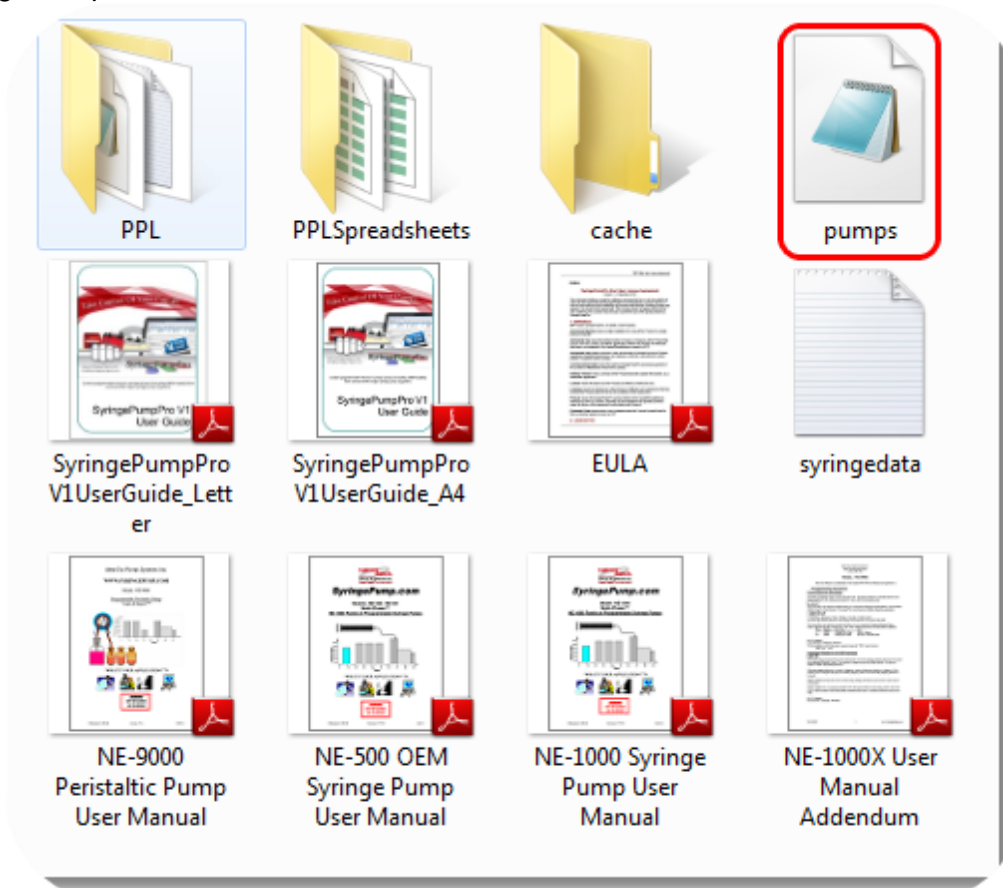
##### **Log Entry and Physical Event**

The time stamps are taken at the point just before the command message is sent (in the cases of commands being sent) and just after the pump responses message has been received and processed.

The time delay between those values is the time taken for the message to pass through the hardware layer of the operating system, the serial port, the round trip to the pump and back and the processing time at the pump for a message to be parsed, acted on and responded to.

## 2.6.1.3.2.2 Log file errors

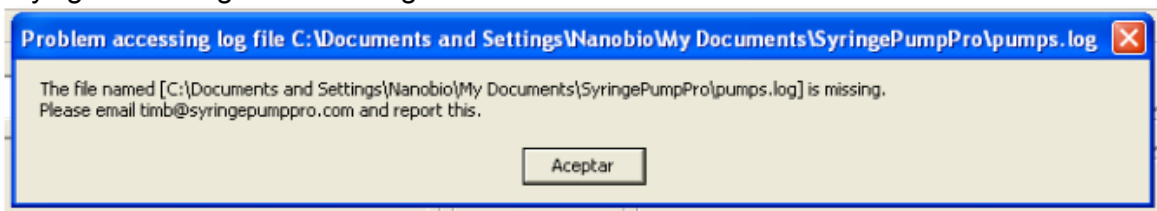
The log file is called pumps.spplog and is located in folder Documents Library \SyringePumpProV1



#### Locating the log file

Each time SyringePumpPro is started it recreates this file.

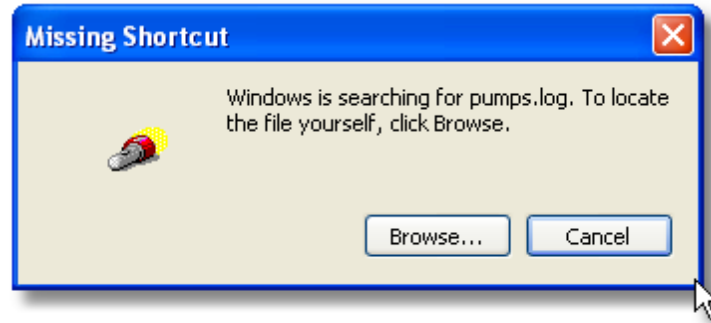
If the log file is deleted whilst SyringePumpPro is running, which is difficult to do because Windows will see the file is in use, attempting to view the log file will give an error message saying that the log file is missing.



Log file missing error message from a customer's computer

With no log file present the start menu entry View Log will fail, Windows will attempt to search for the file, cancel this search the file will not be found.





Windows attempts to search for the log file - cancel

To resolve this simply restart SyringePumpPro. The log file will be created.

#### 2.6.1.3.2.3 Name and extension

The log file is named pumps.splog

The log file defaults to pumps.splog in the directory where SyringePumpPro is .

#### 2.6.1.3.3 View Log File

Enter topic text here.

#### 2.6.1.3.4 Help - Logging

Enter topic text here.

### 2.6.1.4 Visit

Enter topic text here.

#### 2.6.1.4.1 Home Page

Enter topic text here.

#### 2.6.1.4.2 Blog

Enter topic text here.

#### 2.6.1.4.3 Shop

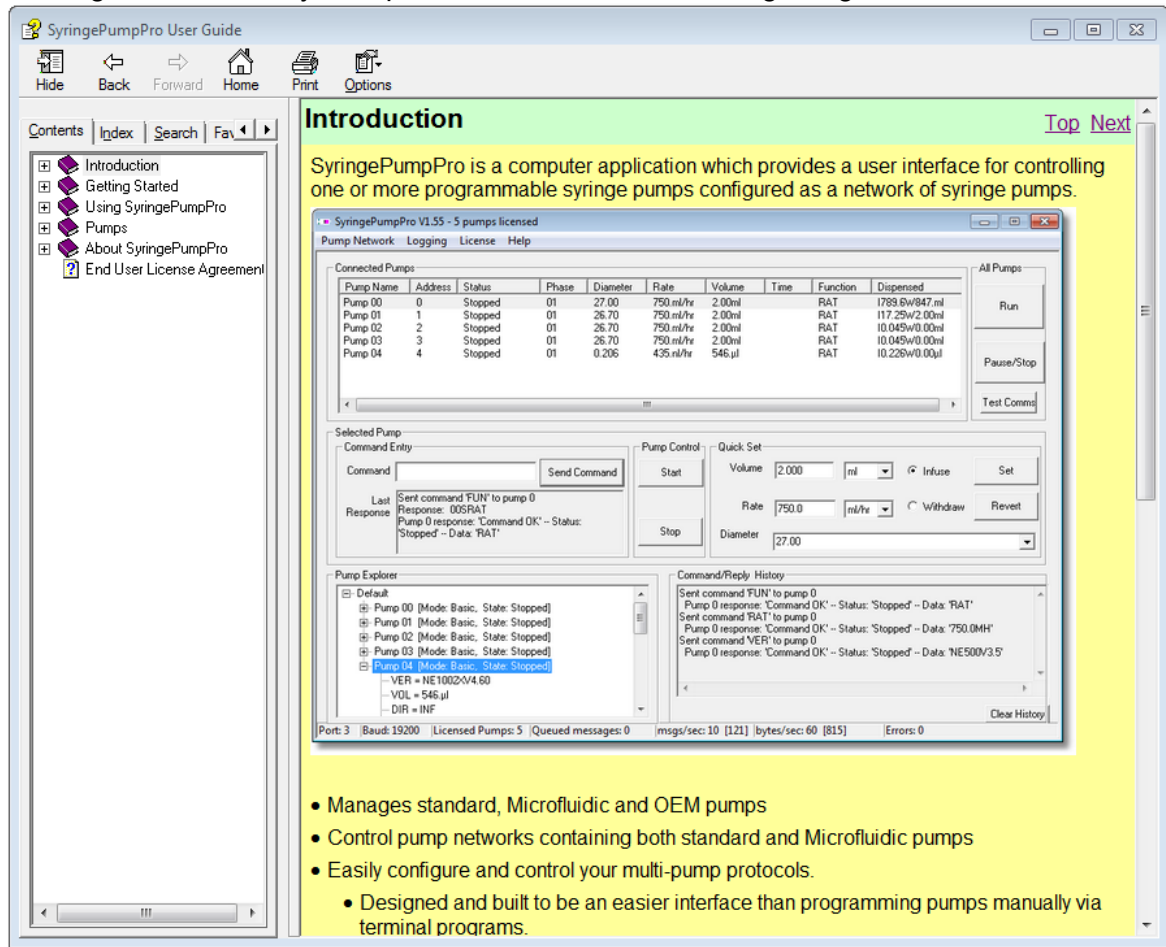
Enter topic text here.

### 2.6.1.5 Help

Enter topic text here.

## 2.6.1.5.1 User Manual

Clicking this menu entry will open this User Guide at the beginning.



## User Guide Open In Windows Help

## 2.6.1.5.2 End User License Agreement

Enter topic text here.

## 2.6.1.5.3 Email Support

This menu entry will open a new email message with:

- my email address filled in as the recipient.
- your email as the sender
- and a couple of prompts in the subject line and message body

Note: The message body automatically has your MachineID as the first line - please leave it there.

Note: Only available on internet connected PC's. When internet is unavailable, this menu entry is greyed out.

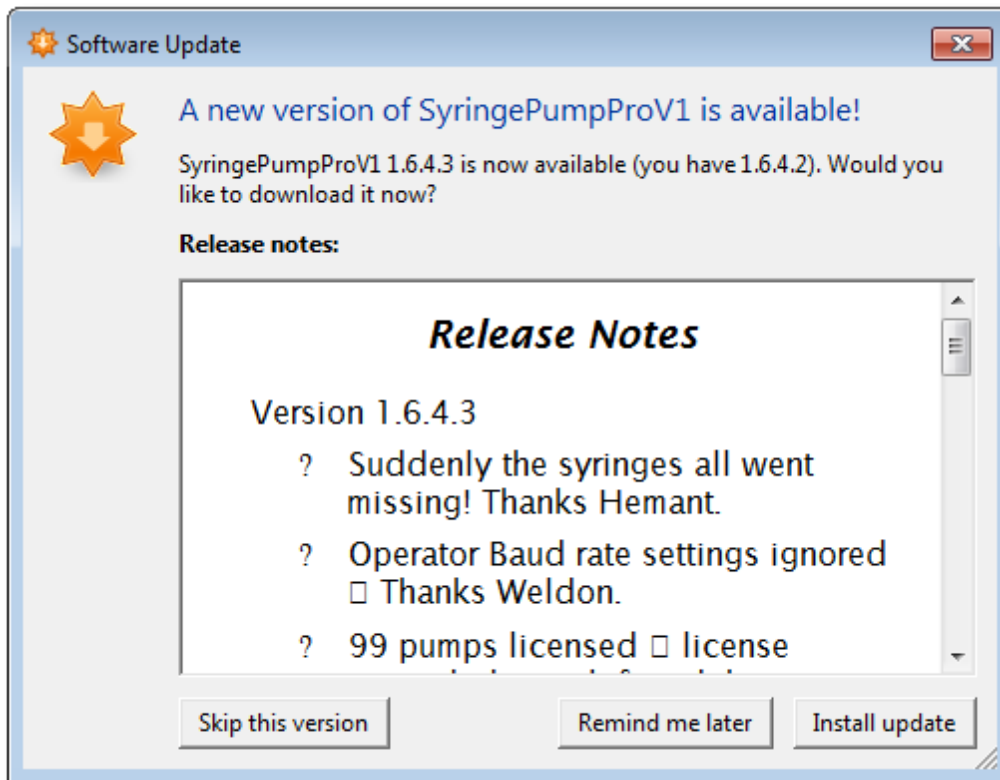
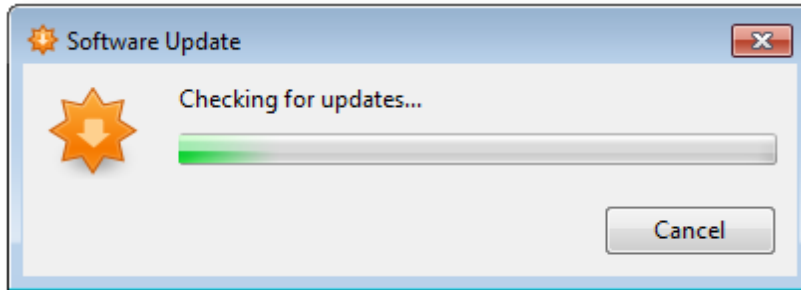
Note: Only works if your email software has been configured correctly.



## 2.6.1.5.4 Check For Updates

SyrinePumpPro has the ability to check for an update from the SyringePumpPro server.

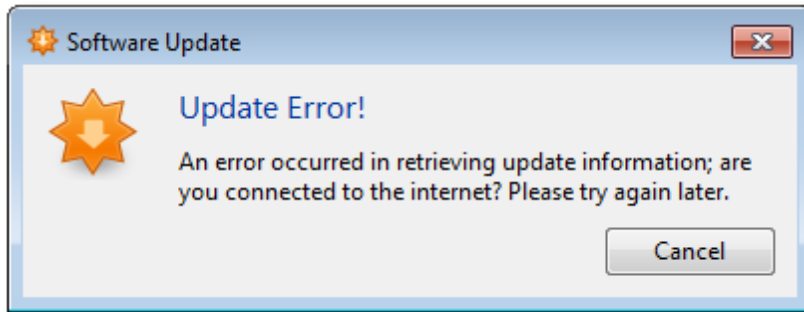
from the menu



## 2.6.1.5.4.1 Update Errors

If it doesn't work..

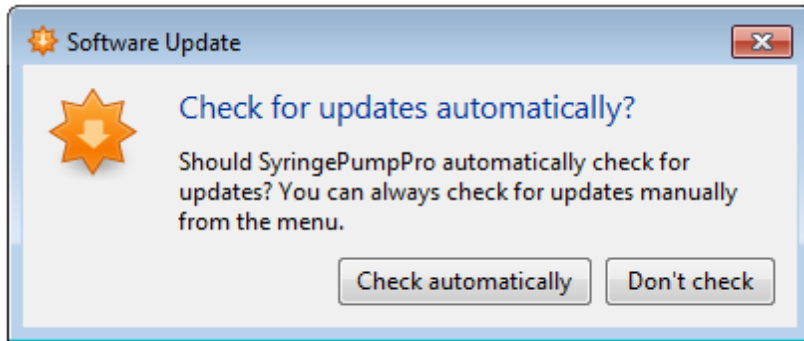
You will see an error message like this:



NOTE: For those of you with lab with no internet, your going to have to take the PC out of the lab to an internet connection somewhere.

## 2.6.1.5.4.2 Configuring the Update Checking

When SyringePumpPro first ran you were asked



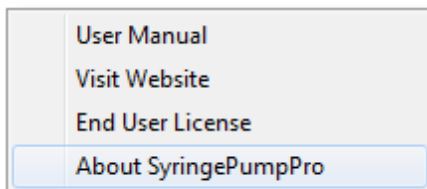
automatically.

If you would like to change your answer from the menu select  
Options->Update Check Automatically



## 2.6.1.5.5 About SyringePumpPro

Clicking the help menu entry *About SyringePumpPro* will display this program information.



About entry in the Help Menu



About box

Clicking the *Visit SyringePumpPro.com* link will open a web browser window and take you to the SyringePumpPro website. There you can check the blog for the latest news and happenings and what the latest version of SyringePumpPro is.

Clicking the link [Email support](mailto:timb@syringep...)<sup>57</sup> link

Note: Both links are only available on internet connected PC's. When internet is unavailable, these links are greyed out.

## 2.6.2 Pump Worksheet

The pumps worksheet lists the detected and connected pumps, and allows you to choose which pump in the pump network will receive the commands entered into the Manual Command panel.

Pump Name	Address	Status	Phase	Diameter	Rate	Volume	Time	Function	Dispensed
saline	0	Withdrawing	02	27.00	1000ml/hr	55.0ml		RAT	1230.0w/271.ml
glucose	1	Pause phase	05	26.70	750.ml/hr	0.25ml		PAS90	113.25w/1.50ml
water	2	Program paused	01	26.70	750.ml/hr	2.00ml		RAT	10.014w/0.00ml
ethanol	3	Program paused	01	26.70	750.ml/hr	2.00ml		RAT	10.009w/0.00ml
microfluidic	4	Infusing	01	0.206	435.nl/hr	546.µl		RAT	10.217w/0.00µl
marker dye	5	Stopped	01	26.70	750.ml/hr	2.00ml		RAT	10.000w/0.00ml

Pump worksheet showing connected pumps

### 2.6.2.1 Labelling Pumps

You can assign your pumps task specific names. When running multiple pumps in a more complex setup, using a meaningful name can help operators. When an alarm or other message appears in the History Window, it will include the pump name. This can help operators know that the problem is with a specific solution rather than pump number X and then try to figure out which is pump X

To label your pumps:

Click the pump name, and you will see the entire name become highlighted.

Type your new pump name and press enter.

Pump Name	Address	Status
Pump 00	0	Progra
Pump 01	1	Progra

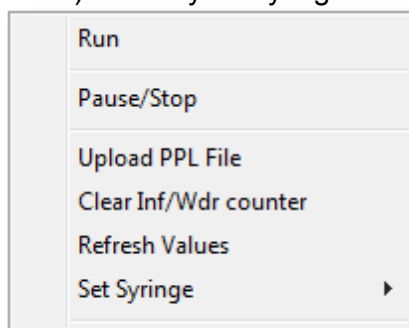
Naming a Pump

The name will now be applied to the pump.

Pumps Named

### 2.6.2.2 Pump Context Menu

The Pump context menu drops down when you right click on a pump in the Connected Pumps Worksheet. If you click on the Set Syringe entry a further drop down menu will appear (larger than portrayed here) with all your syringe settings.





Function	Action
Run	Runs the currently loaded PPL
Pause/Stop	Pause running PPL program on the first click, stop running PPL on second use.
Upload PPL File	Locate a PPL file and then upload it to the pump.
Clear Inf/Wdr counter	The infused and withdrawn counters in the pump will be set to zero
Refresh Values	Request new values from the pump
Set Syringe	Choose a syringe from the syringe list

### 2.6.3 All Pumps

The All Pumps controls effect all of the connected pumps listed in the [Pump Worksheet](#)<sup>[61]</sup>.

These controls are only enabled when 2 or more pumps are detected and you have than 1 pump licesed

The start and stop button will start and stop all pumps at the same time.

Be aware that multiple pumps running ppl programs will be in different phases performing different functions. The Stop button issues a single stop command, and some pumps will enter pause mode whilst others will enter stop mode. Unlike the Selected pump stop button, pause phase is not indicated.

The Clear Counter INF and WDR buttons only effect stopped pumps.

Communications mode button shows whether we are  
XXXXXX Manual



Pause/Stop explained

#### 2.6.3.1 The Run All button

The All Pumps Run button will start all pumps that are paused or stopped. Running pumps will keep running.

#### 2.6.3.2 The Stop All button

The All pumps stop button will send a stop command to all pumps.

Remember a running pump may need to receive 2 stop commands. The first stop command will pause the pump and a pump receiving a stop command will stop. So the first stop makes the pump pause and the second makes the pump stop.

Unlike the selected pump Stop button, this button does not indicate pause and then stop. This is because when there are more than one pump connected, this button cannot indicate

the state of every pump.

## 2.6.4 Selected Pump Controls

When pumps have been detected by SyringePumpPro they are displayed in the Pump Worksheet.

Label	Adr	Status	PHN	Diameter	Rate	Target Vol	Time	Function	Dispensed
S2P1	0	Stopped	01	10.30	2.000ml/...	0.100ml		OUT01	10.000W0.000ml
S2P2	1	Stopped	01	7.284	2.000ml/...	0.100ml		OUT01	10.000W0.000ml
S2P3	2	Stopped	01	7.284	2.000ml/...	0.100ml		OUT01	10.000W0.000ml

Connected pumps worksheet

To control a pump, select it by clicking on the line that contains the desired pump. (The first discovered pump is automatically selected)

A menu of commands is available when you right click on a pump in the Pump Work Sheet

Right click pump control/settings menu



You will be unable to control pumps that are not licensed. License count is applied from the top of the Worksheet. The number of licensed pumps is shown in the status bar.

above.

### 2.6.4.1 Pump Selection and Control

When pumps have been detected by SyringePumpPro they are displayed in the Pump Worksheet.

Label	Adr	Status	PHN	Diameter	Rate	Target Vol	Time	Function	Dispensed
S2P1	0	Stopped	01	10.30	2.000ml/...	0.100ml		OUT01	10.000W0.000ml
S2P2	1	Stopped	01	7.284	2.000ml/...	0.100ml		OUT01	10.000W0.000ml
S2P3	2	Stopped	01	7.284	2.000ml/...	0.100ml		OUT01	10.000W0.000ml

Connected pumps worksheet

To control a pump, select it by left clicking on the line that contains the desired pump. The selected pump controls effect the only the single selected pump.

The first discovered pump is automatically selected.

There can only be one pump selected at a time. The selected pump is indicated by a blue row on the pump worksheet.

Once a pump is selected the [Pump Context Menu](#)<sup>61</sup> is available.





You will be unable to control pumps that are not licensed. Licenses are assigned to connected pumps starting with the lowest number address. Your number of licensed pumps is shown in the status bar.

Right click pump control/settings menu

#### 2.6.4.2 Starting/Stopping Pumps

A selected pump may be stopped and started by first selecting the pump you wish to control in the Connected Pump list and then clicking the start or stop buttons in the selected pump control area.

Selected pump  
start/stop buttons

You may also start and pause/stop all the pumps listed in the Pump Worksheet as a group by using the Run All or the Pause/ Stop All buttons

All connected  
pumps  
run/pause/stop

##### 2.6.4.2.1 Run Button



Run Button - Enabled



#### Run Disabled

Run sends a simple run command which will start the pump from where ever it is in it's ppl file.

when can you use run?

#### 2.6.4.2.2 Stop Button

Enter topic text here.

#### 2.6.4.3 Infusion and Withdrawl Counters

These controls are only available when the pump is stopped - ie the Stop Button is illuminated.

You may clear the pump's dispensed/withdrawn volume counters by using the INF or WDR button.

Note this is only possible whilst the pump is stopped, not when it is pumping or paused.

**Selected pump  
start/stop buttons**

The infusion and withdrawal counters report the counters maintained inside the pump. The counter values displayed on the pump worksheet are read from the pump and reported in the worksheet.

The top row in the illustration contains IO.100ml W0.100ml - which is the Infused Withdraw values.

This means there can be some lag between clicking the buttons and seeing the counters change to zero

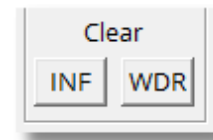
Repeated clicking (a second click because the first click seemed to do nothing) will not cause a problem. The number of pumps connected will affect the refresh rate.

**Infuse and Withdraw  
counter display**



#### 2.6.4.3.1 Clear the counters

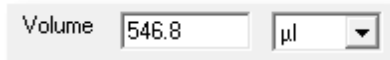
This button will clear the infusion counter in the pump. Sometimes there will be a noticeable pause between clicking the button and seeing the counter clear. This is especially the case when there are several pumps and they are all operation. This is caused by the queuing of both the clear commands and another command to read the counters back.



#### 2.6.4.4 Pump Set Up Area

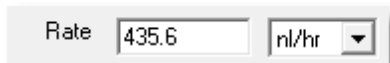
The Pump Set Up area is used to quickly configure the syringe type and pumping actions for the currently highlighted pump in the Pump Worksheet.

Inf and Wdr radio buttons take an instant effect and will stop and restart the pump to effect a direction change.



Pump set up Volume offers a selection of units - micro litres, milli litres and for the Microfluidic pumps nano litres.

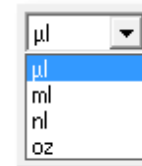
Peristaltic pumps are supported with oz.



Pump set up Rate offers the following rates: micro litres per hour, micro liters per minute, milli litres per hour, milli litres per minute and for the Microfluidic pumps, nano litres per hour and nano litres per minute.

Peristaltic pumps use the oz/min and oz/sec rates.

#### Quick Set Pane



- Using the volume and rate controls will set these parameters for your pump. Be sure to use the correct units for your pump.
- If your pump does not support the microfluidic rates, then attempting use nano litre settings will not work. Similarly using milli litre settings with Microfluidic pumps will not work.
- Both the Volume and Rate numeric entry fields are limit to 5 characters, 4 numbers and a decimal pump. This reflects the pump programming language restrictions.
- If you change the rate or volume whilst a pump is running, that pump will be momentarily stopped, have the parameter changed, and then returned to the running state. Paused pumps are left stopped. The Command Reply/History window will show one or two STP commands being sent prior to your rate/volume change.

## 2.6.4.4.1 Syringe and Tubing Configuration

Many popular syringes, and the two tubing diameters supported by the NE9000 Peristaltic pump are pre-configured in SyringePumpPro.

There are two methods you can use to set the syringe parameters for the pump:

- Quick Set
- Connected Pump worksheet

### Syringe Configuration

#### Syringe list in the pump context menu



See the syringe manufacturer's documentation for the range of values.

## 2.6.4.4.1.1 Using Quick Set

To configure the syringe you are using with a particular pump,  
Click on the pump you wish to configure in the Pump Worksheet

#### First Select the Pump



The right most pane of the selected pump control panel of SyringePumpPro contains controls for quick set up of a syringe and pump.

The currently selected pump's details will be shown in the dialog box items. Click on or tab to the windows to change the values. Once all desired values are entered click on the "Set" button. To discard changes click the "Revert" button. Commands will be sent to the selected pump that will set these values.

Use the drop down selectors to set the Volume Units, the Rate Units and the Pump Direction.

#### Quick Set in Action



You can also set the diameter with a numeric value. Note that this value is inside diameter in mm.

Volume Units    Rate Units    Pump Direction

The syringe diameter can be set from the drop down list – many common syringes are listed with their respective diameters. Choose the one that matches your syringe.

You may modify the contents of this drop down list. See [Syringe Configuration](#)<sup>109</sup>

#### Syringe Drop Down List



Note Illegal or out of range values syringe diameters will be rejected. See [Syringe Configuration](#)<sup>109</sup>

#### 2.6.4.4.1.2 Selecting Syringes

Popular syringes are pre-configured in SyringePumpPro.

To configure the syringe you are using with a particular pump,

- right click on the pump in the pump list
- select 'Set Syringe' from the menu which appears.
- A list of configured syringe will form another menu.
- Click on the syringe you are using.

#### Syringe Selection List

#### 2.6.4.4.1.3 NE900 Tubing Selection

#### NE-9000 Tubing Diameter

Prior to SyringePumpPro Version 1.57, the only tubing diameter option on the NE9000



NE9000 with Green Head Fitted

was 3/16 inch. Which was the default. With the Precision update released in August 2012 the new Green head became an available option.

Head Color	Tubing Diameter inches	Tubing Diameter mm
Blue	3/16 or 0.1875	4.7625
Green	1/16 or 0.0635	1.5875

Select the head color from the drop down list

So now the tubing options are:



### Blue and Green Heads

#### 2.6.4.4.1.4 Changing RATE whilst pumping

a while ago it was made possible to change rates. User enters new rate - hits set the pump is stopped the rate changed and then pump is set going again

## 2.6.5 Your Pump Command

The Manual Command Pane allows you to send commands to the pump selected in the Pump Worksheet. See [Issuing Commands](#) for more details.

Commands may be in upper or lower case. All commands are converted to upper case before being sent out to pumps.

### Manual Command Window

You may issue commands to your pumps using the manual command area. Be sure to check your command's syntax before sending.

If you are sending a command with a pump selected, SyringePumpPro will provide the address

Command Entry

Command VER Send Command

Last Response

Command Entry

Command Send Command

Last Response Sent command 'VER' to pump 1  
Response: 01TNE1000V3.84  
Pump 01 responded: 'Command OK' -- Status: 'Pause phase' -- Data: 'NE1000V3.84'

information for you. If no pump is selected you will need to start the pump command with the address eg 07VER.

Commands are sent by hitting the enter key or by clicking the Send Command button.

The command and its response are displayed in the text box in the bottom.

Commands are sent to the highlighted pump in the connected pump status chart. In the case shown on the right, the commands would be sent to the Glucose pump (the

Label	Adr	Status	PHN	Diameter	Rate	Target Vol	Time	Function	Dispensed
S2P1	0	Stopped	01	10.30	2.000ml/...	0.100ml		OUT01	10.000W0.000ml
S2P2	1	Stopped	01	7.284	2.000ml/...	0.100ml		OUT01	10.000W0.000ml
S2P3	2	Stopped	01	7.284	2.000ml/...	0.100ml		OUT01	10.000W0.000ml

Connected Pump Status Area





second pump in the list).

The Command History Window text displays the pump's responses to any commands sent. You may use the scroll bars on the right to move through the history list.

#### Command History Window

When SET commands (ones that set values) are sent to the pump, the SyringePumpPro automatically follows-up with a query command to confirm that the SET command has taken effect.

#### Network and Pump Details Tree

The result of the query will be shown in the tree view under the pump.

You cannot send extended PPL commands from here.

The commands go directly to the selected pump.

### 2.6.5.1 Issuing Commands

You may issue commands to your pumps using the manual command area. Be sure to check your command's syntax before sending.

Commands are sent by hitting the enter key or by clicking the Send Command button.

The command *and* its response are displayed in the text box in the bottom.

Commands are sent to the highlighted pump in the connected pump status chart. In the case shown on the right,

Command Entry

Command

Last Response

Command Entry

Command

Last Response

```
Sent command 'VER' to pump 1
Response: 01TNE1000V3.84
Pump 01 responded: 'Command OK' -- Status:
'Pause phase' -- Data: 'NE1000V3.84'
```

Connected Pump Status Area



the commands would be sent to the Glucose pump (the second pump in the list).

The Command History Window text displays the pump's responses to any commands sent. You may use the scroll bars on the right to move through the history list.

#### Command History Window

When SET commands (ones that set values) are sent to the pump, the SyringePumpPro automatically follows-up with a query command to confirm that the SET command has taken effect. The result of the query will be shown

#### Pump Explorer with Pump Details Expanded

in the tree  
view under  
the pump.



If a pump is not selected in the Connected Pump Work Sheet, and commands sent will be sent to the default pump - the pump at address 00.

### 2.6.5.2 Spaces in your commands

Confession - no matter what space you put in your commands SyringePumpPro throws them away before sending the command to the pump. If you put spaces in your commands - it's only giving you a warm feeling. (Confession: I still put spaces in my commands and I wrote the code that ditches spaces.)

### 2.6.5.3 Commands and Pump Addresses

There are three forms of commands eg

- `Ver` - will be sent to the selected pump.
- `2Ver` - will be sent to the pump with address 2 - if it exists - no matter what pump is selected.
- `*Ver` - is sent to all pumps.

The \* version is usually used (perhaps it's only me) as a debugging tool for when customers don't know what addresses their pumps are set too and we are having connectivity problems. That's how I think of it.

There is a lot more to it - but once upon a time pumps had to have sequential addresses starting at 0. So with 2 pumps one at 0 and one at 66 - we couldn't see pump 66. So \*VER with just pump 66 connected but undetected, pump 66 would answer and tell us it's address.

The current version of SyringePumpPro has had all of that changed so that it will simply find pump 66 on it's own. Partly (mostly) eliminating the need for many (most) \* address commands.

### 2.6.5.4 Star commands \*

When the address used in a manual command is \* it is sent to all pumps at the same time.

For example

- `0Ver` requests the pump's identifier from the pump at address 0.
- `*Ver` request the pump's identifier from all connected pumps no matter what address

One side effect of this is that all the connected pumps, licensed or unlicensed will all respond at the same time, making it impossible to receive, report or log their responses. It's like asking a room full of people to answer a single question all at the same time, and trying to make out and record what is said.

In the pump said box you will see "No Response Data.



The only way to know if a pump received the command is to witness the commands effect, hear a beep, see movement either mechanical or in the display, or see the status change in the Pump Worksheet.

Command Entry

Command

Last Response

```
Sent command '*BUZ12' to pump *
Response:
Pump * responded: 'Command OK' -- Status:
'No Response from pump' -- Data: "
```

No response is reported for Star Commands

#### 2.6.5.5 Last Response Box



The response box with a pump's response command displayed

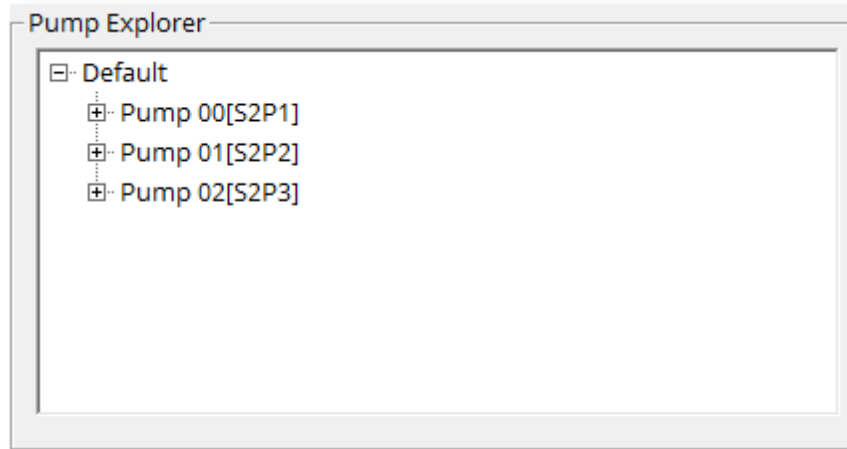
#### Pump 00 responded: Command OK - Status No response comms fault.

- The important bit is No response comms fault. This is saying SyringePumpPro emitted the command on the wire to a pump that has address zero and it never answered.
- The command OK means the command was correctly formed so that it could be sent. Or you entered your command correctly.
- Pump 00 responded - is actually referring to the virtual slot reserved for where a pump 0 would be connected to SyringePumpPro.

So my error message when read by everyone one else on the planet but me says the pump responded but it didn't respond because of a comms fault.

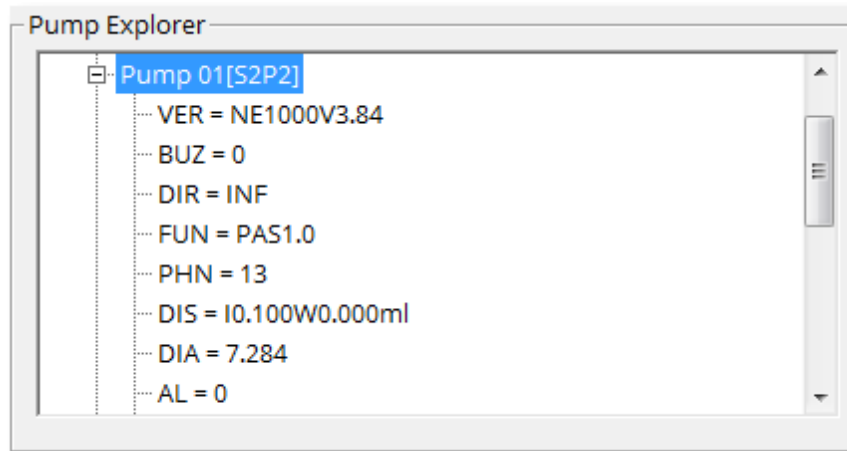
## 2.6.6 Pump Explorer

The tree control on the bottom left of the application can be used to explore the connected pumps and their current settings.



Pump Explorer Area

Clicking on the + symbol expands the entry for that pump and will display all pump parameters. Refer to your New Era Pump Manual to interpret the information presented here.



Pump being examined

Note the entry for DIS is the pumps reply to a DISpensed command. Which indicates I3244.W0.00ul. This is interpreted as Infused 3244.0 ul and Withdrawn 0.0ul.

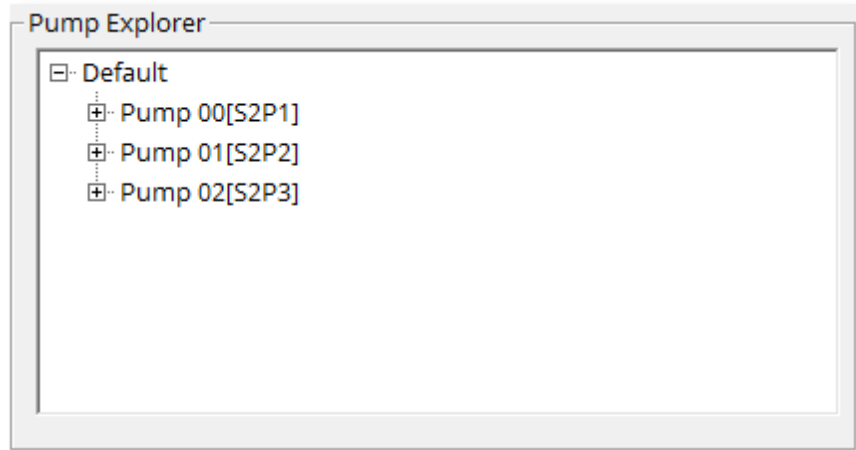


### 2.6.6.1 The Explorer Tree In Depth

At the top or 'root' of the tree is an entry for the Com port that your pump network is connected to.

Each pump has an entry with the:

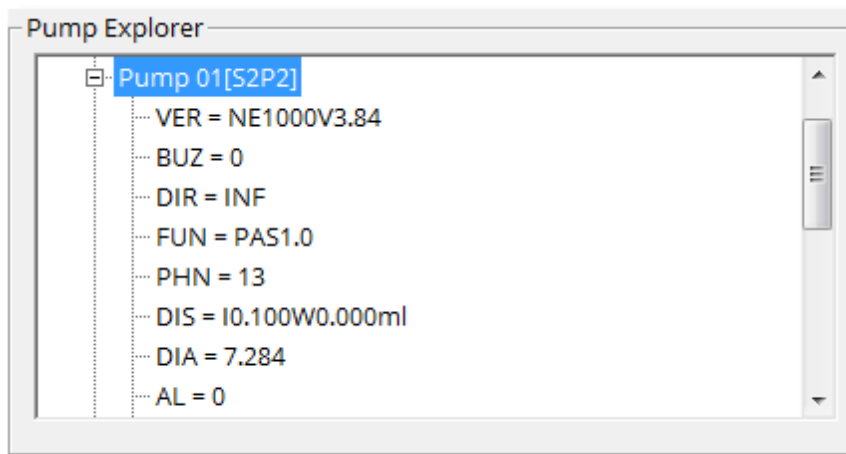
- Pump Label or name - in the above picture the label is XXXXX.
- The status of the pump - usually Infused/Withdrawing/Paused/Stopped.
- Then in (..) the pump identifier consisting of two parts. The pump type and the numbers following the V indicate the internal pump software version.



A tree with a number of pumps

On the left hand side of this pump entry is a small plus sign. When clicked this expands the tree entry to reveal all of the current pump parameters.

The items available for inspection are:

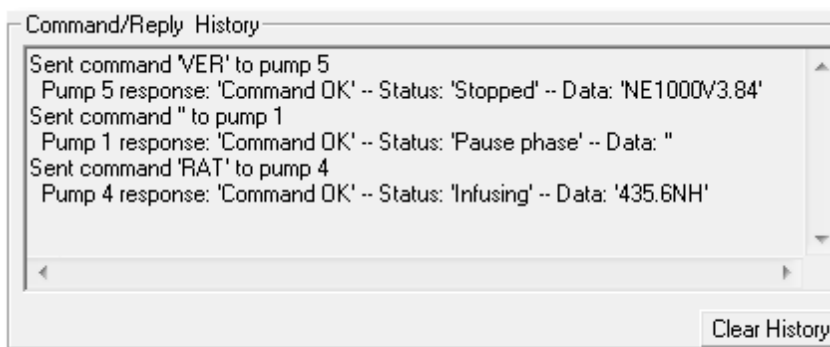


A single pump expanded

Item	Description	Item	Description	How to change
VER	The pump type and software version	DIA	Diameter of the syringe or tubing	Use quick set area to set syringe DIA
DIR	The current pumping direction.	PHN	The current phase number	
RAT	The current pumping rate.	FUN	The current pump function.	
DIS	The Infusion and Withdrawal counter values from the pump.	AL	Alarms on/off	use manual command 00AL1 will turn alarms on for the pump at address 0
PF	Power fail on/off	TRG	Trigger type	
DIN	Digital input state	ROM	Pump motor operating TTL out signal	
LOC	Keypad lockout	BUZ	Buzzer on/off	
SAF	Safe mode on/off	BP	Keypad beeping on/off	
IN2	Digital input #2	IN4	Digital input #3	
IN4	Digital input #4	IN6	Digital input #6	

## 2.6.7 History Window

The Command History Window shows each command issued and the pump's response.



History Window

You may:

- Scroll through the history using the scroll bars

### Display Format

The format of the display is 2 lines represent a single response from a pump. For example:





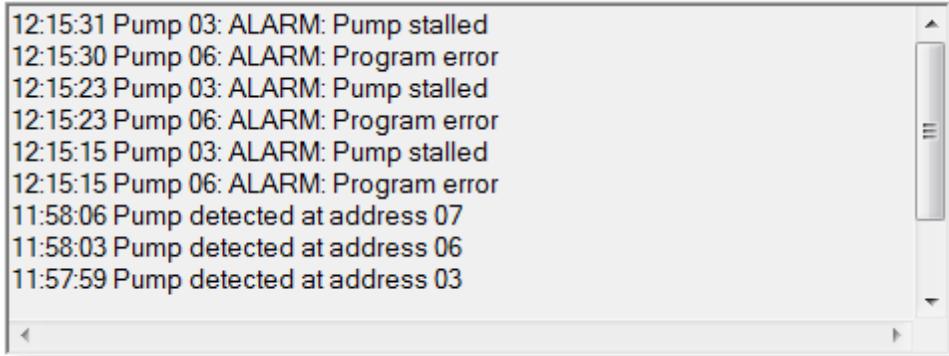
```
18:17:18 Sent: VOL12.45UL to pump 00
  Pump 00: 'Command not recognized' Status:'Stopped' Data:?'
18:16:57 Sent: DIA29 to pump 00
  Pump 00: 'Command OK' Status:'Stopped' Data:''
```

The above represents 2 pump commands and responses.  
The earliest exchange occurred at 18:16:57 the command sent was DIA29, and this command was sent to the pump at address 0.

## Pump Alarms

When a pump generates an alarm, it beeps (if AL=1). The alarm condition is cleared when the next command is received.

Because SyringePumpPro is constantly monitoring pump parameters, alarms are cleared a few seconds after they occur.



Alarms are recorded in the History Window

Alarms are reported in the history window

### 2.6.7.1 Clearing the History Contents

Clear the history using the Clear History Button.

Clear History

### 2.6.8 Status Bar

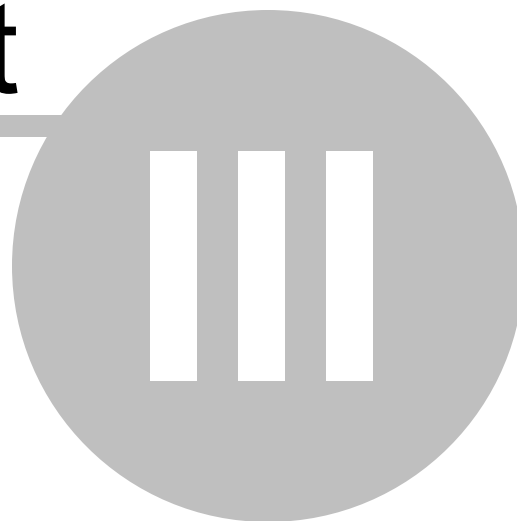
SyringePumpPro displays statistics at the bottom of the window.

Win7: 6.1 | Port: COM4 | Baud: 19200 | Licensed pumps: 99 | Queued Msgs: 0 | Msgs/s: 6 [20] | Bytes/s: 39 [141] | Errors: 0 | Time: 08:21:25

Status Bar

Field	Description
Win7:6.1	Windows version information.
Port: COM4	Com port in use by SyringePumpPro
Baud:19200	The communications baud rate.
Licensed Pumps:5	Indicates the number of pumps that your copy of SyringePumpPro is licensed for.
Queued messages:0	This counter indicates the number of messages that have yet to be sent to pumps. Normal operation should see this sit at zero for most of the time with the occasional rise say to 5. Should this number not spend most of it's time at zero, you may be experiencing communications issues or your baud rate could be set low.
Msgs/sec: 10 [56]	This indicator shows the number of messages being exchanged with your pumps. The screen shot shows 10 messages a second being exchanged.
Bytes/sec	This indicator is used to show the number of bytes traveling across the communications link.
Errors:0	This indicates the detected communications errors. Ideally this should remain at zero. If any errors appear here, you should check your cabling.
Time: 08:21:25	Time of the day

# Part



# Syringe Pump Pro

## User Guide



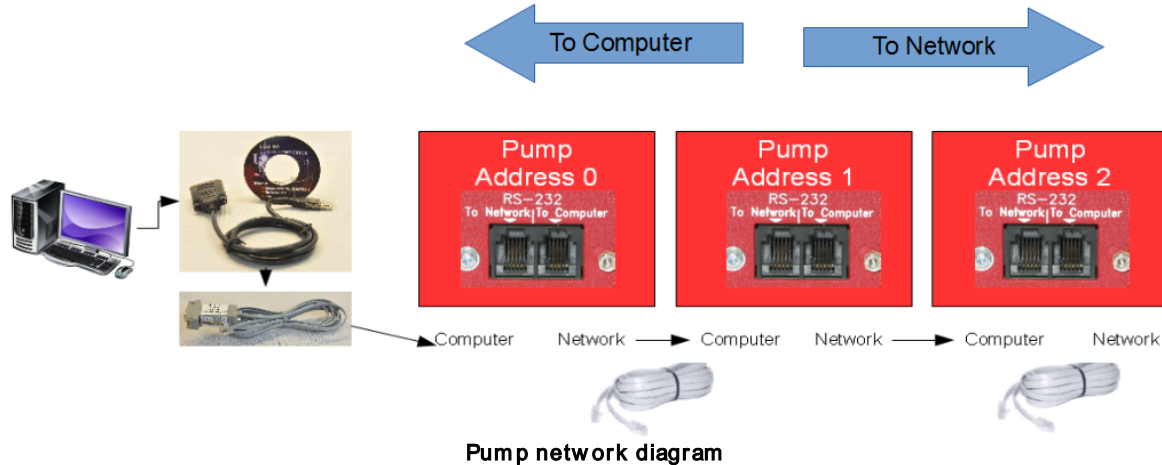
## 3 Pumps

Enter topic text here.

### 3.1 Connecting Your Pump

Let's talk for a moment about how the pumps are connected. An understanding of this will help you diagnose communications problems with your pumps.

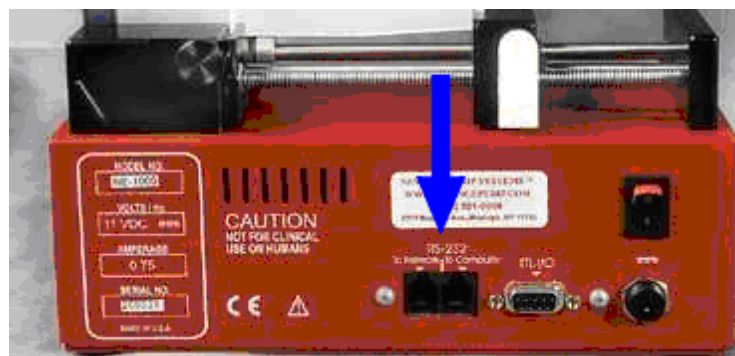
The pumps are connected in a daisy chain to form a network. Each pump listens to all of the commands sent down the wire. All pumps see all the commands at the same time.



The pumps only obey commands after they have 'heard' their address number come down the line. There is a special address '\*' which all pumps obey.

This means that all pumps on a network MUST :

- Be set to the same communications parameters in order for the commands to travel down the network and be understood by all the pumps.
- Be connected into the daisy chain correctly and securely to participate in the network.
- Be set to a unique address. Two pumps set to the same address will answer commands at the same time and cause communications to become garbled for all pumps on the network.



Location of RS232 connectors on pump rear - NOT the db9 connector



### Communications Check List

Here are the things that you need to do in order to have a pump communicate.

- Configure SyringePumpPro with the correct communications port, See [Determining the Com Port](#)<sup>[86]</sup>
- Configure SyringePumpPro to communicate at the correct baud rate
- Pump needs to be connected with the correct cable, to the correct port on your computer,
- Pump needs to be turned on.
- Each pump in the network needs to be set at a unique pump address (if it is connected with other pumps). All pumps are shipped from the factory set to address 0.
- Pump and SyringePumpPro need to be talking in the same mode - use Basic
- There must be a pump configured with the address 0.
- All pumps on a network/port MUST be set to the same baud in order to work correctly.
- Pumps will be discovered in numerical order of their configured network address.
- Pumps configured with an identical address to another pump on the network will not be detected and will lead to communication problems with all pumps on the network.

### 3.1.1 Pump Network Components

This diagram shows the components used to build a pump network connected to your computer. The cables are available from your pump supplier.

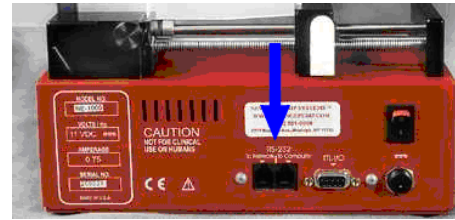


Pump network parts list

### 3.1.2 Pump Connections

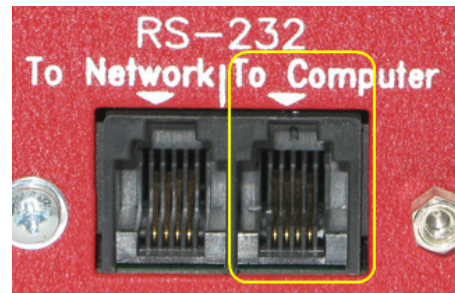
The blue arrow in this picture shows where the two rs232 communications connections are made.

The D connector to the right **is not used** for communications - it is the digital input/output port.

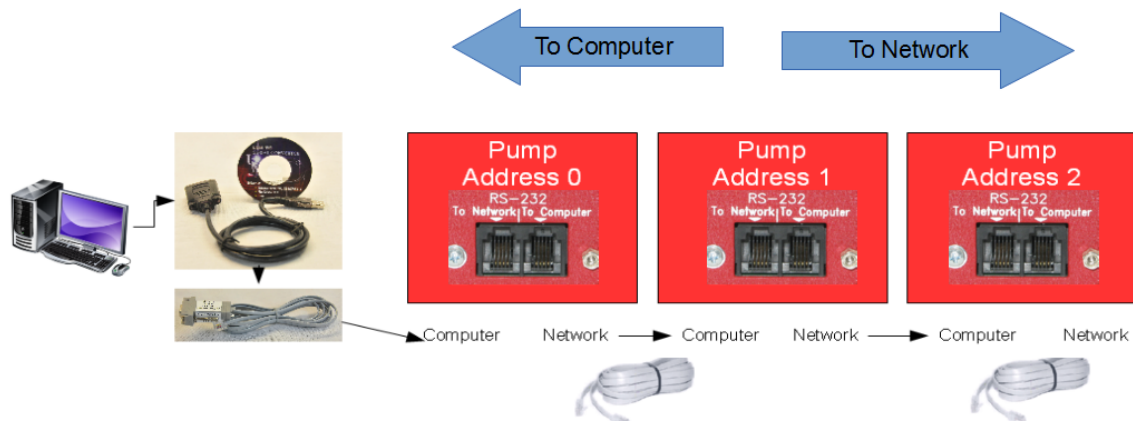


RS232 connections go here - not the db9 connector

There are two square holes in the black recess. The hole on the left (viewed from the rear of the pump) labeled To Network is the connection to the next pump in the network and the hole on the right is to connect to the computer or the next pump on the daisy chain closest (electrically) to the computer.



Here's a wiring diagram



How to connect multiple pumps in a daisy chain



### 3.1.3 Using USB-RS232 Adaptors

Most computers no longer come with a built in serial port and this adaptor creates a RS232 (serial) Port.

There are many different manufacturers of these devices and they are fairly cheap to purchase.

#### USB-RS232 adaptor

If you do use one of these adaptors, then you should check that you have installed the device driver software by:

- Disconnecting the device
- Follow the manufacturer's installation instructions, and install the driver software for your device.
- Insert the device into your computer - you should see Windows acknowledge the device's insertion by displaying a balloon message in the bottom right hand corner of the screen.

#### Windows Detected ATEN Device



If you experience reliability issues with a USB-RS232 device, please purchase another brand for testing. Whilst they are generally very reliable, some are known to fail under high traffic loads.

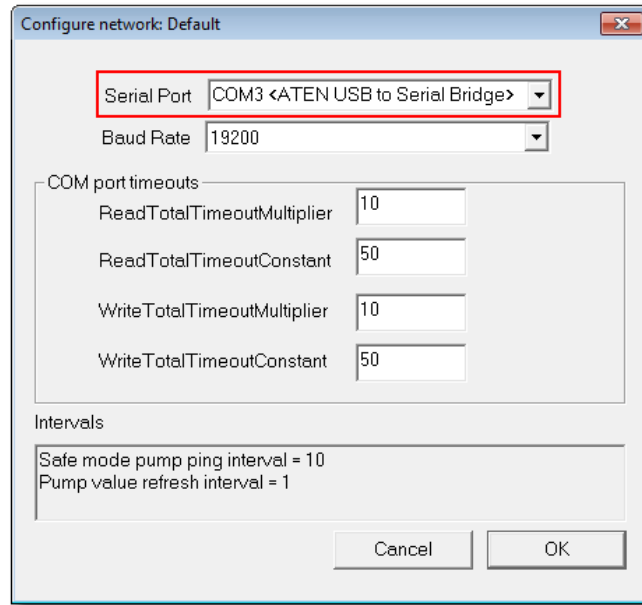
### 3.1.4 Determining The Com Port

If you have connected your USB RS232 device and the driver has correctly installed - there should be no need to configure the COM port because SyringePumpPro will do it for you.

***The following instructions will help you configure standard COM ports and USB-RS232 devices that SyringePumpPro doesn't recognize. (If you find one that isn't recognized, please send me an email.)***

To get your USB-RS232 adapter working with SyringePumpPro you need to configure the correct com port in the drop down box.

Different manufacturers USB-RS232 devices and their driver software configure on a range of com ports. They can sometimes change com port when they are inserted or re-inserted.



**Setting Com port parameters**

You will now need to determine what communications port has been assigned to the device. To do this:

Open an Explorer Window. Use the Windows Key (between Ctrl and ALT) and press E.

Right click on the grey area (My Computer) and a menu will appear.

#### Locate My Computer

Select Properties at the bottom - left click it.

#### Properties menu





The System Properties Window  
will appear.  
Up the top of the Window left  
click on the Hardware Tab

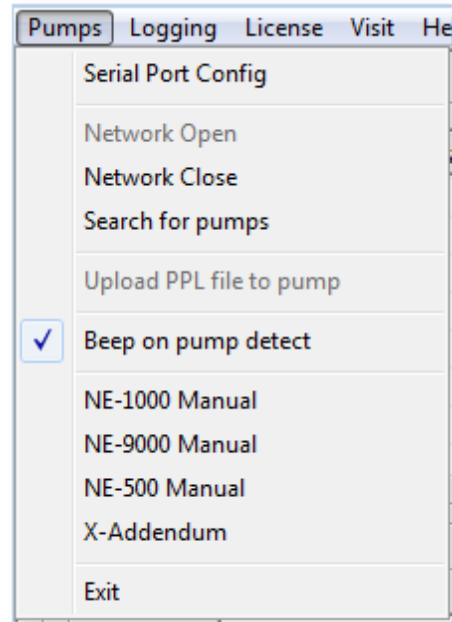
Locate the hardware tab

Click on the plus sign next to the  
label Ports (COM & LPT)

You can see my ATEN device  
listed here.  
Note in this screen shot the  
device is assigned COM3

Locate the USB-RS232 device  
providing your com port

In SyringePumpPro use the menu entry configuration entry to open the configuration settings.



Pump network menu

Select the Comport shown in red above, this image shows COM12

Set the com port to the one you found

### 3.1.5 Port and Network Configuration

SyringePumpPro by default automatically selects the first port with the string 'USB' in it. If no port contains 'USB' then the drop down will select COM1

All pump communications are recommend to run at 19200 baud. Change the baud rate only if you are having communications problems. How about we share some emails if you are having problems?

See [Determining the Com Port](#) <sup>86</sup>


Configure Serial Port



Note that most users will NOT need to configure these settings.  
 Select Pump Network ->  
 Configuration from the main menu to view/modify the configuration.  
 The name of the configuration is 'Default'.

#### Baud Rate Selection List

When you have set the port and baud values appropriately, click OK.



**I recommend against changing the default values for the COM port timeouts and intervals.**

These settings have been made configurable so that user's with a detailed understanding of the communications protocol may fine tune the settings for maximum performance.  
 The default values will provide reliable communications.  
 If you are experiencing communication issues make sure these values are set to their defaults.  
 Users who understand the ramifications of modifying the values have more control over SyringePumpPro's behavior.

Improper configuration can result in unreliable communications which may impact your protocol.

### 3.1.6 Serial Ports Throughput

When many pumps are connected to the computer the traffic on the serial port may become an issue. Below is a table of baud rates and maximum throughput on the serial port.

You may wish to increase the user interface refresh interval for active pump values. This interval is used by SyringePumpPro to trigger queries of active pumps. Active pumps are those with status that is NOT Stopped.

The default value for the update interval is one second. Please see the configuration section for details on how to modify the setting.

The following table shows the approximate max throughput rate of a COM port at a given baud rate. We assume an average command or response message of 18 bytes long.

Baud	Bytes Per Second	Avg Message per Second
19200	2400	133
9600	1200	66
1200	150	8
300	37	2

As you can see, when a number of pumps are operating and a few values are queried for each pump at the query intervals the serial port throughput may become an issue. You must consider the amount of communications traffic on the serial port when configuring the interval(s).

Note that the numbers above are maximum throughput for the serial port. The user will

most likely never see values close to those numbers as SyringePumpPro must also process the user commands and the responses that come from the pump.

Our current testing at 19200 baud has shown maximum throughput rates of 72 messages per second (a message is either a pump command or response) and 1300 bytes per second.

72 messages would translate to 36 pump command/response pairs per second

### 3.1.7 Set Pump Address

There are three ways you can set your pump's network address.

- Using a typed command in SyringePumpPro.
- Reset the pump.
- Using the buttons on the front of your pump.

Obviously if you are using and OEM pump without buttons - there is only one way.

#### Single Pump Users

You cant beat the speed and efficiency of resetting the pump. It will give you manufacturers settings, remove any old pump programs and set your pump's address to 0. Better still there's [a video to show you how](#) <sup>[103]</sup>.

**Multiple Pump Users** - I actually prefer to do this on the pump buttons - it's less fiddly - no cabling changes or brain activity required.

More about pump addresses

#### 3.1.7.1 Set Pump Address From SyringePumpPro

##### Single Pump Users

With your pump connected - type the command

\*ADRnn

where nn is the address you want your pump to take.

**Question:** Why bother setting the address if you only have one pump?

**Answer:** Having it address 0 means it will be detected quick and save a few seconds each time your start SyringePumpPro. Other than that?

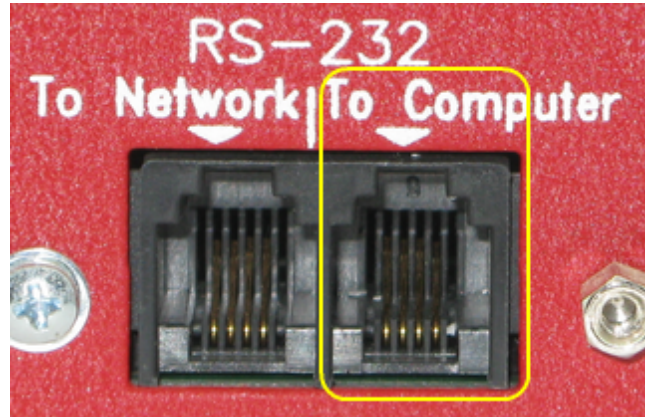
##### Multiple Pump Users

The bad news - you need to disconnect your pumps and then connect them one at a time and do what the Single Pump Users - only you will mentally need to keep track of assigning the addresses AND you will need to reconnect your network cables properly in the end.



### Tip: Make it faster and a little less painful.

1. Disconnect the to computer connection on all of your pumps - but not the to network cable.
2. Use the Computer connected cable to:
3. drop in on the last pump - in the network, connect the PC cable to the To Computer socket,
4. and assign it the highest address
5. Now move the cable to the next pump along your next and then assign it the next to last address,
6. Repeat until you connect the first pump in your network and assign it



Disconnect the To Computer Cable

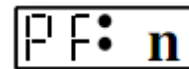
#### 3.1.7.2 Set Pump Address Using Buttons on Your Pump



A typical front panel

#### Objective: Set the pump address to 38

Press and hold until PF setting shows (about 5 seconds)



Once PF is displayed press **Setup** several times until the pump displays

Change the nn part of the address by pressing the right most arrow key (the two right arrows can be used to set the address up to 99)



When you have set the desired address - wait for a second or two. The pump will return to normal operating display - confirm your address setting by

repeating steps

### 3.1.8 RS232 Cable Lengths

The following are the maximum recommended cable lengths for the different baud rates.

Baud Rate	Max Recommended Length Feet / Meters
19200	50ft / 15m
9600	500ft / 150m
2400	3000ft / 900m

In a laboratory or manufacturing scenario it may be easy to require cable runs of over 15m. Note if your environment is electrically noisy these cable lengths may be shorter. You can try running the RS232 cable inside a braid that is earthed at the computer end.

A connection can be made via radio - however it is expensive and takes some configuration to get reliable connections. If you need more information, please email [timb@syringepumppro.com](mailto:timb@syringepumppro.com)

### 3.1.9 Test Coms

The test Coms button floods the pump network with commands. This is handy for confidence testing you computer, your USB-RS232 adapter, your wiring and your pumps to see that the communications are reliable. This is recommended prior to running protocols. You can watch the [status bar area](#)<sup>[80]</sup> and see the number of messages in the message que and the [throughput](#)<sup>[90]</sup> of the system under load.

Test comms  
button

### 3.1.10 Troubleshooting Communications

Communication problems happens to some - if your reading this it's probably happening to you.  and tell me about your problems - I will help you get your pumps communicating. If you do email me, please send me:

- A list of the make and models for all your pumps
- What addresses the pumps are configured to.
- Please indicate which pump(s) is/are not working - if some are working and some aren't.
- Is there a triangle displayed on the pumps front LCD panel? (Non OEM pumps only)



## SyringePumpPro User Guide



SyringePumpPro works fine with lots of pumps - I regularly test with 6 pumps connected. One customer has 32 pumps working.



### ***Don't reinstall SyringePumpPro!***

It is unlikely that reinstalling SyringePumpPro will fix any problems with communications. You won't do any damage if you do reinstall.

Here's a list of some of the things that can be causing pump communications problems:

- Operator (you) have connected the pump communications cables incorrectly.
- Pump is set to the wrong communications parameters - a reset will fix that. See [How To Reset Your Pump](#)<sup>[103]</sup>
- Pump is set to the wrong address - a reset will force it to address 0
- Cabling - these are easily damaged - and well worth a careful check.
- USB RS232 device is faulty or the driver is not installed.
- A malfunctioning pump - This happens very rarely in my experience.

### **Basic checks**

Check these basic items before reinstalling SyringePumpPro and drivers

1. If you are using the RS232 USB adapter check that you have installed the driver.
2. Ensure that the communications cable from your Pumps to the computer is connected at both ends and that the cable is in physically good condition.
3. Ensure that the connection cables between pumps are inserted fully and that the cable is in physically good condition.
4. Make sure your pump communications cables are inserted in the correct sockets. See [Before Connecting Your Pump](#)<sup>[83]</sup>
5. Ensure that your pumps are powered up.
6. Can you see an led on the USB-RS232 adapter? Does it flash when you attempt to send a command? If you have a led on your adapter and it doesn't flash check the USB-RS232 driver and com port number - See [Determining the Com Port](#)<sup>[86]</sup>
7. Is there a triangle displayed on the pumps front LCD panel? (Non OEM pumps only)

### **Troubleshooting Procedure - No Pumps Communicating**

1. Make sure you have checked the items in the previous heading 'Basic Checks'
2. Connect a single pump directly to the computer as the only pump.
3. Reset that pump. See [How To Reset Your Pump](#)<sup>[103]</sup>
4. Run SyringePumpPro
5. Do you get a connection for a pump at address 0? If you don't stop here and resolve this communication problem
6. Send the command **\*VER** - any responses?
7. Send the command **\*BUZ5** - the pump should beep five times.
8. Send the command **\*ADR0B19200**
9. Send the command **VER**

### **Troubleshooting Procedure - Some Pumps Communicating**

1. Move the non communicating pump(s) to one side.
2. Connect a single known working pump directly to the computer as the only pump.
3. Reset that pump. See [How To Reset Your Pump](#)<sup>[103]</sup>
4. Run SyringePumpPro
5. Do you get a connection for a pump at address 0? If you don't stop here and resolve this communication problem - or try another pump from step 1
6. Now change the connected pump for a non communicating pump. - Make sure the cable is in the correct socket - to Computer
7. Reset the pump
8. Run SyringePumpPro
9. Do you get a connection for a pump at address 0? - If you have successfully connected in step 5 you should get a connection now - if we don't we are looking for something out of the ordinary or you might have a faulty pump..
10. Does SyringePumpPro give any error reports at all?
11. Send the command **\*VER** - any responses?
12. Send the command **\*BUZ5** - the pump should beep five times.
13. Send the command **\*ADR0B19200**
14. Send the command **VER**

After attempting this once with no success - please turn the pump off and the computer and take a short break - I know this sounds a bit weird - but it really helps.  
Now repeat the entire procedure again - up till step 14.





### 3.1.10.1 Continuous Infusion Master pump wont talk

That's right - if one of your pumps is configured to be the master pump in a Special Application: Continuous Infusion/Dual Syringe Pump System it wont communicate with SyringePumpPro.

This is because the master pump takes control of the serial connection to the slave pump via a special synchronization cable CBL-DUAL-3. This is intended for situations where the pumps are not going to be used with SyringePumpPro.



Continuous Infusion Syringe Pump System

If you purchased a dual pump set and you wish to use SyringePumpPro to control both pumps, you need to:

- Disconnect the special dual pump communications cable from both pumps.
- Reset the pump that's configured to be the master pump - this removes the special communications configuration and returns it to standard.
- Use the standard pump communications cables see this diagram

### But how do you retain the dual pump / continuous infusion function?



Reciprocating Pump Cable

Use the ttl pump synchronization cable CBL-TTL-1, and code your synchronization into your pump program. This way you get full control of the pumps and SyringePumpPro helping you to monitor and program your pumps.

### 3.1.10.2 Reciprocating Pumps Mode



Dual pump cable

SyringePumpPro

won't talk to my master pump, but it will talk to the slave.

I know what your issue is - your running a dual pump set. They are 'correctly configured' out of the box - for reciprocal pumping. This is a special mode designed to jump out of the box

onto your bench and go to work. It's good and they are popular. Very popular.

They are designed as a stand-alone dual pump system. A lot of them get purchased as a stand alone system and soon the owners want to do more. That's when SyringePumpPro comes into the picture.

But they are not configured in this mode for use with SyringePumpPro. The good news is that they are not 'crippled' pumps - they are fully featured.

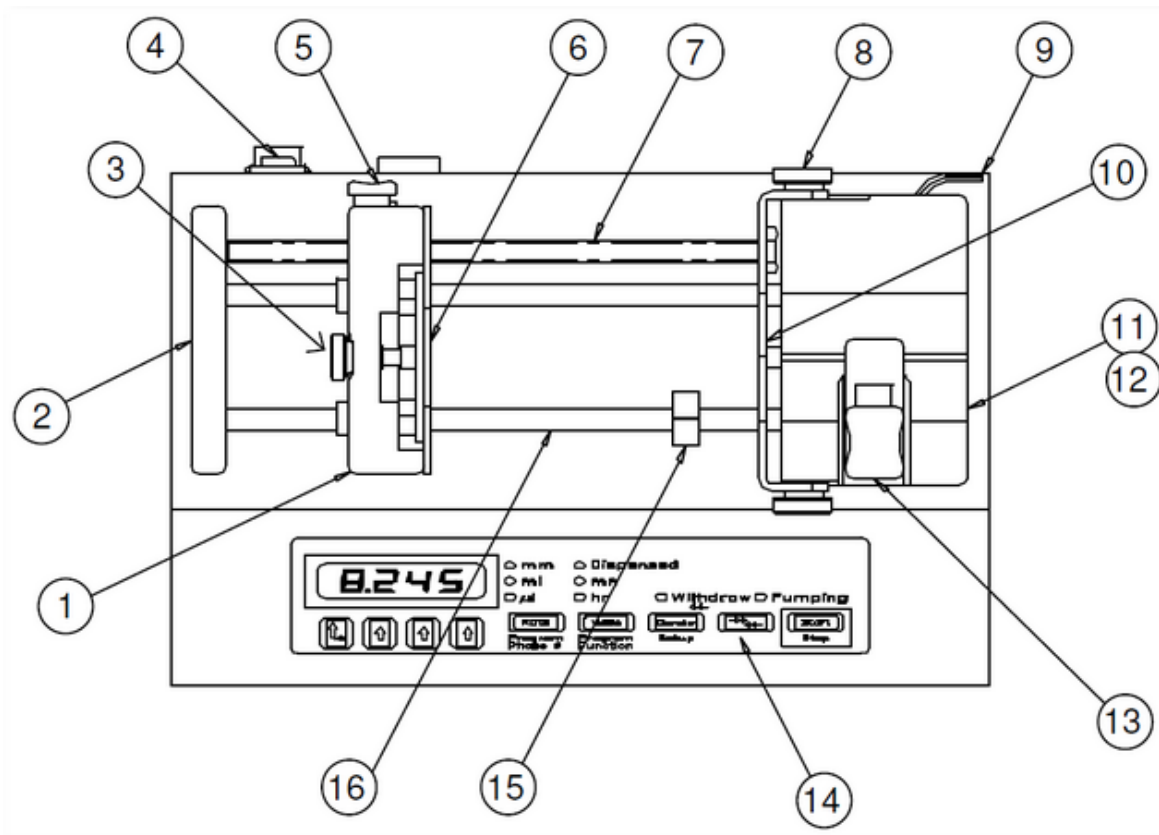
### Why?

In this mode the Master pump takes over the communications and commands the slave pump. SyringePumpPro gets on the wire thinking it's the master and then the trouble begins. It fights with the master pump. But don't go thinking SyringePumpPro is of no use to you!

Many reciprocal pump purchasers don't leave their pumps in this mode for long - many of them soon come to the realization that these pumps can do a whole lot more than reciprocate, and then start programming them. SyringePumpPro is essential then. Even during use solely as reciprocating pumps there will come times when maintenance and other tasks will require them to be connected up and have a talking to by SyringePumpPro.

It is also possible to program the pumps for the same reciprocity not using the special master slave mode - and then SyringePumpPro is an essential tool.

## 3.2 Parts Of A Pump



Parts of a pump



1. Pusher Block
2. End Plate
3. Anti-Siphon Plate Adjustment Knob
4. Power On/Off Switch
5. Drive-Nut Button
6. Anti-Siphon Plate
7. Drive-Screw
8. Syringe Retainer Thumbscrew (2, one on each side)
9. Hex Wrench (in tool holder)
10. Syringe Retainer Bracket
11. Syringe Holder Block
12. 'V' Slot (on Syringe Holder Block)
13. Syringe Clamp
14. Keypad / User Interface
15. Guide Rod Collar Clamp
16. Guide Rod (2 guide rods)

### 3.3 Is your Pump Compatible?

SyringePumpPro is compatible with a number of manufacturer's pumps. Some manufacturers carry more than one line of pumps, so you will need to confirm that your pump is supported.

The best way to do this is:

- Visit the compatible pump pages [Compatible Pumps](#), look for your pump.

or

- Download SyringePumpPro and try it.

If you find a pump that is not listed on the compatibility list, please send an email to [timb@syringepumppro.com](mailto:timb@syringepumppro.com) and let me know.

The manufacturers supported at the time of writing are:

Manufacturer	
Aladdin by WPI	
Brain Tree Scientific	
Cole-Parmer	

<p>Landgraf HLL</p>	
<p>New Era Systems</p>	
<p>Next Advance</p>	
<p>Protea Bioanalytical Biology</p>	
<p>Stoelting</p>	
<p>TSE Systems</p>	



### 3.4 Stall Detection

When the plunger of your syringe strikes the syringe holder block - or 'bottoms' out, a large mechanical load is placed on the drive motor, the drive belt, the drive pulley, the drive screw, and the pusher block. The mechanical drive train 'stalls'.

#### Pumps come with and with out stall detection.

- Pumps **without** stall detection will continue to push against the load until either some one stops them or something breaks.
- Pumps **with** stall detection will stall and then stop pumping shortly after. Thus preventing damage to the pump.



NE-1000 Indicating a stall

#### Bad Operator Behavior

It is generally considered bad operator behavior to allow a pump to stall, and worse yet is to rely on the stall detection to stop your pump. For example putting a 60ml syringe on your pump and saying go ahead, pump 100ml - relying on the stall mechanism to stop the pump when the syringe is empty.

You should be programming your pump carefully to avoid stalls and keep the syringe from extracting the plunger or striking the bottom. Some calculation is required here.

#### It's Hard on Your Drive Nut

Pump warranty is voided by high stalling levels. Each time the pumps stalls, the drive nut is damaged, and will eventually 'loose it's teeth' causing a loss of pressure. However, these nuts are a sacrificial replacement part designed to protect the other drive components. It is not acceptable to run the pump till it 'bottoms' out. Stall detection will 'see' the pump stall and stop the pump drive. The drive nuts are not user replaceable.

#### Without the stall detection feature, how does the pump respond to stalls?

Would the pump continue to run even though no fluid is being dispensed?

Yes the pump will continue to run and the toothed belt will slip over the gears on the motor and screw drive. This damages the gears (slowly) the belt, and the drive nut – which will loose it's teeth and fail first by design.

#### Tip: Buy the stall detecting pumps.

Despite all your best attempts - there will be times when your pump stalls. If this is on Friday night after you have left a pump running for the weekend, and something unexpected happens (and it does!) a stall detecting pump will stop pumping in a moment or two and save it's self. What ever was expecting fluid will be starved of it - but the pump will be saved. Without stall detection, Monday morning you will be sending a pump away for repair.

### 3.5 Multi Syringe Pumps

There are a number of multi-channel or multi-syringe pumps available from the manufacturers that SyringePumpPro supports. Currently SyringePumpPro treats them as a single syringe pump and relies on the operator to make calculations about rates and volumes.



New Era 6  
Channel Pump

For example in the 6 channel pump pictured here, SyringePumpPro doesn't know:

- how many channels are available
- how many channels are loaded with syringes
- if there are multiple syringes loaded -are they the same size and capacity (especially internal diameter)
- are the syringes ganged to the same destination or are they feeding several destinations - resulting in several volumes to be tracked.

The pumps also don't know these things, and treat the situation as a single syringe with the entered diameter. The pump uses that internal diameter to calculate the piston movements to give the requested rates and volumes.

Because of this SyringePumpPro currently mimics the pump and only reports the single syringe rates and volumes, in fact these rates and volumes are the ones reported by the pump.

Customers are using these pumps in every combination suggested above, and I do get requests for the software to report on the different combinations. I am planning to provide this feature in later versions of SyringePumpPro, but I have quite a number of other improvements I would like to make first - all of which would help serve every pump owner.



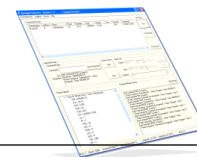
12 Channel pump

The most challenging scenario I need to design a solution for, is the 12 channel pump. This will require quite extensive user input to capture the most complex case of 12 differing syringe diameters, being fed to several destinations, some ganged and some not.

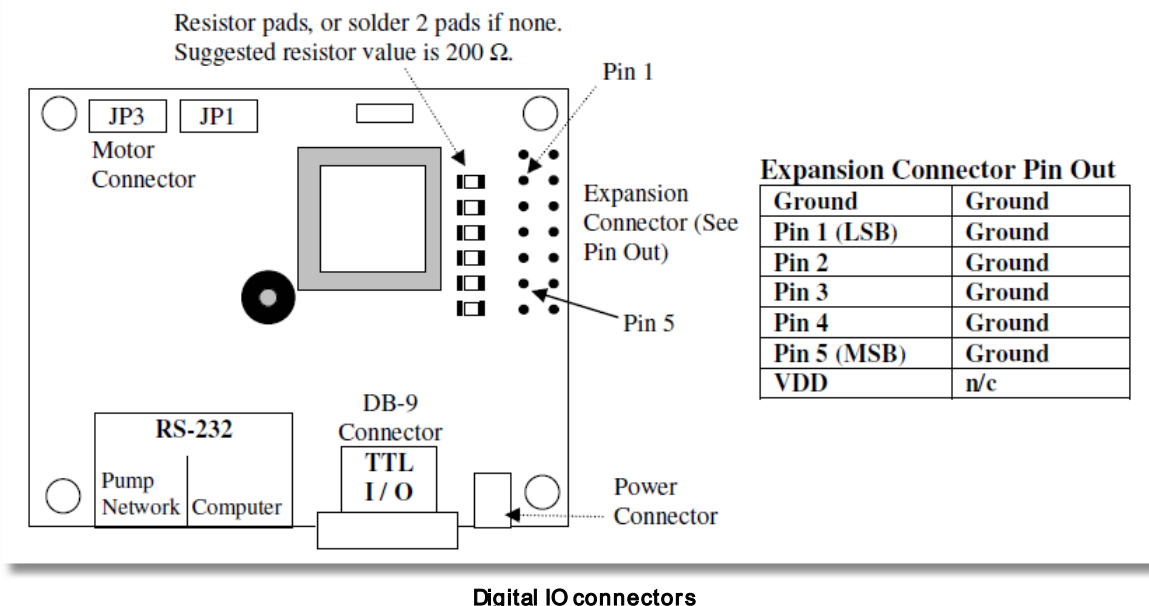
### 3.6 NE5XX Digital I/O Pinouts

The OEM pumps such as the NE500 provide access to several digital control signals. These signals can be used as inputs and outputs within your ppl programs. These can be used to synchronize 2 or more pumps and to react to external stimulus.

The pin outs are documented in the NE500 manual and here's the diagram for those who don't have the pdf of the manual on hand.



## 9. Logic Interface: TTL Input and Output



## Controlling the Expansion Port from PPL Programs

### 7.3.22 Set TTL Expansion Port Output Pin Low

Command: "FUN OE0 <expansion pin>"

Set expansion port pin <expansion pin> to logic level 0.

### 7.3.23 Set TTL Expansion Port Output Pin High

Command: "FUN OE1 <expansion pin>"

Set expansion port pin <expansion pin> to logic level 1.

## 3.7 NE-50X Procedure to re-establish communications

On rare occasions these pumps seem to stop talking. Because they have no buttons people can become very frustrated trying to get back in touch with their pumps.

First thing to remember is that this is NOT a software problem. SyringePumpPro doesn't need 'fixing'. It's a configuration/cabling problem. If SyringePumpPro is using its default coms configuration, then the problem is external to SyringePumpPro and most likely the pump configuration or cabling (including the USB-RS232 device).

## Here's some things to try and let me know what happens.

1. Start SyringePumpPro with the pump connected.
2. In the command box type \*RESET and click send.
3. Exit and restart SyringePumpPro

Pump detected? If not - it's time to:

1. One at a time select each baud rate in the communications setup window (don't change the port that is being auto selected it's correct)

2. Send the \*RESET command
3. Select the next baud rate.
4. Work your way through all baud rates
5. Restart SyringePumpPro

Pump detected? If not it's time to purchase another CBL-PC-Pump and another USB-RS232 device and try them. The 'telephone' part causes most of the failures like you are experiencing.

### 3.8 Burst commands not supported

SyringePumpPro does not use or support the burst mode communications method.

*Here's why:*

This special feature allows commands to be sent to a network of pumps simultaneously. For example, changing the pumping rates simultaneously on a network of pumps.

Note: Since this special feature violates the general communications protocol of one command-one response, all of the pumps will be responding simultaneously, and therefore the communications response to a Network Command Burst will be gibberish and should be ignored.

### 3.9 Configuring Pumps

intro to configuring pumps

#### 3.9.1 How to Reset Your Pump

This is the reset procedure for Aladdin (WPI), Brain Tree Scientific, Cole-Parmer, Landgraf HLL, New Era Systems, Next Advance, Protea Bioanalytical Biology, Stoelting, and TSE Systems programmable syringe pumps.

##### 3.9.1.1 Key Pad Models

1. Turn pump off.
2. Hold down the right most arrow key on the key pad and power the pump on.
3. Release the button when the display illuminates and show rEST.

Note the OEM reset technique will work with Key Pad pumps too.





### 3.9.1.2 Video:How to reset keypad pumps



[View on line here.](#)

### 3.9.1.3 OEM or No Button Models

#### OEM (No Buttons or Display) Models



Note this method relies on working pump communications.

To reset these pumps:

1. Start SyringePumpPro
2. Let the automatic connections time out.
3. Check that SyringePumpPro is configured to use the correct communications port and parameters.
4. Despite thinking that no pumps are connected, enter the command \*RESET and send it.
5. SyringePumpPro may indicate that communication errors have occurred. This depends on a number of factors - and is quite normal.
6. This will reset all your connected and powered on pumps.

## 3.10 Pump Clinic

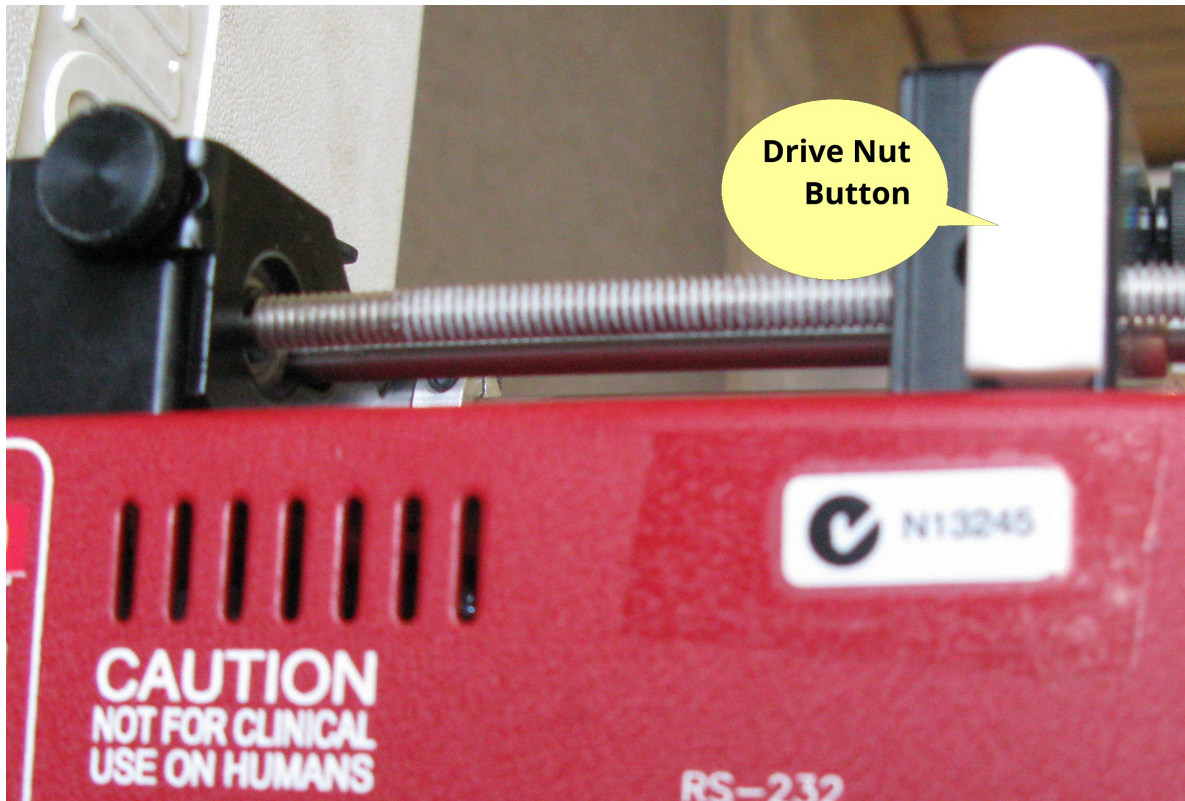
### 3.10.1 Low Pressure

Is your pump suffering from these symptoms?

Low pressure - your pump doesn't deliver anything like the pressure the manufacturer claims

Doesn't stop pumping when the syringe pusher block hits the end stop

There is a thing called the Drive Nut Button on your pump.



The Drive Nut Button - press and hold to dis-engage the pusher block from the motor

When you press this button it lets you move the pusher block freely up and down the worm drive - the long threaded rod shown in this image. This lets you adjust the position of your pusher block to where your loaded syringe plunger handle will be.

When you release the drive nut button, it re-engages the drive nut on the worm drive.

It is very easy to release the Drive Nut Button and not have it properly engage the hidden nut and the worm screw. I call this condition 'riding the worm'.

If your drive nut is 'riding the worm' you will not get full pressure from your pump.

If your pump is allowed to stall often, slowly but surely your drive nut will wear and need replacing.

At the same time your stall detection mechanism will not trigger, and your pump will not automatically stop pumping when the pusher block bottoms out on the collar or the end block. This will effect both the infuse and withdraw directions. It might damage expensive small glass syringes too.

'Riding the worm' has it's own special sound - that of a plastic clicking where as failed stall detection has a rubbery repeated thumping sound as the teeth of the rubber drive belt slip on the motor drive - slowly eating your belt.

Riding the worm effectively means an end to unattended pumping because you can't trust the pump to stop.



## How to fix it.

If you pick up your pump and try to set the drive nut button such that your 'riding the worm' you will convince yourself it's almost impossible to do and if you did do it, it would self correct as soon as the pump started moving.

When it happens to me, I firmly grasp the pusher block and rock it from side to side until I hear a clear and fairly loud 'click'. This is the drive nut engaging properly.

Don't let your pumping program stop by waiting for a stall - set a target volume and stop the pump before a stall occurs.

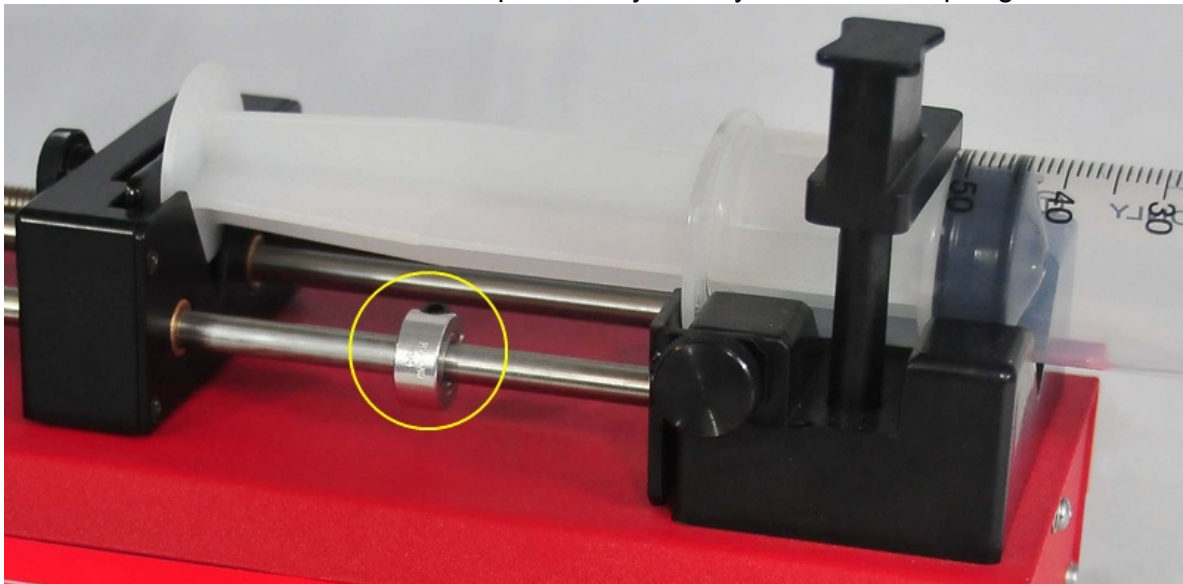
If it's happening all the time, your drive nut needs replacing - contact your pump supplier.

### 3.10.2 Doesn't stop when bottomed out

Syringe pumps are supposed to automatically stop when they had reach the end of the plunger travel. There is stall detection circuitry which can see the high load on the motor and signals the computer in the pump to stop applying the driving force. This is to protect the tooth drive belt and syringe driving mechanism and of course the syringe itself from damage. Especially those tiny glass syringes the micro-fluidic people use!

This end stop can either be the syringe clamp or the Guide Rod Collar Clamp.

These collars are used to set this end point to anywhere you wish on the plunger travel.



Guide Rod Collar Clamp

Some newer pumps (the NE-8000) for example, have two of these collars - one to set the limits of both infusion and withdrawal travel.

If your pump wont stop when the pusher block hits the collar or the syringe clamp then you possibly have a faulty stall detector.

Failed stall detection has a rubbery repeated thumping sound as the teeth of the rubber drive belt slip on the motor drive - slowly eating your belt.

## How to fix it

If your stall detector has failed then your pump needs to be returned for repair.

# Part

# IV

## Syringe Pump Pro

### User Guide



## 4 Syringes and Tubing

Many popular syringes, and the two tubing diameters supported by the NE9000 Peristaltic pump are pre-configured in SyringePumpPro.

There are two methods you can use to set the Syringe parameters for the pump:

- Quick Set
- Connected Pump list

### Syringe Configuration



See the syringe manufacturer's documentation for the range of values.

### 4.1 Using Quick Set

To configure the syringe you are using with a particular pump, Click on the pump you wish to configure in the Pump Worksheet

#### First Select the Pump

The right most pane of the selected pump control panel of SyringePumpPro contains controls for quick set up of a syringe and pump.

The currently selected pump's details will be shown in the dialog box items. Click on or tab to the windows to change the values. Once all desired values are entered click on the "Set" button. To discard changes click the "Revert" button. Commands will be sent to the selected pump that will set these values.

#### Quick Set in Action



You can also set the diameter with a numeric value. Note that this value is inside diameter in mm.



# SyringePumpPro User Guide

Use the drop down selectors to set the Volume Units, the Rate Units and the Pump Direction.

Volume Units    Rate Units

Pump Direction

The syringe diameter can be set from the drop down list – many common syringes are listed with their respective diameters. Choose the one that matches your syringe.

You may modify the contents of this drop down list. See [Syringe Configuration](#)

### Syringe Drop Down List

If the pump involved accepts the new Diameter setting, it will be shown in the pump worksheet DIA column.

	Note Illegal or out of range values syringe diameters will be rejected. See <a href="#">Syringe Configuration</a>
---	---

## 4.1.1 NE900 Tubing Selection

### NE-9000 Tubing Diameter

Prior to SyringePumpPro Version 1.57, the only tubing diameter option on the NE9000 was 3/16 inch. Which was the default. With the Precision update released in August 2012 the new Green head became an available option.

So now the tubing options are:

Head Color	Tubing Diameter inches	Tubing Diameter mm
Blue	3/16 or 0.1875	4.7625
Green	1/16 or 0.0635	1.5875



PERI-HEAD-KIT-YB2  
comes with the NE-9000

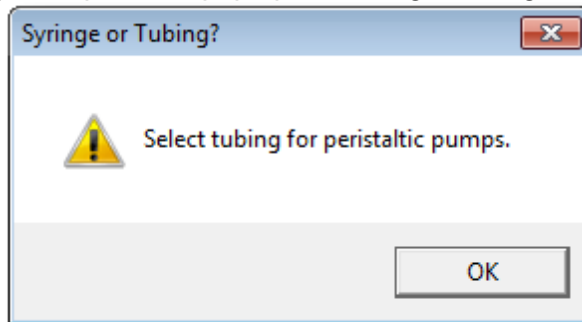
PERI-HEAD-KIT-YG4  
is sold separately

**Blue and Green Heads**

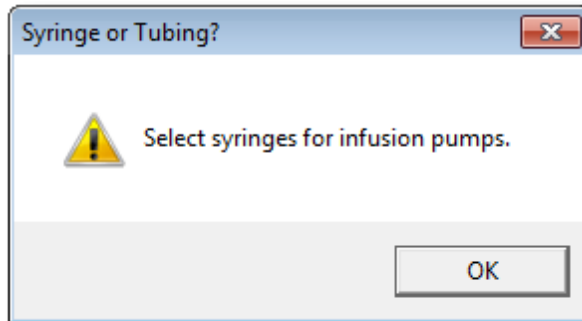
Select the head color from the drop down list

#### 4.1.2 Syringe Or Tubing

If you attempt to set tubing diameters for infusion pumps or syringes for peristaltic pumps, SyringePumpPro will pop up a warning message and ignore your selection.



**Select Tubing Warning**



**Select Syringes Warning**

### 4.2 Using Connected Pumps

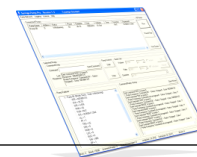
Popular syringes are pre-configured in SyringePumpPro.

To configure the syringe you are using with a particular pump,

- right click on the pump in the pump list

Syringe Selection List





- select 'Set Syringe' from the menu which appears.
- A list of configured syringe will form another menu.
- Click on the syringe you are using.

### 4.3 Changing the Syringe List

The syringe drop down list can have syringes added and removed simply by editing the file containing the list of syringes.

First you will need to open the list of syringes in a text editor. Windows Notepad is ideal for this.

A shortcut has been placed in the start menu

Start menu - edit the syringe list

#### 4.3.1 List Format

Each syringe is represented by a single line in the file syringedata.txt

Manufacturer:<syringe capacity>:Units:<diameter in mm>

Example

Air-Tite:10:cc:15.9

This is the entry for an Air-Tite 10cc syringe with a diameter of 15.9 .

Example

SGE:100:µl:1.457

This entry is for a 100µl syringe which has a diameter of 1.457 millimeters

NOTE Tubing is not configured in this file.

#### 4.3.2 Default Syringe Data

; Syringe and Tubing Diameter Database

; This file is used by SyringePumpPro to program the syringe and tubing  
; drop down selection box.

; Comments  
 ; The ; on the start of a line means ignore this line - it's a comment.

; Removing entries to make the drop down list easier to use.  
 ; If there are syringe entries in this file that you will never use  
 ; delete them by removing the lines you don't want carefully.  
 ; You can comment them out too.

; Entry format Note that the : separates fields

; Manufacturer  
 ; model name (what you will see):size:units:internal diameter(mm)

; The internal diameter should be obtained from manufacturer data sheets.  
 ; Your pump uses this number to calculate flow rates and volumes.  
 ; A small error here will effect the accuracy of fluid delivery.

; Peristaltic tubing

; NE9000  
 NE9000 Head:Blue:cc:4.76  
 NE9000 Head:Green:cc:1.59

; Syringe Database

; Air-Tite  
 Air-Tite:10:cc:15.9  
 Air-Tite:20:cc:20.25  
 Air-Tite:30:cc:22.5  
 Air-Tite:50:cc:29

; Becton-Dickson  
 B-D:1:cc:4.699  
 B-D:3:cc:8.585  
 B-D:5:cc:11.99  
 B-D:10:cc:14.43  
 B-D:20:cc:19.05  
 B-D:30:cc:21.59  
 B-D:60:cc:26.59

; HSW Norm-ject  
 HSW Norm-Ject:1:cc:4.69  
 HSW Norm-Ject:3:cc:9.65  
 HSW Norm-Ject:5:cc:12.45  
 HSW Norm-Ject:10:cc:15.9  
 HSW Norm-Ject:20:cc:20.05  
 HSW Norm-Ject:30:cc:22.9  
 HSW Norm-Ject:50:cc:29.2

; Monoject  
 Monoject:1:cc:5.74  
 Monoject:3:cc:8.941



Monoject:6:cc:12.7  
 Monoject:12:cc:15.72  
 Monoject:20:cc:20.12  
 Monoject:35:cc:23.52  
 Monoject:60:cc:26.64  
 Monoject:140:cc:38.0

; Terumo  
 Terumo:1:cc:4.7  
 Terumo:3:cc:8.95  
 Terumo:5:cc:13  
 Terumo:10:cc:15.8  
 Terumo:20:cc:20.15  
 Terumo:30:cc:23.1  
 Terumo:60:cc:29.7

; SGE (Glass - Gas tight)  
 SGE:0.5:µl:0.1  
 SGE:1:µl:0.15  
 SGE:5:µl:0.343  
 SGE:10:µl:0.485  
 SGE:25:µl:0.728  
 SGE:50:µl:1.03  
 SGE:100:µl:1.457  
 SGE:500:µl:3.26  
 SGE:1:cc:4.606  
 SGE:2.5:cc:7.284  
 SGE:5:cc:10.3  
 SGE:10:cc:14.57  
 SGE:25:cc:23.03  
 SGE:50:cc:27.5  
 SGE:100:cc:24.99

; Poulten & Graf (Glass)  
 PoultenGraf:1:cc:6.7  
 PoultenGraf:2:cc:8.91  
 PoultenGraf:3:cc:9.06  
 PoultenGraf:5:cc:11.75  
 PoultenGraf:10:cc:14.67  
 PoultenGraf:20:cc:19.62  
 PoultenGraf:30:cc:22.69  
 PoultenGraf:50:cc:26.96  
 PoultenGraf::100cc:34.21

; Steel Syringes  
 Steel:1:cc:9.538  
 Steel:3:cc:9.538  
 Steel:5:cc:12.7  
 Steel:8:cc:9.538  
 Steel:20:cc:19.13  
 Steel:50:cc:28.6  
 Steel:100:cc:34.93

Steel:200:cc:44.75

; Hamilton Microliter

Hamilton Microliter:0.5:µl:0.103

Hamilton Microliter:1:µl:0.146

Hamilton Microliter:2:µl:0.206

Hamilton Microliter:3:µl:0.326

Hamilton Microliter:5:µl:1.3

Hamilton Microliter:10:µl:0.48

; Cadence

Cadence:2:cc:8.91

Cadence:3:cc:8.91

Cadence:5:cc:11.71

Cadence:10:cc:14.65

Cadence:20:cc:19.56

Cadence:30:cc:22.7

Cadence:50:cc:28.02

; Codan

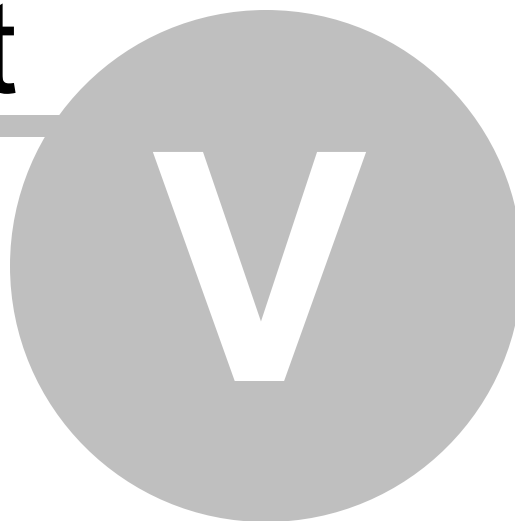
Codan:10:cc:15.3

Codan:5:cc:12.4

; Braun

Braun perfusor:50:cc:28.0

# Part



# Syringe Pump Pro

## User Guide



## 5 Pump Programming

The pumps that SyringePumpPro supports are called programmable pumps. This means that they have a computer in them and that they can receive simple programmed sequences - in a special language called pump programming language or PPL.

You can use SyringePumpPro to create these pump programs and then upload them to your pumps. Once the program is running SyringePumpPro monitors the pumps and reports on their activity.

This can be done from reasonably remote locations in scenarios where human operators can't go.

### 5.1 Introduction to PPL Programs

Pump Programs  
Same program for all pumps or  
different program for each pump

The image shows a workflow for programming pumps. On the left, two windows display PPL code for 'example2 - Not...'. The code includes parameters like DIA (20.15), VOL (ML), TRGFT, AL (0), PF (0), BP (1), PHN (1), FUN (RAT), RAT (750 MH), VOL (2.0), and DIR (INF). A green arrow labeled 'PPL Upload' points from the code to the software interface. The software interface shows a table of 'Connected Pumps' with columns for Pump Name, Address, Status, Phase, Diameter, Rate, Volume, Time, Function, and Expected. Below this is a 'Selected Pump' section with 'Command Entry' and 'Pump Control' fields. A green arrow labeled 'Program loaded into pump' points from the software to two red syringe pumps. Below the pumps, the text reads 'Pump executes the program'.

Pump Programs

### 5.2 PPL Programming Spreadsheets

Currently SyringePumpPro uses the Programmable Pump Language (PPL) Creator spreadsheet supplied by New Era Pump Systems.

This spreadsheet is a Microsoft Office 2010 spreadsheet. These spreadsheets also work in Libre Office the










free Office software suite.

Please see the manufacturer's documentation for the definition of PPL files and the PPL specification.

SyringePumpPro installs four spreadsheets created and supplied by New Era Pump Systems which allows simple generation of pump programs.

**Microfluidic users: In the standard pump creator file, you can select Standard units or Microfluidics units in cell O17.**

These are

Name	Purpose
 NE-1000 Syringe Pump PPL Creator V2.3	Use with standard (including Microfluidic) syringe pumps
 NE-1000X Syringe Pump PPL Creator V2.3	Use with X upgraded pumps(including Microfluidic) - this spreadsheet has support for the extra ppl functionality provided by the X upgrade and 341 phases.
 NE-1000X2 Syringe Pump PPL Creator V2.3	Use with X2 upgraded pumps(including Microfluidic) - this spreadsheet has support for the extra ppl functionality provided by the X2 upgrade and 341 phases.
 NE-1000 Syringe Pump PPL Examples	There is a sheet pre-filled in for each of the example files in your pump's manual.
 NE-9000 Peristaltic Pump PPL Creator V2.2	For use only with the NE-9000 peristaltic pump.

### 5.3 PPL Template

I have included a ppl template file. Copy/paste this into the beginning of each ppl file you save This will document what you are doing and why.

It's located where the user ppl files are meant to be saved.

# This is a template to include when making your your own ppl files

```
; PPL File Name: XXXXXXXX.ppl
; PPL program Purpose: This program .....
; Target pump Model: NE-1000

; Date 5th May 2012
```

```

; Written by:
;   TimB
;   SyringePumpPro http://www.syringepumppro.com
;   timb@syringepumppro.com

; Testing - Document how to test that this program is working
;   or what you did to prove this program is working

; Modification History
;-----

; Date:
; Description of significant changes
;-----

```

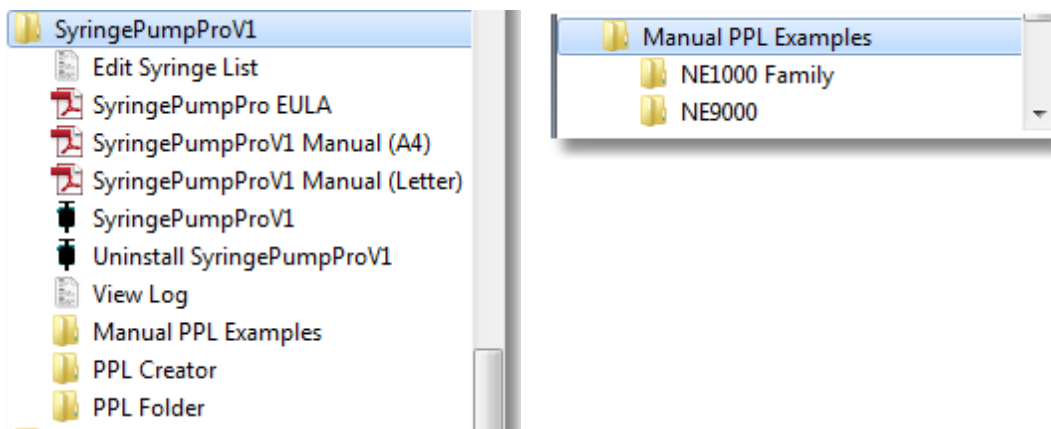
## 5.4 Sample PPL Files

The pump manufacturer has provided sample PPL files that are very helpful when first starting to learn to program your pumps.

These sample files are installed, and have been linked into your start menu. These are the entries PPL Example 1 - 7

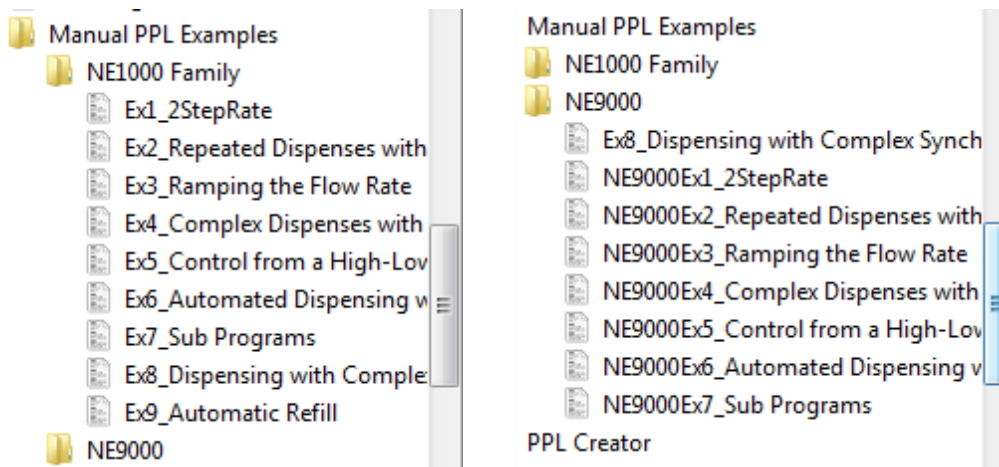
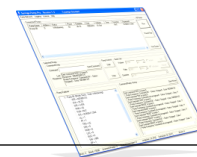
You can upload them to your pumps for testing using SyringePumpPro.

There is also a PPL creator spreadsheet with these example already entered. This is the menu entry NE-1000 Syringe Pump PPL Examples.



start menu folder with ppl files

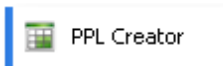




## 5.5 Creating Pump Programs

### Procedure

Once your PPL file is created, it is then uploaded to the pumps using SyringePumpPro. At the moment creating programs of PPL files is done using the spreadsheet that is linked



to the start menu. Its called PPL creator.

To use the spreadsheet you will need either Microsoft Excel or LibreOffice Calc installed.

LibreOffice Calc is part of the free Microsoft compatible office suite of software. It is



available from <http://www.libreoffice.org/>

There are instructions at the top of the spreadsheet. PPL files will upload to the pump from SyringePumpPro. It is the only software to load PPL files into pumps.

### PPL creator spreadsheet

PPL creation requires time spent with the pump manuals to understand the commands the pumps take.

The PPL spreadsheet is good because it creates your PPL file for you, by you clicking and selecting the commands you want. This means no errors when you upload the PPL file. Less frustration and lots of time saved.

## 5.6 Writing and Saving PPL Files

Write the PPL

- Load the PPL Creator spreadsheet using the start menu icon.
- Select the NE1000 sheet.
- Use the drop down selections in the sheet to create your program lines.

PPL creator - start menu entry

NE-1000 programming tab

How To Generate PPL from the spreadsheet:

- Select the PPL Sheet from the sheets
- Select from the above menu: File, Save As...
  - EXCEL: Select "Save as type" "Text (Tab Delimited) (\*.txt)"
  - SCALC: Select "Save as, Text CSV (.csv), Keep Current Format, then in the Export Text files Window, check the Fixed Field width box at the bottom of the dialog.
  - Select folder to save in, then name the file "nnnnn.PPL", where nnnn is your project name.
  - Answer YES/OK to any warnings. Exit spreadsheet without re-saving.

PPL Tab

If you launched the PPL creator spreadsheet from the start menu your newly created PPL File will be in the c:\Program Files\SyringePumpPro\PPL directory which is the default directory that SyringePumpPro loads PPL files from.

## 5.7 The last thing to say in your pump program

What's the last thing EVERY PPL program should have in it?

STP

Your pump programs should always have a stop statement at the end of them

Otherwise your pump might execute old stale ppl. *Don't ask me how I know this.*

### Why?

Imagine if some time in the past you uploaded a 10 line ppl program. Some time later you upload a single line program that isn't a stop command. For example pump a few ml at some rate. When your latest ppl one-liner executes it will go on to step 2 automatically when it finishes step 1, which will be step 2 of what ever was uploaded way back when. Then you might think your pump is going crazy.

Simply always add a stop command at the end of your ppl. If you think about it - you should be saying to the pump

step 1 - do this

step 2 - stop



## 5.8 Uploading PPL Files to Your Pump

First select the pump you wish to receive the PPL file.

Top Pump Is Selected for PPL Upload

If no pump is connected, and/or no pump is selected, SyringePumpPro will give this message, and stop attempting to upload a PPL file.

No Pump Selected Message

Choose the PPL file you wish to upload to the selected pump.

Clicking cancel will abort the action.

Upload PPL File Dialog

## 5.9 Clearing Inf and Wdr displays in your ppl program

To clear the inf or wdr counter you would use the command

cld inf or cld wdr

But these commands are not allowed in running ppl. They are only allowed when the pump is not running.

*Oh - your next question might be*

So why cant you clear the counter? Imagine a scenario of pumping a volume - after all in some sense all pumping is a volume thing. Think about the math for the chip in the pump. Allowing the user to clear the counter means the pump loses track of what was pumped - this makes the maths inside the pump very difficult!

However you can clear the counters when you upload a ppl file. In your ppl file include these lines:

```
; clear the pump's counters, update the SyringePumpPro pump worksheet

0cldinf
0cldwdr
0dis
```

Where the 0 is the target pump's address.

## 5.10 File Format and Grammar

SyringePumpPro recognizes subset of the PPL specification defined by the manufacturer.

Note, that the recognized subset should provide all the functionality you application requires.

- Any command that can be sent to the pump is valid in the file.
- Comment lines must start with a semicolon character.;
- Blank lines are ignored
- The file processor is case-insensitive.
- Phase names must start with an alphabetic character – not a digit.
- If the commands contain no addresses and the SET ADR command has not been issued in the file, the commands will be sent to the highlighted pump. If no pump is selected the network will assume a pump address of 0.

In addition to the manufacturer defined pump commands the following commands may be in the PPL file.

DELAY, DELAYALL JUMP

[See PPL examples](#)  <sup>119</sup>

### 5.10.1 Jump

JMP <phase>  
 <phase> <n> | &<name>  
 JMP is equivalent to the FUNJMP pump command.

### 5.10.2 Phase

PHASE [<name> | <n>]  
 If no number is provided the phase within the PPL file is incremented. Phase number starts at 1.

<name> (if it exists) is then associated with this number.

If phase number is defined by <n> then the subsequent pump commands are set for the phase number n.

PHASE corresponds to a pump command PHN<n> <n> Any phase number (Manufacturer currently supports 1 through 41) <name> A name for a phase – must not start with a digit.



### 5.10.3 Set ADR = <n> | ALL

The PPL file can contain the command “SET ADR” which sends all subsequent commands to the specific pump.

Note that a pump must be covered by the license in order for the commands to be sent to it. ie The fourth pump in a network operating on a computer with a license for 3 pumps will not be able to receive commands.

Alternatively using the command “SET ADR = ALL” will send all commands in the file to all (licensed) pumps. (Note - this is mutually exclusive to the SET ADR = n)

The phase number is reset to 1 when this command is encountered.

### 5.10.4 Call PPL File

The CALL command reads in another PPL file.

This is useful for creating common configuration and loading them to some subset of pumps.

CALL <filename>

<filename> name of PPL file to include

If only a file name is specified, (without full path) SyringePumpPro will look in the same directory as the file that called it.

Make sure that there are no circular references. (e.g. file A calls file B, which calls file A), as this may result in undefined behavior.

Example:

```
Set adr=0
call S1P1.ppl

; Pump 2

Set adr=1
call S1P2.ppl

; Pump 3

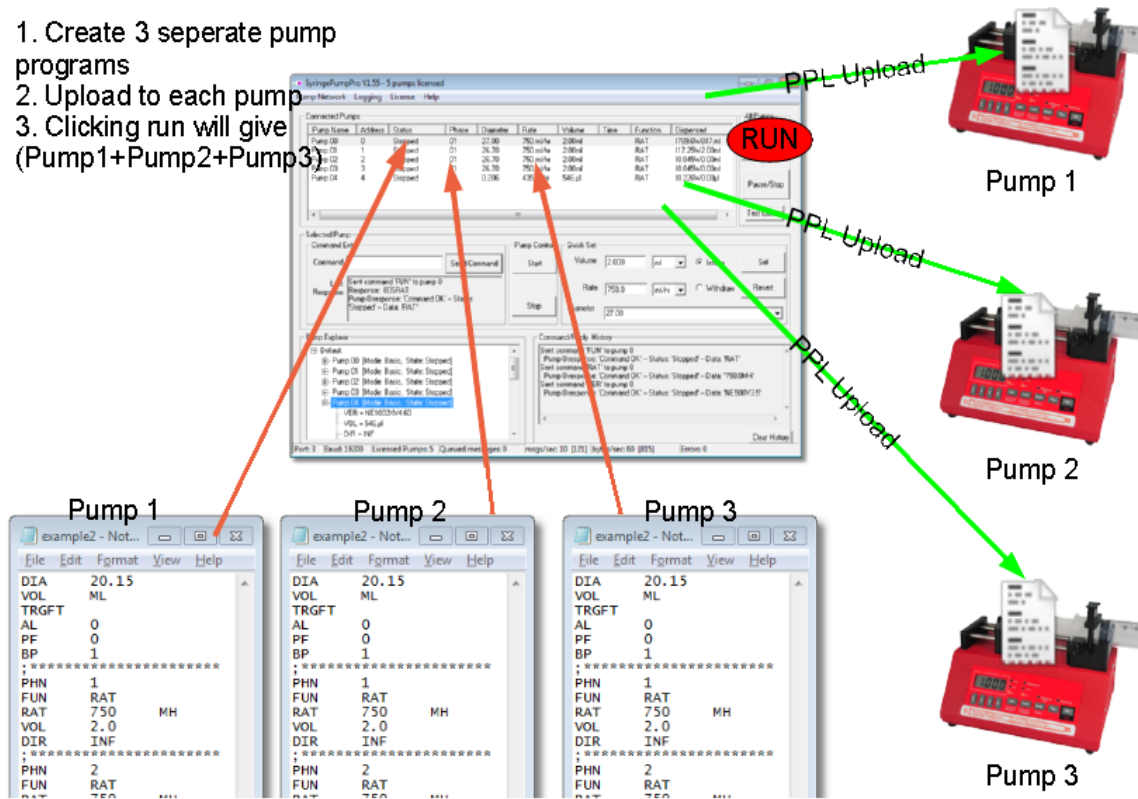
Set adr=2
call S1P3.ppl
```

## 5.11 PPL for more than one pump

Perhaps you have a set of pumps working together - say you are in a manufacturing environment and you wish to have operators change programs for different recipes.

If you had a set of 3 pumps (and lots of you do) expecting an operator to upload the correct pump program file, from the correct recipe to the correct pump, possibly many times a day - mistakes are going to happen.

1. Create 3 separate pump programs
2. Upload to each pump
3. Clicking run will give (Pump1+Pump2+Pump3)



3 PPL files for 3 pumps - now if you have several recipes...

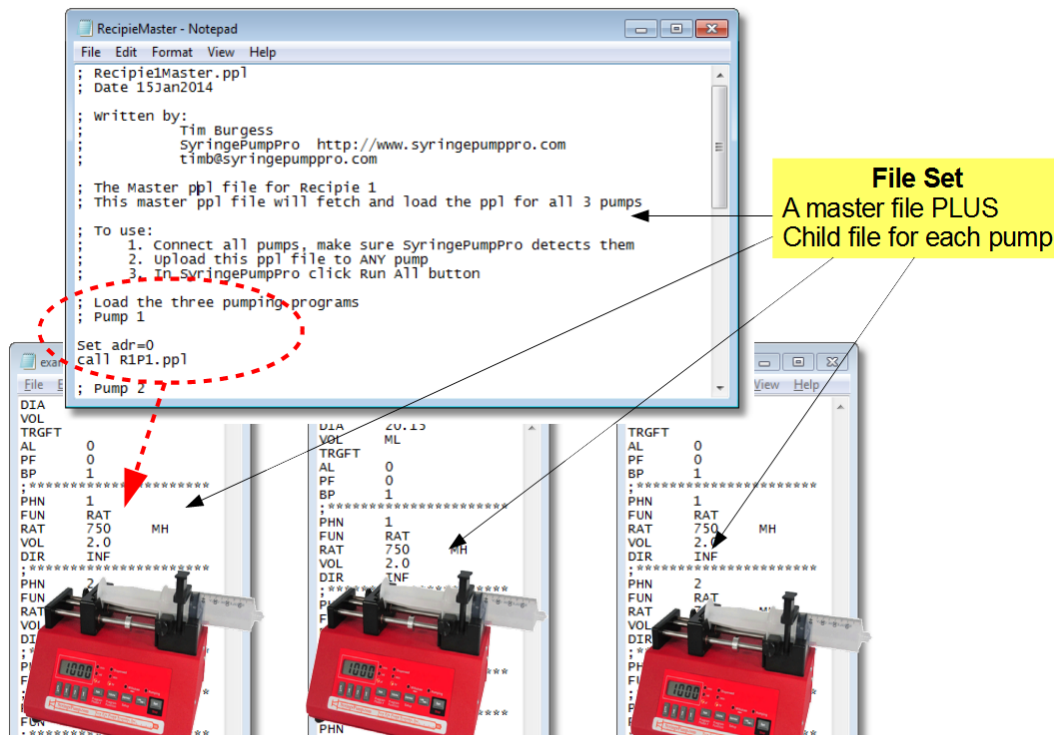
We need some automation here.

Thus was born the File Set concept.



### 5.11.1 PPL File Sets

A file set consists of a file for each pump and a master ppl file.



File Sets - A Master plus a child file for each pump

Continuing with the example, you would have a ppl file for each pump and for each recipe. If you had 6 recipes and 3 pumps, you would have 18 ppl files that need to be uploaded as a set of 3 ppl files.

### Each recipe should have it's own master file.

The master file can be uploaded to **any** connected pump, and it will read in the ppl for each pump and upload it.

The master file:

- Uploads each pumps ppl file to the correct pump.
- Clears inf and wdr counters on the pumps and on SyringePumpPro display
- Then makes all pumps involved beep in chorus signaling that the upload is complete.
- Limited user instructions/information can be displayed in the history window. Simple add comment lines at the end of the master ppl file. These will be placed in the history window.

PPL errors are reported, a missing pump is reported.

This makes it fairly easy for operators to be trained to upload the master.ppl for a recipe to

any pump and wait for the pump choir as I call it. Then they can press Run All and they are pumping!

Some recipes may have one or more pumps doing the same thing - that's fine - you can re-use child ppl files in multiple recipes.

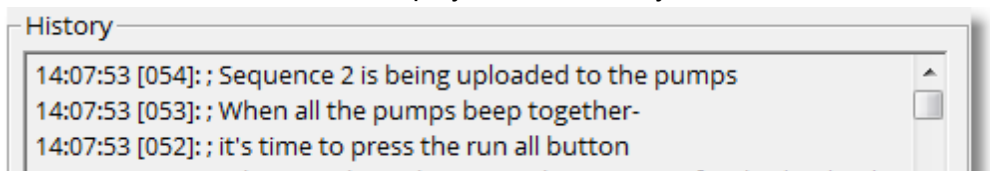
#### 5.11.1.1 Adding Operator Prompts

.To leave some short instructions or operator feedback

Add some comment lines to the end of the master ppl file - like this:

```
; it's time to press the run all button
; When all the pumps beep together-
; Sequence 2 has been uploaded to the pumps
```

These comment lines will be displayed in the history window.



Operator Instructions provided by the Master file

#### 5.11.1.2 Master PPL Example Listing

The following ppl program is an example of a master file, that uploads the three child files R1P1 (recipe 1 pump 1), R1P2, and R1P3 in to the pumps at address 0, 1, 2.

This example master ppl file can be uploaded to any one of the connected pumps and it will load each ppl file into it's target pump, and zeros the infusion and withdrawn counters, ready to run the recipe.

As each pump completes it's upload - it beeps (done at the end of the child ppl file for each pump) and when all ppl is uploaded, all pumps beep - done at the bottom of the master ppl file. Then it's time to click Run All to start the pumps.

```
; Recipie1Master.ppl
; Date 15Jan2014

; Written by:
;         Tim Burgess
;         SyringePumpPro  http://www.syringepumppro.com
;         timb@syringepumppro.com

; The Master ppl file for Recipie 1
; This master ppl file will fetch and load the ppl for all 3 pumps

; To use:
;   1. Connect all pumps, make sure SyringePumpPro detects them
;   2. Upload this ppl file to ANY pump
;   3. In SyringePumpPro click Run All button

; Load the three pumping programs
; Pump 1
```





```

Set adr=0
call R1P1.ppl

; Pump 2

Set adr=1
call R1P2.ppl

; Pump 3

Set adr=2
call R1P3.ppl

; clear the pump's counters, update the SyringePumpPro pump worksheet

0cldinf
0cldwdr
0dis

1cldinf
1cldwdr
1dis

2cldinf
2cldwdr
2dis

; When you hear the pump choir - we are finished ppl upload

0buz13
1buz13
2buz13
; it's time to press the run all button
; When all the pumps beep together-
; Sequence 1 is being uploaded to the pumps.

```

## 5.12 BP doesn't work!

The BP command turns on keypad press beeping for pumps with buttons and displays. For all pumps BP turns on continuous beeping when your pumping program is complete.

When your pump is connected to SyringePumpPro this continuous beeping doesn't occur, Why?

The continuous beeping is stopped by the next command a pump receives. Because SyringePumpPro is constantly talking to your pump, a beeping pump will see the next command almost as soon as it completes it's ppl program - which means no beeping at the end of PPL programs.

# Part



# Syringe Pump Pro

## User Guide





## 6 End User License Agreement

### 6.1 EULA

## SyringePumpPro End User License Agreement

Version 1.1, November 2013

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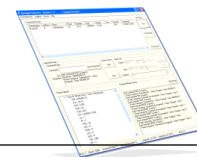
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## Exhibit A - Open Source Components

No Open Source Components Used



# Get Your Results Fast!

- ✓ Minimise your setup and learning time
- ✓ Awesome support!
- ✓ Synchronized start, pause and stop
- ✓ Send commands to one / many pumps
- ✓ Real time pump monitoring
- ✓ Explore pump parameters
- ✓ Data logging - use data in Excel
- ✓ Control multi-pump protocols
- ✓ Eliminate hours of manual operation
- ✓ OEM Pump? No Keypad?

www.syringepumppro.com  
timb@syringepumppro.com

# SyringePumpPro

SyringePumpPro User's Guide  
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