

New Era Pump Systems Inc.

www.SyringePump.com

(631) 249-1392

PUMPTERM.EXE

RS-232 Serial Communications Pump Network Terminal Emulator

NE-1000 Series of Programmable Syringe Pumps

NE-9000 Series of Programmable Peristaltic Pumps

This software is intended as a basic demonstration of the RS-232 serial command communications of the programmable pumps and devices from New Era Pump Systems Inc. Commands can be manually entered in 'Basic' or 'Safe' communications mode. In addition, command files, which may include pumping programs, can be uploaded to the device network for easy development and editing of pumping programs. PUMPTERM is also linked to the Pumping Program Generator Excel Spreadsheet.

A USB to RS-232 converter cable, CBL-USB232, can be used for communications through a USB port. Use primary RS-232 network cable, CBL-PC-PUMP, to connect to the pump. Third party RS-232 cables will not work.

For demonstration purposes only. This software is provided as-is and no guarantees are made to its reliability. Use of this software is at your own risk.

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Setup

Extract all files in "**PUMPTERM.ZIP**". To extract files, right-click on ZIP file, then select "Extract All".

Follow the instructions in the "**Install PUMPTERM Instructions**" PDF file. For best operation: Execute installation file: "**Install PUMPTERM.bat**". All files will be copied to the folder: C:\PUMPTERM, and the batch file, "**PUMPTERM_shortcut.bat**", will be placed on the desktop to run PUMPTERM.

PUMPTERM cannot run directly on 64-bit architecture computers. To support 64-bit architecture computers, DOSBox software will also be installed.

Run PUMPTERM only from the batch file placed on the desktop, "**PUMPTERM_shortcut.bat**", from folder C:\PUMPTERM, or from the Pumping Program Generator Excel spreadsheet. Within the batch file or Excel spreadsheet, communication parameters and a command file can be specified.

Older PC's Below 64 Bit Architecture

PUMPTERM can be executed from a DOS command line by selecting folder C:\PUMPTERM, then entering the program name: PUMPTERM

The default communications settings are COM port 1 and 19,200 baud rate.

A short-cut icon placed on the desktop to PUMPTERM.EXE can be used to auto-upload program files and modify default settings.

To specify a command file and other startup parameters with the short-cut desktop icon: Right-click the icon. Select Properties, then the Program tab. The program path is in field "Cmd Line:". At the end of the path name, enter any parameters.

Example: To communicate with Com port 3 and automatically load command file PPL.PPL:

Cmd Line: C:\PUMPTERM\PUMPTERM.EXE /com=3 PPL.PPL

See "Command Line" below for parameters that can be added to the short-cut icon, entered on the DOS command line, or specified in a batch file.

Different short-cut icons can be created for quick access to different Pumping Programs.

DOS Command Line

PUMPTERM [<param>] [filename]

filename =>	(File name and extension)	Command file name, 8 character limit
<param> =>	/ <option> [<param>]	Command line parameters
		No spaces within individual parameters
		Spaces between parameters
<option> =>	ADR = {number * }	Set Default Device Network Address
	COM = {number}	Set RS-232 communications port
	BAUD = { <baud-rate> AUTO }	Set RS-232 baud rate.
		AUTO: Test all baud rates until communications established
	LOG = {filename}	Specify log file name and enable
	UPDC = {command}	Specify Auto-Update command and enable
	UPDT = {integer}	Specify Auto-Update time and enable (seconds)

When PUMPTERM starts, a disclaimer screen is displayed. PUMPTERM will then attempt to establish communication with the device network. If command file was not specified on the DOS command line, press any key to continue to the next screen.

If no command file is specified, PUMPTERM will begin in full screen mode. Pressing <alt>-<enter> will toggle between full screen and a smaller window.

filename "filename" is the name of a text file, located in the PUMPTERM program folder, that contains commands to be executed by PUMPTERM and/or transmitted directly to the device network. When a command file is specified, PUMPTERM's startup disclaimer screen is bypassed and, after communications is established, PUMPTERM will immediately begin executing the commands in the file.

ADR = {number | * } Specifies the default communications network address. If the address is not specified with a command, then the command address will be set to the specified default address. "*" bypasses the network address. The device will accept the command regardless of its address or communications mode. If not specified, the default address is 0.

COM = {number} Specifies the com port number. The "Virtual" com port number will be set to the specified com port number. Standard com port numbers are 1 to 4. If the "Virtual" com port number is a standard port number, within 1 to 4, the "Real" com port will be set to the "Virtual" com port number, otherwise, if it is greater than 4, the "Real" com port number will be set to 1. COM port 1 is the default COM port if not specified.

<baud-rate> => { 19200 | 9600 | 2400 | 1200 | 300 | AUTO }

<baud-rate> lists the standard baud rates supported, but any baud rate can be entered. "AUTO" will automatically cycle once through the standard baud rates until communications is established. 19,200 is the default baud rate if not specified.

UPDC = {command}

UPDT = {integer}

Setting Auto-Update command (UPDC) or time interval (UPDT) also enables Auto-Update Mode. In Auto-Update Mode, the default Auto-Update command is

UPDC = DIS. The default time interval is **UPDT = 10** seconds.

LOG = {filename}

Specifies a log file, located in the PUMPTerm program folder, and enables Log File Mode. All commands and responses are written to the log file, along with a time stamp.

PUMPTERM Main Screen

Function Keys

<F1> Device Cmd Adr:
Default Device Command Network Address
Valid values: "00-99", or "*". Default = 0.

<F2> Safe Communications Mode: On or Off. Default = Off

<F3> Safe Communications Mode Timeout in seconds
Valid values: 1 to 255. Default = 60.

<F4> Auto-Update Mode: On or Off. Default = Off.

<F5> Auto-Update Mode Interval Time (In seconds)
Valid values: 00 to 99. Default = 10.

<F6> Auto-Update Mode Command
Enter command to be sent every set interval time. Default = DIS.

<F7> Start Command File: Uploads command file to Pump Network

<F8> Command File Name: 8 character limit, plus extension. Must be located in the folder: C:\PUMPTERM Default file name = NE1000.PPL

<F9> Log File: Open or Closed. Default = Closed

<F10> Log File Name: 8 character limit, plus extension
Default = NE1000.log

<home> Beep: Sends a beep command (*BUZ12) to all devices. This function is useful for identifying communication problems. The command will bypass network addresses and communication mode. Upon receiving this command, all devices in the network with buzzers will sound a double beep.

<pg-up> Run: Sends a Run (RUN) command to the device at the default network address.

<pg-dn> Stop: Sends a Stop (STP) command to the device at the default network address.

<esc> Exits PUMPTERM

<alt>-<enter> Toggles full screen mode.

Command Line Sends commands directly to the device network.
Can be upper or lower case. Spaces are optional.
Press <Enter> after entering any command.
Pressing <Enter> on a blank line will send a status query to the device.

PUMPTERM's main screen displays a status line with the COM port and Baud rate that PUMPTERM is using. Com port (Real) is the actual port being used. Com port (Virtual) is the virtual port created by the USB converter. Standard Com port numbers are 1 to 4. The "Real" port will match the "Virtual" port unless the "Virtual" port is greater than 4. Then, the "Real" port number will be set to 1. Verify the virtual port by viewing Settings/Devices in Windows.

The status line will also display the responding device's communication's address or mode setting.

The device model and firmware version are displayed.

Basic settings are displayed according to the type of device. The device status and settings are updated whenever the device status is queried by pressing the <enter> key with the command line blank.

Pumps will display the diameter, pumping rate and target volume. Pumping rate and target volume are for the currently selected program phase.

Heaters will display the target temperature, current temperature and the temperature units. The Ana-Box will display the current operational mode, current voltage reading, and the address of the device under control.

Command Line

Type device control commands on the Command Line. Can be upper or lower case. Spaces are optional. After <enter> is pressed, the command is transmitted to the device network. If the device address was not specified with the command, then the default device command network address will be used. Press <F1> to change the default device command network address.

The last 6 commands and device responses are displayed in the command history list. Response 1 being the most recent.

Special Commands

The following commands entered at the command line are not directly transmitted to the device network. They are interpreted by PUMPTERM as indicated

STOP

Stop pump command: Entering STOP at the command line will transmit the pump stop command STP.

SETUP

Setup command will query and display up to 6 device setup settings.

PHASE [<phase>]

Phase command queries and displays the current Pumping Program Phase. Optionally, if <phase> is specified, the current Program Phase is set to <phase> before query.

If the immediate next command entered is PHASE, or just the <enter> key is pressed, the Program Phase is incremented, then that Phase is displayed. The entire pumping program can be displayed by continuously pressing the <enter> key. The pump must be stopped to change the Program Phase.

BACKUP [<file name>]

Creates a backup file of the device's Pumping Program and settings.

<file name> is the name of the created backup file. If <file name> is not specified, then the backup will be saved to the default file name: "PBACKUP.PPL". The created backup file is saved in the folder C:\PUMPTERM. The backup file will be formatted to be used as a command file to be uploaded to a pump, duplicating a pump's program on a different pump.

Command file

<F7> Uploads command file specified with <F8>. Command file processing will be aborted if an invalid command error message is returned by the device.

Log File

When Open <F9>, PUMPTERM will write a time-stamped record of all communications into the log file specified with <F10>.

Auto-Update Mode

When enabled, will periodically transmit the command specified with <F6> to the pump every number of seconds specified with <F5>. If the log file is open, the command's time-stamped response will be saved in the log file.

Command Files

- File must be a text file
 - Spaces and double quote marks in commands are optional and will be removed
 - Commands can be upper or lower case
 - Precede comments with a semi-colon ';'. Comments are not sent to device.
 - Commas ',' are converted to periods '.' for support of European number systems
 - Blank lines are ignored
- Command file commands:
- ```
{&name} in parameter is substituted for named phase. For Example:
 PHASE mainloop ;Program Phase start
 FUN RAT

 PHASE bottom
 FUN JMP &mainloop ;Jump back to Phase "mainloop"
```
- Invalid commands will abort command file processing. Command file processing will continue if other error responses are received, such as ?NA.

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### **Command File Commands:**

(direct command)            Command transmitted directly to device

#### ---- Communications Setup and Control Commands

SETUP [<param>]            Sets terminal program communication parameters  
<param> => <option> [<param>]    Command line parameters

<option> =>            No spaces within <option>  
    ADR = { ALL | \* | n[n] [ - n[n]] }    Single or range of network address  
            ALL = Command file resent sequentially to all possible  
            network addresses  
            \* = Bypass network address.  
            If a range of addresses is specified, command file will  
            be resent, sequentially, to each specified network  
            address  
    COM = { n }        Com port setting: If 'n' is greater than 4:  
                    Virtual com port set to 'n'. Real com port set to 1.  
    BAUD = { <baud-rate> | AUTO }    Baud rate or AUTO detect baud rate  
    UPDC = {command}        Auto-Update command  
    UPDT = {integer}        Auto-Update time period in seconds

SAFE [nnn]            Set Safe Mode ON or OFF (0 = OFF), where 'nnn' is the  
                    time-out in seconds. If not specified, Safe Mode set to  
                    ON with currently set default time-out. Specified time-  
                    out does not change default time-out. Valid range is 0  
                    to 255.

#### --- Pumping Program Generation Commands ---

PHASE [ name | n ]    Sets pumping program's phase number to 'n'.  
                    If number is not specified, the phase number is  
                    automatically incremented. 'name' is assigned  
                    to the current phase number, and can be referenced  
                    in later commands as '&name'.

REPEAT [##] [d:h:m:s.s-m.m]

Generates Pumping Program code to pause the pump for the set time then repeat the pumping program. All parameters are 1 or 2 digits and all are optional:  
[##] [[[[d:]h:]m:]s[.s][-m.m]]

## (blank) Loop continuously after pause (JP:01)

0 or 1 Do not loop, after pause, continue with the next Phase

nn After pause, repeat program <nn> times, then continue with the next Phase (LP:nn)

d: Days, h: Hours, m: Minutes Specified pause time

ss.s Seconds, tenth seconds: 0 to 99.9 seconds

-m.m Offset time: m.m minutes

For automatic calculations of exact repeat time intervals. Example: To repeat a 1.5 minute dispense every 30 minutes:

REPEAT 30:00-1.5

Within the Excel Programming Generator:

Given a Volume in mL, defined in cell H11, and a Rate in mL/min, defined in cell F11. The REPEAT function parameter would be:  
="30:00-"&(\$H\$11/\$F\$11)

Subsequent program Phase numbers, specified with the PHN command, will be automatically overridden with the next sequential Phase number starting with the Phase number after the code generated by the REPEAT command. It is possible that the auto-generation of Pumping Program code can exceed that pump's memory.

----- Command File Control Commands -----

PAUSE [ <time> | USER | SYNC | CONNECT ]

Pauses command file processing until condition.

<time> Pause command file processing for <time> seconds.

USER Pauses command file processing until the user presses any key. A message is displayed on the main screen in the UPDATE section:  
\*\*\* Press Any Key to Continue File Read \*\*\*

SYNC Pauses command file processing until a synchronization command is received from the pump.

Attached pump must be set to communications mode: Alternating (ALTR)

When the Pumping Program stops, it will transmit a RUN command. When PUMPTERM receives this RUN command, command file processing will continue.

CONNECT

Pauses command file processing until communications is established. PUMPTERM will continuously poll the communications until a

response is received. After a response is received, command file processing will continue.

If preceded by a CHAIN REPEAT command, PUMPTERM first waits until the current device stops communicating. Then, polling begins for a new device connection response.

A message is displayed on the main screen in the UPDATE section. The message is cleared when the next device is detected and command file processing continues.

\*\*\* Waiting for next pump connection \*\*\*

The combination of PAUSE CONNECT at the beginning of the file, and CHAIN REPEAT at the end allows for the quick programming of multiple devices by moving the communications cable from device to device.

USER is the default parameter if none specified.

|                        |                         |                                                                                                                                                                                        |
|------------------------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CHAIN                  | { <filename>   REPEAT } | Continues execution with "filename" Pumping Program. Execution of current file terminates.                                                                                             |
|                        |                         | REPEAT Repeats the command execution of the current file from the beginning. See PAUSE CONNECT for additional usage.                                                                   |
| CALL                   | <filename>              | Calls sub-file "filename" Pumping Program. After execution of "filename", control returns to the current file. Command execution resumes with the next command after the CALL command. |
| LOG { ON   OFF   NEW } |                         | Controls log file:<br>ON: Appends to existing file<br>OFF: Closes log file<br>NEW: Creates new log file                                                                                |
| TIMESTAMP              |                         | Writes the current time to the open log file.                                                                                                                                          |
| EXIT                   |                         | Exits command file and closes PUMPTERM                                                                                                                                                 |